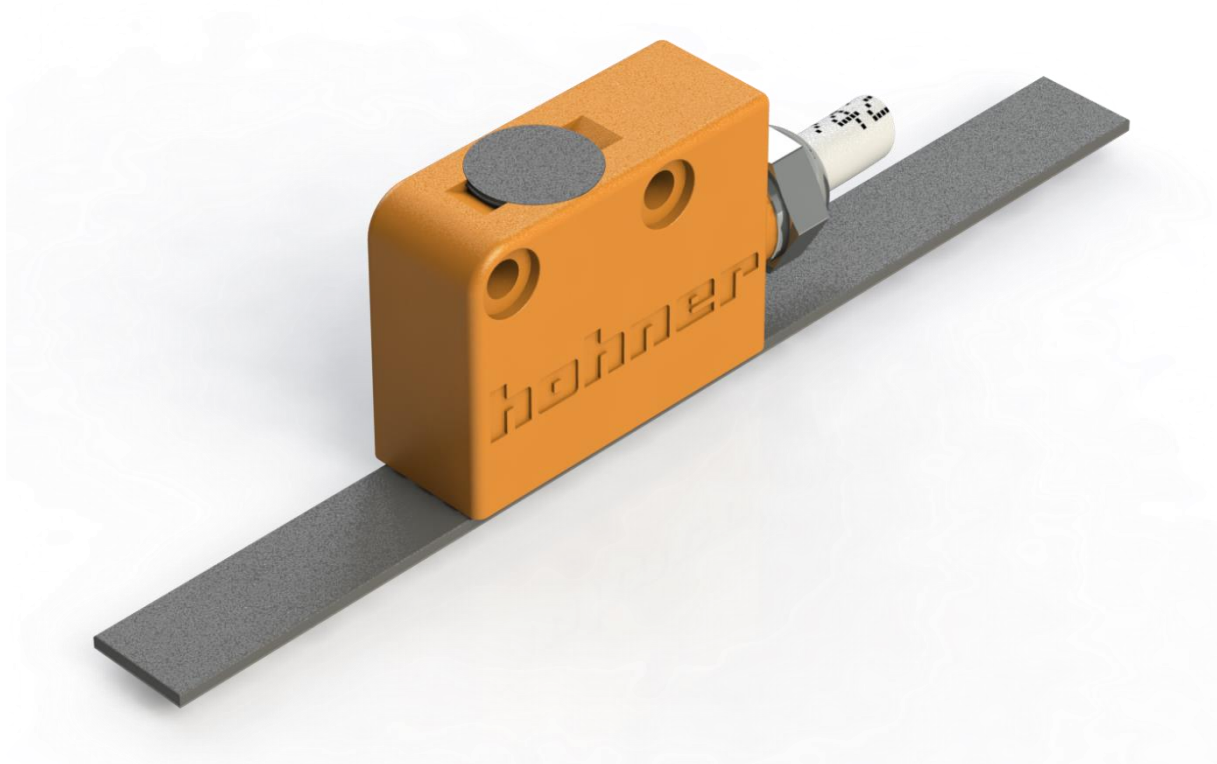


# SERIES DO2 - CO2

## Linear magnetic measuring systems

- Compact sensor with embedded converter
- Output signals proportional to speed
- Index pulse each 5mm on DO2 or 2mm on CO2
- Resolution 0.025mm on DO2 (each edges)
- Resolution 0.010mm on CO2 (each edges)
- Repeatability  $\pm 0.025$ mm on DO2 and 0.01 on CO2



Hohner Automazione srl  
Piazzale Cocchi, 10 · 21040 Veduggio Olona (VA) · Italy  
Tel 0332 866109 · Fax 0332 866066  
[www.hohner.it](http://www.hohner.it) · [hohner.info@hohner.it](mailto:hohner.info@hohner.it)

## Summary

1. Introduction .....	3
2. Sensor .....	3
2.1 Sensor operations .....	3
2.2 Resolution .....	3
2.3 Dimensions.....	3
3. Power Supply and Outputs .....	4
4. Electric connections .....	5
5. Output Waveforms .....	5
6. Mechanical Installation.....	5
6.1 Mechanical mounting tolerances .....	5
6.2 Sensing area .....	6
6.3 Mounting Example .....	6
6.4 Mounting with magnetic ring.....	7
6.5 Site environments warnings.....	7
6.6 Power supply.....	7
6.7 Noise protections .....	7
7. Magnetic Tape .....	7
7.1 Magnetic Tape placing .....	8
8. Technical Data .....	9
9. Order example .....	11

## 1. Introduction

DO2 - CO2 measuring system extends D0-C0 family sensors giving two main features:

1. Compact reading sensor with embedded converting electronic
2. Sensor can also mounted vertically (note, vertical sensor must be specified on order code adding option "L")

## 2. Sensor

### 2.1 Sensor operations

Sensor has integrated magneto resistor that generate analog signals during linear movements along magnetic tape.

Those analog signals are then converted to incremental digital data by converter. Both amplifiers, interpolator and output drivers are embedded inside sensor.

Output signals from sensor are typical square waveform usually seen on traditional optical linear system and rotary encoder.

Gap from sensor and magnetic tape must be less than 2.0mm for DO2 and 0.8mm for CO2. All gaps down to 0.1mm are accepted.

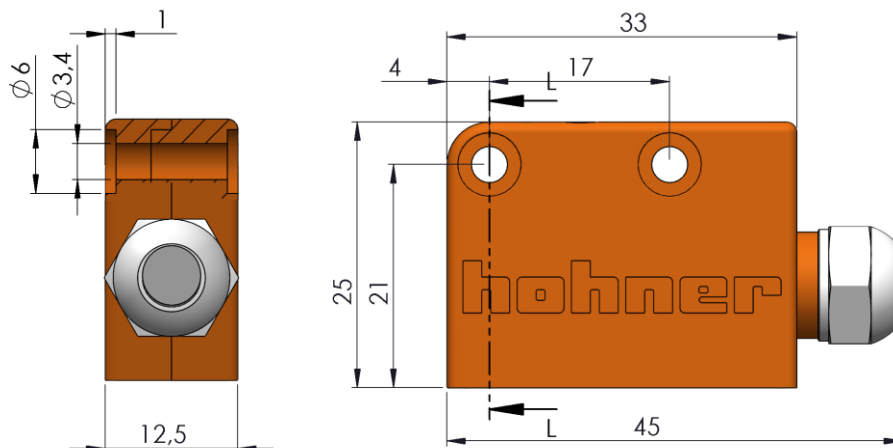
Electric cable is composed by 8 shielded pairs wires and is compatible with mobile installation.

### 2.2 Resolution

DO2: system resolution 0.1mm (measuring 1 edge each period).

CO2: system resolution 0.01mm (measuring 4 edges each period).

### 2.3 Dimensions



All quotes in mm

### 3. Power Supply and Outputs

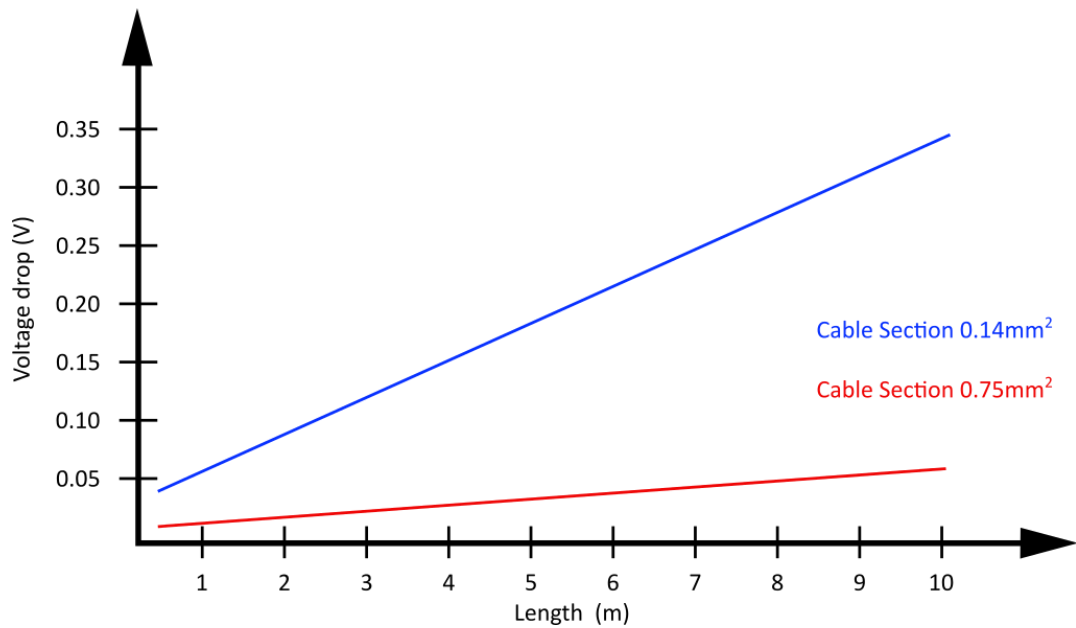
Following combination between power supply and output are available:

- |                          |  |
|--------------------------|--|
| 1. Power supply 5-28VDC  | Output Push-Pull 5-28VDC <sup>1</sup>      |
| 2. Power supply 11-27VDC | Output Line Driver 5VDC <sup>1</sup>       |
| 3. Power supply 5VDC     | Output Line Driver 5VDC <sup>1</sup>       |
| 4. Power supply 5-28VDC  | Output Open Collector 5-28VDC <sup>1</sup> |

1 - see page 10 and 11 for details

**Note: With cable length over 10 meters is advisable to supply 24V and use Line Driver sensor.**

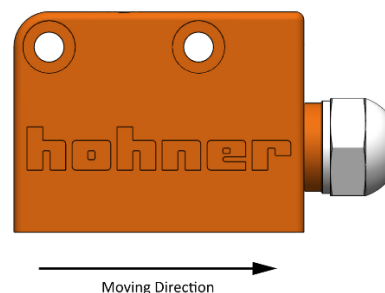
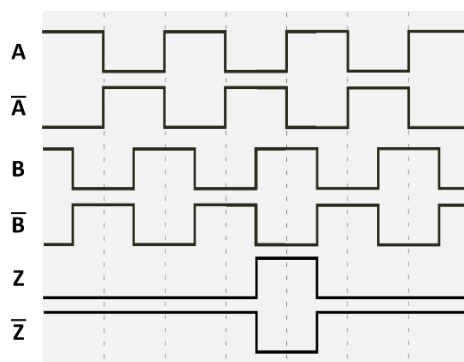
**Voltage drop vs cable length** (referred to 5V power supply)



## 4. Electric connections

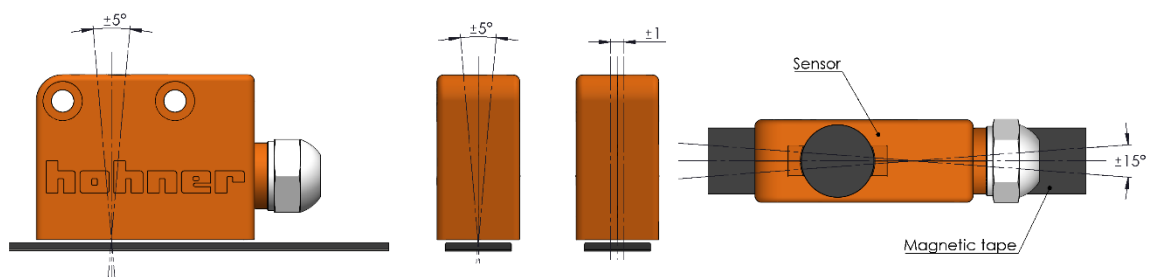
Function	Cable output ( <b>obsolete</b> ) Color	Cable output CABLESWISS mobile installation Color
0V	White	Black
+VDC	Brown	Blue
Channel A	Green	Brown
Channel B	Yellow	Beige (or White)
Channel Z	Black	Rose
Channel A negated	Violet	Green
Channel B negated	Orange	Yellow
Channel Z negated	Grey	Violet
Shield		

## 5. Output Waveforms



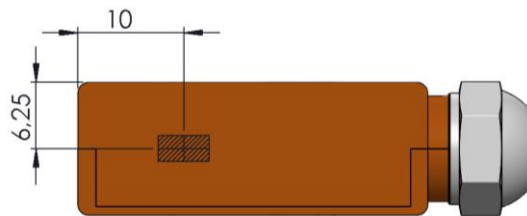
## 6. Mechanical Installation

### 6.1 Mechanical mounting tolerances

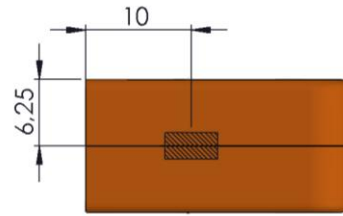


## 6.2 Sensing area

Following image show sensing area of the sensor.

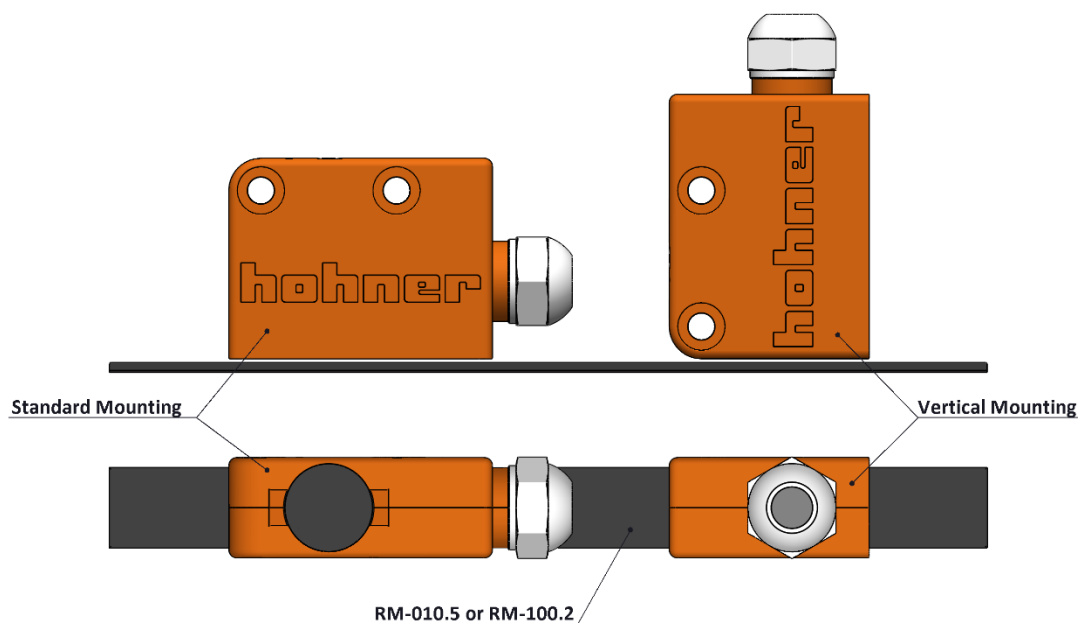


Standard Version



Vertical Version ("L" option)

## 6.3 Mounting Example



## 6.4 Mounting with magnetic ring

Sensor reading area is marked by a triangle on sensor label. Place sensor in middle of magnet ring.

## 6.5 Site environments warnings

Sensor must be placed at least at 0.5m far from inductive or capacitive noise sources, for example relays, motors, main net supply, inverter, etc. Also the cable must be placed far from previous noise sources.

## 6.6 Power supply

Sensor must be connected to a stabilized power supply, max 5% tolerance. Maximum ripple 50mV.

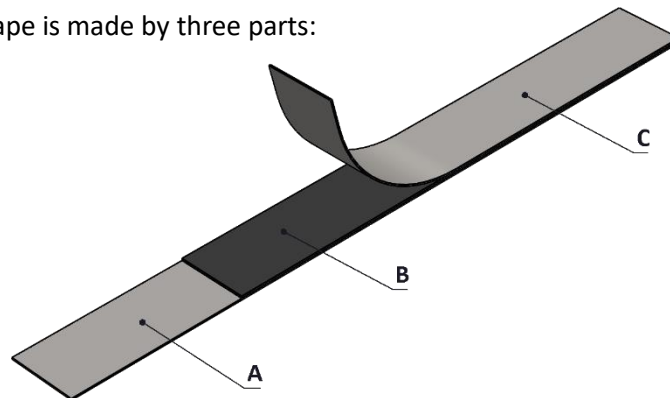
## 6.7 Noise protections

If, also by applying previous noise precaution, there will be noise, then, follow next advices:

1. Connect RC filters to AC contactors coils (ex.  $0.1\mu\text{F}/100\Omega$ ).
2. Connect diodes to DC inductors, electro valves, relays.
3. Connect RC filters on each motor phases and motor brake.
4. Use dedicated power supply for the sensor.

## 7. Magnetic Tape RM-010.5 (MB20.50) or RM-100.2 (MB20.20)

Hohner magnetic tape is made by three parts:



- A. Flexible steel magnetic tape. This tape give mechanical strength to magnetic tape (B). Furthermore it works as magnetic shield versus external magnetic field, this improve system accuracy.
- B. Plastic Magnetic tape. This tape is the main part of the whole tape, it is made by a plastic compound that is magnetized. It come already adherent to steel tape (A).
- C. Steel not magnetic tape. It is the first protection for the tape (B). It came separated from the other two tapes, this because it must be glued to plastic tape after the previously tapes are in place.

## 7.1 Magnetic Tape placing

### Suitable surface

Supplied self-adhesive tape can be placed on clean, dry and flat surfaces. Surface can be cleaned with common solvent (usually made by 50/50 alcohol isoprene and water, in each case follow producer instruction). In case of copper, brass, etc., surface must be protected by oxidation.

### Paste pressure

A good paste is obtained by a uniform pressure on tape during tape paste operation.

### Paste temperature

Tape paste must be done with temperature from +21°C to +38°C. It's inadvisable to paste with temperature less than +10°C, because in this case the adhesive is too much rigid to allow the right bonding. After right bonding, tape bonding is confirmed also at temperature lower than 0°C. Maximum adhesion is obtained after 72 hours (at 21°C).

### Tape storage

To avoid tension on plastic tape, tape must be stocked rolled up with plastic tape outside.

### Chemical influence

Low influence	Medium influence	Strong influence
<ul style="list-style-type: none"> <li>Formic acid</li> <li>Cottonseed oil</li> <li>Formaldehyde 40%</li> <li>Glycerine 93°C</li> <li>Hesano</li> <li>Iso-octane</li> <li>Linseed oil</li> <li>Lactic acid</li> <li>Mineral oil</li> <li>Soybean oil</li> </ul>	<ul style="list-style-type: none"> <li>Acetone</li> <li>Acetylene</li> <li>Undiluted ammonia</li> <li>Petrol</li> <li>Steam</li> <li>Acetic acid 20%</li> <li>Acetic acid 30%</li> <li>Petroleum</li> <li>Acetic acid/glacial acid</li> <li>Isopropyl ether</li> <li>Oleic acid</li> <li>Sea water</li> <li>Stearic acid 70°</li> </ul>	<ul style="list-style-type: none"> <li>Benzene</li> <li>Paint solvent</li> <li>Nitrobenzene</li> <li>Nitric acid 70%</li> <li>Red nitric acid</li> <li>Nitric acid 37%, 93°C</li> <li>Turpentine</li> <li>Trichloroethylene</li> <li>Dimethyl benzene</li> </ul>



## 8. Technical Data

### Sensor technical data

	DO2	CO2
Gap (tape – sensor)	Max 2.0mm	Max 0.8mm
Sensor Housing material	ABS	
IP protection	IP65 (dust and liquid) – IP67 on request	
Operating Temperature	0°C ... +50°C	
Output current	Max 20mA/channel	
Electrical protection	Short circuit – Reversed polarity	
Index	Repeated each 5mm	Repeated each 2mm

### 00 - Power Supply 5-28VDC – Output 5-28VDC Push Pull

Power Supply tolerance - ripple	Max 5% - <50mV	
Current consumption	Max 150mA	
Output frequency	Max 100KHz (channel A/B)	
Speed	Max 10.0m/s	Max 4.0m/s
Cable length	Max 30m	

### 01 - Power Supply 11-27VDC – Output 5VDC TTL Line Driver

Power Supply tolerance - ripple	Max 5% - <50mV	
Current consumption	Max 150mA	
Output frequency	Max 100KHz (channel A/B)	
Speed	Max 10.0m/s	Max 4.0m/s
Cable length	Max 50m	

### 11 - Power Supply 5VDC – Output 5VDC TTL Line Driver

Power Supply tolerance - ripple	Max 5% - <50mV	
Current consumption	Max 150mA	
Output frequency	Max 100KHz (channel A/B)	
Speed	Max 10.0m/s	Max 4.0m/s
Cable length	Max 50m	

### 02 - Power Supply 5-28VDC – Output 5-28VDC Open Collector

Power Supply tolerance - ripple	Max 5% - <50mV	
Current consumption	Max 150mA	
Output frequency	Max 100KHz (channel A/B)	
Speed	Max 10.0m/s	Max 4.0m/s
Cable length	Max 10m	

## Magnetic Tape technical data

Valid for RM-010.5 (MB20.50) and RM-100.2 (MB20.20).

Operating Temperature	0°C ... +60°C
Precision @+20°C	$\pm(0.025 + 0.022 \times L)$ - L = tape length [mm]
Linear expansion coefficient	$16 \times 10^{-6} \text{ m (m} \times ^\circ\text{C)}$
Bending radius	Min 150mm
IP protection	IP65

## PUSH – PULL Output

This kind of driver is usually used to improve performance of NPN and PNP driver. As known, main NPN/PNP disadvantage is due to collector resistor that increase considerably output impedance. Push-Pull driver, instead, use two complementary transistors, in this way it possible to obtain a very low impedance for both switching to ground and to positive voltage. This driver setup improve considerably frequency performance and permit link with longer cable at greater frequency. Last advantage is that Push-Pull driver is compatible also with standard NPN and PNP receiver.

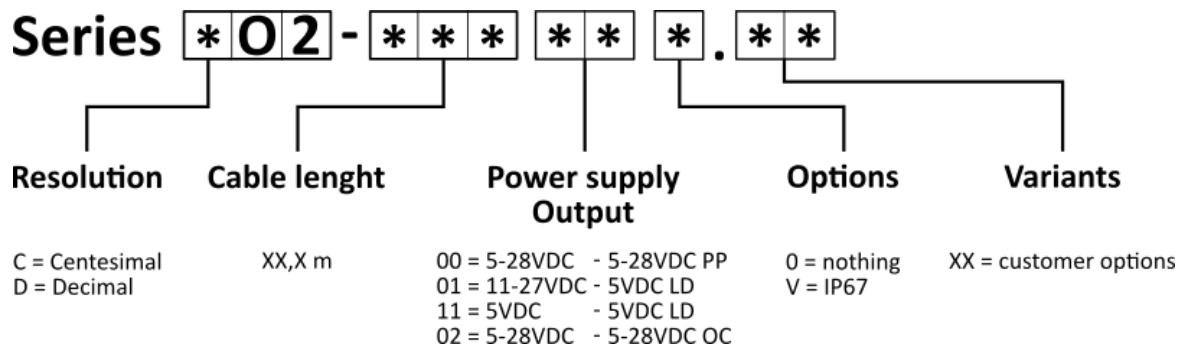
## LINE DRIVER Output

This kind of driver is usually used to improve electric noise immunity, furthermore it allow longer cable that other kind of drivers.

Data transmission and receiving occurs on two complementary channels so to remove noise from other electric device. This kind of noise is also known as “common mode” noise, this way this noise is always referred to a common voltage, usually ground of the plant. Instead, as wrote, Line Driver transmission happen on two complementary signals, so when signals arrive to receiver they are converted to one signal by difference of complementary signals. In this way also eventually noise on both signals is removed.

Line Driver system works on 5VDC systems (RS422 compatible). DO2 and CO2 can also be provided with input power supply to 11-27VDC and output Line Driver 5VDC, this is useful in case of severe conditions (long cable, instable power supply, noise).

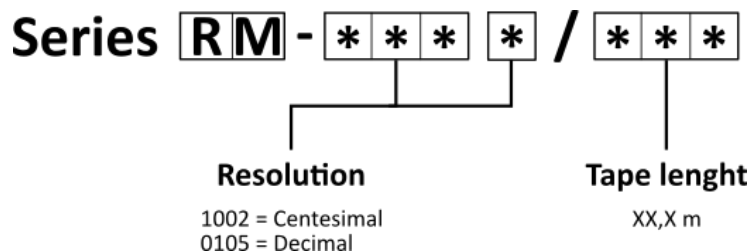
## 9. Order example



Note: for Power Supply/Output code 00, output levels TTL compatible  
(low level <0.5V – high level >+VCC-1.9V)

### Example:

**D02-105000** Decimal sensor - Cable length 10.5mm - Power supply 5-28VDC - Output 5-28VDC Push-Pull - no option



### Example:

**RM-100.2/25** Pole pitch 2mm – Tape length 25m

### DISCLAIMER

Hohner Automazione srl checked correspondences by this handbook and hardware, however we can't guarantee that there aren't some errors. Info in this handbook are periodically checked and updated, so please feel free to send your feedback.

Hohner Automazione Srl, reserves the right to apply changes.