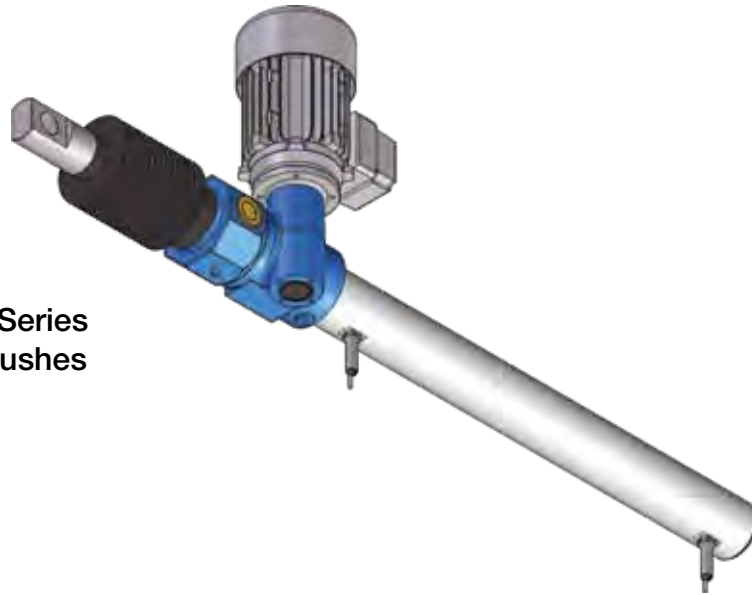
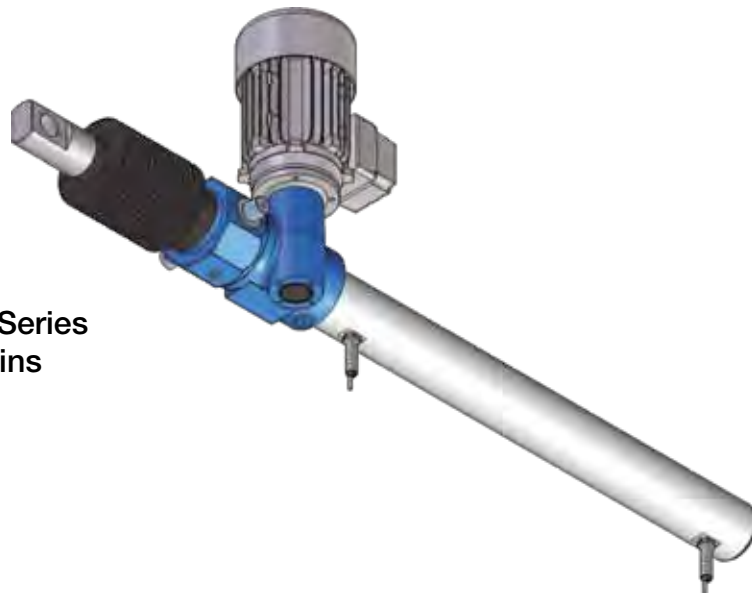


Linear actuators TMA Series

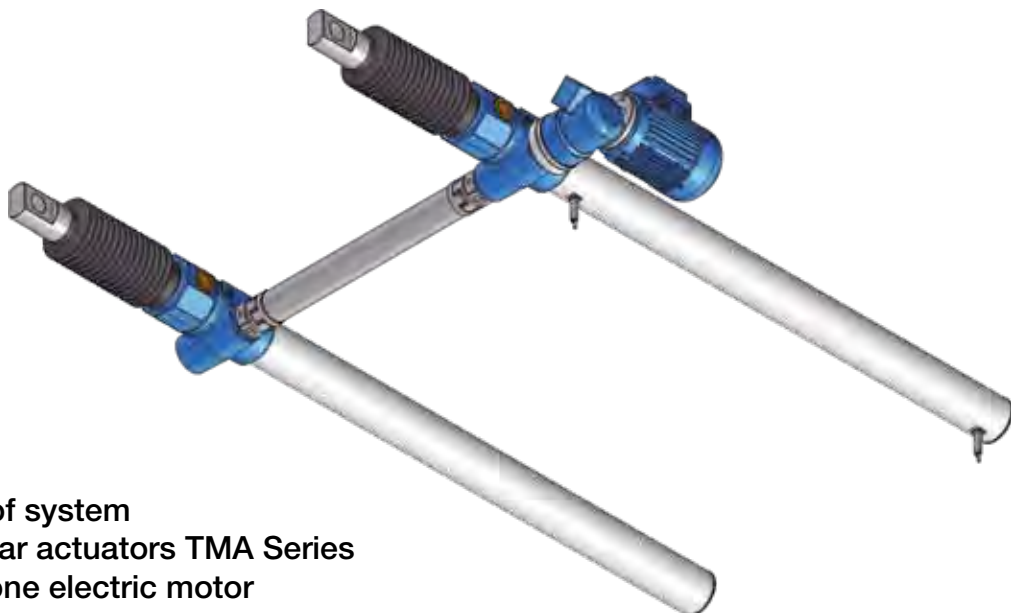
Linear Actuators TMA Series
rear attachment with bushes



Linear Actuators TMA Series
rear attachment with pins



Example of system
with 2 linear actuators TMA Series
and only one electric motor



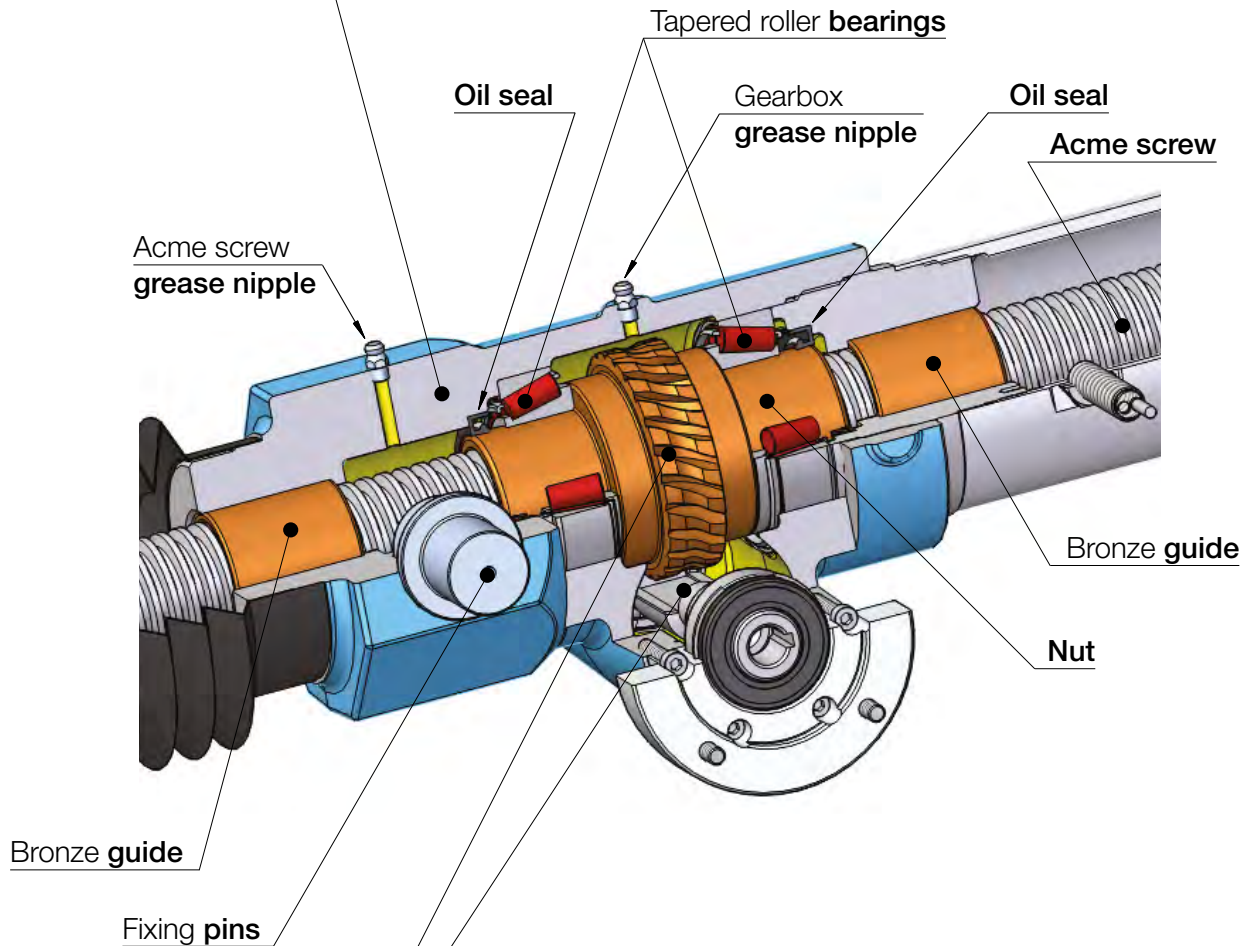
Linear actuators TMA Series

5.1 MANUFACTURING FEATURES

Housing:

designed and manufactured in monobloc form to achieve a compact body able to sustain heavy axial loads and have a high rigidity.

Material: grey cast iron EN-GJL-250 (UNI EN 1561)



Input drive:

precision worm gear

geometric design for high efficiency,

involute profile ZI (UNI 4760 Part 4), low angular backlash.

Worm shaft in case hardened steel 20 MnCr 5 (UNI EN 10084), with thread and input shafts ground.

Wormwheel in bronze EN 1982 – CuSn12-C.

Linear actuators TMA Series

5.2 TECHNICAL DATA - acme screw linear actuators TMA Series

SIZE		TMA 15	TMA 25	TMA 50
Load capacity [kN], (push - pull)		15	25	50
1-start acme screw		Tr 22x5	Tr 30x6	Tr 40x7
Input solid shaft diameter [mm]		10	14	19
Attachment for IEC standard motor (flange and hollow shaft)		63 B14	63 B14	71 B14
Attachment for IEC standard motor (flange adapter + coupling)		—	71 B14	80 B14 90 B14
Ratio	RV	1 : 4 (4 : 16)	1 : 5 (4 : 20)	1 : 6 (4 : 24)
	RN	1 : 16 (2 : 32)	1 : 20	1 : 18 (2 : 36)
	RL	1 : 24	1 : 25	1 : 24
	RXL	1 : 34	1 : 48	1 : 44
Linear travel [mm] for 1 input shaft revolution	Ratio			
	RV1	1.25	1.2	1.17
	RN1	0.31	0.3	0.33
	RL1	0.21	0.24	0.29
Starting efficiency	Ratio			
	RV1	0.26	0.24	0.21
	RN1	0.20	0.16	0.16
	RL1	0.16	0.15	0.14
Running efficiency at 1500 rpm	Ratio			
	RV1	0.41	0.40	0.37
	RN1	0.31	0.27	0.28
	RL1	0.27	0.26	0.25
Starting torque on input shaft at max. load [Nm]	Ratio			
	RV1	12	20	44
	RN1	3.7	7.5	19
	RL1	3.1	6.3	17
Reaction torque on acme screw at max. load [Nm]				
	RXL1	2.8	4.7	12
		30	65	165
Mass of actuator without acme screw [kg]		8	13	26
Mass of each 100 mm of acme screw [kg]		0.5	0.8	1.5

Linear actuators TMA Series

5.2 TECHNICAL DATA - acme screw linear actuators TMA Series

TMA 100	TMA 150	TMA 200	SIZE
100	150	200	Load capacity [kN], (push - pull)
Tr 55×9	Tr 60×12	Tr 80×12	1-start acme screw
24	24	28	Input solid shaft diameter [mm]
80 B5	80 B5	90 B5	Attachment for IEC standard motor (flange and hollow shaft)
90 B14 100-112 B14	90 B14 100-112 B14	100-112 B14	Attachment for IEC standard motor (flange adapter + coupling)
1 : 7 (4 : 28)	1 : 7 (4 : 28)	1 : 8 (4 : 32)	RV
1 : 14 (2 : 28)	1 : 14 (2 : 28)	1 : 24	RN
1 : 28	1 : 28	1 : 32	RL
1 : 40	1 : 40	—	RXL
1.29	1.71	1.5	RV1
0.64	0.86	0.5	RN1
0.32	0.43	0.38	RL1
0.23	0.3	—	RXL1
0.20	0.24	0.21	RV1
0.17	0.20	0.14	RN1
0.13	0.15	0.13	RL1
0.12	0.14	—	RXL1
0.37	0.42	0.39	RV1
0.32	0.36	0.29	RN1
0.25	0.29	0.27	RL1
0.22	0.26	—	RXL1
201	174	230	RV1
61	105	110	RN1
40	70	91	RL1
30	53	—	RXL1
460	800	1 200	Reaction torque on acme screw at max. load [Nm]
43	70	141	Mass of actuator without acme screw [kg]
2.5	3	10.5	Mass of each 100 mm of acme screw [kg]

Linear actuators TMA Series

5.3 PERFORMANCE (actuator WITHOUT input gearbox)

ACME SCREW LINEAR ACTUATORS TMA Series with AC 3-PHASE MOTOR
 PERFORMANCE with: Duty Cycle $F_i = 30\%$ over 10 min at ambient temperature 25 °C

LINEAR SPEED [mm/s]	DYNAMIC LOAD [kN]	RATIO	MOTOR: POWER [kW] – N° of POLES SPEED [rpm]	SELF-LOCKING COEFFICIENT
TMA 15				
29	2.6 ¹⁾	RV1	0.18 kW 4-pole 1400	0.26
7.3	7.7 ¹⁾	RN1	0.18 kW 4-pole 1400	0.20
4.9	10 ¹⁾	RL1	0.18 kW 4-pole 1400	0.16
3.4	12.2 ¹⁾	RXL1	0.18 kW 4-pole 1400	0.13
TMA 25				
28	5.4 ¹⁾	RV1	0.37 kW 4-pole 1400	0.24
7	14.4 ¹⁾	RN1	0.37 kW 4-pole 1400	0.16
5.6	17.5 ¹⁾	RL1	0.37 kW 4-pole 1400	0.15
2.9	25 ²⁾	RXL1	0.37 kW 4-pole 1400	0.11
TMA 50				
27	20.6 ¹⁾	RV1	1.5 kW 4-pole 1400	0.21
9	46.8 ¹⁾	RN1	1.5 kW 4-pole 1400	0.16
6.8	50 ²⁾	RL1	1.5 kW 4-pole 1400	0.14
3.7	50 ²⁾	RXL1	1.5 kW 4-pole 1400	0.11
TMA 100				
30	37.2 ¹⁾	RV1	3 kW 4-pole 1400	0.20
15	63 ¹⁾	RN1	3 kW 4-pole 1400	0.17
7.5	100 ²⁾	RL1	3 kW 4-pole 1400	0.13
5.3	100 ²⁾	RXL1	3 kW 4-pole 1400	0.12
TMA 150				
40	42 ¹⁾	RV1	4 kW 4-pole 1400	0.24
20	72 ¹⁾	RN1	4 kW 4-pole 1400	0.20
10	115 ¹⁾	RL1	4 kW 4-pole 1400	0.15
7	147 ¹⁾	RXL1	4 kW 4-pole 1400	0.14
TMA 200				
35	58 ¹⁾	RV1	5.2 kW 4-pole 1400	0.21
12	130 ¹⁾	RN1	5.2 kW 4-pole 1400	0.14
8.8	159 ¹⁾	RL1	5.2 kW 4-pole 1400	0.13

Note: Lower linear speeds are achievable with 3-phase 6-pole electric motors.

¹⁾ value limited by electric motor power

The total dynamic efficiency (η) of TMA Series actuators **without input drive**, used to determine the DYNAMIC LOAD is calculated as follows:

$$\eta = \eta_1 \times \eta_2 \times \eta_3$$

where:

η_1 – wormgear dynamic efficiency, calculated according to BS 721 : Part 2 : 1983

η_2 – acme screw-bronze nut dynamic efficiency, calculated with reference to the speed

$\eta_3 = 0.9$ – bearings and sealing elements “efficiency”

²⁾ value limited by linear actuator load capacity (see pages 158 ... 159)

Linear actuators TMA Series

5.3 PERFORMANCE (actuator WITH input gearbox)

ACME SCREW LINEAR ACTUATORS TMA Series with AC 3-PHASE MOTOR
PERFORMANCE with: Duty Cycle $F_i = 30\%$ over 10 min at ambient temperature 25 °C

LINEAR SPEED [mm/s]	DYNAMIC LOAD [kN]	ACTUATOR: RATIO	INPUT GEARBOX: CENTRE DISTANCE RATIO	MOTOR: POWER [kW] – N° of POLES SPEED [rpm]	SELF-LOCKING COEFFICIENT
TMA 15					
2.3	9 ¹⁾	RN1	1 25 R 6.25	0.12 kW 2-pole 2800	0.14
1.2	15 ²⁾	RN1	1 25 R 12.5	0.12 kW 2-pole 2800	0.14
0.39	15 ²⁾	RL1	1 25 R 12.5	0.09 kW 4-pole 1400	0.10
0.14	15 ²⁾	RXL1	1 25 R 25	0.09 kW 4-pole 1400	0.06
TMA 25					
1.8	20 ¹⁾	RN1	1 30 R 4	0.18 kW 4-pole 1400	0.09
0.88	25 ²⁾	RN1	1 30 R 16	0.25 kW 2-pole 2800	0.09
0.45	25 ²⁾	RL1	1 25 R 12.5	0.09 kW 4-pole 1400	0.10
0.12	25 ²⁾	RXL1	1 25 R 25	0.09 kW 4-pole 1400	0.05
TMA 50					
1.8	39 ¹⁾	RN1	1 40 R 5	0.37 kW 4-pole 1400	0.10
0.91	50 ²⁾	RN1	1 40 R 20	0.55 kW 2-pole 2800	0.08
0.43	50 ²⁾	RL1	1 30 R 16	0.18 kW 4-pole 1400	0.08
0.15	50 ²⁾	RXL1	1 30 R 24	0.18 kW 4-pole 1400	0.05
TMA 100					
2	100 ²⁾	RV1	1 63 R 15	1.1 kW 4-pole 1400	0.14
1	100 ²⁾	RN1	1 50 R 15	0.75 kW 4-pole 1400	0.12
0.38	100 ²⁾	RL1	1 40 R 20	0.37 kW 4-pole 1400	0.07
0.21	100 ²⁾	RXL1	1 40 R 25	0.37 kW 4-pole 1400	0.06
TMA 150					
2	117 ¹⁾	RV1	1 63 R 20	1.1 kW 4-pole 1400	0.14
1	150 ²⁾	RN1	1 50 R 20	1.1 kW 4-pole 1400	0.12
0.5	150 ²⁾	RL1	1 50 R 20	0.75 kW 4-pole 1400	0.09
0.13	150 ²⁾	RXL1	1 40 R 55	0.37 kW 4-pole 1400	0.01
TMA 200					
1.8	162 ¹⁾	RV1	1 63 R 20	1.5 kW 4-pole 1400	0.13
0.78	200 ²⁾	RN1	1 50 R 15	1.1 kW 4-pole 1400	0.10
0.13	200 ²⁾	RL1	1 63 R 70	0.75 kW 4-pole 1400	0.05

1) value limited by electric motor power

The total dynamic efficiency (η) of TMA Series actuators **with input drive**, used to determine the DYNAMIC LOAD is calculated as follows:

$$\eta = \eta_1 \times \eta_2 \times \eta_3 \times \eta_4$$

where:

η_1 – input drive wormgear dynamic efficiency, calculated according to BS 721 : Part 2 : 1983

η_2 – actuator wormgear dynamic efficiency, calculated according to BS 721 : Part 2 : 1983

η_3 – acme screw-bronze nut dynamic efficiency, calculated with reference to the speed

$\eta_4 = 0.85$ – bearings and sealing elements "efficiency"

2) value limited by linear actuator load capacity (see pages 158 ... 159)

Linear actuators TMA Series

5.4 CONFIGURATION

	DESCRIPTION	CONFIGURATION CODE
	<p>Rear attachment: BUSHES</p> <p>Input shaft axis PERPENDICULAR to the median plane , determined by the rear attachment axis and by the front attachment axis </p> <p>Rear attachment axis between input shaft axis and front attachment axis </p>	Config.1
	<p>Rear attachment: PINS</p> <p>Input shaft axis PERPENDICULAR to the median plane , determined by the rear attachment axis and by the front attachment axis </p> <p>Rear attachment axis between input shaft axis and front attachment axis </p>	Config.2
	<p>Rear attachment: BUSHES</p> <p>Input shaft axis PARALLEL to rear attachment axis and front attachment axis </p> <p>Rear attachment axis between input shaft axis and front attachment axis </p>	Config.3
	<p>Rear attachment: PINS</p> <p>Input shaft axis PARALLEL to rear attachment axis and front attachment axis </p> <p>Rear attachment axis between input shaft axis and front attachment axis </p>	Config.4

5

Linear actuators TMA Series




5.4 CONFIGURATION

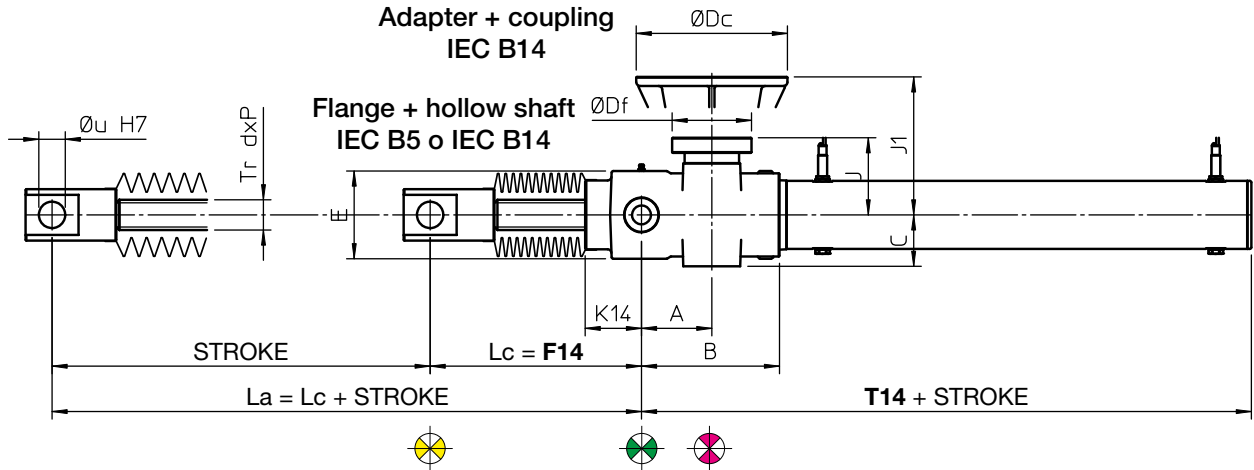
	DESCRIPTION	CONFIGURATION CODE
	<p>Rear attachment: BUSHES</p> <p>Input shaft axis PERPENDICULAR to the median plane , determined by the rear attachment axis and by the front attachment axis </p> <p>Input shaft axis between rear attachment axis and front attachment axis </p>	Config.5
	<p>Rear attachment: PINS</p> <p>Input shaft axis PERPENDICULAR to the median plane , determined by the rear attachment axis and by the front attachment axis </p> <p>Input shaft axis between rear attachment axis and front attachment axis </p>	Config.6
	<p>Rear attachment: BUSHES</p> <p>Input shaft axis PARALLEL to rear attachment axis and front attachment axis </p> <p>Input shaft axis between rear attachment axis and front attachment axis </p>	Config.7
	<p>Rear attachment: PINS</p> <p>Input shaft axis PARALLEL to rear attachment axis and front attachment axis </p> <p>Input shaft axis between rear attachment axis and front attachment axis </p>	Config.8

Linear actuators TMA Series

5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

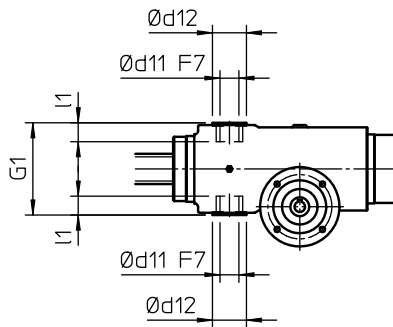
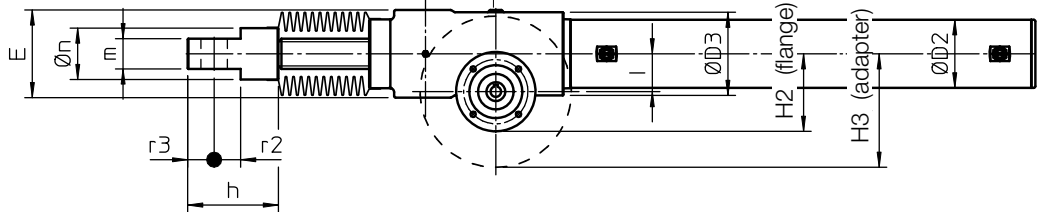
Input shaft axis perpendicular to front and rear attachments axis

Configurations with rear attachment axis  between input shaft axis  and front attachment axis 

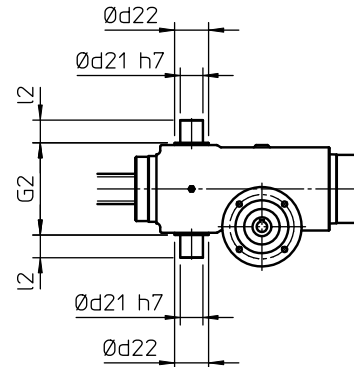


L_c - RETRACTED ACTUATOR length
 La - EXTENDED ACTUATOR length

Front attachment
HINGED HEAD
TF

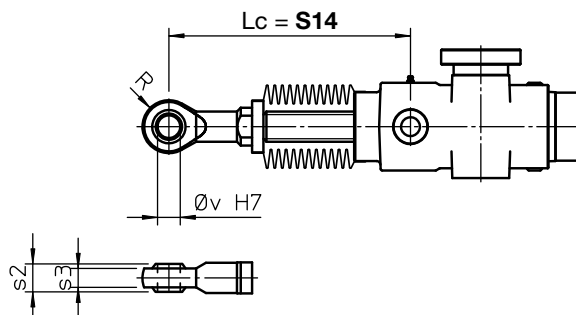


Rear attachment
BUSHES
Config.1



Rear attachment
PINS
Config.2

Front attachment
BALL JOINT
TS



5

Linear actuators TMA Series

5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

Input shaft axis perpendicular to front and rear attachments axis

Config.1 and Config.2 - rear attachment axis between input shaft axis and front attachment axis

	Tr d×P	F14			S14			T14
TMA 15	Tr 22×5	125 ¹⁾	225 ²⁾	325 ³⁾	144 ¹⁾	244 ²⁾	344 ³⁾	240
TMA 25	Tr 30×6	156 ¹⁾	256 ²⁾	356 ³⁾	172 ¹⁾	272 ²⁾	372 ³⁾	259
TMA 50	Tr 40×7	180 ¹⁾	280 ²⁾	380 ³⁾	220 ¹⁾	320 ²⁾	420 ³⁾	304
TMA 100	Tr 55×9	197 ¹⁾	297 ²⁾	397 ³⁾	254 ¹⁾	354 ²⁾	454 ³⁾	332
TMA 150	Tr 60×12	254 ¹⁾	354 ²⁾	454 ³⁾	304 ¹⁾	404 ²⁾	504 ³⁾	404
TMA 200	Tr 80×12	276 ¹⁾	376 ²⁾	476 ³⁾	321 ¹⁾	421 ²⁾	521 ³⁾	525

1) without bellows

2) with bellows and STROKE < 600

3) with bellows and 600 < STROKE < 1200

4) with bellows and STROKE > 1200: please, contact SERVOMECH

	A	B	C	∅ D2	∅ D3	E	I	K14
TMA 15	67	132	50	50	82	88	30	50
TMA 25	77.5	145	57	65	90	96	40	61
TMA 50	93	183	68	90	110	116	50	75
TMA 100	110	219	83	110	140	150	63	77
TMA 150	140	248	83	130	153	168	63	104
TMA 200	200	340	103	160	200	240	80	106

	Attachment for IEC motor (flange + hollow shaft)				Attachment for IEC motor (adapter + coupling)			
	Size	∅ Df	H2	J	Size	∅ Dc	H3	J1
TMA 15	63 B14 – 63 B5	90 – 140	75 – 100	62	—	—	—	—
TMA 25	63 B14 – 63 B5	90 – 140	80 – 110	69	71 B14	105	93	138
TMA 50	63 B5	140	120	102	80 B14	120	110	182
	71 B14 – 71 B5	105 – 160	103 – 130	102	90 B14	140	120	182
TMA 100	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 150	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 200	80 B5	200	179	119	100 B14	160	159	240
	90 B5				112 B14			

	G1	G2	∅ d11	∅ d12	∅ d21	∅ d22	l1	l2
TMA 15	91	92	16	28	20	28	22	20
TMA 25	100	100	20	35	20	35	20	20
TMA 50	122	122	25	45	30	45	25	30
TMA 100	154	154	35	55	40	55	35	40
TMA 150	176	176	40	60	40	60	40	40
TMA 200	248	248	50	70	50	70	60	50

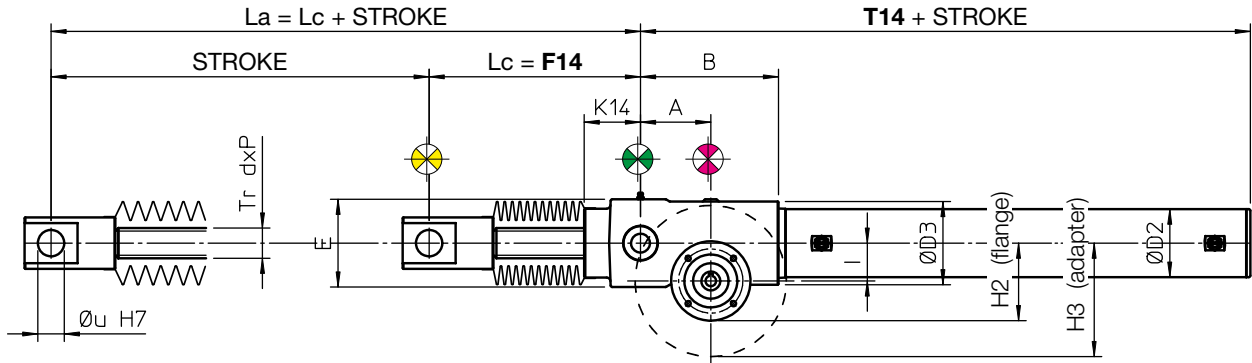
	h	m	∅ n	R	r2	r3	s2	s3	∅ u	∅ v
TMA 15	75	25	38	21	20	20	21	15.5	20	16
TMA 25	100	30	48	27	25	25	16	13	25	20
TMA 50	120	40	68	37	35	35	22	19	35	30
TMA 100	140	50	78	46	40	40	28	23	40	40
TMA 150	180	60	90	56	50	50	35	30	50	50
TMA 200	210	75	108	68	60	60	44	38	60	60

Linear actuators TMA Series

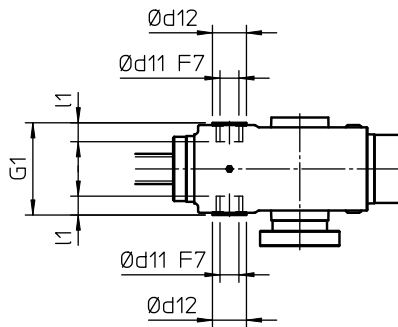
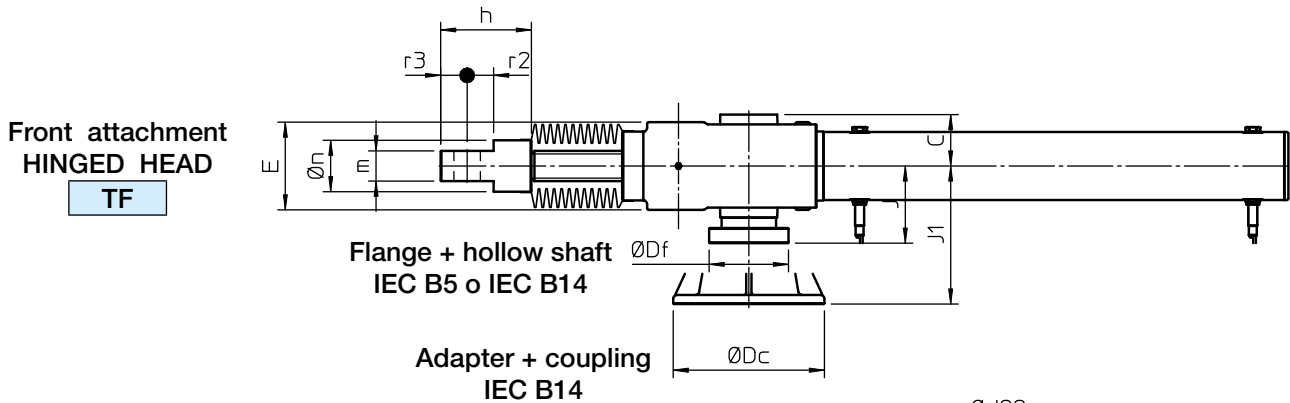
5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

Input shaft axis parallel to front and rear attachments axis

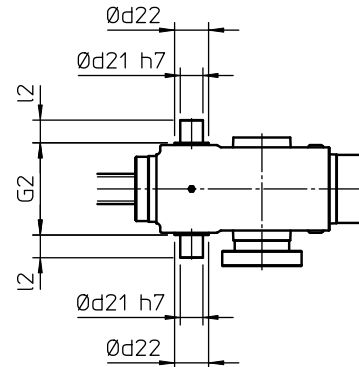
Configurations with rear attachment axis between input shaft axis and front attachment axis



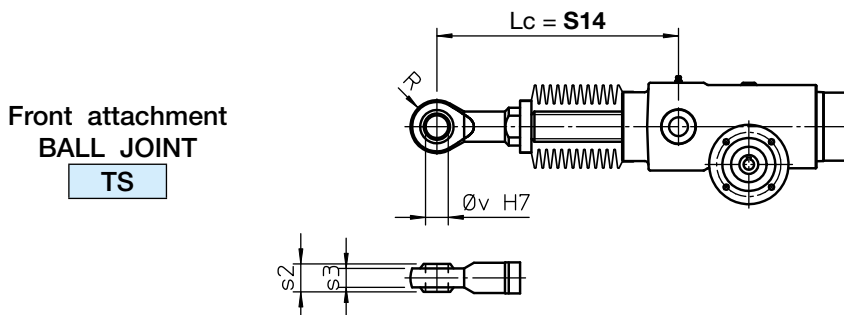
Lc - RETRACTED ACTUATOR length
La - EXTENDED ACTUATOR length



Rear attachment
BUSHES
Config.3



Rear attachment
PINS
Config.4



Front attachment
BALL JOINT
TS

Linear actuators TMA Series

5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

Input shaft axis parallel to front and rear attachments axis

Config.3 and Config.4 - rear attachment axis between input shaft axis and front attachment axis

	Tr d×P	F14			S14			T14
TMA 15	Tr 22×5	125 ¹⁾	225 ²⁾	325 ³⁾	144 ¹⁾	244 ²⁾	344 ³⁾	240
TMA 25	Tr 30×6	156 ¹⁾	256 ²⁾	356 ³⁾	172 ¹⁾	272 ²⁾	372 ³⁾	259
TMA 50	Tr 40×7	180 ¹⁾	280 ²⁾	380 ³⁾	220 ¹⁾	320 ²⁾	420 ³⁾	304
TMA 100	Tr 55×9	197 ¹⁾	297 ²⁾	397 ³⁾	254 ¹⁾	354 ²⁾	454 ³⁾	332
TMA 150	Tr 60×12	254 ¹⁾	354 ²⁾	454 ³⁾	304 ¹⁾	404 ²⁾	504 ³⁾	404
TMA 200	Tr 80×12	276 ¹⁾	376 ²⁾	476 ³⁾	321 ¹⁾	421 ²⁾	521 ³⁾	525

1) without bellows

2) with bellows and STROKE < 600

3) with bellows and 600 < STROKE < 1200

4) with bellows and STROKE > 1200: please, contact SERVOMECH

	A	B	C	∅ D2	∅ D3	E	I	K14
TMA 15	67	132	50	50	82	88	30	50
TMA 25	77.5	145	57	65	90	96	40	61
TMA 50	93	183	68	90	110	116	50	75
TMA 100	110	219	83	110	140	150	63	77
TMA 150	140	248	83	130	153	168	63	104
TMA 200	200	340	103	160	200	240	80	106

	Attachment for IEC motor (flange + hollow shaft)				Attachment for IEC motor (adapter + coupling)			
	Size	∅ Df	H2	J	Size	∅ Dc	H3	J1
TMA 15	63 B14 – 63 B5	90 – 140	75 – 100	62	—	—	—	—
TMA 25	63 B14 – 63 B5	90 – 140	80 – 110	69	71 B14	105	93	138
TMA 50	63 B5	140	120	102	80 B14	120	110	182
	71 B14 – 71 B5	105 – 160	103 – 130	102	90 B14	140	120	182
TMA 100	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 150	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 200	80 B5	200	179	119	100 B14	160	159	240
	90 B5				112 B14			




	G1	G2	∅ d11	∅ d12	∅ d21	∅ d22	l1	l2
TMA 15	91	92	16	28	20	28	22	20
TMA 25	100	100	20	35	20	35	20	20
TMA 50	122	122	25	45	30	45	25	30
TMA 100	154	154	35	55	40	55	35	40
TMA 150	176	176	40	60	40	60	40	40
TMA 200	248	248	50	70	50	70	60	50

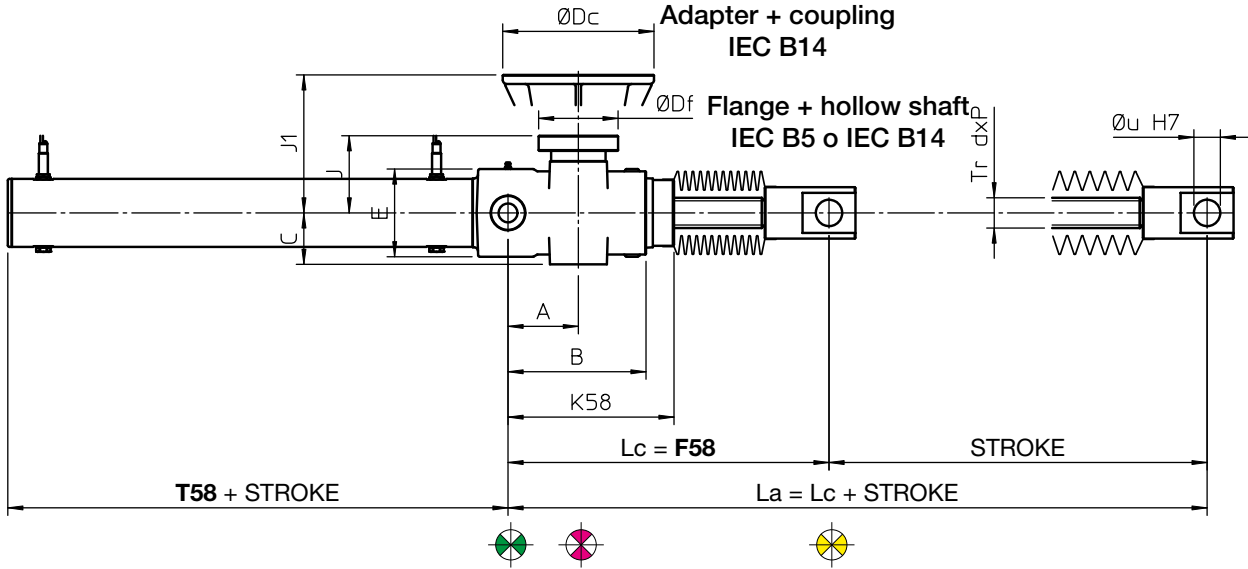
	h	m	∅ n	R	r2	r3	s2	s3	∅ u	∅ v
TMA 15	75	25	38	21	20	20	21	15.5	20	16
TMA 25	100	30	48	27	25	25	16	13	25	20
TMA 50	120	40	68	37	35	35	22	19	35	30
TMA 100	140	50	78	46	40	40	28	23	40	40
TMA 150	180	60	90	56	50	50	35	30	50	50
TMA 200	210	75	108	68	60	60	44	38	60	60

Linear actuators TMA Series

5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

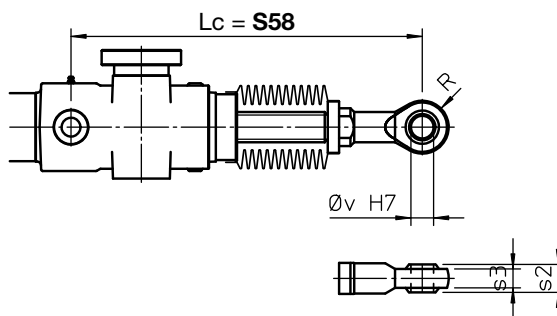
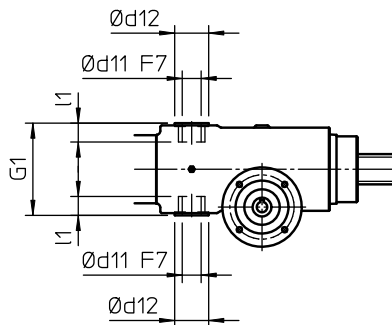
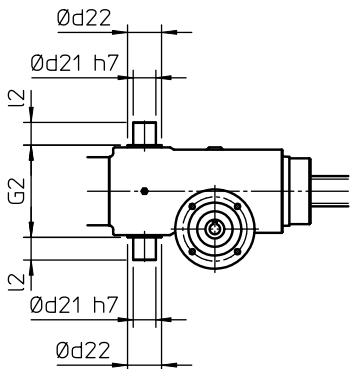
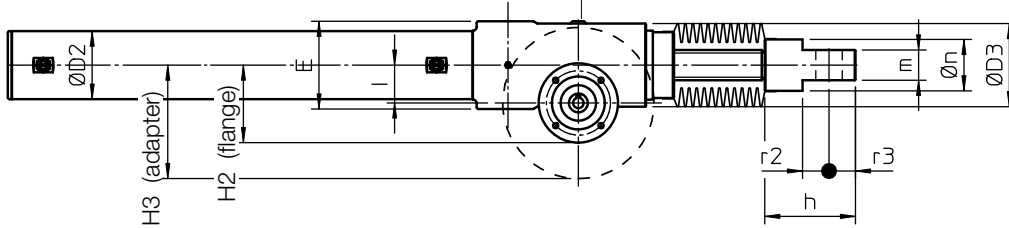
Input shaft axis perpendicular to front and rear attachments axis

Configurations with input shaft axis  between rear attachment axis  and front attachment axis 



L_c - RETRACTED ACTUATOR length
 L_a - EXTENDED ACTUATOR length

Front attachment
HINGED HEAD
TF



5

Linear actuators TMA Series

5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

Input shaft axis perpendicular to front and rear attachments axis

Config.5 and Config.6 - input shaft axis between rear attachment axis and front attachment axis

	Tr d×P	F58			S58			T58
TMA 15	Tr 22×5	235 ¹⁾	335 ²⁾	435 ³⁾	254 ¹⁾	354 ²⁾	454 ³⁾	130
TMA 25	Tr 30×6	274 ¹⁾	374 ²⁾	474 ³⁾	290 ¹⁾	390 ²⁾	490 ³⁾	140
TMA 50	Tr 40×7	324 ¹⁾	424 ²⁾	524 ³⁾	364 ¹⁾	464 ²⁾	564 ³⁾	160
TMA 100	Tr 55×9	367 ¹⁾	467 ²⁾	567 ³⁾	424 ¹⁾	524 ²⁾	624 ³⁾	162
TMA 150	Tr 60×12	460 ¹⁾	560 ²⁾	660 ³⁾	510 ¹⁾	610 ²⁾	710 ³⁾	199
TMA 200	Tr 80×12	590 ¹⁾	690 ²⁾	790 ³⁾	635 ¹⁾	735 ²⁾	835 ³⁾	211

¹⁾ without bellows

²⁾ with bellows and STROKE < 600

³⁾ with bellows and 600 < STROKE < 1200

⁴⁾ with bellows and STROKE > 1200: please, contact SERVOMECH

	A	B	C	∅ D2	∅ D3	E	I	K58
TMA 15	67	132	50	50	82	88	30	160
TMA 25	77.5	145	57	65	90	96	40	179
TMA 50	93	183	68	90	110	116	50	220
TMA 100	110	219	83	110	140	150	63	247
TMA 150	140	248	83	130	153	168	63	305
TMA 200	200	340	103	160	200	240	80	420

	Attachment for IEC motor (flange + hollow shaft)				Attachment for IEC motor (adapter + coupling)			
	Size	∅ Df	H2	J	Size	∅ Dc	H3	J1
TMA 15	63 B14 – 63 B5	90 – 140	75 – 100	62	—	—	—	—
TMA 25	63 B14 – 63 B5	90 – 140	80 – 110	69	71 B14	105	93	138
TMA 50	63 B5	140	120	102	80 B14	120	110	182
	71 B14 – 71 B5	105 – 160	103 – 130	102	90 B14	140	120	182
TMA 100	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 150	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 200	80 B5	200	179	119	100 B14	160	159	240
	90 B5				112 B14			




	G1	G2	∅ d11	∅ d12	∅ d21	∅ d22	l1	l2
TMA 15	91	92	16	28	20	28	22	20
TMA 25	100	100	20	35	20	35	20	20
TMA 50	122	122	25	45	30	45	25	30
TMA 100	154	154	35	55	40	55	35	40
TMA 150	176	176	40	60	40	60	40	40
TMA 200	248	248	50	70	50	70	60	50

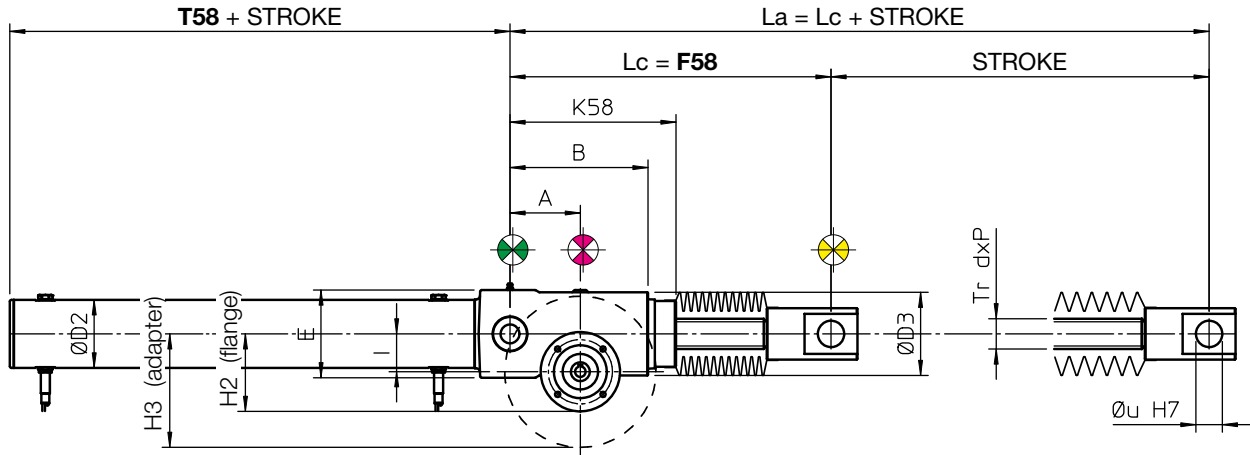
	h	m	∅ n	R	r2	r3	s2	s3	∅ u	∅ v
TMA 15	75	25	38	21	20	20	21	15.5	20	16
TMA 25	100	30	48	27	25	25	16	13	25	20
TMA 50	120	40	68	37	35	35	22	19	35	30
TMA 100	140	50	78	46	40	40	28	23	40	40
TMA 150	180	60	90	56	50	50	35	30	50	50
TMA 200	210	75	108	68	60	60	44	38	60	60

Linear actuators TMA Series

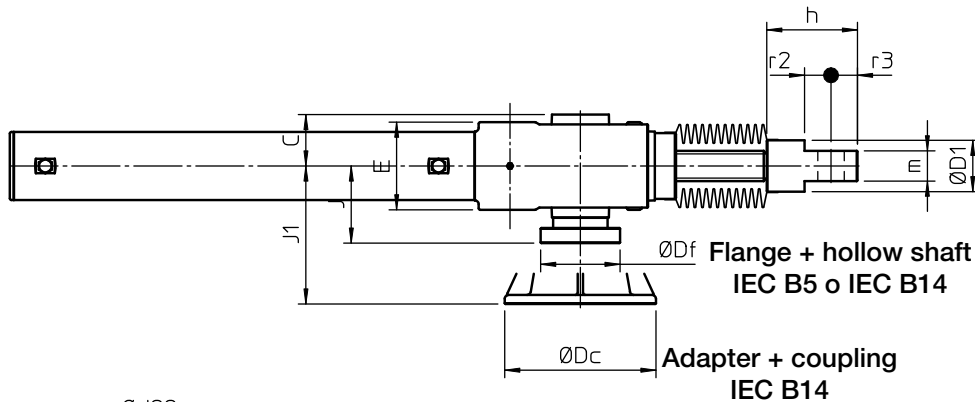
5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

Input shaft axis parallel to front and rear attachments axis

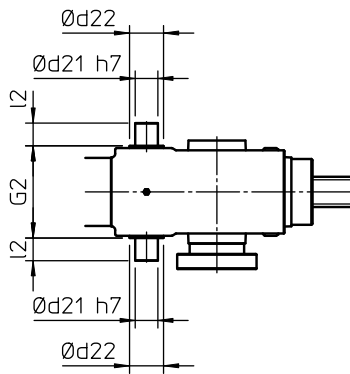
Configurations with input shaft axis  between rear attachment axis  and front attachment axis 



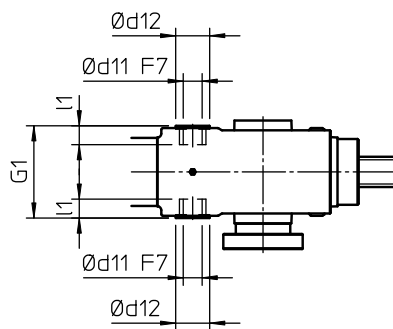
Lc - RETRACTED ACTUATOR length
La - EXTENDED ACTUATOR length



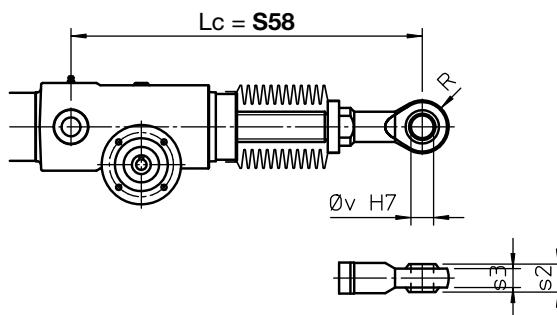
Front attachment
HINGED HEAD
TF



Rear attachment
PINS
Config.8



Rear attachment
BUSHES
Config.7



Front attachment
BALL JOINT
TS

5

Linear actuators TMA Series

5.5 OVERALL DIMENSIONS - actuator WITHOUT input gearbox

Input shaft axis parallel to front and rear attachments axis

Config.7 and Config.8 - input shaft axis between rear attachment axis and front attachment axis

	Tr d×P	F58			S58			T58
TMA 15	Tr 22×5	235 ¹⁾	335 ²⁾	435 ³⁾	254 ¹⁾	354 ²⁾	454 ³⁾	130
TMA 25	Tr 30×6	274 ¹⁾	374 ²⁾	474 ³⁾	290 ¹⁾	390 ²⁾	490 ³⁾	140
TMA 50	Tr 40×7	324 ¹⁾	424 ²⁾	524 ³⁾	364 ¹⁾	464 ²⁾	564 ³⁾	160
TMA 100	Tr 55×9	367 ¹⁾	467 ²⁾	567 ³⁾	424 ¹⁾	524 ²⁾	624 ³⁾	162
TMA 150	Tr 60×12	460 ¹⁾	560 ²⁾	660 ³⁾	510 ¹⁾	610 ²⁾	710 ³⁾	199
TMA 200	Tr 80×12	590 ¹⁾	690 ²⁾	790 ³⁾	635 ¹⁾	735 ²⁾	835 ³⁾	211

1) without bellows

2) with bellows and STROKE < 600

3) with bellows and 600 < STROKE < 1200

4) with bellows and STROKE > 1200: please, contact SERVOMECH

	A	B	C	∅ D2	∅ D3	E	I	K58
TMA 15	67	132	50	50	82	88	30	160
TMA 25	77.5	145	57	65	90	96	40	179
TMA 50	93	183	68	90	110	116	50	220
TMA 100	110	219	83	110	140	150	63	247
TMA 150	140	248	83	130	153	168	63	305
TMA 200	200	340	103	160	200	240	80	420

	Attachment for IEC motor (flange + hollow shaft)				Attachment for IEC motor (adapter + coupling)			
	Size	∅ Df	H2	J	Size	∅ Dc	H3	J1
TMA 15	63 B14 – 63 B5	90 – 140	75 – 100	62	—	—	—	—
TMA 25	63 B14 – 63 B5	90 – 140	80 – 110	69	71 B14	105	93	138
TMA 50	63 B5	140	120	102	80 B14	120	110	182
	71 B14 – 71 B5	105 – 160	103 – 130	102	90 B14	140	120	182
TMA 100	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 150	80 B5	200	163	100	90 B14	140	133	200
					100 B14	160	143	220
TMA 200	80 B5	200	179	119	100 B14	160	159	240
	90 B5				112 B14			

	G1	G2	∅ d11	∅ d12	∅ d21	∅ d22	l1	l2
TMA 15	91	92	16	28	20	28	22	20
TMA 25	100	100	20	35	20	35	20	20
TMA 50	122	122	25	45	30	45	25	30
TMA 100	154	154	35	55	40	55	35	40
TMA 150	176	176	40	60	40	60	40	40
TMA 200	248	248	50	70	50	70	60	50

	h	m	∅ n	R	r2	r3	s2	s3	∅ u	∅ v
TMA 15	75	25	38	21	20	20	21	15.5	20	16
TMA 25	100	30	48	27	25	25	16	13	25	20
TMA 50	120	40	68	37	35	35	22	19	35	30
TMA 100	140	50	78	46	40	40	28	23	40	40
TMA 150	180	60	90	56	50	50	35	30	50	50
TMA 200	210	75	108	68	60	60	44	38	60	60

Linear actuators TMA Series

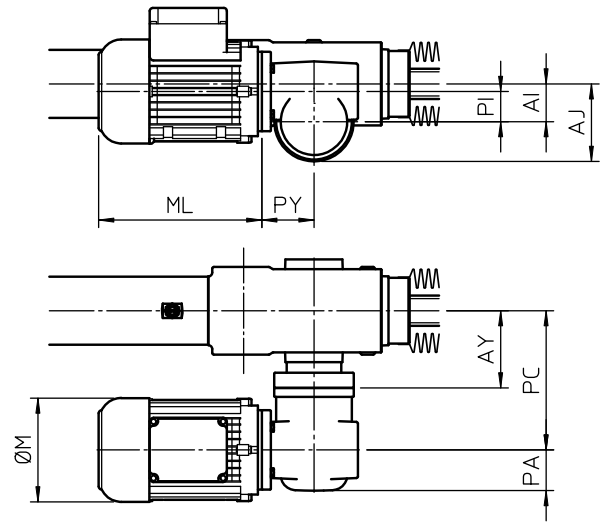
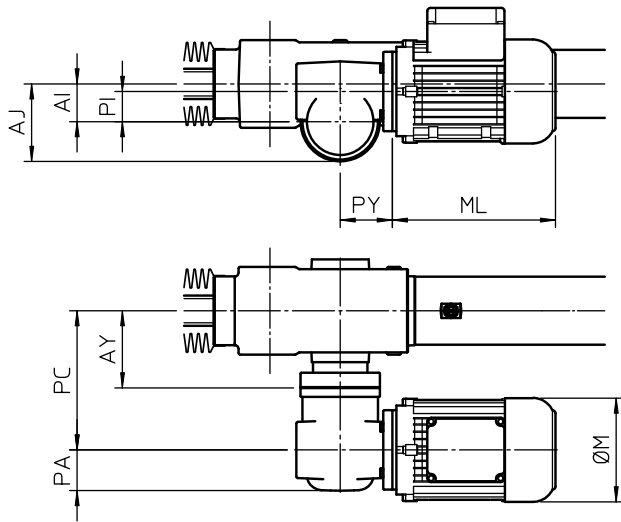
5.5 OVERALL DIMENSIONS - input gearbox



Configurations: 1, 2, 3 and 4



Configurations: 5, 6, 7 and 8



ACTUATOR	INPUT GEARBOX	AI	AJ	AY	PA	PC	PI	PY	Ø M	ML
TMA 15	I 25	30	75	62	44	123	25	58	110	168
TMA 25	I 25	40	85	69	44	130	25	58	110	168
	I 30	40	85	69	49	142	30	62	123	198
TMA 50	I 30	50	103	102	49	175	30	62	123	198
	I 40	50	103	102	54	184	40	69	137	216
TMA 100	I 40	63	123	100	54	182	40	69	137	216

For dimensions of the actuator with input gearbox not stated in this table please contact SERVOMECH.

5

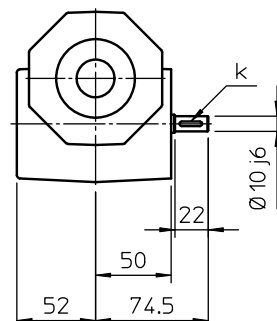
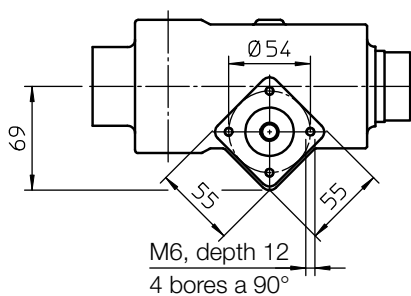
Linear actuators TMA Series

5.6 OPTIONS

ACTUATOR INPUT – size 15

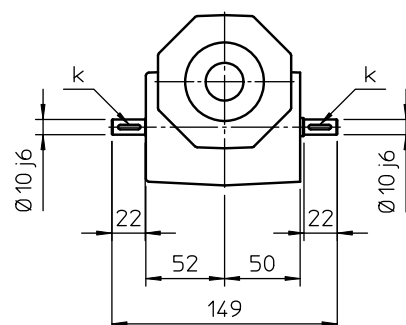
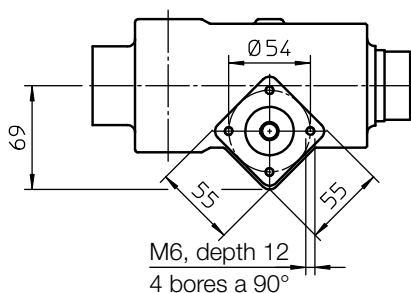
Single input shaft

Code: **Vers.1**



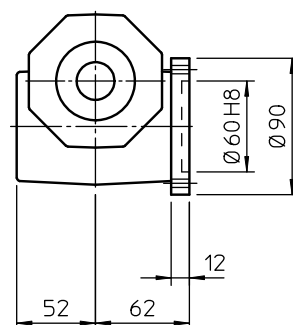
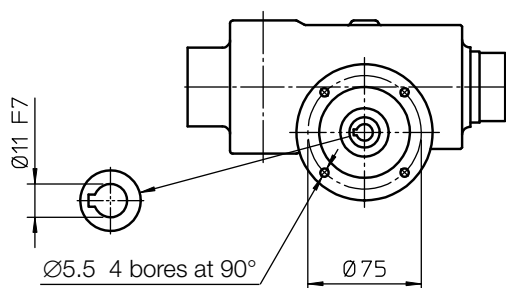
Double input shaft

Code: **Vers.2**



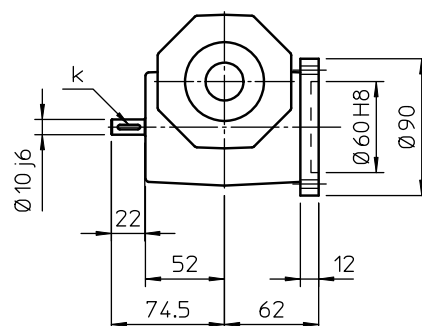
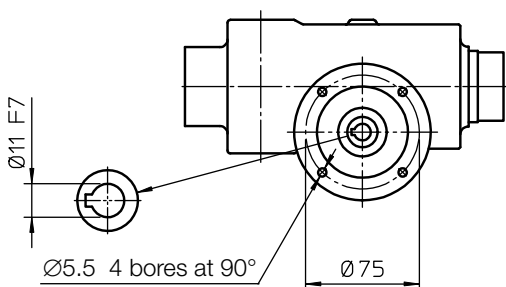
Attachment for IEC _ B14 electric motor (flange and hollow shaft)

Code: **Vers.3**



Attachment for IEC _ B14 electric motor (flange and hollow shaft) and second shaft

Code: **Vers.4**



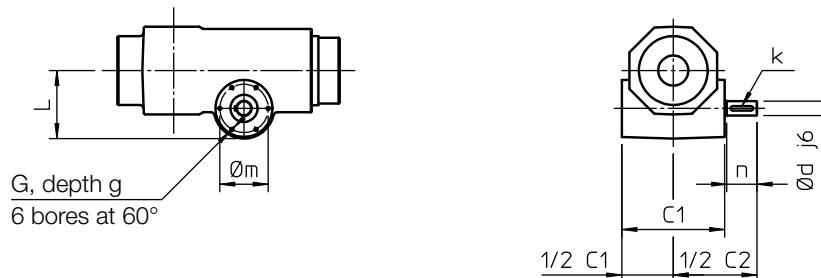
Linear actuators TMA Series

5.6 OPTIONS

ACTUATOR INPUT – size 25 - 50 - 100 - 150 - 200

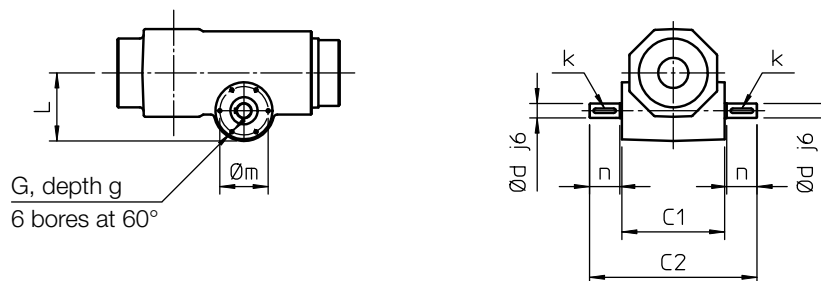
Single input shaft

Code: **Vers.1**



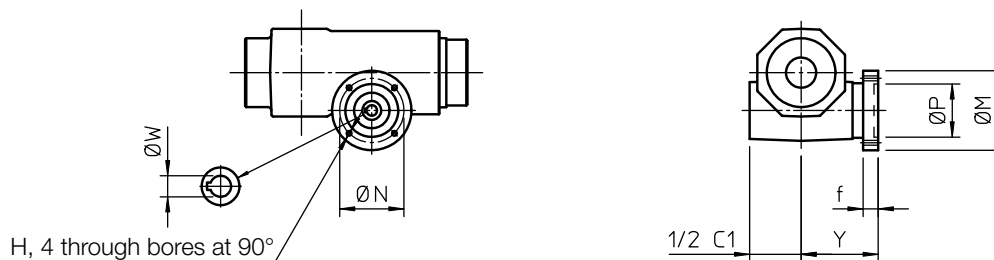
Double input shaft

Code: **Vers.2**



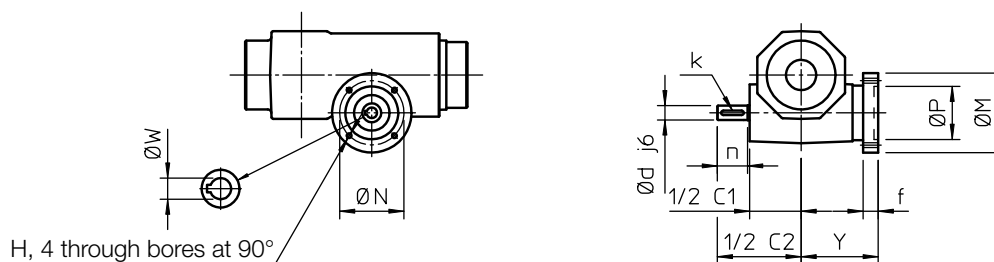
Attachment for IEC _ B5 or B14 electric motor (flange and hollow shaft)

Code: **Vers.3**



Attachment for IEC _ B5 or B14 electric motor (flange and hollow shaft) and second shaft

Code: **Vers.4**



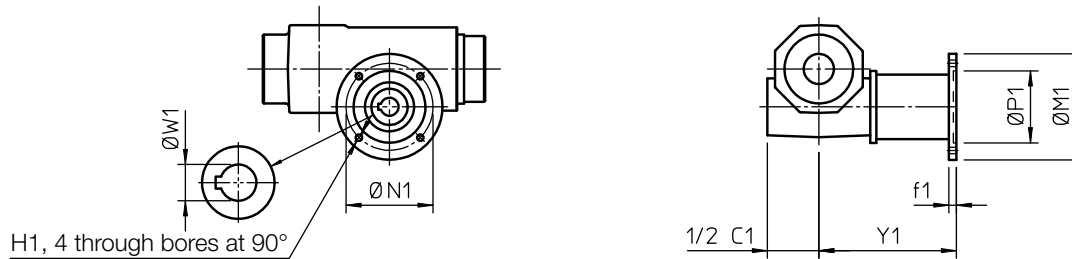
Linear actuators TMA Series

5.6 OPTIONS

ACTUATOR INPUT – size 25 - 50 - 100 - 150 - 200

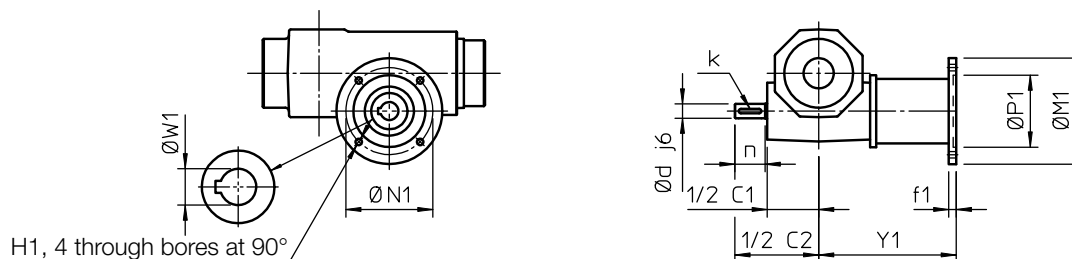
Attachment for IEC _ B14 electric motor (adapter and coupling)

Code: **Vers.5**



Attachment for IEC _ B14 electric motor (adapter and coupling) and second shaft

Code: **Vers.6**



	C1	C2	G	L	g	Ø d	k	Ø m	n
TMA 25	114	179	M5	70	12	14	5x5x20	46	30
TMA 50	136	222	M5	90	10	19	6x6x30	64	40
TMA 100	165	269	M6	104	14	24	8x7x40	63	50
TMA 150	165	269	M6	104	14	24	8x7x40	63	50
TMA 200	205	330	M6	143	14	28	8x7x40	74	60

Attachment for IEC electric motor: flange and hollow shaft

	Motore IEC	H	Ø M	Ø N	Ø P	Ø W	Y	f
TMA 25	63 B14	Ø 5.5	90	75	60	11	69	8
TMA 50	71 B14	Ø 7	105	85	70	14	102	20
TMA 100	80 B5	M10	200	165	130	19	100	12
TMA 150	80 B5	M10	200	165	130	19	100	12
TMA 200	80 B5/90 B5	M10	200	165	130	19 24	119	12

Attachment for IEC electric motor: adapter and coupling

	IEC motor		H1	Ø M1		Ø N1		Ø P1		Ø W1		Y1		f1
TMA 25	71 B14		Ø 6.5	105		85		70		24		138		8
TMA 50	80 B14	90 B14	Ø 6.5 Ø 8.5	120	140	100	115	80	95	19	24	176	182	10 10
TMA 100	90 B14	100-112 B14	Ø 8.5 Ø 8.5	140	160	115	130	95	110	24	28	200	220	10 15
TMA 150	90 B14	100-112 B14	Ø 8.5 Ø 8.5	140	160	115	130	95	110	24	28	200	220	10 15
TMA 200	100 -112 B14		Ø 8.5	160		130		110		28		240		15

Linear actuators TMA Series

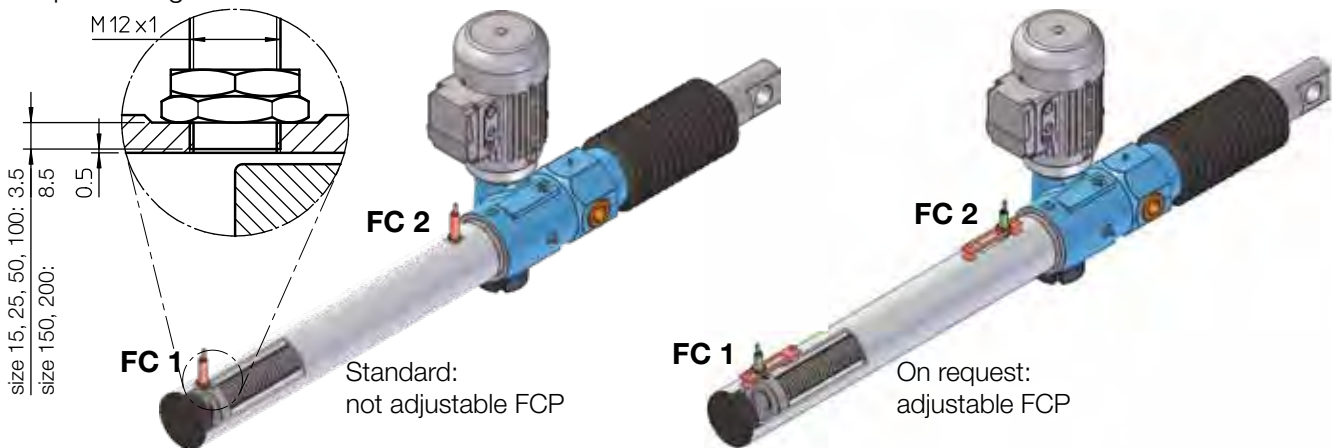
5.6 ACCESSORIES

INDUCTIVE PROXIMITY STROKE END SWITCHES Code FCP

The INDUCTIVE PROXIMITY STROKE END SWITCHES FCP allow the actuator to stop before reaching the internal mechanical stop avoiding damage. They can be also used to fix intermediate positions along the actuator stroke length.

The INDUCTIVE PROXIMITY STROKE END SWITCHES are fixed directly on the actuator outer tube in the required position and are activated by the ferrous-metal ring, which is positioned at the acme screw end.

In case the screw jack is not stopped after the sensor activation, when the ferrous-metal ring moves away, the sensor restores the original state (becomes deactivated). In case the limit switches are used to stop the actuator, an electric connection with electric check is recommended, in order to prevent that the actuator keeps moving in the same direction.



- RETRACTED ACTUATOR (Lc): sensor FC 1
- EXTENDED ACTUATOR (La): sensor FC 2

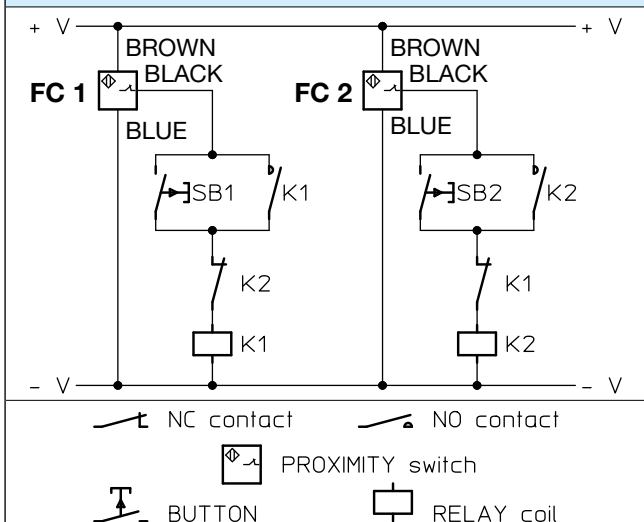
In the standard arrangement, the position of the switches along the tube is not adjustable and it is not angularly fixed. Design with angular position according to customer's requirements is available on request.

Design with axial adjustment of the sensors position is also available on request.

ELECTRIC FEATURES

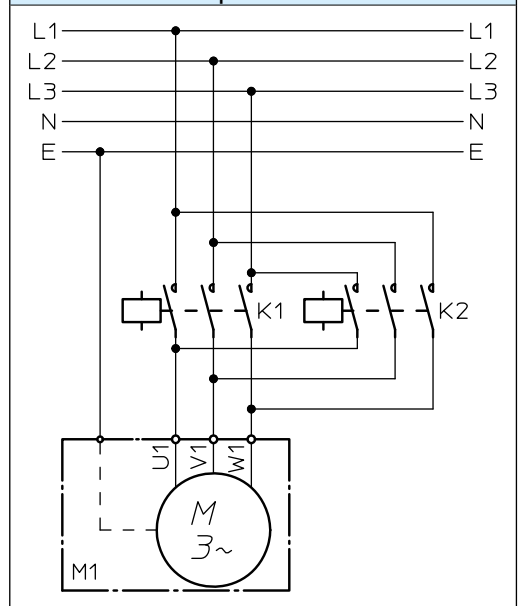
Type:	inductive, PNP
Contact:	normally CLOSED (NC)
Voltage:	(10 ... 30) V DC
Max. output current:	200 mA
Voltage drop (activated switch)	< 3 V (at 200 mA)
Wires:	3 x 0.2 mm ²
Cable length:	2 m

CONTROL CIRCUIT



WIRING DIAGRAM

AC 3-phase motor

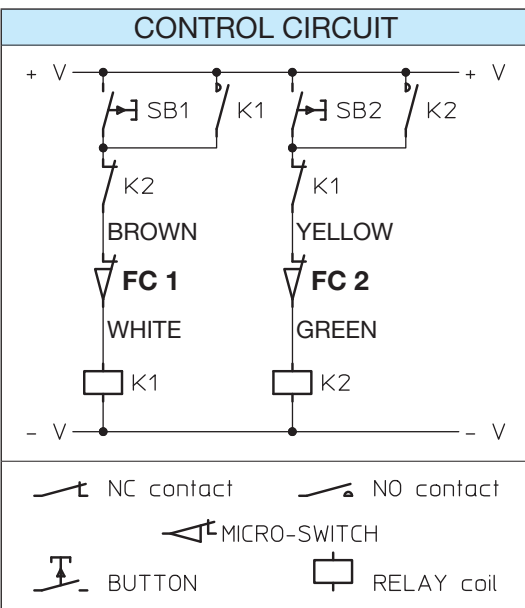
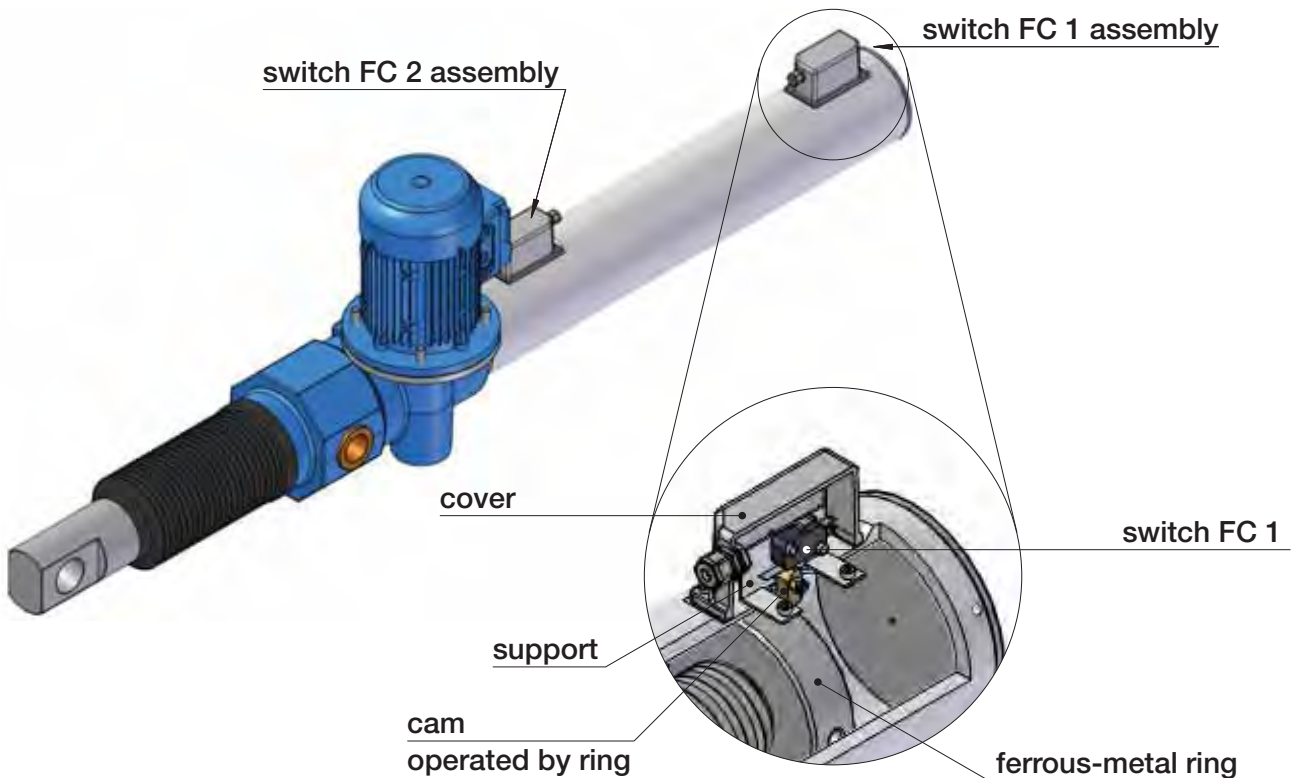


Linear actuators TMA Series

5.6 ACCESSORIES

ELECTRIC STROKE END SWITCHES Code FC

The ELECTRIC STROKE END SWITCHES FC allow to limit the actuator stroke avoiding to reach the extreme positions (mechanical stops) and preventing damage. The device consists of two switch assemblies, each of them consisting of one miniature electric switch (FC 1, FC 2) fixed to the relative support, a switch operating cam, rotating around the relative support pin when operated by the ferrous-metal ring fixed to the acme screw end and a spring that allows the return of the cam to its neutral position, thus deactivating the switch; the entire assembly is covered by an aluminium cover and sealed by a rubber seal. Each assembly determines one of the two extreme positions of the push rod (Lc or La), but it can not be used to fix any intermediate position. The position of the assembly along the outer tube is not adjustable.



The ELECTRIC STROKE END SWITCHES FC must be connected to the electric control circuit to guarantee the motor switch off and to prevent damages to the actuator and the application equipment. The relevant WIRING DIAGRAM is on page 176.

The ELECTRIC STROKE END SWITCHES FC equipped with 2 multi-core cables 2 × 0.75 mm², standard length 1.5 m, longer cable on request. The wire colours are indicated in the CONTROL CIRCUIT on the left.

RATED CONTACT VALUES			
Voltage	250 V AC	125 V AC	125 V DC
Current (resistive load)	16 A	16 A	0.6 A
Current (inductive load)	10 A	10 A	0.6 A

The ELECTRIC STROKE END SWITCHES FC are available for actuators TMA 100, TMA 150 and TMA 200.

Linear actuators TMA Series

5.6 ACCESSORIES

PROTECTIVE BELLOWS Code B

When the actuators are used in severe environment conditions with contaminant agents that can damage the seal scraper between the outer outer tube and the push rod, BELLOWS protection can be useful.

Bellows made of special materials for severe environments are available upon request.



ROTARY ENCODER Code ENC.4

Hall-effect encoder, incremental, bi-directional

Resolution: 4 pulses per revolution

Output: PUSH-PULL

2 channels (phase difference 90°)

Input voltage: (8 ... 32) Vdc

Max. commutable current: 100 mA

Max output voltage drop:

with load connected to 0 and $I_{out} = 100 \text{ mA}$: 4.6 V

with load connected to + V and $I_{out} = 100 \text{ mA}$: 2 V

Protection:

against short circuit

against input polarity inversion

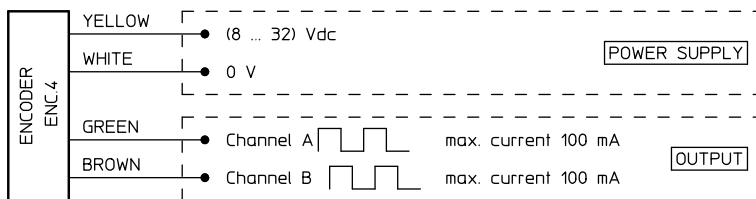
against any incorrect output connection

Cable length: 1.3 m

Protection: IP 55



5



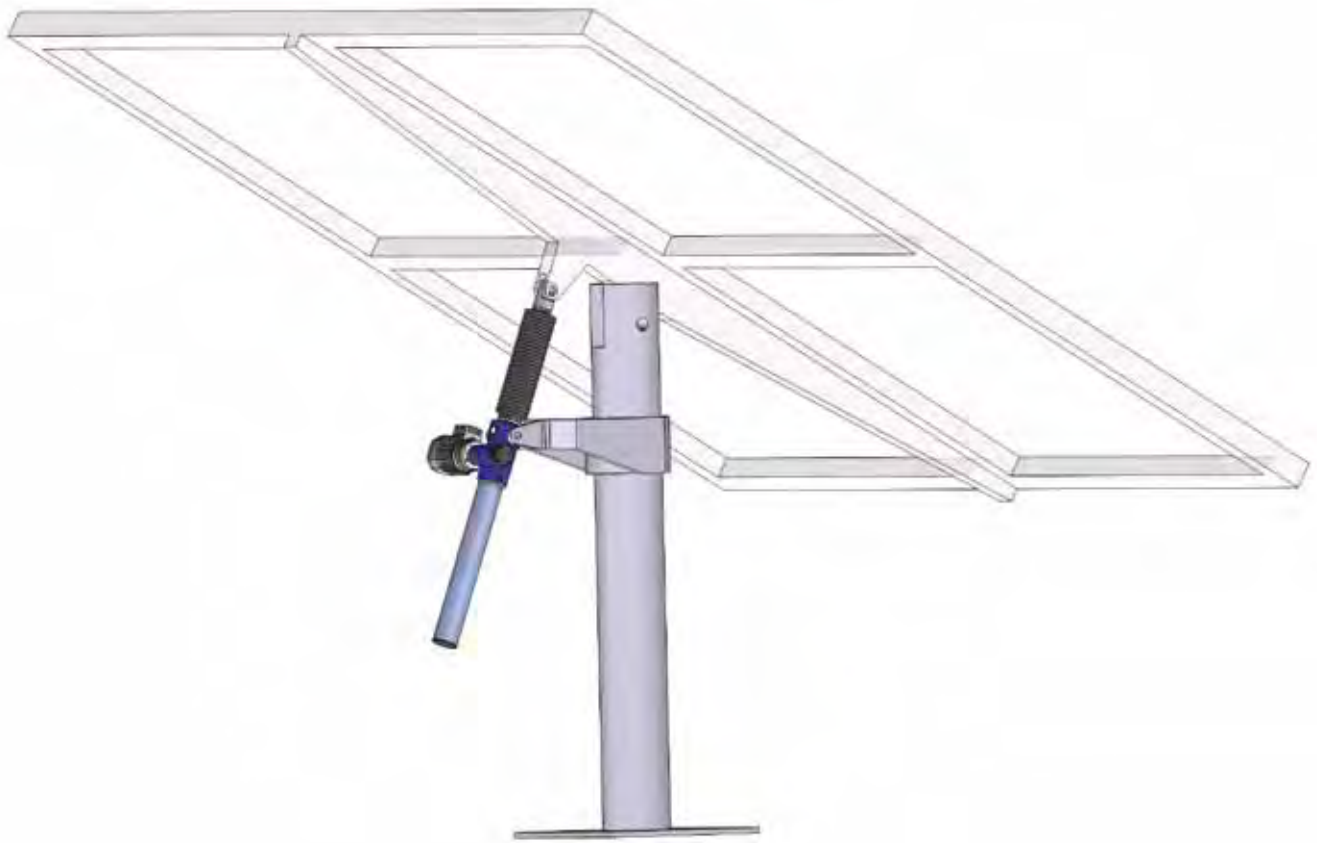
5.7 SPECIAL DESIGNS

According to specific application requirements, special designs can be carried out on standard actuators.

Some possible options are for example:

- acme screw in stainless steel AISI 303
- lubricants for high or low ambient temperature
- seals in VITON or silicone

Thanks to the long experience and know-how, SERVOMECH is able to support customers in selecting the right actuator version and accessories suitable for specific environment and installation conditions.



5

Application example of linear actuator TMA Series: solar tracker

Linear actuators TMA Series

5.8 ORDERING CODE

TMA	50	Config.1	RL1	C800	TF	B	FCP
1	2	3	4	5	6	7	8
Vers.3							
9							
input gearbox I 30 RL							
10							
AC 3-phase motor 0.37 kW 4-pole 230/400 V 50 Hz IP 55 Ins. F							
11							

1	Actuator series TMA	
2	Actuator size 15, 25, 50, 100, 150, 200	pages 158 ... 159
3	Actuator configuration Config.1 ... Config.8	pages 162 ... 163
4	Ratio RV1, RN1, RL1, RXL1	pages 158 ... 159
5	Stroke code (C...)	
6	Front attachment TF - hinged head TS - ball joint	pages 164 ... 172
7	Bellows	page 178
8	Stroke end switches FCP - inductive proximity switches FC - electric switches	page 176 page 177
9	Actuator input Vers.1 - single input shaft Vers.2 - double input shaft Vers.3 - attachment for IEC motor (flange and hollow shaft) Vers.4 - attachment for IEC motor (flange and hollow shaft) + second shaft Vers.5 - attachment for IEC motor (adapter and coupling) Vers.6 - attachment for IEC motor (adapter and coupling) + second shaft	pages 173 ... 175
10	Input gearbox	page 161
11	Motor data	pages 200 ... 201
12	Other specifications example: acme screw in stainless steel AISI 303 example: lubricant for low temperature	
13	Filled in SELECTION DATA sheet	page 181
14	Application layout	

APPLICATION: _____

REQUIRED STROKE: _____ mm

REQUIRED LINEAR SPEED: _____ mm/s _____ mm/min _____ m/min TIME TO PERFORM 1 STROKE: _____ s

STATIC LOAD: PULL: _____ N PUSH: _____ N at STROKE _____ mm

DYNAMIC LOAD: PULL: _____ N PUSH: _____ N at STROKE _____ mm

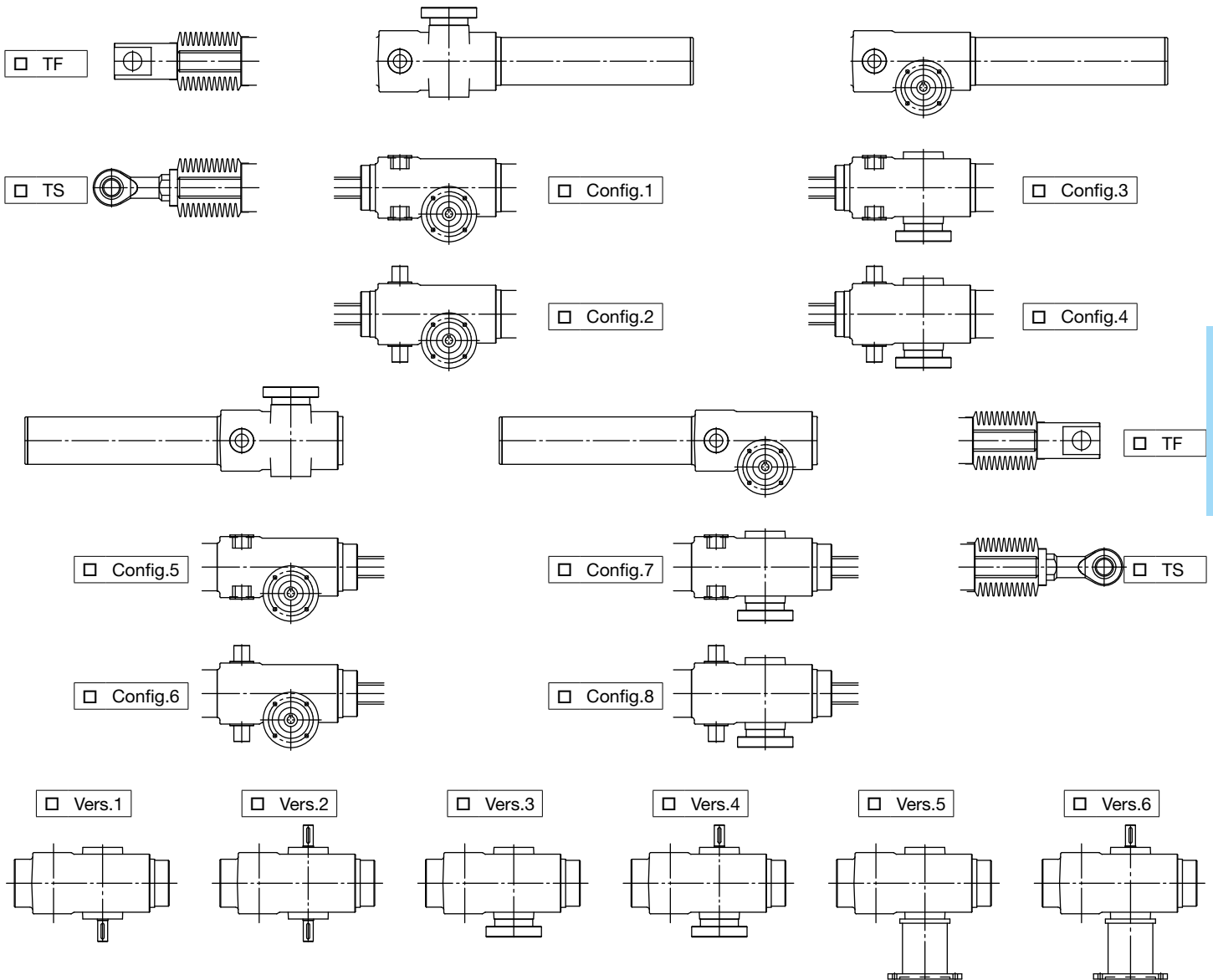
ACTUATOR SUBJECTED TO VIBRATIONS NOT SUBJECTED TO VIBRATIONS

OPERATING: _____ cycle / hour _____ working hours / day Notes: _____

ENVIRONMENT: TEMPERATURE _____ °C DUST HUMIDITY _____ % AGGRESSIVE AGENT _____

Size: 15 25 50 100 150 200

Ratio: RV1 RN1 RL1 RXL1



INPUT GEARBOX _____ ELECTRIC MOTOR AC 3-phase _____

STROKE END SWITCHES PROXIMITY FCP ELECTRIC FC ROTARY ENCODER

BELLOWS

OTHER: _____

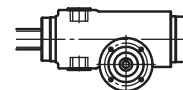
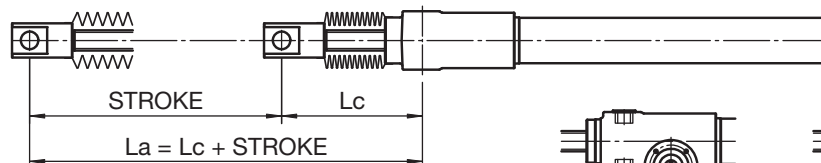
PRODUCT: _____

- | | |
|--------------------------|---------------------------|
| <input type="checkbox"/> | WITHOUT input gearbox |
| <input type="checkbox"/> | WITH input gearbox _____ |
| <input type="checkbox"/> | WITHOUT electric motor |
| <input type="checkbox"/> | WITH electric motor _____ |

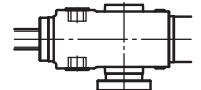
Product serial number: _____ ; q.ty: _____

HINGED HEAD

TF



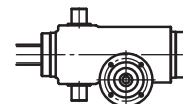
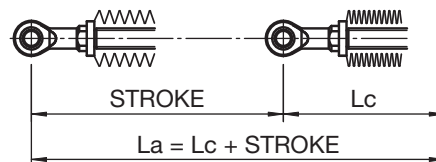
Config.1



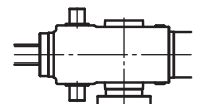
Config.3

BALL JOINT

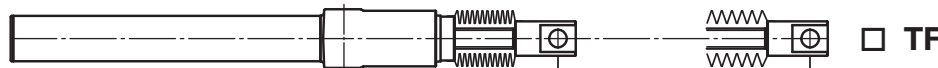
TS



Config.2

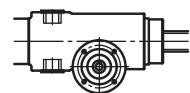


Config.4

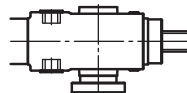


TF

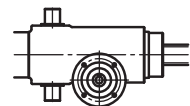
HINGED HEAD



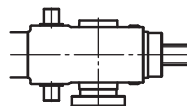
Config.5



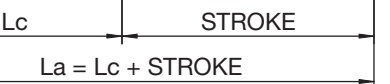
Config.7



Config.6



Config.8



TS

BALL JOINT

LINEAR ACTUATOR LENGTH

WORKING RANGE

RETRACTED ACTUATOR length: **Lc** = _____ mm
 EXTENDED ACTUATOR length: **La** = _____ mm
 STROKE (La - Lc): **C** = _____ mm

INTERNAL MECHANICAL STOP LIMIT

MIN. actuator length: _____ mm
 MAX. actuator length: _____ mm

<p>PASSED</p>	
Date: _____	Signature: _____

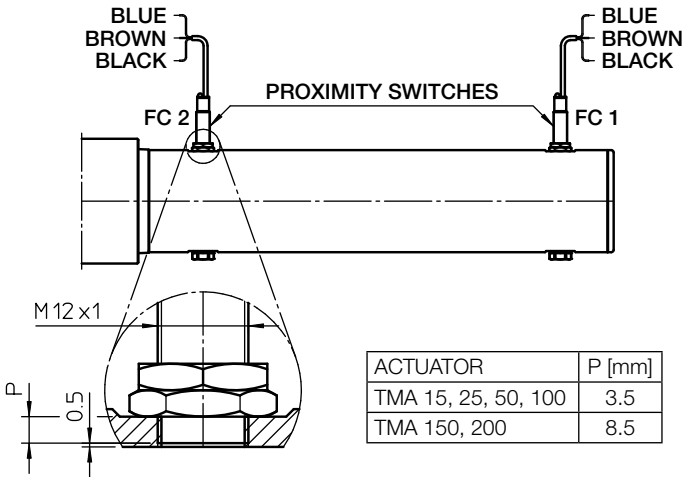
PROXIMITY STROKE END SWITCHES **FCP** □

The PROXIMITY STROKE END SWITCHES **FCP** has proximity sensors FC 1 and FC2.

- type: inductive, PNP
- contact: **normally CLOSED**
- supply voltage: (10 ... 30) V DC
- max. output current: 200 mA
- max. voltage drop (activated sensor): < 3 V (ref. 200 mA)

FC1 - sensor for RETRACTED ACTUATOR position
FC2 - sensor for EXTENDED ACTUATOR position

SINGLE SENSOR WIRING:



ACTUATOR	P [mm]
TMA 15, 25, 50, 100	3.5
TMA 150, 200	8.5

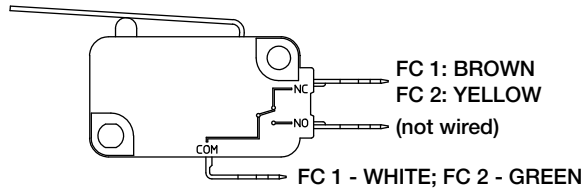
ELECTRIC STROKE END SWITCHES **FC** □

The ELECTRIC STROKE END SWITCHES **FC** has miniature switches FC 1 and FC 2.

- contact: **normally CLOSED**
- voltage: 250 V DC / 125 V DC / 125 V DC
- current: 16 A / 16 A / 0.6 A (resistive load)
10 A / 10 A / 0.6 A (inductive load)

FC1 - switch for RETRACTED ACTUATOR position
The wires that connect the switch FC 1 are WHITE and BROWN.
FC2 - switch for EXTENDED ACTUATOR position
The wires that connect the switch FC 2 are GREEN and YELLOW.

SINGLE SWITCH WIRING:



WARNING!

1. The values **Lc** (RETRACTED ACTUATOR length), **La** (EXTENDED ACTUATOR length) and **C** (STROKE) are the extreme limit values.
2. **BEFORE** using the linear actuator:
 - verify the input shaft rotating direction and the acme screw running direction;
 - make sure that the motor and the limit switches are correctly connected and that the correct voltage is used.
3. **Alignment check:** the load must be in line with the actuator. No off-set or radial loads are allowed.

NOTE: _____

WORMGEAR LUBRICANT: _____

SCREW – NUT LUBRICANT: _____