ABB

Test System

COMBITEST

(SE970870)

Features

- Fail-safe sequence disconnecting trip circuits when the test-plug handle is inserted

- Latching feature so that when the test-plug handle is withdrawn the relay stabilizes in its reset position before the trip circuits are restored

- Complete isolation of secondary instrument transformer circuits

- Trip-block plug which isolates a trip circuit without interrupting other circuits, allows the trip output to be monitored, and also provides visual indication of an isolated trip circuit

- Block-plug handle which disconnects all circuits routed through the test switch

- Ammeter test-plug with local automatic shorting device in case of inadvertent opening of a CT circuit

- Auxiliary station power supply made available for operating test equipment

- Extension bases which facilitate measurement and adjustment of plug-in module circuits

Application

The COMBITEST system for testing relays is built up around the RTXP 8, RTXP 18 or RTXP 24 test switches. The test switch can also be used for other testing needs not directly associated with relays, such as for switchboards or voltmeters.

The test switch may be used where testing relays or instruments would otherwise require disconnection of the instrument transformer's secondary or control wiring. It may also be used to advantage in the testing of other complete relay systems, even when each individual relay has its own test switch.

When the test-plug handle is inserted into the test switch, preparations for testing are automatically carried out in the proper sequence

(i.e. blocking of tripping circuits, short-circuiting of CT's, opening of voltage circuits, making relay terminals available for secondary injection).

The free ends of the test-plug handle leads may be connected to any type of test equipment or instrument. When a number of protective relays of the same type are tested, the test-plug handle need be moved only from the test switch of one relay to the test switch of the other, without altering previously made connections. If different types of relays are to be tested, it is a simple matter to change the connections on the test-plug handle and the relay testing set.

Design

The COMBITEST system comprises test switch, RTXP, test-plug handle, RTXH and block-plug handle, RTXF. These are designed in three different versions equipped with either 8, 18 or 24 contacts (RTXP/ RTXH/ RTXF). The later has one further contact for signalling a test under progress.

Together with the test leads, a trip-block plug, RTXB, and an ammeter test-plug, RTXM, the COMBITEST forms a complete system for the fast and safe testing of relays.

Test switch

The test switch, RTXP, is built up in a transparent[1] housing containing a number of contact units. The contact units are of two basic types. One type is for trip circuits and designed to open first and close last when the test handle is inserted respectively removed. The other type is used for all other circuit functions, current, voltage and auxiliary power. If the housing is not fully equipped with contact units, unused space is occupied by dummies of the same shape as the contact units.

Each test circuit contains two similar, adjacent contact units with the exception of the dc supply voltage. An additional shorting bar which is mounted within portions of the test switch provides the necessary short-circuiting of the current transformer circuits when the test-plug handle is inserted. All contact units have space for a marking piece symbol indicating the significance of it.

The contact units have guiding slots fitting the guides of the test pins, to prevent incorrect insertion of the test-plug handle. The available contact arrangements and marking piece symbols are shown in the ordering table.

Test switch RTXP 8

The test switch RTXP 8 contains eight contacts in a beige plastic housing. The RXTP 8 occupies one seat in the COMBIFLEX system with dimensions 2U and 6C. An adapter is used for mounting RTXP 8 in a 4U rack assembly. This allows one RX 1 terminal base to be mounted under the RTXP 8 (see Fig. 1).
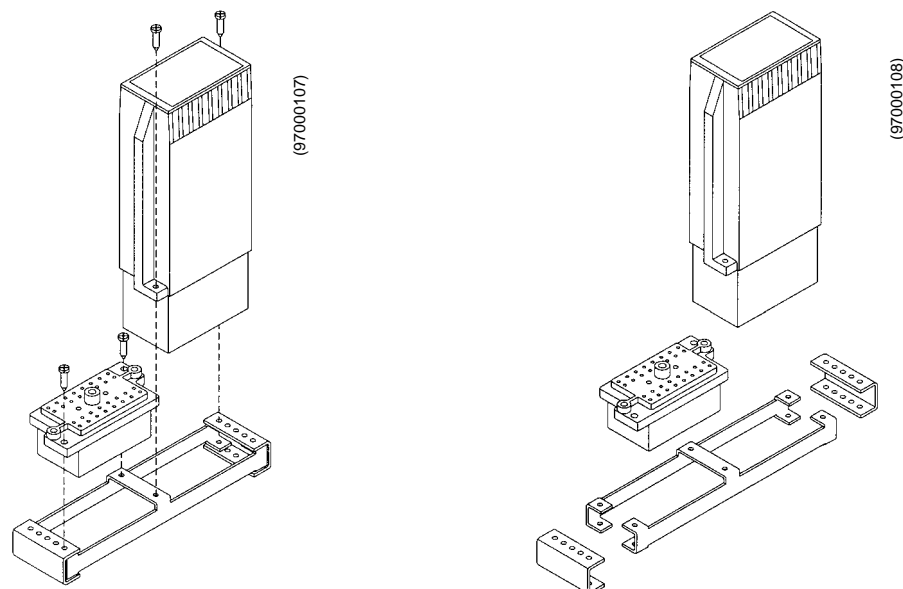

Fig. 1   The assembly of RTXP 8 and terminal base RX 1 with the 4U adapter.

Four versions of RTXP 8 are available with contact combinations suitable for 1, 2, 3 and 4 current or voltage measuring signal inputs and 4 contacts for alarm and trip signal.

Test switch RTXP 18

The test switch RTXP 18, which consists of a transparent[1] plastic housing containing a maximum of 18 contact units, occupies the space of two seats in the COMBIFLEX system with dimensions of 4U and 6C.

It mounts rigidly to the COMBIFLEX apparatus bars or any suitable panel cutout. The connections are done directly to 20 A COMBIFLEX terminals at the rear of the test switch.

The RTXP 18 test switch is available in different contact arrangements (see ordering table).

The contact blocks are numbered consecutively on the left-hand side with marking clips 1-18, from top to bottom. Similar marking clips are arranged on the right-hand side of the contact block for the function marking. As standard the contact block for + is placed at the top (position 1) and the contact block for - at the bottom (position 18) of the housing.

(820255)

Fig. 2   Test switch, RTXP 18

The front of the test switch is a door with two face plates having space for the test device and the protective relay data. Space is also provided for text specified by the customer. On the back of the door there is a label showing the type and location of the contacts and bypassing bars used in the test switch.

Test switch RTXP 24
The test switch RTXP 24 consists of two transparent[1] housings screwed together with the base to one unit. Each housing contains a maximum of 12 contact units. Further, one contact for the signalling of a test under progress, is located on the top right-hand housing. The test switch occupies the front space of 3 U 18 TE.

1)   Light beige as of autumn 1997.

It mounts rigidly to any standard European rack system or any suitable panel cutout, it can also be installed in a RHGS case and in COMBIFLEX equipment frames.

All connections are done to terminals at the rear of the test switch. Test contacts 1-24 have 20 A COMBIFLEX terminals while the signalling contact has a 10 A COMBIFLEX terminal.
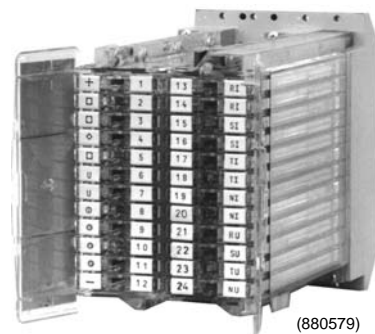

(880579)

Fig. 3   Test switch, RTXP 24

The RTXP 24 test switch is available in different contact arrangements (see ordering table).

The contact units are arranged in two vertical rows and are consecutively numbered with marking clips, 1-12 on the left-hand row and 13-24 on the right-hand row. Similar marking clips, indicating the function are arranged on the outer sides of the two rows of contact units. Contact units of positive and negative dc auxiliary supply have fixed positions and are placed in the left-hand row top (+position 1) respectively bottom (-position 12) of the housing.

The normally open contact for signalling is closed when the test-plug handle is inserted. The block-plug will not close the contact.

The front of the test switch has two doors, each with a plate. The left-hand plate has space for protective relay data and test specified by the customer. On the right-hand plate the type, ordering number and symbol of the test switch are shown.

Test-plug handle
The test-plug handle, RTXH, is fitted with banana-plug sockets for use with 4 mm banana plugs. Test leads are used to connect between the banana-plug socket on test-plug handle and the relay testing set. Plugs for pos-

Design (cont'd)

itive and negative dc auxiliary voltage maintain circuit continuity when inserted into the test switch. The other plugs are test plugs which disconnect the primary circuits from

the relay and connect it to the test leads. To prevent unwanted tripping when the handle is withdrawn, latches on the handle secure it in the half withdrawn position. In this position, all voltages and currents are restored to the relay and any reenergizing transients are given a chance to decay before the trip circuits are restored. When the latches are released, the handle can be completely withdrawn form the test switch, restoring the trip circuits to the relay.

Test-plug handle RTXH 8
The test-plug handle RTXH 8, should be used for the testing of relays equipped with test switch RTXP 8. It has 8 plugs, each with a banana-plug socket for connection of test leads. Plus and minus auxiliary DC voltage is not intended to be brought out via the RTXH 8 contacts. This allows all 8 pins to be used for test signals.

Test-plug handle RTXH 18
The test-plug handle, RTXH 18, should be used for the testing of relays equipped with test switch RTXP 18. It has 18 plugs, each with a banana-plug socket for connection of test leads. The plugs in position 1 and 18 are for positive and negative dc auxiliary voltage respectively. The remaining 16 plugs are test plugs.

Test-plug handle RTXH 24
The test-plug handle, RTXH 24, should be used for the testing of relays equipped with test switch RTXP 24. It has 24 plugs, arranged in two vertical rows and each plug has two banana-plug sockets for connection of test leads. The plugs in position 1 and 12 are for positive and negative dc auxiliary voltage respectively. The remaining 22 plugs are test plugs. The signalling contact is closed by the top right-hand guide of the test-plug handle.
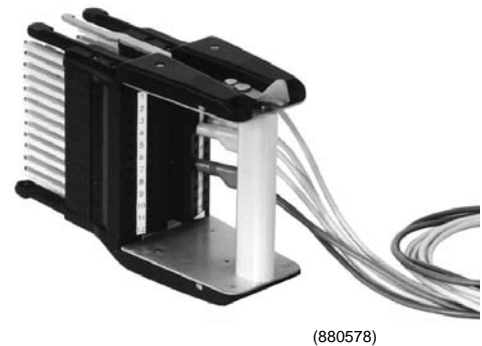

(880578)

Fig. 4   Test-plug handle, RTXH 24

Test leads
Red and black test leads are available in two types. One type has a cross section of 2,5 mm^2 and is 2,5 m long with a 4 mm banana-plug in each end. The other type has a cross section of 1,0 mm^2 and is 2,5 mm long with a 10 A COMBIFLEX terminal pin in one end and a 4 mm banana-plug in the other.

Trip-block plug
The trip-block plug, RTXB, is a short red plug, which can open a trip-type contact only. It cannot cause any switching action if it is inadvertently plugged into a wrong position. It can also be used for measurement purposes in trip circuits. The plug is red to draw attention to the fact that blocking has been carried out. The door of the COMBIFLEX equipment frame can be closed while the plug remains inserted in the test switch.

Ammeter test-plug
The ammeter test-plug RTXM is thinner than the other plugs so that when inserted into a current position it connects the meter in series with the circuit, but does not open the switch far enough to cause the current shorting bars to be contacted. This plug is equipped with a local overvoltage protection which short-circuits the current circuit in case of an inadvertent opening of the CT. At approximately 100 V the overvoltage protection is short-circuiting. A neon lamp in the overvoltage protection indicates the short-circuiting.

The overvoltage protection can withstand a continuous current of 5 A. At very high current during a short time, up to 125 A during 1 s, the voltage between the connection leads is limited to a harmless level. Permanent short-circuiting in the overvoltage protection can be the consequence of such a high

current. The plug shall be replaced by a new plug after a very high current through the overvoltage protection.

The plug has 1 black and 1 red lead, 2,5 m in length with a 2,5 mm^2 cross-section. The free ends are fitted with 4 mm banana-type plugs. The plug is to be inserted with the red lead connected to the relay side.

Block-plug handle
The block-plug handles, RTXF 8, 18 and 24, consist of 8, 18 and 24 test-plugs respectively, clipped together. This device completely blocks the relay by disconnecting all circuits routed through the test switch, including the dc power supply. The signalling contact in RTXP 24 is not activated when the block-

plug handle is inserted. When the block-plug handle is inserted, the door of a COMBI-FLEX equipment frame can be closed.

(880576)
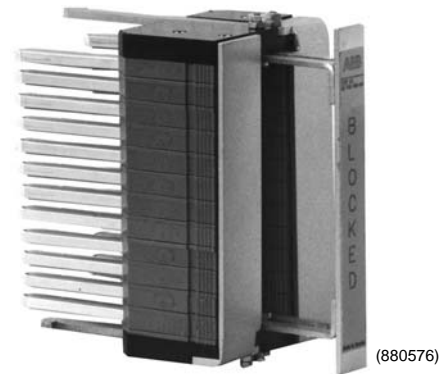
Fig. 5   Block-plug handle, RTXF 24

Methods of use: plugs and contacts

Test switch includes:

(SE 940735)

Contact unit for current and voltage circuits

(832008)

Contact unit for trip circuits

Test-plug handle includes:

(SE84020)

Dc supply plug
2 plugs for + and – dc auxiliary voltage supply to the test equipment.
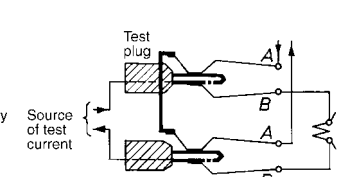Not sold separately

(SE84020)

Test plug
16 or 22 test-plugs, for RTXP 18 or RTXP 24 respectively, which disconnect the relay and connect it to the test leads.
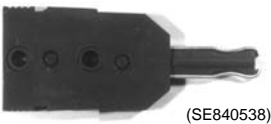Not sold separately
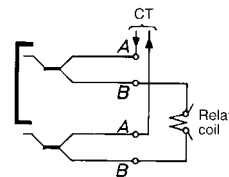
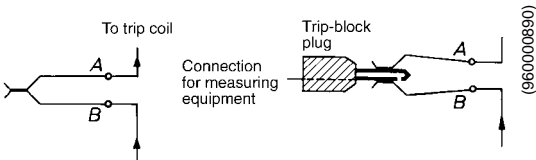(96000089)

Current testing of relay

Design (cont'd)

Loose plugs:

(SE840538)

Trip-block plug
The trip-block plug RTXB is short and is used separately for blocking trip circuits. It can also be used for measurement purposes in trip circuits.

(96000890)

Interruption or blocking of a dc circuit or for time measurement of trip pulses etc.

(SE84020)

Ammeter test-plug
The ammeter test-plug RTXM is used separately for service current measurement It incorporates an overvoltage protection.

(96000091)
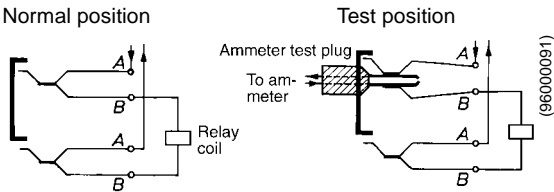
Load current measurement

Extension bases
The extension bases consist of a plug-in plate and a terminal base between which are connected leads with combination pin-sockets.

RX 1   RX 2H   RXY

(76813)

(76812)

(76811)
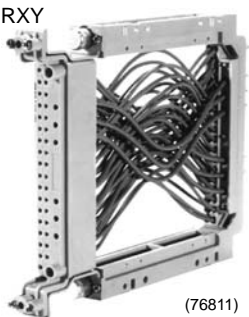
Extension base	RX 1	RX 2H	RXY
Suitable for terminal base type	RX 1 RX 2 RX 2H RX 4	RX 2H RX 4	RXY
Modular dimension	2U 6C	4U 6C	4U 4C

Technical data

Test voltage	2,5 kV
Highest system voltage	600 V dc, 500 V ac

Current-carrying capacity
   Test contacts:
      continuous
      for 1 second
   Signalling contact:
      continuous
      for 1 second
	
	20 A
	500 A
	
	10 A
	150 A

Short-circuiting connector
Short-circuiting connectors type RTXK are supplied with ac current relay modules. The connector is fastened to the terminal base of the relay module with screws and allows the module to be withdrawn from its terminal base without the secondary circuit of the CT being opened. In this way, individual relay modules can be changed, tested, or adjusted separately.

Note: Before an undercurrent relay, which is normally energized, is withdrawn, the trip circuit must first be blocked, either directly, by removing the output relay, or by inserting an RTXB trip-block plug into the test switch.

Ordering

When ordering the test switch, specify:

- Type
- Quantity
- Ordering No.
- Function designation symbol on the marking pieces and the quantity, location and Ordering No. of each one of these

Wording on the face plates:

RTXP 8,	text on plate;	max 14 lines,	10 char./line
RTXP 18,	text on upper half plate;	max 15 lines,	10 char./line
RTXP 18,	text on lower half of plate;	max 16 lines,	10 char./line
RTXP 24,	text on left-hand plate;	max 11 lines,	10 char./line

Ordering example:

Test switch RTXP 18

6 unmarked marking pieces	on position 9-12, 14, 15	2949 0734-1
1 +	on position 1	2949 0734-2
1 -	on position 18	2949 0734-3
2 1L1	on position 3-4	2949 0734-4
2 1L2	on position 5-6	2949 0734-5
2 1L3	on position 7-8	2949 0734-6
2 □	on position 2, 13	2949 0734-65
2 ◎	on position 16-17	2949 0734-66

When ordering other test parts, specify:

- Description
- Quantity
- Ordering No.

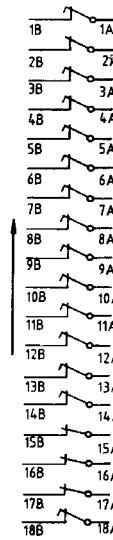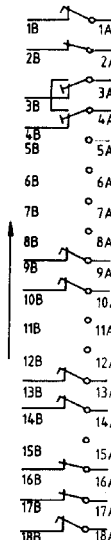Test switch RTXP 18

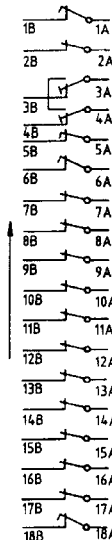**Contact functions**

Blocking of trip circuit
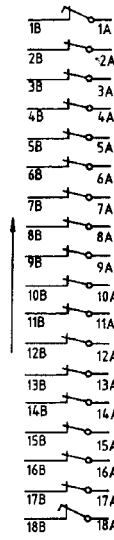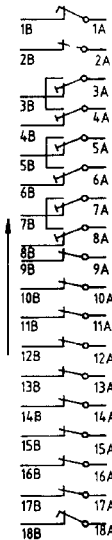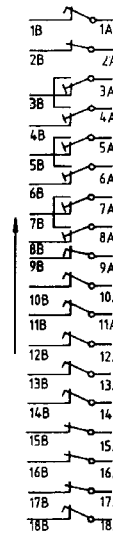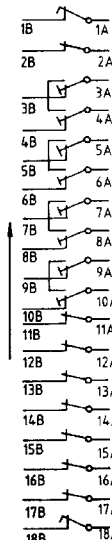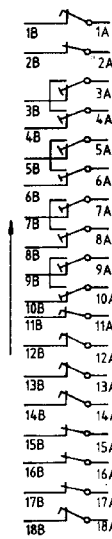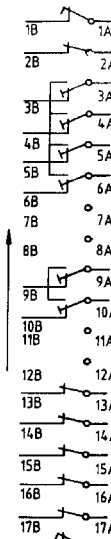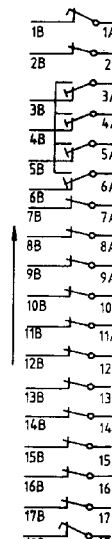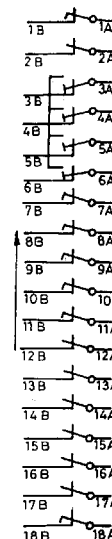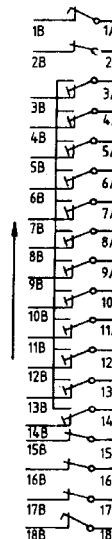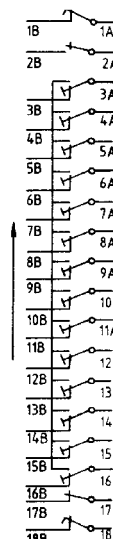
Short-circuiting of current circuit

Opening of voltage circuit

(96000092)

Symbol RTXP 18

Ordering No.

RK 926 115 -AN -AR -AC -AP -BG -AS -BF

(rk926115-xx)

Ordering No.

RK 926 115 -AD -AX -AV -AH -AM -BH

(rk926115-xy)

Other standard variants available on request

Ordering (cont'd)

Symbol RTXP 24
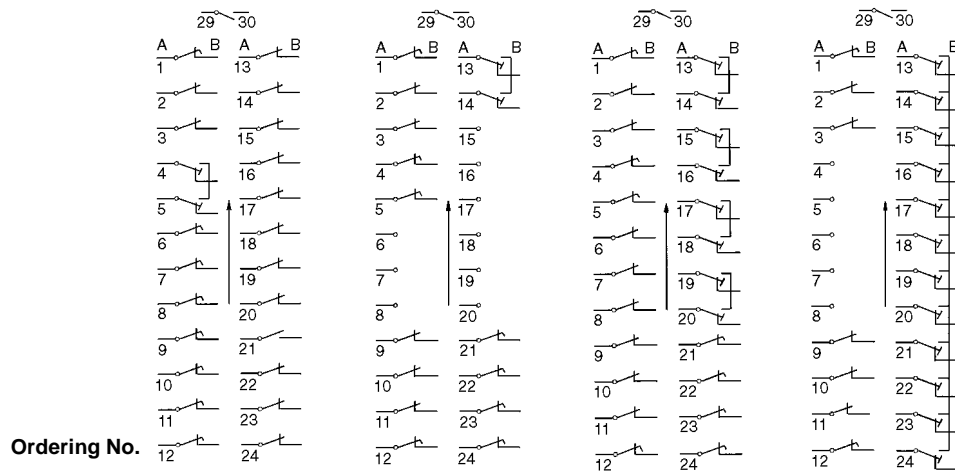
Ordering No.			
RK 926 315	-AA	-AB	-AC	-AD
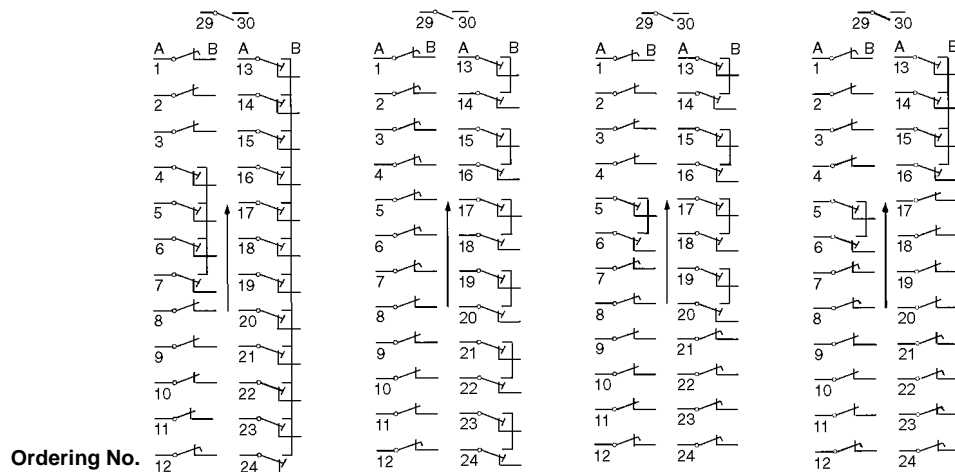
Ordering No.			
RK 926 315	-AE	-AH	-AG	-AK

Other standard variants available on request

Symbol RTXP 8
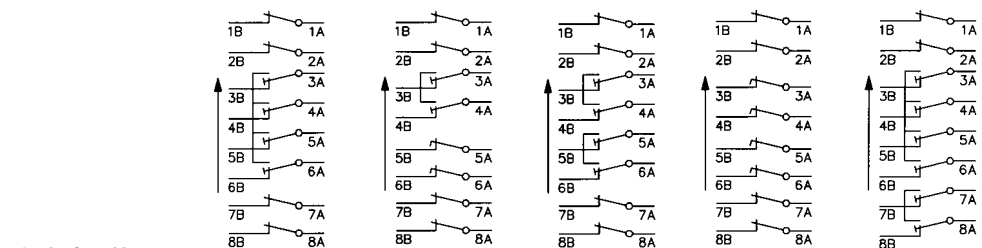
Ordering No.				
RK 926 002	-AD	-AE	-AF	-AG	-AH

Other standard variants available on request.

Symbol	Significance	Ordering No.
Unmarked		2949 0734 - 1
+	Positive terminal	2949 0734 - 2
-	Negative terminal	2949 0734 - 3
+/~	Positive terminal or ac voltage	2949 0734 - 60
-/~	Negative terminal or ac voltage	2949 0734 - 61
~	Ac voltage	2949 0734 - 71
IL1	Phase current in each	2949 0734 - 4
IL2	respective phase	2949 0734 - 5
IL3		2949 0734 - 6
IN	Neutral current	2949 0734 - 8
I	Current	2949 0734 - 10
I_d	Differential current	2949 0734 - 19
I_dL1	Differential current in each	2949 0734 - 20
I_dL2	respective phase	2949 0734 - 21
I_dL3		2949 0734 - 22
UL1	Voltages in three-phase systems	2949 0734 - 23
UL2	with neutral	2949 0734 - 24
UL3		2949 0734 - 25
UN		2949 0734 - 27
U	Voltage	2949 0734 - 29
U_1	Voltages in different stages	2949 0734 - 30
U_2	or levels	2949 0734 - 31
U_3		2949 0734 - 32
□	Various: e.g. signal + outgoing blocking	2949 0734 - 65
◎	Tripping	2949 0734 - 66
①	Closing	2949 0734 - 67
↑ •	Raise	2949 0734 - 68
↓ •	Lower	2949 0734 - 69
◇	Influence of external factors e.g. blocking or deblocking	2949 0734 - 70

Ordering (cont'd)

Description	Ordering No.

Test-plug handle
    RTXH 8
    RTXH 18
    RTXH 24
	
	RK 926 011-AE
	RK 926 011-AC
	RK 926 016-AA

Mounting kit for RTXP 24 in 4U rack assembly	1MRK 000 020-BT
Adapter for mounting RTXP 8 in 4U rack assembly	1MRK 000 316-19

Test leads
    Banana plugs   Black
                     Red
	
	2639 0605-1
	2639 0605-2

Test lead 10 A COMBIFLEX
    Banana plug   Black
                   Red
    Trip-block plug, RTXB
	
	2639 0180-B
	2639 0181-B
	RK 926 005-AC

Ammeter test-plug RTXM	 RK 926 006-AB

Block-plug handle
    RTXF 8
    RTXF 18
    RTXF 24
	
	RK 926 007-AC
	RK 926 007-AB
	RK 926 016-AB

Extensions bases with terminal base
    RX 1
    RX 2H
    RXY
	
	RK 924 035-AA
	RK 924 035-AB
	5371 069-A

References

Connection and installation components   1MRK 513 003-BEN

Relay mounting systems   1MRK 514 001-BEN

Manufacturer

ABB Automation Technology Products AB
Control & Force Measurement
Substation Automation
SE-721 59 Västerås
Sweden
Telephone: +46 (0) 21 34 20 00
Facsimile: +46 (0) 21 14 69 18
Internet: www.abb.com/substationautomation