

Protection and control

HV/MV substation
Sepam 2000
Busbar differential
Installation
Use
Commissioning



Merlin Gerin

Modicon

Square D

Telemecanique

Schneider Electric SA

Postal address
F-38050 Grenoble cedex 9
Tel: 33 (0)4 76 57 60 60
Telex: merge 320842 F
<http://www.schneider-electric.com>

Rcs Nanterre B 954 503 439

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

Publishing: Schneider Electric SA
Design, production: Idra
Printing:

*This document has been
printed on ecological paper.*

Contents

	chapter / page
installation	1/1
use - commissioning	2/1
tests - setting record sheets	3/1

Installation Contents

	chapter / page
Sepam 100 LD high impedance differential - installation	1/2
equipment identification	1/2
installation of Sepam 100 LD	1/2
identification of Sepam 100 LD	1/2
identification of the stabilizing plate	1/2
accessories supplied with Sepam 100 LD	1/3
accessories not supplied with Sepam 100 LD	1/4
stabilizing plate	1/4
assembly and wiring	1/5
dimensions and drilling	1/5
assembly	1/5
connection of current inputs	1/6
5 A CT block and connection diagram	1/6
connection of surge limiters	1/7
connection of power supply and logic input and outputs	1/8
connection of power supply and earth	1/8
connection of logic input and outputs	1/8
parameter setting	1/8
current circuit monitoring: Sepam 2000 W - installation	1/9
equipment identification	1/9
installation of Sepam 2000	1/9
identification of Sepam 2000	1/9
accessories supplied with Sepam 2000	1/11
optional accessories Sepam 2000	1/12
optional accessories Sepam 2000 Jbus/Modbus communication	1/13
dimensions and drilling	1/14
assembly	1/14
Sepam 2000 components	1/15
connections	1/16
terminal identification principle	1/16
connection of current inputs to 1 A or 5 A CTs	1/17
1 A or 5 A CT block and connection diagram	1/17
selection of SW1 and SW2 operating modes	1/17
microswitch setting	1/17
CCA 660 connector	1/18
connection of power supply and logic inputs and outputs	1/19
connection of power supply and earth	1/19
connection of logic input and outputs	1/19
connection of Jbus/Modbus communication coupler	1/20

Sepam 100 LD high impedance differential - Installation

Equipment identification

Installation of Sepam 100 LD

Each Sepam 100 LD comes in a single package which contains:

- Sepam,
- mounting accessories,
- connection accessories (connectors).

The other optional accessories come in a separate package.

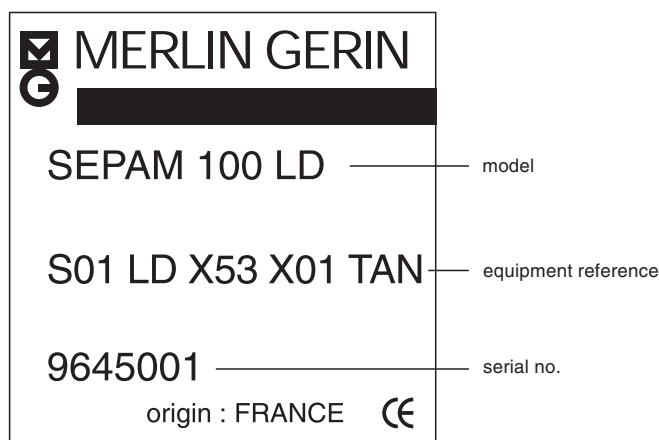
We recommend that you follow the instructions given in this document for quick, correct installation of your Sepam 100 LD:

- equipment identification,
- assembly,
- connection of current inputs,
- microswitch setting,
- connection of power supply and earth,
- checking prior to energizing.

Sepam 100 LD identification

Each Sepam is identified by a 14-character reference which describes its equipment and functional components in accordance with the chart below.

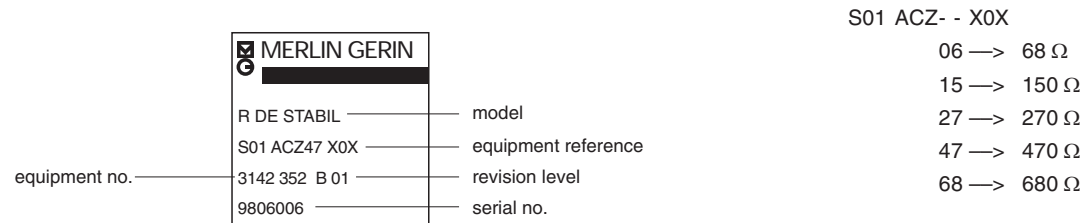
series	model	type	variant	communication	number of ES1 boards	working language	current sensor	auxiliary power supply	operating temperature
S01	LD	X = none	53 = 50 Hz - 3 ph. 63 = 60 Hz - 3 ph.	X = none	0	1 = international	T = CT	A = 24/30 Vdc B = 48/127 Vdc C = 220/250 Vdc E = 110/127 Vac F = 220/250 Vac	N = -5/55 °C



Example of label on right side panel.

Identification of stabilizing plate

Each plate is identified by a 14-character reference which describes its equipment and functional components.



Example of label on the plate.

Accessories supplied with Sepam 100 LD

Each Sepam comes with the following accessories.

CCA 604 connector

4-pin. Connection of power supply:

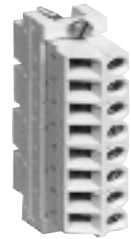
- screw terminals,
- 0.6 to 2.5 mm² wire (awg 20 to awg 14).



CCA 608 connector (according to type of Sepam)

8-pin. Connection of VTs:

- screw terminals,
- 0.6 to 2.5 mm² wire (awg 20 to awg 14).



1 Sepam mounting lug



Sepam 100 LD high impedance differential - Installation

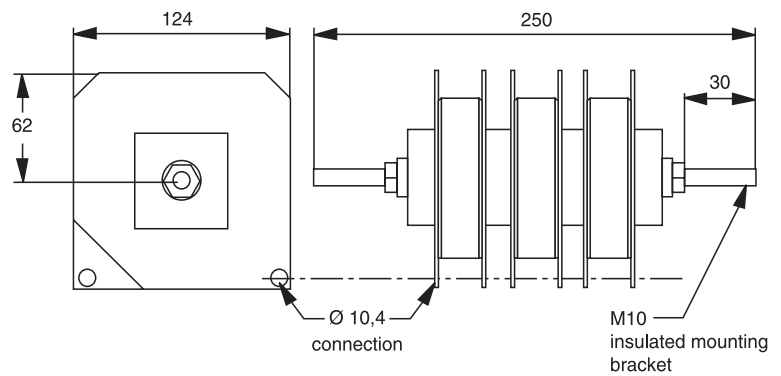
Equipment identification (cont'd)

Accessories not supplied with Sepam 100 LD

Surge limiter

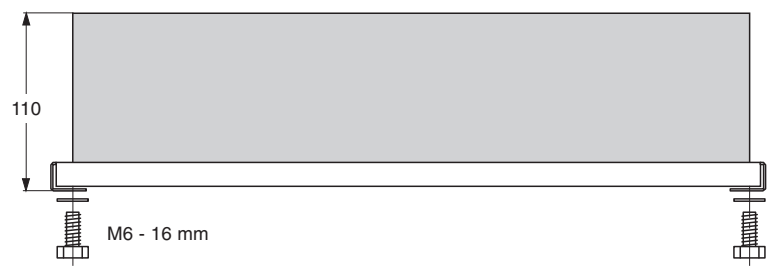
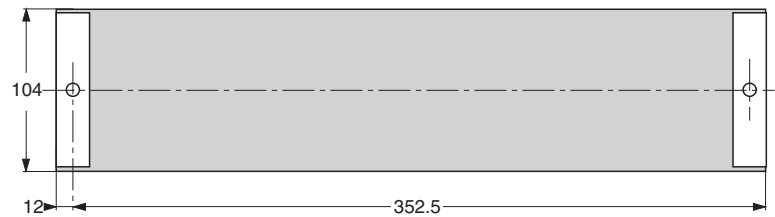
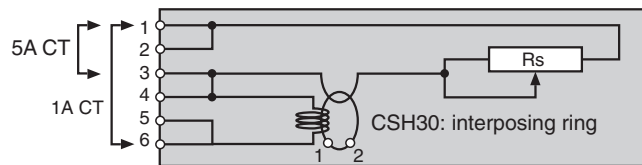
Used to limit the voltage to 3 kV.

Triple module



Stabilizing plate

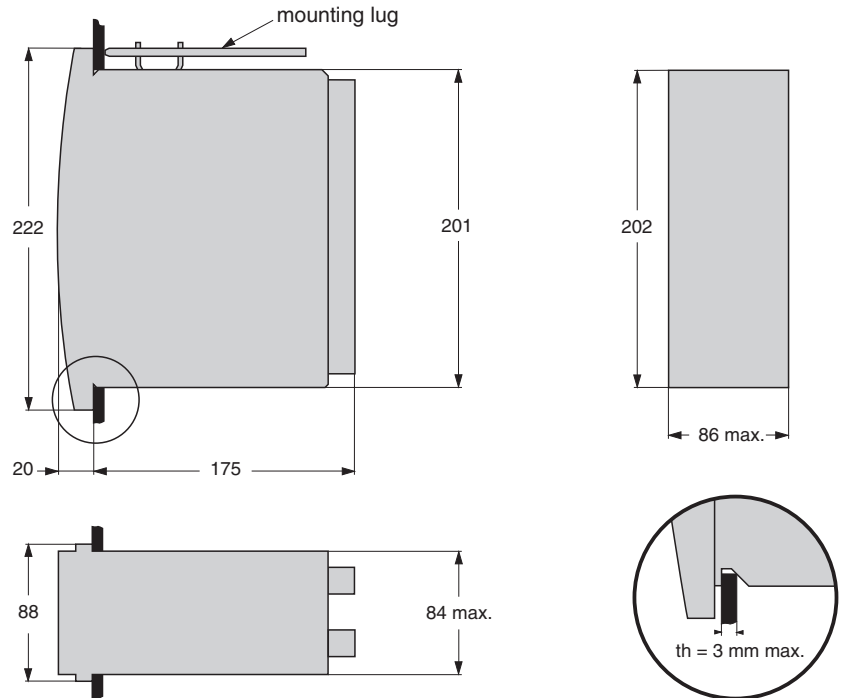
Used to avoid nuisance tripping for faults outside the protected zone.



Sepam 100 LD high impedance differential - Installation Assembly and wiring

Dimensions and drilling

Drilling diagram



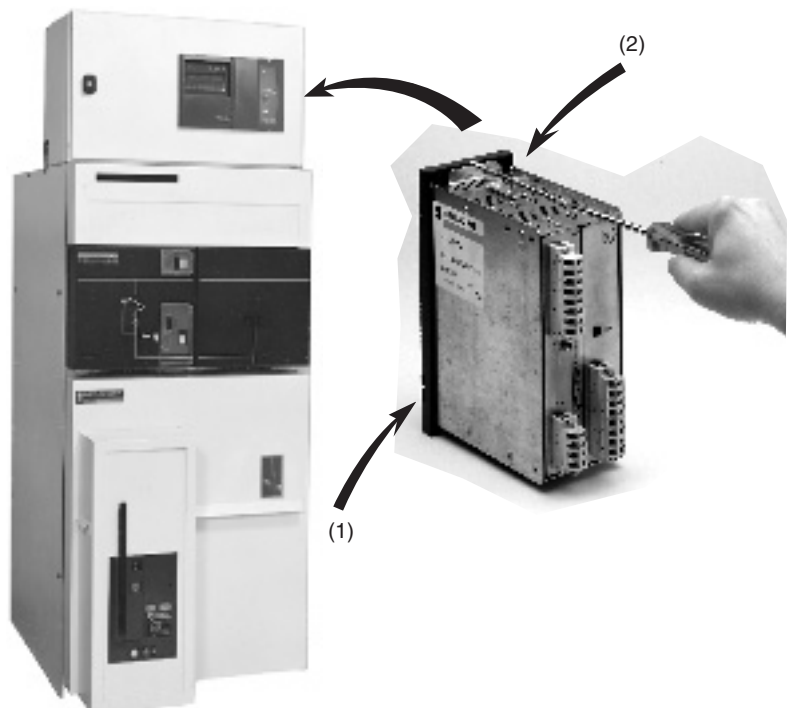
Assembly

■ Insert Sepam 100 LD through the front of the cut-out. Slide it into the cut-out until the front of Sepam 100 LD is in contact with the mounting plate.

The 2 notches (1) at the base of the Sepam 100 LD case allow it to hold by its own weight.

■ Position the lug (2) in the holes on the top of Sepam. Tighten the threaded stud of the lug.

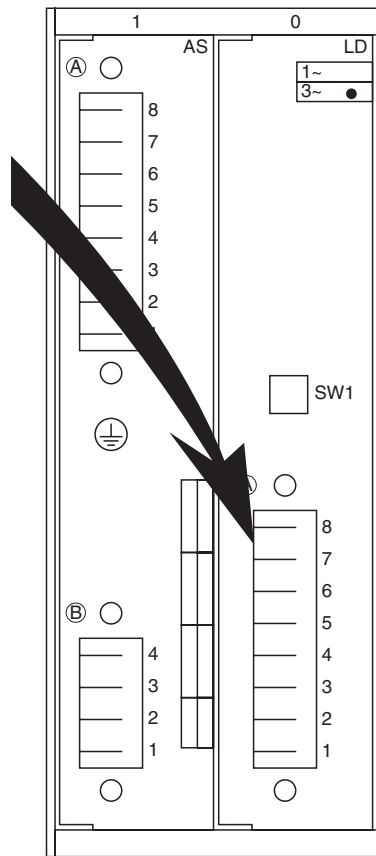
■ Make sure not to block the ventilation openings on the top and bottom of Sepam 100 LD. Leave a space of at least 5 cm above and below Sepam 100 LD.



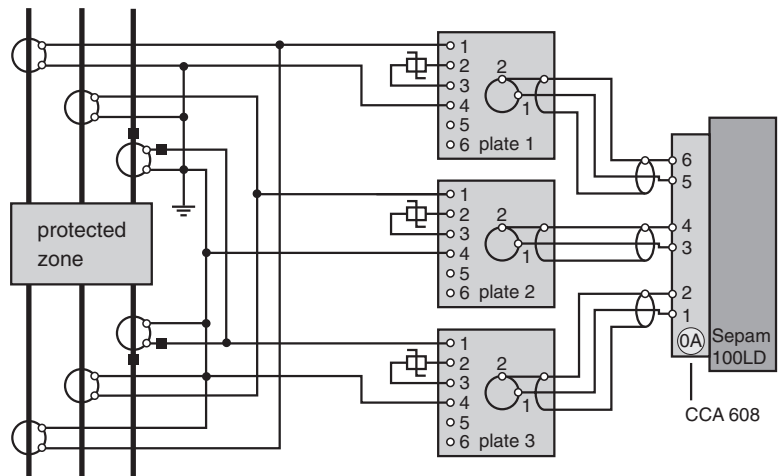
Sezam 100 LD high impedance differential - Installation

Connection of current inputs

The current transformer (1 A or 5 A) secondary circuits are connected to the stabilizing plate.
 The stabilizing plate CSH 30 interposing ring CT outputs are connected to the CCA 608 connector.



5 A CT block and connection diagram

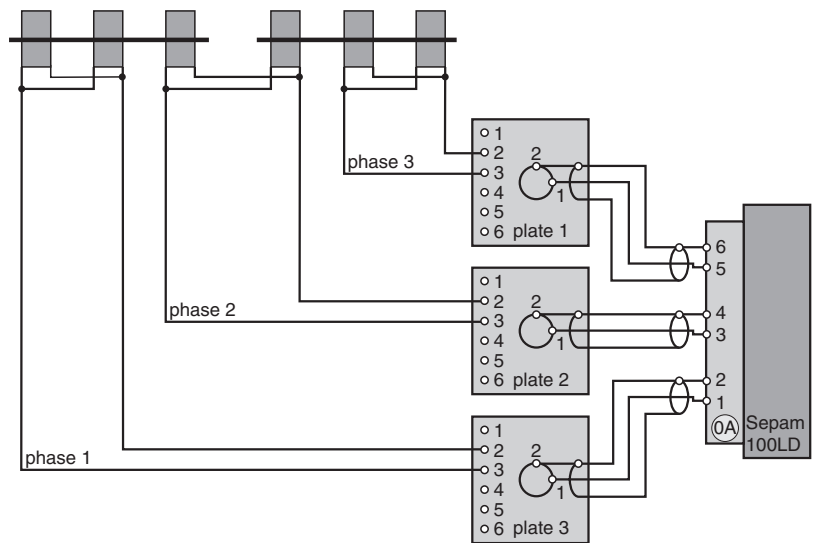


■ Correspondence of primary and secondary connections (e.g. P1, S1).

Sepam 100 LD high impedance differential - Installation

Connection of surge limiters

Example (N = 2 blocks per phase)
2 triple modules



Sepam 100 LD high impedance differential - Installation

Connection of power supply and logic input and outputs

Connection of power supply and earth

The Sepam 100 LD power supply is connected to the CCA 608 8-pin connector on the rear of Sepam 100 LD.

The power supply input is protected against accidental polarity inversion.

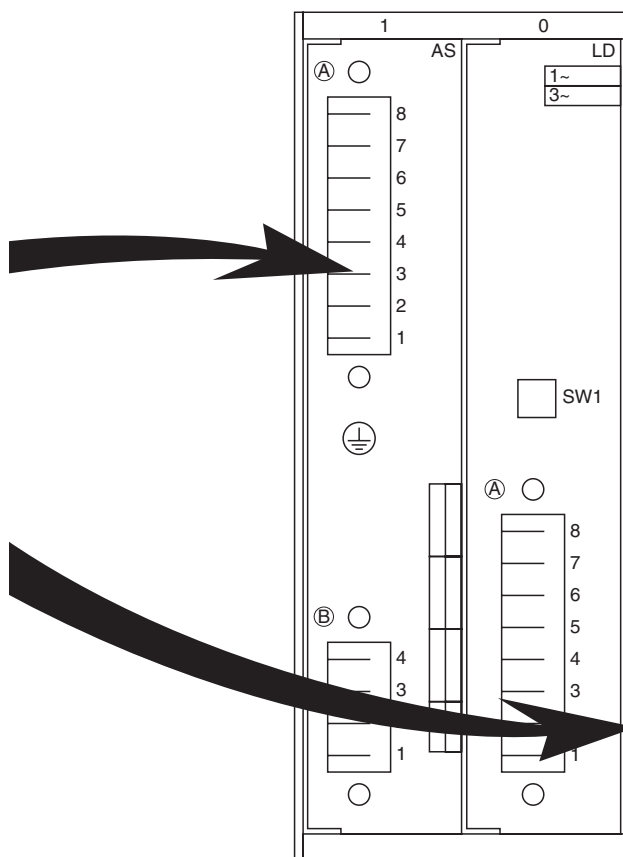


Safety measure:

The Sepam 100 LD chassis must be earthed via the grounding screw situated on the right side panel (rear view).

Use a braid or cable fitted with a 4 mm eye lug. The eye lug fastening screw is already mounted on Sepam when it is delivered.

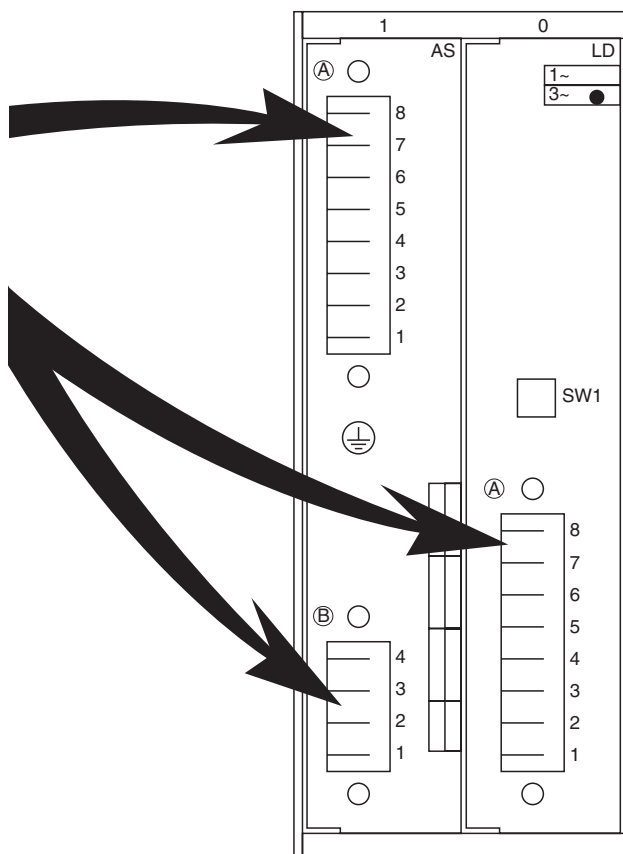
(Should this screw be lost, never replace it by a screw longer than 8 mm).



Connection of logic inputs and outputs

The logic data are connected to the CCA 608 and CCA 604 connectors.

Check that the voltage applied to the inputs is compatible with the voltage indication given on a dot on the subassembly.



Parameter setting

The choice between “with” or “without” latching is made using the SW1 microswitch on the rear of Sepam 100 LD.

Without latching:



With latching:



Current circuit monitoring: Sepam 2000 W

Installation - Equipment identification

Installation of Sepam 2000

Each Sepam 2000 comes in a single package which contains:

- Sepam,
- mounting accessories,
- connection accessories (connectors).

The other optional accessories come in a separate package. We recommend that you follow the instructions given in this document for quick, correct installation of your Sepam 2000:

- equipment identification,
- assembly,
- connection of current inputs,
- microswitch setting,
- connection of power supply and earth,
- checking prior to energizing.

Sepam 2000 identification

Each Sepam is identified by a 14-character reference which describes its equipment and functional components in accordance with the chart below.

series	model	type	variant	communication	number of ESTOR boards	working language	current sensor	auxiliary power supply	operating temperature
S36	KR	W = CT wiring monitoring	1 to 99	X = none	0 = 0	F = French	T = TC	A = 24Vdc	N = -5/55 °C
	YR			J = Jbus	1 = 1	A = English		B = 48/125Vdc	
					2 = 2	I = Italian		C = 220Vdc	
					3 = 3	E = Spanish			

Current circuit monitoring: Sepam 2000 W

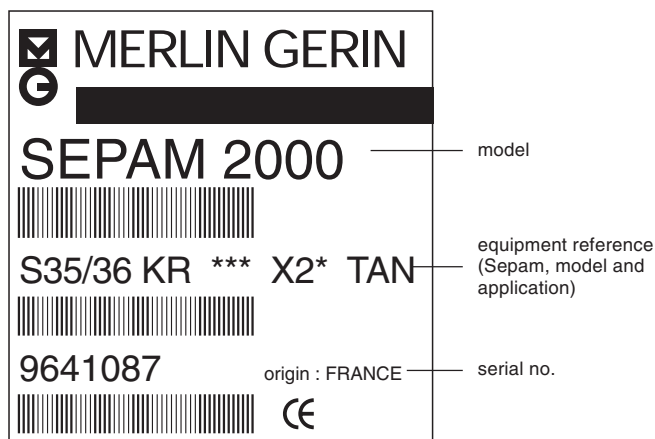
Installation - Equipment identification (cont'd)

There are five labels for identifying Sepam:

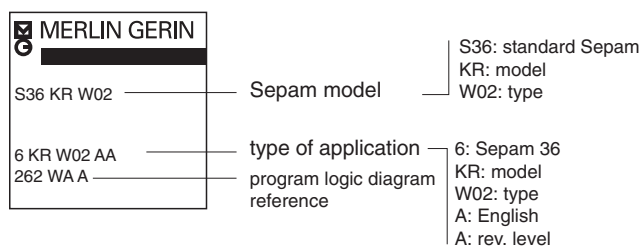
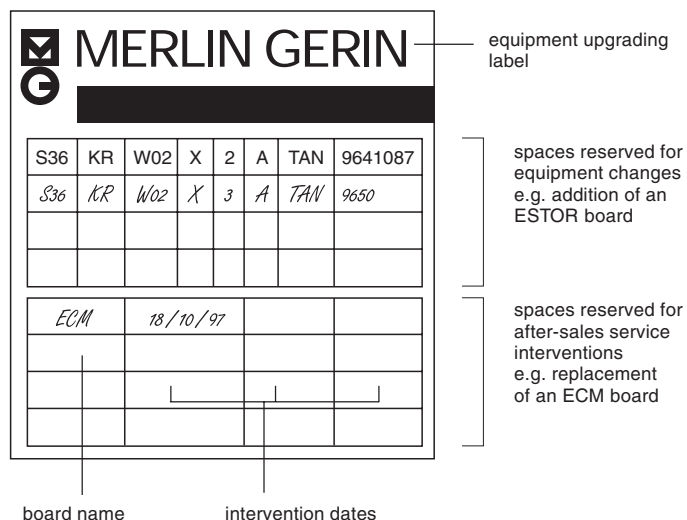
- two labels on the right side panel which give the product equipment features ⁽¹⁾,
- a label on the front of the cartridge which gives the functional features ⁽²⁾,
- a label on the left side of the cartridge which gives the references ⁽³⁾,
- a label on the right side of the cartridge which gives the references of non standard program logic schemes ⁽⁴⁾.

Example of Sepam reference:

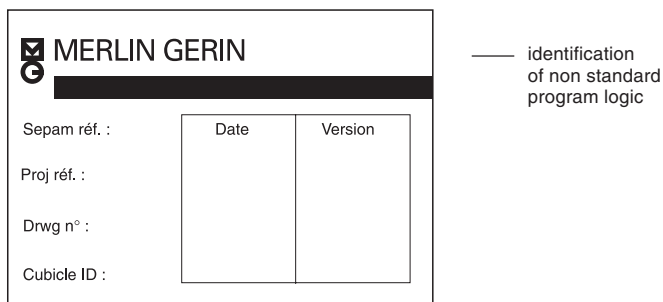
S36	Sepam 2036
KR	type
W	CT wiring monitoring
02	02
X	no communication
2	2 ESTOR boards
A	English
T	CT
A	24 V
N	-5/+55 °C



⁽¹⁾ Example of labels on right side panel.



⁽²⁾ example of label on front of cartridge.



⁽⁴⁾ label on right side of cartridge



⁽³⁾ example of label on left side of cartridge.

Accessories supplied with Sepam 2000

Each Sepam comes with the following accessories.

CCA 660 or CCA 650 connector for connection of 1 A or 5 A CTs:

- for 4 mm eye lugs,
- for max. 6 mm² wire (awg 10).



CCA 604 connector

4-pin. Connection of power supply:

- screw terminals,
- 0.6 to 2.5 mm² wire (awg 20 to awg 14).



CCA 606 connector

6-pin. Connection of a core balance CT:

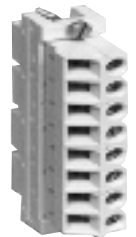
- screw terminals,
- 0.6 to 2.5 mm² wire (awg 20 to awg 14).



CCA 608 connector (according to type of Sepam)

8-pin. Connection of VTs:

- screw terminals,
- 0.6 to 2.5 mm² wire (awg 20 to awg 14).



CCA 621 connector

21-pin. Connection of logic inputs/outputs and temperature sensors:

- screw terminals,
- 0.6 to 2.5 mm² wire (awg 20 to awg 14).



2 Sepam mounting lugs



Current circuit monitoring: Sepam 2000 W

Installation - Equipment identification (cont'd)

Optional accessories Sepam 2000

TSM 2001 pocket terminal

Used to make Sepam 2000 settings. It does not have a battery since it is supplied with power by the Sepam 2000.

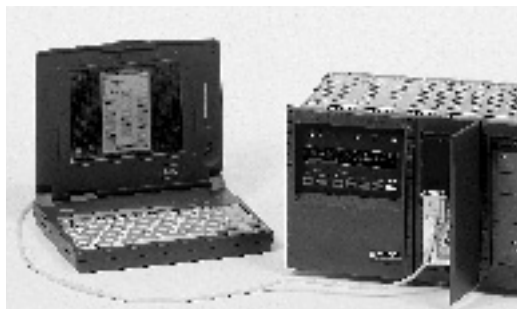


SFT 2801 kit

Software tool installed on PC microcomputer which may be used instead of the TSM 2001 pocket terminal.

It comprises:

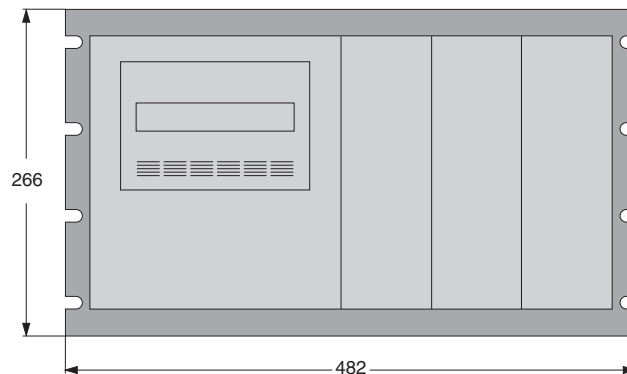
- a 3"1/2 diskette,
- an instruction manual,
- a connection kit (ACE 900 adapter + cord).



ACE 900 adapter to be connected to the pocket terminal socket.

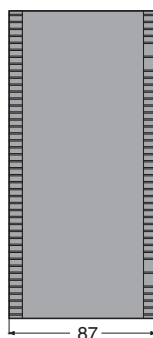
AMT 819 plate

Used to mount Sepam 2000 on a 19" rack.



AMT 820 shield

Used to block off the space between Sepam and the edge of the AMT 819 plate.



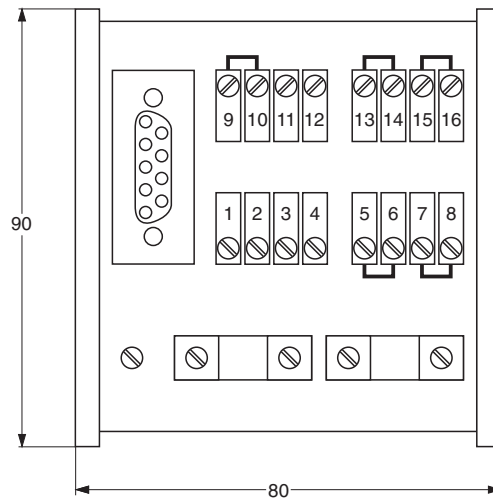
Optional accessories Sepam 2000 Jbus/Modbus communication

CCA 609 connection box and CCA 802 cable (3 m)

Connection to the Jbus communication network.

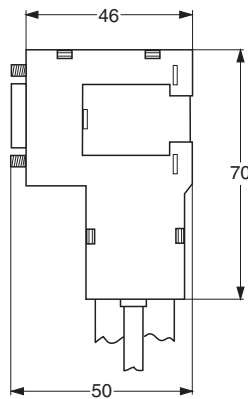
These accessories simplify the wiring of the communication network:

- the network is connected to the screw terminals of the CCA 609 box,
- the CCA 609 box is mounted on a DIN rail,
- the CCA 602 box provides the link between the CCA 609 box and Sepam.



CCA 619 chaining connector

Connector used to connect to the Jbus field bus by chaining.



CCA 600 connector, 9-pin sub D type

Used to connect the communication network.

This is an alternative to using the CCA 609 box and CCA 602 cable or the CCA 619 connector.

The network wires are to be welded to the connector terminals.

CCA 602 cable

3 m long cable with connectors.

N.B.

For further information, please refer to Jbus documentation n°. 3140751.

Current circuit monitoring: Sepam 2000 W

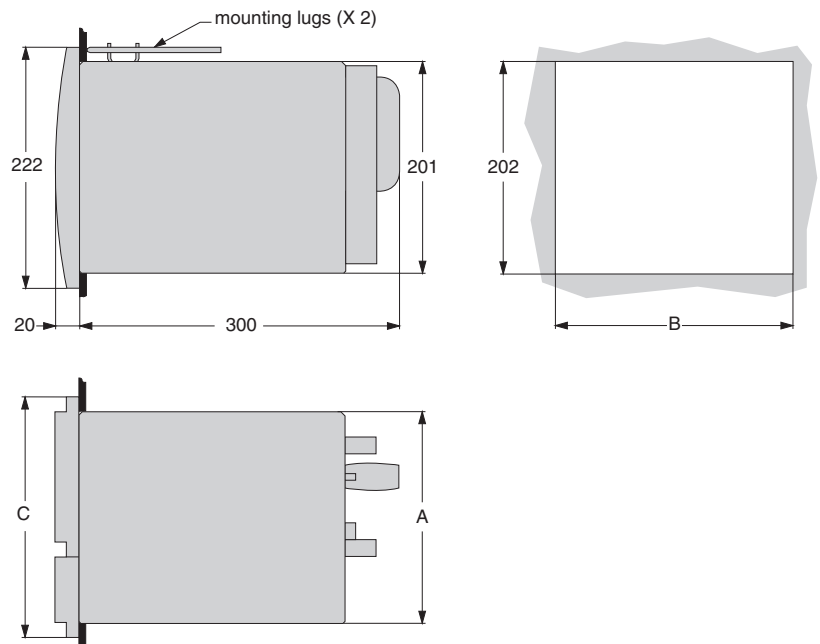
Installation - Equipment identification (cont'd)

Dimensions and drilling

Sepam 2000 is flush-mounted in a rectangular cut-out.
Maximum thickness of mounting: 3 mm.

Sepam	A (mm)	B (mm)	C (mm)
S36	332	338	352

Drilling diagram



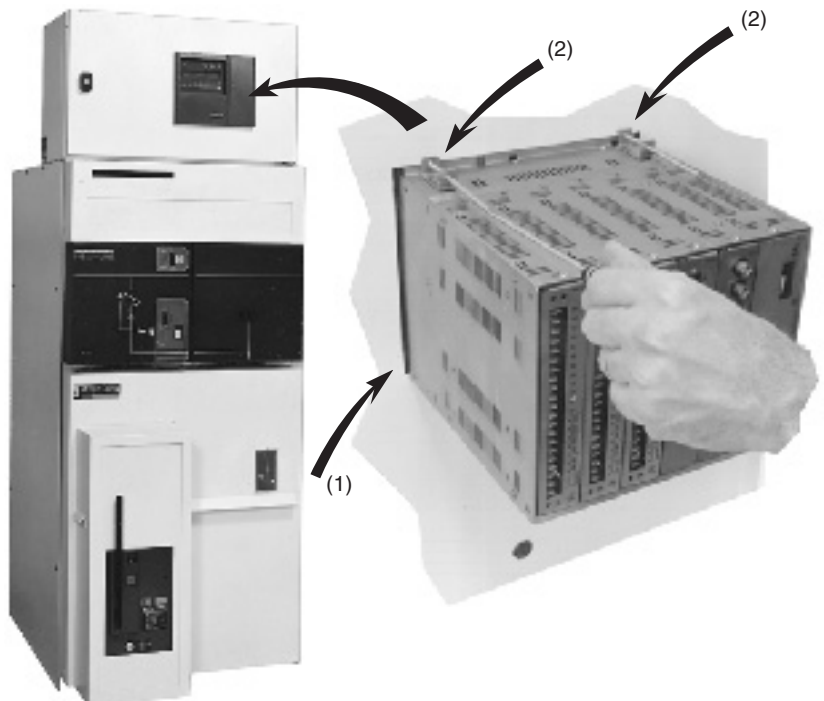
Assembly

■ Insert Sepam 2000 through the front of the cut-out. Slide it into the cut-out until the front of Sepam 2000 is in contact with the mounting plate.

The 2 notches (1) at the base of the Sepam 2000 case allow it to hold by its own weight.

■ Position the 2 lugs (2) in the holes on the top of Sepam. Tighten the threaded studs of the lug.

■ Make sure not to block the ventilation openings on the top and bottom of Sepam 2000. Leave a space of at least 5 cm above and below Sepam 2000.



Sepam components

slot	1	2	3	4	5	6	7	8
	CE40	ECM ⁽²⁾		3U/Vo	ESB	ESTOR1	ESTOR2	ESTOR3 ⁽¹⁾
S36 model*								
KR	CE40	ECM	ECM	–	ESB	ESTOR	ESTOR	ESTOR
YR	CE40	ECM	–	–	ESB	ESTOR	ESTOR	ESTOR

The ESTOR board may be installed, depending on the application.

⁽¹⁾ option for ESTOR board.

* S25, S35 pour versions antérieures.

Current circuit monitoring: Sepam 2000 W Installation - Equipment identification (cont'd)

Connections

The Sepam 2000 connections are made on the removable connectors located on the rear of the device.

All the connectors are screw-lockable.

Wiring of screw connectors:

■ recommended wire fitting:

□ Telemecanique DZ5CE0155 for 1.5 mm²,

□ DZ5CE0253 for 2.5 mm².

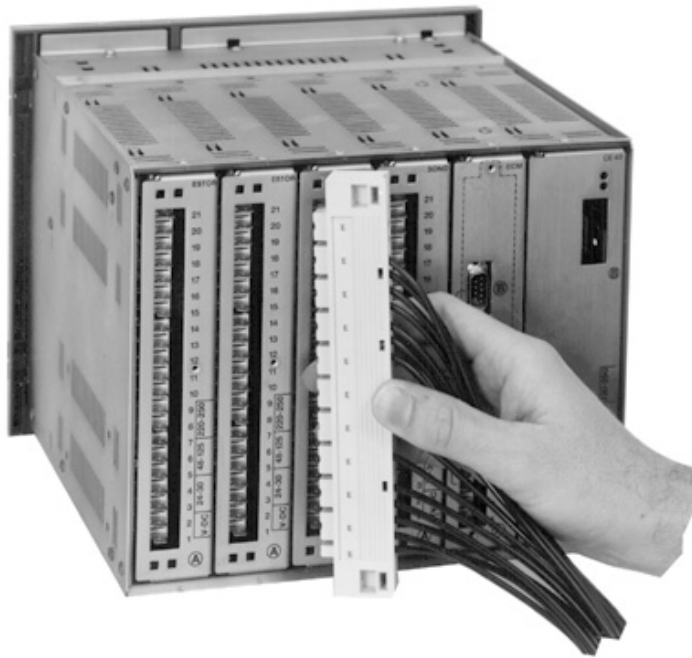
Stripped length with fitting: 17 mm.

Without fitting:

■ stripped length: 10 to 12 mm,

■ maximum 2 wires per terminal.

21-pin connectors must be plugged in correctly by hand before locking with the 2 screws provided (top/bottom).



Terminal identification principle

All the Sepam 2000 connection terminals are located on the rear of the device.

The Sepam 2000 boards are fitted into numbered slots on the back;

Sepam S36: 1 to 8.

The connections are identified by adding different markings:

■ slots 1 to 8,

■ A or B connector,

■ terminals 1 to 21.

Example: 5 A16

slot 5, connector A, terminal 16.

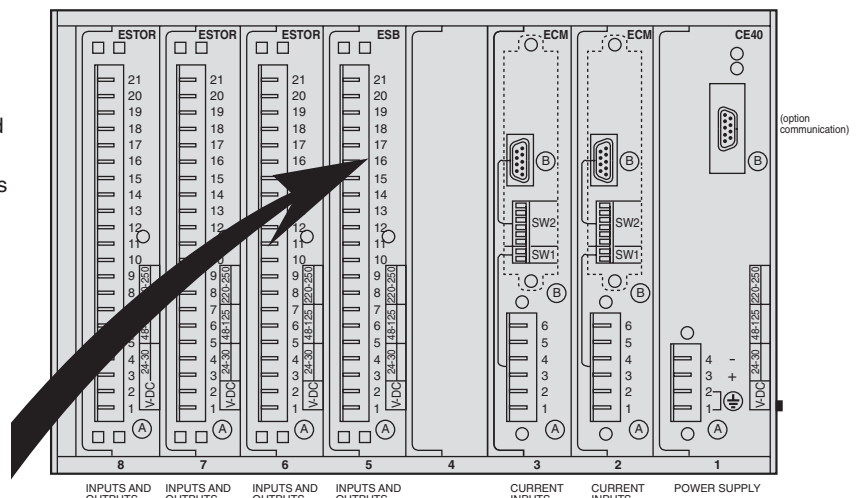
Each connector is used specifically for a functional assembly identified on the top right according to the function:

■ CE40: auxiliary power supply and communication option,

■ ECM: current sensor (CT) interface,

■ ESB: circuit breaker control interface,

■ ESTOR: auxiliary control circuit interface.



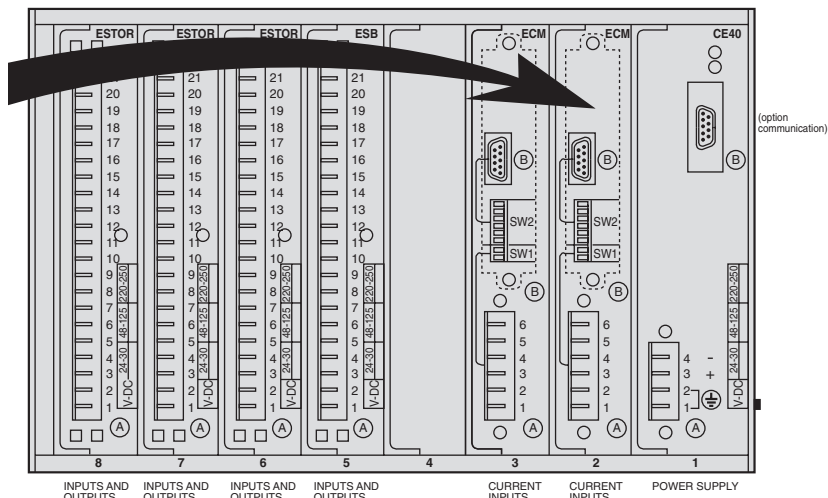
Current circuit monitoring - Installation

Connection of current inputs to 1 A or 5 A CTs

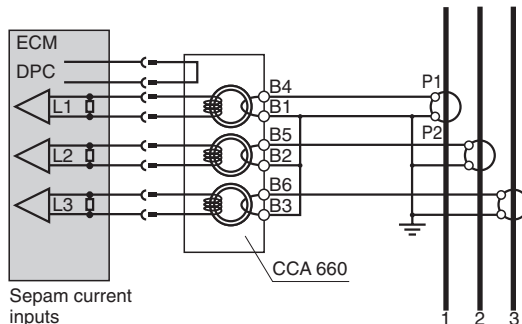
The current transformer (1 A or 5 A) secondary circuits are connected to the CCA 660 connector of the ECM module.

This connector contains 3 interposing ring CTs with through primaries, which ensure impedance matching and isolation between the 1 A or 5 A circuits and Sepam 2000.

The connector may be disconnected with the power on since disconnection does not open the CT secondary circuits.



1 A or 5 A CT block and connection diagram



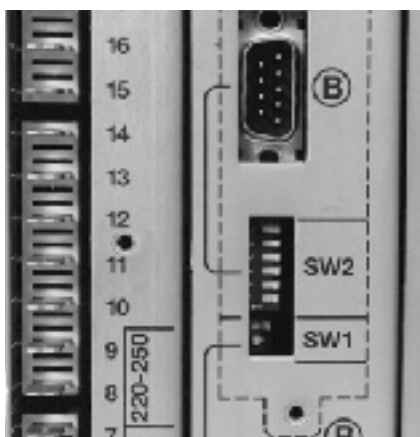
Selection of SW1 and SW2 (microswitches) operating modes

Sepam 2000 has several possible operating modes.

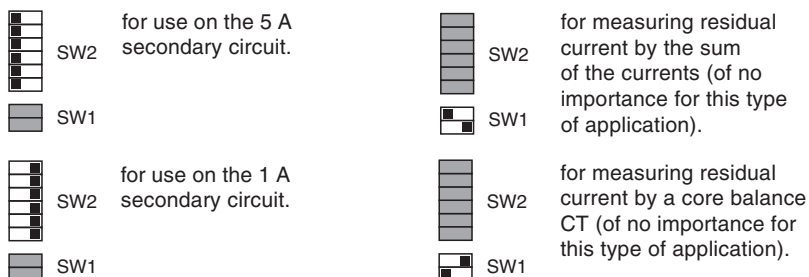
The operating mode is selected via microswitches on the rear of the device. They must be set before Sepam 2000 is put into service. The microswitches must be set with the Sepam 2000 de-energized.

The microswitches are hidden by the CCA 660 connector once it has been installed.

N.B. The Sepam S36 KR model has 2 inputs for connecting CTs. Remember to set the microswitches for the 2 inputs.



Microswitch setting



Current circuit monitoring - Installation

Connection of current inputs to 1 A or 5 A CTs (cont'd)

CCA 660 connector

- open the 2 side shields for access to the connection terminals. The shields may be removed, if necessary, to facilitate wiring. If removed, replace them after wiring.
- remove the bridging strap, if necessary. The strap links terminals 1, 2 and 3.
- connect the wires using 4 mm eye lugs. The connector accommodates wire with cross-sections of 1.5 to 6 mm² (awg 16 to awg 10).
- close the side shields.



- plug the connector into the 9-pin inlet on the rear of the device. Item B of the ECM module.



- tighten the CT connector fastening screws on the rear of Sepam.



Current circuit monitoring - Installation

Connection of power supply and logic inputs and outputs

Connection of power supply and earth

The Sepam 2000 power supply is connected to the CCA 604 4-pin connector on the CE40 module situated on the rear of the device. The power supply input is protected against accidental polarity inversion.

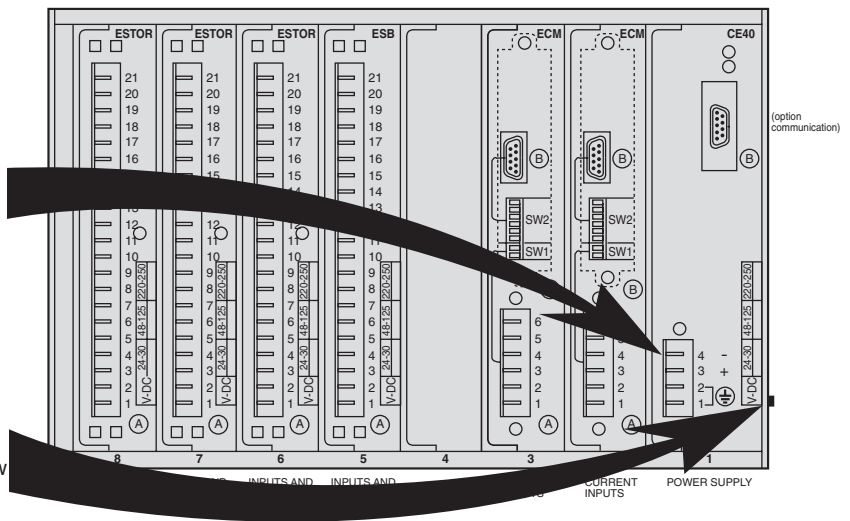


Safety measure:

The Sepam 2000 chassis must be earthed via the grounding screw situated on the right side panel (rear view).

Use a braid or cable fitted with a 4 mm eye lug. The eye lug fastening screw is already mounted on Sepam when it is delivered.

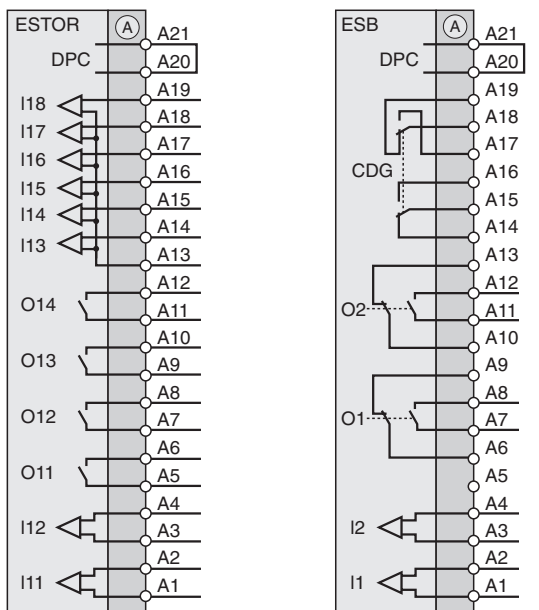
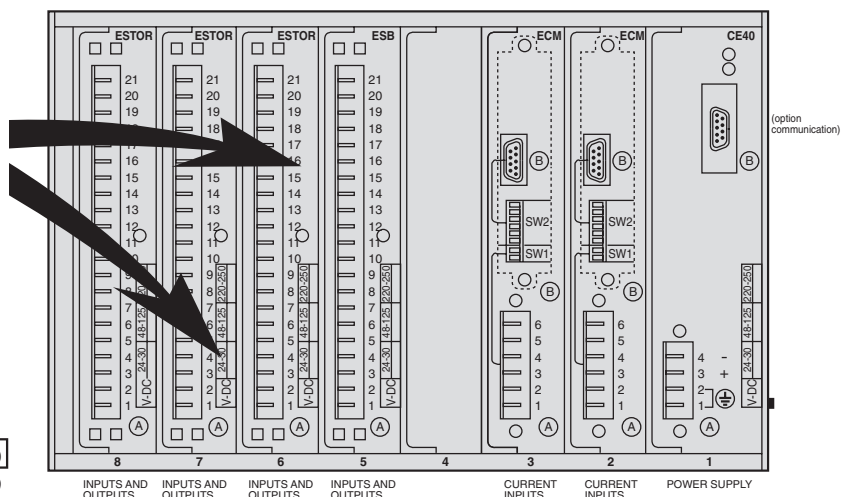
(Should this screw be lost, never replace it by a screw longer than 8 mm).



Connection of logic inputs and outputs

The logic data are connected to the CCA 621 connector on the ESB and ESTOR modules. Check that the voltage applied to the inputs is compatible with the voltage indication given on a dot on the subassembly.

Cabling should be done in accordance with the diagram for your application.



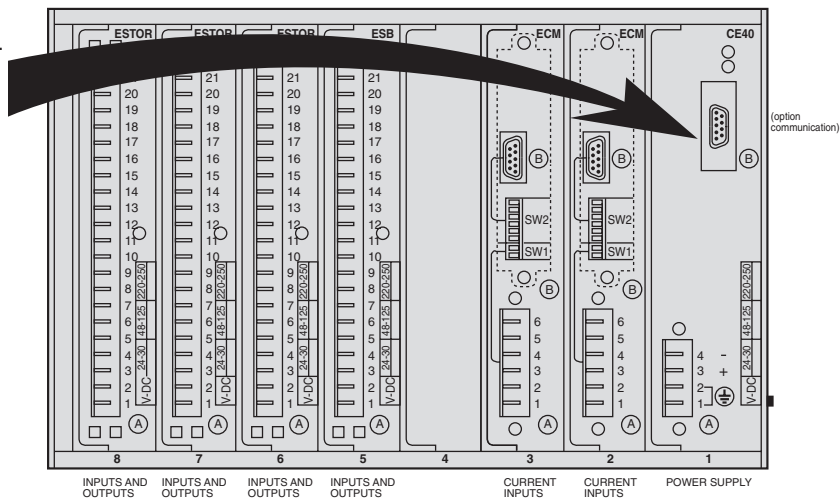
Example: ESTOR 1 and ESB.

Current circuit monitoring - Installation

Connection of the Jbus communication coupler

Sepam 2000 can be equipped, as an option, with a communication coupler situated on the CE40 module. Please refer to the "Sepam 2000, Jbus/Modbus communication" document for instructions on commissioning. A CCA 602 cable (option), 3 meters long, fitted with a 9-pin connector at either end, may be used to connect the coupler directly to the CCA 609 network connection box (option).

This box allows quick connection to the Jbus network and ensures all earthing required for safe operation.



Use - commissioning

Contents

	chapter / page
high impedance differential - use - commissioning	2/1
description / use	2/2
current circuit monitoring - use - commissioning	2/3
description / use	2/3
front face	2/3
TSM 2001 pocket terminal	2/5
use - commissioning	2/7
use (current operation)	2/7
energizing	2/7
operation via the front face or TSM 2001 pocket terminal	2/7
operation via the TSM 2001 pocket terminal only	2/7
annunciation	2/8
list of messages	2/8
Sepam 100 LD high impedance differential commissioning	2/9
checking prior to commissioning	2/9
Sepam 2000 current circuit monitoring commissioning	2/10
checking prior to commissioning	2/10
commissioning using the pocket terminal	2/10
parameter setting error, adjustment	2/11
SW2 microswitch setting	2/12
protection	2/12
protection function setting ranges	2/12
program logic and annunciation	2/13
program logic resource chart	2/13
connection of logic inputs: ESB and ESTOR1 boards	2/13
connection of logic outputs	2/14
connection of logic inputs: ESTOR2 boards	2/14
time delay setting	2/14
set-up	2/15
control and annunciation, operation	2/16
disturbance recording	2/16
remote setting	2/16
Sepam 100 LD high impedance differential - maintenance	2/17
types of indicator lamps	2/17
Sepam 2000 W current circuit monitoring maintenance	2/18
indicator lamps and display messages	2/18
unwanted tripping, no tripping	2/19
tests	2/19
Sepam replacement	2/19
Sepam 2000 circuit current monitoring identification	2/20
Sepam identification using the TSM 2001 pocket terminal	2/20
compatibility of types and models	2/20
Sepam 2000 documentation	2/21
password	2/22

High impedance differential - Use - commissioning

Description/use

Each Sepam 100 LD is designed to perform a complete function. It includes all the elements required, such as:

- tripping output relays,
- annunciation, settings,
- connectors.

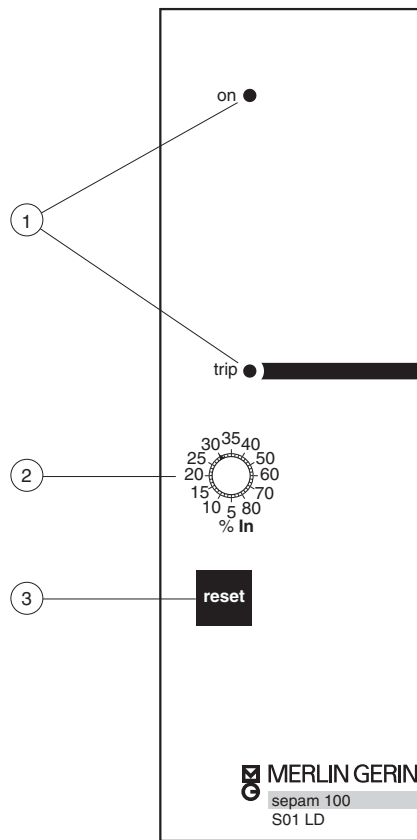
■ status indicators ①:

- power “on” indicator,
- latching “trip” indicator indicating output relay tripping.

■ protection setting dial.

■ “reset” button for acknowledging output relays and the “trip” indicator.

When the button is activated, the “trip” indicator undergoes a lamp test.



- ① status indicators
- ② setting dials
- ③ “reset” button

Current circuit supervision - Use - commissioning

Description/use

Your Sepam 2000 is a multifunction, microprocessor based device which combines, in the same case:

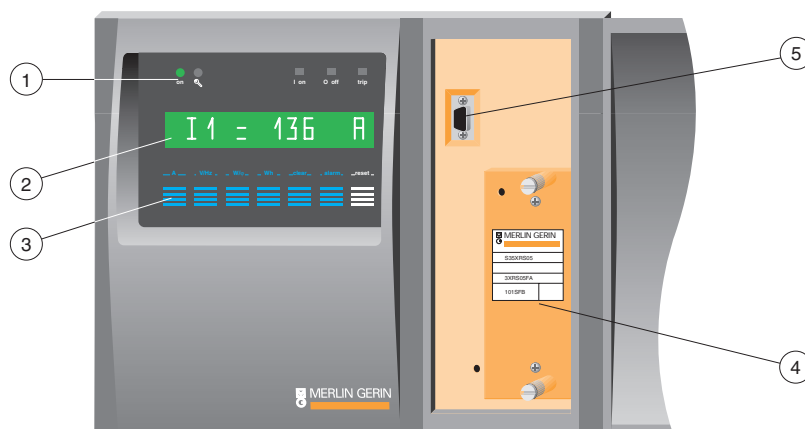
- measurement of electrical variables,
- display of operating messages,
- protection.

Sepam 2000 may be equipped (as an option) with a communication link with the remote monitoring station. There are two models of Sepam.




Standard model: Sepam 2000 S36 (for all types).

Front face



- ① status indicators
- ② display
- ③ keys for access to measurements and alarm processing
- ④ cartridge
- ⑤ pocket terminal socket

Status indicators ① :

- green **on** indicator lamp shows that Sepam 2000 is energized,
- red **trip** indicator lamp: Sepam has triggered short-circuiting of the differential protection of the corresponding zone. A related alarm message indicates the faulty phase.
- red  indicator lamp shows internal Sepam faults. All the output relays are dropped out (fail-safe position), see the chapter on maintenance.

Current circuit supervision - Use - commissioning

Description/use (cont'd)

Display ②

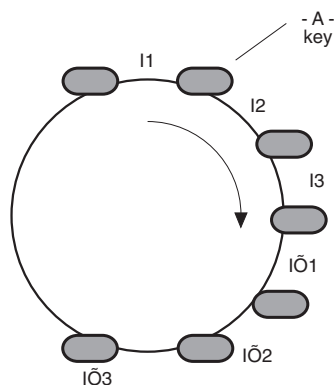
The display unit indicates:

- measurements,
- operating messages.

Keys for access to measurements and alarm processing ③

■ metering key

The measurements may be accessed by pressing the **A** metering keys. Each key provides access to a set of measurements in a loop type system. When the button is pressed, the following measurement is displayed.



Example: current measurement

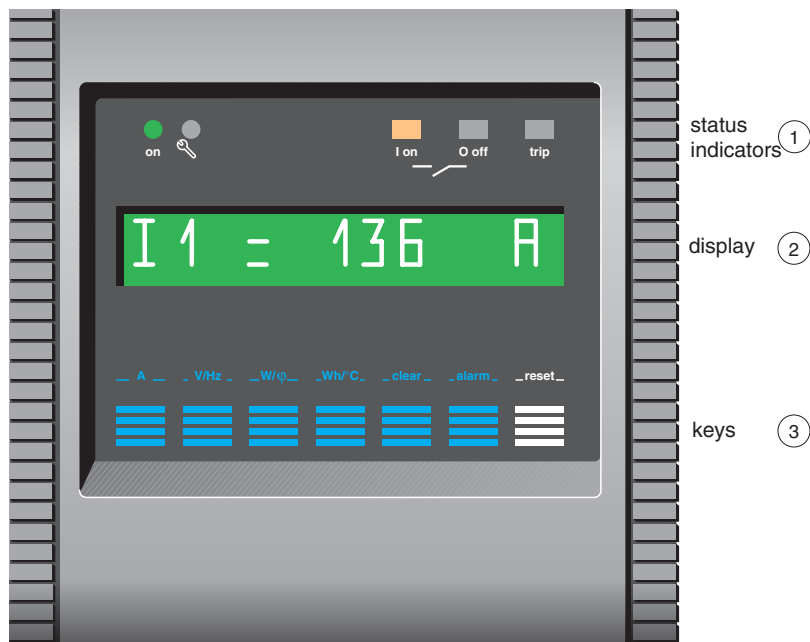
□ reset key:

the protections trigger short-circuiting of the differential protection of the corresponding zone and display of the related message.

The red **trip** indicator lights up.

After the fault has been cleared, the user presses the **reset** key to acknowledge.

The **trip** indicator is extinguished, the lists of alarms is erased and the device can be closed. The **reset** key is disabled until the fault has been cleared.



When a measurement is not available in a type of Sepam, ----- is displayed.

■ clear key: inoperative

■ alarm processing key

□ alarm key:

each time tripping or another event occurs, an alarm message is appeared and stored in a list of alarms. It is the most recent message that appears

on the display.

This key provides access to step by step reading of the list of stored alarm messages.

This key provides access to step by step reading of the list of stored alarm messages.

Une pression sur cette touche permet l'affichage du message précédent.

Display of: ----- indicates the end of the list of alarm messages.

Cartridge ④

The cartridge contains the information required for Sepam operation, such as:

- settings,
- stored data,
- control and monitoring logic...

Pocket terminal ⑤

This socket is used to connect the TSM 2001 pocket terminal or the ACE 900 adapter to the SFT 2801 kit (PC link).

TSM 2001 pocket terminal

Your pocket terminal provides access to all the Sepam 2000 information, such as:

- current measurements,
- operating assistance messages,
- protection settings.



- ① 4-line display
- ② data entry keypad
- ③ brightness adjustment dial

The pocket terminal is supplied with power by Sepam and does not require any batteries; it can be connected with the power on.

The pocket terminal beeps when it is connected. The startup menu appears (if nothing is displayed, adjust the brightness using the dial ③).

The user may access the various data from three menu levels. A menu may comprise several pages. To access a menu, simply position the blinking cursor on the desired line and press the **enter** key.

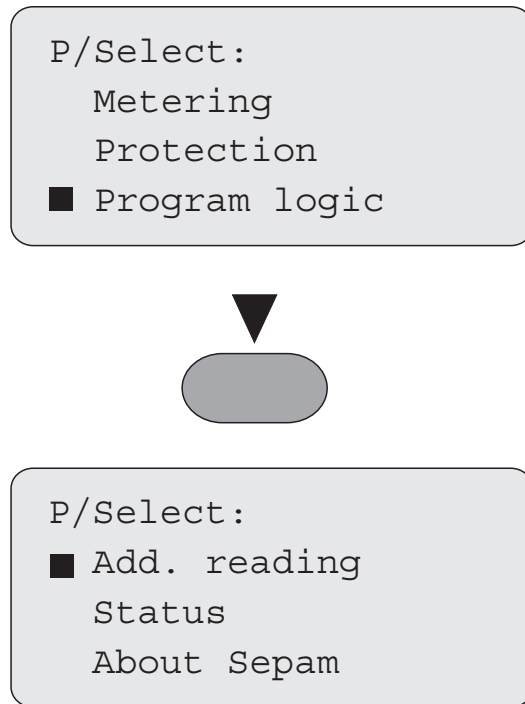
The first line of the menu contains the name of the current menu or function.

When **P/** appears at the top of the menu, it means that the user has entered the password.

Role of the keys:

- the pocket terminal beeps when the user presses a key that is disabled,
- the **menu** key is used to display the previous menu,
- the **▲** and **▼** keys are used to move the **█** cursor one line up or down in a menu.

To move to the next screen of a menu, the user simply positions the cursor on the last line and presses the **▼** key.



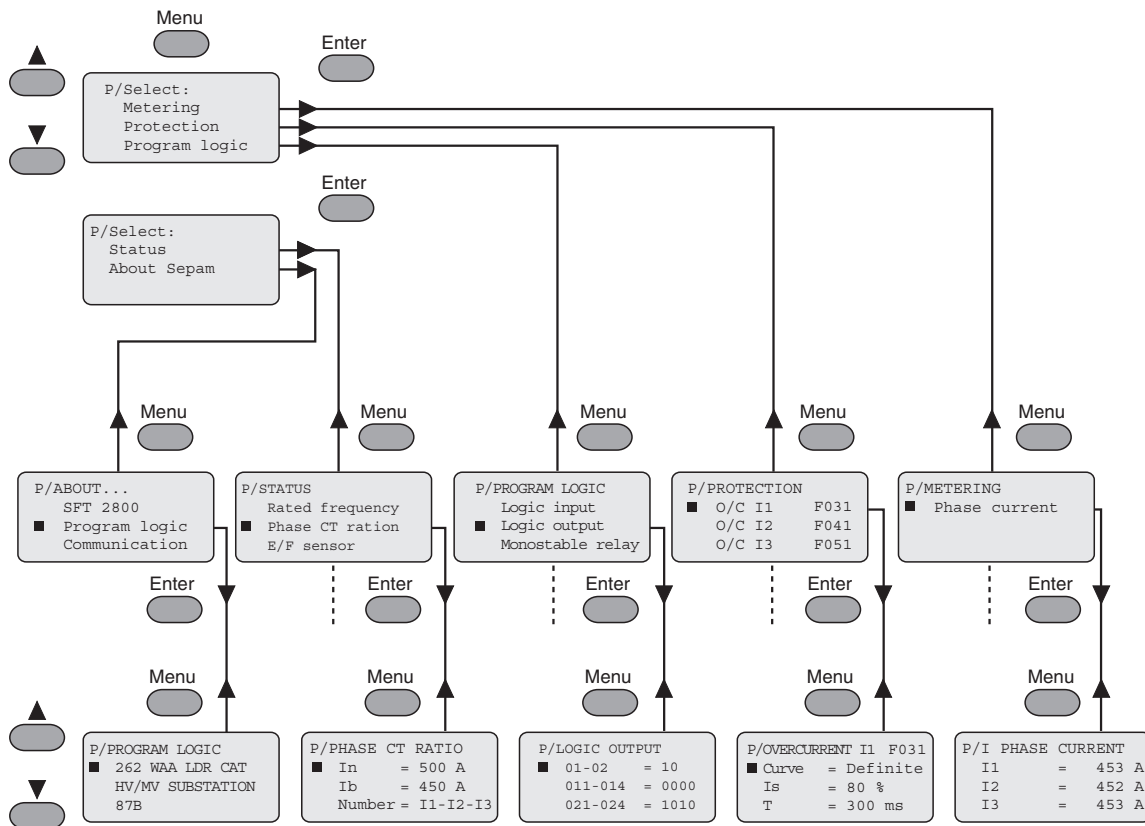
To move to the previous screen of a menu, the user simply positions the cursor on the second line and presses the **▲** key,

- the **code** key is used to enter and exit the parameter setting mode,
- the **numeric** and **.** keys are used to enter settings and the password,
- the **units** key is used to change setting unit multiplying factors (e.g. A, kA, ...),
- the **data+** and **data-** keys are used to select values from preset data lists. These lists are used when only a limited number of values may be used for a parameter, e.g. network frequency.
- the **clear** key is used to:
 - clear error messages,
 - call back a previous setting value during data input,
- the **enter** key is used to confirm a menu selection or to confirm all the settings for a function.

N.B. The first line always contains the name of the current menu or function.

Current circuit supervision - Use - commissioning

Description/use (cont'd)



Use - commissioning

Use (current operation)

Energizing

Sepam is energized when operating normally.

In the event of re-energizing after a break in the auxiliary power supply, Sepam 2000 automatically restarts according to the following sequence, which lasts about 5 s:

- green **on** and red **⚡** indicators light up,
- beep (if the pocket terminal is connected),
- extinction of the red indicator,
- setting of the watchdog contact,
- testing of display:

0,0,0,0,0,0,0,0,0,0 then ***** , then I1 = 0.0 A

- breaker position indicator lights up,
- display of the first message.

Sepam is then in operation. If the pocket terminal is connected, it displays:

Press
menu key,
to access
opening menu

Sepam 2000 performs the functions of a precision measurement and alarm processing unit. The values are displayed directly with the related units A, kA, etc. The messages are clearly worded. There are two ways of operating the device:

- via the front face (**metering, annunciation** keys),
- via the pocket terminal (using menus).

Whenever a measurement is not available in the user's type of Sepam, ----- is displayed.

Operation via the front face or TSM 2001 pocket terminal

functions	key	TSM 2001 menu	name	description	range	accuracy	comments
phase current	A	metering	I1 I2 I3	measurement of each phase current	1 % to 999 % In	±5 %	value depends on associated CT
	A	metering	I'1 I'2 I'3				

N.B. No value is displayed when the measurement is less than 1.5 % of the nominal value.

Operation via the TSM 2001 pocket terminal only



name	description	reset ⁽¹⁾
C1	number of trips zone 1	KP49
C2	number of trips zone 2	KP49

⁽¹⁾ requires password

Use – commissioning

Use (current operation) (cont'd)

Annunciation

When an event is detected by Sepam, an operating message appears on the display.

The messages are stored in a list of alarms and may be reviewed in chronological order of appearance, starting with the most recent one, by pressing the **alarm** key.

Beware:
pressing the reset key will erase the contents of the entire list of alarms.

List of messages (according to type of Sepam)

message ⁽¹⁾	type ⁽²⁾	meaning
CONNECTOR	M	unplugged connector (DPC)
ZONE OUT	A	zone protection out of service
ZONE1 OUT	A	zone 1 protection out of service
ZONE2 OUT	A	zone 2 protection out of service
TRIP ZONE	A	operation of the zone protection
TRIP ZONE1	A	operation of zone 1 protection
TRIP ZONE2	A	operation of zone 2 protection
CHECK ZONE	A	operation of check zone protection
MEM OPG	A	storage of disturbance recording
WIRE CT1	P	CT phase 1 wiring fault
WIRE CT2	P	CT phase 2 wiring fault
WIRE CT3	P	CT phase 3 wiring fault
WIRE CT1 Z1	P	CT phase 1 wiring fault in zone 1
WIRE CT2 Z1	P	CT phase 2 wiring fault in zone 1
WIRE CT3 Z1	P	CT phase 3 wiring fault in zone 1
WIRE CT1 Z2	P	CT phase 1 wiring fault in zone 2
WIRE CT2 Z2	P	CT phase 2 wiring fault in zone 2
WIRE CT3 Z2	P	CT phase 3 wiring fault in zone 2

⁽¹⁾ if your Sepam has been customized, other messages may appear.
Please refer to the information package provided by your installer.

⁽²⁾ type: A = automation; P = protection; M = maintenance.

Sepam 100 LD high impedance differential

Use - commissioning - Commissioning

Checking prior to commissioning

These operations must be carried out before Sepam 100 LD is energized.

Checks:

- supply voltage

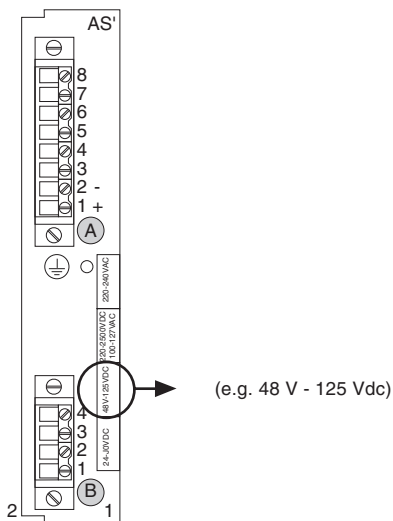
Ensure that the auxiliary supply voltage matches Sepam 100 LD's operating voltage.

- resistor plate.

Set the resistance using an ohmmeter to obtain the calculated value.

Check the wiring of the current transformers to the terminals that match their current ratings, in parallel with the surge limiters.

- between 1-2 and 3-4 for 5 A,
- between 1-2 and 5-6 for 1 A.



- SW1 microswitches.

Set the SW1 microswitch on the rear of the device to "with" or "without" latching.

- connector.

Check that all the connectors on the rear of the device are plugged in correctly and screw-locked.

- earthing.

Check that the Sepam 100 chassis is earthed by the ground nut situated on the Sepam panel beside the power supply connector.

Check that the screw is tightened.

Sepam 2000 current circuit monitoring

Use - commissioning - Commissioning (cont'd)

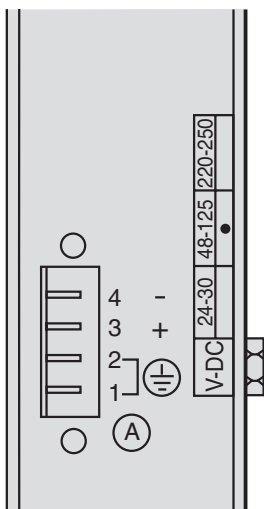
Checking prior to commissioning

These operations must be carried out before Sepam 2000 is energized.

Checks:

■ supply voltage

Ensure that the auxiliary supply voltage matches Sepam 2000's operating voltage. It is indicated on the rear of the device, beside the power supply connector, by a dot in the voltage box,



■ earthing

Check that the Sepam 2000 chassis is earthed by the ground nut situated on the Sepam side panel, on the power supply side.

■ cartridge

□ Check that the cartridge is in its slot behind the front wicket door. To do so, open the wicket door by pulling on the notch situated on the left side panel. Sepam S36 has a shield on the right, which resembles the memory cartridge wicket door. This shield is not another wicket door. Do not try to open it. Check that the cartridge has been inserted correctly. Check the tightening of the 2 threaded screws by hand.

Above all do not insert or remove the cartridge when Sepam 2000 is energized.

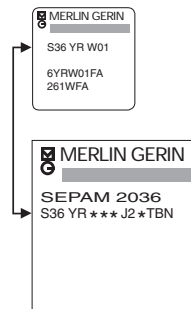
□ the cartridge has an identification label on the front. The first 5 characters in the first line indicate the Sepam 2000 model. Ensure that this model matches the Sepam model indicated on the side of Sepam.

Example

S36YR on the cartridge label should match S36YR on the Sepam label.

■ connectors

Check that all the connectors are correctly connected to the rear of the device and screw-locked.

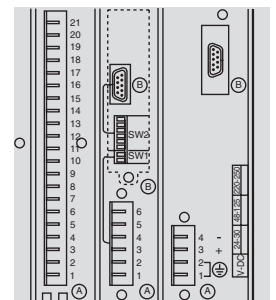


Setting of microswitches on the rear of the device

Check that the microswitches which define Sepam 2000 operating modes and calibration operations were correctly set at the time of installation ⁽¹⁾.

The microswitches must be set with Sepam de-energized.

If the microswitches are incorrectly set, the measurements given by Sepam 2000 will be erroneous and the protections will fail to trip at the desired set points.



Default parameter setting

Factory-set parameter status:

■ microswitches:

□ they are set for a 5 A secondary current power supply,

■ protection:

□ set points: 999 kA,

□ time delays: 655 s,

■ program logic time delay:

□ t = 200 ms,

Commissioning using the pocket terminal

Switch on the Sepam

After the Sepam has started up, check that no messages are present by pressing the "alarm" key.

Checking mode

All the data may be accessed for checking purposes without the risk of changing parameters or settings.

Parameter setting mode ⁽²⁾

This mode is reserved for commissioning and maintenance. The entry of a password is required. P1 appears at the top left of the screen ⁽³⁾.

⁽¹⁾ Refer to the chapter on "Installation".

⁽²⁾ All parameters and settings must be based on a network discrimination study that is to be carried out prior to commissioning.

⁽³⁾ This mode is automatically cancelled if no keys are pressed for about 1 minute. It may be cancelled manually by pressing the Code key.

Parameter and setting errors

Changing a **status** parameter may put a protection setting outside the tolerance range.

Sepam detects the problem and displays the following message:

```
P\CT ration
protection settings
out of range
press clear key
```

The user should then check and, if necessary, change the protection settings. The **PROTECTION** line blinks until the settings have been corrected.

Settings out of range.

A protection value may be out of range when it is set.

Sepam detects this and indicates the permissible range of settings.

```
P\O/C 1      F031
Iso out of range
0.05Ino < Iso < Ino
Press Clear key
```

Example: phase 1 overcurrent protection.

All the parameters and settings are accessible in 3 menus:

- general parameters: **status** menu,
- protection: **protection** menu,
- operating parameters: **program logic** menu,

General parameters

The general parameters are accessible in the **status** menu; they are to be set at the time of commissioning, using the setting sheet (see related chapter) and must not be modified during current operation.

Status menu parameter chart

heading	name	function	command	selection
frequency	Fn	network frequency	data+ and -	50 or 60 Hz
phase CT ratio phase CT' ratio	In	CT rating	numeric keys	adjustable from 10 A to 6250 A
for CT	lb	basis current of the equipment	numeric keys	0,4In to 1,3 In in amps
	number	number of current sensors	data + and -	2 or 3 sensors
lo sensor l'o sensor	Ino	residual current measurement	data + and -	CT: ■ sum of 3Is CSP : ■ sum1 3Is or sum2 3Is ■ 2 A or 30 A core balance CT S26, S36 numeric keys ■ CT + CSH30 Ino adjustable from 1 A to 6250 A
max. demand	interval	maximum demand integration time	data + and -	adjustable: 5, 10, 15, 30, 60 mn
communi- cation ⁽¹⁾	Bauds	transmission speed	data + and -	300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bds
	address	Sepam number in the network	numeric keys	1 to 255
	parity	transmission format	data + and -	even, odd, no parity
time tagging ⁽¹⁾	synchro	type of synchronization used	data + and -	via: - network - inputs I11 or I21
	events	I1 I2 I11 to I18 I21 to I28 I31 to I38 KTS1 to KTS32 KTS33 to KTS64	numeric keys by 8-bit words for S26, S36 only	⁽²⁾ <input type="checkbox"/> _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
password				see corresponding page

⁽¹⁾ please refer to the communication document regarding commissioning of the communication link.

⁽²⁾ 0 = not time-tagged

1 = time-tagged

All events are set to zero by default.

Sepam 2000 current circuit monitoring

Use - commissioning - Commissioning (cont'd)

Microswitch SW2 settings

The microswitch settings must be coherent with the choices made in the **status** and **phase CT ratio** menus:

■ phase current input for 1 A / 5 A CT
 1 A secondary 5 A secondary



Protection

The following functions are available according to the type of Sepam:

Percentage-based single-phase overcurrent (ANSI 50/51) F031, F041, F051, F111, F121, F131

Protects the differential circuit (stabilizing resistor) by detection of a continuous differential current characteristic of the breaking of a high impedance differential protection CT circuit. The definite time delayed action consists of actuating the differential short-circuiting mechanism (3-phase LV contactor, ≥ 660 V, ≥ 5 A, no supply).

Protection function setting ranges

display messages	function	ANSI	TSM item	parameters	commands	setting limits
WIRE CT1 Z1	phase O/C I1	50/51	F031	Is setting	numeric keys and units	3 % to 200 % 1 A or 5 A
WIRE CT2 Z1	phase O/C I2	50/51	F041			
WIRE CT3 Z1	phase O/C I3	50/51	F051			
WIRE CT1 Z2	phase O/C I'1	50/51	F111	T time delay value	numeric keys and units	0.05 s to 655 s
WIRE CT2 Z2	phase O/C I'2	50/51	F121			
WIRE CT3 Z2	phase O/C I'3	50/51	F131			

Program logic and annunciation

Sepam has standard program logic for operation suited to the most current installations, it can be adapted for each application scheme by parameter setting at the time of commissioning. If your Sepam is customized, the role of the parameters may be different. Please refer to the information package provided by your installer.

Resource and program logic chart

function	item for S26, S36	item for S25, S35	remarks
logic input status	I1, I2 I11 to I38	I1, I2 I11 to I38	1 = input supplied 0 = input not supplied
output relay status	O1, O2 O11 to O34	O1, O2 O11 to O34	1 = contact closed 0 = contact open
internal relay status	K1 to K512	K1 to K256	1 = contact closed; 0 = contact open
stored bistable relay status	B1 to B128	B1 to B32	1 = contact closed; 0 = contact open
counter contents	C1 to C24	C1 to C16	reading
time delay output status	T1 to T60	T1 to T60	set between 50 ms and 655 s via numeric and units keys
parameters:			
latched contacts	KP1 to KP16 and KP33 to KP48	KP1 to KP16	set to 1 or 0 via data+ and - keys or numeric keys 0 and 1
temporary contacts	KP17 to KP32	KP17 to KP32	
impulse contacts	KP49 to KP64		
remote control contacts			
latched contacts	KTC1 to KTC32	KTC1 to KTC32	contacts set to 1 or 0 via a remote monitoring system
impulse contacts	KTC33 to KTC96	KTC33 to KTC64	
remote indication contacts	KTS1 to KTS64	KTS1 to KTS32	contacts set to 1 or 0 for reading by a remote monitoring system
alarm messages	AL1 to AL16	not available	reading of the last 16 program logic messages activated (even if erased from display)

Connection of logic inputs: ESB and ESTOR1 boards

ESB ESTOR1	
I1	stop klaxon
I2	high impedance differential check zone operation (Sepam 100 LD check zone)
I11	busbar isolation closed (contact closed)
I12	reserved
I13	zone 1 protection in service
I14	zone 1 protection out of service
I15	high impedance differential zone 1 operation (Sepam 100 LD zone 1)
I16	reserved
I17	reserved
I18	reserved

Sepam 2000 current circuit monitoring

Use - commissioning - Commissioning (cont'd)

Connection of logic outputs

ESB ESTOR1	
O1	O1 = 0 zone 1 or check zone In service O1 = 1 zone 1 or check zone Out of service
O2	O2 = 0 zone 2 In service O2 = 1 zone 2 Out of service
O11	closing of zone 1 differential circuit short-circuiting device
O12	klaxon
O13	zone 1 tripping information
O14	inhibit closing of zone 1 circuit breakers
ESTOR2	
O21	closing of zone 2 differential circuit short-circuiting device
O22	high impedance differential acknowledgment (Sepam 100 LD)
O23	zone 2 tripping information
O24	inhibit closing of zone 2 circuit breakers

Connection of logic inputs: ESTOR2 board

ESB ESTOR2	
I21	reserved for external communication synchronization
I22	fault acknowledgment
I23	zone 2 protection in service
I24	zone 2 protection in service
I25	high impedance differential zone 2 operation (Sepam 100 LD zone 2)
I26	reserved
I27	reserved
I28	reserved

Time delay settings

The time delays are factory-set by default to 200 ms.

time delay	function
	reset
T1 = 0.2 s	duration of fault clearance order impulse for Sepam 100 LD

Set-up

functions	parameters
zone protection / check zone	
zone protection (W01) KP3 = 0	
check zone	(W01) KP3 = 1
busbar differential protection	
with check zone protection	KP4 = 0
without check zone protection	KP4 = 1
remote setting	
remote setting active	KP38 = 0
remote setting inactive	KP38 = 1
counters	
resetting of busbar fault counter	KP49 = 1
disturbance recording	
storage	KP50
automatic triggering	KP51
manual triggering	KP52
zone In/Out of service	
zone 1 In service	KP53
zone 1 Out of service	KP54
zone 2 In service	KP55
zone 2 Out of service	KP56
others	
stop klaxon	KP57 = 1

Parameters KP49 to KP57 are of the impulse type.

Sepam 2000 current circuit monitoring

Use - commissioning - Commissioning (cont'd)

Control and annunciation, operation

functions	short-circuiting differential circuit 1 O11	short-circuiting differential circuit 2 O21	inhibit closing zone 1 O14	inhibit closing zone 2 O24	latching	alarm tripping zone 1 O13	alarm tripping zone 2 O23	message ⁽¹⁾
O/C I1	■							WIRE CT1 ⁽²⁾
O/C I2	■							WIRE CT2 ⁽²⁾
O/C I3	■							WIRE CT3 ⁽²⁾
								WIRE CT1 Z1 ⁽³⁾
								WIRE CT2 Z1 ⁽³⁾
								WIRE CT3 Z1 ⁽³⁾
O/C I'1		■						WIRE CT1 Z2 ⁽³⁾
O/C I'2		■						WIRE CT2 Z2 ⁽³⁾
O/C I'3		■						WIRE CT3 Z2 ⁽³⁾
busbar fault one zone/ or check zone ⁽²⁾			■		■	■		TRIP ZONE/ CHECK ZONE
busbar fault ⁽³⁾ zone 1			■		■	■		TRIP ZONE 1
busbar fault ⁽³⁾ zone 2				■	■		■	TRIP ZONE 2
plugged connectors (DPC)								CONNECTOR

⁽¹⁾ on Sepam 2000 display (according to language versions).

⁽²⁾ W01 application.

⁽³⁾ W02 application.

Disturbance recording

Activation of disturbance recording

application

KP52

KTC52

output O13

output O23

Logic status recorded

function	KFR1	KFR2
output O13	■	
output O23		■

Remote setting

protection function curves, settings, time delays...

program logic time delays

Sepam 100 LD high impedance differential

Use - commissioning - Maintenance

Types of indicator lamps

■ green ON indicator lamp lit up
Sepam is energized.

■ ON indicator extinguished

□ the auxiliary power supply is off, check the auxiliary voltage,

□ the Sepam AS' power supply board is faulty.
Consult your maintenance department.

Sepam 2000 W current circuit monitoring

Use - commissioning - Maintenance (cont'd)

Sepam comprises self-testing and self-diagnosis to facilitate installation maintenance.

Indicator lamps and display messages

■ Green indicator lamp lit up

Sepam is energized.

■ No indicator lamp lit up:

There is probably an auxiliary power supply fault.

Check the auxiliary power supply and CE40 connections and perform the lamp test.

■ Red  lamp indicates an internal Sepam fault.

Sepam continuously performs on-line internal tests.

When the test results are negative, Sepam automatically runs a series of sequences which result in either:

□ automatic reinitialization (minor fault, e.g. transient auxiliary power supply break).

Sepam carries out a complete restart sequence.

If restart is successful, Sepam operates again normally. All the output relays are de-activated ⁽¹⁾,

□ switching to the fail-safe position (major fault)

Sepam goes into the fail-safe position. All the output relays drop out (1) in order to avoid inadvertent

commands, and the watchdog drops out as well. The following may cause internal faults:

■ missing cartridge:

□ red  indicator lamp lit up,

□ display OFF,

□ no dialogue with pocket terminal,

□ no dialogue with communication link,

□ watchdog dropped out,

□ switching to fail-safe position.

Sepam 2000 will not start, lacking a program:

this is a major fault.

■ set-up fault:

□ red  indicator lamp lit up,

□ display indicates **CARTRIDGE**,

□ no dialogue with TSM 2001 pocket terminal,

□ no dialogue with communication link,

□ watchdog dropped out,

□ switching to fail-safe position.

Sepam 2000 is shut down: this is a major fault.

□ the type of cartridge is not compatible with the Sepam model.

Caution: do not insert or remove the cartridge while Sepam is energized.

□ disconnect the auxiliary power supply and wait

2 seconds before handling the cartridge.

Check the references on the Sepam and on the cartridge (refer to chapter on Sepam identification).

□ Sepam is automatically disabled until the appropriate cartridge is inserted.

■ hardware fault on cartridge:

□ red  indicator lamp lit up,

□ display indicates **M CARTRIDGE**,

□ no dialogue with the pocket terminal,

□ no dialogue with communication link,

□ watchdog dropped out,

□ switching to fail-safe position.

Sepam 2000 is shut down: this is a major fault.

□ the cartridge is faulty,

□ disconnect the auxiliary power supply,

□ Sepam is automatically disabled until a new cartridge is installed.

Consult your maintenance department.

■ other major faults:

□ red indicator lamp lit up,

□ display indicates **MAINTENANCE**,

□ no dialogue with the pocket terminal,

□ no dialogue with communication link (if the CPU is faulty),

□ watchdog dropped out,

□ switching to fail-safe position.

Sepam 2000 is shut down: this is a major fault.

Consult your maintenance department.

■ minor or partial fault:

□ red indicator lamp extinguished,

□ display indicates **MAINTENANCE**,

□ dialogue with the pocket terminal is maintained,

□ dialogue with communication link is maintained,

□ watchdog does not drop out.

Sepam 2000 is operating, however it has detected a transient fault

or a component has failed to pass self-testing.

Consult your maintenance department.

■ other minor or partial faults:

□ red indicator lamp extinguished,

□ display indicates **M CARTRIDGE**,

□ dialogue with the pocket terminal is maintained,

□ dialogue with communication link is maintained,

□ watchdog does not drop out, Sepam 2000 is operating, however it has detected a fault in the status parameters or an overrun of the number of entries written in the cartridge memory.

Set the status parameters that are blinking or consult your maintenance department.

Communication indicator lamps

These lamps are located at the rear of the device on the CE40 module

when the module is equipped with the communication option.

■ Green indicator lamp blinking: indicates traffic on the line.

This is the normal operating mode.


■ Indicator lamps extinguished: there is no communication.

Check the cabling and inquiries at the level above.

■ Red indicator lamp lit up: indicates initialization of the coupler, which lasts about

2 seconds, or a coupler fault.

Consult your maintenance department.

■ indicator  lamp lit up and the recommendations given in the maintenance

chapter do not allow Sepam to be restarted.

Call the maintenance department.

The display indicates:

■ ***** or -----

- No measurements have been requested.
- The requested measurement is not available.
- The measurement is out of range.

■ CONNECTOR

- Indication that one or more connectors are unplugged.

Check that the connectors are plugged in and tightened by screws on the rear of the device. Check that the DPC has been strapped to all the connectors.

Unwanted tripping, no tripping

Incorrect parameter setting may cause unwanted tripping or no tripping ⁽¹⁾.

Check the settings.

Tests

■ Lamp test:

when the user presses the **A** and **V/Hz** measurement keys at the same time, all the indicators on the front of the device light up as well as the display, which indicates alternately ***** and 000000000.

Sepam replacement

When Sepam is replaced:

- switch off Sepam,
- dismantle the Sepam to be replaced,
- remove the cartridge,
- mount the Sepam replacement (hardware configuration),
- install the cartridge,
- verify the compatibility of the cartridge and Sepam (see chapter on identification),
- set microswitches SW1 and SW2 on the rear of the device in the same positions as they were in on the Sepam that was replaced,
- install the connectors, checking their markings,
- energize Sepam.

⁽¹⁾ All the settings should be based on a network discrimination study that is to be carried out prior to commissioning.

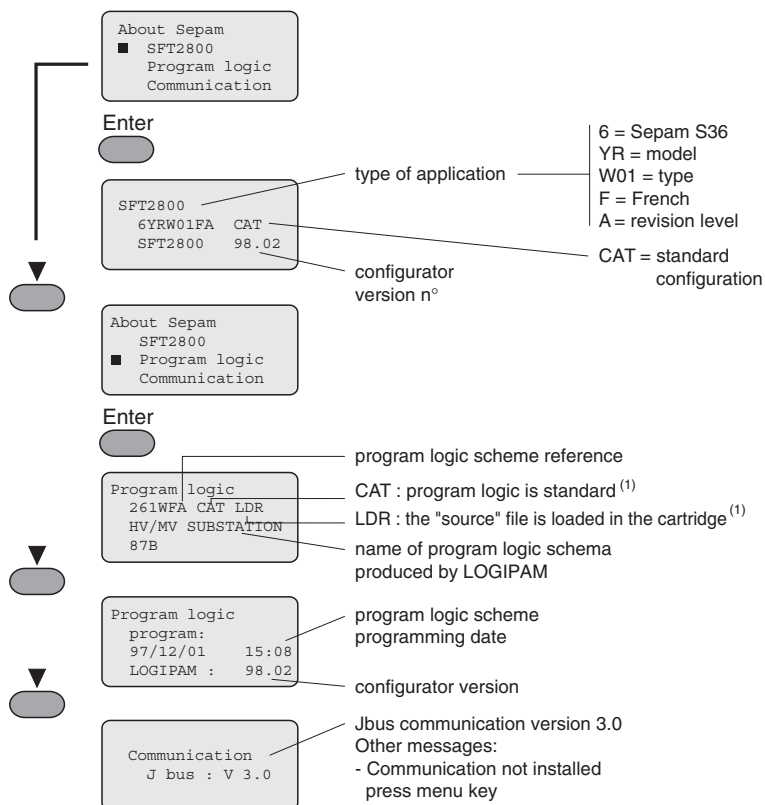


Sepam 2000 current circuit monitoring

Use - commissioning - Identification

Sepam identification using the pocket terminal

Menu: About Sepam



Reminder

In the event of a cartridge error or incompatibility with Sepam, the message **CARTRIDGE** appears on the front of the device.

Check the consistency between the cartridge and Sepam using the compatibility list given on the right.

Compatibility of types and models

type	Sepam 2000 model	nb. of ESTOR boards
	S36	standard
W01	YR	2
W02	KR	2

⁽¹⁾ please note: labels

LDR and NOL labels: these labels refer to the presence or absence of a "source" file that may be viewed using the "Logipam" software.

NOL: the program logic "source" file is not included in the cartridge.

LDR: the "source" file has been loaded in the cartridge and may be reused ⁽²⁾ via a PC equipped with the LOGIPAM software and the PER2901 programming device.

CAT: this label indicates that the program logic is the original standard logic.

If this label is not present, the logic in the Sepam has been customized.

⁽²⁾ the "reuse" operation is described in the LOGIPAM programming manual.

Sepam 2000 documentation

documentation ⁽¹⁾	reference ⁽²⁾	content	use
HV/MV substation	PCRED397071EN	summarized description	selecting the type of Sepam
line	PCRED397080EN	characteristics, selection table, connections	installation studies
transformer	PCRED397086EN	characteristics, selection table, connections	installation studies
busbars	PCRED397088EN	characteristics, selection table, connections	installation studies
overhead / underground feeder	PCRED397090EN	characteristics, selection table, connections	installation studies
capacitor	PCRED398005EN	characteristics, selection table, connections	installation studies
substation	PCRED397087EN	characteristics, selection table, connections	installation studies
busbar differential	PCRED398037EN	characteristics, selection table, connections	installation studies
for customized applications	PCRED398027EN	description of programming	making customized programs
testing	3140746 A	testing methods	testing Sepam and functions
metering and protection	3140747 A	operating principle, characteristics	installation studies, choice of protections, settings
control and monitoring functions	PCRED398004EN	operating principle, characteristics	installation studies
installation, use and commissioning	PCRED398060EN	cubicle mounting instructions, description of display and TSM 2001 pocket terminal	installation, parameter setting, commissioning, use
installation, use and commissioning S46	PCRED398002EN	cubicle mounting instructions, description of display and TSM 2001 pocket terminal	installation, parameter setting, commissioning, use
Jbus communication	3140751 A	implementation of communication	programming of the remote control & monitoring system
general characteristics	3140752 A	details on characteristics and accessories	installation studies
diagnosis guide	3140758 A	diagnosis of Sepam 2000, 1000 faults	use, commissioning

⁽¹⁾ this documentation may be procured from your Merlin Gerin correspondent.

⁽²⁾ references: followed by the letter A for documentation in English, followed by the letter F for documentation in French.

Password

Use of the password

The user enters a password via the pocket terminal in order to be able to change parameters and settings.

Code key

When the user pressed the **code** key, the following menu appears:

```
Enter your
password the
press enter key
```

Type the following on the keypad **6543210** ⁽¹⁾ and press **enter**.

This is the password for standard Sepams. If your Sepam has been customized, refer to the documentation provided by your installer.

To exit this mode, simply:

- press the **code** key,
- wait 2 minutes after activating any key.

When the pocket terminal is in parameter setting mode, **P** appears on the top left of the screen.

Modification of the password

- go to parameter setting mode,
- in the **Status** menu, choose the **password** heading using the arrow and press **enter**.

The following window is displayed:

```
PASSWORD
old =
new =
verif. =
```

- enter, one after the other
- the password to be modified in the "old" line ⁽²⁾
- the new password in the "new" and "verif" lines ⁽³⁾
- after each password, press **enter** to go to the next line.

N.B. If you do not want your operating personnel to know the password that gives access to the parameter setting mode, remove this page from the user's documentation.

- at the end of the sequence, the following window is displayed:

```
Validate settings
Yes = Enter
No = Clear
```

- press **enter**: the new password is validated.

Please note:

If the passwords entered for "new" and "verif" are different, the following message is displayed:

```
new password
not valid:
press "clear"
```

Loss of the password

If the original password has been modified and the latest password entered has been irretrievably lost by the user, the only means of accessing parameter and setting modifications again is to reprogram the cartridge using a PC equipped with the LOGIPAM software, the PER 2901 programmer and the Sepam program logic "source" file (regarding the "source" file, see the chapter on identifying Sepam using the pocket terminal).

Please note: Before reprogramming the cartridge, it is advisable to take a complete reading of the values set in Sepam as well as the identification information. This operation may be performed using the TSM 2001 pocket terminal or the SFT 2801 software. In case of difficulties, contact the Schneider after-sales service department.

⁽¹⁾ code by default in standard program logic; with customization, the password is given by the installer.

⁽²⁾ 7 digits are mandatory.

⁽³⁾ between 3 and 7 digits.

Tests - setting record sheets

Contents

	chapter / page
commissioning tests	3/4
test sheets	3/12
setting record sheets	3/14

Tests

Contents

	chapter / page
tests	3/3
general	3/4
setting the parameters	3/4
testing	3/4
equipment	3/4
checking current transformer primary ratings	3/5
preliminary tests	3/5
tests	3/5
wiring	3/5
checking the wiring of the current transformers of a reference bay	3/6
preliminary tests	3/6
tests	3/6
wiring	3/6
stability checking	3/7
preliminary tests	3/7
tests	3/7
wiring	3/8
checking Sepam 100 LD busbar differential protection	3/9
preliminary tests	3/9
tests	3/9
wiring	3/9
checking Sepam 2000 W01 or W02 current circuit monitoring protection	3/10
preliminary tests	3/10
tests	3/10
wiring	3/11
test sheets	3/12
tests – setting record sheets	3/14
commissioning test	3/14

Tests

General

Setting the parameters

The parameters of the Sepam 2000 W01 and W02 and Sepam 100 LD relays are set using the setting record sheets for each relay.

- Status.
- Setting of single-phase overcurrent protections.
- Program logic.
- Setting of busbar differential protection.
- Setting of stabilizing resistor.

Testing

Different types of tests are to be performed:

- checking of the primary rating of each current transformer,
- checking of the wiring of the current transformers of a reference bay,
- stability checking,
- Sepam 100 LD busbar differential protection test,
- current circuit monitoring protection test.

Equipment

- A 50 Hz or 60 Hz single-phase current generator that can be used for injection in the current transformer primary circuits.
- An ammeter.
- A TSM 2001 pocket terminal.
- This document.
- Setting record sheets correctly filled in.

Tests

Checking current transformer primary ratings

Preliminary tests

Set the primary current injection to a value 20% higher than the Sepam 2000 W01 or W02 "single-phase overcurrent" protection.

Inject into phase 1. After 3 s (Sepam 2000 W01 or W02 "single-phase overcurrent" protection time delay value), a closing order is sent to the short-circuiting device and the message "WIRE CT1" or "WIRE CT1 Z1" or "WIRE CT1 Z2" appears. Do not acknowledge the message.

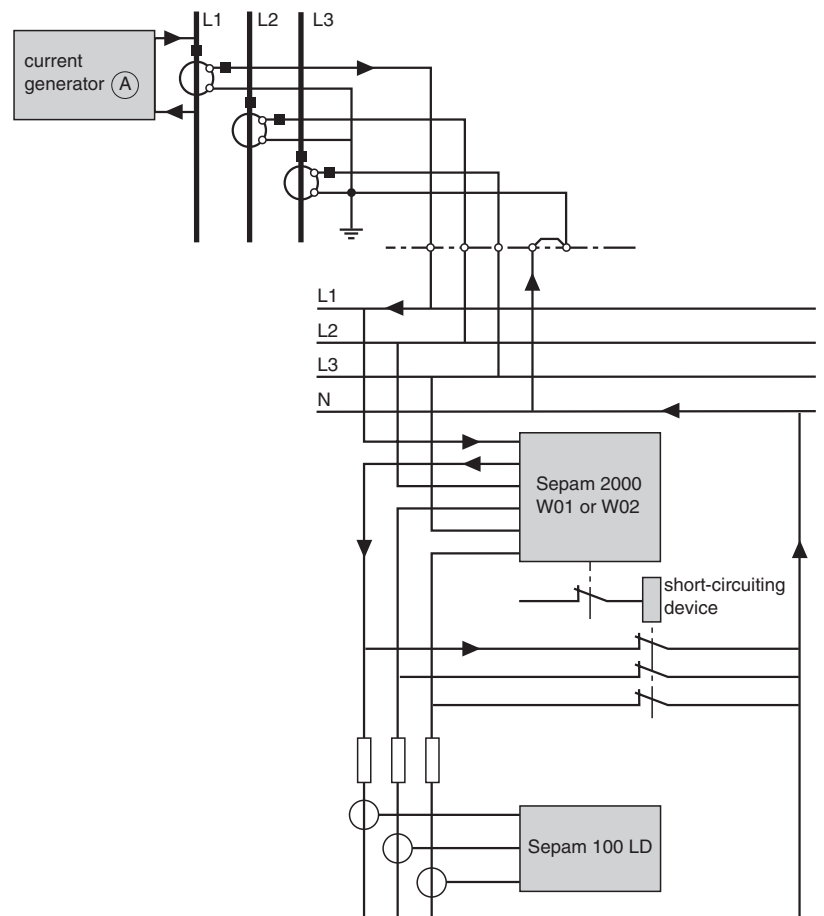
Tests

Inject into phase 1 a primary current equal to 50% of the CT primary rating.

Using the TSM 2001 pocket terminal, in the "Protections" menu, "O/C I1" item, read the percentage of the phase 1 current. The value should be approximately equal to the percentage of the current injected into the primary circuit.

Inject the same value of current into phases 2 and 3. The value measured by Sepam should be approximately equal. Repeat the operation with all the current transformers of the zone.

Wiring



Tests - Checking the wiring of the current transformers of a reference bay

Preliminary tests

Set the primary current injection to a value 20% higher than the Sepam 2000 W01 or W02 "single-phase overcurrent" protection.

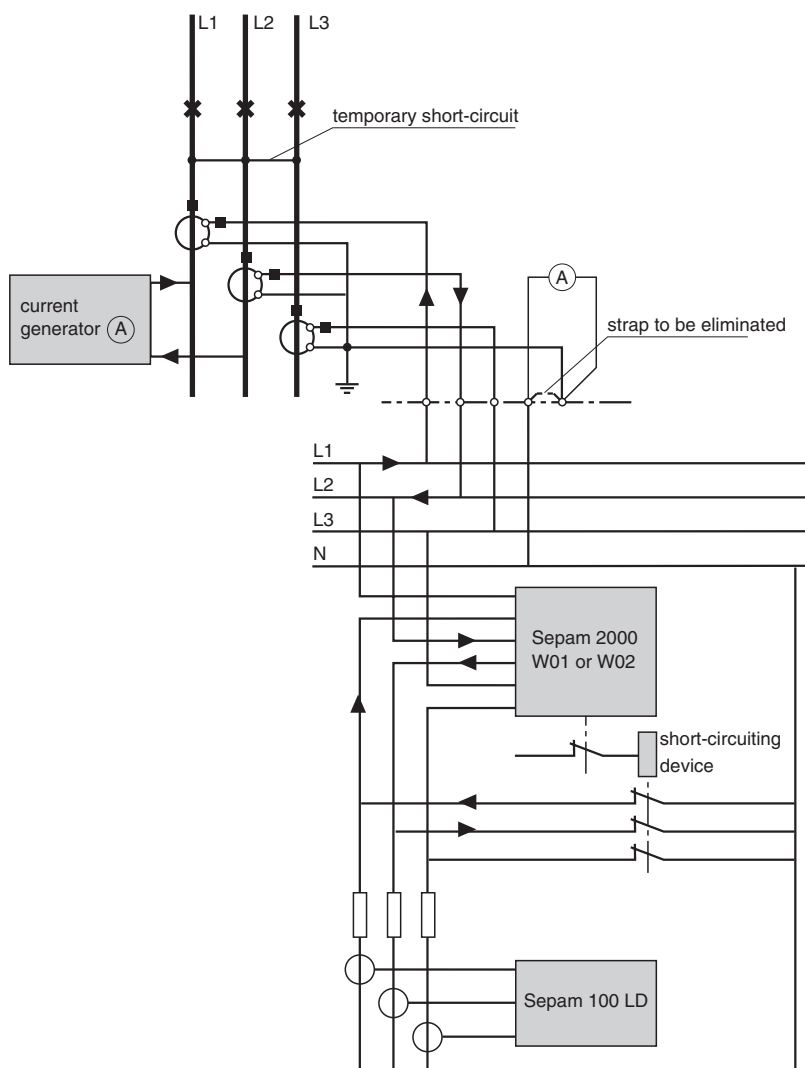
Inject into phase 1. After 3 s (Sepam 2000 W01 or W02 "single-phase overcurrent" protection time delay value), a closing order is sent to the short-circuiting device and the message "WIRE CT1" or "WIRE CT1 Z1" or "WIRE CT1 Z2" appears. Do not acknowledge the message.

Tests

Inject between phases 1 and 2 a current equal to 50% of the CT primary rating.

The wiring is correct if the ammeter installed on the neutral conductor indicates a value of a few milliamps. Inject the same current between phases 2 and 3.

Wiring



Tests

Stability checking

Preliminary tests

Set the primary current injection to a value 20% higher than the Sepam 2000 W01 or W02 “single-phase overcurrent” protection.

Inject into phase 1. After 3 s (Sepam 2000 W01 or W02 “single-phase overcurrent” protection time delay value), a closing order is sent to the short-circuiting device and the message “WIRE CT1” or “WIRE CT1 Z1” or “WIRE CT1 Z2” appears. Do not acknowledge the message.

Tests

Inject between phases 1 and 2 of the reference bay a current equal to 50% of the CT primary rating.

Using the TSM 2001 pocket terminal, in the “Protections” menu, “O/C I1 and O/C I2” item, read the percentage of the phase 1 and 2 currents.

The wiring is correct if the ammeters indicate a value especially close to zero.

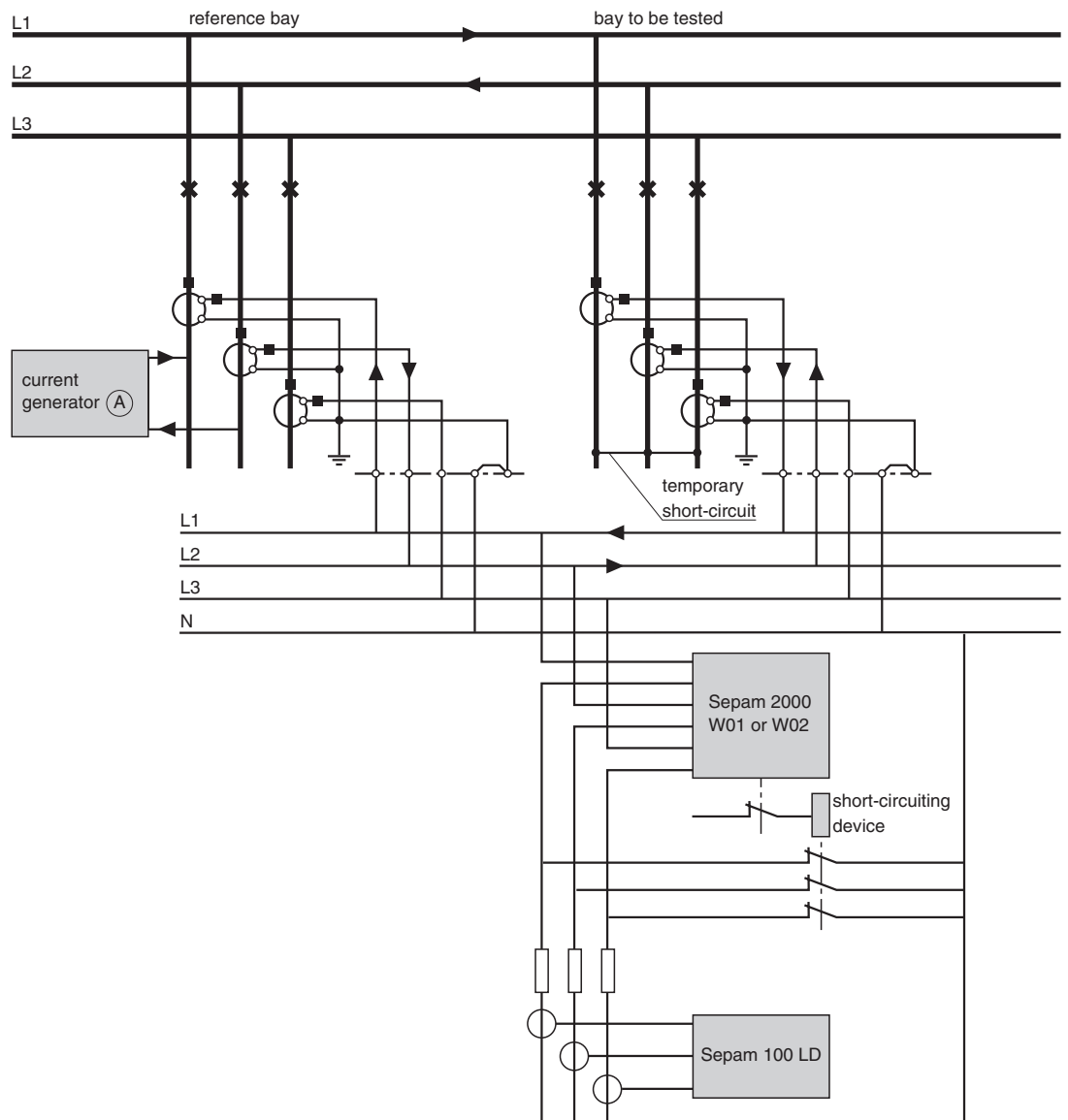
Inject the same current between phases 2 and 3.

Perform the same injection operations with all the bays.

Tests

Stability checking (cont'd)

Wiring



Tests - Checking Sepam 100 LD busbar differential protection

Preliminary tests

Set the primary current injection to a value 20% higher than the Sepam 2000 W01 or W02 “single-phase overcurrent” protection.

Inject into phase 1. After 3 s (Sepam 2000 W01 or W02 “single-phase overcurrent” protection time delay value), a closing order is sent to the short-circuiting device and the message “WIRE CT1” or “WIRE CT1 Z1” or “WIRE CT1 Z2” appears. Do not acknowledge the message.

Tests

Inject into phase 1 a primary current greater than the Sepam 100 LD protection set point. The protection should not trip since the differential circuit is short-circuited by Sepam 2000 W01 or W02.

Acknowledge the Sepam 2000 W01 or W02 message using the RESET button, or via logic input I22 or via the communication link.

No message should appear on the display, logic outputs O11 and O21 are at zero.

Inject into phase 1 a primary current greater than the Sepam 100 LD set point.

The Sepam 100 LD logic output O1 switches to 1, the “Trip” LED goes on, a tripping order is sent to all the circuit breakers of the zone, the “TRIP ZONE” message appears on the Sepam 2000 W01 or W02 display.

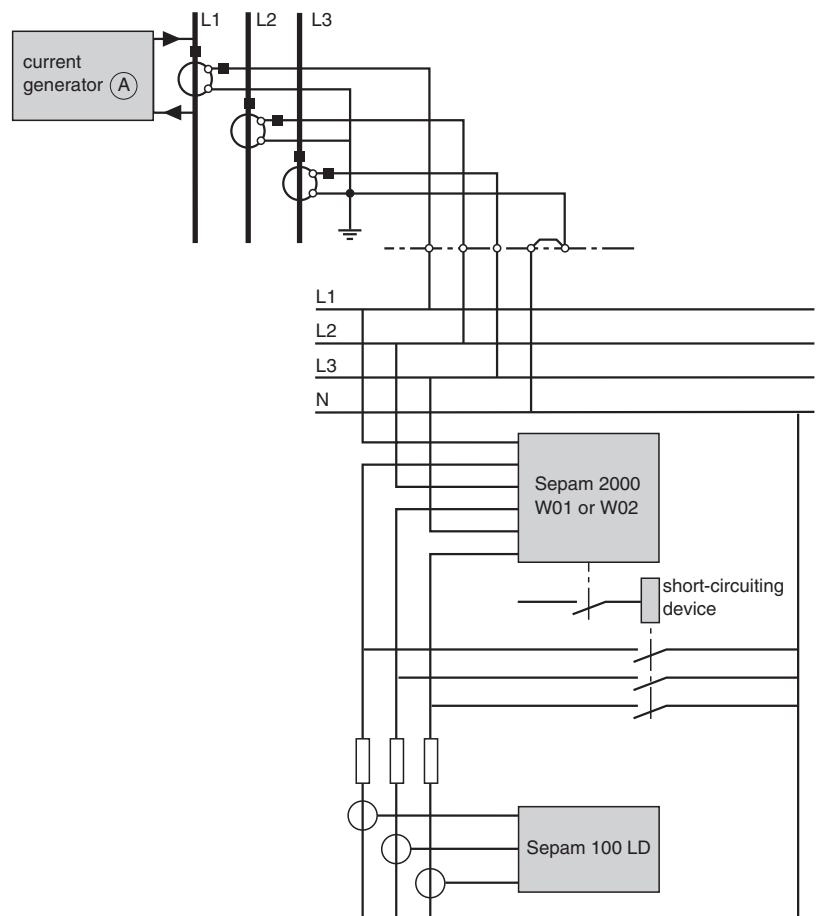
If a “Check zone” protection is included, operation is the same, but the O1 outputs of the two relays must be series wired to trip the zone circuit breakers.

Acknowledge the Sepam 2000 W01 or W02 message using the RESET button.

Reclose the zone circuit breakers.

Perform the same test on phases 2 and 3.

Wiring



Tests - Checking Sepam 2000 W01 or W02 current circuit monitoring protection

Preliminary tests

Acknowledge all display messages using the RESET button.

Tests

Inject into phase 1 a primary current greater than the O/C I1 protection set point, for a period of time that is longer than the protection's time delay T.

The message "WIRE CT1" or "WIRE CT1 Z1" or "WIRE CT1 Z2" appears on the display.

A closing order is given to the short-circuiting device by logic output O11 or O12 and information is sent to a klaxon by logic output O12.

Logic output O12 is reset to zero (klaxon stops):

■ on location using the pocket terminal

KP57 = 1,

■ remotely via logic input

I1 = 1,

■ remotely via the communication link

KTC38 = 1.

Logic outputs O11 and O12 and the message are reset to zero:

■ on location

RESET key,

■ remotely via logic input

I22 = 1,

■ remotely via the communication link

KTC35 = 1.

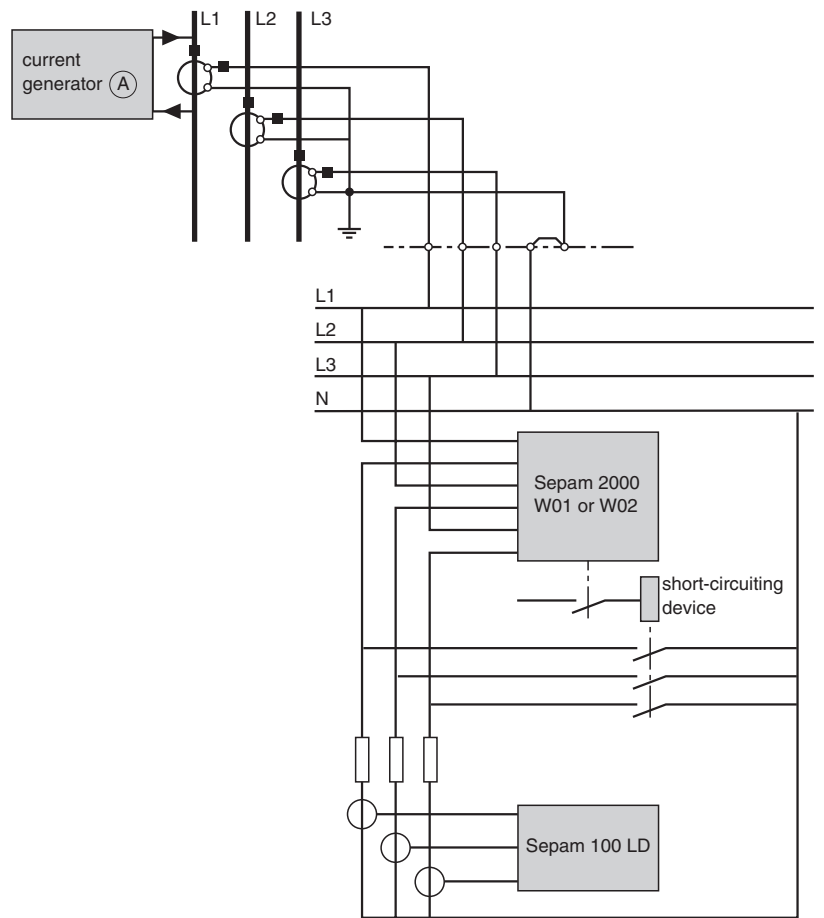
Repeat the same test on phase 2 with the O/C I2 protection.

The message "WIRE CT2" or "WIRE CT2 Z1" or "WIRE CT2 Z2" appears on the display.

Repeat the same test on phase 3 with the O/C I3 protection.

The message "WIRE CT3" or "WIRE CT3 Z1" or "WIRE CT3 Z2" appears on the display.

Wiring



TEST SHEET

Sepam 100 LD High impedance differential

Project:
 Switchboard:
 Panel:

Sepam 100 LD reference
 serial number

Network frequency 50 Hz 60 Hz

CT primary rating check

CT ratio

Vk characteristic

phase	primary current injected		current measured as %
L1	A	%	.....
L2	A	%	.....
L3	A	%	.....

Stability check

phase	primary current injected		current measured as a %
L1	A	%	.....
L2	A	%	.....
L3	A	%	.....

Protection tripping check

Setting: $I_s =$ % Stabilizing resistance: $R_S =$ Ω

Surge limiter:

phase	primary current injected		tripping time		LEDs and logic outputs
	values in amps	multiple of I_s	theoretical value	measured value	
L1					
L2					
L3					

Test carried out on:

by: _____

Signature

Signature

Comments: _____

TEST SHEET

Sepam 2000

Current circuit monitoring

Project:

Switchboard:

Panel:

Type of Sepam 2000

W [][][]

serial number

[][][][][][][][][][]

Setting: Is = % T : s

phase	primary current injected		operating time		messages	logic outputs
	value in amps	value as %	theoretical value	measured value		
L1						
L2						
L3						

Tests carried out on: [][][][][][][][][][]

by: _____

Signature

Signature

Comments: _____

Tests - setting record sheets

Commissioning tests

Sepam commissioning does not call for individual testing of the metering and protection functions.

Sepam has been designed and developed to ensure all of the functions:

- protection,
- metering,
- program logic.

Each of the functions has been factory-qualified in its entirety. In addition, Sepam has a high performing self-testing system which continually checks function integrity (e.g. no settings outside the tolerance range, etc.).

The product is ready to use and commissioning has been simplified accordingly.

Simple testing of one function ensures the correct operation of the whole group of functions, provided that the product is installed correctly.

It is therefore sufficient to check the Sepam installation.

Checking relates to:

- parameter setting,
- connection to current sensors,
- connection of switchgear control and annunciation.

SETTING RECORD SHEET

Sepam 2000 current circuit monitoring

Project:
 Switchboard:

Type of Sepam 2000 **W**.....
 serial number

Status menu parameters

menu	name	function				
rated frequency	Fn	network frequency	<input type="checkbox"/> 50 Hz	<input type="checkbox"/> 60 Hz		
phase CT ratio			board 2 (ECM 1 or ECA)		board 3 (ECM 2)	
	In	CT ratings (in Amps) <input type="checkbox"/> A	<input type="checkbox"/> kA <input type="checkbox"/> A	<input type="checkbox"/> kA
	Ib	basis current (in Amps) <input type="checkbox"/> A	<input type="checkbox"/> kA <input type="checkbox"/> A	<input type="checkbox"/> kA
	number	number of current sensors	<input type="checkbox"/> I1-I3	<input type="checkbox"/> I1-I2-I3	<input type="checkbox"/> I1-I3	<input type="checkbox"/> I1-I2-I3
Io sensor (of no importance for this type of application)			board 2 (ECM 1)		board 3 (ECM 2)	
	Ino	residual current measurement	<input type="checkbox"/> Sum 3I (CT)	<input type="checkbox"/> 2 A core bal. CT	<input type="checkbox"/> 30 A core bal. CT	<input type="checkbox"/> Sum 3I (CT)
			<input type="checkbox"/> CT + CSH 30 for S36 <input type="checkbox"/> A	<input type="checkbox"/> kA	<input type="checkbox"/> CT + CSH 30 for S36
		 <input type="checkbox"/> A	<input type="checkbox"/> kA <input type="checkbox"/> A	<input type="checkbox"/> kA
communi-cation	bauds	transmission speed	<input type="checkbox"/> 300	<input type="checkbox"/> 600	<input type="checkbox"/> 1200	<input type="checkbox"/> 2400
			<input type="checkbox"/> 4800	<input type="checkbox"/> 9600	<input type="checkbox"/> 19200	<input type="checkbox"/> 38400
	address	Sepam number in network	.....		
	parity	transmission format	<input type="checkbox"/> even	<input type="checkbox"/> odd	<input type="checkbox"/> no parity	<input type="checkbox"/>
time-tagging	synchro	type of synchronization used	<input type="checkbox"/> via network	<input type="checkbox"/> via input I11		
				<input type="checkbox"/> via input I21		
		events	KTS1 to 8	.....	
			KTS9 to 16	.....	
		N.B.	KTS17 to 24	.....	
		For each event,	KTS25 to 32	.....	
		choose 0 or 1	KTS33 to 40	.....	
		0 = not time-tagged	KTS41 to 48	.....	
		1 = time-tagged	KTS49 to 56	.....	
		all events are set	KTS57 to 64	.....	
		to 0 by default	I1 I2	.....	
			I11 to I18	.....	
			I21 to I28	.....	
			I31 to I38	.....	

Program logic parameters						
KP	(0 or 1)	comment		KP	(0 or 1)	comment
KP3	<input type="checkbox"/>	zone / check zone protection	<input type="checkbox"/>	KP53	<input type="checkbox"/>	zone 1
KP4	<input type="checkbox"/>	with or without check zone protection	<input type="checkbox"/>			or check zone in service
KP38	<input type="checkbox"/>	remote setting active / inactive	<input type="checkbox"/>	KP54	<input type="checkbox"/>	zone 1
KP49	<input type="checkbox"/>	fault counter	<input type="checkbox"/>			or check zone out of service
KP50	<input type="checkbox"/>	disturbance recording storage	<input type="checkbox"/>	KP55	<input type="checkbox"/>	zone 2 in service
KP51	<input type="checkbox"/>	automatic disturbance recording triggering	<input type="checkbox"/>	KP56	<input type="checkbox"/>	zone 2 out of service
KP52	<input type="checkbox"/>	manual disturbance recording triggering	<input type="checkbox"/>	KP57	<input type="checkbox"/>	stop klaxon

Sepam 2000 current circuit monitoring

function	item	setting			
O/C I1		Is		T	
O/C I2	F031		<input type="checkbox"/>		<input type="checkbox"/>
O/C I3	F041		<input type="checkbox"/>		<input type="checkbox"/>
	F051		<input type="checkbox"/>		<input type="checkbox"/>
O/C I'1	F111				
O/C I'2	F121		<input type="checkbox"/>		<input type="checkbox"/>
O/C I'3	F131		<input type="checkbox"/>		<input type="checkbox"/>

put an X in the box when the setting has been made.

Settings made on:

--	--	--	--	--	--	--	--

by:

Signature

Signature

Comments:
