Controllers u-control UC20

Manual (Original)





UC20-WL2000-AC-CAN	2928020000
UC20-WL2000-AC	1334950000
UC20-WL2000-IOT	1334990000

Weidmüller

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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 risk of explosion
	Warning against electrostatically charged components
	Warning against automatic startups
	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 I/O modules, please also observe the **Remote-I/O-System u-remote Manual**.
- When using safe I/O modules or safe feed-in modules, please also observe the **Modules for Functional Safety Manual**.
- The operation of the engineering tool u-create web and the operating system u-OS are described in the **embedded help**.
- To have the **embedded help** available independently, you can download the latest version from the Support Center.

You can find all documents in the Support Center.

1.3 Hardware and software versions described

The present manual describes the following hardware and software versions of the controllers:

Order No.	Controller	Hardware version	Software version
1334950000	UC20-WL2000-AC	01.23.00	u-create web 1.17.5 or higher u-OS 2.7.0 or higher
2928020000	UC20-WL2000-AC-CAN	01.00.00	u-OS 2.7.0 or higher
1334990000	UC20-WL2000-IOT	01.23.00	u-create web 1.14.0 or higher

2 Safety

This section includes general safety instructions for handling the u-control system. Specific warning notices for specific tasks and situations are given at the appropriate places in the documentation. Failure to observe the safety and warning notices can result in damage to persons and material.



- When using I/O modules modules, please also observe the **Remote-I/O-System u-remote Manual**.
- When using safe I/O modules or safe feed-in modules, please also observe the **Modules for Functional Safety Manual**.

All manuals are available to download from the Weidmüller website.

2.1 General safety notice

Work on the u-control 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 (SELV/PELV). When working during continued operations, the emergency stop mechanisms must not be made ineffective.

The u-control products do not comprehend any components or parts that can be maintained by the operator. If a malfunction on a u-control 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 product 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 IEC 61340-5-1 and IEC 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 IP54. The standards and guidelines applicable for the assembly of switch cabinets and the arrangement of data and supply lines must be complied with.

Fuse protection

The operator must set up the equipment so that it is protected against overloading. The 24 V DC power supply units used must fulfill the SELV category, no matter whether they supply the system or feed-in modules. The output voltage of the feed-in power supply has to fulfill overvoltage category 1 according to IEC 61010. When connecting to outer current circuits the respective overload category has to be regarded for each single module of the u-control station (see technical data).

The main switch, the switches of the subsequent circuits, the cable cross sections and the fuse protection have to be configured according to IEC 61010. The current demand must be caluclated separately for each single u-control station as described in section 4.8.

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 DIN VDE 0298 Part 4).

To meet UL-specifications in accordance with UL 248-14, a UL-certified automatic fuse (e.g. ABB Type S201-B16) or a 10 A fuse with a medium time-lag (e.g. ESKA Part No. 522.227) must be used.

All connections of the u-control components are protected against voltage pulses and overcurrent in accordance with IEC 61131-2, Zone B. The operator has to decide whether additional overvoltage protection according to IEC 62305 is required. Voltages that exceed +/-30 V may cause the destruction of couplers and modules.

Earthing

Via an FE spring on its underside each controller and each module is electrically connected to the DIN rail. This connection is only established certainly if the assembly is carried out carefully and in accordance with the instructions (see section 7.2). In order to ensure the earthing of the station the DIN rail must be connected to the protective earth via the earth terminals (PE).

Several modules 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 7).

2.2 Intended use

The products of the UC20 series are intended for use in industrial automation. A u-control station comprising a controller and connected u-remote I/O modules is intended for the control of systems or sub-systems.

The UC20-WL2000-x controllers are configured and programmed using the integrated web application u-create web.

The UC20-WL200-AC controller can be configured with the u-OS operating system from hardware version 1.23 and the UC20-WL2000-AC-CAN controller can be configured with the u-OS operating system from hardware version 1.00.

The UC20 products conform to degree of protection IP20 (in accordance with IEC 60529).

The observance of the 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. The product-specific protective measures can become ineffective in the event of deviating use.

2.3 Use in a potentially explosive atmosphere

Unless otherwise noted, the u-control products can be used in potentially explosive atmospheres rated as Zone 2 (as per Directive 2014/34/EU). The u-remote products are suitable for use in Class I, Division 2, Groups A to D according to NFPA publication 70.

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.
- The requirements according to IEC 60079-14 must be observed.
- The substitution of any components may impair suitability for Class I, Divsion 2.
- The equipment shall be installed in an enclosure that provides a degree of protection not less than IP54 in accordance with IEC 60079-15, accessible only by the use of a tool.
- The housing enclosing must meet the requirements of explosion protection type Ex n or Ex e.
- The u-control station may only be installed in horizontal orientation.
- The controller may only be used without battery.
- Sensors and actuators that are located in Zone 2 or in a safe zone can be connected to the u-control station.
- If the ambient temperature under rated conditions exeeds 55 °C, the cables used for feed-in (on the fieldbus coupler and on power-feed modules) must be specified for at least 90 °C.
- If the temperature under rated conditions exceeds 70 °C at the cable or conduit entry point, or 80 °C at the branching point of the conductors, the temperature specification of the selected cable shall be in compliance with the actual measured temperature values.
- The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.
- A stabilized 24 V DC power supply with double or reinforced insulation shall be used.
- A visual inspection of the u-control station is to be performed once per year.
- When using relais modules UR20-4RO-CO-255, solid state relais modules UR20-4RO-SSR-255 or UR20-4DI-2W-230V-AC modules in explosive atmosphere:
  - The device shall be installed in an environment free of condensation, corrosives and conducting dusts.
  - If the switching or input voltage exceeds 63 V, a transient protection device shall be provided that limits the transients to a peak voltage of 500 V or less.
- When using relais modules UR20-4RO-CO-255 in explosive atmosphere:
  - Make sure that the module will not be exposed to chemicals, which may degrade the sealing properties of materials used in the relay.
  - Due to the fact that relays are subject to wear, it must be ensured, by appropriate maintenance intervals, that the temperature do not exceed the limits of temperature class T4. A contact resistance of more than 110 mΩ will be considered as a fault.
  - The modules may only be charged with resistive loads.
- While explosive atmosphere is present:
  - No electrical connection shall be separated in energized condition.
  - The USB interface shall not be used.
  - Dip-switches, binary-switches and potentiometers shall not be actuated.

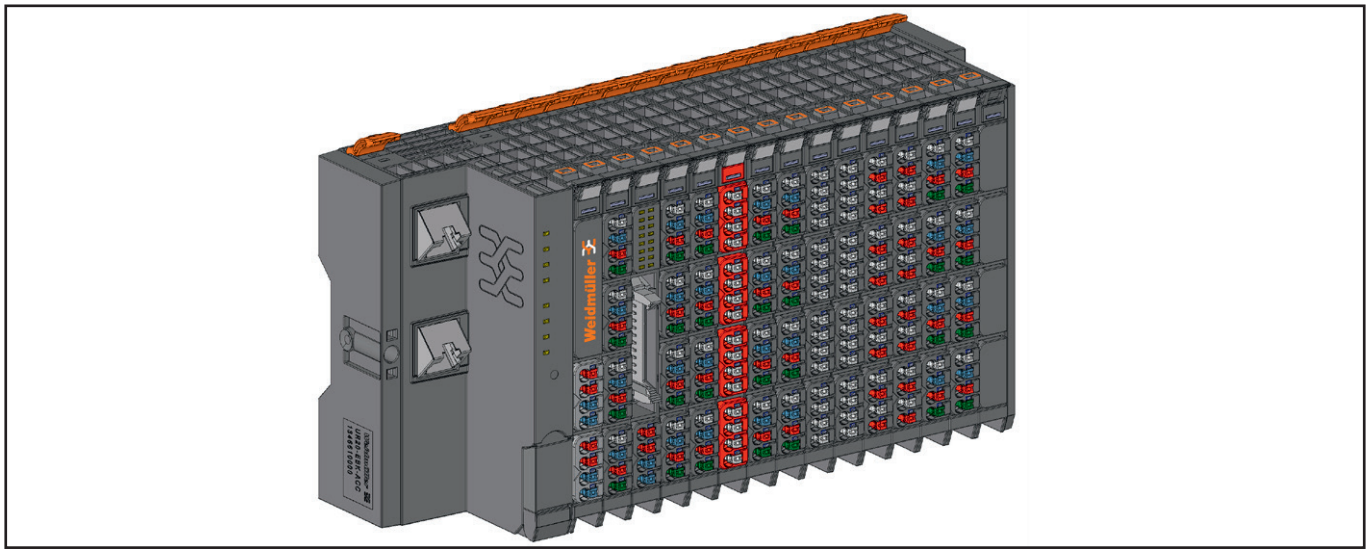
2.4 Legal notice

The u-control series products are CE-compliant in accordance with Directive 2014/30/EU (EMC Directive) and Directive 2014/35/EU (Low Voltage Directive). They also meet the requirements of the ATEX Directive 2014/34/EU unless otherwise noted.

The results of the measurements according to CISPR 16-2-3 should also be suitable to demonstrate the compliance of the u-control devices to the limits for radiated emissions as defined by CFR 47 Part 15, Subpart B, §15.109, Class A (2010) and ICES-003, Issue 5, Class A (2012).

Components of the free software products are integrated into the u-control products. The licensing terms are available in the program.

3 System overview

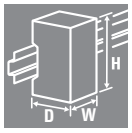


Example arrangement of a u-control station

The products of the u-control series are programmable logic controllers. The UC20-WL2000 controllers are configured, parameterised and programmed using the integrated engineering tool u-create web via a web browser.

Up to 64 active u-remote I/O modules can be connected to a controller. The controller and the I/O module of a u-control-station communicate over the u-remote-system bus.

The following components belong to a u-control-station:
- Controller: head station for production and execution of control programs and for integration into the existing network architecture or into HMIs
- Active I/O modules:
  - Modules with digital input (DI) or digital output (DO) with 4, 8 or 16 channels
  - Modules with analogue input (AI) or analogue output (AO) with up to 8 channels
  - Safety-related supply terminals (PF-O-xDI-SIL) 24 V for output current with either one or two dual channel inputs for safety circuits
- 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 brackets
  - End plate

	Height (H)	Width (W)	Depth (D)
Controller	120.0 / 4.72	52.0 / 2.05	76.0 / 2.99
I/O module	120.0 / 4.72	11.5 / 0.45[1)]	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

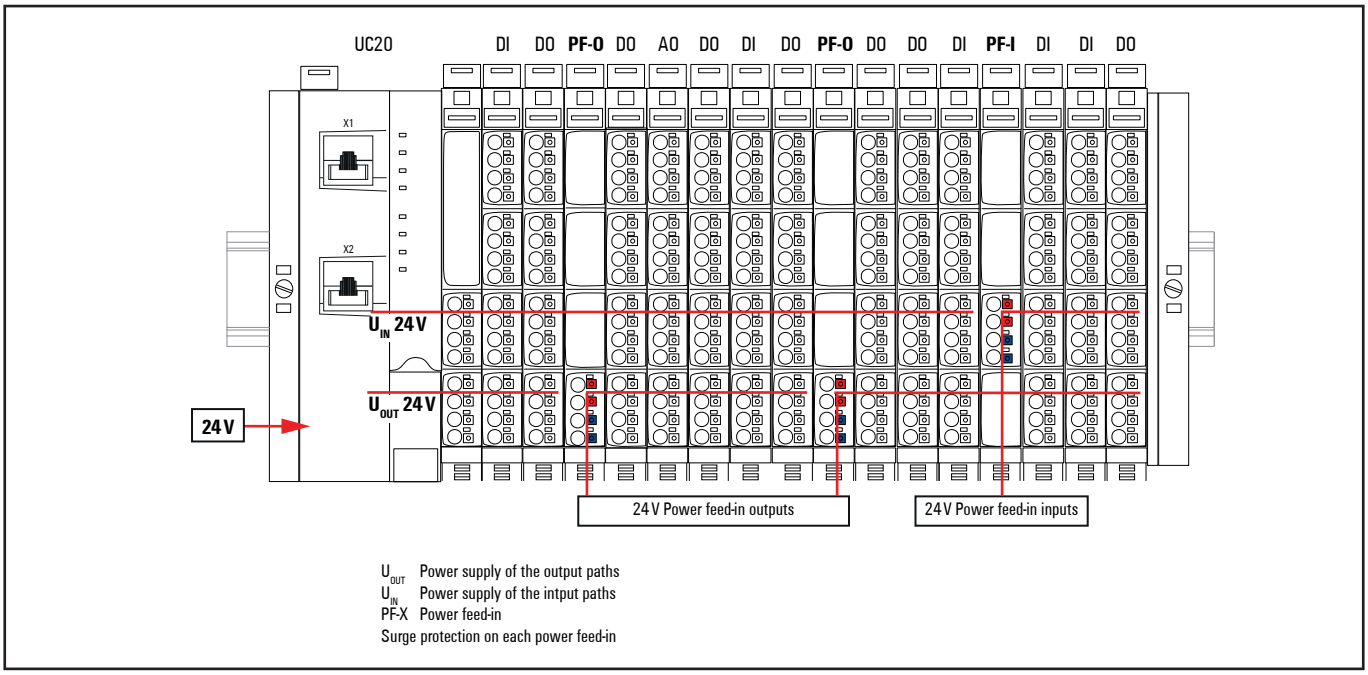
Dimensions of the u-control station components (mm / inch)

"Double-click" installation

The u-control 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.

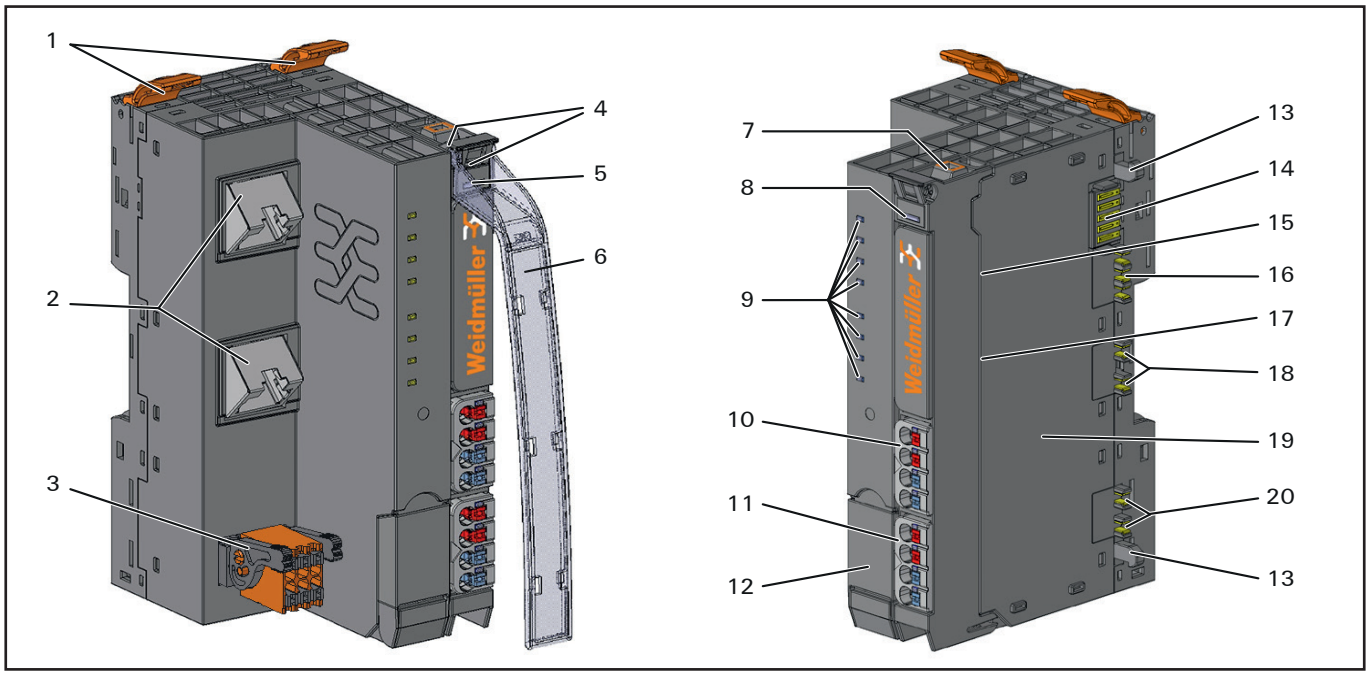
Power supply concept

The u-control controllers and the u-remote modules use three internal current paths as described in following chapter 4. Input and output paths are supplied seperately, therefore a custom-fit refreshing by power-feed modules is easyly feasible. The figure shows the general supply concept. For detailed description and calculation of the current demand please regard sections 4.8 and 4.9.



Power supply of a u-control station in general

3.1 General description of the controller



Controller (example: UC20-SL2000-EC-CAN)

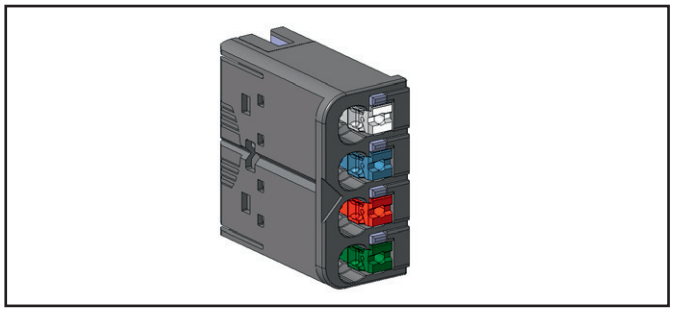
1 Release lever for the DIN rail fixing
2 Data line connection (RJ45)
3 CAN interface (only UC20-WL2000-AC-CAN)
4 Seats for module markers
5 Type designation
6 Swivel marker for labelling modules and channels (optional)
7 Connector frame unlocking device
8 LED power supply controller
9 Controller status LEDs
10 Power supply connector for the system and input modules
11 Power supply connector for output modules
12 Service flap (access USB port)
13 Latching hook for latching onto module sides
14 System bus
15 Battery compartment (behind connector frame)
16 System current path
17 Memory card slot (behind connector frame)
18 Input current path
19 Type plate
20 Output current path

3.2 Approvals and standards

cULus	UL 61010-2-201 UL 121201, 9th Edition, Issue Date 2017/09/15 CSA C22.2 NO. 213, 3rd Edition, Issue Date 2017/09/15
Maritime und offshore applications	see chapter 4.6
Explosion protection	ATEX: IEC/EN 60079-0:2018, IEC/EN 60079-7:2015+A1:2018 IECEx: IEC 60079-0, 7th Edition (2017-12) + Corr. 1 (2020-01) IEC 60079-7, Edition 5.1 (2017-08)
EMC	IEC 61000 (partial standards according to the requirements of IEC 61131-2)
PLC	IEC 61131-2

3.3 Connector PG 1.5 mm

A connector 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 (wiring see section 6.3).



Connector PG 1.5 mm with four conductor connections

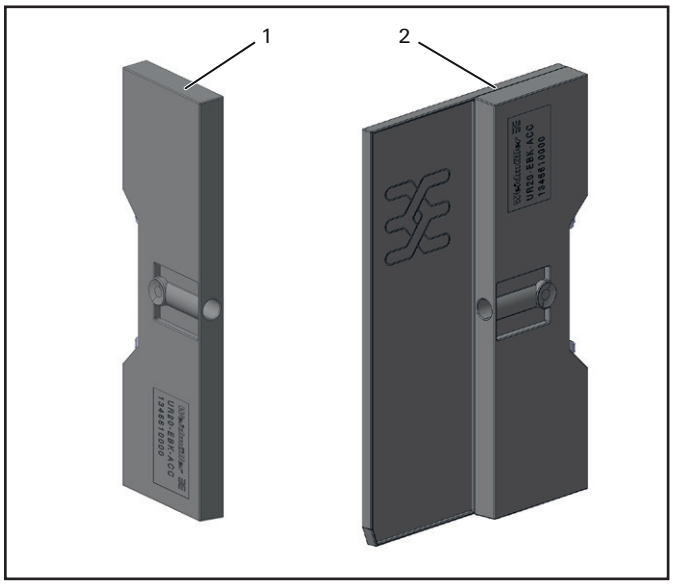
- conductor cross-section 0.14 to 1.5 mm² (AWG 16 – 26)
- max. ampacity: 10 A
- 4-pole

The pushers are colour-coded for the following connections:

White	Signal DC or AC
Blue	GND
Red	24 V DC
Green	Functional earth (FE)
Black	Signal AC

3.4 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 this cover plate the second end bracket is inserted and screwed to the mounting rail. Every u-control controller is supplied with a termination kit.



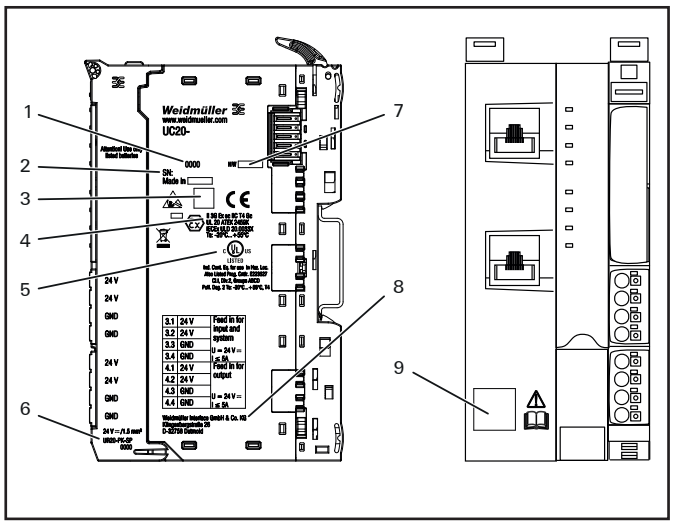
u-control station fixing elements

1 End bracket (left end, on the controller side)
2 Termination kit with end plate and end bracket (right end)

For vertical installation, a special end bracket (Order No. 1805610000 MEW 35/1) must also be installed below the station.

3.5 Type plate

Each controller features a type plate, which includes identification information and the key technical specifications. 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)

1 Product number (Order No.)
2 Serial number
3 Manufacturing code
4 ATEX and IECEx marking
5 Logos of certification bodies
6 Replacement part order number
7 Hardware version
8 Manufacturer
9 QR code for documentation

3.6 RTC Battery

The controller is equipped with a RTC battery (Real Time Clock). The battery continues to supply the integrated real-time clock if the power supply is interrupted. For battery specification see technical data.

3.7 Memory card

The controller can be equipped with a microSD card (for specification see technical data).

It is not recommended to frequently write on the internal memory of the controller, as this can reduce the expected lifetime. Use the microSD card, e. g. if applications of the controller frequently write to a persistent memory.

- The microSD card is automatically mounted if formatted as FAT32.
- The available memory of the microSD card is displayed in the u-OS Control Center.
- The microSD card is mounted under the following paths:
  - /run/media/<Devicename>
    (Example: /run/media/mmcblk0p1)
  - /run/media/<partition-label>-<Devicename>
    (Example: /run/media/mysdcard-mmcblk0p1)

4 Configuration

4.1 Connectable u-remote I/O modules

The release notes concerning the controllers describe which u-remote modules at which firmware version are supported. The release notes are available to download from the Weidmüller website.

► Please regard the information in the release notes.

4.2 Order and arrangement of the modules

The u-control station is designed to be installed on a DIN rail (35 × 7.5 mm or 35 x 15 mm) made from steel or galvanised steel according to EN 60715.

– A u-remote station may be built up to a maximum length of 1 m. Therefore at most 82 modules (including max. 64 active modules) can be aligned on a controller.

A u-control station may only be installed in this sequence (starting from the left/bottom):
– End bracket
– Controller
– 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 safe power-feed modules

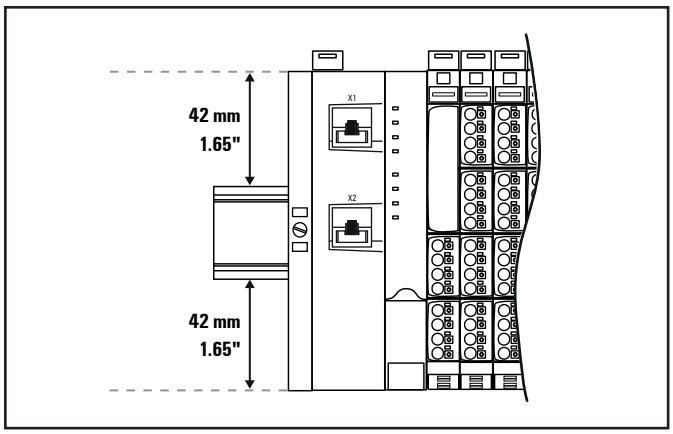
A safe power-feed module PF-O-xDI-SIL module can be positioned anywhere in the u-control station. All of the following output modules (except for the UR20-4RO-CO-255 and UR20-4RO-SSR-255 relay modules) up to the next PF-O module will be safely disconnected (safety segment). Multiple PF-O-xDI-SIL modules/safety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

When using safe power-feed modules, please also observe the **Modules for Functional Safety Manual.**

The manual is available to download from the Weidmüller website.

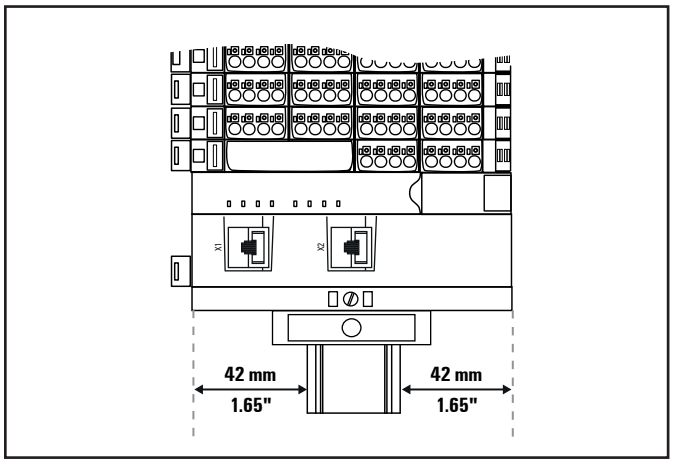
4.3 Orientation of the station

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



Installation position of the u-control 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 4.8).
In the case of vertical mounting, the controller 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-control station on the DIN rail (vertical installation)

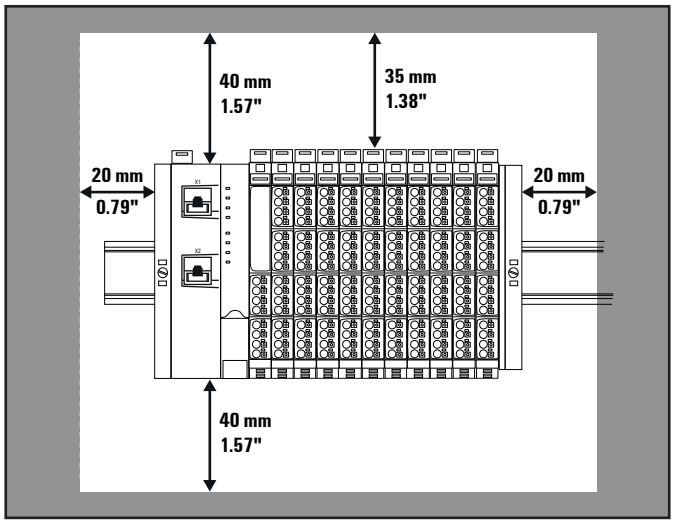
4.4 Installation distances

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

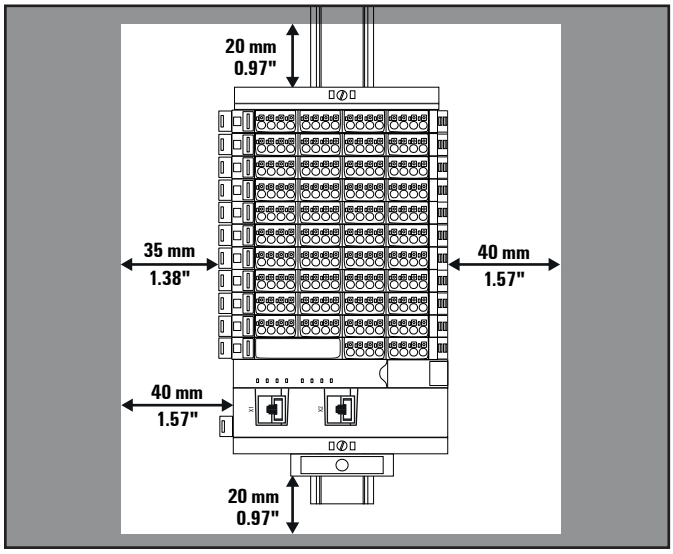
ATTENTION

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

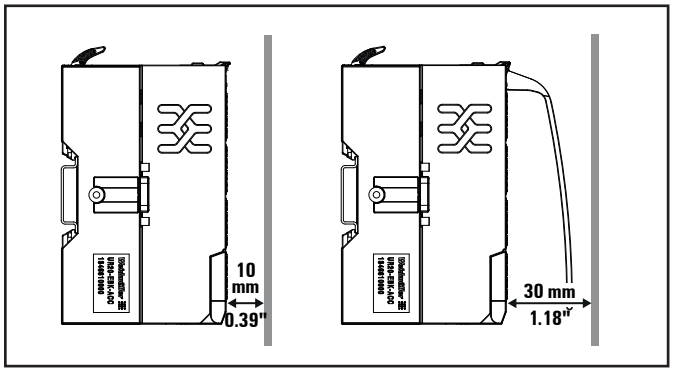
The minimum permissible conductor bending radii must also be observed. Earth terminals already installed can be ignored when calculating the distance.



Minimum distances for horizontal installation



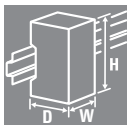
Minimum distances for vertical installation



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

Calculation of space requirements

The space requirements for a u-control station with n modules (**horizontal installation**) is calculated as follows:



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

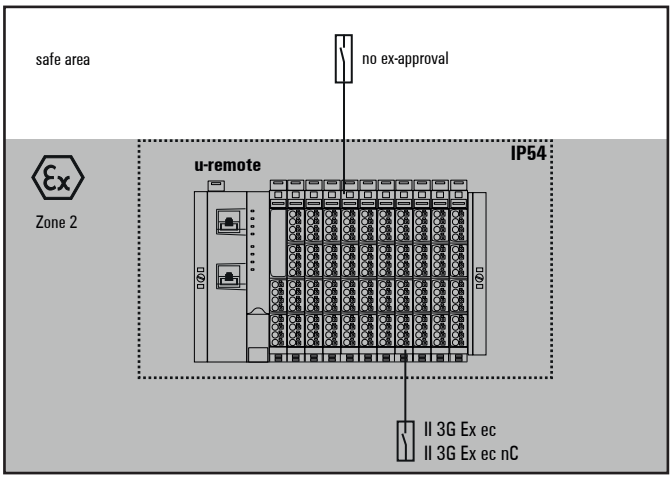
Width: 8 mm (1.57") end bracket
+ 52 mm (2.05") controller
+ n x 11.5 mm (0.45") n modules
+ 11.5 mm (0.45") end plate and end bracket
+ 2 x 20 mm (0.79") distances to the sides
= **111.5 mm (4.39") + n x 11.5 mm (0.45")**

For **vertical installation** please interchange height and width. When calculating the width, 12.5 mm / 0.49" must be added for the end bracket MEW 35/1 (Order No. 1805610000).

4.5 Use in a potentially explosive atmosphere

Please regard the safety notes in section 2.3.

If the u-control 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 degree of protection 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 (internal certification)

Ⓔx II 3 G Ex nA IIC T4 Gc
WI 13ATEX0002 X
Ta: -20 °C ... +55 °C

ATEX marking (external certification)

Ⓔx II 3 G Ex ec IIC T4 Gc
UL 20 ATEX 2459X
Ta: -20 °C ... +55 °C

IECEx marking

Ex ec IIC T4 Gc
IECEx ULD 20.0033X

Calculation of power loss for the use in a potentially explosive atmosphere

You will find the module specific data needed for calculation in the document "WI13ATEX0002_Power_Calc.pdf" which you can download from the Weidmüller Support Center.

4.6 Use in maritime and offshore applications

The UC20 products described in this manual comply with the requirements of the classification society DNV. These products are approved for the usage in maritime and offshore applications. The certificates including the particular location classes are available for download from the Weidmüller website.

Please regard the following in the case of maritime or offshoreapplications:
- The permissible temperature range can be found in the respective certificate.
- For products with maritime approval, a supply voltage range of 24 V DC +30 %/–25 % applies.
- The lower limit for the supply voltage is 18.0 V. For the UC20 products to function properly, the voltage drop on the current paths must not exceed 0.75 V.
- If you want to operate the controller with a microSD card, you must use the SD-CARD-8GB (Order No. 2684400000) to ensure compliance with maritime EMC requirements.

For information on the maximum number of u-remote modules that can be connected in series without further power supply, please refer to the u-remote manual.

Installation with maritime and offshore applications

For vibrations up to a maximum of 0.7 g:
The u-control station can be mounted on a 35x7.5 mm or a 37x15 mm DIN rail. Up to 64 UR20 modules can be installed in one station.

For vibrations above 0.7 g up to a maximum of 4 g:
The u-control station must be mounted on a 35x7.5 mm DIN rail with mounting plate. Up to 50 UR20 modules can be installed in one station.

4.7 "PUSH IN" system cabling

Controllers 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. Copper wires 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)

4.8 Current demand and power supply

A station consisting of the UC20 controller and the connected UR20 modules is supplied via three internal power paths:

The **I_{SYS} system current path** supplies the communication part of the I/O modules; it is fed from the controller input supply and cannot be interrupted by any module. The maximum current-carrying capacity of I_{SYS} allows a u-control 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 controller), 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 connected I_L 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 controller), 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.

Another internal power path in the UC20 controller supplies the CPU, SD card, RTC and RJ45 interfaces. The NV-RAM is not supplied via this power path, see block diagrams in Chapter 5.

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:

Temperature-dependent values for the power supply

	horizontal	vertical
Controller power supply	55 °C / 2 x 5 A	50 °C / 2 x 5 A
Power-feed module power supply	55 °C / 1 x 10 A	50 °C / 1 x 10 A

ATTENTION

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

► In order to achieve spezification according to UL 248-14 use a UL-approved Type-B automatic circuit breaker (e. g. ABB Typ S201-B16) or use a fuse with a maximum of 10 A protection (e. g. ESKA Art. Nr. 522.227).

ATTENTION

Equipment may become damaged by overcurrent!

► Auxiliary supplies as well as signal inputs and outputs may not be used for supplying the station.

Current demand

Product	I_{SYS}	I_{IN}	I_{OUT}
UC20-WL2000-AC	< 116 mA	-	-
UC20-WL2000-AC-CAN	< 116 mA	-	-
UC20-WL2000-IOT	< 116 mA	-	-

The current demand of the u-remote I/O-modules can be found in the **Remote-I/O-System u-remote Manual**.

All manuals are available to download from the Weidmüller website.

Voltage interruption

The controllers meet severity level PS1 (maximum interruption time 1 ms) according to IEC 61131-2. If you want to achieve severity level PS2 (maximum interruption time 10 ms), you must use a power supply that meets the requirements of severity level PS2.

4.9 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 UC20-WL2000-AC controller 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. The first power-feed module must always be used where the current demand exceeds 5 A, every further one after max. 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 controller 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} controller
+ (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

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 exemplary 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 5 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 + (2 A x 0.5) = 1.015 A

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

Module 7:
I = 3.03 A + (0.015 A + (3 A x 0.5) = 4,545 A

Module 8 (without power refresh):
I = 4.545 A + (0.015 A + (2 A x 0.5) = **5,56 A**

Therefore the available 5 A would be exceeded. As a result, a PF-O power-feed module must be positioned before the 8th module, which will supply 10 A again. The calculation of current consumption is repeated for each power-feed module. Unused current values may not be included.

Module 8 (as per PF-O):
I = (0.015 A + (2 A x 0.5) = 1.015 A

Module 9 (as per PF-O):
I = 1,015 A + (0.015 A + (1,2 A x 0.5) = 1,63 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 demand of the input current path	Cumulative current demand of the controller output power path	Cumulative current demand of the PF-O output power path
	UC20-WL2000-AC	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	0.640	**4.545**	
	UR20-PF-O									
8	UR20-8DO-P	0.008		0.015		2	0.5	0.648		1.015
9	UR20-8DO-P	0.008		0.015		1.2	0.5	0.656		1.63
10	UR20-8DO-P	0.008		0.015		4	0.5	0.664		**3.645**
	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		4.03

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 5 A! The output current path must therefore be refreshed **before the 8th module**.

10 A is supplied by the UR20-PF-O module. The 0.455 A calculated as remaining after the 7th module must **not** be added to the 10 A after the UR20-PF-O module!

4.10 Calculation of power loss

The power loss of the controller is calculated as follows:

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

P_0	Static power loss in the controller	24 V * I_{SYS}
I_{SYS}	Current consumption from the system current path	See table "Current demand" in section 4.8
N	Number of modules	
P_{mod}	Power loss due to module supply from the system current path	0.02 W
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-control station is calculated using the power loss of the controller 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 (P_{module}) of 2 watts for the modules.

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

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

Calculation of power loss for the use in a potentially explosive atmosphere

You will find the module specific data needed for calculation in the document "WI13ATEX0002_Power_Calc.pdf" which you can download from the Weidmüller Support Center.

4.11 Feedback energy in DO modules

With digital output modules, power is fed back through the channels when inductive loads are switched off. The respective permissible breaking energy is noted in the technical data of the DO modules. Depending on the switching frequency the breaking energy leads to additional energy loss in the output module.

Observe the specifications in the **Remote-I/O-System u-remote Manual**.

All manuals are available to download from the Weidmüller website.

If the maximum permissible output power loss of a module is exceeded, the module shuts down temporarily.

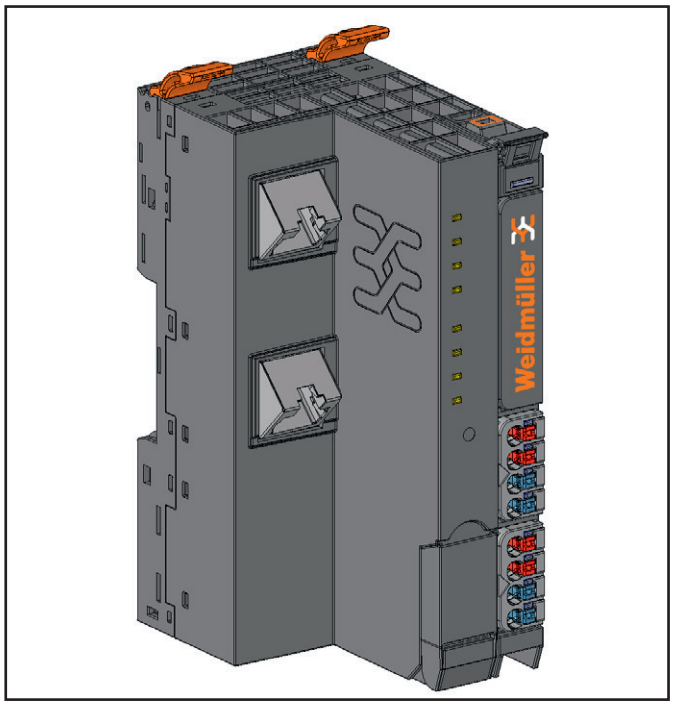
Feedback energy can be prevented by installing external free-wheeling protection. With it, the same switching rate can be achieved with an inductive load as with a resistive load.

5 Detail description of controllers

5.1 UC20-WL2000-AC

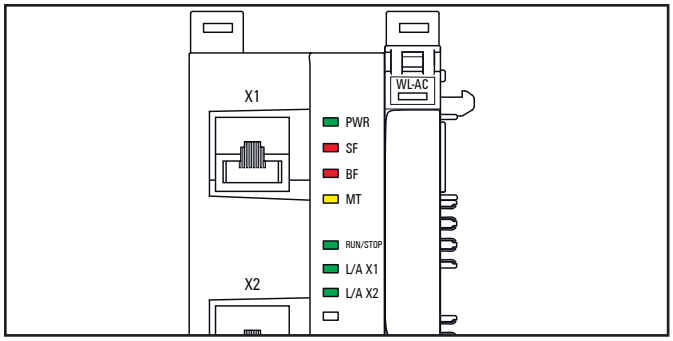
Up to 64 active u-remote modules can be connected via the u-remote system bus to the UC20-WL2000-AC controller. The controller has two Ethernet connections for integration into the existing network architecture or HMI connections. The integrated engineering tool u-create web can be launched via the USB service interface or over Ethernet. An upgrade to the integrated operating system u-OS can be carried out via u-create web. In u-create web or in u-OS, the u-control station can be configured and parametrised. u-create web supports programming according to IEC 61131-3 and JavaScript through Node-RED. With u-OS, programming is supported depending on the installed apps, e.g. CODESYS or Node-RED.
The station's main power supply is integrated into the controller. Power is supplied via two 4-pole connectors, separated into the input and output current paths.
The station can be supplied with 5 V power by the USB connection. This allows to access the web interface of the device, i.e. to update the firmware or change settings.

Certain system components like the NV-RAM or the system bus and the IO modules cannot be used if the station is supplied by USB. This can cause issues when deploying a PLC project to the device.



Controller UC20-WL2000-AC (Order no. 1334950000)

Status indicators



LED Status indicators UC20-WL2000-AC, for error messages see Chapter 13

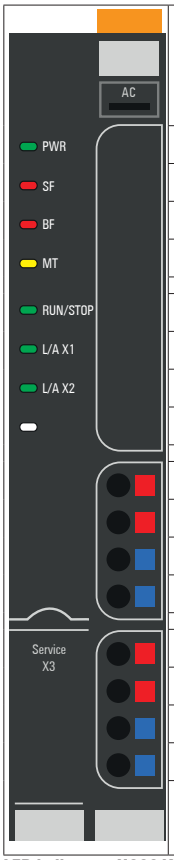
PWR	Power LED	**green**: supply voltage present, firmware is running
SF	System failure	**geen**: system is running **geen flashing**: system is booting **geen/yellow flashing**: update running **red**: system is impaired **red flashing**: kernel panic occured
BF	Bus failure	**green**: I/O bus is running **green flashing**: I/O bus currently configuring **yellow**: I/O bus configuration error **red**: I/O bus general error **red flashing**: Force mode active
MT	Maintenance	**green flashing twice:** operating system is running **red**: system is in recovery mode see RTC Diagnostics
RUN/ STOP	Controller status	**off:** no application deployed **green**: application is deployed and running **yellow**: application is deployed and stopped
L/A X1	Connection/ activity	**green**: connection of controller connection 1 with an additional field device **green/yellow flashing**: data being exchanged on connection 1
L/A X2	Connection/ activity	**green**: connection of controller connection 2 with an additional field device **green/yellow flashing**: data being exchanged on port 2

The LEDs managed by u-OS are displayed as read-only. The freely configurable LEDs (LED service) can be read and written via the Variable-NATS-API or the Variable-HTTP-API.
The LED service is not available when the system is in recovery mode.

RTC Diagnostics

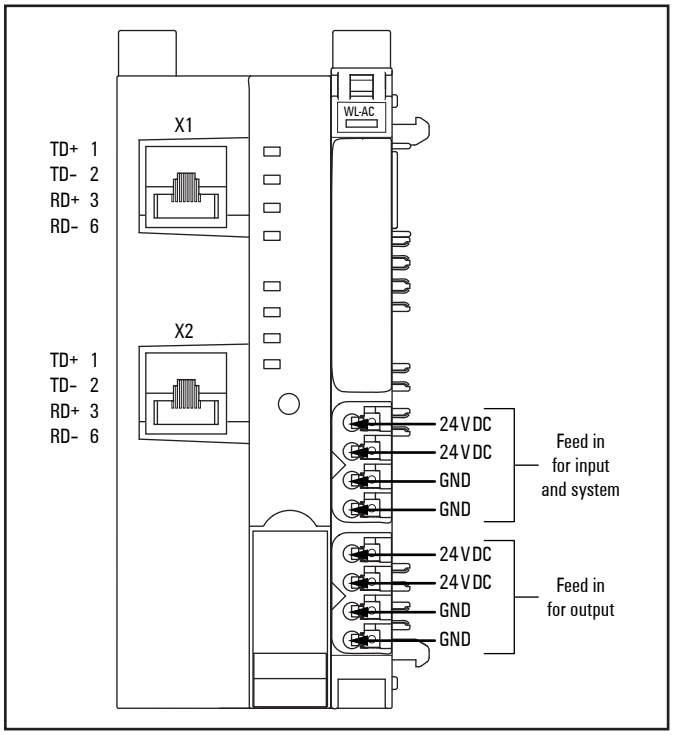
In normal mode, the device monitors the NTP status and the RTC battery voltage in order to control the Maintenance LED.

- NTP enabled: The LED is turned off, the diagnostic is OK.
- NTP disabled: The RTC battery voltage is monitored:
  - If the voltage is below the empty threshold, the LED is flashing red.
  - If the voltage is above the empty threshold, the LED is turned off.



	Controller 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 UC20-WL2000-AC, for error messages, see Chapter 13

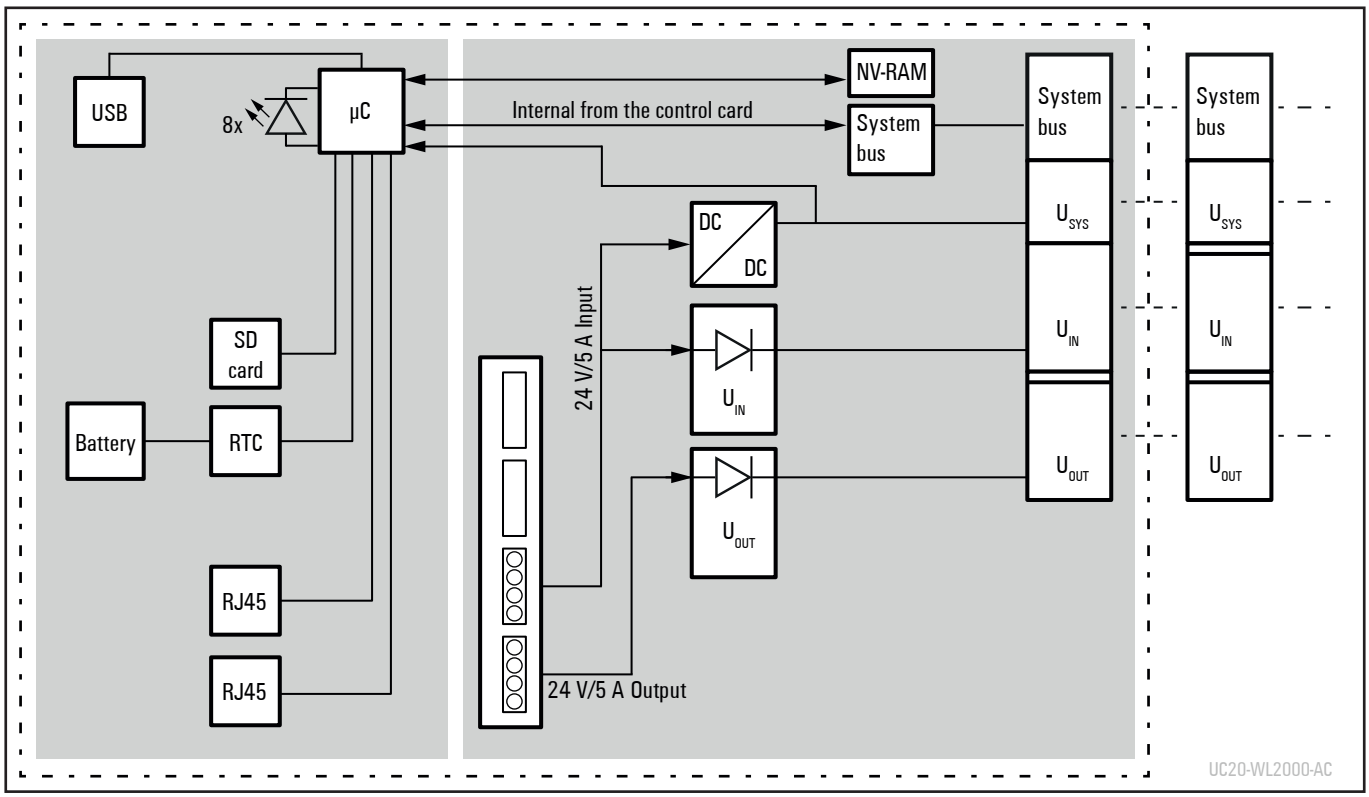


Connection diagram UC20-WL2000-AC

ATTENTION

Risk of material damage!

In the case of a maximum power supply > 3 A and a maximum temperature > +55°C, all four contacts must be connected with 1.5 mm² wiring!



Block diagram UC20-WL2000-AC

Technical data UC20-WL2000-AC (Order No. 1334950000)

General data		
Type of connection	"PUSH IN"	solid, fine-wired
		Wire cross-section 0.14 … 1.5 mm² (AWG 16 – 26)
Configuration interface	Micro USB 2.0	
Degree of protection (IEC 60529)	IP20	
Flammability rating UL 94	V-0	
System data		
Connection	2 x RJ-45	
Number of modules	max. 64 active	
Processor	Dual Core ARM A9, 624 MHz	
Memory	512 MB RAM, 8 GB flash	
Retain memory	128 KB NV-RAM	
Memory card (not included)	microSD (max. 32 GB, NTFS not supported)	
Battery (not included)	Lithium button cell CR1220	
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	5 A	
Max. feed-in current for output modules	5 A	
Current consumption from system current path I_{SYS}	< 116 mA	
Mechanical data		
Dimensions	Height x Width x Depth	120.0 mm / 4.72" (with release lever: 128.0 mm / 5.04") x 52.0 mm / 2.05" x 76.0 mm / 2.99"
Weight (operational status)	223 g	
Environmental conditions		
Temperature data	Operation (horizontal installation) at 24 V DC +20%/-15%	-20°C to +55°C (2×5 A power supply)
	Operation (vertical installation) at 24 V DC +20%/-15%	-20°C to +50°C (2×5 A power supply)
	Storage, transport	-40°C to +85°C
Humidity	Operations	95%, non-condensing according to IEC 61131-2
	Storage, transport	95%, non-condensing according to IEC 61131-2
Air pressure	Operations	≥ 795 hPa (altitude ≤ 2000 m) according to IEC 61131-2
	Storage, transport	≥ 700 hPa (altitude ≤ 3000 m) according to IEC 61131-2

Technical data UC20-WL2000-AC (Order No. 1334950000)

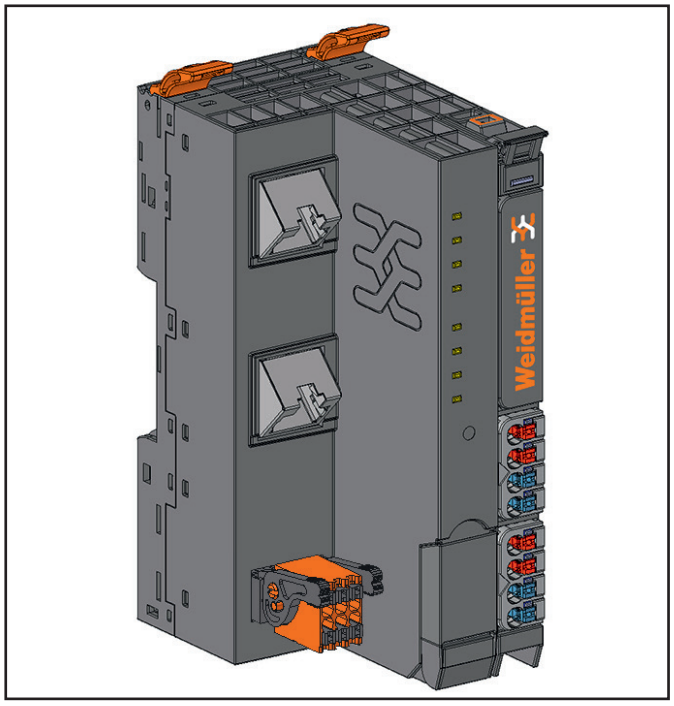
Tests		
Vibration resistance	5 Hz ≤ f ≤ 8.4 Hz: 3.5 mm amplitude as per IEC 60068-2-6 8.4 Hz ≤ f ≤ 150 Hz: 1 g acceleration as per IEC 60068-2-6	
Shock resistance	15g over 11ms, half sine wave, as per IEC 60068-2-27	
Potential isolation	Test voltage	max. 28.8 V inside a channel 500 V DC field/system (according to EN 60079-15:2010)
	Pollution degree	2 (according to DIN EN 60664-1:2008)
	Overvoltage category	II (according to DIN EN 50178)

Currently u-create web does not support retain variables but variables in the data storage. The values of the variables in the data storage are stored in the flash memory.
Please observe the release notes for the controller.

5.2 UC20-WL2000-AC-CAN

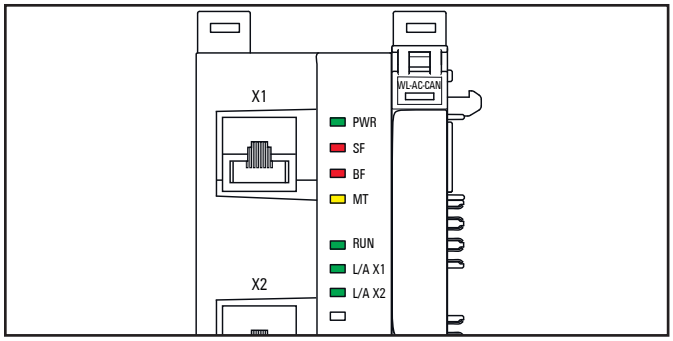
Up to 64 active u-remote modules can be connected via the u-remote system bus to the UC20-WL2000-AC-CAN controller. The controller has two Ethernet connections for integration into the existing network architecture or HMI connections. The CAN interface can be used with the operating system u-OS.
The operating system u-OS can be launched via the USB service interface or over Ethernet. With u-OS, the u-control station can be configured and its functions expanded with additional apps.
The station's main power supply is integrated into the controller. Power is supplied via two 4-pole connectors, separated into the input and output current paths.
The station can be supplied with 5 V power by the USB connection. This allows to access the web interface of the device, i.e. to update the firmware or change settings.

Certain system components like the NV-RAM or the system bus and the IO modules cannot be used if the station is supplied by USB. This can cause issues when deploying a PLC project to the device.



Controller UC20-WL2000-AC-CAN (Order No. 2928020000)

Status indicators



LED status indicators UC20-WL2000-AC-CAN, for error messages see Chapter 13

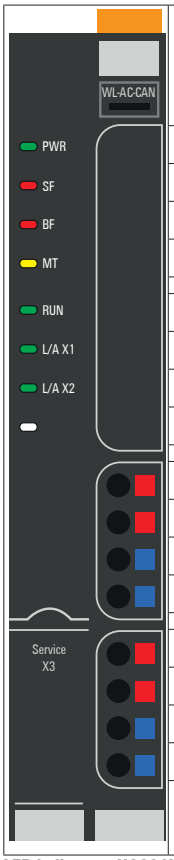
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L/A X1	Connection/ activity	**green**: connection of controller connection 1 with an additional field device **green/yellow flashing**: data being exchanged on connection 1
L/A X2	Connection/ activity	**green**: connection of controller connection 2 with an additional field device **green/yellow flashing**: data being exchanged on port 2

The LEDs managed by u-OS are displayed as read-only. The freely configurable LEDs (LED service) can be read and written via the Variable-NATS-API or the Variable-HTTP-API.
The LED service is not available when the system is in recovery mode.

RTC Diagnostics

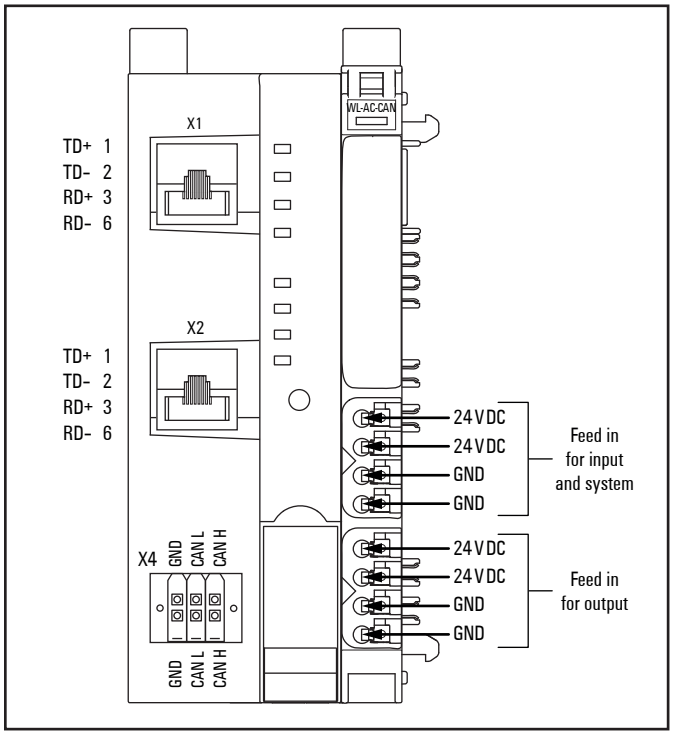
In normal mode, the device monitors the NTP status and the RTC battery voltage in order to control the Maintenance LED.

- NTP enabled: The LED is turned off, the diagnostic is OK.
- NTP disabled: The RTC battery voltage is monitored:
  - If the voltage is below the empty threshold, the LED is flashing red.
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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 UC20-WL2000-AC-CAN, for error messages see Chapter 13

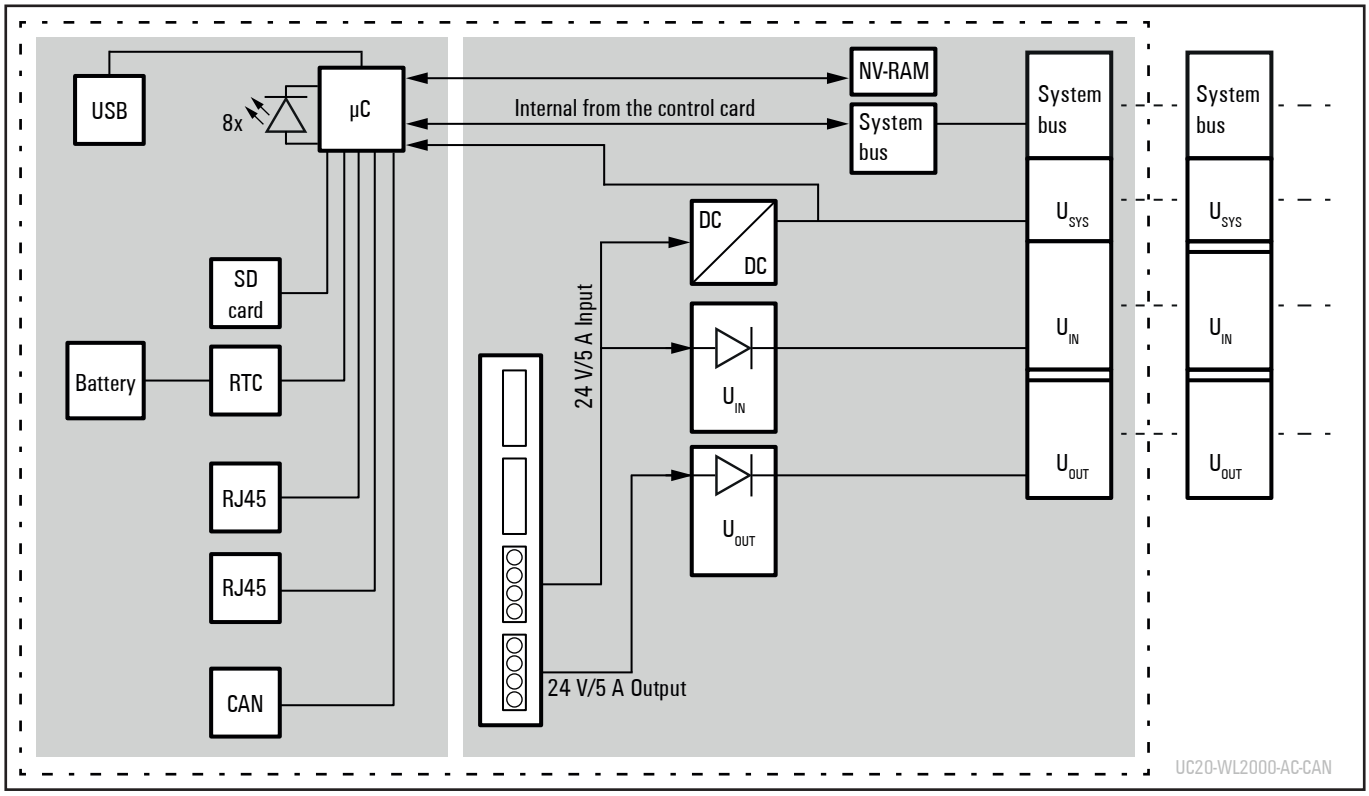


Connection diagram UC20-WL2000-AC-CAN

ATTENTION

Risk of material damage!

In the case of a maximum power supply > 3 A and a maximum temperature > +55°C, all four contacts must be connected with 1.5 mm² wiring!



Block diagram UC20-WL2000-AC-CAN

Technical data UC20-WL2000-AC-CAN (Order No. 2928020000)

General data		
Type of connection	"PUSH IN"	solid, fine-wired
		Wire cross-section 0.14 … 1.5 mm² (AWG 16 – 26)
Configuration interface	Micro USB 2.0	
Degree of protection (IEC 60529)	IP20	
Flammability rating UL 94	V-0	
System data		
Connection	2 x RJ-45, 1 x CAN interface	
Number of modules	max. 64 active	
Processor	Dual Core ARM A9, 624 MHz	
Memory	512 MB RAM, 8 GB flash	
Retain memory	128 KB NV-RAM	
Memory card (not included)	microSD (max. 32 GB, NTFS not supported)	
Battery (not included)	Lithium button cell CR1220	
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	5 A	
Max. feed-in current for output modules	5 A	
Current consumption from system current path I_{sys}	< 116 mA	
Mechanical data		
Dimensions	Height x Width x Depth	120.0 mm / 4.72" (with release lever: 128.0 mm / 5.04") x 52.0 mm / 2.05" x 76.0 mm / 2.99"
Weight (operational status)	223 g	
Environmental conditions		
Temperature data	Operation (horizontal installation) at 24 V DC +20%/-15%	-20°C to +55°C (2×5 A power supply)
	Operation (vertical installation) at 24 V DC +20%/-15%	-20°C to +50°C (2×5 A power supply)
	Storage, transport	-40°C to +85°C
Humidity	Operations	95%, non-condensing according to IEC 61131-2
	Storage, transport	95%, non-condensing according to IEC 61131-2
Air pressure	Operations	≥ 795 hPa (altitude ≤ 2000 m) according to IEC 61131-2
	Storage, transport	≥ 700 hPa (altitude ≤ 3000 m) according to IEC 61131-2

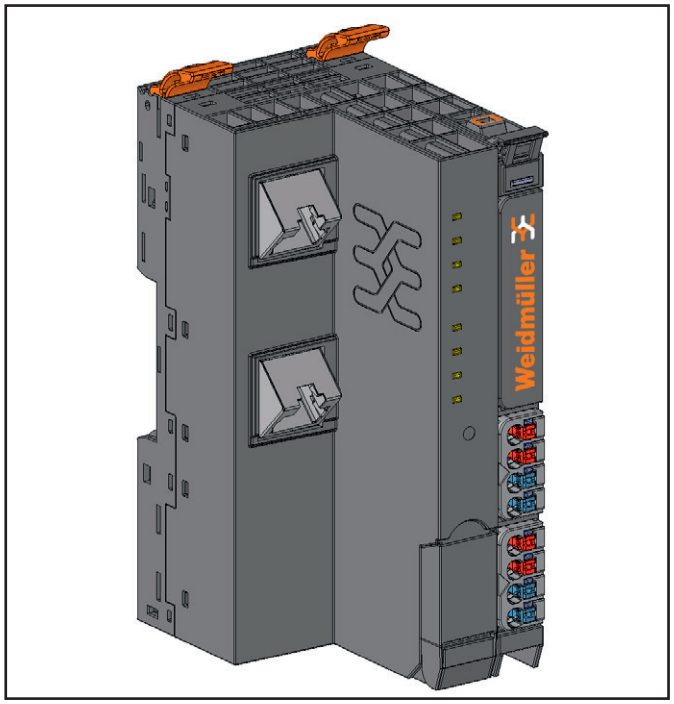
Technical data UC20-WL2000-AC-CAN (Order No. 2928020000)

Tests		
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	15g over 11ms, half sine wave, as per IEC 60068-2-27	
Potential isolation	Test voltage	max. 28.8 V inside a channel 500 V DC field/system (according to EN 60079-15:2010)
	Pollution degree	2 (according to DIN EN 60664-1:2008)
	Overvoltage category	II (according to DIN EN 50178)

5.3 UC20-WL2000-IOT

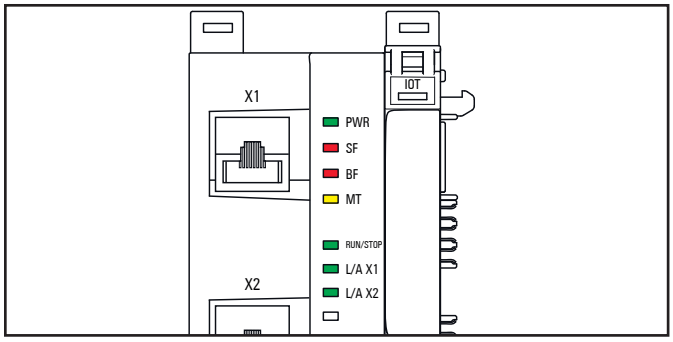
Up to 64 active u-remote modules can be connected via the u-remote system bus to the UC20-WL2000-IOT controller. The controller has two Ethernet connections for integration into the existing network architecture or HMI connections. The integrated engineering tool u-create web can be launched via the USB service interface or over Ethernet. In u-create web, the u-control station can be configured and parametrised and control applications can be programmed (programming language: JavaScript by Node-RED).
The station's main power supply is integrated into the controller. Power is supplied via two 4-pole connectors, separated into the input and output current paths.
The station can be supplied with 5 V power by the USB connection. This allows to access the web interface of the device, i.e. to update the firmware or change settings.

Certain system components like the NV-RAM or the system bus and the IO modules cannot be used if the station is supplied by USB. This can cause issues when deploying a PLC project to the device.



Controller UC20-WL2000-IOT (Order no. 1334990000)

Status indicators



LED Status indicators UC20-WL2000-IOT, for error messages see Chapter 13

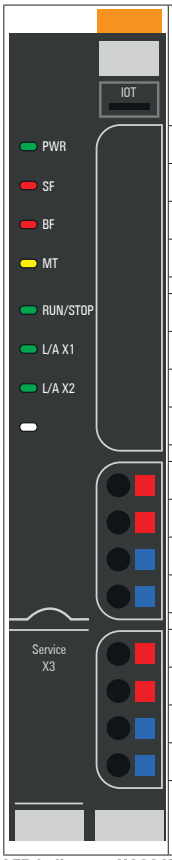
PWR	Power LED	**green**: supply voltage present, firmware is running
SF	System failure	**geen**: system is running **geen flashing**: system is booting **geen/yellow flashing**: update running **red**: system is impaired **red flashing**: kernel panic occured
BF	Bus failure	**green**: I/O bus is running **green flashing**: I/O bus currently configuring **yellow**: I/O bus configuration error **red**: I/O bus general error **red flashing**: Force mode active
MT	Maintenance	**green flashing twice:** operating system is running **red**: system is in recovery mode see RTC Diagnostics
RUN/ STOP	Controller status	**off:** no application deployed **green**: application is deployed and running
L/A X1	Connection/ activity	**green**: connection of controller connection 1 with an additional field device **green/yellow flashing**: data being exchanged on connection 1
L/A X2	Connection/ activity	**green**: connection of controller connection 2 with an additional field device **green/yellow flashing**: data being exchanged on port 2

The LEDs managed by u-OS are displayed as read-only. The freely configurable LEDs (LED service) can be read and written via the Variable-NATS-API or the Variable-HTTP-API.
The LED service is not available when the system is in recovery mode.

RTC Diagnostics

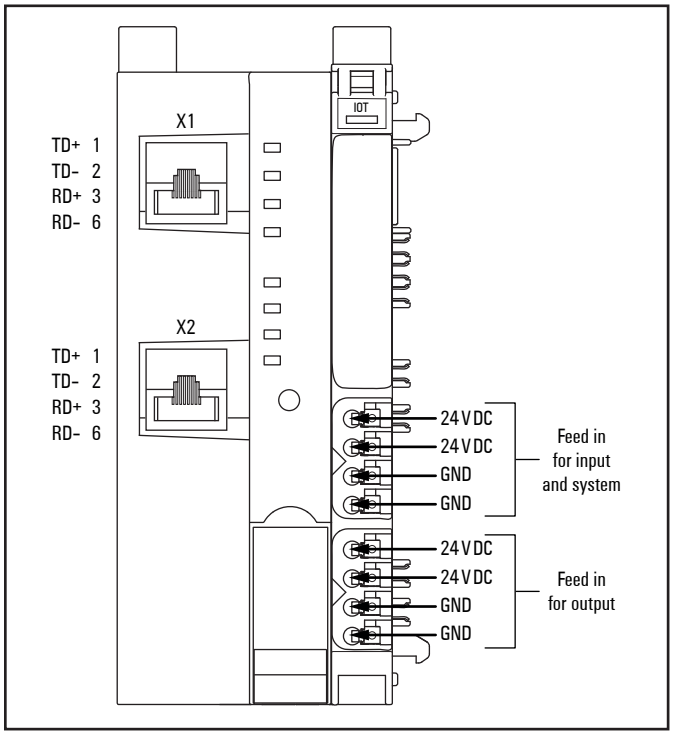
In normal mode, the device monitors the NTP status and the RTC battery voltage in order to control the Maintenance LED.

- NTP enabled: The LED is turned off, the diagnostic is OK.
- NTP disabled: The RTC battery voltage is monitored:
  - If the voltage is below the empty threshold, the LED is flashing red.
  - If the voltage is above the empty threshold, the LED is turned off.



	Controller 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 UC20-WL2000-IOT, for error messages see Chapter 13

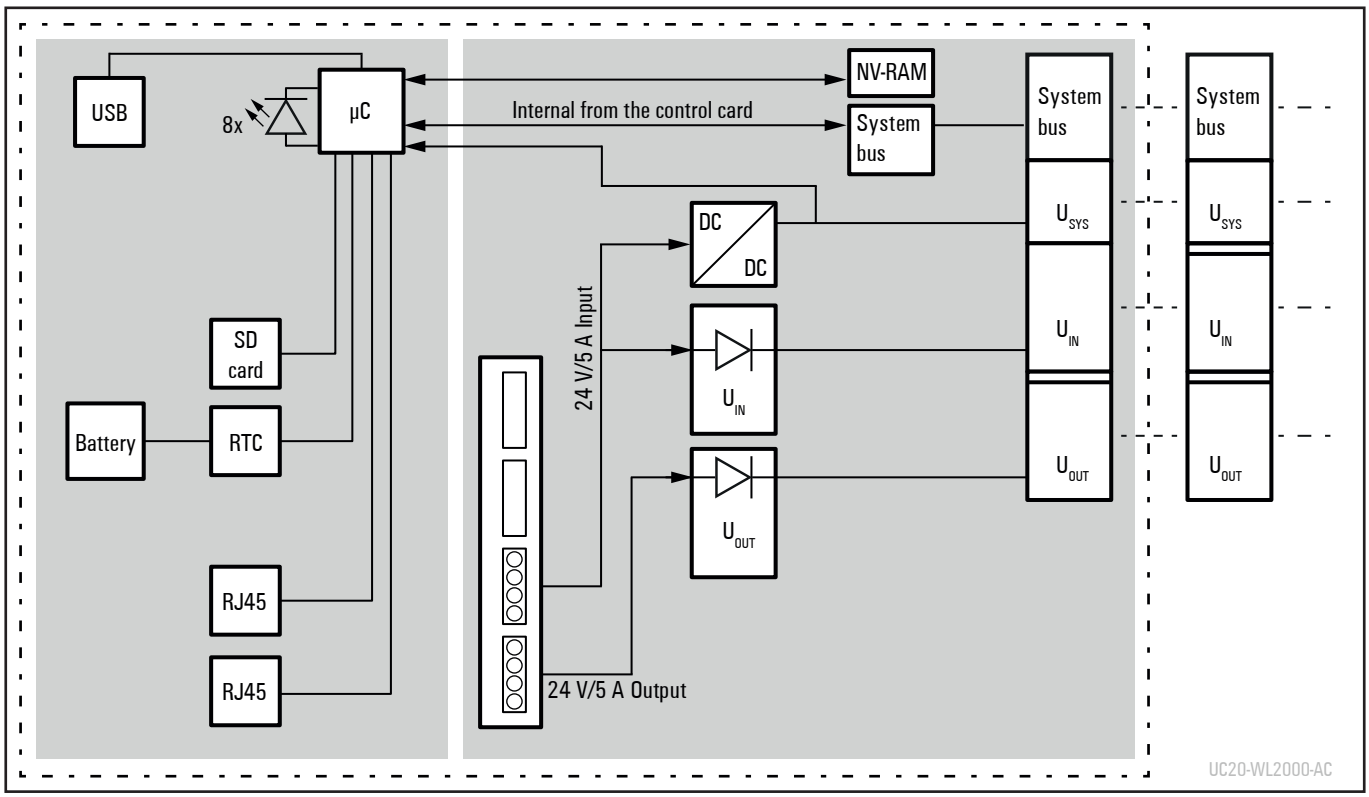


Connection diagram UC20-WL2000-IOT

ATTENTION

Risk of material damage!

In the case of a maximum power supply > 3 A and a maximum temperature > +55°C, all four contacts must be connected with 1.5 mm² wiring!



Block diagram UC20-WL2000-IOT

Technical data UC20-WL2000-IOT (Order No. 1334990000)

General data		
Type of connection	"PUSH IN"	solid, fine-wired
		Wire cross-section 0.14 … 1.5 mm2 (AWG 16 – 26)
Configuration interface	Micro USB 2.0	
Degree of protection (IEC 60529)	IP20	
Flammability rating UL 94	V-0	
System data		
Connection	2 x RJ-45	
Number of modules	max. 64 active	
Processor	Dual Core ARM A9, 624 MHz	
Memory	512 MB RAM, 8 GB flash	
Retain memory	128 KB NV-RAM	
Memory card (not included)	microSD (max. 32 GB, NTFS not supported)	
Battery (not included)	Lithium button cell CR1220	
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	5 A	
Max. feed-in current for output modules	5 A	
Current consumption from system current path I_{sys}	< 116 mA	
Mechanical data		
Dimensions	Height x Width x Depth	120.0 mm / 4.72" (with release lever: 128.0 mm / 5.04") x 52.0 mm / 2.05" x 76.0 mm / 2.99"
Weight (operational status)	223 g	
Environmental conditions		
Temperature data	Operation (horizontal installation) at 24 V DC +20%/-15%	-20°C to +55°C (2×5 A power supply)
	Operation (vertical installation) at 24 V DC +20%/-15%	-20°C to +50°C (2×5 A power supply)
	Storage, transport	-40°C to +85°C
Humidity	Operations	95%, non-condensing according to IEC 61131-2
	Storage, transport	95%, non-condensing according to IEC 61131-2
Air pressure	Operations	≥ 795 hPa (altitude ≤ 2000 m) according to IEC 61131-2
	Storage, transport	≥ 700 hPa (altitude ≤ 3000 m) according to IEC 61131-2

Technical data UC20-WL2000-IOT (Order No. 1334990000)

Tests		
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	15g over 11ms, half sine wave, as per IEC 60068-2-27	
Potential isolation	Test voltage	max. 28.8 V inside a channel 500 V DC field/system (according to EN 60079-15:2010)
	Pollution degree	2 (according to DIN EN 60664-1:2008)
	Overvoltage category	II (according to DIN EN 50178)

Currently u-create web does not support retain variables but variables in the data storage. The values of the variables in the data storage are stored in the flash memory.
Please observe the release notes for the controller.

6 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-control 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!

6.1 Preparations for assembly

The controller is designed for installation in switch cabinets, terminals or switch boxes in decentralised systems. The controller and I/O modules conform to degree of protection IP20.

Environmental conditions

Make sure that the permitted environmental conditions for installation and operation are observed (see the technical data in chapter 5).

DIN rail

The controller is designed to be installed on a DIN rail (35 × 7.5 mm or 35 x 15 mm) made from steel or galvanised steel according to EN 60715. The DIN rail must be mounted prior to the installation of the controller.

The DIN rail must be attached to the surface at least every 20 cm to protect it from vibration and impact. If it 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 6.3.

Unpacking the delivery

- ► Please check the delivery for completeness and transport damage.
- ► Please report any transport damage immediately to the respective transport company.



ATTENTION

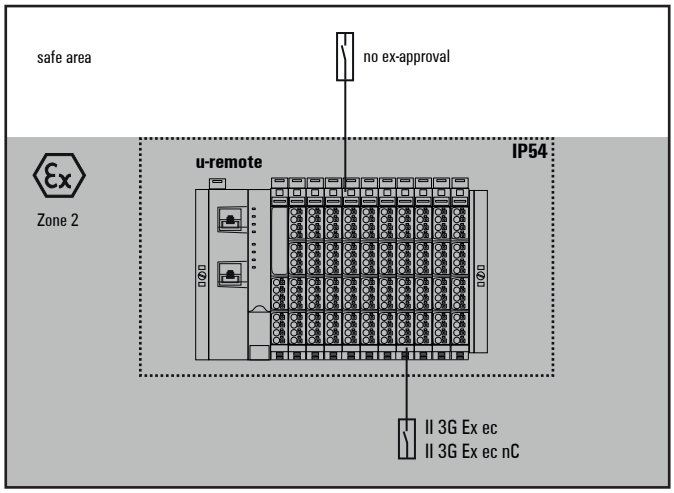
The product can be destroyed by electrostatic discharge!
The components can be destroyed by electrostatic discharge.
- ► Please make sure that personnel and work equipment are adequately earthed!

- ► 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 controllers can be sent for paper recycling.

Use in a potentially explosive atmosphere

Please regard the safety notes in section 2.3.

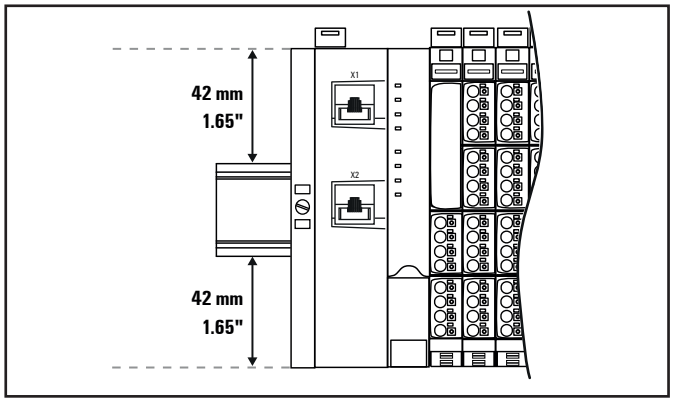
If the u-control station is used in a potentially explosive atmosphere rated as Zone 2, the housing must meet the requirements of explosion protection type Ex n or Ex e and degree of protection IP54. Sensors and actuators that are located in Zone 2 or in a safe zone can be connected. All cable glands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



Use in a potentially explosive atmosphere

Installation position

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



Installation position of the u-control 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 4.8).

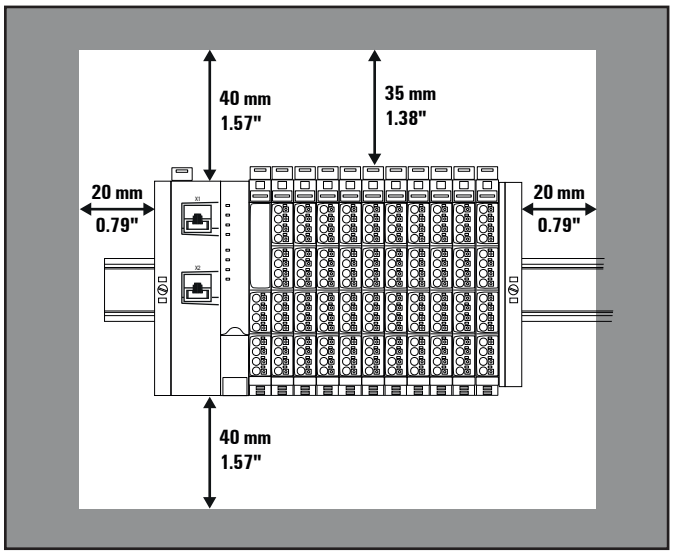
In the case of vertical mounting, the controller must always be arranged as the first module at the bottom and secured with a reinforced end bracket for vertical mounting (Order no. 1805610000).

Installation distances

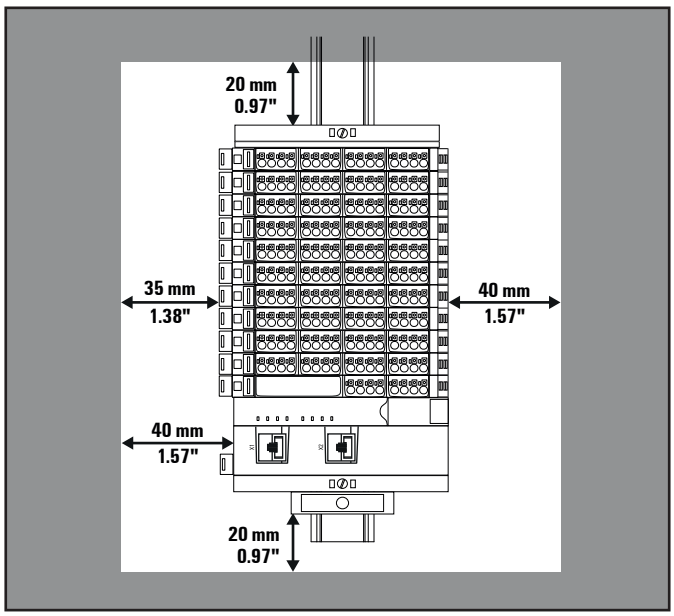
Depending on how the station shielding is implemented, the specified distances may have to be larger than those given below.

Ensure compliance with the minimum permissible cable bending radius.

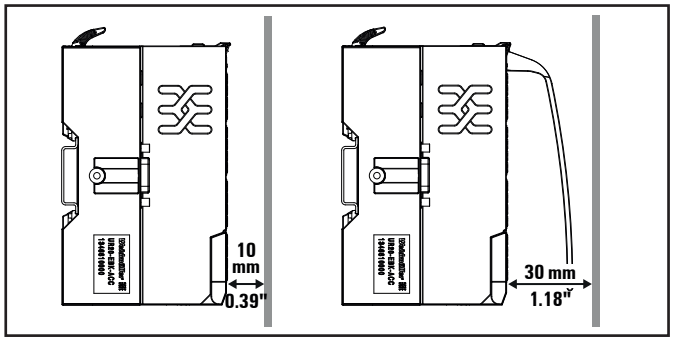
In order to be able to carry out the installation and further maintenance work and to ensure sufficient ventilation, the u-control station must be installed while observing the following minimum distances. Earth terminals already installed can be ignored when calculating the distance.



Minimum distances with horizontal installation



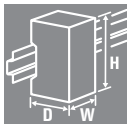
Minimum distances with vertical installation



Minimum distance to switch cabinet door (with/without swivel marker)

Calculation of space requirements

The space requirements for a u-control station with n modules (**horizontal installation**) is calculated as follows:



Height:	120 mm (4.72″)	
	+ 2 × 40 mm (1.57″)	distances at top and bottom
	= **200 mm (7.87″)**	
Width:	8 mm (1.57″)	end bracket
	+ 52 mm (2.05″)	controller
	+ n × 11.5 mm (0.45″)	n modules
	+ 11.5 mm (0.45″)	end plate and end bracket
	+ 2 × 20 mm (0.79″)	distances to the sides
	= **111.5 mm (4.39″) + n × 11.5 mm (0.45″)**	

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 (Order No. 1805610000).

Installation sequence

A u-control station may only be installed in this sequence (starting from the left/bottom):

- End bracket
- Controller
- 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 4.8)!
- 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 safe power-feed modules

A safe power-feed module (PF-O-xDI-SIL) can be positioned anywhere in the u-control station. All of the following output modules up to the next PF-O module will be safely disconnected (safety segment). Multiple safe power-feed modules/ safety segments can be set up in a single station.

When using u-remote safe power-feed 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-control 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.

6.2 Assembling the u-control 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-control 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

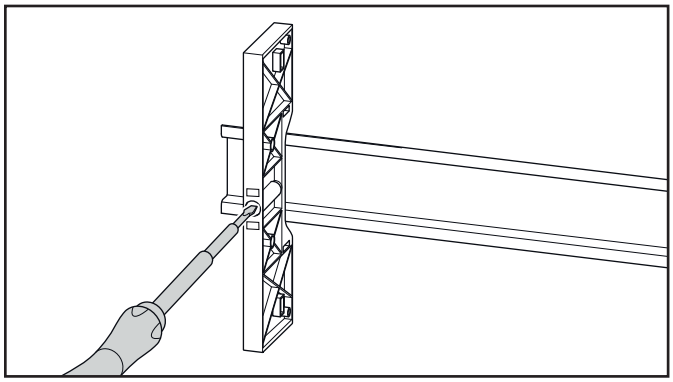
The product can be destroyed by electrostatic discharge!

The components in the u-control series can be destroyed by electrostatic discharge.

► Please make sure that personnel and work equipment are adequately earthed!

Please note that for failure-free operation the end brackets delivered with the controller have to be installed necessarily to achieve a permanent set of the u-control station.

► 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 u-control products and 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.

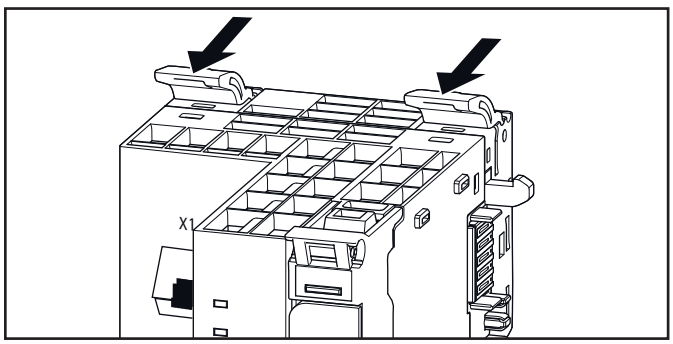
The modules are in the correct position and the connection is made only when both snapping noises are heard.

ATTENTION

Improper installation may prevent earthing!

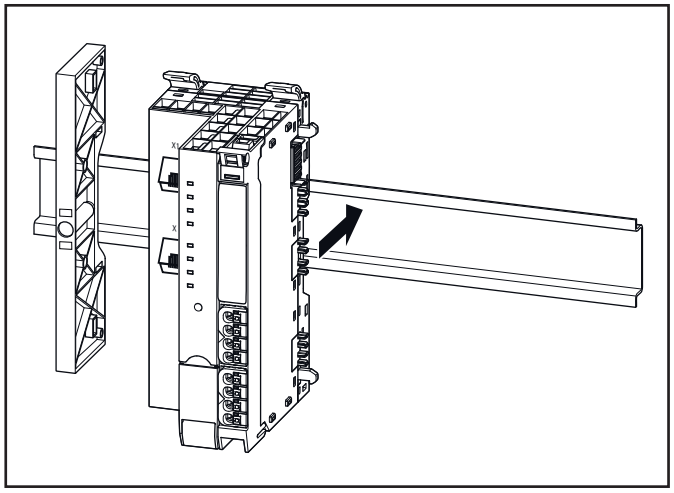
The earthing of the controller and modules is only ensured if the FE spring at the bottom is in contact with the DIN rail.

► During installation, make sure that both release levers on the controller and all release levers on the modules are closed before snapping onto the DIN rail.



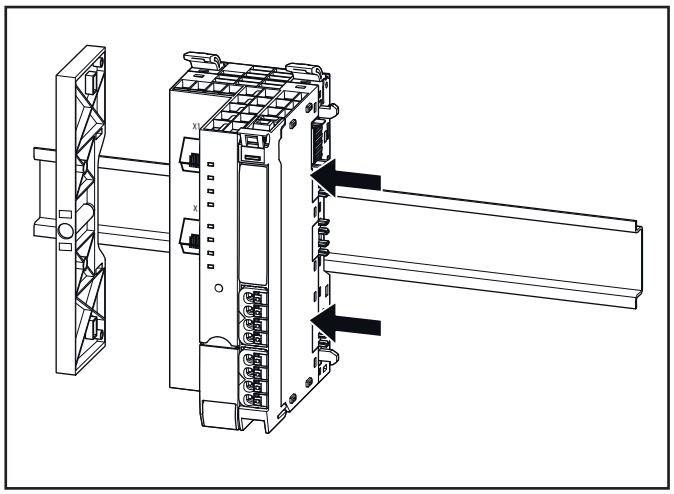
Release lever closed

► Place the controller (module side to the right) on the DIN rail so that it audibly clicks into place.



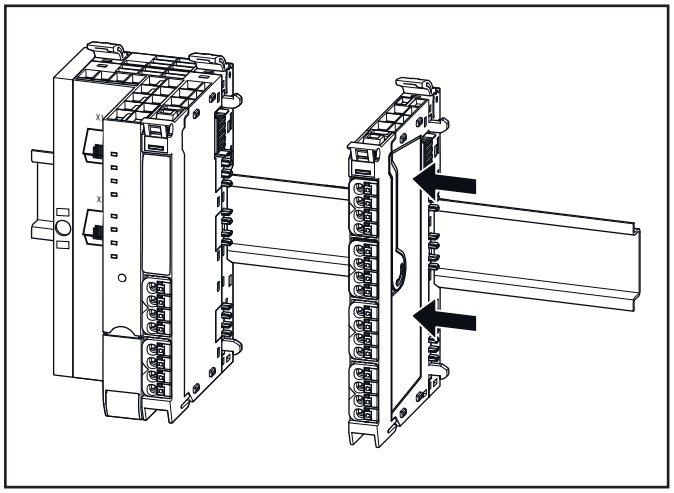
Attaching the controller to the DIN rail

► Slide the controller to the left until it completely connects with the end bracket. At the same time, press the controller as close as possible to the DIN rail so that the controller is not tilted.



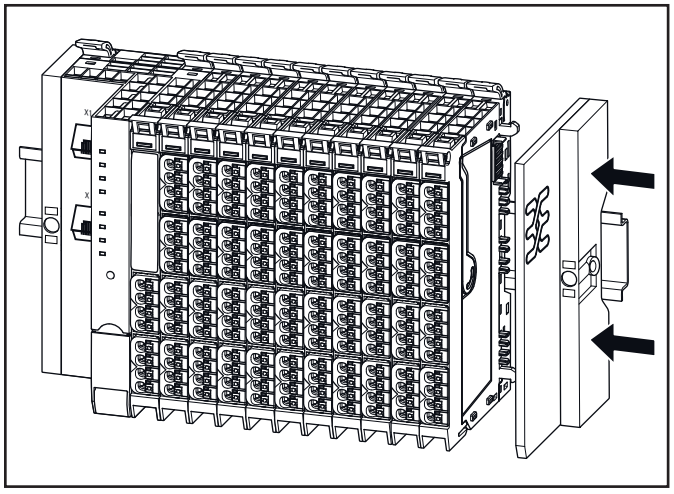
Sliding the controller into position

► 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 controller. 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.

6.3 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-control 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 can be impaired!

When safe I/O modules or safe power-feed modules are installed in the u-control station, please observe the following points:

- ► Please use wire-end ferrules in combination with flexible/multi-conductor cables to avoid cross-circuits.
- ► 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-control station has been mechanically installed, the wiring can be carried out in accordance with the wiring plan.

Wiring of modules with connectors PG 1.5 mm

Only copper wires with a cross section between 0.14 mm² and 1.5 mm² (AWG 16 – 26) may 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. We recommend the following tools for crimping:

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

u-remote modules (except HD modules) and controllers 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 4.7.

6.4 Inserting the battery

WARNUNG

Explosion risk!

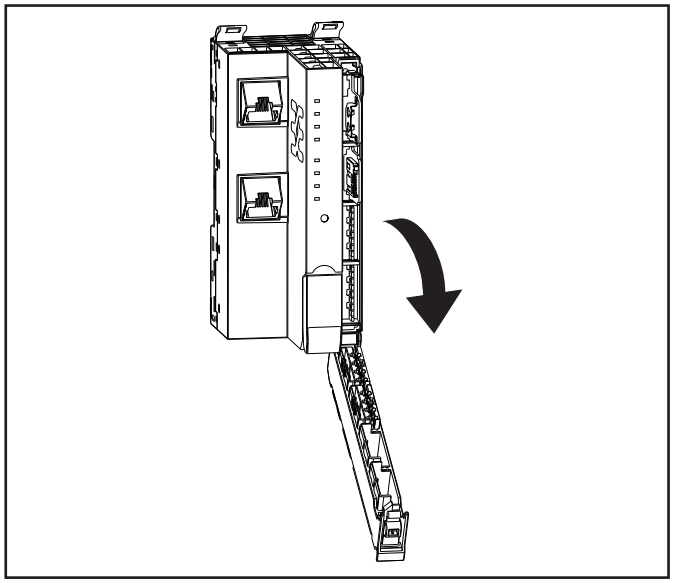
► Do not use the controller with a battery in a potentially explosive atmosphere.

WARNING

Battery may explode if mistreated!
Use of a wrong battery type may cause fire or explosion!

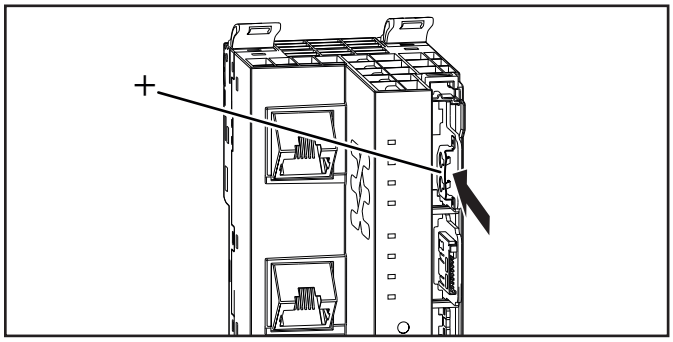
► Do not recharge, disassemble or dispose of in fire.
► Use only batteries of the specified type (see technical data).

► Unlock the connector frame and open it as far as possible (at least to an angle of 90°).



Opening the connector frame

► Insert the battery with the positive terminal to the left.

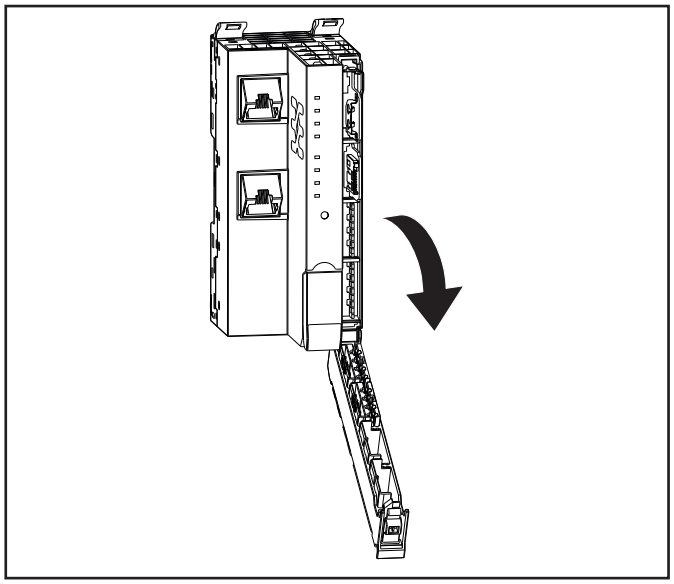


Inserting the battery

► Close the connector frame.

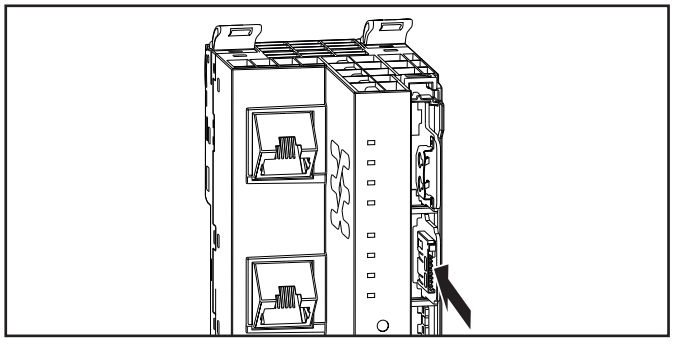
6.5 Inserting the microSD card

► Unlock the connector frame and open it as far as possible (at least to an angle of 90°).



Opening the connector frame

► Insert the microSD card.



Inserting the microSD card

► Close the connector frame.

6.6 Insulation test

Insulation tests on the u-control station have to be done according to the national regulations, in any case necessarily before each commissioning.

ATTENTION

The product can be destroyed by too high test voltage!

Please note during insulation test:

- within one channel the test voltage between 24 V and GND must not exceed 28,8 V![1)]
- A maximum test voltage of 500 V can be applied tho all other connection points.
- Up to 4000 V can be applied to the modules UR20-4RO-SSR-255 and UR20-4RO-CO-255:
  - between the four channels
  - between one channel and the system voltage.

1) We recommend to short-circuit 24 V and GND on all power supply connectors (controller, power-feed modules, safe power-feed modules and PLC-modules).

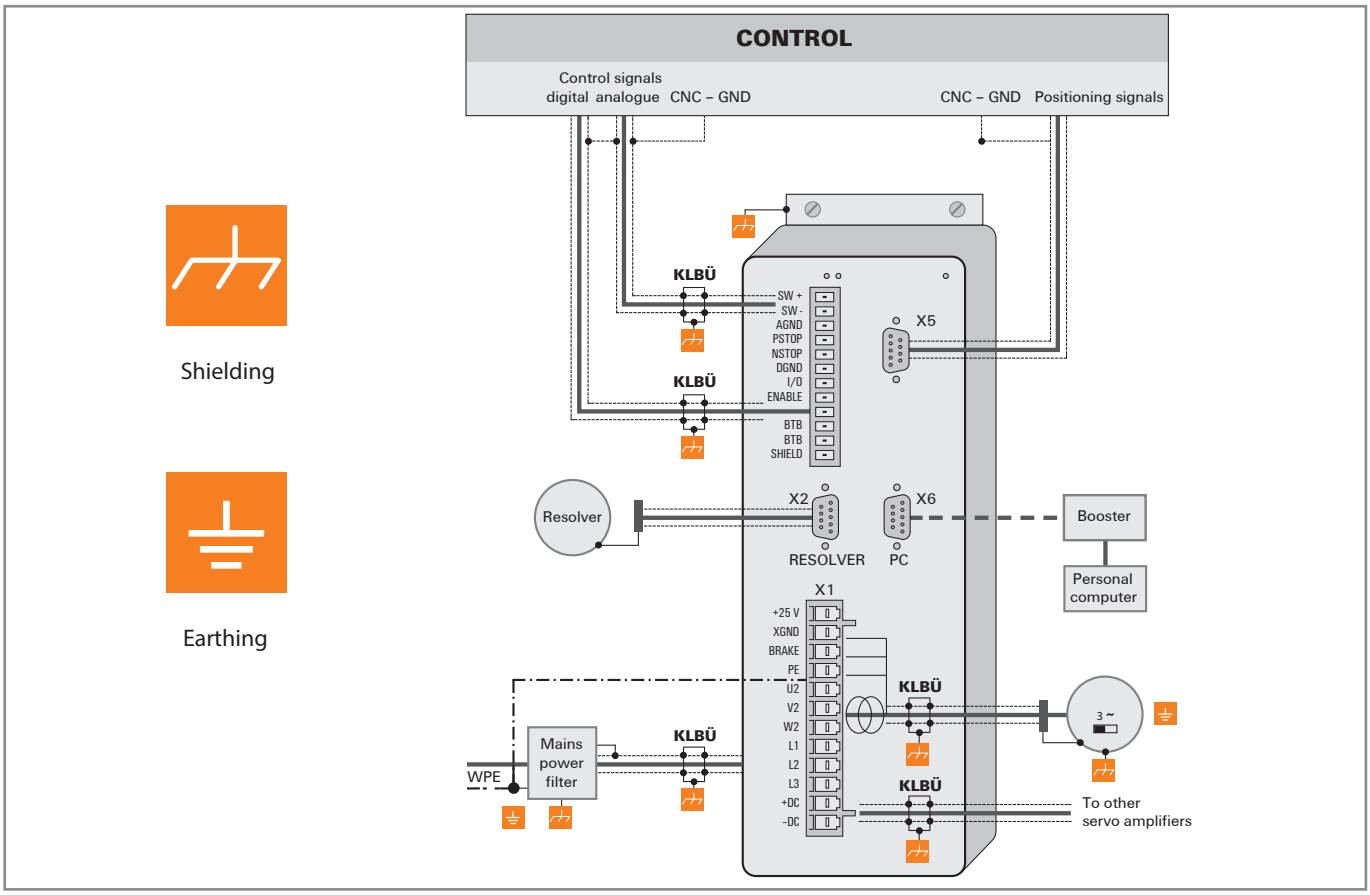
7 Earthing and shielding

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.



Connection diagram of a frequency converter

7.1 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

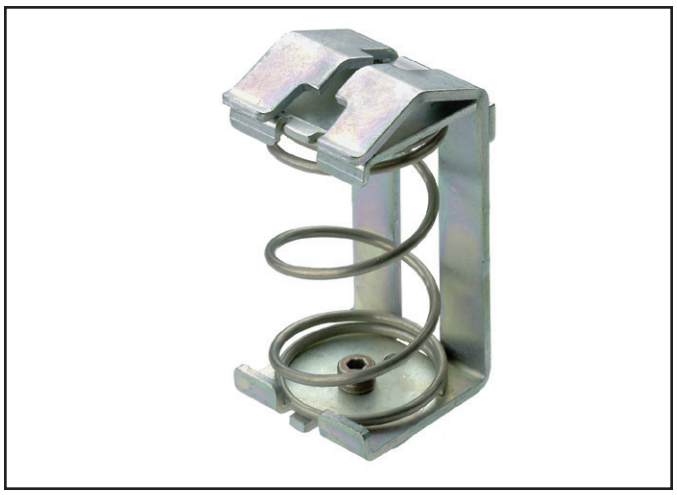
The sources of interference voltages can rarely be eliminated and even then not always completely. Thus, it is necessary to take measures to combat their effect. In general, the more effectively interference voltages can be kept away from circuit elements or can be discharged, the less electrical circuits 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

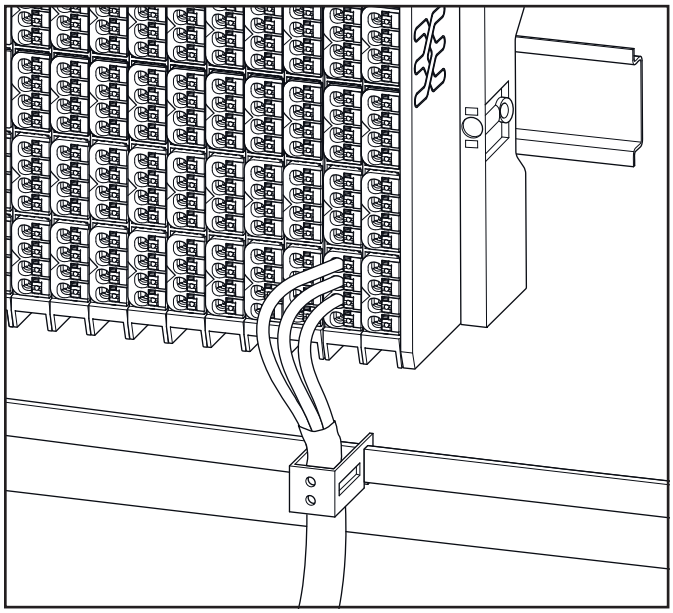
In practice, the shield is still often twisted and connected to a terminal point. There is very high attenuation (voltage drop) on these connections, especially for high-frequency interference. Therefore, this type of shielding should not be used, even for short cable lengths. The shielding of the cable 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



Use of a clamping bracket

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.

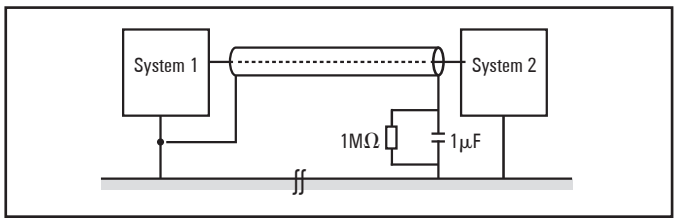
Effective shielding

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.

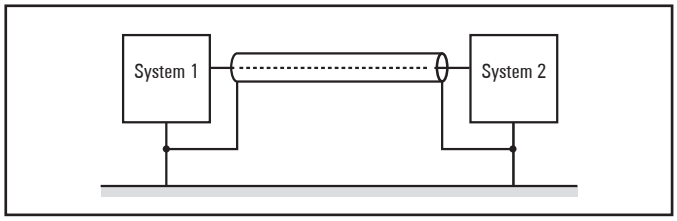
When installing ground connections on shielding, it is generally also important that no earth loops are created. The smaller the earth loop, the less the danger of the induction of interference voltages. It is therefore most suitable to have a purely neutral-point installation.

The following sketches show the possible shielding connections to protective earth.

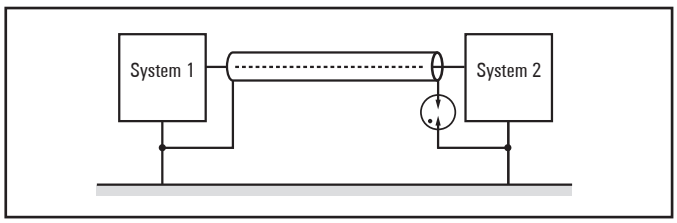
A one-sided connection of the shielding protects against capacitive coupling of interference voltages.



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.

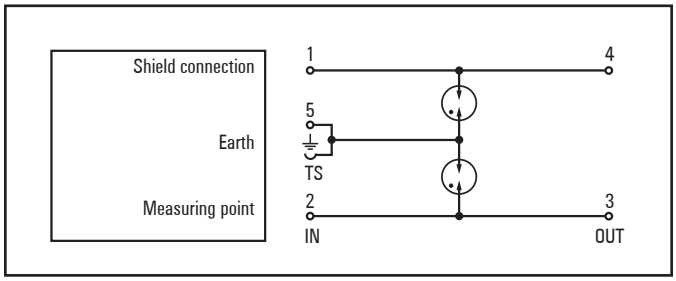


For longer lengths of shielded cables, such as if a sensor must be added to a control panel, a potential difference between both end points must not be ignored.

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.

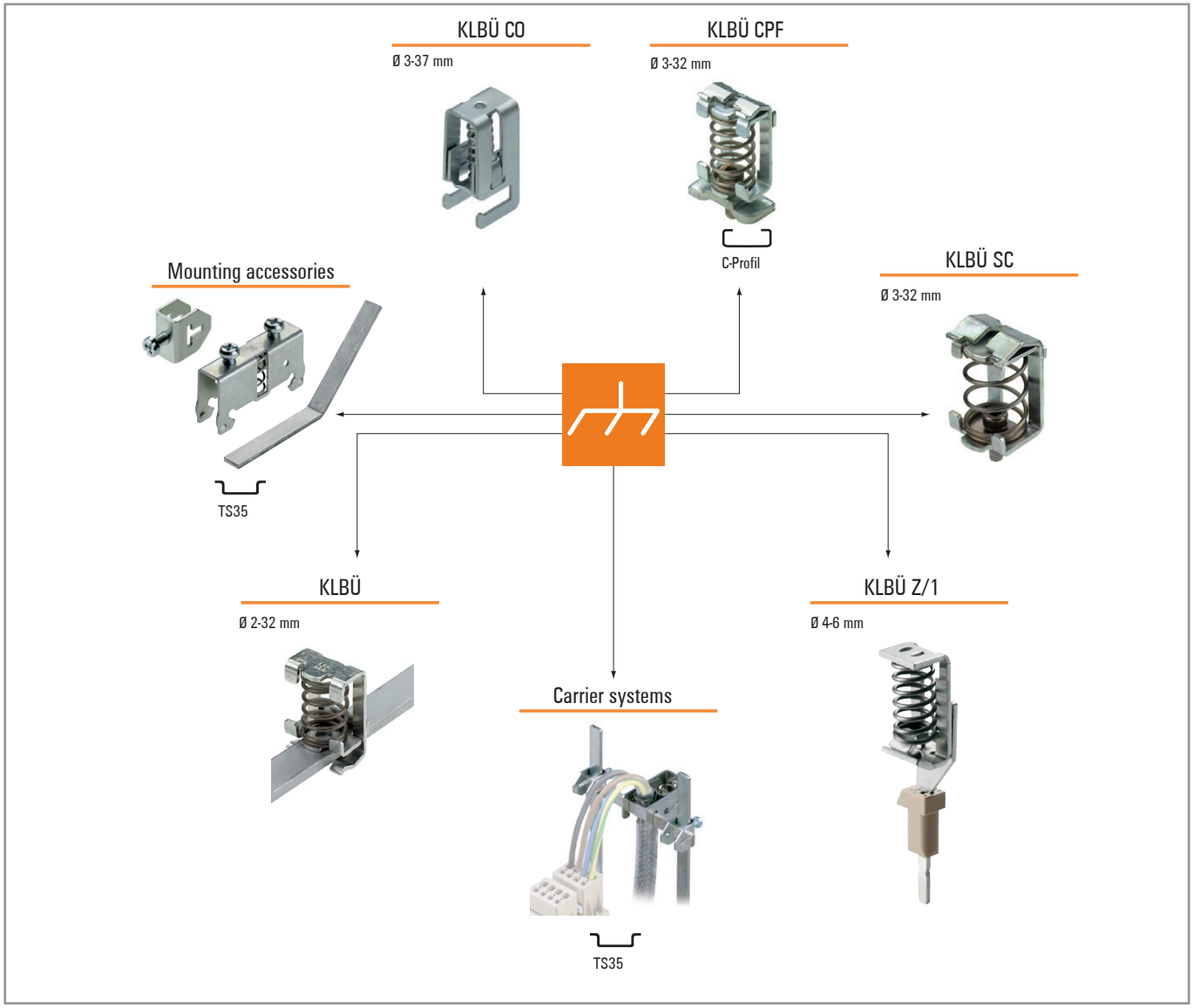
A high-impedance earth connection is also another option. In the control panel, the shield is then connected to the earth potential, and the shield has a high-impedance connection to earth at the measurement location via a gas discharge tube. This solves the problem of a potential transfer and 50-Hz 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.: 1282250000

7.2 Potential ratios

Basic aspects

As regards the potential ratios of a u-control station, the following aspects must be kept in mind:

- The power supply of the controller 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-control station. 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

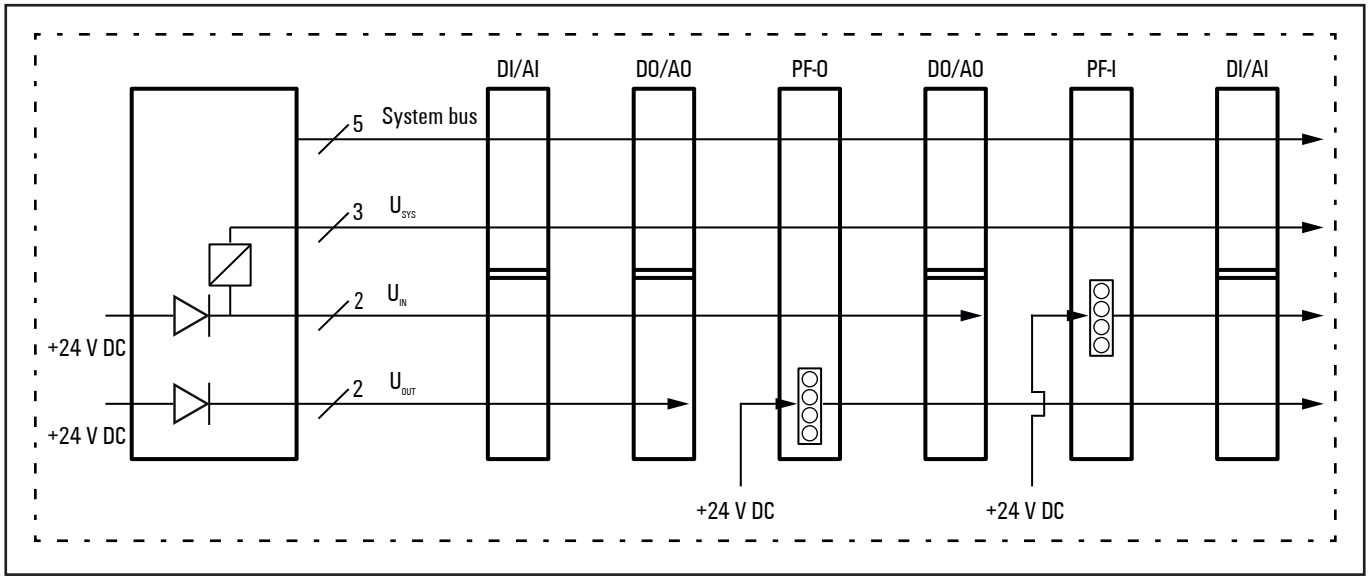
In a potential-free design, the reference potentials of control and load circuits are galvanically isolated from each other.
A potential-free design is necessary for the following:

- 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

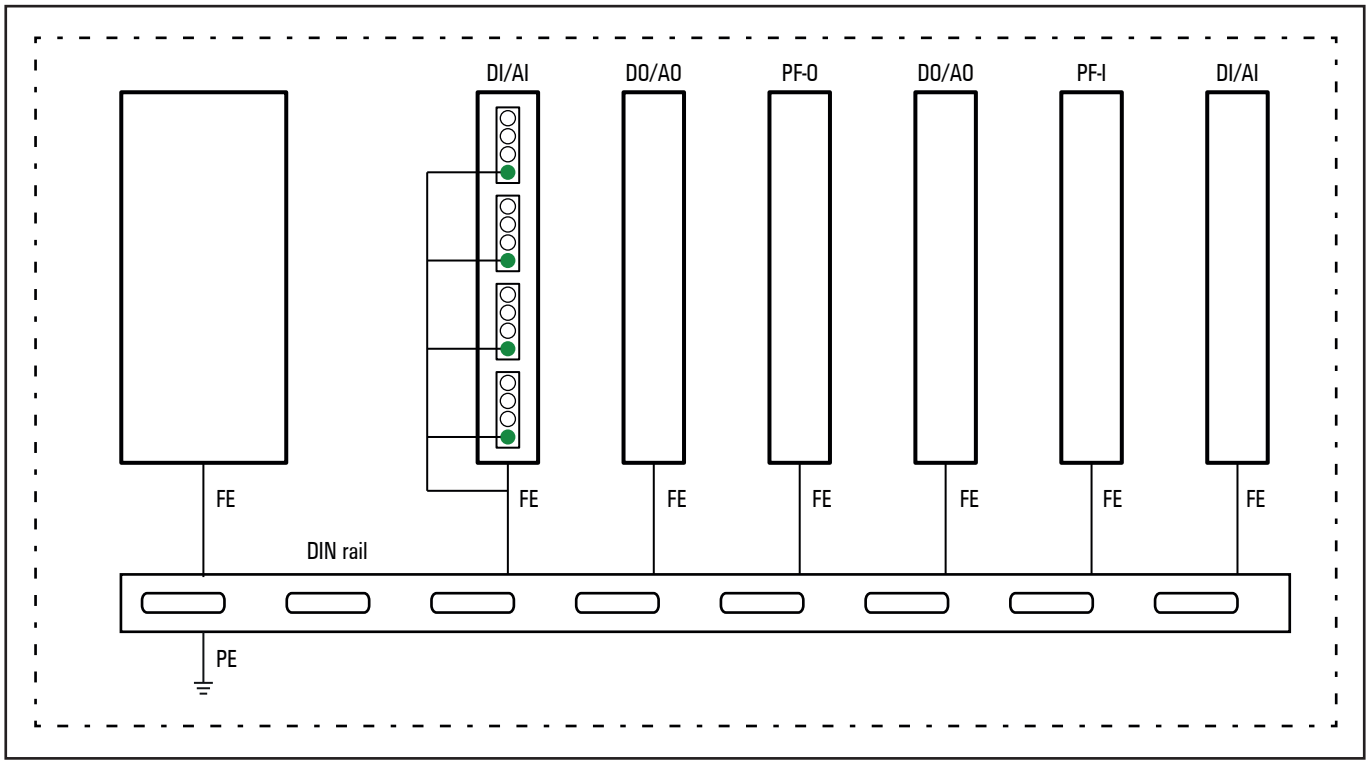
Potential-free installation depends on the type of earthing.

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



earthing concept: The spring contacts underneath the components snap into the DIN rail to make a connection.

7.3 Electromagnetic compatibility (EMC)

u-control products and 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
- Devices and functional units with high interferance potential should be encapsulated if neccessary

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

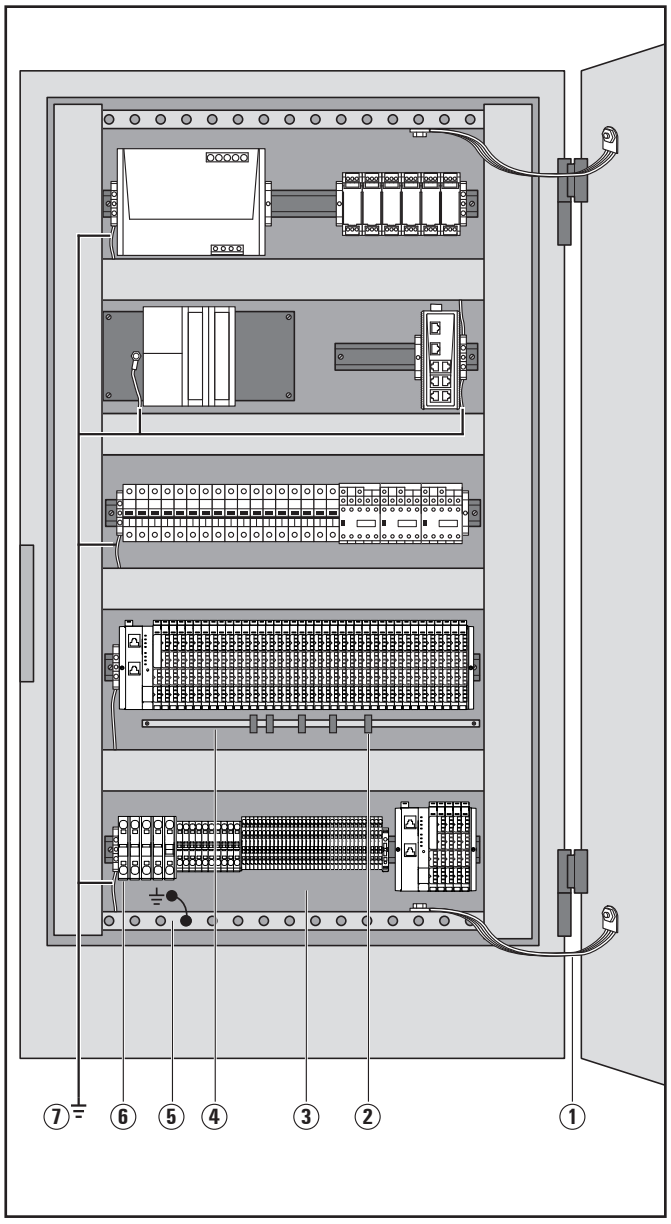
Notes concerning the use of DIN rails:

- 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)

Sensor and actuator lines

To avoid antenna effects caused by looped lines, all lines that go to a certain sensor or actuator should be combined in one cable.

Cabinet design according to EMC guideline:



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 2014/30/EU

7.4 Shielding of cables

To prevent the coupling of interference voltages and the de-coupling 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.

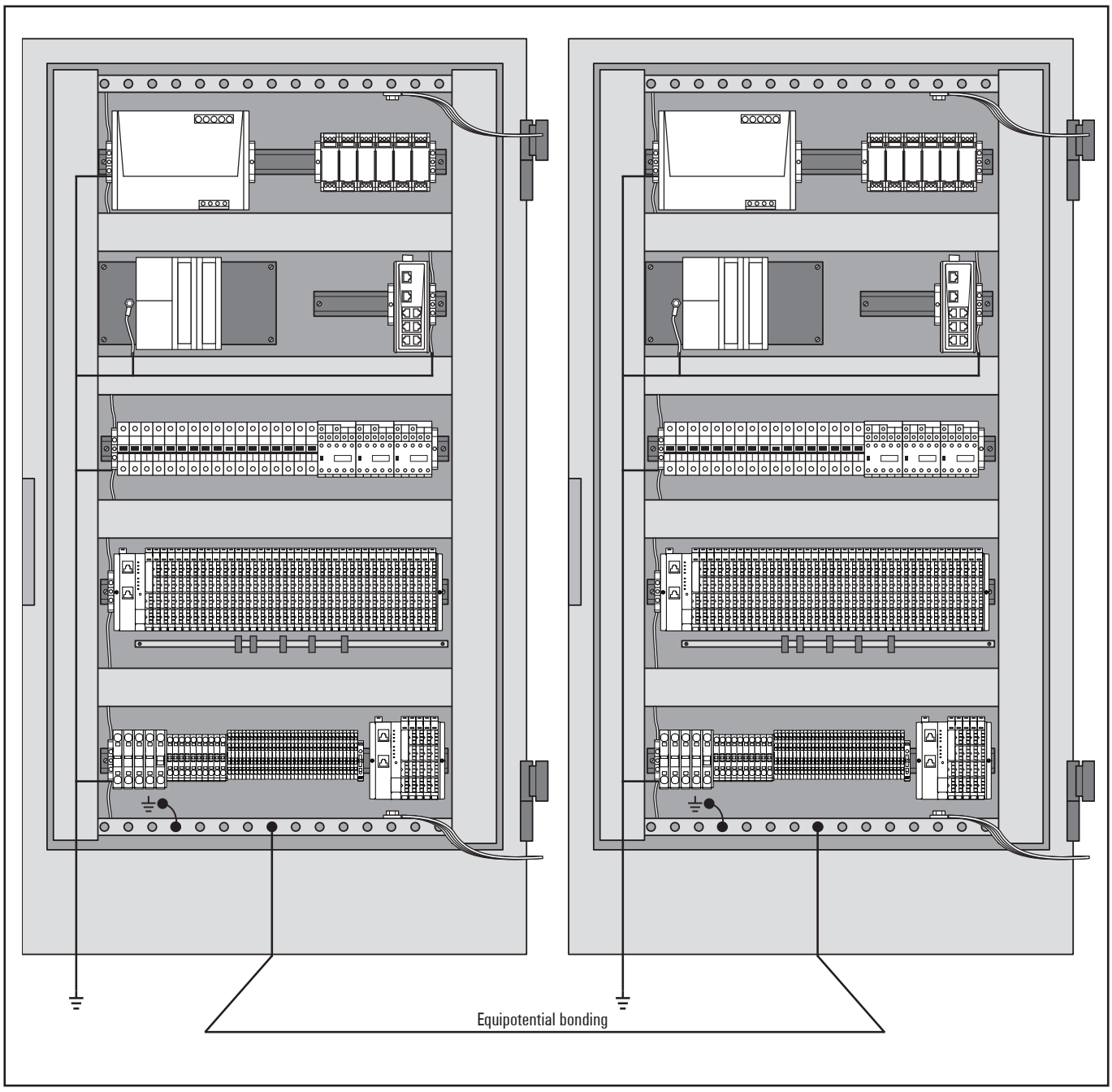


WARNING

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


Equipotential bonding

8 Commissioning using u-create web

WARNING

Explosion risk!

► Before starting any 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!

ATTENTION

The product can be destroyed!

► Before commissioning each time, perform an insulation test of the station (see section 6.6).

► The operation of the engineering tool u-create web is described in the embedded help.

8.1 Requirements

The following controllers can be commissioned using u-create web:

- UC20-WL2000-AC
- UC20-WL2000-IOT

Before you start the commissioning work, the following requirements must be fulfilled:

- The u-control station must be completely assembled and wired up.
- PC or laptop and u-control station are connected via USB or Ethernet.
- The power supply must be turned on.

If these requirements are fulfilled, the following LEDs light up:

- on the controller
  - The PWR LED lights up green.
  - The LED L/A for connection to the network lights up green. .
- On the modules, the Status LEDs lights up green.

Web browser

u-create web can be used with the following web browsers.

- Mozilla Firefox 61 or higher
- Google Chrome 67 or higher
- Microsoft Edge 85 or higher

Screen resolution

For u-create web we recommend a screen resolution of 1280 x 800 or higher. The user interface is displayed optimally when the browser window is maximised.

8.2 Opening u-create web

You can open u-create web via the USB interface or Ethernet.

► For USB access, connect the PC to the controller using a USB cable. The USB connection socket is located under the service flap on the front.

The USB cable should be a maximum of 2 m long (type USB-A to USB Micro-B, for example Weidmüller Order No. 1487980000). Extension cables must not be used!

► For Ethernet access, connect the PC to the controller using a LAN cable or a network switch.
► Open one of the browsers listed in section 8.1.
► In the address line, enter the IP address of the controller.
  - USB access X3: 192.168.10.202
  - Ethernet access X1: 192.168.0.101

The browser warns you of an insecure connection when u-create web is launched for the first time.
► Click **Advanced** and continue the insecure connection.
u-create web is started.

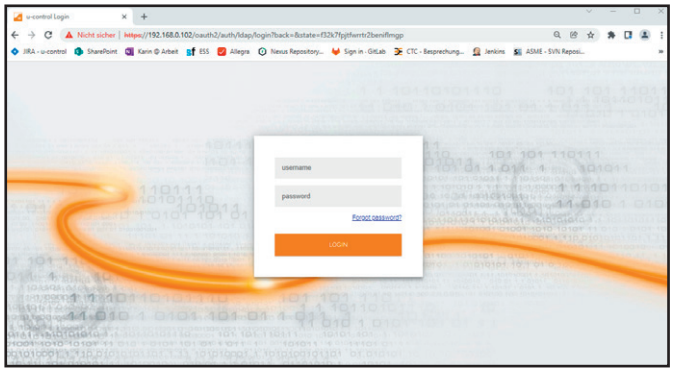
The licence terms are displayed when u-create web is launched for the first time.
► Read the licence terms carefully.
► Confirm that you agree to the licence terms
► Click **Accept license agreement**.

The dialogue **Create the initial Admin User** is opened.

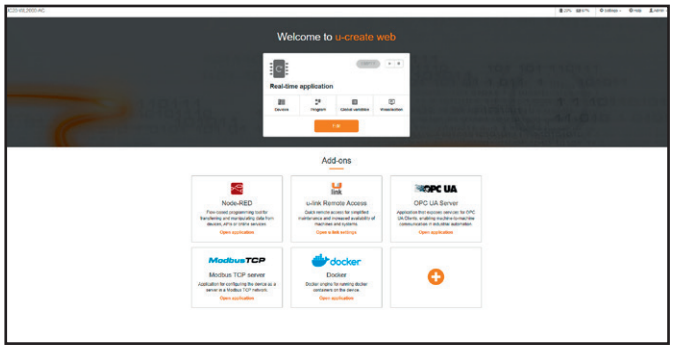
► Enter a username.
► Enter a password.
► Confirm the password.
► Click **Create**.
SIGN IN is displayed.



► Click **SIGN IN**.
Your login details are requested.



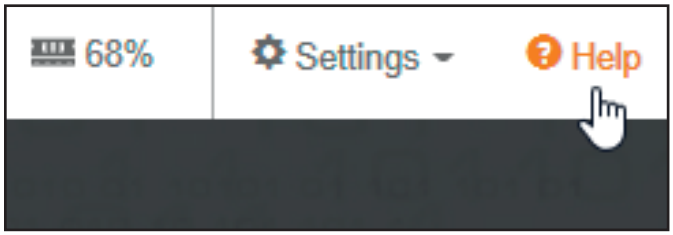
► Enter the initial user and the password and confirm.
The u-create web **starting page** is displayed.



Starting page (Example: UC20-WL2000-AC)

8.3 Opening the u-create web embedded help

The embedded help describes how to operate u-create web.



Opening the embedded help

► On the **starting page**, click **Help**.
The embedded help is opened in a new browser tab.

8.4 Updating the firmware

You can find a description of a firmware update in the **Embedded Help** of u-OS.

8.5 Resetting the controller to default settings

Resetting the controller has the following consequences:
- All application data and custom configuration are removed.
- All installed apps are deleted.
- All network settings are reset.
- The initial user with administration rights and all other users are reset.
- The reset will not affect any data stored on a mounted microSD card.
- The licences of the controller are kept.

► On the **Starting page**, click **Settings**.
► Click **Factory reset**.
► In the dialogue box, click **OK**.

The controller is reset to factory settings.
The controller is automatically restarted.

It is possible that this page is no longer available at the current URL.

8.6 Resetting the controller to default settings without password

You can also reset the controller to default settings without a password e. g. if you have forgotten your password.

Resetting the controller has the following consequences:
- All application data and custom configuration are removed.
- All installed apps are deleted.
- All network settings are reset.
- The initial user with administration rights and all other users are reset.
- The reset will not affect any data stored on a mounted microSD card.
- The licences of the controller are kept.

► Dismount all I/O modules from the u-control station.
► Connect your computer with the controller via USB.
► Start u-create web.
► On the login page, click **Forgot password?**.
A warning is displayed.

► Click **Restore u-control**.
The controller is reset to factory settings.
The controller is automatically restarted.

8.7 Downgrading the firmware



Before starting the downgrade, please observe the release notes.

For firmware downgrades, we recommend connecting the computer with the controller via USB. Depending on the used downgrade file, IP changes and protocol changes will occur.

9 Upgrading from u-create web to u-OS

u-OS does not contain a real-time application. If you upgrade to u-OS, you will no longer be able to edit or create projects. You will lose all data from u-create. Only perform the upgrade if you do not need the data. All data are reset to the default settings.

The power supply must not be disconnected during the upgrade.

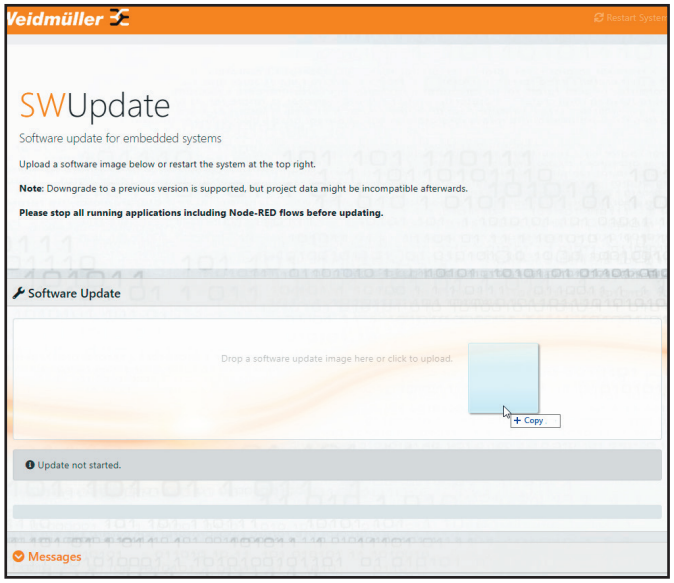
9.1 Upgrading from u-create web to u-OS

You can upgrade the UC20-WL2000-AC controller to u-OS from firmware 1.15.1.

Check before the upgrade:
- Have you saved all of your configurations and applications?
- Have you closed all of your browser windows of your projects?

Prerequisite
- You have downloaded the latest firmware file from the Support Center.
- You have read the release notes.

► On the **Starting page**, click **Settings**.
► Click **Firmware update**.
SWUpdate is opened in a new browser tab.



Starting the firmware upgrade

► Drag-and-drop the upgrade file into the dialogue box.
The upgrade is started.

When the upgrade is finished, the controller is automatically restarted

The controller is restarted twice during the upgrade.

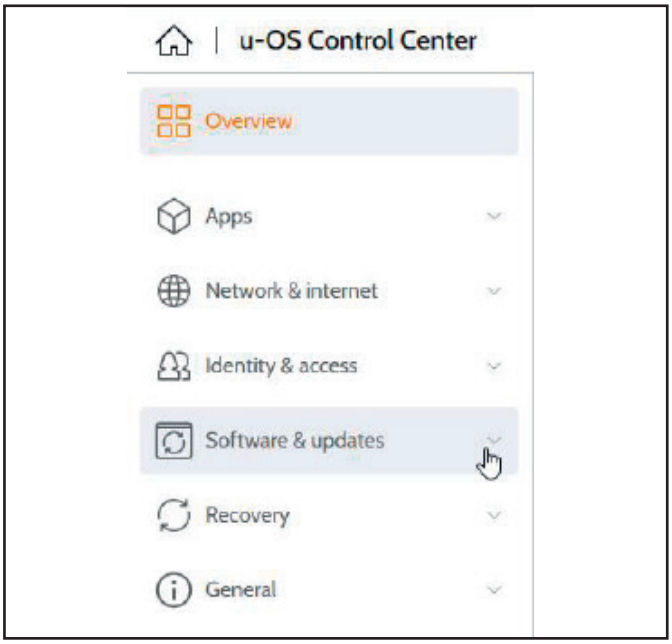
9.2 Downgrading from u-OS to u-create web

You can downgrade the UC20-WL2000-AC and UC20-WL2000-AC-CAN controllers to u-create web.

Check before the downgrade:
- Have you saved all of your configurations and applications?
- Have you closed all of your browser windows of your projects?

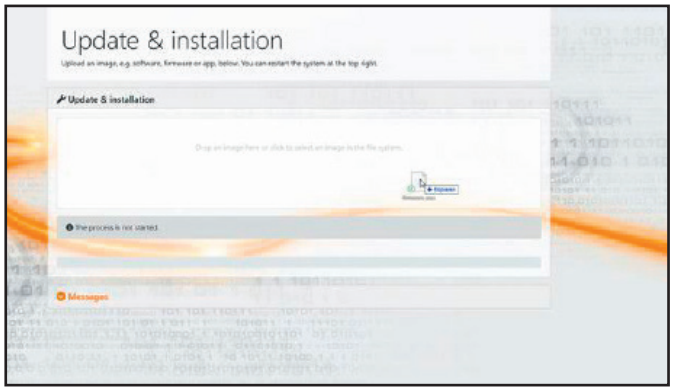
Prerequisite
- You have downloaded the firmware file from the Support Center.
- You have read the release notes.

► Open the **u-OS Control Center**.
► Click **Software & updates**.



Opening Software & updates

► Click **Update & installation**.
A dialog window is opened.



Starting the firmware downgrade

► Drag-and-drop the downgrade file into the dialogue box.
The downgrade is started.

When the downgrade is finished, the controller is automatically restarted

The controller is restarted twice during the downgrade.

10 Commissioning using u-OS



WARNING

Explosion risk!

► Before starting any 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!

ATTENTION

The product can be destroyed!

► Before commissioning each time, perform an insulation test of the station (see section 6.6).



► The operation of the operating system u-OS is described in the **embedded help**.

► To have the **embedded help** available independently from u-OS, you can download the latest version from the Support Center.

10.1 Requirements

The following controllers can be commissioned using u-OS.

- UC20-WL2000-AC
- UC20-WL2000-AC-CAN

Before you start the commissioning work, the following requirements must be fulfilled:

- The u-control station must be completely assembled and wired up.
- PC or laptop and u-control station are connected via USB or Ethernet.
- The power supply must be turned on.

If these requirements are fulfilled, the following LEDs light up:

- on the controller
  - The PWR LED lights up green.
  - The upper LED at the connected interface lights up green for connection to the network.
- On the modules, the Status LEDs lights up green.

Web browser

u-OS can be used with the following web browsers.

- Mozilla Firefox 102 or higher
- Google Chrome 114 or higher
- Microsoft Edge 115 or higher

Screen resolution

For u-OS we recommend a screen resolution of 1280 x 800 or higher. The user interface is displayed optimally when the browser window is maximised.

Open ports

To enable access to u-OS services, the following ports are opened via the system.

Open ports TCP

Port	Service
22	SSH
80	nginx
443	nginx
5355	Link-Local Multicast Name Resolution
22350	CodeMeter

Open ports UDP

Port	Service
5353	Multicast DNS
5355	Link-Local Multicast Name Resolution
22350	CodeMeter
Dynamic	avahi-daemon

10.2 Opening u-OS

You can access u-OS via the USB interface or Ethernet.

► For USB access, connect the PC to the controller using a USB cable. The USB connection socket is located under the service flap on the front.

The USB cable should be a maximum of 2 m long (type USB-A to USB Micro-B, for example Weidmüller Order No. 1487980000). Extension cables must not be used!

► For Ethernet access, connect the PC to the controller using a LAN cable or a network switch.
► Open one of the browsers listed in section 10.1.
► In the address line, enter the IP address of the controller.
– USB access X3: 192.168.10.202
– Ethernet access X1: 192.168.0.101

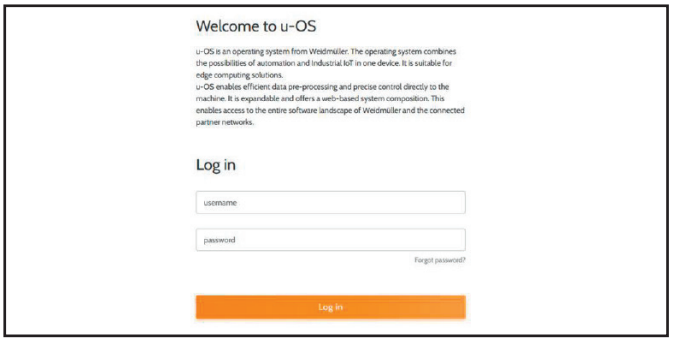
The browser warns you of an insecure connection when u-OS is opened for the first time.

► Click **Advanced** and continue the insecure connection.
u-OS is opened.
The licence terms are displayed when u-OS is opened for the first time.

► Read the licence terms carefully.
► Confirm that you agree to the licence terms
► Click on **Accept license agreement**, to proceed to the login page.
The dialogue **Create the initial Admin User** is opened

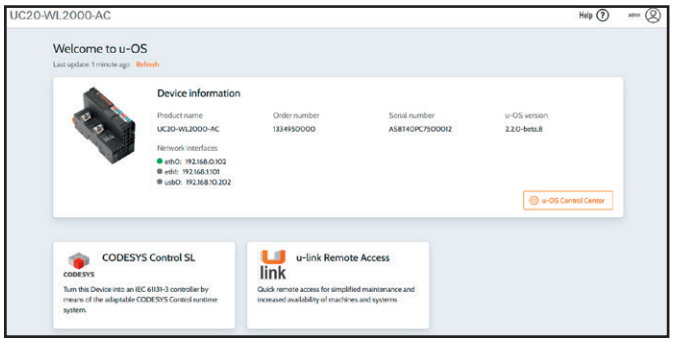
► Enter a username.
► Enter a password.
► Confirm the password.
► Click **Create**.
Log in is displayed.

► Click **Log In**.
Your login details are requested.



Login window

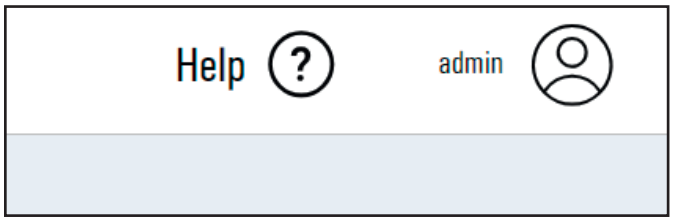
► Enter the initial user and the password and confirm.
The u-OS **starting page** is displayed.



Starting page (Example: UC20-WL2000)

10.3 Opening the u-OS embedded help

The embedded help describes how to operate with u-OS.



Opening the embedded help

► On the **starting page**, click **Help**.
The embedded help is opened in a new browser tab.

10.4 Updating the firmware

You can find a description of a firmware update in the **Embedded Help** of u-OS.

10.5 Resetting the controller to default settings

Resetting the controller has the following effects:
- All application data and custom configuration are removed.
- All installed apps are deleted.
- All network settings are reset.
- The initial user with administration rights and all other users are reset.
- The reset will not affect any data stored on a mounted microSD card.
- The licences of the controller are kept.

► Open the **u-OS Control Center**.
► Click **Recovery**.
► Click **Reset & restart**.
► Click **Factory reset**.
The controller is reset to factory settings.
The controller is automatically restarted.



It is possible that the controller is no longer available at the current URL.

10.6 Resetting the controller to default settings without password

You can also reset the controller to default settings without a password e.g. if you have forgotten your password.

Resetting the controller has the following effects:
- All application data and custom configuration are removed.
- All installed apps are deleted.
- All network settings are reset.
- The initial user with administration rights and all other users are reset.
- The reset will not affect any data stored on a mounted microSD card.
- The licences of the controller are kept.

Prerequisite
- You have a microSD card with only one partition formatted as FAT32.

► Create a file on the microSD card with the file name RECOVERY without a file extension.
► Insert the microSD card into the controller.
► Restart the controller.
The device is restarted in recovery mode.

► Connect the PC to the controller using a USB cable.
► Open a browser.
► In the address line, enter the IP address of the controller for USB access X3: 192.168.10.202

Update & installation is opened.



If the microSD card is not removed, the device will boot back into recovery mode again and again.

► Remove the microSD card.
► Click **Reset**.
► Click **Factory reset**.
The controller is reset to factory settings.
The controller is automatically restarted.

10.7 Resetting network settings in recovery mode

You can reset network settings if you have forgottten your IP address. Only the network settings are reset during this process. All other settings are kept.

Prerequisite
- You have a microSD card with only one partition formatted as FAT32.

► Create a file on the microSD card with the file name RECOVERY without a file extension.
► Insert the microSD card into the controller.
► Restart the controller.
The device is restarted in recovery mode.

► Connect the PC to the controller using a USB cable.
► Open a browser.
► In the address line, enter the IP address of the controller for USB access X3: 192.168.10.202

Update & installation is opened.



If the microSD card is not removed, the device will boot back into recovery mode again and again.

► Remove the microSD card.
► Click **Reset**.
► Click **Reset network settings**.
The network settings are reset.
The controller is automatically restarted.

11 Replacing components

11.1 Removing/replacing the plug-in unit

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-control 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!

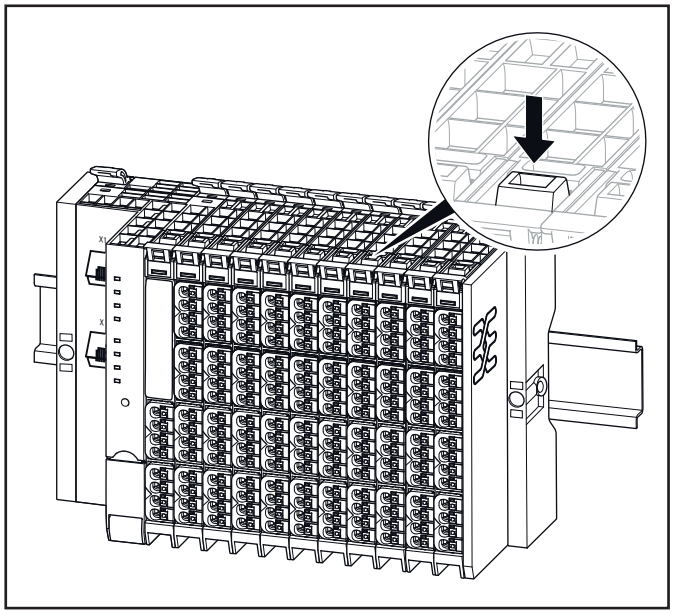
ATTENTION

The product can be destroyed by electrostatic discharge!

The components can be destroyed by electrostatic discharge.

► Please make sure that personnel and work equipment are adequately earthed!

► Unlock the connector frame.

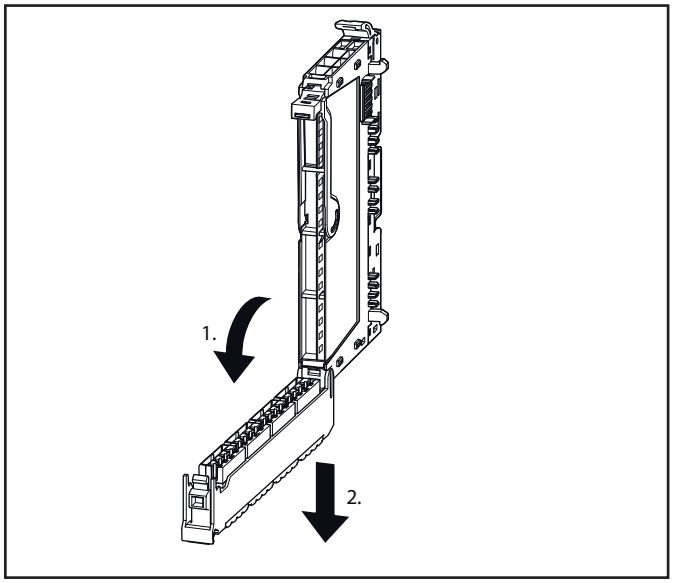


Unlocking the connector frame

► Swivel the plug-in unit with the cabling towards the front by 90°.

The plug-in unit can only be removed in this 90° position!

► Remove the plug-in unit by pulling it out in a straight, downward motion.



Opening the connector frame and pulling out the plug-in unit

11.2 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.

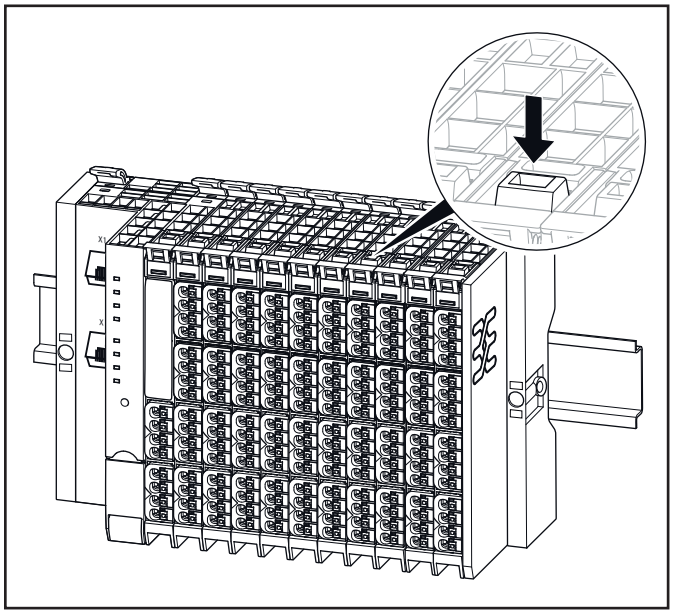
ATTENTION

The product can be destroyed by electrostatic discharge!

The components can be destroyed by electrostatic discharge.

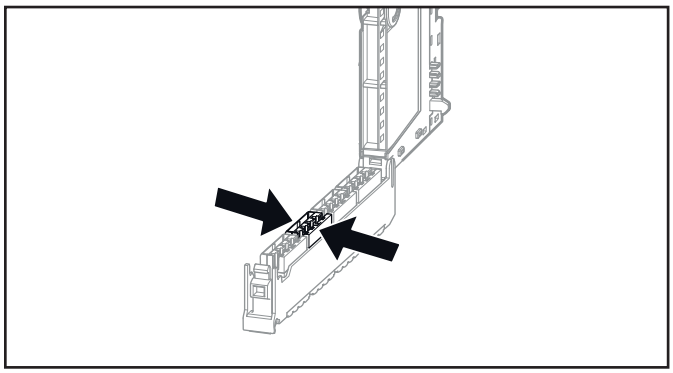
► Please make sure that personnel and work equipment are adequately earthed!

► Open the connector frame and flip the plug-in unit 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.
► Swivel the plug-in unit upwards until the connector frame clicks into place.

11.3 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-control 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 can be destroyed by electrostatic discharge.

► Please make sure that personnel and work equipment are adequately earthed!

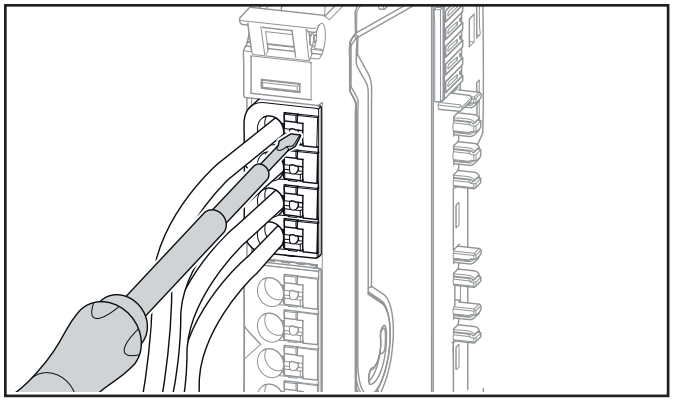
ATTENTION

The product can be destroyed by overcurrent!

Potentials may only be disconnected either simultaneously or in the correct order.

► At the controller as well as at power-feed modules always disconnect the 24 V supply (red pusher) first, before you disconect the GND potential (blue pusher)!

► 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.

11.4 Replacing the battery

WARNING

Explosion risk!

► Before starting any 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 the supply voltage, a replacement can only be made once the machine/system is disconnected from the power!

WARNING

Danger of contact burns!

► Only replace the battery when it is not under load current.

WARNING

Battery may explode if mistreated!
Use of a wrong battery type may cause fire or explosion!

► Do not recharge, disassemble or dispose of in fire.

► Use only batteries of the specified type (see technical data).

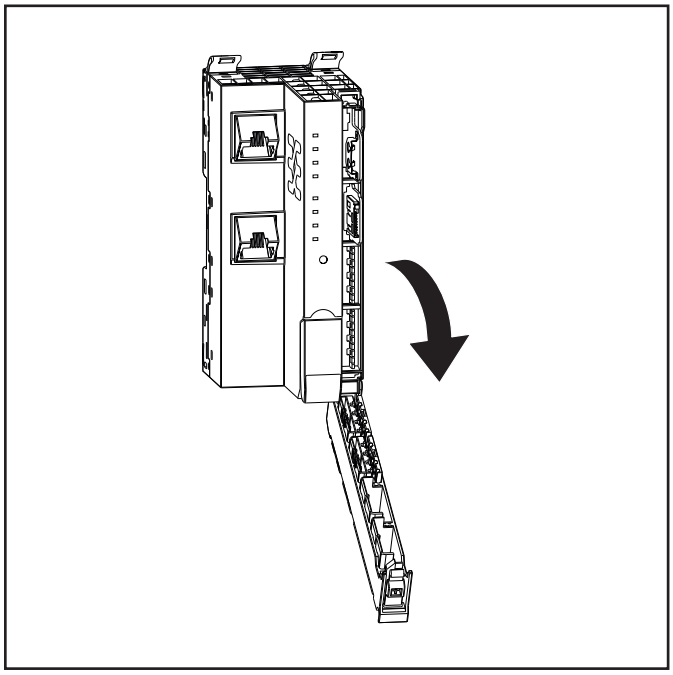
ATTENTION

The product can be destroyed by electrostatic discharge!

The components can be destroyed by electrostatic discharge.

► Please make sure that persons and work equipment are sufficiently earthed!

► Unlock the connector frame and open it as far as possible (at least to an angle of 90°).

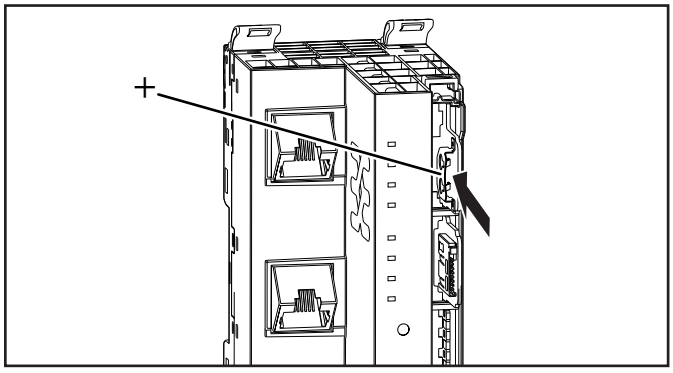


Opening the connector frame

► Remove the battery using tweezers.
Alternatively, push the battery carefully with a screwdriver from the mounting plate.

Dispose of the battery correctly.

► Insert the new battery as shown with the positive terminal to the left.



Inserting the battery

11.5 Replacing the microSD card

WARNING

Explosion risk!

► Before starting any 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 the supply voltage, a replacement can only be made once the machine/system is disconnected from the power!

WARNING

Danger of contact burns!

► Only replace the microSD card when it is not under load current.

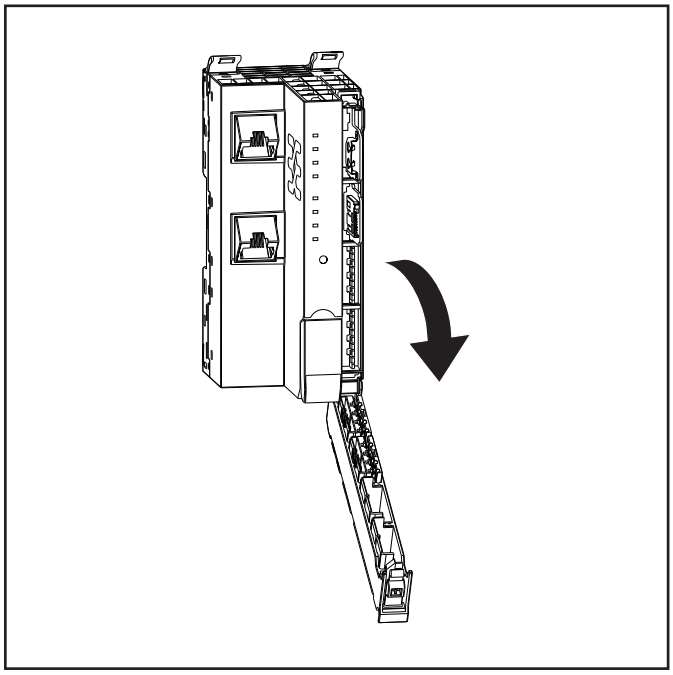
ATTENTION

The product can be destroyed by electrostatic discharge!

The components can be destroyed by electrostatic discharge.

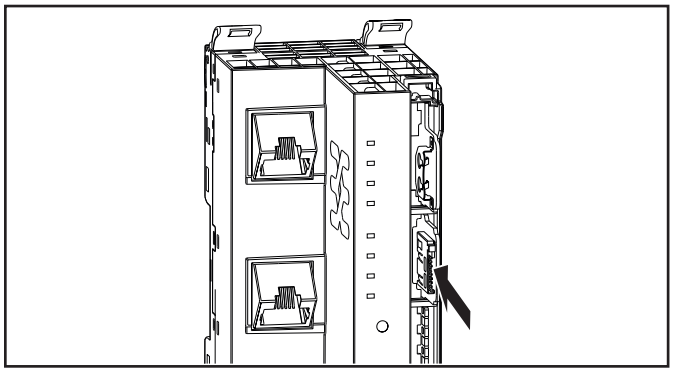
► Please make sure that persons and work equipment are sufficiently earthed!

► Unlock the connector frame and open it as far as possible (at least to an angle of 90°).



Opening the connector frame

► Briefly press on the inserted microSD card in order to unlock it.
► Remove the old microSD card.
► Insert the new microSD card.



Inserting the microSD card

► Close the connector frame.

Make sure that you remove all sensitive data from the microSD card before disposing of it.

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-control 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

Battery may explode if mistreated!

► Do not recharge, disassemble or dispose of in fire.

► Remove all cables and lines.
► Remove the end bracket markers (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 terminal rail.

You can now dismount modules and the controller 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 terminal rail.
► Repeat the above procedure for all remaining modules/ module groups.
► To dismount the controller, open both release levers and remove it from the terminal rail.
► Remove the battery and microSD card from the controller.
► 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-control station



ATTENTION

Products in the u-remote series are subject to WEEE (EU Directive 2012/19/EU), which regulates the collection and recycling of electrical and electronic equipment.
► Make sure that disassembled products are properly disposed of!

When all u-control 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.



Dispose of the battery correctly.



Make sure that you remove all sensitive data from the microSD card before disposing of it.

You can find the address of your respective country representative at the Weidmüller website.

13 LED indicators and troubleshooting

In the event of a malfunction occurring on a u-control product, carry out the following recommended measures. If the malfunction cannot be fixed, please send the affected product to Weidmüller. You can find the address of your respective country representative at the Weidmüller website. Weidmüller does not assume any liability if the base or electronic module has been tampered with!

Controller/indicator	LED	Status	Recommended action
UC20-WL2000-AC, UC20-WL2000-AC-CAN			
Power LED	PWR	**green**: supply voltage present, firmware is running	–
System failure	SF	**geen**: system is running	
		geen flashing: system is booting	
		geen/yellow flashing: update running	
		red: system is impaired	Switch supply voltage off and on again and deploy application again
		red flashing: kernel panic occured	
Bus failure	BF	**green**: I/O bus is running	–
		green flashing: I/O bus currently configuring	
		yellow: I/O bus configuration error	Check whether modules are mounted correctly
		red: I/O bus general error	
		red flashing: Force mode active	
Maintenance	MT	**green flashing twice:** operating system is running	–
		red: system is in recovery mode	
		off: NTP enabled, the diagnostic is OK	
		red flashing: NTP disabled, RTC battery voltage is below the empty threshold	Change the RTC battery
		aus: NTP disabled, RTC battery voltage is above the empty threshold	
Controller status	RUN	**off:** no application deployed	–
		green: application is deployed and running	–
		yellow: application is deployed and stopped	–
Connection/active connection 1	L/A X1	**off**: no connection	Check Ethernet cable
		green: connection of controller connection 1 with an additional field device	–
		green/yellow flashing: data being exchanged on connection 1	
Connection/active connection 2	L/A X2	**off**: no connection	Check Ethernet cable
		green: connection of controller connection 2 with an additional field device established	–
		green/yellow flashing: data being exchanged on connection 2	

Controller/indicator	LED	Status	Recommended action
UC20-WL2000-AC, UC20-WL2000-AC-CAN			
Input supply voltage	3.1	**green**: input current path supply voltage > 18 V DC	–
	3.2	**red**: input current path supply voltage < 18 V DC	Check supply voltage
	3.4	**red**: internal fuse defective	Replace the controller
Output supply voltage	4.1	**green**: output current path supply voltage > 18 V DC	–
	4.2	**red**: output current path supply voltage < 18 V DC	Check supply voltage
	4.4	**red**: internal fuse defective	Replace the controller
Input supply voltage	3.1	**green**: input current path supply voltage > 18 V DC	–
	3.2	**red**: input current path supply voltage < 18 V DC	Check supply voltage
	3.4	**red**: internal fuse defective	Replace the controller
Output supply voltage	4.1	**green**: output current path supply voltage > 18 V DC	–
	4.2	**red**: output current path supply voltage < 18 V DC	Check supply voltage
	4.4	**red**: internal fuse defective	Replace the controller

Controller/indicator	LED	Status	Recommended action
UC20-WL2000-IOT			
Power LED	PWR	**green**: supply voltage present, firmware is running	–
System failure	SF	**geen**: system is running	
		geen flashing: system is booting	
		geen/yellow flashing: update running	
		red: system is impaired	Switch supply voltage off and on again and deploy application again
		red flashing: kernel panic occured	
Bus failure	BF	**green**: I/O bus is running	–
		green flashing: I/O bus currently configuring	
		yellow: I/O bus configuration error	Check whether modules are mounted correctly
		red: I/O bus general error	
		red flashing: Force mode active	
Maintenance	MT	**green flashing twice:** operating system is running	–
		red: system is in recovery mode	
		off: NTP enabled, the diagnostic is OK	
		red flashing: NTP disabled, RTC battery voltage is below the empty threshold	Change the RTC battery
		aus: NTP disabled, RTC battery voltage is above the empty threshold	

Controller/indicator	LED	Status	Recommended action
UC20-WL2000-IOT			
Controller status	RUN	**off:** no application deployed	–
		green: application is deployed and running	–
Connection/active connection 1	L/A X1	**off**: no connection	Check Ethernet cable
		green: connection of controller connection 1 with an additional field device	–
		green/yellow flashing: data being exchanged on connection 1	
Connection/active connection 2	L/A X2	**off**: no connection	Check Ethernet cable
		green: connection of controller connection 2 with an additional field device established	–
		green/yellow flashing: data being exchanged on connection 2	
Input supply voltage	3.1	**green**: input current path supply voltage > 18 V DC	–
	3.2	**red**: input current path supply voltage < 18 V DC	Check supply voltage
	3.4	**red**: internal fuse defective	Replace the controller
Output supply voltage	4.1	**green**: output current path supply voltage > 18 V DC	–
	4.2	**red**: output current path supply voltage < 18 V DC	Check supply voltage
	4.4	**red**: internal fuse defective	Replace the controller
Input supply voltage	3.1	**green**: input current path supply voltage > 18 V DC	–
	3.2	**red**: input current path supply voltage < 18 V DC	Check supply voltage
	3.4	**red**: internal fuse defective	Replace the controller
Output supply voltage	4.1	**green**: output current path supply voltage > 18 V DC	–
	4.2	**red**: output current path supply voltage < 18 V DC	Check supply voltage
	4.4	**red**: internal fuse defective	Replace the controller

14 Accessories and replacement parts

14.1 Accessories

Order No.	Designation	Purpose
9009030000	Screwdriver SDS 0.4X2.5X75	Unfastening conductors from PUSH IN contacts
9008320000	Screwdriver SDS 0.5X3.0X80	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	Tag holder EM 8/30 for end bracket marker	Marks the station at the end bracket
1045570000	Marker ELS 6/30, white, PA 66	Marking end brackets, can be printed with Weidmüller PrintJet ADVANCED
1045580000	Marker ELS 6/30, yellow, PA 66	Marking end brackets, can be printed with Weidmüller PrintJet ADVANCED
2009980000	Marker ELS 6/30 MM, white, polyester	Marking end brackets, can be printed with Weidmüller THM MMP
2010620000	Marker ELS 6/30 MM, yellow, polyester	Marking end brackets, can be printed with Weidmüller THM MMP
1607720000	Labels ESO 7 white, paper	Marking end brackets, can be printed with laser printers
1634780000	Labels ESO 7 yellow, paper	Marking end brackets, can be printed with laser printers
1670390000	Labels ESO 7 P white, polyester	Marking end brackets, can be printed with laser printers
1670400000	Labels ESO 7 P yellow, polyester	Marking end brackets, can be printed with laser printers
1483050000	KOSM BHZ5.00 coding elements	Coding element for customised module coding
1346610000	UR20-EBK-ACC termination kit	Set with two end brackets and one end plate
1805610000	MEW 35/1 end bracket for vertical installation	Reinforced end bracket required in addition to terminal kit for vertical installation
1469340000	HD-Plug UR20-PG0.35	Plug for HD-modules (8 pieces per package)
1919990000	PCB plug-in connector BLDZ DN5.08/05/180F GY BX PRT	5-pole female connector for fieldbus connection UR20-FBC-DN (10 wire connections)
1933550000	PCB plug-in connector BLZ DN 5.08/05/180F AU GY BX PRT	5-pole female connector for fieldbus connection UR20-FBC-DN (5 wire connections)
9202210000	multi-stripax 6-16	Stripping tool for conductors to be used with HD-Plugs
1525820000	Pressing tool PWZ-UR20-HD	Pressing tool for fixing HD-Plugs
1487980000	IE-USB-A-MICRO-1.8M	Connecting line, USB A to USB Micro, sheath material PVC, 1.8 m
2684400000	SD-CARD	microSD memory card
2684410000	BATTERY-CR1220-3V	Lithium coin cell CR1220

14.2 Replacement parts

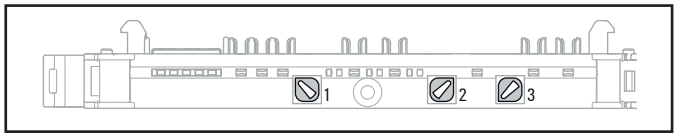
Controller	Order No.	Replacement part	Order No.
UC20-WL2000-AC	1334950000	Plug-in unit UR20-PK-1334940000-SP	2425170000
UC20-WL2000-AC-CAN	2928020000	Plug-in unit UR20-PK-1334940000-SP	2425170000
		PCB plug-in connector for CAN interface B2CF 3.50/06/180LR SN OR BX	1278050000
UC20-WL2000-IOT	1334990000	Plug-in unit UR20-PK-1334940000-SP	2425170000

ANNEX

Examples of module position coding	**A-2**
Breakdown of Serial Numbers	**A-4**
Service	**A-5**

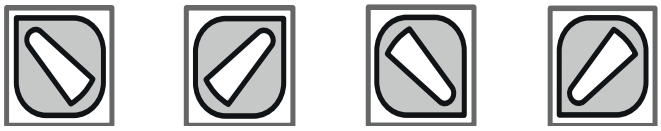
Examples of module position coding

The incorrect insertion of electronic units can be prevented if the base modules are given coding elements KOSM BHZ5.00 (Order No. 1483050000)
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

	Coding position			
Code	**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
53	3	1	0	Power-feed module output 2DI-SIL
60	3	2	3	Potential distributor +
61	3	3	0	Potential distributor –
62	3	3	1	Potential distributor FE (16AUX-FE)

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

Breakdown of Serial Numbers

Position	1	2		3		4		5	6	7	8	9	10	11	12	13	14	15
Year	Code		Month	Code	Day	Code	Production plant	Code		Product family code				Serial numbers				
2013	A	N	January	1	1	1		0	**1**	**P**	**C**	**7**	**5**	**0**	**0**	**1**	**0**	**1**
2014	A	O	February	2	2	2		0	2									
2015	A	P	March	3	3	3		0	3									
2016	A	Q	April	4	4	4		0	4									
2017	A	R	May	5	5	5		0	5									
2018	**A**	**S**	June	6	6	6		0	6									
2019	A	T	**July**	**7**	7	7		0	7									
2020	A	U	August	8	8	8		0	8									
2021	A	V	September	9	9	9		0	9									
2022	A	W	October	O	10	A		1	0									
2023	A	X	November	N	11	B		1	1									
2024	A	Y	December	D	12	C		1	2									
2025	A	Z			13	D		1	3									
2026	B	A			14	E		1	4									
2027	B	B			15	F		1	5									
2028	B	C			16	G		1	6									
2029	B	D			**17**	**H**		1	7									
2030	B	E			18	I		1	8									
2031	B	F			19	J		1	9									
2032	B	G			20	K		**2**	0									
2033	B	H			21	L		2	1									
2034	B	I			22	M		2	2									
2035	B	J			23	N		2	3									
2036	B	K			24	O		2	4									
2037	B	L			25	P		2	5									
2038	B	M			26	Q		2	6									
2039	B	N			27	R		2	7									
2040	B	O			28	S		2	8									
2041	B	P			29	T		2	9									
2042	B	Q			30	U		3	0									
2043	B	R			31	V		3	1									
2044	B	S																
...																		
2052	C	A																
2053	C	B																
...																		

Example: AS7H21PC7500101
Date: July 17, 2018
Production plant: Weidmüller plant
Product family: u-control web

Service

If you have any questions regarding the products described, please contact your responsible country representatives.

You can find all Weidmüller addresses and your local contact on the internet at: www.weidmueller.com/countries

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