

.07 HUMIDITY ABSORBER



High & Medium Voltage switchgear is very reliable and low maintenance provided, it is able to operate within specified parameters. The use of SF_6 as quenching gas is extremely important to guarantee safe operation during the life of equipment. If moisture inside the gas exceeds critical limits, problems can occur. When SF_6 and moisture are exposed to high amounts of heat, such as equipment operating under load or fault current, decomposition by-products can form and cause damage to the switchgear. By-products also pose health risks to personnel, should exposure occur. Once internal desiccants have saturated, moisture levels will rise. If there is no need to enter the switchgear otherwise, external desiccants can be used to reduce high moisture levels and maintain levels below the manufacturer's specified limits. Best of all, when the desiccants inside the chambers have stopped working, simply replace them.

Be sure to follow proper handling and safety procedures in accordance with your company's guidelines and/or government regulations.

FEATURES & BENEFITS

- Attaches to filling port for easy installation & removal.
- Large assortment of gas connections available.
- Absorbs water up to 20% of its weight.
- TEE fittings available for valve fittings.

.08 SGM (STATIC GAS MONITOR) DEVICES

High & Medium Voltage switchgear is very reliable and low maintenance provided they are able to operate within their specified parameters. To improve system reliability, plan maintenance schedules, and reduce workloads, real-time monitoring and control systems (Smart Grid Technology) are becoming commonplace. These devices require the use of electronic sensors and transmitters to provide critical information needed to safely operate the equipment.

ELECTRONSYSTEM MD offers electronic sensors to measure pressure, temperature, density, and moisture levels of insulating gases. Ex: SF_6 , SF_6 mixtures, & N_2 . To ensure long-term durability and reliability, stainless steel and thick ceramics are used. This makes wetted components very resistant to chemicals, including arc byproducts. Sensors are easily integrated into systems by using an analogue 4-20mA or digital connection-RS485 Modbus RTU. G (gauge) type threads are standard, but many options for gas connections are available. Customized solutions are also available on request.



08.1 ELECTRONIC SF_6 DEW POINT TRANSDUCER

FEATURES & BENEFITS

- Continuously monitors moisture allowing user to ensure manufacturer's specified limits are not exceeded.
- Moisture calculation is based on measurement of physical data: relative humidity HR% and temperature.
- Shockproof 30G (xyz).
- Pressure range -1 to 10 bar rel.
- Wide range measurement of dew-point (-60°C - $+20^\circ\text{C}$).
- High accuracy dew-point measurement.
- Patented, chemically resistant, polymer sensor.
- Excellent long-term stability.
- Quick response time.
- Factory calibration by laser trimming.
- Low drift temperature compensated.
- 14-bit ASIC core.
- Digital and analogue outputs available.

- Wide compensated temperature range
- Compatibility with corrosive fluids
- Great for use as safety device in automated systems, mechanical monitoring, and process control
- Combines electronic precision with mechanical resistance for safe operation in almost any conditions.

.13.3 ELECTRONIC SF6 DEW POINT TRANSDUCER

FEATURES & BENEFITS:

- Continuously monitors moisture allowing user to ensure manufacturer's specified limits are not exceeded
- Moisture calculation is based on measurement of physical data: relative humidity HR% and temperature
- Shockproof 30G (xyz)
- Pressure range -1 to 10 bar rel.
- Wide range measurement of dew-point (-60°C - +20°C)
- High accuracy dew-point measurement:
- Patented, chemically resistant, polymer sensor
- Excellent long-term stability
- Quick response time
- Factory calibration by laser trimming
- Low drift temperature compensated
- 14-bit ASIC core
- Digital and analogue outputs available



SF₆ Dew point temperature transmitter



APPLICATIONS

- Moisture monitoring of air or gas (SF₆)
- Suitable for indoor or outdoor
- Industrial, medical or aerospace fields

HIGHLIGHTS

- Wide range measurement of dewpoint
- High accuracy +/- 3°C (+/- 5.4°F)
- Patented polymer die chemically resistant
- Excellent long term stability
- Quick response time
- Factory calibration by laser trimming
- Low drift temperature compensated
- 14 bit ASIC core
- Multiple transmission data output

High 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 as quenching gas is extremely important to guarantee a safe operation during the life of equipment.

But if moisture inside the gas exceed critical limits the properties of insulation of SF₆ are no more valid and severe damages can happen to switchgear.

Moisture limits are defined by IEC60480 standard which defines the guidelines for checking and treatment of sulfur hexafluoride (SF₆) taken from electrical equipment and specification for its re-use.

The inlet of moisture inside tank can bring, during power switching and arc quenching, to chemical decomposition of SF₆ into fluorides.

Fluorides indeed do not reduce good insulating properties of SF₆ unless the content of humidity is beyond critical limit: at this stage the byproducts also include the high corrosive HF hydrogen fluoride acid.

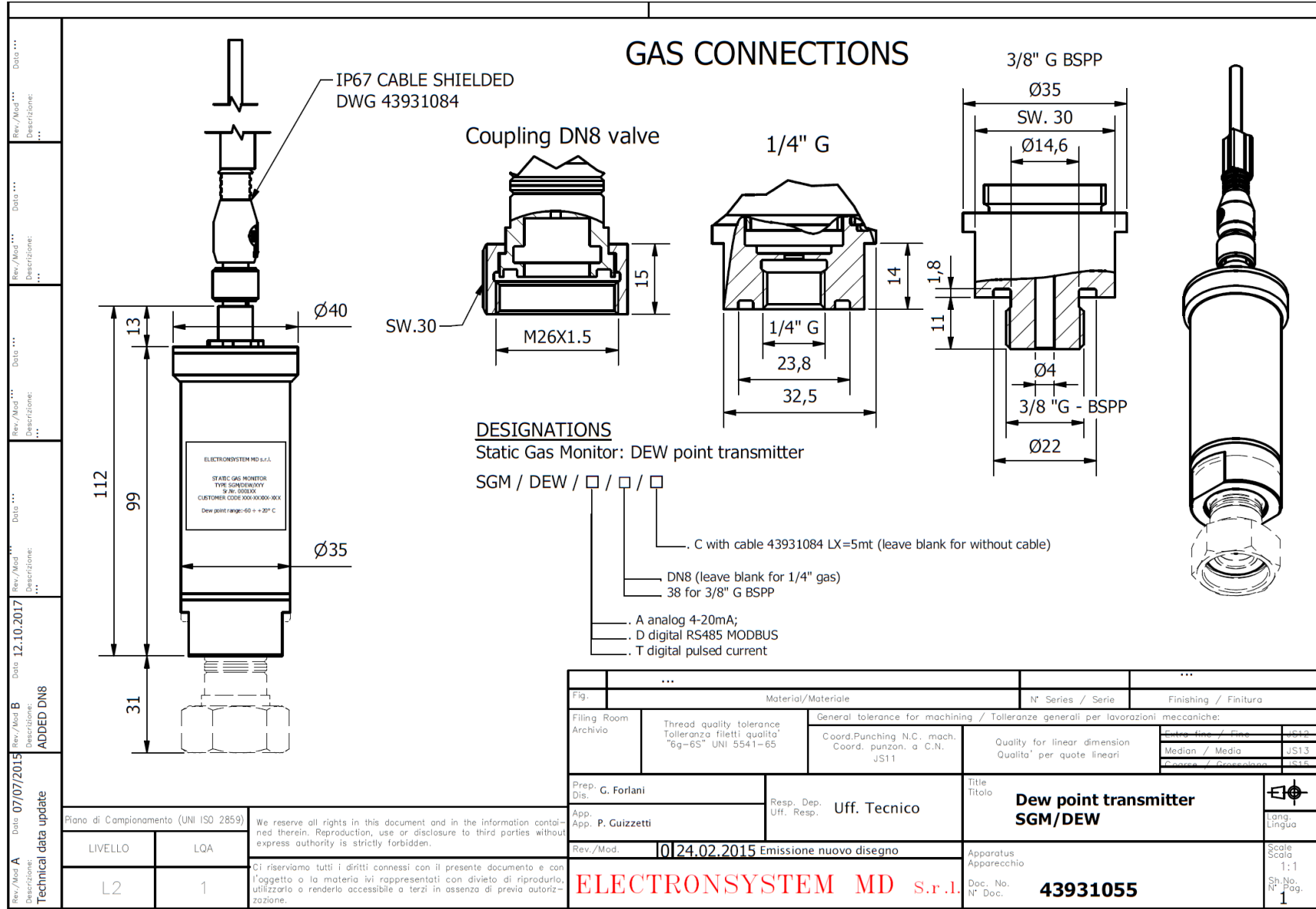
In addition to above the content of moisture must be kept under control to guarantee that in very cold climates the water vapor can't condensate creating tracking lines or leakage currents.

Moisture calculation is based on measurement of two physical data: relative humidity HR% and temperature.

Our sensor has an integrated sensing element able to read contemporary both HR and T which are converted by the ASIC into equivalent dew point temperature.

All specs are subject to change without notice

SF₆ Dew point temperature transmitter

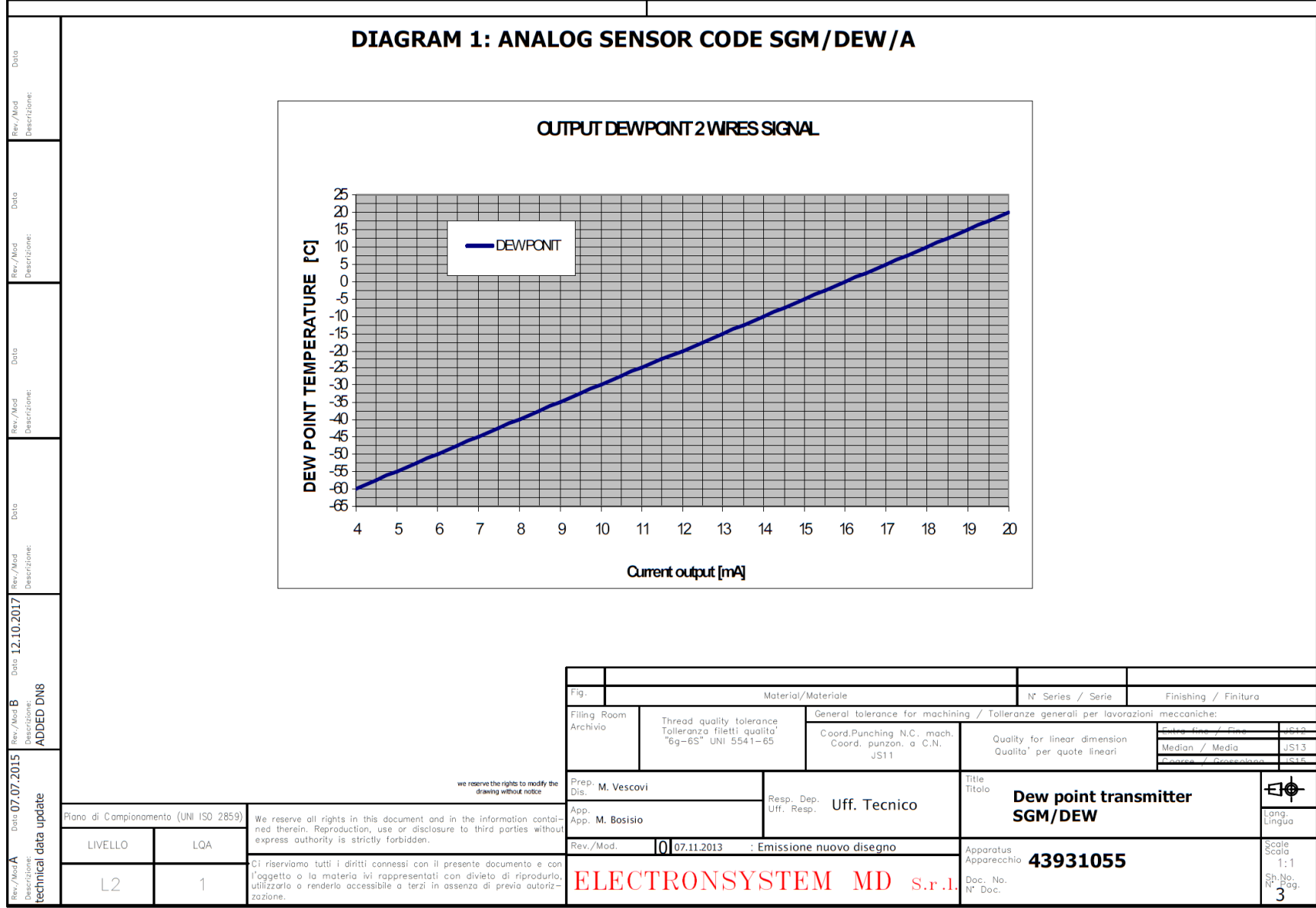


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SF₆ Dew point temperature transmitter

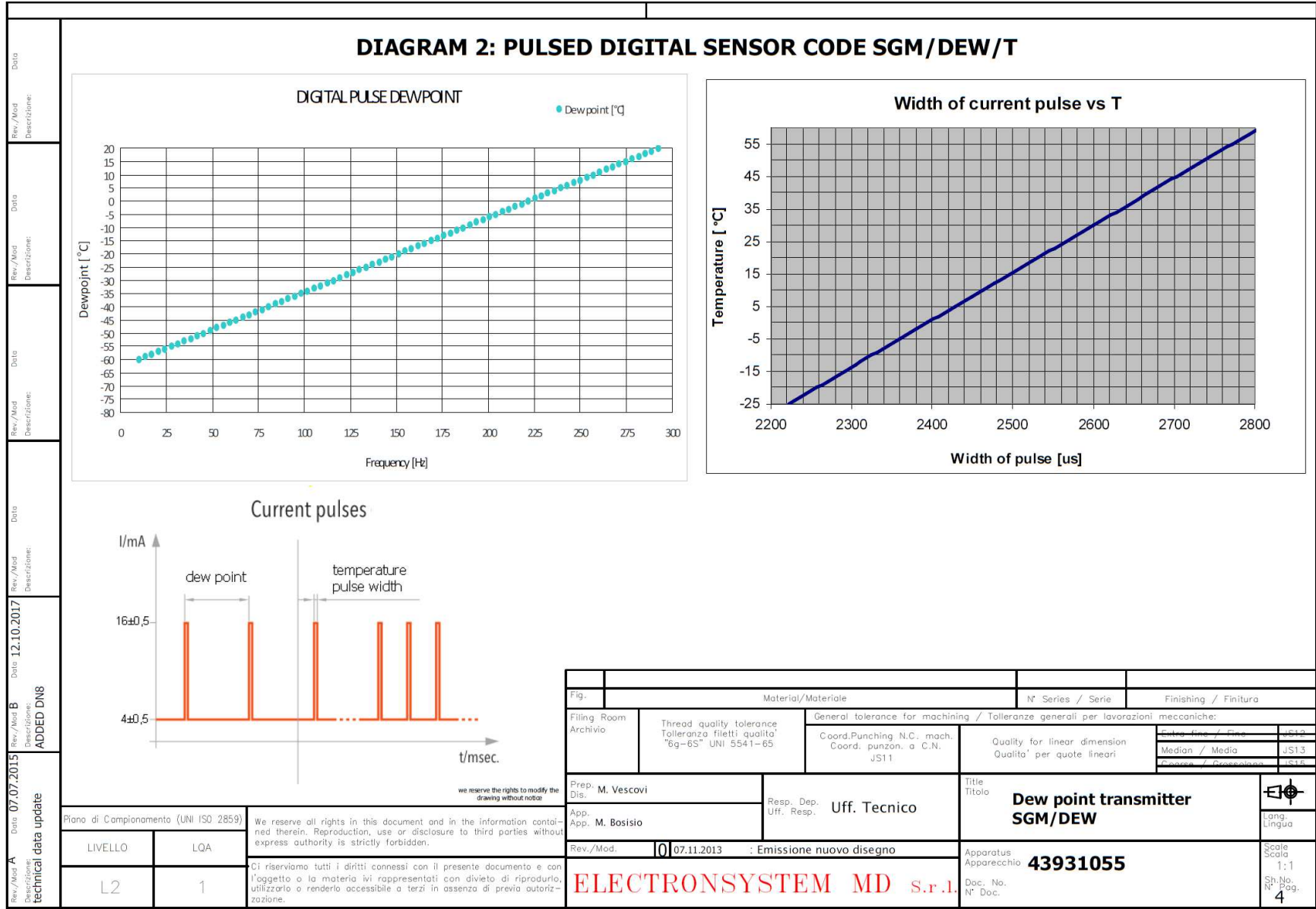
Rev./Mod. Description:	Date	Rev./Mod. Description:	Date	Rev./Mod. Description:	Date	Rev./Mod. Description:	Date	Rev./Mod. Description:	Date	Rev./Mod. Description:	Date
TECHNICAL FEATURES: DESCRIPTION: DEW POINT TRANSMITTER											
1 Materials: 1.1 Housing material : AISI 316 1.2 Inner o.rings material : EPDM70 peroxide cured 1.3 Primary sensing element: Patented polimer chemically resistant 1.4 Cable connection material: aluminium alloy nickel-plated 1.5 Conformity to 2002/95/CE (RoHS), Halogen free											
2 Electrical data of sensors (choose one of the following versions 2.1,2.2 or 2.3)											
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< 250 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											
2.4 Common electrical data: 2.4.4 Input protection : overvoltage supressor and reverse voltage diode 2.4.5 Response time : 1 min. from dry to wet point 2.4.6 Calibration: laser trimmed, low drift digital ASIC core 2.4.7 Long term Stability: +/- 0,15°C dew point / year 2.4.8 Accuracy : ± 3°C -30°<Tdew<+20°, ± 4°C -30°<Tdew<-60°, 2.4.9 Repeativity : ± 0,5°C dew point 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)											
3 Output range: 3.1 Dew point: -60 ÷ +20°C 3.2 Temperature: -25 ÷ +60°C *											
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 2kV withstand of the communication & power supply interfaces with 10m cord 4.4 EN61000-4-5: Surge 0,5kV 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											
Piano di Campionamento (UNI ISO 2859)											
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LIVELLO LQA											
L2 1											
5 Working conditions: 5.1 Mechanical stresses: Shockproof 30G on 3 axys 5.2 Max allowable pressure: 10 bar ABS											
6 Environmental conditions: Operating temperature: Standard : -30°C to +70°C Transport and storage : -30°C to 70°C Relative humidity 0÷100% HR Solar radiation: <= 1000 W/mq Wind: <= 34 m/s Altitude: <= 2000 m 6.1 Pollution Class III IEC 60815, table 1 6.2 Corrosion class (according to DIN EN ISO 12944-6) a) Indoor: C4, high b) Outdoor: C5-M/I high 6.3 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											
9 Primary element features 9.1 Technology: Patented new chemical resistant polymer wafer 9.2 Core chip: ASIC 14bit resolution factory calibrated 9.3 Measurements on chip: combined Relative humidity HR% and Temperature °C 9.4 Protection: integrated filter resistant to dust and chemicals 9.5 Long term stability: 0,15%HR in 5 years ; 2°C in 5 years 9.6 Reliability: MTTF: 9.312.507 hours											
* available only for SGM/DEW/T or SGM/DEW/D											
we reserve the rights to modify the drawing without notice											
Fig. Material/Materiale N° Series / Serie Finishing / Finitura											
Filing Room Archivia Thread quality tolerance Tolleranza filetti qualità "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 Qualità per quote lineari											
Prep. Dis. G. Forlani Resp. Dep. Uff. Tecnico Title Titolo Dew point transmitter SGM/DEW											
App. App. P. Guizzetti											
Rev./Mod. 10/24.02.2015 Emissione nuovo disegno Apparatus Apparecchio 43931055											
Scale Scala 1:1											
N° No. 2											

All specs are subject to change without notice



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SF₆ Dew point temperature transmitter



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SF₆ Dew point temperature transmitter

Rev./Mod. A	Data 07.07.2015	Descrizione: technical data update	Rev./Mod. B	Data 12.10.2017	Descrizione: ADDED DIN8	Rev./Mod. ...	Data ...	Descrizione: ...	Rev./Mod. ...	Data ...	Descrizione: ...
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DIAGRAM 3: MODBUS RTU RS485 CODE SGM/DEW/D

Address	Information	Type	Function
Add_0	ID_slave	Unsigned Int	Read/Write
Add_1	HR.Read [%]	Unsigned Int	Read only
Add_2	Temperature.Read [°C/10]	Signed Int	Read only
Add_3	Tdew.Read [0°C]	Unsigned Int	Read only

Default settings

- Address: 127
- Protocol: Modbus RTU
- Speed: 19200 Baud
- Data: 8 bit
- Parity: Even parity
- Stop: 1 bit stop

Data transmitted are:

- HR: relative humidity
- Temperature: Temperature of gas
- Tdew: Dew point temperature

DIAGRAM 4: TERMINAL BLOCK

SGM/DEW/X/A or SGM/DEW/X/T

3: +VDC
4: -VDC

SGM/DEW/X/D:

1: +VDC
2: Modbus Gnd
3: -VDC
4: D+/B
5: D-/A

Fig. ...		Material/Materiale		N° Series / Serie		Finishing / Finitura	
Filing Room Archivio	Thread quality tolerance Tolleranza filetti qualità "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 Qualità per quote lineari	
Prep. Dis. M. Vescovi	Resp. Dep. Uff. Tecnico	Title Titolo Dew point transmitter SGM/DEW		Long. Lingua		Scale Scala 1:1	
App. M. Bosio	Rev./Mod. 07.11.2013	Emissione nuovo disegno		Apparatus Apparecchio 43931055		Sh. No. N° Doc. 5	

ELECTRONSYSTEM MD S.r.l.

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SF₆ Dew point temperature 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.

SF₆ Dew point temperature transmitter

WARNINGS

CAUTION

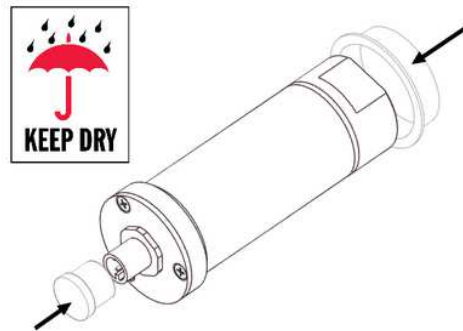
Do not drop or hit the transmitter. The sensor is fragile and may break from sudden shock. When transporting the transmitter, use the original shipping box from Electronsistem.

NOTE

Keep the transmitter dry and clean.

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

Uncapped transmitter will absorb environment moisture which will affect the dewpoint measurement and will potentially need weeks to be ready to give reliable signal.



NOTE

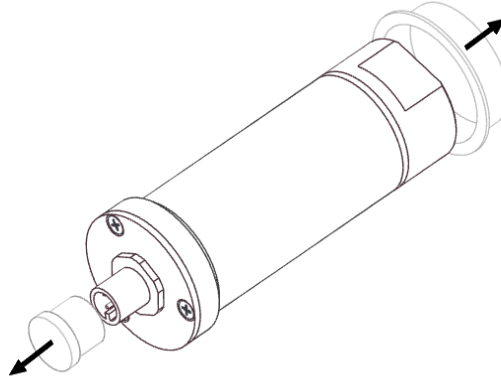
Connect the transmitter directly to the main SF₆ gas volume, not behind a sampling line because this is the area where high humidity tends to accumulate.

In any case after first installation the transmitter will have a small amount of moisture inside the connection. In still dry gas it takes a long time until a vapour pressure inside the measurement cell reaches equilibrium with the main gas tank. It is usual for the stabilization of the dewpoint reading to take several days after installation.

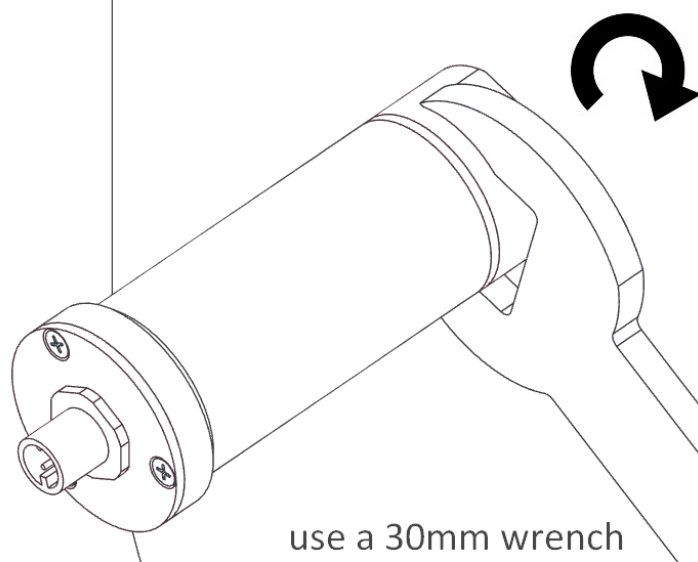
SF₆ Dew point temperature transmitter

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.

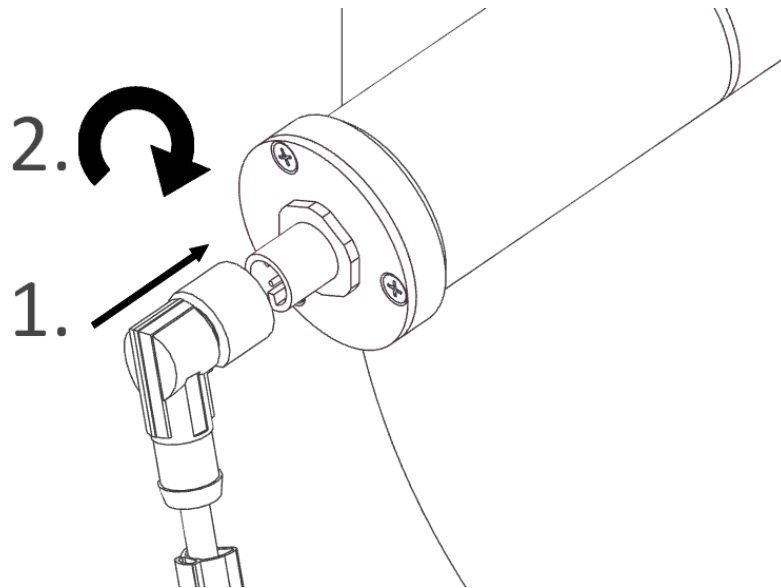


3. Connect proper circular wiring into the output port checking the correct polarization of the connector then turn firmly the rotating crown of the cable.

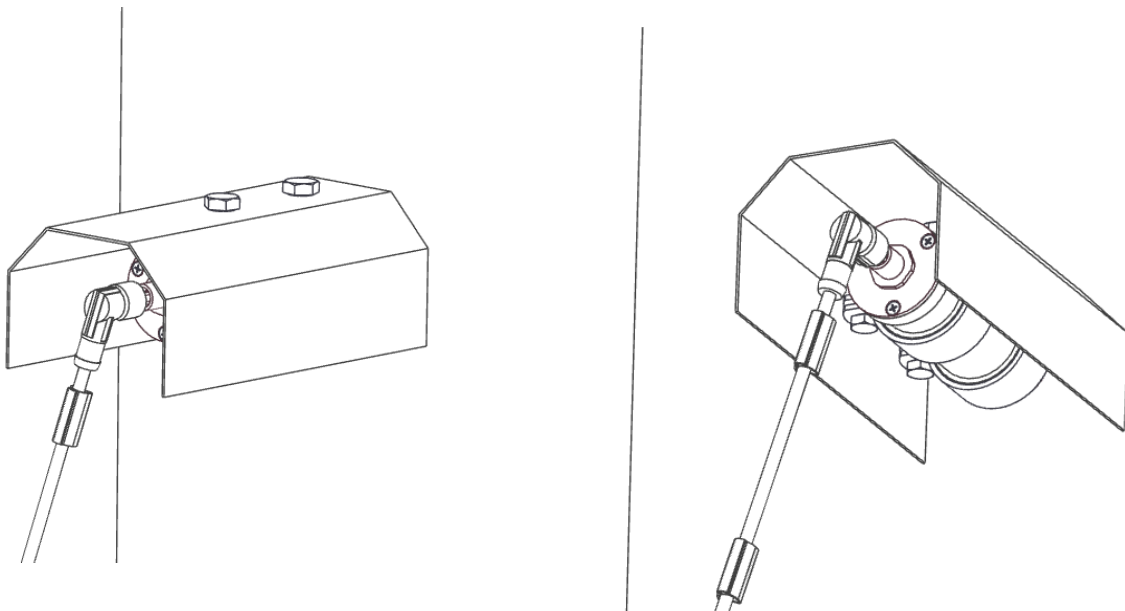
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SF₆ Dew point temperature transmitter

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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SF₆ Dew point temperature transmitter

APPLICATION NOTES and FAQ:

Q: What is the physical parameter transmitted by SGM/DEW/x ?

A: The sensor read relative humidity and temperature and converts into dewpoint temperature

Q: What is dewpoint temperature, Tdew ?

A: The temperature (in degrees °C or °F) at which moisture (water vapour) in the gas begins to condense as liquid (droplets or dew) or solid (ice)

Q: What is ppmV ?

A: Moisture volume concentration (parts per million by volume). One million times the ration of the volume of moisture (water vapour) present in the gas to the total volume of the gas (including water vapour).

Q: What is ppmW ?

A: Moisture mass concentration (parts per million by mass).

For SF₆ gas, conversion to ppmW=ppmV / 8.1

Q: Is Tdew pressure dependant ?

A: Yes it is strongly dependant. It has no sense to deal with Tdew without indicating also the reference pressure of tank

Q: Is ppmV or ppmW pressure dependant ?

A: No they do not depend on pressure of tank

Q: What if measurement in ppmV is desired and only dewpoint is known or measured ?

A: To convert Tdew to ppmV (or ppmW) pressure of tank need to be known. There are some formulas able to calculate ppmV starting from Tdew and pressure.

For general purpose indication please check tables below.

SF₆ Dew point temperature transmitter

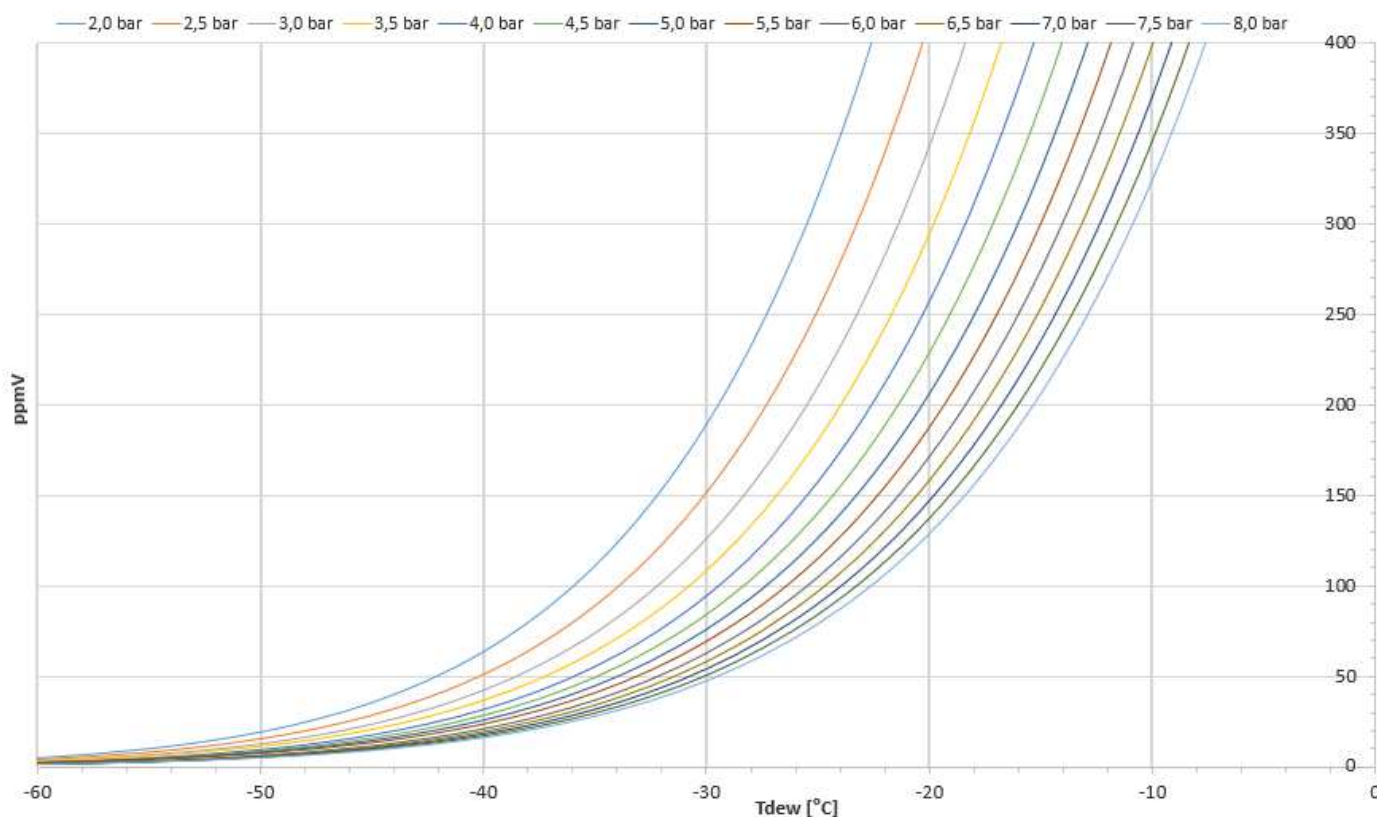
Simplified table for quick conversion to ppmV

ppmV		Ptank [bar abs]													
		2,0	2,5	3,0	3,5	4,0	4,5	5,0	5,5	6,0	6,5	7,0	7,5	8,0	
Dewpoint temperature [°C]	-60	5,4	4,3	3,6	3,1	2,7	2,4	2,2	2,0	1,8	1,7	1,5	1,4	1,4	
	-57,5	7,6	6,0	5,0	4,3	3,8	3,4	3,0	2,7	2,5	2,3	2,2	2,0	1,9	
	-55	10,5	8,4	7,0	6,0	5,2	4,7	4,2	3,8	3,5	3,2	3,0	2,8	2,6	
	-52,5	14,4	11,5	9,6	8,2	7,2	6,4	5,8	5,2	4,8	4,4	4,1	3,8	3,6	
	-50	19,7	15,8	13,1	11,3	9,8	8,8	7,9	7,2	6,6	6,1	5,6	5,3	4,9	
	-47,5	26,7	21,4	17,8	15,3	13,4	11,9	10,7	9,7	8,9	8,2	7,6	7,1	6,7	
	-45	36,0	28,8	24,0	20,6	18,0	16,0	14,4	13,1	12,0	11,1	10,3	9,6	9,0	
	-42,5	48,3	38,6	32,2	27,6	24,1	21,4	19,3	17,5	16,1	14,8	13,8	12,9	12,1	
	-40	64,2	51,4	42,8	36,7	32,1	28,5	25,7	23,4	21,4	19,8	18,4	17,1	16,1	
	-37,5	85,0	68,0	56,7	48,6	42,5	37,8	34,0	30,9	28,3	26,1	24,3	22,7	21,2	
	-35	111,8	89,4	74,5	63,9	55,9	49,7	44,7	40,6	37,3	34,4	31,9	29,8	27,9	
	-32,5	146,2	116,9	97,4	83,5	73,1	65,0	58,5	53,2	48,7	45,0	41,8	39,0	36,5	
	-30	190,1	152,1	126,7	108,6	95,1	84,5	76,0	69,1	63,4	58,5	54,3	50,7	47,5	
	-27,5	246,0	196,8	164,0	140,5	123,0	109,3	98,4	89,4	82,0	75,7	70,3	65,6	61,5	
	-25	316,5	253,2	211,0	180,9	158,2	140,7	126,6	115,1	105,5	97,4	90,4	84,4	79,1	
	-22,5	405,4	324,3	270,2	231,6	202,6	180,1	162,1	147,4	135,1	124,7	115,8	108,1	101,3	
	-20	516,6	413,2	344,3	295,1	258,2	229,5	206,6	187,8	172,1	158,9	147,5	137,7	129,1	
	-17,5	655,2	524,1	436,7	374,3	327,5	291,1	262,0	238,1	218,3	201,5	187,1	174,6	163,7	
	-15	827,2	661,7	551,3	472,5	413,4	367,5	330,7	300,6	275,6	254,4	236,2	220,5	206,7	
	-12,5	1039,8	831,7	693,0	593,9	519,6	461,9	415,7	377,9	346,4	319,7	296,9	277,1	259,8	
-10	1301,5	1040,9	867,3	743,3	650,3	578,0	520,2	472,9	433,4	400,1	371,5	346,7	325,0		
-7,5	1622,2	1297,3	1080,9	926,3	810,4	720,3	648,2	589,3	540,1	498,6	462,9	432,1	405,0		
-5	2013,7	1610,4	1341,6	1149,7	1005,9	894,0	804,5	731,3	670,3	618,8	574,5	536,2	502,7		
-2,5	2490,1	1991,1	1658,7	1421,4	1243,5	1105,2	994,6	904,1	828,7	764,9	710,2	662,8	621,4		
0	3067,6	2452,6	2043,0	1750,6	1531,5	1361,1	1224,8	1113,3	1020,5	941,9	874,5	816,2	765,1		
2,5	3765,2	3009,9	2507,0	2148,1	1879,1	1669,9	1502,7	1365,9	1251,9	1155,5	1072,9	1001,3	938,7		
5	4605,2	3680,8	3065,4	2626,4	2297,3	2041,5	1837,0	1669,7	1530,4	1412,5	1311,5	1223,9	1147,3		
7,5	5613,4	4485,7	3735,3	3200,0	2798,9	2487,1	2237,8	2034,0	1864,2	1720,5	1597,4	1490,8	1397,5		
10	6820,0	5448,5	4536,3	3885,8	3398,4	3019,7	2716,9	2469,3	2263,0	2088,6	1939,1	1809,6	1696,3		
12,5	8259,7	6596,9	5491,3	4703,2	4112,9	3654,2	3287,6	2987,8	2738,2	2527,0	2346,1	2189,3	2052,2		
15	9973,1	7962,6	6626,7	5674,7	4961,8	4408,1	3965,5	3603,7	3302,4	3047,6	2829,3	2640,2	2474,8		
17,5	12007,1	9582,6	7972,8	6826,1	5967,7	5301,1	4768,5	4333,1	3970,6	3664,0	3401,4	3173,9	2975,0		
20	14415,9	11499,6	9564,7	8187,1	7156,4	6356,2	5716,9	5194,5	4759,6	4391,8	4076,9	3804,0	3565,4		

Legenda:

0 < ppmV < 200
201 < ppmV < 500
501 < ppmV < 1000
ppmV > 1001

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SF₆ Dew point temperature transmitter**Water vapour content ppmV curve at different pressure of SF₆ inside tank**

Calculations have been simplified for an easier reading.

DISCLAIMER NOTE:

While we provide application assistance it is up to the customer to determine the suitability for its use.

Specification may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However we assume no responsibility for its use.

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

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