AC/DC

# ISOMETER<sup>®</sup> isoHR685W-x-I-B

Insulation monitoring device for IT AC systems with galvanically connected rectifiers and inverters and for IT DC systems with isoData for logging measurement events with ISOsync for capacitive coupled IT-systems

BENDER iso685		kΩ
SERVICE ALARM 1 ALARM 2	IT-System OK >10 GΩ	



# ISOMETER® isoHR685W-x-I-B

## Insulation Monitoring Device for IT AC systems with galvanically connected rectifiers and inverters and for IT DC systems with isoData for logging measurement events with ISOsync for capacitive coupled IT-systems



## **Device features**

- ISOMETER<sup>®</sup> for IT AC systems with galvanically connected rectifiers or inverters and for IT DC systems (IT = unearthed systems)
- Automatic adaptation to the existing system leakage capacitance
- Combination of *AMP<sup>Plus</sup>* and other profilespecific measurement methods
- Two separately adjustable response value ranges of 1 k $\Omega...3$  G $\Omega$
- High-resolution graphic LC display
- Connection monitoring (monitoring of the measuring lines)
- Automatic device self test
- Graphical representation of the insulation resistance over time (isoGraph)
- History memory with real-time clock (buffer for three days) for storing 1023 alarm messages with date and time
- Current or voltage output 0(4)...20 mA, 0...400 μA, 0...10 V, 2...10 V (galvanically separated), which is analogous to the measured insulation value of the system
- Freely programmable digital inputs and outputs
- Remote setting via the Internet or Intranet (Webserver/Option: COMTRAXX<sup>®</sup> gateway).
- Remote diagnosis via the Internet (made available by Bender Service only)
- isoData: Continuous uninterrupted data transmission
- isoSync: Timely synchronization of measurement processes
- RS-485/BS (Bender sensor bus) for data exchange with other Bender devices via Modbus RTU protocol
- BCOM, Modbus TCP und web server
- ISOnet: Internal separation of the ISOMETER® from the IT system to be monitored (e.g. if several IT systems are interconnected)
- ISOnet priority: Permanent priority of a device within the network
- ISOloop: Special function for ring systems (all systems are coupled)

#### **Product description**

The ISOMETER\* is an insulation monitoring device for IT systems in accordance with IEC 61557-8.

It is universally applicable in AC, 3(N)AC, AC/DC and DC systems. AC systems may include extensive DC-supplied loads (such as rectifiers, inverters, variable-speed drives).

#### Application

• AC, DC or AC/DC main circuits

UPS systems, battery systems

· Heaters with phase control

- AC/DC main circuits with directly connected DC components, such as rectifiers, converters, variable-speed drives
- Systems including switch-mode power supplies

Z – RENDER

- coupled IT systems with high leakage capacitances
- Monitoring of long capacitive coupled lines

## Function

The insulation monitoring device continuously monitors the entire insulation resistance of an IT system during operation and triggers an alarm when the value falls below a preset response value. To obtain a measurement the device has to be connected between the IT system (unearthed system) and the protective earth conductor (PE). A measuring current in the  $\mu$ A range is superimposed onto the system which is recorded and evaluated by a micro-controlled measuring circuit. The measuring time is dependent on the selected measurement profiles, the system leakage capacitance, the insulation resistance and possible system-related disturbances.

The response values and other parameters are set using a commissioning wizard or via different setup menus using the device buttons and a high-resolution graphical LC display. The selected settings are stored in a permanent fail-safe memory. Different languages can be selected for the setup menus as well as the messages indicated on the display. The device utilises a clock for storing fault messages and events in a history memory with time and date stamp. The settings can be password protected to prevent unauthorised changes.

To ensure proper functioning of connection monitoring, the device requires the setting of the system type 3AC, AC or DC and the required use of the appropriate terminals L1/+, L2, L3/-.

The insulation monitoring device isoHR685W-x-I-B is able to measure the insulation resistance reliably and precisely in all common IT systems (unearthed systems). Due to various applications, system types, operating conditions, application of variable-speed drives, high system leakage capacitances etc., the measurement technique must be able to meet varying requirements in order to ensure an optimised response time and relative uncertainty. Therefore different measuring profiles can be selected with which the device can optimally adjusted.

If the preset response value falls below the value of Alarm 1 and/or Alarm 2, the associated alarm relays switch, the LEDs ALARM 1 or ALARM 2 light and the measured value is shown on the LC display (in case of insulation faults in DC systems, a trend graph for the faulty conductor L+/L- is displayed). If the fault memory is activated, the fault message will be stored. Pressing the RESET button resets the insulation fault message, provided that the current insulation resistance displayed at the time of resetting is at least 25 % above the actual response value. As additional Information, the quality of the measuring signal and the time required to update the measured value are shown on the display. A poor signal quality (1-2 bars) may be an indication that the wrong measurement profile has been selected.

The ISOMETER® has an internal system isolating switch, which makes it possible to operate several ISOMETER®s in coupled IT systems. For this purpose, the ISOMETER®s are connected via an Ethernet bus. The integrated ISOnet function ensures that only one ISOMETER® is actively measuring at a time, while the other devices are completely isolated from the system and waiting in standby mode for measuring permission.

The ISOMETER® is able to synchronise itself with other ISOMETER®s. This makes it possible to monitor capacitive coupled IT systems without interfering with each other.

#### Interfaces

- Communication protocol Modbus TCP
- Communication protocol Modbus RTU
- BCOM to communicate with Bender devices via Ethernet
- BS bus for communication of Bender devices (RS-485)
- isoData to record and manage measured values
- Integrated web server to read measured values and for parameter setting

## Device variants

#### isoHR685W-D-I-B

The device version isoHR685W-D-I-B features a high-resolution graphical LC display and control elements for direct operation of the device functions. It **cannot** be combined with an FP200.

#### isoHR685W-S-I-B

The isoHR685W–S–I–B device contains **no display** and **no operating unit**. It can **only be used in combination with FP200W** and is indirectly operated via this front panel.

#### Measurement method

**AMPPlus** The isoHR685W-x-I-B series uses the patented **AMP**<sup>Plus</sup> measurement method. This measurement method allows concise monitoring of modern power supply systems, also in case of extensive, directly connected DC components and high system leakage capacitances.

#### Standards

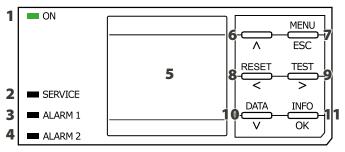
The ISOMETER<sup>®</sup> has been developed in compliance with the following standards:

- DIN EN 61557-8 (VDE 0413-8):2015-12
- IEC 61557-8:2014-12
- IEC 61557-8:2014/COR1:2016
- DIN EN 61557-8 Ber 1 (VDE 0413-8 Ber 1):2016-12

#### Certifications



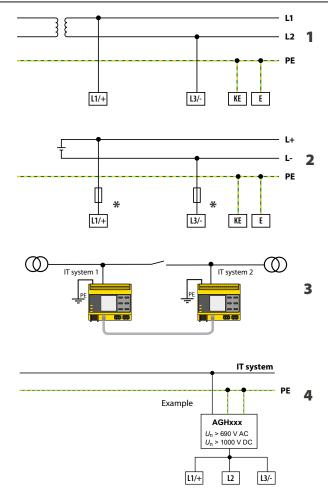
#### **Operating elements**



1 -	ON	The LED "ON" lights when the device is turned on.
2 -	SERVICE	The LED "SERVICE" lights when there is either a device fault or a connection fault, or when the device is in maintenance mode.
3 -	ALARM 1	The LED "ALARM 1" lights when the insulation resistance of the IT system falls below the set response value $R_{an1}$ .
4 -	ALARM 2	The LED "ALARM 2" lights when the insulation resistance of the IT system falls below the set response value $R_{an2}$ .
5 -	Display	The device display shows information regarding the device and the measurements.
6 -	Λ	Navigates up in a list or increases a value.
7 -	MENU	Opens the device menu
	ESC	Cancels the current process or navigates one step back in the device menu.
8 -	RESET	Resets alarms.
	<	Navigates backwards (e.g. to the previous setting step) or selects a parameter.
9 -	TEST	Starts the device self test.
	>	Navigates forwards (e.g. to the next setting step) or selects a parameter.
10 -	DATA	Indicates data and values.
	V	Navigates down in a list or reduces a value.
11 -	INFO	Shows information.
	ОК	Confirms an action or a selection.

The LED "ON" lights when the device is turned on

## Wiring diagram



- 1 Connection to an AC system U<sub>n</sub>
- **2** Connection to a DC system  $U_n$
- 3 Linked with two IT systems which can be interconnected via a coupling switch. Information regarding the state of the coupling switch is not necessary.
- 4 Connection to an IT system with coupling device
- 5 Connection to a 3(N)AC system
- 6 Connection to the IT system to be monitored (L1/+, L2, L3/-)
- 7 Separate connection of KE, E to PE

# Provide line protection!

According to DIN VDE 0100-430, a line protection shall be provided for the supply voltage.

# NOTE

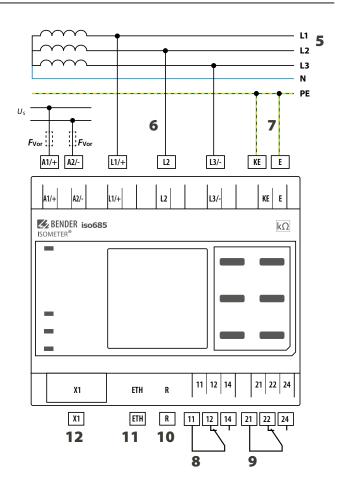
According to DIN VDE 0100-430, devices for protection against a short-circuit can be omitted for the coupling of terminals L1/+, L2 and L3/- to the IT system  $\leq$  690 V to be monitored if the wiring is carried out in such a manner as to reduce the risk of a short-circuit to a minimum. Ensure short-circuit-proof and earth-fault-proof wiring.

The connecting lines L1/+, L2, L3/- to the system to be monitored must be carried out as spur lines. No load current may be conducted through the terminals.

# For UL applications:

Use 60/70°C copper lines only!

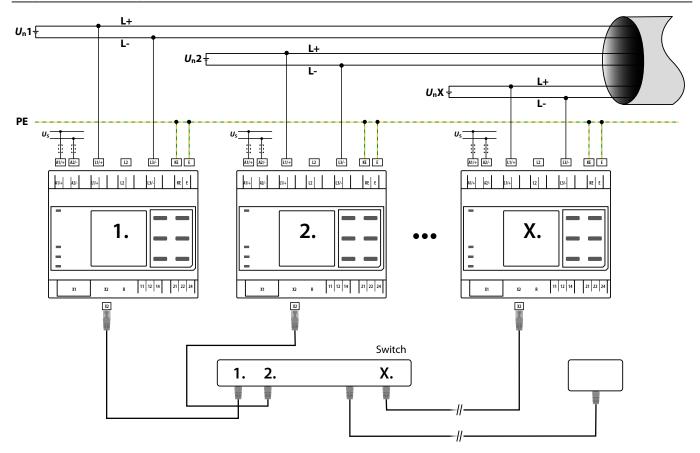
UL and CSA application require the supply voltage to be protected via 5 A fuses.



- 8 (K1) Alarm relay 1, available changeover contacts
- 9 (K2) Alarm relay 2, available changeover contacts
- 10 Switchable resistor R for RS-485 bus termination
- 11 Ethernet interface
- 12 Digital interface
- For systems > 690 V and with overvoltage category III a fuse for the connection to the system to be monitored must be provided.

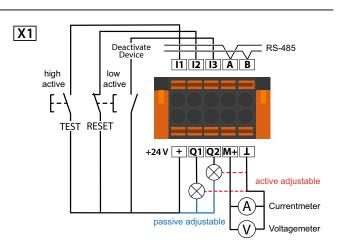
Recommendation: 2A screw-in fuses.

# ISOsync for coupled IT systems



# **Digital interface X1**

Digital interface	Terminal	Description
	l1l3	Configurable digital inputs (e.g. test, reset,)
	A, B	Serial interface RS-485, termination by means of a DIP switch R.
11 12 13 A B + Q1 Q2 M+ <b>L</b> X1	+	Supply voltage of the inputs and outputs I, Q and M. Electrical overload protection. Automatic shutdown in the event of short circuits and transients (resettable). When supplied via an external 24 V source, A1/+, A2/- must not be connected.
	Q1, Q2	Configurable digital output
	M+	Configurable analogue output (e.g. measuring instrument)
	L	Reference potential ground



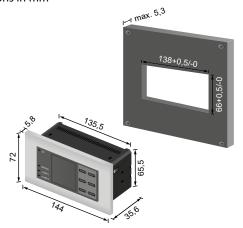
# Dimension diagram isoHR685W-x-I-B

Dimensions in mm

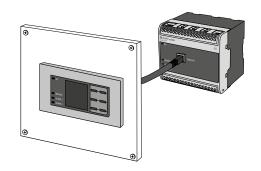
# **Dimension diagram Panel cut-out FP200**

Dimensions in mm

6



# **Connection to FP200**



# Ordering information

Туре	Nominal system voltage range <b>U</b> n	Supply voltage <b>U</b> s	Display	Art. No.
isoHR685W—D—I—B	AC 01000 V; 0.1460 Hz	AC 24240 V; 50400 Hz	integrated	B91067025W
isoHR685W–S–I–B + FP200W	DC 0 1300 V	DC 24240 V	detached	B91067225W

<sup>1)</sup> nur in Kombination erhältlich

# Accessories

Description	Art. No.
A set of screw terminals <sup>1)</sup>	B91067901
A set of push-wire terminals	B91067902
Enclosure accessories (terminal cover, 2 mounting clips) <sup>1)</sup>	B91067903
BB bus 6TE connector	B98110001

<sup>1)</sup> included in the scope of delivery

# Suitable system components

Description	Туре	Art. No.
Device version without display	isoHR685W-S-I-B	B91067125W
Display for front panel mounting	FP200W	B91067904W
Coupling devices	AGH150W-4	B98018006
	AGH204S-4	B914013
	AGH520S	B913033
	AGH676S-4	B913055

Suitable measuring instruments on request!

### **Technical data**

Insulation coordination acc. to IEC 60664-1,	/IEC 60664-3
Definitions:	
Measuring circuit (IC1)	L1/+, L2, L3/
Supply circuit (IC2)	A1, A2
Output circuit 1 (IC3)	11, 12, 14
Output circuit 2 (IC4)	21, 22, 24
Control circuit (IC5)	(E, KE), (X1, ETH, X3, X4
Rated voltage	1300
Overvoltage category	
Rated impulse voltage:	
IC1/( IC2-5 )	8 k <sup>1</sup>
IC2/(IC3-5)	4 k)
IC3/(IC4-5)	4 k'
IC4/IC5	4 k)
Rated insulation voltage:	
IC1/(IC2-5)	1000 \
	300
IC2/(IC3-5)	
IC3/(IC4-5)	300
IC4/IC5	300
Pollution degree outside ( $U_n < 690 \text{ V}$ )	
Pollution degree outside ( $U_n > 690 < 1000 \text{ V}$ )	
Safe isolation (reinforced insulation) between:	
IC1/(IC2-5)	Overvoltage category III, 1000
	Overvoltage category II, 1300
IC2/(IC3-5)	Overvoltage category III, 300
IC3/(IC4-5)	Overvoltage category III, 300
1C3/(IC4-5)	overvoltage category III, 300
	overvoltage category III, 500
/oltage tests (routine test) acc. to IEC 61010-1	
IC2/(IC3-5)	AC 2.2 k
IC3/(IC4-5)	AC 2.2 k
IC4/IC5	AC 2.2 kV
Supply voltage	
Supply via A1/+, A2/-:	
Supply voltage range Us	AC/DC 24240
Folerance of Us	-30+15 %
Maximum permissible input current of U <sub>s</sub>	650 m/
Frequency range of $U_{\rm s}$	DC, 50400 Hz
olerance of the frequency range of $U_{\rm s}$	-5+15 %
Power consumption, typically DC	< 12 W
Power consumption, typically 50/60 Hz	≤ 12 W/21 V/
Power consumption, typically 400 Hz	≤ 12 W/45 V/
Supply via X1:	
Supply voltage Us	DC 24
Folerance of Us	DC -20+25 %
T system being menitored	
T system being monitored	
lominal system voltage range U <sub>n</sub>	AC 01000 V, 3AC 0690 V, DC 01300 V
	AC/DC 01000 V (for UL applications
Tolerance of U <sub>n</sub>	AC/DC +15 %
Frequency range of Un	DC 0.1460 Hz
Max. AC voltage $U_{\sim}$ in the frequency range $f_{\rm n} = 0.1$ .	4 Hz $U_{\sim \max} = 50 \text{ V/Hz}^2 * (1 + f_n^2)^2$
Response values	
Response value R <sub>an1</sub> (Alarm 1)	1 kΩ3 GΩ
Response value R <sub>an2</sub> (Alarm 2)	1 kΩ3 GΩ
Relative uncertainty (acc. to IEC 61557-8)	dependent on the profile, $\pm 15$ %, at least $\pm 1$ kC
lysteresis	25 %, at least 1 kΩ
	,,,
lime response	
Response time $t_{an}$ at $R_F = 0.5 \times R_{an}$ ( $R_{an} = 10 \times \Omega$	) and $C_e = 1 \ \mu F$ according to IEC 61557-8 profile dependent, typ. 10 s (see diagrams in manual
Response time DC Alarm at $C_{a} = 1 \text{ uF}$	
Response time DC Alarm at $C_e = 1  \mu F$ Start-up delay $T_{\text{start-up}}$	profile dependent, typ. 5 s (see diagram in manual 0120

Measuring voltage Um	profile dependent, $\pm 10$ V, $\pm 50$ V (see profile overview
Measuring current Im	≤ 403 µ
Internal resistance R <sub>i</sub> , Z <sub>i</sub>	$\geq$ 124 kG
	tems (inactive by I/O, inactive by ISOnet or cut-off) typ. 50 Mg
Permissible extraneous DC voltage U	
Permissible system leakage capacita	nce C <sub>e</sub> profile dependent, 01000 μ
Measuring ranges	
Measuring range f <sub>n</sub>	0.1460 H
Tolerance measurement of <i>f</i> <sub>n</sub> Voltage range measurement of <i>f</i> <sub>n</sub>	±1%±0.1H
Measuring range $U_n$ (without an extern	AC 25690
weasuring range on without an extern	AC 251000 V; 3AC 25690 V; DC 01300
Voltage range measurement of U <sub>n</sub>	AC/DC 101000 V
Tolerance measurement of Un	±5 % ±5
Measuring range Ce	01000 μ
Tolerance measurement of Ce	±10 % ±10 μ
Frequency range measurement of Ce	DC, 30460 H
Min. insulation resistance measurem	
	depending on the profile and coupling mode, typ. $>$ 10 kC
Display	
Indication	graphic display 127 x 127 pixels, 40 x 40 mm
Display range measured value	0.1 kΩ10 GC
Operating uncertainty (according to	IEC 61557-8) ±15 %, at least ±1 kC
LEDs	
ON (operation LED)	gree
SERVICE	yellov
ALARM 1	yellov
ALARM 2	yellov
In-/Outputs (X1-Interface)	
Cable length X1 (unshielded cable)	≤ 10 r
Cable length X1 (shielded cable, shield	connected to earth PE on one side J-Y(St)Y min. 2x0,8) $\leq$ 100 r
Total max. supply output current via	
Total max. supply output current via	
Total more consult contents and an entry of a	A1/A2 in total on V1 between 16.9 V and 40 V
Total max. supply output current via	A1/A2 in total on X1 between 16.8 V and 40 V
Total max. supply output current via	$I_{\rm LmaxX1} = 10 \text{ mA} + 7 \text{ mA/V} * U_{\rm s}$
Total max. supply output current via	$I_{\rm LmaxX1} = 10 \text{ mA} + 7 \text{ mA/V} * U_{\rm s}$
	$I_{\rm LmaxX1} = 10 \text{ mA} + 7 \text{ mA/V} * U_{\rm s}$
Digital inputs (11, 12, 13) Number	$I_{\text{LmaxX1}} = 10 \text{ mA} + 7 \text{ mA/V} * U_s$ (negative values are not allowed for $I_{\text{LmaxX}}$
<b>Digital inputs (11, 12, 13)</b> Number Operating mode, adjustable	$I_{LmaxX1} = 10 \text{ mA} + 7 \text{ mA/V} * U_s$ (negative values are not allowed for $I_{LmaxX}$ ) active high, active low
<b>Digital inputs (11, 12, 13)</b> Number Operating mode, adjustable Functions	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for I <sub>LmaxX</sub> ) active high, active low off, test, reset, deactivate device, start initial measurement
<b>Digital inputs (11, 12, 13)</b> Number Operating mode, adjustable Functions Voltage	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for I <sub>LmaxX1</sub> active high, active low off, test, reset, deactivate device, start initial measuremen Low DC -35 V, High DC 1132
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for I <sub>LmaxX1</sub> active high, active low off, test, reset, deactivate device, start initial measuremen
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2)	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for I <sub>LmaxX</sub> ) active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 9
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for I <sub>LmaxX</sub> active high, active lo off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 5
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for / <sub>LmaxX</sub> active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 9 active, passiv
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>5</sub> (negative values are not allowed for I <sub>LmaxX</sub> active high, active log off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 9 active, passiv off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>5</sub> (negative values are not allowed for I <sub>LmaxX</sub> active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 9 active, passiv off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable Functions	ILmaxX1 = 10 mA + 7 mA/V * Us (negative values are not allowed for ILmaxX active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -3 5 V, High DC 11 32 ± 10 9 active, passiv off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarr
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable Functions Voltage passive	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>5</sub> (negative values are not allowed for I <sub>LmaxX</sub> active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 9 active, passiv off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarr
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable Functions Voltage passive Analogue output (M+)	<i>I</i> <sub>LmaxX1</sub> = 10 mA + 7 mA/V * <i>U</i> <sub>s</sub> (negative values are not allowed for <i>I</i> <sub>LmaxX</sub> active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 S detive, passiv off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC - alarm 4 DC + alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarn DC 032 V, active DC 0/19.232
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable Functions Voltage passive Analogue output (M+) Number	ILmaxX1 = 10 mA + 7 mA/V * Us (negative values are not allowed for ILmaxX1 active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 9 construction fault, DC- alarm 4 DC+ alarm 4), symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarr DC 032 V, active DC 0/19.232
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable Functions Voltage passive Analogue output (M+) Number Operating mode	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for I <sub>LmaxX</sub> active high, active loo off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 ± 10 9 0 ff, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alari DC 032 V, active DC 0/19.232
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable Functions Voltage passive Analogue output (M+) Number Operating mode Functions	$l_{LmaxX1} = 10 \text{ mA} + 7 \text{ mA/V} * U_{s}$ (negative values are not allowed for $l_{LmaxX1}$ active high, active low off, test, reset, deactivate device, start initial measuremer Low DC -35 V, High DC 1132 $\pm$ 10 9 (negative device) fault, DC - alarm 4 DC+ alarm 4), symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarr DC 032 V, active DC 0/19.232 linear, midscale point 28 k $\Omega$ /120 kC
Digital inputs (11, 12, 13) Number Operating mode, adjustable Functions Voltage Voltage tolerance Digital outputs (Q1, Q2) Number Operating mode, adjustable Functions Voltage passive Analogue output (M+) Number Operating mode Functions	I <sub>LmaxX1</sub> = 10 mA + 7 mA/V * U <sub>s</sub> (negative values are not allowed for I <sub>LmaxX</sub> ) active high, active low off, test, reset, deactivate device, start initial measuremen Low DC -35 V, High DC 1132

#### Interfaces

interface/protocol         web server/Modbus TCP/BCO/           Data rate         10/100 Mbit/s, autodetec           Max. number of Modbus requests         <100/           Cable length         <100/           Connection         R44           IP address         DHCP/manual* 192.168.0.5           BCOM address         system-1-           Function         communication interface           ISOnet         Number of ISOnet devices         220 de           ISOsyme         220 de           ISOsyme devices         220 de	Interfaces						
Data rate         10/100 Mbit/s, autodetec           Max. number of Modbus requests         <<100/	Field bus:						
Max. number of Modbus requests	Interface/protocol			۱	veb server	/Modbus T	CP/BCON
Cable length         ≤ 100 π           Connection         R14           Pa dress         DHCP/manual* 192.168.0.5           Network mask         255.255.255.0           BCOM address         system-1-           Function         communication interfact           ISOnet         wmber of ISOnet devices         220 de           Max. nominal system voltage ISOnet         AC, 690 V/DC, 1000           ISOsync:         Number of ISOlop devices         220 de           ISOsync:         Number of ISOsync devices         ≤ 5           Sensor bus:         Interface/Protocol         R5-485/RB bu           Data rate mode 1         9.64 RBaud/         9.64 RBaud/           Cable length (depending on the baud rate)         ≤ 1200 m         Cable length (depending on the baud rate)         ≤ 1200 m           Cable it wisted pair, one end of shield connected to PE         recommended: J-Y(St)Y min.2x0.         Connection         19           Switching elements         1.00 Q. can be connected internall         19           Switching elements         2 changeover contact         0perating mode         N/C operation/N/O operation           Number of switching elements         2 changeover contact         0.00         Contact 11-12-14/21-22-24         off, Ins. alarm 4, symmetrical alarm, device fault, com	Data rate				10/10	) Mbit/s, au	itodetec
Connection         RJ4           IP address         DHCP/manual* 192, 168.0.5           Network mask         255, 255, 255.           SOM address         system-1           Function         communication interfac           ISOnet	Max. number of Modbus requests						<100/
IP address         DHCP/manual* 192, 168, 0.5           Network mask         255, 255, 255, 255, 05           BCOM address         ystem-1-           Function         communication intefact           ISOnet         X 20 de           Number of ISOnet devices         2 20 de           Max. nominal system voltage ISOnet         AC, 690 V/DC, 1000           ISOloop         Number of ISOloop devices         2 20 de           Number of ISOloop devices         2 20 de           Interface/Protocol         R5-485/BB bu           Data rate mode 1         9.6 kBaud/           Cable length (depending on the baud rate)         ≤1200 rc           Connection         terminals X1.A, X1.           Terminating resistor         120 Q, can be connected internal           Device address         19           Switching elements         2 changeover contact           Number of switching elements         2 changeover contact           Operating mode         N/C operation fault, DC - alarm 4           Contact 11-12-14/21-22-24         off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC - alarm 4           Device address         10.00           Contact 11-12-14/21-22-24         off, Ins. alarm 4           Witching elements         2 changeover contact	Cable length						≤ 100 m
Network mask 255.255.255.05 BCOM address system-1- Function communication interface ISOnet devices20 de Max. nominal system voltage ISOnet AC, 690 V/DC, 1000 ISOloop Number of ISOloop devices20 de ISOsync Number of ISOsync devices20 de ISOsync Number of ISOsync devices20 de ISOsync Sensor bus: Interface/Protocol R5-485/BB bu Data rate mode 196 KBaud/ Cable Iusited pair, one end of shield connected to PE recommended: J-V(SI) V min. 200. Connection terminals X1.A, X1. Terminating resistor 120 CJ, can be connected internall Device address9 Switching elements9 Switching elements	Connection						RJ45
BCOM address system-1-4 Function communication interfac ISOnet Number of ISOnet devices 220 de Max. nominal system voltage ISOnet ACC, 690 V/DC, 1000' ISOloop Number of ISOloop devices 220 de ISOsync: Number of ISOsync devices 220 de Isosync: Connection 19 Switching elements Number of switching elements 220, can be connected internall Device address 19 Switching elements Number of switching elements 224 Operating mode N/C operation/N/O operation Contact 11-12-14/21-22-24 off, Ins. alarm 1, Ins. Alarm 2, connection nalur, DC- alarm 4 DC+ alarm 4 <sup>1</sup> , symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarr Electrical endurance under rated operating conditions, number of cycles 10,000 Contact data acc. to IEC 60947-5-1: Utilisation category AC-13 AC-14 DC-12 DC-12 DC-12 DC-12 Rated operational voltage 2300 V 230 V 24 V 48 V 110 V 2200 Rated operational voltage 2300 V 230 V 24 V 48 V 110 V 2200 Rated operational voltage 2300 m NN 1601 Minimum contact rating 1 m A at AC/DC ≥ 101 Environment/EMC and temperature range EMC [EC 60721-3-1) 142 Classification of dimatic conditions acc. to IEC 60721 (related to temperature and relative humidity): Stationary use (IEC 60721-3-1) 142 Classification of dimatic conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 142 Classification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 142 Classification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 142 Class	IP address				DHCP/ma		
Functioncommunication interfacISOnetcommunication interfacISOnetNumber of ISOnet devices220 deMax. nominal system voltage ISOnetAC, 690 V/DC, 1000ISOloopNumber of ISOloop devices220 deISOsync:Number of ISOsync devices<	Network mask					255.25	5.255.0*
SometNumber of ISOnet devices220 deMax. nominal system voltage ISOnetAC, 690 V/DC, 1000'ISOloopNumber of ISOloop devices220 deISOsync:Sensor bus:Interface/ProtocolRS-485/BB buData rate mode 19.6 kBaud/Cable: twisted pair, one end of shield connected to PEreommended: J-Y(St)Y min. 2v0.Connectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internalDevice address19Switching elements2 changeover contactOperating modeN/C operation/N/O operatioContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, Dc-alarm 4Device address1.0.9Switching elements2 changeover contactContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, Dc-alarm 4Deration advogage 230 V230 V24 V48 VTillsation categoryAC-13AC-14DC-12DC-12Cottact data acc. to IEC 60947-51:Utilisation categoryAC-13AC-14DC-12DC-12DC-12Rated operational voltage230 V230 V24 V48 V110 V220Rated operational voltage200 m NN485°Inminum contact rating1 m A at AC/DC ≥ 10'Environment/EMC and temperature range-25+55°485°Inminum contact rating1 m A at AC/DC ≥ 10'Environment/EMC and temperature range-25+55°485°Inminum contact rating1 m A at AC/	BCOM address						
Number of IsOnet devices220 deMax. nominal system voltage IsOnetAC, 690 V/DC, 1000'IsOloopIsOsyncNumber of IsOloop devices220 deIsOsync devices≤ 50Sensor bus:Iteraface/ProtocolData rate mode 19.6 kBaud/Cable: twisted pair, one end of shield connected to PErecommended: J-Y(St)Y min. 2xot.Connectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internalDevice address19Switching elements2 changeover contactOperating modeN/C operation/N/O Operation/N/	Function				comr	nunication	interface
Max. nominal system voltage ISOnet AC, 690 V/DC, 1000 ISOloop Number of ISOloop devices 220 de ISOsync: Number of ISOsync devices ≤ 5 Sensor bus: Interface/Protocol RS-485/BB bu Data rate mode 1 9.6 kBaud/ Cable length (depending on the baud rate) ≤ 1200 r Cable: twisted pair, one end of shield connected to PE recommended: J-Y(St)Y min. 2x0. Connection terminals X1.4, X1. Terminating resistor 120 Ω, can be connected internal Device address 19 Switching elements Number of switching elements 2 changeover contact Operating mode N/C operation/N/O operatio Contact 11-12-14/21-22-24 off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm Catageory AC-13 AC-14 DC-12 DC-12 DC-12 0.0 Contact data acc. to IEC 60947-5-1: Utilisation category AC-13 AC-14 DC-12 DC-12 DC-12 DC-12 Rated operational current 5 A 3 A 1 A 1 A 0.2 A 0.1 Rated insulation voltage ≤ 2000 m NN = 2500	ISOnet						
SoloopNumber of ISOloop devices220 deISOsync:Sensor bus:Interface/ProtocolRS-485/BB buData rate mode 19.6 kBaud/Cable length (depending on the baud rate)≤ 1200 mCable: twisted pair, one end of shield connected to PErecommended: J-Y(St)Y min. 2x0.Connectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internallDevice address19Switching elements2 changeover contactOperation modeN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alareElectrical endurance under rated operating conflictons, number of cycles10,00Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13Mated insulation voltage230 V230 V24 V48 VRated operational voltage230 V230 V24 V48 VRated operational current5 A3 A1 A1 A0.2 ARated insulation voltage ≤ 3000 m NN1600Minimum contact rating1 mA at AC/DC ≥ 10'EMCIEC 60533, IEC 61326-24'Operating temperature-25+55'sIransport (IEC 60721-3-2)2K1Long-term storage (IEC 60721-3-1)3K2Transport (IEC 60721-3-2)2K1Long-term storage (IEC 60721-3-1)1K2Chastification of dimatic conditions ac	Number of ISOnet devices					2.	20 dev
Number of ISOloop devices220 deISOsync:Number of ISOsync devices≤ 50Sensor bus:Interface/ProtocolRS-485/RB buData rate mode 19.6 kBaud/Cable length (depending on the baud rate)≤ 1200 mCable length (depending on the baud rate)≤ 1200 mConnectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internallDevice address19Switching elementsQ changeover contactOperation MoleN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+12 mole: adarm 4, symmetrical alarm, device fault, C- alarm 4DC operation Alut DC + alarm 9, symmetrical alarm, device fault, DC - alarm 4DC+12 mole: adarm 9, symmetrical alarm, device fault, DC - alarm 4DC operation alore under rated operating conditions, number of cycles10,000Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12DC-12DC-12DC-12Rated operational currentSA3 A1 A0.2 A0.1Rated insulation voltage ≤ 2000 m NN250Rated insulation voltage ≤ 3000 m NN1600Minimum contact rati	Max. nominal system voltage ISOnet				ŀ	AC, 690 V/D	C, 1000V
Solymc:Number of ISOsync devices≤ 5Sensor bus:Interface/ProtocolRS-485/BB buData rate mode 19.6 kBaud/Cable: twisted pair, one end of shield connected to PErecommended: J-Y(St)Y min. 2x0.Connectionterminals X1.A, X1.1Terminating resistor120 Ω, can be connected internallDevice address19Switching elements2 changeover contactOperating modeN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+ alarm 4'', symmetrical alarm, device fault, common alarm measurement complete, device inactive. DC offset alartElectrical endurance under rated operating conditions, number of cycles10.00Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13Mated operational voltage230 V230 V24 V48 VRated operational voltage230 V230 V24 V48 V110 VRated insulation voltage ≤ 3000 m NN2500Rated insulation voltage ≤ 3000 m NN2501Environment/EMC and temperature range-25+55°10.02Congetter storage-40+70°3K2Inasport (IEC 60721-3-1)1K22K1Cassification of dimatic conditions acc. to IEC 60721:3K2Cassification of mechanical conditions acc. to IEC 60721:3K1Cassification of mechanical conditions acc. to IEC 60721:3K1Cassification of mechanical conditions acc. to IEC 60721:2K1Cassificati	ISOloop						
Number of ISOsync devices $≤ 5$ Sensor bus: Interface/Protocol RS-485/BB bu Data rate mode 1 9, 6 kBaud/ Cable length (depending on the baud rate) $< 1200$ r Cable: twisted pair, one end of shield connected to PE recommended: J-Y(St)Y min. 2x0. Connection 120 Ω, can be connected internall Device address 19 Switching elements 19 Switching elements 2 changeover contact Operating mode N/C operation/N/O operation Contact 11-12-14/21-22-24 off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarm Electrical endurance under rated operating conditions, number of cycles 100 Contact data acc. to IEC 60947-5-1: Utilisation category AC-13 AC-14 DC-12 DC-12 DC-12 DC-12 Rated operational voltage 230 V 230 V 24 V 48 V 110 V 220 Rated operational voltage 2300 m NN 160 Minimum contact rating 1 mA at AC/DC ≥ 10 Environment/EMC and temperature range EMC IEC 60533, IEC 61326-2-4 Operating temperature - 2-5+55 % Long-term storage (IEC 60721-3-3) 342 Transport (IEC 60721-3-2) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 140 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 140 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: St	Number of ISOloop devices					2.	20 dev
Number of ISOsync devices $≤ 5$ Sensor bus: Interface/Protocol RS-485/BB bu Data rate mode 1 9, 6 kBaud/ Cable length (depending on the baud rate) $< 1200$ r Cable: twisted pair, one end of shield connected to PE recommended: J-Y(St)Y min. 2x0. Connection 120 Ω, can be connected internall Device address 19 Switching elements 19 Switching elements 2 changeover contact Operating mode N/C operation/N/O operation Contact 11-12-14/21-22-24 off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarm Electrical endurance under rated operating conditions, number of cycles 100 Contact data acc. to IEC 60947-5-1: Utilisation category AC-13 AC-14 DC-12 DC-12 DC-12 DC-12 Rated operational voltage 230 V 230 V 24 V 48 V 110 V 220 Rated operational voltage 2300 m NN 160 Minimum contact rating 1 mA at AC/DC ≥ 10 Environment/EMC and temperature range EMC IEC 60533, IEC 61326-2-4 Operating temperature - 2-5+55 % Long-term storage (IEC 60721-3-3) 342 Transport (IEC 60721-3-2) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 140 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 140 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: Stationary use (IEC 60721-3-1) 240 Cassification of mechanical conditions acc. to IEC 60721: St	ISOsvnc:						
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Interface/ProtocolRS-485/BB buData rate mode 19.6 kBaud/Cable: twisted pair, one end of shield connected to PErecommended: J-Y(St)Y min. 2x0.Connectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internallDevice address19Switching elements2 changeover contactOperating modeN/C operation/N/0 operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 40, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1:Utilization categoryAC-13AC-14DC-12DC-12DC-12DC-12Mated operational ouritage230 V230 V24 V48 V110 V220 VRated operational ouritage200 m NN25001600Minimum contact rating1 mA at AC/DC ≥ 10Environment/EMC and temperature range<	· · · ·						
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Cable length (depending on the baud rate)≤1200 nCable: twisted pair, one end of shield connected to PErecommended: J-Y(St)Y min. 2x0.Connectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internallDevice address19Switching elements2 changeover contactOperating modeN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+alarm 4', symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1:UIIIIandi C-12DC-12DC-12DC-12Uiliastion categoryAC-13AC-14DC-12DC-12DC-12DC-12Rated operational voltage230 V230 V24 V48 V110 V2201Rated insulation voltage ≤ 2000 m NN2500Rated insulation voltage ≤ 3000 m NN1601Minimum contact rating1 mA at AC/DC ≥ 101EMCIEC 60533, IEC 61326-2-40Operating temperature-25+55 °7Transport-40+88 °100, 24Long-term storage-40+88 °Long-term storage-40+70 °Cassification of dimatic conditions acc. to IEC 60721 (related to temperature and relative humidity):Stationary use (IEC 60721-3-3)3K2Transport (IEC 60721-3-3)3K2Transport (IEC 60721-3-3)2K1Long-term sto							
Cable: twisted pair, one end of shield connected to PErecommended: J-Y(St)Y min. 2x0.Connectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internallDevice address19Switching elements2 changeover contactOperating modeN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12DC-12Rated operational voltage2000 m NN2500Rated insulation voltage ≤ 2000 m NN2500Rated insulation voltage ≤ 2000 m NN16010Minimum contact rating1 mA at AC/DC ≥ 10Invironment/EMC and temperature range-25+55 °10,00Casification of dimatic conditions acc. to IEC 60721 (related to temperature and relative humidity):250Stationary use (IEC 60721-3-2)2K12K1Long-term storage (IEC 60721-3-1)1K2Cassification of mechanical conditions acc. to IEC 60721:2K1Stationary use (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IE		te)					
Connectionterminals X1.A, X1.Terminating resistor120 Ω, can be connected internallDevice address19Switching elementsNumber of switching elements2 changeover contactOperating modeN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12DC-12Rated operational voltage230 V230 V24 V48 V110 V220 VRated operational voltage ≤ 2000 m NN250024 00.1 /Rated insulation voltage ≤ 3000 m NN160 VMinimum contact rating1 mA at AC/DC ≥ 10 VEnvironment/EMC and temperature range-40+85 °EMCIEC 60533, IEC 61326-2-4 'Operating temperature-25+55 °Iransport-40+70 °Cassification of dimatic conditions acc. to IEC 60721 (related to temperature and relative humidity):Stationary use (IEC 60721-3-2)2K1Long-term storage-40+70 °Classification of mechanical conditions acc. to IEC 60721:Stationary use (IEC 60721-3-3)3M1Transport (I		,	F	reco	mmended		
Terminating resistor 120 Ω, can be connected internal Device address 19 Switching elements 2 changeover contact Operating mode N/C operation/N/O operation Contact 11-12-14/21-22-24 off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarn Electrical endurance under rated operating conditions, number of cycles 10,000 Contact data acc. to IEC 60947-5-1: Utilisation category AC-13 AC-14 DC-12 DC-12 DC-12 DC-12 Rated operational voltage 230 V 230 V 24 V 48 V 110 V 2200 Rated operational voltage 230 V 230 V 24 V 48 V 110 V 2200 Rated operational current 5 A 3 A 1 A 1 A 0.2 A 0.1 µ Rated insulation voltage ≤ 2000 m NN 2500 Rated insulation voltage ≤ 3000 m NN 1600 Minimum contact rating 1 mA at AC/DC ≥ 10 Environment/EMC and temperature range EMC IEC 60533, IEC 61326-2-4 Operating temperature -25+55° Transport -40+70° Classification of climatic conditions acc. to IEC 60721 (related to temperature and relative humidity): Stationary use (IEC 60721-3-3) 342 Transport (IEC 60721-3-3) 341 Transport (IEC 60721-3-3) 341			L			. ,	
Device address       19         Switching elements       2 changeover contact         Operating mode       N/C operation/N/O operation         Contact 11-12-14/21-22-24       off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4         DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarn         Electrical endurance under rated operating conditions, number of cycles       10,00         Contact data acc. to IEC 60947-5-1:       Utilisation category       AC-13       AC-14       DC-12       DC-12       DC-12       DC-12         Rated operational voltage       230 V       230 V       24 V       48 V       110 V       220 V         Rated operational voltage       200 V       230 V       24 V       48 V       110 V       220 V         Rated operational voltage       200 W       230 V       24 V       48 V       110 V       220 V         Rated insulation voltage ≤ 2000 m NN       250 V       26 V       48 V       110 V       220 V         Rated insulation voltage ≤ 3000 m NN       250 V       34 A       1 A       0.4 0 + 70 °         Construct traing       1 mA at AC/DC ≥ 10 V       EMC       IEC 60533, IEC 61326-2-4 V       0perating temperature       -25 + 55 °       Transport       -40				120 (			
Switching elements2 changeover contactNumber of switching elements2 changeover contactOperating modeN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+ alarm 4', symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12DC-12Rated operational voltage230 V230 V24 V48 V110 V220 VRated operational current5 A3 A1 A1 A0.2 A0.1 ARated operational current5 A3 A1 A1 A0.2 A0.1 ARated insulation voltage $\leq$ 2000 m NN2500Rated insulation voltage $\leq$ 3000 m NN1600Minimum contact rating1 mA at AC/DC $\geq$ 10°EMCIEC 60533, IEC 61326-2-44Operating temperature-25+55°Transport-40+70°Cassification of dimatic conditions acc. to IEC 60721 (related to temperature and relative humidity):Stationary use (IEC 60721-3-3)342Transport (IEC 60721-3-3)342Transport (IEC 60721-3-3)221Cassification of mechanical conditions acc. to IEC 60721:Cassification of mechanical conditions acc. to IEC 60721:Stationary use (IEC 60721-3-3)341Transport (IEC 60721-3-3)3	Device address			1203	2, can be v	onnecteur	190
Number of switching elements2 changeover contactOperating modeN/C operation/N/O operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+ alarm 4), symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12Rated operational voltage230 V230 V24 V48 V110 V220 VRated operational current5 A3 A1 A1 A0.2 A0.1 /Rated insulation voltage ≤ 2000 m NN250 °250 °10 °Rated insulation voltage ≤ 3000 m NN1660 °10 °10 °Minimum contact rating1 mA at AC/DC ≥ 10 °10 °250 °EMCIEC 60533, IEC 61326-24 '0010 °Operating temperature-25 +55 °10 °10 °10 °EMCIEC 60721 °-40 +85 °10 °10 °Iong-term storage-40 +70 °3 °3 °3 °Cassification of dimatic conditions acc. to IEC 60721 (related to temperature and relative humidity):3 °Stationary use (IEC 60721-3-3)3 °3 °Transport (IEC 60721-3-3)3 °3 °Cassification of mechanical conditions acc. to IEC 60721:2 °Cassification of mechanical conditions acc. to IEC 60721:3 °Stationary use (IEC 60	Curitaking alamanta						
Operating modeN/C operation/N/0 operationContact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4DC+ alarm 4', symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1:Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12Rated operational voltage230 V230 V24 V48 V110 V220 °Rated operational current5 A3 A1 A1 A0.2 A0.1 /Rated insulation voltage < 2000 m NN							
Contact 11-12-14/21-22-24off, Ins. alarm 1, Ins. Alarm 2, connection fault, DC- alarm 4 DC+ alarm 4, symmetrical alarm, device fault, common alarm measurement complete, device inactive, DC offset alarnElectrical endurance under rated operating conditions, number of cycles10,00Contact data acc. to IEC 60947-5-1: Utilisation categoryAC-13AC-14DC-12DC-12DC-12DC-12Rated operational voltage230 V230 V24 V48 V110 V220 VRated operational current5 A3 A1 A1 A0.2 A0.1 /Rated insulation voltage < 2000 m NN	3						
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Utilisation categoryAC-13AC-14DC-12<	•	ing conditi	ons, numb	er of cycles	5		10,000
Rated operational voltage230 V230 V24 V48 V110 V220 VRated operational current5 A3 A1 A1 A0.2 A0.1 ARated insulation voltage $\leq$ 2000 m NN250 VRated insulation voltage $\leq$ 3000 m NN160 VMinimum contact rating1 mA at AC/DC $\geq$ 10 VEnvironment/EMC and temperature rangeEMCIEC 60533, IEC 61326-24 Operating temperatureOperating temperature-25+55 °Transport-40+85 °Long-term storage-40+70 °Classification of climatic conditions acc. to IEC 60721 (related to temperature and relative humidity):Stationary use (IEC 60721-3-3)3K2Transport (IEC 60721-3-2)2K1Long-term storage (IEC 60721-3-1)1K2Classification of mechanical conditions acc. to IEC 60721:3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)2MLong-term storage (IEC 60721-3-3)2MLong-term storage (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)2MLong-term storage (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)2MLong-term storage (IEC 60721-3-1)1M1							
Rated operational current5 Å3 Å1 Å1 Å0.2 Å0.1 /Rated insulation voltage $\leq$ 2000 m NN2500Rated insulation voltage $\leq$ 3000 m NN1600Minimum contact rating1 mA at AC/DC $\geq$ 100Environment/EMC and temperature rangeEMCIEC 60533, IEC 61326-2-44Operating temperature $-25+55^{\circ}$ Transport-40+85^{\circ}Long-term storage-40+70^{\circ}Classification of climatic conditions acc. to IEC 60721 (related to temperature and relative humidity):Stationary use (IEC 60721-3-3)3K2Transport (IEC 60721-3-2)2K1Long-term storage (IEC 60721-3-1)1K2Classification of mechanical conditions acc. to IEC 60721:3M1Stationary use (IEC 60721-3-3)3M1Transport (IEC 60721-3-2)2MLong-term storage (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-3)3M1Transport (IEC 60721-3-2)2MLong-term storage (IEC 60721-3-1)1M1							
Rated insulation voltage ≤ 2000 m NN       250 m         Rated insulation voltage ≤ 3000 m NN       160 m         Minimum contact rating       1 mA at AC/DC ≥ 10 m         Environment/EMC and temperature range       1 mA at AC/DC ≥ 10 m         EMC       IEC 60533, IEC 61326-2-4         Operating temperature       -25+55 m         Transport       -40+85 m         Long-term storage       -40+70 m         Classification of climatic conditions acc. to IEC 60721 (related to temperature and relative humidity):       Stationary use (IEC 60721-3-3)         Stationary use (IEC 60721-3-2)       2K1         Long-term storage (IEC 60721-3-1)       1K2         Classification of mechanical conditions acc. to IEC 60721:       Stationary use (IEC 60721-3-3)         Transport (IEC 60721-3-3)       3M1         Transport (IEC 60721-3-2)       2M         Long-term storage (IEC 60721-3-3)       3M1         Transport (IEC 60721-3-2)       2M         Long-term storage (IEC 60721-3-1)       1M1							
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Environment/EMC and temperature range           EMC         IEC 60533, IEC 61326-2-4           Operating temperature         -25+55 °           Transport         -40+85 °           Long-term storage         -40+70 °           Classification of climatic conditions acc. to IEC 60721 (related to temperature and relative humidity):           Stationary use (IEC 60721-3-3)         3K2           Transport (IEC 60721-3-2)         2K1           Long-term storage (IEC 60721-3-1)         1K2           Classification of mechanical conditions acc. to IEC 60721:         Stationary use (IEC 60721-3-3)           Transport (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-2)         2M           Long-term storage (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-2)         2M           Long-term storage (IEC 60721-3-1)         1M1						A	
EMC         IEC 60533, IEC 61326-2-4           Operating temperature         -25+55°           Transport         -40+85°           Long-term storage         -40+70° <b>Classification of climatic conditions acc. to IEC 60721</b> (related to temperature and relative humidity):           Stationary use (IEC 60721-3-3)         3K2           Transport (IEC 60721-3-2)         2K1           Long-term storage (IEC 60721-3-1)         1K2 <b>Classification of mechanical conditions acc. to IEC 60721:</b> 3M1.           Transport (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-3)         2M.           Long-term storage (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-1)         1M1.	Minimum contact rating				11	mA at AC/D	$C \ge 10 V$
Operating temperature         -25+55 °           Transport         -40+85 °           Long-term storage         -40+70 ° <b>Classification of climatic conditions acc. to IEC 60721</b> (related to temperature and relative humidity):           Stationary use (IEC 60721-3-3)         3K2           Transport (IEC 60721-3-2)         2K1           Long-term storage (IEC 60721-3-1)         1K2 <b>Classification of mechanical conditions acc. to IEC 60721:</b> 3M1.           Transport (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-3)         2M.           Long-term storage (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-1)         1M1.	Environment/EMC and temperature	e range					
Transport         -40+85 °           Long-term storage         -40+70 ° <b>Classification of climatic conditions acc. to IEC 60721</b> (related to temperature and relative humidity):           Stationary use (IEC 60721-3-3)         3K2           Transport (IEC 60721-3-2)         2K1           Long-term storage (IEC 60721-3-1)         1K2 <b>Classification of mechanical conditions acc. to IEC 60721:</b> 3M1           Transport (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-3)         2M           Long-term storage (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-2)         2M           Long-term storage (IEC 60721-3-1)         1M1	EMC				IEC 605	33, IEC 613	26-2-4 5
Long-term storage         -40+70 ° <b>Classification of climatic conditions acc. to IEC 60721</b> (related to temperature and relative humidity):           Stationary use (IEC 60721-3-3)         3K2           Transport (IEC 60721-3-2)         2K1           Long-term storage (IEC 60721-3-1)         1K2 <b>Classification of mechanical conditions acc. to IEC 60721:</b> 3M1.           Transport (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-2)         1M1.	Operating temperature					-25.	+55 °C
Classification of climatic conditions acc. to IEC 60721 (related to temperature and relative humidity):         Stationary use (IEC 60721-3-3)         Transport (IEC 60721-3-2)         Long-term storage (IEC 60721-3-1)         TRASSIGNATION OF mechanical conditions acc. to IEC 60721:         Classification of mechanical conditions acc. to IEC 60721:         Stationary use (IEC 60721-3-3)         Transport (IEC 60721-3-3)         Transport (IEC 60721-3-2)         Long-term storage (IEC 60721-3-2)         Long-term storage (IEC 60721-3-1)	Transport					-40.	+85 °C
Stationary use (IEC 60721-3-3)         3K2           Transport (IEC 60721-3-2)         2K1           Long-term storage (IEC 60721-3-1)         1K2           Classification of mechanical conditions acc. to IEC 60721:         2K1           Stationary use (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-3)         3M1           Transport (IEC 60721-3-2)         2M           Long-term storage (IEC 60721-3-1)         1M1	Long-term storage					-40.	+70 °C
Transport (IEC 60721-3-2)         2K1           Long-term storage (IEC 60721-3-1)         1K2           Classification of mechanical conditions acc. to IEC 60721:         2K1           Stationary use (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-1)         1M1.	Classification of climatic conditions ac	c. to IEC 6	0721 (relat	ed to temp	erature and	l relative hu	midity):
Long-term storage (IEC 60721-3-1)         1K2           Classification of mechanical conditions acc. to IEC 60721:         1K2           Stationary use (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M           Long-term storage (IEC 60721-3-1)         1M1.	Stationary use (IEC 60721-3-3)						3K22
Classification of mechanical conditions acc. to IEC 60721:           Stationary use (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M           Long-term storage (IEC 60721-3-1)         1M1.	Transport (IEC 60721-3-2)						2K11
Stationary use (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-1)         1M1.	Long-term storage (IEC 60721-3-1)						1K22
Stationary use (IEC 60721-3-3)         3M1.           Transport (IEC 60721-3-2)         2M.           Long-term storage (IEC 60721-3-1)         1M1.	Classification of mechanical conditi	ons acc. to	D IEC 6072	21:			
Transport (IEC 60721-3-2)         2M           Long-term storage (IEC 60721-3-1)         1M1	Stationary use (IEC 60721-3-3)						3M12
Long-term storage (IEC 60721-3-1) 1M1	Transport (IEC 60721-3-2)						2M4
	Long-term storage (IEC 60721-3-1)						1M12
	Area of application					≤30	

Connection	
Connection type plu	ggable screw terminal or push-wire termina
Screw-type terminals:	
Nominal current	≤ 10 <i>k</i>
Tightening torque	0.50.6 Nm (57 lb-in
Conductor sizes	AWG 24-12
Stripping length	7 mn
rigid/flexible	0.22.5 mm
flexible with ferrules, with/without plastic collar	0.252.5 mm
Multiple conductor	
rigid	0.21 mm
flexible	0.21.5 mm
flexible with ferrule without plastic sleeve	0.251 mm
flexible withTWIN ferrule with plastic sleeve	0.51.5 mm
Push-wire terminals:	
Nominal current	≤ 10 <i>k</i>
Conductor sizes	AWG 24-12
Stripping length	10 mn
rigid/flexible	0.22.5 mm
flexible with ferrules, with/without plastic collar	0.252.5 mm
Multiple conductor, flexible withTWIN ferrule with plasti	c sleeve 0.51.5 mm
Push-wire terminals X1:	
Nominal current	≤ 8 /
Conductor sizes	AWG 24-16
Stripping length	10 mn
rigid/flexible	0.21.5 mm
flexible with ferrule without plastic sleeve	0.251.5 mm
flexible with ferrule with plastic sleeve	0.250.75 mm

## Other

Operating mode	continuous operation
Mounting (0°)	display oriented, cooling slots must be ventilated vertically 6)
Degree of protection internal compon	ents IP40
Degree of protection terminals	IP20
DIN rail mounting acc. to	IEC 60715
Screw fixing	3 x M4 with mounting clip
Enclosure material	polycarbonate
Flammability class	V-0
ANSI code	64
Dimensions (W x H x D)	108 x 93 x 110 mm
Documentation number	D00261
Weight	< 390 g

<sup>1)</sup> At a frequency > 200 Hz, the connection of X1 and remote must be insulated. Only permanently installed devices which at least have overvoltage category CAT2 (300 V) may be connected.

 $^{2)}\,$  Indication limited outside the temperature range -25  $\ldots$  +55 °C.

<sup>3)</sup> U<sub>s</sub> [Volt] = supply voltage ISOMETER<sup>®</sup>

<sup>4)</sup> Only for  $U_n \ge 50$  V.

<sup>5)</sup> This is a class A product. In a domestic environment, this product may cause radio interference. In this case, the user may be required to take corrective actions.

<sup>6)</sup> Recommendation: Mounting position 0° (display-oriented, cooling slots must be ventilated vertically). At mounting position 45°, the max. operating temperature is reduced by 10 °C. At mounting position 90°, the max. operating temperature is reduced by 20 °C.

<sup>7)</sup> Deactivation of voltage metering in a DC system at  $U_n > DC$  1000 V and asymmetric insulation fault at  $R_f < 500 \text{ k}\Omega$ . Reactivation of voltage metering if  $R_f > 500 \text{ k}\Omega$ .

#### "W" option data deviating from the standard version

Devices with the suffix "W" feature increased shock and vibration resistance. The electronics is covered with a special varnish to provide increased protection against mechanical stress and moisture. Rated operational current switching elements max. 3 A (for UL applications)

**1** Combination of ISOMETER® sensor variant with an FP200W: The requirements of the "W" option will only be fulfilled if the ISOMETER® sensor variant is mounted on DIN rail and connected to the FP200W via the patch cable. Refer also to the quick-start guide FP200 (document number D00169).



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