



Non-Contact Absolute Position Transducer

Leading technology revolutionary determine who will hold the competitive advantage today and tomorrow.

**MAGNETOSTRICTIVE
TECHNOLOGY**

Germanjet[®]
PART OF YOUR POSITIONING



*...Experts in
non-contact sensing*

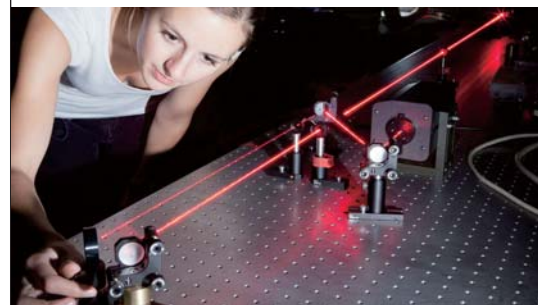
*for extremely accurate, low-noise, and wear-free
absolute position feedback*

Our philosophy ...

Leading technology revolutionary can determine who will hold the competitive advantage today and tomorrow. Germanjet has been in the position to be the trendsetter for sensing revolution. Recognizing promising ideas and identify new approach to challenge has always been one of the most significant elements in our technology planning. To accomplish all this, we closely align our R&D activities toward our business strategy.

Our team is young, dynamic, and committed. Their excellent qualifications allow them to provide exceptional support to customers all around the world. Open and devoted cooperation results in an extraordinarily high degree of identification with the company.

In order to act proactively to our customers' technological needs, Germanjet Advance Sensing and Control Technology (ASCT) group was formed to specialize in designing intelligent product and solution. No matter how diverse and difficult the requirement is, our goal is to provide the highest possible performance with the most optimum service and price.





Worldwide Vision

Our team excellent qualifications allow them to provide exceptional support to customers all around the world.



Parisan control is an advance close-loop control system for blow molding machine. Non-contact absolute position transducer feedbacks the valve position to controller to precisely control the thickness of the bottle.



Non-contact Technology

Absolute Position

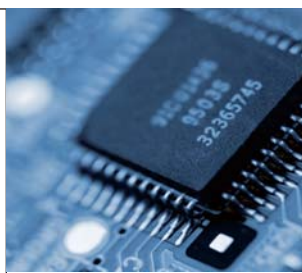
IP 67 Protection

Easy Installation



The fundamental principle of the magnetostrictive transducer is by analyzing the feedback sonic wave induced by an interaction of two magnetic fields. The first magnetic field is produced by the moveable magnetic cursor which attached at the moving component of a machine. The second field is generated by the pulse initiator. After the two magnetic fields interact, a sonic wave is induced and detected by the sonic wave analyzer.

By examining the characteristic of the wave pattern, the embedded microprocessor is able to generate the corresponding analog output signal to indicate the position of the machine. As a result, precise non-contact position is achieved with absolutely no wear to the sensing components.



high precision & reliability...

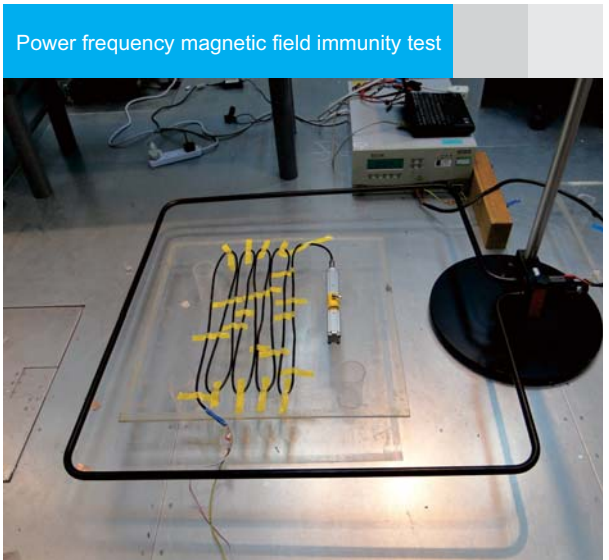
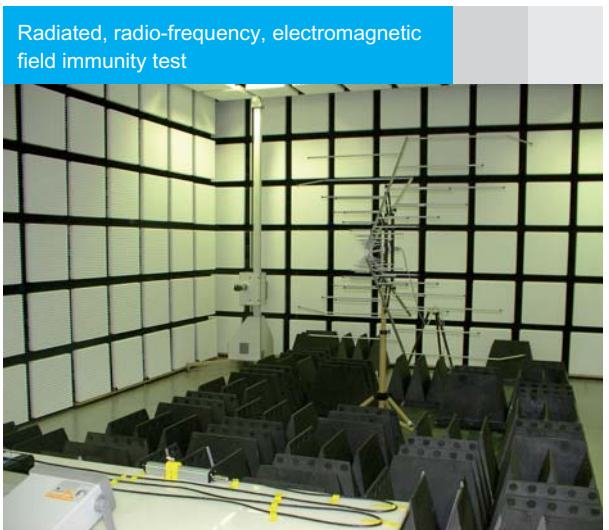
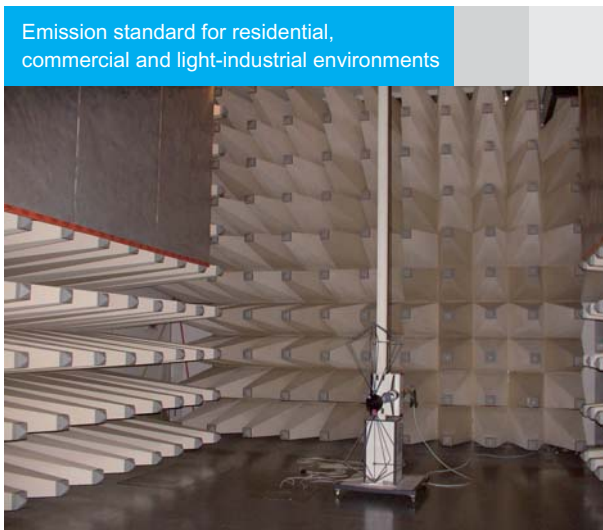


Electromagnetic Compatibility refers to the ability of equipment to perform satisfactorily in its electromagnetic environment without introducing intolerable interference into any thing in that environment.

The equipment must have a certain level of "immunity" to the Electromagnetic Interference (EMI) present in its environment so that it is not "susceptible" to that EMI. Product, in certain country, has to fulfill EMC test in order to be distributed legally.

Our EMC laboratory is fully compatible with ISO/IEC 17025:1996 standard. And our product are passed all required EMC tests and meet the CE standard.

EN 61000-6-3	Emission standard for residential, commercial and light-industrial environments
EN 61000-6-2	Immunity for industrial environments
EN 61000-4-2	Electrostatic discharge immunity test
EN 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	Electrical fast transient/burst immunity test
EN 61000-4-6	Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-8	Power frequency magnetic field immunity test
	Temperature fatigue test
	Liquid and dust protection test
	Shock and vibration test
	On site shock and vibration test



CE *Quality and certification....*

Temperature fatigue test



Product in most working environment would experience certain degree of shock and vibration. The purpose of shock and vibration test is to have product going through a similar simulated environment.

During design phase and pre-production cycle, our product would undergo a series of intensive shock and vibration tests. Machine such as plastic injection machine induces a severe level of vibration. In order to make sure our product overcome the actual challenge, we also perform a series of on-site test.

On-site shock and vibration test



Liquid and dust protection



Applications

- Plastic Injection Machine
- Blow Molding Machine
- Die-Casting Machine
- Rubber Forming Machine
- Label Printing Machine
- Hydraulic Press
- Metal Forming Machine
- Automotive
- Marine Research

Precision and reliability ...



Plastic Injection



Oil and Gas



Marine Research



Mobile Vehicle



Construction



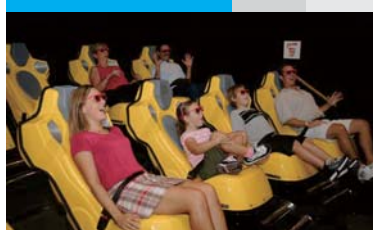
Hydraulic Press



Hydraulic Cylinder



Motion Cinema



Sheet Forming



Medical Equipment



Automotive



Water Dam Control



18 Series

Analog Voltage	1.1
Analog Current	1.3
Start / Stop Digital	1.5

17 Series

Analog Voltage	2.1
Analog Current	2.1
Start / Stop Digital	2.1

19 Series

Selection Guide	3.1
Analog and Start / Stop	3.3
SSI	3.5
CANbus	3.7
Profibus	3.9
DeviceNet	3.11
EtherCAT	3.13
Hydraulic Rod	3.15
Aluminum Profile	3.16
Sensing Rod Detached	3.17
Flex Sensor Housing	3.19

15 Series

Level Sensing Analog	4.1
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16 Series

Low Profile Hydraulic Rod	5.1
Compact Hydraulic Rod	5.5
Redundant Hydraulic Rod	5.9

12 Series

Analog Voltage	6.1
Start / Stop Digital	6.1

13 Series

Mobile Hydraulic	7.1
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Accessories

Magnet and Accessories	A1
Euro Card Holder	A7
Application Profile	B1
FAQ	B5

The 18 series non-contact absolute position transducer adopts the non-contact magnetostrictive measuring technology for precise, direct and absolute measurement. The absence of electrical contact on the cursor eliminates all wear and guarantees almost unlimited mechanical life expectancy. The non-contact (Floating) cursor provides exceptional ease of installation with a variety of available cursor position target.

The high versatile profile housing (IP67, need to match a suitable connector) offers full protection against outside agents for use in harsh environments with high contamination and presence of dust. Mounting is accomplished using clamps that allow precise mechanical adjustment. The 18 series is the most reliable and durable non-contact absolute position transducer among all.

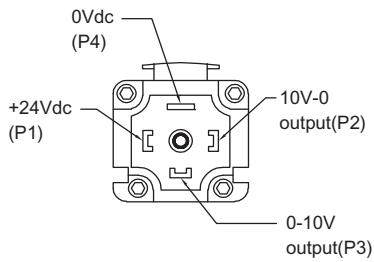


Specifications

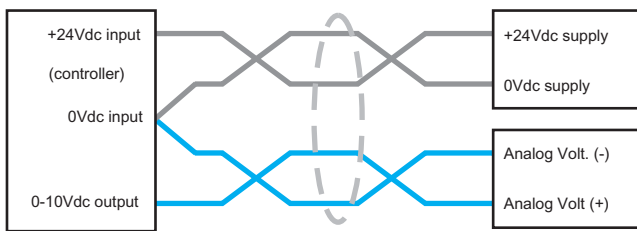
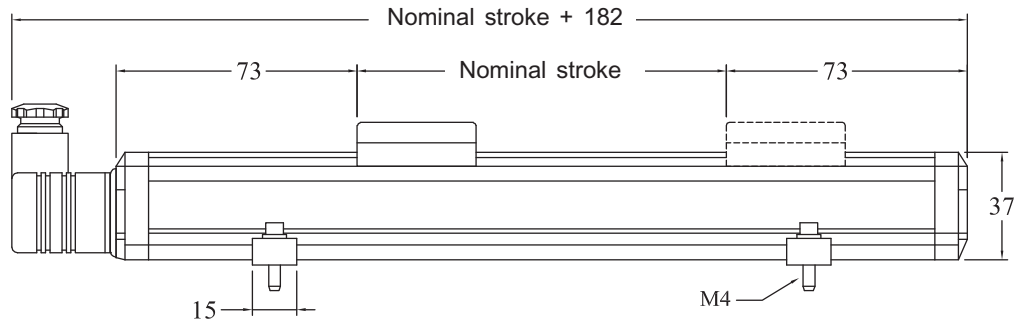
Order Code	180
Output	0-10Vdc, 10-0Vdc dual-output. minimum load 5kΩ
Measurement Type	Linear displacement
Resolution	Infinite, restricted by output ripple
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Current Consumption	50-140mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Repeatability	< ±0.005% of full scale
Non-Linearity	< ±0.02% of full scale (minimum ±90µm)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP65 / IP67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2 EN 61000-4-2/3/4/6

Infinite resolution ...

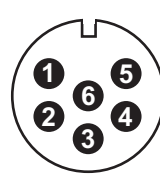




4 pins connector
(View toward sensor pins)

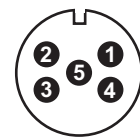


(connection example)



D60 connector
(View toward sensor pins)

1	0-10V output
2	Pin 1 DC Gnd
3	10-0V output
4	Pin 3 DC Gnd
5	+24 Vdc
6	0 Vdc



5 pins M12 connector
(View toward sensor pins)

1	+24Vdc
2	0-10V output
3	0 Vdc
4	10-0V output
5	DC Gnd

Order Code

1 8 0 X X X X X X X

Output

0-10Vdc, 10-0Vdc Dual-output

Connector

- 0 = 4 pins connector (IP65)
- 1 = Cable outlet (P.A4 to select cable length)
- 2 = D60 connector (not include 6 pins female connector)
- 3 = 4 pins connector (IP67)
- 4 = 5 pins M12 connector (not include 5 pins female connector)

Mounting (P. A1)

- 1 = 42.5mm mounting
- 2 = 42.5mm isolation mounting
- 3 = 50mm mounting

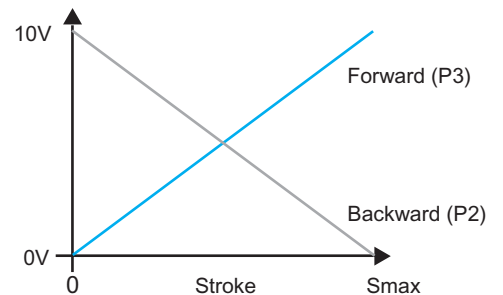
Magnet Type (P. A1)

- 1 = Captive
- 2 = Floating
- 3 = Die-cast
- 4 = Large floating

Stroke Length

0 1 0 0 , 0 1 3 0 , 0 1 5 0 , 0 1 7 5 , 0 2 0 0 , 0 2 2 5 , 0 2 5 0
 0 2 7 5 , 0 3 0 0 , 0 3 6 0 , 0 4 0 0 , 0 4 2 5 , 0 4 5 0 , 0 5 0 0
 0 5 2 5 , 0 5 5 0 , 0 6 0 0 , 0 6 5 0 , 0 7 0 0 , 0 7 5 0 , 0 8 0 0
 0 8 7 5 , 0 9 0 0 , 0 9 5 0 , 1 0 0 0 , 1 1 0 0 , 1 2 5 0 , 1 3 5 0
 1 5 0 0 , 1 6 0 0 , 1 7 5 0 , 2 0 0 0 , 2 2 5 0 , 2 5 0 0 , 2 7 5 0
 3 0 0 0 , 3 2 5 0 , 3 5 0 0 , 4 0 0 0 (other length upon request)

	Cable	Voltage
1	Black	0-10V Output
2	White	DC Gnd
3	Yellow	10-0V Output
4	Green	N.C.
5	Red	+24 Vdc
6	Blue	0 Vdc



Caution:

Please do not connect controller analog input (-) to machine 0V or ground. Only connect directly to transducer 0V (P4).

Use 4 wires shielded twisted pair cable, dia. 0.2mm.

Do not connect power supply +24Vdc to transducer 0Vdc, and at the same time connect power supply 0Vdc to transducer output. This will cause transducer permanent failure.

(Warning: warranty does not include such source of failure)

The 18 series non-contact absolute position transducer adopts the non-contact magnetostrictive measuring technology for precise, direct and absolute measurement. Analog current interfaces are significantly less sensitive for signal traveling a long distance and passing through severe electrical interference.

The 18 series analog current output are available in 0-20mA, 20-0mA, 4-20mA, and 20-4mA. The output signal is directly proportional to the magnet position along the measuring stroke.

The absence of electrical contact on the magnet eliminates all wear and guarantees almost unlimited mechanical life expectancy.

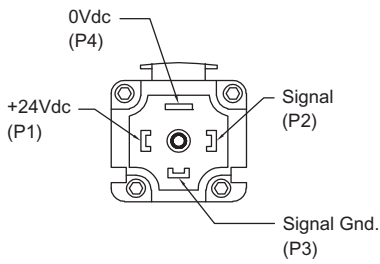


Specifications

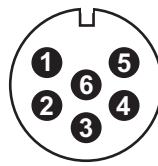
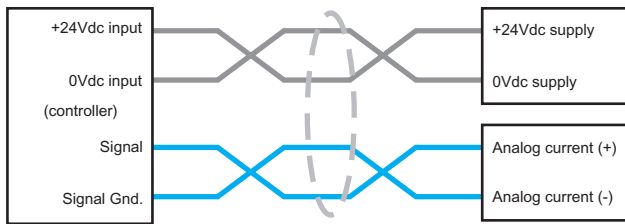
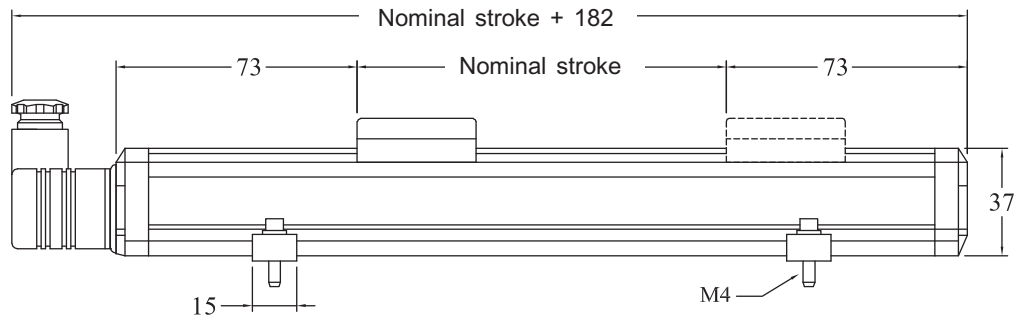
Order Code	181	182	184	185
Output	0 - 20 mA	20 - 0 mA	4 - 20 mA	20 - 4 mA
Measurement Type	Linear displacement			
Resolution	Infinite, restricted by output ripple			
Input Voltage	+24Vdc (20.4 - 28.8Vdc)			
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc			
Current Consumption	50-140mA (stroke range dependent)			
Dielectric Strength	500Vdc (DC ground to machine ground)			
Repeatability	< ±0.005% of full scale			
Non-Linearity	< ±0.02% of full scale (minimum ±90µm)			
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm			
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing			
Sealing	IP65 / IP67 (with connector)			
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6			
Shock Rating	100g single hit per IEC standard 68-2-27			
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2 EN 61000-4-2/3/4/6			



...Non-contact technology

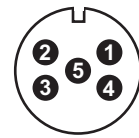


4 pins connector
(View toward sensor pins)



D60 connector
(View toward sensor pins)

1	Signal output
2	Signal Gnd
3	N.C.
4	N.C.
5	+24 Vdc
6	0 Vdc



5 pins M12 connector
(View toward sensor pins)

1	+24Vdc
2	Signal output
3	0 Vdc
4	N.C.
5	Signal Gnd

Order Code

1 8 X X X X X X X X X X

Output

- 1 = 0 - 20 mA
- 2 = 20 - 0 mA
- 4 = 4 - 20 mA
- 5 = 20 - 4 mA

Connector

- 0 = 4 pins connector (IP65)
- 1 = Cable outlet (P.A4 to select cable length)
- 2 = D60 connector (not include 6 pins female connector)
- 3 = 4 pins connector (IP67)
- 4 = 5 pins M12 connector (not include 5 pins female connector)

Mounting (P.A1)

- 1 = 42.5mm mounting
- 2 = 42.5mm isolation mounting
- 3 = 50mm mounting

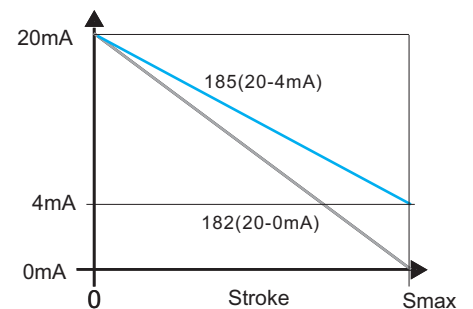
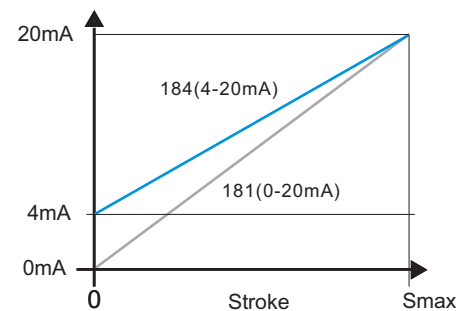
Magnet Type (P.A1)

- 1 = Captive
- 2 = Floating
- 3 = Die-cast
- 4 = Large floating

Stroke Length

0 100, 0 130, 0 150, 0 175, 0 200, 0 225, 0 250
 0 275, 0 300, 0 360, 0 400, 0 425, 0 450, 0 500
 0 525, 0 550, 0 600, 0 650, 0 700, 0 750, 0 800
 0 875, 0 900, 0 950, 1 000, 1 100, 1 250, 1 350
 1 500, 1 600, 1 750, 2 000, 2 250, 2 500, 2 750
 3 000, 3 250, 3 500, 4 000 (other length upon request)

	Cable	Current
1	Black	Signal Output
2	White	Signal Gnd
3	Yellow	N.C.
4	Green	N.C.
5	Red	+24 Vdc
6	Blue	0 Vdc



The 18 series start / stop interface is a simple and economical digital interface. The benefit of these interfaces has strong immunity to noise interference. The time between an assessment and the reply signal is directly proportional to the magnet position along the measuring stroke. The start / stop digital are transmitted using RS485/422 differential line drivers.

The 18 series non-contact absolute position transducer adopts the non-contact magnetostrictive measuring technology for precise, direct and absolute measurement. The absence of electrical contact on the magnet eliminates all wear and guarantees almost unlimited mechanical life expectancy.

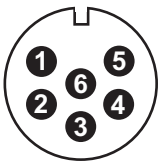
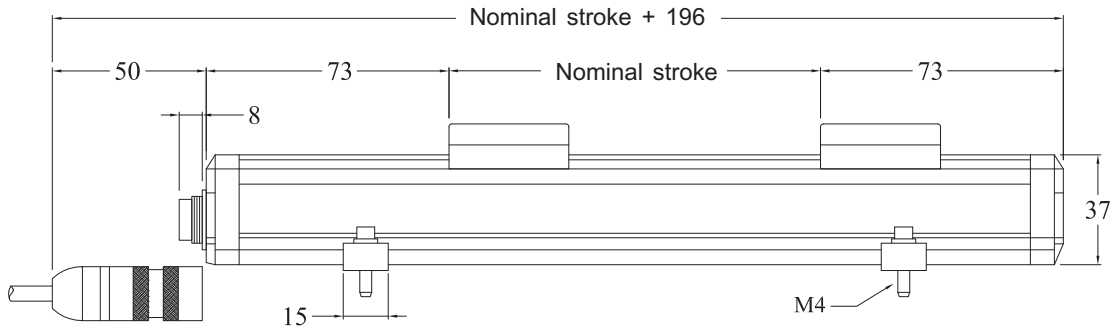


Specifications

Order Code	183
Output	Start / Stop Digital Output
Measurement Type	Linear displacement
Resolution	0.1 / 0.01 / 0.005mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Current Consumption	50-140mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Repeatability	< ±0.005% of full scale
Non-Linearity	< ±0.02% of full scale (minimum ±90µm)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2 EN 61000-4-2/3/4/6

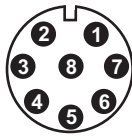
Economical digital solution ...





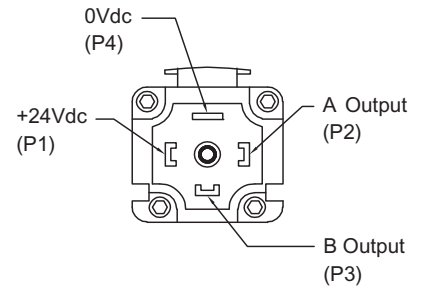
1	Stop (-)
2	Stop (+)
3	Start (+)
4	Start (-)
5	+24 Vdc
6	0Vdc

D60
(View toward sensor pins)



1	Start (+)
2	Start (-)
3	Stop (+)
4	Stop (-)
5	N.C.
6	N.C.
7	+24 Vdc
8	0Vdc

8 pins M12
(View toward sensor pins)



4 pins connector
(View toward sensor pins)

Order Code

1 8 3 X X X X X X X

Output

3 = Start / Stop Digital output

Connector

- 0 = 4 pins connector (IP65, in use with module)
- 2 = D60 connector (not include D60 female connector)
- 6 = 8 pins M12 connector (not include M12 female connector)

Mounting (P. A1)

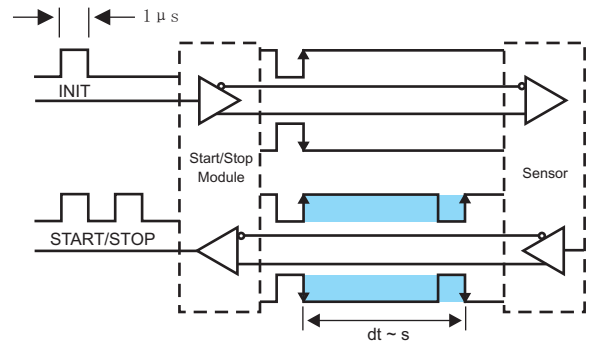
- 1 = 42.5mm mounting
- 2 = 42.5mm isolation mounting
- 3 = 50mm mounting

Magnet Type (P. A1)

- 1 = Captive
- 2 = Floating
- 3 = Die-cast
- 4 = Large floating

Stroke Length

0 1 0 0 , 0 1 3 0 , 0 1 5 0 , 0 1 7 5 , 0 2 0 0 , 0 2 2 5 , 0 2 7 5
 0 3 0 0 , 0 3 6 0 , 0 4 0 0 , 0 4 2 5 , 0 4 5 0 , 0 5 0 0 , 0 5 2 5
 0 5 5 0 , 0 6 0 0 , 0 6 5 0 , 0 7 0 0 , 0 7 5 0 , 0 8 0 0 , 0 8 7 5
 0 9 0 0 , 0 9 5 0 , 1 0 0 0 , 1 1 0 0 , 1 2 5 0 , 1 3 5 0 , 1 5 0 0
 1 6 0 0 , 1 7 5 0 , 2 0 0 0 , 2 2 5 0 , 2 5 0 0 , 2 7 5 0 , 3 0 0 0
 (other length upon request)



The 17 series non-contact absolute position transducer is specially designed for hydraulic cylinder to provide precise, direct and absolute position feedback. Hydraulic body is made by stainless steel; it can be inserted directly into hydraulic cylinder. Electronic component and hydraulic body are modular design which can be detached easily.

The transducer is rated for IP65 which offers full protection against outside agents for use in harsh environments with high contamination and presence of dust. The connector is common for use in hydraulic device and easy for field connection. Besides for hydraulic system, it is also suitable for machine installation. The absence of electrical contact eliminates all wear and guarantees almost unlimited mechanical life expectancy.



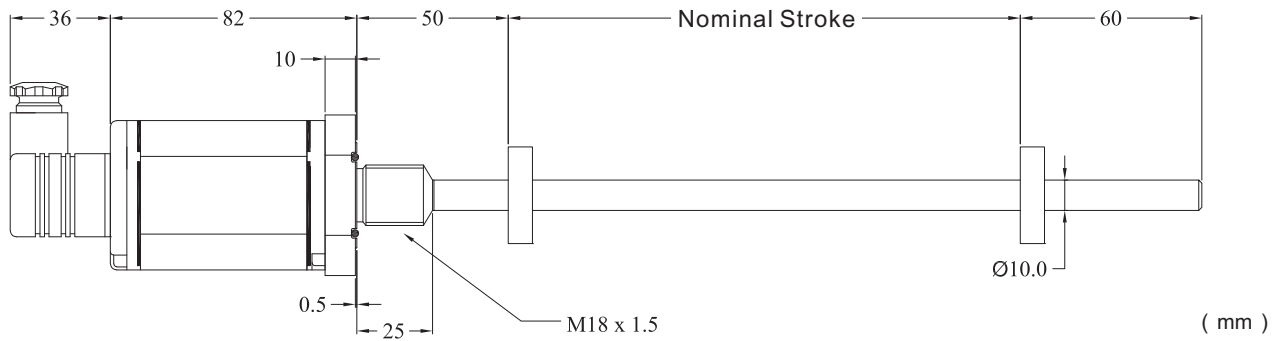
Specifications

Order Code	170	171	172	174	175	173
Output	0 - 10 V 10 - 0 V	0 - 20 mA	20 - 0 mA	4 - 20 mA	20 - 4 mA	Start/Stop
Measurement Type	Linear displacement					
Resolution	Infinite, restricted by output ripple					0.1 / 0.01 / 0.005mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)					
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc					
Current Consumption	50-140mA (stroke range dependent)					
Dielectric Strength	500Vdc (DC ground to machine ground)					
Repeatability	< ±0.005% of full scale					
Non-Linearity	< ±0.02% of full scale (minimum ±90µm)					
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2500 mm					
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing					
Sealing	IP65 (with 4 pin connector) / IP67 (with D60 and M12 connectors)					
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6					
Shock Rating	100g single hit per IEC standard 68-2-27					
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2 EN 61000-4-2/3/4/6					
Pressure Rating	350 bar / 600 bar peak					
Mounting	M18 x 1.5					
Housing Material	Anodized aluminum sensor cartridge, Stainless steel tube and flange, Plastic cartridge cover					

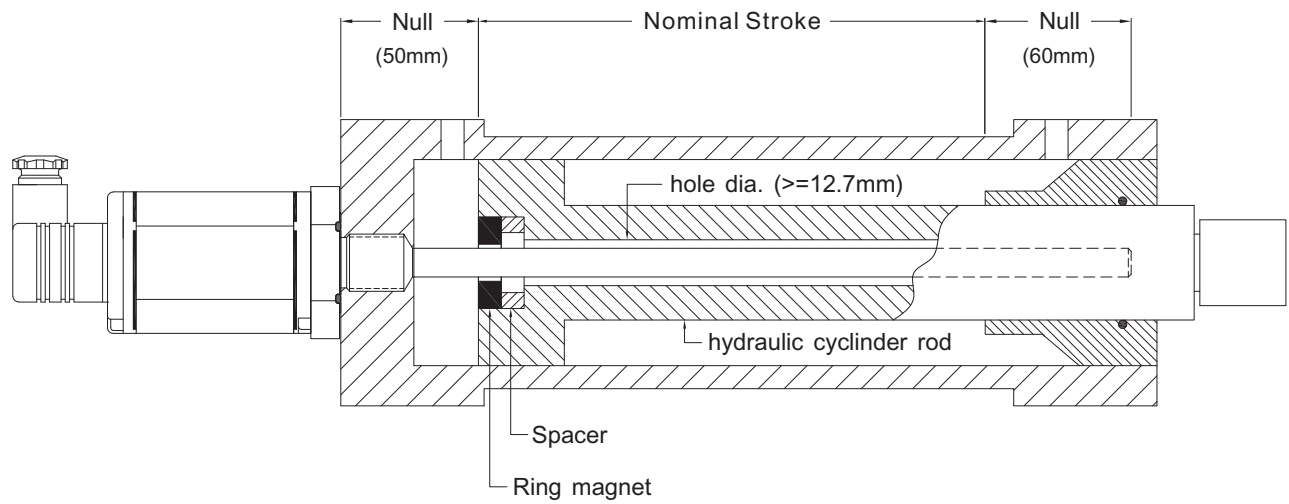
Non-contact technology ...



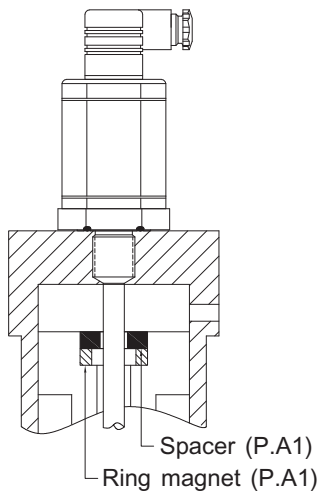
Dimension



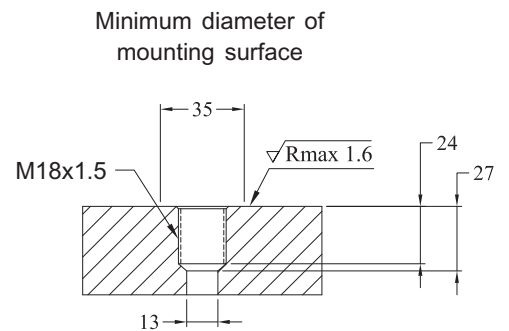
Installation



Magnet installation



Mounting surface requirement



Installation hole must be perpendicular with mounting surface and center with sensor rod.

Remarks:

Mounting screw must be made of non-magnetizable materials. If cylinder is made of magnetizable materials, ring spacer must be installed

Order Code

1 7 X X X X X X X X

Output

- 0 = 0 - 10 V d c and 10 - 0 V d c
- 1 = 0 - 20 m A
- 2 = 20 - 0 m A
- 3 = Start / Stop
- 4 = 4 - 20 m A
- 5 = 20 - 4 m A

Connector (Voltage / Current)

- 0 = 4 pins connector (IP65)
- 3 = 4 pins connector (IP67)
- 4 = 5 pins M12 connector (not include 5 pins female connector)
- 8 = Cable outlet (P.A4 to select cable length)
- 9 = D60 armor sensor cartridge

Connector (Start/Stop)

- 0 = 4 pins connector (IP65, in use with module)
- 6 = 8 pins M12 connector (not include M12 female connector)
- 9 = D60 armor sensor cartridge

Mounting thread

- 2 = M18 x 1.5

Magnet Type (P.A1)

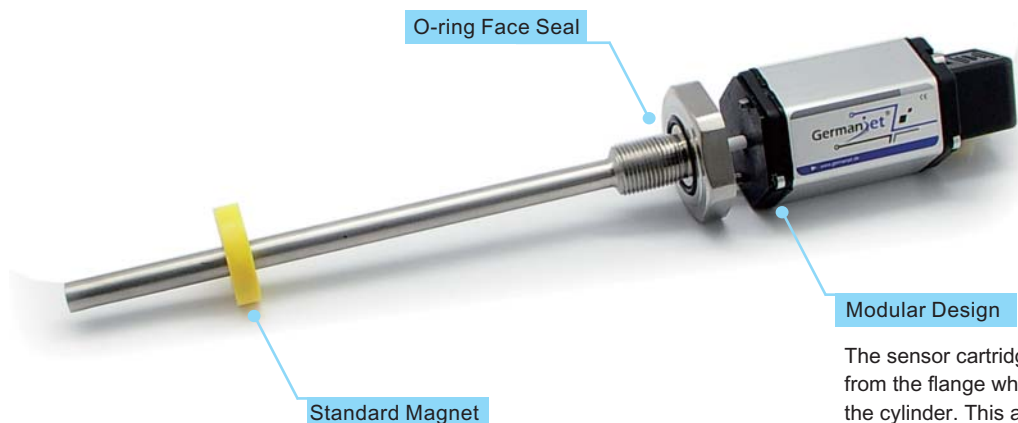
- 1 = Dia. 33mm ring
- 2 = Dia. 25mm ring
- 3 = Floating ball
- 4 = Dia. 60mm ring
- 5 = Dia. 32mm ring

Stroke Length

- 0 0 7 5 , 0 1 0 0 , 0 1 2 5 , 0 1 5 0 , 0 1 7 5 , 0 2 0 0 , 0 2 2 5
- 0 2 5 0 , 0 2 7 5 , 0 3 0 0 , 0 3 2 5 , 0 3 5 0 , 0 3 7 5 , 0 4 0 0
- 0 4 2 5 , 0 4 5 0 , (25mm increment after and up to 2500mm)

Sensor cartridge replacment

O-ring face seal provide an ease of machining on the machine.



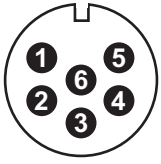
Standard Magnet

A wide selection of ring magnet to choose from.

Modular Design

The sensor cartridge can be removed from the flange while still installed in the cylinder. This allows quick sensor cartridge replacement without the loss of hydraulic pressure.

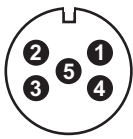
Wiring



	Voltage	Current	Start/Stop
1	0-10V output	Signal output	Stop (-)
2	Pin 1 DC Gnd.	Signal Gnd	Stop (+)
3	10-0V output	N.C.	Start (+)
4	Pin 3 DC Gnd.	N.C.	Start (-)
5	+24 Vdc	+24 Vdc	+24 Vdc
6	0 Vdc	0 Vdc	0 Vdc

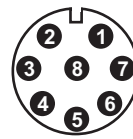
	Cable	Voltage	Current
1	Black	0-10V Output	Signal Output
2	White	Pin 1 DC Gnd	Signal Gnd
3	Yellow	10-0V Output	N.C.
4	Green	Pin 3 DC Gnd	N.C.
5	Red	+24 Vdc	+24 Vdc
6	Blue	0 Vdc	0 Vdc

D60 connector
(View toward sensor pins)



	Voltage	Current
1	+24Vdc	+24Vdc
2	0-10V output	Signal output
3	0 Vdc	0 Vdc
4	10-0V output	N.C.
5	DC Gnd	Signal Gnd

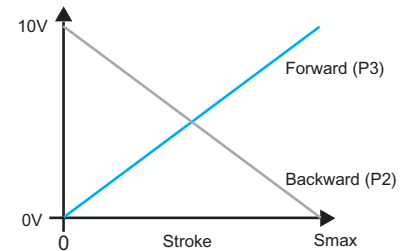
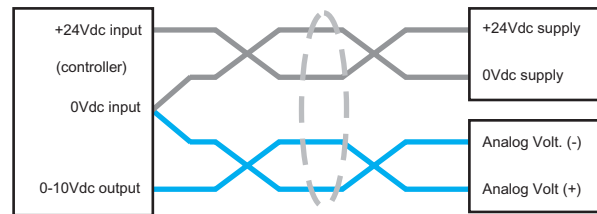
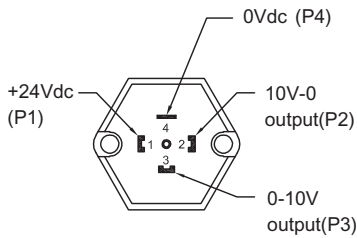
5 pins M12 connector
(View toward sensor pins)



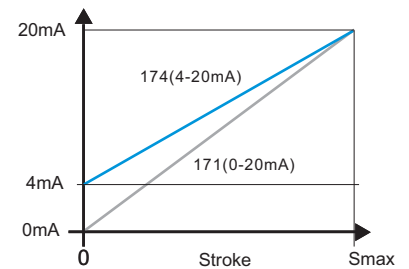
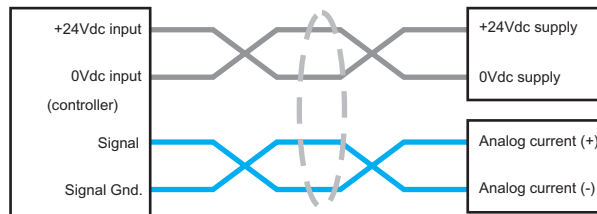
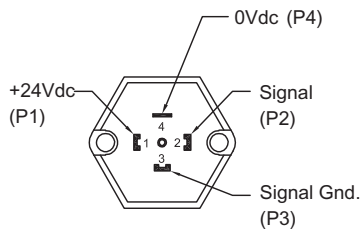
	Start /Stop
1	Start (+)
2	Start (-)
3	Stop (+)
4	Stop (-)
5	N.C.
6	N.C.
7	+24 Vdc
8	0Vdc

8 pins M12
(View toward sensor pins)

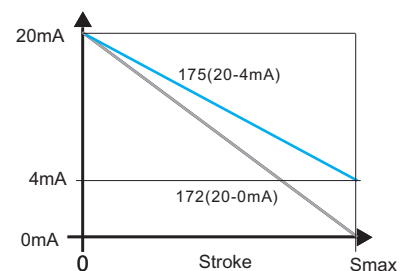
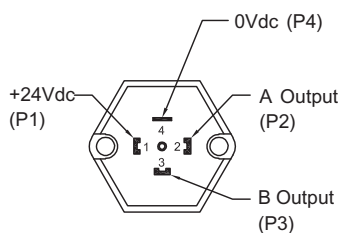
Analog voltage



Analog current



Start/Stop digital output





...19 Series Non-Contact Sensor

19 series is the state-of-the-art digital position transducer. It adopts the non-contact magnetostrictive measuring technology for precise, accurate, and absolute measurement. The non-contact feature provides exceptional ease of installation and guarantees almost unlimited mechanical life expectancy.

This special sensor was designed for use in harsh environments, such as petrochemical, oil refinery, and power plant, with high contamination and presence of dust. 19 series has a wide variety of signal output selection included analog, serial digital and fieldbus interfaces.



H model - hydraulic rod

H model is designed for hydraulic cylinder. Hydraulic body is made by stainless steel; it can be inserted directly into hydraulic cylinder. Electronic component and hydraulic body are modular design which can be detached easily; Hydraulic fluid doesn't need to be withdrawn when doing sensor calibration or replacement. This design greatly reduces machine down time and improves efficiency.



P model - aluminium profile

P model is designed for machine equipment. The high versatile IP67 profile housing offers full protection against outside agents for use in harsh environments with high contamination and presence of dust. Mounting is accomplished using clamps that allow precise mechanical adjustment.



D model - sensing rod detached

D model is designed for hydraulic cylinder with limited head space or clevis rod ends hydraulic cylinder. Sensing rod is made by stainless steel which installed inside the hydraulic cylinder. It is connected to the electronic module installed at the outside of the cylinder by a robust cable.



F model - flex sensor housing

F model is designed for very long stroke lengths and linear measurements on an arc. Standard stroke length begins from 2500mm up to 20 meters. The F model has variety of outputs including analog, serial digital and fieldbus interfaces.

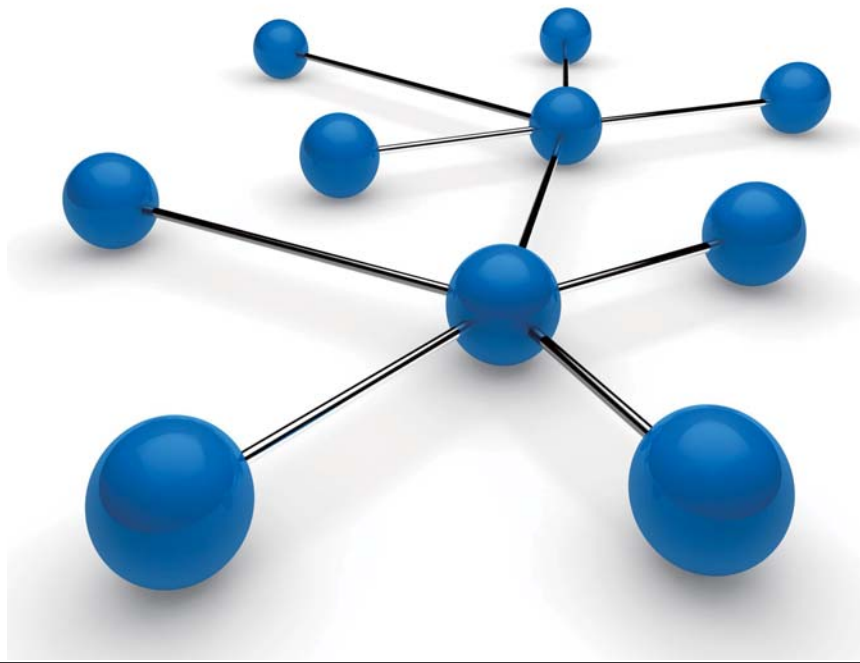


high precision with extreme reliability...

Digital Fieldbus Connection...

This professional series adopts the non-contact magnetostrictive technology for precise, direct and absolute position feedback. Output signals include:

- Programmable analog output
- Start/Stop pulse interface
- Synchronous serial SSI interface
- CANbus
- Profibus
- DeviceNet
- EtherCAT



Order Code

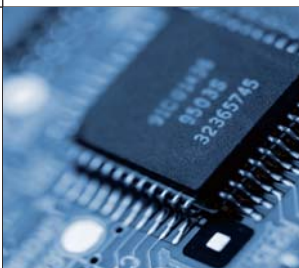
The 19 series order code consists of two parts: output code and installation code

For example, select the preferred output signal such as SSI and then choose the suitable installation profile such as hydraulic rod (H)

1	9	X	X	X	X	X	X	X	X	X	X
(Output code) P3.3 - P3.13						(Installation code) P3.15 - P3.19					

For example: SSI output with hydraulic rod (H)

1	9	2	1	G	1	1	0	0	D	7	0	H	0	2	2	5	2	1
SSI output code												Hydraulic rod installation code						



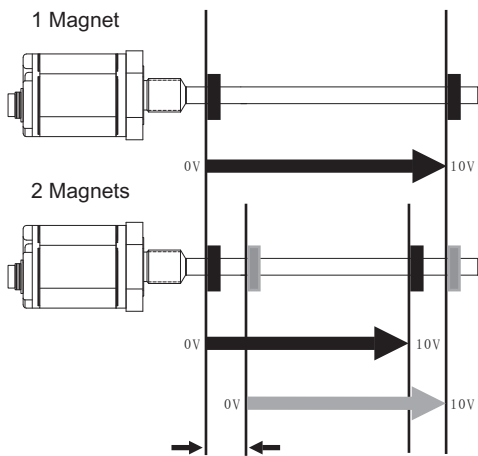
high precision & reliability...



Specifications

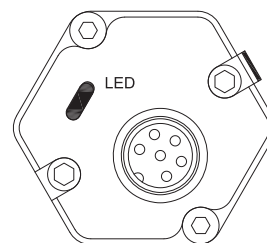
Order Code	190	191	193
Output	Voltage	Current	Start / Stop Digital
Measurement Type	Linear displacement		
Measured Variables	For dual magnets, mini distance of 76mm in between		Single magnet
Resolution	16 Bit D/A, 0.0015% (minimum 1µm)		0.1 / 0.01 / 0.005mm
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)		
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)		
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm		
Input Voltage	+24Vdc (20.4 - 28.8Vdc)		
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc		
Power Consumption	100mA (stroke range dependent)		
Dielectric Strength	500Vdc (DC ground to machine ground)		
Connector Type	D60 Male		
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing		
Sealing	IP 67 (with connector)		
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6		
Shock Rating	100g single hit per IEC standard 68-2-27		
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6		

Magnet Assignment



When using dual magnets, there is a minimum distance of 76mm need to be kept in between.

Diagnostic Display



Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected

Integrated LEDs provide basic visual feedback for normal sensor operation and troubleshooting.

Programming Tools



Order Code	1700 951 018
Discription	19 Series Analog Programming Tool

The 19 series analog programming tool can be used to set the "zero" and "end" values anywhere within the nominal factory stroke range.

Order Code (Output Code)

1 9 X X X X X X X X X X X

Output

3 or 7 digits

1 Output / 1 Magnet Position

001 = 0 - 10V
 011 = 10 - 0V
 021 = 0 - 5V
 031 = 5 - 0V
 041 = -10 - +10V
 051 = -5 - +5V
 101 = 4 - 20mA
 111 = 20 - 4mA
 121 = 0 - 20mA
 131 = 20 - 0mA
 141 = 0 - 24mA
 151 = 24 - 0mA

2 Outputs / 2 Magnets Position

002 = 0 - 10V, 0 - 10V
 012 = 10 - 0V, 10 - 0V
 022 = 0 - 5V
 032 = 5 - 0V
 042 = -10 - +10V
 052 = -5 - +5V
 102 = 4 - 20mA
 112 = 20 - 4mA
 122 = 0 - 20mA
 132 = 20 - 0mA
 142 = 0 - 24mA
 152 = 24 - 0mA

2 Outputs / 1 Magnet (Position + Velocity)

003 xxx.x = 0 - 10V (Position), 0(Mini. Velocity) - 10V (Max. Velocity)
 013 xxx.x = 10 - 0V (Position), 0(Mini. Velocity) - 10V (Max. Velocity)
 103 xxx.x = 4 - 20mA (Position), 4(Mini. Velocity) - 20mA (Max. Velocity)
 113 xxx.x = 20 - 4mA (Position), 4(Mini. Velocity) - 20mA (Max. Velocity)

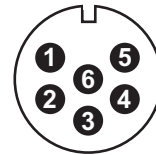
Velocity range: 0.001 - 10m/s
 Sample: 0 - 5.5m/s = 0 - 10V, code = 0030055

19 series sensor is preconfigured at the factory by model code designation. If needed, we offer programming tools for modifying sensor stroke and output types.

Connection Type

D60 = 6 pin male receptacle M16 (Connector not included)
 R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
 H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)

Pin Assignments for 190 / 191

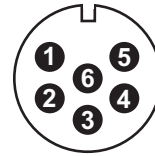


	D60 Pin	Cable
1	Output 1	Black
2	DC Gnd	White
3	Output 2	Yellow
4	DC Gnd	Green
5	+24 Vdc	Red
6	0 Vdc	Blue

(View toward sensor pins)

Cable shield connects to connector shell and grounded at controller side.

Pin Assignments for 193



	D60 Pin	Cable
1	Stop (-)	Black
2	Stop (+)	White
3	Start (+)	Yellow
4	Start (-)	Green
5	+24 Vdc	Red
6	0 Vdc	Blue

(View toward sensor pins)

Cable shield connects to connector shell and grounded at controller side.

Order Code (Output Code)

1 9 3 X 0 X X X

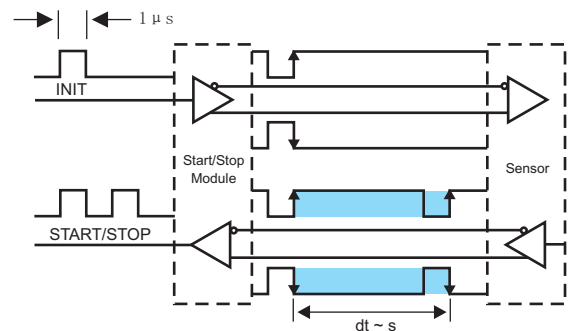
Output

1 = +24Vdc (20.4 - 28.8Vdc)
 2 = +9Vdc to +28Vdc

Connection Type

D60 = 6 pin male receptacle M16 (Connector not included)
 R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
 H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)

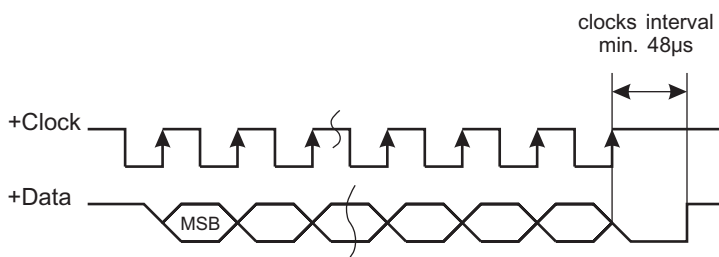
Logic Diagram for 193 Start / Stop



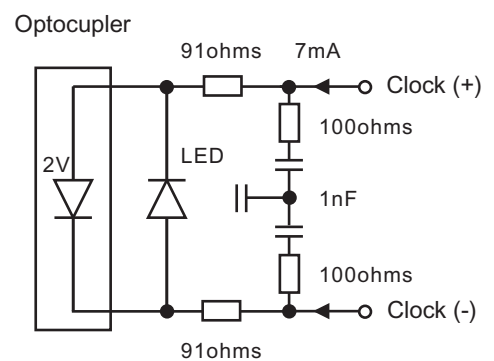
Specifications

Order Code	192
Output	SSI
Measurement Type	Linear displacement
Data Format	Binary or Grey
Data Length	8 - 32 bits
Data Speed	Cable Length : <3 <50 <100 <200 <400 m
	Baud rate : 1000 <400 <300 <200 <100 kBd
Update Time	Measuring Length : 300 750 1000 2000 5000 mm
	Measurement/sec : 3.7 3.0 2.3 1.2 0.5 kHz
Resolution	Displacement : 1 / 2 / 5 / 10 / 20 / 50 / 100 μm
Repeatability	< $\pm 0.001\%$ of full scale (minimum $\pm 2.5\mu\text{m}$)
Non-Linearity	< $\pm 0.01\%$ of full scale (minimum $\pm 40\mu\text{m}$)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm
	2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	100mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Connector Type	D70 Male
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP 67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6

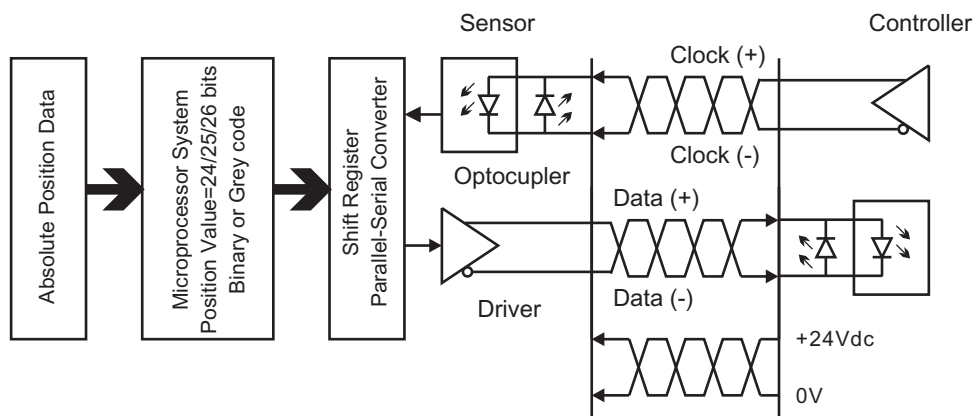
Timing Diagram



Sensor Input



Logic Diagram



Order Code (Output Code)

1 9 2 X X X X X X X X X

Data Length

1 = 25 bits

2 = 24 bits

Output Format

B = Binary

G = Grey Code

Resolution

1 = 5 μ m 2 = 10 μ m

3 = 50 μ m 4 = 100 μ m

5 = 20 μ m 6 = 2 μ m

8 = 1 μ m

Function

1 = Standard

Options

00 = Measuring direction forward

01 = Measuring direction reverse

Remark: Direction forward means position reading become larger while magnet move away from electronic carriage. Direction backward means position reading become smaller while magnet move away from electronic carriage.

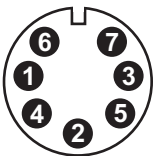
Connection Type

D70 = 7 pin male receptacle M16 (Connector not included)

R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)

H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)

Pin Assignments

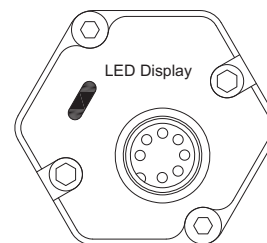


	D70 Pin	Cable
1	Data (-)	Black
2	Data (+)	White
3	Clock (+)	Yellow
4	Clock (-)	Green
5	+24 Vdc	Red
6	0 Vdc	Blue
7	N.C.	

(View toward sensor pins)

Cable shield connects to connector shell and grounded at controller side.

Diagnostic Display



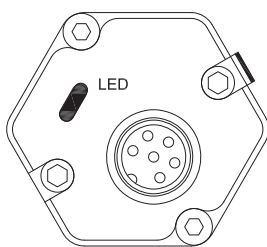
Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected

Integrated LEDs provide basic visual feedback for normal sensor operation and troubleshooting.

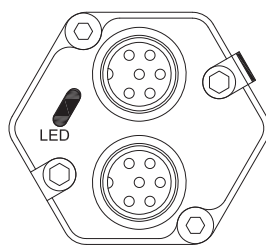
Specifications

Order Code	194	
Output	CANBus	
Measurement Type	Linear displacement	
Data Protocol	CANopen: CIA Standard DS-301 V3.0	
	CANbasic: CAN 2.0A	
Baud Rate	Baud rate : 1000 800 500 250 125 50 20 Kbit/s	
	Cable length : <25 <50 <100 <250 <500 <1000 <2500 m	
Resolution	CANopen	CANbasic
- Displacement	5µm 2µm	5µm 2µm
- Speed	0.5mm/s 0.2mm/s	1.0mm/s 0.1mm/s
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)	
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)	
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm	
	2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm	
Input Voltage	+24Vdc (20.4 - 28.8Vdc)	
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc	
Power Consumption	100mA (stroke range dependent)	
Dielectric Strength	500Vdc (DC ground to machine ground)	
Connector Type	D60 Male	
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing	
Sealing	IP 67 (with connector)	
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6	
Shock Rating	100g single hit per IEC standard 68-2-27	
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 68000-4-2/3/4/6	

Diagnostic Display



D60 / D61 Connection

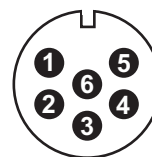


D62 Connection

Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected

Integrated LEDs provide basic visual feedback for normal sensor operation and troubleshooting.

Pin Assignments



	D60/D61 Pin	Cable
1	CAN (-)	Black
2	CAN (+)	White
3	N.C.	Yellow
4	N.C.	Green
5	+24 Vdc	Red
6	0 Vdc	Blue

(View toward sensor pins)

Cable shield connects to connector shell and grounded at controller side.

Order Code (Output Code)

1 9 4 X X X X X X X X X X X X

Protocol

- 101 = CANbasic
- 207 = Multi-Position CANbasic
- 304 = CANopen

Baud Rate

- 1 = 1000 kBit/s
- 2 = 500 kBit/s
- 3 = 250 kBit/s
- 4 = 125 kBit/s

Resolution

- 1 = 5µm 4 = 10µm
- 2 = 2µm 5 = 20µm

Connection Type

- D60 = 6 pin male receptacle M16 with termination resistor
- D61 = 6 pin male receptacle M16
- D62 = 2 x 6 pin male receptacle M16
- R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
- H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)

Magnet Number

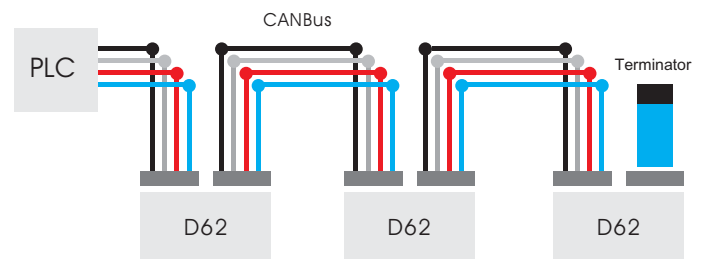
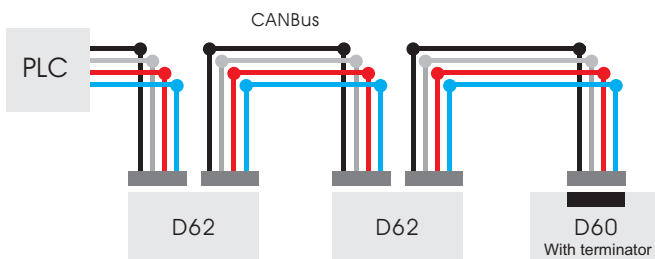
Z__ = 02 - 03 pcs of Magnet (If output 207 is selected)

Baud Rate	Cable Length
1000 Kbd	25M
500 Kbd	100M
250 Kbd	250M
125 Kbd	500M

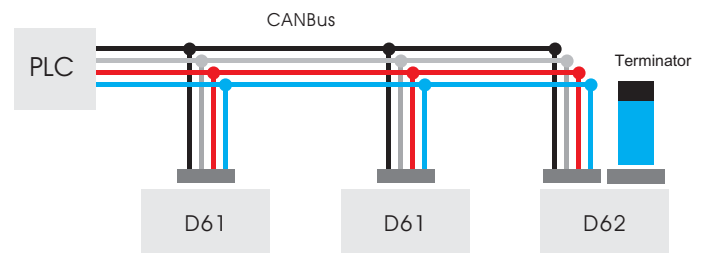
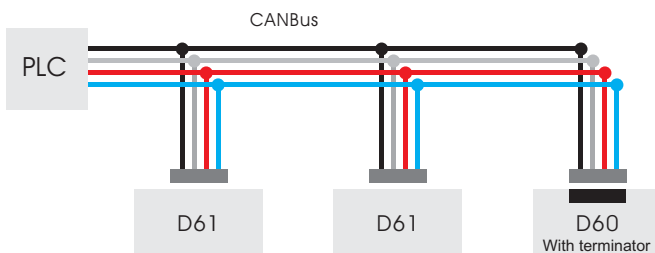
Remark: CANbus protocol parameters are chosen by customer and controller, not decided by Germanjet.

Network Topology

Bus Network Topology



Star Network Topology



Terminator Order Code
1800 951 044

Specifications

Order Code	195
Output	Profibus-DP digital output
Measurement Type	Linear displacement
Data Protocol	Profibus-DP (EN-50 170)
Output Signal	Profibus-DP System according ISO 74498
Baud Rate	Max 12Mbit/s
Resolution	Position: 5µm/ other values selectable via GSD file
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	100mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Connector Type	D53
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP 67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 68000-4-2/3/4/6

Order Code (Output Code)

1 9 5 X X X X X X X X X X X X

Connection Type

D53 = 1 x 5 pin male receptacle M12
1 x 5 pin female receptacle M12
1 x 4 pin male receptacle M8
(Connector not included)

Input Voltage

1 = +24Vdc

Output

P102 = Profibus-DP with 1 Magnet
Measurement (Standard)
P101 = Profibus-DP with Multi-Magnet
Measurement

Magnet Number

Z__ = 02 - 03 pcs of Magnet
(If output P101 is selected)

Profibus Interface

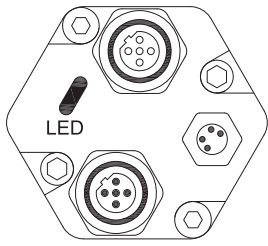
The 19 series Profibus-DP interface fulfill the requirement of EN50170. The position transducer adopts the non-contact magnetostrictive measuring technology with direct transmission of RS-485 standard in a baud rate of 12 Mbits/s. Profibus wiring uses shielded twisted pair cable and can be used to connect up to 32 devices in a single segment (piece of cable).

D53 multi-drop connector outlet is available. Profibus provides useful functions for diagnostics and configuration by loading the GSD (Electronic Device Data Sheet) into the bus. The file is available to be downloaded at www.germanjet.de.

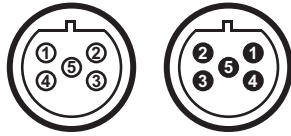
Profibus Addressing

Normally addressing is done by Profibus SetSlaveAddress. If some master systems do not support this standard, or customers controller can not handle, direct addressing is recommended.

D53 Pin Assignments



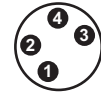
D53 Connection



M12 female M12 male
(View toward sensor pins)

1	N.C.
2	RxD/TxD-N(Bus)
3	N.C.
4	RxD/TxD-P(Bus)
5	Cable Shield

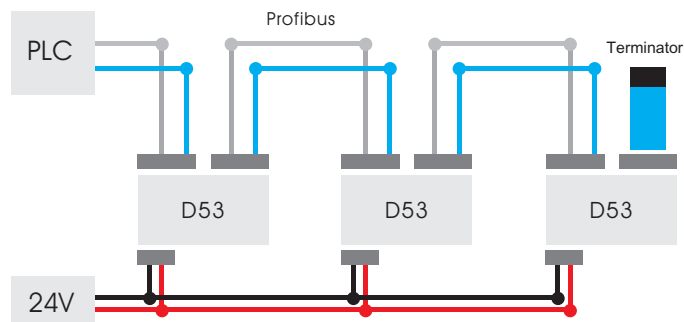
*only apply to female receptacle



Power Male Receptacle

1	+ 24 Vdc
2	N.C.
3	0 Vdc
4	N.C.

Network Topology



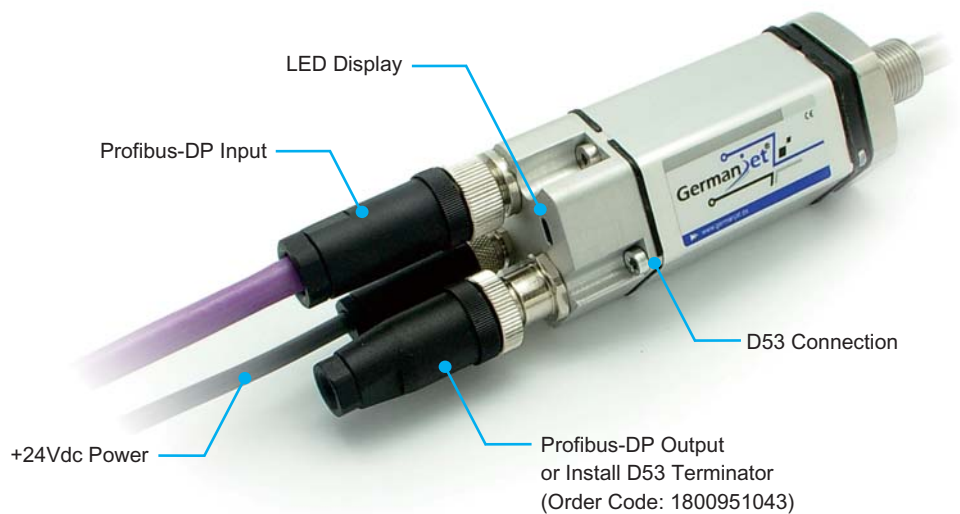
Terminator

Receptacle	Order Code
D53	1800 951 043

Diagnostic Display

Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected

Integrated LEDs provide basic visual feedback for normal sensor operation and troubleshooting.



Specifications

Order Code	196
Output	DeviceNet digital output
Measurement Type	Linear displacement
Data Protocol	DeviceNet 2.0 Version
Output Signal	CAN FieldBus System ISO 11898
Baud Rate	Baud rate : 500 250 125 Kbit/s Cable length : <100 <250 <500 m
Resolution	2µm or 5µm
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	100mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Connector Type	D60 Male
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP 67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 68000-4-2/3/4/6

Order Code (Output Code)

1 9 6 X X X X X X X X X

Hardware

2 = Standard

Output Protocol

02 = DeviceNet

Baud Rate

2 = 500 kBit/s

3 = 250 kBit/s

4 = 125 kBit/s

Resolution

1 = 5µm

2 = 2µm

Type

1 = Standard

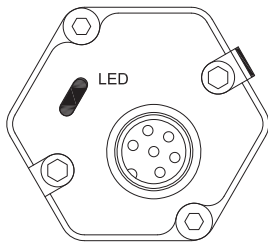
Connection Type

D60 = 6 pin male receptacle M16 with termination resistor

D61 = 6 pin male receptacle M16

Remark: DeviceNet protocol parameters are chosen by customer and controller, not decided by Germanjet.

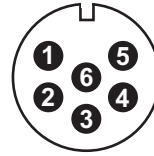
Diagnostic Display



Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected

Integrated LEDs provide basic visual feedback for normal sensor operation and troubleshooting.

Pin Assignments



	D60/D61 Pin
1	CAN (-)
2	CAN (+)
3	N.C.
4	N.C.
5	+24 Vdc
6	0 Vdc

(View toward sensor pins)

Cable shield connects to connector shell and grounded at controller side.

DeviceNet Protocol

DeviceNet is layered on top of the CAN (Controller Area Network) technology and takes advantage of CAN, making it low-cost and robust. DeviceNet supports maximum 500 Kbit/s data rates. Position resolution can be up to 2µm. Nodes are distributed along a DeviceNet network by the means of a trunkline-dropline topology. Nodes can be easily removed and added to reduce production downtime, increase network flexibility, and decrease troubleshooting time.

The DeviceNet installation is quick and easy. Each sensor is provided with an Electrical Data Sheet (EDS). All sensor parameters are installed into the network using the EDS file. The file is available to be downloaded at www.germanjet.de.

A PC programming tool, such as DeviceNet Manager offered by Rockwell Automation, is used to set the node identifier and baud rate. (Factory node setting is 63 and the baud rate is 500 Kbit/s)

Specifications

Order Code	197
Output	EtherCAT
Measurement Type	Linear displacement
Data Protocol	100 Base-Tx, Fast Ethernet
Output Signal	Simultaneous multi-position and velocity measurements up to 3 magnets
Baud Rate	Max. 100Mbit/s
Resolution	Position: 1 to 1000µm selectable / Velocity: 1µm/s depend on velocity and stroke
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)
Non-Linearity	< ±0.01% of full scale (minimum ±50µm)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	100mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Connector Type	D56
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP 67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 68000-4-2/3/4/6

Order Code (Output Code)

1 9 7 X X X X X X X X X X X X

Connection Type

D56 = 2 x 4 pin female receptacle M12
1 x 4 pin male receptacle M8
(Connector not included)

Input Voltage

1 = +24Vdc

Output

E101 = EtherCAT, position and velocity, 1 magnet
E102 = EtherCAT, position and velocity, maximum 3 magnets

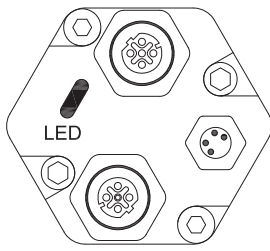
Magnet Number

Z__ = 02 - 03 pcs of Magnet (If output E102 is selected)

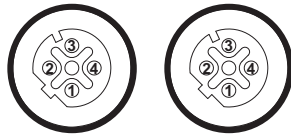
EtherCAT Interface

The 19 series EtherCAT interface fulfill the requirement of EtherCAT 100 Base-Tx standard. EtherCAT (Ethernet for Control Automation Technology) is the state-of-the-art interface developed by Beckhoff Automation. This interface is supported by EtherCAT Technology Group.

D62 Pin Assignments



D56 Connection



M12 female M12 female
(View toward sensor pins)

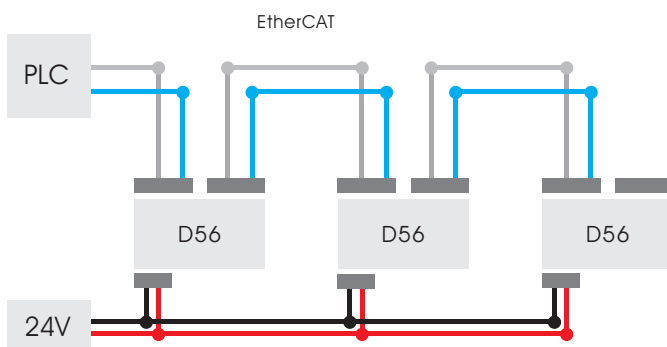
1	Tx +
2	Rx +
3	Tx -
4	Rx -



Power Male Receptacle

1	+ 24 Vdc
2	N.C.
3	0 Vdc
4	N.C.

Network Topology



Diagnostic Display

Green	Red	Description
ON	OFF	Normal function
ON	ON	Magnet not detected

Integrated LEDs provide basic visual feedback for normal sensor operation and troubleshooting.

Order Code (Installation Code)

H X X X X 2 X

Stroke Length (mm)

0075, 0100, 0125, 0150, 0175,
0200, 0225, 0250, 0275, 0300,
0325, 0350, 0375, 0400, 0425,
0450, 0475 (25mm increment after)

Mounting thread

2 = M18 x 1.5

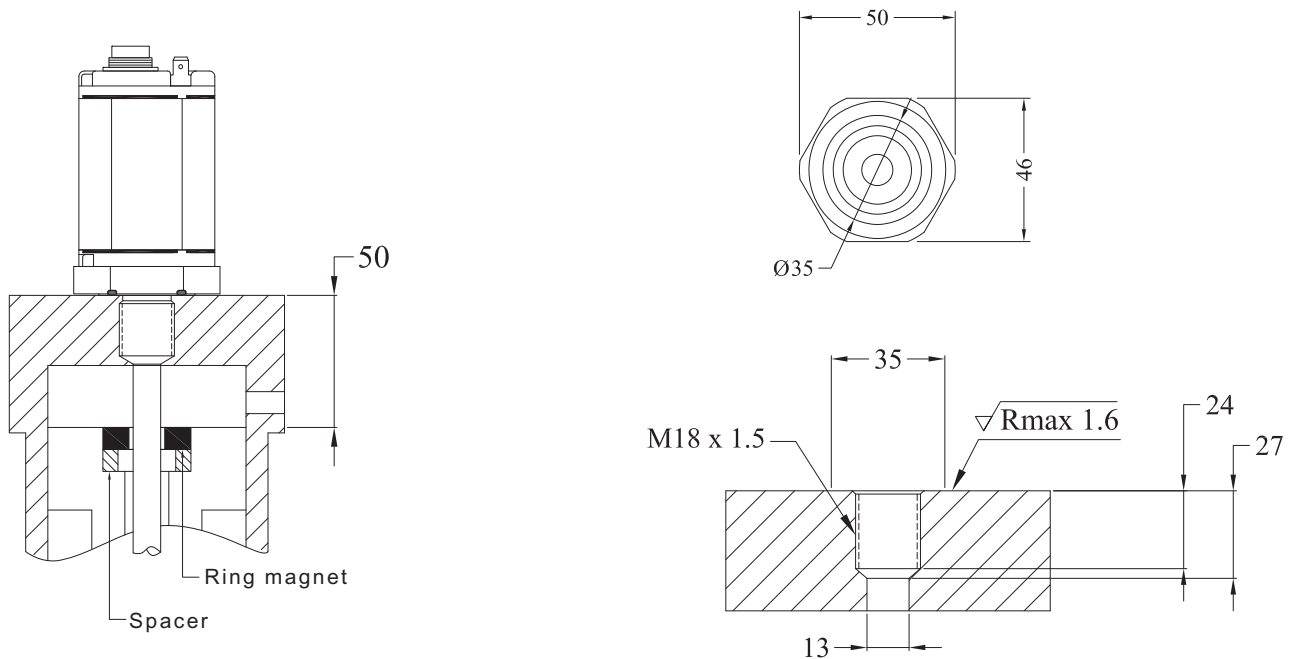
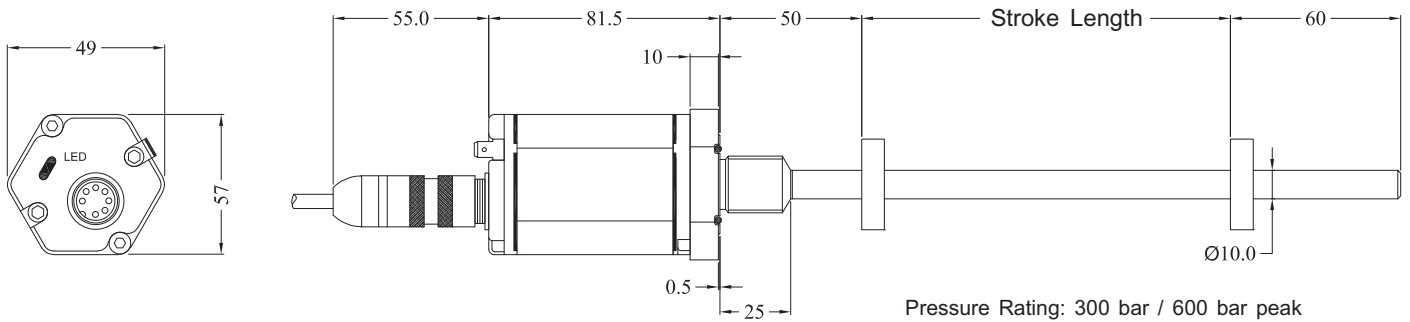
Magnet type

- 1 = Dia. 33mm ring
- 2 = Dia. 25mm ring
- 3 = Floating ball
- 4 = Large floating
- 5 = Dia. 32mm ring
- 6 = Dia. 60mm ring



Installation

Series	mm
Profibus 195	102
EtherCAT 197	102



Order Code (Installation Code)

P X X X X X X

Stroke Length (mm)

0125, 0150, 0200, 0225, 0250
 0275, 0325, 0350, 0410, 0450
 0475, 0500, 0550, 0575, 0600
 0650, 0700, 0800, 0850, 0925
 0950, 1000, 1050, 1150, 1300
 1400, 1550, 1650, 1800, 2050
 2300, 2550, 2800, 3050, 3150
 3300, 3550, 4050 (Other length upon request)

Mounting

1 = 42.5mm mounting
 2 = 42.5mm isolation mounting
 3 = 50mm mounting

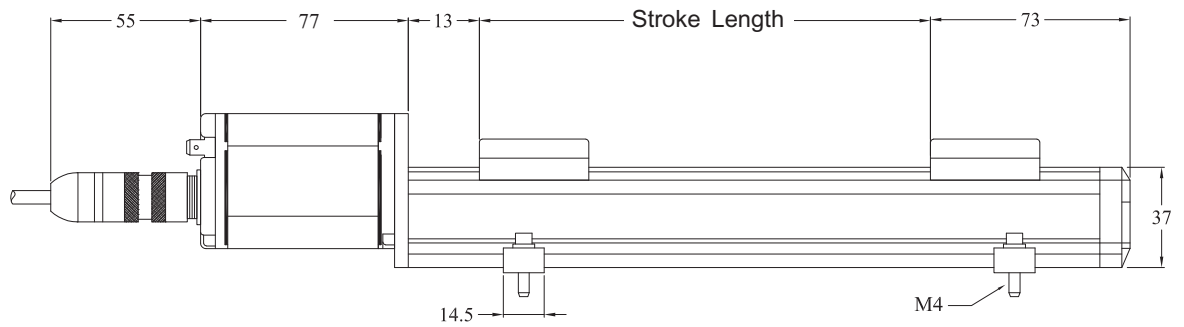
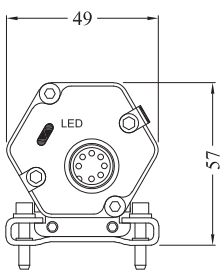
Magnet Type

1 = Captive
 2 = Floating
 3 = Die-cast
 4 = Large floating



Installation

Series	mm
Profibus 195	97
EtherCAT 197	97



easy of installation ...



Order Code (Installation Code)

D X X X X X X X X X

Stroke Length (mm)

0075, 0100, 0125, 0150, 0175,
0200, 0225, 0250, 0275, 0300,
0325, 0350, 0375, 0400, 0425,
0450, 0475 (25mm increment after)

Sensor Electronic

1 = Bottom cable entry
2 = Side cable entry

Sensor Rod Style

1 = Fitting flange
2 = M18 x 1.5 rod style

Magnet type

1 = Dia. 33mm ring
2 = Dia. 25mm ring
4 = Dia. 60mm ring
5 = Dia. 32mm ring

Integral Cable of Sensor Rod

Bottom cable entry

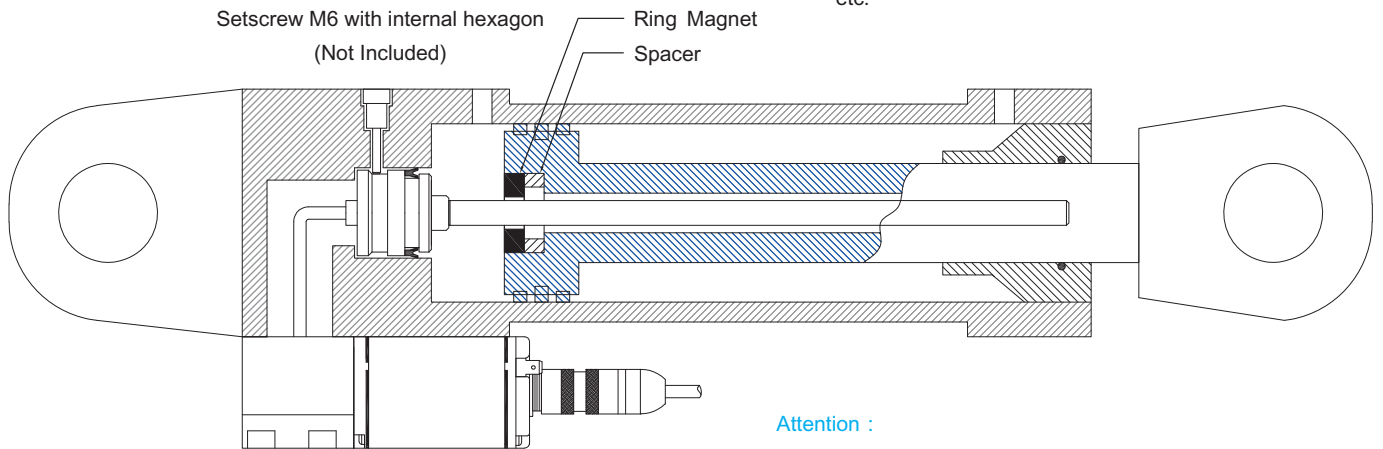
1 = 170mm cable with connector
2 = 230mm cable with connector
3 = 350mm cable with connector

Side cable entry

4 = 250mm cable with connector
5 = 400mm cable with connector
6 = 600mm cable with connector



Installation Example



Mounting Ring Magnet

Mount the magnet with the non-magnetic material for entrainment, screws, spacers, etc.

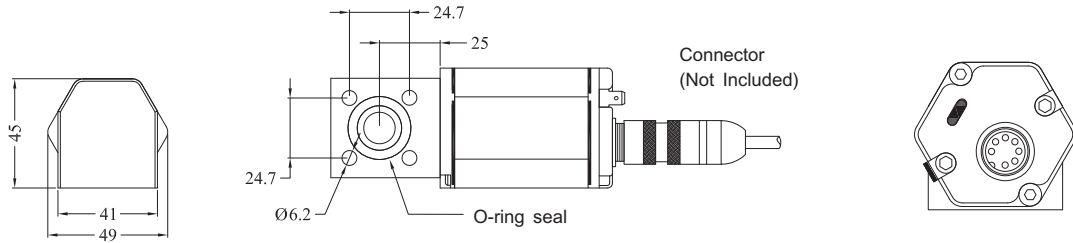
Attention :

The ring magnet should not intouch with the sensor rod.

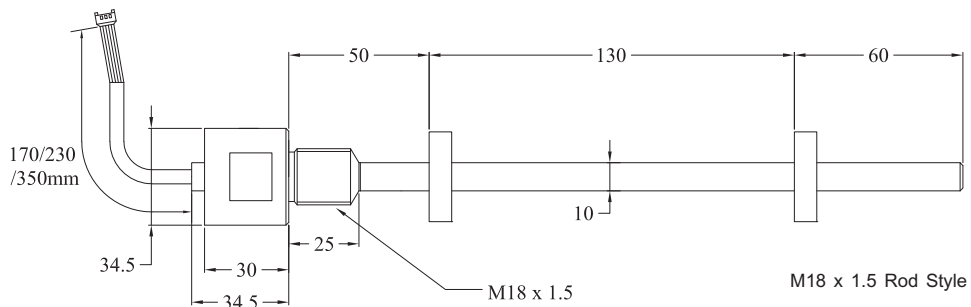
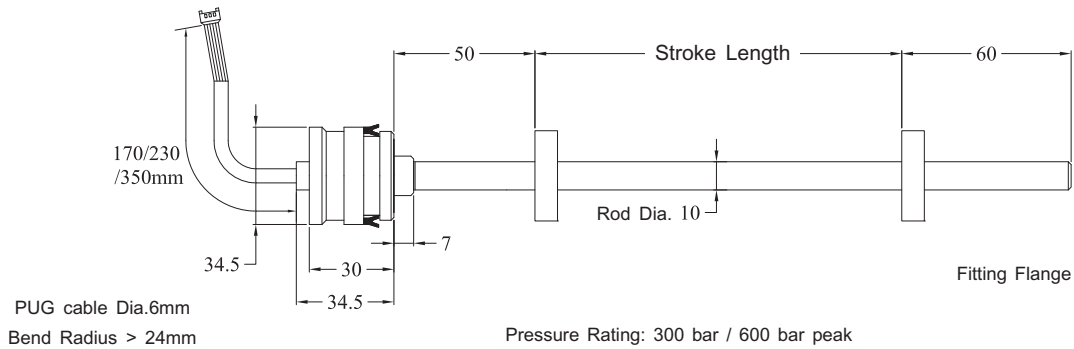
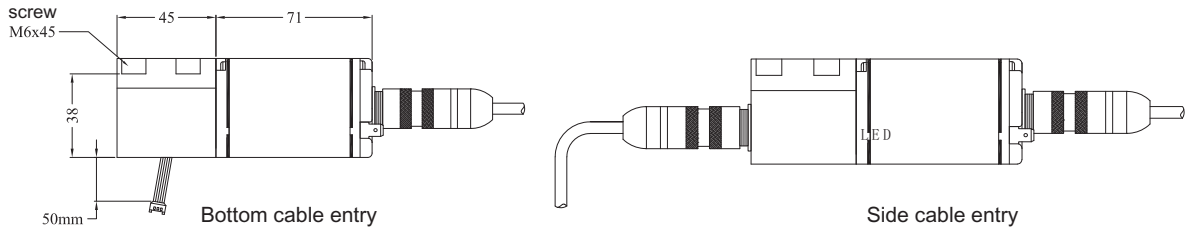
The bore in the piston rod is dependent on the hydraulic pressure and the pistons velocity. The minimum drilling should be 13mm. Do not exceed the peak pressure.

The sensor rod should be protected against wear.

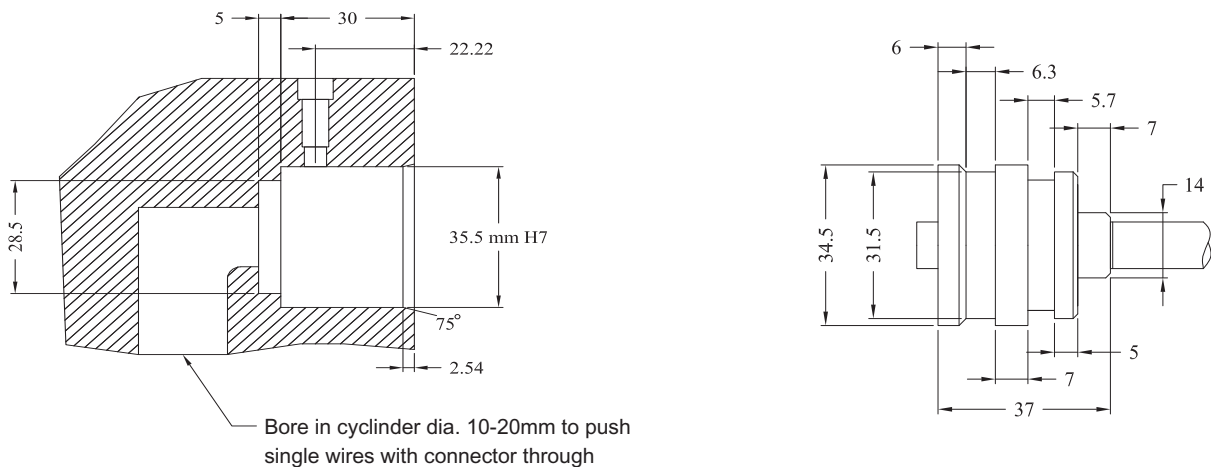
Installation Instruction



Series	mm
Profibus 195	92
EtherCAT 197	92



Mounting Detail



Order Code (Installation Code)

F X X X X X X X

Stroke Length (mm)

02500, 02525, 02550, 02575,
02600, 02625, 02650, 02675,
02700, 02725, 02750, 02775,
(25mm increment after)

Flange Internal Diameter

1 = 10.0 mm Dia.
2 = 12.7 mm Dia.

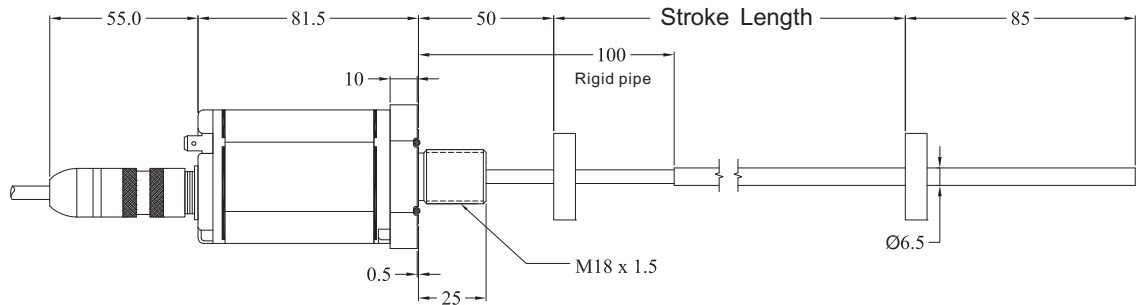
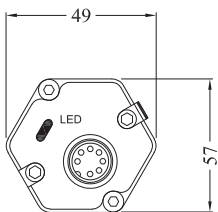
Magnet type

1 = Dia. 33mm ring
2 = Dia. 60mm ring
3 = Large floating



Dimensions

Series	mm
Profibus 195	102
EtherCAT 197	102



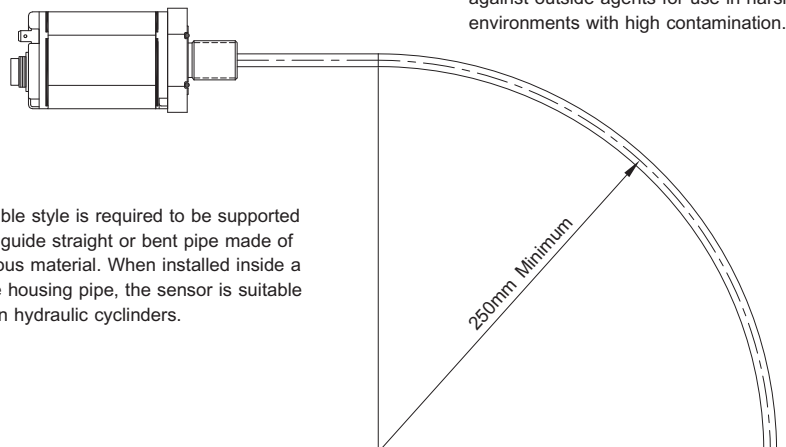
Total sensor length tolerances are :

<8000mm stroke lengths, +8mm tolerance

>8000mm stroke lengths, +15mm/-5mm tolerance

* Tolerances of total length have no influence for the measuring stroke length

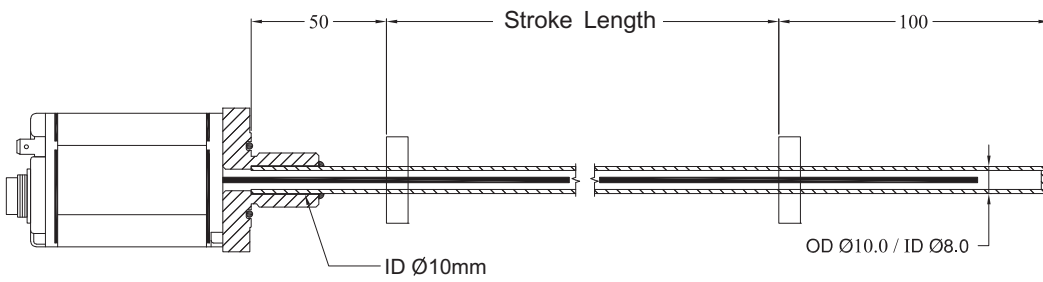
The flexible style is housed in a Teflon coated stainless steel for full protection against outside agents for use in harsh environments with high contamination.



The flexible style is required to be supported inside a guide straight or bent pipe made of non-ferrous material. When installed inside a pressure housing pipe, the sensor is suitable for use in hydraulic cylinders.

Installation Dimensions

Stroke length <8000mm, front dead zone is 50mm
 Stroke length >8000mm, front dead zone is 130mm

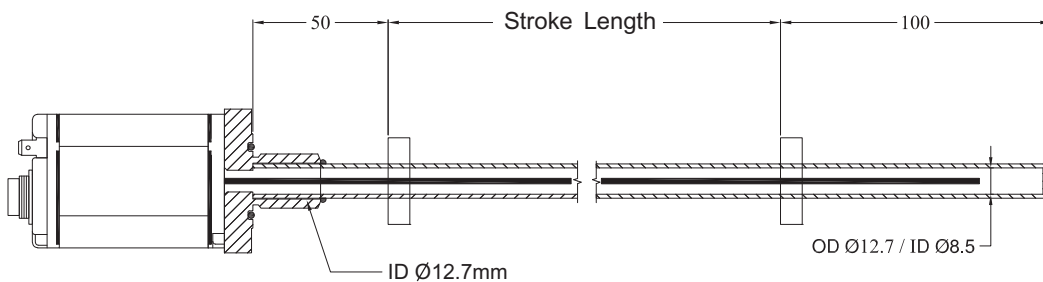


Pressure housing pipe for ID 10mm flange :
 Pipe OD <10mm
 Pipe ID > 8mm

Stroke Length < 8000mm
 - Pipe Length = Stroke Length + 150mm

Stroke Length > 8000mm
 - Pipe Length = Stroke Length + 230mm

Stroke length <8000mm, front dead zone is 50mm
 Stroke length >8000mm, front dead zone is 130mm



Pressure housing pipe for ID 12.7mm flange :
 Pipe OD <12.7mm
 Pipe ID > 8.5mm

Stroke Length < 8000mm
 - Pipe Length = Stroke Length + 150mm

Stroke Length > 8000mm
 - Pipe Length = Stroke Length + 230mm

* Select Dia. 60mm ring magnet
 or High floating magnet

Installation Instruction

In urgent situation, 19F can be delivered immediately and economically on site to shorten unexpected machine downtime.



19F is placed inside a guide pipe made of non-ferrous material.

Welding can be applied to accommodate the connection.



10mm dia. housing pipe mounting
 Order code: 1900951002
 (Install for every 500mm)



An installation of 7600mm long of 19F for 6600 ton two plated plastic injection machine.

15 series is the safe and reliable approach to level application in hazardous location. It is designed according to the explosion protection regulation.

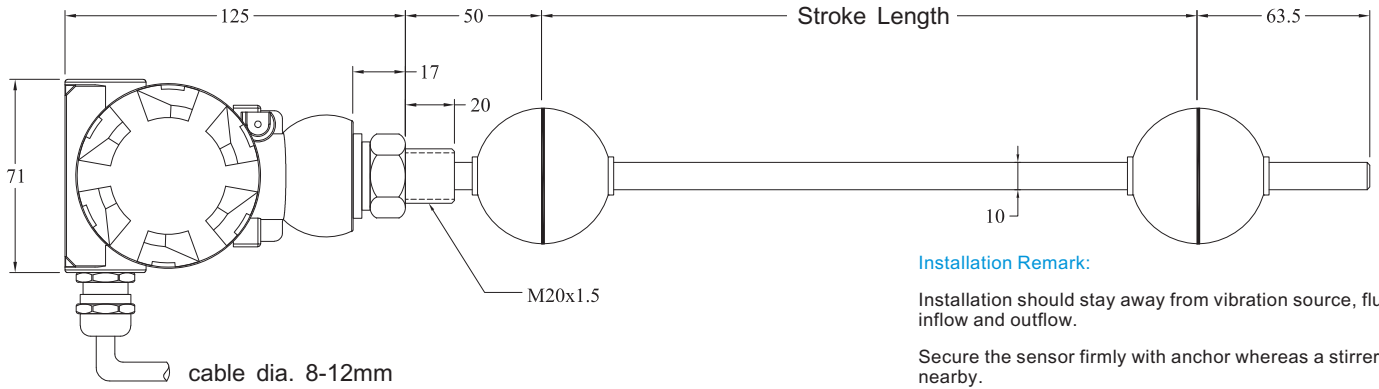
It adopts the non-contact magnet-rostrictive to provide feedback of fluid level and multi-interface level of a storage tank or process vessel. The non-contact feature provides exceptional ease of installation and guarantees almost unlimited mechanical life expectancy. The high versatile IP67 profile housing offers full protection against outside agents for use in harsh environments with high contamination and presence of dust.



Specifications

Order Code	150	151 / 152
Output	Voltage(0-10V)	Current (0-20mA, 4-20mA)
Measurement Type	Linear displacement	
Resolution	16 Bit D/A, 0.0015% (minimum 1µm)	
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)	
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)	
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm	
Input Voltage	+24Vdc (20.4 - 28.8Vdc)	
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc	
Power Consumption	100mA (stroke range dependent)	
Dielectric Strength	500Vdc (DC ground to machine ground)	
Connector Type	Internal wire terminal	
Pressure Rating	100 bar	
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing	
Sealing	IP 67	
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6	
Shock Rating	100g single hit per IEC standard 68-2-27	
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6	
Explosion Rating	Explosion protection only apply to stainless steel rod type	

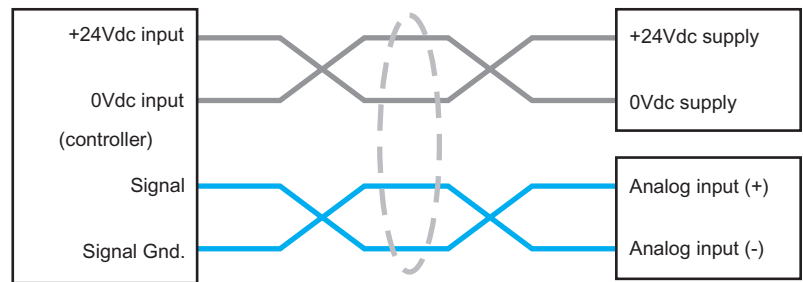
Installation



Wiring Connection



1	+24 Vdc
2	0 Vdc
3	Signal
4	Signal Gnd



Order Code

1 5 X X X X X X X X X

Output

0 = 0 - 10V
1 = 4 - 20mA
2 = 20 - 4mA

Local Display

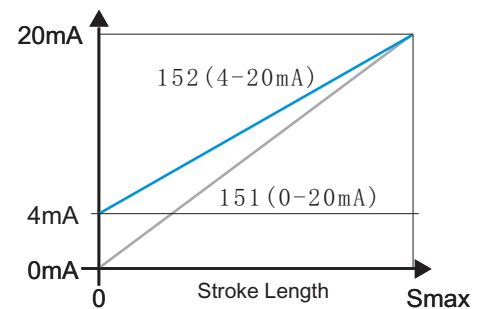
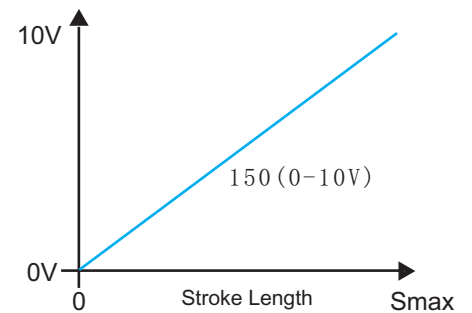
0 = None

Type

H = Hydraulic Rod

Stroke Length (mm)

00500, 00525, 00550, 00575, 00600,
00625, 00650, 00675, 00700, 00725,
00750, 00775, 00800, (25mm increment after)

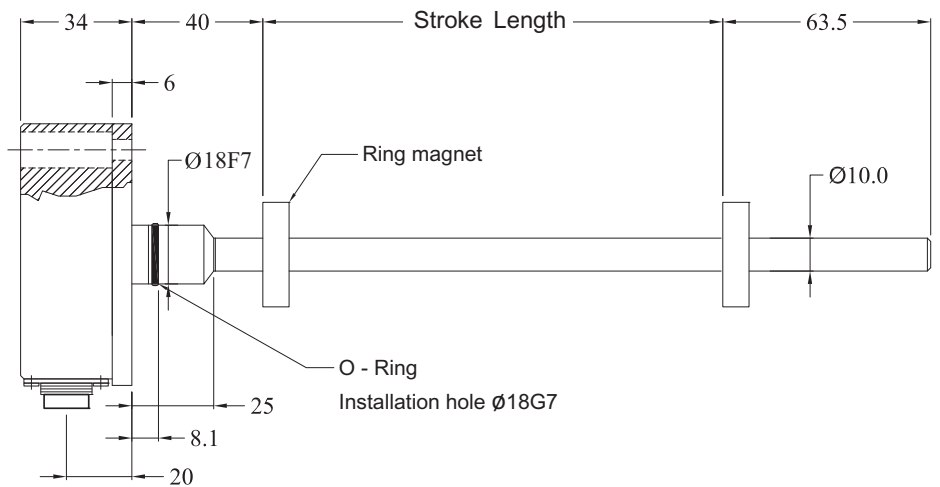
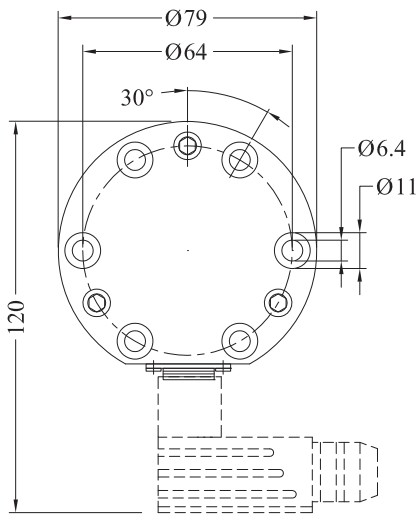


16 series is design for hydraulic cylinder with limited head space or clevis rod ends hydraulic cylinder. Sensing rod is made by stainless steel which installed inside the hydraulic cylinder. It has a wide variety of signal output selection included analog voltage, current, and SSI. It is a perfect combination with hydraulic valve to form a close-loop servo hydraulic system.

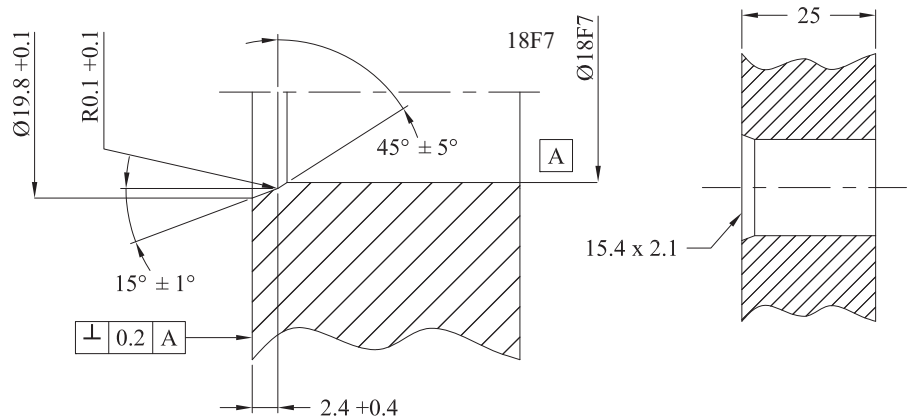
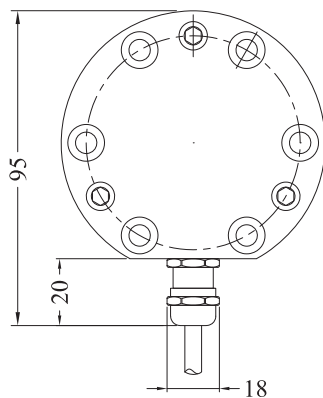
It adopts the non-contact magnet-rostrictive measuring technology for precise, accurate, and absolute measurement. The non-contact feature provides exceptional ease of installation and guarantees almost unlimited mechanical life expectancy. The high versatile IP67 profile housing offers full protection against outside agents for use in harsh environments with high contamination and presence of dust.



Installation



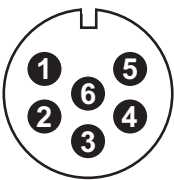
Flange Mounting



Specifications

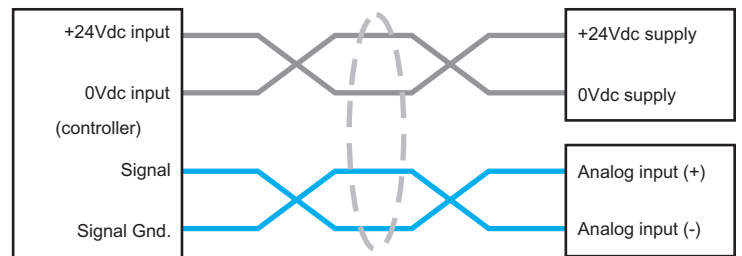
Order Code	1 6 0	1 6 1
Output	Voltage	Current
Measurement Type	Linear displacement	
Resolution	16 Bit D/A, 0.0015% (minimum 1µm)	
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)	
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)	
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm	
Input Voltage	+24Vdc (20.4 - 28.8Vdc)	
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc	
Power Consumption	100mA (stroke range dependent)	
Dielectric Strength	500Vdc (DC ground to machine ground)	
Connector Type	D60 Male	
Pressure Rating	350 bar / 600 bar peak	
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing	
Sealing	IP 67 (with connector)	
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6	
Shock Rating	100g single hit per IEC standard 68-2-27	
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6	

Pin Assignments



(View toward sensor pins)

	Cable	D60 Pin
1	Black	Signal
2	White	Signal Gnd
3	Yellow	N.C.
4	Green	N.C.
5	Red	+24 Vdc
6	Blue	0 Vdc



Order Code

1 6 X X X H X X X X X X X X

Output

001 = 0 - 10V 101 = 4 - 20mA
011 = 10 - 0V 111 = 20 - 4mA

Stroke Length (mm)

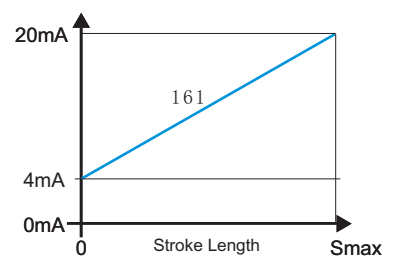
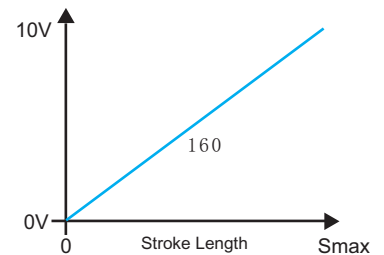
0075, 0100, 0125, 0150, 0175,
0200, 0225, 0250, (25mm increment after)

Magnet Type

1 = Dia. 33mm ring 5 = Dia. 32mm ring
2 = Dia. 25mm ring
4 = Dia. 60mm ring

Connection Type

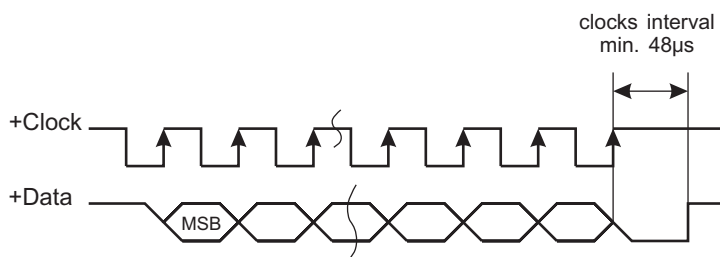
D60 = 6 pin male receptacle M16 (Connector not included)
R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)



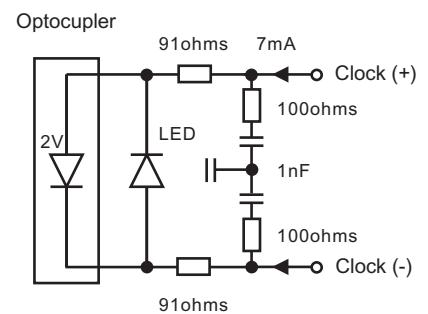
Specifications

Order Code	162
Output	SSI
Measurement Type	Linear displacement
Data Format	Binary or Grey, optional Parity and Errorbit
Data Length	8 - 32 bits
Data Speed	Length : <3 <50 <100 <200 <400 m Baud rate : 1000 <400 <300 <200 <100 kBd
Update Time	Measuring Length : 300 750 1000 2000 5000 mm Measurement/sec : 3.7 3.0 2.3 1.2 0.5 kHz
Resolution	Displacement : 1 / 2 / 5 / 10 / 20 / 50 / 100 μm
Repeatability	< $\pm 0.001\%$ of full scale (minimum $\pm 2.5\mu\text{m}$)
Non-Linearity	< $\pm 0.01\%$ of full scale (minimum $\pm 40\mu\text{m}$)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	100mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Connector Type	D70 Male
Pressure Rating	350 bar / 600 bar peak
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP 67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6

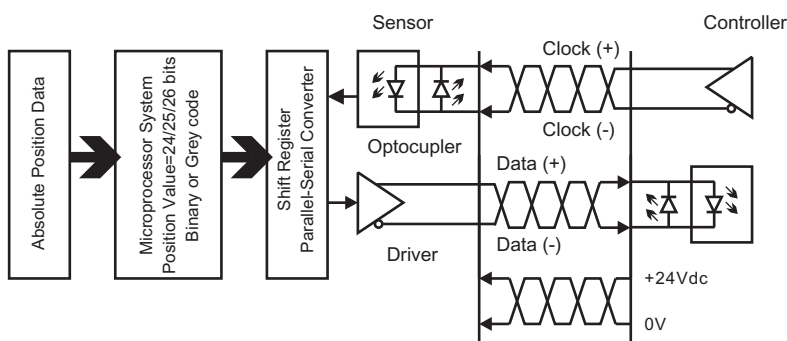
Timing Diagram



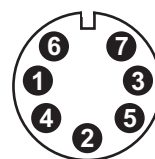
Sensor Input



Logic Diagram



Pin Assignments



(View toward sensor pins)

Cable shield connects to connector shell and grounded at controller side.

	D70 Pin	Cable
1	Data (-)	Black
2	Data (+)	White
3	Clock (+)	Yellow
4	Clock (-)	Green
5	+24 Vdc	Red
6	0 Vdc	Blue
7	N.C.	

Order Code

1 6 2 X X X X X X H X X X X X X X X X

Data Length

- 1 = 25 bits
- 2 = 24 bits

Output Format

- B = Binary
- G = Grey Code

Resolution

- 1 = 5 μ m
- 2 = 10 μ m
- 3 = 50 μ m
- 4 = 100 μ m
- 5 = 20 μ m
- 6 = 2 μ m
- 8 = 1 μ m

Function

- 1 = Standard

Options

- 00 = Measuring direction forward
- 01 = Measuring direction reverse

Stroke Length (mm)

- 0075, 0100, 0125, 0150, 0175,
- 0200, 0225, 0250, 0275, 0300,
- 0325, 0350, 0375, 0400, 0425,
- 0450, 0475, (25mm increment after)

Magnet Type

- 1 = Dia. 33mm ring
- 2 = Dia. 25mm ring
- 4 = Dia. 60mm ring

Connection Type

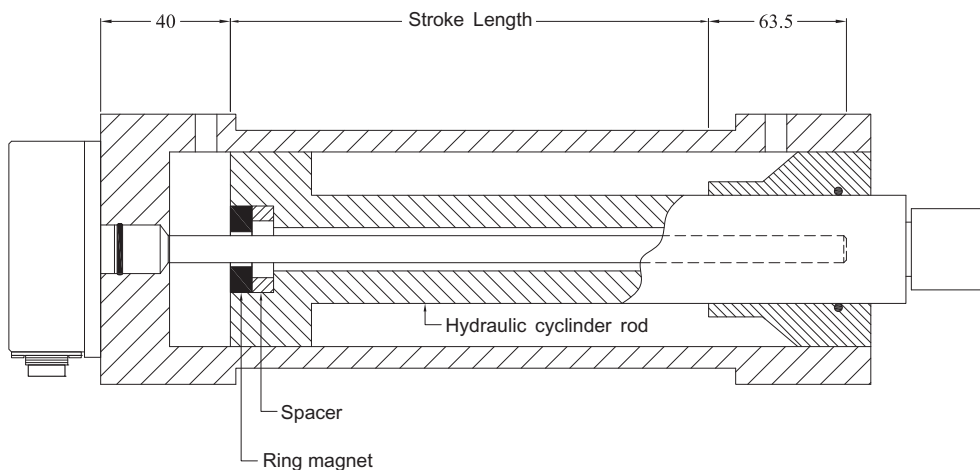
D60 = 6 pin male receptacle M16 (Connector not included)

R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)

H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)

Remark: Direction forward means position reading become larger while magnet move away from electronic carriage. Direction backward means position reading become smaller while magnet move away from electronic

Installation



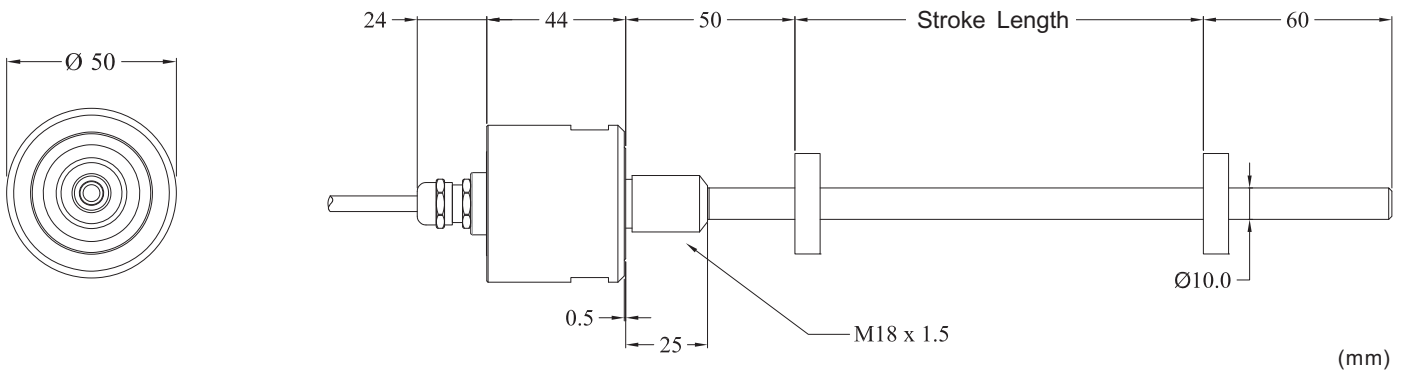
16C series is design for use in extreme harsh environments with high contamination and presence of dust. Sensing element is protected by fully enclosed stainless steel case with IP68 protection rating. It is completely dustproof and resistant to harsh salty air, flooding and powerful water jetting. This unique product is perfect for use in harsh indoor applications and severe outdoor environments.

The core of 16C series adopts the non-contact magnetostrictive measuring technology for precise, accurate, and absolute measurement. The non-contact feature provides exceptional ease of installation and guarantees almost unlimited mechanical life expectancy.

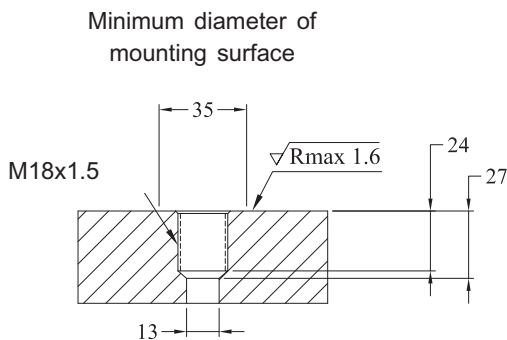


- For Harsh Environment
- IP 68 Protection
- Compact Design

Installation



Mounting surface requirement



Installation hole must be perpendicular with mounting surface and center with sensor rod.

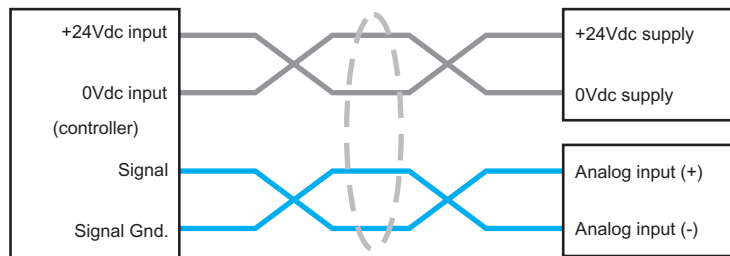


Specifications

Order Code	1 6 0	1 6 1
Output	Voltage	Current
Measurement Type	Linear displacement	
Resolution	16 Bit D/A, 0.0015% (minimum 1µm)	
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)	
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)	
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm	
Input Voltage	+24Vdc (20.4 - 28.8Vdc)	
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc	
Power Consumption	100mA (stroke range dependent)	
Dielectric Strength	500Vdc (DC ground to machine ground)	
Connector Type	Cable Outlet	
Pressure Rating	350 bar / 600 bar peak	
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing	
Sealing	IP 68	
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6	
Shock Rating	100g single hit per IEC standard 68-2-27	
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6	

Pin Assignments

Cable	Output
Black	Signal
White	Signal Gnd
Yellow	N.C.
Green	N.C.
Red	+24 Vdc
Blue	0 Vdc



Order Code

1 6 X X X C X X X X X X X X

Output

001 = 0 - 10V 101 = 4 - 20mA
011 = 10 - 0V 111 = 20 - 4mA

Stroke Length (mm)

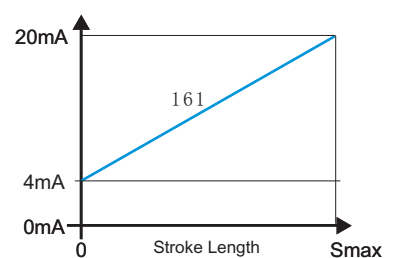
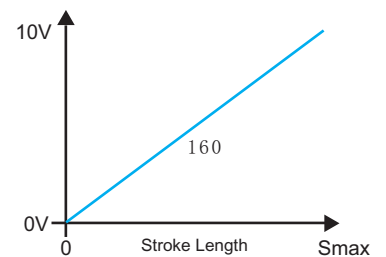
0075, 0100, 0125, 0150, 0175,
0200, 0225, 0250, (25mm increment after)

Magnet Type

1 = Dia. 33mm ring 5 = Dia. 32mm ring
2 = Dia. 25mm ring
4 = Dia. 60mm ring

Connection Type

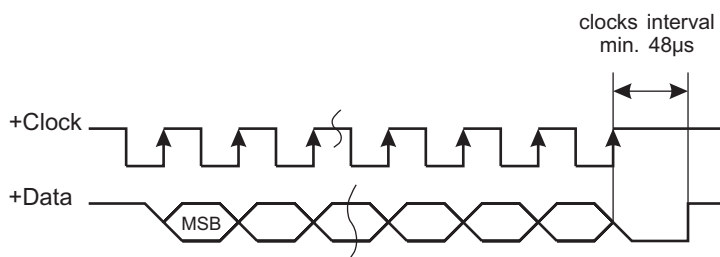
R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)



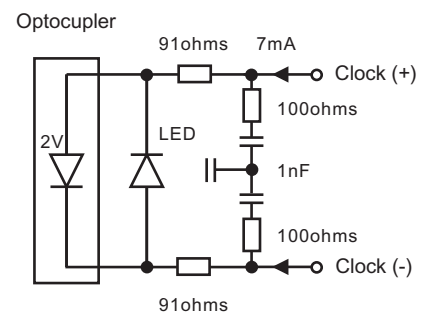
Specifications

Order Code	162
Output	SSI
Measurement Type	Linear displacement
Data Format	Binary or Grey, optional Parity and Errorbit
Data Length	8 - 32 bits
Data Speed	Length : <3 <50 <100 <200 <400 m Baud rate : 1000 <400 <300 <200 <100 kBd
Update Time	Measuring Length : 300 750 1000 2000 5000 mm Measurement/sec : 3.7 3.0 2.3 1.2 0.5 kHz
Resolution	Displacement : 1 / 2 / 5 / 10 / 20 / 50 / 100 μm
Repeatability	< $\pm 0.001\%$ of full scale (minimum $\pm 2.5\mu\text{m}$)
Non-Linearity	< $\pm 0.01\%$ of full scale (minimum $\pm 40\mu\text{m}$)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	100mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Connector Type	Cable Outlet
Pressure Rating	350 bar / 600 bar peak
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP 67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6

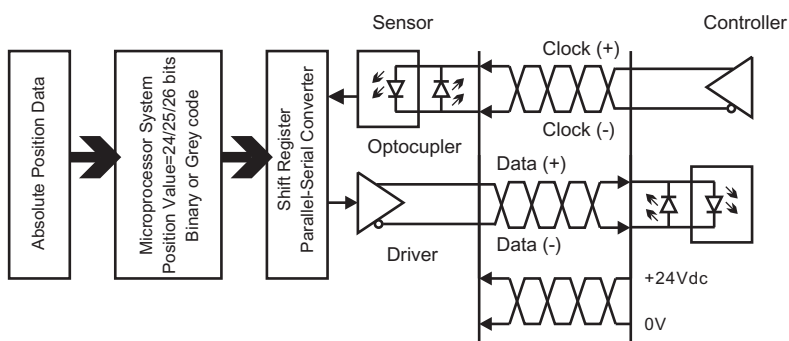
Timing Diagram



Sensor Input



Logic Diagram



Pin Assignments

Cable	Output
Black	Data (-)
White	Data (+)
Yellow	Clock (+)
Green	Clock (-)
Red	+24 Vdc
Blue	0 Vdc

Order Code

1 6 2 X X X X X X C X X X X X X X X X

Data Length

- 1 = 25 bits
- 2 = 24 bits

Output Format

- B = Binary
- G = Grey Code

Resolution

- 1 = 5µm
- 2 = 10µm
- 3 = 50µm
- 4 = 100µm
- 5 = 20µm
- 6 = 2µm
- 8 = 1µm

Function

- 1 = Standard

Options

- 00 = Measuring direction forward
- 01 = Measuring direction reverse

Stroke Length (mm)

- 0075, 0100, 0125, 0150, 0175,
- 0200, 0225, 0250, 0275, 0300,
- 0325, 0350, 0375, 0400, 0425,
- 0450, 0475, (25mm increment after)

Magnet Type

- 1 = Dia. 33mm ring
- 2 = Dia. 25mm ring
- 4 = Dia. 60mm ring
- 5 = Dia. 32mm ring

Connection Type

- R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
- H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)

Remark: Direction forward means position reading become larger while magnet move away from electronic carriage. Direction backward means position reading become smaller while magnet move away from electronic

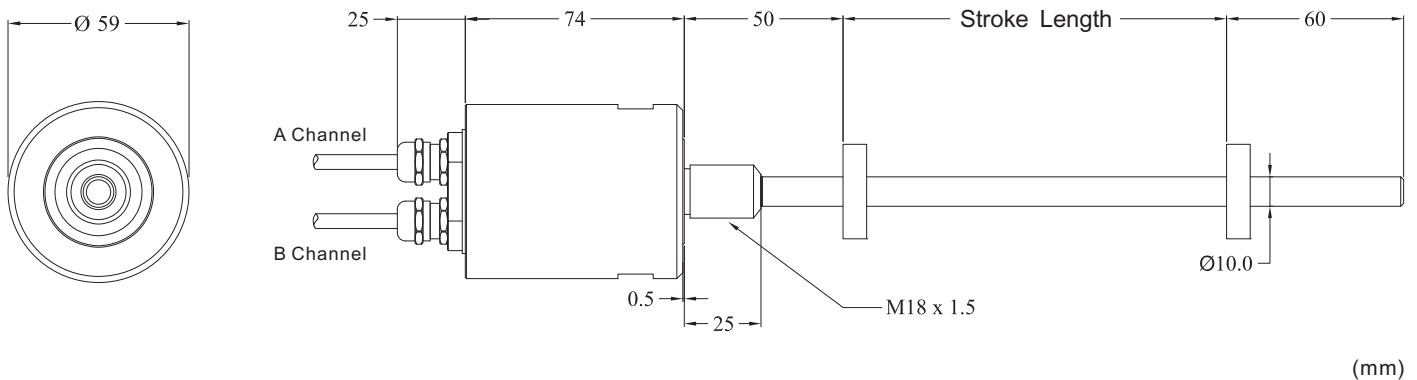
Ship propulsion systems, power plants and tilt technology for trains are challenging application for high safety and effective functioning. For those applications, the redundancy position transducer for mutual monitoring is needed to fulfill superior safety requirement and guarantee non-stop operation. This unique product features two individual measurement systems which are housed in a single protective tube. The magnets simultaneously act on both measurement systems to generate two separated position output.

Sensing elements are protected by fully enclosed stainless steel case with IP68 protection rating. It is completely dust proof and resistant to harsh salty air, flooding and powerful water jetting. The core of 16R series adopts the non-contact magnetostrictive measuring technology for precise, accurate, and absolute measurement.

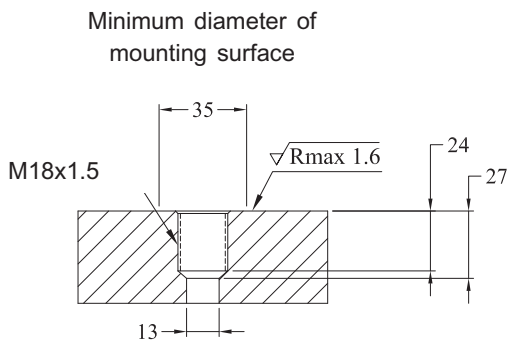


Two Individual Position Sensing Systems in one sensor

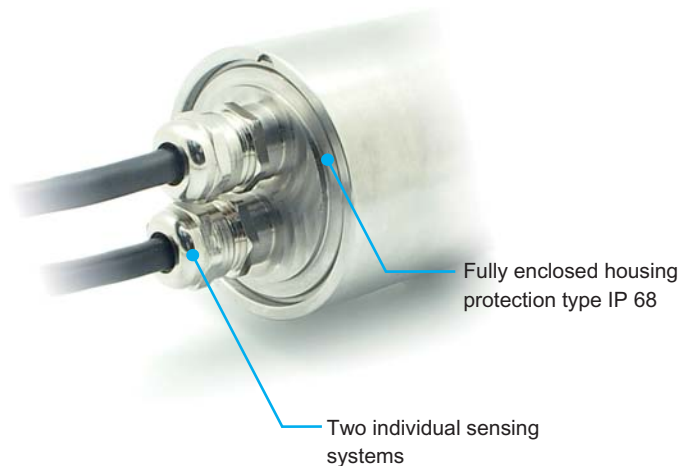
Installation



Mounting surface requirement



Installation hole must be perpendicular with mounting surface and center with sensor rod.

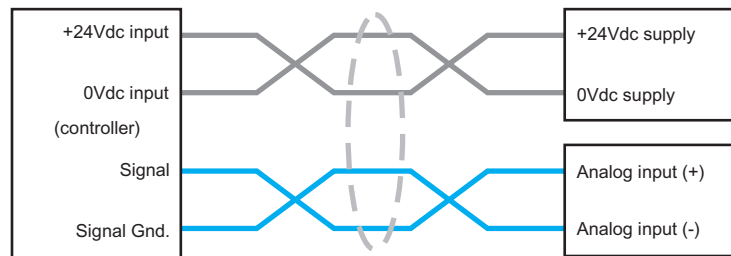


Specifications

Order Code	1 6 0	1 6 1
Output	Voltage	Current
Measurement Type	Linear displacement	
Resolution	16 Bit D/A, 0.0015% (minimum 1µm)	
Repeatability	< ±0.001% of full scale (minimum ±2.5µm)	
Non-Linearity	< ±0.01% of full scale (minimum ±40µm)	
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm	
Input Voltage	+24Vdc (20.4 - 28.8Vdc)	
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc	
Power Consumption	100mA (stroke range dependent)	
Dielectric Strength	500Vdc (DC ground to machine ground)	
Connector Type	Cable Outlet	
Pressure Rating	350 bar / 600 bar peak	
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing	
Sealing	IP 68	
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6	
Shock Rating	100g single hit per IEC standard 68-2-27	
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6	

Pin Assignments

Cable	Output
Black	Signal
White	Signal Gnd
Yellow	N.C.
Green	N.C.
Red	+24 Vdc
Blue	0 Vdc



Order Code

1 6 X X X R X X X X X X X X

Output

001 = 0 - 10V 101 = 4 - 20mA
011 = 10 - 0V 111 = 20 - 4mA

Stroke Length (mm)

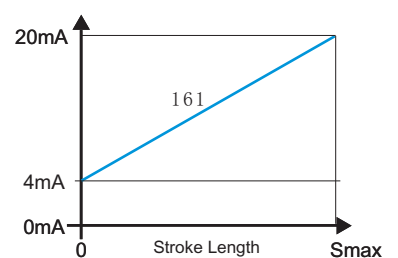
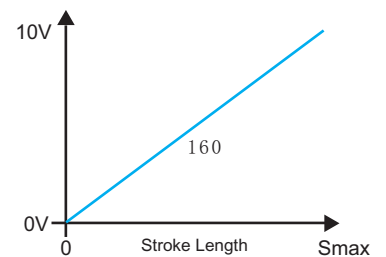
0075, 0100, 0125, 0150, 0175,
0200, 0225, 0250, (25mm increment after)

Magnet Type

1 = Dia. 33mm ring 5 = Dia. 32mm ring
2 = Dia. 25mm ring
4 = Dia. 60mm ring

Connection Type

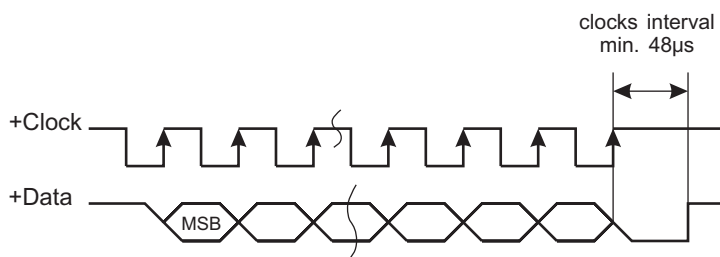
R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)



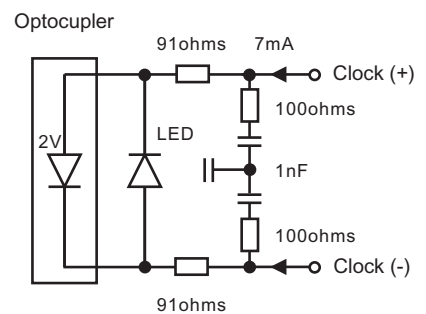
Specifications

Order Code	162
Output	SSI
Measurement Type	Linear displacement
Data Format	Binary or Grey, optional Parity and Errorbit
Data Length	8 - 32 bits
Data Speed	Length : <3 <50 <100 <200 <400 m Baud rate : 1000 <400 <300 <200 <100 kBd
Update Time	Measuring Length : 300 750 1000 2000 5000 mm Measurement/sec : 3.7 3.0 2.3 1.2 0.5 kHz
Resolution	Displacement : 1 / 2 / 5 / 10 / 20 / 50 / 100 μm
Repeatability	< $\pm 0.001\%$ of full scale (minimum $\pm 2.5\mu\text{m}$)
Non-Linearity	< $\pm 0.01\%$ of full scale (minimum $\pm 40\mu\text{m}$)
Update Time	0.5 ms up to 1200 mm / 1.0 ms up to 2400 mm 2.0 ms up to 4800 mm / 5.0 ms up to 7600 mm
Input Voltage	+24Vdc (20.4 - 28.8Vdc)
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	100mA (stroke range dependent)
Dielectric Strength	500Vdc (DC ground to machine ground)
Connector Type	Cable Outlet
Pressure Rating	350 bar / 600 bar peak
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing
Sealing	IP 67 (with connector)
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 68000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6

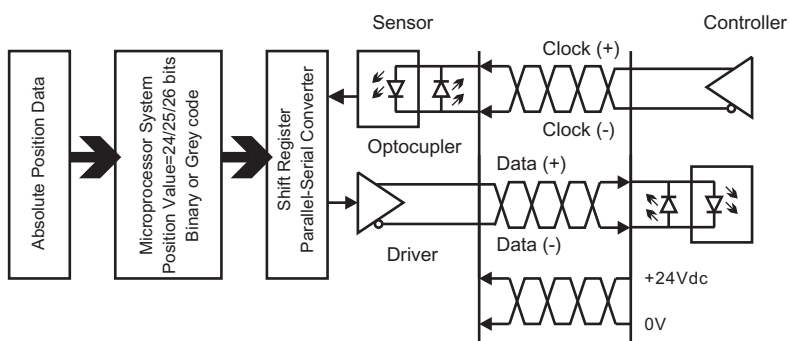
Timing Diagram



Sensor Input



Logic Diagram



Pin Assignments

Cable	Output
Black	Data (-)
White	Data (+)
Yellow	Clock (+)
Green	Clock (-)
Red	+24 Vdc
Blue	0 Vdc

Order Code

1 6 2 X X X X X X R X X X X X X X X X

Data Length

- 1 = 25 bits
- 2 = 24 bits

Output Format

- B = Binary
- G = Grey Code

Resolution

- 1 = 5µm
- 2 = 10µm
- 3 = 50µm
- 4 = 100µm
- 5 = 20µm
- 6 = 2µm
- 8 = 1µm

Function

- 1 = Standard

Options

- 00 = Measuring direction forward
- 01 = Measuring direction reverse

Stroke Length (mm)

- 0075, 0100, 0125, 0150, 0175,
- 0200, 0225, 0250, 0275, 0300,
- 0325, 0350, 0375, 0400, 0425,
- 0450, 0475, (25mm increment after)

Magnet Type

- 1 = Dia. 33mm ring
- 2 = Dia. 25mm ring
- 4 = Dia. 60mm ring
- 5 = Dia. 32mm ring

Connection Type

- R02 = 2m PVC Direct Cable, Option: R01-R10 (1-10m)
- H02 = 2m PUR Direct Cable, Option: H01-H10 (1-10m)

Remark: Direction forward means position reading become larger while magnet move away from electronic carriage. Direction backward means position reading become smaller while magnet move away from electronic carriage.

The 12 series non-contact absolute position transducer is specially designed for parison control which dynamically control thickness of Parison to get a uniform thickness container on an Extrusion Blow Moulding machine.

The 12 series adopts the non-contact magnetostrictive measuring technology for precise, direct and absolute measurement. The absence of electrical contact on the cursor eliminates all wear and guarantees almost unlimited mechanical life expectancy. The non-contact (Floating) cursor provides exceptional ease of installation with a variety of available cursor position target.

The high versatile profile housing (need to match a suitable connector) offers full protection against outside agents for use in harsh environments with high contamination and presence of dust.



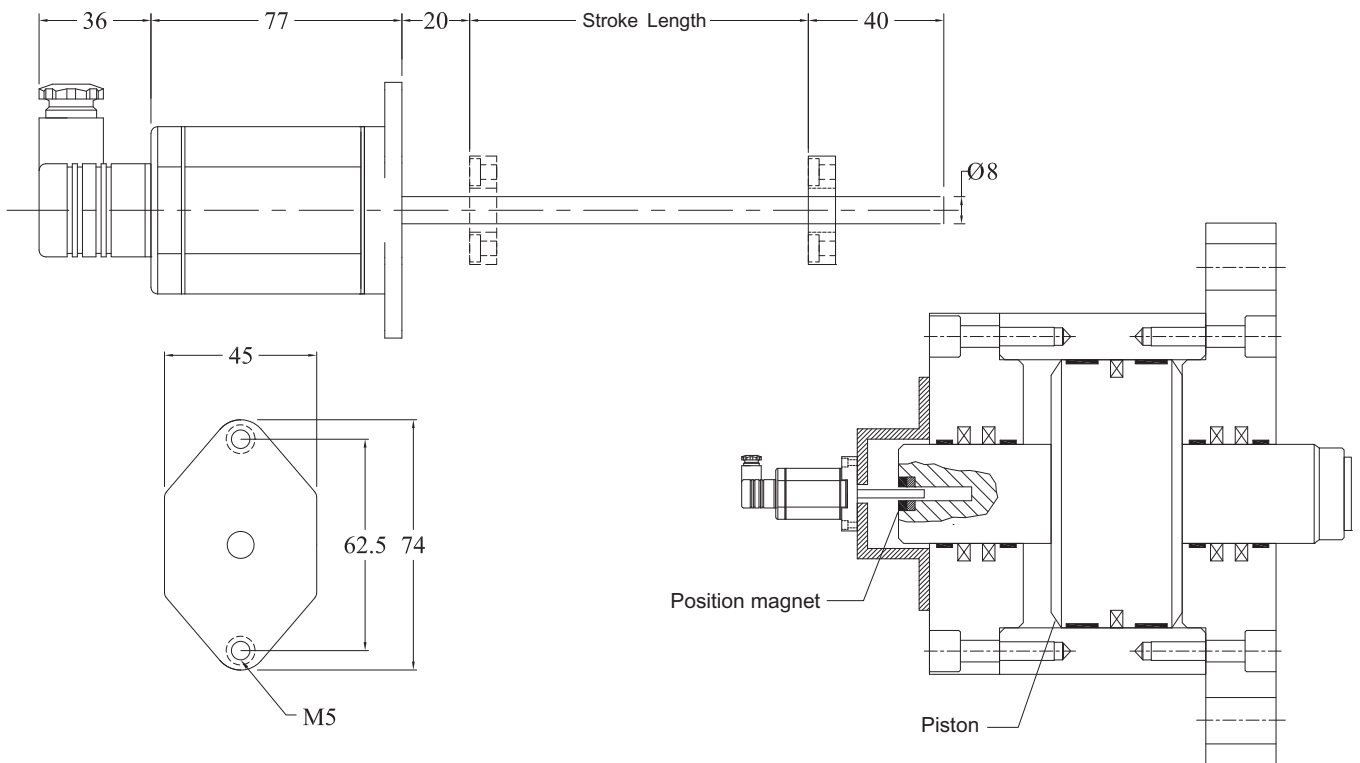
Specifications

Order Code	1 2 0	1 2 3
Output	0-10Vdc, 10-0Vdc dual-output	Start / Stop
Measurement Type	Linear displacement	
Resolution	Infinite, restricted by output ripple	0.1 / 0.01 / 0.005m
Input Voltage	+24Vdc (20.4 - 28.8Vdc)	
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc	
Current Consumption	50-140mA (stroke range dependent)	
Dielectric Strength	500Vdc (DC ground to machine ground)	
Repeatability	< ±0.005% of full scale	
Non-Linearity	< ±0.01% of full scale (minimum ±90µm)	
Update Time	0.2 ms	
Mounting	M5 x 2	
Housing Material	Anodized aluminum	
Operation Temp.	-40 to 75°C, Humidity 90% non-condensing	
Sealing	IP65 / IP67 (with connector)	
Vibration Rating	15g / 10-2000Hz / IEC standard 68-2-6	
Shock Rating	100g single hit per IEC standard 68-2-27	
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2 EN 61000-4-2/3/4/6	

Infinite resolution ...

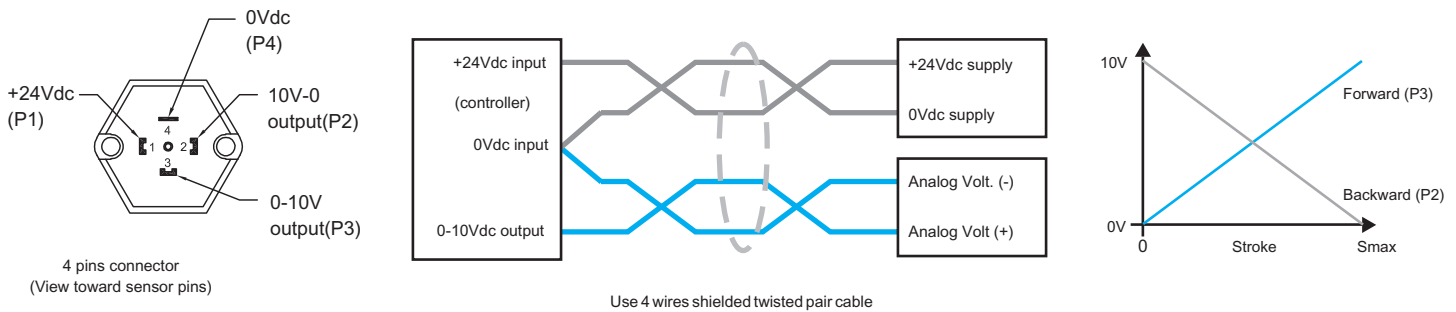


Dimension and Installation

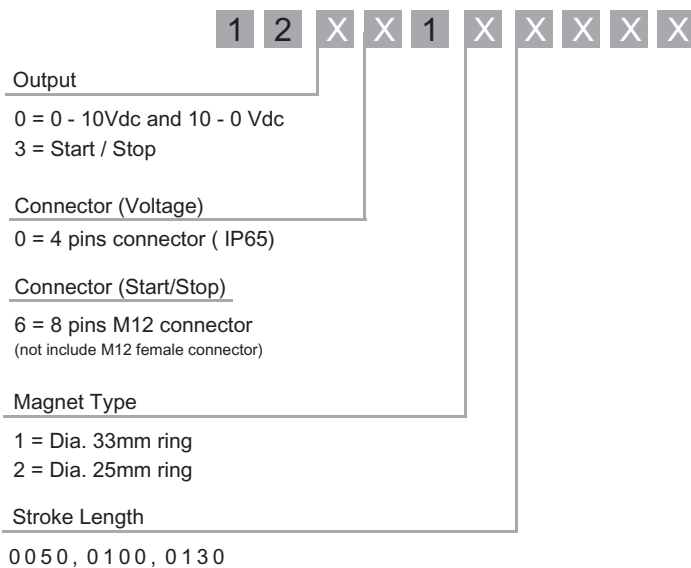


Wiring Connection

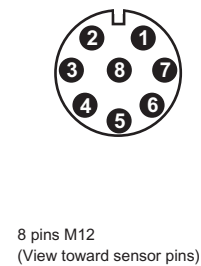
Analog Voltage



Order Code



Start/Stop Digital



Start/Stop	
1	Start (+)
2	Start (-)
3	Stop (+)
4	Stop (-)
5	N.C.
6	N.C.
7	+24 Vdc
8	0Vdc

13 series is designed in strict accordance with the requirements of the mobile machinery industry. Its compact shape can be fully integrated with the hydraulic cylinder with limited head space. The high versatile IP68 profile housing offers full protection for use in harsh environments with high contamination and presence of dust. If the hydraulic cylinder is used with a special connector, the protection level is up to IP69K. Vibration and shock rating are also high-level 25g / 10-2000Hz and 100g (single shock).

It adopts the non-contact magnet-rostrictive measuring technology for precise, accurate, and absolute measurement. The non-contact feature provides exceptional ease of installation and guarantees almost unlimited mechanical life expectancy.



Specifications

Order Code	13
Output	Voltage / Current
Measurement Type	Linear displacement
Resolution	<500mm ±0.10mm, 700mm ±0.18mm, 1000mm ±0.24mm 1250mm ±0.30mm, 1750mm ±0.42mm,
Repeatability	< ±0.005% of full scale
Non-Linearity	< ±0.04% of full scale (minimum ±100µm for 60mm damping zone) < ±0.08% of full scale (for 36.5mm damping zone)
Input Voltage	+12V / +24Vdc
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	1W
Dielectric Strength	500Vdc (DC ground to machine ground)
Operation Temp.	-40 to 85°C, Humidity 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cylinder with M12x1 connection type)
Vibration Rating	25g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6
Pressure Rating	350 bar / 600 bar peak
Material	Stainless Steel

Order Code

1 3 M X X X X X X X X X X X X X X

Output

011 = 0.25 - 4.75V 101 = 4 - 20mA
 012 = 0.5 - 4.5V 104 = 20 - 4mA
 013 = 4.75 - 0.25V
 014 = 4.5 - 0.5V

Connection Type

N__A = 4 single wires (20AWG)
 N__E = 4 single wires , M12x1 IP69K,4pin (pin assignment 2-3-4)
 N__G = 4 single wires , M12x1 IP69K,4pin (pin assignment 1-3-4)
 N__H = 4 single wires , M12x1 IP69K,4pin (pin assignment 1-2-3)
 Ex. : 06 = 60mm wire length
 25 = 250mm wire length
 T__A = integral PUR shielded cable, pigtail for wire termination
 Ex. : 10 = 1.0 meter cable length (0.5 meter mini.)
 35 = 3.5 meter cable length

Sensor Styles

1 = 10mm dia. rod, damping zone 60mm
 2 = 10mm dia. rod, damping zone 36.5mm
 3 = 7mm dia. rod, damping zone 60mm

Magnet Type

1 = Outer dia. 33mm, inner dia. 13.5 ring magnet
 2 = Outer dia. 25.4mm, inner dia. 13.5 ring magnet
 3 = Outer dia. 17.4mm, inner dia. 13.5 ring magnet

Stroke Length (mm)

0075, 0100, 0125, 0150, 0175, 0200, 0225
 0250, 0275, 0300, 0325, 0350, 0375, 0400
 0425, 0450 (25mm increment after)



4 single wires

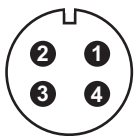


Integral PUR shielded cable



IP69K M12x1

Pin Assignments



4 pin M12
 (View toward sensor pins)

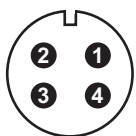
	N__E	N__G	N__H
1	N.C.	+24 Vdc	+24 Vdc
2	+24 Vdc	N.C.	Output
3	0 Vdc	0 Vdc	0 Vdc
4	Output	Output	N.C.

Cable	T__A	N__A
Brown	+24 Vdc	+24 Vdc
Green	Output	Output
Yellow	N.C.	N.C.
White	0 Vdc	0 Vdc

Specifications

Order Code	13 M
Output	Direct CANopen or CAN J1939
Measurement Type	Linear displacement
Resolution	<500mm ±0.10mm, 700mm ±0.18mm, 1000mm ±0.24mm 1250mm ±0.30mm, 1750mm ±0.42mm,
Repeatability	< ±0.005% of full scale
Non-Linearity	< ±0.04% of full scale (minimum ±100µm for 60mm damping zone) < ±0.08% of full scale (for 36.5mm damping zone)
Input Voltage	+12V / +24Vdc
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	1W
Dielectric Strength	500Vdc (DC ground to machine ground)
Operation Temp.	-40 to 85°C, Humidity 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cylinder with M12x1 connection type)
Vibration Rating	25g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6
Pressure Rating	350 bar / 600 bar peak
Material	Stainless Steel

Pin Assignments



4 pin M12
(View toward sensor pins)

	N__E	N__G	N__H
1	N.C.	+24 Vdc	+24 Vdc
2	+24 Vdc	N.C.	Output
3	0 Vdc	0 Vdc	0 Vdc
4	Output	Output	N.C.

Order Code

1 3 M X X X X X X X X X X X X X X X X X X

Output

C011 = CANopen
J01 = SAE J1939

Baud Rate

0 = 1000 kBit/s 4 = 150 kBit/s
1 = 800 kBit/s 6 = 50 kBit/s
2 = 500 kBit/s 7 = 20 kBit/s
3 = 250 kBit/s 8 = 10 kBit/s

Node-ID

CANopen : hex 01 to 7F (default 7F)
SAE J1939 : hex 01 to FD (default FD)

Connection Type

N__A = 4 single wires (20AWG)
N__E = 4 single wires , M12x1 IP69K,4pin (pin assignment 2-3-4)
N__G = 4 single wires , M12x1 IP69K,4pin (pin assignment 1-3-4)
N__H = 4 single wires , M12x1 IP69K,4pin (pin assignment 1-2-3)
Ex. : 06 = 60mm wire length
 25 = 250mm wire length
T__A = integral PUR shielded cable, pigtail for wire termination
Ex. : 10 = 1.0 meter cable length (0.5 meter mini.)
 35 = 3.5 meter cable length

Sensor Styles

1 = 10mm dia. rod, damping zone 60mm
2 = 10mm dia. rod, damping zone 36.5mm
3 = 7mm dia. rod, damping zone 60mm

Magnet Type

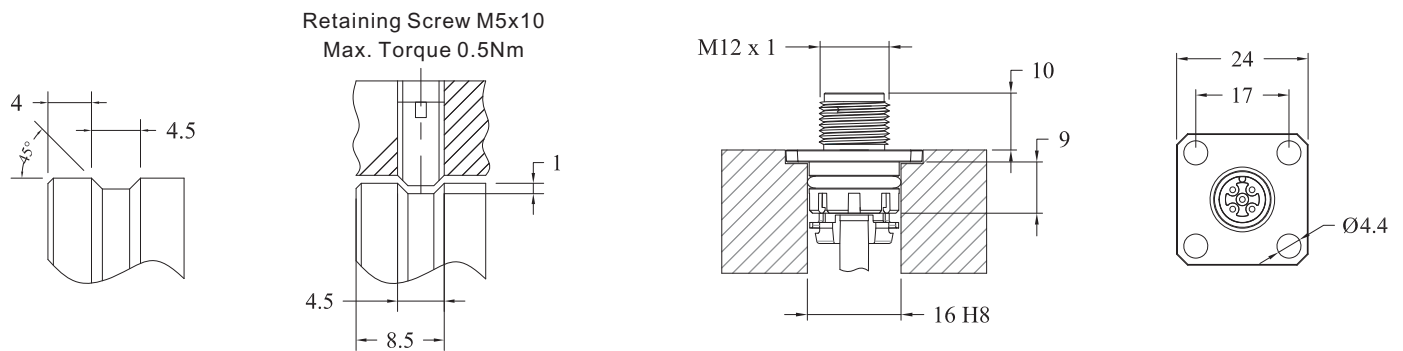
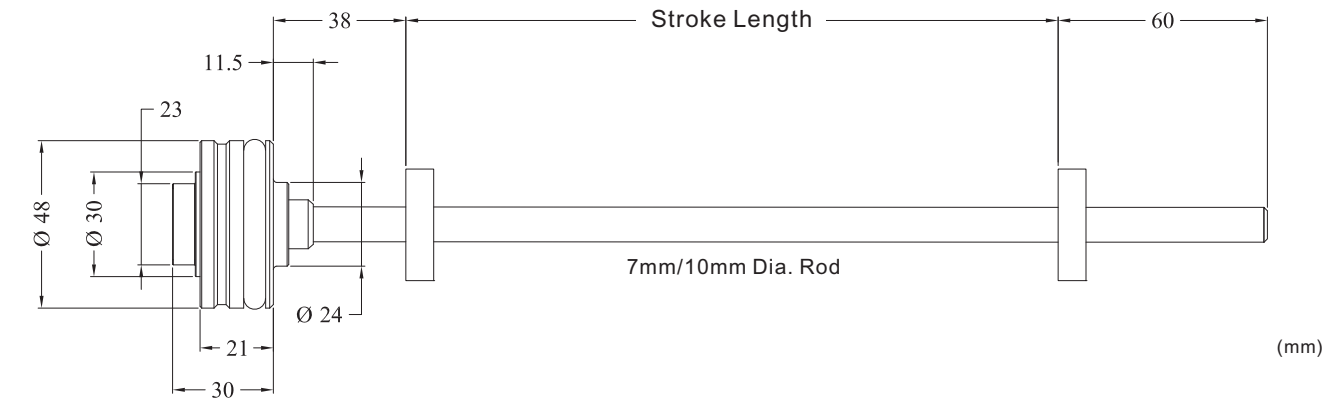
1 = Outer dia. 33mm, inner dia. 13.5 ring magnet
2 = Outer dia. 25.4mm, inner dia. 13.5 ring magnet
3 = Outer dia. 17.4mm, inner dia. 13.5 ring magnet

Stroke Length (mm)

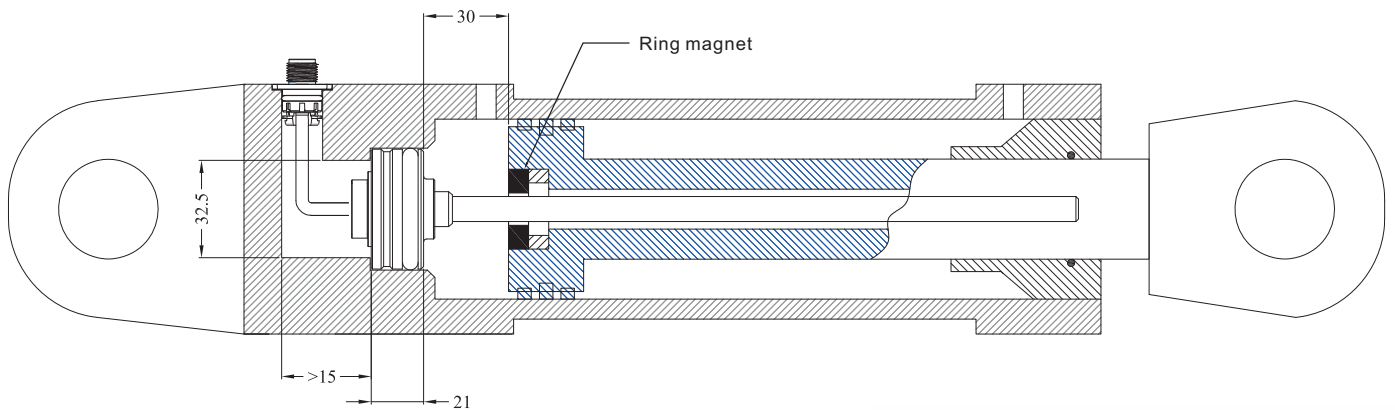
0075, 0100, 0125, 0150, 0175, 0200, 0225
0250, 0275, 0300, 0325, 0350, 0375, 0400
0425, 0450 (25mm increment after)



Installation Dimensions



Installation



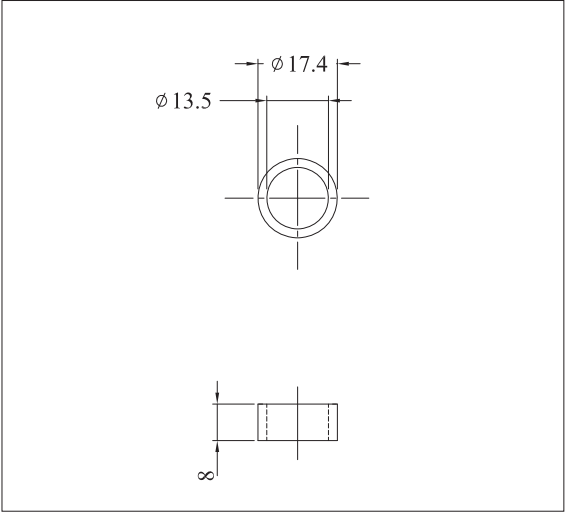
Remark

- 1) Use a non-ferrous circlip to fasten the magnet.
- 2) Minimum drilling for a 10mm rod should be 13.5mm.
- 3) No less than 3mm clearance between the end of the sensor rod and the bottom of the rod bore at full retraction.



Discription
Order Code

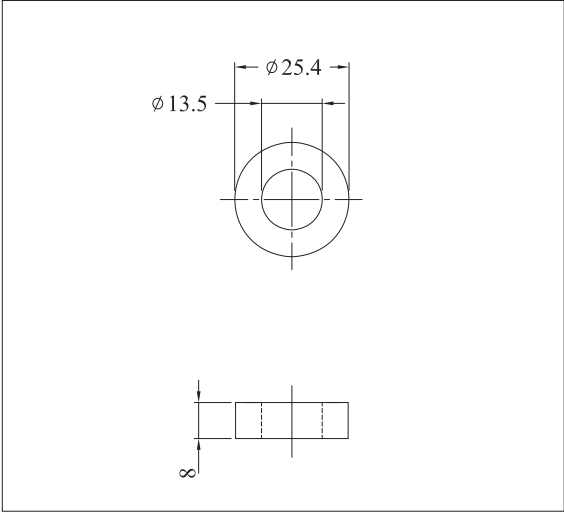
Outer Dia. 17.4 mm ring
1700 951 025



Material
Weight

Plastic
~4g

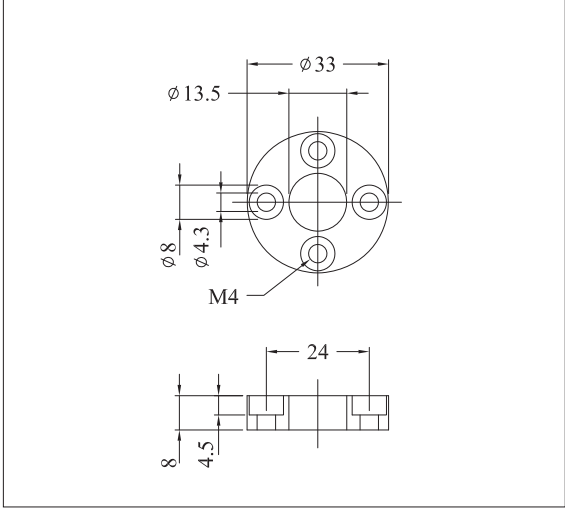
Outer Dia. 25.4mm ring
1700 951 023



Plastic
~8g

Discription
Order Code

Outer Dia. 33mm ring
1700 951 001



Material
Weight

Plastic
~8g

Discription
Order Code
Material

Dia. 33mm Spacer
1700 951 002
Plastic



13 series is designed in strict accordance with the requirements of the mobile machinery industry. Its compact shape can be fully integrated with the hydraulic cylinder with limited head space. The high versatile IP68 profile housing offers full protection for use in harsh environments with high contamination and presence of dust. If the hydraulic cylinder is used with a special connector, the protection level is up to IP69K. Vibration and shock rating are also high-level 25g / 10-2000Hz and 100g (single shock).

It adopts the non-contact magnet-rostrictive measuring technology for precise, accurate, and absolute measurement. The non-contact feature provides exceptional ease of installation and guarantees almost unlimited mechanical life expectancy.



Specifications

Order Code	13 C
Output	Voltage 0.1 - 4.9V output
Measurement Type	Linear displacement
Resolution	±0.15mm
Repeatability	< ± 25µm
Non-Linearity	±0.15mm
Input Voltage	+5Vdc (4.75 - 5.5Vdc) / 12V (9 - 15V)
Input Protection	Over voltage protection up to 22Vdc
Power Consumption	40mA
Dielectric Strength	500Vdc (DC ground to machine ground)
Operation Temp.	-40 to 85°C, Humidity 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cylinder with M12x1 connection type)
Vibration Rating	25g / 10-2000Hz / IEC standard 68-2-6
Shock Rating	100g single hit per IEC standard 68-2-27
EMC	Emission EN 61000-6-3, Immunity EN 61000-6-2, EN 61000-4-2/3/4/6
Pressure Rating	350 bar / 600 bar peak
Material	Stainless Steel



Order Code

1 3 C X X X X X X X X X X X

Output

0 = 0.1 - 4.9V

Output

1 = +5Vdc (4.75 - 5.5Vdc)

2 = +12Vdc (9 - 15Vdc)

Connection Type

N__E = 4 single wires , M12x1 IP69K,4pins

Ex. : 06 = 60mm wire length

25 = 250mm wire length

T__A = integral PUR shielded cable, pigtail for wire termination

Ex. : 10 = 1.0 meter cable length (0.5 meter mini.)

35 = 3.5 meter cable length

Magnet Type

1 = Outer dia. 33mm, inner dia. 13.5 ring magnet

2 = Outer dia. 25.4mm, inner dia. 13.5 ring magnet

3 = Outer dia. 17.4mm, inner dia. 13.5 ring magnet

Stroke Length (mm)

0075, 0100, 0125, 0150, 0175, 0200, 0225

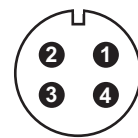
0250, 0275, 0300, 0325, 0350, 0375, 0400

0425, 0450 (25mm increment after)



IP69K M12x1

Pin Assignments

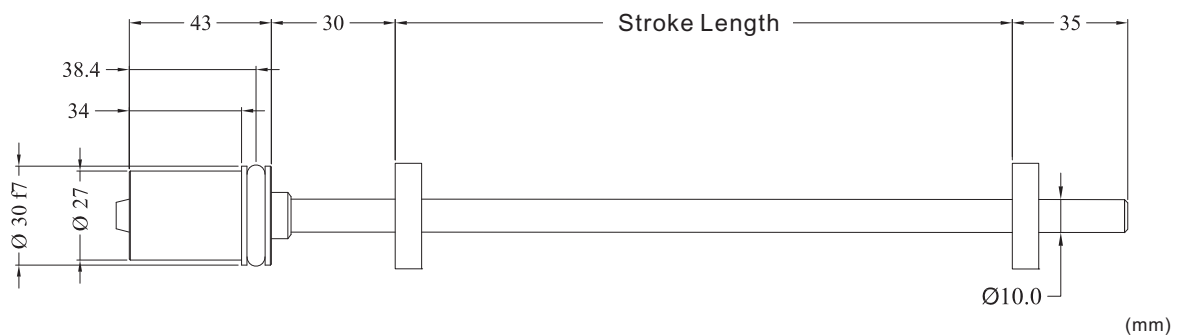


4 pin M12
(View toward sensor pins)

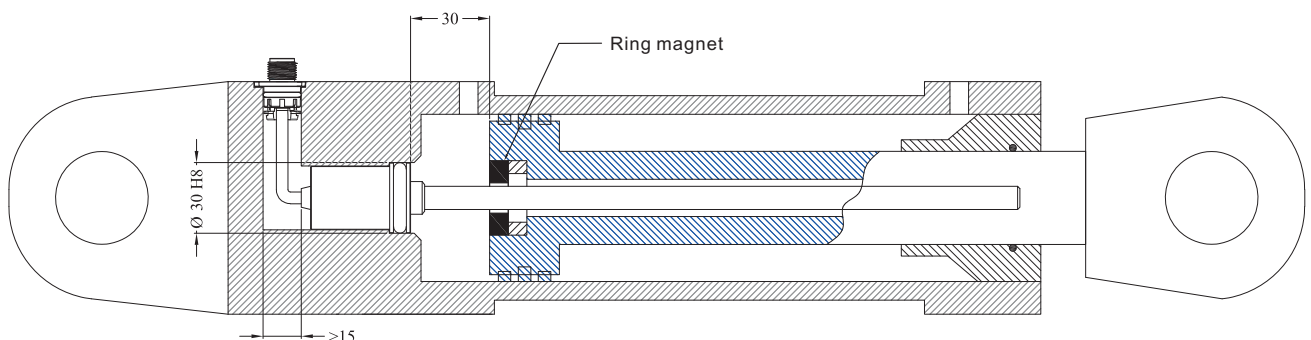
	N__E
1	N.C.
2	+24 Vdc
3	0 Vdc
4	Output

Cable	T__A
Brown	+24 Vdc
Green	Output
Yellow	N.C.
White	0 Vdc

Installation Dimensions

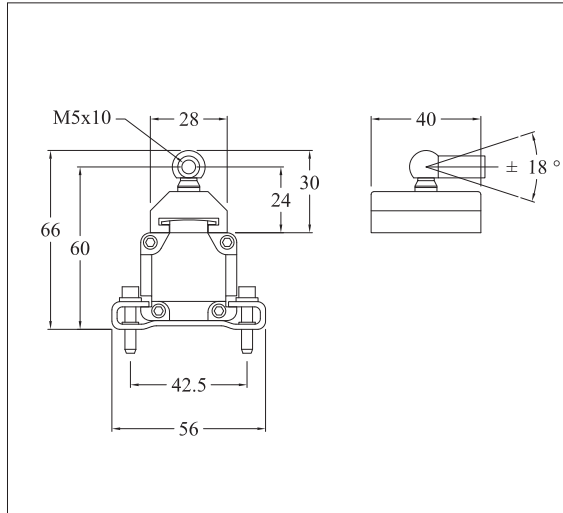


Installation

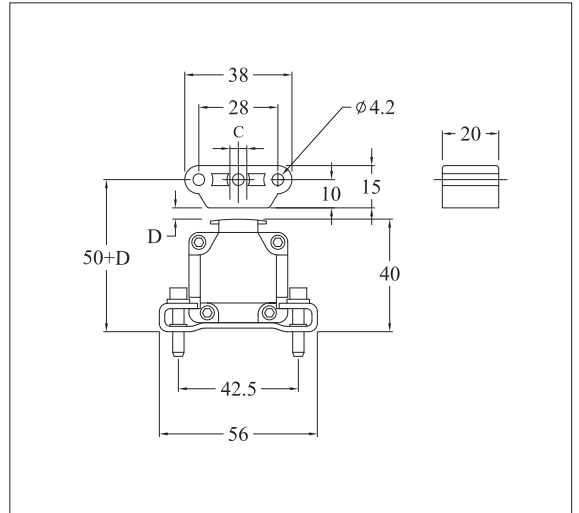


Discription
For series

Captive
18/19 Series



Floating
18/19 Series



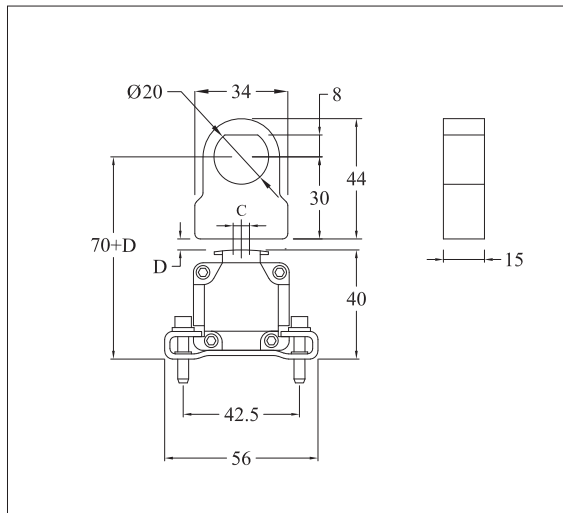
Order Code
Material
Weight
Vertical distance (D)
Lateral offset (C)
Operation Temperature

1800 951 001
Plastic
~30g
Fixed
Fixed
-40 to 75°C

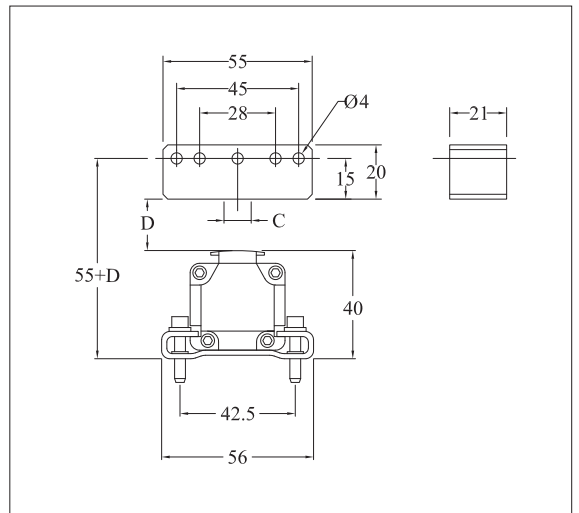
1800 951 002
Plastic
~12g
0.1 - 4mm
±8 m m
-40 to 75°C

Discription
For series

Die-cast
18/19 Series



Large floating
18/19 Series



Order Code
Material
Weight
Vertical distance (D)
Lateral offset (C)
Operation Temperature

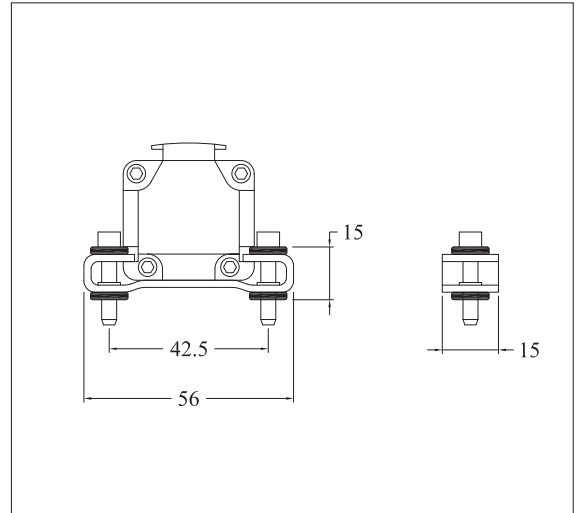
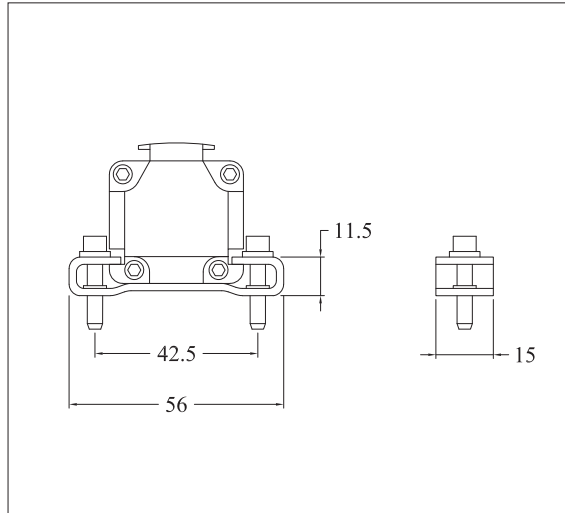
1800 951 003
Plastic
~12g
0.1 - 4mm
±8 m m
-40 to 75°C

1800 951 004
Plastic
~40g
0.1 - 10mm
±20 m m
-40 to 75°C

Discription
For series

42.5mm Mounting
18/19 Series

42.5mm Isolation Mounting
18/19 Series



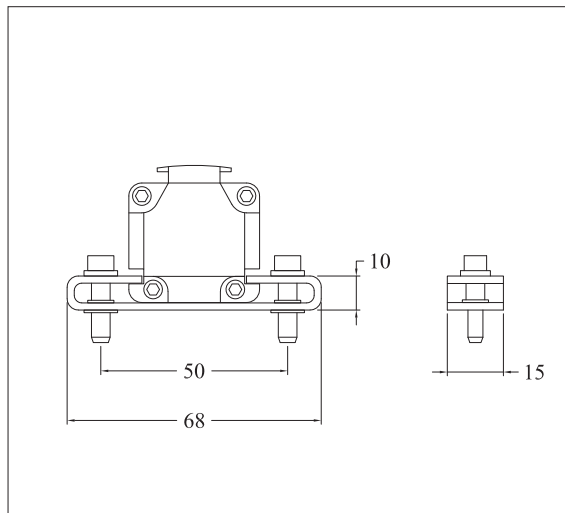
Order Code
Material
Installation
Torque

1800 951 007
Stainless Steel
M4 x 20 (not included)
Max. 4 Nm

1800 951 008
Stainless Steel
M4 x 20 (not included)
Max. 0.5 Nm

Discription
For series

50mm Mounting
18/19 Series



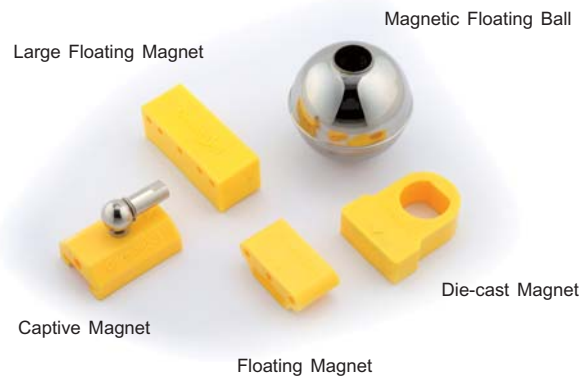
42.5mm Isolation Mounting 50mm Mounting



42.5mm Mounting

Order Code
Material
Installation
Torque

1800 951 009
Stainless Steel
M5 x 20 (not included)
Max. 5 Nm



Large Floating Magnet

Magnetic Floating Ball

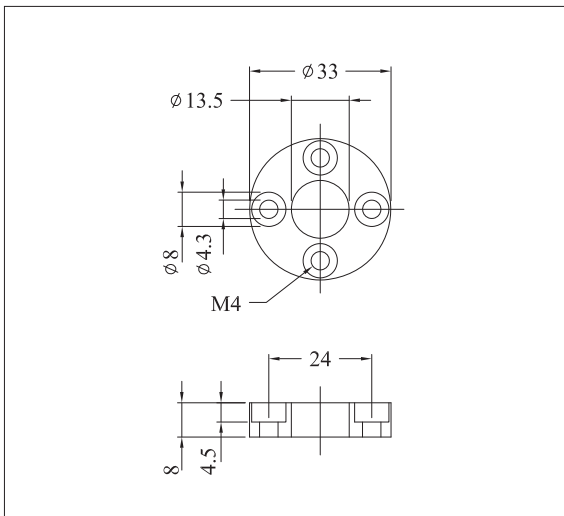
Captive Magnet

Floating Magnet

Die-cast Magnet

Discription
Order Code

Dia. 33mm ring
1700 951 001



Material
Weight

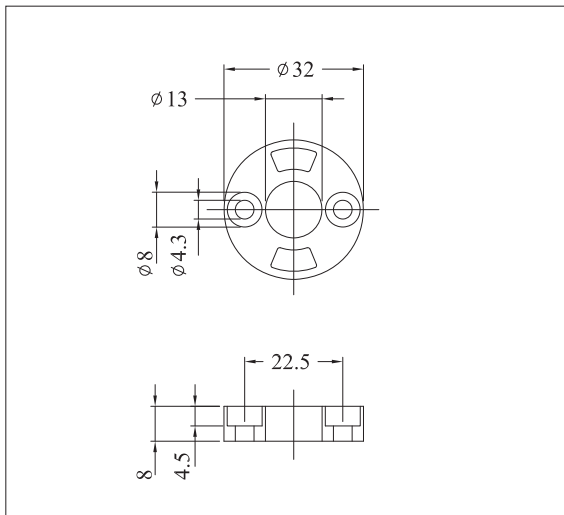
Plastic
~8g

Discription
Order Code
Material

Dia. 33mm Spacer
1700 951 002
Plastic

Discription
Order Code

Dia. 32mm ring
1700 951 020



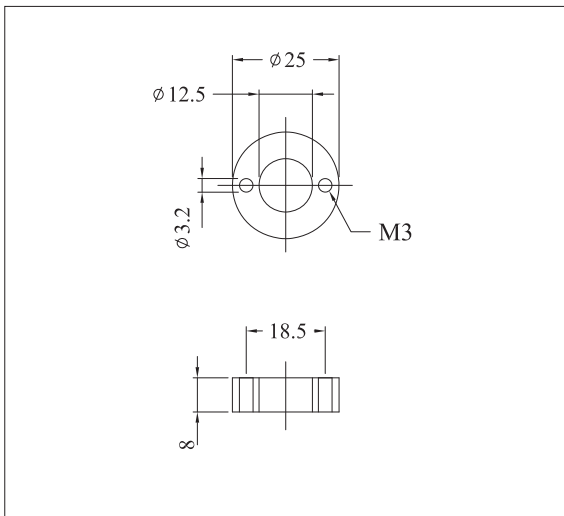
Material
Weight

Plastic
~8g

Dia. 32mm Spacer
1700 951 021
Plastic

Discription
Order Code

Dia. 25mm ring
1700 951 003



Material
Weight

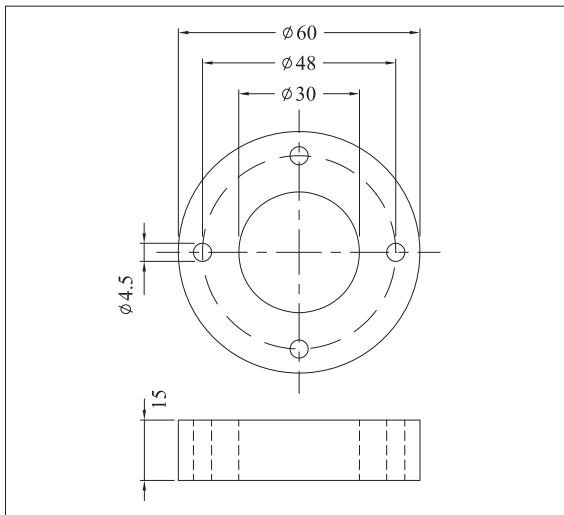
Plastic
~8g

Discription
Order Code
Material

Dia. 25mm Spacer
1700 951 004
Plastic

Discription
Order Code

Dia. 60mm ring
1900 951 004

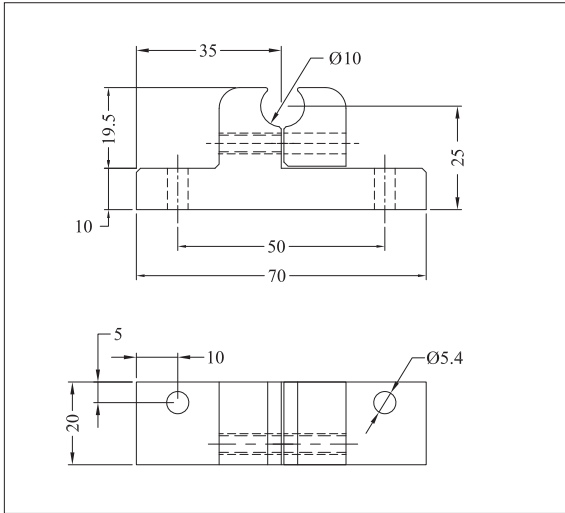


Material
Weight

Plastic
~30g

Discription
Order Code

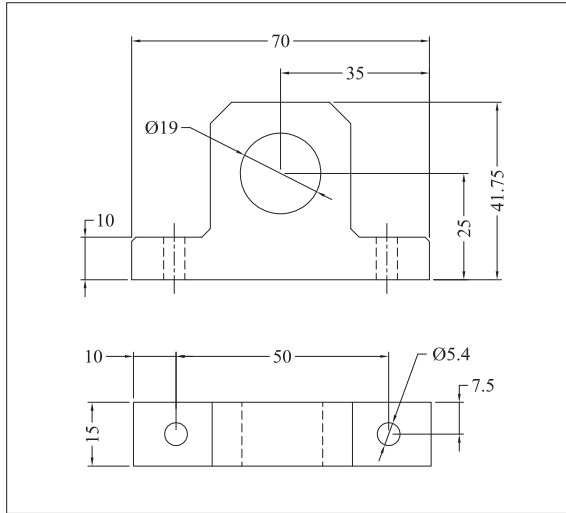
10mm dia. housing pipe mounting
1900 951 002



Material
Weight

Aluminium
~30g

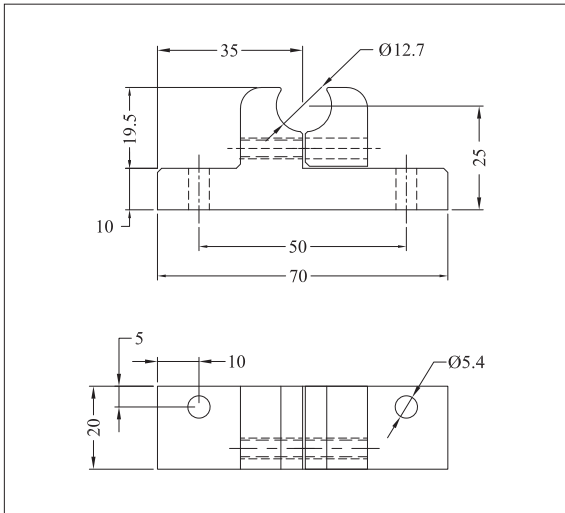
M18x1.5 flange external mounting
1900 951 003



Aluminium
~45g

Discription
Order Code

12.7mm dia. housing pipe mounting
1900 951 005



Material
Weight

Aluminium
~30g



10mm dia. housing pipe mounting



60mm ring

25mm ring

33mm ring

M12 Connector

		EtherCAT Input		EtherCAT Output		24V Power Input	
EtherCAT		Model	4 pins M12 D-model male	Model	4 pins M12 D-model male	Model	4 pins M8 female
197 Series		Order Code	1800 951 041	Order Code	1800 951 041	Order Code	1800 951 040

		Profibus Input		Profibus Output		24V Power Input	
Profibus		Model	5 pins M12 A-model female	Model	5 pins M12 A-model male	Model	4 pins M8 female
195 series D53		Order Code	1800 951 017	Order Code	1800 951 033	Order Code	1800 951 040

		Signal Output / Power Input	
SSI / Start Stop		Model	8 pins M12 female
17 / 18 series		Order Code	1800 951 026

		Signal Output / Power Input	
Analog Output		Model	5 pins M12 A-model female
17 / 18 series		Order Code	1800 951 017



*Cable Dia. 6-8mm

D60 / D70 Connector

Discription		90° Degree Connector (female)	
Model		D60	D70
Order Code		1800 951 011	1800 951 013
Material		Cu Zn / Plastic	

Discription		Straight Connector (female)	
Model		D60	D70
Order Code		1800 951 010	1800 951 012
Material		Cu Zn / Plastic	



90 Degree female
Length: 55mm



Straight female
Length: 55mm

Fieldbus Terminator

CANbus		Model	CANbus D62 terminator
194 series		Order Code	1800 951 044

Profibus		Model	Profibus D53 terminator
195 series D53		Order Code	1800 951 043

Profibus		Model	Profibus D62 terminator
195 series D62		Order Code	1800 951 028



M62 Terminator
Length: 45mm



M53 Terminator
Length: 47mm

Twisted Pairs Cable with Connector Order Code

1 8 0 0 9 5 X X X X

Connector

- 1 1 = No connector, cable only
- 1 2 = D60 straight female
- 1 3 = 4 pins connector (IP67)
- 1 4 = 5 pins M12 A model female
- 1 5 = 8 pins M12 female
- 1 6 = D60 90 degree female
- 1 7 = D70 straight female
- 1 8 = D70 90 degree female
- 1 9 = 4 pins connector (IP65)
- 2 0 = 4 pins M12 D model male
- 2 1 = 4 pins M8 female

Profibus Connector and Cable

- 2 8 = Profibus 5 pins M12 A model female
- 2 9 = Profibus 5 pins M12 A model male

Cable Length

Please select the cable length in unit Meter
For example, 01 = 1 Meter

For 11 to 21, PVC shield twisted pair 3 x 2 x 0.2mm²
For 28 to 29, Profibus Network Cable

Color Code
Black
White
Yellow
Green
Red
Blue

Color Code
Black
White
Yellow
Green
Red
Blue

Color Code
Green
Red
Shield

Color Code
Red
Blue

Voltage		Current	
5Pins M12 A	4Pins IP65/67	5Pins M12 A	4Pins IP65/67
2	P3	2	P2
5	P2/P3 Gnd.	5	P3
4	P2	N.C.	N.C.
N.C.	N.C.	N.C.	N.C.
1	P1	1	P1
3	P4	3	P4

Color Code	D60	D70	8Pins M12	4Pins M12 D
Black	1	1	4	1
White	2	2	3	3
Yellow	3	3	1	4
Green	4	4	2	2
Red	5	5	7	N.C.
Blue	6	6	8	N.C.

Profibus Cable		
Color Code	5P M12 Male	5P M12 Female
Green	2	2
Red	4	4
Shield	N.C.	5

24V Power Cable		
Color Code	4P M8 Profibus	4P M8 EtherCAT
Red	1	1
Blue	3	3



*1m cable with D60 straight connector
Order code: 1800951201

Level Sensing Accessories



Discription	Floating Ball
Order Code	1700 951 005
Material	304 SS
Inside Dia. (ID)	15 mm
Out Dia./Height	52 x 52 mm
Density	0.7
Pressure Rating	40 bar



Discription	Floating Ball Stopper
Order Code	1700 951 013
Material	304 SS
Inside Dia. (ID)	10 mm
Out Dia./Height	20 x 13 mm

Programming Tools



Order Code	1700 951 018
Discription	19 Series Analog Programming Tool

The 19 series analog programming tool can be used to set the "zero" and "end" values anywhere within the nominal factory stroke range.



Order Code	1700 951 032
Discription	19 Series Profibus Simulator

The master simulator can be used to check the sensor functions and to change the slave address. The magnet positions can be read out and diagnostic data.

Diagnostic Tools

Ranging from simple, low cost displays to allow visual position monitoring to full-featured displays with programmable capability, Germanjet offers a display product to meet any application requirement.

Diagnostic Meter
(Sensor not included)



Diagnostic Display Module



	Diagnostic Meter	Diagnostic Display Module	Function Discription
CANbus	1800 951 050	1800 951 053	CANbus position sensor input CANbus address modification 0 - 10V position output
Start / Stop	1800 951 049	1800 951 052	7 segments LED display Start/Stop position sensor input 0 - 10V position output
SSI	1800 951 051	1800 951 054	7 segments LED display SSI position sensor input 0 - 10V position output

Euro Card Holder

This cardholder is for mounting Euro standard controller card. The card is installed by slowly slide into the card holder. Both ejector buttons need to be pushed down to release the card. The holder can be mounted on DIN rail or screwed down.

Features

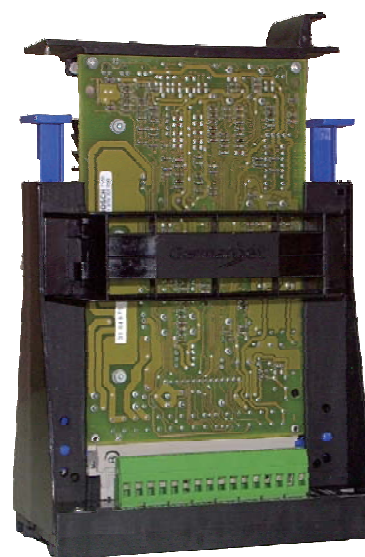
- Compression screw terminals for wire connections.
- Terminal connections on both sides of card holder.
- Fastens to 35mm DIN rail or directly screw to panel.
- Circuit board hold downs.
- Ejector buttons smoothly release card.

Technical Data

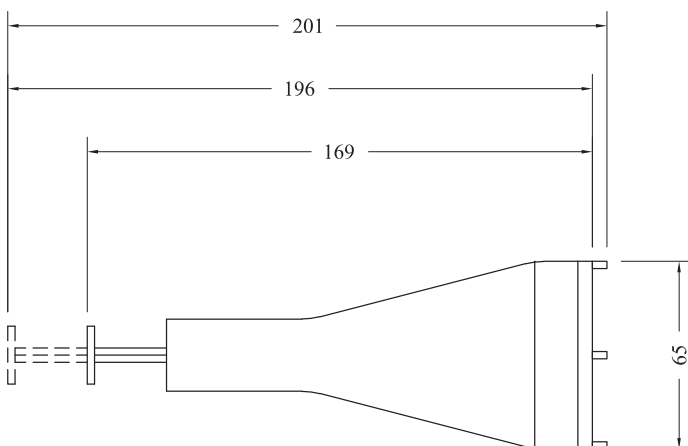
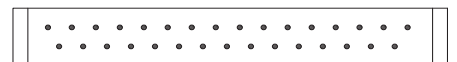
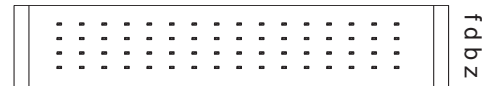
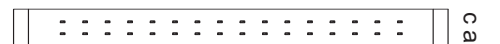
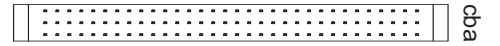
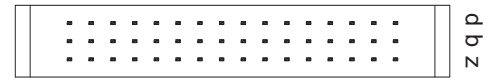
- Maximum wire size - 4mm² (12 AWG).
- Recommended 225mm (9" or larger) box depth with card inserted.
- 0.5lb to 0.75lb Weight.

Mounting

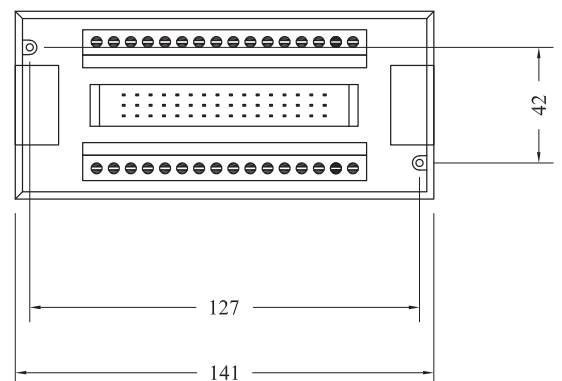
- 2 clearance holes.
- 4.2 mm (0.165in.) dia. X 9.5 mm (3/8 in.) depth

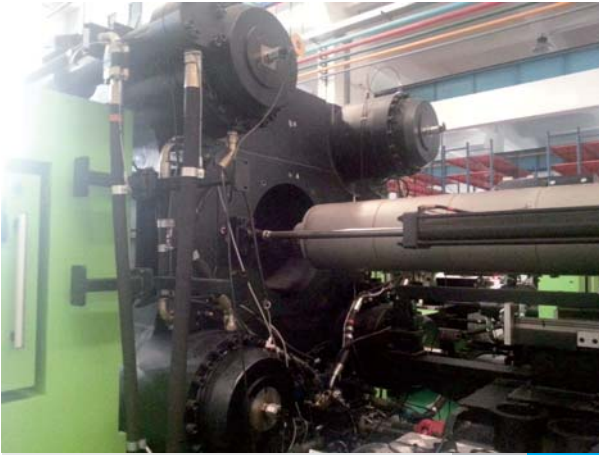


Format	Pins	Pins Config.	Order Code
DIN 41612, Form F	32	row b, z	1 834 486 001
	48	row z, b, d	1 834 486 003
DIN 41612, Form C	32	row a,c	1 834 486 004
	64	row a,c	1 834 486 002
	96	row a,b,c	1 834 486 006
DIN 41612, Form B	64	row a,b	1 834 486 005
DIN 41612, Form D	32	row a,c	1 834 486 007
DIN 41612, Form G	64	row z,b,d,f	1 834 486 008
DIN 41612, Form M	24+7	row z,b,d	1 834 486 009
DIN 41617	31	all	1 834 486 010



screw terminal for fast connection.





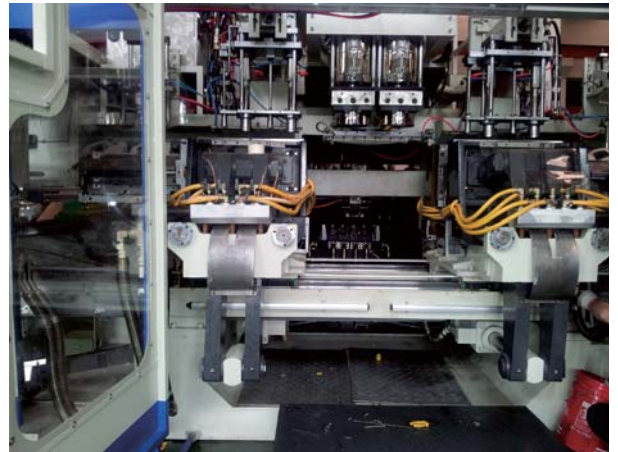
Two plates plastic injection machine use Germanjet fully digital solution



Wood forming machine use Germanjet 17 and 18 series



Mold closing at die-cast machine. injection speed at 10m/s



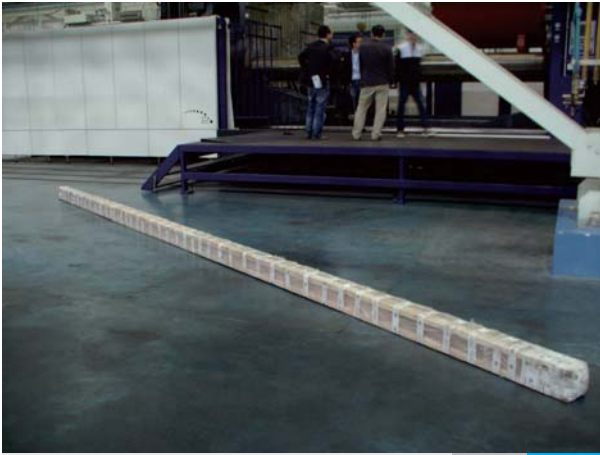
Fast mold shifting at blow molding machine



Automatic Control Valve use 17 series



Product unloading machine



6600 ton two plates plastic injection machine
Germanjet 19 series 7600mm CANBus



University laboratory testing equipment



Packaging machine used IP67 Germanjet
18 series



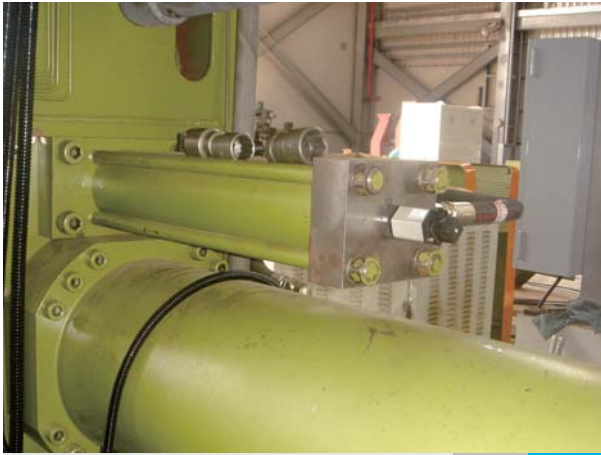
Garbage burning gasifiers use 19 series



Heavy duty hydraulic press



Hot chamber die-cast machine
used Germanjet 17 series



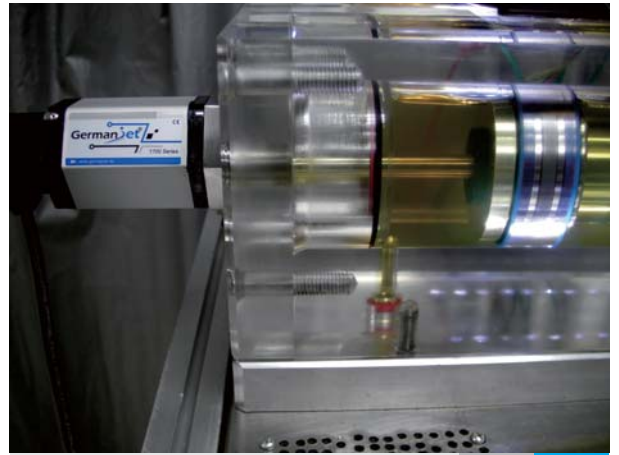
Hydro-forming machine



Stainless Steel Rolling Machine used Germanjet 19 series



Steel Mill used Germanjet 19 series SSI



Crystall cylinder demo at university



6550mm hydraulic cylinder uses 19 series



Handheld testing equipment



Large two-plate plastic injection machine used Germanjet 12 Series



Automotive exhaust pipe bending machine used Germanjet 17 series



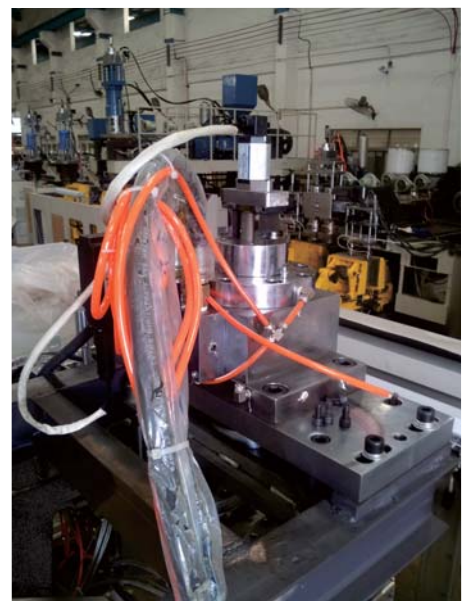
Multi-color plastic second injector



Sand cast molding machines use 18 series



Large hydraulic press uses 19 series

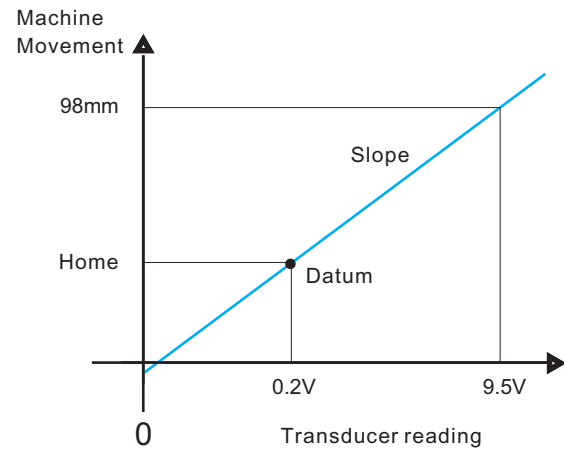


Parisan control used Germanjet 12 series

Transducer on machine calibration

To make sure the nominal stroke length is fully covered, all analog position transducers' output signal were calibrated slightly wider than the stroke. After installation, the machine needs to go through calibration. The step is as follow.

- 1) Move the machine to home position and record the transducer reading.
Example: at home, the transducer reading = 0.2V
- 2) Move the machine away from home position, measure the actual movement and record the transducer reading.
Example: actual movement = 98mm,
transducer actual movement reading = 9.5V
- 3) Calculate the "slope"
Slope = actual movement / (transducer actual movement reading - transducer home reading).
Example: slope = 98mm / (9.5V - 0.2V) = 10.537
- 4) Calculate the "datum"
Datum = slope x transducer home reading
Example: datum = 10.537 x 0.2V = 2.106
- 5) Machine position = (slope x transducer reading) - datum
Example: machine position = (10.537 x transducer reading) - 2.106



International Protection Rating (IP)

IP X X

Solid particle protection

- 4 = >1mm object size protected against
- 5 = Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment;
- 6 = No ingress of dust; complete protection against contact

Liquid ingress protection

- 0 = Not protected
- 5 = Water projected by a nozzle (6.3mm) against enclosure from any direction shall have no harmful effects.
- 7 = Ingress of water in harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time (up to 1 m of submersion).



Transducer may in touch with dust and water, having proper IP rating is needed. Potentiometer IP rating is IP 40 or 50 but non-contact position transducer IP rating is IP 65 or even 67.

Installation of floating magnet



Installation of floating magnet is very simple. Compared to captive magnet, floating magnet can truly demonstrate the advantage of non-contact sensing and eliminate the wear of captive magnet socket.

www.weabu.com





www.weabu.com

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