

RBX1

Technical Data



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The product information, specifications, and technical data embodied in this manual represent the technical status at the time of writing and are subject to change without prior notice.

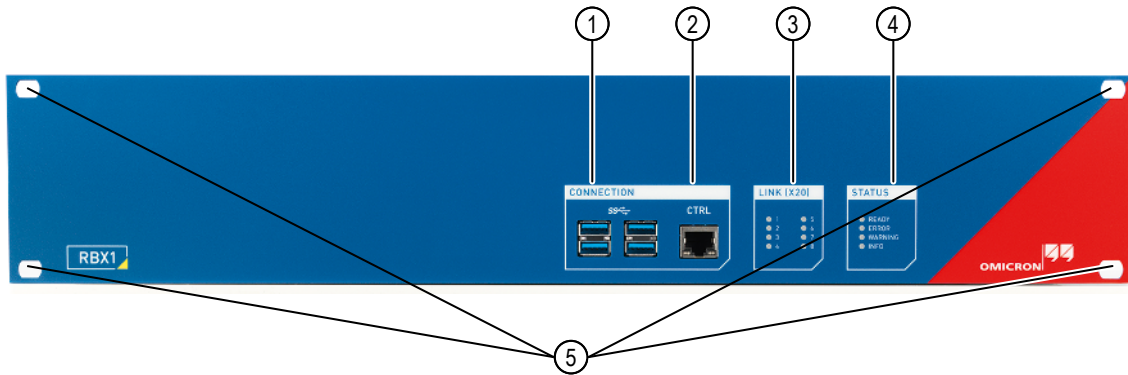
We have done our best to ensure that the information given in this manual is useful, accurate, up-to-date, and reliable. However, OMICRON does not assume responsibility for any inaccuracies which may be present.

The user is responsible for every application that makes use of an OMICRON product.

OMICRON translates this manual from the source language English into a number of other languages. Any translation of this manual is done for local requirements, and in the event of a dispute between the English and a non-English version, the English version of this manual shall govern.

1 Device overview

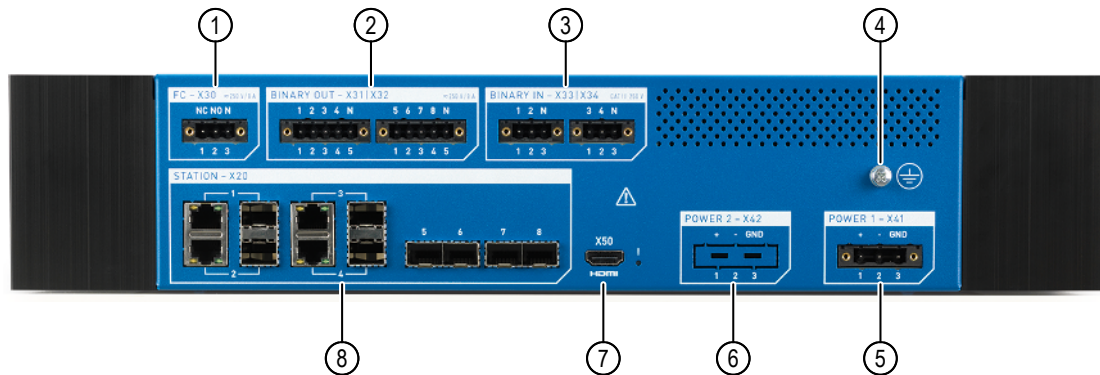
1.1 Front view



CONNECTION		
1	USB connectors	Deactivated (for future use)
2	CTRL	Network (Ethernet) connector for control and management interface
LINK (X20)		
3	Ethernet connectors indicator lights	
	Off	No link
	On	Link established, no activity
	Flashing	Link established and activity present
STATUS		
4	READY	The indicator light is on when the <i>RBX1</i> is on.
	ERROR	The indicator light signals the severity of an alert. Information on the specific alert is available in the software.
	WARNING	
	INFO	
5	Mounting holes (×4)	See section "Mounting the RBX1 in the rack" in the <i>RBX1</i> user manual.

► For technical data, see section [Connectors](#) (page 11).

1.2 Back view



FC – X30	
1	<p>Fault contact for the <i>RBX1</i> status indication</p> <p>Form C contact with Normally Closed (NC) and Normally Open (NO) contact</p> <ul style="list-style-type: none"> • X30:1: This contact is open when the device is on and functional; otherwise it is closed. • X30:2: This contact is closed when the device is on and functional; otherwise it is open.
BINARY OUT – X31 X32	
2	<p>Binary output contacts to signal different statuses of the software running on the <i>RBX1</i></p> <p>Default setting for <i>StationGuard</i>:</p> <ul style="list-style-type: none"> • X31:1: This contact is closed when there is at least one unacknowledged alert (high priority). • X31:2: This contact is closed when there is at least one unacknowledged warning (low priority).
BINARY IN – X33 X34	
3	Binary input contacts to signal different statuses to the software running on the <i>RBX1</i>
Grounding screw	
4	For connection to protective earth. See section "Connecting to ground" in the <i>RBX1</i> user manual.
POWER 1 – X41	
5	Power supply socket
POWER 2 –X42	
6	Optional second power supply socket
X50 HDMI	
7	Deactivated (for future use)
STATION – X20	
8	<p>Network (Ethernet) connectors for connection to substation</p> <p>STATION – X20:1 ... 4 are combo ports, so either RJ45 or SFP can be used.</p> <p>If both are connected, SFP is preferred (→ SFP modules (page 5)).</p> <p>The link status is indicated on the <i>RBX1</i> front panel (→ Front view (page 3)).</p>

► For technical data, see sections [Power supply](#) (page 8) and [Connectors](#) (page 11).

1.3 Accessories

1.3.1 SFP modules

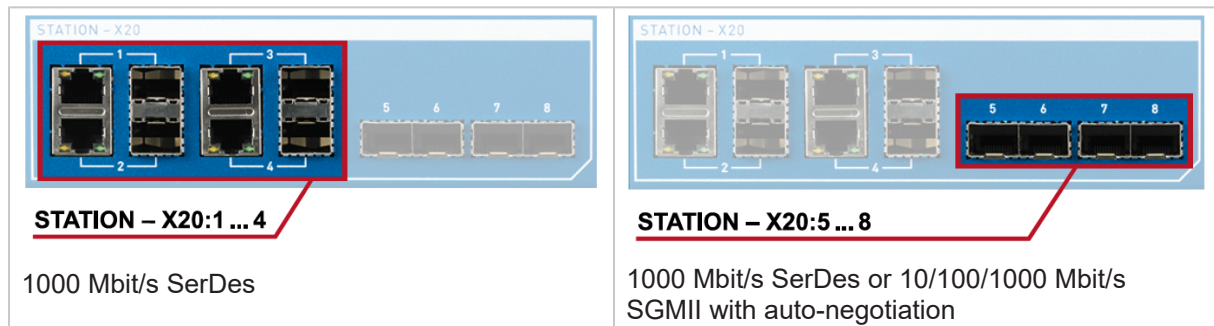
CAUTION

Eye injury due to laser radiation

If the *RBX1* is equipped with an optical SFP module, it is a product of laser class 1 (IEC 60825-1:2014) which emits invisible radiation.

- ▶ Do not look directly into the laser beam or direct it towards other people.

The **STATION – X20** connectors on the back side of the *RBX1* (→ [Back view](#) (page 4)) support modules with the following characteristics:



It is possible that modules compliant to the specifications above are incompatible with the *RBX1*. This can be the case if additional configuration data in a module's EEPROM do not match the *RBX1* SFP ports.

- ▶ To ensure compatibility, we recommend using SFP modules supplied by OMICRON (→ [SFP modules available from OMICRON](#) (page 6)).

Connecting and disconnecting SFP modules

1. Disconnect the *RBX1* from the power supply before disconnecting SFP modules.
2. Reboot the device after connecting SFP modules for the modules to work.
3. See section Connecting binary I/Os and networks for wiring instructions.

Technical Data

SFP modules available from OMICRON

Modules usable in *RBX1* station ports **STATION – X20:1 ... 8**

Module	Characteristics
SFP module for 1000Base-SX with LC connector	<ul style="list-style-type: none">• Multi-mode fiber• 850 nm wavelength• Up to 500 m (via 50/125 µm)• Up to 300 m (via 62.5/125 µm)
SFP module for 1000Base-SX with LC connector	<ul style="list-style-type: none">• Multi-mode fiber• 1310 nm wavelength• Up to 2 km (via multi-mode OM3)
SFP module for 1000Base-LX with LC connector	<ul style="list-style-type: none">• Single-mode fiber• 1310 nm wavelength• Up to 10 km (via 9/125 µm)

Modules usable in *RBX1* station ports **STATION – X20:5 ... 8**

Module	Characteristics
SFP module for 10/100/1000Base-TX (acc. to IEEE 802.3) with RJ45 connector	–
SFP module for 100Base-FX with LC connector ¹	<ul style="list-style-type: none">• Multi-mode fiber• 1310 nm wavelength• Up to 2 km (via 50/125 µm)
SFP module for 100Base-LX with LC connector ¹	<ul style="list-style-type: none">• Single-mode fiber• 1310 nm wavelength• Up to 10 km (via 9/125 µm)

¹ Operating temperature must be above 0 °C (32 °F).

1.3.2 Adapters

Mains adapter (C14)

The delivery of the *RBX1-40* and *RBX1-44* power supply options (→ [Power supply](#) (page 8)) includes a *C14* mains adapter (cable length 180 mm) designed for use in a laboratory environment.



⚠ WARNING

Death or severe injury due to arc fault or electric shock

- ▶ Only connect the *C14* mains adapter to AC supplies. It is not designed for DC supplies.
- ▶ First connect the *C14* mains adapter to the *RBX1* and tighten the screws, then connect to mains AC.

Laboratory adapter package

The *RBX1* laboratory adapter package is an optional accessory available from OMICRON.

It contains adapters to 4 mm sockets for the **FC – X30** and all **BINARY IN – X33|X34** and **BINARY OUT – X31|X32** interfaces of the *RBX1*.

⚠ WARNING

Death or severe injury due to arc fault or electric shock

- ▶ First connect the adapter to the *RBX1* and tighten the screws, then connect to the measurement/test signal.
- ▶ Outputs **FC – X30** and **BINARY OUT – X31|X32**, and inputs **BINARY IN – X33|X34** must be protected by a fuse with sufficient breaking capacity (→ [Connectors](#) (page 11)). This can also be an electronic fuse inside a laboratory supply.

2 Technical data RBX1

Computing performance	
Processors	Secure cryptoprocessor according to TPM 2.0 (ISO/IEC 11889) Quad-core processor with hardware multithreading
Memory	16 GB error-correcting code (ECC) memory 450 GB SSD
Mechanical data	
Weight	Depending on the power supply option: 6.8 kg ... 7.5 kg 15 lb ... 16.5 lb
Dimensions W × H × D	482.6 × 88.1 × 303 mm 19 × 3.5 × 11.9 in Required height in rack: 2U
Ingress protection (IEC 60529)	IP30

2.1 Power supply

The *RBX1* is available with the following power supply options:

- **RBX1-20:** 1 × power supply option A
- **RBX1-22:** 2 × power supply option A
- **RBX1-40:** 1 × power supply option B
- **RBX1-44:** 2 × power supply option B

Power supply option A: RBX1-20 and RBX1-22

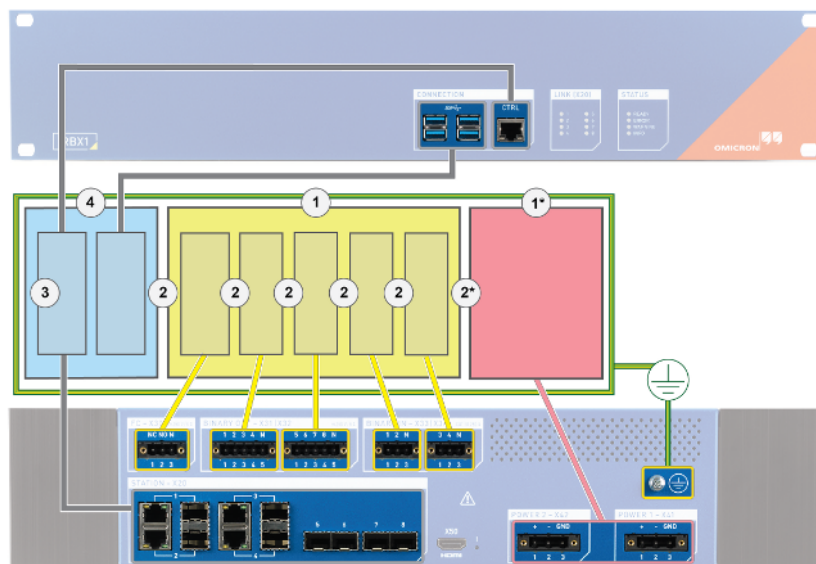
Input voltage	
Connection	PHOENIX CONTACT GMSTB 2.5/3-GF-7.62 (socket) PHOENIX CONTACT GMSTB 2.5/3-STF-7.62 (plug) 1 terminal block for each power supply Maximum conductor cross-section 2.5 mm ²
Nominal voltage (DC)	48 V ... 60 V
Maximum voltage range (DC)	44 V ... 70 V
Nominal input power	65 W
Max. start-up inrush current	< 2 A
Overvoltage category	III

Power supply option B: RBX1-40 and RBX1-44

Input voltage, single phase	
Connection	PHOENIX CONTACT GMSTB 2.5/3-GF-7.62 (socket) PHOENIX CONTACT GMSTB 2.5/3-STF-7.62 (plug) 1 terminal block for each power supply Maximum conductor cross-section 2.5 mm ²
Nominal voltage	100 V _{DC} ... 240 V _{DC} (±10 %) 100 V _{AC} ... 240 V _{AC} (±10 %)
Nominal input power	65 W
Max. start-up inrush current	< 6 A
Overvoltage category	III
Nominal frequency	50 Hz/60 Hz

2.2 Insulation coordination

The *RBX1* is a protection class I equipment according to IEC/EN 61140, with insulation designed for pollution degree 2. Different types of insulation apply to different parts of the device.



Insulation type	Device part	Power supply option	Test voltage	Impulse test voltage
Basic insulation (BI)	1*	RBX1-20/22	1350 V AC	1500 V _{peak}
		RBX1-40/44	2200 V AC	4000 V _{peak}
	1	RBX1-20/22	2200 V AC	4000 V _{peak}
		RBX1-40/44		
Reinforced insulation (RI)	2*	RBX1-20/22	2700 V AC	4000 V _{peak}
		RBX1-40/44	3250 V AC	6400 V _{peak}
	2	RBX1-20/22	3250 V AC	6400 V _{peak}
		RBX1-40/44		
Functional insulation (FI)	3	RBX1-20/22	2250 V DC	–
		RBX1-40/44		
N/A – SELV ¹	4	RBX1-20/22	–	–
		RBX1-40/44		

¹ Safety Extra Low Voltage

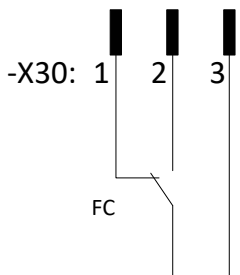
2.3 Connectors

RBX1 front

CONNECTION USB	
Type	4 × USB 3.0 (<i>SuperSpeed</i> , 5 GBit/s)
Connector	USB type A
CONNECTION CTRL	
Type	10/100/1000Base-TX, according to IEEE 802.3
Connector	RJ45
Cable type	LAN cable of category 5 (CAT5) or better
Status indication	Green indicator light: physical link present
	Yellow indicator light: network traffic on interface

Technical Data

RBX1 back

FC – X30 ¹	
Type	Potential-free contacts; software-controlled
Connection	PHOENIX CONTACT MSTB 2.5/3-GF-5.08 (socket) PHOENIX CONTACT MSTB 2.5/3-STF-5.08 (plug) Maximum conductor cross-section 2.5 mm ²
Number of binary outputs	1 form C contact with <i>Normally Closed</i> (NC) and <i>Normally Open</i> (NO) contact
Number of potential groups	1 (FC – X30) 
AC loading capacity	$V_{\max} = 250 \text{ V}$
AC breaking capacity	$I_{\max} = 8 \text{ A}$ $P_{\max} = 2000 \text{ VA}$
DC loading capacity	See Load limit breaking capacity curve for binary output relays with DC voltages (page 14)
DC breaking capacity	
Inrush current	15 A (max. 4 s at 10 % duty cycle)
Carry capacity	5 A continuous at 60 °C (140 °F)
Electrical lifetime	100 000 switching cycles at 230 V/8 A and ohmic load
Operate time ²	Max. 10 ms (no bouncing)
Release time ²	Max. 5 ms (no bouncing)
Overvoltage category	II, according to IEC 61010-1 III, according to IEC 60255-27

¹ Outputs **FC – X30** and **BINARY OUT – X31|X32** must be protected by a fuse with sufficient breaking capacity: slow-breaking fuse type, 8 A/250 V. Breaking capacity 50 kA (CAT III) can be decreased by the impedance value of the connection line.

² Relay timing without software delays.

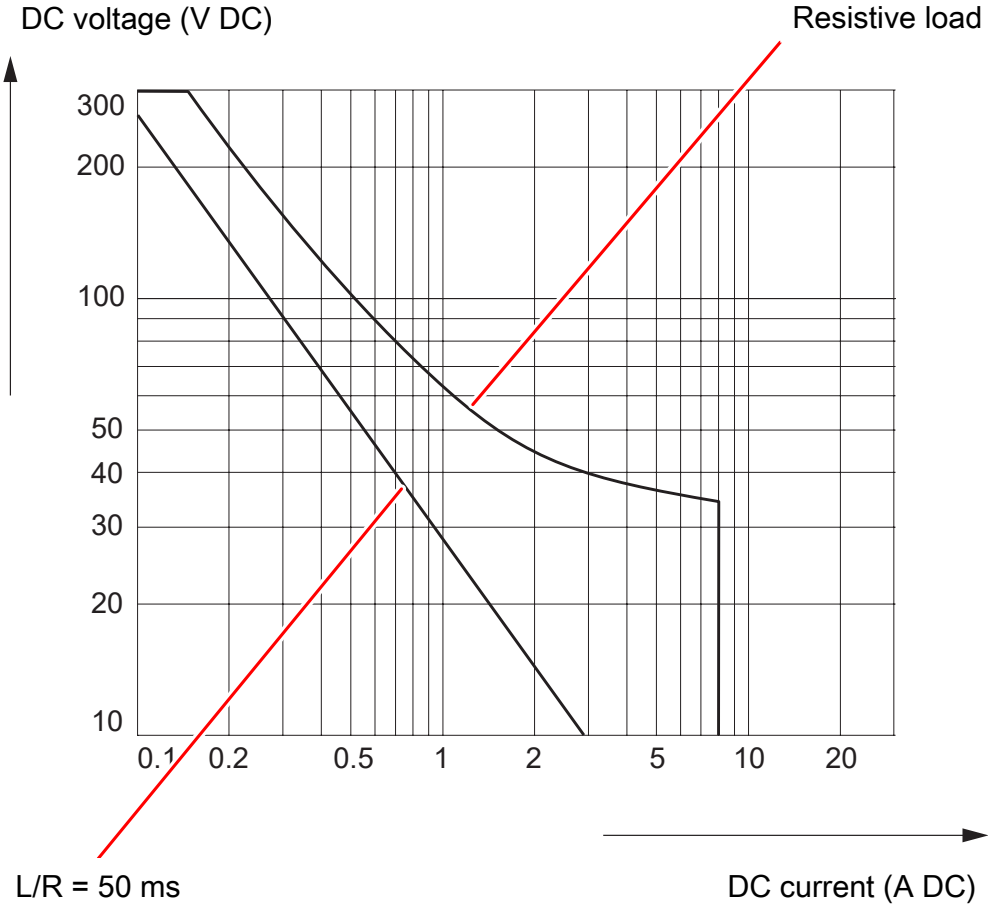
BINARY OUT – X31 X32 ¹	
Type	Potential-free contacts; software-controlled
Connection	PHOENIX CONTACT MSTB 2.5/5-GF-5.08 (socket) PHOENIX CONTACT MSTB 2.5/5-STF-5.08 (plug) 1 terminal block for each potential group; maximum conductor cross-section 2.5 mm ²
Number of binary outputs	8
Number of potential groups	2 (X31 and X32)
AC loading capacity	$V_{max} = 250 \text{ V}$
AC breaking capacity	$I_{max} = 8 \text{ A}$ $P_{max} = 2000 \text{ VA}$
DC loading capacity	See Load limit breaking capacity curve for binary output relays with DC voltages (page 14)
DC breaking capacity	
Inrush current	15 A (max. 4 s at 10 % duty cycle)
Carry capacity	5 A continuous at 60 °C (140 °F)
Electrical lifetime	100 000 switching cycles at 230 V _{AC} /8 A and ohmic load
Operate time ²	Max. 10 ms (no bouncing)
Release time ²	Max. 5 ms (no bouncing)
Overvoltage category	II, according to IEC 61010-1 III, according to IEC 60255-27

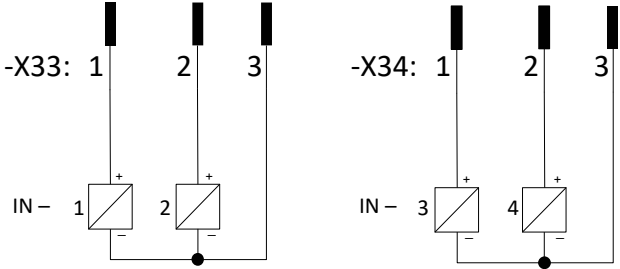
¹ Outputs **FC – X30** and **BINARY OUT – X31|X32** must be protected by a fuse with sufficient breaking capacity: slow-breaking fuse type, 8 A/250 V. Breaking capacity 50 kA (CAT III) can be decreased by the impedance value of the connection line.

² Relay timing without software delays.

Technical Data

Load limit breaking capacity curve for binary output relays with DC voltages



BINARY IN – X33 X34¹	
Connection	PHOENIX CONTACT MSTB 2.5/3-GF-5.08 (socket) PHOENIX CONTACT MSTB 2.5/3-STF-5.08 (plug) 1 terminal block for each potential group Maximum conductor cross-section 2.5 mm ²
Number of binary inputs	4
Number of potential groups	2 (X33 and X34) 
Max. input voltage	250 V CAT III
Rated input voltage	250 V
Accuracy	<5 % of reading + 250 mV
Input impedance	148 kΩ
Measurement category	CAT III/250 V _{RMS} , according to IEC 61010-2-030

¹ Inputs **BINARY IN – X33|X34** must be protected by a fuse with sufficient breaking capacity: slow-breaking fuse type, 8 A/250 V. Breaking capacity 50 kA (CAT III) can be decreased by the impedance value of the connection line.

STATION – X20:1 ... 4¹	
Type	10/100/1000Base-TX, according to IEEE 802.3
Connector	RJ45
Cable type	LAN cable of category 5 (CAT5) or better
Status indication	Green indicator light: physical link present Yellow indicator light: network traffic on interface


STATION – X20:1 ... 8	
Type	1000BASE-X, according to IEEE 802.3
Connector	SFP
Status indication	LINK (X20) (→ Front view (page 3))

¹ **STATION – X20:1 ... 4** are combo ports, so either RJ45 or SFP can be used. If both are connected, SFP is preferred.

X50 HDMI	
Type	HDMI 1.4, up to 4 096 × 2 160 at 24 Hz
Connector	HDMI type A

2.4 Environmental conditions

If the device is operated in a cabinet, make sure the temperature within the cabinet does not exceed the limits specified in this document.

-  The *RBX1* is cooled passively. We recommend leaving one rack unit (1U) free above the *RBX1*, and ventilating the rack to ensure optimal air flow

Temperature	
Operating	–20 °C ... +55 °C –4 °F ... +131 °F
Storage	–25 °C ... +70 °C –13 °F ... +158 °F
Maximum altitude	
Operating	2 000 m 6 561 ft
Storage	15 000 m 49 212 ft
Humidity	
5 % ... 95 % relative humidity; non-condensing	

Mechanical tests¹

Vibration		
IEC 60068-2-6	Non-operational	1 g; 5 Hz ... 500 Hz; 40 sweeps per direction
	During operation	0.5 g; 10 Hz ... 150 Hz; 2 sweeps per direction
Shock		
IEC 60068-2-27	Non-operational	10 g/16 ms; 1000 impacts per direction
		15 g/11 ms; 3 impacts per direction
	During operation	5 g/11 ms; 3 impacts per direction
Drop		
IEC 60068-2-31	Non-operational	5 cm, 2 drops per direction

¹ According to IEC 60255-21-1/2, Class 1.

2.5 EMC and product standards

Generic standards

IEC/EN 61850-3 and IEEE 1613

Electromagnetic compatibility (EMC)

Electromagnetic interference (EMI)	
Europe	EN 61326-1; EN 60255-26; EN 61000-6-4; EN 55032, Class A
International	IEC 61326-1; IEC 60255-26; IEC 61000-6-4; CISPR 32, Class A
USA	FCC Subpart B of Part 15 Class A
Electromagnetic susceptibility (EMS)/Immunity level	
Europe	EN 61326-1; EN 60255-26; EN 61000-6-2; EN 61000-6-5
International	IEC 61326-1; IEC 60255-26; IEC 61000-6-2; IEC 61000-6-5
Electrostatic discharge IEC 61000-4-2	Contact discharge: 6 kV Air discharge: 8 kV
Radiated, radio-frequency, electromagnetic field IEC 61000-4-3	10 V/m, 80 % AM, 1 kHz sinus 80 MHz ... 6 GHz horizontal/vertical 3 V/m, 80 % AM, 1 kHz sinus 1.4 GHz ... 2 GHz 1 V/m, 80 % AM, 1 kHz sinus 2 GHz ... 6 GHz
Power frequency magnetic field IEC 61000-4-8	Permanent: 100 A/m Short-term: 1 kA/m
Electrical fast transient/burst IEC 61000-4-4	At 5 kHz and 100 kHz: <ul style="list-style-type: none"> • FC (X30), BINARY IN/OUT (X31 X32/X33 X34): 4 kV_{peak} • POWER (X41/X42): 4 kV_{peak} • STATION (X20) and CTRL: 2 kV_{peak}
Surge IEC 61000-4-5	FC (X30), BINARY IN/OUT (X31 X32/X33 X34): <ul style="list-style-type: none"> • Common mode: 4 kV • Differential mode: 2 kV POWER (X41/X42): <ul style="list-style-type: none"> • Common mode: 2 kV • Differential mode: 1 kV STATION (X20) and CTRL: <ul style="list-style-type: none"> • Common mode (shield-ground): 4 kV

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Electromagnetic susceptibility (EMS)/Immunity level	
Conducted disturbances induced by radio-frequency fields IEC 61000-4-6, level 3	0.15 ... 80 MHz, 10 V _{unmod.} 27 MHz, 10 V _{unmod.} 68 MHz, 10 V _{unmod.} 80 % AM (1 kHz) FC (X30), BINARY IN/OUT (X31 X32/X33 X34), POWER (X41/X42), STATION (X20) and CTRL
Voltage dips, short interruptions and voltage variations on DC input power port IEC 61000-4-29	POWER (X41/X42): Voltage interruption 20 ms
Voltage dips, short interruptions and voltage variations IEC 61000-4-11	POWER (X41/X42): 1 cycle (50 Hz)
Damped oscillatory wave IEC 61000-4-16	FC (X30), BINARY IN/OUT (X31 X32/X33 X34), POWER (X41/X42): <ul style="list-style-type: none"> Common mode: 2.5 kV, 100 kHz, 1 MHz, 10 MHz Differential mode: 1 kV, 100 kHz, 1 MHz STATION (X20) and CTRL: <ul style="list-style-type: none"> Common mode: 1 kV, 1 MHz
Conducted, common mode disturbances in the 0 Hz ... 150 kHz frequency range IEC 61000-4-18	FC (X30), BINARY IN/OUT (X31 X32/X33 X34): <ul style="list-style-type: none"> Common mode: 300 V (0 Hz, 50 Hz, 60 Hz) Differential mode: 150 V (0 Hz, 50 Hz, 60 Hz) POWER (X41/X42): <ul style="list-style-type: none"> Common mode: 30 V (0 Hz), 300 V (1 s, 0 Hz) STATION (X20) and CTRL: <ul style="list-style-type: none"> Common mode: <ul style="list-style-type: none"> 30 V (0 Hz, 50 Hz, 60 Hz) 300 V (1 s) (0 Hz, 50 Hz, 60 Hz)
Ripple on DC input power port IEC 61000-4-17	DC ripple: 15 % nominal voltage, 100 Hz/120 Hz

Safety

Safety standards	
Europe	EN 61010-2-030; EN 60255-26; EN 61010-1
International	IEC 61010-2-030; IEC 60255-26; IEC 61010-1
USA	UL; 61010-2-030; UL 61010-1
Canada	CAN/CSA-C22.2 No 61010-2-030; CAN/CSA-C22.2 No 61010-1
Certificates	

Support

When you are working with our products, we want to provide you with the greatest possible benefits. If you need any support, we are here to assist you.



OMICRON Support – get in touch

micronenergy.com/support

At our support hotline, you can reach well-educated technicians for all of your questions.

Make use of our 24/7 hotlines:

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Manufacturer:
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