TOSHIBA

6F2S0784

# INSTRUCTION MANUAL

# BUSBAR PROTECTION RELAY

# GRB100 - ∗∗∗∗B

## (1 Channel/1 BU)

TOSHIBA CORPORATION

© TOSHIBA Corporation 2003
All Rights Reserved.

**( Ver. 3.3)**

www . ElectricalPartManuals . com

# Safety Precautions

Before using this product, be sure to read this chapter carefully.

This chapter describes safety precautions recommended when using the GRB100. Before installing and using the equipment, this chapter must be thoroughly read and understood.

**Explanation of symbols used**

Signal words such as DANGER, WARNING, and two kinds of CAUTION, will be followed by important safety information that must be carefully reviewed.

| | |
|---|---|
| **⚠ DANGER** | Indicates an imminently hazardous situation which will result in death or serious injury if you do not follow instructions. |
| **⚠WARNING** | Indicates a potentially hazardous situation which could result in death or serious injury if you do not follow instructions. |
| **⚠CAUTION** | Indicates a potentially hazardous situation which if not avoided, may result in minor injury or moderate injury. |
| **CAUTION** | Indicates a potentially hazardous situation which if not avoided, may result in property damage. |

www . ElectricalPartManuals . com

**⚠ DANGER**

- **Current transformer circuit**

Never allow the current transformer (CT) secondary circuit connected to this equipment to be opened while the primary system is live. Opening the CT circuit will produce a dangerously high voltage.

**⚠WARNING**

- **Exposed terminals**

Do not touch the terminals of this equipment while the power is on, as the high voltage generated is dangerous.

- **Residual voltage**

Hazardous voltage can be present in the DC circuit just after switching off the DC power supply. It takes approximately 30 seconds for the voltage to discharge.

- **Fibre optic**

Do not look directly at the optical beam when connecting this equipment via an optical fibre, as this could injure the eyes.

**⚠CAUTION**

- **Earth**

The earthing terminal of the equipment must be securely earthed.

**CAUTION**

- **Operating environment**

The equipment must only used within the range of ambient temperature, humidity and dust as detailed in the specification and in an environment free of abnormal vibration.

- **Ratings**

Before applying AC voltage and current or the DC power supply to the equipment, check that they conform to the equipment ratings.

- **Printed circuit board**

Do not attach and remove printed circuit boards when the DC power to the equipment is on, as this may cause the equipment to malfunction.

- **External circuit**

When connecting the output contacts of the equipment to an external circuit, carefully check the supply voltage used in order to prevent the connected circuit from overheating.

- **Connection cable**

Carefully handle the connection cable without applying excessive force.

- **Modification**

Do not modify this equipment, as this may cause the equipment to malfunction.

www . ElectricalPartManuals . com

- **Short-link**

Do not remove a short-link which is mounted at the terminal block on the rear of the relay before shipment, as this may cause the performance of this equipment such as withstand voltage, etc., to reduce.

- **Disposal**

When disposing of this equipment, do so in a safe manner according to local regulations.

www . ElectricalPartManuals . com

# Contents



www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

■ The data given in this manual are subject to change without notice. (Ver.3.3)

www . ElectricalPartManuals . com

# 1. Introduction

The GRB100 is a numerical low-impedance busbar differential relay whose main principle is percentage differential characteristics. It is widely applicable to various busbar configurations such as single, double and one-and-a-half busbar and also solidly earthed networks.

The GRB100 is a member of the G-series family of numerical relays which utilizes common hardware modules with the following common features:

- Human interfaces on the relay front panel, and local and remote PCs
  - 4 × 40 character LCD and keypad
  - RS232C and RS485 communication port
- Metering and recording of events, faults and disturbance
- IRIG-B time synchronization
- Automatic supervision
- User configurable binary outputs

The GRB100 provides Central Unit (CU) and Bay Unit (BU) so as to use for de-centralized configuration busbar protection systems.

The GRB100 is composed of one Central Unit (CU) and numbers of Bay Unit (BU) depending on the required number of channels for the busbar configuration. The CU and BU have the following model series:

Relay Type and Model

| CU Model: |
|---|
| - GRB100<br>• Model C310B; Applicable to max. 8 channels, 4 zones<br>• Model C320B; Applicable to max. 16 channels, 4 zones<br>• Model C330B; Applicable to max. 24 channels, 4 zones<br>• Model C340B; Applicable to max. 32 channels, 4 zones<br>• Model C410B; Applicable to max. 8 channels, 4 zones / With fault detector<br>• Model C420B; Applicable to max. 16 channels, 4 zones / With fault detector<br>• Model C430B; Applicable to max. 24 channels, 4 zones / With fault detector<br>• Model C440B; Applicable to max. 32 channels, 4 zones / With fault detector |
| **BU Model:** |
| - GRB100<br>• Model B300B; 1 channel provided. (2 high-speed contacts)<br>• Model B310B; 1 channel provided. (6 high-speed contacts)<br>• Model B410L; 1 channel provided. (6 high-speed contacts) / With LED indication |

www . ElectricalPartManuals . com

# 2. Application Notes

## 2.1 Application

The GRB100 provides high-speed, selective and reliable busbar protection for MV, HV and EHV busbars and is used for the following busbar systems to handle various busbar replicas as shown in Appendix A:

- Single busbars with/without transfer busbar
- Double busbars with/without transfer busbar
- Ring busbars with/without transfer busbar
- One-and-a-half breaker busbars

The protection detects phase and earth faults on the busbar by employing a phase segregated current differential scheme. The current differential scheme employed can distinguish correctly between internal and external faults in the event of CT saturation.

The GRB100 can input a maximum of 32 three-phase currents from feeders, bus-sections and bus-couplers.

The GRB100 also provides circuit breaker failure protection and end zone fault protection.

Circuit breaker failure protection can be applied to all the breakers of feeders, bus-sections and bus-couplers.

The GRB100 provides the following metering and recording functions.

- Metering
- Fault record
- Event record
- Disturbance record

The GRB100 provides the following human interfaces for relay setting or viewing of stored data.

- Relay front panel: LCD, LED display and operation keys
- Local PC
- Remote PC

The relay can be integrated with a local PC or a remote PC through a communication port. A local PC can be connected via the RS232C port on the front panel of the relay. A remote PC can also be connected through the RS485 port on the rear panel of the relay.

www . ElectricalPartManuals . com

## 2.2 System Configuration

The GRB100 incorporates a single central unit (CU) and bay-based local units (BUs). The CU performs current differential protection and breaker failure protection with the currents acquired by the BUs. The CU also performs metering and recording functions and controls local and remote human interfaces. The CU can link with up to 32 BUs.

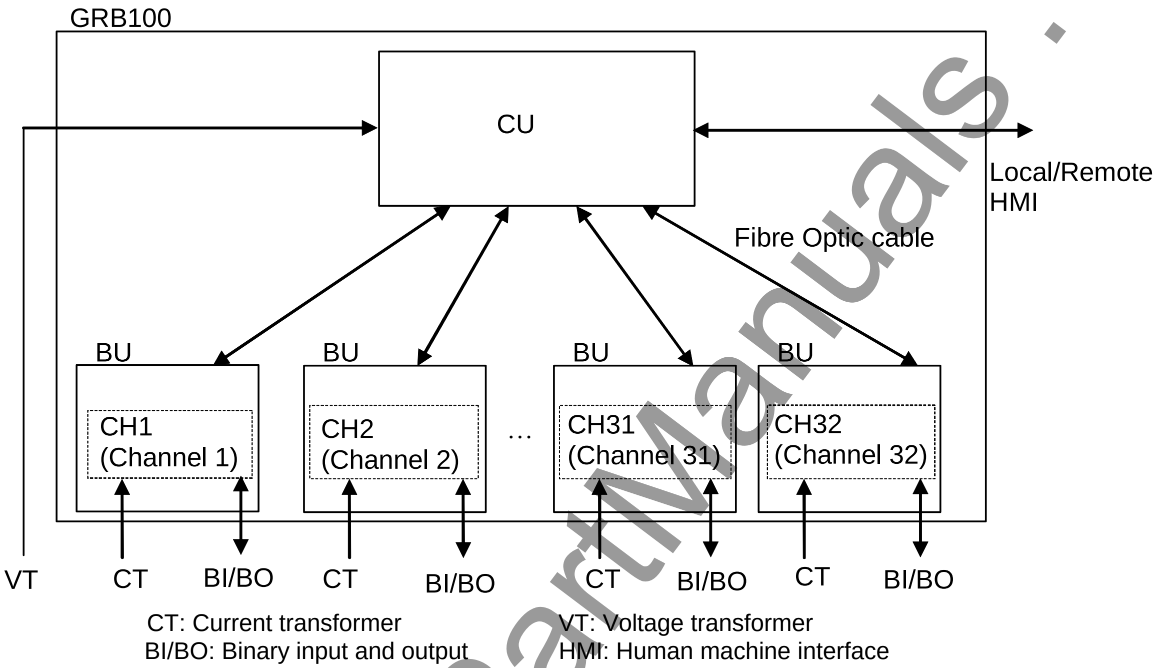



**Figure 2.2.1 System Configuration**

GRB100 Model C400 series has independent undervoltage elements for fault detectors. The busbar voltage of each zone is supplied directly to the central unit.

The BUs interface with the primary power system. They input the currents of feeders, bus-sections and bus-couplers and binary signals such as disconnector open/close status signals, and they output the trip signal of busbar protection and breaker failure protection to the breaker of each bay. The local current is sampled at every 7.5 electrical degrees and converted into a 16-bit digital signal. The sampling timing is synchronized at all BUs based on the sampling signal sent from the CU.

The high-frequency component and DC component in the input current are removed with an analogue filter in the BU and a digital filter in the CU respectively.

One BU has one data channel and each channel can acquire three-phase currents and binary signals from each bay.

The CU identifies the BUs by the address which is set in each BU and transmitted to the CU along with other data.

### Data Link between CU and BUs

The CU and BUs are linked via fibre optic cables with 2.5Mbps data transmission speed.

The per-channel data transmitted from BU to CU are as follows:

Three-phase currents (Ia, Ib, Ic)

Binary input signals (Disconnector N/O and N/C contacts, Breaker contact, Breaker

www . ElectricalPartManuals . com

failure protection initiation signal)

BU address

The per-channel data transmitted from CU to BU are as follows:

Synchronizing signal

Trip command of busbar protection

Trip command of breaker failure protection

Programmable signals, e.g. transfer trip command of breaker failure protection

**BU out-of-service function**

The GRB100 provides the BU out-of-service function for maintenance such as replacement of a BU if failed. This function is available by LCD setting or PLC setting.

- For the LCD setting, see Section 4.2.7.5.
- For the PLC setting, the BU is out-of-service condition when the PLC output command BU∗-OUT (No.2272 – No.2303) is established.

**Caution:** After restoration, remember to reset above to the original setting.

When a BU is out-of-service condition, the relay response is as follows:

- CBF initiation from the BU is blocked.
- Failure related to the BU is not detected.
- The power system quantities related to the BU are displayed as "0" at fault recording and at metering.
- The BU-OUT signal (No. 1433) is "ON" while any BU is out-of-service.
- The assigned BO can be forcibly operated though the BU is out-of-service.

www . ElectricalPartManuals . com

## 2.3 Current Differential Protection

### 2.3.1 Operation of Current Differential Protection

Current differential protection calculates the differential current Id and restraining current Ir employing the incoming and outgoing currents of the protected zone. The calculation is performed on a per-phase basis.

Id is a vector sum of incoming and outgoing currents and Ir is obtained by summing the absolute value of incoming and outgoing currents.

$$Id = I1 + I2 + \cdots + In$$

$$Ir = |I1| + |I2| + \cdots + |In|$$

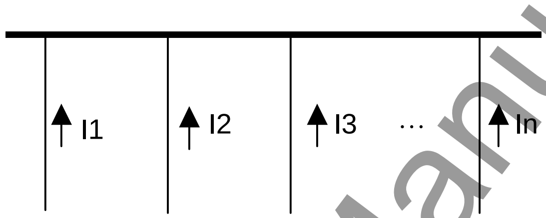



**Figure 2.3.1 Current Differential Protection**

Id takes zero in case of the no-fault or through-fault condition and represents the fault current in case of internal faults. This applies strictly to the primary circuit; it does not apply to the secondary circuit mainly due to CT measurement error.

In case of internal faults, Id is equal to Ir if all the currents are in-phase, and is smaller than Ir if the phases are different.

The GRB100 adopts a percentage restraining differential protection which has a non-restraint characteristic for the small current region and a restraint characteristic in the large current region to cope with erroneous differential current caused by a through-fault current.

The characteristics are shown in Figure 2.3.2. The minimum operating current is set by DIF and the restraining factor k can be set 0.30 to 0.90.

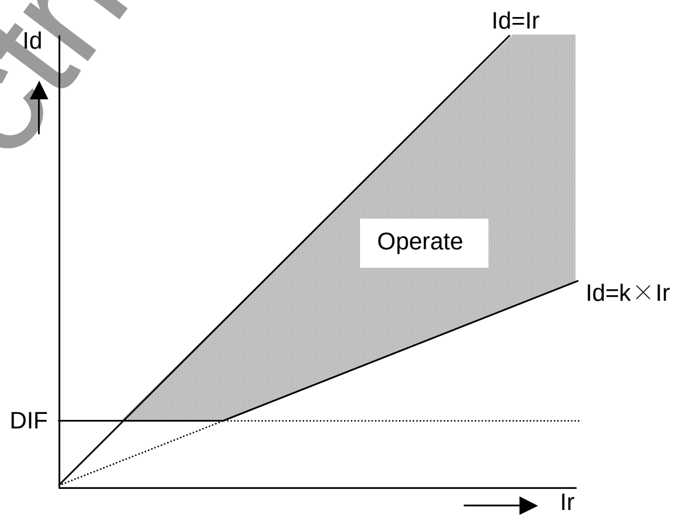



**Figure 2.3.2 Percentage Restraining Characteristic**

www . ElectricalPartManuals . com

### 2.3.2 Discriminating Zone and Check Zone Protection

The GRB100 applies the current differential protection to each individual busbar zone which is sectioned by the bus-section and bus-coupler switches (described hereafter as **discriminating zone protection**) as well as to the overall busbar system (described hereafter as **check zone protection**).

Figure 2.3.3 shows the protection application in case of a double-busbar system. The discriminating zone protections for Zone A and Zone B are overlapped across the bus-coupler breaker.

#### Discriminating zone protection

The discriminating zone protection inputs currents and disconnector position signals from feeders, transformer banks, bus-sections and bus-couplers which are connected to the protected zone and outputs trip signals to all the circuit breakers of the zone.

The zone covered by the discriminating zone protection depends on the busbar configuration and varies with the open/close status of the disconnectors. The GRB100 introduces a replica setting which identifies which circuit is connected to which zone and follows changes in busbar operation. Up to four zone protections are enabled by employing relevant input currents and disconnector signals and outputting trip signals to the relevant channels.

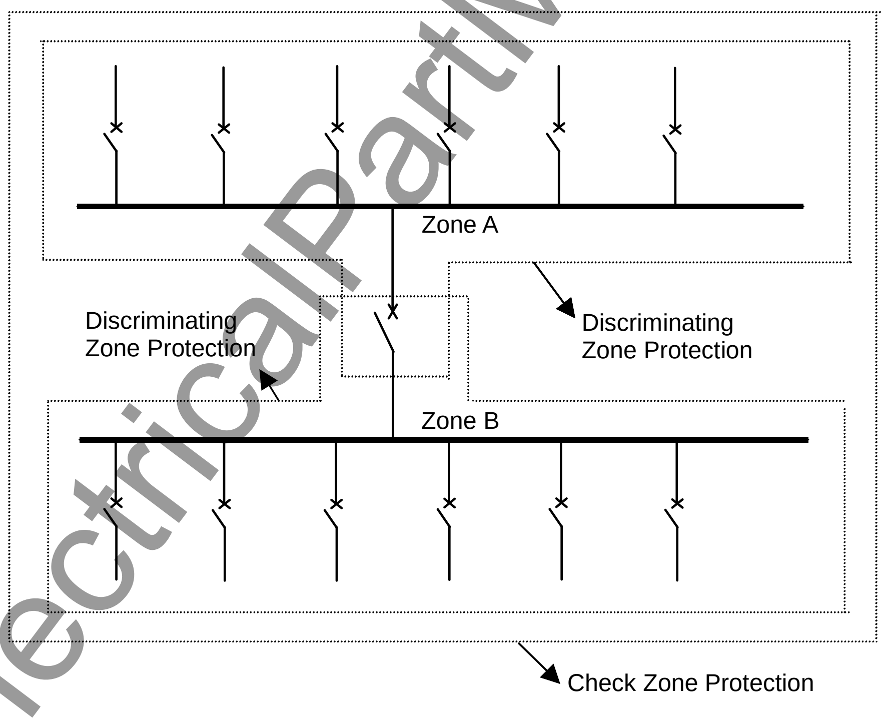



**Figure 2.3.3 Check Zone and Discriminating Zone Protection**

Figure 2.3.4 shows the flow of input signals to the discriminating zone protection elements DIFZA to DIFZD.

The current and binary input (BI) signals of each channel are normally transmitted to one of the zone protections (Zone A to Zone D) through the replica setting, but when the bus zones are bridged, they are transmitted to more than two zone protections. For the zone bridge, see Section 2.3.3.



www. ElectricalPartManuals . com

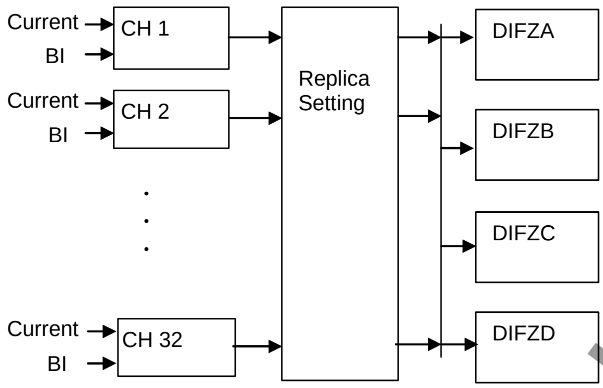



**Figure 2.3.4 Input Signal Flow in Discriminating Zone Protection**

Switching disconnectors under normal busbar operation may turn a load current into a false differential current transiently and the discriminating zone protection may operate if the operating or resetting time of the disconnector is not coordinated between the main and auxiliary contacts. The GRB100 provides very selective discriminating zone protection in combination with the check zone protection described below, hence the time coordination of the main and auxiliary disconnector contacts need not be considered.

Note: Time coordination of disconnector main and auxiliary contacts is difficult in practice. The zone discriminating protection is not used independently.

**Check zone protection**

The check zone protection inputs currents from all feeder bays and transformer bays, performs the overall differential protection for the entire busbar system and outputs trip signals to all the circuit breakers of the feeders and transformers. As the protection does not use the disconnector position signals, the check zone protection is very secure against such false operation in the no-fault and through-fault conditions.

The characteristic of check zone protection can be changed to the non-restraint characteristic shown in Figure 2.3.5 by PLC(*) input (Signal No. 2069: DIFCH_CHARA) to ensure the operation of the check zone protection in case of busbar configuration with a large outgoing current.

Note (*) PLC: Programmable Logic Controller. See Section 3.2.3 in detail function.

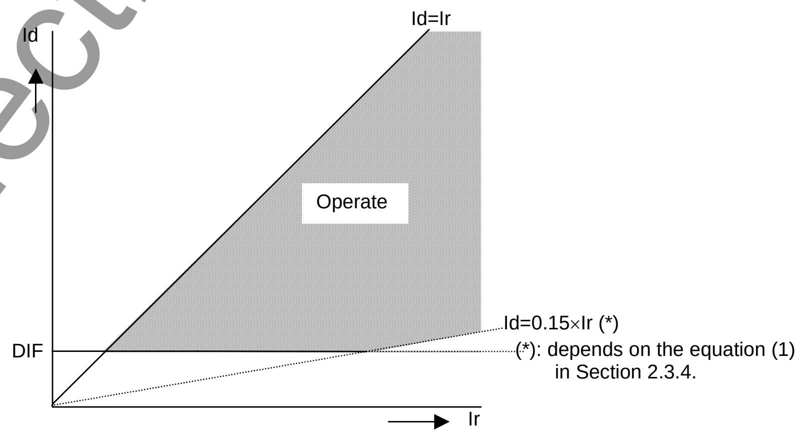



**Figure 2.3.5 DIFCH Characteristic after PLC Input**

For example, the check zone protection with restraint characteristic will not operate under a unique condition such as a fault at Zone B in the busbar configuration shown in Figure 2.3.6, because the outgoing current is over half of the incoming current according to the load and fault current condition. In this case, therefore, the characteristic is changed to non-restraint characteristic when two out of four disconnectors, which are two bus-sections and two bus-couplers, are opened. The check zone protection can operate surely.

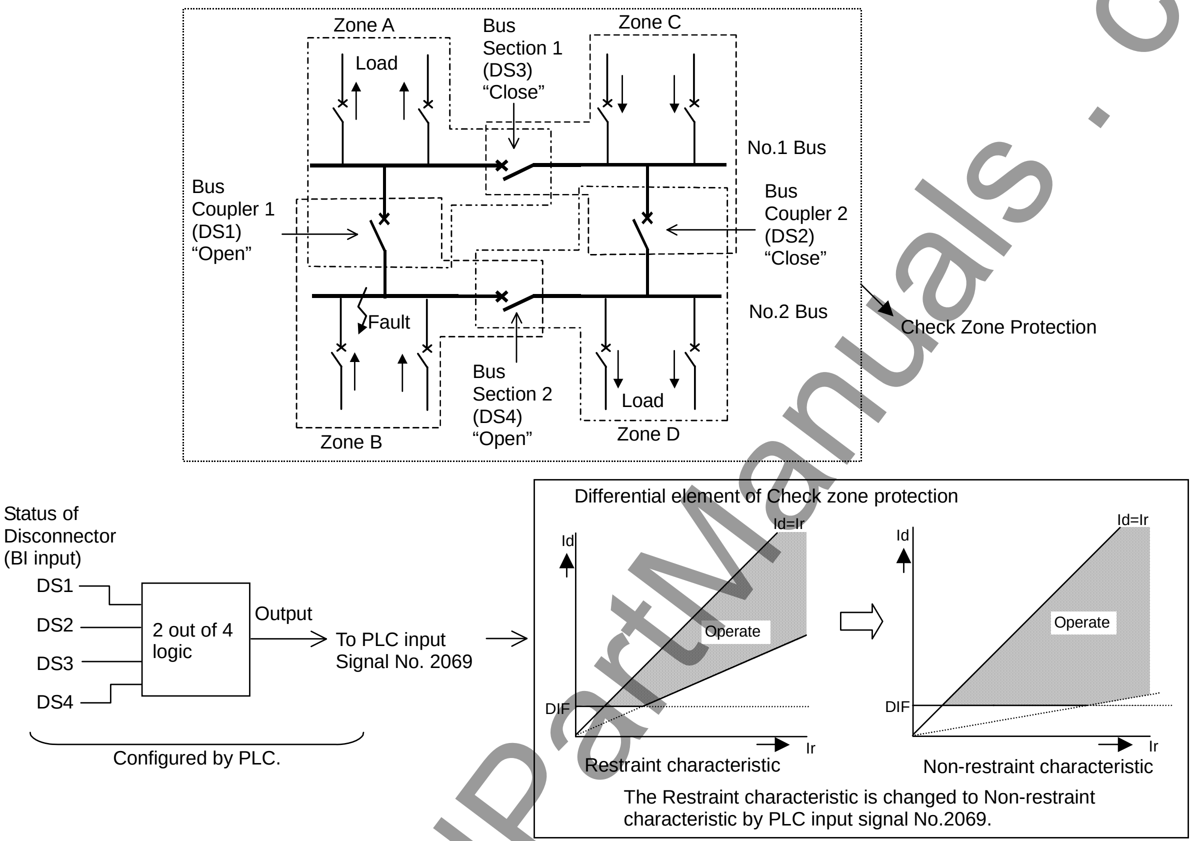



**Figure 2.3.6 Check Zone Protection under Unique Busbar Configuration**

### 2.3.3 Scheme Logic

The GRB100 provides one of the following three protection schemes by the replica setting.

**Note:** The replica setting will be performed by the panel builder before shipping to the end user.

- '*Check zone protection*': The tripping command is transmitted to all bays except bus-section and bus-coupler bays when the check zone protection element operates.
- '*Discriminating zone protection*': The tripping command is transmitted to all bays in the faulty zone when the discriminating zone protection element operates.
- '*Discriminating zone and check zone protection*': The tripping command is transmitted to all bays in the faulty zone only when both of the discriminating zone protection and check zone protection operate.

Note: 'Discriminating zone protection' is applied only to protect a busbar that has duplicated GRB100s (for example, to protect a very important busbar system): one of the GRB100s is set for 'Discriminating zone protection' and the other for 'Check zone protection'.

In the 'Check zone protection', overall protecting current differential element DIFCH outputs trip signals to all the feeder bays and transformer bays. The trip signals can be blocked with the binary input signals (busbar protection block: BP_BLOCK-A and BP_BLOCK-B). If there is any discrepancy between both input signals, the previous value is hold as shown in Figure 2.3.7.

www . ElectricalPartManuals . com

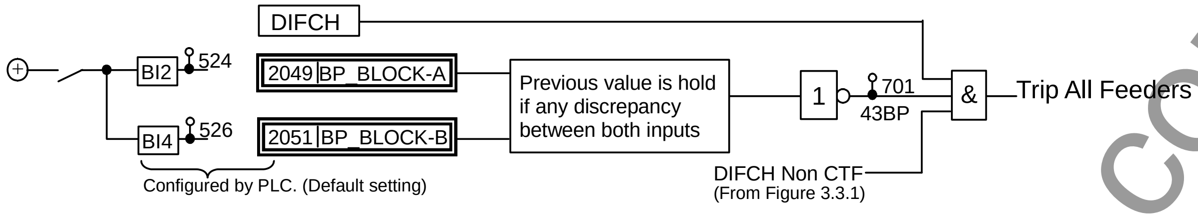


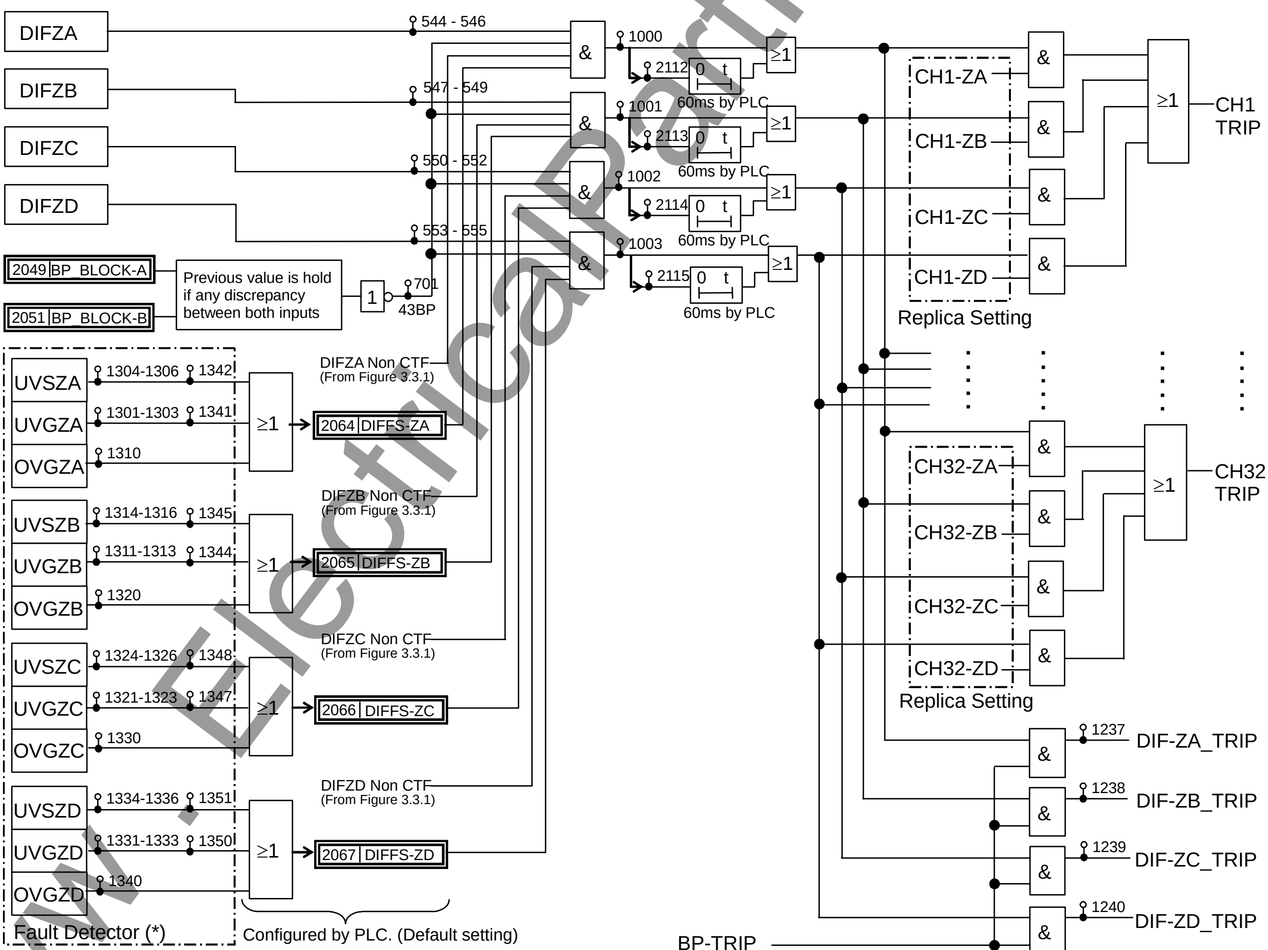

**Figure 2.3.7 Check Zone Protection**

In the 'Discriminating zone protection', up to four zone protecting current differential elements DIFZA to DIFZD are provided. Each channel outputs the trip signal by checking which zone the channel is connected to.

For example, if CH1 is connected to Zone A, then CH1-ZA=1 and CH1-ZB=CH1-ZC =CH1-ZD=0. The CH1 outputs the trip signal only when DIFZA operates.

Thus the zone elements DIFZA to DIFZD output trip signals to the feeder, bus-section and bus-coupler channels which are connected to Zone A to Zone D respectively. The trip signals are blocked with the binary input signals BP_BLOCK-A and -B.

In the 'Discriminating zone and check zone protection', the trip signals are transmitted to the feeder, bus-section and bus-coupler channels connected to the faulty zone when both of the discriminating zone and check zone protection elements operate. The channel is selected in the discriminating zone protection. The trip signals are blocked with the BP_BLOCK-A and -B.




Note (*): Fault detector is provided in Model 400 series and composed by PLC. See Section 2.7.

**Figure 2.3.8 Discriminating Zone Protection**

www.ElectricalPartManuals.com

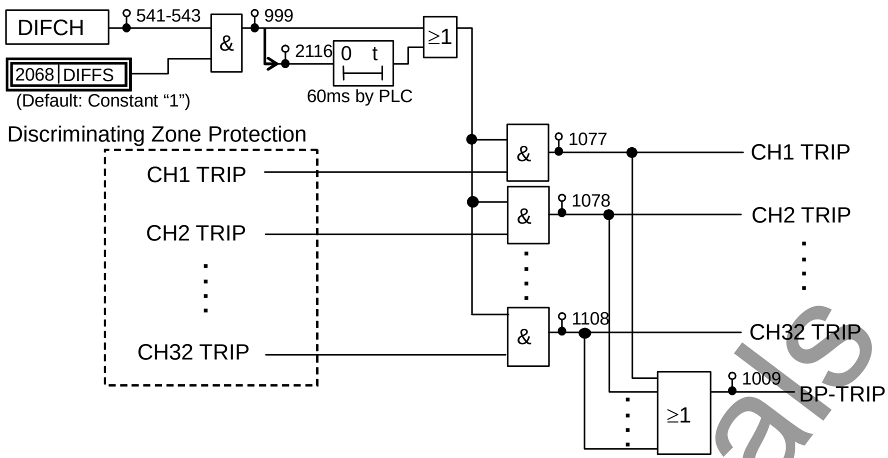



**Figure 2.3.9 Discriminating Zone and Check Zone Protection**

In the following busbar replica and disconnector contact status, two zones are treated as bridged and all the feeder currents are sent to both discriminating zone protections and all feeders in both zones are tripped for a fault in either zone.

- The bus-section has no breaker and the disconnector in the bus-section is closed.

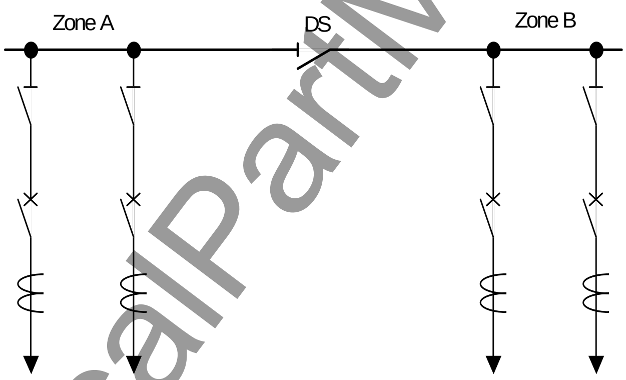



**Figure 2.3.10 Bus-section without Breaker**

- The bus-section has a breaker but it is by-passed by a disconnector in a closed status.

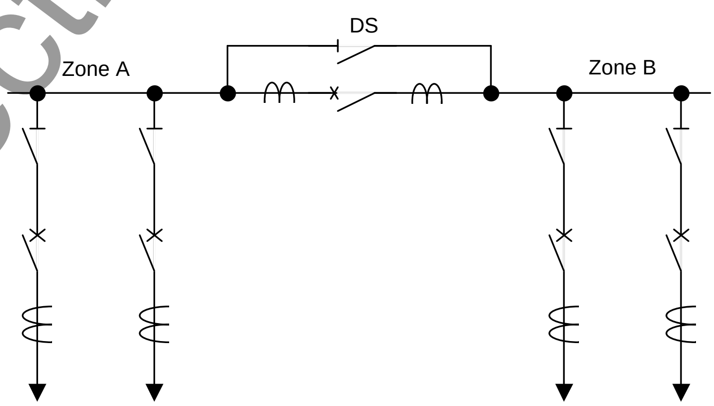



**Figure 2.3.11 Busbar with By-pass Disconnector**

www . ElectricalPartManuals . com

### 2.3.4 Stabilizing for CT Saturation in Through-fault Current

For current differential protection of busbars, a counter measure against CT saturation is essential. If any CTs saturate due to a large through-fault current, an apparent differential current is generated in the differential circuit and causes false operation of the differential protection.

**Operation Principle**

Even when any CTs saturate under very large primary currents, the waveform of the saturated CT secondary current has two periods in each cycle: a non-saturation period and a saturation period. The GRB100 utilizes this phenomenon and provides very secure operation for external faults with a large through-fault current.

Figure 2.3.15 shows a block diagram of a CT saturation countermeasure (CTSC). CTSC has a waveform discriminating element (WDE) and starting element (SE). WDE operates if a change in the instantaneous value of the differential current is less than a specified percentage of a change in the instantaneous value of the restraining current. In the CT non-saturation period, the differential current is theoretically zero for through-fault currents. This element operates in this period.

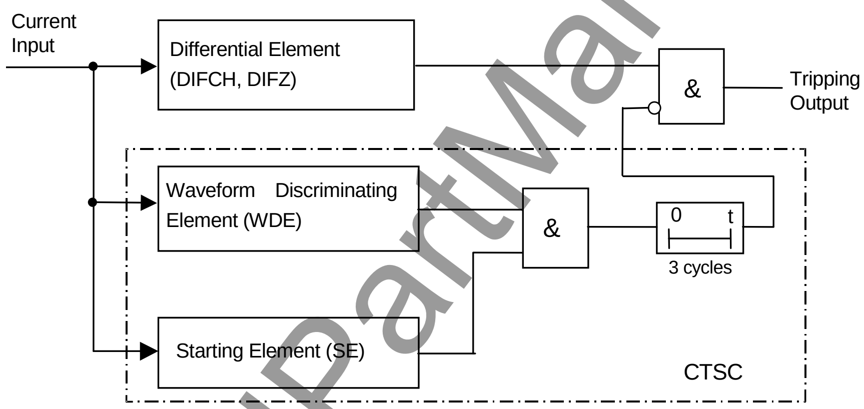



**Figure 2.3.15 Differential Element with CT Saturation Countermeasure**

The algorithm of this element is given by equations (1) to (3):

$$\Delta Id < 0.15 \times (\Delta Ip + \Delta In) \quad (1)$$

$$\Delta Id = |Idm - Idm\text{-}1| + |Idm\text{-}1 - Idm\text{-}2| \quad (2)$$

$$\Delta Ip + \Delta In = |Ipm - Ipm\text{-}1| + |Ipm\text{-}1 - Ipm\text{-}2| + |Inm - Inm\text{-}1| + |Inm\text{-}1 - Inm\text{-}2| \quad (3)$$

where,

$\Delta Id$ : Change in the differential current Id

$(\Delta Ip + \Delta In)$ : Change in the restraining current in the positive and negative cycles

Id : Differential current

Ip : Sum of positive input currents

In : Sum of negative input currents

m, m-1, m-2 : Sampling timing

SE operates when the sum of absolute values of difference between instantaneous values of current data at each channel part from one cycle is greater than a specified percentage of a minimum operating current setting DIF.

www.ElectricalPartManuals.com

$$\sum_{j=1}^{n} |i_{jm} - i_{j(m-24)}| > 0.5 \times \text{DIF}$$

where,

$I_j$ : Current from # j channel

DIF : DIFCH and DIFZ setting in check zone and discriminating zone protection

n : Number of channels

SE discriminates the power system in the faulty state from that in the normal service state and blocks the output of WDE which may operate in the normal service condition.

Figure 2.3.16 shows CT secondary current waveforms of the incoming terminal and the outgoing terminal current and the differential current at the time of an external fault with outgoing terminal CT saturation.

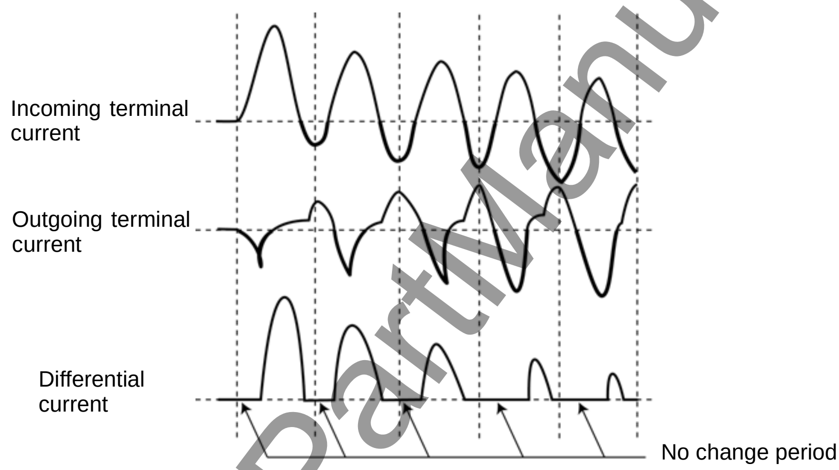



**Figure 2.3.16 CT Secondary Current Waveforms and Differential Current for an External Fault with CT Saturation**

From the inception of a fault until the CT secondary current at the outgoing terminal saturates, the differential current Id is zero and the change in the differential current ΔId obtained from equation (2) is also zero. However, the change in the restraining current given by equation (3) is a sufficiently large positive value, so equation (1) is met and WDE operates.

SE detects changes in the terminal currents and rapidly operates, producing an AND output with WDE. After this, since there is a period during which equation (1) is not satisfied, a certain time delay is inserted to reliably block the operation of the differential element.

If, during an internal fault, there is a period during which the change in the instantaneous value of the differential current is small due to CT saturation, WDE will not operate because the change in the restraining current is also small during that period. Thus, during an internal fault, operation of the differential element is not blocked falsely.

### 2.3.5 Current Transformer Requirements

The GRB100 does not require the use of dedicated CTs nor the use of CTs with an identical ratio. The GRB100 can share the CTs with other protections and the different ratios are adjusted by setting.

The general CT requirements are set for the through-fault stability which comes up when any CTs saturate under very large through-fault currents. To ensure correct operation of the GRB100 for such through-fault currents, the factor Ks of each CT is required to satisfy the following

www.ElectricalPartManuals.com

conditions:

Ks ≧ 1 when Tc ≦ 200ms

or

Ks ≧ 2 when Tc ≦ 250ms

where,

Ks = ratio of CT knee point voltage to CT secondary probable voltage under the maximum through-fault current

= Vk / {($R_{CT}$ + $R_L$ + $R_B$ + $R_O$)($I_F$max / CT ratio)}

Tc = d.c. time constant of primary circuit

Vk = knee point voltage of CT

$R_{CT}$ = resistance of CT secondary winding

$R_L$ = loop resistance of cable between CT and relay

$R_B$ = ohmic load of GRB100 bay unit (i.e. 0.1 ohm for 1A rating and 0.012 ohm for 5A rating)

$R_O$ = ohmic load of other series-connected relays (if any)

$I_F$max = maximum through-fault current

For example, if the following parameters are given:

Vk = 800 V, CT ratio = 1,200/1, $R_{CT}$ = 5.0 ohm, $R_L$ = 3.0 ohm, $R_B$ = 0.1 ohm,

$R_O$ = 0 ohm (i.e. no series-connected relays) and $I_F$max = 40kA

then the factor Ks is calculated as:

Ks = 800/{(5.0 + 3.0 + 0.1)×(40,000/1,200) }

= 800/270

= 3.0

This shows that the GRB100 operates correctly for all the faults under the condition that the d.c. time constant of the primary circuit is less than 250ms.

### 2.3.6 Setting

The following shows the setting elements necessary for the current differential protection and their setting ranges.

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| DIFCH | 500 – 3,000A | 1A | 2000A | Minimum operating current of check zone protection in primary circuit value |
| DIFZ | 500 – 3,000A | 1A | 2000A | Minimum operating current of discriminating zone protection in primary circuit value |
| SLPCH | 0.30 – 0.90 | 0.01 | 0.30 | Restraining factor of check zone protection |
| SLPZ | 0.30 – 0.90 | 0.01 | 0.30 | Restraining factor of discriminating zone protection |
| 1CT to 32CT | 100 – 10,000A | 1A | 2000A | Set with CT primary rating of up to 32 CTs |
| C.TP | BLK / Trip | | BLK | Coupler CB tripped or not under bridge condition |

**DIF setting**

The discriminating zone protection has up to four zones but the minimum operating current

www. ElectricalPartManuals . com

setting is common to each zone with DIFZ setting.

The setting of DIF (DIFCH and DIFZ) is determined from the minimum fault $I_F$min current that can occur on the busbar fault. For example;

DIF setting < 0.8 × $I_F$min

The setting is based on the primary circuit value, so $I_F$min is a primary value. The CT ratios or the difference of the CT ratios between the channels can be disregarded in the setting.

If the minimum operating current is set too low when the CT primary rating is high, the operation error of the differential element is increased as shown in Figure 2.3.17. If it is required to keep the accuracy of minimum operating current less than 5%, the following condition must be checked for the DIFCH and DIFZ setting obtained above depending on the total number of channels.

0.40 × CT primary rating < DIF setting for 25 - 32 channels

0.34 × CT primary rating < DIF setting for 17- 24 channels

0.28 × CT primary rating < DIF setting for 9 - 16 channels

0.23 × CT primary rating < DIF setting for 1 - 8 channels

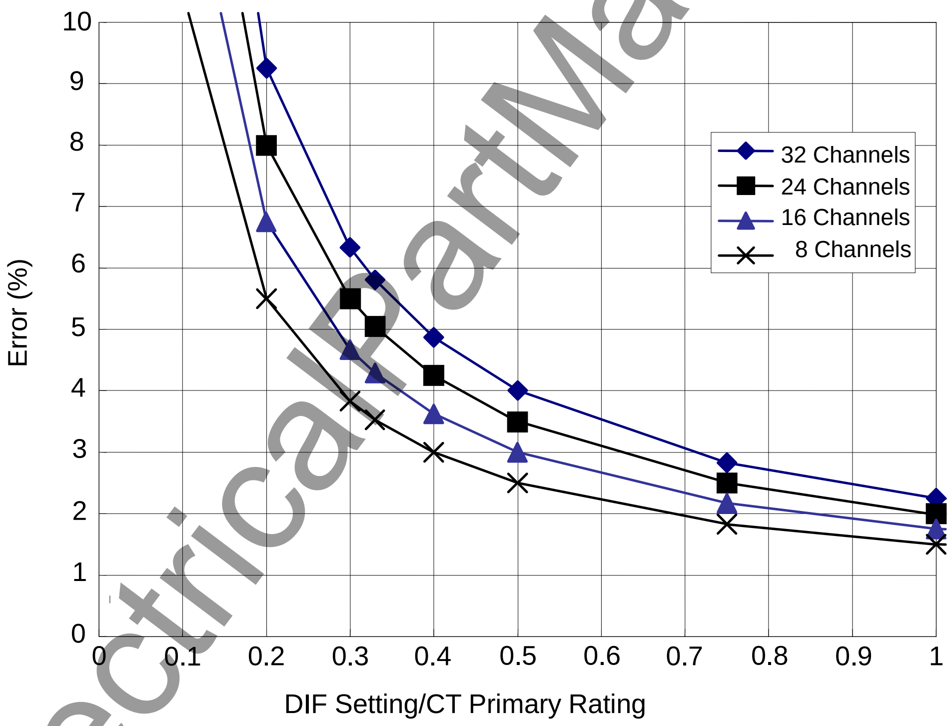



**Figure 2.3.17 Accuracy Check**

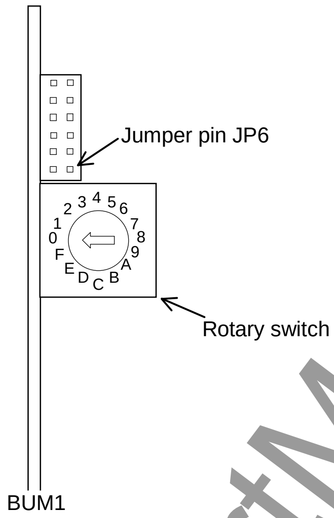
www.ElectricalPartManuals.com

**CT setting**

CT settings are set for each channel with a primary rating.

**BU address setting**

BU address setting is to define the channel number. The channel number can be set the range of CH 1 to CH32 with the rotary switch and jumper pin JP6 of BU. For details, see the section 5.5.2.




www . ElectricalPartManuals . com

## 2.4 Busbar System Replicas and Disconnector Signals

### 2.4.1 Busbar Replicas Covered by GRB100

The GRB100 can be applied to single-, double- and ring-busbar systems with or without a transfer busbar. Application to the one-and-a-half breaker busbar system takes the same format as application to the single-busbar system.

The busbar system replicas which the GRB100 covers are shown in Appendix A. (Feeders and transformer banks connected to the busbars are abbreviated in the figures.)

The busbar can be sectioned into up to four zones, Zone A to Zone D with bus-section switches S1 to S4 and bus-coupler switches C1 to C4.

E1 to E4 show the end of busbars and are used to expand the busbar system and protection system.

#### Single-busbar

The replicas can be with or without a transfer busbar and have up to three bus-sections S1 to S3 and four bus-couplers C1 to C4 for a transfer busbar.

When the replica has a transfer busbar, the transfer busbar is connected to any of the busbar zones through one of the bus-couplers.

#### Double-busbar

The replicas can be with or without a transfer busbar and have up to two bus-sections S1 and S2 and two bus-couplers C1 and C2.

When the replica has no transfer busbar, either of the busbars can double as a transfer busbar.

When the replica has an independent transfer busbar, the transfer busbar is connected to any of the busbar zones through one of the bus-couplers.

#### Ring-busbar

The replicas can be with or without a transfer busbar and have up to four bus-sections S1 to S4 and four bus-couplers C1 to C4 for a transfer busbar connection.

When the replica has no transfer busbar, the busbar can be sectioned into two to four zones with bus-sections S1 to S4.

When the replica has a transfer busbar, the transfer busbar is connected to any of the busbar zones through one of the bus-couplers.

### 2.4.2 Disconnector Signals

Disconnector open/closed position signals are required to determine the busbar replica.

One normally open (N/O) and one normally closed (N/C) auxiliary contacts are required to evaluate the disconnector position. Figure 2.4.1 and Table 2.4.1 show the disconnector position evaluation. In Figure 2.4.1, the logic levels of N/O contact signal DS-NO, N/C contact signal DS-NC and evaluated disconnector position signal DS are “1” for the closed position and “0” for the open position.

www. ElectricalPartManuals . com

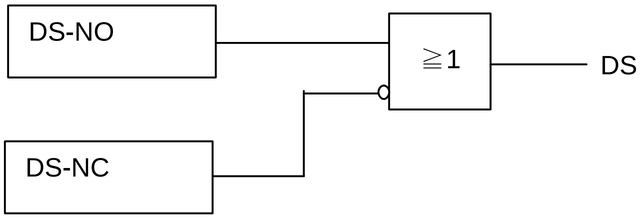



**Figure 2.4.1 Disconnector Evaluation Logic**

**Table 2.4.1 DS Position Evaluation**

| DS-NO (N/O Contact) | DS-NC (N/C Contact) | DS Position Evaluation |
|---|---|---|
| Open | Closed | Open |
| Closed | Open | Closed |
| Open | Open | Closed and Failure Alarm |
| Closed | Closed | Closed and Failure Alarm |

When both of the N/O and N/C contacts are simultaneously in the open or closed position, the disconnector is evaluated to be in the closed position and a failure alarm is issued by the monitoring function. (See Section 3.3.5.)

If the disconnector fails, the evaluation above operates as follows:

If the N/O contact is in the closed position or the N/C contact is in the open position incorrectly when the main contact is open, the main contact is evaluated to be in the closed position, differing with the actual position.

In single- and ring-busbars, the zone protection introduces the current of the failed disconnector, but incorrect operation is not caused because the main contact is open and the current is zero. In double-busbars, the zone protection regards the busbars as bridged. If busbar faults occur in this period, both zone protections operate and trip all the feeders. The zone protections do not operate for the load current or external faults.

If the N/O contact is in the open position or the N/C contact is in the closed position incorrectly when the main contact is closed, the main contact evaluation accords with the actual position, so incorrect operation is not caused.

Note: If only one of the N/O and N/C auxiliary contacts is transmitted, the main contact evaluation and monitoring is invalid. The main contact position is evaluated with the input N/O or N/C signal. Failure of an auxiliary contact may cause an incorrect operation of the discriminating zone protection.

The N/O and N/C auxiliary contact signals are sent to the BU and evaluated in the CU. For the disconnector signal input, refer to Section 3.2.1 and Appendix I.

www . ElectricalPartManuals . com

## 2.5 Breaker Failure Protection

When a fault remains uncleared due to a breaker failure, the breaker failure protection (CBF) clears the fault by tripping the local adjacent breakers or a breaker at a remote line end.

If the current continues to flow following the output of a trip command, the CBF judges it as a breaker failure. The existence of the current is detected by an overcurrent element OCBF provided for each phase and each primary circuit. For high-speed operation of the CBF, a high-speed reset overcurrent element is used.

The GRB100 covers three patterns:

- When a feeder breaker fails to trip for a busbar fault, the CBF sends a transfer trip signal to a breaker at the remote end of the line, after retripping the original breaker.

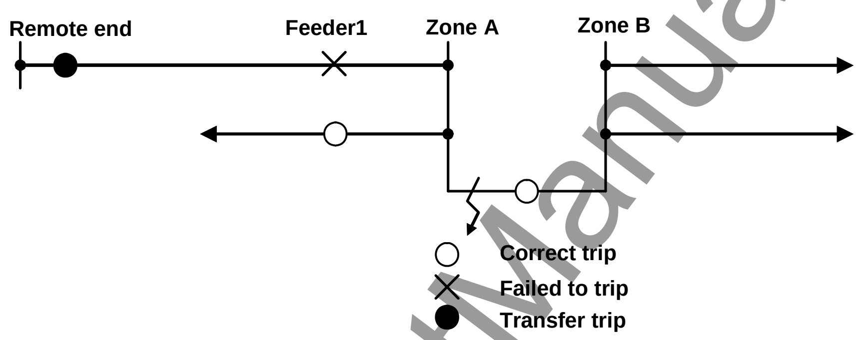



**Figure 2.5.1 Busbar Fault with Feeder Breaker Failure**

- When a feeder breaker fails to trip for a line fault, the CBF is initiated by a trip signal from the external line protection equipment and trips adjacent breakers connected to the zone to which the faulty breaker is connected, after retripping the original breaker.

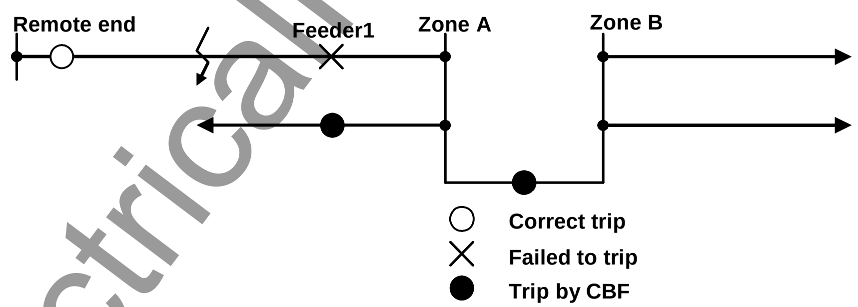



**Figure 2.5.2 Feeder Fault with Feeder Breaker Failure**

- When a bus-section or bus-coupler breaker fails to trip for a busbar fault, the CBF trips feeder breakers, bus-section breaker and bus-coupler breaker in the adjacent zone.

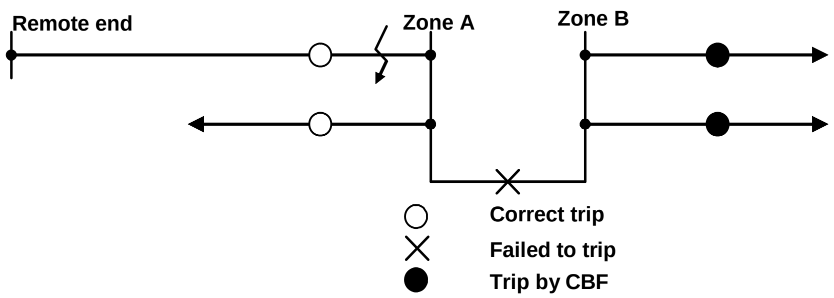



**Figure 2.5.3 Busbar Fault with Bus-selection Breaker Failure**

www . ElectricalPartManuals . com

### 2.5.1 CBF Scheme logic

GRB100 provides the following two CBF scheme logics:

- Parallel initiation of the retrip timer (TnB1) and backtrip timer (TnB2)
- Series initiation of the retrip timer (TnB1) and backtrip timer (TnB2)

The parallel initiation (BF1) or the series initiation (BF2) can be selected by the scheme switch [BFLOGIC] setting.

#### Parallel initiation (BF1)

The CBF scheme logic is provided for each channel. Figure 2.5.4 shows the scheme logic for one channel. The BF1 scheme is available when the [BFLOGIC]=BF1 setting.

The CBF is performed on an individual phase basis and initiated by a trip signal nEXT-TRIP A (B, C) from an external protection or an internal trip signal BP TRIP. Starting with an external trip signal can be disabled by the scheme switch [nBFEXT]. These trip signals must be present as long as the fault persists.

The signal nCBF-TRIP to trip the adjacent breakers is initiated if the overcurrent element nOCBF operates continuously for the setting time of the delayed pick-up timer TnB2 after the start-up. Tripping of the adjacent breakers can be blocked with the scheme switch [nBF2].

The signal CBF-TRIP in a feeder channel is valid when the CBF is initiated with an external trip signal.

There are two kinds of mode of the retrip signal to the original breaker RETRIP: the mode in which RETRIP is controlled by the overcurrent element nOCBF, and the direct trip mode in which RETRIP is not controlled. The retrip mode together with the trip block can be selected with the scheme switch [nBF1].

The remote terminal transfer trip signal CHn-CBF.TR is provided in feeder channels and bus-coupler channels. The signal in a bus-coupler channel is available only when the transfer busbar is in service.

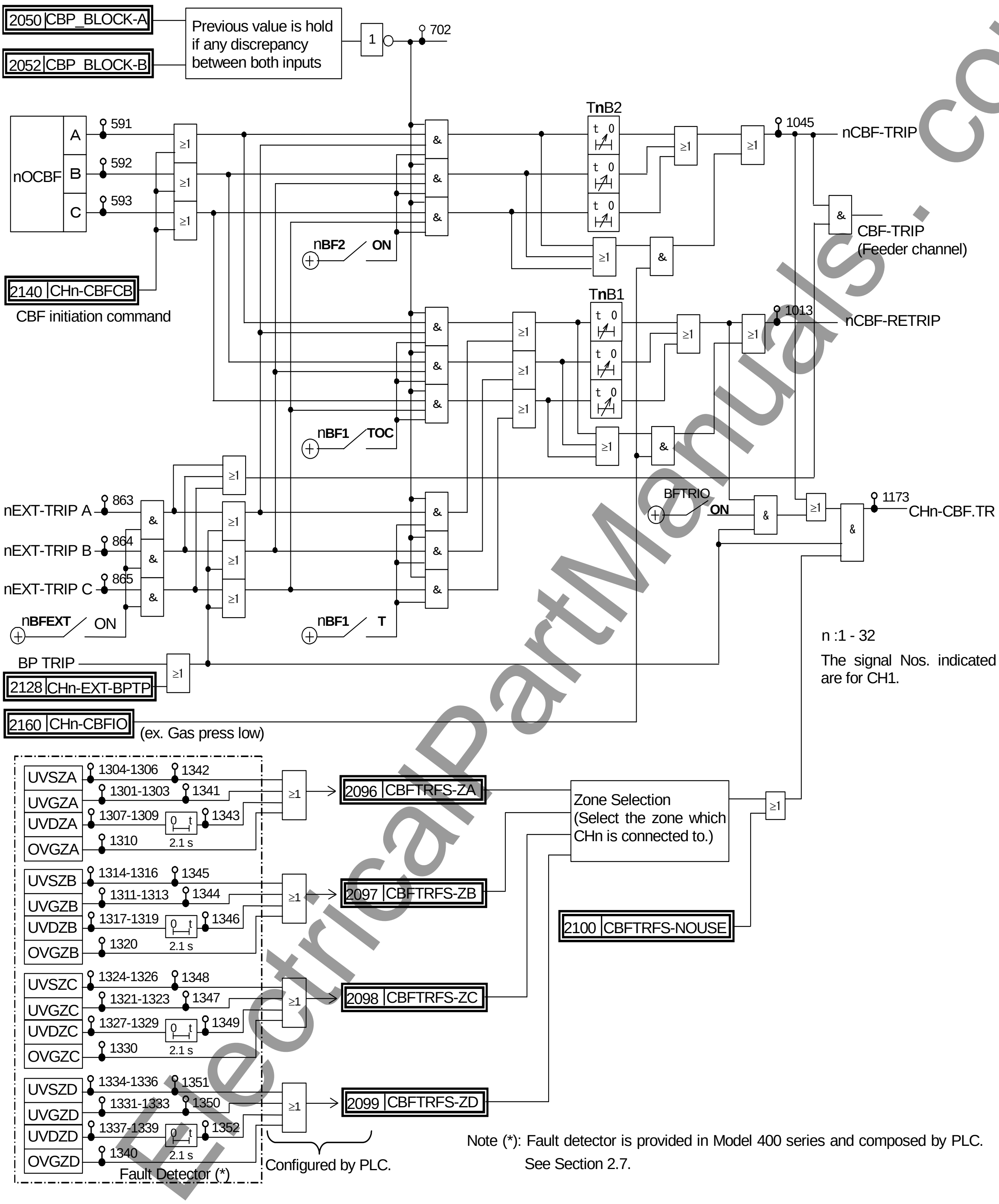
Note: “n” shows the channel number which is 1 to 32.

The remote circuit breaker can be tripped after the stage-1 timer TnB1 not waiting the stage-2 timer by the scheme switch [BFTRIO].

The concerned bus zone tripping and the remote CB tripping are carried out without a time delay by the binary input signal CHn-CBFIO (e.g. under pressure relays of SF6 etc.).

The trip signals are blocked with the binary input signals (CBF protection block: CBF_BLOCK-A and CBF_BLOCK-B).

www . ElectricalPartManuals . com




Note (*): Fault detector is provided in Model 400 series and composed by PLC. See Section 2.7.

**Figure 2.5.4 Scheme Logic of Breaker Failure Protection BF1**

www.ElectricalPartManuals.com

Figure 2.5.5 shows a sequence diagram of the CBF when a retrip and backtrip are used. If the breaker trips normally, the nOCBF is reset before timer TnB1 or TnB2 is picked up and the CBF is reset.

If the nOCBF continues operating, a retrip command is given to the original breaker after the setting time of TB1. Unless the breaker fails, the nOCBF is reset by the retrip. The TnB2 is not picked up and the CBF is reset. This may happen when the CBF is started by mistake and unnecessary tripping of the original breaker is unavoidable.

If the original breaker fails, retrip has no effect and the nOCBF continues operating and the TnB2 is picked up finally. A trip command nCBF-TRIP is issued to the adjacent breakers and the CBF is completed.

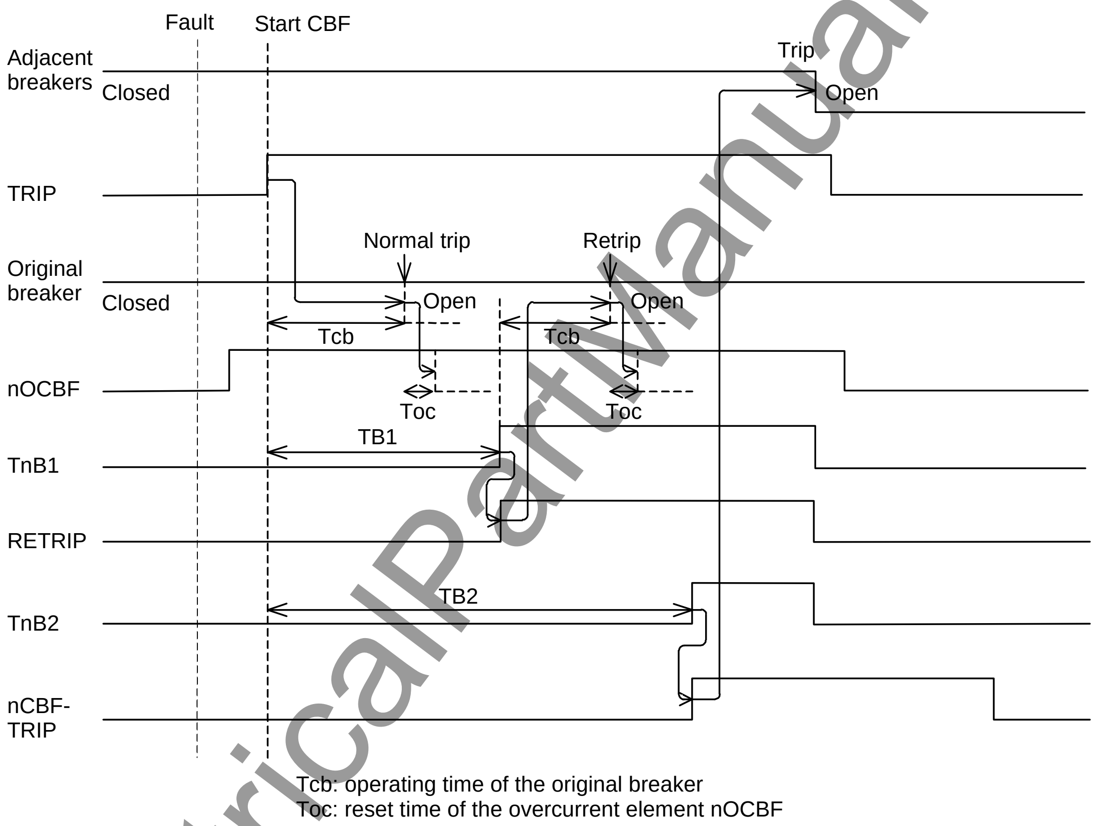



**Figure 2.5.5 Sequence Diagram of BF1**

### Series initiation (BF2)

The BF2 scheme is available when the [BFLOGIC]=BF2 setting.

In the series initiation BF2 logic, the retrip timer (TnB1) and backtrip timer (TnB2) are initiated in series from a trip signal as shown in Figure 2.5.6.

When the CBF is initiated by feeder protection trip (external trip signal), the TnB1 and TnB2 are energized in series. The TnB2 starts after the set time of TnB1 has elapsed, and the nCBF-TRIP is output.

When the CBF is initiated by busbar protection trip, only the TnB2 is energised and the nCBF-TRIP is output after the set time of the TnB2.

When the BF2 scheme is used, the [BFTRIO] setting should be "OFF".

www.ElectricalPartManuals.com

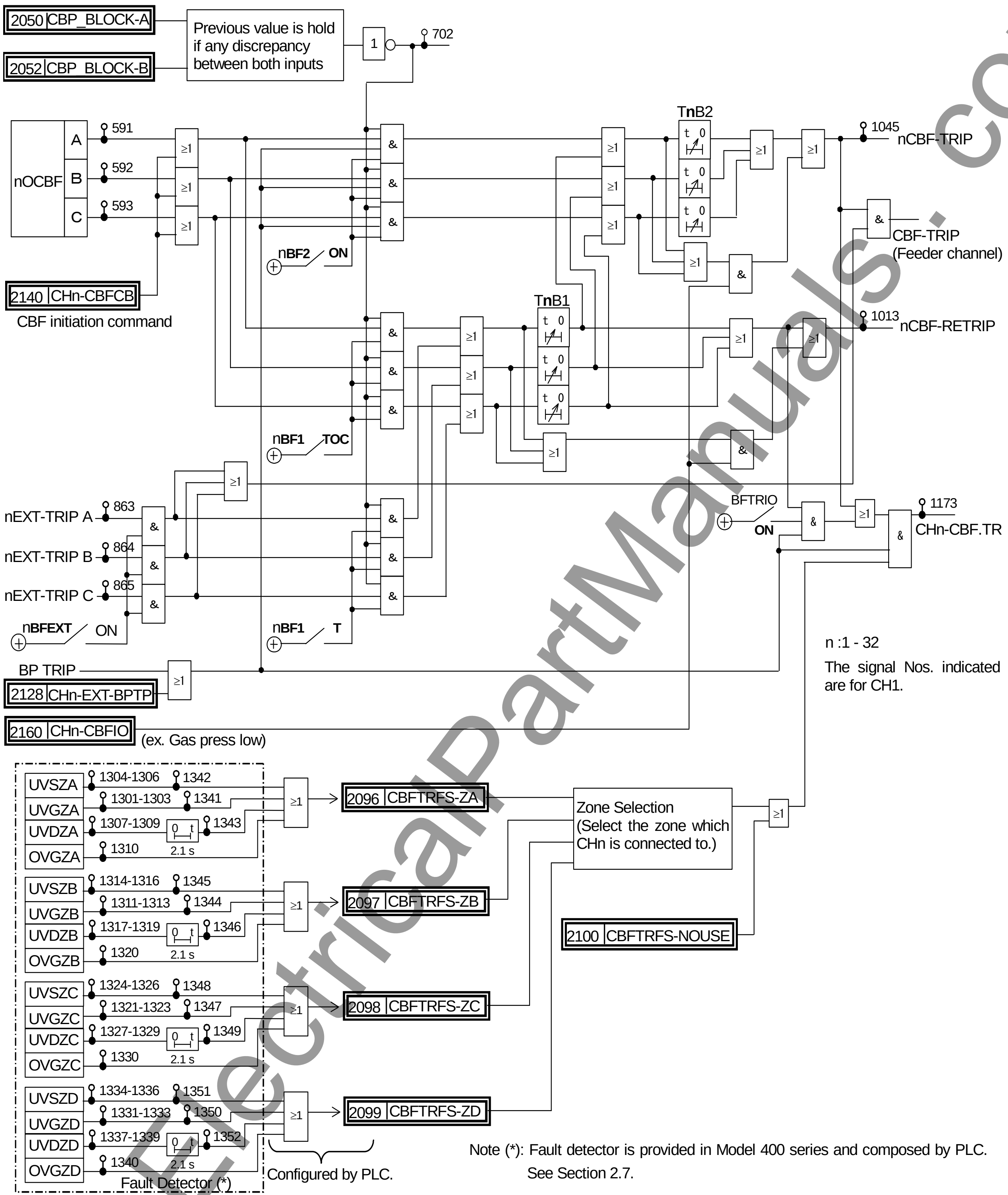



**Figure 2.5.6 Scheme Logic of Breaker Failure Protection BF2**

Figure 2.5.7 shows a sequence diagram of the BF2 scheme.

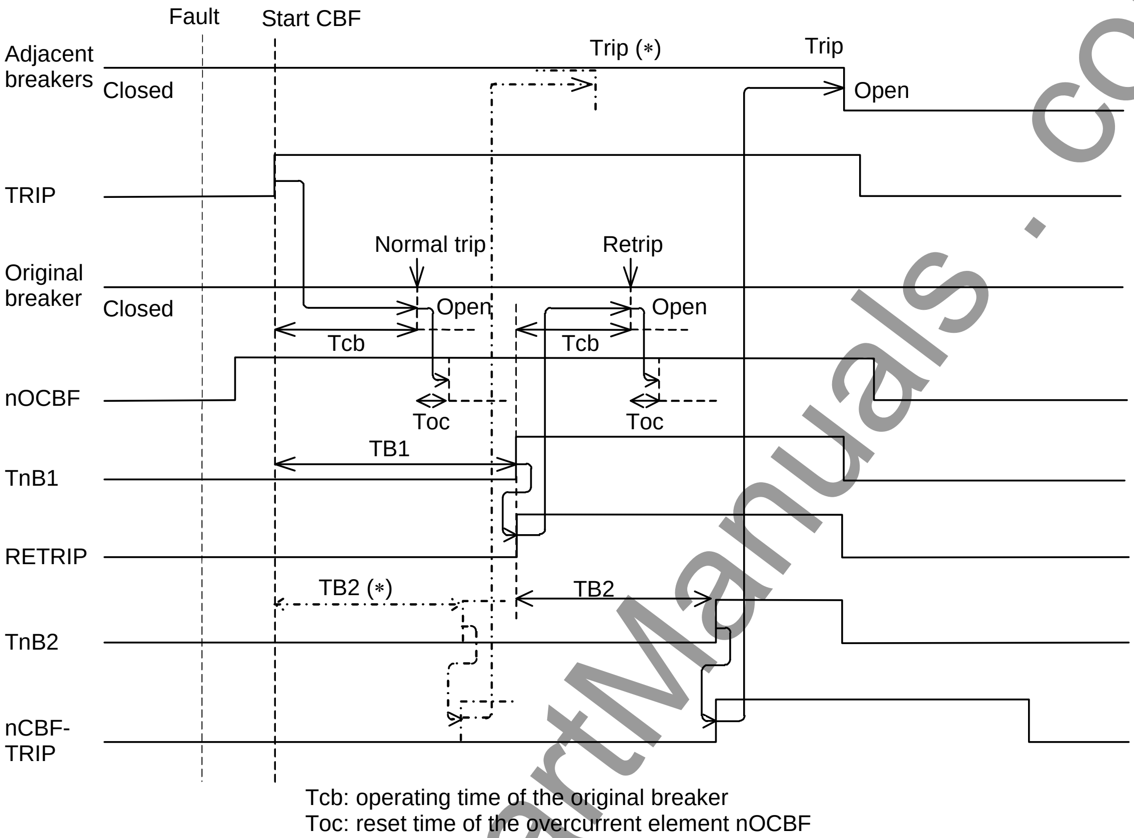



**Figure 2.5.7 Sequence Diagram of BF2**

The CBF-TRIP signal is output not only to all the channels of the original zone but also to adjacent zones if the original zone and adjacent zone(s) are bridged as follows:

- Bus-section is connected with a disconnector and has no circuit breaker.
- Bus-section has a breaker but it is by-passed by a disconnector.
- Busbars are bridged with disconnectors in the double-busbar system.

Figure 2.5.8 shows the CBF-TRIP signal distribution logic. The CBF of each channel outputs a trip signal nCBF-TRIP (n=1 to 32) to the original zone according to the replica setting. Thus the tripping zone(s) is fixed.

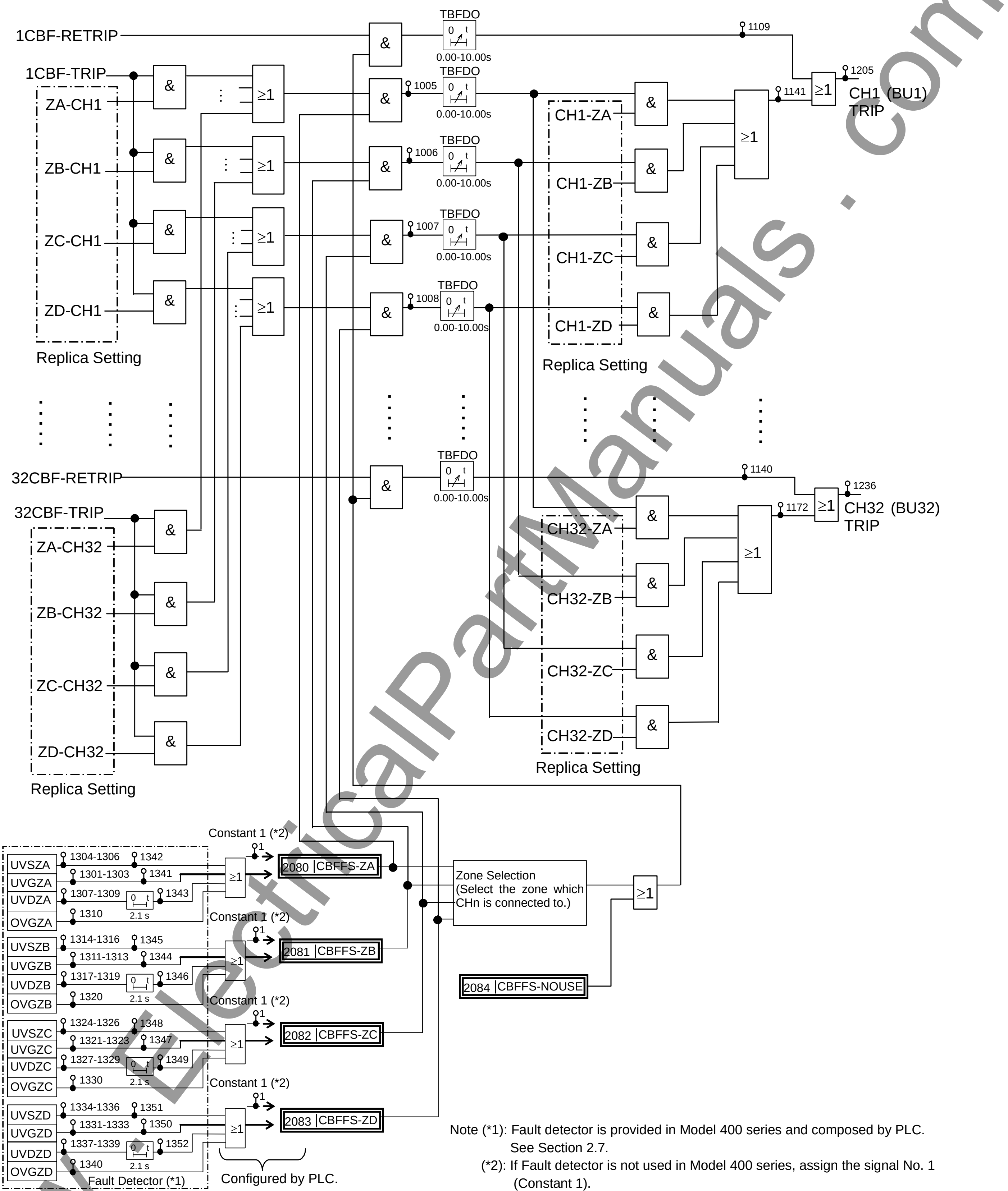
For example, if Zone A is connected to channel 1 and Zone A and Zone B are bridged, then ZA-CH1=1 and ZB-CH1=1. The CBF of channel 1 generates Zone A and Zone B trip signals ZA-TRIP and ZB-TRIP.

Each channel outputs the trip signal by checking which zone the channel is connected to.

For example, if channel 1 is connected Zone A, then CH1-ZA=1 and CH1-ZB=CH1-ZC =CH1-ZD=0. Channel 1 outputs the trip signal only when the signal ZA-TRIP is generated.

Fault detectors (undervoltage elements UVSZ∗, UVGZ∗ and UVDZ∗) as fail-safe can be connected the signals CBFFS-Z∗ by PLC function.

www.ElectricalPartManuals.com




Note (*1): Fault detector is provided in Model 400 series and composed by PLC. See Section 2.7.

(*2): If Fault detector is not used in Model 400 series, assign the signal No. 1 (Constant 1).

**Figure 2.5.8 CBF Trip Signal Distribution**

www.ElectricalPartManuals.com

#### Inter trip scheme at busbar fault

If the busbar protection fails to trip the circuit breaker, the remote circuit breaker is tripped after the stage-1 timer TnB1 not waiting the stage-2 timer. This function can be available by the setting of [BFTRIO].

#### Command tripping (Gas pressure low inter tripping)

The lockout function of the respective circuit breaker (e.g. under pressure relays of SF6 etc.) is introduced in GRB100 relay and sets to zero both stage-1 (TnB1) and stage-2 (TnB2) timers. The concerned bus zone tripping and the remote CB tripping are carried out without a time delay by the binary input signal CHn-CBFIO. The actual tripping logic of command tripping is shown in Figure 2.5.4.

### 2.5.2 Setting

The setting elements necessary for the breaker failure protection and their setting ranges are as follows. The setting is required for each channel excluding the TBFDO and [BFTRIO].

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| nOCB | 0.1 – 2.0 | 0.1 | 0.8 | OCBF overcurrent setting (multiples of secondary rated current) |
| TnB1 | 0 – 500ms | 1ms | 150ms | Retrip (stage-1) timer |
| TnB2 | 0 – 500ms | 1ms | 200ms | Backtrip (stage-2) timer |
| TBFDO | 0.00 – 10.00s | 0.01s | 0.10s | CBF operation drop-off timer |
| [BFLOGIC] | BF1/BF2 | | BF1 | CBF logic option |
| [nBFEXT] | ON/OFF | | OFF | External start |
| [nBF1] | T/TOC/OFF | | OFF | Retrip mode |
| [nBF2] | ON/OFF | | OFF | Adjacent breaker trip |
| [BFTRIO] | ON/OFF | | OFF | Remote trip operating time control |

n: 1 – 32 (depends on the model)

The overcurrent element nOCBF checks that the breaker has opened and the current has disappeared. Therefore, since it is allowed to respond to the load current, it can be set from 10 to 200% of the rated current.

The settings of TnB1 and TnB2 are determined by the opening time of the original breaker (Tcb in Figure 2.5.5) and the reset time of the overcurrent element (Toc in Figure 2.5.5). The timer setting example can be obtained as follows.

Setting of TnB1 = Breaker opening time + nOCBF reset time + Margin
= 40ms + 15ms + 20ms
= 75ms

Setting of TnB2 = Output relay operating time + Breaker opening time
+ nOCBF reset time + Margin
= 10ms + 40ms + 15ms + 10ms
= 75ms



www . ElectricalPartManuals . com

## 2.6 Miscellaneous Protection

### 2.6.1 Protection during Busbar Bridging

- Two busbars are bridged during switching a feeder in the double-busbar system.

  The bridge is detected with the N/O and N/C contacts of the two disconnectors.

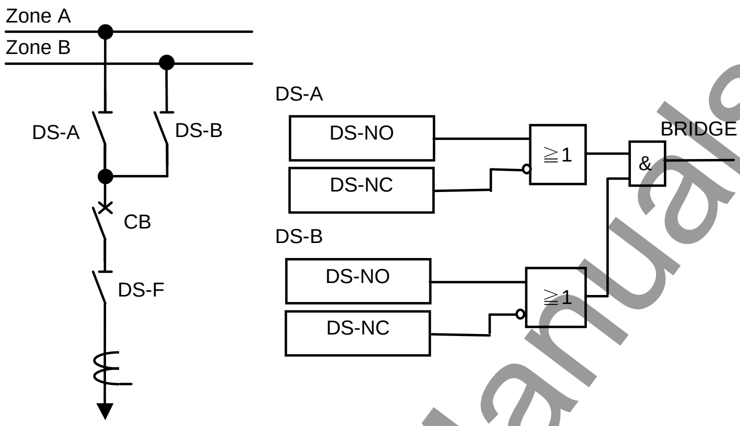



**Figure 2.6.1 Bridging in Double-busbar System**

During this bridging, tripping of the bus-coupler breaker is enabled or disabled by setting the switch [C.TP]. The switch [C.TP] is applied to both busbar protection and CBF protection.

#### 2.6.1.1 Discriminating zone protection during bridging

In case of zones during bridging, the zones are treated as one zone and the discriminating zone protection range is expanded to be able to continue the protection. In Figure 2.6.2, for example, the discriminating zone protection expands the protective range. Zone A is expanded to cover Zone B while Zone A and Zone B are bridged. Zone B is also expanded to cover Zone A.

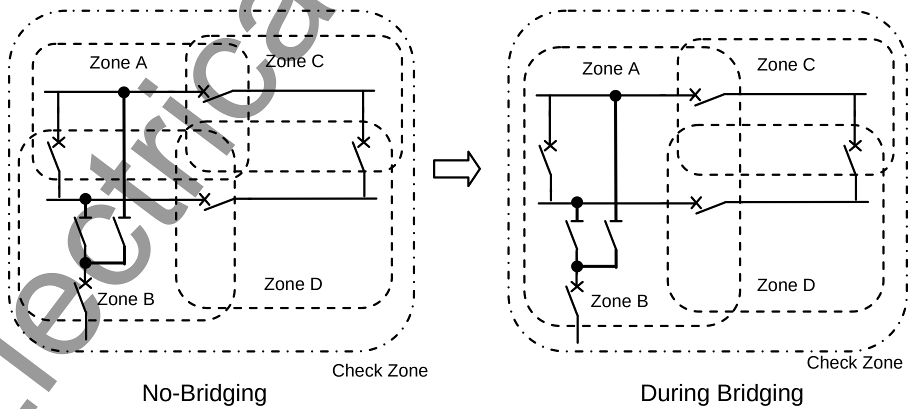



**Figure 2.6.2 Discriminating Zone Protection during Bridging**

### 2.6.2 Command tripping

GRB100 provides the command tripping function which executes a tripping by a trip signal from an external protection panel, etc. If applied, the trip signal is assigned to the trip command initiation signal CHn-COM.TP by PLC function. The command trip function can be disabled by the scheme switch [COMTP].

Note: "n" shows the channel number which is 1 to 32.



www.ElectricalPartManuals.com

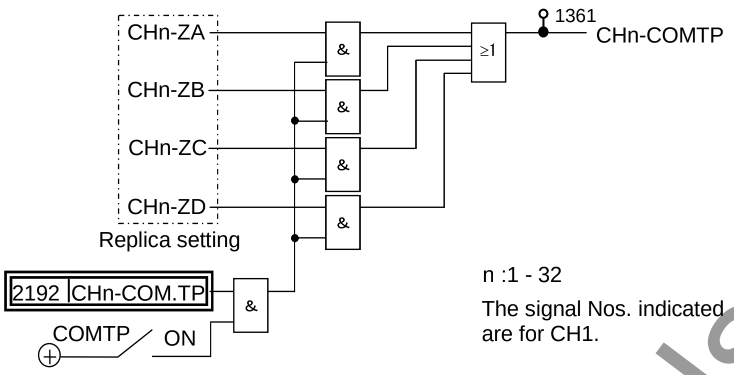



**Figure 2.6.3 Command Tripping**

### 2.6.4 Blind Zone Protection

In the bus-section and bus-coupler, it is normal to arrange two CTs, one on either side of the breaker so as two discriminating zone protections to overlap across the breaker.

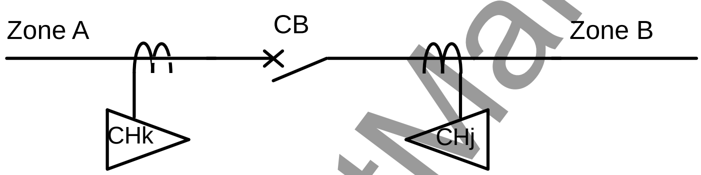



**Figure 2.6.4 Normal CT Arrangement in Bus-section or Bus-coupler**

If CTs are arranged on one side of the breaker or one CT is used for both zones, the protection zones do not overlap across the breaker and so the zone between the CTs and the breaker remains as a blind zone. One of the discriminating zone protections (Zone A in the example shown below) operates for the fault in the blind zone but the other (Zone B protection) does not and the fault is not cleared.

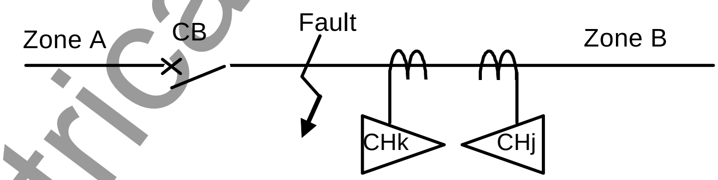



**Figure 2.6.5 CT Arrangement Leaving Blind Zone**

The GRB100 provides a backup protection for blind zone faults. It controls the current of the bus-section or bus-coupler where the blind zone exists to zero in the discriminating zone protection after the breaker is tripped by one of the discriminating zone protections and makes the protection of the other zone operate.

Zero ampere control for the bus-section and bus-coupler current continues one second after the breaker is opened.

One normally open auxiliary contact of the breaker is required for this protection and the auxiliary contact operation is assumed not to be more than 25ms earlier than the main contact operation. If the auxiliary contact operation is earlier than the main contact operation by more than 25 ms, the zero ampere control may function before the main contact opens and the discriminating zone protection may operate incorrectly to faults in the adjacent zone.

If the contact signal is not initiated, the function is disabled.

www . ElectricalPartManuals . com

Note: The setting for this function will be performed by the panel builder.

**Protection in Operating Busbar with Bus-section Open**

If the busbar is operated with a bus-section open as shown in Figure 2.6.6, Zone A protection operates unnecessarily for a fault between the breaker and the CT. To avoid this unnecessary operation, the GRB100 provides a function to control the bus-section current to zero in the discriminating zone protection and to enable only the faulted zone protection to operate.

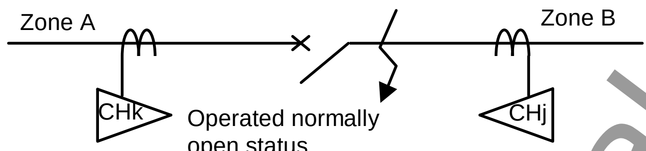



**Figure 2.6.6 Operation with Bus-section Open**

Figure 2.6.7 shows the bus-section current control logic and its time-chart. The zero ampere control is continuous. Therefore to keep security, the function requires both of the normally open (N/O) and normally closed (N/C) auxiliary contacts of the breaker. The main contact is evaluated to be open only when the N/O contact is open in three phases as well as when the N/C contact is closed in three phases. When both of the N/O and N/C contacts are simultaneously in the open or closed position, a failure alarm is issued.

The zero ampere control must be reset before the breaker main contact closes and establishes after the main contact opens. To fulfill this requirement, the N/O and N/C contacts must have the following time characteristics for the main contact:

- Normally open contact closes or normally closed contact opens before the main contact closes.(*)

  Note (*): The "CB close command" is useful for an improvement in requirements of high-speed normally open contact or normally closed contact. See Figure 2.6.8.

- Normally open contact opens or normally closed contact closes after the main contact opens.

This function is valid for the blind zone protection too.

Note: The setting for this function will be performed by the panel builder.

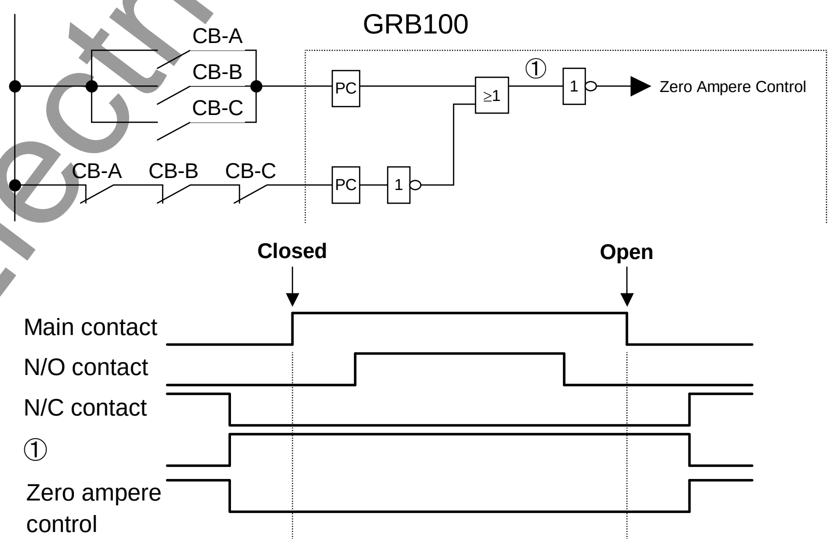



**Figure 2.6.7 Zero Ampere Control Logic and Time Chart**

www . ElectricalPartManuals . com

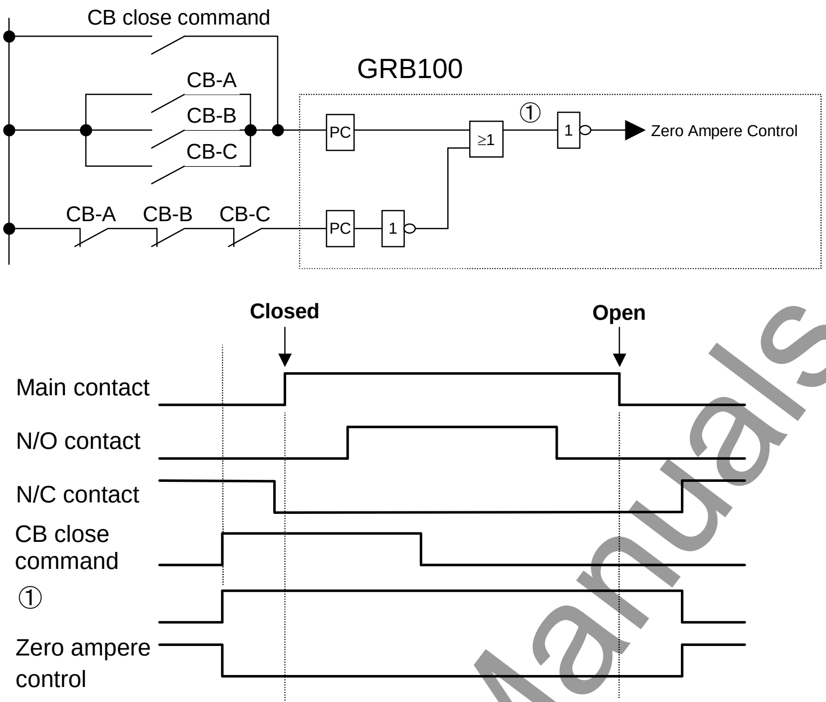



**Figure 2.6.8 Zero Ampere Control Logic and Time-chart by Using CB Close Command**

### 2.6.5 End Zone Fault Protection

GRB100 provides the function of the end fault protection to protect the zone between the CT (Current Transformer) and the CB (Circuit Breaker) when the CB is open.

If a fault occurs between CB-A and CT in the CT location of the busbar protection as shown in Figure 2.6.9, the busbar differential relay cannot operate normally. In this case, the fault can be cleared by the end zone fault protection. The end zone fault protection clears the fault by controlling this CHn bay current $I_{CHn}$ to zero under CB-A open to enable the busbar differential relay to operate and by tripping the circuit breaker CB-B. The condition of CB-A must be input by the binary input signal (PLC signal).

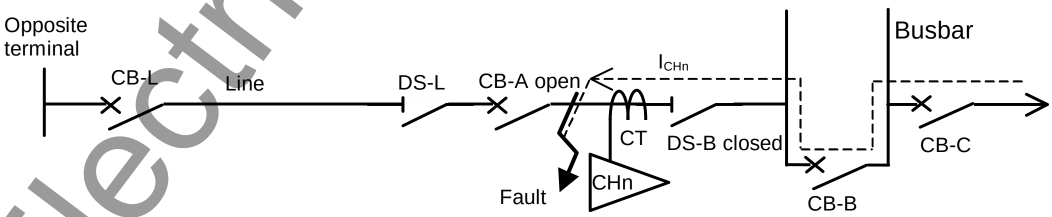



**Figure 2.6.9 End Zone Fault Protection (1)**

If a fault occurs between CB-A and CT in the CT location of the busbar protection as shown in Figure 2.6.10, the end zone fault protection prevents the busbar differential relay from operating by controlling this CHn bay current $I_{CHn}$ to zero under CB-A open, and issues a transfer trip command to the circuit breaker CB-L at the opposite end and clears the fault.

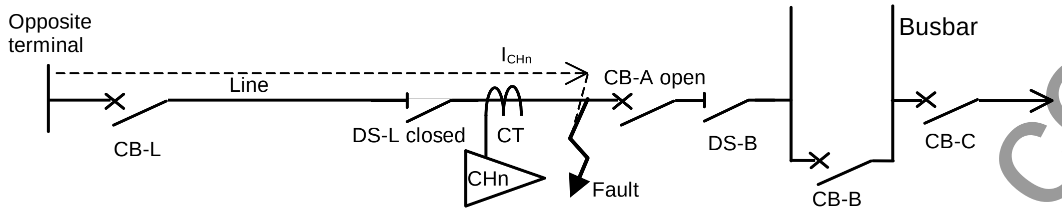



**Figure 2.6.10 End Zone Fault Protection (2)**

Figure 2.6.11 shows the scheme logic. When 1OCBF element operates under open of CH1 CB, the relay issues a transfer trip command CH1 EFP-TR and trips the opposite end CB. The timer TCBO is used to make sure the CB open and its default setting is 1.00s. To enable the function of end zone fault protection, the signal CH1 EFP-TR ON is assigned by PLC function. The function of other channels CH2 to CH32 are same as CH1.

OCBF elements are shared with the breaker failure protection (CBF).

The end zone fault protection for all channels is disabled by the scheme switch EFPTR.

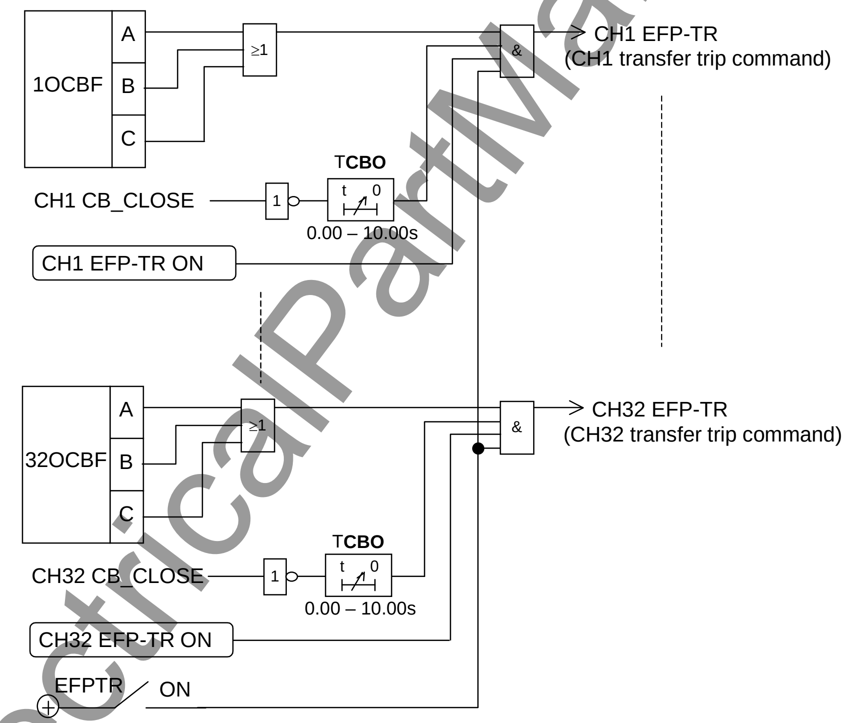



**Figure 2.6.11 Scheme logic of End Zone Fault Protection (2)**

**Setting**

The setting elements necessary for the end zone fault protection and their setting ranges are as follows.

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| nOCB | 0.1 – 2.0 | 0.1 | 0.8 | OCBF overcurrent setting (multiples of secondary rated current) |
| TCBO | 0.00 – 10.00s | 0.01s | 1.00s | |
| EFPTR | OFF / ON | | OFF | |



www . ElectricalPartManuals . com

## 2.7 Fault Detector

GRB100 Model C400s is provided with a fault detector (FD) which functions as a check relay for tripping and enhances security against non-power system fault tripping.

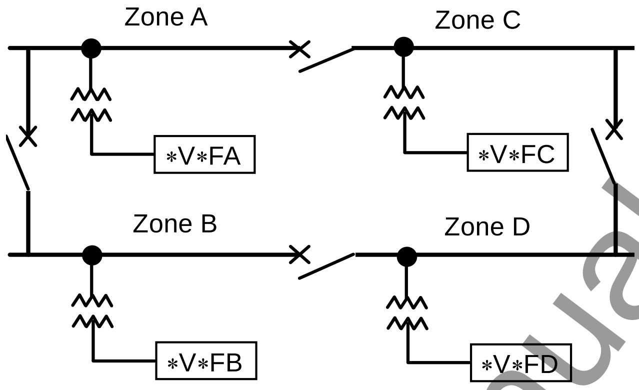



**Figure 2.7.1 FD Available Busbar Replicas**

The FD incorporates the phase fault and earth fault detecting undervoltage elements UVSF (UVSZA - UVSZD) and UVGF (UVGZA – UVGZD) and undervoltage change detection elements UVDF (UVDZA – UVDZD) and earth fault overvoltage elements OVGF. The elements are allocated to each busbar zone shown in Figure 2.7.1. UVSF, UVGF and OVGF are used for the differential protection and UVDF for the breaker failure protection.

### Tripping output circuit

Figure 2.3.8 shows the tripping logic circuit of discriminating zone protection when the FD is in service. Figure 2.5.6 shows the tripping logic of CBF protection when the FD is in service.

### Setting

The FD element setting ranges are shown in the table below.

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| UVSF | 60 - 100V | 1V | 80V | |
| UVGF | 20 - 60V | 1V | 46V | |
| OVGF | 0.1 - 10.0V | 0.1V | 10.0V | |
| VTA to VTD | 1 - 20000 | 1 | 2000 | VT ratio |

www . ElectricalPartManuals . com

## 2.8 Characteristics of Measuring Elements

### 2.8.1 Current Differential Elements DIFCH, DIFZ and DIFSV

The segregated-phase current differential elements used for discriminating zone (DIFZ) and check zone protections (DIFCH) have the non-restraint characteristic for the small current region and the percentage restraint characteristic for the large current region. The non-restraint characteristic defines the minimum sensitivity (operating current).

Figure 2.8.1 shows the characteristics on the differential current (Id) and restraining current (Ir) plane. Id and Ir are the vector and scalar summations of all input currents, respectively.

The non-restraint characteristic of the DIF (DIFCH or DIFZ) element is expressed by the following equation:

$$I_d \geq DIF$$

where DIF is a setting and defines the minimum operating current.

The percentage restraint characteristic is expressed by the following equation:

$$I_d \geq k \times I_r \quad (k = 0.30 \text{ to } 0.90)$$

The latter characteristic has stronger restraint and prevents the element from operating falsely in response to the erroneous differential current that is caused by saturation or transient errors of the CT during an external fault.

The characteristic of DIFCH can be changed to the characteristic shown in Figure 2.8.2 by PLC input (Signal No. 2069: DIFCH_CHARA) to ensure the operation of the check zone protection in case of the busbar configuration with a large outgoing current. (See Section 2.3.1.)

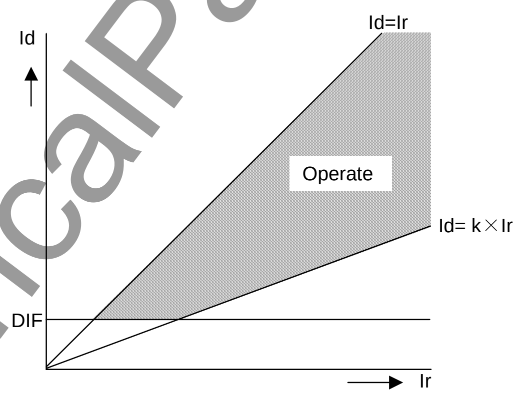



**Figure 2.8.1 Current Differential Element (Ir-Id Plane)**

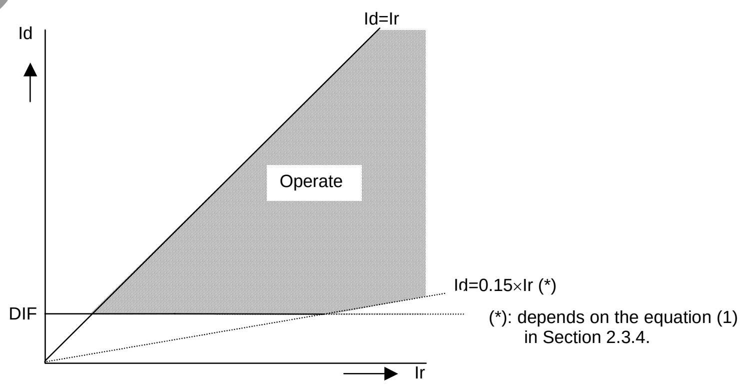



**Figure 2.8.2 DIFCH Characteristic after PLC Input**

The same characteristic can be represented on the outgoing current ($I_{out}$) and incoming current ($I_{in}$) plane as shown in Figure 2.8.3. This representation is useful when testing the percentage restraint characteristic by inputting the outgoing and incoming simulating currents.

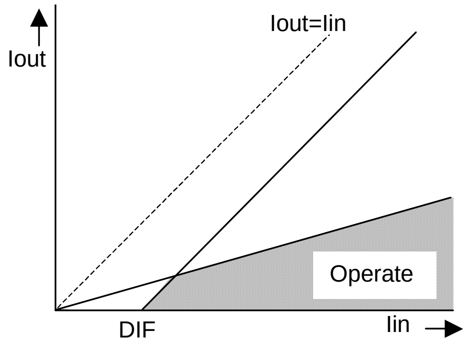



**Figure 2.8.3 Current Differential Element (Iin-Iout Plane)**

The non-restraint characteristic is expressed by

$$\text{Iout} \le \text{Iin} - \text{DIFI}$$

The percentage restraint characteristic is expressed by

$$\text{Iout} \le \{(1-k)/(1+k)\}\text{Iin}$$

The supervisory element DIFSV used for differential current monitoring has a non-restraint characteristic.

### 2.8.2 Overcurrent element OCBF

The OCBF measures three-phase currents. This element is used for the breaker failure protection.

### 2.8.3 Overcurrent element ΣIZ

The ΣIZ measures the restraining current Ir of each zone.

This element is prepared for each zone, and its operating sensitivity is fixed to 20% of DIFZ setting.

### 2.8.4 Fault Detector Elements

The fault detector incorporates the following three fault detection elements.

**Undervoltage change detection element UVDF**

The UVDF operates if a voltage drops by 7% compared to that of two cycles before. Therefore, the operating sensitivity of this element is related not to the rated voltage but to the running voltage. The UVDF can detect the voltage drop in the system condition SIR≥0.1 as a fault detector for CBF initiation. (SIR: Source Impedance Ratio, see Appendix O.)

**Undervoltage element UVSF and UVGF**

The UVSF measures a phase-to-phase voltage while the UVGF measures a phase-to-earth voltage.

**Overvoltage element OVGF**

The OVGF measures zero-sequence voltage for detecting an earth fault.



www . ElectricalPartManuals . com

## 2.9 Tripping Output

Figure 2.9.1 shows the tripping output circuit. The trip signal generated in the central unit is delivered to up to 32 BUs (channels), though only CH1 is expressed in the figure. The figure shows the case when 'Discriminating zone and check zone protection' is selected.

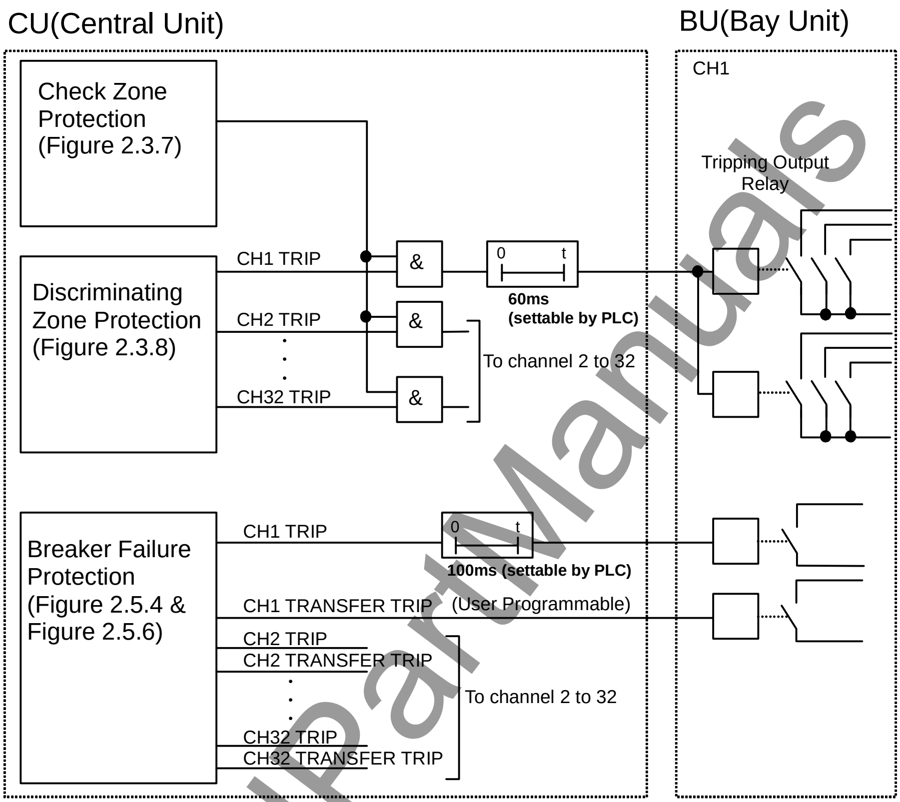



**Figure 2.9.1 Tripping Output Circuit for CH1**

The trip signal of busbar protection drives high-speed tripping output relays. The tripping output relays reset 60ms after the trip signal disappears by clearing the fault. The tripping circuit must be opened with the auxiliary contact of the breaker prior to reset of the tripping relay to prevent the tripping relay from directly interrupting the tripping current of the breaker.

The trip signal of breaker failure protection drives tripping output relays. The output relay resets 100ms after the trip signal disappears by clearing the fault.

www . ElectricalPartManuals . com

# 3. Technical Description

## 3.1 Hardware Description

The GRB100 is composed of one Central Unit (CU) and numbers of Bay Unit (BU) depending on the required channels. The CU and BU are housed in individual cases.

### 3.1.1 Central Unit

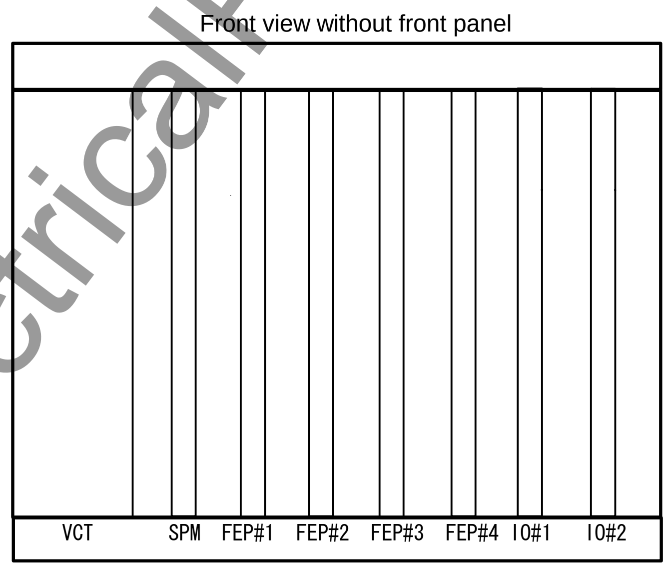
#### 3.1.1.1 Outline of Hardware Modules

Case outline of the Central Unit (CU) is shown in Appendix H.

The hardware structure of the CU is shown in Figure 3.1.1. The front view shows the equipment without the human machine interface module.

The CU consists of the following hardware modules. The human machine interface module is provided with the front panel.

- Transformer module (VCT)
- Signal processing module (SPM)
- Front-end processing module (FEP)
- Binary input and output module 1 (IO#1)
- Binary input and output module 2 (IO#2)
- Human machine interface module (HMI)




Note: The FEP module is incorporated in models as follows:
C∗10 model: FEP#1
C∗20 model: FEP#1, FEP#3
C∗30 model: FEP#1, FEP#2, FEP#4
C∗40 model: FEP#1, FEP#2, FEP#3, FEP#4

**Figure 3.1.1 Hardware Structure**

www . ElectricalPartManuals . com

The hardware block diagrams of the CU using these modules are shown in Figure 3.1.2.

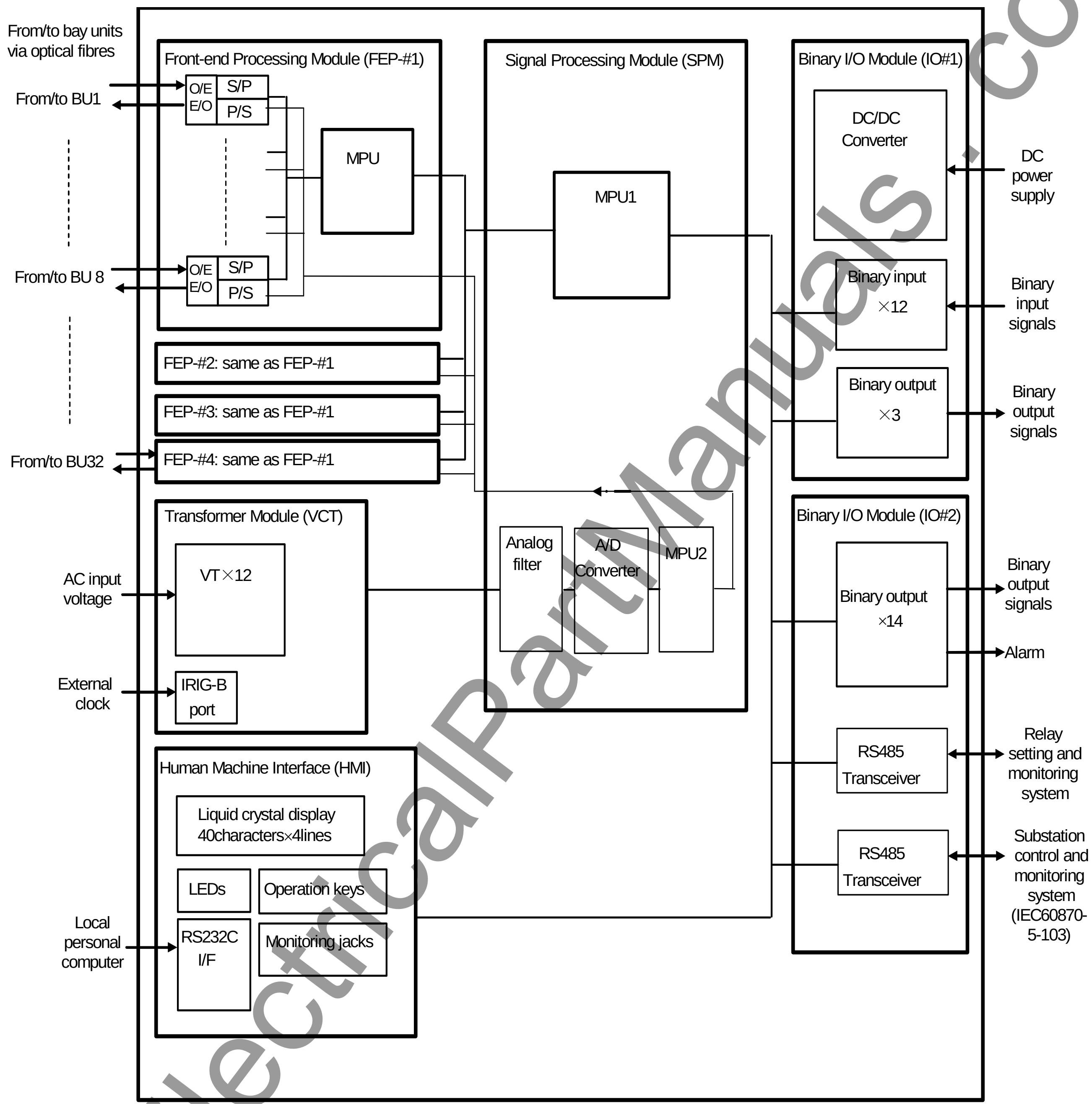



**Figure 3.1.2 Hardware Block Diagram of CU**

www . ElectricalPartManuals . com

#### 3.1.1.2 Transformer Module

The transformer module (VT module) insulates between the internal and external circuits through an auxiliary transformer and transforms the magnitude of AC input signals to suit the electronic circuits for the relay model with FD elements.

There are 6 or 12 auxiliary VTs mounted in the transformer module depending on the relay model. (For the correspondence between the relay model and number of AC input signals, see Table 3.2.1.)

The transformer module is also provided with an IRIG-B port. This port collects the serial IRIG-B format data from the external clock for synchronization of the relay calendar clock. The IRIG-B port is insulated from the external circuit by a photo-coupler. A BNC connector is used as the input connector.

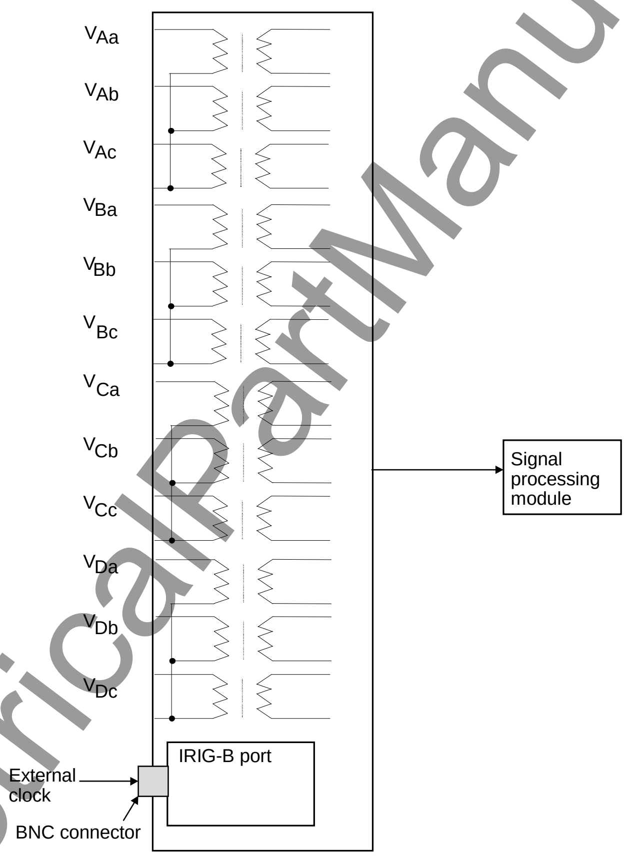



**Figure 3.1.3 Transformer Module of CU**

www . ElectricalPartManuals . com

#### 3.1.1.3 Signal Processing Module

The signal processing module (SPM) consists of RAM, ROM main processing units (MPU1 and MPU2), etc., and executes all kinds of processing such as protection, measurement, recording and display. The MPU1 and MPU2 implement 60 MIPS and use a RISC (Reduced Instruction Set Computer) type 32-bit microprocessor.

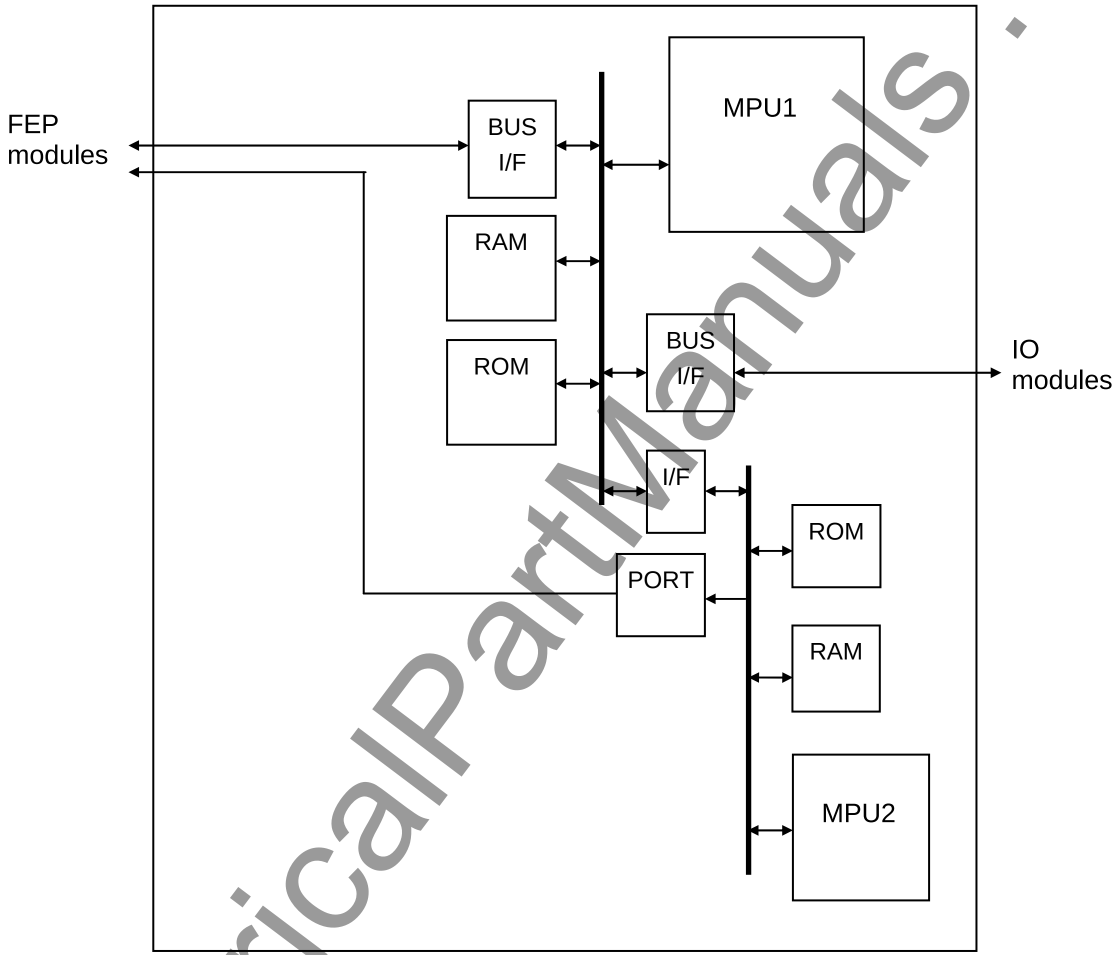



**Figure 3.1.4 Signal Processing Module**

www . ElectricalPartManuals . com

#### 3.1.1.4 Front-End Processing Module

The front-end processing module (FEP) incorporates front-end processing and communication control circuits.

The FEP consists of an MPU executing control processing of received data, memories (RAM and ROM), parallel-to-serial (P/S) and serial-to-parallel (S/P) data converter, and electrical-to-optical (E/O) and optical-to-electrical (O/E) converter.

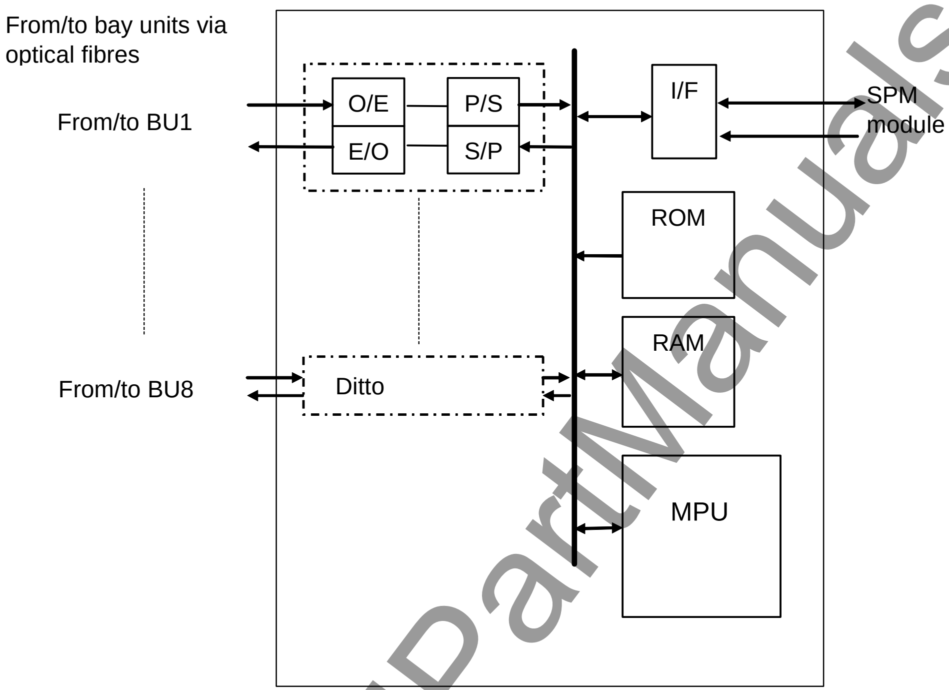



**Figure 3.1.5 FEP Module**

www . ElectricalPartManuals . com

#### 3.1.1.5 Binary Input and Output Module of CU

There are two types of binary input and output module (IO module):IO#1(IO8) and IO#2(IO2B).

**IO#1(IO8) Module**

The IO8 module incorporates a DC/DC converter, 12 photo-coupler circuits (BI1-BI12) for binary input signals and 3 auxiliary relays (BO1 – BO3) for binary output signals.

The input voltage rating of the DC/DC converter is 48/60V, 110V/125V or 220V/250V. The normal range of input voltage is –20% to +20%.

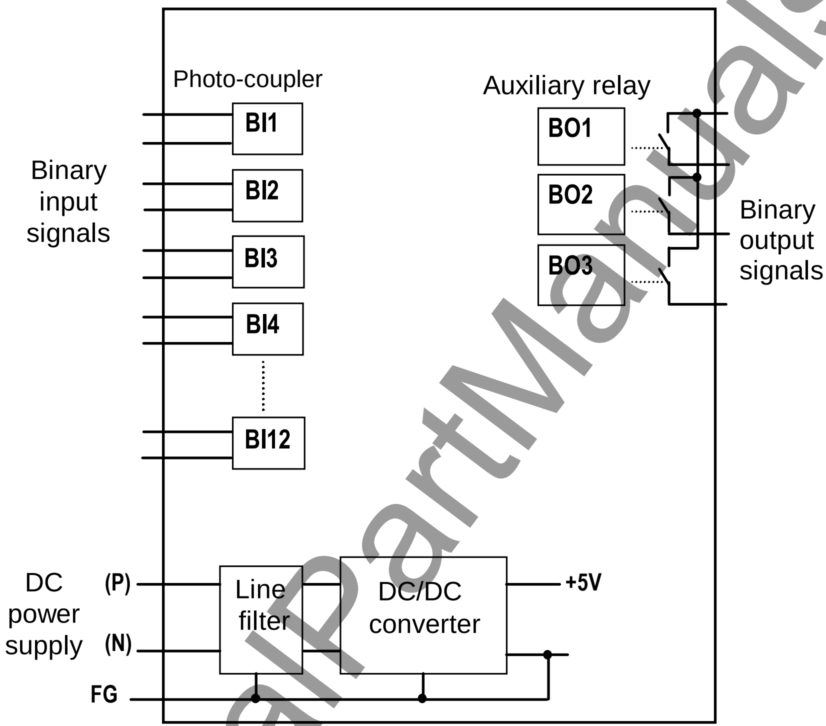



**Figure 3.1.6 IO#1(IO8) Module**

www . ElectricalPartManuals . com

**IO#2(IO2B) Module**

The IO2B module incorporates 3 photo-coupler circuits (BI13-BI15) for binary input signals, 14 auxiliary relays (BO1-BO13 and FAIL) for binary output signals and two RS485 transceivers.

The auxiliary relay FAIL has one normally closed contact, and operates when a relay failure or abnormality in the DC circuit is detected. BO1 to BO13 each have one normally open contact.

The RS485 transceivers are used for the link with the relay setting and monitoring (RSM) system, and substation control and monitoring system by communication protocol IEC 60870-5-103. The external signal is insulated from the relay internal signal.

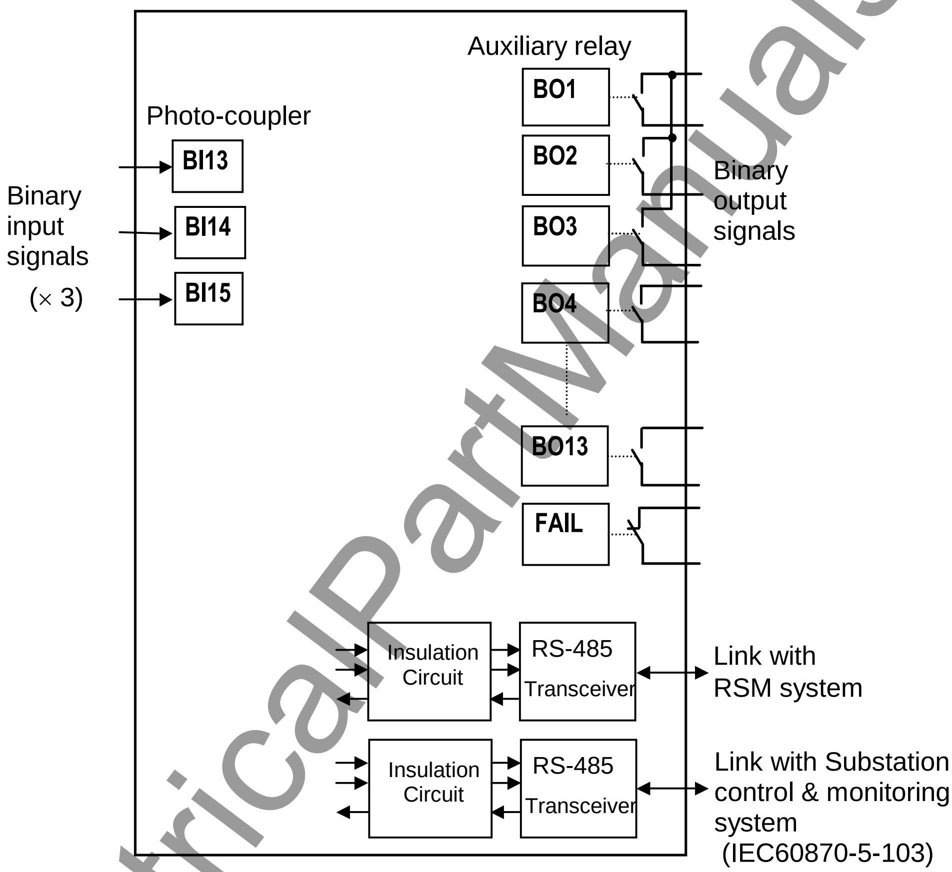



**Figure 3.1.7 IO#2(IO2B) Module**

www . ElectricalPartManuals . com

### 3.1.1.6 Human Machine Interface (HMI) Module

The operator can access the GRB100 via the human machine interface (HMI) module of the central unit (CU). As shown in Figure 3.1.8, the HMI module has a liquid crystal display (LCD), light emitting diodes (LED), view and reset keys, operation keys, testing jacks and an RS232C connector on the front panel.

The LCD consists of 40 columns by 4 rows with a backlight and displays record, status and setting data.

There are a total of 8 LED indicators and their signal labels and LED colors are defined as follows:

| Label | Color | Remarks |
|---|---|---|
| IN SERVICE | Green | Lit when relay is in service. |
| TRIP | Red | Lit when trip command is issued. |
| ALARM | Red | Lit when failure is detected. |
| TESTING | Red | Lit when test condition is set. |
| (LED1) | Red | |
| (LED2) | Red | |
| (LED3) | Red | |
| (LED4) | Red | |

LED1 to LED4 are user-configurable and no label is sealed there.

Once it has started operating, the TRIP LED continues to operate even after the trip command disappears. Pressing the RESET key resets it. Other LEDs operate as long as a signal is present. The RESET key is ineffective for these LEDs.

The VIEW key starts the LCD indication and switches between windows. The RESET key clears the LCD indication and turns off the LCD backlight.

The operation keys are used to display the record, status and setting data on the LCD, input the settings or change the settings.

The monitoring jacks and two pairs of LEDs, A and B, on top of the jacks can be used while the test mode is selected in the LCD window. Signals can be displayed on LED A or LED B by selecting the signal to be observed from the "Signal List" or "Variable Timer List" and setting it in the window and the signals can be transmitted to an oscilloscope via the monitoring jacks. (For the "Signal List" or "Variable Timer List", see Appendix C or D.)

The RS232C connector is a 9-way D-type connector for serial RS232C connection. This connector is used for connection with a local personal computer.

www . ElectricalPartManuals . com

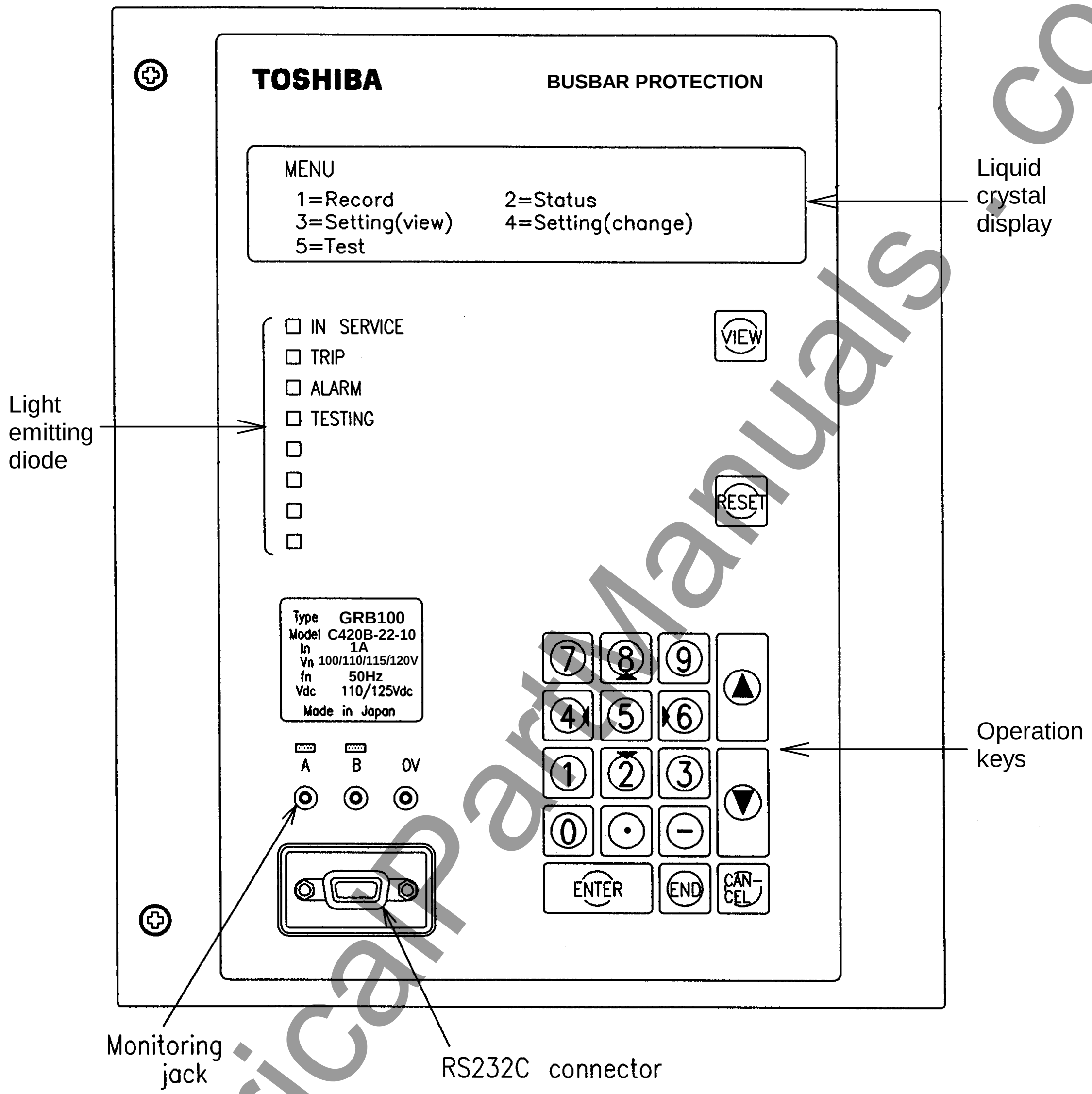



**Figure 3.1.8 HMI of CU (Front Panel)**

www . ElectricalPartManuals . com

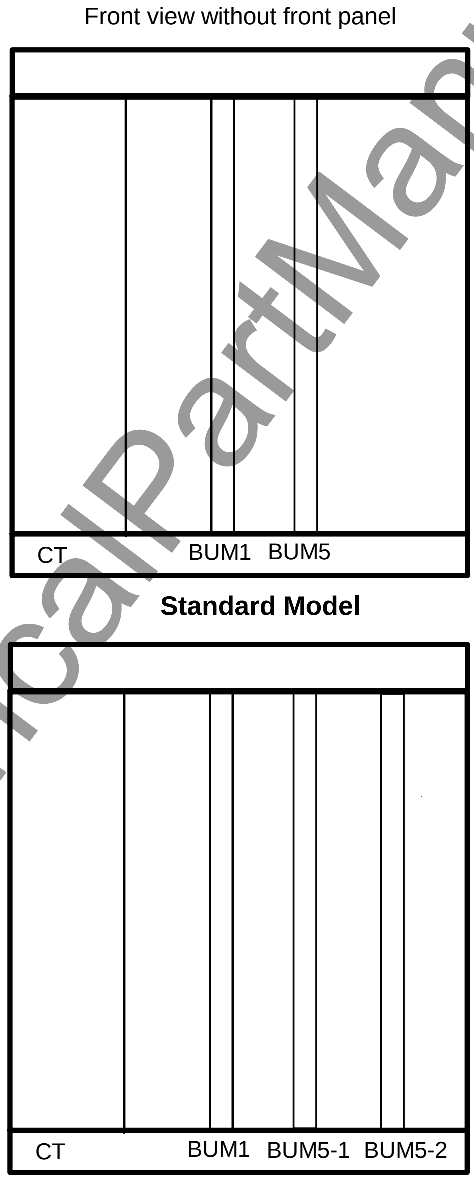
## 3.1.2 Bay Unit

### 3.1.2.1 Outline of Hardware Modules

The hardware structure of the BU is shown in Figure 3.1.9. The front view shows the equipment without the front panel.

The BU consists of the following hardware modules.

- Transformer module (CT)
- Bay unit module 1 (BUM1)
- Bay unit module 2 (BUM5)
- Front panel




Model with LED indication (option)

**Figure 3.1.9 Hardware Structure of BU**

Case outline of the Bay Unit (BU) is shown in Appendix H.

www . ElectricalPartManuals . com

The hardware block diagrams of the BU using these modules are shown in Figure 3.1.10.

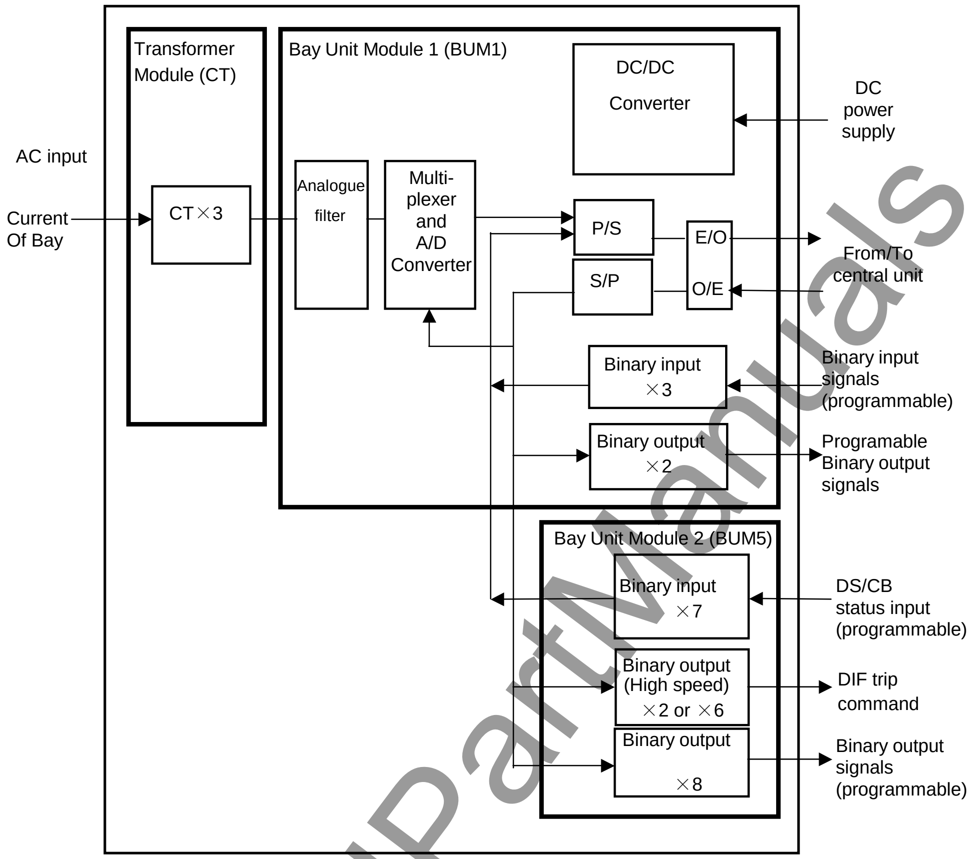



**Figure 3.1.10 Hardware Block Diagram of BU**

www . ElectricalPartManuals . com

#### 3.1.2.2 Transformer Module CT

The transformer module (CT module) insulates between the internal and external circuits through an auxiliary transformer and transforms the magnitude of AC input signals to suit the electronic circuits.

Figure 3.1.11 shows a block diagram of the transformer module. There are 3 auxiliary CTs mounted in the transformer module.

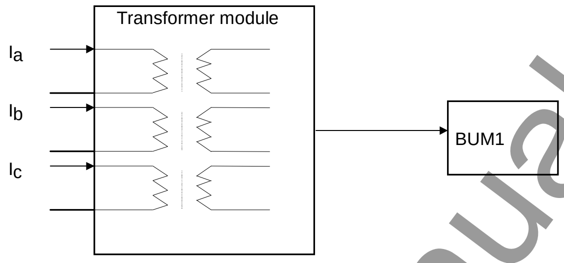



**Figure 3.1.11 Transformer Module of BU**

www . ElectricalPartManuals . com

#### 3.1.2.3 Bay Unit Module

There are two types of module: BUM1 and BUM5.

**BUM1 Module**

The bay unit module 1 (BUM1) consists of an analogue filter, multiplexer, analogue to digital (A/D) converter, DC/DC converter, photo-coupler circuits (BI11 to BI13) for binary input signals and 2 auxiliary relays.

The analogue filter performs low-pass filtering for the corresponding current and voltage signals.

The A/D converter has a resolution of 16 bits and samples input signals at sampling frequencies of 2400 Hz (at 50 Hz) and 2880 Hz (at 60 Hz).

The input voltage rating of the DC/DC converter is 48V/60V, 110V/125V or 220V/250V. The normal range of input voltage is –20% to +20%.

The auxiliary relays BO1 and BO2 have one normally open contact.

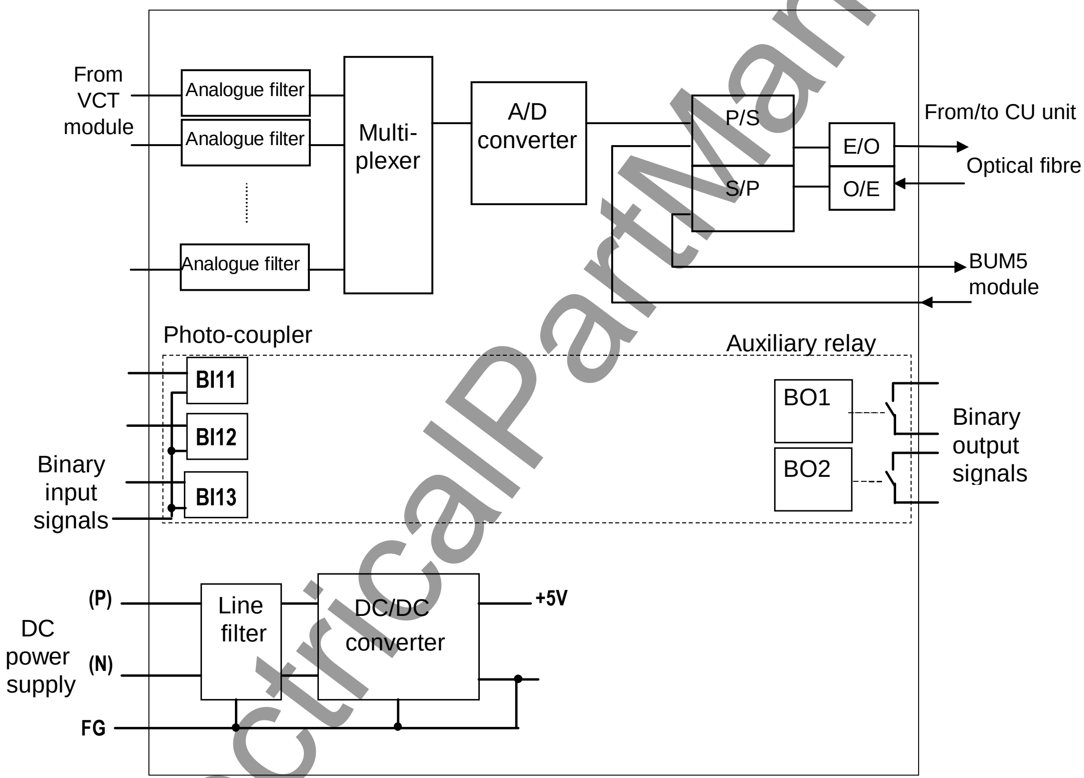



**Figure 3.1.12 BUM1 Module**

**BUM5 Module**

In the GRB100-B310B and -B300B, the bay unit module BUM5 incorporates 7 photo-coupler circuits (BI1-BI7) for binary input signals, 4 auxiliary relays and 2 or 6 high-speed auxiliary relays for tripping command.

In the GRB100-B410L, two modules (BUM5-1 and BUM5-2) are used and total 14 photo-coupler circuits, 4 auxiliary relays and 2 or 6 high-speed auxiliary relays for tripping command. Further, 18 LEDs (LED1 to LED18) are provided. Each LED is linked with a BI or a BO and drove by the output of BI or BO. (Refer to Section 3.1.2.4.)

The tripping command auxiliary relays are the high-speed operation type and have one normally open output contact.

www.ElectricalPartManuals.com

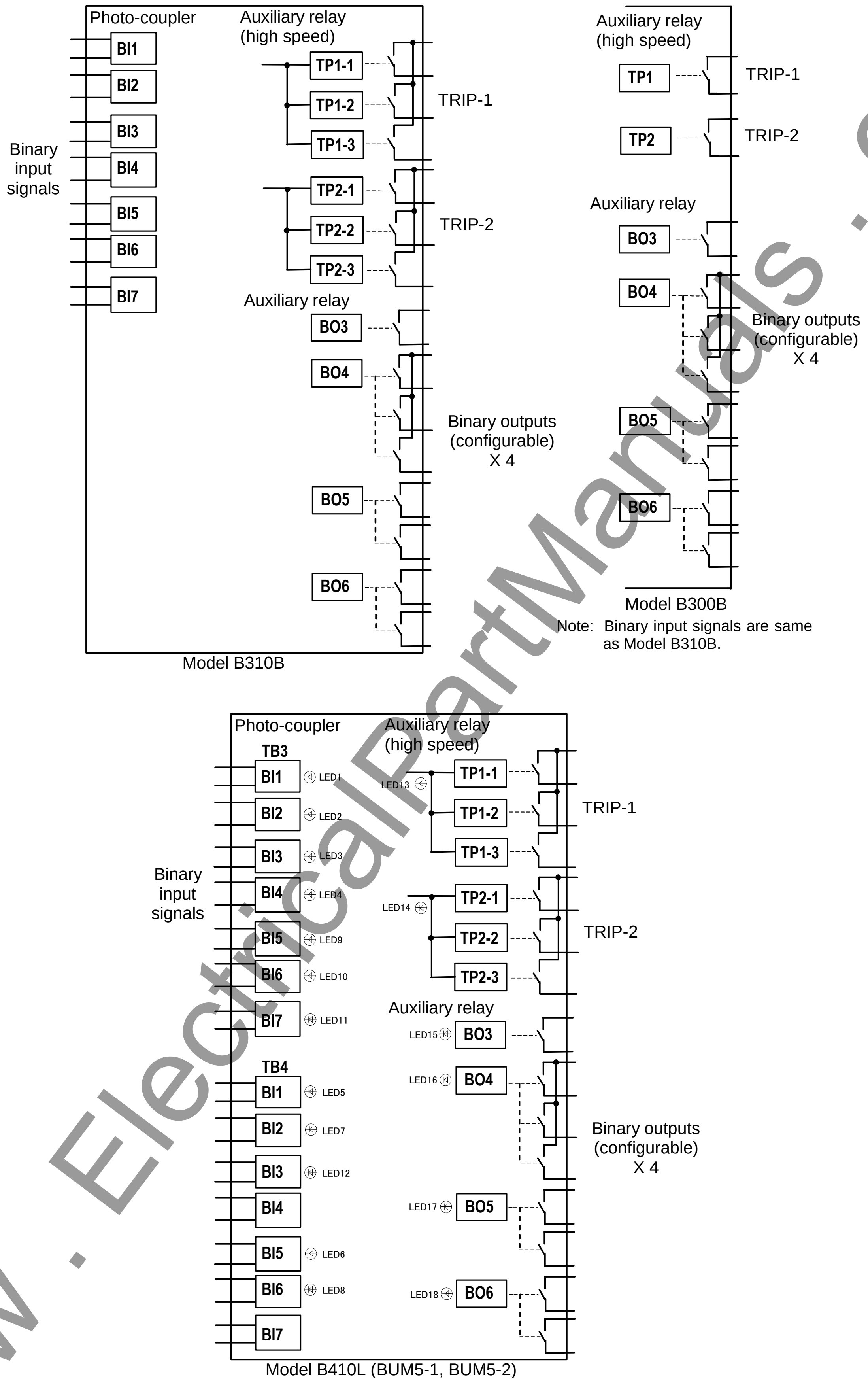



**Figure 3.1.13 BUM5 Module**

www . ElectricalPartManuals . com

### 3.1.2.4 Front Panel of Bay Unit

The front panel provides a green LED. The LED is lit when DC power is supplied.

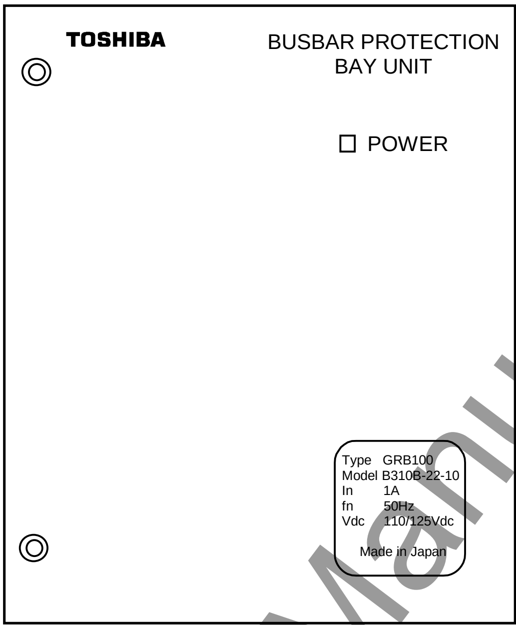



**Figure 3.1.14 Front Panel of BU (GRB100-B300B, -B310B)**

The bay unit can provide LEDs for indication of binary input and output status as option.

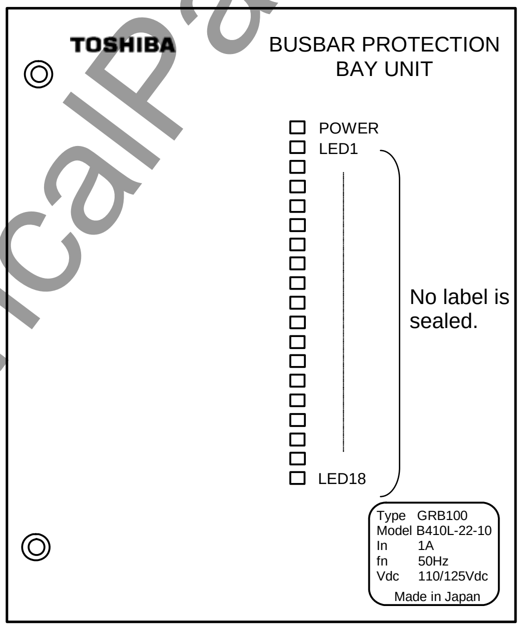



**Figure 3.1.15 Front Panel of BU with LED Indication (GRB100-B410L:option)**

18 LEDs (LED1 to LED18) are provided. Each LED is linked with a BI or a BO and drove by the output of BI or BO as shown in Table 3.1.1. LED1 to 12 are for BI, LED13, 14 for trip BO, and LED15 to 18 for configurable BO assigned by PLC. However, no name label is sealed there. User should seal name labels there. For connections, see Appendix I. As shown in Appendix I, LED12 to 18 can be reset by the binary input “LED RESET”(TB4:BI7). Lamp test for all LEDs can be tested by the binary input “LED TEST”(TB4:BI4) under “LED∗A=Enabled” setting.

www . ElectricalPartManuals . com

**Table 3.1.1 Specification of LEDs**

| LED No. | BI / BO | TB No. | LED color | Latch operation | Enable/Disable function |
|---|---|---|---|---|---|
| LED1 | BI1 (TB3) | TB3-A3, B3 | Red | No | -- |
| LED2 | BI5 (TB3) | TB3-A4, B4 | Green | No | -- |
| LED3 | BI2 (TB3) | TB3-A5, B5 | Red | No | -- |
| LED4 | BI6 (TB3) | TB3-A6, B6 | Green | No | -- |
| LED5 | BI1 (TB4) | TB4-A3, B3 | Red | No | -- |
| LED6 | BI5 (TB4) | TB4-A4, B4 | Red/Green | No | -- |
| LED7 | BI2 (TB4) | TB4-A5, B5 | Red | No | -- |
| LED8 | BI6 (TB4) | TB4-A6, B6 | Red/Green | No | -- |
| LED9 | BI3 (TB3) | TB3-A14, B14 | Red | No | -- |
| LED10 | BI7 (TB3) | TB3-A15, B15 | Red/Green | No | Yes |
| LED11 | BI4 (TB3) | TB3-A16, B16 | Red | No | Yes |
| LED12 | BI3 (TB4) | TB4-A14, B14 | Red | No/Yes | Yes |
| LED13 | TP1 (TB3) | TB3-A1,B1,A2, B2 | Red | Yes | -- |
| LED14 | TP2 (TB3) | TB3-A17,B17,A18, B18 | Red | Yes | Yes |
| LED15 | BO3 (TB3) | TB3-A7, B7 | Red | No/Yes | Yes |
| LED16 | BO4 (TB3) | TB3-A8,B8,A9, B9 | Red | No/Yes | Yes |
| LED17 | BO5 (TB3) | TB3-A10, B10, -A11, B11 | Red | No/Yes | Yes |
| LED18 | BO6 (TB3) | TB3-A12, B12, -A13, B13 | Red | No/Yes | Yes |

The color of LED6, LED8 and LED10 can be set to red or green. LED12 to LED18 are provided with latched operation function, LED12 and LED15 to LED18 can be set to the latched operation or not. LED10 to LED12 and LED13 to LED18 can be set to Enabled or Disabled.

Above setting is performed by connector pins located on the rear of the front panel as follows:

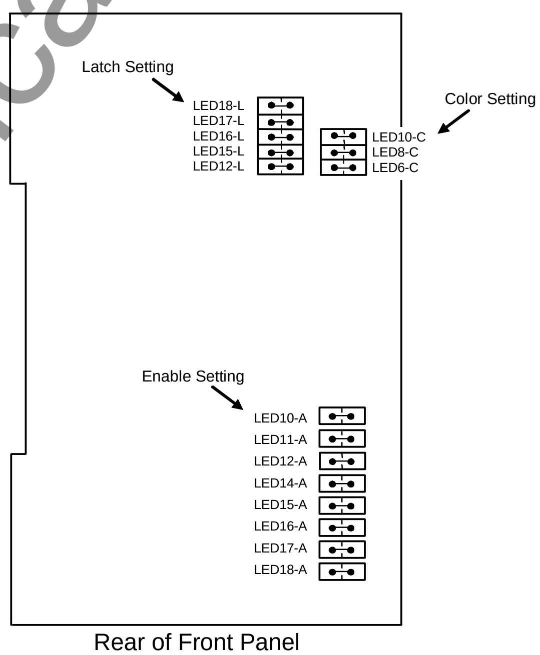



**Figure 3.1.16 Connector Pin Location**

www . ElectricalPartManuals . com

**Color setting**

| LED No. | Connector pin | Setting | Color |
|---|---|---|---|
| LED6 | LED6-C | Insert | Red |
| | | Pull out | Green |
| LED8 | LED8-C | Insert | Red |
| | | Pull out | Green |
| LED10 | LED10-C | Insert | Red |
| | | Pull out | Green |

**Latched operation setting**

| LED No. | Connector pin | Setting | Latched or Non-latched |
|---|---|---|---|
| LED12 | LED12-L | Insert | Non-latched |
| | | Pull out | Latched |
| LED15 | LED15-L | Insert | Non-latched |
| | | Pull out | Latched |
| LED16 | LED16-L | Insert | Non-latched |
| | | Pull out | Latched |
| LED17 | LED17-L | Insert | Non-latched |
| | | Pull out | Latched |
| LED18 | LED18-L | Insert | Non-latched |
| | | Pull out | Latched |

**LED Enabled/Disabled setting**

| LED No. | Connector pin | Setting | LED Function |
|---|---|---|---|
| LED10 | LED10-A | Insert | Enabled |
| | | Pull out | Disabled |
| LED11 | LED11-A | Insert | Enabled |
| | | Pull out | Disabled |
| LED12 | LED12-A | Insert | Enabled |
| | | Pull out | Disabled |
| LED14 | LED14-A | Insert | Enabled |
| | | Pull out | Disabled |
| LED15 | LED15-A | Insert | Enabled |
| | | Pull out | Disabled |
| LED16 | LED16-A | Insert | Enabled |
| | | Pull out | Disabled |
| LED17 | LED17-A | Insert | Enabled |
| | | Pull out | Disabled |
| LED18 | LED18-A | Insert | Enabled |
| | | Pull out | Disabled |

www . ElectricalPartManuals . com

## 3.2 Input and Output Signals

### 3.2.1 Input Signals

#### AC input signals

Table 3.2.1 shows the AC input signals applied to the CU and BU of the GRB100 and their respective input terminal numbers. AC voltage input signals are provided only for the models with FD elements. The model 300s and 400s provide four zones, Zone A to Zone D. See Appendix I for external connections.

**Table 3.2.1 (a) AC Input Signals of CU (Models with FD elements)**

| Terminal No. of TB3 | Signals | Terminal No. of TB3 | Signals |
|---|---|---|---|
| | Zone A | | Zone C |
| 1 | A phase voltage | 9 | A phase voltage |
| 2 | B phase voltage | 10 | B phase voltage |
| 3 | C phase voltage | 11 | C phase voltage |
| 4 | Neutral | 12 | Neutral |
| | Zone B | | Zone D |
| 5 | A phase voltage | 13 | A phase voltage |
| 6 | B phase voltage | 14 | B phase voltage |
| 7 | C phase voltage | 15 | C phase voltage |
| 8 | Neutral | 16 | Neutral |
| | | 18 | (earth) |

**Table 3.2.1 (b) AC Input Signals of BU**

| Terminal No. of TB1 | Signals |
|---|---|
| 1-2 | A-phase current |
| 3-4 | B-phase current |
| 5-6 | C-phase current |
| 14 | (earth) |

#### Binary input signals

Table 3.2.2 shows the binary input signals available in the GRB100. See Appendix I for external connections.

The binary input circuit of the CU is provided with a logic level inversion function as shown in Figure 3.2.1. Each input circuit has a binary switch BISW which can be used to select either normal or inverted operation.

Further, all binary input functions are programmable by PLC (Programmable Logic Circuit) function.

If a signal is not input, the function concerned is disabled.

The operating voltage of binary input signal is typical 74V DC at 110V/125V DC rating and

www.ElectricalPartManuals.com

138V DC at 220/250V DC. The minimum operating voltage is 70V DC at 110/125V DC rating and 125V DC at 220/250V DC.

**Table 3.2.2 (a) Binary Input Signals in CU**

| Signal Name | Contents | Default Setting BI No. |
|---|---|---|
| Indication reset | Reset TRIP LED indication externally. | BI1 |
| Bus protection block-A(*) | Block bus protection externally. | BI2 |
| CBF protection block-A(*) | Block breaker failure protection. | BI3 |
| Bus protection block-B(*) | Block bus protection externally. | BI4 |
| CBF protection block-B(*) | Block breaker failure protection. | BI5 |
| | | BI6 |
| | | BI7 |
| | | BI8 |
| | | BI9 |
| | | BI10 |
| | | BI11 |
| | | BI12 |
| | | BI13 |
| | | BI14 |
| | | BI15 |

(*): These signals are duplicated with two BIs.
- BUS protection block: BI2 & BI4
- CBF protection block: BI3 & BI5

See Appendix I.

**Table 3.2.2 (b) Binary Input Signals in BU of GRB100-B300B, -B310B (each channel CH)**

| Signal Name | Contents | Default Setting BI No. |
|---|---|---|
| DS1 contact (N/O) | Detect disconnector condition. (Closed when disconnector closed.) | BI1 |
| DS1 contact (N/C) | Detect disconnector condition. (Open when disconnector closed.) | BI5 |
| DS2 contact (N/O) | Detect disconnector condition. (Closed when disconnector closed.) | BI2 |
| DS2 contact (N/C) | Detect disconnector condition. (Open when disconnector closed.) | BI6 |
| | | BI3 |
| | | BI7 |
| Command trip | Initiate command tripping. (Gas press low) | BI4 |
| External trip signal | Initiate CBF protection. (A-phase) | BI11 |
| External trip signal | Initiate CBF protection. (B-phase) | BI12 |
| External trip signal | Initiate CBF protection. (C-phase) | BI13 |

www . ElectricalPartManuals . com

**Table 3.2.2 (C) Binary Input Signals in BU of GRB100-B410L (each channel CH)**

| Signal Name | Contents | Default Setting BI No. |
|---|---|---|
| DS1 contact (N/O) | Detect disconnector condition. (Closed when disconnector closed.) | BI1(TB3) |
| DS1 contact (N/C) | Detect disconnector condition. (Open when disconnector closed.) | BI5(TB3) |
| DS2 contact (N/O) | Detect disconnector condition. (Closed when disconnector closed.) | BI2(TB3) |
| DS2 contact (N/C) | Detect disconnector condition. (Open when disconnector closed.) | BI6(TB3) |
| | | BI3(TB3) |
| | | BI7(TB3) |
| Command trip | Initiate command tripping. (Gas press low) | BI4(TB3) |
| External trip signal | Initiate CBF protection. (A-phase) | BI11(TB2) |
| External trip signal | Initiate CBF protection. (B-phase) | BI12(TB2) |
| External trip signal | Initiate CBF protection. (C-phase) | BI13(TB2) |
| | | BI1(TB4) |
| | | BI5(TB4) |
| | | BI2(TB4) |
| | | BI6(TB4) |
| | | BI3(TB4) |
| LED reset | Reset LED12 to LED18 | BI7(TB4) |
| LED test | Test all LEDs | BI4(TB4) |

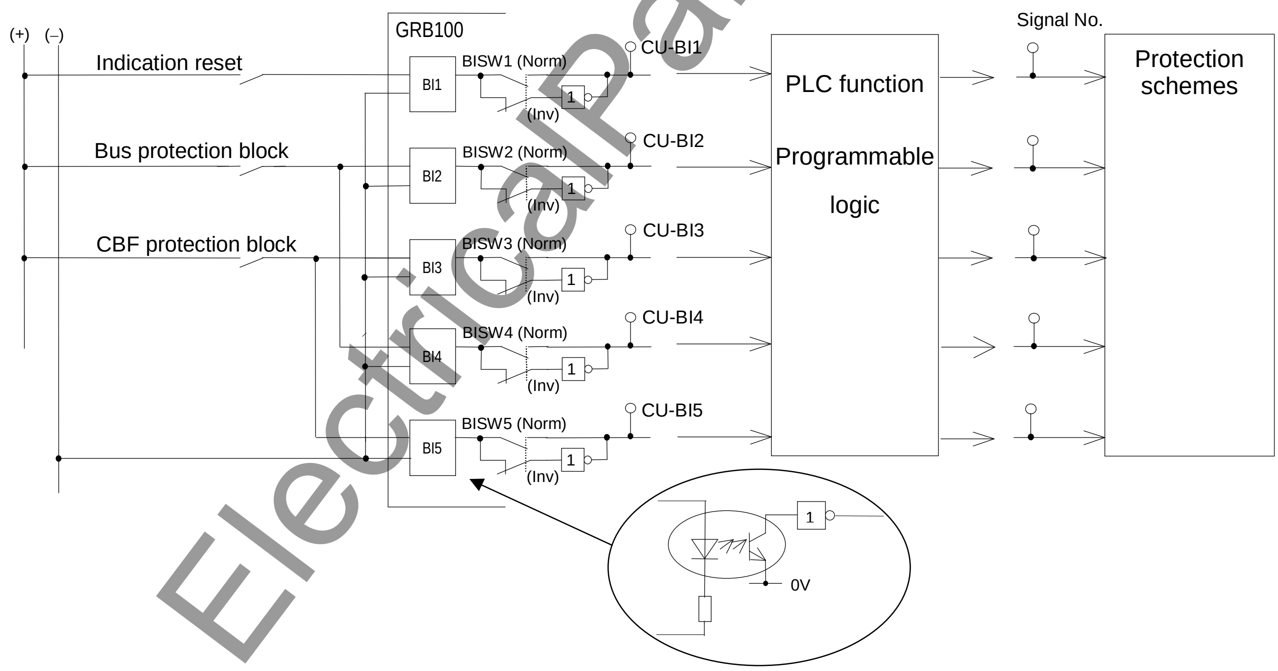



**Figure 3.2.1 Logic Level Inversion**

### 3.2.2 Binary Output Signals

The number of binary output signals and their output terminals vary depending on the relay models. See Appendix I for details. For all models, all outputs except the relay failure signal can be configured.

The signals shown in the signal list in Appendix C can be assigned to the output relay individually

www . ElectricalPartManuals . com

or in arbitrary combinations. Signals can be combined using either an AND circuit or OR circuit with 6 gates each as shown in Figure 3.2.2. The output circuit can be configured according to the setting menu. Appendix E shows the factory default settings.

A 0.2s delayed drop-off timer can be attached to these assigned signals. The delayed drop-off time is disabled by the scheme switch [BOTD].

The relay failure contact closes when a relay defect or abnormality in the DC power supply circuit is detected.

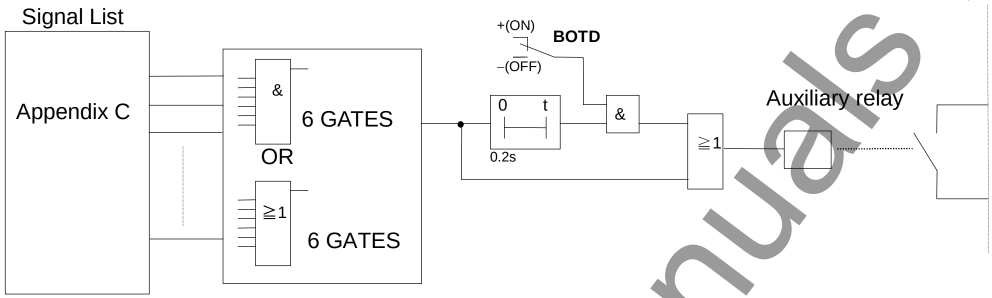



**Figure 3.2.2 Configurable Output**

The binary outputs TP1, TP2, BO3 to BO6 for each BU (CH1 – CH32) are programmed by PLC function.

### 3.2.3 PLC (Programmable Logic Controller) Function

GRB100 is provided with a PLC function allowing user-configurable sequence logics on binary signals. The sequence logics with timers, flip-flops, AND, OR, NOT logics, etc. can be produced by using the PC software "PLC tool" and linked to signals corresponding to relay elements or binary circuits.

Configurable binary inputs, binary outputs and LEDs, and the initiation trigger of disturbance record are programmed by the PLC function. Temporary signals are provided for complicated logics or for using a user-configured signal in many logic sequences.

PLC logic is assigned to protection signals by using the PLC tool. For PLC tool, refer to PLC tool instruction manual.

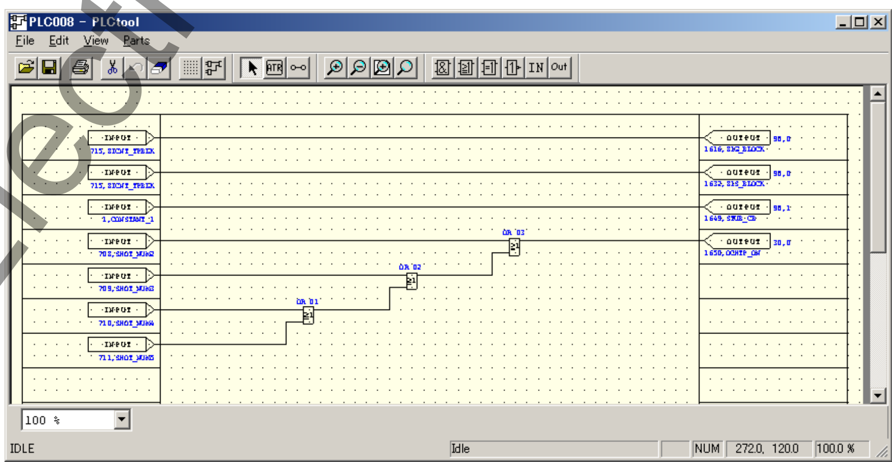



**Figure 3.2.3 Sample Screen of PLC Tool**

www . ElectricalPartManuals . com

## 3.3 Automatic Supervision

### 3.3.1 Basic Concept of Supervision

Though the protection system is in the non-operating state under normal conditions, it is waiting for a power system fault to occur at any time and must operate for the fault without fail. Therefore, the automatic supervision function, which checks the health of the protection system during normal operation by itself, plays an important role. Numerical relays based on the microprocessor operations are suitable for implementing this automatic supervision function of the protection system. The GRB100 implements the automatic supervision function by taking advantage of this feature under the following principles:

- The supervision function should not affect protection performance.
- Supervision must be performed with no omissions wherever possible.
- When a failure occurs, the failure location should be easy to identify.

**Note**: The automatic supervision function includes an automatic monitor function and automatic test function. For the terminology, refer to IEC IEV 60448.

### 3.3.2 Relay Monitoring

The relay is supervised with the following items.

**AC input imbalance monitoring**

The AC current input is monitored and if the following equation is satisfied the health of the AC input circuit is checked.

- CT circuit current monitoring

  $\mathrm{Max}(|I_a|, |I_b|, |I_c|) - 4 \times \mathrm{Min}(|I_a|, |I_b|, |I_c|) \geq k_0$

  where,

  $\mathrm{Max}(|I_a|, |I_b|, |I_c|)$ = Maximum amplitude among $I_a$, $I_b$ and $I_c$

  $\mathrm{Min}(|I_a|, |I_b|, |I_c|)$ = Minimum amplitude among $I_a$, $I_b$ and $I_c$

  $k_0$ = 20% of rated current

The CT circuit current monitoring (AISV) allows high sensitivity detection of failures that have occurred in the AC input circuit.

If the AISV detects an AC input imbalance, it blocks the busbar protection trip by blocking the binary outputs and issues an alarm when the [AISV]="ALM&BLK" setting. It issues only alarm when the [AISV]="ALM" setting.

The AISV is blocked by setting the scheme switch [AISV] to OFF.

Furthermore, for models with FD elements, the AC voltage input is monitored and if the following equations are satisfied the health of the AC input circuit is checked.

- Zero sequence voltage monitoring

  $|V_a + V_b + V_c| / 3 \geq 6.35$ (V)

- Negative sequence voltage monitoring

  $|V_a + a^2V_b + aV_c| / 3 \geq 6.35$ (V)

www.ElectricalPartManuals.com

where,

a = Phase shifter of 120°

These zero sequence monitoring and negative sequence monitoring allow high-sensitivity detection of failures that have occurred in the AC input circuits.

The negative sequence voltage monitoring allows high sensitivity detection of failures in the voltage input circuit, and it is effective for detection particularly when cables have been connected with the incorrect phase sequence.

In the AC voltage input monitoring (AIFDSV), the "ALM&BLK" or only "ALM" is also selected by setting the scheme switch [AIFDSV] the same as the AISV.

**Setting**

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| [AISV] | Off / ALM&BLK / ALM | | ALM&BLK | Alarm and/or blocking |
| [AIFDSV] | Off / ALM&BLK / ALM | | ALM | Alarm and/or blocking |

### A/D accuracy checking

An analogue reference voltage is input to a prescribed channel in the analogue-to-digital (A/D) converter, and the system checks that the data after A/D conversion is within a prescribed range and that the A/D conversion characteristics are correct.

### Memory monitoring

The memories are monitored as follows depending on the type of memory, and the system also checks that the memory circuits are healthy:

- Random access memory monitoring: Writes/reads prescribed data and checks the storage function.
- Program memory monitoring: Checks the checksum value of the written data.
- Setting value monitoring: Checks for any discrepancy between the setting values stored in duplicate.

### Watchdog timer

A hardware timer which is cleared periodically by software is provided, and used to check that the software is running normally.

### DC supply monitoring

The secondary voltage level of the built-in DC/DC converter is monitored, and the system checks that the DC voltage is within a prescribed range.

The DC supply failure of BU is detected by the communication monitoring. See Section 3.3.5.

### Binary input circuit monitoring

The binary input signals for the "Breaker failure protection initiation", "Busbar protection block" and "CBF protection block" are monitored. The monitoring checks the discrepancy between the signals of the input circuits provided in duplicate.

www.ElectricalPartManuals.com

### 3.3.3 CT Circuit Failure Detection

If a failure occurs in a CT circuit, the differential elements may operate incorrectly. GRB100 incorporates a CT failure detection function (CTF) against such incorrect operation. The CTF is provided with each Zone (Check zone and Zone A to D). When the CTF detects a CT failure, it can block the DIF trip.

The CTF is enabled or disabled by the scheme switch [CTFEN] as follows:

- "Off": Disabled.
- "On": Enabled. If once CTF is detected, the CTF function cannot be reset until CTFID is reset.
- "OPT-On": Enabled. After CTF is detected, the CTF function is reset if CTFUV, CTFDV or OVGF operates.

The DIF trip is blocked or not by the scheme switch [CTFCNT].

- "NA": No block the DIF trip
- "BLK": Block the DIF trip of the detected zone

This function is available for Model 400 series.

#### Detection logic

Figure 3.3.1 shows the CTF detection logic for Check zone and Zone A. The logic for Zone B, C and D is same as that for Zone A.

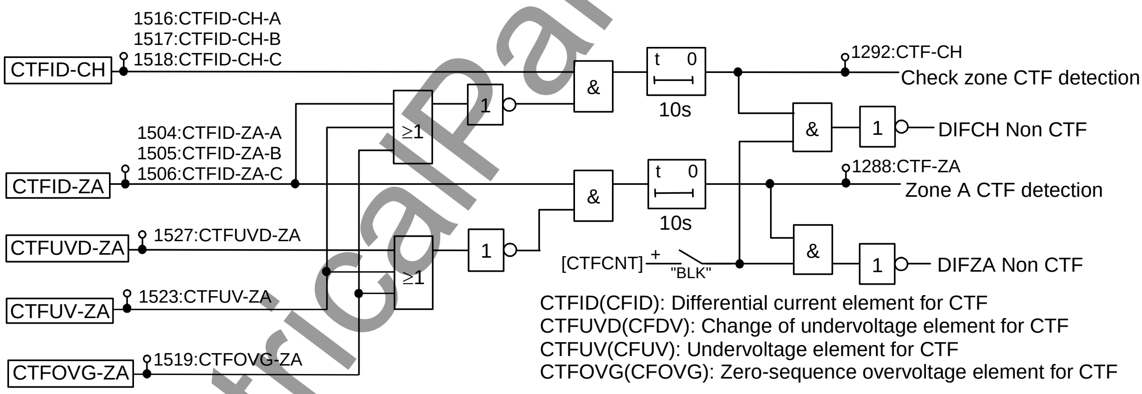



**Figure 3.3.1 CTF Detection Logic**

#### Setting

The setting elements necessary for the CTF and their setting ranges are as follows:

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| CFID | 50 - 3000 A | 1 A | 200 A | Id current level |
| CFUV | 20 - 60 V | 1 V | 20 V | |
| CFDV | 1 - 10 % | 1 % | 7 % | % of rated voltage |
| CFOVG | 0.1 - 10.0 V | 0.1 V | 1.0 V | Zero-sequence voltage |
| [CTFEN] | Off/On/OPT-On | | Off | CTF enabled or not |
| [CTFCNT] | NA / BLK | | NA | Control by CTF detection |



www . ElectricalPartManuals . com

### 3.3.4 Differential Current Monitoring

The supervisory element DIFSV is provided to check the health of the CT circuit. The DIFSV element detects the erroneous differential current that appears in the case of a CT circuit failure. The DIFSV is provided with each Zone (Check zone and Zone A to D). The DIFSV has a non-restraint current differential characteristic.

**Detection logic**

Figure 3.3.2 shows the erroneous differential current detection (DIFSV) logic for Check zone and Zone A. The logic for Zone B, C and D is same as that for Zone A.

If the DIFSV detects an erroneous differential current, it blocks the busbar protection trip by blocking the binary outputs and issues an alarm when the [IDSV]="ALM&BLK" setting. It issues only alarm when the [IDSV]="ALM" setting. The monitoring is blocked by setting the [IDSV] to OFF.

**Setting**

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| DIFSV | 20 – 3000A | 1A | 200A | Min. operating current |
| TIDSV | 0 – 60s | 1s | 10s | Timer for DIFSV |
| [IDSV] | Off / ALM&BLK / ALM | | ALM | Control by IDSV monitoring |

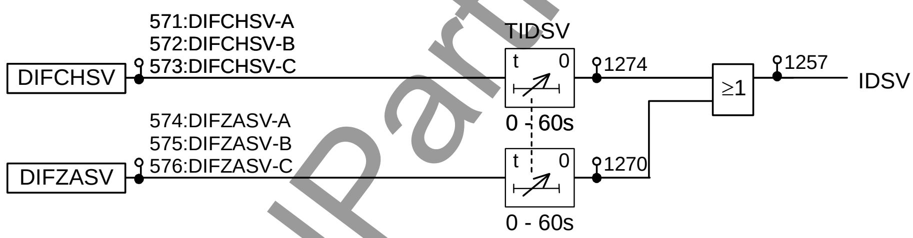



**Figure 3.3.2 DIFSV Logic**

The DIFSV setting is determined from the erroneous differential current which is generated during normal service condition due to errors between CTs.

Maximum erroneous differential current < DIFSV < DIFCH and DIFZ settings

### 3.3.5 Disconnector and Circuit Breaker Monitoring

The disconnector and circuit breaker are monitored to prevent unwanted operation in case of their failure. The scheme logics are shown in Figures 3.3.3 and 3.3.4.

To monitor the disconnector (DS) and circuit breaker (CB), a normally open contact and a normally closed contact are introduced. The failure is detected when the normally open contact and normally closed contact are simultaneously in the open or closed state for the prescribed period. If the DSSV or CBSV detects a DS fail or CB fail, it can block the busbar protection and issues an alarm when the [DSSV] or [CBSV]="ALM&BLK" setting or can issue only alarm when the [DSSV] or [CBSV]="ALM" setting. In the case of DS fail, the discriminating zone protection including the DS failed is blocked. The monitoring is blocked by setting the switch [DSSV] and [CBSV] to OFF. The default settings of these switches are OFF to prevent false failure detection when their contacts are not introduced.

www.ElectricalPartManuals.com

**Setting**

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| TDSSV | 0 – 60s | 1s | 60s | Timer for DSSV |
| TCBSV | 0 – 60s | 1s | 10s | Timer for CBSV |
| [DSSV] | Off / ALM&BLK / ALM | | ALM | Control by DSSV monitoring |
| [CBSV] | Off / ALM&BLK / ALM | | ALM | Alarm and/or blocking |

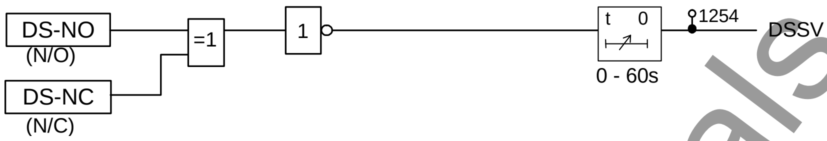



**Figure 3.3.3 DSSV Logic**

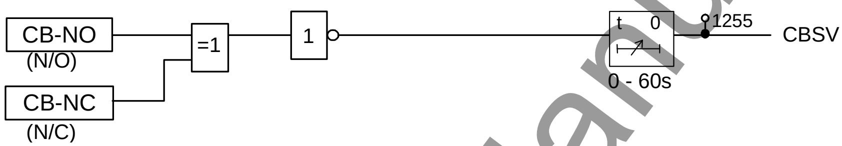



**Figure 3.3.4 CBSV Logic**

### 3.3.6 Communication Monitoring

The communication signal between CU and BU is monitored per channel at both the CU and BU by employing a cyclic redundancy check of the received data.

If a data failure or interruption is detected, an alarm is displayed on the LCD of the CU.

### 3.3.7 BU Address Monitoring

The BU address is set with the rotary switch. If the setting is changed, it is possible that the data could be communicated to the wrong BU. To avoid this, the BU address is monitored at the CU.

If a failure is detected, the failure alarm "BU∗∗: Address err" is displayed on the LCD of the CU.

Note: BU∗∗ means the BU number.

### 3.3.8 Failure Alarms

When a failure is detected by the automatic supervision, it is followed with the LCD display, LED indication, external alarm issuance and event recording. Table 3.3.1 summarizes the supervision items and alarms.

The LCD messages are shown on the "Auto-supervision" screen which is displayed automatically when a failure is detected by pressing the VIEW key. The event record messages are shown on the "Event record" screen by opening the "Record" sub-menu.

Those alarms are retained until the failure is recovered.

Those alarms can be disabled collectively by setting the scheme switch [AMF] to OFF. The setting is used to block unnecessary alarm issuance during commissioning testing or maintenance.

When the Watchdog Timer detects that the software is not running normally, the LCD display and event recording of the failure may not function.

www.ElectricalPartManuals.com

**Table 3.3.1 Supervision Items and Alarms**

| Supervision Item | LCD Message | LED "IN SERVICE" | LED "ALARM" | Ext. alarm | Event record Message |
|---|---|---|---|---|---|
| AC input imbalance monitoring | (1) | On/Off (2) | On | Operate/ No operate (5) | CT err, V0 err, V2 err |
| A/D accuracy check<br>Memory monitoring | (1) | Off | On | (4) | Relay fail |
| Watchdog Timer | ---- | Off | On | (4) | ---- |
| DC supply monitoring | ---- | Off | (3) | (4) | Relay fail |
| Binary input circuit monitoring | BU∗: DIO err | Off | On | (4) | Relay fail |
| Differential current monitoring | Id-Z∗ err<br>Id err | On/Off (2) | On | Operate/ No operate (5) | Id err |
| DS and CB monitoring | DS∗ err<br>DS-Z∗ err<br>CB∗ err | On/Off (2) | On | Operate/ No operate (5) | DS fail,<br>CB fail |
| Communication monitoring | (1) | Off | On | (4) | Relay fail |
| BU address monitoring | BU∗∗: Address err | Off | On | (4) | Relay fail |
| CTF monitoring | CT fail, CT-ZA fail to CT-ZD fail | On | On | No operate (6) | CTF, CTF-ZA to CTF-ZD |

DS: disconnector, CB: circuit breaker

(1): Various messages are provided as expressed with "---fail" or "---err" in the Table in Section 6.7.2.

(2): The LED is on when the related scheme switch [AISV], [AIFDSV], [IDSV], [DSSV] or [CBSV] is set to "ALM" and off when set to "ALM & BLK" (refer to Section 3.3.9).

(3): Whether the LED is lit or not depends on the degree of the voltage drops.

(4): The binary output relay "FAIL" operates.

(5): When the setting is "ALM & BLK", the relay "FAIL" operates. When "ALM" setting is used, the relay "FAIL" does not operate, but an Ext. alarm is possible by assigning the programmable BO (signal No. 1258).

(6): The user-configurable binary output relays operate if the signal assigned.

### 3.3.9 Bridge Alarm

When a bridge condition is retained for the TBRDG setting, the BRIDGE ALARM is issued.

**Setting**

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| TBRDG | 0 – 60s | 1s | 60s | Busbar bridge time |

www . ElectricalPartManuals . com

### 3.3.10 Trip Blocking

When a failure is detected by the following supervision items, the trip function is blocked for as long as the failure exists and is restored when the failure is removed:

- A/D accuracy check
- Memory monitoring
- Watchdog Timer
- DC supply monitoring

When a failure is detected by AC input imbalance monitoring, differential current monitoring, disconnector monitoring or circuit breaker monitoring, the scheme switch [AISV], [AIFDSV], [IDSV], [DSSV] or [CBSV] setting can be used to determine if both tripping is blocked and an alarm is output, or, if only an alarm is output.

www . ElectricalPartManuals . com

## 3.4 Recording Function

The GRB100 is provided with the following recording functions:

Fault recording

Event recording

Disturbance recording

These records are displayed on the LCD of the relay front panel or on the local or remote PC.

### 3.4.1 Fault Recording

Fault recording is started by a tripping command of the GRB100 and the following items are recorded for one fault:

Date and time of fault occurrence

Faulted phase

Tripping channel

Tripping mode

Power system quantities

Up to the 4 most-recent faults are stored as fault records. If a new fault occurs when 4 faults have been stored, the record of the oldest fault is deleted and the record of the latest fault is then stored.

#### Date and time of fault occurrence

The time resolution is 1 ms using the relay internal clock.

To be precise, this is the time at which a tripping command has been initiated, and thus it is approximately 10 ms after the occurrence of the fault.

#### Faulted phase

The faulted phase is indicated by a differential element operating phase.

#### Tripping mode

This shows the protection scheme that initiated the tripping command.

DIF, DIF-ZA, DIF-ZB, DIF-ZC, DIF-ZD: DIF protection trip

(Note) DIF: check zone protection trip only,
DIF-ZA to DIF-ZD: check zone protection trip and discriminating zone protection trip, or discriminating zone protection trip only

CBF-trip: Breaker failure protection backup trip

CBF-retrip: Breaker failure protection retrip

#### Tripped channel

The tripped channel is expressed with the status "1". (See Section 4.2.1)

#### Power system quantities

The following power system quantities in pre-faults and faults are recorded.

(However, the power system quantities are not recorded for evolving faults.)

www . ElectricalPartManuals . com

- Magnitude of phase differential current of check zone and discriminating zone protection ($I_{da}$, $I_{db}$, $I_{dc}$, $I_{daA}$, $I_{dbA}$, $I_{dcA}$ up to $I_{daD}$, $I_{dbD}$, $I_{dcD}$)
- Magnitude and phase angle of phase voltage of check zone and discriminating zone protection ($V_{aA}$, $V_{bA}$, $V_{cA}$ up to $V_{aD}$, $V_{bD}$, $V_{cD}$)
- Magnitude and phase angle of symmetrical component voltage of check zone and discriminating zone protection ($V_{1A}$, $V_{2A}$, $V_{0A}$ up to $V_{1D}$, $V_{2D}$, $V_{0D}$)
- Magnitude and phase angle of phase current of each channel ($I_a$, $I_b$, $I_c$)
- Magnitude and phase angle of symmetrical component current of each channel ($I_1$, $I_2$, $I_0$)

The differential currents of check zone and discriminating zone protection are displayed in percent of DIFCH and DIFZ setting respectively. The voltages are recorded in Model 400s. Phase angles above are expressed taking that of positive sequence voltage as a reference phase angle. The leading phase angles are expressed plus.

If no voltage input, the positive sequence current of CH1 is taken as a reference phase angle. Therefore, it is recommended that the CH1 should be assigned for a feeder. If the current of CH1 is small, the current of the next channel is used as a reference phase angle.

### 3.4.2 Event Recording

The events shown in Table 3.4.1 are recorded with the 1 ms resolution time-tag when the status changes. The user can select the recording items.

Up to 480 records can be stored. If an additional event occurs when 480 records have been stored, the oldest event record is deleted and the latest event record is then stored.

**Table 3.4.1 Event Record Items**

| Event | LCD Indication | |
|---|---|---|
| Zone A trip command output or reset | ZA trip | On or Off |
| Zone B trip command output or reset | ZB trip | On or Off |
| Zone C trip command output or reset | ZC trip | On or Off |
| Zone D trip command output or reset | ZD trip | On or Off |
| Busbar trip command output or reset | Trip | On or Off |
| CBF retrip command output or reset | CBF-retrip | On or Off |
| CBF trip command output or reset | CBF-trip | On or Off |
| CBF transfer trip signal output or reset | CBF-TR | On or Off |
| Busbar bridge operate or reset | Bus bridge | On or Off |
| Transfer bus operate or reset | Trans. bus | On or Off |
| Busbar protection blocking external command input or reset | BP block | On or Off |
| Circuit breaker failure protection blocking external command input or reset | CBF block | On or Off |
| Indication reset input or reset | Ind. reset | On or Off |
| Relay failure detected or restored | Relay fail | On or Off |
| CT current circuit failure detected or restored | CT err | On or Off |
| Differential current monitoring error or restored | Id err | On or Off |
| CTF detected or restored | CTF | On or Off |

| Event | LCD Indication | |
|---|---|---|
| Disconnector failed or restored | DS fail | On or Off |
| CB failed or restored | CB fail | On or Off |
| nDS1 N/C contact open or closed (*) | nDS1 N/C | On or Off |
| nDS1 N/O contact open or closed (*) | nDS1 N/O | On or Off |
| nDS2 N/C contact open or closed (*) | nDS2 N/C | On or Off |
| nDS2 N/O contact open or closed (*) | nDS2 N/O | On or Off |
| Command trip | COM-trip | On or Off |
| n External trip A-phase signal for CBF initiation (*) | nExt. trip A | On or Off |
| n External trip B-phase signal for CBF initiation (*) | nExt. trip B | On or Off |
| n External trip C-phase signal for CBF initiation (*) | nExt. trip C | On or Off |
| System setting changed (**) | Sys. set change | |
| Relay setting changed (**) | Rly. set change | |
| Group setting changed (**) | Grp. set change | |

(*): "n" expresses the channel number and it is up to 32. These events are set in a block by the channel.

(**): The event of a setting change is classified into three events. The event "System setting changed" corresponds to all the setting changes except setting changes in the sub-menu "Protection". (See section 4.2.6 for changing the settings). The event "Relay setting changed" corresponds to setting change of measuring elements and timers in the sub-menu "Protection". The event "Group setting changed" corresponds to other setting changes in the sub-menu "Protection".

**Setting**

One of the following four modes is selectable.

| Modes | Setting |
|---|---|
| Not to record the event. | None |
| To record the event when the status changes to "operate". | Operate |
| To record the event when the status changes to "reset". | Reset |
| To record the event when the status changes both to "operate" and "reset". | Both |

For the setting, see the Section 4.2.6.5. The default setting is "Both" for all events except those marked with (*) in Table 3.4.1. The events marked with (*) have a default setting of "Operate".

### 3.4.3 Disturbance Recording

The disturbance records include 108 analogue signals, which are phase currents of each channel and phase voltages of zones A to D, and 128 binary signals listed in Appendix F and the dates and times at which recording started.

The LCD display only shows the dates and times of disturbance records stored. Details can be displayed on the PC. For how to obtain disturbance records on the PC, see the PC software instruction manual.

The pre-fault recording time is fixed at 0.3s and post-fault recording time can be set between 0.1 and 2.0s.

The number of records stored depends on the post-fault recording time. The approximate relationship between the post-fault recording time and the number of records stored is shown in

www.ElectricalPartManuals.com

Table 3.4.2.

**Note:** If the recording time setting is changed, all previously recorded data is deleted.

**Table 3.4.2 Number of Records**

| CU Model | Frequency (Hz) | Post fault recording time | | | | |
|---|---|---|---|---|---|---|
| | | 0.1s | 0.5s | 1.0s | 1.5s | 2.0s |
| 410 | 50 | 28 | 14 | 8 | 6 | 5 |
| | 60 | 24 | 12 | 7 | 5 | 4 |
| 420 | 50 | 16 | 8 | 5 | 3 | 2 |
| | 60 | 13 | 6 | 4 | 3 | 2 |
| 430 | 50 | 11 | 5 | 3 | 2 | 2 |
| | 60 | 9 | 4 | 2 | 2 | 1 |
| 440 | 50 | 8 | 4 | 2 | 1 | 1 |
| | 60 | 7 | 3 | 2 | 1 | 1 |

### Settings

The elements necessary for starting disturbance recording and their setting ranges are shown in the table below.

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| 1OCG | 0.1 - 10.0(*) | 0.1 | 1.0 | Residual overcurrent element |
| 1OCS | 0.1 - 10.0(*) | 0.1 | 2.0 | Phase overcurrent element |
| 2OCG | 0.1 - 10.0(*) | 0.1 | 1.0 | Residual overcurrent element |
| 2OCS | 0.1 - 10.0(*) | 0.1 | 2.0 | Phase overcurrent element |
| : | | | | |
| : | | | | |
| 32OCG | 0.1 - 10.0(*) | 0.1 | 1.0 | Residual overcurrent element |
| 32OCS | 0.1 - 10.0(*) | 0.1 | 2.0 | Phase overcurrent element |

(*) : Multiplier of CT rated current

Starting the disturbance recording by a tripping command or the starter elements listed above is enabled or disabled by setting the following scheme switches with identical names with the starter elements except the switch [TRIP].

| Element | Range | Step | Default | Remarks |
|---|---|---|---|---|
| [TRIP] | Off / On | | On | Start by tripping command |
| [OCG] | Off / On | | Off | Start by OCG operation |
| [OCS] | Off / On | | Off | Start by OCS operation |

www . ElectricalPartManuals . com

## 3.5 Metering Function

The GRB100 performs continuous measurement of the analogue input quantities. The measurement data shown below is displayed on the LCD of the relay front panel or on the local or remote PC.

- Magnitude of phase differential current of check zone and discriminating zone protection ($I_{da}$, $I_{db}$, $I_{dc}$, $I_{daA}$, $I_{dbA}$, $I_{dcA}$ up to $I_{daD}$, $I_{dbD}$, $I_{dcD}$)
- Magnitude of restraint current of check zone and discriminating zone protection ($I_{ra}$, $I_{rb}$, $I_{rc}$, $I_{raA}$, $I_{rbA}$, $I_{rcA}$ up to $I_{raD}$, $I_{rbD}$, $I_{rcD}$)
- Magnitude and phase angle of phase voltage of check zone and discriminating zone protection ($V_{aA}$, $V_{bA}$, $V_{cA}$ up to $V_{aD}$, $V_{bD}$, $V_{cD}$)
- Magnitude and phase angle of symmetrical component voltage of check zone and discriminating zone protection ($V_{1A}$, $V_{2A}$, $V_{0A}$ up to $V_{1D}$, $V_{2D}$, $V_{0D}$)
- Magnitude and phase angle of phase current of each channel ($I_a$, $I_b$, $I_c$)
- Magnitude and phase angle of symmetrical component current of each channel ($I_1$, $I_2$, $I_0$)
- Frequency (only for Model 400s)

The differential currents of check zone and discriminating zone protection are displayed in current (A) and percent (%) of DIFCH and DIFZ setting respectively. The voltages and frequency are recorded in Model 400s. The differential currents of check zone and discriminating zone protection are displayed in percent of DIFCH and DIFZ setting respectively. Phase angles above are expressed taking that of positive sequence voltage as a reference phase angle. The leading phase angles are expressed plus.

If no voltage input, the positive sequence current of CH1 is taken as a reference phase angle. Therefore, it is recommended that the CH1 should be assigned for a feeder. If the current of CH1 is small, the current of the next channel is used as a reference phase angle.

The above system quantities except the phase differential currents are displayed in values on the primary side or on the secondary side of the CT and VT by the setting. (See Section 4.2.6.6.) To display accurate values, it is necessary to set the each VT ratio too. For the setting method, see "Setting the busbar parameters" in 4.2.6.7. The phase differential currents show the percentage to DIFCH and DIFZ setting values.

www . ElectricalPartManuals . com

# 4. User Interface

## 4.1 Outline of User Interface

The user can access the relay from the front panel of the CU.

Local communication with the relay is also possible using a personal computer (PC) with the RSM (Relay Setting and Monitoring) software via an RS232C port. Furthermore, remote communication is also possible using a PC with the RSM via an RS485 and the protocol converter G1PR2.

This section describes the front panel configuration and the basic configuration of the menu tree of the local human machine communication ports and HMI (Human Machine Interface).

### 4.1.1 Front Panel

As shown in Figure 3.1.8, the front panel of the central unit is provided with a liquid crystal display (LCD), light emitting diode (LED), operation keys, VIEW and RESET keys, monitoring jack and RS232C connector.

**LCD**

The LCD screen, provided with a 4-line, 40-character back-light, displays detailed information of the relay interior such as records, status and setting. The LCD screen is normally unlit, but pressing the VIEW key will display the digest screen and pressing any key other than VIEW and RESET will display the menu screen.

These screens are turned off by pressing the RESET key or END key. If any display is left for 5 minutes or longer without operation, the back-light will go off.

**LED**

There are 8 LED displays. The signal labels and LED colors are defined as follows:

| Label | Color | Remarks |
|---|---|---|
| IN SERVICE | Green | Lit when the relay is in service. |
| TRIP | Red | Lit when a trip command is issued. |
| ALARM | Red | Lit when a failure is detected. |
| TESTING | Red | Lit when test condition is set. |
| (LED1) | Red | |
| (LED2) | Red | |
| (LED3) | Red | |
| (LED4) | Red | |

LED1 to LED4 are configurable and no label is sealed there.

The TRIP LED lights up once the relay is operating and remains lit even after the trip command goes off. The TRIP LED can be turned off by pressing the RESET key. Other LEDs are lit as long as a signal is present and the RESET key is invalid while the signal is maintained.

www. ElectricalPartManuals . com

**Operation keys**

The operation keys are used to display records, status, and set values on the LCD, as well as to input or change set values. The function of each key is as follows:

① 0-9, –: Used to enter a selected number, numerical values and text strings.

② ▼, ▲: Used to move between lines displayed on a screen

Keys 2, 4, 6 and 8 marked with ▼, ◀, ▶ and ▲ are also used to enter text strings.

③ CANCEL: Used to cancel entries and return to the upper screen.

④ END: Used to end entry operation, return to the upper screen or turn off the display.

⑤ ENTER: Used to store or establish entries.

**VIEW and RESET keys**

Pressing VIEW key displays digest screens such as "Metering", "Latest fault" and "Auto-supervision".

Pressing RESET key turns off the display.

**Monitoring jacks**

The two monitoring jacks A and B and their respective LEDs can be used when the test mode is selected on the LCD screen. By selecting the signal to be observed from the "Signal List" and setting it on the screen, the signal can be displayed on LED A or LED B, or sent to an oscilloscope via a monitoring jack.

**RS232C connector**

The RS232C connector is a 9-way D-type connector for serial RS232C connection with a local personal computer.

www . ElectricalPartManuals . com

### 4.1.2 Communication Ports

The following three interfaces are provided with the central unit as communication ports:

- RS232C port
- RS485 port (Two ports)
- IRIG-B port

#### RS232C port

This connector is a standard 9-way D-type connector (straight type) for serial port RS232C transmission and is mounted on the front panel of central unit. By connecting a personal computer to this connector, setting and display functions can be performed from the personal computer.

#### RS485 port

Two RS485 ports can be provided.

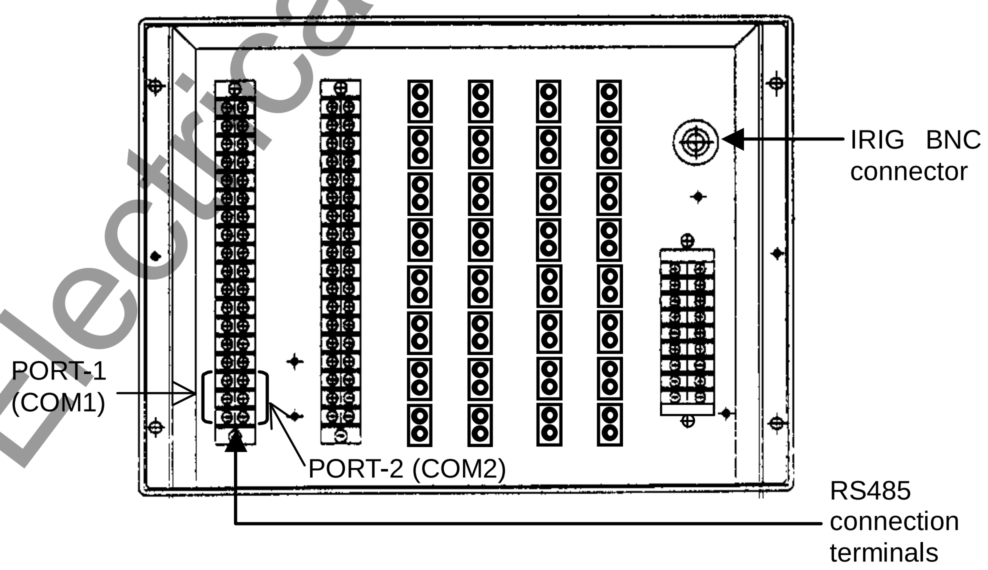
One RS485 port (PORT-1: COM1) is used to connect between relays and between the relay and the protocol converter G1PR2 to construct a network communication system. (For the system configuration, see Figure 4.4.2 in Section 4.4.2) The other port (PORT-2: COM2) is used to communicate substation control and monitoring system (Protocol: IEC 60870-5-103).

This port is on the back of the central unit, as shown in Figure 4.1.1.

#### IRIG-B port

The IRIG-B port is mounted on the transformer module, and collects serial IRIG-B format data from the external clock to synchronize the relay calendar clock. The IRIG-B port is isolated from the external circuit by a photo-coupler. A BNC connector is used as the input connector.

This port is on the back of the central unit, as shown in Figure 4.1.1.




**CU rear view**

**Figure 4.1.1 Locations of RS485 Port and IRIG Port**

www . ElectricalPartManuals . com

## 4.2 Operation of the User Interface

The user can access such functions as recording, measurement, relay setting and testing with the LCD display and operation keys.

### 4.2.1 LCD and LED Displays

#### Displays during normal operation

When the GRB100 is operating normally, the green "IN SERVICE" LED is lit and the LCD is off.

Press the VIEW key when the LCD is off to display the "Metering 1", "Metering 2", "Metering 3", "Metering 4", "Latest fault" and "Auto-supervision" screens in turn. The "Latest fault" and "Auto-supervision" screens are displayed only when there is some data. The following are the digest screens and can be displayed without entering the menu screens.

Metering 1

```
Ida  ***** %  Idb  ***** %  Idc  ***** %



```

Note: Ida, Idb and Idc are the phase differential current of the check zone protection and show the percentage to DIFCH setting value.

```
IdaA ***** %  IdbA ***** %  IdcA ***** %
IdaB ***** %  IdbB ***** %  IdcB ***** %
IdaC ***** %  IdbC ***** %  IdcC ***** %
IdaD ***** %  IdbD ***** %  IdcD ***** %
```

Note: Idax, Idbx and Idcx are the phase differential current of the discriminating zone and show the percentage to DIFZ setting value. ("x"= A, B, C, D)
IdyA to IdyD are displayed depend on applied zones. ("y" = a, b, c)

When the discriminating zone protection provides up to three zone protections, two screens above are displayed in one screen as follows:

```
Ida  ***** %  Idb  ***** %  Idc  ***** %
IdaA ***** %  IdbA ***** %  IdcA ***** %
IdaB ***** %  IdbB ***** %  IdcB ***** %
IdaC ***** %  IdbC ***** %  IdcC ***** %
```

Metering 2

```
VaA  ***.*kV  VbA  ***.*kV  VcA  ***.*kV
VaB  ***.*kV  VbB  ***.*kV  VcB  ***.*kV
VaC  ***.*kV  VbC  ***.*kV  VcC  ***.*kV
VaD  ***.*kV  VbD  ***.*kV  VcD  ***.*kV
```

Note: Vax, Vbx and Vcx for the phase voltage of the discriminating zone.
("x"= A, B, C, D)
VyA to VyD are displayed depend on applied zones. ("y" = a, b, c)

Metering 3

```
CH1  **********************
Ia   **.**kA  Ib   **.**kA  Ic   **.**kA
CH2  **********************
Ia   **.**kA  Ib   **.**kA  Ic   **.**kA
```

www . ElectricalPartManuals . com

"Metering 3" is displayed repeatedly as many as the number of channels.

Metering 4

```
Metering                  08/Dec/1997   18:13


     **.*Hz
```

Latest fault

```
Latest fault    16/Oct/1997   18:13:45.160
Phase  ABC
DIF-ZA
BP [11111100 00000000 00000000 00000000]
```

Status of tripping command

Note: Tripped channel is expressed with the status "1".

Auto-supervision

```
Auto-supervision    08/Dec/1997   22:56

 DIO err
```

Press the RESET key to turn off the LCD.

For any display, the back-light is automatically turned off after five minutes.

### Displays in tripping

If a fault occurs and a tripping command is initiated when the LCD is off, the "Latest fault" screen is displayed on the LCD automatically and the red "TRIP" LED lights.

Press the VIEW key to display the digest screens in turn including the "Metering" and "Auto-supervision" screens.

Press the RESET key to turn off the LEDs and LCD display.

If the tripping command is initiated when any of the screens is displayed, the current screen remains displayed and the red "TRIP" LED lights.

When any of the menu screens is displayed, the VIEW and RESET keys do not function. To return to the digest screen, do the following:

- Return to the top screen of the menu by repeatedly pressing the END key.
- Press the END key to turn off the LCD.
- Press the VIEW key to display the "Latest fault" screen.
- Press the RESET key to turn off the "TRIP" LED and LCD.

### Displays in automatic supervision operation

If the automatic supervision function detects a failure while the LCD is off, the "Auto-supervision" screen is displayed automatically, showing the location of the failure and the "ALARM" LED lights.



www.ElectricalPartManuals.com

Press the VIEW key to display other digest screens in turn including the "Metering" and "Latest fault" screens.

Press the RESET key to turn off the LCD display. However, if the failure continues, the "ALARM" LED remains lit.

After recovery from a failure, the "ALARM" LED and "Auto-supervision" display turn off automatically.

If a failure is detected while any of the screens is displayed, the current screen remains displayed and the "ALARM" LED lights.

While any of the menu screens is displayed, the VIEW and RESET keys do not function. To return to the digest "Auto-supervision" screen, do the following:

- Return to the top screen of the menu by repeatedly pressing the END key.
- Press the END key to turn off the LCD.
- Press the VIEW key to display the digest screen.
- Press the RESET key to turn off the LCD.

### 4.2.2 Relay Menu

Figure 4.2.1 shows the menu hierarchy in the GRB100. The main menu has five sub-menus, "Record", "Status", "Setting (view)", "Setting (change)", and "Test". For details of the menu hierarchy, see Appendix G.

www . ElectricalPartManuals . com

- Menu
  - Record
    - Fault record
    - Event record
    - Disturbance record
  - Status
    - Metering
    - Binary input & output
    - Relay element
    - Time synchronization source
    - Clock adjustment
  - Setting (view)
    - Relay version
    - Description
    - Communication
    - Record
    - Status
    - Protection
    - Binary input
    - Binary output
    - LED
  - Setting (change)
    - Password
    - Description
    - Communication
    - Record
    - Status
    - Protection
    - Binary input
    - Binary output
    - LED
  - Test
    - Switch
    - Binary output
    - Timer
    - Logic circuit

**Figure 4.2.1 Relay Menu**

www . ElectricalPartManuals . com

#### Record

In the "Record" menu, the fault records, event records and disturbance records are displayed or erased.

#### Status

The "Status" menu displays the power system quantities, binary input and output status, relay measuring element status, signal source for time synchronization (IRIG-B, RSM or IEC) and adjusts the clock.

#### Setting (view)

The "Setting (view)" menu displays the relay version, plant name and the current settings of relay address and RS232C baud rate in communication, record, status, protection, configurable binary inputs and outputs, and configurable LEDs.

#### Setting (change)

The "Setting (change)" menu is used to set or change the settings of password, plant name, relay address and RS232C baud rate in communication, record, status, protection, configurable binary inputs and outputs, and configurable LEDs.

Since this is an important menu and is used to set or change settings related to relay tripping, it has password security protection.

#### Test

The "Test" menu is used to set testing switches, to forcibly operate binary output relays, to measure variable timer time and to observe the binary signals in the logic circuit.

When the LCD is off, press any key other than the VIEW and RESET keys to display the top "MENU" screen and then proceed to the relay menus.

```
   MENU
1=Record                2=Status
3=Setting(view)         4=Setting(change)
5=Test
```

To display the "MENU" screen when the digest screen is displayed, press the RESET key to turn off the LCD, then press any key other than the VIEW and RESET keys.

Press the END key when the top screen is displayed to turn off the LCD.

An example of the sub-menu screen is shown below. The top line shows the hierarchical layer of the screen, screen title and total number of lines of the screen. The last item is not displayed for all the screens. "/2" displayed on the far left means that the screen is in the second hierarchical layer, while 1/5 displayed on the far right means that the screen has five lines excluding the top line and that the cursor is on the first line.

To move the cursor downward or upward for setting or for viewing other lines not displayed on the window, use the ▼ and ▲ keys.

www.ElectricalPartManuals.com

```
/2    12/Feb/1998 22:56:19   [Local]   1/ 5
Minute(      0-    59):       41  _
Hour  (      0-    23):       22
Day   (      1-    31):       12
Month (      1-    12):        2
Year  ( 1990- 2089):     1998
```

To move to the lower screen or move from the left-side screen to the right-side screen in Appendix G, select the appropriate number on the screen. To return to the higher screen or move from the right-side screen to the left-side screen, press the END key.

The CANCEL key can also be used to return to the higher screen but it must be used carefully because it may cancel entries made so far.

To move between screens of the same hierarchical depth, first return to the higher screen and then move to the lower screen.

### 4.2.3 Displaying Records

The sub-menu of "Record" is used to display fault records, event records and disturbance records.

#### 4.2.3.1 Displaying Fault Records

To display fault records, do the following:

- Open the top "MENU" screen by pressing any keys other than the VIEW and RESET keys.
- Select 1 (= Record) to display the "Record" sub-menu.

```
/1 Record
1=Fault record         2=Event record
3=Disturbance record
```

- Select 1 (= Fault record) to display the "Fault record" screen.

```
/2 Fault Record
1=Display     2=Clear
```

- Select 1 (= Display) to display the dates and times of fault records stored in the relay from the top in new-to-old sequence.

```
/3 Fault record                          1/ 4
#1   16/Oct/1997 18:13:57.031
#2   20/Sep/1997 15:29:22.463
#3   04/Jul/1997 11:54:53.977
```

- Move the cursor to the fault record line to be displayed using the ▲ and ▼ keys and press the ENTER key to display the details of the fault record.

www.ElectricalPartManuals.com

Date and Time → Fault phase → Tripping mode → Tripping signal output channels; Power system quantities →

```
/4 Fault Record #1                                   3/**
16/Oct/1997   18:13:57.031
Phase ABC
DIF-ZA
BP   [11111100 00000000 00000000 00000000]
RE   [00000000 00000000 00000000 00000000]
CBF  [00000000 00000000 00000000 00000000]
TR   [00000000 00000000 00000000 00000000]
COM  [00000000 00000000 00000000 00000000]
ETR  [00000000 00000000 00000000 00000000]
Ida    **** %
Idb    **** %
Idc    **** %
IdaA   **** %                 IdaB  **** %
IdbA   **** %                 IdbB  **** %
IdcA   **** %                 IdcB  **** %
IdaC   **** %                 IdaD  **** %
IdbC   **** %                 IdbD  **** %
IdcC   **** %                 IdcD  **** %
Fault values
VaA    ***.*kV  ***.*°   V1A   ***.*kV   ***.*°
VbA    ***.*kV  ***.*°   V2A   ***.*kV   ***.
VcA    ***.*kV  ***.*°   V0A   ***.*kV   ***.
VaB    ***.*kV  ***.*°   V1B   ***.*kV   ***.*°
VbB    ***.*kV  ***.*°   V2B   ***.*kV   ***.
VcB    ***.*kV  ***.*°   V0B   ***.*kV   ***.
VaC    ***.*kV  ***.*°   V1C   ***.*kV   ***.*°
VbC    ***.*kV  ***.*°   V2C   ***.*kV   ***.
VcC    ***.*kV  ***.*°   V0C   ***.*kV   ***.
VaD    ***.*kV  ***.*°   V1D   ***.*kV   ***.*°
VbD    ***.*kV  ***.*°   V2D   ***.*kV   ***.
VcD    ***.*kV  ***.*°   V0D   ***.*kV   ***.
CH1    *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
CH2    *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
                  :
CH32   *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
Prefault values
VaA    ***.*kV  ***.*°   V1A   ***.*kV   ***.*°
VbA    ***.*kV  ***.*°   V2A   ***.*kV   ***.
VcA    ***.*kV  ***.*°   V0A   ***.*kV   ***.
                  :
CH2    *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
                  :
CH32   *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
```

Note: The phase differential currents show the percentage to DIFCH and DIFZ setting values.

www.ElectricalPartManuals.com

IdyA to IdyD and VyA to VyD are displayed depend on applied zones. ("y"= a, b, c, 1, 2, 0) In the phase angle indication, the reference phase angle is indicated as "0.0°" at V1A. Phase angles above are expressed taking that of positive sequence voltage as a reference phase angle. The leading phase angles are expressed plus. If no voltage input, the positive sequence current of CH1 is taken as a reference phase angle. If the current of CH1 is small, the current of the next channel is used as a reference phase angle. Therefore, the channel current as a reference phase angle may change to a different channel current after fault.

The lines which are not displayed in the window can be displayed by pressing the ▲ and ▼ keys.

The display format of tripping signal output channels is shown below.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | [■ | ■ | ■ | ■ | ■ | ■ | -- ---- -- | ■ | ■ | ■ | ■ | ■ | ■] |
| BP | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | -- ---- -- | CH27 | CH28 | CH29 | CH30 | CH31 | CH32 |
| RE | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | -- ---- -- | CH27 | CH28 | CH29 | CH30 | CH31 | CH32 |
| CBF | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | -- ---- -- | CH27 | CH28 | CH29 | CH30 | CH31 | CH32 |
| TR | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | -- ---- -- | CH27 | CH28 | CH29 | CH30 | CH31 | CH32 |
| COM | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | -- ---- -- | CH27 | CH28 | CH29 | CH30 | CH31 | CH32 |
| ETR | CH1 | CH2 | CH3 | CH4 | CH5 | CH6 | -- ---- -- | CH27 | CH28 | CH29 | CH30 | CH31 | CH32 |

Line "BP" shows the tripping signal output channels of the discriminating zone or check zone protection. Line "RE" shows the re-tripping tripping signal output channels of the breaker failure protection. Line "CBF" shows the backup signal output channels of the breaker failure protection. Line "TR" the transfer tripping signal output channels of the breaker failure protection. Line "COM" the command trip signal output channels. Line "ETR" the transfer tripping signal output channels of the end zone fault protection. The tripping signal output channel is displayed with the status "1".

To clear all the fault records, do the following:

- Open the "Record" sub-menu.
- Select 1 (= Fault record) to display the "Fault record" screen.
- Select 2 (= Clear) to display the following confirmation screen.

```
/2 Fault record
Clear all fault records?
        ENTER=Yes     CANCEL=No
```

- Press the ENTER (= Yes) key to clear all the fault records stored in non-volatile memory.

If all fault records have been cleared, the "Latest fault" screen of the digest screens is not displayed.

#### 4.2.3.2 Displaying Event Records

To display events records, do the following:

- Open the top "MENU" screen by pressing any keys other than the VIEW and RESET keys.
- Select 1 (= Record) to display the "Record" sub-menu.
- Select 2 (= Event record) to display the "Event record" screen.



www.ElectricalPartManuals.com

```
/2 Event Record
1=Display     2=Clear
```

- Select 1 (= Display) to display the events with date and time from the top in new-to-old sequence.

```
/3 Event record                                2/48
16/Oct/1998 23:18:04.294   Trip             Off
16/Oct/1998 23:18:03.913   Trip             On
12/Feb/1998 03:51:37.622   Rly.set change
```

The lines which are not displayed in the window can be displayed by pressing the ▲and ▼ keys.

To clear all the event records, do the following:

- Open the "Record" sub-menu.
- Select 2 (= Event record) to display the "Event record" screen.
- Select 2 (= Clear) to display the following confirmation screen.

```
/2 Event record
Clear all event records?
         ENTER=Yes     CANCEL=No
```

- Press the ENTER (= Yes) key to clear all the event records stored in non-volatile memory.

#### 4.2.3.3 Displaying Disturbance Records

Details of the disturbance records can be displayed on the PC screen only (*); the LCD displays only the recorded date and time for all disturbances stored in the relay. To display them, do the following:

(*) For the display on the PC screen, refer to RSM100 manual.

- Open the top "MENU" screen by pressing any keys other than the VIEW and RESET keys.
- Select 1 (= Record) to display the "Record" sub-menu.
- Select 3 (= Disturbance record) to display the "Disturbance record" screen.

```
/2 Disturbance record
1=Display      2=Clear
```

- Select 1 (= Display) to display the date and time of the disturbance records from the top in new-to-old sequence.

```
/3 Disturbance record                          3/12
#1  16/Oct/1997 18:13:57.031
#2  20/Sep/1997 15:29:22.463
#3  04/Jul/1997 11:54:53.977
```

The lines which are not displayed in the window can be displayed by pressing the ▲ and ▼ keys.



www . ElectricalPartManuals . com

To clear all the disturbance records, do the following:

- Open the "Record" sub-menu.
- Select 3 (= Disturbance record) to display the "Disturbance record" screen.
- Select 2 (= Clear) to display the following confirmation screen.

```
/2 Disturbance record
Clear all disturbance records?
        ENTER=Yes    CANCEL=No
```

- Press the ENTER (= Yes) key to clear all the disturbance records stored in non-volatile memory.

### 4.2.4 Displaying the Status

From the sub-menu of "Status", the following statuses can be displayed on the LCD:

Metering data of the protected busbar

Status of binary inputs and outputs

Status of measuring elements output

Status of time synchronization source

The data is renewed every second.

This sub-menu is also used to adjust the time of the internal clock.

#### 4.2.4.1 Displaying Metering Data

To display metering data on the LCD, do the following.

- Select 2 (= Status) on the top "MENU" screen to display the "Status" screen.

```
/1 Status
1=Metering             2=Binary I/O
3=Relay element        4=Time sync source
5=Clock adjustment
```

- Select 1 (= Metering) to display the "Metering" screen.

www . ElectricalPartManuals . com

```
/2 Metering         16/Oct/1997   18:13  3/***
Ida    *****  %  *******A   Ira   *******A
Idb    *****  %  *******A   Irb   *******A
Idc    *****  %  *******A   Irc   *******A
--------------------------------------------
IdaA   *****  %  *******A   IraA  *******A
IdbA   *****  %  *******A   IrbA  *******A
IdcA   *****  %  *******A   IrcA  *******A
IdaB   *****  %  *******A   IraB  *******A
IdbB   *****  %  *******A   IrbB  *******A
IdcB   *****  %  *******A   IrcB  *******A
IdaC   *****  %  *******A   IraC  *******A
IdbC   *****  %  *******A   IrbC  *******A
IdcC   *****  %  *******A   IrcC  *******A
IdaD   *****  %  *******A   IraD  *******A
IdbD   *****  %  *******A   IrbD  *******A
IdcD   *****  %  *******A   IrcD  *******A
VaA    ***.*kV  ***.*°   V1A   ***.*kV   ***.*°
VbA    ***.*kV  ***.*°   V2A   ***.*kV   ***.
VcA    ***.*kV  ***.*°   V0A   ***.*kV   ***.
VaB    ***.*kV  ***.*°   V1B   ***.*kV   ***.*°
VbB    ***.*kV  ***.*°   V2B   ***.*kV   ***.
VcB    ***.*kV  ***.*°   V0B   ***.*kV   ***.
VaC    ***.*kV  ***.*°   V1C   ***.*kV   ***.*°
VbC    ***.*kV  ***.*°   V2C   ***.*kV   ***.
VcC    ***.*kV  ***.*°   V0C   ***.*kV   ***.
VaD    ***.*kV  ***.*°   V1D   ***.*kV   ***.*°
VbD    ***.*kV  ***.*°   V2D   ***.*kV   ***.
VcD    ***.*kV  ***.*°   V0D   ***.*kV   ***.
CH1    *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
CH2    *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
                   :
CH32   *********************
Ia     **.**kA  ***.*°   I1    **.**kA   ***.*°
Ib     **.**kA  ***.*°   I2    **.**kA   ***.
Ic     **.**kA  ***.*°   I0    **.**kA   ***.
Frequency               **.*Hz
```

Note: The phase differential currents Idy∗ show the current and the percentage to DIFCH and DIFZ setting values. Iry∗ show the restraining current. IdyA to IdyD and VyA to VyD are displayed depend on applied zones. ("y"= a, b, c, 1, 2, 0)
In the phase angle indication, the reference phase angle is indicated as "0.0°" at V1A. Phase angles above are expressed taking that of positive sequence voltage as a reference phase angle. The leading phase angles are expressed plus. If no voltage input, the positive sequence current of CH1 is taken as a reference phase angle. If the current of CH1 is small, the current of the next channel is used as a reference phase angle.

Metering data except for the phase differential currents is expressed as primary values or secondary values depending on the setting. For setting, see Section 4.2.6.6.

www.ElectricalPartManuals.com

#### 4.2.4.2 Displaying the Status of Binary Inputs and Outputs

To display the binary input and output status, do the following:

- Select 2 (= Status) on the top "MENU" screen to display the "Status" screen.
- Select 2 (= Binary I/O) to display the binary input and output status.

```
/2 Binary input & output                   3/68
Input (CU-IO#1)      [000 000 000 000      ]
Input (CU-IO#2)      [000                  ]
Input (BU-CH1)       [000 000 000 0        ]
Input (BU-CH2)       [000 000 000 0        ]
             ¦
Input (BU-CH32)      [000 000 000 0        ]
Output(CU-IO#1)      [000                  ]
Output(CU-IO#2)      [000 000 000 000 00   ]
Output(BU-CH1)       [000 000 00           ]
Output(BU-CH2)       [000 000 00           ]
             ¦
Output(BU-CH32)      [000 000 00           ]
```

The display format is shown below.

| | [■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Input (CU-IO#1) | BI1 | BI2 | BI3 | BI4 | BI5 | BI6 | BI7 | BI8 | BI9 | BI10 | BI11 | BI12 | — | — | — |
| Input (CU-IO#2) | BI1 | BI2 | BI3 | | | | | | | | | | | | |
| Input (BU-CH1) | BI1 | BI5 | BI2 | BI6 | BI3 | BI7 | BI4 | BI11 | BI12 | BI13 | — | — | — | — | — |
| Input (BU-CH2) | BI1 | BI5 | BI2 | BI6 | BI3 | BI7 | BI4 | BI11 | BI12 | BI13 | — | — | — | — | — |
| : | | | | : | | | | | | | | | | | |
| : | | | | : | | | | | | | | | | | |
| Input (BU-CH32) | BI1 | BI5 | BI2 | BI6 | BI3 | BI7 | BI4 | BI11 | BI12 | BI13 | — | — | — | — | — |
| Output (CU-IO#1) | BO1 | BO2 | BO3 | | | | | | | | | | | | |
| Output (CU-IO#2) | BO1 | BO2 | BO3 | BO4 | BO5 | BO6 | BO7 | BO8 | BO9 | BO10 | BO11 | BO12 | FAIL | BO13 | — |
| Output (BU-CH1) | TP1 | TP2 | BO1 | BO2 | BO3 | BO4 | BO5 | BO6 | — | — | — | — | — | — | — |
| Output (BU-CH2) | TP1 | TP2 | BO1 | BO2 | BO3 | BO4 | BO5 | BO6 | — | — | — | — | — | — | — |
| : | | | | : | | | | | | | | | | | |
| : | | | | : | | | | | | | | | | | |
| Output (BU-CH32) | TP1 | TP2 | BO1 | BO2 | BO3 | BO4 | BO5 | BO6 | — | — | — | — | — | — | — |

Line 1 shows the binary input status of the central unit. BI1 to BI5 correspond to each binary input signal. For details of the binary input signals, see Appendix I. The status is expressed with logical level "1" or "0" at the photo-coupler output circuit.

Lines "Input (BU-CH1)" to "Input (BU-CH32)" show the binary input status of the bay units. BI1 to BI10 of each channel correspond to each binary input signal. The status is expressed with logical level "1" or "0" at the photo-coupler output circuit. CU-IO#1, CU-IO#2 and BU-CH1 to BU-CH32 in the table indicate the name of the module containing the binary input circuits.

Line "Output (CU-IO#2)" shows the binary output status of the central unit. FAIL of "Output (CU-IO#2)" corresponds to the relay failure output. Other outputs expressed with BO1 to BO13 of CU-IO#2 are configurable.



www.ElectricalPartManuals.com

Lines "Output (BU-CH1)" to "Output (BU-CH32)" show the binary output status of a bay unit. TP1 and TP2 correspond to the tripping command outputs. Other outputs expressed with BO1 to BO6 are configurable.

The status of these outputs is expressed with logical level "1" or "0" at the input circuit of the output relay driver. That is, the output relay is energized when the status is "1".

CU-IO#1, CU-IO#2 and BU-CH1 to BU-CH32 in the table indicate the names of the module containing the binary output relays.

To display all the lines, press the ▲ and ▼ keys.

#### 4.2.4.3 Displaying the Status of Measuring Elements

To display the status of measuring elements on the LCD, do the following:

- Select 2 (= Status) on the top "MENU" screen to display the "Status" screen.
- Select 3 (= Relay element) to display the status of the relay elements.

```
/2 Relay element                                 3/13
DIFCH                  [000 000                     ]
DIFZA                  [000 000                     ]
DIFZB                  [000 000                     ]
-----------------------------------------------------
DIFZC                  [000 000                     ]
DIFZD                  [000 000                     ]
OC1                    [000 000 000 000             ]
OC2                    [000 000 000 000             ]
  :                             :
OC8                    [000 000 000 000             ]
```

The display format is as shown below.

| | [■ ■ ■ | ■ ■ ■ | ■ ■ ■ | ■ ■ ■ | ■ ■ ■] |
|---|---|---|---|---|---|
| DIFCH | A B C<br>DIFCH | A B C<br>DIFCHSV | — — — | — — — | — — — |
| DIFZA | A B C<br>DIFZA | A B C<br>DIFZASV | — — — | — — — | — — — |
| DIFZB | A B C<br>DIFZB | A B C<br>DIFZBSV | — — — | — — — | — — — |
| DIFZC | A B C<br>DIFZC | A B C<br>DIFZCSV | — — — | — — — | — — — |
| DIFZD | A B C<br>DIFZD | A B C<br>DIFZDSV | — — — | — — — | — — — |
| OC1 | A B C<br>1OCBF | A B C<br>2OCBF | A B C<br>3OCBF | A B C<br>4OCBF | — — — |
| OC2 | A B C<br>5OCBF | A B C<br>6OCBF | A B C<br>7OCBF | A B C<br>8OCBF | — — — |
| : | : | : | : | : | |
| OC8 | A B C<br>29OCBF | A B C<br>30OCBF | A B C<br>31OCBF | A B C<br>32OCBF | — — — |

www.ElectricalPartManuals.com

Lines 1 to 5 show the operation status of current differential elements DIF∗∗and their supervisory elements DIF∗∗SV. Lines below 6 show the status of overcurrent elements nOCBF for breaker failure protection. The number of these overcurrent elements is the same as that of the applied channels (circuits).

The status of each element is expressed with logical level "1" or "0". Status "1" means the element is in operation.

To display all the lines on the LCD, press the ▲ and ▼ keys.

#### 4.2.4.4 Displaying the Status of the Time Synchronization Source

The internal clock of the GRB100 can be synchronized with external clocks such as the IRIG-B time standard signal clock, RSM (relay setting and monitoring system) clock, or IEC60870-5-103. To display on the LCD whether these clocks are active or inactive and which clock the relay is synchronized with, do the following:

- Select 2 (= Status) on the top "MENU" screen to display the "Status" screen.
- Select 4 (= Time sync source) to display the status of time synchronization sources.

```
/2 Time synchronization source      1/ 3
*IRIG:  Active
 RSM:   Inactive
 IEC:   Inactive
```

The asterisk on the far left shows that the internal clock is synchronized with the marked source clock. If the marked source clock is inactive, the internal clock runs locally.

For details of the setting time synchronization, see Section 4.2.6.6.

#### 4.2.4.5 Adjusting the Time

To adjust the clock when the internal clock is running locally, do the following:

- Select 2 (= Status) on the top "MENU" screen to display the "Status" screen.
- Select 5 (= Clock adjustment) to display the setting screen.

```
/2   12/Feb/1998 22:56:19   [local]   1/ 5
Minute(     0-    59):      41 _
Hour  (     0-    23):      22
Day   (     1-    31):      12
Month (     1-    12):       2
Year  ( 1990- 2089):    1998
```

Line 1 shows the current date, time and time synchronization source with which the internal clock is synchronized. The time can be adjusted only when [Local] is indicated on the top line, showing that the clock is running locally. When [IRIG] or [RSM] or [IEC] is indicated, the following adjustment is invalid.

- Enter a numerical value within the specified range for each item and press the ENTER key.
- Press the END key to adjust the internal clock to the set hours without fractions and return to the previous screen.

If a date which does not exist in the calendar is set and END is pressed, "Error: Incorrect date" is displayed on the top line and the adjustment is discarded. Adjust again.

www.ElectricalPartManuals.com

### 4.2.5 Viewing the Settings

The sub-menu "Setting (view)" is used to view the settings made using the sub-menu "Setting (change)" except for the relay version.

The following items are displayed:

Relay version

Description

Communication (Relay address and baud rate in the RSM or IEC60870-5-103)

Recording setting

Status setting

Protection setting

Binary input setting

Binary output setting

LED setting

Enter a number on the LCD to display each item as described in the previous sections.

#### 4.2.5.1 Relay Version

To view the relay version, do the following.

- Press 3 (= Setting (view)) on the main "MENU" screen to display the "Setting (view)" screen.

```
/1 Setting(view)
1=Version    2=Description   3=Comm.
4=Record     5=Status        6=Protection
7=Binary input  8=Binary output    9=LED
```

- Press 1 (= Version) on the "Setting (view)" screen and the "Relay version" screen appears.

```
/2 Relay version
Relay type:
Serial No.:
Main software:
FD   software:
FEP1 software:
FEP2 software:
FEP3 software:
FEP4 software:
PLC  data:
IEC103 data:
```

Note: The FD software is displayed for Model 400s. The FEP2 to FEP4 software depend on the relay model, and the FEP2, FEP3 and FEP4 are displayed for Models ∗20 to ∗40, Models ∗30 and ∗40, and Model ∗40 respectively.

#### 4.2.5.2 Settings

The "Description", "Comm.", "Record", "Status", "Protection", "Binary input", "Binary output" and "LED" screens display the current settings entered using the "Setting (change)" sub-menu.

www . ElectricalPartManuals . com

### 4.2.6 Changing the Settings

The "Setting (change)" sub-menu is used to make or change settings for the following items:

Password
Description
Communication (Relay address and baud rate in the RSM or IEC60870-5-103)
Recording
Status
Protection
Binary input
Binary output
LED

All of the above settings except the password can be seen using the "Setting (view)" sub-menu.

#### 4.2.6.1 Setting Method

There are three setting methods as follows.

- To enter a selective number
- To enter numerical values
- To enter a text string

**To enter a selected number**

If a screen as shown below is displayed, perform the setting as follows:

The number to the left of the cursor shows the current setting or default setting set at shipment. The cursor can be moved to the upper or lower lines within the screen by pressing the ▲ and ▼ keys. If a setting (change) is not required, skip the line with the ▲ and ▼ keys.

```
/6 Scheme switch                                1/108
C.TP       0=BLK   1=Trip                         0 _
IDSV       0=Off   1=ALM&BLK     2=ALM            2
AISV       0=Off   1=ALM&BLK     2=ALM            1
AIFDSV     0=Off   1=ALM&BLK     2=ALM            0
DSSV       0=Off   1=ALM&BLK     2=ALM            0
CBSV       0=Off   1=ALM&BLK     2=ALM            1
BFLOGIC    0=BF1   1=BF2                          0
1BF1       0=Off   1=T      2=TOC                 0
1BF2       0=Off   1=On                           0
1BFEXT     0=Off   1=On                           1
2BF1       0=Off   1=T      2=TOC                 0
             :
32BF1      0=Off   1=T      2=TOC                 0
32BF2      0=Off   1=On                           0
32BFEXT    0=Off   1=On                           1
BFTRIO     0=Off   1=On                           0
COMTP      0=Off   1=On                           0
EFPTR      0=Off   1=On                           0
CTFEN      0=Off   1=On     2=OPT-On              0
CTFCNT     0=NA    1=BLK                          0
```

www . ElectricalPartManuals . com

- Move the cursor to a setting line.
- Enter the selected number. (Numbers other than those displayed cannot be entered.)
- Press the ENTER key to confirm the entry and the cursor will move to the next line below. (On the lowest line, the entered number blinks.)
- After completing the setting on the screen, press the END key to return to the upper menu.

To correct the entered number, do the followings.

- If it is before pressing the ENTER key, press the CANCEL key and enter the new number.
- If it is after pressing the ENTER key, move the cursor to the correcting line by pressing the ▲ and ▼ keys and enter the new number.

**Note:** If the CANCEL key is pressed after any of the entry is confirmed by pressing the ENTER key, all the entries performed so far on the screen concerned are canceled and the screen returns to the upper one.

When the screen shown below is displayed, perform the settings as follows:

The number to the right of "Current No. = " shows the current setting.

```
/3 Change active group(Active group= *)
1=Group1  2=Group2  3=Group3  4=Group4

  Current No.= *         Select No. = _
```

- Enter a number to the right of "Select No. = ". (Numbers other than those displayed cannot be entered.)
- Press the ENTER key to confirm the entry and the entered number blinks.
- After completing the setting on the screen, press the END key to return to the upper screen.

To correct the entered number, do the following.

- If it is before pressing the ENTER key, press the CANCEL key and enter the new number.
- If it is after pressing the ENTER key, enter the new number.

**To enter numerical values**

When the screen shown below is displayed, perform the setting as follows:

The number to the left of the cursor shows the current setting or default setting set at shipment. The cursor can be moved to upper or lower lines within the screen by pressing the ▲ and ▼ keys. If a setting (change) is not required, skip the line with the ▲ and ▼ keys.



www . ElectricalPartManuals . com

```
/7 DIF                                    1/45
DIFCH(   500-  3000):   3000 _          A
DIFZ (   500-  3000):   3000            A
SLPCH(  0.30-  0.90):   0.30
SLPZ (  0.30-  0.90):   0.30
DIFSV(    20-  3000):   1000            A
TIDSV(     0-    60):     20            s
TBRDG(     0-    60):     60            s
TDDSV(     0-    60):     60            s
TCBSV(     0-    60):     10            s
1CT  (   100- 10000):   1000            A
2CT  (   100- 10000):   1000            A
  :                :
32CT (   100- 10000):   1000            A
CFID (    50-  3000):     50            A
CFUV (    20-    60):     20            V
CFDV (     1-    10):      7            %
CFOVG(   0.1-  10.0):    1.0            V
```

- Move the cursor to a setting line.
- Enter the numerical value.
- Press the ENTER key to confirm the entry and the cursor will move to the next line below. (If a numerical value outside the displayed range is entered, "Error: Out of range" appears on the top line and the cursor remains on the line. Press the CANCEL key to clear the entry.)
- After completing the setting on the screen, press the END key to return to the upper screen.

To correct the entered numerical value, do the following.

- If it is before pressing the ENTER key, press the CANCEL key and enter the new numerical value.
- If it is after pressing the ENTER key, move the cursor to the correct line by pressing the ▲ and ▼ keys and enter the new numerical value.

**Note:** If the CANCEL key is pressed after any entry is confirmed by pressing the ENTER key, all the entries made so far on the screen concerned are canceled and the screen returns to the upper one.

**To enter a text string**

Text strings are entered in the bracket under the "Plant name" or "Description" screen.

To select a character, use keys 2, 4, 6 and 8 to move the blinking cursor down, left, right and up. "→" and "←" on each of lines 2 to 4 indicate a space and backspace, respectively. A maximum of 22 characters can be entered within the brackets.

```
/3 Plant name [ _                      ]
ABCDEFGHIJKLMNOPQRSTUVWXYZ ()[]@_     ←→
abcdefghijklmnopqrstuvwxyz {}*/+-<=>  ←→
0123456789 !"#$%&' :;,.^`             ←→
```

- Set the cursor position in the bracket by selecting "→" or "←" and pressing the ENTER key.
- Move the blinking cursor to select a character.

www.ElectricalPartManuals.com

- Press the ENTER to enter the blinking character at the cursor position in the brackets.
- Press the END key to confirm the entry and return to the upper screen.

To correct the entered character, do either of the following.

- Discard the character by selecting "←" and pressing the ENTER key and enter the new character.
- Discard the whole entry by pressing the CANCEL key and restart the entry from the first.

#### To complete the setting

Enter after making entries on each setting screen by pressing the ENTER key, the new settings are not yet used for operation, though stored in the memory. To validate the new settings, take the following steps.

- Press the END key to the upper screen. Repeat this until the confirmation screen shown below is displayed. The confirmation screen is displayed just before returning to the "Setting (change)" sub-menu.

```
/2 **************
Change settings?
        ENTER=Yes     CANCEL=No
```

- When the screen is displayed, press the ENTER key to start operation using the new settings, or press the CANCEL key to correct or cancel entries. In the latter case, the screen turns back to the setting screen to enable reentries. Press the CANCEL key to cancel entries made so far and to turn to the "Setting (change)" sub-menu.

#### 4.2.6.2 Password

For the sake of security of changing the settings, password protection can be set as follows;

- Press 4 (= Setting (change)) on the main "MENU" screen to display the "Setting (change)" screen.

```
/1 Setting(change)
1=Password   2=Description   3=Comm.
4=Record     5=Status        6=Protection
7=Binary input  8=Binary output   9=LED
```

- Press 1 (= Password) to display the "Password" screen.

```
/2 Password
     Input new password   [_   ]
    Retype new password   [    ]
```

- Enter a 4-digit number within the brackets after "Input new password" and press the ENTER key.
- For confirmation, enter the same 4-digit number in the brackets after "Retype new password" and press the ENTER key.



www . ElectricalPartManuals . com

- Press the END key to display the confirmation screen. If the retyped number is different from that first entered, the following message is displayed on the bottom of the "Password" screen before returning to the upper screen.

  "Mismatch-password unchanged."

  Reentry is then requested.

### Password trap

After the password has been set, the password must be entered in order to enter the setting change screens.

If 4 (= Setting (change)) is entered on the top "MENU" screen, the password trap screen "Password" is displayed. If the password is not entered correctly, it is not possible to move to the "Setting (change)" sub-menu screens.

```
Password
        Input password    [_   ]
```

### Canceling or changing the password

To cancel the password protection, enter "0000" in the two brackets on the "Password" screen. The "Setting (change)" screen is then displayed without having to enter a password.

The password can be changed by entering a new 4-digit number on the "Password" screen in the same way as the first password setting.

### If you forget the password

Press CANCEL and RESET together for one second on the top "MENU" screen. The screen disappears, and the password protection of the GRB100 is canceled. Set the password again.

### 4.2.6.3 Description

To enter the plant name and other data, do the following. These data are attached to records.

- Press 4 (= Setting (change)) on the main "MENU" screen to display the "Setting (change)" screen.
- Press 2 (= Description) to display the "Description" screen.

```
/2 Description
1=Plant name     2=Description
```

- To enter the plant name, select 1 (= Plant name) on the "Description" screen.

```
/3 Plant name  [  _                        ]
ABCDEFGHIJKLMNOPQRSTUVWXYZ ()[]@_      ←→
abcdefghijklmnopqrstuvwxyz {}*/+-<=>   ←→
0123456789 !”#$%&’ :;,.^`              ←→
```

- To enter special items, select 2 (= Description) on the "Description" screen.

www . ElectricalPartManuals . com

```
/3 Description [   _                          ]
ABCDEFGHIJKLMNOPQRSTUVWXYZ  ()[]@_       ←→
abcdefghijklmnopqrstuvwxyz  {}*/+-<=>   ←→
0123456789  !”#$%&’ :;,.^`              ←→
```

- Enter the text string.

#### 4.2.6.4 Communication

If the relay is linked with RSM (relay setting and monitoring system) or IEC60870-5-103, the relay address must be set. Do this as follows:

- Press 4 (= Setting (change)) on the main "MENU" screen to display the "Setting (change)" screen.
- Press 3 (= Comm.) to display the "Communication" screen.

```
/2 Communication
1=Address
2=Switch
```

- Press 1 (= Address) to enter the relay address number.

```
/3 Address                                1/2
HDLC  (      1-     32):       1_
IEC   (      0-    254):       2
```

- Enter the address number on "HDLC" column for RSM and "IEC" column for IEC60870-5-103 and press the ENTER key.

**CAUTION:** Do not overlap the relay address number.

- Press 2 (= Switch) on the "Communication" screen to select the protocol and transmission speed (baud rate), etc., of the RSM or IEC60870-5-103.

```
/3 Switch                                          1/3
232C      1=9.6  2=19.2  3=38.4  4=57.6   1 _
IECBR     1=9.6  2=19.2                   2
IECBLK    1=Normal  2=Blocked             1
```

- Select the number corresponding to the system and press the ENTER key.

**<232C>**

This line is to select the RS-232C baud rate when the RSM system applied.

**Note:** The default setting of the 232C is 9.6kbps. The 57.6kbps setting, if possible, is recommended to serve user for comfortable operation. The setting of RSM100 is also set to the same baud rate.

**<IECBR>**

This line is to select the baud rate when the IEC60870-5-103 system applied.

**<IECBLK>**

Select 2 (=Blocked) to block the monitor direction in the IEC60870-5-103 communication.

www.ElectricalPartManuals.com

#### 4.2.6.5 Setting the Recording

To set the recording function as described in Section 4.2.3, do the following:

- Press 4 (= Setting (change)) on the main "MENU" screen to display the "Setting (change)" screen.
- Press 4 (= Record) to display the "Record" screen.

```
/2 Record
1=Event record
2=Disturbance record
```

**Setting the event recording**

- Press 1 (= Event record) to display the "Event record" screen.

```
/3 Event record     0=None      3= Both  1/**
ZA trip             1=Operate  2=Reset  3_
ZB trip             1=Operate  2=Reset  3
ZC trip             1=Operate  2=Reset  3
ZC trip             1=Operate  2=Reset  3
Trip                1=Operate  2=Reset  3
CBF-retrip          1=Operate  2=Reset  3
CBF-trip            1=Operate  2=Reset  3
CBF-TR              1=Operate  2=Reset  3
COM-trip            1=Operate  2=Reset  3
EFPTR               1=Operate  2=Reset  3
Bus bridge          1=Operate  2=Reset  3
Trans.bus           1=Operate  2=Reset  3
BP block            1=Operate  2=Reset  3
CBF block           1=Operate  2=Reset  3
Ind.reset           1=Operate  2=Reset  3
Relay fail          1=Operate  2=Reset  3
CT err              1=Operate  2=Reset  3
V0 err              1=Operate  2=Reset  3
V2 err              1=Operate  2=Reset  3
Id err              1=Operate  2=Reset  3
DS fail             1=Operate  2=Reset  3
CB fail             1=Operate  2=Reset  3
CTF                 1=Operate  2=Reset  3
CH1 BI              1=Operate  2=Reset  3
    :                        :
CH32 BI             1=Operate  2=Reset  3
Sys.set change      1=Operate           1
Rly.set change      1=Operate           1
Grp.set change      1=Operate           1
```

- Enter 0 or 1 or 2 or 3 and press the ENTER key. Repeat this for all events.

  Enter 0 (= None) not to record the event.

  Enter 1 (= Operate) to record the event when the status changes to "operate".

  Enter 2 (= Reset) to record the event when the status changes to "reset".

  Enter 3 (= Both) to record the event when the status changes both to "operate" and "reset".

www . ElectricalPartManuals . com

**Setting the disturbance recording**

- Press 2 (= Disturbance record) to display the "Disturbance record" screen.

```
/3 Disturbance record
1=Record time & starter
2=Scheme switch
```

- Press 1 (= Record time & starter) to display the "Record time & starter" screen.

```
/4 Record time & starter          1/**
Time  (   0.1-   2.0):    2.0 _    s
1OCG  (   0.1-  10.0):   10.0
1OCS  (   0.1-  10.0):   10.0
2OCG  (   0.1-  10.0):   10.0
2OCS  (   0.1-  10.0):   10.0
  :              :
32OCG(    0.1-  10.0):   10.0
32OCS(    0.1-  10.0):   10.0
```

- Enter the recording time and starter element settings.

To set the starters, do the following:

- Press 2 (= Scheme switch) on the "Disturbance record" screen to display the "Scheme switch" screen.

```
/4 Scheme switch                 1/ 3
TRIP     0=Off   1=On            1 _
OCG      0=Off   1=On            1
OCS      0=Off   1=On            1
```

- Enter 1 to use as a starter or enter 0 if not to use. Repeat this for all items.

### 4.2.6.6 Status

To set the status display described in Section 4.2.4, do the following.

Press 5 (= Status) on the "Setting (change)" sub-menu to display the "Status" screen.

```
/2 Status
1=Metering
2=Time synchronization
3=Time zone
```

**Setting the metering**

- Press 1 (= Metering) to display the "Metering" screen.

```
/3 Metering                                   1/1
Display value 1=Primary 2=Secondary           1 _
```

- Enter the selected number and press the ENTER key. Repeat this for all items.



www . ElectricalPartManuals . com

#### Setting the time synchronization

The calendar clock can run locally or be synchronized with the external IRIG-B time standard signal, RSM or IEC clock. This is selected by setting as follows.

- Press 2 (= Time synchronization) to display the "Time synchronization" screen.

```
/3 Time synchronization                 1/1
Sync  0=Off  1=IRIG  2=RSM  3=IEC       1 _

```

- Enter the selected number and press the ENTER key.

**Note:** When to select IRIG-B, RSM or IEC, check that they are active on the "Time synchronization source" screen in "Status" sub-menu. If it is set to an inactive IRIG-B, RSM or IEC, the calendar clock runs locally.

#### Setting the time zone

When the calendar clock is synchronized with the IRIG-B time standard signal, it is possible to transfer GMT to the local time.

- Press 3 (= Time zone) to display the "Time zone" screen.

```
/3  Time  zone                           1/1
GMT   (   -12-   +12):     +9 _      hrs

```

- Enter the difference between GMT and local time and press the ENTER key.

### 4.2.6.7 Protection

The GRB100 can have four setting groups for protection according to the change of power system operation, one of which is assigned to be active. To set protection, do the following:

- Press 6 (= Protection) on the "Setting (change)" screen to display the "Protection" screen.

```
/2  Protection
1=Change  active  group
2=Change  setting
3=Copy  group
```

#### Changing the active group

- Press 1 (= Change active group) to display the "Change active group" screen.

```
/3  Change  active  group(Active  group= *)
1=Group1   2=Group2   3=Group3   4=Group4

   Current No.= *          Select No.  = _
```

- Enter the selected number and press the ENTER key.

#### Changing the settings

Almost all the setting items have default values that are set when the product GRB100 was

www . ElectricalPartManuals . com

shipped. For the default values, see Appendix E and J. To change the settings, do the following:

- Press 2 (= Change setting) to display the "Change setting" screen.

```
/3 Change setting      (Active group= *)
1=Group1  2=Group2  3=Group3  4=Group4


```

- Press the group number to change the settings and display the "Protection" screen.

```
/4 Protection                    (Group *)
1=Busbar parameter
2=Trip

```

Settings are required for transformer parameter and protection functions.

**Setting the busbar parameters**

Enter the CH name and VT ratio as follows:

**<CH name>**

If the CH name is set, the set name is displayed on the digest screen (electric quantity), the fault record screen and the metering screen.

- Press 1 (= Busbar parameter) on the "Protection" screen to display the "Busbar parameter" screen.

```
/5 Busbar parameter              (Group *)
1=CH name
2=VT ratio

```

Note: “2 = VT ratio” is displayed for Model 400s.

- Press 1 (CH name) to display the "CH name" screen.

```
/6 CH name
Select CH         (  1- 32)

                     Select No.= _
```

- Enter the CH number and press the ENTER key.

```
/7 CH1 name     [  _                  ]
ABCDEFGHIJKLMNOPQRSTUVWXYZ ()[]@_     ←→
abcdefghijklmnopqrstuvwxyz {}*/+-<=>  ←→
0123456789 !”#$%&’ :;,.^`             ←→
```

- Enter the text string.

**<VT ratio>**

This setting is applied for Model 400s.

- Press 2 (VT ratio) on the "Busbar parameter" screen to display the "VT ratio" screen.

www.ElectricalPartManuals.com

```
/6 VT ratio                                    1/4
VTA   (      1- 20000):    2000 _
VTB   (      1- 20000):    2000
VTC   (      1- 20000):    2000
VTD   (      1- 20000):    2000
```

- Enter the VT ratio and press the ENTER key.
- Press the END key to return the display to the "Busbar parameter" screen.

**Setting the protection function**

To set the protection schemes, scheme switches and protection elements, do the following. Protection elements are measuring elements and timers.

**Note:** Depending on the selected protection scheme and scheme switch setting, some of the scheme switches and protection elements are not used and so need not be set. The protection function setting menu of the GRB100 does not display unnecessary setting items. Therefore, start by setting the protection scheme, then set the scheme switch, then the protection elements.
As a result of the above, note that some of the setting items described below may not appear in the actual setting.

- Press 2 (= Trip) on the "Protection" screen to display the "Trip" screen.

```
/5 Trip                              (Group *)
1=Scheme switch
2=Protection element
```

**Setting the scheme switch**

- Press 1 (= Scheme switch) to display the "Scheme switch" screen.

```
/6 Scheme switch                          1/108
C.TP      0=BLK   1=Trip                   0 _
IDSV      0=Off   1=ALM&BLK   2=ALM        2
AISV      0=Off   1=ALM&BLK   2=ALM        1
AIFDSV    0=Off   1=ALM&BLK   2=ALM        0
DSSV      0=Off   1=ALM&BLK   2=ALM        0
CBSV      0=Off   1=ALM&BLK   2=ALM        1
BFLOGIC   0=BF1   1=BF2                    0
1BF1      0=Off   1=T     2=TOC            0
1BF2      0=Off   1=On                     0
1BFEXT    0=Off   1=On                     1
2BF1      0=Off   1=T     2=TOC            0
              :
32BF1     0=Off   1=T     2=TOC            0
32BF2     0=Off   1=On                     0
32BFEXT   0=Off   1=On                     1
BFTRIO    0=Off   1=On                     0
COMTP     0=Off   1=On                     0
EFPTR     0=Off   1=On                     0
CTFEN     0=Off   1=On    2=OPT-On         0
CTFCNT    0=NA    1=BLK                    0
```

- Enter the number corresponding to the switch status to be set and press the ENTER key for



www . ElectricalPartManuals . com

each switch.

- After setting all switches, press the [END] key to return to the "Trip" screen.

### Setting the protection elements

- Press 2 (= Protection element) to display the "Protection element" screen.

```
/6 Protection element          (Group= *)
1=DIF         2=OC         3=FD
```

### <DIF>

- Press 1 (= DIF) to display the "DIF" screen. The measuring elements used in the current differential protection are set using this screen.
- Enter the numerical value and press the [ENTER] key for each element.

  Note: Set DIFCH, DIFZ and DIFSV with CT primary circuit value and 1CT to 32CT with CT primary rating.

- After setting all elements, press the [END] key to return to the "Protection element" menu.

```
/7 DIF                                  1/45
DIFCH(   500-   3000):   3000 _          A
DIFZ (   500-   3000):   3000            A
SLPCH(  0.30-   0.90):   0.30
SLPZ (  0.30-   0.90):   0.30
DIFSV(    20-   3000):   1000            A
TIDSV(     0-     60):     20            s
TBRDG(     0-     60):     60            s
TDDSV(     0-     60):     60            s
TCBSV(     0-     60):     10            s
1CT  (   100-  10000):   1000            A
2CT  (   100-  10000):   1000            A
  :              :
32CT (   100-  10000):   1000            A
CFID (    50-   3000):     50            A
CFUV (    20-     60):     20            V
CFDV (     1-     10):      7            %
CFOVG(   0.1-   10.0):    1.0            V
```

### <OC>

- Press 2 (= OC) to display the "OC" screen. The overcurrent elements and timers are set using this screen.
- Enter the numerical value and press the [ENTER] key for each element.

  Note: Set OCB with multiples of CT secondary rating value.

- After setting all elements, press the [END] key to return to the "Protection element" menu.

www.ElectricalPartManuals.com

```
/7 OC                                          1/98
10CB    (   0.1-    2.0):       0.5 _
T1B1    (     0-    500):        50        ms
T1B2    (     0-    500):       150        ms
20CB    (   0.1-    2.0):       0.5
T2B1    (     0-    500):        50        ms
T2B2    (     0-    500):       150        ms
  :                  :
320CB   (   0.1-    2.0):       0.5
T32B1   (     0-    500):        50        ms
T32B2   (     0-    500):       150        ms
TBFD0   ( 0.00-  10.00):      0.10          s
TCB0    ( 0.00-  10.00):      1.00          s
```

**<FD>**

- Press 3 (= FD) to display the "FD" screen. The measuring elements used in the fault detector are set using this screen.
- Enter the numerical value and press the ENTER key for each element.
- After setting all elements, press the END key to return to the "Protection element" menu.

```
/7 FD                                          1/ 3
UVSF  (     60-    100):        80 _          V
UVGF  (     20-     60):        46            V
OVGF  (    0.1-   10.0):      10.0            V
```

#### 4.2.6.8 Binary Input

The logic level of binary input signals can be inverted by setting before entering the scheme logic. Inversion is used when the input contact cannot meet the conditions described in Table 3.2.2.

- Press 7 (= Binary input) on the "Setting (change)" sub-menu to display the "Binary input" screen.

```
/2 Binary input      1=Norm   2=Inv      1/15
BISW 1                                   1 _
BISW 2                                   1
BISW 3                                   1
BISW 4                                   1
  :                                      :
BISW15                                   1
```

- Enter 1 (= Normal) or 2 (= Inverted) and press the ENTER key for each binary input.

#### 4.2.6.9 Binary Output

All the binary outputs of the GRB100 except the relay failure signal are user-configurable. It is possible to assign one signal or up to six ANDing or ORing signals to one output relay. Available signals are listed in Appendix C.

Note: The binary outputs TP1, TP2, BO3 to BO6 for each BU (CH1 – CH32) are programmed by

www.ElectricalPartManuals.com

PLC function.

It is also possible to attach a drop-off delay time of 0.2 seconds to these signals. The drop-off delay time is disabled by the scheme switch [BOTD].

Appendix E shows the factory default settings.

To configure the binary output signals, do the following:

### Selection of output module

- Press 8 (= Binary output) on the "Setting (change)" screen to display the "Binary output" screen. The available output module(s) will be shown.

```
/2 Binary output
1=CU-IO#1  2=CU-IO#2  4=BU-BO1   5=BU-BO2
```

- Press the number corresponding to the selected output module to display the "Binary output" screen.

  When "1" or "2" selected,

```
/3 Binary output                     (******)
Select BO             (  1- **)

                         Select No.= _
```

  When "3" or "4" selected,

```
/3 Binary output                    (BU-B**)
Select CH             (  1- 32)

                         Select No.= _
```

**Note:** The setting is required for all the binary outputs. If any of the binary outputs are not to be used, enter 0 for the logic gates #1 to #6 when assigning signals.

### Selecting the output relay

- Enter the output relay number on the "Binary output" screen and press the ENTER key to display the "Setting" screen.

```
/4 Setting                        (BO** of ****)
1=Logic gate type & delay timer
2=Input to logic gate
```

or

```
/4 Setting                        (BO1 of CH**)
1=Logic gate type & delay timer
2=Input to logic gate
```

### Setting the logic gate type and timer

- Press 1 on the "Setting" screen to display the "Logic gate type & delay timer" screen.

www.ElectricalPartManuals.com

```
/5 Logic gate type & delay timer      1/ 2
Logic    1=OR    2=AND                1 _
BOTD     0=Off   1=On                 1
```

- Enter 1 or 2 to use an OR gate or AND gate and press the ENTER key.
- Enter 0 or 1 to add 0.2s drop-off delay time to the output relay or not and press the ENTER key.
- Press the END key to return to the "Setting" screen.

**Assigning signals**

- Press 2 on the "Setting" screen to display the "Input to logic gate" screen.

```
/5 Input to logic gate                1/ 6
In #1(     0-  3071):     21 _
In #2(     0-  3071):      4
In #3(     0-  3071):     67
In #4(     0-  3071):      0
In #5(     0-  3071):      0
In #6(     0-  3071):      0
```

- Assign signals to gates (In #1 to #6) by entering the number corresponding to each signal referring to Appendix C.

**Note:** If signals are not assigned to all the gates #1 to #6, enter 0 for the unassigned gate(s).

Repeat this process for the outputs to be configured.

#### 4.2.6.10 LEDs

Four LEDs from the bottom of the front panel are user-configurable. One of the signals listed in Appendix C can be assigned to each LED as follows:

- Press 9 (= LED) on the "Setting (change)" screen to display the "LED" screen.

```
/2 LED                                1/ 4
LED1  (     0-  3071):     21 _
LED2  (     0-  3071):      4
LED3  (     0-  3071):     67
LED4  (     0-  3071):      0
```

- Enter the number corresponding to a signal to assign signals to each LED.

If an LED is not used, enter "0" or the default value will be assigned.

### 4.2.7 Testing

The sub-menu "Test" provides such functions as setting of testing switches, forced operation of binary outputs, time measurement of the variable setting timer, logic signal observation and BU out-of-service function.

#### 4.2.7.1 Setting the switches

The automatic monitor function (A.M.F.) can be disabled by setting the switch [A.M.F] to "OFF".

www.ElectricalPartManuals.com

Disabling the A.M.F. prevents tripping from being blocked even in the event of a failure in the items being monitored by this function. It also prevents failures from being displayed on the "ALARM" LED and LCD described in Section 4.2.1. No events related to A.M.F. are recorded, either.

Disabling A.M.F. is useful for blocking the output of unnecessary alarms output during testing.

**Note:** Set the switch [A.M.F] to "Off" before applying the test inputs, when the A.M.F is disabled.

The switches [1DS1] to [32DS4] and [1CB] to [32CB] are used to simulate the contact condition of the disconnectors and circuit breakers for relay inputs to "Open" or "Close" forcibly for testing.

While the switch [A.M.F] is set to "Off" or [1DS1] to [32DS4] and [1CB] to [32CB] are set to "Open" or "Close", the red "TESTING" LED is lit for alarm indication.

**Caution:** Be sure to restore these switches after the tests are completed.

### Disabling automatic monitoring

- Press 5 (= Test) on the top "MENU" screen to display the "Test" screen.

```
/1 Test
1=Switch                    2=Binary output
3=Timer                     4=Logic circuit
5=BU out
```

- Press 1 (= Switch) to display the "Switch" screen.

```
/2 Switch                                 1/***
A.M.F.   0=Off   1=On                      1 _
IECTST   0=Off   1=On                      0
1DS1     0=Normal  1=Open   2=Close        0
1DS2     0=Normal  1=Open   2=Close        0
1DS3     0=Normal  1=Open   2=Close        0
1DS4     0=Normal  1=Open   2=Close        0
1CB      0=Normal  1=Open   2=Close        0
  :                  :
32DS1    0=Normal  1=Open   2=Close        0
32DS2    0=Normal  1=Open   2=Close        0
32DS3    0=Normal  1=Open   2=Close        0
32DS4    0=Normal  1=Open   2=Close        0
32CB     0=Normal  1=Open   2=Close        0
```

Indicates CH number. See Appendix I.

- Enter 0 for A.M.F to disable the A.M.F. and press the ENTER key.
- Enter 1(=On) for IECTST to transmit 'test mode' to the control system by IEC60870-5-103 communication when testing the local relay, and press the ENTER key.

### Setting the contact condition of disconnectors and circuit breakers (∗∗DS∗, ∗∗CB)

- Enter 1 (= Open) to set the contact condition to "Open".
- Enter 2 (= Close) to set the contact condition to "Close".
- Press the ENTER key.

www.ElectricalPartManuals.com

Repeat this for all items.

- Press the END key to return to the "Test" screen.

#### 4.2.7.2 Binary Output Relay

It is possible to forcibly operate all binary output relays for checking connections with the external devices. Forced operation can be performed on one or more binary outputs at a time for each module.

- Press 2 (= Binary output) on the "Test" screen to display the "Binary output" screen.

```
/2 Binary output
1=CU-IO#1   2=CU-IO#2   3=BU
```

- Enter the selected number corresponding to each module to be operated. Then the LCD displays the name of the module, the name of the output relay, the name of the terminal block and the terminal number to which the relay contact is connected.

  When "1" selected,

```
/3 BO            (0=Disable 1=Enable)   1/ 3
IO#1  BO1                               1 _
IO#1  BO2                               1
IO#1  BO3                               1
```

  When "2" selected,

```
/3 BO            (0=Disable 1=Enable)   1/14
IO#2  BO1                               1 _
IO#2  BO2                               1
IO#2  BO3                               1
IO#2  BO4                               0
IO#2  BO5                               0
IO#2  BO6                               0
IO#2  BO7                               0
IO#2  BO8                               0
IO#2  BO9                               0
IO#2  BO10                              0
IO#2  BO11                              0
IO#2  BO12                              0
IO#2  FAIL                              0
IO#2  BO13                              0
```

  When "3" selected,

www.ElectricalPartManuals.com

```
/3 BO             (0=Disable 1=Enable) 1/***
CH1    TP1                             1 _
CH1    TP2                             0
CH1    BO1                             0
CH1    BO2                             0
CH1    BO3                             0
CH1    BO4                             0
CH1    BO5                             0
CH1    BO6                             0
  ¦
  ¦
CH32   TP1                             0
CH32   TP2                             0
CH32   BO1                             0
CH32   BO2                             0
CH32   BO3                             0
CH32   BO4                             0
CH32   BO5                             0
CH32   BO6                             0
```

- Enter 1 and press the ENTER key.
- After completing the entries, press the END key. Then the LCD displays the screen shown below.

```
/3 BO
Keep pressing 1 to operate.

Press CANCEL to cancel.
```

- Keep pressing 1 key to operate the output relays forcibly.
- Release the press of 1 key to reset the operation.

#### 4.2.7.3 Timer

The pick-up or drop-off delay time of the variable timer used in the scheme logic can be measured with monitoring jacks A and B. Monitoring jacks A and B are used to observe the input signal and output signal to the timer respectively.

- Press 3 (= Timer) on the "Test" screen to display the "Timer" screen.

```
/2 Timer                                1/ 1
Timer(      1-    100):       1 _

```

- Enter the number corresponding to the timer to be observed and press the ENTER key. The timers and related numbers are listed in Appendix D.
- Press the END key to display the following screen.

www . ElectricalPartManuals . com

```
/2 Timer                                  1/ 1
Press ENTER to operate.

Press CANCEL to cancel.
```

- Press the ENTER key to operate the timer. The "TESTING" LED turns on, and the timer is initiated and the following display appears. The input and output signals of the timer can be observed at monitoring jacks A and B respectively. The LEDs above monitoring jacks A or B are also lit if the input or output signal exists.

```
/2 Timer                                  1/ 1
Operating...
Press END to reset.
Press CANCEL to cancel.
```

- Press the END key to reset the input signal to the timer. The "TESTING" LED turns off.
- Press CANCEL key to test other timers. Repeat the above testing.

#### 4.2.7.4 Logic Circuit

It is possible to observe the binary signal level on the signals listed in Appendix C with monitoring jacks A and B.

- Press 4 (= Logic circuit) on the "Test" screen to display the "Logic circuit" screen.

```
/2 Logic circuit                          1/ 2
TermA(     0-   3071):      1 _
TermB(     0-   3071):     48
```

- Enter a signal number to be observed at monitoring jack A and press the ENTER key.
- Enter the other signal number to be observed at monitoring jack B and press the ENTER key.

After completing the setting, the signals can be observed by the binary logic level at monitoring jacks A and B or by the LEDs above the jacks.

On screens other than the above screen, observation with the monitoring jacks is disabled.

#### 4.2.7.5 BU out-of-service

The GRB100 provides the BU out-of-service function for maintenance such as replacement of a BU if failed.

**Caution:** This function is provided for the temporary operation. Therefore, the replica setting should be changed for a long-term operation or permanent operation.

- Press 5 (= BU out) on the "Test" screen to display the "BU out" screen.

www.ElectricalPartManuals.com

```
/2 BU out                                  1/**
BU1      0=Out   1=In                      1  _
BU2      0=Out   1=In                      1
BU3      0=Out   1=In                      1
BU4      0=Out   1=In                      1
 ¦               ¦                         ¦
 ¦               ¦                         ¦
BU32     0=Out   1=In                      1
```

- Enter 0(=Out of service) or 1(=In service) for each BU, and press the ENTER key. The default setting is "1" for all BUs.

Note: Though a BU (CH) is out-of-service, the assigned BO can be forcibly operated in section 4.2.7.2.

www . ElectricalPartManuals . com

## 4.3 Personal Computer Interface

The relay can be operated from a personal computer using an RS232C port on the front panel. On the personal computer, the following analysis and display of the fault voltage and current are available in addition to the items available on the LCD screen..

- Display of voltage and current waveform: Oscillograph, vector display
- Symmetrical component analysis: On arbitrary time span
- Harmonic analysis: On arbitrary time span
- Frequency analysis: On arbitrary time span

For the details, see the separate instruction manual "PC INTERFACE RSM100".

## 4.4 Communication Interface

### 4.4.1 Relay Setting and Monitoring System

The Relay Setting and Monitoring (RSM) system is a system that retrieves and analyses the data on power system quantities, fault and event records and views or changes settings in individual relays via a telecommunication network using a remote PC.

Figure 4.4.1 shows the typical configuration of the RSM system via a protocol converter G1PR2. The relays are connected through twisted pair cables, and the maximum 256 relays can be connected since the G1PR2 can provide up to 8 ports. The total length of twisted pair wires should not exceed 1200 m. Relays are mutually connected using an RS485 port on the relay rear panel and connected to a PC RS232C port via G1PR2. Terminal resistor (150 ohms) is connected the last relay. The transmission rate used is 64 kbits/s.

In case of the optional fiber optic interface (option), the relays are connected through graded-index multi-mode 50/125μm or 62.5/125μm type optical fiber using ST connector at the rear of the relay.

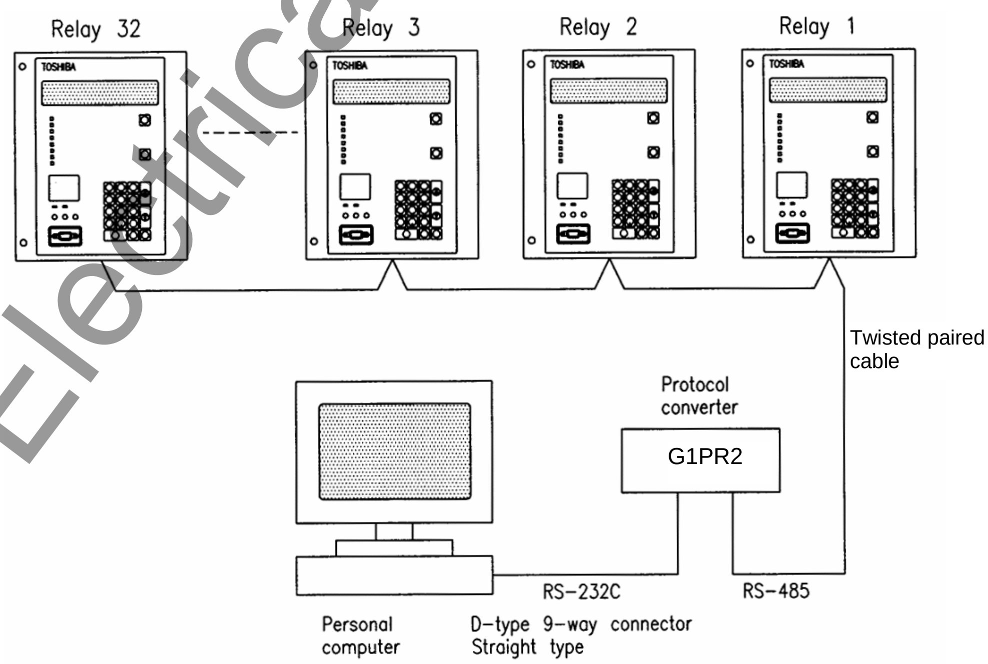



**Figure 4.4.1 Relay Setting and Monitoring System**

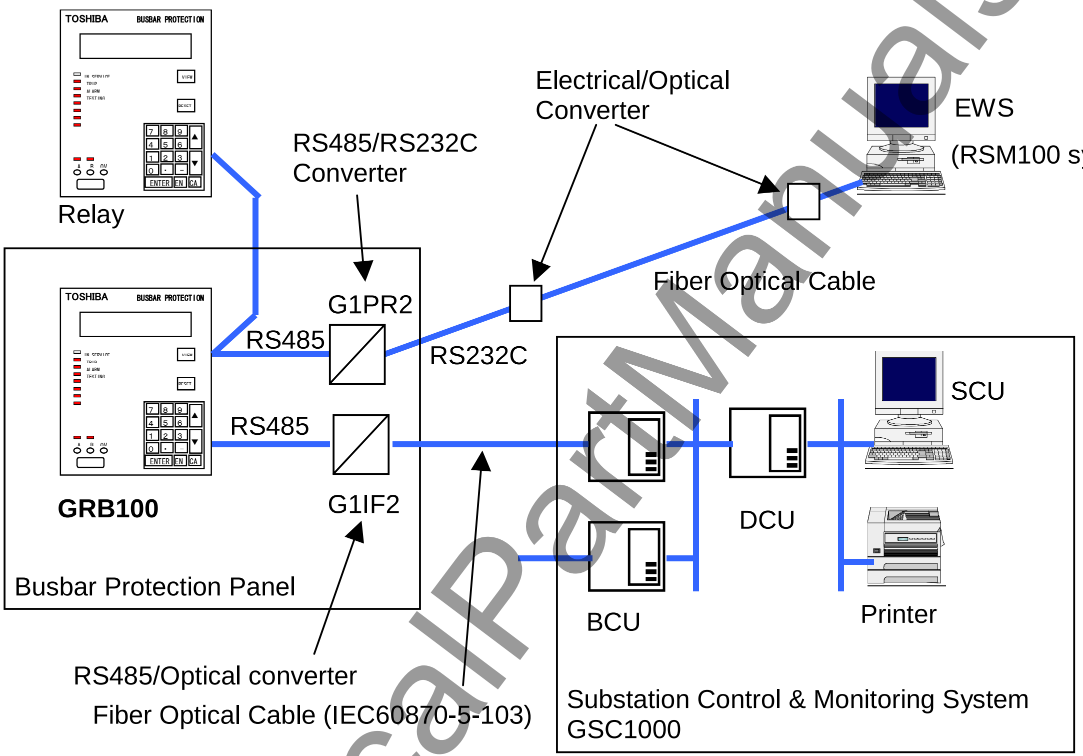
www . ElectricalPartManuals . com

### 4.4.2 Substation Control and Monitoring System

The relay has two communication ports for Relay Setting & Monitoring System RSM100 and Substation Control & Monitoring System (SCMS). The communication interface of SCMS complies with IEC standard protocol IEC60870-5-103.

Figure 4.4.2 shows the typical configuration of the communication interface for SCMS and RSM100 system.

The relays are connected through RS485/Optical converter G1IF2 to the SCMS, and connected through RS485/RS232C converter and Electrical/Optical converter to the RSM100 system.




Note: All devices except GRB100, and cables are option.

**Figure 4.4.2 Communication Interface for SCMS and RSM100 System**

www.ElectricalPartManuals.com

## 4.5 IEC 60870-5-103 Interface

The GRB100 can support the IEC60870-5-103 communication protocol. This protocol is mainly used when the relay communicates with a control system and is used to transfer the following measurand, status data and general command from the relay to the control system.

- Measurand data: current
- Status data: events, fault indications, etc.

The IEC60870-5-103 function in the relay can be customized with the original software "IEC103 configurator". It runs on a personal computer (PC) connected to the relay, and can help setting of Time-tagged messages, General command, Metering, etc. For detais of the setting method, refer to "IEC103 configurator" manual. For the default setting of IEC60870-5-103, see Appendix P.

The protocol can be used through the RS485 port on the relay rear panel and can be also used through the optional fibre optical interface.

The relay supports two baud-rates 9.6kbps and 19.2kbps.

The data transfer from the relay can be blocked by the setting.

For the settings, see the Section 4.2.6.4.

## 4.6 Clock Function

The clock function (Calendar clock) is used for time-tagging for the following purposes:

- Event records
- Disturbance records
- Fault records
- Metering
- Automatic supervision
- Display of the fault records on the digest screen
- Display of the automatic monitoring results on the digest screen

The calendar clock can run locally or be synchronized with the external IRIG-B time standard signal, RSM or IEC clock. This can be selected by setting.

If it is necessary to synchronize with the IRIG-B time standard signal, it is possible to transform GMT to the local time by setting.

When the relays are connected to the RSM system as shown in Figure 4.4.1, the calendar clock of each relay is synchronized with the RSM clock. If the RSM clock is synchronized with the external time standard (GPS clock etc.), then all the relay clocks are synchronized with the external time standard.

www . ElectricalPartManuals . com

# 5. Installation

## 5.1 Receipt of Relays

When relays are received, carry out the acceptance inspection immediately. In particular, check for damage during transportation, and if any is found, contact the vendor.

Check that the following accessories are attached.

- 3 pins for the monitoring jack, packed in a plastic bag.
- An attachment kit required for rack-mounting, if ordered. (See Appendix H.)

  EP-101 or EP102:
  1 large bracket with 5 round head screws, spring washers and washers (M4×10)
  1 small bracket with 3 countersunk head screws (M4×6)
  2 bars with 4 countersunk head screws (M3×8)

  EP-103 (for linking two relays):
  1 spacer with 3 round head screws, spring washers and washers (M4×10)
  2 small brackets with 3 countersunk head screws (M4×6)
  1 link panel for the rear with 8 round head screws, spring washers and washers (M4×10)
  1 link panel for the bottom with 6 round head screws, spring washers and washers (M4×10)
  2 bars with 4 countersunk head screws (M3×8)
- Optical fibre cables (type RFA4012GV) to connect the CU and BUs.

Always store the relays in a clean, dry environment.

## 5.2 Relay Mounting

Either a rack or flush mounting relay is delivered as designated by the customer. Appendix H shows the case outlines.

If the customer requires a rack-mounting relay, support metal fittings necessary to mount it in a 19-inch rack are also supplied with the relay.

When mounting the relay in a rack, detach the original brackets fixed on both sides of the relay and seals on the top and bottom of the relay. Attach the larger bracket and smaller bracket on the left and right sides of the relay respectively and the two bars on the top and bottom of the relay.

When linking two relays together for housing in one rack, detach the original brackets fixed on both sides of the relay and seals on the top and bottom of the relay. Link two relays by using two panels after mounting the spacer between two relays, and attach the small brackets on the left and right sides of the linked relay respectively and the two bars on the top and bottom of the linked relay.

For details on how to mount the attachment kit, see Appendix H.

The dimensions of the attachment kits EP-101, EP-102 and EP-103 are also shown in Appendix H.

www . ElectricalPartManuals . com

## 5.3 Electrostatic Discharge

**CAUTION**

Do not take any modules out of the relay case since electronic components on the modules are very sensitive to electrostatic discharge. If it is absolutely essential to take the modules out of the case, do not touch the electronic components or terminals with your bare hands. Additionally, always put the module in a conductive anti-static bag when storing it.

## 5.4 Handling Precautions

A person's normal movements can easily generate electrostatic potential of several thousand volts. Discharge of these voltages into semiconductor devices when handling electronic circuits can cause serious damage, which often may not be immediately apparent but the reliability of the circuit will have been compromised.

The electronic circuits are completely safe from electrostatic discharge when housed in the case. Do not expose them to risk of damage by withdrawing modules unnecessarily.

Each module incorporates the highest practicable protection for its semiconductor devices. However, if it becomes necessary to withdraw a module, precautions should be taken to preserve the high reliability and long life for which the equipment has been designed and manufactured.

**CAUTION**

- Before removing a module, ensure that you are at the same electrostatic potential as the equipment by touching the case.
- Handle the module by its front plate, frame or edges of the printed circuit board. Avoid touching the electronic components, printed circuit board or connectors.
- Do not pass the module to another person without first ensuring you are both at the same electrostatic potential. Shaking hands achieves equipotential.
- Place the module on an anti-static surface, or on a conducting surface which is at the same potential as yourself.
- Do not place modules in polystyrene trays.

It is strongly recommended that detailed investigations on electronic circuitry should be carried out in a Special Handling Area such as described in IEC 60747.

## 5.5 External Connections

External connections are shown in Appendix I.

### 5.5.1 Connection between CU and BUs

The connection between CU and BUs is carried out with the optical fibre cable with connecrtors (type RFA4012GV).

Special precautions are required when using an optical fibre cable with optical connectors.

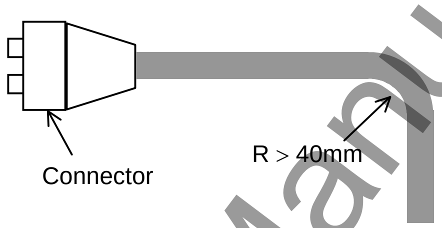
**WARNING**

When connecting this equipment via an optical fibre cable, do not look directly at the optical beam.

www. ElectricalPartManuals . com

### CAUTION

- Do not put a heavy object on an optical fibre cable.
- Be sure to attach and remove an optical connector to/from an optical transceiver module by holding the connector. Never do it by holding the optical fibre cable itself.
- Make sure that the terminal surface of an optical connector does not become dirty. While an optical fibre cable is not connected, cover the optical connector with the protective cap.
- Because optical connectors are designed so that they cannot be attached to an optical transceiver module the wrong way around, attach the connector after confirming it is in the correct attitude.
- Do not bend an optical fibre cable to a radius of less than 40mm.




Connect the terminal OPT11 of CU and the terminal OPT1 of BU1 by the optical fibre cable with connectors as follows:

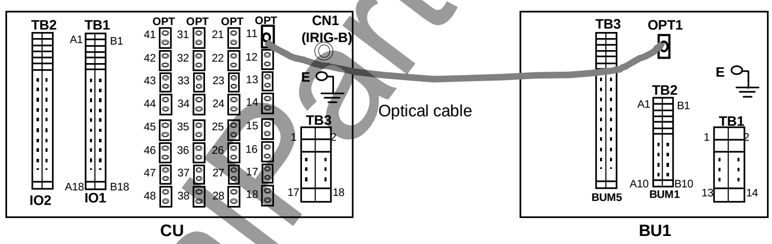



**Figure 5.5.1 Connection between CU and BU**

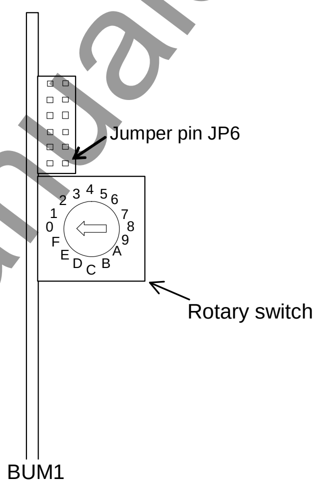
### 5.5.2 Setting of BU

BU address setting is to define the channel number. The channel number can be set the range of CH 1 to CH32 with the rotary switch and jumper pin JP6 of BU. The channel number (CH No.) is set as shown in Table 5.5.1.

www . ElectricalPartManuals . com

**Table 5.5.1 BU Setting**

| BU (CH No.) | BU Setting | | Connection Terminal (OPT) of CU | | | |
|---|---|---|---|---|---|---|
| | JP6 | Rotary switch | Model C∗1∗ | Model C∗2∗ | Model C∗3∗ | Model C∗4∗ |
| BU (CH1) | Open | 0 | 11 | 11 | 11 | 11 |
| BU (CH2) | | 1 | 12 | 12 | 12 | 12 |
| BU (CH3) | | 2 | 13 | 13 | 13 | 13 |
| BU (CH4) | | 3 | 14 | 14 | 14 | 14 |
| BU (CH5) | | 4 | 15 | 15 | 15 | 15 |
| BU (CH6) | | 5 | 16 | 16 | 16 | 16 |
| BU (CH7) | | 6 | 17 | 17 | 17 | 17 |
| BU (CH8) | | 7 | 18 | 18 | 18 | 18 |
| BU (CH9) | | 8 | -- | 31 | 21 | 21 |
| BU (CH10) | | 9 | -- | 32 | 22 | 22 |
| BU (CH11) | | A | -- | 33 | 23 | 23 |
| BU (CH12) | | B | -- | 34 | 24 | 24 |
| BU (CH13) | | C | -- | 35 | 25 | 25 |
| BU (CH14) | | D | -- | 36 | 26 | 26 |
| BU (CH15) | | E | -- | 37 | 27 | 27 |
| BU (CH16) | | F | -- | 38 | 28 | 28 |
| BU (CH17) | Close | 0 | -- | -- | 41 | 31 |
| BU (CH18) | | 1 | -- | -- | 42 | 32 |
| BU (CH19) | | 2 | -- | -- | 43 | 33 |
| BU (CH20) | | 3 | -- | -- | 44 | 34 |
| BU (CH21) | | 4 | -- | -- | 45 | 35 |
| BU (CH22) | | 5 | -- | -- | 46 | 36 |
| BU (CH23) | | 6 | -- | -- | 47 | 37 |
| BU (CH24) | | 7 | -- | -- | 48 | 38 |
| BU (CH25) | | 8 | -- | -- | -- | 41 |
| BU (CH26) | | 9 | -- | -- | -- | 42 |
| BU (CH27) | | A | -- | -- | -- | 43 |
| BU (CH28) | | B | -- | -- | -- | 44 |
| BU (CH29) | | C | -- | -- | -- | 45 |
| BU (CH30) | | D | -- | -- | -- | 46 |
| BU (CH31) | | E | -- | -- | -- | 47 |
| BU (CH32) | | F | -- | -- | -- | 48 |




Connect OPT1 of a BU to OPT11 of CU by the optical fibre. Open the front panel of the BU, and open the jumper pin J6 and set the rotary switch position mounted on the BUM1 module to “0”. Then the CU recognizes the BU as CH1.

Set other BUs the same as above.

www . ElectricalPartManuals . com

# 6. Commissioning and Maintenance

## 6.1 Outline of Commissioning Tests

The GRB100 is fully numerical and the hardware is continuously monitored.

Commissioning tests can be kept to a minimum and need only include hardware tests and conjunctive tests. The function tests are at the user's discretion.

In these tests, user interfaces on the front panel of the relay or local PC can be fully applied.

Test personnel must be familiar with general relay testing practices and safety precautions to avoid personal injuries or equipment damage.

### Hardware tests

These tests are performed for the following hardware to ensure that there is no hardware defect. Defects of hardware circuits other than the following can be detected by monitoring which circuits function when the DC power is supplied.

User interfaces
Binary input circuits and output circuits
AC input circuits

### Function tests

These tests are performed for the following functions that are fully software-based. Tests of the protection schemes require a dynamic test set.

Measuring elements
Timers
Metering and recording

### Conjunctive tests

The tests are performed after the relay is connected with the primary equipment and other external equipment.

The following tests are included in these tests:

On load test: phase sequence check and polarity check
Tripping circuit test
Primary injection test

www . ElectricalPartManuals . com

## 6.2 Cautions

### 6.2.1 Safety Precautions

**⚠CAUTION**

- The relay rack is provided with an earthing terminal.
  Before starting the work, always make sure the relay rack is earthed.
- When connecting the cable to the back of the relay, firmly fix it to the terminal block and attach the cover provided on top of it.
- Before checking the interior of the relay, be sure to turn off the power.

Failure to observe any of the precautions above may cause electric shock or malfunction.

### 6.2.2 Cautions on Tests

**⚠CAUTION**

- While the power is on, do not connect/disconnect the flat cable on the front of the printed circuit board (PCB).
- While the power is on, do not mount/dismount the PCB.
- Before turning on the power, check the following:
  - Make sure the polarity and voltage of the power supply are correct.
  - Make sure the CT circuit is not open.
  - Make sure the VT circuit is not short-circuited.
- Be careful that the transformer module is not damaged due to an overcurrent or overvoltage.
- If settings are changed for testing, remember to reset them to the original settings.

Failure to observe any of the precautions above may cause damage or malfunction of the relay.

Before mounting/dismounting the PCB, take antistatic measures such as wearing an earthed wristband.

www . ElectricalPartManuals . com

## 6.3 Preparations

### Test equipment

The following test equipment is required for the commissioning tests.

1 Three-phase voltage source or 1 Single-phase voltage source
2 Single-phase current sources
1 DC power supply
1 DC voltmeter
1 AC voltmeter
1 Phase angle meter
2 AC ammeters
1 Time counter, precision timer
1 PC (not essential)
1 Primary injection test set

### Relay settings

Before starting the tests, it must be specified whether the tests will use the user's settings or the default settings.

For the default settings, see the following appendixes:

Appendix E Binary Output Default Setting List
Appendix J Relay Setting Sheet

### Visual inspection

After unpacking the product, check for any damage to the relay case. If there is any damage, the internal module might also have been affected. Contact the vendor.

### Relay ratings

Check that the items described on the nameplate on the front of the relay conform to the user's specification. The items are: relay type and model, AC voltage, current and frequency ratings, and auxiliary DC supply voltage rating.

### Local PC

When using a local PC, connect it with the relay via the RS232C port on the front of the relay. RSM100 software is required to run the PC.

For the details, see the separate instruction manual "PC INTERFACE RSM100".

www . ElectricalPartManuals . com

## 6.4 Hardware Tests

The tests can be performed without external wiring, but a DC power supply, AC voltage and two AC current sources are required.

### 6.4.1 User Interfaces (CU)

This test ensures that the LCD, LEDs and keys function correctly.

**LCD display**

- Apply the rated DC voltage and check that the LCD is off.

  **Note:** If there is a failure, the LCD displays the "Auto-supervision" screen when the DC voltage is applied.

- Press the RESET key for one second and check that black dots appear on the whole screen.

**LED display**

- Apply the rated DC voltage and check that the "IN SERVICE" LED is lit in green.
- Press the RESET key for one second and check that seven LEDs under the "IN SERVICE" LED and two LEDs for monitoring jacks A and B are lit in red.

**VIEW and RESET keys**

- Press the VIEW key when the LCD is off and check that the "Metering" screen is displayed on the LCD.
- Press the RESET key and check that the LCD turns off.

**Keypad**

- Press any key on the keypad when the LCD is off and check that the LCD displays the "MENU" screen. Press the END key to turn off the LCD.
- Repeat this for all keys.

www . ElectricalPartManuals . com

### 6.4.2 Binary Input Circuit

The testing circuit is shown in Figure 6.4.1.

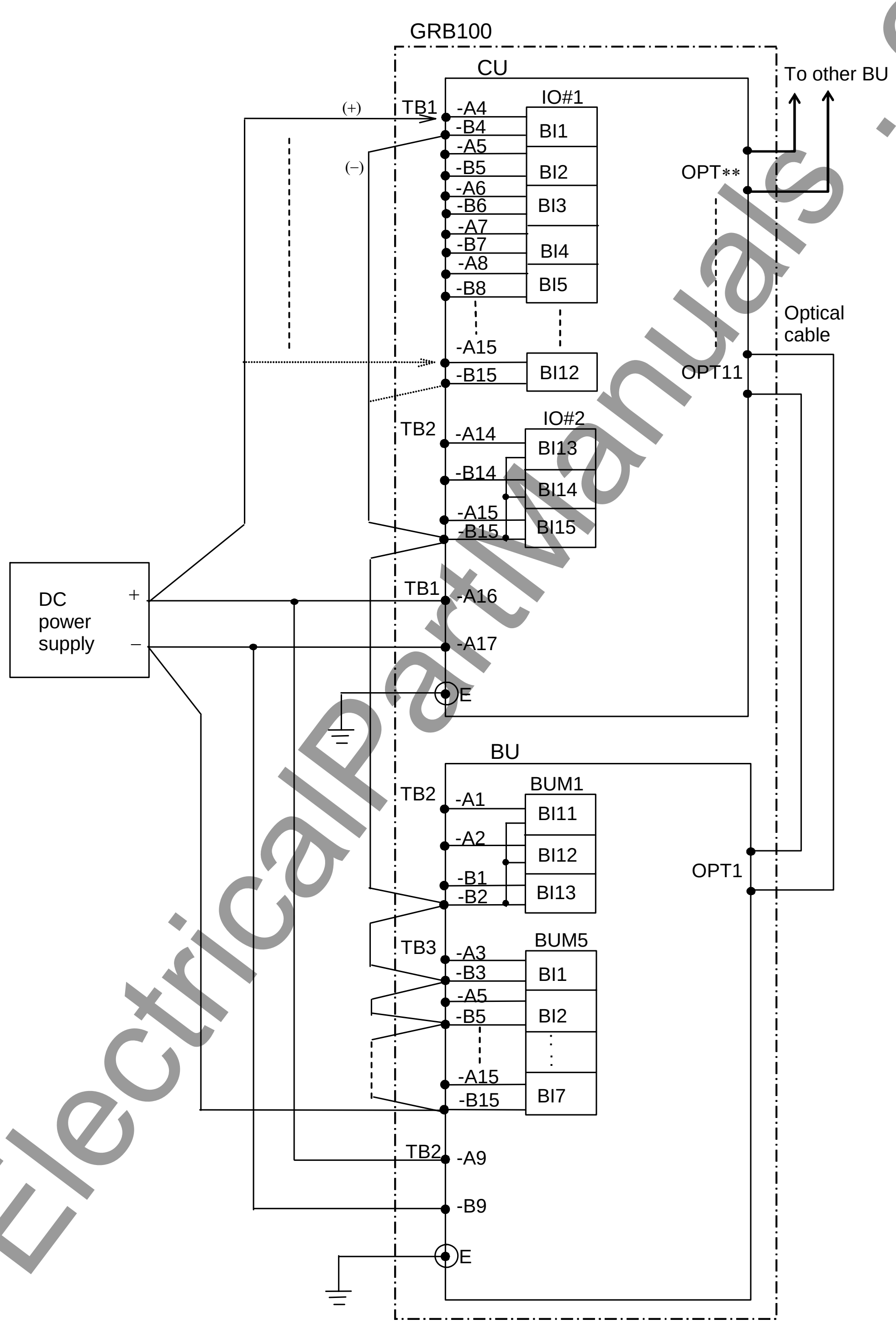



**Figure 6.4.1 Testing Binary Input Circuit**

www . ElectricalPartManuals . com

- Display the "Binary input & output" screen from the "Status" sub-menu.

```
/2 Binary input & output                3/67
Input (CU-IO#1)      [000 000 000 000     ]
Input (BU-CH1)       [000 000 000 0       ]
Input (BU-CH2)       [000 000 000 0       ]
                :
Input (BU-CH32)      [000 000 000 0       ]
Output(CU-IO#1)      [000                 ]
Output(CU-IO#2)      [000 000 000 000 00  ]
Output(BU-CH1)       [000 000 00          ]
Output(BU-CH2)       [000 000 00          ]
                :
Output(BU-CH32)      [000 000 00          ]
```

- Apply the rated DC voltage to terminals of terminal block TB1 and TB2 of CU, terminal block TB2 and TB3 of BU.
  Check that the status display corresponding to the input signal changes from 0 to 1. (For details of the binary input status display, see Section 4.2.4.2.)

**Note:** The number of BU and CH depends on the model.
Test the binary input circuits of other BUs same as above.

The user will be able to perform this test for one terminal to another or for all the terminals at once.

### 6.4.3 Binary Output Circuit

This test can be performed by using the "Test" sub-menu and forcibly operating the relay drivers and output relays. Operation of the output contacts is monitored at the output terminal. The output contact and corresponding terminal number are shown in Appendix I.

- Press 2 (= Binary output) on the "Test" screen to display the "Binary output" screen. The LCD displays the output modules mounted depending on the model.

```
/2 Binary output
1=CU-IO#1   2=CU-IO#2   3=BU
```

- Enter the selected number corresponding to each module to be operated. Then the LCD displays the name of the module and the name of the output relay to which the relay contact is connected.

  When "1" selected,

```
/3 BO           (0=Disable 1=Enable)   1/ 3
IO#1   BO1                             1 _
IO#1   BO2                             1
IO#1   BO3                             1
```

  When "2" selected,

www . ElectricalPartManuals . com

```
/3 BO            (0=Disable 1=Enable)  1/14
IO#2  BO1                              1  _
IO#2  BO2                              1
IO#2  BO3                              1
IO#2  BO4                              0
IO#2  BO5                              0
IO#2  BO6                              0
IO#2  BO7                              0
IO#2  BO8                              0
IO#2  BO9                              0
IO#2  BO10                             0
IO#2  BO11                             0
IO#2  BO12                             0
IO#2  FAIL                             0
IO#2  BO13                             0
```

When "3" selected,

```
/3 BO            (0=Disable 1=Enable) 1/***
CH1   TP1                              1  _
CH1   TP2                              0
CH1   BO1                              0
CH1   BO2                              0
CH1   BO3                              0
CH1   BO4                              0
CH1   BO5                              0
CH1   BO6                              0
  |
  |
CH32  TP1                              0
CH32  TP2                              0
CH32  BO1                              0
CH32  BO2                              0
CH32  BO3                              0
CH32  BO4                              0
CH32  BO5                              0
CH32  BO6                              0
```

- Enter 1 and press the ENTER key.
- After completing the entries, press the END key. Then the LCD displays the screen shown below. If 1 is entered for the output relays, the following forcible operation can be performed collectively.

```
/3 BO
Keep pressing 1 to operate.

Press CANCEL to cancel.
```

- Keep pressing the 1 key to operate the output relays forcibly.
- Check that the output contacts operate at the terminal.

www . ElectricalPartManuals . com

- Release pressing the $\boxed{1}$ key to reset the operation.

### 6.4.4 AC Input Circuits

This test can be performed by applying the checking voltages and currents to the AC input circuits and verifying that the values applied coincide with the values displayed on the LCD screen.

The testing circuit is shown in Figure 6.4.2. A three-phase voltage source and a single-phase current source are required. The three-phase voltage source is required for the models with FD elements.

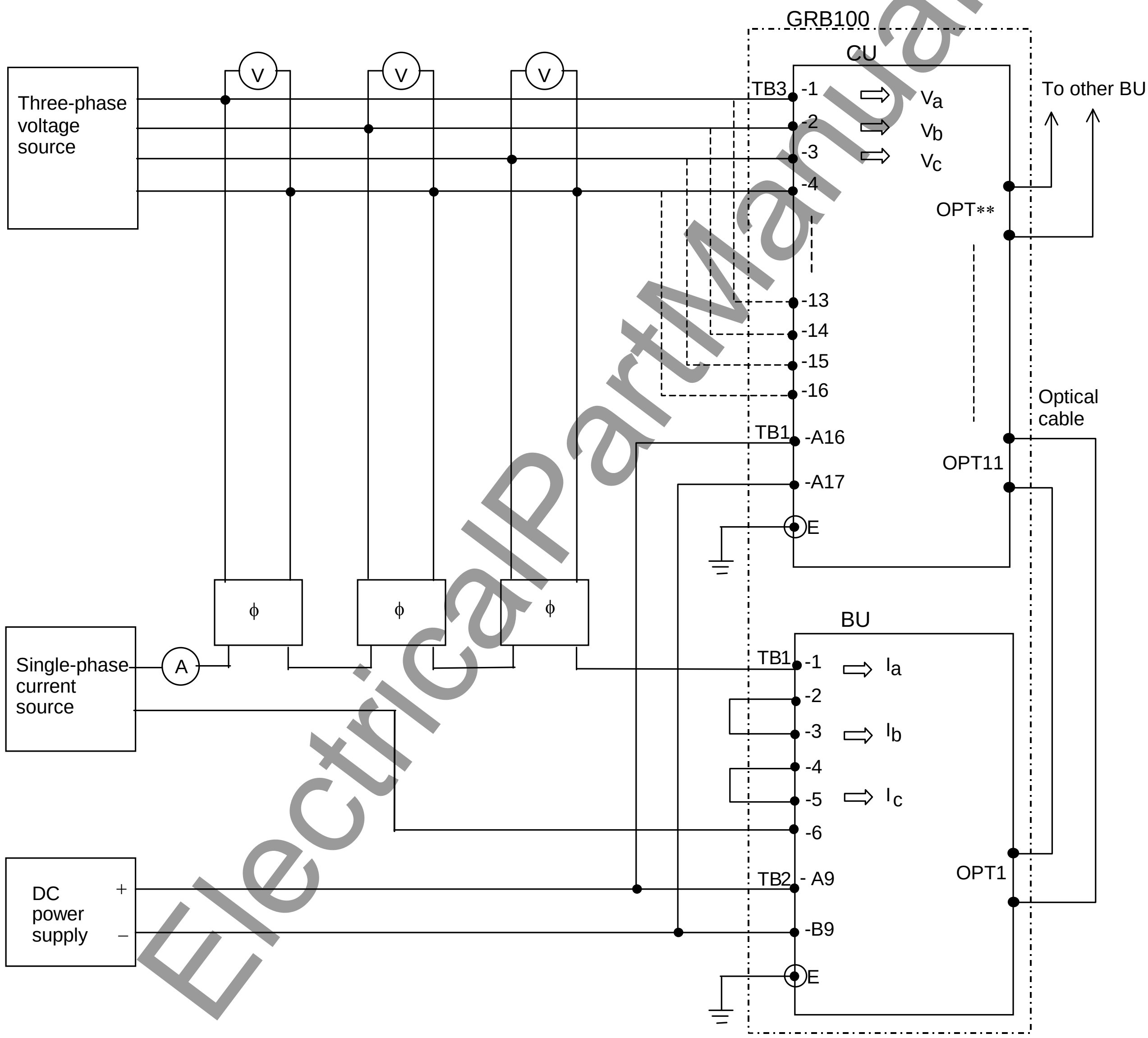



**Figure 6.4.2 Testing AC Input Circuit**

- Check that the metering data is set to be expressed as secondary values (Display value = 2) on the "Metering" screen.

  "Setting (view)" sub-menu → "Status" setting screen → "Metering" screen

  If the setting is Primary (Display value = 1), change the setting in the "Setting (change)"

www . ElectricalPartManuals . com

sub-menu. Remember to reset it to the initial setting after the test is finished. (See Section 4.2.6.6.)

- Open the "Metering" screen in the "Status" sub-menu.

  "Status" sub-menu → "Metering" screen

- Apply the rated AC voltages and current and check that the displayed values are within ± 5% of the input values.

www . ElectricalPartManuals . com

## 6.5 Function Test

### 6.5.1 Measuring Element

Measuring element characteristics are realized by the software, so it is possible to verify the overall characteristics by checking representative points.

Operation of the element under test is observed by the binary output signal at monitoring jacks A or B or by the LED indications above the jacks. In any case, the signal number corresponding to each element output must be set on the "Logic circuit" screen of the "Test" sub-menu.

```
/2 Logic circuit                        1/ 2
TermA(     0-  1500):      1 _
TermB(     0-  1500):     48
```

When a signal number is entered for the TermA line, the signal is observed at monitoring jack A and when entered for the TermB line, observed at monitoring jack B.

**Note:** The voltage level at the monitoring jacks is +15V ±3V for logic level "1" and less than 0.1V for logic level "0".

**CAUTION**

- Use the testing equipment with more than 1kΩ of internal impedance when observing the output signal at the monitoring jacks.
- Do not apply an external voltage to the monitoring jacks.
- Do not leave the A or B terminal shorted to 0V terminal for a long time.

In case of a three-phase element, it is enough to test for a representative phase. A-phase element is selected for hereafter.

#### 6.5.1.1 Current differential elements

The current differential elements are checked on the following items

- Operating current value
- Percentage restraining characteristic
- Operating time

**Note:** Set all the CT settings (1CT to nCT) to the same value or select a BU with the same value setting in the testing described in Figure 6.5.1, because the operating value depends on the settings.

In the testing, it is enough to test the DIFCH element for a representative element.

**Operating current value**

Minimum operating current value is checked by simulating one-end infeed. Figure 6.5.1 shows a test circuit.

www . ElectricalPartManuals . com

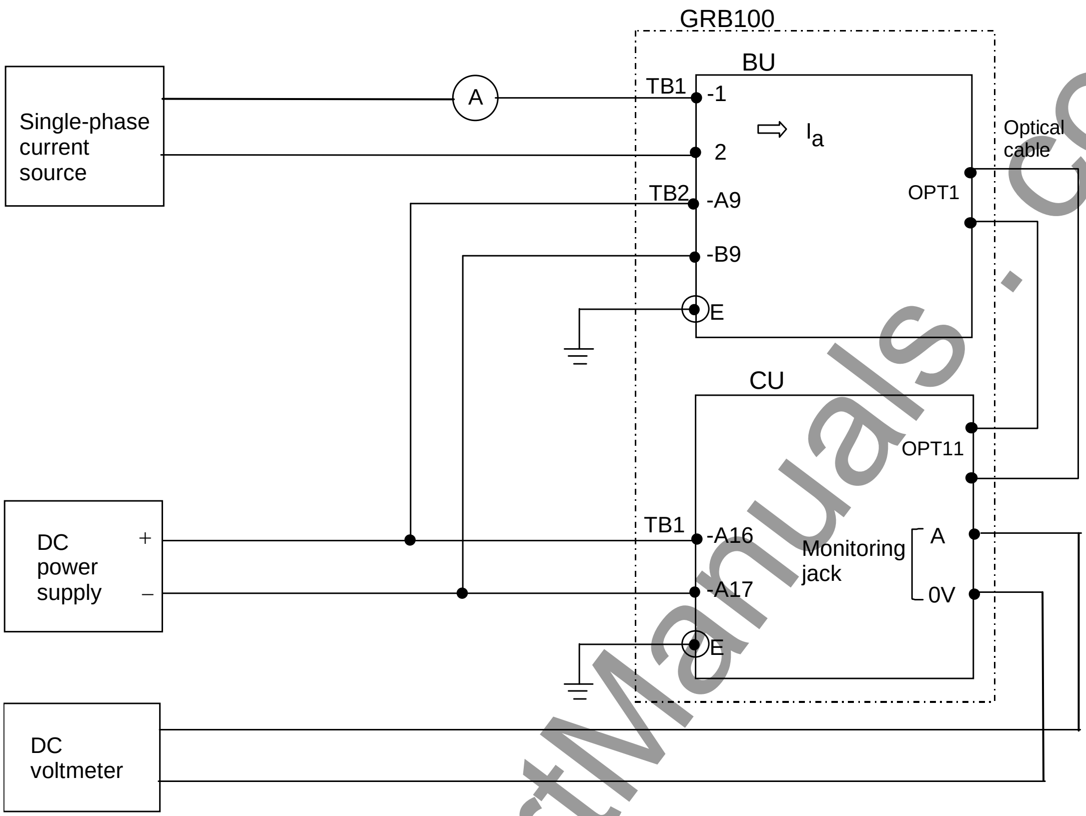



**Figure 6.5.1 Operating Current Value Test Circuit**

The output signal numbers of the elements are as follows:

| Element | Signal number |
|---|---|
| DIFCH-A | 541 |
| DIFCH-B | 542 |
| DIFCH-C | 543 |

- Press 4 (= Logic circuit) on the "Test" sub-menu screen to display the "Logic circuit" screen.
- Enter a signal number to observe the DIFCH-A operation at monitoring jack A and press the ENTER key.
- Apply a test current to A-phase current terminals of bay unit and change the magnitude of the current applied and measure the value at which the element DIFCH-A operates. Check that the measured value is within 5% of the theoretical operating value.

  Theoretical operating value = (DIFCH setting) / (CT setting) × (CT secondary rating)

www . ElectricalPartManuals . com

### Percentage restraining characteristics

The percentage restraining characteristic DF2 is tested on the outflow current ($I_{out}$) and infeed current ($I_{in}$) plane as shown in Figure 6.5.2. The characteristic shown in Figure 6.5.2 is equivalent to the one on the differential current (Id) and restraining current (Ir) plane shown in Figure 2.8.1.

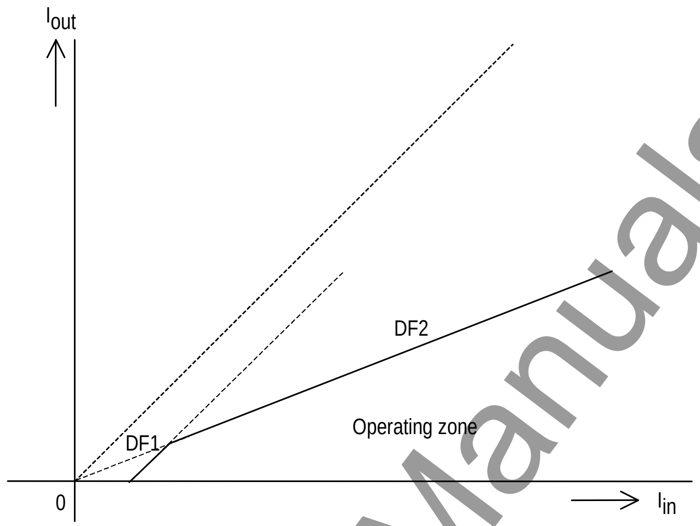



**Figure 6.5.2 Current Differential Element ($I_{out}$ - $I_{in}$ Plane)**

The characteristic test is enough to test for two representative BUs.

Figure 6.5.3 shows a testing circuit simulating infeed from the BU1 and outflow from BU2.

The characteristic DF2, in the case of k=0.3, is expressed by the following equation,

$$I_{out} \leq (7/13)\ I_{in}$$

www . ElectricalPartManuals . com

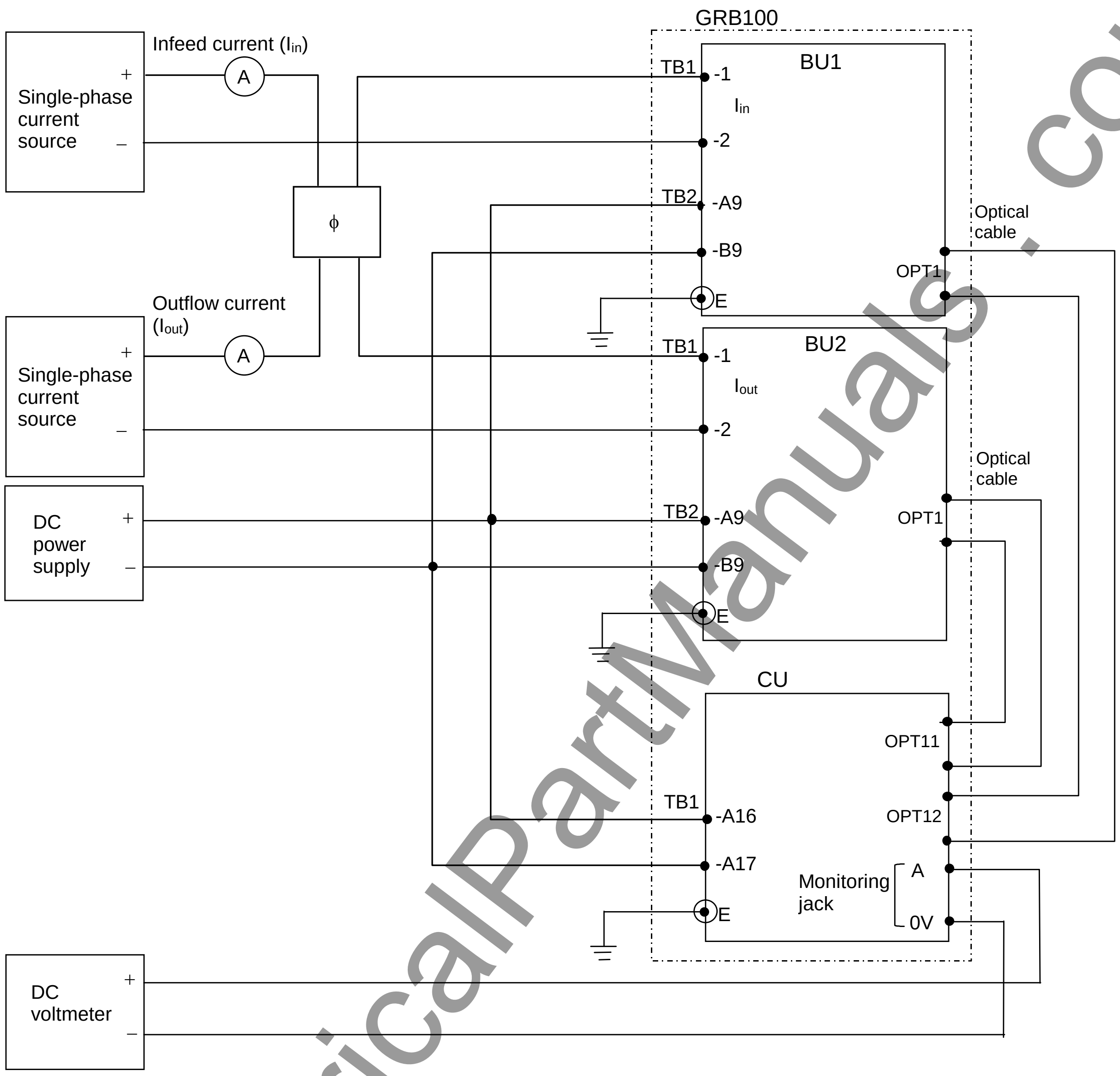



**Figure 6.5.3 Percentage Restraining Characteristic Test of DIF**

- Press 4 (= Logic circuit) on the "Test" sub-menu screen to display the "Logic circuit" screen.
- Enter a signal number to observe the DIFCH-A output at monitoring jack A and press the ENTER key.
- Apply an infeed current to terminal TB1-1 and -2 of the BU1.

  When the infeed current applied is larger than three times the (DIFCH setting) / (CT ratio),
- Apply an outflow current of the same magnitude and counterphase with the infeed current to terminal TB1-1 and -2 of the BU2.
- Decrease the out flow current in magnitude and measure the values at which the element operates.
- Check that the measured values are within 5% of the theoretical values obtained above equation.

www . ElectricalPartManuals . com

**Operating time**

The testing circuit is shown in Figure 6.5.4.

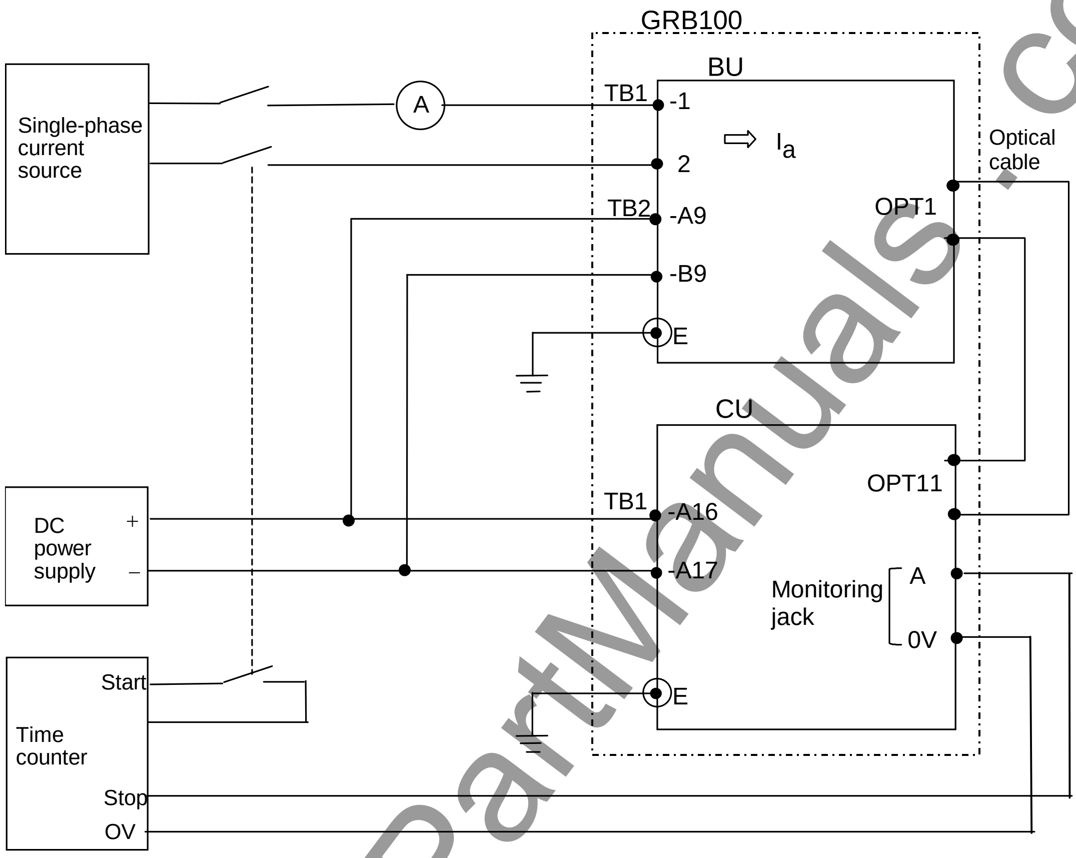



**Figure 6.5.4 Operating Time Test**

- Press 4 (= Logic circuit) on the "Test" sub-menu screen to display the "Logic circuit" screen.
- Enter a signal number to observe the DIFCH-A operation at monitoring jack A and press the ENTER key.
- Set a test current to 3 times of the operating current.
- Apply the test current and measure the operating time.
- Check that the operating time is 1 cycle or less.

www . ElectricalPartManuals . com

#### 6.5.1.2 Overcurrent element OCBF

The testing circuit is shown in Figure 6.5.5.

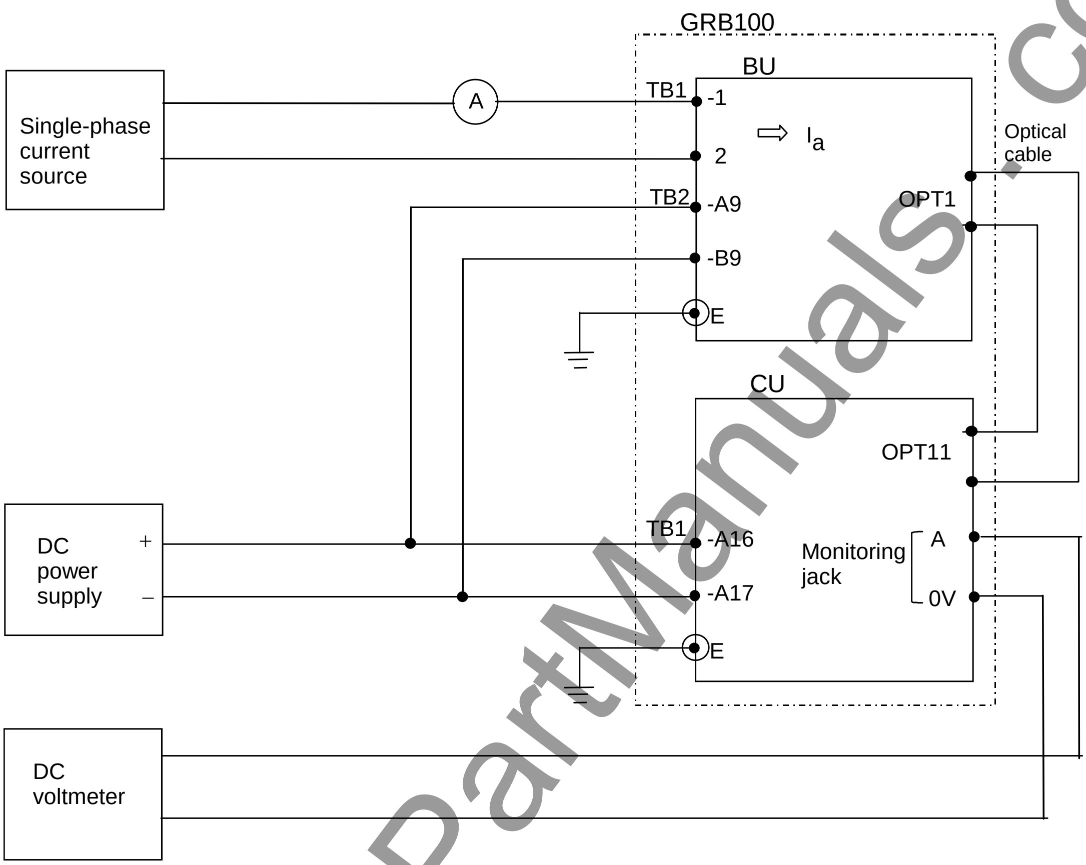



**Figure 6.5.5 Testing OCBF elements**

The output signal numbers of the OCBF elements are as follows:

| Element | Signal number | Element | Signal number | Element | Signal number |
|---|---|---|---|---|---|
| 1OCBF-A | 591 | 13OCBF-A | 627 | 25OCBF-A | 663 |
| 2OCBF-A | 594 | 14OCBF-A | 630 | 26OCBF-A | 666 |
| 3OCBF-A | 597 | 15OCBF-A | 633 | 27OCBF-A | 669 |
| 4OCBF-A | 600 | 16OCBF-A | 636 | 28OCBF-A | 672 |
| 5OCBF-A | 603 | 17OCBF-A | 639 | 29OCBF-A | 675 |
| 6OCBF-A | 606 | 18OCBF-A | 642 | 30OCBF-A | 678 |
| 7OCBF-A | 609 | 19OCBF-A | 645 | 31OCBF-A | 681 |
| 8OCBF-A | 612 | 20OCBF-A | 648 | 32OCBF-A | 684 |
| 9OCBF-A | 615 | 21OCBF-A | 651 | | |
| 10OCFB-A | 618 | 22OCBF-A | 654 | | |
| 11OCBF-A | 621 | 23OCBF-A | 657 | | |
| 12OCBF-A | 624 | 24OCBF-A | 660 | | |

www.ElectricalPartManuals.com

The testing procedure is as follows:

- Press 4 (= Logic circuit) on the "Test" sub-menu screen to display the "Logic circuit" screen.
- Enter a signal number to observe the OCBF at monitoring jack A and press the ENTER key.
- Apply a test current and change the magnitude of the current applied and measure the value at which the element operates.
  Check that the measured value is within ±5% of the theoretical operating value.

  Theoretical operating value = (CT secondary rated current) × (OCBF setting)

### 6.5.1.3 FD elements UVGFA, UVGFB, UVGFC, UVGFD, UVSFA, UVSFB, UVSFC and UVSFD

The testing circuit is shown in Figure 6.5.6.

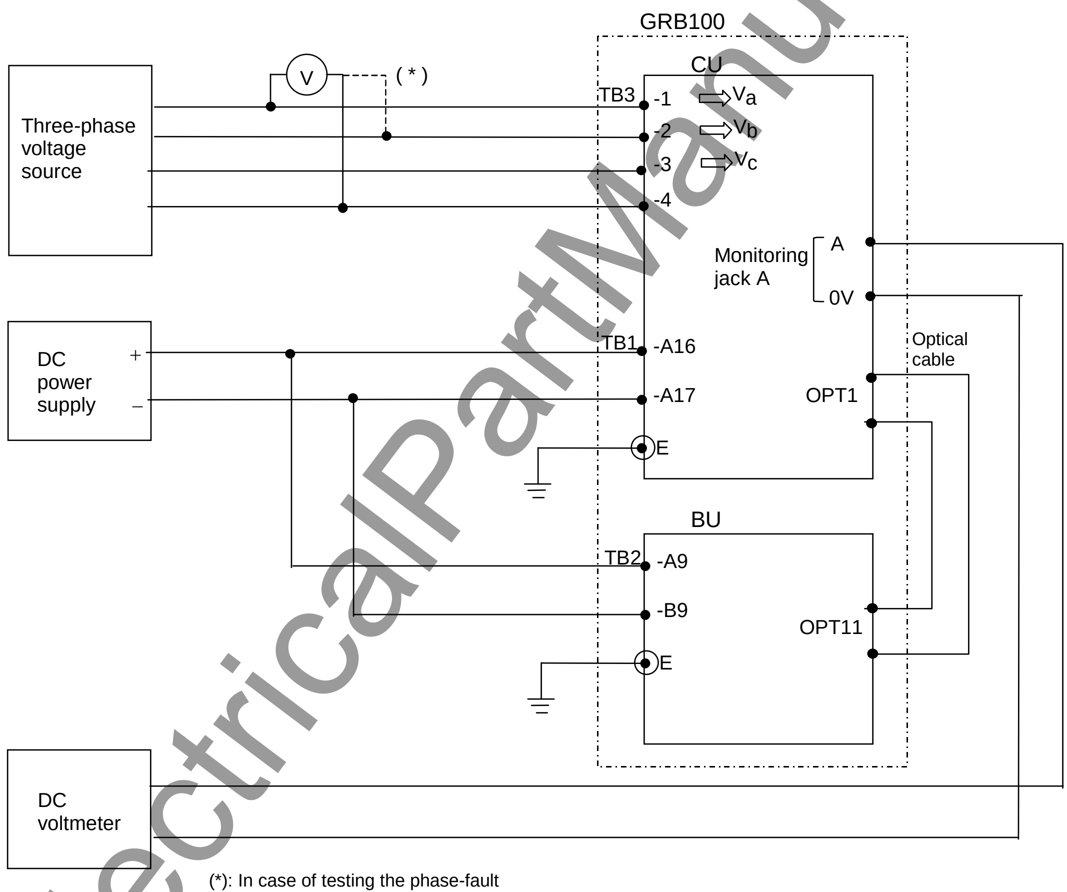



**Figure 6.5.6 Testing FD elements**

The output signal numbers of the FD elements are as follows:

| Element | Signal number |
|---|---|
| UVGFA-A | 1301 |
| UVGFB-A | 1304 |
| UVGFC-A | 1307 |
| UVGFD-A | 1310 |
| UVSFA-A | 1313 |

www . ElectricalPartManuals . com

| Element | Signal number |
|---|---|
| UVSFB-A | 1316 |
| UVSFC-A | 1319 |
| UVSFD-A | 1322 |

The testing procedure is as follows:

- Press 4 (= Logic circuit) on the "Test" sub-menu screen to display the "Logic circuit" screen.
- Enter a signal number to observe the UVGF□ or UVSF□ output at monitoring jack A and press the ENTER key.
- Apply a rated voltage and change the magnitude of the voltage applied, and measure the value at which the element operates. Check that the measured value is within 5% of the setting value.

### 6.5.2 Timer Test

The pick-up delay time of the variable timer can be measured by connecting the monitoring jacks A and B to a time counter as shown in Figure 6.5.7. Jacks A and B are used to observe the input signal and output signal of the timer, respectively.

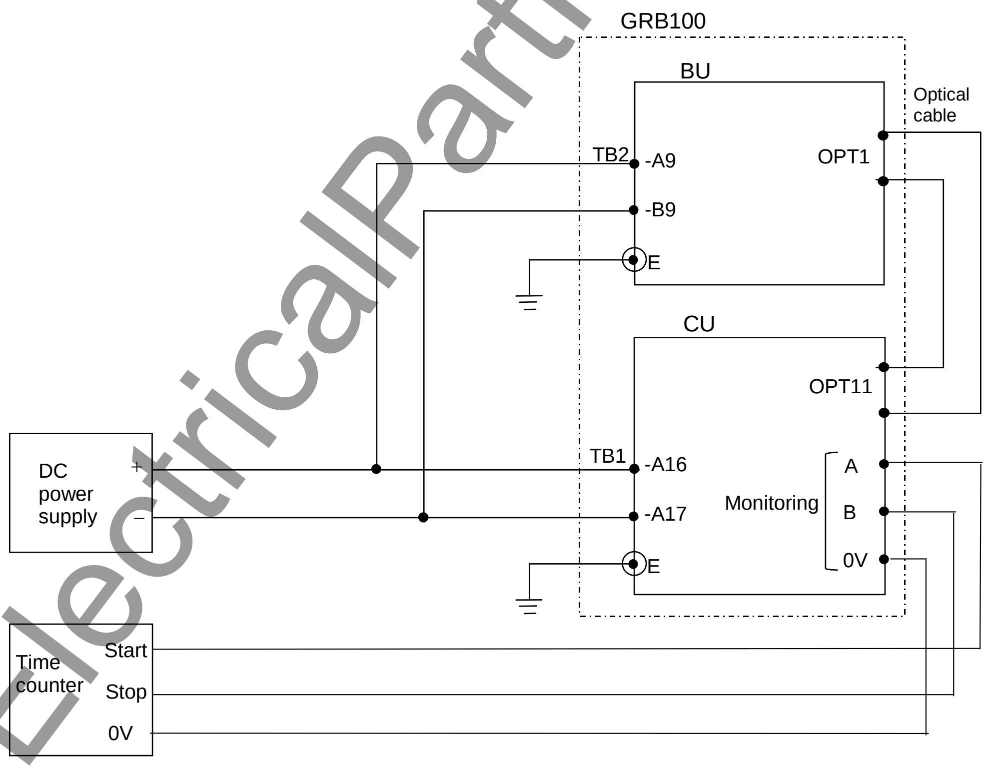



**Figure 6.5.7 Testing Variable Timer**

- Press 3 (= Timer) on the "Test" sub-menu screen to display the "Timer" screen.
- Enter the number corresponding to the timer to be observed. The timers and assigned numbers are listed in Appendix D.
- Press the END key to display the following screen.



www . ElectricalPartManuals . com

```
/2 Timer                                   1/ 1
Press ENTER to operate.

Press CANCEL to cancel.
```

- Press the ENTER key to operate the timer. The "TESTING" LED turns on, and the timer is initiated and the following display appears. The input and output signals of the timer can be observed at monitoring jacks A and B respectively. The LEDs above monitoring jacks A or B are also lit if the input or output signal exists.

```
/2 Timer                                   1/1
Operating...
Press END to reset.
Press CANCEL to cancel.
```

- Press the END key to reset the input signal to the timer. The "TESTING" LED turns off.

  Press CANCEL key to test other timers. Repeat the above testing.

www . ElectricalPartManuals . com

### 6.5.3 Protection Scheme

In the protection scheme tests, a dynamic test set with the three-phase voltage source and current source is required to simulate power system pre-fault, fault and post-fault conditions.

Tripping is observed with the tripping command output relays TP-1 and -2 of each BU.

Check that the indications and recordings are correct.

**Differential tripping**

The tripping should be checked for the test current, which is two times or larger than the minimum operating current of DIFCH and DIFZA to DIFZD, and for the test voltage which is smaller than the operating voltage of UVSF and UVGF. Set the contact condition of all disconnectors and circuit breakers applied to the related channels to simulate the in-service condition before applying the test current and voltage. (See section 4.2.7.)

Operating time is measured by the operating time of the tripping command output relay. It will typically be 1 cycle.

Check that the indications and recordings are correct.

**Circuit breaker failure tripping**

Set the scheme switches [nBF1] to "T" or "TOC" and [nBF2] to "ON".

Apply a fault and retain it. Check that the adjacent breaker tripping output relay operates after the time setting of the TnB2.

Check that the indications and recordings are correct.

### 6.5.4 Metering and Recording

The metering function can be checked while testing the AC input circuit. See Section 6.4.4.

Fault recording can be checked while testing the protection schemes. Open the "Fault record" screen and check that the descriptions are correct for the applied fault.

Recording events are listed in Table 3.4.1. The events BP block, CBF block, Ind. reset, nDS1 N/C to nExt. trip C are external events and others are internal events. Event recording on the external events can be checked by changing the status of binary input signals. Change the status in the same way as the binary input circuit test (see Section 6.4.2) and check that the description displayed on the "Event Record" screen is correct.

**Note:** The record option can be set for each event. Change the status of the binary input signal after confirming that the related event is set to record. (The default setting enables all the events to be recorded.)

Some of the internal events can be checked in the protection scheme tests.

Disturbance recording can be checked while testing the protection schemes. The LCD display only shows the date and time when a disturbance is recorded. Open the "Disturbance record" screen and check that the descriptions are correct.

Details can be displayed on the PC. Check that the descriptions on the PC are correct. For details on how to obtain disturbance records on the PC, see the RSM100 Manual.

www . ElectricalPartManuals . com

## 6.6 Conjunctive Tests

### 6.6.1 On Load Test

With the relay connected to the line which is carrying a load current, it is possible to check the polarity of the voltage transformer and current transformer and the phase rotation with the metering displays on the LCD screen.

- Open the following "Metering" screen from the "Status" sub-menu.

```
/2 Metering      16/Oct/1997   18:13  3/***
Ida   ***** %  *******A   Ira   *******A
Idb   ***** %  *******A   Irb   *******A
Idc   ***** %  *******A   Irc   *******A
IdaA  ***** %  *******A   IraA  *******A
IdbA  ***** %  *******A   IrbA  *******A
IdcA  ***** %  *******A   IrcA  *******A
IdaB  ***** %  *******A   IraB  *******A
IdbB  ***** %  *******A   IrbB  *******A
IdcB  ***** %  *******A   IrcB  *******A
IdaC  ***** %  *******A   IraC  *******A
IdbC  ***** %  *******A   IrbC  *******A
IdcC  ***** %  *******A   IrcC  *******A
IdaD  ***** %  *******A   IraD  *******A
IdbD  ***** %  *******A   IrbD  *******A
IdcD  ***** %  *******A   IrcD  *******A
VaA   ***.*kV  ***.*°  V1A   ***.*kV   ***.*°
VbA   ***.*kV  ***.*°  V2A   ***.*kV   ***.
VcA   ***.*kV  ***.*°  V0A   ***.*kV   ***.
VaB   ***.*kV  ***.*°  V1B   ***.*kV   ***.*°
VbB   ***.*kV  ***.*°  V2B   ***.*kV   ***.
VcB   ***.*kV  ***.*°  V0B   ***.*kV   ***.
VaC   ***.*kV  ***.*°  V1C   ***.*kV   ***.*°
VbC   ***.*kV  ***.*°  V2C   ***.*kV   ***.
VcC   ***.*kV  ***.*°  V0C   ***.*kV   ***.
VaD   ***.*kV  ***.*°  V1D   ***.*kV   ***.*°
VbD   ***.*kV  ***.*°  V2D   ***.*kV   ***.
VcD   ***.*kV  ***.*°  V0D   ***.*kV   ***.
CH1   *********************
Ia    **.**kA  ***.*°  I1    **.**kA   ***.*°
Ib    **.**kA  ***.*°  I2    **.**kA   ***.
Ic    **.**kA  ***.*°  I0    **.**kA   ***.
CH2   *********************
Ia    **.**kA  ***.*°  I1    **.**kA   ***.*°
Ib    **.**kA  ***.*°  I2    **.**kA   ***.
Ic    **.**kA  ***.*°  I0    **.**kA   ***.
                   :
                   :
CH32  *********************
Ia    **.**kA  ***.*°  I1    **.**kA   ***.*°
Ib    **.**kA  ***.*°  I2    **.**kA   ***.
Ic    **.**kA  ***.*°  I0    **.**kA   ***.
Frequency              **.*Hz
```

**Note:** The magnitude of voltage and current can be set in values on the primary side or on the secondary side by the setting. (The default setting is the primary side.)
The phase differential currents show the percentage to DIFCH and DIFZ setting values. IdyA to IdyD and VyA to VyD are displayed depend on applied zones. (“y”=a, b, c, 1, 2, 0)
In the phase angle indication, the reference phase angle is indicated as “0.0°” at V1. Phase angles above are expressed taking that of positive sequence voltage as a reference phase angle. The leading phase angles are expressed plus. If no voltage input, the positive sequence current of CH1 is taken as a reference phase angle. If the current of CH1 is small, the current

www.ElectricalPartManuals.com

of the next channel is used as a reference phase angle.

- Check that the phase rotation is correct.
- Verify the phase relation between voltage and current with a known load current direction.

### 6.6.2 Tripping Circuit Test

The tripping circuit including the circuit breaker is checked by forcibly operating the output relay and monitoring the breaker that is tripped. Forcible operation of the output relay is performed on the "Binary output" screen of the "Test" sub-menu as described in Section 6.4.3.

#### Tripping circuit

- Set the breaker to be closed.
- Press 2 (= Binary output) on the "Test" sub-menu screen to display the "Binary output" screen. The LCD displays the output modules mounted.

```
/2 Binary output
1=CU-IO#1   2=CU-IO#2   3=BU


```

- Enter 3 to select the BU, then the LCD displays the screen shown below.

```
/3 BO          (0=Disable 1=Enable) 1/***
CH1    TP1                          1 _
CH1    TP2                          0
CH1    BO1                          0
CH1    BO2                          0
CH1    BO3                          0
CH1    BO4                          0
CH1    BO5                          0
CH1    BO6                          0
CH2    TP1                          0
CH2    TP2                          0
CH2    BO1                          0
CH2    BO2                          0
  :
  :
  :
CH32   TP1                          0
CH32   TP2                          0
CH32   BO1                          0
CH32   BO2                          0
```

TP1 of each CH is an output relay with one normally open contact.

- Enter 1 for TP1 of CH1 and press the ENTER key.
- Press the END key. Then the LCD displays the screen shown below.



www.ElectricalPartManuals.com

```
/3 BO
Keep pressing 1 to operate.

Press CANCEL to cancel.
```

- Keep pressing the 1 key to operate the output relay TP1 of CH1 and check that the No. 1 breaker is tripped.
- Release pressing the 1 key to reset the operation.
- Repeat the above for other output relays.

### 6.6.3 Primary injection test

This test is a protection stability check (through fault stability) carried out for all feeders before the busbar is energized.

For this test, the tripping circuit has to be opened.

#### Protection Stability Check

Inject a current from a primary injection test set (recommended : 25%CT rated current ) into two feeders (reference feeder and one other feeder, see Figure 6.6.1.)

Check that the relay does not operate.

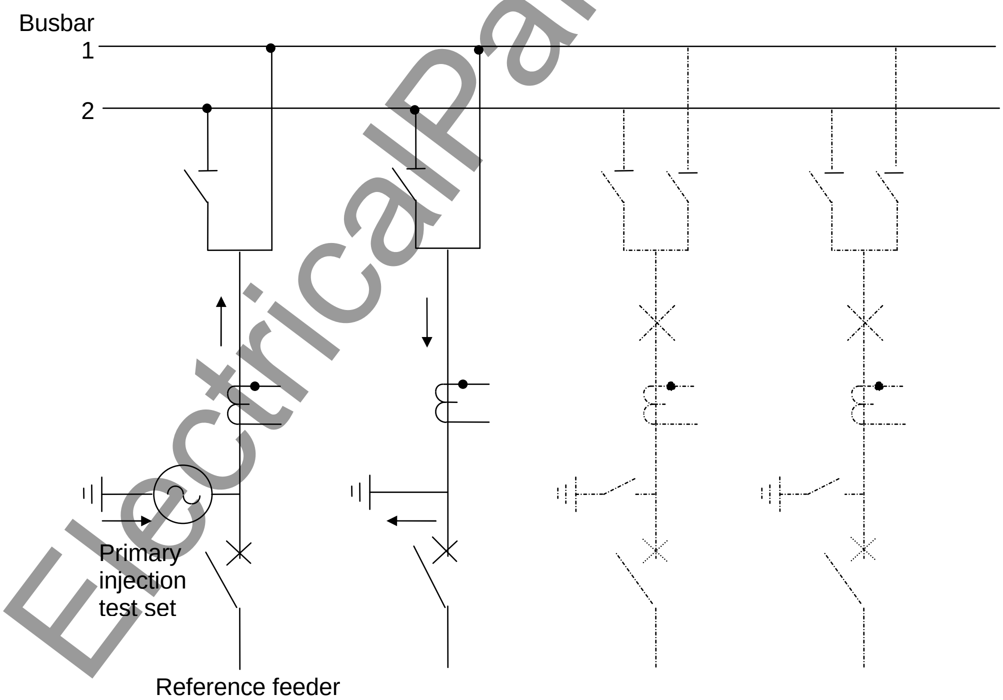



**Figure 6.6.1 Primary Injection Test**

www . ElectricalPartManuals . com

## 6.7 Maintenance

### 6.7.1 Regular Testing

The relay is almost completely self-supervised. The circuits which cannot be supervised are binary input and output circuits and human interfaces.

Therefore regular testing can be minimized to checking the unsupervised circuits. The test procedures are the same as described in Sections 6.4.1, 6.4.2 and 6.4.3.

### 6.7.2 Failure Tracing and Repair

Failures will be detected by automatic supervision or regular testing.

When a failure is detected by supervision, a remote alarm is issued with the binary output signal of FAIL and the failure is indicated on the front panel with LED indicators or LCD display. It is also recorded in the event record.

Failures detected by supervision are traced by checking the "Auto-supervision "screen on the LCD.

If any messages are shown on the LCD, the failed module or failed external circuits can be located by referring to Table 6.7.1.

This table shows the relationship between messages displayed on the LCD and estimated failure location. Locations marked with (1) have a higher probability than locations marked with (2) and (3). Locations marked with (2) have a higher probability than locations marked with (3). The monitoring of BU is performed by FEP module in CU. The monitoring result is displayed on LCD by SPM module. If an FEP module fails, therefore, the result displayed on the LCD may be incorrect. The relationship between the FEP module number and the monitored BUs is as follows:

| FEP Module No. | BU | | | |
|---|---|---|---|---|
| | Model C∗1∗ | Model C∗2∗ | Model C∗3∗ | Model C∗4∗ |
| FEP1 | x | x | x | x |
| FEP2 | | | x | x |
| FEP3 | | x | | x |
| FEP4 | | | x | x |

As shown in the table, some of the messages cannot identify the fault location definitely but suggest plural possible failure locations. In these cases, the failure location is identified by replacing the suggested failed modules with spare modules one by one until the "ALARM" LED is turned off.

The replacement or investigation should be performed first for the module or circuit with higher probability in the table.

If there is a failure and the LCD is not working such as a screen is frozen or not displayed, the failure location is any one of SPM, FEP and HMI module.

www . ElectricalPartManuals . com

### Table 6.7.1 LCD Message and Failure Location

| Message or Operation | Failure location | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CU | | | | | | BU | | | AC cable | Optic. cable | DS or CB | AC inputs |
| | VCT | FEP | SPM | IO#1 | IO#2 | HMI | VCT | BUM1 | BUM5 | | | | |
| Checksum err | | | × | | | | | | | | | | |
| ROM-RAM err | | | × | | | | | | | | | | |
| SRAM err | | | × | | | | | | | | | | |
| BU-RAM err | | | × | | | | | | | | | | |
| DPRAM err | | | × | | | | | | | | | | |
| EEPROM err | | | × | | | | | | | | | | |
| SUB stopped | | | × | | | | | | | | | | |
| A/D err | | | × | | | | | | | | | | |
| V0 err | × (2) | | × (1) | | | | | | | × (2) | | | × (1) |
| V2 err | × (2) | | × (1) | | | | | | | × (2) | | | × (1) |
| Sampling err | | | × | | | | | | | | | | |
| DIO err | | | × (2) | × (1) | × (1) | | | | | | | | |
| LCD err | | | × (2) | | | × (1) | | | | | | | |
| Sub:checksum err | | | × | | | | | | | | | | |
| Sub:ROM/RAM err | | | × | | | | | | | | | | |
| Sub:SRAM err | | | × | | | | | | | | | | |
| Sub:DPRAM err | | | × | | | | | | | | | | |
| Sub:A/D err | | | × | | | | | | | | | | |
| FEP∗: checksum err | | × | | | | | | | | | | | |
| FEP∗: ROM-RAM err | | × | | | | | | | | | | | |
| FEP∗: SRAM err | | × | | | | | | | | | | | |
| FEP∗: DPRAM err | | × | | | | | | | | | | | |
| FEP∗: stopped | | × | | | | | | | | | | | |
| BU∗: COM err | | × (3) | | | | | | × (1) | | | × (2) | | |
| BU∗: A/D err | | × (3) | | | | | × (2) | × (1) | | | × (2) | | |
| BU∗: DIO err | | × (3) | | | | | | × (1) | × (1) | | × (2) | | |
| BU∗: Address err | | × (3) | | | | | | × (1) | | | × (2) | | |
| BU∗: EEPROM err | | × (2) | | | | | | × (1) | | | | | |
| BU∗: AI err | | × (3) | | | | | × (2) | × (1) | | × (2) | | | |
| CT∗ err | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| DS∗ err | | | | | | | | | × (1) | | | | |
| CB∗ err | | | | | | | | | × (1) | | | | |
| Id-∗∗ err | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| Id err | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| CT fail, CT-ZA fail to CT-ZD fail | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| No-working of LCD | | × (1) | × (1) | | | × (1) | | | | | | | |

Note *: The monitoring of BU is performed by FEP module in CU. The monitoring result is displayed on LCD by SPM module. If an FEP module fails, therefore, the result displayed on the LCD may be incorrect.

www . ElectricalPartManuals . com

If there is a failure and no message is shown on the LCD in the CU, it means that the failure location is either in the DC power supply circuit or in the microprocessors mounted on the SPM module. In this case, check the "ALARM" LED. If it is off, the failure is in the DC power supply circuit. If it is lit, open the relay front panel and check the LEDs mounted on the SPM module. If the LED is off, the failure is in the DC power supply circuit. If the LED is lit, the failure is in the microprocessors.

In the former case, check if the correct DC voltage is applied to the relay. If it is, replace the IO#1 module mounting the DC/DC converter and confirm that the "ALARM" LED is turned off. In the latter case, replace the SPM module mounting the processors and confirm that the "ALARM" LED is turned off.

When the "POWER" LED in the BU is off, check if the correct DC voltage is applied to the BU. If it is, replace the BUM1 module mounting the DC/DC converter and confirm that the "POWER" LED is turned on.

When a failure is detected during regular testing, it will not be difficult to identify the failed module to be replaced.

Note: When a failure or an abnormality is detected during the regular test, confirm the following first:
- Test circuit connections are correct.
- Modules are securely inserted in position.
- Correct DC power voltage with correct polarity is applied and connected to the correct terminals.
- Correct AC inputs are applied and connected to the correct terminals.
- Test procedures comply with those stated in the manual.

### 6.7.3 Replacing Failed Modules

If the failure is identified to be in the relay module and the user has spare modules, the user can recover the protection by replacing the failed modules.

Repair at the site should be limited to module replacement. Maintenance at the component level is not recommended.

Check that the replacement module has an identical module name (VCT, FEP, SPM, IO#1, IO#2, etc.) and hardware type-form as the removed module. Furthermore, the SPM module should have the same software name.

The module name is indicated on the bottom front of the relay case. The hardware type-form is indicated on the module in the following format:

| Unit | Module name | Hardware type-form |
|---|---|---|
| CU | VCT | G1PC1-□□□□ |
| | FEP | G1FE1-□□□□ |
| | SPM | G1SP7-□□□□ |
| | IO#1 | G1IO8-□□□□ |
| | IO#2 | G1IO2-□□□□ |
| | HMI | -------- |
| BU | VCT | G1PC1-□□□□ |
| | BUM1 | G1BM1-□□□□ |
| | BUM5 | G1BM5-□□□□ |

www . ElectricalPartManuals . com

The software name is indicated on the memory device on the module with eight letters such as GS1BM1∗∗∗, GS1BF2∗∗∗, GS1BK1∗∗∗, etc.

**⚠ CAUTION** When handling a module, take anti-static measures such as wearing an earthed wrist band and placing modules on an earthed conductive mat. Otherwise, many of the electronic components could suffer damage.

**CAUTION** After replacing the SPM module, check all of the settings including the data related the PLC and IEC103, etc. are restored the original settings.

The initial replacement procedure is as follows:

- Switch off the DC power supply.

  **⚠ WARNING** Hazardous voltage may remain in the DC circuit just after switching off the DC power supply. It takes approximately 30 seconds for the voltage to discharge.

- Disconnect the trip outputs.
- Short circuit all AC current inputs and disconnect all AC voltage inputs.
- Unscrew the relay front cover.

### Replacing the Human Machine Interface (HMI) Module (Front Panel) of CU

- Open the front panel of the relay by unscrewing the binding screw located on the left side of the front panel.
- Unplug the ribbon cable on the front panel by pushing the catch outside.
- Remove the two retaining screws and one earthing screw on the relay case side, then detach the front panel from the relay case.
- Attach the replacement module in the reverse procedure.

### Replacing the Transformer (VT) Module of CU

- Open the right-side front panel (HMI module) by unscrewing the two binding screws located on the left side of the panel.
- Open the left-side front panel (blind panel) by unscrewing the two binding screws located on the right side of the panel.
- Detach the module holding bar by unscrewing the binding screw located on the left side of the bar.
- Unplug the ribbon cable on the other module by nipping the catch.
- Remove the metal cover by unscrewing the binding screw located at the top and bottom of the cover.
- Pull out the module by grasping the handles.
- Insert the replacement module in the reverse procedure.

### Replacing other modules of CU

- Open the right-side front panel (HMI module) by unscrewing the two binding screws located on the left side of the panel.
- Open the left-side front panel (blind panel) by unscrewing the two binding screws located on the right side of the panel.

www.ElectricalPartManuals.com

- Detach the module holding bar by unscrewing the binding screw located on the left side of the bar.
- Unplug the ribbon cable running among the modules by nipping the catch (black connector) and by pushing the catch outside (gray connector) on the connector.
- Unplug the cable connector behind the case when replacing the FEP module.
- Pull out the module by pulling up or down the top and bottom levers.
- Insert the replacement module in the reverse procedure.
- After replacing the SPM module, input the user setting values again.

**Replacing the Transformer (CT) Module of BU**

- Open the front panel by pulling the two knobs located on the left side of the panel.
- Detach the module holding bar by unscrewing the binding screw located on the left side of the bar.
- Unplug the ribbon cable on the other module by nipping the catch.
- Remove the metal cover by unscrewing the binding screw located at the top and bottom of the cover.
- Pull out the module by grasping the handles.
- Insert the replacement module in the reverse procedure.

**Replacing other modules of BU**

- Open the front panel by pulling the two knobs located on the left side of the panel.
- Detach the module holding bar by unscrewing the binding screw located on the left side of the bar.
- Unplug the ribbon cable running among the modules by nipping the catch (black connector) and by pushing the catch outside (gray connector) on the connector.
- Unplug the cable connector behind the case when replacing the BUM module.
- Pull out the module by pulling up or down the top and bottom levers.
- Insert the replacement module in the reverse procedure.
- After replacing the BUM1 module, set the BU address setting again. (See Section 5.5.2.)

For failed module tracing and its replacement, see Appendix Q.

### 6.7.4 Resumption of Service

After replacing the failed module or repairing failed external circuits, take the following procedures for the relay to restore into service.

- Switch on the DC power supply and confirm that the "IN SERVICE" green LED is lit and the "ALARM" red LED is not lit.

  **Note:** Supply DC power after checking that all the modules are in their original positions and the ribbon cables are plugged in.

- Supply the AC inputs and reconnect the trip outputs.

www . ElectricalPartManuals . com

### 6.7.5 Storage

The spare relay or module should be stored in a dry and clean room. Based on IEC Standard 60255-6 the storage temperature should be −25°C to +70°C, but the temperature of 0°C to +40°C is recommended for long-term storage.

www . ElectricalPartManuals . com

# 7. Putting Relay into Service

The following procedure must be adhered to when putting the relay into service after finishing commissioning or maintenance tests.

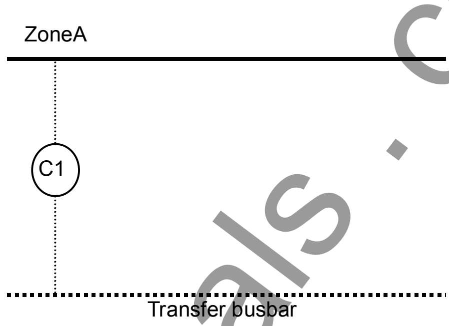
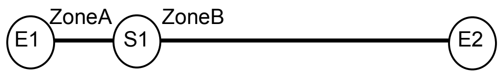
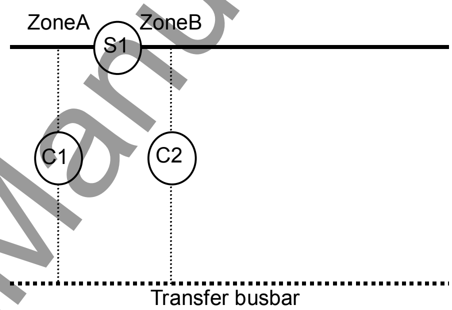
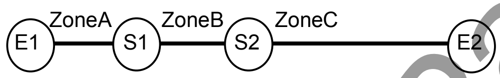
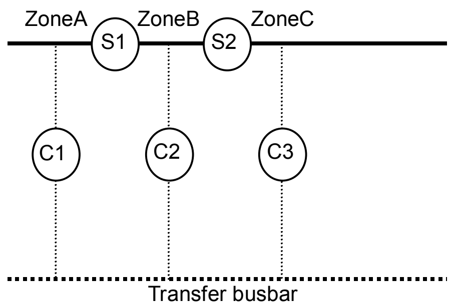
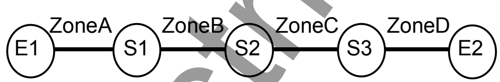
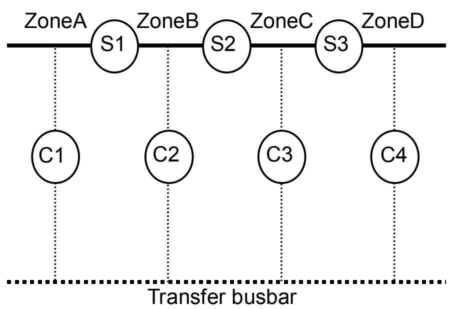
- Check that all external connections are correct.
- Check the setting of all measuring elements, timers, scheme switches, recordings and clock are correct.
  In particular, when settings are changed temporarily for testing, be sure to restore them.
- Clear any unnecessary records on faults, events and disturbances which are recorded during the tests.
- Press the VIEW key and check that no failure message is displayed on the "Auto-supervision" screen.
- Check that the green "IN SERVICE" LED is lit and no other LEDs are lit on the front panel.

www . ElectricalPartManuals . com

# Appendix A

## Busbar Replica

www . ElectricalPartManuals . com

| Zone number | Single-busbar | Single-busbar with a transfer busbar |
|---|---|---|
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

Note: Symbols display the following circuits.

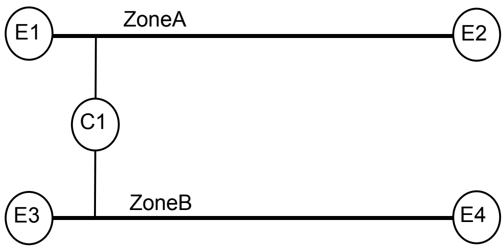
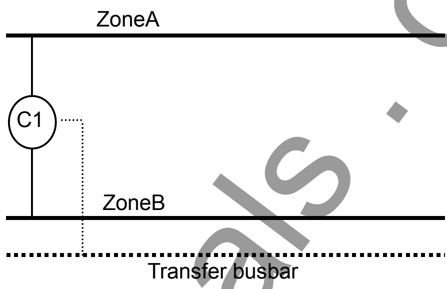
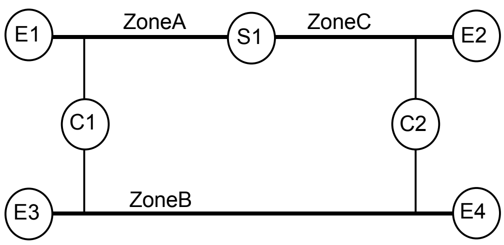
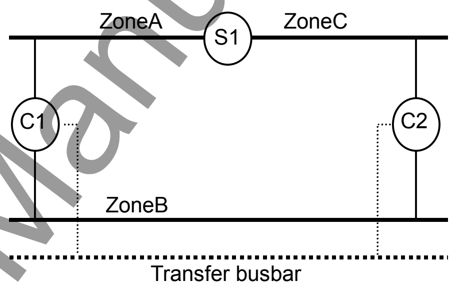
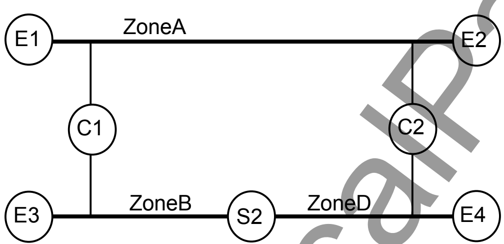
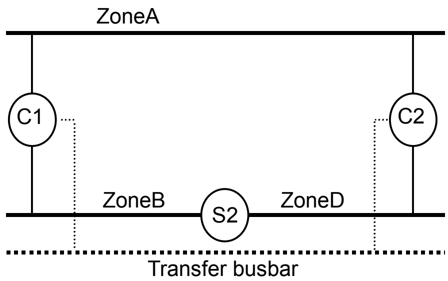
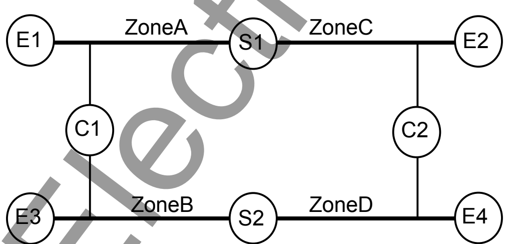
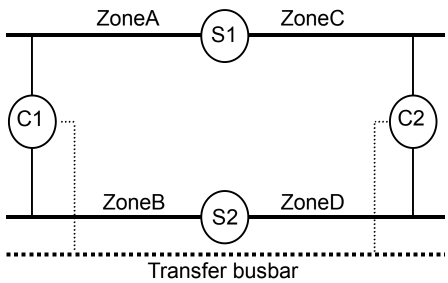
E1 - E4 : End of bus-section

S1 - S4 : Bus-section

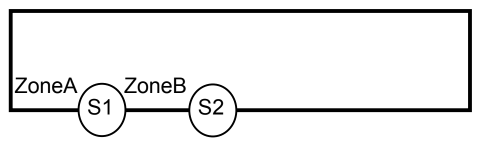
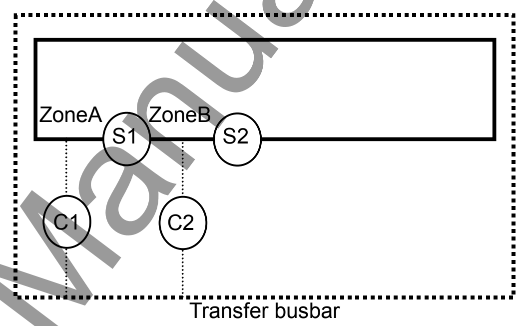
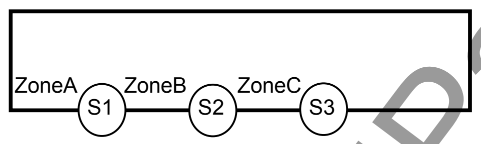
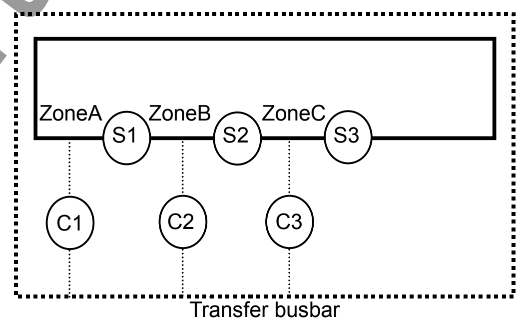
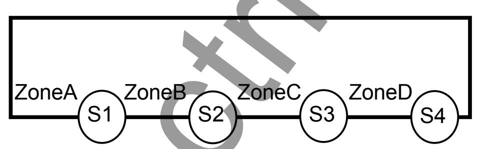
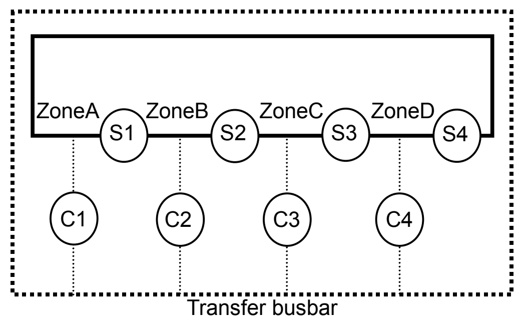
C1 - C4 : Bus-coupler

Feeder circuits are omitted in the figure.

www . ElectricalPartManuals . com

| Zone number | Double-busbar (including to double as a transfer busbar) | Double-busbar with a transfer bus |
|---|---|---|
| 1 |   |   |
| 2 |   |   |
| 3 |   |   |
| 4 |   |   |

www . ElectricalPartManuals . com

| Zone number | Ring-busbar | Ring-busbar with a transfer busbar |
|---|---|---|
| 1 | | |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

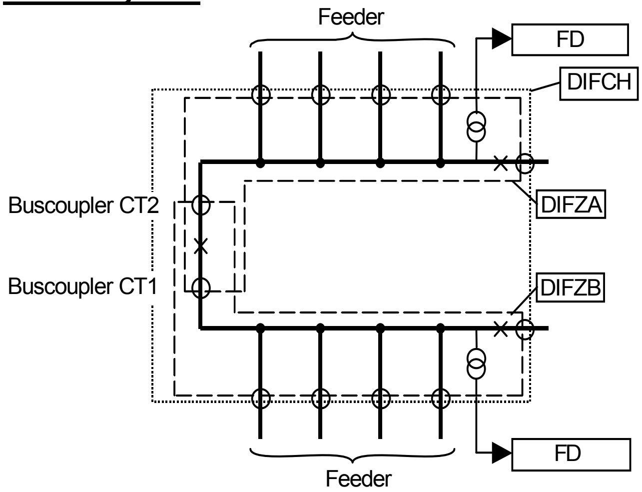
www . ElectricalPartManuals . com

# Appendix B

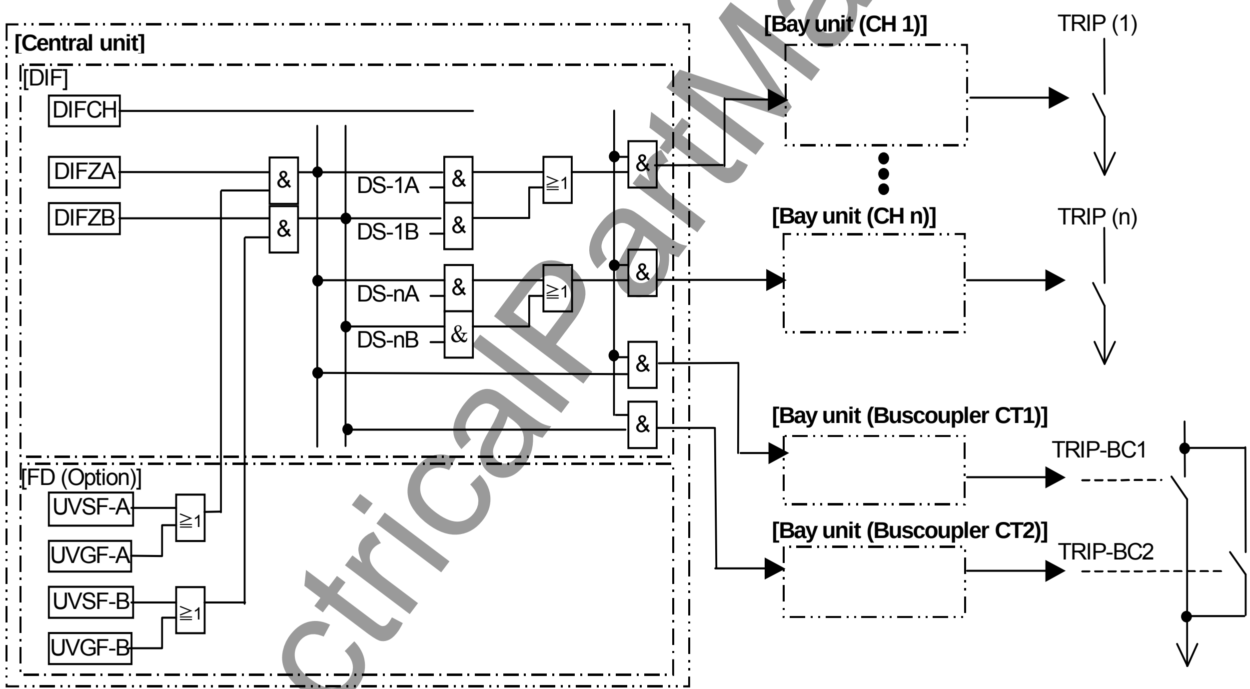
## Block Diagram

www . ElectricalPartManuals . com

**Busbar system**




**Scheme logic**




DS-nA : Disconnector condition of Busbar A side
DS-nB : Disconnector condition of Busbar B side
DS-BC** : Disconnector condition of Buscoupler

**Typical Block Diagram**

www . ElectricalPartManuals . com

# Appendix C

## Signal List

www . ElectricalPartManuals . com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 0 | CONSTANT_0 | constant 0 |
| 1 | CONSTANT_1 | constant 1 |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | CH1-DS1-N/O | Binary input signal CH1 DS1 normaly open contact |
| 12 | CH1-DS1-N/C | Binary input signal CH1 DS1 normaly close contact |
| 13 | CH1-BI2 | Binary input signal CH1 BI2 |
| 14 | CH1-BI6 | Binary input signal CH1 BI6 |
| 15 | CH1-BI3 | Binary input signal CH1 BI3 |
| 16 | CH1-BI7 | Binary input signal CH1 BI7 |
| 17 | CH1-BI4 | Binary input signal CH1 BI4 |
| 18 | CH1-EFP.TR | End-fault-protection transfer trip signal |
| 19 | 1OCBF-OR | OCBF relay element (3ph OR signal) |
| 20 | | |
| 21 | CH1-EXTTP-A1 | Binary input signal CH1 External trip A-phase |
| 22 | CH1-EXTTP-A2 | Binary input signal CH1 External trip A-phase |
| 23 | CH1-EXTTP-B1 | Binary input signal CH1 External trip B-phase |
| 24 | CH1-EXTTP-B2 | Binary input signal CH1 External trip B-phase |
| 25 | CH1-EXTTP-C1 | Binary input signal CH1 External trip C-phase |
| 26 | CH1-EXTTP-C2 | Binary input signal CH1 External trip C-phase |
| 27 | CH2-DS1-N/O | Binary input signal CH2 DS1 normaly open contact |
| 28 | CH2-DS1-N/C | Binary input signal CH2 DS1 normaly close contact |
| 29 | CH2-BI2 | Binary input signal CH2 BI2 |
| 30 | CH2-BI6 | Binary input signal CH2 BI6 |
| 31 | CH2-BI3 | Binary input signal CH2 BI3 |
| 32 | CH2-BI7 | Binary input signal CH2 BI7 |
| 33 | CH2-BI4 | Binary input signal CH2 BI4 |
| 34 | CH2-EFP.TR | End-fault-protection transfer trip signal |
| 35 | 2OCBF-OR | OCBF relay element (3ph OR signal) |
| 36 | | |
| 37 | CH2-EXTTP-A1 | Binary input signal CH2 External trip A-phase |
| 38 | CH2-EXTTP-A2 | Binary input signal CH2 External trip A-phase |
| 39 | CH2-EXTTP-B1 | Binary input signal CH2 External trip B-phase |
| 40 | CH2-EXTTP-B2 | Binary input signal CH2 External trip B-phase |
| 41 | CH2-EXTTP-C1 | Binary input signal CH2 External trip C-phase |
| 42 | CH2-EXTTP-C2 | Binary input signal CH2 External trip C-phase |
| 43 | CH3-DS1-N/O | Binary input signal CH3 DS1 normaly open contact |
| 44 | CH3-DS1-N/C | Binary input signal CH3 DS1 normaly close contact |
| 45 | CH3-BI2 | Binary input signal CH3 BI2 |
| 46 | CH3-BI6 | Binary input signal CH3 BI6 |
| 47 | CH3-BI3 | Binary input signal CH3 BI3 |
| 48 | CH3-BI7 | Binary input signal CH3 BI7 |
| 49 | CH3-BI4 | Binary input signal CH3 BI4 |
| 50 | CH3-EFP.TR | End-fault-protection transfer trip signal |
| 51 | 3OCBF-OR | OCBF relay element (3ph OR signal) |
| 52 | | |
| 53 | CH3-EXTTP-A1 | Binary input signal CH3 External trip A-phase |
| 54 | CH3-EXTTP-A2 | Binary input signal CH3 External trip A-phase |
| 55 | CH3-EXTTP-B1 | Binary input signal CH3 External trip B-phase |
| 56 | CH3-EXTTP-B2 | Binary input signal CH3 External trip B-phase |
| 57 | CH3-EXTTP-C1 | Binary input signal CH3 External trip C-phase |
| 58 | CH3-EXTTP-C2 | Binary input signal CH3 External trip C-phase |
| 59 | CH4-DS1-N/O | Binary input signal CH4 DS1 normaly open contact |
| 60 | CH4-DS1-N/C | Binary input signal CH4 DS1 normaly close contact |
| 61 | CH4-BI2 | Binary input signal CH4 BI2 |
| 62 | CH4-BI6 | Binary input signal CH4 BI6 |
| 63 | CH4-BI3 | Binary input signal CH4 BI3 |
| 64 | CH4-BI7 | Binary input signal CH4 BI7 |
| 65 | CH4-BI4 | Binary input signal CH4 BI4 |
| 66 | CH4-EFP.TR | End-fault-protection transfer trip signal |
| 67 | 4OCBF-OR | OCBF relay element (3ph OR signal) |
| 68 | | |
| 69 | CH4-EXTTP-A1 | Binary input signal CH4 External trip A-phase |
| 70 | CH4-EXTTP-A2 | Binary input signal CH4 External trip A-phase |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 71 | CH4-EXTTP-B1 | Binary input signal CH4 External trip B-phase |
| 72 | CH4-EXTTP-B2 | Binary input signal CH4 External trip B-phase |
| 73 | CH4-EXTTP-C1 | Binary input signal CH4 External trip C-phase |
| 74 | CH4-EXTTP-C2 | Binary input signal CH4 External trip C-phase |
| 75 | CH5-DS1-N/O | Binary input signal CH5 DS1 normaly open contact |
| 76 | CH5-DS1-N/C | Binary input signal CH5 DS1 normaly close contact |
| 77 | CH5-BI2 | Binary input signal CH5 BI2 |
| 78 | CH5-BI6 | Binary input signal CH5 BI6 |
| 79 | CH5-BI3 | Binary input signal CH5 BI3 |
| 80 | CH5-BI7 | Binary input signal CH5 BI7 |
| 81 | CH5-BI4 | Binary input signal CH5 BI4 |
| 82 | CH5-EFP.TR | End-fault-protection transfer trip signal |
| 83 | 5OCBF-OR | OCBF relay element (3ph OR signal) |
| 84 | | |
| 85 | CH5-EXTTP-A1 | Binary input signal CH5 External trip A-phase |
| 86 | CH5-EXTTP-A2 | Binary input signal CH5 External trip A-phase |
| 87 | CH5-EXTTP-B1 | Binary input signal CH5 External trip B-phase |
| 88 | CH5-EXTTP-B2 | Binary input signal CH5 External trip B-phase |
| 89 | CH5-EXTTP-C1 | Binary input signal CH5 External trip C-phase |
| 90 | CH5-EXTTP-C2 | Binary input signal CH5 External trip C-phase |
| 91 | CH6-DS1-N/O | Binary input signal CH6 DS1 normaly open contact |
| 92 | CH6-DS1-N/C | Binary input signal CH6 DS1 normaly close contact |
| 93 | CH6-BI2 | Binary input signal CH6 BI2 |
| 94 | CH6-BI6 | Binary input signal CH6 BI6 |
| 95 | CH6-BI3 | Binary input signal CH6 BI3 |
| 96 | CH6-BI7 | Binary input signal CH6 BI7 |
| 97 | CH6-BI4 | Binary input signal CH6 BI4 |
| 98 | CH6-EFP.TR | End-fault-protection transfer trip signal |
| 99 | 6OCBF-OR | OCBF relay element (3ph OR signal) |
| 100 | | |
| 101 | CH6-EXTTP-A1 | Binary input signal CH6 External trip A-phase |
| 102 | CH6-EXTTP-A2 | Binary input signal CH6 External trip A-phase |
| 103 | CH6-EXTTP-B1 | Binary input signal CH6 External trip B-phase |
| 104 | CH6-EXTTP-B2 | Binary input signal CH6 External trip B-phase |
| 105 | CH6-EXTTP-C1 | Binary input signal CH6 External trip C-phase |
| 106 | CH6-EXTTP-C2 | Binary input signal CH6 External trip C-phase |
| 107 | CH7-DS1-N/O | Binary input signal CH7 DS1 normaly open contact |
| 108 | CH7-DS1-N/C | Binary input signal CH7 DS1 normaly close contact |
| 109 | CH7-BI2 | Binary input signal CH7 BI2 |
| 110 | CH7-BI6 | Binary input signal CH7 BI6 |
| 111 | CH7-BI3 | Binary input signal CH7 BI3 |
| 112 | CH7-BI7 | Binary input signal CH7 BI7 |
| 113 | CH7-BI4 | Binary input signal CH7 BI4 |
| 114 | CH7-EFP.TR | End-fault-protection transfer trip signal |
| 115 | 7OCBF-OR | OCBF relay element (3ph OR signal) |
| 116 | | |
| 117 | CH7-EXTTP-A1 | Binary input signal CH7 External trip A-phase |
| 118 | CH7-EXTTP-A2 | Binary input signal CH7 External trip A-phase |
| 119 | CH7-EXTTP-B1 | Binary input signal CH7 External trip B-phase |
| 120 | CH7-EXTTP-B2 | Binary input signal CH7 External trip B-phase |
| 121 | CH7-EXTTP-C1 | Binary input signal CH7 External trip C-phase |
| 122 | CH7-EXTTP-C2 | Binary input signal CH7 External trip C-phase |
| 123 | CH8-DS1-N/O | Binary input signal CH8 DS1 normaly open contact |
| 124 | CH8-DS1-N/C | Binary input signal CH8 DS1 normaly close contact |
| 125 | CH8-BI2 | Binary input signal CH8 BI2 |
| 126 | CH8-BI6 | Binary input signal CH8 BI6 |
| 127 | CH8-BI3 | Binary input signal CH8 BI3 |
| 128 | CH8-BI7 | Binary input signal CH8 BI7 |
| 129 | CH8-BI4 | Binary input signal CH8 BI4 |
| 130 | CH8-EFP.TR | End-fault-protection transfer trip signal |
| 131 | 8OCBF-OR | OCBF relay element (3ph OR signal) |
| 132 | | |
| 133 | CH8-EXTTP-A1 | Binary input signal CH8 External trip A-phase |
| 134 | CH8-EXTTP-A2 | Binary input signal CH8 External trip A-phase |
| 135 | CH8-EXTTP-B1 | Binary input signal CH8 External trip B-phase |
| 136 | CH8-EXTTP-B2 | Binary input signal CH8 External trip B-phase |
| 137 | CH8-EXTTP-C1 | Binary input signal CH8 External trip C-phase |
| 138 | CH8-EXTTP-C2 | Binary input signal CH8 External trip C-phase |
| 139 | CH9-DS1-N/O | Binary input signal CH9 DS1 normaly open contact |
| 140 | CH9-DS1-N/C | Binary input signal CH9 DS1 normaly close contact |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 141 | CH9-BI2 | Binary input signal CH9 BI2 |
| 142 | CH9-BI6 | Binary input signal CH9 BI6 |
| 143 | CH9-BI3 | Binary input signal CH9 BI3 |
| 144 | CH9-BI7 | Binary input signal CH9 BI7 |
| 145 | CH9-BI4 | Binary input signal CH9 BI4 |
| 146 | CH9-EFP.TR | End-fault-protection transfer trip signal |
| 147 | 9OCBF-OR | OCBF relay element (3ph OR signal) |
| 148 | | |
| 149 | CH9-EXTTP-A1 | Binary input signal CH9 External trip A-phase |
| 150 | CH9-EXTTP-A2 | Binary input signal CH9 External trip A-phase |
| 151 | CH9-EXTTP-B1 | Binary input signal CH9 External trip B-phase |
| 152 | CH9-EXTTP-B2 | Binary input signal CH9 External trip B-phase |
| 153 | CH9-EXTTP-C1 | Binary input signal CH9 External trip C-phase |
| 154 | CH9-EXTTP-C2 | Binary input signal CH9 External trip C-phase |
| 155 | CH10-DS1-N/O | Binary input signal CH10 DS1 normaly open contact |
| 156 | CH10-DS1-N/C | Binary input signal CH10 DS1 normaly close contact |
| 157 | CH10-BI2 | Binary input signal CH10 BI2 |
| 158 | CH10-BI6 | Binary input signal CH10 BI6 |
| 159 | CH10-BI3 | Binary input signal CH10 BI3 |
| 160 | CH10-BI7 | Binary input signal CH10 BI7 |
| 161 | CH10-BI4 | Binary input signal CH10 BI4 |
| 162 | CH10-EFP.TR | End-fault-protection transfer trip signal |
| 163 | 10OCBF-OR | OCBF relay element (3ph OR signal) |
| 164 | | |
| 165 | CH10-EXTTP-A1 | Binary input signal CH10 External trip A-phase |
| 166 | CH10-EXTTP-A2 | Binary input signal CH10 External trip A-phase |
| 167 | CH10-EXTTP-B1 | Binary input signal CH10 External trip B-phase |
| 168 | CH10-EXTTP-B2 | Binary input signal CH10 External trip B-phase |
| 169 | CH10-EXTTP-C1 | Binary input signal CH10 External trip C-phase |
| 170 | CH10-EXTTP-C2 | Binary input signal CH10 External trip C-phase |
| 171 | CH11-DS1-N/O | Binary input signal CH11 DS1 normaly open contact |
| 172 | CH11-DS1-N/C | Binary input signal CH11 DS1 normaly close contact |
| 173 | CH11-BI2 | Binary input signal CH11 BI2 |
| 174 | CH11-BI6 | Binary input signal CH11 BI6 |
| 175 | CH11-BI3 | Binary input signal CH11 BI3 |
| 176 | CH11-BI7 | Binary input signal CH11 BI7 |
| 177 | CH11-BI4 | Binary input signal CH11 BI4 |
| 178 | CH11-EFP.TR | End-fault-protection transfer trip signal |
| 179 | 11OCBF-OR | OCBF relay element (3ph OR signal) |
| 180 | | |
| 181 | CH11-EXTTP-A1 | Binary input signal CH11 External trip A-phase |
| 182 | CH11-EXTTP-A2 | Binary input signal CH11 External trip A-phase |
| 183 | CH11-EXTTP-B1 | Binary input signal CH11 External trip B-phase |
| 184 | CH11-EXTTP-B2 | Binary input signal CH11 External trip B-phase |
| 185 | CH11-EXTTP-C1 | Binary input signal CH11 External trip C-phase |
| 186 | CH11-EXTTP-C2 | Binary input signal CH11 External trip C-phase |
| 187 | CH12-DS1-N/O | Binary input signal CH12 DS1 normaly open contact |
| 188 | CH12-DS1-N/C | Binary input signal CH12 DS1 normaly close contact |
| 189 | CH12-BI2 | Binary input signal CH12 BI2 |
| 190 | CH12-BI6 | Binary input signal CH12 BI6 |
| 191 | CH12-BI3 | Binary input signal CH12 BI3 |
| 192 | CH12-BI7 | Binary input signal CH12 BI7 |
| 193 | CH12-BI4 | Binary input signal CH12 BI4 |
| 194 | CH12-EFP.TR | End-fault-protection transfer trip signal |
| 195 | 12OCBF-OR | OCBF relay element (3ph OR signal) |
| 196 | | |
| 197 | CH12-EXTTP-A1 | Binary input signal CH12 External trip A-phase |
| 198 | CH12-EXTTP-A2 | Binary input signal CH12 External trip A-phase |
| 199 | CH12-EXTTP-B1 | Binary input signal CH12 External trip B-phase |
| 200 | CH12-EXTTP-B2 | Binary input signal CH12 External trip B-phase |
| 201 | CH12-EXTTP-C1 | Binary input signal CH12 External trip C-phase |
| 202 | CH12-EXTTP-C2 | Binary input signal CH12 External trip C-phase |
| 203 | CH13-DS1-N/O | Binary input signal CH13 DS1 normaly open contact |
| 204 | CH13-DS1-N/C | Binary input signal CH13 DS1 normaly close contact |
| 205 | CH13-BI2 | Binary input signal CH13 BI2 |
| 206 | CH13-BI6 | Binary input signal CH13 BI6 |
| 207 | CH13-BI3 | Binary input signal CH13 BI3 |
| 208 | CH13-BI7 | Binary input signal CH13 BI7 |
| 209 | CH13-BI4 | Binary input signal CH13 BI4 |
| 210 | CH13-EFP.TR | End-fault-protection transfer trip signal |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 211 | 13OCBF-OR | OCBF relay element (3ph OR signal) |
| 212 | | |
| 213 | CH13-EXTTP-A1 | Binary input signal CH13 External trip A-phase |
| 214 | CH13-EXTTP-A2 | Binary input signal CH13 External trip A-phase |
| 215 | CH13-EXTTP-B1 | Binary input signal CH13 External trip B-phase |
| 216 | CH13-EXTTP-B2 | Binary input signal CH13 External trip B-phase |
| 217 | CH13-EXTTP-C1 | Binary input signal CH13 External trip C-phase |
| 218 | CH13-EXTTP-C2 | Binary input signal CH13 External trip C-phase |
| 219 | CH14-DS1-N/O | Binary input signal CH14 DS1 normaly open contact |
| 220 | CH14-DS1-N/C | Binary input signal CH14 DS1 normaly close contact |
| 221 | CH14-BI2 | Binary input signal CH14 BI2 |
| 222 | CH14-BI6 | Binary input signal CH14 BI6 |
| 223 | CH14-BI3 | Binary input signal CH14 BI3 |
| 224 | CH14-BI7 | Binary input signal CH14 BI7 |
| 225 | CH14-BI4 | Binary input signal CH14 BI4 |
| 226 | CH14-EFP.TR | End-fault-protection transfer trip signal |
| 227 | 14OCBF-OR | OCBF relay element (3ph OR signal) |
| 228 | | |
| 229 | CH14-EXTTP-A1 | Binary input signal CH14 External trip A-phase |
| 230 | CH14-EXTTP-A2 | Binary input signal CH14 External trip A-phase |
| 231 | CH14-EXTTP-B1 | Binary input signal CH14 External trip B-phase |
| 232 | CH14-EXTTP-B2 | Binary input signal CH14 External trip B-phase |
| 233 | CH14-EXTTP-C1 | Binary input signal CH14 External trip C-phase |
| 234 | CH14-EXTTP-C2 | Binary input signal CH14 External trip C-phase |
| 235 | CH15-DS1-N/O | Binary input signal CH15 DS1 normaly open contact |
| 236 | CH15-DS1-N/C | Binary input signal CH15 DS1 normaly close contact |
| 237 | CH15-BI2 | Binary input signal CH15 BI2 |
| 238 | CH15-BI6 | Binary input signal CH15 BI6 |
| 239 | CH15-BI3 | Binary input signal CH15 BI3 |
| 240 | CH15-BI7 | Binary input signal CH15 BI7 |
| 241 | CH15-BI4 | Binary input signal CH15 BI4 |
| 242 | CH15-EFP.TR | End-fault-protection transfer trip signal |
| 243 | 15OCBF-OR | OCBF relay element (3ph OR signal) |
| 244 | | |
| 245 | CH15-EXTTP-A1 | Binary input signal CH15 External trip A-phase |
| 246 | CH15-EXTTP-A2 | Binary input signal CH15 External trip A-phase |
| 247 | CH15-EXTTP-B1 | Binary input signal CH15 External trip B-phase |
| 248 | CH15-EXTTP-B2 | Binary input signal CH15 External trip B-phase |
| 249 | CH15-EXTTP-C1 | Binary input signal CH15 External trip C-phase |
| 250 | CH15-EXTTP-C2 | Binary input signal CH15 External trip C-phase |
| 251 | CH16-DS1-N/O | Binary input signal CH16 DS1 normaly open contact |
| 252 | CH16-DS1-N/C | Binary input signal CH16 DS1 normaly close contact |
| 253 | CH16-BI2 | Binary input signal CH16 BI2 |
| 254 | CH16-BI6 | Binary input signal CH16 BI6 |
| 255 | CH16-BI3 | Binary input signal CH16 BI3 |
| 256 | CH16-BI7 | Binary input signal CH16 BI7 |
| 257 | CH16-BI4 | Binary input signal CH16 BI4 |
| 258 | CH16-EFP.TR | End-fault-protection transfer trip signal |
| 259 | 16OCBF-OR | OCBF relay element (3ph OR signal) |
| 260 | | |
| 261 | CH16-EXTTP-A1 | Binary input signal CH16 External trip A-phase |
| 262 | CH16-EXTTP-A2 | Binary input signal CH16 External trip A-phase |
| 263 | CH16-EXTTP-B1 | Binary input signal CH16 External trip B-phase |
| 264 | CH16-EXTTP-B2 | Binary input signal CH16 External trip B-phase |
| 265 | CH16-EXTTP-C1 | Binary input signal CH16 External trip C-phase |
| 266 | CH16-EXTTP-C2 | Binary input signal CH16 External trip C-phase |
| 267 | CH17-DS1-N/O | Binary input signal CH17 DS1 normaly open contact |
| 268 | CH17-DS1-N/C | Binary input signal CH17 DS1 normaly close contact |
| 269 | CH17-BI2 | Binary input signal CH17 BI2 |
| 270 | CH17-BI6 | Binary input signal CH17 BI6 |
| 271 | CH17-BI3 | Binary input signal CH17 BI3 |
| 272 | CH17-BI7 | Binary input signal CH17 BI7 |
| 273 | CH17-BI4 | Binary input signal CH17 BI4 |
| 274 | CH17-EFP.TR | End-fault-protection transfer trip signal |
| 275 | 17OCBF-OR | OCBF relay element (3ph OR signal) |
| 276 | | |
| 277 | CH17-EXTTP-A1 | Binary input signal CH17 External trip A-phase |
| 278 | CH17-EXTTP-A2 | Binary input signal CH17 External trip A-phase |
| 279 | CH17-EXTTP-B1 | Binary input signal CH17 External trip B-phase |
| 280 | CH17-EXTTP-B2 | Binary input signal CH17 External trip B-phase |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 281 | CH17-EXTTP-C1 | Binary input signal CH17 External trip C-phase |
| 282 | CH17-EXTTP-C2 | Binary input signal CH17 External trip C-phase |
| 283 | CH18-DS1-N/O | Binary input signal CH18 DS1 normaly open contact |
| 284 | CH18-DS1-N/C | Binary input signal CH18 DS1 normaly close contact |
| 285 | CH18-BI2 | Binary input signal CH18 BI2 |
| 286 | CH18-BI6 | Binary input signal CH18 BI6 |
| 287 | CH18-BI3 | Binary input signal CH18 BI3 |
| 288 | CH18-BI7 | Binary input signal CH18 BI7 |
| 289 | CH18-BI4 | Binary input signal CH18 BI4 |
| 290 | CH18-EFP.TR | End-fault-protection transfer trip signal |
| 291 | 18OCBF-OR | OCBF relay element (3ph OR signal) |
| 292 | | |
| 293 | CH18-EXTTP-A1 | Binary input signal CH18 External trip A-phase |
| 294 | CH18-EXTTP-A2 | Binary input signal CH18 External trip A-phase |
| 295 | CH18-EXTTP-B1 | Binary input signal CH18 External trip B-phase |
| 296 | CH18-EXTTP-B2 | Binary input signal CH18 External trip B-phase |
| 297 | CH18-EXTTP-C1 | Binary input signal CH18 External trip C-phase |
| 298 | CH18-EXTTP-C2 | Binary input signal CH18 External trip C-phase |
| 299 | CH19-DS1-N/O | Binary input signal CH19 DS1 normaly open contact |
| 300 | CH19-DS1-N/C | Binary input signal CH19 DS1 normaly close contact |
| 301 | CH19-BI2 | Binary input signal CH19 BI2 |
| 302 | CH19-BI6 | Binary input signal CH19 BI6 |
| 303 | CH19-BI3 | Binary input signal CH19 BI3 |
| 304 | CH19-BI7 | Binary input signal CH19 BI7 |
| 305 | CH19-BI4 | Binary input signal CH19 BI4 |
| 306 | CH19-EFP.TR | End-fault-protection transfer trip signal |
| 307 | 19OCBF-OR | OCBF relay element (3ph OR signal) |
| 308 | | |
| 309 | CH19-EXTTP-A1 | Binary input signal CH19 External trip A-phase |
| 310 | CH19-EXTTP-A2 | Binary input signal CH19 External trip A-phase |
| 311 | CH19-EXTTP-B1 | Binary input signal CH19 External trip B-phase |
| 312 | CH19-EXTTP-B2 | Binary input signal CH19 External trip B-phase |
| 313 | CH19-EXTTP-C1 | Binary input signal CH19 External trip C-phase |
| 314 | CH19-EXTTP-C2 | Binary input signal CH19 External trip C-phase |
| 315 | CH20-DS1-N/O | Binary input signal CH20 DS1 normaly open contact |
| 316 | CH20-DS1-N/C | Binary input signal CH20 DS1 normaly close contact |
| 317 | CH20-BI2 | Binary input signal CH20 BI2 |
| 318 | CH20-BI6 | Binary input signal CH20 BI6 |
| 319 | CH20-BI3 | Binary input signal CH20 BI3 |
| 320 | CH20-BI7 | Binary input signal CH20 BI7 |
| 321 | CH20-BI4 | Binary input signal CH20 BI4 |
| 322 | CH20-EFP.TR | End-fault-protection transfer trip signal |
| 323 | 20OCBF-OR | OCBF relay element (3ph OR signal) |
| 324 | | |
| 325 | CH20-EXTTP-A1 | Binary input signal CH20 External trip A-phase |
| 326 | CH20-EXTTP-A2 | Binary input signal CH20 External trip A-phase |
| 327 | CH20-EXTTP-B1 | Binary input signal CH20 External trip B-phase |
| 328 | CH20-EXTTP-B2 | Binary input signal CH20 External trip B-phase |
| 329 | CH20-EXTTP-C1 | Binary input signal CH20 External trip C-phase |
| 330 | CH20-EXTTP-C2 | Binary input signal CH20 External trip C-phase |
| 331 | CH21-DS1-N/O | Binary input signal CH21 DS1 normaly open contact |
| 332 | CH21-DS1-N/C | Binary input signal CH21 DS1 normaly close contact |
| 333 | CH21-BI2 | Binary input signal CH21 BI2 |
| 334 | CH21-BI6 | Binary input signal CH21 BI6 |
| 335 | CH21-BI3 | Binary input signal CH21 BI3 |
| 336 | CH21-BI7 | Binary input signal CH21 BI7 |
| 337 | CH21-BI4 | Binary input signal CH21 BI4 |
| 338 | CH21-EFP.TR | End-fault-protection transfer trip signal |
| 339 | 21OCBF-OR | OCBF relay element (3ph OR signal) |
| 340 | | |
| 341 | CH21-EXTTP-A1 | Binary input signal CH21 External trip A-phase |
| 342 | CH21-EXTTP-A2 | Binary input signal CH21 External trip A-phase |
| 343 | CH21-EXTTP-B1 | Binary input signal CH21 External trip B-phase |
| 344 | CH21-EXTTP-B2 | Binary input signal CH21 External trip B-phase |
| 345 | CH21-EXTTP-C1 | Binary input signal CH21 External trip C-phase |
| 346 | CH21-EXTTP-C2 | Binary input signal CH21 External trip C-phase |
| 347 | CH22-DS1-N/O | Binary input signal CH22 DS1 normaly open contact |
| 348 | CH22-DS1-N/C | Binary input signal CH22 DS1 normaly close contact |
| 349 | CH22-BI2 | Binary input signal CH22 BI2 |
| 350 | CH22-BI6 | Binary input signal CH22 BI6 |

www.ElectricalPartManuals.com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 351 | CH22-BI3 | Binary input signal CH22 BI3 |
| 352 | CH22-BI7 | Binary input signal CH22 BI7 |
| 353 | CH22-BI4 | Binary input signal CH22 BI4 |
| 354 | CH22-EFP.TR | End-fault-protection transfer trip signal |
| 355 | 22OCBF-OR | OCBF relay element (3ph OR signal) |
| 356 | | |
| 357 | CH22-EXTTP-A1 | Binary input signal CH22 External trip A-phase |
| 358 | CH22-EXTTP-A2 | Binary input signal CH22 External trip A-phase |
| 359 | CH22-EXTTP-B1 | Binary input signal CH22 External trip B-phase |
| 360 | CH22-EXTTP-B2 | Binary input signal CH22 External trip B-phase |
| 361 | CH22-EXTTP-C1 | Binary input signal CH22 External trip C-phase |
| 362 | CH22-EXTTP-C2 | Binary input signal CH22 External trip C-phase |
| 363 | CH23-DS1-N/O | Binary input signal CH23 DS1 normaly open contact |
| 364 | CH23-DS1-N/C | Binary input signal CH23 DS1 normaly close contact |
| 365 | CH23-BI2 | Binary input signal CH23 BI2 |
| 366 | CH23-BI6 | Binary input signal CH23 BI6 |
| 367 | CH23-BI3 | Binary input signal CH23 BI3 |
| 368 | CH23-BI7 | Binary input signal CH23 BI7 |
| 369 | CH23-BI4 | Binary input signal CH23 BI4 |
| 370 | CH23-EFP.TR | End-fault-protection transfer trip signal |
| 371 | 23OCBF-OR | OCBF relay element (3ph OR signal) |
| 372 | | |
| 373 | CH23-EXTTP-A1 | Binary input signal CH23 External trip A-phase |
| 374 | CH23-EXTTP-A2 | Binary input signal CH23 External trip A-phase |
| 375 | CH23-EXTTP-B1 | Binary input signal CH23 External trip B-phase |
| 376 | CH23-EXTTP-B2 | Binary input signal CH23 External trip B-phase |
| 377 | CH23-EXTTP-C1 | Binary input signal CH23 External trip C-phase |
| 378 | CH23-EXTTP-C2 | Binary input signal CH23 External trip C-phase |
| 379 | CH24-DS1-N/O | Binary input signal CH24 DS1 normaly open contact |
| 380 | CH24-DS1-N/C | Binary input signal CH24 DS1 normaly close contact |
| 381 | CH24-BI2 | Binary input signal CH24 BI2 |
| 382 | CH24-BI6 | Binary input signal CH24 BI6 |
| 383 | CH24-BI3 | Binary input signal CH24 BI3 |
| 384 | CH24-BI7 | Binary input signal CH24 BI7 |
| 385 | CH24-BI4 | Binary input signal CH24 BI4 |
| 386 | CH24-EFP.TR | End-fault-protection transfer trip signal |
| 387 | 24OCBF-OR | OCBF relay element (3ph OR signal) |
| 388 | | |
| 389 | CH24-EXTTP-A1 | Binary input signal CH24 External trip A-phase |
| 390 | CH24-EXTTP-A2 | Binary input signal CH24 External trip A-phase |
| 391 | CH24-EXTTP-B1 | Binary input signal CH24 External trip B-phase |
| 392 | CH24-EXTTP-B2 | Binary input signal CH24 External trip B-phase |
| 393 | CH24-EXTTP-C1 | Binary input signal CH24 External trip C-phase |
| 394 | CH24-EXTTP-C2 | Binary input signal CH24 External trip C-phase |
| 395 | CH25-DS1-N/O | Binary input signal CH25 DS1 normaly open contact |
| 396 | CH25-DS1-N/C | Binary input signal CH25 DS1 normaly close contact |
| 397 | CH25-BI2 | Binary input signal CH25 BI2 |
| 398 | CH25-BI6 | Binary input signal CH25 BI6 |
| 399 | CH25-BI3 | Binary input signal CH25 BI3 |
| 400 | CH25-BI7 | Binary input signal CH25 BI7 |
| 401 | CH25-BI4 | Binary input signal CH25 BI4 |
| 402 | CH25-EFP.TR | End-fault-protection transfer trip signal |
| 403 | 25OCBF-OR | OCBF relay element (3ph OR signal) |
| 404 | | |
| 405 | CH25-EXTTP-A1 | Binary input signal CH25 External trip A-phase |
| 406 | CH25-EXTTP-A2 | Binary input signal CH25 External trip A-phase |
| 407 | CH25-EXTTP-B1 | Binary input signal CH25 External trip B-phase |
| 408 | CH25-EXTTP-B2 | Binary input signal CH25 External trip B-phase |
| 409 | CH25-EXTTP-C1 | Binary input signal CH25 External trip C-phase |
| 410 | CH25-EXTTP-C2 | Binary input signal CH25 External trip C-phase |
| 411 | CH26-DS1-N/O | Binary input signal CH26 DS1 normaly open contact |
| 412 | CH26-DS1-N/C | Binary input signal CH26 DS1 normaly close contact |
| 413 | CH26-BI2 | Binary input signal CH26 BI2 |
| 414 | CH26-BI6 | Binary input signal CH26 BI6 |
| 415 | CH26-BI3 | Binary input signal CH26 BI3 |
| 416 | CH26-BI7 | Binary input signal CH26 BI7 |
| 417 | CH26-BI4 | Binary input signal CH26 BI4 |
| 418 | CH26-EFP.TR | End-fault-protection transfer trip signal |
| 419 | 26OCBF-OR | OCBF relay element (3ph OR signal) |
| 420 | | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 421 | CH26-EXTTP-A1 | Binary input signal CH26 External trip A-phase |
| 422 | CH26-EXTTP-A2 | Binary input signal CH26 External trip A-phase |
| 423 | CH26-EXTTP-B1 | Binary input signal CH26 External trip B-phase |
| 424 | CH26-EXTTP-B2 | Binary input signal CH26 External trip B-phase |
| 425 | CH26-EXTTP-C1 | Binary input signal CH26 External trip C-phase |
| 426 | CH26-EXTTP-C2 | Binary input signal CH26 External trip C-phase |
| 427 | CH27-DS1-N/O | Binary input signal CH27 DS1 normaly open contact |
| 428 | CH27-DS1-N/C | Binary input signal CH27 DS1 normaly close contact |
| 429 | CH27-BI2 | Binary input signal CH27 BI2 |
| 430 | CH27-BI6 | Binary input signal CH27 BI6 |
| 431 | CH27-BI3 | Binary input signal CH27 BI3 |
| 432 | CH27-BI7 | Binary input signal CH27 BI7 |
| 433 | CH27-BI4 | Binary input signal CH27 BI4 |
| 434 | CH27-EFP.TR | End-fault-protection transfer trip signal |
| 435 | 27OCBF-OR | OCBF relay element (3ph OR signal) |
| 436 | | |
| 437 | CH27-EXTTP-A1 | Binary input signal CH27 External trip A-phase |
| 438 | CH27-EXTTP-A2 | Binary input signal CH27 External trip A-phase |
| 439 | CH27-EXTTP-B1 | Binary input signal CH27 External trip B-phase |
| 440 | CH27-EXTTP-B2 | Binary input signal CH27 External trip B-phase |
| 441 | CH27-EXTTP-C1 | Binary input signal CH27 External trip C-phase |
| 442 | CH27-EXTTP-C2 | Binary input signal CH27 External trip C-phase |
| 443 | CH28-DS1-N/O | Binary input signal CH28 DS1 normaly open contact |
| 444 | CH28-DS1-N/C | Binary input signal CH28 DS1 normaly close contact |
| 445 | CH28-BI2 | Binary input signal CH28 BI2 |
| 446 | CH28-BI6 | Binary input signal CH28 BI6 |
| 447 | CH28-BI3 | Binary input signal CH28 BI3 |
| 448 | CH28-BI7 | Binary input signal CH28 BI7 |
| 449 | CH28-BI4 | Binary input signal CH28 BI4 |
| 450 | CH28-EFP.TR | End-fault-protection transfer trip signal |
| 451 | 28OCBF-OR | OCBF relay element (3ph OR signal) |
| 452 | | |
| 453 | CH28-EXTTP-A1 | Binary input signal CH28 External trip A-phase |
| 454 | CH28-EXTTP-A2 | Binary input signal CH28 External trip A-phase |
| 455 | CH28-EXTTP-B1 | Binary input signal CH28 External trip B-phase |
| 456 | CH28-EXTTP-B2 | Binary input signal CH28 External trip B-phase |
| 457 | CH28-EXTTP-C1 | Binary input signal CH28 External trip C-phase |
| 458 | CH28-EXTTP-C2 | Binary input signal CH28 External trip C-phase |
| 459 | CH29-DS1-N/O | Binary input signal CH29 DS1 normaly open contact |
| 460 | CH29-DS1-N/C | Binary input signal CH29 DS1 normaly close contact |
| 461 | CH29-BI2 | Binary input signal CH29 BI2 |
| 462 | CH29-BI6 | Binary input signal CH29 BI6 |
| 463 | CH29-BI3 | Binary input signal CH29 BI3 |
| 464 | CH29-BI7 | Binary input signal CH29 BI7 |
| 465 | CH29-BI4 | Binary input signal CH29 BI4 |
| 466 | CH29-EFP.TR | End-fault-protection transfer trip signal |
| 467 | 29OCBF-OR | OCBF relay element (3ph OR signal) |
| 468 | | |
| 469 | CH29-EXTTP-A1 | Binary input signal CH29 External trip A-phase |
| 470 | CH29-EXTTP-A2 | Binary input signal CH29 External trip A-phase |
| 471 | CH29-EXTTP-B1 | Binary input signal CH29 External trip B-phase |
| 472 | CH29-EXTTP-B2 | Binary input signal CH29 External trip B-phase |
| 473 | CH29-EXTTP-C1 | Binary input signal CH29 External trip C-phase |
| 474 | CH29-EXTTP-C2 | Binary input signal CH29 External trip C-phase |
| 475 | CH30-DS1-N/O | Binary input signal CH30 DS1 normaly open contact |
| 476 | CH30-DS1-N/C | Binary input signal CH30 DS1 normaly close contact |
| 477 | CH30-BI2 | Binary input signal CH30 BI2 |
| 478 | CH30-BI6 | Binary input signal CH30 BI6 |
| 479 | CH30-BI3 | Binary input signal CH30 BI3 |
| 480 | CH30-BI7 | Binary input signal CH30 BI7 |
| 481 | CH30-BI4 | Binary input signal CH30 BI4 |
| 482 | CH30-EFP.TR | End-fault-protection transfer trip signal |
| 483 | 30OCBF-OR | OCBF relay element (3ph OR signal) |
| 484 | | |
| 485 | CH30-EXTTP-A1 | Binary input signal CH30 External trip A-phase |
| 486 | CH30-EXTTP-A2 | Binary input signal CH30 External trip A-phase |
| 487 | CH30-EXTTP-B1 | Binary input signal CH30 External trip B-phase |
| 488 | CH30-EXTTP-B2 | Binary input signal CH30 External trip B-phase |
| 489 | CH30-EXTTP-C1 | Binary input signal CH30 External trip C-phase |
| 490 | CH30-EXTTP-C2 | Binary input signal CH30 External trip C-phase |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 491 | CH31-DS1-N/O | Binary input signal CH31 DS1 normaly open contact |
| 492 | CH31-DS1-N/C | Binary input signal CH31 DS1 normaly close contact |
| 493 | CH31-BI2 | Binary input signal CH31 BI2 |
| 494 | CH31-BI6 | Binary input signal CH31 BI6 |
| 495 | CH31-BI3 | Binary input signal CH31 BI3 |
| 496 | CH31-BI7 | Binary input signal CH31 BI7 |
| 497 | CH31-BI4 | Binary input signal CH31 BI4 |
| 498 | CH31-EFP.TR | End-fault-protection transfer trip signal |
| 499 | 31OCBF-OR | OCBF relay element (3ph OR signal) |
| 500 | | |
| 501 | CH31-EXTTP-A1 | Binary input signal CH31 External trip A-phase |
| 502 | CH31-EXTTP-A2 | Binary input signal CH31 External trip A-phase |
| 503 | CH31-EXTTP-B1 | Binary input signal CH31 External trip B-phase |
| 504 | CH31-EXTTP-B2 | Binary input signal CH31 External trip B-phase |
| 505 | CH31-EXTTP-C1 | Binary input signal CH31 External trip C-phase |
| 506 | CH31-EXTTP-C2 | Binary input signal CH31 External trip C-phase |
| 507 | CH32-DS1-N/O | Binary input signal CH32 DS1 normaly open contact |
| 508 | CH32-DS1-N/C | Binary input signal CH32 DS1 normaly close contact |
| 509 | CH32-BI2 | Binary input signal CH32 BI2 |
| 510 | CH32-BI6 | Binary input signal CH32 BI6 |
| 511 | CH32-BI3 | Binary input signal CH32 BI3 |
| 512 | CH32-BI7 | Binary input signal CH32 BI7 |
| 513 | CH32-BI4 | Binary input signal CH32 BI4 |
| 514 | CH32-EFP.TR | End-fault-protection transfer trip signal |
| 515 | 32OCBF-OR | OCBF relay element (3ph OR signal) |
| 516 | | |
| 517 | CH32-EXTTP-A1 | Binary input signal CH32 External trip A-phase |
| 518 | CH32-EXTTP-A2 | Binary input signal CH32 External trip A-phase |
| 519 | CH32-EXTTP-B1 | Binary input signal CH32 External trip B-phase |
| 520 | CH32-EXTTP-B2 | Binary input signal CH32 External trip B-phase |
| 521 | CH32-EXTTP-C1 | Binary input signal CH32 External trip C-phase |
| 522 | CH32-EXTTP-C2 | Binary input signal CH32 External trip C-phase |
| 523 | CU-BI1 | Binary input signal CU BI1 |
| 524 | CU-BI2 | Binary input signal CU BI2 |
| 525 | CU-BI3 | Binary input signal CU BI3 |
| 526 | CU-BI4 | Binary input signal CU BI4 |
| 527 | CU-BI5 | Binary input signal CU BI5 |
| 528 | CU-BI6 | Binary input signal CU BI6 |
| 529 | CU-BI7 | Binary input signal CU BI7 |
| 530 | CU-BI8 | Binary input signal CU BI8 |
| 531 | CU-BI9 | Binary input signal CU BI9 |
| 532 | CU-BI10 | Binary input signal CU BI10 |
| 533 | CU-BI11 | Binary input signal CU BI11 |
| 534 | CU-BI12 | Binary input signal CU BI12 |
| 535 | CU-BI13 | Binary input signal CU BI13 |
| 536 | CU-BI14 | Binary input signal CU BI14 |
| 537 | CU-BI15 | Binary input signal CU BI15 |
| 538 | | |
| 539 | | |
| 540 | | |
| 541 | DIFCH-A | DIFCH-A relay element output |
| 542 | DIFCH-B | -B relay element output |
| 543 | DIFCH-C | -C relay element output |
| 544 | DIFZA-A | DIFZA-A relay element output |
| 545 | DIFZA-B | -B relay element output |
| 546 | DIFZA-C | -C relay element output |
| 547 | DIFZB-A | DIFZB-A relay element output |
| 548 | DIFZB-B | -B relay element output |
| 549 | DIFZB-C | -C relay element output |
| 550 | DIFZC-A | DIFZC-A relay element output |
| 551 | DIFZC-B | -B relay element output |
| 552 | DIFZC-C | -C relay element output |
| 553 | DIFZD-A | DIFZD-A relay element output |
| 554 | DIFZD-B | -B relay element output |
| 555 | DIFZD-C | -C relay element output |
| 556 | DIFCH-BLK-A | DIFCH-BLK-A relay element output |
| 557 | DIFCH-BLK-B | -B relay element output |
| 558 | DIFCH-BLK-C | -C relay element output |
| 559 | DIFZA-BLK-A | DIFZA-BLK-A relay element output |
| 560 | DIFZA-BLK-B | -B relay element output |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 561 | DIFZA-BLK-C | -C relay element output |
| 562 | DIFZB-BLK-A | DIFZB-BLK-A relay element output |
| 563 | DIFZB-BLK-B | -B relay element output |
| 564 | DIFZB-BLK-C | -C relay element output |
| 565 | DIFZC-BLK-A | DIFZC-BLK-A relay element output |
| 566 | DIFZC-BLK-B | -B relay element output |
| 567 | DIFZC-BLK-C | -C relay element output |
| 568 | DIFZD-BLK-A | DIFZD-BLK-A relay element output |
| 569 | DIFZD-BLK-B | -B relay element output |
| 570 | DIFZD-BLK-C | -C relay element output |
| 571 | DIFCHSV-A | DIFCHSV-A relay element output |
| 572 | DIFCHSV-B | -B relay element output |
| 573 | DIFCHSV-C | -C relay element output |
| 574 | DIFZASV-A | DIFZASV-A relay element output |
| 575 | DIFZASV-B | -B relay element output |
| 576 | DIFZASV-C | -C relay element output |
| 577 | DIFZBSV-A | DIFZBSV-A relay element output |
| 578 | DIFZBSV-B | -B relay element output |
| 579 | DIFZBSV-C | -C relay element output |
| 580 | DIFZCSV-A | DIFZCSV-A relay element output |
| 581 | DIFZCSV-B | -B relay element output |
| 582 | DIFZCSV-C | -C relay element output |
| 583 | DIFZDSV-A | DIFZDSV-A relay element output |
| 584 | DIFZDSV-B | -B relay element output |
| 585 | DIFZDSV-C | -C relay element output |
| 586 | | |
| 587 | | |
| 588 | | |
| 589 | | |
| 590 | | |
| 591 | 1OCBF-A | 1OCBF-A relay element output |
| 592 | 1OCBF-B | -B relay element output |
| 593 | 1OCBF-C | -C relay element output |
| 594 | 2OCBF-A | 2OCBF-A relay element output |
| 595 | 2OCBF-B | -B relay element output |
| 596 | 2OCBF-C | -C relay element output |
| 597 | 3OCBF-A | 3OCBF-A relay element output |
| 598 | 3OCBF-B | -B relay element output |
| 599 | 3OCBF-C | -C relay element output |
| 600 | 4OCBF-A | 4OCBF-A relay element output |
| 601 | 4OCBF-B | -B relay element output |
| 602 | 4OCBF-C | -C relay element output |
| 603 | 5OCBF-A | 5OCBF-A relay element output |
| 604 | 5OCBF-B | -B relay element output |
| 605 | 5OCBF-C | -C relay element output |
| 606 | 6OCBF-A | 6OCBF-A relay element output |
| 607 | 6OCBF-B | -B relay element output |
| 608 | 6OCBF-C | -C relay element output |
| 609 | 7OCBF-A | 7OCBF-A relay element output |
| 610 | 7OCBF-B | -B relay element output |
| 611 | 7OCBF-C | -C relay element output |
| 612 | 8OCBF-A | 8OCBF-A relay element output |
| 613 | 8OCBF-B | -B relay element output |
| 614 | 8OCBF-C | -C relay element output |
| 615 | 9OCBF-A | 9OCBF-A relay element output |
| 616 | 9OCBF-B | -B relay element output |
| 617 | 9OCBF-C | -C relay element output |
| 618 | 10OCBF-A | 10OCBF-A relay element output |
| 619 | 10OCBF-B | -B relay element output |
| 620 | 10OCBF-C | -C relay element output |
| 621 | 11OCBF-A | 11OCBF-A relay element output |
| 622 | 11OCBF-B | -B relay element output |
| 623 | 11OCBF-C | -C relay element output |
| 624 | 12OCBF-A | 12OCBF-A relay element output |
| 625 | 12OCBF-B | -B relay element output |
| 626 | 12OCBF-C | -C relay element output |
| 627 | 13OCBF-A | 13OCBF-A relay element output |
| 628 | 13OCBF-B | -B relay element output |
| 629 | 13OCBF-C | -C relay element output |
| 630 | 14OCBF-A | 14OCBF-A relay element output |

www.ElectricalPartManuals.com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 631 | 14OCBF-B | -B relay element output |
| 632 | 14OCBF-C | -C relay element output |
| 633 | 15OCBF-A | 15OCBF-A relay element output |
| 634 | 15OCBF-B | -B relay element output |
| 635 | 15OCBF-C | -C relay element output |
| 636 | 16OCBF-A | 16OCBF-A relay element output |
| 637 | 16OCBF-B | -B relay element output |
| 638 | 16OCBF-C | -C relay element output |
| 639 | 17OCBF-A | 17OCBF-A relay element output |
| 640 | 17OCBF-B | -B relay element output |
| 641 | 17OCBF-C | -C relay element output |
| 642 | 18OCBF-A | 18OCBF-A relay element output |
| 643 | 18OCBF-B | -B relay element output |
| 644 | 18OCBF-C | -C relay element output |
| 645 | 19OCBF-A | 19OCBF-A relay element output |
| 646 | 19OCBF-B | -B relay element output |
| 647 | 19OCBF-C | -C relay element output |
| 648 | 20OCBF-A | 20OCBF-A relay element output |
| 649 | 20OCBF-B | -B relay element output |
| 650 | 20OCBF-C | -C relay element output |
| 651 | 21OCBF-A | 21OCBF-A relay element output |
| 652 | 21OCBF-B | -B relay element output |
| 653 | 21OCBF-C | -C relay element output |
| 654 | 22OCBF-A | 22OCBF-A relay element output |
| 655 | 22OCBF-B | -B relay element output |
| 656 | 22OCBF-C | -C relay element output |
| 657 | 23OCBF-A | 23OCBF-A relay element output |
| 658 | 23OCBF-B | -B relay element output |
| 659 | 23OCBF-C | -C relay element output |
| 660 | 24OCBF-A | 24OCBF-A relay element output |
| 661 | 24OCBF-B | -B relay element output |
| 662 | 24OCBF-C | -C relay element output |
| 663 | 25OCBF-A | 25OCBF-A relay element output |
| 664 | 25OCBF-B | -B relay element output |
| 665 | 25OCBF-C | -C relay element output |
| 666 | 26OCBF-A | 26OCBF-A relay element output |
| 667 | 26OCBF-B | -B relay element output |
| 668 | 26OCBF-C | -C relay element output |
| 669 | 27OCBF-A | 27OCBF-A relay element output |
| 670 | 27OCBF-B | -B relay element output |
| 671 | 27OCBF-C | -C relay element output |
| 672 | 28OCBF-A | 28OCBF-A relay element output |
| 673 | 28OCBF-B | -B relay element output |
| 674 | 28OCBF-C | -C relay element output |
| 675 | 29OCBF-A | 29OCBF-A relay element output |
| 676 | 29OCBF-B | -B relay element output |
| 677 | 29OCBF-C | -C relay element output |
| 678 | 30OCBF-A | 30OCBF-A relay element output |
| 679 | 30OCBF-B | -B relay element output |
| 680 | 30OCBF-C | -C relay element output |
| 681 | 31OCBF-A | 31OCBF-A relay element output |
| 682 | 31OCBF-B | -B relay element output |
| 683 | 31OCBF-C | -C relay element output |
| 684 | 32OCBF-A | 32OCBF-A relay element output |
| 685 | 32OCBF-B | -B relay element output |
| 686 | 32OCBF-C | -C relay element output |
| 687 | SGM_IZA-A | Zone A differential current (Phase A) |
| 688 | SGM_IZA-B | Zone A differential current (Phase B) |
| 689 | SGM_IZA-C | Zone A differential current (Phase C) |
| 690 | SGM_IZB-A | Zone B differential current (Phase A) |
| 691 | SGM_IZB-B | Zone B differential current (Phase B) |
| 692 | SGM_IZB-C | Zone B differential current (Phase C) |
| 693 | SGM_IZC-A | Zone C differential current (Phase A) |
| 694 | SGM_IZC-B | Zone C differential current (Phase B) |
| 695 | SGM_IZC-C | Zone C differential current (Phase C) |
| 696 | SGM_IZD-A | Zone D differential current (Phase A) |
| 697 | SGM_IZD-B | Zone D differential current (Phase B) |
| 698 | SGM_IZD-C | Zone D differential current (Phase C) |
| 699 | | |
| 700 | | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 701 | 43BP | Bus protection in service |
| 702 | 43CBF | Breaker failuer protecion in service |
| 703 | CH1-DS1 | CH1 DS1 close |
| 704 | CH1-DS2 | CH1 DS2 close |
| 705 | CH1-DS3 | CH1 DS3 close |
| 706 | CH1-DS4 | CH1 DS4 close |
| 707 | CH2-DS1 | CH2 DS1 close |
| 708 | CH2-DS2 | CH2 DS2 close |
| 709 | CH2-DS3 | CH2 DS3 close |
| 710 | CH2-DS4 | CH2 DS4 close |
| 711 | CH3-DS1 | CH3 DS1 close |
| 712 | CH3-DS2 | CH3 DS2 close |
| 713 | CH3-DS3 | CH3 DS3 close |
| 714 | CH3-DS4 | CH3 DS4 close |
| 715 | CH4-DS1 | CH4 DS1 close |
| 716 | CH4-DS2 | CH4 DS2 close |
| 717 | CH4-DS3 | CH4 DS3 close |
| 718 | CH4-DS4 | CH4 DS4 close |
| 719 | CH5-DS1 | CH5 DS1 close |
| 720 | CH5-DS2 | CH5 DS2 close |
| 721 | CH5-DS3 | CH5 DS3 close |
| 722 | CH5-DS4 | CH5 DS4 close |
| 723 | CH6-DS1 | CH6 DS1 close |
| 724 | CH6-DS2 | CH6 DS2 close |
| 725 | CH6-DS3 | CH6 DS3 close |
| 726 | CH6-DS4 | CH6 DS4 close |
| 727 | CH7-DS1 | CH7 DS1 close |
| 728 | CH7-DS2 | CH7 DS2 close |
| 729 | CH7-DS3 | CH7 DS3 close |
| 730 | CH7-DS4 | CH7 DS4 close |
| 731 | CH8-DS1 | CH8 DS1 close |
| 732 | CH8-DS2 | CH8 DS2 close |
| 733 | CH8-DS3 | CH8 DS3 close |
| 734 | CH8-DS4 | CH8 DS4 close |
| 735 | CH9-DS1 | CH9 DS1 close |
| 736 | CH9-DS2 | CH9 DS2 close |
| 737 | CH9-DS3 | CH9 DS3 close |
| 738 | CH9-DS4 | CH9 DS4 close |
| 739 | CH10-DS1 | CH10 DS1 close |
| 740 | CH10-DS2 | CH10 DS2 close |
| 741 | CH10-DS3 | CH10 DS3 close |
| 742 | CH10-DS4 | CH10 DS4 close |
| 743 | CH11-DS1 | CH11 DS1 close |
| 744 | CH11-DS2 | CH11 DS2 close |
| 745 | CH11-DS3 | CH11 DS3 close |
| 746 | CH11-DS4 | CH11 DS4 close |
| 747 | CH12-DS1 | CH12 DS1 close |
| 748 | CH12-DS2 | CH12 DS2 close |
| 749 | CH12-DS3 | CH12 DS3 close |
| 750 | CH12-DS4 | CH12 DS4 close |
| 751 | CH13-DS1 | CH13 DS1 close |
| 752 | CH13-DS2 | CH13 DS2 close |
| 753 | CH13-DS3 | CH13 DS3 close |
| 754 | CH13-DS4 | CH13 DS4 close |
| 755 | CH14-DS1 | CH14 DS1 close |
| 756 | CH14-DS2 | CH14 DS2 close |
| 757 | CH14-DS3 | CH14 DS3 close |
| 758 | CH14-DS4 | CH14 DS4 close |
| 759 | CH15-DS1 | CH15 DS1 close |
| 760 | CH15-DS2 | CH15 DS2 close |
| 761 | CH15-DS3 | CH15 DS3 close |
| 762 | CH15-DS4 | CH15 DS4 close |
| 763 | CH16-DS1 | CH16 DS1 close |
| 764 | CH16-DS2 | CH16 DS2 close |
| 765 | CH16-DS3 | CH16 DS3 close |
| 766 | CH16-DS4 | CH16 DS4 close |
| 767 | CH17-DS1 | CH17 DS1 close |
| 768 | CH17-DS2 | CH17 DS2 close |
| 769 | CH17-DS3 | CH17 DS3 close |
| 770 | CH17-DS4 | CH17 DS4 close |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 771 | CH18-DS1 | CH18 DS1 close |
| 772 | CH18-DS2 | CH18 DS2 close |
| 773 | CH18-DS3 | CH18 DS3 close |
| 774 | CH18-DS4 | CH18 DS4 close |
| 775 | CH19-DS1 | CH19 DS1 close |
| 776 | CH19-DS2 | CH19 DS2 close |
| 777 | CH19-DS3 | CH19 DS3 close |
| 778 | CH19-DS4 | CH19 DS4 close |
| 779 | CH20-DS1 | CH20 DS1 close |
| 780 | CH20-DS2 | CH20 DS2 close |
| 781 | CH20-DS3 | CH20 DS3 close |
| 782 | CH20-DS4 | CH20 DS4 close |
| 783 | CH21-DS1 | CH21 DS1 close |
| 784 | CH21-DS2 | CH21 DS2 close |
| 785 | CH21-DS3 | CH21 DS3 close |
| 786 | CH21-DS4 | CH21 DS4 close |
| 787 | CH22-DS1 | CH22 DS1 close |
| 788 | CH22-DS2 | CH22 DS2 close |
| 789 | CH22-DS3 | CH22 DS3 close |
| 790 | CH22-DS4 | CH22 DS4 close |
| 791 | CH23-DS1 | CH23 DS1 close |
| 792 | CH23-DS2 | CH23 DS2 close |
| 793 | CH23-DS3 | CH23 DS3 close |
| 794 | CH23-DS4 | CH23 DS4 close |
| 795 | CH24-DS1 | CH24 DS1 close |
| 796 | CH24-DS2 | CH24 DS2 close |
| 797 | CH24-DS3 | CH24 DS3 close |
| 798 | CH24-DS4 | CH24 DS4 close |
| 799 | CH25-DS1 | CH25 DS1 close |
| 800 | CH25-DS2 | CH25 DS2 close |
| 801 | CH25-DS3 | CH25 DS3 close |
| 802 | CH25-DS4 | CH25 DS4 close |
| 803 | CH26-DS1 | CH26 DS1 close |
| 804 | CH26-DS2 | CH26 DS2 close |
| 805 | CH26-DS3 | CH26 DS3 close |
| 806 | CH26-DS4 | CH26 DS4 close |
| 807 | CH27-DS1 | CH27 DS1 close |
| 808 | CH27-DS2 | CH27 DS2 close |
| 809 | CH27-DS3 | CH27 DS3 close |
| 810 | CH27-DS4 | CH27 DS4 close |
| 811 | CH28-DS1 | CH28 DS1 close |
| 812 | CH28-DS2 | CH28 DS2 close |
| 813 | CH28-DS3 | CH28 DS3 close |
| 814 | CH28-DS4 | CH28 DS4 close |
| 815 | CH29-DS1 | CH29 DS1 close |
| 816 | CH29-DS2 | CH29 DS2 close |
| 817 | CH29-DS3 | CH29 DS3 close |
| 818 | CH29-DS4 | CH29 DS4 close |
| 819 | CH30-DS1 | CH30 DS1 close |
| 820 | CH30-DS2 | CH30 DS2 close |
| 821 | CH30-DS3 | CH30 DS3 close |
| 822 | CH30-DS4 | CH30 DS4 close |
| 823 | CH31-DS1 | CH31 DS1 close |
| 824 | CH31-DS2 | CH31 DS2 close |
| 825 | CH31-DS3 | CH31 DS3 close |
| 826 | CH31-DS4 | CH31 DS4 close |
| 827 | CH32-DS1 | CH32 DS1 close |
| 828 | CH32-DS2 | CH32 DS2 close |
| 829 | CH32-DS3 | CH32 DS3 close |
| 830 | CH32-DS4 | CH32 DS4 close |
| 831 | CH1-CB | CH1 CB close |
| 832 | CH2-CB | CH2 CB close |
| 833 | CH3-CB | CH3 CB close |
| 834 | CH4-CB | CH4 CB close |
| 835 | CH5-CB | CH5 CB close |
| 836 | CH6-CB | CH6 CB close |
| 837 | CH7-CB | CH7 CB close |
| 838 | CH8-CB | CH8 CB close |
| 839 | CH9-CB | CH9 CB close |
| 840 | CH10-CB | CH10 CB close |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 841 | CH11-CB | CH11 CB close |
| 842 | CH12-CB | CH12 CB close |
| 843 | CH13-CB | CH13 CB close |
| 844 | CH14-CB | CH14 CB close |
| 845 | CH15-CB | CH15 CB close |
| 846 | CH16-CB | CH16 CB close |
| 847 | CH17-CB | CH17 CB close |
| 848 | CH18-CB | CH18 CB close |
| 849 | CH19-CB | CH19 CB close |
| 850 | CH20-CB | CH20 CB close |
| 851 | CH21-CB | CH21 CB close |
| 852 | CH22-CB | CH22 CB close |
| 853 | CH23-CB | CH23 CB close |
| 854 | CH24-CB | CH24 CB close |
| 855 | CH25-CB | CH25 CB close |
| 856 | CH26-CB | CH26 CB close |
| 857 | CH27-CB | CH27 CB close |
| 858 | CH28-CB | CH28 CB close |
| 859 | CH29-CB | CH29 CB close |
| 860 | CH30-CB | CH30 CB close |
| 861 | CH31-CB | CH31 CB close |
| 862 | CH32-CB | CH32 CB close |
| 863 | CH1-EXTTP-A | CH1 External trip command A-phase |
| 864 | CH1-EXTTP-B | CH1 External trip command B-phase |
| 865 | CH1-EXTTP-C | CH1 External trip command C-phase |
| 866 | CH2-EXTTP-A | CH2 External trip command A-phase |
| 867 | CH2-EXTTP-B | CH2 External trip command B-phase |
| 868 | CH2-EXTTP-C | CH2 External trip command C-phase |
| 869 | CH3-EXTTP-A | CH3 External trip command A-phase |
| 870 | CH3-EXTTP-B | CH3 External trip command B-phase |
| 871 | CH3-EXTTP-C | CH3 External trip command C-phase |
| 872 | CH4-EXTTP-A | CH4 External trip command A-phase |
| 873 | CH4-EXTTP-B | CH4 External trip command B-phase |
| 874 | CH4-EXTTP-C | CH4 External trip command C-phase |
| 875 | CH5-EXTTP-A | CH5 External trip command A-phase |
| 876 | CH5-EXTTP-B | CH5 External trip command B-phase |
| 877 | CH5-EXTTP-C | CH5 External trip command C-phase |
| 878 | CH6-EXTTP-A | CH6 External trip command A-phase |
| 879 | CH6-EXTTP-B | CH6 External trip command B-phase |
| 880 | CH6-EXTTP-C | CH6 External trip command C-phase |
| 881 | CH7-EXTTP-A | CH7 External trip command A-phase |
| 882 | CH7-EXTTP-B | CH7 External trip command B-phase |
| 883 | CH7-EXTTP-C | CH7 External trip command C-phase |
| 884 | CH8-EXTTP-A | CH8 External trip command A-phase |
| 885 | CH8-EXTTP-B | CH8 External trip command B-phase |
| 886 | CH8-EXTTP-C | CH8 External trip command C-phase |
| 887 | CH9-EXTTP-A | CH9 External trip command A-phase |
| 888 | CH9-EXTTP-B | CH9 External trip command B-phase |
| 889 | CH9-EXTTP-C | CH9 External trip command C-phase |
| 890 | CH10-EXTTP-A | CH10 External trip command A-phase |
| 891 | CH10-EXTTP-B | CH10 External trip command B-phase |
| 892 | CH10-EXTTP-C | CH10 External trip command C-phase |
| 893 | CH11-EXTTP-A | CH11 External trip command A-phase |
| 894 | CH11-EXTTP-B | CH11 External trip command B-phase |
| 895 | CH11-EXTTP-C | CH11 External trip command C-phase |
| 896 | CH12-EXTTP-A | CH12 External trip command A-phase |
| 897 | CH12-EXTTP-B | CH12 External trip command B-phase |
| 898 | CH12-EXTTP-C | CH12 External trip command C-phase |
| 899 | CH13-EXTTP-A | CH13 External trip command A-phase |
| 900 | CH13-EXTTP-B | CH13 External trip command B-phase |
| 901 | CH13-EXTTP-C | CH13 External trip command C-phase |
| 902 | CH14-EXTTP-A | CH14 External trip command A-phase |
| 903 | CH14-EXTTP-B | CH14 External trip command B-phase |
| 904 | CH14-EXTTP-C | CH14 External trip command C-phase |
| 905 | CH15-EXTTP-A | CH15 External trip command A-phase |
| 906 | CH15-EXTTP-B | CH15 External trip command B-phase |
| 907 | CH15-EXTTP-C | CH15 External trip command C-phase |
| 908 | CH16-EXTTP-A | CH16 External trip command A-phase |
| 909 | CH16-EXTTP-B | CH16 External trip command B-phase |
| 910 | CH16-EXTTP-C | CH16 External trip command C-phase |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 911 | CH17-EXTTP-A | CH17 External trip command A-phase |
| 912 | CH17-EXTTP-B | CH17 External trip command B-phase |
| 913 | CH17-EXTTP-C | CH17 External trip command C-phase |
| 914 | CH18-EXTTP-A | CH18 External trip command A-phase |
| 915 | CH18-EXTTP-B | CH18 External trip command B-phase |
| 916 | CH18-EXTTP-C | CH18 External trip command C-phase |
| 917 | CH19-EXTTP-A | CH19 External trip command A-phase |
| 918 | CH19-EXTTP-B | CH19 External trip command B-phase |
| 919 | CH19-EXTTP-C | CH19 External trip command C-phase |
| 920 | CH20-EXTTP-A | CH20 External trip command A-phase |
| 921 | CH20-EXTTP-B | CH20 External trip command B-phase |
| 922 | CH20-EXTTP-C | CH20 External trip command C-phase |
| 923 | CH21-EXTTP-A | CH21 External trip command A-phase |
| 924 | CH21-EXTTP-B | CH21 External trip command B-phase |
| 925 | CH21-EXTTP-C | CH21 External trip command C-phase |
| 926 | CH22-EXTTP-A | CH22 External trip command A-phase |
| 927 | CH22-EXTTP-B | CH22 External trip command B-phase |
| 928 | CH22-EXTTP-C | CH22 External trip command C-phase |
| 929 | CH23-EXTTP-A | CH23 External trip command A-phase |
| 930 | CH23-EXTTP-B | CH23 External trip command B-phase |
| 931 | CH23-EXTTP-C | CH23 External trip command C-phase |
| 932 | CH24-EXTTP-A | CH24 External trip command A-phase |
| 933 | CH24-EXTTP-B | CH24 External trip command B-phase |
| 934 | CH24-EXTTP-C | CH24 External trip command C-phase |
| 935 | CH25-EXTTP-A | CH25 External trip command A-phase |
| 936 | CH25-EXTTP-B | CH25 External trip command B-phase |
| 937 | CH25-EXTTP-C | CH25 External trip command C-phase |
| 938 | CH26-EXTTP-A | CH26 External trip command A-phase |
| 939 | CH26-EXTTP-B | CH26 External trip command B-phase |
| 940 | CH26-EXTTP-C | CH26 External trip command C-phase |
| 941 | CH27-EXTTP-A | CH27 External trip command A-phase |
| 942 | CH27-EXTTP-B | CH27 External trip command B-phase |
| 943 | CH27-EXTTP-C | CH27 External trip command C-phase |
| 944 | CH28-EXTTP-A | CH28 External trip command A-phase |
| 945 | CH28-EXTTP-B | CH28 External trip command B-phase |
| 946 | CH28-EXTTP-C | CH28 External trip command C-phase |
| 947 | CH29-EXTTP-A | CH29 External trip command A-phase |
| 948 | CH29-EXTTP-B | CH29 External trip command B-phase |
| 949 | CH29-EXTTP-C | CH29 External trip command C-phase |
| 950 | CH30-EXTTP-A | CH30 External trip command A-phase |
| 951 | CH30-EXTTP-B | CH30 External trip command B-phase |
| 952 | CH30-EXTTP-C | CH30 External trip command C-phase |
| 953 | CH31-EXTTP-A | CH31 External trip command A-phase |
| 954 | CH31-EXTTP-B | CH31 External trip command B-phase |
| 955 | CH31-EXTTP-C | CH31 External trip command C-phase |
| 956 | CH32-EXTTP-A | CH32 External trip command A-phase |
| 957 | CH32-EXTTP-B | CH32 External trip command B-phase |
| 958 | CH32-EXTTP-C | CH32 External trip command C-phase |
| 959 | SECTION1-DS | Section1 DS close |
| 960 | SECTION2-DS | Section2 DS close |
| 961 | SECTION3-DS | Section3 DS close |
| 962 | SECTION4-DS | Section4 DS close |
| 963 | COUPLER1-DS | Coupler1 DS close |
| 964 | COUPLER1-DSB1 | Coupler1 DS-B1 close |
| 965 | COUPLER1-DSB2 | Coupler1 DS-B2 close |
| 966 | COUPLER1-DST | Coupler1 DS-T close |
| 967 | COUPLER2-DS | Couoler2 DS close |
| 968 | COUPLER2-DSB1 | Coupler2 DS-B1 close |
| 969 | COUPLER2-DSB2 | Coupler2 DS-B2 close |
| 970 | COUPLER2-DST | Coupler2 DS-T close |
| 971 | COUPLER3-DS | Coupler3 DS close |
| 972 | COUPLER3-DST | Coupler3 DS-T close |
| 973 | COUPLER4-DS | Coupler4 DS close |
| 974 | COUPLER4-DST | Coupler4 DS-T close |
| 975 | SECTION1-CB | Section1 CB close |
| 976 | SECTION2-CB | Section2 CB close |
| 977 | SECTION3-CB | Section3 CB close |
| 978 | SECTION4-CB | Section4 CB close |
| 979 | COUPLER1-CB | Coupler1 CB close |
| 980 | COUPLER2-CB | Coupler2 CB close |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 981 | E.SEC1-CB | End of section1 CB close |
| 982 | E.SEC2-CB | End of section2 CB close |
| 983 | E.SEC3-CB | End of section3 CB close |
| 984 | E.SEC4-CB | End of section4 CB close |
| 985 | C1-TRANS.-ZA | Coupler1 : transfer-bus connected with ZoneA applicable condition |
| 986 | C1-TRANS.-ZB | Coupler1 : transfer-bus connected with ZoneB applicable condition |
| 987 | C2-TRANS.-ZA | Coupler2 : transfer-bus connected with ZoneA applicable condition |
| 988 | C2-TRANS.-ZB | Coupler2 : transfer-bus connected with ZoneB applicable condition |
| 989 | TRANS.-ZA | Transfer-bus connetcted with ZoneA condition |
| 990 | TRANS.-ZB | Transfer-bus connetcted with ZoneB condition |
| 991 | TRANS.-ZC | Transfer-bus connetcted with ZoneC condition |
| 992 | TRANS.-ZD | Transfer-bus connetcted with ZoneD condition |
| 993 | TRANSFER | Transfer-bus applicable condition |
| 994 | BRIDGE-ZA·ZB | Busbar bridge condition ZoneA and ZoneB |
| 995 | BRIDGE-ZB·ZC | Busbar bridge condition ZoneB and ZoneC |
| 996 | BRIDGE-ZA·ZD | Busbar bridge condition ZoneA and ZoneD |
| 997 | BRIDGE-ZC·ZD | Busbar bridge condition ZoneC and ZoneD |
| 998 | BRIDGE | Busbar bridge condition |
| 999 | DIFCH-OPERATE | DIFCH operation |
| 1000 | DIFZA-OPERATE | DIFZA operation |
| 1001 | DIFZB-OPERATE | DIFZB operation |
| 1002 | DIFZC-OPERATE | DIFZC operation |
| 1003 | DIFZD-OPERATE | DIFZD operation |
| 1004 | CBFCH-OPERATE | CBF for check zone operation |
| 1005 | CBFZA-OPERATE | CBF for zone A operation |
| 1006 | CBFZB-OPERATE | CBF for zone B operation |
| 1007 | CBFZC-OPERATE | CBF for zone C operation |
| 1008 | CBFZD-OPERATE | CBF for zone D operation |
| 1009 | BP-TRIP | Bus protection trip |
| 1010 | CBF-RETRIP | Breaker failuer protecion retrip |
| 1011 | CBF-TRIP | Breaker failuer protecion trip |
| 1012 | CBF-TRANSFER | Breaker failuer protecion transfer trip |
| 1013 | 1CBF-RETRIP | CH1 CBF retrip pick-up signal |
| 1014 | 2CBF-RETRIP | CH2 CBF retrip pick-up signal |
| 1015 | 3CBF-RETRIP | CH3 CBF retrip pick-up signal |
| 1016 | 4CBF-RETRIP | CH4 CBF retrip pick-up signal |
| 1017 | 5CBF-RETRIP | CH5 CBF retrip pick-up signal |
| 1018 | 6CBF-RETRIP | CH6 CBF retrip pick-up signal |
| 1019 | 7CBF-RETRIP | CH7 CBF retrip pick-up signal |
| 1020 | 8CBF-RETRIP | CH8 CBF retrip pick-up signal |
| 1021 | 9CBF-RETRIP | CH9 CBF retrip pick-up signal |
| 1022 | 10CBF-RETRIP | CH10 CBF retrip pick-up signal |
| 1023 | 11CBF-RETRIP | CH11 CBF retrip pick-up signal |
| 1024 | 12CBF-RETRIP | CH12 CBF retrip pick-up signal |
| 1025 | 13CBF-RETRIP | CH13 CBF retrip pick-up signal |
| 1026 | 14CBF-RETRIP | CH14 CBF retrip pick-up signal |
| 1027 | 15CBF-RETRIP | CH15 CBF retrip pick-up signal |
| 1028 | 16CBF-RETRIP | CH16 CBF retrip pick-up signal |
| 1029 | 17CBF-RETRIP | CH17 CBF retrip pick-up signal |
| 1030 | 18CBF-RETRIP | CH18 CBF retrip pick-up signal |
| 1031 | 19CBF-RETRIP | CH19 CBF retrip pick-up signal |
| 1032 | 20CBF-RETRIP | CH20 CBF retrip pick-up signal |
| 1033 | 21CBF-RETRIP | CH21 CBF retrip pick-up signal |
| 1034 | 22CBF-RETRIP | CH22 CBF retrip pick-up signal |
| 1035 | 23CBF-RETRIP | CH23 CBF retrip pick-up signal |
| 1036 | 24CBF-RETRIP | CH24 CBF retrip pick-up signal |
| 1037 | 25CBF-RETRIP | CH25 CBF retrip pick-up signal |
| 1038 | 26CBF-RETRIP | CH26 CBF retrip pick-up signal |
| 1039 | 27CBF-RETRIP | CH27 CBF retrip pick-up signal |
| 1040 | 28CBF-RETRIP | CH28 CBF retrip pick-up signal |
| 1041 | 29CBF-RETRIP | CH29 CBF retrip pick-up signal |
| 1042 | 30CBF-RETRIP | CH30 CBF retrip pick-up signal |
| 1043 | 31CBF-RETRIP | CH31 CBF retrip pick-up signal |
| 1044 | 32CBF-RETRIP | CH32 CBF retrip pick-up signal |
| 1045 | 1CBF-TRIP | CH1 CBF trip pick-up signal |
| 1046 | 2CBF-TRIP | CH2 CBF trip pick-up signal |
| 1047 | 3CBF-TRIP | CH3 CBF trip pick-up signal |
| 1048 | 4CBF-TRIP | CH4 CBF trip pick-up signal |
| 1049 | 5CBF-TRIP | CH5 CBF trip pick-up signal |
| 1050 | 6CBF-TRIP | CH6 CBF trip pick-up signal |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1051 | 7CBF-TRIP | CH7 CBF trip pick-up signal |
| 1052 | 8CBF-TRIP | CH8 CBF trip pick-up signal |
| 1053 | 9CBF-TRIP | CH9 CBF trip pick-up signal |
| 1054 | 10CBF-TRIP | CH10 CBF trip pick-up signal |
| 1055 | 11CBF-TRIP | CH11 CBF trip pick-up signal |
| 1056 | 12CBF-TRIP | CH12 CBF trip pick-up signal |
| 1057 | 13CBF-TRIP | CH13 CBF trip pick-up signal |
| 1058 | 14CBF-TRIP | CH14 CBF trip pick-up signal |
| 1059 | 15CBF-TRIP | CH15 CBF trip pick-up signal |
| 1060 | 16CBF-TRIP | CH16 CBF trip pick-up signal |
| 1061 | 17CBF-TRIP | CH17 CBF trip pick-up signal |
| 1062 | 18CBF-TRIP | CH18 CBF trip pick-up signal |
| 1063 | 19CBF-TRIP | CH19 CBF trip pick-up signal |
| 1064 | 20CBF-TRIP | CH20 CBF trip pick-up signal |
| 1065 | 21CBF-TRIP | CH21 CBF trip pick-up signal |
| 1066 | 22CBF-TRIP | CH22 CBF trip pick-up signal |
| 1067 | 23CBF-TRIP | CH23 CBF trip pick-up signal |
| 1068 | 24CBF-TRIP | CH24 CBF trip pick-up signal |
| 1069 | 25CBF-TRIP | CH25 CBF trip pick-up signal |
| 1070 | 26CBF-TRIP | CH26 CBF trip pick-up signal |
| 1071 | 27CBF-TRIP | CH27 CBF trip pick-up signal |
| 1072 | 28CBF-TRIP | CH28 CBF trip pick-up signal |
| 1073 | 29CBF-TRIP | CH29 CBF trip pick-up signal |
| 1074 | 30CBF-TRIP | CH30 CBF trip pick-up signal |
| 1075 | 31CBF-TRIP | CH31 CBF trip pick-up signal |
| 1076 | 32CBF-TRIP | CH32 CBF trip pick-up signal |
| 1077 | CH1-BPTP | CH1 Busbar protecion trip |
| 1078 | CH2-BPTP | CH2 Busbar protecion trip |
| 1079 | CH3-BPTP | CH3 Busbar protecion trip |
| 1080 | CH4-BPTP | CH4 Busbar protecion trip |
| 1081 | CH5-BPTP | CH5 Busbar protecion trip |
| 1082 | CH6-BPTP | CH6 Busbar protecion trip |
| 1083 | CH7-BPTP | CH7 Busbar protecion trip |
| 1084 | CH8-BPTP | CH8 Busbar protecion trip |
| 1085 | CH9-BPTP | CH9 Busbar protecion trip |
| 1086 | CH10-BPTP | CH10 Busbar protecion trip |
| 1087 | CH11-BPTP | CH11 Busbar protecion trip |
| 1088 | CH12-BPTP | CH12 Busbar protecion trip |
| 1089 | CH13-BPTP | CH13 Busbar protecion trip |
| 1090 | CH14-BPTP | CH14 Busbar protecion trip |
| 1091 | CH15-BPTP | CH15 Busbar protecion trip |
| 1092 | CH16-BPTP | CH16 Busbar protecion trip |
| 1093 | CH17-BPTP | CH17 Busbar protecion trip |
| 1094 | CH18-BPTP | CH18 Busbar protecion trip |
| 1095 | CH19-BPTP | CH19 Busbar protecion trip |
| 1096 | CH20-BPTP | CH20 Busbar protecion trip |
| 1097 | CH21-BPTP | CH21 Busbar protecion trip |
| 1098 | CH22-BPTP | CH22 Busbar protection trip |
| 1099 | CH23-BPTP | CH23 Busbar protection trip |
| 1100 | CH24-BPTP | CH24 Busbar protection trip |
| 1101 | CH25-BPTP | CH25 Busbar protection trip |
| 1102 | CH26-BPTP | CH26 Busbar protection trip |
| 1103 | CH27-BPTP | CH27 Busbar protection trip |
| 1104 | CH28-BPTP | CH28 Busbar protection trip |
| 1105 | CH29-BPTP | CH29 Busbar protection trip |
| 1106 | CH30-BPTP | CH30 Busbar protection trip |
| 1107 | CH31-BPTP | CH31 Busbar protection trip |
| 1108 | CH32-BPTP | CH32 Busbar protection trip |
| 1109 | CH1-CBFRETP | CH1 CBF retrip |
| 1110 | CH2-CBFRETP | CH2 CBF retrip |
| 1111 | CH3-CBFRETP | CH3 CBF retrip |
| 1112 | CH4-CBFRETP | CH4 CBF retrip |
| 1113 | CH5-CBFRETP | CH5 CBF retrip |
| 1114 | CH6-CBFRETP | CH6 CBF retrip |
| 1115 | CH7-CBFRETP | CH7 CBF retrip |
| 1116 | CH8-CBFRETP | CH8 CBF retrip |
| 1117 | CH9-CBFRETP | CH9 CBF retrip |
| 1118 | CH10-CBFRETP | CH10 CBF retrip |
| 1119 | CH11-CBFRETP | CH11 CBF retrip |
| 1120 | CH12-CBFRETP | CH12 CBF retrip |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1121 | CH13-CBFRETP | CH13 CBF retrip |
| 1122 | CH14-CBFRETP | CH14 CBF retrip |
| 1123 | CH15-CBFRETP | CH15 CBF retrip |
| 1124 | CH16-CBFRETP | CH16 CBF retrip |
| 1125 | CH17-CBFRETP | CH17 CBF retrip |
| 1126 | CH18-CBFRETP | CH18 CBF retrip |
| 1127 | CH19-CBFRETP | CH19 CBF retrip |
| 1128 | CH20-CBFRETP | CH20 CBF retrip |
| 1129 | CH21-CBFRETP | CH21 CBF retrip |
| 1130 | CH22-CBFRETP | CH22 CBF retrip |
| 1131 | CH23-CBFRETP | CH23 CBF retrip |
| 1132 | CH24-CBFRETP | CH24 CBF retrip |
| 1133 | CH25-CBFRETP | CH25 CBF retrip |
| 1134 | CH26-CBFRETP | CH26 CBF retrip |
| 1135 | CH27-CBFRETP | CH27 CBF retrip |
| 1136 | CH28-CBFRETP | CH28 CBF retrip |
| 1137 | CH29-CBFRETP | CH29 CBF retrip |
| 1138 | CH30-CBFRETP | CH30 CBF retrip |
| 1139 | CH31-CBFRETP | CH31 CBF retrip |
| 1140 | CH32-CBFRETP | CH32 CBF retrip |
| 1141 | CH1-CBFTP | CH1 CBF trip |
| 1142 | CH2-CBFTP | CH2 CBF trip |
| 1143 | CH3-CBFTP | CH3 CBF trip |
| 1144 | CH4-CBFTP | CH4 CBF trip |
| 1145 | CH5-CBFTP | CH5 CBF trip |
| 1146 | CH6-CBFTP | CH6 CBF trip |
| 1147 | CH7-CBFTP | CH7 CBF trip |
| 1148 | CH8-CBFTP | CH8 CBF trip |
| 1149 | CH9-CBFTP | CH9 CBF trip |
| 1150 | CH10-CBFTP | CH10 CBF trip |
| 1151 | CH11-CBFTP | CH11 CBF trip |
| 1152 | CH12-CBFTP | CH12 CBF trip |
| 1153 | CH13-CBFTP | CH13 CBF trip |
| 1154 | CH14-CBFTP | CH14 CBF trip |
| 1155 | CH15-CBFTP | CH15 CBF trip |
| 1156 | CH16-CBFTP | CH16 CBF trip |
| 1157 | CH17-CBFTP | CH17 CBF trip |
| 1158 | CH18-CBFTP | CH18 CBF trip |
| 1159 | CH19-CBFTP | CH19 CBF trip |
| 1160 | CH20-CBFTP | CH20 CBF trip |
| 1161 | CH21-CBFTP | CH21 CBF trip |
| 1162 | CH22-CBFTP | CH22 CBF trip |
| 1163 | CH23-CBFTP | CH23 CBF trip |
| 1164 | CH24-CBFTP | CH24 CBF trip |
| 1165 | CH25-CBFTP | CH25 CBF trip |
| 1166 | CH26-CBFTP | CH26 CBF trip |
| 1167 | CH27-CBFTP | CH27 CBF trip |
| 1168 | CH28-CBFTP | CH28 CBF trip |
| 1169 | CH29-CBFTP | CH29 CBF trip |
| 1170 | CH30-CBFTP | CH30 CBF trip |
| 1171 | CH31-CBFTP | CH31 CBF trip |
| 1172 | CH32-CBFTP | CH32 CBF trip |
| 1173 | CH1-CBF.TR | CH1 CBF transfer trip |
| 1174 | CH2-CBF.TR | CH2 CBF transfer trip |
| 1175 | CH3-CBF.TR | CH3 CBF transfer trip |
| 1176 | CH4-CBF.TR | CH4 CBF transfer trip |
| 1177 | CH5-CBF.TR | CH5 CBF transfer trip |
| 1178 | CH6-CBF.TR | CH6 CBF transfer trip |
| 1179 | CH7-CBF.TR | CH7 CBF transfer trip |
| 1180 | CH8-CBF.TR | CH8 CBF transfer trip |
| 1181 | CH9-CBF.TR | CH9 CBF transfer trip |
| 1182 | CH10-CBF.TR | CH10 CBF transfer trip |
| 1183 | CH11-CBF.TR | CH11 CBF transfer trip |
| 1184 | CH12-CBF.TR | CH12 CBF transfer trip |
| 1185 | CH13-CBF.TR | CH13 CBF transfer trip |
| 1186 | CH14-CBF.TR | CH14 CBF transfer trip |
| 1187 | CH15-CBF.TR | CH15 CBF transfer trip |
| 1188 | CH16-CBF.TR | CH16 CBF transfer trip |
| 1189 | CH17-CBF.TR | CH17 CBF transfer trip |
| 1190 | CH18-CBF.TR | CH18 CBF transfer trip |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1191 | CH19-CBF.TR | CH19 CBF transfer trip |
| 1192 | CH20-CBF.TR | CH20 CBF transfer trip |
| 1193 | CH21-CBF.TR | CH21 CBF transfer trip |
| 1194 | CH22-CBF.TR | CH22 CBF transfer trip |
| 1195 | CH23-CBF.TR | CH23 CBF transfer trip |
| 1196 | CH24-CBF.TR | CH24 CBF transfer trip |
| 1197 | CH25-CBF.TR | CH25 CBF transfer trip |
| 1198 | CH26-CBF.TR | CH26 CBF transfer trip |
| 1199 | CH27-CBF.TR | CH27 CBF transfer trip |
| 1200 | CH28-CBF.TR | CH28 CBF transfer trip |
| 1201 | CH29-CBF.TR | CH29 CBF transfer trip |
| 1202 | CH30-CBF.TR | CH30 CBF transfer trip |
| 1203 | CH31-CBF.TR | CH31 CBF transfer trip |
| 1204 | CH32-CBF.TR | CH32 CBF transfer trip |
| 1205 | CH1-CBF/RE | CH1 CBF retrip/trip |
| 1206 | CH2-CBF/RE | CH2 CBF retrip/trip |
| 1207 | CH3-CBF/RE | CH3 CBF retrip/trip |
| 1208 | CH4-CBF/RE | CH4 CBF retrip/trip |
| 1209 | CH5-CBF/RE | CH5 CBF retrip/trip |
| 1210 | CH6-CBF/RE | CH6 CBF retrip/trip |
| 1211 | CH7-CBF/RE | CH7 CBF retrip/trip |
| 1212 | CH8-CBF/RE | CH8 CBF retrip/trip |
| 1213 | CH9-CBF/RE | CH9 CBF retrip/trip |
| 1214 | CH10-CBF/RE | CH10 CBF retrip/trip |
| 1215 | CH11-CBF/RE | CH11 CBF retrip/trip |
| 1216 | CH12-CBF/RE | CH12 CBF retrip/trip |
| 1217 | CH13-CBF/RE | CH13 CBF retrip/trip |
| 1218 | CH14-CBF/RE | CH14 CBF retrip/trip |
| 1219 | CH15-CBF/RE | CH15 CBF retrip/trip |
| 1220 | CH16-CBF/RE | CH16 CBF retrip/trip |
| 1221 | CH17-CBF/RE | CH17 CBF retrip/trip |
| 1222 | CH18-CBF/RE | CH18 CBF retrip/trip |
| 1223 | CH19-CBF/RE | CH19 CBF retrip/trip |
| 1224 | CH20-CBF/RE | CH20 CBF retrip/trip |
| 1225 | CH21-CBF/RE | CH21 CBF retrip/trip |
| 1226 | CH22-CBF/RE | CH22 CBF retrip/trip |
| 1227 | CH23-CBF/RE | CH23 CBF retrip/trip |
| 1228 | CH24-CBF/RE | CH24 CBF retrip/trip |
| 1229 | CH25-CBF/RE | CH25 CBF retrip/trip |
| 1230 | CH26-CBF/RE | CH26 CBF retrip/trip |
| 1231 | CH27-CBF/RE | CH27 CBF retrip/trip |
| 1232 | CH28-CBF/RE | CH28 CBF retrip/trip |
| 1233 | CH29-CBF/RE | CH29 CBF retrip/trip |
| 1234 | CH30-CBF/RE | CH30 CBF retrip/trip |
| 1235 | CH31-CBF/RE | CH31 CBF retrip/trip |
| 1236 | CH32-CBF/RE | CH32 CBF retrip/trip |
| 1237 | DIF-ZA_TRIP | DIF-ZA trip |
| 1238 | DIF-ZB_TRIP | DIF-ZB trip |
| 1239 | DIF-ZC_TRIP | DIF-ZC trip |
| 1240 | DIF-ZD_TRIP | DIF-ZD trip |
| 1241 | IEC_MDBLK | monitor direction blocked |
| 1242 | IEC_TESTMODE | IEC61870-5-103 testmode |
| 1243 | GROUP1_ACTIVE | group1 active |
| 1244 | GROUP2_ACTIVE | group2 active |
| 1245 | GROUP3_ACTIVE | group3 active |
| 1246 | GROUP4_ACTIVE | group4 active |
| 1247 | | |
| 1248 | | |
| 1249 | | |
| 1250 | | |
| 1251 | RLY_FAIL | RELAY FAILURE |
| 1252 | RLY_OP_BLK | RELAY OUTPUT BLOCK |
| 1253 | AMF_OFF | SV BLOCK |
| 1254 | DSSV | DS failure signal |
| 1255 | CBSV | CB failure signal |
| 1256 | BISV | BI failure signal |
| 1257 | IDSV | ID failure signal |
| 1258 | RELAY_FAIL-A | |
| 1259 | OPSV | |
| 1260 | | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1261 | TRIP-H | Trip signal hold |
| 1262 | | |
| 1263 | | |
| 1264 | | |
| 1265 | | |
| 1266 | BRIDGE_ALARM | Bridge alarm signal |
| 1267 | CT_ERR | |
| 1268 | V0_ERR | |
| 1269 | V2_ERR | |
| 1270 | IDSV-ZA | ID fail signal(Discriminating zone A) |
| 1271 | IDSV-ZB | ID fail signal(Discriminating zone B) |
| 1272 | IDSV-ZC | ID fail signal(Discriminating zone C) |
| 1273 | IDSV-ZD | ID fail signal(Discriminating zone D) |
| 1274 | IDSV-CH | ID fail signal(Chack zone) |
| 1275 | DSSV_DS1 | DS1 failure signal |
| 1276 | DSSV_DS2 | DS2 failure signal |
| 1277 | DSSV_DS3 | DS3 failure signal |
| 1278 | DSSV_DS4 | DS4 failure signal |
| 1279 | GEN_PICKUP | General start/pick-up |
| 1280 | GEN_TRIP | General trip |
| 1281 | DSSV_ZA | ZoneA DS failure signal |
| 1282 | DSSV_ZB | ZoneB DS failure signal |
| 1283 | DSSV_ZC | ZoneC DS failure signal |
| 1284 | DSSV_ZD | ZoneD DS failure signal |
| 1285 | | |
| 1286 | | |
| 1287 | | |
| 1288 | CTF-ZA | CTF detection |
| 1289 | CTF-ZB | ditto |
| 1290 | CTF-ZC | ditto |
| 1291 | CTF-ZD | ditto |
| 1292 | CTF-CH | ditto |
| 1293 | CTF-ZA_ALARM | CTF alarm |
| 1294 | CTF-ZB_ALARM | ditto |
| 1295 | CTF-ZC_ALARM | ditto |
| 1296 | CTF-ZD_ALARM | ditto |
| 1297 | CTF-CH_ALARM | ditto |
| 1298 | CTF_ALARM | ditto |
| 1299 | | |
| 1300 | EFP-TRANSFER | End-fault-protection transfer trip signal |
| 1301 | UVGZA-A | UVGZA-A relay element output |
| 1302 | UVGZA-B | -B relay element output |
| 1303 | UVGZA-C | -C relay element output |
| 1304 | UVSZA-AB | UVSZA-AB relay element output |
| 1305 | UVSZA-BC | -BC relay element output |
| 1306 | UVSZA-CA | -CA relay element output |
| 1307 | UVDZA-A | UVDZA-A relay element output |
| 1308 | UVDZA-B | -B relay element output |
| 1309 | UVDZA-C | -C relay element output |
| 1310 | OVGZA | OVGZA relay element output |
| 1311 | UVGZB-A | UVGZB-A relay element output |
| 1312 | UVGZB-B | -B relay element output |
| 1313 | UVGZB-C | -C relay element output |
| 1314 | UVSZB-AB | UVSZB-AB relay element output |
| 1315 | UVSZB-BC | -BC relay element output |
| 1316 | UVSZB-CA | -CA relay element output |
| 1317 | UVDZB-A | UVDZB-A relay element output |
| 1318 | UVDZB-B | -B relay element output |
| 1319 | UVDZB-C | -C relay element output |
| 1320 | OVGZB | OVGZB relay element output |
| 1321 | UVGZC-A | UVGZC-A relay element output |
| 1322 | UVGZC-B | -B relay element output |
| 1323 | UVGZC-C | -C relay element output |
| 1324 | UVSZC-AB | UVSZC-AB relay element output |
| 1325 | UVSZC-BC | -BC relay element output |
| 1326 | UVSZC-CA | -CA relay element output |
| 1327 | UVDZC-A | UVDZC-A relay element output |
| 1328 | UVDZC-B | -B relay element output |
| 1329 | UVDZC-C | -C relay element output |
| 1330 | OVGZC | OVGZC relay element output |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1331 | UVGZD-A | UVGZD-A relay element output |
| 1332 | UVGZD-B | -B relay element output |
| 1333 | UVGZD-C | -C relay element output |
| 1334 | UVSZD-AB | UVSZD-AB relay element output |
| 1335 | UVSZD-BC | -BC relay element output |
| 1336 | UVSZD-CA | -CA relay element output |
| 1337 | UVDZD-A | UVDZD-A relay element output |
| 1338 | UVDZD-B | -B relay element output |
| 1339 | UVDZD-C | -C relay element output |
| 1340 | OVGZD | OVGZD relay element output |
| 1341 | UVGZA | UVGZA-A,B,C relay elemnet output (3phase OR) |
| 1342 | UVSZA | UVSZA-A,B,C relay elemnet output (3phase OR) |
| 1343 | UVDZA | UVDZA-A,B,C relay elemnet output (3phase OR with del-timer) |
| 1344 | UVGZB | UVGZB-A,B,C relay elemnet output (3phase OR) |
| 1345 | UVSZB | UVSZB-A,B,C relay elemnet output (3phase OR) |
| 1346 | UVDZB | UVDZB-A,B,C relay elemnet output (3phase OR with del-timer) |
| 1347 | UVGZC | UVGZC-A,B,C relay elemnet output (3phase OR) |
| 1348 | UVSZC | UVSZC-A,B,C relay elemnet output (3phase OR) |
| 1349 | UVDZC | UVDZC-A,B,C relay elemnet output (3phase OR with del-timer) |
| 1350 | UVGZD | UVGZD-A,B,C relay elemnet output (3phase OR) |
| 1351 | UVSZD | UVSZD-A,B,C relay elemnet output (3phase OR) |
| 1352 | UVDZD | UVDZD-A,B,C relay elemnet output (3phase OR with del-timer) |
| 1353 | | |
| 1354 | | |
| 1355 | C1_S1_OPEN | Coupler1 opened and Section1 opened |
| 1356 | C1_S2_OPEN | Coupler1 opened and Section2 opened |
| 1357 | C2_S1_OPEN | Coupler2 opened and Section1 opened |
| 1358 | C2_S2_OPEN | Coupler2 opened and Section2 opened |
| 1359 | C1_C2_OPEN | Coupler1 opened and Coupler2 opened |
| 1360 | S1_S2_OPEN | Section1 opened and Section2 opened |
| 1361 | CH1-COMTP | CH1 command trip |
| 1362 | CH2-COMTP | CH2 command trip |
| 1363 | CH3-COMTP | CH3 command trip |
| 1364 | CH4-COMTP | CH4 command trip |
| 1365 | CH5-COMTP | CH5 command trip |
| 1366 | CH6-COMTP | CH6 command trip |
| 1367 | CH7-COMTP | CH7 command trip |
| 1368 | CH8-COMTP | CH8 command trip |
| 1369 | CH9-COMTP | CH9 command trip |
| 1370 | CH10-COMTP | CH10 command trip |
| 1371 | CH11-COMTP | CH11 command trip |
| 1372 | CH12-COMTP | CH12 command trip |
| 1373 | CH13-COMTP | CH13 command trip |
| 1374 | CH14-COMTP | CH14 command trip |
| 1375 | CH15-COMTP | CH15 command trip |
| 1376 | CH16-COMTP | CH16 command trip |
| 1377 | CH17-COMTP | CH17 command trip |
| 1378 | CH18-COMTP | CH18 command trip |
| 1379 | CH19-COMTP | CH19 command trip |
| 1380 | CH20-COMTP | CH20 command trip |
| 1381 | CH21-COMTP | CH21 command trip |
| 1382 | CH22-COMTP | CH22 command trip |
| 1383 | CH23-COMTP | CH23 command trip |
| 1384 | CH24-COMTP | CH24 command trip |
| 1385 | CH25-COMTP | CH25 command trip |
| 1386 | CH26-COMTP | CH26 command trip |
| 1387 | CH27-COMTP | CH27 command trip |
| 1388 | CH28-COMTP | CH28 command trip |
| 1389 | CH29-COMTP | CH29 command trip |
| 1390 | CH30-COMTP | CH30 command trip |
| 1391 | CH31-COMTP | CH31 command trip |
| 1392 | CH32-COMTP | CH32 command trip |
| 1393 | COMTP-ZA | Command trip of zone A |
| 1394 | COMTP-ZB | Command trip of zone B |
| 1395 | COMTP-ZC | Command trip of zone C |
| 1396 | COMTP-ZD | Command trip of zone D |
| 1397 | COM-TRIP | Command trip |
| 1398 | FAULT_PHA_A | fault_phase_A |
| 1399 | FAULT_PHA_B | fault_phase_B |
| 1400 | FAULT_PHA_C | fault_phase_C |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1401 | LOCAL_OP_ACT | local operation active |
| 1402 | REMOTE_OP_ACT | remote operation active |
| 1403 | NORM_LED_ON | IN-SERVICE LED ON |
| 1404 | ALM_LED_ON | ALARM LED ON |
| 1405 | TRIP_LED_ON | TRIP LED ON |
| 1406 | TEST_LED_ON | TEST LED ON |
| 1407 | | |
| 1408 | | |
| 1409 | LED_RESET | TRIP LED RESET |
| 1410 | | |
| 1411 | | IEC103 communication command (reserved) |
| 1412 | | IEC103 communication command (reserved) |
| 1413 | PROT_COM_ON | IEC103 communication command |
| 1414 | PRG_LED1_ON | PROGRAMMABLE LED1 ON |
| 1415 | PRG_LED2_ON | PROGRAMMABLE LED2 ON |
| 1416 | PRG_LED3_ON | PROGRAMMABLE LED3 ON |
| 1417 | PRG_LED4_ON | PROGRAMMABLE LED4 ON |
| 1418 | | PROGRAMMABLE LED5 ON (reserved) |
| 1419 | | PROGRAMMABLE LED6 ON (reserved) |
| 1420 | | PROGRAMMABLE LED7 ON (reserved) |
| 1421 | | PROGRAMMABLE LED8 ON (reserved) |
| 1422 | | PROGRAMMABLE LED9 ON (reserved) |
| 1423 | | PROGRAMMABLE LED10 ON (reserved) |
| 1424 | | PROGRAMMABLE LED11 ON (reserved) |
| 1425 | | PROGRAMMABLE LED12 ON (reserved) |
| 1426 | | PROGRAMMABLE LED13 ON (reserved) |
| 1427 | | PROGRAMMABLE LED14 ON (reserved) |
| 1428 | | PROGRAMMABLE LED15 ON (reserved) |
| 1429 | | PROGRAMMABLE LED16 ON (reserved) |
| 1430 | | |
| 1431 | | |
| 1432 | | |
| 1433 | BU-OUT | Any BU out of service condition |
| 1434 | F.Record_DONE | fault location completed |
| 1435 | F.Record_CLR | Fault record clear |
| 1436 | E.Record_CLR | Event record clear |
| 1437 | D.Record_CLR | Disturbance record clear |
| 1438 | | |
| 1439 | | |
| 1440 | | |
| 1441 | | |
| 1442 | | |
| 1443 | | |
| 1444 | | |
| 1445 | PLC_data_CHG | PLC data change |
| 1446 | | |
| 1447 | | |
| 1448 | Sys.set_change | System setting change |
| 1449 | Rly.set_change | Relay setting change |
| 1450 | Grp.set_change | Group setting change |
| 1451 | | |
| 1452 | | |
| 1453 | | |
| 1454 | | |
| 1455 | | |
| 1456 | KEY-VIEW | VIEW key status (1:pressed) |
| 1457 | KEY-RESET | RESET key status (2:pressed) |
| 1458 | KEY-ENTER | ENTER key status (3:pressed) |
| 1459 | KEY-END | END key status (4:pressed) |
| 1460 | KEY-CANCEL | CANCEL key status (5:pressed) |
| 1461 | | |
| 1462 | | |
| 1463 | | |
| 1464 | | |
| 1465 | | |
| 1466 | | |
| 1467 | | |
| 1468 | | |
| 1469 | | |
| 1470 | | |

www . ElectricalPartManuals . com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 1471 | | |
| 1472 | SUM_err | Program ROM checksum error |
| 1473 | | (reserved for supervision) |
| 1474 | SRAM_err | SRAM memory monitoring error |
| 1475 | BU-RAM_err | BU-RAM memory monitoring error |
| 1476 | DP-RAM_err | DP-RAM memory monitoring error |
| 1477 | EEPROM_err | EEPROM memory monitoring error |
| 1478 | SUB-CPU_err | Sub-CPU stopped |
| 1479 | A/D_err | A/D accuracy checking error |
| 1480 | | (reserved for supervision) |
| 1481 | | (reserved for supervision) |
| 1482 | | (reserved for supervision) |
| 1483 | | (reserved for supervision) |
| 1484 | DIO_err | DIO card connection error |
| 1485 | | (reserved for supervision) |
| 1486 | LCD_err | LCD panel connection error |
| 1487 | ROM_data_err | Data ROM checksum error |
| 1488 | FEP1_SUM_err | FEP#1 Program ROM checksum error |
| 1489 | FEP1_SRAM_err | FEP#1 SRAM memory monitoring error |
| 1490 | FEP1_DPRAM_err | FEP#1 DP-RAM memory monitoring error |
| 1491 | FEP1_stopped | FEP#1 stopped |
| 1492 | FEP2_SUM_err | FEP#2 Program ROM checksum error |
| 1493 | FEP2_SRAM_err | FEP#2 SRAM memory monitoring error |
| 1494 | FEP2_DPRAM_err | FEP#2 DP-RAM memory monitoring error |
| 1495 | FEP2_stopped | FEP#2 stopped |
| 1496 | FEP3_SUM_err | FEP#3 Program ROM checksum error |
| 1497 | FEP3_SRAM_err | FEP#3 SRAM memory monitoring error |
| 1498 | FEP3_DPRAM_err | FEP#3 DP-RAM memory monitoring error |
| 1499 | FEP3_stopped | FEP#3 stopped |
| 1500 | FEP4_SUM_err | FEP#4 Program ROM checksum error |
| 1501 | FEP4_SRAM_err | FEP#4 SRAM memory monitoring error |
| 1502 | FEP4_DPRAM_err | FEP#4 DP-RAM memory monitoring error |
| 1503 | FEP4_stopped | FEP#4 stopped |
| 1504 | CTFID_ZA-A | Id element for CTF detection (Zone A) |
| 1505 | CTFID_ZA-B | ditto |
| 1506 | CTFID_ZA-C | ditto |
| 1507 | CTFID_ZB-A | Id element for CTF detection (Zone B) |
| 1508 | CTFID_ZB-B | ditto |
| 1509 | CTFID_ZB-C | ditto |
| 1510 | CTFID_ZC-A | Id element for CTF detection (Zone C) |
| 1511 | CTFID_ZC-B | ditto |
| 1512 | CTFID_ZC-C | ditto |
| 1513 | CTFID_ZD-A | Id element for CTF detection (Zone D) |
| 1514 | CTFID_ZD-B | ditto |
| 1515 | CTFID_ZD-C | ditto |
| 1516 | CTFID_CH-A | Id element for CTF detection (Check zone) |
| 1517 | CTFID_CH-B | ditto |
| 1518 | CTFID_CH-C | ditto |
| 1519 | CTFOVG_ZA | OVG element for CTF detection |
| 1520 | CTFOVG_ZB | ditto |
| 1521 | CTFOVG_ZC | ditto |
| 1522 | CTFOVG_ZD | ditto |
| 1523 | CTFUV_ZA | UV element for CTF detection |
| 1524 | CTFUV_ZB | ditto |
| 1525 | CTFUV_ZC | ditto |
| 1526 | CTFUV_ZD | ditto |
| 1527 | CTFUVD_ZA | UVD element for CTF detection |
| 1528 | CTFUVD_ZB | ditto |
| 1529 | CTFUVD_ZC | ditto |
| 1530 | CTFUVD_ZD | ditto |
| 1531 | | |
| 1532 | | |
| 1533 | | |
| 1534 | | |
| 1535 | | |

www . ElectricalPartManuals . com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1536 | | |
| 1537 | | |
| 1538 | CH1-DS2_N/O | CH1 DS2 normaly open contact |
| 1539 | CH1-DS2_N/C | CH1 DS2 normaly close contact |
| 1540 | CH1-DS3_N/O | CH1 DS3 normaly open contact |
| 1541 | CH1-DS3_N/C | CH1 DS3 normaly close contact |
| 1542 | CH1-DS4_N/O | CH1 DS4 normaly open contact |
| 1543 | CH1-DS4_N/C | CH1 DS4 normaly close contact |
| 1544 | CH1-CB_N/O | CH1 CB normaly open contact |
| 1545 | CH1-CB_N/C | CH1 CB normaly close contact |
| 1546 | | |
| 1547 | | |
| 1548 | | |
| 1549 | | |
| 1550 | | |
| 1551 | | |
| 1552 | | |
| 1553 | | |
| 1554 | CH2-DS2_N/O | CH2 DS2 normaly open contact |
| 1555 | CH2-DS2_N/C | CH2 DS2 normaly close contact |
| 1556 | CH2-DS3_N/O | CH2 DS3 normaly open contact |
| 1557 | CH2-DS3_N/C | CH2 DS3 normaly close contact |
| 1558 | CH2-DS4_N/O | CH2 DS4 normaly open contact |
| 1559 | CH2-DS4_N/C | CH2 DS4 normaly close contact |
| 1560 | CH2-CB_N/O | CH2 CB normaly open contact |
| 1561 | CH2-CB_N/C | CH2 CB normaly close contact |
| 1562 | | |
| 1563 | | |
| 1564 | | |
| 1565 | | |
| 1566 | | |
| 1567 | | |
| 1568 | | |
| 1569 | | |
| 1570 | CH3-DS2_N/O | CH3 DS2 normaly open contact |
| 1571 | CH3-DS2_N/C | CH3 DS2 normaly close contact |
| 1572 | CH3-DS3_N/O | CH3 DS3 normaly open contact |
| 1573 | CH3-DS3_N/C | CH3 DS3 normaly close contact |
| 1574 | CH3-DS4_N/O | CH3 DS4 normaly open contact |
| 1575 | CH3-DS4_N/C | CH3 DS4 normaly close contact |
| 1576 | CH3-CB_N/O | CH3 CB normaly open contact |
| 1577 | CH3-CB_N/C | CH3 CB normaly close contact |
| 1578 | | |
| 1579 | | |
| 1580 | | |
| 1581 | | |
| 1582 | | |
| 1583 | | |
| 1584 | | |
| 1585 | | |
| 1586 | CH4-DS2_N/O | CH4 DS2 normaly open contact |
| 1587 | CH4-DS2_N/C | CH4 DS2 normaly close contact |
| 1588 | CH4-DS3_N/O | CH4 DS3 normaly open contact |
| 1589 | CH4-DS3_N/C | CH4 DS3 normaly close contact |
| 1590 | CH4-DS4_N/O | CH4 DS4 normaly open contact |
| 1591 | CH4-DS4_N/C | CH4 DS4 normaly close contact |
| 1592 | CH4-CB_N/O | CH4 CB normaly open contact |
| 1593 | CH4-CB_N/C | CH4 CB normaly close contact |
| 1594 | | |
| 1595 | | |
| 1596 | | |
| 1597 | | |
| 1598 | | |
| 1599 | | |
| 1600 | | |

www . ElectricalPartManuals . com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 1601 | | |
| 1602 | CH5-DS2_N/O | CH5 DS2 normaly open contact |
| 1603 | CH5-DS2_N/C | CH5 DS2 normaly close contact |
| 1604 | CH5-DS3_N/O | CH5 DS3 normaly open contact |
| 1605 | CH5-DS3_N/C | CH5 DS3 normaly close contact |
| 1606 | CH5-DS4_N/O | CH5 DS4 normaly open contact |
| 1607 | CH5-DS4_N/C | CH5 DS4 normaly close contact |
| 1608 | CH5-CB_N/O | CH5 CB normaly open contact |
| 1609 | CH5-CB_N/C | CH5 CB normaly close contact |
| 1610 | | |
| 1611 | | |
| 1612 | | |
| 1613 | | |
| 1614 | | |
| 1615 | | |
| 1616 | | |
| 1617 | | |
| 1618 | CH6-DS2_N/O | CH6 DS2 normaly open contact |
| 1619 | CH6-DS2_N/C | CH6 DS2 normaly close contact |
| 1620 | CH6-DS3_N/O | CH6 DS3 normaly open contact |
| 1621 | CH6-DS3_N/C | CH6 DS3 normaly close contact |
| 1622 | CH6-DS4_N/O | CH6 DS4 normaly open contact |
| 1623 | CH6-DS4_N/C | CH6 DS4 normaly close contact |
| 1624 | CH6-CB_N/O | CH6 CB normaly open contact |
| 1625 | CH6-CB_N/C | CH6 CB normaly close contact |
| 1626 | | |
| 1627 | | |
| 1628 | | |
| 1629 | | |
| 1630 | | |
| 1631 | | |
| 1632 | | |
| 1633 | | |
| 1634 | CH7-DS2_N/O | CH7 DS2 normaly open contact |
| 1635 | CH7-DS2_N/C | CH7 DS2 normaly close contact |
| 1636 | CH7-DS3_N/O | CH7 DS3 normaly open contact |
| 1637 | CH7-DS3_N/C | CH7 DS3 normaly close contact |
| 1638 | CH7-DS4_N/O | CH7 DS4 normaly open contact |
| 1639 | CH7-DS4_N/C | CH7 DS4 normaly close contact |
| 1640 | CH7-CB_N/O | CH7 CB normaly open contact |
| 1641 | CH7-CB_N/C | CH7 CB normaly close contact |
| 1642 | | |
| 1643 | | |
| 1644 | | |
| 1645 | | |
| 1646 | | |
| 1647 | | |
| 1648 | | |
| 1649 | | |
| 1650 | CH8-DS2_N/O | CH8 DS2 normaly open contact |
| 1651 | CH8-DS2_N/C | CH8 DS2 normaly close contact |
| 1652 | CH8-DS3_N/O | CH8 DS3 normaly open contact |
| 1653 | CH8-DS3_N/C | CH8 DS3 normaly close contact |
| 1654 | CH8-DS4_N/O | CH8 DS4 normaly open contact |
| 1655 | CH8-DS4_N/C | CH8 DS4 normaly close contact |
| 1656 | CH8-CB_N/O | CH8 CB normaly open contact |
| 1657 | CH8-CB_N/C | CH8 CB normaly close contact |
| 1658 | | |
| 1659 | | |
| 1660 | | |
| 1661 | | |
| 1662 | | |
| 1663 | | |
| 1664 | | |
| 1665 | | |
| 1666 | CH9-DS2_N/O | CH9 DS2 normaly open contact |
| 1667 | CH9-DS2_N/C | CH9 DS2 normaly close contact |
| 1668 | CH9-DS3_N/O | CH9 DS3 normaly open contact |
| 1669 | CH9-DS3_N/C | CH9 DS3 normaly close contact |
| 1670 | CH9-DS4_N/O | CH9 DS4 normaly open contact |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1671 | CH9-DS4_N/C | CH9 DS4 normaly close contact |
| 1672 | CH9-CB_N/O | CH9 CB normaly open contact |
| 1673 | CH9-CB_N/C | CH9 CB normaly close contact |
| 1674 | | |
| 1675 | | |
| 1676 | | |
| 1677 | | |
| 1678 | | |
| 1679 | | |
| 1680 | | |
| 1681 | | |
| 1682 | CH10-DS2_N/O | CH10 DS2 normaly open contact |
| 1683 | CH10-DS2_N/C | CH10 DS2 normaly close contact |
| 1684 | CH10-DS3_N/O | CH10 DS3 normaly open contact |
| 1685 | CH10-DS3_N/C | CH10 DS3 normaly close contact |
| 1686 | CH10-DS4_N/O | CH10 DS4 normaly open contact |
| 1687 | CH10-DS4_N/C | CH10 DS4 normaly close contact |
| 1688 | CH10-CB_N/O | CH10 CB normaly open contact |
| 1689 | CH10-CB_N/C | CH10 CB normaly close contact |
| 1690 | | |
| 1691 | | |
| 1692 | | |
| 1693 | | |
| 1694 | | |
| 1695 | | |
| 1696 | | |
| 1697 | | |
| 1698 | CH11-DS2_N/O | CH11 DS2 normaly open contact |
| 1699 | CH11-DS2_N/C | CH11 DS2 normaly close contact |
| 1700 | CH11-DS3_N/O | CH11 DS3 normaly open contact |
| 1701 | CH11-DS3_N/C | CH11 DS3 normaly close contact |
| 1702 | CH11-DS4_N/O | CH11 DS4 normaly open contact |
| 1703 | CH11-DS4_N/C | CH11 DS4 normaly close contact |
| 1704 | CH11-CB_N/O | CH11 CB normaly open contact |
| 1705 | CH11-CB_N/C | CH11 CB normaly close contact |
| 1706 | | |
| 1707 | | |
| 1708 | | |
| 1709 | | |
| 1710 | | |
| 1711 | | |
| 1712 | | |
| 1713 | | |
| 1714 | CH12-DS2_N/O | CH12 DS2 normaly open contact |
| 1715 | CH12-DS2_N/C | CH12 DS2 normaly close contact |
| 1716 | CH12-DS3_N/O | CH12 DS3 normaly open contact |
| 1717 | CH12-DS3_N/C | CH12 DS3 normaly close contact |
| 1718 | CH12-DS4_N/O | CH12 DS4 normaly open contact |
| 1719 | CH12-DS4_N/C | CH12 DS4 normaly close contact |
| 1720 | CH12-CB_N/O | CH12 CB normaly open contact |
| 1721 | CH12-CB_N/C | CH12 CB normaly close contact |
| 1722 | | |
| 1723 | | |
| 1724 | | |
| 1725 | | |
| 1726 | | |
| 1727 | | |
| 1728 | | |
| 1729 | | |
| 1730 | CH13-DS2_N/O | CH13 DS2 normaly open contact |
| 1731 | CH13-DS2_N/C | CH13 DS2 normaly close contact |
| 1732 | CH13-DS3_N/O | CH13 DS3 normaly open contact |
| 1733 | CH13-DS3_N/C | CH13 DS3 normaly close contact |
| 1734 | CH13-DS4_N/O | CH13 DS4 normaly open contact |
| 1735 | CH13-DS4_N/C | CH13 DS4 normaly close contact |
| 1736 | CH13-CB_N/O | CH13 CB normaly open contact |
| 1737 | CH13-CB_N/C | CH13 CB normaly close contact |
| 1738 | | |
| 1739 | | |
| 1740 | | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1741 | | |
| 1742 | | |
| 1743 | | |
| 1744 | | |
| 1745 | | |
| 1746 | CH14-DS2_N/O | CH14 DS2 normaly open contact |
| 1747 | CH14-DS2_N/C | CH14 DS2 normaly close contact |
| 1748 | CH14-DS3_N/O | CH14 DS3 normaly open contact |
| 1749 | CH14-DS3_N/C | CH14 DS3 normaly close contact |
| 1750 | CH14-DS4_N/O | CH14 DS4 normaly open contact |
| 1751 | CH14-DS4_N/C | CH14 DS4 normaly close contact |
| 1752 | CH14-CB_N/O | CH14 CB normaly open contact |
| 1753 | CH14-CB_N/C | CH14 CB normaly close contact |
| 1754 | | |
| 1755 | | |
| 1756 | | |
| 1757 | | |
| 1758 | | |
| 1759 | | |
| 1760 | | |
| 1761 | | |
| 1762 | CH15-DS2_N/O | CH15 DS2 normaly open contact |
| 1763 | CH15-DS2_N/C | CH15 DS2 normaly close contact |
| 1764 | CH15-DS3_N/O | CH15 DS3 normaly open contact |
| 1765 | CH15-DS3_N/C | CH15 DS3 normaly close contact |
| 1766 | CH15-DS4_N/O | CH15 DS4 normaly open contact |
| 1767 | CH15-DS4_N/C | CH15 DS4 normaly close contact |
| 1768 | CH15-CB_N/O | CH15 CB normaly open contact |
| 1769 | CH15-CB_N/C | CH15 CB normaly close contact |
| 1770 | | |
| 1771 | | |
| 1772 | | |
| 1773 | | |
| 1774 | | |
| 1775 | | |
| 1776 | | |
| 1777 | | |
| 1778 | CH16-DS2_N/O | CH16 DS2 normaly open contact |
| 1779 | CH16-DS2_N/C | CH16 DS2 normaly close contact |
| 1780 | CH16-DS3_N/O | CH16 DS3 normaly open contact |
| 1781 | CH16-DS3_N/C | CH16 DS3 normaly close contact |
| 1782 | CH16-DS4_N/O | CH16 DS4 normaly open contact |
| 1783 | CH16-DS4_N/C | CH16 DS4 normaly close contact |
| 1784 | CH16-CB_N/O | CH16 CB normaly open contact |
| 1785 | CH16-CB_N/C | CH16 CB normaly close contact |
| 1786 | | |
| 1787 | | |
| 1788 | | |
| 1789 | | |
| 1790 | | |
| 1791 | | |
| 1792 | | |
| 1793 | | |
| 1794 | CH17-DS2_N/O | CH17 DS2 normaly open contact |
| 1795 | CH17-DS2_N/C | CH17 DS2 normaly close contact |
| 1796 | CH17-DS3_N/O | CH17 DS3 normaly open contact |
| 1797 | CH17-DS3_N/C | CH17 DS3 normaly close contact |
| 1798 | CH17-DS4_N/O | CH17 DS4 normaly open contact |
| 1799 | CH17-DS4_N/C | CH17 DS4 normaly close contact |
| 1800 | CH17-CB_N/O | CH17 CB normaly open contact |
| 1801 | CH17-CB_N/C | CH17 CB normaly close contact |
| 1802 | | |
| 1803 | | |
| 1804 | | |
| 1805 | | |
| 1806 | | |
| 1807 | | |
| 1808 | | |
| 1809 | | |
| 1810 | CH18-DS2_N/O | CH18 DS2 normaly open contact |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1811 | CH18-DS2_N/C | CH18 DS2 normaly close contact |
| 1812 | CH18-DS3_N/O | CH18 DS3 normaly open contact |
| 1813 | CH18-DS3_N/C | CH18 DS3 normaly close contact |
| 1814 | CH18-DS4_N/O | CH18 DS4 normaly open contact |
| 1815 | CH18-DS4_N/C | CH18 DS4 normaly close contact |
| 1816 | CH18-CB_N/O | CH18 CB normaly open contact |
| 1817 | CH18-CB_N/C | CH18 CB normaly close contact |
| 1818 | | |
| 1819 | | |
| 1820 | | |
| 1821 | | |
| 1822 | | |
| 1823 | | |
| 1824 | | |
| 1825 | | |
| 1826 | CH19-DS2_N/O | CH19 DS2 normaly open contact |
| 1827 | CH19-DS2_N/C | CH19 DS2 normaly close contact |
| 1828 | CH19-DS3_N/O | CH19 DS3 normaly open contact |
| 1829 | CH19-DS3_N/C | CH19 DS3 normaly close contact |
| 1830 | CH19-DS4_N/O | CH19 DS4 normaly open contact |
| 1831 | CH19-DS4_N/C | CH19 DS4 normaly close contact |
| 1832 | CH19-CB_N/O | CH19 CB normaly open contact |
| 1833 | CH19-CB_N/C | CH19 CB normaly close contact |
| 1834 | | |
| 1835 | | |
| 1836 | | |
| 1837 | | |
| 1838 | | |
| 1839 | | |
| 1840 | | |
| 1841 | | |
| 1842 | CH20-DS2_N/O | CH20 DS2 normaly open contact |
| 1843 | CH20-DS2_N/C | CH20 DS2 normaly close contact |
| 1844 | CH20-DS3_N/O | CH20 DS3 normaly open contact |
| 1845 | CH20-DS3_N/C | CH20 DS3 normaly close contact |
| 1846 | CH20-DS4_N/O | CH20 DS4 normaly open contact |
| 1847 | CH20-DS4_N/C | CH20 DS4 normaly close contact |
| 1848 | CH20-CB_N/O | CH20 CB normaly open contact |
| 1849 | CH20-CB_N/C | CH20 CB normaly close contact |
| 1850 | | |
| 1851 | | |
| 1852 | | |
| 1853 | | |
| 1854 | | |
| 1855 | | |
| 1856 | | |
| 1857 | | |
| 1858 | CH21-DS2_N/O | CH21 DS2 normaly open contact |
| 1859 | CH21-DS2_N/C | CH21 DS2 normaly close contact |
| 1860 | CH21-DS3_N/O | CH21 DS3 normaly open contact |
| 1861 | CH21-DS3_N/C | CH21 DS3 normaly close contact |
| 1862 | CH21-DS4_N/O | CH21 DS4 normaly open contact |
| 1863 | CH21-DS4_N/C | CH21 DS4 normaly close contact |
| 1864 | CH21-CB_N/O | CH21 CB normaly open contact |
| 1865 | CH21-CB_N/C | CH21 CB normaly close contact |
| 1866 | | |
| 1867 | | |
| 1868 | | |
| 1869 | | |
| 1870 | | |
| 1871 | | |
| 1872 | | |
| 1873 | | |
| 1874 | CH22-DS2_N/O | CH22 DS2 normaly open contact |
| 1875 | CH22-DS2_N/C | CH22 DS2 normaly close contact |
| 1876 | CH22-DS3_N/O | CH22 DS3 normaly open contact |
| 1877 | CH22-DS3_N/C | CH22 DS3 normaly close contact |
| 1878 | CH22-DS4_N/O | CH22 DS4 normaly open contact |
| 1879 | CH22-DS4_N/C | CH22 DS4 normaly close contact |
| 1880 | CH22-CB_N/O | CH22 CB normaly open contact |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1881 | CH22-CB_N/C | CH22 CB normaly close contact |
| 1882 | | |
| 1883 | | |
| 1884 | | |
| 1885 | | |
| 1886 | | |
| 1887 | | |
| 1888 | | |
| 1889 | | |
| 1890 | CH23-DS2_N/O | CH23 DS2 normaly open contact |
| 1891 | CH23-DS2_N/C | CH23 DS2 normaly close contact |
| 1892 | CH23-DS3_N/O | CH23 DS3 normaly open contact |
| 1893 | CH23-DS3_N/C | CH23 DS3 normaly close contact |
| 1894 | CH23-DS4_N/O | CH23 DS4 normaly open contact |
| 1895 | CH23-DS4_N/C | CH23 DS4 normaly close contact |
| 1896 | CH23-CB_N/O | CH23 CB normaly open contact |
| 1897 | CH23-CB_N/C | CH23 CB normaly close contact |
| 1898 | | |
| 1899 | | |
| 1900 | | |
| 1901 | | |
| 1902 | | |
| 1903 | | |
| 1904 | | |
| 1905 | | |
| 1906 | CH24-DS2_N/O | CH24 DS2 normaly open contact |
| 1907 | CH24-DS2_N/C | CH24 DS2 normaly close contact |
| 1908 | CH24-DS3_N/O | CH24 DS3 normaly open contact |
| 1909 | CH24-DS3_N/C | CH24 DS3 normaly close contact |
| 1910 | CH24-DS4_N/O | CH24 DS4 normaly open contact |
| 1911 | CH24-DS4_N/C | CH24 DS4 normaly close contact |
| 1912 | CH24-CB_N/O | CH24 CB normaly open contact |
| 1913 | CH24-CB_N/C | CH24 CB normaly close contact |
| 1914 | | |
| 1915 | | |
| 1916 | | |
| 1917 | | |
| 1918 | | |
| 1919 | | |
| 1920 | | |
| 1921 | | |
| 1922 | CH25-DS2_N/O | CH25 DS2 normaly open contact |
| 1923 | CH25-DS2_N/C | CH25 DS2 normaly close contact |
| 1924 | CH25-DS3_N/O | CH25 DS3 normaly open contact |
| 1925 | CH25-DS3_N/C | CH25 DS3 normaly close contact |
| 1926 | CH25-DS4_N/O | CH25 DS4 normaly open contact |
| 1927 | CH25-DS4_N/C | CH25 DS4 normaly close contact |
| 1928 | CH25-CB_N/O | CH25 CB normaly open contact |
| 1929 | CH25-CB_N/C | CH25 CB normaly close contact |
| 1930 | | |
| 1931 | | |
| 1932 | | |
| 1933 | | |
| 1934 | | |
| 1935 | | |
| 1936 | | |
| 1937 | | |
| 1938 | CH26-DS2_N/O | CH26 DS2 normaly open contact |
| 1939 | CH26-DS2_N/C | CH26 DS2 normaly close contact |
| 1940 | CH26-DS3_N/O | CH26 DS3 normaly open contact |
| 1941 | CH26-DS3_N/C | CH26 DS3 normaly close contact |
| 1942 | CH26-DS4_N/O | CH26 DS4 normaly open contact |
| 1943 | CH26-DS4_N/C | CH26 DS4 normaly close contact |
| 1944 | CH26-CB_N/O | CH26 CB normaly open contact |
| 1945 | CH26-CB_N/C | CH26 CB normaly close contact |
| 1946 | | |
| 1947 | | |
| 1948 | | |
| 1949 | | |
| 1950 | | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 1951 | | |
| 1952 | | |
| 1953 | | |
| 1954 | CH27-DS2_N/O | CH27 DS2 normaly open contact |
| 1955 | CH27-DS2_N/C | CH27 DS2 normaly close contact |
| 1956 | CH27-DS3_N/O | CH27 DS3 normaly open contact |
| 1957 | CH27-DS3_N/C | CH27 DS3 normaly close contact |
| 1958 | CH27-DS4_N/O | CH27 DS4 normaly open contact |
| 1959 | CH27-DS4_N/C | CH27 DS4 normaly close contact |
| 1960 | CH27-CB_N/O | CH27 CB normaly open contact |
| 1961 | CH27-CB_N/C | CH27 CB normaly close contact |
| 1962 | | |
| 1963 | | |
| 1964 | | |
| 1965 | | |
| 1966 | | |
| 1967 | | |
| 1968 | | |
| 1969 | | |
| 1970 | CH28-DS2_N/O | CH28 DS2 normaly open contact |
| 1971 | CH28-DS2_N/C | CH28 DS2 normaly close contact |
| 1972 | CH28-DS3_N/O | CH28 DS3 normaly open contact |
| 1973 | CH28-DS3_N/C | CH28 DS3 normaly close contact |
| 1974 | CH28-DS4_N/O | CH28 DS4 normaly open contact |
| 1975 | CH28-DS4_N/C | CH28 DS4 normaly close contact |
| 1976 | CH28-CB_N/O | CH28 CB normaly open contact |
| 1977 | CH28-CB_N/C | CH28 CB normaly close contact |
| 1978 | | |
| 1979 | | |
| 1980 | | |
| 1981 | | |
| 1982 | | |
| 1983 | | |
| 1984 | | |
| 1985 | | |
| 1986 | CH29-DS2_N/O | CH29 DS2 normaly open contact |
| 1987 | CH29-DS2_N/C | CH29 DS2 normaly close contact |
| 1988 | CH29-DS3_N/O | CH29 DS3 normaly open contact |
| 1989 | CH29-DS3_N/C | CH29 DS3 normaly close contact |
| 1990 | CH29-DS4_N/O | CH29 DS4 normaly open contact |
| 1991 | CH29-DS4_N/C | CH29 DS4 normaly close contact |
| 1992 | CH29-CB_N/O | CH29 CB normaly open contact |
| 1993 | CH29-CB_N/C | CH29 CB normaly close contact |
| 1994 | | |
| 1995 | | |
| 1996 | | |
| 1997 | | |
| 1998 | | |
| 1999 | | |
| 2000 | | |
| 2001 | | |
| 2002 | CH30-DS2_N/O | CH30 DS2 normaly open contact |
| 2003 | CH30-DS2_N/C | CH30 DS2 normaly close contact |
| 2004 | CH30-DS3_N/O | CH30 DS3 normaly open contact |
| 2005 | CH30-DS3_N/C | CH30 DS3 normaly close contact |
| 2006 | CH30-DS4_N/O | CH30 DS4 normaly open contact |
| 2007 | CH30-DS4_N/C | CH30 DS4 normaly close contact |
| 2008 | CH30-CB_N/O | CH30 CB normaly open contact |
| 2009 | CH30-CB_N/C | CH30 CB normaly close contact |
| 2010 | | |
| 2011 | | |
| 2012 | | |
| 2013 | | |
| 2014 | | |
| 2015 | | |
| 2016 | | |
| 2017 | | |
| 2018 | CH31-DS2_N/O | CH31 DS2 normaly open contact |
| 2019 | CH31-DS2_N/C | CH31 DS2 normaly close contact |
| 2020 | CH31-DS3_N/O | CH31 DS3 normaly open contact |

www . ElectricalPartManuals . com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2021 | CH31-DS3_N/C | CH31 DS3 normaly close contact |
| 2022 | CH31-DS4_N/O | CH31 DS4 normaly open contact |
| 2023 | CH31-DS4_N/C | CH31 DS4 normaly close contact |
| 2024 | CH31-CB_N/O | CH31 CB normaly open contact |
| 2025 | CH31-CB_N/C | CH31 CB normaly close contact |
| 2026 | | |
| 2027 | | |
| 2028 | | |
| 2029 | | |
| 2030 | | |
| 2031 | | |
| 2032 | | |
| 2033 | | |
| 2034 | CH32-DS2_N/O | CH32 DS2 normaly open contact |
| 2035 | CH32-DS2_N/C | CH32 DS2 normaly close contact |
| 2036 | CH32-DS3_N/O | CH32 DS3 normaly open contact |
| 2037 | CH32-DS3_N/C | CH32 DS3 normaly close contact |
| 2038 | CH32-DS4_N/O | CH32 DS4 normaly open contact |
| 2039 | CH32-DS4_N/C | CH32 DS4 normaly close contact |
| 2040 | CH32-CB_N/O | CH32 CB normaly open contact |
| 2041 | CH32-CB_N/C | CH32 CB normaly close contact |
| 2042 | | |
| 2043 | | |
| 2044 | | |
| 2045 | | |
| 2046 | | |
| 2047 | | |
| 2048 | IND.RESET | Indication reset command |
| 2049 | BP_BLOCK-A | BP function block command-A |
| 2050 | CBF_BLOCK-A | CBF function block command-A |
| 2051 | BP_BLOCK-B | BP function block command-B |
| 2052 | CBF_BLOCK-B | CBF function block command-B |
| 2053 | | |
| 2054 | | |
| 2055 | | |
| 2056 | | |
| 2057 | | |
| 2058 | | |
| 2059 | | |
| 2060 | | |
| 2061 | | |
| 2062 | | |
| 2063 | | |
| 2064 | DIFFS-ZA | DIF-ZA protection fail-safe command |
| 2065 | DIFFS-ZB | DIF-ZB protection fail-safe command |
| 2066 | DIFFS-ZC | DIF-ZC protection fail-safe command |
| 2067 | DIFFS-ZD | DIF-ZD protection fail-safe command |
| 2068 | DIFFS | DIF(check zone) protection fail-safe command |
| 2069 | DIFCH_CHARA | DIFCH characteristic changing command |
| 2070 | | |
| 2071 | | |
| 2072 | | |
| 2073 | | |
| 2074 | | |
| 2075 | | |
| 2076 | | |
| 2077 | | |
| 2078 | | |
| 2079 | | |
| 2080 | CBFFS-ZA | CBF protection zone-A fail-safe command |
| 2081 | CBFFS-ZB | CBF protection zone-B fail-safe command |
| 2082 | CBFFS-ZC | CBF protection zone-C fail-safe command |
| 2083 | CBFFS-ZD | CBF protection zone-D fail-safe command |
| 2084 | CBFFS-NOUSE | CBF fail-safe not used command |
| 2085 | | |
| 2086 | | |
| 2087 | | |
| 2088 | COMTP-ZA_COM | Command trip forcibly trip |
| 2089 | COMTP-ZB_COM | ditto |
| 2090 | COMTP-ZC_COM | ditto |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2091 | COMTP-ZD_COM | ditto |
| 2092 | CTF_BLOCK | CTF block command |
| 2093 | | |
| 2094 | | |
| 2095 | | |
| 2096 | CBFTRFS-ZA | CBF transfer zone-A fail-safe command |
| 2097 | CBFTRFS-ZB | CBF transfer zone-B fail-safe command |
| 2098 | CBFTRFS-ZC | CBF transfer zone-C fail-safe command |
| 2099 | CBFTRFS-ZD | CBF transfer zone-D fail-safe command |
| 2100 | CBFTRFS-NOUSE | CBF transfer fail-safe not used command |
| 2101 | | |
| 2102 | | |
| 2103 | | |
| 2104 | | |
| 2105 | | |
| 2106 | | |
| 2107 | | |
| 2108 | | |
| 2109 | | |
| 2110 | | |
| 2111 | | |
| 2112 | DIFZA_DELAY | Trip command delay timer setting |
| 2113 | DIFZB_DELAY | Trip command delay timer setting |
| 2114 | DIFZC_DELAY | Trip command delay timer setting |
| 2115 | DIFZD_DELAY | Trip command delay timer setting |
| 2116 | DIF_DELAY | Trip command delay timer setting |
| 2117 | | |
| 2118 | | |
| 2119 | | |
| 2120 | C1-CUR.BLK_S | Coupler1 current block command for single-bus with trnsfer |
| 2121 | C2-CUR.BLK_S | Coupler2 current block command for single-bus with trnsfer |
| 2122 | C3-CUR.BLK_S | Coupler3 current block command for single-bus with trnsfer |
| 2123 | C4-CUR.BLK_S | Coupler4 current block command for single-bus with trnsfer |
| 2124 | | |
| 2125 | | |
| 2126 | | |
| 2127 | | |
| 2128 | CH1-EXT-BPTP | CH1 external bus protection trip command |
| 2129 | CH2-EXT-BPTP | CH2 external bus protection trip command |
| 2130 | CH3-EXT-BPTP | CH3 external bus protection trip command |
| 2131 | CH4-EXT-BPTP | CH4 external bus protection trip command |
| 2132 | CH5-EXT-BPTP | CH5 external bus protection trip command |
| 2133 | CH6-EXT-BPTP | CH6 external bus protection trip command |
| 2134 | CH7-EXT-BPTP | CH7 external bus protection trip command |
| 2135 | CH8-EXT-BPTP | CH8 external bus protection trip command |
| 2136 | CH9-EXT-BPTP | CH9 external bus protection trip command |
| 2137 | CH10-EXT-BPTP | CH10 external bus protection trip command |
| 2138 | CH11-EXT-BPTP | CH11 external bus protection trip command |
| 2139 | CH12-EXT-BPTP | CH12 external bus protection trip command |
| 2140 | CH13-EXT-BPTP | CH13 external bus protection trip command |
| 2141 | CH14-EXT-BPTP | CH14 external bus protection trip command |
| 2142 | CH15-EXT-BPTP | CH15 external bus protection trip command |
| 2143 | CH16-EXT-BPTP | CH16 external bus protection trip command |
| 2144 | CH17-EXT-BPTP | CH17 external bus protection trip command |
| 2145 | CH18-EXT-BPTP | CH18 external bus protection trip command |
| 2146 | CH19-EXT-BPTP | CH19 external bus protection trip command |
| 2147 | CH20-EXT-BPTP | CH20 external bus protection trip command |
| 2148 | CH21-EXT-BPTP | CH21 external bus protection trip command |
| 2149 | CH22-EXT-BPTP | CH22 external bus protection trip command |
| 2150 | CH23-EXT-BPTP | CH23 external bus protection trip command |
| 2151 | CH24-EXT-BPTP | CH24 external bus protection trip command |
| 2152 | CH25-EXT-BPTP | CH25 external bus protection trip command |
| 2153 | CH26-EXT-BPTP | CH26 external bus protection trip command |
| 2154 | CH27-EXT-BPTP | CH27 external bus protection trip command |
| 2155 | CH28-EXT-BPTP | CH28 external bus protection trip command |
| 2156 | CH29-EXT-BPTP | CH29 external bus protection trip command |
| 2157 | CH30-EXT-BPTP | CH30 external bus protection trip command |
| 2158 | CH31-EXT-BPTP | CH31 external bus protection trip command |
| 2159 | CH32-EXT-BPTP | CH32 external bus protection trip command |
| 2160 | CH1-CBFIO | CH1 CBF instantly operation command |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2161 | CH2-CBFIO | CH2 CBF instantly operation command |
| 2162 | CH3-CBFIO | CH3 CBF instantly operation command |
| 2163 | CH4-CBFIO | CH4 CBF instantly operation command |
| 2164 | CH5-CBFIO | CH5 CBF instantly operation command |
| 2165 | CH6-CBFIO | CH6 CBF instantly operation command |
| 2166 | CH7-CBFIO | CH7 CBF instantly operation command |
| 2167 | CH8-CBFIO | CH8 CBF instantly operation command |
| 2168 | CH9-CBFIO | CH9 CBF instantly operation command |
| 2169 | CH10-CBFIO | CH10 CBF instantly operation command |
| 2170 | CH11-CBFIO | CH11 CBF instantly operation command |
| 2171 | CH12-CBFIO | CH12 CBF instantly operation command |
| 2172 | CH13-CBFIO | CH13 CBF instantly operation command |
| 2173 | CH14-CBFIO | CH14 CBF instantly operation command |
| 2174 | CH15-CBFIO | CH15 CBF instantly operation command |
| 2175 | CH16-CBFIO | CH16 CBF instantly operation command |
| 2176 | CH17-CBFIO | CH17 CBF instantly operation command |
| 2177 | CH18-CBFIO | CH18 CBF instantly operation command |
| 2178 | CH19-CBFIO | CH19 CBF instantly operation command |
| 2179 | CH20-CBFIO | CH20 CBF instantly operation command |
| 2180 | CH21-CBFIO | CH21 CBF instantly operation command |
| 2181 | CH22-CBFIO | CH22 CBF instantly operation command |
| 2182 | CH23-CBFIO | CH23 CBF instantly operation command |
| 2183 | CH24-CBFIO | CH24 CBF instantly operation command |
| 2184 | CH25-CBFIO | CH25 CBF instantly operation command |
| 2185 | CH26-CBFIO | CH26 CBF instantly operation command |
| 2186 | CH27-CBFIO | CH27 CBF instantly operation command |
| 2187 | CH28-CBFIO | CH28 CBF instantly operation command |
| 2188 | CH29-CBFIO | CH29 CBF instantly operation command |
| 2189 | CH30-CBFIO | CH30 CBF instantly operation command |
| 2190 | CH31-CBFIO | CH31 CBF instantly operation command |
| 2191 | CH32-CBFIO | CH32 CBF instantly operation command |
| 2192 | CH1-COM.TP | CH1 command trip initiation command |
| 2193 | CH2-COM.TP | CH2 command trip initiation command |
| 2194 | CH3-COM.TP | CH3 command trip initiation command |
| 2195 | CH4-COM.TP | CH4 command trip initiation command |
| 2196 | CH5-COM.TP | CH5 command trip initiation command |
| 2197 | CH6-COM.TP | CH6 command trip initiation command |
| 2198 | CH7-COM.TP | CH7 command trip initiation command |
| 2199 | CH8-COM.TP | CH8 command trip initiation command |
| 2200 | CH9-COM.TP | CH9 command trip initiation command |
| 2201 | CH10-COM.TP | CH10 command trip initiation command |
| 2202 | CH11-COM.TP | CH11 command trip initiation command |
| 2203 | CH12-COM.TP | CH12 command trip initiation command |
| 2204 | CH13-COM.TP | CH13 command trip initiation command |
| 2205 | CH14-COM.TP | CH14 command trip initiation command |
| 2206 | CH15-COM.TP | CH15 command trip initiation command |
| 2207 | CH16-COM.TP | CH16 command trip initiation command |
| 2208 | CH17-COM.TP | CH17 command trip initiation command |
| 2209 | CH18-COM.TP | CH18 command trip initiation command |
| 2210 | CH19-COM.TP | CH19 command trip initiation command |
| 2211 | CH20-COM.TP | CH20 command trip initiation command |
| 2212 | CH21-COM.TP | CH21 command trip initiation command |
| 2213 | CH22-COM.TP | CH22 command trip initiation command |
| 2214 | CH23-COM.TP | CH23 command trip initiation command |
| 2215 | CH24-COM.TP | CH24 command trip initiation command |
| 2216 | CH25-COM.TP | CH25 command trip initiation command |
| 2217 | CH26-COM.TP | CH26 command trip initiation command |
| 2218 | CH27-COM.TP | CH27 command trip initiation command |
| 2219 | CH28-COM.TP | CH28 command trip initiation command |
| 2220 | CH29-COM.TP | CH29 command trip initiation command |
| 2221 | CH30-COM.TP | CH30 command trip initiation command |
| 2222 | CH31-COM.TP | CH31 command trip initiation command |
| 2223 | CH32-COM.TP | CH32 command trip initiation command |
| 2224 | | |
| 2225 | | |
| 2226 | S1-ZAC.RESET | Section1 zero ampere control reset command |
| 2227 | S2-ZAC.RESET | Section2 zero ampere control reset command |
| 2228 | S3-ZAC.RESET | Section3 zero ampere control reset command |
| 2229 | S4-ZAC.RESET | Section4 zero ampere control reset command |
| 2230 | C1-ZAC.RESET | Coupler1 zero ampere control reset command |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2231 | C2-ZAC.RESET | Coupler2 zero ampere control reset command |
| 2232 | | |
| 2233 | | |
| 2234 | E1-ZAC.RESET | End of section1 zero ampere control reset command |
| 2235 | E2-ZAC.RESET | End of section2 zero ampere control reset command |
| 2236 | E3-ZAC.RESET | End of section3 zero ampere control reset command |
| 2237 | E4-ZAC.RESET | End of section4 zero ampere control reset command |
| 2238 | | |
| 2239 | | |
| 2240 | CH1-CBFCB | CH1 CB for CBF initiation command |
| 2241 | CH2-CBFCB | CH2 CB for CBF initiation command |
| 2242 | CH3-CBFCB | CH3 CB for CBF initiation command |
| 2243 | CH4-CBFCB | CH4 CB for CBF initiation command |
| 2244 | CH5-CBFCB | CH5 CB for CBF initiation command |
| 2245 | CH6-CBFCB | CH6 CB for CBF initiation command |
| 2246 | CH7-CBFCB | CH7 CB for CBF initiation command |
| 2247 | CH8-CBFCB | CH8 CB for CBF initiation command |
| 2248 | CH9-CBFCB | CH9 CB for CBF initiation command |
| 2249 | CH10-CBFCB | CH10 CB for CBF initiation command |
| 2250 | CH11-CBFCB | CH11 CB for CBF initiation command |
| 2251 | CH12-CBFCB | CH12 CB for CBF initiation command |
| 2252 | CH13-CBFCB | CH13 CB for CBF initiation command |
| 2253 | CH14-CBFCB | CH14 CB for CBF initiation command |
| 2254 | CH15-CBFCB | CH15 CB for CBF initiation command |
| 2255 | CH16-CBFCB | CH16 CB for CBF initiation command |
| 2256 | CH17-CBFCB | CH17 CB for CBF initiation command |
| 2257 | CH18-CBFCB | CH18 CB for CBF initiation command |
| 2258 | CH19-CBFCB | CH19 CB for CBF initiation command |
| 2259 | CH20-CBFCB | CH20 CB for CBF initiation command |
| 2260 | CH21-CBFCB | CH21 CB for CBF initiation command |
| 2261 | CH22-CBFCB | CH22 CB for CBF initiation command |
| 2262 | CH23-CBFCB | CH23 CB for CBF initiation command |
| 2263 | CH24-CBFCB | CH24 CB for CBF initiation command |
| 2264 | CH25-CBFCB | CH25 CB for CBF initiation command |
| 2265 | CH26-CBFCB | CH26 CB for CBF initiation command |
| 2266 | CH27-CBFCB | CH27 CB for CBF initiation command |
| 2267 | CH28-CBFCB | CH28 CB for CBF initiation command |
| 2268 | CH29-CBFCB | CH29 CB for CBF initiation command |
| 2269 | CH30-CBFCB | CH30 CB for CBF initiation command |
| 2270 | CH31-CBFCB | CH31 CB for CBF initiation command |
| 2271 | CH32-CBFCB | CH32 CB for CBF initiation command |
| 2272 | BU1-OUT | BU1 out of service command |
| 2273 | BU2-OUT | BU2 out of service command |
| 2274 | BU3-OUT | BU3 out of service command |
| 2275 | BU4-OUT | BU4 out of service command |
| 2276 | BU5-OUT | BU5 out of service command |
| 2277 | BU6-OUT | BU6 out of service command |
| 2278 | BU7-OUT | BU7 out of service command |
| 2279 | BU8-OUT | BU8 out of service command |
| 2280 | BU9-OUT | BU9 out of service command |
| 2281 | BU10-OUT | BU10 out of service command |
| 2282 | BU11-OUT | BU11 out of service command |
| 2283 | BU12-OUT | BU12 out of service command |
| 2284 | BU13-OUT | BU13 out of service command |
| 2285 | BU14-OUT | BU14 out of service command |
| 2286 | BU15-OUT | BU15 out of service command |
| 2287 | BU16-OUT | BU16 out of service command |
| 2288 | BU17-OUT | BU17 out of service command |
| 2289 | BU18-OUT | BU18 out of service command |
| 2290 | BU19-OUT | BU19 out of service command |
| 2291 | BU20-OUT | BU20 out of service command |
| 2292 | BU21-OUT | BU21 out of service command |
| 2293 | BU22-OUT | BU22 out of service command |
| 2294 | BU23-OUT | BU23 out of service command |
| 2295 | BU24-OUT | BU24 out of service command |
| 2296 | BU25-OUT | BU25 out of service command |
| 2297 | BU26-OUT | BU26 out of service command |
| 2298 | BU27-OUT | BU27 out of service command |
| 2299 | BU28-OUT | BU28 out of service command |
| 2300 | BU29-OUT | BU29 out of service command |

www.ElectricalPartManuals.com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 2301 | BU30-OUT | BU30 out of service command |
| 2302 | BU31-OUT | BU31 out of service command |
| 2303 | BU32-OUT | BU32 out of service command |
| 2304 | | |
| 2305 | | |
| 2306 | | |
| 2307 | | |
| 2308 | | |
| 2309 | | |
| 2310 | | |
| 2311 | | |
| 2312 | | |
| 2313 | | |
| 2314 | | |
| 2315 | | |
| 2316 | | |
| 2317 | | |
| 2318 | | |
| 2319 | | |
| 2320 | | |
| 2321 | | |
| 2322 | | |
| 2323 | | |
| 2324 | | |
| 2325 | | |
| 2326 | | |
| 2327 | | |
| 2328 | CH1-TP1 | Binary output signal of CH1-TP1 |
| 2329 | CH1-TP2 | TP2 |
| 2330 | | |
| 2331 | | |
| 2332 | CH1-BO3 | BO3 |
| 2333 | CH1-BO4 | BO4 |
| 2334 | CH1-BO5 | BO5 |
| 2335 | CH1-BO6 | BO6 |
| 2336 | CH2-TP1 | Binary output signal of CH2-TP1 |
| 2337 | CH2-TP2 | TP2 |
| 2338 | | |
| 2339 | | |
| 2340 | CH2-BO3 | BO3 |
| 2341 | CH2-BO4 | BO4 |
| 2342 | CH2-BO5 | BO5 |
| 2343 | CH2-BO6 | BO6 |
| 2344 | CH3-TP1 | Binary output signal of CH3-TP1 |
| 2345 | CH3-TP2 | TP2 |
| 2346 | | |
| 2347 | | |
| 2348 | CH3-BO3 | BO3 |
| 2349 | CH3-BO4 | BO4 |
| 2350 | CH3-BO5 | BO5 |
| 2351 | CH3-BO6 | BO6 |
| 2352 | CH4-TP1 | Binary output signal of CH4-TP1 |
| 2353 | CH4-TP2 | TP2 |
| 2354 | | |
| 2355 | | |
| 2356 | CH4-BO3 | BO3 |
| 2357 | CH4-BO4 | BO4 |
| 2358 | CH4-BO5 | BO5 |
| 2359 | CH4-BO6 | BO6 |
| 2360 | CH5-TP1 | Binary output signal of CH5-TP1 |
| 2361 | CH5-TP2 | TP2 |
| 2362 | | |
| 2363 | | |
| 2364 | CH5-BO3 | BO3 |
| 2365 | CH5-BO4 | BO4 |
| 2366 | CH5-BO5 | BO5 |
| 2367 | CH5-BO6 | BO6 |
| 2368 | CH6-TP1 | Binary output signal of CH6-TP1 |
| 2369 | CH6-TP2 | TP2 |
| 2370 | | |

www.ElectricalPartManuals.com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 2371 | | |
| 2372 | CH6-BO3 | BO3 |
| 2373 | CH6-BO4 | BO4 |
| 2374 | CH6-BO5 | BO5 |
| 2375 | CH6-BO6 | BO6 |
| 2376 | CH7-TP1 | Binary output signal of CH7-TP1 |
| 2377 | CH7-TP2 | TP2 |
| 2378 | | |
| 2379 | | |
| 2380 | CH7-BO3 | BO3 |
| 2381 | CH7-BO4 | BO4 |
| 2382 | CH7-BO5 | BO5 |
| 2383 | CH7-BO6 | BO6 |
| 2384 | CH8-TP1 | Binary output signal of CH8-TP1 |
| 2385 | CH8-TP2 | TP2 |
| 2386 | | |
| 2387 | | |
| 2388 | CH8-BO3 | BO3 |
| 2389 | CH8-BO4 | BO4 |
| 2390 | CH8-BO5 | BO5 |
| 2391 | CH8-BO6 | BO6 |
| 2392 | CH9-TP1 | Binary output signal of CH9-TP1 |
| 2393 | CH9-TP2 | TP2 |
| 2394 | | |
| 2395 | | |
| 2396 | CH9-BO3 | BO3 |
| 2397 | CH9-BO4 | BO4 |
| 2398 | CH9-BO5 | BO5 |
| 2399 | CH9-BO6 | BO6 |
| 2400 | CH10-TP1 | Binary output signal of CH10-TP1 |
| 2401 | CH10-TP2 | TP2 |
| 2402 | | |
| 2403 | | |
| 2404 | CH10-BO3 | BO3 |
| 2405 | CH10-BO4 | BO4 |
| 2406 | CH10-BO5 | BO5 |
| 2407 | CH10-BO6 | BO6 |
| 2408 | CH11-TP1 | Binary output signal of CH11-TP1 |
| 2409 | CH11-TP2 | TP2 |
| 2410 | | |
| 2411 | | |
| 2412 | CH11-BO3 | BO3 |
| 2413 | CH11-BO4 | BO4 |
| 2414 | CH11-BO5 | BO5 |
| 2415 | CH11-BO6 | BO6 |
| 2416 | CH12-TP1 | Binary output signal of CH12-TP1 |
| 2417 | CH12-TP2 | TP2 |
| 2418 | | |
| 2419 | | |
| 2420 | CH12-BO3 | BO3 |
| 2421 | CH12-BO4 | BO4 |
| 2422 | CH12-BO5 | BO5 |
| 2423 | CH12-BO6 | BO6 |
| 2424 | CH13-TP1 | Binary output signal of CH13-TP1 |
| 2425 | CH13-TP2 | TP2 |
| 2426 | | |
| 2427 | | |
| 2428 | CH13-BO3 | BO3 |
| 2429 | CH13-BO4 | BO4 |
| 2430 | CH13-BO5 | BO5 |
| 2431 | CH13-BO6 | BO6 |
| 2432 | CH14-TP1 | Binary output signal of CH14-TP1 |
| 2433 | CH14-TP2 | TP2 |
| 2434 | | |
| 2435 | | |
| 2436 | CH14-BO3 | BO3 |
| 2437 | CH14-BO4 | BO4 |
| 2438 | CH14-BO5 | BO5 |
| 2439 | CH14-BO6 | BO6 |
| 2440 | CH15-TP1 | Binary output signal of CH15-TP1 |

www.ElectricalPartManuals.com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 2441 | CH15-TP2 | TP2 |
| 2442 | | |
| 2443 | | |
| 2444 | CH15-BO3 | BO3 |
| 2445 | CH15-BO4 | BO4 |
| 2446 | CH15-BO5 | BO5 |
| 2447 | CH15-BO6 | BO6 |
| 2448 | CH16-TP1 | Binary output signal of CH16-TP1 |
| 2449 | CH16-TP2 | TP2 |
| 2450 | | |
| 2451 | | |
| 2452 | CH16-BO3 | BO3 |
| 2453 | CH16-BO4 | BO4 |
| 2454 | CH16-BO5 | BO5 |
| 2455 | CH16-BO6 | BO6 |
| 2456 | CH17-TP1 | Binary output signal of CH17-TP1 |
| 2457 | CH17-TP2 | TP2 |
| 2458 | | |
| 2459 | | |
| 2460 | CH17-BO3 | BO3 |
| 2461 | CH17-BO4 | BO4 |
| 2462 | CH17-BO5 | BO5 |
| 2463 | CH17-BO6 | BO6 |
| 2464 | CH18-TP1 | Binary output signal of CH18-TP1 |
| 2465 | CH18-TP2 | TP2 |
| 2466 | | |
| 2467 | | |
| 2468 | CH18-BO3 | BO3 |
| 2469 | CH18-BO4 | BO4 |
| 2470 | CH18-BO5 | BO5 |
| 2471 | CH18-BO6 | BO6 |
| 2472 | CH19-TP1 | Binary output signal of CH19-TP1 |
| 2473 | CH19-TP2 | TP2 |
| 2474 | | |
| 2475 | | |
| 2476 | CH19-BO3 | BO3 |
| 2477 | CH19-BO4 | BO4 |
| 2478 | CH19-BO5 | BO5 |
| 2479 | CH19-BO6 | BO6 |
| 2480 | CH20-TP1 | Binary output signal of CH20-TP1 |
| 2481 | CH20-TP2 | TP2 |
| 2482 | | |
| 2483 | | |
| 2484 | CH20-BO3 | BO3 |
| 2485 | CH20-BO4 | BO4 |
| 2486 | CH20-BO5 | BO5 |
| 2487 | CH20-BO6 | BO6 |
| 2488 | CH21-TP1 | Binary output signal of CH21-TP1 |
| 2489 | CH21-TP2 | TP2 |
| 2490 | | |
| 2491 | | |
| 2492 | CH21-BO3 | BO3 |
| 2493 | CH21-BO4 | BO4 |
| 2494 | CH21-BO5 | BO5 |
| 2495 | CH21-BO6 | BO6 |
| 2496 | CH22-TP1 | Binary output signal of CH22-TP1 |
| 2497 | CH22-TP2 | TP2 |
| 2498 | | |
| 2499 | | |
| 2500 | CH22-BO3 | BO3 |
| 2501 | CH22-BO4 | BO4 |
| 2502 | CH22-BO5 | BO5 |
| 2503 | CH22-BO6 | BO6 |
| 2504 | CH23-TP1 | Binary output signal of CH23-TP1 |
| 2505 | CH23-TP2 | TP2 |
| 2506 | | |
| 2507 | | |
| 2508 | CH23-BO3 | BO3 |
| 2509 | CH23-BO4 | BO4 |
| 2510 | CH23-BO5 | BO5 |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2511 | CH23-BO6 | BO6 |
| 2512 | CH24-TP1 | Binary output signal of CH24-TP1 |
| 2513 | CH24-TP2 | TP2 |
| 2514 | | |
| 2515 | | |
| 2516 | CH24-BO3 | BO3 |
| 2517 | CH24-BO4 | BO4 |
| 2518 | CH24-BO5 | BO5 |
| 2519 | CH24-BO6 | BO6 |
| 2520 | CH25-TP1 | Binary output signal of CH25-TP1 |
| 2521 | CH25-TP2 | TP2 |
| 2522 | | |
| 2523 | | |
| 2524 | CH25-BO3 | BO3 |
| 2525 | CH25-BO4 | BO4 |
| 2526 | CH25-BO5 | BO5 |
| 2527 | CH25-BO6 | BO6 |
| 2528 | CH26-TP1 | Binary output signal of CH26-TP1 |
| 2529 | CH26-TP2 | TP2 |
| 2530 | | |
| 2531 | | |
| 2532 | CH26-BO3 | BO3 |
| 2533 | CH26-BO4 | BO4 |
| 2534 | CH26-BO5 | BO5 |
| 2535 | CH26-BO6 | BO6 |
| 2536 | CH27-TP1 | Binary output signal of CH27-TP1 |
| 2537 | CH27-TP2 | TP2 |
| 2538 | | |
| 2539 | | |
| 2540 | CH27-BO3 | BO3 |
| 2541 | CH27-BO4 | BO4 |
| 2542 | CH27-BO5 | BO5 |
| 2543 | CH27-BO6 | BO6 |
| 2544 | CH28-TP1 | Binary output signal of CH28-TP1 |
| 2545 | CH28-TP2 | TP2 |
| 2546 | | |
| 2547 | | |
| 2548 | CH28-BO3 | BO3 |
| 2549 | CH28-BO4 | BO4 |
| 2550 | CH28-BO5 | BO5 |
| 2551 | CH28-BO6 | BO6 |
| 2552 | CH29-TP1 | Binary output signal of CH29-TP1 |
| 2553 | CH29-TP2 | TP2 |
| 2554 | | |
| 2555 | | |
| 2556 | CH29-BO3 | BO3 |
| 2557 | CH29-BO4 | BO4 |
| 2558 | CH29-BO5 | BO5 |
| 2559 | CH29-BO6 | BO6 |
| 2560 | CH30-TP1 | Binary output signal of CH30-TP1 |
| 2561 | CH30-TP2 | TP2 |
| 2562 | | |
| 2563 | | |
| 2564 | CH30-BO3 | BO3 |
| 2565 | CH30-BO4 | BO4 |
| 2566 | CH30-BO5 | BO5 |
| 2567 | CH30-BO6 | BO6 |
| 2568 | CH31-TP1 | Binary output signal of CH31-TP1 |
| 2569 | CH31-TP2 | TP2 |
| 2570 | | |
| 2571 | | |
| 2572 | CH31-BO3 | BO3 |
| 2573 | CH31-BO4 | BO4 |
| 2574 | CH31-BO5 | BO5 |
| 2575 | CH31-BO6 | BO6 |
| 2576 | CH32-TP1 | Binary output signal of CH32-TP1 |
| 2577 | CH32-TP2 | TP2 |
| 2578 | | |
| 2579 | | |
| 2580 | CH32-BO3 | BO3 |

www.ElectricalPartManuals.com

| Signal list | | |
|---|---|---|
| No. | Signal Name | Contents |
| 2581 | CH32-BO4 | BO4 |
| 2582 | CH32-BO5 | BO5 |
| 2583 | CH32-BO6 | BO6 |
| 2584 | | |
| 2585 | | |
| 2586 | | |
| 2587 | | |
| 2588 | | |
| 2589 | | |
| 2590 | | |
| 2591 | | |
| 2592 | | |
| 2593 | | |
| 2594 | | |
| 2595 | | |
| 2596 | | |
| 2597 | | |
| 2598 | | |
| 2599 | | |
| 2600 | | |
| 2601 | | |
| 2602 | | |
| 2603 | | |
| 2604 | | |
| 2605 | | |
| 2606 | | |
| 2607 | | |
| 2608 | | |
| 2609 | | |
| 2610 | | |
| 2611 | | LED1 lit output (reserved) |
| 2612 | | LED2 lit output (reserved) |
| 2613 | | LED3 lit output (reserved) |
| 2614 | | LED4 lit output (reserved) |
| 2615 | | LED5 lit output (reserved) |
| 2616 | | LED6 lit output (reserved) |
| 2617 | | LED7 lit output (reserved) |
| 2618 | | LED8 lit output (reserved) |
| 2619 | | |
| 2620 | | |
| 2621 | | |
| 2622 | | |
| 2623 | | |
| 2624 | F.RECORD1 | Fault record stored command 1 |
| 2625 | | 2 (reserved) |
| 2626 | | 3 (reserved) |
| 2627 | | 4 (reserved) |
| 2628 | F.RCD_MODE | Fault record mode command (COM trip) |
| 2629 | | |
| 2630 | | |
| 2631 | | |
| 2632 | D.RECORD1 | Disturbance record stored command 1 |
| 2633 | D.RECORD2 | 2 |
| 2634 | D.RECORD3 | 3 |
| 2635 | D.RECORD4 | 4 |
| 2636 | | 5 (reserved) |
| 2637 | | 6 (reserved) |
| 2638 | | 7 (reserved) |
| 2639 | | 8 (reserved) |
| 2640 | SET.GROUP1 | Active setting group changed commamd (Change to group1) |
| 2641 | SET.GROUP2 | 2 |
| 2642 | SET.GROUP3 | 3 |
| 2643 | SET.GROUP4 | 4 |
| 2644 | | 5(rsv) |
| 2645 | | 6(rsv) |
| 2646 | | 7(rsv) |
| 2647 | | 8(rsv) |
| 2648 | | Clock synchronized command (reserved) |
| 2649 | | |
| 2650 | | |

www . ElectricalPartManuals . com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2651 | | |
| 2652 | | |
| 2653 | | |
| 2654 | | |
| 2655 | | |
| 2656 | | |
| 2657 | | |
| 2658 | | |
| 2659 | | |
| 2660 | | |
| 2661 | | |
| 2662 | | |
| 2663 | | |
| 2664 | | |
| 2665 | | |
| 2666 | | |
| 2667 | | |
| 2668 | | |
| 2669 | | |
| 2670 | | |
| 2671 | | |
| 2672 | | |
| 2673 | | |
| 2674 | | |
| 2675 | | |
| 2676 | | |
| 2677 | | |
| 2678 | | |
| 2679 | | |
| 2680 | | |
| 2681 | | |
| 2682 | | |
| 2683 | | |
| 2684 | | Auto-recloser inactivate command received (reserved) |
| 2685 | | Teleprotection inactivate command received (reserved) |
| 2686 | PROT_COM_RECV | protection inactivate command received |
| 2687 | | |
| 2688 | TPLED_RST_RCV | TRIP LED RESET command received |
| 2689 | | |
| 2690 | | |
| 2691 | | |
| 2692 | | |
| 2693 | | |
| 2694 | | |
| 2695 | | |
| 2696 | | |
| 2697 | | |
| 2698 | | |
| 2699 | | |
| 2700 | | |
| 2701 | | |
| 2702 | | |
| 2703 | | |
| 2704 | | |
| 2705 | | |
| 2706 | | |
| 2707 | | |
| 2708 | | |
| 2709 | | |
| 2710 | | |
| 2711 | | |
| 2712 | | |
| 2713 | | |
| 2714 | | |
| 2715 | | |
| 2716 | | |
| 2717 | | |
| 2718 | | |
| 2719 | | |
| 2720 | | |

www . ElectricalPartManuals . com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2721 | | |
| 2722 | | |
| 2723 | | |
| 2724 | | |
| 2725 | | |
| 2726 | | |
| 2727 | | |
| 2728 | | |
| 2729 | | |
| 2730 | | |
| 2731 | | |
| 2732 | | |
| 2733 | | |
| 2734 | | |
| 2735 | | |
| 2736 | | |
| 2737 | | |
| 2738 | | |
| 2739 | | |
| 2740 | | |
| 2741 | | |
| 2742 | | |
| 2743 | | |
| 2744 | | |
| 2745 | | |
| 2746 | | |
| 2747 | | |
| 2748 | | |
| 2749 | | |
| 2750 | | |
| 2751 | | |
| 2752 | CH1-EFPTR_R | Required condition for EFP transfer trip |
| 2753 | CH2-EFPTR_R | ditto |
| 2754 | CH3-EFPTR_R | ditto |
| 2755 | CH4-EFPTR_R | ditto |
| 2756 | CH5-EFPTR_R | ditto |
| 2757 | CH6-EFPTR_R | ditto |
| 2758 | CH7-EFPTR_R | ditto |
| 2759 | CH8-EFPTR_R | ditto |
| 2760 | CH9-EFPTR_R | ditto |
| 2761 | CH10-EFPTR_R | ditto |
| 2762 | CH11-EFPTR_R | ditto |
| 2763 | CH12-EFPTR_R | ditto |
| 2764 | CH13-EFPTR_R | ditto |
| 2765 | CH14-EFPTR_R | ditto |
| 2766 | CH15-EFPTR_R | ditto |
| 2767 | CH16-EFPTR_R | ditto |
| 2768 | CH17-EFPTR_R | ditto |
| 2769 | CH18-EFPTR_R | ditto |
| 2770 | CH19-EFPTR_R | ditto |
| 2771 | CH20-EFPTR_R | ditto |
| 2772 | CH21-EFPTR_R | ditto |
| 2773 | CH22-EFPTR_R | ditto |
| 2774 | CH23-EFPTR_R | ditto |
| 2775 | CH24-EFPTR_R | ditto |
| 2776 | CH25-EFPTR_R | ditto |
| 2777 | CH26-EFPTR_R | ditto |
| 2778 | CH27-EFPTR_R | ditto |
| 2779 | CH28-EFPTR_R | ditto |
| 2780 | CH29-EFPTR_R | ditto |
| 2781 | CH30-EFPTR_R | ditto |
| 2782 | CH31-EFPTR_R | ditto |
| 2783 | CH32-EFPTR_R | ditto |
| 2784 | CH1-EFPTR_ON | EFP transfer trip enable command |
| 2785 | CH2-EFPTR_ON | ditto |
| 2786 | CH3-EFPTR_ON | ditto |
| 2787 | CH4-EFPTR_ON | ditto |
| 2788 | CH5-EFPTR_ON | ditto |
| 2789 | CH6-EFPTR_ON | ditto |
| 2790 | CH7-EFPTR_ON | ditto |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2791 | CH8-EFPTR_ON | ditto |
| 2792 | CH9-EFPTR_ON | ditto |
| 2793 | CH10-EFPTR_ON | ditto |
| 2794 | CH11-EFPTR_ON | ditto |
| 2795 | CH12-EFPTR_ON | ditto |
| 2796 | CH13-EFPTR_ON | ditto |
| 2797 | CH14-EFPTR_ON | ditto |
| 2798 | CH15-EFPTR_ON | ditto |
| 2799 | CH16-EFPTR_ON | ditto |
| 2800 | CH17-EFPTR_ON | ditto |
| 2801 | CH18-EFPTR_ON | ditto |
| 2802 | CH19-EFPTR_ON | ditto |
| 2803 | CH20-EFPTR_ON | ditto |
| 2804 | CH21-EFPTR_ON | ditto |
| 2805 | CH22-EFPTR_ON | ditto |
| 2806 | CH23-EFPTR_ON | ditto |
| 2807 | CH24-EFPTR_ON | ditto |
| 2808 | CH25-EFPTR_ON | ditto |
| 2809 | CH26-EFPTR_ON | ditto |
| 2810 | CH27-EFPTR_ON | ditto |
| 2811 | CH28-EFPTR_ON | ditto |
| 2812 | CH29-EFPTR_ON | ditto |
| 2813 | CH30-EFPTR_ON | ditto |
| 2814 | CH31-EFPTR_ON | ditto |
| 2815 | CH32-EFPTR_ON | ditto |
| 2816 | TEMP001 | |
| 2817 | TEMP002 | |
| 2818 | TEMP003 | |
| 2819 | TEMP004 | |
| 2820 | TEMP005 | |
| 2821 | TEMP006 | |
| 2822 | TEMP007 | |
| 2823 | TEMP008 | |
| 2824 | TEMP009 | |
| 2825 | TEMP010 | |
| 2826 | TEMP011 | |
| 2827 | TEMP012 | |
| 2828 | TEMP013 | |
| 2829 | TEMP014 | |
| 2830 | TEMP015 | |
| 2831 | TEMP016 | |
| 2832 | TEMP017 | |
| 2833 | TEMP018 | |
| 2834 | TEMP019 | |
| 2835 | TEMP020 | |
| 2836 | TEMP021 | |
| 2837 | TEMP022 | |
| 2838 | TEMP023 | |
| 2839 | TEMP024 | |
| 2840 | TEMP025 | |
| 2841 | TEMP026 | |
| 2842 | TEMP027 | |
| 2843 | TEMP028 | |
| 2844 | TEMP029 | |
| 2845 | TEMP030 | |
| 2846 | TEMP031 | |
| 2847 | TEMP032 | |
| 2848 | TEMP033 | |
| 2849 | TEMP034 | |
| 2850 | TEMP035 | |
| 2851 | TEMP036 | |
| 2852 | TEMP037 | |
| 2853 | TEMP038 | |
| 2854 | TEMP039 | |
| 2855 | TEMP040 | |
| 2856 | TEMP041 | |
| 2857 | TEMP042 | |
| 2858 | TEMP043 | |
| 2859 | TEMP044 | |
| 2860 | TEMP045 | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2861 | TEMP046 | |
| 2862 | TEMP047 | |
| 2863 | TEMP048 | |
| 2864 | TEMP049 | |
| 2865 | TEMP050 | |
| 2866 | TEMP051 | |
| 2867 | TEMP052 | |
| 2868 | TEMP053 | |
| 2869 | TEMP054 | |
| 2870 | TEMP055 | |
| 2871 | TEMP056 | |
| 2872 | TEMP057 | |
| 2873 | TEMP058 | |
| 2874 | TEMP059 | |
| 2875 | TEMP060 | |
| 2876 | TEMP061 | |
| 2877 | TEMP062 | |
| 2878 | TEMP063 | |
| 2879 | TEMP064 | |
| 2880 | TEMP065 | |
| 2881 | TEMP066 | |
| 2882 | TEMP067 | |
| 2883 | TEMP068 | |
| 2884 | TEMP069 | |
| 2885 | TEMP070 | |
| 2886 | TEMP071 | |
| 2887 | TEMP072 | |
| 2888 | TEMP073 | |
| 2889 | TEMP074 | |
| 2890 | TEMP075 | |
| 2891 | TEMP076 | |
| 2892 | TEMP077 | |
| 2893 | TEMP078 | |
| 2894 | TEMP079 | |
| 2895 | TEMP080 | |
| 2896 | TEMP081 | |
| 2897 | TEMP082 | |
| 2898 | TEMP083 | |
| 2899 | TEMP084 | |
| 2900 | TEMP085 | |
| 2901 | TEMP086 | |
| 2902 | TEMP087 | |
| 2903 | TEMP088 | |
| 2904 | TEMP089 | |
| 2905 | TEMP090 | |
| 2906 | TEMP091 | |
| 2907 | TEMP092 | |
| 2908 | TEMP093 | |
| 2909 | TEMP094 | |
| 2910 | TEMP095 | |
| 2911 | TEMP096 | |
| 2912 | TEMP097 | |
| 2913 | TEMP098 | |
| 2914 | TEMP099 | |
| 2915 | TEMP100 | |
| 2916 | TEMP101 | |
| 2917 | TEMP102 | |
| 2918 | TEMP103 | |
| 2919 | TEMP104 | |
| 2920 | TEMP105 | |
| 2921 | TEMP106 | |
| 2922 | TEMP107 | |
| 2923 | TEMP108 | |
| 2924 | TEMP109 | |
| 2925 | TEMP110 | |
| 2926 | TEMP111 | |
| 2927 | TEMP112 | |
| 2928 | TEMP113 | |
| 2929 | TEMP114 | |
| 2930 | TEMP115 | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 2931 | TEMP116 | |
| 2932 | TEMP117 | |
| 2933 | TEMP118 | |
| 2934 | TEMP119 | |
| 2935 | TEMP120 | |
| 2936 | TEMP121 | |
| 2937 | TEMP122 | |
| 2938 | TEMP123 | |
| 2939 | TEMP124 | |
| 2940 | TEMP125 | |
| 2941 | TEMP126 | |
| 2942 | TEMP127 | |
| 2943 | TEMP128 | |
| 2944 | TEMP129 | |
| 2945 | TEMP130 | |
| 2946 | TEMP131 | |
| 2947 | TEMP132 | |
| 2948 | TEMP133 | |
| 2949 | TEMP134 | |
| 2950 | TEMP135 | |
| 2951 | TEMP136 | |
| 2952 | TEMP137 | |
| 2953 | TEMP138 | |
| 2954 | TEMP139 | |
| 2955 | TEMP140 | |
| 2956 | TEMP141 | |
| 2957 | TEMP142 | |
| 2958 | TEMP143 | |
| 2959 | TEMP144 | |
| 2960 | TEMP145 | |
| 2961 | TEMP146 | |
| 2962 | TEMP147 | |
| 2963 | TEMP148 | |
| 2964 | TEMP149 | |
| 2965 | TEMP150 | |
| 2966 | TEMP151 | |
| 2967 | TEMP152 | |
| 2968 | TEMP153 | |
| 2969 | TEMP154 | |
| 2970 | TEMP155 | |
| 2971 | TEMP156 | |
| 2972 | TEMP157 | |
| 2973 | TEMP158 | |
| 2974 | TEMP159 | |
| 2975 | TEMP160 | |
| 2976 | TEMP161 | |
| 2977 | TEMP162 | |
| 2978 | TEMP163 | |
| 2979 | TEMP164 | |
| 2980 | TEMP165 | |
| 2981 | TEMP166 | |
| 2982 | TEMP167 | |
| 2983 | TEMP168 | |
| 2984 | TEMP169 | |
| 2985 | TEMP170 | |
| 2986 | TEMP171 | |
| 2987 | TEMP172 | |
| 2988 | TEMP173 | |
| 2989 | TEMP174 | |
| 2990 | TEMP175 | |
| 2991 | TEMP176 | |
| 2992 | TEMP177 | |
| 2993 | TEMP178 | |
| 2994 | TEMP179 | |
| 2995 | TEMP180 | |
| 2996 | TEMP181 | |
| 2997 | TEMP182 | |
| 2998 | TEMP183 | |
| 2999 | TEMP184 | |
| 3000 | TEMP185 | |

www.ElectricalPartManuals.com

Signal list

| No. | Signal Name | Contents |
|---|---|---|
| 3001 | TEMP186 | |
| 3002 | TEMP187 | |
| 3003 | TEMP188 | |
| 3004 | TEMP189 | |
| 3005 | TEMP190 | |
| 3006 | TEMP191 | |
| 3007 | TEMP192 | |
| 3008 | TEMP193 | |
| 3009 | TEMP194 | |
| 3010 | TEMP195 | |
| 3011 | TEMP196 | |
| 3012 | TEMP197 | |
| 3013 | TEMP198 | |
| 3014 | TEMP199 | |
| 3015 | TEMP200 | |
| 3016 | TEMP201 | |
| 3017 | TEMP202 | |
| 3018 | TEMP203 | |
| 3019 | TEMP204 | |
| 3020 | TEMP205 | |
| 3021 | TEMP206 | |
| 3022 | TEMP207 | |
| 3023 | TEMP208 | |
| 3024 | TEMP209 | |
| 3025 | TEMP210 | |
| 3026 | TEMP211 | |
| 3027 | TEMP212 | |
| 3028 | TEMP213 | |
| 3029 | TEMP214 | |
| 3030 | TEMP215 | |
| 3031 | TEMP216 | |
| 3032 | TEMP217 | |
| 3033 | TEMP218 | |
| 3034 | TEMP219 | |
| 3035 | TEMP220 | |
| 3036 | TEMP221 | |
| 3037 | TEMP222 | |
| 3038 | TEMP223 | |
| 3039 | TEMP224 | |
| 3040 | TEMP225 | |
| 3041 | TEMP226 | |
| 3042 | TEMP227 | |
| 3043 | TEMP228 | |
| 3044 | TEMP229 | |
| 3045 | TEMP230 | |
| 3046 | TEMP231 | |
| 3047 | TEMP232 | |
| 3048 | TEMP233 | |
| 3049 | TEMP234 | |
| 3050 | TEMP235 | |
| 3051 | TEMP236 | |
| 3052 | TEMP237 | |
| 3053 | TEMP238 | |
| 3054 | TEMP239 | |
| 3055 | TEMP240 | |
| 3056 | TEMP241 | |
| 3057 | TEMP242 | |
| 3058 | TEMP243 | |
| 3059 | TEMP244 | |
| 3060 | TEMP245 | |
| 3061 | TEMP246 | |
| 3062 | TEMP247 | |
| 3063 | TEMP248 | |
| 3064 | TEMP249 | |
| 3065 | TEMP250 | |
| 3066 | TEMP251 | |
| 3067 | TEMP252 | |
| 3068 | TEMP253 | |
| 3069 | TEMP254 | |
| 3070 | TEMP255 | |
| 3071 | TEMP256 | |

www.ElectricalPartManuals.com

www . ElectricalPartManuals . com

# Appendix D

## Variable Timer List

www . ElectricalPartManuals . com

## Variable Timer List

| Timer | Timer No. | Contents | Timer | Timer No. | Contents |
|---|---|---|---|---|---|
| T1BF1 | 1 | CH1 BF retrip | T26BF1 | 51 | CH26 BF retrip |
| T1BF2 | 2 | CH1 BF trip | T26BF2 | 52 | CH26 BF trip |
| T2BF1 | 3 | CH2 BF retrip | T27BF1 | 53 | CH27 BF retrip |
| T2BF2 | 4 | CH2 BF trip | T27BF2 | 54 | CH27 BF trip |
| T3BF1 | 5 | CH3 BF retrip | T28BF1 | 55 | CH28 BF retrip |
| T3BF2 | 6 | CH3 BF trip | T28BF2 | 56 | CH28 BF trip |
| T4BF1 | 7 | CH4 BF retrip | T29BF1 | 57 | CH29 BF retrip |
| T4BF2 | 8 | CH4 BF trip | T29BF2 | 58 | CH29 BF trip |
| T5BF1 | 9 | CH5 BF retrip | T30BF1 | 59 | CH30 BF retrip |
| T5BF2 | 10 | CH5 BF trip | T30BF2 | 60 | CH30 BF trip |
| T6BF1 | 11 | CH6 BF retrip | T31BF1 | 61 | CH31 BF retrip |
| T6BF2 | 12 | CH6 BF trip | T31BF2 | 62 | CH31 BF trip |
| T7BF1 | 13 | CH7 BF retrip | T32BF1 | 63 | CH32 BF retrip |
| T7BF2 | 14 | CH7 BF trip | T32BF2 | 64 | CH32 BF trip |
| T8BF1 | 15 | CH8 BF retrip | TIDSV | 65 | Id err detected time |
| T8BF2 | 16 | CH8 BF trip | TBRDG | 66 | Busbar bridge alarm time |
| T9BF1 | 17 | CH9 BF retrip | | 67 | |
| T9BF2 | 18 | CH9 BF trip | | 68 | |
| T10BF1 | 19 | CH10 BF retrip | | 69 | |
| T10BF2 | 20 | CH10 BF trip | | 70 | |
| T11BF1 | 21 | CH11 BF retrip | | 71 | |
| T11BF2 | 22 | CH11 BF trip | | 72 | |
| T12BF1 | 23 | CH12 BF retrip | | 73 | |
| T12BF2 | 24 | CH12 BF trip | | 74 | |
| T13BF1 | 25 | CH13 BF retrip | | 75 | |
| T13BF2 | 26 | CH13 BF trip | | 76 | |
| T14BF1 | 27 | CH14 BF retrip | | 77 | |
| T14BF2 | 28 | CH14 BF trip | | 78 | |
| T15BF1 | 29 | CH15 BF retrip | | 79 | |
| T15BF2 | 30 | CH15 BF trip | | 80 | |
| T16BF1 | 31 | CH16 BF retrip | | 81 | |
| T16BF2 | 32 | CH16 BF trip | | 82 | |
| T17BF1 | 33 | CH17 BF retrip | | 83 | |
| T17BF2 | 34 | CH17 BF trip | | 84 | |
| T18BF1 | 35 | CH18 BF retrip | | 85 | |
| T18BF2 | 36 | CH18 BF trip | | 86 | |
| T19BF1 | 37 | CH19 BF retrip | | 87 | |
| T19BF2 | 38 | CH19 BF trip | | 88 | |
| T20BF1 | 39 | CH20 BF retrip | | 89 | |
| T20BF2 | 40 | CH20 BF trip | | 90 | |
| T21BF1 | 41 | CH21 BF retrip | | 91 | |
| T21BF2 | 42 | CH21 BF trip | | 92 | |
| T22BF1 | 43 | CH22 BF retrip | | 93 | |
| T22BF2 | 44 | CH22 BF trip | | 94 | |
| T23BF1 | 45 | CH23 BF retrip | | 95 | |
| T23BF2 | 46 | CH23 BF trip | | 96 | |
| T24BF1 | 47 | CH24 BF retrip | | 97 | |
| T24BF2 | 48 | CH24 BF trip | | 98 | |
| T25BF1 | 49 | CH25 BF retrip | | 99 | |
| T25BF2 | 50 | CH25 BF trip | | 100 | |

www . ElectricalPartManuals . com

# Appendix E

## Binary Output Default Setting List

www . ElectricalPartManuals . com

## Binary Output Default Setting List

| Relay Model | Module Name | BO No. | Terminal No. | Signal Name | Contents | Setting | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Signal No. | LOGIC (OR:1, AND:2) | BOTD (OFF:0, ON:1) |
| C*** | CU-IO#1 | | | | | | | |
| | | BO1 | | | | | | |
| | | BO2 | | | | | | |
| | | BO3 | | | | | | |
| | CU-IO#2 | | | | | | | |
| | | BO1 | | ZONE-A TRIP | | 1237 | 1 | 1 |
| | | BO2 | | ZONE-B TRIP | | 1238 | 1 | 1 |
| | | BO3 | | ZONE-C TRIP | | 1239 | 1 | 1 |
| | | BO4 | | ZONE-D TRIP | | 1240 | 1 | 1 |
| | | BO5 | | BP-TRIP | | 1009 | 1 | 1 |
| | | BO6 | | BP-TRIP | | 1009 | 1 | 1 |
| | | BO7 | | CBF-RETRIP | | 1010 | 1 | 1 |
| | | BO8 | | CBF-RETRIP | | 1010 | 1 | 1 |
| | | BO9 | | CBF-TRIP | | 1011 | 1 | 1 |
| | | BO10 | | CBF-TRIP | | 1011 | 1 | 1 |
| | | BO11 | | CBF-TRANSFER | | 1012 | 1 | 1 |
| | | BO12 | | CBF-TRANSFER | | 1012 | 1 | 1 |
| | | BO13 | | RLY FAIL-A | | 1258 | 1 | 1 |
| | | | | | | | -- | -- |
| B*** | CH1 | | | | | | | |
| | | BO1 | | CH1-CBF, TR | | 1173 | 1 | 1 |
| | | BO2 | | CH1-BPTP, CH1-CBFRETP,<br>CH1-CBFTP | | 1077, 1109<br>1141 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH2 | | | | | | | |
| | | BO1 | | CH2-CBF, TR | | 1174 | 1 | 1 |
| | | BO2 | | CH2-BPTP, CH2-CBFRETP,<br>CH2-CBFTP | | 1078, 1110<br>1142 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH3 | | | | | | | |
| | | BO1 | | CH3-CBF, TR | | 1175 | 1 | 1 |
| | | BO2 | | CH3-BPTP, CH3-CBFRETP,<br>CH3-CBFTP | | 1079, 1111<br>1143 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH4 | | | | | | | |
| | | BO1 | | CH4-CBF, TR | | 1176 | 1 | 1 |
| | | BO2 | | CH4-BPTP, CH4-CBFRETP,<br>CH4-CBFTP | | 1080, 1112<br>1144 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH5 | | | | | | | |
| | | BO1 | | CH5-CBF, TR | | 1177 | 1 | 1 |
| | | BO2 | | CH5-BPTP, CH5-CBFRETP,<br>CH5-CBFTP | | 1081, 1113<br>1145 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH6 | | | | | | | |
| | | BO1 | | CH6-CBF, TR | | 1178 | 1 | 1 |
| | | BO2 | | CH6-BPTP, CH6-CBFRETP,<br>CH6-CBFTP | | 1082, 1114<br>1146 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |

www.ElectricalPartManuals.com

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CH7 | | | | | | | |
| | BO1 | | CH7-CBF, TR | | 1179 | 1 | 1 |
| | BO2 | | CH7-BPTP, CH7-CBFRETP,<br>CH7-CBFTP | | 1083, 1115<br>1147 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH8 | | | | | | | |
| | BO1 | | CH8-CBF, TR | | 1180 | 1 | 1 |
| | BO2 | | CH8-BPTP, CH8-CBFRETP,<br>CH8-CBFTP | | 1084, 1116<br>1148 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH9 | | | | | | | |
| | BO1 | | CH9-CBF, TR | | 1181 | 1 | 1 |
| | BO2 | | CH9-BPTP, CH9-CBFRETP,<br>CH9-CBFTP | | 1085, 1117<br>1149 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH10 | | | | | | | |
| | BO1 | | CH10-CBF, TR | | 1182 | 1 | 1 |
| | BO2 | | CH10-BPTP, CH10-CBFRETP,<br>CH10-CBFTP | | 1086, 1118<br>1150 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH11 | | | | | | | |
| | BO1 | | CH11-CBF, TR | | 1183 | 1 | 1 |
| | BO2 | | CH11-BPTP, CH11-CBFRETP,<br>CH11-CBFTP | | 1087, 1119<br>1151 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH12 | | | | | | | |
| | BO1 | | CH12-CBF, TR | | 1184 | 1 | 1 |
| | BO2 | | CH12-BPTP, CH12-CBFRETP,<br>CH12-CBFTP | | 1088, 1120<br>1152 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH13 | | | | | | | |
| | BO1 | | CH13-CBF, TR | | 1185 | 1 | 1 |
| | BO2 | | CH13-BPTP, CH13-CBFRETP,<br>CH13-CBFTP | | 1089, 1121<br>1153 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH14 | | | | | | | |
| | BO1 | | CH14-CBF, TR | | 1186 | 1 | 1 |
| | BO2 | | CH14-BPTP, CH14-CBFRETP,<br>CH14-CBFTP | | 1090, 1122<br>1154 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH15 | | | | | | | |
| | BO1 | | CH15-CBF, TR | | 1187 | 1 | 1 |
| | BO2 | | CH15-BPTP, CH15-CBFRETP,<br>CH15-CBFTP | | 1091, 1123<br>1155 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |

www.ElectricalPartManuals.com

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CH16 | | | | | | | |
| | BO1 | | CH16-CBF, TR | | 1188 | 1 | 1 |
| | BO2 | | CH16-BPTP, CH16-CBFRETP,<br>CH16-CBFTP | | 1092, 1124<br>1156 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH17 | | | | | | | |
| | BO1 | | CH17-CBF, TR | | 1189 | 1 | 1 |
| | BO2 | | CH17-BPTP, CH17-CBFRETP,<br>CH17-CBFTP | | 1093, 1125<br>1157 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH18 | | | | | | | |
| | BO1 | | CH18-CBF, TR | | 1190 | 1 | 1 |
| | BO2 | | CH18-BPTP, CH18-CBFRETP,<br>CH18-CBFTP | | 1094, 1126<br>1158 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH19 | | | | | | | |
| | BO1 | | CH19-CBF, TR | | 1191 | 1 | 1 |
| | BO2 | | CH19-BPTP, CH19-CBFRETP,<br>CH19-CBFTP | | 1095, 1127<br>1159 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH20 | | | | | | | |
| | BO1 | | CH20-CBF, TR | | 1192 | 1 | 1 |
| | BO2 | | CH20-BPTP, CH20-CBFRETP,<br>CH20-CBFTP | | 1096, 1128<br>1160 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH21 | | | | | | | |
| | BO1 | | CH21-CBF, TR | | 1193 | 1 | 1 |
| | BO2 | | CH21-BPTP, CH21-CBFRETP,<br>CH21-CBFTP | | 1097, 1129<br>1161 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH22 | | | | | | | |
| | BO1 | | CH22-CBF, TR | | 1194 | 1 | 1 |
| | BO2 | | CH22-BPTP, CH22-CBFRETP,<br>CH22-CBFTP | | 1098, 1130<br>1162 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH23 | | | | | | | |
| | BO1 | | CH23-CBF, TR | | 1195 | 1 | 1 |
| | BO2 | | CH23-BPTP, CH23-CBFRETP,<br>CH23-CBFTP | | 1099, 1131<br>1163 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |
| CH24 | | | | | | | |
| | BO1 | | CH24-CBF, TR | | 1196 | 1 | 1 |
| | BO2 | | CH24-BPTP, CH24-CBFRETP,<br>CH24-CBFTP | | 1100, 1132<br>1164 | 1 | 1 |
| | BO3 | | | | | | |
| | BO4 | | | | | | |
| | BO5 | | | | | | |
| | BO6 | | | | | | |

www.ElectricalPartManuals.com

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | CH25 | | | | | | | |
| | | BO1 | | CH25-CBF, TR | | 1197 | 1 | 1 |
| | | BO2 | | CH25-BPTP, CH25-CBFRETP, CH25-CBFTP | | 1101, 1133<br>1165 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH26 | | | | | | | |
| | | BO1 | | CH26-CBF, TR | | 1198 | 1 | 1 |
| | | BO2 | | CH26-BPTP, CH26-CBFRETP, CH26-CBFTP | | 1102, 1134<br>1166 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH27 | | | | | | | |
| | | BO1 | | CH27-CBF, TR | | 1199 | 1 | 1 |
| | | BO2 | | CH27-BPTP, CH27-CBFRETP, CH27-CBFTP | | 1103, 1135<br>1167 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH28 | | | | | | | |
| | | BO1 | | CH28-CBF, TR | | 1200 | 1 | 1 |
| | | BO2 | | CH28-BPTP, CH28-CBFRETP, CH28-CBFTP | | 1104, 1136<br>1168 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH29 | | | | | | | |
| | | BO1 | | CH29-CBF, TR | | 1201 | 1 | 1 |
| | | BO2 | | CH29-BPTP, CH29-CBFRETP, CH29-CBFTP | | 1105, 1137<br>1169 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH30 | | | | | | | |
| | | BO1 | | CH30-CBF, TR | | 1202 | 1 | 1 |
| | | BO2 | | CH30-BPTP, CH30-CBFRETP, CH30-CBFTP | | 1106, 1138<br>1170 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH31 | | | | | | | |
| | | BO1 | | CH31-CBF, TR | | 1203 | 1 | 1 |
| | | BO2 | | CH31-BPTP, CH31-CBFRETP, CH31-CBFTP | | 1107, 1139<br>1171 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |
| | CH32 | | | | | | | |
| | | BO1 | | CH32-CBF, TR | | 1204 | 1 | 1 |
| | | BO2 | | CH32-BPTP, CH32-CBFRETP, CH32-CBFTP | | 1108, 1140<br>1172 | 1 | 1 |
| | | BO3 | | | | | | |
| | | BO4 | | | | | | |
| | | BO5 | | | | | | |
| | | BO6 | | | | | | |

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

# Appendix F

## Disturbance Record Signal List

www . ElectricalPartManuals . com

## Analog signals

| No. | Name | Contents | No. | Name | Contents | No. | Name | Contents |
|---|---|---|---|---|---|---|---|---|
| 1 | VaA | A-phase voltage of ZoneA | 37 | 9Ia | A-phase current of CH9 | | | |
| 2 | VbA | B-phase voltage of ZoneA | 38 | 9Ib | B-phase current of CH9 | | | |
| 3 | VcA | C-phase voltage of ZoneA | 39 | 9Ic | C-phase current of CH9 | | | |
| 4 | VaB | A-phase voltage of ZoneB | 40 | 10Ia | A-phase current of CH10 | | | |
| 5 | VbB | B-phase voltage of ZoneB | 41 | 10Ib | B-phase current of CH10 | | | |
| 6 | VcB | C-phase voltage of ZoneB | 42 | 10Ic | C-phase current of CH10 | | | |
| 7 | VaC | A-phase voltage of ZoneC | 43 | 11Ia | A-phase current of CH11 | | | |
| 8 | VbC | B-phase voltage of ZoneC | 44 | 11Ib | B-phase current of CH11 | | | |
| 9 | VcC | C-phase voltage of ZoneC | 45 | 11Ic | C-phase current of CH11 | | | |
| 10 | VaD | A-phase voltage of ZoneD | 46 | 12Ia | A-phase current of CH12 | | | |
| 11 | VbD | B-phase voltage of ZoneD | 47 | 12Ib | B-phase current of CH12 | | | |
| 12 | VcD | C-phase voltage of ZoneD | 48 | 12Ic | C-phase current of CH12 | | | |
| 13 | 1Ia | A-phase current of CH1 | 49 | 13Ia | A-phase current of CH13 | | | |
| 14 | 1Ib | B-phase current of CH1 | 50 | 13Ib | B-phase current of CH13 | | | |
| 15 | 1Ic | C-phase current of CH1 | 51 | 13Ic | C-phase current of CH13 | | | |
| 16 | 2Ia | A-phase current of CH2 | 52 | 14Ia | A-phase current of CH14 | | | |
| 17 | 2Ib | B-phase current of CH2 | 53 | 14Ib | B-phase current of CH14 | | | |
| 18 | 2Ic | C-phase current of CH2 | 54 | 14Ic | C-phase current of CH14 | | | |
| 19 | 3Ia | A-phase current of CH3 | 55 | 15Ia | A-phase current of CH15 | | | |
| 20 | 3Ib | B-phase current of CH3 | 56 | 15Ib | B-phase current of CH15 | | | |
| 21 | 3Ic | C-phase current of CH3 | 57 | 15Ic | C-phase current of CH15 | | | |
| 22 | 4Ia | A-phase current of CH4 | 58 | 16Ia | A-phase current of CH16 | | | |
| 23 | 4Ib | B-phase current of CH4 | 59 | 16Ib | B-phase current of CH16 | | | |
| 24 | 4Ic | C-phase current of CH4 | 60 | 16Ic | C-phase current of CH16 | | | |
| 25 | 5Ia | A-phase current of CH5 | 61 | 17Ia | A-phase current of CH17 | | | |
| 26 | 5Ib | B-phase current of CH5 | 62 | 17Ib | B-phase current of CH17 | | | |
| 27 | 5Ic | C-phase current of CH5 | 63 | 17Ic | C-phase current of CH17 | | | |
| 28 | 6Ia | A-phase current of CH6 | 64 | 18Ia | A-phase current of CH18 | | | |
| 29 | 6Ib | B-phase current of CH6 | 65 | 18Ib | B-phase current of CH18 | | | |
| 30 | 6Ic | C-phase current of CH6 | 66 | 18Ic | C-phase current of CH18 | | | |
| 31 | 7Ia | A-phase current of CH7 | 67 | 19Ia | A-phase current of CH19 | | | |
| 32 | 7Ib | B-phase current of CH7 | 68 | 19Ib | B-phase current of CH19 | | | |
| 33 | 7Ic | C-phase current of CH7 | 69 | 19Ic | C-phase current of CH19 | | | |
| 34 | 8Ia | A-phase current of CH8 | 70 | 20Ia | A-phase current of CH20 | | | |
| 35 | 8Ib | B-phase current of CH8 | 71 | 20Ib | B-phase current of CH20 | | | |
| 36 | 8Ic | C-phase current of CH8 | 72 | 20Ic | C-phase current of CH20 | | | |

www . ElectricalPartManuals . com

## Binary signals

| No. | Name | Contents | No. | Name | Contents |
|---|---|---|---|---|---|
| 1 | DIFCH-A | A-phase output of DIFCH | 65 | CH1 TRIP | CH1 trip (OR oupput of BP trip, CBF retrip and CBF trip) |
| 2 | DIFCH-B | B-phase output of DIFCH | 66 | CH2 TRIP | CH2 trip (ditto) |
| 3 | DIFCH-C | C-phase output of DIFCH | 67 | CH3 TRIP | CH3 trip (ditto) |
| 4 | DIFZA-A | A-phase output of DIFZA | 68 | CH4 TRIP | CH4 trip (ditto) |
| 5 | DIFZA-B | B-phase output of DIFZA | 69 | CH5 TRIP | CH5 trip (ditto) |
| 6 | DIFZA-C | C-phase output of DIFZA | 70 | CH6 TRIP | CH6 trip (ditto) |
| 7 | DIFZB-A | A-phase output of DIFZB | 71 | CH7 TRIP | CH7 trip (ditto) |
| 8 | DIFZB-B | B-phase output of DIFZB | 72 | CH8 TRIP | CH8 trip (ditto) |
| 9 | DIFZB-C | C-phase output of DIFZB | 73 | CH9 TRIP | CH9 trip (ditto) |
| 10 | DIFZC-A | A-phase output of DIFZC | 74 | CH10 TRIP | CH10 trip (ditto) |
| 11 | DIFZC-B | B-phase output of DIFZC | 75 | CH11 TRIP | CH11 trip (ditto) |
| 12 | DIFZC-C | C-phase output of DIFZC | 76 | CH12 TRIP | CH12 trip (ditto) |
| 13 | DIFZD-A | A-phase output of DIFZD | 77 | CH13 TRIP | CH13 trip (ditto) |
| 14 | DIFZD-B | B-phase output of DIFZD | 78 | CH14 TRIP | CH14 trip (ditto) |
| 15 | DIFZD-C | C-phase output of DIFZD | 79 | CH15 TRIP | CH15 trip (ditto) |
| 16 | | | 80 | CH16 TRIP | CH16 trip (ditto) |
| 17 | ZA trip | Busbar protection Zone A trip | 81 | CH17 TRIP | CH17 trip (ditto) |
| 18 | ZB trip | Busbar protection Zone B trip | 82 | CH18 TRIP | CH18 trip (ditto) |
| 19 | ZC trip | Busbar protection Zone C trip | 83 | CH19 TRIP | CH19 trip (ditto) |
| 20 | ZD trip | Busbar protection Zone D trip | 84 | CH20 TRIP | CH20 trip (ditto) |
| 21 | CBF-retrip | CBF retrip (OR output of CH1 to CH32) | 85 | | |
| 22 | CBF-trip | CBF trip (OR output of CH1 to CH32) | 86 | | |
| 23 | CBF-TR | CBF transfer trip (OR output of CH1 to CH32) | 87 | | |
| 24 | DIFCH-BLK-OR | OR output of DIFCH-BLK-A, -B and -C elements | 88 | | |
| 25 | DIFZA-BLK-OR | OR output of DIFZA-BLK-A, -B and -C elements | 89 | | |
| 26 | DIFZB-BLK-OR | OR output of DIFZB-BLK-A, -B and -C elements | 90 | | |
| 27 | DIFZC-BLK-OR | OR output of DIFZC-BLK-A, -B and -C elements | 91 | | |
| 28 | DIFZD-BLK-OR | OR output of DIFZD-BLK-A, -B and -C elements | 92 | | |
| 29 | UV-ZA | OR output of UVG-ZA and UVS-ZA | 93 | | |
| 30 | UV-ZB | OR output of UVG-ZB and UVS-ZB | 94 | | |
| 31 | UV-ZC | OR output of UVG-ZC and UVS-ZC | 95 | | |
| 32 | UV-ZD | OR output of UVG-ZD and UVS-ZD | 96 | | |
| 33 | 1OCBF-OR | OR output of 1OCBF-BLK-A, -B and -C elements | 97 | CH1 CBF-TR | CH1 CBF transfer signal |
| 34 | 2OCBF-OR | OR output of 2OCBF-BLK-A, -B and -C elements | 98 | CH2 CBF-TR | CH2 CBF transfer signal |
| 35 | 3OCBF-OR | OR output of 3OCBF-BLK-A, -B and -C elements | 99 | CH3 CBF-TR | CH3 CBF transfer signal |
| 36 | 4OCBF-OR | OR output of 4OCBF-BLK-A, -B and -C elements | 100 | CH4 CBF-TR | CH4 CBF transfer signal |
| 37 | 5OCBF-OR | OR output of 5OCBF-BLK-A, -B and -C elements | 101 | CH5 CBF-TR | CH5 CBF transfer signal |
| 38 | 6OCBF-OR | OR output of 6OCBF-BLK-A, -B and -C elements | 102 | CH6 CBF-TR | CH6 CBF transfer signal |
| 39 | 7OCBF-OR | OR output of 7OCBF-BLK-A, -B and -C elements | 103 | CH7 CBF-TR | CH7 CBF transfer signal |
| 40 | 8OCBF-OR | OR output of 8OCBF-BLK-A, -B and -C elements | 104 | CH8 CBF-TR | CH8 CBF transfer signal |
| 41 | 9OCBF-OR | OR output of 9OCBF-BLK-A, -B and -C elements | 105 | CH9 CBF-TR | CH9 CBF transfer signal |
| 42 | 10OCBF-OR | OR output of 10OCBF-BLK-A, -B and -C elements | 106 | CH10 CBF-TR | CH10 CBF transfer signal |
| 43 | 11OCBF-OR | OR output of 11OCBF-BLK-A, -B and -C elements | 107 | CH11 CBF-TR | CH11 CBF transfer signal |
| 44 | 12OCBF-OR | OR output of 12OCBF-BLK-A, -B and -C elements | 108 | CH12 CBF-TR | CH12 CBF transfer signal |
| 45 | 13OCBF-OR | OR output of 13OCBF-BLK-A, -B and -C elements | 109 | CH13 CBF-TR | CH13 CBF transfer signal |
| 46 | 14OCBF-OR | OR output of 14OCBF-BLK-A, -B and -C elements | 110 | CH14 CBF-TR | CH14 CBF transfer signal |
| 47 | 15OCBF-OR | OR output of 15OCBF-BLK-A, -B and -C elements | 111 | CH15 CBF-TR | CH15 CBF transfer signal |
| 48 | 16OCBF-OR | OR output of 16OCBF-BLK-A, -B and -C elements | 112 | CH16 CBF-TR | CH16 CBF transfer signal |
| 49 | 17OCBF-OR | OR output of 17OCBF-BLK-A, -B and -C elements | 113 | CH17 CBF-TR | CH17 CBF transfer signal |
| 50 | 18OCBF-OR | OR output of 18OCBF-BLK-A, -B and -C elements | 114 | CH18 CBF-TR | CH18 CBF transfer signal |
| 51 | 19OCBF-OR | OR output of 19OCBF-BLK-A, -B and -C elements | 115 | CH19 CBF-TR | CH19 CBF transfer signal |
| 52 | 20OCBF-OR | OR output of 20OCBF-BLK-A, -B and -C elements | 116 | CH20 CBF-TR | CH20 CBF transfer signal |
| 53 | | | 117 | | |
| 54 | | | 118 | | |
| 55 | | | 119 | | |
| 56 | | | 120 | | |
| 57 | UVD-ZA | Output of UVD-ZA | 121 | | |
| 58 | UVD-ZB | Output of UVD-ZB | 122 | | |
| 59 | UVD-ZC | Output of UVD-ZC | 123 | | |
| 60 | UVD-ZD | Output of UVD-ZD | 124 | | |
| 61 | | | 125 | | |
| 62 | | | 126 | | |
| 63 | | | 127 | | |
| 64 | | | 128 | | |

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

# Appendix G

## Details of Relay Menu and LCD & Operation Button Instruction

www . ElectricalPartManuals . com

```
  MENU
1=Record        2=Status
3=Setting(view)   4=Setting(change)
5=Test
```

```
/1 Record
1=Fault record     2=Event record
3=Disturbance record
```

```
/2 Fault record
1=Display      2=Clear
```

```
/3 Fault record            2/4
#1  16/Oct/1998 23:18:03.913
#2  12/Feb/1998 03:51:37.622
#3  30/Jan/1997 15:06:11.835
```

```
/4 Fault record #1          3/34
16/Oct/1998 23:18:03.913
Phase  BC
DIF
```

```
/2 Fault record
Clear all fault records?
    ENTER=Yes  CANCEL=No
```

```
/2 Event record
1=Display      2=Clear
```

```
/3 Event record           2/96
16/Oct/1998 23:18:04.294 BP block  On
16/Oct/1998 23:18:03.913 BP block  Off
12/Feb/1998 03:51:37.622 Rly.set change
```

```
/2 Event record
Clear all event records?
    ENTER=Yes  CANCEL=No
```

```
/2 Disturbance record
1=Display      2=Clear
```

```
/3 Disturbance record        1/ 11
#1  16/Oct/1998 23:18:03.913
#2  12/Feb/1998 03:51:37.622
#3  30/Jan/1997 15:06:11.835
```

```
/2 Disturbance record
Clear all disturbance records?
    ENTER=Yes  CANCEL=No
```

a-1

www . ElectricalPartManuals . com

a-1

```
/1 Status
1=Metering       2=Binary I/O
3=Relay element   4=Time sync source
5=Clock adjustment
```

```
/2 Metering  12/Feb/1998 22:56 3/150
Ida ***** % ******** A Ira ******** A
Idb ***** % ******** A Irb ******** A
Idc ***** % ******** A Irc ******** A
```

```
/2 Binary input & output      3/ 68
Input (CU-IO#1) [000 000 000 000   ]
Input (CU-IO#2) [000             ]
Input (BU-CH1)  [000 000 000 0    ]
```

```
/2 Relay element           3/ 13
DIFCH       [000 000       ]
DIFZA       [000 000       ]
DIFZB       [000 000       ]
```

```
/2 Time synchronization source   1/ 3
*IRIG: Active
 RSM: Inactive
 IEC: Inactive
```

```
/2 12/Feb/1998 22:56:19 [local]  1/ 5
Minute ( 0 - 59) : 56 _
Hour  ( 0 - 23) : 22
Day   ( 1 - 31) : 12
```

```
/1 Setting(view)
1=Version 2=Description 3=Comm
4=Record  5=Status    6=Protection
7=Binary input 8=Binary output 9=LED
```

```
/2 Relay version
Relay Type:   ********************
Serial No.:   ********************
Main software: ********************
```

```
/2 Description            2/ 2
Plant name:   ********************
Description:  ********************
```

```
/2 Communication
1=Address
2=Switch
```

```
/3 Address                1/ 1
HDLC (    1   )  IEC (    2   )
```

```
/3 Switch                 3/ 3
232C  1=9.6 2=19.2 3=38.4 4=57.6 1
IECBR 1=9.6 2=19.2         2
IECBLK 1=Normal 2=Blocked      1
```

```
/2 Record
1=Event record
2=Disturbance record
```

```
/3 Event record 0=None   3=Both 3/**
ZA trip      1=Operate 2=Reset 3
ZB trip      1=Operate 2=Reset 3
ZC trip      1=Operate 2=Reset 3
```

```
/3 Disturbance record
1=Record time & starter
2=Scheme switch
```

```
/4 Record time & starter      3/**
Time (  2.0 s  ) 1OCG ( 10.0   )
1OCS (  10.0    ) 2OCG ( 10.0   )
2OCS (  10.0    ) 3OCG ( 10.0   )
```

```
/4 Scheme switch           3/ 3
TRIP         0=Off  1=On   0
OCG          0=Off  1=On   0
OCS          0=Off  1=On   0
```

```
/2 Status
1=Metering
2=Time Synchronization
3=Time zone
```

```
/3 Metering              1/ 1
Display value 1=Primary 2=Secondary 1
```

```
/3 Time synchronization       1/ 1
Sync  0=Off  1=IRIG  2=RSM  3=IEC 1
```

```
/3 Time zone              1/ 1
GMT (    +9 hrs )
```

a-1, b-1

www.ElectricalPartManuals.com

a-1 b-1

```
/2 Protection     (Active group= *)
1=Group1  2=Group2  3=Group3  4=Group4
```

```
/3 Protection          (Group 1)
1=Busbar parameter
2=Trip
```

```
/4 Busbar parameter      (Group 1)
1=CH name
2=VT ratio
```

```
/5 CH name               3/**
CH1 name  :   ********************
CH2 name  :   ********************
CH3 name  :   ********************
```

```
/5 VT ratio              2/ 2
VTA (  2000   )  VTB (  2000  )
VTC (  2000   )  VTD (  2000  )
```

```
/4 Trip                (Group 1)
1=Scheme switch
2=Protection element
```

```
/5 Scheme switch             3/***
C.TP   0=BLK  1=Trip           0
IDSV   0=Off  1=ALM&BLK  2=ALM    2
AISV   0=Off  1=ALM&BLK  2=ALM    1
```

```
/5 Protection element      (Group 1)
1=DIF     2=OC
```

```
/6 DIF                   3/**
DIFCH (  3000 A )  DIFZ  (  3000 A )
DIFSV (  1000 A )  TIDSV (    20 s )
1CT   (  1000 A )  2CT   (  1000 A )
```

```
/6 OC                    3/**
1OCB (  0.5    )  T1B1  (   50 ms )
T1B2 (  100 ms )  2OCB  (  0.5    )
T2B1 (   50 ms )  T2B2  (  100 ms )
```

```
/3 Protection          (Group 2)
1=Busbar parameter
2=Trip
```

```
/3 Protection          (Group 4)
1=Busbar parameter
2=Trip
```

```
/2 Binary input   1=Norm 2=Inv  3/ 3
BISW 1                 1
BISW 2                 1
BISW 3                 1
```

```
/2 Binary output
1=CU-IO#1 2=CU-IO#2 3=BU-BO1 4=BU-BO2
```

```
/3 Binary output       CU-IO#1) 3/13
BO1 (  1, 100,  0,  0,  0,  0)AND,
BO2 (  0,   0,  0,  0,  0,  0) OR,
BO3 (  1,   2,  3,  4,  5,  6) OR,D
```

```
/3 Binary output        (BU-BO2) 3/32
CH1 (  1, 100,  0,  0,  0,  0)AND,
CH2 (  0,   0,  0,  0,  0,  0) OR,
CH3 (  1,   2,  3,  4,  5,  6) OR,D
```

a-1 b-1

www . ElectricalPartManuals . com

a-1 b-1

```
/2 LED                  2/ 2
LED1 (   21  )  LED2 (   4  )
LED3 (   67  )  LED4 (   0  )
```

: Password trap

```
Password
     Input password  [_ ]
```

: Confirmation trap

```
/2 *************
Change settings?
      ENTER=Yes  CANCEL=No
```

```
/1 Setting(change)
1=Password 2=Description 3=Comm.
4=Record  5=Status    6=Protection
7=Binary input 8=Binary output 9=LED
```

```
/2 Password
   Input new password   [ _ ]
  Retype new password   [   ]
```

```
/2 Description
1=Plant name 2=Description
```

```
/3 Plant name [ _              ]
ABCDEFGHIJKLMNOPQRSTUVWXYZ()[]@_  ← →
abcdefghijklmnopqrstuvwxyz{}*/+-<=>← →
0123456789!”#$%&’:;,.^ `        ← →
```

```
/3 Description  [ _            ]
ABCDEFGHIJKLMNOPQRSTUVWXYZ()[]@_  ← →
abcdefghijklmnopqrstuvwxyz{}*/+-<=>← →
0123456789!”#$%&’:;,.^ `       ← →
```

```
/2 Communication
1=Address
2=Switch
```

```
/3 Address               1/ 2
HDLC (   1-    32) :   1 _
IEC  (   0-   254) :   2
```

```
/3 Switch                1/ 3
232C  1=9.6 2=19.2 3=38.4 4=57.6 1 _
IECBR 1=9.6 2=19.2          2
IECBLK 1=Normal 2=Blocked      1
```

```
/2 Record
1=Event record
2=Disturbance record
```

```
/3 Event record  0= None  3=Both 1/**
ZA trip     1=Operate 2=Reset 3 _
ZB trip     1=Operate 2=Reset 3
ZC trip     1=Operate 2=Reset 3
```

```
/3 Disturbance record
1=Record time & starter
2=Scheme switch
```

```
/4 Record time & starter      1/**
Time (  0.1-  2.0):   2.0 _  s
1OCG (  0.1- 10.0):   10.0
1OCS (  0.1- 10.0):   10.0
```

```
/4 Scheme switch            1/ 3
TRIP        0=Off  1=On   1 _
OCG         0=Off  1=On   1
OCS         0=Off  1=On   1
```

```
/2 Status
1=Metering
2=Time Synchronization
3=Time zone
```

```
/3 Metering              1/ 1
Display value 1=Primary 2=Secondary 1_
```

```
/3 Time synchronization      1/ 1
Sync  0=Off 1=IRIG 2=RSM 3=IEC 1 _
```

```
/3 Time zone              1/ 1
GMT (  -12 -  +12):   +9 _   hrs
```

a-1 b-2



www . ElectricalPartManuals . com

a-1 b-2

```
/2 Protection
1=Change active group
2=Change setting
3=Copy group
```

```
/3Change active group(Active group= *)
1=Group1 2=Group2 3=Group3 4=Group4

 Current No.= *     Select No.= _
```

```
/3 Change setting (Active group= *)
1=Group1 2=Group2 3=Group3 4=Group4
```

```
/4 Protection         (Group 1)
1=Busbar parameter
2=Trip
```

```
/5 Busbar parameter      (Group 1)
1=CH name
2=VT ratio
```

```
/6 CH name
Select CH        ( 1- 32)

                    Select No.= _
```

```
/7 CH** name [ _              ]
ABCDEFGHIJKLMNOPQRSTUVWXYZ()[]@_  ← →
abcdefghijklmnopqrstuvwxyz{}*/+-<=>← →
0123456789!"#$%&':;,.^ `         ← →
```

```
/6 VT ratio                1/ 4
VTA (    1- 20000):   2000 _
VTB (    1- 20000):   2000
VTC (    1- 20000):   2000
```

```
/5 Trip              (Group 1)
1=Scheme switch
2=Protection element
```

```
/6 Scheme switch           1/***
C.TP  0=BLK 1=Trip           0 _
IDSV  0=Off 1=ALM&BLK 2=ALM    2
AISV  0=Off 1=ALM&BLK 2=ALM    1
```

```
/6 Protection element    (Group= 1)
1=DIF     2=OC
```

```
/7 DIF                  1/**
DIFCH (  500- 3000): 3000 _  A
DIFZ (  500- 3000): 3000    A
DIFSV (   20- 3000): 1000    A
```

```
/7 OC                   1/**
1OCB (  0.1-  2.0):  0.5 _
T1B1 (    0-  500):   50   ms
T1B2 (    0-  500):  150   ms
```

```
/4 Protection         (Group 2)
1=Busbar parameter
2=Trip
```

```
/4 Protection         (Group 4)
1=Busbar parameter
2=Trip
```

```
/3 Copy groupA to B (Active group= 1)
A   (  1-   4):        _
B   (  1-   4):
```

```
/2 Binary input   1=Norm 2=Inv 1/ 3
BISW 1                  1 _
BISW 2                  1
BISW 3                  1
```

a-1 b-2

www.ElectricalPartManuals.com

```
/2 Binary output
1=CU-IO#1 2=CU-IO#2 3=BU-BO1 4=BU-BO2
```

When 1 or 2 is selected:

```
/3 Binary output        (CU-IO#1)
Select BO      ( 1- 13)

           Select No.= _
```

```
/4 Setting          (BO 1 of IO#1)
1=Logic gate type & delay timer
2=Input to logic gate
```

```
/5 Logic gate type & delay timer 1/ 2
Logic  1=OR 2=AND          1 _
BOTD   0=Off 1=On          1
```

```
/5 Input to logic gate       1/ 6
In #1 (    0 -  1500):    21 _
In #2 (    0 -  1500):    4
In #3 (    0 -  1500):    67
```

```
/4 Setting          (BO ** of IO#2)
1=Logic gate type & delay timer
2=Input to logic gate
```

When 3 or 4 is selected:

```
/3 Binary output          (BU-BO*)
Select CH       ( 1- 32)

              Select No.= _
```

```
/4 Setting         (BO 1 of CH**)
1=Logic gate type & delay timer
2=Input to logic gate
```

```
/5 Logic gate type & delay timer 1/ 2
Logic  1=OR 2=AND          1 _
BOTD   0=Off 1=On          1
```

```
/5 Input to logic gate       1/ 6
In #1 (    0 -  1500):    21 _
In #2 (    0 -  1500):    4
In #3 (    0 -  1500):    67
```

```
/4 Setting          (BO ** of CH**)
1=Logic gate type & delay timer
2=Input to logic gate
```

```
/2 LED                 1/ 4
LED1 (    0 -  1500):    21 _
LED2 (    0 -  1500):    4
LED3 (    0 -  1500):    67
```

```
/1 Test
1=Switch      2=Binary output
3=Timer       4=Logic circuit
5=BU out
```

```
/2 Switch                  1/***
A.M.F. 0=Off 1=On            1 _
IECTST 0=Off 1=On            0
1DS1   0=Normal 1=Open 2=Close 0
```

```
/2 Binary output
1=CU-IO#1 2=CU-IO#2 3=BU
```

```
/3 BO     (0=Disable 1=Enable) 1/3
IO#1 BO1                 1 _
IO#1 BO2                 1
IO#1 BO3                 1
```

```
/3 BO
Keep pressing 1 to operate.

Press CANCEL to cancel.
```

```
/3 BO     (0=Disable 1=Enable) 1/14
IO#2 BO1                 1 _
IO#2 BO2                 1
IO#2 BO3                 1
```

```
/3 BO     (0=Disable 1=Enable) 1/***
CH1  TP1                 1 _
CH1  TP2                 0
CH1  BO1                 0
```

```
/2 Timer                  1/ 1
Timer(   1 -   100):    1 _
```

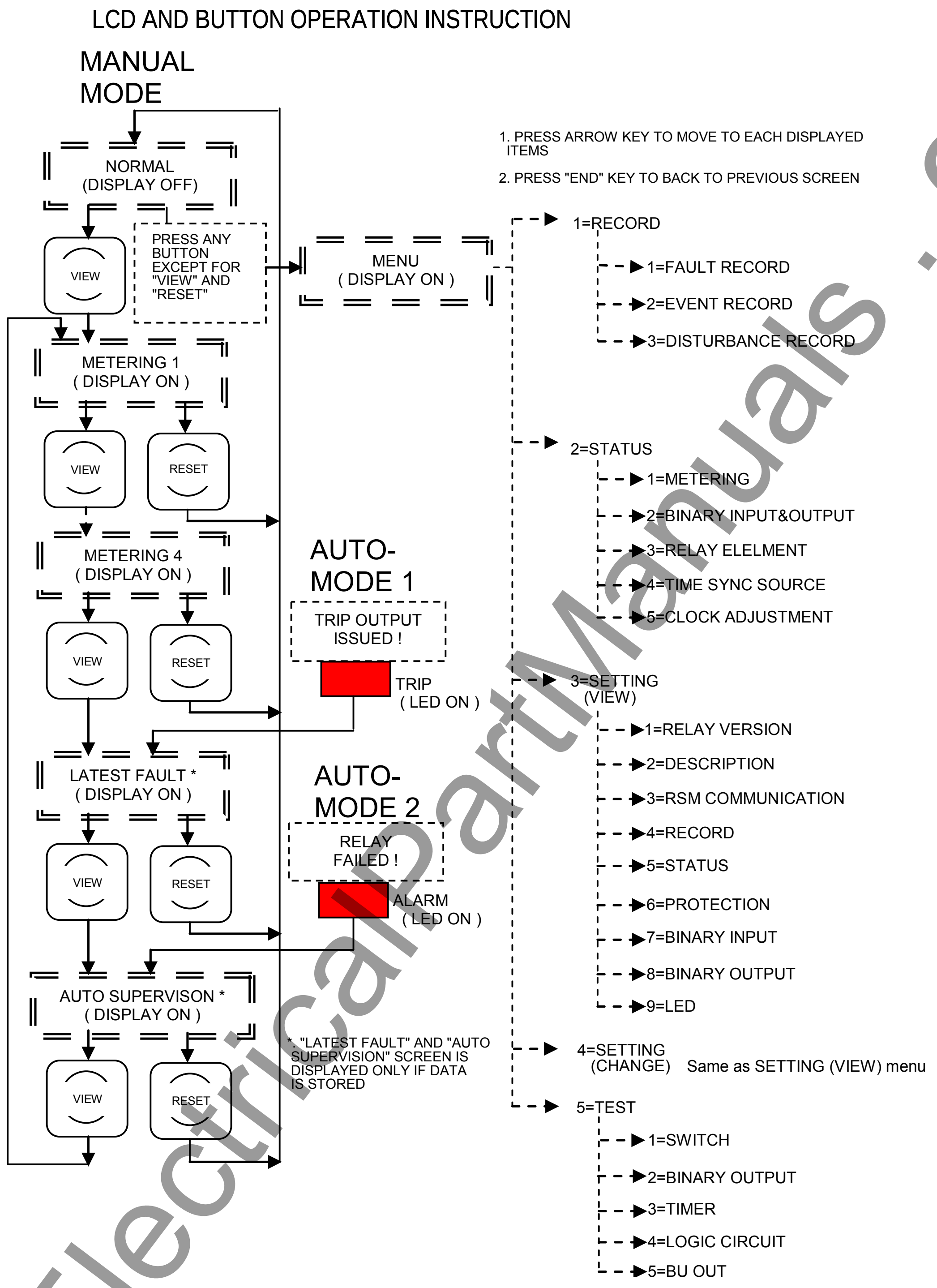
```
/2 Timer                  1/ 1
Press ENTER to operate.

Press CANCEL to cancel.
```

```
/2 Timer                  1/ 1
Operating . . .
Press END to reset.
Press CANCEL to cancel.
```

```
/2 Logic circuit            1/ 2
TermA(   0 -  1500):    1 _
TermB(   0 -  1500):   48
```

```
/2 BU out                 1/***
BU1   0=Out  1=In           1 _
BU2   0=Out  1=In           1
BU3   0=Out  1=In           1
```

www . ElectricalPartManuals . com



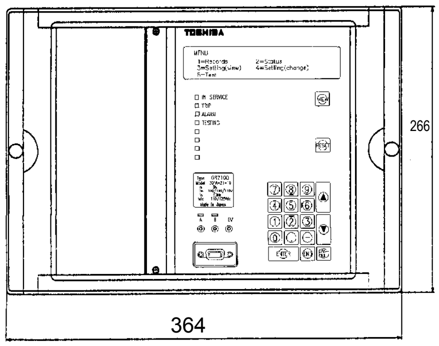

www . ElectricalPartManuals . com

# Appendix H

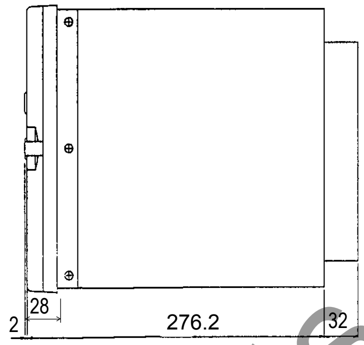
## Case Outline and Rack Mounting

- Central unit
- Bay unit for centralized installation
- How to mount attachment kit for rack-mounting

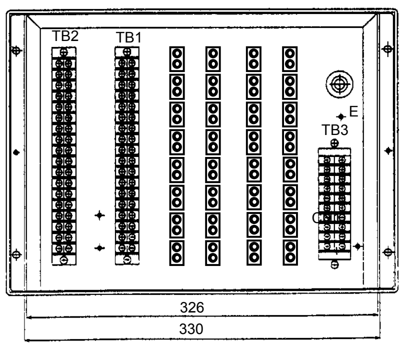
www . ElectricalPartManuals . com



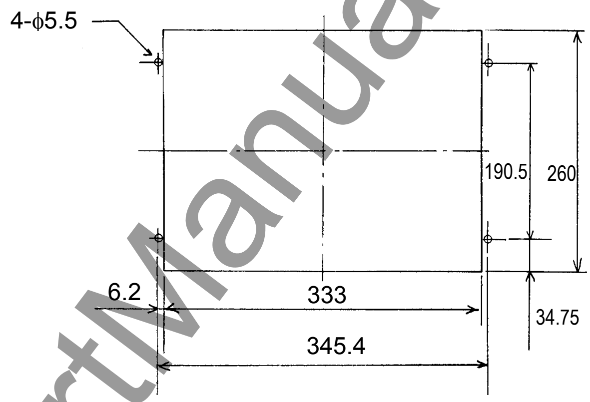

Front View



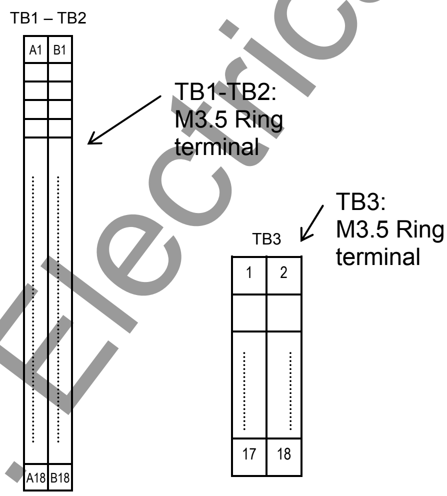

Side view




Rear View



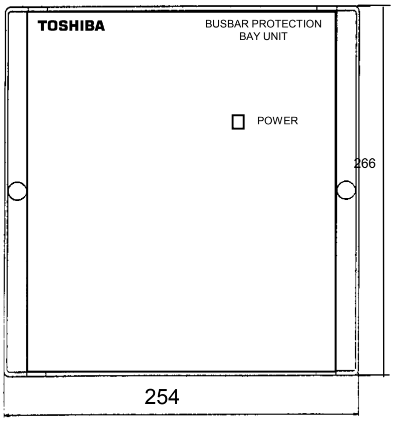

Panel Cutout



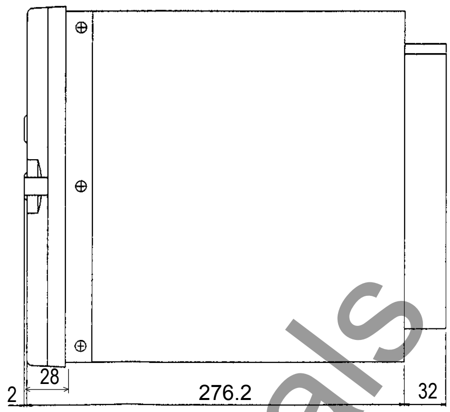

Terminal Block

**Case Outline : Central unit**

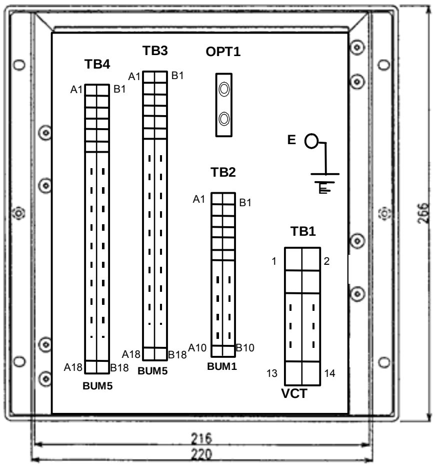
www . ElectricalPartManuals . com



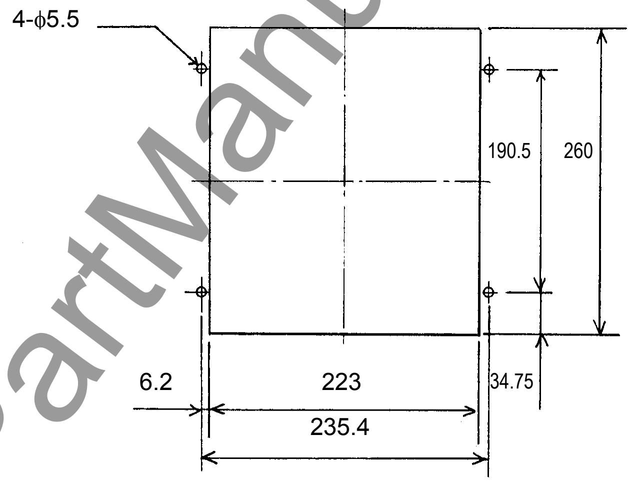

Front View



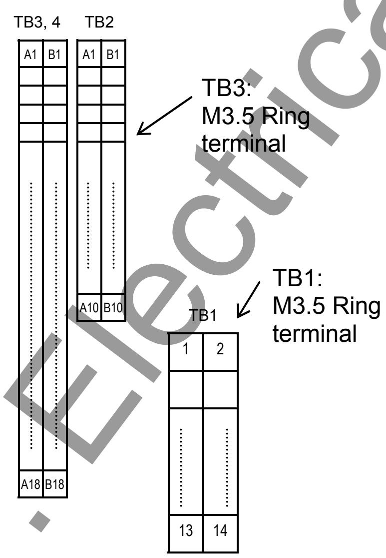

Side view




Rear view



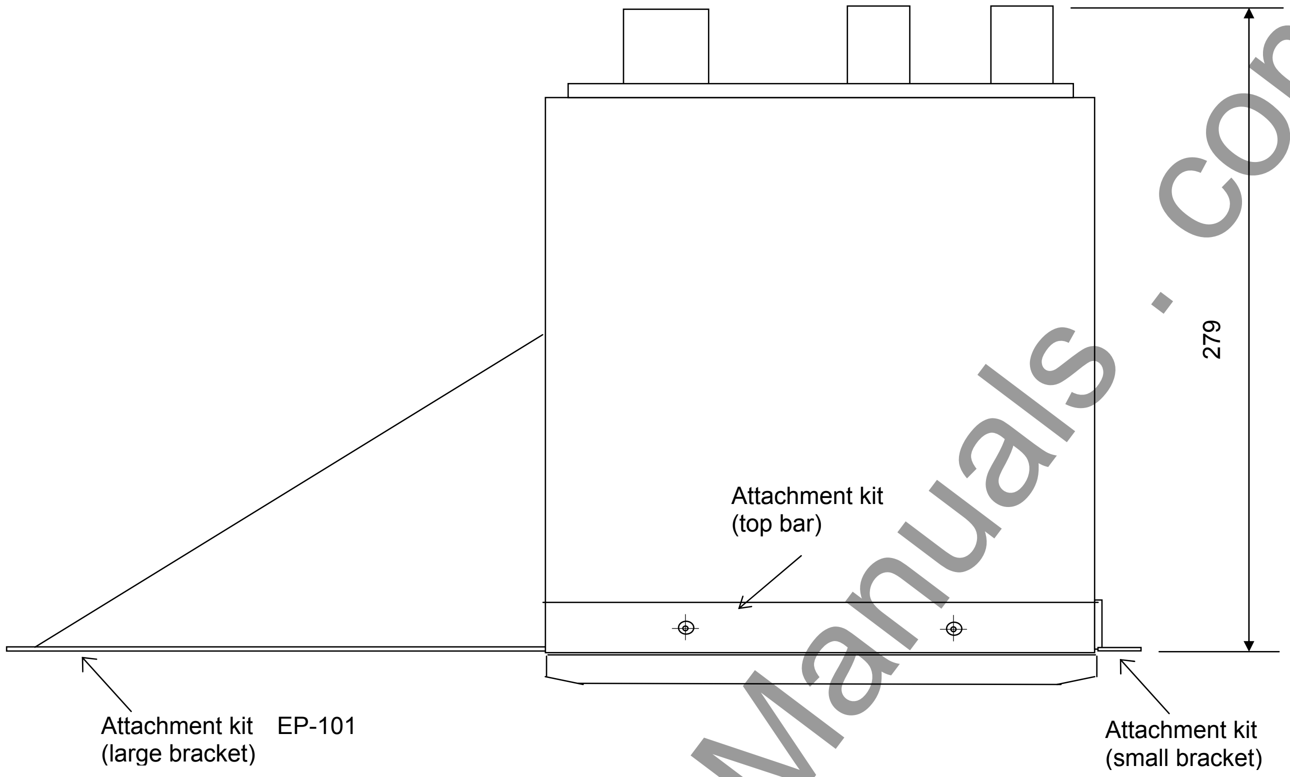

Panel cut-out



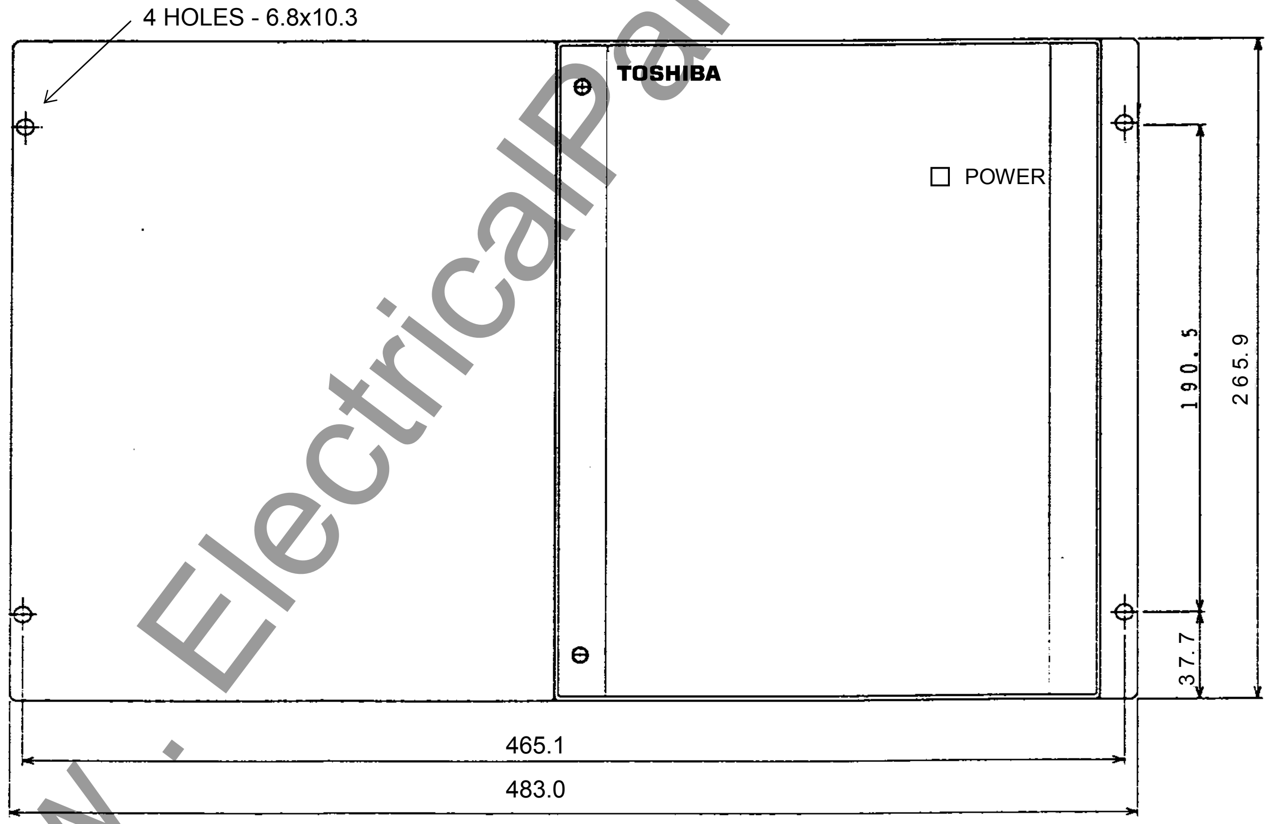

Terminal block

**Case Outline: Bay unit**

www . ElectricalPartManuals . com



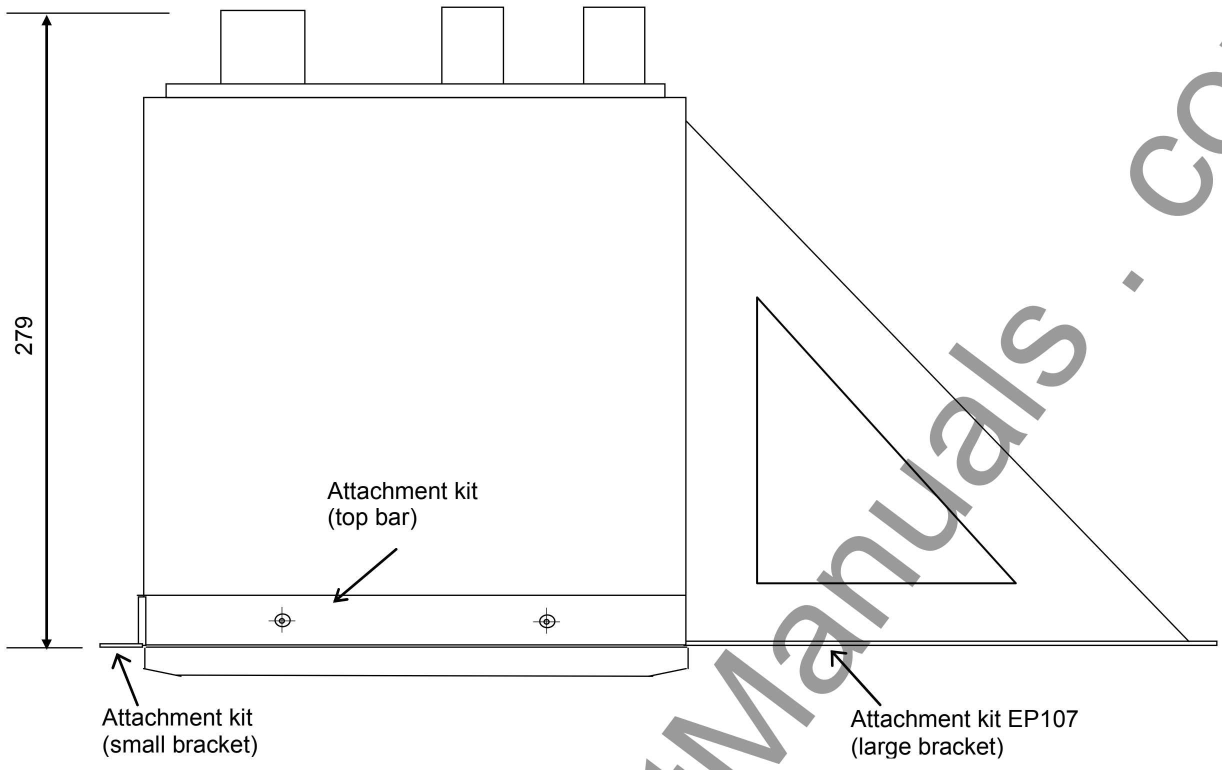

**Top View**



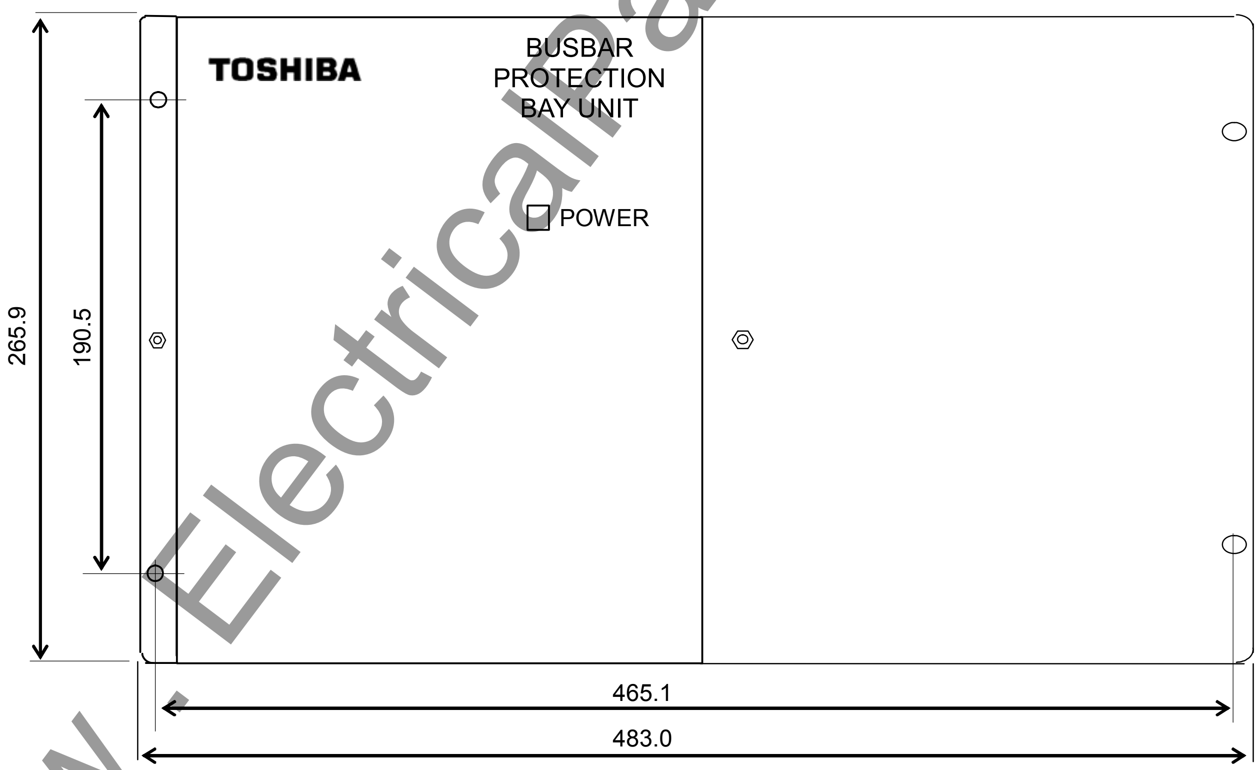

**Front View**

**Case Outline: Rack Mount for BU**

www . ElectricalPartManuals . com




**Top View**

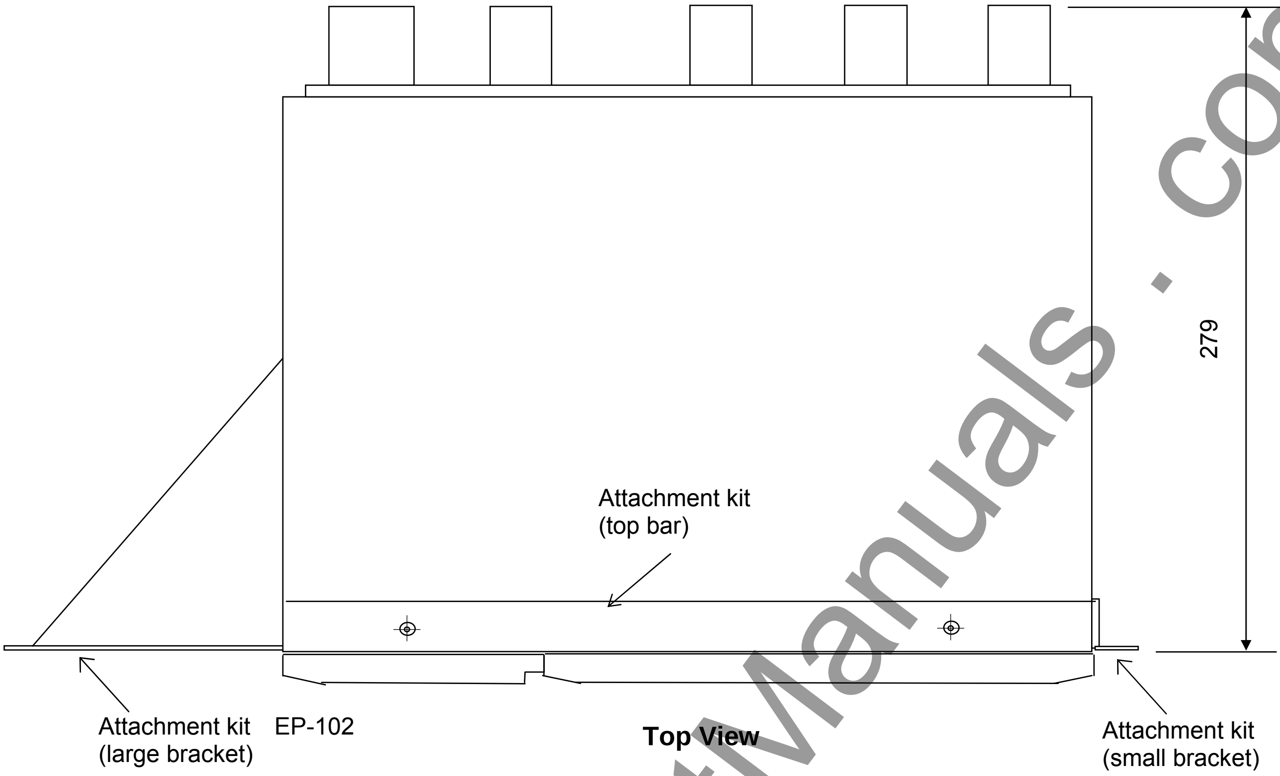



**F**

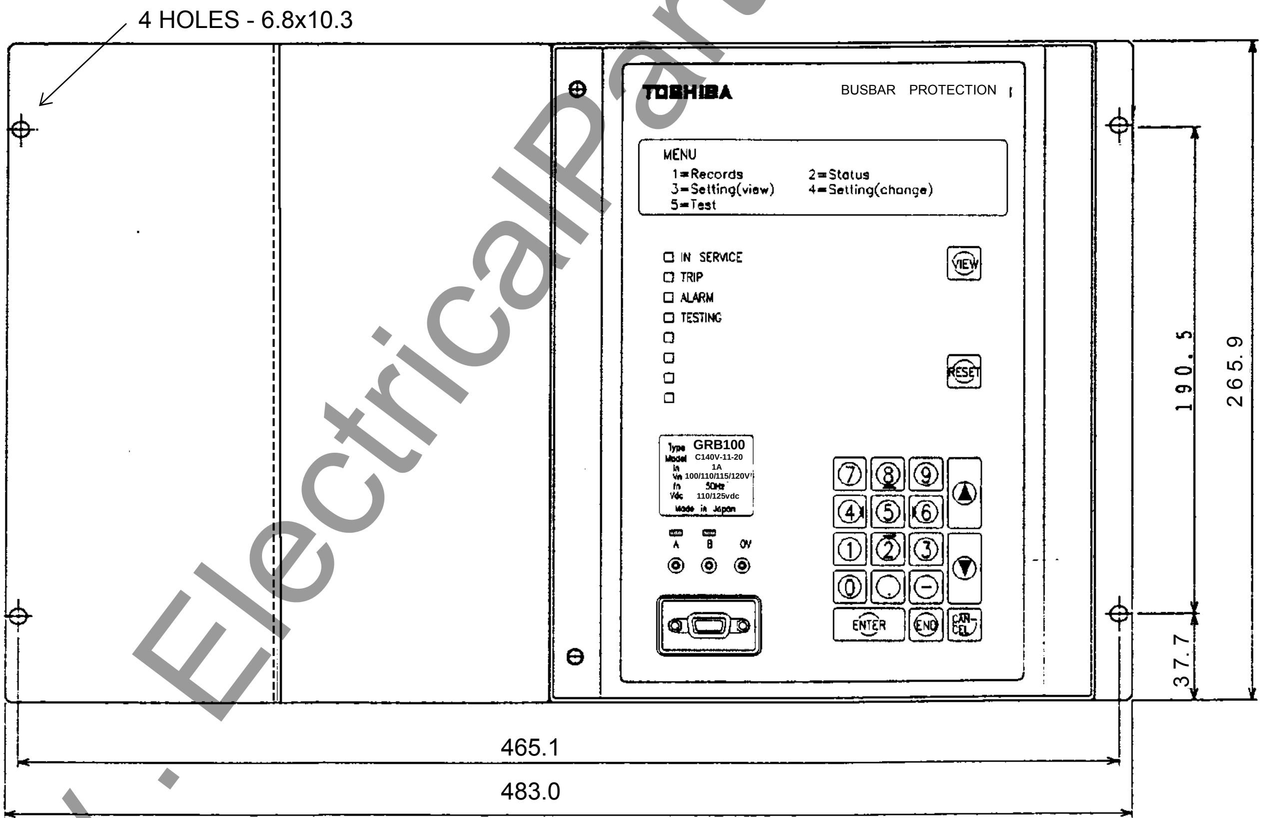
**ront View**

**Case Outline: Rack Mount for BU**

www . ElectricalPartManuals . com




**Top View**

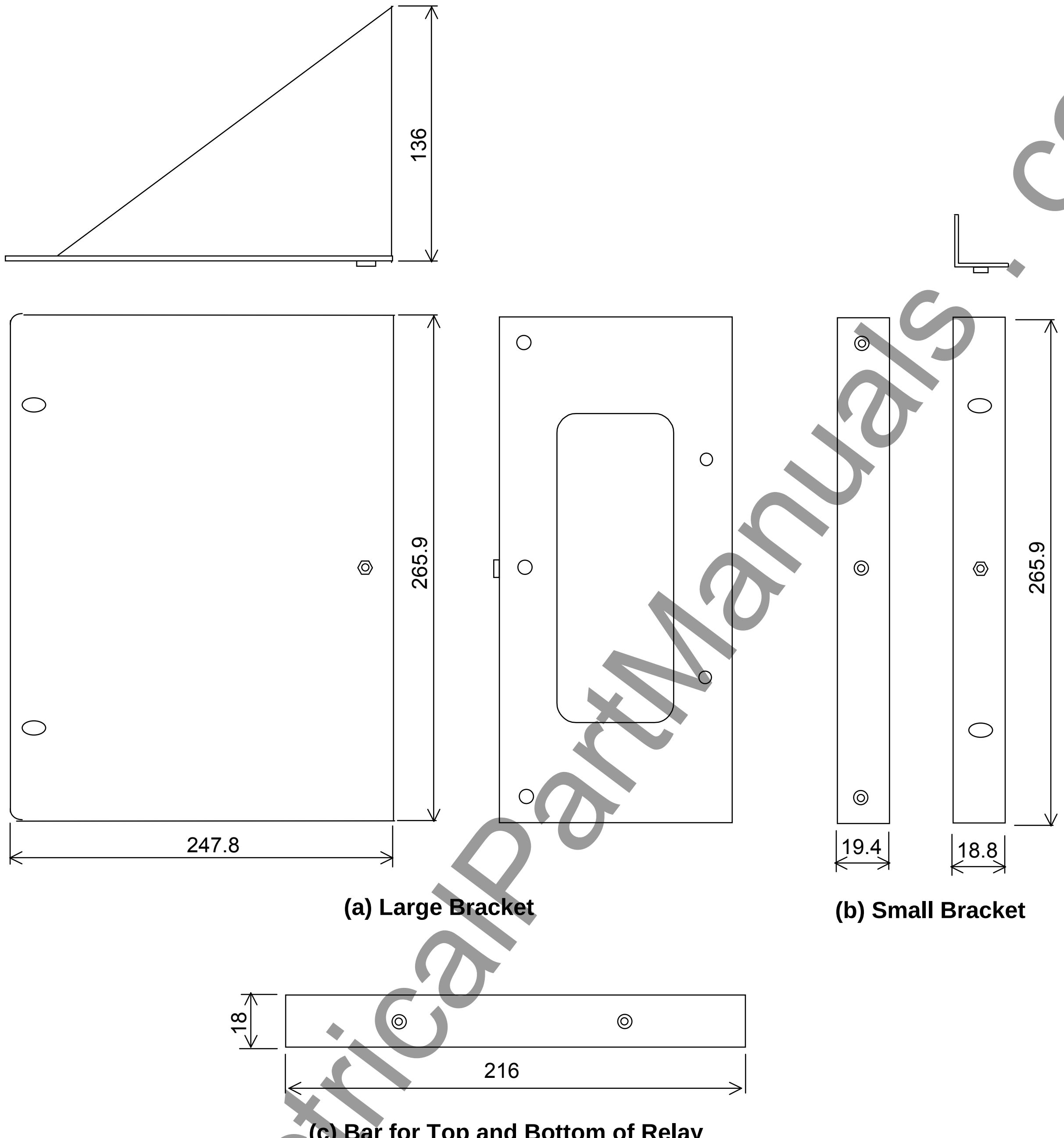



**Front View**

**Case Outline: Rack Mount for CU**

**Dimensions of Attachment Kit EP-101**

www.ElectricalPartManuals.com



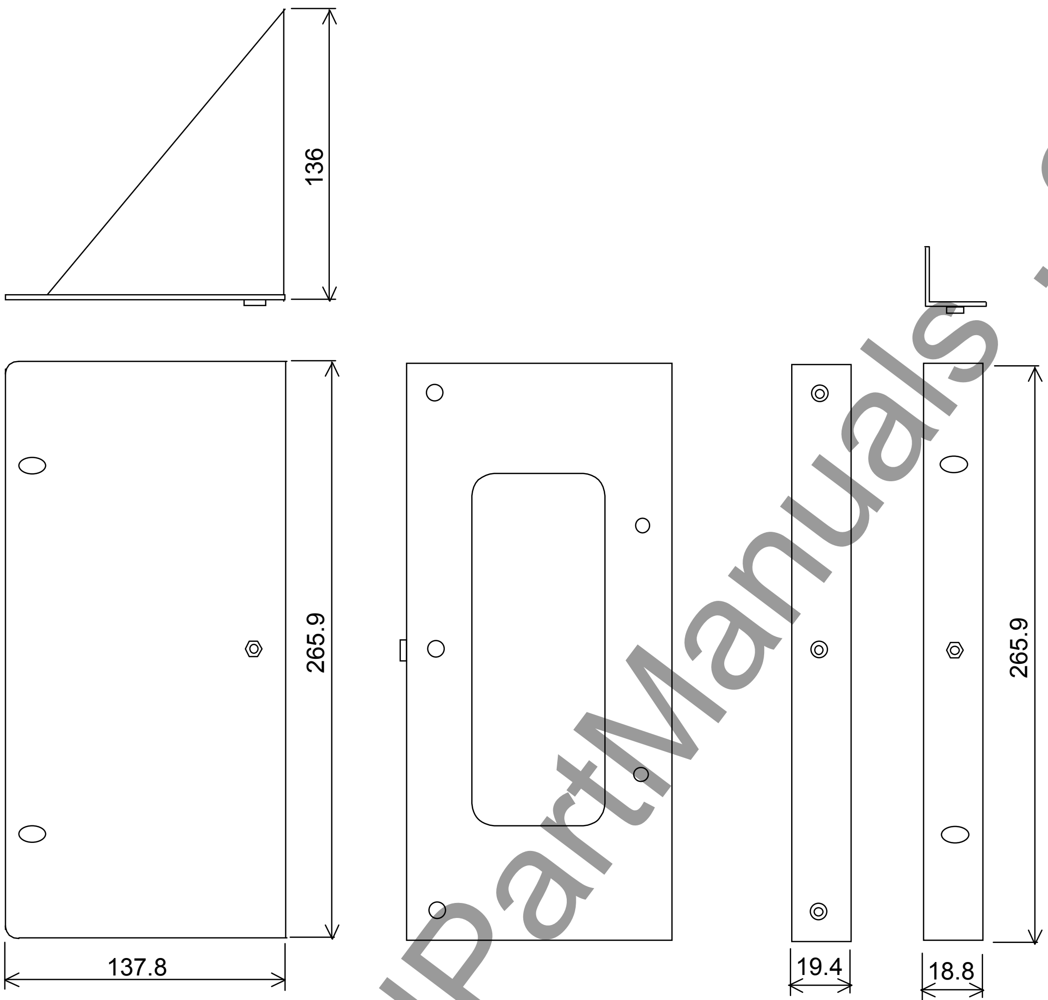

(a) Large Bracket

(b) Small Bracket

(c) Bar for Top and Bottom of Relay

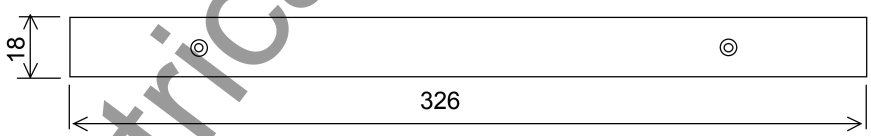
| | Parts |
|---|---|
| (a) | 1 Large bracket, 5 Round head screws with spring washers and washers (M4x10) |
| (b) | 1 Small bracket, 3 Countersunk head screws (M4x6) |
| (c) | 2 Bars, 4 Countersunk head screws (M3x8) |

www . ElectricalPartManuals . com




(a) Large Bracket

(b) Small Bracket

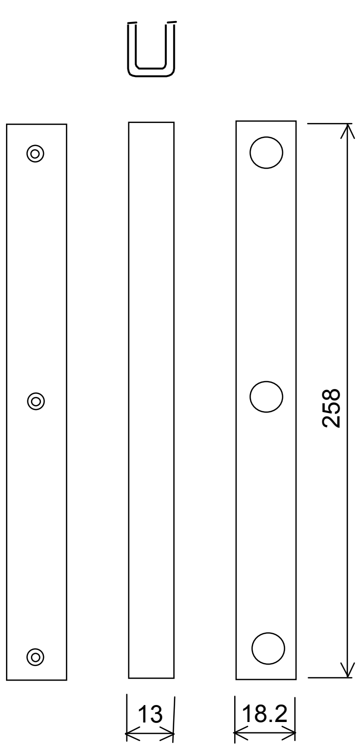



(c) Bar for Top and Bottom of Relay

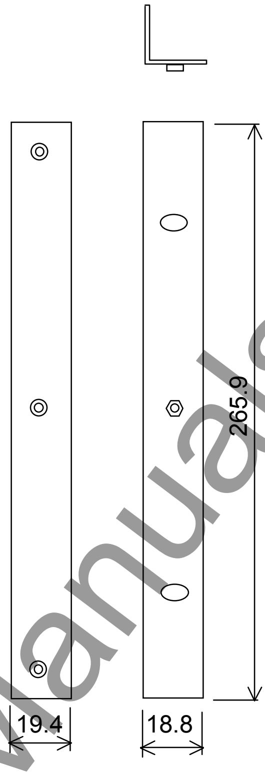
| | Parts |
|---|---|
| (a) | 1 Large bracket, 5 Round head screws with spring washers and washers (M4x10) |
| (b) | 1 Small bracket, 3 Countersunk head screws (M4x6) |
| (c) | 2 Bars, 4 Countersunk head screws (M3x8) |

**Dimensions of Attachment Kit EP-102**

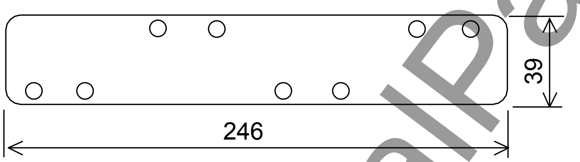
www . ElectricalPartManuals . com



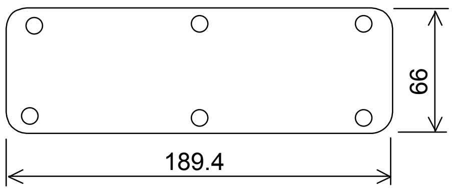

(a) Spacer



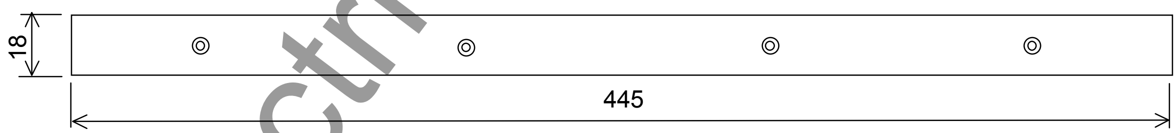

(b) Small Bracket




(c) Link Panel for the Rear




(d) Link Panel for the Bottom

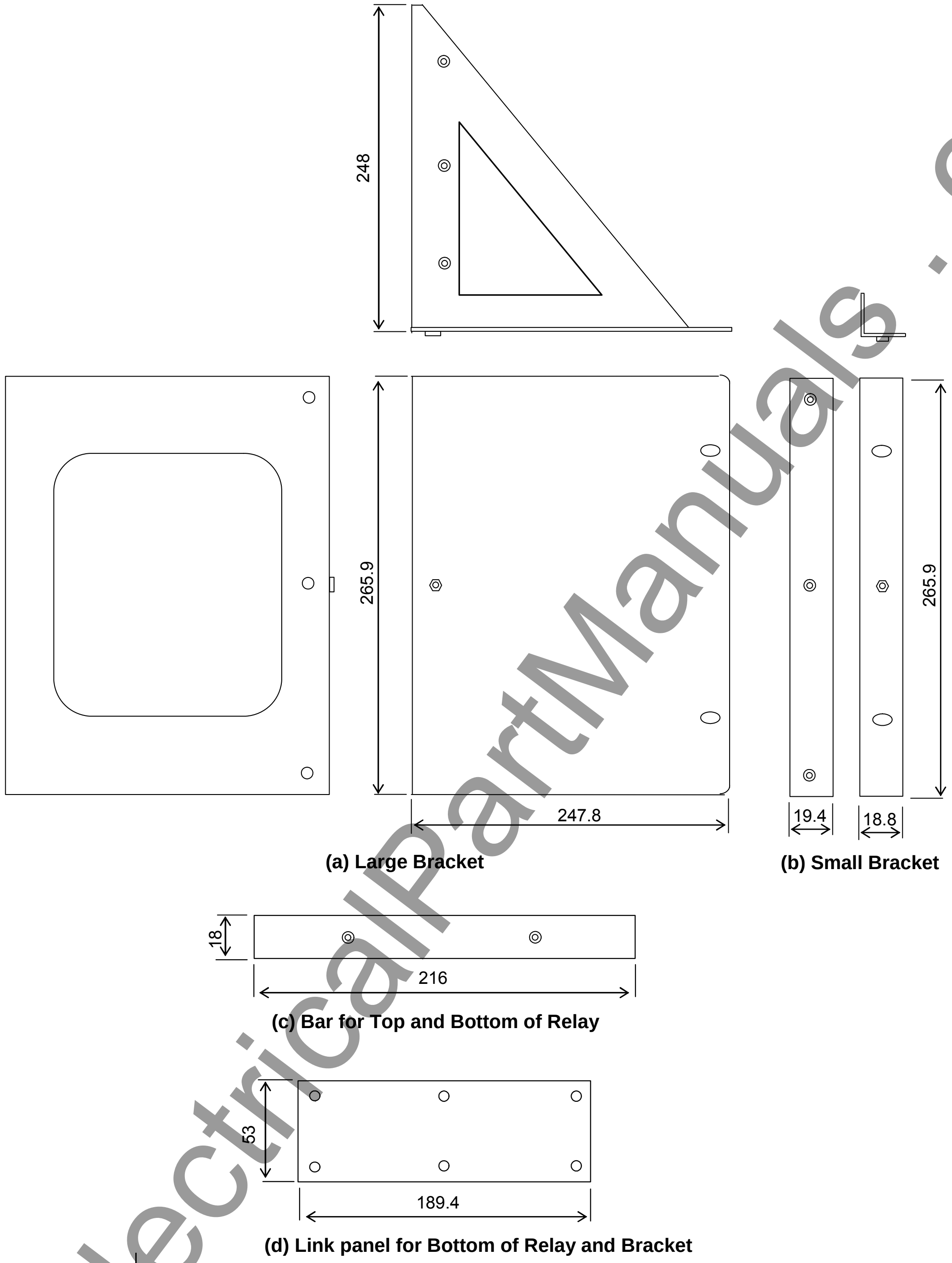



(e) Bar for the Top and Bottom

| | Parts |
|---|---|
| (a) | 1 Spacer, 3 Round head screws with spring washers and washers (M4x10) |
| (b) | 2 Small bracket, 6 Countersunk head screws (M4x6) |
| (c) | 1 Link panel for the rear, 8 Round head screws with spring washers and washers (M4x10) |
| (d) | 1 Link panel for the bottom, 6 Round head screws with spring washers and washers (M4x10) |
| (e) | 2 Bars, 8 Countersunk head screws (M3x8) |

**Dimensions of Attachment Kit EP-103 for Linking Two relays**

www . ElectricalPartManuals . com




| | Parts |
|---|---|
| (a) | 1 Large bracket, 3 Countersunk head screws (M4x6) |
| (b) | 1 Small bracket, 3 Countersunk head screws (M4x6) |
| (c) | 2 Bars, 4 Countersunk head screws (M3x8) |
| (d) | 1 Link, 6 Round head screws with spring washers and washers (M4x10) |

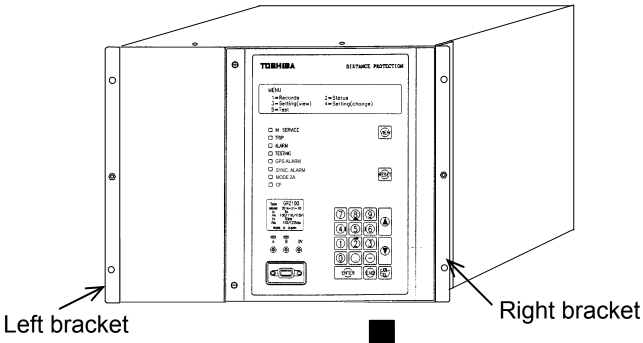
**Dimensions of Attachment Kit EP-107**

www . ElectricalPartManuals . com

## How to Mount Attachment Kit for Rack-Mounting

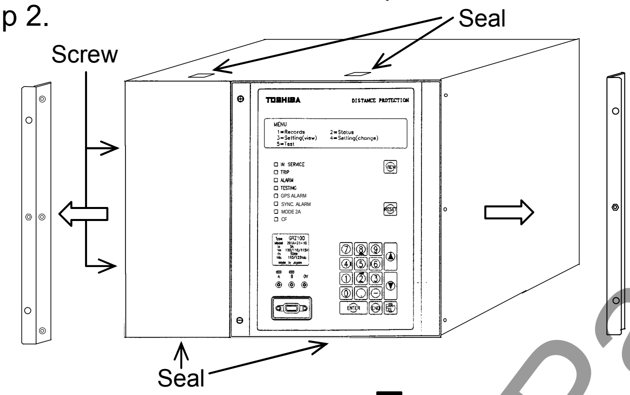
Caution: Be careful that the relay modules or terminal blocks, etc., are not damage while mounting.
Tighten screws to the specified torque according to the size of screw.

Step 1.



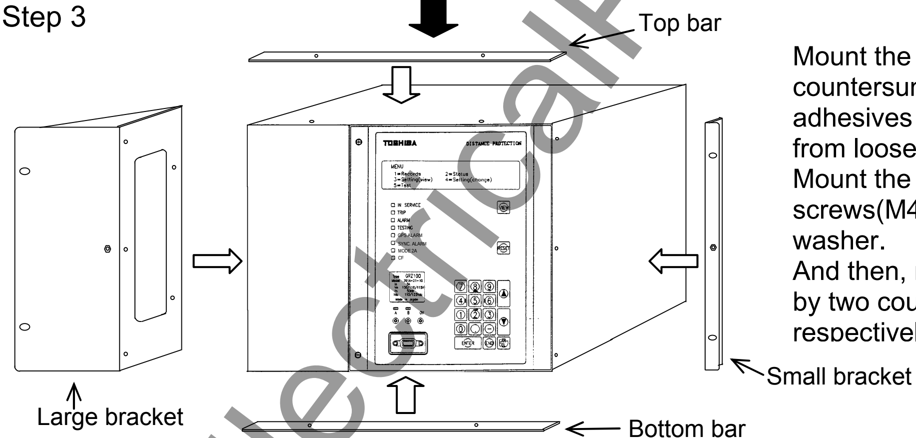

Remove case cover.

Step 2.



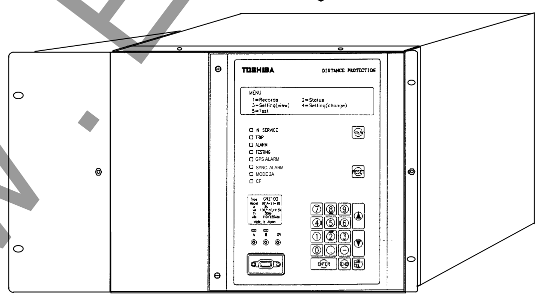

Remove the left and right brackets by unscrewing the three screws respectively, then remove two screws on left side of the relay.
And then, remove four seals on the top and bottom of the relay.

Step 3




Mount the small bracket by screwing three countersunk head screws(M4x6) and apply adhesives to the screws to prevent them from loosening.
Mount the large bracket by five round head screws(M4x10) with washer and spring washer.
And then, mount the top and bottom bars by two countersunk head screws(M3x8) respectively.

Step 4



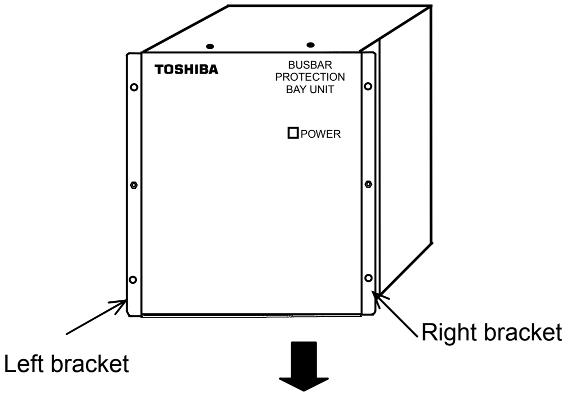
Completed.

www . ElectricalPartManuals . com

## How to link two relays (units) together for rack-mounting

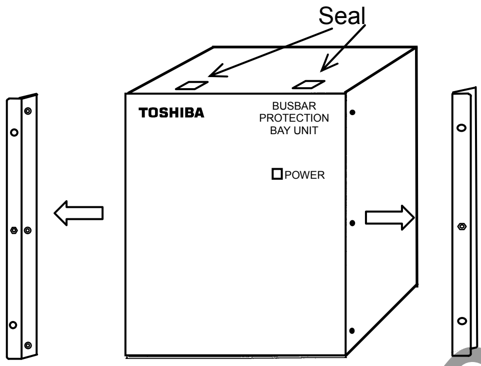
Two relays (units) with 1/2 size (type A case size) can be housed in one rack to be linked together.

Step 1.



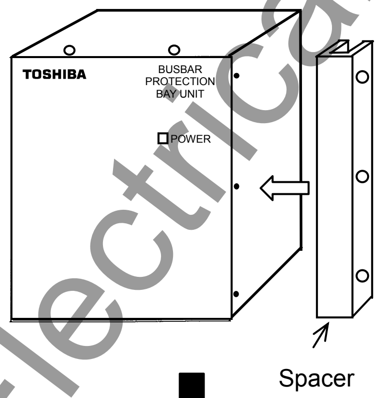

Remove case cover.

Step 2.



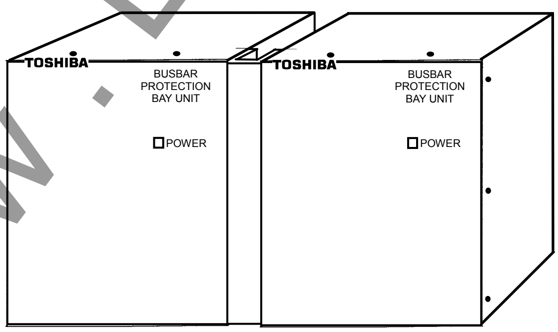

Remove the left and right brackets by unscrewing the three screws respectively, in both relays.
And then, remove four seals on the top and bottom of the relay.

Step 3.




Mount the spacer on one relay by screwing three round head screws (M4x10) with spring washer and washer.

Step 4

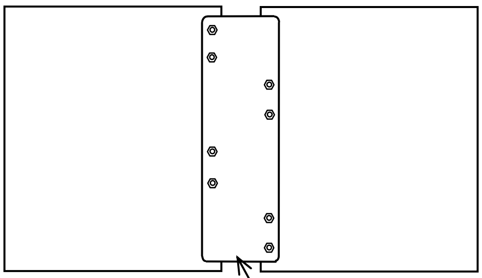



Place another relay next to the relay.
And then, mount the link panel on the rear of relays by eight round head screws (M4x10) with washer and spring washer, and also mount the link panel on the bottom of relays by six round head screws (M4x10) with washer and spring washer after removing six seals as follows.

www . ElectricalPartManuals . com

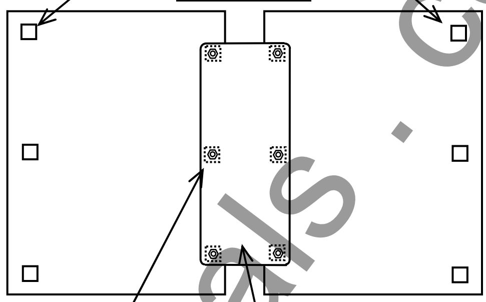
Don't remove the six seals.

Rear View



Link panel for rear of the relay

Bottom View

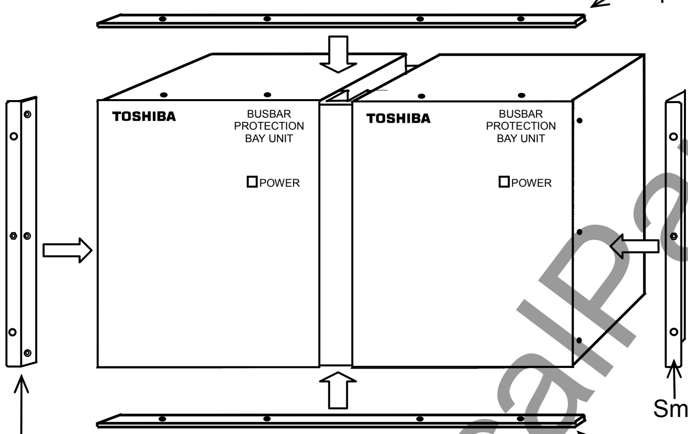


Link panel for bottom of the relay

Mount the link panel by attached screws after removing seals.

Step 5

Top bar



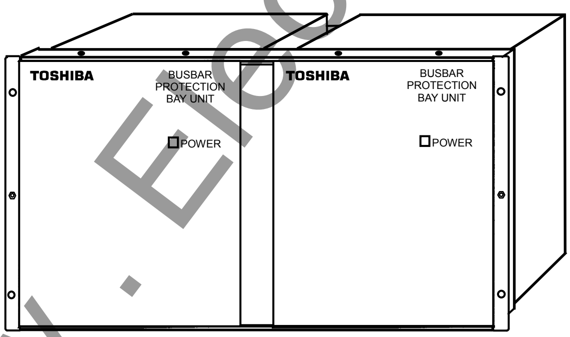

Small bracket

Small bracket

Bottom bar

Mount the small bracket on the both sides by screwing three countersunk head screws(M4x6) respectively, and apply adhesives to the screws to prevent them from loosening.
And then, mount the top and bottom bars by four countersunk head screws(M3x8) respectively.

Step 6




Completed.

www.ElectricalPartManuals.com

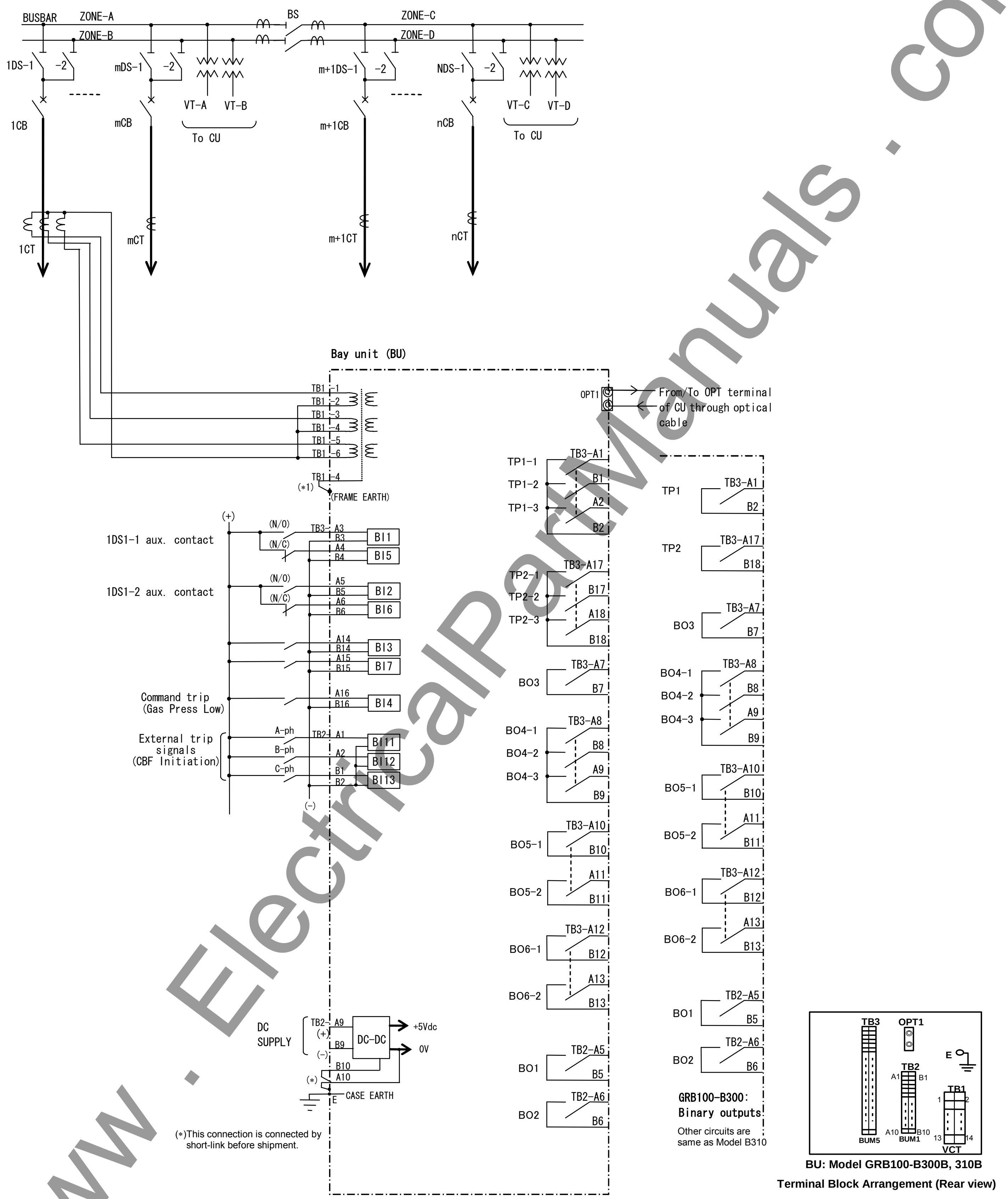
www . ElectricalPartManuals . com

# Appendix I

## Typical External Connections

www . ElectricalPartManuals . com

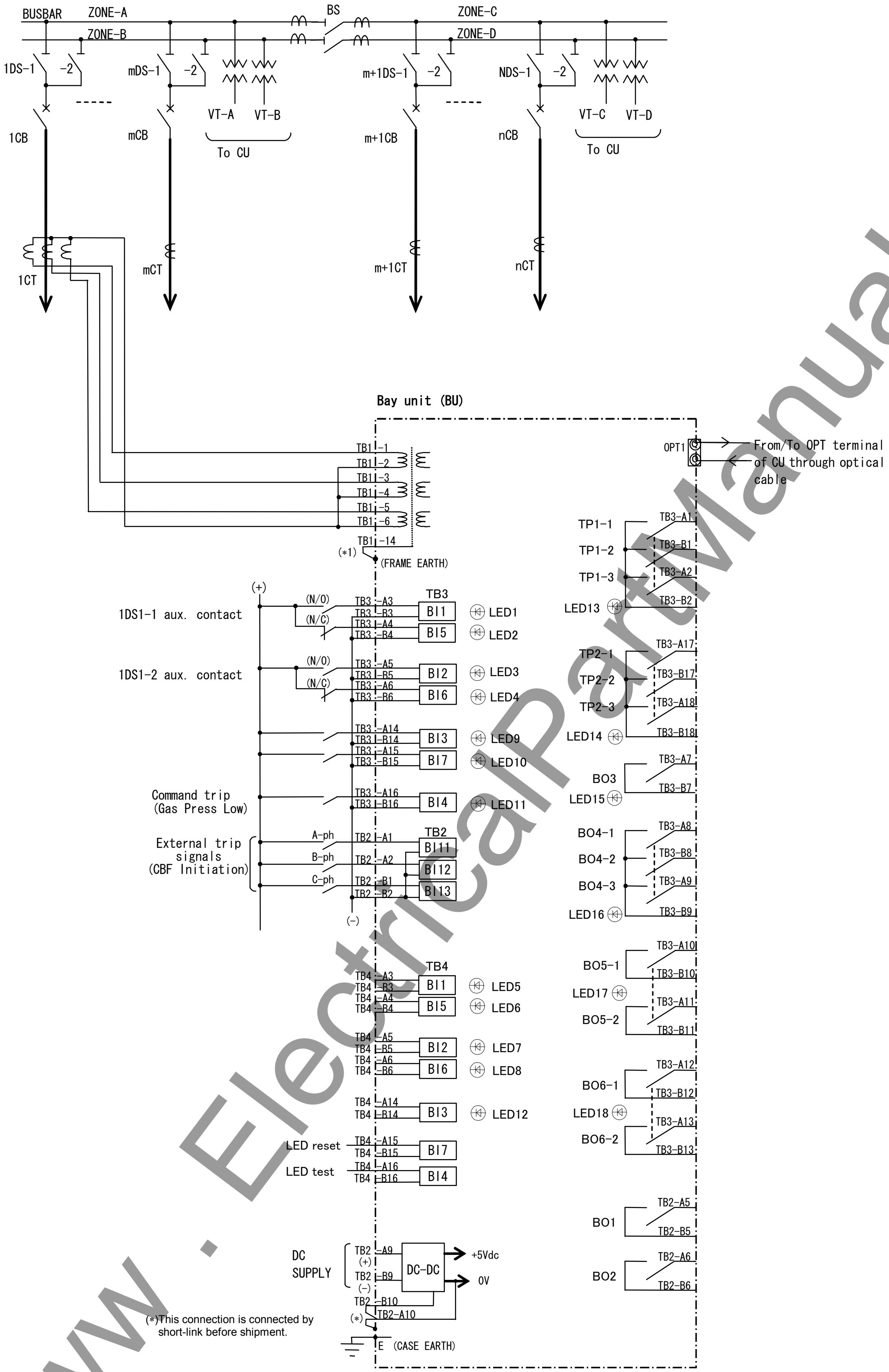
## External Connection for Bay Unit

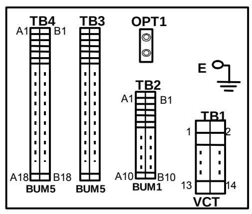



BU: Model GRB100-B300B, 310B
Terminal Block Arrangement (Rear view)

**External connections for GRB100-B300B, B310B**

www . ElectricalPartManuals . com



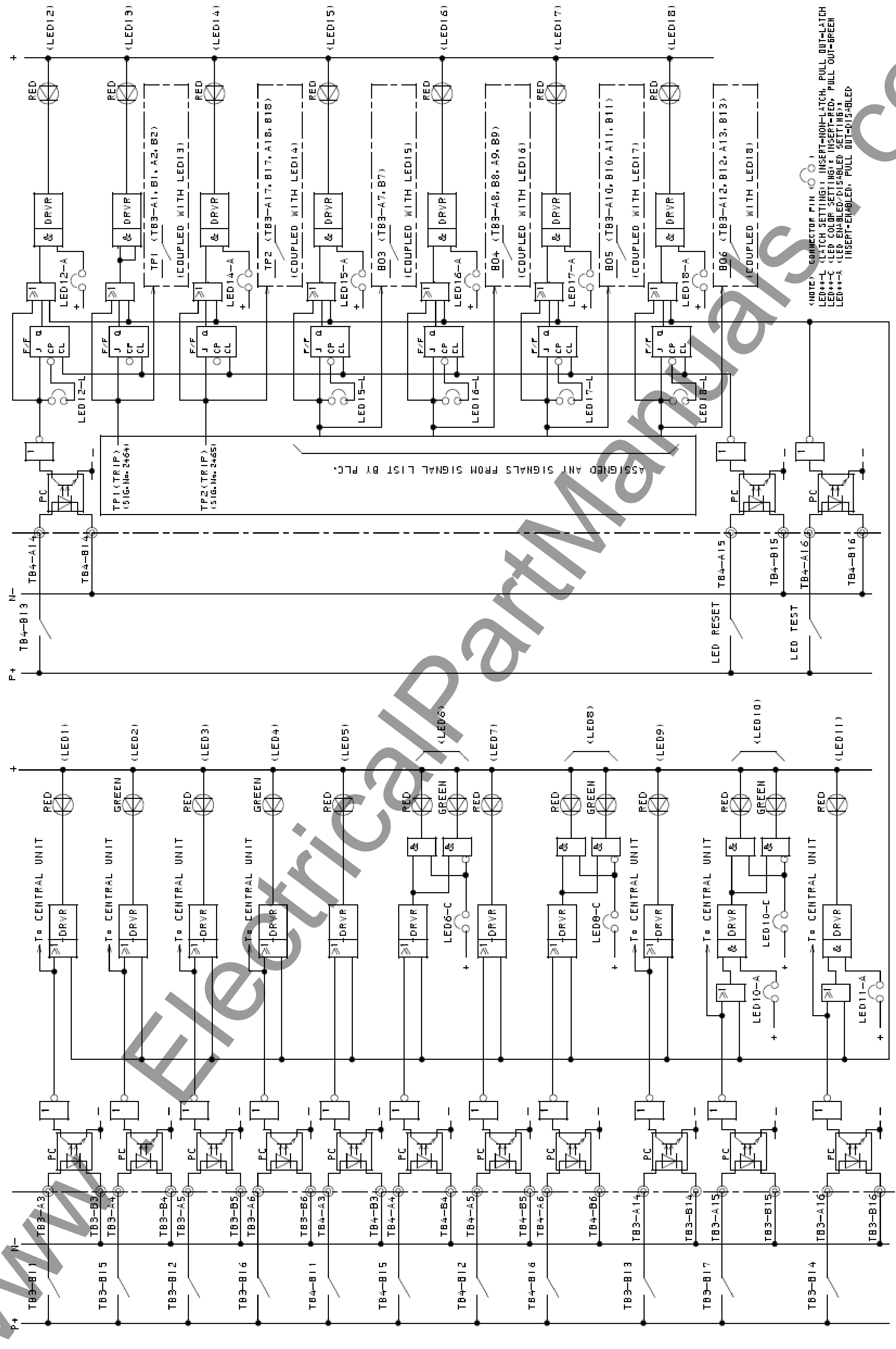




**BU: Model GRB100-B410L**

**Terminal Block Arrangement (Rear view)**

**Typical external connections for GRB100-B410L with LED indication (option)**

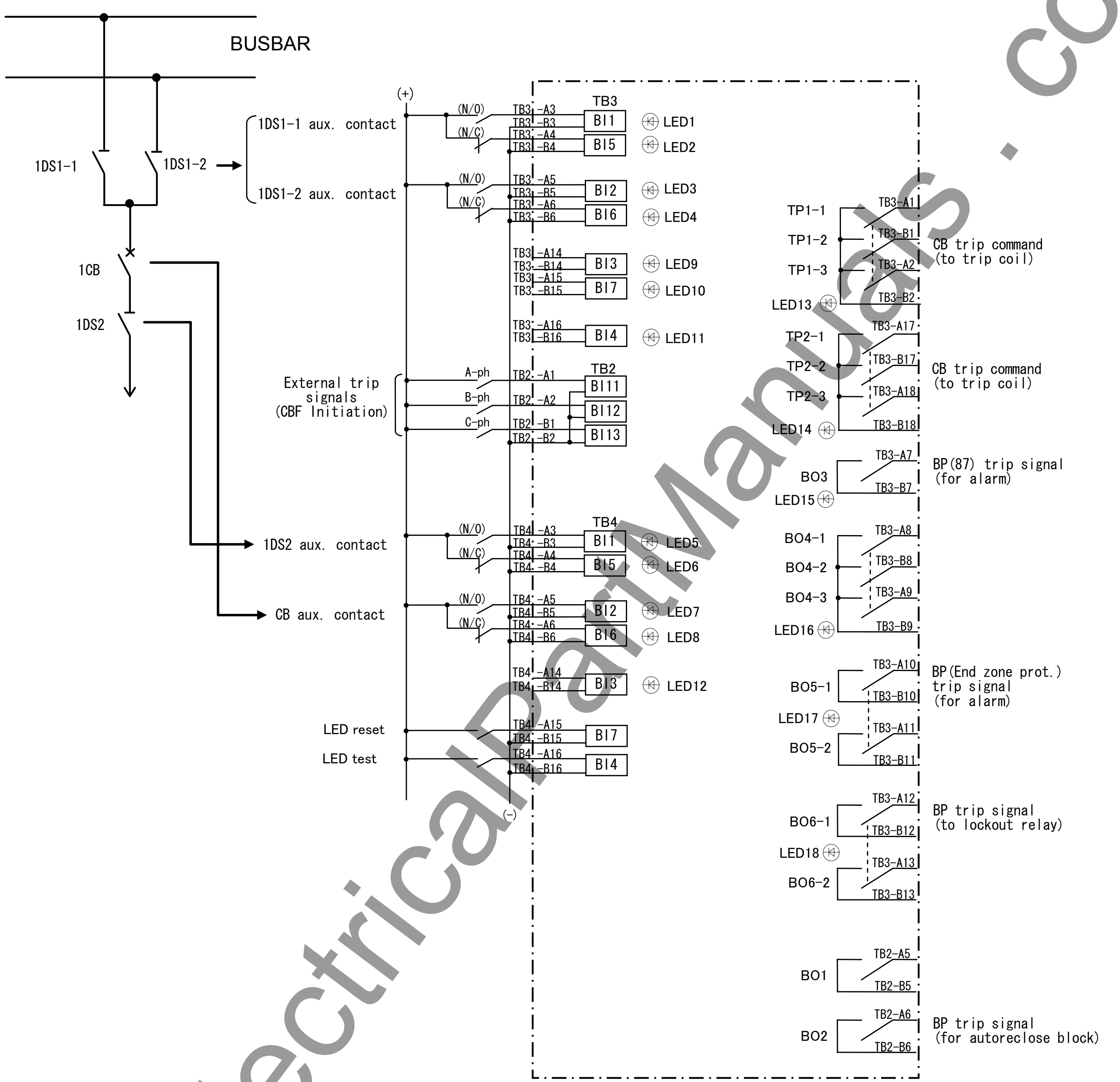
www . ElectricalPartManuals . com




**LED Circuit of GRB100-B410L**

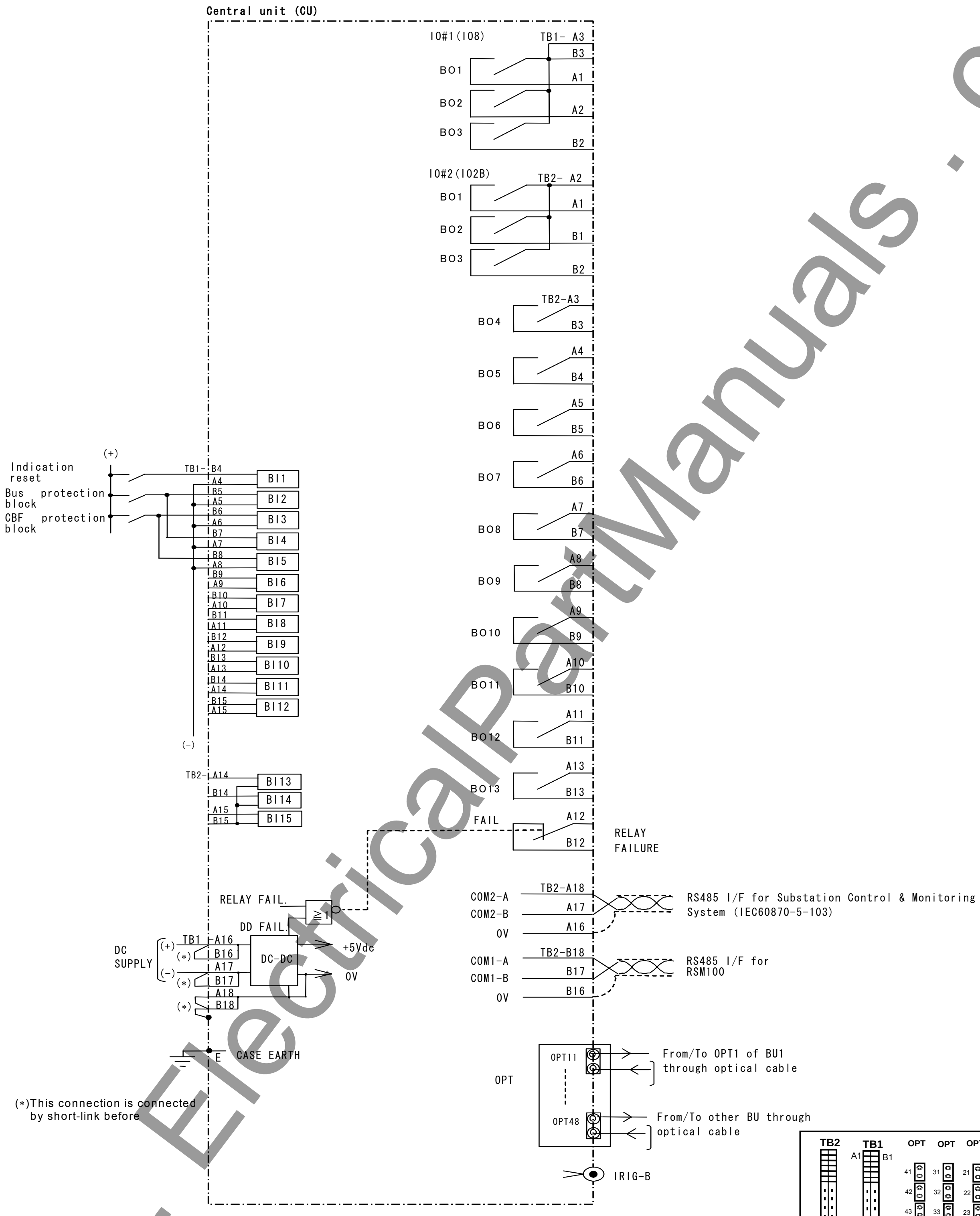
www.ElectricalPartManuals.com

Application Example: BI, BO, LED of GRB100-410L

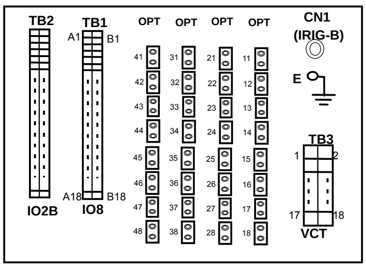



www . ElectricalPartManuals . com

## External Connection for Central Unit




**Typical external connections for GRB100-C3∗0B**

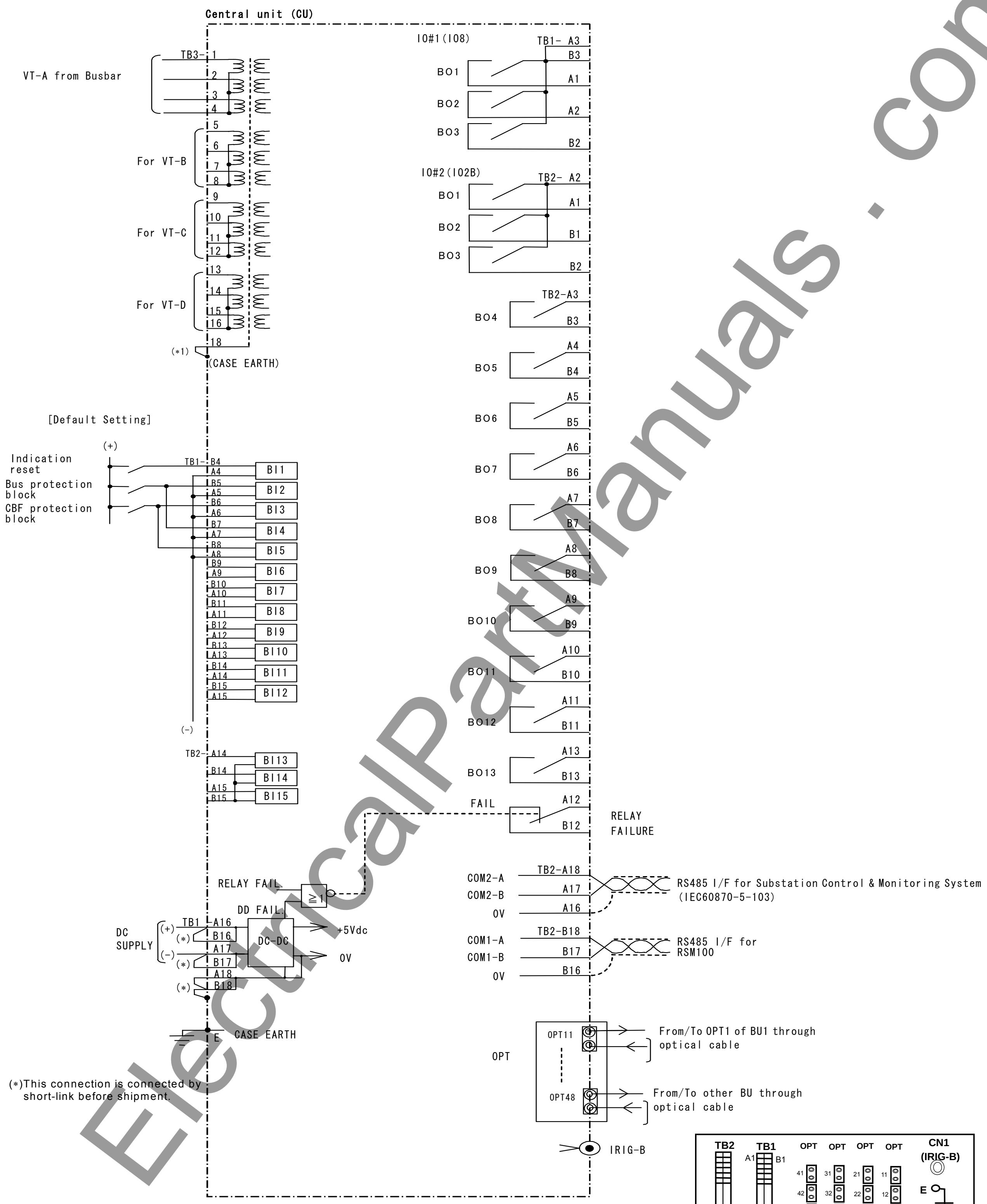



**CU: Model GRB100-C3∗0B**

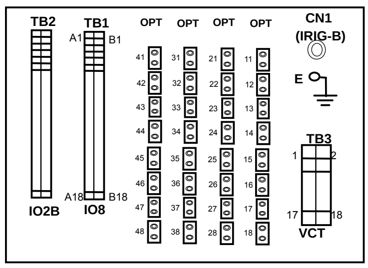
**Terminal Block Arrangement (Rear view)**



www . ElectricalPartManuals . com




**Typical external connections for GRB100-C4∗0B**




**CU: Model GRB100-C4∗0B**

**Terminal Block Arrangement (Rear view)**

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

# Appendix J

## Relay Setting Sheet

1. Relay Identification
2. Contacts Setting
3. Relay and Protection Scheme Setting Sheet

www . ElectricalPartManuals . com

## Relay Setting Sheets

### 1. Relay Identification

Date:

| | |
|---|---|
| Relay type | Serial Number |
| Frequency | CT rating |
| VT rating | dc supply voltage |
| Password | |
| Active setting group | |

### 2. Contacts Setting

| | | |
|---|---|---|
| (1) CU-IO#1 | BO1 | |
| | BO2 | |
| | BO3 | |
| (2) CU-IO#2 | BO1 | |
| | BO2 | |
| | BO3 | |
| | BO4 | |
| | BO5 | |
| | BO6 | |
| | BO7 | |
| | BO8 | |
| | BO9 | |
| | BO10 | |
| | BO11 | |
| | BO12 | |
| | BO13 | |
| (3) BU-CHn | BO1 | |
| | BO2 | |
| | BO3 | |
| | BO4 | |
| | BO5 | |
| | BO6 | |

### 3. Relay and Protection Scheme Setting Sheet

www . ElectricalPartManuals . com

Relay and Protection Scheme Setting Sheet

| № | Name | Range | | Units | Contents | Default Setting of Relay Series(5A rating / 1A rating) | | | | | | | | User Setting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | No voltage | | | | With voltage | | | | |
| | | | | | | FEP×1 | FEP×2 | FEP×3 | FEP×4 | FEP×1 | FEP×2 | FEP×3 | FEP×4 | |
| | | 5A rating | 1A rating | | | 310 | 320 | 330 | 340 | 410 | 420 | 430 | 440 | |
| 1 | Active group | 1 - 4 | | – | Active setting group | 1 | | | | | | | | |
| 2 | CH1 name | Specified by user | | – | CH name | Specified by user | | | | | | | | |
| 3 | CH2 name | Specified by user | | – | ditto | Specified by user | | | | | | | | |
| 4 | CH3 name | Specified by user | | – | ditto | Specified by user | | | | | | | | |
| 5 | CH4 name | Specified by user | | – | ditto | Specified by user | | | | | | | | |
| 6 | CH5 name | Specified by user | | – | ditto | Specified by user | | | | | | | | |
| 7 | CH6 name | Specified by user | | – | ditto | Specified by user | | | | | | | | |
| 8 | CH7 name | Specified by user | | – | ditto | Specified by user | | | | | | | | |
| 9 | CH8 name | Specified by user | | – | ditto | Specified by user | | | | | | | | |
| 10 | CH9 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 11 | CH10 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 12 | CH11 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 13 | CH12 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 14 | CH13 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 15 | CH14 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 16 | CH15 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 17 | CH16 name | Specified by user | | – | ditto | -- | Specified by user | | | -- | Specified by user | | | |
| 18 | CH17 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 19 | CH18 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 20 | CH19 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 21 | CH20 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 22 | CH21 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 23 | CH22 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 24 | CH23 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 25 | CH24 name | Specified by user | | – | ditto | -- | | Specified by user | | -- | | Specified by user | | |
| 26 | CH25 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 27 | CH26 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 28 | CH27 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 29 | CH28 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 30 | CH29 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 31 | CH30 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 32 | CH31 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 33 | CH32 name | Specified by user | | – | ditto | -- | | | ditto | -- | | | ditto | |
| 34 | VTA | 1 - 20000 | | – | VT ratio of zone A | -- | | | | 2000 | | | | |
| 35 | VTB | 1 - 20000 | | – | VT ratio of zone B | -- | | | | 2000 | | | | |
| 36 | VTC | 1 - 20000 | | – | VT ratio of zone C | -- | | | | 2000 | | | | |
| 37 | VTD | 1 - 20000 | | – | VT ratio of zone D | -- | | | | 2000 | | | | |
| 38 | C.TP | BLK - Trip | | – | Under brige condition, coupler CB triped or not | BLK | | | | | | | | |
| 39 | IDSV | Off - ALM&BLK - ALM | | – | Id monitoring control | ALM | | | | | | | | |
| 40 | AISV | Off - ALM&BLK - ALM | | – | AC input imbalance monitoring | ALM&BLK | | | | | | | | |
| 41 | AIFDSV | Off - ALM&BLK - ALM | | – | AC input imbalance of FD monitoring control | -- | | | | ALM | | | | |
| 42 | DSSV | Off - ALM&BLK - ALM | | – | DS monitoring control | ALM | | | | | | | | |
| 43 | CBSV | Off - ALM&BLK - ALM | | – | CB monitoring control | ALM | | | | | | | | |
| 44 | BFLOGIC | BF1 - BF2 | | – | CBF logic option | BF1 | | | | | | | | |
| 45 | 1 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 46 | 1 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 47 | 1 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 48 | 2 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 49 | 2 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 50 | 2 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 51 | 3 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 52 | 3 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 53 | 3 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 54 | 4 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 55 | 4 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 56 | 4 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 57 | 5 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 58 | 5 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 59 | 5 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 60 | 6 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 61 | 6 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 62 | 6 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 63 | 7 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 64 | 7 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 65 | 7 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 66 | 8 BF1 | Off - T - TOC | | – | CBF re-trip | Off | | | | | | | | |
| 67 | 8 BF2 | Off - On | | – | CBF related trip | Off | | | | | | | | |
| 68 | 8 BFEXT | Off - On | | – | CBF initiation by ext. trip | Off | | | | | | | | |
| 69 | 9 BF1 | Off - T - TOC | | – | CBF re-trip | -- | Off | | | -- | Off | | | |
| 70 | 9 BF2 | Off - On | | – | CBF related trip | -- | Off | | | -- | Off | | | |

www.ElectricalPartManuals.com

| Relay and Protection Scheme Setting Sheet | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Default Setting of Relay Series(5A rating / 1A rating) | | | | | | | | |
| № | Name | | Range | Units | Contents | No voltage | | | | With voltage | | | | User |
| | | | | | | FEP×1 | FEP×2 | FEP×3 | FEP×4 | FEP×1 | FEP×2 | FEP×3 | FEP×4 | Setting |
| | | | 5A rating / 1A rating | | | 310 | 320 | 330 | 340 | 410 | 420 | 430 | 440 | |
| 71 | 9 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 72 | 10 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 73 | 10 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 74 | 10 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 75 | 11 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 76 | 11 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 77 | 11 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 78 | 12 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 79 | 12 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 80 | 12 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 81 | 13 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 82 | 13 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 83 | 13 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 84 | 14 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 85 | 14 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 86 | 14 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 87 | 15 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 88 | 15 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 89 | 15 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 90 | 16 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 91 | 16 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 92 | 16 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 93 | 17 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 94 | 17 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 95 | 17 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 96 | 18 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 97 | 18 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 98 | 18 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 99 | 19 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 100 | 19 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 101 | 19 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 102 | 20 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 103 | 20 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 104 | 20 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 105 | 21 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 106 | 21 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 107 | 21 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 108 | 22 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 109 | 22 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 110 | 22 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 111 | 23 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 112 | 23 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 113 | 23 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 114 | 24 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | Off | | -- | | Off | | |
| 115 | 24 | BF2 | Off - On | – | CBF related trip | -- | | Off | | -- | | Off | | |
| 116 | 24 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | Off | | -- | | Off | | |
| 117 | 25 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 118 | 25 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 119 | 25 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |
| 120 | 26 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 121 | 26 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 122 | 26 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |
| 123 | 27 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 124 | 27 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 125 | 27 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |
| 126 | 28 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 127 | 28 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 128 | 28 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |
| 129 | 29 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 130 | 29 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 131 | 29 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |
| 132 | 30 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 133 | 30 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 134 | 30 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |
| 135 | 31 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 136 | 31 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 137 | 31 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |
| 138 | 32 | BF1 | Off - T - TOC | – | CBF re-trip | -- | | | Off | -- | | | Off | |
| 139 | 32 | BF2 | Off - On | – | CBF related trip | -- | | | Off | -- | | | Off | |
| 140 | 32 | BFEXT | Off - On | – | CBF initiation by ext. trip | -- | | | Off | -- | | | Off | |

www.ElectricalPartManuals.com

Relay and Protection Scheme Setting Sheet

| № | Name | Range | | Units | Contents | Default Setting of Relay Series(5A rating / 1A rating) | | | | | | | | User Setting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | No voltage | | | | With voltage | | | | |
| | | | | | | FEP×1 | FEP×2 | FEP×3 | FEP×4 | FEP×1 | FEP×2 | FEP×3 | FEP×4 | |
| | | 5A rating | 1A rating | | | 310 | 320 | 330 | 340 | 410 | 420 | 430 | 440 | |
| 141 | BFTRIO | Off - On | | — | CBF transfer operating time | Off | | | | | | | | |
| 142 | COMTP | Off - On | | — | Command trip enable | Off | | | | | | | | |
| 143 | EFPTR | Off - On | | — | End fault transfer trip enable | Off | | | | | | | | |
| 144 | CTFEN | Off - On - OPT-On | | — | CTF detect.function use or not | -- | | | | Off | | | | |
| 145 | CTFCNT | NA - BLK | | — | Control by CTF detectinon | -- | | | | NA | | | | |
| 146 | DIFCH | 500 - 3000 | | A | Minimum operating current of | 2000 | | | | | | | | |
| 147 | DIFZ | 500 - 3000 | | A | Minimum operating current of | 2000 | | | | | | | | |
| 148 | SLPCH | 0.30 - 0.90 | | - | Slope of DIFCH relay | 0.30 | | | | | | | | |
| 149 | SLPZ | 0.30 - 0.90 | | - | Slope of DIFDZ relay | 0.30 | | | | | | | | |
| 150 | DIFSV | 20 - 3000 | | A | Minimum operating current of | 200 | | | | | | | | |
| 151 | TIDSV | 0 - 60 | | s | Id err detected timer | 10 | | | | | | | | |
| 152 | TBRDG | 0 - 60 | | s | bridge timer | 60 | | | | | | | | |
| 153 | TDSSV | 0 - 60 | | s | DS failure detected timer | 60 | | | | | | | | |
| 154 | TCBSV | 0 - 60 | | s | CB failure detected timer | 10 | | | | | | | | |
| 155 | 1 CT | 100 - 10000 | | A | CT primary value | 2000 | | | | | | | | |
| 156 | 2 CT | 100 - 10000 | | A | ditto | 2000 | | | | | | | | |
| 157 | 3 CT | 100 - 10000 | | A | ditto | 2000 | | | | | | | | |
| 158 | 4 CT | 100 - 10000 | | A | ditto | 2000 | | | | | | | | |
| 159 | 5 CT | 100 - 10000 | | A | ditto | 2000 | | | | | | | | |
| 160 | 6 CT | 100 - 10000 | | A | ditto | 2000 | | | | | | | | |
| 161 | 7 CT | 100 - 10000 | | A | ditto | 2000 | | | | | | | | |
| 162 | 8 CT | 100 - 10000 | | A | ditto | 2000 | | | | | | | | |
| 163 | 9 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 164 | 10 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 165 | 11 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 166 | 12 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 167 | 13 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 168 | 14 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 169 | 15 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 170 | 16 CT | 100 - 10000 | | A | ditto | -- | 2000 | | | -- | 2000 | | | |
| 171 | 17 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 172 | 18 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 173 | 19 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 174 | 20 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 175 | 21 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 176 | 22 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 177 | 23 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 178 | 24 CT | 100 - 10000 | | A | ditto | -- | | 2000 | | -- | | 2000 | | |
| 179 | 25 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 180 | 26 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 181 | 27 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 182 | 28 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 183 | 29 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 184 | 30 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 185 | 31 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 186 | 32 CT | 100 - 10000 | | A | ditto | -- | | | 2000 | -- | | | 2000 | |
| 187 | TBFDO | 0.00 - 10.00 | | s | CBF operatin drop-off timer | 0.10 | | | | | | | | |
| 188 | TCBO | 0.00 - 10.00 | | s | CB opened timer for EFP-TR | 1.00 | | | | | | | | |
| 189 | CFID | 50 - 3000 | | A | Id level of CTF scheme | -- | | | | 200 | | | | |
| 190 | CFUV | 20 - 60 | | V | UV level of CTF scheme | -- | | | | 20 | | | | |
| 191 | CFDV | 1 - 10 | | % | UVD level of CTF scheme | -- | | | | 7 | | | | |
| 192 | CFOVG | 0.1 - 10.0 | | V | Zero pahse overvoltage of CTF | -- | | | | 1.0 | | | | |
| 193 | 1 OCB | 0.1 - 2.0 | | — | Minimum operating current | 0.8 | | | | | | | | |
| 194 | T1 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 195 | T1 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |
| 196 | 2 OCB | 0.1 - 2.0 | | — | Minimum operating current | 0.8 | | | | | | | | |
| 197 | T2 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 198 | T2 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |
| 199 | 3 OCB | 0.1 - 2.0 | | — | Minimum operating current | 0.8 | | | | | | | | |
| 200 | T3 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 201 | T3 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |
| 202 | 4 OCB | 0.1 - 2.0 | | — | Minimum operating current | 0.8 | | | | | | | | |
| 203 | T4 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 204 | T4 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |
| 205 | 5 OCB | 0.1 - 2.0 | | — | Minimum operating current | 0.8 | | | | | | | | |
| 206 | T5 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 207 | T5 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |
| 208 | 6 OCB | 0.1 - 2.0 | | — | Minimum operating current | 0.8 | | | | | | | | |
| 209 | T6 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 210 | T6 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |
| 211 | 7 OCB | 0.1 - 2.0 | | — | Minimum operating current | 0.8 | | | | | | | | |
| 212 | T7 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 213 | T7 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |

www.ElectricalPartManuals.com

Relay and Protection Scheme Setting Sheet

| № | Name | Range | | Units | Contents | Default Setting of Relay Series(5A rating / 1A rating) | | | | | | | | User Setting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | No voltage | | | | With voltage | | | | |
| | | 5A rating | 1A rating | | | FEP×1 310 | FEP×2 320 | FEP×3 330 | FEP×4 340 | FEP×1 410 | FEP×2 420 | FEP×3 430 | FEP×4 440 | |
| 214 | 8 OCB | 0.1 - 2.0 | | – | Minimum operating current | 0.8 | | | | | | | | |
| 215 | T8 B1 | 0 - 500 | | ms | CBF timer for re-trip | 150 | | | | | | | | |
| 216 | T8 B2 | 0 - 500 | | ms | CBF timer for related trip | 200 | | | | | | | | |
| 217 | 9 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 218 | T9 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 219 | T9 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 220 | 10 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 221 | T10 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 222 | T10 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 223 | 11 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 224 | T11 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 225 | T11 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 226 | 12 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 227 | T12 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 228 | T12 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 229 | 13 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 230 | T13 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 231 | T13 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 232 | 14 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 233 | T14 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 234 | T14 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 235 | 15 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 236 | T15 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 237 | T15 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 238 | 16 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | 0.8 | | | -- | 0.8 | | | |
| 239 | T16 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | 150 | | | -- | 150 | | | |
| 240 | T16 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | 200 | | | -- | 200 | | | |
| 241 | 17 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 242 | T17 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 243 | T17 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 244 | 18 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 245 | T18 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 246 | T18 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 247 | 19 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 248 | T19 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 249 | T19 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 250 | 20 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 251 | T20 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 252 | T20 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 253 | 21 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 254 | T21 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 255 | T21 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 256 | 22 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 257 | T22 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 258 | T22 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 259 | 23 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 260 | T23 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 261 | T23 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 262 | 24 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | 0.8 | | -- | | 0.8 | | |
| 263 | T24 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | 150 | | -- | | 150 | | |
| 264 | T24 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | 200 | | -- | | 200 | | |
| 265 | 25 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 266 | T25 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 267 | T25 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |
| 268 | 26 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 269 | T26 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 270 | T26 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |
| 271 | 27 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 272 | T27 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 273 | T27 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |
| 274 | 28 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 275 | T28 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 276 | T28 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |
| 277 | 29 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 278 | T29 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 279 | T29 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |
| 280 | 30 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 281 | T30 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 282 | T30 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |
| 283 | 31 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 284 | T31 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 285 | T31 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |
| 286 | 32 OCB | 0.1 - 2.0 | | – | Minimum operating current | -- | | | 0.8 | -- | | | 0.8 | |
| 287 | T32 B1 | 0 - 500 | | ms | CBF timer for re-trip | -- | | | 150 | -- | | | 150 | |
| 288 | T32 B2 | 0 - 500 | | ms | CBF timer for related trip | -- | | | 200 | -- | | | 200 | |

www.ElectricalPartManuals.com

Relay and Protection Scheme Setting Sheet

| № | Name | Range 5A rating | Range 1A rating | Units | Contents | Default Setting of Relay Series(5A rating / 1A rating) No voltage FEP×1 310 | FEP×2 320 | FEP×3 330 | FEP×4 340 | With voltage FEP×1 410 | FEP×2 420 | FEP×3 430 | FEP×4 440 | User Setting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 289 | UVSF | 60 - 100 | | V | Phase-to-phase undervoltage | -- | | | | 80 | | | | |
| 290 | UVGF | 20 - 60 | | V | Phase-to-earth undervoltage | -- | | | | 46 | | | | |
| 291 | OVGF | 0.1 - 10.0 | | V | Zero-phase overvoltage | -- | | | | 10.0 | | | | |
| 292 | BISW 1 | Norm - Inv | | – | Binary input | Norm | | | | | | | | |
| 293 | BISW 2 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 294 | BISW 3 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 295 | BISW 4 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 296 | BISW 5 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 297 | BISW 6 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 298 | BISW 7 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 299 | BISW 8 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 300 | BISW 9 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 301 | BISW 10 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 302 | BISW 11 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 303 | BISW 12 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 304 | BISW 13 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 305 | BISW 14 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 306 | BISW 15 | Norm - Inv | | – | ditto | Norm | | | | | | | | |
| 307 | LED1 | 0 - 3071 | | – | Configrable LEDs | 0 | | | | | | | | |
| 308 | LED2 | 0 - 3071 | | – | ditto | 0 | | | | | | | | |
| 309 | LED3 | 0 - 3071 | | – | ditto | 0 | | | | | | | | |
| 310 | LED4 | 0 - 3071 | | – | ditto | 0 | | | | | | | | |
| 311 | Plant name | Specified by user | | – | Plant name | Specified by user | | | | | | | | |
| 312 | Description | ditto | | – | Memorandum for user | Specified by user | | | | | | | | |
| 313 | HDLC(LCD) Address(RSM) | 1 - 32 | | – | Relay ID No. for RSM | 1 | | | | | | | | |
| 314 | IEC(LCD) Address(RSM) | 0 - 254 | | – | Relay ID No. for IEC103 | 2 | | | | | | | | |
| 315 | 232C | 9.6 - 19.2 - 38.4 - 57.6 | | – | Comm. speed for RSM | 9.6 | | | | | | | | |
| 316 | IECBR | 9.6 - 19.2 | | – | Comm. speed for IEC103 | 19.2 | | | | | | | | |
| 317 | IECBLK | Normal - Blocked | | – | Comm. switch for IEC103 | Normal | | | | | | | | |
| 318 | ZA trip | None - Operate - Reset - Both | | – | Event record trigger | Both | | | | | | | | |
| 319 | ZB trip | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 320 | ZC trip | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 321 | ZD trip | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 322 | Trip | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 323 | CBF-retrip | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 324 | CBF-trip | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 325 | CBF-TR | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 326 | COM-trip | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 327 | EFP-TR | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 328 | Bus bridge | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 329 | Trans.bus | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 330 | BP block | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 331 | CBF block | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 332 | Ind. reset | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 333 | Relay fail | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 334 | CT err | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 335 | V0 err | None - Operate - Reset - Both | | – | ditto | -- | | | | Both | | | | |
| 336 | V2 err | None - Operate - Reset - Both | | – | ditto | -- | | | | Both | | | | |
| 337 | Id err | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 338 | DS fail | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 339 | CB fail | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 340 | CTF | None - Operate - Reset - Both | | – | ditto | -- | | | | Both | | | | |
| 341 | CH1 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 342 | CH2 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 343 | CH3 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 344 | CH4 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 345 | CH5 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 346 | CH6 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 347 | CH7 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 348 | CH8 BI | None - Operate - Reset - Both | | – | ditto | Both | | | | | | | | |
| 349 | CH9 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 350 | CH10 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 351 | CH11 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 352 | CH12 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 353 | CH13 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 354 | CH14 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 355 | CH15 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 356 | CH16 BI | None - Operate - Reset - Both | | – | ditto | -- | Both | | | -- | Both | | | |
| 357 | CH17 BI | None - Operate - Reset - Both | | – | ditto | -- | | Both | | -- | | Both | | |
| 358 | CH18 BI | None - Operate - Reset - Both | | – | ditto | -- | | Both | | -- | | Both | | |

www.ElectricalPartManuals.com

Relay and Protection Scheme Setting Sheet

| № | Name | Range | | Units | Contents | Default Setting of Relay Series(5A rating / 1A rating) | | | | | | | | User Setting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | No voltage | | | | With voltage | | | | |
| | | | | | | FEP×1 | FEP×2 | FEP×3 | FEP×4 | FEP×1 | FEP×2 | FEP×3 | FEP×4 | |
| | | 5A rating | 1A rating | | | 310 | 320 | 330 | 340 | 410 | 420 | 430 | 440 | |
| 359 | CH19 BI | None - Operate - Reset - Both | | — | ditto | -- | | Both | | -- | | Both | | |
| 360 | CH20 BI | None - Operate - Reset - Both | | — | ditto | -- | | Both | | -- | | Both | | |
| 361 | CH21 BI | None - Operate - Reset - Both | | — | ditto | -- | | Both | | -- | | Both | | |
| 362 | CH22 BI | None - Operate - Reset - Both | | — | ditto | -- | | Both | | -- | | Both | | |
| 363 | CH23 BI | None - Operate - Reset - Both | | — | ditto | -- | | Both | | -- | | Both | | |
| 364 | CH24 BI | None - Operate - Reset - Both | | — | ditto | -- | | Both | | -- | | Both | | |
| 365 | CH25 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 366 | CH26 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 367 | CH27 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 368 | CH28 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 369 | CH29 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 370 | CH30 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 371 | CH31 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 372 | CH32 BI | None - Operate - Reset - Both | | — | ditto | -- | | | Both | -- | | | Both | |
| 373 | Sys. set change | None - Operate | | — | ditto | Operate | | | | | | | | |
| 374 | Rly. set change | None - Operate | | — | ditto | Operate | | | | | | | | |
| 375 | Grp. set change | None - Operate | | — | ditto | Operate | | | | | | | | |
| 376 | Time | 0.1 - 2.0 | | s | Disturbance record | 1.0 | | | | | | | | |
| 377 | 1 OCG | 0.1 - 10.0 | | - | OC element for disturbance | 1.0 | | | | | | | | |
| 378 | 1 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 379 | 2 OCG | 0.1 - 10.0 | | - | ditto | 1.0 | | | | | | | | |
| 380 | 2 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 381 | 3 OCG | 0.1 - 10.0 | | - | ditto | 1.0 | | | | | | | | |
| 382 | 3 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 383 | 4 OCG | 0.1 - 10.0 | | - | ditto | 1.0 | | | | | | | | |
| 384 | 4 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 385 | 5 OCG | 0.1 - 10.0 | | - | ditto | 1.0 | | | | | | | | |
| 386 | 5 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 387 | 6 OCG | 0.1 - 10.0 | | - | ditto | 1.0 | | | | | | | | |
| 388 | 6 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 389 | 7 OCG | 0.1 - 10.0 | | - | ditto | 1.0 | | | | | | | | |
| 390 | 7 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 391 | 8 OCG | 0.1 - 10.0 | | - | ditto | 1.0 | | | | | | | | |
| 392 | 8 OCS | 0.1 - 10.0 | | - | ditto | 2.0 | | | | | | | | |
| 393 | 9 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 394 | 9 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 395 | 10 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 396 | 10 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 397 | 11 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 398 | 11 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 399 | 12 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 400 | 12 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 401 | 13 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 402 | 13 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 403 | 14 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 404 | 14 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 405 | 15 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 406 | 15 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 407 | 16 OCG | 0.1 - 10.0 | | - | ditto | -- | 1.0 | | | -- | 1.0 | | | |
| 408 | 16 OCS | 0.1 - 10.0 | | - | ditto | -- | 2.0 | | | -- | 2.0 | | | |
| 409 | 17 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 410 | 17 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 411 | 18 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 412 | 18 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 413 | 19 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 414 | 19 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 415 | 20 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 416 | 20 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 417 | 21 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 418 | 21 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 419 | 22 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 420 | 22 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 421 | 23 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 422 | 23 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 423 | 24 OCG | 0.1 - 10.0 | | - | ditto | -- | | 1.0 | | -- | | 1.0 | | |
| 424 | 24 OCS | 0.1 - 10.0 | | - | ditto | -- | | 2.0 | | -- | | 2.0 | | |
| 425 | 25 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 426 | 25 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |
| 427 | 26 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 428 | 26 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |

www.ElectricalPartManuals.com

Relay and Protection Scheme Setting Sheet

| № | Name | Range | | Units | Contents | Default Setting of Relay Series(5A rating / 1A rating) | | | | | | | | User Setting |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | No voltage | | | | With voltage | | | | |
| | | | | | | FEP×1 | FEP×2 | FEP×3 | FEP×4 | FEP×1 | FEP×2 | FEP×3 | FEP×4 | |
| | | 5A rating | 1A rating | | | 310 | 320 | 330 | 340 | 410 | 420 | 430 | 440 | |
| 429 | 27 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 430 | 27 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |
| 431 | 28 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 432 | 28 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |
| 433 | 29 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 434 | 29 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |
| 435 | 30 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 436 | 30 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |
| 437 | 31 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 438 | 31 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |
| 439 | 32 OCG | 0.1 - 10.0 | | - | ditto | -- | | | 1.0 | -- | | | 1.0 | |
| 440 | 32 OCS | 0.1 - 10.0 | | - | ditto | -- | | | 2.0 | -- | | | 2.0 | |
| 441 | TRIP | Off - On | | — | Disturbance trigger | On | | | | | | | | |
| 442 | OCG | Off - On | | — | ditto | Off | | | | | | | | |
| 443 | OCS | Off - On | | — | ditto | Off | | | | | | | | |
| 444 | Display value | Primary - Secondary | | — | Metering | Primary | | | | | | | | |
| 445 | Time sync | Off - IRIG - RSM | | — | Time | Off | | | | | | | | |
| 446 | GMT | -12 - +12 | | hrs | Time | 0 | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 1536 | | | | | | | | | | | | | | | |
| 1537 | | | | | | | | | | | | | | | |
| 1538 | CH1-DS2_N/O | | X | | 0 | | [13]CH1-BI2 | | | | | | | | X |
| 1539 | CH1-DS2_N/C | | X | | 0 | | [14]CH1-BI6 | | | | | | | | X |
| 1540 | CH1-DS3_N/O | | | | | | -- | | | | | | | | |
| 1541 | CH1-DS3_N/C | | | | | | -- | | | | | | | | |
| 1542 | CH1-DS4_N/O | | | | | | -- | | | | | | | | |
| 1543 | CH1-DS4_N/C | | | | | | -- | | | | | | | | |
| 1544 | CH1-CB_N/O | | X | | 0 | | [15]CH1-BI3 | | | | | | | | X |
| 1545 | CH1-CB_N/C | | X | | 0 | | [16]CH1-BI7 | | | | | | | | X |
| 1546 | | | | | | | | | | | | | | | |
| 1547 | | | | | | | | | | | | | | | |
| 1548 | | | | | | | | | | | | | | | |
| 1549 | | | | | | | | | | | | | | | |
| 1550 | | | | | | | | | | | | | | | |
| 1551 | | | | | | | | | | | | | | | |
| 1552 | | | | | | | | | | | | | | | |
| 1553 | | | | | | | | | | | | | | | |
| 1554 | CH2-DS2_N/O | | X | | 1 | | [29]CH2-BI2 | | | | | | | | X |
| 1555 | CH2-DS2_N/C | | X | | 1 | | [30]CH2-BI6 | | | | | | | | X |
| 1556 | CH2-DS3_N/O | | | | | | -- | | | | | | | | |
| 1557 | CH2-DS3_N/C | | | | | | -- | | | | | | | | |
| 1558 | CH2-DS4_N/O | | | | | | -- | | | | | | | | |
| 1559 | CH2-DS4_N/C | | | | | | -- | | | | | | | | |
| 1560 | CH2-CB_N/O | | X | | 1 | | [31]CH2-BI3 | | | | | | | | X |
| 1561 | CH2-CB_N/C | | X | | 1 | | [32]CH2-BI7 | | | | | | | | X |
| 1562 | | | | | | | | | | | | | | | |
| 1563 | | | | | | | | | | | | | | | |
| 1564 | | | | | | | | | | | | | | | |
| 1565 | | | | | | | | | | | | | | | |
| 1566 | | | | | | | | | | | | | | | |
| 1567 | | | | | | | | | | | | | | | |
| 1568 | | | | | | | | | | | | | | | |
| 1569 | | | | | | | | | | | | | | | |
| 1570 | CH3-DS2_N/O | | X | | 2 | | [45]CH3-BI2 | | | | | | | | X |
| 1571 | CH3-DS2_N/C | | X | | 2 | | [46]CH3-BI6 | | | | | | | | X |
| 1572 | CH3-DS3_N/O | | | | | | -- | | | | | | | | |
| 1573 | CH3-DS3_N/C | | | | | | -- | | | | | | | | |
| 1574 | CH3-DS4_N/O | | | | | | -- | | | | | | | | |
| 1575 | CH3-DS4_N/C | | | | | | -- | | | | | | | | |
| 1576 | CH3-CB_N/O | | X | | 2 | | [47]CH3-BI3 | | | | | | | | X |
| 1577 | CH3-CB_N/C | | X | | 2 | | [48]CH3-BI7 | | | | | | | | X |
| 1578 | | | | | | | | | | | | | | | |
| 1579 | | | | | | | | | | | | | | | |
| 1580 | | | | | | | | | | | | | | | |
| 1581 | | | | | | | | | | | | | | | |
| 1582 | | | | | | | | | | | | | | | |
| 1583 | | | | | | | | | | | | | | | |
| 1584 | | | | | | | | | | | | | | | |
| 1585 | | | | | | | | | | | | | | | |
| 1586 | CH4-DS2_N/O | | X | | 0 | | [61]CH4-BI2 | | | | | | | | X |
| 1587 | CH4-DS2_N/C | | X | | 0 | | [62]CH4-BI6 | | | | | | | | X |
| 1588 | CH4-DS3_N/O | | | | | | -- | | | | | | | | |
| 1589 | CH4-DS3_N/C | | | | | | -- | | | | | | | | |
| 1590 | CH4-DS4_N/O | | | | | | -- | | | | | | | | |
| 1591 | CH4-DS4_N/C | | | | | | -- | | | | | | | | |
| 1592 | CH4-CB_N/O | | X | | 0 | | [63]CH4-BI3 | | | | | | | | X |
| 1593 | CH4-CB_N/C | | X | | 0 | | [64]CH4-BI7 | | | | | | | | X |
| 1594 | | | | | | | | | | | | | | | |
| 1595 | | | | | | | | | | | | | | | |
| 1596 | | | | | | | | | | | | | | | |
| 1597 | | | | | | | | | | | | | | | |
| 1598 | | | | | | | | | | | | | | | |
| 1599 | | | | | | | | | | | | | | | |
| 1600 | | | | | | | | | | | | | | | |
| 1601 | | | | | | | | | | | | | | | |
| 1602 | CH5-DS2_N/O | | X | | 1 | | [77]CH5-BI2 | | | | | | | | X |
| 1603 | CH5-DS2_N/C | | X | | 1 | | [78]CH5-BI6 | | | | | | | | X |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 1604 | CH5-DS3_N/O | | | | | -- | | | | | | | | | |
| 1605 | CH5-DS3_N/C | | | | | -- | | | | | | | | | |
| 1606 | CH5-DS4_N/O | | | | | -- | | | | | | | | | |
| 1607 | CH5-DS4_N/C | | | | | -- | | | | | | | | | |
| 1608 | CH5-CB_N/O | | X | | 1 | [79]CH5-BI3 | | | | | | | | | X |
| 1609 | CH5-CB_N/C | | X | | 1 | [80]CH5-BI7 | | | | | | | | | X |
| 1610 | | | | | | | | | | | | | | | |
| 1611 | | | | | | | | | | | | | | | |
| 1612 | | | | | | | | | | | | | | | |
| 1613 | | | | | | | | | | | | | | | |
| 1614 | | | | | | | | | | | | | | | |
| 1615 | | | | | | | | | | | | | | | |
| 1616 | | | | | | | | | | | | | | | |
| 1617 | | | | | | | | | | | | | | | |
| 1618 | CH6-DS2_N/O | | X | | 2 | [93]CH6-BI2 | | | | | | | | | X |
| 1619 | CH6-DS2_N/C | | X | | 2 | [94]CH6-BI6 | | | | | | | | | X |
| 1620 | CH6-DS3_N/O | | | | | -- | | | | | | | | | |
| 1621 | CH6-DS3_N/C | | | | | -- | | | | | | | | | |
| 1622 | CH6-DS4_N/O | | | | | -- | | | | | | | | | |
| 1623 | CH6-DS4_N/C | | | | | -- | | | | | | | | | |
| 1624 | CH6-CB_N/O | | X | | 2 | [95]CH6-BI3 | | | | | | | | | X |
| 1625 | CH6-CB_N/C | | X | | 2 | [96]CH6-BI7 | | | | | | | | | X |
| 1626 | | | | | | | | | | | | | | | |
| 1627 | | | | | | | | | | | | | | | |
| 1628 | | | | | | | | | | | | | | | |
| 1629 | | | | | | | | | | | | | | | |
| 1630 | | | | | | | | | | | | | | | |
| 1631 | | | | | | | | | | | | | | | |
| 1632 | | | | | | | | | | | | | | | |
| 1633 | | | | | | | | | | | | | | | |
| 1634 | CH7-DS2_N/O | | X | | 0 | [109]CH7-BI2 | | | | | | | | | X |
| 1635 | CH7-DS2_N/C | | X | | 0 | [110]CH7-BI6 | | | | | | | | | X |
| 1636 | CH7-DS3_N/O | | | | | -- | | | | | | | | | |
| 1637 | CH7-DS3_N/C | | | | | -- | | | | | | | | | |
| 1638 | CH7-DS4_N/O | | | | | -- | | | | | | | | | |
| 1639 | CH7-DS4_N/C | | | | | -- | | | | | | | | | |
| 1640 | CH7-CB_N/O | | X | | 0 | [111]CH7-BI3 | | | | | | | | | X |
| 1641 | CH7-CB_N/C | | X | | 0 | [112]CH7-BI7 | | | | | | | | | X |
| 1642 | | | | | | | | | | | | | | | |
| 1643 | | | | | | | | | | | | | | | |
| 1644 | | | | | | | | | | | | | | | |
| 1645 | | | | | | | | | | | | | | | |
| 1646 | | | | | | | | | | | | | | | |
| 1647 | | | | | | | | | | | | | | | |
| 1648 | | | | | | | | | | | | | | | |
| 1649 | | | | | | | | | | | | | | | |
| 1650 | CH8-DS2_N/O | | X | | 1 | [125]CH8-BI2 | | | | | | | | | X |
| 1651 | CH8-DS2_N/C | | X | | 1 | [126]CH8-BI6 | | | | | | | | | X |
| 1652 | CH8-DS3_N/O | | | | | -- | | | | | | | | | |
| 1653 | CH8-DS3_N/C | | | | | -- | | | | | | | | | |
| 1654 | CH8-DS4_N/O | | | | | -- | | | | | | | | | |
| 1655 | CH8-DS4_N/C | | | | | -- | | | | | | | | | |
| 1656 | CH8-CB_N/O | | X | | 1 | [127]CH8-BI3 | | | | | | | | | X |
| 1657 | CH8-CB_N/C | | X | | 1 | [128]CH8-BI7 | | | | | | | | | X |
| 1658 | | | | | | | | | | | | | | | |
| 1659 | | | | | | | | | | | | | | | |
| 1660 | | | | | | | | | | | | | | | |
| 1661 | | | | | | | | | | | | | | | |
| 1662 | | | | | | | | | | | | | | | |
| 1663 | | | | | | | | | | | | | | | |
| 1664 | | | | | | | | | | | | | | | |
| 1665 | | | | | | | | | | | | | | | |
| 1666 | CH9-DS2_N/O | | X | | 2 | [141]CH9-BI2 | | | | | | | | | X |
| 1667 | CH9-DS2_N/C | | X | | 2 | [142]CH9-BI6 | | | | | | | | | X |
| 1668 | CH9-DS3_N/O | | | | | -- | | | | | | | | | |
| 1669 | CH9-DS3_N/C | | | | | -- | | | | | | | | | |
| 1670 | CH9-DS4_N/O | | | | | -- | | | | | | | | | |
| 1671 | CH9-DS4_N/C | | | | | -- | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 1672 | CH9-CB_N/O | | X | | 2 | [143]CH9-BI3 | | | | | | | | | X |
| 1673 | CH9-CB_N/C | | X | | 2 | [144]CH9-BI7 | | | | | | | | | X |
| 1674 | | | | | | | | | | | | | | | |
| 1675 | | | | | | | | | | | | | | | |
| 1676 | | | | | | | | | | | | | | | |
| 1677 | | | | | | | | | | | | | | | |
| 1678 | | | | | | | | | | | | | | | |
| 1679 | | | | | | | | | | | | | | | |
| 1680 | | | | | | | | | | | | | | | |
| 1681 | | | | | | | | | | | | | | | |
| 1682 | CH10-DS2_N/O | | X | | 0 | [157]CH10-BI2 | | | | | | | | | X |
| 1683 | CH10-DS2_N/C | | X | | 0 | [158]CH10-BI6 | | | | | | | | | X |
| 1684 | CH10-DS3_N/O | | | | | -- | | | | | | | | | |
| 1685 | CH10-DS3_N/C | | | | | -- | | | | | | | | | |
| 1686 | CH10-DS4_N/O | | | | | -- | | | | | | | | | |
| 1687 | CH10-DS4_N/C | | | | | -- | | | | | | | | | |
| 1688 | CH10-CB_N/O | | X | | 0 | [159]CH10-BI3 | | | | | | | | | X |
| 1689 | CH10-CB_N/C | | X | | 0 | [160]CH10-BI7 | | | | | | | | | X |
| 1690 | | | | | | | | | | | | | | | |
| 1691 | | | | | | | | | | | | | | | |
| 1692 | | | | | | | | | | | | | | | |
| 1693 | | | | | | | | | | | | | | | |
| 1694 | | | | | | | | | | | | | | | |
| 1695 | | | | | | | | | | | | | | | |
| 1696 | | | | | | | | | | | | | | | |
| 1697 | | | | | | | | | | | | | | | |
| 1698 | CH11-DS2_N/O | | X | | 1 | [173]CH11-BI2 | | | | | | | | | X |
| 1699 | CH11-DS2_N/C | | X | | 1 | [174]CH11-BI6 | | | | | | | | | X |
| 1700 | CH11-DS3_N/O | | | | | -- | | | | | | | | | |
| 1701 | CH11-DS3_N/C | | | | | -- | | | | | | | | | |
| 1702 | CH11-DS4_N/O | | | | | -- | | | | | | | | | |
| 1703 | CH11-DS4_N/C | | | | | -- | | | | | | | | | |
| 1704 | CH11-CB_N/O | | X | | 1 | [175]CH11-BI3 | | | | | | | | | X |
| 1705 | CH11-CB_N/C | | X | | 1 | [176]CH11-BI7 | | | | | | | | | X |
| 1706 | | | | | | | | | | | | | | | |
| 1707 | | | | | | | | | | | | | | | |
| 1708 | | | | | | | | | | | | | | | |
| 1709 | | | | | | | | | | | | | | | |
| 1710 | | | | | | | | | | | | | | | |
| 1711 | | | | | | | | | | | | | | | |
| 1712 | | | | | | | | | | | | | | | |
| 1713 | | | | | | | | | | | | | | | |
| 1714 | CH12-DS2_N/O | | X | | 2 | [189]CH12-BI2 | | | | | | | | | X |
| 1715 | CH12-DS2_N/C | | X | | 2 | [190]CH12-BI6 | | | | | | | | | X |
| 1716 | CH12-DS3_N/O | | | | | -- | | | | | | | | | |
| 1717 | CH12-DS3_N/C | | | | | -- | | | | | | | | | |
| 1718 | CH12-DS4_N/O | | | | | -- | | | | | | | | | |
| 1719 | CH12-DS4_N/C | | | | | -- | | | | | | | | | |
| 1720 | CH12-CB_N/O | | X | | 2 | [191]CH12-BI3 | | | | | | | | | X |
| 1721 | CH12-CB_N/C | | X | | 2 | [192]CH12-BI7 | | | | | | | | | X |
| 1722 | | | | | | | | | | | | | | | |
| 1723 | | | | | | | | | | | | | | | |
| 1724 | | | | | | | | | | | | | | | |
| 1725 | | | | | | | | | | | | | | | |
| 1726 | | | | | | | | | | | | | | | |
| 1727 | | | | | | | | | | | | | | | |
| 1728 | | | | | | | | | | | | | | | |
| 1729 | | | | | | | | | | | | | | | |
| 1730 | CH13-DS2_N/O | | X | | 0 | [205]CH13-BI2 | | | | | | | | | X |
| 1731 | CH13-DS2_N/C | | X | | 0 | [206]CH13-BI6 | | | | | | | | | X |
| 1732 | CH13-DS3_N/O | | | | | -- | | | | | | | | | |
| 1733 | CH13-DS3_N/C | | | | | -- | | | | | | | | | |
| 1734 | CH13-DS4_N/O | | | | | -- | | | | | | | | | |
| 1735 | CH13-DS4_N/C | | | | | -- | | | | | | | | | |
| 1736 | CH13-CB_N/O | | X | | 0 | [207]CH13-BI3 | | | | | | | | | X |
| 1737 | CH13-CB_N/C | | X | | 0 | [208]CH13-BI7 | | | | | | | | | X |
| 1738 | | | | | | | | | | | | | | | |
| 1739 | | | | | | | | | | | | | | | |
| 1740 | | | | | | | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 1741 | | | | | | | | | | | | | | | |
| 1742 | | | | | | | | | | | | | | | |
| 1743 | | | | | | | | | | | | | | | |
| 1744 | | | | | | | | | | | | | | | |
| 1745 | | | | | | | | | | | | | | | |
| 1746 | CH14-DS2_N/O | | X | | 1 | | [221]CH14-BI2 | | | | | | | | X |
| 1747 | CH14-DS2_N/C | | X | | 1 | | [222]CH14-BI6 | | | | | | | | X |
| 1748 | CH14-DS3_N/O | | | | | | -- | | | | | | | | |
| 1749 | CH14-DS3_N/C | | | | | | -- | | | | | | | | |
| 1750 | CH14-DS4_N/O | | | | | | -- | | | | | | | | |
| 1751 | CH14-DS4_N/C | | | | | | -- | | | | | | | | |
| 1752 | CH14-CB_N/O | | X | | 1 | | [223]CH14-BI3 | | | | | | | | X |
| 1753 | CH14-CB_N/C | | X | | 1 | | [224]CH14-BI7 | | | | | | | | X |
| 1754 | | | | | | | | | | | | | | | |
| 1755 | | | | | | | | | | | | | | | |
| 1756 | | | | | | | | | | | | | | | |
| 1757 | | | | | | | | | | | | | | | |
| 1758 | | | | | | | | | | | | | | | |
| 1759 | | | | | | | | | | | | | | | |
| 1760 | | | | | | | | | | | | | | | |
| 1761 | | | | | | | | | | | | | | | |
| 1762 | CH15-DS2_N/O | | X | | 2 | | [237]CH15-BI2 | | | | | | | | X |
| 1763 | CH15-DS2_N/C | | X | | 2 | | [238]CH15-BI6 | | | | | | | | X |
| 1764 | CH15-DS3_N/O | | | | | | -- | | | | | | | | |
| 1765 | CH15-DS3_N/C | | | | | | -- | | | | | | | | |
| 1766 | CH15-DS4_N/O | | | | | | -- | | | | | | | | |
| 1767 | CH15-DS4_N/C | | | | | | -- | | | | | | | | |
| 1768 | CH15-CB_N/O | | X | | 2 | | [239]CH15-BI3 | | | | | | | | X |
| 1769 | CH15-CB_N/C | | X | | 2 | | [240]CH15-BI7 | | | | | | | | X |
| 1770 | | | | | | | | | | | | | | | |
| 1771 | | | | | | | | | | | | | | | |
| 1772 | | | | | | | | | | | | | | | |
| 1773 | | | | | | | | | | | | | | | |
| 1774 | | | | | | | | | | | | | | | |
| 1775 | | | | | | | | | | | | | | | |
| 1776 | | | | | | | | | | | | | | | |
| 1777 | | | | | | | | | | | | | | | |
| 1778 | CH16-DS2_N/O | | X | | 0 | | [253]CH16-BI2 | | | | | | | | X |
| 1779 | CH16-DS2_N/C | | X | | 0 | | [254]CH16-BI6 | | | | | | | | X |
| 1780 | CH16-DS3_N/O | | | | | | -- | | | | | | | | |
| 1781 | CH16-DS3_N/C | | | | | | -- | | | | | | | | |
| 1782 | CH16-DS4_N/O | | | | | | -- | | | | | | | | |
| 1783 | CH16-DS4_N/C | | | | | | -- | | | | | | | | |
| 1784 | CH16-CB_N/O | | X | | 0 | | [255]CH16-BI3 | | | | | | | | X |
| 1785 | CH16-CB_N/C | | X | | 0 | | [256]CH16-BI7 | | | | | | | | X |
| 1786 | | | | | | | | | | | | | | | |
| 1787 | | | | | | | | | | | | | | | |
| 1788 | | | | | | | | | | | | | | | |
| 1789 | | | | | | | | | | | | | | | |
| 1790 | | | | | | | | | | | | | | | |
| 1791 | | | | | | | | | | | | | | | |
| 1792 | | | | | | | | | | | | | | | |
| 1793 | | | | | | | | | | | | | | | |
| 1794 | CH17-DS2_N/O | | X | | 1 | | [269]CH17-BI2 | | | | | | | | X |
| 1795 | CH17-DS2_N/C | | X | | 1 | | [270]CH17-BI6 | | | | | | | | X |
| 1796 | CH17-DS3_N/O | | | | | | -- | | | | | | | | |
| 1797 | CH17-DS3_N/C | | | | | | -- | | | | | | | | |
| 1798 | CH17-DS4_N/O | | | | | | -- | | | | | | | | |
| 1799 | CH17-DS4_N/C | | | | | | -- | | | | | | | | |
| 1800 | CH17-CB_N/O | | X | | 1 | | [271]CH17-BI3 | | | | | | | | X |
| 1801 | CH17-CB_N/C | | X | | 1 | | [272]CH17-BI7 | | | | | | | | X |
| 1802 | | | | | | | | | | | | | | | |
| 1803 | | | | | | | | | | | | | | | |
| 1804 | | | | | | | | | | | | | | | |
| 1805 | | | | | | | | | | | | | | | |
| 1806 | | | | | | | | | | | | | | | |
| 1807 | | | | | | | | | | | | | | | |
| 1808 | | | | | | | | | | | | | | | |
| 1809 | | | | | | | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 1810 | CH18-DS2_N/O | | X | | 2 | [285]CH18-BI2 | | | | | | | | | X |
| 1811 | CH18-DS2_N/C | | X | | 2 | [286]CH18-BI6 | | | | | | | | | X |
| 1812 | CH18-DS3_N/O | | | | | -- | | | | | | | | | |
| 1813 | CH18-DS3_N/C | | | | | -- | | | | | | | | | |
| 1814 | CH18-DS4_N/O | | | | | -- | | | | | | | | | |
| 1815 | CH18-DS4_N/C | | | | | -- | | | | | | | | | |
| 1816 | CH18-CB_N/O | | X | | 2 | [287]CH18-BI3 | | | | | | | | | X |
| 1817 | CH18-CB_N/C | | X | | 2 | [288]CH18-BI7 | | | | | | | | | X |
| 1818 | | | | | | | | | | | | | | | |
| 1819 | | | | | | | | | | | | | | | |
| 1820 | | | | | | | | | | | | | | | |
| 1821 | | | | | | | | | | | | | | | |
| 1822 | | | | | | | | | | | | | | | |
| 1823 | | | | | | | | | | | | | | | |
| 1824 | | | | | | | | | | | | | | | |
| 1825 | | | | | | | | | | | | | | | |
| 1826 | CH19-DS2_N/O | | X | | 0 | [301]CH19-BI2 | | | | | | | | | X |
| 1827 | CH19-DS2_N/C | | X | | 0 | [302]CH19-BI6 | | | | | | | | | X |
| 1828 | CH19-DS3_N/O | | | | | -- | | | | | | | | | |
| 1829 | CH19-DS3_N/C | | | | | -- | | | | | | | | | |
| 1830 | CH19-DS4_N/O | | | | | -- | | | | | | | | | |
| 1831 | CH19-DS4_N/C | | | | | -- | | | | | | | | | |
| 1832 | CH19-CB_N/O | | X | | 0 | [303]CH19-BI3 | | | | | | | | | X |
| 1833 | CH19-CB_N/C | | X | | 0 | [304]CH19-BI7 | | | | | | | | | X |
| 1834 | | | | | | | | | | | | | | | |
| 1835 | | | | | | | | | | | | | | | |
| 1836 | | | | | | | | | | | | | | | |
| 1837 | | | | | | | | | | | | | | | |
| 1838 | | | | | | | | | | | | | | | |
| 1839 | | | | | | | | | | | | | | | |
| 1840 | | | | | | | | | | | | | | | |
| 1841 | | | | | | | | | | | | | | | |
| 1842 | CH20-DS2_N/O | | X | | 1 | [317]CH20-BI2 | | | | | | | | | X |
| 1843 | CH20-DS2_N/C | | X | | 1 | [318]CH20-BI6 | | | | | | | | | X |
| 1844 | CH20-DS3_N/O | | | | | -- | | | | | | | | | |
| 1845 | CH20-DS3_N/C | | | | | -- | | | | | | | | | |
| 1846 | CH20-DS4_N/O | | | | | -- | | | | | | | | | |
| 1847 | CH20-DS4_N/C | | | | | -- | | | | | | | | | |
| 1848 | CH20-CB_N/O | | X | | 1 | [319]CH20-BI3 | | | | | | | | | X |
| 1849 | CH20-CB_N/C | | X | | 1 | [320]CH20-BI7 | | | | | | | | | X |
| 1850 | | | | | | | | | | | | | | | |
| 1851 | | | | | | | | | | | | | | | |
| 1852 | | | | | | | | | | | | | | | |
| 1853 | | | | | | | | | | | | | | | |
| 1854 | | | | | | | | | | | | | | | |
| 1855 | | | | | | | | | | | | | | | |
| 1856 | | | | | | | | | | | | | | | |
| 1857 | | | | | | | | | | | | | | | |
| 1858 | CH21-DS2_N/O | | X | | 2 | [333]CH21-BI2 | | | | | | | | | X |
| 1859 | CH21-DS2_N/C | | X | | 2 | [334]CH21-BI6 | | | | | | | | | X |
| 1860 | CH21-DS3_N/O | | | | | -- | | | | | | | | | |
| 1861 | CH21-DS3_N/C | | | | | -- | | | | | | | | | |
| 1862 | CH21-DS4_N/O | | | | | -- | | | | | | | | | |
| 1863 | CH21-DS4_N/C | | | | | -- | | | | | | | | | |
| 1864 | CH21-CB_N/O | | X | | 2 | [335]CH21-BI3 | | | | | | | | | X |
| 1865 | CH21-CB_N/C | | X | | 2 | [336]CH21-BI7 | | | | | | | | | X |
| 1866 | | | | | | | | | | | | | | | |
| 1867 | | | | | | | | | | | | | | | |
| 1868 | | | | | | | | | | | | | | | |
| 1869 | | | | | | | | | | | | | | | |
| 1870 | | | | | | | | | | | | | | | |
| 1871 | | | | | | | | | | | | | | | |
| 1872 | | | | | | | | | | | | | | | |
| 1873 | | | | | | | | | | | | | | | |
| 1874 | CH22-DS2_N/O | | X | | 0 | [349]CH22-BI2 | | | | | | | | | X |
| 1875 | CH22-DS2_N/C | | X | | 0 | [350]CH22-BI6 | | | | | | | | | X |
| 1876 | CH22-DS3_N/O | | | | | -- | | | | | | | | | |
| 1877 | CH22-DS3_N/C | | | | | -- | | | | | | | | | |
| 1878 | CH22-DS4_N/O | | | | | -- | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 1879 | CH22-DS4_N/C | | | | | | -- | | | | | | | | |
| 1880 | CH22-CB_N/O | | X | | 0 | | [351]CH22-BI3 | | | | | | | | X |
| 1881 | CH22-CB_N/C | | X | | 0 | | [352]CH22-BI7 | | | | | | | | X |
| 1882 | | | | | | | | | | | | | | | |
| 1883 | | | | | | | | | | | | | | | |
| 1884 | | | | | | | | | | | | | | | |
| 1885 | | | | | | | | | | | | | | | |
| 1886 | | | | | | | | | | | | | | | |
| 1887 | | | | | | | | | | | | | | | |
| 1888 | | | | | | | | | | | | | | | |
| 1889 | | | | | | | | | | | | | | | |
| 1890 | CH23-DS2_N/O | | X | | 1 | | [365]CH23-BI2 | | | | | | | | X |
| 1891 | CH23-DS2_N/C | | X | | 1 | | [366]CH23-BI6 | | | | | | | | X |
| 1892 | CH23-DS3_N/O | | | | | | -- | | | | | | | | |
| 1893 | CH23-DS3_N/C | | | | | | -- | | | | | | | | |
| 1894 | CH23-DS4_N/O | | | | | | -- | | | | | | | | |
| 1895 | CH23-DS4_N/C | | | | | | -- | | | | | | | | |
| 1896 | CH23-CB_N/O | | X | | 1 | | [367]CH23-BI3 | | | | | | | | X |
| 1897 | CH23-CB_N/C | | X | | 1 | | [368]CH23-BI7 | | | | | | | | X |
| 1898 | | | | | | | | | | | | | | | |
| 1899 | | | | | | | | | | | | | | | |
| 1900 | | | | | | | | | | | | | | | |
| 1901 | | | | | | | | | | | | | | | |
| 1902 | | | | | | | | | | | | | | | |
| 1903 | | | | | | | | | | | | | | | |
| 1904 | | | | | | | | | | | | | | | |
| 1905 | | | | | | | | | | | | | | | |
| 1906 | CH24-DS2_N/O | | X | | 2 | | [381]CH24-BI2 | | | | | | | | X |
| 1907 | CH24-DS2_N/C | | X | | 2 | | [382]CH24-BI6 | | | | | | | | X |
| 1908 | CH24-DS3_N/O | | | | | | -- | | | | | | | | |
| 1909 | CH24-DS3_N/C | | | | | | -- | | | | | | | | |
| 1910 | CH24-DS4_N/O | | | | | | -- | | | | | | | | |
| 1911 | CH24-DS4_N/C | | | | | | -- | | | | | | | | |
| 1912 | CH24-CB_N/O | | X | | 2 | | [383]CH24-BI3 | | | | | | | | X |
| 1913 | CH24-CB_N/C | | X | | 2 | | [384]CH24-BI7 | | | | | | | | X |
| 1914 | | | | | | | | | | | | | | | |
| 1915 | | | | | | | | | | | | | | | |
| 1916 | | | | | | | | | | | | | | | |
| 1917 | | | | | | | | | | | | | | | |
| 1918 | | | | | | | | | | | | | | | |
| 1919 | | | | | | | | | | | | | | | |
| 1920 | | | | | | | | | | | | | | | |
| 1921 | | | | | | | | | | | | | | | |
| 1922 | CH25-DS2_N/O | | X | | 0 | | [397]CH25-BI2 | | | | | | | | X |
| 1923 | CH25-DS2_N/C | | X | | 0 | | [398]CH25-BI6 | | | | | | | | X |
| 1924 | CH25-DS3_N/O | | | | | | -- | | | | | | | | |
| 1925 | CH25-DS3_N/C | | | | | | -- | | | | | | | | |
| 1926 | CH25-DS4_N/O | | | | | | -- | | | | | | | | |
| 1927 | CH25-DS4_N/C | | | | | | -- | | | | | | | | |
| 1928 | CH25-CB_N/O | | X | | 0 | | [399]CH25-BI3 | | | | | | | | X |
| 1929 | CH25-CB_N/C | | X | | 0 | | [400]CH25-BI7 | | | | | | | | X |
| 1930 | | | | | | | | | | | | | | | |
| 1931 | | | | | | | | | | | | | | | |
| 1932 | | | | | | | | | | | | | | | |
| 1933 | | | | | | | | | | | | | | | |
| 1934 | | | | | | | | | | | | | | | |
| 1935 | | | | | | | | | | | | | | | |
| 1936 | | | | | | | | | | | | | | | |
| 1937 | | | | | | | | | | | | | | | |
| 1938 | CH26-DS2_N/O | | X | | 1 | | [413]CH26-BI2 | | | | | | | | X |
| 1939 | CH26-DS2_N/C | | X | | 1 | | [414]CH26-BI6 | | | | | | | | X |
| 1940 | CH26-DS3_N/O | | | | | | -- | | | | | | | | |
| 1941 | CH26-DS3_N/C | | | | | | -- | | | | | | | | |
| 1942 | CH26-DS4_N/O | | | | | | -- | | | | | | | | |
| 1943 | CH26-DS4_N/C | | | | | | -- | | | | | | | | |
| 1944 | CH26-CB_N/O | | X | | 1 | | [415]CH26-BI3 | | | | | | | | X |
| 1945 | CH26-CB_N/C | | X | | 1 | | [416]CH26-BI7 | | | | | | | | X |
| 1946 | | | | | | | | | | | | | | | |
| 1947 | | | | | | | | | | | | | | | |

www.ElectricalPartManuals.com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 1948 | | | | | | | | | | | | | | | |
| 1949 | | | | | | | | | | | | | | | |
| 1950 | | | | | | | | | | | | | | | |
| 1951 | | | | | | | | | | | | | | | |
| 1952 | | | | | | | | | | | | | | | |
| 1953 | | | | | | | | | | | | | | | |
| 1954 | CH27-DS2_N/O | | X | | 2 | | [429]CH27-BI2 | | | | | | | | X |
| 1955 | CH27-DS2_N/C | | X | | 2 | | [430]CH27-BI6 | | | | | | | | X |
| 1956 | CH27-DS3_N/O | | | | | | -- | | | | | | | | |
| 1957 | CH27-DS3_N/C | | | | | | -- | | | | | | | | |
| 1958 | CH27-DS4_N/O | | | | | | -- | | | | | | | | |
| 1959 | CH27-DS4_N/C | | | | | | -- | | | | | | | | |
| 1960 | CH27-CB_N/O | | X | | 2 | | [431]CH27-BI3 | | | | | | | | X |
| 1961 | CH27-CB_N/C | | X | | 2 | | [432]CH27-BI7 | | | | | | | | X |
| 1962 | | | | | | | | | | | | | | | |
| 1963 | | | | | | | | | | | | | | | |
| 1964 | | | | | | | | | | | | | | | |
| 1965 | | | | | | | | | | | | | | | |
| 1966 | | | | | | | | | | | | | | | |
| 1967 | | | | | | | | | | | | | | | |
| 1968 | | | | | | | | | | | | | | | |
| 1969 | | | | | | | | | | | | | | | |
| 1970 | CH28-DS2_N/O | | X | | 0 | | [445]CH28-BI2 | | | | | | | | X |
| 1971 | CH28-DS2_N/C | | X | | 0 | | [446]CH28-BI6 | | | | | | | | X |
| 1972 | CH28-DS3_N/O | | | | | | -- | | | | | | | | |
| 1973 | CH28-DS3_N/C | | | | | | -- | | | | | | | | |
| 1974 | CH28-DS4_N/O | | | | | | -- | | | | | | | | |
| 1975 | CH28-DS4_N/C | | | | | | -- | | | | | | | | |
| 1976 | CH28-CB_N/O | | X | | 0 | | [447]CH28-BI3 | | | | | | | | X |
| 1977 | CH28-CB_N/C | | X | | 0 | | [448]CH28-BI7 | | | | | | | | X |
| 1978 | | | | | | | | | | | | | | | |
| 1979 | | | | | | | | | | | | | | | |
| 1980 | | | | | | | | | | | | | | | |
| 1981 | | | | | | | | | | | | | | | |
| 1982 | | | | | | | | | | | | | | | |
| 1983 | | | | | | | | | | | | | | | |
| 1984 | | | | | | | | | | | | | | | |
| 1985 | | | | | | | | | | | | | | | |
| 1986 | CH29-DS2_N/O | | X | | 1 | | [461]CH29-BI2 | | | | | | | | X |
| 1987 | CH29-DS2_N/C | | X | | 1 | | [462]CH29-BI6 | | | | | | | | X |
| 1988 | CH29-DS3_N/O | | | | | | -- | | | | | | | | |
| 1989 | CH29-DS3_N/C | | | | | | -- | | | | | | | | |
| 1990 | CH29-DS4_N/O | | | | | | -- | | | | | | | | |
| 1991 | CH29-DS4_N/C | | | | | | -- | | | | | | | | |
| 1992 | CH29-CB_N/O | | X | | 1 | | [463]CH29-BI3 | | | | | | | | X |
| 1993 | CH29-CB_N/C | | X | | 1 | | [464]CH29-BI7 | | | | | | | | X |
| 1994 | | | | | | | | | | | | | | | |
| 1995 | | | | | | | | | | | | | | | |
| 1996 | | | | | | | | | | | | | | | |
| 1997 | | | | | | | | | | | | | | | |
| 1998 | | | | | | | | | | | | | | | |
| 1999 | | | | | | | | | | | | | | | |
| 2000 | | | | | | | | | | | | | | | |
| 2001 | | | | | | | | | | | | | | | |
| 2002 | CH30-DS2_N/O | | X | | 2 | | [477]CH30-BI2 | | | | | | | | X |
| 2003 | CH30-DS2_N/C | | X | | 2 | | [478]CH30-BI6 | | | | | | | | X |
| 2004 | CH30-DS3_N/O | | | | | | -- | | | | | | | | |
| 2005 | CH30-DS3_N/C | | | | | | -- | | | | | | | | |
| 2006 | CH30-DS4_N/O | | | | | | -- | | | | | | | | |
| 2007 | CH30-DS4_N/C | | | | | | -- | | | | | | | | |
| 2008 | CH30-CB_N/O | | X | | 2 | | [479]CH30-BI3 | | | | | | | | X |
| 2009 | CH30-CB_N/C | | X | | 2 | | [480]CH30-BI7 | | | | | | | | X |
| 2010 | | | | | | | | | | | | | | | |
| 2011 | | | | | | | | | | | | | | | |
| 2012 | | | | | | | | | | | | | | | |
| 2013 | | | | | | | | | | | | | | | |
| 2014 | | | | | | | | | | | | | | | |
| 2015 | | | | | | | | | | | | | | | |
| 2016 | | | | | | | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 2017 | | | | | | | | | | | | | | | |
| 2018 | CH31-DS2_N/O | | X | | 0 | [493]CH31-BI2 | | | | | | | | | X |
| 2019 | CH31-DS2_N/C | | X | | 0 | [494]CH31-BI6 | | | | | | | | | X |
| 2020 | CH31-DS3_N/O | | | | | -- | | | | | | | | | |
| 2021 | CH31-DS3_N/C | | | | | -- | | | | | | | | | |
| 2022 | CH31-DS4_N/O | | | | | -- | | | | | | | | | |
| 2023 | CH31-DS4_N/C | | | | | -- | | | | | | | | | |
| 2024 | CH31-CB_N/O | | X | | 0 | [495]CH31-BI3 | | | | | | | | | X |
| 2025 | CH31-CB_N/C | | X | | 0 | [496]CH31-BI7 | | | | | | | | | X |
| 2026 | | | | | | | | | | | | | | | |
| 2027 | | | | | | | | | | | | | | | |
| 2028 | | | | | | | | | | | | | | | |
| 2029 | | | | | | | | | | | | | | | |
| 2030 | | | | | | | | | | | | | | | |
| 2031 | | | | | | | | | | | | | | | |
| 2032 | | | | | | | | | | | | | | | |
| 2033 | | | | | | | | | | | | | | | |
| 2034 | CH32-DS2_N/O | | X | | 1 | [509]CH32-BI2 | | | | | | | | | X |
| 2035 | CH32-DS2_N/C | | X | | 1 | [510]CH32-BI6 | | | | | | | | | X |
| 2036 | CH32-DS3_N/O | | | | | -- | | | | | | | | | |
| 2037 | CH32-DS3_N/C | | | | | -- | | | | | | | | | |
| 2038 | CH32-DS4_N/O | | | | | -- | | | | | | | | | |
| 2039 | CH32-DS4_N/C | | | | | -- | | | | | | | | | |
| 2040 | CH32-CB_N/O | | X | | 1 | [511]CH32-BI3 | | | | | | | | | X |
| 2041 | CH32-CB_N/C | | X | | 1 | [512]CH32-BI7 | | | | | | | | | X |
| 2042 | | | | | | | | | | | | | | | |
| 2043 | | | | | | | | | | | | | | | |
| 2044 | | | | | | | | | | | | | | | |
| 2045 | | | | | | | | | | | | | | | |
| 2046 | | | | | | | | | | | | | | | |
| 2047 | | | | | | | | | | | | | | | |
| 2048 | IND.RESET | | X | | 0 | [523]CU-BI1 | | | | | | | | | X |
| 2049 | BP_BLOCK-A | | X | | 1 | [524]CU-BI2 | | | | | | | | | X |
| 2050 | CBF_BLOCK-A | | X | | 2 | [525]CU-BI3 | | | | | | | | | X |
| 2051 | BP_BLOCK-B | | X | | 1 | [526]CU-BI4 | | | | | | | | | X |
| 2052 | CBF_BLOCK-B | | X | | 2 | [527]CU-BI5 | | | | | | | | | X |
| 2053 | | | | | | | | | | | | | | | |
| 2054 | | | | | | | | | | | | | | | |
| 2055 | | | | | | | | | | | | | | | |
| 2056 | | | | | | | | | | | | | | | |
| 2057 | | | | | | | | | | | | | | | |
| 2058 | | | | | | | | | | | | | | | |
| 2059 | | | | | | | | | | | | | | | |
| 2060 | | | | | | | | | | | | | | | |
| 2061 | | | | | | | | | | | | | | | |
| 2062 | | | | | | | | | | | | | | | |
| 2063 | | | | | | | | | | | | | | | |
| 2064 | DIFFS-ZA | X | | | | [1]CONSTANT_1 | [1341]UVGZA + [1342]UVSZA + [1310]OVGZA | | | | | | | | X |
| 2065 | DIFFS-ZB | X | | | | [1]CONSTANT_1 | [1344]UVGZB + [1345]UVSZB + [1320]OVGZB | | | | | | | | X |
| 2066 | DIFFS-ZC | X | | | | [1]CONSTANT_1 | [1347]UVGZC + [1348]UVSZC + [1330]OVGZC | | | | | | | | X |
| 2067 | DIFFS-ZD | X | | | | [1]CONSTANT_1 | [1350]UVGZD + [1351]UVSZD + [1340]OVGZD | | | | | | | | X |
| 2068 | DIFFS | X | | | | [1]CONSTANT_1 | | | | | | | | | X |
| 2069 | DIFCH_CHARA | | | | | -- | | | | | | | | | |
| 2070 | | | | | | | | | | | | | | | |
| 2071 | | | | | | | | | | | | | | | |
| 2072 | | | | | | | | | | | | | | | |
| 2073 | | | | | | | | | | | | | | | |
| 2074 | | | | | | | | | | | | | | | |
| 2075 | | | | | | | | | | | | | | | |
| 2076 | | | | | | | | | | | | | | | |
| 2077 | | | | | | | | | | | | | | | |
| 2078 | | | | | | | | | | | | | | | |
| 2079 | | | | | | | | | | | | | | | |
| 2080 | CBFFS-ZA | X | | | | [1]CONSTANT_1 | [1341]UVGZA + [1342]UVSZA + [1343]UVDZA + [1310]OVGZA | | | | | | | | X |
| 2081 | CBFFS-ZB | X | | | | [1]CONSTANT_1 | [1344]UVGZB + [1345]UVSZB + [1346]UVDZB + [1320]OVGZB | | | | | | | | X |
| 2082 | CBFFS-ZC | X | | | | [1]CONSTANT_1 | [1347]UVGZC + [1348]UVSZC + [1349]UVDZC + [1330]OVGZC | | | | | | | | X |
| 2083 | CBFFS-ZD | X | | | | [1]CONSTANT_1 | [1350]UVGZD + [1351]UVSZD + [1352]UVDZD + [1340]OVGZD | | | | | | | | X |
| 2084 | CBFFS-NOUSE | | | | | -- | | | | | | | | | |
| 2085 | | | | | | | | | | | | | | | |

www.ElectricalPartManuals.com

PLC Default Setting

| Output № | Output Signal | Timing Cycle 30 | Timing Cycle 90 | Timing Cycle User | Timing Turn | Logic expression 300 | Logic expression 400 | Flip Flop Norm | Flip Flop Back Up | Flip Flop Release Signal | Timer Off Delay | Timer On Delay | Timer One Shot | Time Value | | None |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2086 | | | | | | | | | | | | | | | | |
| 2087 | | | | | | | | | | | | | | | | |
| 2088 | COMTP-ZA_COM | | | | | | -- | | | | | | | | | |
| 2089 | COMTP-ZB_COM | | | | | | -- | | | | | | | | | |
| 2090 | COMTP-ZC_COM | | | | | | -- | | | | | | | | | |
| 2091 | COMTP-ZD_COM | | | | | | -- | | | | | | | | | |
| 2092 | CTF_BLOCK | | | | | | -- | | | | | | | | | |
| 2093 | | | | | | | | | | | | | | | | |
| 2094 | | | | | | | | | | | | | | | | |
| 2095 | | | | | | | | | | | | | | | | |
| 2096 | CBFTRFS-ZA | X | | | | [1]CONSTANT_1 | [1341]UVGZA + [1342]UVSZA + [1343]UVDZA + [1310]OVGZA | | | | | | | | | X |
| 2097 | CBFTRFS-ZB | X | | | | [1]CONSTANT_1 | [1344]UVGZB + [1345]UVSZB + [1346]UVDZB + [1320]OVGZB | | | | | | | | | X |
| 2098 | CBFTRFS-ZC | X | | | | [1]CONSTANT_1 | [1347]UVGZC + [1348]UVSZC + [1349]UVDZC + [1330]OVGZC | | | | | | | | | X |
| 2099 | CBFTRFS-ZD | X | | | | [1]CONSTANT_1 | [1350]UVGZD + [1351]UVSZD + [1352]UVDZD + [1340]OVGZD | | | | | | | | | X |
| 2100 | CBFTRFS-NOUSE | | | | | | -- | | | | | | | | | |
| 2101 | | | | | | | | | | | | | | | | |
| 2102 | | | | | | | | | | | | | | | | |
| 2103 | | | | | | | | | | | | | | | | |
| 2104 | | | | | | | | | | | | | | | | |
| 2105 | | | | | | | | | | | | | | | | |
| 2106 | | | | | | | | | | | | | | | | |
| 2107 | | | | | | | | | | | | | | | | |
| 2108 | | | | | | | | | | | | | | | | |
| 2109 | | | | | | | | | | | | | | | | |
| 2110 | | | | | | | | | | | | | | | | |
| 2111 | | | | | | | | | | | | | | | | |
| 2112 | DIFZA_DELAY | | X | | 0 | | [1000]DIFZA-OPERATE | | | | X | | | 60 | ms | |
| 2113 | DIFZB_DELAY | | X | | 0 | | [1001]DIFZB-OPERATE | | | | X | | | 60 | ms | |
| 2114 | DIFZC_DELAY | | X | | 0 | | [1002]DIFZC-OPERATE | | | | X | | | 60 | ms | |
| 2115 | DIFZD_DELAY | | X | | 0 | | [1003]DIFZD-OPERATE | | | | X | | | 60 | ms | |
| 2116 | DIF_DELAY | | X | | 0 | | [999]DIFCH-OPERATE | | | | X | | | 60 | ms | |
| 2117 | | | | | | | | | | | | | | | | |
| 2118 | | | | | | | | | | | | | | | | |
| 2119 | | | | | | | | | | | | | | | | |
| 2120 | C1-CUR.BLK_S | | | | | | -- | | | | | | | | | |
| 2121 | C2-CUR.BLK_S | | | | | | -- | | | | | | | | | |
| 2122 | C3-CUR.BLK_S | | | | | | -- | | | | | | | | | |
| 2123 | C4-CUR.BLK_S | | | | | | -- | | | | | | | | | |
| 2124 | | | | | | | | | | | | | | | | |
| 2125 | | | | | | | | | | | | | | | | |
| 2126 | | | | | | | | | | | | | | | | |
| 2127 | | | | | | | | | | | | | | | | |
| 2128 | CH1-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2129 | CH2-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2130 | CH3-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2131 | CH4-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2132 | CH5-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2133 | CH6-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2134 | CH7-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2135 | CH8-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2136 | CH9-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2137 | CH10-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2138 | CH11-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2139 | CH12-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2140 | CH13-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2141 | CH14-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2142 | CH15-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2143 | CH16-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2144 | CH17-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2145 | CH18-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2146 | CH19-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2147 | CH20-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2148 | CH21-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2149 | CH22-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2150 | CH23-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2151 | CH24-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2152 | CH25-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2153 | CH26-EXT-BPTP | | | | | | -- | | | | | | | | | X |
| 2154 | CH27-EXT-BPTP | | | | | | -- | | | | | | | | | X |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | Turn | 300 | 400 | Flip Flop | | | Timer | | | | | None |
| № | Signal | 30 | 90 | User | | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | | |
| 2155 | CH28-EXT-BPTP | | | | | -- | | | | | | | | | | X |
| 2156 | CH29-EXT-BPTP | | | | | -- | | | | | | | | | | X |
| 2157 | CH30-EXT-BPTP | | | | | -- | | | | | | | | | | X |
| 2158 | CH31-EXT-BPTP | | | | | -- | | | | | | | | | | X |
| 2159 | CH32-EXT-BPTP | | | | | -- | | | | | | | | | | X |
| 2160 | CH1-CBFIO | | | | | -- | | | | | | | | | | X |
| 2161 | CH2-CBFIO | | | | | -- | | | | | | | | | | X |
| 2162 | CH3-CBFIO | | | | | -- | | | | | | | | | | X |
| 2163 | CH4-CBFIO | | | | | -- | | | | | | | | | | X |
| 2164 | CH5-CBFIO | | | | | -- | | | | | | | | | | X |
| 2165 | CH6-CBFIO | | | | | -- | | | | | | | | | | X |
| 2166 | CH7-CBFIO | | | | | -- | | | | | | | | | | X |
| 2167 | CH8-CBFIO | | | | | -- | | | | | | | | | | X |
| 2168 | CH9-CBFIO | | | | | -- | | | | | | | | | | X |
| 2169 | CH10-CBFIO | | | | | -- | | | | | | | | | | X |
| 2170 | CH11-CBFIO | | | | | -- | | | | | | | | | | X |
| 2171 | CH12-CBFIO | | | | | -- | | | | | | | | | | X |
| 2172 | CH13-CBFIO | | | | | -- | | | | | | | | | | X |
| 2173 | CH14-CBFIO | | | | | -- | | | | | | | | | | X |
| 2174 | CH15-CBFIO | | | | | -- | | | | | | | | | | X |
| 2175 | CH16-CBFIO | | | | | -- | | | | | | | | | | X |
| 2176 | CH17-CBFIO | | | | | -- | | | | | | | | | | X |
| 2177 | CH18-CBFIO | | | | | -- | | | | | | | | | | X |
| 2178 | CH19-CBFIO | | | | | -- | | | | | | | | | | X |
| 2179 | CH20-CBFIO | | | | | -- | | | | | | | | | | X |
| 2180 | CH21-CBFIO | | | | | -- | | | | | | | | | | X |
| 2181 | CH22-CBFIO | | | | | -- | | | | | | | | | | X |
| 2182 | CH23-CBFIO | | | | | -- | | | | | | | | | | X |
| 2183 | CH24-CBFIO | | | | | -- | | | | | | | | | | X |
| 2184 | CH25-CBFIO | | | | | -- | | | | | | | | | | X |
| 2185 | CH26-CBFIO | | | | | -- | | | | | | | | | | X |
| 2186 | CH27-CBFIO | | | | | -- | | | | | | | | | | X |
| 2187 | CH28-CBFIO | | | | | -- | | | | | | | | | | X |
| 2188 | CH29-CBFIO | | | | | -- | | | | | | | | | | X |
| 2189 | CH30-CBFIO | | | | | -- | | | | | | | | | | X |
| 2190 | CH31-CBFIO | | | | | -- | | | | | | | | | | X |
| 2191 | CH32-CBFIO | | | | | -- | | | | | | | | | | X |
| 2192 | CH1-COM.TP | | | | | -- | | | | | | | | | | X |
| 2193 | CH2-COM.TP | | | | | -- | | | | | | | | | | X |
| 2194 | CH3-COM.TP | | | | | -- | | | | | | | | | | X |
| 2195 | CH4-COM.TP | | | | | -- | | | | | | | | | | X |
| 2196 | CH5-COM.TP | | | | | -- | | | | | | | | | | X |
| 2197 | CH6-COM.TP | | | | | -- | | | | | | | | | | X |
| 2198 | CH7-COM.TP | | | | | -- | | | | | | | | | | X |
| 2199 | CH8-COM.TP | | | | | -- | | | | | | | | | | X |
| 2200 | CH9-COM.TP | | | | | -- | | | | | | | | | | X |
| 2201 | CH10-COM.TP | | | | | -- | | | | | | | | | | X |
| 2202 | CH11-COM.TP | | | | | -- | | | | | | | | | | X |
| 2203 | CH12-COM.TP | | | | | -- | | | | | | | | | | X |
| 2204 | CH13-COM.TP | | | | | -- | | | | | | | | | | X |
| 2205 | CH14-COM.TP | | | | | -- | | | | | | | | | | X |
| 2206 | CH15-COM.TP | | | | | -- | | | | | | | | | | X |
| 2207 | CH16-COM.TP | | | | | -- | | | | | | | | | | X |
| 2208 | CH17-COM.TP | | | | | -- | | | | | | | | | | X |
| 2209 | CH18-COM.TP | | | | | -- | | | | | | | | | | X |
| 2210 | CH19-COM.TP | | | | | -- | | | | | | | | | | X |
| 2211 | CH20-COM.TP | | | | | -- | | | | | | | | | | X |
| 2212 | CH21-COM.TP | | | | | -- | | | | | | | | | | X |
| 2213 | CH22-COM.TP | | | | | -- | | | | | | | | | | X |
| 2214 | CH23-COM.TP | | | | | -- | | | | | | | | | | X |
| 2215 | CH24-COM.TP | | | | | -- | | | | | | | | | | X |
| 2216 | CH25-COM.TP | | | | | -- | | | | | | | | | | X |
| 2217 | CH26-COM.TP | | | | | -- | | | | | | | | | | X |
| 2218 | CH27-COM.TP | | | | | -- | | | | | | | | | | X |
| 2219 | CH28-COM.TP | | | | | -- | | | | | | | | | | X |
| 2220 | CH29-COM.TP | | | | | -- | | | | | | | | | | X |
| 2221 | CH30-COM.TP | | | | | -- | | | | | | | | | | X |
| 2222 | CH31-COM.TP | | | | | -- | | | | | | | | | | X |
| 2223 | CH32-COM.TP | | | | | -- | | | | | | | | | | X |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | Turn | 300 | 400 | Flip Flop | | | Timer | | | | None |
| № | Signal | 30 | 90 | User | | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | |
| 2224 | | | | | | | | | | | | | | | |
| 2225 | | | | | | | | | | | | | | | |
| 2226 | S1-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2227 | S2-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2228 | S3-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2229 | S4-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2230 | C1-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2231 | C2-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2232 | | | | | | | | | | | | | | | |
| 2233 | | | | | | | | | | | | | | | |
| 2234 | E1-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2235 | E2-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2236 | E3-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2237 | E4-ZAC.RESET | | | | | | -- | | | | | | | | X |
| 2238 | | | | | | | | | | | | | | | |
| 2239 | | | | | | | | | | | | | | | |
| 2240 | CH1-CBFCB | | | | | | -- | | | | | | | | |
| 2241 | CH2-CBFCB | | | | | | -- | | | | | | | | |
| 2242 | CH3-CBFCB | | | | | | -- | | | | | | | | |
| 2243 | CH4-CBFCB | | | | | | -- | | | | | | | | |
| 2244 | CH5-CBFCB | | | | | | -- | | | | | | | | |
| 2245 | CH6-CBFCB | | | | | | -- | | | | | | | | |
| 2246 | CH7-CBFCB | | | | | | -- | | | | | | | | |
| 2247 | CH8-CBFCB | | | | | | -- | | | | | | | | |
| 2248 | CH9-CBFCB | | | | | | -- | | | | | | | | |
| 2249 | CH10-CBFCB | | | | | | -- | | | | | | | | |
| 2250 | CH11-CBFCB | | | | | | -- | | | | | | | | |
| 2251 | CH12-CBFCB | | | | | | -- | | | | | | | | |
| 2252 | CH13-CBFCB | | | | | | -- | | | | | | | | |
| 2253 | CH14-CBFCB | | | | | | -- | | | | | | | | |
| 2254 | CH15-CBFCB | | | | | | -- | | | | | | | | |
| 2255 | CH16-CBFCB | | | | | | -- | | | | | | | | |
| 2256 | CH17-CBFCB | | | | | | -- | | | | | | | | |
| 2257 | CH18-CBFCB | | | | | | -- | | | | | | | | |
| 2258 | CH19-CBFCB | | | | | | -- | | | | | | | | |
| 2259 | CH20-CBFCB | | | | | | -- | | | | | | | | |
| 2260 | CH21-CBFCB | | | | | | -- | | | | | | | | |
| 2261 | CH22-CBFCB | | | | | | -- | | | | | | | | |
| 2262 | CH23-CBFCB | | | | | | -- | | | | | | | | |
| 2263 | CH24-CBFCB | | | | | | -- | | | | | | | | |
| 2264 | CH25-CBFCB | | | | | | -- | | | | | | | | |
| 2265 | CH26-CBFCB | | | | | | -- | | | | | | | | |
| 2266 | CH27-CBFCB | | | | | | -- | | | | | | | | |
| 2267 | CH28-CBFCB | | | | | | -- | | | | | | | | |
| 2268 | CH29-CBFCB | | | | | | -- | | | | | | | | |
| 2269 | CH30-CBFCB | | | | | | -- | | | | | | | | |
| 2270 | CH31-CBFCB | | | | | | -- | | | | | | | | |
| 2271 | CH32-CBFCB | | | | | | -- | | | | | | | | |
| 2272 | BU1-OUT | | | | | | -- | | | | | | | | |
| 2273 | BU2-OUT | | | | | | -- | | | | | | | | |
| 2274 | BU3-OUT | | | | | | -- | | | | | | | | |
| 2275 | BU4-OUT | | | | | | -- | | | | | | | | |
| 2276 | BU5-OUT | | | | | | -- | | | | | | | | |
| 2277 | BU6-OUT | | | | | | -- | | | | | | | | |
| 2278 | BU7-OUT | | | | | | -- | | | | | | | | |
| 2279 | BU8-OUT | | | | | | -- | | | | | | | | |
| 2280 | BU9-OUT | | | | | | -- | | | | | | | | |
| 2281 | BU10-OUT | | | | | | -- | | | | | | | | |
| 2282 | BU11-OUT | | | | | | -- | | | | | | | | |
| 2283 | BU12-OUT | | | | | | -- | | | | | | | | |
| 2284 | BU13-OUT | | | | | | -- | | | | | | | | |
| 2285 | BU14-OUT | | | | | | -- | | | | | | | | |
| 2286 | BU15-OUT | | | | | | -- | | | | | | | | |
| 2287 | BU16-OUT | | | | | | -- | | | | | | | | |
| 2288 | BU17-OUT | | | | | | -- | | | | | | | | |
| 2289 | BU18-OUT | | | | | | -- | | | | | | | | |
| 2290 | BU19-OUT | | | | | | -- | | | | | | | | |
| 2291 | BU20-OUT | | | | | | -- | | | | | | | | |
| 2292 | BU21-OUT | | | | | | -- | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 2293 | BU22-OUT | | | | | | -- | | | | | | | | |
| 2294 | BU23-OUT | | | | | | -- | | | | | | | | |
| 2295 | BU24-OUT | | | | | | -- | | | | | | | | |
| 2296 | BU25-OUT | | | | | | -- | | | | | | | | |
| 2297 | BU26-OUT | | | | | | -- | | | | | | | | |
| 2298 | BU27-OUT | | | | | | -- | | | | | | | | |
| 2299 | BU28-OUT | | | | | | -- | | | | | | | | |
| 2300 | BU29-OUT | | | | | | -- | | | | | | | | |
| 2301 | BU30-OUT | | | | | | -- | | | | | | | | |
| 2302 | BU31-OUT | | | | | | -- | | | | | | | | |
| 2303 | BU32-OUT | | | | | | -- | | | | | | | | |
| 2304 | | | | | | | | | | | | | | | |
| 2305 | | | | | | | | | | | | | | | |
| 2306 | | | | | | | | | | | | | | | |
| 2307 | | | | | | | | | | | | | | | |
| 2308 | | | | | | | | | | | | | | | |
| 2309 | | | | | | | | | | | | | | | |
| 2310 | | | | | | | | | | | | | | | |
| 2311 | | | | | | | | | | | | | | | |
| 2312 | | | | | | | | | | | | | | | |
| 2313 | | | | | | | | | | | | | | | |
| 2314 | | | | | | | | | | | | | | | |
| 2315 | | | | | | | | | | | | | | | |
| 2316 | | | | | | | | | | | | | | | |
| 2317 | | | | | | | | | | | | | | | |
| 2318 | | | | | | | | | | | | | | | |
| 2319 | | | | | | | | | | | | | | | |
| 2320 | | | | | | | | | | | | | | | |
| 2321 | | | | | | | | | | | | | | | |
| 2322 | | | | | | | | | | | | | | | |
| 2323 | | | | | | | | | | | | | | | |
| 2324 | | | | | | | | | | | | | | | |
| 2325 | | | | | | | | | | | | | | | |
| 2326 | | | | | | | | | | | | | | | |
| 2327 | | | | | | | | | | | | | | | |
| 2328 | CH1-TP1 | X | | | | | [1077]CH1-BPTP | | | | | | | | X |
| 2329 | CH1-TP2 | X | | | | | [1205]CH1-CBF/RE | | | | | | | | X |
| 2330 | | | | | | | | | | | | | | | |
| 2331 | | | | | | | | | | | | | | | |
| 2332 | CH1-BO3 | | | | | | -- | | | | | | | | |
| 2333 | CH1-BO4 | | | | | | -- | | | | | | | | |
| 2334 | CH1-BO5 | | | | | | -- | | | | | | | | |
| 2335 | CH1-BO6 | | | | | | -- | | | | | | | | |
| 2336 | CH2-TP1 | X | | | | | [1078]CH2-BPTP | | | | | | | | X |
| 2337 | CH2-TP2 | X | | | | | [1206]CH2-CBF/RE | | | | | | | | X |
| 2338 | | | | | | | | | | | | | | | |
| 2339 | | | | | | | | | | | | | | | |
| 2340 | CH2-BO3 | | | | | | -- | | | | | | | | |
| 2341 | CH2-BO4 | | | | | | -- | | | | | | | | |
| 2342 | CH2-BO5 | | | | | | -- | | | | | | | | |
| 2343 | CH2-BO6 | | | | | | -- | | | | | | | | |
| 2344 | CH3-TP1 | X | | | | | [1079]CH3-BPTP | | | | | | | | X |
| 2345 | CH3-TP2 | X | | | | | [1207]CH3-CBF/RE | | | | | | | | X |
| 2346 | | | | | | | | | | | | | | | |
| 2347 | | | | | | | | | | | | | | | |
| 2348 | CH3-BO3 | | | | | | -- | | | | | | | | |
| 2349 | CH3-BO4 | | | | | | -- | | | | | | | | |
| 2350 | CH3-BO5 | | | | | | -- | | | | | | | | |
| 2351 | CH3-BO6 | | | | | | -- | | | | | | | | |
| 2352 | CH4-TP1 | X | | | | | [1080]CH4-BPTP | | | | | | | | X |
| 2353 | CH4-TP2 | X | | | | | [1208]CH4-CBF/RE | | | | | | | | X |
| 2354 | | | | | | | | | | | | | | | |
| 2355 | | | | | | | | | | | | | | | |
| 2356 | CH4-BO3 | | | | | | -- | | | | | | | | |
| 2357 | CH4-BO4 | | | | | | -- | | | | | | | | |
| 2358 | CH4-BO5 | | | | | | -- | | | | | | | | |
| 2359 | CH4-BO6 | | | | | | -- | | | | | | | | |
| 2360 | CH5-TP1 | X | | | | | [1081]CH5-BPTP | | | | | | | | X |
| 2361 | CH5-TP2 | X | | | | | [1209]CH5-CBF/RE | | | | | | | | X |

www . ElectricalPartManuals . com

PLC Default Setting

| Output № | Output Signal | Timing Cycle 30 | Timing Cycle 90 | Timing Cycle User | Timing Turn | Logic expression 300 | Logic expression 400 | Flip Flop Norm | Flip Flop Back Up | Flip Flop Release Signal | Timer Off Delay | Timer On Delay | Timer One Shot | Timer Time Value | None |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2362 | | | | | | | | | | | | | | | |
| 2363 | | | | | | | | | | | | | | | |
| 2364 | CH5-BO3 | | | | | | -- | | | | | | | | |
| 2365 | CH5-BO4 | | | | | | -- | | | | | | | | |
| 2366 | CH5-BO5 | | | | | | -- | | | | | | | | |
| 2367 | CH5-BO6 | | | | | | -- | | | | | | | | |
| 2368 | CH6-TP1 | X | | | | | [1082]CH6-BPTP | | | | | | | | X |
| 2369 | CH6-TP2 | X | | | | | [1210]CH6-CBF/RE | | | | | | | | X |
| 2370 | | | | | | | | | | | | | | | |
| 2371 | | | | | | | | | | | | | | | |
| 2372 | CH6-BO3 | | | | | | -- | | | | | | | | |
| 2373 | CH6-BO4 | | | | | | -- | | | | | | | | |
| 2374 | CH6-BO5 | | | | | | -- | | | | | | | | |
| 2375 | CH6-BO6 | | | | | | -- | | | | | | | | |
| 2376 | CH7-TP1 | X | | | | | [1083]CH7-BPTP | | | | | | | | X |
| 2377 | CH7-TP2 | X | | | | | [1211]CH7-CBF/RE | | | | | | | | X |
| 2378 | | | | | | | | | | | | | | | |
| 2379 | | | | | | | | | | | | | | | |
| 2380 | CH7-BO3 | | | | | | -- | | | | | | | | |
| 2381 | CH7-BO4 | | | | | | -- | | | | | | | | |
| 2382 | CH7-BO5 | | | | | | -- | | | | | | | | |
| 2383 | CH7-BO6 | | | | | | -- | | | | | | | | |
| 2384 | CH8-TP1 | X | | | | | [1084]CH8-BPTP | | | | | | | | X |
| 2385 | CH8-TP2 | X | | | | | [1212]CH8-CBF/RE | | | | | | | | X |
| 2386 | | | | | | | | | | | | | | | |
| 2387 | | | | | | | | | | | | | | | |
| 2388 | CH8-BO3 | | | | | | -- | | | | | | | | |
| 2389 | CH8-BO4 | | | | | | -- | | | | | | | | |
| 2390 | CH8-BO5 | | | | | | -- | | | | | | | | |
| 2391 | CH8-BO6 | | | | | | -- | | | | | | | | |
| 2392 | CH9-TP1 | X | | | | | [1085]CH9-BPTP | | | | | | | | X |
| 2393 | CH9-TP2 | X | | | | | [1213]CH9-CBF/RE | | | | | | | | X |
| 2394 | | | | | | | | | | | | | | | |
| 2395 | | | | | | | | | | | | | | | |
| 2396 | CH9-BO3 | | | | | | -- | | | | | | | | |
| 2397 | CH9-BO4 | | | | | | -- | | | | | | | | |
| 2398 | CH9-BO5 | | | | | | -- | | | | | | | | |
| 2399 | CH9-BO6 | | | | | | -- | | | | | | | | |
| 2400 | CH10-TP1 | X | | | | | [1086]CH10-BPTP | | | | | | | | X |
| 2401 | CH10-TP2 | X | | | | | [1214]CH10-CBF/RE | | | | | | | | X |
| 2402 | | | | | | | | | | | | | | | |
| 2403 | | | | | | | | | | | | | | | |
| 2404 | CH10-BO3 | | | | | | -- | | | | | | | | |
| 2405 | CH10-BO4 | | | | | | -- | | | | | | | | |
| 2406 | CH10-BO5 | | | | | | -- | | | | | | | | |
| 2407 | CH10-BO6 | | | | | | -- | | | | | | | | |
| 2408 | CH11-TP1 | X | | | | | [1087]CH11-BPTP | | | | | | | | X |
| 2409 | CH11-TP2 | X | | | | | [1215]CH11-CBF/RE | | | | | | | | X |
| 2410 | | | | | | | | | | | | | | | |
| 2411 | | | | | | | | | | | | | | | |
| 2412 | CH11-BO3 | | | | | | -- | | | | | | | | |
| 2413 | CH11-BO4 | | | | | | -- | | | | | | | | |
| 2414 | CH11-BO5 | | | | | | -- | | | | | | | | |
| 2415 | CH11-BO6 | | | | | | -- | | | | | | | | |
| 2416 | CH12-TP1 | X | | | | | [1088]CH12-BPTP | | | | | | | | X |
| 2417 | CH12-TP2 | X | | | | | [1216]CH12-CBF/RE | | | | | | | | X |
| 2418 | | | | | | | | | | | | | | | |
| 2419 | | | | | | | | | | | | | | | |
| 2420 | CH12-BO3 | | | | | | -- | | | | | | | | |
| 2421 | CH12-BO4 | | | | | | -- | | | | | | | | |
| 2422 | CH12-BO5 | | | | | | -- | | | | | | | | |
| 2423 | CH12-BO6 | | | | | | -- | | | | | | | | |
| 2424 | CH13-TP1 | X | | | | | [1089]CH13-BPTP | | | | | | | | X |
| 2425 | CH13-TP2 | X | | | | | [1217]CH13-CBF/RE | | | | | | | | X |
| 2426 | | | | | | | | | | | | | | | |
| 2427 | | | | | | | | | | | | | | | |
| 2428 | CH13-BO3 | | | | | | -- | | | | | | | | |
| 2429 | CH13-BO4 | | | | | | -- | | | | | | | | |
| 2430 | CH13-BO5 | | | | | | -- | | | | | | | | |

www.ElectricalPartManuals.com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 2431 | CH13-BO6 | | | | | | -- | | | | | | | | |
| 2432 | CH14-TP1 | X | | | | | [1090]CH14-BPTP | | | | | | | | X |
| 2433 | CH14-TP2 | X | | | | | [1218]CH14-CBF/RE | | | | | | | | X |
| 2434 | | | | | | | | | | | | | | | |
| 2435 | | | | | | | | | | | | | | | |
| 2436 | CH14-BO3 | | | | | | -- | | | | | | | | |
| 2437 | CH14-BO4 | | | | | | -- | | | | | | | | |
| 2438 | CH14-BO5 | | | | | | -- | | | | | | | | |
| 2439 | CH14-BO6 | | | | | | -- | | | | | | | | |
| 2440 | CH15-TP1 | X | | | | | [1091]CH15-BPTP | | | | | | | | X |
| 2441 | CH15-TP2 | X | | | | | [1219]CH15-CBF/RE | | | | | | | | X |
| 2442 | | | | | | | | | | | | | | | |
| 2443 | | | | | | | | | | | | | | | |
| 2444 | CH15-BO3 | | | | | | -- | | | | | | | | |
| 2445 | CH15-BO4 | | | | | | -- | | | | | | | | |
| 2446 | CH15-BO5 | | | | | | -- | | | | | | | | |
| 2447 | CH15-BO6 | | | | | | -- | | | | | | | | |
| 2448 | CH16-TP1 | X | | | | | [1092]CH16-BPTP | | | | | | | | X |
| 2449 | CH16-TP2 | X | | | | | [1220]CH16-CBF/RE | | | | | | | | X |
| 2450 | | | | | | | | | | | | | | | |
| 2451 | | | | | | | | | | | | | | | |
| 2452 | CH16-BO3 | | | | | | -- | | | | | | | | |
| 2453 | CH16-BO4 | | | | | | -- | | | | | | | | |
| 2454 | CH16-BO5 | | | | | | -- | | | | | | | | |
| 2455 | CH16-BO6 | | | | | | -- | | | | | | | | |
| 2456 | CH17-TP1 | X | | | | | [1093]CH17-BPTP | | | | | | | | X |
| 2457 | CH17-TP2 | X | | | | | [1221]CH17-CBF/RE | | | | | | | | X |
| 2458 | | | | | | | | | | | | | | | |
| 2459 | | | | | | | | | | | | | | | |
| 2460 | CH17-BO3 | | | | | | -- | | | | | | | | |
| 2461 | CH17-BO4 | | | | | | -- | | | | | | | | |
| 2462 | CH17-BO5 | | | | | | -- | | | | | | | | |
| 2463 | CH17-BO6 | | | | | | -- | | | | | | | | |
| 2464 | CH18-TP1 | X | | | | | [1094]CH18-BPTP | | | | | | | | X |
| 2465 | CH18-TP2 | X | | | | | [1222]CH18-CBF/RE | | | | | | | | X |
| 2466 | | | | | | | | | | | | | | | |
| 2467 | | | | | | | | | | | | | | | |
| 2468 | CH18-BO3 | | | | | | -- | | | | | | | | |
| 2469 | CH18-BO4 | | | | | | -- | | | | | | | | |
| 2470 | CH18-BO5 | | | | | | -- | | | | | | | | |
| 2471 | CH18-BO6 | | | | | | -- | | | | | | | | |
| 2472 | CH19-TP1 | X | | | | | [1095]CH19-BPTP | | | | | | | | X |
| 2473 | CH19-TP2 | X | | | | | [1223]CH19-CBF/RE | | | | | | | | X |
| 2474 | | | | | | | | | | | | | | | |
| 2475 | | | | | | | | | | | | | | | |
| 2476 | CH19-BO3 | | | | | | -- | | | | | | | | |
| 2477 | CH19-BO4 | | | | | | -- | | | | | | | | |
| 2478 | CH19-BO5 | | | | | | -- | | | | | | | | |
| 2479 | CH19-BO6 | | | | | | -- | | | | | | | | |
| 2480 | CH20-TP1 | X | | | | | [1096]CH20-BPTP | | | | | | | | X |
| 2481 | CH20-TP2 | X | | | | | [1224]CH20-CBF/RE | | | | | | | | X |
| 2482 | | | | | | | | | | | | | | | |
| 2483 | | | | | | | | | | | | | | | |
| 2484 | CH20-BO3 | | | | | | -- | | | | | | | | |
| 2485 | CH20-BO4 | | | | | | -- | | | | | | | | |
| 2486 | CH20-BO5 | | | | | | -- | | | | | | | | |
| 2487 | CH20-BO6 | | | | | | -- | | | | | | | | |
| 2488 | CH21-TP1 | X | | | | | [1097]CH21-BPTP | | | | | | | | X |
| 2489 | CH21-TP2 | X | | | | | [1225]CH21-CBF/RE | | | | | | | | X |
| 2490 | | | | | | | | | | | | | | | |
| 2491 | | | | | | | | | | | | | | | |
| 2492 | CH21-BO3 | | | | | | -- | | | | | | | | |
| 2493 | CH21-BO4 | | | | | | -- | | | | | | | | |
| 2494 | CH21-BO5 | | | | | | -- | | | | | | | | |
| 2495 | CH21-BO6 | | | | | | -- | | | | | | | | |
| 2496 | CH22-TP1 | X | | | | | [1098]CH22-BPTP | | | | | | | | X |
| 2497 | CH22-TP2 | X | | | | | [1226]CH22-CBF/RE | | | | | | | | X |
| 2498 | | | | | | | | | | | | | | | |
| 2499 | | | | | | | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | Turn | 300 | 400 | Flip Flop | | | Timer | | | | None |
| № | Signal | 30 | 90 | User | | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | |
| 2500 | CH22-BO3 | | | | | | -- | | | | | | | | |
| 2501 | CH22-BO4 | | | | | | -- | | | | | | | | |
| 2502 | CH22-BO5 | | | | | | -- | | | | | | | | |
| 2503 | CH22-BO6 | | | | | | -- | | | | | | | | |
| 2504 | CH23-TP1 | X | | | | | [1099]CH23-BPTP | | | | | | | | X |
| 2505 | CH23-TP2 | X | | | | | [1227]CH23-CBF/RE | | | | | | | | X |
| 2506 | | | | | | | | | | | | | | | |
| 2507 | | | | | | | | | | | | | | | |
| 2508 | CH23-BO3 | | | | | | -- | | | | | | | | |
| 2509 | CH23-BO4 | | | | | | -- | | | | | | | | |
| 2510 | CH23-BO5 | | | | | | -- | | | | | | | | |
| 2511 | CH23-BO6 | | | | | | -- | | | | | | | | |
| 2512 | CH24-TP1 | X | | | | | [1100]CH24-BPTP | | | | | | | | X |
| 2513 | CH24-TP2 | X | | | | | [1228]CH24-CBF/RE | | | | | | | | X |
| 2514 | | | | | | | | | | | | | | | |
| 2515 | | | | | | | | | | | | | | | |
| 2516 | CH24-BO3 | | | | | | -- | | | | | | | | |
| 2517 | CH24-BO4 | | | | | | -- | | | | | | | | |
| 2518 | CH24-BO5 | | | | | | -- | | | | | | | | |
| 2519 | CH24-BO6 | | | | | | -- | | | | | | | | |
| 2520 | CH25-TP1 | X | | | | | [1101]CH25-BPTP | | | | | | | | X |
| 2521 | CH25-TP2 | X | | | | | [1229]CH25-CBF/RE | | | | | | | | X |
| 2522 | | | | | | | | | | | | | | | |
| 2523 | | | | | | | | | | | | | | | |
| 2524 | CH25-BO3 | | | | | | -- | | | | | | | | |
| 2525 | CH25-BO4 | | | | | | -- | | | | | | | | |
| 2526 | CH25-BO5 | | | | | | -- | | | | | | | | |
| 2527 | CH25-BO6 | | | | | | -- | | | | | | | | |
| 2528 | CH26-TP1 | X | | | | | [1102]CH26-BPTP | | | | | | | | X |
| 2529 | CH26-TP2 | X | | | | | [1230]CH26-CBF/RE | | | | | | | | X |
| 2530 | | | | | | | | | | | | | | | |
| 2531 | | | | | | | | | | | | | | | |
| 2532 | CH26-BO3 | | | | | | -- | | | | | | | | |
| 2533 | CH26-BO4 | | | | | | -- | | | | | | | | |
| 2534 | CH26-BO5 | | | | | | -- | | | | | | | | |
| 2535 | CH26-BO6 | | | | | | -- | | | | | | | | |
| 2536 | CH27-TP1 | X | | | | | [1103]CH27-BPTP | | | | | | | | X |
| 2537 | CH27-TP2 | X | | | | | [1231]CH27-CBF/RE | | | | | | | | X |
| 2538 | | | | | | | | | | | | | | | |
| 2539 | | | | | | | | | | | | | | | |
| 2540 | CH27-BO3 | | | | | | -- | | | | | | | | |
| 2541 | CH27-BO4 | | | | | | -- | | | | | | | | |
| 2542 | CH27-BO5 | | | | | | -- | | | | | | | | |
| 2543 | CH27-BO6 | | | | | | -- | | | | | | | | |
| 2544 | CH28-TP1 | X | | | | | [1104]CH28-BPTP | | | | | | | | X |
| 2545 | CH28-TP2 | X | | | | | [1232]CH28-CBF/RE | | | | | | | | X |
| 2546 | | | | | | | | | | | | | | | |
| 2547 | | | | | | | | | | | | | | | |
| 2548 | CH28-BO3 | | | | | | -- | | | | | | | | |
| 2549 | CH28-BO4 | | | | | | -- | | | | | | | | |
| 2550 | CH28-BO5 | | | | | | -- | | | | | | | | |
| 2551 | CH28-BO6 | | | | | | -- | | | | | | | | |
| 2552 | CH29-TP1 | X | | | | | [1105]CH29-BPTP | | | | | | | | X |
| 2553 | CH29-TP2 | X | | | | | [1233]CH29-CBF/RE | | | | | | | | X |
| 2554 | | | | | | | | | | | | | | | |
| 2555 | | | | | | | | | | | | | | | |
| 2556 | CH29-BO3 | | | | | | -- | | | | | | | | |
| 2557 | CH29-BO4 | | | | | | -- | | | | | | | | |
| 2558 | CH29-BO5 | | | | | | -- | | | | | | | | |
| 2559 | CH29-BO6 | | | | | | -- | | | | | | | | |
| 2560 | CH30-TP1 | X | | | | | [1106]CH30-BPTP | | | | | | | | X |
| 2561 | CH30-TP2 | X | | | | | [1234]CH30-CBF/RE | | | | | | | | X |
| 2562 | | | | | | | | | | | | | | | |
| 2563 | | | | | | | | | | | | | | | |
| 2564 | CH30-BO3 | | | | | | -- | | | | | | | | |
| 2565 | CH30-BO4 | | | | | | -- | | | | | | | | |
| 2566 | CH30-BO5 | | | | | | -- | | | | | | | | |
| 2567 | CH30-BO6 | | | | | | -- | | | | | | | | |
| 2568 | CH31-TP1 | X | | | | | [1107]CH31-BPTP | | | | | | | | X |

www.ElectricalPartManuals.com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | Turn | 300 | 400 | Flip Flop | | | Timer | | | | None |
| № | Signal | 30 | 90 | User | | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | |
| 2569 | CH31-TP2 | X | | | | | [1235]CH31-CBF/RE | | | | | | | | X |
| 2570 | | | | | | | | | | | | | | | |
| 2571 | | | | | | | | | | | | | | | |
| 2572 | CH31-BO3 | | | | | | -- | | | | | | | | |
| 2573 | CH31-BO4 | | | | | | -- | | | | | | | | |
| 2574 | CH31-BO5 | | | | | | -- | | | | | | | | |
| 2575 | CH31-BO6 | | | | | | -- | | | | | | | | |
| 2576 | CH32-TP1 | X | | | | | [1108]CH32-BPTP | | | | | | | | X |
| 2577 | CH32-TP2 | X | | | | | [1236]CH32-CBF/RE | | | | | | | | X |
| 2578 | | | | | | | | | | | | | | | |
| 2579 | | | | | | | | | | | | | | | |
| 2580 | CH32-BO3 | | | | | | -- | | | | | | | | |
| 2581 | CH32-BO4 | | | | | | -- | | | | | | | | |
| 2582 | CH32-BO5 | | | | | | -- | | | | | | | | |
| 2583 | CH32-BO6 | | | | | | -- | | | | | | | | |
| 2584 | | | | | | | | | | | | | | | |
| 2585 | | | | | | | | | | | | | | | |
| 2586 | | | | | | | | | | | | | | | |
| 2587 | | | | | | | | | | | | | | | |
| 2588 | | | | | | | | | | | | | | | |
| 2589 | | | | | | | | | | | | | | | |
| 2590 | | | | | | | | | | | | | | | |
| 2591 | | | | | | | | | | | | | | | |
| 2592 | | | | | | | | | | | | | | | |
| 2593 | | | | | | | | | | | | | | | |
| 2594 | | | | | | | | | | | | | | | |
| 2595 | | | | | | | | | | | | | | | |
| 2596 | | | | | | | | | | | | | | | |
| 2597 | | | | | | | | | | | | | | | |
| 2598 | | | | | | | | | | | | | | | |
| 2599 | | | | | | | | | | | | | | | |
| 2600 | | | | | | | | | | | | | | | |
| 2601 | | | | | | | | | | | | | | | |
| 2602 | | | | | | | | | | | | | | | |
| 2603 | | | | | | | | | | | | | | | |
| 2604 | | | | | | | | | | | | | | | |
| 2605 | | | | | | | | | | | | | | | |
| 2606 | | | | | | | | | | | | | | | |
| 2607 | | | | | | | | | | | | | | | |
| 2608 | | | | | | | | | | | | | | | |
| 2609 | | | | | | | | | | | | | | | |
| 2610 | | | | | | | | | | | | | | | |
| 2611 | | | | | | | | | | | | | | | |
| 2612 | | | | | | | | | | | | | | | |
| 2613 | | | | | | | | | | | | | | | |
| 2614 | | | | | | | | | | | | | | | |
| 2615 | | | | | | | | | | | | | | | |
| 2616 | | | | | | | | | | | | | | | |
| 2617 | | | | | | | | | | | | | | | |
| 2618 | | | | | | | | | | | | | | | |
| 2619 | | | | | | | | | | | | | | | |
| 2620 | | | | | | | | | | | | | | | |
| 2621 | | | | | | | | | | | | | | | |
| 2622 | | | | | | | | | | | | | | | |
| 2623 | | | | | | | | | | | | | | | |
| 2624 | F.RECORD1 | X | | | | | [1397]COM-TRIP | | | | | | | | X |
| 2625 | | | | | | | | | | | | | | | |
| 2626 | | | | | | | | | | | | | | | |
| 2627 | | | | | | | | | | | | | | | |
| 2628 | F.RCD_MODE | X | | | | | [1397]COM-TRIP | | | | | | | | X |
| 2629 | | | | | | | | | | | | | | | |
| 2630 | | | | | | | | | | | | | | | |
| 2631 | | | | | | | | | | | | | | | |
| 2632 | D.RECORD1 | | | | | | -- | | | | | | | | |
| 2633 | D.RECORD2 | | | | | | -- | | | | | | | | |
| 2634 | D.RECORD3 | | | | | | -- | | | | | | | | |
| 2635 | D.RECORD4 | | | | | | -- | | | | | | | | |
| 2636 | | | | | | | | | | | | | | | |
| 2637 | | | | | | | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 2638 | | | | | | | | | | | | | | | |
| 2639 | | | | | | | | | | | | | | | |
| 2640 | SET.GROUP1 | | | | | | -- | | | | | | | | |
| 2641 | SET.GROUP2 | | | | | | -- | | | | | | | | |
| 2642 | SET.GROUP3 | | | | | | -- | | | | | | | | |
| 2643 | SET.GROUP4 | | | | | | -- | | | | | | | | |
| 2644 | | | | | | | | | | | | | | | |
| 2645 | | | | | | | | | | | | | | | |
| 2646 | | | | | | | | | | | | | | | |
| 2647 | | | | | | | | | | | | | | | |
| 2648 | | | | | | | | | | | | | | | |
| 2649 | | | | | | | | | | | | | | | |
| 2650 | | | | | | | | | | | | | | | |
| 2651 | | | | | | | | | | | | | | | |
| 2652 | | | | | | | | | | | | | | | |
| 2653 | | | | | | | | | | | | | | | |
| 2654 | | | | | | | | | | | | | | | |
| 2655 | | | | | | | | | | | | | | | |
| 2656 | | | | | | | | | | | | | | | |
| 2657 | | | | | | | | | | | | | | | |
| 2658 | | | | | | | | | | | | | | | |
| 2659 | | | | | | | | | | | | | | | |
| 2660 | | | | | | | | | | | | | | | |
| 2661 | | | | | | | | | | | | | | | |
| 2662 | | | | | | | | | | | | | | | |
| 2663 | | | | | | | | | | | | | | | |
| 2664 | | | | | | | | | | | | | | | |
| 2665 | | | | | | | | | | | | | | | |
| 2666 | | | | | | | | | | | | | | | |
| 2667 | | | | | | | | | | | | | | | |
| 2668 | | | | | | | | | | | | | | | |
| 2669 | | | | | | | | | | | | | | | |
| 2670 | | | | | | | | | | | | | | | |
| 2671 | | | | | | | | | | | | | | | |
| 2672 | | | | | | | | | | | | | | | |
| 2673 | | | | | | | | | | | | | | | |
| 2674 | | | | | | | | | | | | | | | |
| 2675 | | | | | | | | | | | | | | | |
| 2676 | | | | | | | | | | | | | | | |
| 2677 | | | | | | | | | | | | | | | |
| 2678 | | | | | | | | | | | | | | | |
| 2679 | | | | | | | | | | | | | | | |
| 2680 | | | | | | | | | | | | | | | |
| 2681 | | | | | | | | | | | | | | | |
| 2682 | | | | | | | | | | | | | | | |
| 2683 | | | | | | | | | | | | | | | |
| 2684 | | | | | | | | | | | | | | | |
| 2685 | | | | | | | | | | | | | | | |
| 2686 | PROT_COM_RECV | | | | | | -- | | | | | | | | |
| 2687 | | | | | | | | | | | | | | | |
| 2688 | TPLED_RST_RCV | | | | | | -- | | | | | | | | |
| 2689 | | | | | | | | | | | | | | | |
| 2690 | | | | | | | | | | | | | | | |
| 2691 | | | | | | | | | | | | | | | |
| 2692 | | | | | | | | | | | | | | | |
| 2693 | | | | | | | | | | | | | | | |
| 2694 | | | | | | | | | | | | | | | |
| 2695 | | | | | | | | | | | | | | | |
| 2696 | | | | | | | | | | | | | | | |
| 2697 | | | | | | | | | | | | | | | |
| 2698 | | | | | | | | | | | | | | | |
| 2699 | | | | | | | | | | | | | | | |
| 2700 | | | | | | | | | | | | | | | |
| 2701 | | | | | | | | | | | | | | | |
| 2702 | | | | | | | | | | | | | | | |
| 2703 | | | | | | | | | | | | | | | |
| 2704 | | | | | | | | | | | | | | | |
| 2705 | | | | | | | | | | | | | | | |
| 2706 | | | | | | | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | | | Flip Flop | | | Timer | | | | |
| № | Signal | 30 | 90 | User | Turn | 300 | 400 | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | None |
| 2707 | | | | | | | | | | | | | | | |
| 2708 | | | | | | | | | | | | | | | |
| 2709 | | | | | | | | | | | | | | | |
| 2710 | | | | | | | | | | | | | | | |
| 2711 | | | | | | | | | | | | | | | |
| 2712 | | | | | | | | | | | | | | | |
| 2713 | | | | | | | | | | | | | | | |
| 2714 | | | | | | | | | | | | | | | |
| 2715 | | | | | | | | | | | | | | | |
| 2716 | | | | | | | | | | | | | | | |
| 2717 | | | | | | | | | | | | | | | |
| 2718 | | | | | | | | | | | | | | | |
| 2719 | | | | | | | | | | | | | | | |
| 2720 | | | | | | | | | | | | | | | |
| 2721 | | | | | | | | | | | | | | | |
| 2722 | | | | | | | | | | | | | | | |
| 2723 | | | | | | | | | | | | | | | |
| 2724 | | | | | | | | | | | | | | | |
| 2725 | | | | | | | | | | | | | | | |
| 2726 | | | | | | | | | | | | | | | |
| 2727 | | | | | | | | | | | | | | | |
| 2728 | | | | | | | | | | | | | | | |
| 2729 | | | | | | | | | | | | | | | |
| 2730 | | | | | | | | | | | | | | | |
| 2731 | | | | | | | | | | | | | | | |
| 2732 | | | | | | | | | | | | | | | |
| 2733 | | | | | | | | | | | | | | | |
| 2734 | | | | | | | | | | | | | | | |
| 2735 | | | | | | | | | | | | | | | |
| 2736 | | | | | | | | | | | | | | | |
| 2737 | | | | | | | | | | | | | | | |
| 2738 | | | | | | | | | | | | | | | |
| 2739 | | | | | | | | | | | | | | | |
| 2740 | | | | | | | | | | | | | | | |
| 2741 | | | | | | | | | | | | | | | |
| 2742 | | | | | | | | | | | | | | | |
| 2743 | | | | | | | | | | | | | | | |
| 2744 | | | | | | | | | | | | | | | |
| 2745 | | | | | | | | | | | | | | | |
| 2746 | | | | | | | | | | | | | | | |
| 2747 | | | | | | | | | | | | | | | |
| 2748 | | | | | | | | | | | | | | | |
| 2749 | | | | | | | | | | | | | | | |
| 2750 | | | | | | | | | | | | | | | |
| 2751 | | | | | | | | | | | | | | | |
| 2752 | CH1-EFPTR_R | | | | | | -- | | | | | | | | |
| 2753 | CH2-EFPTR_R | | | | | | -- | | | | | | | | |
| 2754 | CH3-EFPTR_R | | | | | | -- | | | | | | | | |
| 2755 | CH4-EFPTR_R | | | | | | -- | | | | | | | | |
| 2756 | CH5-EFPTR_R | | | | | | -- | | | | | | | | |
| 2757 | CH6-EFPTR_R | | | | | | -- | | | | | | | | |
| 2758 | CH7-EFPTR_R | | | | | | -- | | | | | | | | |
| 2759 | CH8-EFPTR_R | | | | | | -- | | | | | | | | |
| 2760 | CH9-EFPTR_R | | | | | | -- | | | | | | | | |
| 2761 | CH10-EFPTR_R | | | | | | -- | | | | | | | | |
| 2762 | CH11-EFPTR_R | | | | | | -- | | | | | | | | |
| 2763 | CH12-EFPTR_R | | | | | | -- | | | | | | | | |
| 2764 | CH13-EFPTR_R | | | | | | -- | | | | | | | | |
| 2765 | CH14-EFPTR_R | | | | | | -- | | | | | | | | |
| 2766 | CH15-EFPTR_R | | | | | | -- | | | | | | | | |
| 2767 | CH16-EFPTR_R | | | | | | -- | | | | | | | | |
| 2768 | CH17-EFPTR_R | | | | | | -- | | | | | | | | |
| 2769 | CH18-EFPTR_R | | | | | | -- | | | | | | | | |
| 2770 | CH19-EFPTR_R | | | | | | -- | | | | | | | | |
| 2771 | CH20-EFPTR_R | | | | | | -- | | | | | | | | |
| 2772 | CH21-EFPTR_R | | | | | | -- | | | | | | | | |
| 2773 | CH22-EFPTR_R | | | | | | -- | | | | | | | | |
| 2774 | CH23-EFPTR_R | | | | | | -- | | | | | | | | |
| 2775 | CH24-EFPTR_R | | | | | | -- | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № | Signal | Cycle 30 | Cycle 90 | Cycle User | Turn | 300 | 400 | Flip Flop Norm | Flip Flop Back Up | Flip Flop Release Signal | Timer Off Delay | Timer On Delay | Timer One Shot | Timer Time Value | None |
| 2776 | CH25-EFPTR_R | | | | | | -- | | | | | | | | |
| 2777 | CH26-EFPTR_R | | | | | | -- | | | | | | | | |
| 2778 | CH27-EFPTR_R | | | | | | -- | | | | | | | | |
| 2779 | CH28-EFPTR_R | | | | | | -- | | | | | | | | |
| 2780 | CH29-EFPTR_R | | | | | | -- | | | | | | | | |
| 2781 | CH30-EFPTR_R | | | | | | -- | | | | | | | | |
| 2782 | CH31-EFPTR_R | | | | | | -- | | | | | | | | |
| 2783 | CH32-EFPTR_R | | | | | | -- | | | | | | | | |
| 2784 | CH1-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2785 | CH2-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2786 | CH3-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2787 | CH4-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2788 | CH5-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2789 | CH6-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2790 | CH7-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2791 | CH8-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2792 | CH9-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2793 | CH10-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2794 | CH11-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2795 | CH12-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2796 | CH13-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2797 | CH14-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2798 | CH15-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2799 | CH16-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2800 | CH17-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2801 | CH18-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2802 | CH19-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2803 | CH20-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2804 | CH21-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2805 | CH22-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2806 | CH23-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2807 | CH24-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2808 | CH25-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2809 | CH26-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2810 | CH27-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2811 | CH28-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2812 | CH29-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2813 | CH30-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2814 | CH31-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2815 | CH32-EFPTR_ON | | | | | | -- | | | | | | | | |
| 2816 | TEMP001 | | | | | | -- | | | | | | | | |
| 2817 | TEMP002 | | | | | | -- | | | | | | | | |
| 2818 | TEMP003 | | | | | | -- | | | | | | | | |
| 2819 | TEMP004 | | | | | | -- | | | | | | | | |
| 2820 | TEMP005 | | | | | | -- | | | | | | | | |
| 2821 | TEMP006 | | | | | | -- | | | | | | | | |
| 2822 | TEMP007 | | | | | | -- | | | | | | | | |
| 2823 | TEMP008 | | | | | | -- | | | | | | | | |
| 2824 | TEMP009 | | | | | | -- | | | | | | | | |
| 2825 | TEMP010 | | | | | | -- | | | | | | | | |
| 2826 | TEMP011 | | | | | | -- | | | | | | | | |
| 2827 | TEMP012 | | | | | | -- | | | | | | | | |
| 2828 | TEMP013 | | | | | | -- | | | | | | | | |
| 2829 | TEMP014 | | | | | | -- | | | | | | | | |
| 2830 | TEMP015 | | | | | | -- | | | | | | | | |
| 2831 | TEMP016 | | | | | | -- | | | | | | | | |
| 2832 | TEMP017 | | | | | | -- | | | | | | | | |
| 2833 | TEMP018 | | | | | | -- | | | | | | | | |
| 2834 | TEMP019 | | | | | | -- | | | | | | | | |
| 2835 | TEMP020 | | | | | | -- | | | | | | | | |
| 2836 | TEMP021 | | | | | | -- | | | | | | | | |
| 2837 | TEMP022 | | | | | | -- | | | | | | | | |
| 2838 | TEMP023 | | | | | | -- | | | | | | | | |
| 2839 | TEMP024 | | | | | | -- | | | | | | | | |
| 2840 | TEMP025 | | | | | | -- | | | | | | | | |
| 2841 | TEMP026 | | | | | | -- | | | | | | | | |
| 2842 | TEMP027 | | | | | | -- | | | | | | | | |
| 2843 | TEMP028 | | | | | | -- | | | | | | | | |
| 2844 | TEMP029 | | | | | | -- | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | Turn | 300 | 400 | Flip Flop | | | Timer | | | | None |
| № | Signal | 30 | 90 | User | | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | |
| 2845 | TEMP030 | | | | | -- | | | | | | | | | |
| 2846 | TEMP031 | | | | | -- | | | | | | | | | |
| 2847 | TEMP032 | | | | | -- | | | | | | | | | |
| 2848 | TEMP033 | | | | | -- | | | | | | | | | |
| 2849 | TEMP034 | | | | | -- | | | | | | | | | |
| 2850 | TEMP035 | | | | | -- | | | | | | | | | |
| 2851 | TEMP036 | | | | | -- | | | | | | | | | |
| 2852 | TEMP037 | | | | | -- | | | | | | | | | |
| 2853 | TEMP038 | | | | | -- | | | | | | | | | |
| 2854 | TEMP039 | | | | | -- | | | | | | | | | |
| 2855 | TEMP040 | | | | | -- | | | | | | | | | |
| 2856 | TEMP041 | | | | | -- | | | | | | | | | |
| 2857 | TEMP042 | | | | | -- | | | | | | | | | |
| 2858 | TEMP043 | | | | | -- | | | | | | | | | |
| 2859 | TEMP044 | | | | | -- | | | | | | | | | |
| 2860 | TEMP045 | | | | | -- | | | | | | | | | |
| 2861 | TEMP046 | | | | | -- | | | | | | | | | |
| 2862 | TEMP047 | | | | | -- | | | | | | | | | |
| 2863 | TEMP048 | | | | | -- | | | | | | | | | |
| 2864 | TEMP049 | | | | | -- | | | | | | | | | |
| 2865 | TEMP050 | | | | | -- | | | | | | | | | |
| 2866 | TEMP051 | | | | | -- | | | | | | | | | |
| 2867 | TEMP052 | | | | | -- | | | | | | | | | |
| 2868 | TEMP053 | | | | | -- | | | | | | | | | |
| 2869 | TEMP054 | | | | | -- | | | | | | | | | |
| 2870 | TEMP055 | | | | | -- | | | | | | | | | |
| 2871 | TEMP056 | | | | | -- | | | | | | | | | |
| 2872 | TEMP057 | | | | | -- | | | | | | | | | |
| 2873 | TEMP058 | | | | | -- | | | | | | | | | |
| 2874 | TEMP059 | | | | | -- | | | | | | | | | |
| 2875 | TEMP060 | | | | | -- | | | | | | | | | |
| 2876 | TEMP061 | | | | | -- | | | | | | | | | |
| 2877 | TEMP062 | | | | | -- | | | | | | | | | |
| 2878 | TEMP063 | | | | | -- | | | | | | | | | |
| 2879 | TEMP064 | | | | | -- | | | | | | | | | |
| 2880 | TEMP065 | | | | | -- | | | | | | | | | |
| 2881 | TEMP066 | | | | | -- | | | | | | | | | |
| 2882 | TEMP067 | | | | | -- | | | | | | | | | |
| 2883 | TEMP068 | | | | | -- | | | | | | | | | |
| 2884 | TEMP069 | | | | | -- | | | | | | | | | |
| 2885 | TEMP070 | | | | | -- | | | | | | | | | |
| 2886 | TEMP071 | | | | | -- | | | | | | | | | |
| 2887 | TEMP072 | | | | | -- | | | | | | | | | |
| 2888 | TEMP073 | | | | | -- | | | | | | | | | |
| 2889 | TEMP074 | | | | | -- | | | | | | | | | |
| 2890 | TEMP075 | | | | | -- | | | | | | | | | |
| 2891 | TEMP076 | | | | | -- | | | | | | | | | |
| 2892 | TEMP077 | | | | | -- | | | | | | | | | |
| 2893 | TEMP078 | | | | | -- | | | | | | | | | |
| 2894 | TEMP079 | | | | | -- | | | | | | | | | |
| 2895 | TEMP080 | | | | | -- | | | | | | | | | |
| 2896 | TEMP081 | | | | | -- | | | | | | | | | |
| 2897 | TEMP082 | | | | | -- | | | | | | | | | |
| 2898 | TEMP083 | | | | | -- | | | | | | | | | |
| 2899 | TEMP084 | | | | | -- | | | | | | | | | |
| 2900 | TEMP085 | | | | | -- | | | | | | | | | |
| 2901 | TEMP086 | | | | | -- | | | | | | | | | |
| 2902 | TEMP087 | | | | | -- | | | | | | | | | |
| 2903 | TEMP088 | | | | | -- | | | | | | | | | |
| 2904 | TEMP089 | | | | | -- | | | | | | | | | |
| 2905 | TEMP090 | | | | | -- | | | | | | | | | |
| 2906 | TEMP091 | | | | | -- | | | | | | | | | |
| 2907 | TEMP092 | | | | | -- | | | | | | | | | |
| 2908 | TEMP093 | | | | | -- | | | | | | | | | |
| 2909 | TEMP094 | | | | | -- | | | | | | | | | |
| 2910 | TEMP095 | | | | | -- | | | | | | | | | |
| 2911 | TEMP096 | | | | | -- | | | | | | | | | |
| 2912 | TEMP097 | | | | | -- | | | | | | | | | |
| 2913 | TEMP098 | | | | | -- | | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | Turn | 300 | 400 | Flip Flop | | | Timer | | | | None |
| № | Signal | 30 | 90 | User | | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | |
| 2914 | TEMP099 | | | | | | -- | | | | | | | | |
| 2915 | TEMP100 | | | | | | -- | | | | | | | | |
| 2916 | TEMP101 | | | | | | -- | | | | | | | | |
| 2917 | TEMP102 | | | | | | -- | | | | | | | | |
| 2918 | TEMP103 | | | | | | -- | | | | | | | | |
| 2919 | TEMP104 | | | | | | -- | | | | | | | | |
| 2920 | TEMP105 | | | | | | -- | | | | | | | | |
| 2921 | TEMP106 | | | | | | -- | | | | | | | | |
| 2922 | TEMP107 | | | | | | -- | | | | | | | | |
| 2923 | TEMP108 | | | | | | -- | | | | | | | | |
| 2924 | TEMP109 | | | | | | -- | | | | | | | | |
| 2925 | TEMP110 | | | | | | -- | | | | | | | | |
| 2926 | TEMP111 | | | | | | -- | | | | | | | | |
| 2927 | TEMP112 | | | | | | -- | | | | | | | | |
| 2928 | TEMP113 | | | | | | -- | | | | | | | | |
| 2929 | TEMP114 | | | | | | -- | | | | | | | | |
| 2930 | TEMP115 | | | | | | -- | | | | | | | | |
| 2931 | TEMP116 | | | | | | -- | | | | | | | | |
| 2932 | TEMP117 | | | | | | -- | | | | | | | | |
| 2933 | TEMP118 | | | | | | -- | | | | | | | | |
| 2934 | TEMP119 | | | | | | -- | | | | | | | | |
| 2935 | TEMP120 | | | | | | -- | | | | | | | | |
| 2936 | TEMP121 | | | | | | -- | | | | | | | | |
| 2937 | TEMP122 | | | | | | -- | | | | | | | | |
| 2938 | TEMP123 | | | | | | -- | | | | | | | | |
| 2939 | TEMP124 | | | | | | -- | | | | | | | | |
| 2940 | TEMP125 | | | | | | -- | | | | | | | | |
| 2941 | TEMP126 | | | | | | -- | | | | | | | | |
| 2942 | TEMP127 | | | | | | -- | | | | | | | | |
| 2943 | TEMP128 | | | | | | -- | | | | | | | | |
| 2944 | TEMP129 | | | | | | -- | | | | | | | | |
| 2945 | TEMP130 | | | | | | -- | | | | | | | | |
| 2946 | TEMP131 | | | | | | -- | | | | | | | | |
| 2947 | TEMP132 | | | | | | -- | | | | | | | | |
| 2948 | TEMP133 | | | | | | -- | | | | | | | | |
| 2949 | TEMP134 | | | | | | -- | | | | | | | | |
| 2950 | TEMP135 | | | | | | -- | | | | | | | | |
| 2951 | TEMP136 | | | | | | -- | | | | | | | | |
| 2952 | TEMP137 | | | | | | -- | | | | | | | | |
| 2953 | TEMP138 | | | | | | -- | | | | | | | | |
| 2954 | TEMP139 | | | | | | -- | | | | | | | | |
| 2955 | TEMP140 | | | | | | -- | | | | | | | | |
| 2956 | TEMP141 | | | | | | -- | | | | | | | | |
| 2957 | TEMP142 | | | | | | -- | | | | | | | | |
| 2958 | TEMP143 | | | | | | -- | | | | | | | | |
| 2959 | TEMP144 | | | | | | -- | | | | | | | | |
| 2960 | TEMP145 | | | | | | -- | | | | | | | | |
| 2961 | TEMP146 | | | | | | -- | | | | | | | | |
| 2962 | TEMP147 | | | | | | -- | | | | | | | | |
| 2963 | TEMP148 | | | | | | -- | | | | | | | | |
| 2964 | TEMP149 | | | | | | -- | | | | | | | | |
| 2965 | TEMP150 | | | | | | -- | | | | | | | | |
| 2966 | TEMP151 | | | | | | -- | | | | | | | | |
| 2967 | TEMP152 | | | | | | -- | | | | | | | | |
| 2968 | TEMP153 | | | | | | -- | | | | | | | | |
| 2969 | TEMP154 | | | | | | -- | | | | | | | | |
| 2970 | TEMP155 | | | | | | -- | | | | | | | | |
| 2971 | TEMP156 | | | | | | -- | | | | | | | | |
| 2972 | TEMP157 | | | | | | -- | | | | | | | | |
| 2973 | TEMP158 | | | | | | -- | | | | | | | | |
| 2974 | TEMP159 | | | | | | -- | | | | | | | | |
| 2975 | TEMP160 | | | | | | -- | | | | | | | | |
| 2976 | TEMP161 | | | | | | -- | | | | | | | | |
| 2977 | TEMP162 | | | | | | -- | | | | | | | | |
| 2978 | TEMP163 | | | | | | -- | | | | | | | | |
| 2979 | TEMP164 | | | | | | -- | | | | | | | | |
| 2980 | TEMP165 | | | | | | -- | | | | | | | | |
| 2981 | TEMP166 | | | | | | -- | | | | | | | | |
| 2982 | TEMP167 | | | | | | -- | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | Turn | 300 | 400 | Flip Flop | | | Timer | | | | None |
| № | Signal | 30 | 90 | User | | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | |
| 2983 | TEMP168 | | | | | | -- | | | | | | | | |
| 2984 | TEMP169 | | | | | | -- | | | | | | | | |
| 2985 | TEMP170 | | | | | | -- | | | | | | | | |
| 2986 | TEMP171 | | | | | | -- | | | | | | | | |
| 2987 | TEMP172 | | | | | | -- | | | | | | | | |
| 2988 | TEMP173 | | | | | | -- | | | | | | | | |
| 2989 | TEMP174 | | | | | | -- | | | | | | | | |
| 2990 | TEMP175 | | | | | | -- | | | | | | | | |
| 2991 | TEMP176 | | | | | | -- | | | | | | | | |
| 2992 | TEMP177 | | | | | | -- | | | | | | | | |
| 2993 | TEMP178 | | | | | | -- | | | | | | | | |
| 2994 | TEMP179 | | | | | | -- | | | | | | | | |
| 2995 | TEMP180 | | | | | | -- | | | | | | | | |
| 2996 | TEMP181 | | | | | | -- | | | | | | | | |
| 2997 | TEMP182 | | | | | | -- | | | | | | | | |
| 2998 | TEMP183 | | | | | | -- | | | | | | | | |
| 2999 | TEMP184 | | | | | | -- | | | | | | | | |
| 3000 | TEMP185 | | | | | | -- | | | | | | | | |
| 3001 | TEMP186 | | | | | | -- | | | | | | | | |
| 3002 | TEMP187 | | | | | | -- | | | | | | | | |
| 3003 | TEMP188 | | | | | | -- | | | | | | | | |
| 3004 | TEMP189 | | | | | | -- | | | | | | | | |
| 3005 | TEMP190 | | | | | | -- | | | | | | | | |
| 3006 | TEMP191 | | | | | | -- | | | | | | | | |
| 3007 | TEMP192 | | | | | | -- | | | | | | | | |
| 3008 | TEMP193 | | | | | | -- | | | | | | | | |
| 3009 | TEMP194 | | | | | | -- | | | | | | | | |
| 3010 | TEMP195 | | | | | | -- | | | | | | | | |
| 3011 | TEMP196 | | | | | | -- | | | | | | | | |
| 3012 | TEMP197 | | | | | | -- | | | | | | | | |
| 3013 | TEMP198 | | | | | | -- | | | | | | | | |
| 3014 | TEMP199 | | | | | | -- | | | | | | | | |
| 3015 | TEMP200 | | | | | | -- | | | | | | | | |
| 3016 | TEMP201 | | | | | | -- | | | | | | | | |
| 3017 | TEMP202 | | | | | | -- | | | | | | | | |
| 3018 | TEMP203 | | | | | | -- | | | | | | | | |
| 3019 | TEMP204 | | | | | | -- | | | | | | | | |
| 3020 | TEMP205 | | | | | | -- | | | | | | | | |
| 3021 | TEMP206 | | | | | | -- | | | | | | | | |
| 3022 | TEMP207 | | | | | | -- | | | | | | | | |
| 3023 | TEMP208 | | | | | | -- | | | | | | | | |
| 3024 | TEMP209 | | | | | | -- | | | | | | | | |
| 3025 | TEMP210 | | | | | | -- | | | | | | | | |
| 3026 | TEMP211 | | | | | | -- | | | | | | | | |
| 3027 | TEMP212 | | | | | | -- | | | | | | | | |
| 3028 | TEMP213 | | | | | | -- | | | | | | | | |
| 3029 | TEMP214 | | | | | | -- | | | | | | | | |
| 3030 | TEMP215 | | | | | | -- | | | | | | | | |
| 3031 | TEMP216 | | | | | | -- | | | | | | | | |
| 3032 | TEMP217 | | | | | | -- | | | | | | | | |
| 3033 | TEMP218 | | | | | | -- | | | | | | | | |
| 3034 | TEMP219 | | | | | | -- | | | | | | | | |
| 3035 | TEMP220 | | | | | | -- | | | | | | | | |
| 3036 | TEMP221 | | | | | | -- | | | | | | | | |
| 3037 | TEMP222 | | | | | | -- | | | | | | | | |
| 3038 | TEMP223 | | | | | | -- | | | | | | | | |
| 3039 | TEMP224 | | | | | | -- | | | | | | | | |
| 3040 | TEMP225 | | | | | | -- | | | | | | | | |
| 3041 | TEMP226 | | | | | | -- | | | | | | | | |
| 3042 | TEMP227 | | | | | | -- | | | | | | | | |
| 3043 | TEMP228 | | | | | | -- | | | | | | | | |
| 3044 | TEMP229 | | | | | | -- | | | | | | | | |
| 3045 | TEMP230 | | | | | | -- | | | | | | | | |
| 3046 | TEMP231 | | | | | | -- | | | | | | | | |
| 3047 | TEMP232 | | | | | | -- | | | | | | | | |
| 3048 | TEMP233 | | | | | | -- | | | | | | | | |
| 3049 | TEMP234 | | | | | | -- | | | | | | | | |
| 3050 | TEMP235 | | | | | | -- | | | | | | | | |
| 3051 | TEMP236 | | | | | | -- | | | | | | | | |

www . ElectricalPartManuals . com

PLC Default Setting

| Output | | Timing | | | | Logic expression | | Delay Time / Flip Flop | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cycle | | | | 300 | 400 | Flip Flop | | | Timer | | | | | |
| № | Signal | 30 | 90 | User | Turn | | | Norm | Back Up | Release Signal | Off Delay | On Delay | One Shot | Time Value | | None |
| 3052 | TEMP237 | | | | | -- | | | | | | | | | | |
| 3053 | TEMP238 | | | | | -- | | | | | | | | | | |
| 3054 | TEMP239 | | | | | -- | | | | | | | | | | |
| 3055 | TEMP240 | | | | | -- | | | | | | | | | | |
| 3056 | TEMP241 | | | | | -- | | | | | | | | | | |
| 3057 | TEMP242 | | | | | -- | | | | | | | | | | |
| 3058 | TEMP243 | | | | | -- | | | | | | | | | | |
| 3059 | TEMP244 | | | | | -- | | | | | | | | | | |
| 3060 | TEMP245 | | | | | -- | | | | | | | | | | |
| 3061 | TEMP246 | | | | | -- | | | | | | | | | | |
| 3062 | TEMP247 | | | | | -- | | | | | | | | | | |
| 3063 | TEMP248 | | | | | -- | | | | | | | | | | |
| 3064 | TEMP249 | | | | | -- | | | | | | | | | | |
| 3065 | TEMP250 | | | | | -- | | | | | | | | | | |
| 3066 | TEMP251 | | | | | -- | | | | | | | | | | |
| 3067 | TEMP252 | | | | | -- | | | | | | | | | | |
| 3068 | TEMP253 | | | | | -- | | | | | | | | | | |
| 3069 | TEMP254 | | | | | -- | | | | | | | | | | |
| 3070 | TEMP255 | | | | | -- | | | | | | | | | | |
| 3071 | TEMP256 | | | | | -- | | | | | | | | | | |

www . ElectricalPartManuals . com

# Appendix K

## Commissioning Test Sheet (sample)

1. Relay identification
2. Preliminary check
3. Hardware check
   3.1 User interface check
   3.2 Binary input/binary output circuit check
   3.3 AC input circuit check
4. Function test
   4.1 Current differential element test
   4.2 Overcurrent element test
   4.3 FD element test
5. Protection scheme test
6. Metering and recording check

www . ElectricalPartManuals . com

## 1. Relay identification

Type ____________________ Serial number ____________________

Model ____________________ System frequency ____________________

Station ____________________ Date ____________________

Circuit ____________________ Engineer ____________________

Protection scheme ____________________ Witness ____________________

Active settings group number __________

## 2. Preliminary check

Relay AC ratings ☐

DC power supply ☐

Wiring ☐

Calendar and clock ☐

## 3. Hardware check

User interface check

☐

Binary input/binary output circuit check

Binary input circuit ☐

Binary output circuit ☐

3.3 AC input circuit check

☐

www . ElectricalPartManuals . com

# 4. Function test

## 4.1 Current differential element test

(1)Minimum operating value test

| Element | Tap setting | Measured current |
|---|---|---|
| DIFCH | | |
| DIFZA | | |
| DIFZB | | |
| DIFZC | | |
| DIFZD | | |
| DIFSV | | |

(2) Percentage restraining characteristic test

DIFCH

| Tap setting | I | Measured current ($I_{out}$) |
|---|---|---|
| | × Tap | |
| | × Tap | |
| | × Tap | |

DIFZA

| Tap setting | I | Measured current ($I_{out}$) |
|---|---|---|
| | × Tap | |
| | × Tap | |
| | × Tap | |

DIFZB

| Tap setting | I | Measured current ($I_{out}$) |
|---|---|---|
| | × Tap | |
| | × Tap | |
| | × Tap | |

DIFZC

| Tap setting | I | Measured current ($I_{out}$) |
|---|---|---|
| | × Tap | |
| | × Tap | |
| | × Tap | |

www . ElectricalPartManuals . com

DIFZD

| Tap setting | I | Measured current ($I_{out}$) |
|---|---|---|
| | × Tap | |
| | × Tap | |
| | × Tap | |

## 4.2 Overcurrent element test

| Element | Tap setting | Measured current |
|---|---|---|
| 1OCBF | | |
| 2OCBF | | |
| 3OCBF | | |
| 4OCBF | | |
| 5OCBF | | |
| 6OCBF | | |
| 7OCBF | | |
| 8OCBF | | |
| 9OCBF | | |
| 10OCBF | | |
| 11OCBF | | |
| 12OCBF | | |
| 13OCBF | | |
| 14OCBF | | |
| 15OCBF | | |
| 16OCBF | | |
| 17OCBF | | |
| 18OCBF | | |
| 19OCBF | | |
| 20OCBF | | |
| 21OCBF | | |
| 22OCBF | | |
| 23OCBF | | |
| 24OCBF | | |
| 25OCBF | | |
| 26OCBF | | |
| 27OCBF | | |
| 28OCBF | | |
| 29OCBF | | |

www . ElectricalPartManuals . com

| | | |
|---|---|---|
| 30OCBF | | |
| 31OCBF | | |
| 32OCBF | | |

4.3 FD element test

| Element | Measured value |
|---|---|
| UVSFA | |
| UVSFB | |
| UVSFC | |
| UVSFD | |
| UVGFA | |
| UVGFB | |
| UVGFC | |
| UVGFD | |
| OVGF | |

5. Protection scheme test

6. Metering and recording check

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

# Appendix L

## Return Repair Form

www . ElectricalPartManuals . com

## RETURN / REPAIR FORM

Please fill in this form and return it to Toshiba Corporation with the GRB100 to be repaired.

TOSHIBA CORPORATION
Fuchu Complex
1,Toshiba-cho, Fuchu-shi, Tokyo, Japan
For: Power Systems Protection & Control Department
Quality Assurance Section

Central Unit

Type:___GRB100_____ Model:_______________

(Example: Type:____GRB100_____ Model:_C420B-30-10)

Product No.: ________________________________________

Serial No. : ________________________________________

Date: ________________________________________

Bay Unit

Type:___GRB100_____ Model:_______________

(Example: Type:____GRB100_____ Model:_B310B-21-10)

Product No.: ________________________________________

Serial No. : ________________________________________

Date: ________________________________________

1. Why the relay is being returned ?

☐ mal-operation
☐ does not operate
☐ increased error
☐ investigation
☐ others

________________________________________
________________________________________
________________________________________
________________________________________

www . ElectricalPartManuals . com

2. Fault records, event records or disturbance records stored in the relay and relay settings are very helpful information to investigate the incident.

   So please inform us the information concerned in the incident with Floppy Disk, or filling up the Fault Record sheet and Relay Setting sheet attached.

www . ElectricalPartManuals . com

Fault Record

Date/Month/Year Time / /
/ : : .

(Example: 04/ Nov./ 2001 15:09:58.442)

Faulty phase:

Tripping mode:

Tripped channel:

Fault values (VT ratio: kV/: V)

| | | | | | |
|---|---|---|---|---|---|
| Ida: | % | | | | |
| Idb: | % | | | | |
| Idc: | % | | | | |
| IdaA: | % | | $I_{daB}$: | % | |
| IdbA: | % | | $I_{dbB}$: | % | |
| IdcA: | % | | $I_{dcB}$: | % | |
| IdaC: | % | | $I_{daD}$: | % | |
| IdbC: | % | | $I_{dbD}$: | % | |
| IdcC: | % | | $I_{dcD}$: | % | |
| $V_{aA}$: | kV∠ | ° | $V_{1A}$: | kV∠ | ° |
| $V_{bA}$: | kV∠ | ° | $V_{2A}$: | kV∠ | ° |
| $V_{cA}$: | kV∠ | ° | $V_{0A}$: | kV∠ | ° |
| $V_{aB}$: | kV∠ | ° | $V_{1B}$: | kV∠ | ° |
| $V_{bB}$: | kV∠ | ° | $V_{2B}$: | kV∠ | ° |
| $V_{cB}$: | kV∠ | ° | $V_{0B}$: | kV∠ | ° |
| $V_{aC}$: | kV∠ | ° | $V_{1C}$: | kV∠ | ° |
| $V_{bC}$: | kV∠ | ° | $V_{2C}$: | kV∠ | ° |
| $V_{cC}$: | kV∠ | ° | $V_{0C}$: | kV∠ | ° |
| $V_{aD}$: | kV∠ | ° | $V_{1D}$: | kV∠ | ° |
| $V_{bD}$: | kV∠ | ° | $V_{2D}$: | kV∠ | ° |
| $V_{cD}$: | kV∠ | ° | $V_{0D}$: | kV∠ | ° |
| CH1 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH2 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH3 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH3 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH4 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

www.ElectricalPartManuals.com

CH5

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH6

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH7

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH8

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH9

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH10

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH11

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH12

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH13

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH14

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH15

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

CH16

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

www . ElectricalPartManuals . com

| | | | | | |
|---|---|---|---|---|---|
| CH17 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH18 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH19 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH20 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH21 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH22 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH23 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH22 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH23 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH24 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH25 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH26 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

www . ElectricalPartManuals . com

| | | | | | |
|---|---|---|---|---|---|
| CH27 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH28 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH29 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH30 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH31 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH32 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| Prefault values | (VT ratio: | kV/: | V) | | |
| Ida: | % | | | | |
| Idb: | % | | | | |
| Idc: | % | | | | |
| IdaA: | % | | $I_{daB}$: | % | |
| IdbA: | % | | $I_{dbB}$: | % | |
| IdcA: | % | | $I_{dcB}$: | % | |
| IdaC: | % | | $I_{daD}$: | % | |
| IdbC: | % | | $I_{dbD}$: | % | |
| IdcC: | % | | $I_{dcD}$: | % | |
| $V_{aA}$: | kV∠ | ° | $V_{1A}$: | kV∠ | ° |
| $V_{bA}$: | kV∠ | ° | $V_{2A}$: | kV∠ | ° |
| $V_{cA}$: | kV∠ | ° | $V_{0A}$: | kV∠ | ° |
| $V_{aB}$: | kV∠ | ° | $V_{1B}$: | kV∠ | ° |
| $V_{bB}$: | kV∠ | ° | $V_{2B}$: | kV∠ | ° |
| $V_{cB}$: | kV∠ | ° | $V_{0B}$: | kV∠ | ° |
| $V_{aC}$: | kV∠ | ° | $V_{1C}$: | kV∠ | ° |
| $V_{bC}$: | kV∠ | ° | $V_{2C}$: | kV∠ | ° |
| $V_{cC}$: | kV∠ | ° | $V_{0C}$: | kV∠ | ° |
| $V_{aD}$: | kV∠ | ° | $V_{1D}$: | kV∠ | ° |
| $V_{bD}$: | kV∠ | ° | $V_{2D}$: | kV∠ | ° |
| $V_{cD}$: | kV∠ | ° | $V_{0D}$: | kV∠ | ° |
| CH1 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH2 | | | | | |

www.ElectricalPartManuals.com

| | | | | | |
|---|---|---|---|---|---|
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH3 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH3 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH4 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH5 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH6 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH7 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH8 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH9 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH10 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH11 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH12 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

www . ElectricalPartManuals . com

CH13
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH14
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH15
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH16
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH17
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH18
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH19
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH20
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH21
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH22
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH23
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

CH22
$I_a$: kA or A∠ ° $I_1$: kA or A∠ °
$I_b$: kA or A∠ ° $I_2$: kA or A∠ °
$I_c$: kA or A∠ ° $I_0$: kA or A∠ °

www . ElectricalPartManuals . com

| | | | | | |
|---|---|---|---|---|---|
| CH23 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH24 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH25 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH26 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH27 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH28 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH29 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH30 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH31 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |
| CH32 | | | | | |
| $I_a$: | kA or A∠ | ° | $I_1$: | kA or A∠ | ° |
| $I_b$: | kA or A∠ | ° | $I_2$: | kA or A∠ | ° |
| $I_c$: | kA or A∠ | ° | $I_0$: | kA or A∠ | ° |

www . ElectricalPartManuals . com

3. What was the message on the LCD display at the time of the incident.

4. Please write the detail of the incident.

5. Date of the incident occurred.

Day/ Month/ Year: / / /

(Example: 10/ July/ 2001)

6. Please write any comments on the GRB100, including the document.

www . ElectricalPartManuals . com

Customer

Name: ______________________________

Company Name: ______________________________

Address: ______________________________

Telephone No.: ______________________________

Facsimile No.: ______________________________

Signature: ______________________________

www . ElectricalPartManuals . com

# Appendix M

## Technical Data

www . ElectricalPartManuals . com

# Technical Data

## Ratings

| | |
|---|---|
| AC current: | 1A or 5A |
| Frequency: | 50Hz or 60Hz |
| DC power supply: | 110Vdc/125Vdc (Operative range: 88 to 150Vdc)<br>220Vdc/250Vdc (Operative range: 176 to 300Vdc)<br>48Vdc/54Vdc/60Vdc (Operative range: 38.4 to 72Vdc) |

## Overload Rating

| | |
|---|---|
| AC current input: | 4 times rated continuous |
| | 100 times rated for 1 second |
| AC voltage input: | 2 times rated continuous |

## Binary input signal

| | |
|---|---|
| Operating voltage: | Typical 74Vdc, minimum 70Vdc at 100Vdc/125Vdc rating<br>Typical 138Vdc, minimum 125Vdc at 200Vdc/250Vdc rating<br>Typical 31Vdc, minimum 28Vdc at 48Vdc/54Vdc/60Vdc rating |

## Burden

| | |
|---|---|
| Central unit: | |
| DC power supply: | less than 50W (quiescent) |
| Bay unit: | |
| AC current circuit: | less than 0.3VA per phase (at rated 5A)<br>less than 0.1VA per phase (at rated 1A) |
| DC power supply: | less than 16W (quiescent) |

## Current differential protection

| | |
|---|---|
| Minimum operating current (DIFCH, DIFZ): | |
| | 500 to 3000A in 1A steps (CT primary amps) |
| % slope (SLPCH, SLPZ): | 0.30 to 0.90 in 0.01 steps |
| Primary rating of CT: | 100 to 10000A in 1A steps |

## Operating time of current differential element

| | |
|---|---|
| Typical operating time: | typical 1 cycle |
| Accuracy of current differential protection: | ±5% (±7% at I < 0.3×In) |

## Breaker failure protection

| | |
|---|---|
| Overcurrent element: | 0.1 to 2.0 times of current rating in 0.1 steps |
| BF timer for retrip of failed breaker: | 0 to 500ms in 1ms steps |

www. ElectricalPartManuals . com

| | |
|---|---|
| BF timer for related breaker trip: | 0 to 500ms in 1ms steps |
| Accuracy of overcurrent element: | ±5% (±10% at I < 0.5×In) |
| DO/PU ratio: | 0.8 |

**Fault Detector**

| | |
|---|---|
| Undervoltage element for phase fault | 60 to 100V in 1V steps |
| Undervoltage element for earth fault | 20 to 60V in 1V steps |
| Undervoltage change detection element | 0.07 times voltage before fault |
| Overvoltage element for earth fault | 0.1 to 10.0V in 0.1V steps |

**Disturbance Record Initiation**

| | |
|---|---|
| Overcurrent element | 0.1 to 10.0 times of CT rated current in 0.1 steps |

**Communication port**

| | |
|---|---|
| PORT-1 (RS485): | For RSM100 |
| Connector: | Screw terminals |
| PORT-2 (RS485): | For substation control and monitoring system |
| Protocol: | IEC 60870-5-103 |
| Connector: | Screw terminals |

**Contact ratings**

| | |
|---|---|
| Trip contacts (high-speed type): | |
| Make and carry: | 5A continuously<br>30A, 290V DC for 0.5s (L/R = 10ms) |
| Break: | 0.15A, 290Vdc (L/R = 40ms) |
| Auxiliary contacts: | |
| Make and carry: | 4A continuously<br>10A, 220V DC for 0.2s (L/R ≥ 5ms) |
| Break: | 0.1A, 220V DC (L/R = 40ms) |
| Durability | |
| Make and carry: | 10,000 operations minimum |
| Break: | 100,000 operations minimum |

**Mechanical design**

| | |
|---|---|
| Weight | |
| CU: | 11 kg |
| BU: | 9.5 kg |
| Case color: | 2.5Y7.5/1(approximation to Munsell value) |
| Installation: | Flush mounting or rack mounting |

www.ElectricalPartManuals.com

ENVIRONMENTAL PERFORMANCE CLAIMS

| Test | Standards | Details |
|---|---|---|
| **Atmospheric Environment** | | |
| Temperature | IEC60068-2-1/2 | Operating range: -10°C to +55°C.<br>Storage / Transit: -25°C to +70°C. |
| Humidity | IEC60068-2-3 | 56 days at 40°C and 93% relative humidity. |
| Enclosure Protection | IEC60529 | IP51 (IP20 for terminals) |
| **Mechanical Environment** | | |
| Vibration | IEC60255-21-1 | Response - Class 1<br>Endurance - Class 1 |
| Shock and Bump | IEC60255-21-2 | Shock Response Class 1<br>Shock Withstand Class 1<br>Bump Class 1 |
| Seismic | IEC60255-21-3 | Class 1 |
| **High Voltage Environment** | | |
| Dielectric Withstand | IEC60255-5 | 2kVrms for 1 minute between all terminals and earth.<br>2kVrms for 1 minute between independent circuits.<br>1kVrms for 1 minute across normally open contacts. |
| High Voltage Impulse | IEC60255-5 | Three positive and three negative impulses of 5kV(peak), 1.2/50μs, 0.5J between all terminals and between all terminals and earth. |
| **Electromagnetic Environment** | | |
| High Frequency Disturbance | IEC60255-22-1 Class 3 | 1MHz 2.5kV applied to all ports in common mode.<br>1MHz 1.0kV applied to all ports in differential mode. |
| Electrostatic Discharge | IEC60255-22-2 Class 3 | 6kV contact discharge.<br>8kV air discharge. |
| Radiated RF Electromagnetic Disturbance | IEC60255-22-3 | Field strength 10V/m for frequency sweeps of 80MHz to 1GHz. Additional spot tests at 80, 160, 450, 900 and 1890MHz. |
| Fast Transient Disturbance | IEC60255-22-4 Class 4 | 4kV, 2.5kHz, 5/50ns applied to all inputs. |

www . ElectricalPartManuals . com

# Appendix N

## Symbols Used in Scheme Logic

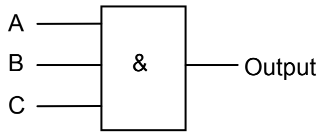
www . ElectricalPartManuals . com

Symbols used in the scheme logic and their meanings as follows:

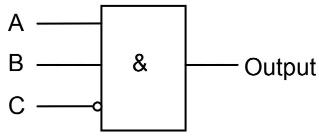
### Signal names

Marked with [box] : Measuring element output signal
Marked with (rounded box) : Binary signal input from or output to the external equipment
Marked with [ ] : Scheme switch
Marked with " " : Scheme switch position
Unmarked : Internal scheme logic signal

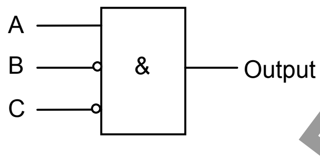
### AND gates




| A | B | C | Output |
|---|---|---|---|
| 1 | 1 | 1 | 1 |
| Other cases | | | 0 |

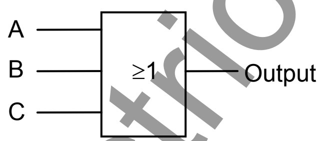



| A | B | C | Output |
|---|---|---|---|
| 1 | 1 | 0 | 1 |
| Other cases | | | 0 |

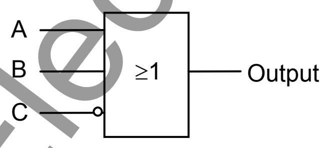



| A | B | C | Output |
|---|---|---|---|
| 1 | 0 | 0 | 1 |
| Other cases | | | 0 |

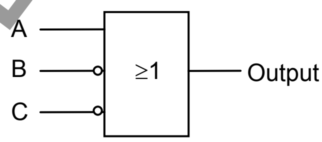
### OR gates




| A | B | C | Output |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| Other cases | | | 1 |



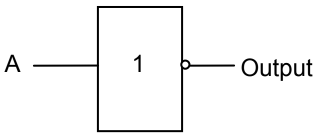

| A | B | C | Output |
|---|---|---|---|
| 0 | 0 | 1 | 0 |
| Other cases | | | 1 |




| A | B | C | Output |
|---|---|---|---|
| 0 | 1 | 1 | 0 |
| Other cases | | | 1 |

www . ElectricalPartManuals . com

Signal inversion




| A | Output |
|---|---|
| 0 | 1 |
| 1 | 0 |

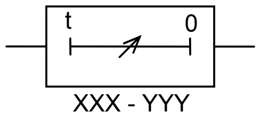
Timer


Delaye pick-up timer with fixed setting

XXX: Set time

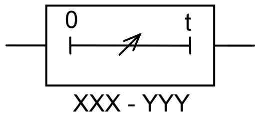

Delayed drop-off timer with fixed setting

XXX: Set time




Delaye pick-up timer with variable setting

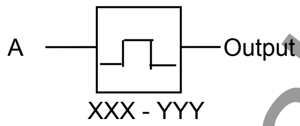
XXX - YYY: Setting range

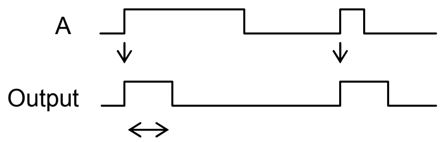



Delayed drop-off timer with variable setting

XXX - YYY: Setting range

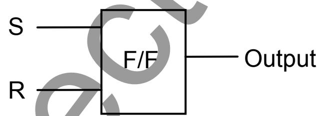
One-shot timer



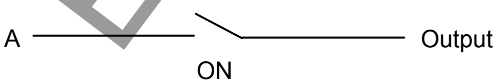

XXX - YYY: Setting range

Flip-flop

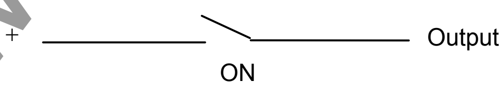



| S | R | Output |
|---|---|---|
| 0 | 0 | No change |
| 1 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 1 | 0 |

Scheme switch




| A | Switch | Output |
|---|---|---|
| 1 | ON | 1 |
| Other cases | | 0 |




| Switch | Output |
|---|---|
| ON | 1 |
| OFF | 0 |

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

# Appendix O

## Sample of Setting Calculation

www . ElectricalPartManuals . com

## 1. Power System Data

Example

- VT Ratio: 154kV/115V
- CT Ratio: 2000A/5A
- Minimum fault current: 2000A (Assumption)
- Number of feeder : 8 feeders (10 channels)

  10 feeders (12 channels)

  12 feeders (14 channels)

## 2. Relay Setting

- Relay application:

Relay type: GRB100

www . ElectricalPartManuals . com

# 3. Setting Calculation

## 3.1 DIF setting

The setting of DIF (DIFCH and DIFZ) is determined from the minimum fault $I_F$min current that can occur on the busbar fault.

DIF setting < 0.8 x $I_F$min          0.8 : Margin

The setting is based on the primary circuit value, so $I_F$min is a primary value. The CT ratios or the difference of the CT ratios between the channels can be disregarded in the setting.

If the minimum operating current is set too low when the CT primary rating is high, the operation error of the differential element is increased as shown in Figure 3.1.1. If it is required to keep the accuracy of minimum operating current less than 5%, the following condition must be checked for the DIFCH and DIFZ setting obtained above depending on the total number of channels.

0.40 × CT primary rating < DIF setting for 25 - 32 channels

0.34 × CT primary rating < DIF setting for 17- 24 channels

0.28 × CT primary rating < DIF setting for 9 - 16 channels

0.23 × CT primary rating < DIF setting for 1 - 8 channels

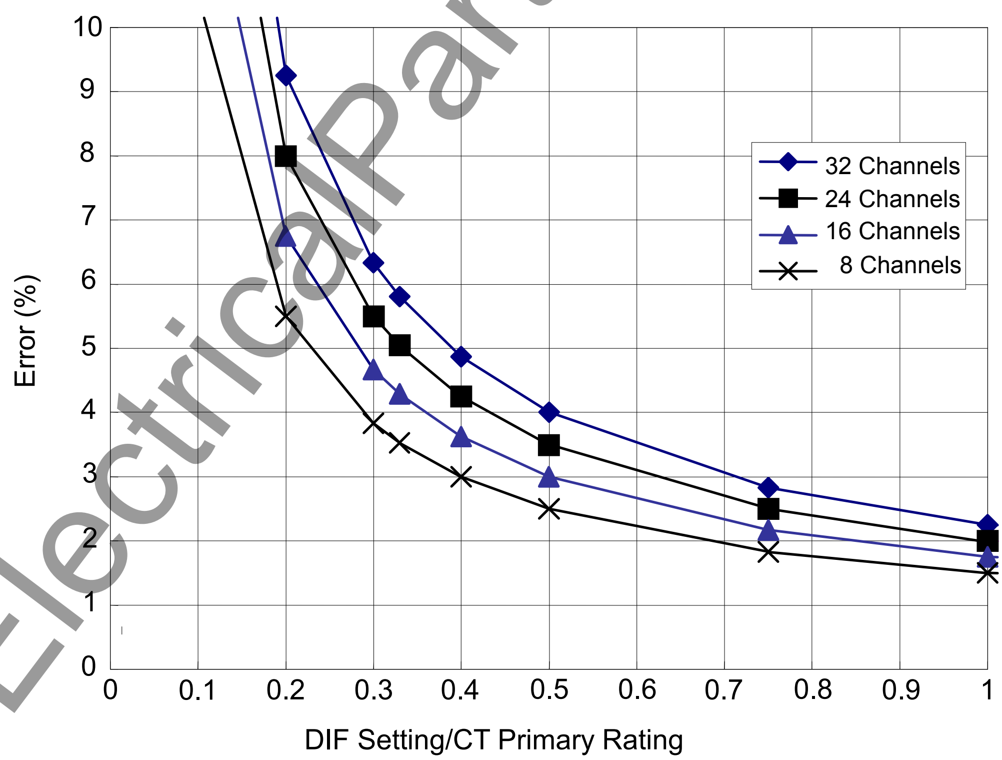



**Figure 3.1.1 Accuracy Check**

www . ElectricalPartManuals . com

DIFCH, DIFZ $= 0.8 \times I_F min$

$= 0.8 \times 2{,}000A$

$= 1{,}600A$

Checking for accuracy of minimum operating current less than 5%.

When the number of feeder is 8 – 12, the number of channel is 10 – 14 channels.

0.28 x CT primary rating < DIF setting for 9 – 16 channels

0.28 x 2,000A < 1,600A

560A < 1,600A

(Example)

| Element | Setting |
|---|---|
| DIFCH | 1,600A |
| DIFZ | 1,600A |

## 3.2 nOCBF setting

The overcurrent element nOCBF checks that the breaker has opened and the current has disappeared. Therefore, since it is allowed to respond to the load current, it can be set from 10 to 200% of the rated current.

The setting of TnB2 are determined by the opening time of the original breaker (Tcb in Figure 3.2.1) and the reset time of the overcurrent element (Toc in Figure 3.2.1).

TnB2 = Breaker opening time + nOCBF reset time + Margin

= 50ms + 10ms +20ms

= 80ms

(Example)

| Element | Setting | Remark |
|---|---|---|
| nOCB | 0.8 | |
| TnB2 | 80ms | |
| nBFEXT | ON | |
| nBF1 | OFF | Retrip is no used |
| nBF2 | ON | |

n: 1 to 32

www . ElectricalPartManuals . com

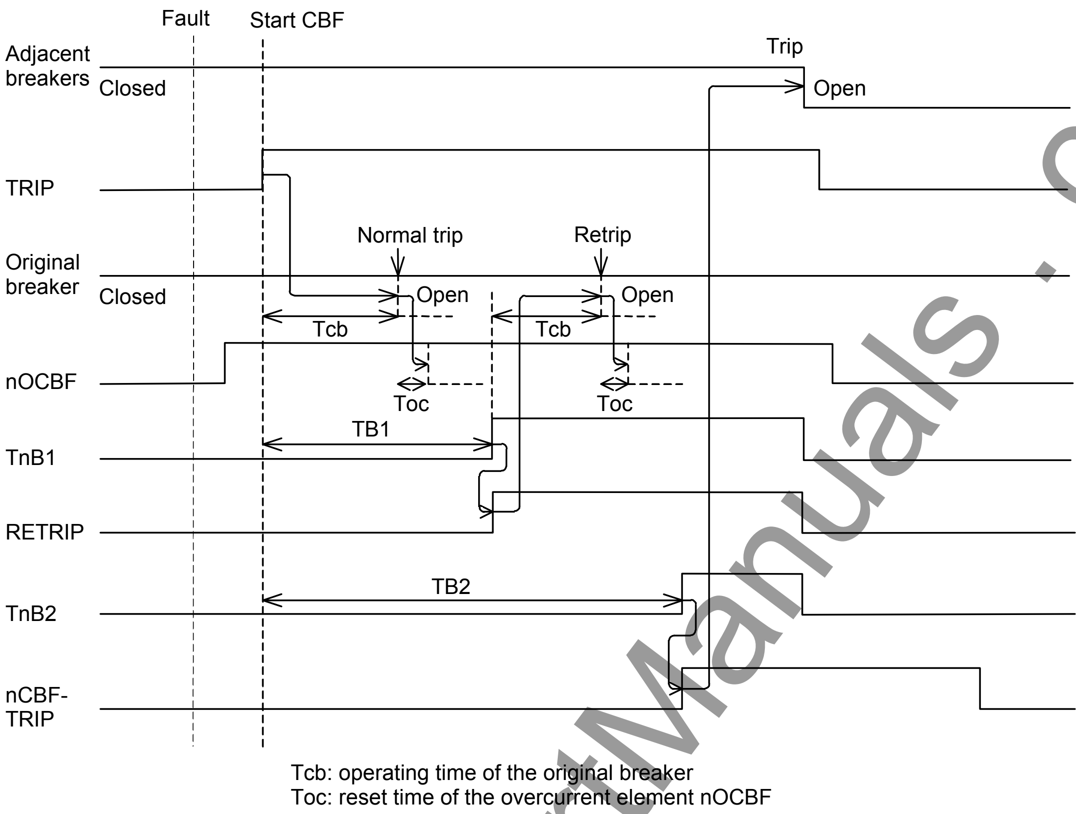



**Figure 3.2.1 Sequence Diagram**

## 3.3 Undervoltage elements setting

The undervoltage element (UVSF, UVGF) is set to about 70% of the rated voltage.

(Example)

| Element | Setting |
|---|---|
| UVSF | 80V |
| UVGF | 46V |

## 3.4 DIFSV setting

The setting of DIFSV for differential current monitoring is determined from the maximum erroneous differential current during normal service condition.

(Example 1)

DIFSV setting > maximum erroneous differential current

$$= \varepsilon \times \sqrt{n} \times I_{Lmax}$$

$\varepsilon$ : CT error

n : Number of channel

$I_{Lmax}$: Maximum load current (assumed to be max. CT primary rating current)

www . ElectricalPartManuals . com

DIFSV $= 1.2 \times 0.05 \times \sqrt{10} \times 2000A$

$= 1.2 \times 320A$

$= 384A$

$\varepsilon = 5\%$, $n = 10$, $I_{Lmax} = 2000$ (Primary rating)

1.2 = Margin

| Element | Setting |
|---|---|
| DIFSV | 380A |

(Example 2)

DIFSV setting = 1.2 × (2 times of the differential current measured in normal service condition)

1.2 = Margin

When the differential current measured in normal service condition is 10% of DIF setting,

DIFSV $= 1.2 \times 1600A \times 0.1 \times 2$

$= 1.2 \times 320A$

$= 384A$

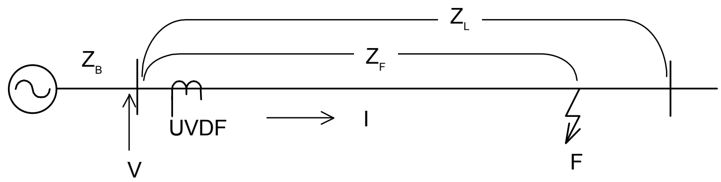
| Element | Setting |
|---|---|
| DIFSV | 380A |

www . ElectricalPartManuals . com

### 3.5 UVDF setting

The sensitivity of UVDF is fixed. The UVDF operates if a voltage drops by 7% compared to that of two cycles before. The UVDF can detect the voltage drop in the system condition SIR≥0.1 as a fault detector for CBF initiation as described below.

(Description)




$Z_B$ : Back source impedance
$Z_L$ : Line impedance
$Z_F$ : Fault point impedance
I : Relay input current
V: Relay input voltage

$$I = \frac{V}{Z_B + Z_F} = \frac{V}{Z_L(\underbrace{Z_B/Z_L}_{SIR} + \underbrace{Z_F/Z_L}_{\%})}$$

SIR : Source Impedance Ratio

$$I = \frac{E}{Z_L(SIR + \%)}, \quad V = \frac{E}{SIR + \%}$$

E : Rated voltage

When SIR = 0.1 and % = 1($Z_L = Z_F$), the voltage drop V is as follows:

$$V = \frac{E}{0.1 + 1} = 0.91E$$

Therefore, the UVDF with 7% fixed setting can detect the voltage drop in the system condition SIR≥0.1.

The following table shows the voltage drop depending on SIR.

| SIR | 0.1 | 0.3 | 0.5 | 1 |
|---|---|---|---|---|
| V (pu) | 0.91 | 0.77 | 0.67 | 0.50 |

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

# Appendix P

## IEC60870-5-103: Interoperability

www . ElectricalPartManuals . com

## IEC60870-5-103 Configurator

IEC103 configurator software is included in a same CD as RSM100, and can be installed easily as follows:

### Installation of IEC103 Configurator

Insert the CD-ROM (RSM100) into a CDROM drive to install this software on a PC.

Double click the “Setup.exe” of the folder “¥IEC103Conf” under the root directory, and operate it according to the message.

When installation has been completed, the IEC103 Configurator will be registered in the start menu.

### Starting IEC103 Configurator

Click [Start]→[Programs]→[IEC103 Configurator]→[IECConf] to the IEC103 Configurator software.

Note: The instruction manual of IEC103 Configurator can be viewed by clicking [Help]→[Manual] on IEC103 Configurator.

## IEC60870-5-103: Interoperability

### 1. Physical Layer

1.1 Electrical interface: EIA RS-485

Number of loads, 32 for one protection equipment

1.2 Optical interface

Glass fibre (option)

ST type connector (option)

1.3 Transmission speed

User setting: 9600 or 19200 bit/s

### 2. Application Layer

COMMON ADDRESS of ASDU

One COMMON ADDRESS OF ASDU (identical with station address)

### 3. List of Information

The following items can be customized with the original software tool “IEC103 configurator”. (For details, refer to “IEC103 configurator” manual No.6F2S0839.)

- Items for “Time-tagged message”: Type ID(1/2), INF, FUN, Transmission condition(Signal number), COT
- Items for “Time-tagged measurands”: INF, FUN, Transmission condition(Signal number), COT, Type of measurand quantities
- Items for “General command”: INF, FUN, Control condition(Signal number)
- Items for “Measurands”: Type ID(3/9), INF, FUN, Number of measurand, Type of measurand quantities
- Common setting
  - Transmission cycle of Measurand frame
  - FUN of System function
  - Test mode, etc.

www . ElectricalPartManuals . com

**Note:** To be effective the setting data written via the RS232C, turn off the DC supply of the relay and turn on again.

## 3. 1 IEC60870-5-103 Interface

### 3.1.1 Spontaneous events

The events created by the relay will be sent using Function type (FUN) / Information numbers (INF) to the IEC60870-5-103 master station.

### 3.1.2 General interrogation

The GI request can be used to read the status of the relay, the Function types and Information numbers that will be returned during the GI cycle are shown in the table below.

For details, refer to the standard IEC60870-5-103 section 7.4.3.

### 3.1.3 Cyclic measurements

The relay will produce measured values using Type ID=3 or 9 on a cyclical basis, this can be read from the relay using a Class 2 poll. The rate at which the relay produces new measured values can be customized.

### 3.1.4 Commands

The supported commands can be customized. The relay will respond to non-supported commands with a cause of transmission (COT) of negative acknowledgement of a command.

For details, refer to the standard IEC60870-5-103 section 7.4.4.

### 3.1.5 Test mode

In test mode, both spontaneous messages and polled measured values, intended for processing in the control system, are designated by means of the CAUSE OF TRANSMISSION ‘test mode’. This means that CAUSE OF TRANSMISSION = 7 ‘test mode’ is used for messages normally transmitted with COT=1 (spontaneous) or COT=2 (cyclic).

For details, refer to the standard IEC60870-5-103 section 7.4.5.

### 3.1.6 Blocking of monitor direction

If the blocking of the monitor direction is activated in the protection equipment, all indications and measurands are no longer transmitted.

For details, refer to the standard IEC60870-5-103 section 7.4.6.

## 3.2 List of Information

The followings are the default settings.

www . ElectricalPartManuals . com

## List of Information

| INF | Description | Contents | GI | Type ID | COT | FUN | DPI Signal No. | DPI OFF | DPI ON |
|---|---|---|---|---|---|---|---|---|---|
| | | | IEC103 Configurator Default setting | | | | | | |
| Standard Information numbers in monitor direction | | | | | | | | | |
| System Function | | | | | | | | | |
| 0 | End of General Interrogation | Transmission completion of GI items. | -- | 8 | 10 | 255 | -- | -- | -- |
| 0 | Time Synchronization | Time Synchronization ACK. | -- | 6 | 8 | 255 | -- | -- | -- |
| 2 | Reset FCB | Reset FCB(toggle bit) ACK | -- | 5 | 3 | 220 | -- | -- | -- |
| 3 | Reset CU | Reset CU ACK | -- | 5 | 4 | 220 | -- | -- | -- |
| 4 | Start/Restart | Relay start/restart | -- | 5 | 5 | 220 | -- | -- | -- |
| 5 | Pow er On | Relay pow er on. | Not supported | | | | -- | -- | -- |
| Status Indications | | | | | | | | | |
| 16 | Auto-recloser active | If it is possible to use auto-recloser, this item is set active, if impossible, inactive. | Not supported | | | | | | |
| 17 | Teleprotection active | If protection using telecommunication is available, this item is set to active. If not, set to inactive. | Not supported | | | | | | |
| 18 | Protection active | If the protection is available, this item is set to active. If not, set to inactive. | GI | 1 | 1, 7, 9, 12, 20, 21 | 220 | 1413 | 1 | 2 |
| 19 | LED reset | Reset of latched LEDs | -- | 1 | 1, 7, 11, 12, 20, 21 | 220 | 1409 | -- | 2 |
| 20 | Monitor direction blocked | Block the 103 transmission from a relay to control system. IECBLK: "Blocked" settimg. | GI | 1 | 9, 11 | 220 | 1241 | 1 | 2 |
| 21 | Test mode | Transmission of testmode situation from a relay to control system. IECTST "ON" setting. | GI | 1 | 9, 11 | 220 | 1242 | 1 | 2 |
| 22 | Local parameter Setting | When a setting change has done at the local, the event is sent to control system. | Not supported | | | | | | |
| 23 | Characteristic1 | Setting group 1 active | GI | 1 | 1, 7, 9, 11, 12, 20, 21 | 220 | 1243 | 1 | 2 |
| 24 | Characteristic2 | Setting group 2 active | GI | 1 | 1, 7, 9, 11, 12, 20, 21 | 220 | 1244 | 1 | 2 |
| 25 | Characteristic3 | Setting group 3 active | GI | 1 | 1, 7, 9, 11, 12, 20, 21 | 220 | 1245 | 1 | 2 |
| 26 | Characteristic4 | Setting group 4 active | GI | 1 | 1, 7, 9, 11, 12, 20, 21 | 220 | 1246 | 1 | 2 |
| 27 | Auxiliary input1 | Binary input 1 | No set | | | | | | |
| 28 | Auxiliary input2 | Binary input 2 | No set | | | | | | |
| 29 | Auxiliary input3 | Binary input 3 | No set | | | | | | |
| 30 | Auxiliary input4 | Binary input 4 | No set | | | | | | |
| Supervision Indications | | | | | | | | | |
| 32 | Measurand supervision I | Zero sequence current supervision | GI | 1 | 1, 7, 9 | 220 | 1267 | 1 | 2 |
| 33 | Measurand supervision V | Zero sequence voltage supervision | GI | 1 | 1, 7, 9 | 220 | 1268 | 1 | 2 |
| 35 | Phase sequence supervision | Negative sequence voltage supevision | GI | 1 | 1, 7, 9 | 220 | 1269 | 1 | 2 |
| 36 | Trip circuit supervision | Output circuit supervision | GI | 1 | 1, 7, 9 | 220 | 1259 | 1 | 2 |
| 37 | I>>backup operation | | Not supported | | | | | | |
| 38 | VT fuse failure | VT failure | Not supported | | | | | | |
| 39 | Teleprotection disturbed | CF(Communication system Fail) supervision | Not supported | | | | | | |
| 46 | Group w arning | Only alarming | GI | 1 | 1, 7, 9 | 220 | 1258 | 1 | 2 |

www . ElectricalPartManuals . com

| INF | Description | Contents | IEC103 Configurator Default setting | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | GI | Type ID | COT | FUN | DPI | | |
| | | | | | | | Signal NO. | OFF | ON |
| Fault Indications | | | | | | | | | |
| 64 | Start/pick-up L1 | A phase, A-B phase or C-A phase element pick-up | No set | | | | | | |
| 65 | Start/pick-up L2 | B phase, A-B phase or B-C phase element pick-up | No set | | | | | | |
| 66 | Start/pick-up L3 | C phase, B-C phase or C-A phase element pick-up | No set | | | | | | |
| 67 | Start/pick-up N | Earth fault element pick-up | Not supported | | | | | | |
| 68 | General trip | Any trip | -- | 2 | 1, 7 | 220 | 1280 | -- | 2 |
| 69 | Trip L1 | A phase, A-B phase or C-A phase trip | No set | | | | | | |
| 70 | Trip L2 | B phase, A-B phase or B-C phase trip | No set | | | | | | |
| 71 | Trip L3 | C phase, B-C phase or C-A phase trip | No set | | | | | | |
| 72 | Trip I>>(back-up) | Back up trip | Not supported | | | | | | |
| 73 | Fault location X In ohms | Fault location | Not supported | | | | | | |
| 74 | Fault forward/line | Forward fault | Not supported | | | | | | |
| 75 | Fault reverse/Busbar | Reverse fault | Not supported | | | | | | |
| 76 | Teleprotection Signal transmitted | Carrier signal sending | Not supported | | | | | | |
| 77 | Teleprotection Signal received | Carrier signal receiving | Not supported | | | | | | |
| 78 | Zone1 | Zone 1 trip | Not supported | | | | | | |
| 79 | Zone2 | Zone 2 trip | Not supported | | | | | | |
| 80 | Zone3 | Zone 3 trip | Not supported | | | | | | |
| 81 | Zone4 | Zone 4 trip | Not supported | | | | | | |
| 82 | Zone5 | Zone 5 trip | Not supported | | | | | | |
| 83 | Zone6 | Zone 6 trip | Not supported | | | | | | |
| 84 | General Start/Pick-up | Any elements pick-up | No set | | | | | | |
| 85 | Breaker Failure | CBF trip or CBF retrip | No set | | | | | | |
| 86 | Trip measuring system L1 | | Not supported | | | | | | |
| 87 | Trip measuring system L2 | | Not supported | | | | | | |
| 88 | Trip measuring system L3 | | Not supported | | | | | | |
| 89 | Trip measuring system E | | Not supported | | | | | | |
| 90 | Trip I> | Inverse time OC trip | Not supported | | | | | | |
| 91 | Trip I>> | Definite time OC trip | Not supported | | | | | | |
| 92 | Trip IN> | Inverse time earth fault OC trip | Not supported | | | | | | |
| 93 | Trip IN>> | Definite time earth fault OC trip | Not supported | | | | | | |
| Autoreclose indications | | | | | | | | | |
| 128 | CB 'ON' by Autoreclose | CB close command output | Not supported | | | | | | |
| 129 | CB 'ON' by long-time Autoreclose | | Not supported | | | | | | |
| 130 | Autoreclose Blocked | Autoreclose block | Not supported | | | | | | |

www . ElectricalPartManuals . com

| INF | Description | Contents | IEC103 configurator Default setting | | | | |
|---|---|---|---|---|---|---|---|
| | | | GI | Type ID | COT | FUN | Max. No. |
| Measurands | | | | | | | |
| 144 | Measurand I | <meaurand I> | No | | | | 0 |
| 145 | Measurand I,V | <meaurand I> | No | | | | 0 |
| 146 | Measurand I,V,P,Q | <meaurand I> | No | | | | 0 |
| 147 | Measurand IN,VEN | <meaurand I> | No | | | | 0 |
| 148 | Measurand IL1,2,3, VL1,2,3, P,Q,f | CH1-Ia, CH2-Ib, CH3-Ic, f measurand <meaurand II> | -- | 9 | 2, 7 | 220 | 9 |
| Generic Function | | | | | | | |
| 240 | Read Headings | | Not supported | | | | |
| 241 | Read attributes of all entries of a group | | Not supported | | | | |
| 243 | Read directory of entry | | Not supported | | | | |
| 244 | Real attribute of entry | | Not supported | | | | |
| 245 | End of GGI | | Not supported | | | | |
| 249 | Write entry with confirm | | Not supported | | | | |
| 250 | Write entry with execute | | Not supported | | | | |
| 251 | Write entry aborted | | Not supported | | | | |

Details of MEA settings in IEC103 configurator

| INF | MEA | Tbl | Offset | Data type | Limit | | Coeff |
|---|---|---|---|---|---|---|---|
| | | | | | Lower | Upper | |
| 148 | CH1-Ia | 1 | 96 | short | 0 | 4096 | 4.266666 |
| | CH1-Ib | 1 | 100 | short | 0 | 4096 | 4.266666 |
| | CH1-Ic | 1 | 104 | short | 0 | 4096 | 4.266666 |
| | (empty) | | | | | | |
| | (empty) | | | | | | |
| | (empty) | | | | | | |
| | (empty) | | | | | | |
| | (empty) | | | | | | |
| | f | 2 | 0 | short | 0 | 4096 | 0.0000833 |

www . ElectricalPartManuals . com

| INF | Description | Contents | IEC103 Configurator Default setting | | | |
|---|---|---|---|---|---|---|
| | | | Control direction | Type ID | COT | FUN |
| Selection of standard information numbers in control direction | | | | | | |
| System functions | | | | | | |
| 0 | Initiation of general interrogation | | -- | 7 | 9 | 255 |
| 0 | Time synchronization | | -- | 6 | 8 | 255 |
| General commands | | | | | | |
| 16 | Auto-recloser on/off | | Not supported | | | |
| 17 | Teleprotection on/off | | Not supported | | | |
| 18 | Protection on/off | (*1) | ON/OFF | 20 | 20 | 220 |
| 19 | LED reset | Reset indication of latched LEDs. | ON | 20 | 20 | 220 |
| 23 | Activate characteristic 1 | Setting Group 1 | ON | 20 | 20 | 220 |
| 24 | Activate characteristic 2 | Setting Group 2 | ON | 20 | 20 | 220 |
| 25 | Activate characteristic 3 | Setting Group 3 | ON | 20 | 20 | 220 |
| 26 | Activate characteristic 4 | Setting Group 4 | ON | 20 | 20 | 220 |
| Generic functions | | | | | | |
| 240 | Read headings of all defined groups | | Not supported | | | |
| 241 | Read values or attributes of all entries of one group | | Not supported | | | |
| 243 | Read directory of a single entry | | Not supported | | | |
| 244 | Read values or attributes of a single entry | | Not supported | | | |
| 245 | General Interrogation of generic data | | Not supported | | | |
| 248 | Write entry | | Not supported | | | |
| 249 | Write entry with confirmation | | Not supported | | | |
| 250 | Write entry with execution | | Not supported | | | |

(∗1) Note: While the relay receives the "Protection off" command, " IN SERVICE LED" is off.

Details of Command settings in IEC103 configurator

| INF | DCO | | | |
|---|---|---|---|---|
| | Sig off | Sig on | Rev | Valid time |
| 18 | 2686 | 2686 | ✓ | 0 |
| 19 | 0 | 2688 | | 200 |
| 23 | 0 | 2640 | | 1000 |
| 24 | 0 | 2641 | | 1000 |
| 25 | 0 | 2642 | | 1000 |
| 26 | 0 | 2643 | | 1000 |

✓: signal reverse

www . ElectricalPartManuals . com

| | Description | Contents | GRB100 supported | Comment |
|---|---|---|---|---|
| Basic application functions | | | | |
| | Test mode | | Yes | |
| | Blocking of monitor direction | | Yes | |
| | Disturbance data | | No | |
| | Generic services | | No | |
| | Private data | | Yes | |
| Miscellaneous | | | | |
| | Measurand | | Max. MVAL = rated value times | |
| | Current L1 | Ia | Configurable | |
| | Current L2 | Ib | Configurable | |
| | Current L3 | Ic | Configurable | |
| | Voltage L1-E | Va | No set | |
| | Voltage L2-E | Vb | No set | |
| | Voltage L3-E | Vc | No set | |
| | Active power P | P | No set | |
| | Reactive power Q | Q | No set | |
| | Frequency f | f | Configurable | |
| | Voltage L1 - L2 | Vab | No set | |

Details of Common settings in IEC103 configurator

- Setting file's remark: GRB100_1.00
- Remote operation valid time [ms]: 4000
- Local operation valid time [ms]: 4000
- Measurand period [s]: 2
- Function type of System functions: 220
- Signal No. of Test mode: 1242
- Signal No. for Real time and Fault number: 1279

www . ElectricalPartManuals . com

[Legend]

GI: General Interrogation (refer to IEC60870-5-103 section 7.4.3)

Type ID: Type Identification (refer to IEC60870-5-103 section 7.2.1)

1 : time-tagged message
2 : time-tagged message with relative time
3 : measurands I
4 : time-tagged measurands with relative time
5 : identification
6 : time synchronization
8 : general interrogation termination
9 : measurands II
10: generic data
11: generic identification
20: general command
23: list of recorded disturbances
26: ready for transmission for disturbance data
27: ready for transmission of a channel
28: ready for transmission of tags
29: transmission of tags
30: transmission of disturbance values
31: end of transmission

COT: Cause of Transmission (refer to IEC60870-5-103 section 7.2.3)

1: spontaneous
2: cyclic
3: reset frame count bit (FCB)
4: reset communication unit (CU)
5: start / restart
6: power on
7: test mode
8: time synchronization
9: general interrogation
10: termination of general interrogation
11: local operation
12: remote operation
20: positive acknowledgement of command
21: negative acknowledgement of command
31: transmission of disturbance data
40: positive acknowledgement of generic write command
41: negative acknowledgement of generic write command
42: valid data response to generic read command
43: invalid data response to generic read command
44: generic write confirmation

FUN: Function type (refer to IEC60870-5-103 section 7.2.5.1)

DPI: Double-point Information (refer to IEC60870-5-103 section 7.2.6.5)

DCO: Double Command (refer to IEC60870-5-103 section 7.2.6.4)

www . ElectricalPartManuals . com

IEC103 setting data is recommended to be saved as follows:

## (1) Naming for IEC103setting data

The file extension of IEC103 setting data is ".csv". The version name is recommended to be provided with a revision number in order to be changed in future as follows:

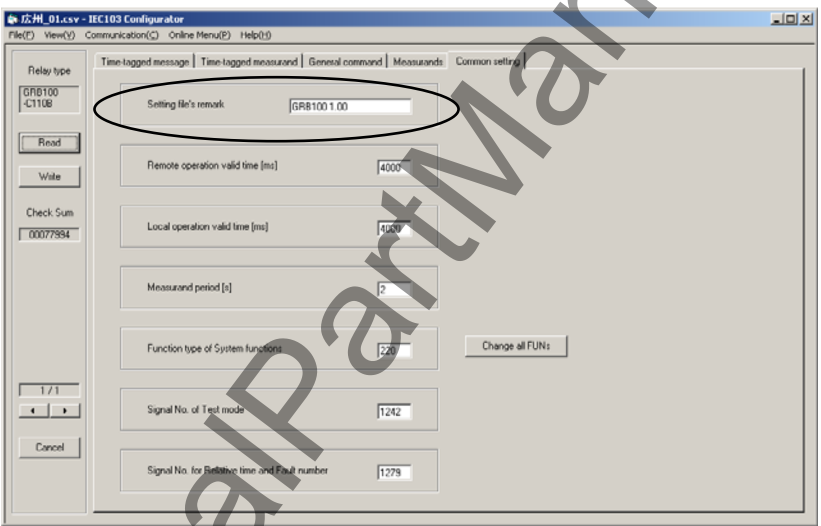
First draft: ******_01.csv

Second draft: ******_02.csv

Third draft: ******_03.csv

Revision number

The name "******" is recommended to be able to discriminate the relay type such as GRZ100 or GRL100, etc. The setting files remark field of IEC103 is able to enter up to 12 one-byte characters. It is utilized for control of IEC103 setting data.




## (2) Saving theIEC103 setting data

The IEC103 setting data is recommended to be saved in external media such as FD (floppy disk) or CD-R, not to remain in the folder.

www . ElectricalPartManuals . com

## Troubleshooting

<table>
<tr><th rowspan="2">No.</th><th rowspan="2">Phenomena</th><th rowspan="2">Supposed causes</th><th colspan="2">Check / Confirmation</th></tr>
<tr><th>Object</th><th>Procedure</th></tr>
<tr><td rowspan="11">1</td><td rowspan="11">Communication trouble （IEC103 communication is not available.）</td><td>Address setting is incorrect.</td><td>BCU<br>RY</td><td>Match address setting between BCU and relay.<br>Avoid duplication of address with other relay.</td></tr>
<tr><td>Transmission baud rate setting is incorrect.</td><td>BCU<br>RY</td><td>Match transmission baud rate setting between BCU and relay.</td></tr>
<tr><td>Start bit, stop bit and parity settings of data that BCU transmits to relay is incorrect.</td><td>BCU</td><td>Go over the following settings by BCU. Relay setting is fixed as following settings.<br>- Start bit: 1bit<br>- Stop bit: 1bit<br>- Parity setting: even</td></tr>
<tr><td>The PRTCL1 setting is incorrect. (The model with PRTCL1 setting.)</td><td>RY</td><td>Change the PRTCL1 setting. Relation between PRTCL1 setting and available transmission protocol is referred to the following table.<br><table><tr><td>RS485 port at the back of the relay</td><td>PRTCL1 =HDLC</td><td>PRTCL1 =IEC</td></tr><tr><td>COM1 (CH1)</td><td>HDLC</td><td>IEC</td></tr><tr><td>COM2 (CH2)</td><td>IEC</td><td>–</td></tr></table></td></tr>
<tr><td>RS485 or optical cable interconnection is incorrect.</td><td>Cable</td><td>- Check the connection port.(CH1/CH2)<br>- Check the interconnection of RS485 A/B/COM<br>- Check the send and received interconnection of optical cable.</td></tr>
<tr><td>The setting of converter is incorrect. (RS485/optic conversion is executed with the transmission channel, etc.)</td><td>Converter</td><td>In the event of using G1IF2, change the DIPSW setting in reference to INSTRUCTION MANUAL (6F2S0794).</td></tr>
<tr><td>The relationship between logical “0/1” of the signal and Sig.on/off is incorrect. (In the event of using optical cable)</td><td>BCU</td><td>Check the following;<br>Logical0 : Sig.on<br>Logical1:Sig.off</td></tr>
<tr><td>Terminal resistor is not offered. (Especially when RS485 cable is long.)</td><td>cable</td><td>Impose terminal resistor (150[ohms]) to both ends of RS 485 cable.</td></tr>
<tr><td>Relay cannot receive the requirement frame from BCU.<br>(The timing coordination of sending and receiving switch control is irregular in half-duplex communication.)</td><td>BCU</td><td>Check to secure the margin more than 15ms between receiving the reply frame from the relay and transmitting the next requirement frame on BCU.</td></tr>
<tr><td>The requirement frame from BCU and the reply frame from relay contend.<br>(The sending and receiving timing coordination is irregular in half-duplex communication.)</td><td>BCU</td><td>Check to set the time-out of reply frame from the relay.<br>Time-out setting: more than 100ms (acceptable value of response time 50ms plus margin)</td></tr>
</table>

www . ElectricalPartManuals . com

| No. | Phenomena | Supposed causes | Check / Confirmation | |
|---|---|---|---|---|
| | | | Object | Procedure |
| 2 | HMI does not display IEC103 event on the SAS side. | The relevant event sending condition is not valid. | RY | Change the event sending condition (signal number) of IEC103 configurator if there is a setting error. When the setting is correct, check the signal condition by programmable LED, etc. |
| | | The relevant event Information Number (INF) and/or Function Type (FUN) may be different between the relay and SAS. | RY<br>SAS | Match the relevant event Information Number (INF) or Function Type (FUN) between the relay and SAS. |
| | | The relay is not initialised after writing IEC103 configurator setting. | RY | Check the sum value of IEC103 setting data from the LCD screen. When differing from the sum value on IEC103 configurator, initialise the relay. |
| | | It changes to the block mode. | RY | Change the IECBR settling to Normal. |
| 3 | Time can be synchronised with IEC103 communication. | BCU does not transmit the frame of time synchronisation. | BCU | Transmit the frame of time synchronisation. |
| | | The settling of time synchronisation source is set to other than IEC. | RY | Change the settling of time synchronisation source to IEC. |

(Note) BCU: Bay control unit, RY: Relay

www . ElectricalPartManuals . com

# Appendix Q

# Ordering

www . ElectricalPartManuals . com

## Central unit (CU)

GRB100 – [ ] B – [ ] 0 – [ ] 0 – [ ]

| | |
|---|---|
| **Relay type:** | |
| Busbar protection relay | GRB100 |
| **CU Model:** | |
| -Model C310: max. 8 channels, 4 zones | C310 |
| -Model C320: max. 16 channels, 4 zones | C320 |
| -Model C330: max. 24 channels, 4 zones | C330 |
| -Model C340: max. 32 channels, 4 zones | C340 |
| -Model C410: max. 8 channels, 4 zones / With voltage inputs | C410 |
| -Model C420: max.16 channels, 4 zones / With voltage inputs | C420 |
| -Model C430: max.24 channels, 4 zones / With voltage inputs | C430 |
| -Model C440: max.32 channels, 4 zones / With voltage inputs | C440 |
| **Ratings:** | |
| 1A, 50Hz, 110V/125Vdc | 1 |
| 1A, 60Hz, 110V/125Vdc | 2 |
| 5A, 50Hz, 110V/125Vdc | 3 |
| 5A, 60Hz, 110V/125Vdc | 4 |
| 1A, 50Hz, 220V/250Vdc | 5 |
| 1A, 60Hz, 220V/250Vdc | 6 |
| 5A, 50Hz, 220V/250Vdc | 7 |
| 5A, 60Hz, 220V/250Vdc | 8 |
| 1A, 50Hz, 48V/54V/60Vdc | A |
| 1A, 60Hz, 48V/54V/60Vdc | B |
| 5A, 50Hz, 48V/54V/60Vdc | C |
| 5A, 60Hz, 48V/54V/60Vdc | D |
| **Communications:** | |
| RS485 | 1 |
| Fibre optic | 2 |
| Dual RS485 | 3 |
| **LED label:** | |
| Standard | None |
| Option: User configurable LED label | J |

www . ElectricalPartManuals . com

## Bay unit (BU)

GRB100 – □ – □□ – □0

| | |
|---|---|
| Relay type: | |
| Busbar protection relay | GRB100 |
| BU Model: | |
| -Model B300B: 1 channel provided. (2 HS contacts) | B300B |
| -Model B310B: 1 channel provided. (6 HS contacts) | B310B |
| -Model B410L: 1 channel provided. (6 HS contacts) / With LED | B410L |
| CT rating: | |
| 1A | 1 |
| 5A | 2 |
| Frequency: | |
| 50Hz | 1 |
| 60Hz | 2 |
| DC power supply rating: | |
| 110V/125V | 1 |
| 220V/250V | 2 |
| 48V | 3 |

Note:

Please inform us which is ordered panel surface mount type or 19-inch rack mount type.

In 19 inch rack mount type, please order attachment kit.

- for BU: attachment kit: EP-101, EP-103(used for linking two units together)
- for CU: attachment kit: EP-102

## Optical Cable (Option)

Optical cables for connection between CU and BUs:

Please inform us the number and length of optical cables. The following length of optical cable is prepared.

- 1 to 8m in 1m steps

www . ElectricalPartManuals . com

www . ElectricalPartManuals . com

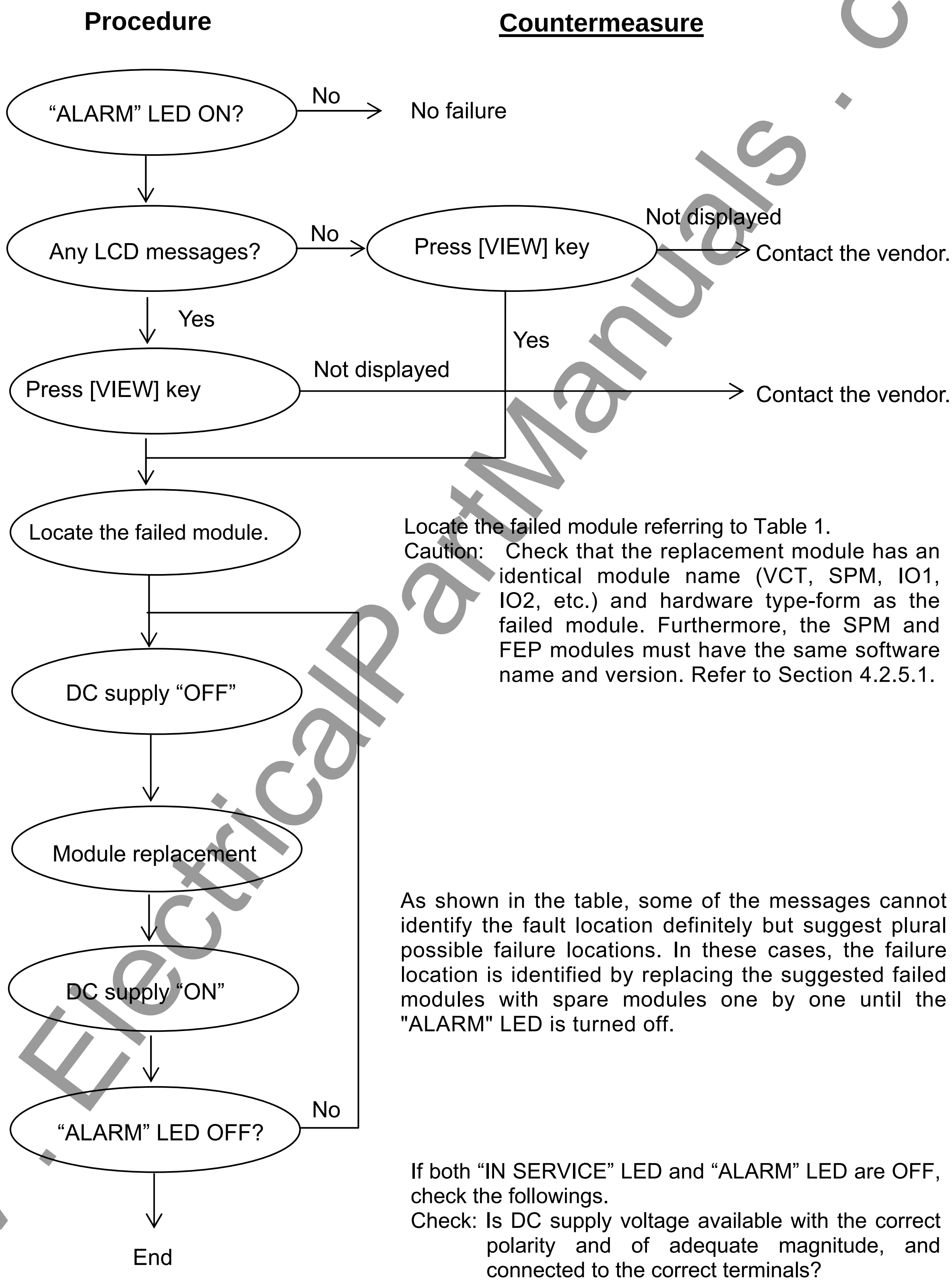
# Appendix R

## Failed Module Tracing and Replacement

www . ElectricalPartManuals . com

## 1. Failed module tracing and its replacement

If the “ALARM” LED is ON, the following procedure is recommended. If not repaired, contact the vendor.




Locate the failed module referring to Table 1.
Caution: Check that the replacement module has an identical module name (VCT, SPM, IO1, IO2, etc.) and hardware type-form as the failed module. Furthermore, the SPM and FEP modules must have the same software name and version. Refer to Section 4.2.5.1.

As shown in the table, some of the messages cannot identify the fault location definitely but suggest plural possible failure locations. In these cases, the failure location is identified by replacing the suggested failed modules with spare modules one by one until the "ALARM" LED is turned off.

If both “IN SERVICE” LED and “ALARM” LED are OFF, check the followings.
Check: Is DC supply voltage available with the correct polarity and of adequate magnitude, and connected to the correct terminals?

www . ElectricalPartManuals . com

If any messages are shown on the LCD, the failed module or failed external circuits can be located by referring to the following table.

This table shows the relationship between messages displayed on the LCD and estimated failure location. Locations marked with (1) have a higher probability than locations marked with (2) and (3). Locations marked with (2) have a higher probability than locations marked with (3). The monitoring of BU is performed by FEP module in CU. The monitoring result is displayed on LCD by SPM module. If an FEP module fails, therefore, the result displayed on the LCD may be incorrect. The relationship between the FEP module number and the monitored BUs is as follows:

| FEP Module No. | BU | | | |
|---|---|---|---|---|
| | Model C∗1∗ | Model C∗2∗ | Model C∗3∗ | Model C∗4∗ |
| FEP1 | x | x | x | x |
| FEP2 | | | x | x |
| FEP3 | | x | | x |
| FEP4 | | | x | x |

As shown in the table, some of the messages cannot identify the fault location definitely but suggest plural possible failure locations. In these cases, the failure location is identified by replacing the suggested failed modules with spare modules one by one until the "ALARM" LED is turned off.

The replacement or investigation should be performed first for the module or circuit with higher probability in the table.

If there is a failure and the LCD is not working such as a screen is frozen or not displayed, the failure location is any one of SPM, FEP and HMI module.

If there is a failure and no message is shown on the LCD in the CU, it means that the failure location is either in the DC power supply circuit or in the microprocessors mounted on the SPM module. In this case, check the "ALARM" LED. If it is off, the failure is in the DC power supply circuit. If it is lit, open the relay front panel and check the LEDs mounted on the SPM module. If the LED is off, the failure is in the DC power supply circuit. If the LED is lit, the failure is in the microprocessors.

In the former case, check if the correct DC voltage is applied to the relay. If it is, replace the IO#1 module mounting the DC/DC converter and confirm that the "ALARM" LED is turned off. In the latter case, replace the SPM module mounting the processors and confirm that the "ALARM" LED is turned off.

When the "POWER" LED in the BU is off, check if the correct DC voltage is applied to the BU. If it is, replace the BUM1 module mounting the DC/DC converter and confirm that the "POWER" LED is turned on.

www . ElectricalPartManuals . com

### LCD Message and Failure Location

| Message or Operation | Failure location | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CU | | | | | | BU | | | AC cable | Optic. cable | DS or CB | AC inputs |
| | VCT | FEP | SPM | IO#1 | IO#2 | HMI | VCT | BUM1 | BUM5 | | | | |
| Checksum err | | | × | | | | | | | | | | |
| ROM-RAM err | | | × | | | | | | | | | | |
| SRAM err | | | × | | | | | | | | | | |
| BU-RAM err | | | × | | | | | | | | | | |
| DPRAM err | | | × | | | | | | | | | | |
| EEPROM err | | | × | | | | | | | | | | |
| SUB stopped | | | × | | | | | | | | | | |
| A/D err | | | × | | | | | | | | | | |
| V0 err | × (2) | | × (1) | | | | | | | × (2) | | | × (1) |
| V2 err | × (2) | | × (1) | | | | | | | × (2) | | | × (1) |
| Sampling err | | | × | | | | | | | | | | |
| DIO err | | | × (2) | × (1) | × (1) | | | | | | | | |
| LCD err | | | × (2) | | | × (1) | | | | | | | |
| Sub:checksum err | | | × | | | | | | | | | | |
| Sub:ROM/RAM err | | | × | | | | | | | | | | |
| Sub:SRAM err | | | × | | | | | | | | | | |
| Sub:DPRAM err | | | × | | | | | | | | | | |
| Sub:A/D err | | | × | | | | | | | | | | |
| FEP*: checksum err | | × | | | | | | | | | | | |
| FEP*: ROM-RAM err | | × | | | | | | | | | | | |
| FEP*: SRAM err | | × | | | | | | | | | | | |
| FEP*: DPRAM err | | × | | | | | | | | | | | |
| FEP*: stopped | | × | | | | | | | | | | | |
| BU*: COM err | | × (3) | | | | | | × (1) | | | × (2) | | |
| BU*: A/D err | | × (3) | | | | | × (2) | × (1) | | | × (2) | | |
| BU*: DIO err | | × (3) | | | | | | × (1) | × (1) | | × (2) | | |
| BU*: Address err | | × (3) | | | | | | × (1) | | | × (2) | | |
| BU*: EEPROM err | | × (2) | | | | | | × (1) | | | | | |
| BU*: AI err | | × (3) | | | | | × (2) | × (1) | | × (2) | | | |
| CT* err | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| DS* err | | | | | | | | | × (1) | | | | |
| CB* err | | | | | | | | | × (1) | | | | |
| Id-** err | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| Id err | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| CT fail, CT-ZA fail to CT-ZD fail | | | | | | | × (2) | × (1) | | × (2) | | | × (1) |
| No-working of LCD | | × (1) | × (1) | | | × (1) | | | | | | | |

Note *: The monitoring of BU is performed by FEP module in CU. The monitoring result is displayed on LCD by SPM module. If an FEP module fails, therefore, the result displayed on the LCD may be incorrect.

www . ElectricalPartManuals . com

## 2. Methods of Replacing the Modules

**⚠ CAUTION** When handling a module, take anti-static measures such as wearing an earthed wrist band and placing modules on an earthed conductive mat. Otherwise, many of the electronic components could suffer damage.

**CAUTION** After replacing the SPM module, check all of the settings including the data related the PLC and IEC103, etc. are restored the original settings.

The initial replacement procedure is as follows:

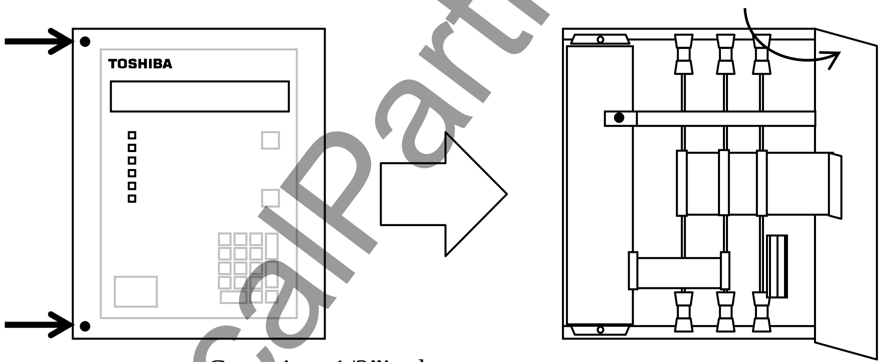
### 1). Switch off the DC power supply.

**⚠ WARNING** Hazardous voltage may remain in the DC circuit just after switching off the DC power supply. It takes about 30 seconds for the voltage to discharge.

### 2). Remove the front panel cover.

### 3). Open the front panel.

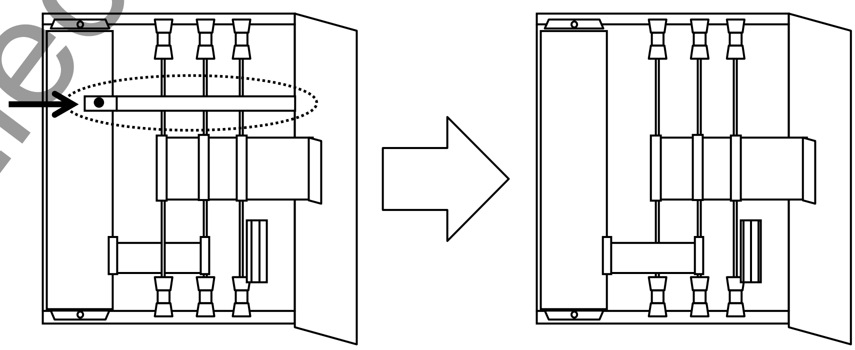
Open the front panel of the relay by unscrewing the binding screw located on the left side of the front panel.




Case size: 1/2"inchs

### 4). Detach the holding bar.

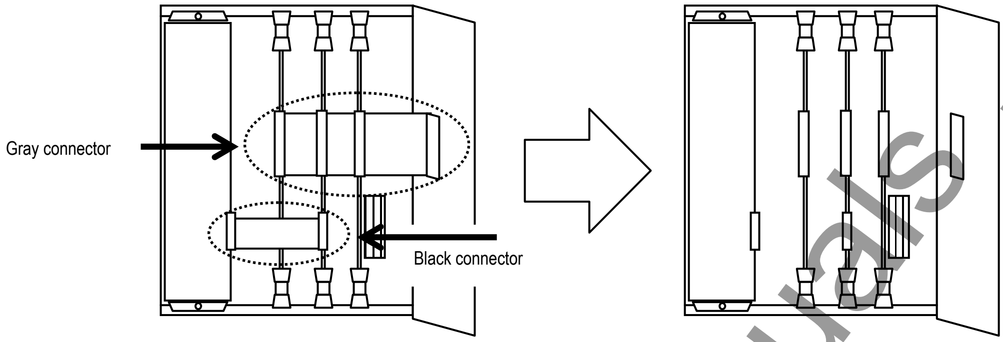
Detach the module holding bar by unscrewing the binding screw located on the left side of the bar.



www.ElectricalPartManuals.com

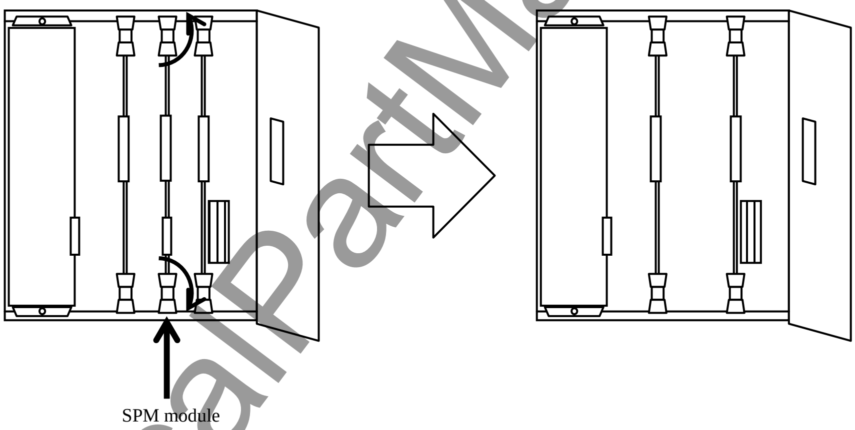
### 5). Unplug the cables.

Unplug the ribbon cable running among the modules by nipping the catch (in case of black connector) and by pushing the catch outside (in case of gray connector) on the connector.




### 6). Pull out the module.

Pull out the failure module by pulling up or down the top and bottom levers (white).




### 7). Insert the replacement module.

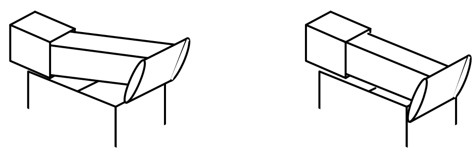
Insert the replacement module into the same slots where marked up.

.

### 8). Do the No.5 to No.1 steps in reverse order.

⚠ CAUTION Supply DC power after checking that all the modules are in their original positions and the ribbon cables are plugged in. If the ribbon cables are not plugged in enough (especially the gray connectors), the module could suffer damage.

Details of the gray connector on modules (top side)




www . ElectricalPartManuals . com

### 9). Lamp Test

- RESET key is pushed 1 second or more by LCD display off.
- It checks that all LCDs and LEDs light on.

### 10). Check the automatic supervision functions.

- LCD not display "Auto-supervision" screens in turn, and Event Records
- Checking the "IN SERVICE" LED light on and "ALARM LED" light off.

www . ElectricalPartManuals . com

## Version-up Records

| Version No. | Date | Revised Section | Contents |
|---|---|---|---|
| 0.0 | Nov. 1, 2003 | -- | First issue. |
| 0.1 | Jan. 19, 2004 | 2.5<br>2.7<br>3.2.1<br>3.2.2<br>3.2.3<br>3.4.1<br>4.2.2<br>4.2.4.2, 4.2.4.4<br>4.2.4.5<br>4.2.5, 4.2.6<br>4.2.6.4, 4.2.6.5,<br>4.2.6.6, 4.2.6.7,<br>4.2.6.8, 4.2.6.9<br>4.2.7.1, 4.2.7.2<br>4.5<br>4.6<br>6.4.2, 6.4.3<br>6.6.2<br>6.7.3<br>Appendices | Modified the description of CBF Scheme logic and Figures 2.5.4 and 2.5.6.<br>Modified the description and Figure 2.7.1.<br>Modified the description of Binary input signals and Table 3.2.2<br>Modified the description.<br>Added the Section 3.2.3 PLC Function.<br>Modified the description of Power system quantities.<br>Modified the description.<br>Modified the description and the sample of LCD screen.<br>Modified the description.<br>Modified the description.<br>Modified the description and the samples of LCD screen.<br><br><br><br>Added the section "4.5 IEC60870-5-103 Interface".<br>Modified the description.<br>Modified the description, Figure 6.4.1 and the samples of LCD screen.<br>Modified the sample of Binary output screen.<br>Modified the description.<br>Modified the Appendix C, E, G, I, and J, and added the Appendix P. |
| 0.2 | Mar. 17, 2004 | 2.3.5<br>Appendix Q | Modified the description.<br>Added the Appendix Q. |
| 0.3 | Apr. 26, 2004 | 2.2<br>4.2.7<br><br>Appendices | Added the description about "BU out-of-service function".<br>Modified the description and LCD screen of Test menu, and added the section 4.2.7.5 BU out-of-service.<br>Modified the Appendix C, G and I. |
| 0.4 | Aug. 24, 2004 | 1.<br>3.1.1.5<br>3.1.2.3<br>3.2.1<br>3.2.3<br>4.5<br>5.5.1<br>6.7.2<br>Appendices | Modified the table.<br>Modified the description and Figure 3.1.7.<br>Modified the description and Figure 3.1.13.<br>Modified the description of Binary input signals.<br>Modified the description.<br>Modified the description.<br>Modified the description.<br>Modified the description of Note.<br>Modified the Appendix H, I, M, P and Q. Added the Appendix R. |
| 0.5 | Nov. 11, 2004 | 2.1, 2.7<br>Appendix P | Modified and added the description of Section 2.1 and 2.7.<br>Modified the Appendix P. |
| 0.6 | Nov. 29, 2004 | 2.7 | Modified the description and added Figures 2.7.1, 2.7.2 and 2.7.3. |
| 0.7 | Dec. 07, 2004 | 4.2.3, 4.2.5, 4.2.6<br>Appendix J | Modified the samples of LCD screen.<br>Modified the Appendix J. |
| 0.8 | May. 10, 2005 | 3.1.2.1<br>3.1.2.4<br><br>Appendices | Modified Figure 3.1.9.<br>Modified the description, and added Figures 3.1.15 and 3.1.16, Table 3.1.1 and setting tables.<br>Modified the Appendix C and P. Added the typical external connections of the model with LED indication in Appendix I, and added model B310L in Appendix Q. |

www . ElectricalPartManuals . com

| Version No. | Date | Revised Section | Contents |
|---|---|---|---|
| 1.8 | Jul. 21, 2005 | 2.3.1<br>2.3.2<br><br>2.3.6<br>2.9.1<br>3.2.1<br>4.2.6.7<br>Appendices | Modified the description and Figure 2.3.2.<br>Modified the description of 'Check zone protection' and added Figures 2.3.5 and 2.3.6.<br>Modified the setting range table.<br>Modified the description and added Figure 2.9.2.<br>Modified the description.<br>Modified the DIF LCD screen.<br>Modified Appendix C, J and M. |
| 1.9 | Dec. 07, 2005 | 2.3.3<br>2.5<br>2.8, 2.9.4<br>3.3.3<br>3.3.8<br>4.2.6.1, 4.2.6.6, 4.2.6.7<br>6.7.2<br>Appendices | Modified Figure 2.3.8<br>Modified Figures 2.5.4 and 2.5.6.<br>Added the OVGF elements.<br>Added '3.3.3.CT Circuit Failure Detection'<br>Modified Table 3.3.1.<br>Modified the samples of LCD screen.<br><br>Modified Table 6.7.1.<br>Modified Appendix J, K and M. |
| 2.9 | Feb. 24, 2006 | 2.5 | Modified the description and Figures 2.5.4 and 2.5.5. |
| 3.0 | Sep. 05, 2006 | 2.3.3<br>2.5.1<br>2.5.2<br>3.3.5<br>3.3.8<br>4.2.4.1, 4.2.6.7<br>Appendices | Modified the description and added Figures 2.3.13 and 2.3.14.<br>Modified the description. (BF1, BF2)<br>Modified the description.<br>Modified the description. (DSSV, CBSV)<br>Modified Table 3.3.1.<br>Modified the samples of LCD screen.<br>Modified Appendix C, H, J and R. |
| 3.1 | Jun. 12, 2007 | 3.1.1<br>3.4.2<br>4.2.1<br>4.2.4.2<br>4.4<br>6.7.2, 6.7.3<br>Appendices | Modified Figures 3.1.2 and 3.1.5.<br>Modified Table 3.4.1.<br>Modified the description.<br>Modified the description.<br>Modified the description.<br>Modified the description.<br>Modified Appendix G, H and P. |
| 3.2 | Oct. 30, 2007 | 4.2.3.1<br>6.7.3<br>Appendices | Modified the sample of the fault record screen.<br>Modified the description.<br>Modified Appendix I, M, P and R. |
| 3.3 | Jun. 26, 2008 | 2.2<br>2.3.3<br>2.3.6<br>2.5.1<br>2.6<br>3.1.1.1<br>3.1.2.3<br>3.1.2.4<br>3.2.1<br>3.3.2, 3.3.4<br>4.2.6.7<br>5.5.2<br>6.7.2<br>Appendices | Modified Figure 2.2.1.<br>Modified Figures 2.3.7 and 2.3.8.<br>Modified the description of 'BU address setting'.<br>Modified Figures 2.5.4 and 2.5.6.<br>Changed the title and included the description of the old 2.6 and 2.7 sections.<br>Modified Figure 3.1.1.<br>Modified the description and Figure 3.1.13.<br>Modified the description.<br>Added Table 3.2.2(c).<br>Modified the description.<br>Modified the description.<br>Modified the description.<br>Modified the description.<br>Modified Appendix I, M and R. |

www . ElectricalPartManuals . com

TOSHIBA CORPORATION

www . ElectricalPartManuals . com