Controllers u-control
Manual (Original)
Let’s connect.

UC20-SL2000-EC-CAN 2674620000
UC20-WL2000-AC 1334950000
UC20-WL2000-IOT 1334990000
UC20-SL2000-EC 2674520000
Content

1 About this documentation
1.1 Symbols and notes
1.2 Complete documentation
1.3 Hardware and software versions described

2 Safety
2.1 General safety notice
2.2 Intended use
2.3 Use in a potentially explosive atmosphere
2.4 Legal notice

3 System overview
3.1 General description of the controller
3.2 General technical data
3.3 Connector PG 1.5 mm
3.4 Mechanical fixing elements
3.5 Type plate
3.6 Battery
3.7 Memory card

4 Configuration
4.1 Connectable u-remote I/O modules
4.2 Order and arrangement of the modules
4.3 Orientation of the station
4.4 Installation distances
4.5 Use in a potentially explosive atmosphere
4.6 Use in maritime and offshore applications
4.7 "PUSH IN" system cabling
4.8 Current demand and power supply
4.9 Example calculation for the power supply
4.10 Calculation of power loss
4.11 Feedback energy in DO modules

5 Detail description of controllers
5.1 UC20-WL2000-AC
5.2 UC20-WL2000-IOT
5.3 UC20-SL2000-EC
5.4 UC20-SL2000-EC-CAN

6 Installation
6.1 Preparations for assembly
6.2 Assembling the u-control station
6.3 Wiring
6.4 Inserting the battery
6.5 Inserting the SD card
6.6 Insulation test

3 7 Earthing and shielding
3 7.1 Earthing of shielded cables
3 7.2 Potential ratios
4 7.3 Electromagnetic compatibility (EMC)
7 7.4 Shielding of cables

5 8 Commissioning using u-create web
6 8.1 Requirements
6 8.2 Starting u-create web
7 8.3 Accessing u-create online help
8 8.4 Updating the firmware
9 8.5 Resetting the controller to default settings
8 8.6 Resetting the control to default settings without password

9 Commissioning using u-create studio
9 9.1 Requirements
9 9.2 Installing the firmware on the controller
9 9.3 Starting „DevAdmin”

10 Replacing components
10 10.1 Removing/replacing the plug-in unit
10 10.2 Removing/replacing connectors
10 10.3 Removing/replacing cables
10 10.4 Replacing the battery
10 10.5 Replacing the SD card

11 Disassembly and disposal
11 11.1 Disassembling the u-remote station
11 11.2 Disposing of the u-control station

12 LED indicators and troubleshooting

13 Accessories and replacement parts
13.1 Accessories
13.2 Replacement parts

ANNEX A-1

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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.

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚠️</td>
<td>Warning against hazardous electrical voltage</td>
</tr>
<tr>
<td>⚠️</td>
<td>Warning against explosive atmospheres</td>
</tr>
<tr>
<td>⚠️</td>
<td>Warning against electrostatically charged components</td>
</tr>
<tr>
<td>⚠️</td>
<td>Warning against automatic startups</td>
</tr>
<tr>
<td>🔄</td>
<td>Instruction: observe the documentation</td>
</tr>
</tbody>
</table>

▶ 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 UC20-SL2000 controllers, please also observe the **u-create studio system manual**.
– 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 u-create web and u-create studio engineering tools contain an **integrated online help**.

All documents are available to download from the Weidmüller website.
1.3 Hardware and software versions described

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

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Controller</th>
<th>Hardware version</th>
<th>Software version</th>
</tr>
</thead>
<tbody>
<tr>
<td>1334950000</td>
<td>UC20-WL2000-AC</td>
<td>01.23.00</td>
<td>u-create web 01.12.00</td>
</tr>
<tr>
<td>1334990000</td>
<td>UC20-WL2000-IOT</td>
<td>01.23.00</td>
<td>u-create web 01.12.00</td>
</tr>
<tr>
<td>2674520000</td>
<td>UC20-SL2000-EC</td>
<td>01.23.00</td>
<td>u-create studio 1.20</td>
</tr>
<tr>
<td>2674620000</td>
<td>UC20-SL2000-EC-CAN</td>
<td>01.23.00</td>
<td>u-create studio 1.20</td>
</tr>
</tbody>
</table>
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 12), 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 calculated 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 6.2). 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 controllers are configured and programmed using the integrated web application u-create web.

The UC20-SL2000 controllers are configured and programmed using the separate engineering tool u-create studio.

The UC20 products conform to protection class 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, Division 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 exceeds 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. The UC20-SL2000 controllers are configured, parameterised and programmed using the separate engineering tool u-create studio.

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Height (H)</th>
<th>Width (W)</th>
<th>Depth (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller</td>
<td>120.0 / 4.72</td>
<td>52.0 / 2.05</td>
<td>76.0 / 2.99</td>
</tr>
<tr>
<td>I/O module</td>
<td>120.0 / 4.72</td>
<td>11.5 / 0.45</td>
<td>76.0 / 2.99</td>
</tr>
<tr>
<td>End plate</td>
<td>120.0 / 4.72</td>
<td>3.5 / 0.14</td>
<td>76.0 / 2.99</td>
</tr>
<tr>
<td>End bracket</td>
<td>120.0 / 4.72</td>
<td>8.0 / 0.32</td>
<td>36.0 / 1.42</td>
</tr>
</tbody>
</table>

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 separately, therefore a custom-fit refreshing by power-feed modules is easily 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.
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-SL2000-EC-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 General technical data

<table>
<thead>
<tr>
<th>Type of connection</th>
<th>&quot;PUSH IN&quot;</th>
<th>solid, fine-wired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration interface</td>
<td>USB 2.0</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>120.0 mm / 4.72&quot; (with release lever: 128.0 mm / 5.04&quot;)</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>52.0 mm / 2.05&quot;</td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>76.0 mm / 2.99&quot;</td>
<td></td>
</tr>
<tr>
<td>Protection class (IEC 60529)</td>
<td>IP20</td>
<td></td>
</tr>
<tr>
<td>Flammability rating UL 94</td>
<td>V-0</td>
<td></td>
</tr>
<tr>
<td>Temperature data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation (horizontal installation) for 24 V DC +20%/-15%</td>
<td>-20°C to +55°C (2×5 A power supply)</td>
<td></td>
</tr>
<tr>
<td>Operation (vertical installation) at 24 V DC +20%/-15%</td>
<td>-20°C to +50°C (2×5 A power supply)</td>
<td></td>
</tr>
<tr>
<td>Storage, transport</td>
<td>-40°C to +85°C</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>95%, non-condensing according to IEC 61131-2</td>
<td></td>
</tr>
<tr>
<td>Storage, transport</td>
<td>95%, non-condensing according to IEC 61131-2</td>
<td></td>
</tr>
<tr>
<td>Air pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td>≥ 795 hPa (altitude ≤ 2000 m) according to IEC 61131-2</td>
<td></td>
</tr>
<tr>
<td>Storage, transport</td>
<td>≥ 700 hPa (altitude ≤ 3000 m) according to IEC 61131-2</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>5 Hz ≤ f ≤ 8.4 Hz: 3.5 mm amplitude as per IEC 60068-2-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8.4 Hz ≤ f ≤ 150 Hz: 1 g acceleration as per IEC 60068-2-6</td>
<td></td>
</tr>
<tr>
<td>Shock resistance</td>
<td>15g over 11ms, half sine wave, as per IEC 60068-2-27</td>
<td></td>
</tr>
<tr>
<td>Potential isolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test voltage</td>
<td>max. 28.8 V inside a channel</td>
<td></td>
</tr>
<tr>
<td></td>
<td>500 V DC field/system (according to EN 60079-15:2010)</td>
<td></td>
</tr>
<tr>
<td>Pollution degree</td>
<td>2 (according to DIN EN 60664-1:2008)</td>
<td></td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II (according to DIN EN 50178)</td>
<td></td>
</tr>
<tr>
<td>Approvals and standards</td>
<td>cULus</td>
<td>UL 61010-2:201</td>
</tr>
<tr>
<td>Maritime und offshore applications</td>
<td>see chapter 4</td>
<td></td>
</tr>
<tr>
<td>Explosion protection</td>
<td>ATEX:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IECEx:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IEC 60079-7, Edition 5.1 (2017-08)</td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>IEC 61000 (partial standards according to the requirements of IEC 61131-2)</td>
<td></td>
</tr>
<tr>
<td>PLC</td>
<td>IEC 61131-2</td>
<td></td>
</tr>
</tbody>
</table>

You can find all product-specific technical data in the corresponding product description in chapter 5.
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).

- 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.

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 Battery

The controller can be equipped with a battery (for specification see technical data). The battery continues to supply the integrated real-time clock if the power supply is interrupted.

3.7 Memory card

The controller can be equipped with an SD card (for specification see technical data).

For the UC20-SL2000 controllers, you need the SD card to install the firmware on the controller.

You can insert an SD card into the UC20-WL2000 controllers, if you want to access the SD card via Node-RED.
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 × 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).
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.

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**Minimum distances for horizontal installation**

- 20 mm (0.79")
- 35 mm (1.38")
- 40 mm (1.57")

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**Minimum distances for vertical installation**

- 20 mm (0.79")
- 35 mm (1.38")
- 40 mm (1.57")

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

- 30 mm (1.18")
- 10 mm (0.39")

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**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")
- + 52 mm (2.05") end bracket
- + 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 protection class IP54. Sensors and actuators that are located in Zone 2 or in a safe zone can be connected. All cable glands on the housing must be approved for Ex e.

**ATEX marking (internal certification)**

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

**ATEX marking (external certification)**

© 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 website](https://www.weidmueller.com).

[Diagram showing the u-control station with safety notes and ATEX markings]
4.6 Use in maritime and offshore applications

The UC20 products described in this manual comply with the requirements of the classification society DNV/GL. 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 offshore applications:
- 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 an SD 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:

<table>
<thead>
<tr>
<th>Cross-section</th>
<th>AWG</th>
<th>Weidmüller order no.</th>
<th>Weidmüller colour code</th>
<th>Weidmüller order no.</th>
<th>DIN colour code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.14 mm²</td>
<td>26</td>
<td>9028240000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.25 mm²</td>
<td>24</td>
<td>9025780000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.34 mm²</td>
<td>22</td>
<td>9025770000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.50 mm²</td>
<td>20</td>
<td>9025870000</td>
<td>9019020000</td>
<td>9019050000</td>
<td></td>
</tr>
<tr>
<td>0.75 mm²</td>
<td>18</td>
<td>9025860000</td>
<td>9019060000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00 mm²</td>
<td>17</td>
<td>9025950000</td>
<td>9019100000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.50 mm²</td>
<td>16</td>
<td>0635100000</td>
<td>9019130000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

The u-control controllers use three internal current paths:

The \textit{I}_{\text{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 \textit{I}_{\text{SYS}} allows a u-control station to be expanded with a maximum of 64 active modules without having to refresh the power.

The \textit{I}_{\text{IN}} input current path\ supplies the input circuit of the input modules as well as the connected \textit{I}_{\text{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 \textit{I}_{\text{OUT}} output current path\ supplies the output circuit of the output modules with power, as well as the connected \textit{I}_{\text{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.

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:

<table>
<thead>
<tr>
<th>Temperature-dependent values for the power supply</th>
<th>horizontal</th>
<th>vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller power supply</td>
<td>55 °C / 2 x 5 A</td>
<td>50 °C / 2 x 5 A</td>
</tr>
<tr>
<td>Power-feed module power supply</td>
<td>55 °C / 1 x 10 A</td>
<td>50 °C / 1 x 10 A</td>
</tr>
</tbody>
</table>

ATTENTION

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

- In order to achieve specification 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.

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. A power-feed module must always be used where the current demand exceeds 10 A.

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

Calculation of the current demand for the input current

The current consumption of the 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:

\[
\begin{align*}
I_{\text{SYS}} \text{controller} &+ (I_{\text{SYS}} + I_{\text{IN}}) + (I_{\text{S}} \times g) \text{ module 1} \\
&+ (I_{\text{SYS}} + I_{\text{IN}}) + (I_{\text{S}} \times g) \text{ module 2} \\
&+ \sum ((I_{\text{SYS}} + I_{\text{IN}}) + (I_{\text{S}} \times g)) \text{ modules 3 to 4} \\
\end{align*}
\]

= Cumulative current demand

\[
\begin{align*}
I_{\text{SYS}} &\quad \text{Current consumption from the system current path} \\
I_{\text{IN}} &\quad \text{Current consumption from the input current path} \\
I_{\text{S}} &\quad \text{Power supplies for the connected sensors}
\end{align*}
\]

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:

\[
\begin{align*}
((I_{\text{IN}} + I_{\text{S}} \text{ module } x) \times g) \\
+ ((I_{\text{IN}} + I_{\text{S}} \text{ module } y) \times g) \\
+ \sum ((I_{\text{IN}} + I_{\text{S}}) \times g) \text{ n modules}
\end{align*}
\]

= 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:

\[
\begin{align*}
I_{\text{OUT}} + (I_{l} \times g) \text{ module 1} \\
+ (I_{\text{OUT}} + (I_{l} \times g) \text{ module 2} \\
+ \sum (I_{\text{OUT}} + (I_{l} \times g)) \text{ n modules}
\end{align*}
\]

= Cumulative current demand

\[
\begin{align*}
I_{\text{OUT}} &\quad \text{Module current consumption from the output current path} \\
I_{l} &\quad \text{Current demand of the connected actuators}
\end{align*}
\]

Example:
The values in the following table are used to calculate the current demand of the example station (cumulative for each module). The input current is:

<table>
<thead>
<tr>
<th>Module</th>
<th>Current Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.196 A</td>
</tr>
<tr>
<td>2</td>
<td>0.276 A</td>
</tr>
<tr>
<td>3 to 4</td>
<td>0.370 A</td>
</tr>
</tbody>
</table>

The result shows that the accumulated value for up to 12 modules remains under 10 A, and therefore a power-feed module need not be used for the input current path.

Results for the output current path:

<table>
<thead>
<tr>
<th>Module</th>
<th>Current Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.015 A</td>
</tr>
<tr>
<td>6</td>
<td>3.03 A</td>
</tr>
<tr>
<td>7</td>
<td>4.030 A</td>
</tr>
<tr>
<td>8</td>
<td>5.030 A</td>
</tr>
<tr>
<td>9</td>
<td>6.030 A</td>
</tr>
<tr>
<td>10</td>
<td>8.165 A</td>
</tr>
<tr>
<td>11 (as per PF-O)</td>
<td>2.015 A</td>
</tr>
<tr>
<td>12</td>
<td>4.030 A</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Module 11 (as per PF-O)</th>
<th>Current Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>2.015 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 12 (as per PF-O)</th>
<th>Current Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>4.030 A</td>
</tr>
</tbody>
</table>
### Example calculation for the current demand (all current values in A)

<table>
<thead>
<tr>
<th>Module no.</th>
<th>Product</th>
<th>I&lt;sub&gt;SYS&lt;/sub&gt;</th>
<th>I&lt;sub&gt;IN&lt;/sub&gt;</th>
<th>I&lt;sub&gt;OUT&lt;/sub&gt;</th>
<th>I&lt;sub&gt;S&lt;/sub&gt;</th>
<th>I&lt;sub&gt;L&lt;/sub&gt;</th>
<th>Simultaneity factor</th>
<th>Cumulative current demand of the input current path</th>
<th>Cumulative current demand of the controller output power path</th>
<th>Cumulative current demand of the PF-O output power path</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UC20-WL2000-AC</td>
<td>0.116</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.116</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>UR20-4DI-P</td>
<td>0.008</td>
<td>0.012</td>
<td>0.06</td>
<td>1</td>
<td></td>
<td></td>
<td>0.196</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>UR20-4DI-P</td>
<td>0.008</td>
<td>0.012</td>
<td>0.06</td>
<td>1</td>
<td></td>
<td></td>
<td>0.276</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>UR20-4DI-P</td>
<td>0.008</td>
<td>0.012</td>
<td>0.12</td>
<td>1</td>
<td></td>
<td></td>
<td>0.416</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>UR20-4DI-P</td>
<td>0.008</td>
<td>0.012</td>
<td>0.18</td>
<td>1</td>
<td></td>
<td></td>
<td>0.616</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>2</td>
<td>0.5</td>
<td></td>
<td></td>
<td>0.624</td>
<td>1.015</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>4</td>
<td>0.5</td>
<td></td>
<td></td>
<td>0.632</td>
<td>3.03</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>3</td>
<td>0.5</td>
<td></td>
<td></td>
<td>0.64</td>
<td>4.545</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>2</td>
<td>0.5</td>
<td></td>
<td></td>
<td>0.648</td>
<td>5.56</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>1.2</td>
<td>0.5</td>
<td></td>
<td></td>
<td>0.656</td>
<td>6.175</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>4</td>
<td>0.5</td>
<td></td>
<td></td>
<td><strong>0.664</strong></td>
<td><strong>8.19</strong></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>4</td>
<td>0.5</td>
<td></td>
<td></td>
<td>0.672</td>
<td><strong>2.015</strong></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>UR20-8DO-P</td>
<td>0.008</td>
<td>0.015</td>
<td>4</td>
<td>0.5</td>
<td></td>
<td></td>
<td><strong>0.68</strong></td>
<td><strong>4.030</strong></td>
<td></td>
</tr>
</tbody>
</table>

- \( I_{\text{SYS}} \): Current consumption from the system power supply
- \( I_{\text{IN}} \): Power consumption from input current path
- \( I_{\text{OUT}} \): Power consumption from output current path
- \( I_{\text{S}} \): Current demand of the connected sensors
- \( I_{\text{L}} \): Current demand of the connected actuators

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

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

The power loss of the controller is calculated as follows:

\[ P_{\text{controller}} = P_0 + N \times P_{\text{mod}} + I_{\text{in}} \times \Delta U_{\text{in}} + I_{\text{out}} \times \Delta U_{\text{out}} \]

- \( P_0 \): Static power loss in the controller
- \( I_{\text{SYS}} \): Current consumption from the system current path
- \( N \): Number of modules
- \( P_{\text{mod}} \): Power loss due to module supply from the system current path
- \( I_{\text{in}} \): Current fed in through the input current path
- \( \Delta U_{\text{in}} \): Voltage drop across the contacts in the input current path
- \( I_{\text{out}} \): Current fed in through the output current path
- \( \Delta U_{\text{out}} \): Voltage drop across the contacts in the output current path

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 \( (P_{\text{module}}) \) of 2 watts for the modules.

\[ P_{\text{station}} = P_{\text{controller}} + N \times P_{\text{module}} \]

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 website.

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.


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. In u-create web, the u-control station can be configured and parametrised and control applications can be programmed according to IEC 61131-3 with the additional 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.

![Controller UC20-WL2000-AC (Order no. 1334950000)](image)

### Status indicators

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR</td>
<td>Power LED</td>
<td>green: supply voltage present, firmware is running</td>
</tr>
<tr>
<td>SF</td>
<td>System failure</td>
<td>red: serious system failure</td>
</tr>
<tr>
<td>BF</td>
<td>Bus failure</td>
<td>green: communication with modules OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red: communication error with module or no modules connected</td>
</tr>
<tr>
<td>MT</td>
<td>Maintenance</td>
<td>green flashing twice: operating system is running</td>
</tr>
<tr>
<td>RUN/STOP</td>
<td>Controller status</td>
<td>off: no application deployed</td>
</tr>
<tr>
<td>L/A X1</td>
<td>Connection/activity</td>
<td>green: connection of controller connection 1 with an additional field device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green/yellow flashing: data being exchanged on connection 1</td>
</tr>
<tr>
<td>L/A X2</td>
<td>Connection/activity</td>
<td>green: connection of controller connection 2 with an additional field device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green/yellow flashing: data being exchanged on port 2</td>
</tr>
</tbody>
</table>

LED Status indicators UC20-WL2000-AC, for error messages see Chapter 12
### LED indicators UC20-WL2000-AC, for error messages, see Chapter 12

<table>
<thead>
<tr>
<th>Controller power supply LED</th>
<th>Green: supply voltage &gt; 18 V</th>
<th>Red: at least one current path &lt; 18 V</th>
</tr>
</thead>
</table>

### 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

---

**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!
5 Detail description of controllers | UC20-WL2000-AC

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

#### System data

<table>
<thead>
<tr>
<th>Connection</th>
<th>2 x RJ-45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of modules</td>
<td>max. 64 active</td>
</tr>
<tr>
<td>Configuration interface</td>
<td>Micro USB 2.0</td>
</tr>
<tr>
<td>Processor</td>
<td>Dual Core ARM A9, 624 MHz</td>
</tr>
<tr>
<td>Memory</td>
<td>512 MB RAM, 4 GB flash</td>
</tr>
<tr>
<td>Retain memory</td>
<td>128 KB NV-RAM</td>
</tr>
<tr>
<td>Memory card (not included)</td>
<td>microSD (max. 32 GB, NTFS not supported)</td>
</tr>
<tr>
<td>Battery (not included)</td>
<td>Lithium button cell CR1220</td>
</tr>
</tbody>
</table>

#### 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\text{SYS} | < 116 mA |

#### Weight

| Weight (operational status) | 223 g |

#### General data, see Section 3.2

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-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.

### Status indicators

| LED Status indicators UC20-WL2000-IOT, for error messages see Chapter 12 |
|-------------------|-----------------|------------------|
| PWR               | Power LED       | green: supply voltage present, firmware is running |
| SF                | System failure  | red: serious system failure |
| BF                | Bus failure     | green: communication with modules OK, red: communication error with module or no modules connected |
| MT                | Maintenance     | green flashing twice: operating system is running |
| 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 |
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 12

**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!
5 Detail description of controllers | UC20-WL2000-IOT

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

<table>
<thead>
<tr>
<th>System data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
<td>2 x RJ-45</td>
</tr>
<tr>
<td><strong>Number of modules</strong></td>
<td>max. 64 active</td>
</tr>
<tr>
<td><strong>Configuration interface</strong></td>
<td>Micro USB 2.0</td>
</tr>
<tr>
<td><strong>Processor</strong></td>
<td>Dual Core ARM A9, 624 MHz</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>512 MB RAM, 4 GB flash</td>
</tr>
<tr>
<td><strong>Retain memory</strong></td>
<td>128 KB NV-RAM</td>
</tr>
<tr>
<td><strong>Memory card (not included)</strong></td>
<td>microSD (max. 32 GB, NTFS not supported)</td>
</tr>
<tr>
<td><strong>Battery (not included)</strong></td>
<td>Lithium button cell CR1220</td>
</tr>
</tbody>
</table>

### Supply

<table>
<thead>
<tr>
<th>Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply voltage for system and inputs</strong></td>
<td>24 V DC +20%/-15%</td>
</tr>
<tr>
<td><strong>Supply voltage for outputs</strong></td>
<td>24 V DC +20%/-15%</td>
</tr>
<tr>
<td><strong>Max. feed-in current for input modules</strong></td>
<td>5 A</td>
</tr>
<tr>
<td><strong>Max. feed-in current for output modules</strong></td>
<td>5 A</td>
</tr>
<tr>
<td><strong>Current consumption from system current path I_{SYS}</strong></td>
<td>&lt; 116 mA</td>
</tr>
</tbody>
</table>

### Weight

<table>
<thead>
<tr>
<th>Weight</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight (operational status)</strong></td>
<td>223 g</td>
</tr>
</tbody>
</table>

### General data, see Section 3.2

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.
5.3 UC20-SL2000-EC

Up to 64 active u-remote modules can be connected via the u-remote system bus to the UC20-SL2000-EC controller. The controller has two Ethernet connections for integration into the existing network architecture or HMI connections.

The controller can be configured as a EtherCAT master.

The u-control station can be configured and parametrised and controlling applications can be programmed using the engineering tool u-create studio (according to IEC 61131-3, additional programming languages: C and C++)

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.

Status indicators

<table>
<thead>
<tr>
<th>LED</th>
<th>Status Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR</td>
<td>Power LED</td>
<td>Green: supply voltage present, firmware is running</td>
</tr>
<tr>
<td>SF</td>
<td>System failure</td>
<td>Red: system bus failure</td>
</tr>
<tr>
<td>BF</td>
<td>Bus failure</td>
<td>Red: field bus failure</td>
</tr>
<tr>
<td>MT</td>
<td>Maintenance</td>
<td>Yellow: communication error with module</td>
</tr>
</tbody>
</table>
| RUN | Controller status | Green: application running  
        Green flashing: application stopped  
        Yellow: operating system running  
        Yellow flashing: system update running  
        Red: serious system failure |
| 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 connection 2 |
LED indicators UC20-SL2000-EC, for error messages see Chapter 12

**Controller power supply LED**
- Green: supply voltage > 18 V
- Red: at least one current path < 18 V

**LED indicators UC20-SL2000-EC, for error messages see Chapter 12**

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

**Connection diagram UC20-SL2000-EC**

**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!
5 Detail description of controllers | UC20-SL2000-EC

Block diagram UC20-SL2000-EC
### Technical data UC20-SL2000-EC (Order No. 2674520000)

<table>
<thead>
<tr>
<th>System data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
</tr>
<tr>
<td><strong>Number of modules</strong></td>
</tr>
<tr>
<td><strong>Configuration interface</strong></td>
</tr>
<tr>
<td><strong>Processor</strong></td>
</tr>
<tr>
<td><strong>Memory</strong></td>
</tr>
<tr>
<td><strong>Retain memory</strong></td>
</tr>
<tr>
<td><strong>Memory card (not included)</strong></td>
</tr>
<tr>
<td><strong>Battery (not included)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply voltage for system and inputs</strong></td>
</tr>
<tr>
<td><strong>Supply voltage for outputs</strong></td>
</tr>
<tr>
<td><strong>Max. feed-in current for input modules</strong></td>
</tr>
<tr>
<td><strong>Max. feed-in current for output modules</strong></td>
</tr>
<tr>
<td><strong>Current consumption from system current path I_{SYS}</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight (operational status)</strong></td>
</tr>
</tbody>
</table>

General data, see Section 3.2
5.4 UC20-SL2000-EC-CAN

Up to 64 active u-remote modules can be connected via the u-remote system bus to the UC20-SL2000-EC-CAN controller. The controller has two Ethernet connections for integration into the existing network architecture or HMI connections.

The controller has a CAN interface. For information regarding the CAN-based communication protocols, which are supported by the controller, please refer to the documentation for the u-create studio software.

The controller can be configured as a EtherCAT master.

The u-control station can be configured and parametrised and controlling applications can be programmed using the engineering tool u-create studio (according to IEC 61131-3, additional programming languages: C and C++)

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.

Controller UC20-SL2000-EC-CAN (Order No. 2674620000)
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-SL2000-EC-CAN for error messages see Chapter 12

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-SL2000-EC-CAN
### Technical data UC20-SL2000-EC (Order No. 2674520000)

<table>
<thead>
<tr>
<th>System data</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection</strong></td>
</tr>
<tr>
<td><strong>Number of modules</strong></td>
</tr>
<tr>
<td><strong>Configuration interface</strong></td>
</tr>
<tr>
<td><strong>Processor</strong></td>
</tr>
<tr>
<td><strong>Memory</strong></td>
</tr>
<tr>
<td><strong>Retain memory</strong></td>
</tr>
<tr>
<td><strong>Memory card (not included)</strong></td>
</tr>
<tr>
<td><strong>Battery (not included)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply voltage for system and inputs</strong></td>
</tr>
<tr>
<td><strong>Supply voltage for outputs</strong></td>
</tr>
<tr>
<td><strong>Max. feed-in current for input modules</strong></td>
</tr>
<tr>
<td><strong>Max. feed-in current for output modules</strong></td>
</tr>
<tr>
<td><strong>Current consumption from system current path I_{SYS}</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight (operational status)</strong></td>
</tr>
</tbody>
</table>

| General data, see Section 3.2 |
6 Installation

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 protection class IP20.

Environmental conditions

Make sure that the permitted environmental conditions for installation and operation are observed (see the general technical data in section 3.2).

DIN rail

The controller is designed to be installed on a DIN rail (35 × 7.5 mm or 35 × 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.

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!

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.

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.
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 protection class IP54. Sensors and actuators that are located in Zone 2 or in a safe zone can be connected. All cable glands on the housing must be approved for Ex e.

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.

Installation position

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

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).
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 x 40 mm (1.57") distances at top and bottom
= 200 mm (7.87")

Width:
- 8 mm (0.31"
- + 52 mm (2.05") end bracket
- + n x 11.5 mm (0.45") controller
- + 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 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).

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

Attach 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:

<table>
<thead>
<tr>
<th>Cross-section</th>
<th>AWG</th>
<th>Weidmüller order no.</th>
<th>Weidmüller colour code</th>
<th>Weidmüller order no.</th>
<th>DIN colour code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.14 mm²</td>
<td>26</td>
<td>9028240000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.25 mm²</td>
<td>24</td>
<td>9025760000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.34 mm²</td>
<td>22</td>
<td>9025770000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.50 mm²</td>
<td>20</td>
<td>9025870000</td>
<td></td>
<td>9019020000</td>
<td></td>
</tr>
<tr>
<td>0.75 mm²</td>
<td>18</td>
<td>9025860000</td>
<td></td>
<td>9019050000</td>
<td></td>
</tr>
<tr>
<td>1.00 mm²</td>
<td>17</td>
<td>9025950000</td>
<td></td>
<td>9019100000</td>
<td></td>
</tr>
<tr>
<td>1.50 mm²</td>
<td>16</td>
<td>0635100000</td>
<td></td>
<td>9019130000</td>
<td></td>
</tr>
</tbody>
</table>

**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°).

- Insert the battery as shown with the positive terminal to the left.

- Close the connector frame.
6.5 Inserting the SD card

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

- Insert the SD card as shown.

- 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 to 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).
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.

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.

Shielding of cables increases 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.
In practice, the shield is still often twisted and connected to a terminal point. There is very high attenuation (voltage drop) on these connections, especially for high-frequency interference. Therefore, this type of shielding should not be used, even for short cable lengths. The shielding of the cable is practically negated and can, at best, be helpful for low-frequency interference. We recommend that there is a large amount of surface contact with the braided shield of the cable.

There are generally four distinct types of coupling:

- Galvanic coupling
- Capacitive coupling
- Inductive coupling
- Radiation coupling

These types of interference usually occur mixed together, but they can be categorised as follows:

- Electromagnetic fields
- Ripple voltage (50 Hz)
- Lightning
- Interference pulses (current, voltage)
- Transient surge voltages
- Radio interference
- ESD (electrostatic discharge)
- Burst
- Mains feedback

Another area of concern as regards shield contact is the “flow” within the conductor. Temperature changes caused by the current lead to changes in the conductor cross-section. A rigid contact can therefore only be partially effective. A self-adjusting contact is what is really required. Weidmüller’s clamping bracket products (KLBÜ series) provide the perfect solution to meet this challenge.
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.

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.
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 interference potential should be encapsulated if necessary

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.
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 mm², 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 decoupling of interference fields in cables, only shielded cables made from well-conducting material (copper or aluminium) with braided shielding and a coverage of at least 80% should be used in the design of a cable shield.

Only when a cable shield is connected to the local reference potential on both sides is it possible to achieve optimal shielding against electric and magnetic fields. Exceptions are possible, for example, with high-impedance, symmetrical or analogue signal cables. If a shield is attached on only one side, this merely achieves an isolation against electric fields.

**ATTENTION**

**Material damage!**
Requirements for effective shielding design:
- The shield connection to the shield bus should be low impedance
- The shield must be connected directly at its entrance into the system
- Keep cable ends as short as possible
- Do not use cable shields for equipotential bonding

When connecting a data cable using a sub-D connector, the connection must be made through the connector's shield collar and never through pin 1.

The data cable’s shield must be attached to the shield bus with the insulation stripped away. The shield is to be connected and attached with clamping brackets or similar metal fixing devices. The shield bus must be connected to the reference potential surface through a low impedance (e.g. fastening point with a separation of 10 to 20 cm). The brackets must surround and make contact with a large part of the shield.

Isolation of the cable shield should be avoided. Instead, it should be routed into the system (for example, the switch cabinet) up to the interface connection.

**ATTENTION**

Shielding of field bus cables
When shielding field-bus cables, the installation guidelines for the respective field buses must be observed. (See the websites of the field bus organisations.)

**ATTENTION**

**Material damage!**
If it is only possible to have a one-sided shield connection for reasons specific to the circuit or equipment, the second side of the cable shield can be routed to the local reference potential via a capacitor (with short connections). To prevent disruptive discharges when interference pulses occur, a varistor or a resistor can also be wired in parallel to the capacitor.

As an alternative, a doubled version (galvanically isolated) can be used, whereby the inner shield is connected on one side and the outside shield is connected on both sides.

**ATTENTION**

**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 mm² If the cable is greater than 200 m in length, a cross-section of at least 25 mm² 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

### 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.
  - For the port to which the controller is connected, the L/A LED lights up green.
- On the modules, the Status LED 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 Starting u-create web

You can access 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: 192.168.10.202
  - Ethernet access: 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.

- Click Accept license agreement, to proceed to the login page.
Your login details are requested.

The following login data are then requested:
Username: admin
Password: Detmold

▶ Enter the username and password and confirm.

The u-create web starting page is displayed.

In order to prevent unauthorised access you should change the login data immediately. Observe the individual data security regulations of your company.

▶ Change the password in the menu Settings/Change password.

8.3 Accessing u-create online help

The built-in online help describes how to operate u-create.

On the starting page, click Help.

The u-create web online help opens in a new browser tab.
8.4 Updating the firmware

The current firmware of the controller can be downloaded from the Weidmüller website.

1. On the starting page, click **Settings**.
2. Click **Firmware update**. A dialogue window opens.
3. Click **OK**. The connection to u-create is interrupted, the controller restarts, and the page **SWUpdate** is displayed in the browser.

If you are not automatically directed to the **SWUpdate** page, simply reload the page.

- Drag the software update file into the dialogue window. The upload then commences. The controller is subsequently restarted.
8.5 Resetting the controller to default settings

The following data are reset:
- The current runtime application is removed.
- The controller is restarted.
- The IP address is reset to the standard IP address.
- The working copy is deleted.

▶ On the starting page, click Settings.
▶ Click Factory reset.

A dialogue window opens.

▶ Click OK.

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

8.6 Resetting the control 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. To do this you need physical access to the u-control station.

▶ 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 screen, click Forgot password?. A warning appears.

▶ Click Restore u-control.

The controller is reset to factory settings. The controller is subsequently restarted.
9 Commissioning using u-create studio

### 9.1 Requirements

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

- UC20-SL2000-EC
- UC20-SL2000-EC-CAN

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

- The u-control station must be completely assembled and wired up.
- The runtime license of the controller is activated.
- u-create studio is installed on a PC.
- The u-create studio license is activated for this PC.
- The PC has a slot for a microSD card.
- PC and controller are in the same network.

### 9.2 Installing the firmware on the controller

The UC20-SL2000 controllers do not have any firmware installed on delivery except for the hardware-related software. You must first create the firmware in u-create studio as a target and load it onto the controller via SD card.

- Please observe the integrated online help in u-create studio when creating targets.

- Start u-create studio.
- Create a new project.
- Insert a microSD card into the PC.
- Create a new target for the controller and save the target on the SD card.
- Remove the SD card from the. Be careful that the storage medium is ejected safely.
- Switch off the power supply of the controller.
- Open the connector frame of the controller.
- Insert the SD card into the designated slot.
- Close the connector frame.
- Switch on the power supply of the controller.

The firmware is installed to the controller. The MT LED is flashing yellow during the installation. After successful installation of the firmware, the MT LED lights up green twice at regular intervals. The RUN LED changes to green.

### 9.3 Starting „DevAdmin“

With the DevAdmin web application, UC20-SL2000 controllers are displayed on a connected PC. With DevAdmin, you can perform the following functions for test purposes, during commissioning or in case of service:

- Access information about the status of the controller
- Editing network settings and time settings
- Creating long-term data recordings
- Activating the runtime license of the device

- For the operation of DevAdmin please refer to the u-create system manual.

- Open a web browser.
- In the address bar, enter the IP address of the controller.
  - Ethernet access: 192.168.101.100
DevAdmin is started. You will be asked to enter your login data.
The following login data is valid on delivery:
Username: Administrator
Password: tobechanged

Login data (on delivery)

- Enter the username and password and confirm the entry.

The Diagnostic view of DevAdmin is displayed.
10 Replacing components

10.1 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!

- 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.

- Unlock the connector frame.

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

Unlocking the connector frame
10.2 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.
### 10.3 Removing/replacing cables

#### WARNING

<table>
<thead>
<tr>
<th>Explosion risk!</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

#### WARNING

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<tr>
<th>Operation of the machine/system can be disrupted!</th>
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<tbody>
<tr>
<td>▶ 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!</td>
</tr>
</tbody>
</table>

#### WARNING

<table>
<thead>
<tr>
<th>Dangerous contact voltage!</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Prior to removing modules, the u-control station must be completely de-energised (supply of the field bus coupler and all external feed-in).</td>
</tr>
<tr>
<td>▶ Make sure that the place of installation (switch cabinet etc.) has been disconnected from the power supply.</td>
</tr>
</tbody>
</table>

#### ATTENTION

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>The components can be destroyed by electrostatic discharge.</td>
</tr>
<tr>
<td>▶ Please make sure that personnel and work equipment are adequately earthed!</td>
</tr>
</tbody>
</table>

#### ATTENTION

<table>
<thead>
<tr>
<th>The product can be destroyed by overcurrent!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentials may only be disconnected either simultaneously or in the correct order.</td>
</tr>
<tr>
<td>▶ At the controller as well as at power-feed modules always disconnect the 24 V supply (red pusher) first, before you disconnect the GND potential (blue pusher)!</td>
</tr>
</tbody>
</table>

- Using a 3-mm screwdriver, push in the pusher adjacent to the cable to be removed and pull the wire out.
- Release the pusher.
- Insert the new wire into the opening. To do so, you do not need to push in the pusher.
10.4 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°).

- 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.

Opening the connector frame

Inserting the battery
10.5 Replacing the SD 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 SD 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 SD card in order to unlock it.
- Remove the old SD card.
- Insert the new SD card.

**Inserting the SD card**

- Close the connector frame.

Make sure that you remove all sensitive data from the SD card before disposing of it.
11 Disassembly and disposal

11.1 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 SD card from the controller.
▶ Unfasten the mounting screw on the left-hand end bracket and remove it.
▶ Please observe the instructions for proper disposal.

11.2 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 SD card before disposing of it.

You can find the address of your respective country representative at the Weidmüller website.
# 12 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 all Weidmüller addresses and your local contact on the Internet at [www.weidmueller.com](http://www.weidmueller.com). Weidmüller does not assume any liability if the base or electronic module has been tampered with!

<table>
<thead>
<tr>
<th>Controller/indicator</th>
<th>LED</th>
<th>Status</th>
<th>Recommended action</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC20-WL2000-AC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power LED</strong></td>
<td>PWR</td>
<td>green: supply voltage present, firmware is running</td>
<td>-</td>
</tr>
<tr>
<td><strong>System failure</strong></td>
<td>SF</td>
<td>red: serious system failure</td>
<td>Switch supply voltage off and on again and deploy application again</td>
</tr>
<tr>
<td><strong>Bus failure</strong></td>
<td>BF</td>
<td>green: communication with modules OK</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red: communication error with module or no modules connected</td>
<td>Check whether modules are mounted correctly</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>MT</td>
<td>green flashing twice: operating system is running</td>
<td>-</td>
</tr>
<tr>
<td><strong>Controller status</strong></td>
<td>RUN</td>
<td>off: no application deployed</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: application is deployed and running</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>yellow: application is deployed and stopped</td>
<td>-</td>
</tr>
<tr>
<td><strong>Connection/active connection 1</strong></td>
<td>L/A X1</td>
<td>off: no connection</td>
<td>Check Ethernet cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: connection of controller connection 1 with an additional field device</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green/yellow flashing: data being exchanged on connection 1</td>
<td>-</td>
</tr>
<tr>
<td><strong>Connection/active connection 2</strong></td>
<td>L/A X2</td>
<td>off: no connection</td>
<td>Check Ethernet cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: connection of controller connection 2 with an additional field device established</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green/yellow flashing: data being exchanged on connection 2</td>
<td>-</td>
</tr>
<tr>
<td><strong>Input supply voltage</strong></td>
<td></td>
<td>3.1 green: input current path supply voltage &gt; 18 V DC</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.2 red: input current path supply voltage &lt; 18 V DC</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4 red: internal fuse defective</td>
<td>Replace the controller</td>
</tr>
<tr>
<td><strong>Output supply voltage</strong></td>
<td></td>
<td>4.1 green: output current path supply voltage &gt; 18 V DC</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2 red: output current path supply voltage &lt; 18 V DC</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4 red: internal fuse defective</td>
<td>Replace the controller</td>
</tr>
</tbody>
</table>
### LED indicators and troubleshooting

<table>
<thead>
<tr>
<th>Controller/Indicator</th>
<th>LED</th>
<th>Status</th>
<th>Recommended action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power LED</strong></td>
<td>PWR</td>
<td>green: supply voltage present, firmware is running</td>
<td>–</td>
</tr>
<tr>
<td><strong>System failure</strong></td>
<td>SF</td>
<td>red: serious system failure</td>
<td>Switch supply voltage off and on again and deploy application again</td>
</tr>
<tr>
<td><strong>Bus failure</strong></td>
<td>BF</td>
<td>green: communication with modules OK</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red: communication error with module or no modules connected</td>
<td>Check whether modules are mounted correctly</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>MT</td>
<td>green flashing twice: operating system is running</td>
<td>–</td>
</tr>
<tr>
<td><strong>Controller status</strong></td>
<td>RUN</td>
<td>off: no application deployed</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: application is deployed and running</td>
<td>–</td>
</tr>
<tr>
<td><strong>Connection/active connection 1</strong></td>
<td>L/A X1</td>
<td>off: no connection</td>
<td>Check Ethernet cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: connection of controller connection 1 with an additional field device</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green/yellow flashing: data being exchanged on connection 1</td>
<td>–</td>
</tr>
<tr>
<td><strong>Connection/active connection 2</strong></td>
<td>L/A X2</td>
<td>off: no connection</td>
<td>Check Ethernet cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: connection of controller connection 2 with an additional field device established</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green/yellow flashing: data being exchanged on connection 2</td>
<td>–</td>
</tr>
<tr>
<td><strong>Input supply voltage</strong></td>
<td>3.1</td>
<td>green: input current path supply voltage &gt; 18 V DC</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red: input current path supply voltage &lt; 18 V DC</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td></td>
<td>3.4</td>
<td>red: internal fuse defective</td>
<td>Replace the controller</td>
</tr>
<tr>
<td><strong>Output supply voltage</strong></td>
<td>4.1</td>
<td>green: output current path supply voltage &gt; 18 V DC</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>4.2</td>
<td>red: output current path supply voltage &lt; 18 V DC</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>red: internal fuse defective</td>
<td>Replace the controller</td>
</tr>
<tr>
<td>Controller/indicator</td>
<td>LED</td>
<td>Status</td>
<td>Recommended action</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Power LED</td>
<td>PWR</td>
<td>green: supply voltage present, bootloader/firmware is running</td>
<td>–</td>
</tr>
<tr>
<td>System failure</td>
<td>SF</td>
<td>red: system bus failure</td>
<td>Read off the diagnostic message from the engineering tool and determine which further actions to take</td>
</tr>
<tr>
<td>Bus failure</td>
<td>BF</td>
<td>red: field bus failure</td>
<td>Check whether modules are mounted correctly. Check if the configured station setup matches the actual setup. Read off the diagnostic message from the engineering tool and determine which further actions to take</td>
</tr>
<tr>
<td>Maintenance</td>
<td>MT</td>
<td>yellow: communication error with module</td>
<td>–</td>
</tr>
<tr>
<td>Controller status</td>
<td>RUN</td>
<td>green: application running</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green flashing: application stopped</td>
<td>Start the application using the engineering tool</td>
</tr>
<tr>
<td></td>
<td></td>
<td>yellow: operating system running</td>
<td>Wait until the application is running</td>
</tr>
<tr>
<td></td>
<td></td>
<td>yellow flashing: system update running</td>
<td>Wait until update is finished</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red: serious system failure</td>
<td>–</td>
</tr>
<tr>
<td>Connection/active connection 1</td>
<td>L/A X1</td>
<td>off: no connection</td>
<td>Check Ethernet cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: connection of controller connection 1 with an additional field device established</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green/yellow flashing: data being exchanged on connection 1</td>
<td>–</td>
</tr>
<tr>
<td>Connection/active connection 2</td>
<td>L/A X2</td>
<td>off: no connection</td>
<td>Check Ethernet cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green: connection of controller connection 2 with an additional field device established</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>green flashing/yellow flashing: data being exchanged on connection 2</td>
<td>–</td>
</tr>
<tr>
<td>Input supply voltage</td>
<td>3.1</td>
<td>green: input current path supply voltage &gt; 18 V DC</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red: input current path supply voltage &lt; 18 V DC</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td></td>
<td>3.4</td>
<td>red: internal fuse defective</td>
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</tr>
<tr>
<td>Output supply voltage</td>
<td>4.1</td>
<td>green: output current path supply voltage &gt; 18 V DC</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>red: output current path supply voltage &lt; 18 V DC</td>
<td>Check supply voltage</td>
</tr>
<tr>
<td></td>
<td>4.4</td>
<td>red: internal fuse defective</td>
<td>Replace the controller</td>
</tr>
</tbody>
</table>
## 13 Accessories and replacement parts

### 13.1 Accessories

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Designation</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>9009030000</td>
<td>Screwdriver SDS 0.4X2.5X75</td>
<td>Unfastening conductors from PUSH IN contacts</td>
</tr>
<tr>
<td>9008320000</td>
<td>Screwdriver SDS 0.5X3.0X80</td>
<td>Assembling/disassembling an end bracket</td>
</tr>
<tr>
<td>1323700000</td>
<td>PM 2.7/2.6 MC SDR marker</td>
<td>Connection marker for a pusher, with custom printing to customer specifications</td>
</tr>
<tr>
<td>1323710000</td>
<td>PM 2.7/2.6 MC NE WS marker</td>
<td>Connection marker for a pusher, unprinted</td>
</tr>
<tr>
<td>1341610000</td>
<td>DEK 5/8-11.5 MC SDR marker</td>
<td>Module marker with custom printing to customer specifications</td>
</tr>
<tr>
<td>1341630000</td>
<td>DEK 5/8-11.5 MC NE WS marker</td>
<td>Module marker, unprinted</td>
</tr>
<tr>
<td>1339920000</td>
<td>UR20-SM-ACC swivel marker</td>
<td>Pivoting holder for module markers</td>
</tr>
<tr>
<td>1429420000</td>
<td>White thermal-transfer label for swivel markers</td>
<td>Can be printed with thermal-transfer printers</td>
</tr>
<tr>
<td>1429910000</td>
<td>Yellow thermal-transfer labels for swivel markers</td>
<td>Can be printed with thermal-transfer printers</td>
</tr>
<tr>
<td>1429430000</td>
<td>Paper labels for swivel markers</td>
<td>Can be printed with laser printers</td>
</tr>
<tr>
<td>1806120000</td>
<td>Tag holder EM 8/30 for end bracket marker</td>
<td>Marks the station at the end bracket</td>
</tr>
<tr>
<td>1045570000</td>
<td>Marker ELS 6/30, white, PA 66</td>
<td>Marking end brackets, can be printed with Weidmüller PrintJet ADVANCED</td>
</tr>
<tr>
<td>1045580000</td>
<td>Marker ELS 6/30, yellow, PA 66</td>
<td>Marking end brackets, can be printed with Weidmüller PrintJet ADVANCED</td>
</tr>
<tr>
<td>2009980000</td>
<td>Marker ELS 6/30 MM, white, polyester</td>
<td>Marking end brackets, can be printed with Weidmüller THM MMP</td>
</tr>
<tr>
<td>2010620000</td>
<td>Marker ELS 6/30 MM, yellow, polyester</td>
<td>Marking end brackets, can be printed with Weidmüller THM MMP</td>
</tr>
<tr>
<td>1607720000</td>
<td>Labels ESO 7 white, paper</td>
<td>Marking end brackets, can be printed with laser printers</td>
</tr>
<tr>
<td>1634780000</td>
<td>Labels ESO 7 yellow, paper</td>
<td>Marking end brackets, can be printed with laser printers</td>
</tr>
<tr>
<td>1670390000</td>
<td>Labels ESO 7 P white, polyester</td>
<td>Marking end brackets, can be printed with laser printers</td>
</tr>
<tr>
<td>1670400000</td>
<td>Labels ESO 7 P yellow, polyester</td>
<td>Marking end brackets, can be printed with laser printers</td>
</tr>
<tr>
<td>1483050000</td>
<td>KÖSM BHZ5.00 coding elements</td>
<td>Coding element for customised module coding</td>
</tr>
<tr>
<td>1346610000</td>
<td>UR20-EBK-ACC termination kit</td>
<td>Set with two end brackets and one end plate</td>
</tr>
<tr>
<td>1805610000</td>
<td>MEW 35/1 end bracket for vertical installation</td>
<td>Reinforced end bracket required in addition to terminal kit for vertical installation</td>
</tr>
<tr>
<td>1469340000</td>
<td>HD-Plug UR20-PG0.35</td>
<td>Plug for HD-modules (8 pieces per package)</td>
</tr>
<tr>
<td>1919990000</td>
<td>PCB plug-in connector BLZ DN5.08/05/180F GY BX PRT</td>
<td>5-pole female connector for fieldbus connection UR20-FBC-DN (10 wire connections)</td>
</tr>
<tr>
<td>1933550000</td>
<td>PCB plug-in connector BLZ DN 5.08/05/180F AU GY BX PRT</td>
<td>5-pole female connector for fieldbus connection UR20-FBC-DN (5 wire connections)</td>
</tr>
<tr>
<td>9202210000</td>
<td>multi-strippax 6-16</td>
<td>Stripping tool for conductors to be used with HD-Plugs</td>
</tr>
<tr>
<td>1525820000</td>
<td>Pressing tool PWZ-UR20-HD</td>
<td>Pressing tool for fixing HD-Plugs</td>
</tr>
<tr>
<td>1487980000</td>
<td>IE-USB-A-MICRO-1.8M</td>
<td>Connecting line, USB A to USB Micro, sheath material PVC, 1.8 m</td>
</tr>
<tr>
<td>2684400000</td>
<td>SD-CARD-8GB</td>
<td>microSD memory card (8 GB)</td>
</tr>
<tr>
<td>2684410000</td>
<td>BATTERY-CR1220-3V</td>
<td>Lithium coin cell CR1220</td>
</tr>
</tbody>
</table>
## 13.2 Replacement parts

<table>
<thead>
<tr>
<th>Controller</th>
<th>Order No.</th>
<th>Replacement part</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC20-WL2000-AC</td>
<td>1334950000</td>
<td>Plug-in unit UR20-PK-1334940000-SP</td>
<td>2425170000</td>
</tr>
<tr>
<td>UC20-WL2000-IOT</td>
<td>1334990000</td>
<td>Plug-in unit UR20-PK-1334940000-SP</td>
<td>2425170000</td>
</tr>
<tr>
<td>UC20-SL2000-EC</td>
<td>2674520000</td>
<td>Plug-in unit UR20-PK-1334940000-SP</td>
<td>2425170000</td>
</tr>
<tr>
<td>UC20-SL2000-EC-CAN</td>
<td>2674620000</td>
<td>Plug-in unit UR20-PK-1334940000-SP</td>
<td>2425170000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PCB plug-in connector for CAN interface</td>
<td>1278050000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B2CF 3.50/06/180LR SN OR BX</td>
<td></td>
</tr>
</tbody>
</table>
ANNEX

Examples of module position coding A-2
Breakdown of Serial Numbers A-4
Service A-5
The incorrect insertion of electronic units can be prevented if the base modules are given coding elements KOSMBHZ5.00 (Order No. 1483050000)

Three coding sockets each with four possible positions can be plugged into every base module. This results in a maximum of 4³ 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.

### Functionally-oriented coding

<table>
<thead>
<tr>
<th>Code</th>
<th>Coding position</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>0 0 0</td>
<td>4 digital inputs (4DI)</td>
</tr>
<tr>
<td>02</td>
<td>0 0 1</td>
<td>8 digital inputs (8DI)</td>
</tr>
<tr>
<td>03</td>
<td>0 0 2</td>
<td>16 digital inputs (16DI)</td>
</tr>
<tr>
<td>10</td>
<td>0 2 1</td>
<td>4 digital outputs (4DO)</td>
</tr>
<tr>
<td>11</td>
<td>0 2 2</td>
<td>8 digital outputs (8DO)</td>
</tr>
<tr>
<td>12</td>
<td>0 2 3</td>
<td>16 digital outputs (16DO)</td>
</tr>
<tr>
<td>13</td>
<td>0 3 0</td>
<td>2-channel PWM module (2PWM)</td>
</tr>
<tr>
<td>20</td>
<td>1 0 3</td>
<td>4 analogue inputs (4AI)</td>
</tr>
<tr>
<td>21</td>
<td>1 1 0</td>
<td>8 analogue inputs (8AI)</td>
</tr>
<tr>
<td>30</td>
<td>1 3 1</td>
<td>4 analogue outputs (4AO)</td>
</tr>
<tr>
<td>22</td>
<td>1 1 1</td>
<td>4 temperature inputs (4AAX-DIAG)</td>
</tr>
<tr>
<td>50</td>
<td>3 0 1</td>
<td>Power-feed module input (PF-I)</td>
</tr>
<tr>
<td>51</td>
<td>3 0 2</td>
<td>Power-feed module output (PF-O)</td>
</tr>
<tr>
<td>52</td>
<td>3 0 3</td>
<td>Power-feed module output 1DI-SIL</td>
</tr>
<tr>
<td>53</td>
<td>3 1 0</td>
<td>Power-feed module output 2DI-SIL</td>
</tr>
<tr>
<td>60</td>
<td>3 2 3</td>
<td>Potential distributor +</td>
</tr>
<tr>
<td>61</td>
<td>3 3 0</td>
<td>Potential distributor –</td>
</tr>
<tr>
<td>62</td>
<td>3 3 1</td>
<td>Potential distributor FE (16AUX-FE)</td>
</tr>
</tbody>
</table>
### Slot-oriented coding

<table>
<thead>
<tr>
<th>Code</th>
<th>Coding position</th>
<th>Station slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>0 0 0 1</td>
<td>1</td>
</tr>
<tr>
<td>02</td>
<td>0 0 1 2</td>
<td>2</td>
</tr>
<tr>
<td>03</td>
<td>0 0 2 3</td>
<td>3</td>
</tr>
<tr>
<td>04</td>
<td>0 0 3 4</td>
<td>4</td>
</tr>
<tr>
<td>05</td>
<td>0 1 0 5</td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>0 1 1 6</td>
<td>6</td>
</tr>
<tr>
<td>07</td>
<td>0 1 2 7</td>
<td></td>
</tr>
<tr>
<td>08</td>
<td>0 1 3 8</td>
<td></td>
</tr>
<tr>
<td>09</td>
<td>0 2 0 9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0 2 1 10</td>
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</tr>
<tr>
<td>11</td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>0 2 3 12</td>
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<td>13</td>
<td>0 3 0 13</td>
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<td>0 3 3 16</td>
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<td>19</td>
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<td>1 0 3 20</td>
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<td>22</td>
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<td>24</td>
<td>1 1 3 24</td>
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<td>25</td>
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<td>27</td>
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<td>28</td>
<td>1 2 3 28</td>
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<tr>
<td>29</td>
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<td>31</td>
<td>1 3 2 31</td>
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</tr>
<tr>
<td>32</td>
<td>1 3 3 32</td>
<td></td>
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</table>

### Slot-oriented coding

<table>
<thead>
<tr>
<th>Code</th>
<th>Coding position</th>
<th>Station slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>2 0 0 33</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>2 0 1 34</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>2 0 2 35</td>
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<tr>
<td>36</td>
<td>2 0 3 36</td>
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</tr>
<tr>
<td>37</td>
<td>2 1 0 37</td>
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<tr>
<td>38</td>
<td>2 1 1 38</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>2 1 2 39</td>
<td></td>
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<tr>
<td>40</td>
<td>2 1 3 40</td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>2 2 0 41</td>
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<td>2 2 1 42</td>
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<tr>
<td>43</td>
<td>2 2 2 43</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>2 2 3 44</td>
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# Breakdown of Serial Numbers

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- **2018 A S**
  - June | 6 | 6 | 6 | 0 | 6 |

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- **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 | 0 | 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**
  - 32 | W | 3 | 2 |

- **2045 B T**
  - 33 | X | 3 | 3 |

- **2046 B U**
  - 34 | Y | 3 | 4 |

- **2047 B V**
  - 35 | Z | 3 | 5 |

- **2048 B W**
  - 36 | A | 3 | 6 |

- **2049 B X**
  - 37 | B | 3 | 7 |

- **2050 B Y**
  - 38 | C | 3 | 8 |

- **2051 B Z**
  - 39 | D | 3 | 9 |

- **2052 C A**
  - 40 | E | 4 | 0 |

- **2053 C B**
  - 41 | F | 4 | 1 |

---

**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

Let's connect.

All orders are based on our general terms of delivery, which can be reviewed on the websites of our group companies where you place your order. On demand we can also send the general terms of delivery to you.
As experienced experts we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data. We are at home in their industries and markets and know the technological challenges of tomorrow. We are therefore continuously developing innovative, sustainable and useful solutions for their individual needs. Together we set standards in Industrial Connectivity.