ADDENDUM FOR SMOR2000

INTRODUCTION

SMOR2000 models are part of the SMOR family. SMOR2000 models include all the protection functions included in SMOR1000 (as described in instruction manual GEK-105593) except for the voltage related functions (voltage protection functions, frequency protection functions, voltage supervision of the recloser, voltage metering, etc).

This addendum describes the characteristics of SMOR2000 relays.

1. DESCRIPTION

The SMOR2000 Feeder Management System is a microprocessor based multifunction protection, control, and measurement unit. The SMOR2000 uses a set of algorithms to create a general purpose protection and monitoring unit for power electrical systems.

The SMOR2000 is a device that provides protection, monitoring, analysis and control functions. It has been designed to be applied as main protection in medium voltage lines and distribution feeders, and as main or backup protection in power transformers, capacitor banks, busbars, motors and transmission lines, and also as integral protection for interconnections in small stations and co-generations.

Complete overcurrent protection is provided. This includes phase, ground and negative sequence protection for time overcurrent, hiset overcurrent, and loset overcurrent. Four shot recloser is also available. With programmable logic inputs and outputs, the SMOR2000 can be easily configured for the user's specific applications.

The relay has extensive monitoring and metering functions. It has an internal, non-volatile, memory which allows it to record the last 165 events, the last 256 alarms, and 4 registers (66 cycles each) of oscillography data. The relay performs background self-tests during operation.

All the information and settings of the unit are accessible by means of a computer connected to one of the three serial ports (RS232, RS485 or fiber optic) or by using the man-machine interface (HMI). The HMI includes a 20 character keypad and a 32 character (2 line) LCD display situated on the front of the relay.

The remote communication capability of the SMOR2000 can be integrated in a centralized system to supervise and manage power in the electrical system.

The SMOR2000 system represents a great advance in functions' integration concept focused in power system management optimization.

2. PROTECTION AND CONTROL

Each protective function can be programmed independently to trip, trip after manual closing or enable a reclosing.

Overcurrent Units

The SMOR includes the following overcurrent elements:

- phase and ground time delay (51PT and 51NT)
- hiset and loset phase and ground instantaneous (50PH, 50PL, 50NH and 50NL)
- negative sequence time delay (46P)

Time delay units (51PT, 51NT and 46PT) can use inverse, very inverse, extremely inverse and definite time curves.

Breaker Control

The SMOR incorporates functions for breaker control which can be accessed from the keypad or through the remote communications port.

Operation Failure Detection

Breaker opening and closure are supervised by separate opening and closing failure detectors.

Recloser

The SMOR2000 system recloser allows up to 4 shots and up to 50 trips per hour. Dead time is programmable for each shot.

Cold Load Pickup

This function is provided to prevent operation of the breaker overcurrent functions during breaker re-energization.

Settings Tables

Three alternative setting tables are available. The active table at each moment is selectable by setting or input, the input having priority over the setting value.

Time Synchronization

Synchronization can be controlled through the keypad, communication software or the IRIG-B input.

Monitoring

The SMOR performs the following monitoring functions:

- associated circuit breaker status
- alarms and operations optical indication
- associated breaker's tripping and closing circuits supervision
- breaker health monitoring (I2t)
- phase sequence selection (ABC or CBA)
- protection status self-checking

3. MONITORING AND METERING

Metering

The SMOR performs accurate measurement of I and I2.

Load Profile Recorder

The average and RMS current are calculated for a 15, 30 or 60 min period for each phase.

Event Recorder

165 events are recorded in non-volatile EEPROM memory. Date and time (1 ms resolution), type of event, voltage and current, and a relay status snapshot are stored.

Oscillography Recorder

The Oscillography recorder can be triggered by any of the protective functions' pickup or trip or by an external input. Each of these records stores, with a resolution of 16 samples per cycle, the following data:

1) analog signals: Ia, Ib, Ic, and In

2) digital signals: unit pickup and trip
   inputs and outputs
   signals from the recloser
   date and time
   protection settings

The relay stores a up to 4 records of 66 cycles each (pre-fault cycles are adjustable between 2 and 10) which can be stored in Comtrade® file format, and visualized and analyzed using the GE-OSC™ software.

Alarm Recorder

In addition to the event recorder, the SMOR can record up to 255 alarms labeled in time. Alarms can be sent to a digital control system or upper levels, grouped using programmable logic and their text defined by the user.

4. INPUTS AND OUTPUTS

Digital Inputs

The SMOR2000 system has 6 digital inputs, which can be configured by the user by means of the GE-INTRO™ configuration software.

Outputs

The SMOR2000 system has 12 outputs: 2 trip, 2 closing, 1 alarm, and 2 groups of 4 configurable outputs.

5. USER INTERFACES

Communications

The SMOR incorporates two commuted RS232 communication ports, one on the front of the unit and one on the rear. A third port on the rear can be selected to be RS485 or fiber optic (glass or plastic).

The GE-LOCAL™ software allows local or remote communications with a computer for a variety of functions including monitoring and control.

Using a GE_NESIS-DDS system, we can connect the SMOR to a communications net allowing it to be part of an integrated system.

Human Machine Interface (HMI)

The SMOR has a 20 key keypad that can be used to control and program the system without a computer.

A 2 line (16 character per line) LCD display is illuminated and controlled by a potentiometer situated on the rear of the front board.

LED Indicators

One of the LEDs is bicolour for the system alarm, and 16 are red, configurable to any of the 32 alarms available. Each LED can be configured with or without memory.

7. ORDERING

To order select the basic model and the desired features from the Selection Guide below:

SMOR	2	*	*	*	*	21	0	*	04B	
SMOR										
		1								Front port: RS232. Rear ports: RS232 + Plastic F.O.
		2								Front port: RS232. Rear ports: RS232 + Glass F.O.
		3								Front port: RS232. Rear ports: RS232 + RS485
			B							phase: 0.2-2.4 A, ground: 0.2-2.4 A
			C							phase: 1-12 A, ground: 0.2-2.4 A
			D							phase: 1-12 A, ground: 0.5-6 A
			E							phase: 1-12 A, ground: 0.1-1.2 A
			F							phase: 0.5-6 A, ground: 0.2-2.4 A
			G							phase: 0.5-6 A, ground: 0.1-1.2 A
			H							phase: 2-16 A, ground: 0.2-2.4 A
				1						P1, P2, P3: M-Link protocol
				2						P1, P2: M-Link protocol; P3: ModBus® RTU protocol
					M					HMI language: Spanish
					D					HMI language: English
								F		Auxiliary Voltage: 24-48 VDC
								G		Auxiliary Voltage: 48-125 VDC
								H		Auxiliary Voltage: 110-250 VDC

8. TECHNICAL CHARACTERISTICS

INPUTS

THERMAL CAPACITY

Current circuits:

Continuous:	4 x In
During 3 seconds:	50 x In
During 1 second:	100 x In

BURDENS

Current circuits:	0.5 VA for In = 5 A
	0.1 VA for In = 1 A

Auxiliary voltage (VDC):

During operation:	12 W
Per active input:	8 mA/1 W, Vaux: 125 VDC

OUTPUTS

TRIPPING CONTACTS

Contact capacity:

Maximum operating voltage:	440 VAC
Continuous current:	16 A
Make and carry:	25 A
Breaking:	4000 VA

SIGNALING CONTACTS

Contact capacity:

Maximum operating voltage:	380 VAC, 250 VDC
Continuous current:	8 A
Make and carry:	8 A
Breaking:	1760 VA

METERING

Frequency: 50/60 Hz

Rated phase current: 1 or 5 A (depending on model)

Rated ground current: 1 or 5 A (depending on model)

Auxiliary voltage: 24-48 VDC, ±20%

110-250 VDC, ±20%

COMMUNICATIONS

Local Communication: 2-line alphanumerical display (16 characters per line); 20-key front keypad

Remote Communication:

(PC communication network local or remote)

Mode: Half duplex

Baudrate: 1200 to 19200 bps

Physical media:

RS232 (ports 1 and 2)

RS485 (optional for port 3)

Plastic fiber optic (optional for port 3):

Type of connector: HFBR-4516

Emission power: 8 dBm

Receiver sensitivity: -39 dBm

Wave length: 660 nm

Glass fiber optic (optional for port 3): Type of connector: STA

Emission power: 17.5 dBm

Receiver sensitivity: -24.5 dBm

Wave length: 820 nm

Synchronization: IRIG-B

- DB9 connector for port RS232 on the front (PORT 1)
- PORT 2 may have a 3-pin Phoenix™ connector for RS485, 1 mm plastic fiber optic, or 50/125 glass fiber optic

ENVIRONMENTAL

Temperature:

Storage: -40 to +85ºC

Operation: -20 to +70ºC

Humidity: Up to 95% without condensing

MECHANICAL CHARACTERISTICS

- Metallic package in 1/2 19" rack 4 units high.
- Frontal HMI with LCD display and keypad.
- Four rear terminal blocks (six in models with expansion board) including connector for IRIG-B time synchronization.
- Protection class IP52 (according to IEC 529)

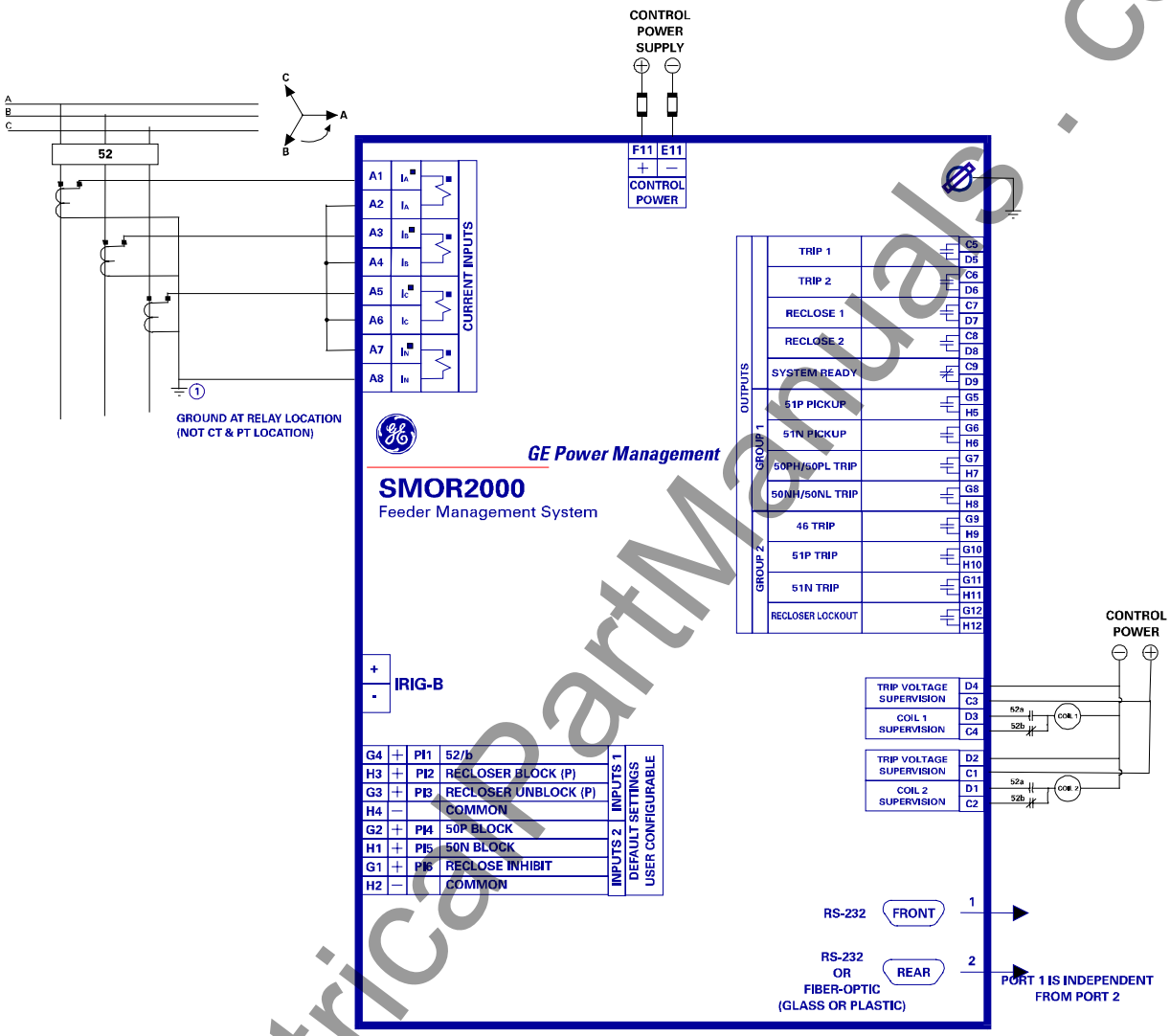
TYPE TESTS

Isolation Test Voltage:	2 kV, 50/60 Hz, 1 min
Surge Test Voltage:	5 kV peak, 0.5 J
Interference:	Class III according to IEC 255-22-1
Electrostatic Discharge:	Class IV according to IEC 255-22 2
Radiointerference:	Class III according to IEC 255-22-3
Fast Transient:	Class IV according to IEC 255-22-4
Sinusoidal Vibration:	Class II according to IEC 255-21-1
Shock:	Class I according to IEC-22521-2
Radiofrequency Emission:	according to IEC 41B (Sec) 81 and EN55022 class B

PACKAGING

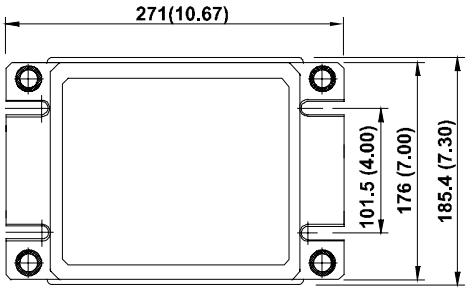
Dimensions:	271mm x 260mm x 176mm
Weight:	
Net:	6 kg (13.2 lbs)
Packaged:	7 kg (15.4 lbs)

9. WIRING DIAGRAM

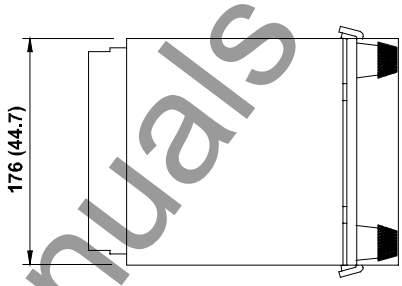


10. DIMENSIONS

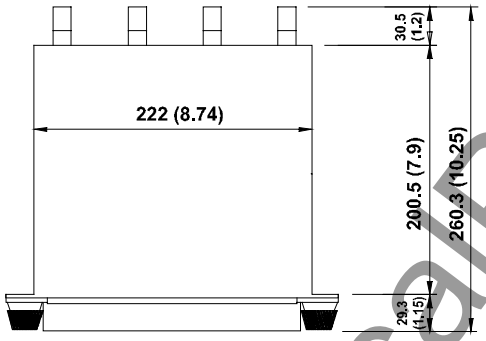
FRONT VIEW



SIDE VIEW



ABOVE VIEW



PANEL MOUNTING