

Brief Instruction

GB-Series

Magnetostrictive Linear Position Sensors



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1. Introduction

1.1 Purpose and use of this manual

Before starting the operation of Temposonics® sensors read this documentation thoroughly and follow the safety information. Keep the manual for future reference!

The content of this technical documentation is intended to provide information on mounting, installation and commissioning by qualified automation personnel¹ or instructed service technicians who are familiar with the project planning and dealing with Temposonics® sensors.

1.2 Used symbols and warnings

Warnings are intended for your personal safety and for avoidance of damage to the described product or connected devices. In this documentation, safety information and warnings to avoid danger that might affect the life and health of operating or service personnel or cause material damage are highlighted by the preceding pictogram which is defined below.

Symbol	Meaning
NOTICE	This symbol is used to point to situations that may lead to material damage, but not to personal injury.

- 1/ The term qualified technical personnel characterizes persons who:
- are familiar with the safety concepts of automation technology applicable to the particular project
 - are competent in the field of electromagnetic compatibility (EMC)
 - have received adequate training for commissioning and service operations
 - are familiar with the operation of the device and know the information required for correct operation provided in the product documentation.

2. Safety instructions

2.1 Intended use

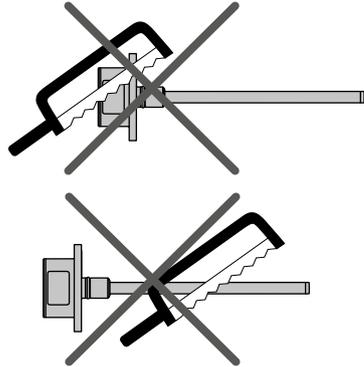
This product may be used only for the applications defined under item 1 only in conjunction with the third-party devices and components recommended or approved by Temposonics. As a prerequisite of proper and safe operation the product requires correct transport, storage, mounting and commissioning and must be operated with utmost care.

1. The sensor systems of all Temposonics® series are intended exclusively for measurement tasks encountered in industrial, commercial and laboratory applications. The sensors are considered as system accessories and must be connected to suitable evaluation electronics, e.g. a PLC, IPC, indicator or other electronic control unit.

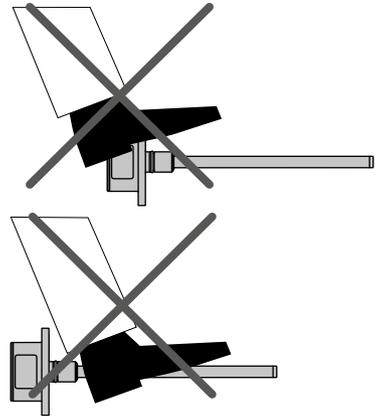
2.2 Forseeable misuse

Forseeable misuse	Consequence
Wrong sensor connection	The sensor does not work properly or will be destroyed
Operate the sensor out off the operating temperature	No signal output The sensor can be damaged
Power supply is out of the defined range	Signal output is wrong / no signal output / the sensor will be damaged
Position measurement is influenced by an external magnetic field	Signal output is wrong
Cables are damaged	Short circuit – the sensor can be destroyed / sensor does not respond
Spacers are missing / are installed in a wrong order	Error in position measurement
Wrong connection of ground / shield	Signal output is disturbed The electronics can be damaged
Use of a magnet that is not certified by Temposonics	Error in position measurement

Do not reprocess the sensor afterwards.
→ The sensor might be damaged.



Do not step on the sensor.
→ The sensor might be damaged.



2.3 Installation, commissioning and operation

The position sensors must be used only in technically safe condition. To maintain this condition and to ensure safe operation, installation, connection and service, work may be performed only by qualified technical personnel.

If danger of injury to persons or of damage to operating equipment is caused by sensor failure or malfunction, additional safety measures such as plausibility checks, limit switches, EMERGENCY STOP systems, protective devices etc. are required. In the event of trouble, shut down the sensor and protect it against accidental operation.

Safety instructions for commissioning

To maintain the sensor's operability, it is mandatory to follow the instructions given below.

1. Protect the sensor against mechanical damage during installation and operation.
2. Do not open or dismantle the sensor.
3. Connect the sensor very carefully and pay attention to the polarity of connections and power supply.
4. Use only approved power supplies.
5. It is indispensable to ensure that the specified permissible limit values of the sensor for operating voltage, environmental conditions, etc. are met.
6. Check the function of the sensor regularly and provide documentation of the checks.
7. Before applying power, ensure that nobody's safety is jeopardized by starting machines.

2.4 Safety instructions for use in explosion-hazardous areas

The sensors are not suitable for operation in explosion-hazardous areas.

2.5 Warranty

Temposonics grants a warranty period for the Temposonics® position sensors and supplied accessories relating to material defects and faults that occur despite correct use in accordance with the intended application ². The Temposonics obligation is limited to repair or replacement of any defective part of the unit. No warranty can be provided for defects that are due to improper use or above average stress of the product, as well as for wear parts. Under no circumstances will Temposonics accept liability in the event of offense against the warranty rules, no matter if these have been assured or expected, even in case of fault or negligence of the company.

Temposonics explicitly excludes any further warranties. Neither the company's representatives, agents, dealers nor employees are authorized to increase or change the scope of warranty.

2.6 Return

For diagnostic purposes, the sensor can be returned to Temposonics. Any shipment cost is the responsibility of the sender ². For a corresponding form, see detailed operation manual (available at: www.Temposonics.com).

2.7 Maintenance & removal

Maintenance

The sensor is maintenance-free.

Repair

Repairs on the sensor may be performed only by Temposonics or a repair facility explicitly authorized by Temposonics.

List of spare parts

No spare parts are available for this sensor.

Transport and storage

The conditions of transport and storage of the sensor match the operating conditions mentioned in this document.

Removal from service / dismantling

The product contains electronic components and must be disposed of in accordance with the local regulations.

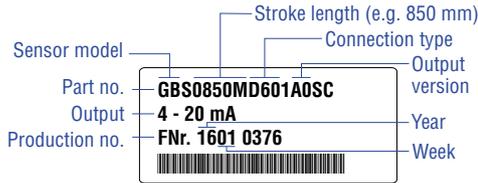
^{2/} See also applicable Temposonics sales and supply conditions, e.g. at www.Temposonics.com

Temposonics® GB-Series

Brief Instructions

3. Identification

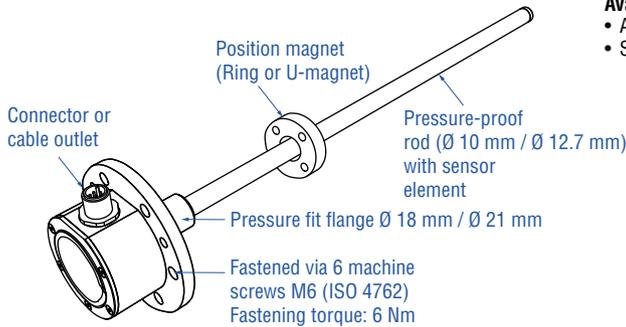
Nameplate (e.g. GB-Series GB-S Analog)



Approvals and certificates

You will find approvals and certificates in the sensor specific operation manuals.

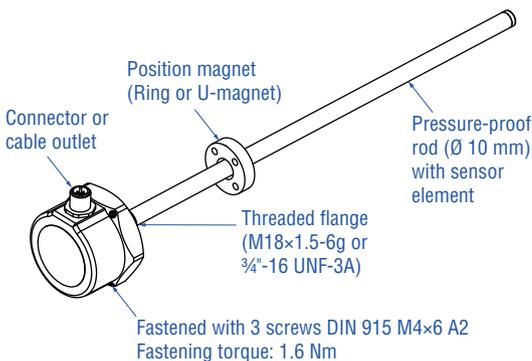
3.1 Temposonics® GB-Series with pressure fit flange (GB-J / GB-K / GB-N / GB-S)



Available outputs:

- Analog
- SSI

3.2 Temposonics® GB-Series GB-M / GB-T with threaded flange (GB-M / GB-T)



Available outputs:

- Analog
- SSI

Manuals, Software & 3D Models available at:
www.temposonics.com

4. Installation & mounting

4.1 Sensor installation

General

- Seat the flange contact surface completely on the cylinder mounting surface.
- The cylinder manufacturer determines the pressure-resistant gasket (copper gasket, O-ring, etc.).
- The position magnet should not grind on the sensor rod.
- The piston rod drilling ($\geq \varnothing 13$ mm / for GB-J and GB-K sensors: $\geq \varnothing 16$ mm) depends on the pressure and piston speed.
- Adhere to the information relating to operating pressure.
- Protect the sensor rod against wear.

GB-Series with pressure fit flange

Mount the sensor via the fitting flange through the bores in the sensor electronics housing with 6 machine screws M6×16 A2-70 (ISO 4762). Note the fastening torque of 6 Nm. The hydraulic sealing requires the use of a supplied O-ring 15 × 2 mm (GB-J: 17 × 2 mm).

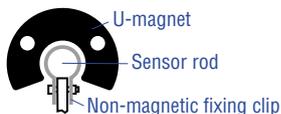
GB-Series with threaded flange

Mount the sensor via the threaded flange M18×1.5-6g or ¾"-16 UNF-3A. Note the fastening torque of 50 Nm.

Notice for sensors with stroke lengths ≥ 1 meter

Support horizontally installed sensors with a stroke length from 1 meter mechanically at the rod end. Without the use of a support, rod and position magnet may be damaged. A false measurement is also possible. Longer rods require evenly distributed mechanical support over the entire length. Use an U-magnet for measurement.

Sensor support (for sensors with stroke length ≥ 1 meter)



NOTICE

For detailed mounting instructions see operation manual.

4.2 Magnet installation

Typical use of magnets

- | | |
|--|--|
|  <p>Ring magnet</p> | <ul style="list-style-type: none"> • Rotationally symmetrical magnetic field |
|  <p>U-magnet</p> | <ul style="list-style-type: none"> • The magnet can be lifted off • Height tolerances can be compensated |

Install the magnet using non-magnetic material for mounting device, screws, spacers etc.. The magnet must not grind on the sensor rod. Alignment errors are compensated via the air gap.

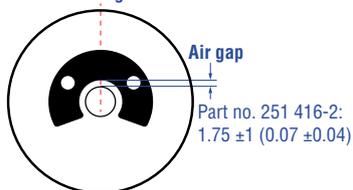
- Max. permissible surface pressure: 40 N/mm²
- Fastening torque for M4 screws: 1 Nm; use washers, if necessary
- Minimum distance between position magnet and any magnetic material has to be 15 mm.
- If no other option exists and magnetic material is used, observe the specified dimensions.

NOTICE

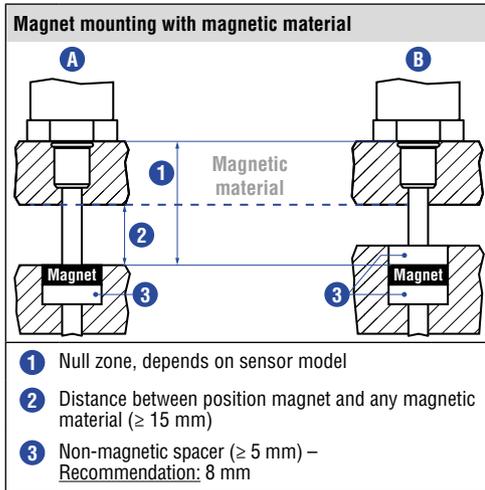
Mount the ring magnet and U-magnet concentrically. The maximum permissible air gap must not be exceeded.

Concentric mounting of U-magnet

Concentric mounting of U-magnet



- 1 U-magnet
- 2 Non-magnetic mounting device and screws

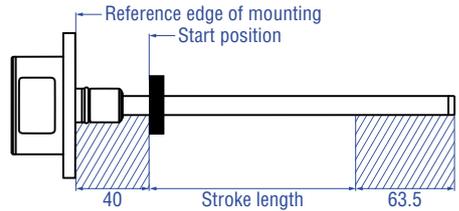


Magnet mounting with magnetic material

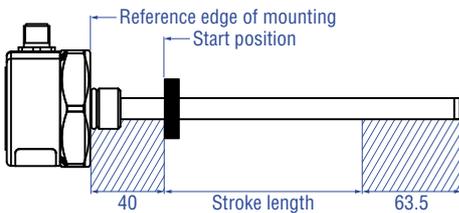
- A. If the position magnet aligns with the drilled piston rod
- B. If the position magnet is set further into the drilled piston rod, install another non-magnetic spacer above the magnet

4.3 Mounting dimensions of GB-Series

GB-Series with pressure fit flange with ring / U-magnet



GB-Series with threaded flange with ring / U-magnet



NOTICE

On all sensors, the areas left and right of the active stroke length are provided for mounting and damping of the measuring signal. They could not be used for measurement, but the active stroke length can be exceeded.

5. Electrical connection

Placement of installation and cabling have decisive influence on the sensor's electromagnetic compatibility (EMC). Hence correct installation of this active electronic system and the EMC of the entire system must be ensured by using suitable metal connectors, shielded cables and grounding. Overvoltages or faulty connections can damage its electronics despite protection against wrong polarity.

NOTICE

Never connect / disconnect the sensor when voltage is applied.

Instructions for connection

- Use low-resistant twisted pair and shielded cables and connect the shield to ground externally via the controller equipment.
- Keep control and sign leads separate from power cables and sufficiently far away from motor cables, frequency inverters, valve lines, relays, etc..
- Use only connectors with metal housing and connect the shielding to the connector housing.
- Keep the connection surface at both shielding ends as large as possible.
- Keep all non-shielded leads as short as possible.
- Keep the earth connection as short as possible with a large cross section. Avoid ground loops.
- With potential differences between machine and electronics earth connections, no compensating currents are allowed to flow across the cable shielding.

Recommendation:

Install potential compensating leads with large cross section, or use cables with separate double shielding, and connect only one end of the shield.

- Use only stabilized power supplies in compliance with the specified connecting values.

NOTICE

Do not mount the sensors in an area of strong magnetic or electric noise fields.

NOTICE

Connect the sensor electronics housing to the machine ground via pressure fit flange respectively via threaded flange.

5.1 Analog

D34 (for outputs: V0, A0, A1, A2, A3 in order code)

Signal + power supply

M12 male connector (A-coded)	Pin	Voltage	Current
 <p>View on sensor</p>	1	+24 VDC (-15 / +20 %)	+24 VDC (-15 / +20 %)
	2	0...10 VDC	4(0)...20 mA or 20... 4(0) mA
	3	DC Ground (0 V)	DC Ground (0 V)
	4	10...0 VDC	Not connected *
	5	DC Ground	DC Ground

* Connection necessary for programming with hand or cabinet programmer

D34 (for output: A4 in order code)

Signal + power supply

M12 male connector (A-coded)	Pin	Current
 <p>View on sensor</p>	1	+24 VDC (-15 / +20 %)
	2	4...20 mA *
	3	DC Ground (0 V)
	4	20...4 mA
	5	DC Ground

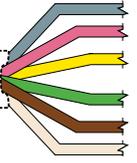
* Connect the first output (4...20 mA) at low-resistance, if you only use the second output (20...4 mA)

Temposonics® GB-Series

Brief Instructions

D60 (for outputs: V0, A0, A1, A2, A3 in order code)			
Signal + power supply			
M16 male connector	Pin	Voltage	Current
 <p>View on sensor</p>	1	0...10 VDC	4(0)...20 mA or 20... 4(0) mA
	2	DC Ground	DC Ground
	3	10...0 VDC	Not connected *
	4	DC Ground	DC Ground
	5	+24 VDC (-15 / +20 %)	+24 VDC (-15 / +20 %)
	6	DC Ground (0 V)	DC Ground (0 V)

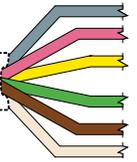
* Connection necessary for programming with hand or cabinet programmer

HXX / TXX / VXX (for outputs: V0, A0, A1, A2, A3 in order code)			
Signal + power supply			
Cable	Color	Voltage	Current
	GY	0...10 VDC	4(0)...20 mA or 20... 4(0) mA
	PK	DC Ground	DC Ground
	YE	10...0 VDC	Not connected *
	GN	DC Ground	DC Ground
	BN	+24 VDC (-15 / +20 %)	+24 VDC (-15 / +20 %)
	WH	DC Ground (0 V)	DC Ground (0 V)

* Connection necessary for programming with hand or cabinet programmer

D60 (for output: A4 in order code)		
Signal + power supply		
M16 male connector	Pin	Current
 <p>View on sensor</p>	1	4...20 mA *
	2	DC Ground
	3	20...4 mA
	4	DC Ground
	5	+24 VDC (-15 / +20 %)
	6	DC Ground (0 V)

* Connect the first output (4...20 mA) at low-resistance, if you only use the second output (20...4 mA)

HXX / TXX / VXX (for output: A4 in order code)		
Signal + power supply		
Cable	Color	Current
	GY	4...20 mA *
	PK	DC Ground
	YE	20...4 mA
	GN	DC Ground
	BN	+24 VDC (-15 / +20 %)
	WH	DC Ground (0 V)

* Connect the first output (4...20 mA) at low-resistance, if you only use the second output (20...4 mA)

NOTICE DANGER OF SHORT-CIRCUIT!

Insulate the conductors of the second output (yellow, green), if you only use the first output. We recommend providing terminals for the second output in the control cabinet, since the leads are required for sensor programming.

5.2 SSI

D84

Signal + power supply

M12 male connector (A-coded)	Pin	Function
 <p>View on sensor</p>	1	Clock (+)
	2	Clock (-)
	3	Data (+)
	4	Data (-)
	5	Not connected
	6	Not connected
	7	+24 VDC (-15 / +20 %)
	8	DC Ground (0 V)

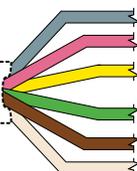
D70

Signal + power supply

M16 male connector	Color	Function
 <p>View on sensor</p>	1	Data (-)
	2	Data (+)
	3	Clock (+)
	4	Clock (-)
	5	+24 VDC (-15 / +20 %)
	6	DC Ground (0 V)
	7	Not connected

GB with cable outlet (HXX / TXX / VXX)

Signal + power supply

Cable	Color	Function
	GY	Data (-)
	PK	Data (+)
	YE	Clock (+)
	GN	Clock (-)
	BN	+24 VDC (-15 / +20 %)
	WH	DC Ground (0 V)

NOTICE

Connect the sensor electronics housing to the machine ground via fitting flange respectively via threaded flange.



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