

meteocontrol stations **X**-Series

Operating manual

Version 20181212



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Contact data

The manufacturer of the device described in this documentation is:

meteocontrol GmbH

Spicherer Straße 48

D-86157 Augsburg

Tel.: +49 (0) 821 3 46 66-0

Web: www.meteocontrol.com

Technical support:

Tel.: +49 (0) 821 3 46 66-88

Fax: +49 (0) 821 3 46 66-11

E-mail: technics@meteocontrol.com

Details regarding the manual

The original operating manual is written in German. All other language versions are translations of the original operating manual and are hereby identified as such.

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All information in this operating manual has been compiled and checked with the greatest care and diligence. Nevertheless, the possibility of errors cannot be entirely excluded. meteocontrol GmbH therefore cannot accept any liability for errors or any circumstances resulting from errors.

Subject to technical alterations.

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1. General notes

1.1 Safety instructions

Safety instructions warn of dangers when using the devices and explain how they can be avoided.

The safety instructions are classified according to the severity of the risk and are subdivided into four groups:

DANGER



Imminent danger

- Failure to comply with the warning notice will lead to an imminent risk of death or serious physical injury!

WARNING



Possible danger

- Failure to comply with the warning notice may lead to a risk of death or serious physical injury!

CAUTION



Hazard with a risk of material damage

- Failure to comply with the warning notice may lead to minor injuries!

ATTENTION

Risk of material damage

- Failure to comply with the warning notice will lead to material damage!

1.2 Warning symbols

Particular dangers are highlighted using warning symbols.

RISK OF ELECTRIC SHOCK



Electric shock hazard! Danger to life and limb!

- Failure to comply with the warning notice will lead to an imminent risk of serious injury or death.

1.3 Additional information



This symbol can be found next to notes, additional information and tips.

1.4 Text display

Emphasised points are shown in bold and indicate important information.

Lists are shown with bullet points (level 1) and dashes (level 2):

- List 1
 - Point A
 - Point B
- List 2

Instructions describe steps which are to be carried out in the given order.

1. Instruction 1
 2. Instruction 2
- ↳ Result of the operation

Button names are shown in capitals and in "QUOTATION MARKS".

In figures, item numbers are used to indicate components.

The legend including item numbers and descriptions of the components is shown below the figure. Alternatively, direct references to components are made in the text.

2. Advice on using the operating manual

This description is a key aid when it comes to ensuring proper operation of meteocontrol stations X-Series. It contains important information and safety notes to help you use the devices correctly, economically and in the intended manner.

This operating manual helps to avoid dangers, to reduce repair costs and downtimes, and to increase the reliability and operating life of the stations and the built-in components.

This manual is intended for persons who are responsible for planning the installation, installing, starting up, operating, and maintaining the stations.

Read this operating manual carefully and attentively before you start work on the stations. It is assumed that the reader has basic knowledge of electrical engineering, cabling, electrical components and the use of symbols in circuit diagrams.

DANGER



Danger through improper handling

- The staff responsible for the installation, operation and maintenance of the system must have read and understood this operating manual before the stations can be used safely!
- If necessary, the description and documents must be available at all times.

meteocontrol GmbH accepts no liability for personal injury, damage to property, or system malfunctions and their consequences, insofar as these result from non-observance of this operating manual.

The manual is continually updated. The most up-to-date version of this description can be found on our Internet site. www.meteocontrol.com

2.1 Warranty and liability

Details of the scope and form of the warranty as well as the warranty period are given in the meteocontrol GmbH General Terms and Conditions.

meteocontrol rejects any liability for damage arising from the non-observance of the operating manual.

This applies, in particular, for damage from:

- Unintended use
- Faulty operation
- Wrongly chosen materials and tools
- Faulty or non-executed maintenance and repairs

With Power Control, meteocontrol GmbH accepts no liability for events and occurrences outside of its control, such as:

- the correctness of control commands given by an energy supply company or failure to implement control commands that have been passed on
- hardware and/or software faults on the part of the system operator
- switching processes at the end consumer.
- Any liability for damage caused by such events and occurrences, such as lost profits, grid instability, damage to parts of the customer's system, for instance of an inverter, shall remain expressly excluded.

2.2 Additional documentation

Observance of the information contained in this operating manual does not release from also pay attention to technical documentation regarding the component parts of the stations! Please read any documentation supplied with the station relating to installed components.

Please also adhere to documentation relating to the inverter and the sensors connected to the station.

The enclosed circuit diagram and operating manual of blue'Log and MX extension modules are instrumental for connection of external devices as well as setup of the station itself.

3. Product description

3.1 Power Control Station X-Series Outdoor/Indoor



The measurement control cabinet for implementation of the grid feed-in management system in PV power plants, for indoor and outdoor use.

Actual product may vary

Fig. 1: Power Control Station X-Series

- Interface between the grid operator and your system
- blue'Logs, MX-Modules, a power quality analyser and further components can be built in depending on the grid operator's requirements
- The pre-wired components allow quick installation and commissioning
- Low-maintenance control cabinet cooling unit allows outdoor installation (only Outdoor Stations)

Overview of components in standard configuration

- Power supply unit PRO MAX 480W 24V 20A
- UPS unit CP DC UPS 24V 20A/10A
- UPS-Bat CP A BATTERY 24V DC7.2AH
- 5-port Ethernet switch
- blue'Log X-1000, X-3000 or X-6000 (optional)
- MX-Module RS485/422 (optional)
- MX-Module Multi I/O (optional)
- UMG 604 24V power quality analyser (optional)
- ALRE KTRRN-267.014 climate controller (only Outdoor Stations)
- DR.NEUMANN FR-104C control cabinet cooling unit (only Outdoor Stations)
- Circuit breakers
- SCHUKO socket
- Measuring transducer disconnect terminal blocks

3.2 Power Control Station X-Series Commercial



The measurement control cabinet for implementation of the grid feed-in management system in commercial PV power plants.

Actual product may vary

Fig. 2: Power Control Station X-Series Commercial

- Interface between the grid operator and your system
- blue'Logs, MX-Modules, energy meter and further components can be built in depending on the grid operator's requirements
- Cost-optimized all-in-one solution due to direct connection of communication lines
- Application area Indoor and Outdoor for moderate climate conditions

Overview of components in standard configuration

- Power supply unit UNO-PS/1AC/24DC/60W
- UPS with integrated power storage UNO-UPS/24DC/24DC/60W
- Top-hat rail socket (optional)
- blue'Log X-1000, X-3000 or X-6000 (optional)
- MX-Module RS485/422 (optional)
- MX-Module Multi I/O (optional)
- Transformer energy meter iEM3255 (3-phase, Modbus)
- VPN LTE Router EBW-L100
- Circuit breakers
- Measuring transducer disconnect terminal blocks

3.3 Data Station X-Series Outdoor/Indoor



The measurement control cabinet as centralised hub for data logging and processing for all system data of the PV power plant for outdoor and indoor use.

Actual product may vary

Fig. 3: Data Station X-Series

- Centralized data acquisition and communication with VCOM
- Depending on the system topology blue'Logs, MX-Modules and further components can be built in if required
- The pre-wired components allow quick installation and commissioning
- Low-maintenance control cabinet cooling unit allows outdoor installation (only Outdoor Stations)

Overview of components in standard configuration

- Power supply unit PRO MAX 480W 24V 20A
- UPS unit CP DC UPS 24V 20A/10A
- UPS-Bat CP A BATTERY 24V DC7.2AH
- 5-port Ethernet switch
- blue'Log X-1000, X-3000 or X-6000 (optional)
- MX-Module RS485/422 (optional)
- MX-Module Multi I/O (optional)
- ALRE KTRRN-267.014 climate controller (only Outdoor Stations)
- DR.NEUMANN FR-104C control cabinet cooling unit (only Outdoor Stations)
- Circuit breakers
- SCHUKO socket

3.4 Data Station X-Series Commercial



The measurement control cabinet as centralised hub for data logging and processing for all system data in commercial PV power plants.

Actual product may vary

Fig. 4: Data Station X-Series Commercial

- Centralized data acquisition and communication with VCOM
- Depending on the system topology blue'Logs, MX-Modules and further components can be built in if required
- Cost-optimized all-in-one solution due to direct connection of communication lines
- Application area Indoor and Outdoor for moderate climate conditions

Overview of components in standard configuration

- Power supply unit UNO-PS/1AC/24DC/60W
- UPS with integrated power storage UNO-UPS/24DC/24DC/60W
- Top-hat rail socket (optional)
- blue'Log X-1000, X-3000 or X-6000 (optional)
- MX-Module RS485/422 (optional)
- MX-Module Multi I/O (optional)
- Circuit breakers

4. Transportation

Every product leaves our factory in perfect electrical and mechanical condition.

On delivery, unpack the station and all accessories and check them for any damage.

WARNING



A damaged station must not be put into operation!

Transport the station using a forklift truck or pallet lift truck.

During transport, ensure the station is sufficiently secured in place in order to prevent overturning or movement. Do not encumber the station.

ATTENTION

Do not transport stations using a crane

- Using a crane can lead to damage to the station.

ATTENTION

Do not transport stations upright

- Transporting the station upright can lead to damage to the cable feedthroughs.

ATTENTION

Do not transport stations lying on the front panel

- Transporting the station lying on the front panel can lead to damage to the cabinet.

ATTENTION

Do not transport Outdoor Stations lying on the cooling unit

- Never transport Outdoor Stations lying on the cooling unit! This can damage the cooling unit.

The following images show possible options for transport of the station.

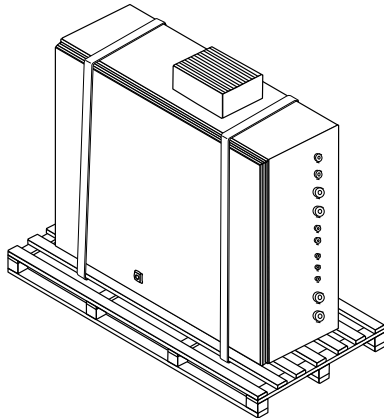


Fig. 5: Transportation lying on the side

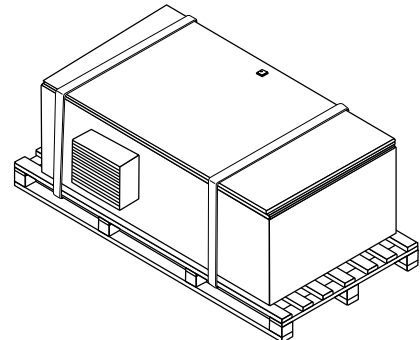


Fig. 6: Transportation lying on the rear panel

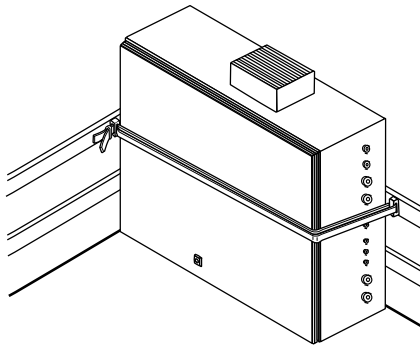


Fig. 7: Transportation without a pallet

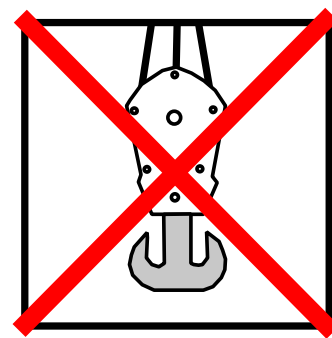


Fig. 8: Do not transport via crane

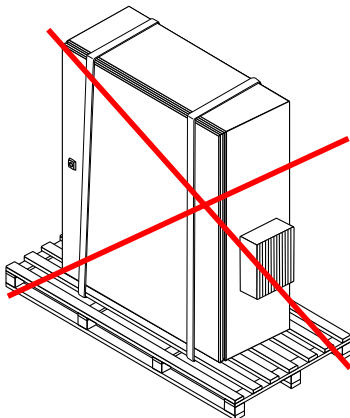


Fig. 9: Do not transport upright

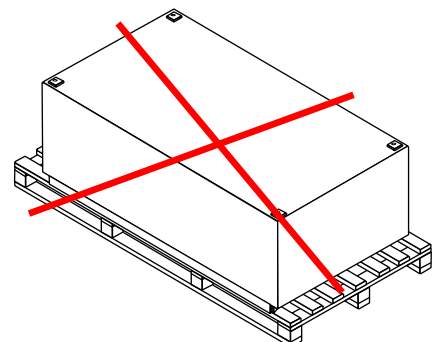


Fig. 10: Do not transport on the front plate

5. Safety instructions

During installation, operation and maintenance of the station the safety regulations contained in this chapter have to be strictly adhered to. Non-compliance can lead to injuries or fatal accidents and/or damage to the station. Reading these safety regulations before working with the station is mandatory.

5.1 Intended use

The connections for stations and modules in use may only subject to the approved signal types and strengths.

Indoor Stations may only be installed within interior zones. Outdoor Stations are suitable for both installation in- and outdoors. For specific information about individual stations please note the respective station data sheet.

5.2 Personnel

Installation, commissioning and maintenance may only be performed by a qualified electrician.

Given their specialist training, knowledge, experience and familiarity with the relevant standards and regulations, a qualified electrician is in a position not only to carry out work on electrical systems but also to recognise and avoid possible dangers unaided.

The qualified electrician must comply with the respective occupational health and safety laws in force.

Please note in particular:

- the national installation and assembly regulations (e.g. VDE in Germany),
- the generally accepted codes of practice,
- information on transport, installation, operation, service and maintenance and disposal given in this manual,
- specific values, limit values and information relating to operating and ambient conditions on type plates and in data sheets.

RISK OF ELECTRIC SHOCK



Electric shock hazard! Danger to life and limb!

- Never work on the station or its input and output cables while the station is still connected to the grid.
- The station must be disconnected before starting work on the station itself or its components. This applies particularly to the uninterruptible power supply (UPS)! Potential-free wiring in the station also requires particular attention due to possible external power sources!

5.3 General precautionary measures

- Read the safety regulations for the operational range and components installed in the station you are working on. Pay attention to the specific manuals of the station components!
- Turn off all possible power sources.
- All other possible live parts have to be protected against accidental contact.
- Special precautionary measures are required when working close to bare conductors.
- Check the system for tensionless state. Always take measurements to ensure a de-energised state.

5.4 Safety instructions for individual station components

Different components are installed in the stations depending on the type or model of station, such as power supply units, DC/DC converter, power storage, etc.

A complete list of all the components installed in your station can be found in the accompanying circuit diagram of the station. It is imperative that you also pay attention to the documentation relating to the installed components.

6. Mounting and installation

6.1 Safety instructions for installation

DANGER



Electric shock hazard! Danger to life and limb!

Fatal injuries or death from contact with cables and terminals.

- Only connect or disconnect cables while they are de-energized.
- Take measures to prevent the power cable from being reactivated.

CAUTION



Hazard with a risk of material damage

- Be careful of hot surfaces. Some parts within the control cabinet, such as the power supply cooling unit, remain hot for some time after the power supply has been switched off.
- Ensure no drill or abrasive dust can penetrate the control cabinet during installation. Electrically conductive dust inside the device may lead to damage or malfunction.
- Mounting the cabinet using riveting should be avoided.
- As far as possible, all cables should be placed directly from below via the supplied cable glands into the station.
- Not used cable glands must be sealed with plugs. The glands should be tightened with a tool to achieve leakproofness.

ATTENTION

Damage due to improperly connected cables!

Improperly connected cables can lead to damage or destruction of the measuring inputs and the device.

- Connect cables only to the respectively allocated sockets.
- Observe the polarity while connecting cables.

ATTENTION

Damage due to overvoltage!

Overvoltage or voltage peaks may damage or destroy the device.

- Protect the power supply against electrical surge.

ATTENTION

Damage due to overvoltage!

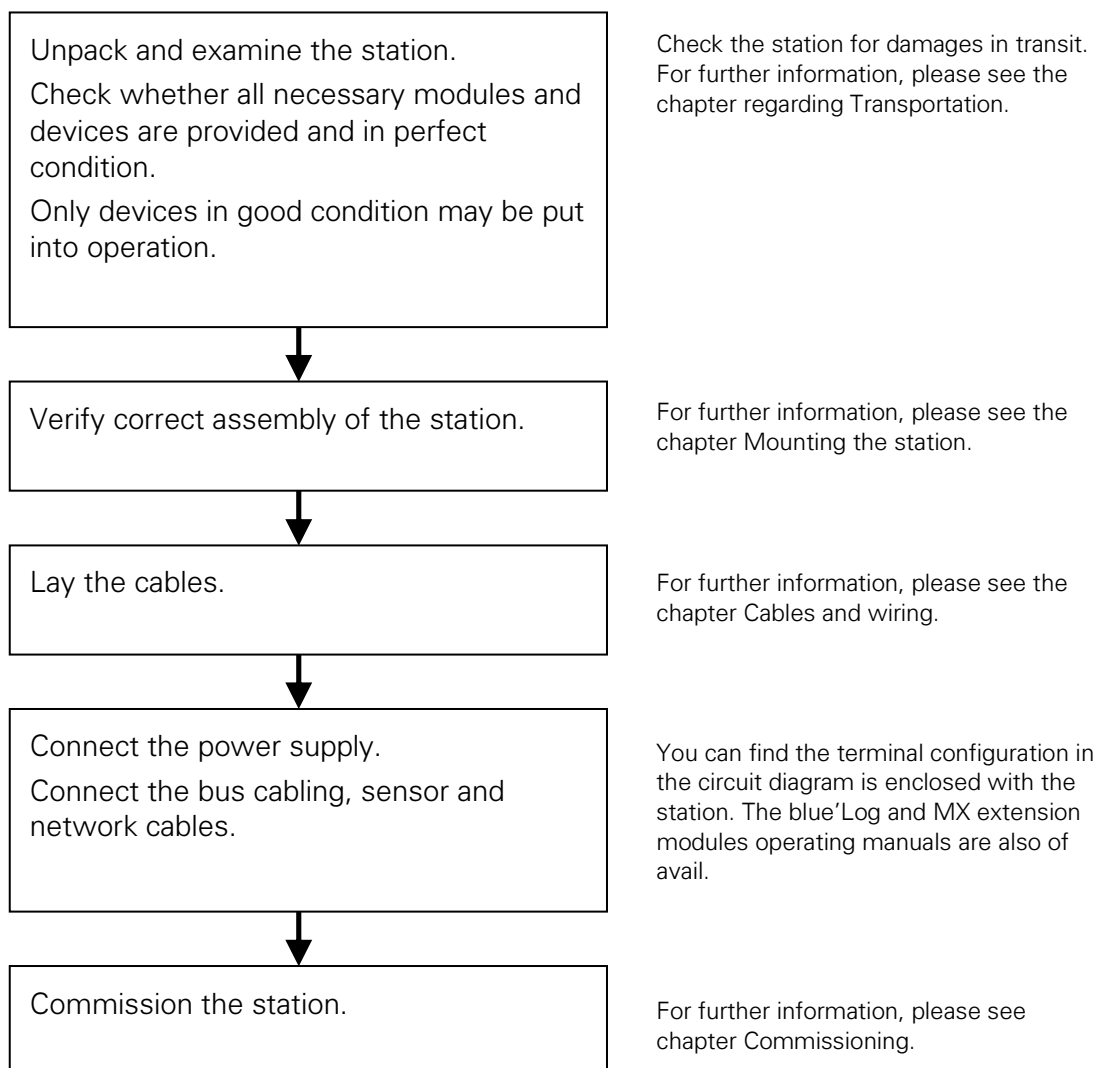
Voltages of more than 10 V DC and currents of more than 50 mA on the analogue inputs can destroy the respective measuring inputs.

- Ensure only voltages of up to 10 V DC are applied and only currents of up to 20 mA flow.

Voltages of more than 60 V DC and currents of more than 50 mA on the digital inputs can destroy the respective measuring inputs.

- Ensure only voltages of up to 60 V DC are applied and only currents of up to 50 mA flow.

6.2 Work flow for installation and commissioning



6.3 Mounting the station

The cabinet of the stations is generally suitable for installation in indoor and outdoor areas. The following rules must be observed:

- The mounting surface should be horizontal and flat as possible to prevent leakage through warping of the cabinet.

6.3.1 Power Control Station X-Series and Data Station X-Series Outdoor/Indoor

Please use the 8 mm-diameter screws to fix the station to the wall. Fasten 4 screws to the wall using the distances stated in the diagram. The position of the mounting plates (above, to the side, below) is freely selectable.

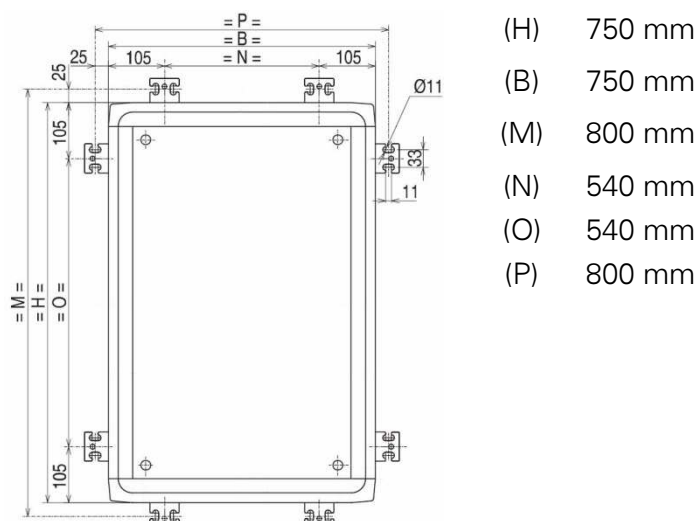


Fig. 11: Mounting the station

CAUTION



Hazard with a risk of material damage

- Screws and dowels (if necessary) have to be right dimensioned so that the weight of the stations can be worn.
- Outdoor stations shall not be exposed to direct weathering. Cabinets which are mounted on the roof or in open fields must be protected by separate rain roofs from sun and rain.
- Only mount Outdoor Stations in the shade. Direct sunlight may cause the station components to overheat.
- Mount Outdoor Stations at a minimum distance of 40 cm from the ground. Otherwise, the build-up of moisture may damage the station components. This does not apply to stations mounted with an earthing base.

6.3.2 Power Control Station X-Series and Data Station X-Series Commercial

Please use the 8 mm-diameter screws to fix the station to the wall. Fasten 4 screws to the wall using the distances stated in the diagram.

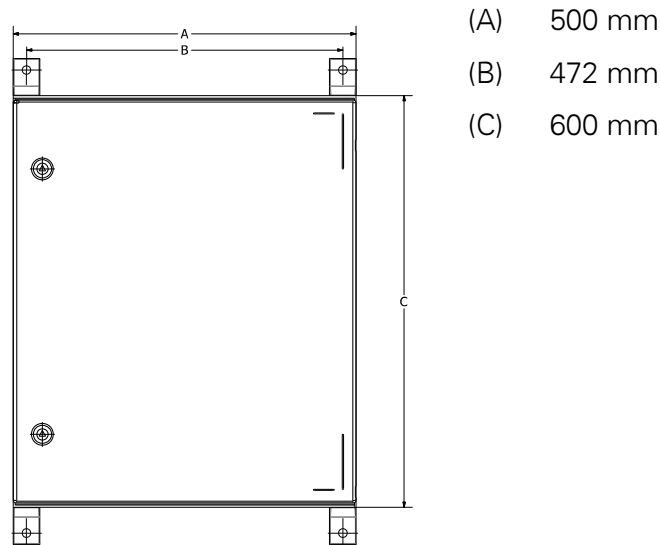


Fig. 12: Mounting the commercial station

CAUTION



Hazard with a risk of material damage

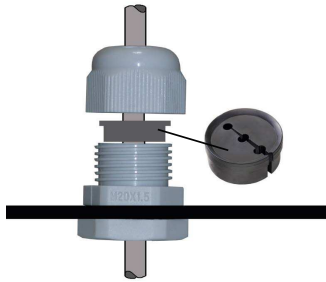
- Screws and dowels (if necessary) have to be right dimensioned so that the weight of the stations can be worn.
- Outdoor stations shall not be exposed to direct weathering. Cabinets which are mounted on the roof or in open fields must be protected by separate rain roofs from sun and rain.
- Only mount Outdoor Stations in the shade. Direct sunlight may cause the station components to overheat.
- Mount Outdoor Stations at a minimum distance of 40 cm from the ground. Otherwise, the build-up of moisture may damage the station components. This does not apply to stations mounted with an earthing base.

6.3.3 Special Model Station

The dimensions of Special Model Stations may deviate from the dimensions of the standard stations depending on the control cabinet used. Please consult the documentation of the relevant control cabinet for mounting instructions.

6.3.4 Routing the network cable into the station

Two cable glands with a split sealing are used in the control cabinet to install a network cable in the station.



Procedure:

- To lay the network cable, the cable gland must first be removed from the cabinet
- Remove the blind plug from the cable seal of the control cabinet
- Untie the cap nut and remove the sealing

Fig. 13: Cable gland with split sealing

- The cap nut needs to be placed around the network cable before the sealing. During positioning of the seal, the required length for the network cable within the station has to be taken into consideration
- The network cable with the sealing can then be reassembled in the screw connection of the control cabinet
- Finally fix the network cable by tightening the cap nut

ATTENTION

Hazard with a risk of material damage

- It is essential to keep the sealing plug within unused screw connections.

6.4 Cables and wiring

6.4.1 Cable types

Bus cabling (inverters, current sensors)

- Recommended: Data cable (twisted and shielded) Li2YCYv (TP) 2×2×0.5mm² ¹⁾
- Alternative: Network cable CAT 6-SFTP

Analogue signals (irradiance sensor, temperature sensor)

- Sensor cable LiYCY 2×2×0.5mm²

Digital signals (energy meter, telecontrol systems)

- Sensor cable LiYCY 2×2×0.5mm²

Ethernet network

- Network cable CAT 5 / CAT 6

6.4.2 Maximum permissible cable lengths

- Bus cabling (data cable RS485) 1200 m^{2) 3)}
- Sensor (voltage signal 0V – 10V) 100 m
- Sensor (current signal 4mA – 20mA) 600 m⁴⁾
- Meter 30 m
- Ethernet network 100 m³⁾

¹⁾ We recommend using the cable type UNITRONIC® Li2YCYv (TP) manufactured by Lapp Kabel, or an equivalent cable type. This cable is suitable for laying in soil.

²⁾ For longer cable lengths, repeaters must be used.

³⁾ Several, separate cables of this length require a Hub.

⁴⁾ Power supply of 24 V DC is required.



Data cables must be separated of current cables according to EN 50174-2 using metallic cable carrier.

6.4.3 Shielding

The cable shielding may only be grounded at one end of the connection.

7. Commissioning

The chapter gives details of the commissioning procedure for the station.

RISK OF ELECTRIC SHOCK



Electric shock hazard! Danger to life and limb!

- During installation and commissioning please follow the safety instructions! See chapter Safety instructions.

The station has to be installed, commissioned and maintained by a qualified electrician only.

- Make sure the station is correctly mounted
- Check if all cable connections are linked correctly. Also pay attention to the included circuit diagram as well as the blue'Log and MX extension module operating manual
- Check whether the temperature for commissioning lies within limit values.
- If the station is brought from a cold environment into the operating environment, condensation water can be occurred. Before commissioning the station therefore must be 2 hours to wait until the harmonization with the ambient temperature is finished and the station is absolutely dry.



Depending on ambient temperature, Outdoor Stations may be required to run the cooling unit continuously for some time preceding commissioning in order to regulate the internal temperature to the required values.

- Check the set switching points on the ALRE KTRRN-267.014 thermostat and, if necessary, adapt them to your location requirements (factory setting: heating switching point < 5 °C / cooling switching point > 30 °C).



By setting the cooling switching point, you significantly affect the power consumption of the control cabinet and the lifetime of the UPS battery module. Increasing the cooling switching point (higher temperature) lowers the power consumption while reducing the battery lifetime. Reducing the cooling switching point (lower temperature) increases power consumption, but also increases the battery life.

- Switch on the power supply for all components
- Wait until the blue'Log have completed the start-up phase (Power LED and Status LED glows)
- The blue'Log and the MX extension modules are then configured and operated according to the respective operating manual
- Please refer to the wiring diagram for each station for the terminal assignment



The blue'Logs installed in the Power Control Station X-Series and Data Station X-Series are already pre-configured to the circuitry of each station. The assigned IP addresses of the data loggers can be shown on the display of the respective data logger.

Alarm inputs, such as a mains power failure or disturbance to the heating/cooling system, are already parameterized. Similarly, status messages, such as battery charging mode active or battery mode active are parameterized.

The blue'Logs installed in the Special Model Station are not preconfigured. The configuration must take place on-site during start-up.

8. Care and maintenance

The station requires only little maintenance when installed in an environment according to specification. meteocontrol recommends an annual check of the station to ensure optimal operation.

Furthermore, a requalification in accordance with DIN VDE 0105 – "Operation of electrical installations" – has to be carried out.

If necessary, the cabinet interior can be cleaned using a soft brush and a vacuum cleaner. For this procedure the safety instructions specified in chapter 5 have to be observed!

8.1 Cleaning the control cabinet cooling unit (only Outdoor)

In environments with normal levels of soiling and low levels of dust, the exterior of the control cabinet cooling unit only needs to be cleaned every 6 months. During this process the cooling fins as well as the fan have to be dusted off.

When used in rooms with high levels of soiling or dust, this interval must be shortened accordingly. If the control cabinet is not dustproof, the interior of the control cabinet cooling unit also has to be checked for soiling every so often.

To clean the control cabinet cooling unit, please proceed as follows:

- Disconnect the control cabinet cooling unit from the power supply.
- Secure the fan in place, for example by placing a pencil between the rotors.
- Remove coarse soiling using a paint brush or a brush.
- Then clean the fan and the cooling unit using compressed air or water (only on the exterior). Here the fan has to be protected from too high a rotational speed due to compressed air or water, for which the pencil or similar tool is used.
- Reconnect the control cabinet cooling unit to the power supply.

9. Technical data

For technical data please consult the circuit diagram for each Station.

10. Environmental protection and disposal

Older stations no longer in serviceable condition have to be disposed of in accordance with national and local regulations for environmental protection and raw material recovery. Electronic components may not be disposed of along with household waste.

11. Appendix

11.1 Scale drawings

For further information, please see the circuit diagram for each Station.

11.2 CE certificates



EG - KONFORMITÄTSERKLÄRUNG EC DECLARATION OF CONFORMITY



Hersteller: <i>Manufacturer:</i>	meteocontrol GmbH
Anschrift: <i>Address:</i>	Spichererstrasse 48 D – 86157 Augsburg Germany
Produkt: <i>Product:</i>	Data Station X-Series Outdoor Data Station X-Series Indoor Data Station X-Series Commercial Power Control Station X-Series Outdoor Power Control Station X-Series Indoor Power Control Station X-Series Commercial

Wir erklären, dass die genannten Produkte folgenden Dokumenten und Normen entsprechen:

We declare that the products described above are in compliance with following documents and norms:

Low Voltage Directive (LVD)

Directive 2014/35/EU

Electromagnetic Compatibility (EMC)

Directive 2014/30/EU

Low-voltage switchgear and controlgear assemblies

EN 61439-1:	(2012-06)
IEC 61439-1:	(2011-08)
EN 61439-2:	(2012-06)
IEC 61439-2:	(2011-08)

Für die Geräte "blue'Log" und "MX Erweiterungsmodule", welche in den oben aufgeführten Produkten verbaut sein können, verweisen wir hiermit auf die entsprechende EG-

Konformitätserklärung der einzelnen Produkte.

For the devices "blue'Log" and "MX extension modules", which can be included in the products listed above, we refer to the corresponding EC Declaration of Conformity of the individual product.

Augsburg, 18.10.2018

Ort, Datum

place, date


Jens Wening
Technischer Direktor
Technical director

11.3 RoHS Statement



DECLARATION OF CONFORMITY

2011/65/EU (ROHS)

meteocontrol GmbH declares that all manufactured products are RoHS compliant according to the Directive 2011/65/EU of the European Parliament and the Council from 8 June 2011 on restriction of the use of certain hazardous substances in electrical and electronic appliances. This concerns the following substances whose concentrations must not be exceeded:

Lead	0.1%
Mercury	0.1%
Cadmium	0.01%
Hexavalent chromium	0.1%
Polybrominated biphenyls (PBB)	0.1%
Polybrominated diphenyl ethers (PBDE)	0.1%

Since we are guaranteed RoHS compliance by our suppliers, we, meteocontrol GmbH, can confirm with a clear conscience that all our products comply with the above mentioned Directive.

Augsburg, 18.10.2018

Place, date



Jens Wening
Technical Director

Energy&Weather¹Services

meteocontrol GmbH | Spicherer Straße 48 | 86157 Augsburg
Geschäftsführung | Martin Schneider | Robert Pfatischer¹ | Jing Nealis
Amtsgericht Augsburg | HRB 16 415 | DE 19 45 56 368
Stadtsparkasse Augsburg¹
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Spicherer Straße 48 • D-86157 Augsburg • Phone +49 (0) 821 3 46 66-88 • Fax +49 (0) 821 3 46 66-11 technics@meteocontrol.com • www.meteocontrol.com

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