Operating Instructions for ATEX coded Magnetic Sensors series N557

Original Instructions

1. INTRODUCTION

The coded Magnetic switches are a series of technical safety devices for monitoring:

- **Protection of Moveble safety guards on Machine Tools** : they ensure that dangerous works on machines can only be carried out if the safety guards are in place. Before safety switches are used, a risk assessment must be performed on the machine in accordance with:

- **EN ISO 13849-1:2008**, Safety of machinery - Safety-related parts of control systems: Part 1: General principles for design.
- **EN ISO 14119:2013**, interlocking devices associated with guards.
- **EN 60204-1:2006**, electrical equipment of machines.
- **EN 60947-5-3:2013**, Low-voltage switchgear and controlgear. Part 5-3: Control circuit devices and switching elements - Requirements for proximity devices with defined behaviour under fault conditions (PDDB).

- **Landing or Cabin Doors of a Lift:** The whole system (sensor and control unit NC80 or NC82) ensure the movement of the elevator only if all the doors are closed. The opening of the door causes the displacement of the actuator from the sensor and consequently the opening of the safety chain and the immediate stopping of the lift.

Before using the coded sensors, you must make sure that it is respected the point 5.3.9.1.2 EN81-20 so that they ensure mechanical locking of the door for at least 7mm. The final installer is responsible to check these point.

These operating instructions are only valid in conjunction with the operating instructions for the relevant safety units NCxx.
If the sensors are not used with the control unit NCxx they must be connected to a safety modules or a safery PLC and the whole system must be homologated for the safety functions. The manufacturer of a machine or installation is responsible for correct and safe overall function.

Sensors described in this manual are suitable to be used in areas with a potentially explosive atmosphere and in particular:

Zone 2 and **22** / **Category 3G** and **3D** according with directive: **2014/34/UE** and standards:

EN 60079-0 - Explosive atmospheres - Part 0: Equipment - General requirements

EN 60079-18 - Explosive atmospheres - Part 18: Equipment protection by encapsulation "m"

All sensors indicated in this manual are covered by a **EU type certificate n° IMQ 16 ATEX 023 X** released by competend body IMQ SpA.

1.1. FUNCTIONING

The safety system consists of a control unit, sensors and activation magnets and is only functional in particular combinations (see combination options)!
The sensors connected to the control unit contains reed contacts which are activated by the coded magnets. The control unit converts this information and transfers the safety guard state to the control system via a safety output.

The safe state is defined as the state of the sensor when is far from his activation magnet (see "Circuit Diagram").

2. INSTALLATION and COMMISSIONING

The manufacturer of the machine, or the Installer, is responsible for a correct and safe installation. Electrical connections must be carried out by authorized and qualified personnel trained in compliance with EN60079-14 and EN60079-17.

Install Sensors and Magnets so that:

- Are accessible for inspection work and for the installation of spare parts.

- When the lift doors are closed or the guards are in place, the sensor and magnet marking points must be aligned (see § 4.4). Small misalignments are allowed to ensure correct functioning even in the event of wear that can cause mechanical clearances.

- The magnet is inside the sensor activation area when the door is locked by a mechanical lock for a length of at least 7mm (see requirements of the reference standard).

- If the Sensors and Magnets are mounted in sequence, the switching distance could be reduced depending on the distance between the Sensor-Magnet pairs and the door material.

- The approach speed between sensor and magnet must not be too low if the control unit is configured to work with automatic start.

- The sensor connection cable must not be extended or spliced in any way.

- Sensors and actuators must not be used as a mechanical stop and in any case must not come into direct contact with moving parts.
A stop mechanism must be inserted on the protective doors in the closed position.

- During installation, care must be taken not to cause shocks to the sensor bacause it could be cause of malfunction. If during the installation a sensor falls down or suffers a violent impact, separate the sensor and do not proceed with the assembly of the same.

- Sensors and Magnets must not be used in an environment with strong magnetic fields.

- If the sensors and actuators are mounted on a ferromagnetic material, the activation distance is reduced or there could be cases of false activation due to the undesired magnetization of the ferromagnetic metal parts surrounding the sensor.

- If there are problems of activation of the sensors due to the eventual ferrous component of the doors, It is suggested to use plastic spacers in order to guarantee the correct magnetic flux (see §7.0 on page 3/3 of this manual).

2.1. SAFETY PRECAUTIONS

⚠ WARNING ⚠

Safety functions are guaranteed only when used as a complete system; this means safety coded sensors connected to a safety control unit NCxx.

The coded switches fullfills a personal protection function.

Incorrect installations or manipulation can lead to severe injuries to personnel.

No responsibility whatever is accepted for the use or the technical safety functioning of the coded sensors or magnets without the relevant safety control units NCxx.

Coded switches must not be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.

The switching operation may only be triggered by coded magnets specially provided for this purpose which are permanently connected to the safety guard.

A complete safety-oriented system generally consists of several signalling devices, sensors, control units and concepts for safe shut-off operations. The manufacturer of a machine or installation is responsible for correct and safe overall function.

Additional measures to minimize defeat possibilities (EN ISO 14119:2013, Table 3)

It is mandatory to apply one of the following measures:

1) Install sensors and magnets out of reach from the operator.

2) Sensors and magnets physical obstruction or shielding.

3) Sensors and magnets installed in hidden positions.

4) Control Periodically (at the beginning of every shift) the correct functioning of the sensors by checking:

- Correct switching function of each sensor:
  a) the opening of the single sensor / safety guard must cause the opening of the safety outputs of the control unit.

  b) the closure of the same sensor / safety guard must cause the closing of the safety outputs of the unit as a result of a startup command.

- Secure mounting of components.
- Correct connection fixing.

If one of the above points 1, 2 or 3 is applied, it is still necessary to carry out the checks described at point 4.

The device monitoring function is performed at each intervention of the device itself.
If with all the protection guards are closed and a relative start command given, the control unit does not activate its safety outputs; DO NOT turn off and on the device but proceed to check for any open shelters and carry out the checks indicated above at point a) and b).

In case of breakdown or wear, the damaged system must be replaced.

3. MODELS IDENTIFICATION

This manual apply for sensors models codes: N557 HD and N557 HE;

For complete code identification, please refer to the codification diagram reported below In this manual.

2.3. SERVICE and INSPECTION

In order to assure the correct functioning in time it's necessary to remove iron swarf from the sensors and magnets at regular intervals.
If It's necessary to clean the sensor housing and/or magnetic actuator, to avoid accumulating electrostatic charges on the plastic, use a damp cloth and solvents-free detergents.
In any way, avoid the rubbing of the plastic housing of the sensor and/or of the magnetic actuator with non-conductive materials.

In order to ensure lasting, trouble-free operation,regular inspection of the following is required:

-Correct switching function

-Secure mounting of components

In the event of damage or wear and tear, the damaged system component must be replaced.

Regularly check cables and electrical connections and check the insulation integrity; carry out these operations in accordance with EN60079-17.

2.4. WARRANTY

Liability coverage is void under the following circumstances:

- If directives of this instructions are not followed.

- In case of non-compliance with safety regulations.

- Installation and electrical connection not performed by authorized personnel.

- Non-implementation of functional checks and Maintenance.

- Tampering.

3.1 CODIFICATION DIAGRAM SENSORS SERIES N557

N55 7 H D Q R Z 200 P 0 EX

- N55: Series and Shape: Rectangualar for Safety
- 7: Housing Variant: 7 = PA6 30% G.F. Tested for ATEX use
- H: Type of Diagram: HD o HE (2 N.O. separated 2x SPST)
- D: Cable Type: QR= PVC UL cable 4xAWG24
- Q: Encapsulation: Z = Potting IP67
- R: Cable lenght [cm] (three digits) or [m] (two digits followed by "M")
- Z: Housing Material Variant: P= PA6 30% G.F.
- 200: Cable end: 0 = Unsheathed cable and stripped conductors; P=Ferrule; A...Y = Others Terminations
- P: EX = ATEX construction
- 0
- EX

3.2 MAGNETIC ACTUATOR CODE

M151 00 20 0000

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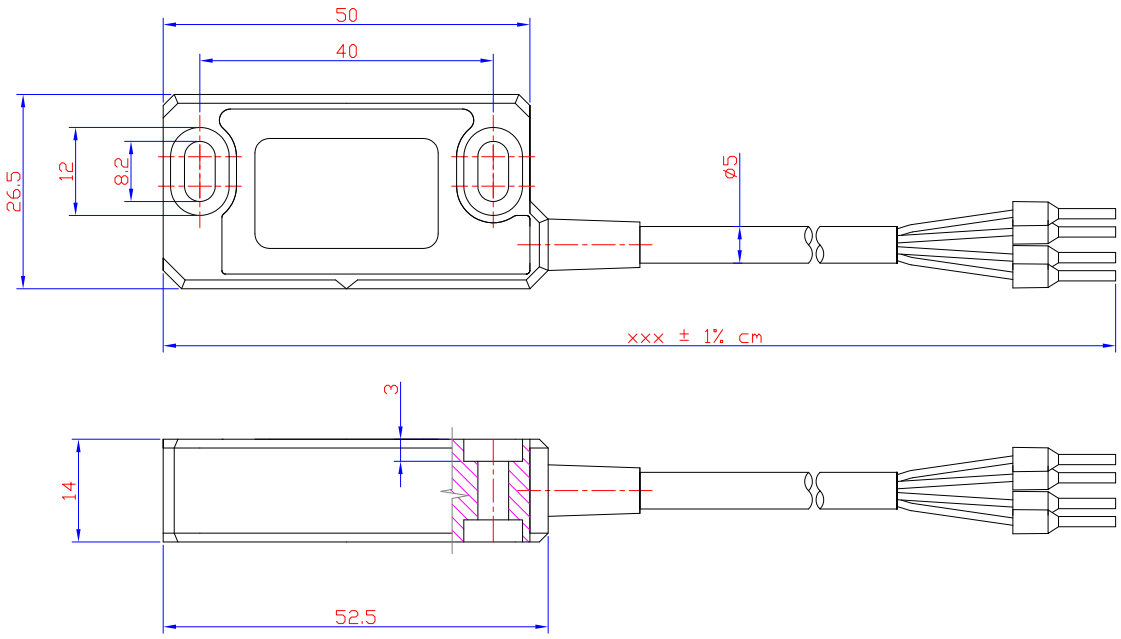
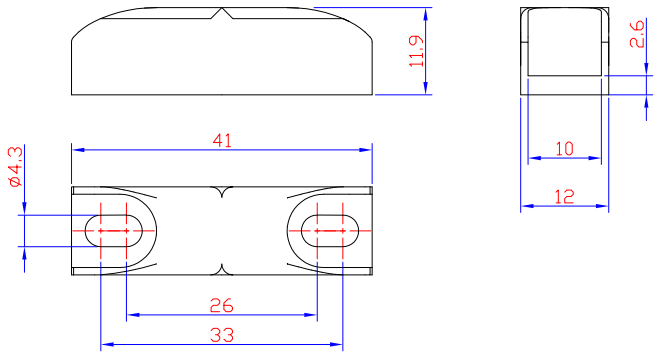
4.0. MECHANICAL FEATURES of MAGNETIC SENSOR code: N557



4.1. MECHANICAL FEATURES of MAGNETIC ACTUATOR code: M151 00 20 0000



4.2. ELECTRICAL DIAGRAM for SENSOR code: N557

The contacts are shown in rest position; this means with a magnetic actuator outside the sensor activation range.

CHANNEL 1	CHANNEL 2
BN Brown WH White	GN Green YE Yellow

4.3. SENSOR N557 and ACTUATOR M151 TECHNICAL DATA:

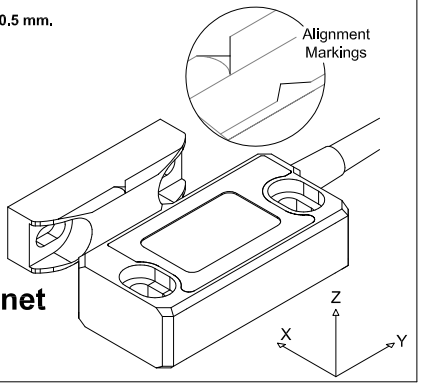
Parameter	*Value*
N557 Sensor Housing Material	PA6 30% fibra vetro colore Nero
M151 Actuator housing material	PA6 30% fibra vetro colore Nero
Ambient Temperature (T_a)	-20°C ... +70 °C
Degree of Protection	IP67 (EN 60529)
Maximum Switching Voltage	Version HD: 27V AC/DC Version HE: 27V AC/DC
Maximum Switching Current	Version HD: 0,50A Version HE: 0,25 A
Minimum operational current	8 mA
OFF-state current	0,0 A
Maximum resistance at closed contact	1,5 Ω (for each channel)
Voltage Drop	Vd ≤ 8V DC
Rated imp. withstand voltage	2,5 kV AC
External Fuse	Version HD: 800 mA Version HE: 400 mA minimum braking capacity: 80A
Max. switching frequency	1 Hz
Repeatibilty accurancy	0,2 mm
Pollution Degree	2
Mechanical Life	$100x10^6$ cycles
TM (Mission Time)	20 years
B10d (EN 13849-1:2008)	$20x10^6$ cycles
Diagnostic coverage (DC)	Depending on connected safety unit DC
Response Time	3 ms
Risk Time	Depending on connected safety unit response time
EN ISO 14119:2013 coding	Type 4 (Low Level Coding)
Shock & vibration resistance	CEI EN 60947-5-3:2013
EMC Conformity - Lift Directive	EN 12015:2004; EN 12016:2013
EMC - Machine Directive	EN 60947-5-3:2013; EN 61326-3-1:2008
Doors safety System Test Report	IMQ N° CA50.00417
Machine Directive Approvals	TÜV (see safet unit instruction manual)

4.4. DISTANZE di ATTIVAZIONE SENSORI N557 con ATTUATORI M151

Sensor	*Magnetic Actuator*	Switch-ON Distance Son [mm]	Switch-OFF Distance Soff [mm]
N557 HD/HE	M151	> 2 < 9	> 19

The activation of the Sensor is guaranteed if included between the two values.
Activation, deactivation and reset distances are affected by ferromagnetic materials.
All data relate to the forward direction of approach (X-axis) centered with offset of 0.0 mm with the axis Y, Z.

All distances have a tolerance of ± 0,5 mm.



Sensor and Magnet Alignment

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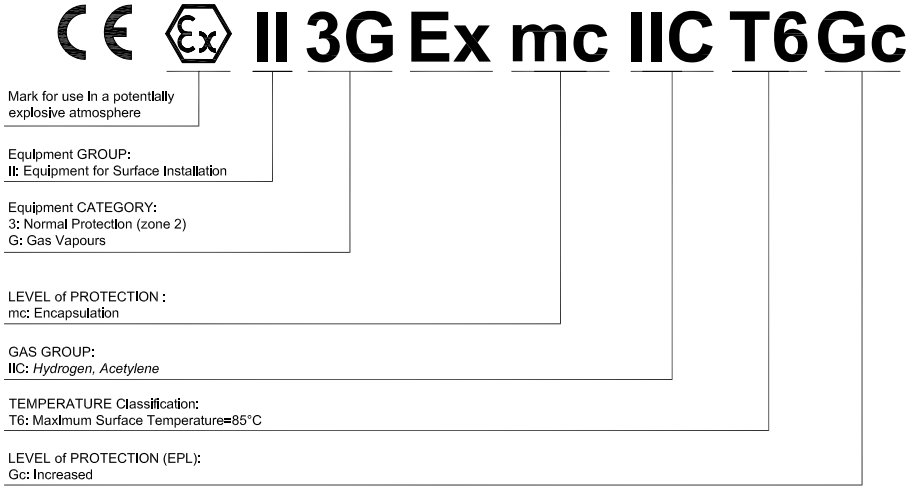
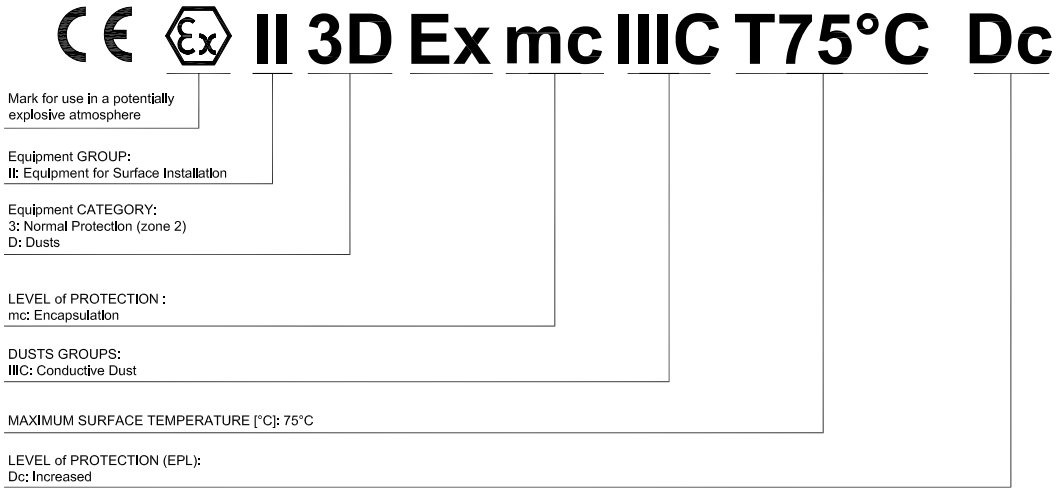
5.0 ATEX MARKING of SENSORS N557

ATEX magnetic Sensors series "N557" are marked as follow:

5.1 ATEX MARKING MEANING for USE with GAS (G)



5.2 ATEX MARKING MEANING for USE with DUST (D)



6.0 CONDITIONS OF USE In POTENTIALLY EXPLOSIVE AREA

ATEX magnetic sensors must be used in potentially explosive areas with an ambient temperature range: -20 ° C <Ta <+ 70 ° C

6.1 SPECIAL CONDITIONS OF USE (X)

None.

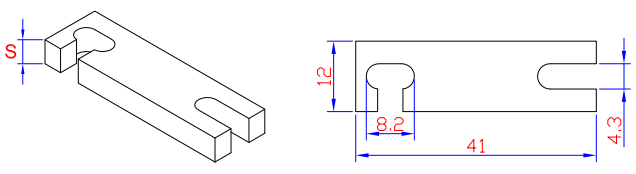
7.0 FITTINGS

PLASTIC SPACER for M151 MAGNETIC ACTUATOR to be used in case of installation on ferrous metals.

Made of black PA66 plastic, are available three different thicknesses; specify the desired thickness using the order code below.

ORDER CODE:

S=1 mm: 1115 01
S=2 mm: 1115 02
S=5 mm: 1115 05



In case of doubts or doubts about the Installation of the sensors object of this manual, contact the technical office STEM S.r.l.