

# M1x-M4x Stainless steel gauges with electrical contacts

Ø 100 - Ø 150 - Ø 160 mm

Based upon the MIX series (Ø 100, 150, 160 mm), the stainless steel gauges M11, M12 and M13 devices are fitted with electrical contact blocks to implement control functions.

The contact block is mounted on the dial.

A knob on the window can be used for the adjustments of the set points.

All stainless steel (M11, M12, M13) or monel (M41, M42, M43) sensing elements.

Electrical contacts specifications :

(See overleaf or catalog . see electricals contact).

Explosion-proof housing version

For the M13 series and for use in explosive areas, the pressure gauge, with one or 2 inductive contacts, should be used with the amplifying relay RSI 1 or RSI 2. The complete assembly is intrinsically safe, conforming to standards :

NF EN 50014 - NF EN 50020



## Specifications (20°C)

**Ranges** Vacuum and compound : from -1 + 0 to 0 + 1600 bar

### Minimum ranges

CES - CEI		CES A	
1 contact	2 contacts	1 contact	2 contacts
0.6 bar	1 bar	1 bar	1.6 bar

**Accuracy (in operating area)** CES : Class 2  
CESA : Class 2  
CEI+RSI : Class 1.6

**Degree of protection** IP 65 according to EN 60529

### Sensing element and connection

	FOR SCALE RANGE	
<b>CONNECTION MATERIAL</b>	MIX : 1.4404 (AISI 316L) stainless steel MIM : Monel 400	
<b>CONNECTION SHAPE</b>	22 mm square	
<b>THREAD</b>	G 1/2 or 1/2 NPT	
<b>SENSING ELEMENT MATERIAL</b>	MIX : P ≤ 2.5 bar and P ≥ 1000 bar : 1.4404 (316L) - solid drawn tube 2.5 < P < 1000 bar : 1.4571 (316 Ti) - rolled welded tube MIM : Monel 400	
<b>TUBE SHAPE</b>	In C P < 60 bar Helicoil P ≥ 60 bar	
<b>OPERATING TEMPERATURE</b>	CES-CESA °C	CEI °C
Process fluide	- 40 to + 200	-20 to + 150
Ambient	- 40 to + 100	-20 to + 80

**Case and bezel ring** Stainless steel 1.4301 (AISI 304). Bayonet lock type.

**Window** Transparent polycarbonate domed, with watertight index adjustment knob.

**Window gasket** PVC nitril elastomer, ensuring a tight seal between the window and the case.

**Connection seal** PVC nitril elastomer but for 160 dia, types B.E.F. (Connection welded to the case).

**Movement** Stainless steel.

### Mounting

	Type	
Direct	D	F
Surface mounting with 3 back lugs fixing	A	E
Flush panel mounting with welded front flange	C	B

**Dial** Aluminium alloy.  
Black figures and lines on white background.

**Pointer** Aluminium alloy, painted black.

**Safety blow out disc** In elastomer it is located on the top of the case. It allows the inside of the case to vent to atmosphere. In the event of overpressure inside the case, the disc blows out.

### Block wiring diagram

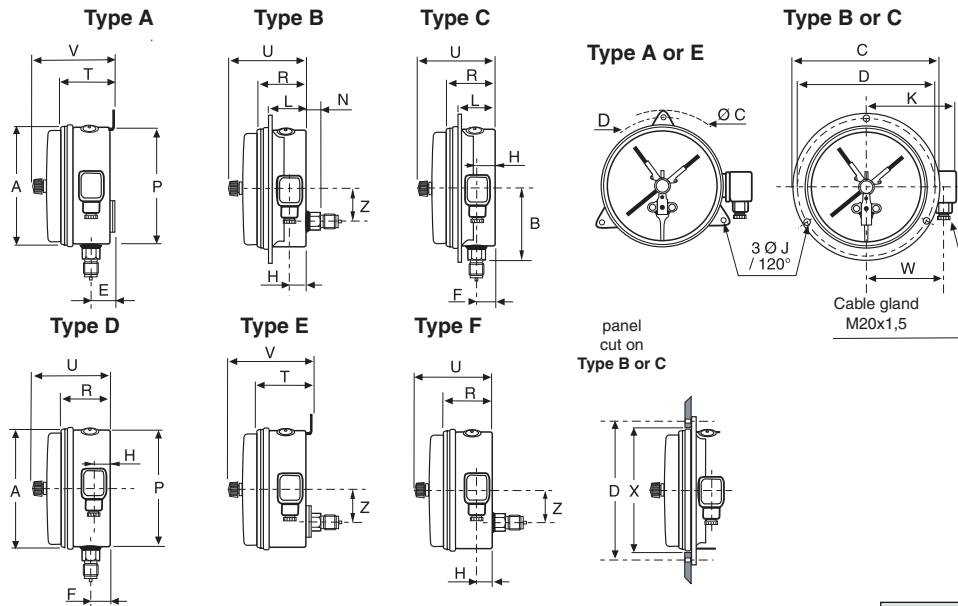
MIN 10-2	MAX 01-2	INTER-INDEX 010-2 101-2	MIN-MAX 101-3 MIN-MIN 110-3 MAX-MAX 011-3 MAX-MIN 111-3
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Block insulation 2000 V to earth.

**Electrical connection** Terminal block. Cable gland M20x1.5. Cable 7 to 13mm

**BOURDON  
HAENNI**  
made to measure

## Dimensions (mm)



Dimensions Ø mm	mm																	Weight in kg type D		
	A	B	C	D	E	F	H	J	K	L	N	P	R	T	U	V	W	X	Z	Dry (BH)
100	106.2	63	130	118	25.5	23	19	5.5	89	39.3	17	98	54.5	57	105	110	74	107	31.5	0.605 kg
150	150.2	85	180	168	25.5	23	19	5.5	111	39.3	17	142	54.5	57	105	110	96	151	31.5	0.930 kg
160	160.2	99	196	178	23.7	21.7	19.5	5.5	116	38	19	152	55.5	57.5	106	110.5	101	161	54	0.980 kg

## Options

### Uncoded options (have to be listed after the code number)

Case and bezelring in 1.4404 (AISI 316L) stainless steel  
 Cleanliness for oxygen service (BH5 liquid filling, P-160 bar)  
 Contact material : silver palladium, gold alloy  
 Tamper proof : index adjustment

### Coded options

BH version : CES-CESA-CEI electrical contacts specifications, see overleaf  
 Special connection smaller than or equal to G 1/2 or 1/2 NPT  
 Special scales  
 Explosion-proof housing version EEx d II C T6 (150 dia. only) conforming to standards : NF EN 50014 - NF EN 50018

## Ranges

code	Ranges bar		
59	-1	+	0
72	-1	+	0.6
74	-1	+	1.5
76	-1	+	3
77	-1	+	5
79	-1	+	9
81	-1	+	15
82	-1	+	24
12	0	+	0.6 *
15	0	+	1 *
16	0	+	1.6 *
18	0	+	2.5
19	0	+	4
20	0	+	6
22	0	+	10
24	0	+	16
26	0	+	25
27	0	+	40
29	0	+	60
31	0	+	100
33	0	+	160
35	0	+	250
38	0	+	400
39	0	+	600 **
41	0	+	1000
42	0	+	1600

code	Ranges kPa		
59	-100	+	0
72	-100	+	60
74	-100	+	150
76	-100	+	300
77	-100	+	500
79	-100	+	900
81	-100	+	1500
82	-100	+	2400
12	0	+	60 *
15	0	+	100 *
16	0	+	160 *
18	0	+	250
19	0	+	400
20	0	+	600
22	0	+	1000
24	0	+	1600
26	0	+	2500
27	0	+	4000
29	0	+	6000
31	0	+	10000
33	0	+	16000
35	0	+	25000
38	0	+	40000
39	0	+	60000 **
41	0	+	100000
42	0	+	160000

code	Ranges psi		
59	-30"	Hg +	0
73	-30"	Hg +	15
75	-30"	Hg +	30
2C	-30"	Hg +	60
78	-30"	Hg +	100
79	-30"	Hg +	150
80	-30"	Hg +	200
82	-30"	Hg +	300
13	0	+	10 *
15	0	+	15 *
1C	0	+	20 *
17	0	+	30
19	0	+	60
21	0	+	100
22	0	+	160
23	0	+	200
25	0	+	300
26	0	+	400
27	0	+	600
30	0	+	1000
31	0	+	1500
34	0	+	3000
38	0	+	6000
40	0	+	10000 **
41	0	+	15000
1D	0	+	20000

\* 1 and 2 contacts minimum ranges : see electricals contact. \*\* Monel version (M41, M42, M43) limited to 0+600 bar (0+60000 kPa or 0+100000 psi)

## CES - CESA - CEI - CEI+RSI

### GENERAL

Electrical contacts can be fitted to our instruments with nominal diameters 100, 150, 160 mm.

They are adjustable over the whole scale (270° arc maximum).

The overall dimensions, mounting and switching arrangements, operating limits (pressure and temperature) are all given in the corresponding documentation for each series of equipment.

#### Various contact models :

- dry contact : **CES**
- dry contact with magnet : **CES A** (forbidden for differential pressure gauges)
- inductive contact : **CEI**
- inductive contact + amplifier relay : **CEI+RSI**

### Specifications

#### Contact material :

During their use, electrical contacts are subjected to a varying degree of wear, depending on their operating conditions, under the effect of mechanical stresses, the effect of electrical arc and heating.

The choice of material for contacts must allow for the specific operating conditions.

Standard material is a Ag 80-Ni 20 alloy. It has a high resistance to the electric arc effect (sparking).

#### Oil filled version (forbidden for differential pressure gauges) :

When a gauge is to be oil filled, CES A or CEI contacts must be used. The gauge must be filled with silicon oil (BH3). The power switching capacity is significantly reduced. It is then necessary to use a relay.

#### CAUTION :

For use with OXYGEN, use filling fluid BH5 (forbidden for differential pressure gauges).

Standard nomenclature NF E 15-100		Contact block control function CES - CESA - CEI	
		CES-CESA	CEI
Two wire supply	1 contact	Min 10.2	Contact open above the set point
		Max 01.2	Contact closed above the set point
	2 contacts	Inter Index Closed 010.2	Contact closed inside area determined by the 2 set points open outside
		Inter Index Opened 101.2	Contact open inside area determined by the 2 set points closed outside

The last figure correspond to the number of terminal output  
Example : 10-2 (2 terminal outputs)

Standard nomenclature NF E 15-100		Contact block control function CES - CESA - CEI		
		CES-CESA	CEI	
Three wire supply	1 contact	Min Max 101.3	Min Max 101.4	First contact open second contact closed above the set point
		Min Min 110.3	Min Min 110.4	First and second contacts open above the set point
	2 contacts	Max Max 011.3	Max Max 011.4	First and second contacts closed above the set point
		Max Min 111.3	Max Min 111.4	First contact closed second contact open above the set point

very thick black sector : closed contact  
very fine sector : open contact

# Dry electrical contacts **CES**

## APPLICATIONS :

These contacts are used when normal service conditions require a low switching power.

This type of contacts requires vibration-free installation and cannot be used with liquid filled gauges.

In aggressive environments and in areas where there is a risk of explosion, use CEI inductive contacts + RSI amplifier relay or explosion-proof enclosure versions.

## Technical characteristics

Contacts can switch continuous or alternating voltages of up to 250 volts with a maximum rating of 10 W or 18 VA.

Table of maximal for standard electrical contacts :

V	Resistive load		Inductive load Cosφ > 0,7
	DC	AC	
220	40 mA	45 mA	25 mA
110	80 mA	90 mA	45 mA
48	120 mA	170 mA	70 mA
24	200 mA	350 mA	100 mA

NOTA : with 24 Vcc, minimum current 16 mA.

# Dry electrical contacts with magnets **CES A**

## APPLICATIONS (forbidden for differential pressure gauges) :

These contacts are used in practically all service conditions. They are, **to a very great extent, insensitive to vibrations**. They can be used with liquid filled instruments.

In areas where there is a risk of explosion, use CEI inductive contacts + RSI amplifier relay or explosion-proof enclosure versions.

## Technical characteristics

Contacts can switch continuous or alternating current voltages of up to 250 volts with a maximum rating of 30W or 50 VA

Table of nominal values :

V	Resistive load		Inductive load Cosφ > 0.8
	DC	AC	
220	100 mA	120 mA	65 mA
110	200 mA	240 mA	130 mA
48	300 mA	450 mA	200 mA
24	400 mA	600 mA	250 mA

NOTA : values for non-liquid filled instruments.

# Inductive electrical contacts **CEI**

## APPLICATIONS :

CEI contacts are used in a highly vibrating environment. They are spark, overheating or wear proof. They must be used with an amplifier relay : RSI.

# Inductive electrical contacts **CEI+RSI** amplifier relay

Officially approved, intrinsic safety :

CEI sensor, EEX ia IIc T6

RSI amplifier, EEX ia IIc

Hazardous area

Non-hazardous area

## APPLICATIONS :

CEI contacts are used in explosive atmosphere and hazardous area. They are spark, overheating or wear proof.

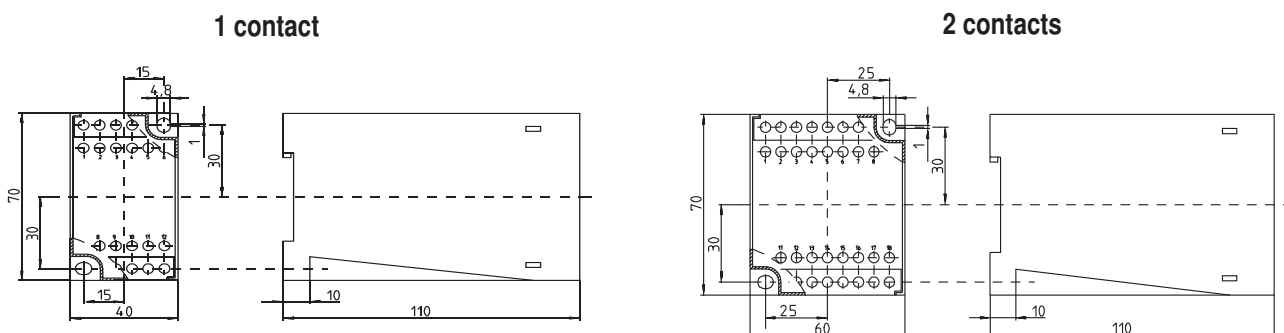
They must be used with a RSI amplifier relay as follows :

Power supply  
Output

## Specifications

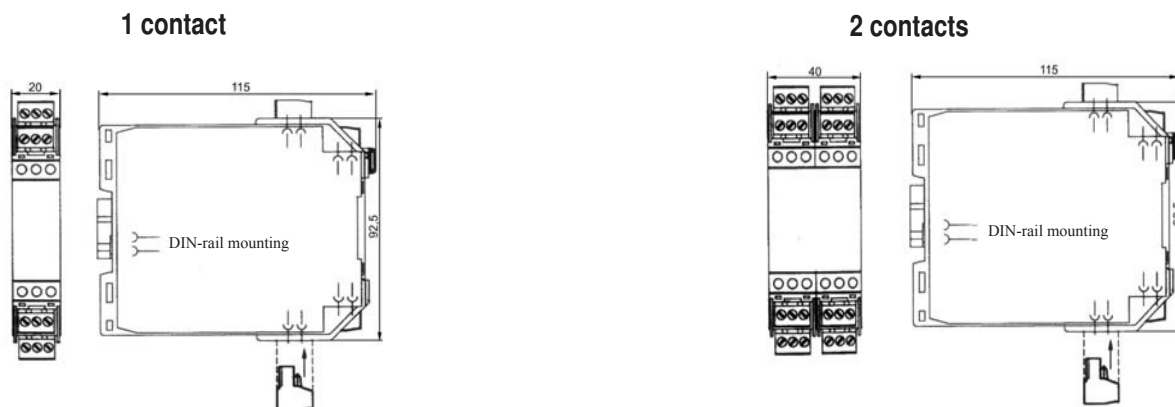
<b>Case</b>	SE Noryl. Overall dimensions - mounting : see below. Weight : RSI 1 - 0.220 kg : RSI 2 - 0.420 kg	<b>Output</b>	Reversing contact relay; rupturing capacity 4A - 250 V - 500 VA
<b>Power supply</b>	Standard : 220 Vac $\pm$ 15%, 45-60 Hz Options : 110 Vac $\pm$ 15%, 40-60 Hz 24 Vcc	<b>Operating temperature</b>	- 20° C to + 60° C (-4° F to + 140° F)
<b>Consumption</b>	1.5 VA.	<b>Protection</b>	IP 30. Max. RSI pressure gauge distance : 3000 m. (Max. R in line 100 $\Omega$ ).

## Relay dimensions RSI (220 Vac-110 Vac)



Attachment : on rail DIN 50022 or by 2 screws

## Relay dimensions RSI (24 Vcc)



Attachment : on rail DIN 50022

## Codification - M11

	Mxxx	xxxx	xxx
<b>Family</b>	<b>1' digit</b>		
Pressure gauges	M		
<b>Type</b>	<b>2' digit</b>		
M1	1		
M4	4		
<b>Type of contact</b>	<b>3' digit</b>		
CES	1		
CES A	2		
CEI <sup>(1)</sup>	3		
<sup>(1)</sup> Must be used with an intrinsically safe electrical installation.			
<b>Dial diameter</b>	<b>4' digit</b>		
Ø 100 mm	5		
Ø 150 mm	7		
Ø 160 mm	8		
Ø 150 mm (explosion-proof housing)	E		
<b>Control functions</b>	<b>5' digit</b>		
Mini		1	
Max		2	
Inter-index : opened between set points		3	
Min-max		4	
Min-min		5	
Max-max		6	
Max-min		7	
Inter-index : closed between set points		8	
<b>Type of mounting</b>	<b>6' digit</b>		
bottom connection, 3 back lugs fixing		A	
back connection, front flange		B	
bottom connection, front flange		C	
bottom connection		D	
back connection, 3 back lugs fixing		E	
back connection		F	
<b>Hydraulic connection</b>	<b>7' digit</b>		
G 1/4		2	
G1/2		3	
1/4 NPT		5	
1/2 NPT		6	
<b>Type of liquid filling</b>	<b>8' digit</b>		
without filling		0	
BH3 filling (- 40° to + 100°C)		3	
BH5 filling (- 15° to + 100°C)		5	
<b>Unit of measurement</b>	<b>9' digit</b>		
bar			B
kPa			D
kg/cm <sup>2</sup>			F
psi			H
<b>Pressure range</b>	<b>10'...11' digit</b>		
See codes in table overleaf			xx

## Relay codification

	AYRA	x0D	0xA
<b>Family</b>	<b>1' digit</b>		
Accessories	A		
<b>Relay</b>	<b>2'...4' digit</b>		
RSI (intrinsically safe)	YRA		
MSR	REB		
<b>Power supply</b>	<b>5'...6' digit</b>		
Standard 220 Vac		A	
Option 110 Vac		D	
Option 24 Vcc		F	
<b>Attachment on rail DIN</b>	<b>7' digit</b>		
Attachment on rail Din		D	
<b>Control functions</b>	<b>8'...10' digit</b>		
1 thresholds			1
2 thresholds			2
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Modifications reserved			

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