...19 Series
Non-Contact Sensor

19 series is the state-of-the-art digital position transducer. It adopts the non-contact magnetrostrictive 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 voltage and current, SSI, CANbus, Profibus and etc.

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component and hydraulic body are modular design which can be detached easily; Hydraulic fluid doesn't need to be withdrawn when doing sensor calibration or replacement.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 the 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 detacted

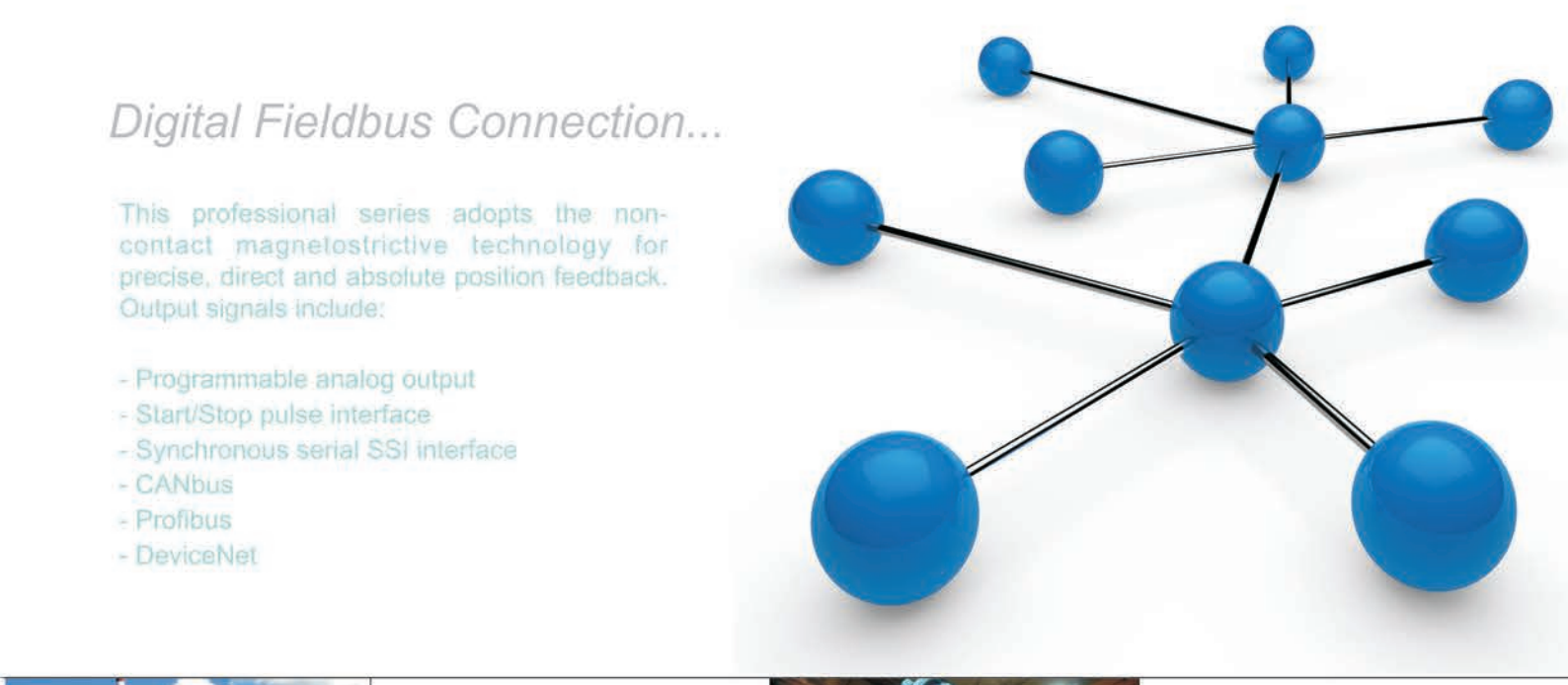
D model is design for hydraulic cylinder with limited head space or clevis rod ends hydraulic cylinder. Sensing rod is made by stainless steel which installed inside the hydraulic cylinder. It is connected to the electronic module installed at the outside of the cylinder by a robust cable.

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



Order Code

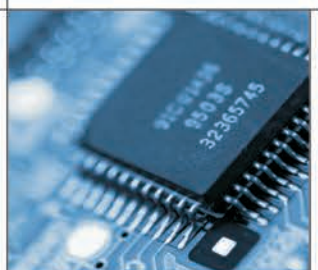
The 19 series order code cosists of two parts: output code and installation code

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

1	9	X	X	X	X	X	X	X	X	X	X
(Output code) P11 - P20						(Installation code) P21 - P24					

For example: SSI output with hydraulic rod (H)

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



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Specifications

Order Code	190	191
Output	Voltage	Current
Measurement Type	Linear displacement	
Measured Variables	For dual magnets, kept minimum distance of 76mm in between	
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	
Operation Temp.	-40 to 75°C, Humility 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	

Order Code (Output Code)

1 9 X X X

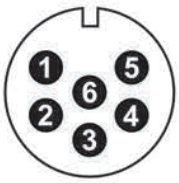
Output

1 Output with 1 Magnet	2 Outputs with 2 Magnets
001 = 0 - 10V	002 = 0 - 10V,0 - 10V
011 = 10 - 0V	012 = 10 - 0V,10 - 0V
021 = 0 - 5V	022 = 0 - 5V
031 = 5 - 0V	032 = 5 - 0V
041 = -10 - +10V	042 = -10 - +10V
051 = -5 - +5V	052 = -5 - +5V
101 = 4 - 20mA	102 = 4 - 20mA
111 = 20 - 4mA	112 = 20 - 4mA
121 = 0 - 20mA	122 = 0 - 20mA
131 = 20 - 0mA	132 = 20 - 0mA
141 = 0 - 24mA	142 = 0 - 24mA
151 = 24 - 0mA	152 = 24 - 0mA

Sensor Field Programming

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

Pin Assignments

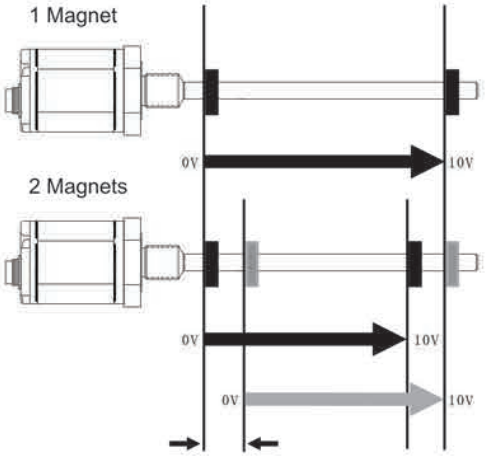


1	Output 1 : Position 1
2	DC Gnd
3	Output 2 : Position 2
4	DC Gnd
5	+24 Vdc
6	0 Vdc

(View toward sensor pins)

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

Magnet Assigment



Remarks

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

Specifications

Order Code	193
Output	(Start / Stop) Digital Output
Measurement Type	Linear Displacement
Resolution	0.1 / 0.01 / 0.005mm
Repeatability	< ±0.001% of full scale (minimun ±2.5µm)
Non-Linearity	< ±0.01% of full scale (minimun ±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, Humility 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

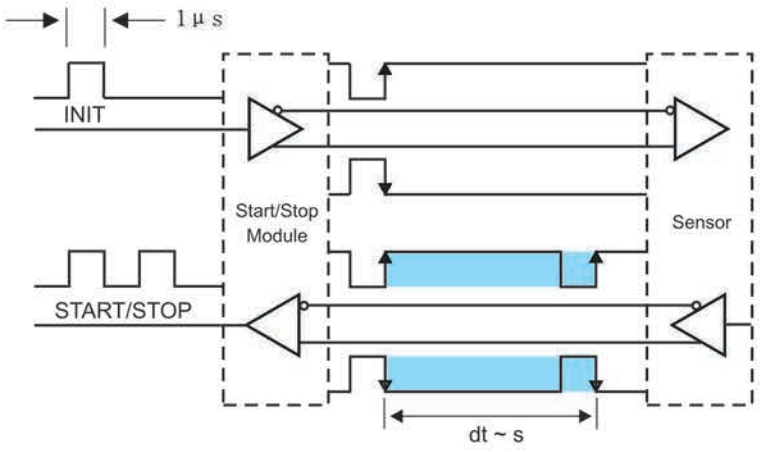
Order Code (Output Code)

1 9 3 X

Output

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

Logic Diagram



Pin Assignments

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

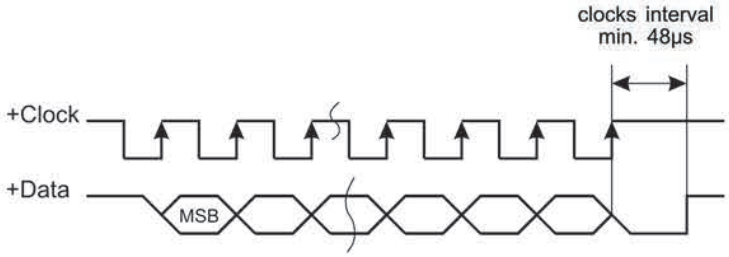
(View toward sensor pins)

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

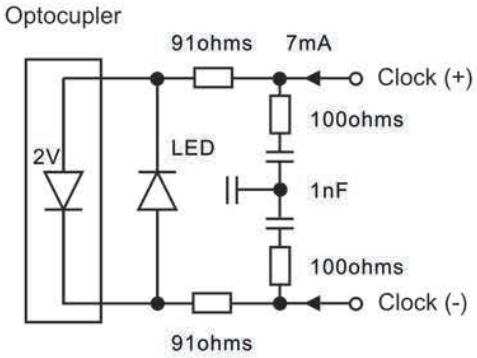
Specifications

Order Code	192
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	< ±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	D70 Male
Operation Temp.	-40 to 75°C, Humility 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

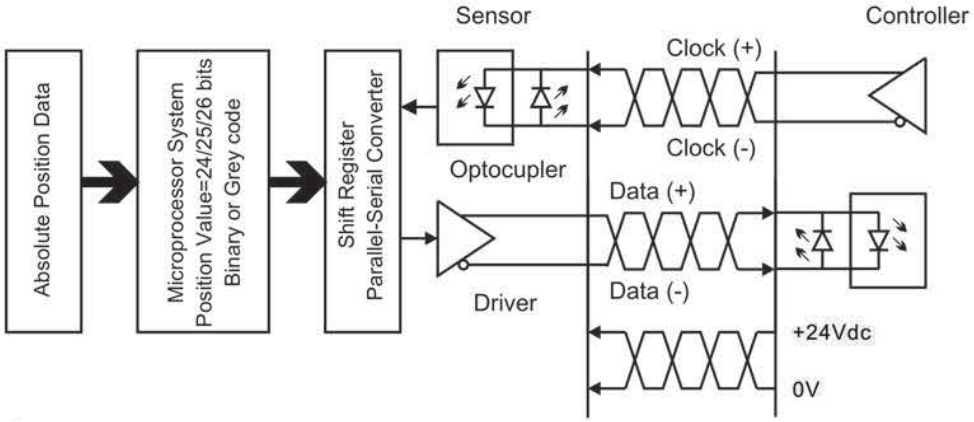
Timing Diagram



Sensor Input



Logic Diagram



Order Code (Output Code)

1	9	2	X	X	X	X	X	X

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

Resolution

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.

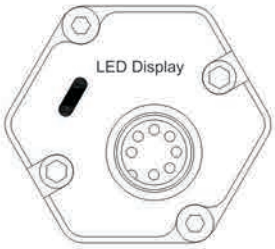
Pin Assignments

1	Data (-)
2	Data (+)
3	Clock (+)
4	Clock (-)
5	+24Vdc
6	0Vdc
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.

high precision & reliability...

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, Humility 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	4	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 = 2x6 pin male receptacle M16

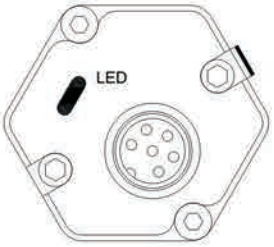
Magnet Number

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

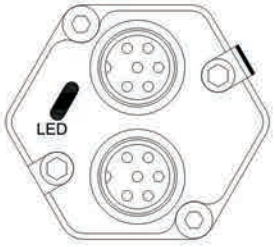
Baud Rate	Cable Length
1000 Kbd	25M
500 Kbd	100M
250 Kbd	250M
125 Kbd	500M

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

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.

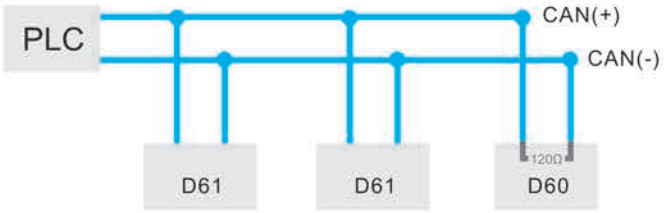
Pin Assignments

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

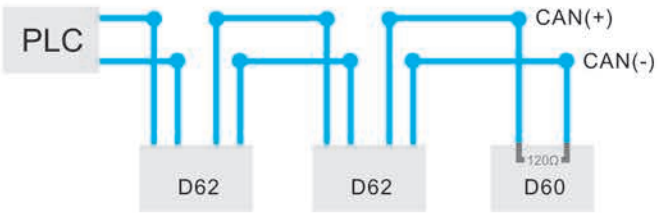
(View toward sensor pins)

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

Network Topology



Star Network Topology



Bus Network Topology

advance fieldbus technology ...

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	D60 Male
Operation Temp.	-40 to 75°C, Humility 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

Connection Type

D60 = 6 pin male receptacle M16 with Profibus termination

D61 = 6 pin male receptacle M16

D62 = 2x6 pin male receptable M16

Input Voltage

1 = +24Vdc

Output

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

P101 = Profibus-DP with Multi-Magnet Measurement

Magnet Number

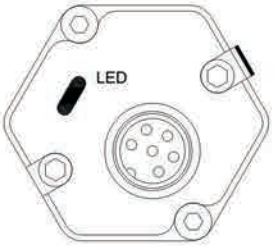
Z__ = 02 - 03 pcs of Magnet (If output P101 is selected)

Profibus Interface

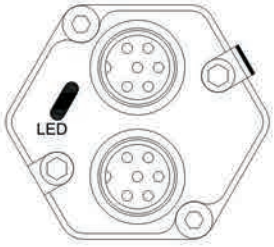
The 19 series Profibus-DP interface fulfill the requirement of EN50170. The position transducer adopts the non-contact magnetostrictive measuring technology with direct transmission of RS-485 standard in a baud rate of 12 Mbits/s. Profibus wiring uses shielded twisted pair cable and can be used to connect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

D62 multi-drop connector outlet and D60 connector outlet with bus termination are 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.

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.

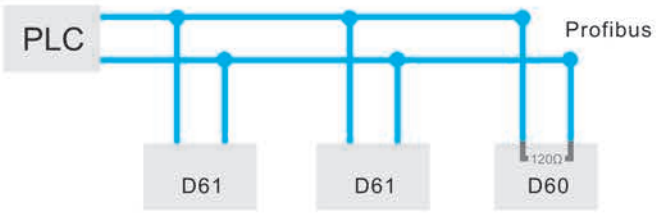
Pin Assignments

1	RxD/TxD-N(Bus)
2	RxD/TxD-P(Bus)
3	No connection
4	No connection
5	+24Vdc
6	0Vdc

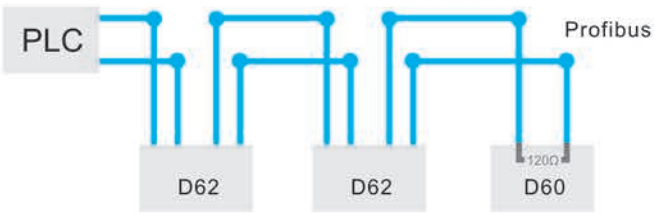
(View toward sensor pins)

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

Network Topology



Star Network Topology



Bus Network Topology

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.

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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, Humility 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

Hardware
2 = Standard

Output Protocol
02 = DeviceNet

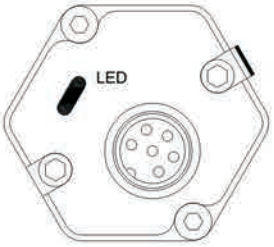
Baud Rate
2 = 500 kBit/s
3 = 250 kBit/s
4 = 125 kBit/s

Resolution
1 = 5µm
2 = 2µm

Type
1 = Standard

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

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

(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 maxinium 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 Electronical 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)

Order Code (Installation Code)

H X X X X 2 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)

Mounting thread

2 = M18 x 1.5

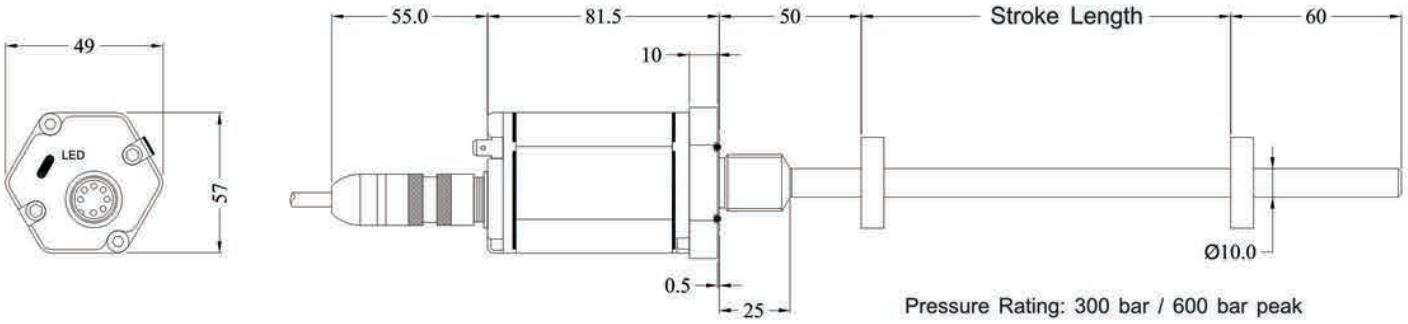
Magnet type

1 = Dia. 33mm ring
2 = Dia. 25mm ring
3 = Floating ball

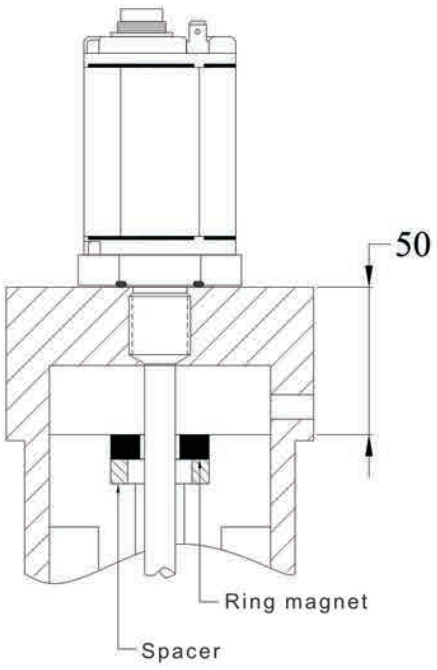
Connector and Cable

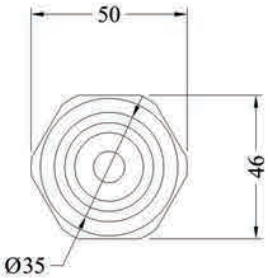
1 = D60/D70 (depend on output format)
2 = Cable outlet (Not apply to D62 connector)
(P.A4 for cable length)

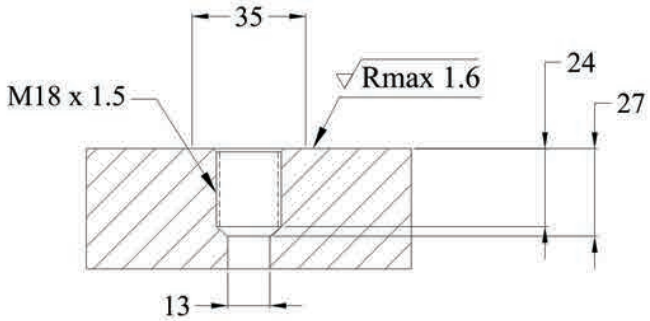
Installation



Pressure Rating: 300 bar / 600 bar peak







Order Code (Installation Code)

P X 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

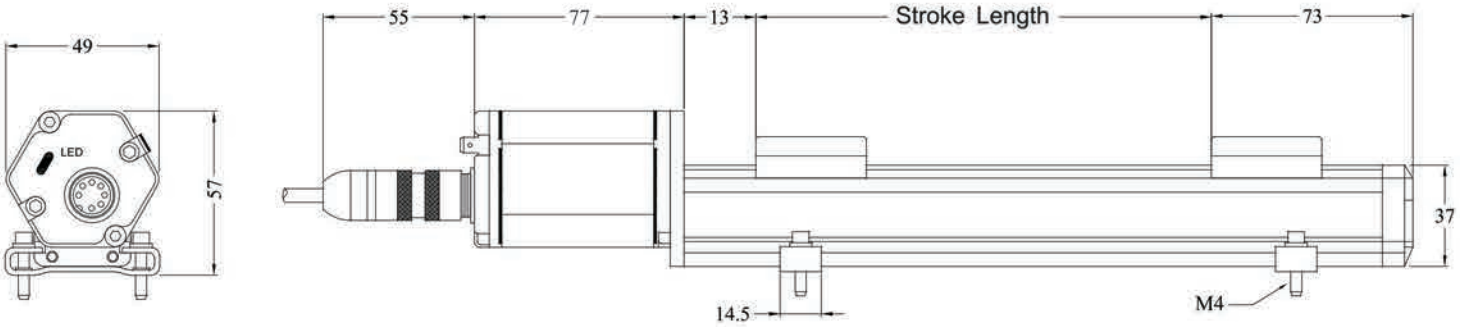
Magnet Type

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

Connector and Cable

1 = D60/D70 (depend on output format)
2 = Cable outlet (Not apply to D62 connector)
(P.A4 for cable length)

Installation



easy of installation ...

Order Code (Installation Code)

D X X X X 1 1 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

Sensor Rod Style

1 = Fitting flange

Magnet type

1 = Dia. 33mm ring
2 = Dia. 25mm ring

Integral Cable of Sensor Rod

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

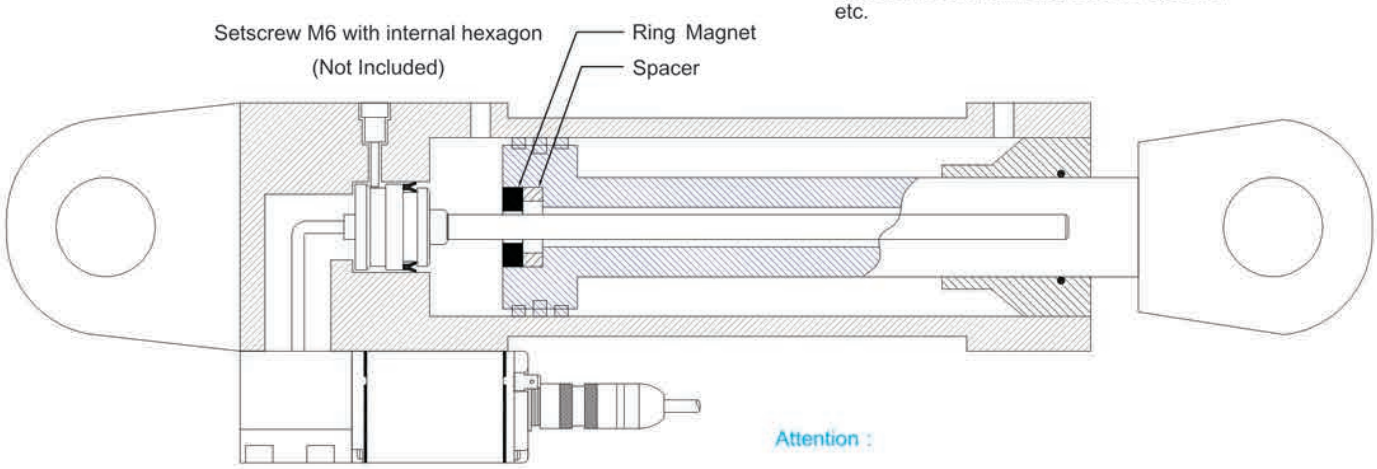
Connector and Cable

1 = D60/D70 (depend on output format)
2 = Cable outlet (Not apply to D62 connector)
(P.A4 for cable length)

Installation Example

Mounting Ring Magnet

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



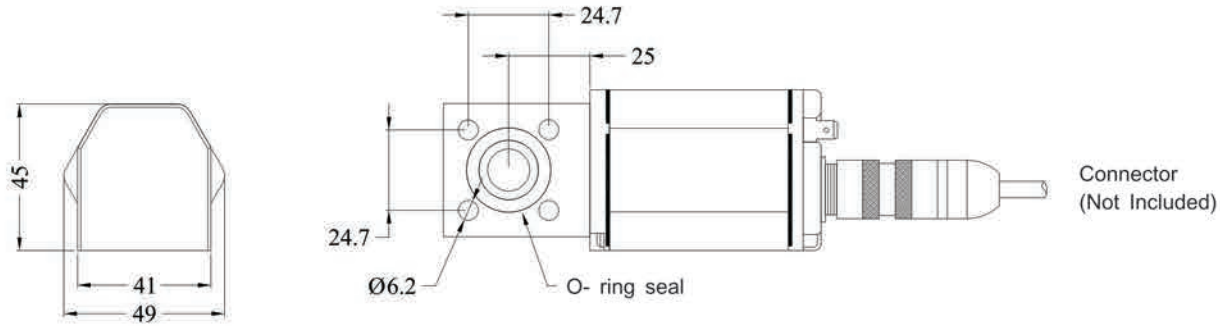
Attention :

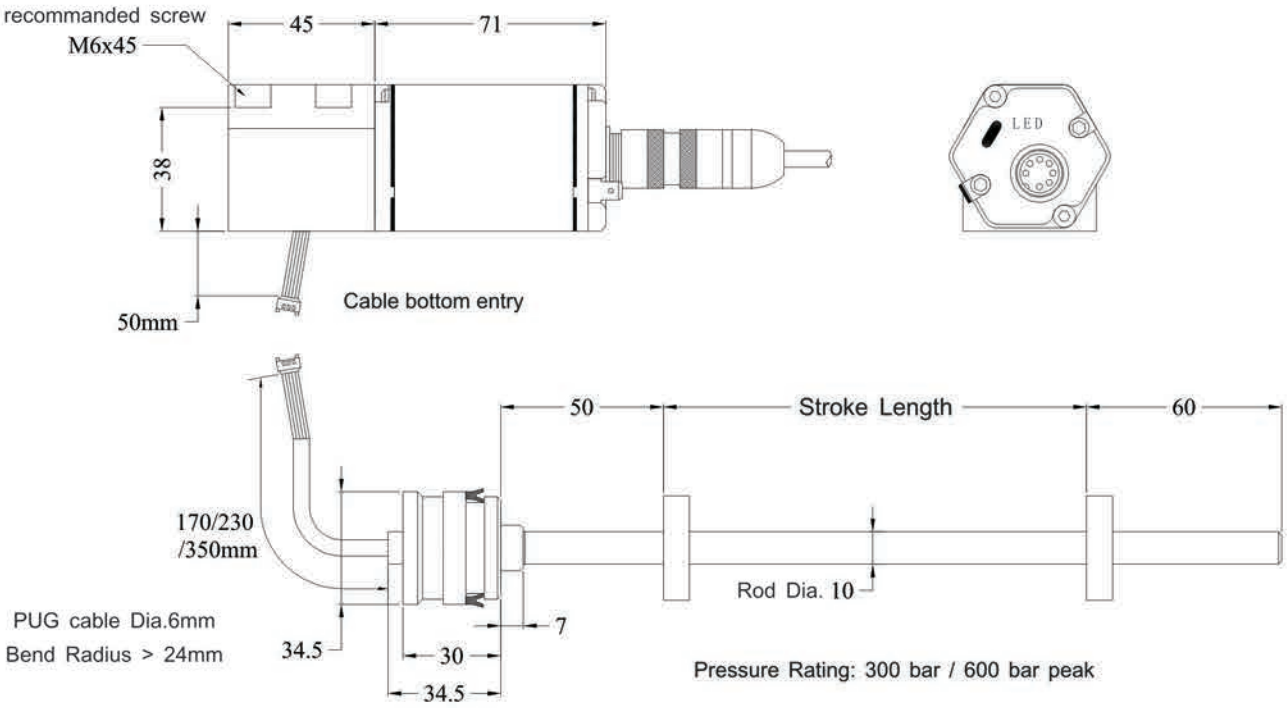
The ring magnet should not intouch with the sensor rod.

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 Instrustion





Mounting Detail