Data Sheet

R-Series V RD5 EtherCAT®
Magnetostrictive Linear Position Sensors

▌ Space-saving installation due to detached sensor electronics housing
▌ Distance between sensor rod and sensor electronics up to 20 m (65.6 ft.)
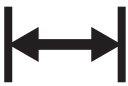▌ Field adjustments and diagnostics using the TempoLink® and TempoGate® smart assistants

THE NEW **V** GENERATION

MEASURING TECHNOLOGY

The absolute, linear position sensors provided by Temposonics rely on the company's proprietary magnetostrictive technology, which can determine position with a high level of precision and robustness. Each Temposonics® position sensor consists of a ferromagnetic waveguide, a position magnet, a strain pulse converter and supporting electronics. The magnet, connected to the object in motion in the application, generates a magnetic field at its location on the waveguide. A short current pulse is applied to the waveguide. This creates a momentary radial magnetic field and torsional strain on the waveguide. The momentary interaction of the magnetic fields releases a torsional strain pulse that propagates the length of the waveguide. When the ultrasonic wave reaches the beginning of the waveguide it is converted into an electrical signal. Since the speed of the ultrasonic wave in the waveguide is precisely known, the time required to receive the return signal can be converted into a linear position measurement with both high accuracy and repeatability.

Measurement cycle

1	Current pulse generates magnetic field
2	Interaction with position magnet field generates torsional strain pulse
3	Torsional strain pulse propagates
4	Strain pulse detected by converter
5	Time-of-flight converted into position

Fig. 1: Time-of-flight based magnetostrictive position sensing principle

R-SERIES Ⅴ RD5 EtherCAT®

The Temposonics® R-Series Ⅴ brings very powerful sensor performance to meet the many demands of your application. The sensor RD5 is the version of the R-Series Ⅴ with a detached sensor electronics. The main advantages of the version RD5 are:

Space-saving installation
The detached sensor electronics allow space-saving installation of the compact measuring rod.

Great distance
The sensor electronics can be mounted up to 20 m (65.6 ft.) away from the sensor rod. This offers more mounting locations for the remote electronics for easier installation, serviceability, or increased protection.

Swappable sensor electronics
The sensor electronics can be ordered separately and can be connected to the previously installed RD5 sensor rod without further adaptation. This simplifies service repairs and saves costs.

Protection of the sensor electronics
By separating the robust sensor rod from the complex evaluation electronics improved protection against process influences can be realized.
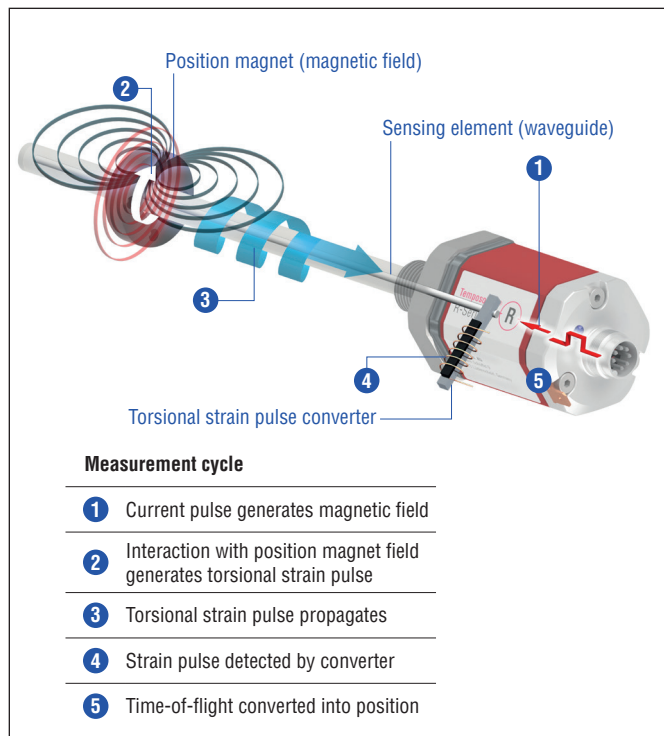
In addition the R-Series Ⅴ EtherCAT® scores with the following features:

2 positions simultaneously
The R-Series Ⅴ RD5 EtherCAT® can detect and report the position, velocity and acceleration of up to 2 magnets simultaneously.

R-Series Ⅴ EtherCAT®
In addition to the measured position value via the EtherCAT® protocol further data about the current sensor status, such as the total distance travelled, the internal temperature and the total operating hours, can be displayed for diagnostic purposes.

All settings under control with the smart assistants for the R-Series Ⅴ
The TempoLink® and the TempoGate® smart assistants support you in setup and diagnostics of the R-Series Ⅴ. For more information of these assistants please see the data sheets:
• TempoLink® smart assistant
  (Document part number: 552070)
• TempoGate® smart assistant
  (Document part number: 552110)
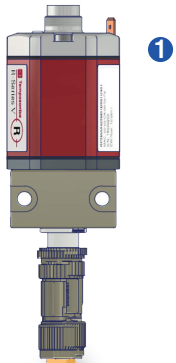
RD5: COMPLETE SENSOR OR SEPARATE COMPONENTS – IT'S UP TO YOU

The RD5 sensor consists of 2 main components:

❶ Sensor electronics assembly with mounting block and mating connector
❷ Sensor rod assembly with cable and connector

The RD5 sensor is the latest version in the RD model line. These sensor models are unique in that their sensor rod is detached from the main electronics components and connected only by a joining cable.

The RD5 sensor is normally ordered as a **complete kit (RD5-K)**. Also, the **sensor rod assembly (RD5-R)** and the **sensor electronics assembly (RD5-E)** can each be ordered separately. This offers added flexibility for ordering just the replacement components needed or for keeping spare components on site for your more critical applications.

RD5 VERSATILITY FOR SOLVING CHALLENGING APPICATIONS

The RD5 sensor from Temposonics® is characterized by its remote electronics. This allows you to move the sensor electronics away from the sensor rod for protection from harsh environments or when the installation space at the measuring point is too small to fit a RH5 rod version.
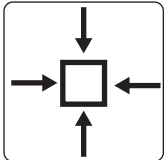
Configure the sensor you need to fit your confined space applications
RD5 offers new options for confined installation spaces like a small footprint connector and a compact mounting block.
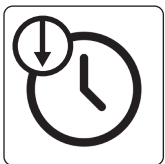
Reduce or eliminate your machine down time
RD5 offers you easy ordering of spare or replacement components if sensor damage does occur.
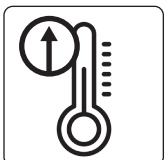
Use at high temperature applications
The sensor rod assembly of RD5 is rated up to 120 °C (248 °F) for stroke lengths up to 2540 mm (100 in.) and up to 105 °C (221 °F) for longer stroke lengths.

THE RD5 OPTIONS – TO BEST FIT YOUR APPLICATION
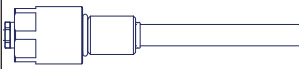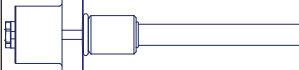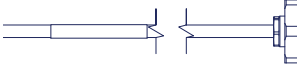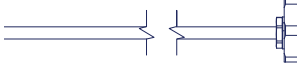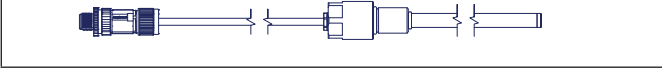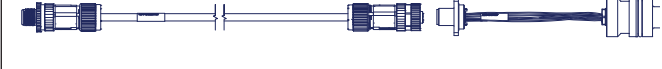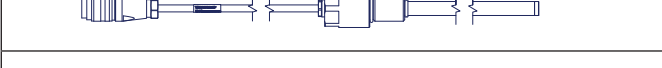
Sensor rod flange options

Image	Type	Advantage
	»S«	• Pressure fit for embedding in cylinder
	»M/T«	• Small threaded flange for confined space
	»C/D«	• Large surface hex flange

Sensor rod cable options
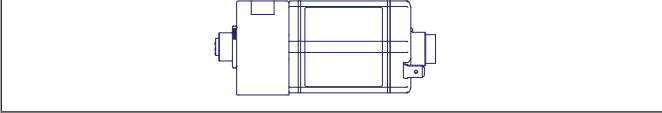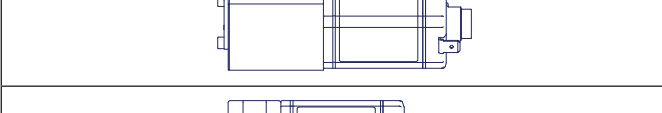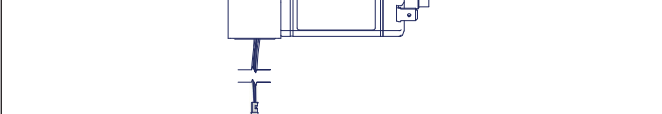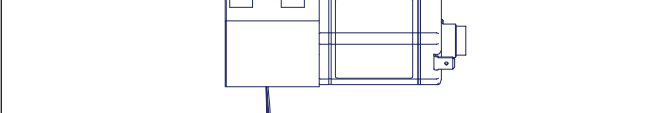
Image	Type	Advantage
	»W«	• Single wires allows small bend radius • For short distances up to 50 cm
	»K«	• PUR cable with min. bend radius of 24 mm • For distances up to 1.15 m
	»J«	• FEP cable with min. bend radius of 57 mm • For great distances up to 20 m

Sensor rod connectors
(for connecting the sensor rod to the sensor electronics)

Image	Type	Advantage
	»G«	• Compact inline M12 connector • Suitable for cable type »J« and »K« • For side connection
	»W«	• Small footprint panel mount M12 connector • Suitable for cable type »W« • Requires joining cable RD5-C • For side connection
	»S«	• Standard inline M16 connector • Suitable for cable type »J« and »K« • For side connection
	»E«	• Compact inline flat connector • Suitable for cable type »J«, »K« and »W« • For bottom connection

Sensor electronics mounting blocks with mating connectors

Image	Type	Advantage
	»G«	• Compact mounting block with side M12 mating connector • For sensor rod connector type »G« or joining cable RD5-C • For reduced mounting space
	»S«	• Classic mounting block with side M16 mating connector • For sensor rod connector type »S«
	»E«	• Compact mounting block with bottom connection and flat mating connector • For sensor rod connector type »E« • For reduced mounting space
	»B«	• Classic mounting block with bottom connection and flat mating connector • For sensor rod connector type »E«

TECHNICAL DATA

Output	
Interface	EtherCAT® Ethernet Control Automation Technology
Data protocol	EtherCAT®100 Base-Tx, Fast Ethernet
Data transmission rate	100 MBit/s max.
Measured value	Position, velocity and acceleration/option: Simultaneous multi-position, multi-velocity and multi-acceleration measurements up to 2 magnets

Measurement parameters							
Resolution: Position	0.5…100 µm (selectable)						
Cicle time	Stroke length	25 mm	300 mm	750 mm	1000 mm	2000 mm	5080 mm
	Cycle time	100 µs	294 µs	370 µs	476 µs	833 µs	2273 µs
Extrapolation cycle time	Number of magnets	≤ 2 magnets					
	Cycle time	100 µm					
Linearity deviation [1, 2]	Stroke length	≤ 500 mm	> 500 mm				
	Linearity deviation	≤ ±50 µm	< ±0.01 % F.S.				
Repeatability	< ±0.001 % F.S. (minimum ±2.5 µm) typical						
Hysteresis	< 4 µm typical						
Temperature coefficient	< 15 ppm/K typical						

Operating conditions	
Operating temperature	Sensor electronics housing: –40…+85 °C (–40…+185 °F) Sensor rod with »J« type cable: –40…+120 °C (–40…+248 °F) (for stroke lengths up to 2540 mm (100 in.) and up to 105 °C (221 °F) for longer stroke lengths) Sensor rod with »K« type cable: –40…+80 °C (–40…+176 °F) Sensor rod with »W« type single wires: -40...+85 °C (-40...+185 °F)
Humidity	90% relative humidity, no condensation

Ingress protection	Sensor electronics housing: IP67 (with correctly mounted housing and connectors)
	Sensor rod with »J« or »K« type cable: IP67/IP69K
	    Connector »G« or »S« type: IP67 (correctly mated),
	    Connector »E« type: IP30
	Sensor rod with »W« type single wires: IP67
	    Connector »W« type: IP67 (correctly mounted)

Shock test	150 g/11 ms, IEC standard 60068-2-27
Vibration test	30 g/10…2000 Hz, IEC standard 60068-2-6 (excluding resonant frequencies)
EMC test	Electromagnetic emission according to EN 61000-6-3 Electromagnetic immunity according to EN 61000-6-2 The RD5 sensors fulfill the requirements of the EMC directives 2014/30/EU, UKSI 2016 No. 1091 and TR CU 020/2011 under the condition of an EMC compliant installation. [3]
Operating pressure	350 bar (5076 psi)/700 bar (10,153 psi) peak (at 10 × 1 min) for sensor rod
Magnet movement velocity	Any

Design/Material	
Sensor electronics housing	Aluminum (painted), zinc die cast
Sensor rod with flange	Stainless steel 1.4301 (AISI 304)
RoHS compliance	The used materials are compliant with the requirements of EU Directive 2011/65/EU and EU Regulation 2015/863 as well as UKSI 2022 No. 622 with amendments
Stroke length	25…2540 mm (1…100 in.) for pressure-fit flange »S« 25…5080 mm (1…200 in.) for all threaded flanges

Technical data "Mechanical mounting" and "Electrical connection" on

1/ With position magnet #251 416-2
2/ For rod style »S« the linearity deviation can be higher in the first 30 mm (1.2 in.) of stroke length.
3/ The cable between the sensor element and the sensor electronics housing must be mounted in an appropriately shielded environment
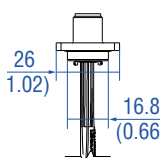
Mechanical mounting	
Mounting position	Any
Mounting instruction	Please consult the technical drawings and the operation manual (document part number: 552059)
Electrical connection	
Connection type	2 x M12 female connectors (5 pin), 1 x M12 male connector (4 pin) or 2 x M12 female connectors (5 pin), 1 x M8 male connector (4 pin)
Operating voltage	+12…30 VDC ±20 % (9.6…36 VDC); the RD5 sensors must be power supplied via an external Class 2 power source in accordance with the UL approval
Power consumption	Less than 4 W typical
Dielectric strength	500 VDC (DC ground to machine ground)
Polarity protection	Up to −36 VDC
Overvoltage protection	Up to 36 VDC

TECHNICAL DRAWING – SENSOR ROD CABLES & CONNECTORS

Cable »J«	Cable »K«	Cable »W«
Material: FEP jacket, tan Min. bending radius: 57 mm (2.2 in) Operating temperature: −40…+120 °C (−40…+248 °F) Max. cable length: 20 m (65.6 ft.)	Material: PUR jacket, black Min. bending radius: 24 mm (0.94 in) Operating temperature: −40…+80 °C (−40…+176 °F) Max. cable length: 1.15 m (3.9 ft.)	Single wires, unshielded Min. bending radius: 4 mm (0.16 in.) Operating temperature: −40…+85 °C (−40…+185 °F) Max. cable length: 0.5 m (1.6 ft.)

Connector »G«	Connector »S«	Connector »W«	Connector »E«
Operating temperature: −40...+105 °C (−40...+221 °F) Ingress protection: IP65/IP67 (correctly fitted) For side connection	Operating temperature: −40...+105 °C (−40...+221 °F) Ingress protection: IP67 (correctly fitted) For side connection	Operating temperature: −40...+85 °C (−40...+185 °F) Ingress protection: IP67 (correctly fitted) For side connection	Operating temperature: −40...+85 °C (−40...+185 °F) Ingress protection: IP30 For bottom connection

TECHNICAL DRAWING – SENSOR ROD FLANGE TYPES

Threaded flange »C« & »D«

Null zone
32 (1.26)
51 (2.01)
Stroke length
25…5080 (1…200)
Dead zone
63.5/66* (2.5/2.6)
26.9 (1.1)
A/F 46
4.5 (0.18)
Ø 10 ± 0.13 (Ø 0.39 ± 0.01)
A/F 46
Magnet

Threaded flange »C«: M18×1.5-6g
Threaded flange »D«: ¾"-16 UNF-3A
* Stroke length > 5000 mm (196.9 in.)

Threaded flange »M« & »T«

Null zone
32 (1.26)
51 (2.01)
Stroke length
25…5080 (1…200)
Dead zone
63.5/66* (2.5/2.6*)
26.9 (1.1)
A/F 25
25 (0.98)
4.5 (0.18)
Ø 10 ± 0.13 (Ø 0.39 ± 0.01)
A/F 25
Magnet

Threaded flange »M«: M18×1.5-6g
Threaded flange »T«: ¾"-16 UNF-3A
* Stroke length > 5000 mm (196.9 in.)

Pressure fit flange »S«

26.9 f6 (1.1)
Null zone
32 (1.26)
21.4 (0.84)
Stroke length
25…2540 (1…100)
Dead zone
63.5 (2.5)
4.5 (0.18)
12.7 (0.5)
Ø 10 ± 0.13 (Ø 0.39 ± 0.01)
Magnet

Controlling design dimensions are in millimeters and measurements in ( ) are in inches

Fig. 2: Temposonics® RD5 sensor rod flange types

TECHNICAL DRAWING – SENSOR ELECTRONICS & MOUNTING BLOCK

RD5 with side connection

The connecting cable between the sensor electronics housing and the rod is connected to the side of the sensor electronics housing.

Compact mounting block with side M12 mating connector, type »G«, example: Connection type D58 (connector outlet)

Controlling design dimensions are in millimeters and measurements in ( ) are in inches
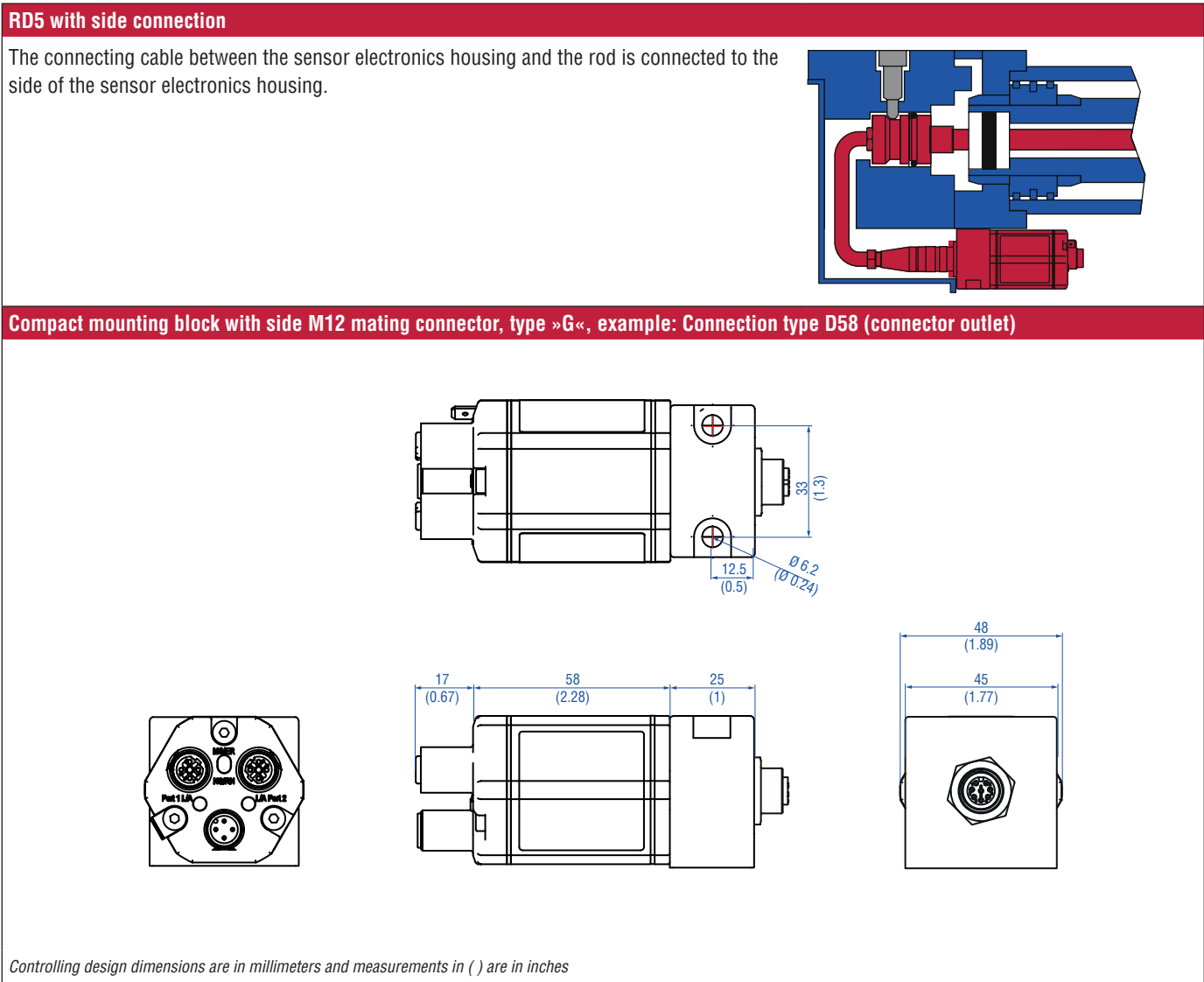
Fig. 3: Temposonics® RD5 sensor electronics & mounting block

TECHNICAL DRAWING – SENSOR ELECTRONICS & MOUNTING BLOCK

Classic mounting block with side M16 mating connector, type »S«, example: Connection type D58 (connector outlet)
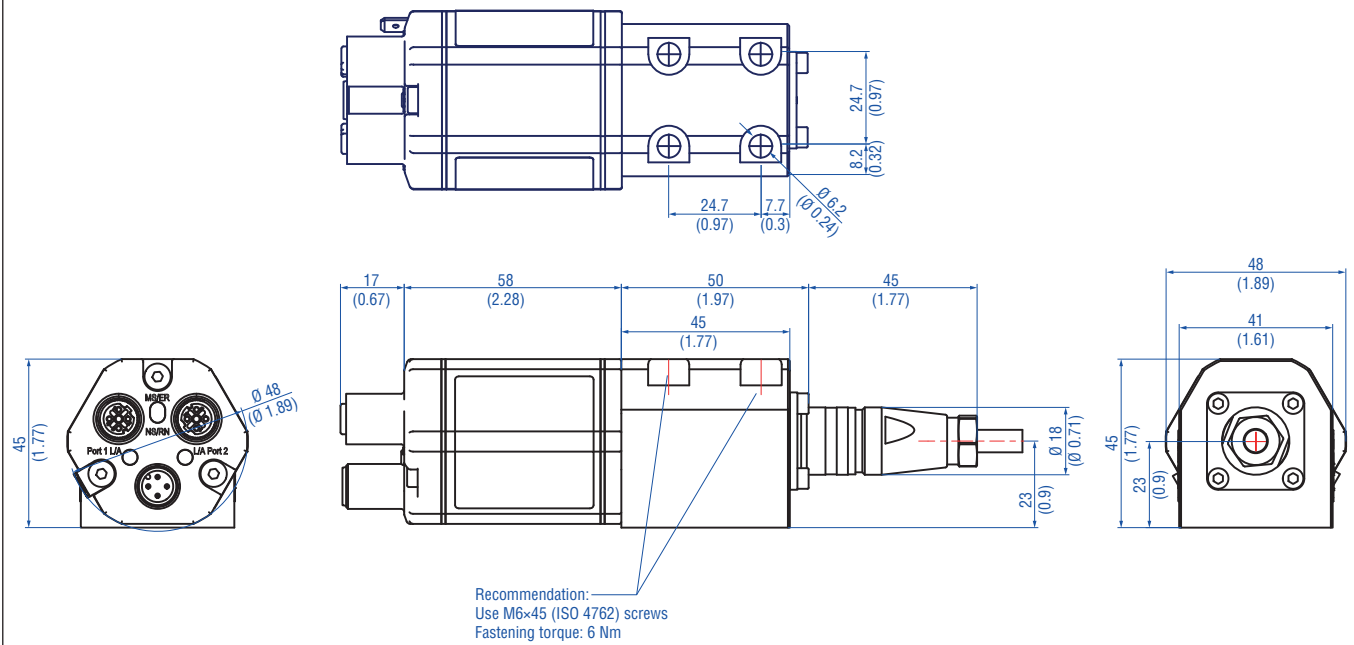
Controlling design dimensions are in millimeters and measurements in ( ) are in inches

Recommendation:
Use M6×45 (ISO 4762) screws
Fastening torque: 6 Nm

Fig. 4: Temposonics® RD5 sensor electronics & mounting block

Temposonics® R-Series V RD5 EtherCAT®
Data Sheet

TECHNICAL DRAWING – SENSOR ELECTRONICS & MOUNTING BLOCK

RD5 with bottom connection

The connecting cable between the sensor electronics housing and the rod is connected to the bottom of the sensor electronics housing.

Compact mounting block with bottom connection and flat mating connector, type »E«, example: Connection type D56 (connector outlet)

Controlling design dimensions are in millimeters and measurements in ( ) are in inches
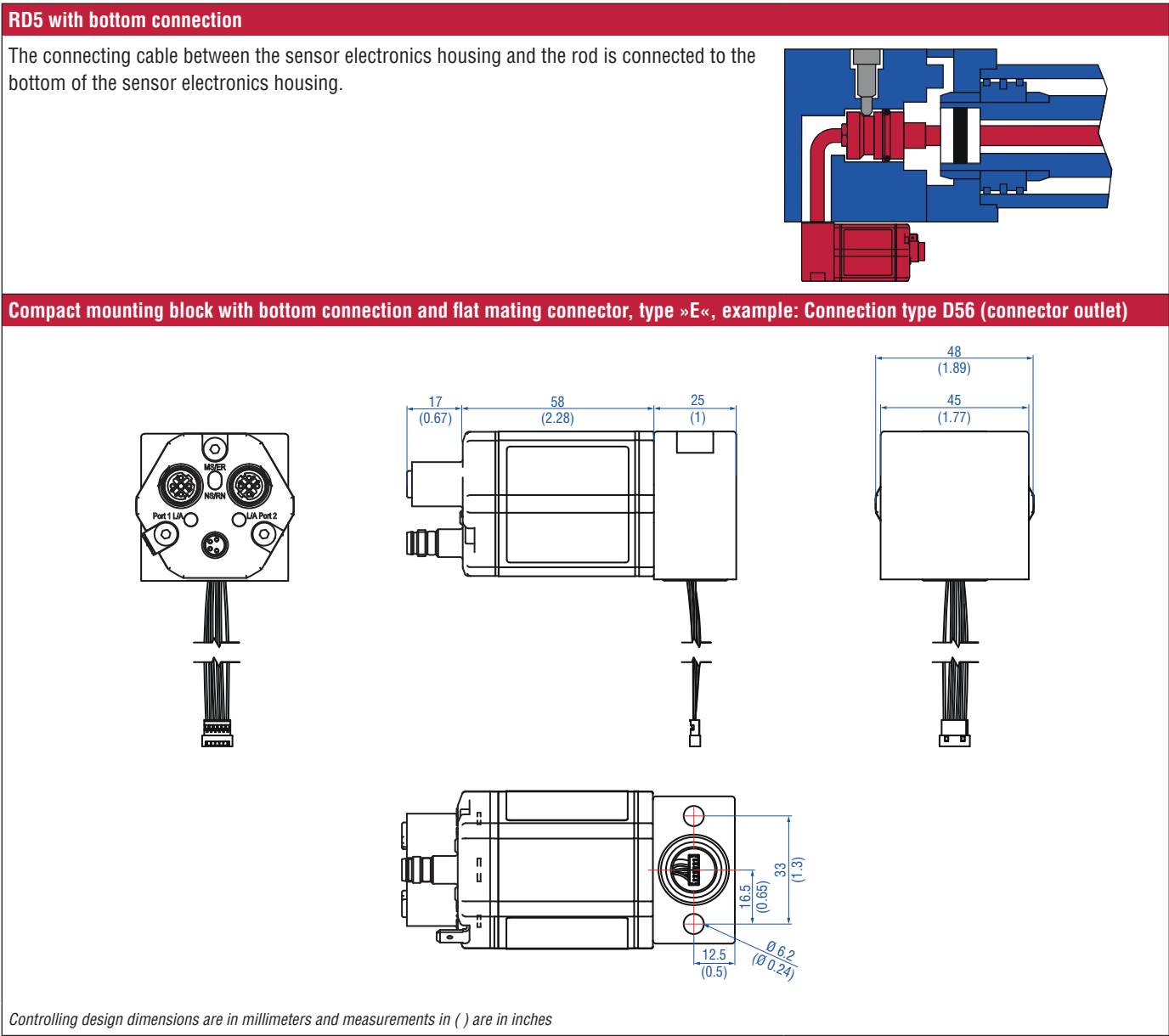
Fig. 5: Temposonics® RD5 sensor electronics & mounting block

TECHNICAL DRAWING – SENSOR ELECTRONICS & MOUNTING BLOCK

Classic mounting block with bottom connection and flat mating connector, type »B«, example: Connection type D58 (connector outlet)

Recommendation:
Use M6×45 (ISO 4762) screws
Fastening torque: 6 Nm
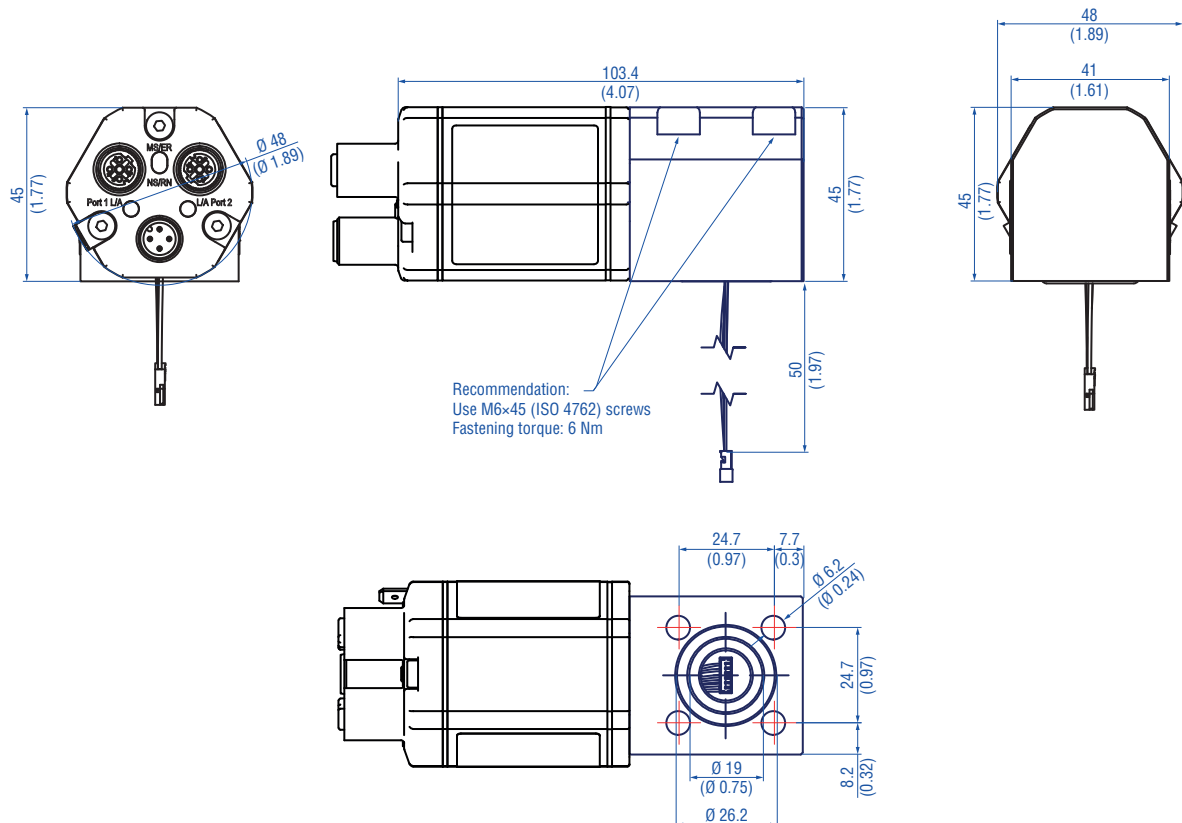
Controlling design dimensions are in millimeters and measurements in ( ) are in inches

Fig. 6: Temposonics® RD5 sensor electronics & mounting block

CONNECTOR WIRING
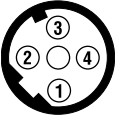
D58		
Port 1 – Signal		
M12 female connector (D-coded)	**Pin**	**Function**
View on sensor	1	Tx (+)
	2	Rx (+)
	3	Tx (–)
	4	Rx (–)
Port 2 – Signal		
M12 female connector (D-coded)	**Pin**	**Function**
View on sensor	1	Tx (+)
	2	Rx (+)
	3	Tx (–)
	4	Rx (–)
Power supply		
M12 male connector (A-coded)	**Pin**	**Function**
View on sensor	1	+12…30 VDC (±20 %)
	2	Not connected
	3	DC Ground (0 V)
	4	Not connected

Fig. 7: Connector wiring D58
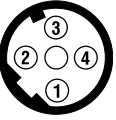
D56		
Port 1 – Signal		
M12 female connector (D-coded)	**Pin**	**Function**
View on sensor	1	Tx (+)
	2	Rx (+)
	3	Tx (–)
	4	Rx (–)
Port 2 – Signal		
M12 female connector (D-coded)	**Pin**	**Function**
View on sensor	1	Tx (+)
	2	Rx (+)
	3	Tx (–)
	4	Rx (–)
Power supply		
M8 male connector	**Pin**	**Function**
View on sensor	1	+12…30 VDC (±20 %)
	2	Not connected
	3	DC Ground (0 V)
	4	Not connected

Fig. 8: Connector wiring D56

FREQUENTLY ORDERED ACCESSORIES – Additional options available in our <u>Accessories Catalog</u> 551444

Position magnets

U-magnet OD33
Part no. 251 416-2

Material: PA ferrite GF20
Weight: Approx. 11 g
Surface pressure: Max. 40 N/mm²
Fastening torque for M4 screws: 1 Nm
Operating temperature:
–40…+120 °C (–40…+248 °F)

Ring magnet OD33
Part no. 201 542-2

Material: PA ferrite GF20
Weight: Approx. 14 g
Surface pressure: Max. 40 N/mm²
Fastening torque for M4 screws: 1 Nm
Operating temperature:
–40...+120 °C (–40...+248 °F)

Ring magnet OD25.4
Part no. 400 533

Material: PA ferrite
Weight: Approx. 10 g
Surface pressure: Max. 40 N/mm²
Operating temperature:
–40…+120 °C (–40…+248 °F)

Ring magnet OD17.4
Part no. 401 032

Material: PA neobond
Weight: Approx. 5 g
Surface pressure: Max. 20 N/mm²
Operating temperature:
–40…+105 °C (–40…+221 °F)

Magnet spacer   O-rings
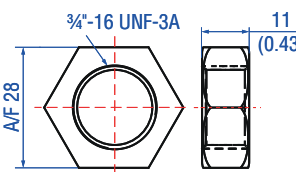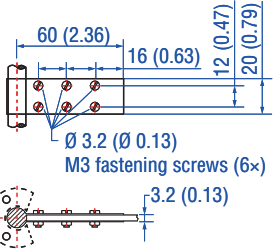
Magnet spacer
Part no. 400 633

Material: Aluminum
Weight: Approx. 5 g
Surface pressure: Max. 20 N/mm²
Fastening torque for M4 screws: 1 Nm

O-ring for threaded flange
M18×1.5-6g
Part no. 401 133

Material: Fluoroelastomer
Durometer: 75 ±5 Shore A
Operating temperature:
–40…+204 °C (–40…+400 °F)

O-ring for threaded flange
¾"-16 UNF-3A
Part no. 560 315

Material: Fluoroelastomer
Durometer: 75 ±5 Shore A
Operating temperature:
–40…+204 °C (–40…+400 °F)

O-ring for pressure fit flange Ø 26.9 mm
Part no. 560 705

Material: Nitrile rubber
Operating temperature:
–53…+107 °C (–65…+225 °F)

O-rings   Mounting accessories

Back-up ring for pressure fit flange
Ø 26.9 mm
Part no. 560 629

Material: Polymyte
Durometer: 90 Shore A

O-ring for classic mounting block with bottom entry »B«
Part no. 561 435

Material: FKM
Durometer: 80± 5 Shore A
Operating temperature:
–15…+200 °C (5…+392 °F)

O-ring for compact mounting block with bottom entry »E«
Part no. 562 405

Material: BUNA
Durometer: 70 Shore A
Operating temperature:
–40…+121 °C (–40…+249,8 °F)

Hex jam nut M18×1.5-6g
Part no. 500 018

Material: Steel, zinc plated

Controlling design dimensions are in millimeters and measurements in ( ) are in inches

Mounting accessories

¾"-16 UNF-3A 11 (0.43) A/F 28	60 (2.36) 16 (0.63) 12 (0.47) 20 (0.79) Ø 3.2 (Ø 0.13) M3 fastening screws (6×) 3.2 (0.13)
Hex jam nut ¾"-16 UNF-3A **Part no. 500 015**	**Fixing clip** **Part no. 561 481**
Material: Steel, zinc plated	Application: Used to secure sensor rods (Ø 10 mm (Ø 0.39 in.)) when using an U-magnet or block magnet Material: Brass, non-magnetic

Controlling design dimensions are in millimeters and measurements in ( ) are in inches

Cable connectors* – Signal
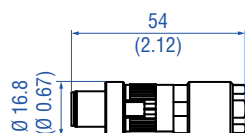
**M12 D-coded male connector
(4 pin), straight
Part no. 370 523**

Material: Zinc nickel-plated
Termination: Insulation-displacement
Cable Ø: 6…7.2 mm (0.2…0.28 in.)
Wire: 24 AWG – 22 AWG
Operating temperature:
−25…+85 °C (−13…+185 °F)
Ingress protection: IP65 / IP67
(correctly fitted)
Fastening torque: 0.6 Nm

**M12 connector end cap
Part no. 370 537**

Female connectors M12 should be
covered by this protective cap
Material: Brass nickel-plated
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.39…0.49 Nm

Cable connectors* – Power

**M12 A-coded female connector
(4 pin/5 pin), straight
Part no. 370 677**

Material: GD-Zn, Ni
Termination: Screw
Contact insert: CuZn
Cable Ø: 4…8 mm (0.16…0.31 in.)
Wire: max. 1.5 mm² (16 AWG)
Operating temperature:
−30…+85 °C (−22…+185 °F)
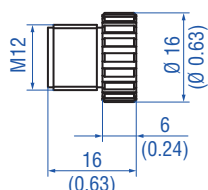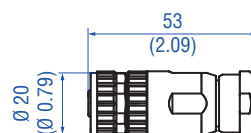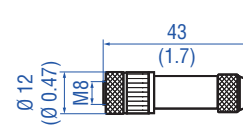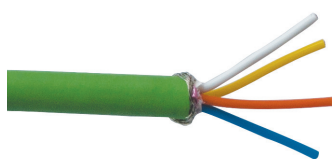Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.6 Nm

**M8 female connector (4 pin), straight
Part no. 370 504**

Material: CuZn nickel plated
Termination: Solder
Cable Ø: 3.5…5 mm (0.14…0.28 in.)
Wire: 0.25 mm²
Operating temperature:
−40…+85 °C (−40…+185 °F)
Ingress protection: IP67 (correctly fitted)
Fastening torque: 0.5 Nm

Cables

**PUR signal cable
Part no. 530 125**

Material: PUR jacket; green
Features: Cat 5, highly flexible, halogen
free, suitable for drag chains, mostly oil
& flame resistant
Cable Ø: 6.5 mm (0.26 in.)
Cross section: 2 × 2 × 0.35 mm²
(22 AWG)
Bending radius: 6 × D (fixed installation)
Operating temperature:
−20…+60 °C (−4…+140 °F)

**PVC power cable
Part no. 530 108**

Material: PVC jacket; gray
Features: Shielded, flexible,
mostly flame resistant
Cable Ø: 4.9 mm (0.19 in.)
Cross section: 3 × 0.34 mm²
Bending radius: 5 × D (fixed installation)
Operating temperature:
−30…+80 °C (−22…+176 °F)

Cable sets

**Signal cable with M12 D-coded male
connector (4 pin), straight – M12
D-coded, male connector (4 pin),
straight
Part no. 530 064**

Material: PUR jacket; green
Feature: Cat 5e
Cable length: 5 m (16.4 ft)
Cable Ø: 6.5 mm (0.26 in.)
Ingress protection: IP65, IP67, IP68
(correctly fitted)
Operating temperature:
−30…+70 °C (−22…+158 °F)

**Signal cable with M12 D-coded male
connector (4 pin), straight – RJ45
male connector, straight
Part no. 530 065**

Material: PUR jacket; green
Feature: Cat 5e
Cable length: 5 m (16.4 ft)
Cable Ø: 6.5 mm (0.26 in.)
Ingress protection M12 connector:
IP67 (correctly fitted)
Ingress protection RJ45 connector:
IP20 (correctly fitted)
Operating temperature:
−30…+70 °C (−22…+158 °F)

*/ Follow the manufacturer's mounting instructions
Controlling design dimensions are in millimeters and measurements in ( ) are in inches
Color of connectors and cable jacket may change. Color codes for the individual wires and technical properties remain unchanged.

Temposonics® R-Series Ⅴ RD5 EtherCAT®
Data Sheet

Cable sets		Programming tools	
Power cable with M8 female connector (4 pin), straight – pigtail **Part no. 530 066 (5 m (16.4 ft.))** **Part no. 530 096 (10 m (32.8 ft.))** **Part no. 530 093 (15 m (49.2 ft.))**	**Power cable with M12 A-coded female connector (5 pin), straight – pigtail** **Part no. 370 673**	**TempoLink® kit for Temposonics® R-Series Ⅴ** **Part no. TL-1-0-EM08 (D56)** **Part no. TL-1-0-EM12 (D58)**	**TempoGate® smart assistant for Temposonics® R-Series Ⅴ** **Part no. TG-C-0-D***xx* (*xx* indicates the number of R-Series Ⅴ sensors that can be connected (even numbers only))
Material: PUR jacket; gray Feature: Shielded Cable Ø: 5 mm (0.2 in.) Operating temperature: –40…+90 °C (–40…+194 °F)	Material: PUR jacket; black Feature: Shielded Cable length: 5 m (16.4 ft) Ingress protection: IP67 (correctly fitted) Operating temperature: –25…+80 °C (–13…+176 °F)	• Connect wirelessly via Wi-Fi enabled device or via USB with the diagnostic tool • Simple connectivity to the sensor via 24 VDC power line (permissible cable length: 30 m) • User friendly interface for mobile devices and desktop computers • See data sheet "TempoLink® smart assistant" (document part no.: 552070) for further information	• OPC UA server for diagnostics of the R-Series Ⅴ • For installation in the control cabinet • Connection via LAN and Wi-Fi • See data sheet "TempoGate® smart assistant" document part no.: 552110) for further information

Color of connectors and cable jacket may change. Colors of the cores and technical properties remain unchanged.

ORDER CODE FOR COMPLETE SENSOR: RD5 KIT

NOTICE

The RD5 sensor is normally ordered as a kit containing the sensor rod and the sensor electronics housing/mounting block, all in one complete model number. For ordering the kit, use the **RD5-K** model number configurator below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
R	D	5	K														0		D	5		1	U	1	0	1
	a		b	c			d					e			f			g		h		i	j		k	

a	**Sensor model**
R D 5	Sensor rod with detached electronics

b	**Sensor components**
K	Kit (includes both sensor rod and sensor electronics housing)

c	**Design**
C	Threaded flange M18×1.5-6g (A/F 46)
D	Threaded flange ¾"-16 UNF-3A (A/F 46)
M	Threaded flange M18×1.5-6g (A/F 25)
S	Pressure fit flange Ø 26.9 mm f6
T	Threaded flange ¾"-16 UNF-3A (A/F 25)

d	**Sensor rod cable type and length**
J X X X X	FEP cable, length in centimeters (range 0007…2000 cm). See historical available*, or select length from: 0020, 0030, 0080, 0300, 0500, 1000, 1500, or 2000 cm
K X X X X	PUR cable, length in centimeters (range 0007…0115 cm). See historical available*, or select length from: 0020, 0030, or 0080 cm
W X X X X	6 single wires, length in centimeters (range 0007…0050 cm). Select length from: 0007, 0010, 0015, 0020, 0030, 0040 or 0050 cm

* Historical lengths available:

0007 cm	0023 cm	0040 cm	0115 cm
0010 cm	0025 cm	0060 cm	
0017 cm	0035 cm	0100 cm	

Non-standard lengths for cable/wires are available; must be encoded in 1 cm increments and within the specified range

e	**Sensor rod connector type**
E	Flat connector
G	M12 connector (only for sensor rod cable type »J« and »K«)
S	M16 connector (only for sensor rod cable type »J« and »K«)
W	M12 square panel mount connector (only for sensor rod cable type »W«) Requires RD5-C joining cable (ordered separately)

f	**Stroke length**
X X X X M	Flange »S«: 0025…2540 mm Flange »C«, »D«, »M«, »T«: 0025…5080 mm

Stroke length (mm)	Ordering steps
25… 500 mm	5 mm
500… 750 mm	10 mm
750…1000 mm	25 mm
1000…2500 mm	50 mm
2500…5080 mm	100 mm

X X X X U	Flange »S«: 001.0…100.0 in. Flange »C«, »D«, »M«, »T«: 001.0…200.0 in.

Stroke length (in.)	Ordering steps
1… 20 in.	0.2 in.
20… 30 in.	0.4 in.
30… 40 in.	1.0 in.
40…100 in.	2.0 in.
100…200 in.	4.0 in.

Non-standard stroke lengths are available; must be encoded in 5 mm/0.1 in. increments

g	**Sensor electronics mounting block with mating connector**
B	Classic mounting block with bottom connection and flat mating connector (only for sensor rod connector type »E«)
E	Compact mounting block with bottom connection and flat mating connector (only for sensor rod connector type »E«)
G	Compact mounting block with side M12 mating connector (only for sensor rod connector type »G« and »W«)
S	Classic mounting block with side M16 mating connector (only for sensor rod connector type »S«)

h	**Number of magnets**
X X	01…02 position(s) (1…2 magnet(s))

i	Connection type
D **5** **8**	2 × M12 female connectors (D-coded), 1 × M12 male connector (A-coded)
D **5** **6**	2 × M12 female connectors (D-coded), 1 × M8 male connector

j	System
1	Standard

k	Output
U **1** **0** **1**	EtherCAT®, position, velocity and acceleration (1…2 magnet(s))

NOTICE

- Specify number of magnets for your application and order the magnets separately.
- The number of magnets is limited by the stroke length.
  The minimum allowed distance between magnets (i.e. front face of one to the front face of the next one) is 75 mm (3 in.).
- Use magnets of the same type for multi-position measurement.

DELIVERY

RD5-K-C/D/M/T:
Sensor, O-ring
RD5-K-S:
Sensor, O-ring, back-up ring

Accessories have to be ordered separately.

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

ORDER CODE FOR SENSOR ROD ONLY

The RD5 sensor rod with cable/wires and connector can be ordered separately as a spare or replacement. For ordering just the sensor rod components, use the **RD5-R** model number configurator below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
R	D	5	R												
a			b	c			d			e			f		

a	Sensor model
R D 5	Sensor rod with detached electronics

b	Sensor components
R	Sensor rod assembly with cable and connector

c	Design
C	Threaded flange M18×1.5-6g (A/F 46)
D	Threaded flange ¾"-16 UNF-3A (A/F 46)
M	Threaded flange M18×1.5-6g (A/F 25)
S	Pressure fit flange Ø 26.9 mm f6
T	Threaded flange ¾"-16 UNF-3A (A/F 25)

d	Sensor rod cable type and length
J X X X X	FEP cable, length in centimeters (range 0007…2000 cm). See historical available*, or select length from: 0020, 0030, 0080, 0300, 0500, 1000, 1500, or 2000 cm
K X X X X	PUR cable, length in centimeters (range 0007…0115 cm). See historical available*, or select length from: 0020, 0030, or 0080 cm
W X X X X	6 single wires, length in centimeters (range 0007…0050 cm). Select length from: 0007, 0010, 0015, 0020, 0030, 0040 or 0050 cm

* Historical lengths available:			
0007 cm	0023 cm	0040 cm	0115 cm
0010 cm	0025 cm	0060 cm	
0017 cm	0035 cm	0100 cm	

Nonstandard lengths for cable/wires are available; must be encoded in 1 cm increments and within the specified range

e	Sensor rod connector type
E	Flat connector
G	M12 connector (only for sensor rod cable type »J« and »K«)
S	M16 connector (only for sensor rod cable type »J« and »K«)
W	M12 square panel mount connector (only for sensor rod cable type »W«) Requires RD5-C joining cable (ordered separately)

f	Stroke length
X X X X M	Flange »S«: 0025…2540 mm Flange »C«, »D«, »M«, »T«: 0025…5080 mm

Stroke length (mm)	Ordering steps
25… 500 mm	5 mm
500… 750 mm	10 mm
750…1000 mm	25 mm
1000…2500 mm	50 mm
2500…5080 mm	100 mm

X X X X U	Flange »S«: 001.0…100.0 in. Flange »C«, »D«, »M«, »T«: 001.0…200.0 in.

Stroke length (in.)	Ordering steps
1… 20 in.	0.2 in.
20… 30 in.	0.4 in.
30… 40 in.	1.0 in.
40…100 in.	2.0 in.
100…200 in.	4.0 in.

Non-standard stroke lengths are available; must be encoded in 5 mm/0.1 in. increments
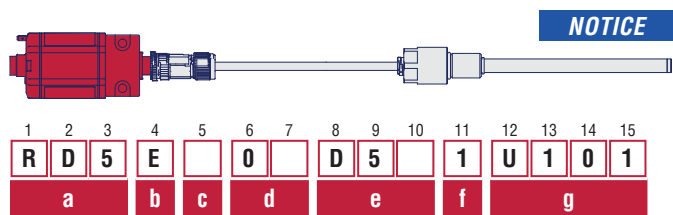
DELIVERY

RD5-R-C/D/M/T:
Sensor rod, O-ring
RD5-R-S:
Sensor rod, O-ring, back-up ring

Accessories have to be ordered separately.

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

ORDER CODE FOR SENSOR ELECTRONICS AND MOUNTING BLOCK ONLY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R	D	5	E		0		D	5		1	U	1	0	1
a			b	c		d		e		f		g		

The RD5 sensor electronics housing with mounting block can be ordered separately as a spare or replacement. For ordering just the sensor electronics components, use the **RD5-E** model number configurator below.

a	Sensor model
R D 5	Sensor rod with detached electronics

b	Sensor components
E	Sensor electronics assembly with mounting block and mating connector

c	Sensor electronics mounting block with mating connector
B	Classic mounting block with bottom connection and flat mating connector (only for sensor rod connector type »E«)
E	Compact mounting block with bottom connection and flat mating connector (only for sensor rod connector type »E«)
G	Compact mounting block with side M12 mating connector (only for sensor rod connector type »G« and »W«)
S	Classic mounting block with side M16 mating connector (only for sensor rod connector type »S«)

d	Number of magnets
X X	01…02 position(s) (1…2 magnet(s))

e	Connection type
D 5 8	2 × M12 female connectors (D-coded), 1 × M12 male connector (A-coded)
D 5 6	2 × M12 female connectors (D-coded), 1 × M8 male connector

f	System
1	Standard

g	Output
U 1 0 1	EtherCAT®, position, velocity and acceleration (1…2 magnet(s))

NOTICE
- Specify number of magnets for your application and order the magnets separately.
- The number of magnets is limited by the stroke length.
  The minimum allowed distance between magnets (i.e. front face of one to the front face of the next one) is 75 mm (3 in.).
- Use magnets of the same type for multi-position measurement.

DELIVERY

RD5-E:
As ordered

Accessories have to be ordered separately.

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

ORDER CODE FOR RD5 JOINING CABLE – RD5-C

NOTICE

The **RD5-C** joining cable is required when the sensor rod connector is the M12 square panel mount connector, W . For ordering the joining cable, use the RD5-C model number configurator below.

1	2	3	4	5	6	7	8	9	10	11
R	D	5	C	J					C	M
a			b	c					e	

a	**Sensor model**
R D 5	Sensor rod with detached electronics

b	**Sensor components**
C	Joining cable (M12 to M12)

c	**Cable type and length**
J X X X X	FEP cable Length in centimeters (range 0050...2000 cm) Standard lengths are: 0050, 0100, 0300, 0500, 1000, 1500, 2000 cm
	Non-standard lengths for the joining cable are available; must be encoded in 1 cm increments and within the specified range

d	**Unit of measure**
C M	Length in centimeters

DELIVERY

RD5-C:
As ordered

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

GLOSSARY

D

Distributed Clock
EtherCAT® uses a logical network of **D**istributed **C**locks (DC) to synchronize the time on all local bus devices on the network. The EtherCAT® master usually selects the first Distributed Clock capable slave device as a Reference Clock, and then maintains a precise mapping of frame delays for all other slave devices in order to adjust their time to match the system time.

E

ESI
The properties and functions of an EtherCAT® device are described in an ESI file (**E**therCAT® **S**lave **I**nformation). The XML-based ESI file contains all relevant data that are important for the implementation of the device in the controller as well as for data exchange during operation. The ESI file of the R-Series V EtherCAT® is available on the homepage www.temposonics.com.

EtherCAT®
EtherCAT® (**Ether**net for **C**ontrol **A**utomation **T**echnology) is an Industrial Ethernet interface and is managed by the **E**therCAT® **T**echnology **G**roup (ETG). The R-Series V EtherCAT® and its corresponding ESI file are certitified by the ETG.

Extrapolation
The native measurement cycle time of a sensor increases with the stroke length. With extrapolation, the sensor is able to report data faster than the native cycle time, independent of the stroke length of the sensor. Without extrapolation, if data is requested faster than the native cycle time, the last measured value is repeated.

M

Multi-position measurement
During the measurement cycle, the positions of every magnet on the sensor are simultaneously reported. The velocity and acceleration are continuously calculated based on these changing position values as the magnets are moved.

Temposonics

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