The ***Magnetostrictive*** Position Sensors

MTS®
SENSORS GROUP

Temposonics® R-Series

Rod Model RD compact

- ***Linear, Absolute Position Measurement in Hydraulic Cylinders***
- ***Absolute Displacement Sensor***
- ***Non-contact Sensing***
- ***Stable Design, Minor Dimensions***
- ***Resolution: Up to 5 µm***
- ***Linearity Tolerance: Better 0,02 %, Repeatability 0,001 %***
- ***Direct 25 / 24 Bit SSI-Output***
- ***Measuring Range: 25 - 3500 mm***

Precision is our Strength!

CE ISO 9001 CERTIFIED

SSI-Output

Temposonics-RD, *SSI Output*

Function

Temposonics - RD are highly repeatable, absolute position sensors for linear movements. Specifically designed for internal clevis type cylinder mounting, the sensing element is connected to the head electronics via an interconnection cable allwing the head assembly to be mounted adjacent to the sensor.
This makes the Temposonics-RD ideal for use in small cylinders or any space limited cylinder applications. Using the magnetostrictive technology, which MTS pioneered, the sensor precisely measures the position of an external magnet through the sensor rod with a high degree of resolution and accuracy.

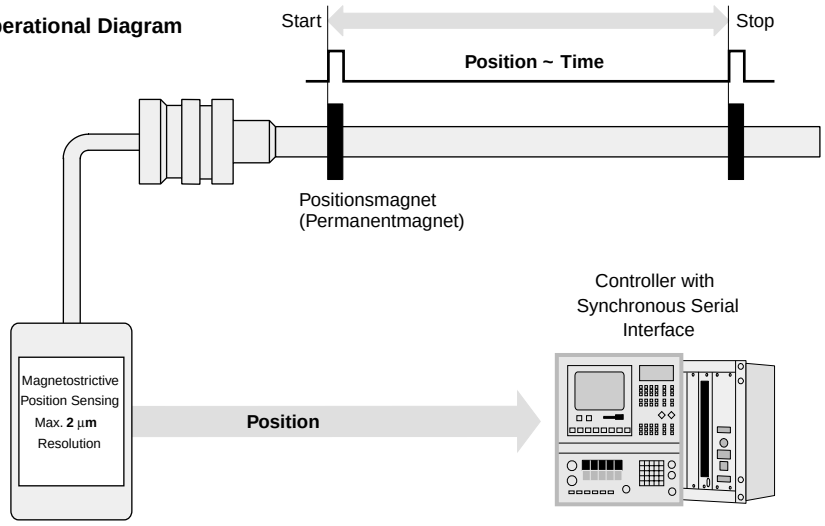
Output

Temposonics - RD digital sensors offer an SSI output in which resolution up to **2 µm** is standard.
The displacement value is encoded in a **25- or 24-bit** Binary or Gray code format and transmitted at high speed via SSI interface in **RS 422/485** standard to the control device.
The **S**ynchronous **S**erial **I**nterface is the most widely used output between sensors and controllers.

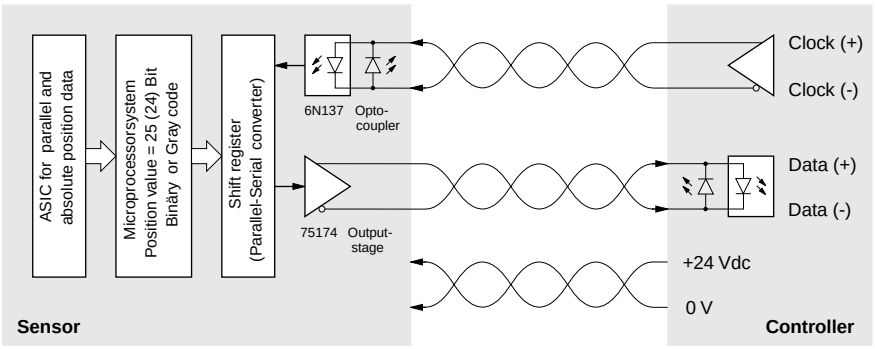
Data Transfer

Main feature of SSI is the synchronized data transfer. Synchronization in a closed-loop control system is made simple. A clock pulse train from a controller is used to gate out sensor data: one bit of position data is transmitted to the controller per one clock pulse received by the sensor. The absolute, parallel position data is continually updated by the sensor and converted by the shiftregister into serial information. Between each clock pulse train there is a minimum dwell of 25 µs during which fresh data is moved into the register. Data is shifted out when the sensor receives a pulse train from the controller. When the least significant bit (LSB) goes HIGH and the minimum dwell time has elapsed, new data is available to read.

Operational Diagram



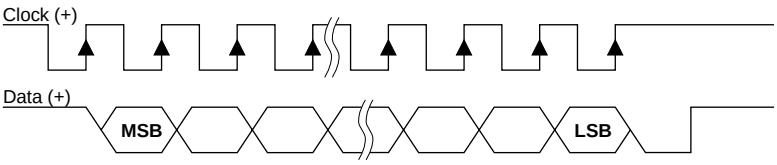
Logic Diagram



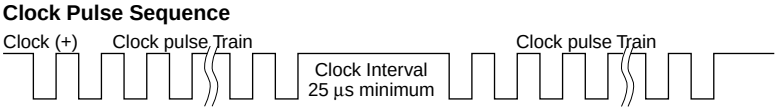
Measuring Frequency

Measuring Range, mm:	up to 500	750	1000	2000
Measurements per Second, kHz:	4,3	3,2	2,5	1,3

Timing Diagramm



Clock Pulse Sequence



Data Transmission Speed

Cable Length: < 3		< 50	< 100	< 200	< 400 m
Baud Rate:	1,5 MBd	< 400 kBd	< 300 kBd	< 200 kBd	< 100 kBd

The baud rate, depending on cable length, has a maximum of 1,5 MBaud / min 70 kBaud.
Please use shielded cable with twisted pairs.

Product Specifications

Input	***Measured Variable:*** Displacement ***Measuring Range:*** 25 - 3500 mm
Output	***Signal:*** SSI (Synchronous Serial Interface) - RS 422/485 standard ***Current:*** 70 mA typical ***Data Format:*** Binäry or Gray encodes ***Hysteresis:*** < 4 µm
Accuracy	***Resolution:*** 2 µm maximim ***Linearity, uncorrected:*** < ± 0,02% F.S. (Minimum ± 100 µm) ***Repeatability:*** < ± 0,001% F.S. (Minimum ± 2,5 µm) ***Ripple:*** < 1% peak to peak
Operating conditions	***Mounting Position, Sensor:*** Any orientation ***Magnet Speed:*** Any ***Dew Point, Humidity:*** 90% rel. humidity, no condensation ***Operating Temperature:*** -40° C ... +75° C ***Temperature Coefficient:*** <15 ppm/° C ***Enclosure:*** IP 65 ***EMC-Test:*** DIN IEC 801-4 / Type 4 / CE qualified ***Shock Rating:*** 100 g (Single hit) / IEC-Standard 68-2-27 ***Vibration Rating:*** 5 g / 10 - 150 Hz / IEC-Standard 68-2-6
Form factor, Material	***Sensor head:*** Aluminium diecasting housing ***Rod with Flange:*** Stainless steel ***Pressure Rating:*** 350 bar, 530 bar peak pressure ***Magnet Type:*** Position magnets
Installation	***Mounting:*** Press fit or thread M18 x 1,5
Electrical connections	***Connection Type:*** Integral cable output ***Input Voltage:*** 24 VDC (+20% / -15%) ***Current Drain:*** 70 mA typical ***Ripple:*** < 1% peak to peak ***Electric Strength:*** 500 V (DC ground to machine ground)

Temposonics-RD, *SSI Output*

Dimensions

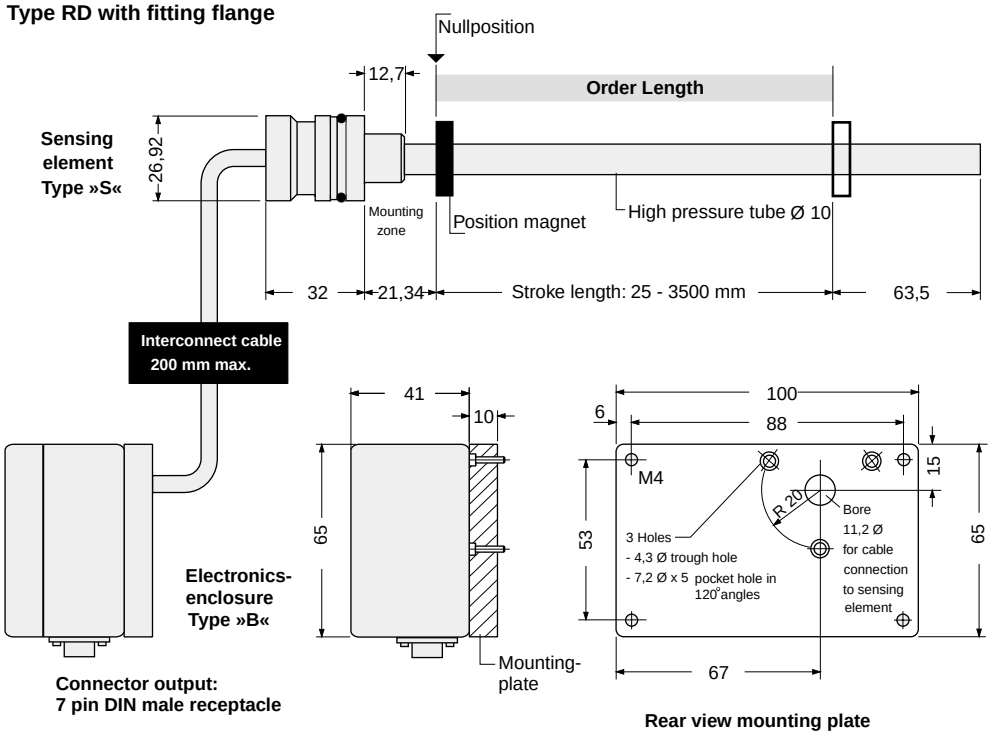
Temposonics-RD,
Measuring Range 25 - 3500 mm

The pressure proof stainless steel sensing element of the Temposonics-RD sensor can be build in when space is at a premium. The interconnection cable is mechanically protected by a oil-resistant teflon coating and a metallic shield and its maximum length is 200 mm. The sensor electronic is mounted in the high-pressure housing (IP65) and is connected to the sensing element via terminal screws. The housing is equipped with cable output and Pg-fitting for being connected to the controller.

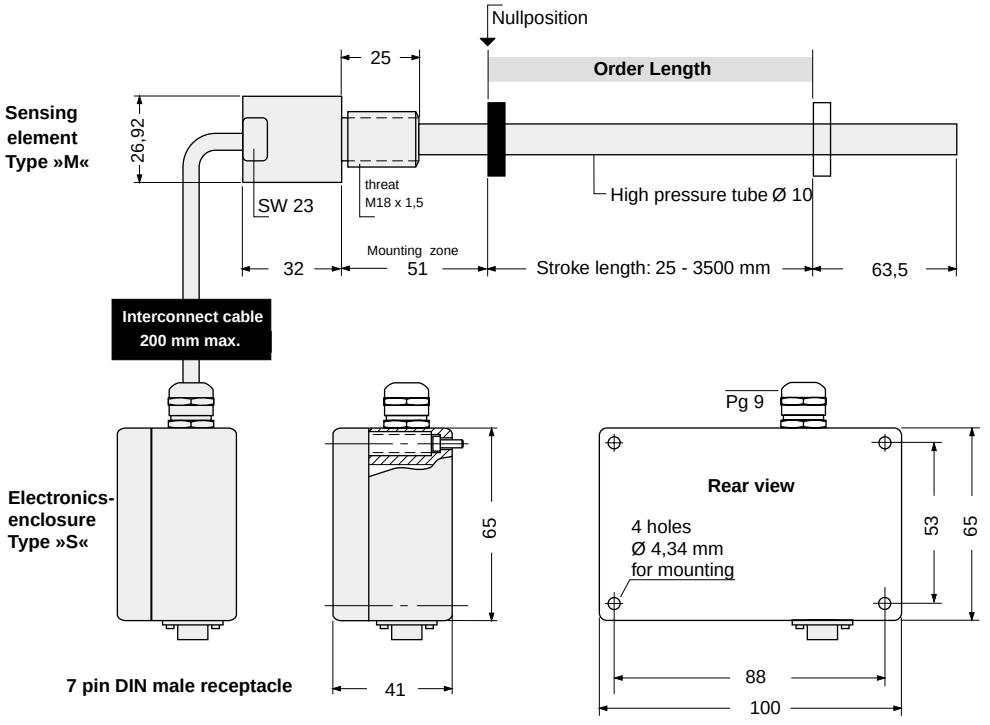
Option:
selectable length of cable with or w/o cable connector.

The Temposonics-RD sensor with pressure housing was designed for use in hydraulic cylinders, specifically for space limited units. An adapterplate for the electronic housing makes mounting under restricted conditions possible. For being able to mount sensor and cable capsulated the connection to the sensor element has been solved via the bottom of the housing (see page 5).

Type RD with fitting flange



Type RD with threaded flange



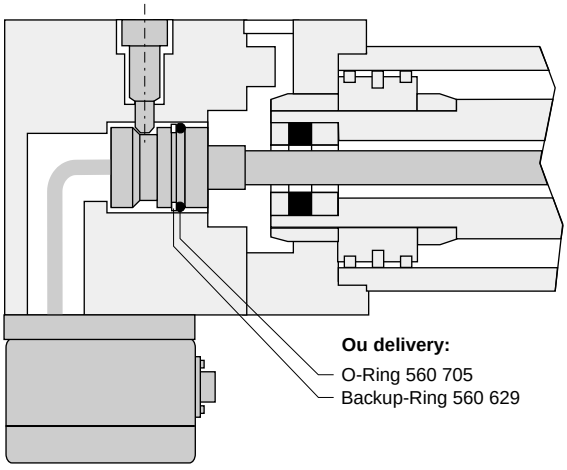
Installation

The TEMPOSONICS-RD (type right) is designed for installation into hydraulic cylinders. Mounting of a RD sensor requires the use of a O-ring (black) and a backup-ring (orange). Both are supplied with the sensor. The sensor will be fixed via special screw.

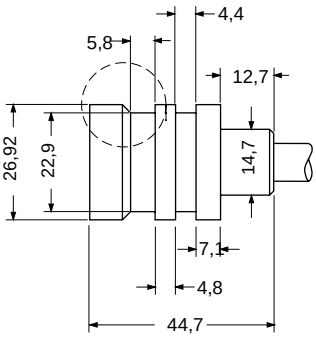
Installation Notes.

When mounted in the manner as shown, the interconnect cable is shielded according to the EMV norms at the cylinder end cap. However, when the RD sensor is mounted in an alternative way, proper care must be taken to shield the interconnect cable.

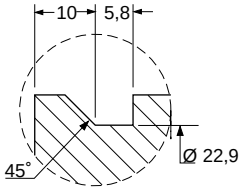
Sensor with fitting flange

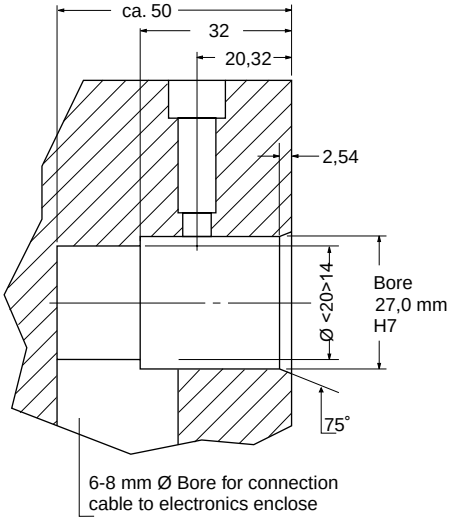


Sensor Element Style »S« with Electronics Housing Style »B«



Detail: Fitting flange

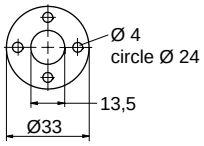




Detail:
Cap shoulder screw 8 M6 - ISO 7379 with hex. socket

Technical alterations reserved!

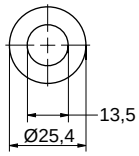
Position magnets



Ring magnet Ø 33, standard
Height = 8 mm

Part No. 201 542

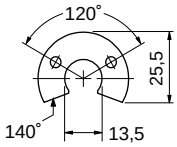
Material: PA 66-GF 30, magnets compound-filled, weight ca. 10 g, operating ***temperature:*** *-40...+75° C*



Ring magnet Ø 25,4
Height = 8 mm

Part No. 400 533

Material: Composite PA-Ferrite weight ca. 10 g, operating ***temperature:*** *-40...+100° C*



Open Ring magnet Ø 33
Height = 8 mm

Part No. 401 416

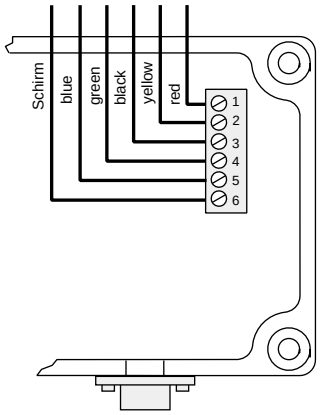
Material: PA 66-GF 30 magnets compound-filled, weight ca. 8 g, operating ***temperature:*** *-40...+75° C*

Temposonics-RD, *SSI Output*

Wiring

Electronics Housing

Interconnect cable to Sensor Element



7 pin DIN male receptacle

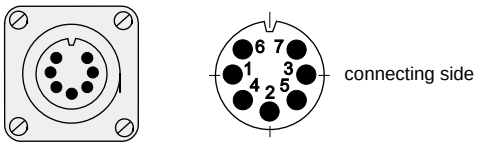
Internal terminal wiring for sensor element

	Pin No.	Cable	Function
Interconnection cable wiring customer side	1	red	Vin (SE)
	2	yellow	SE (aus)
	3	black	Ground
	4	green	WG (--)
	5	blue	WG (+)
	6	Cable shield	Machine ground

Attention!

Cable shield must be connected to EMC-PG!
Pls. connect parts with corresponding Part No. only.

Connector output



7 pin DIN male receptacle

Wiring

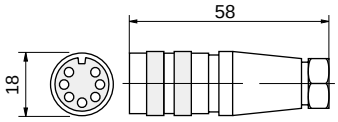
Pin	Cable	Function
1	gray	Data (-)
2	pink	Data (+)
3	yellow	Clock (+)
4	green	Clock (-)
5	brown	+ 24 V dc
6	white	0 V
7	***Do not connect***	

Attention!

Cable shield and DC Ground have to be isolated separately!

Connector

(Pls. order separately)



7 pin DIN female cable connector

Part No. ST C0 9131 D07

Housing	Metal shell
Termination	solder
Contact insert	Female, silver plating
Cable Clamp	Pg 7
Cable Ø max.	6 mm
Cable type	7 wires, twisted pairs, shielded (e.g. PUR cable 7 x 0,14 mm²)

Temposonics-RD, *SSI Output*

Ordering Guide

Sensing System

Temposonics | R | D | | | | | | | | M | D | 7 | 0 | 1 | S | | | | 1 | | |

Scope of delivery:

Sensing Element, Electronics Housing.

Magnets are not included with rod-style sensors. They must be ordered separately.

Pls. order accessories separately!

[1] **only to use with housing style»B«**
[2] **only to use with housing style»S«**

*** Measuring Range:**

Standard:

- up to 1000 mm in 50 mm Steps
- up to 3500 mm in 250 mm Steps

Options:
Other stroke length upon request.

Sensor Element Style
S = Pressure-fit housing[1)]
M = Metric flange, thread M18 x 1,5[2)]

Electronics Housing Style
B = Bottom entry
S = Side entry

Measuring Length (Order Length)*
0025 - 3500 mm

Connection Type
D70 = 7 pin DIN male receptacle

Input Voltage
1 = +24 Vdc

Output
S [1][2][3][4][5][6] = Synchronous Serial Interface

[1] Data length: **1** = 25 bit • **2** = 24 bit
[2] Output format: **B** = Binary • **G** = Gray
[3] Resolution (mm): **1** = 0,005 • **2** = 0,01 • **3** = 0,05 • **4** = 0,1 • **5** = 0,02 • **6** = 0,002 mm
[4] Performance: **1** = Standard
[5][6] Options: **00** = Measuring direction forward · **01** = Measuring direction reverse
02 = Measuring direction forward, synchronized measurement

Accessories

Description	Part No.
Ring magnet Ø 33 mm, Standard	201 542
Open Ring magnet Ø 33 mm	251 416
Ring magnet Ø 25,4 mm	400 533
O-Ring	560 705
Backup-Ring	560 629
7 pin DIN female cable connector	St C0 9131 D07

Temposonics-RD, *SSI*

MTS SENSORS GROUP

Pioneers, Innovators, Leaders in Magnetostrictive Sensing

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