

DENSITY CONTROLLER

GMDX95 rev.11/06/2008

Dimensions



Security actuator for checking **leakage and pressure fast transient**, even shorter than 10 ms
Normally used as **density controller on SF6 Medium Voltage Switchboards**. Temperature compensated.

Characteristics of this sensor make it suitable as :

- Leakage and density monitor
- Over heating (slow rise) monitor
- Arc detector: protection from explosions phenomena due to arc fault inside.

The system allows to use two different switching levels to operate a double protection:

In case of overheating the lowest threshold sends an alarm signal; in case of explosion for internal arc or other phenomena, characterised from pressure wave with steep front, the highest threshold sends a block signal; operates directly to inhibit instantly the cause of fail.

A cut-off valve is supplied to use the sensor in containers under pressure. This valve makes it possible to install and remove the sensor without switches, without contacting and leaking the fluid being monitored. The same valve also allows the container being monitored to be filled or emptied, without the need of other devices and openings.

GMDX95

- Density controller for G.I.S.
- Alarm with decreasing density
- Self-checking of sensor itself and high pressure alarm for device being monitored
- Arc detector
- Gas in contact with stainless steel
- Protection IP 54
- Automatic cut-off valve (patented)

Mechanical and physical characteristics

Calibration range (low levels)..... 100 - 250 kPa
Maximum pressure transient amplitude6 bar*

Mechanical protection of active components.IP 54
Operating temperature range..... -25° + 85° C*
Maximum fluid loss (sensor mounted on gas containers)..... 1×10^{-9} mbar l/sec

Levels:

- L 1 - Leakage : 120 kPa.+0 .. -5 kPa
- L 2 - Self diagnosis: 150 kPa±5 kPa
- L 3 - Arc detector : 190 kPa± 5 kPa

Compatibility with corrosive fluids (particularly SF6 and its derivatives)

Manual resetting

*Versions with customised features can be provided

Microswitch characteristics

Minimum time to failure of microswitch10 MIO
Switching capability (IEC 947-5-1)6000 cycles

Micro-switches ratings :bistable contact

<u>Voltage</u>	<u>Inductive load</u>	<u>Resistive load</u>
30Vdc	14 A	16 A
250Vac	10 A	12 A
380Vac	5 A	8 A

Approvals: UL / CSA / UTE / VDE / ASE / SEMKO

Micro-switches ratings :SPT gold-clad contacts

<u>Voltage</u>	<u>Resistive load</u>
30Vdc	0.1 A
125Vac	0.1 A
250Vac	0.1 A

Applicable current range : from 1mA to 100mA

Approvals: UL / CSA / VDE / SEMKO

Electrical insulation characteristics

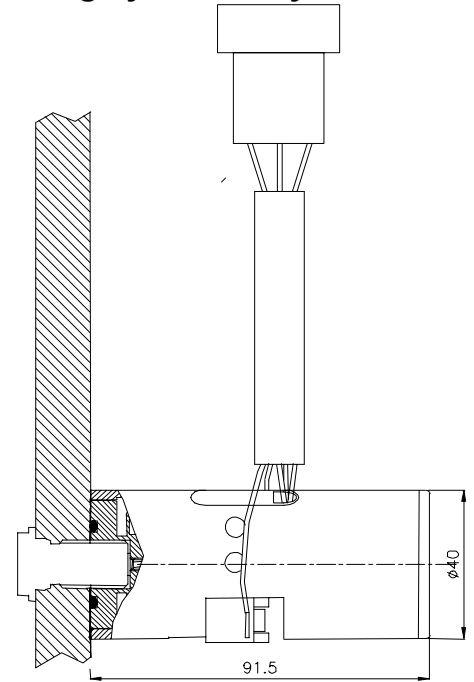
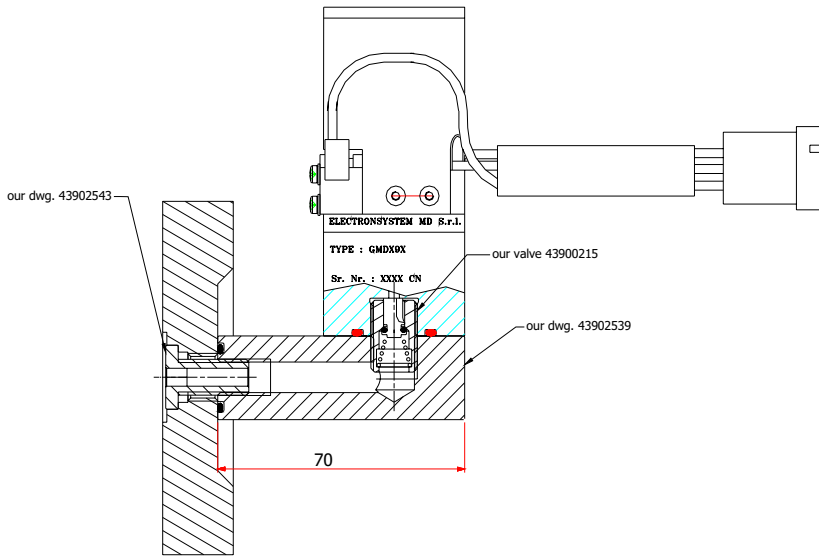
Isolation level to ground.....3 kV 50 Hz x 1'
Isolation level between contacts.1.5 kV 50 Hz x 1'

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Mounting by assembling kit and valves

Mounting by valve only



WORKING PRINCIPLE AND CONSTRUCTION DETAILS

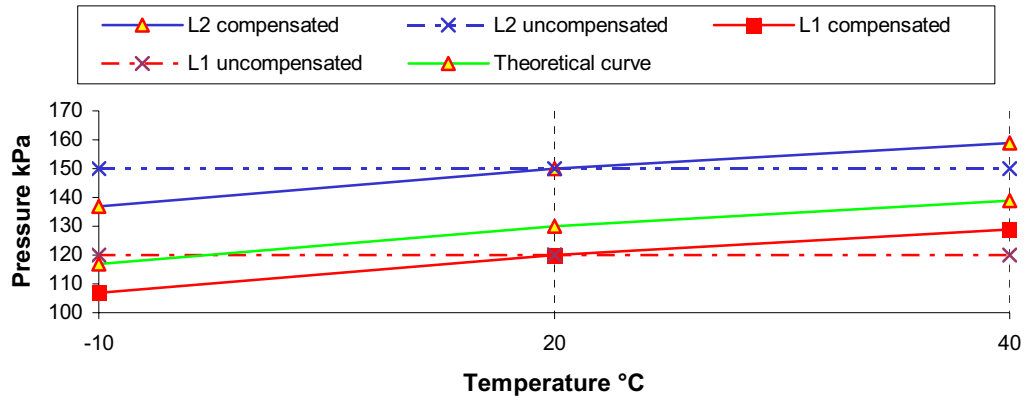
Main sensor	<ul style="list-style-type: none"> • Metal bellows similar to bellows used in bottles for vacuum insulated circuit breakers. • The multiple-bellows system permits wide movement without going beyond the elastic limit; this results in insensitivity to overpressure transients and thus repeatability of the pre-set density thresholds. • All parts of the containment system, in contact with the fluid being monitored, are made of stainless steel or bronze, in order to guarantee compatibility with highly reactive chemicals. 			
Operating of contacts	Functioning is based on the state -on/off- of electrical contacts; to the upper part of the main sensor is mounted a flange with adjustable actuators able to switch contacts at requested values.			
Contacts	Contacts are fast action micro-switches. They move with speed independent from the speed of actuators; high levels of breaking capacity (bistable contact) allows to drive directly actuators without relay. Contacts are mounted with a double insulation to ground;			
Wiring plan	<p style="text-align: center;">Electronsystem MD</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;"> Lev.3 ARC DETECTOR </td> <td style="width: 33%; text-align: center;"> Type: GMDX95 CALOR EMAG SPEC. </td> <td style="width: 33%; text-align: center;"> Lev.1 LEAK DETECTOR </td> </tr> </table>	Lev.3 ARC DETECTOR 	Type: GMDX95 CALOR EMAG SPEC.	Lev.1 LEAK DETECTOR
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Geometry	<ul style="list-style-type: none"> • Movements proportional to change of internal pressure • Working range of sensors delimited by maximum and minimum mechanical stops • The low mechanical stop makes the system insensitive to vacuum cycles • The high mechanical stop avoids permanent deformations and makes the system insensitive to anomalous over pressure transients 			

DENSITY CONTROLLER

Temperature compensation

The system works as a perfect gas according to $PV = n RT$.

SWITCHING VALUES OF A DENSITY SENSOR GMDX95 IN THE TEMPERATURE OPERATING RANGE

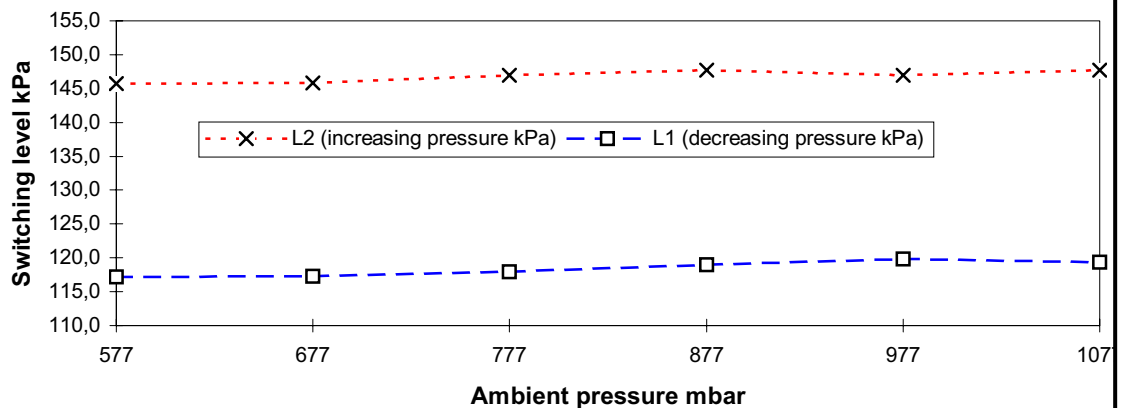


At extra low temperature and high density level the gas could work near the dew point; it is possible to realise counter systems with a partial condensation at extra low temperature similar to the condensation of the gas in the tank to be monitored.

To ambient pressure sensibility

The working principle and a correct dimensioning of bellows guarantee insensibility to ambient pressure; the sensor can work at the sea level so as at an altitude of 4000 meter, without any influence from weather conditions.

SWITCHING VALUES OF A DENSITY SENSOR GMDX95 AT DIFFERENT AMBIENT PRESSURE



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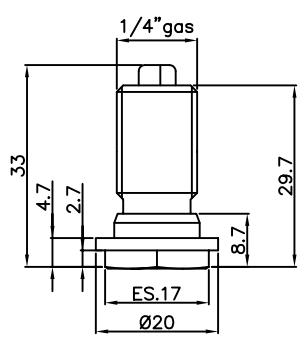
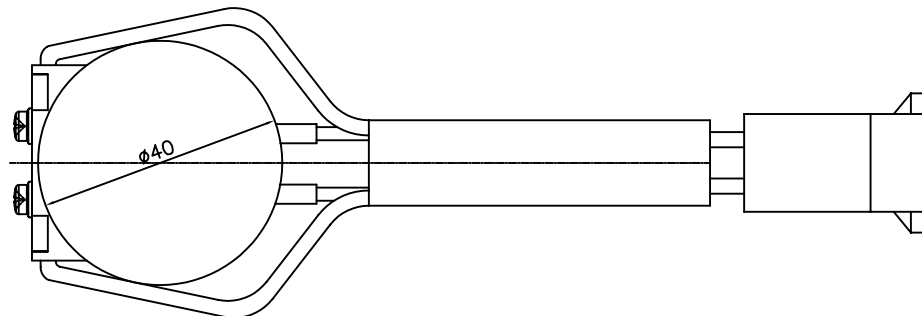
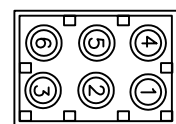
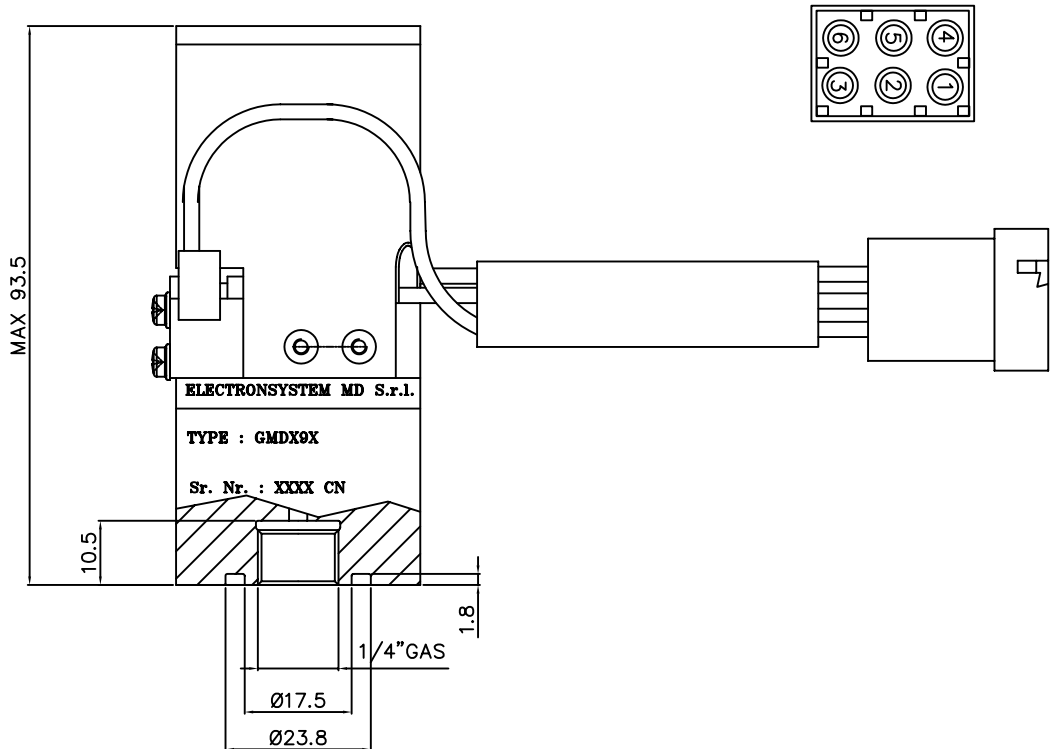
Rev./Mod: E
Data: 11/06/2008
Descrizione: AGGIORNAMENTO GMDX99

Rev./Mod: D
Data: 10/06/2008
Descrizione: modificate caratteristiche micro

Rev./Mod: C
Data: 05/09/2007
Descrizione: AGGIUNTO GMDX92

Rev./Mod B
Data: 30/05/2006
Descrizione: AGGIUNTO 1.13

Rev./Mod A
Data: 03/03/2005
Descrizione: MODIFICATO INGOMBRO



VALVE'S TECHNICAL FEATURES	
OPERATING TEMPERATURE	-30°C +70°C
BODY MATERIAL	AISI 303
SPRING MATERIAL	AISI 302
OR MATERIAL	NBR70
LEAKAGE RATE	< 1x10 ⁻³ mbarxlit/sec

Fig.	Material/Materiale	N° COMMESSA	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:	
Prep. Dis. M.BOSISIO	Resp. Dep. Uff. Resp. Uff. Tecnico	Coord. Punching N.C. mach. Coord. punzon. a C.N. JS11	Quality for linear dimension Qualita' per quote lineari
App. App. P.CIBOLDI		Title Titolo	DENSITY SWITCH "GMD9X"
Rev./Mod	0 07.03.2001 : Emissione nuovo disegno	Apparatus Apparecchio	Scale Scala
ELECTRONSYSTEM MD S.r.l.		Doc. No. N° Doc.	43903350
			Sh. No. N° Pag.
			1/3

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
TECHNICAL FEATURES

1 MECHANICAL DATA

- 1.1 DENSITY SWITCH COMPATIBLE WITH SF6
- 1.2 CASE MATERIAL: ANODIZED ALUMINIUM
- 1.3 THREAD CONNECTION : 1/4" GAS FEMALE
- 1.4 PROTECTION >IP54
- 1.5 OPERATING TEMPERATURE: -25...+85°C
- 1.6 LEAKAGE RATE 1×10^{-9} MBARxL/SEC
- 1.7 MAX PRESSURE ADMISSIBLE (PEAK 100 MSEC) :6 BAR
- 1.8 BURSTING PRESSURE : >30 BAR
- 1.9 VALUE OF SETTING LEVEL 1 AT 20°C : SEE TABLE 43903350/T
- 1.10 VALUE OF SETTING LEVEL 2 AT 20°C : SEE TABLE 43903350/T
- 1.11 TOLERANCE AT 20°C : SEE TABLE 43903350/T
- 1.12 MAX ERROR OF COMPENSATION AT LIMIT TEMPERATURE:
 - ±0.05 BAR REL. WITH: LEVEL MAX < 1.5 BAR ABS.
 - ±0.1 BAR REL. WITH: LEVEL MAX > 1.5 BAR ABS.
- 1.13 DRIVING TORQUE : 5 Nm < TORQUE < 10 Nm

2 ELECTRICAL DATA

- 2.1 TYPE OF CONTACT: MICRO SWITCH
- 2.2 CONTACT MATERIAL: GOLD PLATE
- 2.3 INSULATION LEVEL BETWEEN CONTACTS N.O.:
 - _1.5 KV x 50 Hz x 1'
 - _2 KV AT IMPULSE VOLTAGE TEST (1.2/50ms)
- 2.4 INSULATING LEVEL BETWEEN CONTACTS AND CASE:
 - _3 KV x 50 Hz x 1'
 - _5 KV AT IMPULSE VOLTAGE TEST (1.2/50ms)
- 2.5 SWITCHING CAPABILITY: 0.1A 220V AC

Fig.	Material/Materiale	N° COMMESSA	Finishing / Finitura						
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App. App. P.CIBOLDI	Resp. Dep. Uff. Tecnico	Title Titolo DENSITY SWITCH "GMDX9X" technical features	 Lang. Lingua						
Rev./Mod 0	07.03.2001 : Emissione nuovo disegno	Apparatus Apparecchio	Scale Scala 1:1						
ELECTRONSYSTEM MD S.r.l.		Doc. No. N° Doc. 43903350	Sh. No. Pag. 2/3						

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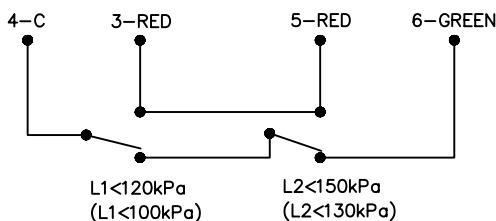
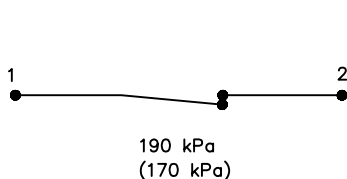
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GMDX95 (GMDX99)

LEVEL 3: ARC DETECTOR

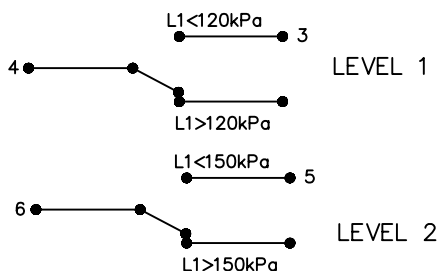
LEVEL 1: LEAK DETECTOR
LEVEL 2: SELF DIAGNOSIS



GMDX96

LEVEL 1: LEAK DETECTOR
LEVEL 2: SELF DIAGNOSIS

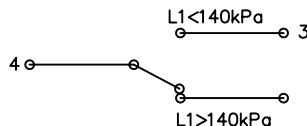
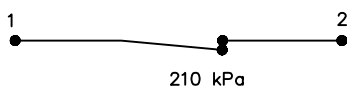
LEVEL 3: ARC DETECTOR



GMDX97

LEVEL 2: ARC DETECTOR

LEVEL 1: LEAK DETECTOR



GMDX92

LEVEL 2: ARC DETECTOR

LEVEL 1: LEAK DETECTOR

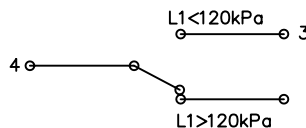
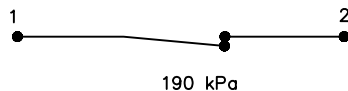


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