



BusCon  
PROFIBUS-DP Gateway for recorders and  
transducers for electric power variables

## Manual

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## Producer

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## 1 Description

The Profibus Interface Module BusCon is designed to provide the values measured with ABB recorders PointMaster 100/200, LineMaster 200/300 and the power transmitter Contrans E SU as Profibus DP signals. Communication to the units is effected via the RS 485 interface in accordance with the Modbus protocol specifications (only Modbus RTU is supported). BusCon enables access to all components connected to the RS485 bus by way of a single Profibus address. The data exchange takes place by means of a configurable data length in both directions, with a maximum 12 Mbaud. Here, the interface module always plays the role of a Profibus-DP slave.

For the connection of the units to BusCon, Operating Instructions of each respective unit destined for the Modbus interface must be provided.

Detailed information on the MODBUS protocol can be found in the following document:

GOULD MODICON MODBUS PROTOCOL  
Reference Guide  
Gould Inc., Programmable Control Division  
P.O Box 3083  
Andover, Massachusetts, 01810  
PI-MBUS -300 Rev A, November 93

**2 Dimensions and connections**

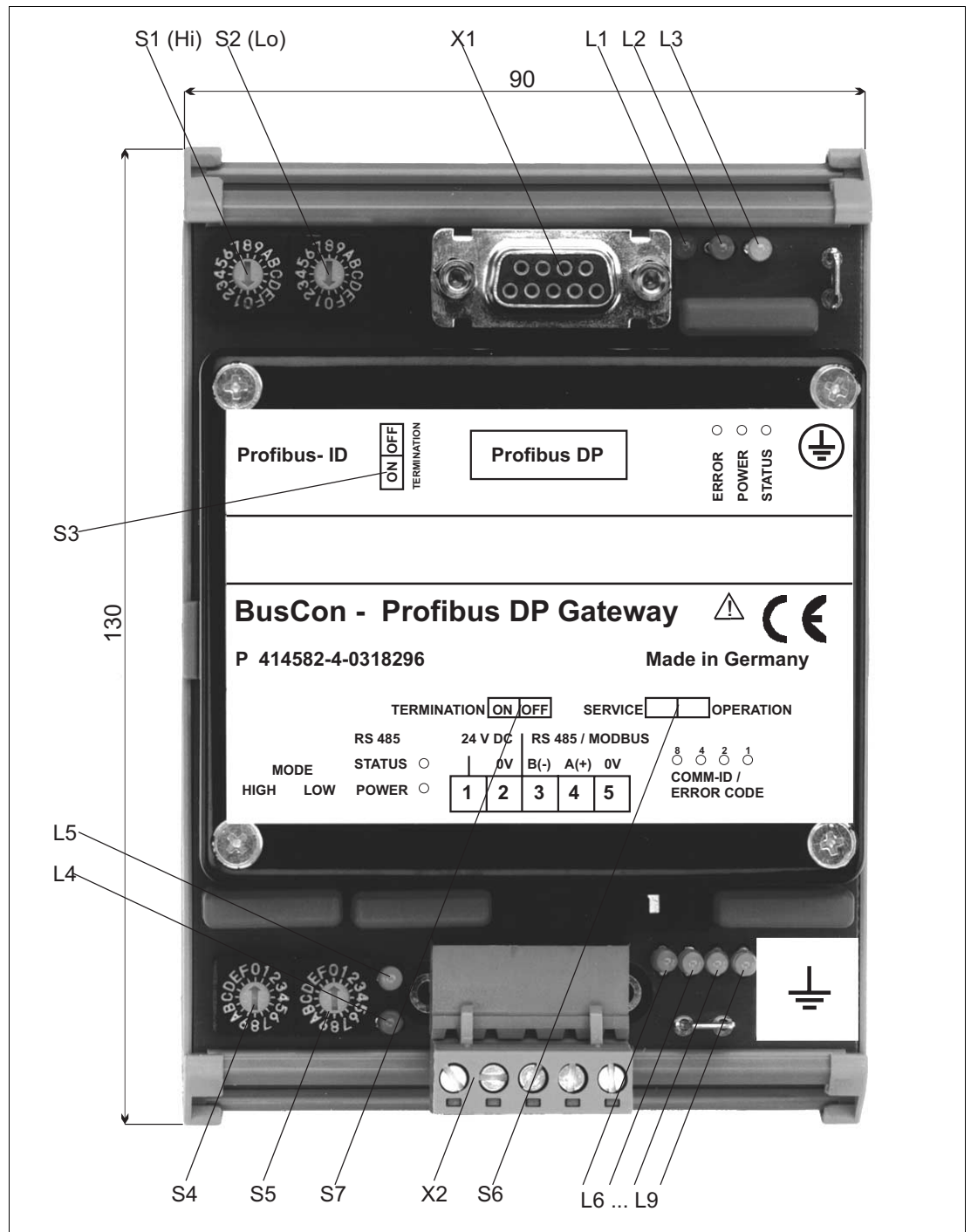


Bild 2-1 BusCon Dimension and Connections (Dimensions in mm)  
 X1 Connector Profibus DP  
 X2 Connectors power supply and RS 485/RS 232 interface  
 S1, S2 Rotary encoding switch Profibus-ID  
 S3§ Sliding switch Profibus termination  
 S4, S5 Rotary encoding switch RS 485-ID  
 S6 Sliding switch Operation/Service changeover  
 S7 Sliding switch RS 485 termination  
 L1...L9 LED's 1 to 9

### 3 Electrical connections

The interface module has 2 connectors X1 and X2, as well as 2 grounding terminals for equipotential bonding, which are described in detail below.

#### 3.1 Connector X1 (Profibus DP)

The PROFIBUS-DP is coupled to this 9-pin D-Sub female connector with the following standard features:

- 1 = Shielding
- 2 = not connected
- 3 = B conduit
- 4 = Request to Send (RTS)
- 5 = Mass (separated potential)
- 6 = 5 V (separated potential)
- 7 = not connected
- 8 = A conduit
- 9 = Mass (separated potential)

#### 3.2 X2 Connectors (power supply and R 485/RS 232 interface)

The power supply and the RS 485/RS 232 signals are fed to the interface module via this connector. It is equipped as follows:

- 1 = power supply 10 ... 30 VDC
- 2 = power supply 0 Volt
- 3 = RS 485 B (-)
- 4 = RS 485 A (+)
- 5 = reference for PINS 3 + 4



#### Attention

**For power supply, only direct current mains units with electrical isolation may be used.**

#### Equipotential bonding

Potential differences can crop up between the various component parts. If these component parts are hooked up via signal lines, compensation currents will flow through the signal lines to falsify the signals. This makes equipotential bonding imperative.

The equipotential bonding line must have a minimum cross-section of 4 mm<sup>2</sup>, better 10 mm<sup>2</sup>.

For better high frequency conduction, the line must be finely-stranded.

When connecting the equipotential line to the central equipotential rail, it must be ensured that power components and nonpower components are assembled together.

The possibility of avoiding potential fluctuations within a system can be enhanced by the quality of the equipotential bonding.

## 4 Switches

The interface module has 7 switches whose functions are described below.

### 4.1 Rotary encoding switch S1 + S2 (Profibus-ID)

The Profibus address of the interface module is adjusted to the hexadecimal mode with the aid of these two switches. This value is read only once into the unit during the first switch on of the interface module and cannot be changed via the Profibus.

### 4.2 Sliding switch S3 (Profibus bus termination)

Should the interface module be physically used as the first or last unit in the PROFIBUS-DP, it must have a bus terminal. In addition, either a bus terminal resistor in the connector or the resistor (220  $\Omega$ ) integrated into the interface module must be activated. Following that, the sliding switch ought to be pushed to the ON position. In all other cases, the sliding switch should remain on the OFF position.

Detailed information on the topic "Bus terminal" are to be found in the general literature on the Profibus.

### 4.3 Rotary encoding switch S4 + S5 (RS 485-ID)

If the cyclical exchange of process data is desired, the number of connected units (recorders and/or power transmitters) shall be adjusted to the hexadecimal mode by using the S4 switch. The user can use Switch S5 to select various combinations of the operation states „cyclical process data exchange" and „user-defined MODBUS telegrams" as well as other service functions. These values are read into the unit only once upon switching on the interface module.

### 4.4 Sliding switch S6 (Operation/Service changeover)

This sliding switch can be used to change over the module to a service module which is here not described in detail and which is only used for conducting internal error diagnostics.

### 4.5 Sliding switch S7 (RS 485 bus termination)

Should the interface module be physically used as the first or last unit in the RS 485 bus, it must have a bus terminal. In addition, either a bus terminal resistor in the connector or the resistor (15  $\Omega$ ) integrated into the component must be activated. Following that, the sliding switch ought to be pushed to the ON position. In all other cases, the sliding switch should remain on the OFF position.

Detailed information on the topic "Bus terminal" can be found in the general literature on the Profibus.

If the integrated resistor is used, it should be borne in mind that this will automatically activate a pull-down resistor (390  $\Omega$ ) to mass and a pull-up resistor (390  $\Omega$ ) to VCC.



**5 LED displays**

The interface module has 9 LEDs. Their significance is described in detail below.

**5.1 LED1 (L1)**

This LED is directly driven by the Profibus ASIC and signals a Profibus error.

**5.2 LED2 (L2)**

This LED is directly connected to the potentially separated supply voltage of the Profibus section.

**5.3 LED3 (L3)**

Green light	Profibus in the state of data exchange
Flashing green	Interface module is waiting for Profibus configuration data
Flashing green/red	Interface module is waiting for Profibus parameter data
Red light	General Profibus failure

**5.4 LED4 (L4)**

This LED is directly connected to the (optionally also separated potential) supply voltage of the RS485 section.

**5.5 LED5 (L5)**

Green light	Data exchange active via RS485
Flashing green	RS 485 OK but no data exchange
Flashing green/red	RS 485 error
Red light	General interface module error (see LEDs 6-9)

**5.6 LED6 to LED9 (L6...9)**

If these 4 LEDs flash and the LED5 simultaneously light up red, the error number will be displayed in accordance with the binary coding, as shown on the table below. Otherwise, the address with which communication via the R 485 interface is possible will be displayed in a nonflashing but similarly binary coded fashion (thus a cyclical flashing rhythm in case of several coupled units).

Whenever the interface module recognizes an error, the error shall be signaled with the red lighting of LED5 and the simultaneous display of the error number, in accordance with the table below on the LEDs 6-9.

Additionally, these error numbers are transmitted to the Master via the Profibus as external diagnostics bytes.

There are two categories of errors:

**Grave error (1-5):**

In this case, the interface module must be switched off and on again. If the error repeats itself, the interface module must be replaced and the faulty one sent for repair.

**Warnings (6-15):**

These warnings are there to serve as information only and are displayed for 1 minute before extinguishing automatically. If these warnings occur frequently, contact the customer service for advice.

Prior to that, however, it must be ascertained that the wiring is correct and that the sliding switch for the bus terminals? Have been correctly adjusted

**Error handling table**

Error No. or ID resp.	LED 6	LED7	LED8	LED9	Description of error
0	0	0	0	0	Reserved
1	0	0	0	1	Initialization error of the RS 485 interface
2	0	0	1	0	EEPROM error
3	0	10	1	1	Stack error
4	0	1	0	0	Hardware error of the Fieldbus ASICs
5	0	1	0	1	Reserved
6	0	1	1	0	Reserved
7	0	1	1	1	Internal overflow of transmission buffer
8	1	0	0	0	Internal overflow of receiver buffer
9	1	0	0	1	Time-out for receiver RS485 interface
10	1	0	1	0	Transmission error of the RS485 interface
11	1	0	1	1	Receiver error of the RS485 interface
12	1	1	0	0	Address error of the RS485/RS232 interface
13	1	1	0	1	Set module type does not match with Profibus configuration
14	1	1	1	0	General error of the RS485 interface
15	1	1	1	1	Internal error

**6 Interface terminal RS 485 (unit section)**

On the component section, 1 ... 15 units (recorders, power transmitters) can be connected to BusCon. All units must be equipped with an RS 485 interface. The wiring between the interface module and the components should be effected in accordance with the instructions below:

A maximum of 16 bus subscribers (including interface module BusCon)

Line structure without branching or feeder lines to individual subscribers < 0.3 m

Line length < 1200 m

Use at least a three-wire, shielded bus cable with a twisted pair of wires for data transmission and an additional insulated conductor for equipotential bonding between the „Module zero“ connections of all electrically isolated bus subscribers. As a rule, bus subscribers without electrical isolation require a separate line with a large cross-section and running parallel to the data cable.

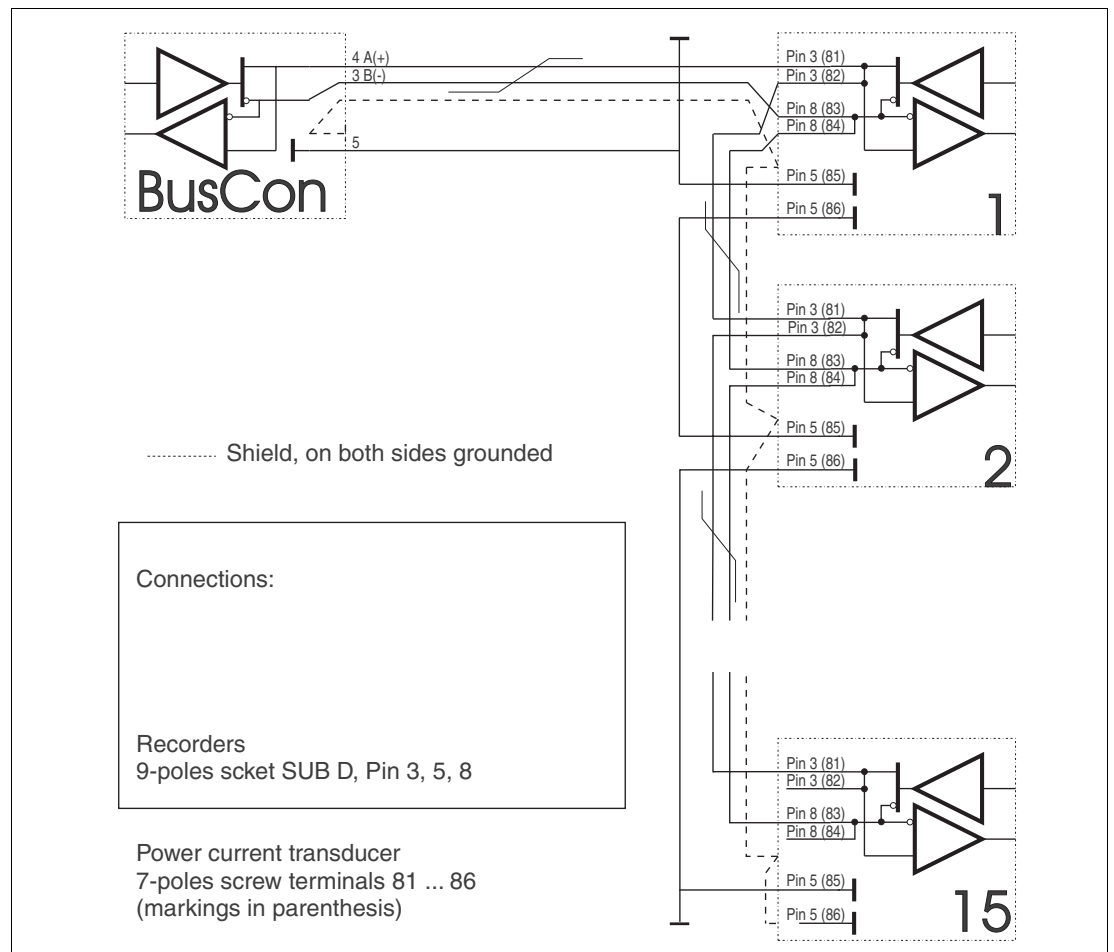


Fig. 6-1 Connection diagram RS 485

## 7 Start-up

### 7.1 In general

The electrical and the interface connections for the Profibus DP - and RS 485 unit sections should be first wired in accordance with the stipulated guidelines.

### 7.2 Settings on BusCon

On the Profibus DP side, BusCon functions as a modular slave. On the RS 485 unit side, on the contrary, it functions as a bus master.

Before switching on the power supply of the interface module, the number of connected units (recorders, power transmitters) should be adjusted (if the operation mode „cyclical process data exchange is required) via the rotary encoding switches S1 and S2, the Profibus slave address, and via the S4 or 0 if only the user-defined MODBUS telegrams are to be used. The settings should be in the hexadecimal mode! Adjust the required mode of operation with S5 (see below). The setting of the sliding switch for the bus terminals should be effected in accordance with the bus topology.

After effecting changes on the rotary encoding switches, switch the power supply off and on, so that the new switching settings are recognized and accepted. The modified slave configuration in the Profibus Master should be adapted in like manner.

### 7.3 Settings on the units

Depending on the type of switching adjustment selected with the rotary encoding switch S4, cyclical communication can take place with 1 ... 15 units. To enable this, the following interface parameters must be defined for all units connected to the interface module:

Baud rate:	19200 baud
Data bits:	8
Stop bits:	1
Parity:	even

Other settings are not permissible.

All connected components must have serial addresses beginning with Address 1, if they are to exchange process data cyclically.

For instance, in the case of 10 coupled units (switch S4 on position "A") the addresses 1, 2, 3, ... 10 must be defined in the parameters.

Whilst in the operation mode „cyclical process data exchange", the interface module reads the contents of the Modbus register addresses of every connected unit from 16384 to max. 16399, depending on the number of units hooked up. The contents of the register addresses depend on the type of unit connected. Relevant details on the interfaces can be found in the operating instructions under the key word "process display".

Units with addresses exceeding 15 can only be prompted with user-defined telegrams (no cyclical process data exchange is possible with these units).

**8 Data transfer**

**8.1 In General**

The interface module BusCon is capable of providing intermediate buffering for a maximum of 242 byte data from the connected units and to offer the Profibus DP side without delay, if requested. In relation to that, the limitations on quantity of components which can be connected and the length of possible user-defined MODBUS telegrams will become apparent.

The BusCon can be used in different operating modes:

- Cyclical process data exchange (ABB type 10 ... F0)
- Only user-defined MODBUS telegrams (ABB type 00 ... ABB type 02)
- Combinations from both operating modes (ABB type 10 ... F0)

User-defined MODBUS telegrams can be sent with all types which can be adjusted on the BusCon (if necessary, parallel to the cyclical process data exchange).

**Cyclical process data**

If measured values from the unit are provided in the INTEGER format, 2 byte data shall be transmitted per measured value. If the REAL format is used, 4 bytes will be required per measured value. For a cyclical reading of the MODBUS units, the MODBUS function code 3 (READ HOLDING REGISTERS) shall be used to read the register from 16384 to max. 16399. Measured values of the recorder are provided in the REAL format, those for the power transmitter are in the INTEGER format.

The following table provides an overview of the number of measured values which can be transmitted per unit to the Profibus DP side (information provided in brackets refer to the power transmitter), depending on the number of components connected to the interface module.

Number of units and measured values

<b>Position of rotaryencoding switch S4</b>	<b>Number of units</b>	<b>Measured value per unit</b>
1	1	8 (16)
2	2	8 (16)
3	3	8 (16)
4	4	8 (16)
5	5	8 (16)
6	6	8 (16)
7	7	6 (12)
8	8	6 (12)
9	9	4 (8)
A	10	4 (8)
B	11	4 (8)
C	12	4 (8)
D	13	4 (8)
E	14	4 (8)
F	15	3 (7)

**8.2 GSD file "EBHB2079.GSD"**

After setting the number of subscribers on 0 using S4 and S5, (=cyclical process data exchange) or setting S4 on 0 (=only used-defined MODBUS telegrams) and after setting the maximum telegram length using the S5, use the following table to configure the related Profibus Master by selecting from the relevant GSD file the appropriate type of module (in the grey background are the types for the exclusive use of user-defined MODBUS telegrams).

**Module types**

Number of units on MODBUS (=S4)	S5	Module name (GSD file)	Bytes in data telegrams (of the Profibus Master)		Process data bytes per unit
			Output	Input	
1 (1)	0	ABB Typ. 10	16	50	32
2 (2)	0	ABB Typ. 20	16	82	32
3 (3)	0	ABB Typ. 30	16	114	32
4 (4)	0	ABB Typ. 40	16	146	32
5 (5)	0	ABB Typ. 50	16	138	24
6 (6)	0	ABB Typ. 60	16	162	24
7 (7)	0	ABB Typ. 70	16	186	24
8 (8)	0	ABB Typ. 80	16	210	24
9 (9)	0	ABB Typ. 90	16	162	16
10 (A)	0	ABB Typ. A0	16	178	16
11 (B)	0	ABB Typ. B0	16	194	16
12 (C)	0	ABB Typ. C0	16	210	16
13 (D)	0	ABB Typ. D0	16	226	16
14 (E)	0	ABB Typ. E0	16	242	16
15 (F)	0	ABB Typ. F0	16	228	14
0	0	ABB Typ. 00	24	26	0
0	1	ABB Typ. 01	40	42	0
0	2	ABB Typ. 02	72	74	0

The length of the data telegrams is equally stated on the above table. There are differences between the input and output data of the Profibus Master. The length of the output data for the module types 10 ... F0 remains constantly 16 bytes and is used for the transmission of user-defined telegrams to the MODBUS units.

The Input data of the Profibus Master consist of three parts. These are: one word (2 bytes) diagnostics information, which reproduce the communication status to the Modbus units. 16 bytes are reserved for the response to the user-defined MODBUS telegrams. Then follows for each unit a section with its vital data (only for the modes of operation 10 ... F0 for cyclical process data exchange). The size depends on the number of units connected to the Modbus (see the table for unit quantity and measured values). An example is given further below.

**Special function switch S5**

In the operating types 10 ... F0, Switch S5 is set to 0 during normal operation. This is equivalent to the triggering off of a Profibus diagnostics following the failure of a MODBUS unit to respond for the second time. In this case, the Profibus diagnostics is nullified one minute after the error ceases to exist.

For tests or special applications, Switch S5 can also be set to 1 or 2:

Position of switch 1: The Profibus diagnosis is set for the very first time-out

Position of switch 2: The diagnosis is nullified immediately after the error disappears and not just after a minute has expired.

**8.3 Input data (cyclical process data)**

The diagnosis word consists of 16 bits. The highest valued bit (Bit 15) determines the operation state of the interface module. It is 0 in the initial phase and subsequently fixed at 1 during running operations, when the process data of all connected units are available, or when all units with process data are queried once. Then follows for each unit (1-15) at the bit positions 0 - 14 that supplies process data, 1 bit, which represents the connection status. It is 1 if the unit correctly supplies process data and otherwise 0. If an

operation mode is selected which does not cover 15 process subscribers, the unutilized bits are set to 1. During trouble-free operation, the value FFFFh thus stands for diagnosis information in all operation modes.

The contents of the process data sections depend on the unit itself and therefore can be referred from the respective interface description. Since we are concerned here with Modbus units, registers (Integers) are transmitted as 2 bytes, whereby the high byte takes precedence over the low byte. Float values are transmitted in two consecutive registers (see also Chapter on "Start-up").

The user program on the Profibus Master must check the corresponding bit of the diagnostics word before evaluation of the process data takes place!

**Input data Profibus Master**

Range	Offset	Length	Description
Diagnostics word	0	1 Word	A bit that determines if communication is going to be effected with the unit is reserved for each Modbus unit. During trouble-free operation all bits are set to 1. Bit 0 refers to unit 1 etc. Till bit 14 for unit 15.
User-defined MODBUS telegrams	2	16 Bytes	16 Bytes Response to user-defined MODBUS telegram (see below)
MODBUS unit 1	18	n Bytes	Output data of Modbus unit 1 as of register address 16384. The contents should be referred from the relevant interface description.
...	...	...	...
MODBUS unit n		n Bytes	as for MODBUS unit 1

**8.4 User-defined MODBUS telegrams - output data**

Output data bytes are used exclusively to transmit user-defined MODBUS telegrams. In this section the user determines which user-defined telegram should be sent once or several times.

The output data range is subdivided into 4 sections: status, unit address, MODBUS function code and telegram data.

If bit 0 of the Status byte is set, the time-out time for this telegram shall be extended to 1500 ms (default 250 ms). If bit 1 is set, the user-defined telegram shall be cyclically transmitted (default is one-time transmission). Bits 2-7 must be set to 0.

Under Unit address (ID) the address of the target unit to which the telegram should be sent is input. It is permissible to prompt unit addresses exceeding 15.

One of the following values is entered as a function code (FC) in accordance with the MODBUS standard which is supported by the BusCon.

The contents and the length of the telegram data depends on the function code. The maximum length provided is fixed to the type of operation made selected and can range between 13 and 69 bytes (bigger lengths on request).

**BusCon-supported MODBUS function codes**

Value	Description
1	READ COIL STATUS (e.g. re-reading of binary outputs such as relays)
2	READ INPUT STATUS (e.g. reading of the value of a binary input)
3	READ HOLDING REGISTER (e.g. re-reading of analog outputs)
4	READ INPUT REGISTER (e.g. reading of analog inputs)
5	FORCE SINGLE COIL (e.g. setting of a binary output)
6	PRESET SINGLE REGISTER (e.g. setting of analog outputs)
7	READ EXCEPTION STATUS (momentary unit status)
8	LOOPBACK TEST, only subfunction 0 (unit transmits back received telegrams identically)
15	FORCE MULTIPLE COILS (setting of several binary outputs)
16	PRESET MULTIPLE REGISTERS (setting of several analog outputs)
17	REPORT SLAVE ID (read unit address, e.g. for unit recognition on bus)
65-72	USER FUNCTIONS (first byte after the function code equals the length of telegr. data in Bytes)

**Output data for Profibus Master**

Range	Offset	Length	Description
Status	0	1	Time-out, cyclical
Unit address (ID)	1	1	Unit supposed to receive telegram
Function code (FC)	2	1	Type of telegram
Telegram data	3	13...69	depends on the type of telegram (pay attention to max. telegram length in accordance with the selected type)

The BusCon always transmits the user-defined telegram on the MODBUS when the telegram changes. Serving as indicators of change for the BusCon are the unit address, the function code and the first 4 bytes of the telegram data. In order to prevent an inadvertent transmission of a telegram during the modification of telegram data, for instance the function code can be initially set on 0 during changes and later set to the right value when the desired time for the right value comes.

**8.5 User-defined MODBUS telegrams - input data**

The response to the MODBUS query is stored in the Profibus input data field. The input data which are part of the response are located within the Profibus input data; applies to all operation types of BusCon, as of Offset 2.

**Input data for Profibus Master**

Range	Offset	Length	Description
Status	2	1	Failure, Time-out, Validity of response
Unit address (ID)	3	1	Unit which sent the response
Function code (FC)	4	1	Type of telegram; Bit7=1 acknowledgment from unit if negative
Telegram data	5	13...69	Depends on the type of telegram (pay attention to max. telegram length in accordance with the selected type)

The Status is divided into 2 sections:

- Bits 0-3: error code for response
- Bit 7: is toggled for every new response; with it the Master can determine if a response to its query is expected. All other bits are currently not being utilized and may not be evaluated.

**Error codes (Bits 0-3)**

Value	Description
0	Invalid response. Data have been passed on. Response from MODBUS unit still expected
1	Valid response/data
2	Rejected. Previous query still being processed
3	Failure. Section contains invalid MODSBus telegram
4	Time-out. No response from unit
5	CRC error in response of unit
6	Length error during transmission of a MODBUS telegram to a unit
7	Error. Response from MODBUS unit is too big for transmission via Profibus (overflow of receiver)

The *unit address* in the response is the MODBUS address of the unit from which the response originates.

The Function code represents the repetition of the value of the query in question. Bit 7 within the function code is set in case the MODBUS unit responds with a negative acknowledgment.



The significance of the contents of the telegram data depends on the function code. The maximum available length depends on the type of operation selected and can be between 13 and 69 bytes (greater lengths on request).

**Notice:**

For the operation types 00...02, the diagnostics word (Offset 0 of the input data) shall remain on 0 until the response to the first query arrives.

## 8.6 User-defined MODBUS telegrams -sequence

The overall sequence of a user-defined MODBUS query looks like this:

1. Profibus Master waits until status byte Bits 0-3 are on 1
2. Status bit 0 on 1 if extended time-out is required; set bit 1 if the telegram is to be automatically sent cyclically or only once; all other bits = 0.
3. Profibus Master writes a valid MODBUS telegram (ID, FC, data) into the output data section (eventually leave FC 0 initially, in order to prevent inadvertent transmission) and notes the status of bit 7 of the status bytes.
4. Wait until bit 7 of the status bytes has changed (arrival of new response) or until bits 0-3 display an error code.
5. Check the ID and the FC (Attention: Bit 7 could = 1 in case of negative acknowledgment) in the response and the status (bits 0-3)= 1.
6. Evaluation of the response

In the operation types 10 ... F0 a query of process data takes place alongside the cyclical query, irrespective of whether user-defined telegrams have been sent. User-defined telegrams are given priority during execution.

As long as no response to a query or an error code exits, the Profibus Master should leave the output data section unchanged.

**9 Specimen configuration**

The setup of a Profibus connection for cyclical process data exchange should be illustrated using a configuration of BusCon plus three power transmitters on the Modbus addresses 1 to 3 as an example.

**9.1 Configuration of the Profibus Master**

The Profibus Master should be configured with the enclosed GSD file. As module type select here "ABB Type 30".

**9.2 Settings on BusCon**

**Profibus-ID**

The slave address of BusCon should be 16 (decimal) or 10 (hexadecimal) respectively. Set the rotary-type switch S1 to position "1" and S2 to "0".

**Termination**

The Profibus and RS 485 terminations should be set using the sliding switches S3 and S6 in accordance with the bus topology (see Chapter on "Switches").

**Units**

The number of units on the Modbus should be set on S4 (place on position "3"). S5 should be set to "0".

**9.3 Unit settings on Modbus / RS 485**

Set the units to 19200 baud, even parity. The values 1 to 3 should be reserved for Modbus addresses.

**9.4 Cyclical Profibus data traffic - Master to BusCon**

The Master transmits cyclical data packages of 16 bytes. All bytes should be set to 0, if no user-defined MODBUS telegrams are to be transmitted.

**9.5 Cyclical Profibus data traffic - BusCon to Master**

BusCon transfers data to the Master whose length depends on the selected module type. In this example, these are 114 bytes (see table of module types).

	Diagnostics	Reserved	PD* unit 1	PD* unit 2	PD* unit 3
Length (in bytes)	2	16	32	32	32
Byte-offset	0	2	18	50	82

\* PD = Process data

For the power transmitter, the process data component of a unit is composed of up to 16 words (register). If the process display shows that the variables for voltage L1, current in L1 and the current frequency in L1 were parameter-defined under the measured variables 1...3, the process data range will become apparent.

Process data for Unit 1								
1. Register		2. Register		3. Register		...	16. Register	
Hi-Byte	Lo-Byte	Hi-Byte	Lo-Byte	Hi-Byte	Lo-Byte	...	Hi-Byte	Lo-Byte
Voltage L1		Current L1		Frequency I L1		...	unutilized	

**9.6 User-defined telegrams**

In addition to the cyclical exchange of process data, telegrams defined by user can amount to a data range of 13 bytes in the specimen configuration (in addition to status, unit address and function code). Refer to the above user-defined MODBUS telegram sequence for information on how to proceed.

**10 Technical data**

<p><b>Interface connectors</b>          PROFIBUS DP side          RS 485 via 9pin SUB-D connector          Device side (Modbus)          RS 485 via 5pin screw/plug terminals</p> <p><b>Baudrate</b>          PROFIBUS DP side          up to 12 Mbaud          Device side (Modbus)          19200 baud</p> <p><b>Bus termination</b>          PROFIBUS DP side          adjustable          Device side (Modbus)          adjustable</p> <p><b>Electrical isolation</b>          PROFIBUS DP side          standard          Device side (Modbus)          option</p> <p><b>Power supply</b>          10...30 V DC/3 W</p>	<p><b>Housing, mounting, connection</b>          Surface-mounting case          for rail mounting          Material          Plastics, heavily inflammable          Connections          ref. to interface connectors          Dimensions (W × H × D)          90 mm × 130 mm × 60 mm          Weight          approx. 0.25 kg</p> <p><b>Mechanical capabilities</b>          Tested to DIN IEC 68-2-27 and 68-2-6          Shock: 15g, 11 ms          Vibrations: 0.15 mm          10...50 Hz, 1 G          50...150 Hz</p> <p><b>Environmental capabilities</b>          Ambient temperature          0...+45 °C without additional ventilation          0...65 °C with additional ventilation          Storage temperature          -25 °C...+70 °C</p>
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