

ECF3

ELECTRIC CYLINDERS FOR FORCE CONTROL APPLICATIONS

SERIES 11

DESCRIPTION

A - Electric cylinder
B - Lubrication point
C - Integrated load cell
D - Load cell cable outlet
E - Load cell power supply
F - Motor

- ECF3 cylinders are designed for all applications requiring direct force measurement and control.
- They are characterized by compact design and integrated load cell with voltage output signal.
- The linear motion transmission is realized by means of precise and with high efficiency ball screws. This series is characterized by a selection of oversized ball screws. This feature maximizes the life of the cylinders and makes them suitable for the most demanding applications.
- The cylinder design is made to minimize vibrations: the piston is precisely guided in the barrel with double sliding guide; the shaft end of the screw is supported by a bearing; the rod is guided into the front head with a long linear bushing.
- The cylinder can be equipped with a robust integrated rotation stopper.
- The piston is equipped with a magnetic ring and the external side of the barrel is provided with slots that might accommodate sensor. The rod has an increased external diameter and thickness to maximize rigidity and resistance to radial and buckling loads. The screw is supported by high-capacity bearings to allow the transmission of high loads in both directions.

PERFORMANCES

Size		80	100	125
Maximum axial force	N	20 900	53 500	123 400
Maximum speed	mm/s	833	533	423
Maximum acceleration	m/s ²	13	13	13
Load cell nominal force	mm	25 000		
Maximum average axial force for 2500 km life	N	4 500	19 745	49 640
Ambient temperature range	°C	-20 / +80		
Max air humidity allowed for IP65 (without condensation)	%	90		
Protection degree		IP44 o IP65		



1 - IDENTIFICATION CODE

EC	F	3	-		/	-	B	/	11	-		/	P	-	/M
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Electric cylinders

Series: **F** = force control

Dimensional group

Bore: **080** = 80 mm
100 = 100 mm
125 = 125 mm

Mounting type: **T** = front threaded hole (standard)
A = front flange (MF1)

Rod end: **M** = male thread (standard)
F = female thread
C = clevis cap
S = spherical cap

Stroke: For the definition of the strokes contact our technical dept.

Screw type: **B** = ball screw
Roller screw available upon request.

Screw lead: (see overall dimension tables of each size for availability and matches)
050 = 5 mm
100 = 10 mm
200 = 20 mm

Series number

Project No. assigned by Diplomatic

Rod offset:
S000 = no offset (standard)
S010 = offset 10 mm
Custom offset on request

Motor flange:
S = stepper
B = brushless
G = gearbox
Flange for AC or DC motors on request

Motor position (electrical connections):
0 = 12 o'clock **3** = 3 o'clock
9 = 9 o'clock

Motor mounting flange: (omit if not required)
P = parallel (ratio 1:1) (standard)
On request, parallel flange with 2:1 ratio or with customized ratio are also available.

Load cell reference signal:
E0 = 0 ÷ 10 V DC (standard)
E2 = ±5 V DC

End stroke sensor type (see point 12):
0 = no sensor
1 = PNP normally open (standard)
2 = PNP normally closed
3 = NPN normally open
4 = NPN normally closed

End stroke sensor pcs.:
N = none
A = single
D = double
T = triple
Q = quadruple

Lubrication:
N = none
F0 = centred 12 o'clock
F3 = centred 3 o'clock
F6 = centred 6 o'clock
F9 = centred 9 o'clock

Protection class:
N = IP44 **S** = IP65

Rotation stopper:
N = none **P** = present

NOTE: For all items on request you have to contact our sales support.

2 - COMMON TECHNICAL CHARACTERISTICS

ENVIRONMENT	Ambient temperature range	°C	-20 / +80 (NOTE)
	Protection class		IP44 o IP65
	Humidity	%	0 ÷ 90
MECHANICAL	Duty cycle	%	100
	Internal rotation stopper		available on all sizes
	Rod end		male or female
	Rod material		chromium-plated (standard) stainless steel upon request
	Mounting		on front cap or with accessories
	End stroke sensor		available on all sizes
LOAD CELL (force)	Accuracy	% FS	± 0.5
	Repeatability	% FS	± 0.5
	Total error	% FS	< 1%
	Zero shifting	N	± 1
	Thermal effect on zero point	% FS	± 0.1 each 10 °C
ELECTRONIC CARD	Power supply	V DC	12 ÷ 24
	Output signal	V DC	0 ÷ 10 , ±5
	Load cell connection		BN 24V Power supply BK 0÷10V o ±5V Reference signal BU 0V Common GND
	Accuracy		<1% F (min resolution 12-bit)

NOTE: The indicated temperature range refers to the cylinder only, without motor. If the cylinder is equipped with end stroke sensors, the temperature range has to be limited to -10 / +70 °C.

3 - FIELD OF APPLICATION

ECF3 electric cylinders are suitable:

- In normal motion systems with ball screws in automation field; to replace normal cylinders when speed and controlled ramps are required, even under load.
- In any application where motion with considerable traction / thrust forces is required.
- In any system where absence of pollution and / or extreme silence is required.

3.1 - Applications

ECF3 electric cylinders are the right solution for all those applications that require accurate and controlled positioning.

In addition, by integrating a load cell, they make it possible to control the force loop directly on the sensor, and thus they provide a significant advantage for all those applications that require the measurement and control of thrust and traction parameters, such as pressing, forming, clinching and press fitting.

The installation simplicity and the different construction types make the ECF3 cylinder a reference point in this kind of product.

The possibility to share most of the standard accessories with Diplomatic MS EC*3 electric cylinders is an additional practical and cost advantage in mounting the cylinders.



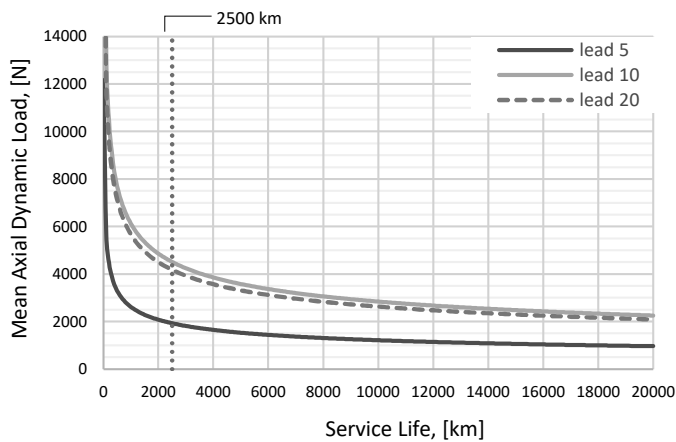
4 - ECF3-080

4.1 - Technical Characteristics

MECHANICAL	Rod diameter	mm	45		
	Rod end		M20x1.5		
BALL SCREW	Nominal diameter	mm	32	32	32
	Lead	mm	5	10	20
	Dynamic load	N	15 333	28 439	20 895
FORCE	Load cell nominal force	N	25 000		
	Max force	N	13 145	20 941	15 990
	Max torque	Nm	13	39.3	58.3
	Dynamic axial force at 2500 km lifetime	N	1 932	4 514	4 179
SPEED	Max speed	rpm	2 500		
		mm/s	208	417	833
ACCELERATION	Max acceleration	m/s ²	3.2	6.4	12.7
EFFICIENCY		%	72	76	76

4.2 - Service Life

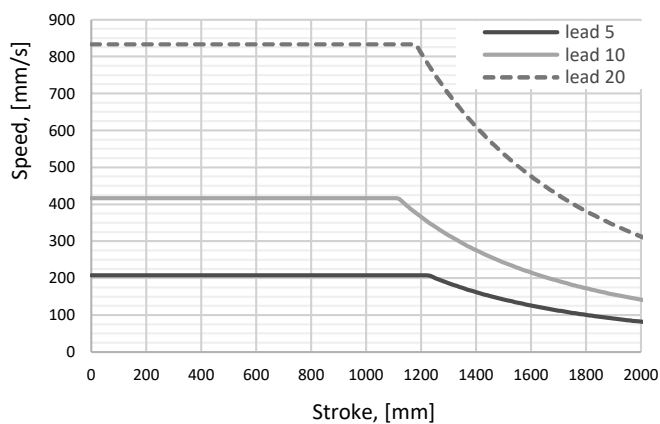
The service life depends on average dynamic axial load.



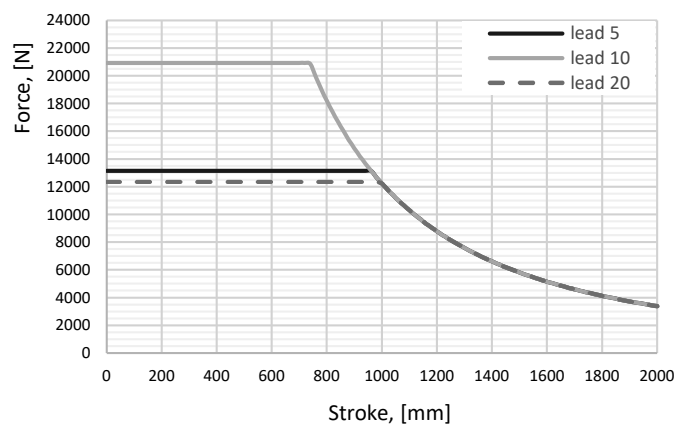
NOTES

- Service life is a statistical value and refers to 90%reliability.
- Correct working conditions: i.e. no lateral-load, no over-load, right lubrication, no over-temperature, no short-stroke application.
- The permissible axial force is calculated considering a pushing condition with free rod end and fixed barrel constraint. Contact us for different loading applications and for further information.

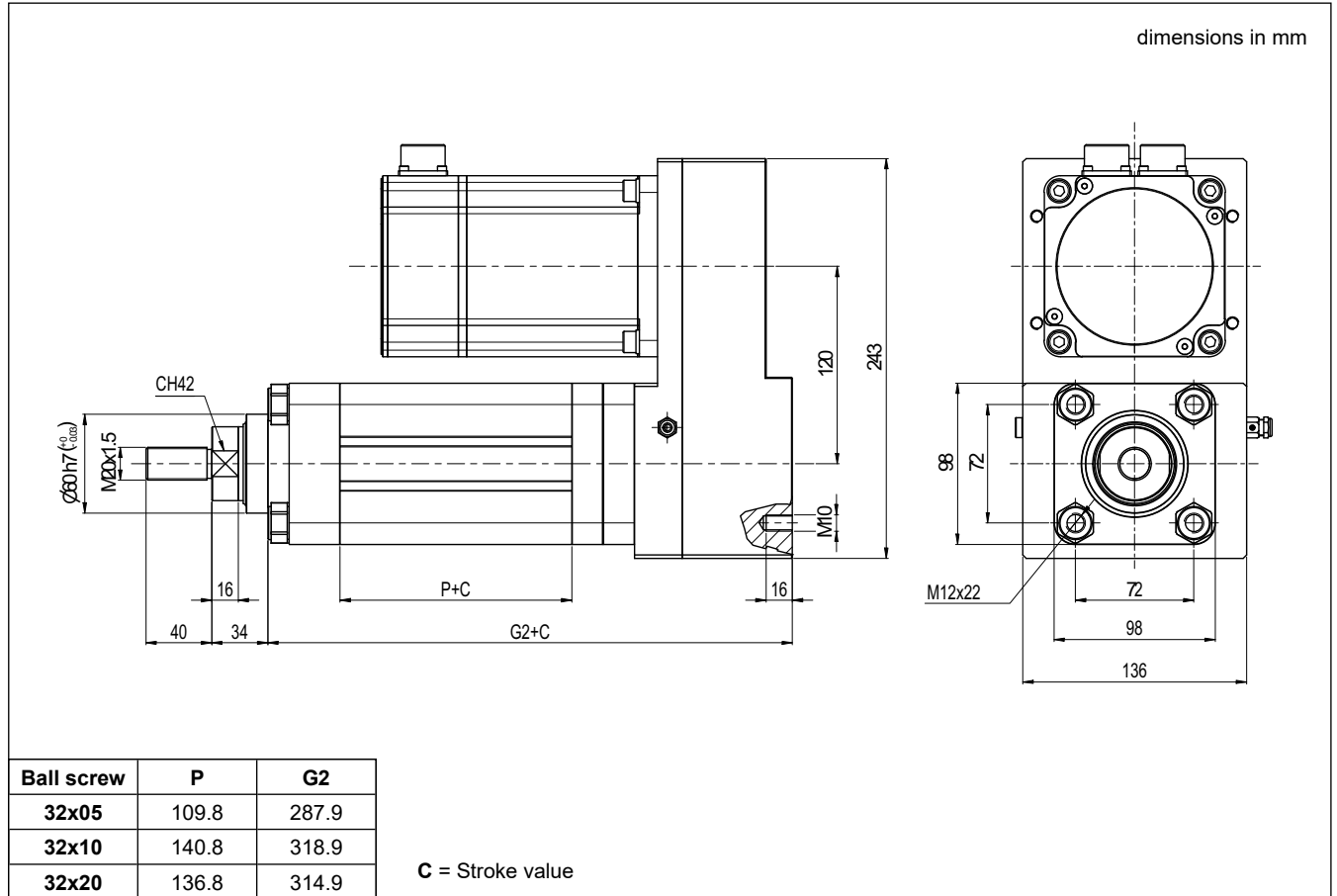
4.3 - Permissible speed



4.4 - Permissible axial force



4.5 - ECF3-080 Overall mounting dimensions





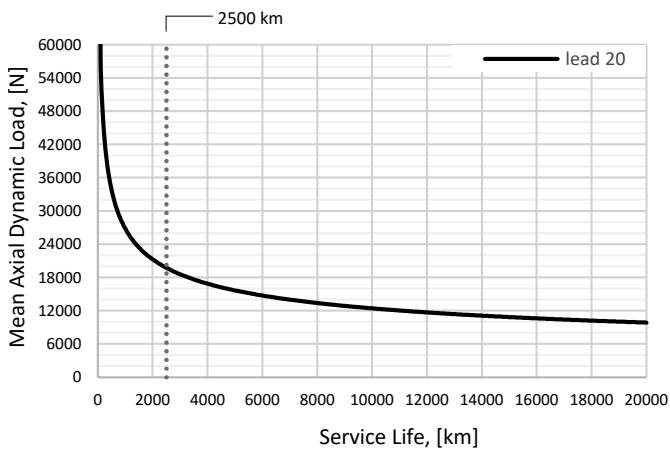
5 - ECF3-100

5.1 - Technical Characteristics

MECHANICAL	Rod diameter	mm	70
	Rod end		M42x2
BALL SCREW	Nominal diameter	mm	50
	Lead	mm	20
	Dynamic load	N	98 718
FORCE	Load cell nominal force	N	50 000
	Max force - parallel	N	53 535
	Max torque - parallel	Nm	198.3
	Dynamic axial force at 2500 km lifetime	N	19 744
SPEED	Max speed	rpm	1 600
		mm/s	533
ACCELERATION	Max acceleration	m/s ²	12.7
EFFICIENCY		%	81

5.2 - Service Life

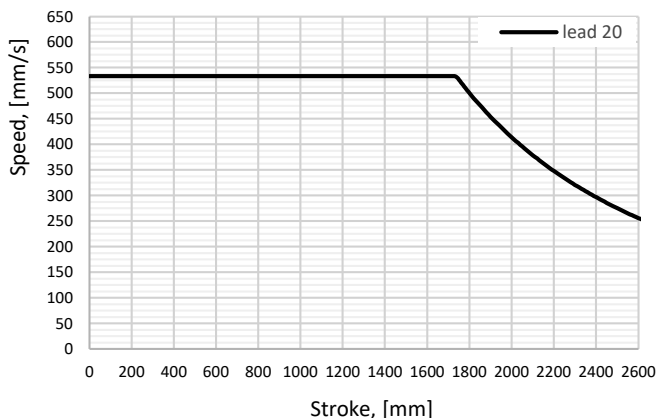
The service life depends on average dynamic axial load.



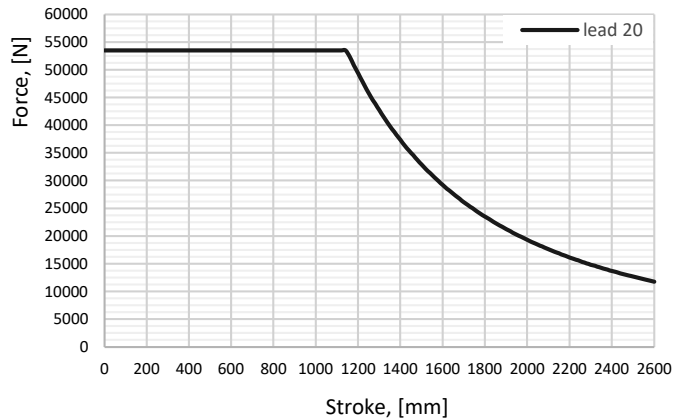
NOTES

- Service life is a statistical value and refers to 90%reliability.
- Correct working conditions: i.e. no lateral-load, no over-load, right lubrication, no over-temperature, no short-stroke application.
- The permissible axial force is calculated considering a pushing condition with free rod end and fixed barrel constraint. Contact us for different loading applications and for further information.

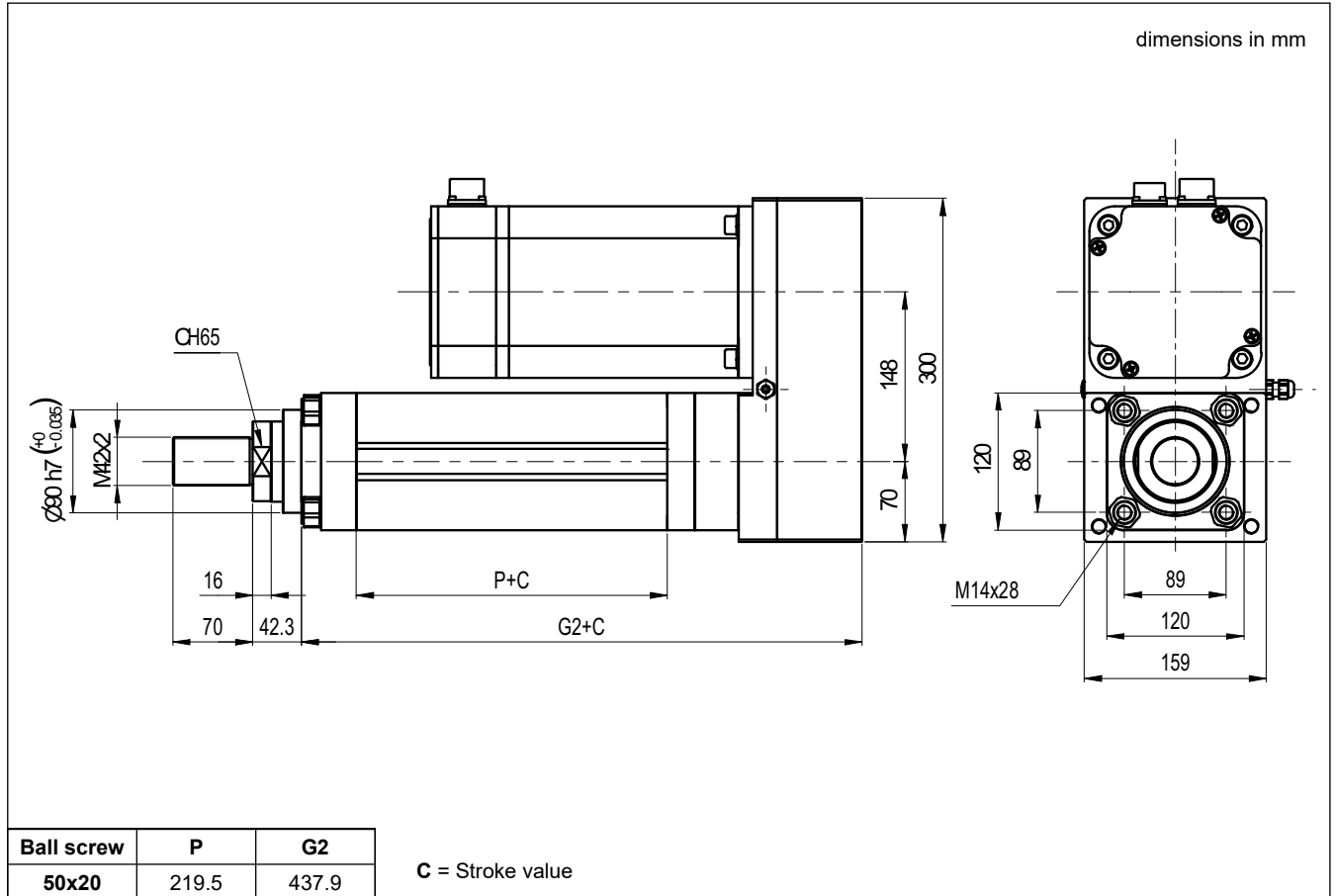
5.3 - Permissible speed



5.4 - Permissible axial force



5.5 - ECF3-100 Overall mounting dimensions





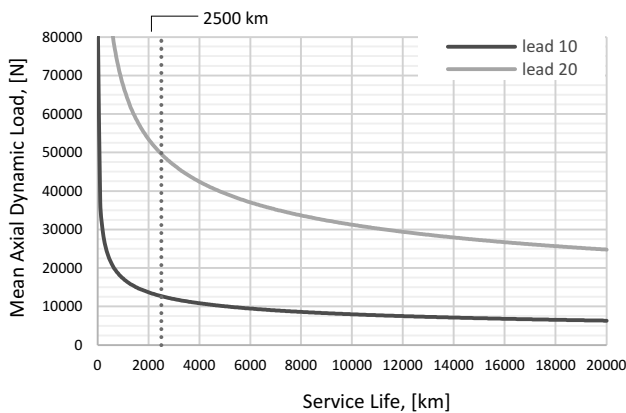
6 - ECF3-125

6.1 - Technical Characteristics

MECHANICAL	Rod diameter	mm	85	
	Rod end		M48x2	
BALL SCREW	Nominal diameter	mm	63	63
	Lead	mm	10	20
	Dynamic load	N	80 148	248 193
FORCE	Load cell nominal force	N	100 000	
	Max force - parallel	N	103 823	123 485
	Max torque - parallel	Nm	205.4	462.7
	Dynamic axial force at 2500 km lifetime	N	12 723	49 639
SPEED	Max speed	rpm	1270	1270
		mm/s	212	423
ACCELERATION	Max acceleration	m/s ²	6.4	12.7
EFFICIENCY		%	76	80

6.2 - Service Life

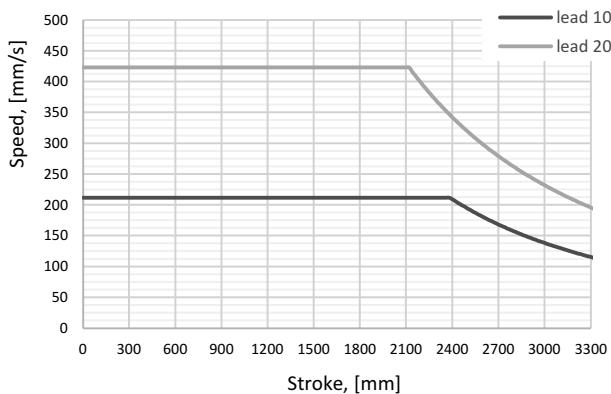
The service life depends on average dynamic axial load.



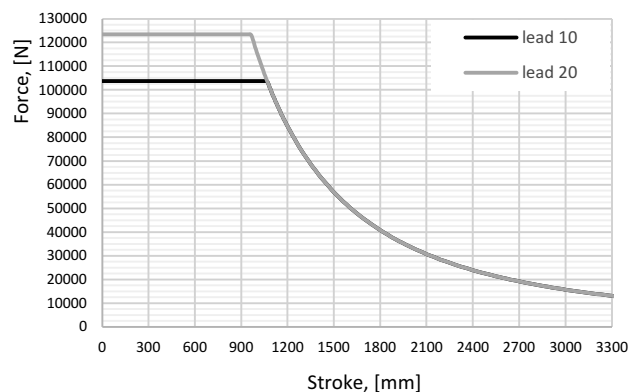
NOTES

- Service life is a statistical value and refers to 90%reliability.
- Correct working conditions: i.e. no lateral-load, no over-load, right lubrication, no over-temperature, no short-stroke application.
- The permissible axial force is calculated considering a pushing condition with free rod end and fixed barrel constraint. Contact us for different loading applications and for further information.

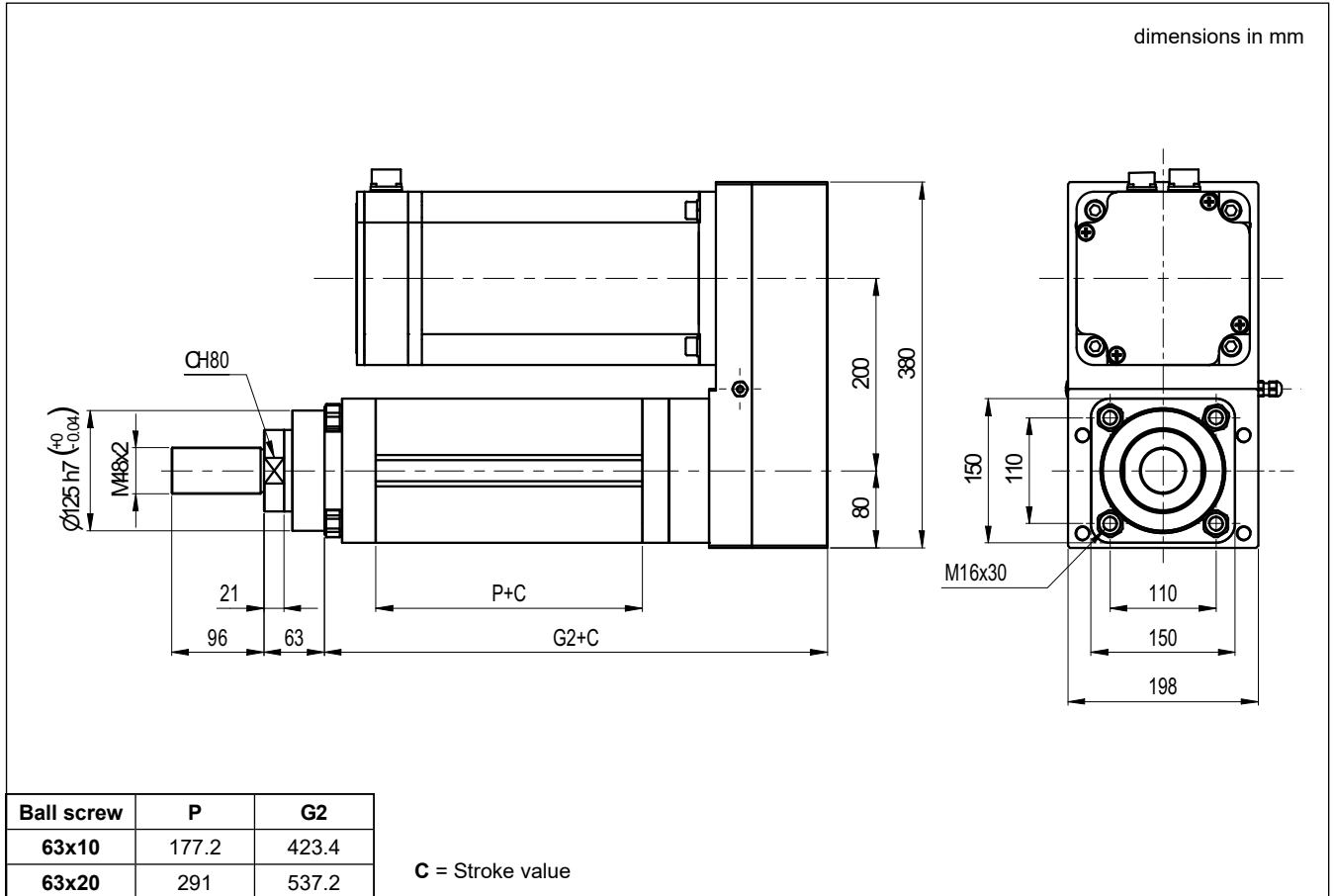
6.3 - Permissible speed



6.4 - Permissible axial force



6.5 - ECF3-125 Overall mounting dimensions



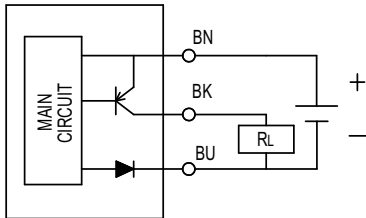
7 - END STROKE SENSORS

All ECF3 electric cylinders can be equipped with end stroke sensors, PNP or NPN type, with normally open or normally closed function. The sensors can be single or redundant, up to 4 sensors.

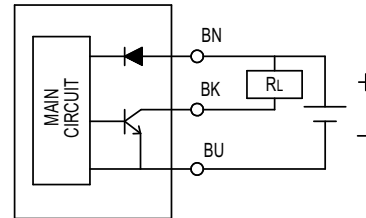
The end stroke sensors are housed in the side grooves of the cylinder. The sensor must then be manually arranged in the desired point. All models are equipped with signalling LEDs.

TYPE		1	2	3	4
Logic		PNP		NPN	
Sensor type		NO	NC	NO	NC
Operating voltage	V DC	5 ÷ 30	10 ÷ 28	5 ÷ 30	10 ÷ 28
switching current	mA	200			
Contact rating	W	6	5.5	6	5.5
current consumption at 24V DC	mA	6	10	6	10
Max voltage drop	V	0.5 (a 200 mA)	1.5	0.5 (a 200 mA)	1.5
Leakage current	mA	0.01	0.05	0.01	0.05
Switching frequency	kHz	max 1000			
Temperature	°C	-10 / +70			
Cable		Ø2.8 PUR - 26 AWG (0.15 mm ²) - 3 wires - 3 meters length			

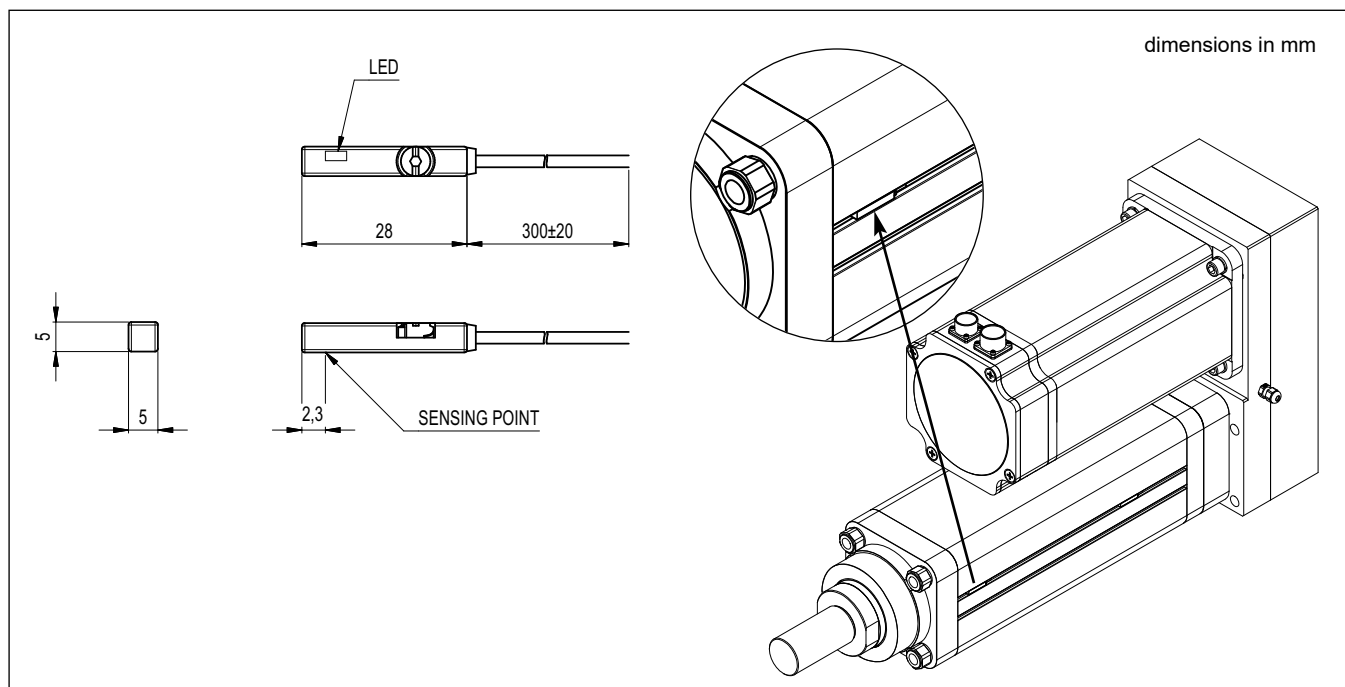
7.1 - Wiring diagram sensor type 1 and 2



sensor type 3 and 4



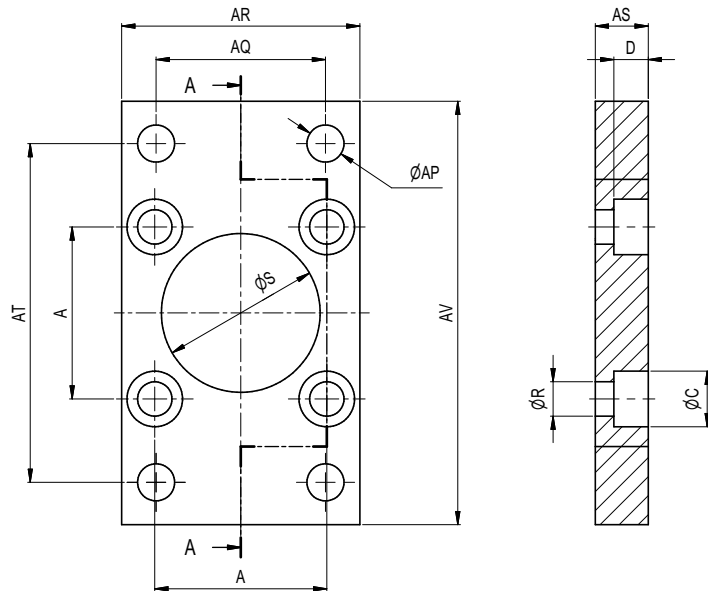
7.2 - Overall dimensions



8 - MOUNTING TYPE A

A FRONT FLANGE (MF1)

dimensions in mm

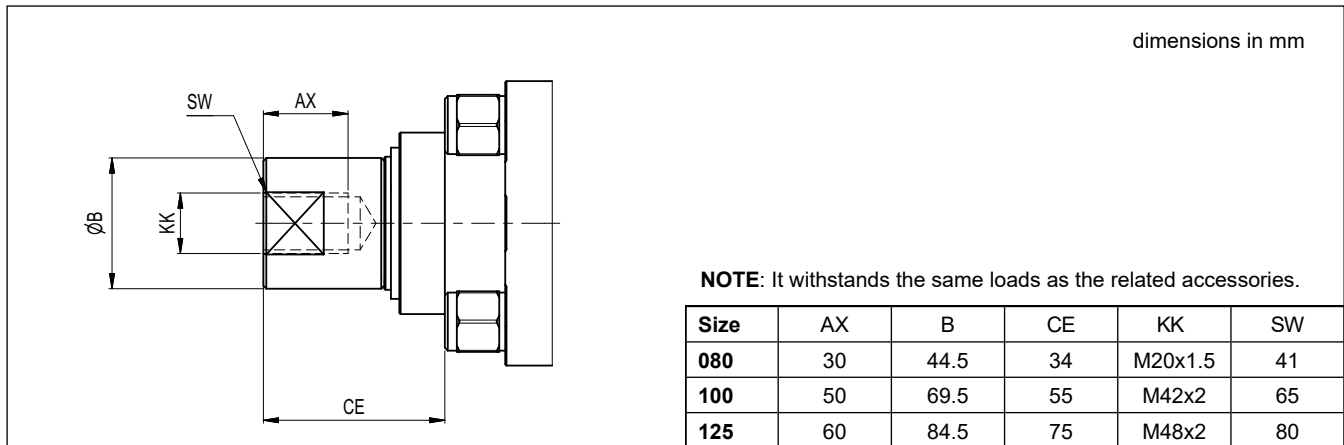


NOTE: Withstands the same loads as for cylinders

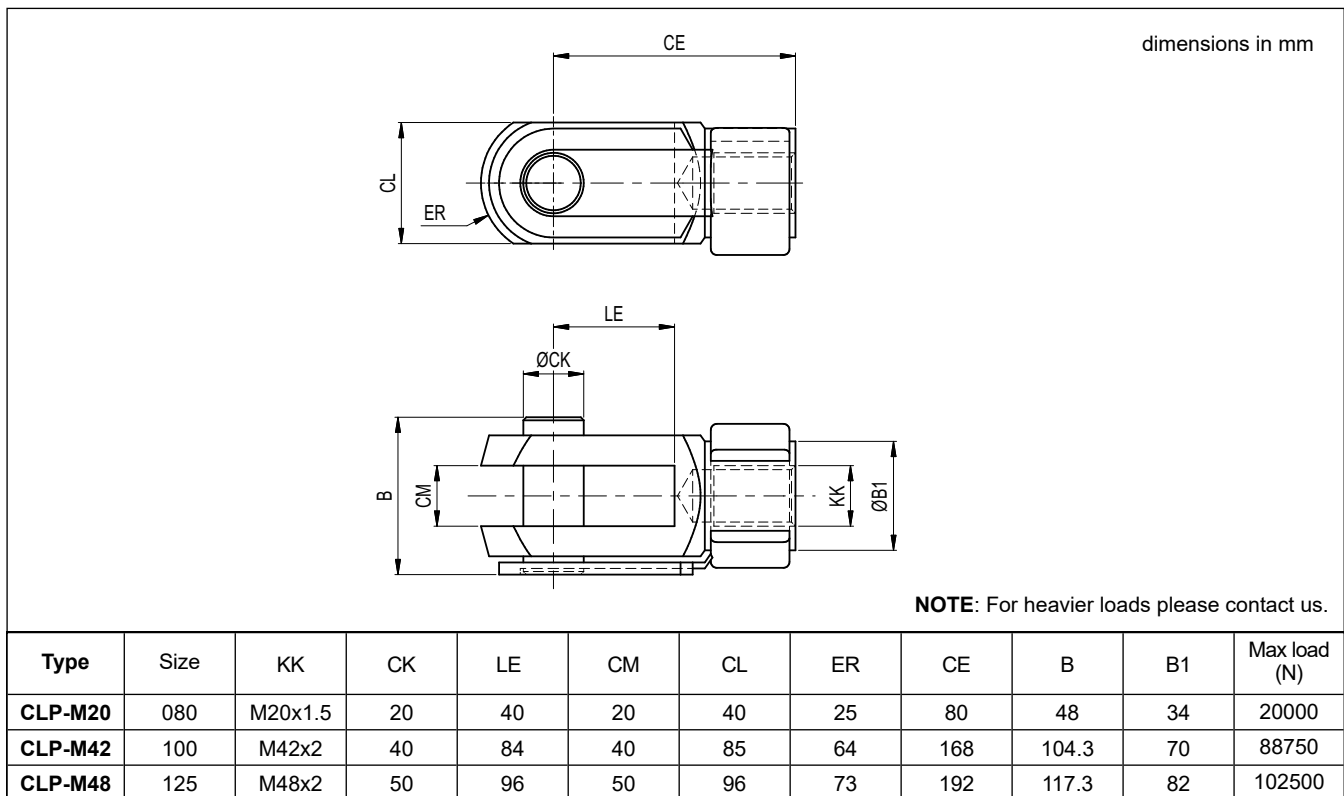
Size	S H11	A ± 0.2	AP H13	R	AS ± 0.2	AR	AQ JS14	AT JS14	AV	C	D
FFP-080	60	72	12	12.5	18	95	63	126	150	19	13
FFP-100	90	89	14.5	14.5	20	115	75	150	170	22	15
FFP-125	125	110	16.5	16.5	25	140	90	180	205	25	18

9 - OVERALL MOUNTING DIMENSIONS FOR ROD END

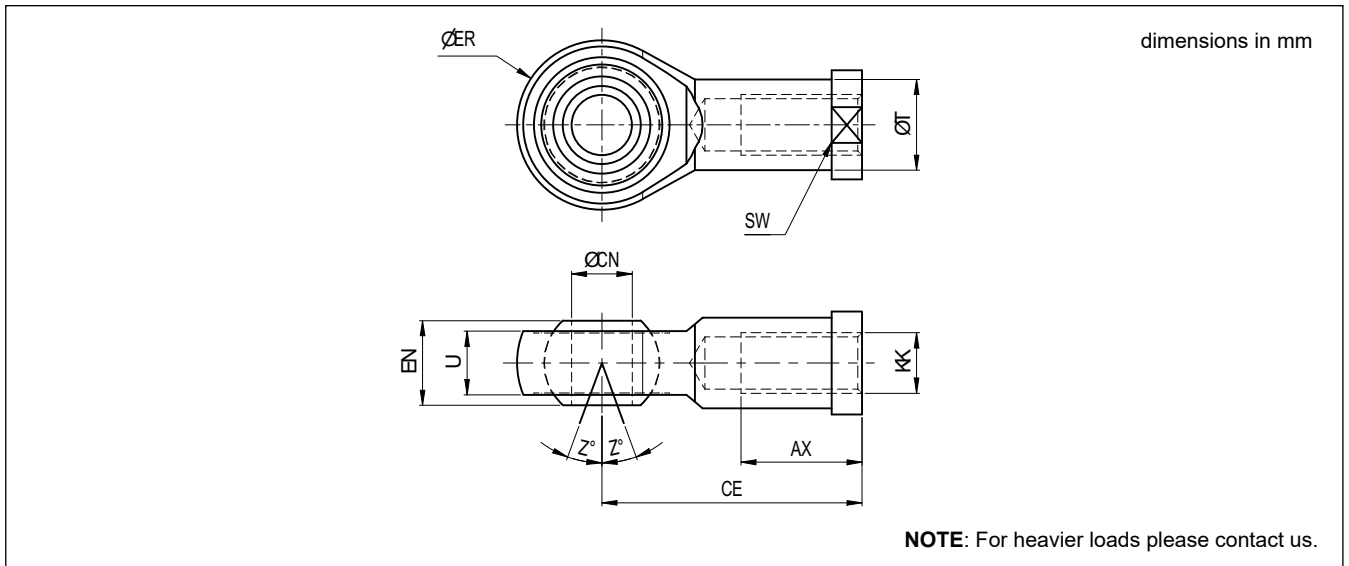
9.1 - Female thread



9.2 - Clevis cap (ISO 8140)



9.3 - Spherical cap (ISO 8139)



Type	Size	KK	CN	U	EN	ER	AX	CE	T	Z	SW	Max load (N)
SPP-M20	080	M20x1.5	20	18	25	50	33	77	27.5	7	30	13000
SPP-M42	100	M42x2	40	33	49	91	60	142	53	8	55	65000
SPP-M48	125	M48x2	50	45	60	117	65	162	65	7	65	77000



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