



T3F - EtherCAT

T-Series III

Data Sheet

Ethernet header	Ethernet Data				FCS
14Byte	EtherCAT header				4bit
	11bit	1bit	4bit	44*-1498Byte	
Ethernet header	Length	Res.	Type	1...n Datagrams	FCS

- + Updated new generation: stronger performance
- + Stroke length up to 20 m
- + EtherCAT output: position and velocity



THE NEW

III

GENERATION



High precision



Double anti-interference



High performance chip



Wide operating voltage



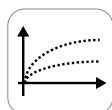
Reverse polarity protection



Shock/vibration resistant

TECHNICAL PARAMETER

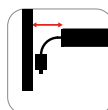
TECHNOLOGY PERCEIVES THE FUTURE



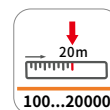
Linear/Curve measurement



Compact for transport and storage



Confined space installation



Wider stroke length range

Input	Measured data	Position/Velocity
	Position measurement range	100mm...20000mm
Output	Interface	EtherCAT
	Data protocol	EtherCAT 100 Base-Tx, high speed Ethernet
	Data transmission rate	Max. 100Mbit/s
Resolution	Position resolution	0.5...1000µm optional
	None-Linearity	< ±0.02%F.S. (min. ±100µm)
	Repeatability	< ±0.001%F.S. (min. ±2.5µm)
	Update time	Depends on stroke length
	Temperature coefficient	< 15ppm/°C
Mounting	Mounting position	Any
	Pressure resistance outer tube	Thread metric M18×1.5, 3/4"-16UNF-3A etc.
Design/Material	Electronics housing	Aluminum alloy/Zinc alloy
	Magnet	Stainless soft pipe (Teflon skin), min. bending semidiameter 150mm, shipping semidiameter 500mm
Electrical connection	Wiring connection	6 pin M16 connector, two 5 pin M12 connectors and one 4 pin M12 connector, two 5 pin M12 connectors and one 4 pin M8 connector, straight out cable
	Operating voltage	9VDC...36VDC
	Polarity protection	Up to -36VDC
	Overvoltage protection	Up to +36VDC
	Power consumption	< 120mA (varies with range size)
	Dielectric strength	500 VDC (DC ground to machine ground)
Operating conditions	Loop velocity	Any
	Operating temperature	-40...85°C
	Humidity	90 % relative humidity, no condensation
	Ingress protection	IP67 installed into pressure pipe (top IP68)
	Shock	100 g/11 ms, IEC standard 60068-2-27
	Vibration	5 g/10...2000 Hz, IEC standard 60068-2-6 (resonant frequencies exclusive)
	EMC	Flexible sensor installed into pressure pipe Electromagnetic emission according to EN 61000-6-4 Electromagnetic immunity according to EN 61000-6-2

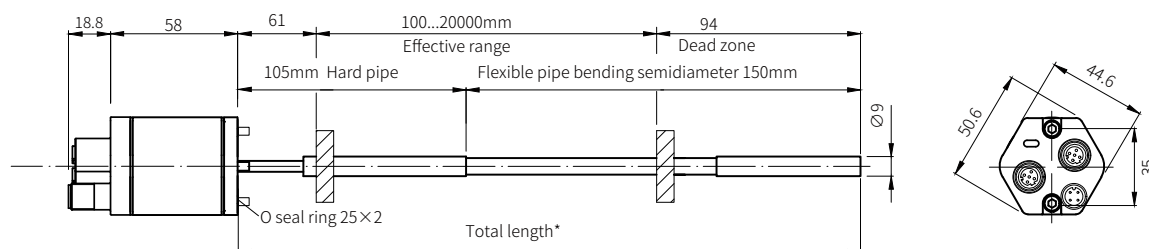
ITEM

CATEGORY

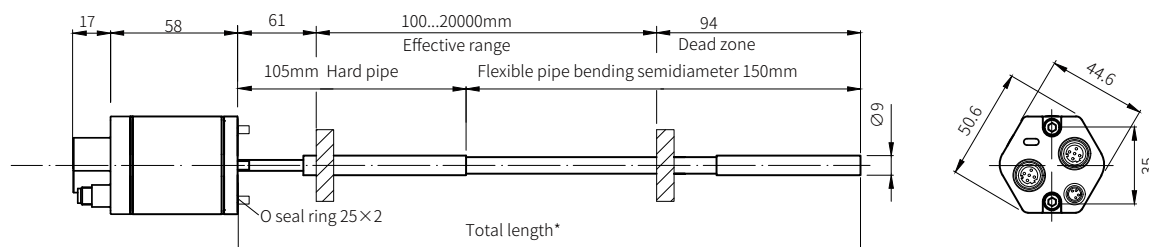
PARAMETER

Aviation plug : Two 5 pin M12 (female) + One 4 pin M12 (male)

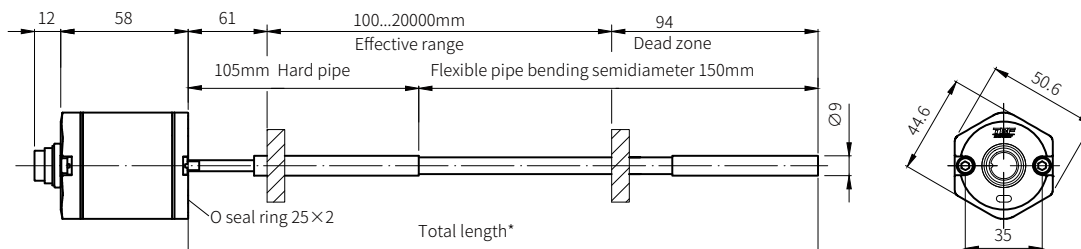
T3F- ____ - D5D42 - ____


Aviation plug : Two 5 pin M12 (female) + One 4 pin M8 (male)

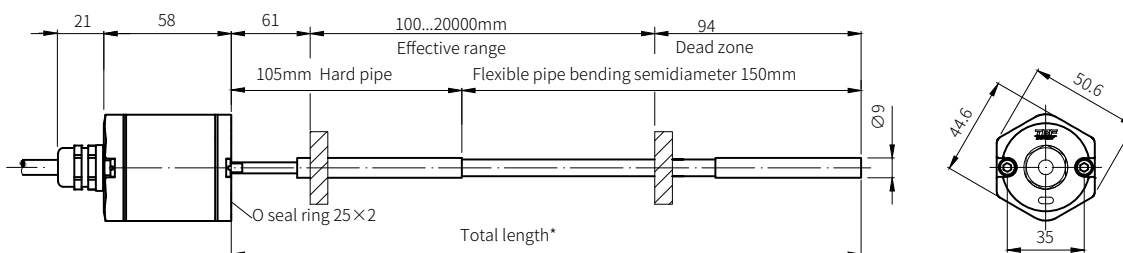
T3F- ____ - D5D48 - ____


Aviation plug : 6 pin M16 (male)

T3F- ____ - D616 - ____


Straight out cable

T3F- ____ - RP__ - ____



*Total length < 7600mm, error 0/+8mm; > 7600mm, error +15mm /-5mm;

Total length error has no impact on effective range.

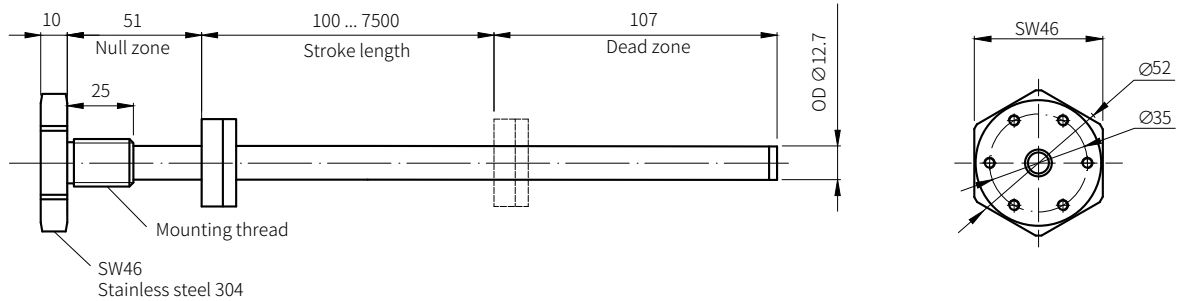
DRAWING

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Pressure pipe

Continuous pressure tolerance of the pressure pipe is 35MPa (70MPa peak).

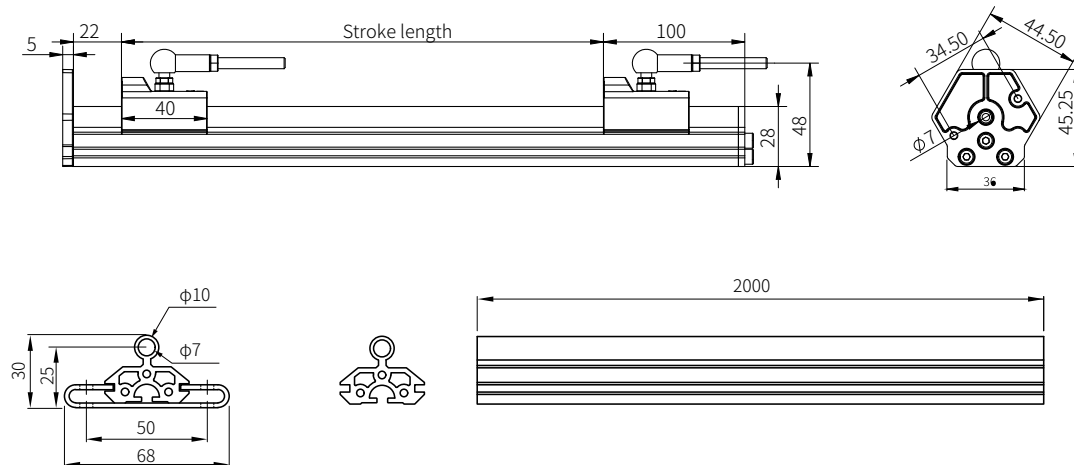
T3F flexible sensor is installed into pressure pipe, straight out cable IP68, aviation plug IP67.



ORDER CODE

HD	M	
		Stroke length
		0100...7500mm (5mm increments)
		Thread
	M	Metric M18x1.5
	V	Metric M20x1.5
	S	3/4"-16UNF-3A
	W	Metric M24x1
		If not selected, thread M18x1.5 by default.

Aluminum profile



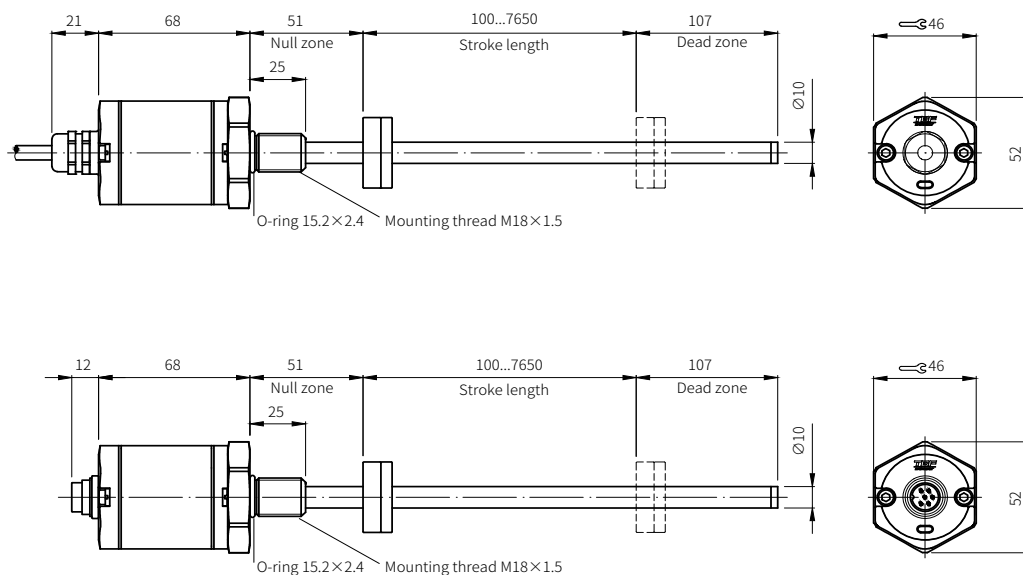
ORDER CODE

H3P	M	
		Stroke length
		0025...5600mm (5mm increments)
		Magnet
	S	Magnet slider joint at top
	V	Magnet slider joint at front
	F	Suspension magnet
	U	U- magnet

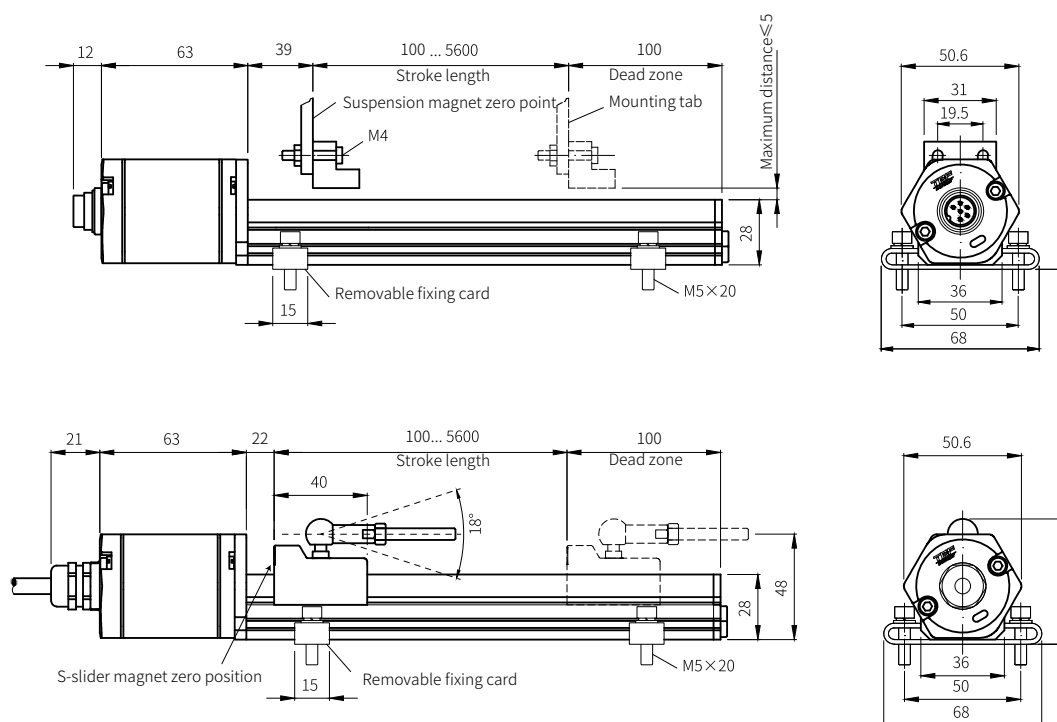
Combination example drawings

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Flexible sensor installed into pressure pipe



Flexible sensor installed into aluminum profile



MOUNTING DRAWING

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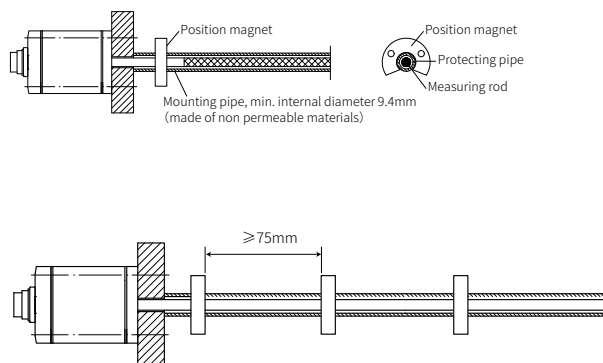
T3FH type of installation diagram

Electronics housing for T3F flexible sensor employs two M4x60 non permeable screws for installation.

When arc measurement is adopted, the flexible pipe can be bended into required shape with min. bending semidiameter 150mm.

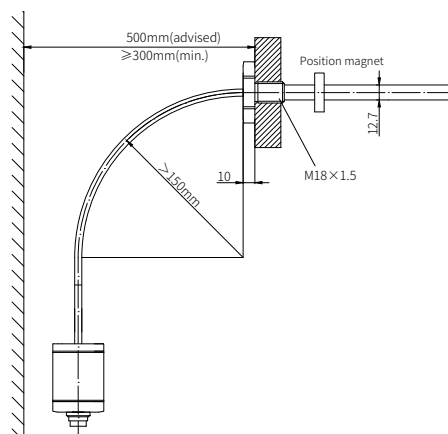
With long range sensor, pipes made of non permeable materials can be used as support. In addition, pressure pipe with flange can also be ordered to support and protect the sensor.

Linear measurement



Spacing between multiple magnets shall be $\geq 75\text{ mm}$

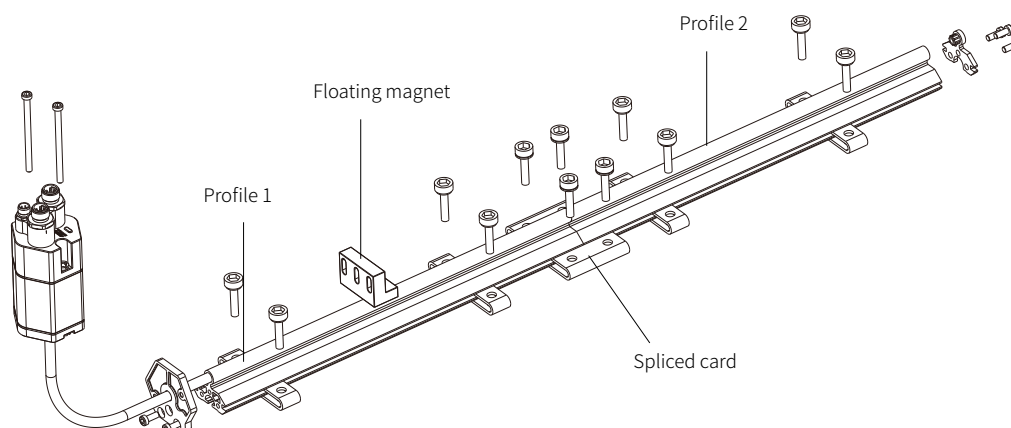
Pressure pipe



T3FP type of installation diagram

T series external guide rail sensors are fixed with removable fixing cards. The distance between the cards should be with in 500mm.

When the sensors are used under extremely severe shock and vibration conditions, it is recommended to configure a removable fixing card every 250mm.



For spliced profiles:

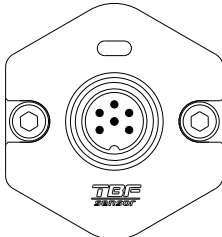
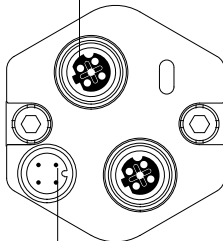
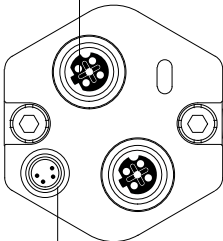
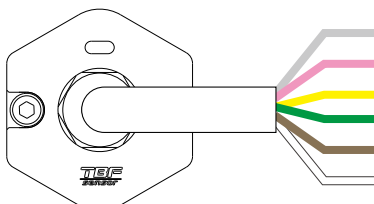


Ensure the joints are flush.

Only compatible with floating magnets or U-shaped magnets.

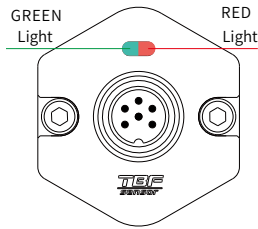
FUNCTION

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6 pin M16 male connector		D616	PIN	Function
		 View on sensor	1 2 3 4 5 6	TX+ RX+ TX- RX- 9VDC...36VDC 0 VDC(GND)
Two 5 pin M12 female connectors (D-coded), One 4 pin M12 male connector		D5D42	PIN	Function
5 pin M12 female connector(D-coded)  4 pin M12 male connector		 D512 (female) View on sensor D412(male)	1 2 3 4 5 PIN	TX+ RX+ TX- RX- NC Function
Two 5 pin M12 female connectors (D-coded), One 4 pin M8 male connector		D5D48	PIN	Function
5 pin M12 female connector(D-coded)  4 pin M8 male connector		 D512 (female) View on sensor D408(male)	1 2 3 4 5 PIN	TX+ RX+ TX- RX- NC Function
Straight out cable 		Color		Function
		Gray		TX-
		Pink		TX+
		Yellow		RX+
		Green		RX-
		Brown		9VDC...36VDC
		White		0 VDC(GND)

Enhanced monitoring and diagnostic functions

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Green light	Red light	Function
ON	OFF	View on sensor
ON	ON	Magnet cannot be measured, nor magnet number is correct.
OFF		Communication exception

ORDER CODE

Basic structure

T3F - C - - - - M - - - - - 1 - E - - - - -

Pipe mounting	Stroke length	Connection type	Output
C Basic structure	00100...20000mm (< 1000: 50mm increments) > 1000: 250mm increments) Max. range 7500mm (pressure pipe installed)	RP_ _ Straight out _ _m high performance cable (Fill in zero if less than 2 places) D616 M16 male connector (6 pin) D5D42 Two sets of M12 female connectors (D-coded), One set of M12 male connector D5D48 Two sets of M12 female connectors (D-coded), One set of M8 male connector	(Output Code)

Flexible sensor installed into pressure pipe

T3F - - - - - M - - - - - 1 - E - - - - -

Pipe mounting	Stroke length	Connection type	Output
M Thread M18×1.5 with pressure pipe S 3/4"-16UNF-3A with pressure pipe	0100...7500mm	Same as above	(Output Code)

Flexible sensor installed into aluminum profile

T3FP - - - - - M - - - - - 1 - E - - - - -

Magnet	Stroke length	Connection type	Output
S Magnet slider joint at top V Magnet slider joint at front F Suspension magnet U U- magnet	00100...5600mm (5mm increments)	Same as above	(Output Code)

EtherCAT Output Code [1]-E[2][3][4]-[5][6]

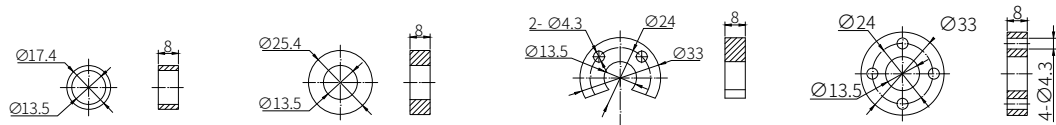
[1] System	[2][3][4] Output	[5][6] Magnet number
1 Standard	101 Position, update in high speed, 1-5 magnet 102 Position, 1-20 magnet 103 Position and velocity, update in high speed, 1-5 magnet, linear correction optional 105 Position and velocity, 1-20 magnet, linear correction optional	01 one magnet 02 two magnets 20 twenty magnets

Model selection Model: T3F-M-00600M-D616-1-E101-01

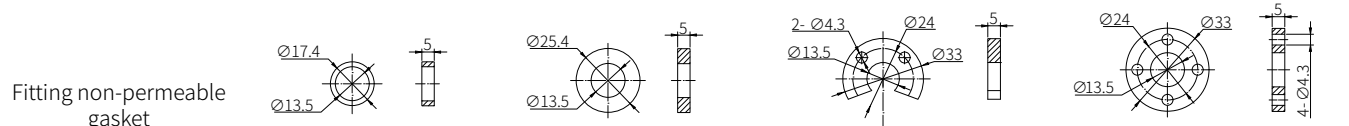
Explanation: T series III generation, T3F flexible sensor, installed inside pressure pipe, mounting thread metric M18x1.5, stroke length 600mm, 6pin M16 aviation plug, standard, EtherCAT output, position measurement, update in high speed, single magnet.

PARTS SELECTION

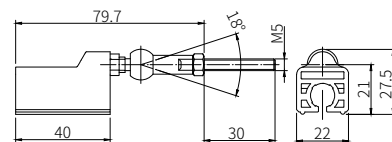
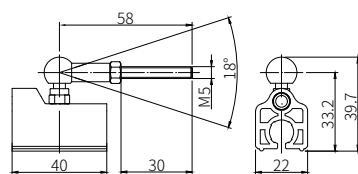
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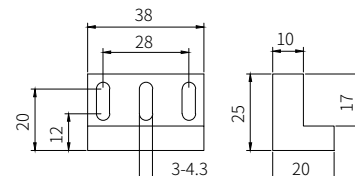
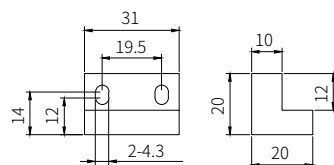
Name	Ring magnet	Ring magnet	U-magnet	Ring magnet
Operating temperature	-40...125°C			
Order code	12-1032	12-1019	12-1017	12-1001



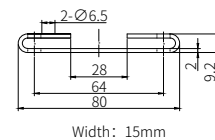
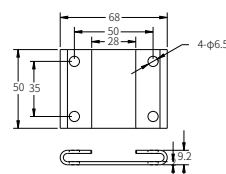
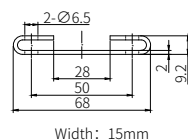
Name	Non-permeable gasket	Non-permeable gasket	Non-permeable gasket	Non-permeable gasket
Operating temperature	-40...125°C			
Order code	12-1037	12-1021	12-1018	12-1008



Name	Magnet slider S, joint at top	Magnet slider V, joint at front
Operating temperature	-40...105°C	
Order code	12-1114	12-1115



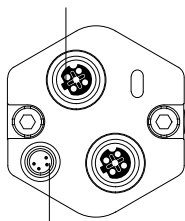
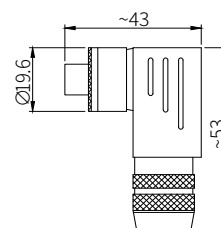
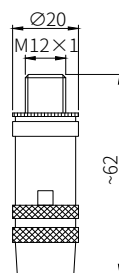
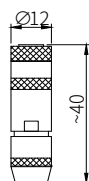
Name	Suspension magnet 31x20	Suspension magnet 38x25
Operating temperature	-40...105°C	
Order code	12-1010	12-1009

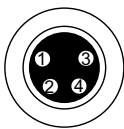


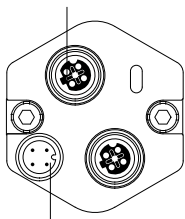
Name	Removable fixing card	Splicing Fixing Clip	Removable fixing card
Order code	11-1003	11-1058	11-1004

PARTS SELECTION

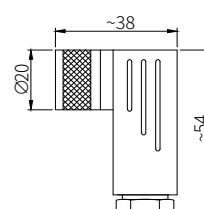
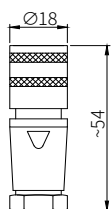
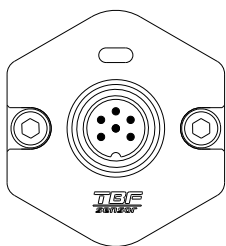
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5 pin M12(D-coded)
female connector4 pin M8
male connector

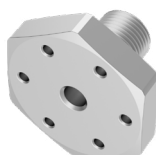
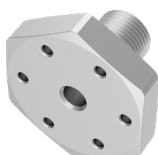
Name	4 pin M8 female connector	4 pin M12(D-coded) male connector	4 pin M12(D-coded) male connector (90 degree angle)
End view drawing			
Material	Galvanized nickel		
Fitting diameter	3.5...5mm	6...8mm	
Connection	Welding	Threaded	
Adaptive	4 pin M12 (Power connector)	5 pin M12(D-coded)	
Order code	18-1001	18-1011	18-1012

5 pin M12(D-coded)
female connector4 pin M12
male connector

Connector	5 pin M12 female connector	5 pin female connector (90 degree angle)	4pin M12(D-coded) male connector
Name	Integral cable	Integral cable	Integral cable
Cable	5 wire 0.25mm ² shielded cable	5 wire 0.25mm ² shielded cable	4 wire 0.25mm ² shielded cable
Color/Diameter	Orange/ Ø 6	Orange/ Ø 6	Green/ Ø 6
Plug surface	 1-Brown 2-Green 3-White 4-Gray 5-Yellow	 1-Brown 2-Green 3-White 4-Gray 5-Yellow	 1-Yellow 2-White 3-Orange 4-Blue
Length	5...30M	5/10/15/20/30M	5...30MM
Adaptive	4 pin M12 (Power connector)	4 pin M12 (Power connector)	5 pin M12(D-coded)
Order code	16-1035	16-1040	16-1045



Name	6 pin M16 female connector	6 pin M16 female connector (90 degree angle)
End view drawing		
Material	Galvanized nickel	Galvanized nickel
Fitting diameter	8...10mm	6...8mm
Connection	Welding	Welding
Order code	18-3007	18-3003



Name	Threaded flange M18×1.5-6g	Threaded flange 3/4"-16UNF-3A	Pressure rod with threaded flange M18×1.5-6g	Pressure rod with threaded flange 3/4"-16UNF-3A
Material	Stainless steel 304/316L			
Order code	11-1075	11-1076	HD-XXXXM-M	HD-XXXXM-S



Name	Profile with flange length ≤ 5600mm	Profile length: 2000mm
Material	Aluminum alloy, Zinc alloy	Aluminum alloy
Order code	H3P-XXXXM-X	11-1077

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