# Operating Instructions

# for

# Turbine Wheel Flow Meter

## Model: TUR

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# 2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

**as per PED 2014/68/EU**

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.
Diagram 8, Pipe, Group 1 dangerous fluids

# 3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, as they are responsible for damages during transit.

**Scope of delivery:**
The standard delivery includes:
- Turbine Wheel Flow Meter, model: TUR

# 4. Regulation Use

The TUR series units are used for the flow measurement of liquids. These units are furnished with the following outputs.

**Pulse Output**
Rotary motion of the turbine a signal with a specific frequency.

**Analogue Output**
In order to transduce the measured flow data, an analogue output is available, (DIN IEC 381) with 0-20 mA, 4-20 mA or 0-10 V (see Type-tag).

Only low-viscosity media flows that are chemically compatible with the sensor housing materials may be measured. With higher-viscosity media, considerable measurement-errors will occur.

Long fibre-pieces may jam the rotor.

# 5. Operating Principle

The unit comprises a thick-walled plastic pipe; rotatable PVC flanges are secured at each end.
At the meter inlet and outlet bearing supports help to reduce media turbulence. A turbine-wheel with a core of moulded soft iron rotates as the liquid flows trough the body.
The metallic parts are not exposed to the medium and are therefore protected against corrosion. The bearings are made of sapphire and are self adjusting.
The bearings are made of chemically highly resistant Wolfram-carbide and are moulded into the turbine wheel. The rotation is sensed through the built-in pulse transmitter, which requires no sealing and has now mechanical connection with the turbine wheel. This rotation is converted into pulses by the associated electronics.
The version with integrated transducer converts the frequency into a standard-analogue signal. An optionally available, external electronic unit processes the pulse output-signal to drive a display, allows limit contact produces an analogue output or indicate the measure of flowing volume.

# 6. Mechanical Connection

**Before Installation:**

- Please ensure that the actual flow-rate corresponds with the measured volume within measuring range of the unit. Measuring range is printed on the type-tag.

**Attention! Exceeding the measuring range (more than 20 %) may result in damage to bearings and considerable measurement-errors.**

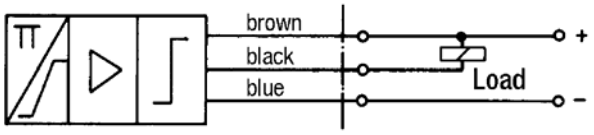
- Make sure that the permitted max. pressure and temperature are not exceeded during unit operation.
- Please ensure that the power supply of the unit corresponds with the power requirements (operational data) printed on the Type-tag.
- Ensure that no packing material remains inside the unit.
- Mounting of these units is position-independent; the flow must always follow the direction of arrow.
- During installation, please ensure that the pipe inlet straight is 4 times and outlet straight is 2 times of nominal diameter of the unit.
- The installation is potential-free, and should be carried out with the help of soft sealing rings or gaskets (not in the scope of delivery).
- If possible, just after mechanical installation, it should be checked that the flange-connections are properly sealed.

# 7. Electrical Connection

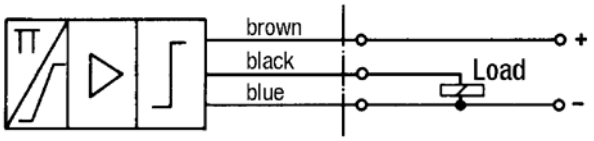
**Warning! Please ensure that the supply voltage to your instrument conforms to the value given on the equipment label.**

- Ensure that the power lines are not active.
- With units without transducer, connect the cable-ends with your power supply and load, as is shown in the figure.
- Units with transducer require cable connections through PG connector. Make the connections according to figure 2.
- Power supply cable: area of cross-section should be min. 0.75 mm².

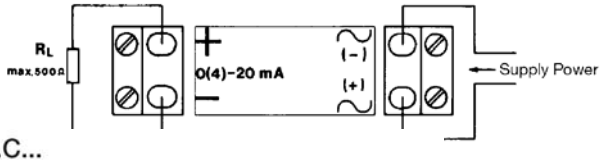
**Connections NPN TUR 1...N**



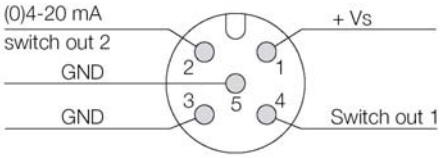

**Connections PNP TUR 1...P**



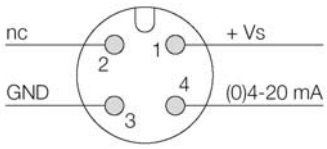

**Connections Transmitter TUR 2...**




TUR-2...C...




TUR-2...C...




**Warning! Incorrect wiring in the coupling plug can lead to damage to the electronics.**

# 8. Electrical Commissioning

- The instrument is delivered ready to operate.
- On Instruments with transducers the electronic is matched and calibrated with the transducer. Calibration screws are **not** intended for customer's use. An attempt to calibrate the unit by the customer would require a new calibration to restore factory accuracy (rendered by the firm, on payment).

## 8.1. ADI-Evaluating Electronics

See completion to operating instructions for ADI-Evaluating Electronics

# 9. Mechanical Commissioning

- To avoid pressure shocks, the flow medium should run slowly into the unit.

**Warning! Pressure shocks from solenoid valves, ball valves or similar devices may lead to breakage of the instrument (water hammer). In the operating condition, it must be checked that the instrument housing is continuously filled with the flow medium.**

**Attention! Large air bubbles in the measuring chamber may lead to measurement errors as well as destruction of the bearings.**

# 10. Maintenance

In case that the medium (to be measured) is not polluted, the model TUR is maintenance-free.
Should the cleaning of unit become necessary, it is easier to do by loosening the three plastic screws on one side and then the turbine may be taken out and cleaned.
During installation of the turbine wheel and bearing support, please observe that the Sapphire bearing is pushed straight onto the axle. The bearing support slides into the measuring pipe without applying any force and is secured in position with the help of screws.

**Warning! Damage rendered to sapphire bearings caused by careless handling and assembling expires the guarantee.**

Restoration work on electronic part may only be conducted by the supplier in order to ascertain the validity of guarantee.

# 11. Technical Information

| | |
|---|---|
| Measuring accuracy: | ±1% of f. s. |
| Viscosity range: | for low-viscosity media |
| Max. operating temperature: | 60 °C (PVC version)<br>70 °C (PVDF version) |
| Max. operating pressure: | PN 10 |
| Protection type: | IP 65 |

| | PVC version | PVDF version |
|---|---|---|
| (1) Fitting | PVC | PVDF |
| (2) Bearing cross bars | PVC | PVDF |
| (3) Turbine wheel | PVC | PVDF |
| (4a) Bearing bush | sapphire | sapphire |
| (4b) Bearing axle | sapphire | sapphire |
| (6) Bolts | polyamide | PVDF |
| (7) Flange | PVC | PVC |

**Frequency output**

| | |
|---|---|
| Power supply: | 24 $V_{DC}$ ±20% |
| Idle current: | typ. 15 mA |
| Pulse output: | PNP or NPN, max. 400mA |
| Electrical connection: | 2 m PVC cable |

**Transmitter**

| | |
|---|---|
| Power supply: | 230 $V_{AC}$, 24 $V_{AC}$, 24 $V_{DC}$ |
| Output: | 0-20 mA, 4-20 mA or 0-10 VDC, 4-wire |
| Max. load: | 500 Ω |
| Electrical connection: | adapter box with cable connection |

**Compact electronics**

| | |
|---|---|
| Display: | 3-segment LED |
| Analogue output: | (0)4 -20 mA adjustable, max. 500 Ω |
| Switching outputs: | 1 (2) semiconductor PNP or NPN, factory set |
| Contact operation: | N/C/N/O contact programmable |
| Setting: | with 2 buttons |
| Power supply: | 24 $V_{DC}$ ±20%, 3-wire technology |
| Electrical connection: | plug connector M12x1 |

**ADI electronics**

| | |
|---|---|
| Display: | bar graph and 5 digit digital display |
| Analogue output: | (0)4-20 mA, 0-10 $V_{DC}$ |
| 2 switching outputs: | relay/changeover contact<br>max. 250 $V_{AC}$/5 A<br>resistive load max. 30 $V_{DC}$/5 A |
| Setting: | via 4 buttons |
| Power supply: | 100...240 $V_{AC}$ ± 10% or<br>18...30 $V_{AC}$/10...40 $V_{DC}$ |
| Electrical connection: | pluggable terminal block via cable gland |

# 12. Order Codes

**Measuring sensor with frequency output – Order details**
(example: TUR-1025 N)

| Connection PVC flange NW | Measuring range m³/h water | Frequency range Hz | Frequency Pulses/Liter | Model designation wetted parts PVC | PVDF | Pulse detector |
|---|---|---|---|---|---|---|
| 25 | 0.2 - 5.0 | 5.5 - 157 | 113 | **TUR-1025...** | **TUR-1125...** | **..N** pulse detector NPN, 24 $V_{DC}$, 3-wire |
| 50 | 1.2 - 20.0 | 4.8 - 79.4 | 14,30 | **TUR-1050...** | **TUR-1150...** | |
| 80 | 2.0 - 80.0 | 2.7 - 106.4 | 4,79 | **TUR-1080...** | **TUR-1180...** | **..P** pulse detector PNP, 24 $V_{DC}$, 3-wire |
| 100 | 2.5 - 100.0 | 2.1 - 82.2 | 2,96 | **TUR-1010...** | **TUR-1110...** | |

## Measuring sensor with ADI electronics – Order details

(example: TUR-2025 M000)

| Connection PVC flange Nominal dia. | Measuring range water [m³/h] | Model designation wetted parts PVC | PVDF |
|---|---|---|---|
| 25 | 0.2-5.0 | **TUR-2025...** | **TUR-2125...** |
| 50 | 1.2-20.0 | **TUR-2050…** | **TUR-2150…** |
| 80 | 2.0-80.0 | **TUR-2080…** | **TUR-2180…** |
| 100 | 2.5-100.0 | **TUR-2010...** | **TUR-2110...** |

**Evaluating electronics Transmitter**

| Supply | Output |
|---|---|
| **..M0..** = 230 $V_{AC}$<br>**..M2..** = 24 $V_{AC}$<br>**..M3..** = 24 $V_{DC}$ | **..40** = 4-20 mA<br>**..00** = 0-20 mA<br>**..10** = 0-10 $V_{DC}$ |

**Compact electronics***

**..C30R**=LED-display, 2x open collector, PNP, plug con. M12x1
**..C30M** = LED-display, 2x open collector, NPN, plug con. M12x1
**..C34P** = LED-display, 4-20 mA, 1x open coll., PNP, plug con. M12x1
**..C34N** = LED-display, 4-20 mA, 1x open coll. NPN, plug con. M12x1

**Counter electronics**

**..E34R** = 24 $V_{DC}$, 0(4)-20 mA
**..E31R** = 24 $V_{DC}$, 0-10 V
**..E04R** = 90-250 $V_{AC}$, 0(4)-20 mA
**..E01R** = 90-250 $V_{AC}$, 0-10 V

**Dosing electronics**

**..G34R** = 24 $V_{DC}$, 0(4)-20 mA
**..G31R** = 24 $V_{DC}$, 0-10 V
**..G04R** = 90-250 $V_{AC}$, 0(4)-20 mA
**..G01R** = 90-250 $V_{AC}$, 0-10 V

**ADI-electronics***

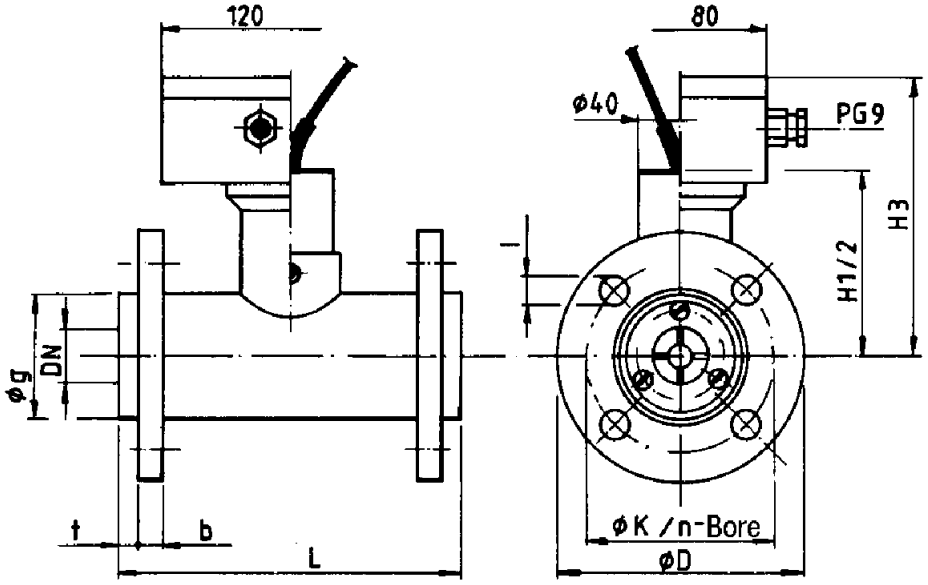
| Display | Supply | Output | Contacts |
|---|---|---|---|
| **..K..**= Bar graph/ digital display | **..0..** = 100-240 $V_{AC/DC}$<br>**..3..** = 18-30 $V_{AC}$ 10-40 $V_{DC}$ | **..0..**= without<br>**..4..**= 0(4)-20 mA 0-10 V | **..2**= 2 changeover contacts |

*Please specify flow direction in writing

# 13. Materials

| | PVC version | PVDF version |
|---|---|---|
| Fitting, Bearing cross bars, Turbine wheel | PVC | PVDF |
| Bearing bushing, Bearing axle | Sapphire | Sapphire |
| Bolts | Polyamide | PVDF |
| Flange | PVC | PVC |

# 14. Dimensions

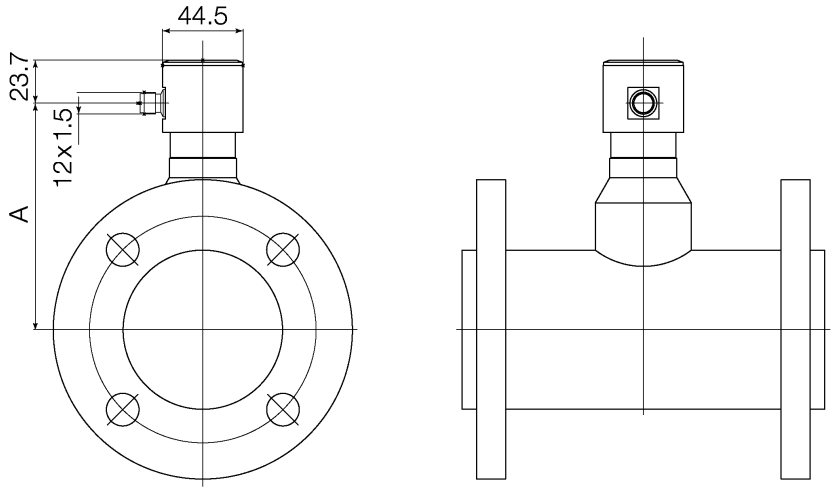



| DN | b | D | g | H2* | H3 | K | L | n | l | t |
|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 15 | 115 | 58 | 87 | 127 | 85 | 160 | 4x | 14 | 9 |
| 50 | 20 | 165 | 88 | 100 | 140 | 125 | 200 | 4x | 18 | 11 |
| 80 | 22 | 200 | 123 | 115 | 155 | 160 | 225 | 8x | 18 | 11 |
| 100 | 22 | 220 | 145 | 125 | 165 | 180 | 250 | 8x | 18 | 11 |

*with PNP or NPN Sensor

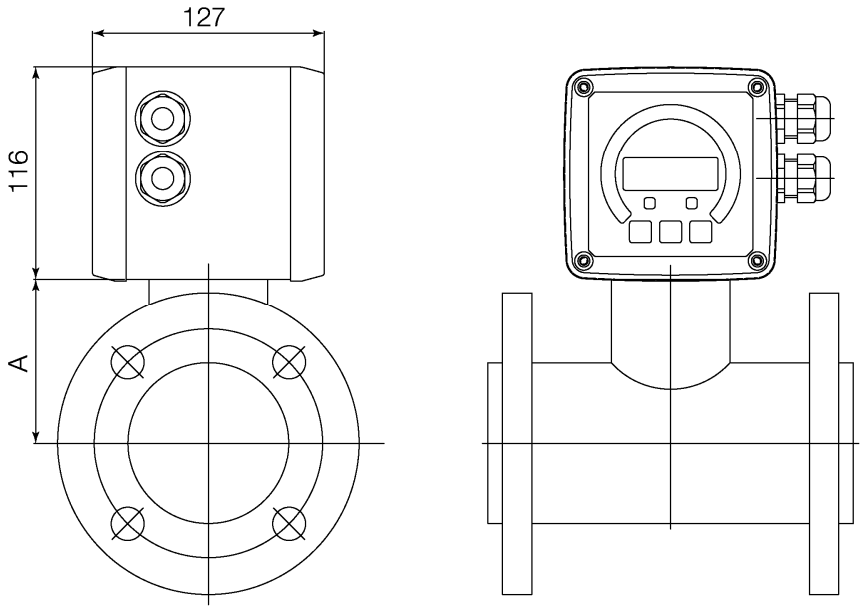
**TUR with compact**

| Description | Dimension A |
|---|---|
| TUR-..25 | 112 |
| TUR-..50 | 125 |
| TUR-..80 | 140 |
| TUR-..10 | 150 |

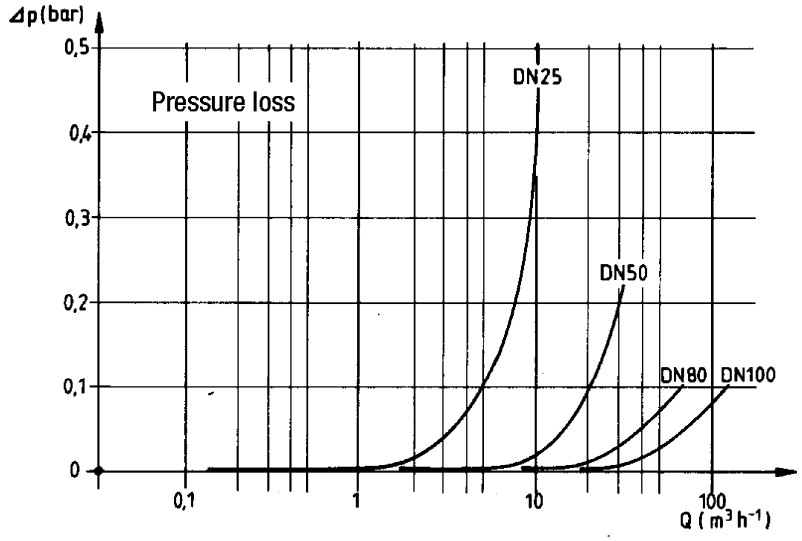



**TUR with ADI-, Gxxx- and Exxx electronics**

| Description | Dimension A |
|---|---|
| TUR-..25 | 77 |
| TUR-..50 | 90 |
| TUR-..80 | 105 |
| TUR-..10 | 115 |



# 15. Pressure Loss Diagram



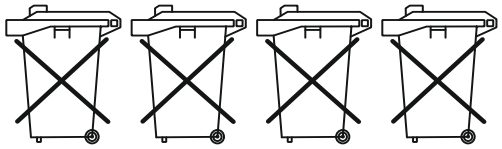
# 16. Disposal

**Note!**

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

**Batteries**

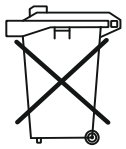
Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



Cd[1] Hg[2] Pb[3] Li[4]

1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

**Electrical and electronic equipment**



# 17. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

**Turbine Wheel Flow Meter** **Model: TUR-1**

which relates to this certificate, conforms to the standards listed below:

**EN 60947-5-2:2007 + A1:2012**
Low-voltage switchgear and controlgear - Part 5-2: Control circuit devices and switching elements - Proximity switches

**EN IEC 63000:2018** Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EU guidelines are fulfilled:

| | |
|---|---|
| **2014/30/EU** | **EMC Directive** |
| **2011/65/EU** | **RoHS** (category 9) |
| **2015/863/EU** | Delegated Directive (RoHS III) |

Hofheim, 03 Febr. 2021

H. Peters
General Manager

M. Wenzel
Proxy Holder

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

**Turbine Wheel Flow Meter Model: TUR-2**

to which this declaration relates is in conformity with the standards noted below:

**EN 61000-6-3:2011**
Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

**EN 61000-6-4:2011**
Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

**EN 61010-1:2011**
Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

**EN IEC 63000:2018** Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EU guidelines are fulfilled:

| | |
|---|---|
| **2014/30/EU** | **EMC** Directive |
| **2014/35/EU** | Low Voltage Directive |
| **2011/65/EU** | **RoHS** (category 9) |
| **2015/863/EU** | Delegated Directive (RoHS III) |

Hofheim, 03 Febr. 2021

H. Peters
General Manager

M. Wenzel
Proxy Holder

# 18. UK Declaration of Conformity

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

**Turbine Wheel Flow Meter** **Model: TUR-1**

to which this declaration relates is in conformity with the standards noted below:

**BS EN 60947-5-2:2007 + A1:2012**
Low-voltage switchgear and controlgear. Control circuit devices and switching elements. Proximity switches

**BS EN IEC 63000:2018**
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Also, the following UK guidelines are fulfilled:

| | |
|---|---|
| **S.I. 2016/1091** | **Electromagnetic Compatibility Regulations 2016** |
| **S.I. 2012/3032** | The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 |

Hofheim, 03 Febr. 2021

H. Peters
General Manager

M. Wenzel
Proxy Holder

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

**Turbine Wheel Flow Meter** **Model: TUR-2**

to which this declaration relates is in conformity with the standards noted below:

**BS EN 61000-6-3:2007+A1:2011**
Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments

**BS EN 61000-6-4:2007+A1:2011**
Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments

**BS EN 61010-1:2010+A1:2019**
Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

**BS EN IEC 63000:2018**
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Also, the following UK guidelines are fulfilled:

| | |
|---|---|
| **S.I. 2016/1091** | **Electromagnetic Compatibility Regulations 2016** |
| **S.I. 2016/1101** | **Electrical Equipment (Safety) Regulations 2016** |
| **S.I. 2012/3032** | The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 |

Hofheim, 03 Febr. 2021

H. Peters
General Manager

M. Wenzel
Proxy Holder