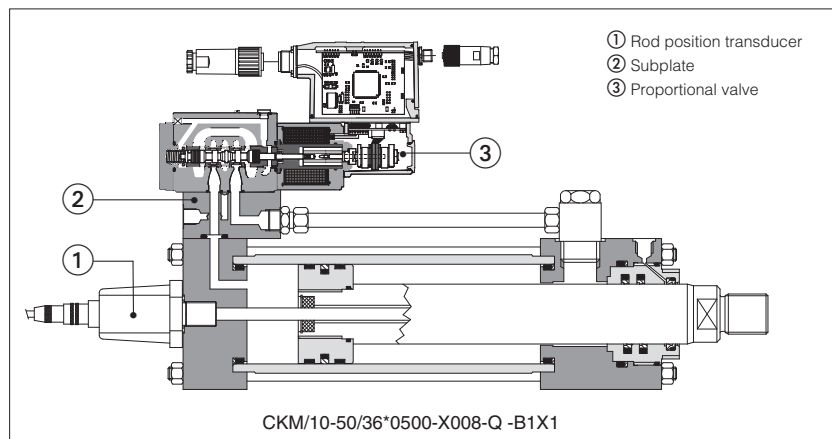


# Servocylinders type CK\* with built-in position transducer

to ISO 6020-2 - nominal pressure 16MPa (160 bar) - max 25 MPa (250 bar)



CK\* electrohydraulic servocylinders have engineered double acting construction, designed to suit the requirements of industrial applications: top reliability, high performances and long working life. Their compact construction allows high flexibility for use in all applications. The rod position transducer ① is well protected against shocks or external dirt, and maintenance is reduced to a minimum.

- Derived from cylinders series CK according to ISO 6020-2, **see tab. B137**
  - Integral position transducers: Magneto-sonic analog or digital, Potentiometric and Inductive
  - Bore sizes from **40** to **200** mm
  - Available with incorporated subplates ② for on-board on/off or proportional valves ③ to achieve the max hydraulic strenght, fast response time and repeatability.
  - Attachments, **see tab. B500**
- For cylinder's choice and sizing criteria **see tab. B015**



## DVC Cylinder's Designer

The configuration and options of CK\* electrohydraulic servocylinders are easily selectable with the DVC software. Once the cylinder code is correctly defined, using the configurator tool, the relevant 3D modelling and imaging are immediately available for the user.

## 1 MAIN CHARACTERISTICS OF TRANSDUCERS

Code	CKF	CKM	CKP	CKV
Transducer type	Magnetosonic, analog	Magnetosonic, programmable	Potentiometric	Inductive
Electronic conditioning	Integral	Integral	None	Separate
Linearity error (1)	< ± 0,03%	< ± 0,01%	± 0,1%	± 0,2%
Repeatability (1)	< ± 0,005%	< ± 0,001%	± 0,05%	± 0,05%
Max speed	1 m/s	2 m/s	0,5 m/s	1 m/s
Strokes	100 to 1000 (by increments of 100)	100 to 3000 (by increments of 100)	100 to 900 (by increments of 100)	100 to 3000 (by increments of 100)
Interface	Voltage 0 ÷ 10 V	Analog: 0 ÷ 10 V, 4 ÷ 20 mA Digital: Serial SSI, CANopen, PROFIBUS DP	Voltage 0 ÷ 10	Voltage: 0 ÷ 10 V Current: 4 ÷ 20 mA
Typical applications	Sawing or bending machines	Steel plants, plastic and rubber	Various, compact construction	Simulators and energy
Temperature limits	-20°C to + 75°C	-20°C to + 75°C	-20°C to + 75°C	-20°C to + 120°C

Note: (1) Percentage of the total stroke

## 2 MODEL CODE

<p><b>CK</b></p> <p>CYLINDER SERIES <b>CK</b> to ISO 6020 - 2, see <b>tab. B137</b> See section [24] for other cylinder series</p> <p>ROD POSITION TRANSDUCER <b>F</b> = magnetosonic, see section [3] <b>M</b> = magnetosonic programmable, see section [4] <b>P</b> = potentiometric, see section [9] <b>V</b> = inductive, see section [10]</p> <p>INCORPORATED SUBPLATE, see section [21] <b>00</b> = without subplate <b>10</b> = size 06 <b>20</b> = size 10 <b>30</b> = size 16 <b>40</b> = size 25</p> <p>BORE SIZE, see sections [6] and [11] from <b>40</b> to <b>200</b> mm</p> <p>ROD DIAMETER, see sections [6] and [11] from <b>28</b> to <b>140</b> mm</p> <p>STROKE, see section [1] up to <b>3000</b> mm</p> <p>MOUNTING STYLE, see sections [6] and [8] or [11] and [13]</p> <table border="0"> <tr> <td><b>REF. ISO</b></td> <td><b>REF. ISO</b></td> </tr> <tr> <td><b>X</b> = basic execution</td> <td><b>L</b> = intermediate trunnion</td> </tr> <tr> <td><b>C</b> = fixed clevis</td> <td><b>N</b> = front flange</td> </tr> <tr> <td><b>D</b> = fixed eye</td> <td><b>P</b> = rear flange</td> </tr> <tr> <td><b>E</b> = feet</td> <td><b>S</b> = swivel with eye</td> </tr> <tr> <td><b>G</b> = front trunnion</td> <td><b>Y</b> = front tie rods extended</td> </tr> <tr> <td></td> <td><b>Z</b> = front threaded holes</td> </tr> </table> <p>*Not available for CKF and CKM</p>	<b>REF. ISO</b>	<b>REF. ISO</b>	<b>X</b> = basic execution	<b>L</b> = intermediate trunnion	<b>C</b> = fixed clevis	<b>N</b> = front flange	<b>D</b> = fixed eye	<b>P</b> = rear flange	<b>E</b> = feet	<b>S</b> = swivel with eye	<b>G</b> = front trunnion	<b>Y</b> = front tie rods extended		<b>Z</b> = front threaded holes	<p><b>P / 10 - 63 / 45 * 0500 - S 2 0 8 - K - B1E3X1</b></p> <p>Series number (1)</p> <p>HEADS' CONFIGURATION (2), see section [19] Oil ports positions <b>B1</b> = front head <b>X1</b> = rear head Cushioning adjustment position <b>E3</b> = front head* * Enter E2 only for mounting style E</p> <p>OPTIONS (2): Rod end, see sections [7] and [12] <b>H</b> = rod thread Rod treatment, see section [17] <b>K</b> = nickel and chrome plating <b>T</b> = hardening and chrome plating Oversized oil ports, see sections [6] and [7] <b>D</b> = front oversized oil port    <b>Y</b> = rear oversized oil port</p> <p>Options for CKM: Analog output, see section [4] <b>A</b> = current output (4÷20 mA)    <b>V</b> = voltage output (0÷10V) Digital SSI output, see section [4] <b>Q</b> = binary 24 bit    <b>R</b> = binary 25 bit <b>S</b> = gray 24 bit    <b>U</b> = gray 25 bit Fieldbus output, see section [5] <b>C</b> = CANopen    <b>P</b> = PROFIBUS DP</p> <p>SEALING SYSTEM, see section [20] <b>2</b> = (FKM+PTFE) <b>very low friction and high temperatures</b> <b>4</b> = (NBR + PTFE) <b>very low friction and high speeds</b> <b>8</b> = (NBR + PTFE and POLYURETHANE) <b>low friction</b></p> <p>SPACER, see section [14] <b>0</b> = none    <b>2</b> = 50 mm    <b>4</b> = 100 mm    <b>6</b> = 150 mm    <b>8</b> = 200 mm</p> <p>CUSHIONINGS, see section [18] (option 2 is only available for bores from 63 to 200) <b>0</b> = without cushioning    <b>2</b> = front adjustable cushioning</p>
<b>REF. ISO</b>	<b>REF. ISO</b>														
<b>X</b> = basic execution	<b>L</b> = intermediate trunnion														
<b>C</b> = fixed clevis	<b>N</b> = front flange														
<b>D</b> = fixed eye	<b>P</b> = rear flange														
<b>E</b> = feet	<b>S</b> = swivel with eye														
<b>G</b> = front trunnion	<b>Y</b> = front tie rods extended														
	<b>Z</b> = front threaded holes														

Notes:  
(1) For spare parts request always indicate the series number printed on the nameplate  
(2) To be entered in alphabetical order

### 3 SERVOCYLINDERS TYPE CKF

#### 3.1 Magnetosonic transducers - basic working principles

The magnetosonic transducer is composed by: a waveguide element ① fixed to the cylinder's body, a permanent magnet ② rigidly connected to the cylinder's rod and an integral electronics signal conditioning ③ located on the rear head.

The position measurement is based upon the magnetostriction phenomenon: the electronics signal conditioning ③ generates a short current pulse that travels through the waveguide ①. When this pulse meets the magnetic field of the permanent magnet ②, a torsional wave is generated and it travels back to the electronics signal conditioning.

The position of the moving magnet is thus accurately determined by measuring the elapsed time between the application of the current pulse and the arrival of the torsional wave, thanks to their constant ultrasonic speed. Sensor electronics signal conditioning transforms this measurement into the output feedback signal.

The contactless construction of the position transducer ensures a long working life and allows its use even in hard environmental conditions (shocks, vibrations etc.) or high working frequencies.

The transducer can be replaced without disassembling the cylinder, providing a great advantage of easy and quick maintenance.

The sensor electronics is covered by a steel case ④ to prevent shocks or mechanical damages. The steel case is screwed to the rear head.

Magnetosonic transducers, particularly simple and cost-effective, makes the CKF servocylinders commonly used as alternatives to external absolute encoders or potentiometers.

#### 3.2 Output signal

The transducer integral electronics supplies an analog voltage output  $0 \div 10$  Vdc corresponding to the rod position.

#### 3.3 Transducer features

CKF are equipped with MTS's magnetosonic transducers whose main features are shown in the table at side.

#### 3.4 Electronic connections

The 6 PIN male connector M16 is located on the transducer rear head. The straight female cable connector ⑤ **SP-ST-CO-9131-D06-PG9** is included in the supply.

See the table at side for electronic connections.

#### 3.5 Strokes

From 100 to 1000 mm by increments of 100 mm.

If a not standard stroke is required please contact our technical office.

#### 3.6 Cylinder features

See sections ⑥, ⑦ and ⑧ for sizes, mounting style and dimensions.

See sections from ⑭ to ⑰ for materials and options.

#### 3.7 Fluid requirements

CKF servocylinders are suitable for operation with mineral oils with or without additives (**HH**, **HL**, **HLP**, **HLP-D**, **HM**, **HV**), fire resistant fluids (**HFA** oil in water emulsion - 90-95% water and 5-10% oil, **HFB** water in oil emulsion - 40% water, **HFC** water glycol - max 45% water) and synthetic fluids (**HFD-U** organic esters, **HFD-R** phosphate esters). For the proper choice of the sealing system, in relation to the fluid characteristics, see section ⑳.

Recommended fluid characteristics:

- Viscosity:  $15 \div 100$  mm<sup>2</sup>/s

- Temperature range:  $0 \div 70^{\circ}\text{C}$

- Fluid contamination class: ISO 19/16 achieved with in-line filters at 25  $\mu\text{m}$

#### 3.8 Start-up notes

During the start-up it is necessary to bleed off the air from the servocylinder as indicated in section ㉒.

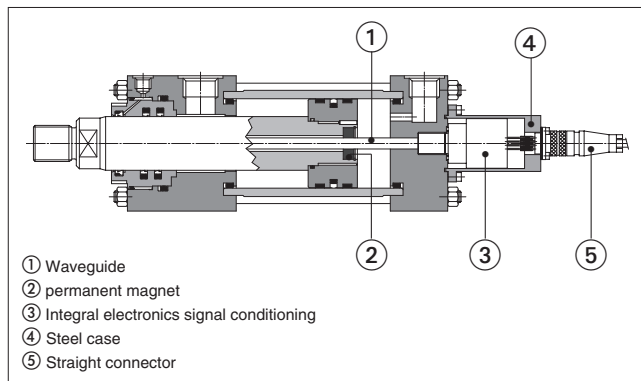
For other details please refer to the start-up instructions included in the supply.

#### 3.9 Warnings

Ensure that the servocylinder and wirings are kept away from strong magnetic field and electrical noise to prevent noises on the feedback signal. Switch-off the power supply and check the electronic connections before connecting or disconnecting the position transducer to avoid electronic damages.

It is recommended to connect the draining port to the tank without back pressure, see section ㉓ for details.

### SERVOCYLINDER TYPE CKF



#### TRANSDUCER FEATURES

Power supply	24 VDC ( $\pm 15\%$ )
Output signal	$0 \div 10$ Vdc
Resolution	infinite, restricted by the output ripple
Linearity	$< \pm 0,03\%$ F.S (min $\pm 100$ $\mu\text{m}$ )
Repeatability	$< \pm 0,005\%$ F.S.
Output update frequency	$> 1,5$ kHz
Temperature coefficient	$< 50$ ppm/ $^{\circ}\text{C}$
Operating temperature	$-20 \div +75$ $^{\circ}\text{C}$
Connection type	6 Pin connector M16 to DIN 45322
Protection degree	IP67 to DIN 40050
Shock resistance	100g (single hit) / IEC Standard 68-2-27
Vibration resistance	5g/10 $\div$ 150 Hz / IEC Standard 68-2-6
Measuring range	100 to 1000 mm
Maximum speed	1m/s

#### ELECTRONIC CONNECTIONS

6 PIN female connector (to solder)	PIN	SIGNAL	NOTES
<p><b>SP-ST-CO-9131-D06-PG9</b> (Transducer view)</p>	1	Vout	Output - $0 \div 10$ V
	2	AGND	Input - ground; signal zero for Vout
	3	NC	Do not connect
	4	NC	Do not connect
	5	V+	Input - power supply 24 VDC ( $\pm 15\%$ )
	6	V0	Input - power supply 0 VDC

## 4 SERVOCYLINDERS TYPE CKM analog and digital SSI

### 4.1 Magnetosonic transducers - basic working principles

The magnetosonic transducer is composed by: a waveguide element ① fixed to the cylinder's body, a permanent magnet ② rigidly connected to the cylinder's rod and an integral electronics signal conditioning ③ located on the rear head.

The position measurement is based upon the magnetostriction phenomenon: the electronics signal conditioning ③ generates a short current pulse that travels through the waveguide ①. When this pulse meets the magnetic field of the permanent magnet ②, a torsional wave is generated and it travels back to the electronics signal conditioning.

The position of the moving magnet is thus accurately determined by measuring the elapsed time between the application of the current pulse and the arrival of the torsional wave, thanks to their constant ultrasonic speed. Sensor electronics signal conditioning transforms this measurement into the output feedback signal.

The contactless construction of the position transducer ensures a long working life and allows its use even in hard environmental conditions (shocks, vibrations etc.) or high working frequencies.

The transducer can be replaced without disassembling the cylinder, providing a great advantage of easy and quick maintenance.

Additionally, the only electronics signal conditioning can be easily removed and replaced without removing its case; in this way the cylinder could keep on working avoiding any production-stop time.

CKM servocylinders are characterized by high performances and flexibility due to the several available versions.

### 4.2 Output signal

The transducer integral electronics is available with the following configurations:

#### Analog

V = 0-10 V

A = 4-20 mA

#### Digital SSI

Q = Binary 24 bit

R = Binary 25 bit

S = Gray 24 bit

U = Gray 25 bit

Other output ranges are available on request, please contact our technical office.

### 4.3 Transducer features

CKM are equipped with MTS's magnetosonic transducers whose main features are shown in the table at side. The integral position transducer is also available with an explosion-proof housing, ATEX EEx approved, for use in explosion-hazardous environments.

Other integral position transducers brands are available on request, please contact our technical office.

### 4.4 Electronic connections

The 6 or 7 PIN male connector M16 is located on the transducer rear head.

The straight female cable connector ④ is included in the supply:

**SP-ST-CO-9131-D06-PG9**

6 PIN female connector for analog version

**SP-ST-CO-9131-D07**

7 PIN female connector for digital SSI version

See the tables at side for electronic connections.

For other connector types or cable outputs please contact our technical office.

### 4.5 Strokes

From 100 to 3000 mm by increments of 100 mm.

If a not standard stroke is required please contact our technical office.

### 4.6 Cylinder features

See sections ⑥, ⑦ and ⑧ for sizes, mounting style and dimensions.

See sections from ⑭ to ⑳ for materials and options.

### 4.7 Fluid requirements

For the suitable fluids and the proper choice of the sealing system, in relation to the fluid characteristics, see sections ③ and ⑫.

Recommended fluid characteristics:

- Viscosity: 15 ÷ 100 mm<sup>2</sup>/s

- Temperature range: 0 ÷ 70°C

- Fluid contamination class: ISO 19/16 achieved with in-line filters at 25 µm

### 4.8 Start-up notes

All the servocylinders with analog output are supplied with the zero/span values adjusted to the cylinder's mechanical stroke ends.

The output signal of the CKM analog or digital SSI versions is programmable by using proper programming tools to be ordered separately:

**SP-253-124** for zero/span setting of analog version

**SP-253-135** for complete re-programming of the transducers parameters (resolution, output format, length etc.) of digital SSI version

The sensor electronics case is equipped with two LED that indicate the transducer status, allowing a quick recognition of main possible faults (magnet not detected or out of set-up range).

During the start-up it is necessary to bleed off the air from the servocylinder as indicated in section ⑫.

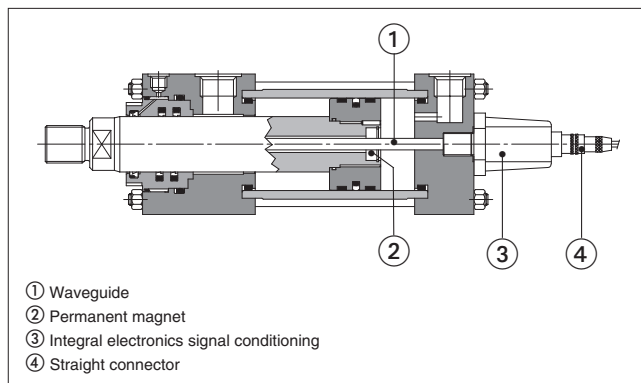
For other details please refer to the start-up instructions included in the supply.

### 4.9 Warnings

Ensure that the servocylinder and wirings are kept away from strong magnetic field and electrical noise to prevent noises on the feedback signal. Switch-off the power supply and check the electronic connections before connecting or disconnecting the position transducer to avoid electronic damages.

It is recommended to connect the draining port to the tank without back pressure, see section ⑫ for details.

## SERVOCYLINDER TYPE CKM



### TRANSDUCER FEATURES

	Analog	Digital SSI
Power supply	24 Vdc (±15%)	
Outputs signal	0÷10 Vdc/ 4÷20 mA	SSI RS 422/485 Standard
Data format (SSI)	NA	Binary / Gray
Data length (SSI)	NA	24 / 25 bit
Resolution	16 bit; 0,0015% (min. 1 µm)	5 µm
Linearity	<±0,01% F.S. (min ±50 µm)	<±0,01% F.S. (min ±40 µm)
Repeatability	<±0,001% F.S. (min ±1 µm)	
Hysteresis	< 4 µm	
Data speed (only for digital)	70 kBd÷1MBd (depending to cables length)	
Update frequency	0,5÷2kHz (depending to the stroke)	0,5÷3,7kHz (depending to the stroke)
Temperature coefficient	< 30 ppm/°C	< 15 ppm/°C
Connection type	6 PIN connector M16 to DIN45322	7 PIN connector M16 to DIN45329
Protection degree	IP67 to DIN 40050	
Shock resistance	100g (single hit) / IEC Standard 68-2-27	
Vibration resistance	15g/10÷2000 Hz / IEC Standard 68-2-6	
Polarity protection	up to -30 VDC	
Operating temperature	-20 ÷ +75 °C	
Measuring range	100 to 3000 mm	
Maximum speed	2m/s	

### ELECTRONIC CONNECTIONS - ANALOG

6 PIN female connector (to solder)	PIN	SIGNAL	NOTES
	1	Vout	Output - 0-10 V (V option) 4-20 mA (A option)
	2	AGND	Input - ground; signal zero for Vout
	3	NC	Do not connect
	4	NC	Do not connect
	5	V+	Input - power supply 24 VDC (±15%)
	6	V0	Input - power supply 0 VDC
<b>SP-ST-CO-9131-D06-PG9</b> (Transducer view)			

### ELECTRONIC CONNECTIONS - DIGITAL SSI

7 PIN female connector (to solder)	PIN	SIGNAL	NOTES
	1	DATA -	Input - serial position data (-)
	2	DATA +	Output - serial position data (+)
	3	CLOCK +	Output - serial synchronous clock (+)
	4	CLOCK -	Input - serial synchronous clock (-)
	5	V+	Input - power supply 24 Vdc (±15%)
	6	V0	Input - power supply 0 VDC
	7	NC	Do not connect
<b>SP-ST-CO-9131-D07</b> (Transducer view)			

## 5 SERVOCYLINDERS TYPE CKM PROFIBUS DP and CANopen

### 5.1 Working basic principles

CKM servocylinders (see section 4 for magnetosonic working principle) are also available with fieldbus communication interface. Field communication networks, usually called fieldbus, allow to exchange a great amount of data among all the devices installed on the machines and industrial plants (servocylinders, valves, pumps, motors, etc.) by means of just one cable. It is so possible to connect all the devices of the system to the machine control unit (fieldbus master) avoiding expensive wirings and start-up costs.

Fieldbus provides also a more efficient connection that can speed up the installation task as well as prevent wiring errors.

The capability to perform system level diagnostics on each node or device in the system has introduced a valuable maintenance tool that can have a positive impact on the system performance.

The remarkable aspect of these communication networks is the common standardized language ("protocol") of all the connected devices, making the control and monitoring of the whole machine very easy.

### 5.2 Output signal

The available feedback protocols are:

**P = PROFIBUS DP** according to EN 50 170 (ISO 74498)

**C = CANopen** according to CiA standard DS-301 V4.02 (ISO-DIS11898)

The integral position transducer is also available with an explosion-proof housing, ATEX EEx approved, for use in explosion-hazardous environments.

Other feedback protocols are available on request, please contact our technical office.

### 5.3 Transducer features

CKM are equipped with MTS's magnetosonic transducers whose features are shown in the table at side. Other integral position transducers brands are available on request, please contact our technical office.

### 5.4 Electronic connections

Male and female connectors are located on the transducer rear head. The cable connectors are included in the supply:

**CANopen** - 2 connectors

**SP-ST-CO-9131-D06-PG9** 6 Pin female M16 connector to DIN45322 for bus

**SP-ST-CO-9131-D06-PG9** 6 Pin female M16 connector to DIN45322 for bus

**PROFIBUS DP**- 3 connectors

**SP-560884** 5 Pin male M12 connector for bus input

**SP-560885** 5 Pin female M12 connector for bus output

**SP-560888** 5 Pin female M12 for bus terminator

**SP-560886** 4 Pin female M8 connector for power supply

See the table at side for electronic connections..

For other connector types please contact our technical office.

### 5.5 Strokes

From 100 to 3000 mm by increments of 100 mm.

If a not standard stroke is required, please contact our technical office.

### 5.6 Cylinder features

See sections 6, 7 and 8 for sizes, mounting style and dimensions.

See sections from 14 to 23 for materials and options.

### 5.7 Fluid requirements

For the suitable fluids and the proper choice of the sealing system, in relation to the fluid characteristics, see sections 3 and 20.

Recommended fluid characteristics:

- Viscosity: 15 ÷ 100 mm<sup>2</sup>/s

- Temperature range: 0 ÷ 70°C

- Fluid contamination class: ISO 19/16 achieved with in-line filters at 25 µm

### 5.8 Start-up notes

The bus transducer's fieldbus configuration files and the manual for start-up are included in the supply.

The setup of the transducer's slave address is usually done by the bus standard service of the system: if the fieldbus master does not support this service, the setting can be done by a proper programmer tool to be separately ordered:

**SP-252-382-D62** for CANopen protocol

**SP-252-173-D52** for PROFIBUS DP protocol

The sensor electronics case is equipped with two LED that indicate the transducer status, allowing a quick recognition of main possible faults (magnet not detected or out of set-up range).

During the start-up it is necessary to bleed off the air from the servocylinder as indicated in section 22.

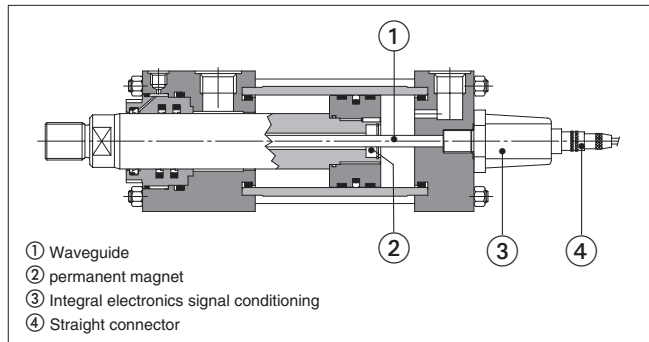
For other details please refer to the start-up instructions included in the supply.

### 5.9 Warnings

Ensure that the servocylinder and wirings are kept away from strong magnetic field and electrical noise to prevent noises on the feedback signal. Switch-off the power supply and check the electronic connection before connecting or disconnecting the position transducer to avoid electronic damages.

It is recommended to connect the draining port to the tank without back pressure, see section 23 for details.

## SERVOCYLINDER TYPE CKM



### TRANSDUCER FEATURES

Power supply	24 Vdc (±15%)
Data transmission rate (with cable L < 25 m and 1 node)	<b>PROFIBUS DP:</b> Max. 12 MBit/s <b>CAN open:</b> Max. 1000 KBit/s
Cycle time	1 ms with stroke up to 2000 mm
Resolution (selectable by Bus)	5 µm for <b>CANopen</b> ; 1 µm for <b>PROFIBUS DP</b>
Linearity	<±0,01% F.S. (min ±50 µm)
Repeatability	<±0,001% F.S. (min ±2,5 µm)
Hysteresis	< 4 µm
Temperature coefficient	< 15 ppm/°C
Shock resistance	100g (single hit) / IEC Standard 68-2-27
Vibration resistance	15g/10÷2000 Hz / IEC Standard 68-2-6
Overvoltage protection	Up to 36 VDC
Protection degree	IP67 to DIN 40050
Operating temperature	-20 ÷ +75 °C
Measuring range	100 to 3000 mm
Maximum speed	2m/s

### ELECTRONIC CONNECTIONS - CANopen

6 pin female connectors (to solder)	PIN	SIGNAL	NOTES
	1	CAN_L	Bus line (low)
	2	CAN_H	Bus line (high)
	3	NC	Do not connect
	4	NC	Do not connect
	5	V+	Power supply 24 Vdc (±15%)
	6	CAN_GND	Signal zero data line (0V)
<b>SP-ST-CO-9131-D06-PG9</b> (Transducer view)			

### ELECTRONIC CONNECTIONS - PROFIBUS DP

5 pin connectors (to screw)	PIN	SIGNAL	NOTES
<b>SP-560884</b> male (Transducer view)	1	+ 5V	for bus termination *
	2	LINE-B	RxD/TxD-N (BUS)
	3	DGND	data line and termination signal zero *
	4	LINE-A	RxD/TxD-P (BUS)
	5	SCHIELD	
<b>SP-560885</b> female (Transducer view)	1	V+	Input - power supply 24 VDC (±15%)
	2	NC	Do not connect
	3	V0	Input - power supply 0 VDC
	4	NC	Do not connect
	5	NC	Do not connect
<b>SP-560886</b> (Transducer view)			

\* female only

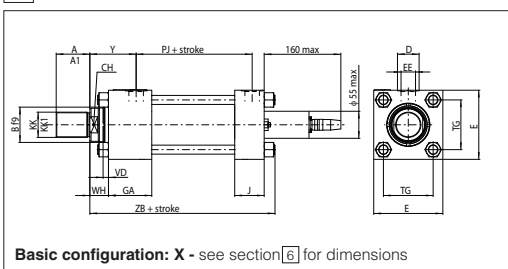
## 6 INSTALLATION DIMENSIONS [mm] FOR SERVOCLINDERS TYPE CKF, CKM

Ø Bore	40	50	63	80	100	125	160	200
Ø Rod	28	36	45	56	70	90	110	140
A	28	36	45	56	63	85	95	112
A1 (option H)	18	22	28	36	45	56	63	85
AA	59	74	91	117	137	178	219	269
B f9	42	50	60	72	88	108	133	163
BB	35	46	46	59	59	81	92	115
BG min	12	18	18	24	24	27	32	40
CH	22	30	39	48	62	80	100	128
CO N9	12	12	16	16	16	20	30	40
DD 6g	M8x1	M12x1,25	M12x1,25	M16x1,25	M16x1,25	M22x1,5	M27x2	M30x2
D (1)	25	29	29	36	36	42	42	52
E	63	75	90	115	130	165	205	215
EE standard (1)	G 3/8	G 1/2	G 1/2	G 3/4	G 3/4	G 1	G 1	G 1 1/4
EE option D, Y (1)	G 1/2	NA	NA	G 1	G1	G1 1/4	NA	NA
F	10	16	16	20	22	22	25	25
FB H13	11	14	14	18	18	22	26	33
GA	55	61	61	70	72	80	83	101
KC	4	4,5	4,5	5	6	6	8	8
KK standard	M20 x 1,5	M27 x 2	M33 x 2	M42 x 2	M48 x 2	M64 x 3	M80 x 3	M100 x 3
KK1 option H	M14 x 1,5	M16 x 1,5	M20 x 1,5	M27 x 2	M33 x 2	M42 x 2	M48 x 2	M64 x 3
LH h10	31	37	44	57	63	82	101	122
PJ	85	74	80	93	101	117	130	165
R js13	41	52	65	83	97	126	155	190
RD	62	74	88	105	125	150	170	210
RT	M8x1,25	M12x1,75	M12x1,75	M16x2	M16x2	M22x2,5	M27x3	M30x3,5
SB H13	11	14	18	18	26	26	33	39
SS	110	92	86	105	102	131	130	172
ST js13	12,5	19	26	26	32	32	38	44
TC h14	63	76	89	114	127	165	203	241
TD f8	20	25	32	40	50	63	80	100
TG js13	41,7	52,3	64,3	82,7	96,9	125,9	154,9	190,2
TM h14	76	89	100	127	140	178	215	279
TO js13	87	105	117	149	162	208	253	300
TS	83	102	124	149	172	210	260	311
UM	108	129	150	191	220	278	341	439
UO max	110	130	145	180	200	250	300	360
US	103	127	161	186	216	254	318	381
UT	95	116	139	178	207	265	329	401
UW	70	88	98	127	141	168	205	269
VD	12	9	13	9	10	7	7	7
VE	22	25	29	29	32	29	32	32
VL	3	4	4	4	5	5	5	5
WF	35	41	48	51	57	57	57	57
WH	25	25	32	31	35	35	32	32
XG	57	64	70	76	71	75	75	85
XS	45	54	65	68	79	79	86	92
XV (2)	Minimum stroke	5	15	20	20	35	35	35
	min	100	109	120	129	148	155	161
	max	99+stroke	98+stroke	100+stroke	115+stroke	117+stroke	134+stroke	141+stroke
		166+stroke						
Y	62	67	71	77	82	86	86	98
ZB max	178	184	192	212	225	260	279	336

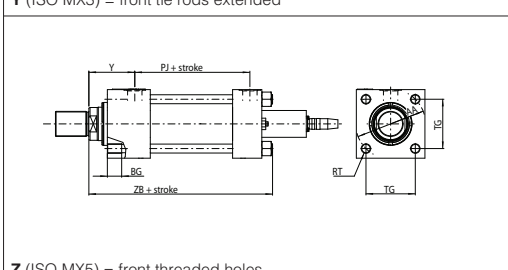
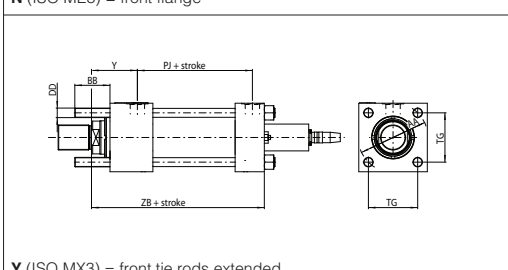
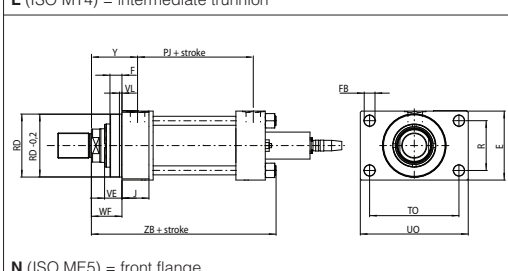
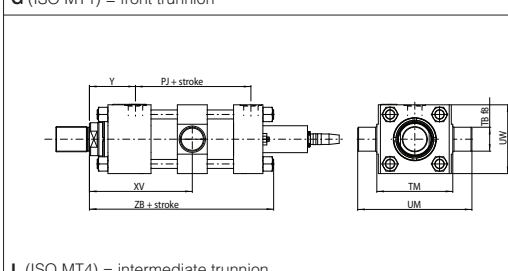
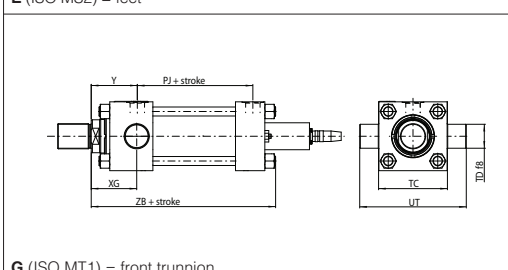
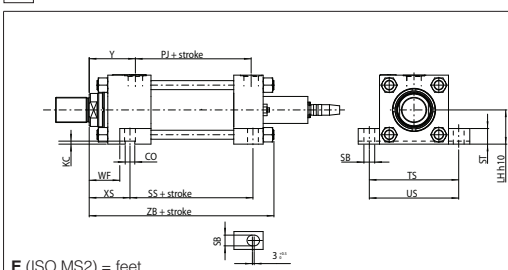
### NOTES TO TABLE

- (1) Oil ports are threaded according to ISO 1179-1 (GAS standards) with counterbore dimension D. Oversized oil ports are available depending to the bore, see dimensions EE for options D (front oversized oil port) or Y (rear oversized oil port)
- (2) XV - For cylinders with mounting style L the stroke must always exceed the minimum values reported in the table.  
The requested XV value must be included between **XV min** and **XV max** and it must be always indicated, with dimension in millimeters, together with the cylinder code. See the following example:  
CKM/00-50/36\*0500-L208 - D - B1E3X1  
**XV = 200**

## 7 BASIC CONFIGURATION



## 8 MOUNTING STYLE FOR SERVOCYLINDERS TYPE CKF, CKM





## 9 SERVOCYLINDERS TYPE CKP

### 9.1 Potentiometric transducers - basic working principles

The potentiometric transducer is composed by a resistive track ① and a wiper ② which realizes the sliding contact through two metallic brushes. The resistive track is an aluminium element with a conductive plastic coating fixed to the cylinder's rear head. The wiper is mounted on the piston rod and moves together with it.

The track of the potentiometer has to be connected to a stabilized DC voltage to allow a small current flow. The two brushes of the wiper close the electric circuit with the track (see figure at side), changing the resistance value and thus the voltage output proportionally to the rod position (principle of potential divider).

CKP servocylinders present the best price/performance ratio. Their compact construction allows the easy application of servocylinders in place of a standard cylinders without any measuring system.

### 9.2 Transducer features

For all the transducer features see the table at side

### 9.3 Electronic connections

The 4 PIN male connector is mounted on side 4 of the cylinder rear head for all mounting styles except style E (ISO MS2) where it is mounted along the cylinder axis, see section 13.

The straight female cable connector ③ **SP-PT-06W-8-4S** is included in the supply.

See the table at side for electronic connections.

### 9.4 Strokes

From 100 to 900 mm by increments of 100 mm.

If a not standard stroke is required please contact our technical office.

### 9.5 Cylinder features

See sections 11, 12 and 13 for sizes, mounting style and dimensions.

See sections from 14 to 21 for materials and options.

### 9.6 Fluids requirements

CKP servocylinders are suitable for operation with mineral oils with or without additives (**HH, HL, HLP, HLP-D, HM, HV**).

For the proper choice of the sealing system, in relation to the fluid characteristics, see section 20.

Recommended fluid characteristics:

- Viscosity: 15 ÷ 100 mm²/s
- Temperature range: 0 ÷ 70°C
- Fluid contamination class: ISO 19/16 achieved with in-line filters at 25 µm

### 9.7 Start-up notes

During the start-up it is necessary to bleed off the air from the servocylinder. The air bleed is located on the rod end, see figure at side.

For a proper use of the air-bleed unlock the grub screw ④ M8 x 10 with a wrench for hexagonal head screws, moves the cylinder for the necessary cycles to bleed-off the air and retighten by a torque of 20 Nm.

Take care to completely bleed off the air from the inside because the compressibility effects of the air trapped-in may compromise the contact between wiper and resistive track.

Ensure to bleed off the air after every long time stop of the servocylinder.

For other details please refer to the start-up instructions included in the supply.

### 9.8 Warnings

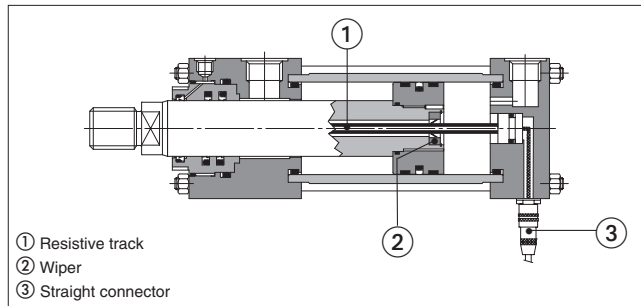
For a correct functioning, the transducer must be exclusively used as a potential divider.

Ensure to observe the maximum rating power indicated in the table "transducer features" to avoid any component damage.

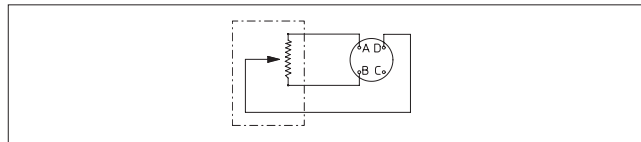
The power supply must be stabilized: variations on the voltage provided have direct influence on the output values.

It is recommended to connect the draining port to the tank without back pressure, see section 23 for details.

## SERVOCYLINDER TYPE CKP



### ELECTRONIC CIRCUIT



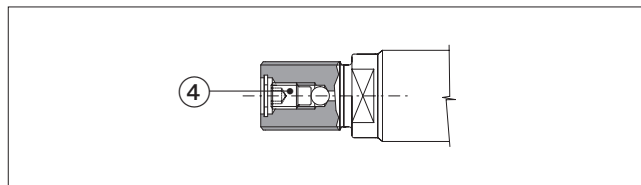
### TRANSDUCER FEATURES

Supply reference	10 Vdc recommended (max 30 Vdc)
Maximum power rating	0,3 W/cm at 25°C. 0 W at 125°C
Linearity	±0,1% F.S.
Repeatability	±0,05% F.S.
Total resistance	150 Ω/cm
Insulation resistance	> 1000 MΩ to 500 Vdc
Wiper current	Recommended: a few µA (1mA max)
Temperature limits	-20 ÷ + 75°C
Connection type	4 Pin connector to Mil-C-26482
Protection degree	IP65 to DIN 40050
Measuring range	100 to 900 mm
Maximum speed	0,5 m/s

### ELECTRONIC CONNECTIONS

4 pin female connector (to solder)	PIN	WIRING	SIGNAL	NOTES
 <b>SP-PT-06W-8-4S</b> (Transducer view)	A	yellow	AGND	Input - ground; signal zero for Vout
	B	green	Vref	Input - 10 V recommended
	C	-	NC	Do not connect
	D	red	Vout	Output - 0 - 10 V

### ROD AIR BLEED



## 10 SERVOCYLINDERS TYPE CKV

### 10.1 Inductive transducers - basic working principles

The inductive transducer is composed by a single coil-winding ① and a ferromagnetic core ②. The coil-winding is integrated into a tube fixed to the cylinder's rear head, the core is fixed to the piston rod and moves together with it.

When the core moves together with the piston, the inductance of the coil-winding changes proportionally to the core position and a proper separate electronics conditioning card transforms this measurement into an analogic output feedback signal.

The contactless principle of the transducer ensures a long working life and its ruggedness construction allows to withstand high frequencies or dynamical stresses (i.e. simulators, vibropresses etc.).

The compact construction of CKV allows the easy application of the servocylinders in place of cylinders without any measuring system.

The separated conditioning card makes the inductive transducer ideal for all applications with high temperatures: in this case the max temperature is limited by the sealing system.

### 10.2 Transducer features

CKV are equipped with Penny & Giles's ICT inductive transducers whose features are shown in the table at side.

The performances of the transducer indicated in the table at side refer exclusively to the use with its proper conditioning card.

### 10.3 Electronic conditioning card

The electronic conditioning card is not included in the supply and has to be ordered separately. Two types of electronic conditioning card are available:

**SP-EICT/VM** (voltage output 0-10V)

**SP-EICT/CM** (current output 4-20mA)

Both have the possibility to adjust the zero and gain references.

The card format fits to DIN EN50022 or EN50035 rails or allows a wall mounting by 4 screws M5x30.

Other output ranges are available on request, please contact our technical office.

### 10.4 Electronic connections

The 4 PIN male connector is mounted on side 4 of the cylinder rear head for all mounting styles except style E (ISO MS2) where it is mounted along the cylinder's axis, see section 13.

The straight female cable connector ③ **SP-PT-06W-8-4S** is included in the supply.

See the table at side for electronic connections.

### 10.5 Strokes

From 100 to 900 mm by increments of 100 mm.

If a not standard stroke is required please contact our technical office.

### 10.6 Cylinder features

See sections 11, 12 and 13 for sizes, mounting style and dimensions.

See sections from 14 to 21 for materials and options.

### 10.7 Fluid requirements

CKV servocylinders are suitable for operation with mineral oils with or without additives (**HH**, **HL**, **HLP**, **HLP-D**, **HM**, **HV**), fire resistant fluids (**HFA** oil in water emulsion - 90-95% water and 5-10% oil, **HFB** water in oil emulsion - 40% water, **HFC** water glycol - max 45% water) and synthetic fluids (**HFD-U** organic esters, **HFD-R** phosphate esters).

For the proper choice of the sealing system, in relation to the fluid characteristics, see section 20.

Recommended fluid characteristics:

- Viscosity: 15 ÷ 100 mm<sup>2</sup>/s

- Temperature range: 0 ÷ 70°C

- Fluid contamination class: ISO 19/16 achieved with in-line filters at 25 µm

### 10.8 Start-up notes

During the start-up it is necessary to bleed off the air from the servocylinder see section 22.

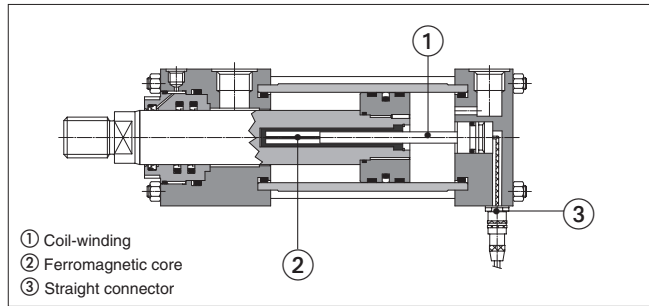
For other details please refer to the start-up instructions included in the supply.

### 10.9 Warnings

Ensure that the maximum distance between the servocylinder and the conditioning card is lower than the recommended one: 25 m.

It is recommended to connect the draining port to the tank without back pressure, see section 23 for details.

## SERVOCYLINDER TYPE CKV



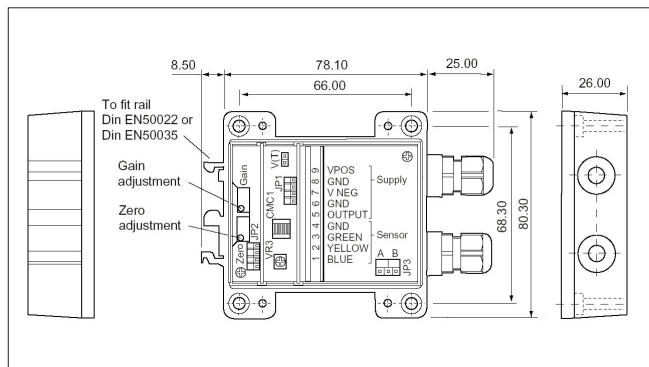
### TRANSDUCER FEATURES

Linearity	±0,2%
Repeatability	±0,05 %
Insulation resistance	>50 MΩ to 50 Vdc
Temperature coefficient	±200 ppm/°C from -20 to +100°C
Operating temperature	-20 ÷ +120°C
Connection type	4 Pin connector to Mil-C-26482
Protection degree	IP65 to DIN 40050
Measuring range	100 to 1000 mm
Maximum speed	1 m/s

### ELECTRONIC CONNECTIONS

4 pin female connector (to solder)	PIN	WIRING	SIGNAL	NOTES
 <b>SP-PT-06W-8-4S</b> (Transducer view)	A	yellow	Ve+	Coil V+
	B	green	AGND	Ground; signal zero for Vout
	C	-	NC	Do not connect
	D	blue	Ve-	Coil V-

### ELECTRONIC CONDITIONING CARD



	SP-EICT/VM	SP-EICT/CM
Supply voltage	from 13,5 to 30 Vdc	from 10 to 30 Vdc
Supply current	19 mA max	12,6 mA max
Output	0÷10 Vdc	4÷20 mA
Zero adjustment range	-10% to +60% of span	
Gain adjustment range	+40% to +110% of span	
Output ripple	< 5 mV rms	
Output load	10 kΩ min.	
Operating temperature	0 ÷ +70°C (storage -40 +85°C)	
Temperature coefficient	300 ppm/°C	
Protection degree	IP66 to DIN 40050	

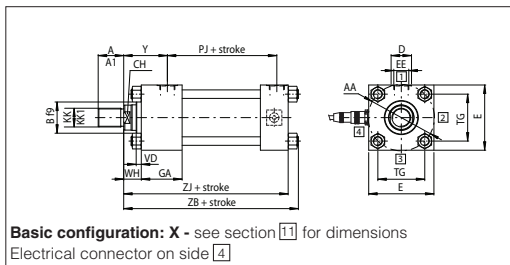
# 11 INSTALLATION DIMENSIONS [mm] FOR SERVOCLINDERS TYPE CKP, CKV

Ø Bore	40	50	63	80	100	125	160	200
Ø Rod	28	36	45	56	70	90	110	140
<b>A</b>	28	36	45	56	63	85	95	112
<b>A1</b> option <b>H</b>	NA	NA	NA	36	45	56	63	85
<b>AA</b>	59	74	91	117	137	178	219	269
<b>B</b> f9	42	50	60	72	88	108	133	163
<b>CB</b> A16	20	30	30	40	50	60	70	80
<b>CD</b>	14	20	20	28	36	45	56	70
<b>CF</b>	40	60	60	80	100	120	140	160
<b>CH</b>	22	30	39	48	62	80	100	128
<b>CO</b> N9	12	12	16	16	16	20	30	40
<b>CX</b>	value	20	25	30	40	50	60	80
	tolerance	0 -0,012			0 -0,015		0 -0,02	
<b>D</b> (1)	25	29	29	36	36	42	42	52
<b>E</b>	63	75	90	115	130	165	205	245
<b>EE</b> (1)	G 3/8	G 1/2	G 1/2	G 3/4	G 3/4	G 1	G 1	G 1 1/4
<b>EP</b>	13	17	19	23	30	38	47	57
<b>EW</b> h14	20	30	30	40	50	60	70	80
<b>EX</b>	16	20	22	28	35	44	55	70
<b>F</b>	10	16	16	20	22	22	25	25
<b>FB</b> H13	11	14	14	18	18	22	26	33
<b>GA</b>	55	61	61	70	72	80	83	101
<b>J</b>	38	38	38	45	45	58	58	76
<b>KC</b>	4	4,5	4,5	5	6	6	8	8
<b>KK</b>	M20x1,5	M27x2	M33x2	M42x2	M48x2	M64x3	M80x3	M100x3
<b>KK1</b> option <b>H</b>	NA	NA	NA	M27x2	M33x2	M42x2	M48x2	M64x2
<b>L</b>	19	32	32	39	54	57	63	82
<b>LH</b> h10	31	37	44	57	63	82	101	122
<b>LT</b> min	25	31	38	48	58	72	92	116
<b>MR</b> max	17	29	29	34	50	53	59	78
<b>MS</b> max	29	33	40	50	62	80	100	120
<b>PJ</b>	85	74	80	93	101	117	130	165
<b>R</b> js13	41	52	65	83	97	126	155	190
<b>RD</b>	62	74	88	105	125	150	170	210
<b>SB</b> H13	11	14	18	18	26	26	33	39
<b>SS</b>	110	92	86	105	102	131	130	172
<b>ST</b> js13	12,5	19	26	26	32	32	38	44
<b>TC</b> h14	63	76	89	114	127	165	203	241
<b>TD</b> f8	20	25	32	40	50	63	80	100
<b>TG</b> js13	41,7	52,3	64,3	82,7	96,9	125,9	154,9	190,2
<b>TM</b> h14	76	89	100	127	140	178	215	279
<b>TO</b> js13	87	105	117	149	162	208	253	300
<b>TS</b>	83	102	124	149	172	210	260	311
<b>UM</b>	108	129	150	191	220	278	341	439
<b>UO</b> max	110	130	145	180	200	250	300	360
<b>US</b>	103	127	161	186	216	254	318	381
<b>UT</b>	95	116	139	178	207	265	329	401
<b>UW</b>	70	88	98	127	141	168	205	269
<b>VD</b>	12	9	13	9	10	7	7	7
<b>VE</b>	22	25	29	29	32	29	32	32
<b>VL</b>	3	4	4	4	5	5	5	5
<b>WF</b>	35	41	48	51	57	57	57	57
<b>WH</b>	25	25	32	31	35	35	32	32
<b>XC</b>	184	191	200	229	257	289	308	381
<b>XG</b>	57	64	70	76	71	75	75	85
<b>XO</b>	190	190	206	238	261	304	337	415
<b>XS</b>	45	54	65	68	79	79	86	98
<b>XV</b> (2)	Minimum stroke	5	15	20	20	35	35	35
	min	100	109	120	129	148	155	161
	max	99+stroke	98+stroke	100+stroke	115+stroke	117+stroke	134+stroke	141+stroke
<b>Y</b>	62	67	71	77	82	86	86	98
<b>ZB</b> max	178	176	185	212	225	260	279	336
<b>ZJ</b>	165	159	168	190	203	232	245	299

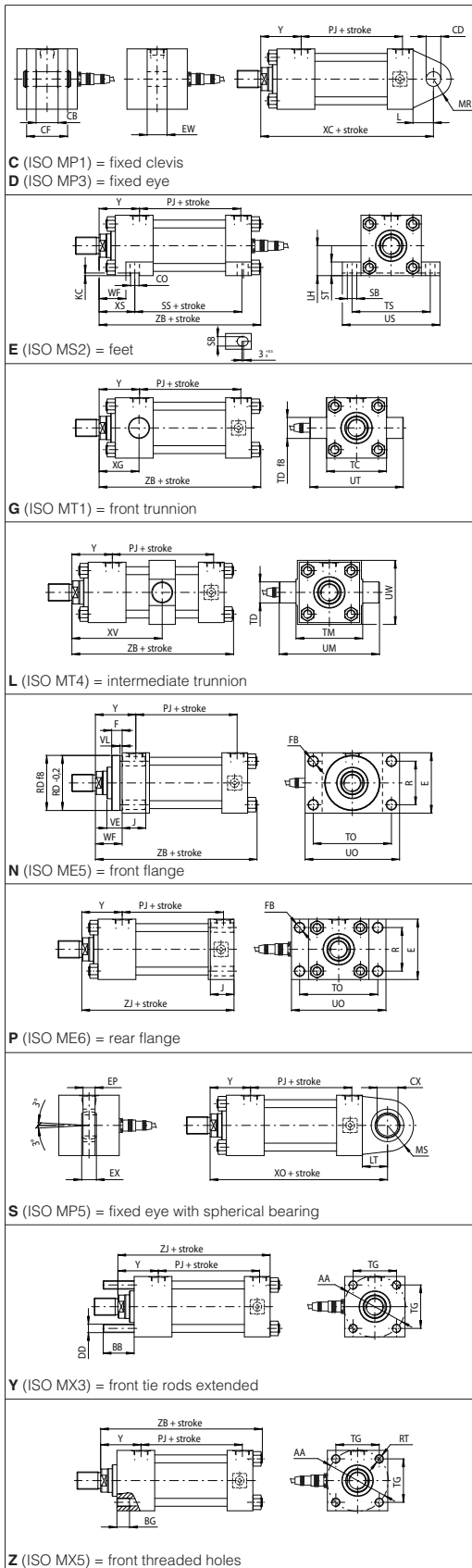
## NOTES TO TABLE

- (1) Oil ports EE are threaded according to ISO 1179-1 (GAS standards) with counter-bore dimension D.
- (2) **XV** - For cylinders with mounting style **L** the stroke must always exceed the minimum values reported in the table. The requested XV value must be included between **XV min** and **XV max** and it must be always indicated, with dimension in millimeters, together with the cylinder code. See the following example:  
CKP/00-50/36\*0500-L208 - K - B1E3X1  
**XV = 200**

# 12 BASIC CONFIGURATION



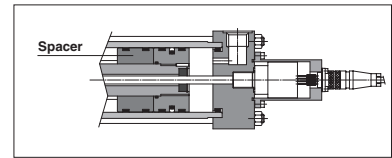
# 13 MOUNTING STYLES FOR SERVOCYLINDERS TYPE CKP, CKV





#### 14 SPACER

For strokes longer than 1000 mm, proper spacers should be introduced in the cylinder's construction to increase the rod and piston guide and to protect them from overloads and premature wear. Spacers can be omitted for cylinders working in traction mode. The introduction of spacers increases the overall cylinder's dimensions: spacers' length has to be added to all stroke dependent dimensions in sections [6] and [11].



#### 15 CYLINDER'S HOUSING FEATURES

The cylinder's housings are made in "cold drawn and stressed steel" with  $R_s = 450 \text{ N/mm}^2$ ; the internal surfaces are lapped: diameter tolerance H8, roughness  $R_a \leq 0,4 \text{ } \mu\text{m}$ .

#### 16 TIE RODS FEATURES

The cylinder's tie rods are made in "normalized automatic steel" with  $R_s = 610 \text{ N/mm}^2$ ; end-threads are rolled to improve the fatigue working life. They are screwed to the heads or mounted by means of nuts with a prefixed tightening torque MT, see the table at side.

#### 17 RODS FEATURES and options

The rods materials have high strength, which provide safety coefficients higher than 4 in static stress conditions, at maximum working pressure. The rod surface is chrome plated: diameter tolerances f7; roughness  $R_a \leq 0,25 \text{ } \mu\text{m}$ . Corrosion resistance of 100 h in neutral spray to ISO 9227 NSS

Ø Rod	Material	$R_s \text{ min}$ [N/mm <sup>2</sup> ]	Chrome thickness [mm]	hardness [HV]
28÷90	hardened and tempered alloy-steel	700	0,020	850-1150
110÷140	alloy steel	450		

Rod diameters from 28 to 70 mm have rolled threads; in rolling process the component material is stressed beyond its yield point, being deformed plastically. This offers many technical advantages: higher profile accuracy, improved fatigue working life and high wear resistance. The rod and piston are mechanically coupled by a threaded connection in which the thread on the rod is at least equal to thread KK, indicated in the table [6] and [11]. The piston is screwed to the rod by a prefixed tightening torque in order to improve the fatigue resistance. The stop pin ① avoids the piston unscrewing.

**Please contact our technical office** in case of heavy duty applications.

Rod corrosion resistance and hardness can be improved selecting the options **K** and **T**:

**K** = Nickel and chrome-plating (only for rods from 28 to 110 mm, for pressure up to 100 bar)

Corrosion resistance (rating 10 to ISO 10289):

- 350 h in acetic acid salt spray to ISO 9227 AASS
- 1000 h in neutral spray to ISO 9227 NSS

**T** = Induction surface hardening and chrome plating:

- 56-60 HRC (613-697 HV) hardness

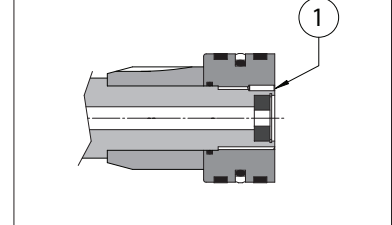
#### RECOMMENDED SPACERS

Stroke [mm]	1001 ÷ 1500	1501 ÷ 2000	2001 ÷ 2500	2501 ÷ 3000
Spacer code	<b>2</b>	<b>4</b>	<b>6</b>	<b>8</b>
Length [mm]	50	100	150	200

#### TIE RODS TIGHTENING TORQUES

Ø Bore	40	50	63	80
MT [Nm]	20	70	70	160
Wrench	13	19	19	24
Ø Bore	100	125	160	200
MT [Nm]	160	460	820	1160
Wrench	24	32	41	46

#### ROD-PISTON COUPLING



#### 18 CUSHIONINGS

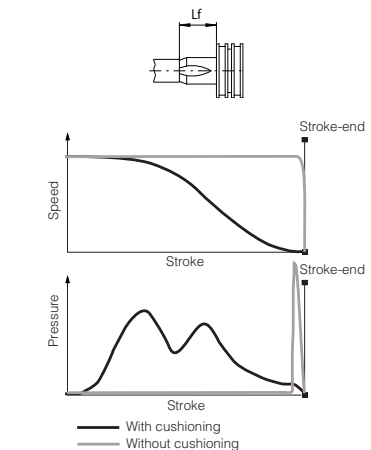
Cushionings are recommended for applications where: • the piston makes a full stroke with speed over than 0,05 m/s; • it is required to reduce undesirable noise and mechanical shocks; • vertical application with heavy loads. The stroke-end cushionings are hydraulic dampers specifically designed to dissipate the energy of the mass connected to the cylinder rod, by progressively increasing the pressure in the cushioning chamber and thus reducing the rod speed before the cylinder's mechanical stroke-end (see the graphics at side). See **tab. B015** for the max damping energy.

The cylinder is provided with needle valve to optimize cushioning performances in different applications. The regulating screws are supplied fully screwed in (max cushioning effect).

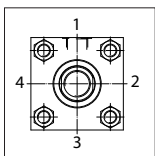
In case of high masses and/or very high operating speeds we recommend to back them off to optimize the cushioning effect. The adjustment screw has a special design to prevent unlocking and expulsion. The cushioning effect is highly ensured even in case of variation of the fluid viscosity.

Ø Bore		63	80	100	125	160	200
Ø Rod		45	56	70	90	110	140
Cushioning length [mm]	Lf	27	29	27	25	34	34

Lf is the total cushioning length. When the stroke-end cushionings are used as safety devices, to mechanically preserve the cylinder and the system, it is advisable to select the cylinder's stroke longer than the operating one by an amount equal to the cushioning length Lf. In this way the cushioning effect does not influence the movement during the operating stroke.



#### 19 POSITION OF THE OIL PORTS AND CUSHIONING ADJUSTMENTS



FRONT HEAD: **B1** = oil port position; **E\*** = cushioning adjustment position

REAR HEAD: **X1** = oil port position.

The oil ports and cushioning adjustment positions are available, respectively, on sides 1 and 3 for all styles except E (see the figure at side): the style E has the cushioning adjustment on side 2.

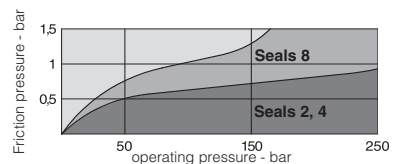
Example of model code: CKM/00-50/22 \*0500-S301 - D - **B1E3X1**

#### 20 SEALING SYSTEM FEATURES

Choose the sealing system according to the working conditions of the system: speed, operating frequencies, fluid type and temperature.

Seals **2** and **4** not available for CKP.

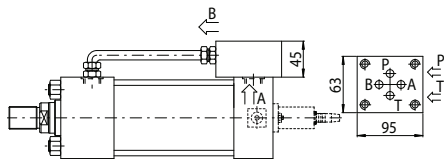
Special sealing system for low temperature, high frequencies (up to 20 Hz), long working life and heavy duty are available on request. All the seals, static and dynamic, must be periodically replaced: proper spare kits are available, see **tab. B137**. Please contact our technical office for the compatibility with other fluids not mentioned below and specify type and composition.



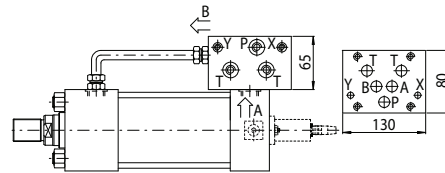
Sealing system	Material	Features	Max speed [m/s]	Fluid temperature range	Fluids compatibility	ISO Standards for seals	
						Piston	Rod
<b>2</b>	FKM + PTFE	very low friction and high temperatures	1	-20°C to 120°C	Mineral oils HH, HL, HLP, HLP-D, HM, HV, fire resistance fluids HFA, HFB, HFD-U, HFD-R	ISO 7425/1	ISO 7425/2
<b>4</b>	NBR + PTFE	very low friction and high speeds	4	-20°C to 85°C	Mineral oils HH, HL, HLP, HLP-D, HM, HV, MIL-H-5606 fire resistance fluids HFA, HFC (water max 45%), HFD-U	ISO 7425/1	ISO 7425/2
<b>8</b>	PTFE + NBR + POLYURETHANE	low friction	1	-20°C to 85°C	Mineral oils HH, HL, HLP, HLP-D, HM, HV	ISO 7425/1	ISO 7425/2

## 21 INCORPORATED SUBPLATE

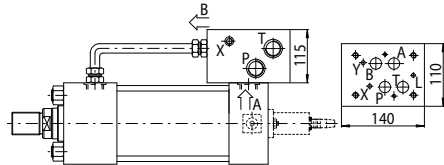
CK\* servocylinders can be supplied with ISO (size 06, 10, 16 and 25) incorporated subplates for mounting of valves directly on the cylinder.



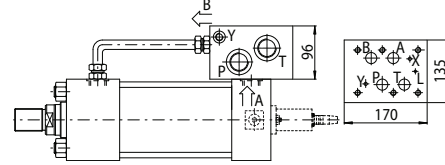
**10** = subplate with mounting surface 4401-03-03-0-05 (size 06)  
Oil ports P and T = G 3/8  
For bores from 40 to 200 and strokes longer than 100 mm, for shorter strokes, the cylinder must be provided with suitable spacer.



**20** = subplate with mounting surface 4401-05-05-0-05 (size 10)  
Oil ports P and T = G 3/4; X and Y = G 1/4  
For bores from 40 to 200 and strokes longer than 150 mm, for shorter strokes, the cylinders must be provided with suitable spacer.



**30** = subplate with mounting surface 4401-07-07-0-05 (size 16)  
Oil ports P and T = G 1; L, X and Y = G 1/4  
For bores from 80 to 200 and strokes longer than 150 mm, for shorter strokes, the cylinders must be provided with suitable spacer.

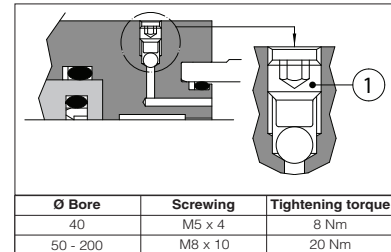


**40** = subplate with mounting surface 4401-08-08-0-05 (size 25)  
Oil ports P and T = G 1; L, X and Y = G 1/4  
For bores from 125 to 200 and strokes longer than 150 mm, for shorter strokes, the cylinders must be provided with suitable spacer.

**Note:** For the choice of suitable spacer see section 14. The addition of spacer length and working stroke must be at least equal or upper than the minimum stroke indicated above, see the following example:  
Subplate **20** ; working stroke = **70** mm; min. stroke = **150** mm → select spacer **4** (length = **100**mm)

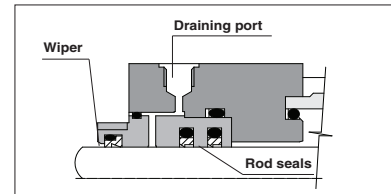
## 22 AIR BLEEDS

The air in the hydraulic circuit must be removed to avoid noise, vibrations and irregular cylinder's motion: air bleed valves realize this operation easily and safely.  
If not otherwise specified, the air bleeds are positioned on side 3, see section 19.  
For a proper use of the air-bleed (see figure on side) unlock the grub screw ① with a wrench for hexagonal head screws, moves the cylinder for the necessary cycles to bleed-off the air and retighten as indicated in table at side.



## 23 DRAINING

The rod side draining reduces the seals friction and increases their reliability.  
The draining is positioned on the same side of the oil port, between the wiper and the rod seals (see figure at side).  
It is recommended to connect the draining port to the tank without backpressure.  
Draining port is G1/8.



## 24 SERVOCYLINDERS DERIVED FROM SERIES CH, CN, CC

Servocylinders derived from CH (ISO 6020-2 P = 160 bar; **tab. B140**), CH big bores (ISO 6020-3 P = 160 bar; **tab. B160**), CN (ISO 6020-1 P = 160 bar; **tab. B180**) and CC series (ISO 6022 P = 250 bar; **tab. B241**) are available on request. Please contact our technical office for details.

BASIC CYLINDER	DERIVED SERVOCYLINDERS	
<b>CH big bore</b> (tab. B160) <b>ISO 6020-3</b> Pnom 160 bar Pmax 250 bar Ø bore 250÷400 mm Ø rod 140÷220 mm	<b>CHP, CHV</b> - example of style "S"	<b>CHF, CHM</b> - example of style "N"
<b>CN</b> (tab. B180) <b>ISO 6020-1</b> Pnom 160 bar Pmax 250 bar Ø bore 50÷200 mm Ø rod 36÷140 mm	<b>CNP, CNV</b> - example of style "N"	<b>CNF, CNM</b> - example of style "L"
<b>CC</b> (tab. B241) <b>ISO 6022</b> Pnom 250 bar Pmax 320 bar Ø bore 50÷400 mm Ø rod 36÷280 mm	<b>CCP, CCV</b> - example of style "S"	<b>CCF, CCM</b> - example of style "A"