Operating Instructions
RMx621 / FML621

DP slave module ("PROFIBUS coupler") from V2.01.00
Connection of RMx621 / FML621 to PROFIBUS DP via
the serial RS485 interface with an external module (HMS
AnyBus Communicator for PROFIBUS)

Endress+Hauser

People for Process Automation

Table of contents

1 General information

1.1 Damage in transit

Please notify the freight forwarder and supplier immediately.

1.2 Scope of delivery

- These Operating Instructions
- The DP slave module HMS AnyBus Communicator for PROFIBUS
- Serial connecting cable to RMx621 / FML621
- CD-ROM with GSD file and bitmaps

Please notify the supplier immediately if any parts are missing!

1.3 Safety symbols
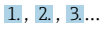
Symbol	Meaning
⚠ DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
⚠ WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
⚠ CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** This symbol contains information on procedures and other facts which do not result in personal injury.

1.4 Symbols for certain types of information

Symbol	Meaning
✓	**Permitted** Procedures, processes or actions that are permitted.
✓✓	**Preferred** Procedures, processes or actions that are preferred.
✗	**Forbidden** Procedures, processes or actions that are forbidden.
🛈	**Tip** Indicates additional information.
📖	Reference to documentation.
🖹	Reference to page.
🖾	Reference to graphic.
▶	Notice or individual step to be observed.
1., 2., 3.…	Series of steps.
↳	Result of a step.

Symbol	Meaning
[?]	Help in the event of a problem.
[eye]	Visual inspection.

1.5   Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,...	Item numbers	1. , 2. , 3...	Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections
EX	Hazardous area	[crossed EX]	Safe area (non-hazardous area)

1.6   List of abbreviations/definition of terms

PROFIBUS coupler

In the following text, the term "PROFIBUS coupler" is used to refer to the external DP slave module HMS AnyBus Communicator for PROFIBUS.

PROFIBUS master

All units such as the PLC and PC plug-in boards that perform a PROFIBUS-DP master function are referred to as PROFIBUS masters.

2 Installation

2.1 Function description

The Profibus-DP connection is made using an external PROFIBUS coupler. The module is connected to the RS485 interface (RxTx1) of the RMx621 / FML621.

The PROFIBUS coupler acts as a master in the direction of the RMx621 / FML621 and reads the process values to its buffer memory every second. In the direction of the PROFIBUS DP, the PROFIBUS coupler operates with the function of a DP slave for cyclic data transfer and makes the buffered process values available on the bus on request.

For the architecture, see the following graphic.

A0041610-EN
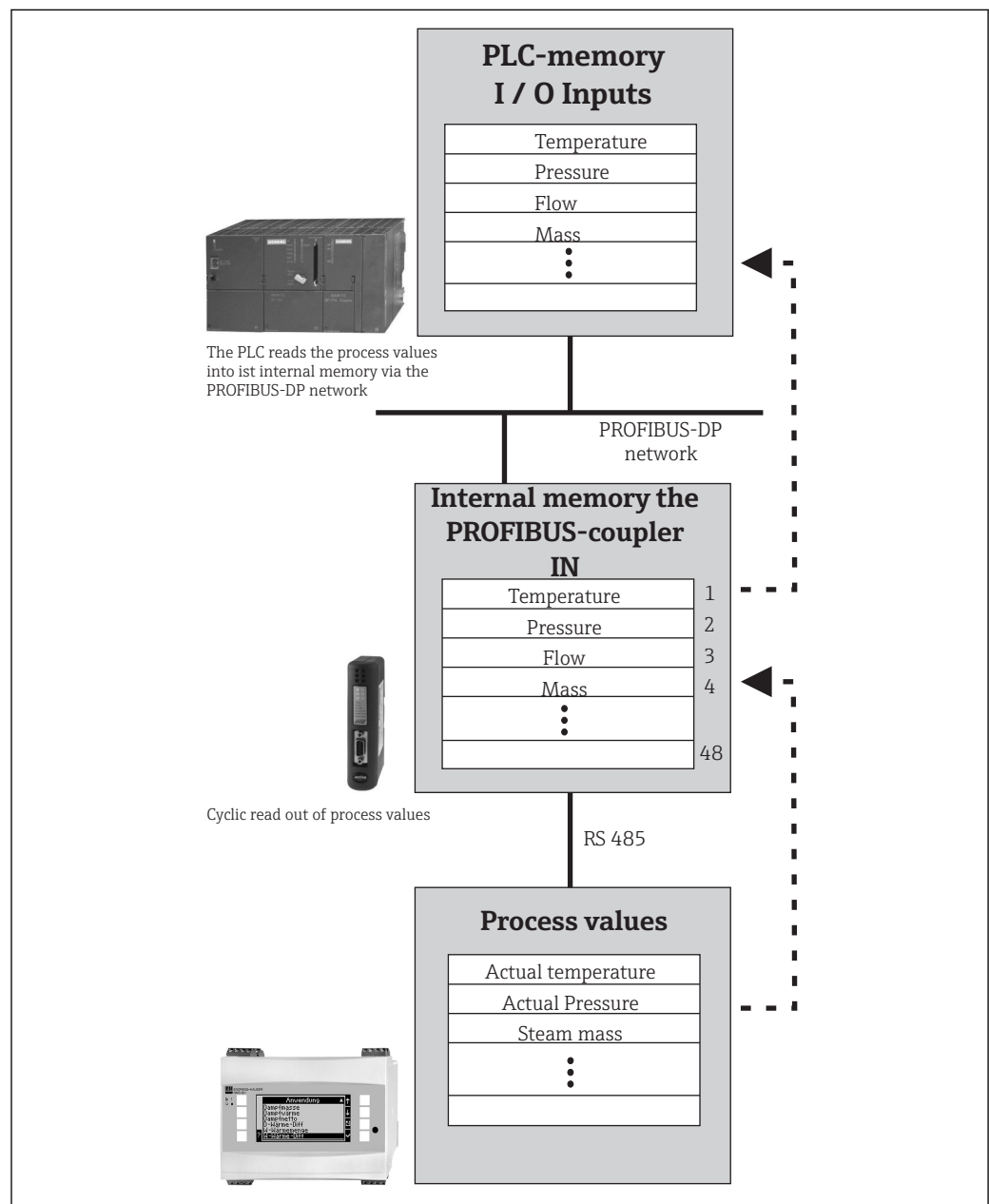
2.2   Requirements

The option is available in the RMx621 and FML621 with firmware version V 1.00.00 and higher.

2.3   Connections and operating elements

A0041611

1   Status LEDs
2   Configuration of bus address
3   Fieldbus connection
4   Connection for supply voltage
5   RMx621, FML621 connection

2.4   Installation on DIN rail
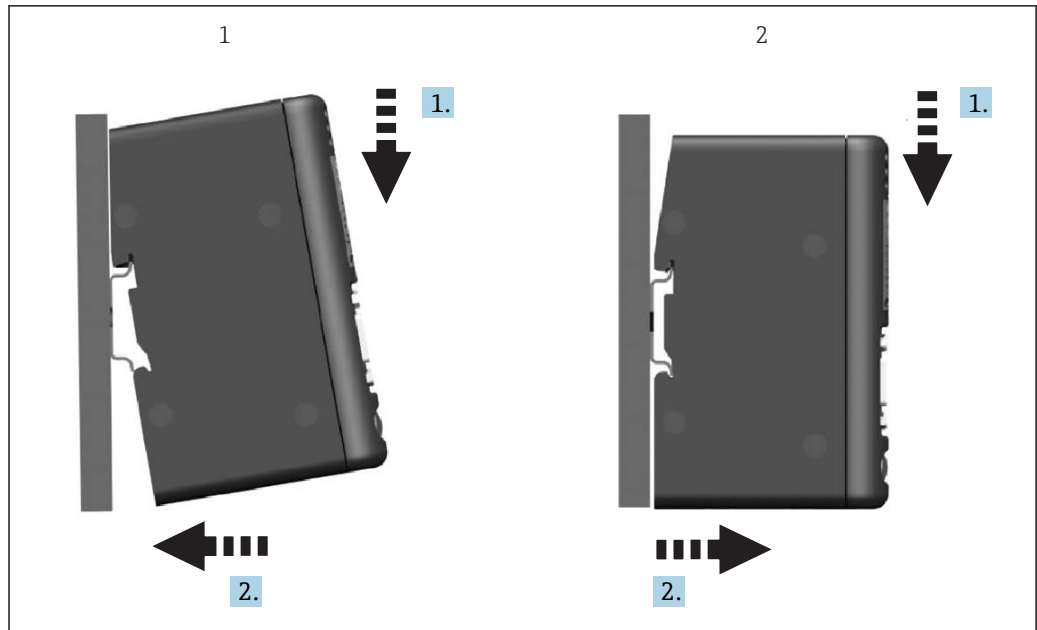
1   Snap on
2   Snap off

2.5   Connections and terminal diagram

Connecting the RMx621 / FML621 with the PROFIBUS coupler
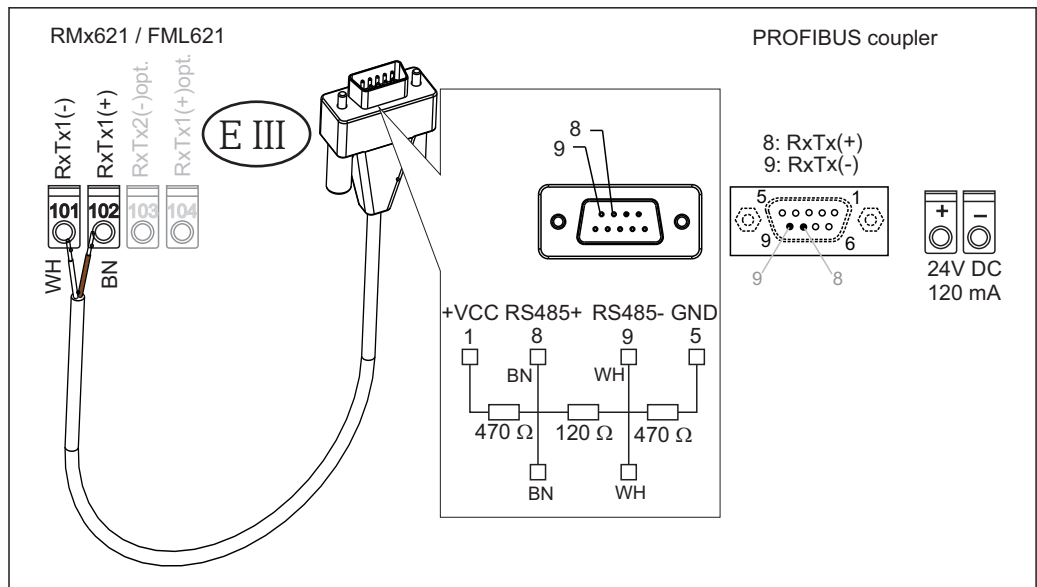
The color coding applies for the cable supplied.

PROFIBUS DP connection (to the PROFIBUS coupler)

To connect to the PROFIBUS, it is advisable to use the 9-pin D-sub plug with integrated bus terminating resistors, as recommended according to EN 50170.
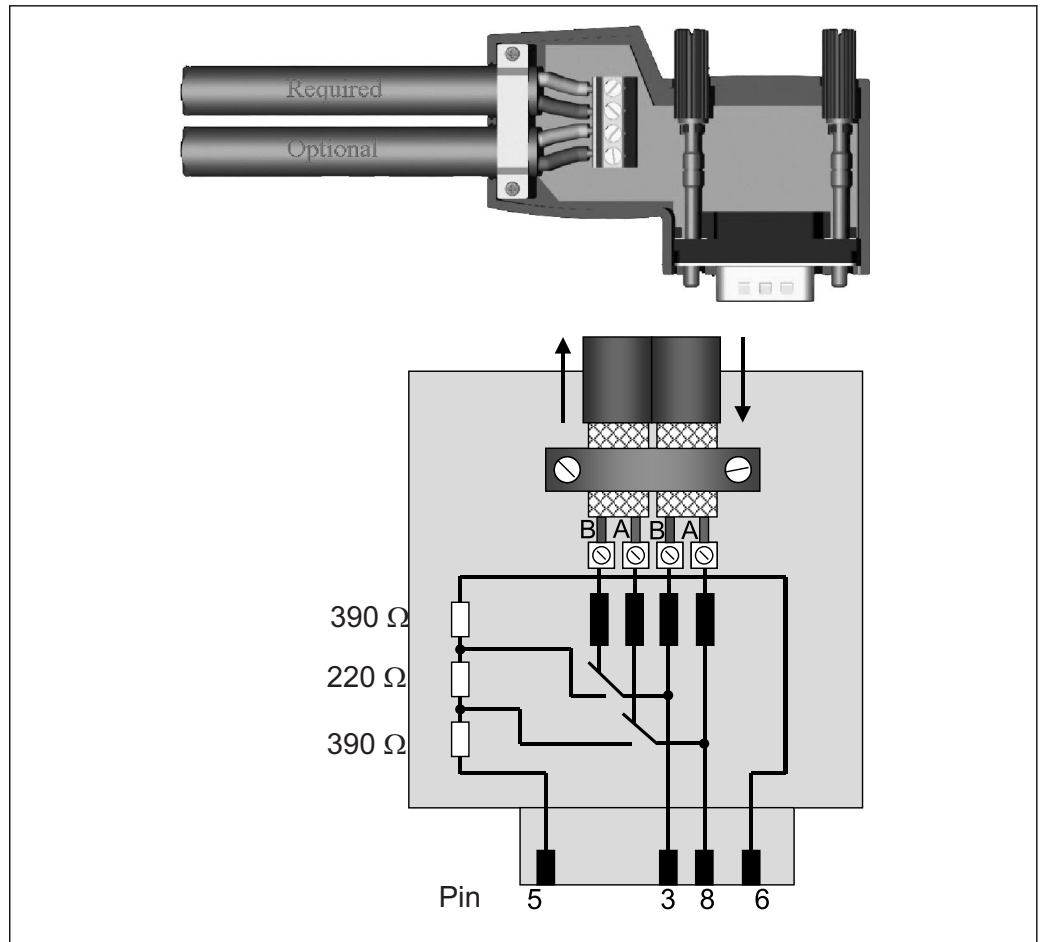
A0041616

2.6   PROFIBUS-DP terminal assignment

Pin No.	Signal	Meaning
Housing	Shielding	Functional ground
3	B-wire	RxTx (+)
5	GND	Reference potential
6	VP	Power supply for terminating resistors
8	A-wire	RxTx (-)

2.7   Configuration of the bus address

After carefully opening the front cover, the user can access the two rotary switches for the configuration of the bus address.

A0041617
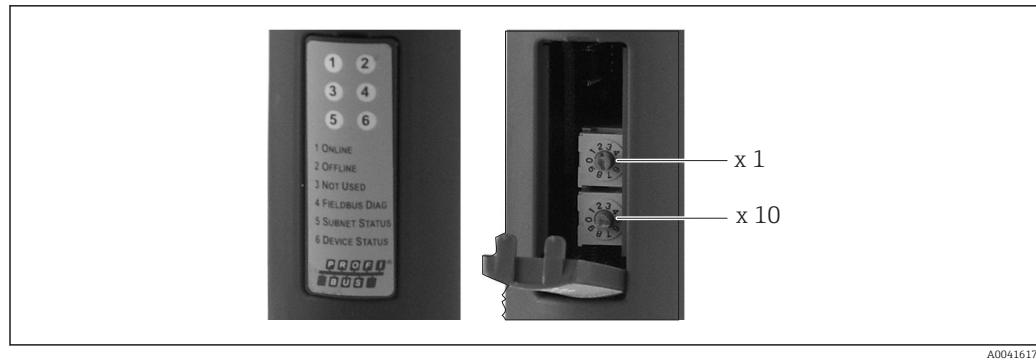
Using these rotary switches, a bus address in the range between 00 and 99 can be configured.

Only use valid bus addresses.

3   Commissioning

3.1   Configuration of the RMx621 / FML621

In the main menu **Communication** → **RS485(1)** of the RMx621/ FML621, the parameters of the RS485(1) interface must be configured as follows: set **Unit address** to 1 and set **Baud rate** to 38400.
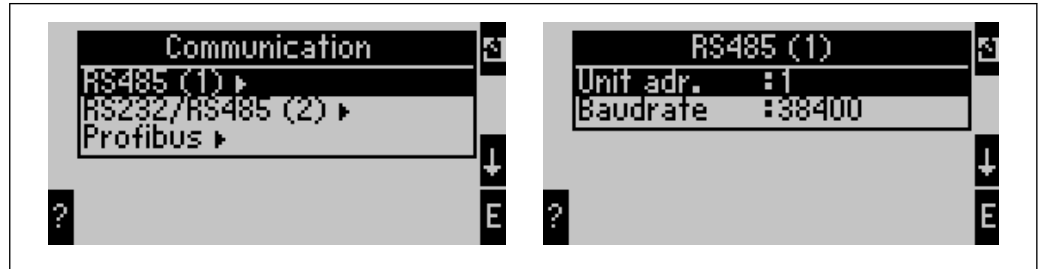
A0041721

The number of process values that should be output must be defined in the main menu **Communication** → **PROFIBUS** → **Number**. The maximum number is limited to 48. In the next steps, each offset address is assigned the desired process value using the selection lists.

ℹ️ The menu item "PROFIBUS" has been changed to "Anybus Gateway" in device software versions V3.09.00 and higher for RMx621, and versions V1.03.00 and higher for FML621.
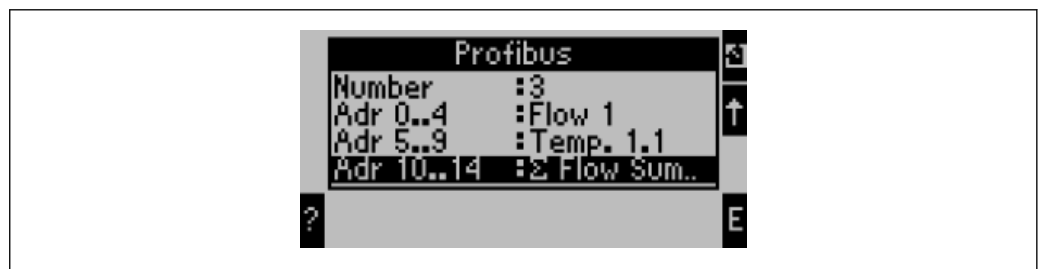
A0041722

To facilitate the further processing of the process values, the list of offset addresses can also be printed out via the ReadWin® 2000 operating software.

ℹ️ When defining the process values displayed with PROFIBUS DP, please note that the same process value can be set to more than one address.

If a PROFIBUS coupler labeled "Rev.B" is used, device software version V03.02.03 must be used for RMC621.

PROFIBUS couplers labeled "Rev.B" have a fixed baud rate of 38,400 baud.

Set the baud rate to 57,600 for devices before "Rev.B".

3.2   Configuring the PROFIBUS coupler

The PROFIBUS coupler is already pre-configured at the factory. Apart from the bus address, no further settings are required. The coupler is automatically adapted to the data transmission rate of the PROFIBUS-DP line.

3.3   Status indicators

The 6 light emitting diodes indicate the current device and data exchange status.

A0041621

LED	Description	Display	Status	Actions
1	ONLINE	Green Off	PROFIBUS coupler ready for operation	
2	OFFLINE	Red	PROFIBUS coupler not ready for operation	Check plug-in connector Check PROFIBUS network
		Off		
3	NOT USED			
4	FIELDBUS DIAG	Flashing red	Configuration error	Check configuration of PLC
		Off	No bus error detected	
5	SUBNET STATUS	Green	Data exchange in progress	Check wiring of PROFIBUS coupler - RMx621 / FML621; check communication parameters in RMx621 / FML621
		Flashing green	Data exchange paused	
		Red	No data exchange possible	
		Off	Supply voltage failure	Check supply voltage
6	DEVICE STATUS	Green	Initializing	
		Flashing green	PROFIBUS coupler operating	
		Flashing red/green	Configuration incorrect	Device defective
		Off	Supply voltage failure	Check supply voltage

4 Process data

4.1 General information

Depending on the applications configured, a wide variety of process variables are computed in the RMx621/ FML621 and are available for read-out.

In addition to the computed values, the input variables can also be read out of the RMx621/ FML621.

4.2 Payload structure

Each process value occupies 5 bytes in the process representation.

The first 4 bytes correspond to a 32-bit floating point number as per IEEE-754 (MSB first).

32-bit floating point number (IEEE-754)

Octet	8	7	6	5	4	3	2	1
1	Sign	(E) 2^7	(E) 2^6					(E) 2^1
2	(E) 2^0	(M) 2^{-1}	(M) 2^{-2}					(M) 2^{-7}
3	(M) 2^{-8}							(M) 2^{-15}
4	(M) 2^{-16}							(M) 2^{-23}

Sign = 0: positive number

Sign = 1: negative number $Number = -1^{sign} \cdot (1 + M) \cdot 2^{E-127}$

E = exponent; M = mantissa

Example: 40 F0 00 00 h   = 0100 0000 1111 0000 0000 0000 0000 0000 b

Value $= -1^0 \cdot 2^{129-127} \cdot (1 + 2^{-1} + 2^{-2} + 2^{-3})$

                $= 1 \cdot 2^2 \cdot (1 + 0.5 + 0.25 + 0.125)$

                $= 1 \cdot 4 \cdot 1.875 = 7.5$

The last byte indicates the status:

80h = valid value

81h = valid value with limit value violation (linked with relay output)

10h = invalid value (e.g. cable open circuit)

00h = no value available (e.g. communication error in subnet)

In the case of calculated values (e.g. mass flow), the alarm condition of all the inputs used and of the application is checked. If a "fault" is indicated in one of these variables, the calculated value is given the status "10h", i.e. invalid value.

Example:

Temp1 cable open circuit; alarm type: fault => calculated mass flow (10h)

Temp1 cable open circuit; alarm type: notification => calculated mass flow (80h)

The number of process values transmitted is defined in the configuration of the energy manager, → 🕮 11. The minimum number is 1 process value (5 bytes), the maximum is 48 process values (240 bytes).

4.3   Units for transmitting the process values

The units for the transmission of the process values are configured in the Setup menu of the RMx621 / FML621.
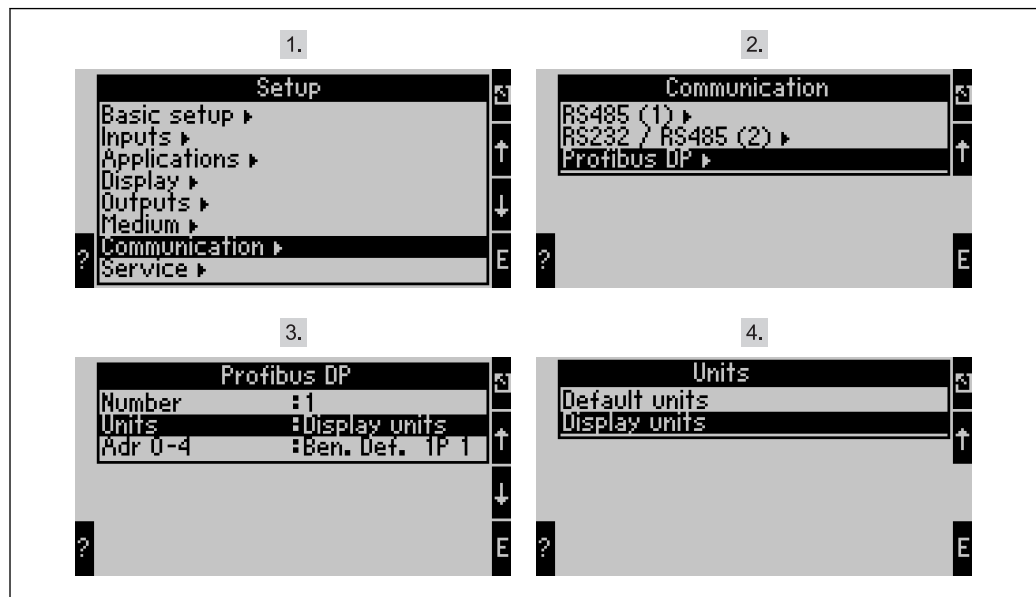
A0041725

ℹ️ The menu item "PROFIBUS" has been changed to "Anybus Gateway" in device software versions V3.09.00 and higher for RMx621, and versions V1.03.00 and higher for FML621.

Set **Display units** to use the units that are configured for the display for transmission via PROFIBUS DP.

Set **Default units** to use the following default units for data transmission:

Volume flow	l/s
Temperature	℃
Pressure	bar
Heat quantity	kJ
Heat flow (output)	kW (kJ/s)
Mass flow	kg/s
Corrected volume	(N)l/s
Total volume	l
Total mass	kg
Total corrected volume	(N)l
Density	kg/m^3
Enthalpy	kJ/kg

5 Integration into Simatic S7

5.1 Network overview
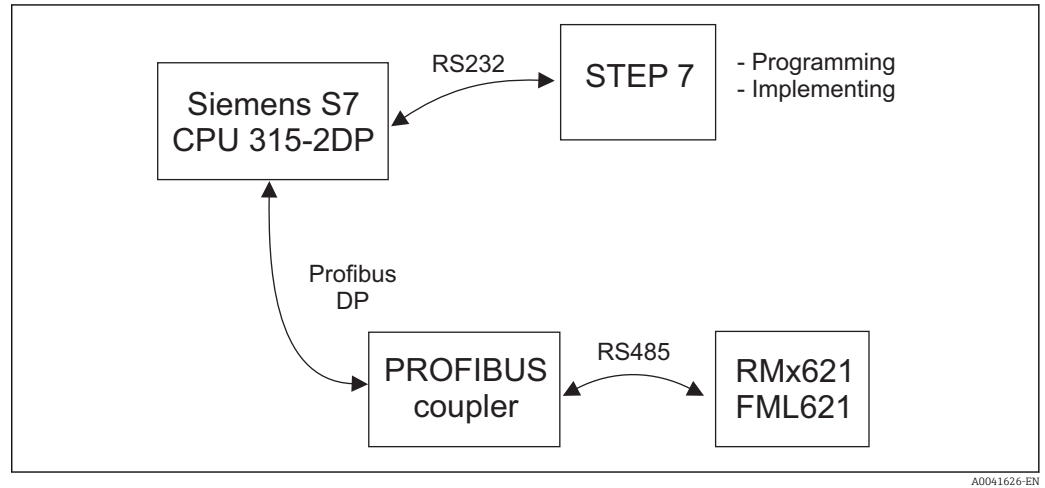
A0041626-EN
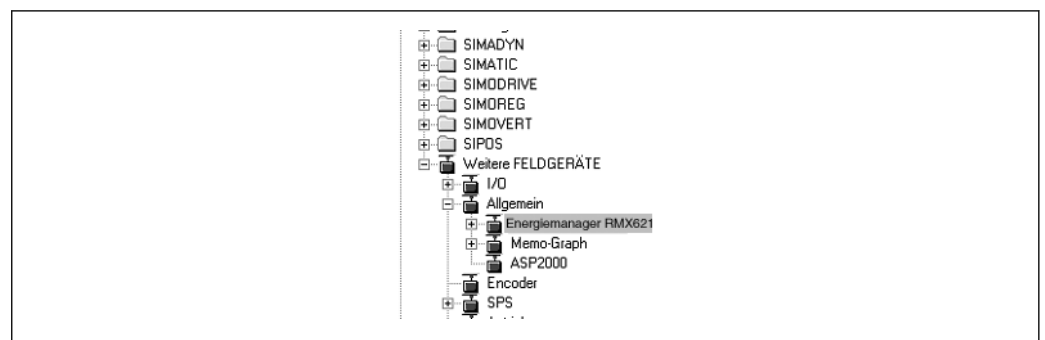
5.2 GSD file EH_x153F.gsd

- Either install via Options/Install new GSD
- Or copy the GSD and BMP files into the STEP 7 software directory provided.
  e.g.: c:\...\Siemens\Step7\S7data\GSD
  c:\...\ Siemens\Step7\S7data\NSBMP

The GSD file can be found on the Readwin® 2000 CD-ROM provided in the directory **\GSD \RMS621 RMC621 RMM621\DP**

Example for energy manager:

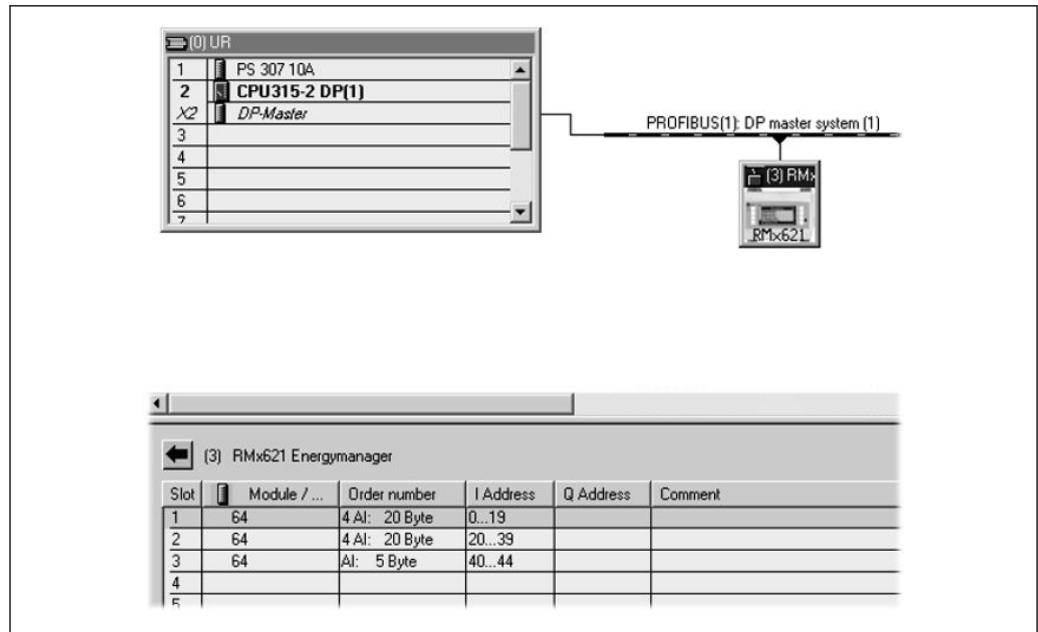

A0041723

5.3 Configuring the RMx621 / FML621 as a slave

Hardware configuration (taking the example of the energy manager RMS/RMC621):

- Drag the energy manager RMx621 device from the Hardware catalog -> PROFIBUS DP -> Additional field devices -> General to PROFIBUS DP network
- Set the user address

A0041724

Two modules are defined in the GSD file:

Input (PLC)	RMx621 → PROFIBUS master	Config string
AI: 5 bytes	One measured value + status	0x40, 0x84
4 AI: 20 bytes	Four measured values with status	0x40, 0x93

Assign as many modules to the individual slots as needed for the number of process values to match the number set in the energy manager. A maximum of 12 modules may be used here. The "4 AI: 20 bytes" module can be used instead of four individual "AI: 5 bytes" modules.

ℹ The configured device address must match the hardware address that is actually configured. The address range of the process values must be continuous without interruption.

6 Technical data

Dimensions:	120mm x 75mm x 27mm (height, depth, width)
Supply voltage:	24V DC +/-10%
Current consumption:	Typ. 120mA, max. 280mA
PROFIBUS-DP baud rate:	9,600, 19,200, 45,450, 93,750, 187,500, 500,000, 1.5M, 3M, 6M, 12M
RS485 interface parameters:	Baud rate 38400, 8 data bit, 1 stop bit, device address 01
Ambient temperature:	5 to 55 ℃
Storage temperature:	−55 to +85 ℃
Humidity:	5 to 95%, non-condensing
Degree of protection:	IP 20
Protective ground connection:	Grounded internally via DIN rail
Approvals:	UL - E214107

Endress+Hauser

People for Process Automation

www.addresses.endress.com