POSITION SENSOR: INTRODUCTION

Magnetic position sensors are used for measuring the linear stroke of actuators. The position of the piston is measured without contact and given via a configurable analogue output signal, as voltage (0-10 V) or current (4-20 mA).
Our position sensors are divided into three types: LTS, LTL and LTE.
The LTS position sensors can be used for various product families with strokes up to 256 mm. It is used for ISO 15552 type A and series 3 cylinders, CMPC and ISO 21287 LINER compact cylinders, ELEKTRO ISO 15552 electric cylinders and R3 rotary actuators.
With ISO 15552 type A and ELEKTRO ISO 15552 cylinders, the other two types of position sensors, LTL and LTE, can be used when the stroke exceeds 256 mm (see table).

LTS

LTL

LTE

RANGE OF APPLICATION OF LTS, LTL AND LTE SENSORS ON ISO 15552 TYPE A CYLINDERS

Bore	LTS	LTL	LTE
mm	Strokes from 0 to 256 mm	Strokes from 257 to 503 mm	Strokes from 150 to 500 mm
32	YES	NO	YES
40	YES	NO	YES
50	YES	YES	YES
63	YES	YES	NO
80	YES	YES	NO
100	YES	YES	NO
125	YES	YES	NO

NOTES

LTS POSITION SENSOR

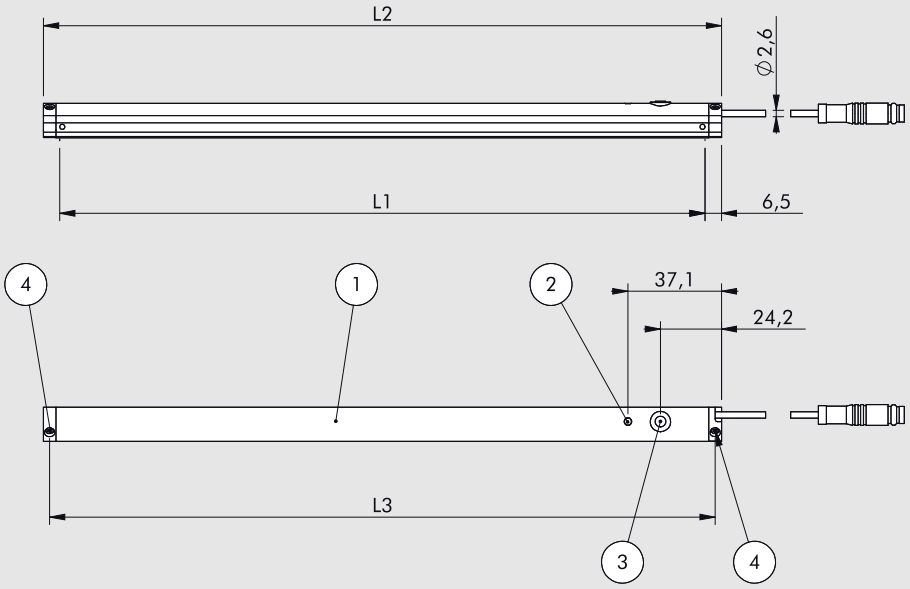
The LTS is a magnetic position sensor for measuring linear strokes of actuators. The position of the piston is measured without contact and given via a configurable analogue output signal, as voltage or current. The body of the LTS is very compact, so it can be used in applications where limited space is available.
This position sensor can measure the strokes of various families of actuators up to 256 mm.
Correct operation requires a magnetic field strength of between 4 and 30 mT.
The measurement range can be regulated accurately using the Teach-in button (zero point and end point). Teach-in can be performed regardless of the polarity of the magnetic field and the position of the sensor. The yellow ON light comes on when the piston is in measuring range.
The position sensor is out of the measuring range when:

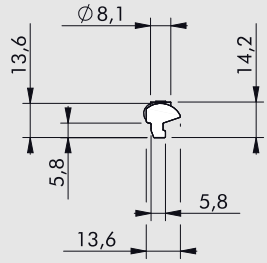
- the yellow light is off; and
- the voltage signal is 11V (range 0-10V) or the current 3 mA (range 4-20 mA).

TECHNICAL DATA		
Measuring length (± 1 mm)	mm	from 0 to 256
Electrical connection		M8x1 – 4 pin
Electromagnetic compatibility in accordance with standard		EN 60947-5-7
Sample time	ms	1
IEC 60068-2-6 shock test		30 g, 11 ms
IEC 60068-2-6 vibration test		10 Hz ... 55 Hz, 1 mm
Maximum displacement speed	m/s	< 3
Linearity*	mm	0.3
Resolution	mm	0.03 % FSR (≥ 0.05 mm)
Repeatability	mm	0.06 % FSR (≥ 0.1 mm)
Operating temperature	°C	–20 to +70
Index of protection		IP 67
Protection class		III
Voltage	V	15 - 30
Black current (without load)	mA	< 25
Analogue output (voltage)	V	0 to 10
Out-of-range analogue output	V	11
Analogue output (current)	mA	4 to 20
Out-of-range analogue output	mA	3
Max. load resistance (current output)	Ω	500
Min. load resistance (voltage output)	Ω	2000
Polarity inversion protection		YES
Short-circuit protection		YES
Overload protection		YES

* In some applications, linearity may be higher than the value indicated.

DIMENSIONS AND ELECTRICAL CONNECTION

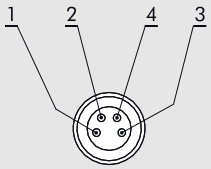




① LTS
② LED (yellow)
③ TEACH-IN button
④ Fixing screw

L1 = Measuring range
L2 = Total length
L3 = Fixing screws centre

Type	L1 [mm]	L2 [mm]	L3 [mm]
LTS-032	32	45	40
LTS-064	64	77	72
LTS-096	96	109	104
LTS-128	128	141	136
LTS-160	160	173	168
LTS-192	192	205	200
LTS-224	224	237	232
LTS-256	256	269	264



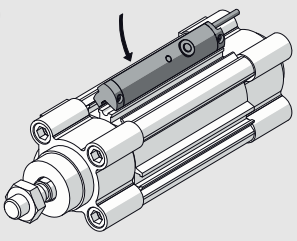
PIN	Colour	Function
1	Brown	Positive
2	White	Current output
3	Blue	Negative
4	Black	Voltage output

FIXING ON THE ACTUATOR AND START-UP

1. Connect the position sensor to the power supply using the M8x1 4-pin connector, wiring the voltage or the current output;
2. Insert the position sensor in one of the T-slots in the actuator (fig. A) and tighten the two screws using the key provided (fig. B);
3. If you wish to determine a specific measuring range, perform the procedure with the Teach-In button ③ (see instruction manual).

N.B. If a measuring range is not set, the maximum range is used automatically.

Ⓐ



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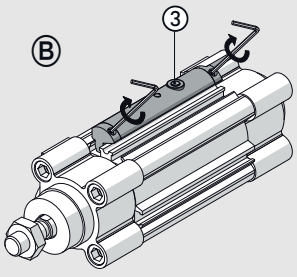
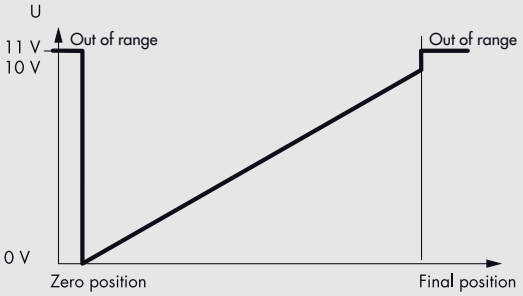
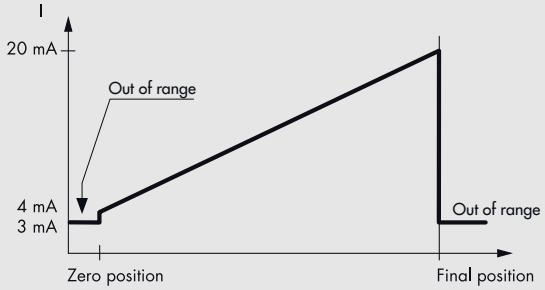


GRAPH OF THE VOLTAGE OR CURRENT ANALOGUE OUTPUT SIGNAL VALUE AND THE OUT-OF-RANGE VALUE

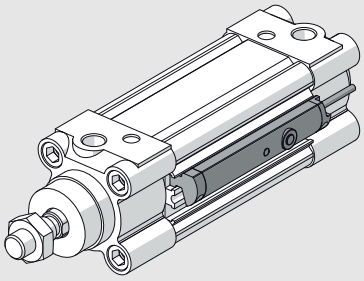




CHOICE OF POSITION SENSOR BASED ON THE MEASURING STROKE

The tables below show the recommended position sensors model for some families of actuators. For other products it is necessary to determine whether the LTS operates correctly.

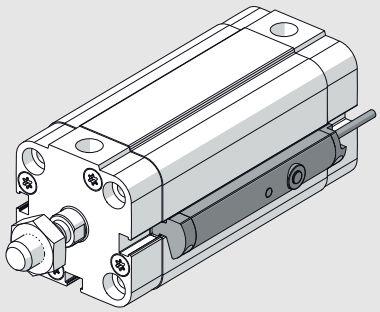
ISO 15552 TYPE A CYLINDERS – SERIES 3



Ø 32* - Ø 40 - Ø 50 - Ø 63 - Ø 80 - Ø 100 - Ø 125	
Stroke [mm]	**Position sensors model**
up to 32	LTS-032
from 33 to 64	LTS-064
from 65 to 96	LTS-096
from 97 to 128	LTS-128
from 129 to 160	LTS-160
from 161 to 192	LTS-192
from 193 to 224	LTS-224
from 225 to 256	LTS-256

* ISO 15552 series 3 cylinders cannot be used for strokes up to 3 mm.

COMPACT CYLINDERS - SERIES CMPC



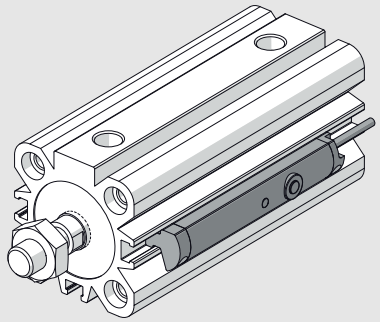
Ø 12- Ø 16 - Ø 20		
Stroke [mm]	**Position sensors model**	**Strokes for which the LTS projects beyond the cylinder heads, despite being fixed correctly.**
up to 32	LTS-032	-
from 34 to 64	LTS-064	from 34 to 38
from 66 to 96	LTS-096	from 66 to 70
from 98 to 128	LTS-128	from 98 to 102
from 130 to 160	LTS-160	from 130 to 134
from 162 to 192	LTS-192	from 162 to 166
from 194 to 224	LTS-224	from 194 to 198
from 226 to 256	LTS-256	from 226 to 230

The LTS cannot be used with some strokes (e.g. 33 mm).

Ø 25		
Stroke [mm]	**Position sensors model**	**Strokes for which the LTS projects beyond the cylinder heads, despite being fixed correctly.**
up to 32	LTS-032	-
from 33 to 64	LTS-064	from 33 to 37
from 65 to 96	LTS-096	from 65 to 69
from 97 to 128	LTS-128	from 97 to 101
from 129 to 160	LTS-160	from 129 to 133
from 161 to 192	LTS-192	from 161 to 165
from 193 to 224	LTS-224	from 193 to 197
from 225 to 256	LTS-256	from 225 to 229

Ø 32 - Ø 40 - Ø 50 - Ø 63 - Ø 80 - Ø 100	
Stroke [mm]	**Position sensors model**
up to 32	LTS-032
from 33 to 64	LTS-064
from 65 to 96	LTS-096
from 97 to 128	LTS-128
from 129 to 160	LTS-160
from 161 to 192	LTS-192
from 193 to 224	LTS-224
from 225 to 256	LTS-256

ISO 21287 COMPACT CYLINDERS – LINER SERIES



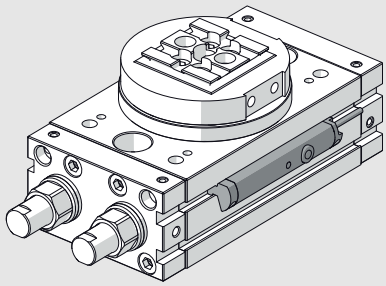
Ø 20		
Stroke [mm]	Position sensor model	Strokes for which the LTS projects beyond the cylinder heads, despite being fixed correctly.
up to 32	LTS-032	-
from 35 to 64	LTS-064	from 39 to 64
from 67 to 96	LTS-096	from 71 to 96
from 99 to 128	LTS-128	from 103 to 128
from 131 to 160	LTS-160	from 135 to 160
from 163 to 192	LTS-192	from 167 to 192
from 195 to 224	LTS-224	from 199 to 224
from 227 to 256	LTS-256	from 231 to 256

The LTS cannot be used with some strokes (e.g. 33 mm).

Ø 25		
Stroke [mm]	Position sensor model	Strokes for which the LTS projects beyond the cylinder heads, despite being fixed correctly.
up to 32	LTS-032	-
from 33 to 64	LTS-064	from 37 to 64
from 65 to 96	LTS-096	from 69 to 96
from 97 to 128	LTS-128	from 101 to 128
from 129 to 160	LTS-160	from 133 to 160
from 161 to 192	LTS-192	from 165 to 192
from 193 to 224	LTS-224	from 197 to 224
from 225 to 256	LTS-256	from 229 to 256

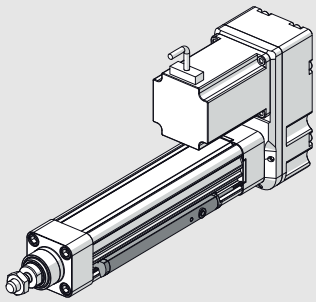
Ø 32 - Ø 40 - Ø 50 - Ø 63 - Ø 80 - Ø 100	
Stroke [mm]	Position sensor model
up to 32	LTS-032
from 33 to 64	LTS-064
from 65 to 96	LTS-096
from 97 to 128	LTS-128
from 129 to 160	LTS-160
from 161 to 192	LTS-192
from 193 to 224	LTS-224
from 225 to 256	LTS-256

ROTARY ACTUATORS - SERIES R3



Bore [mm]	Position sensor model
16	LTS-64
20	LTS-64
22	LTS-64
25	LTS-64
30	LTS-64
40	LTS-64

ELECTRIC CYLINDER SERIES ELEKTRO ISO 15552



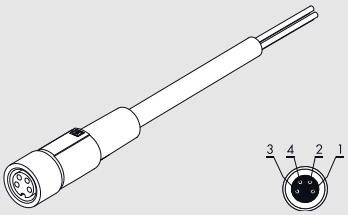
Ø 32 - Ø 50 - Ø 63	
Bore [mm]	Position sensor model
up to 32	LTS-032
from 33 to 64	LTS-064
from 65 to 96	LTS-096
from 97 to 128	LTS-128
from 129 to 160	LTS-160
from 161 to 192	LTS-192
from 193 to 224	LTS-224
from 225 to 256	LTS-256

ORDERING CODES

Code	Description
W0950000470	LTS-032 position sensor with M8 4-PIN 0.3 m connector
W0950000471	LTS-064 position sensor with M8 4-PIN 0.3 m connector
W0950000472	LTS-096 position sensor with M8 4-PIN 0.3 m connector
W0950000473	LTS-128 position sensor with M8 4-PIN 0.3 m connector
W0950000474	LTS-160 position sensor with M8 4-PIN 0.3 m connector
W0950000475	LTS-192 position sensor with M8 4-PIN 0.3 m connector
W0950000476	LTS-224 position sensor with M8 4-PIN 0.3 m connector
W0950000477	LTS-256 position sensor with M8 4-PIN 0.3 m connector

ACCESSORIES

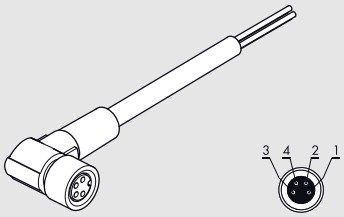
STRAIGHT M8 CONNECTORS



Pin	Cable colour
1	Brown
2	White
3	Blue
4	Black

Code	Description
0240009100	M8 4-pin connector – female, straight L = 2 m
0240009101	M8 4-pin connector – female, straight L = 5 m

90° M8 CONNECTORS



Pin	Cable colour
1	Brown
2	White
3	Blue
4	Black

Code	Description
0240009102	M8 4-pin connector – female, 90° angle L = 2 m
0240009103	M8 4-pin connector – female, 90° angle L = 5 m

NOTES

LTL POSITION SENSOR

The LTL position sensor uses an array of Hall sensors to measure positions without contact, thanks to the presence of a magnet inside the cylinder.
It uses a smart algorithm to adapt dynamically to the magnets during operation, so that the output signal is always linear and reproducible.
This technology allows the position sensor to adapt dynamically to changes in the intensity of the magnetic field connected with ageing of the magnet and the different operating temperatures.
A magnetic field intensity of between 2 and 15 mT is required for correct operation.
The LTL can be set by means of a TEACH-PAD capacitive button that allows rapid actuation of the position sensor and adaptation to the user's requirements. Just press slightly with the fingers to:

- select an output current (4-20 mA) or output voltage (0-10 V);
- establish the desired measuring range;
- reset the position sensor to the factory setting.

The button is designed to prevent unintentional changes to the parameters.
The position sensor is out of the measuring range when:

- the yellow light is off; and
- the voltage signal is 11V (range 0-10V) or the current 3 mA (range 4-20 mA).

LED1 (operating light) comes on when the piston is in the measuring range:

- yellow on - optimal signal power;
- yellow on and red flashing - signal power not optimal.

LED2 tells you which analogue output is active:

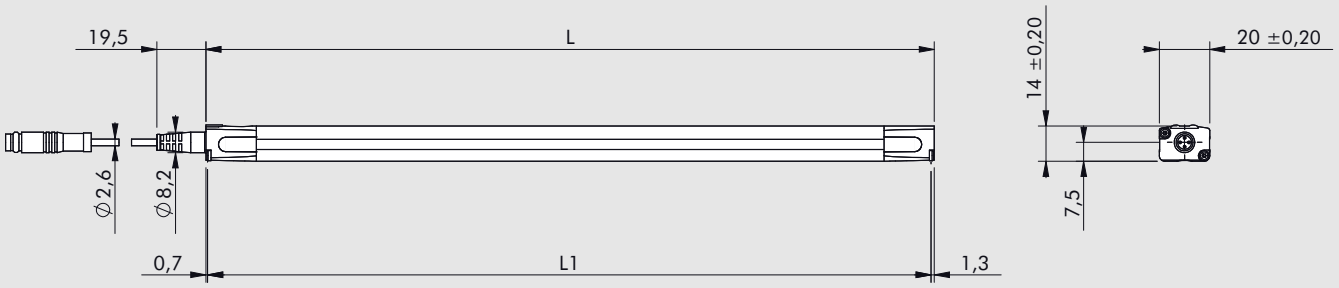
- green – voltage analogue output;
- blue – current analogue output.

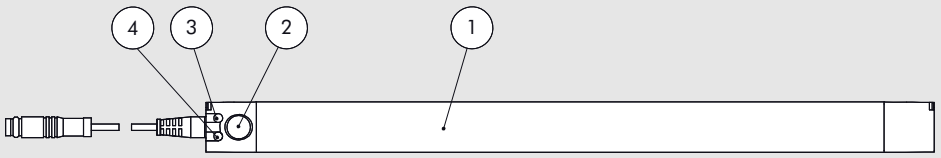
The position sensor is secured by means of brackets near one of the actuator T-slots.
The LTL position sensor is applied to ISO 15552 type A cylinders, and electric cylinders serie ELEKTRO ISO 15552.
For longer strokes please contact our sales department.

TECHNICAL DATA		
Measuring length (± 1 mm)	mm	from 257 to 503
Electrical connection		M8x1 – 4 pin
Electromagnetic compatibility in accordance with standard		EN 60947-5-7
Sample time	ms	1.15
IEC 60068-2-6 shock test		30 g, 11 ms
IEC 60068-2-6 vibration test		10 Hz ... 55 Hz, 1 mm
Maximum displacement speed	m/s	< 3
Linearity	mm	0.5
Resolution	mm	0.03 % FSR (≥ 0.06 mm)
Repeatability	mm	0.06 % FSR (≥ 0.1 mm)
Operating temperature	°C	–20 to +70
Index of protection		IP 65, IP 67
Protection class		III
Voltage	V	15 to 30
Black current (without load)	mA	< 35
Analogue output (voltage)	V	0 to 10
Out-of-range analogue output	V	11
Analogue output (current)	mA	4 to 20
Out-of-range analogue output	mA	3
Max. load resistance (current output)	Ω	< 500
Min. load resistance (voltage output)	Ω	> 2000
Polarity inversion protection		YES
Short-circuit protection		YES

METAL WORK PNEUMATIC

DIMENSIONS AND ELECTRICAL CONNECTION

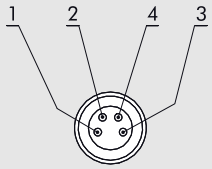




① LTL
② TEACH PAD button
③ LED1 (yellow/red)
④ LED2 (blue/green)

L = Total length
L1 = Measuring range

Type	L [mm]	L1 [mm]
LTL-287	289	287
LTL-359	361	359
LTL-431	433	431
LTL-503	505	503



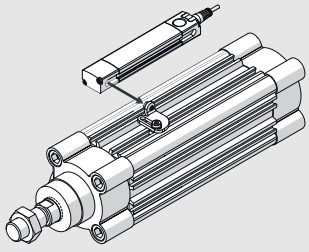
PIN	Colour	Function
1	Brown	Voltage +
2	White	Current output
3	Blue	Voltage -
4	Black	Voltage output

FIXING ON THE ACTUATOR AND START-UP

1. Position the brackets (code W0950000721) in one of the T-slots in the cylinder liner (fig. A);
2. Fix the brackets in the position sensor slot at least 30 mm from the ends of the position sensor (fig. B). The brackets are used to adjust the position along the axis of the piston rod, including perpendicular to the T-slot (fig. C). This allows you to fix the position sensor in as central a position as possible (fig. D);
3. Connect the position sensor to the power supply using the M8x1 4-pin connector, wiring the voltage or the current output;
4. If you wish to determine a specific measuring range, perform the procedure with the Teach pad (②) (see user manual).

N.B. If a measuring range is not set, the maximum range is used automatically.

Ⓐ



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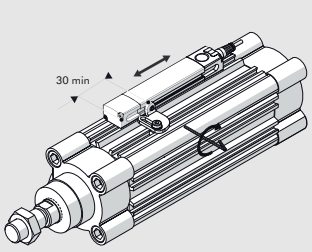

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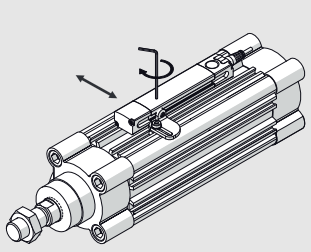

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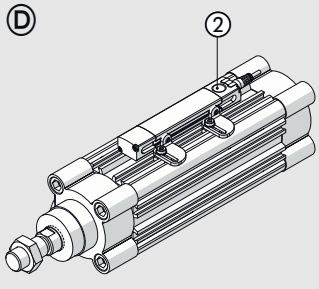
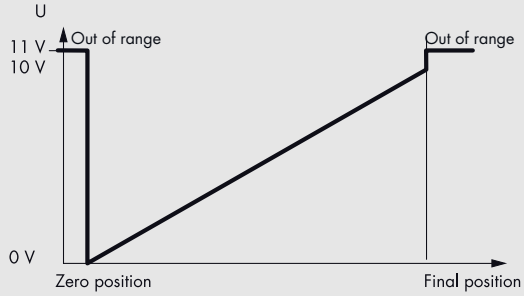
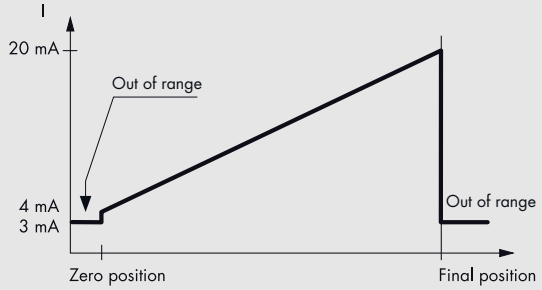


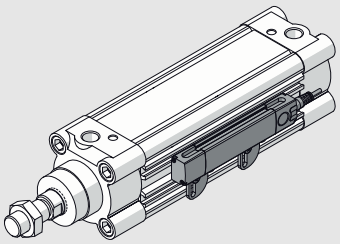
GRAPH OF THE VOLTAGE OR CURRENT ANALOGUE OUTPUT SIGNAL VALUE AND THE OUT-OF-RANGE VALUE





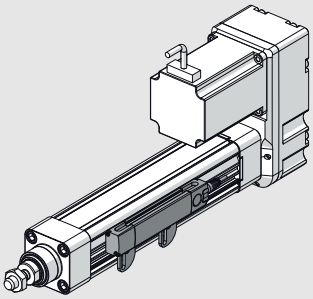
CHOICE OF POSITION SENSOR BASED ON THE ACTUATOR MEASURING STROKE

ISO 15552 TYPE A CYLINDERS



Ø 50 - Ø 63 - Ø 80 - Ø 100 - Ø 125	
Measuring stroke [mm]	**Position sensor model**
from 255 to 287	LTL-287
from 288 to 359	LTL-359
from 360 to 431	LTL-431
from 432 to 503	LTL-503

ELECTRIC CYLINDER SERIES ELEKTRO ISO 15552



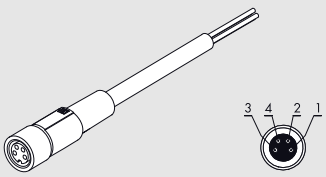
Ø 32 - Ø 50 - Ø 63	
Measuring stroke [mm]	**Position sensor model**
from 255 to 287	LTL-287
from 288 to 359	LTL-359
from 360 to 431	LTL-431
from 432 to 503	LTL-503

ORDERING CODE

Code	Description
W0950000478	LTL-287 Position sensor with M8 4-PIN 0.3 m connector
W0950000479	LTL-359 Position sensor with M8 4-PIN 0.3 m connector
W0950000480	LTL-431 Position sensor with M8 4-PIN 0.3 m connector
W0950000481	LTL-503 Position sensor with M8 4-PIN 0.3 m connector

ACCESSORIES

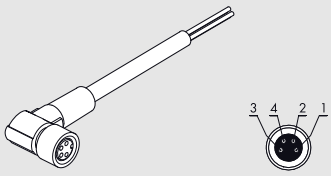
STRAIGHT M8 CONNECTORS



Pin	Cable colour
1	Brown
2	White
3	Blue
4	Black

Code	Description
0240009100	M8 4-pin connector – female, straight L = 2 m
0240009101	M8 4-pin connector – female, straight L = 5 m

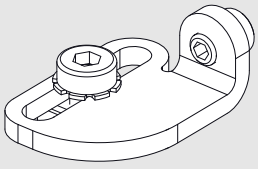
90° M8 CONNECTORS



Pin	Cable colour
1	Brown
2	White
3	Blue
4	Black

Code	Description
0240009102	M8 4-pin connector – female, 90° angle L = 2 m
0240009103	M8 4-pin connector – female, 90° angle L = 5 m

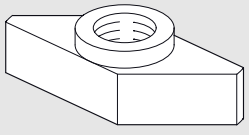
T-SLOT BRACKET



Code	Description
W0950000721	Bracket for mounting LTL on cylinder with T-slot

Bracket for fixing the LTL position sensor in the T-slot of the actuator.

SLOTTED FIXING PLATE WITH INSERTION FROM ABOVE



Code	Description	Weight [g]
0950003001	M4 T-slotted fixing plate	4

Note: Individually packed.

N.B. To be used with the T-slot bracket W0950000721 when the T-slot is not a through one (e.g. in cylinders series ELEKTRO ISO 15552).

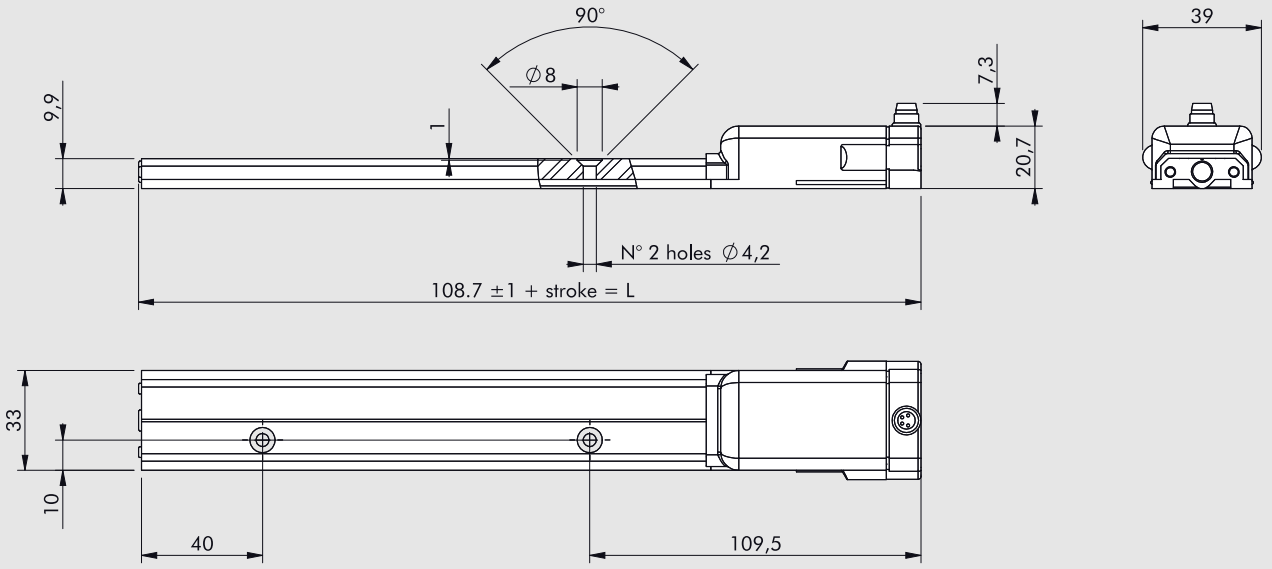
LTE POSITION SENSOR

The LTE is a in-line position sensor with an innovative magnetostrictive solution and no electric contact.
The absence of an electric contact on the slide eliminates the problem of wear and guarantees a virtually unlimited life. The position sensor is fixed in one of the sensor slots in the actuator liner by means of two screws. Actuators to which the position sensor is applied are standard and require no adaptation, they just have to be the magnetic version. The position sensor automatically detects the position of the magnets inside the cylinder.
The LTE is applied to ISO 15552 type A cylinders with the same stroke and the measuring length.
For longer strokes please contact our sales department.

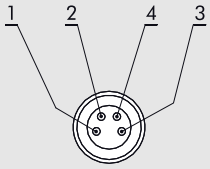
TECHNICAL DATA		
Measuring length	mm	150 - 200 - 250 - 300 - 350 - 400 - 450 - 500
Electrical connection		M8x1 – 4 pin
Sample time	ms	1 for measuring lengths up to 600 mm, 1.5 for greater lengths
DIN IEC68T2-27 shock test		100 g - 11 ms - single stroke
DIN IEC68T2-6 vibration test		12g / 10 ... 2000 Hz
Maximum displacement speed	m/s	≤ 10
Maximum acceleration	m/s^2	≤ 100
Resolution		Endless
Linearity*	mm	≤ ±0.2% f.s. (min ±1 mm)
Maximum repeatability	mm	≤ 0.05
Maximum hysteresis	mm	≤ 0.2
Operating temperature	°C	0 to +50
Storage temperature	°C	-40 to +100
Temperature coefficient		≤ ±0.01% f.s./°C (min 0.015 mm/°C)
Index of protection		IP 65
Spam		9 VDC ± 100 mV max
Voltage	V	24 ± 20%
Electrical zero	V	0.8
Maximum ripple voltage		1 Vpp
Output current consumption	mA	35
Output load	kΩ	≥ 10
Max. output value	V	12
Alarm output value	V	10.5
Electrical insulation	V	50
Polarity inversion protection		YES
Short-circuit protection		YES
Overload protection		YES

* In some applications, linearity may be higher than the value indicated.

DIMENSIONS AND ELECTRICAL CONNECTION



L = Total length



PIN	Colour	Function
1	Brown	Voltage +
2	White	Output
3	Blue	Voltage -
4	Black	Shield

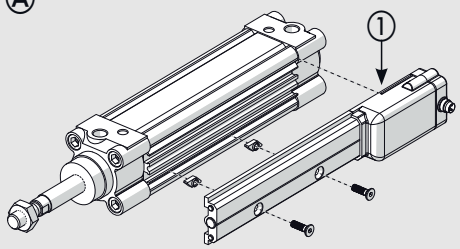
FIXING ON THE ACTUATOR AND START-UP

The position sensor can be fixed on the cylinder using either two M4 T-slot plates for vertical insertion + 2 M4x14 hexagon socket countersunk head screws (code W0950000469). If the cylinder head projects from the liner, position one or more spacers.
The installation procedure is as follows:

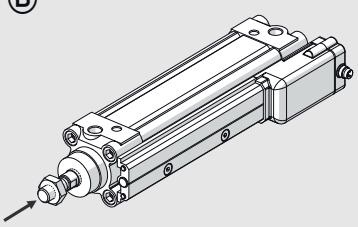
1. Insert either the fixing blocks or the plates in the T-slots in the cylinder (fig. A);
2. Mount the position sensor on the cylinder, aligning the reference mark a) with the end of the liner (Fig. A). Do up the screws loosely and retract the piston rod completely (Fig. B).
3. Connect the voltage or current analogue output, power on the position sensor and wait at least 1 second for the magnet orientation to be recognized.
4. Slide the position sensor along until the zero value reading is 0.8V.
5. Tighten the two M4x14 screws on the securing element inserted in the T-slot (Fig. C).

The end of the position sensor may project a certain amount from the end of the cylinder head, depending on the type of cylinder.

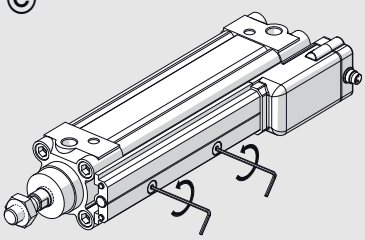
Ⓐ



Ⓑ

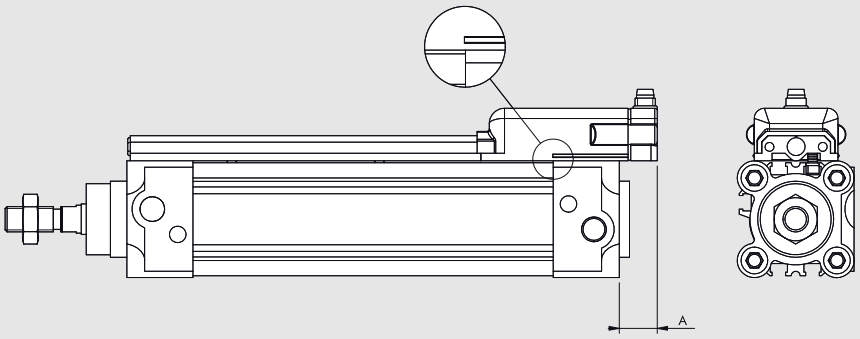


Ⓒ



METAL WORK PNEUMATIC

PROJECTION OF POSITION SENSOR ON ISO 15552 TYPE A CYLINDERS

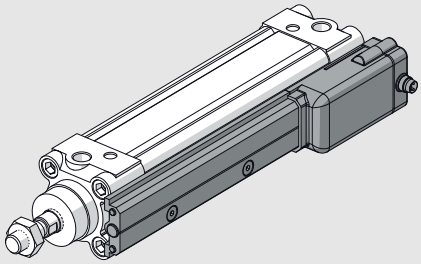


Bore [mm]	A [mm]
32	~ 16
40	~ 12
50	~ 12

N.B. Projection by a zero value equal to 0.8V

CHOICE OF POSITION SENSOR BASED ON THE ACTUATOR MEASURING STROKE

ISO 15552 TYPE A CYLINDERS



Ø 32 - Ø 40 - Ø 50	
Measuring stroke [mm]	Position sensor model
150	LTE-150
200	LTE-200
250	LTE-250
300	LTE-300
350	LTE-350
400	LTE-400
450	LTE-450
500	LTE-500

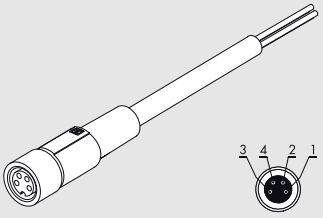
ORDERING CODE

Code	Description Metal Work	Description GEFRAN
W0950000482	LTE-150 position sensor	ONPP-A-S-0150-N
W0950000483	LTE-200 position sensor	ONPP-A-S-0200-N
W0950000484	LTE-250 position sensor	ONPP-A-S-0250-N
W0950000485	LTE-300 position sensor	ONPP-A-S-0300-N
W0950000486	LTE-350 position sensor	ONPP-A-S-0350-N
W0950000487	LTE-400 position sensor	ONPP-A-S-0400-N
W0950000488	LTE-450 position sensor	ONPP-A-S-0450-N
W0950000489	LTE-500 position sensor	ONPP-A-S-0500-N

NOTES

ACCESSORIES

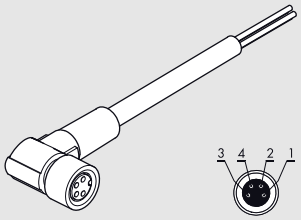
STRAIGHT M8 CONNECTORS



Pin	Cable colour
1	Brown
2	White
3	Blue
4	Black

Code	Description
0240009100	M8 4-pin connector – female, straight L = 2 m
0240009101	M8 4-pin connector – female, straight L = 5 m

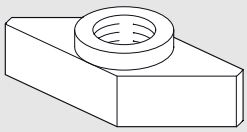
90° M8 CONNECTORS



Pin	Cable colour
1	Brown
2	White
3	Blue
4	Black

Code	Description
0240009102	M8 4-pin connector – female, 90° angle L = 2 m
0240009103	M8 4-pin connector – female, 90° angle L = 5 m

SLOTTED FIXING PLATE WITH INSERTION FROM ABOVE



Code	Description	Weight [g]
W0950000469	M4 T-slotted fixing plate	4

Note: 2 items plus 2 M4x14 screws per pack

Materials: Stainless steel plate and screws

NOTES