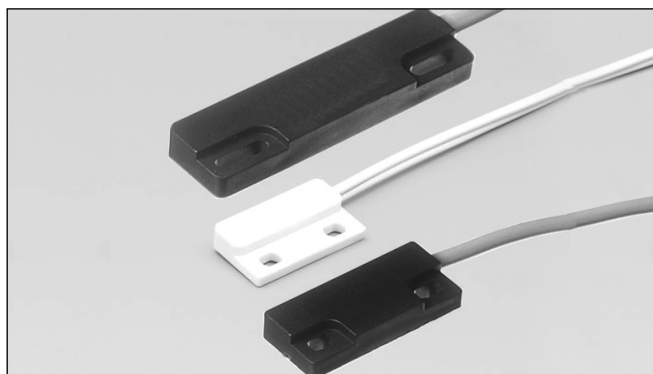# Intrinsic Safety - Magnetic proximity sensors for potentially explosive environments MW, MQ and MJ Series

CARLO GAVAZZI

- **Micro-miniature, miniature or standard plastic housing**
- **Output function NO, NC or Change-Over (CO)**
- **For use in zone 0 or zones 1 and 2**
- **Approval:**

Product Description

Proximity magnetic sensors Mc.x.y/-MT/Sx EX M, intended for use in potentially explosive atmospheres, are realized and encapsulated following the "m" procedure of EN 50028 normative.

Proximity magnetic sensors Mc.x.y/-MT/Sx EX IA, intended for use in potentially explosive atmospheres, are realized to satisfy the intrinsic safety "i", stated in EN 50020 normative

Ordering Key

MQC1EX

Housing type
Output function
Reed contact type
For use in potentially explosive atmospheres

Type Selection

Dimensions	Output function	Reed contact type	Zones 1 and 2 II 2 G EEx m II T5	Zone 0 II 1 G EEx ia IIC T6
23,5 x 14 x 6,1 mm	NO	6	MWA6EX	MWA0EX
37 x 16 x 8.3 mm	NO	1	MQA1EX	MQA0EX
	NC		MQC1EX	MQC0EX
	CO		MQS1EX	MQS0EX
79 x 21,2 x 11,5 mm	NO	7	MJA7EX	MJA0EX

General Specifications

Output function	See type selection	Protection degree	IP67
Dimensions	See type selection	Output connection	Cable (PVC; L = 2m, Ø 4 mm)
Housing MQ and MJ Series	Self-extinguishing polypropylene with 30% glass fibre PBT	Operating temperature	-20 ÷ + 60 °C
MW Series		Temperature class	T6 (zone 0) T5 (zones 1 and 2)

Operating Distance

Magnetic unit	CL.1	CL.2	CL.3	CL.4
MQA and MQS	10 mm	15 mm	22 mm	35 mm
MQC*	7/2 mm	13/5 mm	17/7 mm	30/15 mm
MW	14 mm	20 mm	30 mm	50 mm
MJ	5 mm	19 mm	19 mm	54 mm

* Left: operating distance - Right: closing contact distance

Electrical Connections

Zones 1 and 2:
If the environment does not contain gases constantly, and verified all the other conditions, it is possible the use the sensor in conformity with the reed contact charateristics, as in the following table; in this case, it is mandatory to protect the circuit by a 1 A fuse with a breaking capacity of at least 4kA.

Zone 0:
The realization of the intrisic safety circuit zone 0 has to be done using a safety barrier (i.e. a zener safety barrier) and a power supply apparatus, which must be compulsorily installed outside the hazardous area. The aim of the safety barrier is to interface a non-intrinsic safety circuit to the sensor, realizing an intrinsically safe output for the sensor. The values of parameters for use in intrinsic safety circuit zone 0 are listed in the following table.

CARLO GAVAZZI

Electrical Specifications

For use in zones 1 and 2	MWA6EX	MQA1EX-MQC1EX	MQS1EX	MJA7EX
Max switching voltage Ui	100 Vac	230 Vac	150 Vac	230 Vac
Max switching current Ii	0,5 A	0,75 A	0,25 A	0,5 A
Max switching power Pi	10 VA	10 VA	5 VA	10 VA
Effective internal inductance Li	< 3 µH	< 15 µH	< 15 µH	< 25 µH
Effective internal capacity Ci	< 20 pF	< 300 pF	< 300 pF	< 75 pF

For use in zone 0	MWA0EX	MQA0EX-MQC0EX MQS0EX	MJA0EX	
Max switching voltage Ui	10,9V	10,9V	10,9V	
Max switching current Ii	15mA	15mA	15mA	
Max switching power Pi	41mW	41mW	41mW	
Effective internal inductance Li	< 3 µH*	< 15 µH*	< 25 µH*	
Effective internal capacity Ci	< 20 pF*	< 300 pF*	< 75 pF*	

* Maximum acceptable values of capacity and inductance at intrinsically safe terminals of the safety barrier, for II group and with voltages and currents listed in the table above, are: $C_0 = 2,05$ µF e $L_0 = 165$ mH.

Parameters C_i ed L_i, added respectively to connecting cables capacity and inductance (if these parameters are unknown, for capacity C_c it can be used 180 pF/m and for inductance L_c0.60 µH/m), must not exceed C_0 and

L_0 values indicated above. Maximum r.m.s. voltage applicable to non-intrinsically safe terminals of associadet electrical apparatus (barrier) without invalidating the intrinsic safety is Um = 250 Vac.

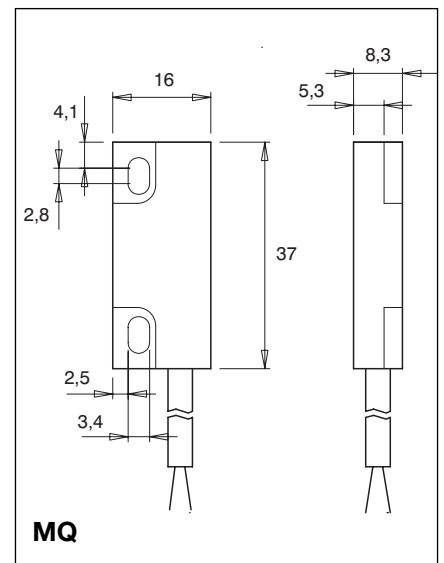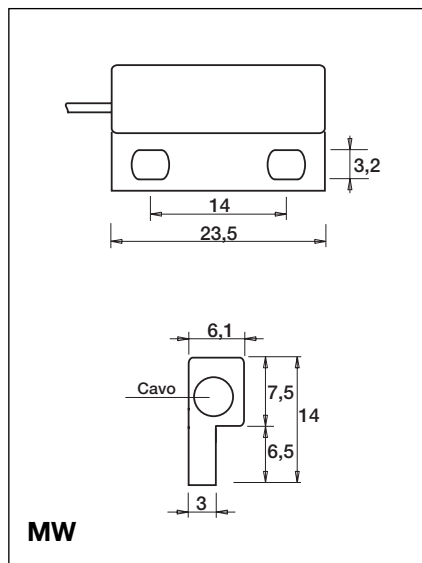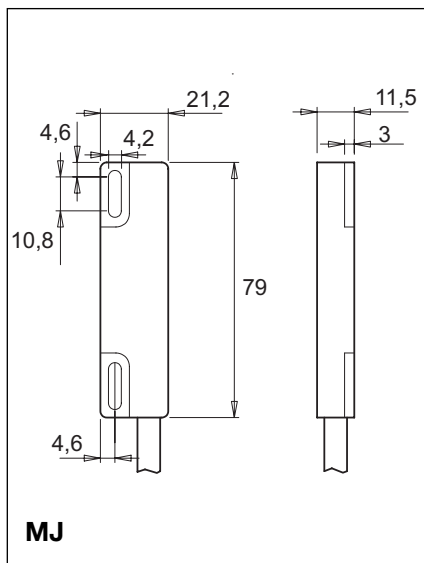The conditions required to satisfy the safety of a system are:
$U_0 \leq U_i$
$I_0 \leq I_i$
$C_0 \geq C_{i+}C_c$
$L_0 \geq L_{i+}L_c$

Dimensions

MJ

MW

MQ

Wiring Diagrams

Output function CO

Output function NO

Output function NC