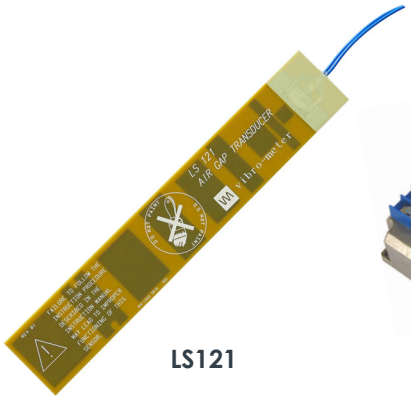
MEGGITT

DATA SHEET

Vibro-Meter®

LS121 and ILS731 air-gap measurement system



LS121

ILS731

CE

KEY FEATURES AND BENEFITS

- From the Vibro-Meter® product line
- Contactless measurement for alternators
- Electric field principle
- No wear-out
- 20 to 60 mm linear measurement range
- Operating temperature ranges:
  −15 to +125°C for the LS121 air-gap sensor
  −25 to +70°C for the ILS731 signal conditioner
- Enhanced filtering of noise and spikes induced by high excitation currents
- Available with cable lengths of 5 or 10 m

APPLICATIONS

- Contactless measurement of air gap in hydroelectric generators, and other large alternators and motors

DESCRIPTION

The air-gap measurement system consists of a LS121 air-gap sensor with an integral cable and an ILS731 signal conditioner. The two devices are connected via the integral cable of the sensor, which is a pair of coaxial cables.

The LS121 air-gap sensor contains two mutually insulated electrodes (transmitter and receiver) which are shielded on the rear side. The ILS731 signal conditioner contains the electronic circuitry that excites the sensor and processes the measurement signals returned.

An oscillator in the signal conditioner feeds a high-frequency signal to the transmitter electrode of the sensor and produces an electric field. Part of this field is picked up by the receiver electrode of the sensor and is sent to the receiver circuitry.

When the sensor is mounted on the stator of a machine, the distance between the sensor and the rotor surface (the target) affects the coupling of the electric field between the transmitter and receiver electrodes. In this way, the modulated signal at the receiver output is proportional to the distance between the stator and the rotor of the alternator.

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DESCRIPTION *(continued)*

The air-gap measurement system provides three output signals: POLE PROFILE, ROTOR PROFILE and MIN GAP.

• The POLE PROFILE output indicates the instantaneous value between the surface of the sensor and the rotor.

• The ROTOR PROFILE output indicates the minimum value of the air gap for each pole.

• The MIN GAP output reflects the minimum air gap value for all poles of the rotor.

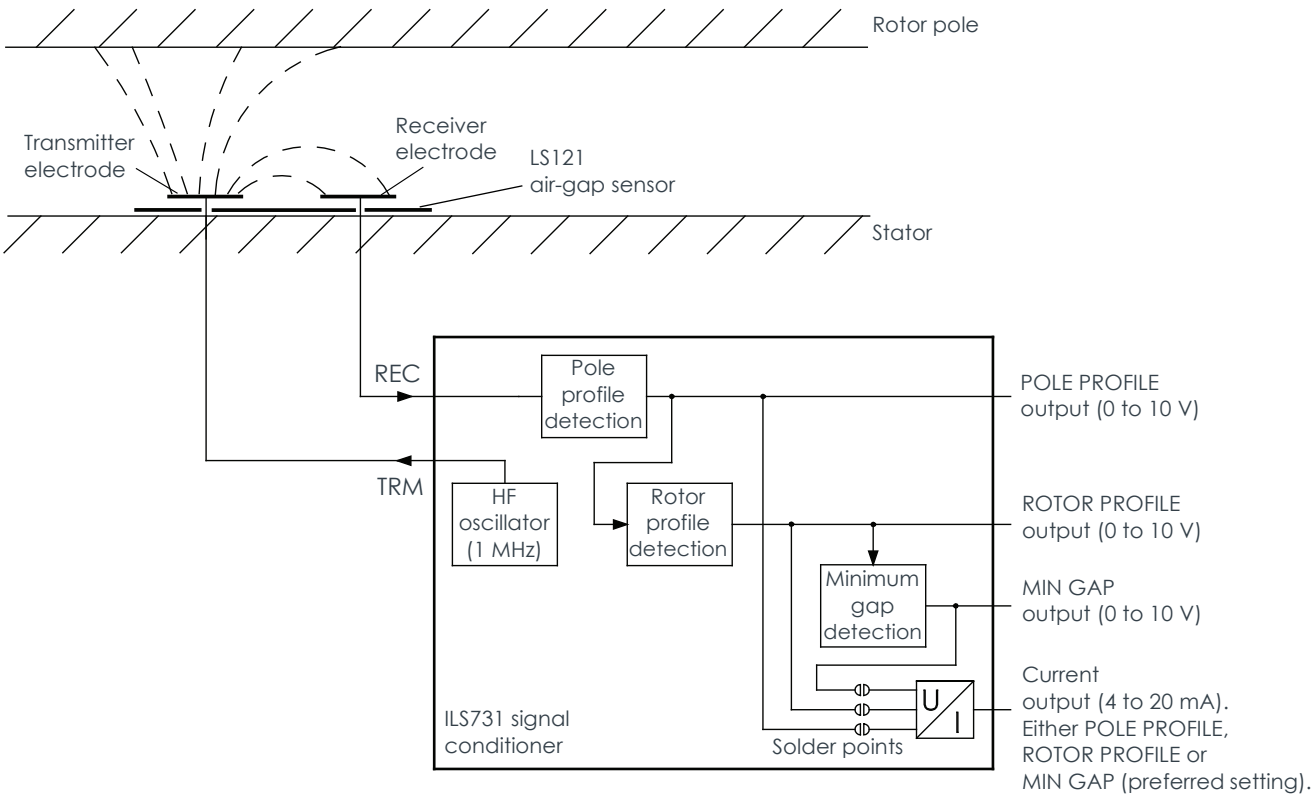
Each of these measurements is available as a voltage-based (0 to 10 V) output. In addition, one of these measurements can be selected to be also available as a current-based (4 to 20 mA) output. The selection is made by factory-set solder points which are placed according to the option chosen when ordering (see **Mechanical drawings and ordering information starting on page 6**).

All output signals are available on a screw-terminal strip on the ILS731 signal conditioner.

A range of multi-wire shielded transmission cables are available to connect a LS121 and ILS731 air-gap measurement system to monitoring and/or protection systems such as VM600 and VibroSmart®.

For specific applications, contact your nearest Meggitt representative.

BLOCK DIAGRAM



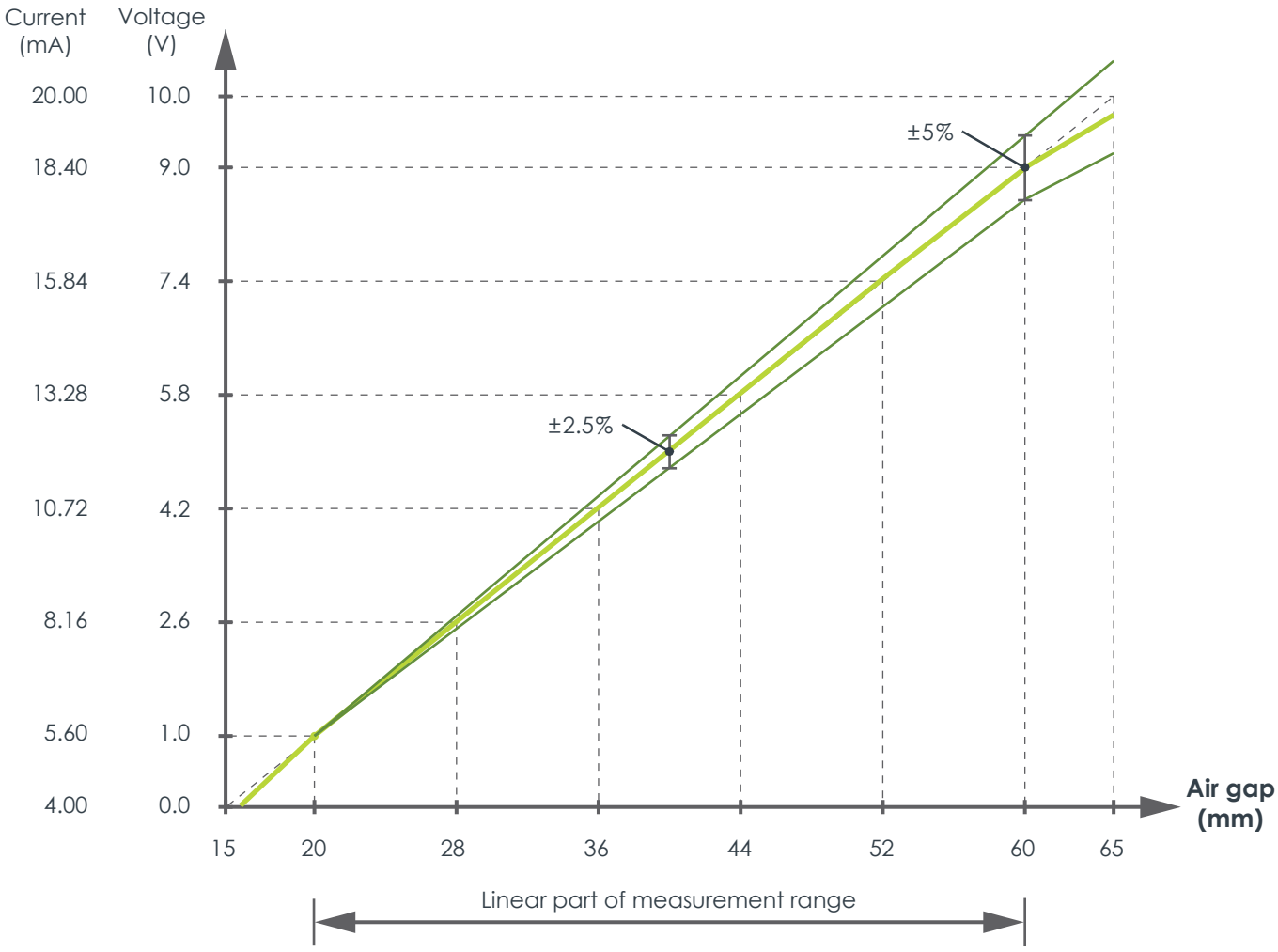
SPECIFICATIONS

Operating

Measurement range	: 20 to 60 mm. Note: 15 to 65 mm can be used (see **Transfer characteristic** below).
Output sensitivity	: 200 mV/mm or 320 µA/mm
Sensitivity error (precision)	: ≤±5% typical after offset compensation at 20 mm (test bench measurement)
Linearity error	: ≤1.5% (20 to 60 mm measurement range)
Temperature drift	
• *On zero (mean gap 5 V_{DC})*	: ≤ 200 ppm/K
• *On sensitivity*	: ≤ 200 ppm/K

Transfer characteristic

Output signal



Note: This transfer characteristic curve shows the typical transfer characteristics for an LS121/ILS731 after offset compensation at 5 mm, as measured on a test bench.

SPECIFICATIONS *(continued)*

Output characteristics

Voltage outputs (0 to 10 V)

• *Impedance*	: <20 Ω
• *Minimum load resistance*	: 1 kΩ
Current output (4 to 20 mA)	
•*Maximum load resistance*	: 500 Ω
POLE PROFILE output	
•*Frequency range*	: DC to 1 kHz
ROTOR PROFILE output	
• *Trigger level*	: 10 V ± 0.5 V
• *Hysteresis*	: 0.5 V
MIN GAP output	
• *Peak rectifier rise time*	: 1 ms
• *Peak rectifier decay time*	: 50 s

Power supply (to ILS731)

Voltage	: 24 V_{DC} nom. (18 to 32 V_{DC} input range)
Current	: 150 mA nom. (600 mA start-up current, 60 ms at 24 V_{DC})

Environmental

Temperature range	
• *Operating*	: −15 to +125°C (5 to +257°F) for LS121. −25 to +70°C (−13 to +158°F) for ILS731.
• *Short-term*	: −40 to +150°C (−40 to +302°F) for LS121. −40 to +80°C (−40 to +176°F) for ILS731.
Humidity	: 95% max. non condensing
Protection rating (according to IEC 60529)	: IP40 (LS731 signal conditioner)
Vibration (according to IEC 60068-2-6)	: 0.7 mm peak-peak, 5 g peak, 10 to 150 Hz
Shock acceleration (according to IEC 60068-2-27)	: 15 g peak, 11 ms half-sine wave
EMC (according to EN 50081-2 and EN 50082-2)	: LS121 sensor withstands 1.5 Tesla in a 50 or 60 Hz magnetic field
Fluid compatibility	: LS121 sensor contact with liquids strongly influences measurements. LS121 sensor contact with solvents and acids should be avoided.

Approvals

Conformity	: CE marking, European Union (EU) declaration of conformity
Electromagnetic compatibility	: EN 61000-6-2:2005. EN 61000-6-4:2007 + A1:2011.
Electrical safety	: EN 61010-1:2010

SPECIFICATIONS *(continued)*

Physical characteristics

LS121 air-gap sensor

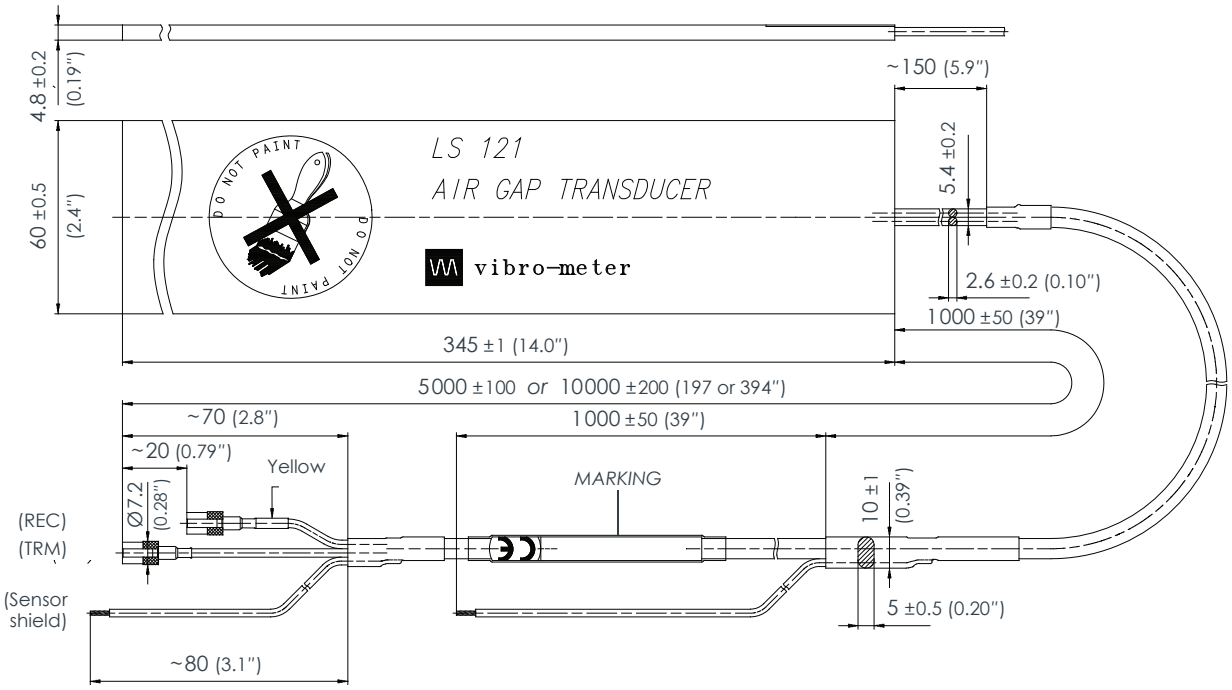
• *Material*	: Vetronit FR4 type fibreglass
• *Integral cable*	: Pair of coaxial cables (blue) protected by a common shield and FEP insulation (black)
• *Mounting*	: See the adhesives in **Accessories starting on page 8** and refer to the *LS12x and ILS73x air-gap measurement systems installation manual*

ILS731 signal conditioner

• *Material*	: Injection-moulded aluminium enclosure with IP40 protection rating. Note: The ILS731 is suitable for indoor use only unless it is installed in an industrial housing or enclosure that ensures a higher level of environmental protection.
• *Electrical connections*	: Screw terminals – wire section 2.5 mm^2 (max.)
• *Mounting*	: Without DIN-rail mounting adaptor (ordering option code I0): Four M4 screws, or equivalent. With DIN-rail mounting adaptor (ordering option code I1): TH 35 DIN rail (according to EN 50022 / IEC 60715). For example, TH 35-15 or TH 35-7.5. See **Accessories starting on page 8**.
Dimensions	: See **Mechanical drawings and ordering information starting on page 6**

MECHANICAL DRAWINGS AND ORDERING INFORMATION

LS121 air-gap sensor



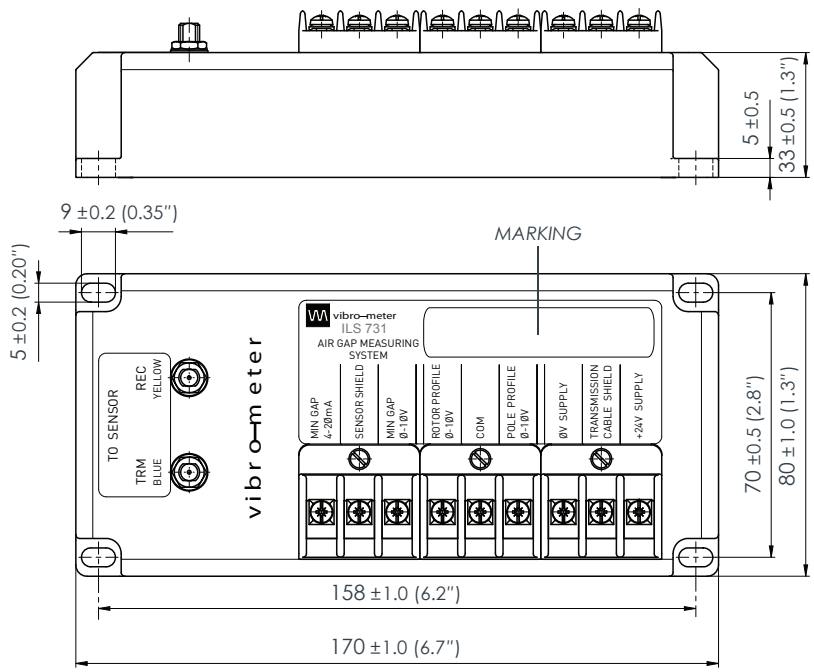
Note: All dimensions are in mm (in) unless otherwise stated.

To order please specify

Type	Designation	Ordering number (PNR)
LS121	Air-gap sensor with 5 m integral cable	151-121-000-023
LS121	Air-gap sensor with 10 m integral cable	151-121-000-123

MECHANICAL DRAWINGS AND ORDERING INFORMATION *(continued)*

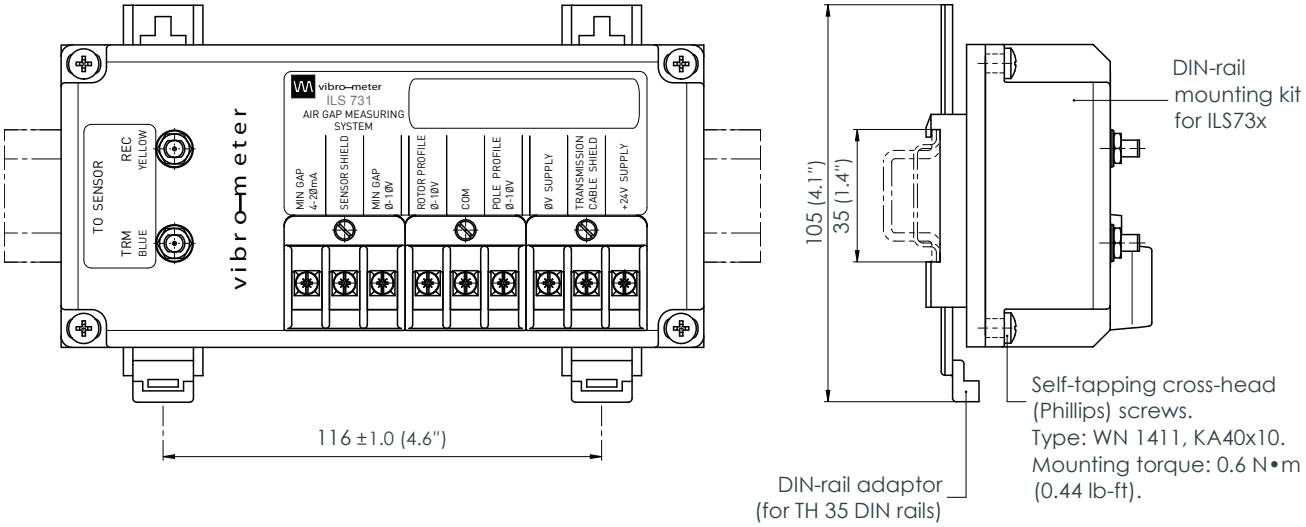
ILS731 signal conditioner (ordering option code I0)



Notes:
All dimensions are in mm (in) unless otherwise stated.
This drawing shows a label for an ILS731 signal conditioner with the current output configured for MIN GAP.

ILS731 signal conditioner with MA130 mounting adaptor (ordering option code I1)

Notes:
All dimensions are in mm (in) unless otherwise stated.
This drawing shows a label for an ILS731 signal conditioner with the current output configured for MIN GAP.



MECHANICAL DRAWINGS AND ORDERING INFORMATION *(continued)*

To order please specify

Ordering number (PNR): 204-731-000-201 / B □ — H □ □ — I □

4-20 mA output (B)	
MIN GAP	1
ROTOR PROFILE	2
POLE PROFILE	3

Total system length (H)	
5 m	05
10 m	10

Installation (I)	
Signal conditioner only	0
Signal conditioner assembled on MA130 mounting adaptor	1

ACCESSORIES

To order please specify

Type	Designation	Ordering number (PNR)
EPO-TEK T7110	Adhesive for LS12x sensors – 2 components, epoxy, contents 400 g, for mounting up to 8 x LS121. Operation up to 125°C (257°F).	Contact your local distributor
LOCTITE 330 and 7386	Adhesive for LS12x sensors – 2 components, methacrylate, contents 80 g, for mounting up to 2 x LS121. Operation up to 80°C (176°F).	965.06.01.0330

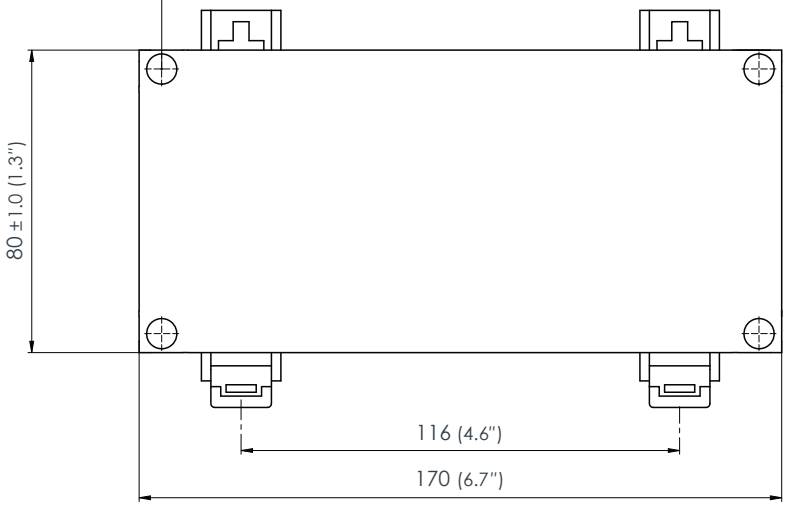
Note: Refer to the *LS12x and ILS73x air-gap measurement systems installation manual* for information on the EPO-TEK and LOCTITE® adhesives.

ABA17x	Industrial housings	Refer to the data sheet

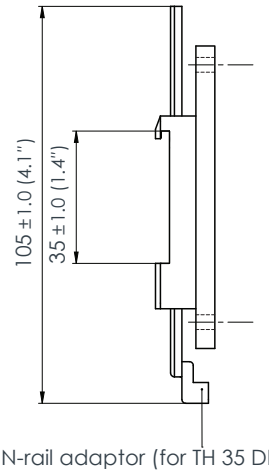
ACCESSORIES *(continued)*

MA130 mounting adaptor for ILS73x signal conditioners

Holes for self-tapping cross-head (Phillips) screws.
Type: WN 1411, KA40x10.
Mounting torque: 0.6 N•m (0.44 lb-ft).
Quantity: 4 screws supplied.



Notes:
All dimensions are in mm (in) unless otherwise stated.



DIN-rail adaptor (for TH 35 DIN rails).
Compatibility: TH 35-15 and TH 35-7.5.

Ordering number (PNR): 809-130-000-111

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The Energy & Equipment division includes the Energy Sensing and Controls product group that specialises in sensing and monitoring solutions for a broad range of energy infrastructure, and control valves for industrial gas turbines, primarily for the Power Generation, Oil & Gas and Services markets. Energy & Equipment is headquartered in Switzerland (Meggitt SA) and incorporates the Vibro-Meter® product line, which has over 65 years of sensor and systems expertise and is trusted by original equipment manufacturers (OEMs) globally.

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