

ELECTROHYDRAULIC THRUSTERS



FLUIDOTEHNIK

VRNJAČKA BANJA



Electrohydraulic thruster, consider its working principle, is a hydrodynamic power unit. Due to its positive characteristics, it has a wide industrial application: brake activation, coupling drive, valve drive, gate valve drive, and shearing machine. In fact, the device can be used for short time functions, where the overload and voltage drop insensitive is required.

However, very often applications are for activation the brake on different crane and portal hoist and surface mining machinery, such as excavators, stackers, transporting systems and combination devices. The operation principle enables the brake activation in case of failure of electrohydraulic thruster, this prevents the plant from damage.

FLUIDOTEHNIK has produced electrohydraulic thrusters since 1994. Thousands of these units have been used in some of the harshest environmental conditions, from the polar to tropical.



Fluidotehnik's electrohydraulic thrusters are compact designed and reliable, with high aesthetic level. Their electric motor immersed on transformer oil and good cooling conditions provide continuous work up to 2000 switchings per hour. The device is built to satisfy the most advanced needs in force (12-400daN), stroke (50-160mm) and temperature range (-45 to +45 °C). Standard voltage is 380V 50Hz, but we also can satisfy special requests for voltage, frequency, dimensions and temperature range.

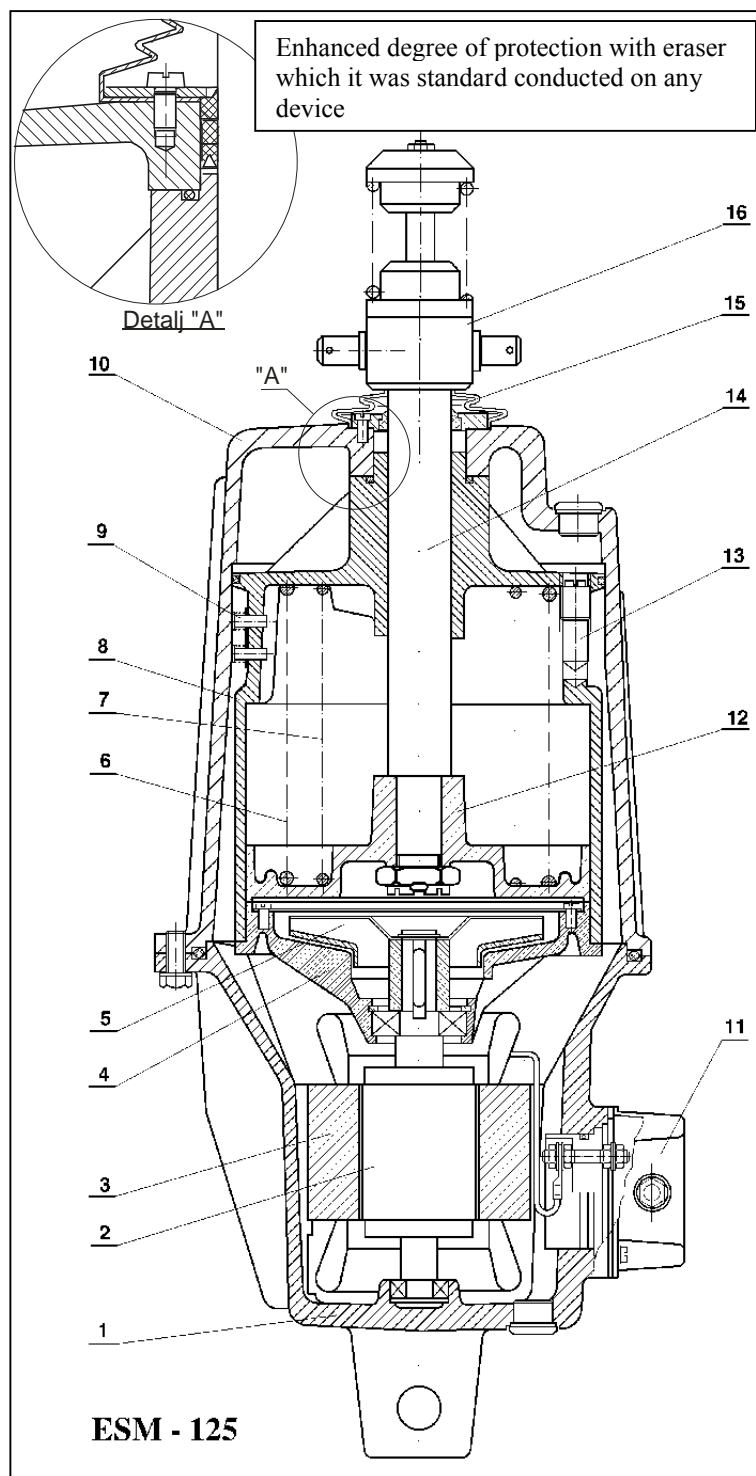
ELECTROHYDRAULIC THRUSTERS SERIES "ESM"



- NOMINAL STROKE 50 - 160 mm
- NOMINAL FORCE 12 - 400 daN
- SWITCHING TIME 0.5 - 14 s
- ROD PROTECTION WIPER
- ROD PROTECTION RUBBER
- EXTERNAL OPERATING INDICATOR
- INTERNAL OPERATING INDICATOR
- ENVIRONMENT TEMPERATURE -45 °C ; +45 °C
- NOMINAL POWER CONSUMPTION 1500-2000W
- SWITCHING FREQUENCY 2000 cycle/hour
- RELATIVE DUTY FACTOR ED 100%
- WIDE RANGE OF VOLTAGE AND FREQUENCY OF THE ELECTRIC MOTOR

TECHNICAL DEVICE'S DESCRIPTION

The device can operate in any position from vertical to horizontal. In horizontal or in angular position connecting box should be upside.



The device can operate in any position from vertical to horizontal. In horizontal or in angular position connecting box should be upside.

Housing of the motor (1) is constructed with eyelet connection and can be fixed on fundament by a bolt. There is also oil drain plug on the housing. Driving motor stator (3) (squirrel cage asynchronous motor) is fitted in the housing. Connecting box for electrical supply (11) is fixed on the housing hermetically separated from the inside of the housing. The rotor (2) is fixed in the housing by its downside, and upside fitted in the turbine bearing (4). The turbine wheel (5) is mounted on the rotor shaft. The guide cylinder (8) with piston (12) and rod (14) is located upper the turbine.

There is also screw (13) for speed adjusting in the guide cylinder. The guide cylinder is covered by jacket (10), which with the housing forms a functional block. The transformer oil fills interior of the device.

The electric motor drives the turbine, which produce oil pressure downside of the piston. The piston and the rod are forced to move upward. The oil from upside of the piston returns through the holes to the turbine inlet. Position of the piston does not influence to the hydraulic force. The force does not depend of the piston position, but depends only of the speed of turbine (current frequency), turbine size, and of the piston diameter. If the outside load of the rod is in the nominal range, upward movement is uniform and independence of the load. Pushing force gradually increase during 0.1 – 0.15 s, which provide very soft start of the rod. Electric motor is suspended in oil, which results in very good heat dissipation.

The output force is constant which enable permanent operation without overloading. Switching off the electric motor, outside load caused the backward movement, which delay for 0.2 – 0.3 s, due to inertial forces of the rotor and turbine.

The oil from downside flows to upside of the piston. Oil level in device should be on the down blade of the filling port (device is in the vertical position).

Any position of the rod could be chosen for the output value. This is very important for brake releasing application because the wear out of the break linings does not affect on the pushing force. It is recommended that the brake should be adjusted for 1/3 stroke of the rod.

All sizes based on the same principle, except ESM-320, which have two-stage turbine. Dimensions of ESM-320 are the same like ESM-250, but the pushing force is greater.

~~an be chosen any arbitrary position.~~ This is very important when using the device as thruster, because in this way compensates wear of brake linings. We recommend that you set the brake, when fully closed, the 1/3 stroke piston rod.

Constructive all sizes are also resolved other than ESM-320, which is due to the required thrust force derived from the two-turbine circuit. Thus was obtained the required thrust force from the device which has the same external dimensions as ESM-250.

According to the customer request, several versions also available:

- Device with return springs C (6,7)

One or two springs are mounted upper the piston. The piston forced back to the start position by the spring, after the motor switching off. There are three versions of the device, depends of the spring force: internal, external and both of them. It should be considered that the spring force reduces the nominal output force. The nominal return spring force is given according to the piston position on the 1/3 stroke. In full extract position of the rod, real return force exceeds nominal value for approximately 20%, in full retract position, pushing force is reduced for 10%.

-Device with shock absorber R (16)

The shock absorber, fixed on the rod, prevents starting and stopping shocks and enables swiveling of the brake gear around the rod axe and around the perpendicular axe. This provides gradual increasing of the braking force and the softly operation.

- Device with speed control valve (9)

The speed control valve is build on the cylinder holes and, depends of the type, prevent the one of the flow directions.

There are few types of speed controls valves:

Check valve for the lifting speed control - H

In case of the piston movement to the upper position, check valve is closed so the flow is enabling only through the port beside the adjustment screw (13). Then the speed is determined by the screw position. When the piston moves down, the check valve is opened and speed is maximal. Turning the adjustment screw in clockwise direction produces lower, counter clockwise higher speed. Before the adjusting it is necessary to remove the socket screw for filling.

Check valve for the lowering speed control - S

The function of the valve is opposite as already described, the downward speed is determined by the screw position.

Throttle valve for the speed control in the both directions - D

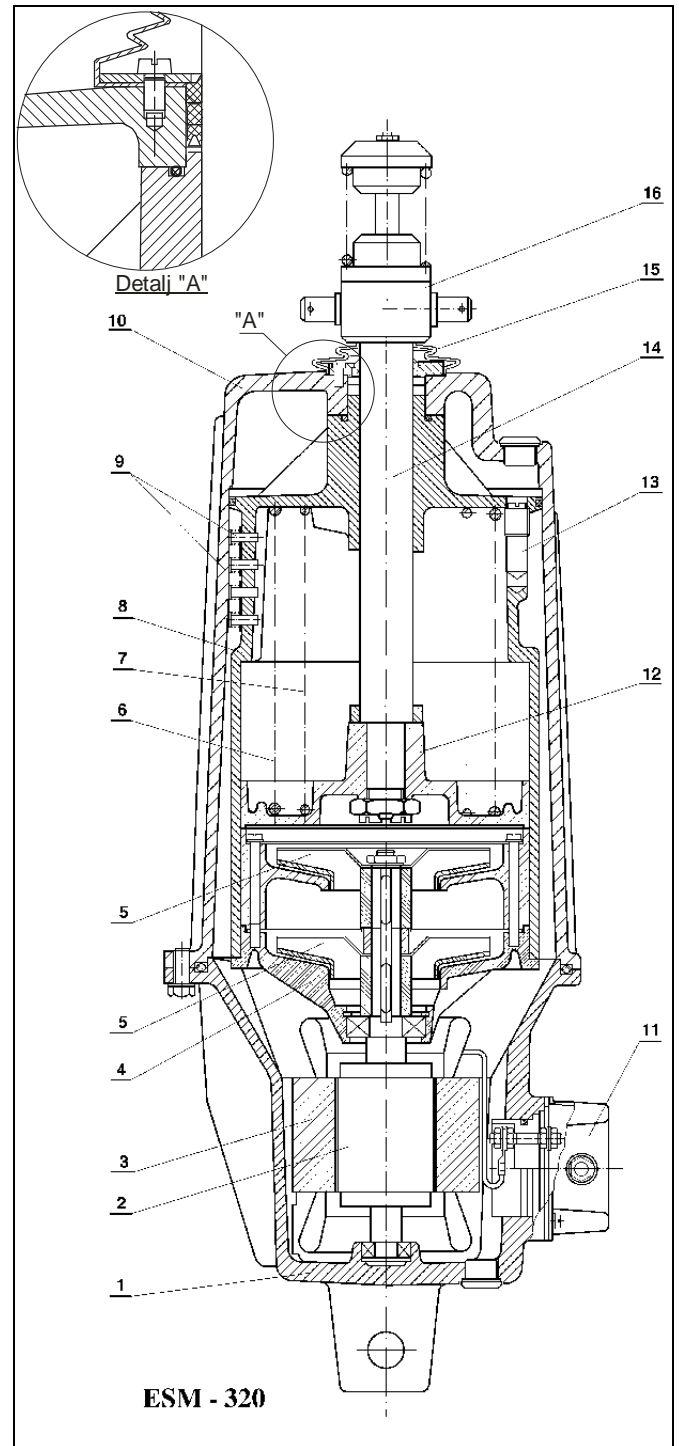
The flow is restricted in the both of the directions and it always depends of the adjustment screw position.

Note:

It should be considered that these valves reduce speed of the device. If the maximum speed is necessary, the valves should not be used.

- Device with cover protection (15)

The cover protects the rod and seal set from dust penetration. It allows long life of the device in heavy operating conditions (surface mining, and cement industry.



We meet special customer requests for voltage and frequency. For extremely hard operation conditions, such as permanent ~~r for the periodical operation under~~ extremely low temperature, we used special seals, electric motors and proper synthetically oils. To choice the best solution, we recommend to contact our experts.

The delivered device is filled of oil and prepared for connection. There is eyelet on the housing and on the rod. The bolts through the each eyelet fit the device. If the shock absorber is built on the device, there is the fork for the upper connection. Connected device should be self-adjustable to avoid side forces during operation. Load direction along the axe of the rod is only allowed. Since the turbine is symmetrical, the direction of rotation of electric motors is not important for device function.

ELECTROHYDRAULIC THRUSTERS

SERIE *ESM*

TECHNICAL DATA

Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	Current	Mass without oil	Oil mass	Lifting time	Lowering time
		mm	N	N	W	A	kg	kg	s	s
1	ESM 20/50 ESM 20/50 C12 ESM 20/50 C20	50	200	0 120 200	150	0.50	8.4	1.7	0.55	0.65
2	ESM 50/50 ESM 50/50 C18 ESM 50/50 C32 ESM 50/50 C50	50	500	0 155 330 485	200	0.55	11.0	2.5	0.55	0.65
2	ESM 50/60 ESM 50/60 C18 ESM 50/60 C32 ESM 50/60 C50	60	500	0 155 330 485	200	0.55	11.0	2.5	0.6	0.65
2.1	ESM 50/100 ESM 50/100 C18 ESM 50/100 C32 ESM 50/100 C50	100	500	0 130 290 420	200	0.55	12.5	3	0.8	0.7
3	ESM 80/60 ESM 80/60 C45 ESM 80/60 C80	60	800	0 400 780	350	0.60	16.4	4.1	0.55	0.6
3.1	ESM 80/160 ESM 80/160 C45 ESM 80/160 C80	160	800	0 300 520	350	0.60	18.8	5.7	1.2	1.1
3	ESM 125/60 ESM 125/60 C45 ESM 125/60 C80 ESM 125/60 C125	60	1250	0 400 780 1180	400	0.60	16.4	4.1	0.65	0.6
3.1	ESM 125/160 ESM 125/160 C45 ESM 125/160 C80 ESM 125/160 C125	160	1250	0 300 520 820	400	0.60	18.8	5.7	1.2	1.1
3	ESM 150/60 ESM 150/60 C45 ESM 150/60 C80 ESM 150/60 C125	60	1500	0 400 780 1180	450	0.65	16.4	4.1	0.7	0.6
3.1	ESM 150/160 ESM 150/160 C45 ESM 150/160 C80 ESM 150/160 C125	160	1500	0 300 520 820	450	0.65	18.8	5.7	1.3	1.1
4	ESM 250/60 ESM 250/60 C70 ESM 250/60 C130 ESM 250/60 C200	60	2500	0 700 1300 2000	500	0.80	26.0	8.5	0.7	0.6
5	ESM 250/160 ESM 250/160 C70 ESM 250/160 C130 ESM 250/160 C200	160	2500	0 510 850 1360	500	0.80	32.5	10.0	1.5	1.1
5	ESM 320/100 ESM 320/100 C70 ESM 320/100 C250* ESM 320/100 C320*	100	3200	0 610 2190 2800	600	0.90	34.5	9.0	1.4	0.9

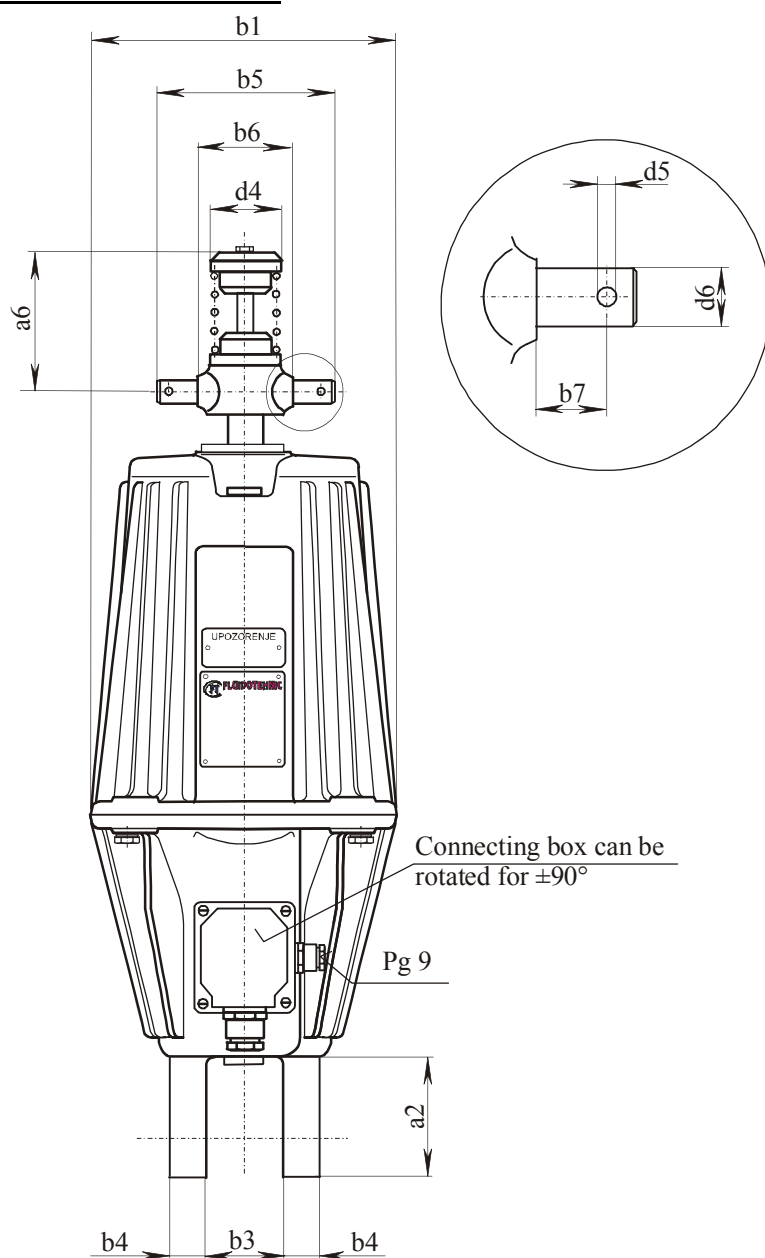
* For the devices ESM 320/100 C250 and ESM 320/100 C320 nominal stroke of piston rod is limited to 60mm.

		Standard execution		For tropic conditions	For low temperature	
		Simbol		T	L	
Environment temperature	maximum	+40 ⁰ C		+45 ⁰ C	+40 ⁰ C	
	minimum	-25 ⁰ C		-25 ⁰ C	-45 ⁰ C	
Hydraulic oil		Isulation oil SHELL DIALA OIL DX DRIED		Isulation oil SHELL DIALA OIL DX DRIED	AEROSHELL FLUID 41	
Voltage and motor frekveny		3 x 380V 50Hz ; 3 x 400V 50Hz				
Duty of the device		2.000 cikl/h or ED100%				
Connecting box insulation		IP 56				
Version on customer's request	Voltage of motor		od 200V to 660V			
	Frequency		od 42Hz to 60Hz			
	Connecting box insulation		IP 66			
	Work control	mechanical switch	I	external control sensor, signals that the brake is raised (open)		voltage 24...250V AC/DC; current 2,5A; external IP65
			II	external control sensor, signals that the brake is raised (open) and brake lining are worn		
			MP	internal control sensor, signals that the brake is raised (open)		
			MP1	internal control sensor, signals that the brake is raised (open) and brake lining are worn		
		magnetic-inductive switch	Lk2	internal control sensor, signals that the brake is raised (open)		voltage 24...250V AC/DC; current 0,5A
			Lk4	internal control sensor, signals that the brake is raised (open) and brake lining are worn		

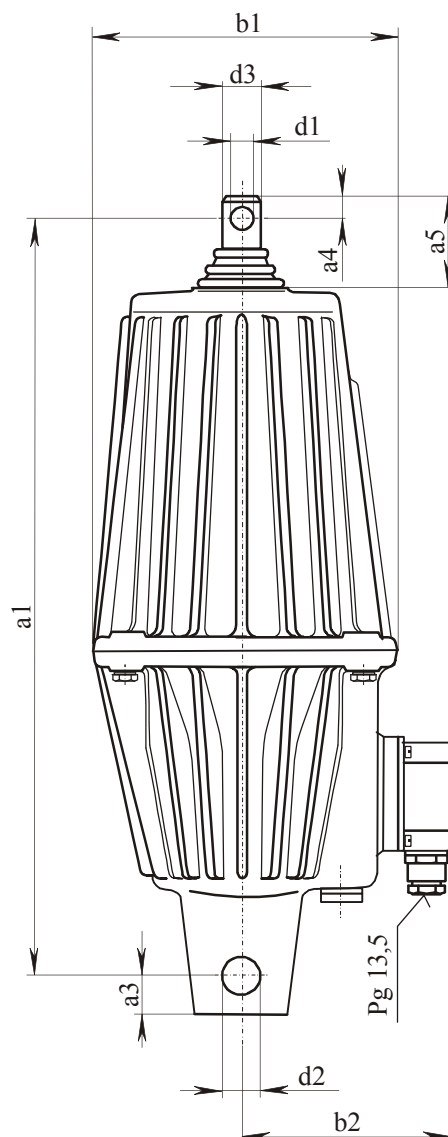
NOTE:

- Nominal pushing force for the device without a spring, is a declared force on the piston rod in the output direction. Maximum pushing force is ~ 50% higher. In devices with spring it is reduced by force springs.
- Nominal return force is the force that spring returns the piston rod and this information related to the 1/3 piston rod stroke. Tolerance is +10%.
- The weight of the device and oil are approximate.
- Time of lifting and lowering is related to a variant of the device without irreversible valve with built-in springs, i.e. with the corresponding external load. Tolerance is +10%. In devices with built-in non-return valve min. lifting and lowering time is greater for ~ 25%, while by the wring screw (13) can be continuously adjusted up to a maximum of 3-5s for a stroke rate 50-60mm, 8-12s for the stroke rate 100 mm and 10-15s for the stroke rate 160mm.

BUILT-IN DRAWING



VERSION WITH SHOCK ABSORBER - R



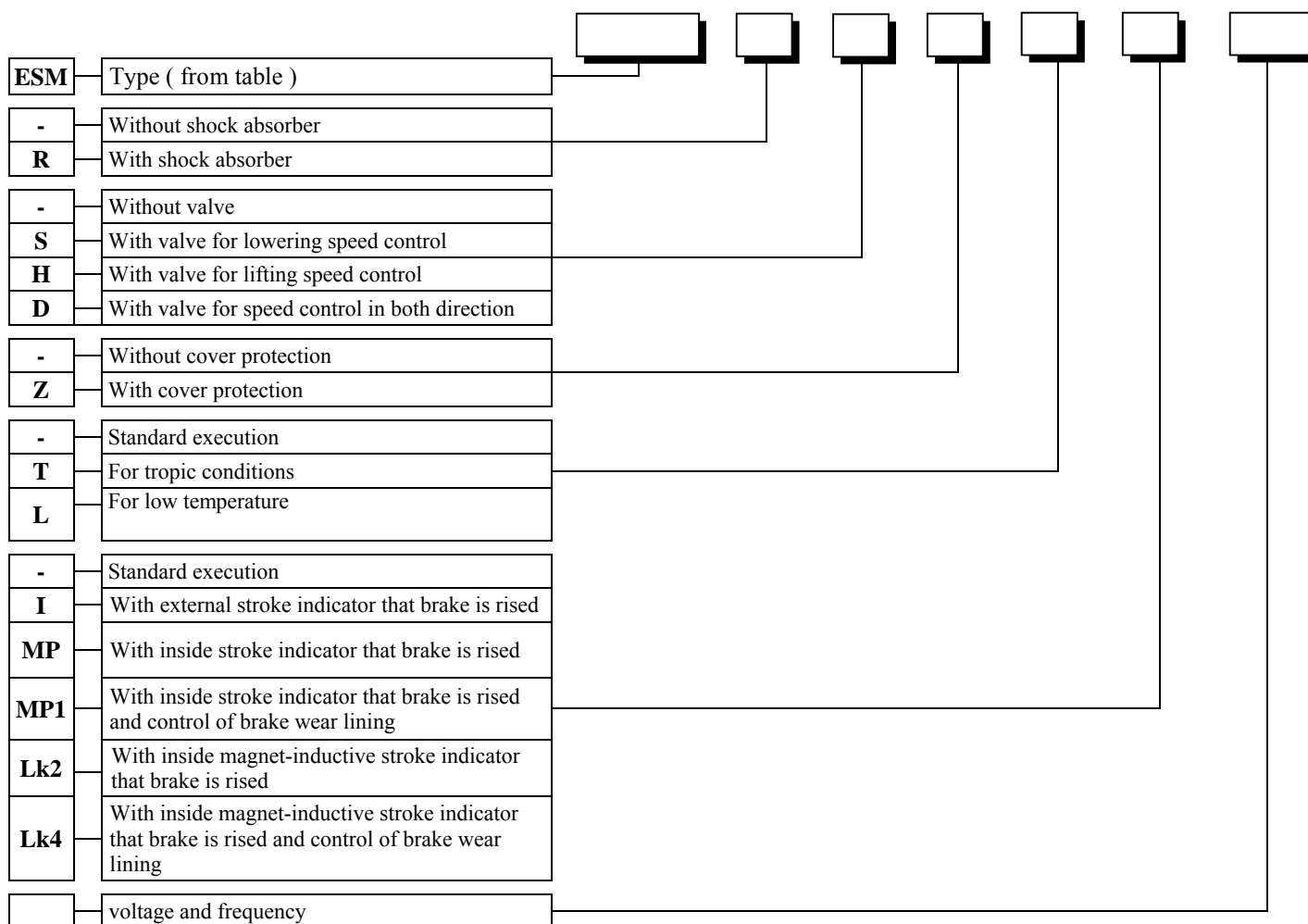
VERSION WITH COVER PROTECTION - Z

MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ^{±1}	a3 ^{±1}	a4 ^{+0,2}	a5	a6 ^{+0,2}	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b5	b6 ^{+0,2}	b7 ^{+0,2}	d1 ^{F9}	d2 ^{+0,1}	d3 ^{e8}	d4	d5	d6 ^{e8}
1	380	50	20	14	53	85	152	118	40	21	110	65	16,5	12	20,1	21,5	49	5	12
2	400	50	20	14	54	85	182	120	40	26	110	65	16,5	12	20,1	21,5	49	5	12
2.1	452	50	20	14	54	85	182	120	40	26	110	65	16,5	12	20,1	21,5	49	5	12
3	458	55	25	20	56	110	208	130	40	26	110	65	16,5	16	20,1	27,5	49	5	16
3.1	573	55	25	20	66	110	208	130	40	26	110	65	16,5	16	20,1	27,5	49	5	16
4	549	55	25	24	64	114	250	140	40	26	121	70	17,5	20	20,1	35,5	58	5	20
5	660	55	25	24	74	114	250	140	40	26	121	70	17,5	20	20,1	35,5	58	5	20

The devices are registered by INSTITUTE FOR QUALITY 1. MAJ – Nis. Registered number is 03-3322/2 from 25.12.1996. The CERTIFICATE OF SAFETY and CERTIFICATE OF TESTING are available for each device.

ORDERING CODE:



NOTE:

1. Stroke indicators I, MP and Lk2 indicate maximum ejection of the rod (brake open). Stroke MP1 i Lk4 indicate maximum ejection of the rod (brake open) and that the brake linings are worn (used-up). Internal indicator is build inside of device. Current supply for indicator is provided from connecting box.
2. Standard execution of devices is with protection against corrosion, due to the working conditions, such as surface mines, blast furnace, cement and so on. where they are present dust, salts, acids, etc..

EXAMPLES

Electrohydraulic thruster with pushing force 1250N, stroke 60mm, with return spring 780N, shock absorber and valve for lowering speed control, voltage 380V 50Hz is marked:

ESM 125/60 C80 R S 380V 50Hz

Electrohydraulic thruster with pushing force 500N, stroke 50 mm, with return spring 485N, valve for lowering speed control, cover protection, for tropic conditions, with inside sensor for control device check voltage 500V 50Hz is marked:

ESM 50/50 C50 S Z T MP 500V 50Hz

Electrohydraulic thruster with pushing force 2500N, stroke 160mm, without return spring, with valve for lifting speed control, for low temperature, voltage 380V 50Hz is marked:

ESM 250/160 H L 380V 50Hz

ELECTROHYDRAULIC THRUSTERS
SERIJE *ESM* ACCORDING TO NORMS DIN 15430

TECHNICAL DATA

Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	Current	Mass without oil	Oil mass	Lifting time	Lowering time
		mm	N	N	W	A	kg	kg	s	s
1	ESM 300-50 ESM 300-50 C120 ESM 300-50 C180 ESM 300-50 C220	50	300	0 120 180 220	150	0.50	8,4	1.7	0,50	0,55
2	ESM 500-60 ESM 500-60 C180 ESM 500-60 C320 ESM 500-60 C500	60	500	0 180 320 500	200	0.55	11,0	2.5	0,50	0,55
2.1	ESM 500-120 ESM 500-120 C180 ESM 500-120 C320 ESM 500-120 C500	120	500	0 130 290 420	200	0.55	12,5	3	0,80	0,70
3	ESM 800-60 ESM 800-60 C450 ESM 800-60 C800	60	800	0 450 800	350	0.60	16,4	4.1	0,45	0,50
3.1	ESM 800-120 ESM 800-120 C450 ESM 800-120 C800	120	800	0 300 520	350	0.60	18,8	5.7	0,8	0,65
3.2	ESM 1250-60 ESM 1250-60 C450 ESM 1250-60 C800 ESM 1250-60 C1250	60	1250	0 450 800 1250	400	0.60	16,4	4.1	0,55	0,40
3.3	ESM 1250-120 ESM 1250-120 C450 ESM 1250-120 C800 ESM 1250-120 C1250	120	1250	0 300 520 820	400	0.60	18,8	5.7	1,05	0,70
4	ESM 2000-60 ESM 2000-60 C700 ESM 2000-60 C1300 ESM 2000-60 C2000	60	2000	0 700 1300 2000	500	0.80	26,0	8,5	0,65	0,45
5.1	ESM 2000-120 ESM 2000-120 C700 ESM 2000-120 C1300 ESM 2000-120 C2000	120	2000	0 510 850 1360	500	0.80	32,5	10,0	1,20	0,70
5.1	ESM 2500-160 ESM 2500-160 C700 ESM 2500-160 C1300 ESM 2500-160 C2000	160	2500	0 510 850 1360	500	0.80	32,5	10,0	1,30	0,80
5	ESM 3000-60 ESM 3000-60 C700 ESM 3000-60 C2500 ESM 3000-60 C3200	60	3000	0 700 2300 2950	600	0.90	34,5	9,0	0,75	0,50
5.1	ESM 3000-120	120	3000	0	600	0.90	34,5	9,0	1,20	0,75
5.1	ESM 3200	100	3200	0	600	0.90	34,5	9,0	1,15	0,70

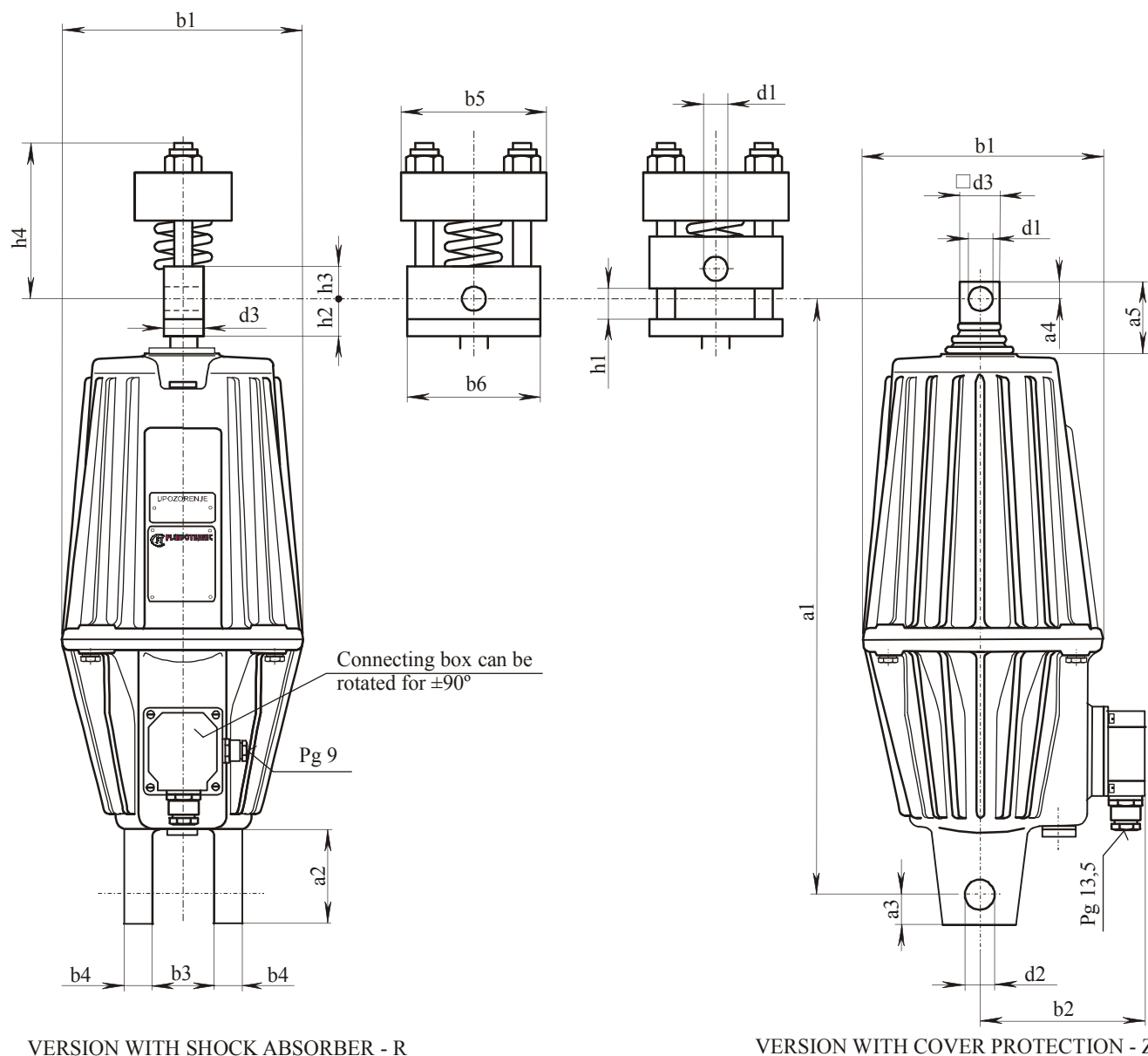
TECHNICAL DEVICE'S CHARACTERISTICS

		Standard execution		For tropic conditions	For low temperature	
Simbol		-		T	L	
Environment temperature	maximum	+40 ⁰ C		+45 ⁰ C	+40 ⁰ C	
	minimum	-25 ⁰ C		-25 ⁰ C	-45 ⁰ C	
Hydraulic oil				Isulation oil SHELL DIALA OIL DX DRIED	AEROSHELL FLUID 41	
Voltage and motor frekvency		3 x 380V 50Hz ; 3 x 400V 50Hz				
Duty of the device		2.000 cikl/h or ED100%				
Connecting box insulation		IP 56				
Version on customer's request	Voltage of motor		od 200V to 660V			
	Frequency		od 42Hz to 60Hz			
	Connecting box insulation		IP 66			
	Work control	mechanical switch	I	external control sensor, signals that the brake is raised (open)		voltage 24...250V AC/DC; current 2,5A; external IP65
			II	external control sensor, signals that the brake is raised (open) and brake lining are worn		
			MP	internal control sensor, signals that the brake is raised (open)		
			MP1	internal control sensor, signals that the brake is raised (open) and brake lining are worn		
		magnetic-inductive switch	Lk2	internal control sensor, signals that the brake is raised (open)		voltage 24...250V AC/DC; current 0,5A
			Lk4	internal control sensor, signals that the brake is raised (open) and brake lining are worn		

NOTE:

- Nominal pushing force for the device without a spring, is a declared force on the piston rod in the output direction. Maximum pushing force is ~ 50% higher. In devices with spring it is reduced by force springs.
- Nominal return force is the force that spring returns the piston rod and this information related to the 1/3 piston rod stroke. Tolerance is +10%.
- The weight of the device and oil are approximate.
- Time of lifting and lowering is related to a variant of the device without irreversible valve with built-in springs, i.e. with the corresponding external load. Tolerance is +10%. In devices with built-in non-return valve min. lifting and lowering time is greater for ~ 25%, while by the wring screw (13) can be continuously adjusted up to a maximum of 3-5s for a stroke rate 50-60mm, 8-12s for the stroke rate 100 mm and 10-15s for the stroke rate 160mm.

BUILT-IN DRAWING



MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ^{±1}	a3 ^{±1}	a4 ^{+0,2}	a5	b1 ^{±1}	b2 ^{±1}	b3 ^{±2}	b4 ^{+0,5}	b5	b6	h1	h2	h3	h4	d1 ^{F9}	d2 ^{+0,1}	Ød3 ^{-0,1}
1	370	35	16	15	50	152	118	40	20	78	68	15	30	20	75	16	16,1	25
2	435	50	20	18	93	182	120	60	30	78	68	20	36	20	100	20	20,1	30
2.1	515	50	20	18	113	182	120	60	30	78	68	20	36	20	100	20	20,1	30
3	458	45	22	18	56	208	130	60	30	78	68	20	36	20	100	20	20,1	30
3.1	530	50	22	18	57*	208	130	60	30	78	68	20	36	20	100	20	20,1	30
3.2	645	55	25	25	248	208	130	40	25	116	110	20	38	35	175	25	25,1	40
3.3	705	55	25	25	201	208	130	40	25	116	110	20	38	35	175	25	25,1	40
4	645	55	25	25	161	250	140	40	25	116	110	20	38	35	175	25	25,1	40
5	660	55	25	25	65	250	140	40	25	116	110	20	38	35	175	25	25,1	40
5.1	705	55	25	25	110	250	140	40	25	116	110	20	38	35	175	25	25,1	40

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ESM 2000-120 H L 380V 50Hz

ORDERING CODE:

ESM	Type (from table)						
-	Without shock absorber						
R	With shock absorber						
-	Without valve						
S	With valve for lowering speed control						
H	With valve for lifting speed control						
D	With valve for speed control in both direction						
-	Without cover protection						
Z	With cover protection						
-	Standard execution						
T	For tropic conditions						
L	For low temperature						
-	Standard execution						
I	With external stroke indicator that brake is rised						
MP	With inside stroke indicator that brake is rised						
MP1	With inside stroke indicator that brake is rised and control of brake wear lining						
Lk2	With inside magnet-inductive stroke indicator that brake is rised						
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining						
	voltage and frequency						

NOTE:

- Stroke indicators I, MP and Lk2 indicate maximum ejection of the rod (brake open). Stroke MP1 i Lk4 indicate maximum ejection of the rod (brake open) and that the brake linings are worn (used-up). Internal indicator is build inside of device. Current supply for indicator is provided from connecting box.
- Standard execution of devices is with protection against corrosion, due to the working conditions, such as surface mines, blast furnace, cement and so on. where they are present dust, salts, acids, etc..

EXAMPLES

Electrohydraulic thruster with pushing force 1250N, stroke 60mm, with return spring 800N, shock absorber and valve for lowering speed control, voltage 380V 50Hz is marked:

ESM 1250-60 C800 R S 380V 50Hz

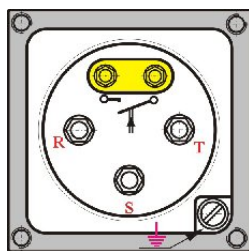
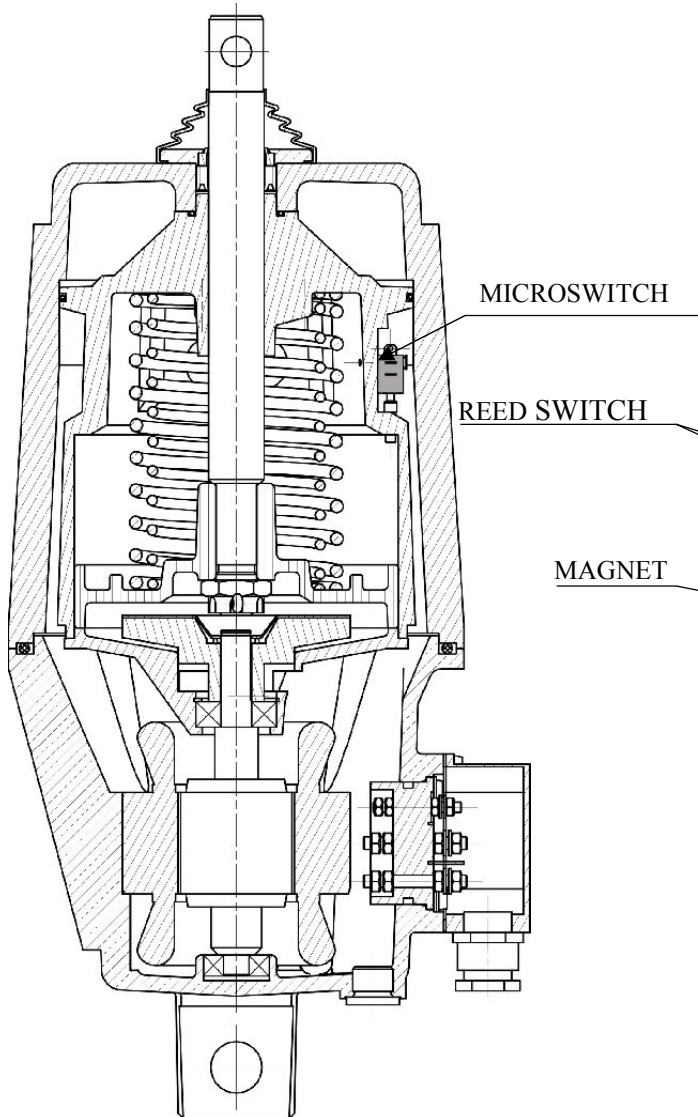
Electrohydraulic thruster with pushing force 500N, stroke 60 mm, with return spring 500N, valve for lowering speed control, cover protection, for tropic conditions, with inside sensor for control device check, voltage 500V 50Hz is marked:

ESM 500-60 C500 S Z T MP 500V 50Hz

Electrohydraulic thruster with pushing force 2000N, stroke 120mm, without return spring, with valve for lifting speed control, for low temperature, voltage 380V 50Hz is marked:

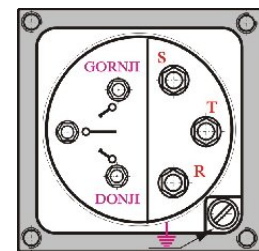
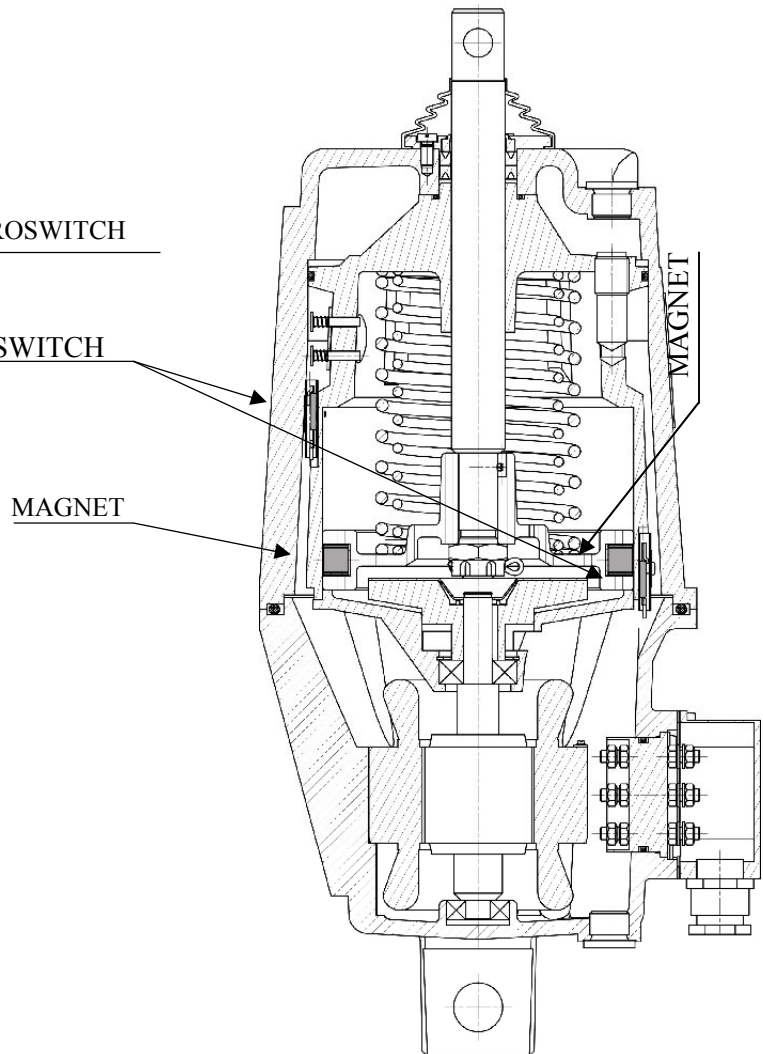
ESM 2000-120 H L 380V 50Hz

ELECTROHYDRAULIC THRUSTER WITH INSIDE INSTALLATION OF MICROSWITCH FOR DEVICE WORK CONTROL "MP"



CONNECTING BOX "MP"

ELECTROHYDRAULIC THRUSTER WITH INSIDE INSTALLATION OF MAGNETIC-INDUCTIVE SWITCHES FOR DEVICE WORK CONTROL "Lk"

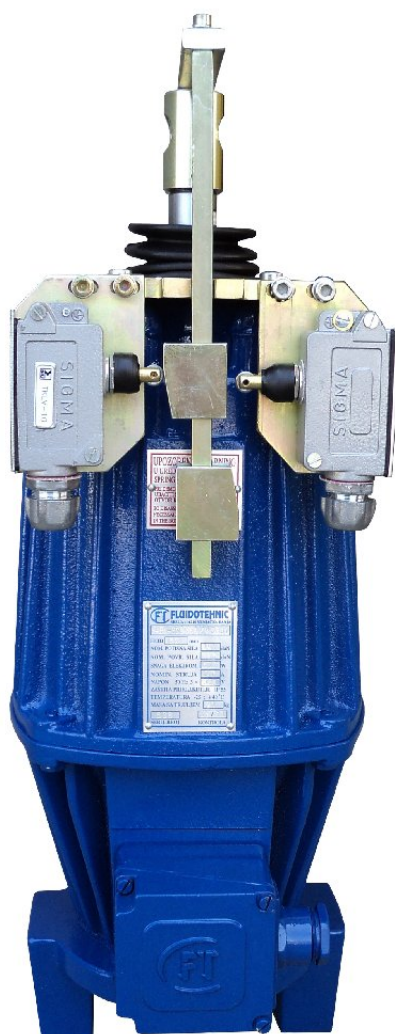


CONNECTING BOX "Lk"

L lb nrv lsbg is build on the outside of cylinder. It is abshu sd v gdm sg d olrsm hr lmsgd sno onrlshnm m l fndslb hnt bshud rv lsbg rv lsbgdr d kn at lks nmsgd nt srlcd ne sg d bxlncd ne bshu sdr sgdl od l nrlms l fnds at lks lmsgd olrsm gd cu ns fd ne sglr rnk slm hr sg s sg d rv lsbgdr d et lks o nsdbsdc e nl dwsd m k hnt dnbdr ne lmsglr v x d ud x dlh akd lmsgd v n lm fd hr cndd lmbnrmulbsmf anw

ELECTROHYDRAULIC THRUSTERS

SPECIJAL EXECUTION



ELECTROHYDRAULIC THRUSTERS Type F-EB

TECHNICAL DEVICE'S CHARACTERISTICS

- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

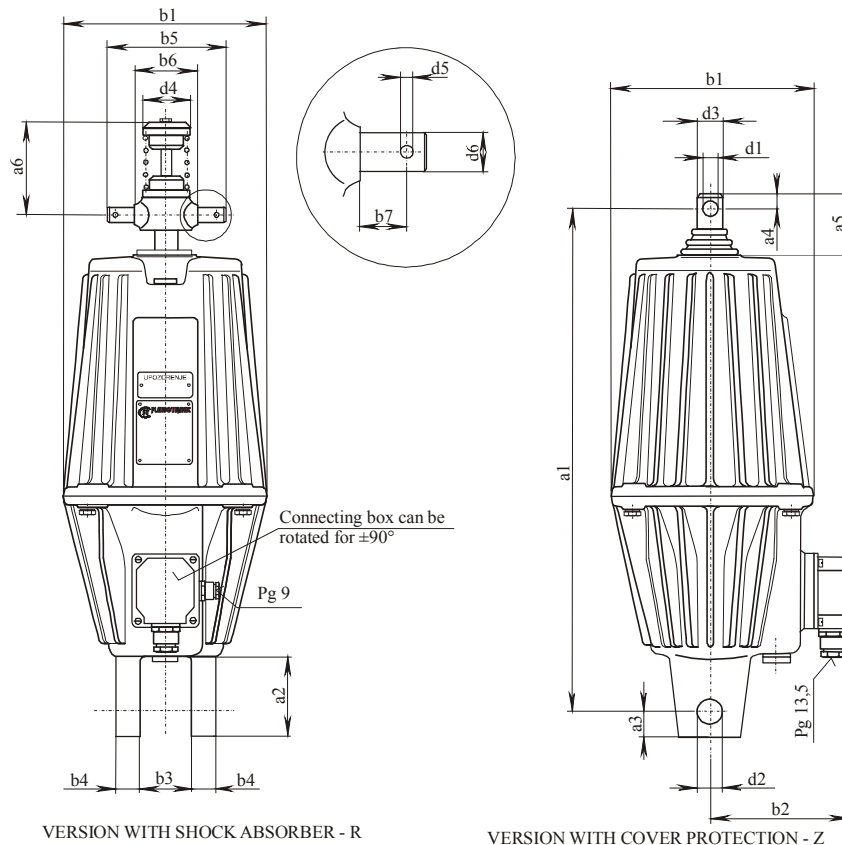
Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	mass	Lifting time	Lowering time
		mm	N	N	W	kg	s	s
1	F-EB 20/50 F-EB 20/50 C12 F-EB 20/50 C20	50	200	0 130 200	150	10.1	0.55	0.65
2	F-EB 50/50 F-EB 50/50 C18 F-EB 50/50 C32 F-EB 50/50 C50	50	500	0 155 330 485	200	13.5	0.55	0.65
2	F-EB 50/60 F-EB 50/60 C18 F-EB 50/60 C32 F-EB 50/60 C50	60	500	0 155 330 485	200	13.5	0.55	0.65
3	F-EB 80/60 F-EB 80/60 C45 F-EB 80/60 C80	60	800	0 400 780	350	20.5	0.55	0.6
3.1	F-EB 80/160 F-EB 80/160 C45 F-EB 80/160 C80	160	800	0 300 520	350	24.5	1.2	1.1
3	F-EB 125/60 F-EB 125/60 C45 F-EB 125/60 C80 F-EB 125/60 C125	60	1250	0 400 780 1180	400	20.5	0.65	0.6
3	F-EB 150/60 F-EB 150/60 C45 F-EB 150/60 C80 F-EB 150/60 C125	60	1500	0 400 780 1180	450	16.4	0.65	0.7
3.1	F-EB 125/160 F-EB 125/160 C45 F-EB 125/160 C80 F-EB 125/160 C125	160	1250	0 300 520 820	400	24.5	1.2	1.1
4	F-EB 250/60 F-EB 250/60 C70 F-EB 250/60 C130 F-EB 250/60 C200	60	2500	0 700 1300 2000	500	34.5	0.7	0.6
5	F-EB 250/160 F-EB 250/160 C70 F-EB 250/160 C130 F-EB 250/160 C200	160	2500	0 510 850 1360	500	42.5	1.5	1.1
5	F-EB 320/100 F-EB 320/100 C70 F-EB 320/100 C250* F-EB 320/100 C320*	100	3200	0 610 2190 2800	600	43.5	1.4	0.9

* For the devices F-EB 320/100 C250 and F-EB 320/100 C320 nominal stroke of piston rod is limited to 60mm

MEASURES FOR INSTALLATION

SIZE	DIMENS.																		
	a1 ^{±1}	a2 ^{±1}	a3 ^{±1}	a4 ^{+0,2}	a5	a6 ^{+0,2}	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b5	b6 ^{+0,2}	b7 ^{+0,2}	d1 ^{F9}	d2 ^{+0,1}	d3 ^{e8}	d4	d5	d6 ^{e8}
1	380	50	20	14	53	85	152	118	40	21	110	65	16,5	12	20,1	21,5	49	5	12
2	400	50	20	14	54	85	182	120	40	26	110	65	16,5	12	20,1	21,5	49	5	12
3	458	55	25	20	56	110	208	130	40	26	110	65	16,5	16	20,1	27,5	49	5	16
3.1	573	55	25	20	66	110	208	130	40	26	110	65	16,5	16	20,1	27,5	49	5	16
4	549	55	25	24	64	114	250	140	40	26	121	70	17,5	20	20,1	35,5	58	5	20
5	660	55	25	24	74	114	250	140	40	26	121	70	17,5	20	20,1	35,5	58	5	20

BUILT-IN DRAWING



ORDERING CODE

F-EB	Type (from table)						
-	Without shock absorber						
R	With shock absorber						
-	Without valve						
S	With valve for lowering speed control						
H	With valve for lifting speed control						
D	With valve for speed control in both direction						
-	Without cover protection						
Z	With cover protection						
-	Standard execution						
T	For tropic conditions						
L	For low temperature						
-	Standard execution						
I	With external stroke indicator that brake is rised						
MP	With inside stroke indicator that brake is rised						
MP1	With inside stroke indicator that brake is rised and control of brake wear lining						
Lk2	With inside magnet-inductive stroke indicator that brake is rised						
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining						
	voltage and frequency						

ELECTROHYDRAULIC THRUSTERS F-EB DIN 15430

TECHNICALS DEVICE'S CHARACTERISTICS

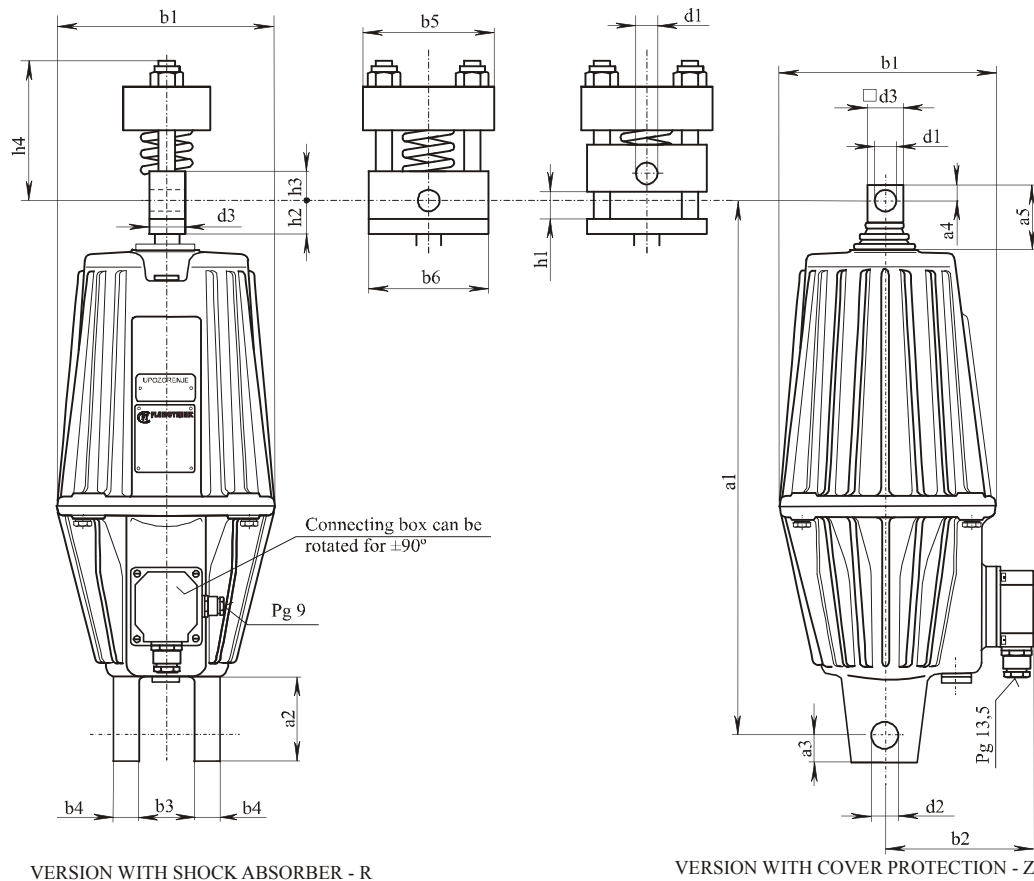
- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

Size	Type ESM	Nominal stroke	Nominal pushing force	Nominal return force	Power	mass	Lifting time	Lowering time
		mm	N	N	W	kg	s	s
1	F-EB 300-50 F-EB 300-50 C120 F-EB 300-50 C180 F-EB 300-50 C220	50	300	0 120 180 220	150	10,1	0,50	0,55
2	F-EB 500-60 F-EB 500-60 C180 F-EB 500-60 C320 F-EB 500-60 C500	60	500	0 180 320 500	200	13,5	0,50	0,55
2.1	F-EB 500-120 F-EB 500-120 C180 F-EB 500-120 C320 F-EB 500-120 C500	120	500	0 130 290 420	200	15,5	0,80	0,70
3	F-EB 800-60 F-EB 800-60 C450 F-EB 800-60 C800	60	800	0 450 800	350	20,5	0,45	0,50
3.1	F-EB 800-120 F-EB 800-120 C450 F-EB 800-120 C800	120	800	0 300 520	350	24,5	0,8	0,65
3.2	F-EB 1250-60 F-EB 1250-60 C450 F-EB 1250-60 C800 F-EB 1250-60 C1250	60	1250	0 450 800 1250	400	20,5	0,55	0,40
3.3	F-EB 1250-120 F-EB 1250-120 C450 F-EB 1250-120 C800 F-EB 1250-120 C1250	120	1250	0 300 520 820	400	24,5	1,05	0,70
4	F-EB 2000-60 F-EB 2000-60 C700 F-EB 2000-60 C1300 F-EB 2000-60 C2000	60	2000	0 700 1300 2000	500	34,5	0,65	0,45
5.1	F-EB 2000-120 F-EB 2000-120 C700 F-EB 2000-120 C1300 F-EB 2000-120 C2000	120	2000	0 510 850 1360	500	42,5	1,20	0,70
5.1	F-EB 2500-160 F-EB 2500-160 C700 F-EB 2500-160 C1300 F-EB 2500-160 C2000	160	2500	0 510 850 1360	500	42,5	1,30	0,80
5	F-EB 3000-60 F-EB 3000-60 C700 F-EB 3000-60 C2500 F-EB 3000-60 C3200	60	3000	0 700 2300 2950	600	43,5	0,75	0,50
5.1	F-EB 3000-120	120	3000	0	600	43,5	1,20	0,75
5.1	F-EB 3200	100	3200	0	600	43,5	1,15	0,70

MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ⁺¹	a3 ⁺¹	a4 ^{+0,2}	a5	b1 ^{±1}	b2 ^{±1}	b3 ⁺²	b4 ^{+0,5}	b5	b6	h1	h2	h3	h4	d1 ^{F9}	d2 ^{+0,1}	Ød3 ^{-0,1}
1	370	35	16	15	50	152	118	40	20	78	68	15	30	20	75	16	16,1	25
2	435	50	20	18	93	182	120	60	30	78	68	20	36	20	100	20	20,1	30
2.1	515	50	20	18	113	182	120	60	30	78	68	20	36	20	100	20	20,1	30
3	458	45	22	18	56	208	130	60	30	78	68	20	36	20	100	20	20,1	30
3.1	530	50	22	18	57*	208	130	60	30	78	68	20	36	20	100	20	20,1	30
3.2	645	55	25	25	248	208	130	40	25	116	110	20	38	35	175	25	25,1	40
3.3	705	55	25	25	201	208	130	40	25	116	110	20	38	35	175	25	25,1	40
4	645	55	25	25	161	250	140	40	25	116	110	20	38	35	175	25	25,1	40
5	660	55	25	25	65	250	140	40	25	116	110	20	38	35	175	25	25,1	40
5.1	705	55	25	25	110	250	140	40	25	116	110	20	38	35	175	25	25,1	40

BUILT-IN DRAWING



ORDERING CODE

F-EB	Type (from table)	
-	Without shock absorber	
R	With shock absorber	
-	Without valve	
S	With valve for lowering speed control	
H	With valve for lifting speed control	
D	With valve for speed control in both direction	
-	Without cover protection	
Z	With cover protection	
-	Standard execution	
T	For tropic conditions	
L	For low temperature	
-	Standard execution	
I	With external stroke indicator that brake is rised	
MP	With inside stroke indicator that brake is rised	
MP1	With inside stroke indicator that brake is rised and control of brake wear lining	
Lk2	With inside magnet-inductive stroke indicator that brake is rised	
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining	
	voltage and frequency	

ELECTROHYDRAULIC THRUSTERS

Type F-BL

TECHNICAL DEVICE'S CHARACTERISTICS

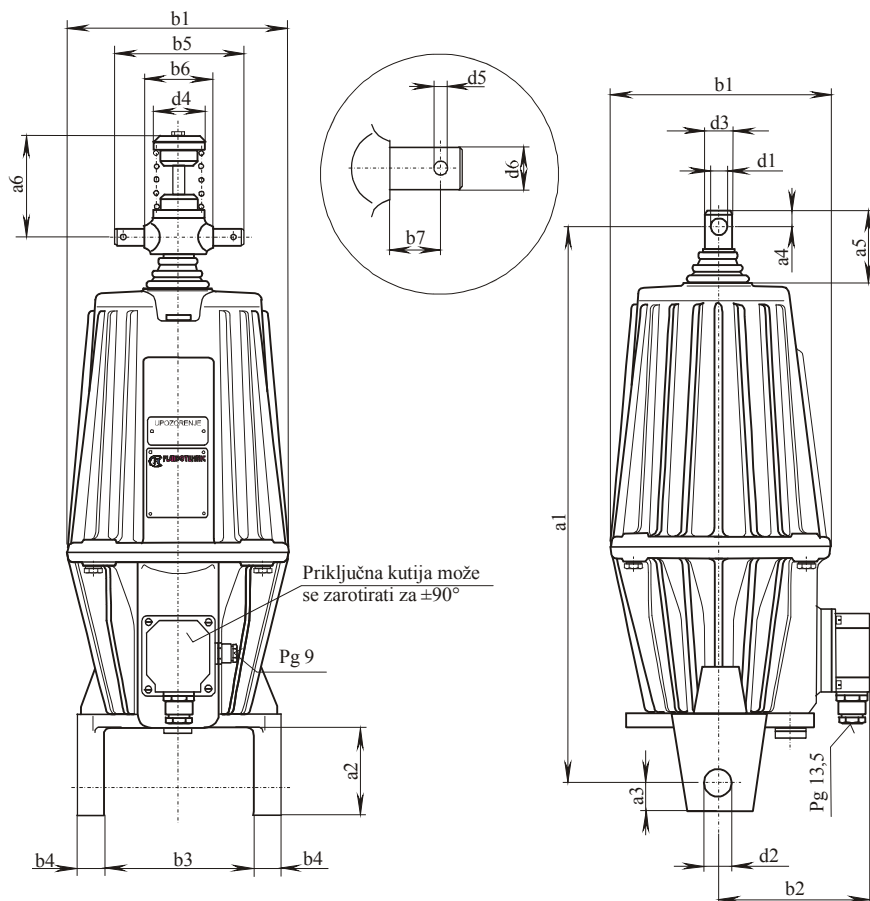
- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	mass	Lifting time	Lowering time
		mm	N	N	W	kg	s	s
1	F-BL-12 F-BL-12 SV F-BL-12 C F-BL-12 C SV	50	200	0 0 120 120	150	10.2	0.55	0.65
1	F-BL-20 F-BL-20 SV F-BL-20 C F-BL-20 C SV	50	200	0 0 180 180	150	10.2	0.55	0.65
2	F-BL-32 F-BL-32 SV F-BL-32 C F-BL-32 C SV	50	500	0 0 330 330	200	13,5	0,55	0,65
2	F-BL-50 F-BL-50 SV F-BL-50 C F-BL-50 C SV	50	500	0 0 485 485	200	13.5	0.55	0.65
3	F-BL-80 F-BL-80 SV F-BL-80 C F-BL-80 C SV	60	1250	0 0 775 775	350	21.0	0.55	0.6
3-1	F-BL-80/16 F-BL-80/16 SV	160	1250	0	350	24.5	1.2	1.1
3	F-BL-125 F-BL-125 SV F-BL-125 C F-BL-125 C SV	60	1250	0 0 1290 1290	400	21.0	0.65	0.6
3-1	F-BL-125/16 F-BL-125/16 SV	160	1250	0	400	24.5	1.2	1.1
4	F-BL-200 F-BL-200 SV F-BL-200 C F-BL-200 C SV	60	2500	0 0 1910 1910	500	34.5	0.7	0.6
5	F-BL-200/16 F-BL-200/16 SV F-BL-250/16 F-BL-250/16 SV F-BL-320 F-BL-320 SV	160 160 160 160 100 100	2000 2000 2500 2500 3200 3200	0	450 450 500 500 600 600	42.5 42.5 42.5 42.5 43.5 43.5	1.5 1.5 1.5 1.5 1.4 1.4	1.1 1.1 1.1 1.1 0.9 0.9

MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ^{±1}	a3 ^{±1}	a4 ^{±0.2}	a5 [~]	a6 ^{±1}	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b5	b6 ^{+0.2}	b7 ^{+0.2}	d1 ^{F9}	d2 ^{+0.1}	d3	d4	d5	d6 ^{-0.1}
1	405	50	23	16	80	42	150	110	88	23	110	65	16,5	16	20,1	24	49	5	12
2	430	50	23	20	90	57	180	120	110	32	110	65	16,5	16	20,1	29	49	5	12
3	513	55	25	25	116	52	204	130	116	38	110	65	16,5	20	20,1	34	49	5	16
3.1	613	55	25	25	109	52	204	130	116	38	110	65	16,5	20	20,1	34	49	5	16
4	605	55	25	30	121	63	250	140	126	38	121	70	17,5	25	20,1	40	58	5	20
5	705	55	25	30	110	63	250	140	126	38	121	70	17,5	25	20,1	40	58	5	20

BUILT-IN DRAWING



ORDERING CODE

F-BL	Type (from table)						
-	Without shock absorber						
R	With shock absorber						
-	Without valve						
SV	With valve for lowering speed control						
-	Without cover protection						
Z	With cover protection						
-	Standard execution						
T	For tropic conditions						
L	For low temperature						
-	Standard execution						
I	With external stroke indicator that brake is rised						
MP	With inside stroke indicator that brake is rised						
MP1	With inside stroke indicator that brake is rised and control of brake wear lining						
Lk2	With inside magnet-inductive stroke indicator that brake is rised						
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining						
	voltage and frequency						

ELECTROHYDRAULIC THRUSTERS

F- EHT 12.5 to 250-60

TECHNICAL DEVICE'S CHARACTERISTICS

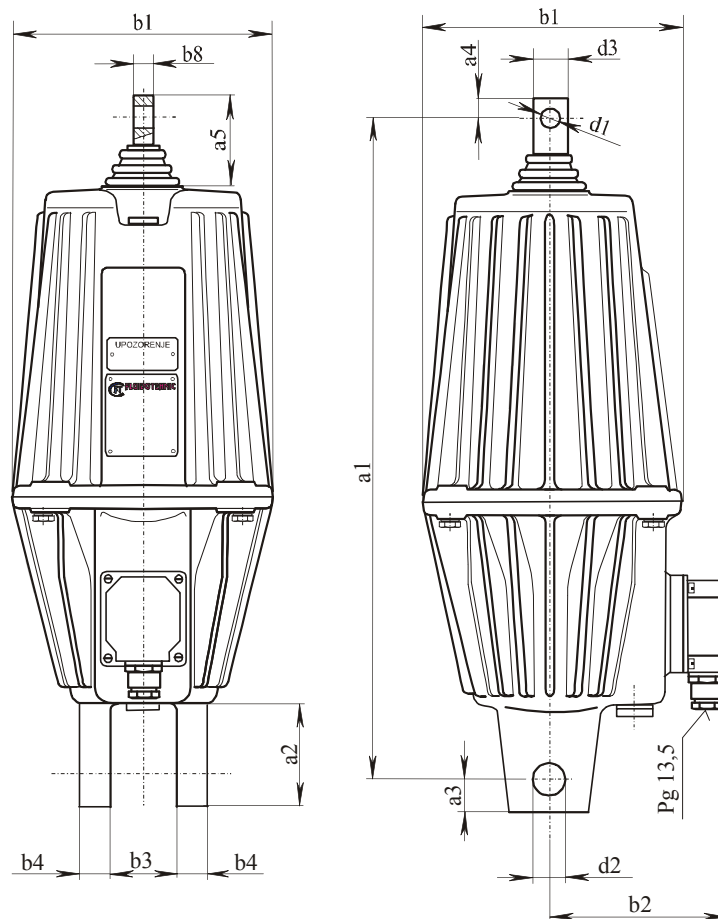
- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	mass	Lifting time	Lowering time
		mm	N	N	W	kg	s	s
1	F-EHT 12.5-50 F-EHT 12.5-50V F-EHT 12.5-50F F-EHT 12.5-50FV	50	200	0 0 130 130	150	10.2	0.55	0.65
1	F-EHT 20-50 F-EHT 20-50V F-EHT 20-50F F-EHT 20-50FV	50	200	0 0 200 200	150	10.2	0.55	0.65
2	F-EHT 32-50 F-EHT 32-50V F-EHT 32-50F F-EHT 32-50FV	50	500	0 0 330 330	200	13.5	0.55	0.65
2	F-EHT 50-50 F-EHT 50-50V F-EHT 50-50F F-EHT 50-50FV	50	500	0 0 485 485	200	13.5	0.55	0.65
3	F-EHT 80-60 F-EHT 80-60V F-EHT 80-60F F-EHT 80-60FV	60	1250	0 0 775 775	350	21.0	0.55	0.6
3.1	F-EHT 125-60 F-EHT 125-60V F-EHT 125-60F F-EHT 125-60FV	60	1250	0 0 1290 1290	400	21.0	0.65	0.6
4	F-EHT 200-60 F-EHT 200-60V F-EHT 200-60F F-EHT 200-60FV	60	2500	0 0 1910 1910	500	34.5	0.7	0.6
4	F-EHT 250-60 F-EHT 250-60V F-EHT 250-60F F-EHT 250-60FV	60	2800	0 0 2000 2000	500	34.5	0.75	0.65

MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ^{±1}	a3 ^{±1}	a4 ^{±0.2}	a5 [~]	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b8 ^{-0.2}	d1 ^{F9}	d2 ^{+0,1}	d3 ^{±0.2}
1	400	50	20	15	67	150	110	40	15	22	16	20,1	30
2	420	50	20	15	69	180	120	40	15	22	16	20,1	30
3	557	55	25	19	154	204	130	40	20	25	20	25,1	35
3.1	582	55	25	19	179	204	130	40	20	25	20	25,1	35
4	582	55	25	19	93	250	140	40	20	25	20	25,1	35

BUILT-IN DRAWING



ORDERING CODE

F-EHT	Type (from table)						
-	Without spring						
F	With spring						
-	Without valve						
V	With valve for lowering speed control						
-	Without cover protection						
Z	With cover protection						
-	Standard execution						
T	For tropic conditions						
L	For low temperature						
-	Standard execution						
I	With external stroke indicator that brake is rised						
MP	With inside stroke indicator that brake is rised						
MP1	With inside stroke indicator that brake is rised and control of brake wear lining						
Lk2	With inside magnet-inductive stroke indicator that brake is rised						
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining						
	voltage and frequency						

ELEKTROHYDRAULIC THRUSTERS F- EHT 338 to 2960

TECHNICAL DEVICE'S CHARACTERISTICS

- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	mass	Lifting time	Lowering time
		mm	N	N	W	kg	s	s
3	F-EHT 338	75	450	0			0.6	0.7
3-F	F-EHT 338 F	50	450	420			0.6	0.7
3	F-EHT 375	50	750	0	350	21.0	0.5	0.55
3-F	F-EHT 375 F	50	750	700			0.5	0.55
3.1	F-EHT 900	120	750	0	350	21.0	1	0.7
4	F-EHT 1100	60	1850	0	500	34.5	0.8	0.6
4-F	F-EHT 1100-F	60	1850	1750	500	34.5	0.8	0.6
5	F-EHT 2960	160	1850	0	500	42.5	1.8	1.1

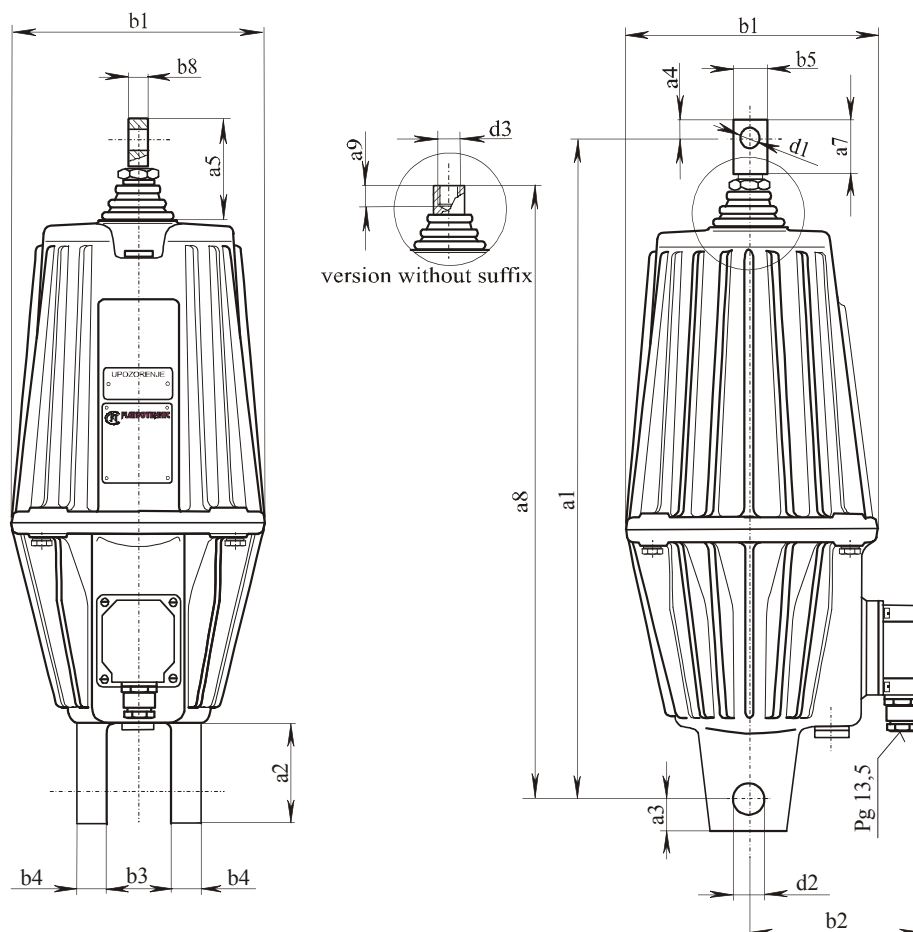
MEASURES FOR INSTALLATION

DIMENS. SIZE	a1	a2 ⁺¹	a3 ⁺¹	a4 ^{±0.2}	a5	a7 ^{±0.2}	a8 ^{±1}	a9 ^{±0.2}	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b5 ^{±0.2}	b8 ^{-0.2}	d1 ^{F9}	d2 ^{+0.1}	d3
3	509	50	22	14	102	30			208	130	60	30	34	22	16	24,1	
3.1	609	50	22	15	85	57			208	130	60	30	34	25	16	24,1	
4	600	60	24	23	114	70			250	140	80	32	40	40	25	27,1	
5	700	60	24	23	103	70			250	140	80	32	40	40	25	27,1	
3-F		50	22				480	30	208	130	60	25				24,1	M16x1,5
4-F		60	24				568	30	250	140	80	32				27,1	M16x1,5

NOTE:

- Nominal pushing force for the device without a spring, is a declared force on the piston rod in the output direction. Maximum pushing force is ~ 50% higher. In devices with spring it is reduced by force springs.
- Nominal return force is the force that spring returns the piston rod and this information related to the 1/3 piston rod stroke. Tolerance is +10%.
- The weight of the device and oil are approximate.
- Time of lifting and lowering is related to a variant of the device without irreversible valve with built-in springs, i.e. with the corresponding external load. Tolerance is +10%. In devices with built-in non-return valve min. lifting and lowering time is greater for ~ 25%, while by the wring screw (13) can be continuously adjusted up to a maximum of 3-5s for a stroke rate 50-60mm, 8-12s for the stroke rate 100 mm and 10-15s for the stroke rate 160mm.

BUILT-IN DRAWING



ORDERING CODE:

F-EHT	Type (from table)						
-	without spring						
F	with spring						
-	Without valve						
V	With valve for lowering speed control						
-	Without cover protection						
Z	With cover protection						
-	Standard execution						
T	For tropic conditions						
L	For low temperature						
-	Standard execution						
I	With external stroke indicator that brake is rised						
MP	With inside stroke indicator that brake is rised						
MP1	With inside stroke indicator that brake is rised and control of brake wear lining						
Lk2	With inside magnet-inductive stroke indicator that brake is rised						
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining						
	voltage and frequency						

ELEKTROHYDRAULIC THRUSTERS

Type F- SZH-45 and F-SZH-185

TECHNICAL DEVICE'S CHARACTERISTICS

- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	mass	Lifting time	Lowering time
		mm	N	N	W	kg	s	s
3	F-SZH 45/50	60	800	0	350	21.0	0.5	0.55
4	F-SZH 185/60	60	2500	0	500	34.5	0.7	0.6
5	F-SZH 185/120	120	2500	0	500	42.5	1.4	0.9

MEASURES FOR INSTALLATION

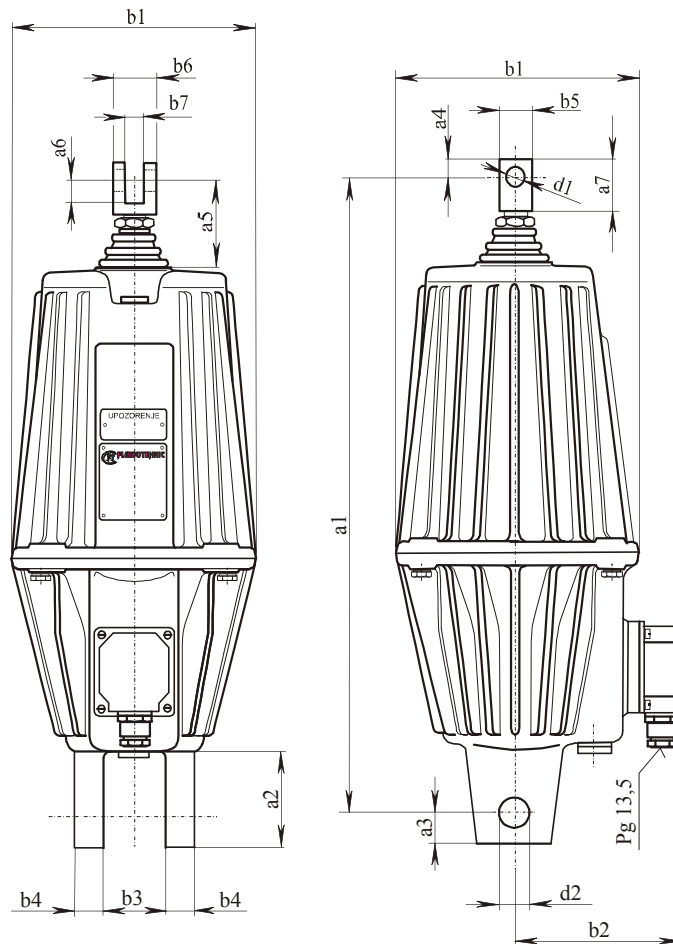
DIMENS. SIZE	a1*	a2 ⁺¹	a3 ⁺¹	a4 ^{±0.2}	a5*	a6 ^{±0.2}	a7 ^{±0.2}	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b5 ^{±0.2}	b6 ^{±0.2}	b7 ^{+0.2}	d1 ^{F9}	d2 ^{+0.1}
3	509	50	22	15	97	32	57	208	130	60	25	34	39	21	16	24.2
4	757	60	24	23	358	34	70	250	140	84	31	40	60	36	22	24.2
5	757	60	24	23	160	34	70	250	140	84	31	40	60	36	22	24.2

* Adjust the range ± 10 mm

NOTE:

- Nominal pushing force for the device without a spring, is a declared force on the piston rod in the output direction. Maximum pushing force is ~ 50% higher. In devices with spring it is reduced by force springs.
- Nominal return force is the force that spring returns the piston rod and this information related to the 1/3 piston rod stroke. Tolerance is +10%.
- The weight of the device and oil are approximate.
- Time of lifting and lowering is related to a variant of the device without irreversible valve with built-in springs, i.e. with the corresponding external load. Tolerance is +10%. In devices with built-in non-return valve min. lifting and lowering time is greater for ~ 25%, while by the wring screw (13) can be continuously adjusted up to a maximum of 3-5s for a stroke rate 50-60mm, 8-12s for the stroke rate 100 mm and 10-15s for the stroke rate 160mm.

BUILT-IN DRAWING



ORDERING CODE:

F-SZH	Type (from table)	
-	without spring	
F	with spring	
-	Without valve	
V	With valve for lowering speed control	
-	Without cover protection	
Z	With cover protection	
-	Standard execution	
T	For tropic conditions	
L	For low temperature	
-	Standard execution	
I	With external stroke indicator that brake is rised	
MP	With inside stroke indicator that brake is rised	
MP1	With inside stroke indicator that brake is rised and control of brake wear lining	
Lk2	With inside magnet-inductive stroke indicator that brake is rised	
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining	
	voltage and frequency	

ELEKTROHYDRAULIC THRUSTERS F-TGM

TECHNICAL DEVICE'S CHARACTERISTICS

- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

Size	Type FLUIDOTEHNIC	Nominal stroke	Nominal pushing force	Nominal return force	Power	Current	mass	Lifting time	Lowering time
		mm	N	N	W	A	kg	s	s
1	F-TGM 25	32	300	0	150	0,50	10,1	0,35	0,45
2	F-TGM 50	50	500	0	200	0,55	13,5	0,45	0,50

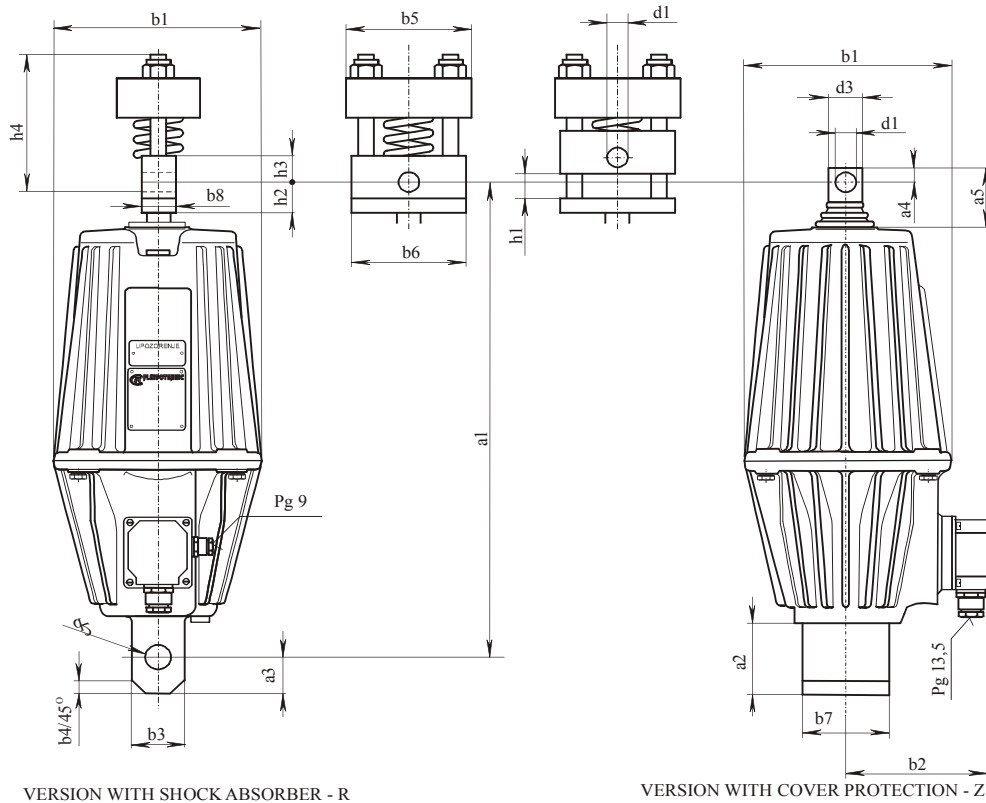
MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ⁺¹	a3 ⁺¹	a4 ^{+0,2}	a5	b1 ^{±1}	b2 ^{±1}	b3 ⁺²	b4 ^{+0,5}	b5	b6	b7	b8 ^{-0,2}	h1	h2	h3	h4	d1 ^{F9}	d2 ^{+0,1}	d3 ^{-0,1}
1	349	39	15	13	32	152	114	30	10			60	16					12	12,2	20
2	400	47	17	16	60	180	116	35	12	78	68	60	25	20	36	20	100	16	16,2	32

NOTE:

- Stroke indicators I, MP and Lk2 indicate maximum ejection of the rod (brake open). Stroke indicators MP1 and Lk4 indicate maximum ejection of the rod (brake open) and that the brake linings are worn (used-up). Internal indicator is build inside of device. Current supply for indicator is provided from connecting box.
- Standard execution of devices is with protection against corrosion, due to the working conditions, such as surface mines, blast furnace, cement and so on. where they are present dust, salts, acids, etc..

BUILT-IN DRAWING



ORDERING CODE

F-TGM	Type (from table)						
-	Without shock absorber						
R	With shock absorber						
-	Without valve						
S	With valve for lowering speed control						
H	With valve for lifting speed control						
D	With valve for speed control in both direction						
-	Without cover protection						
Z	With cover protection						
-	Standard execution						
T	For tropic conditions						
L	For low temperature						
-	Standard execution						
I	With external stroke indicator that brake is rised						
MP	With inside stroke indicator that brake is rised						
MP1	With inside stroke indicator that brake is rised and control of brake wear lining						
Lk2	With inside magnet-inductive stroke indicator that brake is rised						
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining						
	voltage and frequency						

ELECTROHYDRAULIC THRUSTERS

Type F-REH and F-R

TECHNICALS DEVICE'S CHARACTERISTICS

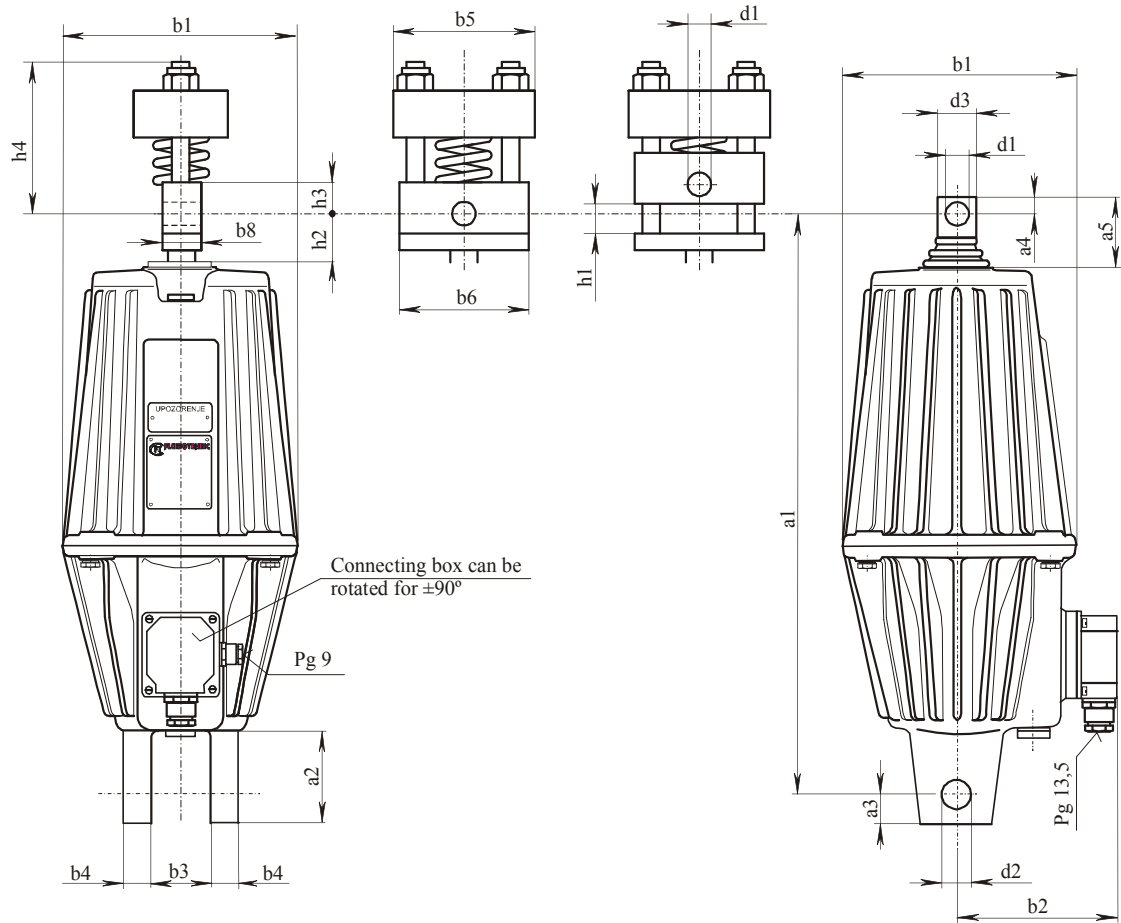
- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

Size	Type FLUIDOTEHNIC	Nominal stroke	Nominal pushing force	Nominal return force	Power	Current	mass	Lifting time	Lowering time
		mm	N	N	W	A	kg	s	s
1	F-R 12/5	50	200	0	150	0,50	10,2	0,55	0,65
	F-R 12/5 c			120					
	F-R 20/5			0					
	F-R 20/5 c			200					
1.1	F-REH 12/50 H	50	200	0	150	0,50	10,2	0,55	0,65
	F-REH 12/50 C			200					
	F-REH 20/50 H			0					
	F-REH 20/50 C			200					
2	F-R 32/5	50	500	0	200	0,55	13,5	0,55	0,65
	F-R 32/5 c			330					
	F-R 50/5			0					
	F-R 50/5 c			485					
2.1	F-REH 32/50 H	50	500	0	200	0,55	13,5	0,55	0,65
	F-REH 32/50 C			330					
	F-REH 50/50 H			0					
	F-REH 50/50 C			485					
3	F-R 80/6	60	800	0	350	0,60	21,0	0,55	0,60
	F-R 80/6 c			780					
	F-R 125/6		1250	0	400			0,65	0,60
	F-R 125/6 c			1180					
3.1	F-REH 80/60 H	60	800	0	350	0,60	21,0	0,55	0,60
	F-REH 80/60 C			1180					
3.3	F-REH 80/120 H	120	800	0	350	0,6	24,5	0,90	0,80
3.2	F-REH 125/60 H	60	1250	0	400	0,60	21,0	0,65	0,60
	F-REH 125/60 C			1180					
4	F-REH 200/60 H	60	2500	0	500	0,80	34,5	0,70	0,60
	F-REH 200/60 C			2000					
5	F-REH 320/60 H	60	3200	0	500	0,90	43,0	0,75	0,65
	F-REH 320/60 C			2800					

MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ⁺¹	a3 ⁺¹	a4 ^{+0.2}	a5 [~]	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b5	b6	b8 ^{-0.2}	h1	h2	h3	h4	d1 ^{F9}	d2 ^{+0.1}	d3 ^{+0.2}			
	1	416	50	20	18	152	118	87	24	78	68	40	15	76	20	75	20	18,1	40			
1.1	370	40	58		32			20	45			40		16			16,1	45				
2	428	50	20	16	72	182	120	110	30	78	68	40	20	56	20	100	20	25.1	40			
2.1	450				94			40	25			50		78				20	50	20	50	
3	515	55	25	25	114	208	130	116	38	78	68	40	20	89	20	100	20	25,1	40			
3.1	450	50		20	53			40	25			116		110					50	33	50	
3.2	620	55			218														60	198	35	175
3.3	510	50			55														60	35	35	100
4	620	55	25	25	135	250	140	40	25	116	110	60	20	110	35	175	20	25,1	60			
5	675	55	25	25	83	250	140	40	25	116	110	60	20	58	35	175	20	25,1	60			

BUILT-IN DRAWING



VERSION WITH SHOCK ABSORBER - R

VERSION WITH COVER PROTECTION - Z

ORDERING CODE

F-REH (R)	Type (from table)	
O (-)	Without shock absorber	
A (a)	With shock absorber	
-	Without valve	
Vc	With valve for lowering speed control	
Vr	With valve for lifting speed control	
-	Without cover protection	
Z	With cover protection	
-	Standard execution	
T	For tropic conditions	
L	For low temperature	
-	Standard execution	
I	With external stroke indicator that brake is rised	
MP	With inside stroke indicator that brake is rised	
MP1	With inside stroke indicator that brake is rised and control of brake wear lining	
Lk2	With inside magnet-inductive stroke indicator that brake is rised	
Lk4	With inside magnet-inductive stroke indicator that brake is rised and control of brake wear lining	
	voltage and frequency	

ELECTROHYDRAULIC THRUSTERS

Type F-Ed

TECHNICALS DEVICE'S CHARACTERISTICS

- Voltage and frequency.....3 x 380V 50Hz, duty 2.000 cikl/h ED 100%.
Connecting box insulation IP 55, on request IP 66
- Fluid.....
Isulation oil SHELL DIALA OIL DX DRIED
(L execution oil AEROSHELL FLUID 41)
- Environment temperature-25 do +40°C (L execution -45 to +40°C, T execution -25 to +45°C)
- Oil temperature max. 90°C (T execution max. 100°C)

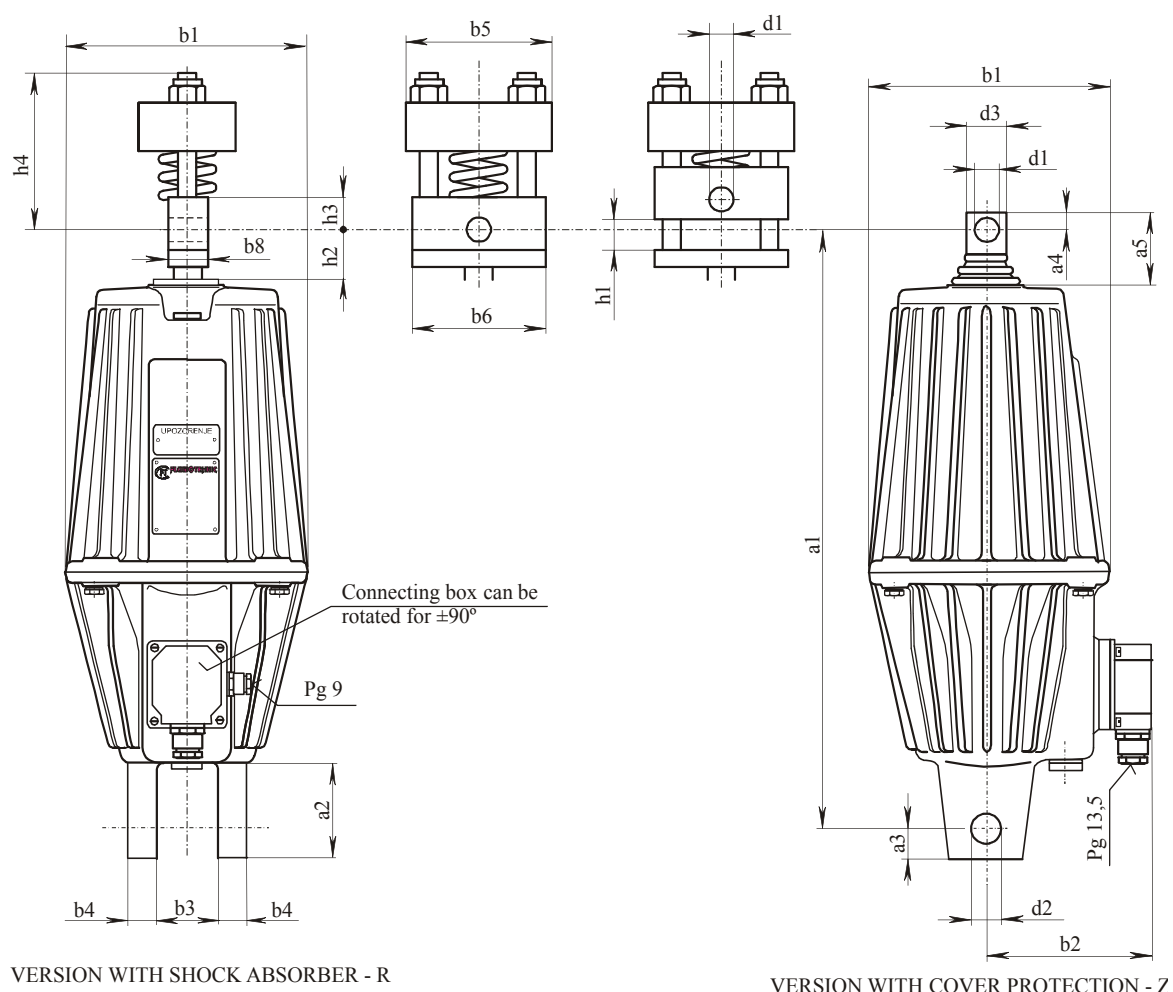
Size	Type	Nominal stroke	Nominal pushing force	Nominal return force	Power	mass	Lifting time	Lowering time
		mm	N	N	W	kg	s	s
1	F-Ed 30/5	50	300	280 *	200	10.2	0.55	0.65
1.01	F-Ed 30/5.1							
	F-Ed 30/5.1							
2	F-Ed 50/6	55	500	485 *	200	13.5	0.55	0.65
	F-Ed 50/6.2							
	F-Ed 50/6.2							
2.01	F-Ed 50/6.1							
	F-Ed 50/6.1							
2.1	F-Ed 50/12	120	500	0	200	15.5	0.8	0.7
3	F-Ed 80/6	60	800	780 *	350	21.0	0.55	0.6
3.01	F-Ed 80/6.1							
	F-Ed 80/6.1							
3.1	F-Ed 80/12	120	800	0	350	24.5	0.9	0.8
3.1.01	F-Ed 80/12.1							
	F-Ed 80/12.1							
3.2	F-Ed 121/6	60	1250	1180 *	400	21.0	0.65	0.6
	F-Ed 121/6							
3.3	F-Ed 121/12	120	1250	0	400	24.5	0.9	0.8
3.3.01	F-Ed 125/12.1							
	F-Ed 125/12.1							
4	F-Ed 185/6	60	1850	1900 *	500	34,5	0,7	0,6
	F-Ed 185/6							
4.1	F-Ed 185/16	155	1850	0	500	34,5	1,4	0,9
	F-Ed 185/16							
4.2	F-Ed 201/6	60	2500	2000 *	500	34.5	0.7	0.6
	F-Ed 201/6							
4.3	F-Ed 201/12	120	2500	0	500	34,5	1,1	0,8
4.3.01	F-Ed 201/12.1							
	F-Ed 201/12.1							
5	F-Ed 301/6	60	3200	2700 *	600	43.5	1.5	1.1
5.01	F-Ed 301/6.1							
	F-Ed 301/6.1							
5.1	F-Ed 301/12	120	3200	0	600	43.5	1.5	1.1
	F-Ed 301/12.1							
5.1.01	F-Ed 301/12.1							

*RETURN FORCE IS RELATED TO THE VARIANT "c". IN THE VARIANT WITHOUT SPRING RETURN FORCE IS "0".

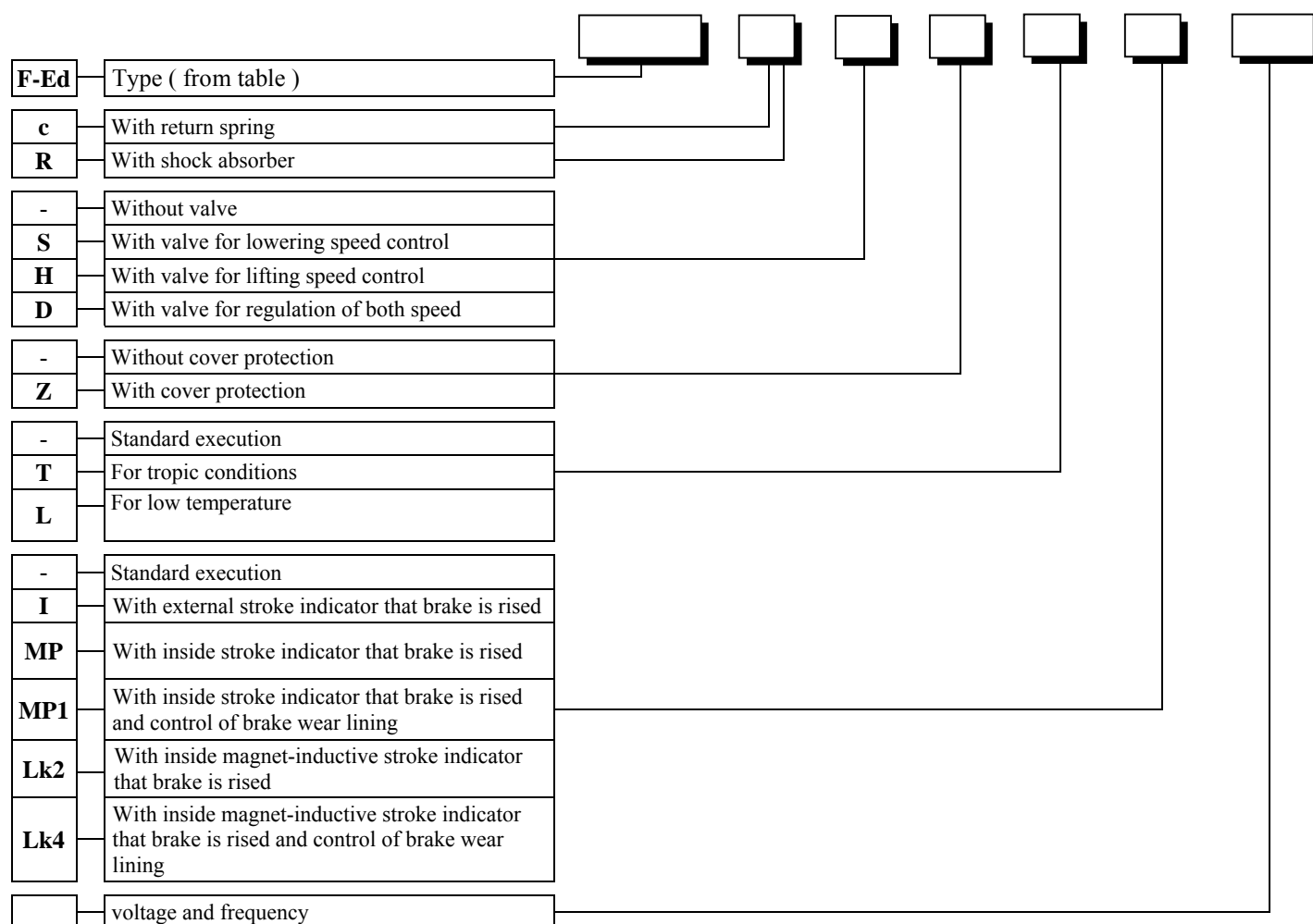
MEASURES FOR INSTALLATION

DIMENS. SIZE	a1 ^{±1}	a2 ⁺¹	a3 ⁺¹	a4 ^{±0.2}	a5 [~]	b1 ^{±1}	b2 ^{±1}	b3 ^{±1}	b4 ^{±1}	b5	b6	b8 ^{-0.2}	h1	h2	h3	h4	d1 ^{F9}	d2 ^{+0.1}	d3 ^{±0.2}
1	370	50	20	14	44	152	118	40	20	78	68	25	15	30	20	75	16	16.1	20
1.01	433				107														
2	435	50	20	20	93	182	120	60	30	78	68	30	20	73	20	100	20	20.1	30
2.01	511				169														
2.1	515	50	22	18	113	182	120	60	30	/	/	30	/	/	/	/	20	20.1	30
3	450	55	25	18	47	208	130	60	30	78	68	30	20	29	20	100	20	20.1	30
3.01	509				106														
3.1	530*	55	25	20	20	208	130	60	30	/	/	30	/	/	/	/	20	20.1	30
3.1.01	606				96														
3.2	645	55	25	20	242	208	130	40	25	116	110	40	20	222	35	175	25	25.1	50
3.3	705	55	25	20	195	208	130	40	25	/	/	40	/	/	/	/	25	25.1	50
3.3.01	765				255														
4	600	65	25	24	115	250	140	80	40	116	110	40	20	91	35	175	25	27.1	50
4.1	700	65	25	24	110	250	140	80	40	/	/	40	/	/	/	/	25	27.1	50
4.2	645	55	25	24	160	250	140	40	25	116	110	40	20	135	35	175	25	25.1	50
4.3	705	55	25	24	60	250	140	40	25	/	/	40	/	/	/	/	25	25.1	50
4.3.01	765				120														
5	645*	55	25	24	64	250	140	40	25	116	110	40	20	40	35	175	25	25.1	50
5.01	680				99														
5.1	705	55	25	24	124	250	140	40	25	/	/	40	/	/	/	/	25	25.1	50
5.1.01	800				219														

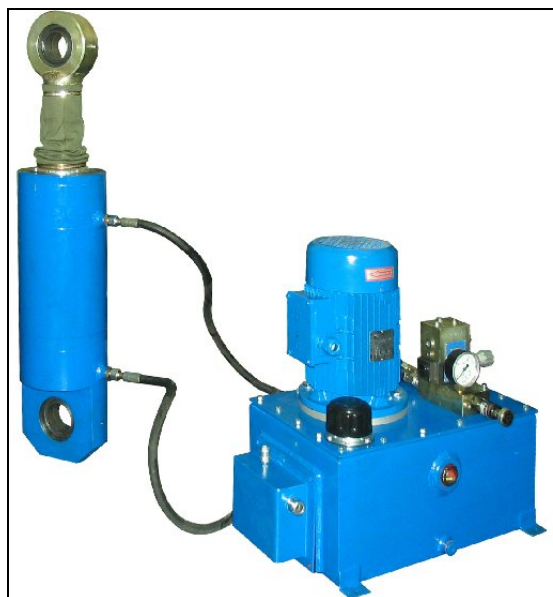
BUILT-IN DRAWING



ORDERING CODE

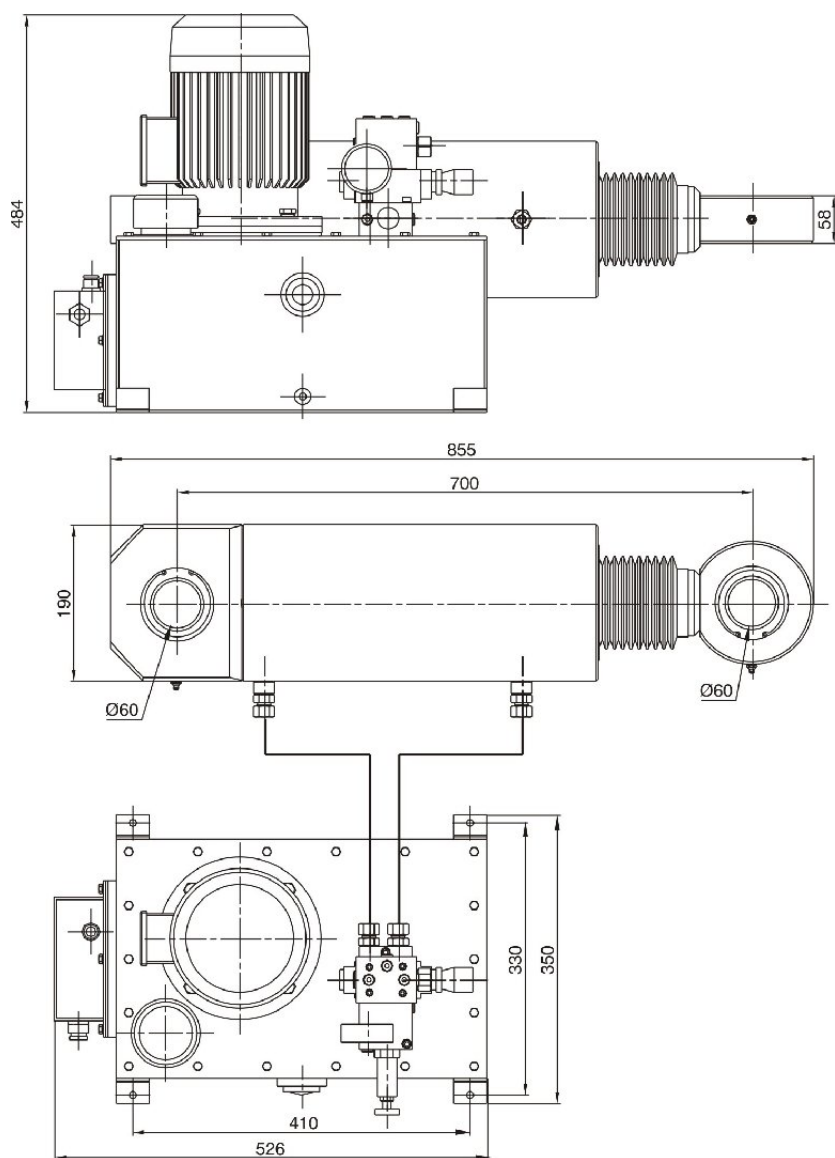


CATCHER RAILS ACTUATOR 15T/220 (ELECTROHYDRAULIC RELEASE DEVICE)

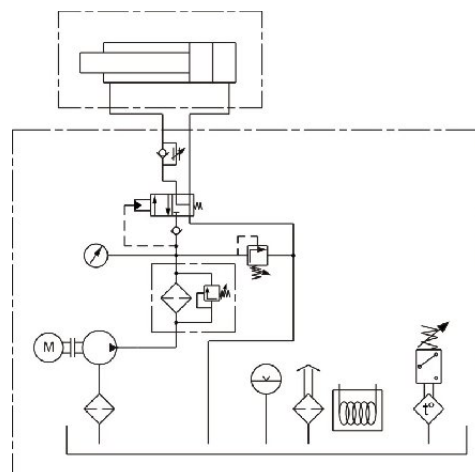


The main application of the actuator is for large cranes. The device produces great force which releases the anchor brake. When the electric motor is started and solenoid is energized, forcing pump transmit oil in the feeding cylinder and on this way exceed spring force who exercise anchorage and thereby movement of the crane is in posse. During this movement, hydraulic aggregate transfuse oil across overflow valve. The retracting force of the cylinder overcomes the spring force of the brake mechanism. Detaching the jaws from the rail enabling the movement of the crane. Releasing force is limited by the value of pressure set on the relief valve. It is recommended that the maximum releasing force exceed spring force for 15 to 20%. To avoid possible damages to the system, be sure adjusting pressure doesn't exceed maximum admissible value. After switching off the electric motor, the spring force returns the rod of the cylinder and the crane is arrested again (anchored). The braking speed can be adjusted by the flow restrictor (check throttle valve). The oil heater and thermostat enable start and operating under temperature of -150C. According to the customer's request we also produce actuators of other dimensions and working parameters.

BUILT-IN DRAWING



CONNECTING SCHEME



TECHNICAL CHARACTERISTICS

Ordering code		15T/220
Output force		max. 160kN
Stroke		220mm
Retraction speed		6,06mm/s
Extracting time		adjustable
Pump	Flow	6,0dm ³ /min
	Operating pressure	max. 100bar
Mineral hydraulic oil		Shell Tellus* Arctic 32
Tank volume		20dm ³
Electric motor		1,5kW; 380V; 50Hz
Oil heater		220V; 500W
Thermostat		0 do +40°C
Environment temperature *		-40 do +50°C
Mass		136kg
* Minimum temperature without heating oil is -15°C		

ACTUATOR (ELECTROHYDRAULIC RELEASE DEVICE)



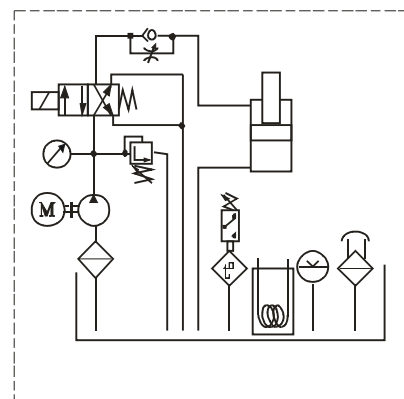
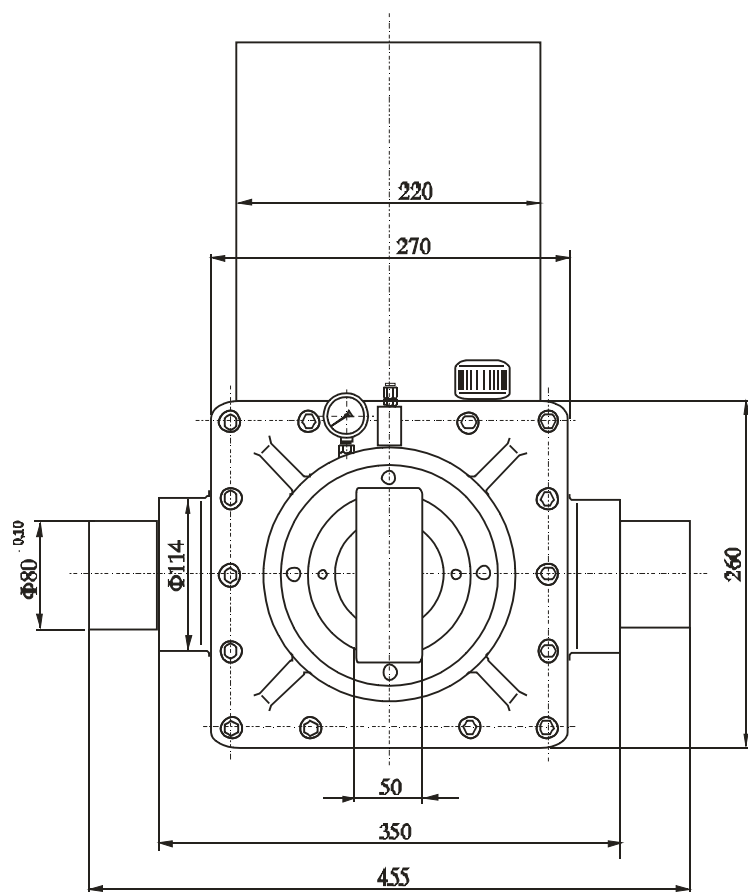
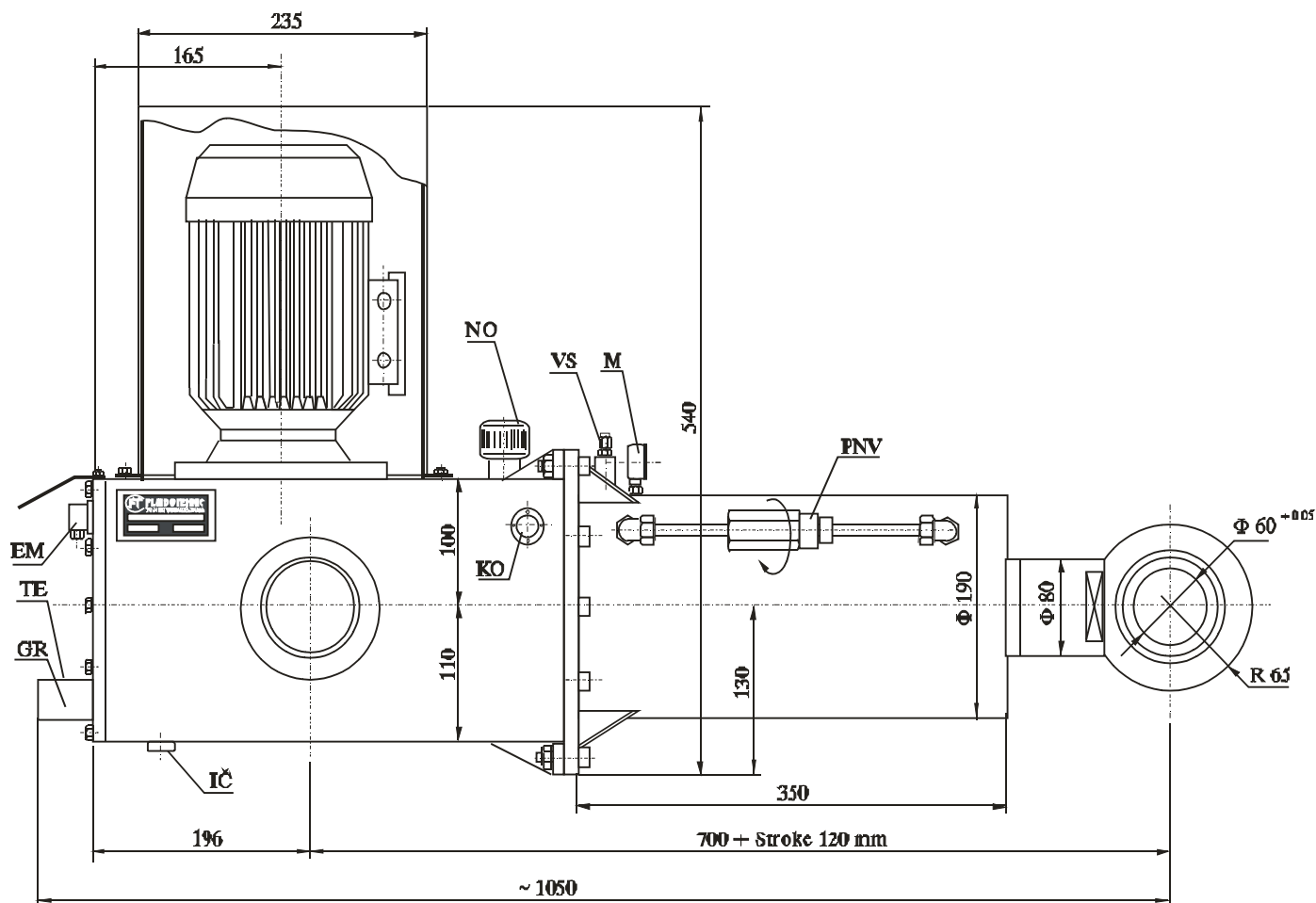
Ordering code		12T/120.000
Output force		max. 120kN
Stroke		120 mm
Retracting time		17s
Extracting time		adjustable from 6 to 60s
Pump	Flow	6,3 dm ³ /min
	Operating pressure	max. 80 bar
Fluid		Mineral oil ISO VG 46
Tank volume		16 dm ³
Electric motor	Power	1,1 KW
	Voltage	380 V 50 Hz
	Speed	1370 rpm
Solenoid directional valve		220V 50Hz 0,13A
Oil heater		220V 500W
Thermostat		0; +50°C
Environment temperature *		-40; +50°C
Mass		180kg
* Minimum temperature without heating oil is -15 °C		

The main application of the actuator is for large cranes. The device produces great force which releases the anchor brake.

The hydraulic power unit with gear pump is placed in the robust case. When the electric motor is started and solenoid is energized, the pump delivers oil through the distributing valve into the rod chamber of the hydraulic cylinder.

The retracting force of the cylinder overcomes the spring force of the brake mechanism. Detaching the jaws from the rail enabling the movement of the crane. Releasing force is limited by the value of pressure set on the relief valve. It is recommended that the maximum releasing force exceed spring force for 15 to 20%. To avoid possible damages to the system, be sure adjusting pressure doesn't exceed maximum admissible value. After switching off the electric motor and deenergizing the solenoid the spring force returns the rod of the cylinder and the crane is arrested again. The braking speed can be adjusted by the flow restrictor (check throttle valve). Turning the sleeve in ccw direction produces higher speeds, and cw lower speeds. There is a swivel bearing on the cylinder rod. The oil heater and thermostat enable start and operating under temperature of -15°C.

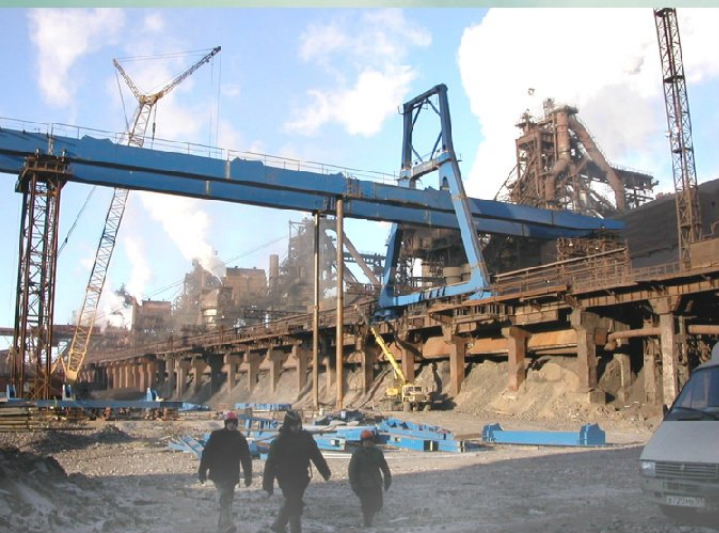
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Installation of drive station to Mining plant
KEK KOSOVO Obilic

Installation of the electrohydraulic thruster
in the GOSA FOM Smederevska Palanka,
on Novokuznjeck Siberia RUSSIA



Installation of the electrohydraulic thruster
in the Caterpillar excavator driver on surface
mining Drmno, Thermal Power Station
Kostolac



Electrohydraulic thruster embedded in the drive
station on surface mining Drmno, Thermal
Power Station Kostolac

