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	1 3 M / L
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℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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 / 530 bar peak
Material	Stainless Steel

Order Code

1	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Model

M = stroke 25 to 2500mm

L = stroke 2500 to 3800mm

Output

011 = 0.25 - 4.75V

012 = 0.5 - 4.5V

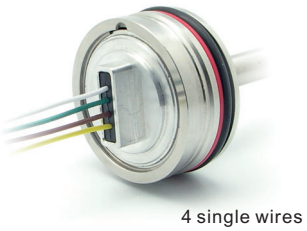
013 = 4.75 - 0.25V

014 = 4.5 - 0.5V

015 = 0.5 - 10V

101 = 4 - 20mA

104 = 20 - 4mA



4 single wires

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

IP69K M12x1

Sensor Styles

1 = 10mm dia. rod, damping zone 60mm

2 = 10mm dia. rod, damping zone 36.5mm

3 = 7mm dia. rod, damping zone 60mm (for stroke <1300mm)

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)

Pin Assignments

4 pin M12 A model
(View toward sensor pins)

	Color	N__E
1	Yellow	N.C.
2	Brown	12/24 Vdc
3	White	0 Vdc
4	Green	Output

	Color	N__G
1	Brown	12/24 Vdc
2	Yellow	N.C.
3	White	0 Vdc
4	Green	Output

	Color	N__H
1	Brown	12/24 Vdc
2	Green	Output
3	White	0 Vdc
4	Yellow	N.C.

Cable Assignments

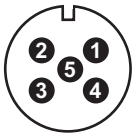
Color	N__A
Brown	12/24 Vdc
Green	Output
Yellow	N.C.
White	0 Vdc

Color	T__A
Red	12/24 Vdc
Green	Output
Yellow	N.C.
Black	0 Vdc

Specifications

Order Code	1 3 M / L
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℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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 / 530 bar peak
Material	Stainless Steel

Pin Assignments



5 pin M12 A model
(View toward sensor pins)

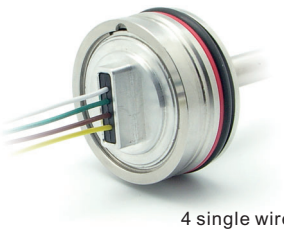
	Color	N__F
1	N.C.	N.C.
2	Brown	12/24 Vdc
3	White	0 Vdc
4	Yellow	CAN High
5	Green	CAN Low

Cable Assignments

Color	N__A
Brown	12/24 Vdc
Green	CAN Low
Yellow	CAN High
White	0 Vdc

Color	T__A
Red	12/24 Vdc
Green	CAN Low
Yellow	CAN High
Black	0 Vdc

IP69K M12x1



4 single wires

mobile hydraulic technology ...

Order Code

1 3 X X X X X X X X X X X X X X X X X X

Model

M = stroke 25 to 2500mm

L = stroke 2500 to 3800mm

Output

C01 = CANopen

J01 = SAE J1939

Baud Rate

0 = 1000 kBit/s	4 = 125 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 = pigtail (stripped conductors) no termination (20AWG)

N__F = 4 single wires , M12x1 IP69K,5pin (pin assignment 2-3-4-5)

Ex. : 06 = 60mm wire length

25 = 250mm wire length

T__A = 4 wires integral PUR shielded cable, pigtailed

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 (for stroke <1300mm)

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)

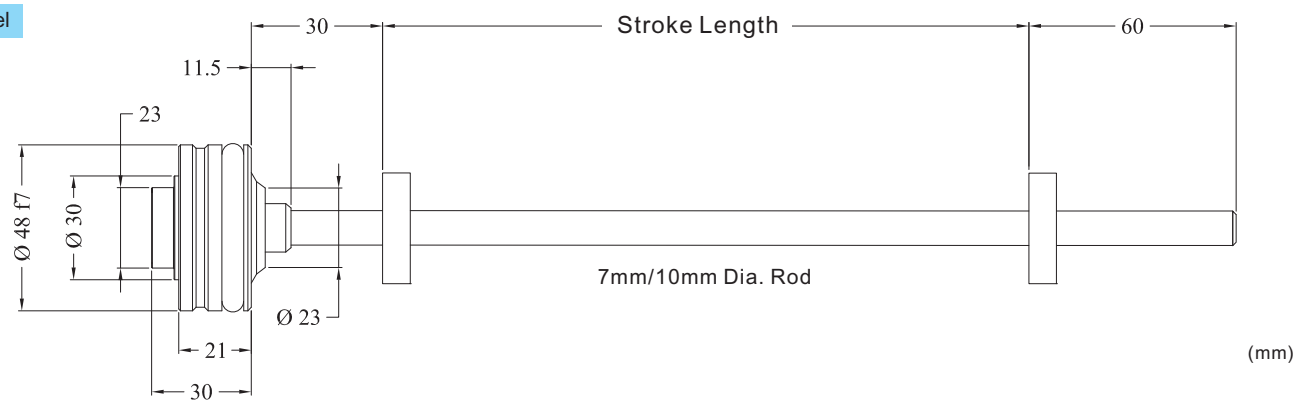
0075, 0100, 0125, 0150, 0175, 0200, 0225

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

0425, 0450 (25mm increment after)

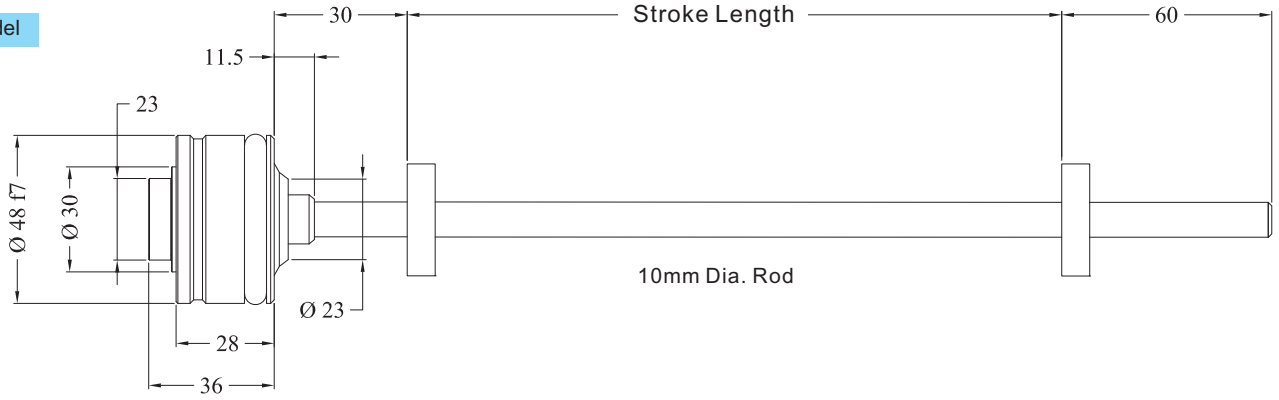
Installation Dimensions

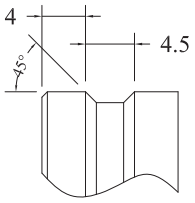
M model

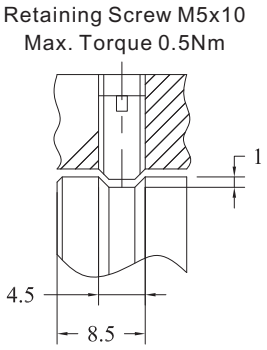


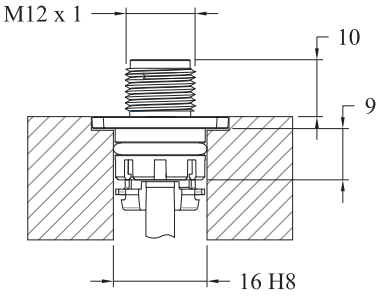
(mm)

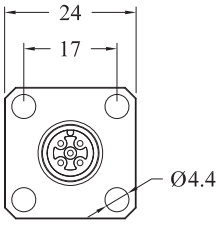
L model



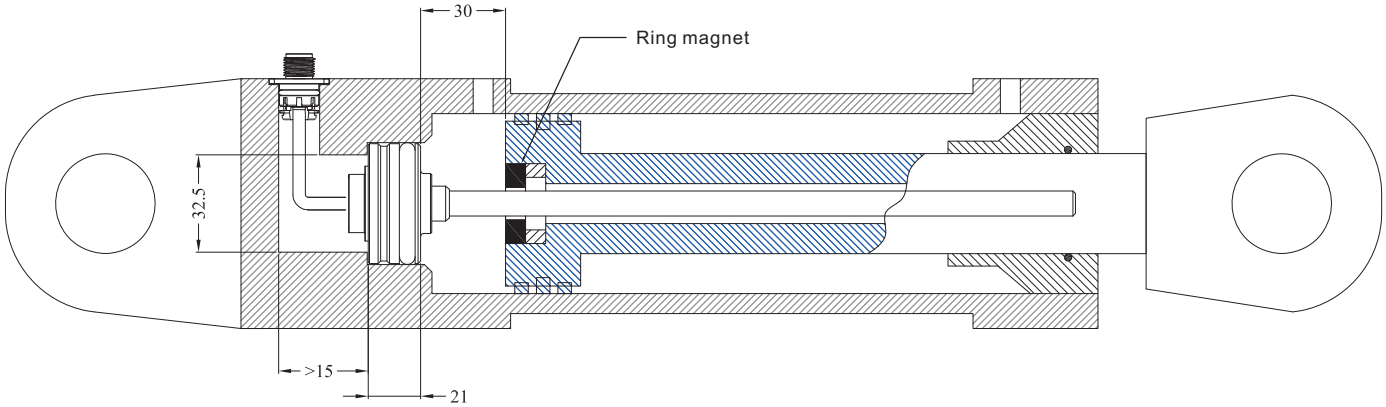


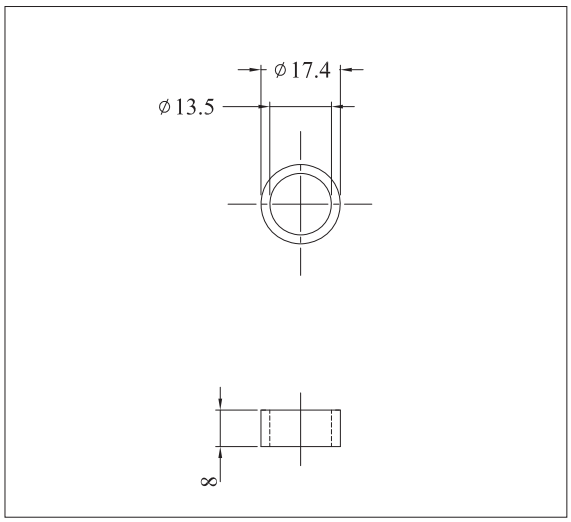
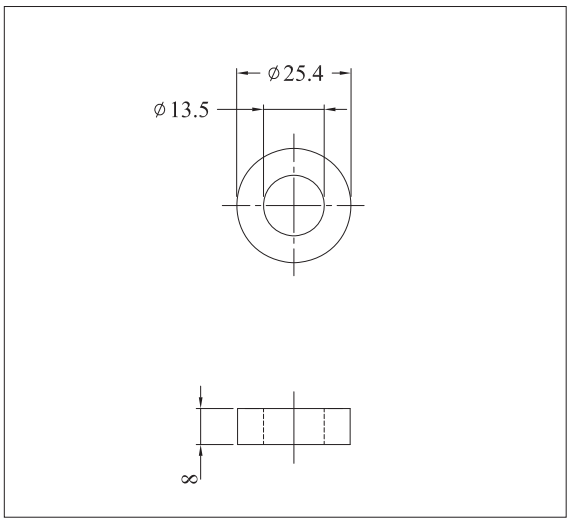


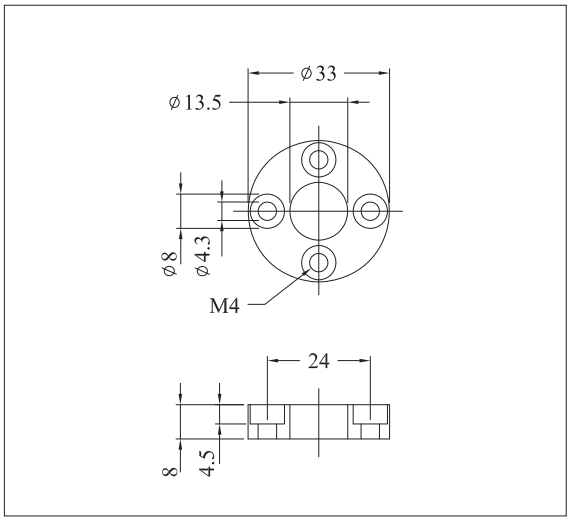




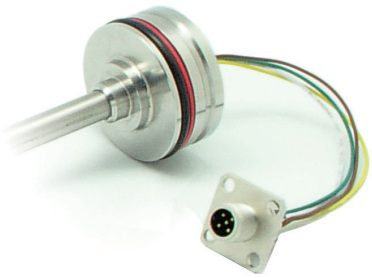
Installation



Discription	Outer Dia. 17.4 mm ring	Outer Dia. 25.4mm ring
Order Code	1700 951 025	1700 951 023
		
Material	Plastic	Plastic
Weight	~4g	~8g

Discription	Outer Dia. 33mm ring
Order Code	1700 951 001
	
Material	Plastic
Weight	~8g

Discription	Dia. 33mm Spacer
Order Code	1700 951 002
Material	Plastic



Remark

1) Use a non-ferrous circlip to fastern 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.

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	1 3 S
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℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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	300 bar / 400 bar peak
Material	Stainless Steel

Order Code

1	3	S	X	X	X	X	X	X	X	X	X	X	X	X	X

Output

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

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

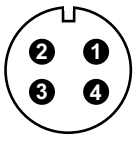
Magnet Type

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)

Pin Assignments



	Color	N__E
1	Yellow	N.C.
2	Brown	12/24 Vdc
3	White	0 Vdc
4	Green	Output

	Color	N__G
1	Brown	12/24 Vdc
2	Yellow	N.C.
3	White	0 Vdc
4	Green	Output

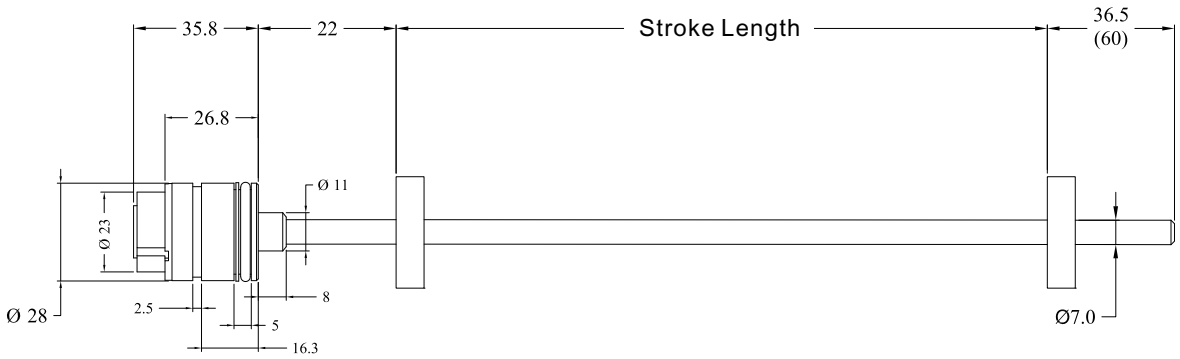
	Color	N__H
1	Brown	12/24 Vdc
2	Green	Output
3	White	0 Vdc
4	Yellow	N.C.

Cable Assignments

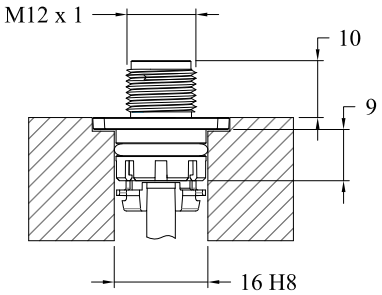
Color	N__A
Brown	12/24 Vdc
Green	Output
Yellow	N.C.
White	0 Vdc

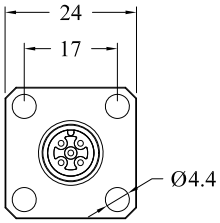
Color	T__A
Red	12/24 Vdc
Green	Output
Yellow	N.C.
Black	0 Vdc

Installation Dimensions



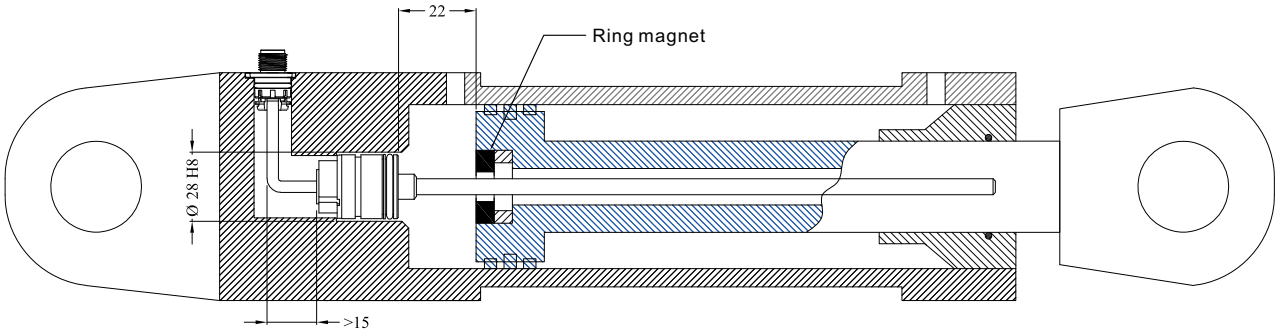
(mm)





IP69K M12x1

Installation

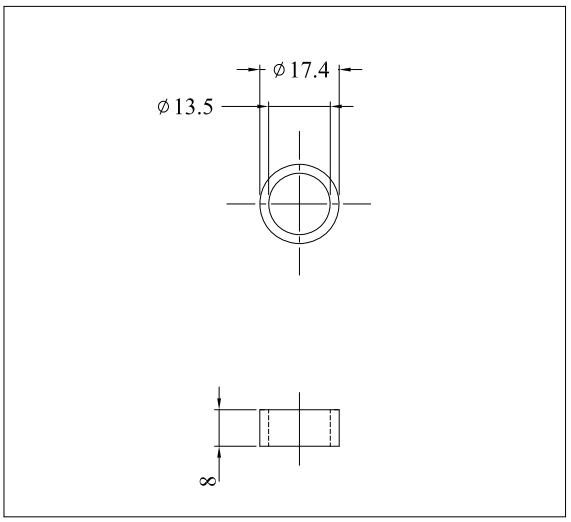
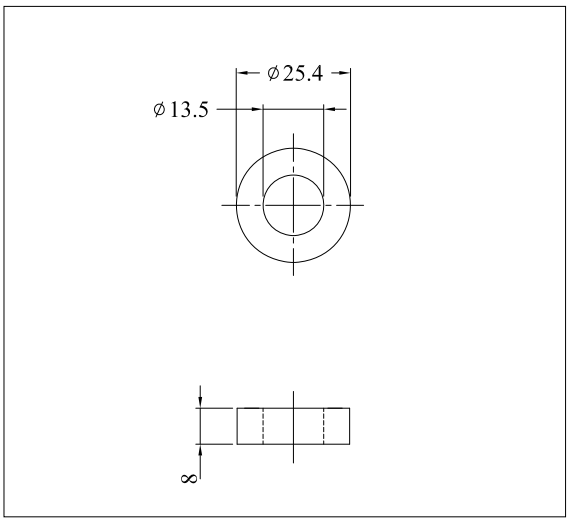


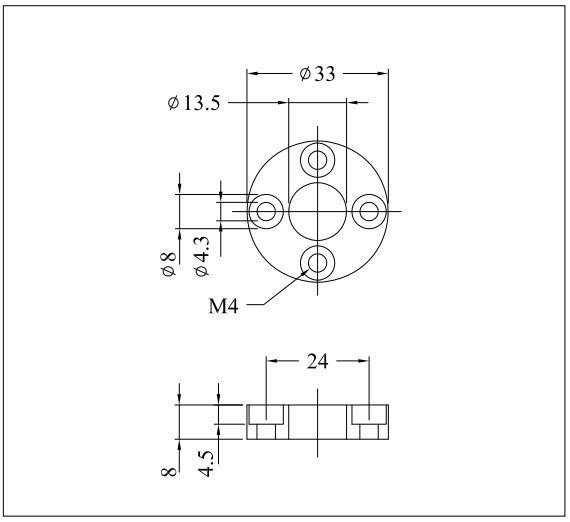
Remark

1) Use a non-ferrous circlip to fastern 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	Outer Dia. 17.4 mm ring	Outer Dia. 25.4mm ring
Order Code	1700 951 025	1700 951 023
		
Material	Plastic	Plastic
Weight	~4g	~8g

Discription	Outer Dia. 33mm ring
Order Code	1700 951 001
	
Material	Plastic
Weight	~8g

Discription	Dia. 33mm Spacer
Order Code	1700 951 002
Material	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	1 3
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℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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	T	X	X	X	X	X	X	X	X	X	X	X	X	X

Output

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

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

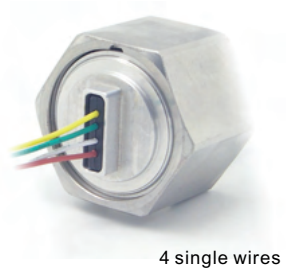
1 = M18x1.5, Rod Ø10mm, dead zone 60mm
2 = M18x1.5, Rod Ø10mm, dead zone 36.5mm

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)

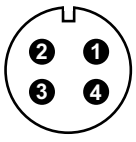


4 single wires

Integral PUR shielded cable

IP69K M12x1

Pin Assignments



4 pin M12 A model
(View toward sensor pins)

	Color	N__E
1	Yellow	N.C.
2	Brown	12/24 Vdc
3	White	0 Vdc
4	Green	Output

	Color	N__G
1	Brown	12/24 Vdc
2	Yellow	N.C.
3	White	0 Vdc
4	Green	Output

	Color	N__H
1	Brown	12/24 Vdc
2	Green	Output
3	White	0 Vdc
4	Yellow	N.C.

Cable Assignments

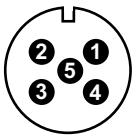
Color	N__A
Brown	12/24 Vdc
Green	Output
Yellow	N.C.
White	0 Vdc

Color	T__A
Red	12/24 Vdc
Green	Output
Yellow	N.C.
Black	0 Vdc

Specifications

Order Code	1 3 T
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℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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 / 530 bar peak
Material	Stainless Steel

Pin Assignments



5 pin M12 A model
(View toward sensor pins)

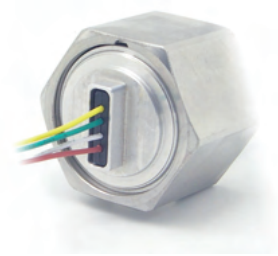
	Color	N__F
1	N.C.	N.C.
2	Brown	12/24 Vdc
3	White	0 Vdc
4	Yellow	CAN High
5	Green	CAN Low

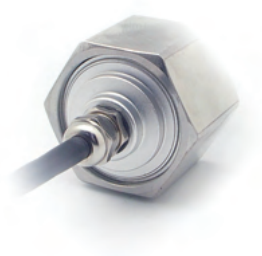
Cable Assignments

Color	N__A
Brown	12/24 Vdc
Green	CAN Low
Yellow	CAN High
White	0 Vdc

Color	T__A
Red	12/24 Vdc
Green	CAN Low
Yellow	CAN High
Black	0 Vdc

IP69K M12x1





mobile hydraulic technology ...

Order Code

1 3 T X X X X X X X X X X X X X X X X X X

Output

C01 = CANopen

J01 = SAE J1939

Baud Rate

0 = 1000 kBit/s	4 = 125 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 = pigtail (stripped conductors) no termination (20AWG)

N__F = 4 single wires , M12x1 IP69K,5pin (pin assignment 2-3-4-5)

Ex. : 06 = 60mm wire length

25 = 250mm wire length

T__A = 4 wires integral PUR shielded cable, pigtailed

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

35 = 3.5 meter cable length

Sensor Styles

1 = M18x1.5, Rod Ø10mm, dead zone 60mm

2 = M18x1.5, Rod Ø10mm, dead zone 36.5mm

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

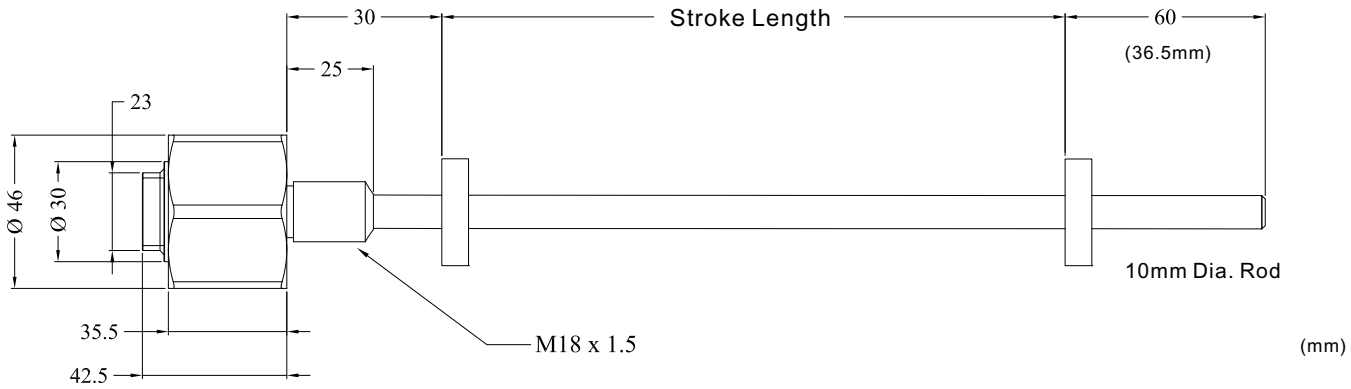
Stroke Length (mm)

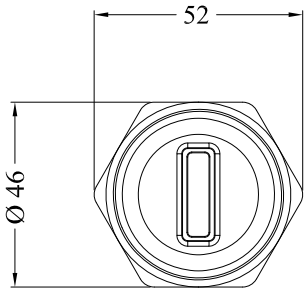
0075, 0100, 0125, 0150, 0175, 0200, 0225

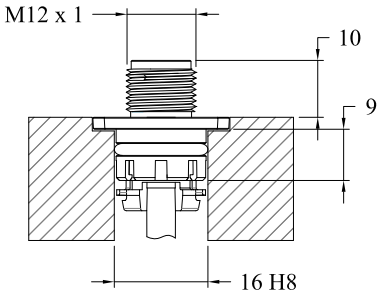
0250, 0275, 0300, 0325, 0350, 0375, 0400

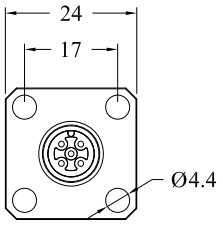
0425, 0450 (25mm increment after)

Installation Dimensions

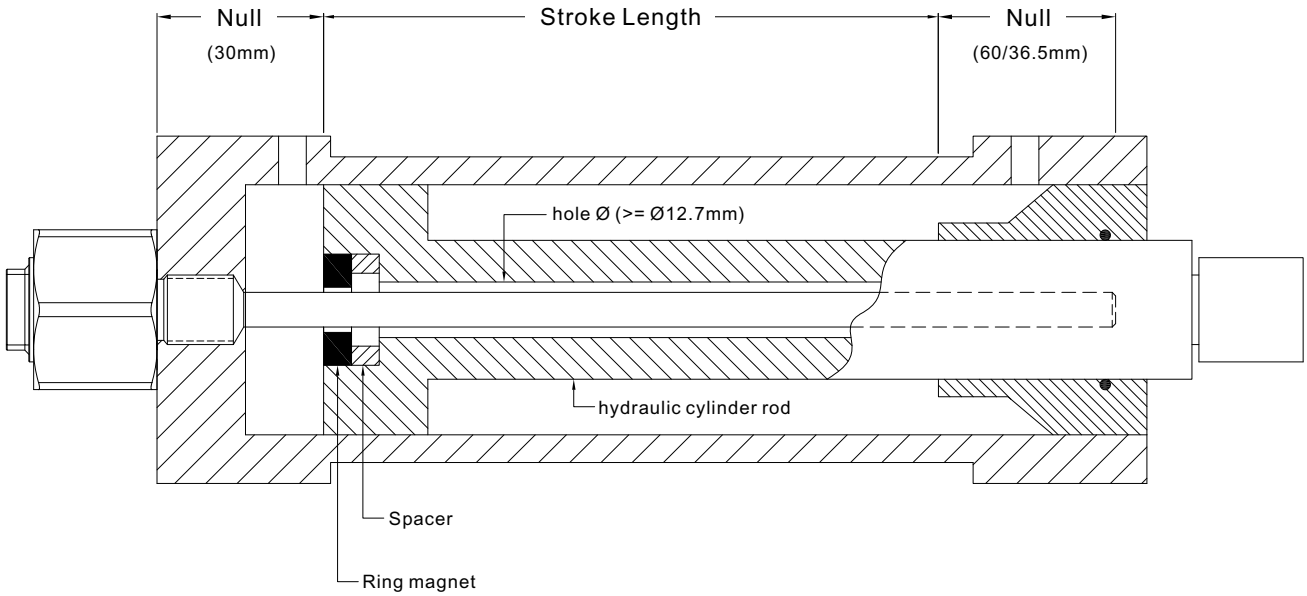








Installation

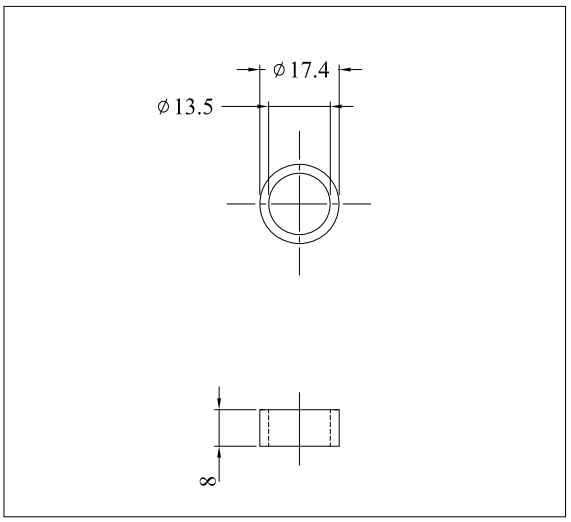
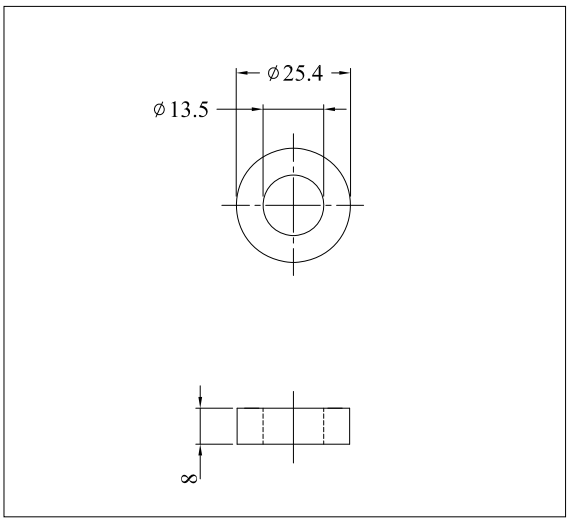


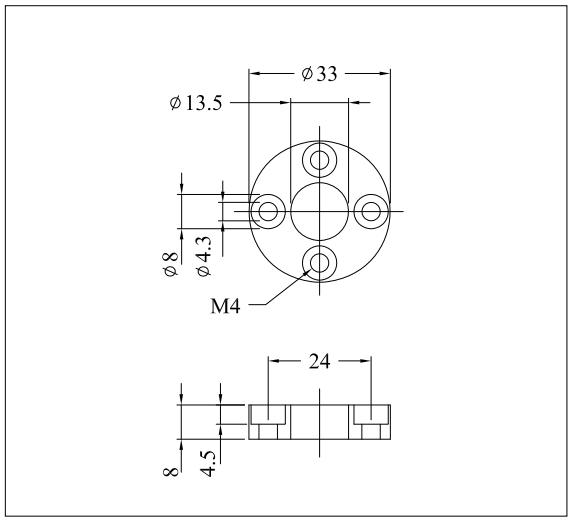
Remark

1) Use a non-ferrous circlip to fastern 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	Outer Dia. 17.4 mm ring	Outer Dia. 25.4mm ring
Order Code	1700 951 025	1700 951 023
		
Material	Plastic	Plastic
Weight	~4g	~8g

Discription	Outer Dia. 33mm ring
Order Code	1700 951 001
	
Material	Plastic
Weight	~8g

Discription	Dia. 33mm Spacer
Order Code	1700 951 002
Material	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	1 3 C
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℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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	300 bar / 400 bar peak
Material	Stainless Steel

Order Code

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

Output

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

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

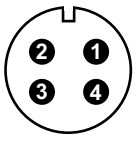
Magnet Type

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)

Pin Assignments



4 pin M12 A model
(View toward sensor pins)

	Color	N__E
1	Yellow	N.C.
2	Brown	12/24 Vdc
3	White	0 Vdc
4	Green	Output

	Color	N__G
1	Brown	12/24 Vdc
2	Yellow	N.C.
3	White	0 Vdc
4	Green	Output

	Color	N__H
1	Brown	12/24 Vdc
2	Green	Output
3	White	0 Vdc
4	Yellow	N.C.

Cable Assignments

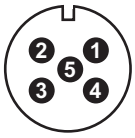
Color	N__A
Brown	12/24 Vdc
Green	Output
Yellow	N.C.
White	0 Vdc

Color	T__A
Red	12/24 Vdc
Green	Output
Yellow	N.C.
Black	0 Vdc

Specifications

Order Code	1 3 C
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℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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 / 530 bar peak
Material	Stainless Steel

Pin Assignments



5 pin M12 A model
(View toward sensor pins)

	Color	N__F
1	N.C.	N.C.
2	Brown	12/24 Vdc
3	White	0 Vdc
4	Yellow	CAN High
5	Green	CAN Low

Cable Assignments

Color	N__A
Brown	12/24 Vdc
Green	CAN Low
Yellow	CAN High
White	0 Vdc

Color	T__A
Red	12/24 Vdc
Green	CAN Low
Yellow	CAN High
Black	0 Vdc

IP69K M12x1

Order Code

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

Output

C01 = CANopen

J01 = SAE J1939

Baud Rate

0 = 1000 kBit/s	4 = 125 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 = pigtail (stripped conductors) no termination (20AWG)

N__F = 4 single wires , M12x1 IP69K,5pin (pin assignment 2-3-4-5)

Ex. : 06 = 60mm wire length

25 = 250mm wire length

T__A = 4 wires integral PUR shielded cable, pigtailed

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

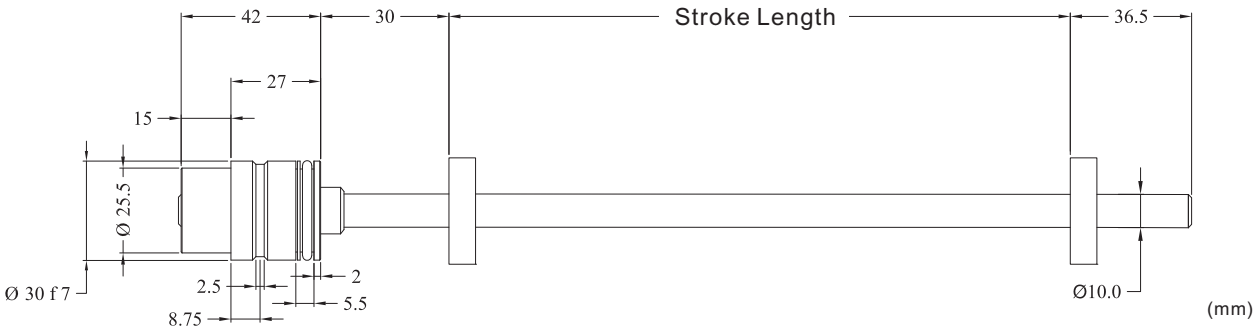
Stroke Length (mm)

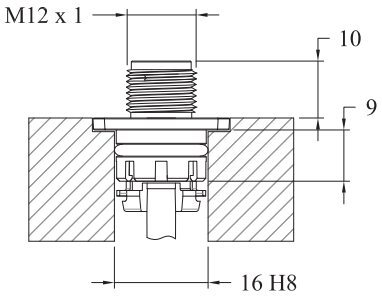
0075, 0100, 0125, 0150, 0175, 0200, 0225

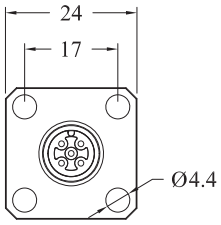
0250, 0275, 0300, 0325, 0350, 0375, 0400

0425, 0450 (25mm increment after)

Installation Dimensions

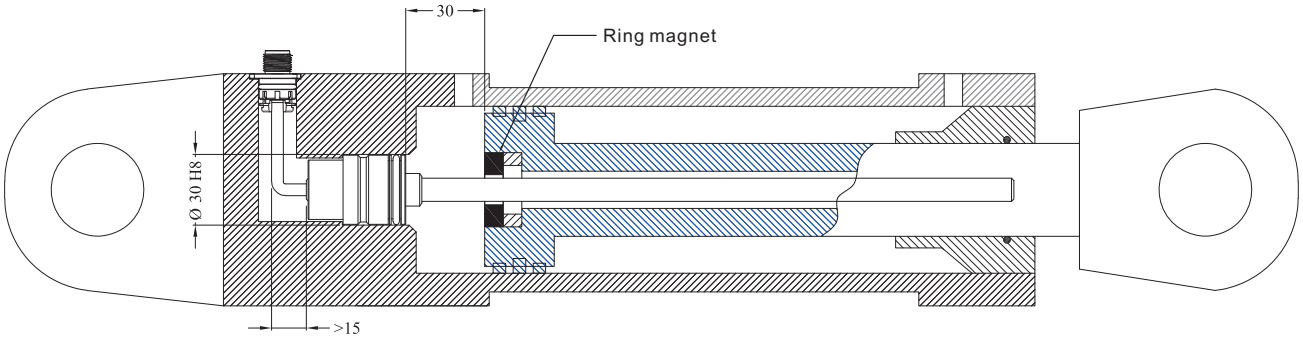






IP69K M12x1

Installation

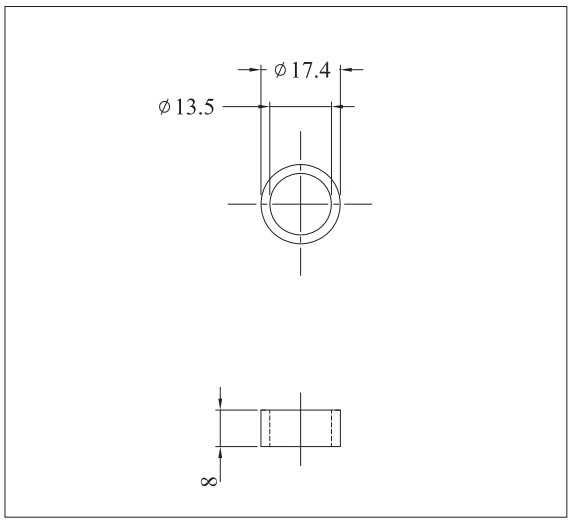
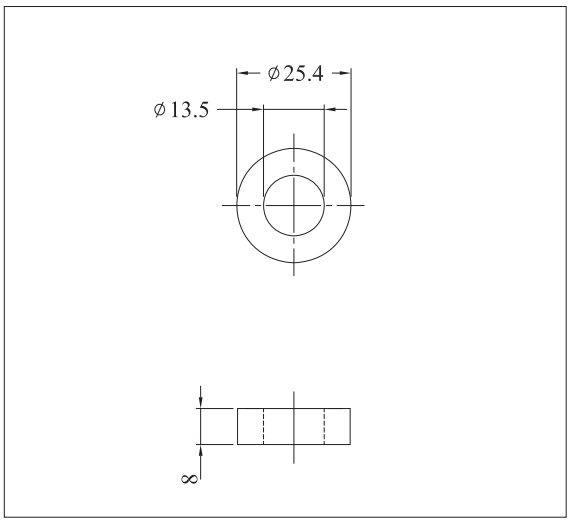


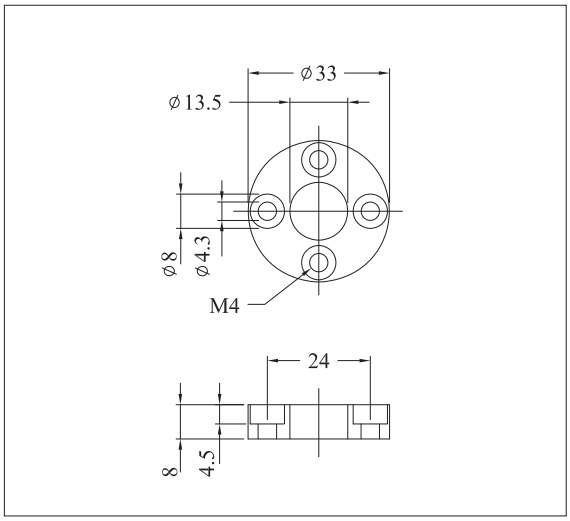
Remark

1) Use a non-ferrous circlip to fastern 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	Outer Dia. 17.4 mm ring	Outer Dia. 25.4mm ring
Order Code	1700 951 025	1700 951 023
		
Material	Plastic	Plastic
Weight	~4g	~8g

Discription	Outer Dia. 33mm ring
Order Code	1700 951 001
	
Material	Plastic
Weight	~8g

Discription	Dia. 33mm Spacer
Order Code	1700 951 002
Material	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.

>> Redundant Output

Specifications

Order Code	1 3 R
Output	Voltage / Current redundant
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)
Input Voltage	+12V / +24Vdc
Input Protection	Polarity protection up to -30Vdc, Over voltage protection up to 36Vdc
Power Consumption	1W per channel
Dielectric Strength	500Vdc (DC ground to machine ground)
Operation Temp.	-40 to 85℃, Humility 90% non-condensing
Sealing	IP 68 (IP 69K when installed inside a cyclinder 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	300 bar / 400 bar peak
Material	Stainless Steel

Order Code

1	3	R	X	X	X	X	X	X	X	X	X	X	X	X	X

Output

	Channel A	Channel B
011 =	0.25 - 4.75V	0.25 - 4.75V
012 =	0.5 - 4.5V	0.5 - 4.5V
013 =	4.75 - 0.25V	4.75 - 0.25V
014 =	4.5 - 0.5V	4.5 - 0.5V
021 =	0.25 - 4.75V	4.75 - 0.25V
022 =	0.5 - 4.5V	4.5 - 0.5V
101 =	4 - 20mA	4 - 20mA
104 =	20 - 4mA	20 - 4mA
121 =	4 - 20mA	20 - 4mA

Connection Type

N__R = Channel A, 4 single wires ,
M12 - IP69K,4pin (pin assignment 1-3-4)
Channel B, 4 single wires ,
M12 - IP69K,5pin (pin assignment 1-2-3)
Ex. : 06 = 60mm wire length
25 = 250mm wire length

Sensor Styles

1 = 10 mm dia. rod
2 = 10 mm dia. rod with M4 end plug

Magnet Type

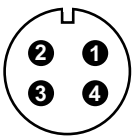
1 = Outer dia. 33mm, inner dia. 13.5 ring magnet
2 = Outer dia. 25.4mm, inner dia. 13.5 ring magnet
3 = Outer dia. 17.4mm, inner dia. 13.5 ring magnet

Stroke Length (mm)

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

Pin Assignments

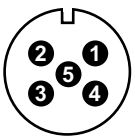
Channel A



4 pin M12 A model

	Color	N__R
1	Brown	12/24 Vdc
2	Yellow	N.C.
3	White	0 Vdc
4	Green	Output

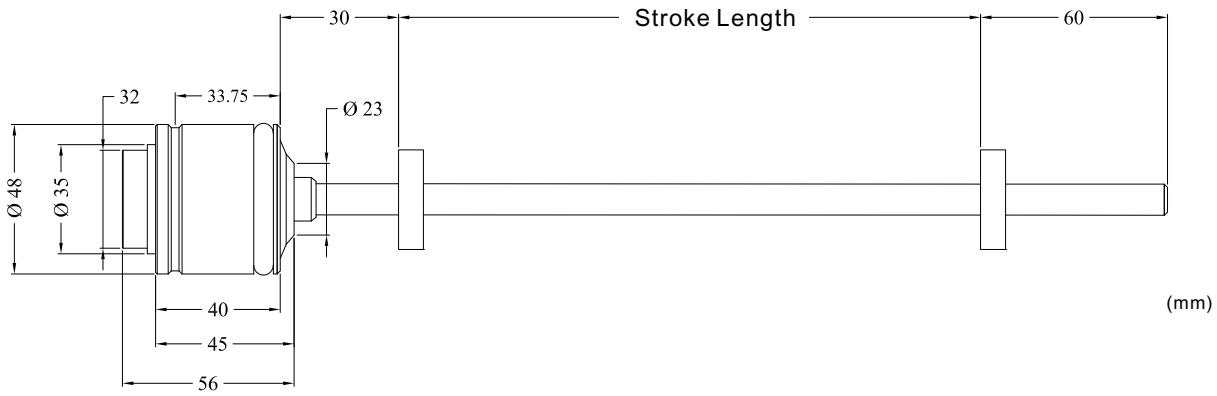
Channel B

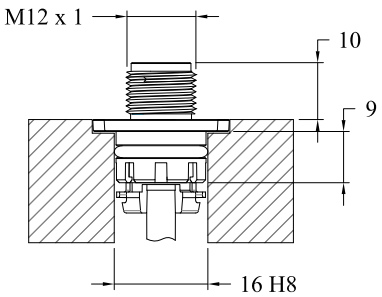


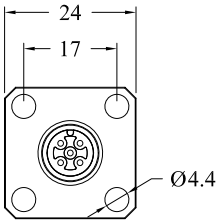
5 pin M12 A model

	Color	N__R
1	Brown	12/24 Vdc
2	Green	Output
3	White	0 Vdc
4	Yellow	N.C.
5	--	N.C.

Installation Dimensions

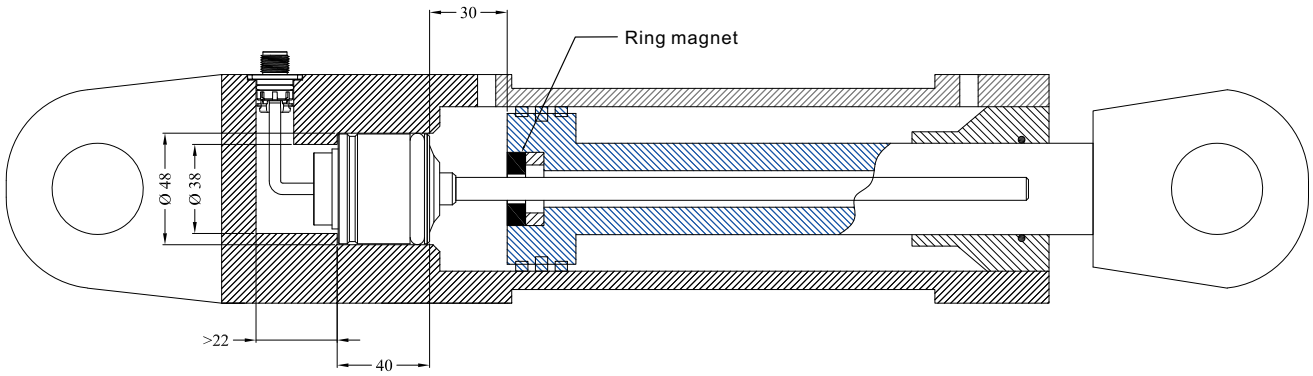






IP69K M12x1

Installation

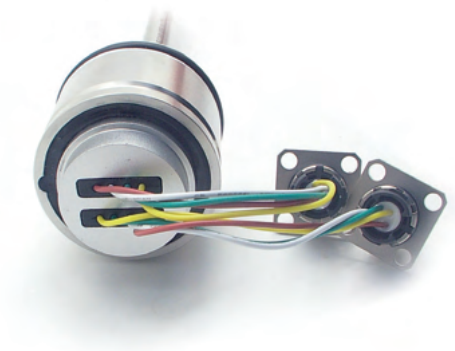


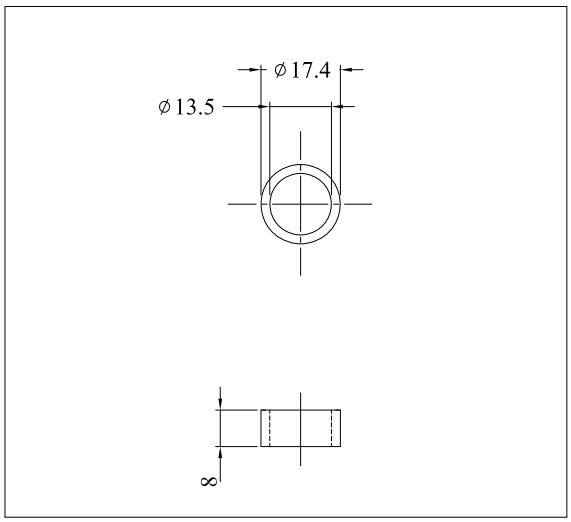
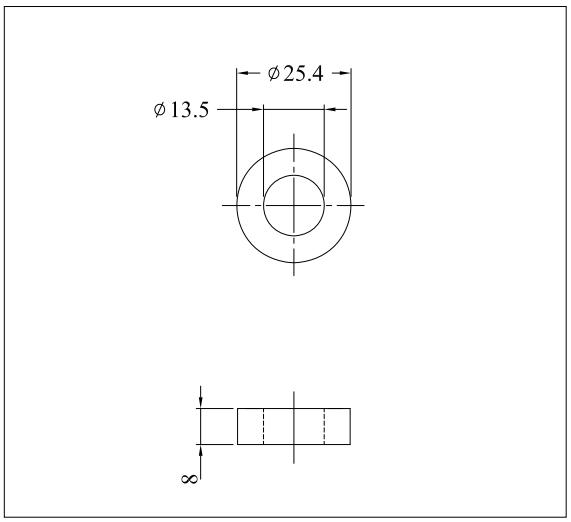
Remark

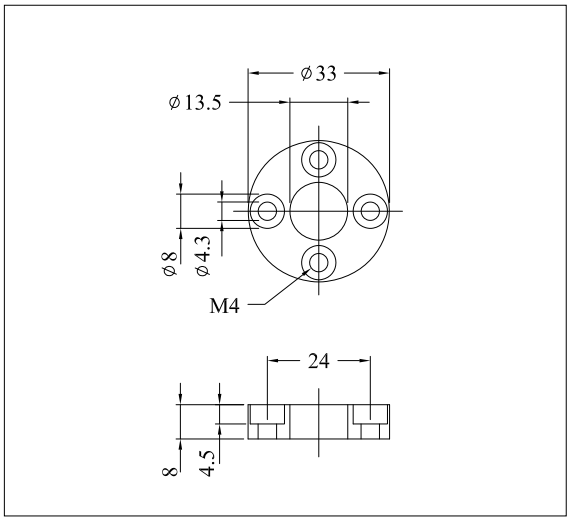
1) Use a non-ferrous circlip to fastern the magnet.

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	Outer Dia. 17.4 mm ring	Outer Dia. 25.4mm ring
Order Code	1700 951 025	1700 951 023
		
Material	Plastic	Plastic
Weight	~4g	~8g

Discription	Outer Dia. 33mm ring
Order Code	1700 951 001
	
Material	Plastic
Weight	~8g

Discription	Dia. 33mm Spacer
Order Code	1700 951 002
Material	Plastic