

Safety instructions
FIBERTRAC 31, 32
SOLITRAC 31
MINITRAC 31, 32
POINTRAC 31
WEIGHTRAC 31, 32

Flameproof enclosures
Dust ignition protection by enclosure
Intrinsic safety
IECEX BVS 10.0060
4 ... 20 mA/HART - four-wire



Document ID: 55222



VEGA

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Supplementary documentation:

- Operating Instructions FIBERTRAC 31, 32, SOLITRAC 31, MINITRAC 31, 32, POINTRAC 31, WEIGHTRAC 31, 32
- SIL Safety Manual FIBERTRAC 31, 32, SOLITRAC 31, MINITRAC 31, 32, POINTRAC 31
- Certificate of Conformity IECEx BVS 10.0060 (Document ID: 55223)

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1 Area of applicability

These safety instructions apply to the radiation-based sensors of the PROTRAC series:

FIBERTRAC FT31/2.DK*A/B/I/L****(*)**

SOLITRAC ST31.DK*A/B/I/L****(*)**

MINITRAC MT31/2.DK*A/B/I/L****

POINTRAC PT31.DK*A/B/I/L****(*)**

WEIGHTRAC WT31/2.DK*A/B*****

according to Certificate of Conformity IECEx BVS 10.0060 (certificate number on the type label) and for all instruments with the number of the safety instruction (55222) on the type label.

2 General information

The sensors of the PROTRAC series are part of the radiation-based measuring principle.

In a radiation-based measurement, a weak radioactive source on the tank emits focused gamma rays. A special detector mounted on the opposite side of the tank receives the radiation which is converted into flashes of light. The number of these flashes is detected and evaluated.

The FIBERTRAC 31, FIBERTRAC 32 and SOLITRAC 31 sensors of the PROTRAC series are suitable for non-contact level and interface measurement.

The MINITRAC 31, MINITRAC 32 sensors of the PROTRAC series are suitable for the non-contact, continuous density measurement and level detection of liquids and bulk solids in pipelines and vessels.

The POINTRAC 31 sensors of the PROTRAC series are suitable for non-contact level detection of liquids and bulk solids.

The WEIGHTRAC 31, WEIGHTRAC 32 sensors of the PROTRAC series are suitable for non-contact, continuous mass flow measurement of bulk solids on conveyor belts and screw conveyors.

The sensors of the PROTRAC series FIBERTRAC FT31/2.DK*A/B/I/L****(*)**, SOLITRAC ST31.DK*A/B/I/L****(*)**, MINITRAC MT31/2.DK*A/B/I/L****, POINTRAC PT31.DK*A/B/I/L****(*)**, WEIGHTRAC WT31/2.DK*A/B***** when used with "Flameproof enclosure (Ex d)" are suitable for the use in hazardous atmosphere of all combustible substances of explosion groups IIA, IIB and IIC, for applications requiring EPL Gb instruments.

The sensors of the PROTRAC series are suitable for applications requiring EPL Gb instruments.

The sensors of the PROTRAC series FIBERTRAC FT31/2.DK*A/B/I/L****(*)**, SOLITRAC ST31.DK*A/B/I/L****(*)**, MINITRAC MT31/2.DK*A/B/I/L****, POINTRAC PT31.DK*A/B/I/L****(*)**, WEIGHTRAC WT31/2.DK*A/B***** when used with "Protection through housing (Ex t)" are suitable for the use in areas with combustible, dust generating bulk solids of explosion groups IIA, IIB and IIC. These sensors of the PROTRAC series are suitable for applications requiring EPL Da or EPL Db instruments.

If the PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** are installed and operated in hazardous areas, the general Ex installation regulations IEC 60079-14 as well as these safety instructions must be observed.

Ignition protection label

IEC 60079-0, IEC 60079-1, IEC 60079-11, IEC 60079-31

Ex db [ia Ga] IIC T6 Gb

Ex ta [ia Da] IIIC T98 °C Da IP 66

Ex tb [ia Da] IIIC T98 °C Db IP 66

Important specification in the type code

PROTRAC-Serie (x)xxxxTRAC xT3*.a*cdef*h(*)

Position		Feature	Description
(x)xxxxTRAC	Device name	FIBER	FIBERTRAC FT31, FIBERTRAC FT32
		SOLI	SOLITRAC ST31
		MINI	MINITRAC MT31, MINITRAC MT32
		POIN	POINTRAC PT31
		WEIGH	WEIGHTRAC WT31, WEIGHTRAC WT32
xT3*	Instrument code	F	FIBERTRAC FT31, FIBERTRAC FT32
		S	SOLITRAC ST31
		M	MINITRAC MT31, MINITRAC MT32
		P	POINTRAC PT31
		W	WEIGHTRAC WT31, WEIGHTRAC WT32
a	Approval	DK	Ex db [Ex ia Ga] IIC T6; Ex ta, tb [Ex ia Da] IIIC T98°C Da, Db IP 66
c	Electronics	A	Four-wire, 4 ... 20 mA/HART (Ex-d output)
		B	Four-wire, 4 ... 20 mA/HART (Ex-ia output)
		I	Four-wire, 4 ... 20 mA/HART (Ex-d output) with SIL qualification
		L	Four-wire, 4 ... 20 mA/HART (Ex-ia output) with SIL qualification
d	Housing / Protection	D	Aluminium double chamber / IP 66/IP 67
		W	Stainless steel double chamber / IP 66/IP 67
		A	Aluminium double chamber with 316L Conduit cooling connection / IP 66/IP 67
		V	Stainless steel double chamber with 316L Conduit cooling connection / IP 66/IP 67
		S	Aluminium double chamber (special colour) / IP 66/IP 67
		R	Aluminium double chamber (special colour) with 316L Conduit cooling connection / IP 66/IP 67
e	Cable entry / Cable gland / Plug connection	M	M20 x 1.5 / without / without
		N	½ NPT / without / without
f	Display and adjustment module PLICSCOM	X	without
		F	without; lid with inspection window
		B	Laterally mounted
		L	laterally mounted; with Bluetooth, magnetic pen operation
		S	laterally mounted; with Bluetooth, battery, magnetic pen operation

Position		Feature	Description
h	Measuring length	(*)**	2 or 3-digit measuring length of the sensor connection with FIBERTRAC FT31, FIBERTRAC FT32, SOLITRAC ST31 and POINTRAC PT31 This feature is not available with MINITRAC MT31, MINITRAC MT32.
h(*)	Frame setup	***	Different features of the frame setup with frame construction, measuring width, clear height and source fastening with WEIGHTRAC WT31, WEIGHTRAC WT32

3 Special instructions for installation

- The following requirements must be fulfilled for mounting, electrical installation, setup and maintenance of the instrument:
 - the staff must qualified according the respective tasks
 - the staff must be trained in explosion protection
 - the staff must be familiar with the respectively valid regulations, e.g. planning and installation acc. to IEC 60079-14
- The instrument has to be mounted according to the manufacturer specifications and the valid regulations and standards.
- Modifications on the instruments can influence the explosion protection and hence the safety. Modifications must only be carried by staff authorized by VEGA.
- Keep in mind for instrument mounting
 - mechanical damage on the instrument must be avoided
 - mechanical friction must be avoided
- The instruments must be mounted/installed in such a way that the following can be ruled out:
 - electrostatic charges during operation, maintenance and cleaning.
 - process-related electrostatic charges, e.g. by measuring media flowing past
- Take note of the type and size of the thread
 - Label in the area of the thread with respective name.
 - Only use the cable entries and closing screws if they are required and suitable according to ignition protection type and the application. Take note of the selection criteria acc. to IEC 60079-14.
 - Threads must have no damages.
 - The threads for mounting certified cable entries are of type M20 x 1.5 with sensors of the PROTRAC series (x)xxxTRACxT31/2.DK***M**.
 - The threads for mounting certified cable entries are of type ½-14 NPT with sensors of the PROTRAC series (x)xxxTRAC xT31/2.DK***N**.



- 1 Label: Type and size of the thread ½-14 NPT or M20 x 1.5
- 2 Locking screw of the lid
- 3 Screw plug
- 4 "Ex-d" connection compartment
- 5 Red threaded or dust protection cap
- 6 Label: Type and size of the thread ½-14 NPT or M20 x 1.5
- 7 "Ex-i" connection compartment

- Cable entries and closing screws should be mounted correctly and according to the safety instructions of the manufacturer to ensure the specified ignition protection type. Supplied cable entries or closing screws meet these requirements.
- The red thread or/dust covers screwed in when the instruments are shipped (depending on the version) must be removed before setup and closed by cable entries or closing screws suitable for the ignition protection type.
- When using certified or suitable cable glands, closing screws or plug connections, it is obligatory to observe the appropriate certificates/documents.
- Before operation tighten the housing lid/s up to the stop to ensure the IP protection rating specified on the type label. Lock the lid by unscrewing the locking screw up to the stop. On the double chamber housing, you have to lock both lids.

The housing lids are marked with a warning label.

**WARNING- DO NOT OPEN WHEN AN
EXPLOSIVE ATMOSPHERE IS PRESENT**

- Unused openings must be provided with plugs suitable for the ignition protection type. Supplied plugs meet these requirements.

4 Installation, assignment EPL areas

EPL Gb instrument

The sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** are installed in hazardous areas requiring a EPL Gb instrument.

EPL Da instrument

The sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** are installed in hazardous areas requiring a EPL Da instrument.

EPL Db instrument

The sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** are installed in hazardous areas requiring a EPL Db instrument.

5 Safe operating mode

Do not operate the instrument outside the electrical, thermal and mechanical specifications of the manufacturer.

The supplied cable entries and closing screws are suitable for the specified housing temperature range. If other cable entries and closing screws are used, they will probably specify the permissible ambient temperature on the housing.

To exclude the danger of mechanical damage, the FIBERTRAC FT31/2.DK*A/B/I/L****(*)** must be installed in such a way that the flexible detector is protected from environmental influences.

6 Grounding

For safety reasons, the the sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** must be grounded. The external or internal ground connection terminal on the housing is used for this purpose.

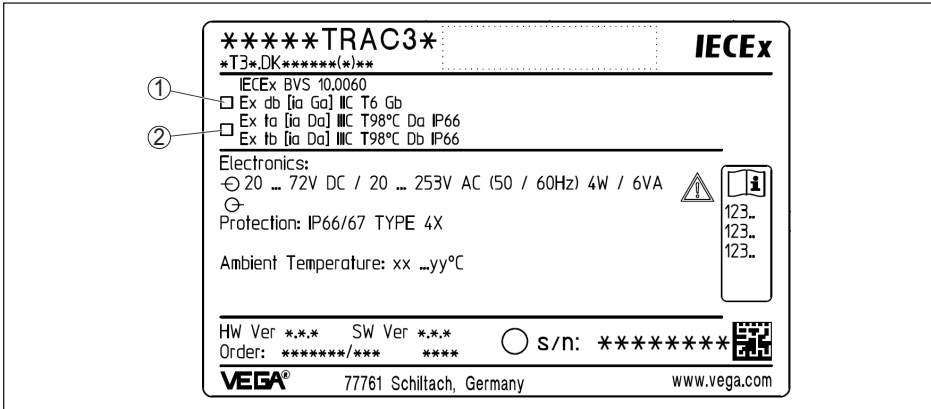
7 Material resistance

The sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** must only be used in media against which the materials of the wetted parts are sufficiently resistant.

8 Different ignition protection types

The sensors can be either used in explosive dust atmospheres or in explosive gas atmospheres.

The operator must specify the selected ignition protection type before installation. The selected ignition protection must be marked by scratching off on the identification mark of the type label.



- 1 Identification label Ex-d ignition protection type
- 2 Identification label Ex-t ignition protection type

9 Electrical data

Non-intrinsically safe circuits (in the "Ex-d" connection compartment) **PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/IL******

Voltage supply: (terminals 1[L1], 2[N])	U = 20 ... 253 V AC U = 20 ... 72 V DC U _m = 253 V
Relay circuit: (terminals 4[NC], 5[Common], 6[NO])	Maximum values: 253 V AC, 3 A, 500 VA 253 V AC, 1 A, 41 W
Current input: (terminals 12[In+], 13[In-])	I = 4 ... 20 mA
Digital input: (terminals 14[+100 mA], 15[+10 mA], 16[Common])	
Digital output: (terminals 17[Out+], 18[Out-])	
– Max. load current: floating transistor output	400 mA, 55 V DC
Multigauge Communication: (terminals 19[Serial out-], 20[Serial out+], 21[Serial in-], 22[Serial in+])	Communication circuit, only for communication with additional PROTRAC instruments

PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/I****

Signal circuit: (terminals 9[+active], 10[+passive], 11[common] in the "Ex-d" connection compartment)	<ul style="list-style-type: none"> ● FIBERTRAC, SOLITRAC, MINITRAC, WEIGHTRAC: <ul style="list-style-type: none"> – I = 4 ... 20 mA with superimposed HART signal ● POINTRAC 31: <ul style="list-style-type: none"> – I = 8/16 mA with superimposed HART signal
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Intrinsically safe circuits (in the "Ex-i" connection compartment)

PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L****

Display and adjustment circuit: (terminals 5, 6, 7, 8 in the lateral chamber)

In ignition protection type intrinsic safety Ex ia IIC, IIIC

For connection to the intrinsically safe circuit of the associated external indicating instrument VEGADIS 61/81 (IECEX PTB 06.0048 X and IECEX BVS 06.0014).

The rules for the interconnection of intrinsically safe circuits between PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** and the external indicating unit VEGADIS 61/81 are fulfilled, provided that the total inductance and total capacitance of the connection cable between PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** and the external indicating unit VEGADIS 61/81 $L_{\text{cable}} = 100 \mu\text{H}$ and $C_{\text{cable}} = 3.4 \mu\text{F}$ are not exceeded.

When using the delivered VEGA connection cable between PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** and the external indicating unit VEGADIS 61/81, the following listed cable inductances L_i and cable capacitances C_i must be taken into account with a cable length $\geq 50 \text{ m}$.

- $L_i = 0.62 \mu\text{H/m}$
- $C_{i \text{ wire/wire}} = 132 \text{ pF/m}$
- $C_{i \text{ wire/screen}} = 208 \text{ pF/m}$
- $C_{i \text{ screen/screen}} = 192 \text{ pF/m}$

Circuit of the display and adjustment module: (spring contacts in the lateral chamber)

In ignition protection type intrinsic safety Ex ia IIC, IIIC

Only for connection to the display and adjustment module PLICSCOM.

PROTRAC-Serie (x)xxxxTRAC xT31/2.DK*B/L****

Intrinsically safe current output: (terminals 1[+], 2[-] in the lateral chamber)

- FIBERTRAC, SOLITRAC, MINITRAC, WEIGHTRAC:
 - $I = 4 \dots 20 \text{ mA}$ with superimposed HART signal
- POINTRAC 31:
 - $I = 8/16 \text{ mA}$ with superimposed HART signal

Maximum values:

- $U_o = 22.16 \text{ V}$
- $I_o = 111.9 \text{ mA}$
- $P_o = 620.03 \text{ mW}$

Characteristics: linear

The effective internal capacitance C_i is negligibly small.

The effective internal inductance L_i is negligibly small.

	Ex ia IIC, IIIC	Ex ia IIC, IIIC	Ex ia IIB, IIIB	Ex ia IIB, IIIB
Permissible inductance L_o	1 mH	0.5 mH	5 mH	0.5 mH
Permissible capacitance C_o	0.08 μF	0.098 μF	0.58 μF	0.65 μF

10 Thermal data

The max. permissible ambient temperatures depending on the temperature classes are specified in

the following tables.

EPL Gb instrument

Temperature class	Ambient temperature on the sensor
T6	-40 ... +46 °C
T5, T4, T3, T2, T1	-40 ... +60 °C

EPL Da or EPL Db instrument

The max. surface temperature is limited by a temperature fuse to +98 °C.

The permissible ambient temperature is -40 ... +60 °C.

11 Protection against static electricity

The PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B//L**** in the version with chargeable plastic parts, as e.g. metal housing with inspection window or plastic detectors, is provided with a caution label referring to the safety measures that must be taken with regard to electrostatic charges during operation.

WARNING- POTENTIAL ELECTROSTATIC
CHARGING HAZARD - SEE INSTRUCTIONS

Caution: Plastic parts! Danger of electrostatic charging!

- Avoid friction
- No dry cleaning
- Construction/Installation: The PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B//L**** must be constructed/installed in such a way that
 - electrostatic charges are ruled out during operation, maintenance and cleaning.
 - process-related electrostatic charges, e.g. by measuring media flowing past, are ruled out

12 Impact and friction sparks

When used as category EPL Gb instruments, the PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B//L**** in light metal versions (e.g. aluminium/titanium/zircon) must be mounted in such a way that sparks from impact and friction between light metals and steel (except stainless steel, if the presence of rust particles can be excluded) cannot occur.

13 Mounting with external display unit VEGADIS 61/81

The intrinsically safe signal circuit between PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B//L**** and the external indicating unit VEGADIS 61 or VEGADIS 81 should be set up without grounding. The required insulation voltage is > 500 V AC. When using VEGA connection cable, this requirement is fulfilled. If grounding of the cable screen is required, it must be carried out according to IEC 60079-14 (edition 2013).

Overvoltage arrester, for the display circuit VEGADIS 61/81 (IECEx PTB 06.0048).

As far as acc. to IEC 60079-14, paragraph 16.3 (edition 2013) or other valid standards or regulations, an overvoltage protection is necessary, then a suitable overvoltage arrester must be connected to the display circuit of the instrument.

14 Ignition protection type flameproof enclosure Ex "d"

The terminals for connecting the operating voltage or signal circuits are integrated in the terminal compartment with ignition protection type flameproof enclosure "d".

The thread gap between housing and cover is a flameproof gap.

The "Ex-d" connection compartment is provided with a M20 x 1.5 or ½-14 NPT thread for connection to a certified "Conduit" system or for mounting a "Ex-d" cable entry certified according to IEC 60079-1 (edition 2014). Cable entries of simple construction may not be used. Please take note of section 13.1 and 13.2 of IEC 60079-1. When connecting to a "Conduit" system, the associated sealing facility must be located directly on the "Ex-d" connection compartment.

When the sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** are delivered, depending on the version, the red threaded or dust protection caps must be removed before installing the device and the openings must be sealed according to the requirements of the ignition protection type and the IP protection type specified on the type label.

When using certified or suitable cable glands, closing screws or plug connections, it is obligatory to observe the appropriate certificates/documents.

The "Ex-d" cable entry and the closing screws must be tightly screwed into the housing.

The cable entry sent with the delivery is suitable for the housing temperature range specified in the PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** certificate. If a different cable entry is used, the separately certified cable entry/gland or the temperature classes on the electronics determines the max. permissible ambient temperature on the housing.

Before opening the lid of the "Ex-d" terminal compartment or in case it is already open (e. g. during connection or service work), make sure that either the supply cable is completely voltage free or no explosive atmosphere is present.

When wiring the connection line to the "Ex-d" connection compartment, it must be sufficiently secured against damage and in conformity with IEC 60079-14.

The connection cables, the cable entries and the closing screws or the pipeline sealing facilities must be suitable for the lowest ambient temperature.

The cover of the "Ex-d" connection compartment must be screwed in completely before commissioning and secured by screwing out the lid locking screw all the way to the stop.

Unused openings must be sealed according to IEC 60079-1 paragraph 13.8 (edition 2014).

The flame path joints must not be repaired.

Double chamber housing with "Ex-d" connection compartment



- 1 "Ex-i" connection compartment
- 2 Locking screws of the cover
- 3 "Ex-d" connection compartment

15 Ignition protection type protection by enclosure Ex "t"

Before setup and application of the PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** as explosion-proof EPL Da or EPL Db instruments, the two lids have to be screwed in to the stop.

When the sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** are delivered, depending on the version, the red threaded or dust protection caps must be removed before installing the device and the openings must be sealed according to the requirements of the ignition protection type and the IP protection type specified on the type label.

When using certified or suitable cable glands, closing screws or plug connections, it is obligatory to observe the appropriate certificates/documents.

The "Ex-t" cable entry and the closing screws must be tightly screwed into the housing.

Cable entries must only be replaced by the same types or suitable cable entries/glands certified according to IECEx with at least IP 66.

The cable entry sent with the delivery is suitable for the housing temperature range specified in the certificate of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L****. If a different cable entry is used, the separately certified cable entry/gland determines the max. permissible ambient temperature on the housing.

16 Instructions for zone 20 applications

In hazardous areas, the instrument should only be operated under atmospheric conditions:

- Temperature: -20 ... +60 °C.
- Pressure: 80 ... 110 kPa (0.8 ... 1.1 bar)
- Air with normal oxygen content, normally 21 %

If there are no explosive mixtures, then the instruments can be also operated according to the manufacturer specification outside atmospheric conditions.

If there is a risk of dangerous potential differences inside zone 20, then suitable measures for intrinsically safe circuits in zone 20 must be taken, e.g. according to the requirements of IEC 60079-14 section 16.3 (edition 2014).

17 Ignition protection type intrinsic safety Ex "ia"

Optionally the VEGA display and adjustment module PLICSCOM can be integrated.

The VEGA display and adjustment unit VEGADIS 61 or VEGADIS 81 (IECEX PTB 06.0048) can be connected if necessary. The respective operating or safety instructions must be observed.

The PROTRAC series (x)xxxTRAC xT31/2.DK*B/L**** has an intrinsically safe current output.

Only connect the instrument to certified associated instruments with protective level Ex ia (EPL Ga) or Ex ib (EPL Gb). When connecting to an associated instrument with protective level Ex ib (EPL Gb), then the flame proofing changes to Ex ib. After the use as EPL Gb instrument with Ex-ib supply, the use as EPL Ga instrument is no longer permitted.

The regulations for connection of intrinsically safe circuits (e.g. IEC 60079-14, proof of intrinsic safety) must be observed

The intrinsically safe output circuits are ground-free. The voltage resistance is min. 500 Veff against ground.

18 Use of an overvoltage arrester

If necessary, a suitable overvoltage arrester can be connected in front of the sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L****.

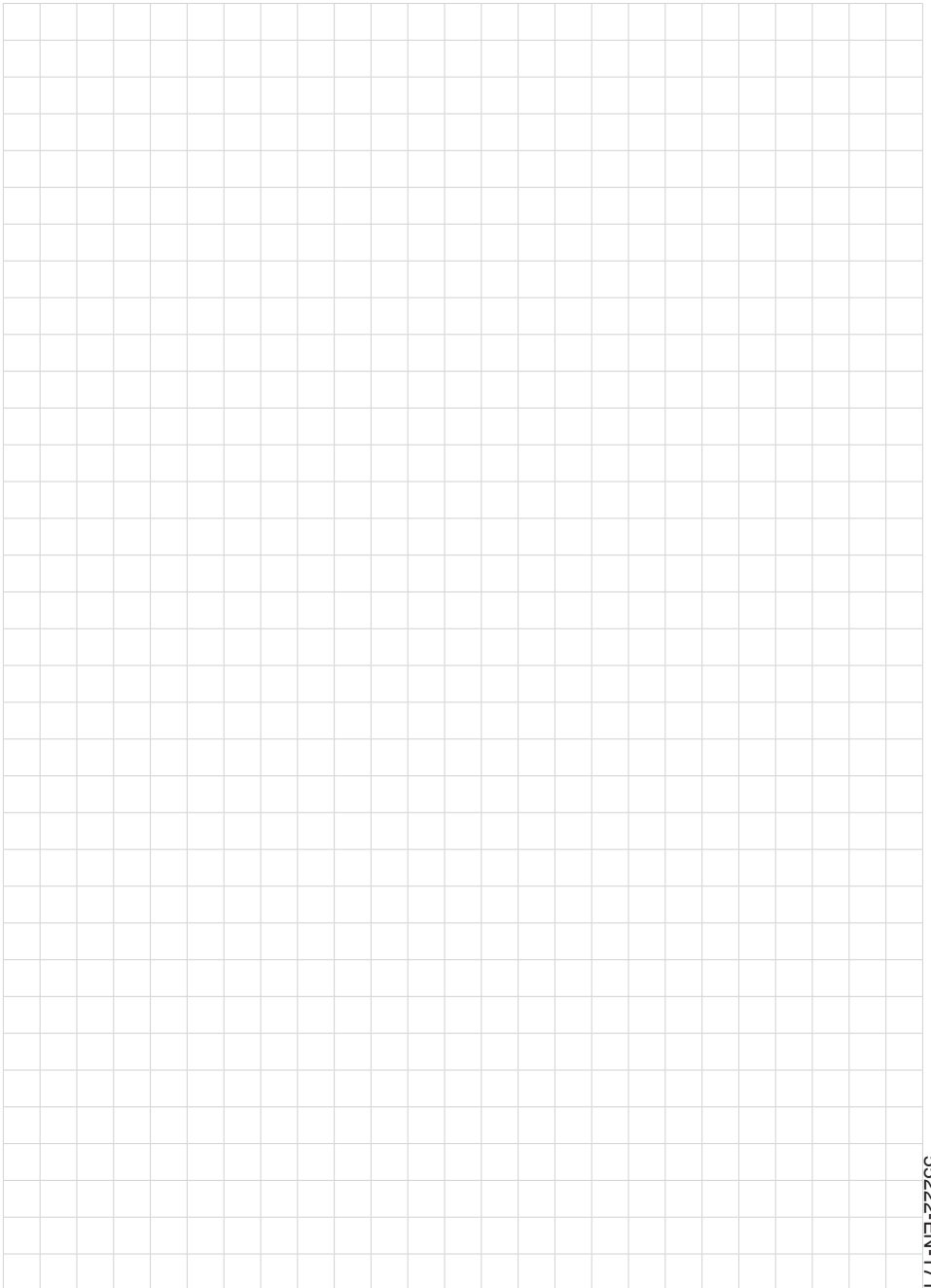
As far as acc. to IEC 60079-14, paragraph 16.3 (edition 2013) or other valid standards or regulations, an overvoltage protection is necessary, then a suitable overvoltage arrester must be connected to the instrument.

Observe the respective operating or safety instructions.

19 Version with cooling option

With sensors of PROTRAC-Serie (x)xxxTRAC xT31/2.DK*A/B/I/L**** with optional accessory of the cooling option, the operator must take care that the approved ambient temperature range on the Ex-certified housing, electronics is not exceeded.

Please make sure that before cooling, there is no explosive atmosphere present in the cooling option.



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All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Subject to change without prior notice

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