Remote-I/O-System u-remote

Manual

Let's connect.

Weidmüller

Content

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Content

1 About this documentation

1.1 Symbols and notes

The safety notices in this documentation are designed according to the severity of the danger.

	DANGER
	Imminent risk to life! Notes with the signal word "Danger" warn you of situations which will result in serious injury or death if you do not follow the instructions given in this manual.

	WARNING
	Possible danger to life! Notes with the signal word "Warning" warn you of situations which may result in serious injury or death if you do not follow the instructions given in this manual.

	CAUTION
	Risk of injury! Notes with the signal word "Caution" warn you of situations which may result in injury if you do not follow the instructions given in this manual.

ATTENTION
Material damage! Notes with the signal word "Attention" warn you of hazards which may result in material damage.

Text next to this arrow are notes which are not relevant to safety, but provide important information about proper and effective work procedures.

The situation-dependent safety notices may contain the following warning symbols:

Symbol	Meaning
	Warning against hazardous electrical voltage
	Warning against explosive atmospheres
	Warning against electromagnetic fields
	Warning against electrostatically charged components
	Warning against automatic startup
	Instruction: wear conductive footwear
	Instruction: disconnect before working
	Instruction: unplug before opening
	Instruction: observe the documentation

- ► All instructions can be identified by the black triangle next to the text.
- – Lists are marked with a tick.

1.2 Complete documentation

When using u-remote PF-O-xDI-SIL modules, please also observe the **Module for Functional Safety Manual.**

The manual is available to download from the Weidmüller website.

2 Safety

This section includes general safety instructions for handling the u-remote system. Specific safety instructions for specific tasks and situations are given at the appropriate places in the documentation.

When using u-remote PF-O-xDI-SIL modules, please also observe the **Module for Functional Safety Manual.**

The manual is available to download from the Weidmüller website.

2.1 General safety notice

Work on the u-remote products may only be performed by qualified electricians with the support of trained persons. As a result of their professional training and experience, an electrician is qualified to perform the necessary work and identify any potential risks.

Before any work is carried out on the products (installation, maintenance, retrofitting), the power supply must be switched off and secured against being switched on again. Work may be carried out with safety extra-low voltage.

When working during continued operations, the emergency stop mechanisms must not be made ineffective.

If a malfunction on a u-remote product cannot be fixed after following the recommended measures (see Chapter 13), the product in question must be sent back to Weidmüller. Weidmüller does not assume any liability if the base or electronic module has been tampered with!

Electrostatic discharge

u-remote products can be damaged or destroyed by electrostatic discharge. When handling the products, the necessary safety measures against electrostatic discharge (ESD) according to EN 61340-5-1 and EN 61340-5-2 must be observed.

All devices are supplied in ESD-protected packaging. The packing and unpacking as well as the installation and disassembly of a device may only be carried out by qualified personnel and in accordance with the ESD information.

Open equipment

u-remote products are open equipment that may only be installed and operated in lockable housings, cabinets or electrical operations rooms. Only trained and authorised personnel may access the equipment.

For applications requiring functional safety, the surrounding housing must meet at least IP 54.

The standards and guidelines applicable for the assembly of switch cabinets and the arrangement of data and supply lines must be complied with.

Fusing

The operator must set up the equipment so that it is protected against overloading. The upstream fuse must be designed such that it does not exceed the maximum load current. The maximum permissible load current of an I/O module can be found in the technical data.

The I/O-module inputs are protected against voltage pulses and overcurrent in accordance with IEC 61131-2, Zone B. Voltages that exceed +/-30 V may cause the destruction of the module.

In the case of modules without fused sensor/actuator power supplies, all lines to the connected sensors/actuators must be fused corresponding to their conductor cross-section (as per VDE 0298 Part 4).

To meet UL specifications in accordance with UL 248-14, a 10 A fuse with a medium time-lag must be used (e.g. ESKA Part No. 522.227).

A feed-in power supply with secure isolation must be used.

Earthing (functional earth FE)

Each u-remote I/O module is fitted with an FE spring on the underside which creates an electrical connection to the DIN rail. In order to establish a secure connection, the assembly must be carried out carefully in accordance with the instructions (see Chapter 7). The module is earthed by connecting the DIN rail to the protective earth via the earth terminal.

Modules UR20-16AUX-FE, UR20-4DI-P, UR20-4DO-P, UR20-4AI-UI-12 and UR20-4AI-UI-16 have connections with green pushers. An FE potential is also provided at these connections. They must not be used as a PE!

Shielding

Shielded lines are to be connected with shielded plugs and fixed on a shield bus in compliance with the relevant standard (see Chapter 10).

2.2 Intended use

The products of the u-remote series are intended for use in industrial automation. A u-remote station with bus coupler and connected modules is intended for the decentralised control of systems or sub-systems. Via the fieldbus bus coupler every module of a station is integrated into a fieldbus structure and connected to the superordinate control unit. The u-remote products conform to protection class IP 20 (in accordance with DIN EN 60529), they can be used in potentially explosive atmospheres rated as Zone 2 (as per Directive 94/9/EC) and in safe zones.

The observance of the supplied documentation is part of the intended use. The products described in this manual may only be used for the intended applications and only in connection with certified third-party devices or components.

2.3 Legal notice

The u-remote series products are CE-compliant in accordance with Directive 2004/108/EC (EMC Directive) and Directive 2006/95/EC (Low Voltage Directive). They also meet the requirements of the ATEX Directive 94/9/EG.

Components of the following free software products are integrated into the u-remote products:

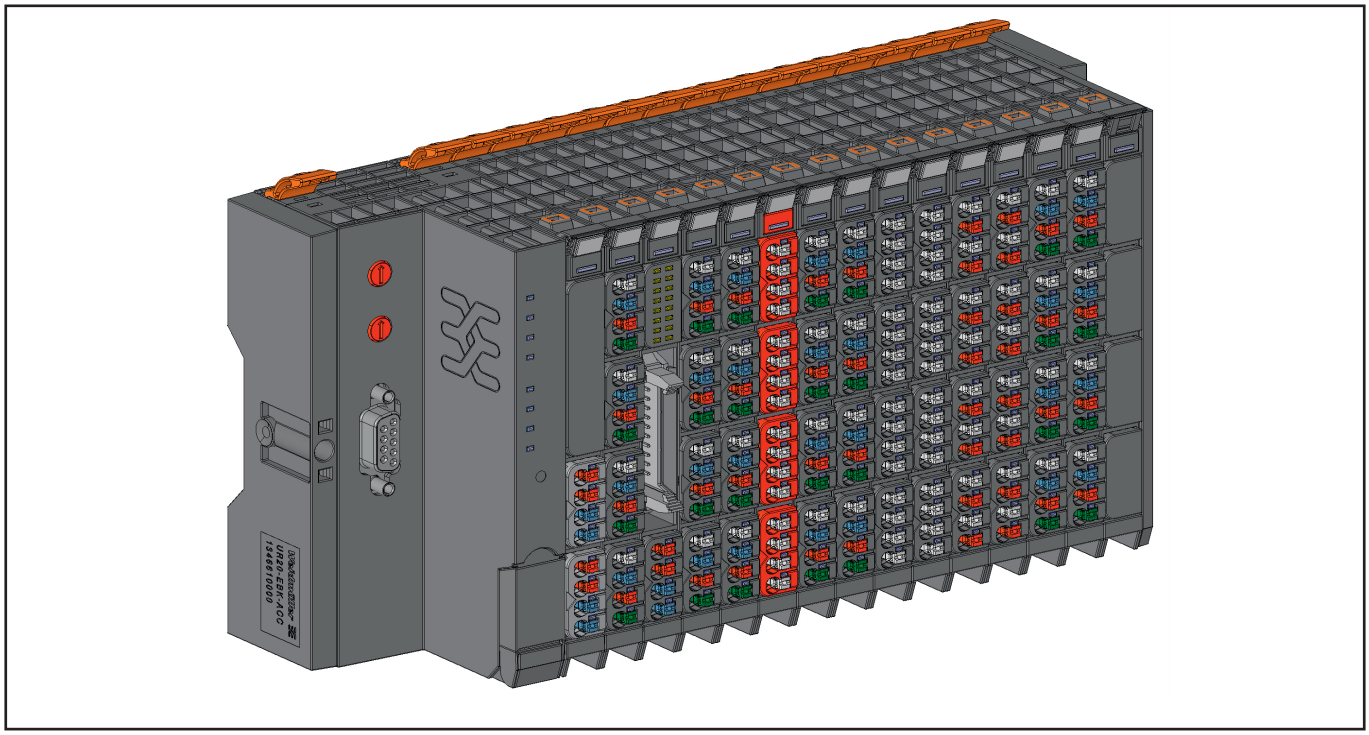
Components	Licence	Link
Ecos	modified GPL	http://ecos.sourceware.org/license-overview.html
mongoose web server	freeware	http://code.google.com/p/mongoose/source/browse/LICENSE
jQuery	MIT	http://jquery.org/license/
Jquery Tooltip	MIT	http://jquery.org/license/
Jquery SVG	MIT	http://jquery.org/license/
Jquery MD5	GPL	http://www.gnu.org/licenses/gpl.html
Jquery int. languages	MIT	http://jquery.org/license/

2.4 Use in a potentially explosive atmosphere

If u-remote products are used in potentially explosive atmospheres, the following notes are **also** applicable:

- Staff involved in assembly, installation and operation must be qualified to perform safe work on electrical systems protected against potentially explosive atmospheres.
- For applications in potentially explosive atmospheres, the requirements according to DIN EN 60079-15 must be observed, in particular the housing enclosing the system must meet the requirements of explosion protection type Ex n or Ex e and protection class IP54.
- Sensors and actuators that are located in Zone 2 or in a safe zone can be connected to the u-remote station.
- When the temperature under rated conditions exceeds 70 °C at the conductor or conduit entry point, or 80 °C at the contact, the temperature specification of the selected cable shall be in compliance with the actual measured temperature values.
- When using relais modules UR20-4RO-CO-255 in explosive atmosphere:
  - Condensation shall be avoided.
  - If the switching voltage exceeds 63V, a surge protection device shall be provided that limits the transients to a peak voltage of 500V or less.
- A visual inspection of the u-remote station is to be performed once per year.

3 System overview



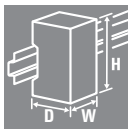
Example arrangement of a u-remote station

The modular u-remote system supports common fieldbus systems and conforms to IEC 61131-2. Each station is assigned a bus address in the fieldbus structure. Only the coupler is fieldbus-specific; the I/O modules are independent of the fieldbus.

Up to 64 active I/O modules can be combined in a u-remote station. The largest expansion possible depends on the maximum amount of data transmitted by the selected fieldbus, in particular the configuration, parameter, or process data for the module types provided.

The following components belong to the u-remote product series:

- Field-bus coupler (gateway): Head station for converting the respective fieldbus protocol on the u-remote system bus
- Active I/O modules:
  - Modules with digital input (DI) or digital output (DO) with 2, 4, 8 or 16 channels
  - Modules with analogue input (AI) or analogue output (AO) with 4 or 8 channels
  - Pulse width modulation modules (PWM)
  - Digital counter modules (CNT)
- Passive I/O modules (no fieldbus communication)
  - 24-V power-feed modules (PF) for input or output current
  - Potential distribution modules (AUX)
  - Empty modules acting as placeholders (ES)
- Mechanical fixing elements
  - End bracket
  - End plate

	Height (H)	Width (W)	Depth (D)
Field-bus coupler	120,0 / 4.72	52,0 / 2.05	76,0 / 2.99
I/O module	120,0 / 4.72	11,5 / 0.45	76,0 / 2.99
End plate	120,0 / 4.72	3,5 / 0.14	76,0 / 2.99
End bracket	120,0 / 4.72	8,0 / 0.32	36,0 / 1.42

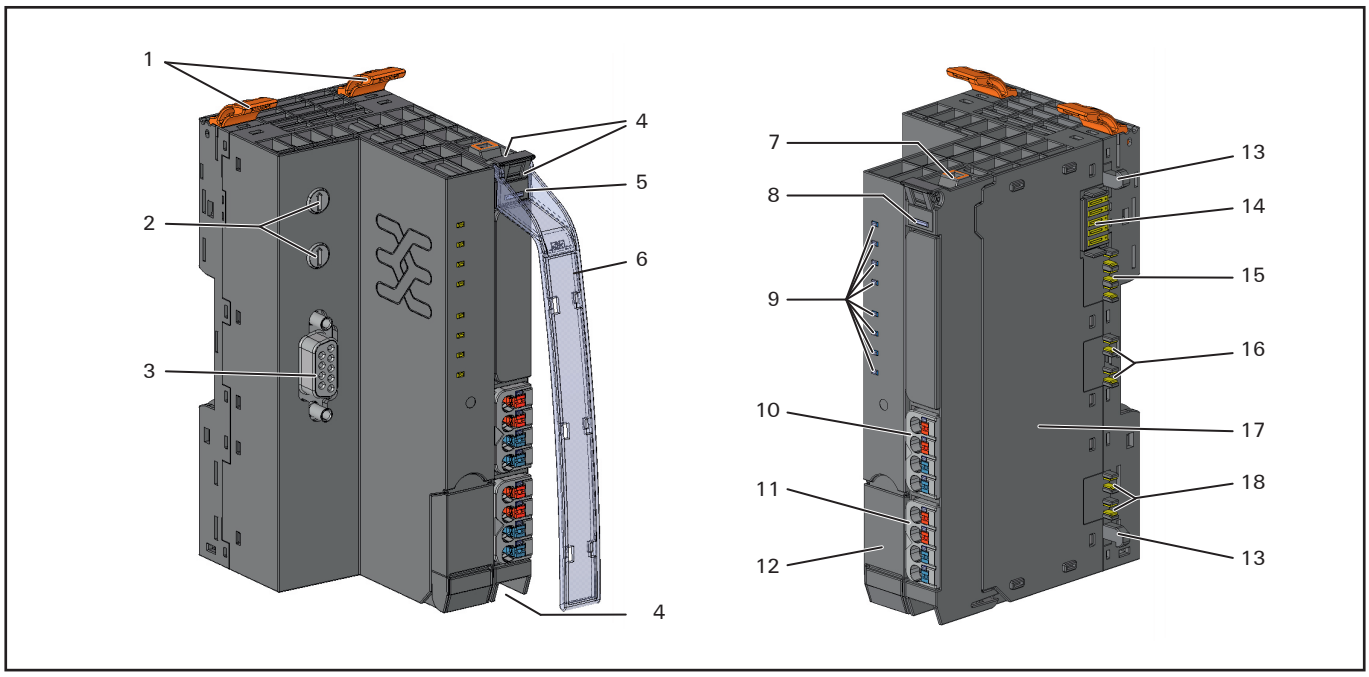
Dimensions of the u-remote components (mm / inch)

"Double-click" installation

The u-remote station modules can be installed quickly and simply. When attaching the module to the DIN rail, a clear clicking noise can be heard, which means that the module has clicked into place. In the second step, which involves pushing the module being installed together with the neighbouring module, a further clicking noise indicates that the modules have been correctly connected to each other.

3.1 General description of the field-bus coupler

A field-bus coupler is used to connect the station I/O modules to the fieldbus. All of the data traffic with the programmable logic controller including the diagnostic messages is exchanged via the coupler. The integrated power supply provides the coupler and all connected modules with power.
A detailed description of the individual coupler types is available in Chapter 5.



Field-bus coupler (example: UR20-FBC-PB-DP)

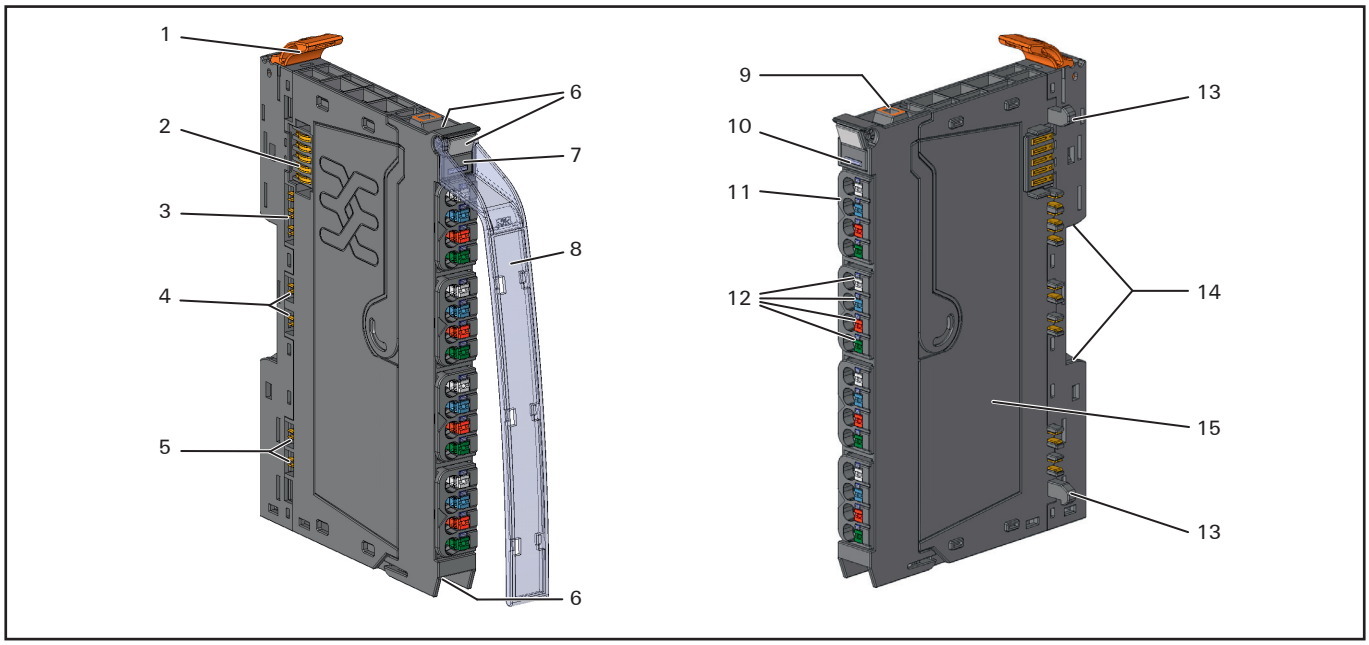
1 Catch lever for securing the DIN rail
2 Rotary switch (only Profibus)
3 Data line connection (e.g. SUB-D socket)
4 Seats for module markers
5 Type designation
6 Optional: swivel marker for labelling modules and channels
7 Connector frame unlocking device
8 LED power supply coupler
9 Fieldbus/coupler status LEDs
10 Power supply connector for the system and input modules
11 Power supply connector for output modules
12 Service flap
13 Latching hook for latching onto module sides
14 System bus
15 System current path
16 Input current path
17 Type plate with block diagram
18 Output current path

3.2 General technical data for the field-bus coupler

Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 – 1.5 mm² (AWG 16 – 26)
	Fine-wired	0.14 – 1.5 mm² (AWG 16 – 26)
Dimensions	Height	120,0 mm / 4.72" (with release lever: 128,0 mm / 5,04")
	Width	52,0 mm / 2.05"
	Depth	76,0 mm / 2.99"
Weight	220 g	
Protection class (DIN EN 60529)	IP 20	
Flammability rating UL 94	V-0	
Temperature data	Operation (horizontal installation)	-20 °C to +60 °C / -4 ... +140 °F (8-A power supply) -20 °C to +55 °C / -4 ... +131 °F (10-A power supply)
	Operation (vertical installation)	-20 °C to +55 °C / -4 ... +131 °F (6-A power supply) -20 °C to +50 °C / -4 ... +122 °F (8-A power supply)
	Storage, transport	-40 °C to +85 °C / -40 ... +185 °F
Humidity	Operation	95 %, non-condensing as per DIN EN 61131-2
	Storage, transport	95 %, non-condensing as per DIN EN 61131-2
Air pressure	Operation	≥ 795 hPa (altitude ≤ 2000 m) as per DIN EN 61131-2
	Storage, transport	≥ 700 hPa (altitude ≤ 3000 m) as per DIN EN 61131-2
Vibration resistance	5 Hz ≤ f ≤ 8.4 Hz: 3.5 mm amplitude as per IEC 60068-2-6 8.4 Hz ≤ f ≤ 150 Hz: 1 g acceleration as per IEC 60068-2-6	
Shock resistance	15 g over 11 ms, half sinewave, as per IEC 60068-2-27	
Potential isolation	Test voltage	500 V DC field/system
	Pollution severity level	2
	Overvoltage category	II
Approvals	cULus	UL 508
Standards	Potentially explosive atmosphere Zone 2*	ATEX Directive 94/9/EC
	EMC	EN 61000 (partial standards as per the requirements of EN 61131-2)
	Explosion protection	EN 60079-0:2009 and EN 60079-15:2010
	PLC	DIN EN 61131-2

All product-specific technical data is available in the corresponding product description in Chapter 5.
* unless otherwise noted within the product-specific technical data.

3.3 General description of I/O modules



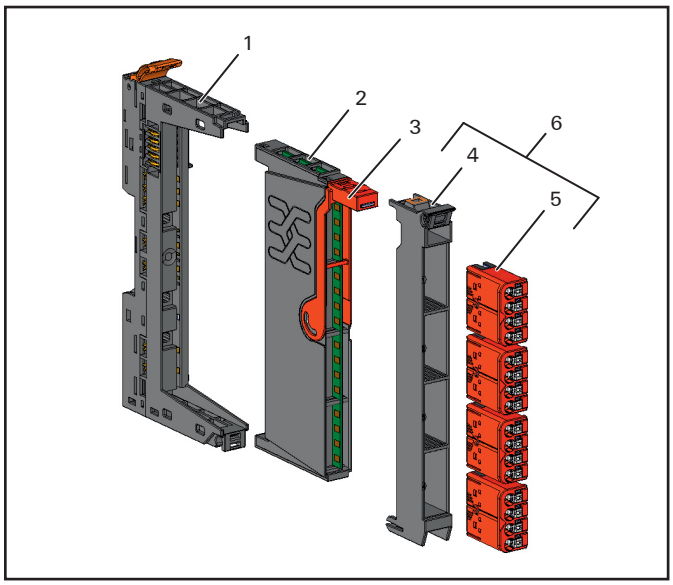
I/O module (Example UR20-4-DI-P)

1 Catch lever for securing the DIN rail
2 System bus
3 System current path
4 Input current path
5 Output current path
6 Seats for module markers
7 Type designation
8 Optional: swivel marker for labelling modules and channels
9 Connector frame unlocking device
10 Module status LED (collective message)
11 Connector
12 Channel status LEDs
13 Latching hook for latching onto module sides
14 DIN rail foot
15 Type plate

Colour coding

The removal levers for the electronic unit and the connectors are colour-coded as follows:

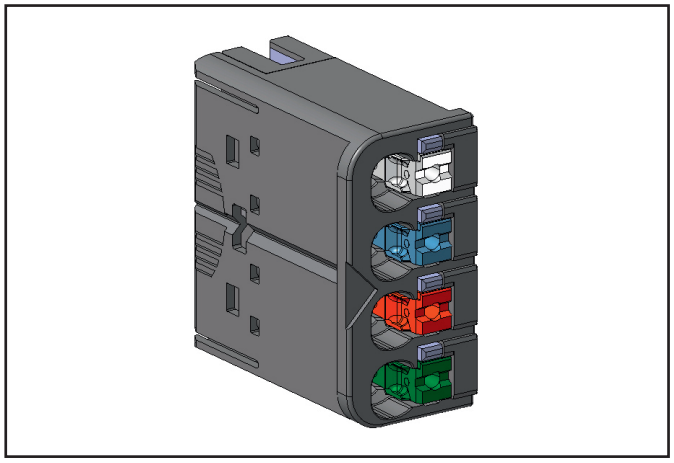
Black	standard
Grey	power supply
Red	230 V
Yellow	SIL products



I/O module components

1 Basic module
2 Electronic unit
3 Removal lever for electronic unit
4 Connector frame
5 Connector
6 Plug-in unit

The connection frame can take up to four connectors, and four conductors can be connected to each connector. "PUSH IN" technology allows for fine-wired conductors with crimped wire-end ferrules or ultrasonically welded conductors, each with a maximum cross-section of 1.5 mm², to be inserted easily through the opening in the clamping terminal without having to use tools. To insert fine-wired conductors without wire-end ferrules, the pusher must be pressed in with a screwdriver.



Connectors with four conductor connectors

The pushers are colour-coded for the following connections:

Grey	Signal
Blue	GND
Red	24 V DC
Green	Functional earth (FE)

Detailed descriptions of the individual module types are available in Chapter 6.

Cable protection

The modules listed in the following table do not have a fused sensor/activator power supply. Here, all cables to the connected sensors/actuators must be fused corresponding to their conductor cross-sections (as per Standard EN 60204-1, section 12).

Modules	Order No.
Digital input modules	
UR20-4DI-P	1315170000
UR20-8DI-P-3W	1394400000
UR20-2DI-P-TS	1460140000
UR20-4DI-P-TS	1460150000
Digital output modules	
UR20-4DO-P	1315220000
UR20-4DO-P-2A	1315230000
UR20-4DO-PN-2A	1394420000
Analogue input modules	
UR20-4AI-UI-16	1315620000
UR20-4AI-UI-12	1394390000
Functional modules	
UR20-2PWM-PN-0.5A	1315600000
UR20-2PWM-PN-2A	1315610000
UR20-1CNT-100-1DO	1315570000
UR20-2CNT-100	1315590000
Potential distribution modules	
UR20-16AUX-I	1334770000
UR20-16AUX-O	1334780000
UR20-16AUX-GND-I	1334800000
UR20-16AUX-GND-O	1334810000

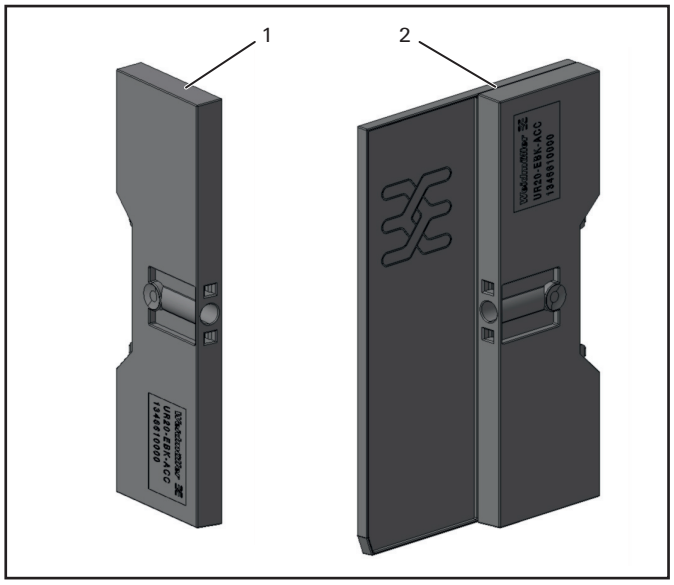
3.4 General technical data for I/O modules

Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 – 1.5 mm² (AWG 16 – 26)
	Fine-wired	0.14 – 1.5 mm² (AWG 16 – 26)
Dimensions	Height	120,0 mm / 4.72" (with release lever: 128,0 mm / 5,04")
	Width	11,5 mm / 0.45"
	Depth	76,0 mm / 2.99"
Weight	70 to 91 g (see module descriptions)	
Protection class (DIN EN 60529)	IP 20	
Flammability rating UL 94	V-0	
Temperature data	Operation	-20 °C ... +60 °C / -4 ... +140 °F
	Storage, transport	-40 °C ... +85 °C / -40 ... +185 °F
Humidity	Operation, storage, transport	5 % to 95 %, non-condensing as per IEC 61131-2
Air pressure	Operation	≥ 795 hPa (altitude ≤ 2000 m) as per IEC 61131-2
	Storage, transport	≥ 700 hPa (altitude ≤ 3000 m) as per IEC 61131-2
Vibration resistance	5 Hz ≤ f ≤ 8.4 Hz: 3.5-mm amplitude as per IEC 60068-2-6 8.4 Hz ≤ f ≤ 150 Hz: 1-g acceleration as per IEC 60068-2-6	
Shock resistance	15 g over 11 ms, half sinewave, as per IEC 60068-2-27	
Potential isolation	Test voltage	500 V DC field/system
	Pollution severity level	2
	Overvoltage category	II
Approvals	UL	UL 508
Standards	Potentially explosive atmosphere Zone 2	ATEX Directive 94/9/EC
	EMC	EN 61000 (partial standards as per the requirements of EN 61131-2)
	Explosion protection	EN 60079-0:2009 and EN 60079-15:2010
	PLC	IEC 61131-2

All product-specific technical data is available in the corresponding product description in Chapter 6.

3.5 Mechanical fixing elements

The station is fixed in the installation position by an end bracket at either side. The last I/O module is protected against dust by a cover plate, into which the second end bracket is inserted and screwed to the mounting rail. Every u-remote coupler is supplied with a termination kit.



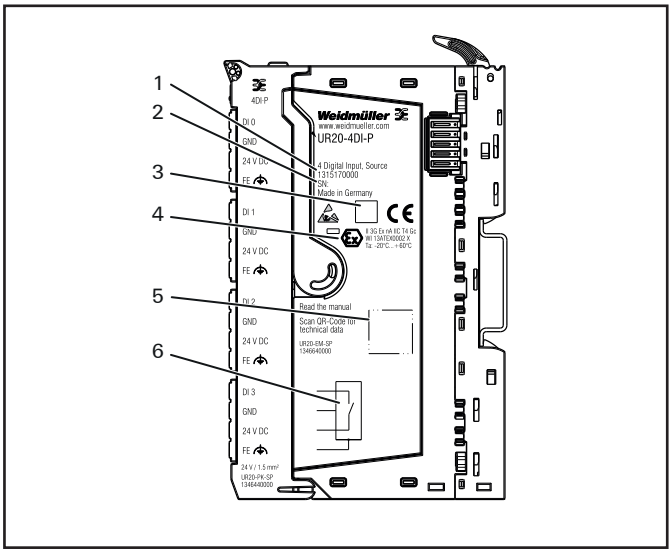
u-remote station fixing elements

1 End bracket (left end, on the coupler side)
2 Terminatio n kit with end plate and end bracket (right end)

For vertical installation, a special end bracket (Order No. 1162600000 WEW 35/1 SW) must also be installed below the station.

3.6 Type plate

Each field-bus coupler and each module features a type plate, which includes identification information, the key technical specifications and a block diagram. In addition, a QR code allows for direct online access to the associated documentation. The software for reading the QR code must support inverted QR codes. A breakdown of the serial numbers can be found in the table provided in the annex.



Type plate (example of UR20-4 DI-P)

1 Product number
2 Serial number
3 Manufacturing code
4 ATEX marking
5 QR code
6 Block diagram

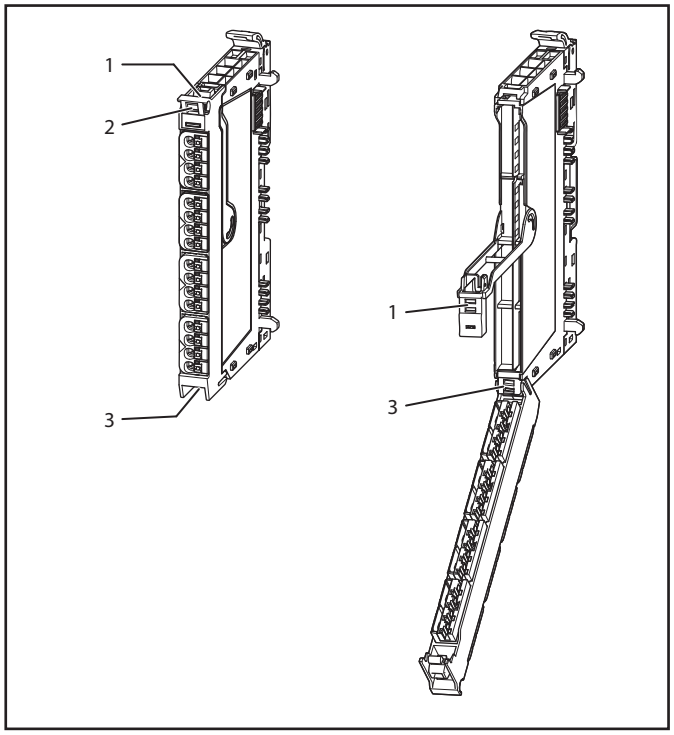
3.7 Markers

A wide range of markers are available as accessories for labelling equipment.

Module marker

Each I/O module can be labelled at three points using the markers. This ensures clear allocation when replacing individual modules or electronic units.

The following markers are available as accessories:
- With custom printing as per customer specifications (Order No. 1341610000)
- Blank (Order No. 1341630000), can be printed with the Weidmüller PrintJet ADVANCED (Order No. 1324380000)

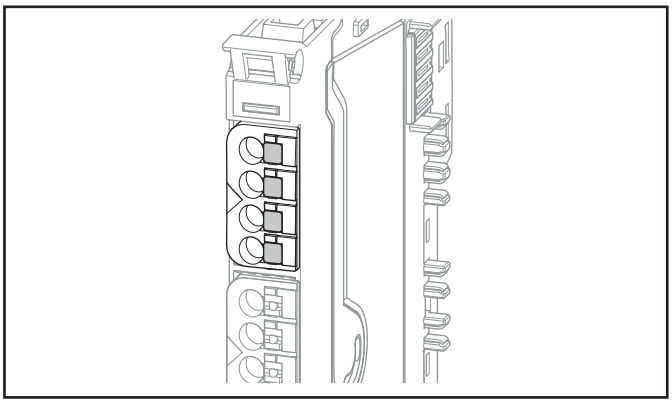


Three attachment points for module markers

Connection marker for lines and channels

The connection marker is used to label lines and channels, and is attached to the pusher for the connector.

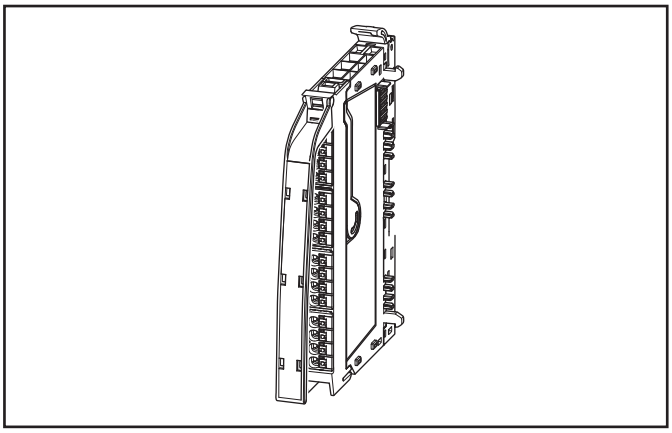
The following markers are available as accessories:
- With custom printing as per customer specifications (Order No. 1323700000)
- Blank (Order No. 1323710000) or yellow (Order No. 1435010000) can be printed with the Weidmüller PrintJet ADVANCED (Order No. 1324380000)



Connection marker

Swivel marker

Swivel markers (Order No. 1339920000) allow for modules and all respective channels and lines to be labelled in detail. They are attached to the connector frame.

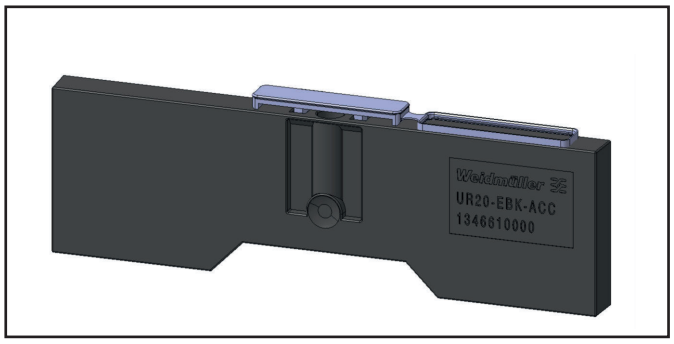


Module with swivel marker

The following labels are available for the labelling:
- Thermal transfer printer labels for printing with a thermal transfer printer (such as Order No. 1276230000)
  - Order No. 1429420000 THM UR20 WS
  - Order No. 1429910000 THM UR20 GE
- Paper labels for printing with laser printers (Order No. 1429430000, ESO UR20 DIN A4 WS)

End bracket marker EM 8/30

The end bracket of the u-remote station can be fitted with an end bracket marker (Order No. 1806120000).



End bracket with end bracket marker

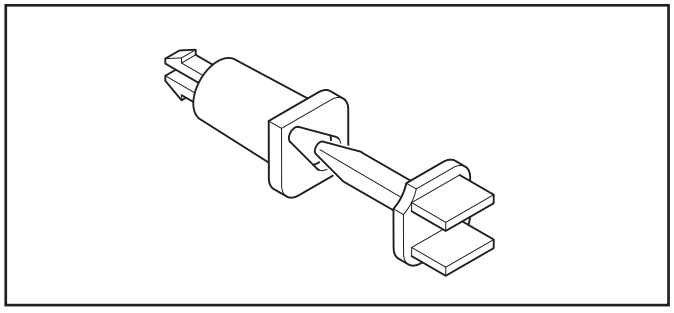
The following labels are available for the labelling:

- Paper labels for printing with laser printers
  - Order No. 1607720000, ESO 7 white
  - Order No. 1634780000, ESO 7 yellow
- Polyester labels for printing with laser printers
  - Order No. 1670390000, ESO 7POLY white
  - Order No. 1670400000, ESO 7POLY yellow

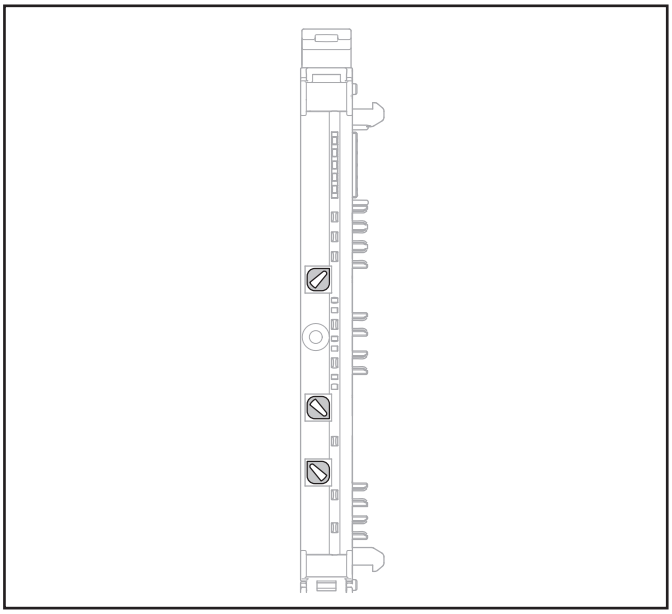
3.8 Module codings

Position coding

In order to prevent an electronic module being mismated, the modules can be coded by the customer. Coding is carried out by two small components: the orange coding socket and the black coding pin. Three codings can be applied to each basic module.



Socket and pin for position coding

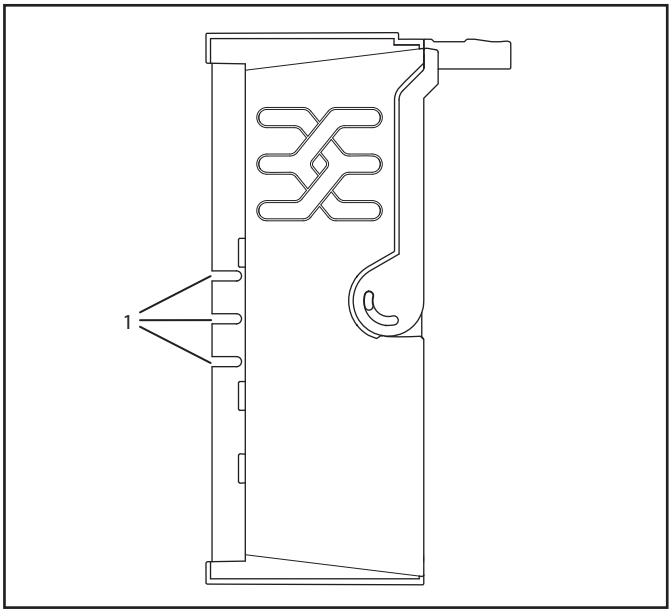


Basic module with inserted coding sockets

Functional coding

The I/O modules are mechanically coded using three cut-outs in the circuit board. There are four different function codes for:

- I/O modules
- Power-feed modules for the input current path (UR20-PF-I)
- Power-feed modules for the output current path (UR20-PF-O)
- Safe power-feed modules (UR20-PF-O-xDI-SIL)



Electronic unit with coding cut-outs (1) in the PCB

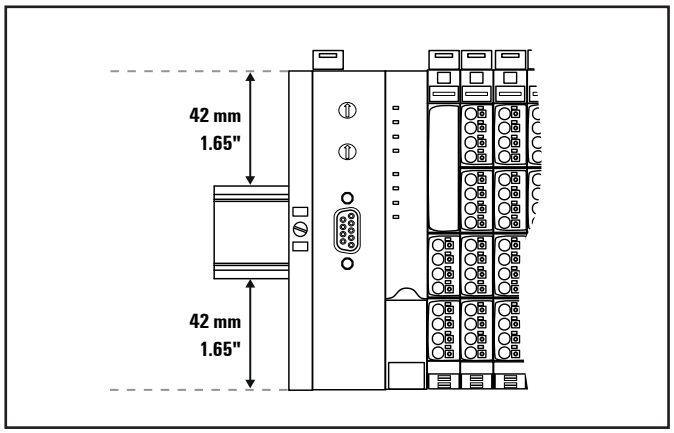
4 Configuration

4.1 Order and arrangement of the modules

The u-remote system elements are designed to be installed on a profile rail according to EN 60715 (35 × 7.5 mm), a steel strip in accordance with Annex A of EN 60715, or a tin-plated steel strip.

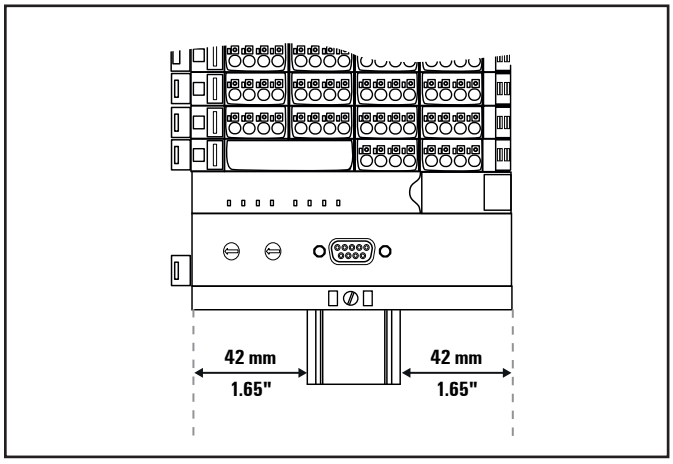
A u-remote station may be built up to a maximum length of 1 m. Therefore at most 82 modules can be aligned on a coupler.

The u-remote station is usually installed on a horizontally positioned DIN rail.



Installation position of the u-remote station on the DIN rail (horizontal installation)

Installation on vertically positioned DIN rails is also possible. In this case however, the heat dissipation is reduced such that the derating values change (see Section 4.5).
In the case of vertical mounting, the field-bus coupler must always be arranged as the first module at the bottom and secured with a MEW 35/1 end bracket for vertical mounting (Order No. 1805610000).



Installation position of the u-remote station on the DIN rail (vertical installation)

A u-remote station may only be installed in this sequence (starting from the left/bottom):
- End bracket
- Bus coupler
- Up to 82 modules (including max. 64 active modules)
- End plate and end bracket

ATTENTION

A maximum of three passive modules (potential distribution module, power-feed module or blank module) may be placed in successive positions. Then at least one active module must follow.

Arrangement of SIL modules

A UR20-PF-O SIL module can be positioned anywhere in the u-remote station. All of the following output modules (except for the UR20-4RO-CO-255 and UR20-4RO-SSR-255 relay modules) up to the next PF-O module are safely disconnected (safety segment). Multiple UR20-PF-O SIL modules/safety segments can be arranged within a station.

When using u-remote PF-O-xDI-SIL modules, please also observe the **Module for Functional Safety Manual.**

The manual is available to download from the Weidmüller website.

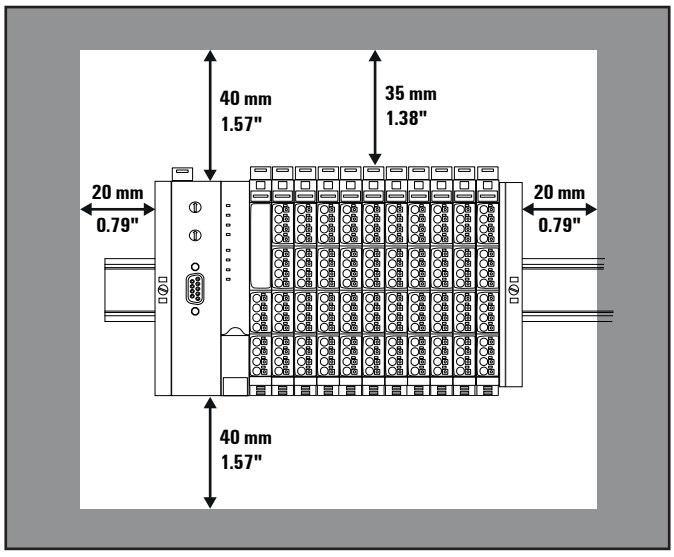
4.2 Installation distances

In order to be able to carry out the installation and subsequent maintenance work and to ensure sufficient ventilation, the u-remote station must be installed while observing the following minimum distances (see the following figures).

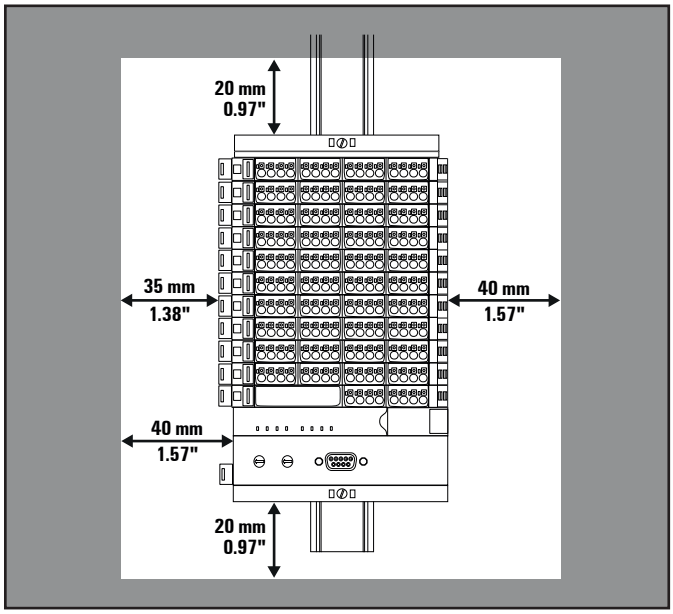
ATTENTION

Depending on how the station shielding is implemented, the specified distances may have to be made larger, where necessary.

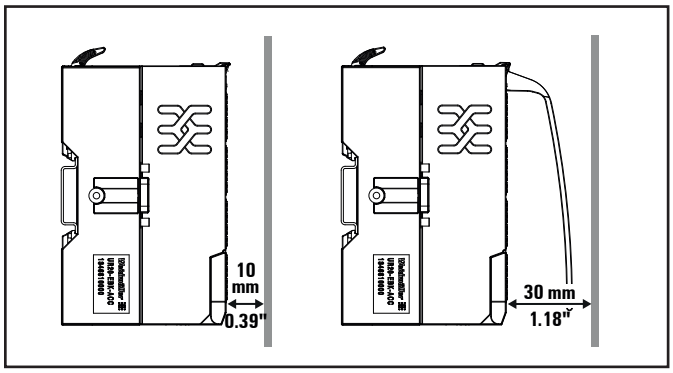
The minimum permissible conductor bending radii must also be observed. Earth terminals already installed can be ignored when calculating the distance.



Minimum distances for horizontal installation



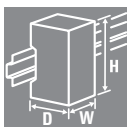
Minimum distances for vertical installation



Minimum distance for electrical cabinet door (without/with swivel marker)

Example calculation for space requirements

The space requirements for the horizontal installation of a u-remote station with n modules are calculated as follows:



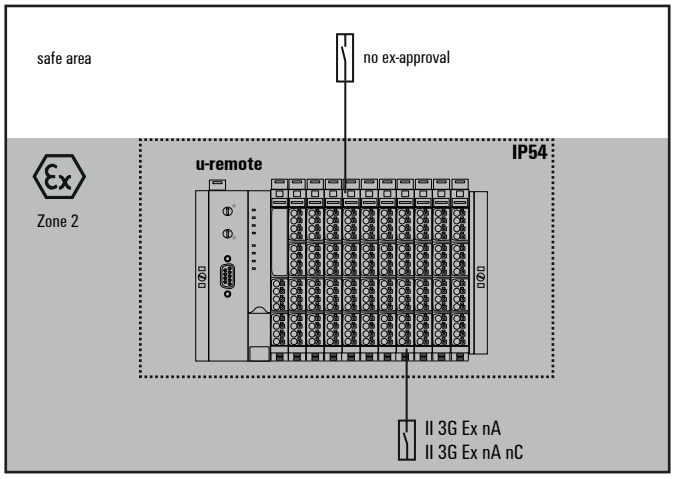
Height: 120 mm / 4.72"
+ 2 x 40 mm / 1.57" (distances at top and bottom)
= 200 mm / 7.87"

Width: 8 mm / 1.57" (end bracket)
+ 52 mm / 2.05" (bus coupler)
+ n x 11.5 mm / 0.45" (n modules)
+ 11.5 mm / 0.45" (end plate and end bracket)
+ 2 x 20 mm / 0.79" (distances to the sides)
= 111.5 / 4.39" + n x 11.5 mm / 0.45"

For vertical installation interchange height and width. When calculating the width, 4,5 mm / 0.18" for the must be added for the end bracket MEW 35/1.

4.3 Use in a potentially explosive atmosphere

If the u-remote station is used in a potentially explosive atmosphere rated as Zone 2, the housing must meet the requirements of explosion protection type Ex n or Ex e and protection class IP54. Sensors and actuators that are located in Zone 2 or in a safe zone can be connected. All cable glands on the housing must be approved for Ex e.



Use in a potentially explosive atmosphere

ATEX marking

Ⓔx II 3 G Ex nA IIC T4 Gc
WI 13ATEX0002 X
Ta: -20 °C ... +60 °C

4.4 "PUSH IN" system cabling

u-remote modules and field-bus couplers are equipped with the "PUSH IN" connector system. Single-strand and fine-strand lines with wire-end ferrules can be inserted without the need for a tool. Lines with a cross-section measuring between 0.14 mm² and 1.5 mm² can be connected.

We recommend using the following wire-end ferrules:

Cross-section	AWG	Weidmüller order no. Weidmüller colour code	Weidmüller order no. DIN colour code
0,14 mm²	26	9028240000	
0,25 mm²	24	9025760000	
0,34 mm²	22	9025770000	
0,50 mm²	20	9025870000	9019020000
0,75 mm²	18	9025860000	9019050000
1,00 mm²	17	9025950000	9019100000
1,50 mm²	16	0635100000	9019130000

Wire-end ferrules for the wiring

The external dimensions of the crimped wire-end ferrules must conform with IEC-60947-1. For crimping, we recommend crimp shape A and the following tools:

- Crimping tool for wire-end ferrules from 0.25 mm² to 1.5 mm² (AWG 24 to 16) with a trapezoidal indentation crimp, type: PZ 6/5 ZERT (Order No. 9017900000)
- Crimping tool for wire-end ferrules from 0.14 mm² to 0.75 mm² (AWG 26 to 18) with a trapezoidal crimp, type: PZ 1.5 ZERT (Order No. 9017310000)

4.5 Current demand and power supply

The u-remote system uses three internal current paths:

The **I_{SYS} system current path** supplies the communication part of the I/O modules; it is fed from the coupler input supply and cannot be interrupted by any module. The maximum current-carrying capacity of I_{SYS} allows a u-remote station to be expanded with a maximum of 64 active modules without having to refresh the power.

The **I_{IN} input current path** supplies the input circuit of the input modules as well as the connected I_S sensors. The current must be refreshed with UR20-PF-I (power feed in) modules as required. These UR20-PF-I modules isolate the input current path towards the left (towards the coupler), and as a result start a new electricity segment towards the right.

The **I_{OUT} output current path** supplies the output circuit of the output modules with power, as well as the I_L connected actuators. The current must be refreshed with the UR20-PF-O (power feed-out), as required. These UR20-PF-O modules isolate the output current path to the left (towards the coupler), and as a result start a new electricity segment to the right.

The design of the power supply being used must take start-up peaks into account.

Power supply derating

The power supply is restricted according to the temperature. The following values apply for the horizontal and vertical positioning of the u-remote station:

	Horizontal	Vertical
Coupler power supply	60 °C / 140 °F : 2 x 8 A 55 °C / 131 °F : 2 x 10 A	55 °C / 131 °F : 2 x 6 A 50 °C / 122 °F : 2 x 8 A
Power-feed module power supply	60 °C / 140 °F : 1 x 10 A	55 °C / 131 °F : 1 x 8 A

Temperature-dependent values for the power supply

ATTENTION

Equipment may become damaged if improperly rated circuit protection is used!

- ► A UL-approved Type-B automatic circuit breaker must be used.
- ► Use a fuse with a maximum of 10 A protection, which is matched to the rated current (example: fuse rated at ≤ 5 A for a 5 A power supply).

Current demand

Product group	Product	I_{SYS}	I_{IN}	I_{OUT}	I_S	I_L
Field-bus coupler	UR20-FBC-PB-DP	100 mA				
	UR20-FBC-PN-IRT	116 mA				
	UR20-FBC-MOD-TCP	112 mA				
	UR20-FBC-EC	130 mA				
Digital input modules	UR20-4DI-P	8 mA	12 mA		x	
	UR20-8DI-P-3W	8 mA	22 mA		x	
	UR20-16DI-P	8 mA	42 mA			
	UR20-16DI-P-PLC-INT	8 mA	42 mA			
	UR20-2DI-P-TS	8 mA	< 10 mA		x	
	UR20-4DI-P-TS	8 mA	< 10 mA		x	
Digital output modules	UR20-4DO-P	8 mA		10 mA		x
	UR20-4DO-P-2A	8 mA		10 mA		x
	UR20-4DO-PN-2A	8 mA		10 mA		x
	UR20-8DO-P	8 mA		15 mA		x
	UR20-16DO-P	8 mA		20 mA		x
	UR20-16DO-P-PLC-INT	8 mA		20 mA		x
	UR20-4RO-SSR-255	8 mA		< 15 mA		
	UR20-4RO-CO-255	8 mA		< 15 mA		
Analogue input modules	UR20-4AI-UI-16	8 mA	25 mA		x	
	UR20-4AI-UI-12	8 mA	25 mA		x	
	UR20-8AI-I-PLC-INT	8 mA	20 mA			
	UR20-4AI-TC-DIAG	8 mA	20 mA			
	UR20-4AI-RTD-DIAG	8 mA	20 mA			
Analogue output module	UR20-4AO-UI-16	8 mA		85 mA		
Functional modules	UR20-1CNT-100-1DO	8 mA	35 mA			x
	UR20-2CNT-100	8 mA	35 mA			x
	UR20-2PWM-PN-0.5A	8 mA		21 mA		x
	UR20-2PWM-PN-2A	8 mA		21 mA		x
Power-feed modules	UR20-PF-O			10 mA		
	UR20-PF-I		10 mA			
	UR20-PF-O-1DI-SIL	8 mA	20 mA	6 mA		x
	UR20-PF-O-2DI-SIL	8 mA	20 mA	6 mA		x
	UR20-PF-O-2DI-DELAY-SIL	8 mA	20 mA	6 mA		x
Potential distribution modules	UR20-16AUX-O					
	UR20-16AUX-I					

I_{SYS} Current consumption from the system current path
I_{IN} Power consumption from input current path
I_{OUT} Power consumption from output current path
I_S Current demand of the connected sensors
I_L Current demand of the connected actuators

4.6 Example calculation for the power supply

The power supply must be calculated individually for each station installation. Therefore the simultaneity factor g and the current demand of each module, as well as the devices to be connected must be established (see the example calculation table).

In the **example station**, a PROFINET-IRT coupler is configured with four UR20-4DI-P modules and eight UR20-8DO-P modules. The cumulative current demand for each module is now calculated to determine whether and at which point a UR20-PF-I power-feed module must be positioned to refresh the current path. A power-feed module must always be used where the current demand exceeds 10 A.

The power refresh must be separately calculated for the input and output current paths. The system voltage need not be considered during this step.

Calculation of the current demand for the input current
The current consumption of the field-bus coupler must be considered for the **main power supply**, and the sum of consumption values is multiplied by the simultaneity factor g for each following module:

I_{SYS} coupler
+ (I_{SYS} + I_{IN}) + (I_S x g) module 1
+ (I_{SYS} + I_{IN}) + (I_S x g) module 2
+ $\sum$ ((I_{SYS} + I_{IN}) + (I_S x g)) modules 3 to 4
= Cumulative current demand

I_{SYS} Current consumption from the system current path
I_{IN} Current consumption from the input current path
I_S Power supplies for the connected sensors

In the case of an additional power supply (**power refresh**) with a UR20-PF-I power-feed module, only the sensor power supplies and the module current consumption have to be considered:

((I_{IN} + I_S module x) x g)
+ ((I_{IN} + I_S module y) x g)
+ $\sum$ ((I_{IN} + I_S) x g) n modules
= Cumulative current demand

I_{IN} Current consumption from the input current path
I_S Power supplies for the connected sensors

Calculation of current demand for the output current
The current consumption of each module and the current demand of the connected actuators must be considered for the output current. There is no difference in the calculation of the main power supply and power refresh:

(I_{OUT} + (I_L x g) module 1
+ (I_{OUT} + (I_L x g) module 2
+ $\sum$ (I_{OUT} + (I_L x g)) n modules
= Cumulative current demand

I_{OUT} module current consumption from the output current path
I_L Current demand of the connected actuators

Example:
The values in the following table are used to calculate the current demand of the example station (cumulative for each module). The input current is:
Module 1:
I = 0.116 A + (0.008 A + 0.012 A) + (0.06 A x 1) = 0.196 A

Module 2:
I = 0.196 A + (0.008 A + 0.012 A) + (0.06 A x 1) = 0.276 A

The values for the other modules are calculated accordingly. The result shows that the accumulated value for up to 12 modules remains under 10 A, and therefore a power-feed module need not be used for the input current path.
Results for the output current path:
Module 5:
I = 0.015 A + (0.5 A x 2) = 1.015 A

Modul6 6:
I = 1.015 A + (0.015 A + (0.5 A x 4) = 3.03 A

Module 10:
I = 6.175 A + (0.015 A + (0.5 A x 4) = 8.19 A

Module 11 (without power refresh):
I = 8.19 A + (0.015 A + (0.5 A x 4) = **10.205 A**

Therefore the available 10 A would be exceeded. As a result, a PF-O power-feed module must be positioned e 11th module, which will supply anocalculation of current consumption is repeated for each power-feed module. Unused current values may not be included.

Module 11 (as per PF-O):
I = (0.015 A + (0.5 A x 4) = 2.015 A

Module 12 (as per PF-O):
I = 2.015 A (0.015 A + (0.5 A x 4) = 4.030 A

Example calculation for the current demand (all current values in A)

Module no.	Product	I_{SYS}	I_{IN}	I_{OUT}	I_S	I_L	Simultaneity factor g	Cumulative current demands of the input current path	Cumulative current demand of the output power path coupler	Cumulative current demand of the PF-O output power path
	UR20-FBC-PN-IRT	0.116						0.116	0	
1	UR20-4DI-P	0.008	0.012		0.06		1	0.196	0	
2	UR20-4DI-P	0.008	0.012		0.06		1	0.276	0	
3	UR20-4DI-P	0.008	0.012		0.12		1	0.416	0	
4	UR20-4DI-P	0.008	0.012		0.18		1	0.616	0	
5	UR20-8DO-P	0.008		0.015		2	0.5	0.624	1.015	
6	UR20-8DO-P	0.008		0.015		4	0.5	0.632	3.03	
7	UR20-8DO-P	0.008		0.015		3	0.5	0.64	4.545	
8	UR20-8DO-P	0.008		0.015		2	0.5	0.648	5.56	
9	UR20-8DO-P	0.008		0.015		1.2	0.5	0.656	6.175	
10	UR20-8DO-P	0.008		0.015		4	0.5	0.664	**8.19**	
	UR20-PF-O									
11	UR20-8DO-P	0.008		0.015		4	0.5	0.672		2.015
12	UR20-8DO-P	0.008		0.015		4	0.5	0.68		4.030

I_{SYS} Current consumption from the system power supply
I_{IN} Power consumption from input current path
I_{OUT} Power consumption from output current path
I_S Current demand of the connected sensors
I_L Current demand of the connected actuators

The current demand is just under 10 A! The output current path must therefore be refreshed **before the 11th module**.

10 A is supplied by the UR20-PF-O module. The 1.81 A calculated as remaining after the 10th module must **not** be added to the 10 A after the UR20-PF-O module!

4.7 Calculation of power loss

The power loss of the field bus coupler is calculated als follows:

$$P_{coupler} = P_0 + N * P_{mod} + I_{in} * \Delta U_{in} + I_{out} * \Delta U_{out}$$

P_0	static power loss in the coupler	2,3 W
N	number of modules	
P_{mod}	power loss due to module supply from the system current path	0,02 W
P_{module}	max. power loss module	
I_{in}	current fed in through the input current path	
ΔU_{in}	Voltage drop across the contacts in the input current path	0,18 V
I_{out}	current fed in through the output current path	
ΔU_{out}	voltage drop across the contacts in the output current path	0,18 V

The power loss of a u-remote station is calculated using the power loss of the coupler and the power loss of the individual modules. It depends on the current in both current paths. It is assumed that there is a maximum power loss of 2 watts for the module

Maximum values were assumed for these calculations. If you need detailed calculations, please contact Weidmüller Service.

$$P_{station} = P_{koppler} + N * P_{module}$$

4.8 Feedback energy in DO modules

With digital output modules, power is fed back through the channels during operation. The sum of the power fed back through all channels is the output module's feedback energy. It varies with the ambient temperature.

If the maximum permissible feedback energy for a module is exceeded, the module shuts down temporarily.

Feedback energy can be prevented by installing external freewheeling protection. With it, the same switching rate can be achieved with an inductive load as with a resistive load.

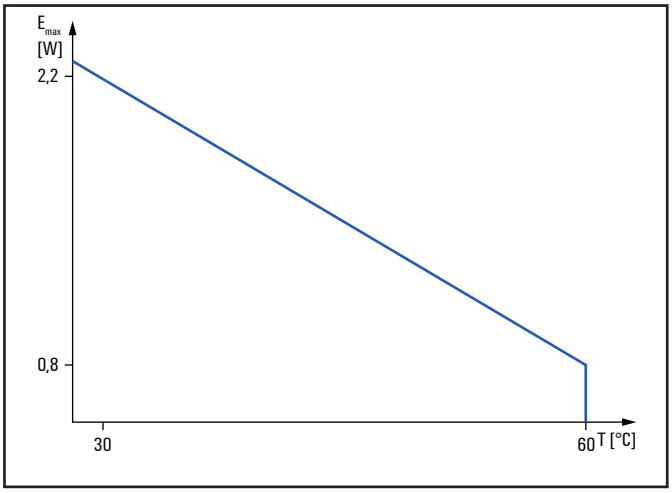
Calculation of feedback energy

The feedback energy for a digital output module can be calculated as follows:

$$P = \sum_{all\ channels} 1/2\ n_i * L_i * I_i^2$$

P	Feedback energy of the module
n_i	Switching cycles of Channel i in 1/seconds
E_i	Feedback energy when shutting off Channel i during a shutdown procedure
I_i	Current through the load connected to Channel i
L_i	Inductance of the load connected to Channel i

Once the maximum permissible feedback energy E_{max} is reached, the module shuts down.



The maximum feedback energy varies with the ambient temperature

4.9 Parameter overview

Overview of the editable parameters

Product	Order No.	Parameter	Optional values	Default value
UR20-FBC-PB-DP	1334870000	DP-Alarm mode	V0 / V1	V1
		DP alarm mode V0	**For mode V0, the alarm triggers are set in the parameter data.**	
		Diagnostic alarm*	enabled / disabled	disabled
		Process alarm*	enabled / disabled	disabled
		Hot-plug alarm*	enabled / disabled	enabled
		*These switches are always selectable, but they only have a function in mode V0. Diagnostic messages are generated which are not acknowledged by the PLC.		
		DP alarm mode V1	**In mode V1, the alarm triggers are set in the engineering environment.**	
		Diagnostic alarm**	enabled / disabled	disabled
		Process alarm**	enabled / disabled	disabled
		Hot-plug alarm**	enabled / disabled	enabled
		**These switches can be selected only in mode V1, in V0 they are inactive. Diagnostic messages are generated which are acknowledged by the PLC.		
		Identifier-related diagnosis***	enabled / disabled	enabled
		Channel-related diagnosis***	enabled / disabled	enabled
		Module status***	enabled / disabled	enabled
		***A diagnostic block is attached to the diagnostic message.		
		Data format	Motorola / Intel	Motorola
		Field-bus error output behaviour	All outputs off / activate replacement values / retain last value	All outputs off
		Module behaviour during hot swap	Continue data exchange / behaviour as with field-bus error	Continue data exchange
UR20-FBC-PN-IRT	1334880000	Process alarm	disabled / enabled	disabled
		Diagnostic alarm	disabled / enabled	disabled
		Type of diagnostic	Extended channel diagnostic (short diagnostic) Manufacturer-specific diagnostic (complete diagnostic)	Extended channel diagnostic (short diagnostic)
		Behaviour of outputs on field-bus errors	All outputs off / Enable substitute value / Hold last value	All outputs off
		Module behaviour on hot swap	Continue data exchange / Behaviour like field-bus error	Continue data exchange
		Data format	Motorola / Intel	Motorola
		Webserver via Ethernet	disabled / enabled	disabled

Overview of the editable parameters

Product	Order No.	Parameter	Optional values	Default value
UR20-FBC-EC	1334910000	Process alarm	disabled / enabled	disabled
		Diagnostic	disabled / enabled	disabled
		Behaviour of outputs on field-bus error	All outputs off / Enable substitute value/ Hold last value	All outputs off
		Module behaviour on hot swap	Continue data exchange / behaviour like field-bus error	Continue data exchange
		Data format	Motorola / Intel	Intel
		Webserver via Ethernet	disabled / enabled	disabled
		Coupler control	Reserved	Off
UR20-FBC-MOD-TCP	1334930000	IP-Address	Input of 4 numbers between 0-255	192.168.0.222
		Subnet mask	Input of 4 numbers between 0-255	255.255.255.0
		Gateway	Input of 4 numbers between 0-255	192.168.0.1
		IP Configuration	Static, DHCP, BootP	Static
		IP-Address USB-Port	192.168.1.202; 192.168.2.202, 192.168.3.202, 192.168.4.202, 192.168.5.202	192.168.1.202
		Webserver via Ethernet	disabled / enabled	disabled
		Save configuration	no / yes / Standard	no, see field-bus register 0x113E-0x113F
		Status Modbus watchdog	Watchdog time in steps of 10 ms	0 *10 ms, see field-bus register 0x1120
		Modbus Connection Timeout	Connection watchdog time in sec	1 s, see field-bus register 0x1031
		ModbusConnectionMode	write for all, 1stWr1stServe, 1stConn1st-Serve	write for all, see field-bus register 0x1130
		RefListMode	disabled / enabled	deaktiviert, see field-bus register 0x1132
		Process alarm	disabled / enabled	see field-bus register 0x1133
		Diagnostic alarm	disabled / enabled	see field-bus register 0x1134
		Behaviour of outputs on field-bus error	All outputs off / Enable substitute values / Hold last value	All outputs off, see field-bus register 0x1135
		Module behaviour on hot swap	Continue data exchange / Behaviour like field-bus error	Continue data exchange, see field-bus register 0x1136
		Data format	Motorola / Intel	Motorola, see field-bus register 0x1137
UR20-4DI-P	1315170000	Ch 0 ... Ch 3: Input delay	no (0) / 0,3 ms (1) (not at PROFIBUS-DP) / 3 ms (2) / 10 ms (3) / 20 ms (4) /	3 ms
UR20-8DI-P-3W	1394400000	Ch 0 ... Ch 7: Input delay	40 ms (5) (not at PROFIBUS-DP)	3 ms

Overview of the editable parameters

Product	Order No.	Parameter	Optional values	Default value
UR20-2DI-P-TS	1460140000	Ch 0 ... Ch 1: Input delay	no (0) / 0,3 ms (1) (not at PROFIBUS-DP) / 3 ms (2) / 10 ms (3) / 20 ms (4) / 40 ms (5) (not at PROFIBUS-DP)	3 ms
		Ch 0 ... Ch 1: TimeStamp at edge 0-1	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 1: TimeStamp at edge 1-0	disabled (0) / enabled (1)	disabled
UR20-4DI-P-TS	1460150000	Ch 0 ... Ch 3: Input delay	no (0) / 0,3 ms (1) (not at PROFIBUS-DP) / 3 ms (2) / 10 ms (3) / 20 ms (4) / 40 ms (5) (not at PROFIBUS-DP)	3 ms
		Ch 0 ... Ch 3: TimeStamp at edge 0-1	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 3: TimeStamp at edge 1-0	disabled (0) / enabled (1)	disabled
UR20-4DO-P	1315220000	Ch 0 ... Ch 3: Substitute value	Off (0) / On (1)	Off
UR20-4DO-P-2A	1315230000	Ch 0 ... Ch 3: Substitute value	Off (0) / On (1)	Off
UR20-4DO-PN-2A	1364420000	Ch 0 ... Ch 3: Substitute value OP-Mode	Sinking (0) / Sourcing (1)	Sourcing
		Ch 0 ... Ch 3: Substitute value	Off (0) / On (1)	Off
UR20-8DO-P	1315240000	Ch 0 ... Ch 7: Substitute value	Off (0) / On (1)	Off
UR20-4RO-SSR-255	1315540000	Ch 0 ... Ch 3: Substitute value	Off (0) / On (1)	Off
UR20-4RO-CO-255	1315550000	Ch 0 ... Ch 3: Substitute value	Off (0) / On (1)	Off
UR20-1CNT-100-1DO	1315570000	Diagnostic alarm	disabled (0) / enabled (1)	disabled
		Ch 0: Filter time signal A	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
		Ch 0: Filter time signal B	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
		Ch 0: Filter time latch	0,01 ms (0) / 0,017 ms (1) / 0,033 ms (2) / 0,1 ms (3) / 0,2 ms (4) / 0,5 ms (5) / 1 ms (6)	0,01 ms
		Ch 0: Filter time gate	0,01 ms (0) / 0,017 ms (1) / 0,033 ms (2) / 0,1 ms (3) / 0,2 ms (4) / 0,5 ms (5) / 1 ms (6)	0,01 ms
		Ch 0: Filter time reset	0,01 ms (0) / 0,017 ms (1) / 0,033 ms (2) / 0,1 ms (3) / 0,2 ms (4) / 0,5 ms (5) / 1 ms (6)	0,01 ms
		Ch 0: Process alarm HW gate open	disabled (0) / enabled (1)	disabled
		Ch 0: Process alarm HW gate closed	disabled (0) / enabled (1)	disabled
		Ch 0: Process alarm overflow	disabled (0) / enabled (1)	disabled
		Ch 0: Process alarm underflow	disabled (0) / enabled (1)	disabled
		Ch 0: Process alarm comp. value	disabled (0) / enabled (1)	disabled
		Ch 0: Process alarm end value	disabled (0) / enabled (1)	disabled

Overview of the editable parameters

Product	Order No.	Parameter	Optional values	Default value
		Ch 0: Process alarm latch value	disabled (0) / enabled (1)	disabled
		Ch 0: Counting mode	count endless (0) / once - forward (1) / once - backwards (2) / once - no main direction (3) / periodic - forward (4) / periodic - backwards (5) / periodic - no main direction (6)	count endless
		Ch 0: Condition for DO	disabled (0) / higher equal comparison value (1) / lower equal comparison value (2)/ equal comparison value (3)	disabled
		Ch 0: Counter dir. signal B inv.	disabled (0) / enabled (1)	disabled
		Ch 0: Reset	disabled (0) / high level (1) / rising edge 0-1 (2)/ rising edge once 0-1 (3)	disabled
		Ch 0: Signal mode	Rotary transducer - single (0) / Rotary transducer - double **(1) / Rotary trans-** ducer - quadruple (2) / Pulse and Direction (3) / disabled (4)	disabled
		Ch 0: HW gate	disabled (0) / enabled (1)	disabled
		Ch 0: Counter behaviour internal gate	Interrupt counting (0) / Cancel counting (1)	interrupt counting
		Ch 0: End value	-2147483648 ... 2147483647	2147483647
		Ch 0: Load value	-2147483648 ... 2147483647	0
		Ch 0: Hysteresis	0 ... 255	0
		Ch 0: Pulse duration	0 ... 255 [Input value x 2 = output time; corresponds to 0 ... 510 ms]	0
UR20-2CNT-100	1315590000	Diagnostic alarm	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 1: Filter time signal A	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
		Ch 0 ... Ch 1: Filter time signal B	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
		Ch 0 ... Ch 1: Process alarm overflow	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 1: Process alarm underflow	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 1: Process alarm comp. value	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 1: Process alarm end value	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 1: Counting mode	count endless (0) / once - forward (1) / once - backwards (2) / once - no main direction (3) / periodic - forward (4) / periodic - backwards (5) / periodic - no main direction (6)	count endless

Overview of the editable parameters

Product	Order No.	Parameter	Optional values	Default value
		Ch 0 ... Ch 1: Comparison function	disabled (0) / higher equal comparison value (1) / lower equal comparison value (2)/ equal comparison value (3)	disabled
		Ch 0 ... Ch 1: Counter dir. signal B inv.	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 1: Signal mode	Rotary transducer - single (0) / Rotary transducer - double **(1) / Rotary trans-** ducer - quadruple (2) / Pulse and Direction (3) / disabled (4)	disabled
		Ch 0 ... Ch 1: Counter behaviour internal gate	Interrupt counting (0) / Cancel counting (1)	interrupt counting
		Ch 0 ... Ch 1: Set value	-2147483648 ... 2147483647	0
		Ch 0 ... Ch 1: End value	-2147483648 ... 2147483647	2147483647
		Ch 0 ... Ch 1: Load value	-2147483648 ... 2147483647	0
		Ch 0 ... Ch 1: Hysteresis	0 ... 255	0
UR20-2PWM-PN-0.5A	1315600000	Ch 0 ... Ch 1: Period duration = n*20,83 ns	1202 ... 8388607	1202
UR20-2PWM-PN-2A	1315610000	Ch 0 ... Ch 1: Period duration = n*20,83 ns	1202 ... 8388607	1202
UR20-4AI-UI-16 **UR20-4AI-UI-12**	1315620000 1394390000	Frequency suppression	disabled (0) / 50 Hz (1) / 60 Hz (2) / Average over 16 values (3)	disabled
		Ch 0 ... Ch 3: Data format	S5 Data format (0) / S7 Data format (1)	S7 Data format
		Ch 0 ... Ch 3: Measurement range	0 to 20 mA (0) / 4 to 20 mA (1) / 0 V to 10 V (2) / -10 to 10 V (3) / 0 to 5 V (4) / -5 to 5 V (5) / 1 to 5 V (6) / 2 to 10 V (7) /disabled (8)	disabled
UR20-8AI-I-PLC-INT	1315670000	Frequency suppression	disabled (0) / 50 Hz (1) / 60 Hz (2) / Average over 16 values (3)	disabled
		Ch 0 ... Ch 7: Data format	S5 Data format (0) / S7 Data format (1)	S7 Data format
		Ch 0 ... Ch 7: Measurement range	0 to 20 mA (0) / 4 to 20 mA (1) / disabled (3)	disabled
UR20-4AO-UI-16	1315680000	Ch 0 ... Ch 3 Data format	S5 Data format (0) / S7 Data format (1)	S7 Data format
		Ch 0 ... Ch 3 Output range	0 to 20 mA (0) / 4 to 20 mA (1) / 0 to 10 V (2) / -10 to 10 V (3) / 0 to 5 V (4) / -5 to 5 V (5) / 1 to 5 V (6) / 2 to 10 V (7) / disabled (8)	disabled
		Ch 0 ... Ch 3 Substitute value	depending on the chanels data format (S5/S7), see Tables "Measurement range"	0

Overview of the editable parameters

Product	Order No.	Parameter	Optional values	Default value
UR20-4AI-RTD-DIAG	1315700000	Temperature unit	Degree Celsius (0) / Degree Fahrenheit (1) / Kelvin (2)	Degree Celsius
		Ch 0 ... Ch 3 Measurement range	PT100 -200 ... 850 Degree Celsius (0) / PT200 -200 ... 850 Degree Celsius (1) / PT500 -200 ... 850 Degree Celsius (2) / PT1000 -200 ... 850 Degree Celsius (3) / NI100 -60 ... 250 Degree Celsius (4) / NI120 -80 ... 260 Degree Celsius (5) / NI200 -60 ... 250 Degree Celsius (6) / NI500 -60 ... 250 Degree Celsius (7) / NI1000 -60 ... 250 Degree (8) / Cu10 -100 ... 260 Degree Celsius (9) / Resistance 40 Ω (10) / Resistance 80 Ω (11) / Resistance 150 Ω (12) / Resistance 300 Ω (13) / Resistance 500 Ω (14) / Resistance 1000 Ω (15) / Resistance 2000 Ω (16) / Resistance 4000 Ω (17) / disabled (18)	disabled
		Ch 0 ... Ch 3 Connection type	2-wire (0) / 3-wire (1) / 4-wire (2)	2-wire
		Ch 0 ... Ch 3 Conversion time	240 ms (0) / 130 ms (1) / 80 ms (2) / 55 ms (3) / 43 ms (4) / 36 ms (5)	80 ms
		Ch 0 ... Ch 3 Channel diagnostics	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 3 Limit value monitoring	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 3 High limit value	-32768 ... 32767	0
		Ch 0 ... Ch 3 Low limit value	-32768 ... 32767	0
UR20-4AI-TC-DIAG	1315710000	Temperature unit	Degree Celsius (0) / Degree Fahrenheit (1) / Kelvin (2)	Degree Celsius
		Ch 0 ... Ch 3 Measurement range	TC Type J (0) / TC Type K (1) / TC Type N (2) / TC Type R (3) / TC Type S (4) / TC Type T (5) / TC Type B (6) / TC Type C (7) / TC Type E (8) / TC Type L (9) / TC Type U (10) / ± 15,625 mV (11) / ± 31,25 mV (12) / ± 62,5 mV (13) / ± 125 mV (14) / ± 250 mV (15) / ± 500 mV (16) / ± 1000 mV (17) / ± 2000 mV (18) / disabled (19)	disabled
		Ch 0 ... Ch 3 Cold junction compensation	internal (0) / external Channel 0 (1) / external Channel 1 (2) / external Channel 2 (3) / external Channel 3 (4)	internal
		Ch 0 ... Ch 3 Conversion time	240 ms (0) / 130 ms (1) / 80 ms (2) / 55 ms (3) / 43 ms (4) / 36 ms (5)	80 ms
		Ch 0 ... Ch 3 Channel diagnostics	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 3 Limit value monitoring	disabled (0) / enabled (1)	disabled
		Ch 0 ... Ch 3 High limit value	-32768 ... 32767	0
		Ch 0 ... Ch 3 Low limit value	-32768 ... 32767	0

4.10 Data width of I/O module, dependent on the coupler used

PROFIBUS-DP UR20-FBC-PB-DP field-bus coupler

Order No.	Module	Configuration	Parameter	Diagnostics	Process data	
					Input	Output
		Bytes	Bytes	Bytes	Bytes	Bytes
1334870000	UR20-FBC-PB-DP	–	8	47	–	–
1315170000	UR20-4DI-P	3	7/0*	47	1	–
1394400000	UR20-8DI-P-3W	3	11/0*	47	1	–
1315200000	UR20-16DI-P	3	–	47	2	–
1315210000	UR20-16DI-P-PLC-INT	3	–	47	2	–
1460140000	UR20-2DI-P-TS	3	9	47	60	–
1460150000	UR20-4DI-P-TS	3	11	47	60	–
1315220000	UR20-4DO-P	3	4/0*	47	–	1
1315230000	UR20-4DO-P-2A	3	4/0*	47	–	1
1394420000	UR20-4DO-PN-2A	3	4	47	–	1
1315240000	UR20-8DO-P	3	4/0*	47	–	1
1315250000	UR20-16DO-P	3	–	47	–	2
1315270000	UR20-16DO-P-PLC-INT	3	–	47	–	2
1315540000	UR20-4RO-SSR-255	3	4/0*	47	–	1
1315550000	UR20-4RO-CO-255	3	4/0*	47	–	1
1315570000	UR20-1CNT-100-1DO	3	24	47	12	10
1315590000	UR20-2CNT-100	3	43	47	12	12
1315600000	UR20-2PWM-PN-0.5A	3	11	47	4	12
1315610000	UR20-2PWM-PN-2A	3	11	47	4	12
1315620000	UR20-4AI-UI-16	3	9	47	8	–
1394390000	UR20-4AI-UI-12	3	9	47	8	–
1315710000	UR20-4AI-TC-DIAG	3	31	47	8	–
1315670000	UR20-8AI-I-PLC-INT	3	13	47	16	
1315680000	UR20-4AO-UI-16	3	15	47	–	8
1315700000	UR20-4AI-RTD-DIAG	3	31	47	8	–
1335030000	UR20-PF-O-1DI-SIL	3	–	47	4	–
1335040000	UR20-PF-O-2DI-DELAY-SIL	3	–	47	4	–
1335050000	UR20-PF-O-2DI-SIL	3	–	47	4	–
Max. data (in bytes)		244	244	244	244	244

*Modules with /O, such as UR20-8DO-P-NoParam, are present in the GSD and then have no parameters.

PROFINET field-bus coupler UR20-FBC-PN-IRT

Order No.	Module	Configuration	Parameter	Diagnostics	Process data	
					Input	Output
		Bytes	Bytes	Bytes	Bytes	Bytes
1334880000	UR20-FBC-PN-IRT	4	10	47	4	4
1315170000	UR20-4DI-P	4	8	47	2	1
1394400000	UR20-8DI-P-3W	4	12	47	2	1
1315200000	UR20-16DI-P	4	–	47	3	1
1315210000	UR20-16DI-P-PLC-INT	4	–	47	3	1
1460140000	UR20-2DI-P-TS	4	10	47	61	1
1460150000	UR20-4DI-P-TS	4	12	47	61	1
1315220000	UR20-4DO-P	4	5	47	1	2
1315230000	UR20-4DO-P-2A	4	5	47	1	2
1394420000	UR20-4DO-PN-2A	4	5	47	1	21
1315240000	UR20-8DO-P	4	5	47	1	2
1315250000	UR20-16DO-P	4	–	47	1	3
1315270000	UR20-16DO-P-PLC-INT	4	–	47	1	3
1315540000	UR20-4RO-SSR-255	4	5	47	1	2
1315550000	UR20-4RO-CO-255	4	5	47	1	2
1315570000	UR20-1CNT-100-1DO	4	25	47	13	11
1315590000	UR20-2CNT-100	4	44	47	13	13
1315600000	UR20-2PWM-PN-0.5A	4	12	47	5	13
1315610000	UR20-2PWM-PN-2A	4	12	47	5	13
1315620000	UR20-4AI-UI-16	4	10	47	9	1
1394390000	UR20-4AI-UI-12	4	10	47	9	1
1315710000	UR20-4AI-TC-DIAG	4	32	47	9	1
1315670000	UR20-8AI-I-PLC-INT	4	14	47	17	1
1315680000	UR20-4AO-UI-16	4	16	47	1	9
1315700000	UR20-4AI-RTD-DIAG	4	32	47	9	1
1335030000	UR20-PF-O-1DI-SIL	4	–	47	5	1
1335040000	UR20-PF-O-2DI-DELAY-SIL	4	–	47	5	1
1335050000	UR20-PF-O-2DI-SIL	4	–	47	5	1
Max. data (in bytes)		260	4362	1408	512	512

EtherCAT field-bus coupler UR20-FBC-EC

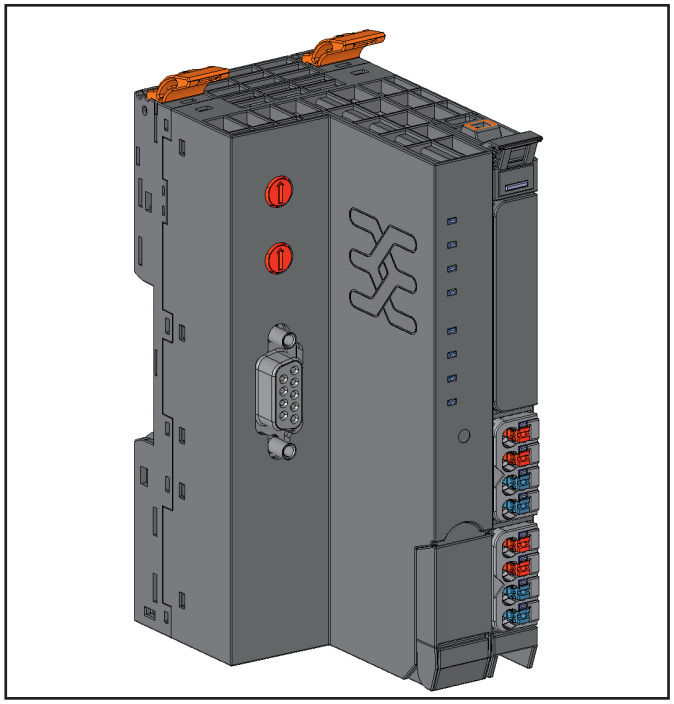
Order No.	Module	Configuration	Parameter	Diagnostics	Process data	
					Input	Output
		Bytes	Bytes	Bytes	Bytes	Bytes
1334910000	UR20-FBC-EC	256	4096	3328	1024	1024
1315170000	UR20-4DI-P	4	4	47	1	–
1394400000	UR20-8DI-P-3W	4	8	47	1	–
1315200000	UR20-16DI-P	4	–	47	2	–
1315210000	UR20-16DI-P-PLC-INT	4	–	47	2	–
1460140000	UR20-2DI-P-TS	4	–	47	1	–
1460150000	UR20-4DI-P-TS	4	1	47	61	1
1315220000	UR20-4DO-P	4	1	47	1	1
1315230000	UR20-4DO-P-2A	4	1	47	1	1
1394420000	UR20-4DO-PN-2A	4	62	47	1	1
1315240000	UR20-8DO-P	4	1	47	1	1
1315250000	UR20-16DO-P	4	–	47	1	2
1315270000	UR20-16DO-P-PLC-INT	4	–	47	1	2
1315540000	UR20-4RO-SSR-255	4	1	47	1	1
1315550000	UR20-4RO-CO-255	4	1	47	1	1
1315570000	UR20-1CNT-100-1DO	4	82	47	13	10
1315590000	UR20-2CNT-100	4	97	47	13	12
1315600000	UR20-2PWM-PN-0.5A	4	8	47	4	12
1315610000	UR20-2PWM-PN-2A	4	8	47	4	12
1315620000	UR20-4AI-UI-16	4	6	47	8	–
1394390000	UR20-4AI-UI-12	4	6	47	8	–
1315710000	UR20-4AI-TC-DIAG	4	28	47	8	–
1315670000	UR20-8AI-I-PLC-INT	4	10	47	16	–
1315680000	UR20-4AO-UI-16	4	12	47	1	8
1315700000	UR20-4AI-RTD-DIAG	4	28	47	8	–
1335030000	UR20-PF-O-1DI-SIL	4	–	47	4	–
1335040000	UR20-PF-O-2DI-DELAY-SIL	4	–	47	4	–
1335050000	UR20-PF-O-2DI-SIL	4	–	47	4	–
Max. data (in bytes)		1514 per message + CoE	1514 per message + CoE	1514 per message + CoE	1024	1024

5 Detailed descriptions of the field-bus coupler

5.1 Profibus DP field-bus coupler UR20-FBC-PB-DP

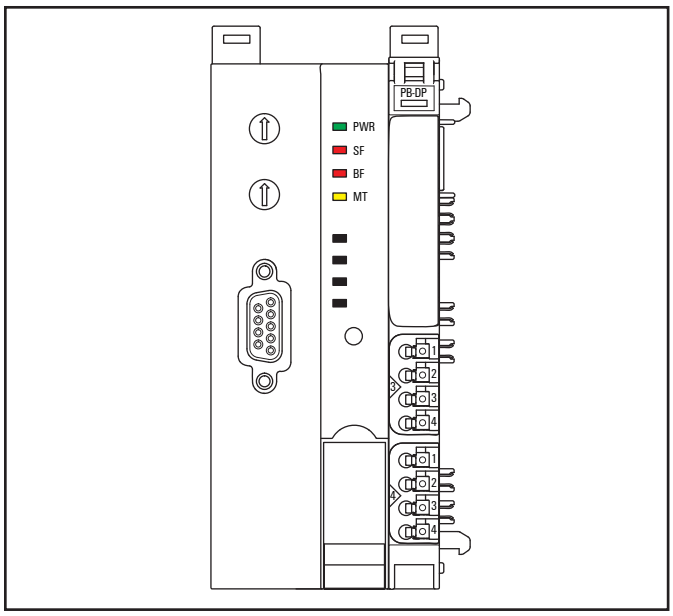
The UR20-FBC-PB-DP field-bus coupler is a PROFIBUS-DP participant certified by the PROFIBUS user organisation. The coupler is the head module for the u-remote system bus, to which up to 64 active u-remote modules can be connected. The PROFIBUS-DP coupler has a Sub-D socket and supports all services in accordance with the DP-V1 specification.

The coupler can be activated with a system-independent web server application via the USB service interface. In addition, all information, such as diagnostics, status values and parameters, can be exported and all connected modules can be simulated or forced.
The station's main power supply is integrated in the coupler. Power is supplied via two 4-pole connectors, separated into the input and output current paths.



Field-bus coupler UR20-FBC-PB-DP (Order No. 1334870000)

Status indicators



LED status indicators UR20-FBC-PB-DP

PWR	Power LED	**Green**: Supply voltage
SF	Collective error	**Red:** Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic report **Red flashing**: Station in Force mode
BF	Bus failure	**Red:** No connection to the field-bus **Red flashing**: Configuration error, no connection to the control unit, or error in the parameter set or slave address error or firmware update is running
MT	Maintenance	**Yellow**: Error on the system bus or field-bus

LED status indicators

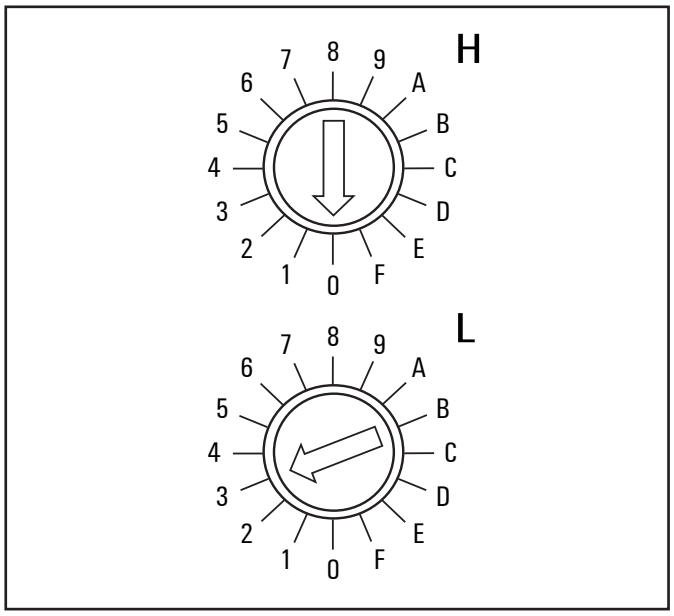
Addressing

The field-bus coupler on the PROFIBUS-DP is addressed via the two rotary switches.

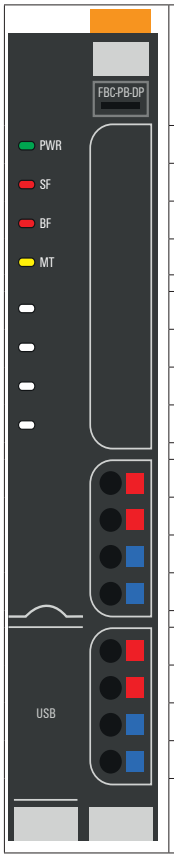
A maximum of 125 addresses (1 to 125) can be assigned. Each address may be assigned only **once** in the overall bus structure. Addresses 1 and 2 are generally used by the control systems. Bus addresses 000 plus 126 and higher may not be used!

The most significant digit is set with rotary switch **H**, the least significant digit with rotary switch **L** . The switches are labelled in the hexadecimal numbering system (0 to 9, A=10, B=11, C=12, ... F = 15). A hexadecimal to decimal conversion table is provided in the annex.

Coding: Address = (H*16) + L



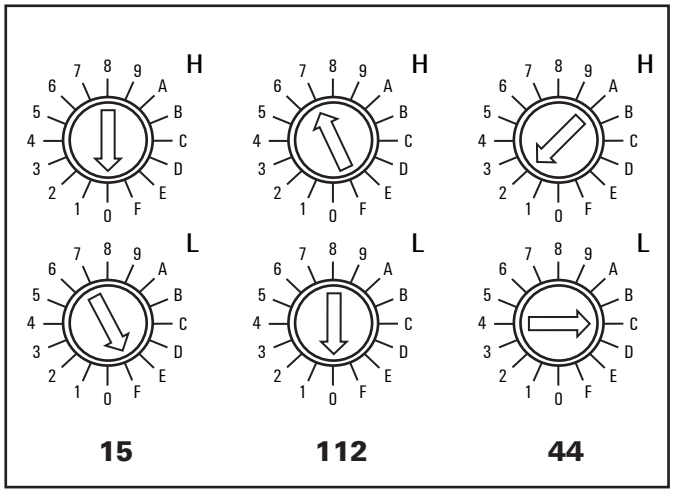
Default setting UR20-FBC-PB-DP: Address = 3



	Coupler power supply LED green: supply voltage >18 V red: at least one current path <18 V
3.1	Green: Input current path supply voltage > 18 V DC
3.2	Red: Input current path supply voltage < 18 V DC
3.4	Red: Internal fuse defective
4.1	Green: Output current path supply voltage > 18 V DC
4.2	Red: Output current path supply voltage < 18 V DC
4.4	Red: Internal fuse defective

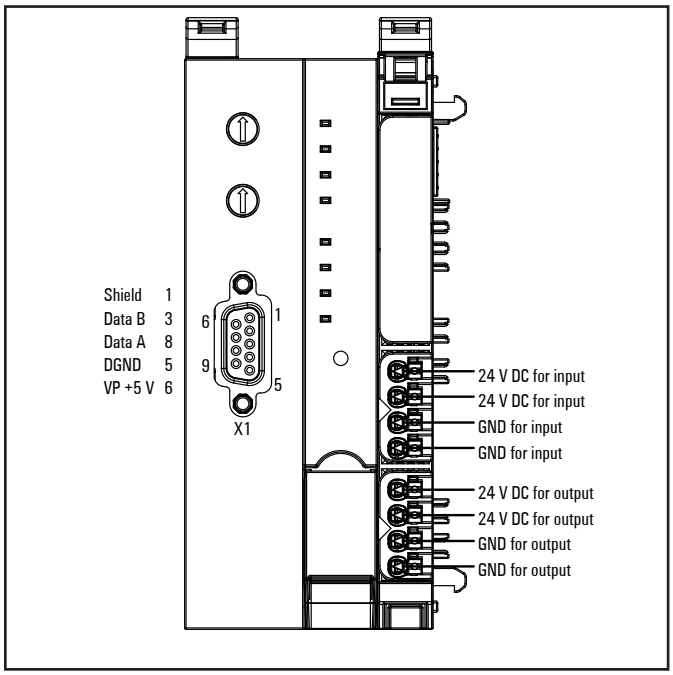
LED indicators UR20-FBC-PB-DP, error messages, see Chapter 13

Addressing examples:

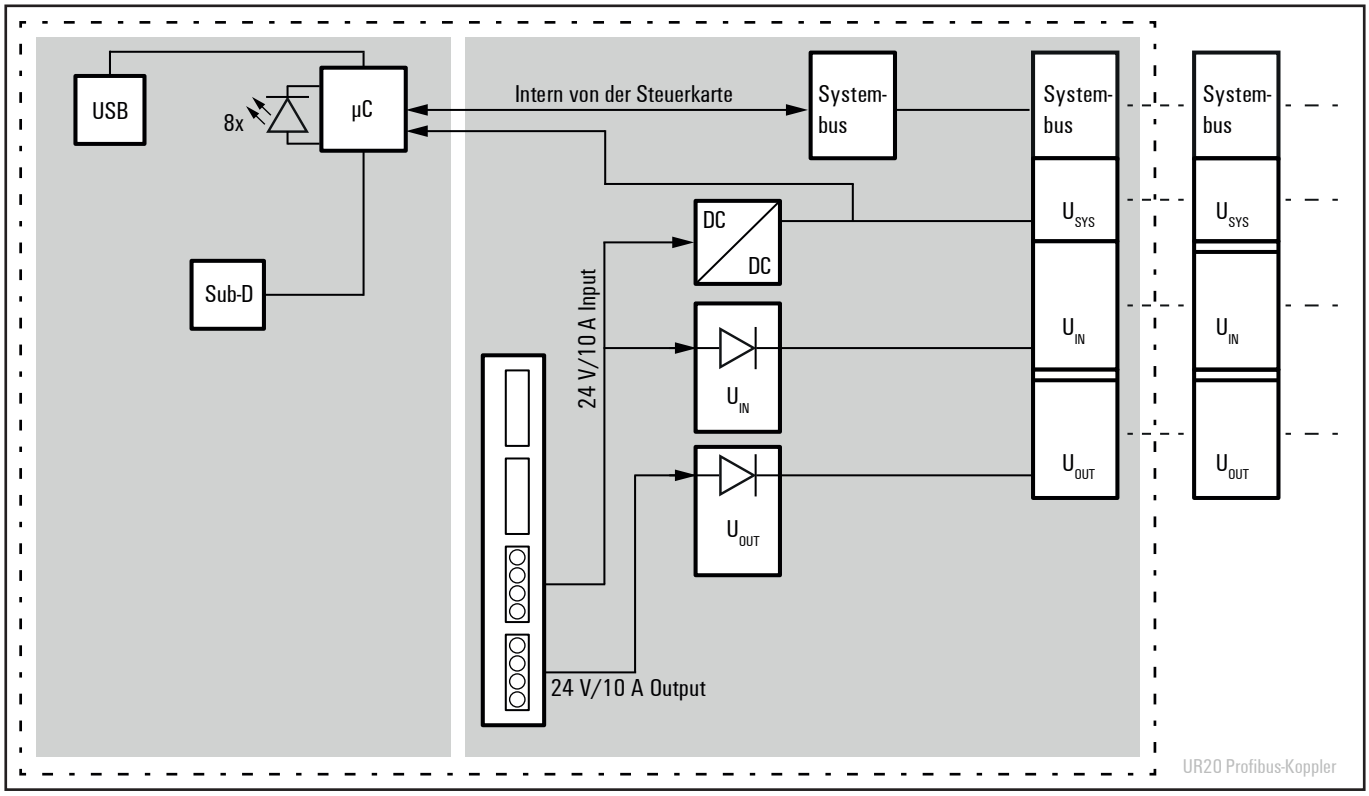


Examples for addressing the UR20-FBC-PB-DP

PROFIBUS address **15**: H = 0, L = F
PROFIBUS address **112**: H = 7, L = 0
PROFIBUS address **44**: H = 2, L = C



Connection diagram UR20-FBC-PB-DP



Block diagram UR20-FBC-PB-DP

ATTENTION

Risk of material damage!
In the case of a maximum power supply of >8 A and a maximum temperature of >+55 °C, all four contacts must be connected with 1.5 mm² wiring!

Technical data UR20-FBC-PB-DP Order No. 1334870000)

System data		
Connection	9-pole SUB-D socket	
Field-bus protocol	PROFIBUS-DP V1	
Process image	Input data width	max. 244 Byte
	Output data width	max. 244 Byte
	Parameter data	max. 244 bytes
	Diagnostic data	max. 244 bytes
Number of modules	max. 64 active	
Configuration interface	USB	2.0
Transfer rate	Field-bus	Max. 12 Mbps
	u-remote system bus	Max. 48 Mbps
Supply		
Supply voltage for system and inputs	24 V DC +20 % / -15 %	
Supply voltage for outputs	24 V DC +20 % / -15 %	
Max. feed-in current for input modules	10 A	
Max. feed-in current for output modules	10 A	
Current consumption (internal), typ.	100 mA	
Connection data		
Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
	Fine-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
General data, see Section 3.2		

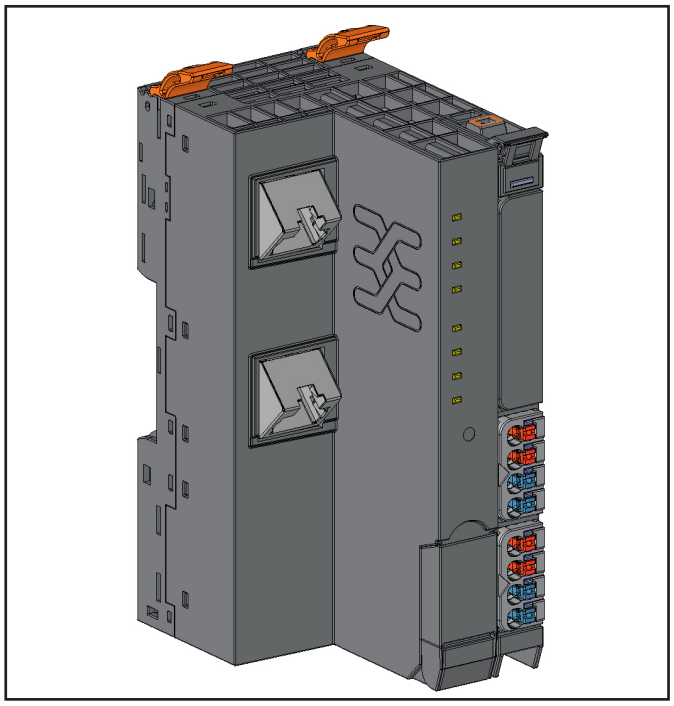
Overview of editable parameters UR20-FBC-PB-DP

Parameter	Additional explanations	Optional values	Default value
DP-Alarm mode		V0 / V1	V1
DP alarm mode V0	**For mode V0, the alarm triggers are set in the parameter data.**		
Diagnostic alarm	These switches are always selectable, but they only have a function in mode V0. Diagnostic messages are generated which are not acknowledged by the PLC.	enabled / disabled	disabled
Process alarm		enabled / disabled	disabled
Hot-plug alarm		enabled / disabled	enabled
DP alarm mode V1	**In mode V1, the alarm triggers are set in the engineering environment.**		
Diagnostic alarm	These switches can be selected only in mode V1, in V0 they are inactive. Diagnostic messages are generated which are acknowledged by the PLC.	enabled / disabled	disabled
Process alarm		enabled / disabled	disabled
Hot-plug alarm		enabled / disabled	enabled
Identifier-related diagnosis	A diagnostic block is attached to the diagnostic message.	enabled / disabled	enabled
Channel-related diagnosis	A diagnostic block is attached to the diagnostic message.	enabled / disabled	enabled
Module status	A diagnostic block is attached to the diagnostic message.	enabled / disabled	enabled
Data format		Motorola / Intel	Motorola
Field-bus error output behaviour		All outputs off / activate replacement values / retain last value	All outputs off
Module behaviour during hot swap		Continue data exchange / behaviour as with field-bus error	Continue data exchange

5.2 PROFINET IRT field-bus coupler UR20-FBC-PN-IRT

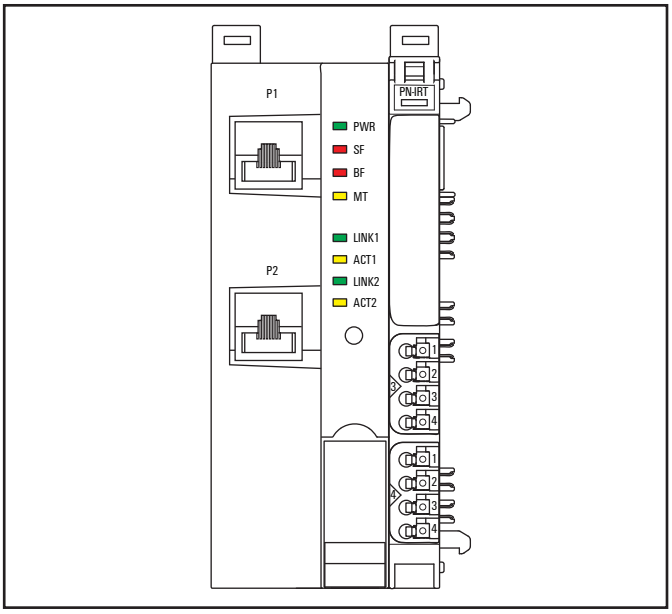
The UR20-FBC-PN-IRT field-bus coupler is a PROFINET IRT participant certified by the PROFINET user organisation. The coupler is the head module for the u-remote system bus, to which up to 64 active u-remote modules can be connected. The PROFINET coupler has two Ethernet ports, and the integrated switch supports a line network structure.
The coupler can be activated with a system-independent web server application via the USB service interface or the Ethernet. In addition, all information, such as diagnostics, status values and parameters, can be exported and all connected modules can be simulated or forced.

The station's main power supply is integrated in the coupler. Power is supplied via two 4-pole connectors, separated into the input and output current paths.



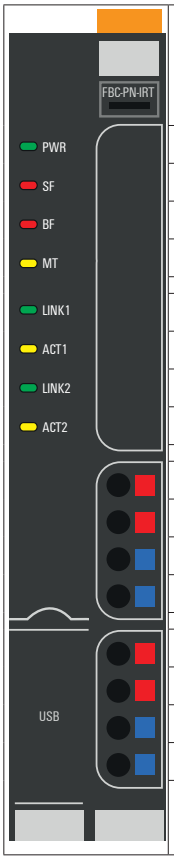
Field-bus coupler UR20-FBC-PN-IRT (Order No. 1334880000)

Status indicators



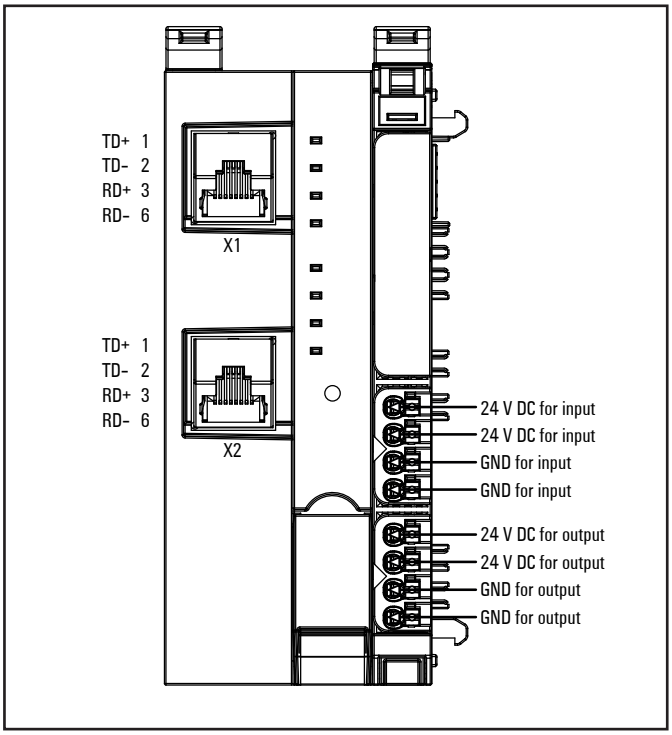
LED status indicators UR20-FBC-PN-IRT

PWR	Power LED	**Green**: Supply voltage
SF	Collective error	**Red:** Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic report **Red flashing**: Station in Force mode
BF	Bus failure	**Red:** No connection to the field-bus **Red flashing**: Configuration error, no connection to the control unit, or error in the parameter set
MT	Maintenance	**Yellow**: Error on the system bus or the field-bus
LINK1	Connection	**Green**: Connection established between port 1 of the coupler and another field device
ACT1	Active	**Yellow flashing**: Data being exchanged on port 1
LINK2	Connection	**Green**: Connection established between port 2 of the coupler and another field device
ACT2	Active	**Yellow flashing**: Data being exchanged on port 2



	Coupler power supply LED green: supply voltage > 18 V red: at least one current path < 18 V
3.1	Green: Input current path supply voltage > 18 V DC
3.2	Red: Input current path supply voltage < 18 V DC
3.4	Red: Internal fuse defective
4.1	Green: Output current path supply voltage > 18 V DC
4.2	Red: Output current path supply voltage < 18 V DC
4.4	Red: Internal fuse defective

LED indicators UR20-FBC-PN-IRT, error messages, see Chapter 13

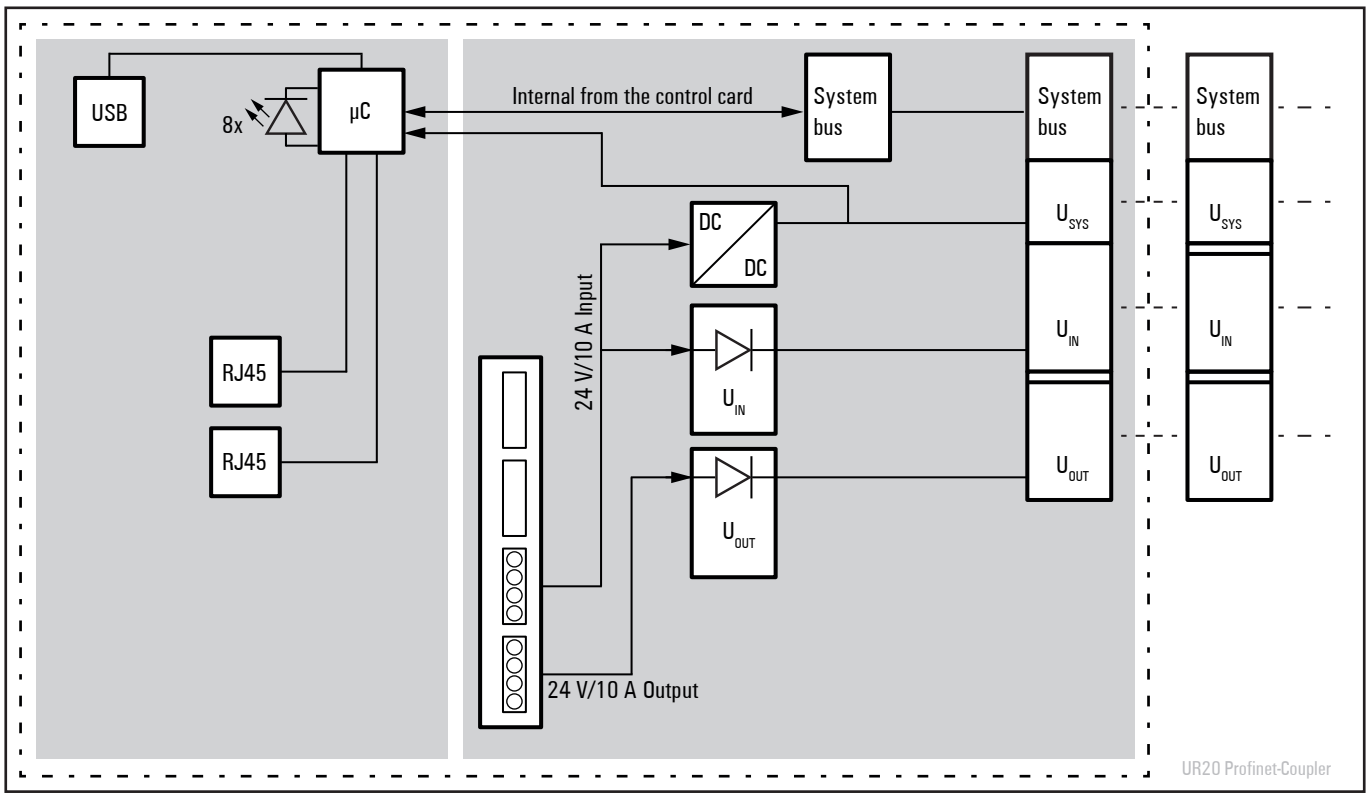


Connection diagram UR20-FBC-PN-IRT

ATTENTION

Risk of material damage!

In the case of a maximum power supply of >8 A and a maximum temperature of >+55 °C, all four contacts must be connected with 1.5 mm² wiring!



Block diagram UR20-FBC-PN-IRT

Technical data UR20-FBC-PN-IRT (Order No. 1334880000)

System data		
Connection	2 x RJ-45	
Field-bus protocol	PROFINET IRT	
Process image	Input data width	max. 512 bytes
	Output data width	max. 512 bytes
	Parameter data	max. 4362 bytes
	Diagnostic data	max. 1408 bytes
Number of modules	max. 64 active	
Configuration interface	USB	2.0
Transfer rate	Field-bus	Max. 100 Mbps
	u-remote system bus	Max. 48 Mbps
Fast start-up	< 500 ms	with a maximum of 10 modules
Supply		
Supply voltage for system and inputs	24 V DC +20 % / -15 %	
Supply voltage for outputs	24 V DC +20 % / -15 %	
Max. feed-in current for input modules	10 A	
Max. feed-in current for output modules	10 A	
Current consumption (internal), typ.	116 mA	
Connection data		
Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
	Fine-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
General data, see Section 3.2		

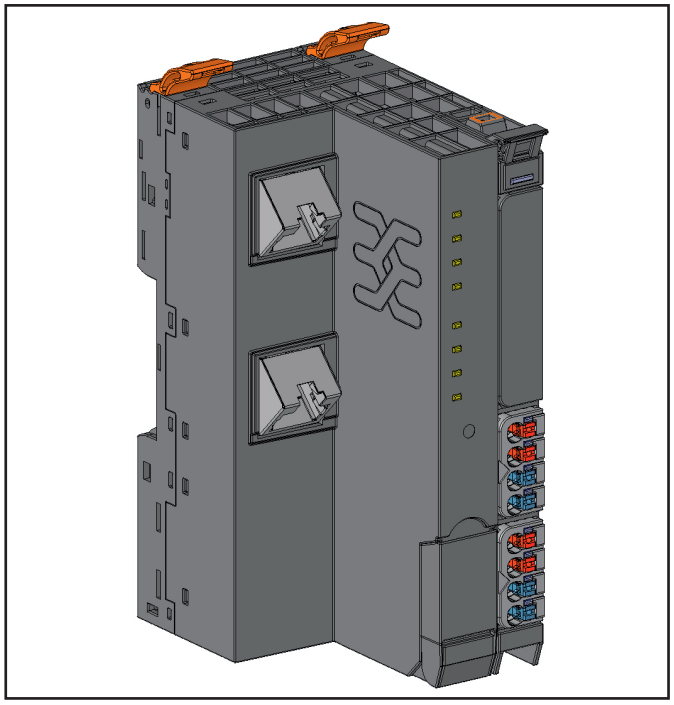
Overview of editable parameters UR20-FBC-PN-IRT

Parameter	Optional values	Default value
Process alarm	disabled / enabled	disabled
Diagnostic alarm	disabled / enabled	disabled
Type of diagnostic	Extended channel diagnostic (short diagnostic) Manufacturer-specific diagnostic (complete diagnostic)	Extended channel diagnostic (short diagnostic)
Behaviour of outputs on field-bus errors	All outputs off / Enable substitute value / Hold last value	All outputs off
Module behaviour on hot swap	Continue data exchange / Behaviour like field-bus error	Continue data exchange
Data format	Motorola / Intel	Motorola
Webserver via Ethernet	disabled / enabled	disabled

5.3 EtherCAT field-bus coupler UR20-FBC-EC

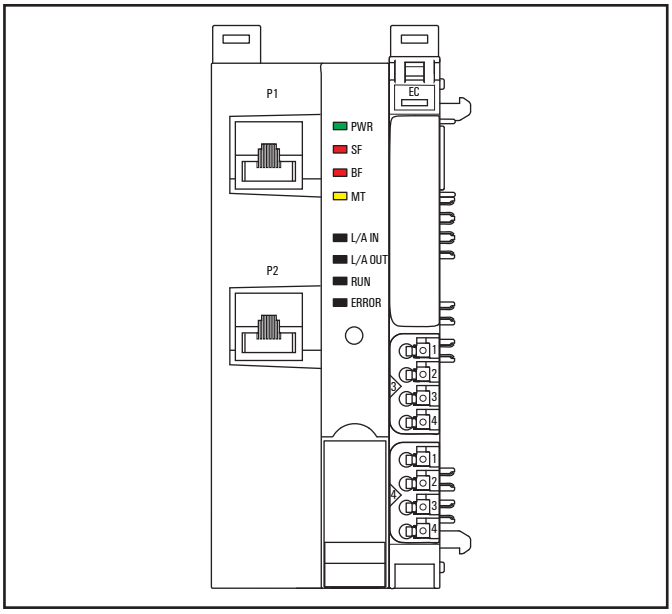
The UR20-FBC-EC field-bus coupler is an EtherCAT participant certified by the EtherCAT* Technology Group. The coupler is the head module for the u-remote system bus, to which up to 64 active u-remote modules can be connected. The EtherCAT coupler has two Ethernet ports, and the integrated switch supports a line network structure.
The coupler can be activated with a system-independent web server application via the USB service interface or the EtherCAT. In addition, all information, such as diagnostics, status values and parameters, can be exported and all connected modules can be simulated or forced.

The station's main power supply is integrated in the coupler. Power is supplied via two 4-pole connectors, separated into the input and output current paths.



Field-bus coupler UR20-FBC-EC (Order No. 1334910000)

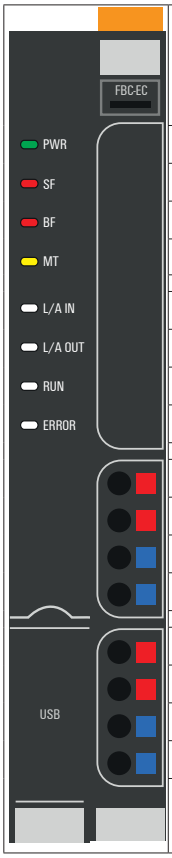
Status indicators



LED status indicators UR20-FBC-EC

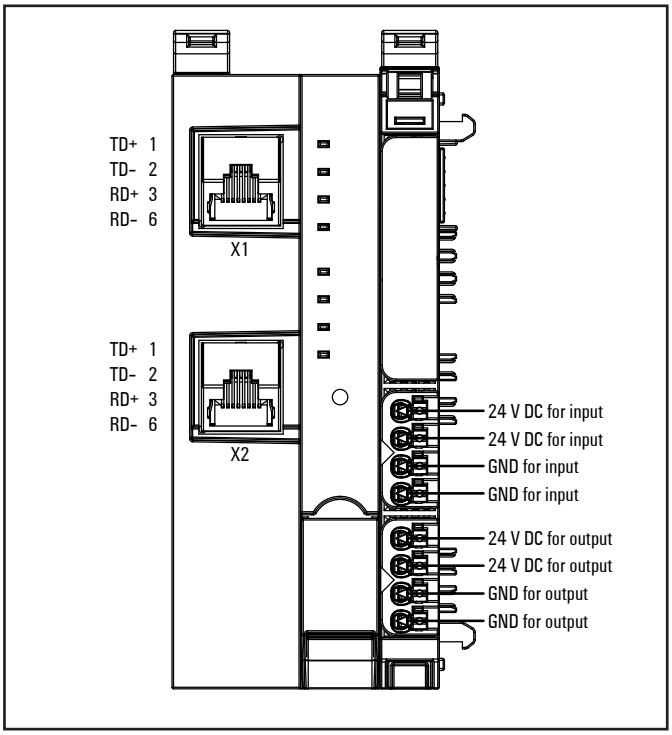
PWR	Power LED	**Green**: Supply voltage
SF	Collective error	**Red:** Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic report **Red flashing**: Station in Force mode
BF	Bus failure	**Red:** No connection to the field-bus **Red flashing**: Configuration error, no connection to the control unit, or error in the parameter set
MT	Maintenance	**Yellow**: Error on the system bus
L/A IN	Connection/Activity	**Green**: Connection established between port 1 of the coupler and another field device **Green flashing**: Data being exchanged on port 1
L/A OUT	Connection/Activity	**Green**: Connection established between port 2 of the coupler and another field device **Green flashing**: Data being exchanged on port 2
RUN	Coupler state	**Off**: INIT **Green flashing** PRE-OPERATIONAL **Green lights up briefly**: SAFE-OPERATIONAL **Green**: OPERATIONAL
ERROR	Internal error	**Red**: Critical error in the coupler **Red lights up briefly**: Error in coupler application **Red briefly lights up twice**: Output Syncmanager Watchdog expired **Red flashing**: Configuration error

* EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany



	Coupler power supply LED green: supply voltage > 18 V red: at least one current path < 18 V
3.1	Green: Input current path supply voltage > 18 V DC
3.2	Red: Input current path supply voltage < 18 V DC
3.4	Red: Internal fuse defective
4.1	Green: Output current path supply voltage > 18 V DC
4.2	Red: Output current path supply voltage < 18 V DC
4.4	Red: Internal fuse defective

LED indicators UR20-FBC-EC, error messages, see Chapter 13

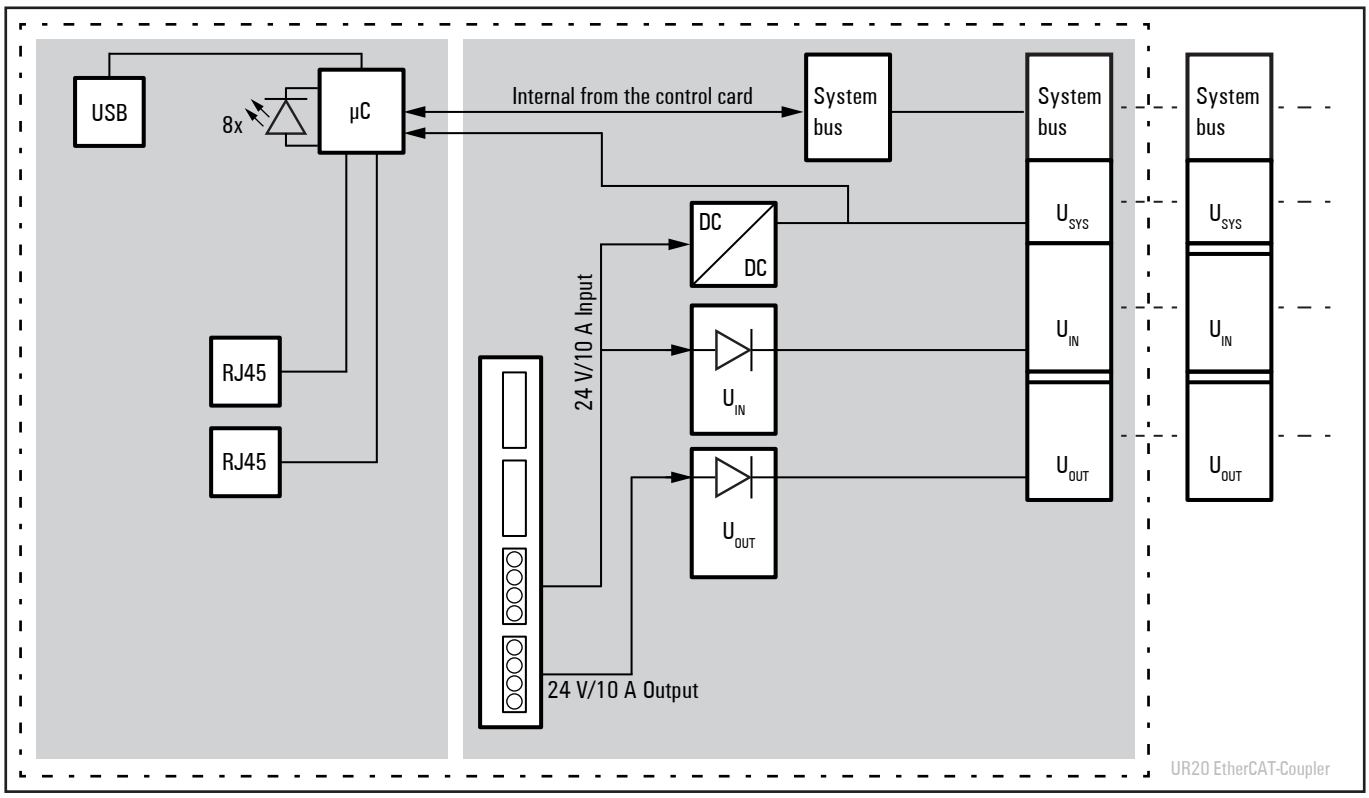


Connection diagram UR20-FBC-EC

ATTENTION

Risk of material damage!

In the case of a maximum power supply of >8 A and a maximum temperature of >+55 °C, all four contacts must be connected with 1.5 mm² wiring!



Block diagram UR20-FBC-EC

Technical data UR20-FBC-EC (Order No. 1334910000)

System data		
Connection	2 x RJ-45	
Field-bus protocol	EtherCAT	
Process image	Process data	max. 1024 bytes
	Parameter data	max. 64*64= 4 KB
	Diagnostic data	max. 64*50 bytes
Number of modules	max. 64 active	
Configuration interface	USB	2.0
Transfer rate	Field-bus	Max. 100 Mbps
	u-remote system bus	Max. 48 Mbps
Supply		
Supply voltage for system and inputs	24 V DC +20 % / -15 %	
Supply voltage for outputs	24 V DC +20 % / -15 %	
Max. feed-in current for input modules	10 A	
Max. feed-in current for output modules	10 A	
Current consumption (internal), typ.	130 mA	
Connection data		
Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
	Fine-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
General data, see Section 3.2.		

Overview of the editable parameters UR20-FBC-EC

Parameter	Optional values	Default value
Process alarm	disabled / enabled	disabled
Diagnostic	disabled / enabled	disabled
Behaviour of outputs on field-bus error	All outputs off / Enable substitute value/ Hold last value	All outputs off
Module behaviour on hot swap	Continue data exchange / behaviour like field-bus error	Continue data exchange
Data format	Motorola / Intel	Intel
Webserver via Ethernet	disabled / enabled	disabled
Coupler control	Reserved	Off

u-remote status messages

In order to directly and quickly access diagnostic and status messages from the u-remote through the PLC, status bytes are provided which serve as supplemental process input data for the EtherCAT coupler UR20-FBC-EC and the module.

Coupler status

One status word is defined, and it is appended to the coupler as a process input word. With the status word, the process data can be used to query the status of the u-remote station in a PLC program at any time.

Coupler status bits UR20-FBC-EC

Bit	Name	Bedeutung
0	Summarized module diagnosis	Module diagnostic is present. A diagnosis is available for at least one module with diagnostics functionality.
1	Errorbit 1	Reserve bit 1, currently not used
2	Errorbit 2	Reserve bit 2, currently not used
3	Systembus error	Error on the system bus. Communication with the connected modules is disrupted.
4	Errorbit 4	Reserve bit 4, currently not used
5	Errorbit 5	Reserve bit 5, currently not used
6	I/O-Configuration error	Deviation in the configuration. The module list has changed. The list of configured modules (Configured Module Ident List 0xF030) differs from the module list detected by the coupler (Detected Module Ident List 0xF050).
7	Master configuration error	Master configuration error. The list of configured modules (Configured Module Ident List 0xF030) differs significantly from the module list detected by the coupler (Detected Module Ident List 0xF050). No process data can be exchanged with the modules. The station switches into PRE OPERATIONAL state.
8	Errorbit 8	Reserve bit 8, currently not used
9	Errorbit 9	Reserve bit 9, currently not used
10	Force mode active	Web server Force mode is active. Force mode was activated through the web server. Process data cannot be exchanged between the EtherCAT master and forced channels.
11	Errorbit 11	Reserve bit 11, currently not used
12	Errorbit 12	Reserve bit 12, currently not used
13	Voltage U_{OUT} error	Error in the supply voltage of outputs
14	Voltage U_{IN} error	Error in the supply voltage of system and inputs
15	Errorbit 15	Reserve bit 15, currently not used

Module status messages

Every module in an EtherCAT u-remote station also gets a status word which is appended to the relevant process data. This status word makes it possible to directly display the status of a module while it is operating.

Module status messages in an EtherCAT u-remote station

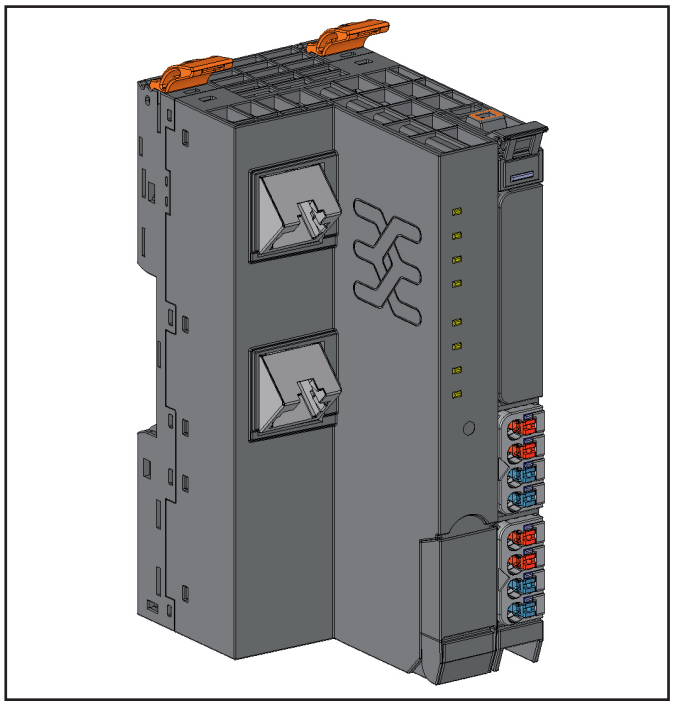
Status value	Meaning
0x0	Plug-in station is undefined
0x1	Plug-in station = module OK
0x80	Plug-in station empty, module has been removed
0x81	Incorrect module plugged in

5.4 Modbus TCP field-bus coupler UR20-FBC-MOD-TCP

Modbus-IDA
the architecture for distributed automation

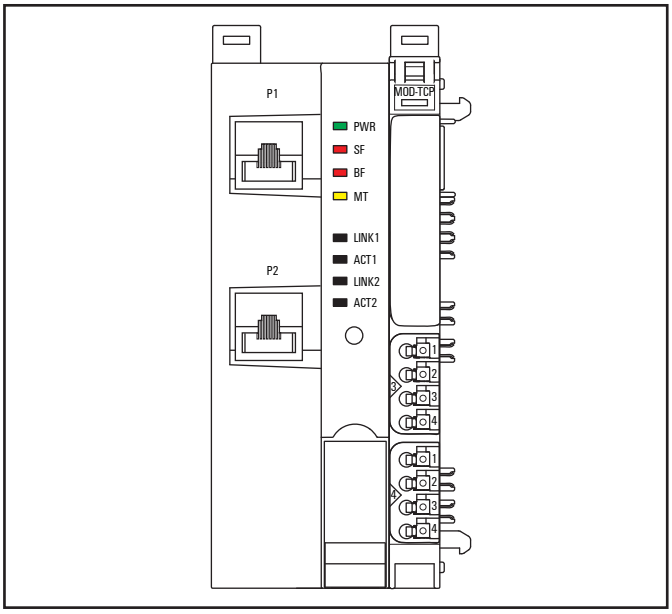
The UR20-FBC-MOD-TCP field-bus coupler is a Modbus TCP participant developed according to IEC 61158. The coupler is the head module for the u-remote system bus, to which up to 64 active u-remote modules can be connected. The Modbus TCP coupler has two Ethernet ports, and the integrated switch supports a line network structure.
The coupler can be activated with a system-independent web server application via the USB service interface or the Ethernet. In addition, all information, such as diagnostics, status values and parameters, can be exported and all connected modules can be simulated or forced.

The station's main power supply is integrated in the coupler. Power is supplied via two 4-pole connectors, separated into the input and output current paths.



Field-bus coupler UR20-FBC-MOD-TCP (Order No. 1334930000)

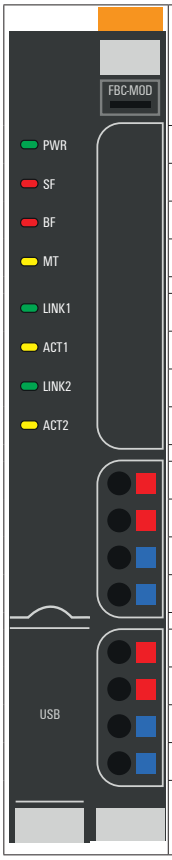
Status indicators



LED status indicators UR20-FBC-MOD-TCP

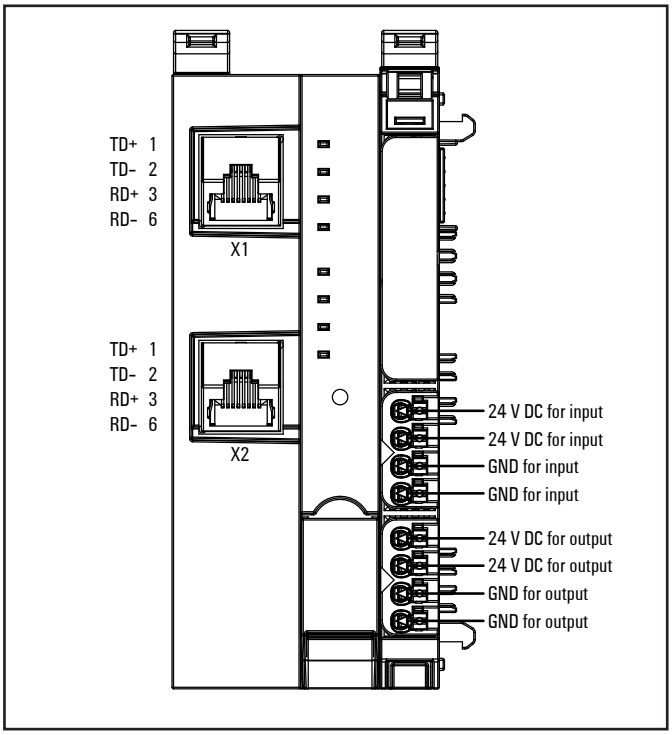
PWR	Power LED	**Green**: Supply voltage
SF	Collective error	**Red:** Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic report **Red flashing**: Station in Force mode
BF	Bus failure	**Red:** No connection to the field-bus **Red flashing**: Configuration error, no connection to the control unit, or error in the parameter set
MT	Maintenance	**Yellow**: Error on the system bus or field-bus
L/A X1	Connection/active	**Green / Yellow***: Connection established between port 1 of the coupler and another field device **Green flashing / Yellow flashing***: Data being exchanged on port 1
L/A X2	Connection/active	**Green**: Connection established between port 2 of the coupler and another field device **Green flashing**: Data being exchanged on port 2

*** Green: Transfer rate 100 MBit/s**
Yellow: Transfer rate 10 MBit/s



	Coupler power supply LED green: supply voltage >18 V red: at least one current path <18 V
3.1	Green: Input current path supply voltage > 18 V DC
3.2	Red: Input current path supply voltage < 18 V DC
3.4	Red: Internal fuse defective
4.1	Green: Output current path supply voltage > 18 V DC
4.2	Red: Output current path supply voltage < 18 V DC
4.4	Red: Internal fuse defective

LED indicators UR20-FBC-MOD-TCP, error messages, see Chapter 13

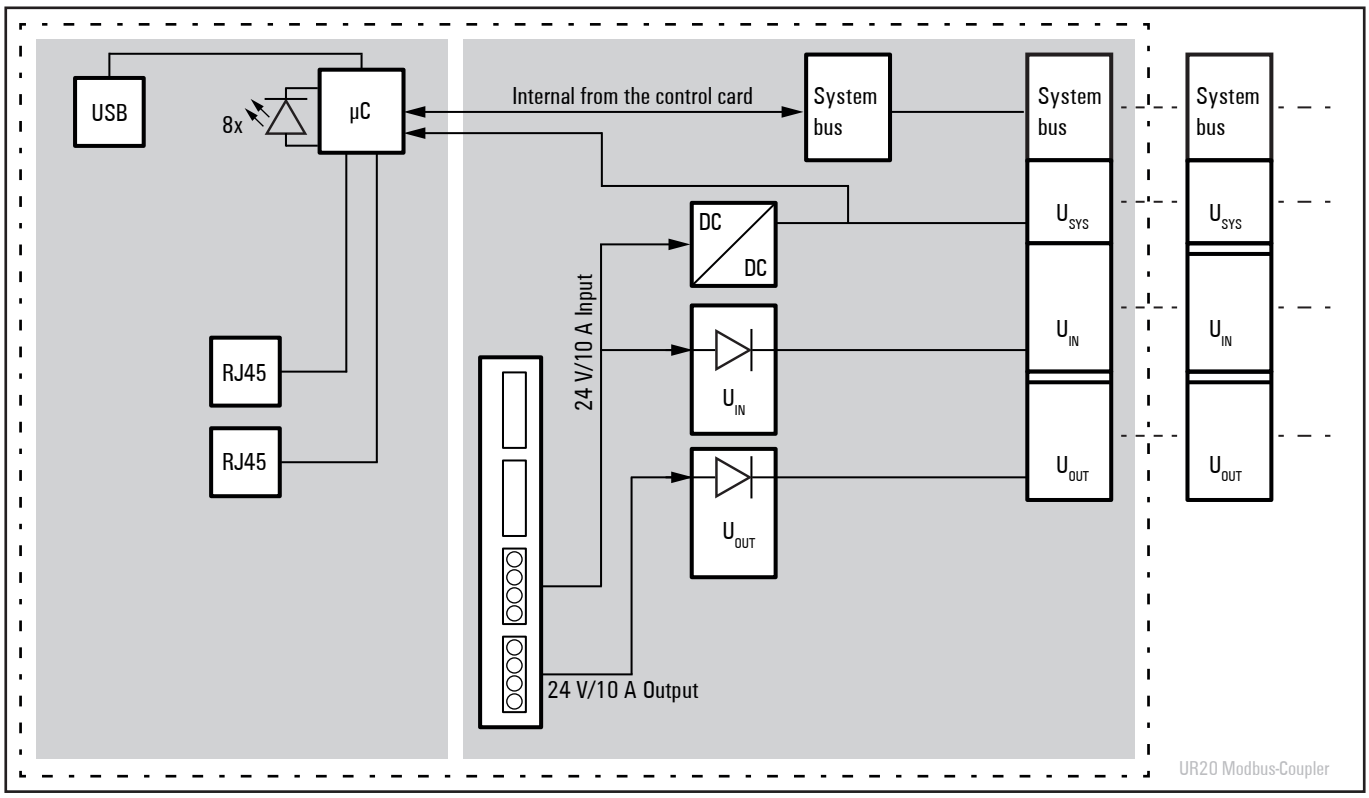


Connection diagram UR20-FBC-MOD-TCP

ATTENTION

Risk of material damage!

In the case of a maximum power supply of >8 A and a maximum temperature of >+55 °C, all four contacts must be connected with 1.5 mm² wiring!



Block diagram UR20-FBC-MOD-TCP

Technical data UR20-FBC-MOD-TCP (Order No. 1334930000)

System data		
Connection	2 x RJ-45	
Field-bus protocol	Modbus TCP	
Process image	Process data	max. 8 kBytes
	Parameter data	max. 1024 kBytes
	Diagnostic data	max. 1024 kBytes
Number of modules	max. 64 active	
Configuration interface	USB	2.0
Transfer rate	Field-bus	10 Mbps/100 Mbps
	u-remote system bus	Max. 48 Mbps
Supply		
Supply voltage for system and inputs	24 V DC +20 % / -15 %	
Supply voltage for outputs	24 V DC +20 % / -15 %	
Max. feed-in current for input modules	10 A	
Max. feed-in current for output modules	10 A	
Current consumption (internal), typ.	112 mA	
Connection data		
Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
	Fine-wired	0.14 – 1.5 mm^2 (AWG 16 – 26)
General data, see Section 3.2		

Addressing using DHCP mode

The web server can be used to define whether a static IP address should be used (default) or if the address is automatically assigned (DHCP/BootP). In case of an automatically assigned address, the DHCP server assigns an IP address to the client. This can be read using the web server.

Overview of the editable parameters UR20-FBC-MOD-TCP

Parameter	Optional values	Default value
IP-Address	Input of 4 numbers between 0-255	192.168.0.222
Subnet mask	Input of 4 numbers between 0-255	255.255.255.0
Gateway	Input of 4 numbers between 0-255	192.168.0.1
IP Configuration	Static, DHCP, BootP	Static
IP-Address USB-Port	192.168.1.202; 192.168.2.202, 192.168.3.202, 192.168.4.202, 192.168.5.202	192.168.1.202
Webserver via Ethernet	disabled / enabled	disabled
Save configuration	no / yes / Standard	no, see field-bus register 0x113E-0x113F
Status Modbus watchdog	Watchdog time in steps of 10 ms	0 *10 ms, see field-bus register 0x1120
Modbus Connection Timeout	Connection watchdog time in sec	1 s, see field-bus register 0x1031
ModbusConnectionMode	write for all, 1stWr1stServe, 1stConn1stServe	write for all, see field-bus register 0x1130
RefListMode	disabled / enabled	deaktiviert, see field-bus register 0x1132
Process alarm	disabled / enabled	see field-bus register 0x1133
Diagnostic alarm	disabled / enabled	see field-bus register 0x1134
Behaviour of outputs on field-bus error	All outputs off / Enable substitute values / Hold last value	All outputs off, see field-bus register 0x1135
Module behaviour on hot swap	Continue data exchange / Behaviour like field-bus error	Continue data exchange, see field-bus register 0x1136
Data format	Motorola / Intel	Motorola, see field-bus register 0x1137

Register structure (ro: read only = input register, rw: read write = holding register)

Register address (in hex)	Access	Data width	Description	Remarks
0x0000 – 0x01FF	ro	Module-dependent	Packed process data for inputs	byte granularly
0x0800 – 0x09FF	rw	Module-dependent	Packed process data for outputs	byte granularly
0x1000 – x1006	ro	Byte	Coupler identifier	
0x100C	ro	Word	Coupler status	Bit assignment as with UR20-FBC-EC
0x1010	ro	Word	Process image length in bits for the output modules	
0x1011	ro	Word	Process image length in bits for the input modules	
0x1017	ro	Word	Register mapping revision	
0x1018 – 0x101B	ro	Byte	Collective diagnostics message for I/O modules (1 bit per I/O module)	
0x101C – 0x101F	ro	Byte	Collective process alarm message for I/O modules (1 bit per I/O module)	
0x1028 – 0x102F	ro	Byte	Module status (2 bits per I/O module) 00 = module I/O 01 = module error 10 = incorrect module 11 = module not plugged in	Structure as in PROFIBUS module status
0x1030	ro	Word	MODBUS DATA EXCHANGE watchdog, current time (x*10 ms) 0 = watchdog has expired 0xFFFF = watchdog deactivated	Time still remaining for monitoring the exchange of process data
0x1120	rw	Word	MODBUS DATA EXCHANGE watchdog, predefined time (x*10 ms) default = 0 ms -> no watchdog active	Time for monitoring the exchange of process data
0x1121	rw	Word	MODBUS DATA EXCHANGE watchdog reset register Bit0 = 1 – watchdog reset at predefined time Bit8 = 1 – restart after expired watchdog	Bit 0: reset watchdog while it is running = retrigger Bit 8: restart of expired watchdog
0x1130	rw	Word	MODBUS CONNECTION mode register	
0x1131	rw	Word	MODBUS CONNECTION timeout in sec. Default = 1 (0 not allowed)	
0x1132	rw	Word	Check the reference list before data exchange 0x0000 = disable 0x0001 = enable	
0x1133	rw	Word	Process alarm 0x0000 = disable 0x0001 = enable	
0x1134	rw	Word	Diagnostics alarm 0x0000 = disable 0x0001 = enable	
0x1135	rw	Word	Behaviour in case of field bus error and reference list error 0x0000 = all outputs to 0 0x0001 = set error values 0x0002 = retain process data	
0x1136	rw	Word	Behaviour when module removed 0x0000 = process data continues to run 0x0001 = behaviour as with field bus error	
0x1137	rw	Word	Data format 0x0000 = Motorola 0x0001 = Intel	

Register structure (ro: read only = input register, rw: read write = holding register)

Register address (in hex)	Access	Data width	Description	Remarks
0x113C – 0x113D	w	Long	Restore MODBUS parameters Motorola="LOAD" Intel="DAOL"	corresponds to the "DEFAULT" in the web server
0x113E – 0x113F	w	Long	Save MODBUS parameters Motorola="SAVE" Intel="EVAS"	Corresponds to "SAVE" in the web server
0x27FE	ro	Word	Number of entries in the current module list	
0x27FF	ro	Word	Number of entries in the reference module list	
0x2800 – 0x287F	rw	Long	Reference module list (max. 64 modules per station x 2 registers per module)	There must always be 2, 4, 6 etc. registers transferred
0x2A00 – 0x2A7F	ro	Long	Current module list (max. 64 modules per station x 2 registers per module)	There must always be 2, 4, 6 etc. registers transferred
0x8000 – 0x87FF	ro	Module	Process data inputs (max. 64 modules per station x 32 registers per module)	
0x9000 – 0x97FF	rw	Module	Process data outputs (max. 64 modules per station x 32 registers per module)	
0xA000 – 0xA7FF	ro	Byte	Diagnostics (max 64 modules per station x 32 registers per module)	Confirmation by readout
0xB000 – 0xB7FF	ro	Byte	Process alarms (max 64 modules per station x 32 registers per module)	Confirmation by readout
0xC000 – 0xC7FF	rw	Byte	Parameters (max 64 modules per station x 32 registers per module)	

Implemented modbus functions

Function code no.	Function	Description
1	Read Coils	Reading of output bits in the range of 0x0800 – 0x0FFF
2	Read Discrete Inputs	Reading of input bits in the range of 0x0000 – 0x07FF
3	Read Holding Registers	Reading of multiple holding registers
4	Read Input Registers	Reading of multiple input registers
5	Write Single Coil	Writing of an individual output bit in the range of 0x0800 – 0x0FFF
6	Write Single Registers	Writing of individual holding registers
15	Write Multiple Coils	Writing of output bits in the range of 0x0800 – 0x0FFF
16	Write Multiple Registers	Writing of multiple holding registers
23	Read/Write Multiple Registers	Reading of multiple input registers and writing of multiple holding registers simultaneously

Overview of module IDs

Modul	Modul-ID
Digital input modules	
UR20-4DI-P	00091F84
UR20-8DI-P-3W	000A1FC1
UR20-16DI-P	00049FC2
UR20-16DI-P-PLC-INT	00059FC2
UR20-2DI-P-TS	0F014700
UR20-4DI-P-TS	0F024700
Digital output modules	
UR20-4DO-P	01012FA0
UR20-4DO-P-2A	01052FA0
UR20-8DO-P	01022FC8
UR20-16DO-P	0103AFD0
UR20-16DO-P-PLC-INT	0104AFD0
UR20-4RO-SSR-255	01072FA0
UR20-4RO-CO-255	01062FA0
Digital counter modules	
UR20-1CNT-100-1DO	08C13800
UR20-2CNT-100	08C33800
Digital pulse width modulation output modules	
UR20-2PWM-PN-0.5A	09084880
UR20-2PWM-PN-2A	09094880
Analogue input modules	
UR20-4AI-UI-16	040115C4
UR20-4AI-UI-12	041115C4
UR20-8AI-I-PLC-INT	040915C5
Analogue output modules	
UR20-4AO-UI-16	050225E0
Analogue input modules DIAG	
UR20-4AI-RTD-DIAG	04061544
UR20-4AI-TC-DIAG	04071544
Safe feed-in modules	
UR20-PF-O-1DI-SIL	08019E43
UR20-PF-O-2DI-SIL	08029E43
UR20-PF-O-2DI-DELAY-SIL	08039E43

Packed process data

Packed input process data

Input register range: 0x0000 to 0x01FF

Access to all 512 registers is always possible regardless of the I/O structure. Unused registers respond with “0”.

Packed output process data

Output register range: 0x0800 to 0x09FF

Access to all 512 registers is always possible regardless of the I/O structure. Unused registers send “0” during a read access, write accesses are ignored.

Structure of packed process data

The byte granularly packed process data contains all input data (register range 0x0000 to 0x01FF) and output data (register range 0x0800 to 0x09FF) of the u-remote station.

Process data is mapped according to the modules are arranged. To avoid larger gaps in the process data, the different modules should be arranged in an optimal manner.

Example of an optimal module arrangement

Product	Input data	Output data	Number of input registers	Number of output registers	Remarks
UR20-FBC-MOD			0	0	
UR20-4AO-UI	–	4 words	0	4	allocated 4 registers
UR20-4AI-UI	4 words	–	4	0	allocated 4 registers
UR20-4DI-P	1 Byte	–	1	0	allocated 1/2 register low byte (1 byte)
UR20-4DI-P	1 Byte	–	0	0	allocated 1/2 register high byte (1 byte)
UR20-16DI-x	2 Byte		1		allocated 1 register
Total			6	4	

Example of an suboptimal module arrangement

Product	Input data	Output data	Number of input registers	Number of output registers	Remarks
UR20-FBC-MOD			0	0	
UR20-4DI-P	1 Byte	–	1	0	allocated 1 register
UR20-4AO-UI	–	4 words	0	4	allocated 4 registers
UR20-4AI-UI	4 words	–	4	0	allocated 4 registers
UR20-4DI-P	1 Byte	–	1	0	allocated 1 register
UR20-16DI-x	2 Byte		1		allocated 1 register
Total			**7**	4	

Data widths of I/O modules in the modbus register range

Order no.	Module	Process data	
		Input	Output
		Byte	Byte
1315170000	UR20-4DI-P	1 Byte	–
1394400000	UR20-8DI-P-3W	1 Byte	–
1315200000	UR20-16DI-P	2 Byte	–
1315210000	UR20-16DI-P-PLC-INT	2 Byte	–
1460140000	UR20-2DI-P-TS	15*(2 Byte, 1 Word)	–
1460150000	UR20-4DI-P-TS	15*(2 Byte, 1 Word)	–
1315220000	UR20-4DO-P	-	1 Byte
1315230000	UR20-4DO-P-2A	-	1 Byte
1394420000	UR20-4DO-PN-2A	-	1 Byte
1315240000	UR20-8DO-P	-	1 Byte
1315250000	UR20-16DO-P	-	2 Byte
1315270000	UR20-16DO-P-PLC-INT	-	2 Byte
1315540000	UR20-4RO-SSR-255	-	1 Byte
1315550000	UR20-4RO-CO-255	-	1 Byte
1315570000	UR20-1CNT-100-1DO	2 DWord, 2 Word	2 DWord, 1 Word
1315590000	UR20-2CNT-100	2 DWord, 2 Word	2 DWord, 2 Word
1315600000	UR20-2PWM-PN-0.5A	2 Word	2 DWord, 2 Word
1315610000	UR20-2PWM-PN-2A	2 Word	2 DWord, 2 Word
1315620000	UR20-4AI-UI-16	4 Word	–
1394390000	UR20-4AI-UI-12	4 Word	–
1315710000	UR20-4AI-TC-DIAG	4 Word	–
1315670000	UR20-8AI-I-PLC-INT	8 Word	–
1315680000	UR20-4AO-UI-16	-	4 Word
1315700000	UR20-4AI-RTD-DIAG	4 Word	–
1335030000	UR20-PF-O-1DI-SIL	4 Byte	–
1335040000	UR20-PF-O-2DI-DELAY-SIL	4 Byte	–
1335050000	UR20-PF-O-2DI-SIL	4 Byte	–

0x1000 – 0x1006 Coupler identifier

The identifier is the "product designation": UR20-FBC-MOD.

0x100C Coupler status

Bit	Name	Meaning
0	Summarized module diagnosis	A diagnosis is available on at least one module with diagnostics functionality.
1	Errorbit 1	Reserve bit 1, currently not used
2	Errorbit 2	Reserve bit 2, currently not used
3	Systembus error	Error on system bus. Communication with the connected modules is disrupted.
4	Errorbit 4	Reserve bit 4, currently not used
5	Errorbit 5	Reserve bit 5, currently not used
6	I/O-Configuration error	Differing configuration. The module list has changed. The list of configured modules (reference module list 0x2800 – 0x287F) differs from the module list detected by the coupler (current module list 0x2A00 – 0x2A7F).
7	Master configuration error	Master configuration error. The list of configured modules (reference module list 0x2800 – 0x287F) differs significantly from the module list detected by the coupler (current module list 0x2A00 – 0x2A7F). Process data cannot be exchanged with the modules.
8	Errorbit 8	Reserve bit 8, currently not used
9	Errorbit 9	Reserve bit 9, currently not used
10	Force mode active	Force mode was activated via the web server. Forced channels do not exchange data with the master.
11	Errorbit 11	Reserve bit 11, currently not used
12	Errorbit 12	Reserve bit 12, currently not used
13	Voltage U_{OUT} error	Error in the supply voltage of outputs
14	Voltage U_{IN} error	Error in the supply voltage of system and inputs
15	Errorbit 15	Reserve bit 15, currently not used

0x1010 Process image length in bits for the output modules

0x1011 Process image length in bits for the input modules

0x1017 Register – mapping revision

Version of the register structure

0x1018 – 0x101B Collective diagnostics message for I/O modules

If a diagnostic alarm is activated (Register 0x1134) and there is a diagnostic message for a module, it is indicated here with a set bit. A module's slot position corresponds to its position in the 64-bit data field (minus passive modules without slot recognition). Example: 0x0000 0000 0000 0002 = There is a diagnostic alarm for module 2.
Reading the module's diagnostic memory (0xAXXX) confirms the diagnosis and resets the corresponding bit. In case of multiple diagnoses for one module, only the most up-to-date diagnosis is displayed. The next diagnostic is then placed in a wait loop and only becomes active once the current one has been confirmed.

0x101C – 0x101F Collective process alarm message for the I/O modules

If a process alarm is activated (Register 0x1133) and there is an alarm for a module, this is indicated here with a set bit. A module's slot position corresponds to its position in the 64-bit data field (minus passive modules without slot recognition). Example: 0x0000 0000 0000 0002 = These is a process alarm for module 2.
Reading the module's process alarm memory (0xBXXX) confirms the alarm and resets the corresponding bit. In case of multiple process alarms for one module, only the latest alarm is displayed. The next alarm is then placed in a wait loop and only becomes active once the current one has been confirmed.

0x1028 – 0x102F Module status

The module status (2 bits per module) is displayed in the corresponding bit positions of the 128 bits.

0 0	Valid data from this module
0 1	Invalid data, faulty module
1 0	Invalid data, incorrect module
1 1	Invalid data, missing module

0x1030 MODBUS DATA EXCHANGE watchdog, current time

Amount of time (input value x 10 ms) still remaining on the active watchdog to monitor the exchange of process data.
If a 0 is read, the watchdog has expired and must be restarted.
If 0xFFFF is read, the watchdog is deactivated.

0x1120 MODBUS DATA EXCHANGE watchdog, predefined time

In this register, the watchdog is activated/deactivated and the watchdog time is set. An input can be made as long as the watchdog is deactivated or it is activated and still running. But it is accepted only after a watchdog reset to the current time. The length is calculated with the input value x 10 ms. Entering 0 deactivates the watchdog.

0x1121 MODBUS DATA EXCHANGE Watchdog Reset Register

If Bit 0 in this register is set, the predefined time is loaded into the watchdog time (watchdog reset).
If Bit 8 in this register is set, an expired watchdog (value 0 in register 1030) is reactivated.

0x1130 MODBUS CONNECTION mode register

Bit	Name/Description
2 to 15	**reserved**
1	**MB_ImmediateWritePermission**
	– 0: during the first write access, write authorisation is requested for the corresponding modbus connection. If this is not successful, an exception response with the exception code 0x01 is generated. If it is successful, the write access is executed and write authorisation remains in effect until the end of the connection. – 1: write authorisation for the corresponding modbus connection is already requested when the connection is being established. As a result, the first modbus connection receives the write authorisation, and nothing happens for all those that follow (as long as Bit 0 = 1).
0	**MB_OnlyOneWritePermission**
	– 0: all modbus connections have write authorisation – 1: in all cases only one modbus connection can be assigned write authorisation. Once assigned, write authorisation is retained until there is a disconnect. After the connection that has write authorisation is disconnected, the next connection which attempts write access receives write authorisation.

0x1131 MODBUS CONNECTION timeout in sec.

This register determines how long a modbus connection must be inactive before it is ended with a disconnect.

0x1132 Check reference list prior to data exchange

If the value in register 0x1132 is set to 0, the data exchange begins without checking the reference module list (0x2800 and the following) against the current module list (0x2A00 and the following). The reference module list must also not be described.
If the value in in register 0x1132 is set to 1, the data exchange only starts if the reference module list (0x2800 and the following) matches the current module list (0x2A00 and the following).

0x1133 Process alarm

If the value in this register is set to 0, process alarms are reported, but it is not necessary to confirm or read them.
If the value in this register is set to 1, process alarms are reported and they must be confirmed by reading the corresponding register.

0x1134 Diagnostic alarm

If the value 0 is set in this register, the diagnostic alarm is deactivated. Pending diagnostics do not have any effect on the exchange of process data and must not be confirmed. They are, however, displayed locally on the UR20 hardware with red LEDs (SF and module) and also can be read in the module-specific diagnostic registers 0xAXXX.
If the value in this register is set to 1, diagnostics alarms are reported, and they must be confirmed by reading the corresponding register.

0x1135 Field bus or reference list error behaviour

If the value in this register is set to 0, in case of a field bus or reference list error all outputs are set to 0.
If the value in this register is set to 1, in case of a field bus error all outputs are set to the substitute values.
If the value in this register is set to 2, in case of a field bus error all outputs are held at the last process value.

0x1136 Module removal behaviour

If the value in this register is set to 0, the exchange of process data continues.
If the value in this register is set to 1, the behaviour during a field bus error is used.

0x1137 Data format

If the value in this register is set to 0, data is transferred in Motorola format.
If the value in this register is set to 1, data is transferred in Intel format.

0x113C – 0x113F MODBUS parameter restore/save

Inputs in the **Modbus Parameter Restore** register (0x113C – 0x113D) and **Modbus Parameter Save** (0x113E – 0x113F) register in a Motorola format follow this scheme:

	„LOAD“				„SAVE“			
Letter of the alphabet	L	O	A	D	S	A	V	E
ASCII code decimal	076	079	065	068	083	065	086	069
ASCII hexadecimal	4C	4F	41	44	53	41	56	45
Input in register no.	0x113C		0x113D		0x113E		0x113F	
Hexadecimal	4C4F		4144		5341		5645	
Decimal	19535		16708		21313		22085	

“LOAD” loads the default parameter set of all modules and deletes parameters stored in the coupler.
“SAVE” stores all current module parameters in the coupler, and because of this there is no need to enter parameters again after restarting the coupler.

Using the Intel format the inputs follow „DAOL“ and „EVAS“:

	„DAOL“				„EVAS“			
Letter of the alphabet	D	A	O	L	E	V	A	S
ASCII code decimal	068	065	079	076	069	086	065	083
ASCII hexadecimal	44	41	4F	4C	45	56	41	53
Input in register no.	0x113D		0x113C		0x113F		0x113E	
Hexadecimal	4144		4C4F		5645		5341	
Decimal	16708		19535		22085		21313	

0x27FE Number of entries in the current module list

This displays the number of modules that were connected when the coupler was started.

0x27FF Number of entries in the reference module list

This displays the number of modules that were entered into the reference list.

0x2800 – 0x287F Reference module list

Each module identifier is made up of 4 bytes (2 registers) (see the Overview of module IDs on page 58). If a 1 is set in register 1132, the reference module list must be identical to the current module list before the data exchange can begin.

0x2A00 – 0x2A7F Current module list

Each module identifier is made up of 4 bytes (2 registers) (see the Overview of module IDs). The modules that were connected when the coupler was started are entered here. To simplify configuration, the current module list can be copied into the reference module list.

0x8000 – 0x87FF Process data inputs

For each module a data length of 64 Byte (32 Register) is reserved.
Example: Module 3 starts at address 0x8040.

0x9000 – 0x97FF Process data outputs

For each module a data length of 64 Byte (32 Register) is reserved.
Example: Module 3 starts at address 0x9040.

0xA000 – 0xA7FF Diagnostics

For each module a diagnostics data length of 64 Byte (32 Register) is reserved.
Example: Module 3 starts at address 0xA040.
In case of a diagnostics message, the 47 bytes of the module diagnosis are entered here from the corresponding tables (see the table of diagnostic data in the corresponding module description in the Module chapter).
If a 1 is set in register 0x1134, reading out the corresponding diagnosis results in a confirmation of the alarm.

0xB000 – 0xB7FF Prozess alarms

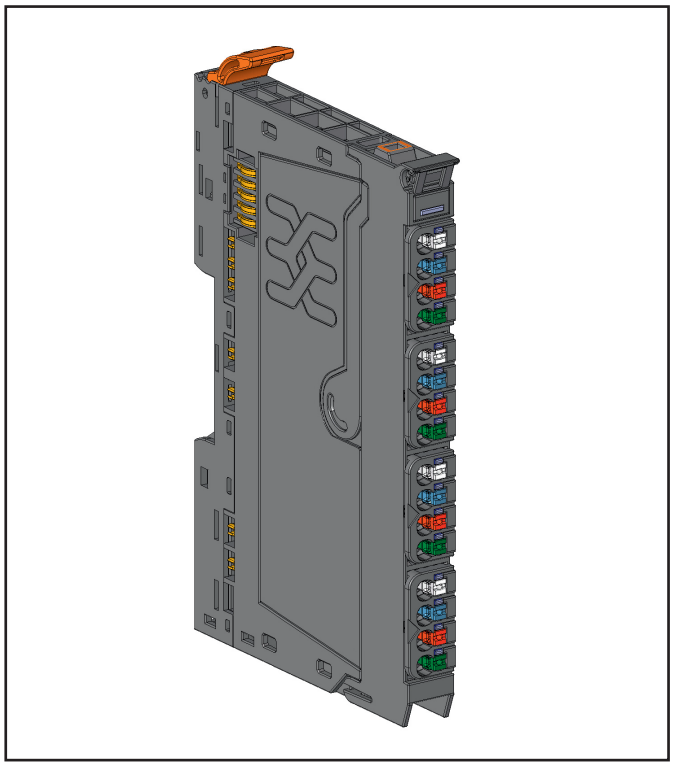
For each module a process alarm data length of 64 Byte (32 Register) is reserved.
Example: Module 3 starts at address 0xB040.
In case of a process alarm, the 4 bytes of the module are entered here from the corresponding table (see the table of process alarms in the corresponding module description in the Module chapter).

0xC000 –0xC7FF Parameters

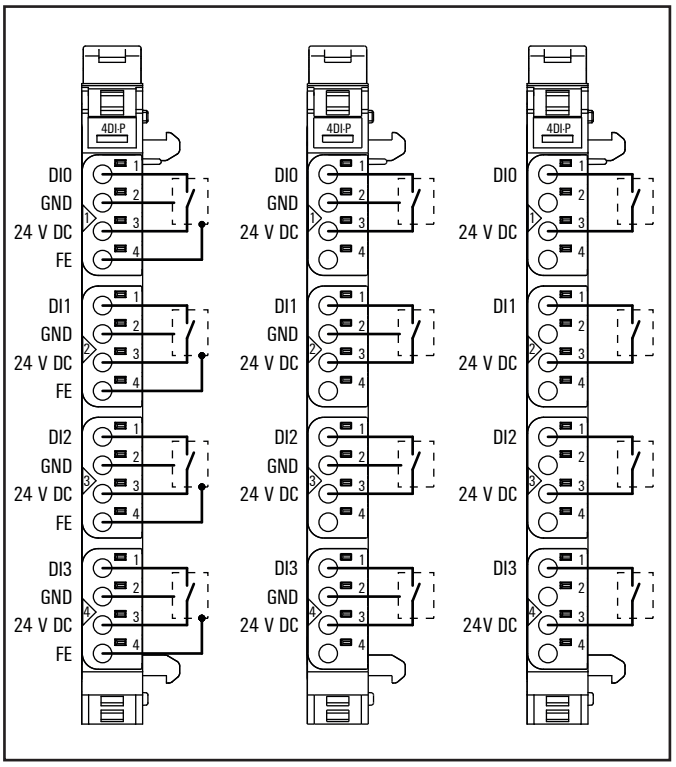
For each module a parameter data length of 64 Byte (32 Register) is reserved.
Example: Module 3 starts at address 0xC040.
To parameterise a module, use the web server (see the Web Server chapter). After parameterisation, you can read out the parameter set for the corresponding module using the modbus command function code 3 Read Holding Registers You can copy this data into your project.

6 Detailed descriptions of I/O modules

6.1 Digital input module UR20-4DI-P

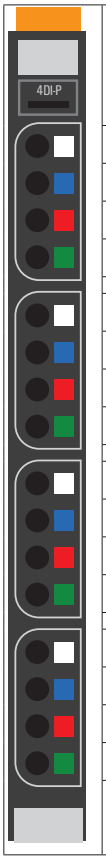


Digital input module UR20-4DI-P (Order No. 1315170000)



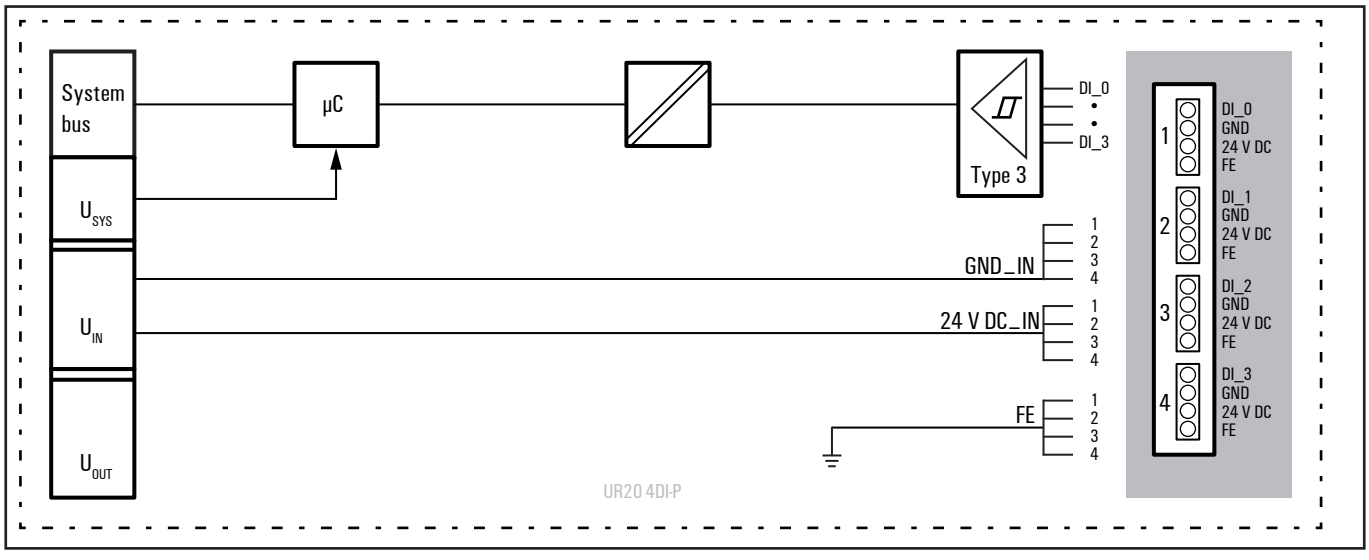
Connection diagram UR20-4DI-P

The digital input module UR20-4DI-P can detect up to 4 binary control signals. A sensor can be connected to each connector using a 2-wire, 3-wire or 3-wire + FE connection. A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Input 0 active
2.1	Yellow: Input 1 active
3.1	Yellow: Input 2 active
4.1	Yellow: Input 3 active

LED indicators UR20-4DI-P, error messages see Chapter 13



Block diagram UR20-4DI-P

Technical data UR20-4DI-P (Order No. 1315170000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	4
Sensor types	Type 1 and Type 3 sensors as per IEC 61131-2
Input filter	Filter time adjustable up to 40 ms
Low input voltage	< 5 V
High input voltage	> 11 V
Sensor supply	max. 2 A per plug, total max. 8 A
Sensor connection	2-wire, 3-wire, 3-wire + FE
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	no
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	< 12 mA + sensor feed
General data	
Weight	87 g
For additional general data, see Section 3.4	

Overview of the editable parameter UR20-4DI-P

Channel	Description	Options (Value)	Default value
0 ... 3	Input delay	no (0) / 0,3 ms (1) (not at PROFIBUS-DP) / 3 ms (2) / 10 ms (3) / 20 ms (4) / 40 ms (5) (not at PROFIBUS-DP)	3 ms

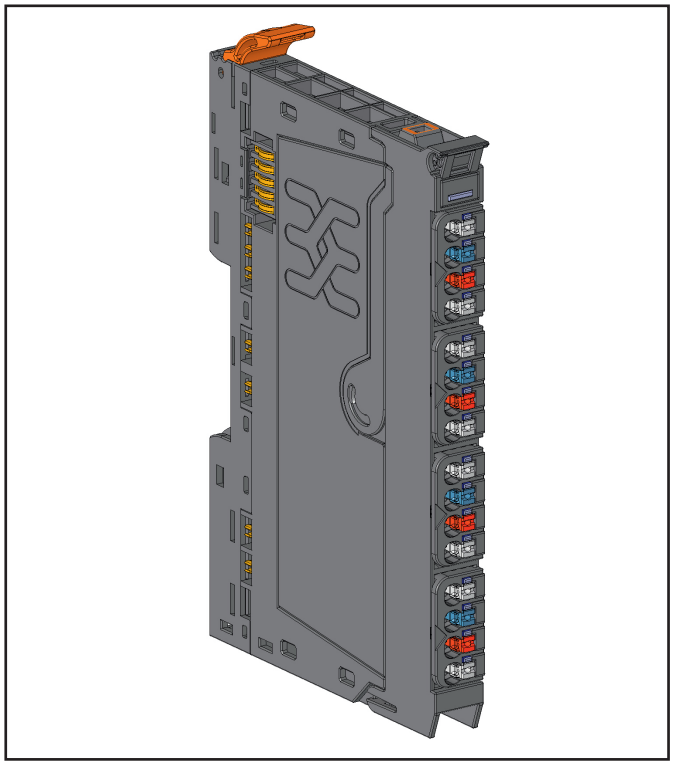
Diagnostic data UR20-4DI-P

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	0
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x70
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

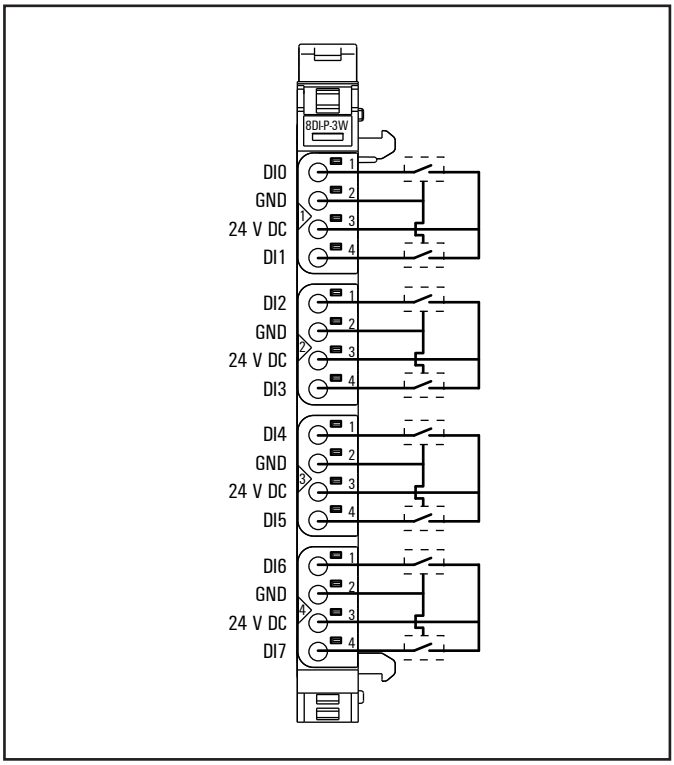
Process data inputs UR20-4DI-P

Byte	Bit	Description
IB0	IX0.0	DI0
	IX0.1	DI1
	IX0.2	DI2
	IX0.3	DI3
	IX0.4	reserved
	IX0.5	reserved
	IX0.6	reserved
	IX0.7	reserved

6.2 Digital input module UR20-8DI-P-3W

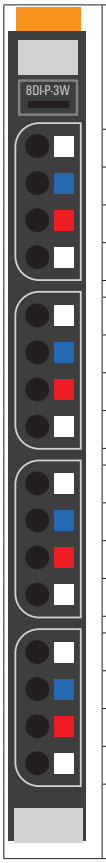


Digital input module UR20-8DI-P-3W (Order No. 1394400000)



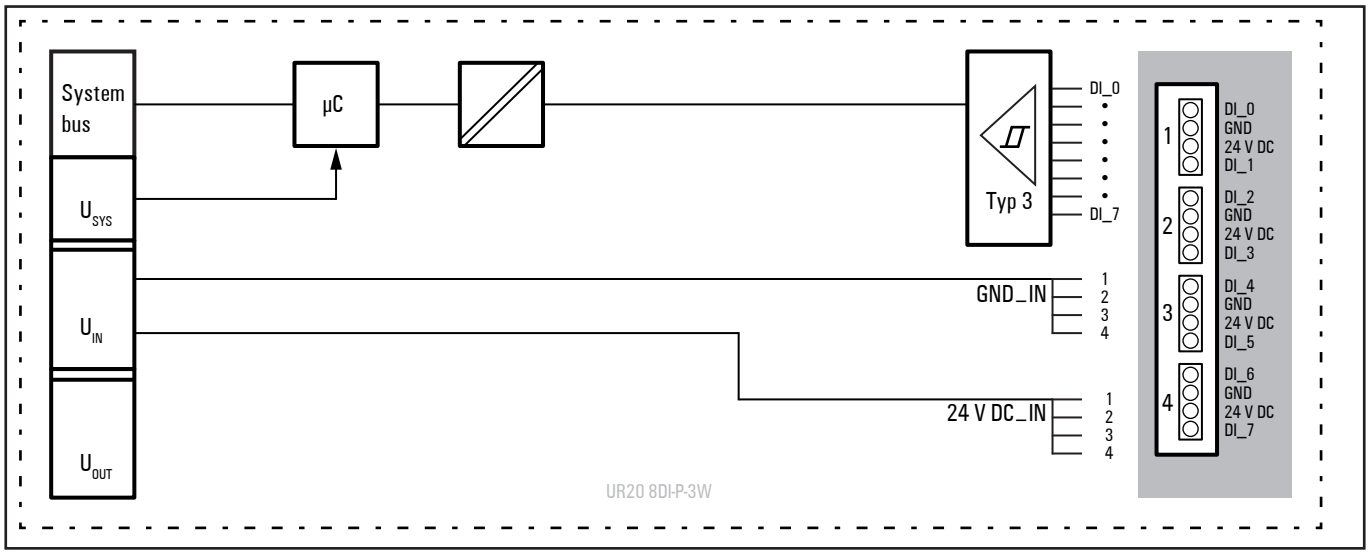
Connection diagram UR20-8DI-P-3W

The digital input module UR20-8DI-P-3W can detect up to eight binary control signals. Two sensors can be connected to each connector using a 2-wire or 3-wire connection.
A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Input 0 active
1.4	Yellow: Input 1 active
2.1	Yellow: Input 2 active
2.4	Yellow: Input 3 active
3.1	Yellow: Input 4 active
3.4	Yellow: Input 5 active
4.1	Yellow: Input 6 active
4.4	Yellow: Input 7 active

LED indicators UR20-8DI-P-3W, error messages see Chapter 13



Block diagram UR20-8DI-P-3 W

Technical data UR20-8DI-P-3W (Order No. 1394400000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	8
Sensor types	Type 1 and Type 3 sensors as per IEC 61131-2
Input filter	Filter time adjustable up to 40 ms
Low input voltage	< 5 V
High input voltage	> 11 V
Sensor supply	max. 2 A per plug, total max. 8 A
Sensor connection	2-wire, 3-wire
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	no
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	< 30 mA + sensor feed
General data	
Weight	83 g
For additional general data, see Section 3.4	

Overview of the editable parameters UR20-8DI-P-3W

Channel	Description	Options (Value)	Default value
0 ... 7	Input delay	no (0) / 0,3 ms (1) (not at PROFIBUS-DP) / 3 ms (2) / 10 ms (3) / 20 ms (4) / 40 ms (5) (not at PROFIBUS-DP)	3 ms

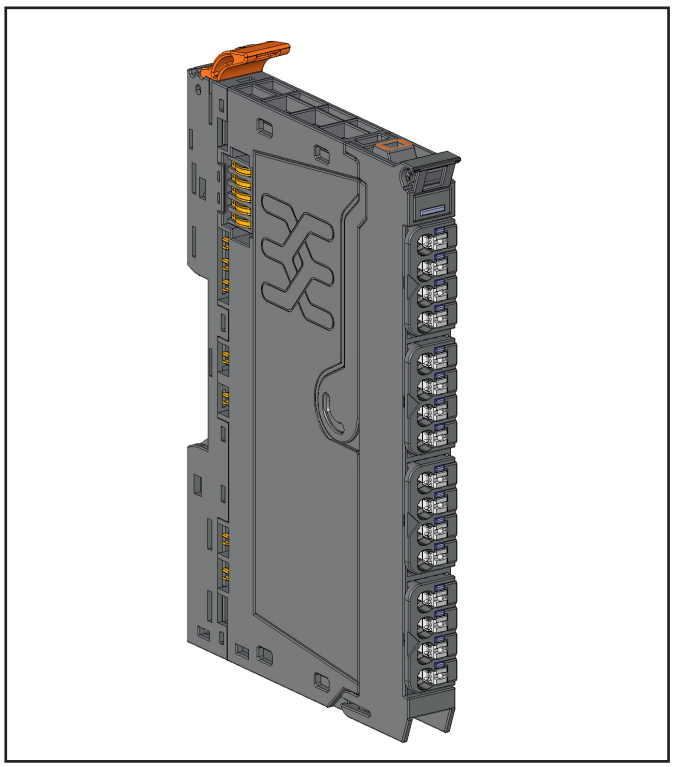
Diagnostic data UR20-8DI-P-3W

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	0
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x70
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	8
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

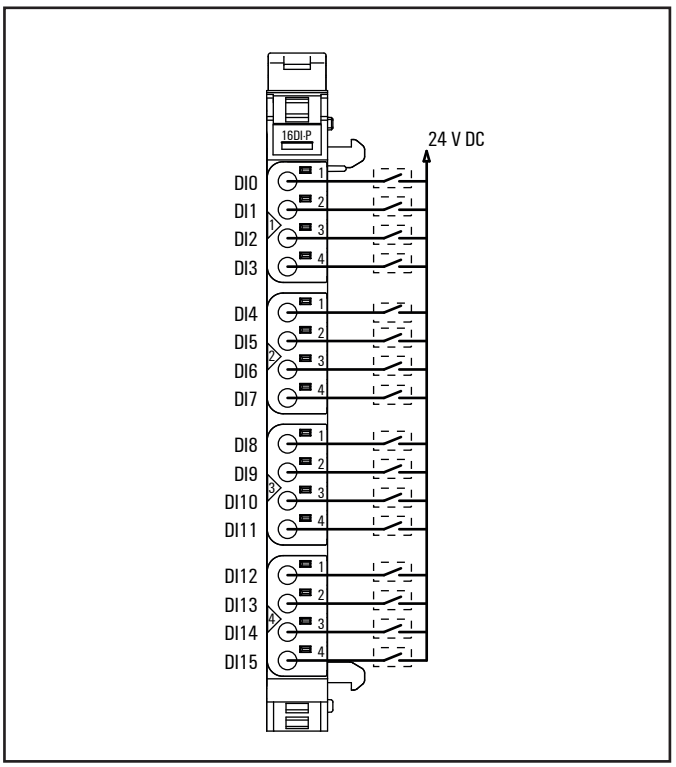
Process data inputs UR20-8DI-P-3W

Byte	Bit	Description
IB0	IX0.0	DI0
	IX0.1	DI1
	IX0.2	DI2
	IX0.3	DI3
	IX0.4	DI4
	IX0.5	DI5
	IX0.6	DI6
	IX0.7	DI7

6.3 Digital input module UR20-16DI-P

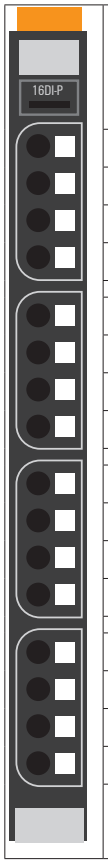


Digital input module UR20-16DI-P (Order No. 1315200000)



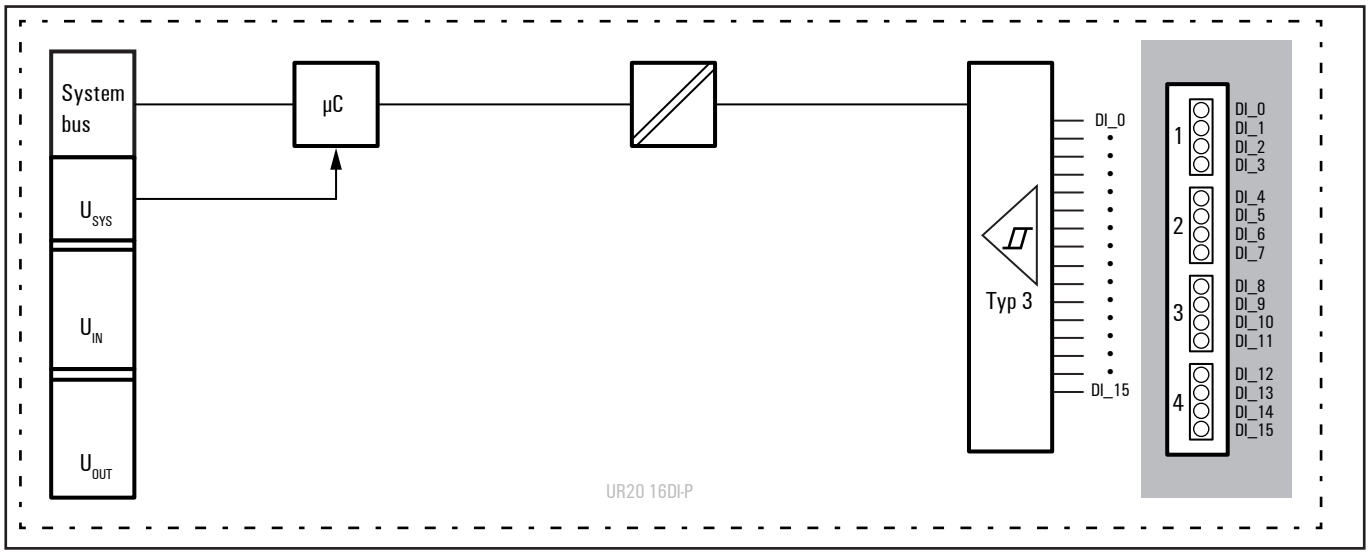
Connection diagram UR20-16DI-P

The UR20-16 DI-P digital input module can detect up to 16 binary control signals. Four sensors can be connected to each connector in a 1-wire connection. A status LED is assigned to each channel. The connected sensors must be supplied with power from external sources.



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Input 0 active
1.2	Yellow: Input 1 active
1.3	Yellow: Input 2 active
1.4	Yellow: Input 3 active
2.1	Yellow: Input 4 active
2.2	Yellow: Input 5 active
2.3	Yellow: Input 6 active
2.3	Yellow: Input 7 active
3.1	Yellow: Input 8 active
3.2	Yellow: Input 9 active
3.3	Yellow: Input 10 active
3.4	Yellow: Input 11 active
4.1	Yellow: Input 12 active
4.2	Yellow: Input 13 active
4.3	Yellow: Input 14 active
4.4	Yellow: Input 15 active

LED indicators UR20-16DI-P, error messages see Chapter 13



Block diagram UR20-16DI-P

Technical data UR20-16DI-P (Order No. 1315200000)

System data	
Data	Process and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	16
Sensor types	Type 1 and Type 3 sensors as per IEC 61131-2
Input filter	Non-adjustable, 3 ms
Low input voltage	< 5 V
High input voltage	> 11 V
Sensor supply	no
Sensor connection	1-conductor
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	no
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	< 42 mA
General data	
Weight	87 g
For additional general data, see Section 3.4	

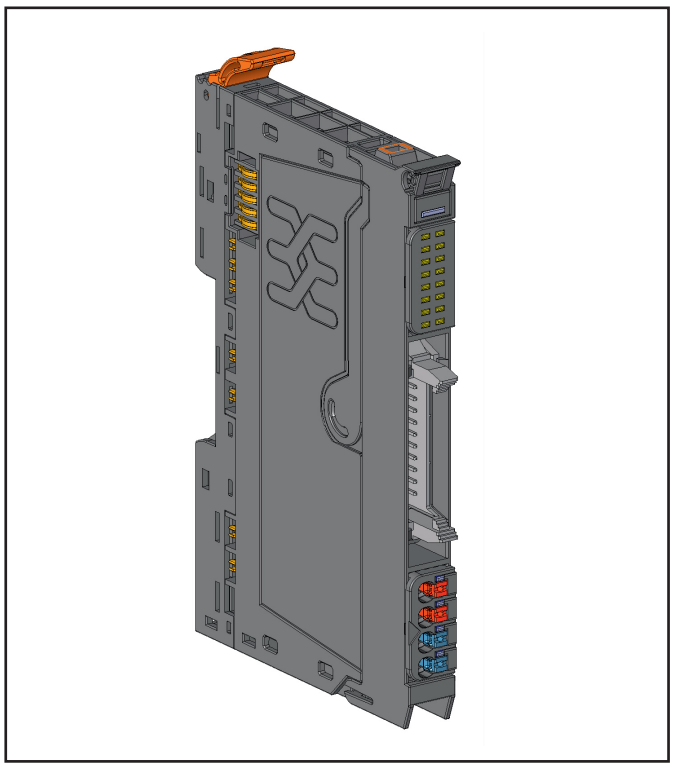
Diagnostic data UR20-16DI-P

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	0
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x70
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	16
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

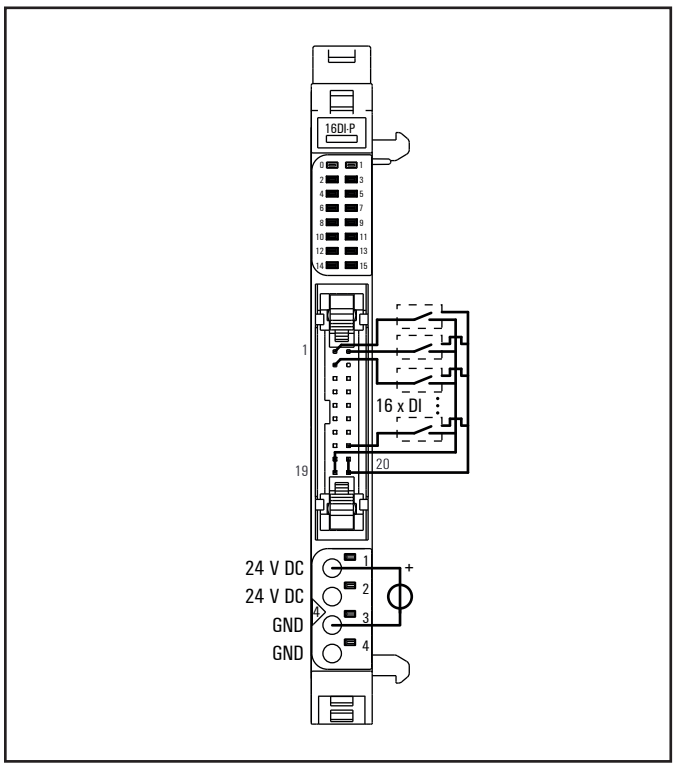
Process data inputs UR20-16DI-P

Byte	Bit	Description
IB0	IX0.0	DI0
	IX0.1	DI1
	IX0.2	DI2
	IX0.3	DI3
	IX0.4	DI4
	IX0.5	DI5
	IX0.6	DI6
	IX0.7	DI7
IB1	IX1.0	DI8
	IX1.1	DI9
	IX1.2	DI10
	IX1.3	DI11
	IX1.4	DI12
	IX1.5	DI13
	IX1.6	DI14
	IX1.7	DI15

6.4 Digital input module UR20-16DI-P-PLC-INT



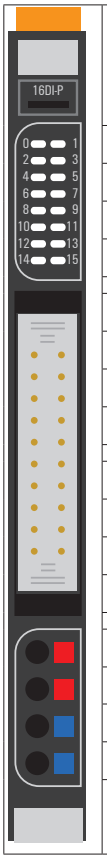
Digital input module UR20-16DI-P-PLC-INT (Order No. 1315210000)



Connection diagram UR20-16DI-P-PLC-INT

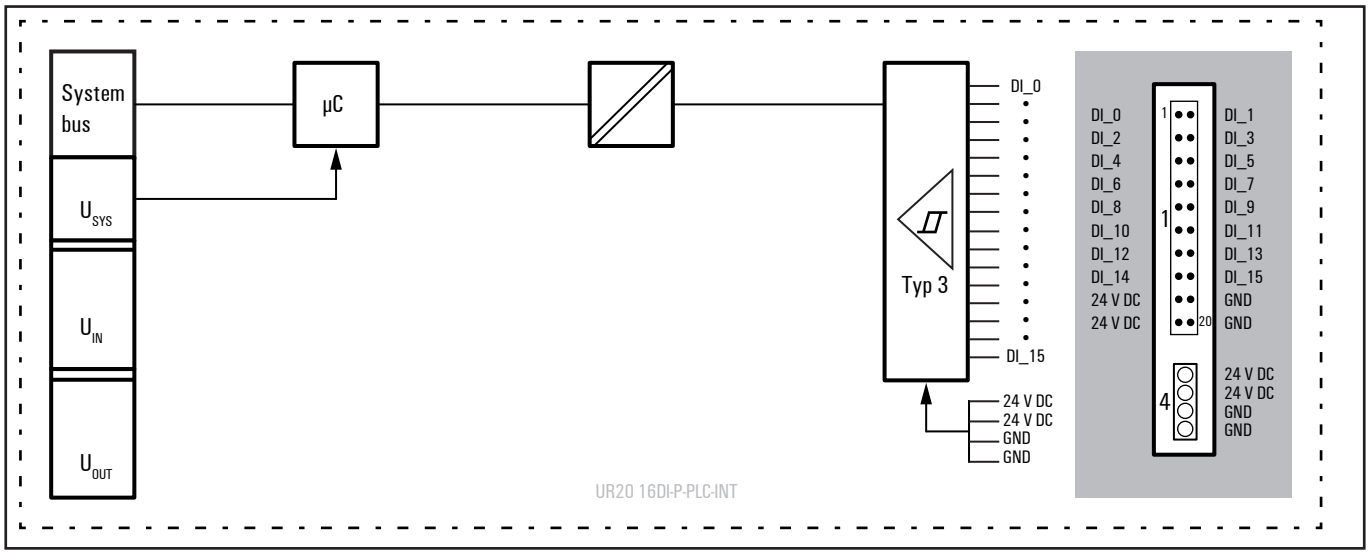
The UR20-16DI-P-PLC-INT digital input module can detect up to 16 binary control signals. The sensors are connected via a standard flat ribbon cable connector. A status LED is assigned to each channel in a separate block. The module electronics supplies the sensors with power through the flat ribbon cable connector from the separate 4-pole connector.

For the PLC connection, the following applies: a maximum current of 2 A (with a max. of 1 A per contact) can be taken from the +24 V connections or fed through the 0 V connections. In the case of a total current greater than 2 A, the common ground wire must be connected to the separate 4-pin plug-in connector.



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
0	Yellow: Input 0 active
1	Yellow: Input 1 active
to	to
15	Yellow: Input 15 active
4.1	24 V DC
4.2	24 V DC
4.3	GND
4.4	GND

LED indicators UR20-16DI-P-PLC-INT, error messages see Chapter 13



Block diagram UR20-16DI-P-PLC-INT

Technical data UR20-16DI-P-PLC-INT (Order No. 1315210000)

System data	
Data	Process and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	16
Sensor types	Type 1 and Type 3 sensors as per IEC 61131-2
Input filter	Non-adjustable, 3 ms
Low input voltage	< 5 V
High input voltage	> 11 V
Sensor supply	External
Sensor connection	PLC interface unit
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	no
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	< 42 mA (output current path), power supply via plug-in connector 4
General data	
Weight	73 g
For additional general data, see Section 3.4	

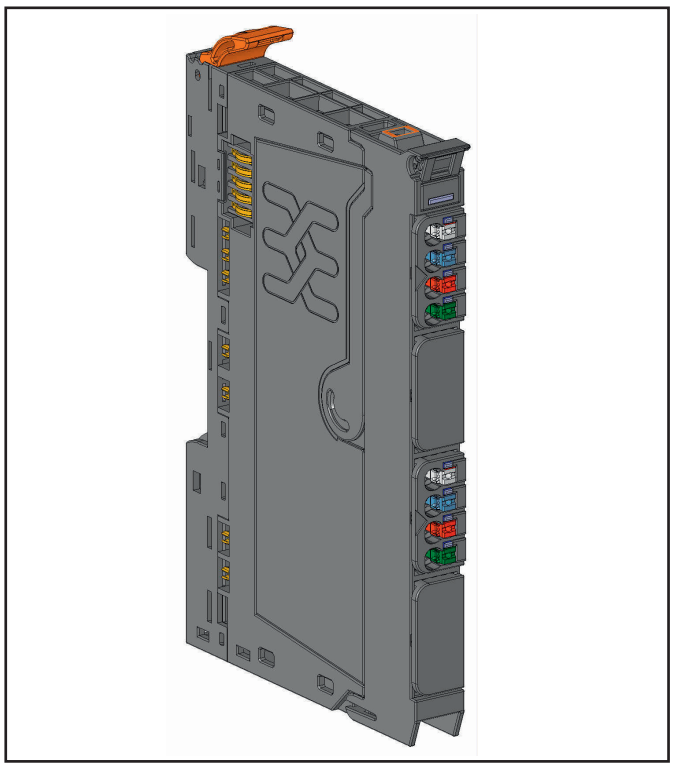
Diagnostic data UR20-16DI-P-PLC-INT

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	0
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x70
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	16
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

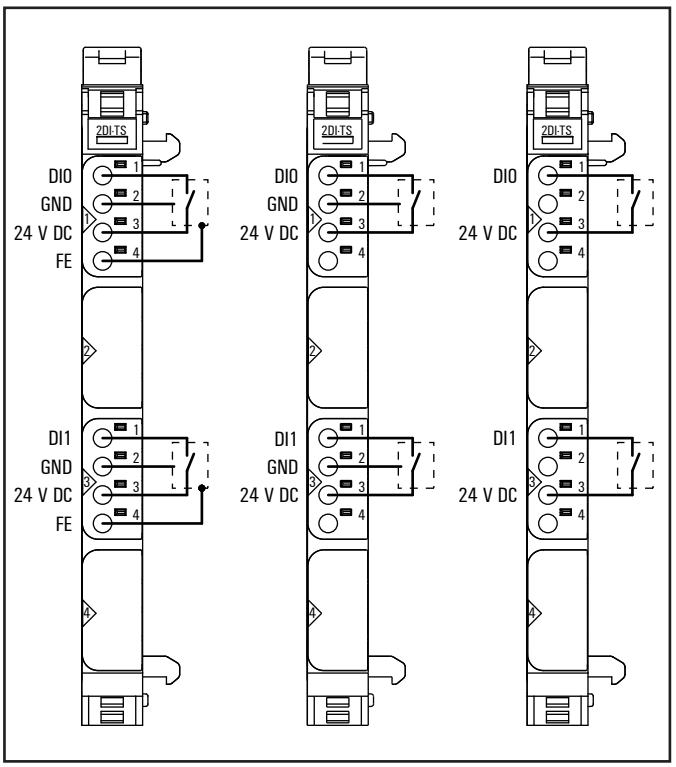
Process data inputs UR20-16DI-P-PLC-INT

Byte	Bit	Description
IB0	IX0.0	DI0
	IX0.1	DI1
	IX0.2	DI2
	IX0.3	DI3
	IX0.4	DI4
	IX0.5	DI5
	IX0.6	DI6
	IX0.7	DI7
IB1	IX1.0	DI8
	IX1.1	DI9
	IX1.2	DI10
	IX1.3	DI11
	IX1.4	DI12
	IX1.5	DI13
	IX1.6	DI14
	IX1.7	DI15

6.5 Digital input module with time stamp UR20-2DI-P-TS



Digital input module UR20-2DI-P-TS (Order No. 1460140000)



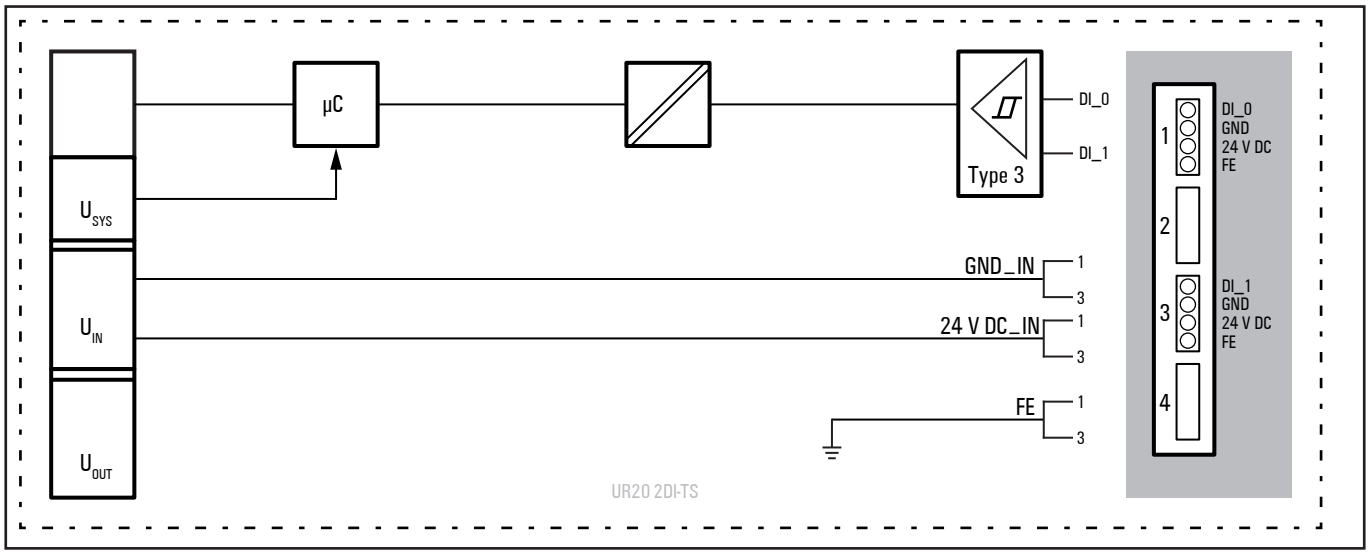
Connection diagram UR20-2DI-P-TS

The digital input module with a time stamping function UR20-2DI-P-TS can detect up to 2 binary control signals and provide them with a time stamp (resolution 1 µs). Depending on the configuration of the module, up to 5 or 15 time stamp entries can be evaluated.

1 sensor can be connected to each connector using a 2-wire connection or a 3-wire connection + FE. A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).

	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Input 0 active
3.1	Yellow: Input 1 active

LED indicators UR20-2DI-P-TS, error messages see Chapter 13



Block diagram UR20-2DI-P-TS

Technical data UR20-2DI-P-TS (Order No. 1460140000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	2
Sensor type	Type 1 and Type 3 sensors as per IEC 61131-2
Input filter	Filter time adjustable up to 40 ms
Low input voltage	< 5 V
High input voltage	> 11 V
Max. input current per channel	3 mA
Sensor supply	yes
Sensor connection	2-wire, 3-wire, 3-wire + FE
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	no
Time stamp data width	16 bits
Time stamp resolution	1 µs
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	< 10 mA + sensor feed
General data	
Weight	83 g
For additional general data, see Section 3.4	

Overview of the editable parameter UR20-2DI-P-TS

Channel	Description	Options (Value)	Default value
0 ... 1	Input delay	no (0) / 0,3 ms (1) (not at PROFIBUS-DP) / 3 ms (2) / 10 ms (3) / 20 ms (4) / 40 ms (5) (not at PROFIBUS-DP)	3 ms
0 ... 1	TimeStamp at edge 0-1	disabled (0) / enabled (1)	disabled
0 ... 1	TimeStamp at edge 1-0	disabled (0) / enabled (1)	disabled

Diagnostic data UR20-2DI-P-TS

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	0
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x70
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	2
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		time stamp [µs] (32 bit)	

Process data inputs UR20-2DI-P-TS

Byte	Format	Name	Remark
IB0	Byte	Input image 1	Bit0 = DI0, Bit1 = DI1, Bit2 ... 7 reserved
IB1	Byte	Running number 1	0 ... 127 rotating
IB2	Wort	Time stamp 1	0 ... 65535 µs rotating
IB3			
IB4	Byte	Input image 2	
IB5	Byte	Running number 2	
IB6	Wort	Time stamp 2	
IB7			
IB8	Byte	Input image 3	
IB9	Byte	Running number 3	
IB10	Wort	Time stamp 3	
IB11			
...	...	...	
IB56	Byte	Input image 15	
IB57	Byte	Running number 15	
IB58	Wort	Time stamp 15	
IB59			

Time stamp function

With time stamp function (ETS = edge time stamp) enabled, at every corresponding edge the time value of the timer is stored in the process image as an ETS entry together with the status of the inputs and a running number.

The module does not use any bytes in the output range. It uses 60 Bytes in the input range for 15 ETS entries each with 4 bytes.

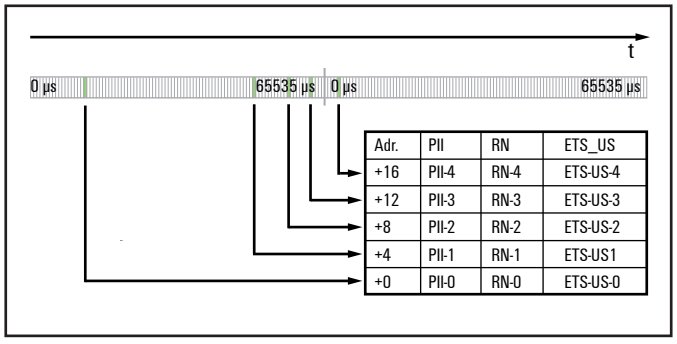
Structure of an ETS entry

Input map After the edge transition, the status of the inputs is stored here. The input byte has the following bit assignments:
Bit 0: DI 0
Bit 1: DI 1
Bit 2 ... 7: reserved (0)

Running Nummer The RN (running number) is a consecutive number from 0 to 127. The RN describes the chronological sequence of the edges

Time stamp The 16-bit timer (0 ... 65535µs) in the u-remote module is started as soon as the power supply ist switched on and after (2^{16}-1) µs restarts at 0.

Structure of the ETS entries in the input range in chronological order.



Adr.	PII	RN	ETS_US
+16	PII-4	RN-4	ETS-US-4
+12	PII-3	RN-3	ETS-US-3
+8	PII-2	RN-2	ETS-US-2
+4	PII-1	RN-1	ETS-US1
+0	PII-0	RN-0	ETS-US-0

Example for the mode of operation

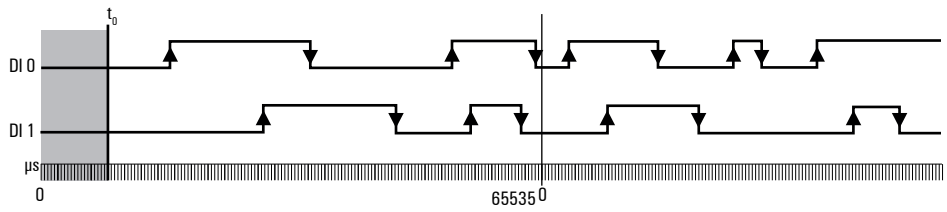
The following example shows the sequence in which ETS entries are stored. The input channels are predefined as follows:

DI 0 and DI 1: time stamp at edge 0-1 enabled
DI 0 and DI 1: time stamp at edge 1-0 enabled

The ETS entries available at time "t" are designated by the green area in the diagram. ETS entries that are not (or no longer) available have a grey background

New ETS entries are always entered starting at address + 0 and already existing ETS entries are each shifted by 4 bytes.

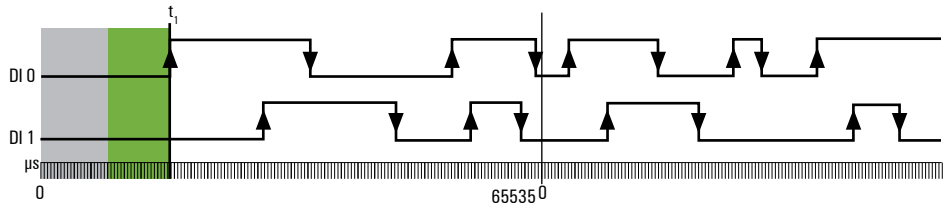
Process image is empty at t_0



Address	PII	RN	ETS_US
+0			
+4			
+8			
+12			
+16			

1st ETS entry at t_1

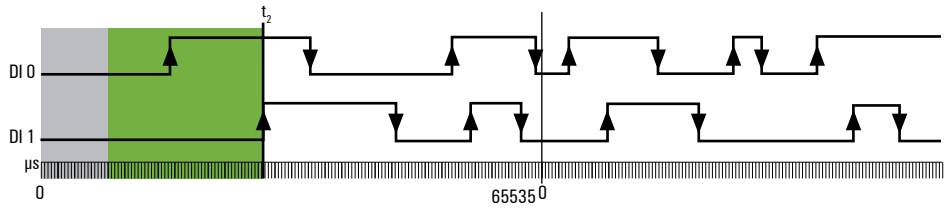
A rising 0-1 edge on DI 0 causes the 1st ETS entry at address + 0.



Address	PII	RN	ETS_US
+0	00000001	0	16875
+4			
+8			
+12			
+16			

2nd ETS entry at t_2

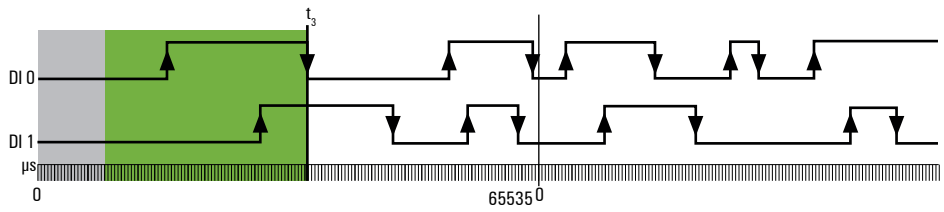
A rising 0-1 edge on DI 1 causes the 2nd ETS entry at address + 0. The 1st ETS entry is shifted by 4 bytes.



Address	PII	RN	ETS_US
+0	00000011	1	28344
+4	00000001	0	16875
+8			
+12			
+16			

3rd ETS entry at t_3

A falling 1-0 edge on DI 0 causes the 3rd ETS entry.

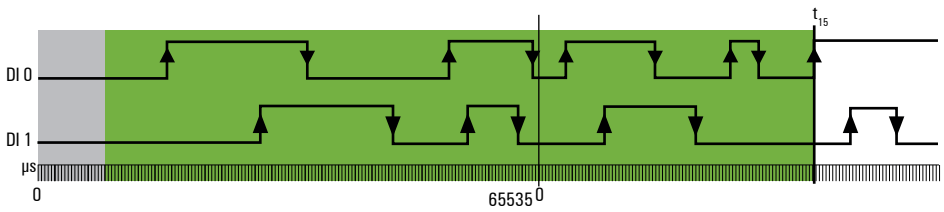


Address	PII	RN	ETS_US
+0	00000010	2	43194
+4	00000011	1	28344
+8	00000001	0	16875
+12			
+16			

... 4th to14th ETS entry ...

15. ETS entry at t_{15}

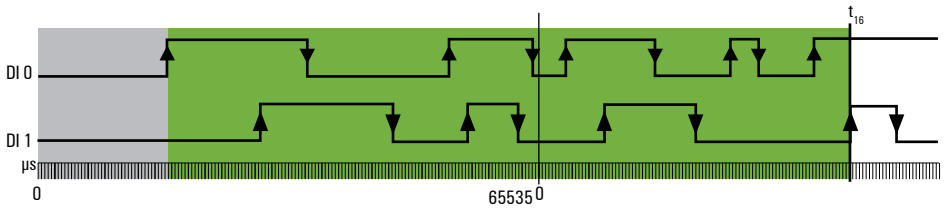
A rising 0-1 edge on DI 0 causes the15th ETS entry.



Address	PII	RN	ETS_US
+0	00000001	14	35717
+4	00000000	13	28344
+8	00000001	12	24576
+12	00000000	11	19988
+16	00000010	10	14745
+20	00000011	9	8192
+24	00000001	8	3277
+28	00000000	7	63896
+32	00000010	6	62422
+36	00000011	5	55869
+40	00000001	4	53247
+44	00000000	3	45875
+48	00000010	2	43194
+52	00000011	1	28344
+56	00000001	0	16875

16th ETS entry at t_{16}

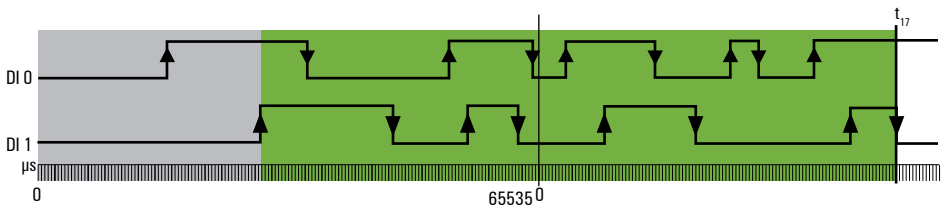
A rising 0-1 edge on DI 1 causes the16th ETS entry. The 1st ETS entry is deleted and not available anymore.



Address	PII	RN	ETS_US
+0	00000011	15	37683
+4	00000001	14	35717
+8	00000000	13	28344
+12	00000001	12	24576
+16	00000000	11	19988
+20	00000010	10	14745
+24	00000011	9	8192
+28	00000001	8	3277
+32	00000000	7	63896
+36	00000010	6	62422
+40	00000011	5	55869
+44	00000001	4	53247
+48	00000000	3	45875
+52	00000010	2	43194
+56	00000011	1	28344
	00000001	0	16875

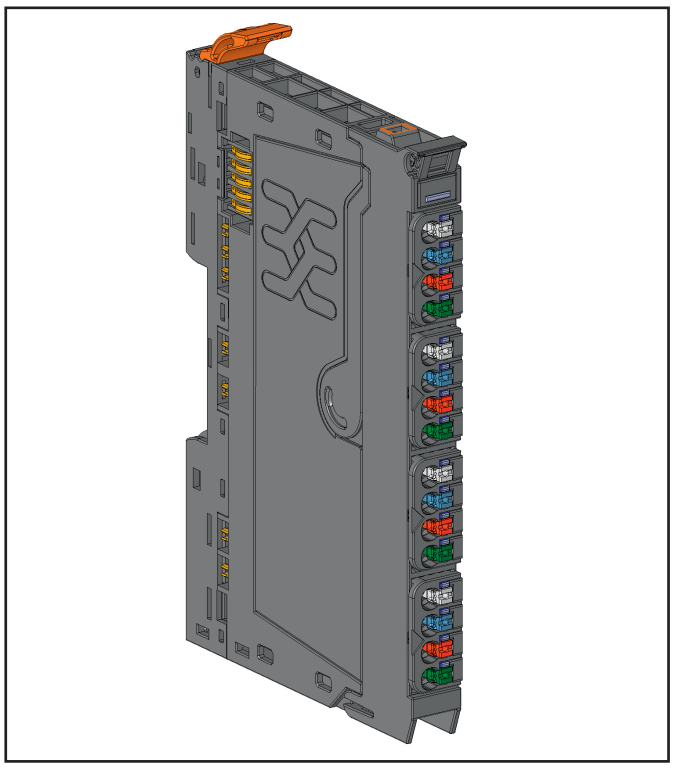
17. ETS entry at t_{17}

A falling 1-0 edge on DI 1 causes the17th ETS entry. The 2nd ETS entry is deleted and not available anymore.

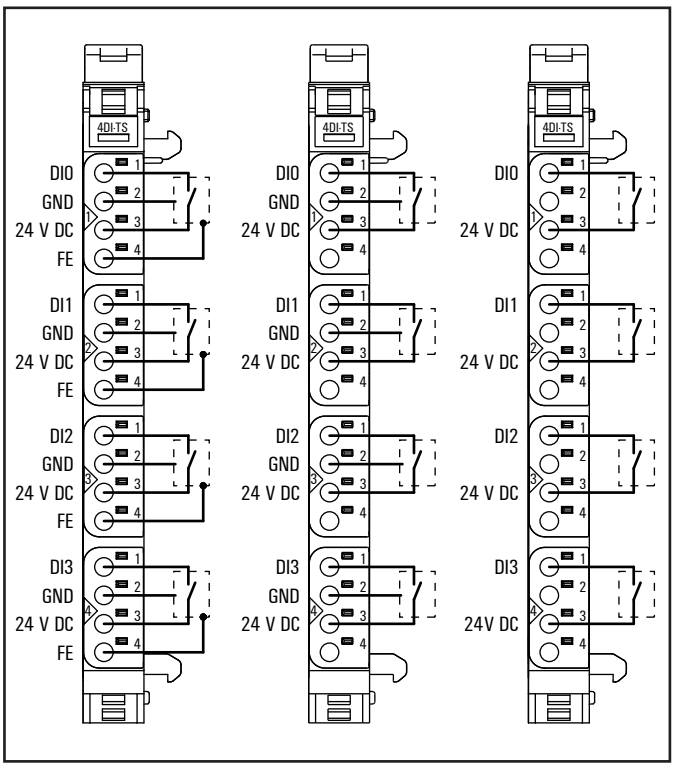


Address	PII	RN	ETS_US
+0	00000001	16	44236
+4	00000011	15	37683
+8	00000001	14	35717
+12	00000000	13	28344
+16	00000001	12	24576
+20	00000000	11	19988
+24	00000010	10	14745
+28	00000011	9	8192
+32	00000001	8	3277
+36	00000000	7	63896
+40	00000010	6	62422
+44	00000011	5	55869
+48	00000001	4	53247
+52	00000000	3	45875
+56	00000010	2	43194
	00000011	1	28344
	00000001	0	16875

6.6 Digital input module with time stamp UR20-4DI-P-TS



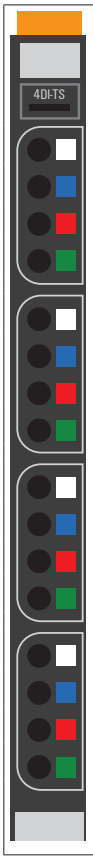
Digital input module UR20-4DI-P-TS (Order No. 1460150000)



Connection diagram UR20-4DI-P-TS

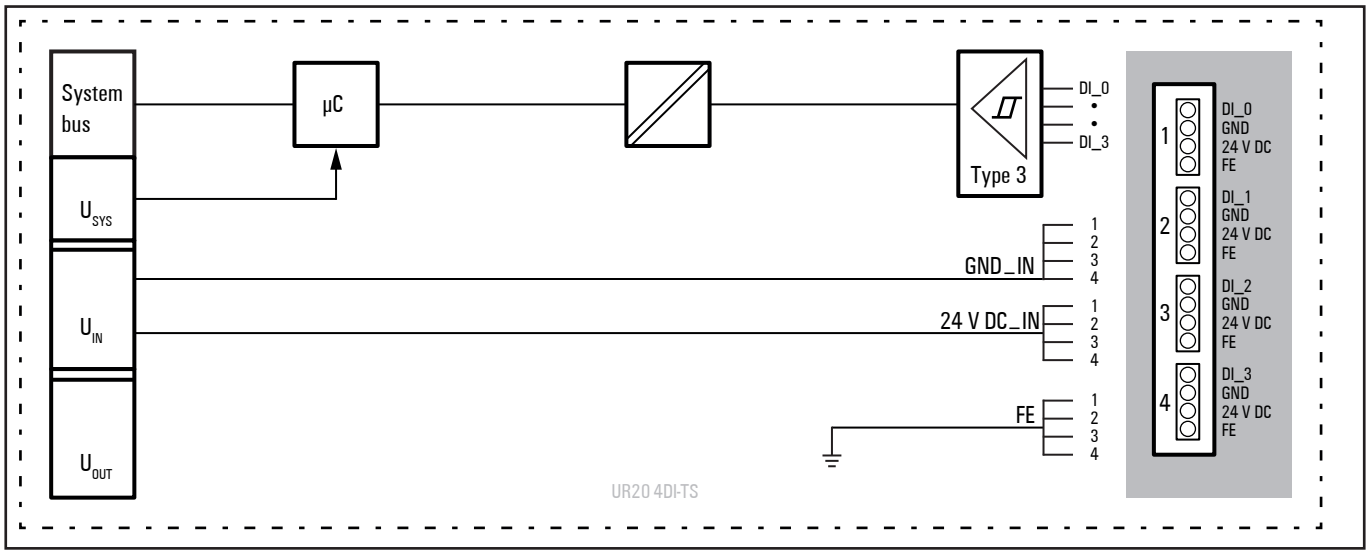
The digital input module with time stamp functionality UR20-4DI-P-TS can detect up to 4 binary control signals and provide them with a time stamp (resolution 1 µs). Depending on the configuration of the module, up to 5 or 15 time stamp entries can be evaluated.

1 sensor can be connected to each connector using a 2-wire connection or a 3-wire connection + FE. A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).



	Module status LED Green: Communication on system bus Red: No communication on system bus or there is a diagnostic message displayed
1.1	Yellow: Input 0 active
2.1	Yellow: Input 1 active
3.1	Yellow: Input 1 active
4.1	Yellow: Input 1 active

LED indicators UR20-4DI-P-TS, error messages see Chapter 13



Block diagram UR20-4DI-P-TS

Technical data UR20-4DI-P-TS (Order No. 1460150000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	4
Sensor type	Type 1 and Type 3 sensors as per IEC 61131-2
Input filter	Filter time adjustable up to 40 ms
Low input voltage	< 5 V
High input voltage	> 11 V
Max. input current per channel	3 mA
Sensor supply	yes
Sensor connection	2-wire, 3-wire, 3-wire + FE
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	no
Time stamp data width	16 bits
Time stamp resolution	1 µs
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	< 10 mA + sensor feed
General data	
Weight	87 g
For additional general data, see Section 3.4	

Overview of the editable parameter UR20-4DI-P-TS

Channel	Description	Options (Value)	Default value
0 ... 3	Input delay	no (0) / 0,3 ms (1) (not at PROFIBUS-DP) / 3 ms (2) / 10 ms (3) / 20 ms (4) / 40 ms (5) (not at PROFIBUS-DP)	3 ms
0 ... 3	TimeStamp at edge 0-1	disabled (0) / enabled (1)	disabled
0 ... 3	TimeStamp at edge 1-0	disabled (0) / enabled (1)	disabled

Diagnostic data UR20-4DI-P-TS

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	0
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 – 7	Reserved	0
Error byte 3	3	0 – 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 – 6	Channel type	0x70
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 – 10	0 – 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 – 7	Reserved	0
Time stamp	43 – 46		Time stamp [µs] (32 bit)	

Process data inputs UR20-4DI-P-TS

Byte	Format	Name	Remark
IB0	Byte	Input image 1	Bit0 = DI0, Bit3 = DI3, Bit4 ... 7 reserved
IB1	Byte	Running number 1	0 ... 127 rotating
IB2	Wort	Time stamp 1	0 ... 65535 µs rotating
IB3			
IB4	Byte	Input image 2	
IB5	Byte	Running number 2	
IB6	Wort	Time stamp 2	
IB7			
IB8	Byte	Input image 3	
IB9	Byte	Running number 3	
IB10	Wort	Time stamp 3	
IB11			
...	...	...	
IB56	Byte	Input image 15	
IB57	Byte	Running number 15	
IB58	Wort	Time stamp 15	
IB59			

Time stamp function

With time stamp function (ETS = edge time stamp) enabled, at every corresponding edge the time value of the timer is stored in the process image as an ETS entry together with the status of the inputs and a running number.

The module does not use any bytes in the output range. It uses 60 Bytes in the input range for 15 ETS entries each with 4 bytes.

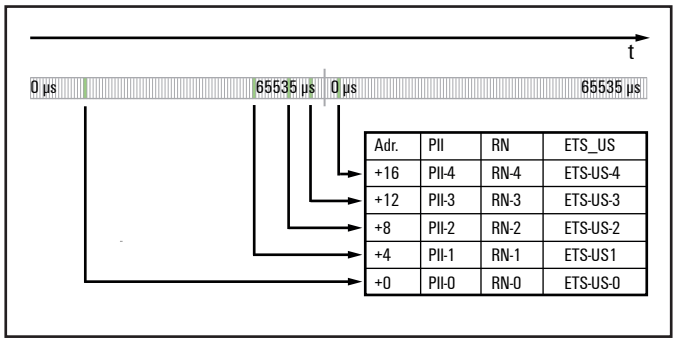
Structure of an ETS entry

Input map After the edge transition, the status of the inputs is stored here. The input byte has the following bit assignments:
Bit 0: DI 0
Bit 1: DI 1
Bit 2: DI 2
Bit 3: DI 3
Bit 4 ... 7: reserved (0)

Running Nummer The RN (running number) is a consecutive number from 0 to 127. The RN describes the chronological sequence of the edges

Time stamp The 16-bit timer (0 ... 65535µs) in the u-remote module is started as soon as the power supply ist switched on and after (2^{16}-1) µs restarts at 0.

Structure of the ETS entries in the input range in chronological order.



Example for the mode of operation

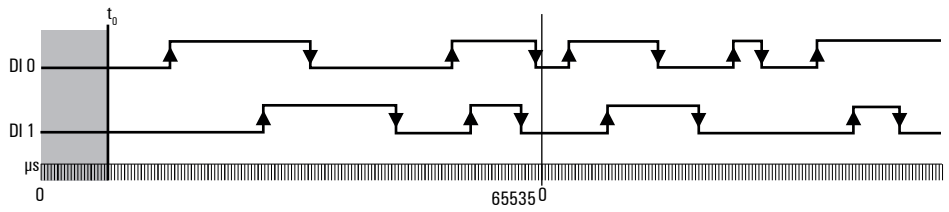
The following example shows the sequence in which ETS entries are stored. The input channels are predefined as follows:

DI 0 and DI 1: time stamp at edge 0-1 enabled
DI 2 and DI 3: time stamp at edge 0-1 disabled
DI 0 and DI 1: time stamp at edge 1-0 enabled
DI 2 and DI 3: time stamp at edge 1-0 disabled

The ETS entries available at time "t" are designated by the green area in the diagram. ETS entries that are not (or no longer) available have a grey background

New ETS entries are always entered starting at address + 0 and already existing ETS entries are each shifted by 4 bytes.

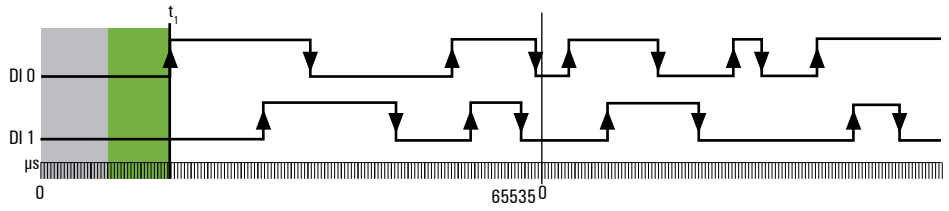
Process image is empty at t_0



Address	PII	RN	ETS_US
+0			
+4			
+8			
+12			
+16			

1st ETS entry at t_1

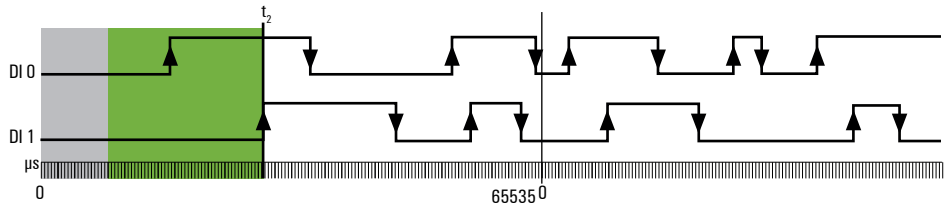
A rising 0-1 edge on DI 0 causes the 1st ETS entry at address + 0.



Address	PII	RN	ETS_US
+0	00000001	0	16875
+4			
+8			
+12			
+16			

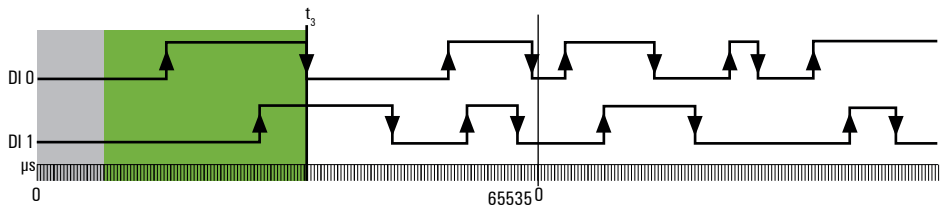
2nd ETS entry at t_2

A rising 0-1 edge on DI 1 causes the 2nd ETS entry at address + 0. The 1st ETS entry is shifted by 4 bytes.



Address	PII	RN	ETS_US
+0	00000011	1	28344
+4	00000001	0	16875
+8			
+12			
+16			

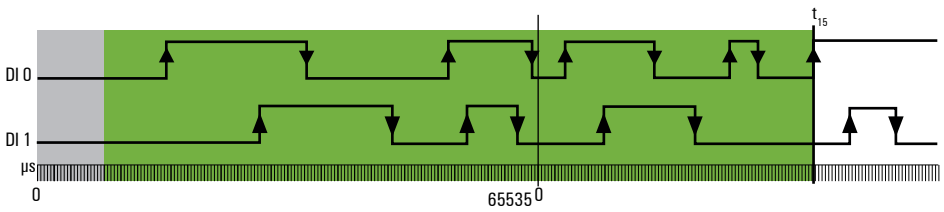
3rd ETS entry at t_3
A falling 1-0 edge on DI 0 causes the 3rd ETS entry.



Address	PII	RN	ETS_US
+0	00000010	2	43194
+4	00000011	1	28344
+8	00000001	0	16875
+12			
+16			

... 4th to14th ETS entry ...

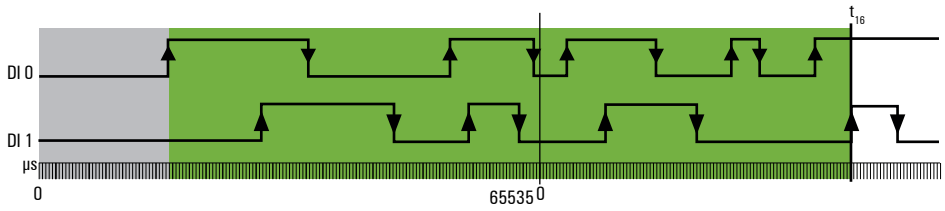
15. ETS entry at t_{15}
A rising 0-1 edge on DI 0 causes the15th ETS entry.



Address	PII	RN	ETS_US
+0	00000001	14	35717
+4	00000000	13	28344
+8	00000001	12	24576
+12	00000000	11	19988
+16	00000010	10	14745
+20	00000011	9	8192
+24	00000001	8	3277
+28	00000000	7	63896
+32	00000010	6	62422
+36	00000011	5	55869
+40	00000001	4	53247
+44	00000000	3	45875
+48	00000010	2	43194
+52	00000011	1	28344
+56	00000001	0	16875

16th ETS entry at t_{16}

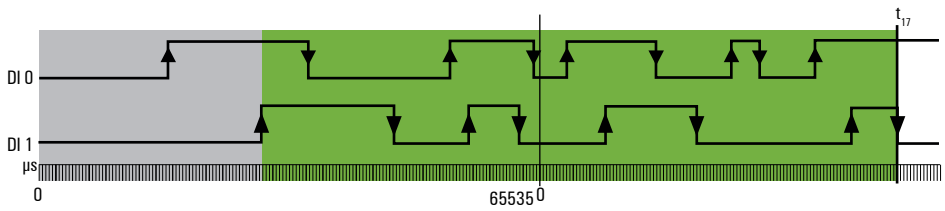
A rising 0-1 edge on DI 1 causes the16th ETS entry. The 1st ETS entry is deleted and not available anymore.



Address	PII	RN	ETS_US
+0	00000011	15	37683
+4	00000001	14	35717
+8	00000000	13	28344
+12	00000001	12	24576
+16	00000000	11	19988
+20	00000010	10	14745
+24	00000011	9	8192
+28	00000001	8	3277
+32	00000000	7	63896
+36	00000010	6	62422
+40	00000011	5	55869
+44	00000001	4	53247
+48	00000000	3	45875
+52	00000010	2	43194
+56	00000011	1	28344
	00000001	0	16875

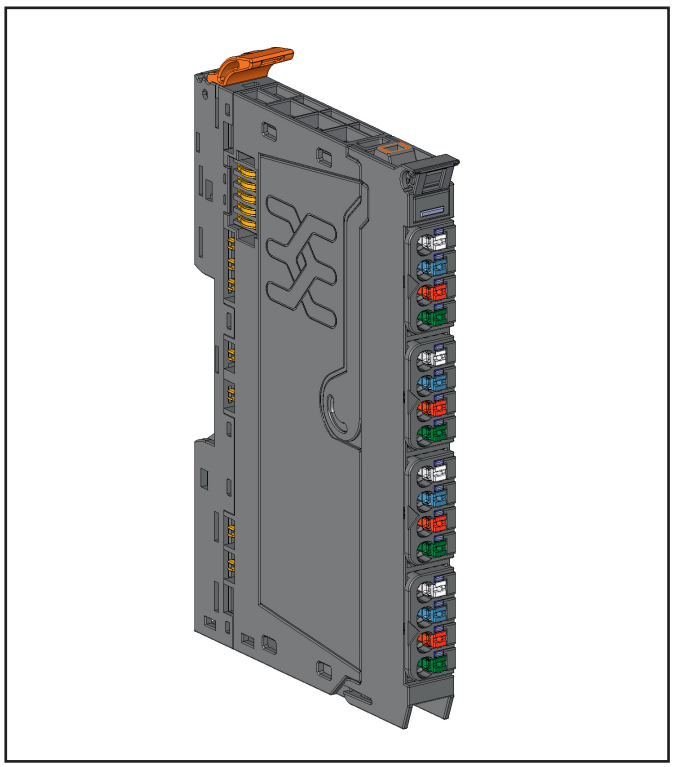
17. ETS entry at t_{17}

A falling 1-0 edge on DI 1 causes the17th ETS entry. The 2nd ETS entry is deleted and not available anymore.

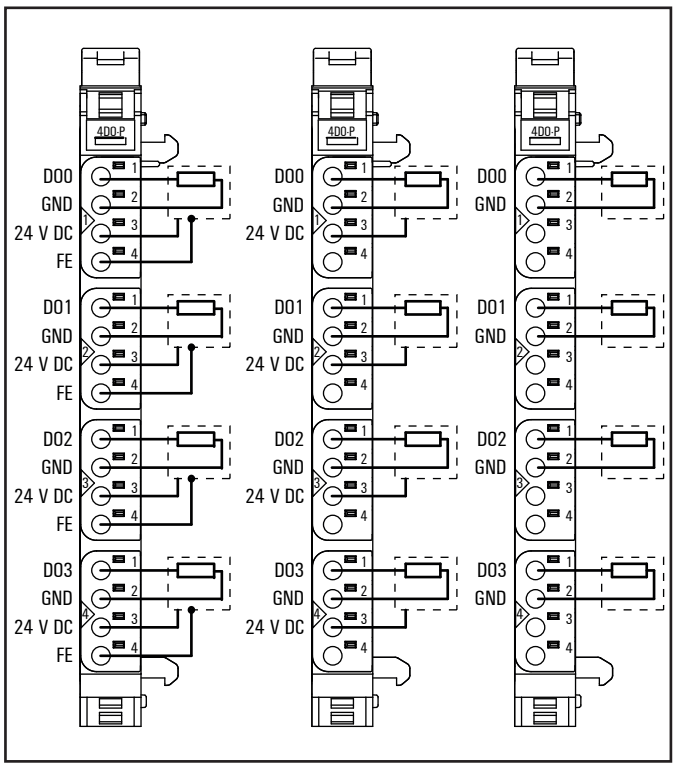


Address	PII	RN	ETS_US
+0	00000001	16	44236
+4	00000011	15	37683
+8	00000001	14	35717
+12	00000000	13	28344
+16	00000001	12	24576
+20	00000000	11	19988
+24	00000010	10	14745
+28	00000011	9	8192
+32	00000001	8	3277
+36	00000000	7	63896
+40	00000010	6	62422
+44	00000011	5	55869
+48	00000001	4	53247
+52	00000000	3	45875
+56	00000010	2	43194
	00000011	1	28344
	00000001	0	16875

6.7 Digital output module UR20-4DO-P

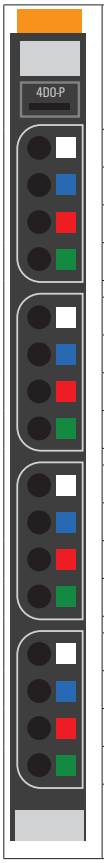


Digital output module UR20-4DO-P (Order No. 1315220000)



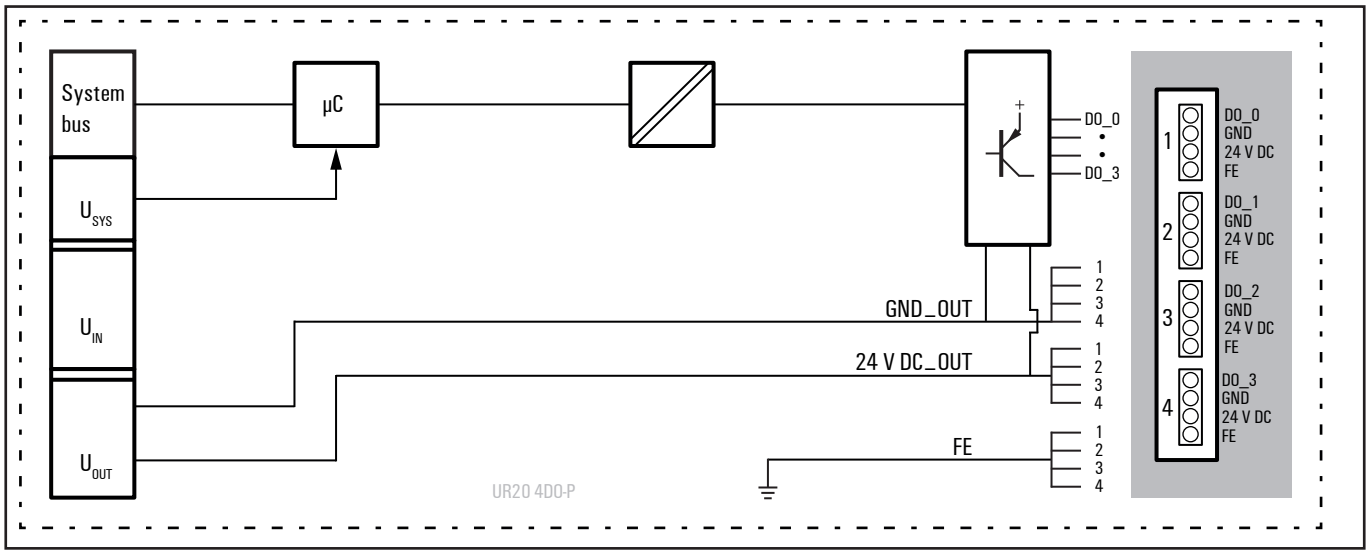
Connection diagram UR20-4DO-P

The UR20-4DO-P digital output module can control up to 4 actuators each with a maximum of 0.5 A. 1 sensor can be connected to each connector using a 2-wire connection, 3-wire connection or 3-wire connection + FE. A status LED is assigned to each channel. The outputs are supplied with power from the output current path (U_{OUT}).



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Output 0 active
2.1	Yellow: Output 1 active
3.1	Yellow: Output 2 active
4.1	Yellow: Output 3 active

LED indicators UR20-4DO-P, error messages see Chapter 13



Block diagram UR20-4DO-P

Technical data UR20-4DO-P (Order No. 1315220000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	4	
Type of load	ohmic, inductive, lamp load	
Response time	max. 100 µs high ; max. 250 µs low	
Max. output current	per channel	0.5 A
	per module	2 A
Breaking energy (inductive)	150 mJ	
Switching frequency	Resistive load (min. 47 Ω)	1 kHz
	Inductive load (DC 13)	2 Hz
	Lamp load (12 W)	1 kHz
Actuator connection	2-wire, 3-wire, 3-wire + FE	
Actuator supply	max. 2 A per plug, total max. 8 A	
Short-circuit-proof	yes	
Protective circuit	Constant current with thermal switch-off and automatic restart	
Response time of the current limiting circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Can be used with UR20-PF-SIL	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	10 mA + load	
General data		
Weight	86 g	
For additional general data, see Section 3.4		

Overview of the editable parameter UR20-4DO-P

Channel	Description	Options (Value)	Default value
0 ... 3	Substitute value	Off (0) / On (1)	Off

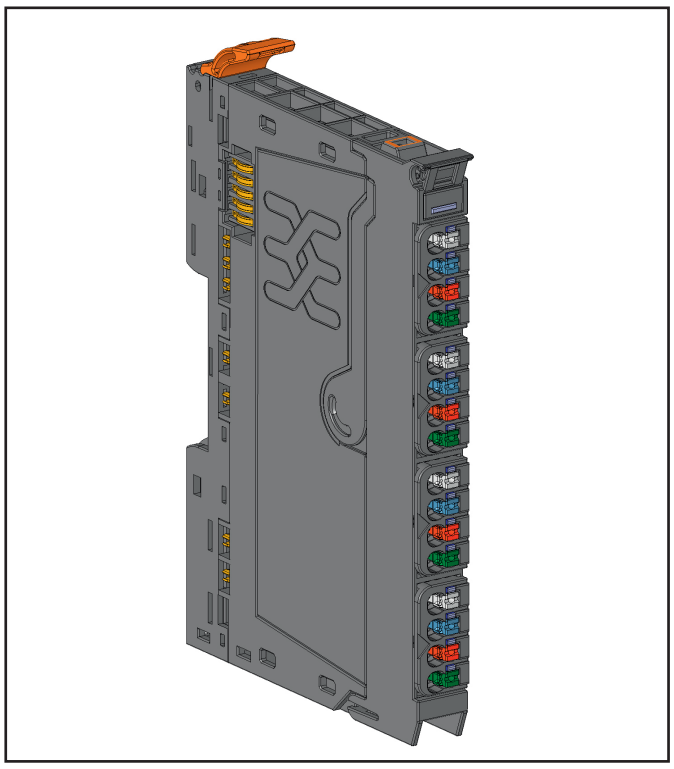
Diagnostic data UR20-4DO-P

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	0
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

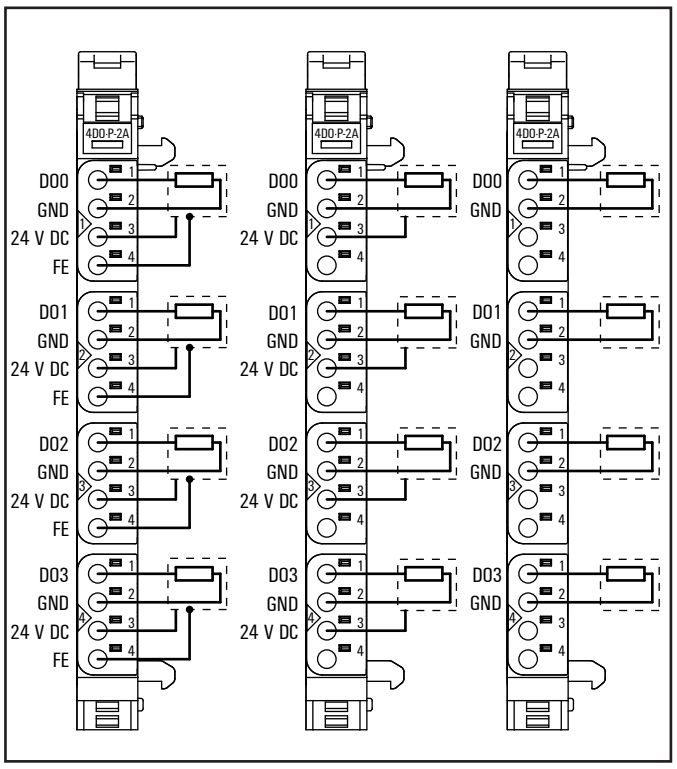
Process data outputs UR20-4DO-P

Byte	Bit	Description
QB0	QX0.0	DO0
	QX0.1	DO1
	QX0.2	DO2
	QX0.3	DO3
	QX0.4	reserved
	QX0.5	reserved
	QX0.6	reserved
	QX0.7	reserved

6.8 Digital output module UR20-4DO-P-2A

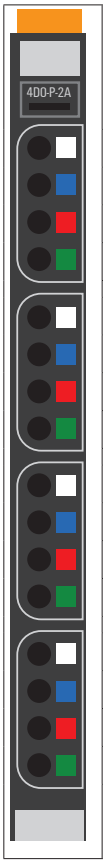


Digital output module UR20-4DO-P-2A (Order No. 1315230000)



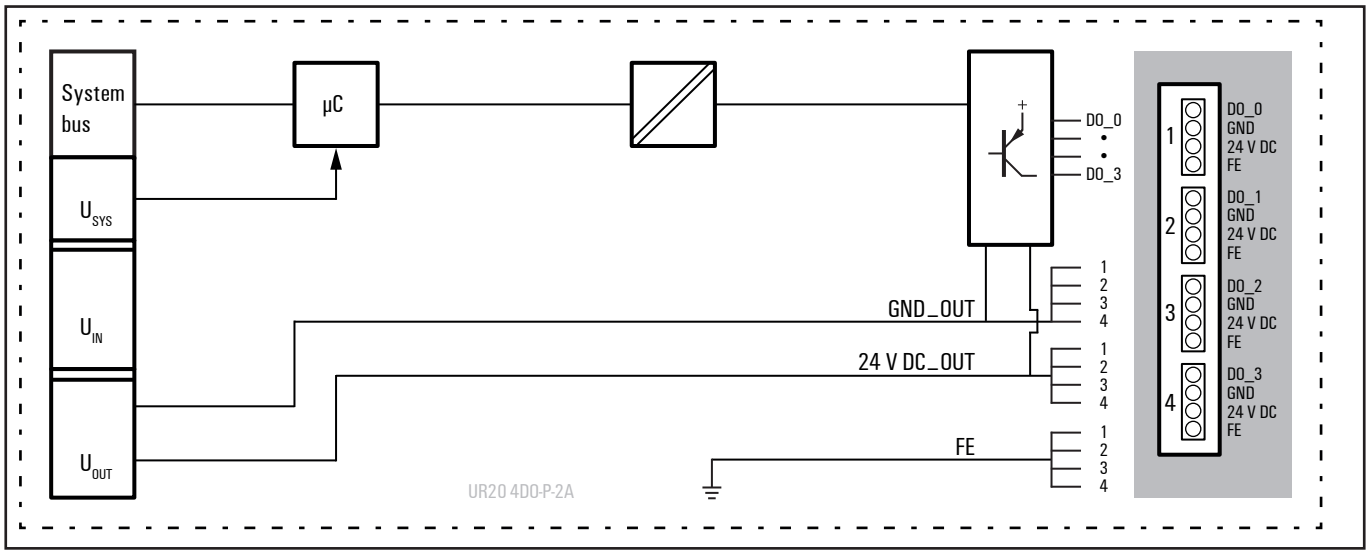
Connection diagram UR20-4DO-P-2A

The digital output module UR20-4DO-P-2A can control up to 4 actuators, each with a maximum of 2 A. 1 sensor can be connected to each connector using a 2-wire connection, 3-wire connection or 3-wire connection + FE. A status LED is assigned to each channel. The outputs are supplied with power from the output current path (U_{OUT}).



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Output 0 active
2.1	Yellow: Output 1 active
3.1	Yellow: Output 2 active
4.1	Yellow: Output 3 active

LED indicators UR20-4DO-P-2A, error messages see Chapter 13



Block diagram UR20-4DO-P-2A

Technical data UR20-4DO-P-2A (Order No. 1315230000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	4	
Type of load	ohmic, inductive, lamp load	
Response time	max. 100 µs high ; max. 250 µs low	
Max. output current	per channel	2 A
	per module	8 A
Breaking energy (inductive)	150 mJ	
Switching frequency	Resistive load (min. 47 Ω)	1 kHz
	Inductive load (DC 13)	2 Hz
	Lamp load (12 W)	1 kHz
Actuator connection	2-wire, 3-wire, 3-wire + FE	
Actuator supply	max. 2 A per plug, total max. 8 A	
Short-circuit-proof	yes	
Protective circuit	Constant current with thermal switch-off and automatic restart	
Response time of the current limiting circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Can be used with UR20-PF-SIL	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	10 mA + load	
General data		
Weight	86 g	
For additional general data, see Section 3.4		

Overview of the editable parameter UR20-4DO-P-2A

Channel	Description	Options (Value)	Default value
0 ... 3	Substitute value	Off (0) / On (1)	Off

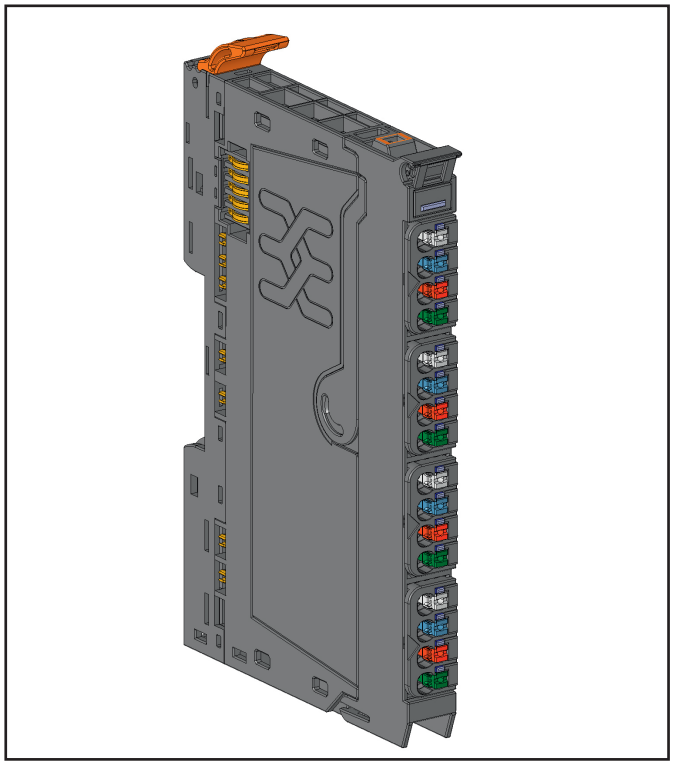
Diagnostic data UR20-4DO-P-2A

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Process data outputs UR20-4DO-P-2A

Byte	Bit	Description
QB0	QX0.0	DO0
	QX0.1	DO1
	QX0.2	DO2
	QX0.3	DO3
	QX0.4	reserved
	QX0.5	reserved
	QX0.6	reserved
	QX0.7	reserved

6.9 Digital output module UR20-4DO-PN-2A

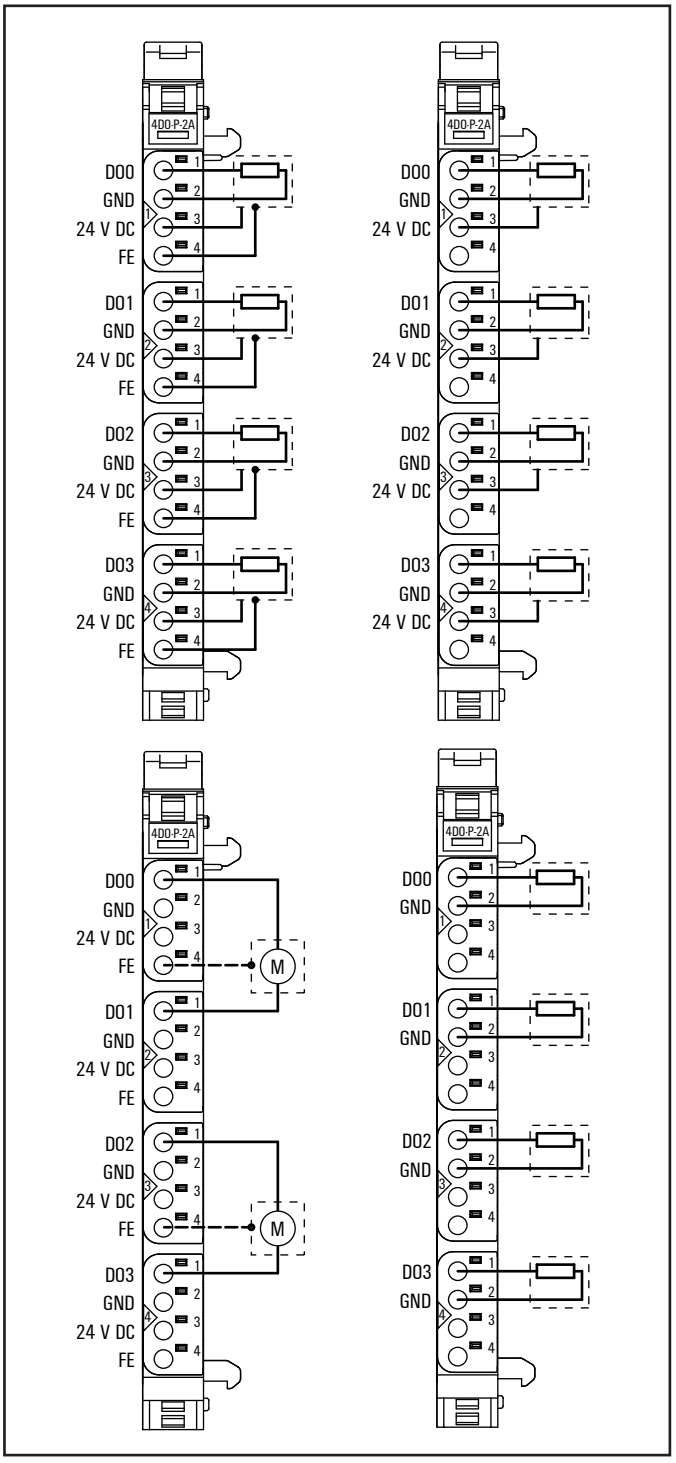


Digital output module UR20-4DO-PN-2A (Order No. 1394420000)

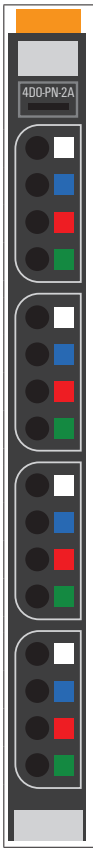
The digital output module UR20-4DO-PN-2A can control up to 4 actuators each with a maximum of 2 A. 1 actuator can be connected to each connector in a 2-wire or 3-wire + FE connection. A status LED is assigned to each channel. The outputs are supplied with power from the output current path (U_{OUT}).

Each channel can be switched between positive and negative switching. This allows, among other things, a switch in rotational direction if an DC motor is connected between two outputs. For this purpose, an output byte is reserved for the physical outputs, and each channel is assigned two bits in this byte. The switching characteristics of each output are set in the low nibble of the byte. If a bit is set, the corresponding channel has positive switching, if it is 0 then it has negative switching. The outputs are switched in the high nibble. Example: If you write the value 185 decimal (1011 1001 binary) in the output byte, Channel 1 is set to 24 V, Channel 2 is set to GND, Channel 3 is deactivated and Channel 4 is set to 24 V.

The module is protected against external voltages between 0 V and the operating voltage.

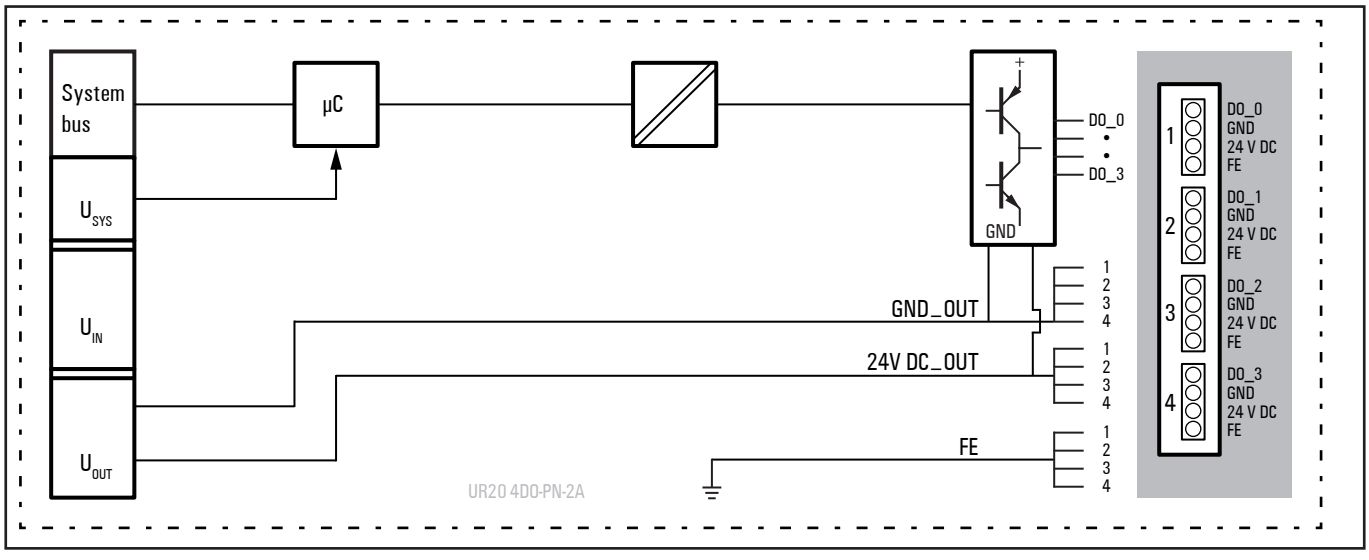


Connection diagram UR20-4DO-PN-2A



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Output 0 active, p- or n-switching
2.1	Yellow: Output 1 = 100 %, p- or n-switching
3.1	Yellow: Output 2 = 100 %, p- or n-switching
4.1	Yellow: Output 3 = 100 %, p- or n-switching

LED indicators UR20-4DO-PN-2A, error messages see Chapter 13



Block diagram UR20-4DO-PN-2A

Technical data UR20-4DO-PN-2A (Order No. 1364420000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	4	
Type of load	ohmic, inductive, lamp load	
Response time	max. 100 µs high, max. 250 µs low	
Max. output current	per channel	2 A
	per module	8 A
Breaking energy (inductive)	150 mJ	
Switching frequency	Resistive load (min. 47 Ω)	1 kHz
	Inductive load (DC 13)	2 Hz
	Lamp load (12 W)	1 kHz
Actuator connection	2-wire, 3-wire, 3-wire + FE	
Short-circuit-proof	yes	
Actuator supply	max. 2 A per plug, total max. 8 A	
Protective circuit	Constant current with thermal switch-off and automatic restart	
Response time of the current limiting circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Can be used with UR20-PF-SIL	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	10 mA + load	
General data		
Weight	86 g	
For additional general data, see Section 3.4		

Overview of the editable parameter UR20-4DO-PN-2A

Channel	Description	Options (Value)	Default value
0 ... 3	Substitute value OP-Mode	Sinking (0) / Sourcing (1)	Sourcing
0 ... 3	Substitute value	Off (0) / On (1)	Off

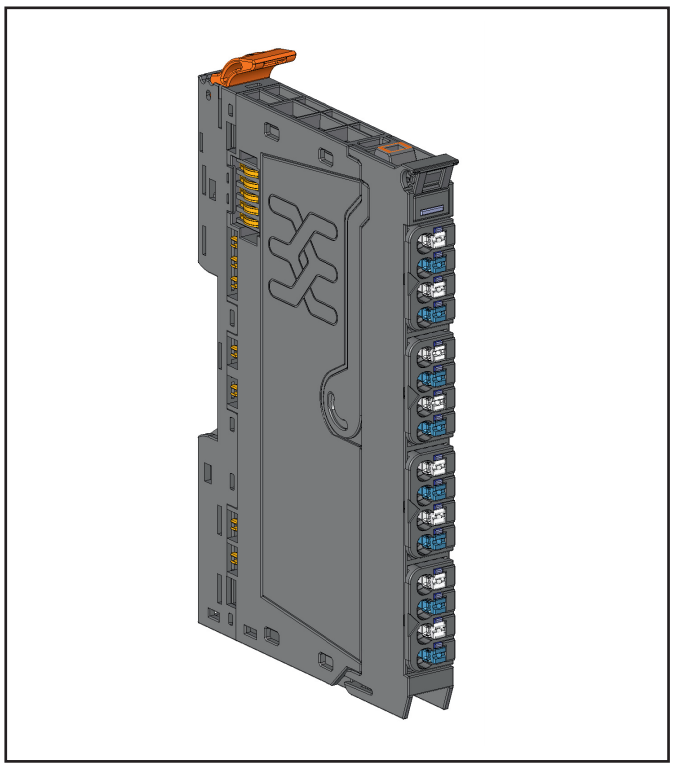
Diagnostic data UR20-4DO-PN-2A

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

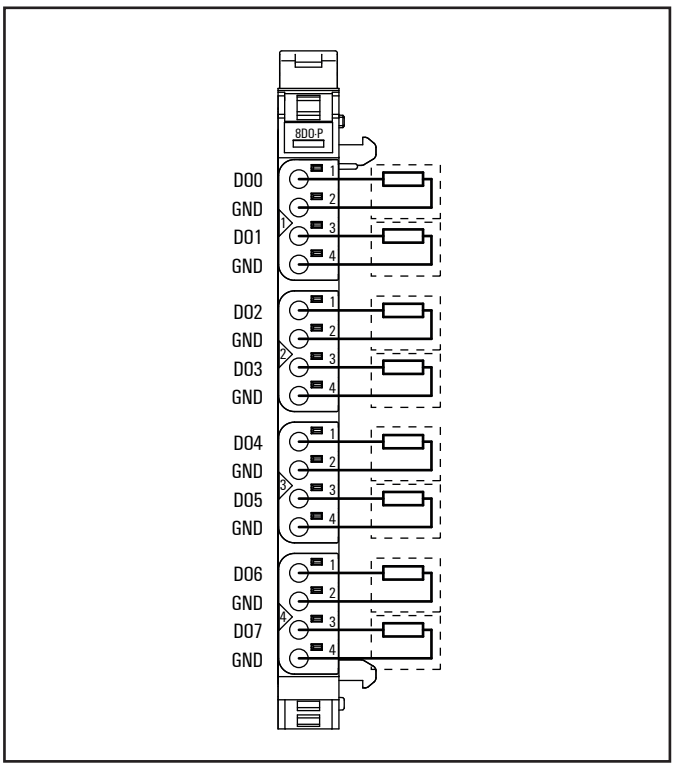
Process data outputs UR20-4DO-PN-2A

Byte	Format	Name	Remark
QB0	QX0.0	OP-mode DO0	0: Sinking, 1: Sourcing
	QX0.1	OP-mode DO1	0: Sinking, 1: Sourcing
	QX0.2	OP-mode DO2	0: Sinking, 1: Sourcing
	QX0.3	OP-mode DO3	0: Sinking, 1: Sourcing
	QX0.4	DO0	
	QX0.5	DO1	
	QX0.6	DO2	
	QX0.7	DO3	

6.10 Digital output module UR20-8DO-P

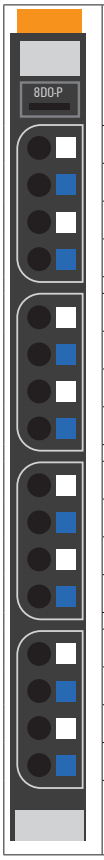


Digital output module UR20-8DO-P (Order No. 1315240000)



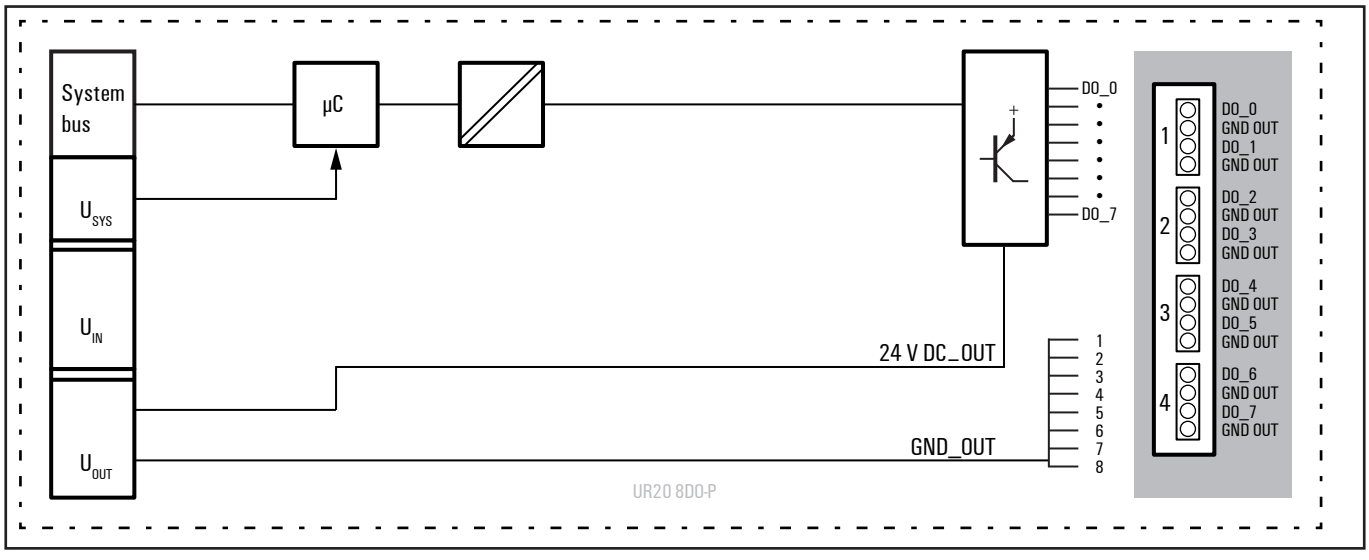
Connection diagram UR20-8DO-P

The UR20-8DO-P digital output module can control up to 8 actuators each with a maximum of 0.5 A. Actuators can be connected to each connector in a 2-wire connection. A status LED is assigned to each channel The outputs are supplied with power from the output current path (U_{OUT}).



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Output 0 active
1.3	Yellow: Output 1 active
2.1	Yellow: Output 2 active
2.3	Yellow: Output 3 active
3.1	Yellow: Output 4 active
3.3	Yellow: Output 5 active
4.1	Yellow: Output 6 active
4.3	Yellow: Output 7 active

LED indicators UR20-8DO-P, error messages see Chapter 13



Block diagram UR20-8DO-P

Technical data UR20-8DO-P (Order No. 1315240000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	8	
Type of load	ohmic, inductive, lamp load	
Response time	max. 100 µs high ; max. 250 µs low	
Max. output current	per channel	0.5 A
	per module	4 A
Breaking energy (inductive)	150 mJ	
Switching frequency	Resistive load (min. 47 Ω)	1 kHz
	Inductive load (DC 13)	2 Hz
	Lamp load (12 W)	1 kHz
Actuator connection	2-wire	
Short-circuit-proof	yes	
Protective circuit	Constant current with thermal switch-off and automatic restart	
Response time of the current limiting circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Reactionless	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	15 mA + load (output current path)	
General data		
Weight	87 g	
For additional general data, see Section 3.4		

Overview of the editable parameter UR20-8DO-P

Channel	Description	Options (Value)	Default value
0 ... 7:	Substitute value	Off (0) / On (1)	Off (0)

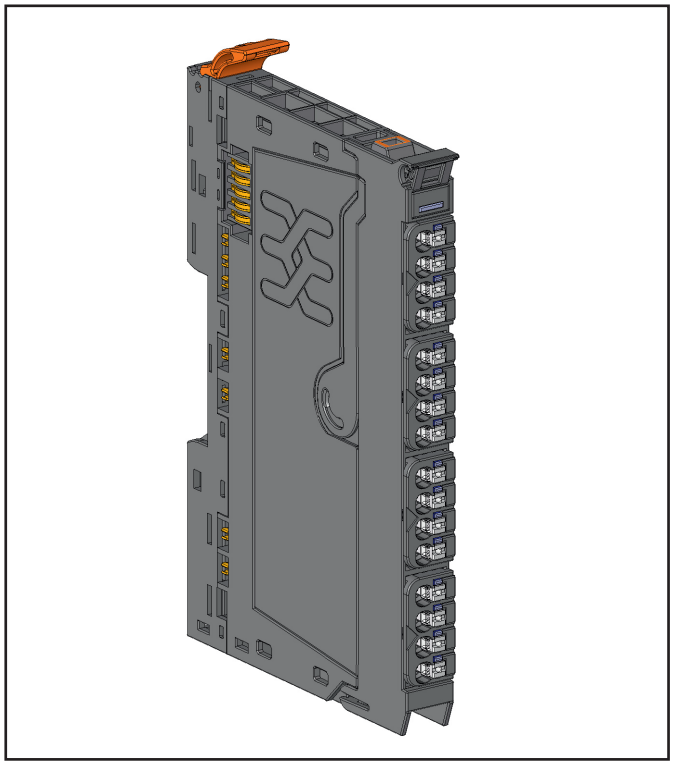
Diagnostic data UR20-8DO-P

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	8
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

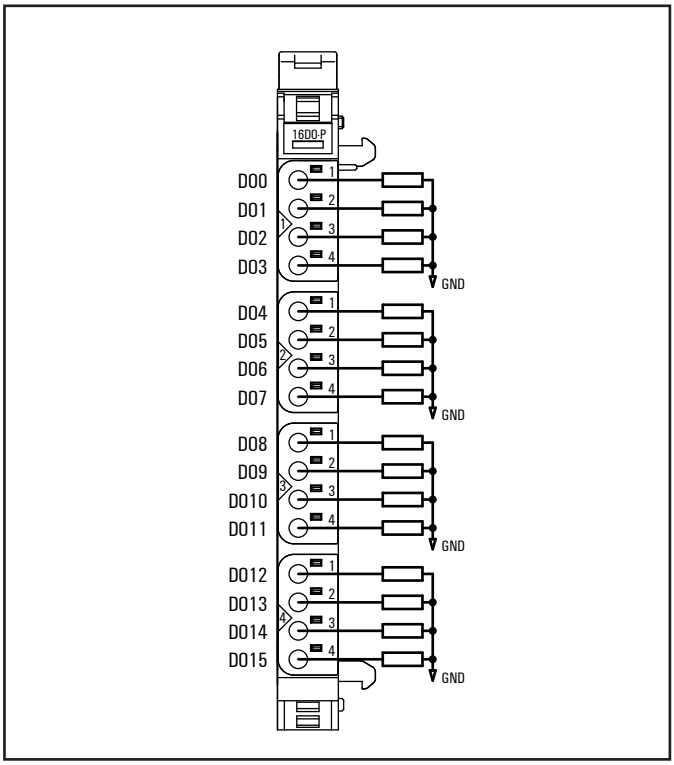
Process data outputs UR20-8DO-P

Byte	Bit	Description
QB0	QX0.0	DO0
	QX0.1	DO1
	QX0.2	DO2
	QX0.3	DO3
	QX0.4	DO4
	QX0.5	DO5
	QX0.6	DO6
	QX0.7	DO7

6.11 Digital output module UR20-16DO-P



Digital output module UR20-16DO-P (Order No. 1315250000)

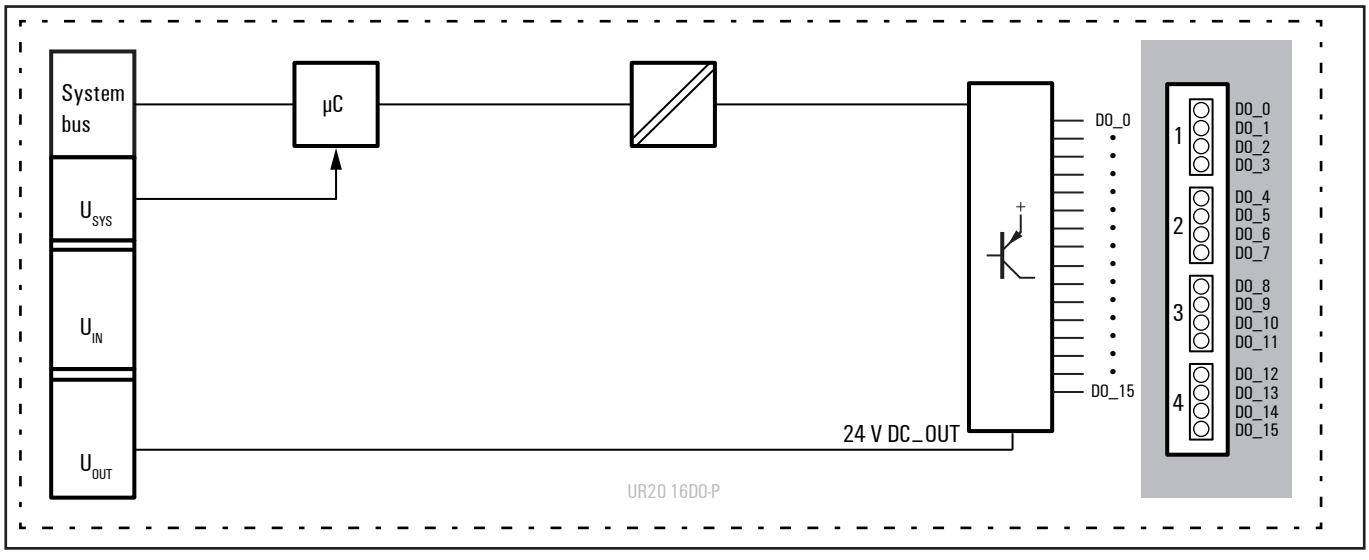


Connection diagram UR20-16DO-P

The UR20-16DO-P digital output module can control up to 16 actuators each with a maximum of 0.5 A. Four actuators can be connected to each connector. A status LED is assigned to each channel. The outputs are supplied with power from the output current path (U_{OUT}).

	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Output 0 active
1.2	Yellow: Output 1 active
1.3	Yellow: Output 2 active
1.4	Yellow: Output 3 active
2.1	Yellow: Output 4 active
2.2	Yellow: Output 5 active
2.3	Yellow: Output 6 active
2.4	Yellow: Output 7 active
3.1	Yellow: Output 8 active
3.3	Yellow: Output 9 active
3.3	Yellow: Output 10 active
3.4	Yellow: Output 11 active
4.1	Yellow: Output 12 active
4.2	Yellow: Output 13 active
4.3	Yellow: Output 14 active
4.4	Yellow: Output 15 active

LED indicators UR20-16DO-P, error messages see Chapter 13



Block diagram UR20-16DO-P

Technical data UR20-16DO-P (Order No. 1315250000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	16	
Type of load	ohmic, inductive, lamp load	
Response time	max. 100 µs high ; max. 250 µs low	
Max. output current	per channel	0.5 A
	per module	8 A
Breaking energy (inductive)	150 mJ	
Switching frequency	Resistive load (min. 47 Ω)	1 kHz
	Inductive load (DC 13)	2 Hz
	Lamp load (12 W)	1 kHz
Actuator connection	1-conductor	
Short-circuit-proof	yes	
Protective circuit	Constant current with thermal switch-off and automatic restart	
Response time of the current limiting circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Reactionless	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	20 mA + load (output current path)	
General data		
Weight	83 g	
For additional general data, see Section 3.4		

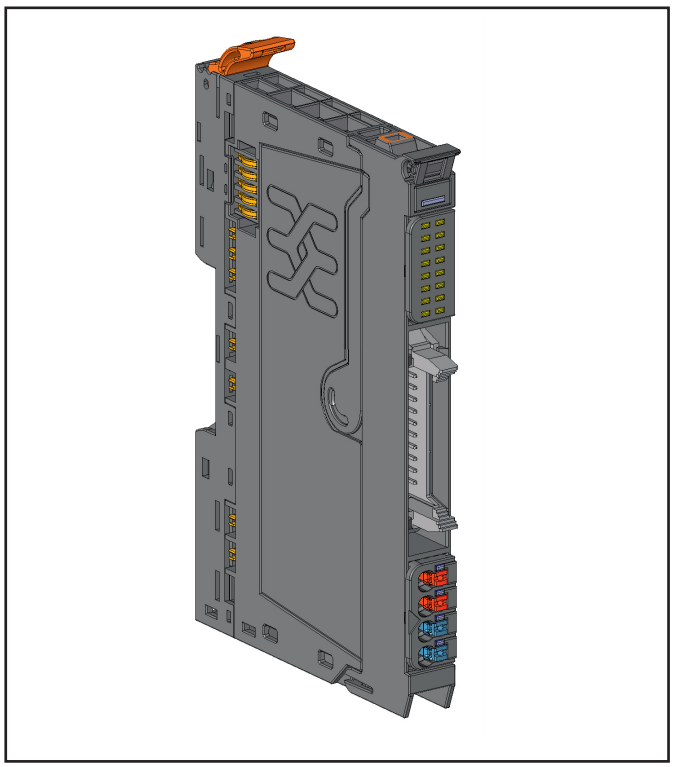
Diagnostic data UR20-16DO-P

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	16
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

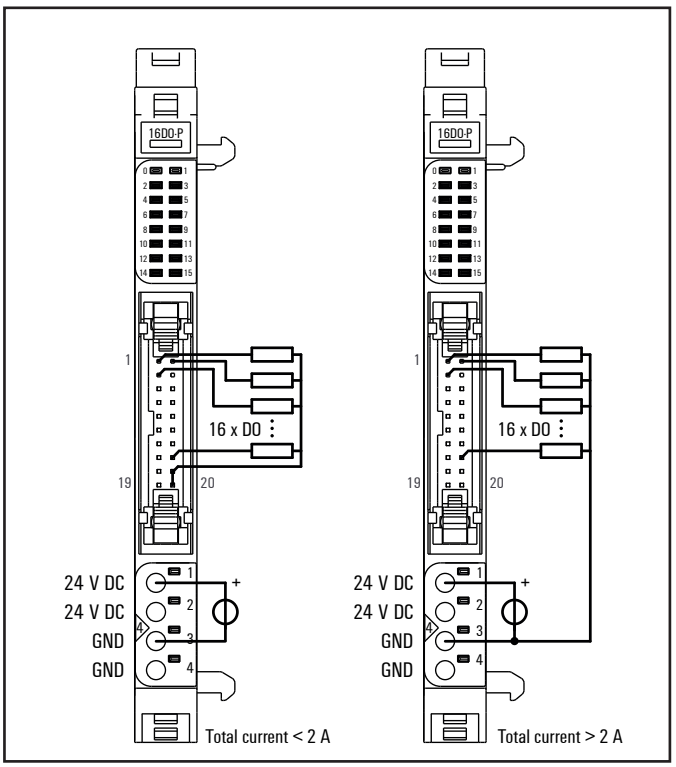
Process data outputs UR20-16DO-P

Byte	Bit	Description
QB0	QX0.0	DO0
	QX0.1	DO1
	QX0.2	DO2
	QX0.3	DO3
	QX0.4	DO4
	QX0.5	DO5
	QX0.6	DO6
	QX0.7	DO7
QB1	QX1.0	DO8
	QX1.1	DO9
	QX1.2	DO10
	QX1.3	DO11
	QX1.4	DO12
	QX1.5	DO13
	QX1.6	DO14
	QX1.7	DO15

6.12 Digital output module UR20-16DO-P-PLC-INT



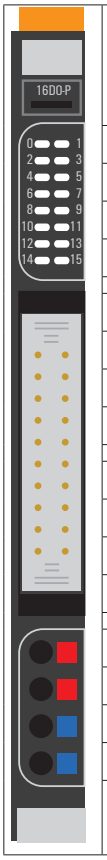
Digital output module UR20-16DO-P-PLC-INT (Order No. 1315270000)



Connection diagram UR20-16DO-P-PLC-INT

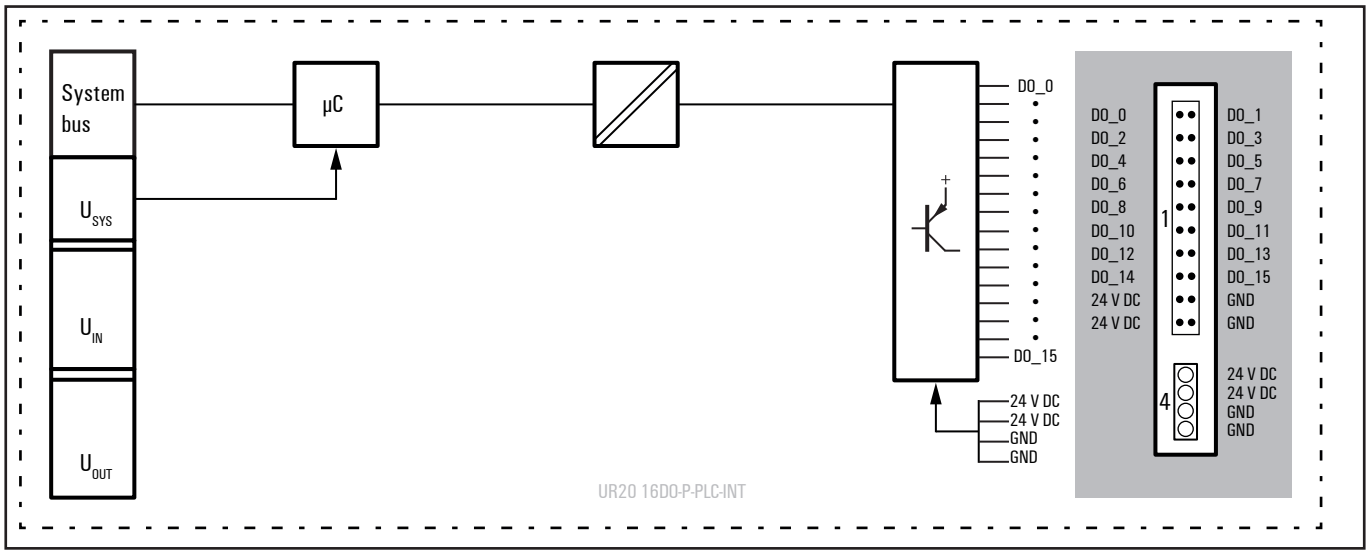
The digital output module UR20-16DO-P-PLC-INT can control up to 16 actuators each with a maximum of 0.5 A. The actuators are connected via a standard flat ribbon cable connector. A status LED is assigned to each channel in a separate block. The module electronics supplies the outputs with power through the flat ribbon cable connector from the separate 4-pole connectors.

For the PLC connection, the following applies: a maximum current of 2 A (with a max. of 1 A per contact) can be taken from the +24 V connections or fed through the 0 V connections. In the case of a total current greater than 2 A, the common ground wire must be connected to the separate 4-pin plug-in connector.



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
0	Yellow: Output 0 active
1	Yellow: Output 1 active
to	to
15	Yellow: Output 15 active
4.1	24 V DC
4.2	24 V DC
4.3	GND
4.4	GND

LED indicators UR20-16DO-P-PLC-INT, error messages see Chapter 13



Block diagram UR20-16DO-P-PLC-INT

Technical data UR20-16DO-P-PLC-INT (Order No. 1315270000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	16	
Type of load	ohmic, inductive, lamp load	
Response time	max. 100 µs high ; max. 250 µs low	
Max. output current	per channel	0.5 A
	per module	8 A (2 A with power supply via a flat ribbon cable)
Breaking energy (inductive)	150 mJ	
Switching frequency	Resistive load (min. 47 Ω)	1 kHz
	Inductive load (DC 13)	2 Hz
	Lamp load (12 W)	1 kHz
Actuator connection	PLC interface unit	
Short-circuit-proof	yes	
Protective circuit	Constant current with thermal switch-off and automatic restart	
Response time of the current limiting circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Reactionless	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	20 mA + load, power supply through plug-in connector 4	
Connection data		
Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 – 1.5 mm² (AWG 16 – 26)
	Fine-wired	0.14 – 1.5 mm² (AWG 16 – 26)
I/O connector	20-pole ribbon cable connection	
General data		
Weight	82 g	
For additional general data, see Section 3.4		

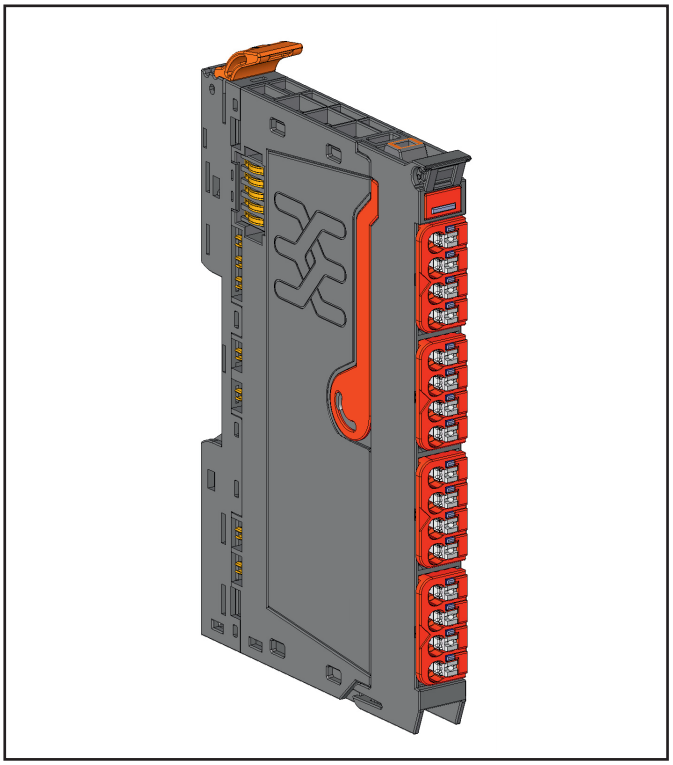
Diagnostic data UR20-16DO-P-PLC-INT

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 – 7	Reserved	0
Error byte 3	3	0 – 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 – 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	16
Channel error	7 – 10	0 – 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 – 7	Reserved	0
Time stamp	43 – 46		Time stamp [µs] (32 bit)	

Process data outputs UR20-16DO-P-PLC-INT

Byte	Bit	Description
QB0	QX0.0	DO0
	QX0.1	DO1
	QX0.2	DO2
	QX0.3	DO3
	QX0.4	DO4
	QX0.5	DO5
	QX0.6	DO6
	QX0.7	DO7
QB1	QX1.0	DO8
	QX1.1	DO9
	QX1.2	DO10
	QX1.3	DO11
	QX1.4	DO12
	QX1.5	DO13
	QX1.6	DO14
	QX1.7	DO15

6.13 Digital output module UR20-4RO-SSR-255

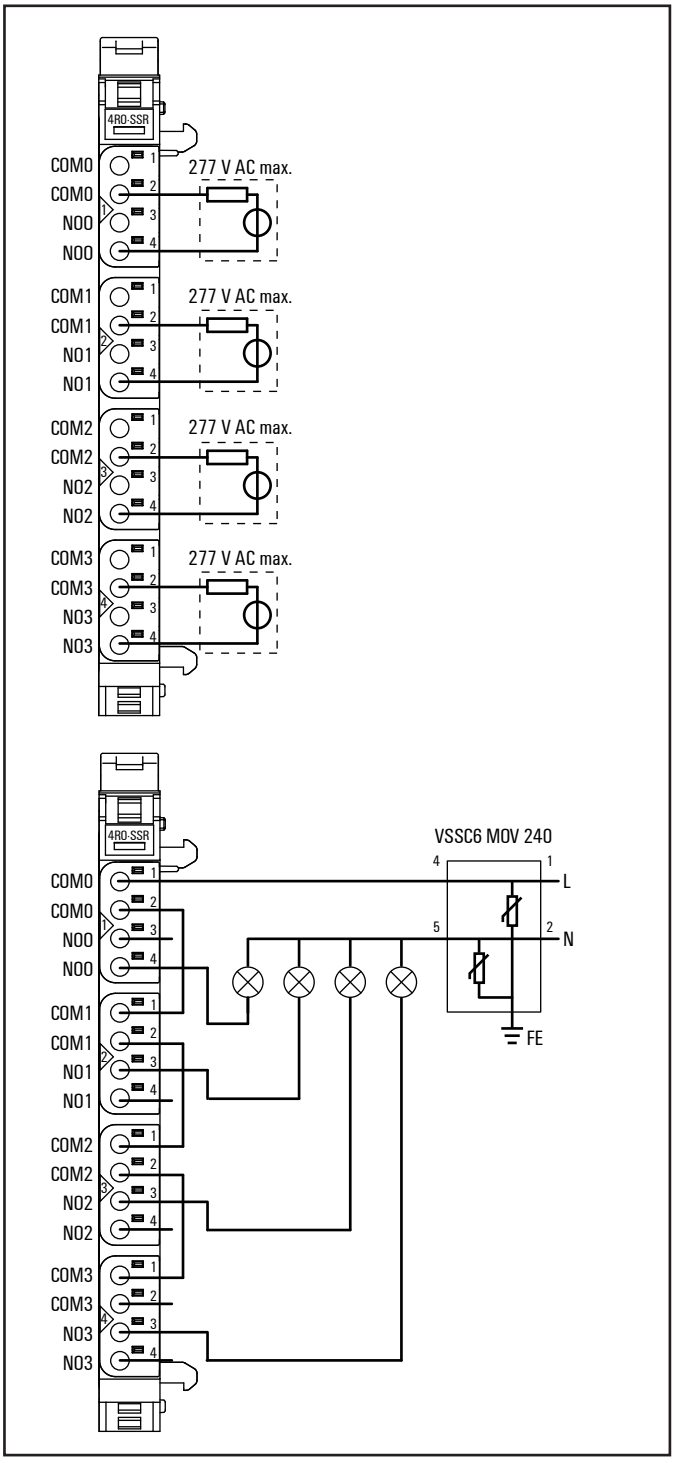


Digital output module UR20-4RO-SSR-255 (Order No. 1315540000)

The digital output module UR20-4RO-SSR-255 uses four semiconductor switches to control up to four actuators, each with a maximum of 0.5 A at 255 V AC. The switching characteristics of the semiconductor switch have it as being closed when the voltage crosses zero and open when the current crosses zero. Each connector features a potential-free NO contact. A status LED is assigned to each channel.

ATTENTION

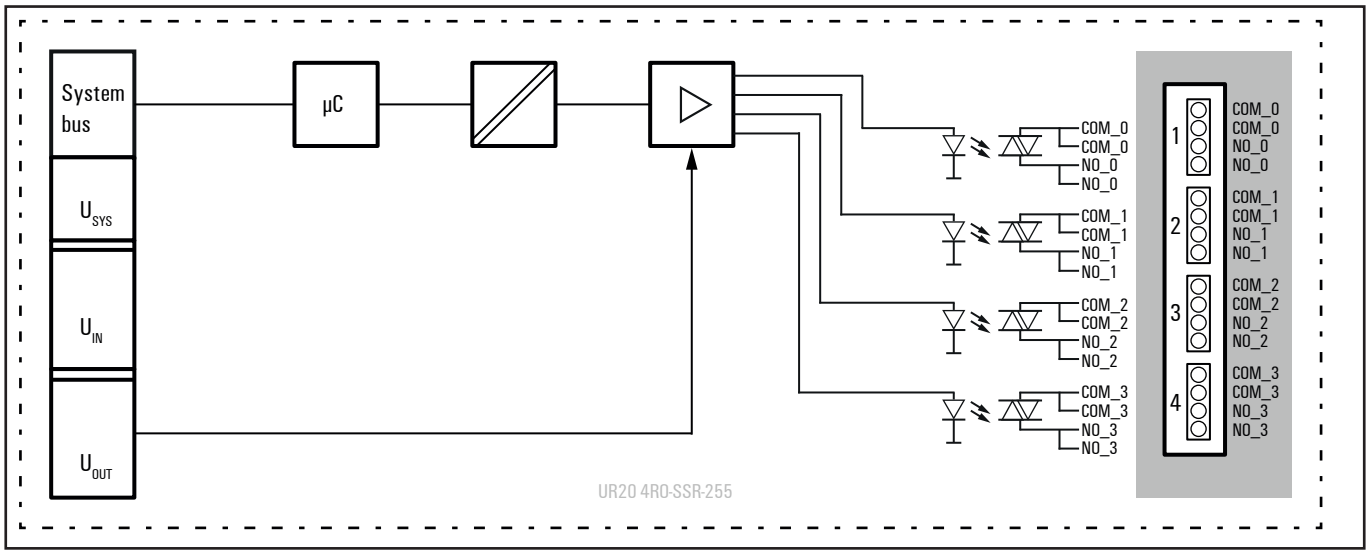
I/O modules can be destroyed by surge voltage.
If surge voltages can be expected, the switch input must be protected externally, e.g. with a VSSC6 MOV 240 VAC/DC surge voltage protection terminal (Order No. 1064630000), see connection diagram on the right.



Connection diagram UR20-4RO-SSR-255

	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: Output 0 active
2.1	Yellow: Output 1 active
3.1	Yellow: Output 2 active
4.1	Yellow: Output 3 active

LED indicators UR20-4RO-SSR-255, error messages see Chapter 13



Block diagram UR20-4RO-SSR-255

Technical data UR20-4RO-SSR-255 (Order No. 1315540000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	4	
Type	SSR / triac	
Response time	10 ms	
Minimum switching current	per channel	50 mA
Maximum switching current	per channel	0.5 A
	per module	2 A
Holding current	25 mA	
Installation	external surge voltage protection circuit recommended for overvoltage category II and overvoltage category III	
Switching frequency	up to 20 Hz	
Short-circuit-proof	no	
Defined trip behaviour of the prescribed external fuse	0.5 A super quick-acting	
Module diagnosis	yes	
Individual channel diagnosis	no	
Max. switching voltage	255 V AC, UL: 277 AC	
Reactionless	yes	
General data		
Weight	83 g	
For additional general data, see Section 3.4		

Overview of the editable parameter UR20-4RO-SSR-255

Channel	Description	Options (Value)	Default value
0 ... 3	Substitute value	Off (0) / On (1)	Off

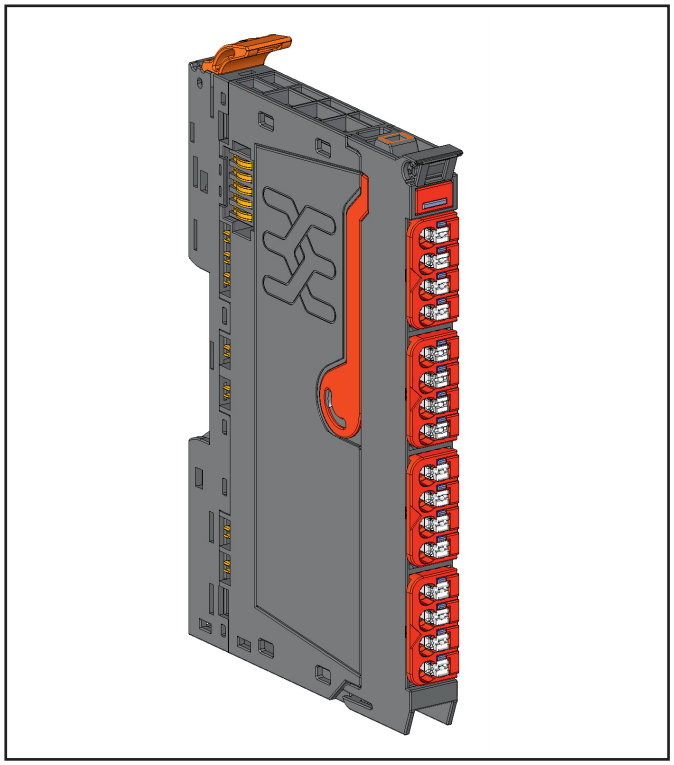
Diagnostic data UR20-4RO-SSR-255

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

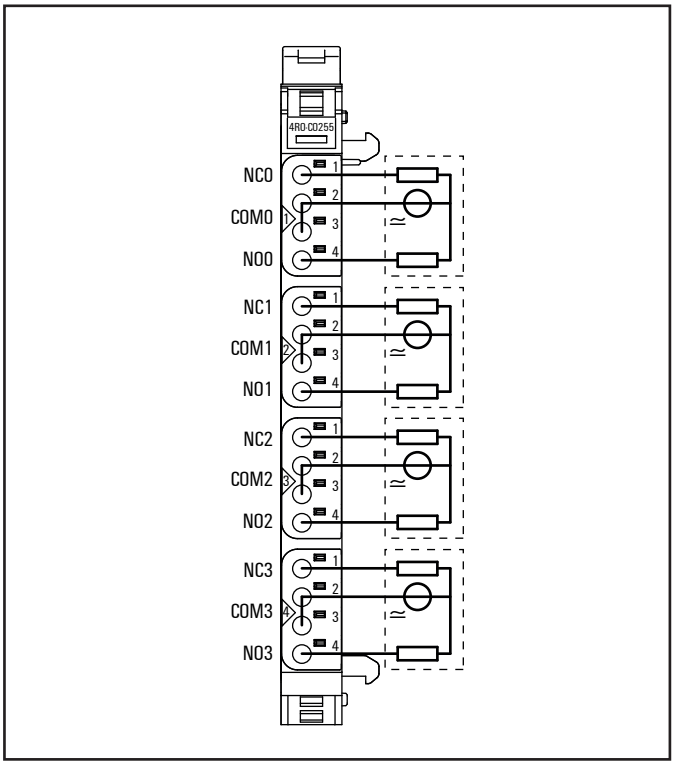
Process data outputs UR20-4RO-SSR-255

Byte	Bit	Description
QB0	QX0.0	DO0
	QX0.1	DO1
	QX0.2	DO2
	QX0.3	DO3
	QX0.4	reserved
	QX0.5	reserved
	QX0.6	reserved
	QX0.7	reserved

6.14 Digital relay output module UR20-4RO-CO-255



Digital relay output module UR20-4RO-CO-255 (Order No. 1315550000)



Connection diagram UR20-4RO-CO-255

The digital relay output module UR20-4 RO-CO-255 can control up to 4 actuators each with a maximum of 6 A. Each connector features a potential-free changeover contact. A status LED is assigned to each channel.

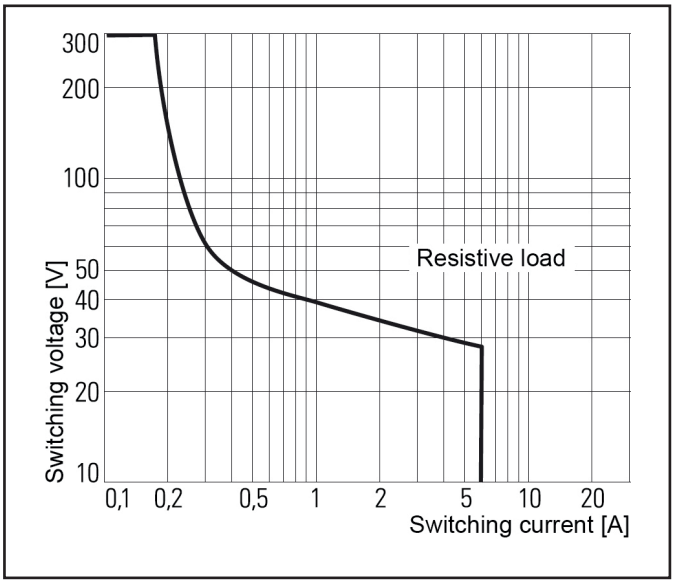
ACHTUNG

When using relais modules UR20-4RO-CO-255 in explosive atmosphere:

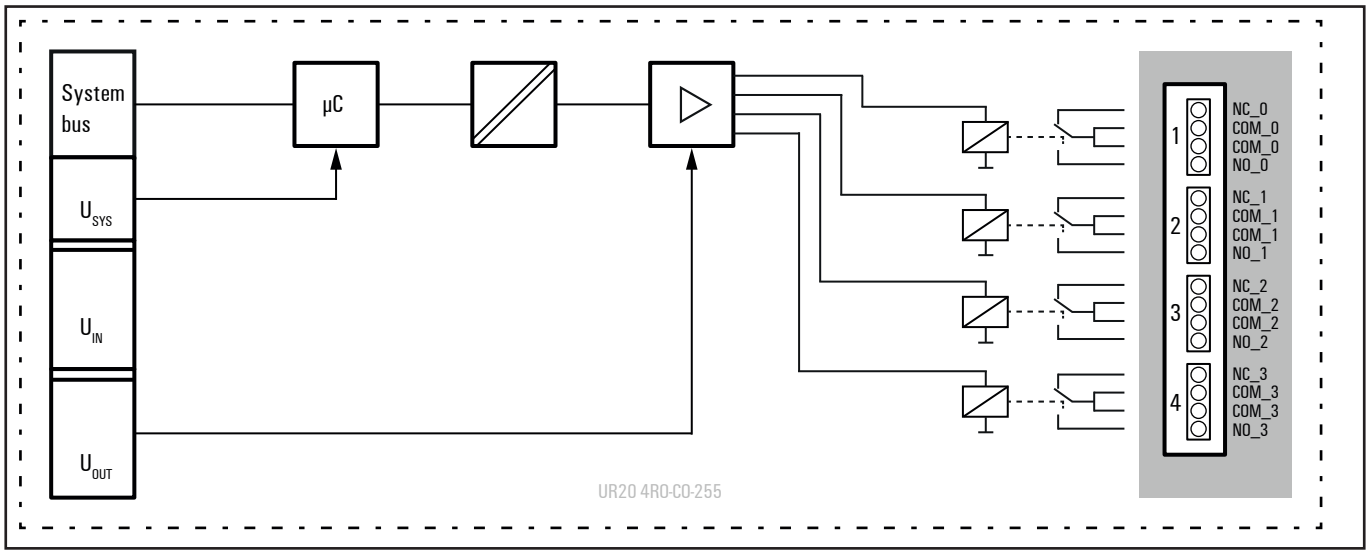
- Condensation shall be avoided.
- If the switching voltage exceeds 63V, a transient protection device shall be provided that limits the transients to a peak voltage of 500V or less.

	Status LED module Green: Communication on system bus Red: No communication on system bus or diagnostic message displayed
1.1	Yellow: Output 0 active
2.1	Yellow: Output 1 active
3.1	Yellow: Output 2 active
4.1	Yellow: Output 3 active

LED indicators UR20-4RO-CO-255, error messages see Chapter 13



Derating curve



Block diagram UR20-4RO-CO-255

Technical data UR20-4RO-CO-255 (Order No. 1315550000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	4	
Type	CO contact	
Material for power and data contacts	Ni-Au, 3 µm	
Response time	20 ms	
Max. output current	per channel	5 A at 60 °C / 6 A at 55 °C
	per module	20 A at 60 °C / 24 A at 55 °C
Switching frequency	max. 5 Hz	
Short-circuit-proof	no	
Response time of the protective circuit	External fusing with 6 A prescribed	
Service life with AC-15 load and 1-A switching current	> 300.000 switching cycles	
Module diagnosis	yes	
Individual channel diagnosis	no	
Max. switching voltage	255 V AC, UL: 277 V AC, DC corresponding to the derating curve	
Reactionless	yes	
General data		
Weight	83 g	
For additional general data, see Section 3.4		

Overview of the editable parameter UR20-4RO-CO-255

Channel	Description	Options (Value)	Default value
0 ... 3	Substitute value	Off (0) / On (1)	Off

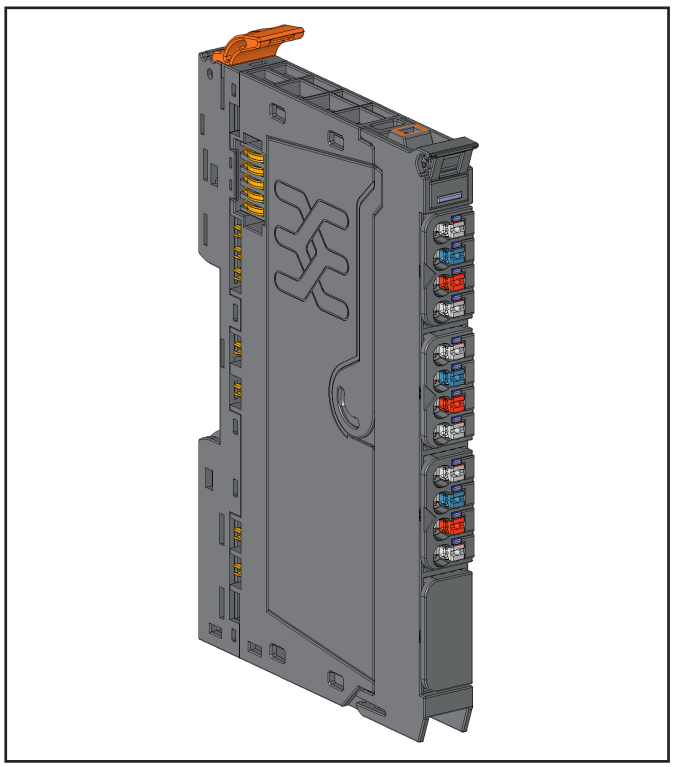
Diagnostic data UR20-4RO-CO-255

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	0
		4	SPI timeout error	0
		5	Reserved	0
		6	Process alarm lost	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

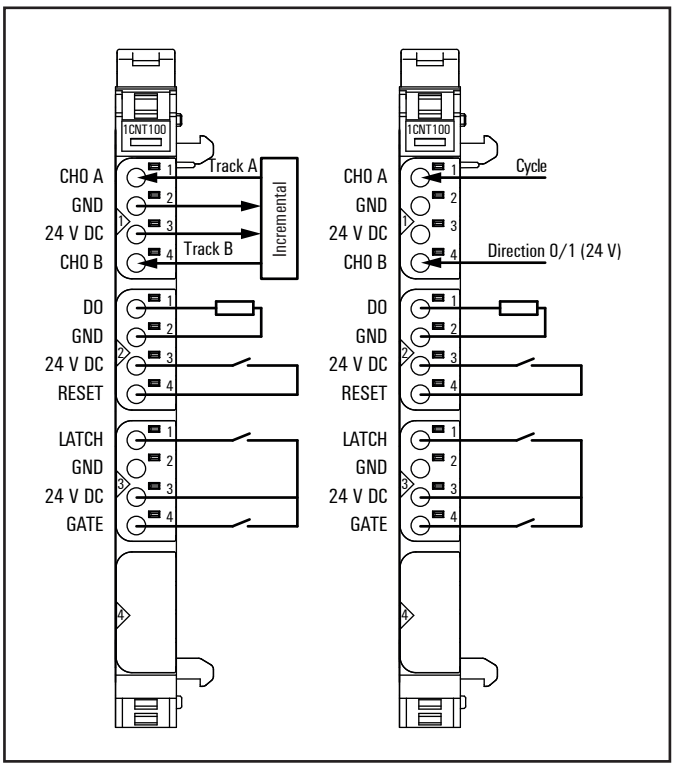
Process data outputs UR20-4RO-CO-255

Byte	Bit	Description
QB0	QX0.0	DO0
	QX0.1	DO1
	QX0.2	DO2
	QX0.3	DO3
	QX0.4	reserved
	QX0.5	reserved
	QX0.6	reserved
	QX0.7	reserved

6.15 Digital counter module UR20-1CNT-100-1DO



Counter module UR20-1CNT-100-1DO (Order No. 1315570000)

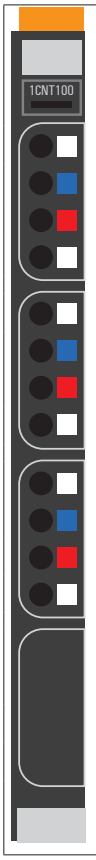


Connection diagram UR20-1CNT-100-1DO

The counter module UR20-1CNT-1DO-100 can read signals (e.g. from an incremental encoder) with a max. input frequency of 100 kHz. The 32-bit counter can count up or down within a predetermined range of values. The counter can be controlled using software or externally through the latch, gate and reset inputs. A digital output can be parametrized to be activated immediatly upon dropping below, meeting or exceeding the set comparison value. In order to make it possible for the PLC to always recognise the signal in its sequential operations in case of very fast events, an overrun time can be provided with the parameter **Pulse duration**.

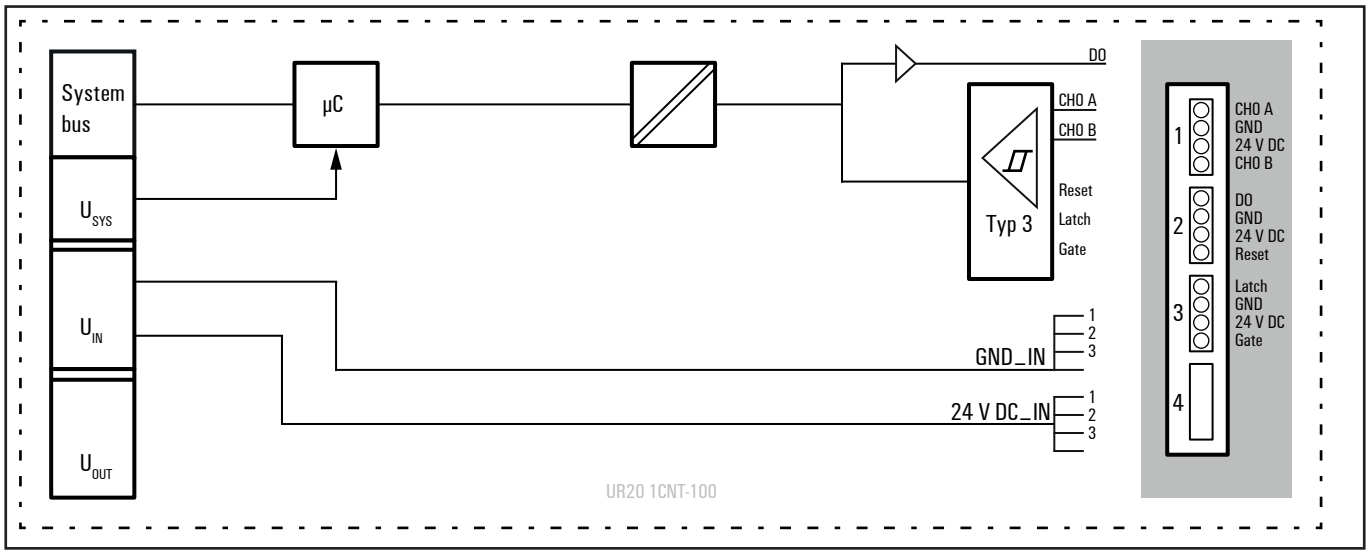
In counter mode, CH0 A on plug-in connector 1 can be used as the input and CH0 B as a direction-detection input. In incremental mode, an incremental encoder with track A and B can be connected and at the same time supplied with operating voltage. The control inputs are then connected to the other plug-in connectors. A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).

- 1 32-bit counter (AB) invertible, 24 V DC
- Counting frequency 100 kHz max (AB 1/2/4-times sampling or pulse and direction)
- Latch value, comparision value, setting value, input filter (parametrizable)
- HW gate reset, digital output for comparison
- Alarm and diagnostic function with µs time stamp
- µs time stamp for counting value (e.g. for speed measurements)



	Module status LED Green: communication over system bus
1.1	Yellow: A / pulse controlled
1.4	Yellow: B / direction controlled
2.1	Yellow: output controlled
2.4	Yellow: Reset controlled
3.1	Yellow: latch controlled
3.4	Yellow: hardware gate controlled

LED indicators UR20-1CNT-100-1DO, error messages see Chapter 13



Block diagram UR20-1CNT-100-1DO

Technical data UR20-1CNT-100-1DO (Order No. 1315570000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Galvanic isolation	500 V DC between the current paths
Digital inputs	
Number of counter inputs	1
Type	Incremental encoders and other input characteristics for sensor types 1 and 3 are in accordance with EN 61131-2
Input filter	Filter time adjustable to 1 ms
Low input voltage	< 5 V
High input voltage	> 11 V
Max. input current per channel	3.5 mA
Sensor supply	yes
Sensor connection	2- and 3-wire
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	yes
Counter width	32 bits
Maximum input frequency	100 kHz
Latch, gate, reset input	yes
Mode of operation	Pulse / direction / 1-, 2-, 4-times
Status, alarm, diagnostics	
Status indicator	yes
Process alarm	yes, parametrizable
Diagnostic alarm	yes
Outputs	
Number	1
Output current	0.5 A
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	yes
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (internal)	35 mA (input current path)

Technical data UR20-1CNT-100-1DO (Order No. 1315570000)

General data	
Weight	83 g
ATEX	Approval for operation in potentially explosive atmosphere Zone 2 pending
For additional general data, see Section 3.4	

Overview of the editable parameter UR20-1CNT-100-1DO

Channel	Description	Options (Value)	Default value
	Diagnostic alarm	disabled (0) / enabled (1)	disabled
0	Filter time signal A	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
0	Filter time signal B	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
0	Filter time latch	0,01 ms (0) / 0,017 ms (1) / 0,033 ms (2) / 0,1 ms (3) / 0,2 ms (4) / 0,5 ms (5) / 1 ms (6)	0,01 ms
0	Filter time gate	0,01 ms (0) / 0,017 ms (1) / 0,033 ms (2) / 0,1 ms (3) / 0,2 ms (4) / 0,5 ms (5) / 1 ms (6)	0,01 ms
0	Filter time reset	0,01 ms (0) / 0,017 ms (1) / 0,033 ms (2) / 0,1 ms (3) / 0,2 ms (4) / 0,5 ms (5) / 1 ms (6)	0,01 ms
0	Process alarm HW gate open	disabled (0) / enabled (1)	disabled
0	Process alarm HW gate closed	disabled (0) / enabled (1)	disabled
0	Process alarm overflow	disabled (0) / enabled (1)	disabled
0	Process alarm underflow	disabled (0) / enabled (1)	disabled
0	Process alarm comp. value	disabled (0) / enabled (1)	disabled
0	Process alarm end value	disabled (0) / enabled (1)	disabled
0	Process alarm latch value	disabled (0) / enabled (1)	disabled
0	Counting mode	count endless (0) / once - forward (1) / once - backwards (2) / once - no main direction (3) / periodic - forward (4) / periodic - backwards (5) / periodic - no main direction (6)	count endless
0	Condition for DO	disabled (0) / higher equal comparison value (1) / lower equal comparison value (2)/ equal comparison value (3)	disabled
0	Counter dir. signal B inv.	disabled (0) / enabled (1)	disabled
0	Reset	disabled (0) / high level (1) / rising edge 0-1 (2)/ rising edge once 0-1 (3)	
0	Signal mode	Rotary transducer - single (0) / Rotary transducer - double (1) / Rotary transducer - quadruple (2) / Pulse and Direction (3) / disabled (4)	disabled
0	HW gate	disabled (0) / enabled (1)	disabled
0	Counter behaviour internal gate	Interrupt counting (0) / Cancel counting (1)	interrupt counting
0	End value	-2147483648 ... 2147483647	2147483647
0	Load value	-2147483648 ... 2147483647	0
0	Hysteresis	0 ... 255	0
0	Pulse duration	0 ... 255 [Input value x 2 = output time; corresponds to 0 ... 510 ms]	0

The parameter setting in the coupler for the **Behaviour of outputs on field bus error** affects the control word and thus the behaviour of the counter module:

- The **Hold last value** setting
  The counter continues to count during the error. Once normal operating conditions have been restored, the counter continues to count starting at the previous value.
- The **Enable substitute value** setting
  The counter value is frozen. Once normal operating conditions have been restored, the counter value is reset to the parameterised load value.
- **All outputs off** setting
  The UR20-1CNT-100-1DO module behaves in the same was as for **Enable substitute value**.
  The UR20-2CNT-100 module behaves in the same way as for **Hold last value**.

Diagnostic data UR20-1CNT-100-1DO

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	External auxiliary supply error	
		5	Reserved	0
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x18
		1		
		2		
		3		
		4	Channel information available	1
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Reserved	0
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x76
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	1
Channel error	7	0	Error at channel 0	
		1 - 7	Reserved	0
Channel error	8	8 - 15	Reserved	0
Channel error	9	16 - 23	Reserved	0
Channel error	10	24 - 31	Reserved	0
Channel 0 error	11	0	Hardware gate opened	
		1	Hardware gate closed	
		2	Overflow/underflow/end value	
		3	Comparison value reached	
		4	Latch value saved	
		5 - 7	Reserved	0
Channel 1 error to Channel 31 error	12 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Process data inputs UR20-1CNT-100-1DO

Byte	Format	Name	Bit	Function when active	Remark
IB0	Double word	Counter value			current count value
IB1					
IB2					
IB3					
IB4	Double word	Latch value			Count value image at the point of edge 0-1 at latch input
IB5					
IB6					
IB7					
IB8	Word	Counter status	IX8.0	Reset was active	
			IX8.1	DO released	
			IX8.2	SW gate active	
			IX8.3	Reset input active	
			IX8.4	HW gate active	
			IX8.5	internal gate active	
			IX8.6	DO set	
			IX8.7	Counter direction down	
IB9			IX9.0	Counter direction up	
			IX9.1	Comparison condition met	remains until reset
			IX9.2	End value reached	remains until reset
			IX9.3	Overflow performed	remains until reset
			IX9.4	Underflow performed	remains until reset
			IX9.5	Zero crossing performed	remains until reset
			IX9.6	Latch input active	
			IX9.7	reserved	
IB10	Word	Time stamp			0 ... 65535 µs rotating, updated when counter value changes
IB11					

Process data outputs UR20-1CNT-100-1DO

Byte	Format	Name	Bit	Function, when edge 0-1	Remark
QB0	Double word	Comparison value			depending on parametrization for triggering of process alarm or setting the DO, as soon as the condition is met
QB1					
QB2					
QB3					
QB4	Double word	Set value			this value is copied into counter value in the event of edge 0-1 at bit 5 of the control word
QB5					
QB6					
QB7					
QB8	Word	Control word	QX8.0	Activate reset mode	
			QX8.1	Release DO	
			QX8.2	Set SW gate	
			QX8.3 - 8.4	reserved	
			QX8.5	Load set value	loads set value into counter value
			QX8.6	Reset status bits	counter status bits 9.1 - 9.5
			QX8.7	reserved	
			QX9.0	Deactivate reset mode	
QB9			QX9.1	Block DO	
			QX9.2	Reset SW gate	
			QX9.3 - 9.7	reserved	

Counter functions

Overview

As essential conditions to start counting the signal mode needs to be parametrized and a rising flank at the bit "Set SW gate" of the control word is required.
Counting can be carried out up or down, during which time the following functions are available:

- 1-time counting, e.g. for counting products up to a maximum limit
- Continuous counting, e.g. for detecting the position with an incremental encoder
- Periodic counting, e.g. repeated identical pick-and-place operations

Through parametrization, a counting range with a start and stop value can be defined in the "1-time counting" and "periodic counting" operating modes.
Parameterizable additional functions are available with the counter in the form of the gate function, comparator, hysteresis and process alarm.

Primary counting direction

A primary counting direction can be predetermined for the counter through parametrizing.
When "none" is selected, the entire counting range is available.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)

Primary counting direction up

The counting range is limited at the top. Starting at 0 or the load value, the counter counts to the parametrized end value -1 and is reset to the load value with the next encoder pulse.

Primary counting direction down

The counting range is limited at the bottom. Starting from a parametrized start or load value, the counter counts until the parametrized end value +1 and is reset to the start value with the next encoder input.

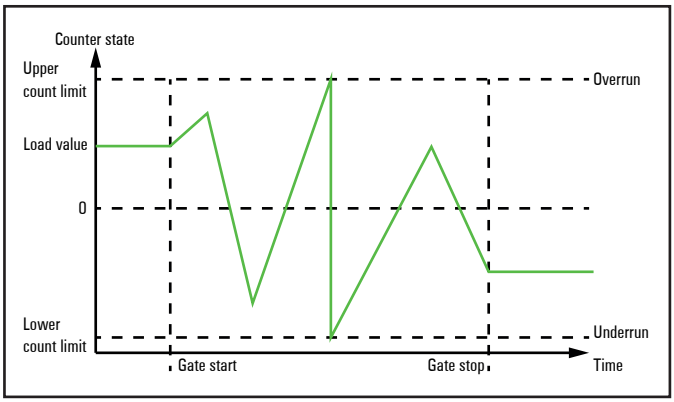
Gate function cancelling / interrupting

The counter is activated and deactivated using an internal gate (I-gate). If the hardware gate (HW gatephysical input "Gate") is deactivated in parameters the internal gate is identical to the software gate. With activated hardware gate the internal gate is a logic AND connection of hardware gate and software gate. When the HW gate is released, the gate functions operate only on the HW gate. In this case, opening and closing the SW gate has only an interrupting effect.

The software gate is activated using a 0-1 edge at the bit "Set SW gate" in the control word. It is deactivated with a 0-1 edge at the bit "Reset SW gate" in the control word (see table "Process data outputs").

Cancelling the counting process
After closing the gate and a new gate start, the counting process starts over from the load value.

Interrupting the counting process
After closing the gate and a new gate start, the counting process starts again from the last updated counter reading.



Overview of gate functions

Continuous counting

In this case, counting starts with the load value.
If the upper count limit is reached during up-counting, an additional counting pulse in the positive direction leads to a jump to the lower count limit. Counting continues from there.
If the lower count limit is reached during down-counting, an additional counting pulse in the negative direction leads to a jump to the upper count limit. Counting continues from there.
Because of the register size, the count limits are fixed and cannot be changed.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)

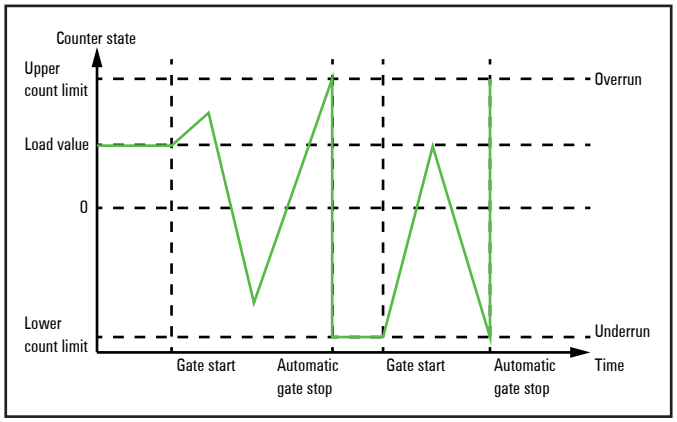
The status bits "Overflow performed" and "Underflow performed" are set in the case of an overflow or underflow. They remain set until they are reset with the bit "Reset status bits" in the control word.
In addition, a process alarm can be triggered if it is provided.

1-time counting

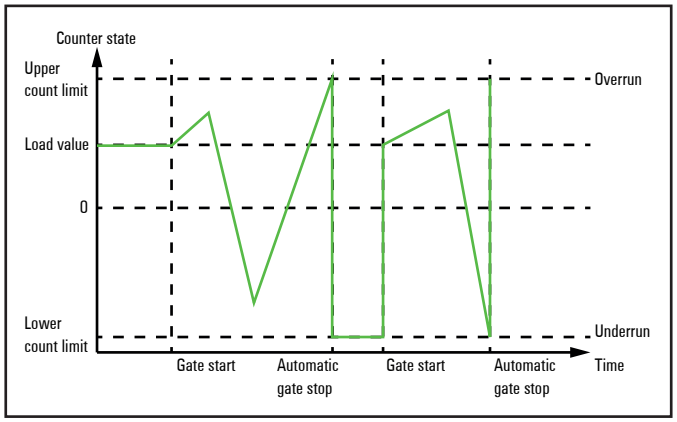
No primary counting direction
- 1-time counting from the load value
- Counting up or down
- Fixed setting of the count limit to the maximum counting range
- If the upper or lower count limits are exceeded, the counter always jumps to the other count limit. This allows the status bits “overflow performed” or “underflow performed” to be set and the internal gate to be automatically closed. In addition, a process alarm can be triggered if it is parametrized.
- To start the counting process once again, the internal gate must be reopened.
- If the gate controls are interrupted, the counting process continues from the current counter reading.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)



1-time counting, interrupted gate controls

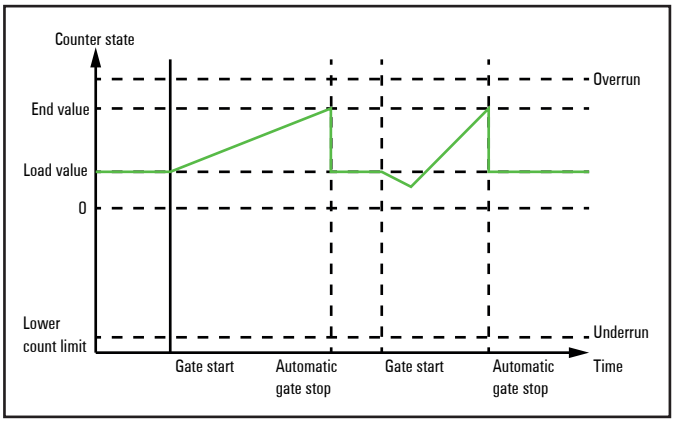


1-time counting, cancelled gate controls

Primary counting direction up
- Up-counting starting at the load value
- If the end value -1 is reached during counting in the positive direction, the counter jumps to the load value at the next positive count pulse and the internal gate is automatically closed. In addition, a process alarm can be triggered if it is parametrized.
- To restart the counting process, the internal gate must be reopened and the counting starts at the load value.
- It is possible to count beyond the lower count limit.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 ($-2^{31}+1$) to +2 147 483 647 ($2^{31}-1$)
Upper count limit	+2 147 483 648 (2^{31})

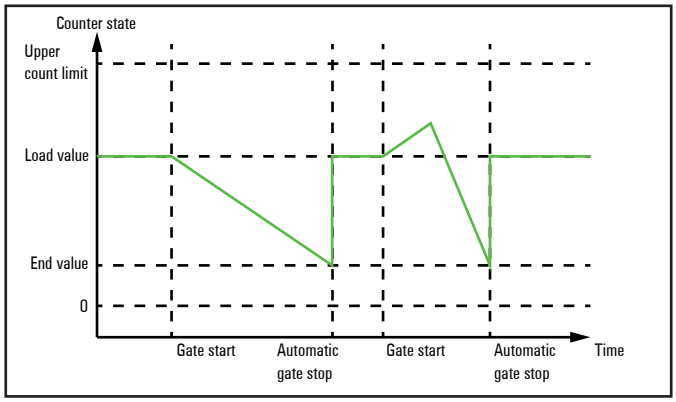


1-time counting, primary counting direction up

Primary counting direction down
- Down-counting from the load value
- If the end value +1 is reached during counting in the negative direction, the counter jumps to the load value at the next count pulse and the internal gate is automatically closed. In addition, a process alarm can be triggered if it is parametrized.
- To restart the counting process, the internal gate must be reopened and the counting starts at the load value.
- It is possible to count beyond the upper count limit.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 (-2^{31}) to +2 147 483 647 ($2^{31}-2$)
Upper count limit	+2 147 483 648 ($2^{31}-1$)



1-time counting, primary count direction down.

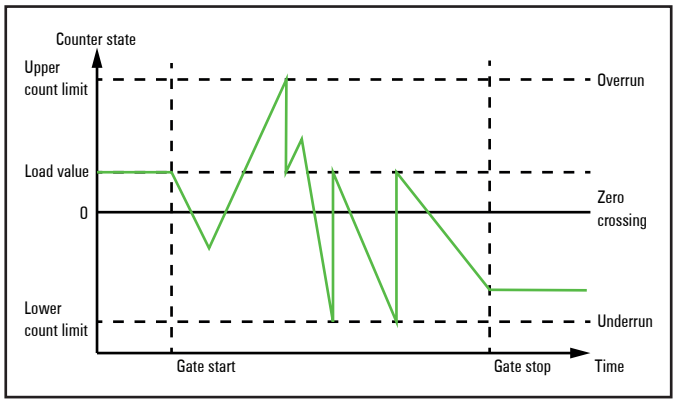
Periodic counting

No primary counting direction

- Counting starting at the load value, up or down.
- Upon reaching the corresponding count limit, the counter jumps to the load value and starts counting again from there. In addition, a process alarm can be triggered if it is parametrized.
- Because of the register size, the count limits are fixed and cannot be changed.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)



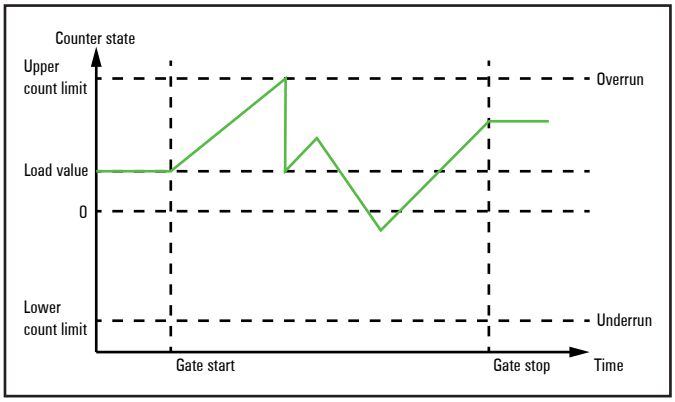
Periodic counting, no primary counting direction

Primary counting direction up

- Up-counting starting at the load value
- If the end value -1 is reached during counting in the positive direction, the counter jumps to the load value at the next positive count pulse and continues counting from there. In addition, a process alarm can be triggered if it is parametrized.
- It is possible to count beyond the lower count limit.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 ($-2^{31}+1$) to +2 147 483 647 ($2^{31}-1$)
Upper count limit	+2 147 483 648 (2^{31})



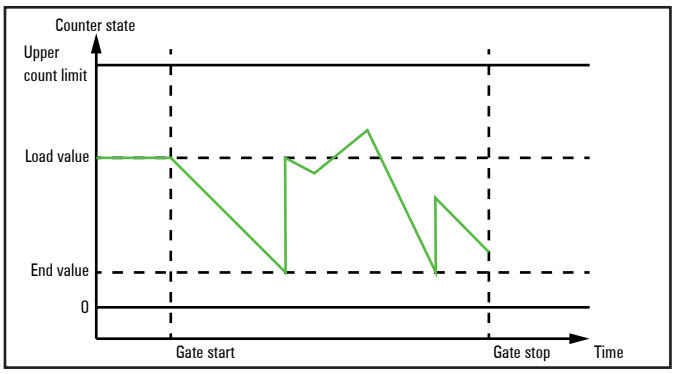
Periodic counting, primary counting direction up.

Primary counting direction down

- Down-counting from the load value
- If the end value +1 is reached during counting in the negative direction, the counter jumps to the load value at the next count pulse and continues counting from there. In addition, a process alarm can be triggered if it is parametrized.
- It is possible to count beyond the lower count limit.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 (-2^{31}) to +2 147 483 646 ($2^{31}-2$)
Upper count limit	+2 147 483 648 ($2^{31}-1$)



Periodic counting, primary counting direction down.

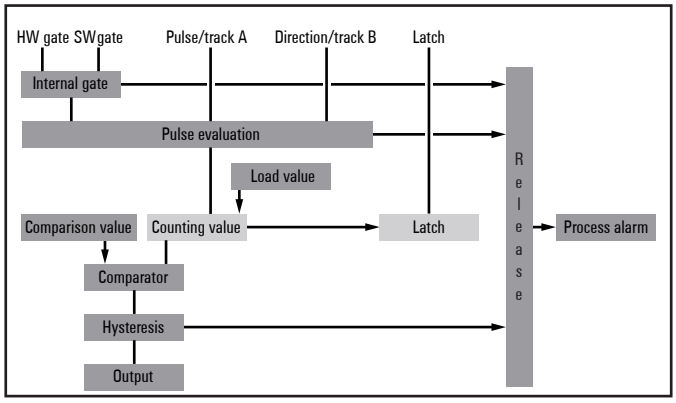
Additional counter features

Overview

You can set the additional features for the counter listed below by parametrizing the UR20-1CNT-100-1DO:

- Latch function
  If a 0-1 edge appears at the latch input, the current count value is stored in the latch register
- Comparator
  By entering a comparison value, the digital output is activated or a process alarm is triggered depending on the counter value
- Hysteresis
  It is possible to prevent frequent switching of the output and/or triggering of the alarm, e.g. when the value of a sensor signal fluctuates around the comparison value, by setting the hysteresis

The figure illustrates how counting behaviour is affected by the additional features. These additional features are explained in the following pages.



Additional counter functions.

Latch function

If a 0-1 edge appears at the “latch” input during a counting process, the current counter value is stored in the latch register.
The latch register is accessed through the input range. The latch is always 0 after a STOP-RUN transition.

Comparison function

The comparison value is preset using the first double word of the process data outputs. If the digital output was released via control word the bit “Comparison condition met” of the status word is activated as soon as the comparison condition is met.

The behaviour of the counter output can be determined via prametrizing:

- Output never switches
- Output switches if the counter value ≥ comparison value
- Output switches if the counter value ≤ comparison value
- Output switches at the comparison value

Output never switches
The output never switches.

Output switches if the counter value ≥ comparison value
The output remains set as long as the counter value is larger than or equal to the comparison value.

Output switches if the counter value ≤ comparison value
The output remains set as long as the counter value is less than or equal to the comparison value.

Pulse at comparison value
The output is set for the parametrized pulse duration if the counter reaches the comparison value.

If the pulse duration = 0, the output remains set until the comparison condition is no longer met.

If a primary counting direction has been set, the output switches only upon reaching the comparison value from the primary counting direction.

Pulse duration
The pulse duration indicates how long the output should remain set. It can be preselected between 0 and 522.24 ms in steps of 2.048 ms.

The pulse duration begins with the setting of the corresponding digital output. The inaccuracy of the pulse duration is less than 2.048 ms.

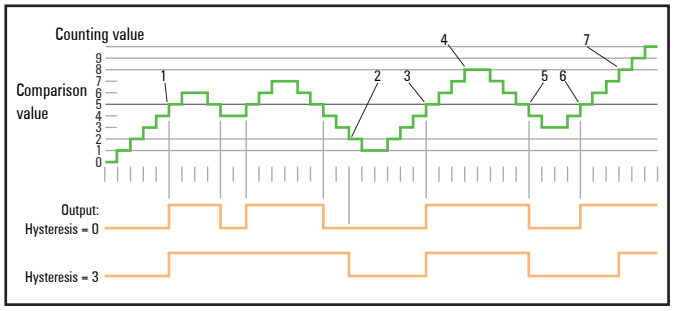
If the comparison value is left during a pulse output and is reached again, there is no post-triggering of the pulse duration.

The bit “comparison condition met” is activated together with the bit “DO set” of the status word. In contrast to the “DO set” bit it remains active until it is reset with the bit “Reset status bits” of the control word..

Hysteresis

It is possible to prevent frequent switching of the output and/or triggering of the alarm, e.g. if the value of a sensor signal fluctuates around the comparison value, by setting the hysteresis. A range between 0 and 255 can be preset for the hysteresis. Hysteresis is deactivated with the values 0 and 1. Hysteresis affects a zero-crossing, overflow/underflow and comparison value.
Active hysteresis remains active after the change. The new hysteresis range is active during the next hysteresis event. The behaviour of the output for hysteresis 0 and hysteresis 3 is shown in the following diagram for the corresponding conditions:

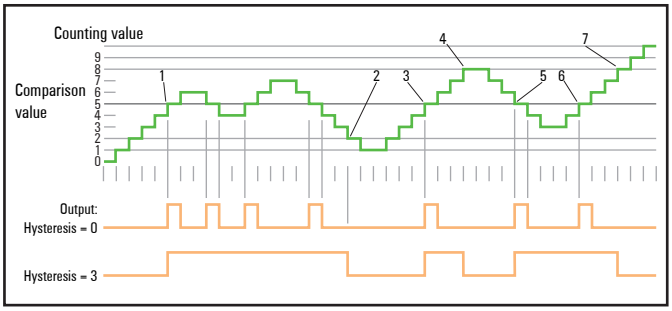
Operating principle when counter value ≥ comparison value



1 Counter value ≥ comparison value → output is set and hysteresis activated
2 Leaving the hysteresis range → output is reset
3 Counter value ≥ comparison value → output is set and hysteresis activated
4 Upon leaving the hysteresis range, the output remains set because the counter value ≥ comparison value
5 Counter value < comparison value and hysteresis active → output is reset
6 Counter value ≥ comparison value → output is not set because hysteresis is activated
7 Upon leaving the hysteresis range, the output is set because the counter value ≥ comparison value

Hysteresis becomes active upon reaching the comparison condition. The comparison result remains unchanged during active hysteresis until the counter value leaves the set hysteresis range. After leaving the hysteresis range, hysteresis is reactivated only upon reaching the comparison condition again.

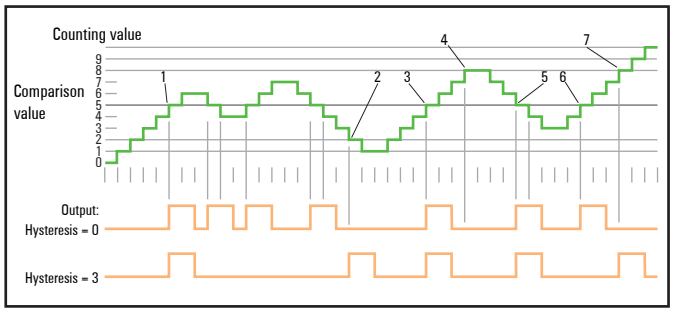
Operating principle when counter value = comparison value



1 Counter value = comparison value → output is set and hysteresis activated
2 Leaving the hysteresis range → output is reset and counter value < comparison value
3 Counter value = comparison value → output is set and hysteresis activated
4 Output is reset because of leaving the hysteresis range and counter value > comparison value
5 Counter value = comparison value → output is set and hysteresis activated
6 Counter value = comparison value and hysteresis active → output remains set
7 Leaving the hysteresis range and counter value > comparison value → output is reset

Hysteresis becomes active upon reaching the comparison condition. The comparison result remains unchanged during active hysteresis until the counter value leaves the set hysteresis range. After leaving the hysteresis range, hysteresis is reactivated only upon reaching the comparison condition again.

Operating principle of comparison value with pulse duration not equal to zero



1 Counter value = comparison value → pulse of the parametrized duration is output, hysteresis is activated and the counting direction is stored
2 Leaving the hysteresis range against the stored counting direction → pulse with the parametrized duration is output and hysteresis-is deactivated
3 Counter value = comparison value → a pulse of the parametrized pulse dura tion is output, hysteresis is activated and the counting direction is stored
4 The hysteresis range is left without changing the counting direction → hysteresis is deactivated
5 Counter value = comparison value → a pulse of the parametrized pulse dura tion is output, hysteresis is activated and the counting direction is stored
6 Counter value = comparison value and hysteresis active → no pulse
7 Leaving the hysteresis range against the stored counting direction → a pulse of the parametrized duration is output and hysteresis is deactivated

Hysteresis becomes active upon reaching the comparison condition and the output is set for the time preset in the parameter “pulse duration”. For a counter value within the hysteresis range, the output is not set again. The counting direction is retained in the module with the activation of hysteresis. If the counter value leaves the hysteresis range against the stored counting direction, the output is set again for the parametrized pulse duration. There is no pulse output upon leaving the hysteresis range without a change in direction.

Diagnostics and alarm

Overview

Trigger	Process alarm	Diagnostic alarm	Parametrizable
HW gate open	✓	-	✓
HW gate closed	✓	-	✓
Overflow	✓	-	✓
Underflow	✓	-	✓
Comparision value	✓	-	✓
End value	✓	-	✓
Latch value	✓	-	✓
Diagnostics buffer overflow	-	✓	-
Process alarm lost	-	✓	✓
Overload at the output	-	✓	✓

Process alarm data

In order to react to asynchronous events, there is the option of activating process alarms. Linear program flow is interrupted by the process alarm and it branches to a specific interrupt routine depending on the master system. At this place, it is possible to respond appropriately to the process alarm.

Process alarm data UR20-1CNT-100-1DO

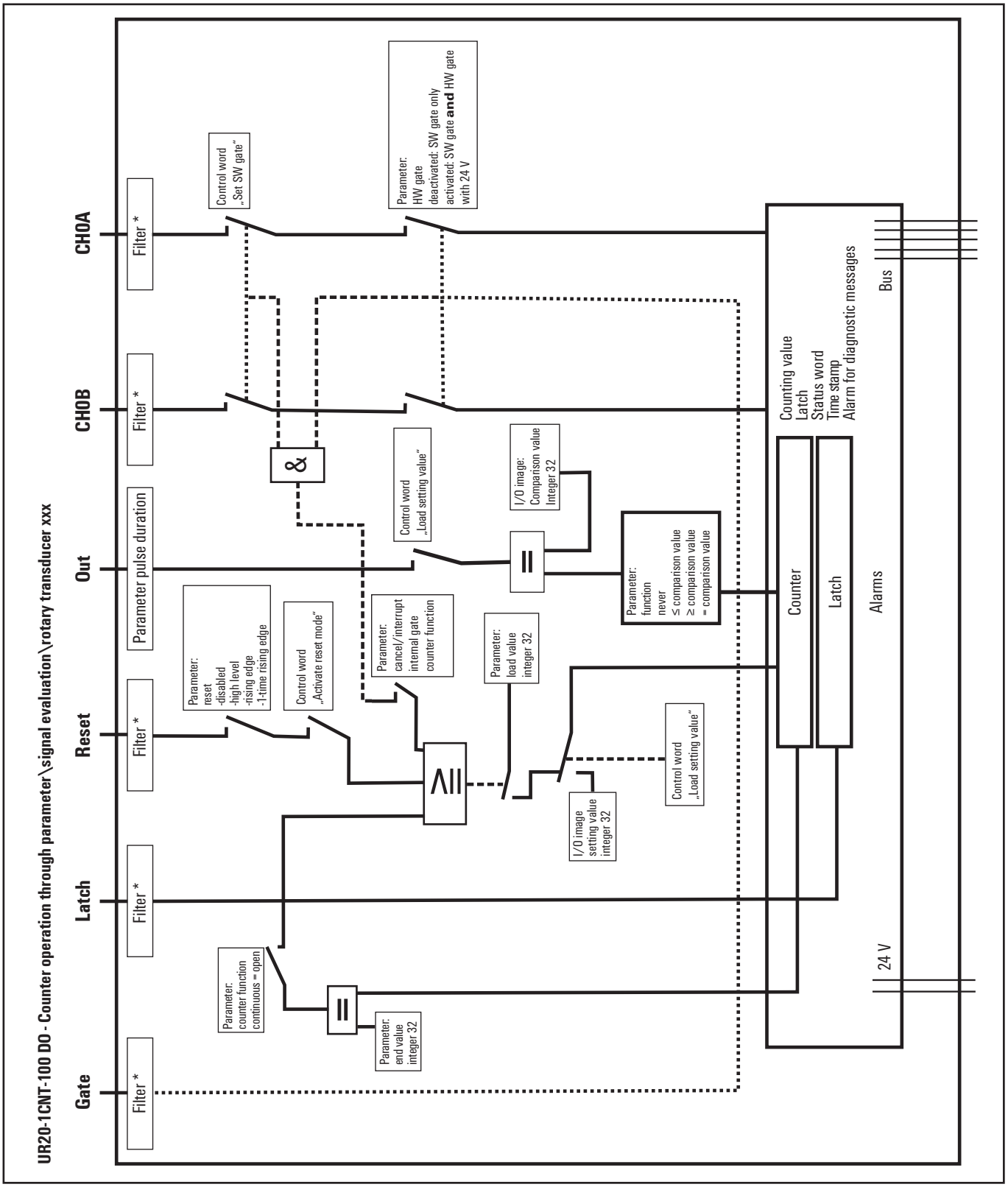
Byte	Bit	Function
B0	X0.0	HW gate activated
	X0.1	HW gate deactivated
	X0.2	Overflow, underflow or end value reached
	X0.3	Comparison value reached
	X0.4	Latch value reached
	X0.5 - 0.7	reserved
B1	X1.0	Status input channel 0 A (trace A)
	X1.1	Status input channel 0 B (trace B)
	X1.2	Status input "Latch"
	X1.3	Status input "Gate"
	X1.4	Status input "Reset"
	X1.5 - 1.7	reserved
B2	6	16 bit time stamp 0 ... 65535µs, rotating
B3	7	

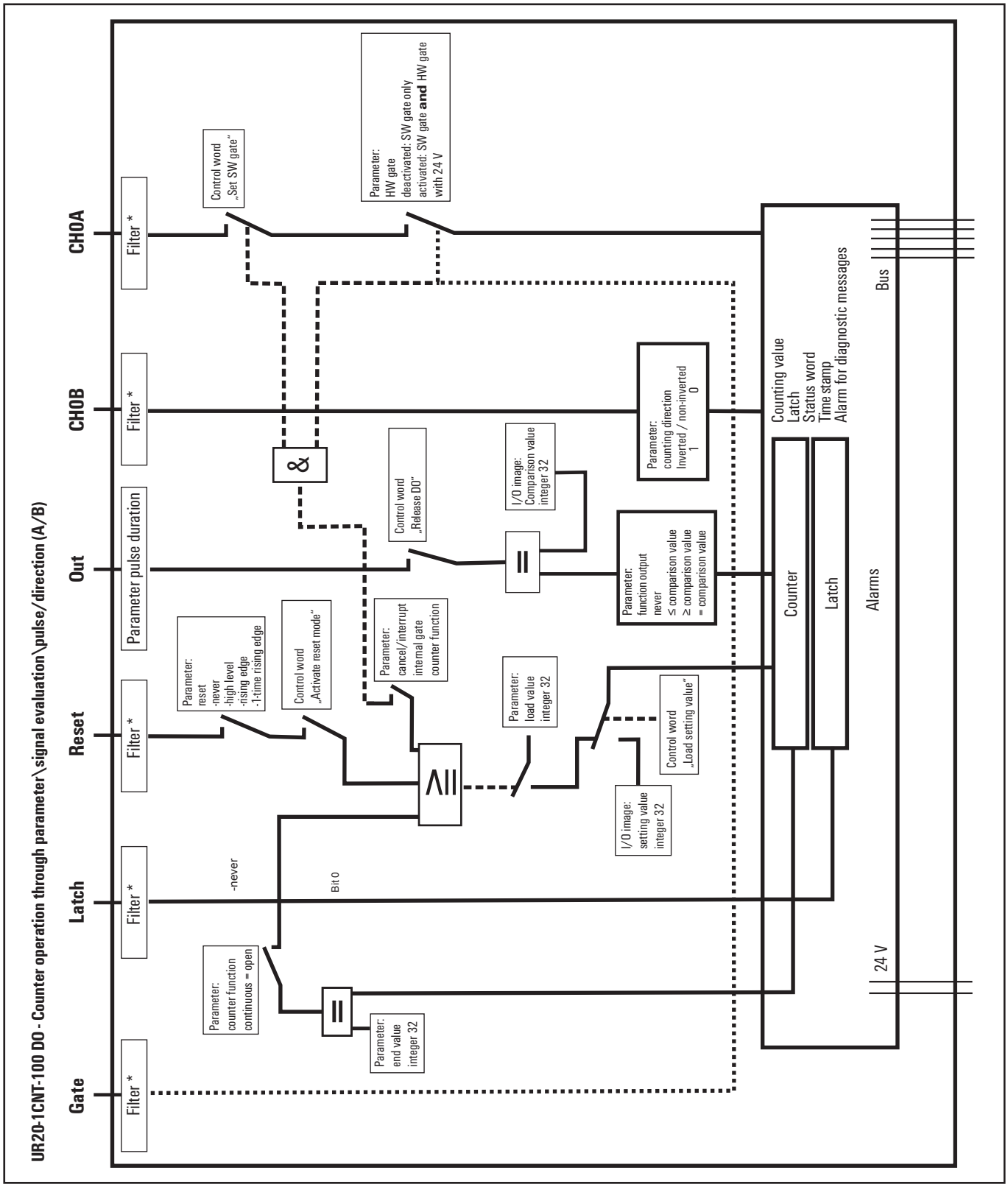
Diagnostic data
A diagnostic alarm for the module can be activated through parametrizing.

Upon triggering of a diagnostic alarm, the diagnostic data from the module is made available for diagnosis$_{incoming}$. As soon as the causes of the triggering of a diagnostic alarm are no longer present, an automatic diagnostic alarm$_{outgoing}$ is activated.

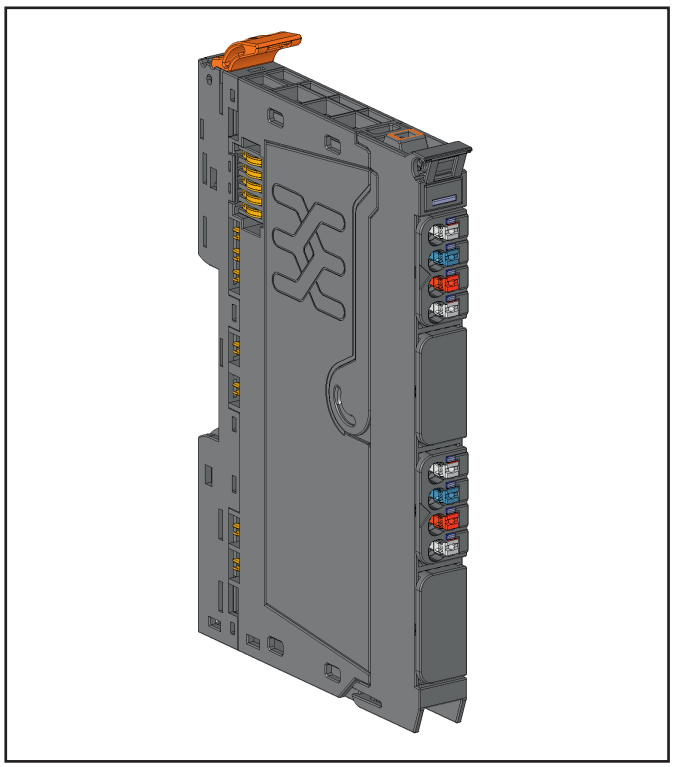
If a diagnostic alarm$_{incoming}$ is triggered for a channel due to a process alarm going missing, all events up until the corresponding diagnostic alarm$_{outgoing}$ are lost.

Within this period of time (1st diagnostic alarm$_{incoming}$ until the last diagnostic alarm$_{outgoing}$), the module's dome LED lights up.

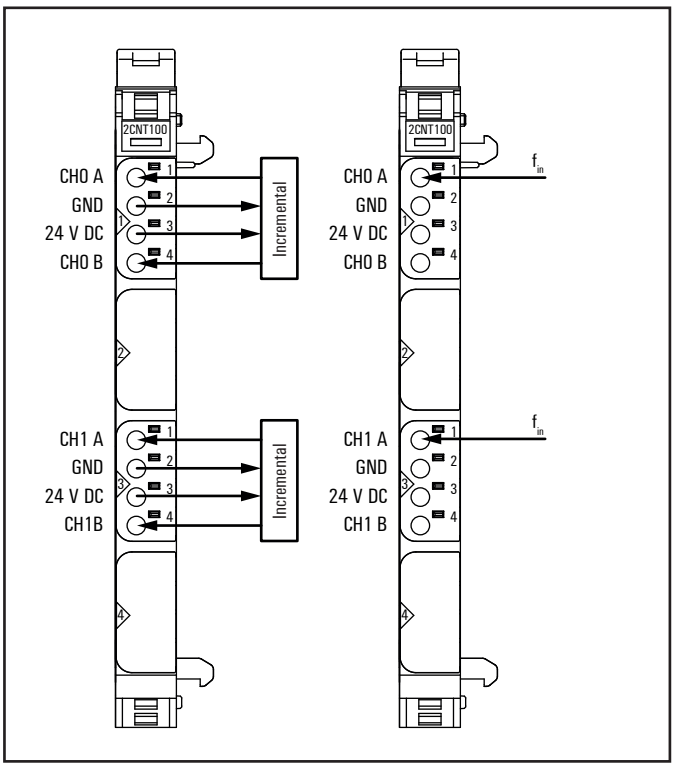

UR20-1CNT-100 DO - Counter operation through parameter\signal evaluation\rotary transducer xxx
Gate
Latch
Reset
Out
CH0B
CH0A
Filter *
Parameter pulse duration
Control word „Set SW gate"
Parameter: HW gate deactivated: SW gate only activated: SW gate and HW gate with 24 V
Control word „Load setting value"
I/O image: Comparison value Integer 32
Parameter: reset -disabled -high level -rising edge -1-time rising edge
Control word „Activate reset mode"
Parameter: cancel/interrupt internal gate counter function
Parameter: load value integer 32
Parameter: function never ≤ comparison value ≥ comparison value = comparison value
Parameter: counter function continuous = open
Parameter: end value integer 32
I/O image setting value integer 32
Control word „Load setting value"
Counting value
Latch
Status word
Time stamp
Alarm for diagnostic messages
Bus
Counter
Latch
Alarms
24 V


UR20-1CNT-100 DO - Counter operation through parameter\signal evaluation\pulse/direction (A/B)
Gate
Latch
Reset
Out
CH0B
CH0A
Filter *
Parameter pulse duration
Control word „Set SW gate"
Parameter: HW gate deactivated: SW gate only activated: SW gate and HW gate with 24 V
Parameter: counting direction Inverted / non-inverted 1 0
Counting value
Latch
Status word
Time stamp
Alarm for diagnostic messages
Bus
Parameter: reset -never -high level -rising edge -1-time rising edge
Control word „Activate reset mode"
Parameter: cancel/interrupt internal gate counter function
Control word „Release DO"
I/O image: Comparison value integer 32
Parameter: function output never ≤ comparison value ≥ comparison value = comparison value
Counter
Latch
Alarms
Parameter: load value integer 32
Control word „Load setting value"
I/O image: setting value integer 32
-never
Bit 0
Parameter: counter function continuous = open
Parameter: end value integer 32
24 V

6.16 Digital counter module UR20-2CNT-100



Digital counter module UR20-2CNT-100 (Order No. 1315590000)



Connection diagram UR20-2CNT-100

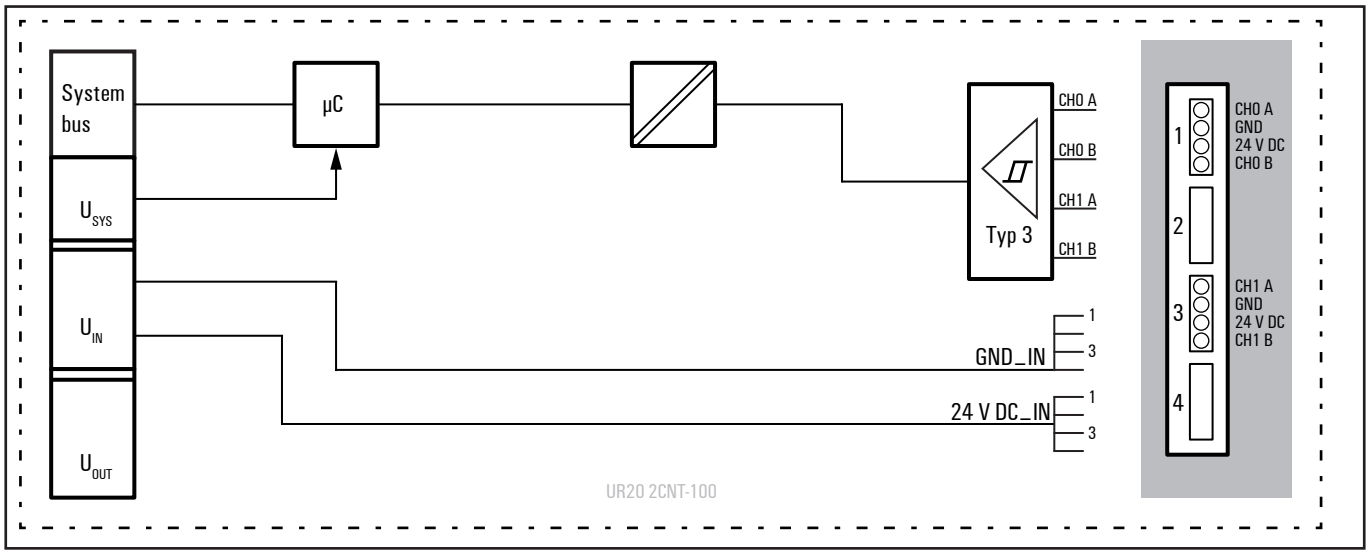
The digital counter module UR20-2CNT-100 can read signals (e.g. from an incremental encoder) with a maximum input frequency of 100 kHz. Depending on the operating mode, both 32-bit counters can count up or down independent of each other in a preset range of values.

In counter mode, CH0 A on plug-in connector 1 or 3 can be used as the input. In incremental mode, an incremental encoder with track A and B can be connected and at the same time supplied with operating voltage. A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).

- 2 32-bit counters (AB), invertible, DC 24 V
- Counting frequency 100 kHz max (AB 1/2/4-times sampling or pulse and direction)
- Comparison value, setting value, input filter (parametrizable)
- Alarm and diagnostic function with µs time stamp
- µs time stamp for value counting (e.g. for speed measurements)

	Module status LED Green: Communication on system bus
1.1	Yellow: CH0 A pulse controlled
1.4	Yellow: CH0 B direction controlled
3.1	Yellow: CH1 A pulse controlled
3.4	Yellow: CH1 B direction controlled

LED indicators UR20-2CNT-100, error messages see Chapter 13



Block diagram UR20-2CNT-100

Technical data UR20-2CNT-100 (Order No. 1315590000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Galvanic isolation	500 V DC between the current paths	
Digital inputs		
Number of counter inputs	2	
Type	Incremental encoder	
Input filter	Filter time adjustable to 1 ms	
Low input voltage	< 5 V	
High input voltage	> 11 V	
Max. input current per channel	3.5 mA	
Sensor supply	yes	
Sensor connection	2- and 3-wire	
Reverse polarity protection	yes	
Module diagnosis	yes	
Individual channel diagnosis	yes	
Counter width	32 bits	
Maximum input frequency	100 kHz	
Mode of operation	Pulse / direction / 1-, 2-, 4-times	
Status, alarm, diagnostics		
Status indicator	yes	
Process alarm	yes	parametrizable
Diagnostic alarm	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (internal)	35 mA (input current path)	
General data		
Weight	72 g	
For additional general data, see Section 3.4		

Overview of the editable parameter UR20-2CNT-100

Channel	Description	Options (Value)	Default value
	Diagnostic alarm	disabled (0) / enabled (1)	disabled
0 ... 1	Filter time signal A	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
0 ... 1	Filter time signal B	0,01 ms [100 kHz] (0) / 0,017 ms [50 kHz] (1) / 0,033 ms [30 kHz] (2) / 0,1 ms [10 kHz] (3) / 0,2 ms [5 kHz] (4) / 0,5 ms [2 kHz] (5) / 1 ms [1 kHz] (6)	0,01 ms
0 ... 1	Process alarm overflow	disabled (0) / enabled (1)	disabled
0 ... 1	Process alarm underflow	disabled (0) / enabled (1)	disabled
0 ... 1	Process alarm comp. value	disabled (0) / enabled (1)	disabled
0 ... 1	Process alarm end value	disabled (0) / enabled (1)	disabled
0 ... 1	Counting mode	count endless (0) / once - forward (1) / once - backwards (2) / once - no main direction (3) / periodic - forward (4) / periodic - backwards (5) / periodic - no main direction (6)	count endless
0 ... 1	Comparison function	disabled (0) / higher equal comparison value (1) / lower equal comparison value (2)/ equal comparison value (3)	disabled
0 ... 1	Counter dir. signal B inv.	disabled (0) / enabled (1)	disabled
0 ... 1	Signal mode	Rotary transducer - single (0) / Rotary transducer - double (1) / Rotary transducer - quadruple (2) / Pulse and Direction (3) / disabled (4)	disabled
0 ... 1	Counter behaviour internal gate	Interrupt counting (0) / Cancel counting (1)	Interrupt counting
0 ... 1	Set value	-2147483648 ... 2147483647	0
0 ... 1	End value	-2147483648 ... 2147483647	2147483647
0 ... 1	Load value	-2147483648 ... 2147483647	0
0 ... 1	Hysteresis	0 ... 255	0

Diagnostic data UR20-2CNT-100

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	External auxiliary supply error	
		5	Reserved	0
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x18
		1		
		2		
		3		
		4	Channel information available	1
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Reserved	0
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x76
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	2
Channel error	7	0	Error at channel group 0	
		1	Error at channel group 1	
		2 - 7	Reserved	0
Channel error	8	8 - 15	Reserved	0
Channel error	9	16 - 23	Reserved	0
Channel error	10	24 - 31	Reserved	0
Channel 0 error	11	0 - 1	Reserved	0
		2	Overflow/underflow/end value	
		3	Comparison value reached	
		4 - 7	Reserved	0
Channel 1 error	12	0 - 1	Reserved	0
		2	Overflow/underflow/end value	
		3	Comparison value reached	
		4 - 7	Reserved	0
Channel 2 error to Channel 31 error	13 - 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Process data inputs UR20-2CNT-100

Byte	Format	Name	Bit	Function when active	Remark
IB0	Double word	Counter 0: Counter value			Counter 0: current count value
IB1					
IB2					
IB3					
IB4	Double word	Counter 1: Counter value			Counter 1: current count value
IB5					
IB6					
IB7					
IB8	Word	Counter 0: Counter status	IX8.0	reserved	
			IX8.1	Comparison bit released	
			IX8.2	SW gate active	
			IX8.3 - 8.4	reserved	
			IX8.5	internal gate active	
			IX8.6	Comparison bit active	
			IX8.7	Counter direction down	
IB9			IX9.0	Counter direction up	
			IX9.1	Comparison condition met	
			IX9.2	End value reached	
			IX9.3	Overflow performed	
			IX9.4	Underflow performed	
			IX9.5	Zero crossing performed	
			IX9.6 - 9.7	reserved	
IB10	Word	Counter 1: Counter status	IX10.0	reserved	
			IX10.1	Comparison bit released	
			IX10.2	SW gate active	
			IX10.3 - 10.4	reserved	
			IX10.5	internal gate active	
			IX10.6	Comparison bit active	
			IX10.7	Counter direction down	
IB11			IX11.0	Counter direction up	
			IX11.1	Comparison condition met	
			IX11.2	End value reached	
			IX11.3	Overflow performed	
			IX11.4	Underflow performed	
			IX11.5	Zero crossing performed	
			IX11.6 - 11.7	reserved	

Process data outputs UR20-2CNT-100

Byte	Format	Name	Bit	Function, when edge 0-1	Remark
QB0	Double word	Counter 0: Comparison value			
QB1					
QB2					
QB3					
QB4	Double word	Counter 1: Comparison value			
QB5					
QB6					
QB7					
QB8	Word	Counter 0: Control word	QX8.0	reserved	
			QX8.1	Release comparison bit	
			QX8.2	Set SW gate	
			QX8.3 - 8.4	reserved	
			QX8.5	Load set value	loads set value into counter value
			QX8.6	Reset status bits	Counter 0: status bits 9.1 - 9.5
QB9			QX8.7 - 9.0	reserved	
			QX9.1	Deactivate comparison bit	
			QX9.2	Reset SW gate	
			QX9.3 - 9.7	reserved	
QB10	Word	Counter 1: Control word	QX10.0	reserved	
			QX10.1	Release comparison bit	
			QX10.2	Set SW gate	
			QX10.3 - 10.4	reserved	
			QX10.5	Load set value	loads set value into counter value
			QX10.6	Reset status bits	Counter 1: status bits 11.1 - 11.5
QB11			QX10.7 - 11.0	reserved	
			QX11.1	Deactivate comparison bit	
			QX11.2	Reset SW gate	
			QX11.3 - 11.7	reserved	

Counter functions

Overview

Counting can be carried out up or down, with the following functions are available:

- 1-time counting, e.g. for counting products up to a maximum limit
- Continuous counting, e.g. for detecting the position with an incremental encoder
- Periodic counting, e.g. repeated identical pick-and-place procedures.

Through parametrizing, a counting range with a start and stop value can be defined in the "1-time counting" and "periodic counting" operating modes.

Parametrizable additional functions are available with the counter in the form of the gate function, comparator, hysteresis and process alarm.

Primary counting direction

A primary counting direction can be predetermined for the counter through parametrizing.

When "none" is selected, the entire counting range is available.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)

Primary counting direction up

The counting range is limited at the top. Starting at 0 or the load value, the counter counts to the parametrized end value -1 and is reset to the load value with the next encoder pulse.

Primary counting direction down

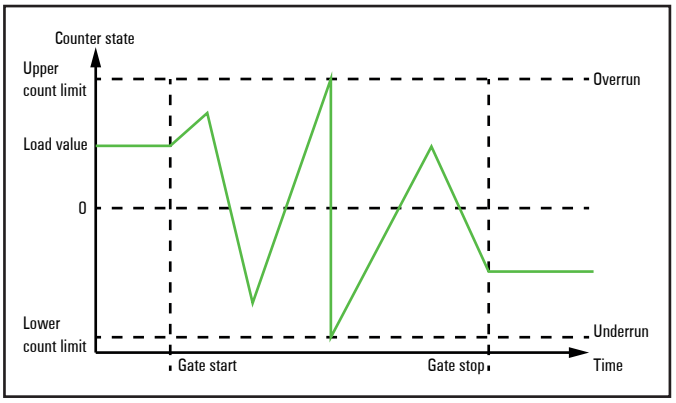
The counting range is limited at the bottom. Starting from a parametrized start or load value, the counter counts until the parametrized end value +1 and is reset to the start value with the next encoder input.

Gate function cancelling / interrupting

The counter is activated and deactivated using an internal gate (I gate). The I gate corresponds to the software gate (SW gate). The SW gate in the application program is opened (activated) using a 0-1 edge at the "Set SW gate" bit in the control word. The SW gate is closed (deactivated) once again using a 0-1 edge at the "Reset SW gate" bit.
If the I gate has been automatically closed during "1-time counting", it can be reopened only with a 0-1 edge at "Set SW gate".

Cancelling the counting process
After closing the gate and a new gate start, the counting process starts over from the load value.

Interrupting the counting process
After closing the gate and a new gate start, the counting process starts again from the last updated counter reading.



Overview of gate functions.

Continuous counting

In this case, counting starts with the load value.
If the upper count limit is reached during up-counting, an additional counting pulse in the positive direction leads to a jump to the lower count limit. Counting continues from there.
If the lower count limit is reached during down-counting, an additional counting pulse in the negative direction leads to a jump to the upper count limit. Counting continues from there.
Because of the register size, the count limits are fixed and cannot be changed.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)

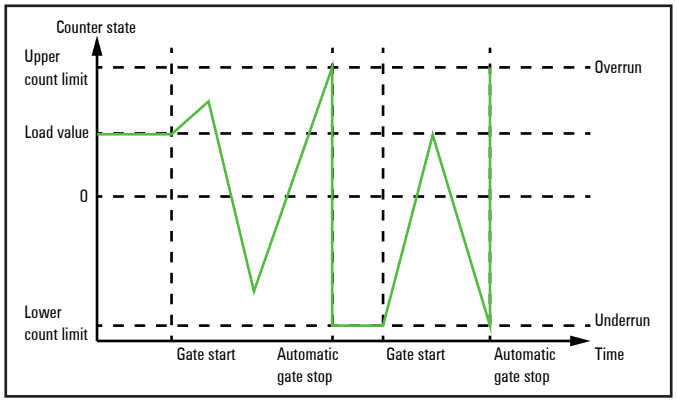
The status bits "Overflow performed" and "Underflow performed" are set in the case of an overflow or underflow. They remain set until they are reset with bit "Reset status bits" in the control word.
In addition, a process alarm can be triggered if it is provided.

1-time counting

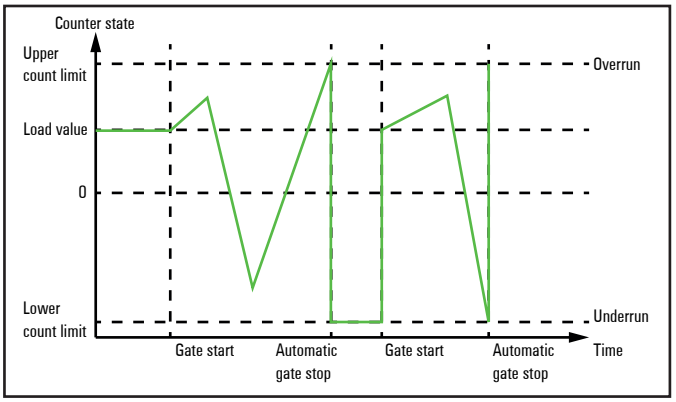
No primary counting direction
- 1-time counting from the load value
- Counting up or down
- Fixed setting of the count limit to the maximum counting range
- If the upper or lower count limits are exceeded, the counter always jumps to the other count limit. Along with this the status bits "Overflow performed" or "Underflow performed" will be set and the internal gate will be closed automatically. In addition, a process.
- Alarm can be triggered if it is parametrized
- To start the counting process once again, the internal gate must be reopened
- In the event of interrupted gate control, the counting process is continued at the respective current counter reading.
- After a cancelled gate control, the counting process starts with the load value

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)



1-time counting, interrupted gate control.

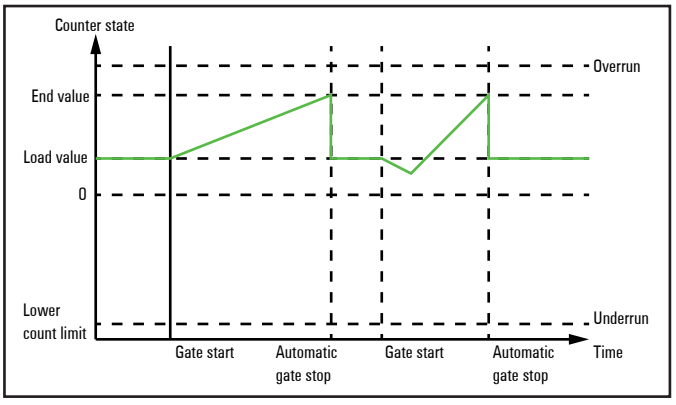


1-time counting, cancelled gate control.

Primary counting direction up
- Up-counting starting at the load value
- If the end value -1 is reached during counting in the positive direction, the counter jumps to the load value at the next positive count pulse and the internal gate is automatically closed. In addition, a process alarm can be triggered if it is parametrized.
- To restart the counting process, the internal gate must be reopened and the counting starts at the load value
- It is possible to count beyond the lower count limit

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 (-2^{31} + 1) to +2 147 483 647 ($2^{31}-1$)
Upper count limit	+2 147 483 648 (-2^{31})

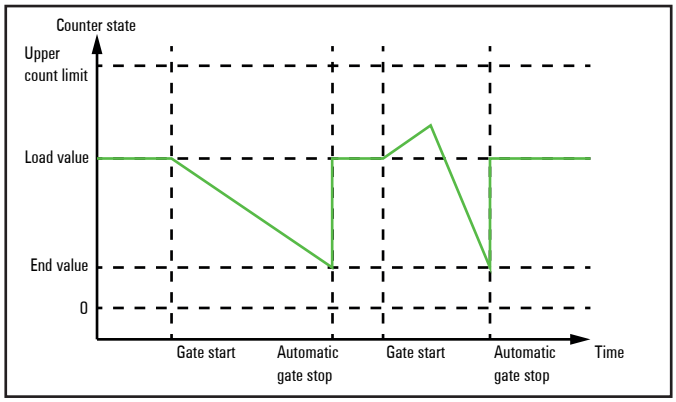


1-time counting, primary counting direction up.

Primary counting direction down
- Down-counting from the load value
- If the end value -1 is reached during counting in the negative direction, the counter jumps to the load value at the next count pulse and the internal gate is automatically closed. In addition, a process alarm can be triggered if it is parametrized.
- To restart the counting process, the internal gate must be reopened and the counting starts at the load value
- It is possible to count beyond the upper count limit

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 (-2^{31}) to +2 147 483 646 ($2^{31}-2$)
Upper count limit	+2 147 483 648 ($2^{31}-1$)



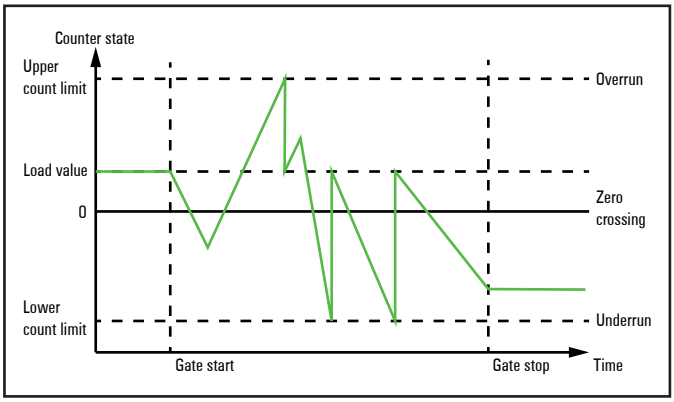
1-time counting, primary counting direction down.

Periodic counting

No primary counting direction
- Counting starting at the load value, up or down.
- Upon reaching the corresponding count limit, the counter jumps to the load value and starts counting again from there. In addition, a process alarm can be triggered if it is parametrized.
- Because of the register size, the count limits are fixed and cannot be changed.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 648 (-2^{31})
Upper count limit	+2 147 483 647 ($2^{31}-1$)

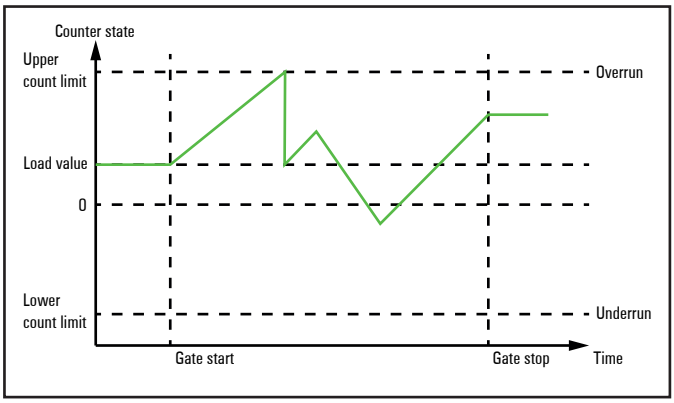


Periodic counting, no primary counting direction.

Primary counting direction up
- Up-counting starting at the load value
- If the end value -1 is reached during counting in the positive direction, the counter jumps to the load value at the next positive count pulse and continues counting from there. In addition, a process alarm can be triggered if it is parametrized.
- It is possible to count beyond the lower count limit.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 (-2^{31} +1) to +2 147 483 647 ($2^{31}-1$)
Upper count limit	+2 147 483 648 (2^{31})

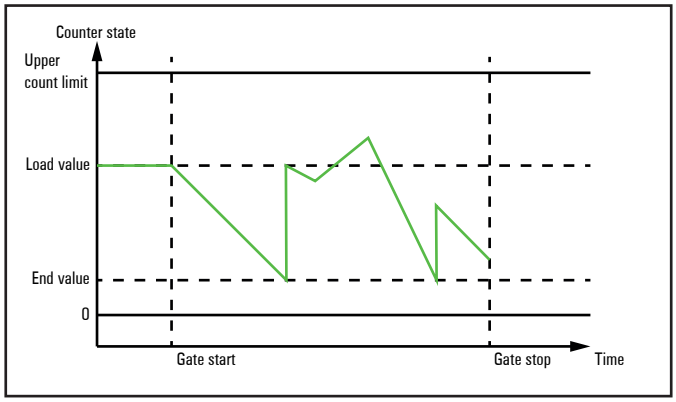


Periodic counting, primary counting direction up.

Primary counting direction down
- Down-counting from the load value
- If the end value +1 is reached during counting in the negative direction, the counter jumps to the load value at the next count pulse and continues counting from there. In addition, a process alarm can be triggered if it is parametrized.
- It is possible to count beyond the lower count limit.

Counting range

Limits	Valid range of values
Lower count limit	-2 147 483 647 (-2^{31}) to +2 147 483 646 ($2^{31}-2$)
Upper count limit	+2 147 483 648 ($2^{31}-1$)



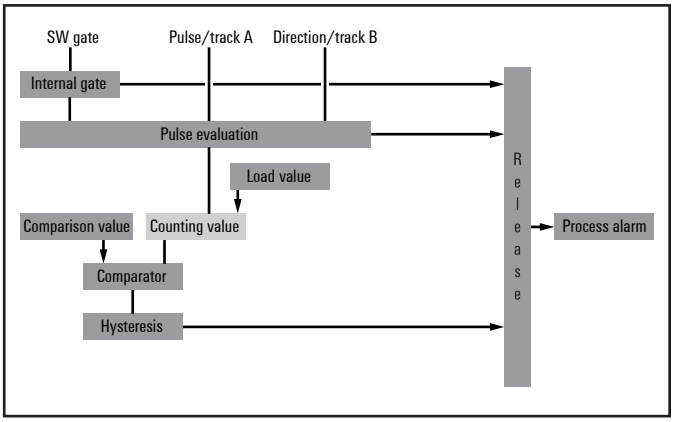
Periodic counting, primary counting direction down.

Additional counter features

Overview

You can set the additional features listed below for the counter by parametrizing the UR20 2CNT-100:
- By entering a comparison value, the digital output is activated or a process alarm is triggered depending on the counter value
- Hysteresis
  It is possible to prevent frequent switching of the output and/or triggering of the alarm, e.g. when the value of a sensor signal fluctuates around the comparison value, by setting the hysteresis

The figure illustrates how counting behaviour is affected by the additional features. These additional features are explained in the following pages.



Additional counter functions.

Comparison function

The comparison values for the two counter channels are preset using the first two double words of the process data outputs. If the comparison bit was released via control word the bit "Comparison condition met" of the status word is activated as soon as the comparison condition is met.

The following behaviour can be set for the comparison bit through parametrizing:

- No comparison: the comparison bit is not affected
- Counter value ≥ comparison value: comparison bit is set
- Counter value ≤ comparison value: comparison bit is set
- Counter value = comparison value: comparison bit is set

No comparison

The comparison bit is not affected.

The comparison bit is set when the counter value ≥ comparison value

The comparison bit remains set until the counter value is larger than or equal to the comparison value.

The comparison bit is set when the counter value ≤ comparison value

The comparison bit remains set until the counter value is less than or equal to the comparison value.

The comparison bit is set when the counter value ≤ comparison value

The comparison bit is set as soon as the counter value equals the comparison value. The bit remains set until the comparison condition is no longer met.

If a primary counting direction has been set, the output switches only upon reaching the comparison value from the primary counting direction.

The bit "comparison condition met" is activated together with the bit "Comparison bit set" of the status word. In contrast to the "Comparison bit set" bit it remains active until it is reset with the bit "Reset status bits" of the control word.

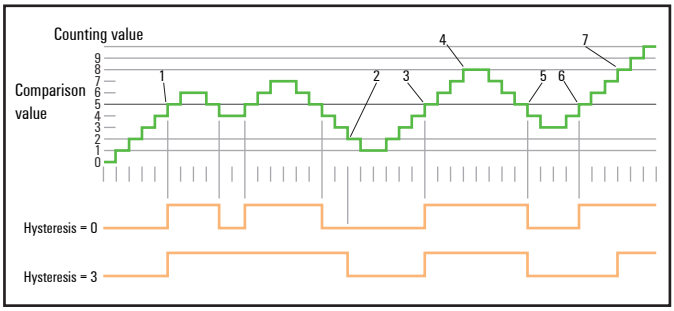
Hysteresis

It is possible to prevent frequent switching of the output and/or triggering of the alarm, e.g. if the value of a sensor signal fluctuates around the comparison value, by setting the hysteresis. A range between 0 and 255 can be preset for the hysteresis. Hysteresis is deactivated with the values 0 and 1. Hysteresis affects a zero-crossing, overflow/underflow and comparison value.

Active hysteresis remains active after the change. The new hysteresis range is active during the next hysteresis event. The behaviour of the status bits for hysteresis 0 and hysteresis 3 are shown in the following diagrams for the corresponding conditions.

Status bits are not reset automatically. The reset always needs to be done via reset bit of the control word. Therefore hysteresis does not affect the reset behaviour of the status bits but their reset enabling and retrigger behaviour.

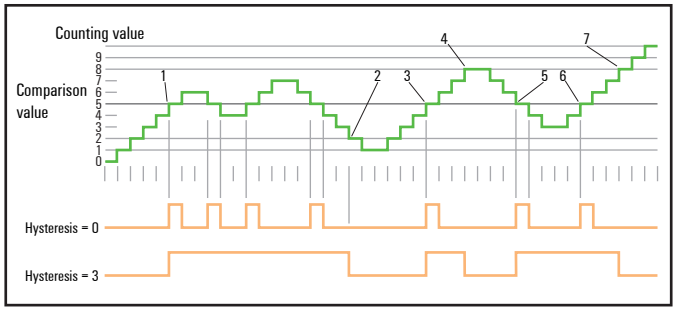
Operating principle when counter value ≥ comparison value



1 Counter value ≥ comparison value → status bit is set and hysteresis activated
2 Leaving the hysteresis range → status bit is reset enabled
3 Counter value ≥ comparison value → status bit is set and hysteresis activated
4 Upon leaving the hysteresis range, the status bit remains set because the counter value ≥ comparison value
5 Counter value < comparison value and hysteresis active → status bit is reset enabled
6 Counter value ≥ comparison value → status bit is not set because hysteresis is activated
7 Upon leaving the hysteresis range, the status bit is set because the counter value ≥ comparison value

Hysteresis is active upon reaching the comparison condition. The comparison result remains unchanged during active hysteresis until the counter value leaves the set hysteresis range. After leaving the hysteresis range, hysteresis is reactivated only upon reaching the comparison condition again.

Operating principle when counter value = comparison value



1 Counter value = comparison value → comparison bit is set and hysteresis activated
2 Leaving the hysteresis range → comparison bit is reset and counter value < comparison value
3 Counter value = comparison value → comparison bit is set and hysteresis activated
4 Comparison bit is reset because the hysteresis range is left and counter value > comparison value
5 Counter value = comparison value → output is set and hysteresis activated
6 Counter value = comparison value and hysteresis active → comparison bit remains set
7 Leaving the hysteresis range and counter value > comparison value → comparison bit is reset

Hysteresis becomes active when the comparison condition is reached. The comparison result remains unchanged during active hysteresis until the counter value leaves the set hysteresis range. After leaving the hysteresis range, hysteresis is reactivated only upon reaching the comparison condition again.

Diagnostics and alarm

Overview

Trigger	Process alarm	Diagnostic alarm	parametrizable
Overflow	✓	-	✓
Underflow	✓	-	✓
Comparision value	✓	-	✓
End value	✓	-	✓
Diagnostics buffer overflow	-	✓	-
Process alarm lost	-	✓	

Process alarm data

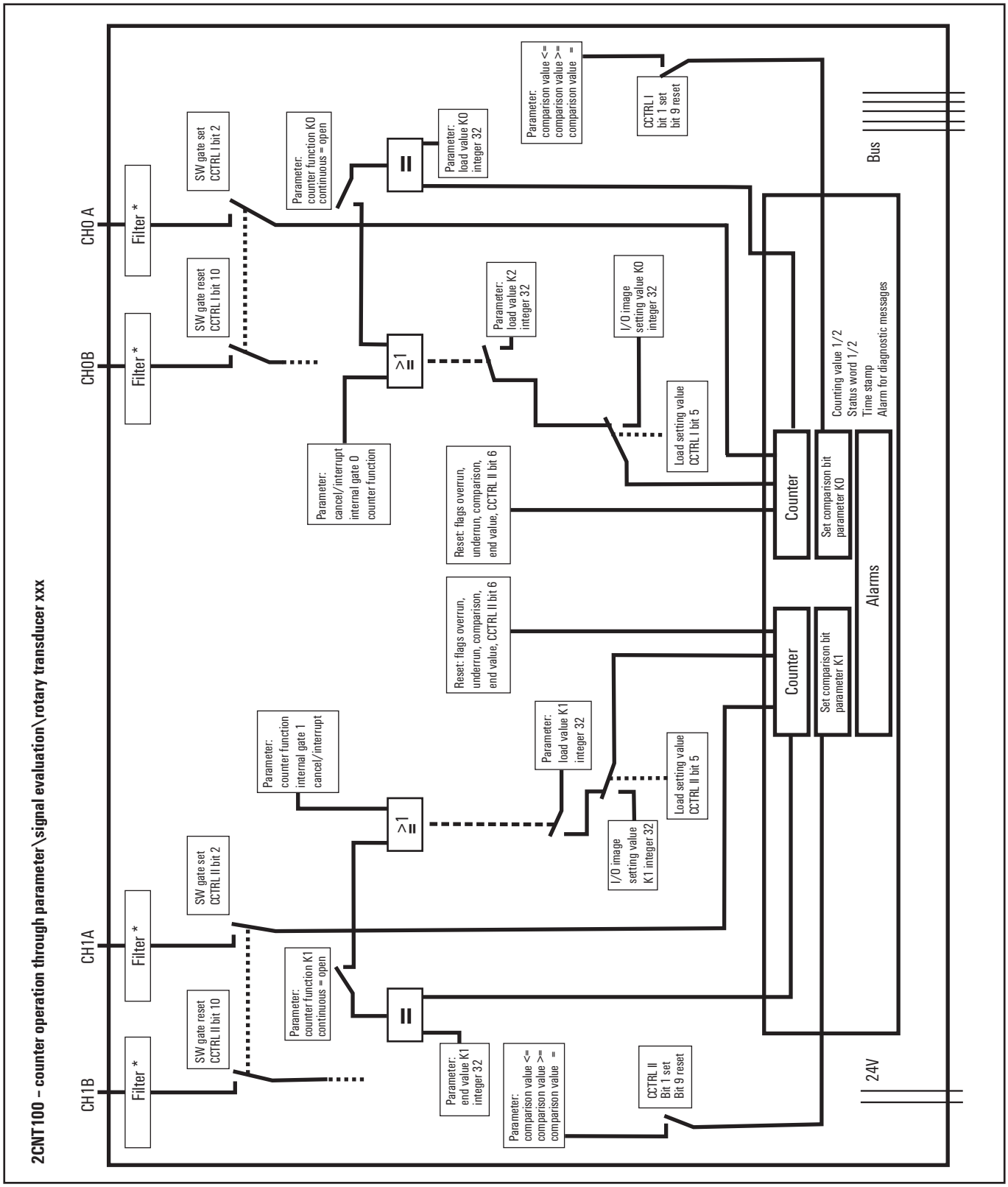
In order to react to asynchronous events, there is the option of activating process alarms. Linear program flow is interrupted by the process alarm and it branches to a specific interrupt routine depending on the master system. At this place it is possible to respond appropriately to the process alarm.

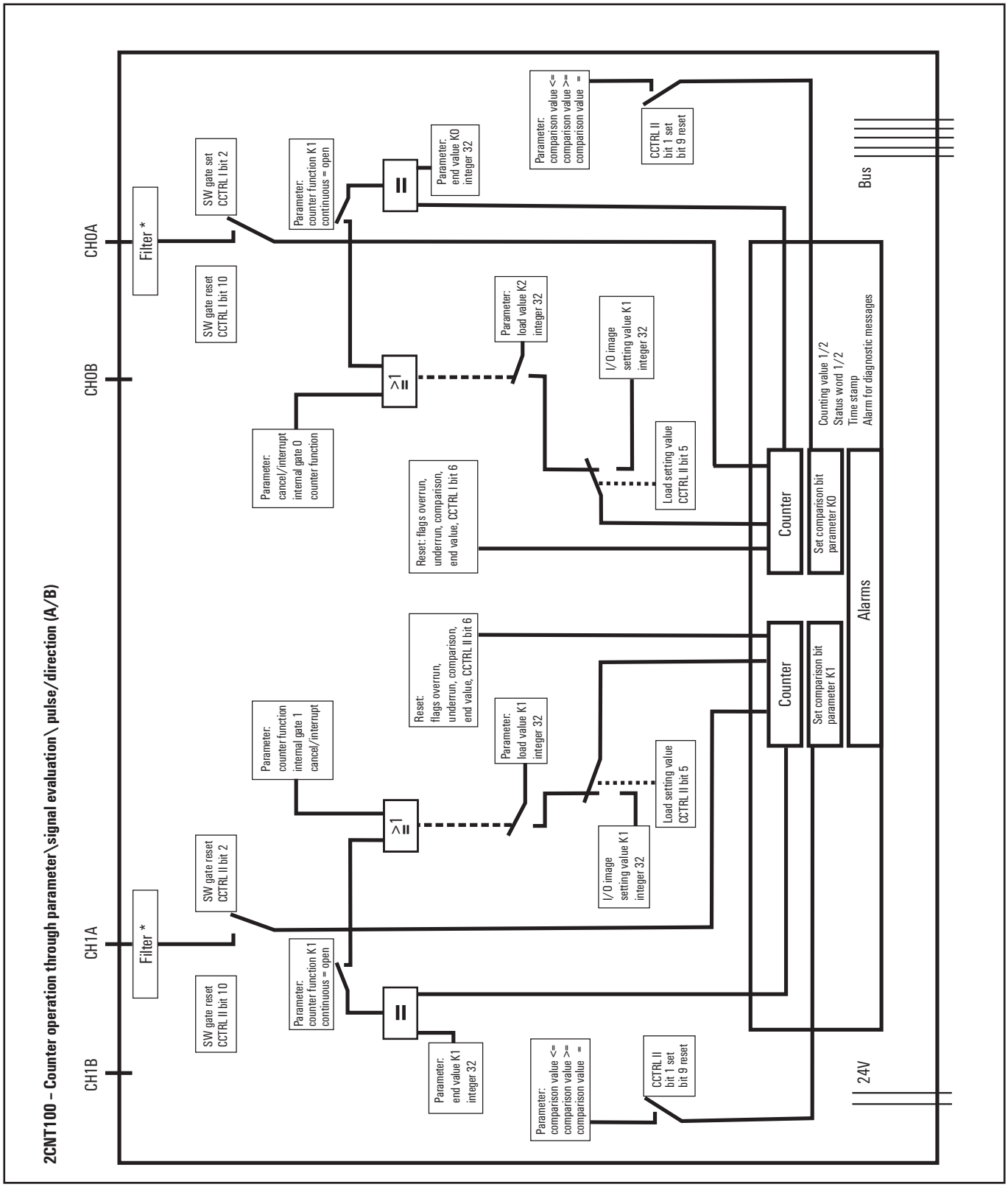
Process alarm data UR20-2CNT-100

Byte	Bit	Funktion
B0	X0.0 - 0.1	reserved
	X0.2	Counter 0 : Overflow, underflow or end value reached
	X0.3	Counter 0: Comparison value reached
	X0.4 - 0.5	reserved
	X0.6	Counter 1 : Overflow, underflow or end value reached
	X0.7	Counter 1: Comparison value reached
B1	X1.0	Status Counter 0: Input channel 0 A (trace A)
	X1.1	Status Counter 0: Input channel 0 B (trace B)
	X1.2	Status Counter 1: Input channel 0 A (trace A)
	X1.3	Status Counter 1: Input channel 0 B (trace B)
	X1.4 - 1.7	reserved
B2		16 Bit Zeitstempel 0 ... 65535µs, rotierend
B3		

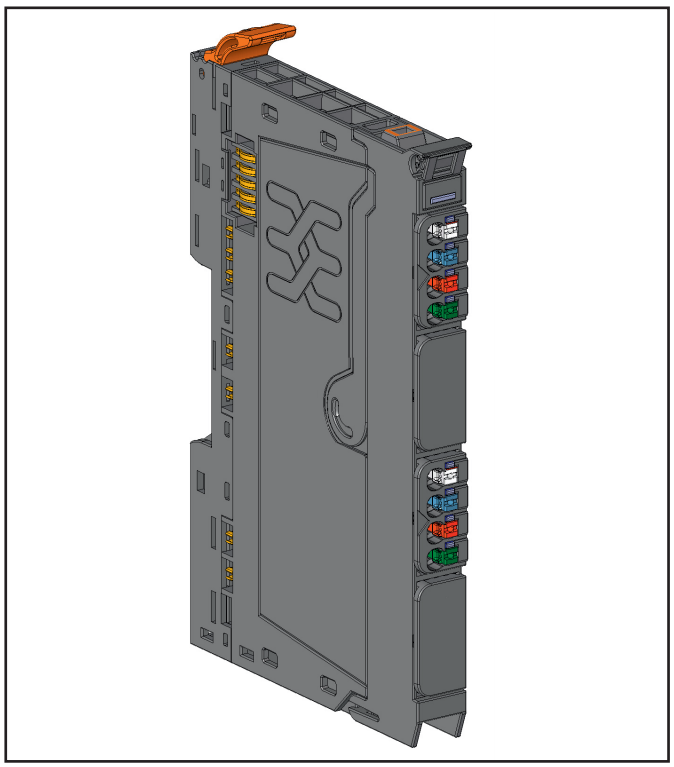
Diagnostic data

A diagnostic alarm for the module can be activated through parametrizing.
Upon triggering of a diagnostic alarm, the diagnostic data from the module is made available for diagnosis$_{incoming}$. As soon as the causes of the triggering of a diagnostic alarm are no longer present, an automatic diagnostic alarm$_{outgoing}$ is activated.
If a diagnostic alarm$_{incoming}$ is triggered for a channel due to a process alarm going missing, all events up until the corresponding diagnostic alarm$_{outgoing}$ are lost.
Within this period of time (1st diagnostic alarm$_{incoming}$ until the last diagnostic alarm$_{outgoing}$), the module's dome LED lights up.

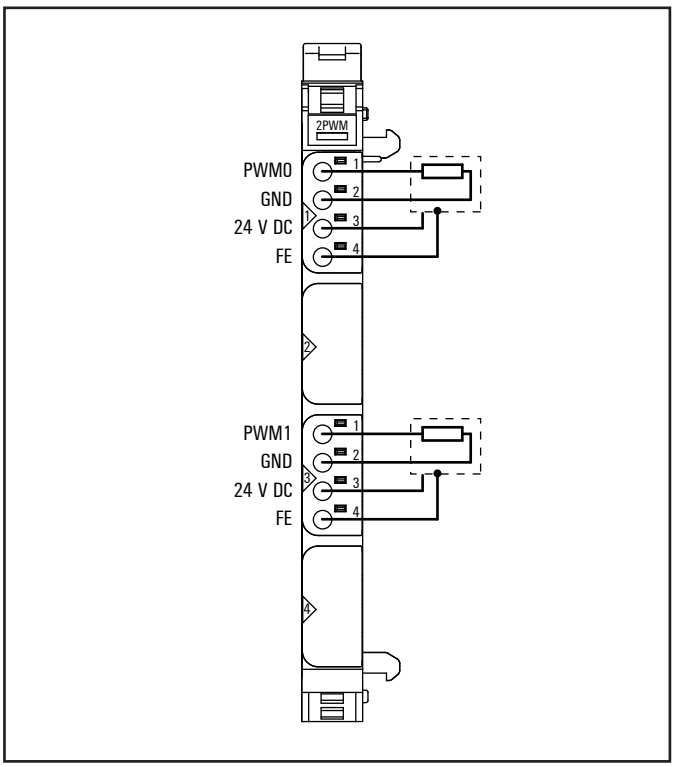

2CNT100 – counter operation through parameter\signal evaluation\rotary transducer xxx
CH 1B
CH1A
CH0B
CH0 A
Filter *
SW gate reset CCTRL II bit 10
SW gate set CCTRL II bit 2
SW gate reset CCTRL I bit 10
SW gate set CCTRL I bit 2
Parameter: counter function K1 continuous = open
Parameter: counter function K0 continuous = open
Parameter: counter function internal gate 1 cancel/interrupt
Parameter: cancel/interrupt internal gate 0 counter function
Parameter: end value K1 integer 32
Parameter: load value K1 integer 32
Parameter: load value K2 integer 32
Parameter: load value K0 integer 32
Parameter: comparison value <= comparison value >= comparison value =
I/O image setting value K1 integer 32
I/O image setting value K0 integer 32
Load setting value CCTRL II bit 5
Load setting value CCTRL I bit 5
CCTRL II Bit 1 set Bit 9 reset
CCTRL I bit 1 set bit 9 reset
Reset: flags overrun, underrun, comparison, end value, CCTRL II bit 6
Reset: flags overrun, underrun, comparison, end value, CCTRL II bit 6
Counter
Counter
Set comparison bit parameter K1
Set comparison bit parameter K0
Alarms
Counting value 1/2
Status word 1/2
Time stamp
Alarm for diagnostic messages
Bus
24V


2CNT100 – Counter operation through parameter\signal evaluation\ pulse/direction (A/B)
CH0A
CH0B
CH1A
CH1B
Filter *
SW gate set CCTRL I bit 2
SW gate reset CCTRL I bit 10
Parameter: counter function K1 continuous = open
=
Parameter: end value K0 integer 32
Parameter: comparison value <= comparison value >= comparison value =
CCTRL II bit 1 set bit 9 reset
Bus
Parameter: load value K2 integer 32
≥1
I/O image setting value K1 integer 32
Load setting value CCTRL II bit 5
Parameter: cancel/interrupt internal gate 0 counter function
Reset: flags overrun, underrun, comparison, end value, CCTRL I bit 6
Counter
Set comparison bit parameter K0
Counting value 1/2
Status word 1/2
Time stamp
Alarm for diagnostic messages
Alarms
Reset: flags overrun, underrun, comparison, end value, CCTRL II bit 6
Parameter: counter function internal gate 1 cancel/interrupt
Parameter: load value K1 integer 32
SW gate reset CCTRL II bit 2
SW gate reset CCTRL II bit 10
Parameter: counter function K1 continuous = open
Parameter: end value K1 integer 32
Parameter: comparison value <= comparison value >= comparison value =
CCTRL II bit 1 set bit 9 reset
24V

6.17 Digital pulse width modulation output module UR20-2PWM-PN-0.5A



Digital pulse width modulation output module UR20-2PWM-PN-0.5A (Order No. 1315600000)



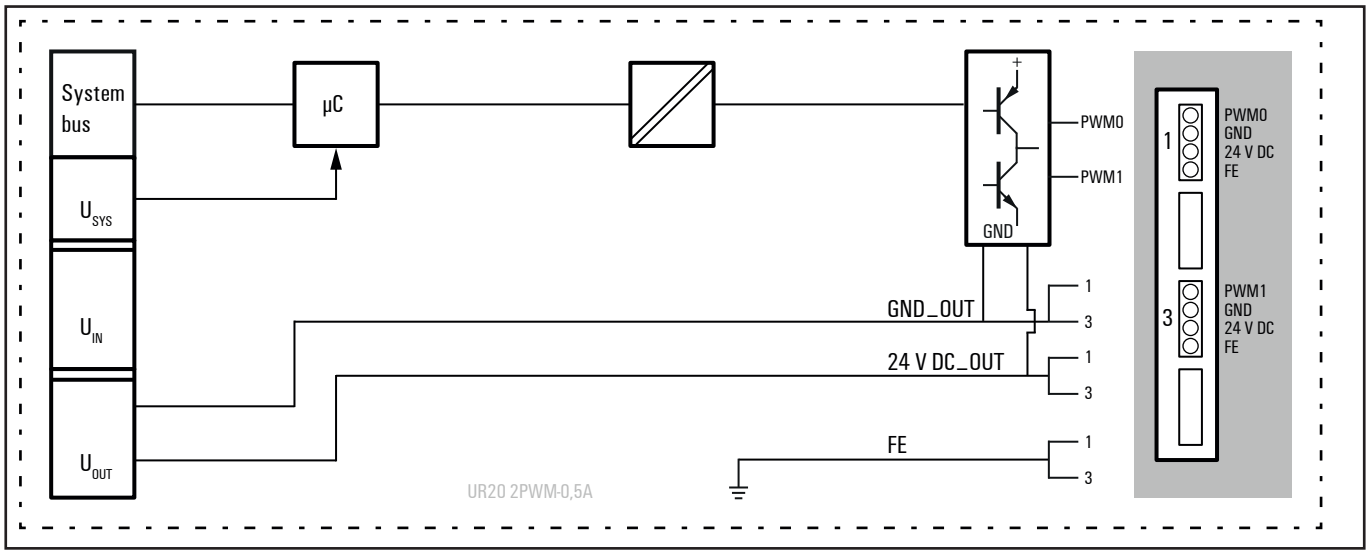
Connection diagram UR20-2PWM-PN-0.5A

The digital pulse width modulation module UR20-2PWM-PN-0.5A can control up to 2 actuators each with a maximum of 0.5 A. The parameterization can specify the period duration for each channel. Input values of 1 ... 8388607 based on a factor 20.83 ns are supported (approx. 21 ns ... approx. 175 ms). Using the same dimension the pulse duration is defined in the process data via an output double word. If the pulse duration exceeds the duration of the period, the output is set permanently. In another output word the output mode is switched and the output is being started and stopped. Deactivated outputs are set to GND.

For each channel the current status can be read in an status word. A status LED is assigned to each channel. The outputs are supplied with power from the output current path (U_{OUT}). The module is protected against external voltages between 0 V and the operating voltage.

	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: PWM output 0 = 100 %, p- or n-switching
	Yellow flashing at 2 Hz: PWM output 0 is > 0 and < 100 %, p- or n-switching
3.1	Yellow: PWM output 1 = 100 %, p- or n-switching
	Yellow flashing at 2 Hz: PWM output 1 is > 0 and < 100 %, p- or n-switching

LED indicators UR20-2PWM-PN-0.5A, error messages see Chapter 13



Block diagram UR20-2PWM-PN-0.5A

Technical data UR20-2PWM-PN-0.5A (Order No. 1315600000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	2	
Type	DO PWM push/pull	
Response time	max. 100 ns high; max. 100 ns low	
Resolution	32 bits	
Accuracy	1 bit	
Max. output current	per channel	0.5 A
	per module	1 A
Switching frequency	Resistive load (min. 47 Ω)	static, 6 Hz to 40 kHz
	Inductive load (DC 13)	static, 6 Hz to 40 kHz
	Lamp load (12 W)	static, 6 Hz to 40 kHz
Actuator connection	2-wire, 3-wire, 3-wire + FE	
Actuator supply	max. 2 A per plug, total max. 8 A	
Pulse duty factor	0–100 % push/pull or push parametrizable	
Short-circuit-proof	yes	
Response time of the protective circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Reactionless	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (internal)	40 mA (output current path)	
General data		
Weight	77 g	
For additional general data, see Section 3.4		

Overview of the editable parameters UR20-2PWM-PN-0.5A

Channel	Description	Options (Value)	Default value
0 ... 1	Period duration = n*20,83 ns	1202 ... 8388607	1202

Diagnostic data UR20-2PWM-PN-0.5A

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	External auxiliary supply error	
		5	Reserved	0
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0-2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Reserved	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	0
Number of channels	6		Number of similar channels per module	0
Channel error	7 - 10	0-31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

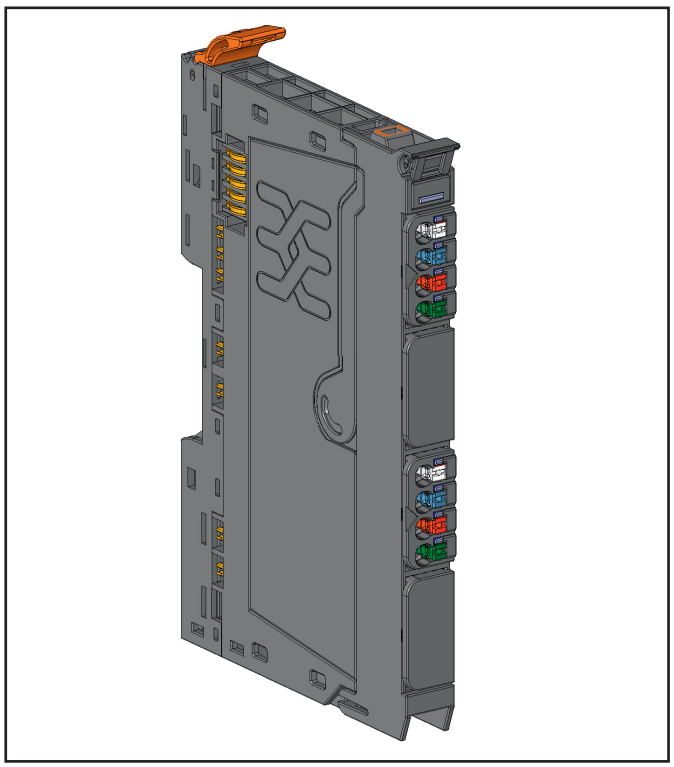
Process data inputs UR20-2PWM-PN-0.5A

Byte	Format	Name	Bit	Function, when active	Remarks
IB0	Word	Channel 0: Status word	IX0.0	reserved	
			IX0.1	Status PWM output	0: disabled, 1: enabled
			IX0.2	reserved	
			IX0.3	Output mode	0: Push/Pull 1:Highside
			IX0.4 ... 0.7	reserved	
IB1			IX1.0 ... 1.7	reserved	
IB2	Word	Channel 1: Status word	IX2.0	reserved	
			IX2.1	Status PWM output	0: disabled, 1: enabled
			IX2.2	reserved	
			IX2.3	Output mode	0: Push/Pull 1:Highside
			IX02.4 ... 2.7	reserved	
IB3			IX3.0 ... 3.7	reserved	

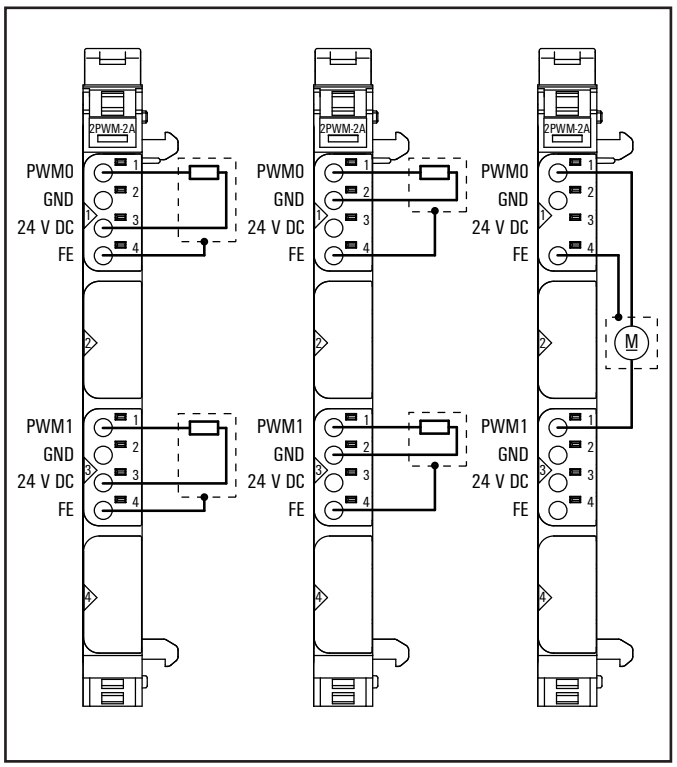
Process data outputs UR20-2PWM-PN-0.5A

Byte	Format	Name	Bit	Function, when set	Remarks
QB0	Double Word	Channel 0: Pulse duration			Input value * 20,83 ns Input range: 1 ... 8388607
QB1					
QB2					
QB3					
QB4	Double Word	Channel 1: Pulse duration			Input value * 20,83 ns Input range: 1 ... 8388607
QB5					
QB6					
QB7					
QB8	Word	Channel 0: Control word	QX8.0 ... QX8.1	reserved	
			QX8.2	Output mode	0: Push/Pull 1: Highside
			QX8.3 ... QX8.7	reserved	
QB9			QX9.0	starts output	Setting with edge 0-1, dominates stop bit
			QX9.1	stops output	Setting with edge 0-1, start bit must be resetted
			QX9.2 ... QX9.7	reserved	
QB10	Word	Channel 1: Control word	QX10.0 ... QX10.1	reserved	
			QX10.2	Output mode	0: Push/Pull 1: Highside
			QX10.3 ... QX10.7	reserved	
QB11			QX11.0	starts output	Setting with edge 0-1, dominates stop bit
			QX11.1	stops output	Setting with edge 0-1, start bit must be resetted
			QX11.2 ... QX11.7	reserved	

6.18 Digital pulse width modulation output module UR20-2PWM-PN-2A



Digital pulse width modulation output module UR20-2PWM-PN-2A (Order No. 1315610000)



Connection diagram UR20-2PWM-PN-2A

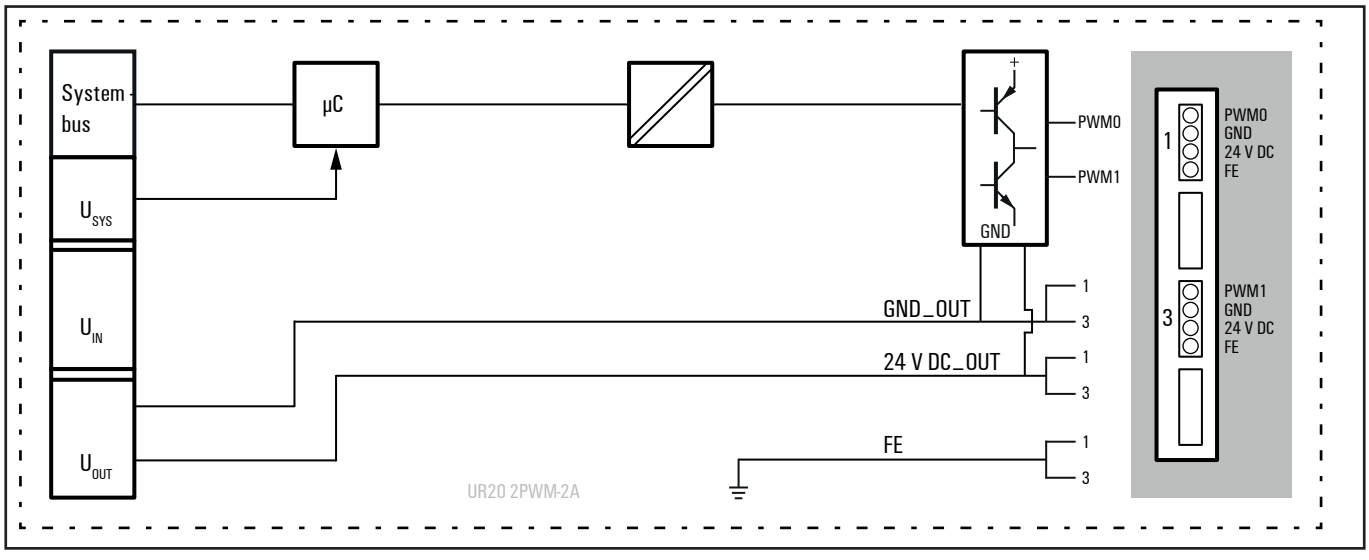
The digital pulse width modulation module UR20-2PWM-2A can control up to 2 actuators each with a maximum of 0.5 A. The parameterization can specify the period duration for each channel. Input values of 1 ... 8388607 based on a factor 20.83 ns are supported (approx. 21 ns ... approx. 175 ms). Using the same dimension the pulse duration is defined in the process data via an output double word. If the pulse duration exceeds the duration of the period, the output is set permanently. In another output word the output mode is switched and the output is being started and stopped. De-activated outputs are set to GND.

For each channel the current status can be read in an status word.

A status LED is assigned to each channel. The outputs are supplied with power from the output current path (U_{OUT}). The module is protected against external voltages between 0 V and the operating voltage.

	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Yellow: PWM output 0 = 100 %, p- or n-switching
	Yellow flashing at 2 Hz: PWM output 0 is > 0 and < 100 %, p- or n-switching
3.1	Yellow: PWM output 1 = 100 %, p- or n-switching
	Yellow flashing at 2 Hz: PWM output 0 is > 0 and < 100 %, p- or n-switching

LED indicators UR20-2PWM-PN-2A, error messages see Chapter 13



Block diagram UR20-2PWM-PN-2A

Technical data UR20-2PWM-PN-2A (Order No. 1315610000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Outputs		
Number	2	
Type	DO PWM push/pull	
Response time	max. 100 ns high; max. 100 ns low	
Resolution	32 bits	
Accuracy	1 bit	
Max. output current	per channel	2 A
	per module	4 A
Switching frequency	Resistive load (min. 12 Ω)	6 Hz to 40 kHz
	Inductive load (DC 13)	6 Hz to 40 kHz
	Lamp load (48 W)	6 Hz to 40 kHz
Actuator connection	2-wire, 3-wire, 3-wire + FE	
Actuator supply	max. 2 A per plug, total max. 8 A	
Pulse duty factor	0–100 % push/pull or push programmable	
Short-circuit-proof	yes	
Response time of the protective circuit	< 100 µs	
Module diagnosis	yes	
Individual channel diagnosis	no	
Reactionless	yes	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (internal)	40 mA (output current path)	
General data		
Weight	82 g	
For additional general data, see Section 3.4		

Overview of the editable parameters UR20-2PWM-PN-2A

Channel	Description	Options (Value)	Default value
0 ... 1	Period duration = n*20,83 ns	1202 ... 8388607	1202

Diagnostic data UR20-2PWM-PN-2A

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	External auxiliary supply error	
		5	Reserved	0
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x0F
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0-2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Reserved	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x72
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	2
Channel error	7 - 10	0-31	Reserved	0
Channel 0 error to Channel 31 error	11 to 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

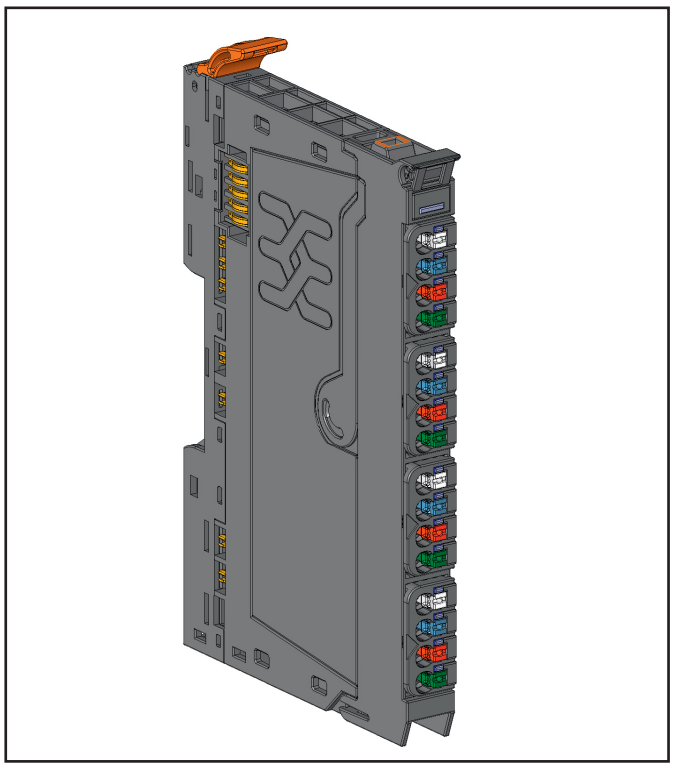
Process data inputs UR20-2PWM-PN-2A

Byte	Format	Name	Bit	Function, if active	Remarks
IB0	Word	Channel 0: Status word	IX0.0	reserved	
			IX0.1	Status PWM output	0: disabled, 1: enabled
			IX0.2	reserved	
			IX0.3	Output mode	0: Push/Pull 1:Highside
			IX0.4 ... 0.7	reserved	
IB1			IX1.0 ... 1.7	reserved	
IB2	Word	Channel 1: Status word	IX2.0	reserved	
			IX2.1	Status PWM output	0: disabled, 1: enabled
			IX2.2	reserved	
			IX2.3	Output mode	0: Push/Pull 1:Highside
			IX02.4 ... 2.7	reserved	
IB3			IX3.0 ... 3.7	reserved	

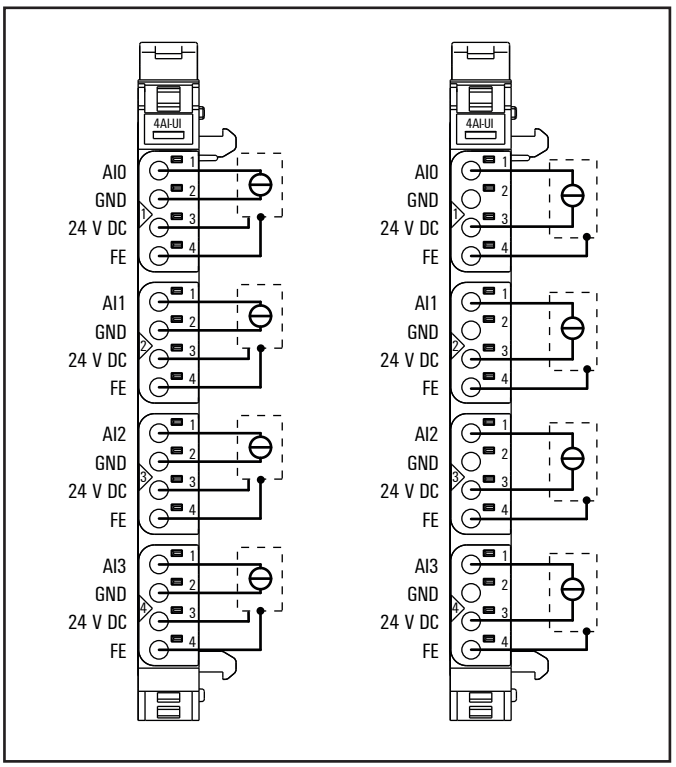
Process data outputs UR20-2PWM-PN-2A

Byte	Format	Name	Bit	Function, if set	Remarks
QB0	Double Word	Channel 0: Pulse duration			Input value * 20,83 ns Input range: 1 ... 8388607
QB1					
QB2					
QB3					
QB4	Double Word	Channel 1: Pulse duration			Input value * 20,83 ns Input range: 1 ... 8388607
QB5					
QB6					
QB7					
QB8	Word	Channel 0: Control word	QX8.0 ... QX8.1	reserved	
			QX8.2	Output mode	0: Push/Pull 1: Highside
			QX8.3 ... QX8.7	reserved	
QB9			QX9.0	starts output	Setting with edge 0-1, dominates stop bit
			QX9.1	stops output	Setting with edge 0-1, start bit must be resetted
			QX9.2 ... QX9.7	reserved	
QB10	Word	Channel 1: Control word	QX10.0 ... QX10.1	reserved	
			QX10.2	Output mode	0: Push/Pull 1: Highside
			QX10.3 ... QX10.7	reserved	
QB11			QX11.0	starts output	Setting with edge 0-1, dominates stop bit
			QX11.1	stops output	Setting with edge 0-1, start bit must be resetted
			QX11.2 ... QX11.7	reserved	

6.19 Analogue input module UR20-4AI-UI-16



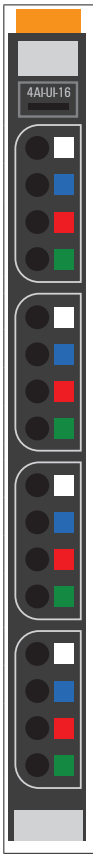
Analogue input module UR20-4AI-UI-16 (Order No. 1315620000)



Connection diagram UR20-4AI-UI-16 (left 3/4-wire sensor with sensor wiring via electronics, right: 2-wire sensor with sensor wiring via electronics)

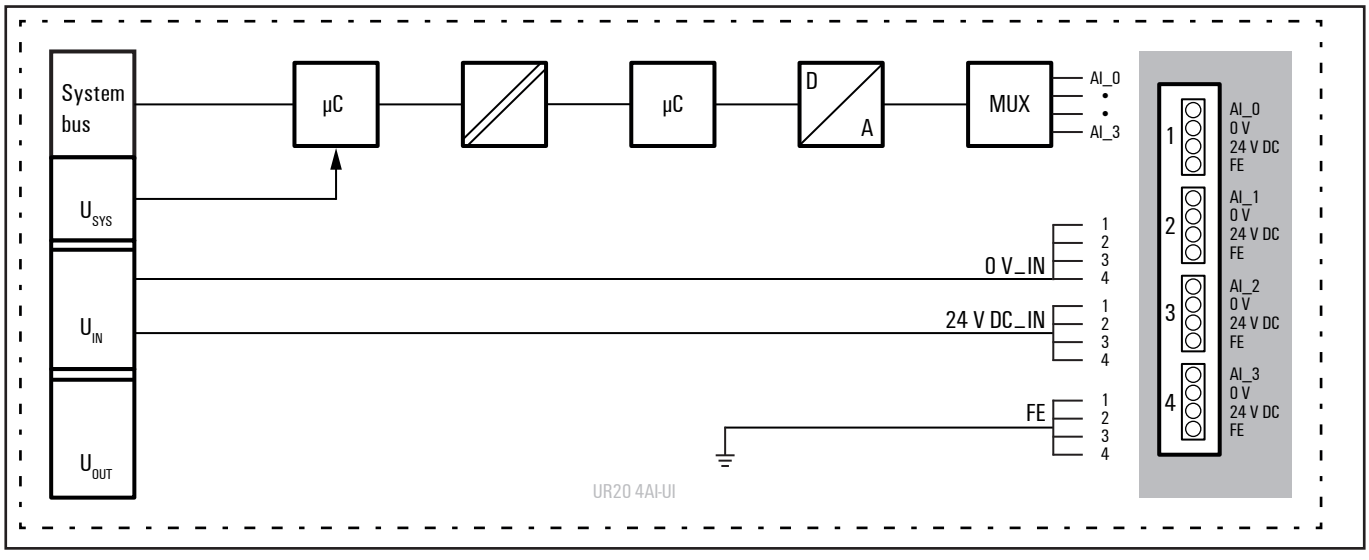
The UR20-4AI-UI-16 analogue input module can record up to 4 analogue sensors with ±10 V, ±5 V, 0 ... 10 V, 0 ... 5 V, 2 ... 10 V, 1 ... 5 V, 0 ... 20 mA or 4 ... 20 mA. The resolution is 16 bit per channel. Sensors can be connected to each connector in a 2- or 3-wire connection. The measurement range is defined using parameterisation. A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).

The inputs are protected against voltage surges and overcurrent. Voltages that exceed ±30 V may cause the destruction of the module. As a protection against overcurrent, the module temporarily switches to voltage mode.



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Red: channel error
2.1	Red: channel error
3.1	Red: channel error
4.1	Red: channel error

LED indicators UR20-4AI-UI-16, error messages see Chapter 13



Block diagram UR20-4AI-UI-16

Technical data UR20-4AI-UI-16 (Order No. 1315620000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Inputs		
Number	4	
Input values	1. Voltage (0 ... 5 V, ±5 V, 0 ... 10 V, ±10 V, 1 ... 5 V, 2 ... 10 V) 2. Current (0 ... 20 mA, 4 ... 20 mA)	
Resolution	16 bits	
Accuracy	±0.1 % max. ±50 ppm/K max. max. -10 mV/A	at 25 °C Temperature coefficient additional inaccuracy in the voltage mode due to sensor power supply current
Sensor supply	max. 2 A per plug, total max. 8 A	
Sensor connection	2-wire, 3-wire, 3-wire + FE	
Conversion time	1 ms	
Internal resistance	U: 100 kΩ; I: 41.2 Ω	
Reverse polarity protection	yes	
Short-circuit-proof	yes	
Response time of the protective circuit	< 50 ms	
Module diagnosis	yes	
Individual channel diagnosis	no	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	25 mA + sensor feed	Input current path
General data		
Weight	89 g	
For additional general data, see Section 3.4		

Overview of the editable parameters UR20-4AI-UI-16

Channel	Description	Options (Value)	Default value
	Frequency suppression	disabled (0) / 50 Hz (1) / 60 Hz (2) / Average over 16 values (3)	disabled
0 ... 3	Data format	S5 Data format (0) / S7 Data format (1)	S7 Data format
0 ... 3	Measurement range	0 to 20 mA (0) / 4 to 20 mA (1) / 0 V to 10 V (2) / -10 to 10 V (3) / 0 to 5 V (4) / -5 to 5 V (5) / 1 to 5 V (6) / 2 to 10 V (7) /disabled (8)	disabled

Diagnostic data UR20-4AI-UI-16

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	not used	
		4	Error	
		5	not used	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x05
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0–2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Power supply fault	
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x74
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0–31	Reserved	0
Channel 0 error to Channel 31 error	11 - 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Measurement range UR20-4AI-UI-16

Measurement range	Current (I) / Voltage (U)	Decimal (D)	Hexadecimal	Range	Conversion
0 – 20 mA Siemens S7 format	23.52 mA	32511	0x7EFF	Overloading	D = 27648 x I / 20 I = D x 20 / 27648
	20 mA	27648	0x6C00	Nominal range	
	10 mA	13824	0x3600		
	0 mA	0	0x0000		
0 – 20 mA Siemens S5 format	23.52 mA	19268	0x4B44	Overloading	D = 16384 x I / 20 I = D x 20 / 16384
	20 mA	16384	0x4000	Nominal range	
	10 mA	8192	0x2000		
	0 mA	0	0x0000		
4 – 20 mA Siemens S7 format	22.81 mA	32511	0x7EFF	Overloading	D = 27648 x (I – 4) / 16 I= D x 16 / 27648 + 4
	20 mA	27648	0x6C00	Nominal range	
	12 mA	13824	0x3600		
	4 mA	0	0x0000		
	1.19 mA	-4864	0xED00	Underloading	
4 – 20 mA Siemens S5 format	22.82 mA	19268	0x4B44	Overloading	D = 27648 x (I – 4) / 16 I = D x 16 / 16384 + 4
	20 mA	16384	0x4000	Nominal range	
	12 mA	8192	0x2000		
	4 mA	0	0x0000		
	0.8 mA	-3277	0xF333	Underloading	
0 – 10 V Siemens S7 format	11.76 V	32511	0x7EFFh	Overloading	D = 27648 x U/10 I = D x 10 / 27648
	10 V	27648	0x6C00	Nominal range	
	5 V	13824	0x3600		
	0 V	0	0x0000		
0 – 10 V Siemens S5 format	11.76 V	19268	0x4B44	Overloading	D = 16384 x U / 10 U = D x 10 / 16384
	10 V	16384	0x4000	Nominal range	
	5 V	8192	0x2000		
	0 V	0	0x0000		
±10 V Siemens S7 format	11.76 V	32511	0x7EFF	Overloading	D = 27648 x U / 10 U = D x 10 / 27648
	10 V	27648	0x6C00	Nominal range	
	5 V	13824	0x3600		
	0 V	0	0x0000		
	-5 V	-13824	0xCA00		
	-10 V	-27648	0x9400		
	-11.76 V	-32511	0x8100	Underloading	

Measurement range UR20-4AI-UI-16

Measurement range	Voltage (U)	Decimal (D)	Hexadecimal	Range	Conversion
±10 V Siemens S5-format	11,76 V	19268	0x4B44	Overloading	D = 16384 x U / 10 U = D x 10 / 16384
	10 V	16384	0x4000	Nominal range	
	5 V	8192	0x2000		
	0 V	0	0x0000		
	-5 V	-8192	0xE000		
	-10 V	-16384	0xC000		
	-11,76 V	-19268	0xB4BC	Underloading	
2 ... 10 V Siemens S7-format	11,41 V	32511	0x7EFF	Overloading	D = 27648 x (U – 2) / 8 U = D x 8 / 27648 + 2
	10 V	27648	0x6C00	Nominal range	
	6 V	13824	0x3600		
	2 V	0	0x0000		
	0,59 V	-4864	0xED00	Underloading	
2 ... 10 V Siemens S5-format	11,41 V	19268	0x4B44	Overloading	D = 16384 x (U – 2) / 8 U = D x 8 / 16384 + 2
	10 V	16384	0x4000	Nominal range	
	6 V	8192	0x2000		
	2V	0	0x0000		
	0,40 V	-3277	0xF333	Underloading	
1 ... 5 V Siemens S7-format	5,7 V	32511	0x7EFF	Overloading	D = 27648 x (U – 1) / 4 U = D x 4 / 27648 + 1
	5 V	27648	0x6C00	Nominal range	
	3 V	13824	0x3600		
	1 V	0	0x0000		
	0,30 V	-4864	0xED00	Underloading	
1 ... 5 V Siemens S5-format	5,7 V	19268	0x4B44	Overloading	D = 16384 x (U – 1) / 4 U = D x 4 / 16384 + 1
	5 V	16384	0x4000	Nominal range	
	3 V	8192	0x2000		
	1 V	0	0x0000		
	0,20 V	-3277	0xF333	Underloading	
0 ... 5 V Siemens S7-format	5,88 V	32511	0x7EFF	Overloading	D = 27648 x U / 5 U = D x 5 / 27648
	5 V	27648	0x6C00	Nominal range	
	2,5 V	13824	0x3600		
	0 V	0	0x0000		

Measurement range UR20-4AI-UI-16

Measurement range	Voltage (U)	Decimal (D)	Hexadecimal	Range	Conversion
0 ... 5 V Siemens S5-format	5,88 V	19268	0x4B44	Overloading	D = 16384 x U / 5 U = D x 5 / 16384
	5 V	16384	0x4000	Nominal range	
	2,5 V	8192	0x2000		
	0 V	0	0x0000		
±5 V Siemens S7-format	5,88 V	32511	0x7EFF	Overloading	D = 27648 x U / 5 U = D x 5 / 27648
	5 V	27648	0x6C00	Nominal range	
	2,5	13824	0x3600		
	0 V	0	0x0000		
	-2,5 V	-13824	0xCA00		
	-5 V	-27648	0x9400		
	-5,88 V	-32511	0x8100	Underloading	
±5 V Siemens S5-format	5,88 V	19268	0x4B44	Overloading	D = 16384 x U / 5 U = D x 5 / 16384
	5 V	16384	0x4000	Nominal range	
	2,5	8192	0x2000		
	0 V	0	0x0000		
	-2,5 V	-8192	0xE000		
	-5 V	-16384	0xC000		
	-5,88 V	-19268	0xB4BC	Underloading	

The following applies for all S7 ranges:
input value > overload range = 0x7FFF
input value < underload range = 0x8000

Additional status bits are set for S5

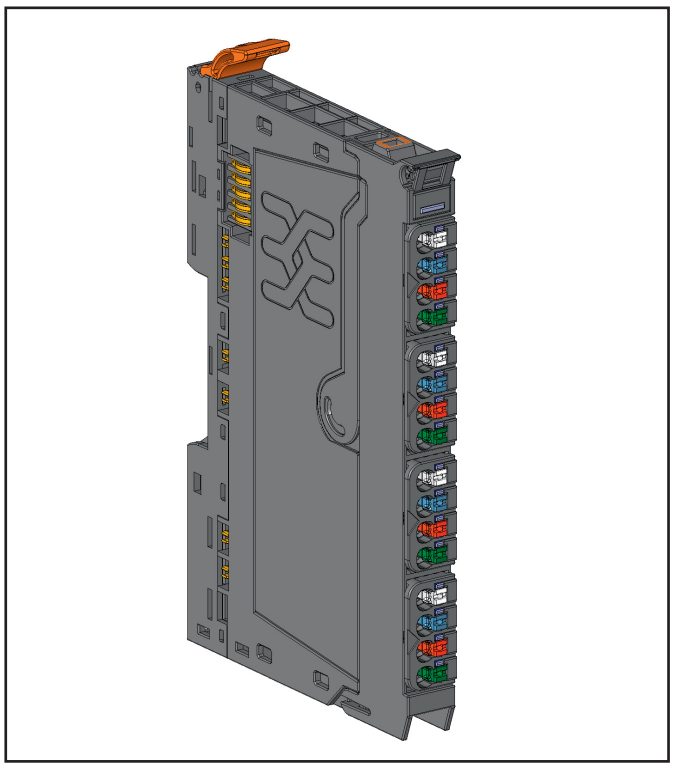
Digital measured value representation in Siemens S5 format

Data bit	7	6	5	4	3	2	1	0
Byte 0 (High Byte)	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}
Byte 1 (low byte)	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	A	F	O

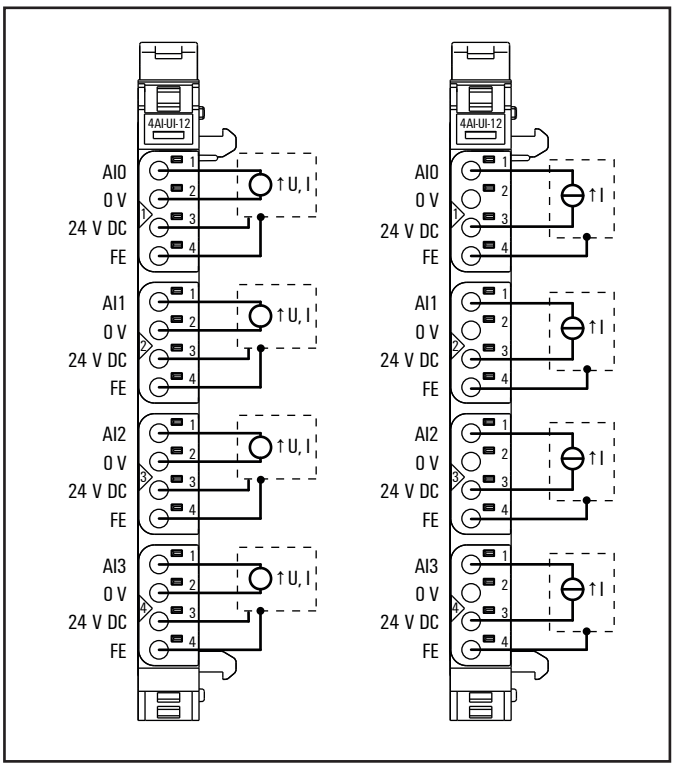
A: 0 = not active
1 = active
F: 0 = no line break
1 = line break
O: 0 = 0 to 4095 units
1 = ±4096 units (overflow)

Representation in two's complement
2^{12} = VZ in representation as amount and signs

6.20 Analogue input module UR20-4AI-UI-12



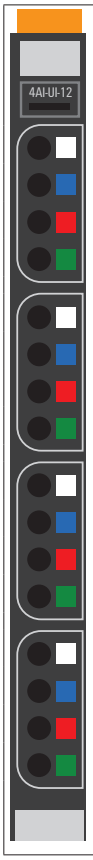
Analogue input module UR20-4AI-UI-12 (Order No. 1394390000)



Connection diagram UR20-4AI-UI-12 (left 3/4-wire sensor with sensor wiring via electronics, right: 2-wire sensor with sensor wiring via electronics)

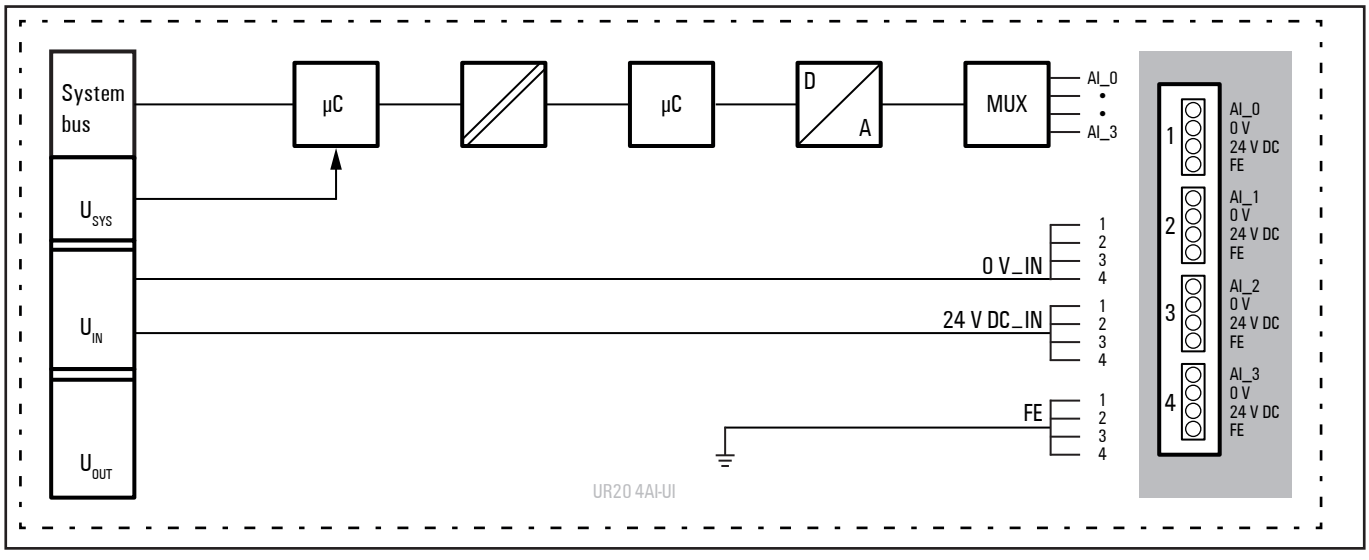
The analogue input module UR20-4AI-UI-12 can record up to 4 analogue sensors with ±10 V, ±5 V, 0 ... 10 V, 0 ... 5 V, 2 ... 10 V, 1 ... 5 V, 0 ... 20 mA or 4 ... 20 mA. The resolution is 12 bits per channel. Sensors can be connected to each connector in a 2- or 3-wire connection. The measurement range is defined using parameterisation. A status LED is assigned to each channel. The module electronics supply the connected sensors with power from the input current path (U_{IN}).

The inputs are protected against voltage surges and overcurrent. Voltages that exceed ±30 V may cause the destruction of the module. As a protection against overcurrent, the module temporarily switches to voltage mode.



	Status LED module Green: Communication over the system bus Red: No communication on system bus or diagnostic message displayed
1.1	Red: channel error input 0
2.1	Red: channel error input 1
3.1	Red: channel error input 2
4.1	Red: channel error input 3

LED indicators UR20-4AI-UI-12, error messages see Chapter 13



Block diagram UR20-4AI-UI-12

Technical data UR20-4AI-UI-12 (Order No. 1394390000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Inputs		
Number	4	
Input values	1. Voltage (0 ... 5 V, ±5 V, 0 ... 10 V, ±10 V, 1 ... 5 V, 2 ...10 V) 2. Current (0 ... 20 mA, 4 ... 20 mA)	
Resolution	12 bits	
Accuracy	±0,25 % max. ±50 ppm/K max. max. -10 mV/A	at 25 °C Temperature coefficient additional inaccuracy in the voltage mode due to sensor power supply current
Sensor supply	max. 2 A per plug, total max. 8 A	
Sensor connection	2-wire, 3-wire, 3-wire + FE	
Conversion time	1 ms	
Internal resistance	U: 100 kΩ; I: 42 Ω	
Reverse polarity protection	yes	
Short-circuit-proof	yes	
Response time of the protective circuit	< 50 ms	
Module diagnosis	yes	
Individual channel diagnosis	no	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (I_{IN} in the respective power segment)	25 mA + sensor feed	Input current path
General data		
Weight	87 g	
For additional general data, see Section 3.4		

Overview of the editable parameters UR20-4AI-UI-12

Channel	Description	Options (Value)	Default value
	Frequency suppression	disabled (0) / 50 Hz (1) / 60 Hz (2) / Average over 16 values (3)	disabled
0 ... 3	Data format	S5 Data format (0) / S7 Data format (1)	S7 Data format

Overview of the editable parameters UR20-4AI-UI-12

Channel	Description	Options (Value)	Default value
0 ... 3	Measurement range	0 to 20 mA (0) / 4 to 20 mA (1) / 0 V to 10 V (2) / -10 to 10 V (3) / 0 to 5 V (4) / -5 to 5 V (5) / 1 to 5 V (6) / 2 to 10 V (7) / disabled (8)	disabled

Diagnostic data UR20-4AI-UI-12

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	not used	
		4	Error	
		5	not used	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x05
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Power supply fault	
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x74
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 - 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Measurement range UR20-4AI-UI-12

Measurement range	Current (I) / Voltage (U)	Decimal (D)	Hexadecimal	Range	Conversion
0 – 20 mA Siemens S7 format	23.52 mA	32511	0x7EFF	Overloading	D = 27648 x I / 20 I = D x 20 / 27648
	20 mA	27648	0x6C00	Nominal range	
	10 mA	13824	0x3600		
	0 mA	0	0x0000		
0 – 20 mA Siemens S5 format	23.52 mA	19268	0x4B44	Overloading	D = 16384 x I / 20 I = D x 20 / 16384
	20 mA	16384	0x4000	Nominal range	
	10 mA	8192	0x2000		
	0 mA	0	0x0000		
4 – 20 mA Siemens S7 format	22.81 mA	32511	0x7EFF	Overloading	D = 27648 x (I – 4) / 16 I= D x 16 / 27648 + 4
	20 mA	27648	0x6C00	Nominal range	
	12 mA	13824	0x3600		
	4 mA	0	0x0000		
	1.19 mA	-4864	0xED00	Underloading	
4 – 20 mA Siemens S5 format	22.82 mA	19268	0x4B44	Overloading	D = 27648 x (I – 4) / 16 I = D x 16 / 16384 + 4
	20 mA	16384	0x4000	Nominal range	
	12 mA	8192	0x2000		
	4 mA	0	0x0000		
	0.8 mA	-3277	0xF333	Underloading	
0 – 10 V Siemens S7 format	11.76 V	32511	0x7EFF	Overloading	D = 27648 x U/10 I = D x 10 / 27648
	10 V	27648	0x6C00	Nominal range	
	5 V	13824	0x3600		
	0 V	0	0x0000		
0 – 10 V Siemens S5 format	11.76 V	19268	0x4B44	Overloading	D = 16384 x U / 10 U = D x 10 / 16384
	10 V	16384	0x4000	Nominal range	
	5 V	8192	0x2000		
	0 V	0	0x0000		
±10 V Siemens S7-format	11,76 V	32511	0x7EFF	Overloading	D = 27648 x U / 10 U = D x 10 / 27648
	10 V	27648	0x6C00	Nominal range	
	5 V	13824	0x3600		
	0 V	0	0x0000		
	-5 V	-13824	0xCA00		
	-10 V	-27648	0x9400		
	-11,76 V	-32511	0x8100	Underloading	

Measurement range UR20-4AI-UI-12

Measurement range	Voltage (U)	Decimal (D)	Hexadezimal	Range	Conversion
±10 V Siemens S5-format	11,76 V	19268	0x4B44	Overloading	D = 16384 x U / 10 U = D x 10 / 16384
	10 V	16384	0x4000	Nominal range	
	5 V	8192	0x2000		
	0 V	0	0x0000		
	-5 V	-8192	0xE000		
	-10 V	-16384	0xC000		
	-11,76 V	-19268	0xB4BC	Underloading	
2 ... 10 V Siemens S7-format	11,41 V	32511	0x7EFF	Overloading	D = 27648 x (U – 2) / 8 U = D x 8 / 27648 + 2
	10 V	27648	0x6C00	Nominal range	
	6 V	13824	0x3600		
	2 V	0	0x0000		
	0,59 V	-4864	0xED00	Underloading	
2 ... 10 V Siemens S5-format	11,41 V	19268	0x4B44	Overloading	D = 16384 x (U – 2) / 8 U = D x 8 / 16384 + 2
	10 V	16384	0x4000	Nominal range	
	6 V	8192	0x2000		
	2V	0	0x0000		
	0,40 V	-3277	0xF333	Underloading	
1 ... 5 V Siemens S7-format	5,7 V	32511	0x7EFF	Overloading	D = 27648 x (U – 1) / 4 U = D x 4 / 27648 + 1
	5 V	27648	0x6C00	Nominal range	
	3 V	13824	0x3600		
	1 V	0	0x0000		
	0,30 V	-4864	0xED00	Underloading	
1 ... 5 V Siemens S5-format	5,7 V	19268	0x4B44	Overloading	D = 16384 x (U – 1) / 4 U = D x 4 / 16384 + 1
	5 V	16384	0x4000	Nominal range	
	3 V	8192	0x2000		
	1 V	0	0x0000		
	0,20 V	-3277	0xF333	Underloading	
0 ... 5 V Siemens S5-format	5,88 V	19268	0x4B44	Overloading	D = 16384 x U / 5 U = D x 5 / 16384
	5 V	16384	0x4000	Nominal range	
	2,5 V	8192	0x2000		
	0 V	0	0x0000		

Measurement range UR20-4AI-UI-12

Measurement range	Voltage (U)	Decimal (D)	Hexadezimal	Range	Conversion
±5 V Siemens S7-format	5,88 V	32511	0x7EFF	Overloading	D = 27648 x U / 5 U = D x 5 / 27648
	5 V	27648	0x6C00	Nominal range	
	2,5	13824	0x3600		
	0 V	0	0x0000		
	-2,5 V	-13824	0xCA00		
	-5 V	-27648	0x9400		
	-5,88 V	-32511	0x8100	Underloading	
±5 V Siemens S5-format	5,88 V	19268	0x4B44	Overloading	D = 16384 x U / 5 U = D x 5 / 16384
	5 V	16384	0x4000	Nominal range	
	2,5	8192	0x2000		
	0 V	0	0x0000		
	-2,5 V	-8192	0xE000		
	-5 V	-16384	0xC000		
	-5,88 V	-19268	0xB4BC	Underloading	

The following applies for all S7 ranges:
input value > overload range = 0x7FFF
input value < underload range = 0x8000

Additional status bits are set for S5

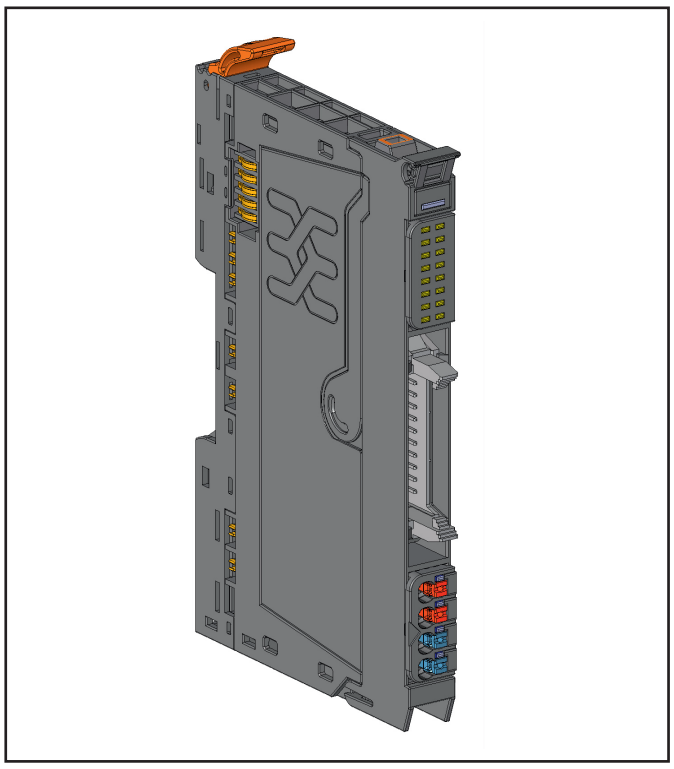
Digital measured value representation in Siemens S5 format

Data bit	7	6	5	4	3	2	1	0
Byte 0 (high byte)	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}
Byte 1 (low byte)	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	A	F	0

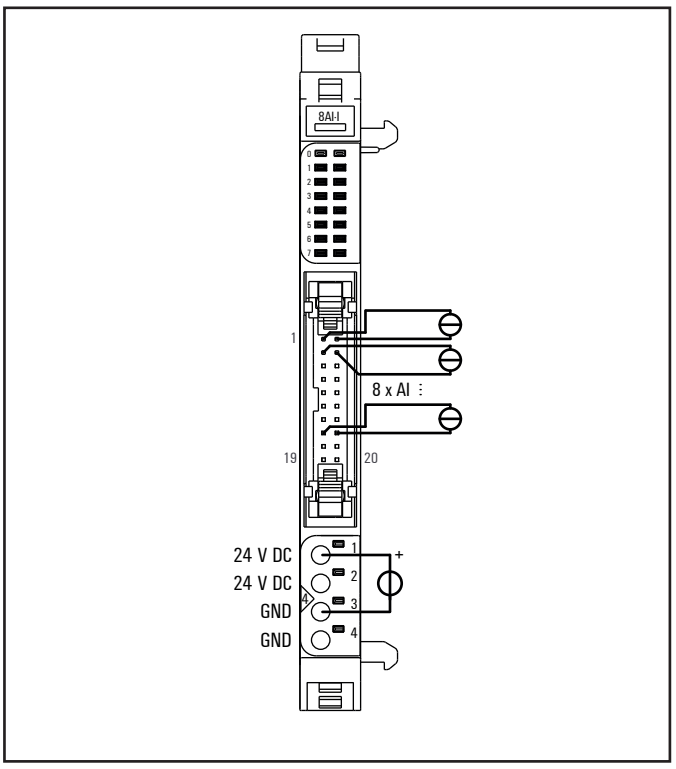
A: 0 = not active
1 = active
F: 0 = no line break
1 = line break
O: 0 = 0 to 4095 units
1 = ±4096 units (overflow)

Representation in two's complement
2^{12} = VZ in representation as amount and signs

6.21 Analogue input module UR20-8AI-I-PLC-INT



Analogue input module UR20-8AI-I-PLC-INT (Order No. 1315670000)

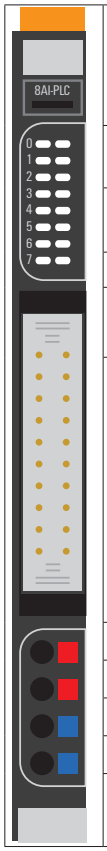


Connection diagram UR20-8AI-I-PLC-INT

The analogue input module UR20-8AI-I-PLC-INT can detect up to 8 analogue sensors with 0 ... 20 mA or 4 ... 20 mA. The 8 sensors are connected via a standard flat ribbon cable connector. The measurement range is defined using parameterisation. A single-colour LED for status and diagnosis is assigned in a separate block for each channel. The module electronics supply the connected sensors with power from the 4-pole feed plug (U_{IN}). The inputs are protected against overcurrent by a self-resetting fuse.

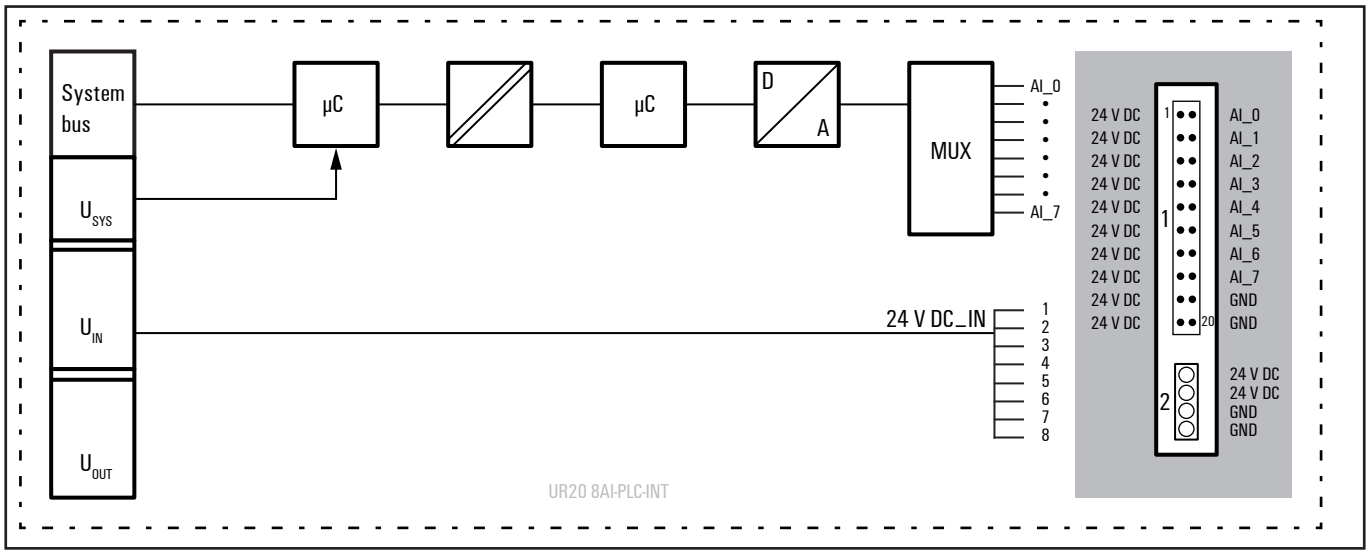
For the PLC connection, the following applies: a maximum current of 2 A (with a max. of 1 A per contact) can be taken from the +24 V connections or fed through the 0 V connections. In the case of a total current greater than 2 A, the common ground wire must be connected to the separate 4-pin plug-in connector.

Supplying power via the flat ribbon-cable connector must be ensured, also in case of higher voltage decline caused by an increased cable resistance.



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
0	Red: channel error
1	Red: channel error
...	...
7	Red: channel error
	24 V DC
	24 V DC
	GND
	GND

LED indicators UR20-8AI-I-PLC-INT, error messages see Chapter 13



Block diagram UR20-8AI-I-PLC-INT

Technical data UR20-8AI-I-PLC-INT (Order No. 1315670000)

System data		
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.	
Interface	u-remote system bus	
System bus transfer rate	48 Mbps	
Inputs		
Number	8	
Input values	Current input	
Resolution	16 bits	
Accuracy	max. 0.1 % FSR ±50 ppm/K max.	at 25 °C temperature coefficient
Sensor supply	External	
Sensor connection	PLC interface unit	
Conversion time	1 ms	
Internal resistance	approx. 50 Ω	
Reverse polarity protection	yes	
Short-circuit protection	yes	
Response time	< 0.1 s with short-circuit to +24 V	
Reset time	Temperature-dependent; < 30 s at 20 °C	
Module diagnosis	yes	
Individual channel diagnosis	no	
Supply		
Supply voltage	24 V DC +20 %/-15 %	
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA	
Current consumption (via supply connector at the module)	20 mA	
Connection data		
Type of connection	"PUSH IN"	
Line connection cross-section	Single-wired	0.14 … 1.5 mm² (AWG 16 – 26)
	Fine-wired	0.14 … 1.5 mm² (AWG 16 – 26)
I/O connector	20-pole ribbon cable connection	
General data		
Weight	73 g	
For additional general data, see Section 3.4		

Overview of the editable parameters UR20-8AI-I-PLC-INT

Channel	Description	Options (Value)	Default value
	Frequency suppression	disabled (0) / 50 Hz (1) / 60 Hz (2) / Average over 16 values (3)	disabled
0 ... 7	Data format	S5 Data format (0) / S7 Data format (1)	S7 Data format
0 ... 7	Measurement range	0 to 20 mA (0) / 4 to 20 mA (1) / disabled (3)	disabled

Diagnostic data UR20-8AI-I-PLC-INT

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	not used	
		4	Error	
		5	not used	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x05
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Power supply fault	
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x74
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	8
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 - 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Measurement range UR20-8AI-I-PLC-INT

Measurement range	Current (I)	Decimal (D)	Hexadecimal	Range	Conversion
0 - 20 mA Siemens S7 format	23.52 mA	32511	0x7EFF	Overloading	D = 27648 x I / 20 I = D x 20 / 27648
	20 mA	27648	0x6C00	Nominal range	
	10 mA	13824	0x3600		
	0 mA	0	0x0000		
0 - 20 mA Siemens S5 format	23.52 mA	19268	0x4B44	Overloading	D = 16384 x I / 20 I = D x 20 / 16384
	20 mA	16384	0x4000	Nominal range	
	10 mA	8192	0x2000		
	0 mA	0	0x0000		
4 - 20 mA Siemens S7 format	22.81 mA	32511	0x7EFF	Overloading	D = 27648 x (I - 4) / 16 I= D x 16 / 27648 + 4
	20 mA	27648	0x6C00	Nominal range	
	12 mA	13824	0x3600		
	4 mA	0	0x0000		
	1.19 mA	-4864	0xED00	Underloading	
4 - 20 mA Siemens S5 format	22.82 mA	19268	0x4B44	Overloading	D = 27648 x (I - 4) / 16 I = D x 16 / 16384 + 4
	20 mA	16384	0x4000	Nominal range	
	12 mA	8192	0x2000		
	4 mA	0	0x0000		
	0.8 mA	-3277	0xF333	Underloading	

The following applies for all S7 ranges:
input value > overload range = 0x7FFF
input value < underload range = 0x8000

Additional status bits are set for S5.

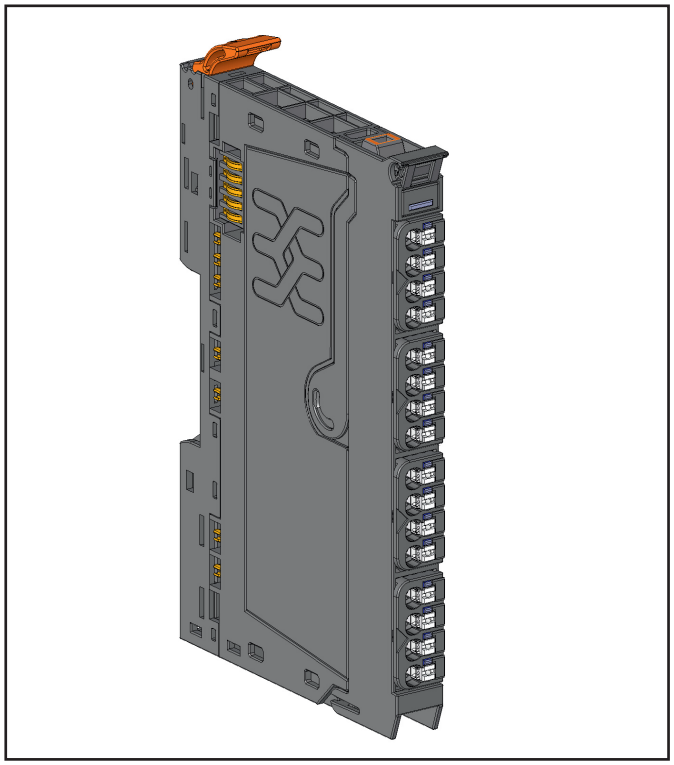
Digital measured value representation in Siemens S5 format

Data bit	7	6	5	4	3	2	1	0
Byte 0 (high byte)	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}
Byte 1 (low byte)	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}	A	F	O

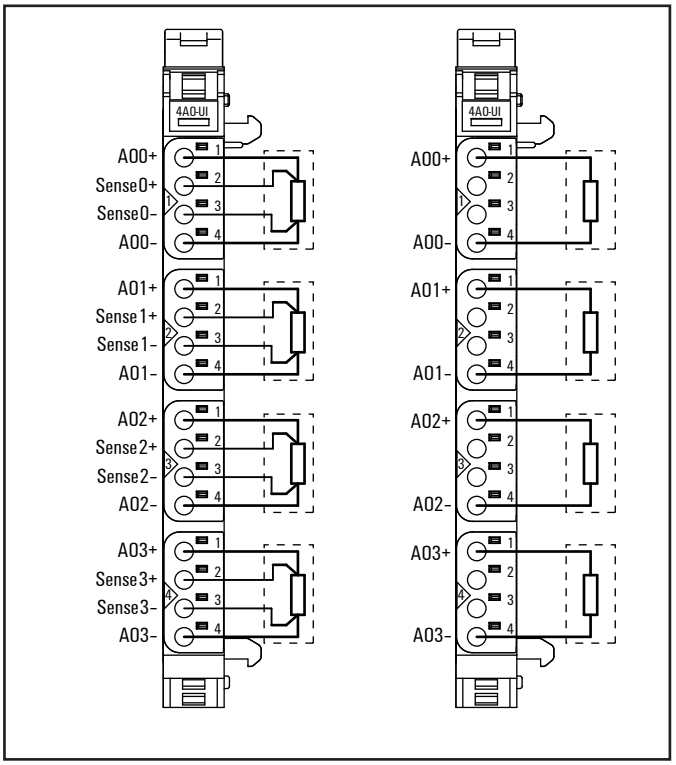
A: 0 = not active
1 = active
F: 0 = no line break
1 = line break
O: 0 = 0 to 4095 units
1 = ±4096 units (overflow)

Representation in two's complement
2^{12} = VZ in representation as amount and signs

6.22 Analogue output module UR20-4AO-UI-16

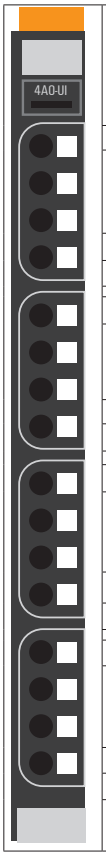


Analogue output module UR20-4AO-UI-16 (Order No. 1315680000)



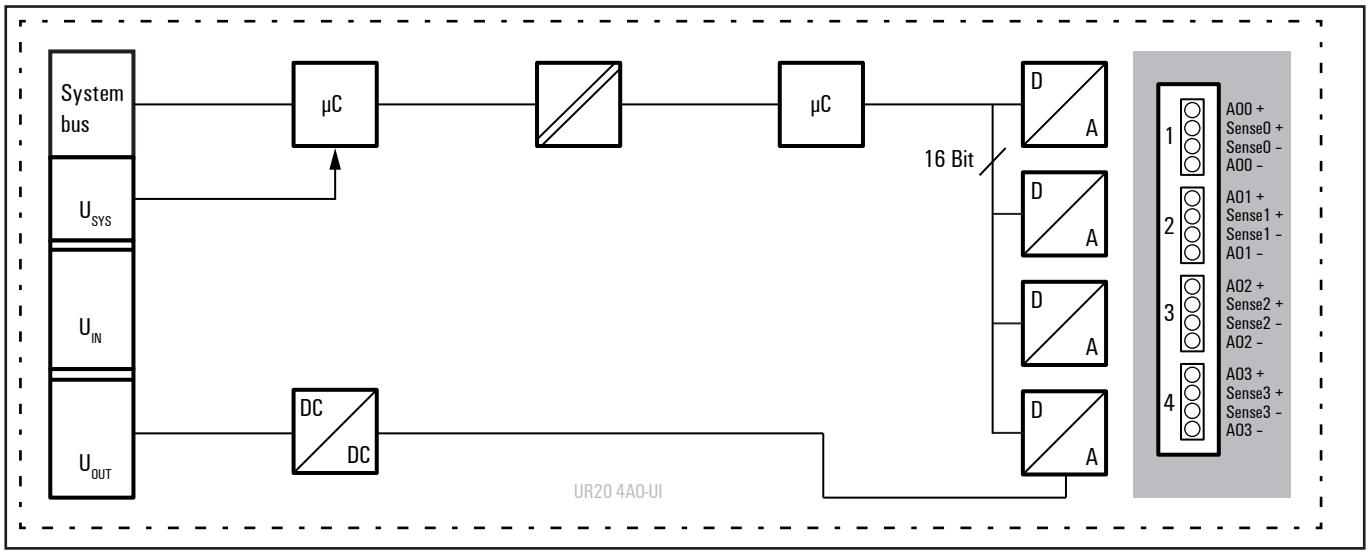
Connection diagram UR20-4AO-UI-16

The analogue output module UR20-4AO-UI-16 can control up to 4 analogue actuators with ±10 V, ±5 V, 0 ... 10 V, 0 ... 5 V, 2 ... 10 V, 1 ... 5 V, 0 ... 20 mA or 4 ... 20 mA. An actuator can be connected to each connector in a 2- or 4-wire connection, the internal switching is carried out automatically. The output range is defined using parameterisation. A status LED is assigned to each channel. The outputs are supplied with power from the output current path (U_{OUT}).



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.2	Red: Channel 0 at voltage output: overload or short circuit, at current output: shunt resistance too high or line break detected
2.2	Red: Channel 1 at voltage output: overload or short circuit, at current output: shunt resistance too high or line break detected
3.2	Red: Channel 2 at voltage output: overload or short circuit, at current output: shunt resistance too high or line break detected
4.2	Red: Channel 3 at voltage output: overload or short circuit, at current output: shunt resistance too high or line break detected

LED indicators UR20-4AO-UI-16, error messages see Chapter 13



Block diagram UR20-4AO-UI-16

Technical data UR20-4AO-UI-16 (Order No. 1315680000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Outputs	
Number	4
Output levels	1. Voltage (0 – 5 V, ±5 V, 0 – 10 V, ±10 V, 1 – 5 V, 2 – 10 V) 2. Current (0 – 20 mA, 4 – 20 mA)
Response time	1 ms for 4 channels
Resolution	16 bits
Accuracy	±0.1 % FSR max., 0.05 % FSR typ.
Temperature coefficient	20 ppm voltage / 31 ppm current measurement / K
Max. error between T_{min} and T_{max}	±220 ppm FSR
Monotony	yes
Crosstalk between the channels	±0.001 % FSR max.
Repeat accuracy	< ±1 mV eff.
Output ripple	max. 0.001 %
Voltage output load resistance	≥ 1 kΩ (at > 50 °C max ambient temperature, total sensor current of 25 mA and 10 mA per channel)
Current output load resistance	≤ 600 Ω
Actuator connection	2-wire (current and voltage), 4-wire (voltage), (2-wire: automatic detection)
Short-circuit-proof	yes
Module diagnosis	yes
Individual channel diagnosis	no
Substitute value	yes
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	85 mA (output current path)
General data	
Weight	83 g
For additional general data, see Section 3.4	

Overview of the editable parameters UR20-4AO-UI-16

Channel	Description	Options (Value)	Default value
0 ... 3	Data format	S5 Data format (0) / S7 Data format (1)	S7 Data format
0 ... 3	Output range	0 to 20 mA (0) / 4 to 20 mA (1) / 0 to 10 V (2) / -10 to 10 V (3) / 0 to 5 V (4) / -5 to 5 V (5) / 1 to 5 V (6) / 2 to 10 V (7) /disabled (8)	disabled
0 ... 3	Substitute value	depending on the chanels data format (S5/S7), see Tables "Measurement range"	0

Diagnostic data UR20-4AO-UI-16

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	not used	
		4	Error	
		5	not used	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module Type	0x05
		1		
		2		
		3		
		4	Channel information available	0
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Power supply fault	
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x73
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7 - 10	0 - 31	Reserved	0
Channel 0 error to Channel 31 error	11 - 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Measurement range UR20-4AO-UI-16

Measurement range	Current (I) / Voltage (U)	Decimal (D)	Hexadecimal	Range	Conversion
0 – 20 mA Siemens S7 format	23.52 mA	32511	0x7EFF	Overloading	D = 27648 x I / 20 I = D x 20 / 27648
	20 mA	27648	0x6C00	Nominal range	
	10 mA	13824	0x3600		
	0 mA	0	0x0000		
0 – 20 mA Siemens S5 format	23.52 mA	19268	0x4B44	Overloading	D = 16384 x I / 20 I = D x 20 / 16384
	20 mA	16384	0x4000	Nominal range	
	10 mA	8192	0x2000		
	0 mA	0	0x0000		
4 – 20 mA Siemens S7 format	22.81 mA	32511	0x7EFF	Overloading	D = 27648 x (I – 4) / 16 I= D x 16 / 27648 + 4
	20 mA	27648	0x6C00	Nominal range	
	12 mA	13824	0x3600		
	4 mA	0	0x0000		
	1.19 mA	-4864	0xED00	Underloading	
4 – 20 mA Siemens S5 format	22.82 mA	19268	0x4B44	Overloading	D = 27648 x (I – 4) / 16 I = D x 16 / 16384 + 4
	20 mA	16384	0x4000	Nominal range	
	12 mA	8192	0x2000		
	4 mA	0	0x0000		
	0.8 mA	-3277	0xF333	Underloading	
0 – 10 V Siemens S7 format	11.76 V	32511	0x7EFF	Overloading	D = 27648 x U/10 I = D x 10 / 27648
	10 V	27648	0x6C00	Nominal range	
	5 V	13824	0x3600		
	0 V	0	0x0000		
0 – 10 V Siemens S5 format	11.76 V	19268	0x4B44	Overloading	D = 16384 x U / 10 U = D x 10 / 16384
	10 V	16384	0x4000	Nominal range	
	5 V	8192	0x2000		
	0 V	0	0x0000		
±10 V Siemens S7 format	11.76 V	32511	0x7EFF	Overloading	D = 27648 x U / 10 U = D x 10 / 27648
	10 V	27648	0x6C00	Nominal range	
	5 V	13824	0x3600		
	0 V	0	0x0000		
	-5 V	-13824	0xCA00		
	-10 V	-27648	0x9400		
	-11.76 V	-32511	0x8100	Underloading	

Measurement range UR20-4AO-UI-16

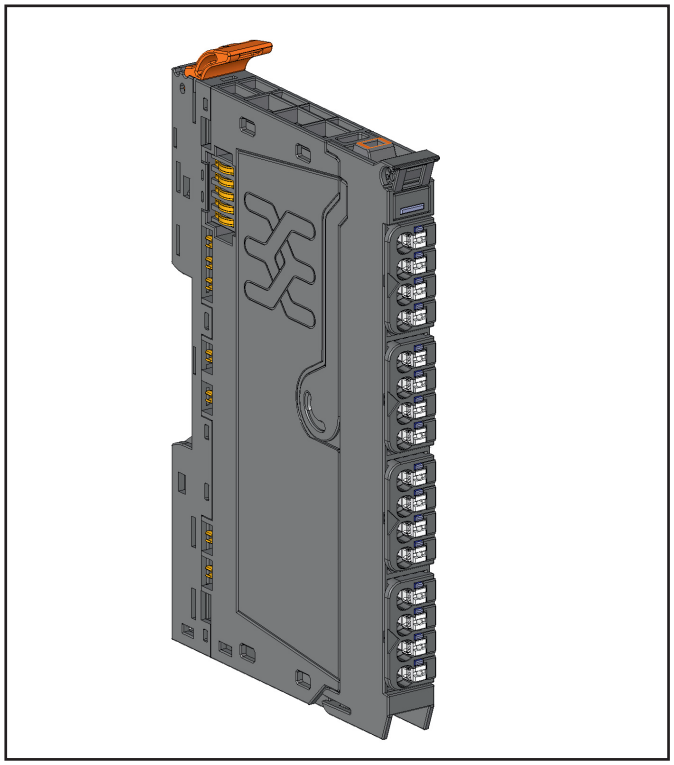
Measurement range	Voltage (U)	Decimal (D)	Hexadecimal	Range	Conversion
±10 V Siemens S5-format	11,76 V	19268	0x4B44	Overloading	D = 16384 x U / 10 U = D x 10 / 16384
	10 V	16384	0x4000	Nominal range	
	5 V	8192	0x2000		
	0 V	0	0x0000		
	-5 V	-8192	0xE000		
	-10 V	-16384	0xC000		
	-11,76 V	-19268	0xB4BC	Underloading	
2 ... 10 V Siemens S7-format	11,41 V	32511	0x7EFF	Overloading	D = 27648 x (U – 2) / 8 U = D x 8 / 27648 + 2
	10 V	27648	0x6C00	Nominal range	
	6 V	13824	0x3600		
	2 V	0	0x0000		
	0,59 V	-4864	0xED00	Underloading	
2 ... 10 V Siemens S5-format	11,41 V	19268	0x4B44	Overloading	D = 16384 x (U – 2) / 8 U = D x 8 / 16384 + 2
	10 V	16384	0x4000	Nominal range	
	6 V	8192	0x2000		
	2V	0	0x0000		
	0,40 V	-3277	0xF333	Underloading	
1 ... 5 V Siemens S7-format	5,7 V	32511	0x7EFF	Overloading	D = 27648 x (U – 1) / 4 U = D x 4 / 27648 + 1
	5 V	27648	0x6C00	Nominal range	
	3 V	13824	0x3600		
	1 V	0	0x0000		
	0,30 V	-4864	0xED00	Underloading	
1 ... 5 V Siemens S5-format	5,7 V	19268	0x4B44	Overloading	D = 16384 x (U – 1) / 4 U = D x 4 / 16384 + 1
	5 V	16384	0x4000	Nominal range	
	3 V	8192	0x2000		
	1 V	0	0x0000		
	0,20 V	-3277	0xF333	Underloading	
0 ... 5 V Siemens S7-format	5,88 V	32511	0x7EFF	Overloading	D = 27648 x U / 5 U = D x 5 / 27648
	5 V	27648	0x6C00	Nominal range	
	2,5 V	13824	0x3600		
	0 V	0	0x0000		
0 ... 5 V Siemens S5-format	5,88 V	19268	0x4B44	Overloading	D = 16384 x U / 5 U = D x 5 / 16384
	5 V	16384	0x4000	Nominal range	
	2,5 V	8192	0x2000		
	0 V	0	0x0000		

Measurement range UR20-4AO-UI-16

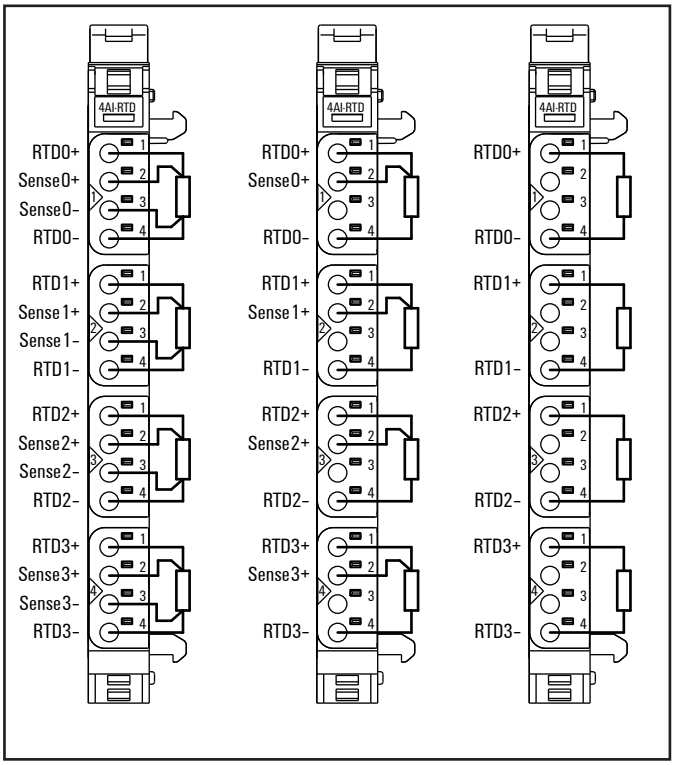
Measurement range	Voltage (U)	Decimal (D)	Hexadecimal	Range	Conversion
±5 V Siemens S7-format	5,88 V	32511	0x7EFF	Overloading	D = 27648 x U / 5 U = D x 5 / 27648
	5 V	27648	0x6C00	Nominal range	
	2,5	13824	0x3600		
	0 V	0	0x0000		
	-2,5 V	-13824	0xCA00		
	-5 V	-27648	0x9400		
	-5,88 V	-32511	0x8100	Underloading	
±5 V Siemens S5-format	5,88 V	19268	0x4B44	Overloading	D = 16384 x U / 5 U = D x 5 / 16384
	5 V	16384	0x4000	Nominal range	
	2,5	8192	0x2000		
	0 V	0	0x0000		
	-2,5 V	-8192	0xE000		
	-5 V	-16384	0xC000		
	-5,88 V	-19268	0xB4BC	Underloading	

The following applies for all S5 and S7 ranges:
value > overload range = outgang deactivated
value < underload range = outgang deactivated

6.23 Analogue input module UR20-4AI-RTD-DIAG

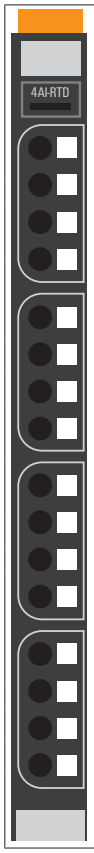


Analogue input module UR20-4AI-RTD-DIAG (Order No. 1315700000)



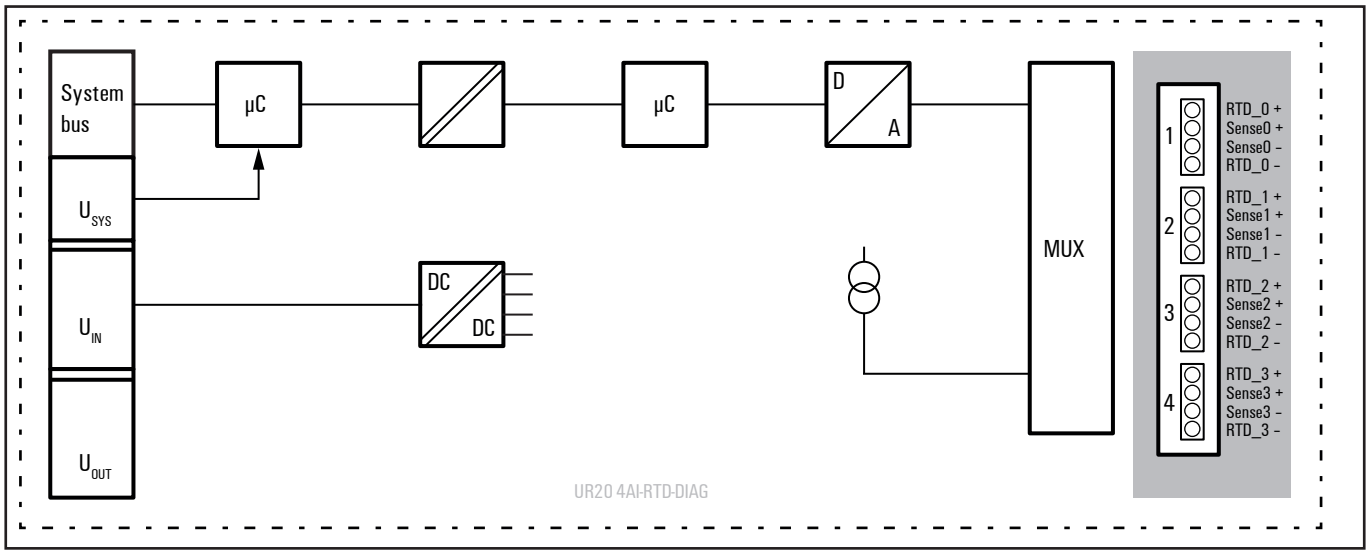
Connection diagram UR20-4AI-RTD-DIAG

The analogue input module UR20-4AI-RTD-DIAG can detect up to 4 analogue resistance thermometers. A sensor can be connected to each connector in a 2-, 3- or 4-wire connection. Mixed operation is possible. Sensor type and temperature range are set using parameterisation. A status LED is assigned to each channel. The sensors are supplied with power from the input current path (U_{IN}).



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Red: Signal at input 0 outside the permissible range, line break or short-circuit
2.1	Red: Signal at input 1 outside the permissible range, line break or short-circuit
3.1	Red: Signal at input 2 outside the permissible range, line break or short-circuit
4.1	Red: Signal at input 3 outside the permissible range, line break or short-circuit

LED indicators UR20-4AI-RTD-DIAG, error messages see Chapter 13



Block diagram UR20-4AI-RTD-DIAG

Technical data UR20-4AI-RTD-DIAG (Order No. 1315700000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	4
Sensor types	Pt100, Pt200, Pt500, Pt1000, Ni100, Ni120, Ni 200, Ni500, Ni1000, Cu10, 40 Ω, 80 Ω, 150 Ω, 300 Ω, 500 Ω, 1 kΩ, 2 kΩ, 4 kΩ
Resolution	16 bits
Accuracy	max. 0.2 % FSR / 0.3 % FSR for Ni sensors / 0.6 % FSR for Cu10
Sensor connection	2-wire, 3-wire, 4-wire
Max. wire resistance / measurement range	2.5 Ω / 40 Ω, 5 Ω / 80 Ω, 10 Ω / 150 Ω and Cu10, 25 Ω in all other measuring ranges
Temperature coefficient	±50 ppm/K max.
Temperature range	-200 … +850 °C
Conversion time	36 to 240 ms, adjustable
Common mode input voltage range	Channel to channel: max. ±2 V
	Channel to voltage supply: max. ±50 V
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	yes
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	20 mA (input current path)
General data	
Weight	91 g
For additional general data, see Section 3.4	

Overview of the editable parameters UR20-4AI-RTD-DIAG

Channel	Description	Options (Value)	Default value
	Temperature unit	Degree Celsius (0) / Degree Fahrenheit (1) / Kelvin (2)	Degree Celsius
0 ... 3	Measurement range	PT100 -200 ... 850 Degree Celsius (0) / PT200 -200 ... 850 Degree Celsius (1) / PT500 -200 ... 850 Degree Celsius (2) / PT1000 -200 ... 850 Degree Celsius (3) / NI100 -60 ... 250 Degree Celsius (4) / NI120 -80 ... 260 Degree Celsius (5) / NI200 -60 ... 250 Degree Celsius (6) / NI500 -60 ... 250 Degree Celsius (7) / NI1000 -60 ... 250 Degree (8) / Cu10 -100 ... 260 Degree Celsius (9) / Resistance 40 Ω (10) / Resistance 80 Ω (11) / Resistance 150 Ω (12) / Resistance 300 Ω (13) / Resistance 500 Ω (14) / Resistance 1000 Ω (15) / Resistance 2000 Ω (16) / Resistance 4000 Ω (17) / disabled (18)	disabled
0 ... 3	Connection type	2-wire (0) / 3-wire (1) / 4-wire (2)	2-wire
0 ... 3	Conversion time	240 ms (0) / 130 ms (1) / 80 ms (2) / 55 ms (3) / 43 ms (4) / 36 ms (5)	80 ms
0 ... 3	Channel diagnostics	disabled (0) / enabled (1)	disabled
0 ... 3	Limit value monitoring	disabled (0) / enabled (1)	disabled
0 ... 3	High limit value	-32768 ... 32767	0
0 ... 3	Low limit value	-32768 ... 32767	0

Diagnostic data UR20-4AI-RTD-DIAG

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module type	0x05
		1		
		2		
		3		
		4	Channel information available	1
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 - 7	Reserved	0
Error byte 3	3	0 - 2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Power supply fault	
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 - 6	Channel type	0x71
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7	0	Error at channel 0	
		1	Error at channel 1	
		2	Error at channel 2	
		3	Error at channel 3	
		4 - 7	Reserved	0
Channel error	8	8 - 15	Reserved	0
Channel error	9	16 - 23	Reserved	0
Channel error	10	24 - 31	Reserved	0
Channel 0 error	11	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	Reserved	0
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	

Diagnostic data UR20-4AI-RTD-DIAG

Name	Bytes	Bit	Description	Default
Channel 1 error	12	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	Reserved	0
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	
Channel 2 error	13	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	Reserved	0
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	
Error in channel 3	14	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	Reserved	0
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	
Channel 4 error to Channel 31 error	15 - 42	0 - 7	Reserved	0
Time stamp	43 - 46		Time stamp [µs] (32 bit)	

Resistance measurement ranges UR20-4AI-RTD-DIAG

Measurement range	Resistance	Decimal	Hexadecimal	Range
40 Ω	> 47.04 Ω	32767	0x7FFF	Overloading or line break
	47.04 Ω	32511	0x7EFF	Overloading
	40 Ω	27648	0x6C00	Nominal range
	0	0	0x0000	
80 Ω	> 94.07 Ω	32767	0x7FFF	Overloading or line break
	94.07 Ω	32511	0x7EFF	Overloading
	80 Ω	27648	0x6C00	Nominal range
	0	0	0x0000	
150 Ω	> 176.4 Ω	32767	0x7FFF	Overloading or line break
	176.4 Ω	32511	0x7EFF	Overloading
	150 Ω	27648	0x6C00	Nominal range
	0	0	0x0000	
300 Ω	> 352.77 Ω	32767	0x7FFF	Overloading or line break
	352.77 Ω	32511	0x7EFF	Overloading
	300 Ω	27648	0x6C00	Nominal range
	0	0	0x0000	
500 Ω	> 587.9 Ω	32767	0x7FFF	Overloading or line break
	587.9 Ω	32511	0x7EFF	Overloading
	500 Ω	27648	0x6C00	Nominal range
	0	0	0x0000	
1 kΩ	> 1.177 kΩ	32767	0x7FFF	Overloading or line break
	1.177 kΩ	32511	0x7EFF	Overloading
	1.0 kΩ	27648	0x6C00	Nominal range
	0	0	0x0000	
2 kΩ	2.352 kΩ	32767	0x7FFF	Overloading or line break
	2.352 kΩ	32511	0x7EFF	Overloading
	2.0 kΩ	27648	0x6C00	Nominal range
	0	0	0x0000	
4 kΩ	> 4.703 kΩ	32767	0x7FFF	Overloading or line break
	4.703 kΩ	32511	0x7EFF	Overloading
	4.0 kΩ	27648	0x6C00	Nominal range
	0	0	0x0000	

Temperature measurement ranges UR20-4AI-RTD-DIAG

Measurement range	Value in °C 0.1 ° resolution	Value in °F 0.1 °/digit	Value in K 0.1 K/digit	Range
Pt100	-2000 to 8500	-3280 to 15620	732 to 11232	-200 °C to +850 °C
	-2040	-3352	692	Underloading
	8540	15692	11272	Overloading
	32767	32767	32767	Line break
Pt200	-2000 to 8500	-3280 to 15620	732 to 11232	-200 °C to +850 °C
	-2040	-3352	692	Underloading
	8540	15692	11272	Overloading
	32767	32767	32767	Line break
Pt500	-2000 to 8500	-3280 to 15620	732 to 11232	-200 °C to +850 °C
	-2040	-3352	692	Underloading
	8540	15692	11272	Overloading
	32767	32767	32767	Line break
Pt1000	-2000 to 8500	-3280 to 15620	732 to 11232	-200 °C to +850 °C
	-2040	-3352	692	Underloading
	8540	15692	11272	Overloading
	32767	32767	32767	Line break
Ni100	-600 to +2500	-760 to 4820	2132 to 5232	-60 °C to 250 °C
	-640	-832	2092	Underloading
	2540	4892	5272	Overloading
	32767	32767	32767	Line break
Ni120	-800 to +2600	-1120 to +5000	1932 to 5332	-80 °C to 260 °C
	-840	-1192	1892	Underloading
	2640	5072	5372	Overloading
	32767	32767	32767	Line break
Ni200	-600 to +2500	-760 to 4820	2132 to 5232	-60 °C to 250 °C
	-640	-832	2092	Underloading
	2540	4892	5272	Overloading
	32767	32767	32767	Line break
Ni500	-600 to +2500	-760 to 4820	2132 to 5232	-60 °C to 250 °C
	-640	-832	2092	Underloading
	2540	4892	5272	Overloading
	32767	32767	32767	Line break

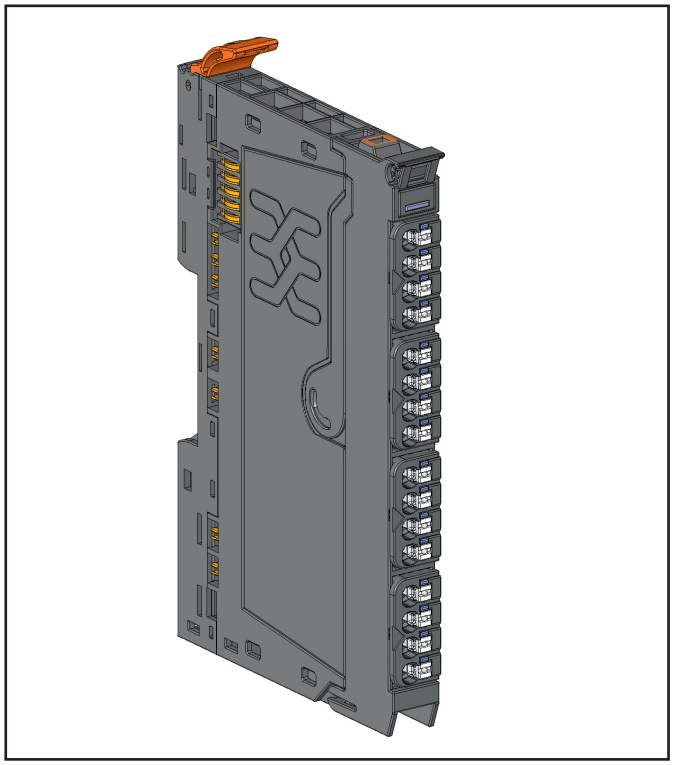
Temperature measurement ranges UR20-4AI-RTD-DIAG

Measurement range	Value in °C 0.1 ° resolution	Value in °F 0.1 °/digit	Value in K 0.1 K/digit	Range
Ni1000	-600 to +2500	-760 to 4820	2132 to 5232	-60 °C to 250 °C
	-640	-832	2092	Underloading
	2540	4892	5272	Overloading
	32767	32767	32767	Line break
Cu10	-1000 to +2600	-1480 to 5000	1732 to 5332	-100 °C to 260 °C
	-1040	-1552	1692	Underloading
	2640	5072	5372	Overloading
	32767	32767	32767	Line break

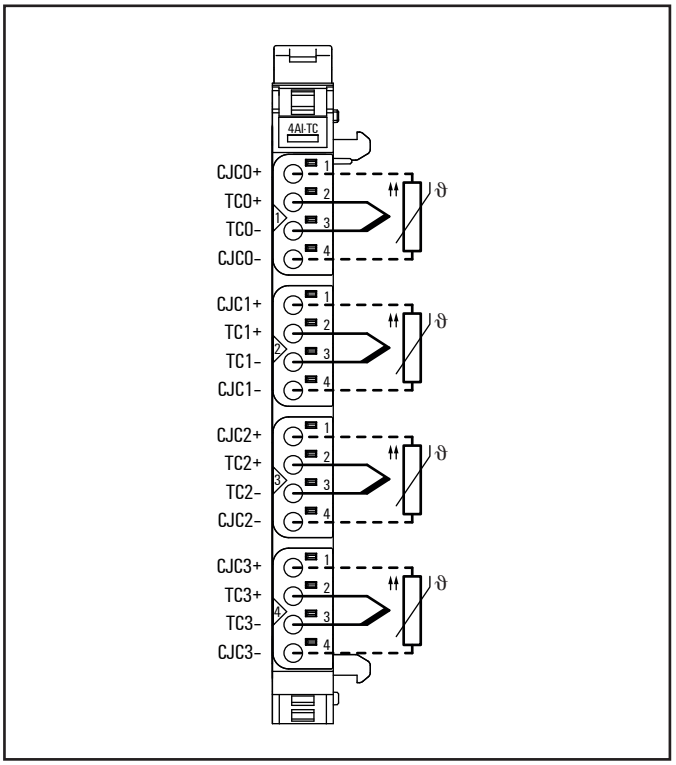
Process alarm UR20-4AI-RTD-DIAG

Name	Number of bytes	Function
High alarm	1	Bit 0: Upper limit exceeded channel 0
		Bit 1: Upper limit exceeded channel 1
		Bit 2: Upper limit exceeded channel 2
		Bit 3: Upper limit exceeded channel 3
		Bit 4 – 7: Reserved
Low Alarm	1	Bit 0: Lower limit underrun channel 0
		Bit 1: Lower limit underrun channel 1
		Bit 2: Lower limit underrun channel 2
		Bit 3: Lower limit underrun channel 3
		Bit 4 – 7: Reserved
Timestamp	2	The two least valuable bytes of the internal 32-bit timer

6.24 Analogue input module UR20-4AI-TC-DIAG

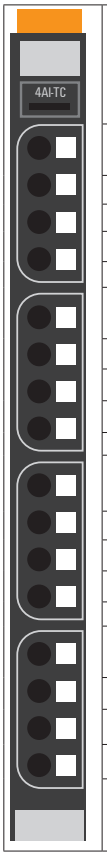


Analogue input module UR20-4AI-TC-DIAG (Order No. 1315710000)



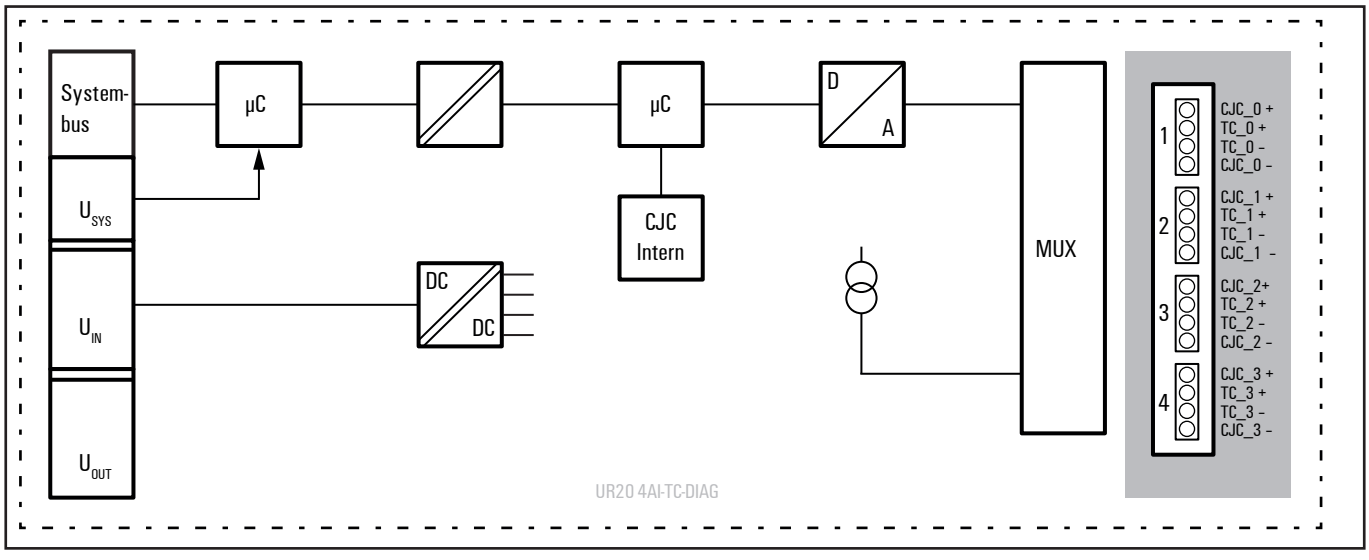
Connection diagram UR20-4AI-TC-DIAG

The analogue input module UR20-4AI-TC-DIAG can detect up to 4 analogue thermocouple sensors. Sensor type and temperature range are set using parameterisation. A status LED is assigned to each channel. The sensors are supplied with power from the input current path (U_{IN}). For each channel, an internal or external cold-junction compensation (CJC) can be parametrized.



	Module status LED Green: Communication over the system bus Red: Collective error diagnostic
1.1	Red: Signal at input 0 outside the permissible range, line break or cold-junction compensation error
2.1	Red: Signal at input 1 outside the permissible range, line break or cold-junction compensation error
3.1	Red: Signal at input 2 outside the permissible range, line break or cold-junction compensation error
4.1	Red: Signal at input 3 outside the permissible range, line break or cold-junction compensation error

LED indicators UR20-4AI-TC-DIAG, error messages see Chapter 13



Block diagram UR20-4AI-TC-DIAG

Technical data UR20-4AI-TC-DIAG (Order No. 1315710000)

System data	
Data	Process, parameter and diagnostic data depend on the coupler used, see the table in Section 4.10.
Interface	u-remote system bus
System bus transfer rate	48 Mbps
Inputs	
Number	4
Sensor types	J, K, T, B, N, E, R, S, L, U, C, mV
Resolution	16 bits
Accuracy	10 µV + 0.1 % of voltage measurement range (without cold-junction compensation error)
Sensor connection	2-wire
Cold-junction compensation	Internal and external (Pt1000), int. accuracy ≤ 3 K
Temperature coefficient	±50 ppm/K max.
Temperature range	-200 °C ... +2315 °C
Conversion time	36 ... 240 ms, adjustable
Internal resistance	> 1 MΩ
Reverse polarity protection	yes
Module diagnosis	yes
Individual channel diagnosis	yes
Supply	
Supply voltage	24 V DC +20 %/-15 %
Current consumption (I_{IN} in the power segment of the field-bus coupler), typ.	8 mA
Current consumption (I_{IN} in the respective power segment)	20 mA (input current path)
General data	
Weight	86 g
For additional general data, see Section 3.4	

Overview of the editable parameters UR20-4AI-TC-DIAG

Channel	Description	Options (Value)	Default value
	Temperature unit	Degree Celsius (0) / Degree Fahrenheit (1) / Kelvin (2)	Degree Celsius
0 ... 3	Measurement range	TC Type J (0) / TC Type K (1) / TC Type N (2) / TC Type R (3) / TC Type S (4) / TC Type T (5) / TC Type B (6) / TC Type C (7) / TC Type E (8) / TC Type L (9) / TC Type U (10) / ± 15,625 mV (11) / ± 31,25 mV (12) / ± 62,5 mV (13) / ± 125 mV (14) / ± 250 mV (15) / ± 500 mV (16) / ± 1000 mV (17) / ± 2000 mV (18) / disabled (19)	disabled
0 ... 3	Cold junction compensation	internal (0) / external Channel 0 (1) / external Channel 1 (2) / external Channel 2 (3) / external Channel 3 (4)	internal
0 ... 3	Conversion time	240 ms (0) / 130 ms (1) / 80 ms (2) / 55 ms (3) / 43 ms (4) / 36 ms (5)	80 ms
0 ... 3	Channel diagnostics	disabled (0) / enabled (1)	disabled
0 ... 3	Limit value monitoring	disabled (0) / enabled (1)	disabled
0 ... 3	High limit value	-32768 ... 32767	0
0 ... 3	Low limit value	-32768 ... 32767	0

Diagnostic data UR20-4AI-TC-DIAG

Name	Bytes	Bit	Description	Default
Error indicator	0	0	Module error	
		1	Internal error	
		2	External error	
		3	Channel error	
		4	Reserved	0
		5	Power supply fault	
		6	Reserved	0
		7	Parameter error	
Module types	1	0	Module type	0x05
		1		
		2		
		3		
		4	Channel information available	1
		5	Reserved	0
		6	Reserved	0
		7	Reserved	0
Error byte 2	2	0 – 7	Reserved	0
Error byte 3	3	0 – 2	Reserved	0
		3	Internal diagnostic FIFO full	
		4	Power supply fault	
		5	Reserved	0
		6	Process alarm lost	
		7	Reserved	0
Channel type	4	0 – 6	Channel type	0x71
		7	Reserved	0
Diagnostic bits per channel	5		Number of diagnostic bit per channel	8
Number of channels	6		Number of similar channels per module	4
Channel error	7	0	Error at channel 0	
		1	Error at channel 1	
		2	Error at channel 2	
		3	Error at channel 3	
		4 – 7	Reserved	0
Channel error	8	8 – 15	Reserved	0
Channel error	9	16 – 23	Reserved	0
Channel error	10	24 – 31	Reserved	0
Channel 0 error	11	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	CJC error	
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	

Diagnostic data UR20-4AI-TC-DIAG

Name	Bytes	Bit	Description	Default
Channel 1 error	12	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	CJC error	
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	
Channel 2 error	13	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	CJC error	
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	
Error in channel 3	14	0	Parameter error	
		1	Reserved	0
		2	Reserved	0
		3	CJC error	
		4	Line break	
		5	Process alarm lost	
		6	Lower limit exceeded	
		7	Upper limit exceeded	
Channel 4 error to Channel 31 error	15 – 42	0 – 7	Reserved	0
Time stamp	43 – 46		Time stamp [µs] (32 bit)	

Voltage measurement ranges UR20-4AI-TC-DIAG

Measurement range	Voltage	Decimal signal range	Hexadecimal signal range
±15.625 mV	15.625 mV	32767	0x7FFF
	-15.625 mV	-32768	0x8000
±31.25 mV	31.25 mV	32767	0x7FFF
	-31.25 mV	-32768	0x8000
±62.5 mV	62.5 mV	32767	0x7FFF
	-62.5 mV	-32768	0x8000
±125 mV	125 mV	32767	0x7FFF
	-125 mV	-32768	0x8000
±250 mV	250 mV	32767	0x7FFF
	-250 mV	-32768	0x8000
±500 mV	500 mV	32767	0x7FFF
	-500 mV	-32768	0x8000
±1 V	+1 V	32767	0x7FFF
	-1 V	-32768	0x8000
±2 V	+2 V	32767	0x7FFF
	-2 V	-32768	0x8000

Temperature measurement ranges UR20-4AI-TC-DIAG

Measurement range	Value in °C 0.1 ° resolution Bit significance	Value in °F 0.1 °F Bit significance	Value in K 0.1°K Bit significance	Range
Type K	-2000 to 13720	-3280 to 25016	732 to 16452	-200 °C to +1372 °C
	-2040	-3352	692	Underloading
	13760	25088	16492	Overloading
	32767	32767	32767	Line break, cold compensation error
Type J	-2100 to 12000	-3460 to 21920	632 to 14732	-210 °C to +1200 °C
	-2140	-3532	592	Underloading
	12040	21992	14772	Overloading
	32767	32767	32767	Line break, cold compensation error
Type B	500 to 18200	1220 to 32767 (limited range 3276.7 °F)	3232 to 20932	+50 °C to +1820 °C
	460	1148	3192	Underloading
	18240	33152	20972	Overloading
	32767	32767	32767	Line break, cold compensation error
Type N	-2000 to +13000	-3280 to 23720	4732 to 15732	-200 °C to +1300 °C
	-2040	-3352	692	Underloading
	13040	23792	15772	Overloading
	32767	32767	32767	Line break, cold compensation error
Type E	-2000 to +10000	-3280 to 18320	4732 to 12732	-200 °C to +1000 °C
	-2040	-3352	692	Underloading
	10040	18392	12772	Overloading
	32767	32767	32767	Line break, cold compensation error
Type R	-500 to +17680	-580 to +32144	3232 to 20412	-50 °C to +1768 °C
	-540	-652	2192	Underloading
	17720	32216	20452	Overloading
	32767	32767	32767	Line break, cold compensation error
Type S	-500 to +17680	-580 to +32144	3232 to 20412	-50 °C to +1768 °C
	-540	-652	2192	Underloading
	17720	32216	20452	Overloading
	32767	32767	32767	Line break, cold compensation error
Type T	-2000 to +4000	-3280 to 7520	732 to 6732	-200 °C to +400 °C
	-2040	-3352	692	Underloading
	4040	7592	6772	Overloading
	32767	32767	32767	Line break, cold compensation error

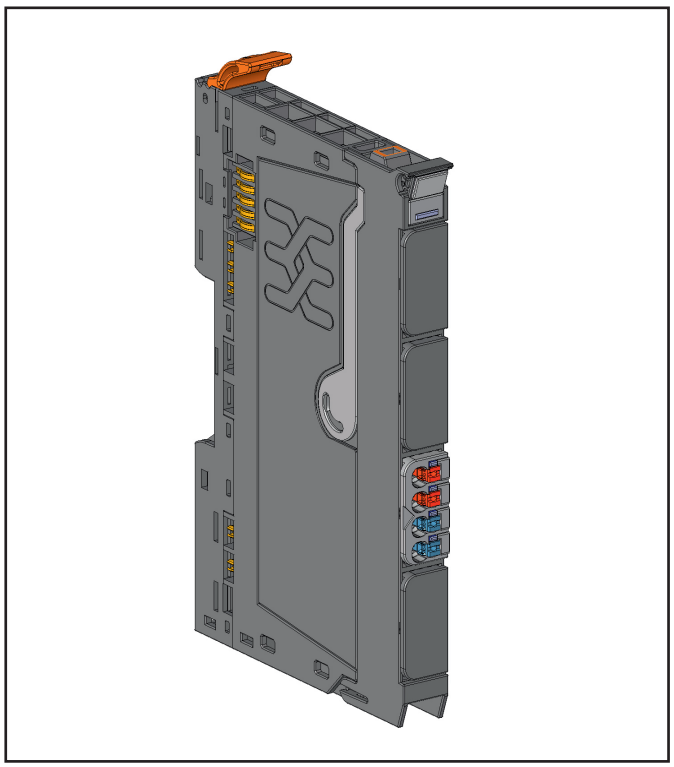
Temperature measurement ranges UR20-4AI-TC-DIAG

Measurement range	Value in °C 0.1 ° resolution Bit significance	Value in °F 0.1 °F Bit significance	Value in K 0.1°K Bit significance	Range
Type L	-2000 to +9000	-3280 to 16520	732 to 11732	-200 °C to +900 °C
	-2040	-3352	692	Underloading
	9040	16592	11772	Overloading
	32767	32767	32767	Line break, cold compensation error
Type U	-2000 to +6000	-3280 to 11120	732 to 8732	-200 °C to +600 °C
	-2040	-3352	692	Underloading
	6040	11192	8772	Overloading
	32767	32767	32767	Line break, cold compensation error
Type C	0 to 23150	320 to 32767 (limited range) 3276.7 °F = 1802.6 °C	2732 to 25882	0 to +2315 °C
	-40	248	2692	Underloading
	23190	32767	25922	Overloading
	32767	32767	32767	Line break, cold compensation error

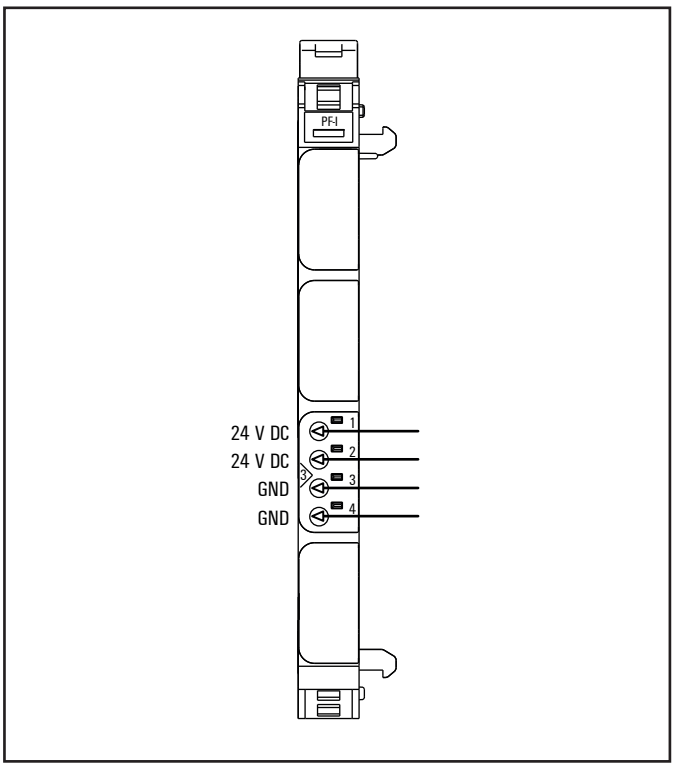
Process alarm UR20-4AI-TC-DIAG

Name	Number of bytes	Function
High alarm	1	Bit 0: Upper limit exceeded channel 0
		Bit 1: Upper limit exceeded channel 1
		Bit 2: Upper limit exceeded channel 2
		Bit 3: Upper limit exceeded channel 3
		Bit 4 – 7: Reserved
Low alarm	1	Bit 0: Lower limit underrun channel 0
		Bit 1: Lower limit underrun channel 1
		Bit 2: Lower limit underrun channel 2
		Bit 3: Lower limit underrun channel 3
		Bit 4 – 7: Reserved
Timestamp	2	The two least valuable bytes of the internal 32-bit timer

6.25 Power-feed module for input current path UR20-PF-I



Power-feed module for input current path UR20-PF-I (Order No. 1334710000)



Connection diagram UR20-PF-I

The u-remote station's main power supply is fed in via the coupler. A power-feed module must be connected if the current demand of the series of input modules is too large. Power-feed modules serve to refresh the current paths and isolate the power supply. The maximum feed-in current in the input current path via the 4-pole connector is 10 A. Details required to calculate current demand and power supply see section 4.5.

Power-feed modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

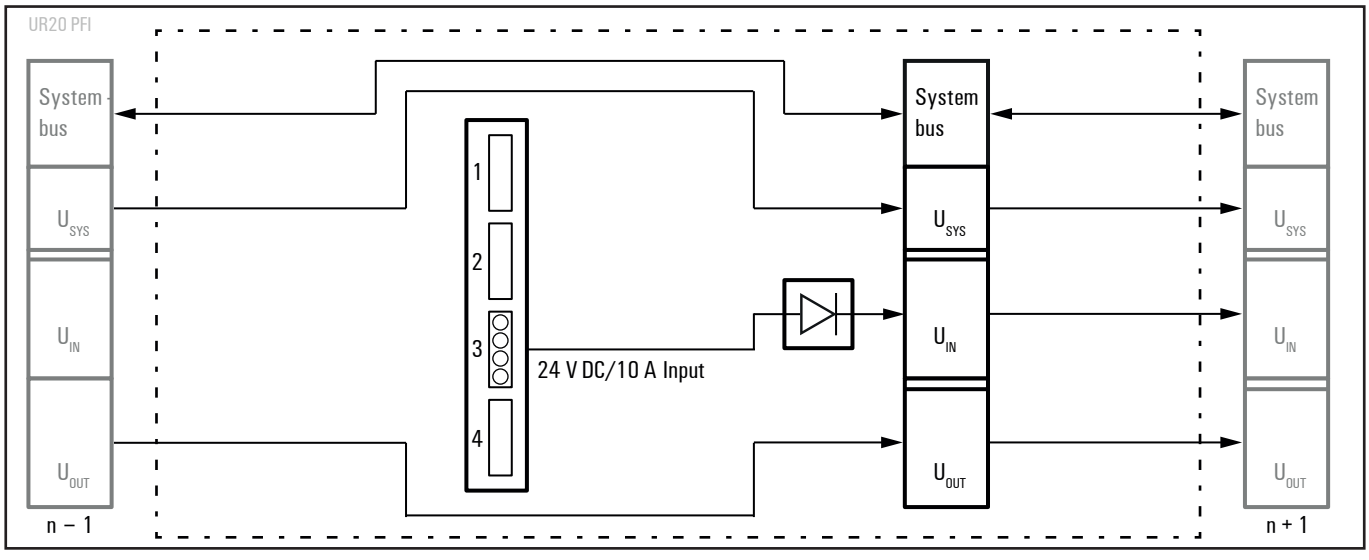
ATTENTION

Risk of material damage!

In the case of a maximum power supply of >8 A and a maximum temperature of >+55 °C, all four contacts must be connected with 1.5 mm² wiring!

	Module status LED Green: voltage applied and is >18 V DC
3.1	Green: Supply voltage for input current path > 18 V DC
3.2	Red: Supply voltage for input current path < 18 V DC
3.4	Red: Internal fuse defective, replace module

LED indicators UR20-PF-I, error messages see Chapter 13



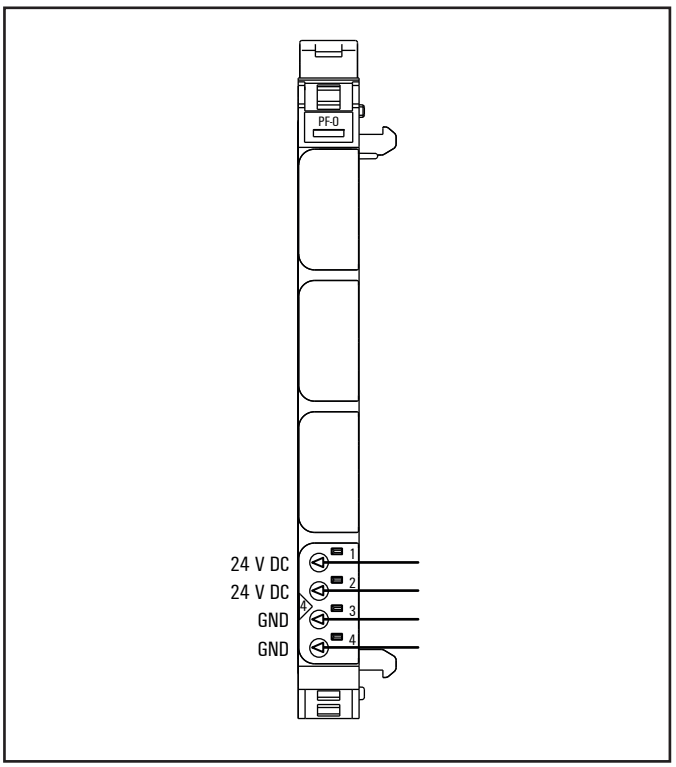
Block diagram UR20-PF-I

Technical data UR20-PF-I (Order No. 1334710000)

Supply	
Input supply voltage	24 V DC +20 %/-15 %
Maximum feed current for input modules	10 A
Current consumption (internal)	10 mA (input current path)
General data	
Weight	76 g
For additional general data, see Section 3.4	

6.26 Power-feed module for output current path UR20-PF-O

Power-feed module for output current path UR20-PF-O (Order No. 1334740000)



Connection diagram UR20-PF-O

The u-remote station's main power supply is fed in via the coupler. A power feed module must be connected if the current demand of the series of output modules is too large. Power-feed modules serve to refresh the current paths and isolate the power supply. The maximum feed-in current in the output current path via the 4-pole connector is 10 A. Details required to calculate current demand and power supply see section 4.5.

Power-feed modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

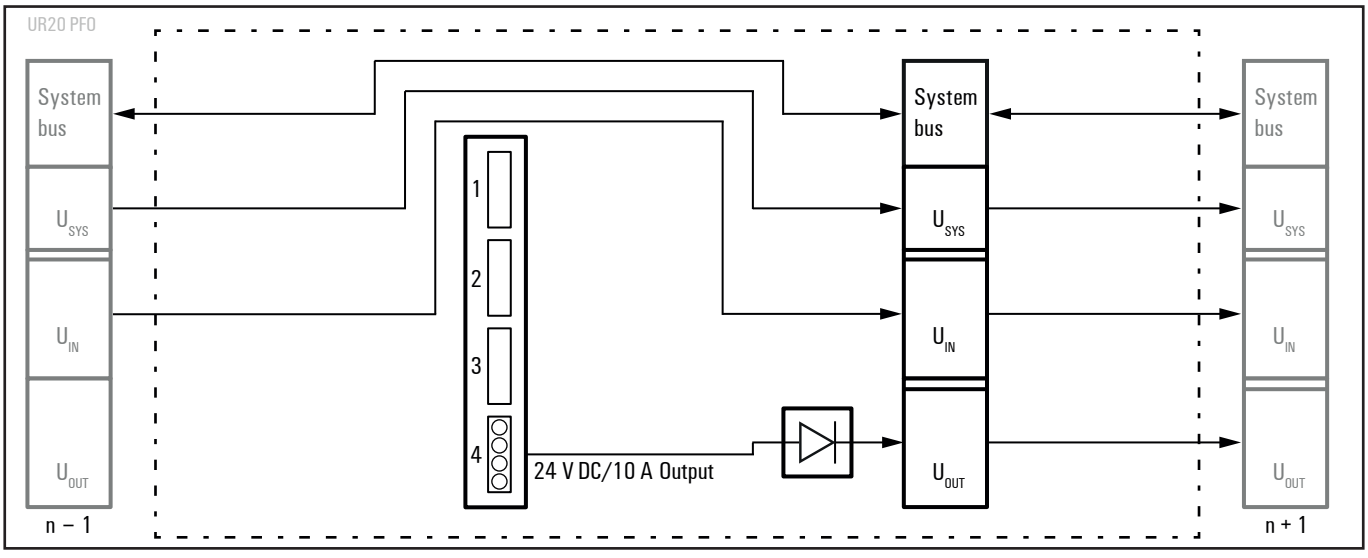
ATTENTION

Risk of material damage!

In the case of a maximum power supply of >8 A and a maximum temperature of >+55 °C, all four contacts must be connected with 1.5 mm² wiring!

	Module status LED Green: voltage applied and is > 18 V DC
4.1	Green: Supply voltage for output circuit > 18 V DC
4.2	Red: Supply voltage for output circuit < 18 V DC
4.4	Red: Internal fuse defective, replace module

LED indicators UR20-PF-O, error messages see Chapter 13

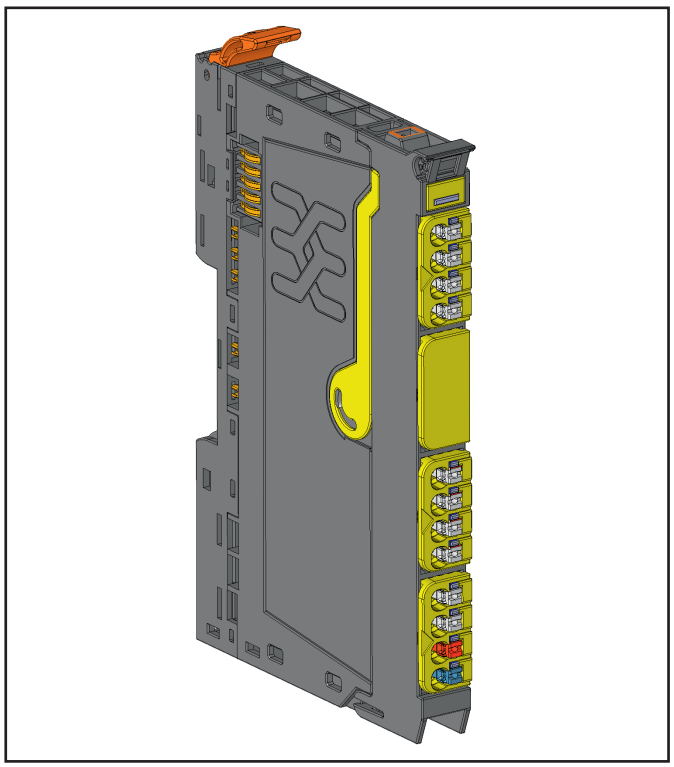


Block diagram UR20-PF-O

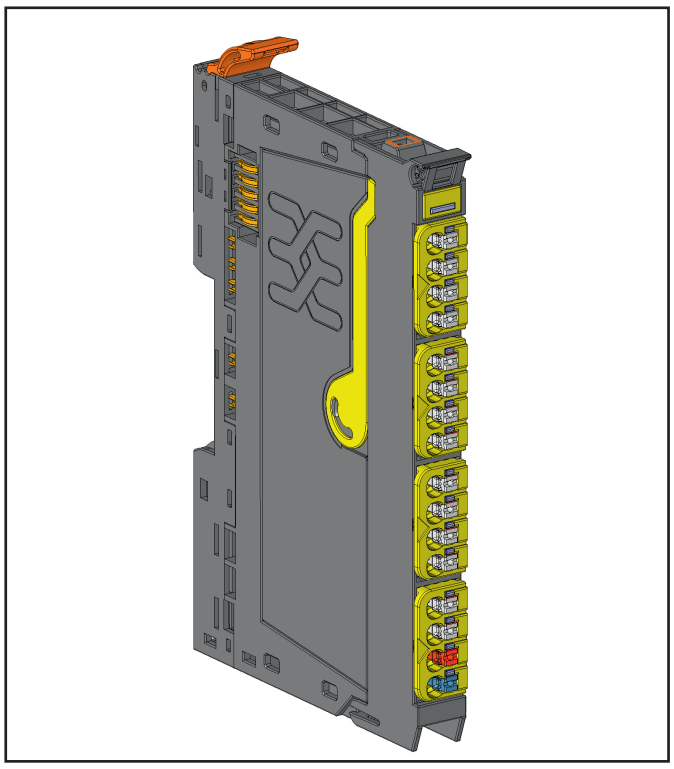
Technical data UR20-PF-O (Order No. 1334740000)

Supply	
Supply voltage for system and outputs	24 V DC +20 %/-15 %
Supply voltage for outputs	24 V DC +20 %/-15 %
Maximum feed-in current for output modules	10 A
Current consumption (internal)	10 mA (output current path)
General data	
Weight	76 g
For additional general data, see Section 3.4	

6.27 Safe feed-in modules UR20-PF-O-xDI-SIL



Safe feed-in module UR20-PF-O-1DI-SIL



Safe feed-in module UR20-PF-O-2DI-DELAY-SIL

The u-remote safe feed-in modules **PF-O-xDI-SIL are intended** for connecting safety-related equipment. The **PF-O-xDI-SIL** modules are controlled with non-solid-state safety encoders and or safety encoders with OSSD inputs. The safety function consists of the safe interruption of 24 V outputs, the safe status of which is "24 V disconnected" (current path for outputs and the OSSD output is disconnected).
Each **PF-O-xDI-SIL module safely disconnects the subsequent** UR20 output modules; in each case, the safety segment up to the next following PF-O power-feed module. A safety-oriented input circuit together with pulsed outputs serve for detecting broken wires and short circuits.

Three types of **PF-O-xDI-SIL modules are available in the** u-remote system:
- UR20-PF-O-1DI-SIL (Order No. 1335030000): one safe input
- UR20-PF-O-2DI-SIL (Order No. 1335050000): two safe inputs
- UR20-PF-O-2DI-DELAY-SIL (Order No. 1335040000): two safe inputs, delayed disconnection possible

With **PF-O-xDI-SIL modules, it is possible to implement the** following safety functions:
- Up to two 2-channel safety circuits (AND linked), e.g. for emergency shutdown buttons, safety door contacts and safety light grids
- A range of output modules within a u-remote station is supplied with safe power through the switched +24 V OSSD output.
- PF-O-xDI-SIL **modules can be cascaded.**

In contrast to other power-feed modules the PF-O-xDI-SIL modules are active modules. Therefore up to three passive modules can be arranged directly behind.

All product-specific information and notes on the use of **PF-O-xDI-SIL modules can be** found in the **Modules for functional safety** manual.
The manual can be downloaded from the Weidmüller website.

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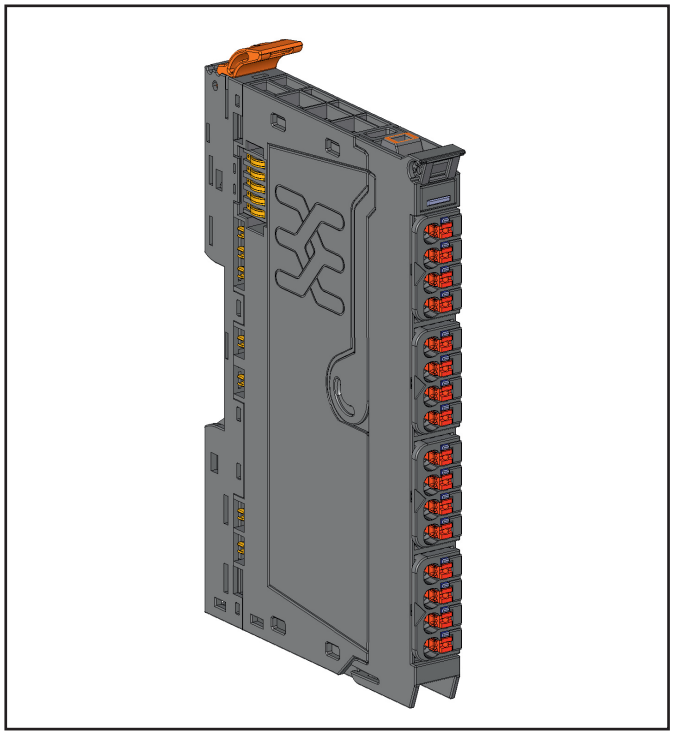
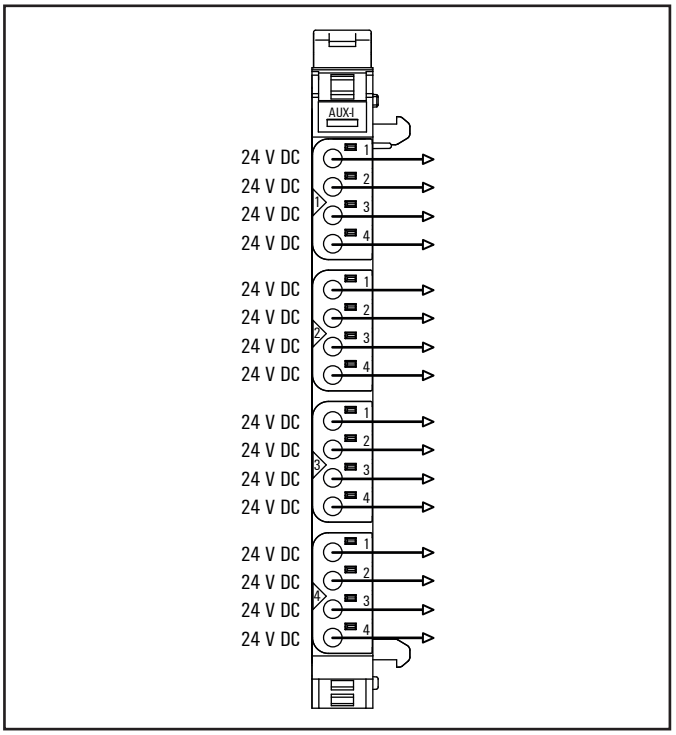
6.28 Potential distribution module for input current path UR20-16AUX-I



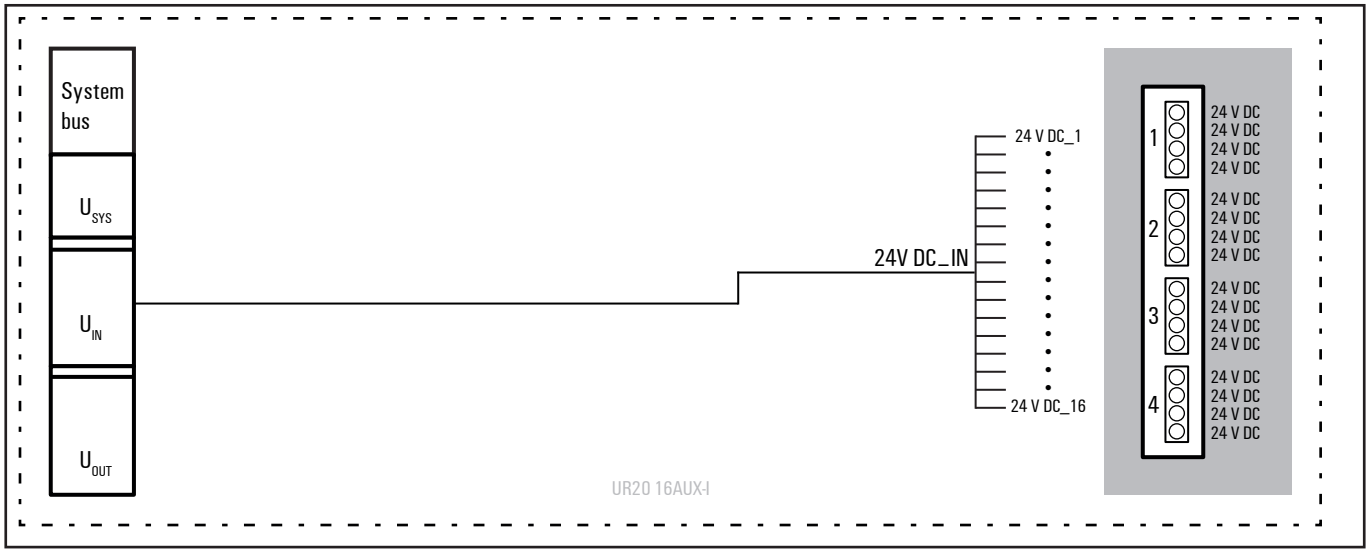
Power-feed module for output current path UR20-16AUX-I (Order No. 1334770000)



Connection diagram UR20-16AUX-I

The potential distribution module provides 16 connections for +24 V from the input current path. The module can be combined with a 16DI module for connection to the sensor power supply.
Potential distribution modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

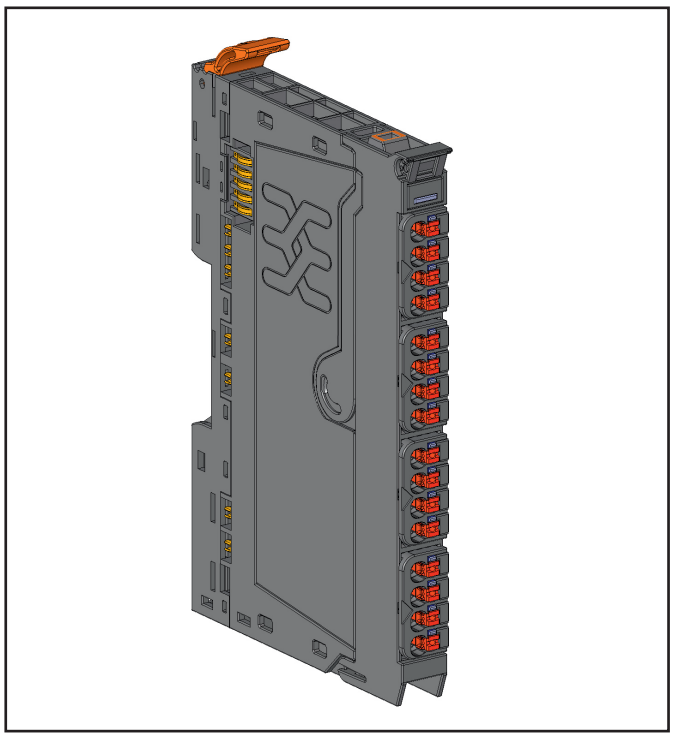


Block diagram UR20-16AUX-I

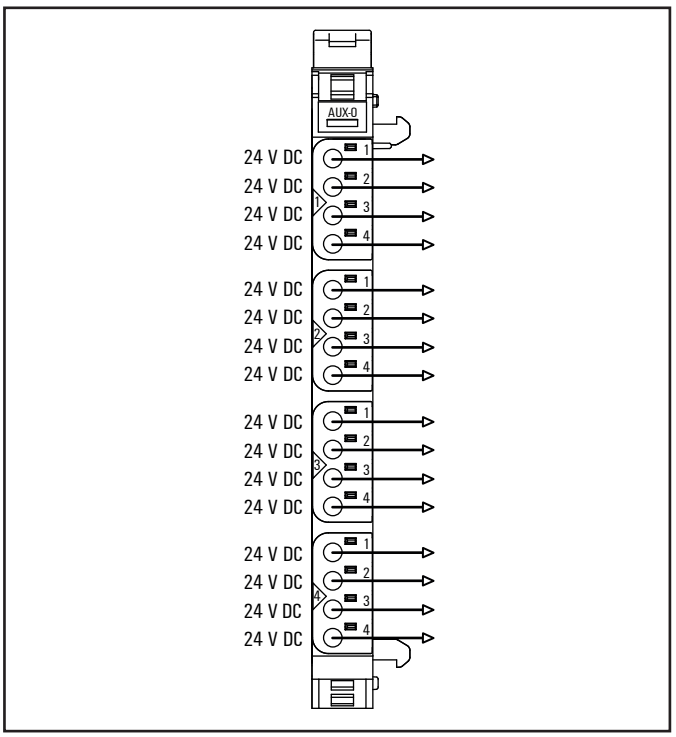
Technical data UR20-16AUX-I (Order No. 1334770000)

Supply	
Supply voltage	24 V DC +20 %/-15 % (from input current path)
General data	
Weight	84 g
For additional general data, see Section 3.4	

6.29 Potential distribution module for output current path UR20-16AUX-O



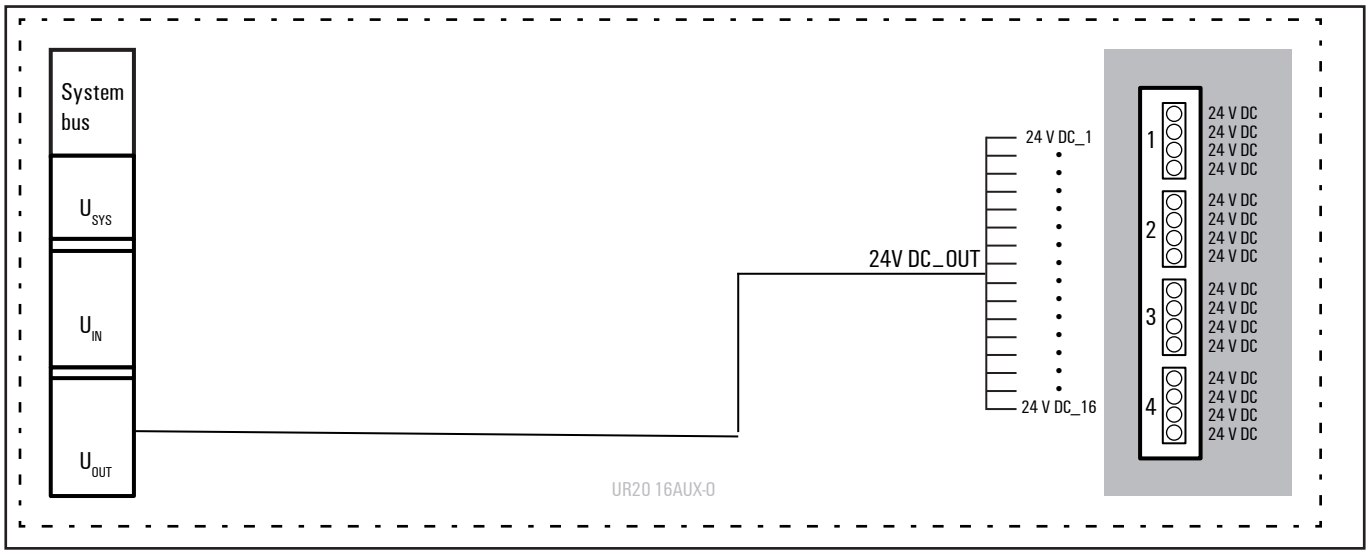
Potential distribution module for output current path UR20-16AUX-O (Order No. 1334780000)



Connection diagram UR20-16AUX-O

The potential distribution module provides 16 connections for +24 V from the output current path. The module can be combined with a 16DO module for connection to the actuator power supply.
Potential distribution modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

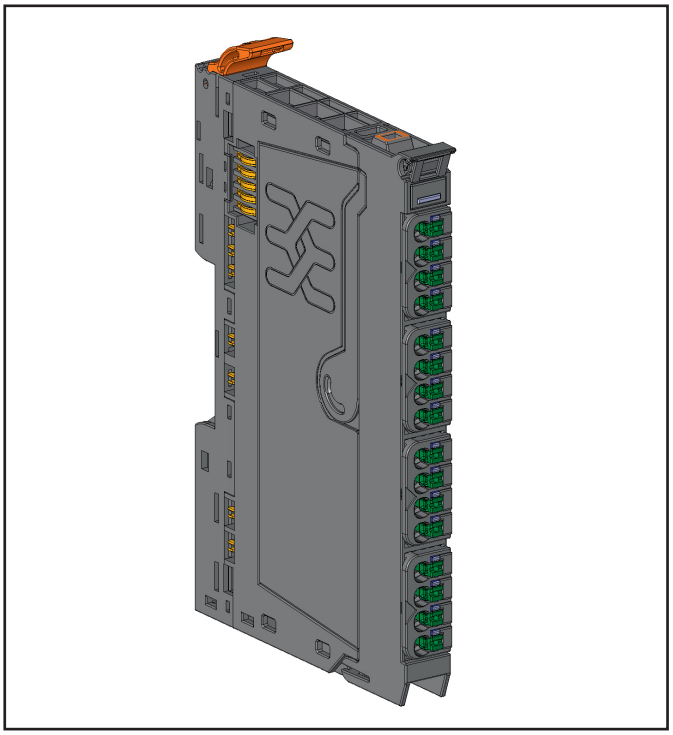


Block diagram UR20-16AUX-O

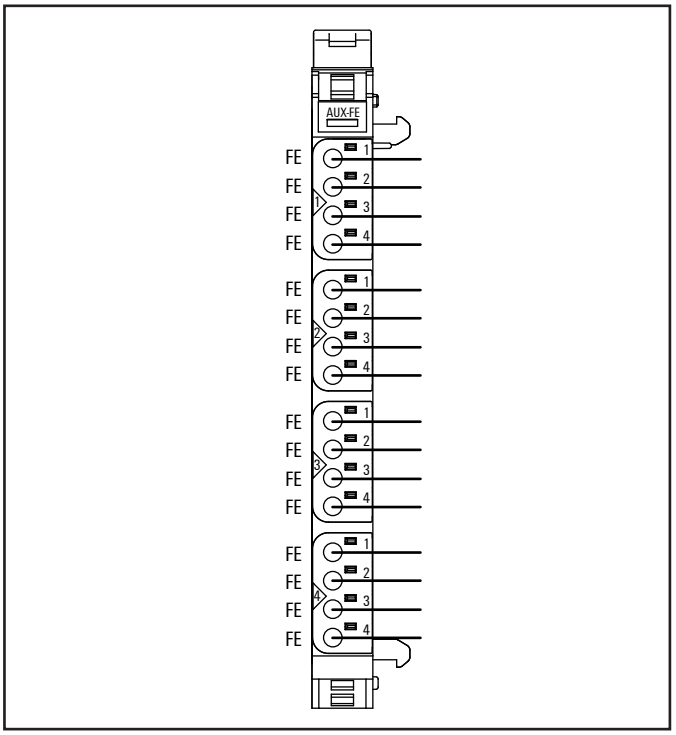
Technical data UR20-16AUX-O (Order No. 1334780000)

Supply	
Supply voltage	24 V DC +20 %/-15 % (from output current path)
General data	
Weight	84 g
For additional general data, see Section 3.4	

6.30 Potential distribution module for functional earth UR20-16AUX-FE



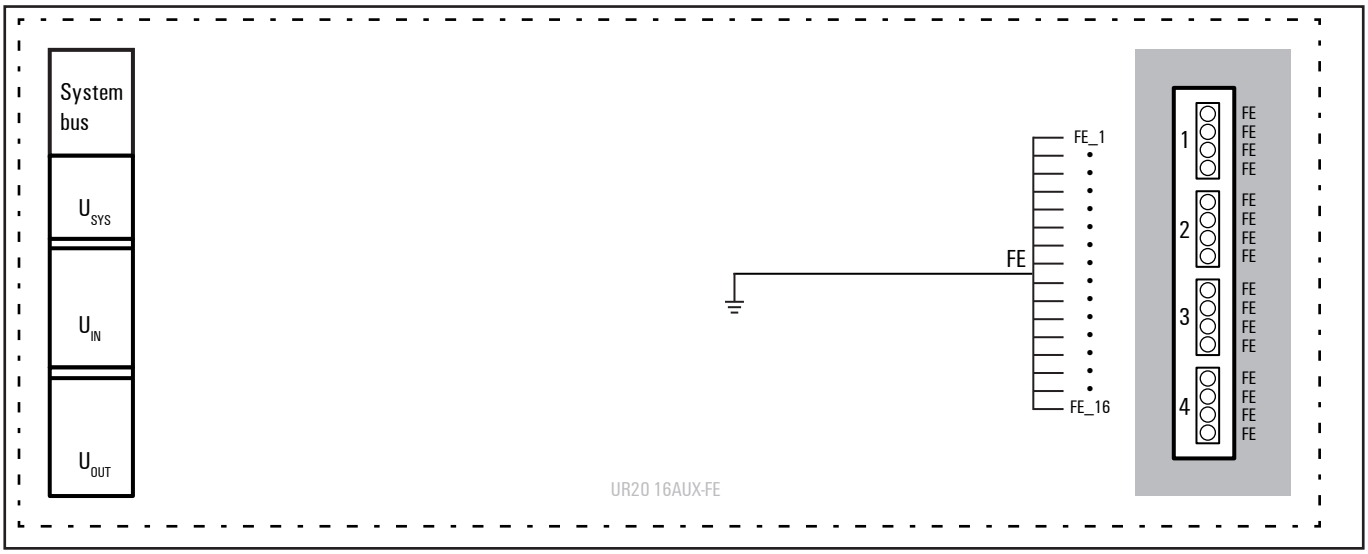
Potential distribution module for output current path UR20-16AUX-FE (Order No. 1334790000)



Connection diagram UR20-16AUX-FE

The potential distribution module provides 16 connections for the functional earth. The module can be combined with a 16DO module for connection to the functional earth. Potential distribution modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

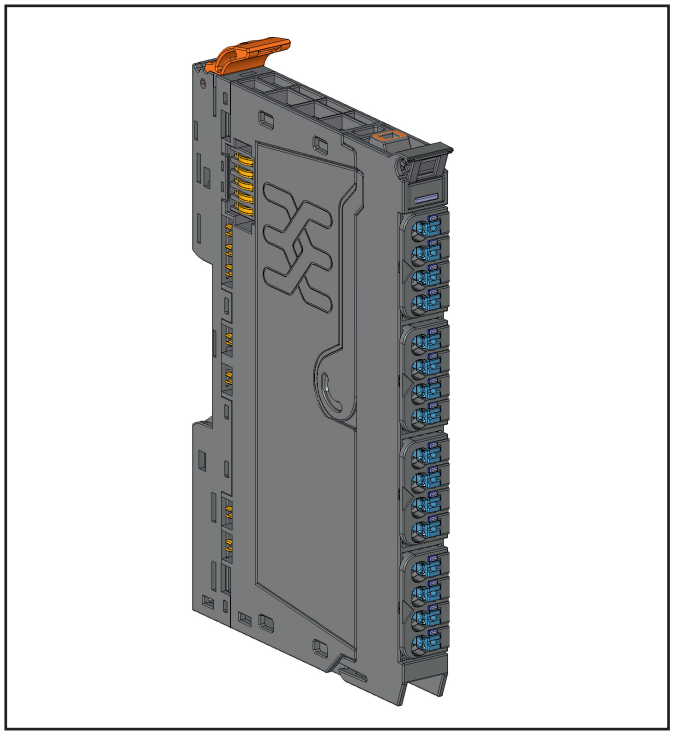


Block diagram UR20-16AUX-FE

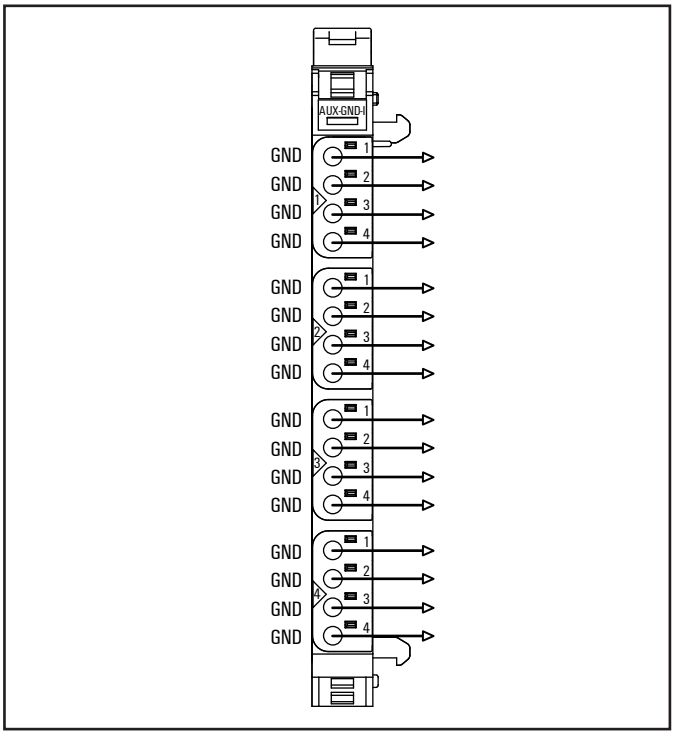
Technical data UR20-16AUX-FE (Order No. 1334790000)

Supply	
Supply voltage	None
General data	
Weight	84 g
For additional general data, see Section 3.4	

6.31 0-V potential distribution module for the input current path UR20-16AUX-GND-I



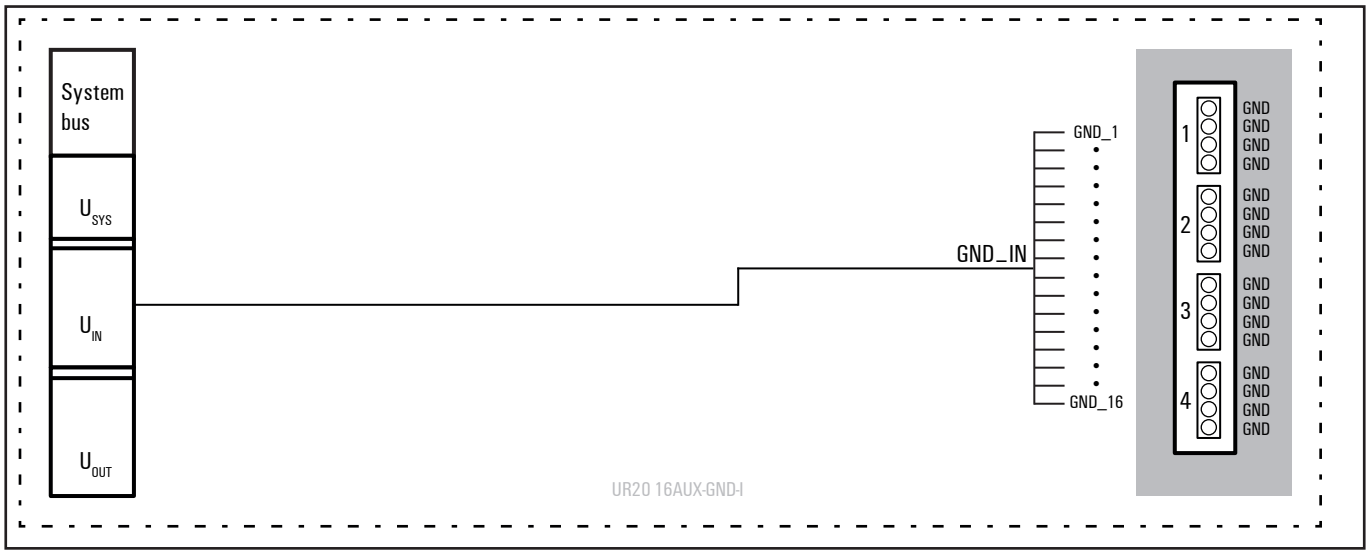
0-V potential distribution module for the input current path UR20-16AUX-GND-I (Order No. 1334800000)



Connection diagram UR20-16AUX-GND-I

The potential distribution module provides 16 connections for 0 V from the input current path. The module can be combined with a 16DI module for connection to the sensor power supply.
Potential distribution modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

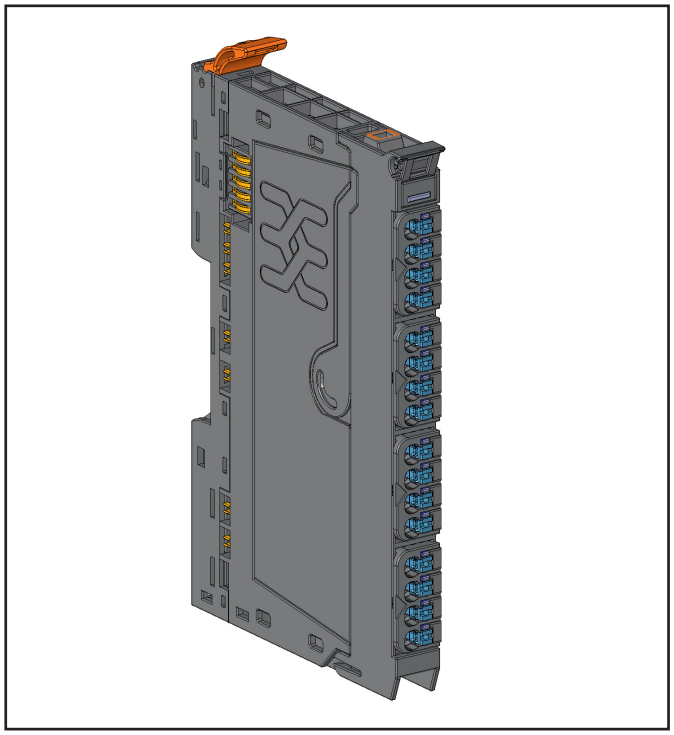


Block diagram UR20-16AUX-GND-I

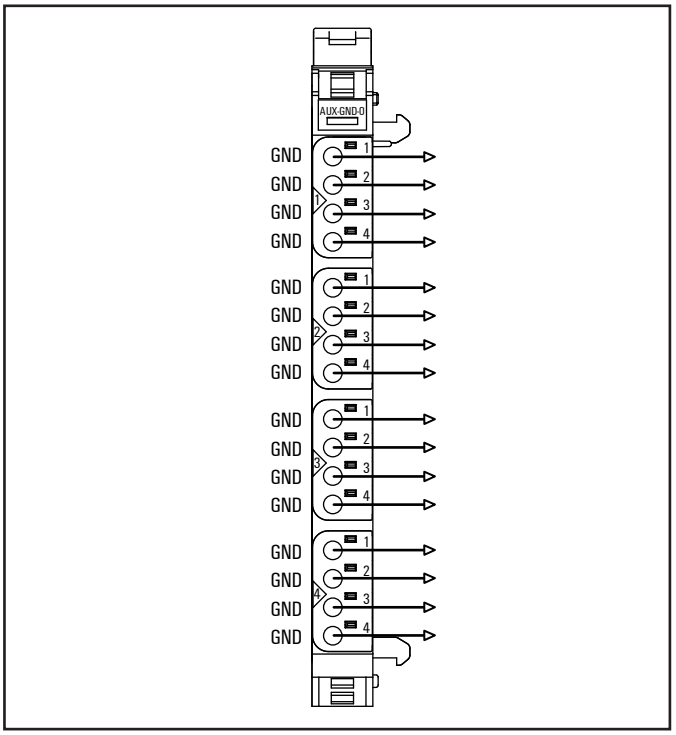
Technical data UR20-16AUX-GND-I (Order No. 1334800000)

Supply	
Supply voltage	0 V (from input current path)
General data	
Weight	84 g
For additional general data, see Section 3.4	

6.32 0-V potential distribution module for the output current path UR20-16AUX-GND-0



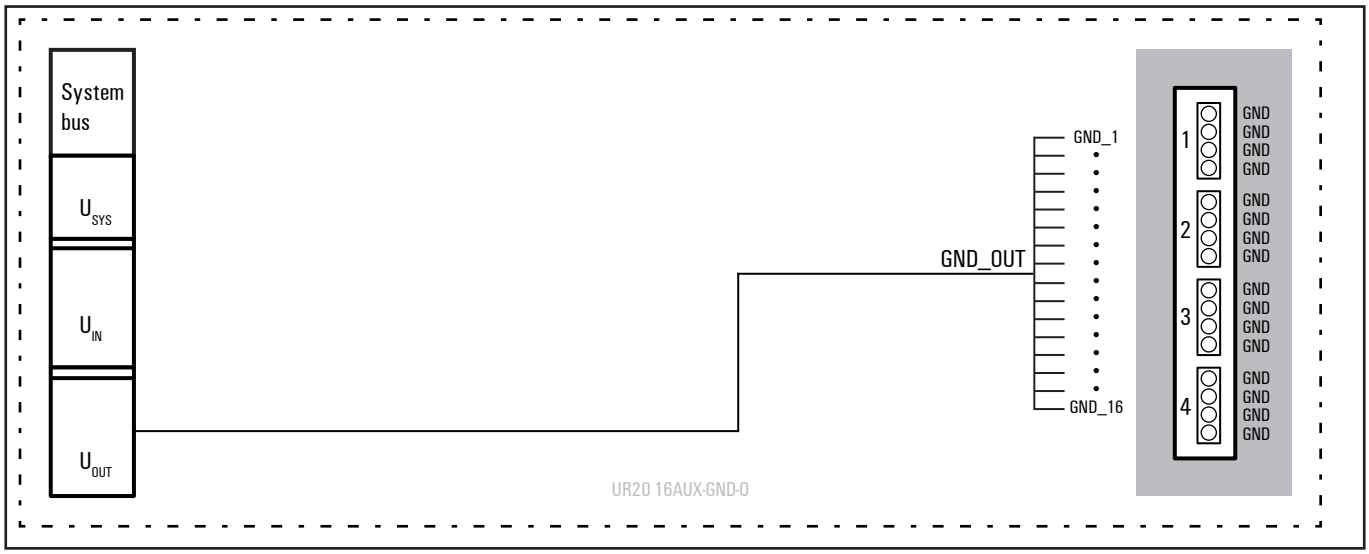
0-V potential distribution module for the output current path UR20-16AUX-GND-0 (Order No. 1334810000)



Connection diagram UR20-16AUX-GND-0

The potential distribution module provides 16 connections for 0 V from the output current path. The module can be combined with a 16DO module for connection to the actuator power supply.
Potential distribution modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

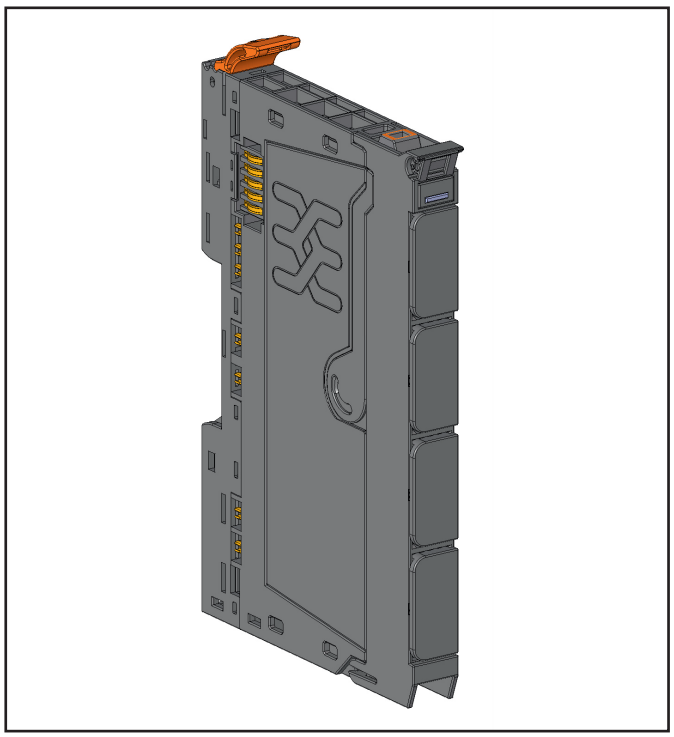


Block diagram UR20-16AUX-GND-0

Technical data UR20-16AUX-GND-0 (Order No. 1334810000)

Supply	
Supply voltage	0 V (from output current path)
General data	
Weight	84 g
For additional general data, see Section 3.4	

6.33 Empty slot module UR20-ES



Empty slot module UR20-ES (Order No. 1315770000)

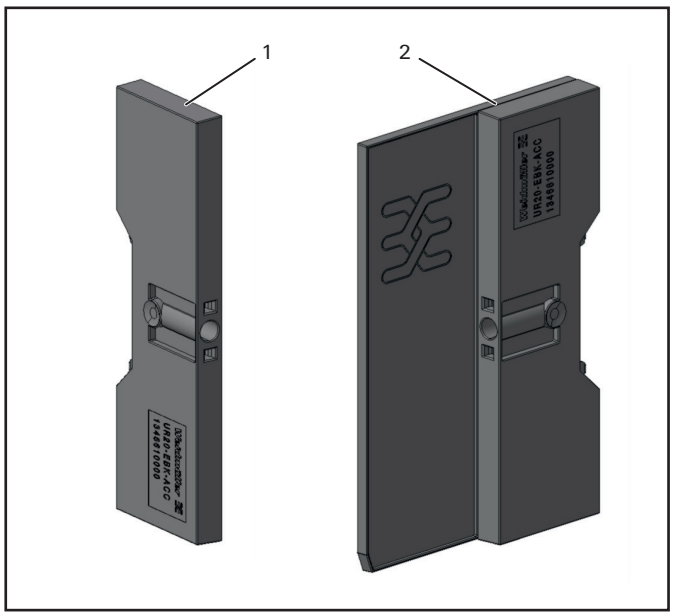
Empty slot modules can be integrated as reserve modules in a station. They bridge all contacts in the basic module 1:1 and otherwise have no function.
Empty slot modules are passive modules without field bus communication, therefore they are not considered during configuration.

A maximum of three passive modules (power-feed module, potential distribution module, empty slot module) may be installed in succession, however the next module to be installed must be an active module!

Technical data UR20-ES (Order No. 1315770000)

General data	
Weight	70 g
For additional general data, see Section 3.4	

6.34 Termination kit



Termination kit (Order No. 1346610000)

The termination kit comprises 2 end brackets and an end plate. The end plate protects the contacts on the last module at the end of the u-remote station. The station is fixed to the DIN rail on both sides via the end brackets.

7 Installation

WARNING

Explosion risk!
During assembly work, sparks can form and surfaces may become excessively hot.
- ► Before assembly, make sure that there is not a potentially explosive atmosphere!
- ► For applications in potentially explosive atmospheres, observe the installation and construction requirements of EN 60079-15 and/or country-specific regulations.

WARNING

Dangerous contact voltage!
- ► Carry out assembly and wiring work on the u-remote station only when the power supply is disconnected.
- ► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply!

7.1 Preparations for assembly

The u-remote station is designed for installation in switch cabinets, terminals or switch boxes in decentralised systems. The field-bus coupler and I/O modules conform to protection class IP20.

Environmental conditions

Make sure that the permitted environmental conditions for installation and operation are observed (see the General Technical Data in Sections 3.2 and 3.4).

DIN rail

The u-remote system products are intended for installation on a DIN rail in accordance with EN 60715 (35 × 7.5 mm), steel strip in accordance with Annex A of EN 60715, or tin-plated steel strip. The DIN rail must be mounted prior to the installation of the u-remote station.

The DIN rail must be attached to the surface at least every 20 cm to protect it from vibration and impact.

If the DIN rail is installed on earthed mounting plates, it does not have to be separately earthed.

Stripping lengths

The required stripping length for every Weidmüller product is specified in mm. These lengths, e.g. 6 mm ± 0.5 mm, ≥ 10 mm ±1 mm, must be observed. This also applies to the use of wire-end ferrules. The external dimensions of the crimped wire-end ferrules must conform with IEC-60947-1. For detailed information see section 7.5.

Unpacking the delivery

All of the elements that make up the u-remote station are packaged individually for delivery.
- ► Please check the delivery for completeness and transport damage.
- ► Please report any transport damage immediately to the respective transport company.

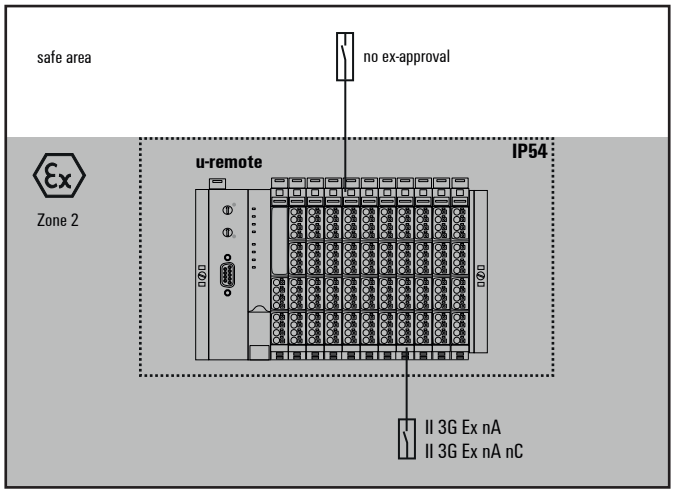
ATTENTION

The product can be destroyed by electrostatic discharge!
The components in the u-remote series can be destroyed by electrostatic discharge.
- ► Please make sure that personnel and work equipment are adequately earthed!

- ► Unpack all parts and sort the modules into the installation sequence as per the instructions.
- ► Dispose of all packaging in accordance with the local disposal guidelines. The cardboard packaging from the modules and fieldbus couplers can be sent for paper recycling.

Use in a potentially explosive atmosphere

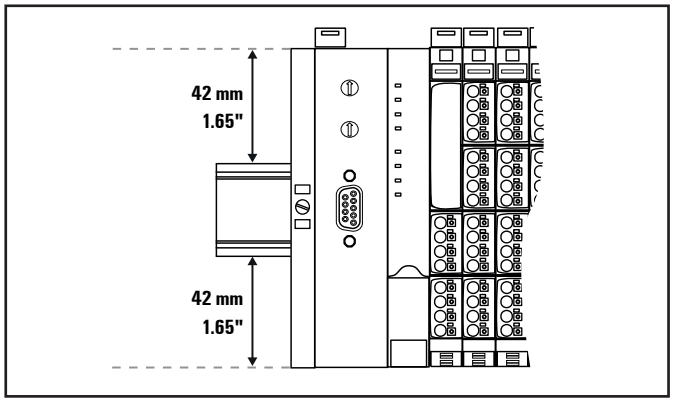
If the u-remote station is used in a potentially explosive atmosphere rated as Zone 2, the housing must meet the requirements of explosion protection type Ex n or Ex e and protection class IP54. Sensors and actuators that are located in Zone 2 or in a safe zone can be connected. All cable glands on the housing must be approved for Ex e.



Use in a potentially explosive atmosphere

Installation position

The u-remote station is usually installed on a horizontally positioned DIN rail.



Installation position of the u-remote station on the DIN rail (horizontal installation)

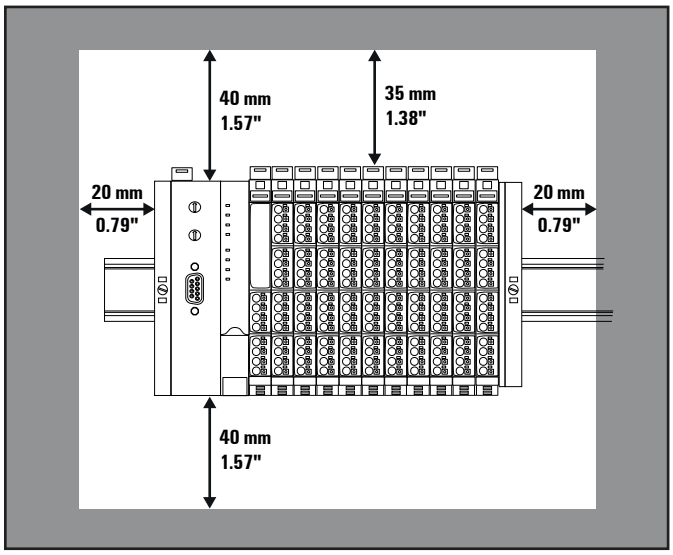
Installation on vertically positioned DIN rails is also possible. In this case however, the heat dissipation is reduced such that the derating values change (see Section 4.5).
In the case of vertical mounting, the field-bus coupler must always be arranged as the first module at the bottom and secured with a reinforced end bracket for vertical mounting (Order no. 1805610000).

Installation distances

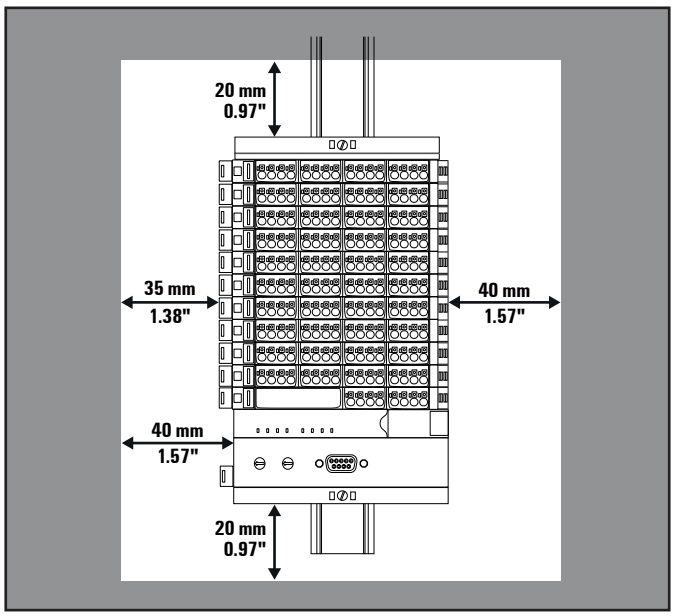
Depending on how the station shielding is implemented, the specified distances may have to be larger than those given below.

Ensure compliance with the minimum permissible cable bending radius.

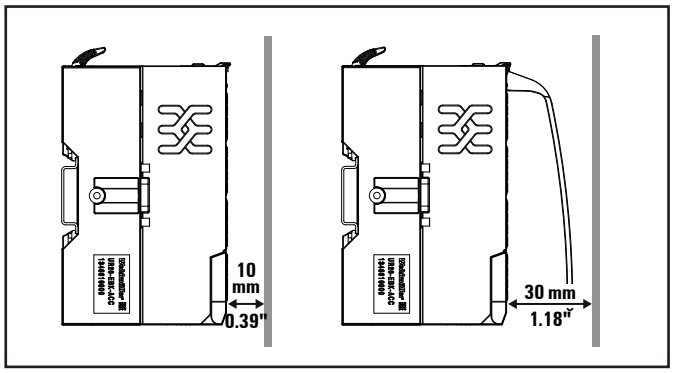
In order to be able to carry out the installation and further maintenance work and to ensure sufficient ventilation, the u-remote station must be installed while observing the following minimum distances. Earth terminals already installed can be ignored when calculating the distance.



Minimum distances with horizontal installation



Minimum distances with vertical installation



Minimum distance to switch cabinet door (with/without swivel marker)

Example calculation for space requirements

The space requirements for a u-remote station with n modules is calculated as follows:

Height: 120 mm + 2 x 40 mm (distances at top and bottom)
= 200 mm
Width: 8 mm (end bracket) + 52 mm (bus coupler) +
n x 11.5 mm (n modules) + 11.5 mm (end plate and end bracket) + 2 x 20 mm (distances to the sides)
= 111.5 + n x 11.5 mm

For vertical installation interchange height and width. When calculating the width, 4.5 mm for the must be added for the end bracket MEW 35/1.

Installation sequence

A u-remote station may only be installed in this sequence (starting from the left/bottom):

- End bracket
- Bus coupler
- Up to 64 active modules
- End plate and end bracket

If the station has already been configured, please proceed to the corresponding installation drawing. If you are configuring the station yourself, please observe the following instructions:

- Observe the maximum current carrying capacity (see section 4.5)!
- Furthermore, the modules may be arranged in any sequence. In order to configure the station as clearly as possible, we recommend arranging the modules according to their function.

Arrangement of SIL modules

A PF-O-xDI-SIL module can be positioned anywhere in the u-remote-station. All of the following output modules up to the next PF-O module are safely disconnected (safety segment). Multiple PF-O-SIL modules / safety segments can be set up in a single station.

When using u-remote PF-O-xDI-SIL modules, please also observe the **Modules for Functional Safety Manual**.
The manual is available to download from the Weidmüller website.

Preparation and the required tool

The DIN rail must already be installed. To mechanically install the u-remote station, you will need a 3-mm screwdriver.

- ► Lay out the modules in the intended sequence.
- ► Check whether the DIN rail feet can be moved on both end brackets. If necessary, loosen the mounting screw until the DIN rail feet can be moved freely.
- ► If not done yet, fit an earth terminal to the DIN rail.

7.2 Assembling the u-remote station

WARNING

Explosion risk!

► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING

Dangerous contact voltage!

► All work on the u-remote station must be carried out with the power supply disconnected.

► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply!

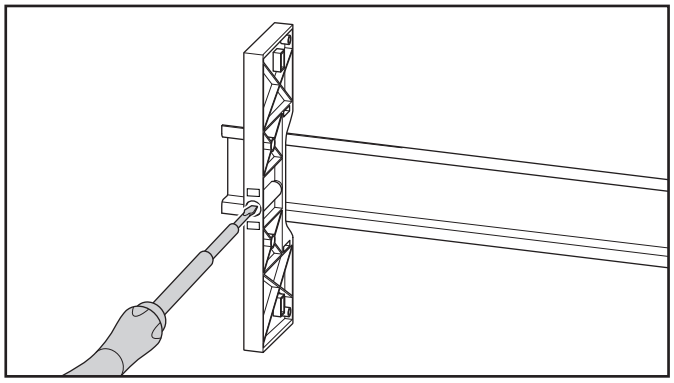
ATTENTION

The product can be destroyed by electrostatic discharge!

The components in the u-remote series can be destroyed by electrostatic discharge.

► Please make sure that personnel and work equipment are adequately earthed!

► On the left side of the installation site, place an end bracket on the DIN rail with the exterior of the bracket facing left and screw it down tightly (using a 3-mm screwdriver).



Attaching the end bracket

When installing the u-remote products, make sure that you listen for the double click:

1. When snapping onto the DIN rail
2. When pushing together with the neighbouring module.

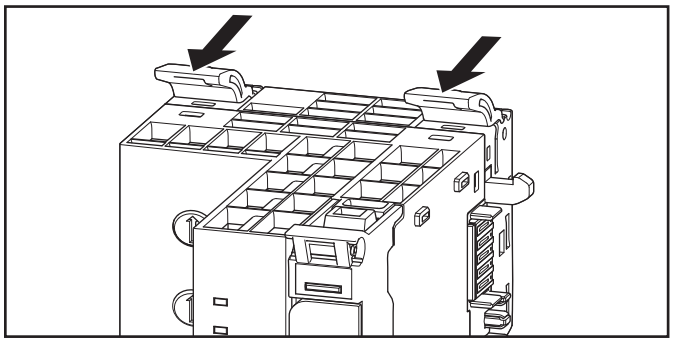
The modules are in the correct position and the connection is made only when both snapping noises are heard.

ATTENTION

Improper installation may prevent earthing!

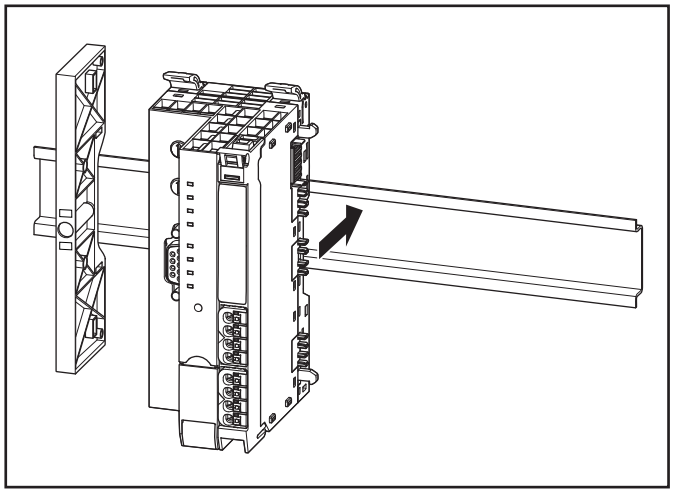
The earthing of the modules and couplers is only ensured if the FE spring at the bottom is in contact with the DIN rail.

► During installation, make sure that both release levers on the bus coupler and all release levers on the modules are closed before snapping onto the DIN rail.



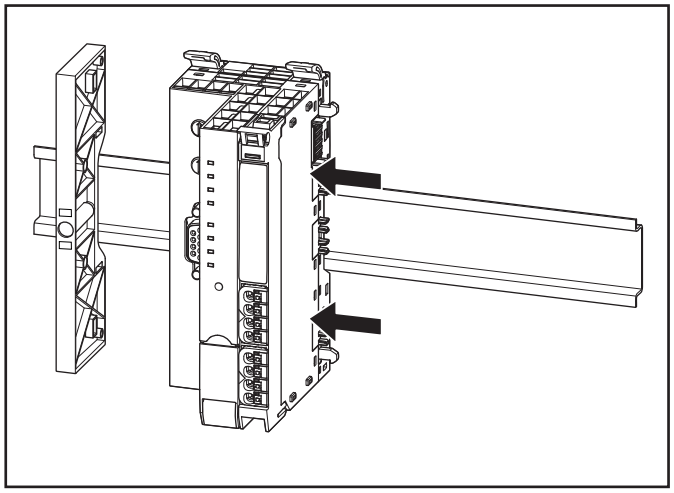
Release lever closed

► Place the field bus coupler (module side to the right) on the DIN rail so that it audibly clicks into place.



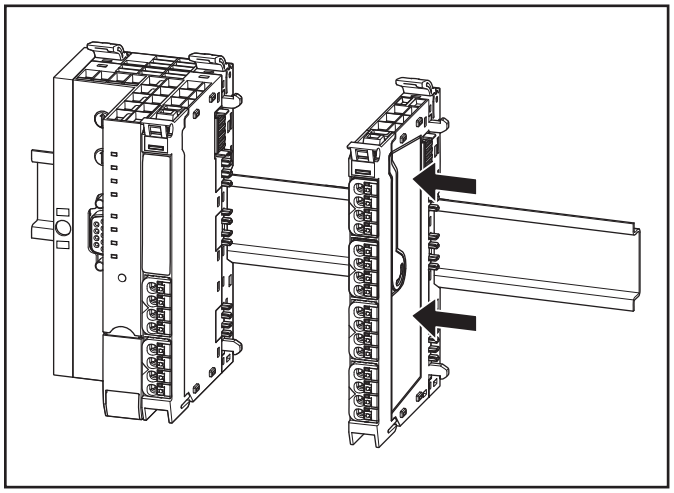
Attaching the bus coupler to the DIN rail

► Slide the bus coupler to the left until it completely connects with the end bracket. At the same time, press the bus coupler as close as possible to the DIN rail so that the coupler is not tilted.



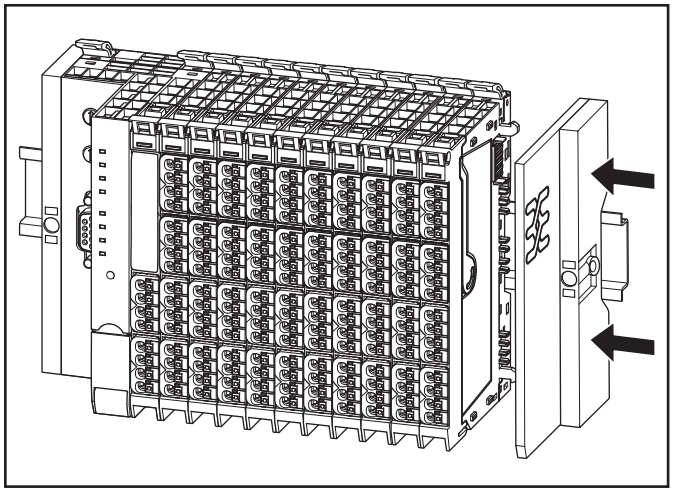
Sliding the bus coupler into position

► Place the first module on the DIN rail and press it down firmly. It must audibly click into place.
► Slide the module to the left until it audibly clicks into place on the bus coupler. At the same time, press the module as close as possible to the DIN rail so that the module is not tilted.



Sliding the module into position

► Attach all of the other modules as described above.
► Connect the second end bracket to the end plate as specified by the alignment pins.
► Place both parts on the DIN rail on the right-hand side of the station so that the end bracket faces outwards.
► Slide the end bracket and end plate to the left until it completely connects with the last module.



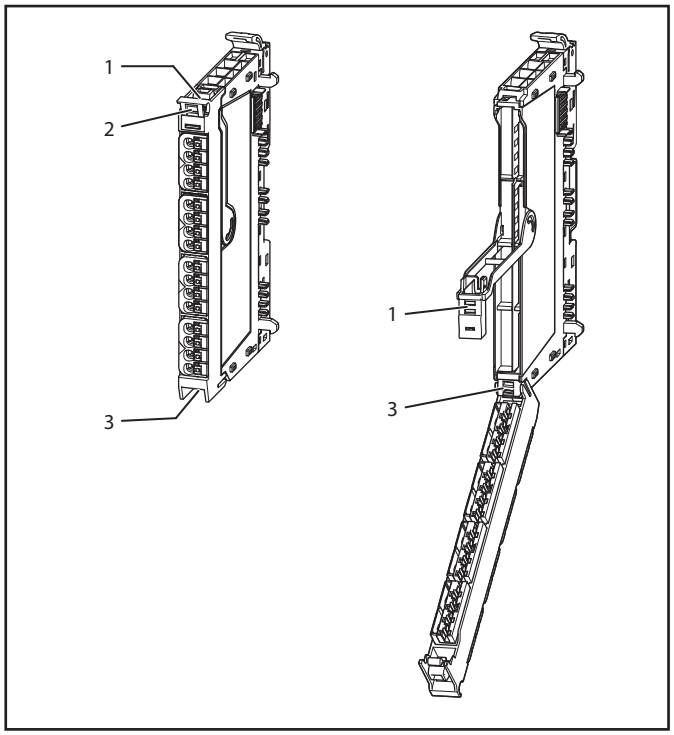
Sliding the end plate with end bracket into position

► Screw down the end bracket tightly (using a 3-mm screwdriver).
► Make sure that all release levers are in the locking position as standard. If this is not the case, click the open release lever into place.

7.3 Attaching the marker

Attaching the module marker

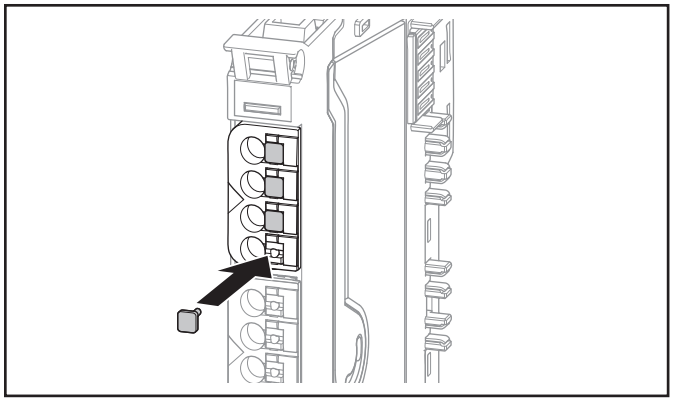
Each I/O module can be labelled at three points using the markers. This ensures clear allocation when replacing individual elements.



Three attachment points for markers

► Press the labelled marker into the corresponding fixture.

Attaching the marker for lines and channels



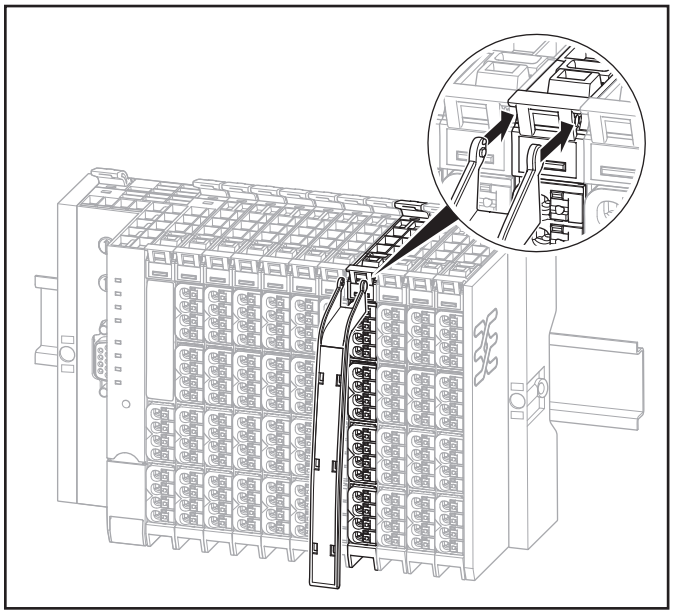
Attaching the connection marker

► Insert the labelled marker into the pusher for the connector.

Attaching the swivel marker

A swivel marker, available as an accessory (Order No. 1339920000), is best suited for making detailed markings on the connector frame.

► Snap the swivel marker into place on top of the module connector frame.

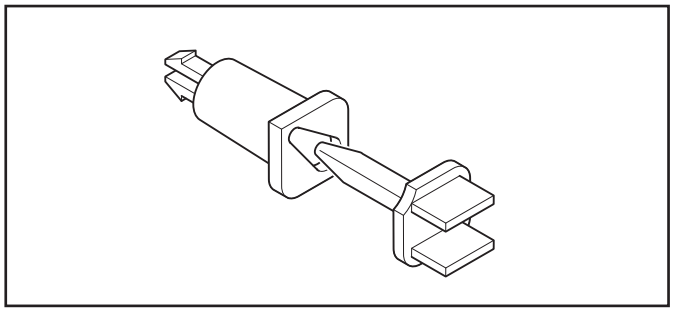


Attaching the swivel marker

► Insert the labelled marker into the swivel marker from below.

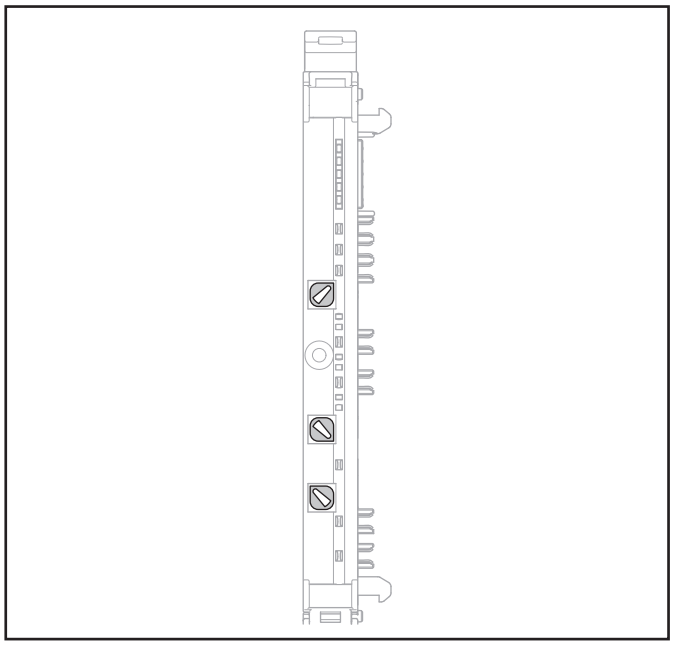
7.4 Coding the module

In order to prevent an electronic module being mismated, the modules can be coded by the customer. Coding is carried out by two small components: the orange coding socket and the black coding pin. Three codings can be applied to each basic module. Suggestions for the appropriate coding can be found in the annex.



Coding socket and coding pin

- ► Open the connection frame and remove the electronic unit (see Chapter 7).
- ► Place the coding sockets (orange) in the coding ports on the inside of the basic module.

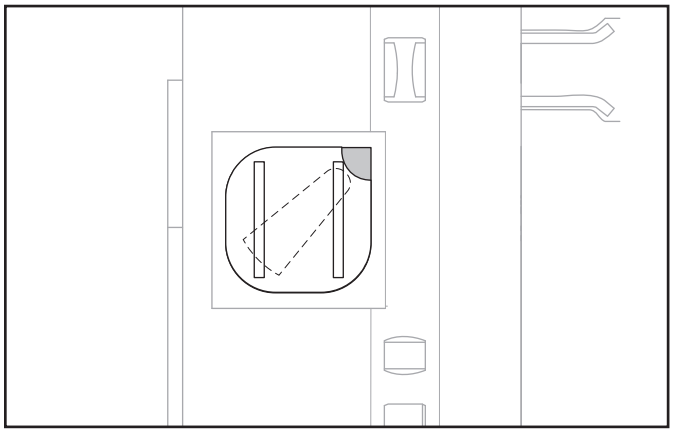


Basic module with inserted coding sockets

Each coding socket has one pointed and three rounded corners. The arrangement of the three sockets in the basic module allows for 4^3, i.e. 64, possible combinations.

- ► If necessary, you can rotate the inserted coding sockets into the required position using a 3-mm screwdriver.
- ► Insert a black coding pin to the stop in each coding socket.

A small orange corner will now be visible on each coding unit, which allows the coding state to be identified.



Coding socket with inserted coding pin

- ► Put the electronic module back into position.

The coding pin now engages securely in the electronic module. If the electronic unit has to be removed again, it can subsequently only be re-inserted back into the correspondingly coded basic module.

If the electronic module is replaced by a new module, this must be fitted with new coding pins.

7.5 Wiring

WARNING

Explosion risk!

- ► Before assembly, make sure that there is not a potentially explosive atmosphere!
- ► For applications in potentially explosive atmospheres, observe the installation and construction requirements of EN 60079-15 and/or country-specific regulations.

WARNING

Dangerous contact voltage!

- ► Carry out assembly and wiring work on the u-remote station only when the power supply is disconnected.
- ► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply!

WARNING

Safety functions of PF-O-xDI-SIL modules can be impaired!

When PF-O-xDI-SIL modules are installed in the u-remote station, please observe the following points:

- ► Please use wire-end ferrules in combination with flexible/multi-conductor cables.
- ► Ensure that for safety inputs in the configuration without test pulses the cabling prevents external short circuits (see DIN EN ISO 13849-2 Table D.4).

Once the u-remote station has been mechanically installed, the wiring can be carried out in accordance with the wiring plan. Lines with a cross-section measuring between 0.14 mm² and 1.5 mm² can be connected.

We recommend using the following wire-end ferrules:

Cross-section	Weidmüller order no. Weidmüller colour code	Weidmüller order no. DIN colour code
0,14 mm²	9028240000	
0,25 mm²	9025760000	
0,34 mm²	9025770000	
0,50 mm²	9025870000	9019020000
0,75 mm²	9025860000	9019050000
1,00 mm²	9025950000	9019100000
1,50 mm²	0635100000	9019130000

Wire-end ferrules for the wiring

The external dimensions of the crimped wire-end ferrules must conform with IEC-60947-1. We recommend the following tools for crimping:

- – Crimping tool for wire-end ferrules from 0.25 mm² to 1.5 mm² with a trapezoidal indentation crimp, type: PZ 6/5 ZERT (Order No. 9017900000)
- – Crimping tool for wire-end ferrules from 0.14 mm² to 0.75 mm² with a trapezoidal crimp, type: PZ 1.5 ZERT (Order No. 9017310000)

u-remote modules and bus couplers are equipped with the “PUSH IN” connector system. Single-strand and fine-strand lines with wire-end ferrules can be inserted without the need for a tool.

- ► Each cable must be the optimal length so that the bending radii observe the manufacturer's specifications.
- ► Strip the insulation from the lines to a length of approx. 10 mm ± 1 mm, even if you are using wire-end ferrules. If you use wire-end ferrules with plastic collars, strip the wires to 12 mm ± 1 mm.
- ► Connect all lines according to wiring diagram.

For the usage and handling of the “PUSH-IN” system, see Section 8.5.

8 Earthing and shielding

The terms “earths” and “shields” are classified according to their relation to human safety or system safety. An earth is installed primarily to protect human life, and for this reason it is referred to as the protective earth (PE) conductor. A shield, on the other hand, serves to ensure the trouble-free operation of an electrotechnical system as well as electromagnetic compatibility.

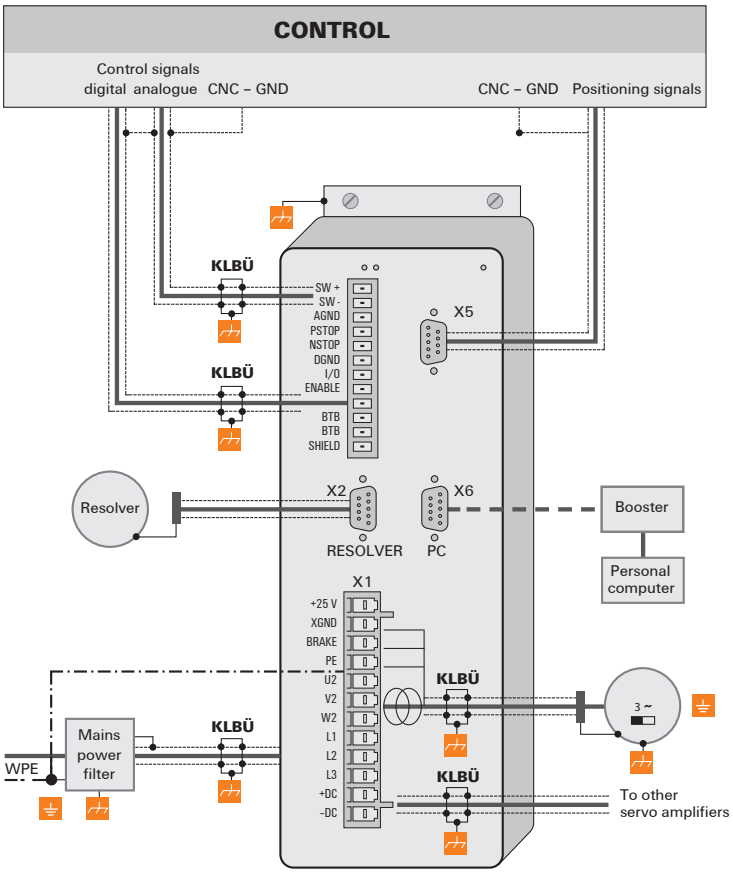
The main differences between the two terms are therefore the electrical design and installation. A shield is not designed to transfer power, even though leakage currents can flow on it – something which must be avoided. In contrast, a PE conductor must be capable, at least in the short term, of discharging high residual currents (IEC 60947-7-2). The corresponding short-term current resistance of the PE connection must be 120 A/mm² of the connected cross-section. To make sure a shielding concept is able to work properly, the shield impedance must be 10 times larger than the impedance of the earth potential.

The following figure shows how these two topics relate to each other in application.

As shown in the figure below, the cable's shielding is connected to the earth potential so that the shield's current can be discharged. Depending on the sensitivity of the system, an attempt is made to create separate potential areas for this. However, it is still typical to mix the areas, i.e. the shielding has a common equipotential bonding (earth). This figure shows how the number of shields and PE conductors that need to be connected can increase quite rapidly (in this case only one component is used). The shielding and earthing systems must be planned carefully to provide adequate safeguards for personnel and equipment. The following sections describe the complexity and special characteristics in more detail.

Shielding

Earthing



Connection diagram of a frequency converter

8.1 Earthing of shielded cables

Electrical and electronic systems must be designed such that they are largely safeguarded against electrical interference, thus enabling them to operate securely even in the case of transient interference voltages.

Electrical interference can be introduced into electric circuits in a variety of ways. The most frequent causes are due to inductive interference. In addition, galvanic and capacitive coupling as well as electrical fields and other processes are causes for interference voltages. Here, high-frequency voltage fluctuations – known as transients – are the cause of interference with a high level of effectiveness.

Shielded cables increase interference resistance

The sources of interference voltages can rarely be eliminated and even then not always completely. Thus, it is necessary to take measures to combat their effect. In general, the more effectively interference voltages can be kept away from circuit elements or can be discharged, the less electrical circuits are affected. This can be accomplished in a variety of ways with varying levels of effectiveness. A very effective measure, in particular for safeguarding against inductive effects, i.e. ensuring "electromagnetic compatibility" (EMC), is the shielding of electrically functional components to earth potential. In doing so, for instance, components are installed in metallic, earthed housings and the connecting lines are equipped with shielding.

In general, it can be said that interference from cables can be combated by routing cables as far away as possible from each other, keeping the common return as short as possible and using twisted-pair wire. Far better protection, however, is provided by completely shielding of all cables. This is the most effective measure that can be taken against the coupling of interference signals.

The best type of shielding consists of a braided mesh sleeve that uses individual wires made of non-magnetic materials (copper, aluminium). The braided mesh should be sufficiently large and also be as thick as possible. For cables that are equipped with foil shields, it is necessary to be aware of the low mechanical strength and the low current-carrying capacity of the shielding.

Proper use of shielded cables

The shielding of cables will only result in the desired effect if this is implemented properly. Incorrect earthing or the use of improper components that perform their task inadequately reduces or even totally eliminates the effect. Placing the shielding at any spot on the earth potential will not suffice, as this earth connection may have no effect on high frequencies. In addition, ground loops must also be taken into consideration. Furthermore, the shielding should be earthed over a large surface area. Beyond that, the quality of the shield conductor and earthing accessories is also important.

A Weidmüller clamping bracket (KLBUE 10-20 SC)
Order number: 1712321001

In practice, the shield is still often twisted and connected to a terminal point. There is very high attenuation (voltage drop) on these connections, especially for high-frequency interference. Therefore, this type of shielding should not be used, even for short cable lengths. The shielding of the cable is practically negated and can, at best, be helpful for low-frequency interference. We recommend that there is a large amount of surface contact with the braided shield of the cable.

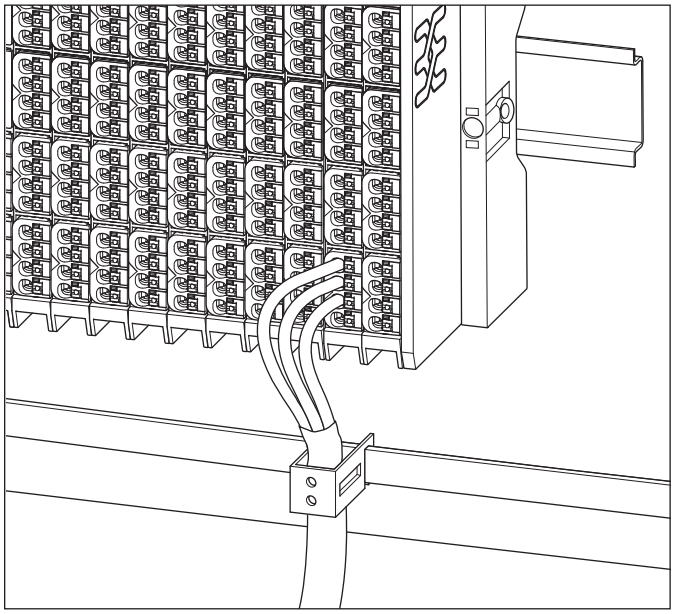
There are generally four distinct types of coupling:

- Galvanic coupling
- Capacitive coupling
- Inductive coupling
- Radiation coupling

These types of interference usually occur mixed together, but they can be categorised as follows:

- Electromagnetic fields
- Ripple voltage (50 Hz)
- Lightning
- Interference pulses (current, voltage)
- Transient surge voltages
- Radio interference
- ESD (electrostatic discharge)
- Burst
- Mains feedback

Another area of concern as regards shield contact is the “flow” within the conductor. Temperature changes caused by the current lead to changes in the conductor cross-section. A rigid contact can therefore only be partially effective. A self-adjusting contact is what is really required. Weidmüller's clamping bracket products (KLBÜ series) provide the perfect solution to meet this challenge.



Use of a clamping bracket

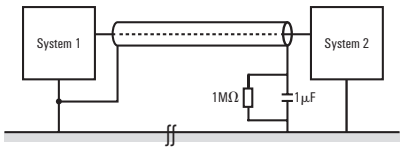
Effective shielding

It is important that the shielding is not positioned on the earth of the connected component, but on the protective earth. In the case of components that are installed in a metal housing, the shielding must be positioned to this housing. If no earthed housing is available, the shielding is positioned on a separate earth.

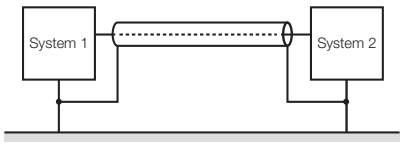
When installing ground connections on shielding, it is generally also important that no earth loops are created. The smaller the earth loop, the less the danger of the induction of interference voltages. It is therefore most suitable to have a purely neutral-point installation.

The following sketches show the possible shielding connections to protective earth.

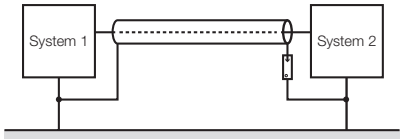
A one-sided connection of the shielding protects against capacitive coupling of interference voltages.



If you use a two-sided shielding connection, make sure that compensating current (different earth potentials) does not flow through the cable shield.



If you wish to avoid the disadvantages associated with creating an earth loop with two-sided shields, it is recommended you connect one side of the shield through a high impedance.

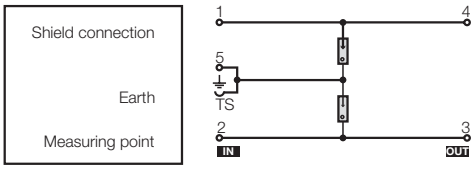


For longer lengths of shielded cables, such as if a sensor must be added to a control panel, a potential difference between both end points must not be ignored.

However, such shield conductors are relatively expensive and also require more time in working with them. Another possibility would be to place an additional voltage equalising cable between the measurement location and the control panel. The shield can then be hooked up on both sides.

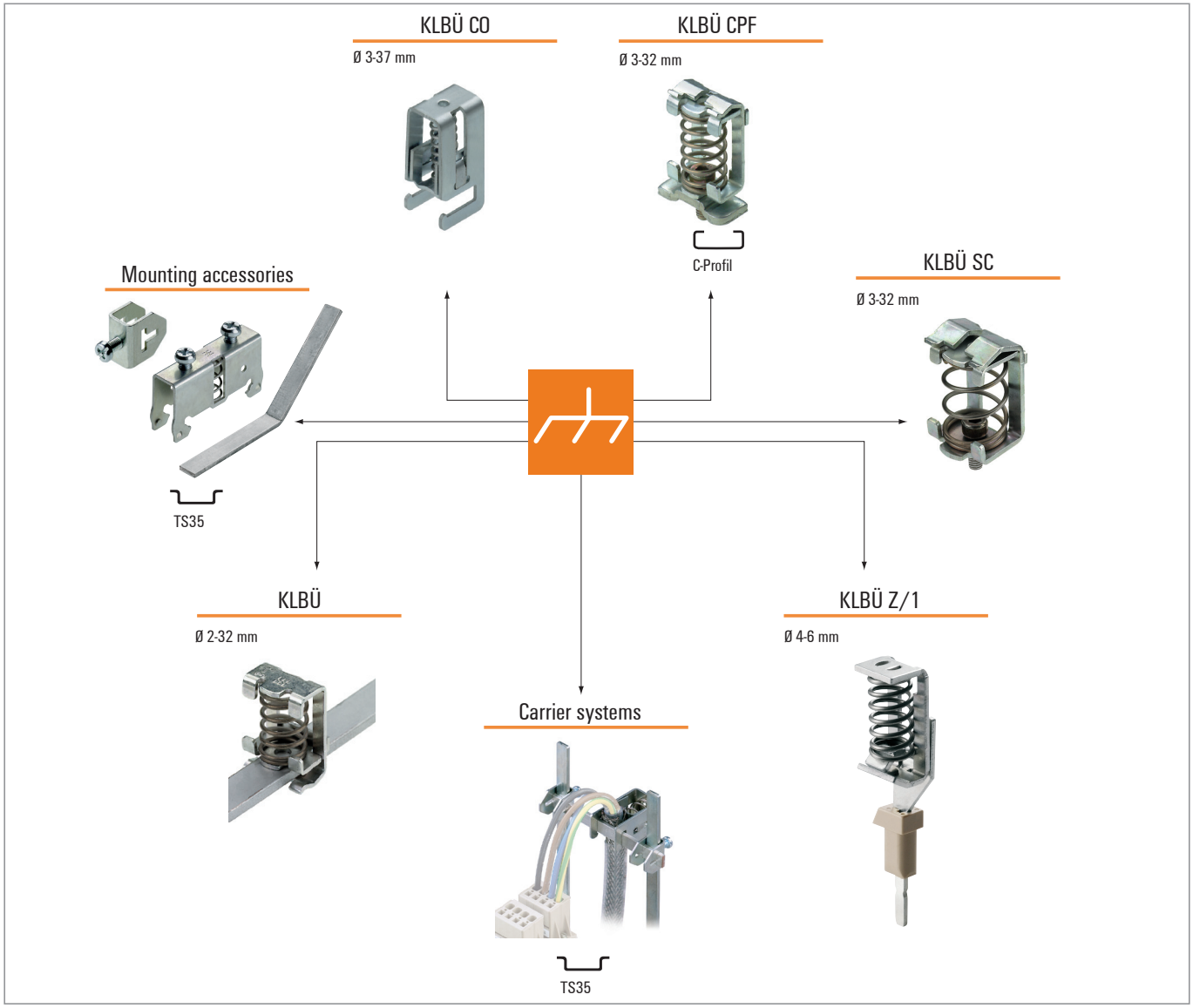
A high-impedance earth connection is also another option. In the control panel, the shield is then connected to the earth potential, and the shield has a high-impedance connection to earth at the measurement location via a gas discharge tube. This solves the problem of a potential transfer and 50-Hz humming.

For non-isolated measurement locations, two gas discharge tubes must be installed. One connects the shield to earth, and the other connects it to the non-isolated measurement location. This method prevents a galvanic coupling between the measurement circuit and the earthed measurement location.



Summary

Earthing is a key element for the reliable functioning of an electrical system in the event of interference. In this regard, HF-related aspects must be taken into consideration. Only the proper use of materials and a well thought-out circuit design will lead to success.



Overview of the product line for shielding connections

Please refer to our Modular Terminals Catalogue for more information.
Order No.: 1282240000

8.2 Potential ratios

Basic aspects

As regards the potential ratios of a u-remote system, the following aspects must be kept in mind:

- The power supply of the coupler and I/O modules as well as field power is provided via the power supply at the power-feed module (PF)
- A potential-free design is made possible through the use of an isolated power supply at the system power supply and the field power supply

The block diagram shows the typical design of a u-remote system. The power supply concept here makes sure that, starting with a certain capacity utilisation, power refresh is implemented using power-feed modules.

Potential-free design

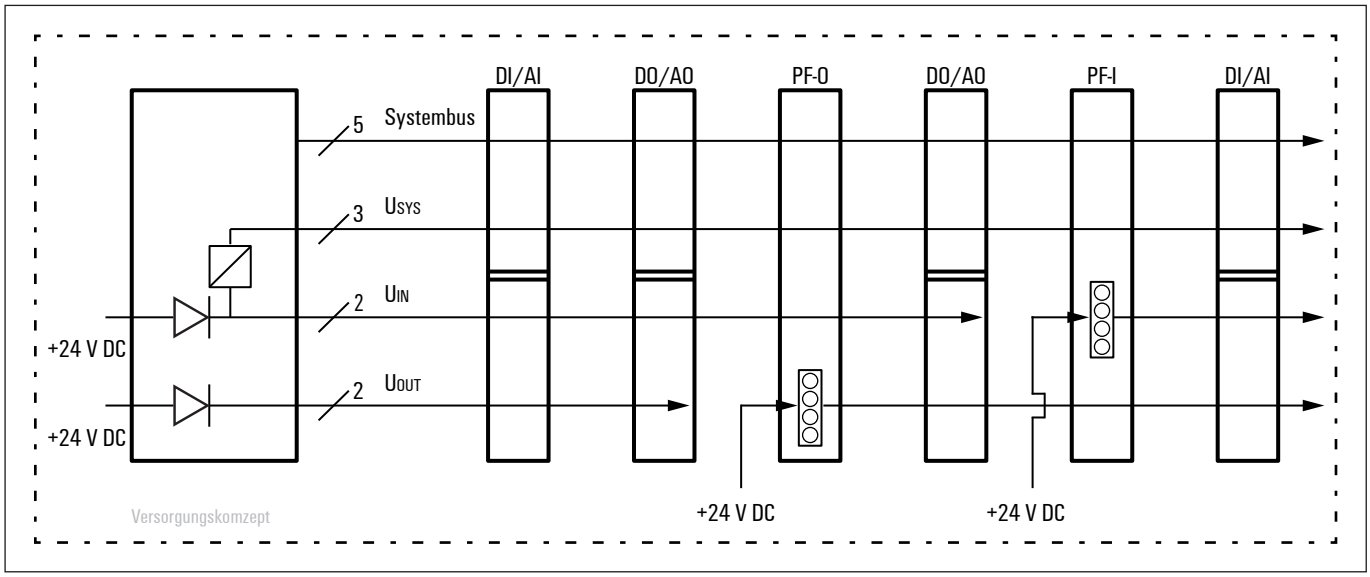
In a potential-free design, the reference potentials of control and load circuits are galvanically isolated from each other.
A potential-free design is necessary for the following:

- Use of the power-feed module (in both the PF-I and PF-O variants), i.e. in all AC load circuits
- DC load circuits that cannot be coupled

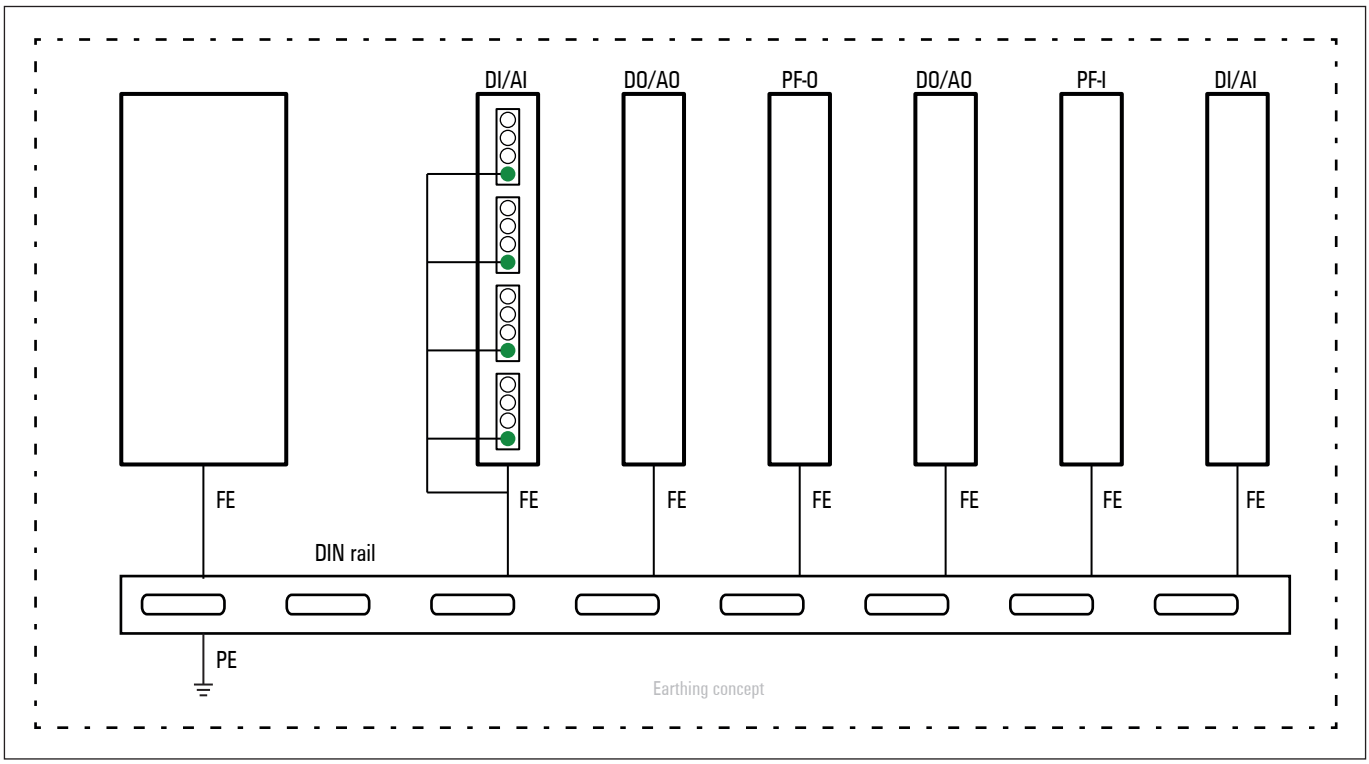
Potential-free installation depends on the type of earthing.

Non-isolated design

In a non-isolated design, the reference potentials of control and load circuits are galvanically connected to each other.



u-remote power supply concept



u-remote earthing concept: The spring contacts underneath the module and the coupler snap into the DIN rail to make a connection.

8.3 Electromagnetic compatibility (EMC)

u-remote products completely meet EMC requirements. EMC planning, however, is necessary prior to installation.

Aspects to consider include all potential interference sources such as galvanic, inductive and capacitive couplings, as well as radiation couplings.

Ensuring EMC

To ensure EMC, the following basic principles must be observed during installation of the u-remote modules:

- Proper, extensive earthing of inactive metal parts
- Correct shielding of cables and equipment
- Proper layout of wires – cabling
- Creation of a uniform reference potential and earthing of all electrical equipment
- Special EMC measures for special applications (e.g. frequency converters, servo drives)
- Contactors and relay coils must be equipped with the corresponding interference suppressors

Earthing of inactive metal parts

The earthing of all inactive metal parts reduces the influence of coupled interference. For this purpose, all inactive metal parts (such as switch cabinets, cabinet doors, support beams, mounting plates, DIN rails, etc.) must be connected to each other over a large surface area with low impedance, whereby a uniform reference potential is ensured for all control unit elements.

Required measures:

- Removal of the insulating layer around screw connections. Protection of connection points against corrosion
- Connection of moving earthed components (cabinet doors, separated mounting plates, etc.) through short earthing straps with large surfaces
- When possible, avoid using aluminium parts, because aluminium oxidises easily and in this respect is unsuited for earthing

PE connection

The connection from earth to the PE (protective earth) connection must be done centrally.

WARNING

Possible danger to life!
In the event of a fault, the earth must never take on a dangerous contact voltage, which is why it must be connected to a PE conductor.

Unearthed operation

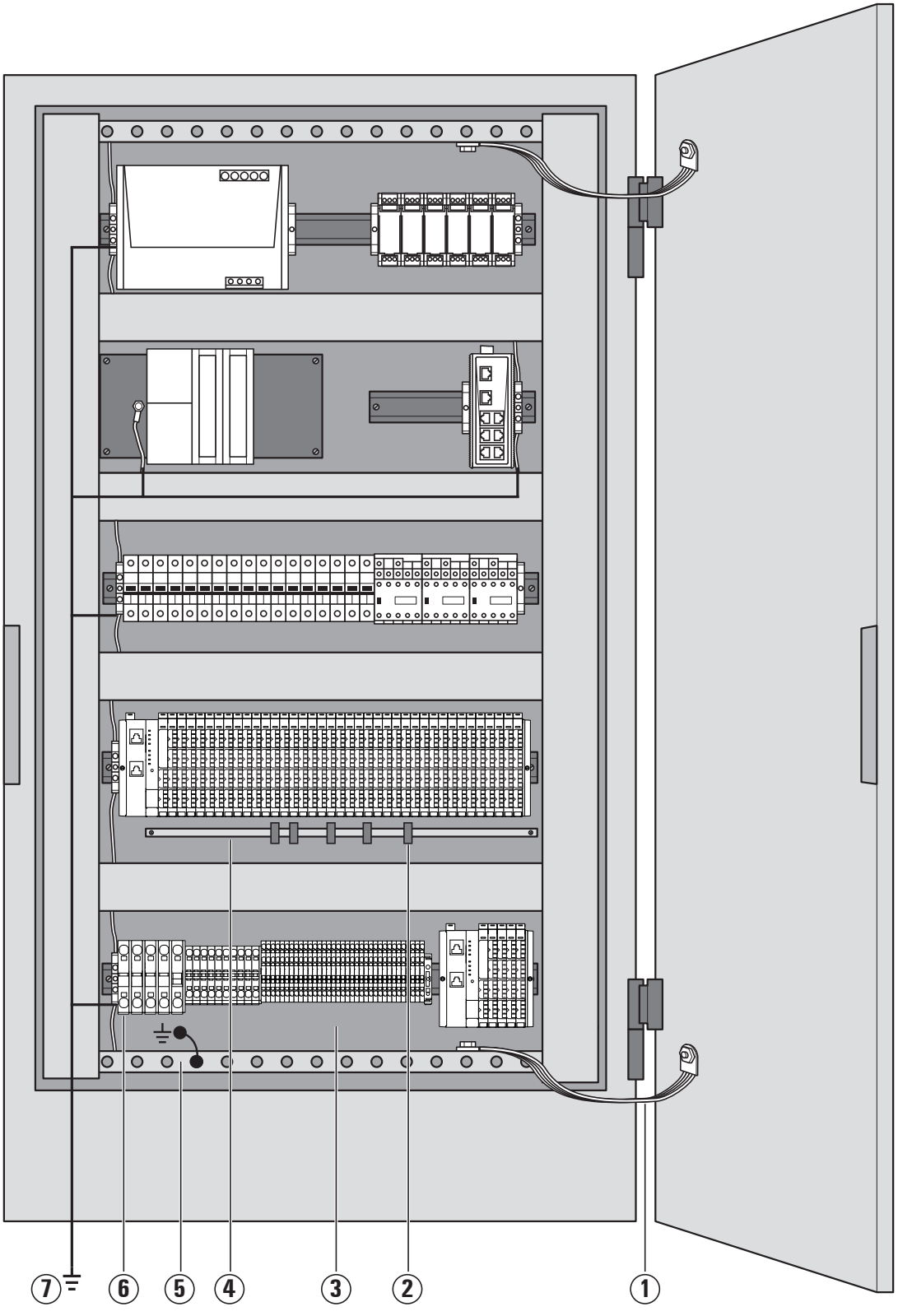
In the event of unearthed operation, the corresponding safety regulations must be observed.

DIN rails

Notes concerning the use of DIN rails:

- Large-surface, low-impedance attachment on the mounting plate and corresponding contact with the carrier system using screws or rivets
- Proper earthing
- Use corrosion-proof DIN rails
- Remove the insulating layer on painted, anodised or insulated metal components in the area around the connection point
- Protect the connection point against corrosion (e.g. using grease; Attention: only use grease suitable for the purpose)

Cabinet design according to EMC guidelines:



1 Earthing strips
Earthing strips must be used for connecting inactive metal parts if it is not possible to connect two large pieces of metal. Use short earthing strips with large surfaces.

2 Clamping bracket for signal cables
If shielded signal cables are used, the shield must be attached to the clamping bracket (KLBÜ series) on the busbar over a large surface. The braided shield must cover and make good contact with a large part of the clamping bracket.

3 Mounting plate
The support beam for holding control components must be connected to a large part of the cabinet housing.

4 Busbar
The busbar must be connected via the rail holding fixture. The cable shields are fixed to the busbar.

5 Protective earth conductor rail
The protective earth conductor rail must likewise be attached to a large part of the mounting plate, and it must be connected to the protective earth conductor system via an external cable with a cross-section of at least 10 mm^2, in order to discharge interference current.

6 Protective earth terminal strip
The protective earth terminal strip must be connected to the protective earth conductor rail in a neutral-point configuration.

7 Cable to protective conductor system (earthing point)
The cable must be connected to a large part of the protective conductor system.

See also:
EMC Directive 2004/108/EC

8.4 Shielding of cables

To prevent the coupling of interference voltages and the decoupling of interference fields in cables, only shielded cables made from well-conducting material (copper or aluminium) with braided shielding and a coverage of at least 80 % should be used in the design of a cable shield.

Only when a cable shield is connected to the local reference potential on both sides is it possible to achieve optimal shielding against electric and magnetic fields. Exceptions are possible, for example, with high-impedance, symmetrical or analogue signal cables. If a shield is attached on only one side, this merely achieves an isolation against electric fields.

ATTENTION

Material damage!
Requirements for effective shielding design:

- The shield connection to the shield bus should be low impedance
- The shield must be connected directly at its entrance into the system
- Keep cable ends as short as possible
- Do not use cable shields for equipotential bonding

When connecting a data cable using a sub-D connector, the connection must be made through the connector's shield collar and never through pin 1.

The data cable's shield must be attached to the shield bus with the insulation stripped away. The shield is to be connected and attached with clamping brackets or similar metal fixing devices. The shield bus must be connected to the reference potential surface through a low impedance (e.g. fastening point with a separation of 10 to 20 cm). The brackets must surround and make contact with a large part of the shield.

Isolation of the cable shield should be avoided. Instead, it should be routed into the system (for example, the switch cabinet) up to the interface connection.

ATTENTION

Shielding of field bus cables
When shielding field-bus cables, the installation guidelines for the respective field buses must be observed. (See the websites of the field bus organisations.)

ATTENTION

Material damage!
If it is only possible to have a one-sided shield connection for reasons specific to the circuit or equipment, the second side of the cable shield can be routed to the local reference potential via a capacitor (with short connections). To prevent disruptive discharges when interference pulses occur, a varistor or a resistor can also be wired in parallel to the capacitor.

As an alternative, a doubled version (galvanically isolated) can be used, whereby the inner shield is connected on one side and the outside shield is connected on both sides.

Equipotential bonding

If system components are positioned separately from each other, potential differences may arise, provided that:

- Power is provided from different sources
- The earthing is implemented at different system parts, despite the cable shields being connected at both sides

A voltage equalising cable must be used for equipotential bonding.

WARNING

Possible danger to life!
The shield must not be used for equipotential bonding!

The following features are essential for a voltage equalising cable:

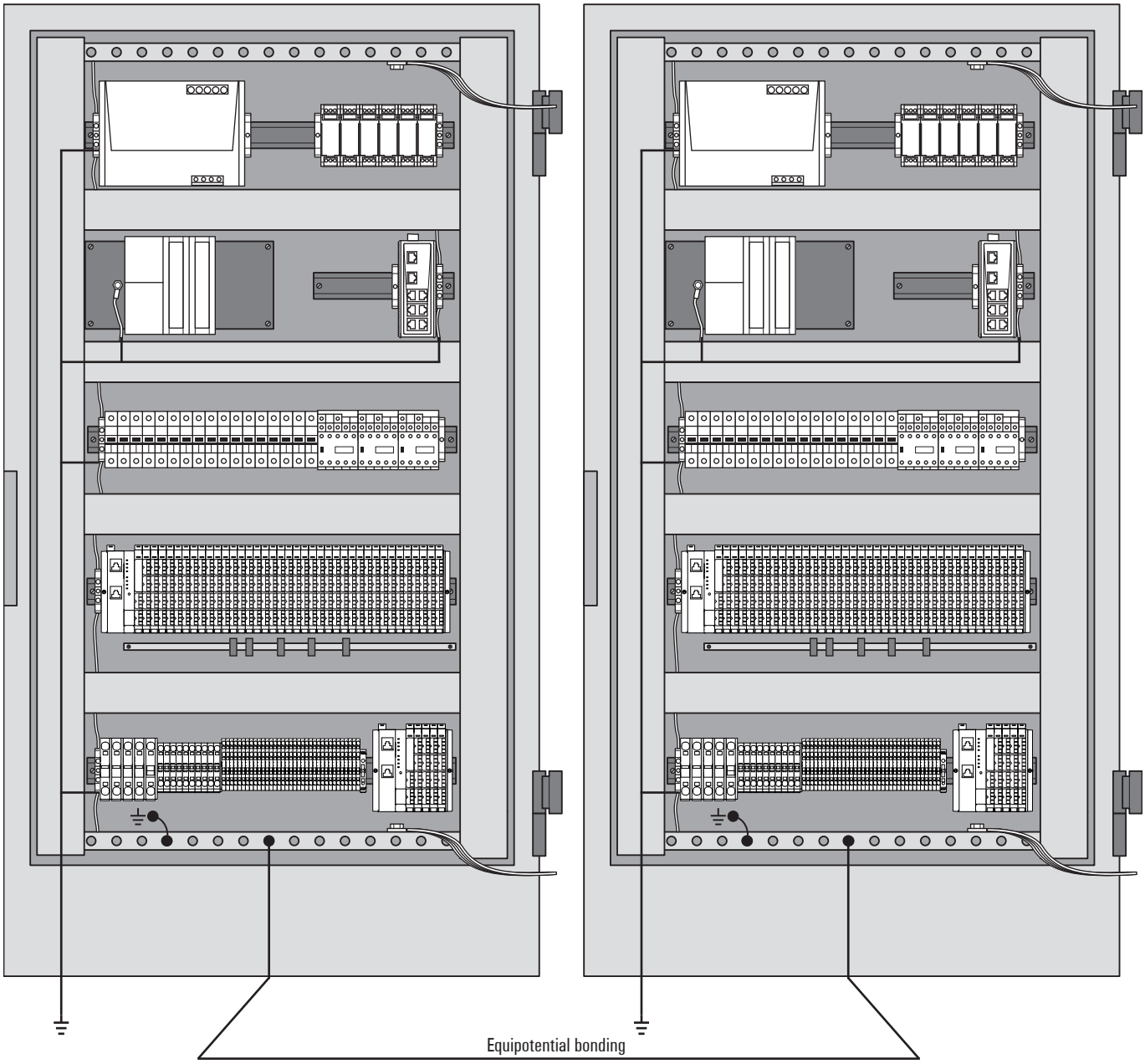
- In the case of cable shields on both ends, the impedance of the equalising cable must be considerably smaller than that of the shield connection (maximum 10 % of its impedance)
- When the length of the equalising cable is less than 200 m, its cross-section must be at least 16 mm^2 If the cable is greater than 200 m in length, a cross-section of at least 25 mm^2 is necessary.
- Large-surface connection with the PE conductor or the earthing and corrosion protection are requirements for long-term safe operation
- They must be made of copper or galvanised steel
- In order to keep the enclosed area as small as possible, the equalising cable and signal cable must be routed as close to each other as possible

Inductance wiring

For inductive loads, it is recommended that protective circuits be placed directly on the load. The earth (PE/FE) must be connected in a neutral-point configuration according to regulations for switch cabinets.

ATTENTION

Material damage due to electrical discharge!
When disassembled, u-remote modules and couplers are at risk of ESD. Therefore, avoid touching bus connections with bare hands, as this can lead to damage due to electrostatic discharges.


Equipotential bonding

9 Commissioning

WARNING

Explosion risk!

► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING!

Manipulation of the control unit!

During commissioning, the system may be manipulated to such an extent that can result in risks to life and material damage.

► Make sure that system components cannot start up unintentionally!

The procedures applied during commissioning depend on which control unit is being used on site. The descriptions in this chapter use commissioning with a Profinet coupler and the Siemens SIMATIC Manager Step7 as an example.

9.1 Requirements

Before you start the commissioning work, the following requirements must be fulfilled.

- The control unit must be in operation.
- The u-remote station must be completely assembled and wired up.
- The control unit and u-remote station must be connected via fieldbus, and a PC/laptop must also be connected.
- The power supply must be turned on.

If these requirements are fulfilled, the following LEDs light up:

- On the bus coupler
  - The PWR LED lights up green.
  - For the port to which the control unit is connected, the LINK LED lights up green and the ACT LED lights up yellow.
- On the modules, the Status LED lights up green.

9.2 GSD files

Downloading and installing GSD files

► Download the device master data files (GSD files) from the Weidmüller website (www.weidmueller.com/Download/Software).

These include:

- GSDML files for PROFINET couplers
- GSD files for PROFIBUS couplers

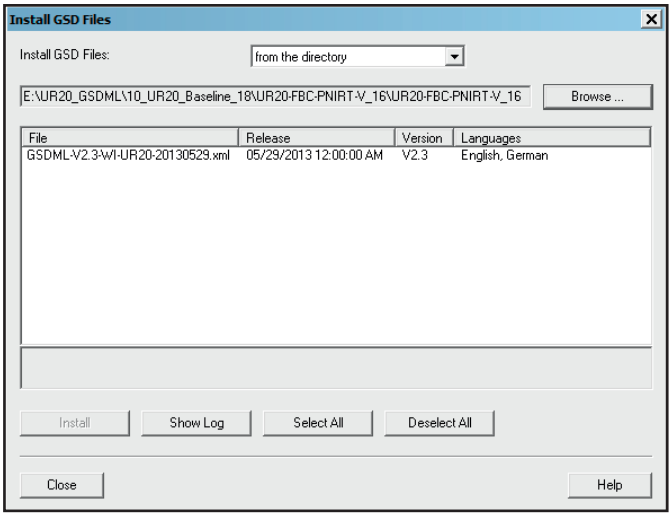
If bitmap files for visualising the coupler are also supplied, store them in the same folder as the GSD files.

Projects must not be open in the hardware configuration tool while the GSD files are being installed!

► Close any open projects before installing the GSD files!

► In the hardware configuration tool, open: **Extras/Install GSD files**.
► Select the directory in which you have stored the GSD files.

The GSD files available are displayed.



Selecting GSD files

► Select the GSD files that you would like to install.
► Click **Install**.
► When the installation is complete, click **Close**.
► Update the device catalogue via **Extras/Update catalogue**.

The devices associated with the current GSD file are now listed in the device catalogue.

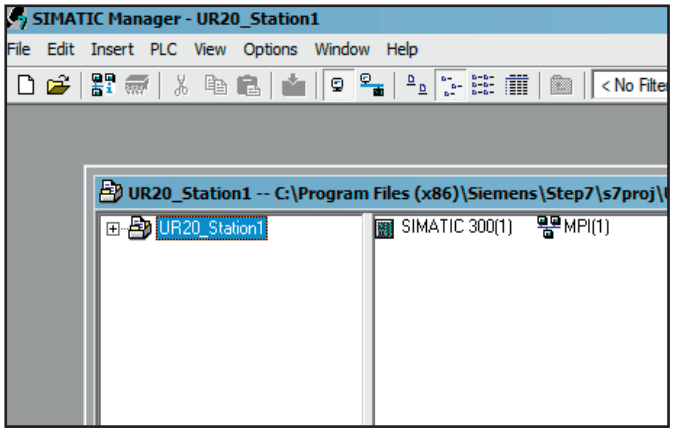
Updating GSD files

The naming convention for GSD files always follows this pattern: GSD_V2.3-WI-UR20-20121214.xml. By reading off the version (V2.3) and the date (14.12.2012), you can find out the status of a GSD file and determine whether you are already using the latest version.

► Download the latest GSD files from the Weidmüller website.

9.3 Commissioning the UR20-FBC-PN-IRT

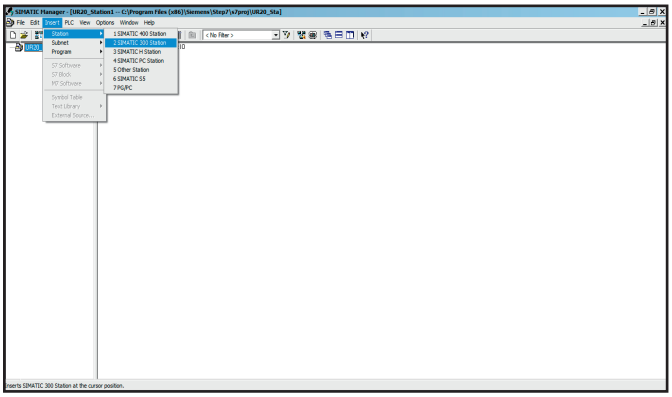
► Start SIMATIC Manager.
► To set up a new project, click **File/New**.
The "New Project" window opens.
► Enter a name for the new project (e.g. UR20_Station1) and click **OK**.
The new project is displayed in SIMATIC Manager.



Creating a new project

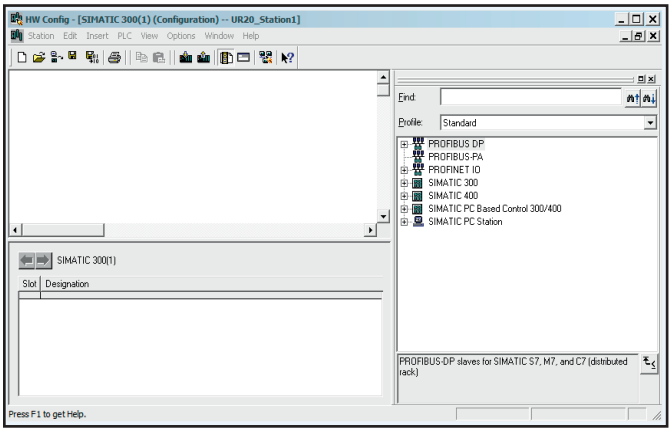
Adding a control unit type

► Select the project in SIMATIC Manager.
► Select the control unit type VIA **Add/Station** (e.g. SIMATIC 300).



Adding a station

► Double-click on the project name so that the station (SIMATIC 300) is displayed below in the directory tree.
► Click on the station (SIMATIC 300).
► Double-click **Hardware** on the right-hand side of the window.
The "Hardware Configuration" window opens.

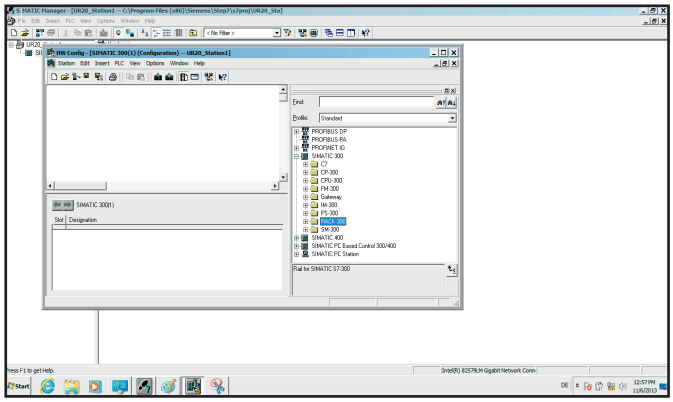


Hardware configuration

► The device catalogue is displayed on the right-hand side of this window. If this does not occur, open the catalogue via **View/Catalogue**.

Adding a profile rail:

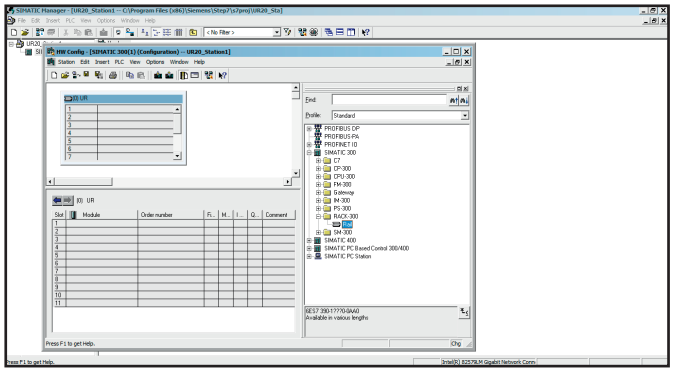
► In the catalogue, select the profile rail in use (e.g. SIMATIC 300/RACK-300).



Selecting a profile rail

► Double-click on the profile rail or drag it to the left-hand side of the window using the mouse.

The profile rail (UR) is displayed with the open positions.

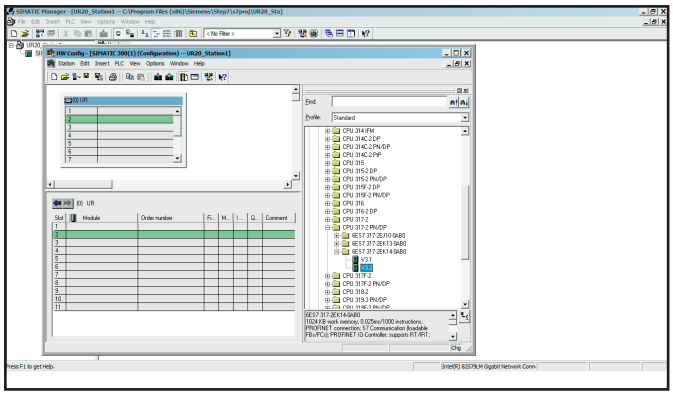


Profile rail with open positions

Selecting the control unit version

► Click on the second line of the **UR** table.

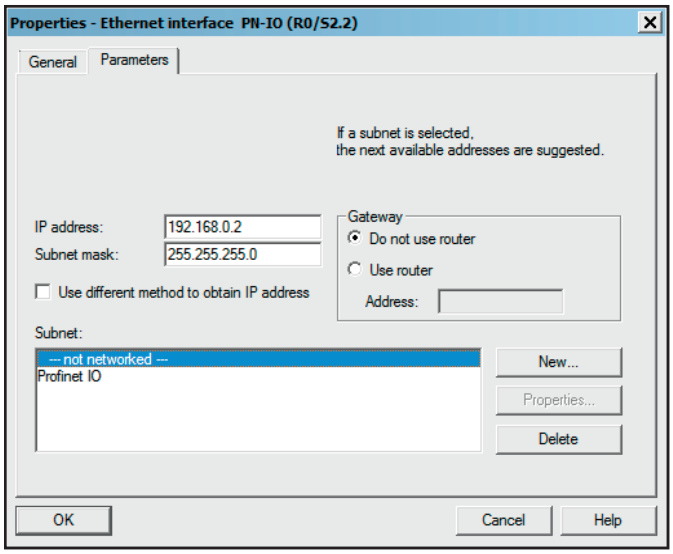
► From the catalogue, select the control unit in use and its version (inscription on the control unit, e.g. 317-2EK14- etc.).



Selecting the control unit version

► Double-click on the respective version, or use the mouse to drag it to the second position in the table on the left-hand side of the window.

The **Ethernet interface properties** window opens.



Ethernet interface properties

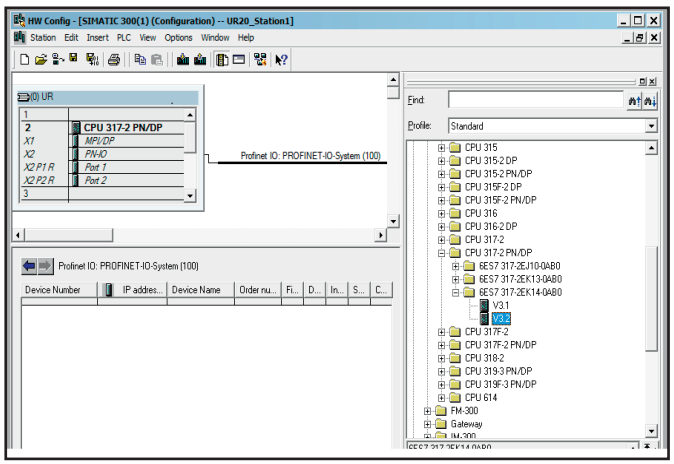
► Enter the designated IP address and the subnet mask.

► Click on **New**.

► Enter a name for the subnet (e.g. Ethernet UR20-S1). This name is assigned to the control unit.

► Confirm **twice** by clicking **OK**.

A network line which has the subnet name is now displayed in the configuration window.

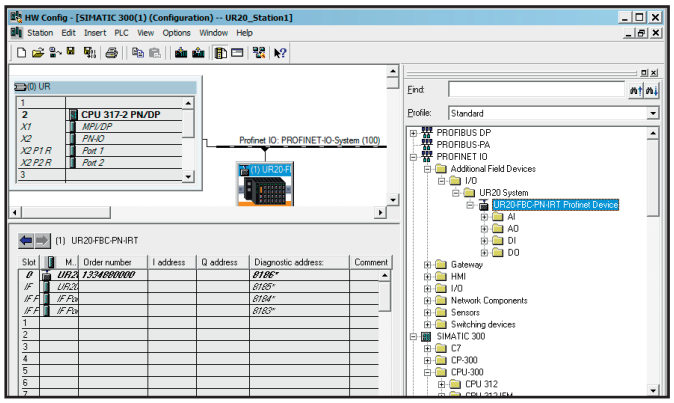


Ethernet configuration

Linking a bus coupler

► Click on the network line in the configuration window.
► In the device catalogue, select the bus coupler (UR20-FBC-PN-IRT) under **PROFINET IO/Additional field devices/ I/O /UR20 system**.
► Double-click on the coupler or drag it to the subnet line.

The coupler is added to the subnet.



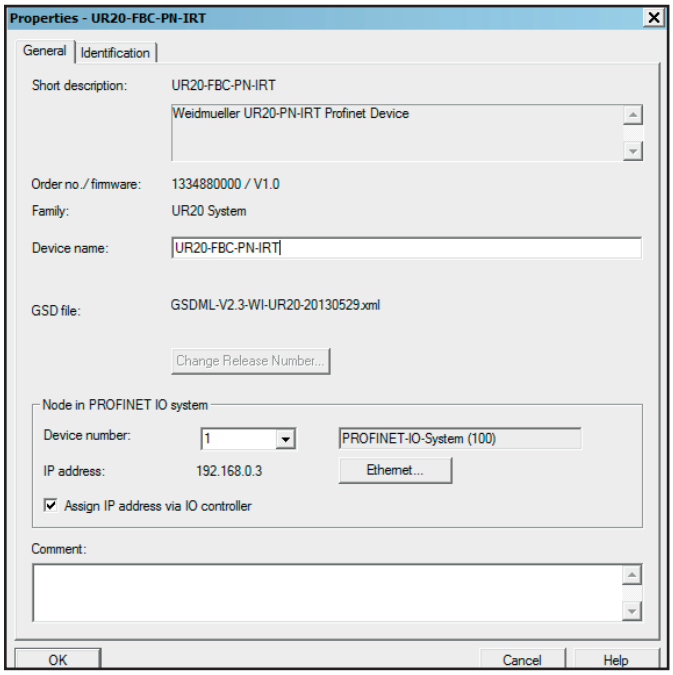
Linking the coupler

Providing the bus coupler with an IP address

All settings only take effect once they have been loaded into the component/control unit (see below).

► Double-click on the bus coupler icon.

The **UR20FBC-PN-IRT properties** window opens.



Bus coupler properties

The device name must be the same as the name that is defined in the device (see “Setting the properties of the Ethernet participants”).

All settings only take effect once they have been loaded into the component/control unit (see below).

Providing the control unit with an IP address

► Double-click on **PN-IO** in the upper window (UR).
The **Properties** window opens.

► Click on the **General** tab.
► Change the **Device names** as required.

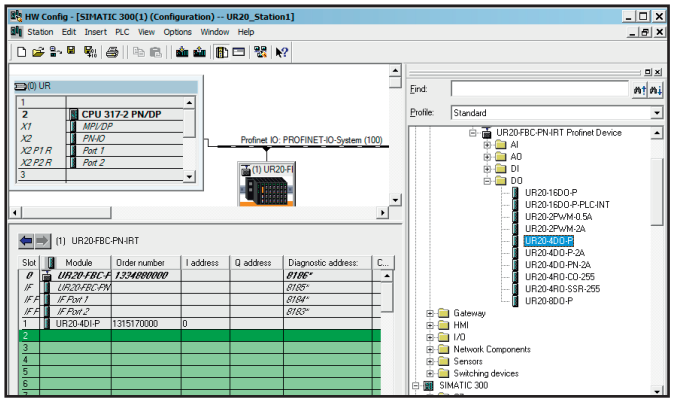
All settings only take effect once they have been loaded into the component (see below).

Adding modules

Only modules with an address can be added. All modules that do not communicate (AUX, PF power-feed modules and ES empty slot modules) are not listed in the device catalogue.

► In the hardware configuration tool, click on the icon for the UR20-FBC-PN-IRT bus coupler.
The list of components is listed in the lower part of the window.

► In the list of components, click in the first free line.
► Navigate to the device catalogue and select the first module you would like to add (corresponding to the first module in the u-remote station).
► Double-click on the module, or drag it into the configuration list.
The module is displayed in the list of components.



Adding modules

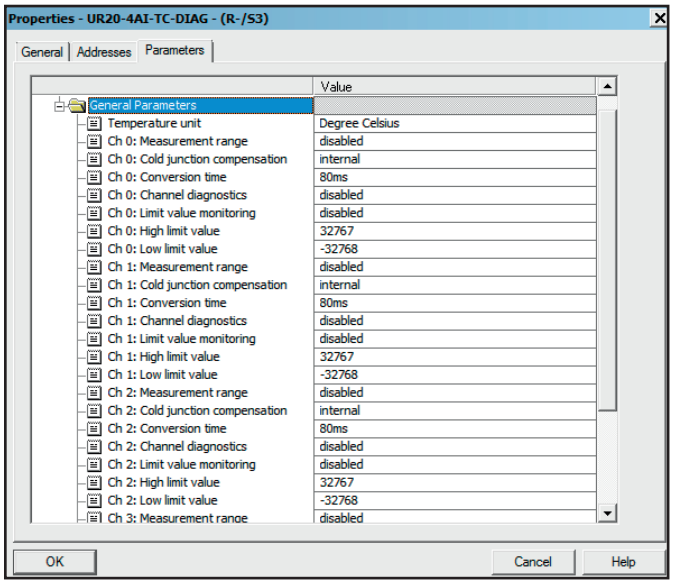
► The same method can be used for any additional modules be installed in the station.

Removing a module

► To delete a module from the list, select the module and click **Edit/Delete**.
or
► Using the right mouse button, click on the module in the list and select **Delete**.

Setting module parameters

A wide range of parameters can be edited for some modules.
► Navigate to the list of components and click on the module.
The **Parameters - Module XY** window opens.
► Select the **Parameters** tab.
A list of all module parameters is displayed.



Editing module parameters

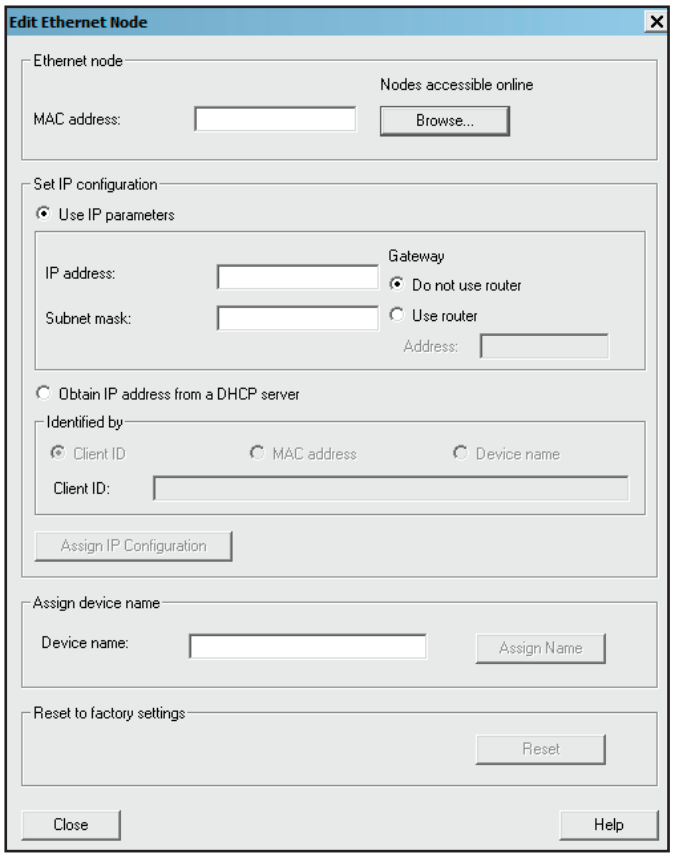
► Click on the parameter that you would like to change and amend the setting as required.
► Use this method to edit all of the parameters that you would like to change.
► Save the settings by clicking on **OK**.

All settings only take effect once they have been loaded into the component (see below).

Setting the properties of the Ethernet participants

To allow communication with the Ethernet participants, the device names and IP addresses of the participating devices must be defined.

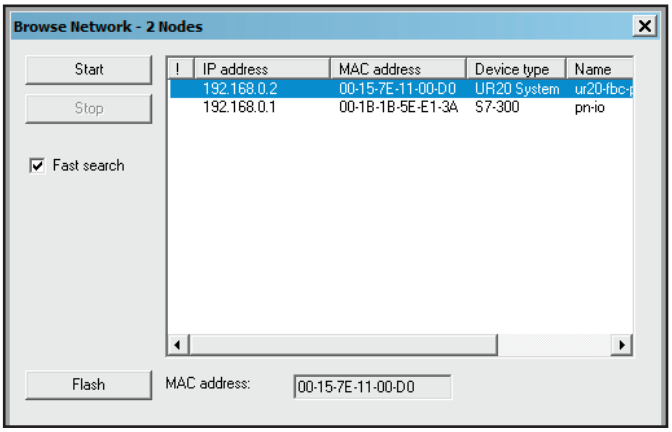
► Navigate to the device manager and select **Target system/Edit Ethernet participants...**.



Searching for Ethernet participants

► Enter the MAC address of the participant or click on **Browse** to look for all connected participants.

The connected participants are displayed.



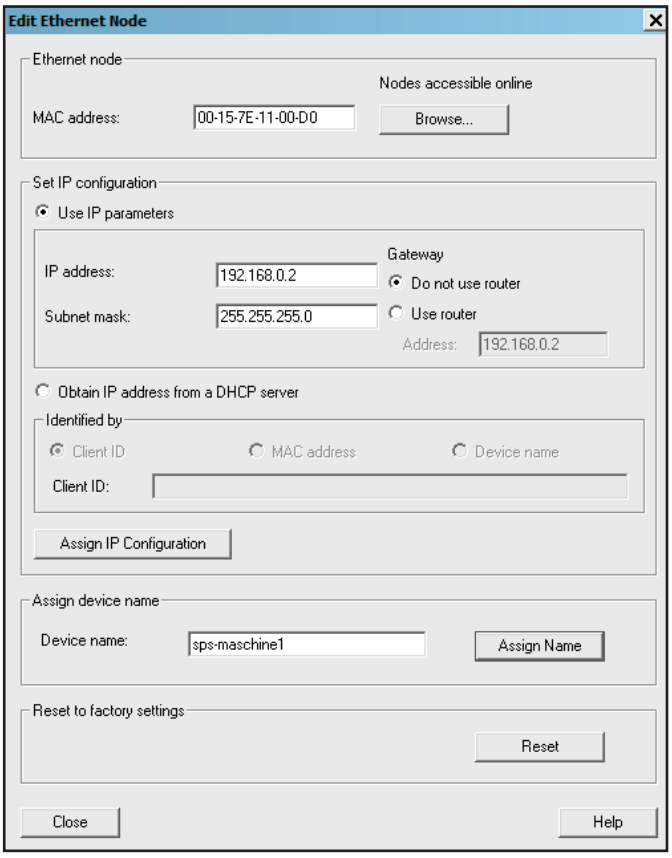
Ethernet participants found on the network

► To identify a participant at the station, click on **Flash**.

The data-transfer LED on the identified device now flashes.

► To stop the flashing, click on **Stop flashing**.

► Navigate to the list of participants and click on the one you would like to edit.



Editing Ethernet participants

► Change the **IP address** and **subnet mask** as required and click on **Assign IP configuration**.
► To change the **device name**, enter the new name and click on **Assign name**.
► If you would like to change the properties of other participants, click once again on **Browse** and select the next participant.
► Make the changes as described above.
► When you have finished editing all of the participants, click on **Close**.

These settings are sent directly to the devices!

Saving the configuration

You can save your project in the hardware configuration tool at any time and continue working on it at a later point in time. There are two ways to save the settings you have made:

– Click **Station/Save** to save the configuration in its current state. Use this function if you would like to stop working for a short period of time.
– Click **Station/Save and translate** to save the configuration in its current state and translate it into the data-transfer language. **Always** use this function when you have finished working on the configuration and want to transfer it to the control unit.

Loading the configuration into the control unit

► Navigate to the hardware configuration tool.
► If not already done, save the configuration via **Station/Save and translate**.
► To load the configured project into the control unit, open **Target system/Load in components**.
► Select the target component and click on **OK**.

The project is transferred to the connected control unit.

Any changes made later to the configuration take effect only after you reload the project in the control unit.

10 Web server

With the web server, the u-remote station is displayed on a connected PC. This allows you to carry out the following tasks prior to the complete commissioning of a system:
- Simulate the operation of the u-remote station
- Query the status of each coupler and module
- Display the parameters of couplers and modules, and change them for testing purposes
- Access diagnostic information
- Operate the station in Force mode for testing purposes

With default settings each coupler type offers web server access only via USB port. For that multiple IP addresses can be parametrized. Please note that this is a virtual DHCP server. To avoid network disruption no other network device with the same subnet ID should be connected to the PC.
Using couplers for ethernet-based fieldbus systems – recognizable by the RJ45 socket – web server access can be realized alternatively via ethernet. This function must be enabled in the web server in the couplers parameter setup.
Any changes of the IP settings on either USB port or ethernet port will not be effective until restarting the coupler.

	***WARNING*** **Explosion risk!** ► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

	***WARNING*** **Manipulation of the control unit!** In Force mode, the system may be manipulated to such an extent that can result in life-threatening personal injury and damage to materials. Only use Force mode if you are very familiar with the connected system and know at all times the consequences that your actions will have!

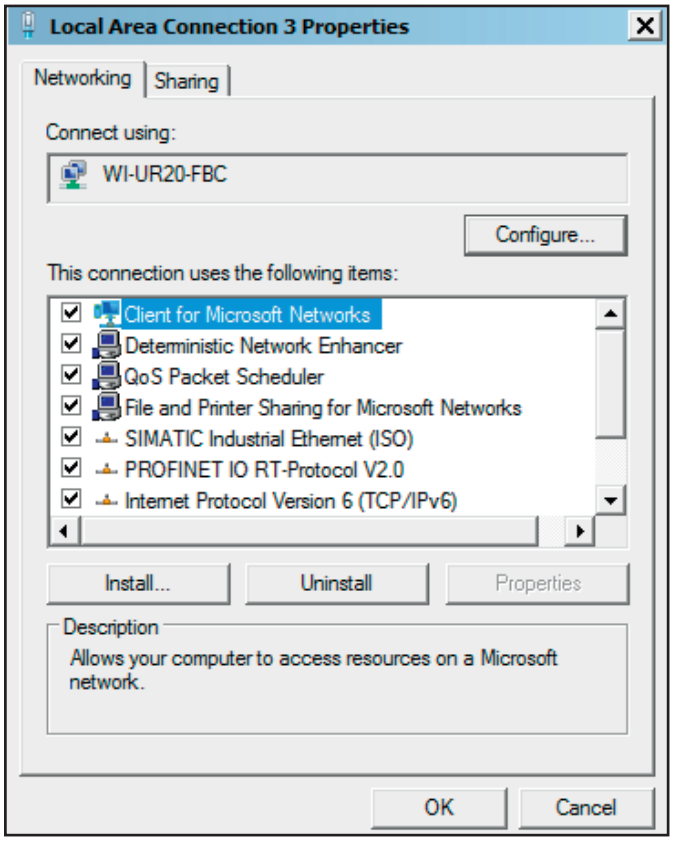
10.1 Requirements

The u-remote station must be completely assembled and supplied with voltage.

Operating system

The u-remote web server is designed for operation with the Windows XP®, Windows 7® and Windows Vista® operating systems.

For **operation with Windows XP**: if you installed the Siemens Primary Setup Tool, the DLC (data link control) protocol was also installed. To access the web server, you must deactivate the DLC protocol.



Deactivating the DLC protocol

Browser

The u-remote web server can be used with the following browsers:
- Microsoft Internet Explorer, Version 9.0 or higher
- Mozilla Firefox, Version 4.0 or higher
- Opera, Version 10.61 or higher
- Apple Safari, Version 5 or higher
- Google Chrome, Version 9.0 or higher

Device drivers

You need the driver files **usb8023.inf** and **wmrndis.inf**, which you can download from the Weidmüller website.

10.2 Installing the USB driver

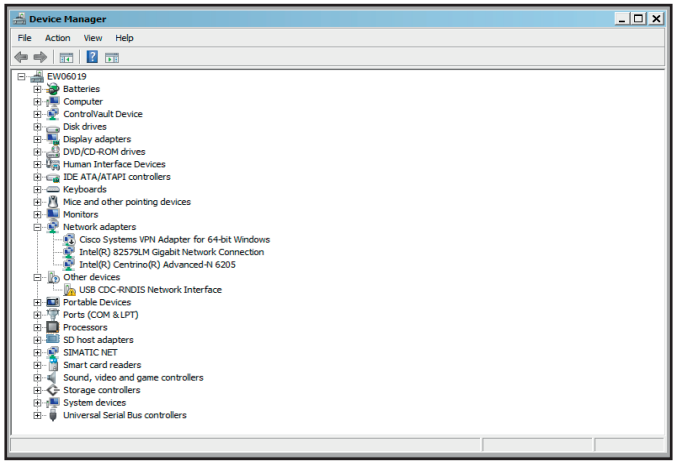
The USB port acts as an virtual DHCP Server. Please avoid to connect any other devices via the same IP address (192.168.1.0), otherwise a false mapping of IP addresses might occur.

► Start up your PC.
► Connect the PC to the coupler using a USB cable (Type USB-A to USB Micro-B). The USB socket at the coupler can be found behind the service flap.

The USB cable can be a maximum of 2 m in length. Extension cables must not be used!

You receive the message that Windows cannot install the driver.
► To install the driver manually, open the Device Manager.

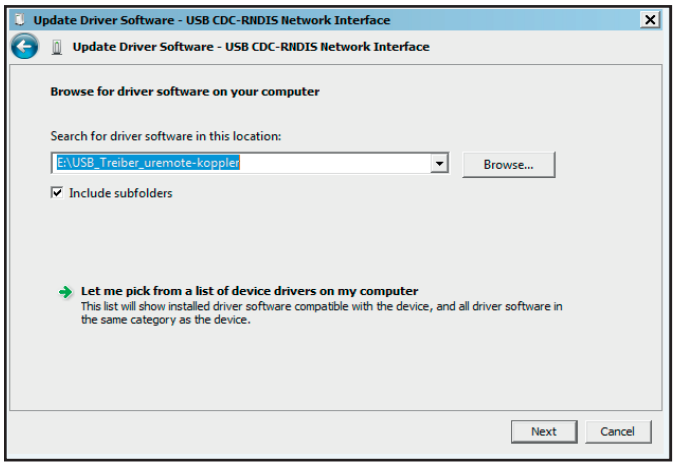
Under "Other devices" the interface **USB CDC-RNDIS Network Interface** appears.



New USB interface in the Device Manager

► Using the mouse, right-click on the interface and select **Update driver software**.

You will be asked if you would like to search for the driver software.
► Select the option **Search for driver software on this computer.**.



Searching for installation files on the computer

► Click on **Search** and select the folder in which you have stored both .inf files.

There could possibly be a security enquiry because the driver software does not have a signature. Nonetheless, continue with the installation.
► Follow the rest of the steps in the installation routine until the successful installation is confirmed.

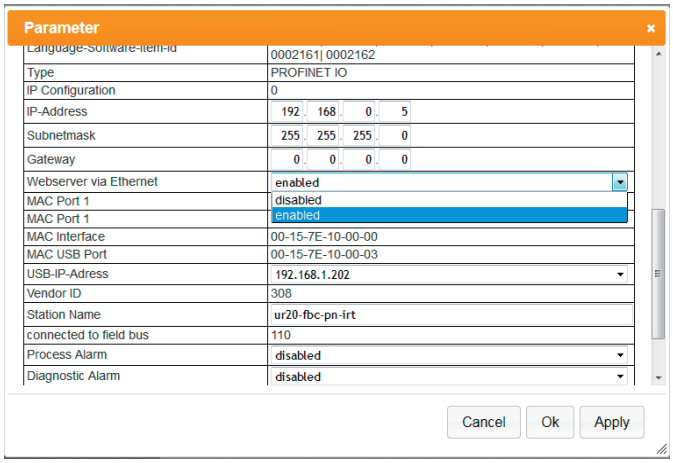
The driver will now appear in the Device Manager under **Network adapters.**
► Close the Device Manager.

10.3 Starting the web server

► Open one of the browsers listed above.
► In the address line, enter the IP address of the coupler (default: 192.168.1.202).

Activating the Ethernet socket

► In the station view, click on the **Coupler** and then on **Parameters.**
► Scroll down the list of parameters until you see the entry **Web server via Ethernet**.
► Change the setting to **enabled**.



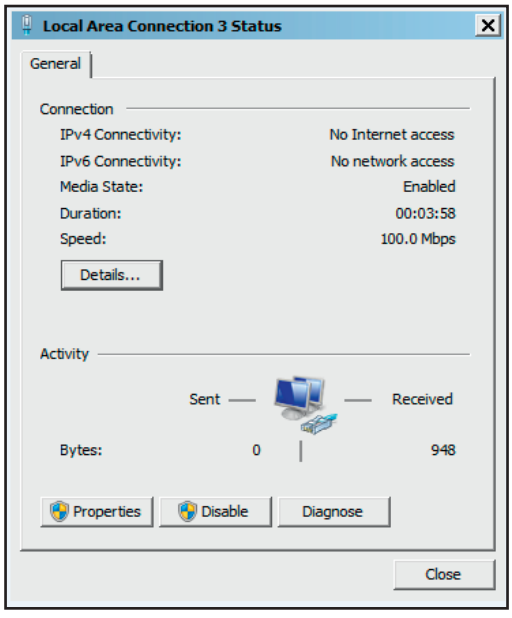
Activating the Ethernet socket

- ► Enter the required IP address and subnet mask.
- ► Confirm the entry by clicking OK.
- ► Close the coupler window and restart the coupler.

You can review the IP address in the **Network and Sharing Center**, which is found in the **Windows Control Panel**:

- ► Under **Unidentified network**, click on **LAN connection**.

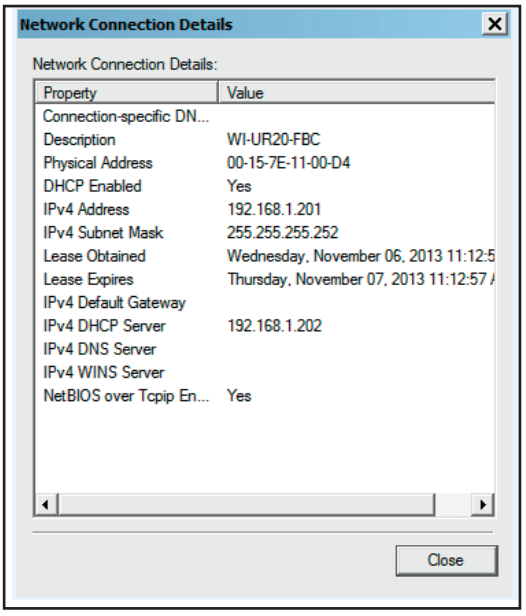
The **LAN connection status** window opens.



LAN connection status

- ► Click on **Details**.

The **Network connection details** window opens.



Network connection details

The IP address of the virtual LAN port (the USB connection) is displayed under **IPv4 DHCP server.** The standard IP address is: 192.168.1.202.

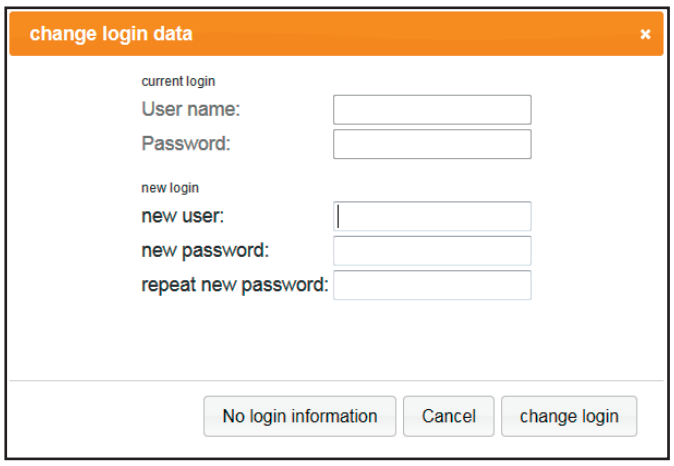
The web server is started.

10.4 Setting up registration data and password protection

If you do not set up any users, all web server functions are accessible to every user at all times!
As soon as you set up one user with password protection, users without a user ID will only have read-only rights. Write access is blocked for them, which means that they **cannot** do the following:

- – Change parameters
- – Operate the station in Force mode
- – Load firmware updates

When you start up the web server for the first time, you are prompted to enter the registration data. The **Change registration data** window opens automatically. You can access this window later via the **Coupler status** dialogue box (see Section 11.4):



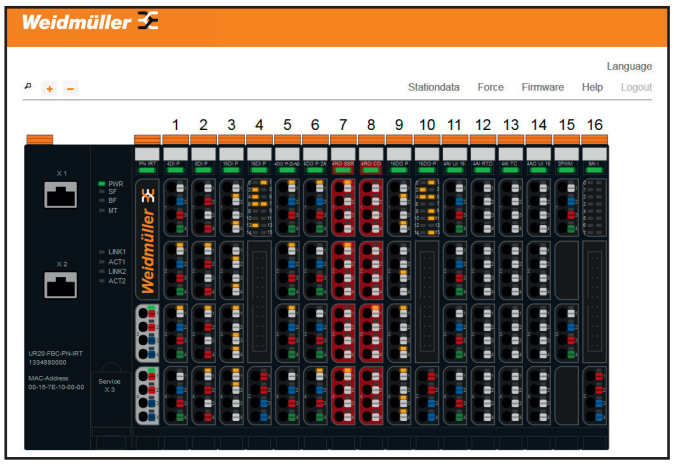
Changing registration data, setting up password protection

- ► Enter the user name and password.
- ► To change the registration data, enter the new user name and the new password twice, then click on **Change registration**.
- ► To deactivate password protection, do not enter any new data, but instead click on **No registration data**.
- ► If you have changed the registration data, you must log back in again afterwards.

A forgotten password can be overwritten if the coupler gets restarted with no modules connected.

The status data can be displayed at all time, regardless of the state of the field bus connection. Setup changes can only be stored while the field bus is not active.

After registration, the connected station is displayed with all of its active modules.



Example display after the program starts up

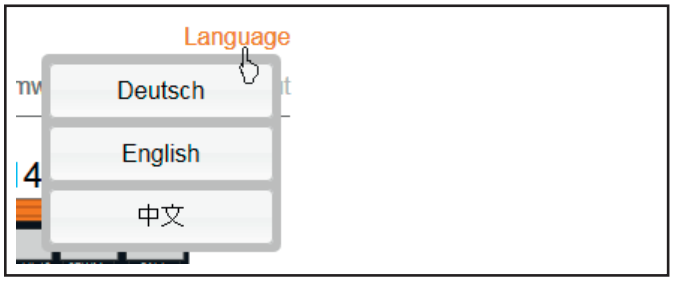
The web server only registers modules that can communicate on the system bus. Empty slot modules and other passive modules (e.g. AUX modules) are not registered by the web server and thus are not displayed in the screen view. The numbering of the modules in the web server view may therefore deviate from the count in the actual station!

10.5 Navigation and operating instructions

Setting the language

When the program is started, the web server attempts to start with the PC's language settings. If this language is not supported by the web server, the program starts with the "English" setting.
New language versions are continually being developed and can be later installed by the user with separate language files.

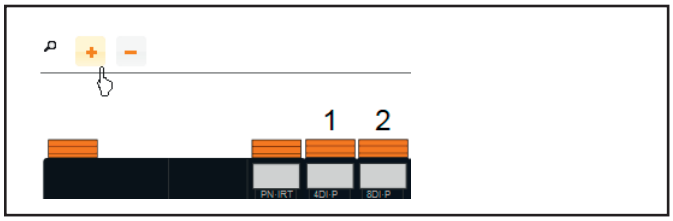
- ► To change the language, click on **Language** and choose the desired setting.



Setting the language

Zooming the view in/out

- ► Click on the magnifying glass symbol to zoom in or out on the station's display.

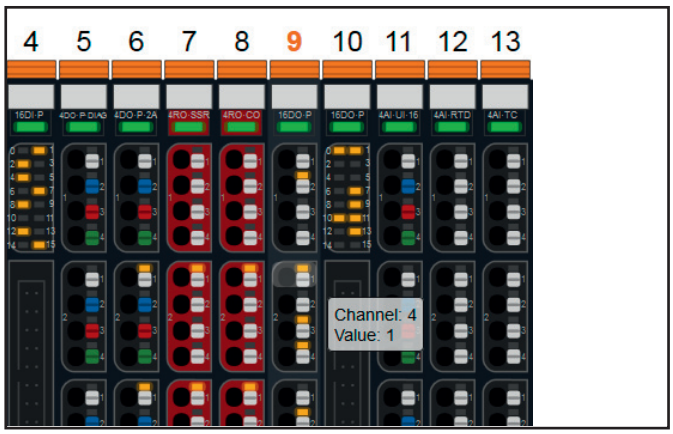


Scaling the display

Quick view of detailed values

► Move the cursor slowly over the station without clicking.

The detailed values of the channel on top of which the cursor is presently situated are displayed.



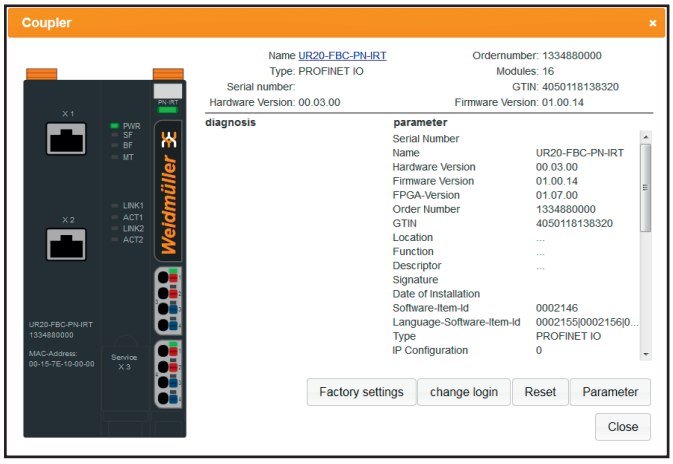
Display of channel values

10.6 Displaying and editing the coupler status

These functions are only accessible when Force mode is **not** activated.

The status data can be displayed at all time, regardless of the state of the field bus connection. Setup changes can only be stored while the field bus is not active.

► Click on the coupler.
The **Coupler Status** dialogue box opens.



Coupler Status dialogue box

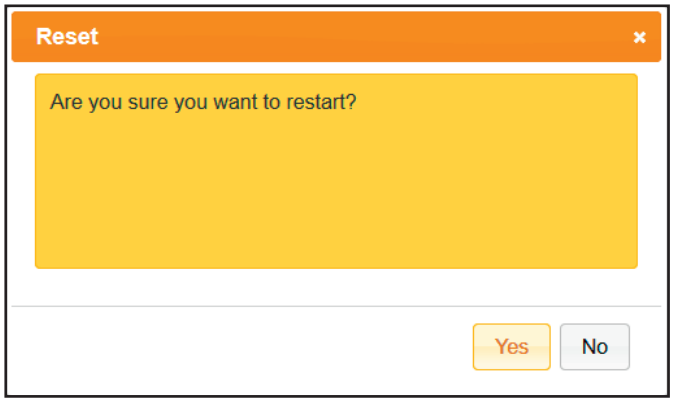
Here you can:
- Reset the coupler to factory default settings
- Change the registration data and set up password protection to limit access to the web server
- Reset any changes that have been made
- Access the coupler parameters
- Access the coupler's datasheet (link to product designation)

Resetting the web server

You can undo all the changes that have been made since the last time that the web server was started.

After a reset, the coupler is restarted! All data which is not protected against power failure is reset.

► Click on the coupler.
► Click on **Reset** In the coupler status dialogue box.



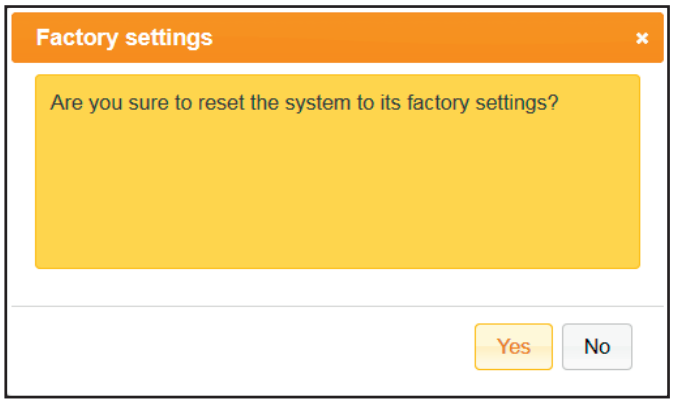
Resetting changes

► To reset changes that have been made, respond to the prompt by clicking **Yes**.

Resetting the coupler to factory settings

This function allows you to set up the web server in its original state as at delivery. This also includes registration data and password protection.

► Click on the coupler.
► In the Coupler Status dialogue box, click on **Factory settings.**



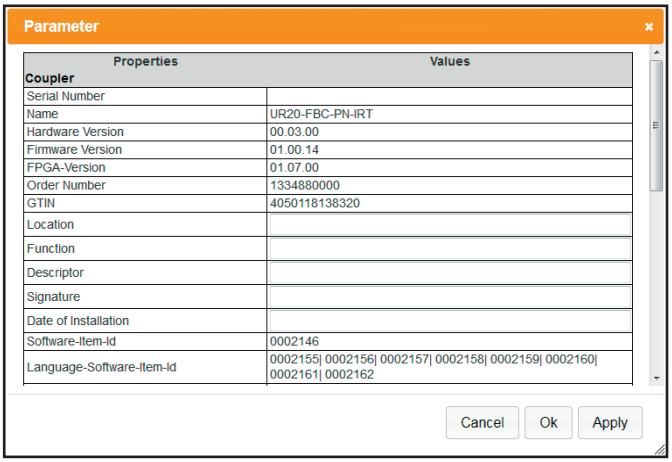
Resetting the coupler to factory settings

► To confirm that you would like to reset the coupler to the factory settings, respond to the prompt by clicking **Yes**.

Accessing coupler parameters

► Navigate to the Coupler Status dialogue box and click **Parameters**.

All the parameters are then listed in a new window.



Editing coupler parameters

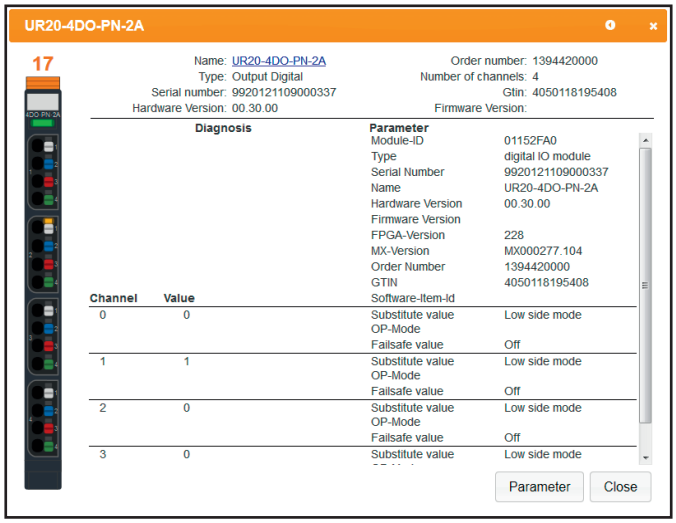
For parameters that can be edited, you can enter the changes in the entry fields or choose alternative settings from a dropdown menu.

10.7 Displaying module data and editing parameters

These functions are only accessible when Force mode is **not** activated.

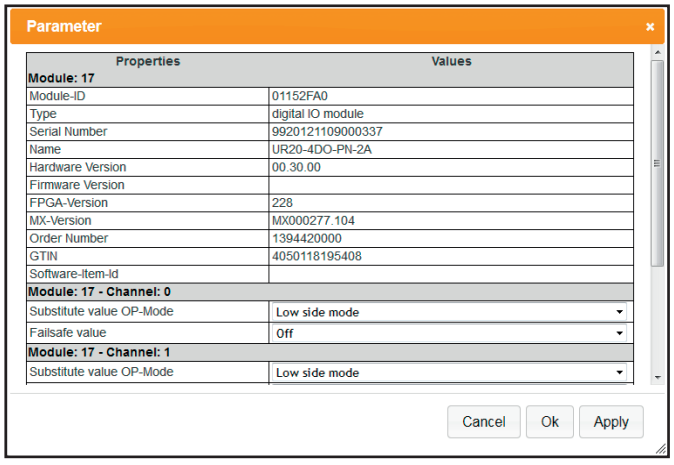
Parameters can only be written when the field bus is **not** active.

► Click on a module if you would like to see its properties.
A window with all status values opens.



Module Status dialogue box

► To open the datasheet for the module, click on the link next to **Designation**.
► To change individual parameters, click **Parameters**.
All the parameters are then listed in a new window.



Editing module parameters

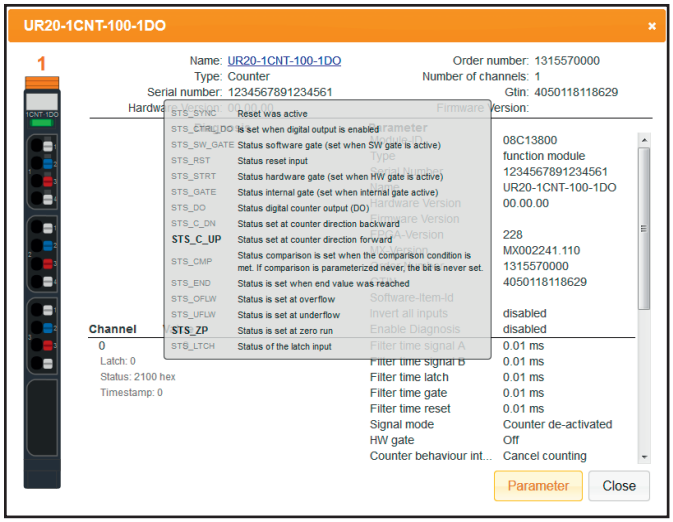
For parameters which can be edited, alternative settings are offered in a dropdown menu.

► Select the parameter you would like to change.
► Select the desired setting from the dropdown menu.
► To save the change, click **Accept**. You can now change other parameters.
► To save all changes and close the window, click **OK**.
► Click on **Close** to close the Module Status window.

Modules with registers

For modules with registers (e.g. counter modules and PWM modules), the register settings are displayed in a tool tip.

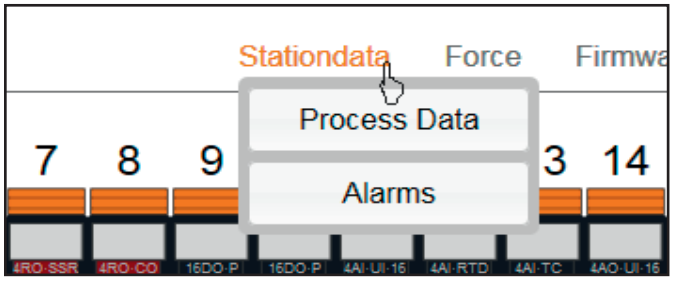
► Move the cursor over the **Status** entry to see the register settings.
The registers displayed in bold are activated, all of the others are deactivated.



Displaying register settings

10.8 Displaying station data

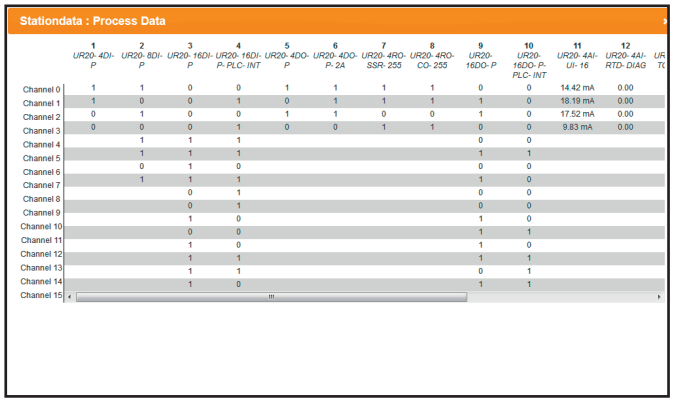
You can use this menu to display all of the **process data** and **diagnostic data**.



Station data menu

Displaying process data

► Click on **Station data** and then on **Process data**.
The overview displays all modules and channels along with their current values; these values are continuously updated.



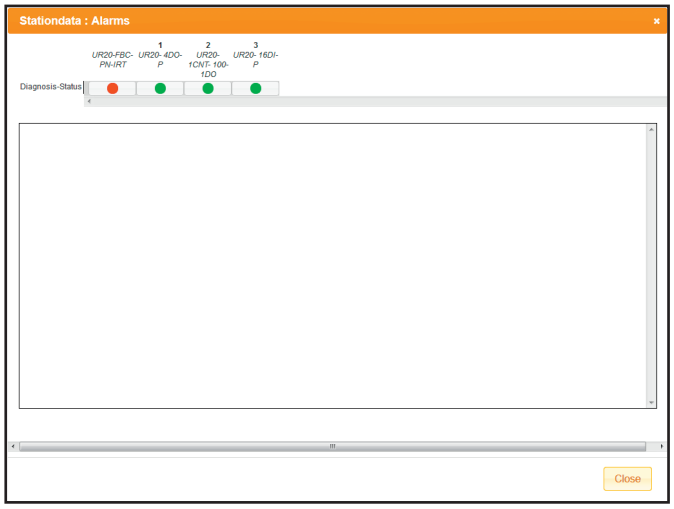
Display of process data

► To leave this view, click on **Close**.

Displaying diagnostic data

► Click on **Station data** and then on **Diagnostic data**.

In the overview, all of the modules are displayed with symbols; if there is a green dot next to a module, there are no messages. Modules that have a red dot next to them have a diagnostic message.



Display of diagnostic data

► To view a diagnostic message, click on the red dot.
► To leave this view, click on **Close**.

10.9 Web server in Force mode

WARNING!

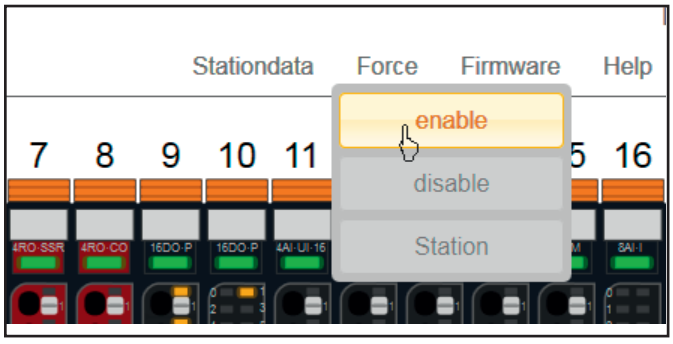
Manipulation of the control unit!
In Force mode, the system may be manipulated to such an extent that can result in life-threatening personal injury and damage to materials.

Only use Force if you are very familiar with the connected system and know at all times the consequences that your actions will have!

If the force mode is activated during an established field bus connection a diagnose alarm is generated. Depending on parametrized alarm behaviour the PLC can continue to transmit process data and the u-remote station will process them for all unforced channels. However, forced channels will ignore any process data and behave according to forced values.

This function allows you to carry out functional tests or preconfigure the station prior to commissioning, even if sensors have not yet been connected.
To do so, you must change the operating mode of the web server.

► Click on **Force** and **Activate**.

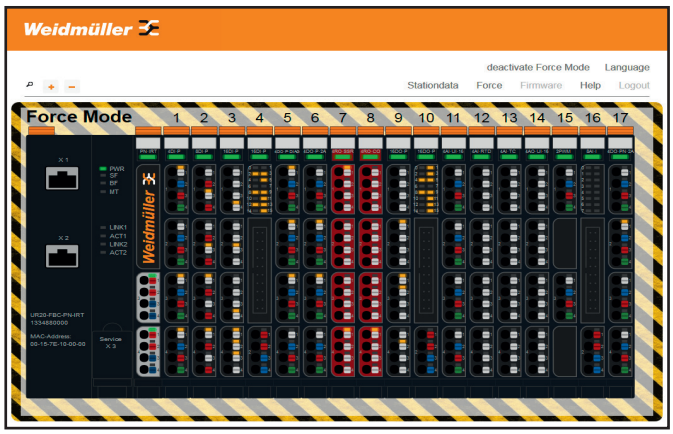


Switching over to Force mode

The web server is now in Force mode.

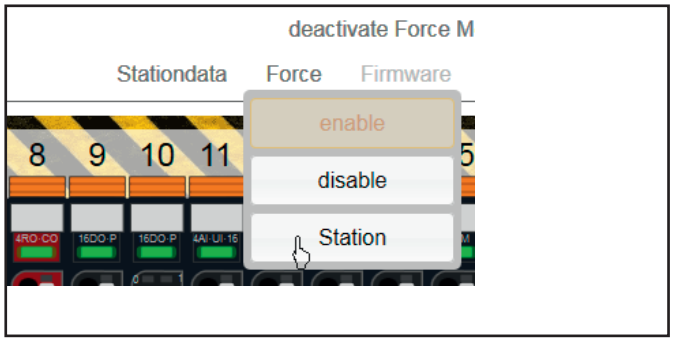
When Force mode is activated, the screen display changes – the entire station is highlighted and outlined in warning colours.

If the USB connection is interrupted, Force mode is stopped immediately.

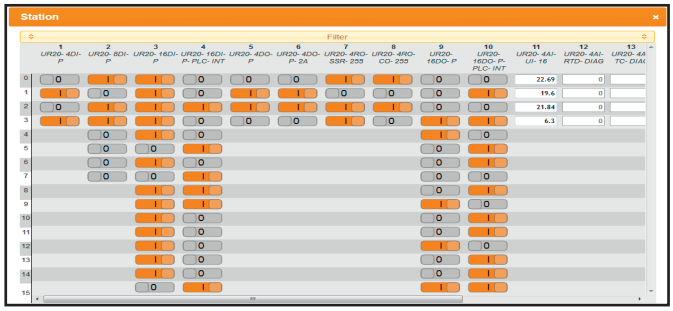


Web server in Force mode

► Click on **Force** and **Station**.



Putting the station in Force mode



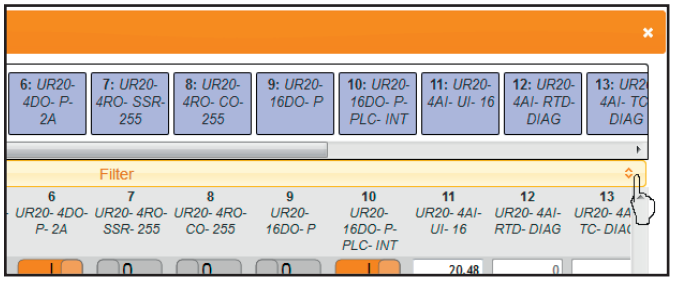
Display of station in Force mode

All of the modules are displayed in the overview. The switchable channels are provided with a changeover switch.

Filtering the module view

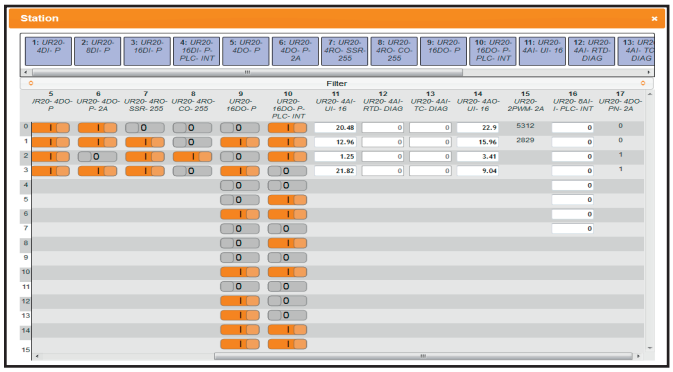
If you only want to see the modules that you would like to force, use the filter function.

► Click on the double arrow in the **Filter bar** at the top-right of the screen.



Window with filter function open

Displayed modules are highlighted in colour in the filter bar, while hidden modules are displayed in white.



Window with filter running

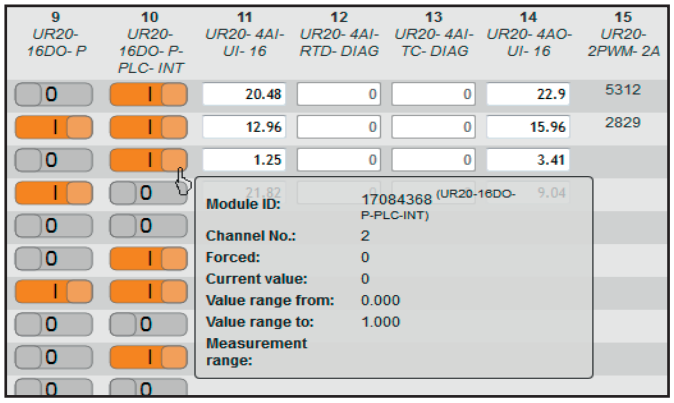
► To display or hide modules, go to the filter bar and click on the module you would like to display or hide.

Resetting filters

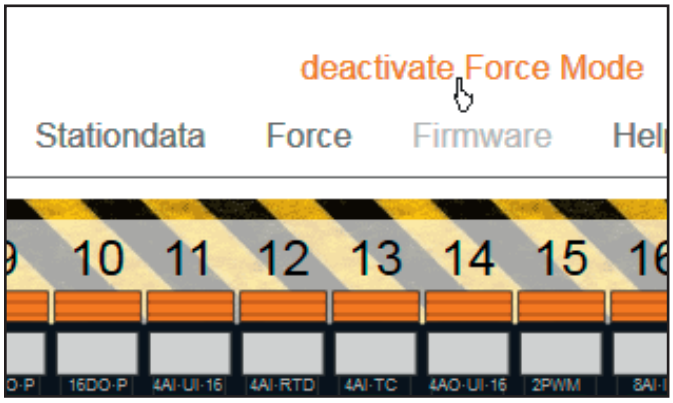
► To display all modules again, click **Display all**.
► To hide all modules, click **Hide all**.

Manually switching outputs (forcing)

► To switch a channel, click on the corresponding switch in the station display.



Forcing a channel

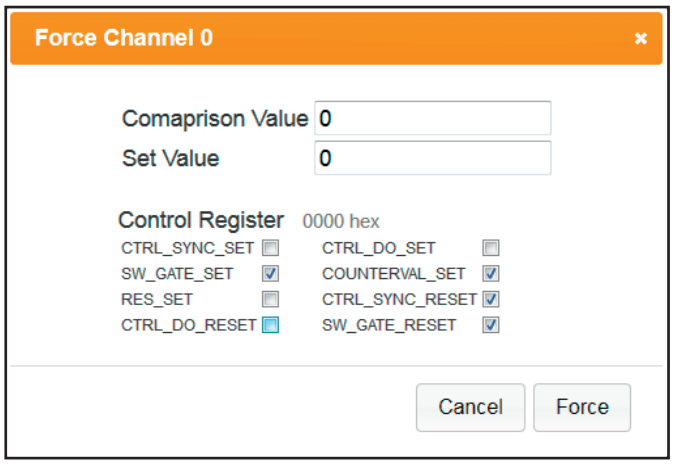


Deactivating Force mode

► To accept an individual change, click on **Accept**.
► To accept all changes, click **OK**.

Modules with registers

Modules with registers (e.g. counter modules and PWM modules) can be forced individually.
► Click on the module.
The **Force channel** window appears.



Forcing modules with registers (e.g. UR20-1CNT-100-1DO)

► Enter the desired value and select the desired register via the check box

Ending/deactivating forced operations

► To cancel a forced operation, click **Cancel**.
All of the changes you made will not have any effect.

► To end a forced operation, close the window.
► To deactivate Force mode, click on **Deactivate Force mode**.

10.10 Updating firmware

► Before you can update the firmware, you must download the latest firmware file for each coupler and each module from the Weidmüller website to your local PC.

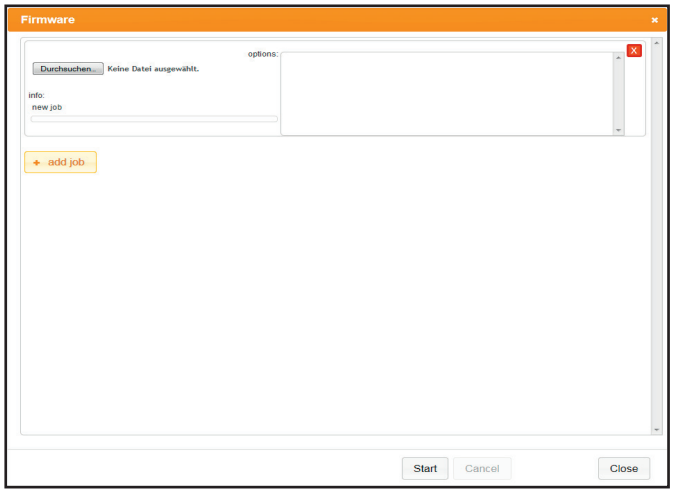
Firmware files have the extension .bsc. For PROFINET couplers, for instance, the file might be named FBC-PN-IRT-00XX.bsc.

A firmware update cannot be undone. The old firmware in the coupler/module is overwritten.

You can determine for each individual module as to whether an update should be carried out. In this way, multiple modules of the same type can run with different versions of the firmware.

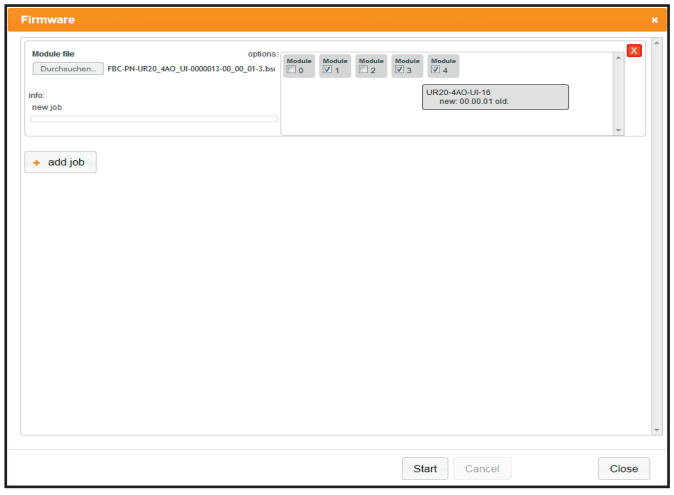
Make sure that the power supply is not interrupted while the firmware files are being loaded!

► To carry out a firmware update, navigate to the web server and click on **Firmware**.
The **Firmware** window opens.



Updating firmware

- ► To select a firmware file, navigate to the **Job-Ticket 0** area and click on **Search**.
- ► Select the firmware file from the storage location on your computer and click **Open**.



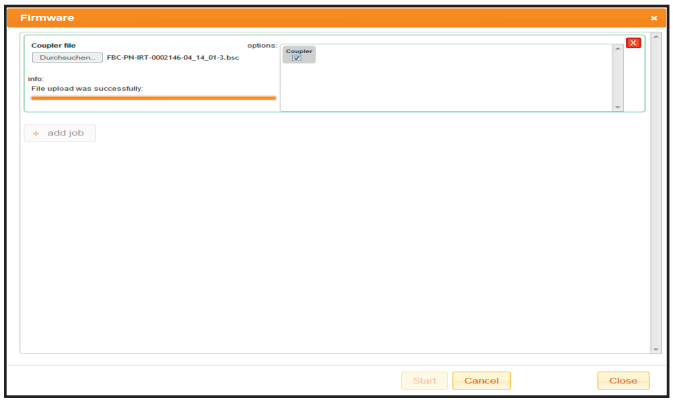
Loading a firmware file

- ► If you would like to carry out a firmware update for individual modules in the u-remote station, click on **Add job**.
- ► You can also use the relevant firmware file for this purpose.

Once the firmware file has been loaded, the **Options** area shows which modules can be updated with this file.

- ► Tick or untick the boxes so that only those modules that are to be updated are ticked.
- ► Once you have called up all the required firmware files and you have selected the modules as required, click on **Start**.

The firmware is updated. For each job ticket, progress of the data upload is displayed in the **Info** area. Once the data has been transferred, the job ticket is marked with a green outline.

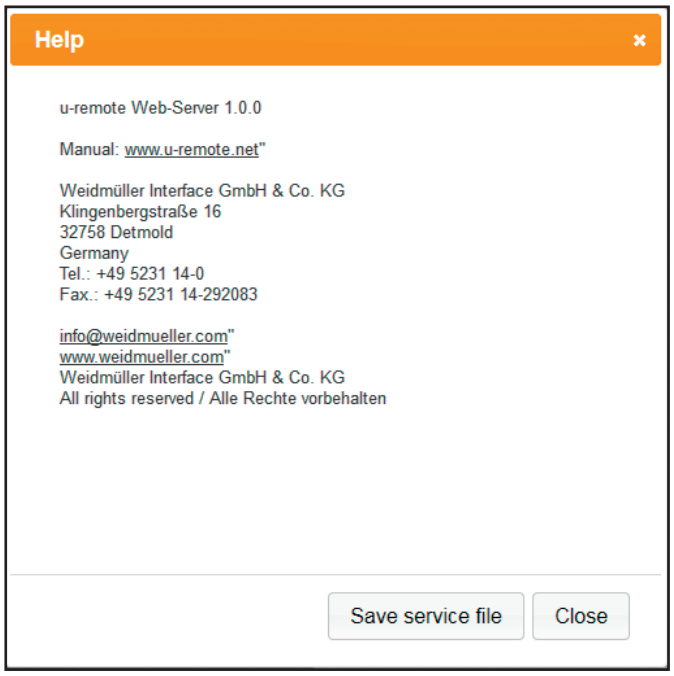


Firmware data successfully transferred

- ► To complete the firmware update, click **Close** and restart the coupler (power reset).

10.11 Web server help

► Click on **Help**.



Help dialogue box

The program version of the web server is displayed in the help dialogue box.

► To open the manual for the u-remote station, click on the link.

Exporting log data, saving a service file

In the event of problems and service cases, it may be helpful to save the current log data for the u-remote station. This data can provide the service technician with valuable information about the malfunction.

► To save a service file, click on **Save service file**.
► Select a storage location on your PC for the service file (logdata.wmi) and click **Save**.
► To close the window, click on **Close**.

11 Replacing components

11.1 Removing the connector frame

WARNING

Explosion risk!

► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING

Dangerous contact voltage!

► All work on the u-remote station must be carried out with the power supply disconnected.

► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply!

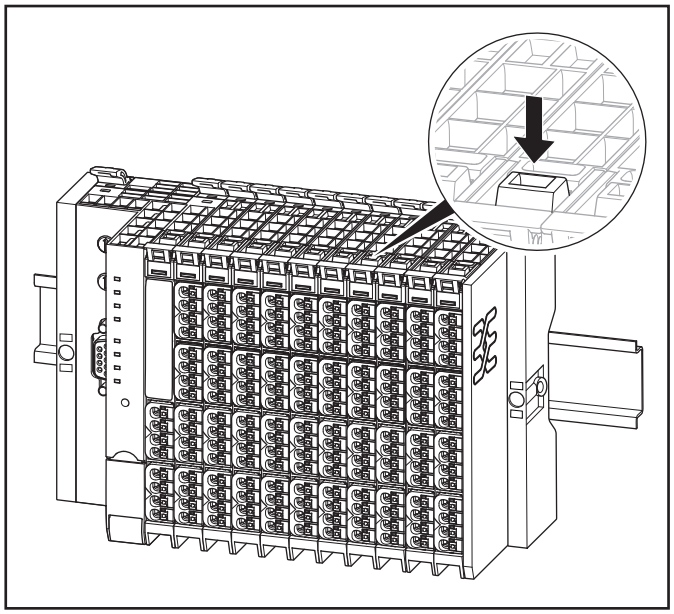
ATTENTION

The product can be destroyed by electrostatic discharge!

The components in the u-remote series can be destroyed by electrostatic discharge.

► Please make sure that personnel and work equipment are adequately earthed!

► Unlock the connector frame.

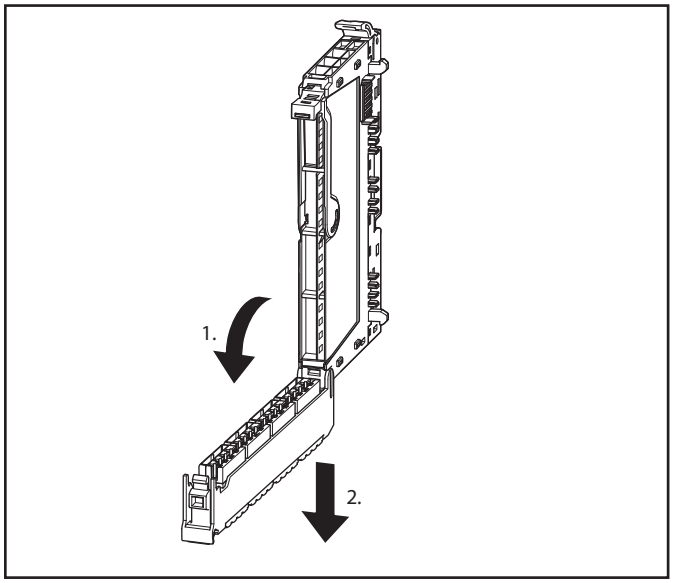


Unlocking the connector frame

► Swivel the connector frame with the cabling towards the front by 90°.

The connector frame can only be removed in this 90° position!

► Remove the connector frame by pulling it out in a straight, downward motion.



Opening and pulling out the connector frame

11.2 Replacing the electronic unit

WARNING

Explosion risk!
Pulling out the electronic unit (hot swap) may generate sparks.
► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING

Pulling or inserting of an electronic unit might bring the inputs and outputs of all other modules temporaryly into an undefined condition!
► If the machine/system might be put into a dangerous state as a result of the removal of an electronic unit, a replacement can only be made once the machine/system is disconnected from the power!
► Only one electronic unit may be removed from the station at any one time. If multiple electronic units have to be replaced, this must be done consecutively.

ATTENTION

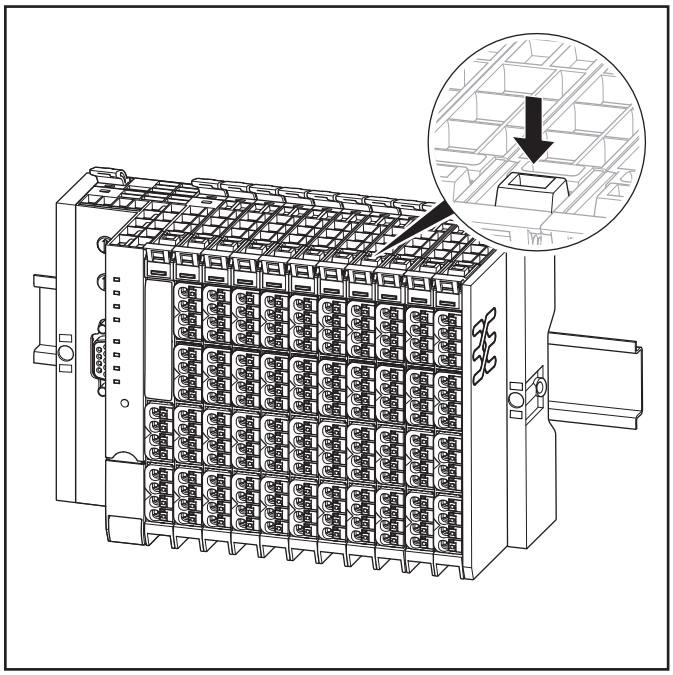
The product can be destroyed by electrostatic discharge!
The components in the u-remote series can be destroyed by electrostatic discharge.
► Please make sure that personnel and work equipment are adequately earthed!

Once an electronic unit is removed from a power-feed module, the inputs and outputs of the subsequent modules are no longer supplied with power. For PF-O-xDI-SIL modules, this is equivalent to triggering the connected safety equipment!

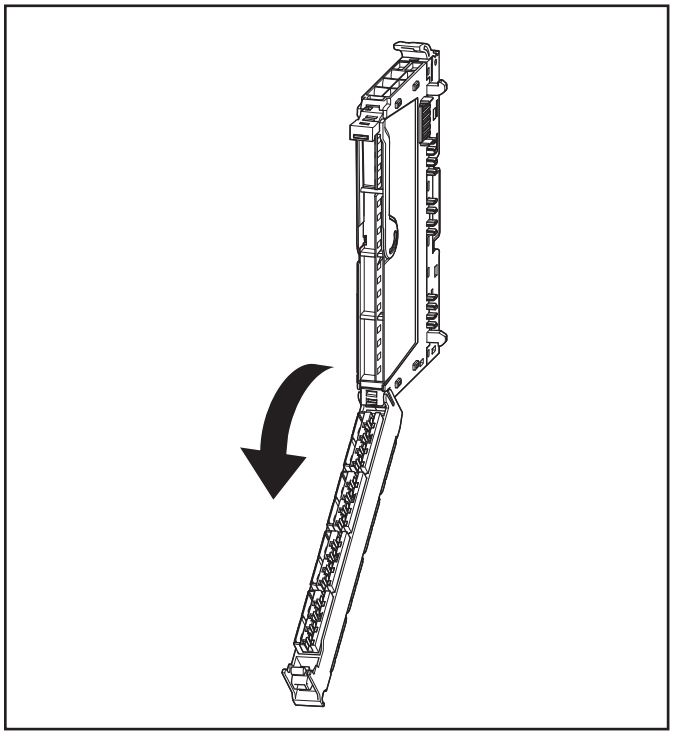
An electronic unit can be replaced while the system is powered up (no load) and in operation without having to disassemble the module. The station remains functional, and there is no need to disconnect and restart it. When replacing the electronic unit, the wiring remains intact.

If the new electronic unit is to be coded by the customer, new coding pins will be required.

► Unlock the connector frame and open it as far as possible (at least to an angle of 90°).

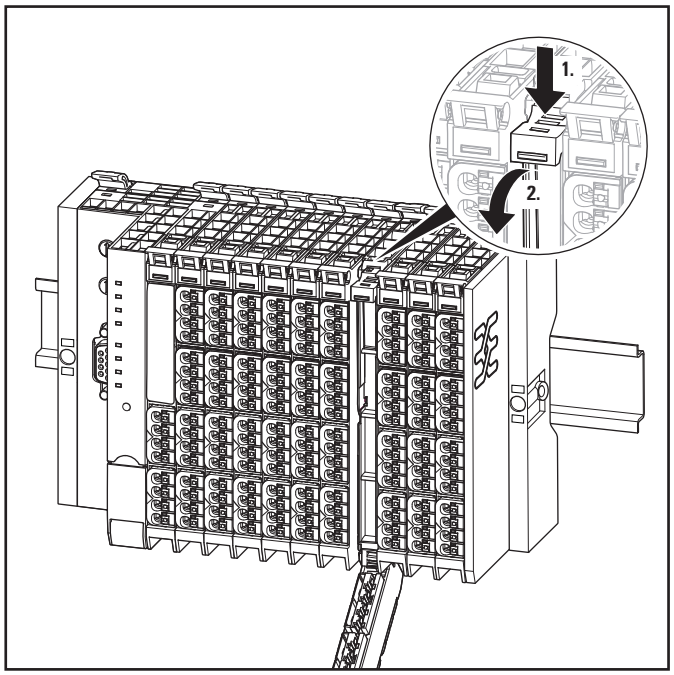


Unlocking the connector frame

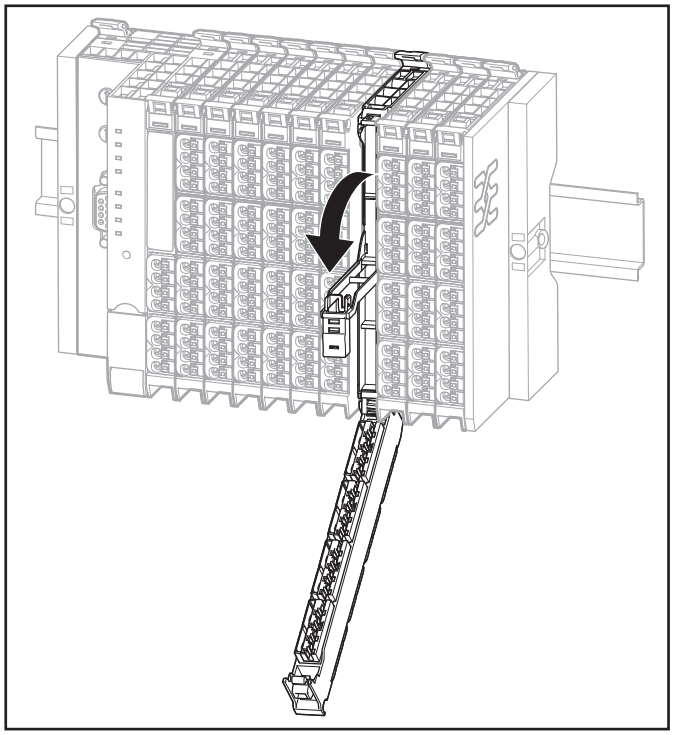


Opening the connector frame

► Lift the electronic unit removal lever and swivel it forwards by 90°.

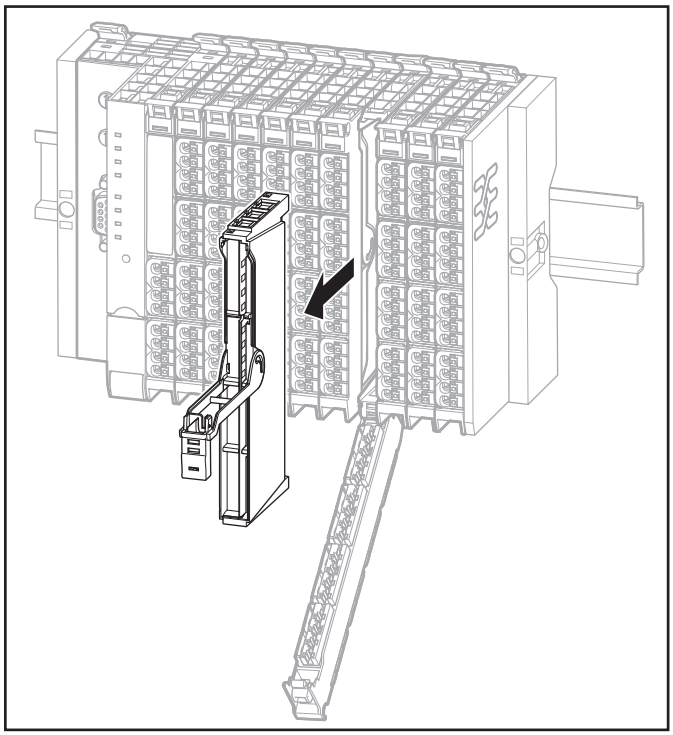


Unlocking the electronic unit



Opening the removal lever for the electronic unit

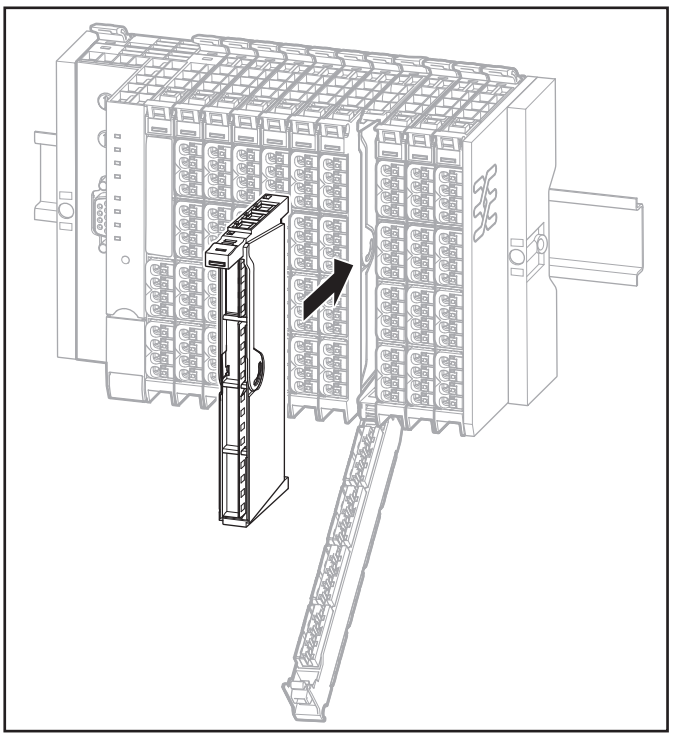
► Using the removal lever, pull the electronic unit forwards and out.



Pulling out the electronic unit

► If the existing electronic unit was coded, insert the new coding pins into the coding seats located in the base module (see Section 7.4).
► Hold the new electronic unit by the top and the bottom, and carefully slide it into the base module.

The electronic units are functionally coded so that they can only be inserted into the appropriate base module. If it is not possible to insert a new electronic unit into the base module, check if the combination is correct and if there is a possible mix-up.



Inserting the new electronic unit

- ► Fold the connector frame back so that it closes and clicks into place.
- ► In case of replacement during operation: Pay attention to the **collective error LED** (**SF**) on the field-bus coupler. Only when this doesn't light up any more, the new electronic unit has been recognised and the next electronic unit is able to be pulled out.

11.3 Replacing an I/O module

WARNING

Explosion risk!

- ► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING

Dangerous contact voltage!

- ► Prior to removing modules, the u-remote station must be completely de-energised (supply of the field bus coupler and all external feed-in).
- ► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply.

ATTENTION

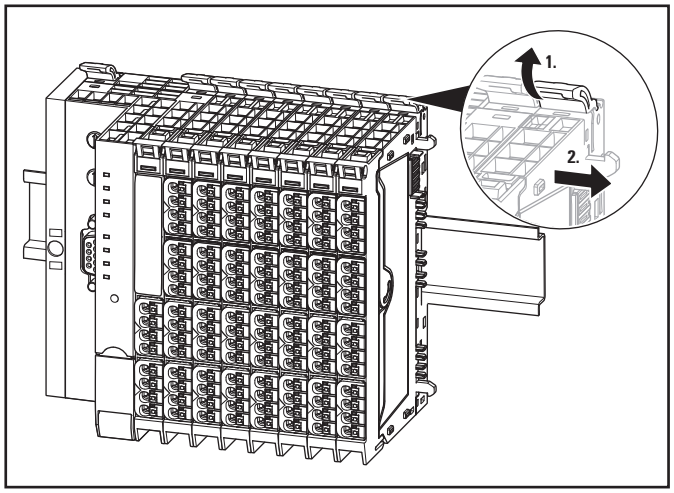
The product can be destroyed by electrostatic discharge!

The components in the u-remote series can be destroyed by electrostatic discharge.

- ► Please make sure that personnel and work equipment are adequately earthed!

To remove an individual module from the station, all modules to the right of it and the termination kit must be moved by approximately 5 cm.

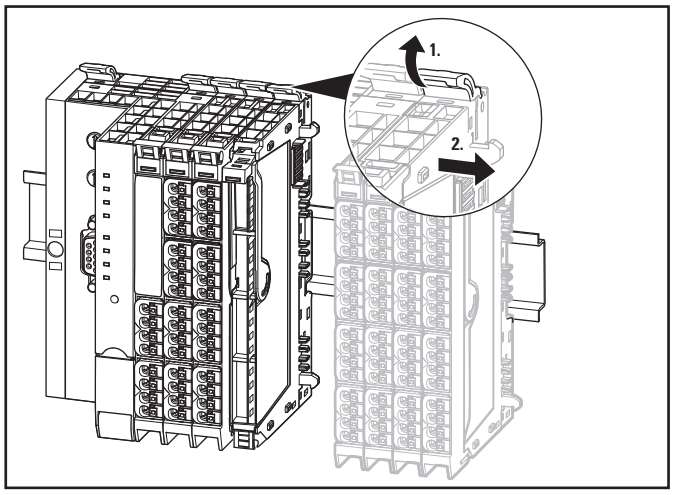
- ► Unfasten the mounting screw on the right-hand end bracket.
- ► Slide the end bracket and end plate approximately 5 cm to the right or remove both parts from the DIN rail.
- ► Open the release lever on the module furthest to the right.



Unlocking the last I/O module

- ► Slide the module on the DIN rail approximately 5 cm to the right, push it onto the DIN rail and click the release lever into place.
- ► Repeat the aforementioned step for all other modules which are located to the right of the module being replaced: release, slide to the right and click in once again.

- ► Remove the connector frame of the module to be replaced as described in the "Removing the connector frame" section.
- ► Open the release lever for the module to be removed.



Unlocking the I/O module to be replaced

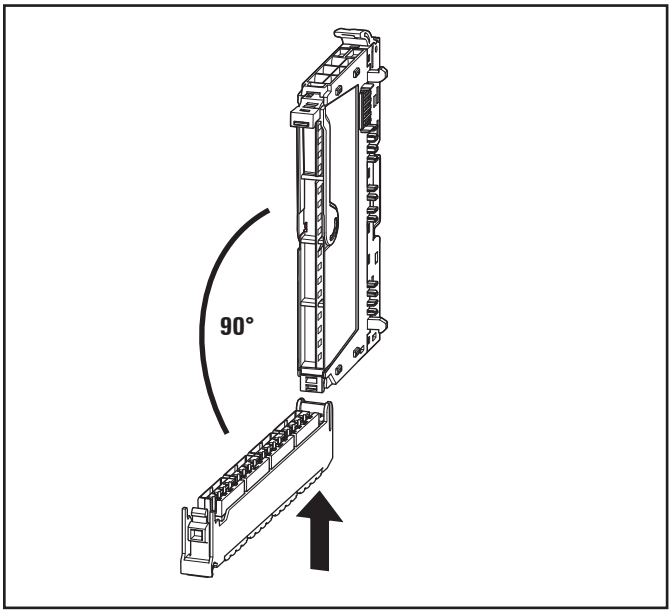
- ► Slide the module to the right and remove it from the DIN rail.
- ► Position the new module with its closed release lever on the DIN rail so that it clicks audibly into place.

- ► Slide the module to the left until it audibly clicks into place against the neighbouring module.
- ► Return the modules that were slid away back into their original position: slide the modules to the left so that they audibly click into place on the new module.

After all the modules have been moved, make sure that they have all been clicked securely into place on the DIN rail!

- ► Reassemble the end plate and end bracket.
- ► Place the connector frame in a 90° position from below into the guideway of the base module on the new module.

The connector frame can only be inserted in this 90° position!



Inserting the connector frame

- ► Swivel the connector frame upwards until it clicks into place.

11.4 Removing/replacing connectors

WARNING

Explosion risk!

► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING

Operation of the machine/system can be disrupted!

► In the event of the machine/system being put into a dangerous state as a result of the removal of a connector, a replacement can only be made once the machine/system is disconnected from the power!

WARNING

Risk of contact fire!

► Remove connectors only while they are load current free.

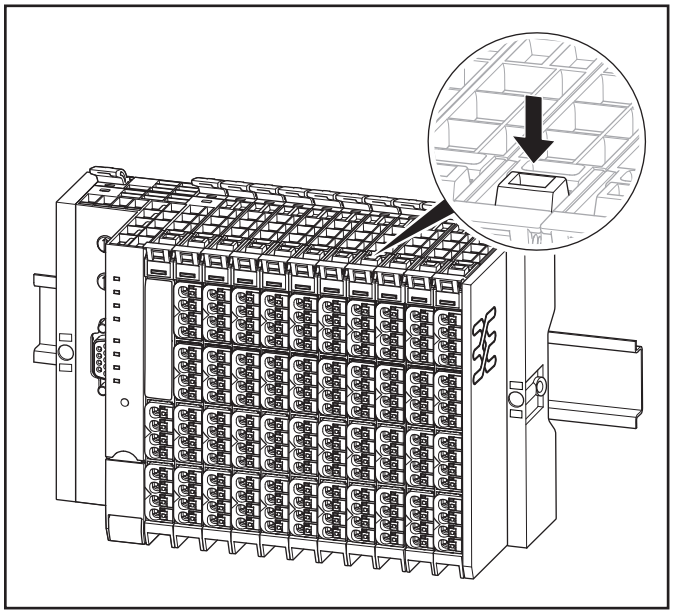
ATTENTION

The product can be destroyed by electrostatic discharge!

The components in the u-remote series can be destroyed by electrostatic discharge.

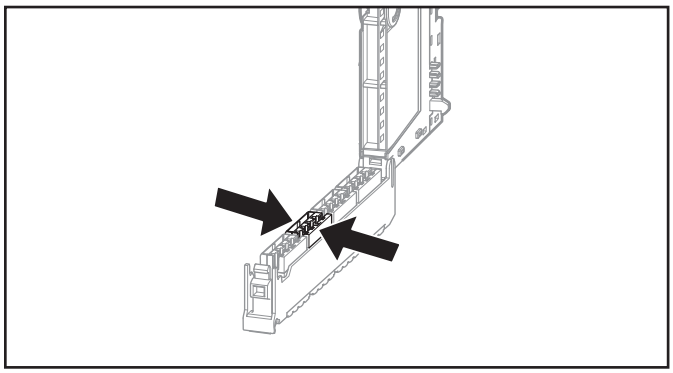
► Please make sure that personnel and work equipment are adequately earthed!

► Open the connector frame and flip it open so far that you can reach the connector.



Unlocking the connector frame

► Press both sides of the connector together so that it can be slid off the frame.



Pushing the connector together

► Remove the connector by pulling it off.
► Insert the new connector in the frame so that it audibly clicks into place.
► Close the connector frame.

11.5 Removing/replacing cables

WARNING

Explosion risk!

► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING

Operation of the machine/system can be disrupted!

► If the machine/system is put into a dangerous state as a result of the removal of cables a replacement can only be made once the machine/system is disconnected from the power!

WARNING

Dangerous contact voltage!

► Prior to removing modules, the u-remote station must be completely de-energised (supply of the field bus coupler and all external feed-in).

► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply.

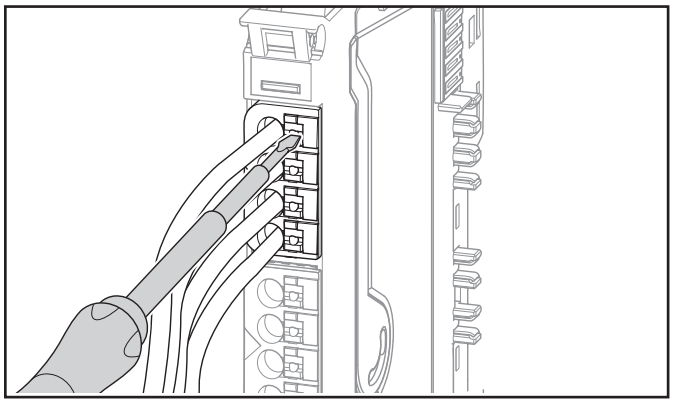
ATTENTION

The product can be destroyed by electrostatic discharge!

The components in the u-remote series can be destroyed by electrostatic discharge.

► Please make sure that personnel and work equipment are adequately earthed!

► Using a 3-mm screwdriver, push in the pusher adjacent to the cable to be removed and pull the wire out.



Pushing the pusher in with a screwdriver

► Release the pusher.

► Insert the new wire into the opening. To do so, you do not need to push in the pusher.

12 Disassembly and disposal

12.1 Disassembling the u-remote station

WARNING

Explosion risk!

► Prior to starting work, make sure that there is not a potentially explosive atmosphere!

WARNING

Dangerous contact voltage!

► Carry out all disassembly work on the u-remote station only when the power supply is disconnected.
► Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply!

► Remove all cables and lines.
► Remove the end bracket marker (if present).
► Unfasten the mounting screw on the right-hand end bracket.
► Slide the end bracket with the end plate to the right and remove both from the DIN rail.

You can now disassemble the modules and the field-bus coupler either individually or in groups of three to four modules.

► Press all the release levers of a module group towards the mounting plate so that they click into place.
► Slide the module group to the right and remove it from the DIN rail.
► Repeat the above procedure for all remaining modules/ module groups.
► To disassemble the field-bus coupler, open both release levers and remove it from the DIN rail.
► Unfasten the mounting screw on the left-hand end bracket and remove it.
► Please observe the instructions for proper disposal.

12.2 Disposing of the u-remote station

ATTENTION

Products in the u-remote series are subject to WEEE (EU Directive 2002/96 EC), which regulates the collection and recycling of electrical and electronic equipment.

► Make sure that disassembled products are properly disposed of!

When all u-remote products reach the end of their life cycle, you can return them to Weidmüller, and we will arrange for their proper disposal. This also applies to countries outside the European Union.

► Please pack the products properly and send them to your responsible distributor.

You can find the address of your respective country representative in the annex and at the Weidmüller website.

13 LED indicators and troubleshooting

ATTENTION

In the event of a malfunction occurring on a u-remote station, carry out the following recommended measures. If the malfunction cannot be fixed, send the affected product to Weidmüller (see the Service addresses in the annex). Weidmüller does not assume any liability If the base or electronic module has been tampered with!

13.1 Field-bus coupler

Coupler/indicator	LED	Status	Recommended action
Profibus DP field-bus coupler UR20-FBC-PB-DP			
Power LED	PWR	Green: Supply voltage applied	
		Off, status LED of the module is green: Defective coupler	Have the coupler repaired or replaced The internal fuse was triggered due to an overload
		Off, module status LED is off: Improper supply voltage	Check the supply voltage
Collective error	SF	Red: Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic message Red flashing: Station in Force mode	Check that the GSD file is up-to-date Check if the configured station setup matches the actual setup Read the diagnostic message with the web server or an engineering tool and determine which further actions to take
Bus failure	BF	Red: No connection to the fieldbus	Check the fieldbus cable and the PLC configuration
		Red flashing: Configuration error, no connection to the control unit, or error in the parameter set or slave address error or firmware update is running	Check the fieldbus parameters and the PLC configuration Check that the GSD file is up-to-date Check if the configured station setup matches the actual setup
Maintenance	MT	Yellow: Error on the system bus or the fieldbus	Check that the modules have been snapped into place properly Check fieldbus wiring Check the fieldbus connection parameters
Input supply voltage	3.1	Green: Supply voltage for input circuit > 18 V DC	
	3.2	Red: Supply voltage for input circuit < 18 V DC	Check the supply voltage
	3.4	Red: Internal fuse defective	Replace the coupler
Output supply voltage	4.1	Green: Supply voltage for output circuit > 18 V DC	
	4.2	Red: Supply voltage for output circuit < 18 V DC	Check the supply voltage
	4.4	Red: Internal fuse defective	Replace the coupler

Coupler/indicator	LED	Status	Recommended action
PROFINET IRT field-bus coupler UR20-FBC-PN-IRT			
Power LED	PWR	Green: Supply voltage	
		Off and the status LED on the module is green: Defective coupler	Have coupler repaired or replaced The internal fuse was triggered due to an overload
		Off and the status LED on the module is off: Improper supply voltage	Check the supply voltage
Collective error	SF	Red: Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic message Red flashing: Station in Force mode	Check that the GSDML file is up-to-date. Check if the configured station setup matches the actual setup Read the diagnostic message with the web server or an engineering tool and determine which further actions to take
Bus failure	BF	Red: No connection to the fieldbus	Check the fieldbus cable and the PLC configuration
		Flashing red: Configuration error, no connection to the control unit, or error in the parameter set	Check the fieldbus parameters and the PLC configuration Check that the GSD file is up-to-date Check if the configured station setup matches the actual setup
Maintenance	MT	Yellow: Error on the system bus	Check that the modules have been snapped into place properly
Connection	LINK1	Green: Connection established between port 1 of the coupler and another field device	
		Off: No connection	Check the connection to the next participant and the fieldbus cable
Active	ACT1	Flashing yellow: Data being exchanged on port 1	
Connection	LINK2	Green: Connection established between port 2 of the coupler and another field device	
		Off: No connection	Check the connection to the next participant and the fieldbus cable
Active	ACT2	Flashing yellow: Data being exchanged on port 2	
Input supply voltage	3.1	Green: Supply voltage for input circuit > 18 V DC	
	3.2	Red: Supply voltage for input circuit < 18 V DC	Check the supply voltage
	3.4	Red: Internal fuse defective	Replace the coupler
Output supply voltage	4.1	Green: Supply voltage for output circuit > 18 V DC	
	4.2	Red: Supply voltage for output circuit < 18 V DC	Check the supply voltage
	4.4	Red: Internal fuse defective	Replace the coupler

Coupler/indicator	LED	Status	Recommended action
EtherCAT field-bus coupler UR20-FBC-EC			
Power LED	PWR	Green: Supply voltage	
		Off and the status LED on the module is green: Defective coupler	Have coupler repaired or replaced The internal fuse was triggered due to an overload
		Off and the status LED on the module is off: Improper supply voltage	Check the supply voltage
Collective error	SF	Red: Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic message Red flashing: Station in Force mode	Check that the ESI configuration file is up-to-date Check if the configured station setup matches the actual setup Read the diagnostic message with the web server or an engineering tool and determine which further actions to take
Bus failure	BF	Red: No connection to the fieldbus	Check the fieldbus cable and the PLC configuration
		Flashing red: Configuration error, no connection to the control unit, or error in the parameter set	Check the fieldbus parameters and the PLC configuration Check that the ESI configuration file is up-to-date Check if the configured station setup matches the actual setup
Maintenance	MT	Yellow: Error on the system bus or fieldbus	Check that the modules have been snapped into place properly
Connection/active	L/A IN	Off: No connection	Check the fieldbus cable
		Green: Connection established between port 1 of the coupler and another field device Flashing green: Data being exchanged on port 1	
Connection/active	L/A OUT	Off: No connection	Check the fieldbus cable
		Green: Connection established between port 2 of the coupler and another field device Flashing green: Data being exchanged on port 2	
Coupler state	RUN	Off: Coupler in INIT state Flashing green: Coupler in PRE-OPERATIONAL state Lights up green briefly: Coupler in SAFE OPERATIONAL state Green: Coupler in OPERATIONAL state	
Internal error	ERROR	Red: Critical error in the coupler Red lights up briefly: Error in the coupler application Red lights up briefly twice: Output of the sync manager watchdog out-of-date Blinking red: Configuration error	Check that the ESI file is up-to-date. Check if the configured station setup matches the actual setup Check that the coupler firmware is up-to-date. Compare the master cycle time with the time set up on watchdog timer
Input supply voltage	3.1	Green: Supply voltage for input circuit > 18 V DC	
	3.2	Red: Supply voltage for input circuit < 18 V DC	Check the supply voltage
	3.4	Red: Internal fuse defective	Replace the coupler
Output supply voltage	4.1	Green: Supply voltage for output circuit > 18 V DC	
	4.2	Red: Supply voltage for output circuit < 18 V DC	Check the supply voltage
	4.4	Red: Internal fuse defective	Replace the coupler

Coupler/indicator	LED	Status	Recommended action
Modbus TCP field-bus coupler UR20-FBC-MOD-TCP			
Power LED	PWR	Green: Supply voltage	
		Off and the status LED on the module is green: Defective coupler	Have coupler repaired or replaced The internal fuse was triggered due to an overload
		Off and the status LED on the module is off: Improper supply voltage	Check the supply voltage
Collective error	SF	Red: Configuration error, or error in the coupler, or error in a module, or there is a new diagnostic message Red flashing: Station in Force mode	Check if the configured station setup matches the actual station setup Read the diagnostic message with the web server or an engineering tool and determine which further actions to take
Bus failure	BF	Red: No connection to the fieldbus	Check the fieldbus cable and the PLC configuration
		Flashing red: Configuration error, no connection to the control unit, or error in the parameter set	Check if the configured station setup matches the actual station setup Check the master configuration and try again to establish connection
Maintenance	MT	Yellow: Error on the system bus or the fieldbus	Check that the modules have been snapped into place properly Check the fieldbus cabling Check the fieldbus connection parameters
Connection/active	L/A X1	Green: Connection established between port 1 of the coupler and another field device	
		Flashing green: Data being exchanged on port 1	
		Off: No connection	Check the connection to the next participant and the fieldbus cable
Connection/active	L/A X2	Green: Connection established between port 2 of the coupler and another field device	
		Flashing green: Data being exchanged on port 2	
		Off: No connection	Check the connection to the next participant and the fieldbus cable
Input supply voltage	3.1	Green: Supply voltage for input circuit > 18 V DC	
	3.2	Red: Supply voltage for input circuit < 18 V DC	Check the supply voltage
	3.4	Red: Internal fuse defective	Replace the coupler
Output supply voltage	4.1	Green: Supply voltage for output circuit > 18 V DC	
	4.2	Red: Supply voltage for output circuit < 18 V DC	Check the supply voltage
	4.4	Red: Internal fuse defective	Replace the coupler

13.2 I/O modules

Module	LED	Status	Recommended action
Digital input modules			
UR20-4DI-P, UR20-8DI-P-3W, UR20-16DI-P, UR20-16DI-P-PLC-INT, UR20-2DI-P-TS, UR20-2DI-P-TS	Status LED	Red: – Error in supply voltage at input current path – Communication error on the system bus – There is a new diagnostic message	– Check that the module has been snapped into place properly – Check the supply voltage
Digital output modules			
UR20-4DO-P, UR20-8DO-P, UR20-16DO-P, UR20-16DO-P-PLC-INT, UR20-4DO-PN-2A	Status LED	Red: – Error in supply voltage at output current path – Communication error on the system bus – There is a new diagnostic message – At least one output overloaded	– Check that the module has been snapped into place properly – Check the supply voltage – Eliminate the overload/short circuit
Digital relay output modules			
UR20-4RO-SSR-255, UR20-4RO-CO-255	Status LED	Red: – Error in supply voltage at output current path – Communication error on the system bus – There is a new diagnostic message	– Check that the module has been snapped into place properly – Check the supply voltage
Digital counter modules			
UR20-1CNT-100-1DO, UR20-2CNT-100	Status LED	Red: – Error in supply voltage at input current path – Communication error on the system bus – There is a new diagnostic message	– Check that the module has been snapped into place properly – Check the supply voltage
Pulse-width modulation modules			
UR20-2PWM-0.5A, UR20-2PWM-2A	Status LED	Red: – Error in supply voltage at output current path – Communication error on the system bus – There is a new diagnostic message – At least one output overloaded	– Check that the module has been snapped into place properly – Check the supply voltage – Eliminate the overload/short circuit
Analogue input modules			
UR20-4AI-UI-16, UR20-4AI-UI-12	Status LED	Red: – Error in supply voltage at input current path – Communication error on the system bus – There is a new diagnostic message – Channel error – Firmware error	– Check that the module has been snapped into place properly – Check the supply voltage – Check channel error – Check firmware, update firmware as nessecary
		Status LED off and all other LEDs red: Error in the bus coupler power supply	Check the bus coupler supply voltage
	Channel LED 1.1 ... 4.1	Red: – Input signal outside permissible range – System bus cannot be accessed (e.g. caused by interruption of the bus coupler power supply)	– Check the input signal – Check the bus coupler supply voltage

Module	LED	Status	Recommended action
UR20-8AI-I-PLC-INT			
	Status LED	Red: – Error in the supply voltage – Communication error on the system bus – There is a new diagnostic message – Channel error – Error on the supply voltage of the feed in plug	– Check that the module has been snapped into place properly – Check the supply voltage – Check channel error – Check supply voltage of feed in plug
		Status LED off and all other LEDs red: – Error in the bus coupler power supply	– Check the bus coupler supply voltage
	Channel LED 1.0 ... 1.7	Red: – Input signal outside permissible range – System bus cannot be accessed (e.g. caused by interruption of the bus coupler power supply)	– Check the input signal – Check the bus coupler supply voltage
	4.1	Green: Supply voltage feed in plug > 18 V DC	
	4.2	Red: Error on the supply voltage of the feed in plug	– Check supply voltage of feed in plug
	4.4	Red: – Fuse for the sensor supply has been triggered	– Check the load connected to the sensor supply
UR20-4AI-TC-DIAG, UR20-4AI-RTD-DIAG			
	Status LED	Red: – Error in supply voltage at input current path – Communication error on the system bus – There is a new diagnostic message – Channel error – Firmware error	– Check that the module has been snapped into place properly – Check the supply voltage – Check channel error – Check firmware, update firmware as nessecary
		Status LED **off** and all other LEDs red: – Error in the bus coupler power supply	– Check the bus coupler supply voltage
	Channel LED 1.1 ... 4.1	Red: – Input signal outside the permissible range – Cable break – Cold-junction compensation error (UR20-4AI-TC-DIAG only) – System bus cannot be accessed (e.g. caused by interruption of the bus coupler power supply)	– Check the input signal, the cabling and, if necessary, the sensor for external cold-junction compensation. – Check the bus coupler supply voltage
UR20-4AO-UI-16			
	Status LED	Red: – Error in the supply voltage – Communication error – Channel error	– Check that the module has been snapped into place properly. – Check the supply voltage – Check the channel error
		Status LED **off** and all other LEDs red: – Error in the bus coupler power supply	– Check the bus coupler supply voltage
	Channel LED 1.1 ... 4.1	Red: – Overload in voltage mode – Broken wire in current mode – System bus cannot be accessed (e.g. caused by interruption of the bus coupler power supply)	– Check the connected load, check the cabling, – Check the bus coupler supply voltage

Module	LED	Status	Recommended action
UR20-PF-I			
	Status LED	Red: – Channel error or communication error on the system bus, or there is an error in the supply voltage	– Check that the module has been snapped into place properly – Check the channel error, check the supply voltage
	3.2	Red: – Supply voltage of the feed in plug < 18 V DC	Check the supply voltage of the feed in plug
	3.4	Red: – Damage of internal fuse	– replace module
UR20-PF-O			
	Status LED	Red: – Channel error or communication error on the system bus, or there is an error in the supply voltage	– Check that the module has been snapped into place properly – Check the channel error, check the supply voltage
	4.1	Red: – Supply voltage of the feed in plug < 18 V DC	Check the supply voltage of the feed in plug
	4.2	Red: – Damage of internal fuse	– replace module
Potential distribution modules			
UR20-16AUX-I **UR20-16AUX-GND-I**	Status LED	Red: – Error on the supply voltage of the input path	– Check that the module has been snapped into place properly – Check the supply voltage
UR20-16AUX-O **UR20-16AUX-GND-O**	Status LED	Red: – Error on the supply voltage of the output path	– Check that the module has been snapped into place properly – Check the supply voltage
UR20-16AUX-FE	Status LED	Off: No supply voltage	– Check that the module has been snapped into place properly
UR20-PF-O-1DI-SIL			
	Status LED red	Red: – Channel error or error in the supply voltage – Channel error	– Check that the module has been snapped into place properly. – Check supply voltage – Check channel error
		– Overload at the OSSD output level	– Remove cross connection at OSSD
		– External feed-in recognised from field side	– Measure voltage at OSSD pin (4.3) vs. GND (4.4). If a voltage is present, check the wiring! **Attention**: safety hazard! Shut down the system and prevent it from switching on again!
		– Internal error detected	– Perform a cold start. If the error has not been fixed, send the module to Weidmüller for a technical examination.
		– Interruption in one of the two safety loops of a safety circuit for at least 3 seconds.	– Check safety circuit for interruptions if an interruption of the safety channel is not part of the application.
		– Cross connection between the safety loops for at least 3 seconds.	– Check safety circuit for cross connections.
	1.1	Off: Safety circuit 1 interrupted Yellow: Safety circuit 1 OK	Check safety circuit 1
	4.3	Green: Feed-in voltage in valid range	

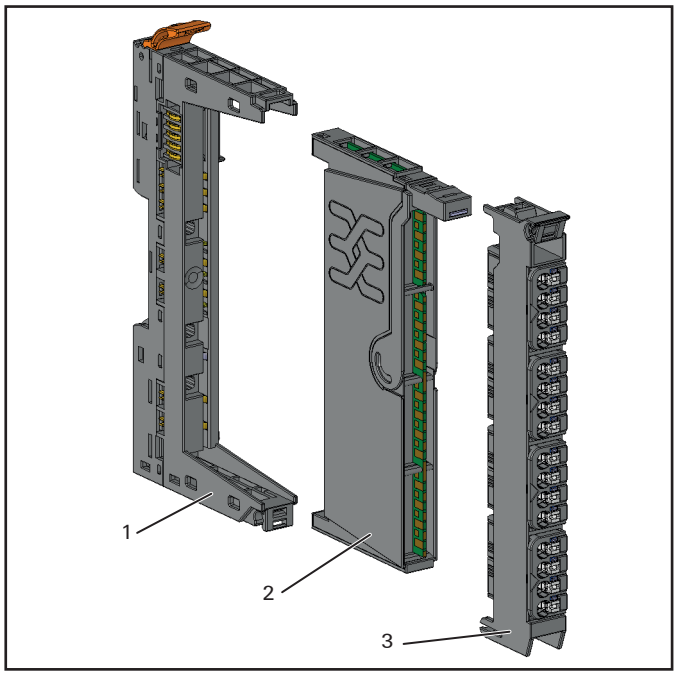
Module	LED	Status	Recommended action
UR20-PF-O-2DI-SIL, UR20-PF-O-2DI-DELAY-SIL			
	Status LED red	Red: – Channel error or error in the supply voltage – Channel error	– Check that the module has been snapped into place properly. – Check supply voltage – Check channel error
		– Overload at the OSSD output level	– Remove cross connection at OSSD
		– External feed-in recognised from field side	– Measure voltage at OSSD pin (4.3) vs. GND (4.4). If a voltage is present, check the wiring! **Attention**: safety hazard! Shut down the system and prevent it from switching on again!
		– Internal error detected	– Perform a cold start. If the error has not been fixed, send the module to Weidmüller for a technical examination.
		– Interruption in one of the two safety loops of a safety circuit for at least 3 seconds.	– Check safety circuit for interruptions if an interruption of the safety channel is not part of the application.
		– Cross connection between the safety loops for at least 3 seconds.	– Check safety circuit for cross connections.
	1.1	Off: Safety circuit 1 interrupted Yellow: Safety circuit 1 OK	Check safety circuit 1
	2.1	Off: Safety circuit 2 interrupted Yellow: Safety circuit 2 OK	Check safety circuit 2
	4.3	Green: Feed-in voltage in valid range	

14 Accessories and replacement parts

14.1 Accessories

Order No.	Designation	Purpose
9009030000	Screwdriver SD 0.4 x 2.5 x 75	Unfastening conductors from PUSH IN contacts
9008320000	Screwdriver SD 0.5 x 3.0 x 80	Assembling/disassembling an end bracket
1323700000	PM 2.7/2.6 MC SDR marker	Connection marker for a pusher, with custom printing to customer specifications
1323710000	PM 2.7/2.6 MC NE WS marker	Connection marker for a pusher, unprinted
1341610000	DEK 5/8-11.5 MC SDR marker	Module marker with custom printing to customer specifications
1341630000	DEK 5/8-11.5 MC NE WS marker	Module marker, unprinted
1339920000	UR20-SM-ACC swivel marker	Pivoting holder for module markers
1429420000	White thermal-transfer label for swivel markers	Can be printed with thermal-transfer printers
1429910000	Yellow thermal-transfer labels for swivel markers	Can be printed with thermal-transfer printers
1429430000	Paper labels for swivel markers	Can be printed with laser printers
1806120000	EM 8/30 end bracket marker	Marks the station at the end bracket
1483050000	KOSM BHZ5.00 coding element	Coding element for customised module coding
1346610000	UR20-EBK-ACC termination kit	Set with two end brackets and one end plate
1162600000	WEW 35/1 SW end bracket for vertical installation	Reinforced end bracket required in addition to terminal kit for vertical installation

14.2 Replacement parts



1 Base module
2 Electronic unit
3 Plug-in uniit

Replacement parts for modules

Module	Order No.	Base module	Electronic unit	Plug-in unit
UR20-4DI-P	1315170000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315170000-SP Order No.: 1346640000	UR20-PK-1315170000-SP Order No.: 1346440000
UR20-8DI-P-3W	1394400000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1394400000-SP Order No.: 1434220000	UR20-PK-1394400000-SP Order No.: 1411430000
UR20-16DI-P	1315200000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315200000-SP Order No.: 1346680000	UR20-PK-1315200000-SP Order No.: 1346400000
UR20-16DI-P-PLC-INT	1315210000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315210000-SP Order No.: 1346690000	UR20-PK-1315210000-SP Order No.: 1346590000
UR20-16DO-P-PLC-INT	1315270000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315270000-SP Order No.: 1346740000	UR20-PK-1315270000-SP Order No.: 1483940000
UR20-8AI-I-PLC-INT	1315670000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315670000-SP Order No.: 1347250000	UR20-PK-1315670000-SP Order No.: 1483950000
UR20-4DO-P	1315220000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315220000-SP Order No.: 1346700000	UR20-PK-1315220000-SP Order No.: 1483960000
UR20-4DO-P-2A	1315230000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315230000-SP Order No.: 1346710000	UR20-PK-1315230000-SP Order No.: 1483970000
UR20-4DO-PN-2A	1394420000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1394420000-SP Order No.: 1480950000	UR20-PK-1394420000-SP Order No.: 1483980000
UR20-8DO-P	1315240000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315240000-SP Order No.: 1346720000	UR20-PK-1315240000-SP Order No.: 1346410000
UR20-16DO-P	1315250000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315250000-SP Order No.: 1346730000	UR20-PK-1315250000-SP Order No.: 1483990000
UR20-4RO-CO-255	1315550000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315550000-SP Order No.: 1347130000	UR20-PK-1315550000-SP Order No.: 1346500000
UR20-4RO-SSR-255	1315540000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315540000-SP Order No.: 1347120000	UR20-PK-1315540000-SP Order No.: 1484000000
UR20-1CNT-100-1DO	1315570000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315570000-SP Order No.: 1347140000	UR20-PK-1315570000-SP Order No.: 1346520000
UR20-2CNT-100	1315590000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315590000-SP Order No.: 1347150000	UR20-PK-1315590000-SP Order No.: 1346540000
UR20-2PWM-PN-2A	1315610000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315610000-SP Order No.: 1347190000	UR20-PK-1315610000-SP Order No.: 1346550000
UR20-2PWM-PN-0.5A	1315600000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315600000-SP Order No.: 1347180000	UR20-PK-1315600000-SP Order No.: 1484010000
UR20-4AI-UI-16	1315620000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315620000-SP Order No.: 1347200000	UR20-PK-1315620000-SP Order No.: 1484020000
UR20-4AI-UI-12	1394390000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1394390000-SP Order No.: 1434230000	UR20-PK-1394390000-SP Order No.: 1484030000
UR20-4AI-RTD-DIAG	1315700000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315700000-SP Order No.: 1347290000	UR20-PK-1315700000-SP Order No.: 1484040000
UR20-4AI-TC-DIAG	1315710000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315710000-SP Order No.: 1435740000	UR20-PK-1315710000-SP Order No.: 1484050000
UR20-4AO-UI-16	1315680000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315680000-SP Order No.: 1347270000	UR20-PK-1315680000-SP Order No.: 1484070000
UR20-ES	1315770000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1315770000-SP Order No.: 1347370000	UR20-PK-1315770000-SP Order No.: 1346510000

Replacement parts for modules

Module	Order No.	Base module	Electronic unit	Plug-in unit
UR20-PF-I	1334710000	UR20-BM-PF-I-SP Order No.: 1350940000	UR20-EM-1334710000-SP Order No.: 1347380000	UR20-PK-1334710000-SP Order No.: 1346460000
UR20-PF-O	1334740000	UR20-BM-PF-O-SP Order No.: 1350950000	UR20-EM-1334740000-SP Order No.: 1347420000	UR20-PK-1334740000-SP Order No.: 1346480000
UR20-16AUX-I	1334770000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1334770000-SP Order No.: 1347450000	UR20-PK-1334770000-SP Order No.: 1346450000
UR20-16AUX-O	1334780000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1334780000-SP Order No.: 1347470000	UR20-PK-1334780000-SP Order No.: 1484080000
UR20-16AUX-FE	1334790000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1334790000-SP Order No.: 1347480000	UR20-PK-1334790000-SP Order No.: 1346490000
UR20-16AUX-GND-I	1334800000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1334800000-SP Order No.: 1347490000	UR20-PK-1334800000-SP Order No.: 1346470000
UR20-16AUX-GND-O	1334810000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1334810000-SP Order No.: 1347500000	UR20-PK-1334810000-SP Order No.: 1484090000
UR20-PF-O-1DI-SIL	1335030000	UR20-BM-SIL-SP Order No.: 1350970000	UR20-EM-1335030000-SP Order No.: 1347520000	UR20-PK-1335030000-SP Order No.: 1346560000
UR20-PF-O-2DI-SIL	1335050000	UR20-BM-SIL-SP Order No.: 1350970000	UR20-EM-1335050000-SP Order No.: 1347540000	UR20-PK-1335050000-SP Order No.: 1346570000
UR20-PF-O-2DI-DELAY-SIL	1335040000	UR20-BM-SIL-SP Order No.: 1350970000	UR20-EM-1335040000-SP Order No.: 1347530000	UR20-PK-1335040000-SP Order No.: 1484100000
UR20-4DI-P-TS	1460150000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1460150000-SP Order No.: 1463680000	UR20-PK-1460150000-SP Order No.: 1484430000
UR20-2DI-P-TS	1460140000	UR20-BM-SP Order No.: 1350930000	UR20-EM-1460140000-SP Order No.: 1463690000	UR20-PK-1460140000-SP Order No.: 1484110000

Replacement parts for couplers

Coupler	Order No.	Base module
UR20-FBC-PB-DP	1334870000	UR20-PK-1334870000-SP Order No.: 1361520000
UR20-FBC-PN-IRT	1334880000	UR20-PK-1334880000-SP Order No.: 1484120000
UR20-FBC-MOD	1334930000	UR20-PK-1334930000-SP Order No.: 1484130000
UR20-FBC-EC	1334910000	UR20-PK-1334910000-SP Order No.: 1484440000

ANNEX

Decimal ↔ hexadecimal conversion table

Decimal ↔ hexadecimal

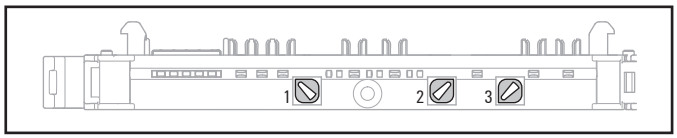
Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal
001	1	034	22	067	43	100	64
002	2	035	23	068	44	101	65
003	3	036	24	069	45	102	66
004	4	037	25	070	46	103	67
005	5	038	26	071	47	104	68
006	6	039	27	072	48	105	69
007	7	040	28	073	49	106	6A
008	8	041	29	074	4A	107	6B
009	9	042	2A	075	4B	108	6C
010	A	043	2B	076	4C	109	6D
001	B	044	2C	077	4D	110	6E
012	C	045	2D	078	4E	111	6F
013	D	046	2E	079	4F	112	70
014	E	047	2F	080	50	113	71
015	F	048	30	081	51	114	72
016	10	049	31	082	52	115	73
017	11	050	32	083	53	116	74
018	12	051	33	084	54	117	75
019	13	052	34	085	55	118	76
020	14	053	35	086	56	119	77
021	15	054	36	087	57	120	78
022	16	055	37	088	58	121	79
023	17	056	38	089	59	122	7A
024	18	057	39	090	5A	123	7B
025	19	058	3A	091	5B	124	7C
026	1A	059	3B	092	5C	125	7D
027	1B	060	3C	093	5D	126	7E
028	1C	061	3D	094	5E	127	7F
029	1D	062	3E	095	5F	128	80
030	1E	063	3F	096	60	129	81
031	1F	064	40	097	61	130	82
032	20	065	41	098	62	131	83
033	21	066	42	099	63	132	84

Decimal ↔ hexadecimal

Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal
133	85	166	A6	199	C7	232	E8
134	86	167	A7	200	C8	233	E9
135	87	168	A8	201	C9	234	EA
136	88	169	A9	202	CA	235	EB
137	89	170	AA	203	CB	236	EC
138	8A	171	AB	204	CC	237	ED
139	8B	172	AC	205	CD	238	EE
140	8C	173	AD	206	CE	239	EF
141	8D	174	AE	207	CF	240	F0
142	8E	175	AF	208	D0	241	F1
143	8F	176	B0	209	D1	242	F2
144	90	177	B1	210	D2	243	F3
145	91	178	B2	211	D3	244	F4
146	92	179	B3	212	D4	245	F5
147	93	180	B4	213	D5	246	F6
148	94	181	B5	214	D6	247	F7
149	95	182	B6	215	D7	248	F8
150	96	183	B7	216	D8	249	F9
151	97	184	B8	217	D9	250	FA
152	98	185	B9	218	DA	251	FB
153	99	186	BA	219	DB	252	FC
154	9A	187	BB	220	DC	253	FD
155	9B	188	BC	221	DD	254	FE
156	9C	189	BD	222	DE	255	FF
157	9D	190	BE	223	DF	256	100
158	9E	191	BF	224	E0	257	101
159	9F	192	C0	225	E1	258	102
160	A0	193	C1	226	E2	259	103
161	A1	194	C2	227	E3	260	104
162	A2	195	C3	228	E4	261	105
163	A3	196	C4	229	E5	262	106
164	A4	197	C5	230	E6	263	107
165	A5	198	C6	231	E7	264	108

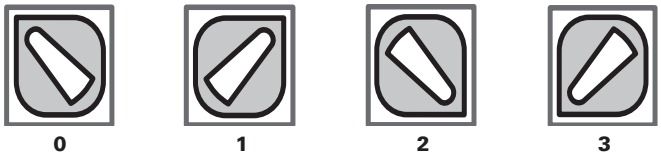
Examples of module position coding

The incorrect insertion of electronic units can be prevented if the base modules are given coding elements CO BHZ CH20M BK (Order No.1429560000)
Three coding sockets each with four possible positions can be plugged into every base module. This results in a maximum of 4^3 or 64 codes.
It is practical to use either functionally oriented or slot-oriented coding. Example codes are provided for each coding scheme in the following tables.



Base module with three coding places and coding sockets plugged (Example code 013)

Possible positions of the coding sockets:



Functionally-oriented coding

Code	Coding position 1	2	3	Meaning
01	0	0	0	4 digital inputs (4DI)
02	0	0	1	8 digital inputs (8DI)
03	0	0	2	16 digital inputs (16DI)
10	0	2	1	4 digital outputs (4DO)
11	0	2	2	8 digital outputs (8DO)
12	0	2	3	16 digital outputs (16DO)
40	2	1	3	1-channel counter (1CNT)
41	2	2	0	2-channel counter (2CNT)
13	0	3	0	2-channel PWM module (2PWM)
20	1	0	3	4 analogue inputs (4AI)
21	1	1	0	8 analogue inputs (8AI)
30	1	3	1	4 analogue outputs (4AO)
22	1	1	1	4 temperature inputs (4AI-X-DIAG)
50	3	0	1	Power-feed module input (PF-I)
51	3	0	2	Power-feed module output (PF-O)
52	3	0	3	Power-feed module output 1DI SIL (1DI-SIL)
53	3	1	0	Power-feed module output 2DI SIL (2DI-X-SIL)
60	3	2	3	Potential distributor +
61	3	3	0	Potential distributor –
62	3	3	1	Potential distributor FE (16AUX-FE)
63	3	3	2	Empty slot module (ES)

Examples of module position coding

Slot-oriented coding

Code	Coding position 1	2	3	Station slot
01	0	0	0	1
02	0	0	1	2
03	0	0	2	3
04	0	0	3	4
05	0	1	0	5
06	0	1	1	6
07	0	1	2	7
08	0	1	3	8
09	0	2	0	9
10	0	2	1	10
11	0	2	2	11
12	0	2	3	12
13	0	3	0	13
14	0	3	1	14
15	0	3	2	15
16	0	3	3	16
17	1	0	0	17
18	1	0	1	18
19	1	0	2	19
20	1	0	3	20
21	1	1	0	21
22	1	1	1	22
23	1	1	2	23
24	1	1	3	24
25	1	2	0	25
26	1	2	1	26
27	1	2	2	27
28	1	2	3	28
29	1	3	0	29
30	1	3	1	30
31	1	3	2	31
32	1	3	3	32

Slot-oriented coding

Code	Coding position 1	2	3	Station slot
33	2	0	0	33
34	2	0	1	34
35	2	0	2	35
36	2	0	3	36
37	2	1	0	37
38	2	1	1	38
39	2	1	2	39
40	2	1	3	40
41	2	2	0	41
42	2	2	1	42
43	2	2	2	43
44	2	2	3	44
45	2	3	0	45
46	2	3	1	46
47	2	3	2	47
48	2	3	3	48
49	3	0	0	49
50	3	0	1	50
51	3	0	2	51
52	3	0	3	52
53	3	1	0	53
54	3	1	1	54
55	3	1	2	55
56	3	1	3	56
57	3	2	0	57
58	3	2	1	58
59	3	2	2	59
60	3	2	3	60
61	3	3	0	61
62	3	3	1	62
63	3	3	2	63
64	3	3	3	64

EC Declaration of Conformity

Weidmüller

EG-Konformitätserklärung
EC Declaration of Conformity

Dokument-Nr (.../Monat/Jahr) Document No. (.../month/year)	**K552/11/13**
Hersteller / Manufacturer	**Weidmüller Interface GmbH & Co. KG**
Anschrift / Address	**Klingenbergstr. 16** **32758 Detmold, Germany**
Gegenstand der Erklärung / Object of the declaration	**Modulares Remote-I/O-System "u-remote" (siehe Liste auf Seite 2)** **Modular remote I/O-System "u-remote" (see list on page 2)**

☑ Fortsetzung auf Seite 2 / Continued on page 2

Der Hersteller erklärt in alleiniger Verantwortung, dass der oben beschriebene Gegenstand mit den grundlegenden Anforderungen der Richtlinien übereinstimmt: / The manufacturer attests, in sole-responsibility, that the object of the declaration described above is in conformity with the essential requirements of directive(s):

☑	**2006/95/EG**	Niederspannungsrichtlinie (NSR)	Low Voltage Directive (LVD)
		Anbringung der CE-Kennzeichnung: / Affixing of the CE marking: 2013	
☑	**2004/108/EG**	Elektromagnetische Verträglichkeit (EMV)	Electromagnetic Compatibility (EMC)
☐	**2006/42/EG**	Maschinenrichtlinie	Mechanical Equipment - Machinery
☑	**94/9/EG**	ATEX-Richtlinie	ATEX Directive
		Kennzeichnung (Gerätegruppe, Kategorie, Atmosphäre) / Marking (Equipment Group, Category, Atmosphere) II 3 G Ex nA IIC T4 Gc, II 3 G Ex nA nC IIC T4 Gc	
☐	**1995/5/EG**	Funkanlagen und Telekommunikationsendeinrichtungen	Radio Equipment and Telecommunications Terminal Equipment (R&TTE)

Verweis auf die angewandten relevanten harmonisierten Normen oder Bestimmungen aufgrund derer die Konformität erklärt wird: / References to the relevant harmonised standards used, or references to the specifications in relation to which conformity is declared:

DIN EN 50178:1998
DIN EN 61131-2:2008
EN 60079-0:2009, EN 60079-15:2010
EN 61000-6-2:2005, EN 61000-6-4:2011

Herausgegebene Zertifikate benannter Stellen: / Issued certificates from notified bodies:

Benannte Stelle (Name und Kennnummer) Notified body (name and number)	Beschreibung der Einbindung Description of intervention	Zertifikat Certificate

Detmold, 13.11.2013
Ort, Datum / place, date

Rechtsverbindliche Unterschrift / legally binding signature

Name und Funktion / name and function

Dr.-Ing. Timo Berger, Leiter Division Elektronische Interfacetechnik

Diese Erklärung bescheinigt die Übereinstimmung mit der genannten Richtlinie, beinhaltet jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten. / This declaration certifies compliance with the indicated directive but no warranty of properties. The safety instructions of the accompanying product documentation shall be observe.

F_Entw_Konformitätserklärung

Seite 1 von 2 \ page 1 of 2

EC Declaration of Conformity

Weidmüller

EG-Konformitätserklärung
EC Declaration of Conformity

Dokument-Nr (.../Monat/Jahr)
Document No. (.../month/year) **K552/11/13**

Gegenstand der Erklärung /
Object of the declaration

II 3 G Ex nA IIC T4 Gc:

I/O-Modules:

1315170000	UR20-4DI-P	Digital input module	4 channels, 4-wire
1460150000	UR20-4DI-P-TS	Digital input module	4 channels, 4-wire
1460140000	UR20-2DI-P-TS	Digital input module	2 channels, 4-wire
1394400000	UR20-8DI-P-3W	Digital input module	8 channels, 3-wire
1315200000	UR20-16DI-P	Digital input module	16 channels
1315210000	UR20-16DI-P-PLC-INT	Digital input module	16 channels, PLC interface
1315220000	UR20-4DO-P	Digital output module	4 channels, 4-wire
1315240000	UR20-8DO-P	Digital output module	8 channels, 2-wire
1315250000	UR20-16DO-P	Digital output module	16 channels
1315270000	UR20-16DO-P-PLC-INT	Digital output module	16 channels, PLC interface
1315620000	UR20-4AI-UI-16	Analogue input module	4 channels, 16 bits
1394390000	UR20-4AI-UI-12	Analogue input module	4 channels, 12 bits
1315700000	UR20-4AI-RTD-DIAG	Analogue input module	4 channels, RTD
1315710000	UR20-4AI-TC-DIAG	Analogue input module	4 channels, thermocouple
1315680000	UR20-4AO-UI-16	Analogue output module	4 channels, 16 bits

Bus couplers:

1334870000	UR20-FBC-PB-DP	Fieldbus coupler	PROFIBUS DP-V1
1334880000	UR20-FBC-PN-IRT	Fieldbus coupler	PROFINET IRT
1334910000	UR20-FBC-EC	Fieldbus coupler	EtherCAT
1334930000	UR20-FBC-MOD-TCP	Fieldbus coupler	Modbus TCP

Power-feed modules:

1334710000	UR20-PF-O	Power supply module (Output current path)
1334740000	UR20-PF-I	Power supply module (Input current path)

Potential distribution modules:

1334770000	UR20-16AUX-I	Potential distribution module (Input current path, positive branch)
1334780000	UR20-16AUX-O	Potential distribution module (Output current path, positive branch)
1334790000	UR20-16AUX-FE	Potential distribution module (Functional earth)
1334800000	UR20-16AUX-GND-I	Potential distribution module (Input current path, GND branch)
1334810000	UR20-16AUX-GND-O	Potential distribution module (Input current path, GND branch)

Empty Slot Modules:

1315770000	UR20-ES	Empty Slot Module

II 3 G Ex nA nC IIC T4 Gc:

I/O-Modules:

	UR20-4RO-CO-255	Digital output module	4 channels, relais

Die Konformität der I/O Module ist nur gültig in Verbindung mit den Feldbuskopplern UR20-FBC-.../ The conformity of the I/O-modules is only valid in combination with the field bus coupler UR20-FBC-...

F_Entw_Konformitätserklärung

Breakdown of Serial Numbers

Position	1	2		3		4		5	6	7	8	9	10	11	12	13	14	15
Year	Code		Month	Code	Tag	Code	Manufacturer	Code		Product family code				Serial numbers				
2014	**A**	**0**	January	1	1	1		0	**1**	**P**	**C**	**7**	**3**	**0**	**0**	**1**	**0**	**1**
2015	A	P	February	2	2	2		0	2									
2016	A	Q	March	3	3	3		0	3									
2017	A	R	April	4	4	4		0	4									
2018	A	S	May	5	5	5		0	5									
2019	A	T	June	6	6	6		0	6									
2020	A	U	**July**	**7**	7	7		0	7									
2021	A	V	August	8	8	8		0	8									
2022	A	W	September	9	9	9		0	9									
2023	A	X	October	O	10	A		1	0									
2024	A	Y	November	N	11	B		1	1									
2025	A	Z	December	D	12	C		1	2									
2026	B	A			13	D		1	3									
2027	B	B			14	E		1	4									
2028	B	C			15	F		1	5									
2029	B	D			16	G		1	6									
2030	B	E			**17**	**H**		1	7									
2031	B	F			18	I		1	8									
2032	B	G			19	J		1	9									
2033	B	H			20	K		**2**	0									
2034	B	I			21	L		2	1									
2035	B	J			22	M		2	2									
2036	B	K			23	N		2	3									
2037	B	L			24	O		2	4									
2038	B	M			25	P		2	5									
2039	B	N			26	Q		2	6									
2040	B	O			27	R		2	7									
2041	B	P			28	S		2	8									
2042	B	Q			29	T		2	9									
2043	B	R			30	U		3	0									
2044	B	S			31	V		3	1									
...																		
2052	C	A																
2053	C	B																
...																		

Example: A07H21PC7300101
Date: 17 July 2014
Manufacturer: Weidmüller
Product family: u-remote

Service

If you have any questions about u-remote, please contact your responsible country representatives.

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