FTC1500

COMMUNICATION BRIDGE
BMS® BUS / JBUS/MODBUS®
FOR IMD IRDH265 / 365
OR INSULATION FAULT LOCATION SYSTEMS
EDS473 / EDS470 / RCMS470

INSTALLATION AND OPERATING INSTRUCTIONS

TGH 1309E edition 07/2002

CONTENTS

1 POINTS TO BE CONSIDERED BEFORE USE

Important : *for the safety of personnel and equipment, it is essential to read these instructions carefully before using the equipment.*

When you receive the package containing the FTC1500 bridge, please check the following points :
- the package is in good condition,
- the product has not been damaged in transit,
- the reference number of the device conforms to your order,
- the package contains the product fitted with its 3 connectors and instructions for use.
- to use the FTC1500 properly, you should be acquainted with the associated products. Please refer to the related operating instructions.

2 GENERAL INFORMATION

The FTC1500 is a communication bridge between a serial link RS485 using an BMS® (bus ISOM) specific protocol (EDS bus protocols or IMD IRDH265/365) and a serial link using the JBUS/MODBUS® protocol.
From the front panel - LED display and 3 function keys - you can configure all the communication parameters.
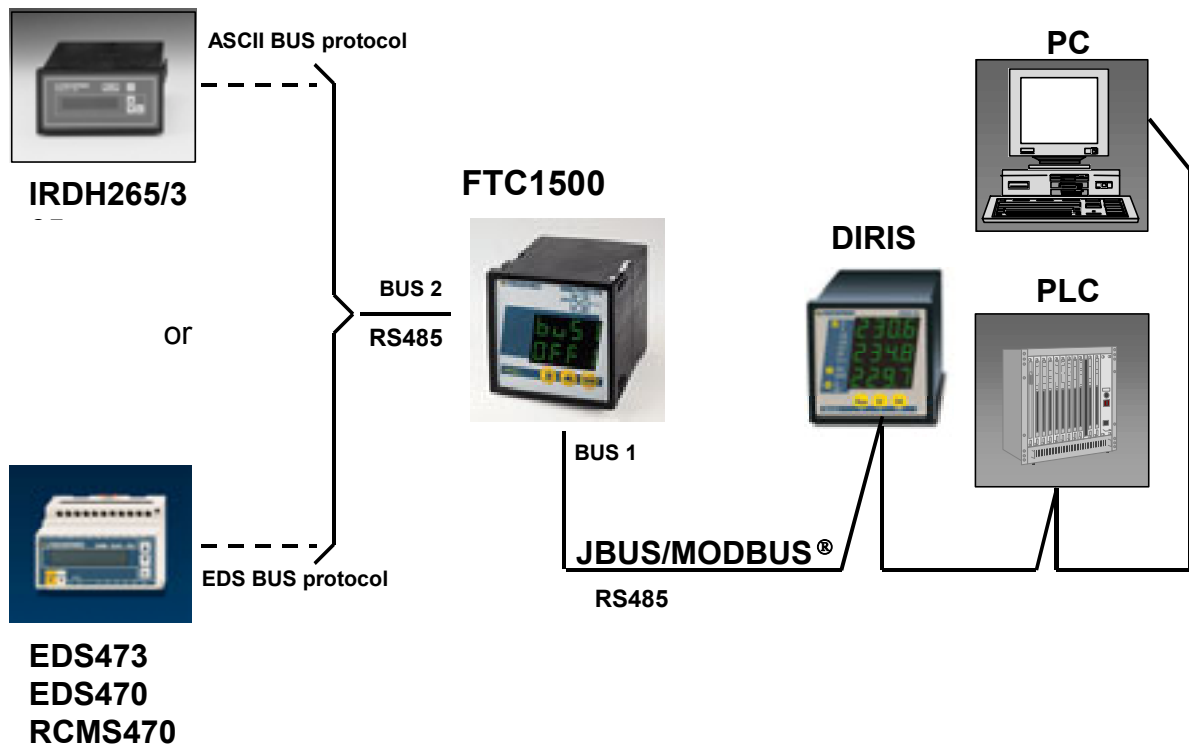
In the standard configuration, the FTC1500 bridge allows to interconnect the following BENDER devices **(other devices : please consult us)** :

- 1 insulation monitoring device IRDH265/365 (current version)

or

- the following insulation fault location systems (up to 71 devices connected to the EDS bus) :

  - 30 insulation fault evaluators EDS473/470-12 (IT system) or
    RCMS470-12 (TNS / TT systems),
  - 9 insulation fault test devices PGH473, PGH471,
  - 30 signalling modules SMO480-12,
  - 1 central control and indication device PRC470,
  - 1 additional assignable device (EDS473-12, EDS470-12, RCMS470-12, PGH473, PGH471, SMO480-12)

with supervising systems (PC, BMS,...) or PLCs.

3 PRESENTATION

The FTC1500 has a 96 x 96 x 116,5mm box construction (conformity to the standards prIEC 61554 and DIN 43700) with a display and a keypad to facilitate operation.

(1) Green LED display : 2 lines, 4 digits, 8 segments.

(2) Configuration and display pushbuttons :

Key to shift right / left.

Key to scroll menus or increment digits.

Key to confirm the current operation.

The active display line is shown by 4 light dots. The cursor position is indicated by one of the light dots.

4 INSTALLATION

The FTC1500 bridge is fitted on the front of a control panel by means of the metal strips on the top and the bottom of the box.

4.1 Mechanical environment

To install the device properly, the cutout diagram given below must be followed closely.
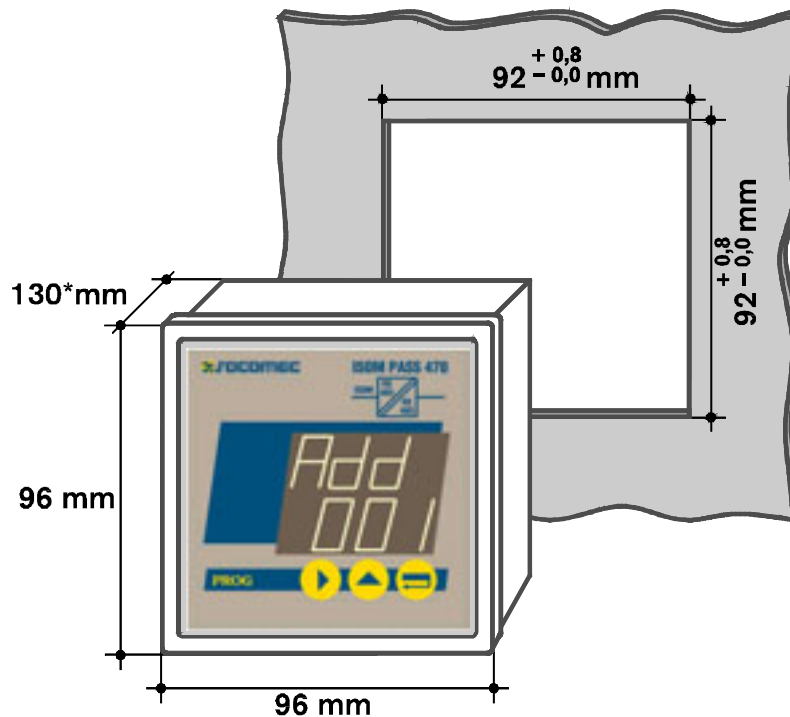
* with connection terminal blocks

Note: a separate mounting kit is available for installing the FTC1500 bridge on a DIN symmetrical rail.

Recommendations :
- *Install it a least 30 cm from a switching device (switch, contactor, etc...).*
- *Avoid proximity to systems, which generate electromagnetic interference.*
- *Avoid vibrations with accelerations in excess of 1 g for frequencies below 60 Hz.*

4.2 Climatic environment

To guarantee optimal operation, it is recommended to use this equipment at 0 to 55°C with relative humidity between 20 and 85%.
The device can tolerate an ambient temperature of -10°C to +55°C.

4.3 Connection

The FTC1500 bridge consists of disconnectable terminal blocks (2.5 mm^2) for supply voltage, RS485 inputs and outputs.
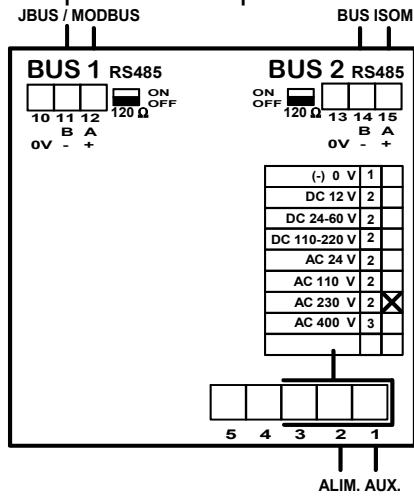
Note: the maximum coupling torque for disconnectable terminal blocks is 0.4 Nm.
switched 120 Ω : upper DIPswitch position.

4.3.1 Connection of the auxiliary supply

The provided mains voltage is indicated by a cross on the supplied device (it corresponds to 230 VAC in the example above).

4.3.2 Connection of the RS485 serial links
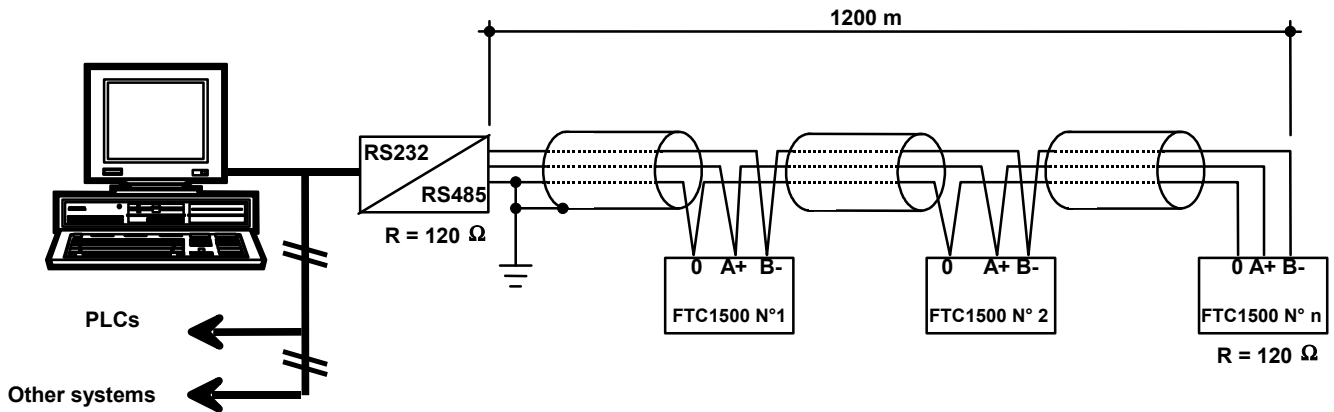
A 120 Ohms resistance charge is imperative at both ends of the RS485 serial links.

If the max. admissible distance is exceeded (> 1200 m.), a repeater must be used. On BUS 1 side, use a corresponding repeater for MODBUS/JBUS; on BUS 2 side, use a repeater DI1. For more information on these products, please contact us.

4.4 Communication

Connection to an IMD IRDH265/365 or an EDS473 / EDS470 / RCMS470 system :
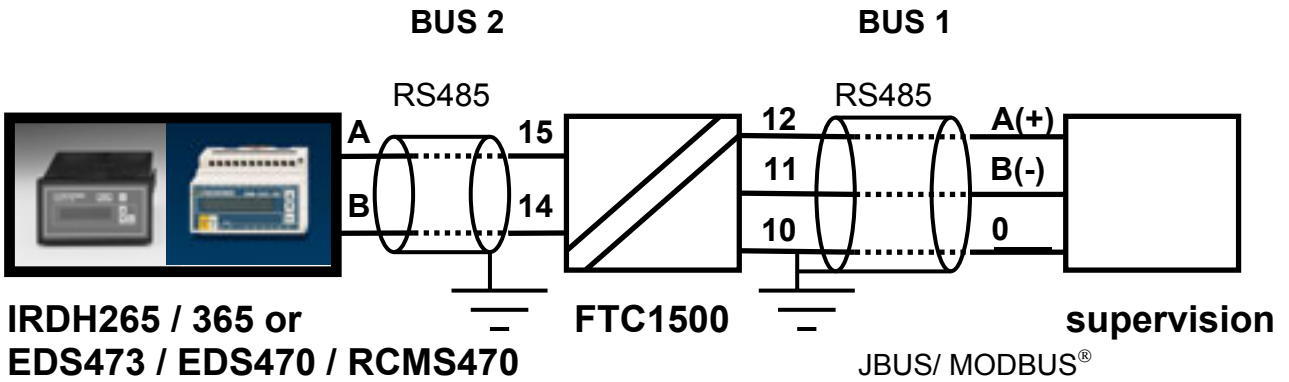
Maximum length of BUS 1 and BUS 2 : 1200 m.

Recommendation : you must use a twisted pair. In systems with high electrical interferences or extended systems, it is preferable to use 2 shielded pairs (1 pair for the + and the - and 1 pair for the 0 V) or a shielded third (+, - and 0 V).

5 OPERATION

5.1 Start-up screen : welcome message / software version
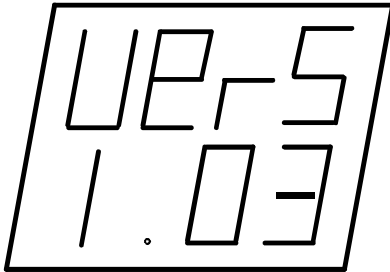
At system start-up, the software version is displayed briefly (e.g. : version 1.03). Depending on your supplier another designation than socomec may be displayed, e.g.bender.

5.2 Display during operation : communication status
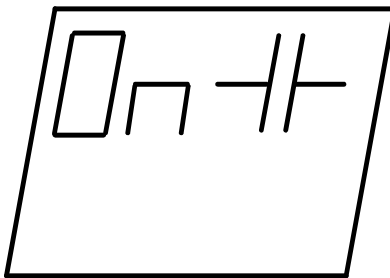
A few seconds after start-up, the FTC1500 bridge shows a blinking display consisting of one of the following symbols :

ON	the FTC1500 is operating
│	no communication
┤├	the FTC1500 is in communication with BUS 1 and 2
┤	the FTC1500 is in communication with BUS 2 (IMD IRDH265/365 or EDS)
├	the FTC1500 is in communication with BUS 1 (JBUS/MODBUS supervisor)

Communication errors are displayed on the bottom line (see Appendix 3 : table of communication errors).

6 DISPLAY

6.1 Access to display mode - BUS status
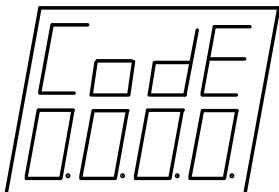
KEYS	**INSTRUCTION**	**DISPLAY**	**COMMENT**
▲	Press once.	buS1 / JbUS	= BUS 1 state ('offline' or 'JBUS') Press the key again to display the status of BUS 2 ('offline', 'SLAVE', 'ASCII').
		buS2 / OFF 1	If 'offline' is displayed, no message is present on BUS 2.
		buS2 / SLA	If 'offline' / 'ASCII or SLAVE' are displayed in turn, a message is present on BUS 2. To quit, press the key ⊟

6.2 Access to display mode - communication parameters

KEYS	**INSTRUCTION**	**DISPLAY**	**COMMENT**
▲ + ⊟	Press the 2 keys simultaneously for about 2 seconds, then release.	bAUd / 9600	Press the key ⊟ successively to display the following parameters : - transmission speed (BUS 1), - parity, - number of stop bits, - FTC1500 address, - type of BUS 2, - serial number.
		PAr / no	StoP / 1	
		Add / 101	buS2 / dld	1234 / 5678	To quit, press the 2 keys simultaneously for about 2 seconds.
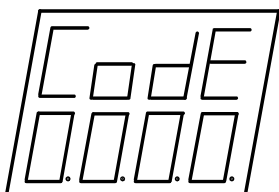
7 CONFIGURATION
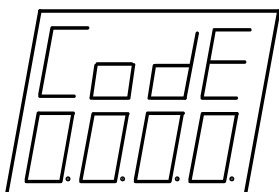
7.1 Access to configuration mode
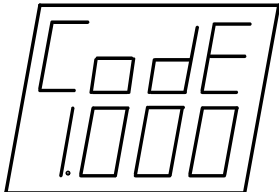
KEYS	INSTRUCTION	DISPLAY	COMMENT
(▶) + (▲) + (⬅)	Press the 3 keys simultaneously for about 3 seconds.	CodE 0.0.0.0.	The active display line is shown by 4 light dots.
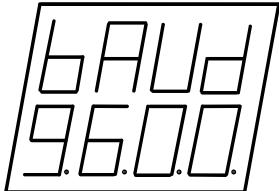
You must enter an access code to program this device. The default code is 1000.

To change the code, see **7.9 -**
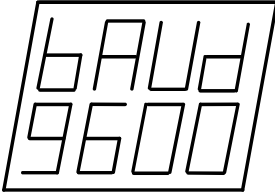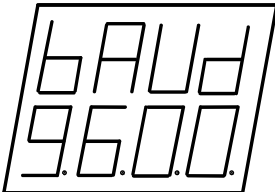
KEYS	INSTRUCTION	DISPLAY	COMMENT
(▶)	This key is used to move from left to right, from one digit to another (the cursor is represented by a point (.)).	CodE 0.0.0.	A point lights up after the selected digit.
(▲)	This key is used to increment the selected digit.		To confirm the access code, press the key (⬅)
(▲)	Press once.	CodE 1.000	To confirm, go to the next instruction.
(⬅)	Press once.	bAUd 9.6.0.0.	You are now in configuration mode of the transmission speed **see 7.2 -**
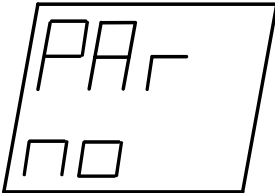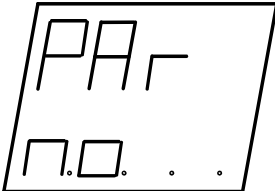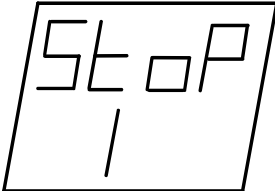
7.2 Configuring the transmission speed

KEYS	INSTRUCTION	DISPLAY	COMMENT
▲	Press successively to scroll through the different possible settings : 1200, 2400, 4800 or 9600 bauds.	bAUd 9600	The different devices of the JBUS/ MODBUS® network must imperatively have the same parameters to be able to intercommunicate.
⬅	Press once.	bAUd 9.6.0.0.	= to confirm the current display. The 4 points confirm this instruction. Press again to go to the next page. see 7.3 -

7.3 Configuring the parity

KEYS	INSTRUCTION	DISPLAY	COMMENT
▲	Press successively to scroll through the different possibilities : even, odd, no (parity).	PAr no	
⬅	Press once.	PAr n.o. . .	= to confirm the current display. The 4 points confirm this instruction. Press again to go to the next page. see 7.4 -

7.4 Configuring the stop bit

KEYS	INSTRUCTION	DISPLAY	COMMENT
▲	Press successively to scroll through the possible settings : 1 or 2.	StoP 1	
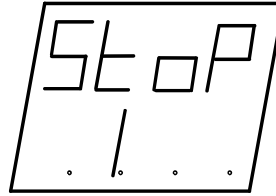
| | Press once. | St_oP . . . | = to confirm the current display. The 4 points confirm this instruction. Press again to go to the next page. **see 7.5 -** |

7.5 Configuring the JBUS/MODBUS® address of the FTC1500
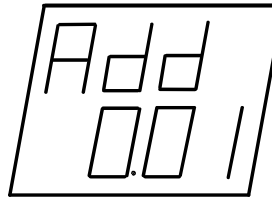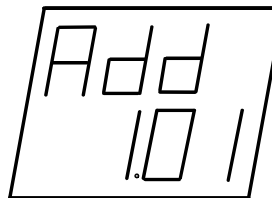
KEYS	**INSTRUCTION**	**DISPLAY**	**COMMENT**
▶	This key is used to move from left to right, from one digit to another. (the cursor is represented by a point (.)).	Add 0.0 1	
▲	This key is used to increment the selected digit.	Add 1.0 1	Possible settings : between 001 and 255.
⬅	Press once.	Add 1.0 1	= to confirm the current display. Press again to go to the next page. **see 7.6 -**
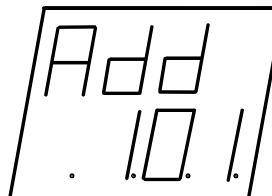
7.6 Configuring the BMS® BUS type (BUS 2)

KEYS	**INSTRUCTION**	**DISPLAY**	**COMMENT**
▲	This key is used to modify the BUS type (EDS or ASCII).	bu S2 ASCII	ASCII corresponds to a FTC1500 using an IMD IRDH265/365.
⬅	Press once.	bu S2 A.S.C.I.I.	= to confirm the current display. The 4 points confirm this instruction. Press again to go to the next page. **see 7.7 -**
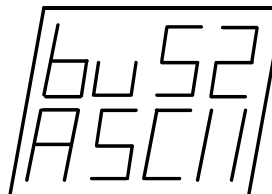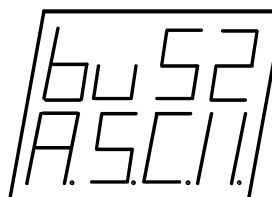
7.7 Configuring the BMS®BUS JBUS/MODBUS® addresses

Note: this menu is only accessible if the BUS is set to EDS / RCMS mode (see 7.6).

ADDRESSING PRINCIPLE :

The FTC1500 enables communication with 71 devices connected to the BMS® BUS.

Before you must configure - either in local mode on the bridge or via JBUS/MODBUS® - a correspondence table linking up the BMS® BUS address of each device (in conformity to the manufacturer protocol and set directly on the devices by means of DIP-switches) with a JBUS/MODBUS® address (adjustable between 1 and 255). So 71 correspondence lines can be configured.

Correspondence table :

Correspondence number	BMS® BUS address	JBUS/MODBUS® address	Type of device
1...30	001...030	1 to 255	EDS473-12, EDS470-12, RCMS470-12
31...60	031...060	1 to 255	SMO480-12
61	100	1 to 255	PRC470
62...70	111...119	1 to 255	PGH473, PGH471
71	000...255	1 to 255	Other type

ADDRESSING METHOD VIA KEYPAD (FTC1500) :

1) Configure the devices individually by means of the DIP switches located on the front panel.
   Refer to the operating instructions of the products EDS and RCMS.

2) Check the proper operation of the EDS or RCMS system, the communication between the devices and the defined BMS® BUS addresses.
   This verification can be easily performed with the 'TEST' menu, if the installation is equipped with a central PRC470.

3) Define and write down the addresses in the table of Appendix 2.
   The preset configurations are also indicated in Appendix 2.
   If the preset configurations of the EDS addresses (BMS® BUS side) are suitable, go directly to the pages 15 - 17 to configure the JBUS/MODBUS® addresses.

DISPLAY EXAMPLE (on the bridge) :
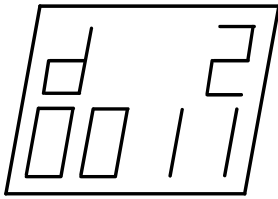
$\leftarrow$ Correspondence number
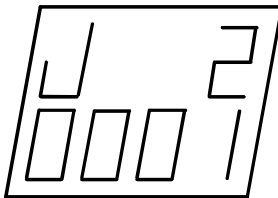
$\leftarrow$ BMS$^\circledR$ BUS address

$\leftarrow$ Correspondence number

$\leftarrow$ JBUS/MODBUS$^\circledR$ address

Interpretation : number 2 corresponds to the BMS$^\circledR$ BUS address 11 and to the JBUS/MODBUS$^\circledR$ address 1.

Caution ! Do not use the same address (BMS$^\circledR$ BUS or JBUS/MODBUS$^\circledR$) for two different devices.

MODIFYING THE CORRESPONDENCE NUMBER OF THE BMS® BUS ADDRESSES
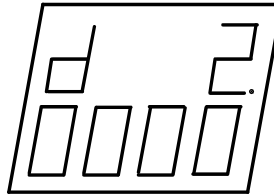
KEYS	INSTRUCTION	DISPLAY	COMMENT
▶	This key is used to move from left to right, from one digit to another. (the cursor is represented by a point (.)).	`d   2.` `000`	the letter 'd' (upper line) indicates that the address displayed below is of type BMS® BUS.
▲	This key is used to increment the selected digit. The correspondence line goes from 1 to 71.	`d   3.` `000`	
⏎	Press this key to confirm the correspondence number and display the BMS® BUS address.	`d   3` `.0.0.2.`	In this example, the BMS® BUS address of the device present on line 3 is : 2. Use the keys ▶ and ▲ to change this address. Press the key ⏎ to confirm the address.
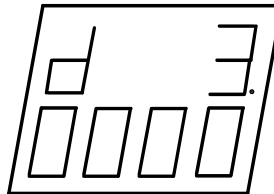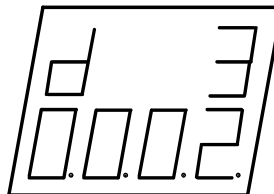
MODIFYING THE JBUS® ADDRESS :
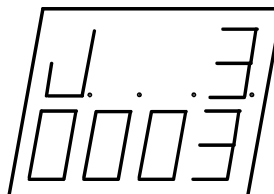
⏎	Press once.	`J. . .3.` `003`	= display of the JBUS® address of the device present on line 3. The type of address is indicated by the letter 'J' (upper line).
▶	Press once.	`J   3` `003.`	Press the key ⏎ to display the JBUS® address. Use the keys ▶ + ▲ to modify it (see above). Press the key ⏎ again to confirm the address and go to the configuration menu of the transmission speed. **see 7.2 -**
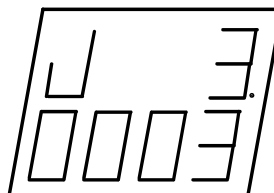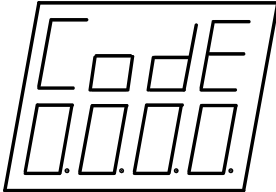
7.8 Exiting the configuration mode

KEYS	INSTRUCTION	DISPLAY	COMMENT
(▶) + (▲) + (⏎)	Press the 3 keys simultaneously for about 3 seconds or wait 2 minutes.		At any time it is possible to leave the configuration mode.

When you leave the configuration mode, all the configured parameters are stored. They are kept stored even in case of power failure.

7.9 Modifying the access code

KEYS	INSTRUCTION	DISPLAY	COMMENT
(▶) + (▲) + (⏎)	Press the 3 keys simultaneously for about 3 seconds, then release.	CodE 0.0.0.0.	The cursor position is indicated by the 4 light dots.

*Note: to modify the access code, enter **1936**. Press the key (▶) to move to the right, (▲) to increment the digit and (⏎) to confirm.*
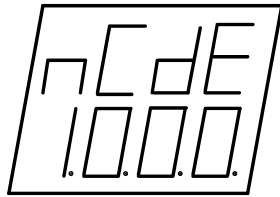
		nCdE 1.0.0.0.	You can now enter your new access code, as shown below.

*Example : to enter the access code **3210**, proceed as follows :*

(▲)	Press twice. You go from 1 to 3.	nCdE 3.0.0.0.	
(▶)	Press once to go to the next digit.		

(▲)	Press twice. You go from 0 to 2.	nCdE 32.0.0.	
(▶)	Press once to go to the next digit.		

(▲)	Press once. You go from 0 to 1.	nCdE 32.1.0.	Your access code is entered.
(⏎)	Press once to confirm.		

*Note: (▶) + (▲) + (⏎) to quit this menu. From now on, you must enter **3210** instead of **1000** to have access to the configuration mode.*

8 COMMUNICATION

The FTC1500 is a communication bridge between an BMS® specific RS485 serial link (EDS bus protocols or IMD) and a serial link using the JBUS/MODBUS® protocol.

The BMS® system consists of :

Type of device	Function	Main information accessible via JBUS/MODBUS®
IRDH265/365	Insulation Monitoring Device (IMD)	• global system insulation resistance (kΩ). • alarm thresholds (kΩ) • IMD alarm status
PGH473 PGH471	Insulation fault test device	
EDS473-12 EDS470-12	Insulation fault evaluator - 12 outputs (IT system)	• number of faulty outputs. • state of each output
RCMS470-12	Insulation fault evaluator - 12 outputs (TN / TT systems)	• number of faulty outputs • state of each output
SMO480-12	signalling module - 12 relays	
PRC470	central control and monitoring device	• system configuration (storage mode, operating mode of the relays, ...)

The information mentioned above can only be obtained with the following basic equipment (according to the neutral system) :

IT :   1 IRDH265/365   **TN / TT :**   1 RCMS470-12
1 PGH473/471   1 PRC470
1 EDS473/470-12
1 PRC470

Note: the SMO480-12 module is an optional device in both cases.

8.1 JBUS/MODBUS® communication

8.1.1 Dialogue

This protocol implies a dialogue using a master-slave hierarchical structure :

The master communicates with a slave (FTC1500) and waits for its reply.

The mode of communication is the RTU (Remote Terminal Unit) mode using hexadecimal characters of at least 8 bits.

Note: the FTC1500 only behaves as a slave on JBUS/MODBUS® side.

8.1.2 Communication frame

Slave address (1 to 255)	Function code (3, 6 or 16)	Address (according to emitter type and function)	Data	Data	Cyclic redundancy check (CRC 16)
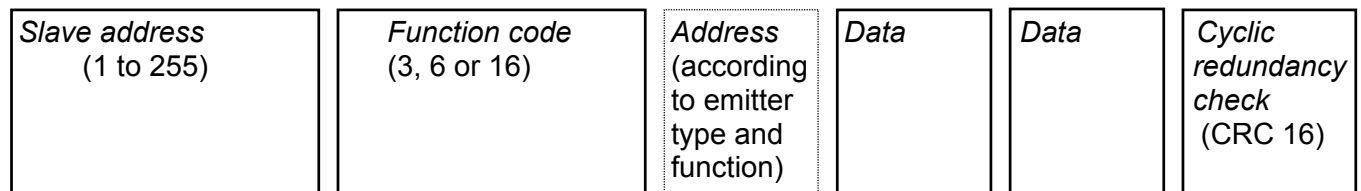
To use the information properly, it is essential to use the following functions :

3 :   to read "n" words (maximum 128)
6 :   to write one word
16 :   to write "n" words (maximum 128).

Transmission rate must be less than 3 breaks for the message to be processed by the FTC1500. One break corresponds to the emission time of one character.

Note: all examples of messages to follow, that are received or sent by the FTC1500, are coded (hexadecimal base).

8.2 BUS 2 ASCII

BUS 2 ASCII (FTC1500 SLAVE)

No	Available information, operations to perform	Instructions	Type of device	Hex. Address	Write value	No of words	Reply to the request (function 3) and interpretation
1	• **_Read the insulation value_**	Reading the insulation value	IRDH265/365	200		2	Hexadecimal **value** (kΩ)
2	• **_Read the alarm threshold value AL1_**	Reading AL1	IRDH265/365	204		2	Hexadecimal **value** (kΩ)
3	• **_Read the alarm threshold value AL2_**	Reading AL2	IRDH265/365	208		2	Hexadecimal **value** (kΩ)
4	• **_Read the status of the K1 / K2 output relays_**	Reading	IRDH265/365	20C		1	**0H** : K1 off, K2 off **1H** : K1 on, K2 off **2H** : K1 off, K2 on **3H** : K1 on, K2 on
5	• **_Read the status of the alarm leds 1 / 2_**	Reading	IRDH265/365	20D		1	**0H** : no active alarm **1H** : alarm 1 **2H** : alarm 2 **3H** : alarm 1 / 2
6	• **_Read the type of fault_**	Reading	IRDH265/365	20^E		1	**0H** : AC **1H** : DC- **2H** : DC +

Example :

To do operation No 3, it is necessary to send the following requests :
(FTC1500 : JBUS address = 1H)

Request :

Slave	Function	Address high-order	Address low-order	Number of words high-order	Number of words low-order	CRC16
01	03	**02**	**08**	00	02	4471

Reply :

Slave	Function	Number of bytes	High-order	Low-order	CRC16
01	03	04	0000	0028	FA2D

The hexadecimal value of the alarm threshold 2 of the IMD is : 0000 0028 (40kΩ in decimal).

8.3 BUS 2 EDS

8.3.1 General information

The protocol involves a dialogue using a master-slave hierarchical structure :

1 - the master communicates with a slave and waits for its reply.
2 - the master communicates with all the slaves without waiting for their reply.

According to the BMS$^{\circledR}$ BUS communication protocol , there are two possible operating modes:

- 'slave' mode : the devices send messages only in the event of a request.

- 'master' mode : the devices send messages and possibly wait for a reply.

Each device of this range has an BMS$^{\circledR}$ BUS address, configurable via the DIP switches located on the front panel.
The FTC1500 has a fixed BMS$^{\circledR}$ BUS address : 101. It enables the interface to operate as the 'master' of the EDS system.

OPERATING MODES OF THE FTC1500 :

```
                    ┌──────────┐
                    │ FTC1500  │
                    └──────────┘
                   ↙  2 operating modes  ↘
        ┌──────────┐              ┌──────────┐
        │  Slave   │              │  Master  │
        └──────────┘              └──────────┘
```
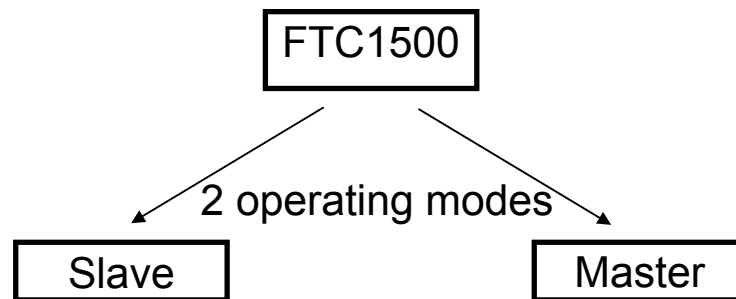
FTC1500 'listen' mode
(reading only).
All the information
conveyed on the BMS$^{\circledR}$
BUS are stored in the
FTC1500 memory.
In the event of a
JBUS/MODBUS$^{\circledR}$ request,
these data can be
transmitted.

FTC1500 'driver' mode
(reading & writing)
The FTC1500 replaces the
PRC470 and becomes the
BMS$^{\circledR}$ BUS master.

8.3.2 Main operations

The available commands and information are listed in the following tables.

Note: Reading (function 3)
           Writing of a word (function 6)
           Writing of several words (function 16)

BUS 2 EDS (FTC1500 SLAVE)

No	Available information, operations	Instructions	Type of device	Hex. Address	Write value	No of words	Reply to the request (function 3) and interpretation
7	• **Check if a EDS/RCMS470-12 device is under fault condition and in this case read the fault value.**	Read the number of alarms.	EDS/RCMS	16		2	**004E 00XX** : scanning not completed. **006E 00XX** : scanning completed, with XX fault.
		Read the fault value in channel "n".	EDS/RCMS	n00		3	**0000 0000 0000** : no active alarm. **0001 0000 0000** : channel not available. **0002 yyyy yyyy** : fault value yyyy yyyy in mA (hexa) – EDS 0003 yyyy yyyy : fault value yyyy yyyy in mA (hexa) – RCMS **7F7F 7F7F 7F7F** : output not scanned yet.

BUS 2 EDS (FTC1500 MASTER)

No	Available information, operations	Instructions	Type of device	Hex. Address	Write value	No of words	In case of reading : reply interpretation.
8	• **Set the FTC1500 to 'master' mode on** ® BUS side until inverse instruction.	Write the 'non-listen' instruction. Write the validity time. Write the change to 'master'. Write the confirmation message. Read the FTC1500 status.	FTC1500	205 204 200 201 200	1 1 1 1	1 1 1 1 1	2H : FTC1500 'master'.
9	• **Start or stop a scanning sequence** of the EDS/RCMS470 system.	Write the start (3) or stop (5) instruction. Write the confirmation message. Read the system's status.	FTC1500	200 201 200	3 or 5 3 or 5	1 1 1	4H : start permitted 6H : stop permitted
10	• **Start or stop a scanning sequence in 'position' mode** of the EDS/RCMS470 system.	Write the address ' x ' of the device to be checked. Write the channel ' n ' of the device to be checked. Write the start (7) or stop (5) instruction. Write the confirmation message. Read the system's status	FTC1500	202 203 200 201 200	x n 7 or 5 7 or 5	1 1 1 1 1	8H : start permitted 6H : stop permitted
11	• **Start a test sequence** of all EDS/RCMS470-12 devices.	Set the FTC1500 to 'master' mode. Write the test command (wait 25s : duration of the test sequence). Set the FTC1500 to 'slave' mode.	FTC1500	see 8. 300 see 14.	F003	1	
12	• **Perform a reset** of all EDS/RCMS470-12 devices.	Set the FTC1500 to 'master' mode. Write the reset command. Set the FTC1500 to 'slave' mode.	FTC1500	see 8. 306 see 14.	F000	1	
13	• **Configure the threshold value** on the RCMS470-12	Set the FTC1500 to 'master mode' Write the channel 'n' of the device to be configurate Read the current value of threshold Write the new threshold Read the new threshold Set the FTC1500 to 'slave' mode	FTC1500 RCMS470 FTC1500	See 8. 1A n16 n16 n16 See 14.	FF0n FF00 xxxx xxxx	1 3 3 3	xxxx xxxx = value of hex. threshold
14	• **Set the FTC1500 to 'slave' mode** on ® BUS side	Write the change to 'slave'. Write the confirmation message. Read the FTC1500 status. Write the 'listen' status.	FTC1500	200 201 200 205	9 9 0	1 1 1 1	0H : FTC1500 'slave'

Example 1 :

To do the operation No 7, it is necessary to send the following JBUS/MODBUS requests :
(EDS470-12 : JBUS address = 0AH)

- Reading the number of alarms :

Request :

Slave	Function	Address high-order	Address low-order	Number of words High-order	Number of words low-order	CRC16
0A	03	00	16	00	02	24B4

Reply :

Slave	Function	Number of bytes	High-order value WORD 1	Low-order value WORD 1	High-order value WORD 2	Low-order value WORD 2	CRC16
0A	03	04	00	6E	00	03	612F

The FTC1500 returns the value 006E 0003 : the scanning is completed and 3 faults have been located.

- Reading the fault value in channel 'n' : (please note this : if there is no alarm, the fault value should not be read)

Request :

Slave	Function	Address high-order	Address Low-order	Number of words High-order	Number of words low-order	CRC16
0A	03	01	00	00	03	054C

Reply :

Slave	Function	Number of bytes	High-order value WORD 1	Low-order value WORD 1	High-order value WORD 2	Low-order value WORD 2	High-order value WORD 3	Low-order value WORD 3	CRC16
0A	03	06	00	02	00	00	00	0A	AB82

Channel 1 is under fault condition (WORD 1 = 02H) with a fault current of 10mA (WORDS 2 and 3 = 0AH).

Example 2 :

To do the operation No 9, it is necessary to send the following JBUS/MODBUS requests :
(FTC1500 : JBUS address = 65H)

- Writing the start command (3) :

Request :

Slave	Function	Address High-order	Address Low-order	Value high-order	Value low-order	CRC16
65	06	02	00	00	03	C057

Reply : the FTC1500 confirms the received command by returning it to the master.

- Writing the confirmation message :

Request :

Slave	Function	Address high-order	Address Low-order	Value high-order	Value low-order	CRC16
65	06	02	01	00	03	9197

Reply : the FTC1500 confirms the received command by returning it to the master.

As soon as the 2 messages are sent, the EDS or RCMS470 system will be activated.

- Reading the system's status :

Request :

Slave	Function	Address high-order	Address low-order	Value high-order	Value low-order	CRC16
65	03	02	00	00	01	8D96

Reply :

Slave	Function	Number of bytes	Value high-order	Value low-order	CRC16
65	03	02	00	04	C84F

The FTC1500 returns the value 0004 : the start command has been accepted.

8.4 Comments on the operating principle of the bridge

1) The FTC1500 bridge (as 'slave') is permanently 'listening' to the information exchanged between the different devices that are connected to the BMS® BUS.
The conveyed messages are stored in the memory of the bridge and converted according to the JBUS/MODBUS® protocol.
If an information requested on JBUS/MODBUS® side has not been transmitted to the EDS side, the corresponding data field contains the value '7F7F' (hexadecimal value).

2) When the FTC1500 is no longer in 'listen' mode, no message conveyed on the BMS® BUS is processed any more.

3) When the FTC1500 is set to 'slave' mode, some information (type of device, software version, ...) are only generated, when a test of the EDS / RCMS system is activated (menu m3 of EDSC470).

4) When using the PRC470 in local mode, the communication with the FTC1500 and the change to 'master' mode may be invalid.

5) For some read or write operations make sure, that the FTC1500 is set to 'master' mode.

6) When filling in the table of addresses (see page 14), do not configure two identical BMS® BUS (or JBUS/MODBUS®) addresses on two different correspondence lines (as a consequence, the message '7F7F' would be sent by the bridge in response to a request of the master).

Examples :

Correspondence number	BMS® BUS address	JBUS/MODBUS® address
1	1	1
10	1	10

NO !

Correspondence number	BMS® BUS address	JBUS/MODBUS® address
001	1	10
010	2	10

NO !

9 TECHNICAL DATA

Insulation coordination, according to IEC 60664 :

Rated insulation voltage	*AC 400V*
Rated impulse withstand voltage / contamination level	*4kV/3*

SUPPLY VOLTAGE

Nominal voltage Us	*see name plate*
Operating range Us	*0.85...1.15 x Us*
Frequency Us (AC)	*45...65 Hz*
Max. power consumption	*10 VA*

COMMUNICATION

RS485 communication via half duplex 2 or 3-wire link	
Max. length	*1200 m*
Galvanic insulation	*2.5 kV / 1 minute*

ADDRESSING

Addressing table :
Each EDS or IMD address can be associated with one JBUS/MODBUS® address
The FTC1500 bridge has its own address
Max. number of EDS bus or IMD devices

Remote insulation fault evaluator EDS473-12 / EDS470-12/RCMS470-12	*30*
Insulation fault test device PGH473 / PGH471	*9*
Signalling module (12 relays) SMO480-12	*30*
Control and monitoring device PRC470	*1 required for operation*
or	
IMD IRDH265/365 (current version)	*1*

TYPE TESTS

Electromagnetic compatibility according to :	
Emissions acc. to	*EN 61000-6-2*
Mechanical tests :	
Shock resistance acc. to IEC 60 68-2-27	*15g / 11ms*
Bumping acc. to IEC 68-2-29	*40g / 6 ms*
Vibration strength acc. to IEC60 68-2-6	*10...150Hz / 0.15mm - 2g*

ENVIRONMENTAL CONDITIONS

Ambient temperature during operation	*- 10°C...+ 55°C*
Storage temperature range	*- 20°C...+ 55°C*
Climatic class according to IEC 60721	*3K5 except condensation or formation of ice*

GENERAL DATA

Operation	*continuous*
Mounting	*panel mounting, quick mounting*
Connection	*disconnectable terminal block*
Flexible conductors	*0.2...2.5 mm²*
Rigid conductors	*0.2...2.5 mm²*
Degree of protection, front face	*IP 54*
Degree of protection, terminal blocks	*IP 20*
Box	*panel-mounted DIN 96x96*
Flammability class, box	*UL94V-0*
Weight	*approx. 900 g.*

APPENDIX 1 : PARAMETERS TO BE DISPLAYED

- IMD IRDH265 / 365

Address		Number of words	Designation
Hexa.	Dec.		
200	512	2	Insulation resistance (kΩ)
204	516	2	Alarm1 threshold (kΩ)
208	520	2	Alarm2 threshold (kΩ)
20C	524	1	Status of the output relays K1 / K2 0H : K1 off, K2 off 1H : K1 on, K2 off 2H : K1 off, K2 on 3H : K1 on, K2 on
20D	525	1	Status of the alarm LEDs 1 / 2 0H : no active alarm 1H : alarm 1 2H : alarm 2 3H : alarm 1 / 2
20E	526	1	Type of fault 0H : AC 1H : DC- 2H : DC+

- Communication bridge FTC1500

Address		Number of words	Designation
Hexa.	Dec.		
300	768	1	General status of the EDS / RCMS system 1H = **MEAS** : start measurement 2H = **STOP** : stop measurement 3H = **TEST** : system test
302	770	1	**MEMRY** : Configuring of the memory mode 1H : memory 0H : automatic reset
304	772	1	**NUM** : Configuring the PEAK function (n)H : number of PEAK cycles (in case of disturbance)
306	774	1	**ALMCL** : General system reset (display + relay) 0H : reset performed
30A	778	1	Configuring the operating mode of the relays 0H = **RELNO** : NO operation (negative security) 1H = **RELNC** : NC operation (positive security)

- Insulation fault evaluators EDS473-12 / EDS470-12 / RCMS470-12

Address		Number of words	Designation
Hexa.	Dec.		
0	0	1	General status of the EDS / RCMS system 1H = **MEAS** : start measurement 2H = **STOP** : stop measurement 3H = **TEST** : system test
2	2	2	**IDNM** : Type of the connected device + type number 0H 1D6H : EDS470 0H CCH : EDS473 3H 1D6H : RCMS470
6	6	2	**IDNV** : Other device version + corresponding number 1H : - 2H : E- 3H : -R
A	10	2	**IDNF** : Software version of the connected device
E	14	2	**IDNS** : Serial number
12	18	1	**MEMRY** : Configuring the memory mode 0H : automatic reset 1H : memory
14	20	1	**NUM** : Configuring the PEAK function (n)H : number of PEAK cycles (in case of disturbance)
16	22	2	**ALMN** : Scanning status + number of outputs under fault condition 4EH : partial scanning 6EH : scanning all outputs
1A	26	1	**CAN** : Previously scanned channel (n)H : channel number
1C	28	1	**ALMCL** : General system reset (display + relay) 0H : reset performed
20	32	1	**REL** : Operating mode of the relay 0H : NO operation 1H : NC operation
22	34	1	Configuring the operating mode of the relay 0H = **RELNO** : NO operation (negative security) 1H = **RELNC** : NC operation (positive security)
24	36	2	**BTRN** : number of operating messages received 0H = no message 1H : n followed by the number of messages

For each channel 'n' (from 1 to 12 or 1 to 0C in hexadecimal) of the EDS473-12 / EDS470-12 / RCMS470-12 devices, the following information are available :

Address		Number of words	Designation
Hexa.	Dec.		
n00		3	**ALM** : Status of the specified measuring current transformer input and alarm value (2 words) 0H : no alarm 1H : channel not available 2H : (EDS470) Is followed by the corresponding value in mA 3H : (RCMS) Id followed by the corresponding value in mA 4H : (RCMS) real differential current greater than 10A 5H : (RCMS) Ip prealarm current in mA 6H : no measuring current transformer connected to the measuring current transformer input 7H : digital input alarm 8H : continuous scanning mode active (GND-IN1) 9H : scanning mode 1 active (GND-IN2) 0AH : inhibition active (GND-IN3) 0BH : manual stop active (BP START/STOP) 0CH : (EDS) transient disturbance (PEAK) 0DH : (EDS) differential current greater than 1A or 10A* 0FH : (EDS473) Is followed by the corresponding value in µA 11H : (RCMS) Id followed by the value in A (use of 'FACTOR') 12H : (RCMS) Ip followed by the value in A (use of 'FACTOR')
n06		3	**VAL** : Type and value of the fault current on the specified measuring current transformer input (2 words) : 2H : (EDS) Is followed by the corresponding value in mA 3H : (RCMS) Id followed by the corresponding value in mA 4H : (RCMS) differential current greater than 10A 5H : (RCMS) Ip prealarm current in mA 6H : no measuring current transformer connected to the measuring current transformer input 0DH : (EDS) differential current greater than 1A or 10A* 0FH : (EDS473) Is followed by the value in µA
n0C		1	**MEAS** : Starting measurement
n0E		1	**TEST** : Test of the specified measuring current transformer input 0H : no measuring current transformer connected 1H : measuring current transformer connected 2H : short-circuit on the measuring current transformer input
n14		1	**SENS** : Type of measuring current transformer 0H : Closed measuring current transformer W...-S, W...-P, WR 1H : Open measuring current transformer WS 4H : no measuring current transformer connected
n16		3	**TRSH** : Detection threshold value (RCMS470-12) 3H : alarm threshold Y followed by the value in mA 0CH : prealarm threshold Y2 followed by the value in % (n=0DH)
n1E		3	**BTR :** Type and operating message value 0H : no message 1H : channel not available 3H : (RCMS) Id followed by the value in mA 6H : (RCMS) no measuring current transformer connected 10H : (RCMS) short-circuit on the measuring CT input 11H : (RCMS) Id followed by the value in A (use of 'FACTOR')

(*) 1A (EDS473) or 10A (EDS470)

- Signalling module SMO480-12

Address		Number of words	Designation
Hexa.	**Dec.**		
0	0	2	**IDNM** : Type of the connected device and number of type 7H 1E0H : SMO480
4	4	2	**IDNV** : Other device version + corresponding number 1H : - 2H : E- 3H : -R
8	8	2	**IDNF** : Software version
C	12	2	**IDNS** : Serial number

- Central insulation monitoring device PRC470

Address		Number of words	Designation
Hexa.	**Dec.**		
0	0	1	General status of the EDS / RCMS system 1H = **MEAS** : start measurement 2H = **STOP** : stop measurement 3H = **TEST** : system test
2	2	2	**IDNM** : Type of the connected device 6H 1D6H : PRC470
6	6	2	**IDNV** : Other device version + corresponding number 1H : - 2H : E- 3H : -R
A	10	2	**IDNF** : Software version
E	14	2	**IDNS** : Serial number
12	18	1	**MAST** : Master device
14	20	1	**MEMRY** : Configuring the memory mode 0H : automatic reset 1H : memory
16	22	1	**NUM** : Configuring the PEAK function (n)H : number of PEAK cycles (in case of disturbance)
18	24	2	**ALMN** : Scanning status + number of outputs under fault condition 4EH : partial scanning 6EH : scanning all outputs
1C	28	1	**ALMCL** : General reset of the system (display + relay) 0H : reset performed
1E	30	1	**REL** : Operating mode of the relay 0H : NO operation 1H : NC operation
20	32	1	Configuring the operating mode of the relays 0H = **RELNO** : NO operation (negative security) 1H = **RELNC** : NC operation (positive security)

- Insulation fault test device PGH473 / PGH471

Address		Number of words	Designation
Hexa.	Dec.		
0	0	1	General status of the EDS / RCMS system 1H = **MEAS** : start measurement 2H = **STOP** : stop measurement 3H = **TEST** : system test
2	2	2	**IDNM** : Type of the connected device + type number 5H CCH : PGH473 5H 1D7H : PGH471
6	6	2	**IDNV** : Other device version + corresponding number 1H : - 2H : E- 3H : -R
A	10	2	**IDNF** : Software version
E	14	2	**IDNS** : Serial number
12	18	1	**MAST** : Master device
14	20	2	**ALMN** : Scanning status + number of outputs under fault condition 4EH : partial scanning 6EH : scanning all outputs
18	24	2	**ALMCL** : General reset of the system (display + relay) 0H : reset performed

APPENDIX 2 : CONFIGURATION TABLES

It is advisable to write down the defined configurations at system start-up.

Appendix 2.1 : Configuring the communication parameters

Transmission speed	
Parity	
Number of stop bits	
FTC1500 address	
BUS 2 type	

Appendix 2.2 : Configuring addresses

Operating mode : configuration of the BMS$^®$ BUS and JBUS/MODBUS$^®$ addresses

Press ▶ **and** ⬅ **to configure the BMS$^®$ BUS address.**

Use the keys ▶ **and** ▲ **to modify the BMS$^®$ BUS address.**

⬅ **this key is used to confirm the address.**

▶ ▲ **to modify the correspondence number and start again**

or

⬅ **to go to the configuration menu of the JBUS/MODBUS$^®$ addresses (same procedure)**
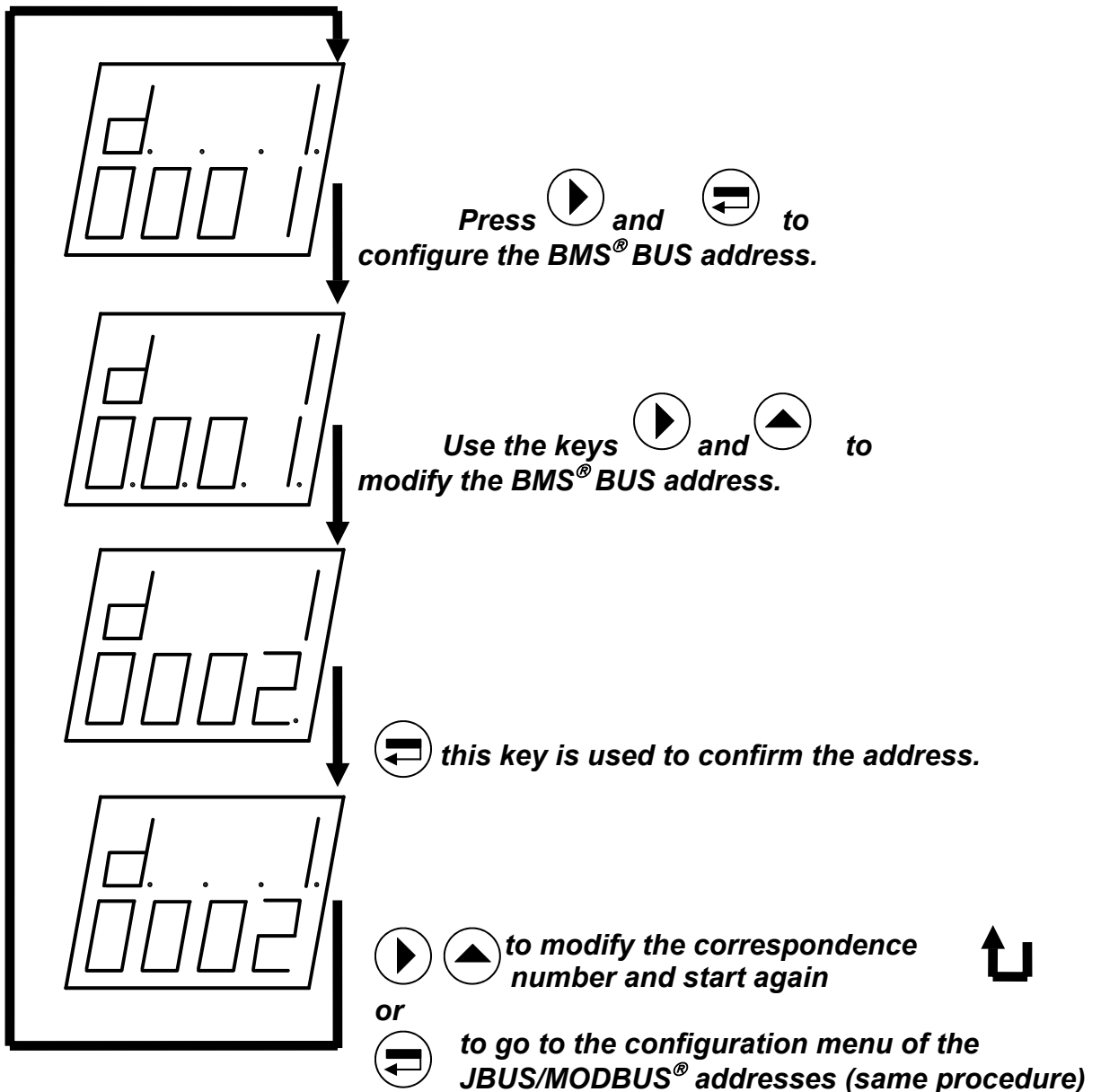
EDS473-12 / EDS470-12 / RCMS470-12

Switch cabinet location	Device ident.	Type of product	BMS® BUS address		Correspondence number	JBUS/MODBUS® address	
			Default Setting	user-defined		default setting	user-defined
			1		**1**	0	
			2		**2**	0	
			3		**3**	0	
			4		**4**	0	
			5		**5**	0	
			6		**6**	0	
			7		**7**	0	
			8		**8**	0	
			9		**9**	0	
			10		**10**	0	
			11		**11**	0	
			12		**12**	0	
			13		**13**	0	
			14		**14**	0	
			15		**15**	0	
			16		**16**	0	
			17		**17**	0	
			18		**18**	0	
			19		**19**	0	
			20		**20**	0	
			21		**21**	0	
			22		**22**	0	
			23		**23**	0	
			24		**24**	0	
			25		**25**	0	
			26		**26**	0	
			27		**27**	0	
			28		**28**	0	
			29		**29**	0	
			30		**30**	0	

SMO480-12

Switch cabinet location	Device ident.	Type of product	BMS® BUS address		Correspondence number	JBUS/MODBUS® address	
			default setting	user-defined		default setting	user-defined
		MODS	31		**31**	0	
		MODS	32		**32**	0	
		MODS	33		**33**	0	
		MODS	34		**34**	0	
		MODS	35		**35**	0	
		MODS	36		**36**	0	
		MODS	37		**37**	0	
		MODS	38		**38**	0	
		MODS	39		**39**	0	
		MODS	40		**40**	0	

SMO480-12

Switch cabinet location	Device ident.	Type of product	BMS® BUS address		Correspondence number	JBUS/MODBUS® address	
			default setting	user-defined		default setting	user-defined
		MODS	41		**41**	0	
		MODS	42		**42**	0	
		MODS	43		**43**	0	
		MODS	44		**44**	0	
		MODS	45		**45**	0	
		MODS	46		**46**	0	
		MODS	47		**47**	0	
		MODS	48		**48**	0	
		MODS	49		**49**	0	
		MODS	50		**50**	0	
		MODS	51		**51**	0	
		MODS	52		**52**	0	
		MODS	53		**53**	0	
		MODS	54		**54**	0	
		MODS	55		**55**	0	
		MODS	56		**56**	0	
		MODS	57		**57**	0	
		MODS	58		**58**	0	
		MODS	59		**59**	0	
		MODS	60		**60**	0	

PRC470

Switch cabinet location	Device ident.	Type of product	BMS® BUS address		Correspondence number	JBUS/MODBUS® address	
			default setting	user-defined		default setting	user-defined
		EDSC	100		**61**	0	

PGH473 / PGH471

Switch cabinet location	Device ident.	Type of product	BMS® BUS address		Correspondence number	JBUS/MODBUS® address	
			default value	user-defined		default setting	user-defined
		INJ	111		**62**	0	
		INJ	112		**63**	0	
		INJ	113		**64**	0	
		INJ	114		**65**	0	
		INJ	115		**66**	0	
		INJ	116		**67**	0	
		INJ	117		**68**	0	
		INJ	118		**69**	0	
		INJ	119		**70**	0	

OTHER*

Switch cabinet location	Device ident.	Type of product	BMS® BUS address		Correspondence number	JBUS/MODBUS® address	
			default setting	user-defined		default setting	user-defined
			200		**71**	0	

* as you wish (EDS473-12, EDS470-12, RCMS470-12, etc..) if the 71st address is allocated to a device.

APPENDIX 3 : TABLE OF COMMUNICATION ERRORS

Possible communication errors (bottom line) :

Display	Type of error	Probable causes
E10	JBUS/MODBUS error : CRC error	EMI problems
E20	EDS error : CRC error	EMI problems - several 'Masters' !
E30	ASCII error : character > 128	BUS 2 configuration error
E31	ASCII error : invalid message	BUS 2 configuration error

Generally these errors are due to transmission or configuration errors.

E20 : this message may be displayed even if there is no real failure, when the system is scanning the FTC1500 or when the system is activated.

APPENDIX 4 : DIAGNOSIS TOOL

0 – Purpose of the document

To help the initial operation on the gateway FTC1500 and allow to solve easily the more frequent problems

1 – First information :

– Are drawings of the general wiring available (IMD, EDS470, FTC1500) ?
– Has the system already been tested ?
– Which supervisor is used ?
– Which SPS is(are) used ?

2 – Checking the configuration of the gateway

STEP ❶ : Fill-in the table of address page 33 and 34 :

ADDRESSING PRINCIPLE :

The FTC1500 enables communication with 71 devices connected to the BMS$^®$ BUS.
Before, you must configure - either in local mode on the bridge or via JBUS/MODBUS$^®$ - a correspondence table linking up the BMS$^®$ BUS address of each device (in conformity to the manufacturer protocol and set directly on the devices by means of DIP-switches) with a JBUS/MODBUS$^®$ address (settable between 1 and 255). So 71 correspondence lines can be configured.

Correspondence table :

| Correspondence number	BMS$^®$ BUS address	JBUS/MODBUS$^®$ address	Type of device
1...30	001...030	1 to 255	EDS473/470-12, RCMS470-12
31...60	031...060	1 to 255	SMO480-12
61	100	1 to 255	PRC470
62...70	111...119	1 to 255	PGH473 / PGH471
71	000...255	1 to 255	other type

STEP ❷ : Check if the configuration of the address within the FTC1500 corresponds to the addresses of the table of address.

3 – Checking the wiring to the FTC1500 :

> BUS 2 configured in ASCII <
(communication with IRDH265/365)
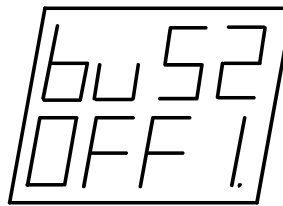
STEP ❶ :   Check first that the IMD works well (=IMD measuring the
            insulation level)

STEP ❷ :   Wire only the BUS 2 (on the IMD side) to the FTC1500 and
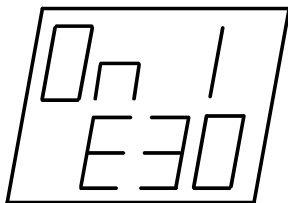   have a look on the display :
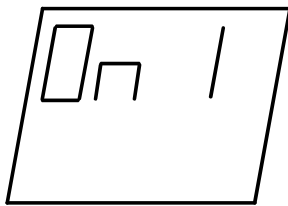
continuously   or   **continuously (visualisation mode)**
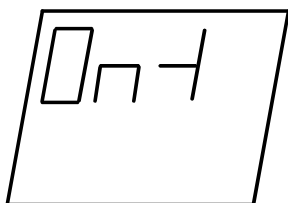
= Bad wiring on the BUS 2 side
➔ *Check the wiring of the terminals A and B on the IMD and the FTC1500*

continuously

= Inversion of the wiring on the terminals A and B
➔ *Invert the wiring on the terminals A and B*

= The FTC1500 received well the information of the IMD

STEP ❸ : Wire only the BUS 1 (on the JBUS side) to the FTC1500 and have a look on the display while sending a JBUS message :
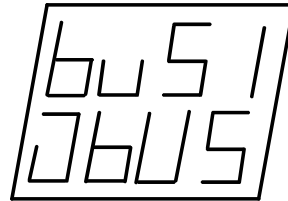
If an error message is generated on the supervisor and the following screen is displayed in mode visualisation on the FTC1500 :
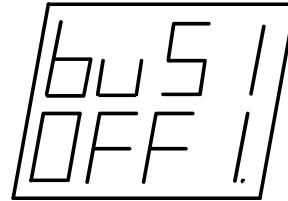
= Problem of wiring on the BUS 1 :
➔ *Check if the wiring is well done on the BUS 1 side*

If an error message is generated on the supervisor and the following screen is displayed in mode visualisation on the FTC1500 :


= Problem on the supervisor : the message is not correct (Slave JBUS address or function address is not correct, the number of words is not correct…)
➔ *Check the JBUS message that is sent on the supervisor*

> BUS 2 configured in EDS <
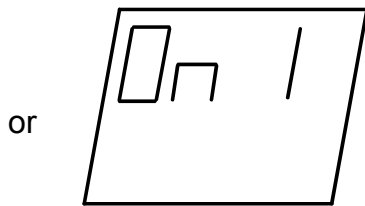### (communication with system EDS or RCMS470)

STEP ❶ : First check that the system works well

ETAPE ❷ : Wire only the BUS 2 (on the EDS side) to the FTC1500 and
have a look on the display :
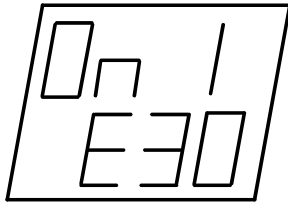
```
On 1
E 30
```
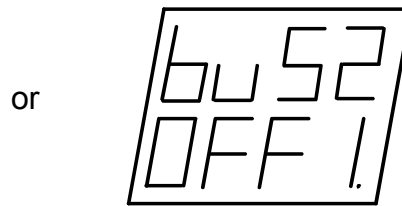**continuously**

= BUS 2 is wrong configured
➜ *Configure BUS2 in 'EDS'*

_____
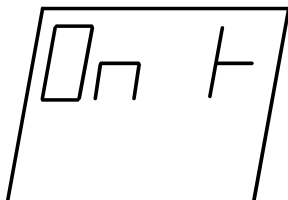
or
```
On 1
```
continuously

or
```
bu S2
OFF 1.
```
continuously (visualisation mode)

= Bad wiring on the BUS 2 side
➜ *Check the wiring on the terminals A and B*

_____

STEP ❸ : Wire only the BUS 1 (on the JBUS side) to the FTC1500 and
have a look on the display:

```
On ┣
```
continuously

= Inversion of the wiring on the terminals A et B
➜ *Invert the wiring on the terminals A and B*

_____

STEP ❹ : Wire only the BUS 1 (on the JBUS side) to the FTC1500 and
have a look on the display while sending a JBUS message
see STEP ❸ page 39