



FTC470XDP



**Protocol converter for the connection
of the Bender Measuring interface
to the PROFIBUS DP
Software version: D143 V2.1x**



Bender GmbH & Co. KG

P.O. Box 1161 • 35301 Gruenberg • Germany
Londorfer Straße 65 • 35305 Gruenberg • Germany
Tel.: +49 6401 807-0 • Fax: +49 6401 807-259
E-mail: info@bender.de • www.bender.de

Photos: Bender archives and bendersystembau archives.

© Bender GmbH & Co. KG
All rights reserved.
Reprinting only with permission
of the publisher.
Subject to change!

Table of Contents

1. How to use this documentation effectively	7
1.1 About the operating manual	7
1.2 Overview of the individual chapters	7
1.3 Brief instruction	8
2. Safety instructions	9
2.1 Work activities on electrical installations	9
2.2 Address setting and termination	9
3. Standard application	11
3.1 Bus interface	11
3.2 Application of the FTC470XDP	12
3.3 Restrictions	12
4. The FTC470XDP protocol converter	13
4.1 Scope of delivery	13
4.2 Display and operating elements	13
4.2.1 PROFIBUS DP status indicators	14
4.2.2 Status indicators for the BMS bus and supply voltage	14
4.3 BMS side of the FTC470XDP	15
4.4 PROFIBUS DP side of the FTC470XDP	16
4.4.1 Cyclical data exchange	16
4.4.2 Correct time control of the FTC470XDP by PROFIBUS commands is required	16
4.4.3 FTC470XDP communicates with the PROFIBUS DP Master as 'BMS Slave'	17
4.4.4 The FTC470XDP communicates as the 'BMS Master' with the PROFIBUS DP Master	18
4.4.5 Format of output and input data	19
4.5 Intended use	21
5. Installation	23
5.1 Basic configuration	23
5.2 Mounting and connection of the device	24
5.2.1 Wiring diagram	25

6. Function	27
6.1 GSD file for the PROFIBUS DP Master	27
6.2 Function lists	27
6.3 Requesting alarm messages	28
6.3.1 Number of all alarm messages of a BMS device	28
6.3.2 Requesting alarm messages via the channel number	29
6.4 Requesting operating messages	32
6.4.1 Number of all operating messages of a BMS device	32
6.4.2 Requesting operating messages via the channel number	33
6.5 Requesting measuring values	35
6.5.1 Requesting measuring values via the channel number	35
6.6 Taking over or returning the Master function	36
6.6.1 Taking over the Master function	36
6.6.2 Returning the Master function	36
6.7 Parameterization	37
6.7.1 Requesting the response values via channel number	37
6.7.2 Setting the response values via channel number	39
6.7.3 Requesting the delay on response	41
6.7.4 Setting the delay on response	41
6.7.5 Requesting the CT type	42
6.7.6 Setting the CT type	42
6.7.7 Requesting the status of CT monitoring	43
6.7.8 Setting the status of CT monitoring	43
6.7.9 Requesting the correction factor for the CT transformation ratio	44
6.7.10 Setting the correction factor for CT transformation ratio	44
6.7.11 Requesting the fault memory	45
6.7.12 Setting the fault memory	45
6.7.13 Requesting the operating mode of the alarm relay	46
6.7.14 Setting the operating mode of the alarm relay	46
6.7.15 Requesting the channel function	47
6.7.16 Setting the channel function	47
6.7.17 Requesting the number of measurements per channel	48
6.7.18 Setting the number of measurements per channel	48
6.7.19 Requesting the maximum number of measurements	49
6.7.20 Setting the maximum number of measurements	49
6.8 Requesting device-specific information	50
6.8.1 Requesting fault messages after a self test	50
6.8.2 Requesting the software version	50
6.8.3 Requesting the device type and device version	51
6.9 Control commands for use in BMS Master mode	52

6.9.1	Deleting all alarm messages	52
6.9.2	Starting a self test of insulation monitoring devices	52
6.9.3	Starting the self test of an EDS system	53
6.9.4	Buzzer mute	53
6.9.5	Switching the relay of a specific channel	54
6.10	Control commands to be used in the BMS Slave mode	55
6.10.1	Starting and stopping EDS systems	55
6.11	Output of PROFIBUS messages via the BMS bus	56
6.11.1	Output of PROFIBUS alarm messages via BMS bus	56
6.11.2	Output of PROFIBUS operating messages via BMS bus	56
7.	Programming examples	57
7.1	Alarm messages	57
7.1.1	Number of alarm messages	57
7.1.2	Requesting alarm messages or information via channel number	58
7.2	Operating messages	60
7.2.1	Requesting the operating messages via channel number	60
7.3	Requesting the measuring values via channel number	62
7.4	Temporary Master takeover and return	64
7.4.1	Taking over the Master function	64
7.4.2	Returning the Master function	64
7.5	Control commands for use in the Master mode	65
7.5.1	Interrogating the FTC470XDP device type	67
7.6	Control commands for use in the BMS Slave mode	68
7.6.1	Requesting the measuring value of all channels of an RCMS470-12	69
7.6.2	Requesting a device type after taking over the Master function by FTC470XDP	70
7.6.3	Parameter setting after the FTC470XDP has taken over the Master function	71
8.	Service and support	73
8.1	Damage in transit	73
8.2	Malfunctions	73
8.2.1	What shall be checked?	73
8.2.2	Where do you get help?	73
8.3	Warranty claims	74
8.4	Warranty and liability	74
9.	Technical Data	75
9.1	Technical data in tabular form	75
9.2	Dimension diagram	76

9.3	Ordering details	76
9.4	Certification	76
INDEX		77

1. How to use this documentation effectively

1.1 About the operating manual

This operating manual will concern qualified experts in electrical and communication technology!

In order to make it easier to find certain text passages or references in this manual and for reasons of comprehensibility, important information is emphasized by symbols. The meaning of these symbols is explained below:



Information calling attention to hazards is marked with this warning symbol.



Information intended to assist the user to make optimum use of the product is marked with the Info symbol.

1.2 Overview of the individual chapters

- How to use this documentation effectively:
This chapter provides information about the use of this documentation.
- Safety instructions:
This chapter draws attention to hazards involved with the installation and operation.
- Basic application:
This chapter deals with the normal use of this product.
- The protocol converter FTC470XDP (gateway):
This chapter describes the scope of delivery, the operating and display elements available at the device, the function of the protocol converter as well as the intended use.
- Installation:
This chapter describes the device settings which are to be set prior to installation and the installation itself.
- Function:
This chapter provides information about the device data file GSD includes a summary of all PROFIBUS-DP commands that are transmitted to the FTC470XDP converter.
- Programming examples:
This chapter contains various programming examples which are intended to help you to configure the FTC470XDP.

- Service and support:
This chapter offers service and support in case of a fault. In addition you will find information about the technical sales department.
- Technical data:
This chapter provides an overview of technical data, a dimension diagram as well as the ordering details.

1.3 Brief instruction

If you are familiar with automation engineering, particularly with the PROFIBUS DP, it may be helpful to start right away with chapter "4. The FTC470XDP protocol converter" and chapter "5. Installation". In chapter 4 you will find information about the BMS-PROFIBUS DP communication model including the ID numbers and start addresses required for read and write access. Chapter 5 provides information about the basic configuration, installation as well as the connection of the FTC470XDP. Furthermore a wiring diagram is provided.

2. Safety instructions

2.1 Work activities on electrical installations

- All work activities necessary for installation, commissioning or work activities during operation of electrical devices or systems are to be carried out by adequately skilled personnel.
- Observe the relevant regulations applying to work on electrical installations, in particular DIN EN 50110 or its subsequent regulations.



Unprofessional work activities on electrical installations may result in personal injury!

- If the equipment is used outside the Federal Republic of Germany, the respective national standards and regulations are to be observed.

2.2 Address setting and termination

A prerequisite for proper functioning of the FTC470XDP protocol converter is its correct address setting and termination.



Addresses assigned twice may lead to serious malfunctions in BMS or PROFIBUS-DP systems.

Ensure correct address setting and termination of the FTC470XDP. For details refer to the chapter basic configuration on page 23.

3. Standard application

3.1 Bus interface

In common building services management systems GLT as well as in other areas of automation engineering a variety of field buses are used. Bender systems like EDS470/473, RCMS470 and MEDICS communicate with each other via the Bender Measuring Interface BMS.

Our protocol converter FTC470XDP (gateway) is intended to connect this BMS interface to the PROFIBUS DP. For that purpose, the FTC470XDP is connected to the PROFIBUS DP network in the function of a PROFIBUS DP slave.

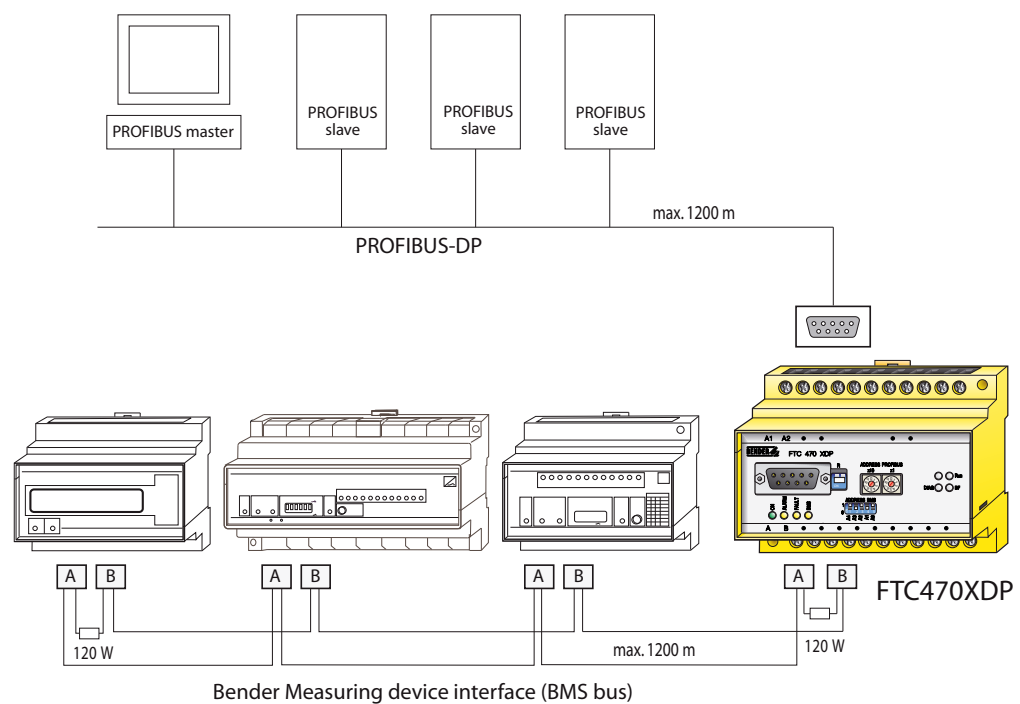


Fig. 3.1: Block diagram of an interface between the BMS bus and the PROFIBUS DP

3.2 Application of the FTC470XDP

The connection of Bender systems to the BMS bus and to the PROFIBUS DP by means of the FTC470XDP can become necessary for several reasons:

- A PROFIBUS DP device is expected to respond to an event in the BMS world.
- A BMS interface device is expected to respond to an event in the PROFIBUS DP world.
- The BMS interface data and the PROFIBUS DP data are intended to be indicated and evaluated centrally on a personal computer using PROFIBUS DP software.
- The BMS interface data are to be indicated in the software of a building services management system incorporating a PROFIBUS DP interface.
- The configuration of devices of the BMS side is to be carried out via a personal computer with PROFIBUS DP interface.
- The control of certain BMS interface activities is to be carried out via the PROFIBUS DP.

3.3 Restrictions

Some Bender devices like TM operator panels or PRC1470 use in addition to the internal interface an external interface capable of connecting such devices to extended networks. This external interface cannot be addressed by the FTC470XDP. In BMS systems including TM operator panels or PRC1470 these components can only communicate with the FTC470XDP via the internal interface.

If FTC470XDP is operating to the internal interface of TM operator panel or PRC1470, a Master take over cannot take place. In this cause only the functions described on page 17 can be used.



Please note that some BMS Masters cannot return their Master function

If the FTC470XET is operated on the internal bus of a PRC1470 or TM operator panel, the protocol converter cannot take over the Master function. When operated in combination with these devices, only Slave functions can be used. For details see "FTC470XDP communicates with the PROFIBUS DP Master as 'BMS Slave'" on page 17.

4. The FTC470XDP protocol converter

This chapter describes:

- the scope of delivery
- the display and operating elements on the device
- the function of the protocol converter
- the intended use

4.1 Scope of delivery

Included are:

- the FTC470XDP protocol converter
- the technical manual
- the configuration file ftc_1003.gsd

The latest version of this file is available on our Internet server. Load the file under:

<http://www.bender-de.com> => Download/Software

As soon as the Login procedure is completed, the category software will be displayed.

4.2 Display and operating elements

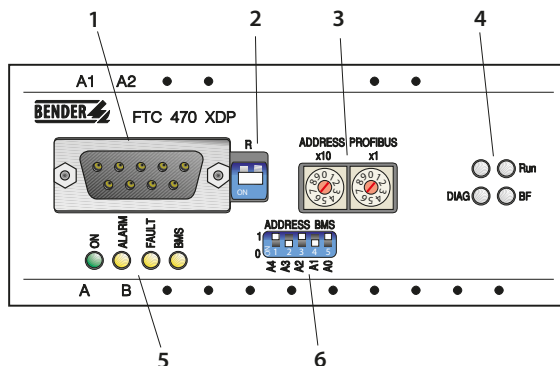


Fig. 4.1: FTC470XDP front plate

Figure	Function
1	RS485 Socket for PROFIBUS cable: 9 pole Sub-D
2	Micro switch for PROFIBUS DP termination: "ON" = terminating resistor activated
3	Rotary switch for PROFIBUS DP address setting: 01-99
4	PROFIBUS DP status indication (further text below)
5	BMS bus status indication (further text below)
6	DIP-switch for BMS bus address setting: 1-30

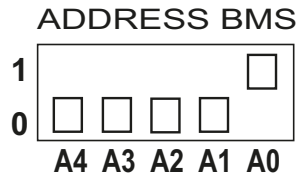


Fig. 4.2: DIP-switch for the BMS bus address setting

4.2.1 PROFIBUS DP status indicators

LED	Meaning
RUN	Green LED for the PROFIBUS DP, indicating that the FTC470XDP is connected to the PROFIBUS DP. Data exchange is possible.
BF	Red fault LED indicates that the FTC470XDP is not connected with a PROFIBUS DP. Data exchange is not possible.
DIAG	<p>Red diagnosis LEDs: flash with a frequency of 1 Hz: configuration faults. Input and output data of the FTC470XDP initialization are not in compliance with the configuration data.</p> <p>Flash with a frequency of 2 Hz: Fault in the user parameterization data. The length and the content of the parameter data are not in compliance with the configuration data.</p> <p>Flash with a frequency of 4 Hz: fault during PROFIBUS DP ASIC initialization.</p>

4.2.2 Status indicators for the BMS bus and supply voltage

LED	Meaning
ON	Green Power On LED, lights in case of correct power supply
ALARM	Yellow alarm LED lights when an alarm message is being transmitted to the BMS side via the PROFIBUS DP.
FAULT	Yellow fault LED lights in case of disturbances on the BMS bus, e.g. when an invalid BMS address has been set and/or in case of FTC470XDP malfunctions.
BMS	Yellow BMS LED indicates activities on the BMS bus.

4.3 BMS side of the FTC470XDP

On the BMS side, the FTC470XDP can be used either as Master or as Slave.



It is recommended to use the Master mode because of the fast data access.

- BMS address 1 = Master mode
- BMS address 2 = redundant Master mode
- BMS address 2 to 30 = Slave mode
- Data transfer rate = 9600 Baud

The following data is available on the BMS bus:

Alarm and operating messages

Bender devices with addresses 1-30 and 61-90 connected to the BMS bus cyclically send their alarm and operating messages. Each device can send up to 12 alarm and operating messages. Each of the channels 1-12 can be addressed separately.

Diagnostics and parameterization

This data is only be sent to the bus if requested by BMS commands.

Redundant Master function

FTC470XDP can be worked as a redundant Master. In the event failure of the regular Master (bus address 1) the FTC470XDP takes over the Master function after approximately 60 seconds in order to control the BMS bus. If the regular Master becomes active again, the "redundant" FTC470XDP returns the Master function.



The FTC470XDP provides the redundant Master function when the BMS address 2 to 30 was assigned to.

In case of failure of the regular Master tried first the BMS device with BMS address 2 to take over the Master function. If the taking over does not succeed, address 3 etc. follows. That means, a FTC470XDP with the BMS address 2 takes over the redundant Master function faster than equipment with the address 30.

4.4 PROFIBUS DP side of the FTC470XDP

The FTC470XDP is a PROFIBUS DP slave in accordance with EN 50170. That means that at least one Master must exist on the PROFIBUS side.

- FTC470XDP = PROFIBUS DP slave
- PROFIBUS DP address = 1...99
- Data transmission rate = 9.6 kbit/s to 12 Mbit/s
Detection of the baud rate is carried out automatically.

4.4.1 Cyclical data exchange

In this manual, the PROFIBUS is generally regarded from the PROFIBUS DP Master's point of view. The communication process on the PROFIBUS DP is organized in cycles, which means that the PROFIBUS Master interrogates all PROFIBUS Slaves, one after the other. The Master sends a request to the Slave, these represents the Master's output data. In reply the FTC470XDP sends an answer, these are the Master's input data.

Due to the large amount of data on the BMS side, a cyclical data exchange is not possible at the same time. For that reason, the PROFIBUS-DP Master must define the data he wants to receive from the BMS device.

The allocation of input and output data is organized via a consecutive ID number. A request with the ID number 1 must be followed by an answer from the Slave with the ID number 1. Only then the next request with ID number 2 may be sent. Since one ID number needs 1 byte, the numbers from 0 to 255 can be allocated. Then it starts again with number 0.

4.4.2 Correct time control of the FTC470XDP by PROFIBUS commands is required

Since commands are intended for different devices, different time behaviour must be considered. Answers to previously sent requests may accumulate while a PROFIBUS-DP Master's request is being answered by the associated Slave (FTC470XDP). Therefore it is of utmost importance to compare the ID number of the request to the respective ID number of the answer.

Command	typ. duration	max. duration	BMS operation mode
Commands 1, 2, 3, 4, 102, 104, 105 execute	20 ms	100 ms	Slave, Master
Switching commands execute	160 ms	600 ms	Master, temporarily Master
Parameterizing	160 ms	600 ms	Master, temporarily Master
Taking over the master function	6 s	60 s	Slave
Returning the master function	100 ms	200 ms	temporarily Master



The PROFIBUS programmer is responsible for the correct increment of the ID numbers in compliance the system requirements. Wrong control of the time behaviour may result in misinterpretations (PROFIBUS input data)!

Consider the duration for the execution of the instructions!

4.4.3 FTC470XDP communicates with the PROFIBUS DP Master as 'BMS Slave'

If a BMS address between 2 and 30 has been assigned to the FTC470XDP, it acts as a BMS Slave. In this case, the PROFIBUS DP Master can use the following functions:

Function in the BMS network	PROFIBUS DP instruction code*
Request for the number of alarm messages of a device	1
Request for the alarm message of a channel	2
Request for the number of operating messages of a device	3
Request for the operating message of a channel	4
Request for the current measuring value of a channel	105
Transmission of an alarm message from the PROFIBUS to a channel of the FTC470XDP	102
Transmission of an operating message from the PROFIBUS to a channel of the FTC470XDP	104
Starting, stopping or setting the position mode at EDS470/473 systems	115
Taking over respectively returning the Master function	112

* For detailed information about the PROFIBUS instruction code refer to the tables "Function lists" on page 27.

Temporary taking over of the Master function

Setting or requesting parameters of BMS cannot be carried out unless the FTC470XDP has taken over the Master function on the BMS bus. After the setting respectively the requesting of parameters, the Master function must be returned to the initial BMS Master. The associated commands can be found on page 36.

If no parameters are transmitted to the BMS bus by the PROFIBUS DP for 200 seconds, the FTC470XDP "assumes" that the Master function has not been returned. In this case, the FTC470XDP automatically returns the Master function to the initial BMS Master in order to avoid that the BMS bus is operated without a Master and hence would not be able to function reliably.

The response time for taking over or returning the Master function depends on the extension of the BMS system. A typical response time is approximately 6 seconds, but may be up to 60 seconds in extended systems.

The time needed to execute the instruction codes 1, 2, 3, 4, 105, 102 and 104 is about 20 ms.



Please note that some BMS Masters cannot return their Master function

If FTC470XDP is operating to the internal interface of TM operator panel or PRC1470, a Master take over cannot take place. In this cause only the functions described on page 17 can be used.

4.4.4 The FTC470XDP communicates as the 'BMS Master' with the PROFIBUS DP Master

Once the BMS address 1 is assigned to the FTC470XDP, the device acts as the BMS Master. In this way it can act as Master in all BMS systems. In addition to the interrogation of alarm and operating messages, it is also possible to set switching commands and parameters.

The response time for the instruction codes 1, 2, 3, 4, 105, 102 and 104 is about 20ms as it is in the slave mode. Switching commands and requesting of parameters are usually executed within approximately 160ms. Depending on the size of the BMS systems, however, also up to 600ms are possible.

4.4.5 Format of output and input data

The communication process is regarded from the PROFIBUS DP's point of view. The PROFIBUS DP Master sends the output data, a byte sequence, to the FTC470XDP (the PROFIBUS Slave). As an answer, the input data is returned as a byte sequence to the PROFIBUS DP Master. As already explained before, the assignment of input bytes and output bytes, i.e. of requests and answers, is carried out via an ID number. The PROFIBUS DP programmer is responsible for the correct assignment of the next ID number immediately after receiving an answer to the last request.

Format of output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive ID number of transmission	always "0"	BMS address of the addressed device	Channel number of the addressed device	Command	Type of data value	High byte data value	Low byte data value

- **Byte 1:**
Consecutive ID No. of transmission. Must be set by the programmer of the PROFIBUS DP Master. The ID number for the next request must be incremented as soon as an answer to the previous request is received.
- **Byte 2:**
No function, always zero (0) must be entered here
- **Byte 3:**
BMS address of the addressed device. Note: TM operator panels and PRC1470 must be addressed via their internal interface. Data of the external interface of these devices cannot be processed by the FTC470XDP.
- **Byte 4:**
BMS channel number of the addressed device. If no channel number is required, enter "0".
- **Byte 5:**
BMS command code, refer to the tables on page 28. If no command code is required, enter "0".
- **Byte 6:**
BMS data type, refer to the tables on page 28. If no data type is required, enter "0".
- **Byte 7:**
BMS high byte data value, refer to the tables on page 28. If no data value is required, enter "0".
- **Byte 8:**
BMS low byte data value, refer to the tables on page 28. If no data value is required, enter "0".

Format of input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive ID number of transmission	always "0"	BMS address of the addressed device	Channel number of the addressed device	Command	Type of data value	High byte data value	Low byte data value

- **Byte 1:**
Consecutive ID No. of transmission. The ID number corresponds to the associated request (output data).
- **Byte 2:**
No function, the device reads always zero (0) here.
- **Byte 3:**
BMS address of the addressed device. Address corresponds to the associated request (output data).
- **Byte 4:**
BMS channel number of the addressed device. Channel number corresponds to the associated request (output data).
- **Byte 5:**
BMS command code, refer to the tables on page 28. Command code corresponds to the associated request (output data).
- **Byte 6:**
BMS data type, refer to the tables on page 28. The data type represents the requested result read out by the device.
- **Byte 7:**
BMS high byte data value, refer to the tables on page 28. The data value represents the requested result read out by the device.
- **Byte 8:**
BMS low byte data value, refer to the tables on page 28. The data value represents the requested result read out by the device.

4.5 Intended use

The FTC470XDP protocol converter connects the serial Bender BMS bus to the serial PROFIBUS DP. The converter is capable of transmitting information from the BMS bus to the PROFIBUS DP and vice versa.

Interface on the PROFIBUS DP side:



The FTC470XDP is always operated as a slave on the PROFIBUS DP side

Hence, the PROFIBUS Master must be informed about the protocol converter and its PROFIBUS address. For that purpose refer to the file ftc_1003.gsd (See page 27).

Interface on the BMS side:

The FTC470XDP can be operated either as Master or as Slave.



The FTC470XDP must take over the Master function if

- parameters are requested or modified*
- or special control commands are given*

5. Installation

5.1 Basic configuration

Before installing the FTC470XDP, an address must be assigned to it. The BMS bus and the PROFIBUS DP must also be provided with an address.



Double assignment of addresses may lead to serious malfunctions in the BMS or PROFIBUS DP networks concerned.

1. At first, consult the person in charge of the electrical installation for the address assignment of the protocol converter in the respective bus structures. Therefore, it is necessary to find out whether the FTC470XDP can be operated as BMS Master (basic setting).
2. Set the appropriate BMS address (1 to 30; 1 = Master) by means of the DIP switch using binary digits. Address 5 corresponds to the following switch positions, for example:
 $A4 = 0$ $A3 = 0$ $A2 = 1$ $A1 = 0$ $A0 = 1$
 Factory setting = 1

Dez. Addr.	A4	A3	A2	A1	A0	Dez. Addr.	A4	A3	A2	A1	A0
1	0	0	0	0	1	16	1	0	0	0	0
2	0	0	0	1	0	17	1	0	0	0	1
3	0	0	0	1	1	18	1	0	0	1	0
4	0	0	1	0	0	19	1	0	0	1	1
5	0	0	1	0	1	20	1	0	1	0	0
6	0	0	1	1	0	21	1	0	1	0	1
7	0	0	1	1	1	22	1	0	1	1	0
8	0	1	0	0	0	23	1	0	1	1	1
9	0	1	0	0	1	24	1	1	0	0	0
10	0	1	0	1	0	25	1	1	0	0	1
11	0	1	0	1	1	26	1	1	0	1	0
12	0	1	1	0	0	27	1	1	0	1	1
13	0	1	1	0	1	28	1	1	1	0	0
14	0	1	1	1	0	29	1	1	1	0	1
15	0	1	1	1	1	30	1	1	1	1	0

Table 5.1: BMS bus address table

3. BMS termination: If FTC470XDP is located at the end of the BMS bus, terminate the bus with $120\ \Omega$ parallel to the clamps A/B.
4. Set the appropriate PROFIBUS DP address (1 to 99) by means of the rotary switch using decimal numbers.
factory setting = 3
5. Set the termination switch R to the required position in order to activate or deactivate the internal terminating resistor:
 - If the FTC470XDP is located at the end of the PROFIBUS DP, set the switch R to position "ON" (down position). The terminating resistor is activated.
 - If the FTC470XDP is not located at the end of the PROFIBUS DP, set the switch R to the up position. The terminating resistor is deactivated

5.2 Mounting and connection of the device

1. Mounting on support rail
Snap the clamping springs at the rear of the FTC470XDP into place in a way that a tight and secure fit is ensured.
2. Connection to the supply voltage:
Connect the terminals A1 and A2 to a supply voltage of $U_s = 85$ to $275\ \text{V}$ (AC/DC). Other supply voltages are under consideration, please refer to the nameplate of the device. A 6 A fuse is recommended for the voltage supply. In case of DC voltage supply, any connection polarity can be used.
3. Connection to the BMS:
Connect the terminals A and B to the BMS bus by means of the control cable (A to A, B to B). A suitable cable type is J-Y(St)Y 2x0.6.
If the FTC470XDP is located at the end of the BMS bus, the end of the bus must be terminated with a resistor of $120\ \Omega$. For that purpose loosen the terminals A and B in order to connect the terminating resistance in parallel.
4. Connection to the PROFIBUS DP:
Connect the 9-pole Sub-D socket to the respective plug of the PROFIBUS cable.
If the FTC470XDP is located at the end of the PROFIBUS DP network, set the terminating switch of the device to the "ON" position.

When all the points above are considered, the protocol converter is ready to receive and convert commands and data from the BMS network and from the PROFIBUS DP network.



The FTC470XDP must be disconnected from the supply after changing the DIP switch settings. Reconnection to the power supply provides the actual indication of the PROFIBUS DP status.

5.2.1 Wiring diagram

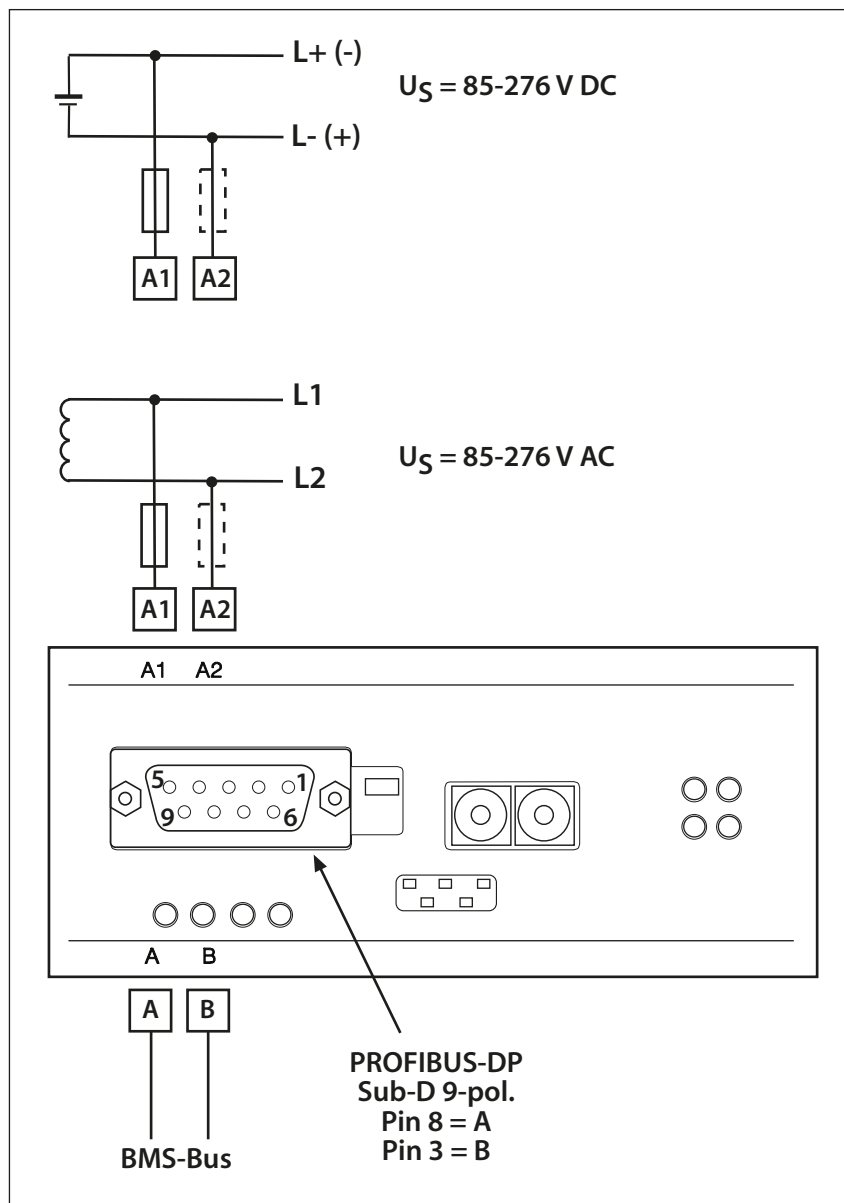


Fig. 5.1: wiring diagram FTC470XDP

6. Function

6.1 GSD file for the PROFIBUS DP Master

A PROFIBUS DP Master requires the device data base (GSD) of its slave components connected to the respective automation engineering system. Hence, the GSD file `ftc_1003.gsd` must be installed on the Master. This file describes the characteristics of the FTC470XDP in a standardized format.

1. Select the target directory the GSD file is to be copied to. The exact target location is indicated in the documentation of that software program you intend to program the PROFIBUS DP Master with.
2. Additionally, copy the `ftc_1003.gsd` file to the directory set up for the device master data.

6.2 Function lists

The following tables describe the bus communication from the PROFIBUS Master is point of view. Possible answers from the protocol converter FTC470XDP to the Master is request are listed in the table below. The following data types are described:

- Alarm messages
- Operating messages
- Measuring values
- Requesting and setting parameters
- Taking over the Master function
- Control commands

The tables contain the following information in columns:

- Function
- Addressable BMS devices
- BMS channel (Byte 4)
- BMS instruction code (Byte 5)
- BMS data type (Byte 6)
- BMS data value (Byte 7+8)



The columns of the table are hierarchical sorted according to command, data type, data value

Detailed information about the byte sequences can be found in chapter "4.4.5 Format of output and input data".

6.3 Requesting alarm messages

Alarm messages occur when the preset value of a device falls below or exceeds the response value. Depending on the device, these can be measuring values or status messages. Alarm messages are provided by BMS devices and are requested by the BMS Master. Because of their safety-relevant meaning alarm messages have high priority on the bus.

6.3.1 Number of all alarm messages of a BMS device

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the current number of alarm messages	All	0	1	0	0

Table 6.1: Master request: number of alarm messages

Reading from FTC470XDP (= input data of the PROFIBUS Master)

No device with such an address available	All	0	1	0	0
No alarm messages	All	0	1	1	0
Number of alarm messages	All	0	1	1	value
Number of alarm messages Not all the channels have been measured yet	EDS...	0	1	2	value
Number of alarm messages occurred by pressing the test button or by activating the "TEST" menu integrated in the device (for example)	107TD47 IRDH... PRC487	0	1	3	value
Number of alarm messages occurred during a test initiated via the interface	107TD47 IRDH... MK2418...	0	1	4	value
Request for a self test for an insulation monitoring device	MK2418...	0	1	5	address
Switching off the buzzer for alarm messages of a device	MK2418...	0	1	6	address

Table 6.2: FTC answer to: number of alarm message

6.3.2 Requesting alarm messages via the channel number

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Requests for alarm messages or information via channel number	all	Channel No.	2	0	0

Table 6.3: Master request: requests for alarm messages or information via channel number

Reading from FTC470XDP (= input data of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
No alarm	all	Channel No.	2	1	0
Insulation fault in the IT system	MK2418-11 SMI470-9	1 1	2	11	1
Transformer overload	MK2418-11 SMI470-9	2 2	2	11	2
Transformer overtemperature	107TD47 IZ427 MK2418-11 SMI470-9	3 3 3 3	2	11	3
Failure line 1	PRC487 MK2418-11 SMI470-9	1 4 4	2	11	4
Failure line 2	PRC487 MK2418-11 SMI470-9	2 5 5	2	11	5
Insulation fault operating theatre lamp	107TD47 MK2418-11 SMI470-9	8 6 6	2	11	6
Failure distribution board (Line 3, upstream the switchover device)	PRC487 MK2418-11 SMI470-9	3 8 8	2	11	8
Failure AV line	PRC487	1, 2	2	11	25
Failure SV line	PRC487	1, 2	2	11	26
Failure UPS line	PRC487	1, 2	2	11	27
Failure N conductor	PRC487	4	2	11	29
Short circuit distribution board	PRC487	10	2	11	30
Phase sequence left	ATICS	30	2	11	39
Failure BSV line (Battery-backed power supply system)	ATICS	1, 2	2	11	40
Connection fault system	107TD47 IRDH...	4 3	2	12	101
Connection fault PE	107TD47 IRDH... IZ427	5 4 5	2	12	102
Short circuit CT input	107TD47 IZ427 EDS46x/49x RCMS460 RCMS490	6 6 1...12 1...12 1...12	2	12	103

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Connection fault CT	107TD47 IZ427 EDS46x/49x RCMS460 RCMS490	7 7 1...12 1...12 1...12	2	12	104
Fault K1 (open circuit, contactor can't be switched on)	PRC487	5	2	12	107
Fault K2 (open circuit, contactor can't be switched on)	PRC487	6	2	12	108
Control fault	MK2418-11 SMI470-9	7 7	2	12	112
Failure switching element K1 respectively Q1	PRC487	5	2	12	113
Failure switching element K2 respectively Q2	PRC487	6	2	12	114
Fault insulation monitoring device	107TD47 IRDH375B IRDH575 IZ427	9 5 5 8	2	12	115
Switchover device in manual mode	PRC487	9	2	12	116
Open circuit closing coil K1	PRC487	5	2	12	117
Open circuit opening coil K1	PRC487	5	2	12	118
Open circuit closing coil K2	PRC487	6	2	12	119
Open circuit opening coil K2	PRC487	6	2	12	120
Switching element 1 cannot be switched on	PRC487	5	2	12	121
Switching element 1 cannot be switched off	PRC487	5	2	12	122
Switching element 2 cannot be switched on	PRC487	6	2	12	123
Switching element 2 cannot be switched off	PRC487	6	2	12	124
Failure contactor relay K3	PRC487	7	2	12	125
Fault Q1 (open circuit, load switch not switchable)	PRC487	5	2	12	126
Fault Q2 (open circuit, load switch not switchable)	PRC487	6	2	12	127
Fault PGH47..	PGH47..	5	2	12	136
Short circuit trip circuit breaker Line 1	PRC487	10	2	12	137
Short circuit trip circuit breaker Line 2	PRC487	10	2	12	138
Fault CV460	PRC487	8	2	12	139
Fault RK464	PRC487	8	2	12	140
Test of the automatic transfer switching device every 6 months	ATICS	6	2	12	144
End of the service life	ATICS	6	2	12	145
Channel is switched off	EDS...	1... 12	2	21	0
Interferences (FAULT)	EDS...	1... 12	2	31	0
Start-up of insulation fault location, runs until the input will be reset	PGH...	1	2	32	1
Start-up of insulation fault location for 1 pass (approx. 5 min.)	PGH...	2	2	33	1
Start/Stop insulation fault location via button	PGH...	4	2	34	1
Function of the device switched off (suppression)	IRDH575 PGH...	6 3	2	35	1
Start-up of insulation fault location: continuous measurement by a 5 minute pause	IRDH575	7	2	36	1
Start-up of insulation fault location: 1 cycle	IRDH575	8	2	36	1
Start-up of insulation fault location: Position mode	IRDH575	9	2	36	Position
Prewarning overcurrent in [A]	RCMS460/ RCMS490-D4 CMS460	9...12 1...12	2	37	value
Prewarning overcurrent in [mA]	RCMS460/ RCMS490-D4 CMS460	9...12 1...12	2	38	value

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Overcurrent < as value in [mA]	RCMS460/ RCMS490-D4 CMS460	9...12 1...12	2	39	value
Overcurrent > as value in [mA]	RCMS460/ RCMS490-D4 CMS460	9...12 1...12	2	40	value
Overcurrent in mA		1... 12	2	41	value
Overcurrent in A		1... 12	2	42	value
Overcurrent > as value in A		1... 12	2	43	value
Undercurrent in mA	RCMS460/ 490	1... 12	2	44	value
Undercurrent in A	RCMS460/ 490	1... 12	2	45	value
Undercurrent < as value in mA	RCMS460/ 490	1... 12	2	46	value
Undercurrent > as value in A	RCMS460/ 490	1...12	2	47	value
Total hazard current in μ A	LIM2010	1	2	48	value
Total hazard current > as value in μ A	LIM2010	1	2	49	value
Residual current fault > as value in mA	RCMS...	1...12	2	50	value
Insulation fault with fault current [value] in mA	EDS470/460/ 490	1... 12	2	51	value
Insulation fault with fault current [value] in μ A	EDS473/461/ 491	1... 12	2	52	value
Residual current > 10 A (FAULT)	EDS470/460/ 490	1... 12	2	53	value
Residual current > 1 A (FAULT)	EDS473/461/ 491	1... 12	2	53	value
Residual current > as value in mA	EDS46x/49x RCMS460 RCMS490	1... 12	2	54	value
Residual current/overcurrent/undercurrent fault in mA	RCMS... EDS46x/49x	1... 12	2	55	value
Residual current/overcurrent/undercurrent fault in A	RCMS... EDS46x/49x	1... 12	2	56	value
Residual current/overcurrent/undercurrent fault > as value in A	RCMS...	1... 12	2	57	value
Prewarning residual current fault in mA	RCMS...	1... 12	2	58	value
Prewarning residual current fault in A	RCMS...	1... 12	2	59	value
Residual current fault < as value in A	RCMS...	1...12	2	60	value
Insulation fault in k Ω	107TD47 IRDH...	1 1, 2	2	61	value
Insulation fault in Ω	107TD47 IRDH...	1 1, 2	2	62	value
Insulation fault in M Ω	107TD47 IRDH...	1 1, 2	2	63	value
Transformer load in %	107TD47 IZ427	2 2	2	65	value
Transformer load < as value in %	IZ427	2	2	66	value
Transformer load > as value in %	IZ427	2	2	67	value
Alarm digital input [value]	MK2418C... TM... SMI471..	1... 8 1... 8 1... 8	2	70	value
Overvoltage in V	ATICS	1, 2	2	72	value
Undervoltage in V	ATICS IZ427	1, 2 4	2	75	value

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Undervoltage < as value in V	IZ427	4	2	76	value
Voltage in 1/10 V	ATiCS	1, 2	2	87	value
Impedance in kΩ	IZ427	1	2	91	value
Impedance < as value in kΩ	IZ427	1	2	92	value
Impedance > as value in kΩ	IZ427	1	2	93	value
Prewarning Impedance in kΩ	IZ427	1	2	94	value
This and the following channel numbers are not available for this device	all	channel number	2	254	0

Table 6.4: FTC reply to: requests for alarm messages or information about channel number

6.4 Requesting operating messages

Operating messages are measuring values and/or information which is constantly provided by BMS devices and that can be requested from the BMS Master via the bus. Some BMS devices (EDS47x) do not provide operating messages, they only provide alarm messages.

6.4.1 Number of all operating messages of a BMS device

Writing to FTC470XDP (= output data of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Requesting the actual number of operating messages	All	0	3	0	0

Table 6.5: Master request: number of operating messages

Reading from FTC470XDP (= input data of the PROFIBUS Master)

No operating messages	All	0	3	1	0
Number of operating messages	All	0	3	1	value
Number of operating messages. The alarms occurred by activating the menu "Test"	107TD47 IRDH... PRC487	0	3	3	value
Number of operating messages, occurred during a test initiated via the interface.	107TD47 IRDH...	0	3	4	value
No device with such an address available.	All	0	3	0	0

Table 6.6: FTC answer to: number of operating messages

6.4.2 Requesting operating messages via the channel number

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Requesting for operating messages or information about the channel number	All	channel No.	4	0	0

Table 6.7: Master request: requesting the operating messages via the channel number

Reading from FTC470XDP (= input data of the PROFIBUS Master)

No operating messages (e.g. because of alarms)	All	channel No.	4	1	0
Relay not connected	SMO...	1... 12	4	3	0
Relay connected	SMO...	1... 12	4	3	1
Line 1 ready for operation **	PRC487	1, 2	4	13	201
Line 2 ready for operation **	PRC487	1, 2	4	13	202
Switching element 1 is switched on	PRC487	3	4	13	203
Switching element 2 is switched on	PRC487	4	4	13	204
Insulation of the main Op light ok	107TD47	8	4	13	205
Switchover system in automatic mode	PRC487	5	4	13	206
Switchover system in manual mode	PRC487	6	4	13	207
Line AV ready for operation **	PRC487	1, 2	4	13	210
Line SV ready for operation **	PRC487	1, 2	4	13	211
Line ZSV ready for operation **	PRC487	1, 2	4	13	212
Channel is switched off	RCMS46x/ 49x EDS46x/ 49x	1... 12	4	13	213
Switching back interlocking function active	ATICS	4	4	13	214
Phase sequence right	ATICS	30	4	13	215
Switching element position 0	ATICS	3	4	13	216
BSV line ready for operation	ATICS	1, 2	4	13	217
Channel is switched off	RCMS470 EDS470	1... 12	4	21	0
No CT connected. Input open	RCMS470	1... 12	4	22	0
Input is short-circuited	RCMS470	1... 12	4	23	0
Prewarning overcurrent in [A]	RCMS460/ RCMS490- D4 CMS460	9...12 1...12	4	37	value
Prewarning overcurrent in [mA]	RCMS460/ RCMS490- D4 CMS460	9...12 1...12	4	38	value
Overcurrent < as value in [mA]	RCMS460/ RCMS490- D4 CMS460	9...12 1...12	4	39	value
Overcurrent > as value in [mA]	RCMS460/ RCMS490- D4 CMS460	9...12 1...12	4	40	value
Overcurrent in mA			4	41	value

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Overcurrent in A			4	42	value
Overcurrent > as value in A			4	43	value
Undercurrent in mA	RCMS460/490	1... 12	4	44	value
Undercurrent in A	RCMS460/490	1... 12	4	45	value
Undercurrent < as value in mA	RCMS460/490	1...12	4	46	value
Undercurrent > as value in A	RCMS460/490	1...12	4	47	value
Total hazard current in μ A	LIM2010	1	4	48	value
Total hazard current > as value in μ A	LIM2010	1	4	49	value
Residual current > as value in mA	EDS46x/49x RCMS460 RCMS490	1... 12	4	54	value
Residual current/overcurrent/undercurrent fault in mA	RCMS....	1... 12	4	55	value
Residual current/overcurrent/undercurrent fault in A	RCMS....	1... 12	4	56	value
Residual current/overcurrent/undercurrent fault > than value in A	RCMS....	1... 12	4	57	value
Insulation value in k Ω	107TD47 IRDH...	1 1, 2	4	61	value
Insulation value in Ω	107TD47 IRDH...	1 1, 2	4	62	value
Insulation value in M Ω	107TD47 IRDH...	1 1, 2	4	63	value
System leakage capacitance	IRDH...	3	4	64	value
Transformer load in %	107TD47 IZ427 SMI470-9	2 2 1	4	65	value
Transformer load < as value in %	IZ427	2	4	66	value
Transformer load > as value in %	IZ427	2	4	67	value
Digital input set	SMI471...	1... 4	4	70	value
Overvoltage in V	LIM2010	3	4	72	value
Undervoltage in V	IZ427 LIM2010	4 3	4	75	value
Voltage in V	LIM2010	3	4	86	value
Voltage in 1/10 V	LIM2010	3	4	87	value
Delay on release	ATiCS	4	4	95	value
This and the subsequent channel numbers concerning this device are not available.	All	channel No.	4	254	0

Table 6.8: FTC reply to: operating messages or information via channel number

**Dependent on the settings in the menu POWER

6.5 Requesting measuring values

Measuring values are the sum of all existing alarm and operating messages. The protocol converters of the FTC470... series offers the possibility to request each actual measuring value (alarm as well as operating messages) via the channel number using the command 105.

This function offers the entire data stock and can be used for the purpose of logging.

6.5.1 Requesting measuring values via the channel number

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the actual measuring value for a channel. As an answer the alarm message is provided or the operating message, if no alarm message exists.	all	channel No.	105	0	0

Table 6.9: Master request: requesting the operating messages via the channel number

Reading from FTC470XDP (= input data of the PROFIBUS Master)

All alarm and operating messages listed in table 6.3 on page 29 "Requests for alarm messages via channel number" and in table 6.7 on page 33 "Requests for operating messages via channel number".	all	channel No.	105	data type	data value
--	-----	-------------	-----	-----------	------------

Table 6.10: FTC reply to: request for actual measuring values via channel number

6.6 Taking over or returning the Master function

Certain commands in a BMS network can only be carried out when the FTC470XDP takes over the Master function. This is required for the parameterization of BMS devices, for example. When BMS address 1 is continuously assigned to the FTC470XDP, taking over of the Master function is not necessary.



The FTC470XDP must take over the Master function in case of parameter requests and new parameter settings!

Take into account that the Master function must be returned by the FTC470XDP after taking over the Master function and the subsequent parameterization.

6.6.1 Taking over the Master function

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Command to FTC470XDP to take over the Master function in the BMS network temporarily. After carrying out this command, the FTC470XDP is ready to output further commands to the BMS network.	FTC470X..	0	112	2	0

Table 6.11: Master request: taking over of the Master function by FTC470XDP

Reading from FTC470XDP (= input data of the PROFIBUS Master):

FTC470XDP has taken over the Master function. The taking over is acknowledged by the old Master by answering already as a Slave.		0	112	2	0
--	--	---	-----	---	---

Table 6.12: FTC reply to: taking over of the Master function by FTC470XDP

Taking over of the Master function is not required for requesting alarm and operating messages, measuring values and in case of control functions for EDS systems.

6.6.2 Returning the Master function

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Command to FTC470XDP to return the Master function in the BMS network. After carrying out this command, the FTC470XDP again has the status of a Slave in the BMS network.	FTC470X..	0	112	101	0

Table 6.13: Master request: Master return by FTC470XDP

Reading from FTC470XDP (= input data of the PROFIBUS Master):

FTC470XDP has taken over the Slave function		0	112	101	0
---	--	---	-----	-----	---

Table 6.14: FTC reply to: Master return by FTC470XDP

6.7 Parameterization



When the FTC470XDP works in the BMS Slave mode, a temporary Master takeover is required before carrying out the parameterization below!
Take into consideration that the Master function must be returned by the FTC470XDP after Master function transfer and the parameterization.

6.7.1 Requesting the response values via channel number

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the response value of a device via channel number	all	channel No.	30	0	0

Table 6.15: Master request: requesting the device response values

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Response value, insulation fault location in mA	EDS470	1... 12	30	51	value
Response value, insulation fault location in μ A	EDS473, 474	1... 12	30	52	"
Response value of the residual current (mA), range: 1...1000 mA	RCMS....	1... 12	30	55	"
Response value of the residual current (A), range: 10...2250 A	RCMS....	1... 12	30	56	"
Response value insulation monitoring in k Ω	IRDH..	1, 2	30	61	"
Set prewarning in %	RCMS....	13	30	66	"
Digital input is set to 0 V (low)	MK2418..-11	1... 8	30	70	0
Digital input is set to 24 V (high)	MK2418..-11	1... 8	30	70	1
Relay mode of operation: 0 = N/O operation "N.O." test 1 = N/C operation "N.C. test 2 = Flash 3 = N.O. 4 = N.C.	IRDH..	3, 4	30	81	value
Mode current output: 0 = 0...20 mA; 1 = 4...20 mA	IRDH..	5	30	82	"
Mode coupling unit: 0 = none 1 = AGH204 AK80 2 = AGH520S 3 = AGH204 AK160 4 = AGH150 AK160	IRDH..	6	30	83	"
Max. leakage capacitance ISOMETER: 0 = 1 μ F 1 = 10 μ F 2 = 150 μ F 3 = 500 μ F	IRDH..	7	30	84	"
Repeating self test: 0 = 24 h 1 = 1 h 2 = off	IRDH..	8	30	85	"
Display language: 0 = de 1 = en	IRDH.., MK2418..	9	30	86	"
Service password: 000...999	IRDH..	10	30	87	"
Function password: 0 = off 1 = on	IRDH..	11	30	88	value
Fault memory: 0 = off 1 = on	IRDH..	12	30	89	value
Start time self test: 00:00...23:59	IRDH..	13	30	90	value

Function	Devices	Channel No.	BMS command	Data Type	Data Value
EDS mode: 0 = off 1 = on 2 = auto 3 = 1 cycle 4 = position	IRDH..	14	30	91	value
EDS operation, system: 0 = DC 1 = AC 2 = 3AC	IRDH..	15	30	92	"
EDS pulse: 0 = 1mA 1 = 2,5 mA 2 = 10 mA 3 = 25 mA 4 = 50 mA	IRDH..	16	30	93	"
EDS position mode: indication of the BMS address	IRDH..	17	30	94	"
EDS position mode: indication of the channel number	IRDH..	18	30	95	"
Value = alarm address * 100 + channel No. (of the alarm giving device; reference to the subsequent pages)	SMO482-12	1... 12	30	96	"
Test address: 0 = all connected devices will be tested, Value = BMS address of the addressed device	MK2418..	13	30	97	"
Buzzer, collective alarm reset: 1 = on 2 = off	MK2418..	14	30	98	"
Personnel: 0 = medical 1 = technical	MK2418..	15	30	99	"
LSD470 mode	107TD47	16	30	181	"
Display language		17			
EDS mode		18			
Response value insulation monitoring in k Ω	107TD47	5	30	182	"
Response value load current in A	107TD47	6	30	183	"
Time delay of the alarm relay in s	107TD47	7	30	184	"
No further channels	all	channel No.	30	254	254
Invalid value	RCMS...., MK2418..-11	1... 12	30	255	255

Table 6.16: FTC reply to: requesting the device response values

6.7.2 Setting the response values via channel number

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Response value, residual current in mA, range: 1...20000 mA	RCMS....	1... 12	28	55	value
Response value, residual current in A, range: 10...2250 A	RCMS....	1... 12	28	56	"
Response value insulation monitoring in kΩ	IRDH..	1, 2	28	61	"
Prewarning in %	RCMS....	13	28	66	"
Set the digital input to 0 V (low)	MK2418..-11	1... 8	28	70	0
Set the digital input to 24 V (high)	MK2418..-11	1... 8	28	70	1
Relay mode of operation: 0 = N/O operation "N.O." test 1 = N/C operation "N.C." test 2 = Flash 3 = N.O. 4 = N.C.	IRDH..	3, 4	28	81	value
Mode current output: 0 = 0...20 mA 1 = 4...20 mA	IRDH..	5	28	82	"
Mode coupling units: 0 = none 1 = AGH204 AK80 2 = AGH520S 3 = AGH204 AK160 4 = AGH150 AK160	IRDH..	6	28	83	"
Max. leakage capacitance ISOMETER: 0 = 1 μF 1 = 10 μF 2 = 150 μF 3 = 500 μF	IRDH..	7	28	84	"
Repeating self test: 0 = 24 h 1 = 1 h 2 = off	IRDH..	8	28	85	"
Display language: 0 = de 1 = en	IRDH., MK2418..	9	28	86	"
Service password: 000...999	IRDH..	10	28	87	"
Function password: 0 = off 1 = on	IRDH..	11	28	88	"
Fault memory: 0 = off 1 = on	IRDH..	12	28	89	"
Start time self test: 00:00...23:59	IRDH..	13	28	90	"
EDS mode: 0 = off 1 = on 2 = auto 3 = 1 cycle 4 = position	IRDH..	14	28	91	"
EDS operation, system: 0 = DC 1 = AC 2 = 3AC	IRDH..	15	28	92	"
EDS pulse: 0 = 1mA 1 = 2.5 mA 2 = 10 mA 3 = 25 mA 4 = 50 mA	IRDH..	16	28	93	"
EDS position mode: BMS address setting	IRDH..	17	28	94	"
EDS position mode: channel no. setting	IRDH..	18	28	95	"
Data value = alarm address x 100 + channel no. (of the alarm giving device) **	SMO482-12	1... 12	28	96	"
Test address: 0 = all connected devices will be tested Value = BMS address of the device	MK2418..	13	28	97	"
Buzzer, collective alarm reset: 1 = on 2 = off	MK2418..	14	28	98	"
Personnel: 0 = medical 1 = technical	MK2418..	15	28	99	value

Function	Devices	Channel No.	BMS command	Data Type	Data Value
LSD470 mode	107TD47	16	28	181	"
Display language		17			
EDS mode		18			
Response value insulation monitoring in kΩ	107TD47	5	28	182	"
Response value load current in A	107TD47	6	28	183	"
Time delay of the alarm relay in s	107TD47	7	28	184	"

Table 6.17: Master request: setting the response values

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	RCMS...	channel No	28	*	value
Invalid value	RCMS...	"	28	255	255

Table 6.18: FTC reply to: setting the response values

* The read-out data type corresponds to the previously defined data type.

** Example SMO482-12 (table 6.17)

An A-Isometer with BMS address 3 provides an alarm message on channel 2. An SMO482-12 with address 37 located in the BMS network must signal this alarm message at its output relay 1. Output relay 1 = channel number 1 of SMO482-12. Which data value must be entered?

SMO address = 37

SMO channel no. = 1

ISOMETER address = 3

ISOMETER channel no. = 2

Data value = $3 \times 100 + 2 = 302$

Data value to be entered = 302

Data value = alarm address x 100 + channel no. (of the alarm giving device)	SMO482-12	37	1	28	96	302
---	-----------	----	---	----	----	-----

6.7.3 Requesting the delay on response

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the delay on response of a device	RCMS....,	1... 12	48	0	0

Table 6.19: Master request: requesting the delay on response

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Delay on response in ms	RCMS....,	1... 12	48	75	value
No more channels	RCMS....,	1... 12	48	254	254
Invalid value	RCMS....,	1... 12	48	255	255

Table 6.20: FTC reply to: requesting the delay on response

6.7.4 Setting the delay on response

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Setting the delay on response of a device	RCMS....,	1... 12	47	75	value

Table 6.21: Master request: setting the delay on response

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	RCMS....,	1... 12	47	75	value
Invalid value	RCMS....,	1... 12	47	255	255

Table 6.22: FTC reply to: setting the delay on response

6.7.5 Requesting the CT type

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the sensor type of a device (CT type)	EDS...	1... 12	32	0	0

Table 6.23: Master request: request for the sensor type

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Standard CT (W0..W5 /-S-P, WR)	EDS...	1... 12	32	1	0
Split core transformer WS	EDS...	1... 12	32	1	1
No CT connected The channel is being deactivated	EDS...	1... 12	32	1	4
No more channels	EDS...	1... 12	32	254	254
Invalid value	EDS...	1... 12	32	255	255

Table 6.24: FTC reply to: request for the sensor type

6.7.6 Setting the CT type

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Setting the CT type to standard CT (W0..W5/-S/-P, WR)	EDS...	1... 12	31	1	0
Setting the CT type to split core CT (WS)	EDS...	1... 12	31	1	1
Setting the CT type to "no CT"	EDS...	1... 12	31	1	4

Table 6.25: Master request: Setting the CT type

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	EDS...	1... 12	31	1	value
Invalid value	EDS...	1... 12	31	255	255

Table 6.26: FTC reply to: Setting the CT type

6.7.7 Requesting the status of CT monitoring

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the status of CT monitoring of a device channel	EDS..., RCMS...	1... 12	37	0	0

Table 6.27: Master request: status of CT monitoring

Reading from FTC470XDP (= input data of the PROFIBUS Master)

CT monitoring activated	EDS..., RCMS...	1... 12	37	1	1
CT monitoring deactivated	EDS..., RCMS...	1... 12	37	1	0
No more channels	EDS..., RCMS...	1... 12	37	254	254
Invalid value	EDS..., RCMS...	1... 12	37	255	255

Table 6.28: FTC reply to: status of CT monitoring

6.7.8 Setting the status of CT monitoring

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
CT monitoring ON	EDS..., RCMS...	1... 12	36	1	1
CT monitoring OFF	EDS..., RCMS...	1... 12	36	1	0

Table 6.29: Master request: switching the CT monitoring ON or OFF

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	EDS..., RCMS...	1... 12	36	1	value
Invalid value	EDS..., RCMS...	1... 12	36	255	255

Table 6.30: FTC reply to: switching the CT monitoring ON or OFF

6.7.9 Requesting the correction factor for the CT transformation ratio

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Requesting the correction factor for the CT transformation ratio via channel number	RCMS...	1... 12	35	0	0

Table 6.31: Master request: correction factor for CT transformation ratio

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Multiplication with correction factor, (data value = correction factor)	RCMS...	1... 12	35	1	value
Division by correction factor, (data value = correction factor)	RCMS...	1... 12	35	2	value
No more channels	RCMS...	1... 12	35	254	254
Invalid value	RCMS...	1... 12	35	255	255

Table 6.32: FTC reply to: correction factor for CT transformation ratio

6.7.10 Setting the correction factor for CT transformation ratio

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Transformation ratio is multiplied with correction factor 1... 255 (data value = correction factor). For example: Required if an additional CT is used in series with the standard CT	RCMS...	1... 12	33	1	value
Transformation ratio is divided by correction factor 1... 10 (data value = correction factor). Required if several windings are routed through a standard CT	RCMS...	1... 12	33	2	value

Table 6.33: Master request: setting the correction factor for CT

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	RCMS...	1... 12	33	1	value
Acknowledgement	RCMS...	1... 12	33	2	value
Invalid value	RCMS...	1... 12	33	255	255

Table 6.34: FTC reply to: setting the correction factor for CT

6.7.11 Requesting the fault memory

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the status of the fault memory	EDS., RCMS., PRC470, PRC487, MK2418., SMI..	0	24	0	0

Table 6.35: Master request: status of the fault memory

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Fault memory ON	EDS., RCMS., PRC470, PRC487, MK2418., SMI..	0	24	1	1
Fault memory OFF	"	0	24	1	0
Invalid value	"	0	24	255	255

Table 6.36: FTC reply to: status of the fault memory

6.7.12 Setting the fault memory

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Fault memory ON	EDS..., RCMS..., PRC470	0	23	1	1
Fault memory OFF	"	0	23	1	0

Table 6.37: Master request: switching the fault memory on or off

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	EDS..., RCMS..., PRC470	0	23	1	value
Invalid value	"	0	23	255	255

Table 6.38: FTC reply to: switching the fault memory on or off

6.7.13 Requesting the operating mode of the alarm relay

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the operating mode of the collective alarm relay	EDS., RCMS., PRC470...	0	27	0	0

Table 6.39: Master request: operating mode of the collective alarm relay

Reading from FTC470XDP (= input data of the PROFIBUS Master)

N/O operation	EDS., RCMS., PRC470...	0	27	1	0
N/C operation	"	0	27	1	1
Invalid value	"	0	27	255	255

Table 6.40: FTC reply to: operating mode of the collective alarm relay

6.7.14 Setting the operating mode of the alarm relay

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Setting the alarm relays to N/O operation	107TD47 EDS..., RCMS..., PRC470	0	25	1	0
Setting the alarm relays to N/C operation	"	0	25	1	1

Table 6.41: Master request: setting the operating mode of the alarm relay

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	EDS..., RCMS..., PRC470	0	25	1	value
Invalid value	"	0	25	255	255

Table 6.42: FTC reply to: setting the operating mode of the alarm relay

6.7.15 Requesting the channel function

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the current function of a channel	all	channel No.	39	1	0

Table 6.43: Master request: request for a channel's function

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Overcurrent monitoring, residual current monitoring	RCMS...	1... 12	39	1	1
Undercurrent monitoring, open circuit	RCMS...	1... 12	39	1	2
Input switched off	RCMS...	1... 12	39	1	3
Alarm address ON	MK2418	1... 30	39	1	4
Alarm address OFF	MK2418	1... 30	39	1	5
No more channels	all	channel No.	39	254	254
Invalid value	all	channel No.	39	255	255

Table 6.44: FTC reply to: request for a channel's function

6.7.16 Setting the channel function

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Setting the channel to overcurrent/ residual current monitoring	RCMS...	1... 12	38	1	1
Setting the channel to undercurrent / open circuit monitoring	RCMS...	1... 12	38	1	2
Switching the channel function off	RCMS...	1... 12	38	1	3
Setting the alarm address to ON	MK2418	1... 30	38	1	4
Setting the alarm address to OFF	MK2418	1... 30	38	1	5

Table 6.45: Master request: setting the channel's function

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	RCMS..., MK2418	1... 12	38	1	value
Invalid value	"	channel No.	38	255	255

Table 6.46: FTC reply to: setting the channel's function

6.7.17 Requesting the number of measurements per channel

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the number of measurements per channel	EDS...	1... 12	46	0	0

Table 6.47: Master request: number of measurements per channel

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Number of measurements per channel	EDS...	1... 12	46	1	quantity
------------------------------------	--------	---------	----	---	----------

Table 6.48: FTC reply to: number of measurements per channel

6.7.18 Setting the number of measurements per channel

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Setting the number of measurements per channel	EDS...	1... 12	45	1	quantity

Table 6.49: Master request: setting the number of measurements per channel

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	EDS...	1... 12	45	1	quantity
Invalid value	"	1... 12	45	255	255

Table 6.50: FTC reply to: setting the number of measurements per channel

6.7.19 Requesting the maximum number of measurements

In EDS systems, the maximum number of measurements can be set in the menu item "Peak". Setting a higher peak value allows increased measuring reliability in systems where interferences occur, for example caused by converters.

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the maximum number of measurements	EDS..., PRC470	1... 12 1... 12	41	0	0

Table 6.51: Master request: the maximum number of measurements

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Preset max. number of measurements	EDS..., PRC470	1... 12 1... 12	41	1	quantity
------------------------------------	-------------------	--------------------	----	---	----------

Table 6.52: FTC reply to: the maximum number of measurements

6.7.20 Setting the maximum number of measurements

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Setting of the max. number of measurement	EDS..., PRC470	1... 12 1... 12	40	1	quantity

Table 6.53: Master request: setting of the maximum number of measurements

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	EDS..., PRC470	1... 12 1... 12	40	1	quantity
Invalid value	EDS..., PRC470	1... 12 1... 12	40	255	255

Table 6.54: FTC reply to: setting of the maximum number of measurements

6.8 Requesting device-specific information



*When the FTC470XDP works in the BMS Slave mode, a temporary Master takeover is required before carrying out the parameterization below!
Take into consideration that the Master function must be returned by the FTC470XDP after Master function transfer and the parameterization.*

6.8.1 Requesting fault messages after a self test

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for fault messages after a self test		channel No.	9	1	0

Table 6.55: Master request: fault messages after a self test

Reading from FTC470XDP (= input data of the PROFIBUS Master)

No fault detected	EDS., RCMS...	1... 12	9	1	0
Input not connected, no CT connected	EDS., RCMS...	1... 12	9	22	0
No CT connected	EDS..	1... 12	9	22	0
Input switched off	EDS., RCMS...	1... 12	9	21	0
Input short-circuited	EDS., RCMS...	1... 12	9	23	0
No more channels		1... 12	9	254	254
Invalid value	EDS., RCMS...	1... 12	9	255	255

Table 6.56: FTC reply to: fault messages after a self test

6.8.2 Requesting the software version

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the software version	all	0	22	0	0

Table 6.57: Master request: for the software version

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Number of the device software version x 100. Example: answer 112 = V 1.12.	all	0	22	1	Version x 100
---	-----	---	----	---	------------------

Table 6.58: FTC reply to: the software version

6.8.3 Requesting the device type and device version

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Request for the device type. The answer includes the device family [enclosure/variant]	all	0	20	0	0

Table 6.59: Master request: for the device type and device variant

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Device type

A-ISOMETER for medical locations acc. to DIN VDE 0107	107TD47	0	20	121	
Insulation fault evaluator	EDS470-12	0	20	1	
Insulation fault evaluator	EDS473-12	0	20	5	
Converter BMS <=> PROFIBUS DP	FTC470XDP	0	20	201	
Converter BMS <=> Ethernet, TCP/IP	FTC470XET	0	20	205	
Converter BMS <=> Modbus RTU	FTC470XMB	0	20	203	
Insulation monitoring device	IRDH275B	0	20	41	
Insulation monitoring device	IRDH375B	0	20	43	
Insulation monitoring device	IRDH575	0	20	45	
Alarm indicator and test combination	MK2418	0	20	81	
Alarm indicator and test combination	MK2418C	0	20	81	
Converter BMS=> digital outputs	MODS480	0	20	72	
Insulation fault test device	PGH471	0	20	51	
Insulation fault test device	PGH473	0	20	55	
Insulation fault test device	PGH474	0	20	57	
Control and indicating device	PRC470	0	20	61	
Control and indicating device	PRC487	0	20	91	
Residual current evaluator	RCMS470	0	20	31	
Converter digital inputs => BMS	SMI470	0	20	111	
Converter digital inputs => BMS	SMI471	0	20	112	
Converter digital inputs => BMS	SMI472	0	20	113	
Converter BMS => digital outputs	SMO480	0	20	71	
Converter BMS => digital outputs	SMO481	0	20	73	
Invalid value	all	0	20	255	
No device with such an address available	all	0	20	0	

Device variant

No variant		0	20		0
Number of inputs	...-9	0	20		9
Number of inputs	...-11	0	20		11
Number of inputs	...-12	0	20		12
Programmable device variant	...C-11	0	20		211
Programmable device variant	...C-12	0	20		212
Device variant for an extended address range	...E	0	20		1
Device variant for an extended address range	...E-11	0	20		111
Device variant for an extended address range	...E-12	0	20		112
Invalid value		0	20		255

Table 6.60: FTC reply to: device type and variant

6.9 Control commands for use in BMS Master mode



When the FTC470XDP works in the BMS Slave mode, a temporary Master takeover is required before carrying out the control commands below! Take into consideration that the Master function must be returned by the FTC470XDP after Master function transfer and after the control commands have been carried out.

6.9.1 Deleting all alarm messages

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Deleting all alarm messages	all	0	13	0	0

Table 6.61: Master request: deleting all alarm messages

Reading from FTC470XDP (= input data of the PROFIBUS Master):

Acknowledgement that all alarm messages are deleted	RCMS...	0	13	0	0
No answer	EDS...	0	13	255	255

Table 6.62: FTC reply to: deleting all alarm messages

6.9.2 Starting a self test of insulation monitoring devices

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Starting the self test of an insulation monitoring device	107TD47, IRDH375B/ 575, MK2418-11, SMI470-9	0	8	0	0

Table 6.63: Master request: starting the self test of an insulation monitoring device

Reading from FTC470XDP (= input data of the PROFIBUS Master):

Self test is being acknowledged	107TD47., MK2418- 11, SMI470-9	0	8	255	255
---------------------------------	--------------------------------------	---	---	-----	-----

Table 6.64: FTC reply to: starting a self test of an insulation monitoring device

6.9.3 Starting the self test of an EDS system

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Starting the self test of an EDS system	EDS.., RCMS..	0	7	0	0

Table 6.65: Master request: starting the self test of an EDS system

Reading from FTC470XDP (= input data of the PROFIBUS Master):

No answer	EDS... RCMS...	0	7	255	255
Self test is being confirmed	EDS... effective from version 2.0	0	7	0	0

Table 6.66: FTC reply to: starting the self test of an EDS system

6.9.4 Buzzer mute

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Buzzer mute	MK2418.., SMI470...	0	14	0	address

Table 6.67: Master request: buzzer mute

Reading from FTC470XDP (= input data of the PROFIBUS Master):

No answer	MK2418.., SMI470...	0	14	255	255
Acknowledgement of the buzzer mute version 2.0 or higher	"	0	14	0	0

Table 6.68: FTC reply to: buzzer mute

6.9.5 Switching the relay of a specific channel

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Switching on the relay of a specific channel	SMO481	1... 12	42	1	0
Switching off the relay of a specific channel	"	1... 12	42	2	0
Switching off all relays	"	1... 12	42	3	0

Table 6.69: Master request: switching relays of a specific channel

Reading from FTC470XDP (= input data of the PROFIBUS Master):

No answer	SMO481	1... 12	42	255	255
Acknowledgement	"	1... 12	42	0	0

Table 6.70: FTC reply to: switching relays of a certain channel

6.10 Control commands to be used in the BMS Slave mode

6.10.1 Starting and stopping EDS systems

Writing to FTC470XDP (= output of the PROFIBUS Master):

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Command to BMS Master to start insulation fault location of an EDS system		0	115	3	0
Command to BMS Master to stop insulation fault location of an EDS system		0	115	4	0
Command to BMS Master to start insulation fault location of an EDS system in POSITION mode		1... 12	115	5	BMS address + channel *

Table 6.71: Master request: BMS Master is intended to control the EDS system

* The value "address" consists of:

"Address" = (BMS address x 100) + channel number

Reading from FTC470XDP (= input data of the PROFIBUS Master):

No answer		0	115	255	255
Acknowledgement		0	115	data type	value

Table 6.72: FTC reply to: BMS Master is intended to control the EDS system

6.11 Output of PROFIBUS messages via the BMS bus

The functions 102 and 104 allow messages to be transmitted from the PROFIBUS to the BMS bus where they can be processed as alarm respectively operating messages. That allows, for example, the indication of PROFIBUS messages on BMS panels or alarm and operator panels.

The FTC470XDP provides a maximum of 12 channels for PROFIBUS messages.

6.11.1 Output of PROFIBUS alarm messages via BMS bus

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Output of a message as an alarm message from the PROFIBUS to the BMS bus	FTC470XDP	1... 12	102	*	*

Table 6.73: Master request: Output of PROFIBUS messages to BMS bus

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	FTC470XDP	channel No.	102	*	*
Invalid value	FTC470XDP	1... 12	102	255	255

Table 6.74: FTC reply to: Output of PROFIBUS messages to BMS bus

* All the information about data types and values listed in the tables beginning on page 29: apply: "Requesting alarm messages"

6.11.2 Output of PROFIBUS operating messages via BMS bus

Writing to FTC470XDP (= output of the PROFIBUS Master)

Function	Devices	Channel No.	BMS command	Data Type	Data Value
Output of a message as an operating message from the PROFIBUS to the BMS bus	FTC470XDP	1... 12	104	*	*

Table 6.75: Master request: output of PROFIBUS messages to the BMS bus

Reading from FTC470XDP (= input data of the PROFIBUS Master)

Acknowledgement	FTC470XDP	1... 12	104	*	*
Invalid value	FTC470XDP	1... 12	104	255	255

Table 6.76: FTC reply to: output of PROFIBUS messages to the BMS bus

* All the information about data types and values listed in the tables beginning on page 33: apply: "Requesting operating messages"

7. Programming examples

Necessary configuration data for the PRODFIBUS DP are to be communicated to the PROFIBUS-Master by means of gsd file ftc_1003.gsd before the program is executed. You can load the current file under the following address:

<http://www.bender-de.com>

=> Download/Software

7.1 Alarm messages

7.1.1 Number of alarm messages

The PROFIBUS DP Master addresses BMS address 3, the EDS470-12 insulation fault evaluator, requesting the current number of its alarm messages.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
1	0	3	0	1	0	0	0

The addressed EDS470-12 returns 4 alarm messages:

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1	0	3	0	1	1	0	4

The PROFIBUS DP Master addresses BMS address 5, the insulation monitoring device 107TD47, requesting the current number of alarm messages.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
2	0	5	0	1	0	0	0

The addressed 107TD47 provides 3 stored alarm messages which had been released by pressing the internal test button of the device.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
2	0	5	0	1	3	0	3

7.1.2 Requesting alarm messages or information via channel number

The PROFIBUS Master interrogates BMS address 5, the 107TD47 insulation monitoring device, for information about the overtemperature (alarm message). This message is available at channel 3 of the 107TD47:

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
3	0	5	3	2	0	0	0

The addressed 107TD47 signals overtemperature of the monitored isolating transformer:
PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
3	0	5	3	2	11	0	3

The PROFIBUS Master interrogates BMS address 10, a PRC487 control device, for information about the state of Line 1 (alarm message). This information is available at channel 1 of PRC487:

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
4	0	10	1	2	0	0	0

The addressed PRC487 signals failure of Line 1:
PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
4	0	10	1	2	11	0	4

The PROFIBUS Master interrogates BMS address 20, an EDS470-12 insulation fault evaluator, for information about the alarm value of channel 5:

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
5	0	20	5	2	0	0	0

The EDS470-12 signals an alarm value of 11 mA to channel 5:

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
5	0	20	5	2	51	0	11

The PROFIBUS Master addresses BMS address 17, the residual current evaluator RCMS470-12, for the alarm value of channel 12:

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
6	0	17	12	2	0	0	0

The RCMS470-12 signals a "fault current of 3 A" (depending on the setting of residual current/over-current/undercurrent) as alarm value:

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
6	0	17	12	2	56	0	3

7.2 Operating messages

7.2.1 Requesting the operating messages via channel number

The PROFIBUS Master addresses BMS address 25, the control device PRC487, for information about the state of Line 1 (operating message). This information is available at channel 1.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
7	0	25	1	4	0	0	0

The PRC487 replies that Line 1 is carrying current and is ready for operation.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
7	0	25	1	4	13	0	* 201

* The answer in byte 8 could also be 210, 211 or 212.

The PROFIBUS Master addresses BMS address 29, the IRDH.... insulation monitoring device, for information about the actual insulation resistance (operating message). This information is available at channel 1 of the IRDH.....

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
8	0	29	1	4	0	0	0

The IRDH.... replies that the value of the actual insulation resistance is 185 k Ω

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
8	0	29	1	4	61	0	185

The PROFIBUS Master addresses BMS address 29, 107TD47, for information about the actual load of the transformer (operating message). This value is available at channel 2 of the device:

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
9	0	29	2	4	0	0	0

The 107TD47 replies that the transformer utility is 66 % :

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
9	0	29	2	4	65	0	66

7.3 Requesting the measuring values via channel number

The following examples only differ in their replies.

The PROFIBUS Master addresses BMS address 7, the RCMS470-12 residual current monitor, for information about the actual measuring value. This value is available at channel 10.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
10	0	7	10	105	0	0	0

The RCMS470-12 replies that a fault current of 100 mA is the measuring value to channel 10.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
10	0	7	10	105	55	0	100

The PROFIBUS Master addresses BMS address 7, the RCMS470-12 residual current monitor, for information about the actual measuring value. This value is available at channel 10.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
11	0	7	10	105	0	0	0

The RCMS470-12 signals a fault current of 9 A as the actual measuring value.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
11	0	7	10	105	56	0	9

The PROFIBUS Master addresses BMS address 20, the insulation monitoring device 107TD47, for the actual measuring value. This information is available at channel 1 of the 107TD47.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
12	0	20	1	105	0	0	0

The 107TD47 signals an insulation resistance of 100 kΩ as measuring value.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
12	0	20	1	105	61	0	100

7.4 Temporary Master takeover and return

Certain commands in a BMS network can only be carried out when the FTC470XDP takes over the Master function. This is required for the parameterization of BMS devices, for example. When BMS address 1 is continuously assigned to the FTC470XDP, taking over of the Master function is not necessary.



*The FTC470XDP must take over the Master function in case of parameter requests and new parameter settings!
Take into account that the Master function must be returned by the FTC470XDP after taking over the Master function and the subsequent parameterization.*

7.4.1 Taking over the Master function

BMS address 3 is to be assigned to the protocol converter FTC470XDP. The PROFIBUS Master sends an appropriate command FTC470XDP. PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
30	0	3	0	112	2	0	0

FTC470XDP acknowledges the temporary change to Master mode. PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
30	0	3	0	112	2	0	0

7.4.2 Returning the Master function

The PROFIBUS Master sends an appropriate command FTC470XDP. PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
40	0	3	0	112	101	0	0

FTC470XDP acknowledges the change to Slave mode. PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
40	0	3	0	112	101	0	0

7.5 Control commands for use in the Master mode

For the control commands in the tables below the FTC470XDP is required to take over the Master function or must already be in this mode.

The PROFIBUS Master deletes all existing alarm messages of all the devices connected to the bus.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
13	0	0	0	13	0	0	0

All existing alarms are being deleted, neither a reply nor an acknowledgement is sent by the respective device.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
13	0	0	0	13	255	0	255

The PROFIBUS Master deletes all alarm messages of an EDS470-12 insulation fault evaluator with address 5.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
14	0	5	0	13	0	0	0

The existing alarms of the EDS470-12 are being deleted, but not acknowledged by the device.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
14	0	5	0	13	255	0	255

The PROFIBUS Master deletes all alarm messages of an RCMS470-12 residual current evaluator with address 10.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
15	0	10	0	13	0	0	0

The existing alarms of the RCMS470-12 are being deleted and acknowledged.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
15	0	10	0	13	0	0	0

The PROFIBUS Master introduces an internal self test of a 107TD47 insulation monitoring device with address 3.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
16	0	3	0	8	0	0	0

The 107TD47 carries out a self test and acknowledges it.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
16	0	3	0	8	0	0	0

The PROFIBUS Master mutes the buzzer of an MK2418 alarm indicator and test combination with address 22.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
17	0	22	0	14	0	0	0

MK2418 acknowledges the buzzer mute (software 2.0 or higher).

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
17	0	22	0	14	0	0	0

7.5.1 Interrogating the FTC470XDP device type

For fault finding or commissioning, the following example can be helpful.

The device type of the protocol converter FTC470XDP with address 1 (= Master) is to be interrogated.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
1	0	1	0	20	0	0	0

The PROFIBUS Master receives data type 201 as identification for FTC470XDP.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1	0	1	0	20	201	0	0

7.6 Control commands for use in the BMS Slave mode

For carrying out the control commands below, the FTC470XDP is not required to take over the Master function.

The PROFIBUS Master instructs a random Master in a BMS network to start insulation fault location in an EDS system. FTC470XDP is in Slave mode during the whole process.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
18	0	1	0	115	3	0	0

Insulation fault location is being started and acknowledged.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
18	0	1	0	115	3	0	0

The PROFIBUS Master instructs a random Master in a BMS network to start insulation fault location in an EDS system in POSITION mode. The value to be requested is available at channel 3 with BMS address 7. FTC470XDP is in the Slave mode during the whole process.

PROFIBUS Master output data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
19	0	1	0	115	5	* 2	* 191

Insulation fault location in POSITION mode is being started and acknowledged.

PROFIBUS Master input data:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
19	0	1	0	115	5	* 2	* 191

In this example the "value" results from linking High-Byte and Low-Byte (byte 7+8).

* The value of the whole "address" is formed as follows:

"Address" = (BMS address x 100) + channel number.

As shown in the example above, the result of linking address = 7 and channel = 3 is 703.

703 = 2BF hex

Byte 7 = 002 decimal

Byte 8 = 191 decimal

7.6.1 Requesting the measuring value of all channels of an RCMS470-12

The actual measuring values of all 12 channels of an RCMS470-12 with address 12 are to be interrogated.

For that purpose the PROFIBUS-Master at first interrogates channel 1 (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
20	0	12	1	105	0	0	0

In return the RCMS470-12 sends a measuring value of 22 mA to channel 1 (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
20	0	12	1	105	55	0	22

Channel 2 is being requested (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
21	0	12	2	105	0	0	0

In return the RCMS470-12 sends a measuring value of 224 mA to channel (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
21	0	12	2	105	55	0	224

Channel 3 is being requested (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
22	0	12	3	105	0	0	0

In return the RCMS470-12 sends a measuring value of 8 A to channel 3 (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
22	0	12	3	105	56	0	8

Channel 4 is being requested(output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
23	0	12	4	105	0	0	0

The RCMS470-12 replies that channel 4 has been switched off (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
23	0	12	4	105	21	0	0

Channel 4 is being requested (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
24	0	12	5	105	0	0	0

The RCMS470-12 replies that no current measuring transformer is connected to channel 5:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
24	0	12	5	105	22	0	0

The channels 6 to 12 are to be requested consecutively, as shown in the example.

7.6.2 Requesting a device type after taking over the Master function by FTC470XDP

The following example shows the Master takeover, the subsequent interrogation and Master return. In this example it is assumed that BMS address 2 is assigned to FTC470XDP 2. By assigning BMS address 1 to the FTC470XDP, it would anyway have the Master function.

Requesting the device type (EDS470)

The insulation fault evaluator EDS470-12 with address 5 is to be interrogated. For that purpose, at first the protocol converter FTC470XDP with address 2 must take over the Master function

(output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
1	0	2	0	112	2	0	0

The Master function is acknowledged (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
1	0	2	0	112	2	0	0

The PROFIBUS-Master interrogates the device type of EDS470-12 (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
2	0	5	0	20	0	0	0

The PROFIBUS Master reads the device type of EDS470-12 (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
2	0	5	0	20	1	0	12

The PROFIBUS Master instructs the FTC470XDP to return the Master function to the initial Master (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
3	0	2	0	112	101	0	0

The return of the Master function is acknowledged (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
3	0	2	0	112	101	0	0

7.6.3 Parameter setting after the FTC470XDP has taken over the Master function

The examples below show the taking over of the Master function, the subsequent activity and the Master return. All the examples are based on the assumption that the BMS address of the FTC470XDP is 2. By assigning BMS address 1 to the FTC470XDP, it would anyway have the Master function.

Changing the operating mode of an alarm relay (107TD47)

The operating mode of the alarm relay of the insulation monitoring device 107TD47 with address 4 is to be changed from N/O operation to N/C operation. For that purpose, the protocol converter FTC470XDP with BMS address 2 at first has to take over the Master function.

(output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
4	0	2	0	112	2	0	0

The transfer of the Master function will be acknowledged (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
4	0	2	0	112	2	0	0

The PROFIBUS Master sets the operating mode of the alarm relay of the 107TD47 to N/C operation: (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
5	0	4	0	25	1	0	1

The changed operation mode is acknowledged (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
5	0	4	0	25	1	0	1

The PROFIBUS Master instructs FTC470XDP to return the Master function to the initial Master (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
6	0	2	0	112	101	0	0

The return of the Master function is acknowledged (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
6	0	2	0	112	101	0	0

Switching two channels of an RCMS470 off

The channels 11 and 12 of a residual current evaluator RCMS470-12 with address 10 are to be switched off because they are not used. In this way the measuring time of the devices can be reduced. At first, the PROFIBUS Master instructs the FTC470XDP to take over the Master function

(output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Consecutive PROFIBUS ID No.	always "0"	BMS address of the addressed device	BMS channel number	BMS Command	BMS data type	High byte BMS data value	Low byte BMS data value
7	0	2	0	112	2	0	0

The transfer of the Master function is acknowledged (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
7	0	2	0	112	2	0	0

The PROFIBUS Master disables channel 11 of the RCMS470-12 (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
8	0	10	11	38	1	0	3

Acknowledgement that channel 11 has been disabled: (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
8	0	10	11	38	1	0	3

The PROFIBUS Master disables channel 12 of the RCMS470-12 (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
9	0	10	12	38	1	0	3

Acknowledgement that channel 12 has been disabled: (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
9	0	10	12	38	1	0	3

The PROFIBUS Master instructs FTC470XDP to return the Master function to the initial Master (output data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
10	0	2	0	112	101	0	0

The return of the Master function is acknowledged (input data):

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
10	0	2	0	112	101	0	0

8. Service and support

8.1 Damage in transit

Damage in transit must be confirmed directly by the carrier. In case of doubt, please inform Bender immediately:

Dipl.-Ing. W. Bender GmbH & Co. KG
Londorfer Straße 65
35305 Grünberg
+49 6401 807-0

8.2 Malfunctions

If the FTC470XDP leads to malfunctions in the connected system, please refer to the accompanying technical manual.

8.2.1 What shall be checked?

Check whether ...

- the device is supplied by the correct supply voltage U_S
- the BMS bus cable is correctly connected and terminated (120 Ω)
- the PROFIBUS cable is correctly connected and terminated (DIP switch)
- the BMS address is correctly set
- the PROFIBUS address is correctly set
- the GSD file was transferred to the PROFIBUS DP master
- the PROFIBUS DP command "requesting device type" to FTC470XDP:
ID No, 0, BMS address of the FTC470XDP, 0, 20, 0, 0, 0
leads to the following result:
ID No, 0, BMS address of the FTC470XDP, 0, 20, 201, 0, 0
Otherwise the FTC470XDP is already operating incorrectly
- the PROFIBUS DP commands for FTC470XDP show the correct syntax.

8.2.2 Where do you get help?

If, after thorough reading of the technical manual and intensive fault location in your installation, you cannot clear the fault signalled by the protocol converter FTC470XDP, please contact our technical sales office:

0049 6401 807-0

or contact us via the Internet:

info@bender-de.com

8.3 Warranty claims

Bender warrants the FTC470XDP to be free from defects in material and workmanship under normal use and service for a period of 24 months from the date of delivery.

This warranty does not extend to any kind of maintenance work and shall only be valid for the first purchaser and shall not extend to products or individual parts thereof which have not been correctly used, or which have undergone modifications. Any warranty shall lapse if the device is used other than for the intended purpose.

The warranty obligation is limited to the repair or the exchange of a product which has been sent to Bender within the warranty period. The qualifying conditions are that Bender shall recognize this product as being faulty, and that the fault cannot be attributed to improper handling or modification of the device, nor to abnormal operating conditions.

Any warranty obligation shall lapse if repairs are undertaken by persons who are not authorized by Bender.

Bender shall not assume any liability for direct or indirect concomitant or subsequent damage regardless of whether these are attributable to legal, illegal or other actions.

8.4 Warranty and liability

Warranty and liability claims in cases of damage to persons and property shall be excluded if they are attributable to one or more of the following causes:

- Use of the FTC470XDP other than for the intended purpose
- Incorrect assembly or installation, commissioning, operation and maintenance of the device
- Operation of the device with faulty safety equipment, or safety and protective devices which are not correctly positioned or are not capable of functioning
- Failure to comply with the information in the operating instructions regarding transport, storage, assembly or installation, commissioning, operation and maintenance
- Unauthorized structural modifications to the device
- Failure to comply with the technical data
- Improperly executed repairs, and the use of spare parts or accessories which are not recommended by the manufacturer
- Cases of disaster and force majeure

9. Technical Data

9.1 Technical data in tabular form

The values marked with * are absolute values

Insulation coordination acc. to IEC 60664-1

Rated voltage.....	AC 250 V
Rated impulse voltage/pollution degree.....	4 kV / 3

Voltage ranges

Supply voltage U_S (see nameplate)	AC/DC 85... 276 V
.....	DC independent of polarity
Frequency range U_S	50... 400 Hz
Max. power consumption.....	12 VA

Displays

PROFIBUS DP.....	3 diagnosis LEDs: Run (Bus ready), DIAG (HW setting status), BF (Bus error)
BMS bus.....	4 diagnosis LEDs: ON, Alarm, FAULT, BMS

Serial interfaces

PROFIBUS DP	RS485 Sub D 9 pole, electrically isolated / PROFIBUS DP Slave protocol
BMS bus	RS485 (terminals A/B) / BMS protocol
Max. cable length	1200 m
Cable: twisted pair, shielded, shield connected to PE on one side.....	recommended: J-Y(St)Y min. 2 x 0.8
Terminating resistor PROFIBUS DP	DIP switch
Terminating resistor BMS.....	terminal connections A/B, 120 Ω (0,5 W)
Address assignment PROFIBUS DP	Rotary switches, 1... 99
Address assignment BMS.....	DIP switches, 1... 30
Baud rate PROFIBUS DP.....	automatic baud rate recognition: 9.6 kBit/s... 12.0 MBit/s
.....	9.6 / 19.2 / 93.75 / 187.5 / 500 kBit/s
.....	1.5 / 3.0 / 6.0 / 12.0 MBit/s
Baud rate BMS	9.6 KBit/s

General data

EMC immunity	according to IEC 61326
EMC emission	according to IEC 61326
Shock resistance IEC60068-2-27 (device in operation).....	15 g / 11 ms
Bumping IEC60068-2-29 (during transport)	40 g / 6 ms
Vibration resistance IEC 60068-2-6 (device in operation).....	1 g / 10... 150 Hz
Vibration resistance IEC 60068-2-6 (during transport)	2 g / 10... 150 Hz
Ambient temperature (during operation)	-10 °C... +55 °C
Ambient temperature (storage)	-40 °C... +70 °C
Climatic class according to IEC 60721-3-3.....	3K5
Operating mode	continuous operation
Mounting	any position
Connection.....	screw terminals
Connection rigid, flexible	0.2... 4 mm ² / 0.2... 2.5 mm ²
Connection, flexible with connector sleeve, without/with plastic sleeve.....	0.25... 2.5 mm ²
Conductor sizes (AWG)	24... 12
Protection class, internal components (DIN EN 60529).....	IP30
Protection class, terminals (DIN EN 60529).....	IP20
Type of enclosure.....	X470, free from halogen

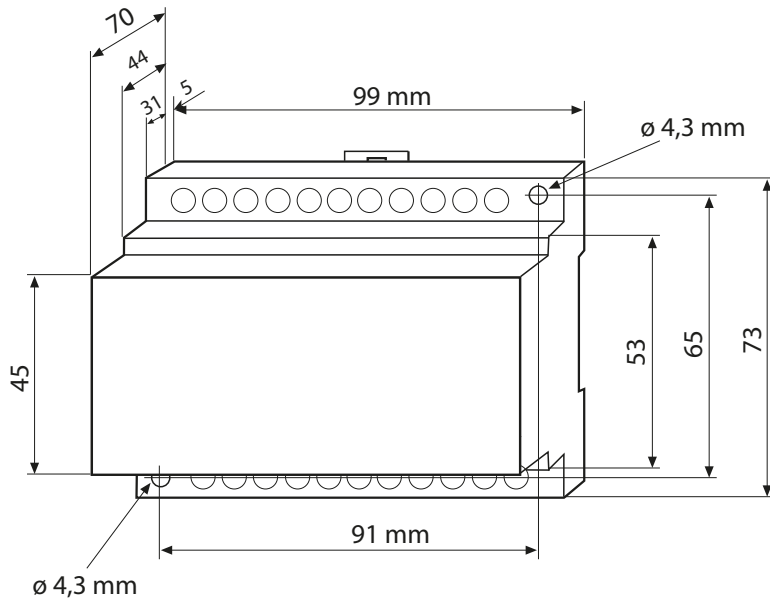
DIN rail mounting according to IEC 60715
 Flammability class..... UL94 V-1
 Weight approx. 350 g

Option "W"

Shock resistance according to IEC 60068-2-27 (device in operation)30 g / 11 ms
 Bumping according to IEC 60068-2-29 (transport) 40 g / 6 ms
 Vibration resistance according to IEC 60068-2-61.6 mm / 10...25 Hz
 4 g / 25...150 Hz
 Ambient temperature, during operation..... -25 °C... +70 °C
 Ambient temperature (storage)..... -40 °C... +85 °C
 Screw mounting..... 2 x M4

9.2 Dimension diagram

FTC470XDP is incorporated in a Bender enclosure of the X470 series, as described below



Possible is:

- DIN rail mounting according to IEC 60715
- Screw Mounting

9.3 Ordering details

Type	Supply voltage U_S	Art. No.
FTC470XDP-36	AC 85...276 V / DC 85...276 V	B 9506 1000

9.4 Certification

A certification for the PROFIBUS coupling module is available.

Module: Anybus-S PDP, manufacturer: HMS, Sweden

PROFIBUS conformity: Z00271

INDEX

107TD47

- actual load of transformer, requesting 61
- Changing the operating mode of an alarm relay 71
- Display language, setting 40
- EDS mode, setting 40
- internal self test, introducing 66
- LSD470 mode, setting 40
- number of alarm messages, requesting 57
- Overtemperature, requesting 58
- Response value insulation monitoring, setting 40
- Response value load current, setting 40
- Time delay of the alarm relay, setting 40

A

- address setting, BMS 23
- address setting, PROFIBUS DP 24
- Alarm messages, requesting 28
- Alarm relay, changing the operating mode 71
- Alarm relay, requesting and setting the operating mode 46

B

- BMS address setting 23
- Buzzer, collective alarm reset 39

C

- Channel functions, requesting and setting 47
- connection and mounting 24
- Connection to the BMS 24
- Connection to the PROFIBUS DP 24
- Control commands, Master mode 52
- Control commands, Slave mode 55
- Correction factor for the CT transformation ratio, requesting and setting 44
- CT monitoring, requesting and setting the status 43
- CT type, requesting and setting 42

D

- Damage in transit 73
- Deleting all existing alarm messages of all the devices connected to the bus 65
- Device type of the FTC470XMB, requesting 67
- device type, requesting 51, 70
- Dimension diagram 76
- DIP switch, BMS bus address 14
- Display and operating elements 13

E

- EDS system in POSITION mode, starting 68
- EDS470
 - alarm message, channel related requesting 59
 - alarm messages, deleting 65
 - alarm messages, requesting number of 57
 - device type, requesting 70
 - insulation fault location, starting 68
 - Response value, insulation fault location, requesting 37

F

- Fault memory, requesting and setting 45
- Fault messages after a self test, requesting 50
- Format input data 20
- Format output data 19
- FTC470XDP as BMS Master 18
- FTC470XDP as BMS Slave 17

G

- GSD file 27

H

- How to use this documentation 7

I

- IRDH...
 - actual insulation resistance, requesting 60
 - Display language, setting 39

- EDS measuring puls, setting 39
- EDS mode, setting 39
- EDS operation, AC, 3AC or DC system, setting 39
- EDS position mode, BMS address set 39
- EDS position mode, channel no. set 39
- Fault memory off/on, setting 39
- Function password on/off, setting 39
- Max. leakage capacitance Isometer, setting 39
- Mode coupling unit, setting 39
- Mode current output, setting 39
- Relay mode of operation, setting 39
- Repeating selftest, setting 39
- Response value insulation monitoring, setting 39
- Service password, setting 39
- Start time selftest, setting 39

M

- Master return by FTC470XDP 64
- Master takeover by FTC470XDP 64
- Maximum number of measurements (PEAK), requesting and setting 49
- Measuring values, requesting 35
- MK2418
 - Buzzer, collective alarm reset on/off, setting 39
 - buzzer, muting 66
 - Display language, setting 39
 - Personnel, medical/technical, setting 39
 - Test address, setting 39
- Mounting and connection 24

N

- Number of measurements per channel, requesting and setting 48

O

- Operating messages, requesting 32

P

- Parameterization 37
- PEAK, setting 49
- PRC487
 - state of Line 1, requesting 58
- PROFIBUS messages via the BMS bus 56
- Programming examples 57

R

- RCMS4...
 - delay on response, requesting 41
 - Prewarning in %, setting 39
 - Response value of the residual current (A), setting 39
 - Response value of the residual current (mA), setting 39
- RCMS470
 - Alarm value, requesting via channel number 59
 - all alarm messages, deleting 66
 - channels, switching off 72
 - measuring value of all channels, requesting 69
 - Measuring values, requesting via channel number 62
- Redundant Master function 15
- Response values, requesting and setting 37

S

- Setting the number of measurements per channel 48
- setting the PROFIBUS DP address 24
- Software version, requesting 50
- Status indicators, BMS bus 14
- status indicators, PROFIBUS DP 14
- support and service 73

T

- Temporary taking over of the Master function 17

W

- Warranty and liability 74
- Warranty claims 74
- wiring diagram FTC470XDP 25
- Work activities on electrical installations 9



Bender GmbH & Co. KG

P.O. Box 1161 • 35301 Gruenberg • Germany
Londorfer Straße 65 • 35305 Gruenberg • Germany
Tel.: +49 6401 807-0 • Fax: +49 6401 807-259
E-mail: info@bender.de • www.bender.de

Fotos: Bender Archiv und bendersystembau Archiv.



BENDER Group