

Instruction Manual SIR3, SIQ3



Issue

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1 General information

Use for intended purpose

- The product may only be used for the applications specified in this document and in the technical documentation. Transportation with due care and attention, correct storage and installation as well as careful use and maintenance during operation of the product must be ensured to guarantee trouble-free and safe operation.
- The product must be used at all times in agreement with the technical specifications. In particular, compliance with the ambient conditions recommended in the technical documentation must be ensured.

Installation, assembly, repair and maintenance work

- Observe the relevant national regulations and observe the applicable standards and directives for special applications.
- Installation, assembly, repair and maintenance work must be carried out exactly according to the installation and maintenance instructions applicable to the individual products in order to guarantee their functional reliability and avoid installation errors and damage.
- Installation, assembly, repair and maintenance work must only be performed by qualified and authorised technical personnel in accordance with the relevant documentation, especially the safety and warning information contained therein.
- Make sure that no excess parts (screws, tools, etc) are left behind in or on products after performing installation, assembly, repair or maintenance work. Non-compliance with this requirement may cause malfunctions and/or damage to the products or the system.
- Make sure a function test is carried out on completion of installation, assembly, repair and maintenance work to ensure trouble-free operation of the products.

Suitable tools and equipment

Only suitable tools and equipment, especially materials provided by NORIS, are to be used for installation, assembly, repair and maintenance work. Damaged products or components are to be replaced only by genuine NORIS components or parts. NORIS shall accept no liability whatsoever for any damage incurred as the result of using unauthorised spare parts. This will invalidate the warranty. Keep the operating instructions in a place that is accessible to all users at any time.

Modification of products

NORIS shall accept no liability whatsoever if unauthorised modifications have been made to the products. This will also invalidate the warranty. Therefore, consult our technical staff before undertaking any modifications.

Shipping, appropriate storage and packaging

Products that are sent in for repair must be appropriately packaged to prevent damage (from impacts, moisture, static charge, etc). Make sure that products and all spare parts are stored correctly. Refer to the corresponding technical information for further information.

Disclaimer

We review the contents of our technical documentation at regular intervals to ensure it agrees with our products. Nevertheless, variations cannot be completely ruled out. NORIS therefore cannot guarantee complete agreement of the documentation contents with the hardware and software. Changes and corrections will be included in subsequent issues of the technical documentation.

2 General information

2.1 Scope of validity

This instruction manual applies the indicator series listed below:

Indicator type	Product revision
SIR3, SIQ3	A

Important information on the use of this instruction manual and supplementary information

Please note that the indicators are often adapted to customer-specific requirements. The functions, connections, etc. described in this instruction manual may vary in terms of the features on your specific product. Therefore always first refer to the information in the customer-specific drawing for installation, commissioning and operation.

2.2 Subject of the operating instructions

The subject of these operating instructions is the installation, commissioning, operation and maintenance of the indicators type SIR3, SIQ3. This manual also contains important troubleshooting information.

2.3 Design and use of safety and warning notes

DANGER

Warning about the type and source of danger that lead to serious injuries or even to death when disregarding the given precautions.

CAUTION

Warning about the type and source of danger that lead to minor physical injury when disregarding the given precautions.

NOTICE

Warning about the type and source of danger that lead to material damages when disregarding the given precautions.

2.4 Scope of delivery

Note on customer-specific scope of delivery

The scope of delivery of your product may vary from the specifications below. Refer to the corresponding parts list for a detailed overview of the scope of delivery for your product.

The standard scope of delivery contains:

- Indicator, packed in a polyethylene bag in a box
- 4x mounting screws for installation in the control panel cut-out; 3x mounting screws for indicator type SIR3-060 and SIR3-080.
- 8-pin connector

2.5 Accessories and spare parts

Available accessories

In addition to the installation material, the following accessories are available for Series SIR3, SIQ3 indicators:

- Split ferrite Würth No. 742 711 31, Ø 6,0 ... 7,5 mm (necessary for indicators for type -I2 in conjunction with DIN EN 50155)
- Split ferrite Würth No. 742 711 32, Ø 6,0 ... 7,5 mm (necessary for indicators for type -I2 in conjunction with DIN EN 50155)

Available spare parts

Available spare parts include installation material and connectors. For detailed information please contact our Service department or marketing team at sales@noris-group.com.

2.6 Packaging and its disposal

Indicator packaging

The indicator is packed in a polyethylene bag in a cardboard box. The mounting screws are packed in a separate polyethylene bag. The polyethylene bag and the cardboard box protect the device from dirt, dust, moisture and prevent the housing from being scratched. To avoid damaging the device only unpack it directly before installation. If you remove the device as part of system maintenance, it should be kept in the polyethylene bag and in the cardboard box to avoid damage.

Disposal of packaging

If the packaging is no longer required, it should be disposed of in accordance with the locally applicable waste disposal regulations.

2.7 Type code

Structure of type code SIR3..., SIQ3...				
SI	R	3	-060	-I2 -123 Example: SIR3-060-I2-123
	Housing type			
	Series			
	Housing size			
	Input signal			
	Scale version			

Type code SIR3..., SIQ3...				
Housing type	R	Round		
	Q	Square		
Series	3	Fixed digit (indicator generation)		
Housing size	-072	Square, front frame size 72 x 72 mm		
	-096	Square, front frame size 96 x 96 mm		
	-144	Square, front frame size 144 x 144 mm		
	-060	Round, housing diameter Ø 60 mm		
	-080	Round, housing diameter Ø 80 mm		
	-100	Round, housing diameter Ø 100 mm		
	-130	Round, housing diameter Ø 130 mm		
	Input signal	-I1	Direct current 0...20 mA	
-I2		Direct current 4...20 mA		
-I4		Direct current -20...0...+20 mA		
-I0		Direct current, customer-specific compensation		
-U1		DC voltage, 0 ... 10 VDC		
-U2		DC voltage, 2 ... 10 VDC		
-U4		DC voltage, -10...0...+10 VDC		
-U0		DC voltage, customer-specific compensation		
-UG0		DC voltage, compensation for GE1214 tachometer		
-W0		Customised alternating voltage measuring range		
Scale version	-123	Measuring range, scale graduations etc.		
Customised indicator	-V456	Customised indicator		
SI	_	3	- _ _ - - _ _ Example: SIQ3-096-U2-123	

Ordering information

- To ensure the dial design is implemented as accurately as possible, exact descriptions, drawings or photos of existing dials should accompany the order.
- If the dial markings are not specified when ordering, coarse/fine scale graduations will be supplied as standard. An orientation graduation or other deviating dial markings must be specified in the order.
- The dial version number and the V### number are assigned by NORIS.

3 Product description

3.1 Scope of application

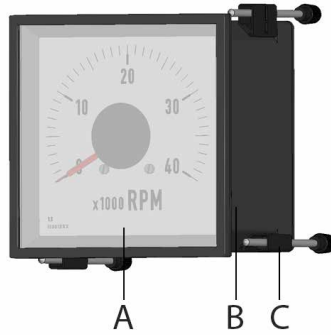
Type SIR3, SIQ3 analogue indicators are commonly used in the fields of the shipbuilding industry, transport technology, machinery and equipment. They are suitable for use in harsh ambient conditions and comply with the requirements of DIN EN 50155 for railway applications and the ship classification society DNV-GL. Thanks to its mechanical design, the casing is extremely resistant to salt spray, enabling use in outdoor applications. The DIN-standardised casing sizes are suitable for installation in control cabinets and control panels with pre-stamped standardised installation openings.

3.2 Display principle

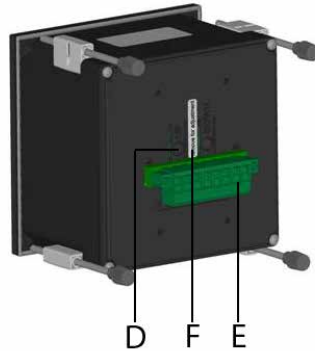
The display on the SIR3, SIQ3 is based on a 1 mA moving-coil element. The moving-coil element contains a coil that rotates in the magnetic field of a permanent magnet. When a direct current flows through the coil, a second magnetic field is produced in the opposite direction of the magnetic field of the permanent magnet. The two magnetic fields repel, thus rotating the coil with an attached pointer. A coil spring acts against the magnetic force in the coil.

3.3 Indicator design

Indicator SIQ3

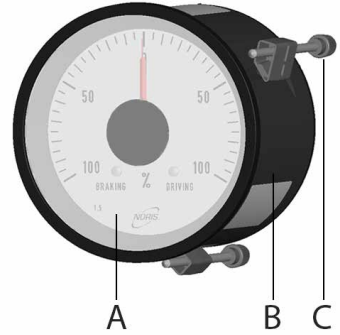


A B C

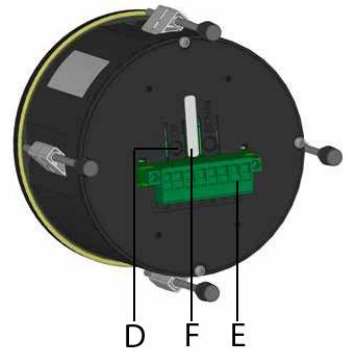


D F E

Indicator SIR3



A B C



D F E

Legend to previous illustrations

- A) Non-reflective float glass
- B) Stable, glass-fibre reinforced plastic housing
- C) Mounting screws
- D) 2x dummy buttons
- E) 8-pin connector
- F) Adhesive label for protection of trimmer potentiometer

NOTICE

Note, that the readjustment with the potentiometer by customers results in the loss of warranty.

Calibration of the indicator is done by the manufacturer ex factory. Calibration by the customer is undesired. Thus, the trimmer potentiometer is protected by an adhesive label.

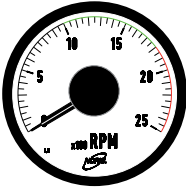
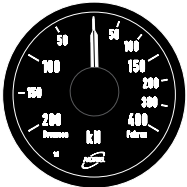
3.4 Scale and pointer

The markings and the scale graduation comply with DIN43802 and DIN43780 but can also be customised on request.

Dial and pointer – standard versions (to DIN 43802 and DIN 43780)		
	White scale dial	Black scale dial
Scale graduations and dial markings	Black	White
Type of graduation	Coarse-fine graduation	
Scale dial illumination	Dial illumination, white	Graduation and markings illumination, white
Pointer versions	Black pointer, unlit	White pointer, unlit

Dial and pointer – individual versions	
Scale and scale markings	Available in all RAL colours in accordance with customer requirements, own logos possible
Type of graduation	Orientation graduation or any other scale graduation available according to customer requirements
Black scale dial illumination	Dial illumination and markings red, green or in another translucent colour
Pointer versions	Non-illuminated: yellow

3.5 Zero point, pointer return point and measuring range

Zero point	Zero point on the left	Zero point in the middle	
			
Scale measuring range	<ul style="list-style-type: none"> The measuring range shown on the dial (can be individually defined) and the signal measuring range (see type code) differ. Processing of current/voltage signals (customised current/voltage measuring ranges also possible), see type code 		

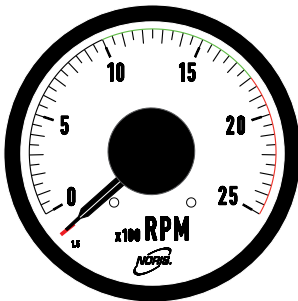
3.6 Illumination

NOTICE! For technical reasons, the moving coil system casts shadows in the centre of the indicator's scale dial for indicators with white scale dial. For indicators with black scale dial in dark rooms with sufficient ambient light, the pointer is visible in the dark. This becomes possible due to reflexion of the ambient light and the scale illumination on the pointer.

The indicator is lit by six integrates white LEDs which illuminate the dial from behind. The illumination can be realised protected against polarity reversal via a 24 VDC input or a 12 VDC control input.

The brightness depends on the applied voltage. For both control inputs, the control range starts at approx. 6 VDC and ends at maximum brightness at the respective final voltage of 12 VDC or 24 VDC. The brightness can be regulated with a commercially available PWM dimmer. The pointer is unlit.

3.7 Monitoring measuring signal - "Live Zero" function



Live Zero

Type -I2: 4...20 mA

Type -U2: 2...10 VDC

Functional description

The Live Zero function monitors the accuracy of the measuring signal thus increasing operational reliability. The measured value zero is not sent as a standard signal of the zero variable but rather it is offset (example: with 4...20 mA inputs the scale value is 0 at 4 mA). This makes it possible to detect possible sensor failure, wire break or short-circuit of the sensor line.

Function indicator

The pointer will drop below the zero point to indicate failure of the measuring signal (see illustration).

Technical data

Electrical connection	
Reverse voltage protection	Yes
Connection	8-pin connector
Input signal	
Analogue measurement signals	0 ... 20 mA (Ri ~ 70 Ω); 4 ... 20 mA (Ri ~265 Ω); -20 ... +20 mA (Ri ~65 Ω); 0 ... 10 VDC (Ri ~10 kΩ); 2 ... 10 VDC (Ri ~8 kΩ); -10 VAC ... +10 VDC (Ri ~10 kΩ); custom- er-specific measuring ranges on request
Alternating voltage	Max. 250 VAC (Ri voltage-dependent: for 50 VAC = Ri ~50 kΩ; for 100 VAC = Ri ~100 kΩ)
Input for illumination control	For direct voltage or commercially available PWM dimmer in 12 V or 24 V range (see connector and connection assignments)
Class of accuracy	IEC 60051: 1.5
Environmental influences	
Operating temperature	Reference range of operation: 5 ... 35 °C, Nominal range of operation: -25 ... +70 °C
Storage temperature	-40 ... +70 °C (max. peak values within 30 days/year at relative humidity of 5...95%)
Protection class	IEC 60529: Front of housing IP66, IP67 and IP68 (1m, 24h); rear of housing IP30 (standard, higher on request)
Salt spray resistance	IEC 60068-2-52: Test severity class 1 (open deck) and test severity class 4 (de-icing salt)
Vibration resistance	IEC 60068-T2-6, 0.7 g @ 5 ... 100 Hz (sine) IEC 60068-2-6: 0.5 g, test duration 3 x 90 minutes (at 100 Hz)
Shock resistance	EN 61373 cat. 2: 5 g at 30 ms; 10 g at 18 ms
Climatic test	IEC 60068-2-1 dry cold: -25 °C, test duration 16 h IEC 60068-2-2 dry heat: +70 °C, test duration 16 h IEC 60068-2-30 moist heat: ≤95% relative at 55 °C, test duration 2 x 12h
ESD	IEC 61000-4-2 and EN50121-3-2, Tab. 9.3, evaluation criterion "A": 8 kV for air discharge; 6 kV for contact discharge
Burst	IEC 61000-4-4 and EN50121-3-2, Tab. 7.2 and 8.2, power supply connections: 2 kV, signal, data and control lines 2 kV
Surge	IEC 61000-4-5 and EN50121-3-2, Tab. 7.3, as- sessment criterion A, operating voltage positive to operating voltage negative at 1 kV (Ri = 2Ω)

Environmental influences	
RF interference immunity	IEC 61000-4-3: 80 MHz...2 GHz, 80% AM at 1 kHz, E = 10 Vrms/m EN 50121-3-2, Tab. 9.1 and 9.2: 80 MHz ... 1 GHz at 80% AM @1 kHz, E = 20 Vrms/m; 1.0 GHz ... 2.1 GHz at 80% AM @1 kHz, E = 10 Vrms/m; 2.1 GHz ... 2.5 GHz at 80% AM @1 kHz, E = 5 Vrms/m;
Conducted RF interference	IEC 61000-4-6 and EN50121-3-2, Tab. 7.1 and 8.1: 150 kHz...80 MHz, 80% AM at 1 kHz, U = 10 Vrms
Conducted AF interference	GL 2012: 50 Hz...10 kHz, U = 3 Vrms
Emitted interference	CISPR 16-1, 16-2: Battery-related connections, 10 kHz ... 30 MHz EN 50121-3-2, Tab. 4: Battery-related connections, 150 kHz ... 30 MHz EN 50121-3-2, Tab. 6: Casing, 30 MHz ... 1 GHz
Dielectric strength	1000 VDC between all electrical inputs and outputs
Mechanical variables	
Housing material	Glas fibre reinforced, salt spray resistant and uv stabilised plastic; upper part: PC GF10; base plate: PC GF30; face made of lumenized float glass
Mounting	Fastening screws with dovetail key and hand knob (tool-less)
Installation position	Any
Weight	SIQ3-072: 280 g SIQ3-096: 340 g SIQ3-144: 570 g SIR3-060: 240 g SIR3-080: 280 g SIR3-100: 325 g, SIR3-130: 450 g
Housing sizes	Square: 72 x 72 mm, 96 x 96 mm, 144 x 144 mm Round: Ø 60 mm, Ø 80 mm, Ø 100 mm, Ø 130 mm
Other	
Illumination	Externally dimmableLED illumination
Scale angular	240°
Fire protection class	UL94: V0 (all housing parts)
Approvals	CE, DNV-GL (other certifications available on request)
Other standards	DIN EN 50155 (railway applications)

4 Installation

4.1 Information on avoiding faults and damage

NOTICE

Installation must be carried out exactly as described in this manual. If customer drawings with deviating information are available they have priority over the information in this manual.

Follow the information and instructions. The indicator may otherwise be damaged.

NOTICE

Make sure that the ambient conditions at the place of installation correspond to the requirements specified in the technical data.

Use in direct sunlight should be avoided due to possible temperature and other effects inside the housing.

4.2 Indicator installation

4.2.1 Control panel cut-out

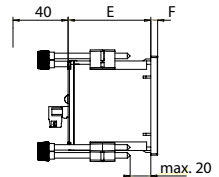
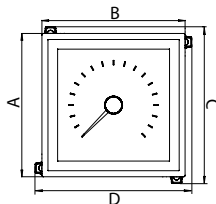
A correspondingly sized cut-out in the control panel is required to install the indicator.

- A. Make the cut-out in the control panel for your indicator as specified in the next table.

NOTICE

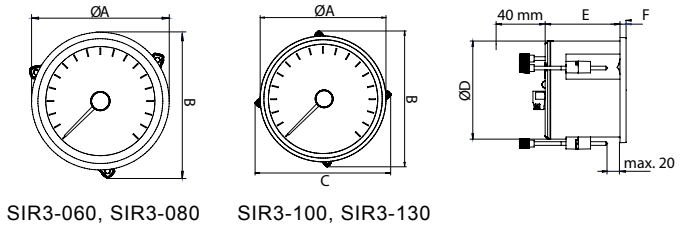
Make sure that the cut-out in the control panel matches the dimensions specified for your indicator in the next table. Make sure that the cut-out has no sharp edges. Do not use force to fit the indicator in the cut-out.

Otherwise the indicator may be damaged while fitting in the cut-out.



Indicator type	A	B	C	D	E	F	Panel cut-out	Permissible deviation
SIQ3-072...	72	72	81	81	60	5	67.5 x 67.5	+0.5
SIQ3-096...	96	96	105	105	60	5	91.5 x 91.5	+0.8
SIQ3-144...	144	144	153	153	61	8	137.5 x 137.5	+1.0

All values in this table in mm



Indicator type	A	B	C	D	E	F	Panel cut-out	Permissible deviation
SIR3-060...	66	71.5	-	60	61	5	Ø 60.5	+0.5
SIR3-080...	86	91.5	-	80	61	5	Ø 80.5	+0.5
SIR3-100...	106	116.5	116.5	100	61	5	Ø 100.5	+0.5
SIR3-130...	136	146.5	146.5	130	63	6	Ø 130.5	+0.5

All values in this table in mm

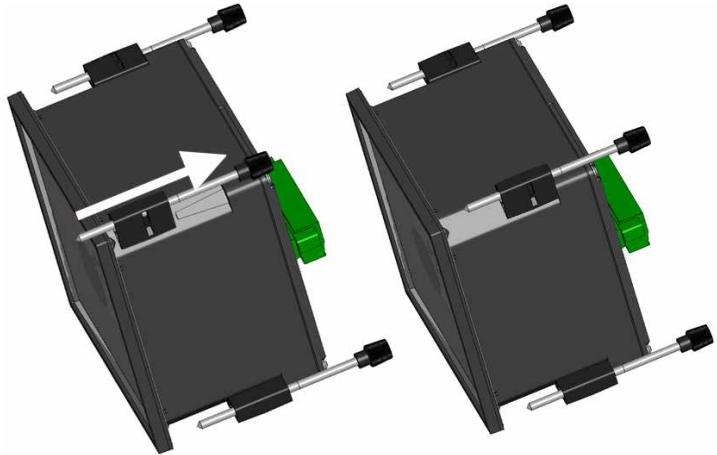
4.2.2 Securing the indicator

Depending on the installed location and design of the control panel it may be advisable to make the electrical connections to the indicator first and then secure the indicator in the panel (see section Connection and cable installation).

- ▶ **Prerequisite:** You have placed the indicator in the corresponding cut-out in the control panel.

A. Fit all mounting screws in the corresponding positions on the indicator (see next Fig.).

- ⇒ There are 3 or 4 mounting screws depending on the design and size of the indicator. All supplied mounting screws must be used to ensure the indicator is fitted securely.



1: Indicator mounting elements

- B. Turn the knurled screws clockwise until they make contact with the inner side of the control panel. Now turn the knurled screws further by several turns until the indicator is secure.

NOTICE

Do not use force to screw in the knurled screws.

Otherwise the indicator housing or the mounting element may be damaged.

- ➔ The indicator is now securely installed.

NOTICE

Only two mounting elements may be needed in special cases, e.g. instruments arranged next to each other in a block without spacing.

In this case, the control panel cut-out must be sufficiently reinforced in order to maintain the protection class.

4.3 Connection and cable installation

NOTICE

Make sure that the indicator is connected correctly.

Incorrect wiring and incorrectly or inappropriately tightened connector mounting screws may result in signal loss or damage to the indicator or connection.

NOTICE

Make sure that the connection cables are installed correctly.

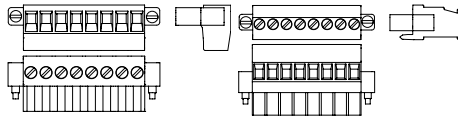
Incorrectly installed connection cables can result in signal loss or damage to the indicator.

Electrically connect your indicator as described in this section.

- A. Screw the connection cables to the connector. Refer to the corresponding connection diagram for your indicator in this section.
- B. Plug the connector into the socket of the indicator and secure the connector with the two screws.

Connector versions and general connection assignments

Two types of connector are available corresponding to the order



Connector with straight cable outlet (standard)

Connector with 90° angled cable outlet (optional)

Connection assignment



2: SIx3 connector, 8-pin

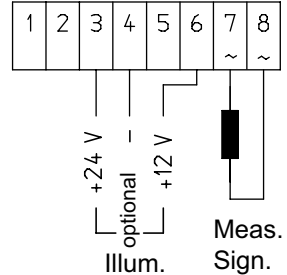
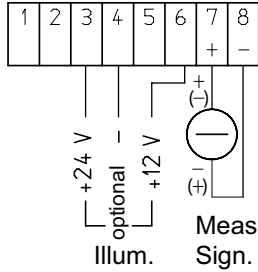
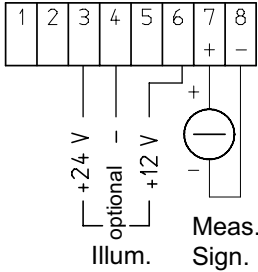
Pin	Indicator labeling	Description
1	N.C.	Not connected
2	N.C.	Not connected
3	Illum. + ($\leq 24V$)	Illumination control input, positive (24 VDC)
4	Illum. -	Illumination control input, negative
5	N.C.	Not connected
6	Illum. + ($\leq 12V$)	Illumination control input, positive (12 VDC)
7	Meas. Sign. + (type-specific)	Measuring signal input, positive
8	Meas. Sign. - (type-specific)	Measuring signal input, negative

Note on lighting control inputs

The lighting can be powered either at 24 VDC (Pin 3) or 12 VDC (Pin 6).

Connection diagrams of the different types

Free pins in the diagrams below are not connected for the respective signal type.



- Type -I1: 0...20 mA
- Type -I2: 4...20 mA
- Type -I0: Customised
- Type -U1: 0...10 VDC
- Type -U2: 2...10 VDC
- Type -U0: Customised

- Type -I4: -20...0...+20 mA
- Type -U4: -10...0...+10 VDC
- Type -UG0: Tachogenerator
GE1214, DC voltage signal

- Type -W0: Alternating voltage for tachogenerator; sinusoidal signal, 250 VAC max.

Notes on connection

Observe the following information on connection:

NOTICE

Make sure that the polarity of the connections for the lighting is not reversed. Make sure that the DC voltage corresponding to the lighting control input is used. Do not use both connections at the same time.

The electronics in the indicator may otherwise be damaged.

Note on using Type -I2 together with DIN EN 50155:

A Snap-on Ferrite must be fitted on the connection cable directly at the connector for Type -I2 indicators in connection with DIN ENM 50155 for railway applications. The following types are recommended:

1. Snap-on Ferrite Würth No. 742 711 131, Ø 6.0 ... 7.5 mm
2. Snap-on Ferrite Würth No. 742 711 132, Ø 7.0 ... 8.5 mm

5 Commissioning

5.1 Checking the lighting control

With the external lighting control function, the indicator lighting can be adapted to the ambient lighting conditions or to the lighting emitted from adjacent devices. Check the voltage for the lighting control function as part of the commissioning procedure.

NOTICE

The lighting electronics of the indicator may be damaged if the voltage for lighting control exceeds the maximum permissible value.

Therefore, check the voltage for the lighting control prior to start-up.

Check that the voltage for the lighting control function corresponds to specifications

- ▶ **Prerequisite:** The connector has been wired correctly. The connector is not plugged into the indicator.
- ▶ **Prerequisite:** The lighting control is set to maximum.
- A. Set the measuring range for DC voltage on the multimeter.
- B. Using 24 VDC control:
Connect the multimeter [+] to "Illum. + ($\leq 24V$)" [Pin 3] and multimeter [-] to "Illum. -" [Pin 4] of the connector.
- C. Using 12 VDC control:
Connect the multimeter [+] to "Illum. + ($\leq 12V$)" [Pin 6] and multimeter [-] to "Illum. -" [Pin 4] of the connector.
- D. Switch on the voltage supply for the lighting.
- ➔ **Result:** The multimeter correspondingly shows the correct voltage of the lighting control function used (≤ 12 VDC or ≤ 24 VDC) □

5.2 Checking the input signal

Check the input signal before using the indicator.

NOTICE

The polarity of the signal inputs for Type -I1, -I2, -I0, -U1, -U2 and -U0 must not be reversed.

The indicator may otherwise be damaged.

NOTICE

Make sure the input signal complied with the specifications for your indicator.

The indicator may otherwise be damaged.

6 Maintenance

Indicators contain no wearing parts and are therefore classified as "maintenance-free devices" by the manufacturer. As part of system maintenance it is recommended to check the indicator mounting at regular intervals and, if necessary, to retighten the mounting screws to maintain the protection class.

7 De-installation and disposal

De-installation of indicators

NOTICE

If the indicator is removed, first disconnect the plug and then remove the fixing arrangements. After de-installation ensure that no parts remain in the panel.

The indicator or other devices in the panel may otherwise be damaged.

Disposal of defective indicators

Electric devices should not be disposed of together with normal waste. Dispose of the indicators in accordance with local requirements for electronic equipment.

8 Troubleshooting

Fault	Cause	Problem resolution
No function / no indication	Wire break	Repair cable
Indication outside valid range	Wrong signal	Check signal
Illumination too dark / no illumination	DC voltage at external lighting control input too low	Check DC voltage at external lighting control input
	Wire break	Repair cable

9 Service

Do you have any questions or do you require help with the installation, commissioning or maintenance? Contact our Service representatives:

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