Temposonics®

Absolute, Non-Contact Position Sensors

R-Series
CANopen • CANbasic

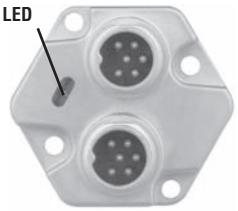
Temposonics® RP and RH
Stroke length 25…7600 mm

More than just a sensor
Multi-position measurement

- Rugged industrial sensor
- Linear and absolute measurement
- LEDs for sensor diagnostic
- Non-contact sensing with highest durability
- Superior accuracy: Resolution up to 2 µm
- Linearity better 0.01 % F.S.
- Repeatability 0.001 % F.S.
- Sensor-based intelligence
- Direct CAN output, position + velocity
- Multi-position measurement (1 sensor for 20 positions)
- Selectable bus termination (CANopen)
- CANopen with heartbeat-function

Sensor diagnostic display

Integrated LEDs (green/red) provide basic visual feedback for normal sensor operation and troubleshooting.



Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected or wrong quantity of magnets
OFF	ON	Initialization error
Flashing	Flashing	Power out of range (high or low)

CAN Bus Interface

Temposonics® position sensors fulfill - as slave devices - all requirements of the CAN-Bus (ISO 11898). The sensors electronics convert the position measurements into bus oriented outputs and transfer these data directly to the control unit. The bus interface is appropriate for serial data transfer of 1 Mbit/s maximum. Sensor integrated software supports the Bus profiles **CANopen**, **CANbasic** and **DeviceNet** for a comprehensive customized configuration of the sensor-bus system.

Operation modes

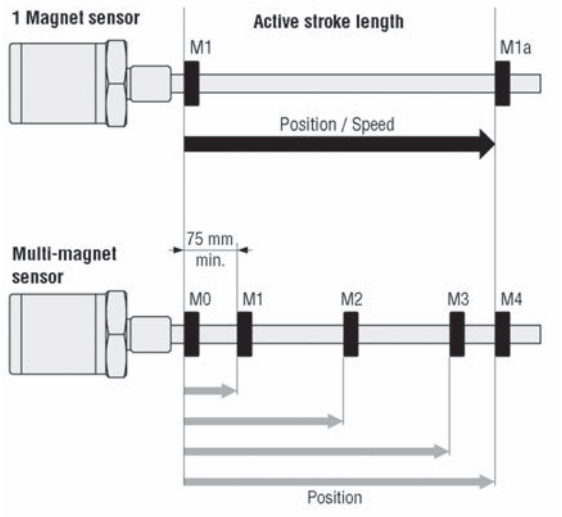
CAN sensors provide following measurings with **one** or **multiple** magnets:

1. Standard measurement:

- **CANbasic:** Position + velocity with 1 magnet
- **CANopen:** Position + velocity with 1 - 4 magnets and electronic temperature

2. Multi-Magnet measurement:

- **CANbasic:** Positions for each of 2 - 20 magnets *simultaneously*



Temposonics® CANbus variations

1. CANopen

is corresponding to encoder profile DS-406 V3.1 (CiA Standard DS-301 V4.02). CANopen functionality describes communication objects (below), which are set via configuration tool.

- **Service Data Object (SDO)** main usage is the sensor configuration. Selectable parameters: Resolution for position + speed, 4 set-points, Preset of operation range and null position for 4 magnets.
- **Process Data Object (PDO)** is used for real-time data transfer of sensor measurements in max. 8 bytes data blocks. The sensor uses PDOs for information about position, speed, limit status, cam-control and operation range of 4 magnets. Data formats: Positions = 32 bit and speed = 16 bit integer value. Limit value = 8 bit.
- **PDO Transmission Type:** Asynchronous (cycle time of 1 to 65'535 ms) or synchronous.
- **Synchronisation Object (SYNC)**
- **Emergency Object**
- **Nodeguard Object**
- **Heartbeat Function**
- **Selectable bus termination**
- **Electronics temperature can be controlled via CANbus**
- **CANopen Configuration Tool** is a software (CD-ROM) and is used as an Electronic Data Sheet (EDS) for sensor configuration. Each sensor will be delivered with an operating manual and an EDS.

2. CANbasic (MTS)

permits a simple, flexible adaption to customized profiles with a short bus access. Here, no configuration tool is needed because parameters are factory set. CANbasic protocol complies with CAN 2.0A standard and always includes the following applications data for 1-magnet measurement: Position, velocity, sensor status and 5 setpoints.

3. CANbasic Multi-Magnet Measurement

provides the position measurement with **maximum 20 magnets on one sensor.** Set-ups and operation are via the on-site control system according to MTS instruction manual.

Data protocols of above CAN options are factory set in the sensor processor, so all versions can be connected directly to the fieldbus.

Conformance test certificate no. CiA199902-301V30/I-004 is given by the CANbus user organisation CiA (CAN in Automation) for MTS CANopen sensors.

Accessory: MTS Servicetool

CANopen address programmer is used for setup the node-address to sensors with CANopen interface. This setup is normally done by the **LMT/LSS-Service** of the bus. Since some master systems do not support this standard, or customer controller system can not handle, this tool - connected to the sensor - can be used for direct setup.

Technical Data

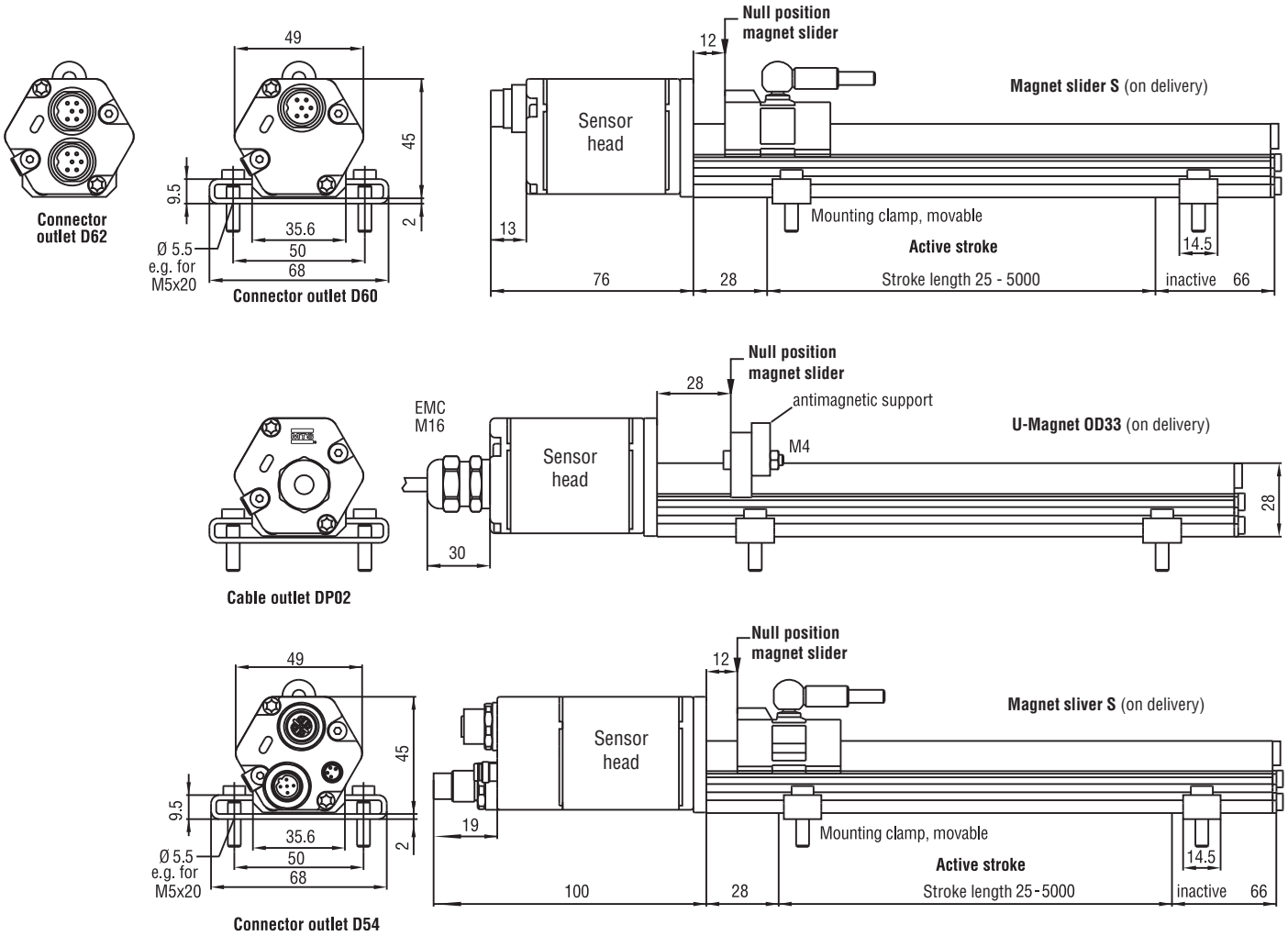
Input	
Measured value	Position, velocity / Option: Multi-magnet measurement (max. 20 positions simultaneous)
Stroke length	Profile 25…5000 mm / Rod 25…7600 mm
Output	
Interface	CAN-Fieldbus System ISO-DIS 11898
Data protocol	CANopen: CIA Standard DS 301 V3.0 / Encoder Profile DS 406 V3.1, CANbasic: CAN 2.0 A
Baud rate, kBit/s	1000 800 500 250 125 50 20
Cable length, m	< 25 < 50 < 100 < 250 < 500 < 1000 < 2500
	The sensor will be supplied with ordered baud rate, which is changeable by customer
Accuracy	
Resolution	CANopen CANbasic
- Position	5 µm 2 µm 5 µm 2 µm
- Speed	0.5 mm/s 0.2 mm/s 1.0 mm/s 0.1 mm/s
Update time	1.0 ms up to 2400 / 2.0 ms up to 4800 / 4.0 ms up to 7600 mm stroke length
	0.5 ms up to 1200 mm extra for CANbasic
Linearity	< ± 0.01 % F.S. (Minimum ± 40 µm)
	Option internal linearization
	Linearity tolerance:
	RP/RH < 300 mm: typ. ± 15 µm, max. ± 25 µm, > 300…600 mm: typ. ± 20 µm, max. ± 30 µm
	> 600…1200 mm: typ. ± 30 µm, max. ± 50 µm
	RP 1200…3000 mm: typ. ± 45 µm, max. ± 90 µm, 3…5 m: typ. ± 85 µm, max. ± 150 µm
Repeatability	< ± 0.001 % F.S. (Minimum ± 2.5 µm)
Temperature coefficient	< 15 ppm/°C
Hysteresis	< 4 µm
Operating conditions	
Magnet speed	any
Operating temperature	-40 °C…+75 °C
Dew point, humidity	90% rel. humidity, no condensation
Ingress protection[1]	Profile style: IP65 / Rod style: IP67, IP68 for cable outlet, RS: IP69K
Shock test	100 g, single hit, IEC-Standard 60068-2-27
Vibration test	15 g / 10 - 2000 Hz, IEC-Standard 60068-2-6
Standards, EMC test	Electromagnetic emission EN 61000-6-4
	Electromagnetic immunity EN 61000-6-2
	EN 61000-4-2/3/4/6, Level 3/4, Criterium A, CE-qualified
Design, material	
Diagnostic display	LEDs beside connector
Profile model:	
Sensor head	Aluminum
Sensor stroke	Aluminum
Position magnet	Magnet slider or removable U-magnet
Rod model:	
Sensor head	Aluminum
Rod with flange	Stainless steel 1.4301 / AISI 304
Pressure rating	350 bar, (700 bar peak) for hydraulic rod
Position magnet	Ring magnets, U-magnets
Installation	
Mounting position	any orientation
Profile	movable mounting clamps or T-slot nuts M5 in base channel
U-magnet, removable	mounting plate and screws from antimagnetical material
Rod	threaded flange M18 x 1.5 or ¾" -16 UNF-3A, Hex nut M18
Position magnet	mounting plate and screws from antimagnetical material
Electrical connection	
Connection type	single or dual 6 pin connectors M16 or cable outlet or 2 x 5 p i n connector M12 + 4 pin connector M8
Supply voltage	24 VDC (-15 / +20 %); UL Recognition requires an approved power supply with energy limitation
	(UL 61010-1), or Class 2 rating according to the National Electrical Code (USA) / Canadian Electrical Code.
- Polarity protection	up to -30 VDC
- Overvoltage protection	up to 36 VDC
Current drain	90 mA typical
Ripple	≤ 0.28 Vpp
Electric strength	500 VDC (DC ground to machine ground)

[1] The IP rating is not part of the UL recognition

Stable profile design

Temposonics® RP offers modular construction, flexible mounting configurations and easy installation. Position measurement is contactless via two versions of permanent magnets.

- A sliding magnet running in profile housing rails. Connection with the mobile machine part is via a ball jointed arm to taking up axial forces.
- A floating magnet, mounted directly on the moving machine part, travels over the profile at a low distance. Its air-gap allows the correction of small misalignments at installation.

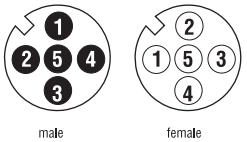


Connector outlet D60/D62

Wiring	Pin	Cable	Function
	1	grey	CAN (-)
	2	pink	CAN (+)
	3	do not connect	---
	4	do not connect	---
	5	brown	+24 VDC (-15 / +20 %)
	6	white	0 V

Male insert sensor plug
rear of cable connector

Connector outlet D54

Wiring	Pin	Function
	1	shield
	2	do not connect
	3	do not connect
	4	CAN (+)
	5	CAN (-)

male female

View:
Front of sensor connector
Back of mating connector

Input voltage	Pin	Cable	Function
	1	brown	+24 VDC (-15 / +20 %)
	2	white	do not connect
	3	blue	0 V (GND)
	4	black	

Male insert sensor plug
rear of cable connector

All dimensions in mm

Standard position magnet included in delivery (see chapter accessories)

Position magnets
Magnet slider S (part no. 252 182)
Magnet slider V (part no. 252 184)
U-magnet OD33 (part no. 251 416-2)

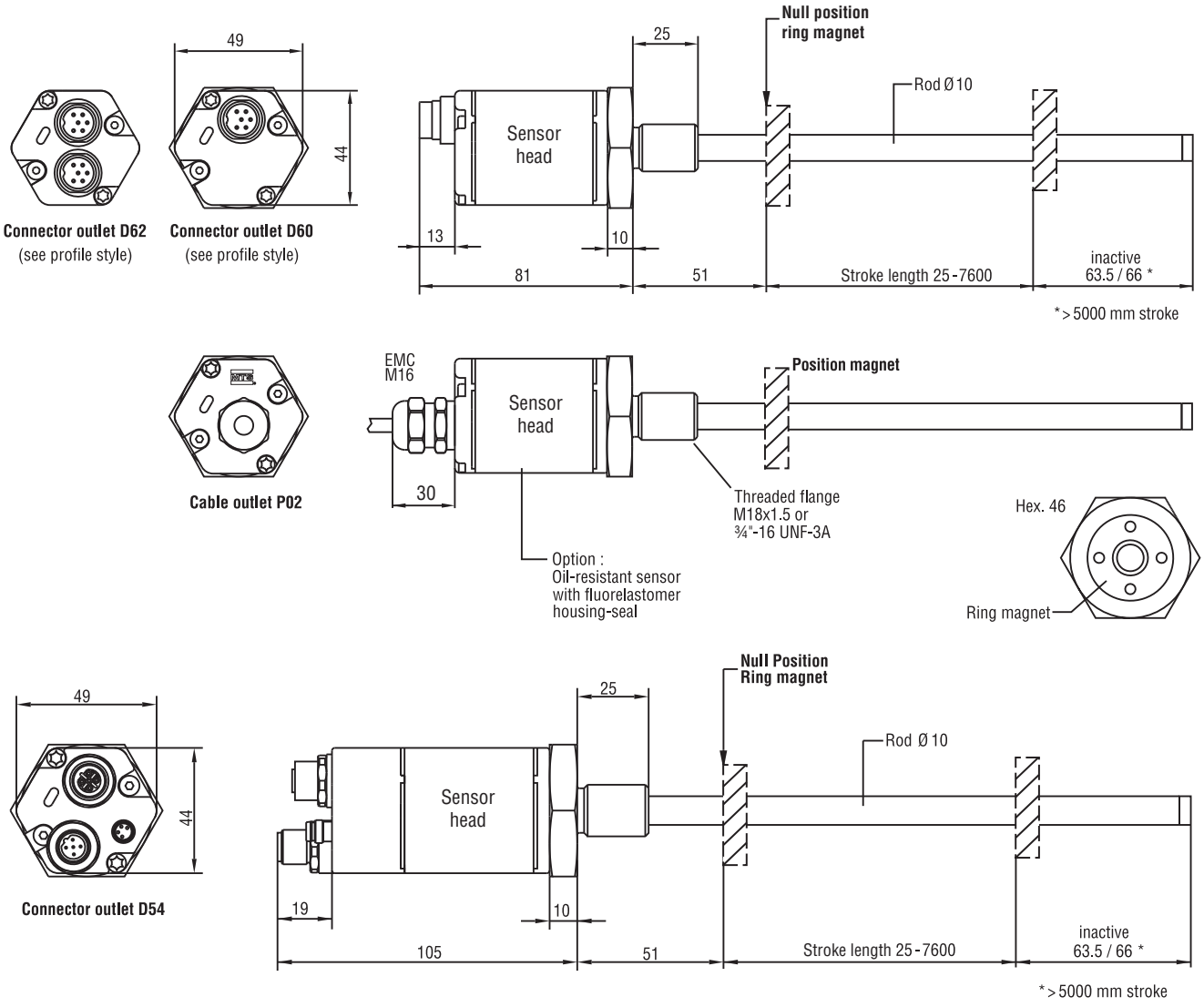
Connection types
6 pin female connector (part no. 370 623)
6 pin female connector M16, 90° (part no. 560 778)

High pressure rod design

Temposonics® RH with a pressure resistant stainless steel flange and sensing rod is suitable for use in hydraulic cylinders and externally in all applications where space is a problem. Position measurement is via ring or U-magnets travelling along the sensing rod without any mechanical contact.

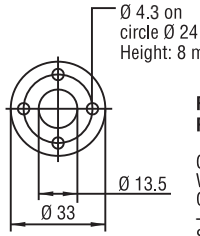
Advantage…

the completely operable sensor cartridge can be replaced for servicing easily without opening the fluid circuit.



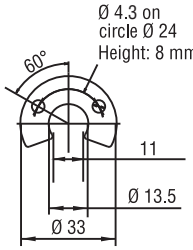
Standard position magnets (not included in, please order seperatly)

= Magnets must be ordered separately (details see chapter accessories)



Ring magnet OD33
Part No. 201 542-2

Composite PA-Ferrite-GF20
Weigth ca. 14 g
Operating temperature:
-40…+100 °C
Surface pressure max. 40 N/mm²
Fastening Torque for M4 screws max. 1 Nm



U-magnet OD33
Part No. 251 416-2

PA-Ferrit-GF20
Weigth ca. 11 g
Operating temperature: -40…+100 °C
Surface pressure max. 40 N/mm²
Fastening torque for M4 screws max. 1 Nm

All dimensions in mm

Standard position magnet not included in delivery (see chapter accessories)

Position magnets
Ring magnet OD33 (part no. 201 542-2)
Ring magnet OD25,4 (part no. 400 533)
U-magnet OD33 (part no. 251 416-2)

Connection types
6 pin female connector (part no. 370 623)
6 pin female connector M16, 90° (part no. 560 778)

Temposonics® | | | | | | | | **M** | | | | | **C** | | | | | | | **Z** | | |

Sensor model
RP - Profile
RH - Rod

Design
Profile Temposonics® RP:
S - Magnet slider, joint to top
V - Magnet slider, joint at front
G - Magnet slider, joint at top, blacklash free
M - U-magnet, OD33
Rod Temposonics® RH:
M - Flange M18 x 1.5 (Standard)
V - Flange M18 x 1.5
(Fluorelastomer housing-seal)
D - Flange M18 x 1.5 with bushing on rod end
R - Flange M18 x 1.5 with thread M4 at rod end
J - Flange M22 x 1.5, rod Ø 12.7 mm, 800 bar
S - Flange ¾" - 16 UNF - 3A

Stroke length
Profile - 0025…5000 mm
Rod - 0025…7600 mm
Standard: See chart
Other length upon request.

Connection type
D60 - 6 pin male receptacle M16
D62 - 2 x 6 pin male receptacle M16
D54 - 2 x 5 pin male/female receptacle M12, 4 pin male receptacle M8
P02 - 2 m PUR cable w/o connector, Option: P01-P10 (1 - 10 m)

Supply voltage
1 - +24 VDC
A - +24 VDC, high vibration resistant (stroke length 25…2000 mm)

Output
C [1][2][3][4][5][6] = CAN-Bus

[1][2][3] Protocol:	**101** = CANbasic (MTS) • **207** = Multi-position measurement • **304** = CANopen • **504** = CANopen internal linearization
[4] Baud rate:	**1** = 1000 kBit/s • **2** = 500 kBit/s • **3** = 250 kBit/s • **4** = 125 kBit/s
[5] Resolution:	**1** = 5 µm • **2** = 2 µm
[6] Type:	**1** = Standard

Magnet number for multi-position measurement*
Z02 - Z20 = 2 - 20 pcs.
**Note: Please specify magnet numbers for your sensing application and order separately*

Included in delivery profile model:
Sensor, 1 position magnet, 2 mounting clamps up to 1250 mm + 1 clamp for every additional 500 mm.

Included in delivery rod model:
Sensor and O-ring. Magnets must be ordered separately. Use signed magnets for sensors w/LCO

CANopen only:
Installation guide + CD-ROM (Electronic Data Sheet)

Stroke Length Standard RP	
Stroke Length	**Ordering Steps**
≤ 500 mm	25 mm
500…2500 mm	50 mm
2500…5000 mm	100 mm

Stroke Length Standard RH	
Stroke Length	**Ordering Steps**
< 500 mm	5 mm
500…750 mm	10 mm
750…1000 mm	25 mm
1000…2500 mm	50 mm
2500…5000 mm	100 mm
> 5000 mm	250 mm

Accessories page 67 and following.