SF_6 /Dry-Air Gas density transmitter

APPLICATIONS

- Reading of SF6 gas density or Dry-Air or any gas mixture
- Monitoring of critical parameter of SF6 such as pressure, temperature, density
- Digital version with RS485 Modbus RTU for smart grid application
- Predictive signals available for digital version
- Suitable to work with pure SF6 or mix without any adaptation*
- Suitable for indoor or outdoor, IP67 protection
- Industrial, medical or aerospace fields

High voltage or medium voltage circuit breakers commonly used for distribution and transmission are reliable if they are able to operate in steady and controlled conditions.
The use of SF6 or Dry-Air as quenching gas is extremely important to guarantee a safe operation during the life of equipment.
In order to have continuous check of gas filling and immediate warning in case of leakage the EMD transmitter is suitable to be connected to most standard monitoring systems.
It is ready to operate immediately after installation because of our technology based on ceramic primary element capable of reading the temperature and pressure of gas and calculate density.
All the materials used, such as thick ceramic and stainless steel are insensitive to chemical attach of corrosive and polluted gases.
The case is very robust and it is tested to face heavy duty conditions, so all the inner parts are immersed into resin to guarantee resistance to moisture and vibrations.
The sensor is available with both analog or digital output.
The analog version is a two wires loop powered and the digital is a standard Modbus RTU 485.

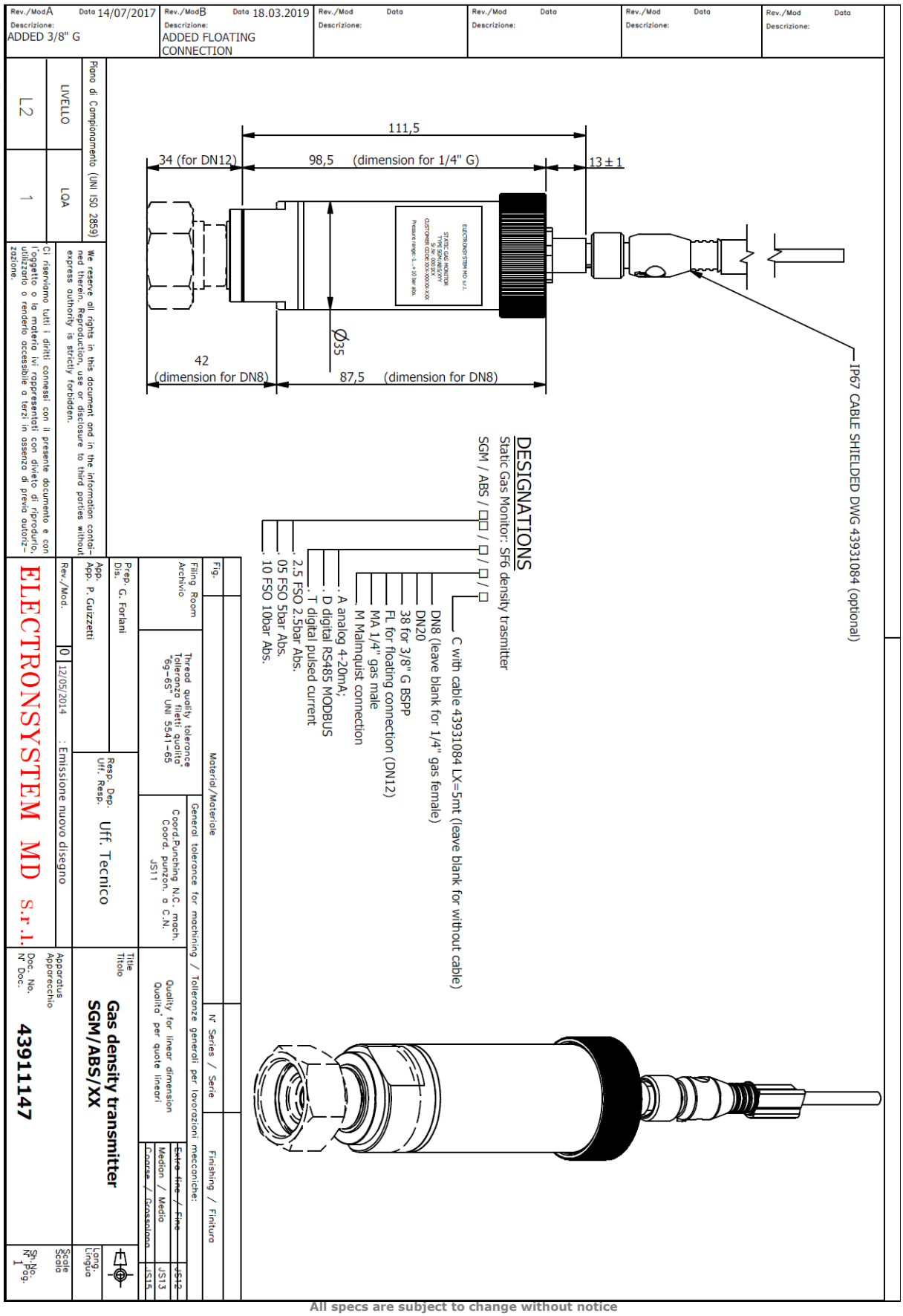
Density calculation is based on measurement of two physical data: pressure and temperature; proprietary algorithm is used to convert these data into density and can be customized by changing some coefficients to meet specific request.

HIGHLIGHTS

- Absolute compensated pressure reading
- High accuracy +/- 1°C FSO over a wide temperature range
- Ceramic primary element chemically resistant
- Excellent long term stability
- Quick response time
- Factory calibration by laser trimming and automated process
- 14 bit ASIC core
- Multiple transmission data output customizable on request

*density g/l depending on type of gas

SF_6 /Dry-Air Gas density transmitter



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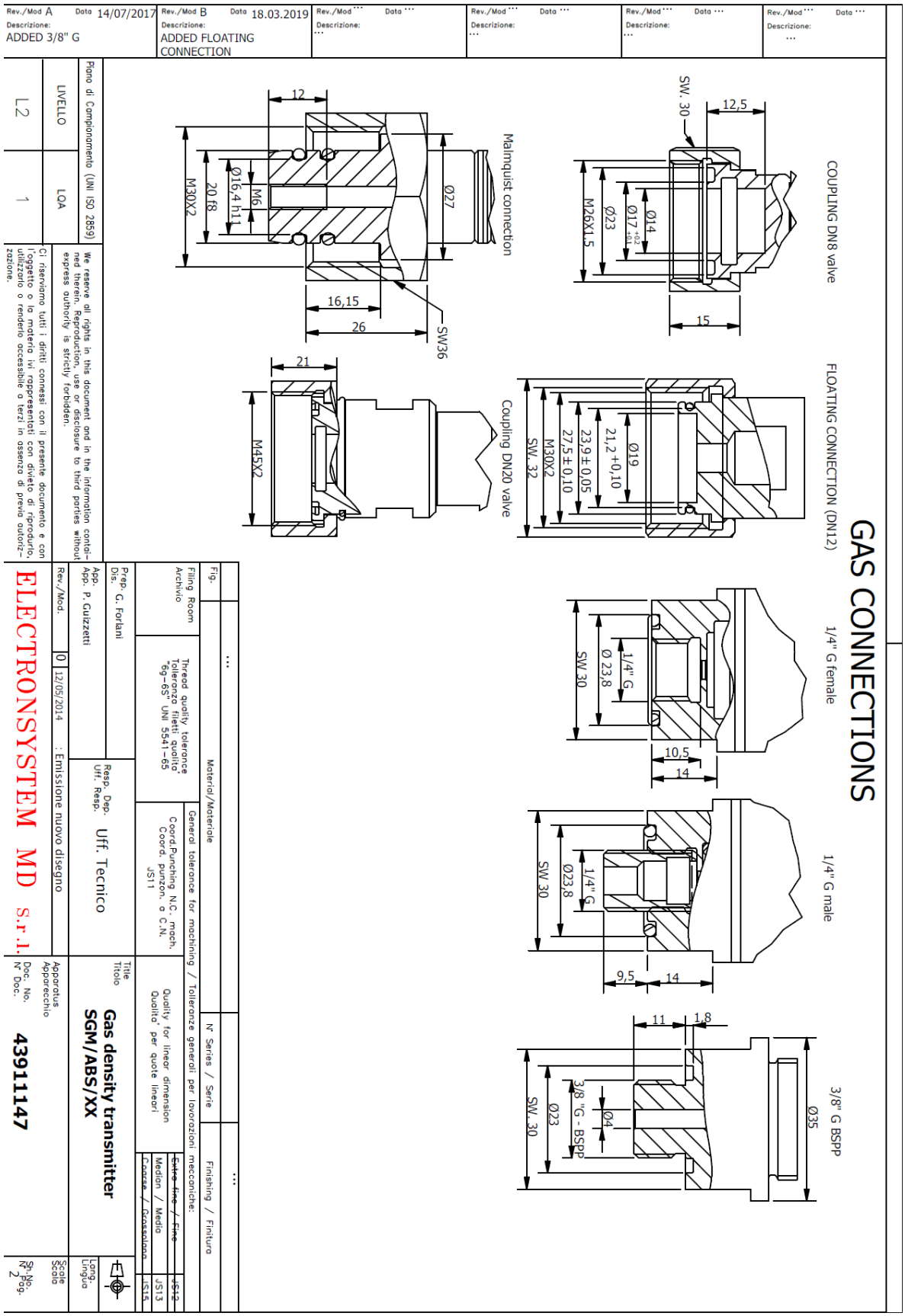
SF_6 /Dry-Air Gas density transmitter



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SF_6/Dry-Air Gas density transmitter

Rev./Mod A	Data 14/07/2017	Rev./Mod B	Data 18.03.2019	Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data	Rev./Mod	Data
Descrizione: ADDED 3/8" G		Descrizione: ADDED FLOATING CONNECTION		Descrizione:		Descrizione:		Descrizione:		Descrizione:	

TECHNICAL FEATURES:

DESCRIPTION:
TEMPERATURE COMPENSATED SF6 GAS DENSITY TRANSMITTER

1 Materials:
1.1 Housing material : AISI 316
1.2 Inner o.rings material : EPDM70 peroxide cured
1.3 Primary sensing element: Ceramic
1.4 Cable connection material: aluminium alloy nickel-plated
1.5 Conformity to 2002/95/CE (RoHS)

2 Electrical data of sensors
2.1 Electrical data analog version
2.1.1 Output signal : 4 - 20 mA 2 wires loop system (see diagram 1)
2.1.2 Input voltage : 15-30 Vdc
2.1.3 Rload: Rin< 250 ohm
2.2 Electrical data digital pulsed current version:
2.2.1 Output signal : PWM pulse current (see diagram 2)
2.2.2 Input voltage : 15-30 Vdc
2.2.3 Rload: Rin< 100 ohm
2.3 Electrical data digital version:
2.3.1 Output signal : RTU MODBUS RS485 (see diagram 3)
2.3.2 Data protocol: baudrate 19200, databits 8, parity even, stopbit 1
2.3.3 Input voltage : 15-30 Vdc
2.3.4 Current Consumption : 20mA typ. / 40mA max.
2.4 Common electrical data:
2.4.4 Input protection : overvoltage supressor and reverse voltage diode
2.4.5 Response time : < 30 msec.
2.4.6 Resolution : < 0.1% of full scale
2.4.7 Stability : < 0.2% of full scale per yearù
2.4.8 Accuracy : < ± 1% @ T=0÷40°C (± 0.3%/10°C extended temp. range)
2.4.9 Repeatitivity : < 10^-3
2.4.10 Isolation: max 250Vac 50Hz against mass
2.4.11 Resistance of insulation: >10Mohm
2.4.12 Terminal block : circular shielded M12x1 connector (see diagram 4)
2.4.13 Gas condensation: measurement of SF6 in liquid phase is not allowed
(see isochores diagram 5)

3 Output range:
3.1 Pressure: 0 - 2,5, 0 - 5 or 0 - 10 Bar ABS @20°C compensated
3.2 Density: 15,33g/l @ 2,5 Bar ABS, 31,56g/l @ 5 Bar ABS, 66,86g/l @ 10 Bar ABS
3.3 Density: 56,4g/l @ 8,5 Bar ABS *
3.4 Temperature: -40 - 100°C *

* available only for SGM/ABS/T or SGM/ABS/D

4 Electromagnetic protection:
4.1 EN61000-4-2: ESD air 15kV
4.2 EN61000-4-3: Radiated immunity AM 10V/m 80...1000MHz, PM 10V/m 900...2700MHz with 10m cord
4.3 EN61000-4-4: Burst 4kV withstand of the communication & power supply interfaces with 10m cord
4.4 EN61000-4-5: Surge 4kV withstand on the shield of 10m cord
4.5 EN61000-4-6: Conducted immunity 10V/m
4.6 EN61000-6-4: Radiated disturbances 30MHz-1000MHz class B

5 Working conditions:
5.1 Mechanical stresses:
Shockproof 30G on 3 axys
5.2 MTBF indoor: 20 years, MTBF outdoor: 15 years
5.3 Max allowable pressure: 16 bar ABS

6 Environmetal conditions:
Operating temperature:
Standard : -25°C to +80°C (LT version: -40°C to +80°C)
Transport and storage : -60°C to 85°C
Relative air humidity in yearly average <80%, occasionally 100%
Solar radiation: <= 1000 W/mq
Wind: <= 34 m/s
Altitude: <= 2000 m
6.1 Pollution Class III IEC 60815, table 1
6.2 Gas Media: SF6, pure>99% , other medias such as N2/SF6 are allowable
6.3 Corrosion class (according to DIN EN ISO 12944-6)
a) Indoor: C4, high
b) Outdoor: C5-M/I high
6.4 Protection degree (DIN EN 60529): IP65; IP67 on request

7 Leakage rate
7.1 Leakage rate: < 1x10^ -9 mbar x l/s.
7.2 Leakage test with helium gas

8 Weight : ≈ 250 gr

Piano di Campionamento (UNI ISO 2859)		Fig.					
LIVELLO	LQA	Filing Room Archivio	Materiali/Materiale		N° Series / Serie	Finishing / Finitura	
L2	1	Thread quality tolerance Tolleranza filetti qualità "6g-6G" UNI 5541-65	General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:				
			Coord.Punching N.C. mach. Coord. punzon. a C.N. JS11	Quality for linear dimension Qualità per quote lineari	Extra fine / Fine	JS12	
					Medium / Media	JS13	
					Coarse / Grossolano	JS15	

Rev./Mod.		Prep. Dis. G. Forlani	Title Titolo	Gas density transmitter SGM/ABS/XX	Apparatus Apparecchio	Scale Scala
0	12/05/2014 : Emissione nuovo disegno	App. App. P. Guizzetti	Resp. Dep. Uff. Resp. Uff. Tecnico		Doc. No. N° Doc. 43911147	Lang. Lingua
						Sh. No. N° Pag. 3

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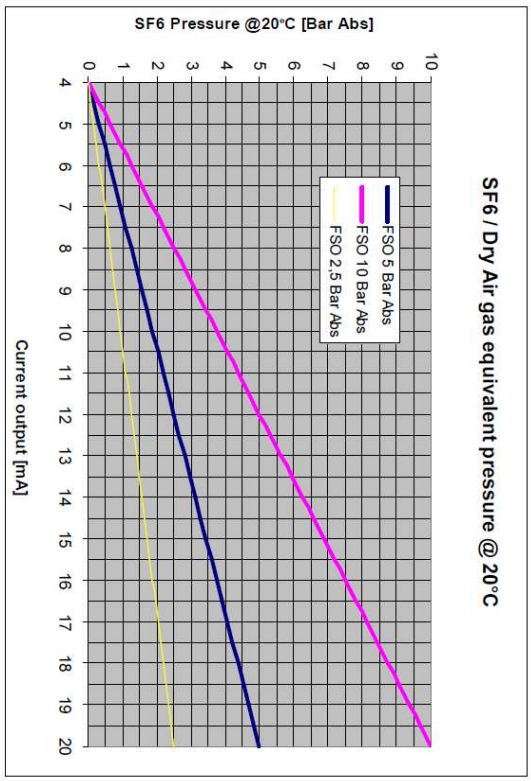
SF_6 /Dry-Air Gas density transmitter

Rev./Mod	Data	Descrizione:
A	14/07/2017	ADDED 3/8" G
B	18.03.2019	ADDED FLOATING CONNECTION



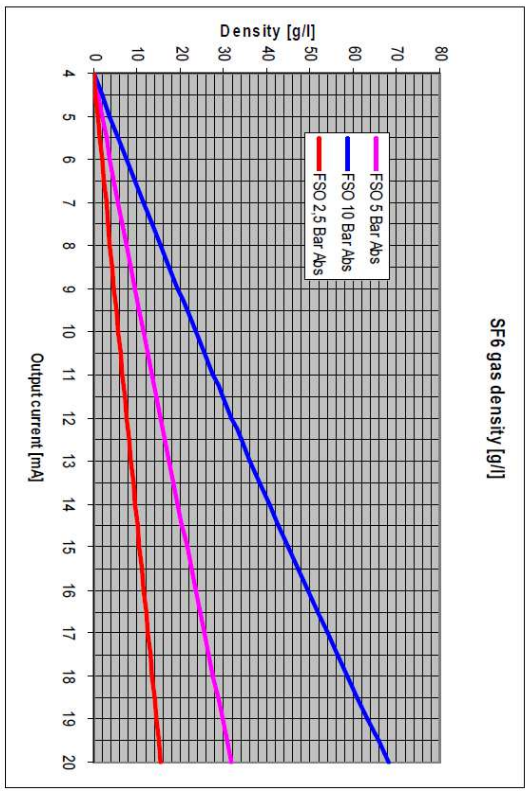


DIAGRAM 1: ANALOG SENSOR

LIVELLO	L2	Piano di Campionamento (UNI ISO 2859)	
LQA	1		

Fig.
Filing Room
Archivio

Material/Materiale
General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:
Thread quality tolerance "6g-6S" UNI 5541-65
Tolleranza filetti qualità "6g-6S" UNI 5541-65
Coord.Punching N.C. mach. Coord. punzon. a C.N. JS11
N° Series / Serie
Finishing / Finitura
Quality for linear dimension Qualità per quote lineari
Extra fine / Fine JS12
Medium / Medio JS13
Coarse / Grossolano JS15

Prep. Dis.	G. Forlani		
App. App.	P. Guizzetti		
Resp. Dep. Uff. Resp.	Uff. Tecnico		

Rev./Mod.		
0	07.11.2013	: Emissione nuovo disegno

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Title / Titolo: **Gas density transmitter SGM/ABS/XX**

Apparatus / Apparecchio: **43911147**

Doc. No. / N° Doc.

Scale / Scala: 1:1
Sh. No. / N° Pag.: 4

Long. / Lingua

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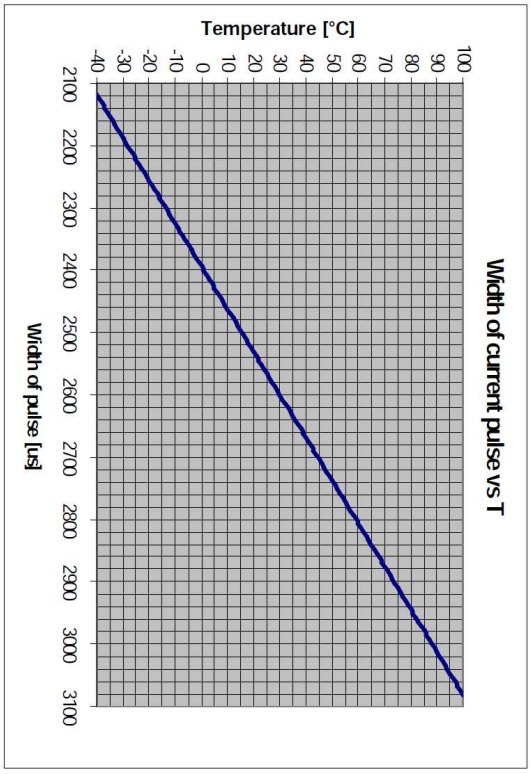
SF_6 /Dry-Air Gas density transmitter

Rev./Mod	Data	Descrizione:
A	14/07/2017	ADDED 3/8" G
B	18.03.2019	ADDED FLOATING CONNECTION



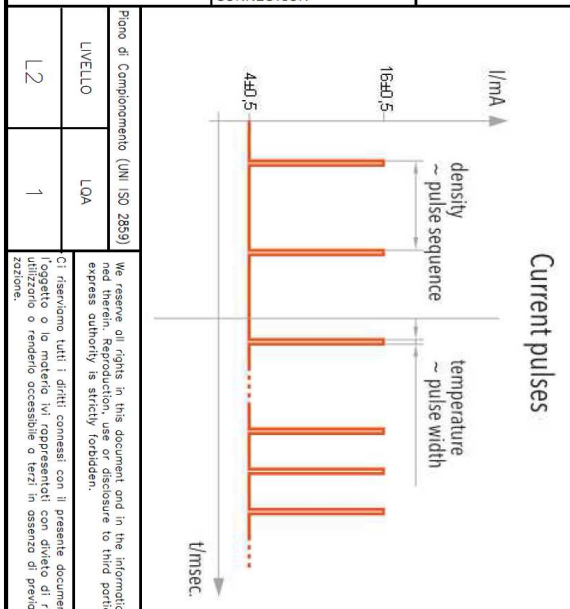
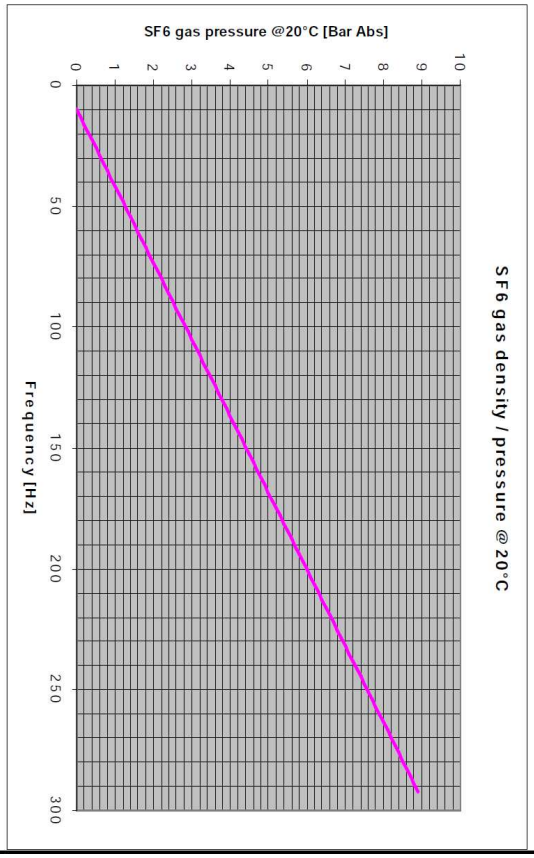


DIAGRAM 2: DIGITAL SENSOR



Piano di Campionamento (UNI ISO 2859)
LIVELLO: L2
LQA: 1

Fig.
Filing Room
Archivio
Thread quality tolerance
Tolleranza filetti qualita'
"6g-6G" UNI 5541-65
Material/Materiale
General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:
Coord.Punching N.C. mach.
Coord. punzon. o C.N.
JS11
Quality for linear dimension
Qualita' per quote lineari
Extra fine / Fine
Medium / Media
Coarse / Grossolana
IS12
JS13
JS15
N° Series / Serie
Finishing / Finitura

Rev./Mod.		
0	07.11.2013	: Emissione nuovo disegno

Prep. Dis. G. Forlani
App. App. P. Guizzetti
Resp. Dep. Uff. Resp. Uff. Tecnico

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Title / Titolo: **Gas density transmitter SGM/ABS/XX**
Apparatus / Apparecchio: **43911147**
Doc. No. / N° Doc.
Long. / Lungo
Scale / Scale 1:1
Sh. No. / N° Sh. 1 Pg. 4

SF_6/Dry-Air Gas density transmitter

DIAGRAM 3: TABLE OF TELEGRAM

Address	Information	Type	Function
Add_0	ID_slave	Unsigned Int	Read/Write
Add_1	Pressure.Read [mbar ABS]	Unsigned Int	Read only
Add_2	Temperature.Read [°K/10]	Signed Int	Read only
Add_3	Compensated Pressure.Read [mbar ABS @20°C]	Unsigned Int	Read only
Add_4*	Density SF6.Read [g/l]	Unsigned Int	Read only
Add_5*	Leakage rate [mbar/week]	Unsigned Int	Read only
Add_6*	Confidence level [%]	Unsigned Int	Read only
Add_7	Firmware release	Unsigned Int	Read only

*=available on request

Protocol settings

ADDRESS	127 default
Protocol	Modbus RTU
Speed	19200 Baud
Data	8 bit
Parity	Even parity
Stop	1 bit stop
Scan rate	50ms
Response time out	100ms
Delay	100ms

Example

Registry	bit reading	value	Unit	Description
0	127	127		slave add
1	987	987	[mbar abs]	pressure
2	2945	294,5	[°K]	temperature
3	981	981	[mbar abs]	comp. Pressure
4	5970	5,97	[g/l]	SF6 density
5	0	0	mbar/week]	leakage rate
6	100	100	[%]	confidence
7	304	304		FW revision

Rev./Mod A Data 14/07/2017 Descrizione: ADDED 3/8" G
Rev./Mod B Data 18.03.2019 Descrizione: ADDED FLOATING CONNECTION
Rev./Mod Descrizione: Data
Rev./Mod Descrizione: Data
Rev./Mod Descrizione: Data
Rev./Mod Descrizione: Data

Piano di Campionamento (UNI ISO 2859)

LIVELLO	LQA
L2	1

Fig. | Material/Materiale | N° Series / Serie | Finishing / Finitura

Filing Room Archivio

Thread quality tolerance Tolleranza filetti qualita' "6g-6S" UNI 5541-65

General tolerance for machining / Tolleranze generali per lavorazioni meccaniche:
Coord.Punching N.C. mach. Coord. punzon. a C.N. JS11

Quality for linear dimension Qualita' per quote lineari
Extra fine / Fine JS12
Median / Media JS13
Coarse / Grossolana JS15

Prep. Dis. G. Forlani
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Title Titolo **Gas density transmitter SGM/ABS/XX**

Lang. Lingua

Rev./Mod. 0 07.11.2013 : Emissione nuovo disegno

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Apparatus Apparecchio **43911147**

Doc. No. N° Doc.

Scale Scala 1:1

Sh.No. N° Pag. 6

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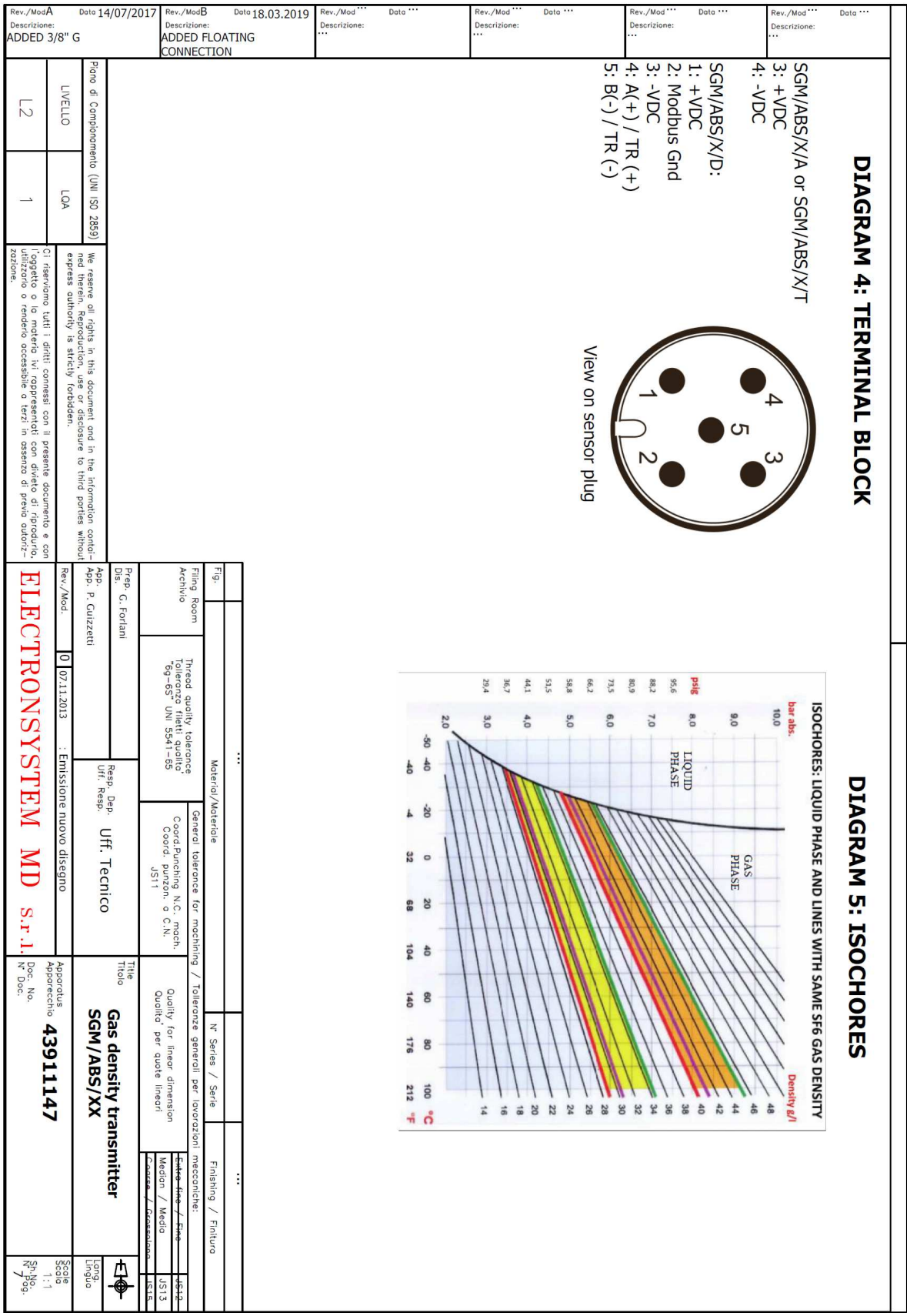
SF_6 /Dry-Air Gas density transmitter



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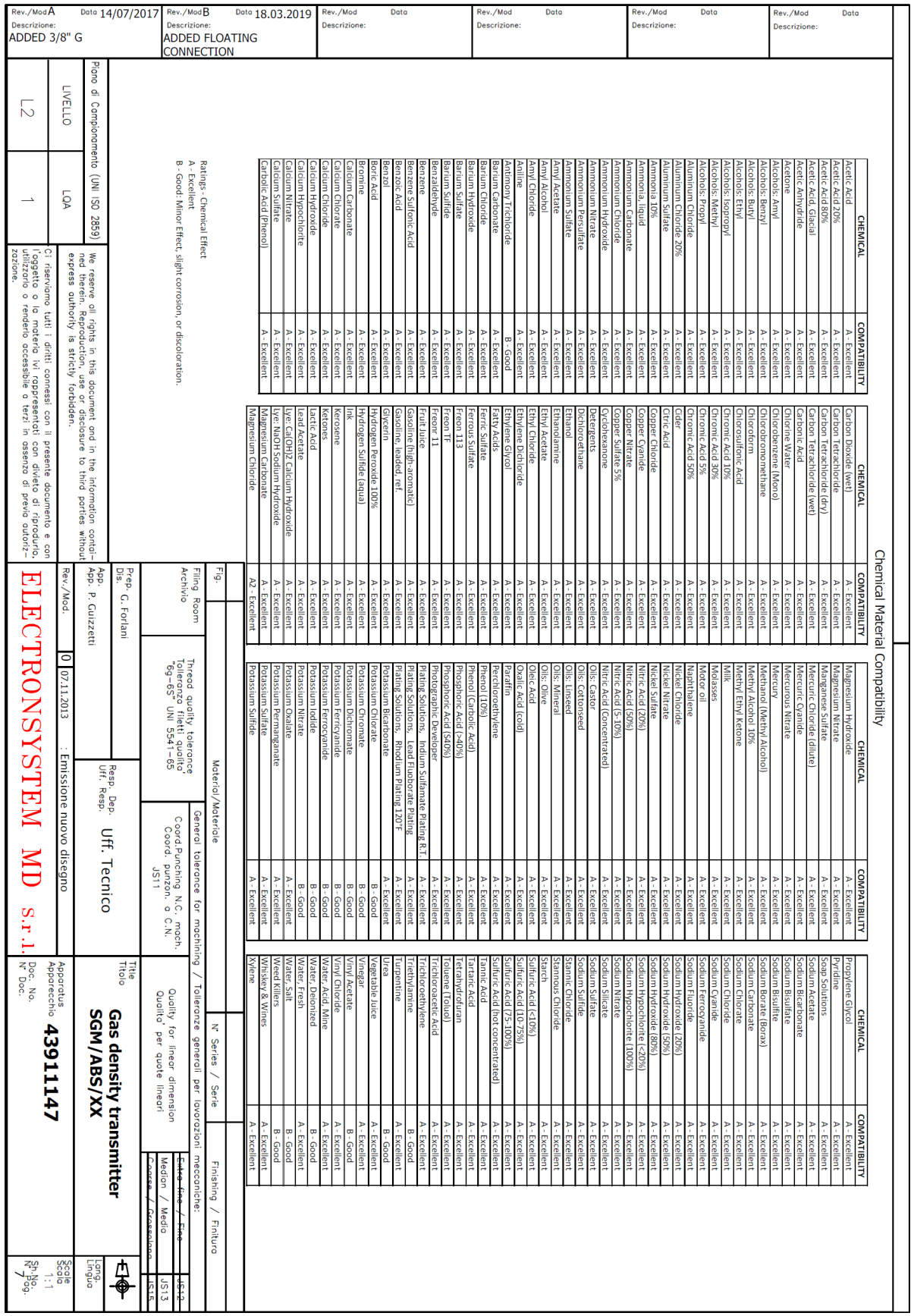
SF_6 /Dry-Air Gas density transmitter



STORAGE

If the complex must be storage before use, please keep dry and repaired.
Do not leave outdoor.
Device is strongly sensitive to humidity hence avoid to store where relative humidity is more than 90%

STORAGE TEMPERATURE: -30°C ÷ +70°C
RELATIVE HUMIDITY: max 90% @ +40°C

MAINTENANCE

Maintenance of transmitter must be done compulsory in factory. We recommend every 5 years to send back transmitter for calibration check and inspection.

WARRANTY

Device is covered by 24 months after installation or max 36 months after delivery.
In case of service the transmitter must be sent back to factory for inspection.

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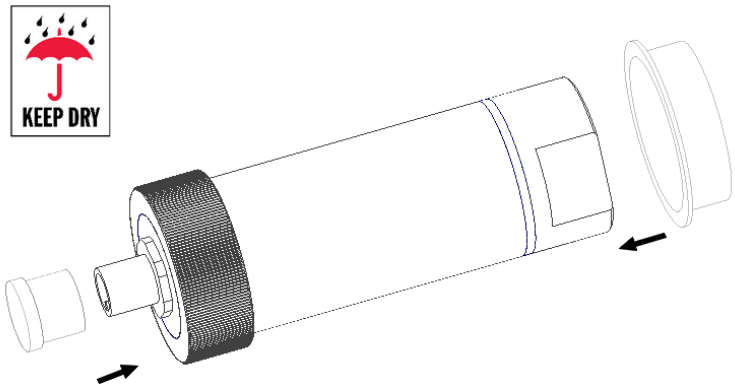
WARNINGS

CAUTION

Do not drop or hit the transmitter. The sensor is fragile and may break from sudden shock.
When transporting the transmitter, use the original shipping box from Electronsystem MD.

NOTE

Keep the transmitter dry and clean.
Do not remove the transparent transport protection caps before you are ready to install the transmitter.

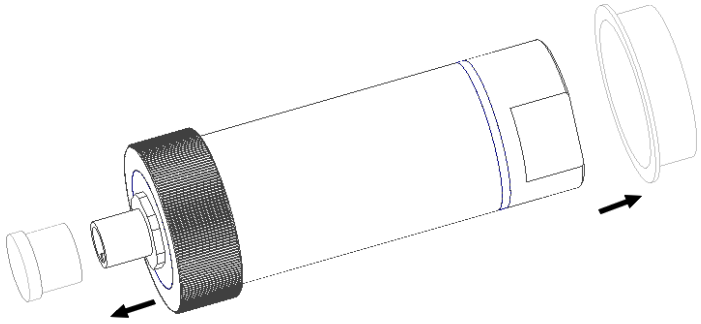


NOTE

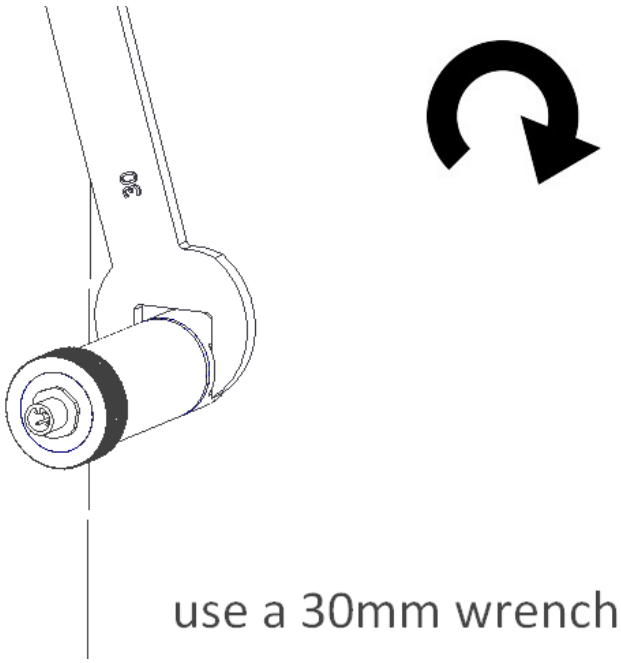
Connect the transmitter directly to the main SF_6 gas volume, not behind a sampling line because this is the area where high humidity tends to accumulate and where the temperature of gas is not the imagine of gas near breaker.
The use of original cable wiring is advised to have the better protection performances.

INSTALLATION

1. Remove the transparent transport caps when you are ready to install the transmitter. Check o-ring is clean without dust and properly assembled.



2. Install the transmitter to the mechanical coupling and tighten gently by hand. Then use a 30mm wrench to tighten the connection. Use a sufficient force to achieve a tight installation (recommended 10-15Nm) . The system must be leak-free for accurate measurement.



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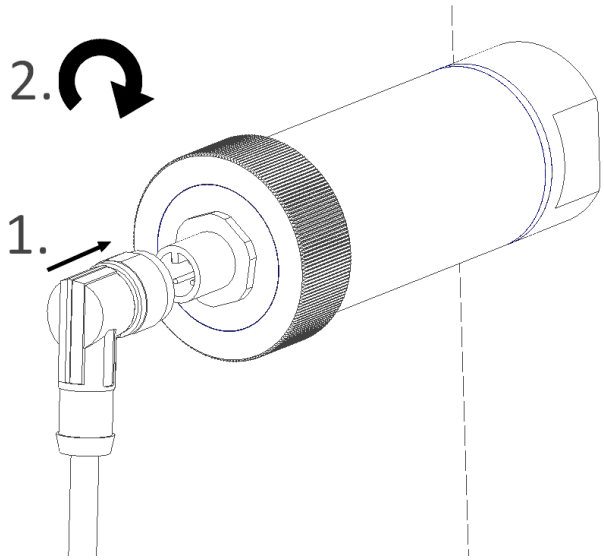
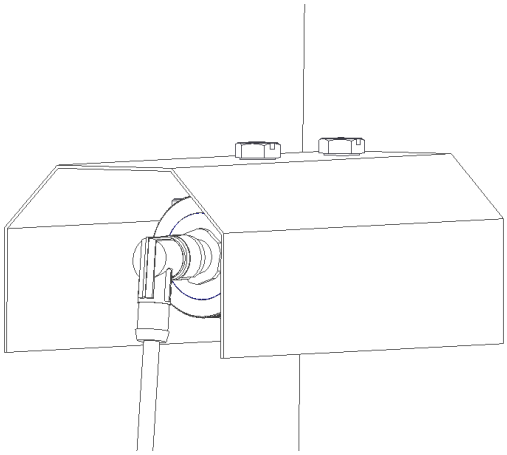
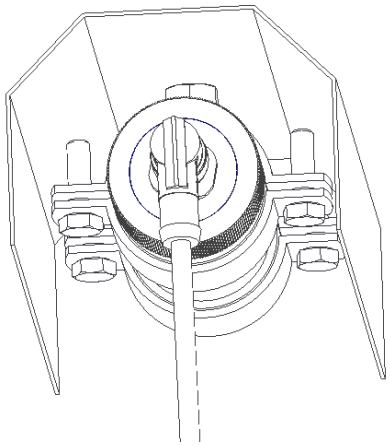
3. Connect proper circular wiring into the output port checking the correct polarization of the connector then turn firmly the rotating crown of the cable.
   Use a cable with a suitable outdoor IP67 connector for your installation (straight or angled)



4. In case the weather shield is needed (optional), can be added to the transmitter by fitting the two rubber clamps on the body of transmitter and tightening to assure it can remain in place.
   Assure that the stainless roof completely cover the transmitter and the cable connection.





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However we assume no responsibility for its use.

The quality of ElectronsystemMD products is guaranteed by a Quality, Safety and Environmental management system certified by DNV according to ISO 9001, ISO 18001 and ISO 14001. Electronsystem MD works in partnership with its customers in designing customized executions in order to meet specific requirements, please contact us.

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