

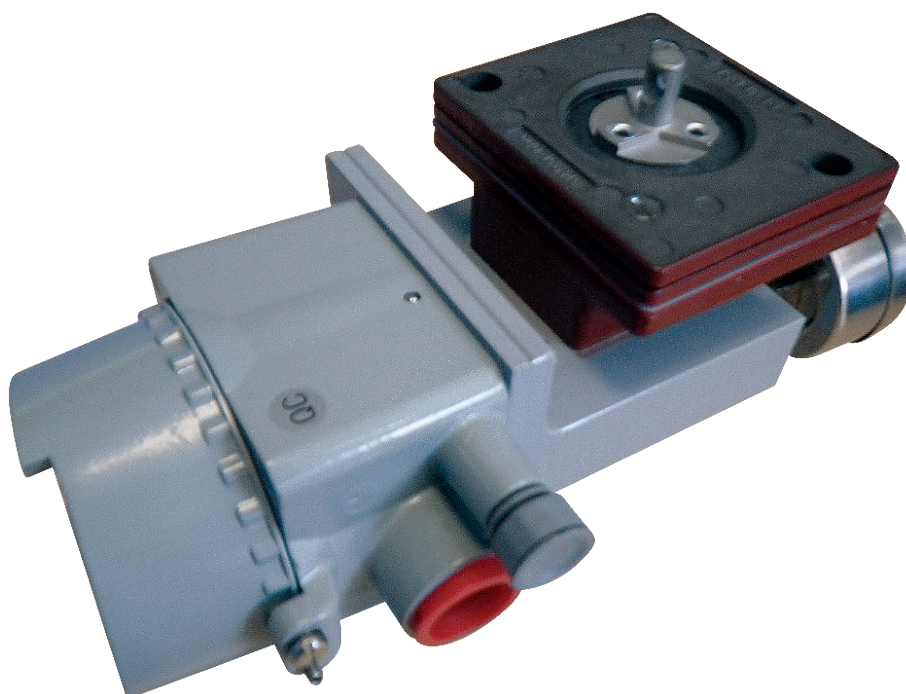
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a Baker Hughes business

Type 7700E

Electro-Pneumatic Positioner

ATEX Instruction Manual (Rev.C)



THESE INSTRUCTIONS PROVIDE THE CUSTOMER/OPERATOR WITH IMPORTANT PROJECT-SPECIFIC REFERENCE INFORMATION IN ADDITION TO THE CUSTOMER/ OPERATOR'S NORMAL OPERATION AND MAINTENANCE PROCEDURES. SINCE OPERATION AND MAINTENANCE PHILOSOPHIES VARY, BAKER HUGHES COMPANY (AND ITS SUBSIDIARIES AND AFFILIATES) DOES NOT ATTEMPT TO DICTATE SPECIFIC PROCEDURES, BUT TO PROVIDE BASIC LIMITATIONS AND REQUIREMENTS CREATED BY THE TYPE OF EQUIPMENT PROVIDED.

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WARNING

BEFORE installing, using or carrying out any maintenance tasks associated with this instrument, READ THE INSTRUCTIONS CAREFULLY.

This instrument complies with the essential safety requirements of the European Directive ATEX 2014/34/EU.

It is certified to be used in gas or dust explosive atmospheres, groups IIC or IIIC:

- Category II 1GD - zones 0, 1, 2, 20, 21 and 22 for the protection mode "ia"
- Category II 2GD - zones 1, 2, 21 and 22 for the protection mode "db" and "tb".

This instrument also complies with the essential safety requirements of the European Directive EMC 2014/30/EU (as amended), for use within an industrial environment.

Products certified as **flameproof equipment** or for use in **intrinsically safe** installations MUST BE:

- a. Installed, put into service, used and maintained in compliance with national and local regulations and in accordance with the recommendations contained in the relevant standards concerning potentially explosive atmospheres.
- b. Used only in situations that comply with the certification conditions shown in this document and after verification of their compatibility with the zone of intended use and the permitted maximum ambient temperature.
- c. Installed, put into service and maintained by qualified and competent professionals who have undergone suitable training for instrumentation used in areas with potentially explosive atmospheres.

It is the end user's responsibility to:

- **Ensure proper use of fall protection when working at heights, per Safe Site Work Practices**
- **Ensure use of proper Personal Protective Equipment**
- **Take the appropriate actions to ensure that site personnel who are performing installation, commissioning and maintenance have been trained in proper site procedures for working with and around equipment, per Safe Site Work Practices**

Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design, or specifications without notice.

Under certain operating conditions, the use of damaged instruments could cause a degradation of the performances of the system which may lead to personal injury or death.

Use only genuine replacement parts, which are provided by the manufacturer, to guarantee that the products comply with the essential safety requirements of the European Directives mentioned above.

1. Instrument Operation

The Model 7700 positioner operation principle is a force-balance mechanism:

- An entry force exerted by the double diaphragm under the effect of a pneumatic signal pressure
- An opposite force developed by a feedback spring. The tension of this spring varies with the displacement of the actuator lever to which it is connected.

The 7700E Electro-pneumatic positioner is made with a manifold block which is equipped with a I/P 4000 converter (Intensity/Pressure) which generates the pneumatic signal operating on the double diaphragm.

2. Numbering System

Unique positioner: 7700 E (I/P 4000 module).

Different versions:

- Housing material:
 - Aluminum
 - Stainless steel
- Mounting:
 - Single lever: 28001
 - Adjustable Cv: 28002

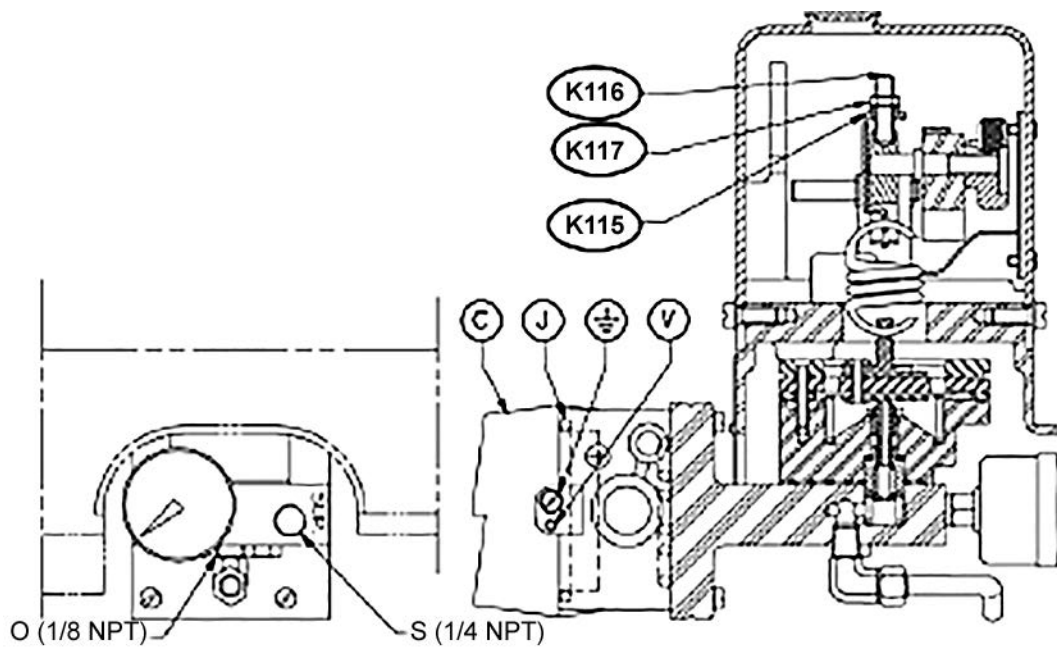
3. Technical Data

3.1 Performances

Performances	(% of the Signal Range)
Started point (closed valve)	≤ 2,0%
Hysteresis (mid-stroke)	≤ 0,9%

- Maximum service temperature range: -40°C to +85°C
- Storage temperature: -55°C to +90°C
- Housing protection: IP66 (I/P converter Module)
- Cable entry:
 - ½" NPT
 - M20

3.2 Schematic



Rep.	Designation	Rep.	Designation	Rep.	Designation
K115	Spring clamp	C	Cover	S	Supply
K116	Take up screw	J	O-ring	V	Safety screw
K117	Locknut	O	Output		

4. ATEX Markings

ITS-I21ATEX29368X Notified Body CE XXXX (See Product Label for NB Number)

Intrinsic Safety: II 1GD:

- Ex ia h IIC T6 Ga (Tamb.= -40°C to +55°C, Pi= 0.33 W)
- Ex ia h IIC T4 Ga (Tamb.= -40°C to +80°C, Pi= 1.1 W)
- Ex ia h IIC Da T90°C (Tamb.= -40°C to +80°C, Pi= 1.1 W)

Flame Proof: II 2GD:

- Ex db h IIC T6 Gb (Tamb.= -40°C to +55°C)
- Ex db h IIC T5 Gb (Tamb.= -40°C to +70°C)
- Ex db h IIC T4 Gb (Tamb.= -40°C to +85°C)
- Ex tb IIC T90°C Db (Tamb.= -40°C to +55°C)

IP 66 / Type 4X

WARNING

- Do not open when energized.
- Do not open when an explosive gas atmosphere is present.
- Potential electrostatic charging hazard. See instructions for safe use.
- Use cables rated to $\geq 5^{\circ}\text{C}$ above ambient.

5. Electrical Characteristics

- Input signal: 4-20 mA (positioner is self-powered)
- Input impedance: 170 ohms

6. Assembly of a 7700E Positioner on a Varipak valve

- Comply with current national and local regulations for electrical installation work.
- Comply with national and local explosive atmosphere regulations.
- Must be installed and put into service in conformance with EN/IEC 60079-14 and / or national and local regulations applicable for explosive atmospheres.
- Before carrying out any work on the device, power off the instrument or make sure that the local conditions in the potentially explosive atmosphere permit the safe opening of the cover.
- Before switching on or after doing any work on the device, always tighten the cover (C) with a seal (J) in good condition and put back the safety screw (V).

Note: Before installation, check that the device is undamaged. In the event of damage, replace the defective parts with genuine manufacturer's replacement parts.

If the positioner is supplied mounted on a valve, Baker Hughes ensures installation, pneumatic connection, configuration and calibration.

If the positioner is shipped alone, the user is responsible for installation, electrical and pneumatic connections, and calibration.

Please refer to Varipak instruction Manual for more details.

7. Pneumatic Connection of Positioner 7700E

Make sure that the air supply pressure is suitable for the installation and for the instrument.

When using a positioner, make sure that the air supply pressure matches the one specified on the serial plate without exceeding 275 kPa (40 psi).

The positioner is intended for use with industrial compressed air. Make sure the air supply temperature is compatible with ambient temperature of class T6/T4/T3 defined in section 4.

Diameter of tubing required: 4 x 6 mm.

8. Electrical Connection, Installation and Start-Up

- Comply with current national and local regulations for electrical installation work.
- Comply with national and local explosive atmosphere regulations.
- Must be installed and put into service in conformance with EN/IEC 60079-14 and /or national and local explosive atmosphere regulations.
- Before carrying out any work on the device, power off the instrument or make sure that the local conditions in the potentially explosive atmosphere permit the safe opening of the cover.
- Connect the wires to the instrument's terminals taking care of complying with polarities and maximum voltage allowed.
- Before switching on or after doing any work on the device, always tighten the cover (C) with a seal (J) in good condition and put back the safety screw (V).

Note: Before installation, check that the device is undamaged. In the event of damage, replace the defective parts with genuine manufacturer's replacement parts.

8.1 Cable entry

The cable entry on the I/P 4000 converter is ½" NPT (following ANSI ASME B 1.20.1) or M20 (ISO965-1 and ISO965-3).

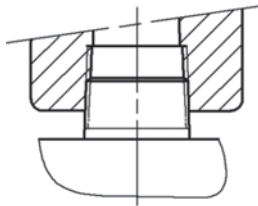
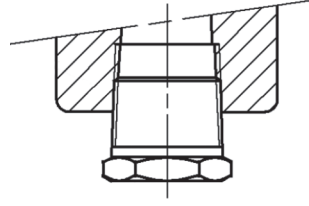
The connections can be done with different variations taking into account approved manufacturer and requested approvals:

- A cable entry of a certified type **Ex d IIC / Ex tb IIIC** can be mounted directly on the single ½" NPT (ANSI/ASME B1.20.1) housing conduit connection or M20 (ISO965-1 and ISO965-3).
- For identification machining thread, check the part number sticker on the Model 4000 I/P Converter body:

M20	00-055100106-888
½ NPT	00-055100212-888

- The cable entry has to be suitable to the equipment operating zone (IP 6X for zones 20, 21 and 22).
- Adaptors or reducers if apparatus certified ATEX or IECEx.

- The cable entry with or without its adaptor/reducer must be installed in conformance with the figure below:

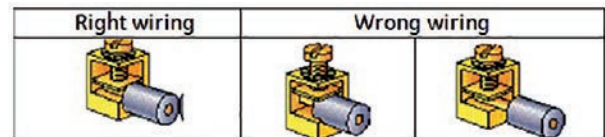
Cable Gland Accessories Mounting on Instruments	
	
With Cable Entry	with Adaptor or Reducer
Taper threaded joints in conformance with ANSI ASME B1.20.1: 5 threads provided on each part	Taper threaded joints in conformance with ANSI ASME B1.20.1: 5 threads provided on each part Cemented with "Loctite Freinfillet Fort" or equivalent product with similar efficiency

Ground the device using the grounding connections provided inside and outside the device.

8.2 Electrical connection

Basic rule for wiring:

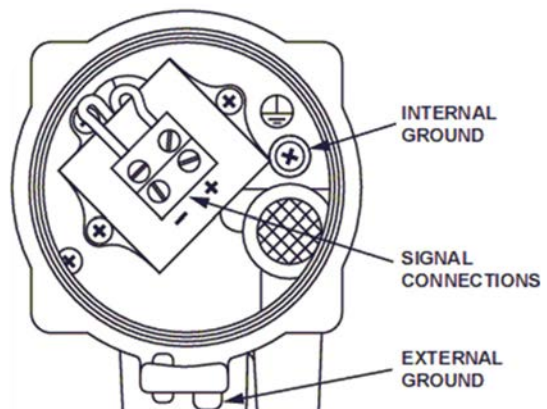
- Must be used in addition to local regulation for electrical installation
- Connector slot approval:



- Insulation must be free of any damage along the wires inside the housing
- Tightening must be sufficient to bring constant contact in time without being excessive to cut or damage connection.

Current signal:

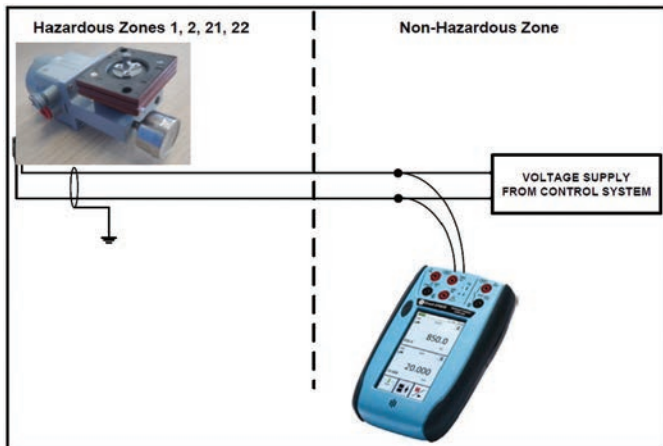
The Positioner is self-powered 4-20mA current receiver. Connect the wires to the instrument's terminals taking care to comply with polarities plus and minus. The terminals will accept wire sizes up to AWG 14. Make the earth connections with the internal and external ground terminals.



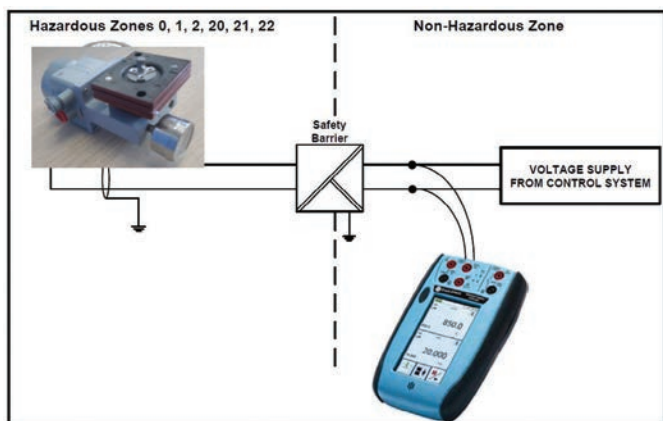
8.3 Installation and start up

These operations must be put into service in conformance with EN/IEC 60079-17 and national and local regulations applicable for explosive atmospheres. Before carrying out any work on the device, check that the local conditions in the potentially explosive atmosphere zone permit the safe opening of the covers.

8.3.1 Installation



Flameproof instrument can be installed in flammable gas explosive atmosphere groups IIA, IIB, IIC for the zones 1 and 2 or in flammable dust explosive atmosphere group IIIC zones 21 and 22. Maximum power: 0,8 W.



Intrinsically safe instrument can be installed in flammable gas explosive atmospheres groups IIA, IIB, IIC for the zones 0, 1 and 2 or in flammable dust explosive atmosphere group IIIC zones 20, 21 and 22.

Intrinsic Safety entity parameters

	Ui (V)	Ii (mA)	Pi (W)	Ci (nF)	Li (μH)
Temperature class T4	30	110	1,1	0	0
Temperature class T6	30	110	0,33	0	0

Note: It is under the user responsibility to check the installation against Intrinsic safety rules taking into account entity parameters of all devices in the loop in addition of temporary one like measurement devices.

8.3. Start-Up

- Before switching on or after doing any work on the device, always tighten the cover (C) with a seal (J) in good condition and put back the safety screw (V).
- Check that the cable gland is certified for the intended use and that the electrical data are suitable for the operating zone.

Note: Before start-up, proceed, if required, with instrument calibration as per section 9 and/or ensure that all the safety instructions in the preceding paragraphs have been strictly followed.

9. Calibration of the 7700E Positioner

- Comply with current national and local regulations for electrical installation work.
- Comply with national and local explosive atmosphere regulations.
- Must be installed and put into service in conformance with EN 60079-14 and / or national and local regulations applicable for explosive atmospheres.
- Before carrying out any work on the device, power off the instrument or make sure that the local conditions in the potentially explosive atmosphere permit the safe opening of the cover.
- Connect the wires to the instrument's terminals taking care of complying with polarities and maximum voltage allowed
- Before switching on or after doing any work on the device, always tighten the cover (C) with a seal (J) in good condition and put back the safety screw (V).

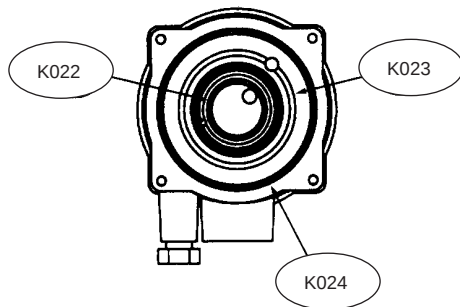
The positioner assembled on valve is factory-calibrated, but if it is necessary to remake the calibration on the site, it will be carried out by the customer according to the following general principles

- Make the pneumatic and electrical connections, see section 7 and section 8.
- The adjustment of the starting pressure is made by screw (K116). Calibrate the electrical signal corresponding to the closing of the valve (4 or 20 mA). Turn the take-up screw (K116) until the piston rod just begins to move (the plug leaves the contact with the seat ring).
- Tighten the locknut (K117).
- Strictly follow safety instructions under section 12 before putting into service

Note: The I/P 4000 module does not require any adjustment.

10. Maintenance of the Positioner

- Comply with current national and local regulations for electrical installation work.
 - Comply with national and local explosive atmosphere regulations.
 - These operations must be done in conformance with EN 60079-17 and/or national and local regulations applicable for explosive atmospheres
 - Before carrying out any work on the device, power off the instrument or make sure that the local conditions in the potentially explosive atmosphere permit the safe opening of the cover.
 - Before switching on or after doing any work on the device, always tighten the cover (C) with a seal (J) in good condition and put back the safety screw (V).
- Make sure that the components of the instrument are not damaged. In the event of damage replace the defective parts with genuine manufacturer's replacement parts.
 - Pay particular attention to the following:
 - General condition of the housing.
 - Check the cable gland and the electrical connections.
 - When replacing the I/P module, check the condition of the three O-rings (K022, K023, K024) and replace them if necessary.



- The user shall clean the equipment regularly to avoid dust accumulating on the walls, for instruments installed in zones 20, 21 and 22. See instructions in section 12.1 b and c for safe cleaning.
- Avoid contact of the apparatus with aggressive substances which could damage the metallic or plastic parts.

11. Special Conditions of Work

Based on 2014/34/EU directive, a training session must be followed by person usually recognized to use apparatus in explosive atmospheres.

This training session is not supported by Dresser Produits Industriels S.A.S.

12. Special Conditions of Use

12.1 For Intrinsic Safety and Flameproof Type

- It is under the user responsibility to check once a year the gasket and in the event of damage, to replace the defective parts with manufacturer's replacement parts only.
- For use in dusty hazardous areas, the user will have to proceed to a cleaning regularly the different sides of the enclosure to avoid the deposits of dusts, the maximum thickness must be <5 mm. This cleaning will be done using recommendations defined in point c hereunder.
For safe operation, this can be done only if the local conditions around the device are free of potentially explosive atmosphere.
- To avoid any spark due to electrostatic discharges, it is requested to follow the instructions of EN 60079-32-1. For example, the user will proceed a cleaning of the device and mainly the plastic label with a wet rag to.
For safe operation, this can be done only if the local conditions around the device are free of potentially explosive atmosphere.
- The user will have to check the temperature increase on the 7700E coming from the mechanical part in contact with the 7700E housing or through the process thermal radiation be less or equal than the temperature classification allowed. This must be done in conformance with EN 60079-14 and/or national and local regulations applicable for explosive atmospheres.
- If the Model 4000 I/P Converter is mounted with the axis of the plastic baffle in the vertical position with the baffle uppermost, the required ingress protection against water is invalidated; therefore, it shall only be installed in this orientation if its location provides protection against falling water.
- This requirement is only applicable for multi protection marking. The final user during the 7700E series installation on site must show the protection mode used on the serial plate.

12.2 For Intrinsic Safety Type

- The cable entry and its installation must have a protection level at least equal to IP6X according to EN 60529 standards.
- For the 7700E housing with aluminum material, the user will have to determine the use of the device for **group II zones 0 and 20 (Ga and Da) against potential inflammable source causing by sparks in the event of impact or friction.**
- The voltage supply connected on 7700E connector must be certified for use in group IIC and the loop intrinsic safety approved. The entity parameters of the voltage supply must be compatible with the entity parameters of the 7700E described section 5.

12.3 For Flameproof Type

- The cable entry and its installation must have a protection level at least equal to IP65 according to EN 60529 standards.
- When the ambient temperature is higher than 70°C, the user will have to choose a cable entry and a cable compatible with the data of the table below:

T ambient	T cable
70°C	75°C
75°C	80°C
80°C	85°C
85°C	90°C

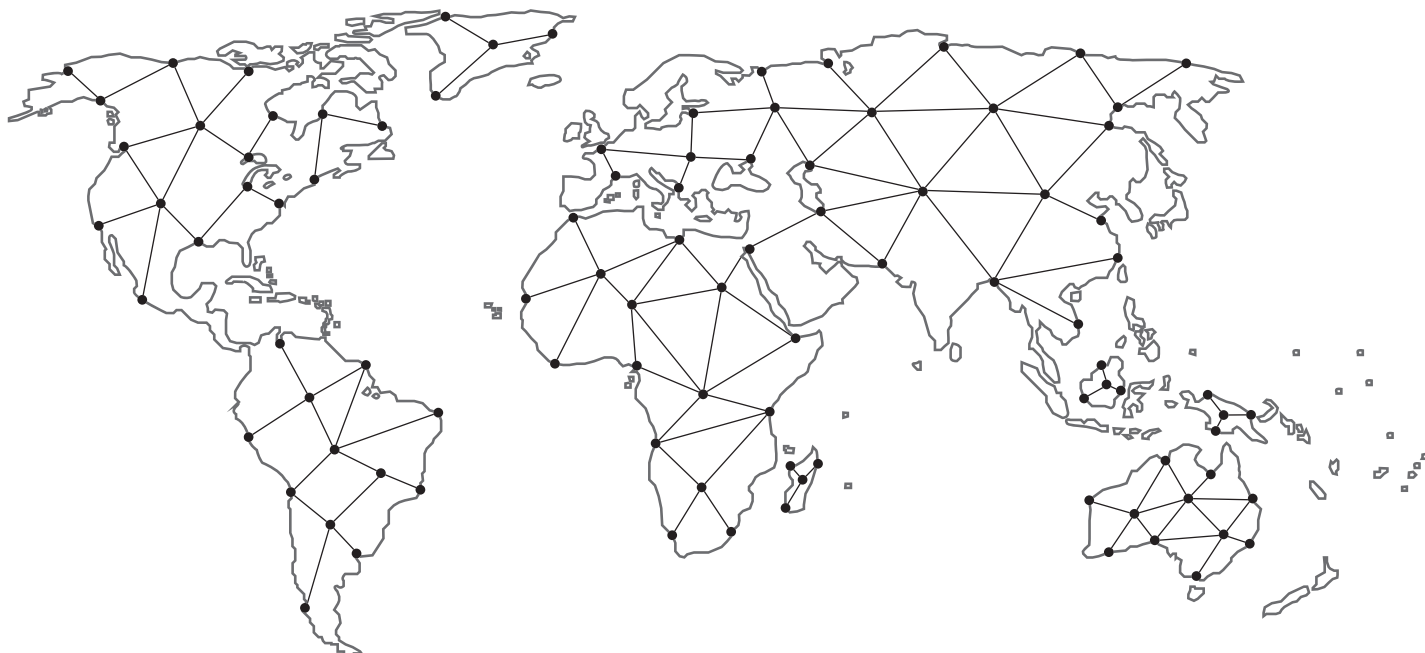
- The minimal temperature of the cable is indicated on the serial plate.
- When the ambient temperature is lower than -20°C, the user will have to choose a cable entry and a cable compatible with the ambient temperature specified on the marking plate.
- The cable entry must have a degree of protection at least equal to IP66.
- Use only the following greases for the cable gland:

Type	Brand
SI 33	ORAPI
GRAPHENE 702	ORAPI
MOLYKOTE 111 COMPOUND	MOLYKOTE®
MULTILUB	MOLYKOTE®
GRIPCOTT NF	MOLYDAL

Notes

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