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

Nonincendive electrical equipment "NI"
Intrinsic safety "IS"
Foundation Fieldbus
Profibus PA

Document ID: 66102

Contents

1 Area of applicability 3
2 Important specification in the type code 3
3 General information 4
4 Application area 5
5 Special operating conditions 5
6 Important information for mounting and maintenance 5
7 Safe operating mode 8
8 Potential equalization/Grounding 9
9 Electrostatic charging (ESD) 9
10 Mounting with external display unit VEGADIS 61/81 9
11 Use of an overvoltage arrester 9
12 Version with cooling option 10
13 Electrical data 10
14 Mechanical data 11
15 Thermal data 12
16 Installation diagram 13

Supplementary documentation:

- Operating Instructions FIBERTRAC 31, 32, SOLITRAC 31, MINITRAC 31, 32, POINTRAC 31, WEIGHTRAC 31, 32
- Quick setup guide FIBERTRAC 31, 32, SOLITRAC 31, MINITRAC 31, 32, POINTRAC 31, WEIGHTRAC 31, 32
- Certificate of Compliance CSA 10CA2354484X (Document ID: 54510)

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1 Area of applicability

These safety instructions apply to the PROTRAC devices of type series:

- FIBERTRAC 31, 32
- SOLITRAC 31
- MINITRAC 31, 32
- POINTRAC 31
- WEIGHTRAC 31, 32

With the electronics versions:

- C - Four-wire: Foundation Fieldbus (Ex d output)
- D - Four-wire: Foundation Fieldbus (Ex ia output)
- E - Four-wire: Profibus PA (Ex d output)
- G - Four-wire: Profibus PA (Ex ia output)

According to Certificate of Compliance CSA 10CA2354484X (certificate number on the type label) and for all instruments with safety instruction 66102.

The classification as well as the respective standards are stated in the Certificate of Conformity.

Type of protection marking:

- Class I, Division 2 Groups A, B, C, D, T6 with Associated Nonincendive Field Wiring;
- Class II, Division 2 Groups F, G with Associated Nonincendive Field Wiring;
- Class III; TYPE 4X

2 Important specification in the type code

PROTRAC-Serie (x)xxxxTRAC xT3*.abcdefgh(*)

Position		Feature	Description
(x)xxxxTRAC	Device name	FIBER	FIBERTRAC 31, FIBERTRAC 32
		SOLI	SOLITRAC 31
		MINI	MINITRAC 31, MINITRAC 32
		POIN	POINTRAC 31
		WEIGH	WEIGHTRAC 31, WEIGHTRAC 32
xT3*	Instrument code	F	FIBERTRAC 31, FIBERTRAC 32
		S	SOLITRAC 31
		M	MINITRAC 31, MINITRAC 32
		P	POINTRAC PT31
		W	WEIGHTRAC 31, WEIGHTRAC 32
a	Approval	KX	Class I, II, III Division 2, Groups A, B, C, D, F, G
b	Version	1	Standard
c	Electronics	C	Four-wire: Foundation Fieldbus (Ex d output)
		D	Four-wire: Foundation Fieldbus (Ex ia output)
		E	Four-wire: Profibus PA (Ex d output)
		G	Four-wire: Profibus PA (Ex ia output)

Position		Feature	Description
d	Housing / Protection	D	Aluminium double chamber / IP66/IP67
		W	Stainless steel double chamber / IP66/IP67
		A	Aluminium double chamber with 316L Conduit cooling connection / IP66/IP67
		V	Stainless steel double chamber with 316L Conduit cooling connection / IP66/IP67
		S	Aluminium double chamber (special colour) / IP66/IP67
		R	Aluminium double chamber (special colour) with 316L Conduit cooling connection / IP66/IP67
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
g	Additional equipment	X	without
		*	1-digit; without meaning for explosion protection
h	Measuring length	(*)**	2 or 3-digit measuring length of the sensor connection with FIBERTRAC 31, FIBERTRAC 32, SOLITRAC 31 and POINTRAC 31 This feature is not available with MINITRAC 31, MINITRAC 32.
h(*)	Frame setup	***	Different features of the frame setup with frame construction, measuring width, clear height and source fastening with WEIGHTRAC 31, WEIGHTRAC 32

In the following, all above mentioned versions are called PROTRAC devices. If parts of these safety instructions refer only to certain versions, then these will be mentioned explicitly with their type code.

3 General information

The PROTRAC devices are part of the radiometric measuring principle.

In a radiometric 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 PROTRAC devices which is converted into flashes of light. The number of these flashes is detected and evaluated.

The FIBERTRAC 31, 32 and SOLITRAC 31 are suitable for non-contact level and interface measurement.

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

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

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

The FIBERTRAC 31, 32, SOLITRAC 31, MINITRAC 31, 32, POINTRAC 31, WEIGHTRAC 31, 32 are suitable for use in explosive atmospheres of all combustible materials of explosion groups A, B, C, D.

The PROTRAC devices are suitable for applications requiring Class I, Division 2 instruments.

The FIBERTRAC 31, FIBERTRAC 32, SOLITRAC 31, MINITRAC 31, 32, POINTRAC 31, WEIGHTRAC 31, 32 are suitable for use in areas with combustible, dust-producing bulk solids of explosion groups F, G. These sensors of the PROTRAC devices are suitable for applications requiring Class II, III Division 2 equipment.

4 Application area

Class I, Division 2, Groups A, B, C, D
The PROTRAC devices with the mechanical fixing element are installed in hazardous areas of Class I, Division 2, Groups A, B, C, D.

Class II, Division 2, Groups F, G
The PROTRAC devices with the mechanical fixing element are installed in hazardous areas of Class II, Division 2, Groups F, G.

Class III, Division 2
The PROTRAC devices with the mechanical fixing element are installed in hazardous areas of Class III, Division 2.

5 Special operating conditions

The following overview lists all special features of PROTRAC devices.

Electrostatic charging (ESD)
You can find the details in chapter "*Electrostatic charging (ESD)*" of these safety instructions.

Ambient temperature
You can find the details in chapter "*Thermal data*" of these safety instructions.

Impact and friction sparks
The PROTRAC devices 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.

Non-grounded, metallic parts
The resistance between aluminium housing to metal measuring point identification plate is $> 10^9$ Ohm.

The capacitance of the metal measuring point identification plate was measured as follows:

Measurement loop identification label	Capacitance
45 x 23 mm (standard)	21 pF
100 x 30 mm	52 pF
73 x 47 mm	61 pF

6 Important information for mounting and maintenance

General instructions
The following requirements must be fulfilled for mounting, electrical installation, setup and maintenance of the instrument:

- The staff must be 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 National Electric Code NEC, ANSI/NFPA 70, Canadian Electric Code CEC, CSA C22.1 Part 1
- Make sure when working on the instrument (mounting, installation, maintenance) that there is no explosive atmosphere present, the supply circuits should be voltage-free, if possible
- The instrument has to be mounted according to the manufacturer specifications, the Certificate of Compliance and the valid regulations and standards
- Modifications on the instrument can influence the explosion protection and hence the safety, therefore repairs are not permitted to be conducted by the end user

WARNING -- SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 AND INTRINSIC SAFETY

AVERTISSEMENT -- LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE L'ADÉQUATION À LA CLASSE I, DIVISION 2 ET À LA SÉCURITÉ INTRINSÈQUE

- Modifications must only be carried out by employees authorized by VEGA company
- Use only approved spare parts
- Components for installation and connection not included in the approval documents are only permitted if these correspond technically to the latest standard mentioned on the cover sheet. They must be suitable for the application conditions and have a separate certificate. The special conditions of the components must be noted and if necessary, the components must be integrated in the type test. This applies also to the components already mentioned in the technical description.
- Vessel installations and probable flow must be taken into account

Cable and wire entries

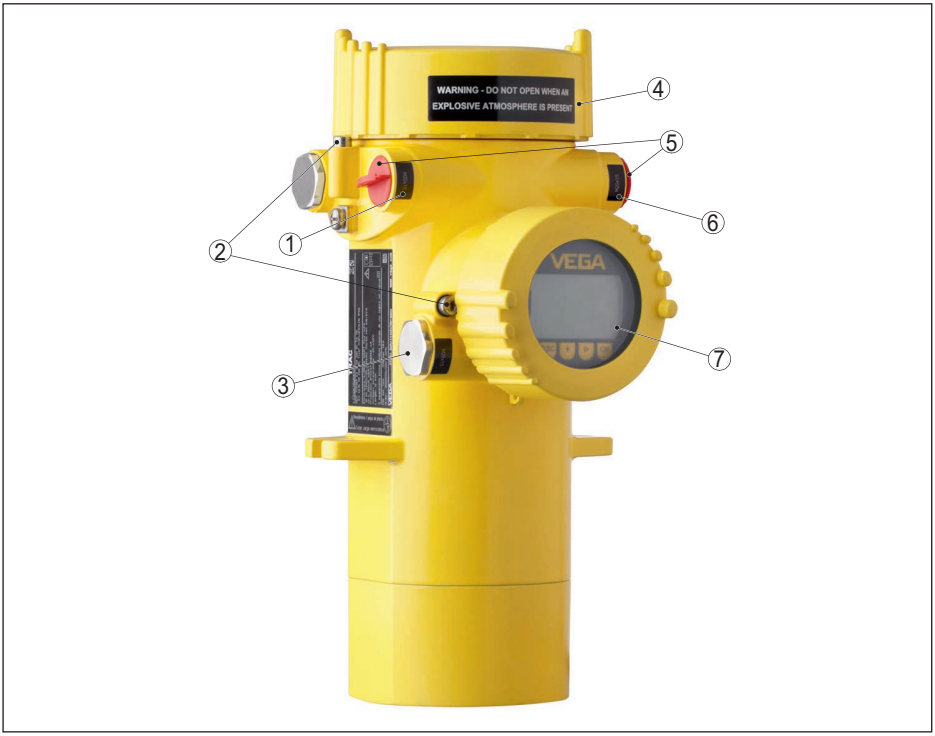
- The PROTRAC device must be connected via suitable cable gland or conduit systems that are in conformity with the requirements of the type of protection and the IP protection and provided with a separate type approval certificate. When connecting PROTRAC devices to conduit systems, the corresponding sealing facility must be connected directly to the housing.
  – A warning label indicates this:

WARNING -- SEAL ENTRIES WITHIN 18 inch OF ENCLOSURE

AVERTISSEMENT -- SCELLER LES ENTRÉES À MOINS DE 18 pouces DE LÉNCIENTE

- The red thread or/dust covers screwed in when the instruments are shipped (depending on the version) must be removed before setup and replaced by cable entries or closing screws suitable for the respective ignition protection type and IP protection.
- Note type and size of the thread: A label with the respective thread name is in the area of the respective thread
- Threads must have no damages
- Cable and conduit entries and closing screws should be mounted correctly and according to the safety instructions of the manufacturer to ensure the specified ignition protection type and IP protection rating. When using certified or suitable cable glands, closing screws or plug connections, it is absolutely necessary to note the corresponding certificates/documents. Supplied cable and conduit entries or closing screws meet these requirements.
- Unused openings must be closed with plugs suitable for the ignition protection type and IP protection. Supplied plugs meet these requirements.
- Cable and conduit entries resp. the closing screws must be tightly screwed into the housing

- The connection cables resp. pipeline sealing facilities must be suitable for the application conditions (e.g. temperature range) of the application
- With surface temperatures > 70 °C, the cables must be suitable for the higher application conditions
- The connection cable of PROTRAC devices has to be wired fix and in such a way that damages can be excluded.



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

Mounting

Keep in mind for instrument mounting

- Mechanical damage on the instrument must be avoided
- Mechanical friction must be avoided
- Vessel installations and probable flow must be taken into account
- Process connections separating two areas of different Ex-zones must comply to valid regulations and standards and the protection rating must be in conformity to ANSI/IEC 60529.
- Close the housing lid (s) up to the stop before starting operating, to ensure the IP protection rating specified on the type label

- Protect the lid against unauthorized opening by unscrewing the locking screw up to the stop. With double chamber housing, you have to protect both lids.

Maintenance

To ensure the functionality of the device, periodic visual inspection is recommended for:

- Secure mounting
- No mechanical damages or corrosion
- Worn or otherwise damaged cables
- No loose connections of the line connections, equipotential bonding connections
- Correct and clearly marked cable connections

The parts of the PROTRAC devices being in contact with flammable media during operation must be included in the periodic overpressure test of the plant.

Intrinsic safety "IS"

- Valid regulations for connection of intrinsically safe circuits, e.g. proof of intrinsic safety according to National Electric Code NEC, ANSI/NFPA 70, Canadian Electric Code CEC, CSA C22.1 Part 1 must be observed
- The instrument is only suitable for connection to certified, intrinsically safe instruments
- When connecting a circuit with protection level Ex ib, the device, the sensor meas. system of the device must no more be used in hazardous areas of zone 0.
- When connecting an intrinsically safe instruments with classification mark Ex ia to a circuit with protection level Ex ib, then the classification mark of the instrument changes to Ex ib. After the use as instrument with Ex ib power supply, the instrument must no more be used in circuits with protection level Ex ia
- When connecting an intrinsically safe instrument to an non-intrinsically safe circuit, the instrument must be no longer used in intrinsically safe circuits
- With surface temperatures > 70 °C, the cables must be suitable for the higher application conditions

7 Safe operating mode

General operating conditions

- Do not operate the instrument outside the electrical, thermal and mechanical specifications of the manufacturer
- Use the instrument only in media against which the wetted parts are sufficiently resistant
- Note the relation between process temperature on the sensor/antenna and the permissible ambient temperature on the electronics housing. For permissible temperatures, see the respective temperature tables. See chapter "*Thermal data*".
- If necessary, a suitable overvoltage arrester can be connected in front of the PROTRAC device
- For assessment and reduction of the explosion risk, valid standards such as for example ISO/EN 1127-1 must be taken into account
- Lids must not be opened if there is a hazardous atmosphere. The housing lids are marked with the warning label:

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

AVERTISSEMENT -- NE PAS OUVRIR SI UNE ATMOSPHÈRE EXPLOSIVE PEUT ÊTRE PRÉSENTE

- To exclude the danger of mechanical damage, the FIBERTRAC 31, 32 must be installed in such a way that the flexible detector is protected from environmental influences.

8 Potential equalization/Grounding

- Integrate the instruments into the local potential equalisation, e.g. via the internal or external earth terminal
- The potential equalization terminal must be secured against loosening and twisting
- If grounding of the cable screening is necessary, this must be carried out acc. to the valid standards and regulations

9 Electrostatic charging (ESD)

In case of instrument versions with electrostatically chargeable plastic parts, the danger of electrostatic charging and discharging must be taken into account!

The following parts can charge and discharge:

- Lacquered housing version or alternative special lacquering
- Plastic housing, plastic housing parts
- Metal housing with inspection window
- Plastic process fittings
- Plastic-coated process fittings and/or plastic-coated sensors
- Connection cable for separate versions
- Type label
- Isolated metallic labels (measuring point identification plate)

Take note in case of danger of electrostatic charges:

- Avoid friction on the surfaces
- Do not dry clean the surfaces

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

The warning label indicates danger:

WARNING -- POTENTIAL ELECTROSTATIC CHARGING HAZARD -- SEE INSTRUCTIONS

AVERTISSEMENT -- DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES -- VOIR INSTRUCTIONS

10 Mounting with external display unit VEGADIS 61/81

The intrinsically safe signal circuit between PROTRAC device 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.

11 Use of an overvoltage arrester

If necessary, a suitable overvoltage arrester can be connected in front of the PROTRAC devices.

As far as acc. to National Electric Code NEC, ANSI/NFPA 70, Canadian Electric Code CEC, CSA C22.1 Part 1 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.

12 Version with cooling option

With the PROTRAC devices 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.

13 Electrical data

Non-intrinsically safe circuits (in the "main" connection compartment)

PROTRAC devices (x)xxxxTRAC 3* type xT3*.KX*C/D/E/G*(*)****

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]	100 mA (open collector input between 14 - 16) 10 mA (open collector input between 15 - 16)
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 devices (x)xxxxTRAC 3* type xT3*.KX*C/E**(*)****

Communication circuit: Terminals 10, 11 [Signal + Power] in the "main" connection compartment	U = 9 … 32 V DC

Intrinsically safe circuits (in the "IS" connection compartment)

PROTRAC devices (x)xxxxTRAC 3* type xT3*.KX*C/D/E/G*(*)****

<table>
<tr><td rowspan="6">Display and adjustment circuit:
Terminals 5, 6, 7, 8 in the lateral chamber</td><td colspan="2">In type of protection intrinsic safety "IS"
For connection to the intrinsically safe circuit of the corresponding external display unit VEGADIS 61/81.</td></tr>
<tr><td colspan="2">Maximum values:
● $U_o \leq 6$ V DC
● $I_o \leq 209.7$ mA
● $P_o \leq 314.6$ mW</td></tr>
<tr><td colspan="2">Characteristics: Linear
● L_i negligible
● C_i negligible</td></tr>
<tr><td></td><td>Ex ia IIC, IIIC</td></tr>
<tr><td>Permissible inductance L_o</td><td>0.8 mH</td></tr>
<tr><td>Permissible capacitance C_o</td><td>1.4 µF</td></tr>
<tr><td colspan="3">When using the supplied VEGA connection cable, the following cable inductances L_i and cable capacitances C_i must to be taken into account.
● $L_i = 0.62$ µH/m
● $C_{i\ wire/wire} = 150$ pF/m
● $C_{i\ wire/screen} = 270$ pF/m</td></tr>
</table>

Signal circuit of the display and adjustment module: Spring contacts in the lateral chamber	In type of protection intrinsic safety "IS" Only for connection to the display and adjustment module PLICSCOM or if it is ensured that no explosive atmosphere is present, for service purposes on the interface adapter VEGACONNECT.

The intrinsically safe display/control circuit is earthed and connected to the external and internal earth terminal.

PROTRAC devices (x)xxxxTRAC 3* type xT3*.KX*D/G**(*)****

Intrinsically safe communication circuit: Terminal 1, 2 [Signal+Power] in the lateral chamber	In type of protection intrinsic safety Ex ia/ib IIC, IIIC Only for connection to a certified, intrinsically safe circuit.
	Maximum values: ● $U_i = 24$ V ● $I_i = 250$ mA ● $P_i = 1.2$ W
	Characteristics: Linear The effective internal capacitance C_i is negligibly small. The effective internal inductance is $L_i \leq 5$ µH

The intrinsically safe communication circuit is galvanically separated from ground.

The metallic parts of PROTRAC devices are electrically connected with the earth terminals.

14 Mechanical data

The following mechanical data are valid for all housing and electronics versions.

Mechanical data	
Protection (ANSI/IEC 60529)	TYPE 4x; IP66/IP67
Ground terminal (connection cross-section)	≥ 4 mm²

15 Thermal data

The following temperature tables are valid for all housing and electronics versions.

The relationship between the permissible ambient temperature for the electronics housing depending on the area of application and the maximum surface temperatures, temperature classes, can be seen in the following tables.

Class I, Division 2, Groups A, B, C, D

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

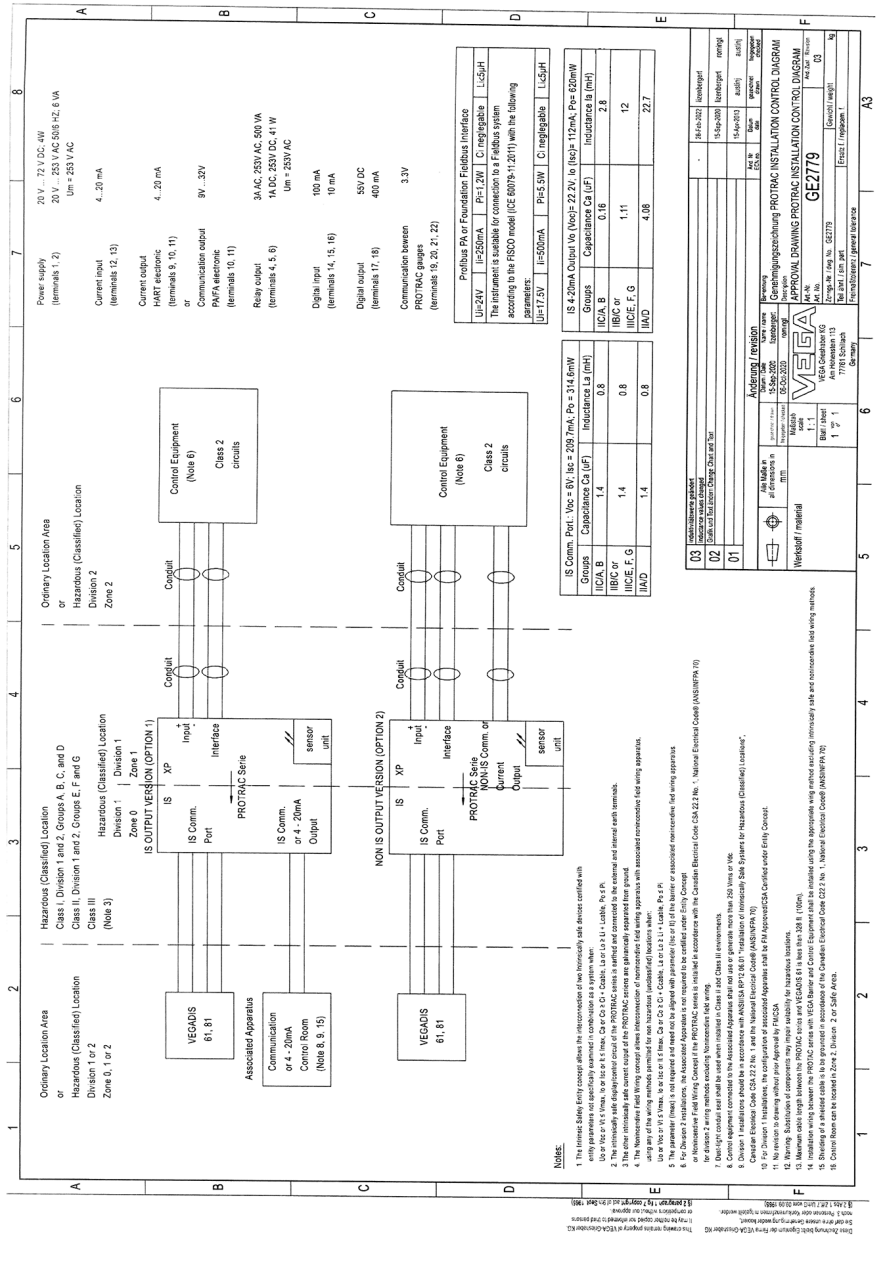
Class II, III, Division 2, Groups F, G

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

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

The application conditions during operation without explosion-endangered atmosphere are mentioned in the respective manufacturer instructions, e.g. operating instructions manuals.

16 Installation diagram



Notes:

1. The Intrinsic Safety Entity concept allows the interconnection of two intrinsically safe devices

Certified with entity parameters not specifically examined in combination as a system when:

- Uo or Voc or Vt ≤ Vmax
- Io or Isc or It ≤ Imax
- Po ≤ Pi
- Ca or Co ≥ Ci + Ccable
- La or Lo ≥ Li + Lcable

2. The intrinsically safe display/control circuit of the PROTRAC series is earthed and connected to the external and internal earth terminals.

3. The other intrinsically safe current output of the PROTRAC series are galvanically separated from ground.

4. The Nonincendive Field Wiring concept allows the interconnection of nonincendive field wiring apparatus with associated nonincendive field wiring apparatus, using any of the wiring methods permitted for non hazardous (unclassified) locations when:

- Uo or Voc or Vt ≤ Vmax
- Io or Isc or It ≤ Imax
- Po ≤ Pi
- Ca or Co ≥ Ci + Ccable
- La or Lo ≥ Li + Lcable

5. The parameter (Imax) is not required and need not be aligned with paraneter (Isc or It) of the barrier or associated nonincendive field wiring apparatus.

6. For Division 2 Installations, the Associated Apparatus is not required to be Certified under Entity concept or Nonincendive Field Wiring concept if the PROTRAC series is installed in accordance with the National Electric Code NEC, ANSI/NFPA 70, Canadian Electric Code CEC, CSA C22.1 Part 1 for division 2 wiring methods excluding Nonincendive Field Wiring.

7. Dust-tight conduit seal shall be used when installed in Class II and Class III environments.

8. Control equipment connected to the Associated Apparatus shall not use or generate more than 250 Vms or Vdc.

9. Division 1 Installations should be in accordance with ANSI/ISA RP12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations " and the National Electric Code NEC, ANSI/NFPA 70, Canadian Electric Code CEC, CSA C22.1 Part 1.

10. For Division 1 Installations, the configuration of Associated Apparatus shall be FM Approved/ CSA Certified under Entity concept.

11. No revision to drawing withour prior Approval by FM/CSA.

12. Warning- Substitution of components may impair suitability for Hazardous Locations.

13. Maximum cable length between the PROTRAC series and VEGADIS 81 is less than 328 fl. (100m)

14. Installation wiring between the PROTRAC series with VEGA Barrier and Control Equipment shall be installed using the appropriate wiring method excluding intrinsically safe and nonincendive field wiring methods.

15. Shielding of a shielded cable is to be grounded in accordance of the Canadian Electrical Code C22.2 No. 1, National Electrical Code® (ANSI/NFPA 70).

16. Control Room can be located in Zone 2, Division 2 or Safe Area.

Printing date:

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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