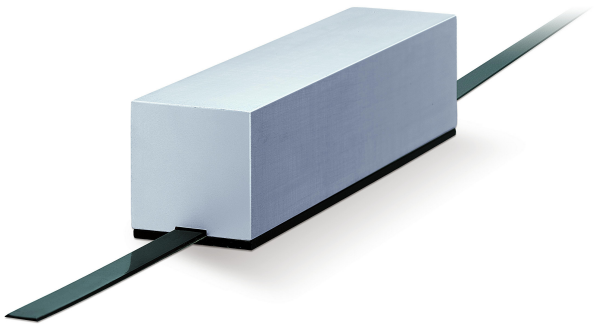
User manual

SMAL-GA-...(SSI, Gray code)
SMAL-BA-...(SSI, Binary code)

Description

This manual describes the products of SMAL series.
The purpose of this system is to measure linear displacements on lift system and on automation systems. The device is composed by a sensor with an integrated conversion electronic that moving along the magnetic tape, generates a signal equivalent to an absolute encoder.
The sensor has to be matched with MTAL magnetic tape.



Chapters

1 - Safety summary

Safety

- observe the professional safety and accident prevention regulations applicable to your country during device installation and operation;
- installation has to be carried out by qualified personnel only, without power supply and stationary mechanics parts;
- the device must be used only for the purpose appropriate to its design;
- high current, voltage and rotating parts can cause serious or fatal injury.

Electrical safety

- switch OFF the voltage before connecting the device;
- connect according to instructions of "Electrical connections";
- connect complementary and zero setting inputs to "0Vdc GND" if not used;
- according to the 89/336/CEE norm on electromagnetic compatibility, following precautions must be taken:

  - before handling and installing, discharge electrical charge from your body and tools which may come in touch with the device;
  - power supply must be stable without noise, install EMC filters on device power supply if needed;
  - always use shielded and twisted cables if possible;
  - avoid cables runs longer than necessary;
  - avoid running the signal cable near high voltage power cables;
  - mount the device as far as possible from any capacitive or inductive noise source, shield the device from noise source if needed;
  - minimize noise by connecting shield or connector housing to ground (GND). Make sure that ground (GND) is not affected by noise. The shield connection point to ground can be situated both on the device side and on user's side. The best solution to minimize the interference must be carried out by the user.

Mechanical safety

- install according to the section "Mounting instructions" with stationary mechanics parts;
- do not disassemble the device;
- do not tool the device;
- do not subject the device to knocks or shocks;
- protect the system against solvents and substances damaging it;
- respect the environmental characteristics of the product;
- be sure that the system is mounted where hard or sharp objects (e.g. metal chips) do not come into contact with the magnetic tape and the bottom of the sensor head. If these conditions cannot be avoided provide a wiper or pressurized air.

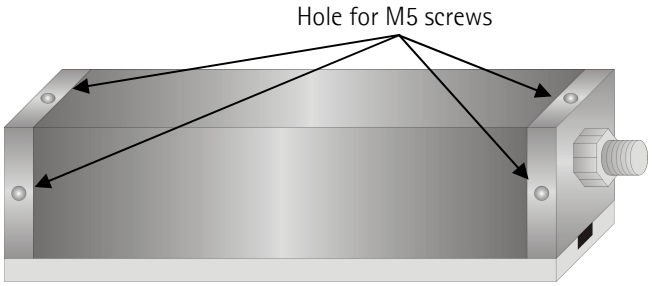
2 - Identification

The device can be identified by the label's data (ordering code, serial number). This information is listed in the delivery document. For technical features of the product, refer to the technical catalogue.

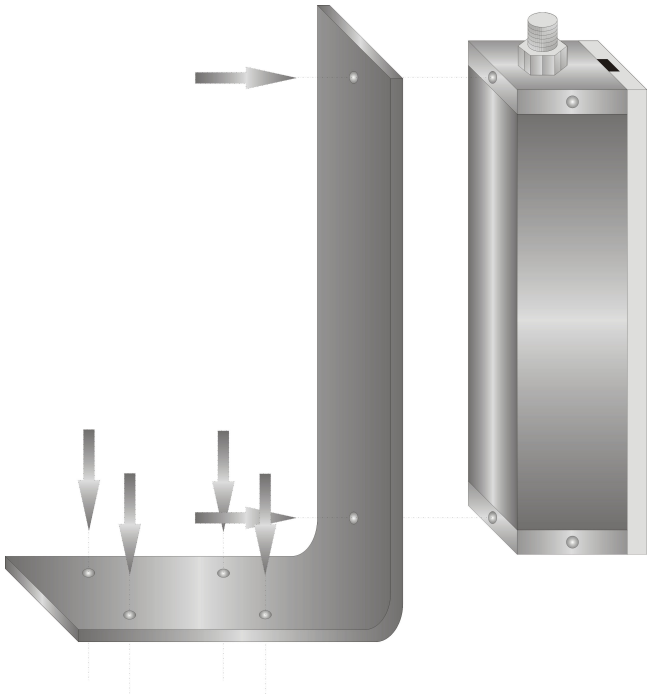
3 - Mounting instructions

3.1 Sensor mounting

Do not tool the device.



A - Fix the device to the square with M5 screws.
B - Connect the cable.
C - Put the square at the cabin roof adjusting the overhangs according to the desired working position and then fix it.

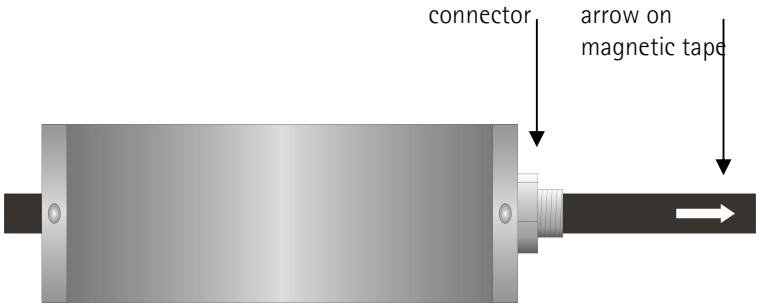


3.2 Magnetic tape

The magnetic tape must be insert on the device hole and fixed at the ends of the lift vane. The magnetic tape must be free to slide into device.

The active side of magnetic tape (black side), however installed, has to face the active part of magnetic sensor on electronic board

Install sensor and magnetic tape according to the above figure. The arrow shows positive counting direction.
The system doesn't work if mounted incorrectly.



4 - SSI interface

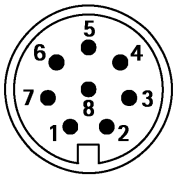
4.1 Electrical connections

ATTENTION:
minimize noise by connecting shield or device body to ground (GND). Make sure that ground (GND) is not affected by noise. It's recommended to provide the ground connection as close as possible to the device.

M12	Colour	Function
1	Black	0Vdc GND
2	Red	+10Vdc +30Vdc
3	Yellow	Clock in +
4	Blue	Clock in -
5	Green	Data out +
6	Orange	Data out -
7	White	Zero setting
8	Grey	Complementary

Specifications of the cable
Wires : 6 x 0.14mm^2 + 2 x 0.24mm^2
Screening : Copper
Outside Ø : Ø 5.2 mm ± 0.2 mm (Ø 0.2" ± 0.01")
Impedance : 6 x 145 Ω/km, 2 x 87 Ω/km

M12 connector:
male, frontal side



4.2 LED indicator

L1	Description
ON	Power supply ON
OFF	Power supply OFF

L2	Description
ON	Flash memory error
OFF	No error

L3	Not used

4.3 LSB right aligned protocol

The type of transmission protocol is "right aligned" with a length of 25 bits.
The transmission starts with MSB (most significant bit) and ends with LSB (less significant bit).
The device uses 19 bits for the position, unused bits are set to 0 (zero).
The output code of the sensor can be GRAY or BINARY:
SMAL-GA-... Gray code
SMAL-BA-... Binary code.
The position is transmitted in millimeters.

Position structure:

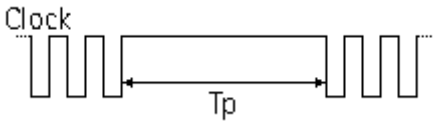
bit	24...19	18	...	0
value	000000	MSB	...	LSB

4.4 Recommended transmission rates

The SSI interface has a frequency of data transmission from 100 kHz to 1 MHz.
The CLOCK signal and DATA signal follow the "EIA standard RS-422".
The transmission rate (baud rate) depends on the length of cables.

Cable length	Baud rate
< 50 m	< 400 kHz
< 100 m	< 300 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz

The time interval between two Clock sequence transmissions must be at least 16µs (Tp > 16µs).



4.5 Complementary

The complementary function allows to change the sensor's counting direction. The function can be activated supplying a high level voltage (within the range of +10Vdc +30Vdc) to the complementary input.
ATTENTION : after a change of counting direction a reset of the position is necessary.

4.6 Zero setting

The output value can be set to zero (reset) by means of an external signal from PLC or other device. The internal microprocessor uses this signal to perform reset of position value. The position reset is possible only at still stand of the sensor (not moving). The reset signal has to be at logic level HIGH (from 10Vdc to 30Vdc) for 100 μsec minimum.

Man.Vers.	Description
1.0	1st issue
1.1	Chapter 4.4 up to date
1.2	General revision
1.3	Chapter 4.1 up to date

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Lika Electronic
Via S. Lorenzo, 25 - 36010 Carrè (VI) - Italy

Tel. +39 0445 806600
Fax +39 0445 806699

Italy : eMail info@lika.it - www.lika.it
World : eMail info@lika.biz - www.lika.biz