

EMC ELDRO[®]

Electro-hydraulic thrusters ELDRO[®]



The safety component



Electro-hydraulic Thrusters

ELDRO®

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Electro-hydraulic Thrusters

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Fields of application

In addition to a wide range of applications in the mechanical engineering industry, materials lifting and handling can be considered as the main uses of industrial brakes offered on the market. Drive and brake problems can be solved using a drum brake or a shoe brake which is still quite common or by using industrial type disk brakes.

As the requirements with respect to driving power, controllability and availability have clearly increased, advanced electrical engineering and electronics have become ever more important catering for these demands. Although most components of modern systems are electrical and electronic, the mechanical safety brake, with the electrohydraulic ELDRO® brake thruster, still has the most important role to play: as the last link in the chain, it ensures safety for man and machine in the event of power failure.

ELDRO® brake thrusters have been able to maintain their leading position in terms of functional reliability, service life and high availability for decades.

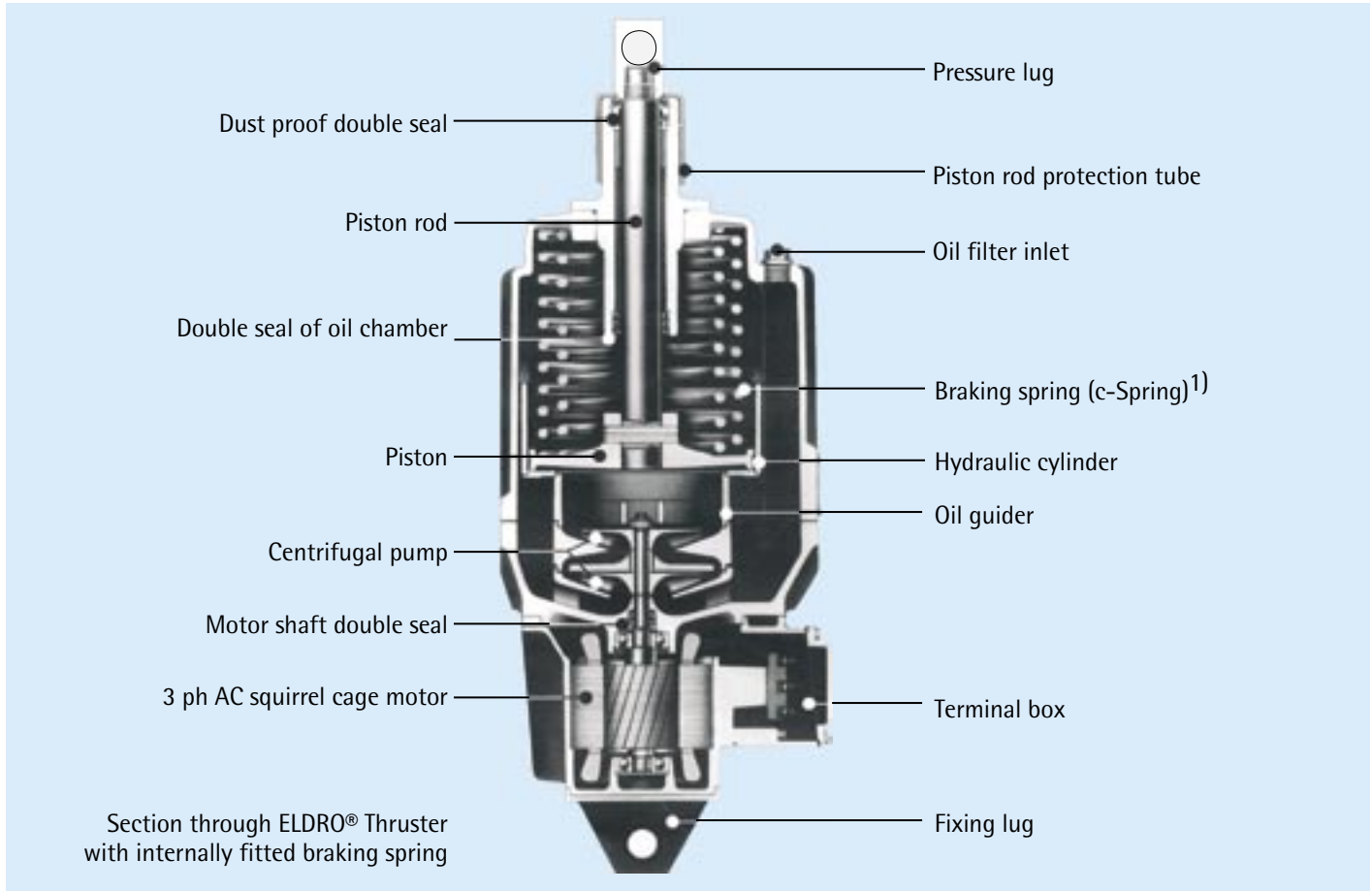
Precise manufacture and continuous control during the whole manufacturing cycle, improvements in structural design to cope with increasing requirements when used in regions with extreme climatic conditions as well as technical innovations introduced by sub-suppliers are the main elements which reinforce the high reputation which ELDRO® brake thrusters enjoy worldwide.



Electro-hydraulic Thrusters

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Design and Method of Operation



1) Accessories

Design

The basic components of the ELDRO® Thruster, i.e. electric motor and closed hydraulic system are coaxially assembled to form a functional unit. The working fluid of the hydraulic system serves as the operating medium for the generation of thrust.

Method of Operation

In the switched-off state (de-energised), the hydraulic piston with the piston rod is at its lower limit.

In the switched-on state, the centrifugal pump delivers the working fluid under the piston and produces there hydraulic pressure, i.e. the thrust of the ELDRO® unit. As a result of this pressure, the piston travels along its path against the internally fitted braking or re-setting spring or against an external load.

The work resulting from the product of 'force x distance' is transmitted via the

piston rod and the pressure lug to the device to be operated. Thus, the piston can either travel the total stroke distance or the externally reduced stroke lengths.

In accordance with the hydraulic transmission principle, at each end position of the piston, motor power consumption decreases relative to power intake for lifting action. Simultaneously the pressure within the thruster reaches its maximum value. The driving motor is therefore less loaded when the piston is at rest. In that way the ELDRO® Thruster becomes insensitive to mechanical overloads e.g. blocking of the brake. The result of all these factors is that electrical thermal protection is unnecessary.

The thrusters are equipped with asynchronous motors. Mains voltage fluctuations therefore have minimum

influence only on the function of the thrusters as the motor speed is primarily frequency dependent, and less voltage dependent.

When the thruster is in the isconnected state the piston returns to its original position under the impact of the external force (braking spring or weight). Except for the starting and running down phases of the motor, the lifting and lowering speeds are linear. The response times obtained depend on the magnitude of the load as well as on the viscosity of the working fluid injected, which in turn is effected by the ambient temperature.

Electro-hydraulic Thrusters

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Range of Types

Type	Lifting force	Stroke	Standard version	DC version	Type „pressure-tight enclosure“ flame-proof EEx I	Type „pressure-tight enclosure“ explosion-proof EEx II	Braking spring (c-spring)	Damping spring (d-spring)	Lifting valve	Lowering valve	Mechanical limit switch	Inductive limit switch
	N	mm	kg*	kg*	kg*	kg*	N					
Ed 23/5	220	50	10	-	-	-	180	•	•	•	•	•
Ed 30/5	300	50	14	-	28	27	270	•	•	•	•	•
Ed 50/6	500	60	23	27	50	40	460	•	•	•	•	•
Ed 80/6	800	60	24	27	50	40	750	•	•	•	•	•
Ed 121/6	1250	60	39	43	84	58-	1200	•	•	•	•	•
Ed 185/6	1850	60	39	-	-	58	1900	•	•	•	•	•
Ed 201/6	2000	60	39	43	84	59	1900	•	•	•	•	•
Ed 301/6	3000	60	40	43	85	46	2700	•	•	•	•	•
Ed 50/12	500	120	26	31	57	46	-	-	•	•	•	•
Ed 80/12	800	120	27	31	57	58	-	-	•	•	•	•
Ed 121/12	1250	120	39	44	84	58	-	-	•	•	•	•
Ed 201/12	2000	120	39	44	84	60	-	-	•	•	•	•
Ed 301/12	3000	120	40	44	86	-	-	-	•	•	•	•
Ed 185/16	1850	155	40	-	-	-	-	-	•	•	•	•
Ed 301/15	3000	150	50	-	-	-	-	-	•	•	•	•
Ed 350/20	3500	200	50	-	-	-	-	-	•	•	•	•

The power consumption of the thrusters is between 165 W and 550 W.

*Approximate values.



Ed 30/5
with inductive
limit switch



Ed 30/5
explosionproof
version



Ed 50/6
with mechanical
limit switch



Ed 50/12
with two inductive
limit switches



Ed 201/6
with build-in c-spring
and damping spring

Electro-hydraulic Thrusters

ELDRO®

Characteristic Features

ELDRO® Thrusters through their electrohydraulic mechanism, their suitability to integrate into brake systems and simple electrical commissioning procedure, offer for a wide range of applications the following advantages:

- High reliability.
- Long service life with minimum maintenance due to low wear operation under continuous self lubrication.
- Soft and smooth operation due to the hydraulic principle.
- Fast response (short regulating times).
- High switching frequency: up to 2000 cycles per hour.
- Reversing operation without restrictions.
- Simple installation and dismantling.
- No reversing contactors required as the motor may rotate in either direction.
- Overloading during operation not possible.
- Suitable for adjusting length of stroke from outside as required.
- Stepless prolongation of lifting and/or lowering times by the fitting of valves.
- Universal applications also in hazardous areas in which there is danger of occurrence of explosion.

Standardization and Worldwide Application

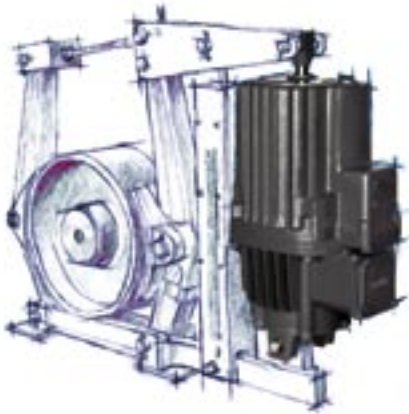
Physical dimensions, technical ratings and the specific characteristics of the ELDRO® Thruster are factors which have greatly influenced standards applicable to modern industrial brakes. In close cooperation with reputable brake manufacturers, with the industry and the standardization committee the ELDRO® type range was enlarged to the graduation available today and prescribed e.g. in the German standard DIN 15430 "Electrohydraulic Thrusters" as well as in the steel and iron working sheet of the "Union of German Ironworkers" (Verein Deutscher Eisenhüttenleute) SEB 602471 "ELDRO® Thrusters". This range of thrusters has been successful in the international market.

In order to remove trade barriers from the market, national standards and regulations have been adapted more and more to the international publications already known.

Design, production and testing of the ELDRO® Thrusters are carried out strictly to German regulations and standards (such as DIN and VDE) and thereby also according to the internationally approved IEC publications.

The harmonisation on the sector of 'low power 3 ph AC rotating electrical machines' has already lead to conformity of recommendations and regulations in the following countries:

Australia	Netherlands
Austria	Norway
Belgium	South Africa
Germany	Sweden
Denmark	Suisse
Finland	USA
France	etc.
Great Britain	
Italy	
Japan	



Double shoe brake with ELDRO® Thruster



Disk brake with ELDRO® Thruster

ELDRO® and Quality

- Certified quality assurance system to DIN EN ISO 9001
- 100 % serial test including 16 hours endurance run and subsequent functional test with documentation of all technical data
- Acceptance certificate to DIN EN 10204
- Homologation of standard units in long-time test
- 24 months guarantee

ELDRO®-Standard range

3 phase AC design



Thruster Versions

Electrical Design

Motor

3 ph AC squirrel cage motor, construction according to VDE 0530. For performance details refer to technical data.
Insulation class F.

Modes of Operation

Continuous operation S1 and intermittent service S3-60 % duty cycle.
>50 °C ambient temperature technical data change - please enquire.

Voltages and Frequencies

230/400 V, 50 Hz, 3 ph AC
290/500 V, 50 Hz, 3 ph AC
400/690 V, 50 Hz, 3 ph AC
All units are on principle star (Y) connected at delivery. Special windings 110 V - 690 V, 3 ph AC at extra charge.
60 Hz design at extra charge.
Single phase versions on request.

Terminal Box

6-pole terminal board, with heater 9-pole terminal board. Connection screws M4. Protective conductor terminal M4. Earthing screw M6 (outside on terminal box.)

Cable Gland

Cable gland Pg 21 for conductor sizes up to 4 x 2.5 mm² (Ø 17-19 mm).

Motor Circuit Breakers

When protecting the units by motor circuit breakers the thermal trigger should be set at least on 1.5 times the rated current for all types.

Mechanical Design

Assembly Dimensions

Refer to dimension tables.

Mounting Positions

Vertical: piston rod uppermost.
Horizontal and intermediate positions: rating plate to be on top.
Types Ed 301/15 and 350/20 only vertical mounting position.

Mounting Options except units with limit switches

The base mounting is bolted and 90° rotatable. The base mounting with types Ed 23/5 and Ed 30/5 is available shifted in steps of 90° (indicate when ordering).
The top pressure lug is rotatable with all types.

Working fluid

Hydraulic oil HL 10 acc. to DIN 51524, part 1, filled at factory.

Safety Measures

Dust proof double seal.
Double seal to oil chamber.
Piston rod chromium plated to size.
Piston rod tube to protect against the ingress of foreign bodies with types Ed 121, Ed 201, Ed 301, Ed 350.

Standard Paint

Synthetic resin lacquer varnish, impact and scratch resistant.
Coating thickness ~ 40 µ.
Tint RAL 7022 (umbergrey), other colours and coating 'Increased Protection against Corrosion' at extra charge.

Enclosure

IP 65 to EN 60529, DIN VDE 0470 T1

ELDRO®-Standard range

3 phase AC design

Thruster Versions

Additional Equipment

Lifting or Lowering Valve (H, S, HS)

Built-in lifting (H) and/or lowering (S) valves for stepless prolongation of normal lifting or lowering times. The adjustable minimum values obtain a level 10-20 times the standard values. Built-in valves in setting 'open' result in increased lifting and lowering times for short stroke units of approx. 0.1 to 0.2 seconds and for long stroke units of approx. 0.2 to 0.4 seconds. The valves are adjusted from the outside.

Braking Spring (c-Spring)

The c-spring generates the braking force. The specified force of the c-spring applies for 1/3 of the piston rod's rated lift stroke or 2/3 of the rated lower stroke.

Re-setting Spring

Operation similar to c-spring, re-setting force is, however, lower (on request).

Damping Spring (d-Spring)

For an aperiodic transient of the brake. This assists the brake to close smoothly. Only effective in conjunction with a built-in braking spring. No limit switch can be annexed in this case. There is no alteration in the mounting distance A. When determining the operating point of the brake the dimension 'z' is to be considered (see dimension drawing). Main application: ELDRO®-regulated brake.

High-Speed Lowering Circuit

By means of motor capacitors, or by shortcircuiting the stator winding and inserting a contactor. The lowering times are reduced by approx. 15 %.

Heater

For operation below - 25 °C a heating element must be installed; also to be used as a stand-by heater. The customer has to provide a separate power supply and temperature regulator.

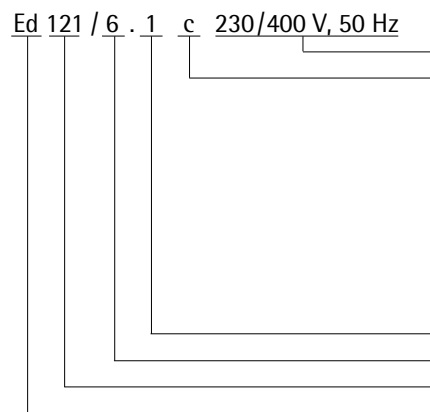
Increased Protection against Corrosion

Application: aggressive media and/or high relative humidity and the resulting danger of formation of condensate.
Motor: fully vacuum potted stator, applicable also instead of idling space heater (on request).
Special paint: Polyurethane lacquer (KOR).
Primer: one coat
Paintfinish: two coats polyurethane varnish.
Tint RAL 7022 (umbergrey).

Limit Switches

For electrical indication of the release or closing positions of the brake, mechanical or inductive limit switches can be fitted as standard. The appropriate types of switches are listed in the technical data sheet 'Limit Switches'. All additional equipment is to be ordered separately at extra charge.

Key to Types



- Rated voltage
Code for additional equipment
c Braking spring (c-spring)
d Damping spring (d-spring)
H Lifting valve
S Lowering valve
E Limit switch, mechanical
EB Limit switch, inductive

Code for exchange unit
Stroke in cm
Lifting force x 10 in N
Ed: ELDRO®, 3 ph AC version

ELDRO®-Standard range

3 phase AC design

Characteristics

Technical Data

Type	Lifting force	Stroke	Thrust	Braking spring force (c-spring) ¹⁾	Power consumption ²⁾	Current consumption at 400 V/50 Hz ²⁾	Duty rating at S3 – 60 % duty cycle ³⁾	Weight
	N	mm	N cm	N	W	A	c/h	kg
Short-stroke units								
Ed 23/5	220	50	1 100	180	165	0.5	2000	10
Ed 30/5	300	50	1500	270	200	0.5	2000	14
Ed 50/6	500	60	3000	460	210	0.5	2000	23
Ed 80/6	800	60	4800	750	330	1.2	2000	24
Ed 121/6	1250	60	7500	1200	330	1.2	2000	39
Ed 185/6 ⁴⁾	1850	60	11100	1900	450	1.3	2000	39
Ed 201/6	2000	60	12000	1900	450	1.3	2000	39
Ed 301/6	3000	60	18000	2700	550	1.4	1500	40
Long-stroke units								
Ed 50/12	500	120	6000	–	210	0.5	1200	26
Ed 80/12	800	120	9600	–	330	1.2	1200	27
Ed 121/12	1250	120	15000	–	330	1.2	1200	39
Ed 201/12	2000	120	24000	–	450	1.3	1200	39
Ed 301/12	3000	120	36000	–	550	1.4	900	40
Ed 185/16	1850	155	29600	–	450	1.3	400	40
Ed 301/15	3000	150	45000	–	550	1.4	400	50
Ed 350/20	3500	200	70000	–	550	1.4	400	50

Units up to 6300 N lifting force 200 mm stroke on request.

All technical data are mean values related to + 20 °C operating temperature of unit.

1) Values of braking force apply to 1/3 of the rated stroke.

2) Values at end-position of piston. During lifting operation the specified values multiply. At - 25 °C operating temperature of unit the current consumption is approx. 1.5 times that of the current consumption at + 20 °C.

3) Continuous operation S1 and intermittent service S3 are permitted up to + 50 °C ambient temperature.

4) Only to be used as exchange thruster for Ed 5.

Approximate calculation for current consumption for non-standard voltages:

$$I_x = \frac{U_{(400\text{ V})}}{U_{(x)}} \cdot I_{(400\text{ V})}$$

Performance in Service depending on Ambient Temperatures

Temperature range	Hydraulic fluid	Performance in service
- 25 °C to + 50 °C	HL 10, DIN 51524, part 1	In the lower range of ambient temperatures the lifting times may increase up to four times the specified lifting times when the unit is operated the first time. The lowering times remain unaffected.
over + 50 °C	special fluid	Enquire.
- 35 °C to + 40 °C	special low temperature fluid	Space heater not required.
below - 25 °C ¹⁾	HL 10, DIN 51524, part 1	Space heater required in unit. Connect up heater in terminal box using an additional Pg 16 cable gland. 230 or 115 volt connected voltage. Thermostatic control be provided by customer.

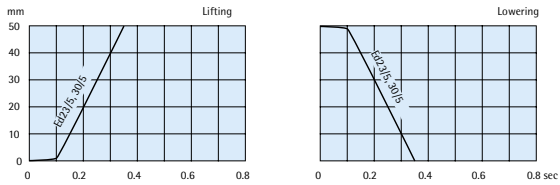
1) The details given apply for vertical positioning when temperatures drop below - 25 °C.

ELDRO®-Standard range

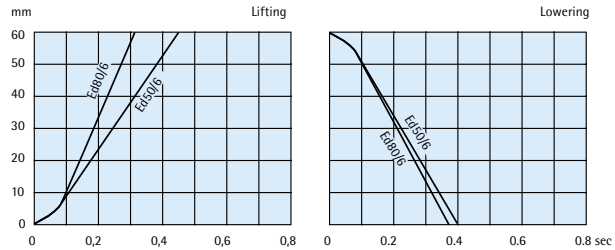
3 phase AC design

Stroke-Time Diagrams

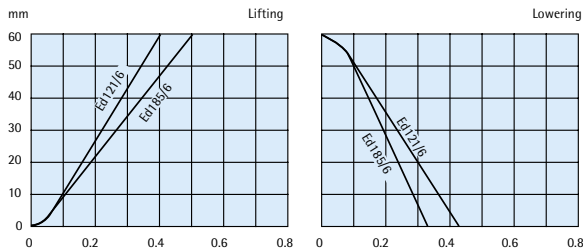
Ed 23/5, Ed 30/5



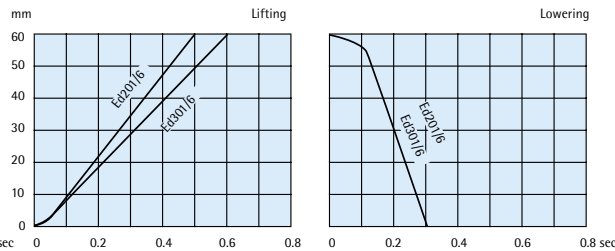
Ed 50/6, Ed 80/6



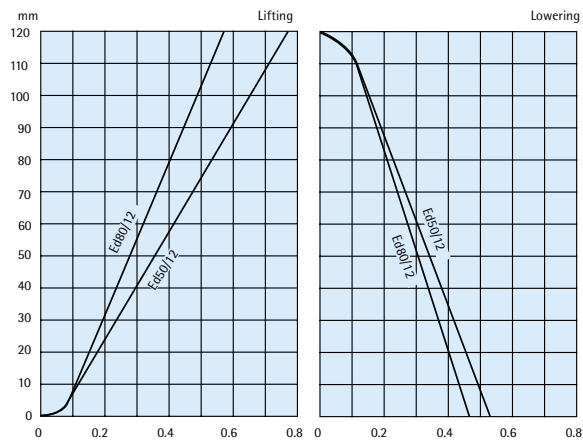
Ed 121/6, Ed 185/6



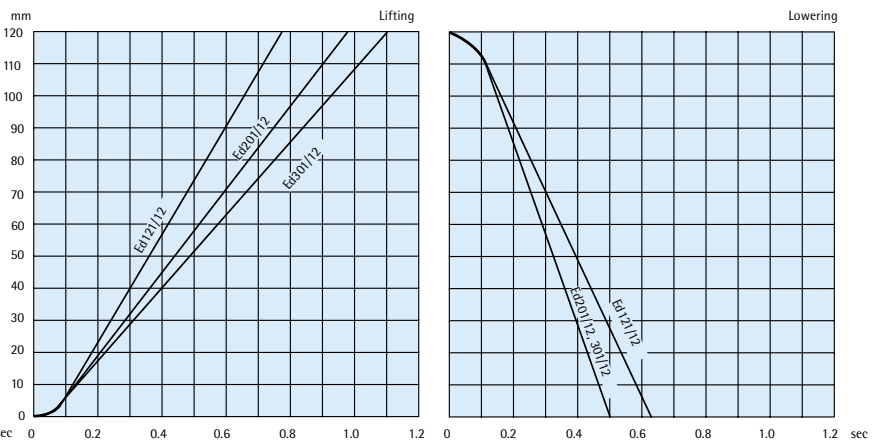
Ed 201/6, Ed 301/6



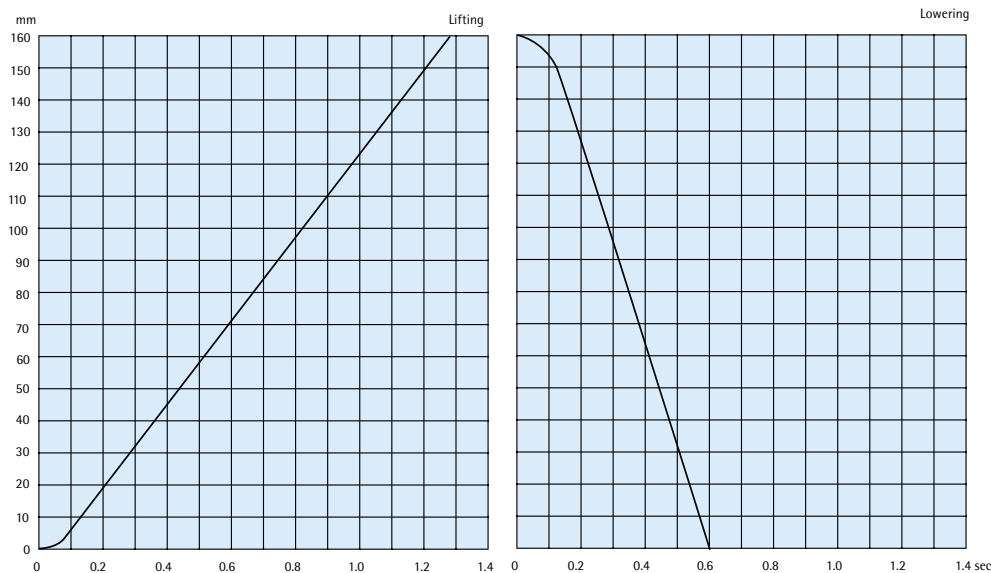
Ed 50/12, Ed 80/12



Ed 121/12, Ed 201/12, Ed 301/12



Ed 185/16



Diagrams taken under load at + 20 °C operating temperature of unit.

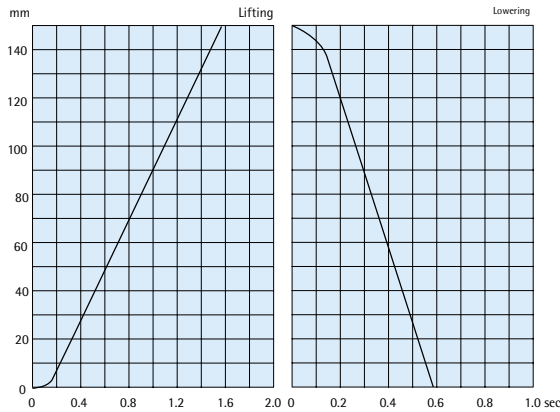
When applying the high-speed lowering circuit, the given lowering times are reduced by approx 15 %.

ELDRO®-Standard range

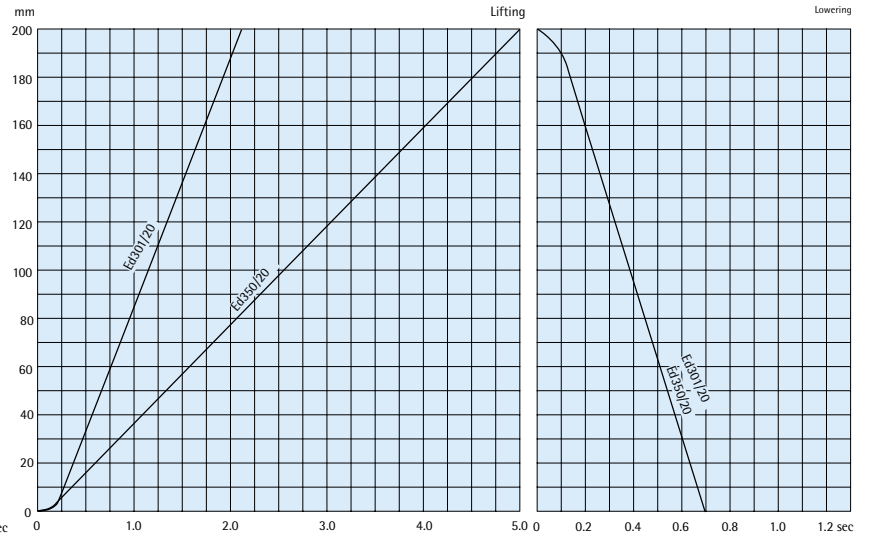
3 phase AC design

Stroke-Time Diagrams

Ed 301/15

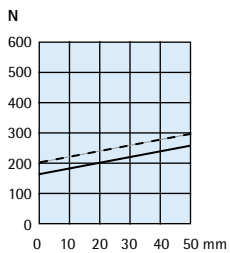


Ed 301/20, Ed 350/20

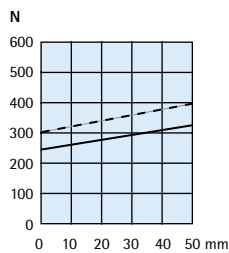


c-Spring-Diagrams

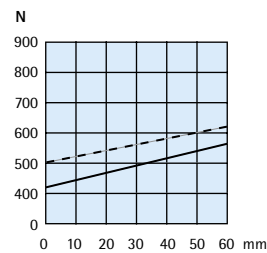
Ed 23/5 c



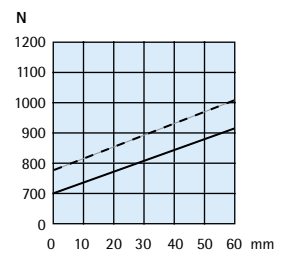
Ed 30/5 c



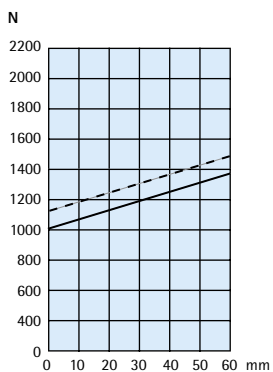
Ed 50/6 c



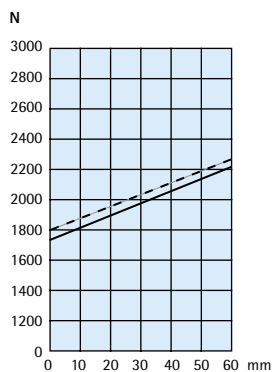
Ed 80/6 c



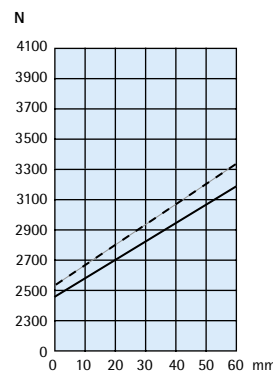
Ed 121/6 c



Ed 185/6 c, Ed 201/6 c



Ed 301/6 c



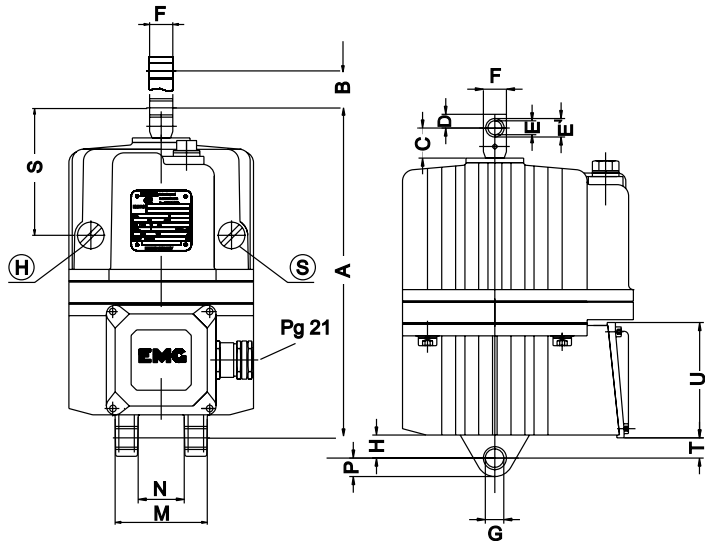
Parameter values in Newtons (N)
 - - - necessary force to compress c-spring
 ----- force given from c-spring (braking force)

ELDRO®-Standard range

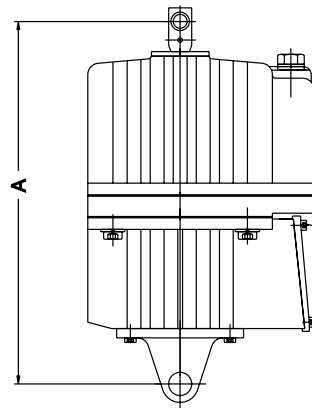
3 phase AC design

Dimension Drawings

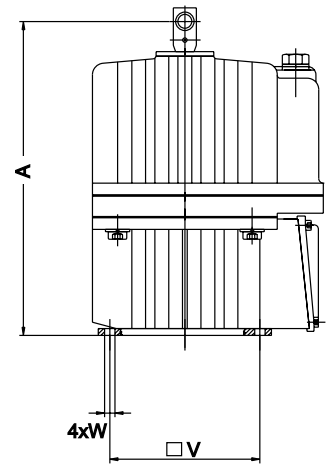
Ed 23/5



Ed 23/5.1

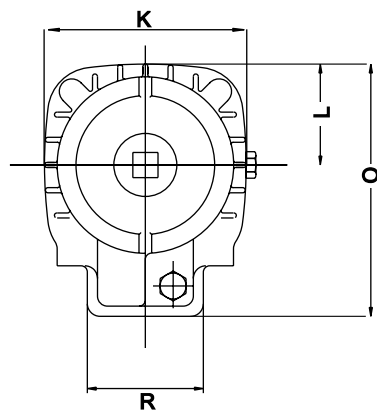


Ed 23/5.2



(H) = Lifting Valve

(S) = Lowering Valve

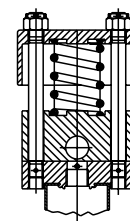
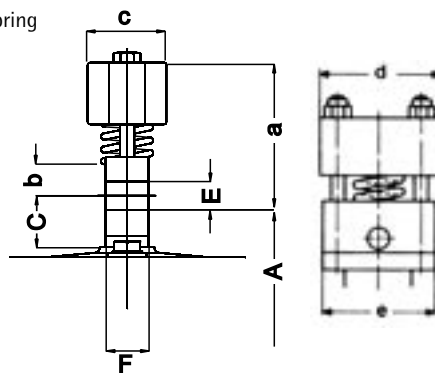


The motor housing with terminal box can be rotated in steps of 90° (indicate when ordering).

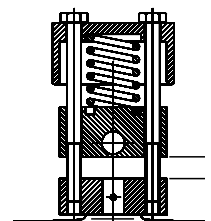
Mounting options, except units with limit switches:

The base mounting with type Ed 23/5 is cast integral with the housing and can be supplied rotated by 90° (indicate when ordering), the base mounting with type Ed 23/5.1 is bolted and 90° rotatable, the top pressure lug is rotatable on all units.

d-spring



expanded
(unit is lifted)



compressed
(unit in braking mode)

Dimension Table

Type	A	B	C	D	E ¹⁾	E ₁ ¹⁾	F	G ²⁾	H	K	L	M	N	O	P	R	S	T	U	V	W	a	b	c	d	e	z
Ed 23/5	286	50	26	12	12	16	20	16	20	160	80	80	40	200	16	92	110	18	100	-	-	100	20	55	85	75	15
Ed 23/5.1	314	50	26	12	12	16	20	16	20	160	80	80	40	200	16	92	110	18	100	-	-	100	20	55	85	75	15
Ed 23/5.2	272	50	26	12	12	16	20	16	20	160	80	80	40	200	16	92	110	18	100	130	9	100	20	55	85	75	15

1) tolerance +0.1 2) tolerance $\begin{matrix} +0.25 \\ +0.15 \end{matrix}$

E changeable to E₁ by removing of the clamping bush.

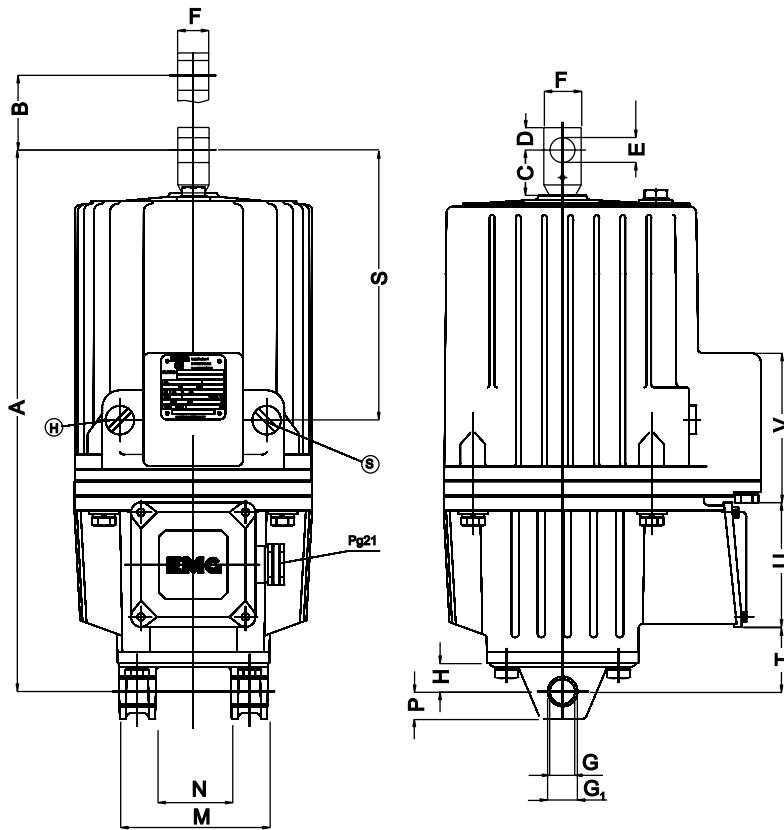
All dimensions in millimeter.

ELDRO®-Standard range

3 phase AC design

Dimension Drawings

Ed 30/5, Ed 50/6, Ed 80/6, Ed 50/12, Ed 80/12

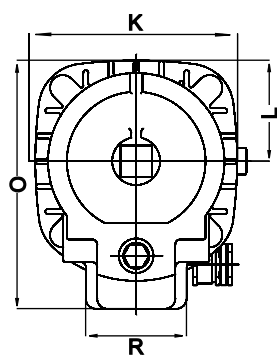


⊕= Lifting Valve

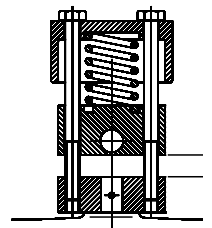
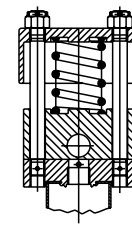
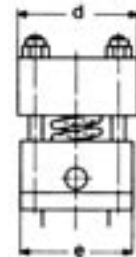
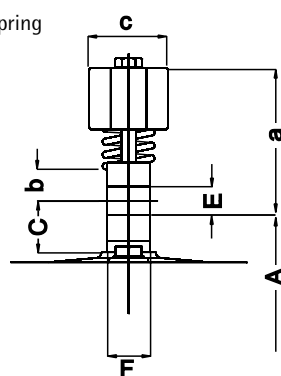
⊙= Lowering Valve

The motor housing with terminal box can be rotated in steps of 90° (indicate when ordering).

Mounting options, except units with limit switches: The base mounting with type Ed 30 is cast integral with the housing and can be supplied rotated by 90° (indicate when ordering), the base mounting with types Ed 50 and Ed 80 is bolted and 90° rotatable, the top pressure lug is rotatable on all units.



d-spring



expanded
(unit is lifted)

compressed
(unit in braking mode)

Dimension Table

Type	A	B	C	D	E ¹⁾	F	G ²⁾	G ₁ ²⁾	H	K	L	M	N	O	P	R	S	T	U	V	a	b	c	d	e	z
Ed 30/5	370	50	34	15	16	25	16	-	18	160	80	80	40	197	16	80	175	34	100	77	100	20	55	85	75	15
Ed 50/6	435	60	36	18	20	30	20	24	23	195	97	120	60	254	22	90	217	52	100	120	100	22	55	85	75	15
Ed 80/6	450	60	36	18	20	30	20	24	23	195	97	120	60	254	22	90	217	67	100	120	100	22	55	85	75	15
Ed 50/12	515	120	36	18	20	30	20	24	23	195	97	120	60	254	22	90	297	52	100	176	-	-	-	-	-	-
Ed 80/12	530	120	36	18	20	30	20	24	23	195	97	120	60	254	22	90	297	67	100	176	-	-	-	-	-	-

1) tolerance $+0.1$ 2) tolerance $+0.25$
 $+0.15$

G changeable to G₁ by removing of the clamping bush

All dimensions in millimeters

For exchanging ELDRO® Thrusters of the former design refer to "Ordering Instructions for Exchange Units" on page 31.

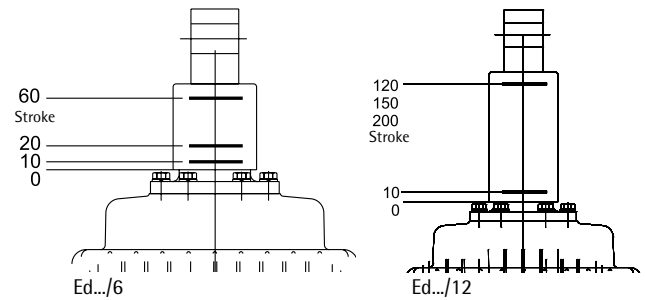
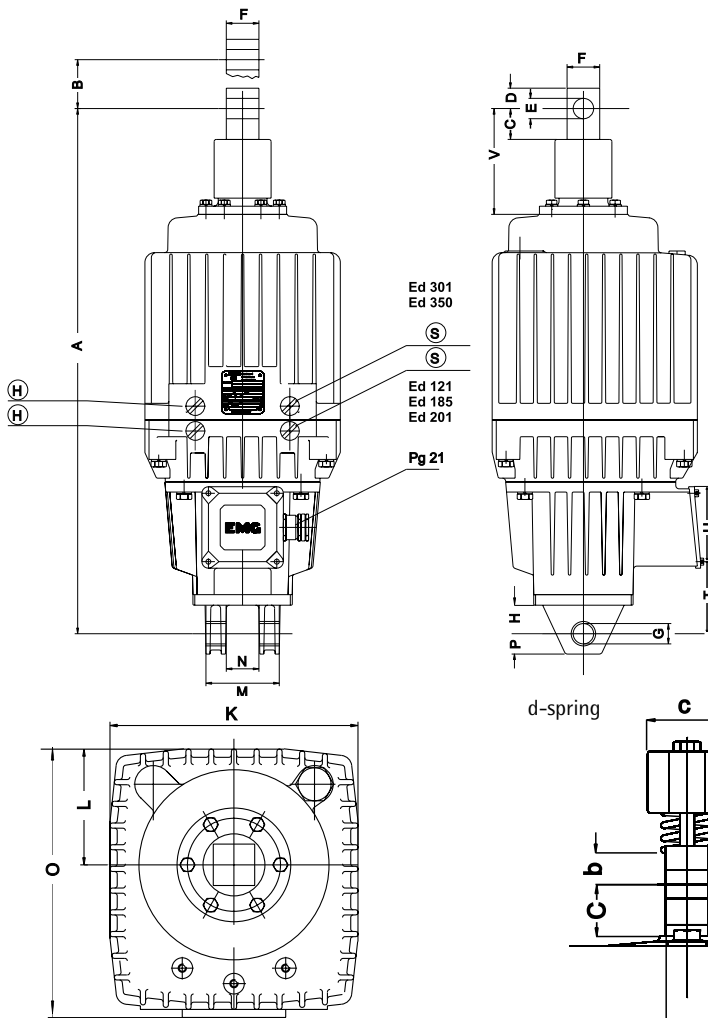
ELDRO®-Standard range

3 phase AC design

Dimension Drawings

Ed 121/6, Ed 185/6, Ed 201/6, Ed 301/6, Ed 121/12, Ed 201/12,
Ed 301/12, ED 185/16, Ed 301/15, Ed 350/20

Lifting Marks



For easier setting and checking of the brake the piston guide bush of the thruster is marked. These marks can be read at the bottom edge of the piston rod protection tube (see drawing).

The motor housing with terminal box can be rotated in steps of 90° (indicate when ordering).

Mounting options, except units with limit switches:
The base mounting is bolted and 90° rotatable, the top pressure lug is rotatable.

(H) = Lifting Valve

(S) = Lowering Valve

Dimension Table

Type	A	B	C	D	E ¹⁾	F	G ²⁾	H	K	L	M	N	O	P	T	U	V	a	b	c	d	e	z
Ed 121/6	645	60	38	25	25	40	25	35	240	112	90	40	260	25	77	100	130	147	35	80	130	120	20
Ed 201/6	645	60	38	25	25	40	25	35	240	112	90	40	260	25	77	100	130	147	35	80	130	120	20
Ed 301/6	645	60	38	25	25	40	25	35	240	112	90	40	260	25	77	100	130	147	35	80	130	120	20
Ed 121/12	705	120	38	25	25	40	25	35	240	112	90	40	260	25	77	100	190	-	-	-	-	-	-
Ed 201/12	705	120	38	25	25	40	25	35	240	112	90	40	260	25	77	100	190	-	-	-	-	-	-
Ed 301/12	705	120	38	25	25	40	25	35	240	112	90	40	260	25	77	100	190	-	-	-	-	-	-
Ed 185/6	600	60	42	25	25	40	27	44	240	112	160	80	260	25	87	100	76	147	35	80	130	120	20
Ed 185/16	700	155	42	25	25	40	27	44	240	112	160	80	260	25	87	100	176	-	-	-	-	-	-
Ed 301/15	880	150	38	25	25	40	27	44	250	117	160	80	265	25	87	100	275	-	-	-	-	-	-
Ed 350/20	880	200	38	25	25	40	27	44	250	117	160	80	265	25	87	100	275	-	-	-	-	-	-

1) tolerance^{0.1}

2) tolerance^{+0.25}_{0.15}

Units in other dimensions on request.

All dimensions in millimeters

For exchanging ELDRO® Thrusters of the former design refer to "Ordering Instructions for Exchange Units" on page 31.



Thruster Versions

Electrical Design

Motor

DC Shunt-wound motor construction according to DIN VDE 0530.

For performance details refer to technical data. Insulation class F.

Modes of Operation

Continuous operation S1 and intermittent service S3-60 % duty cycle.

Voltages and Frequencies

Rated power up to formfactor 1.05

Standard voltage 220 V DC

Special windings 24 V - 500 V DC on request

Terminal Box

6-pole terminal board.

Connection screws M4.

Protective conductor terminal M4.

Earthing screw M6 (outside on terminal box).

With special voltage < 100 V DC other connecting engineering.

Cable Gland

Cable gland Pg 21 for conductor sizes up to 4 x 2.5 mm² (Ø 17-19 mm).

Motor Circuit Breakers

When protecting the units by motor circuit breakers the thermal trigger should be set at least on 1.5 times the rated current for all types.

Mechanical Design

Assembly Dimensions

Refer to dimension tables.

Mounting Positions

Vertical: piston rod uppermost.

Mounting Options except units with limit switches

The base mounting is 90° rotatable.

The top pressure lug is rotatable with all types.

Working fluid

Hydraulic oil HL 10 acc. to DIN 51524, part 1, filled in factory.

Safety Measures

Double seal to oil chamber.

Dust proof double seal.

Piston rod chromium plated to size.

Piston rod tube to protect against the ingress of foreign bodies with types Eg 121, Eg 201, Eg 301.

Standard Paint

Synthetic resin lacquer varnish, impact and scratch resistant.

Coating thickness ~ 40 µ.

Tint RAL 7022 (umbergrey),

other colours and coating 'Increased Protection against Corrosion' at extra charge.

Enclosure

IP 65 to EN 60529, DIN VDE 0470 T1

Thruster Versions

Additional Equipment

Lifting or Lowering Valve (H, S, HS)

Built-in lifting (H) and/or lowering (S) valves for stepless prolongation of normal lifting or lowering times. The adjustable minimum values obtain a level 10-20 times the standard values. Built-in valves in setting 'open' result in increased lifting and lowering times for short stroke units of approx. 0.1 to 0.2 second and for long stroke units of approx. 0.2 to 0.4 second. The valves are adjusted from the outside.

Braking Spring (c-spring)

The c-spring generates the braking force. The specified force of the c-spring applies for $\frac{1}{3}$ of the piston rod's rated lift stroke or $\frac{2}{3}$ the rated lower stroke.

Re-setting Spring

Operation similar to c-spring, re-setting force is, however, lower (on request).

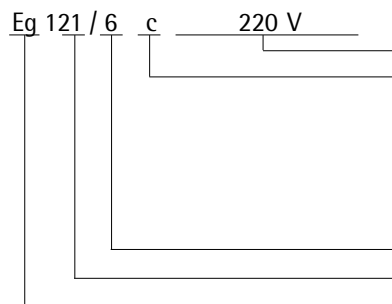
Increased Protection against Corrosion

Special paint: Polyurethane lacquer
Primer: one coat
Paintfinish: Polyurethane varnish
Coating thickness: ~80 µm
Tint: RAL 7022 (umbergrey)

Limit switches

For electrical indication of the release or closing positions of the brake, mechanical or inductive (contactless) limit switches can be fitted as standard. The appropriate types of switches are listed in the technical data sheet 'Limit Switches'.

Key to Types



- Rated voltage
- Code for additional equipment
- c Braking spring (c-spring)
- H Lifting valve
- S Lowering valve
- E Limit switch, mechanical
- EB Limit switch, inductive
- Stroke in cm
- Lifting force x 10 in N
- Eg: ELDRO®, DC version

Performance in Service depending on Ambient Temperatures

Temperature range	Hydraulic fluid	Performance in service
- 15 °C to + 35 °C	HL 10, DIN 51524, Part 1	In the lower range of ambient temperatures the lifting times may increase up to four times the specified lifting times when the unit is operated the first time. The lowering times remain unaffected.
- 35 °C to + 35 °C	special low temperature	
over + 35 °C	special hydraulic fluid	request necessary

Characteristics

Technical Data

Type	Lifting force	Stroke	Thrust	Braking spring force (c-spring) ¹⁾	Lifting time	Lowering time	Power consumption ²⁾	Current consumption at 220 V DC ²⁾	Duty rating at S3 – 60 % duty cycle ³⁾	Weight
	N	mm	N cm	N	s	s	W	A	c/h	kg
Short-stroke units										
Eg 50/6	500	60	3000	460	0.4	0.5	350	1.6	1000	27
Eg 80/6	800	60	4800	750	0.5	0.4	330	1.5	1000	27
Eg 121/6	1250	60	7500	1200	0.6	0.5	330	1.5	1000	43
Eg 201/6	2000	60	12000	1900	0.7	0.4	430	2.0	1000	43
Eg 301/6	3000	60	18000	2700	0.8	0.4	470	2.2	800	43
Long-stroke units										
Eg 50/12	500	120	6000	–	0.5	0.8	350	1.6	600	31
Eg 80/12	800	120	9600	–	0.8	0.6	330	1.5	600	31
Eg 121/12	1250	120	15000	–	1.0	0.7	330	1.5	500	44
Eg 201/12	2000	120	24000	–	1.2	0.6	430	2.0	500	44
Eg 301/12	3000	120	36000	–	1.4	0.6	470	2.2	400	44

1) Values of braking force apply to 1/3 of the rated stroke.

2) Values at end-position of piston. During lifting operation the specified values multiply. In the lower range of temperature the current and power consumption increases.

3) Continuous operation S1 and intermittent service S3 are permitted up to +35 °C ambient temperature.

All technical data are mean values related to operating temperature of unit with hydraulic fluid Shell Morlina 10.

Approximate calculation for current consumption for non-standard voltages:

$$I_x = \frac{U_{(220V)}}{U_{(x)}} \cdot I_{(220V)}$$

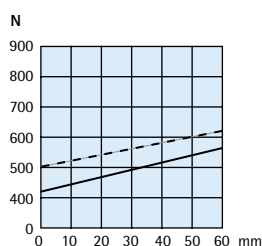
c-Spring-Diagrams

Parameter values in Newtons (N)

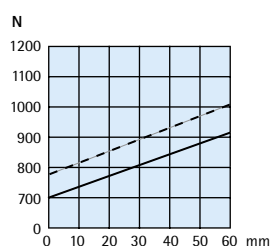
--- necessary force to compress c-spring

— force given from c-spring (braking force)

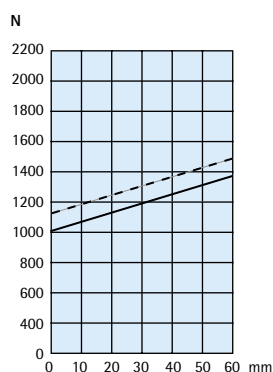
Ed 50/6 c



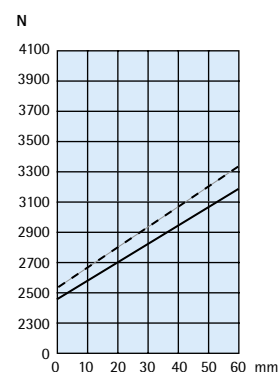
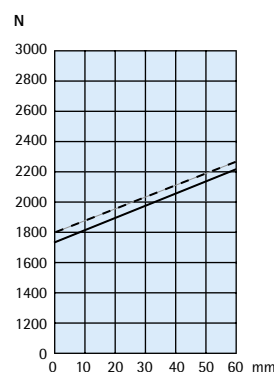
Ed 80/6 c



Ed 121/6 c



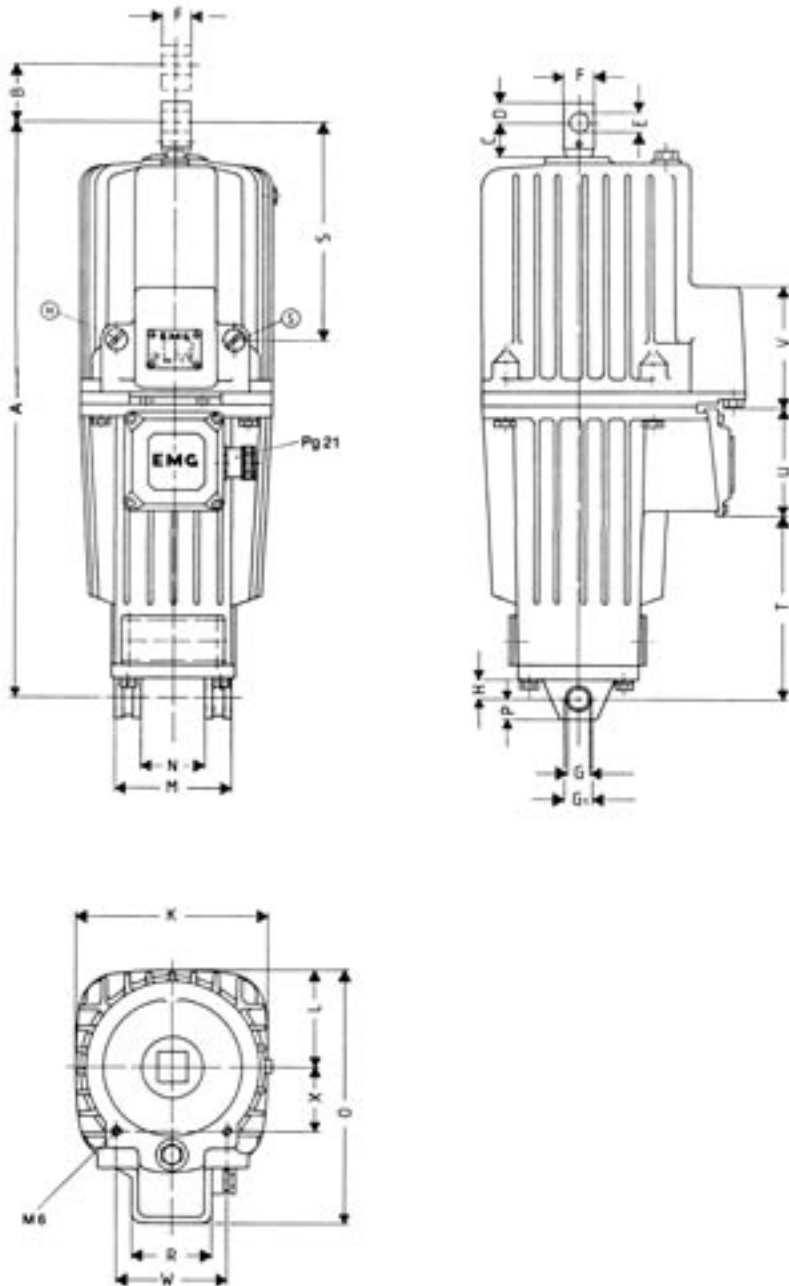
Ed 185/6 c, Ed 201/6 c Ed 301/6 c



ELDRO®- DC Version

Dimension Drawings

Eg 50/6, Eg 80/6, Eg 50/12, Eg 80/12



The motor housing with terminal box can be rotated in steps of 90° (indicate when ordering).

Mounting options, except units with limit switches:
The base mounting is bolted and 90° rotatable, the top pressure lug is rotatable.

Ⓜ= Lifting valve

Ⓝ= Lowering valve

Dimensions Table

Type	A	B	C	D	E ¹⁾	F	G ²⁾	G ₁ ²⁾	H	K	L	M	N	O	P	R	S	T	U	V	W	X
Eg 50/6	570	60	36	18	20	30	20	24	23	195	97	120	60	254	22	90	217	172	100	120	110	65
Eg 80/6	570	60	36	18	20	30	20	24	23	195	97	120	60	254	22	90	217	172	100	120	110	65
Eg 50/12	650	120	36	18	20	30	20	24	23	195	97	120	60	254	22	90	217	172	100	120	110	65
Eg 80/12	650	120	36	18	20	30	20	24	23	195	97	120	60	254	22	90	217	172	100	120	110	65

1) tolerance $+0.1$ 2) tolerance $+0.25$
 $+0.15$

G changeable to G₁ by removing of the clamping bush.

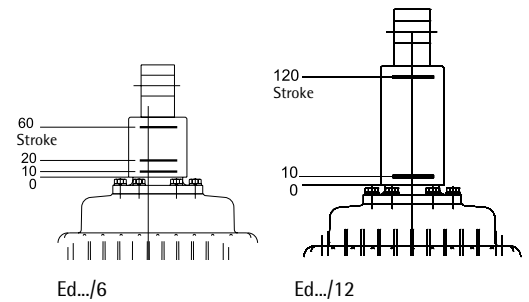
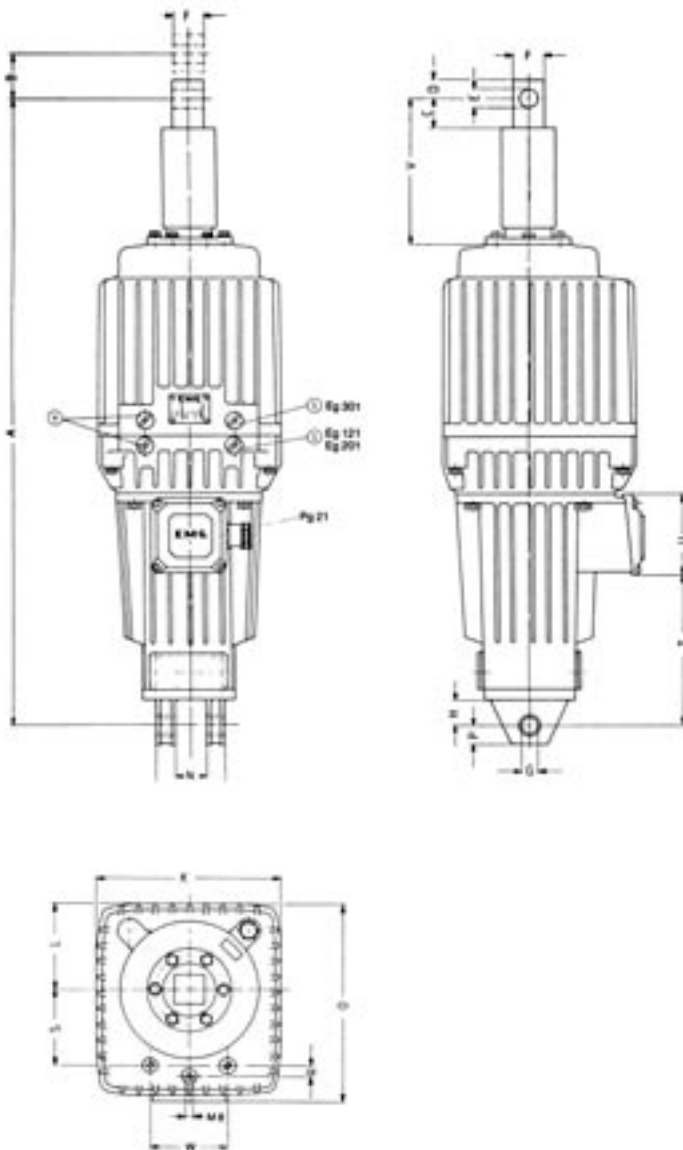
All dimensions in millimeter.

ELDRO® DC Version

Dimension Drawings

Eg 121/6, Eg 201/6, Eg 301/6, Eg 121/12, Eg 201/12, Eg 301/12,

Lifting marks



For easier setting and checking of the brake the piston guide bush of the thruster is marked. These marks can be read at the bottom edge of the piston rod protection tube (see drawing).

The motor housing with terminal box can be rotated in steps of 90° (indicate when ordering).
Mounting options, except units with limit switches:
The base mounting is bolted and 90° rotatable, the top pressure lug is rotatable.

Ⓜ = Lifting valve

Ⓢ = Lowering valve

Dimensions Table

Type	A	B	C	D	E ¹⁾	F	G ²⁾	H	K	L	M	N	O	P	R	S	T	U	V	W
Eg 121/6	765	60	38	25	25	40	25	35	240	112	90	40	260	25	15	100	172	100	130	100
Eg 201/6	765	60	38	25	25	40	25	35	240	112	90	40	260	25	15	100	172	100	130	100
Eg 301/6	765	60	38	25	25	40	25	35	240	112	90	40	260	25	15	100	172	100	130	100
Eg 121/12	825	120	38	25	25	40	25	35	240	112	90	40	260	25	15	100	172	100	130	100
Eg 201/12	825	120	38	25	25	40	25	35	240	112	90	40	260	25	15	100	172	100	130	100
Eg 301/12	825	120	38	25	25	40	25	35	240	112	90	40	260	25	15	100	172	100	130	100

1) tolerance +0,1 2) tolerance $\begin{matrix} +0,25 \\ +0,15 \end{matrix}$

ELDRO® - Flame-, Explosionproof Version



Thruster Versions

Electrical Design

Motor

Enclosure IP 44, DIN 40050 (IEC 529)
3 ph AC squirrel cage motor,
construction according to VDE 0530
(IEC 34).

For performance details refer to technical data. Insulation class F.

Modes of Operation

Continuous operation S1 and intermittent service S3-60 % duty cycle.
For duty rating refer to technical data.

Voltages and Frequencies

400 V, 50 Hz, 3 ph AC
500 V, 50 Hz, 3 ph AC
690 V, 50 Hz, 3 ph AC
All units are on principle star (Y) connected at delivery.
Special windings 110 V - 1000 V, 3 ph AC at extra charge.
60 Hz design at extra charge.

Terminal box

Enclosure IP 54, DIN 40050 (IEC 529)
3 supply terminals with connection screws M4.
Protective conductor terminal M4.
Earthing screw M6 (outside on terminal box.)

Cable Gland

on request

Mechanical Design

Assembly Dimensions

Refer to dimension drawings.

Mounting positions

Vertical: piston rod uppermost
Horizontal and intermediate positions: rating plate to be on top.

Mounting Options for Units without Limit Switches

The base mounting can be rotated in steps of 90° (indicate when ordering).
The top pressure lug is rotatable.

Hydraulic fluid

The hydraulic fluid is filled at factory for principle.

Safety Measures

Piston rod chromium plated to size.
Dust proof double seal.
Double seal to oil chamber.
Piston rod protection tube and lifting marks with units Ed 121, Ed 201, Ed 301.

Standard Paint

Synthetic resin lacquer varnish, impact and scratch resistant.
Coating thickness ~ 40 µ.
Tint RAL 7022 (umbergrey),
other colours and coating 'Increased Protection against Corrosion' at extra charge.

ELDRO® - Flame-, Explosionproof Version

Thruster Versions

Additional Equipment

Lifting or Lowering Valve (H, S, HS)

Built-in lifting (H) and/or lowering (S) valves for stepless prolongation of normal lifting or lowering times. The adjustable minimum values obtain a level 10-20 times the standard values.

Built-in valves in setting 'open' result in increased lifting and lowering times for short stroke units of approx. 0.1 to 0.2 second and for long stroke units of approx. 0.2 to 0.4 second.

The valves are adjusted from the outside.

Braking spring (c-spring)

The c-spring generates the braking force.

The specified force of the c-spring applies for $\frac{1}{3}$ of the piston rod's rated lift stroke or $\frac{2}{3}$ the rated lower stroke.

Damping spring (d-spring)¹⁾

For aperiodic transient of the brake, this assists the brake to close smoothly. Effective only in conjunction with a braking spring.

No limit switch can be annexed in this case. There is no alteration in the mounting distance A.

When determining the operating point of the brake the dimension V is to be considered (see dimension drawing).

Main application: ELDRO®-regulated brake.

1) Applies only to units with 60 mm stroke

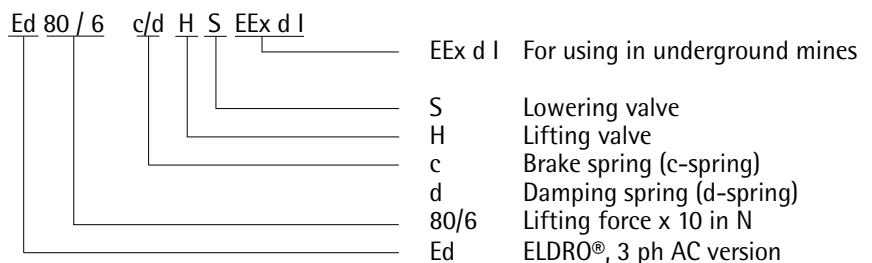
Exchange units

For spare orders for phased out units refer to 'Ordering instructions for exchange units in explosion-proof design'. (on request)

Certificate of Conformity

on request

Key to Types



ELDRO® - Flame-, Explosionproof Version

Characteristics

Technical Data

Type	Lifting force	Stroke	Thrust	Brake spring force (c-Feder) ¹⁾	Power consumption ²⁾	Current consumption at 400 V ²⁾	Duty rating at S3 – 60 % duty cycle ³⁾	Weight
	N	mm	N cm	N	W	A	c/h	kg
Short-stroke units								
Ed 30/5	300	50	1500	270	180	0,43	1500	27
Ed 50/6	500	60	3000	460	275	1,2	1500	47
Ed 80/6	800	60	4800	750	280	1,2	1500	48
Ed 121/6	1250	60	7500	1200	280	1,2	1500	70,5
Ed 201/6	2000	60	12000	1900	385	1,3	1500	70,5
Ed 301/6	3000	60	18000	2700	470	1,3	1000	70
Ed 50/12	500	120	6000	–	275	1,2	900	57
Ed 80/12	800	120	9600	–	280	1,2	900	58
Ed 121/12	1250	120	15000	–	280	1,2	900	71
Ed 201/12	2000	120	24000	–	385	1,3	900	71
Ed 301/12	3000	120	36000	–	470	1,3	600	72

1) Values of braking force apply to 1/3 of the rated stroke.

2) Values at end-position of piston. During lifting operation the specified values multiply. In the lower range of temperature the current and power consumption increases.

3) Continuous operation S1 and intermittent service S3 are permitted up to +40 °C ambient temperature.

4) Housing of grey cast.

Approximate calculation for current consumption for non-standard voltages:

$$I_x = \frac{U_{(400V)}}{U_{(x)}} \cdot I_{(400V)}$$

Performance in Service depending on Ambient Temperature

Temperature range	Hydraulic fluid	usable for:	Performance in service
- 20 °C to + 40 °C	Shell Morlina 10 ¹⁾	EEx II, EEx I	In the lower range of ambient temperatures the lifting times may increase up to four times the specified lifting times when the unit is operated the first time. The lowering times remain unaffected.
- 10 °C bis + 40 °C	HFC 46 ²⁾	EEx I	

1) This hydraulic fluid can also be used for EEx I, if no flame resistant hydraulic fluid is required by the regulatory authority.

2) Flame resistant hydraulic fluid.

Housing Material

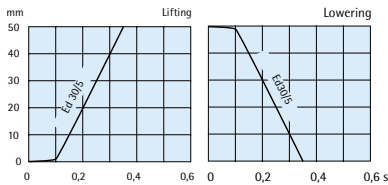
Ed 50, Ed 80, Ed 121, Ed 201, Ed 301	EEx I design	EEx II design
Motor housing	Ducile cast iron	GGG
Hydraulic housing	Gray cast	Aluminium or gray cast ¹⁾

1) Gray cast housing at extra charge.

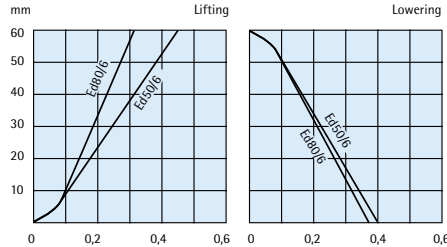
ELDRO® - Flame-, Explosionproof Version

Stroke-Time Diagrams

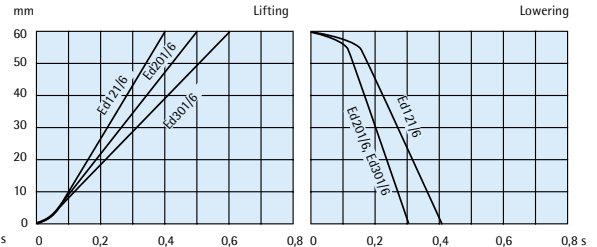
Ed 30/5



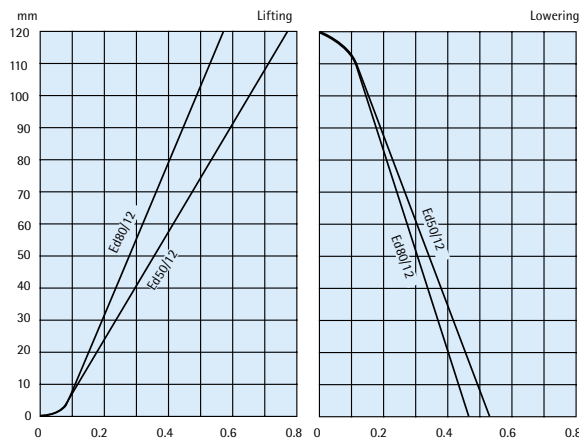
Ed 50/6, Ed 80/6



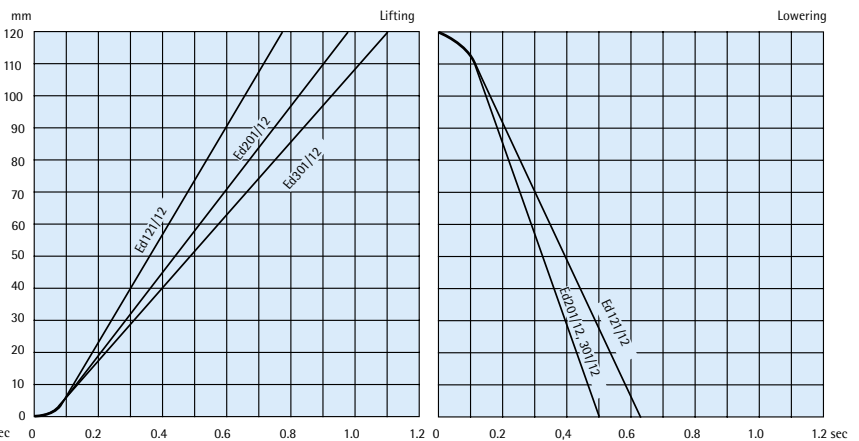
Ed 121/6, Ed 201/6, Ed 301/6



Ed 50/12, Ed 80/12



Ed 121/12, Ed 201/12, Ed 301/12



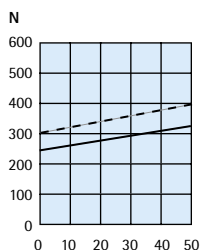
Diagrams taken under load at +20 °C operating temperature of unit with hydraulic fluid Shell Morlina 10.

When applying the high-speed lowering circuit, the given lowering times are reduced by approx. 15 %.

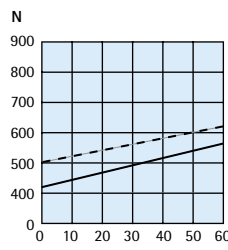
c-Spring Diagrams

Parameter values in Newtons (N)
 --- necessary force to compress c-spring
 — force given from c-spring (braking force)

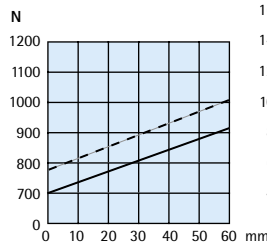
Ed 30/5 c



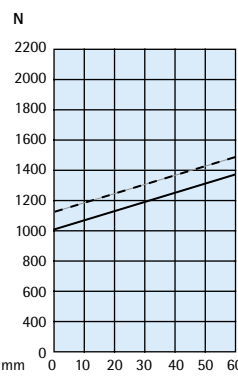
Ed 50/6 c



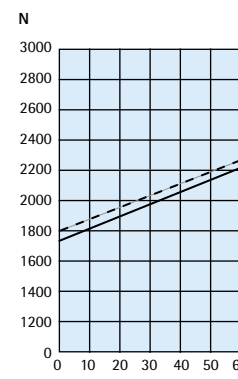
Ed 80/6 c



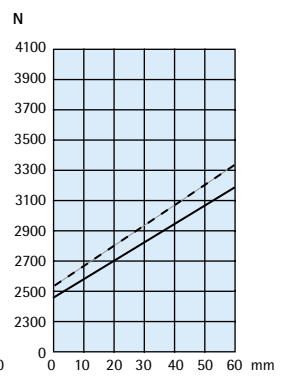
Ed 121/6 c



Ed 201/6 c



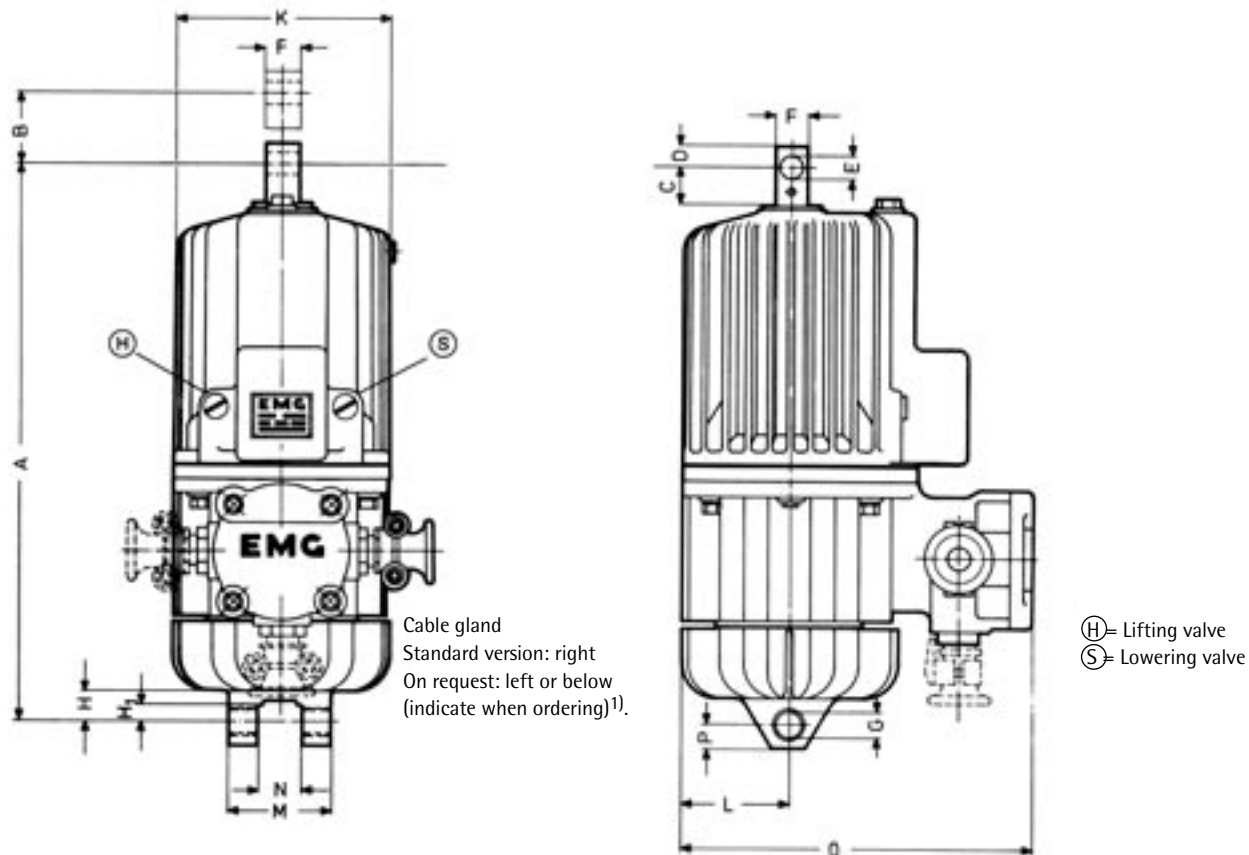
Ed 301/6 c



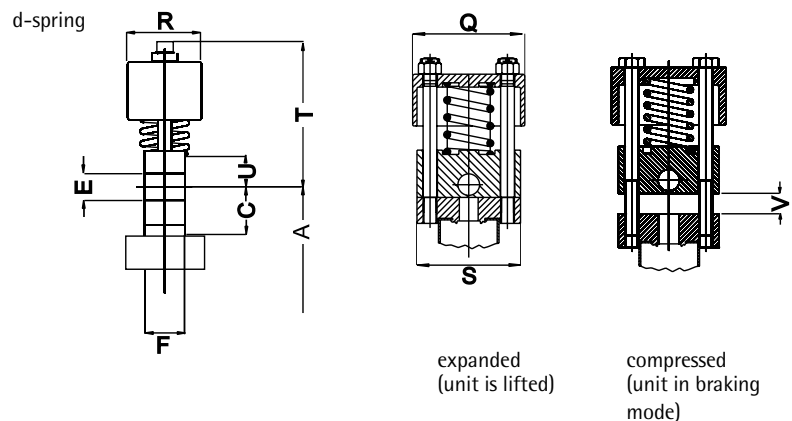
ELDRO® - Flame-, Explosionproof Version

Dimension Drawings

Ed 30/5, Ed 50/6, Ed 80/6, Ed 50/12, Ed 80/12
Enclosure EEx I / EEx II



¹⁾ For Ed 30/5 only possible at the bottom.



Dimension Table

Type	A	B	C	D	E ₁	F	G ¹⁾²⁾	H	H ₁	K	L	M	N	O	P	Q	R	S	T	U	V
Ed 30/5	410	50	34,5	15	16	25	16	18	-	160	80	80	40	270	16	85	55	75	98	20	15
Ed 50/6	509	60	36,5	18	20	30	24	45	35	190	95	120	60	310	22	85	55	75	100	22	15
Ed 80/6	509	60	36,5	18	20	30	24	45	35	190	95	120	60	310	22	85	55	75	100	22	15
Ed 50/12	609	120	36,5	18	20	30	24	45	35	190	95	120	60	310	22	-	-	-	-	-	-
Ed 80/12	609	120	36,5	18	20	30	24	45	35	190	95	120	60	310	22	-	-	-	-	-	-

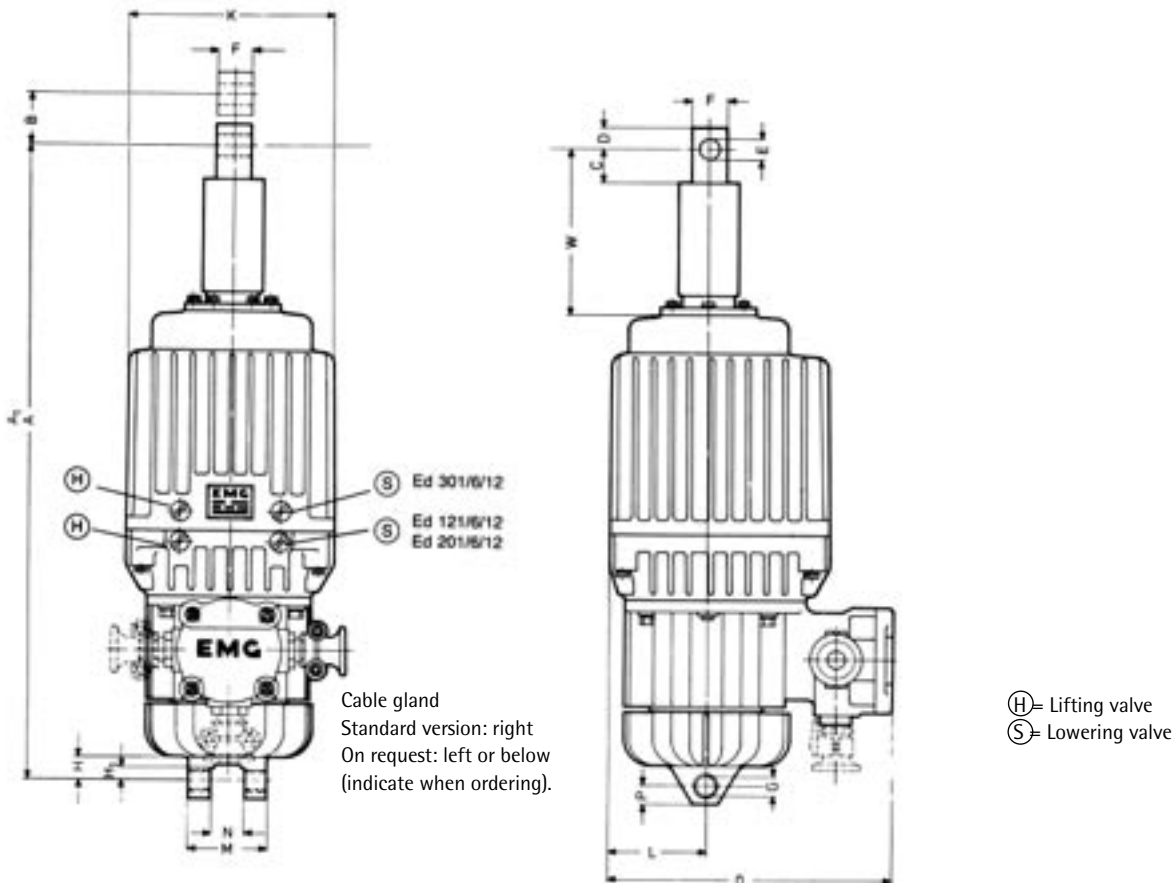
¹⁾ tolerance +0,1 ²⁾ Also available with clamping sleeve $\varnothing 20^{-0,1}$

ELDRO® - Flame-, Explosionproof Version

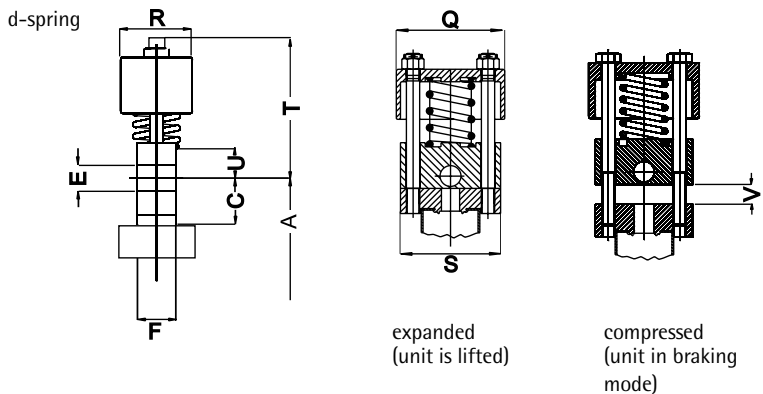
Dimension Drawings

Ed 121/6, Ed 201/6, Ed 301/6, Ed 121/12, Ed 201/12, Ed 301/12

Enclosure EEx I / EEx II



Cable gland
Standard version: right
On request: left or below
(indicate when ordering).



Dimension Table

Type	A	B	C	D	E ¹⁾	F	G ²⁾	H	H ₁	K	L	M	N	O	P	Q	R	S	T	U	V	W	
Ed 121/6	690	60	38	25	25	40	25	45	35	240	112	90	40	324	30	130	80	120	147	35	20	130	
Ed 201/6	690	60	38	25	25	40	25	45	35	240	112	90	40	324	30	130	80	120	147	35	20	130	
Ed 301/6	690	60	38	25	25	40	25	45	35	240	112	90	40	324	30	130	80	120	147	35	20	130	
Ed 121/12	750	120	38	25	25	40	25	45	35	240	112	90	40	324	30	-	-	-	-	-	-	-	190
Ed 201/12	750	120	38	25	25	40	25	45	35	240	112	90	40	324	30	-	-	-	-	-	-	-	190
Ed 301/12	750	120	38	25	25	40	25	45	35	240	112	90	40	324	30	-	-	-	-	-	-	-	190

1) tolerance +0.1 2) Also available with clamping sleeve $\varnothing 20^{+0.1}$

Method of Operation

Design and Method of Operation

BRAKEMATIC® controls for electrohydraulic drum and disc brakes are consisting of a programmable frequency converter with function modules (software) and an input unit (pedal, internal or external parametrization interface, process control module with measuring sensor). A frequency change is generated at the output of frequency converter. This frequency change is used for activation of an ELDRO® thruster so that its hydraulic force can be varied. The resultant actuating force of ELDRO® is effective opposite to the braking force of braking system so that this relation forms the basis for the control of braking operation.

One BRAKEMATIC® control is sufficient for simultaneous operation of a number of brakes, provided the functions and

the operation mode of brake systems are identical and the sum of the current input values of all ELDRO® thrusters is in conformity with the selected size of BRAKEMATIC®.

Note:

Working in conjunction with an electrohydraulic brake, the BRAKEMATIC® control forms one functional unit, i.e. both components are specifically adapted to each other. If one of the components is to be replaced, recalibration of the overall system is necessary.

Functions

Pedal type BM P

... is an electronic pedal control with „manual“ parameter presetting for generation of an analoguecontrolled braking operation. The system permits sensitive braking of travelling operations and rotations. Accuracy of positioning and operational comfort are decisively improved. Especially undesired load change impulses or even oscillation of crane loads can be drastically reduced or even eliminated at all.

Ramp type BM R

... is an electronic control for the creation of fixed and preprogrammed braking torque characteristics. Thus coercive guided opening and closing movements of brakes are realized. Short braking times, multistage or continuous braking processes are possible according to the preselected ramp function. The BRAKEMATIC® ramp is offered specifically for remotecontrolled cranes where crane operation is required with a minimum of control signals. Only a simple control signal is required for activation of the ramp function. After that, for example a complete shutdown regime may be automatically executed.

Another possible application solution is the automatic control of load-dependent excessive speeds in case of downwards operating belt conveyor systems. One maximum and minimum value each of admissible conveyor speed is acquired as limitation parameter and transmitted to the frequency converter. If the upper limit value is exceeded, the conveyor speed is reduced on the basis of a preselected functional sequence. If the lower speed limit is reached, the frequency converter deactivates the ramp and the conveying system returns to the normal operation mode.

Method of Operation

Functions

Advance

BRAKEMATIC® advance is an electronic control with variable parameter presetting for generation of controlled brake torque characteristics. In this case an external reference signal (usually rotation) and a programmed presetting parameter (e.g. time, rotation) are evaluated and a linear or nonlinear time function is calculated in the frequency converter. An integral process controller module makes a permanent setpoint/actual value comparison of calculated characteristic and the actual values.

conveyor systems. This is the only way to provide protection from surcharges caused by asynchronous stoppage of conveyors. The application of BRAKEMATIC® advance is excellently suited for this job since it ensures the preset braking times independent of the conveying direction (up or down) and the loading status.

Constant brake times for strip guiding systems

Proceeding from the guide signal generated by the controller, the frequency converter modifies the working frequency at the ELDRO® thruster and thus controls the process of braking operation. Safe adherence to brake time stipulations is the initial prerequisite for the realization of the shutdown regime of complex belt

ABS-System for trackbound travelling

Trackbound travelling and trolley gears are another field of application. Due to unfavourable friction (metal to metal contact) in combination with swaying loads, heavy braking torques, (e.g. caused by operation of EMERGENCY STOP) or adverse climatic influences it might occur that wheels are blocked. In those cases the BRAKEMATIC® advance can be used as antilock system.

Function of the pedal

Using the pedal, the crane operator can actuate the control system. The lifting power of the ELDRO® brake thruster, and thus the braking torque, are changed in proportion to the pedal travel.

When the pedal is not depressed at all, the full lifting power is applied to the ELDRO® brake thruster, and the brake is being lifted. The more the pedal is pressed, the lower is the lifting power on the ELDRO® brake thruster and the higher is the braking torque. A special setting allows a long pedal travel

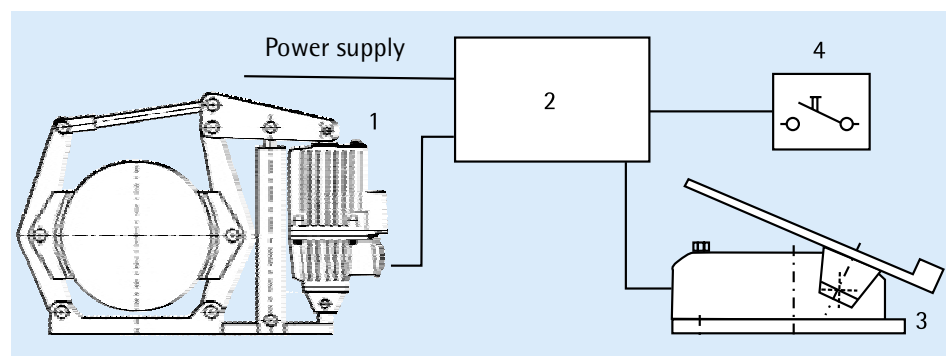
for sensitive variation of the braking torque. In order to avoid full braking, a progressively acting pull-back spring is incorporated in the pedal.

When the crane operator slightly retracts the pedal, the braking torque is reduced accordingly.

Thus, all conditions required for safety brakes are complied with.

Example of pedal control with parking switch

- 1 ELDRO® thruster
- 2 Control device
- 3 Pedal
- 4 Parking switch



Control units

Characteristics

	230/... voltage variant	400/... voltage variant
System voltage	1 x 180 to 260 V \pm 0 %, 48 to 62 Hz alternatively 220 to 360 V \pm 0 % DC	3 x 345 to 525 V \pm 0 %, 48 to 62 Hz alternatively 420 to 700 V \pm 0 % DC
Protection class	IP 55 acc. to DIN 40050 (at delivery in housing, otherwise IP 20)	
Ambient temperature	-10 °C to +40 °C at operation up to +50 °C with power reducing of 2.5 % / °C -40 °C to +55 °C at storage	
Surge voltage strength	Class I acc. to EN 50178	
Permitted pollution	Pollution degree 2 acc. to VDE 0110, Part 2	
Permitted moisture stress	relative humidity 95 %, no condensation	
Influence of altitude	1000 m: 100 % rated current up to 3000 m with reducing the rated current about 10 % / 1000 m	
Vibro stability	in correlation to: IEC 68-2-64 and IEC 68-2-36 Test Fh IEC 68-2-6 Test Fc IEC 68-2-29 Test Eb	

Control and thruster lines should be shielded.

Dimensions

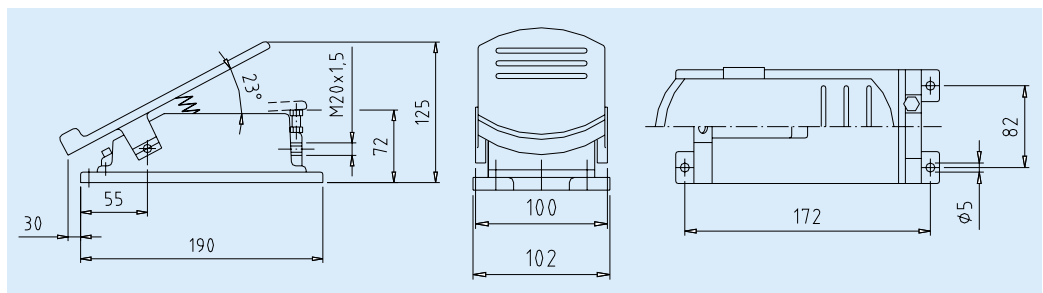
Housing, lockable design, IP 55, IEC 529, DIN 40050

for type	Width mm	Depth mm	Height mm	Total weight kg
230/2.2	300	210	400	9.0
230/3.0	300	210	400	9.0
230/4.0	300	210	400	9.0
400/2.1	300	210	400	10.0
400/2.8	300	210	400	10.0
400/3.8	300	210	400	10.0

* at ambient temperature >40 °C
housing dimensions 400 x 250 x 500 mm

Pedal

Reinforced version IP 54
(IEC 337, DIN 0660)



Control units

Selection table for all applications

Type	System Voltage [V] ± 0 %	System Frequency [Hz] ± 0 %	max. permitted output current [A]	max. length of motor feed line [m]
230/2.2	220...360 V DC	0	2,2	50
230/3.0	220...360 V DC	0	3,0	75
230/4.0	220...360 V DC	0	4,0	75
400/2.1	420...700 V DC	0	2,1	100
400/2.8	420...700 V DC	0	2,8	100
400/3.8	420...700 V DC	0	3,8	100
230/2.2	180...260 V AC	48-62	2,2	50
230/3.0	180...260 V AC	48-62	3,0	75
230/4.0	180...260 V AC	48-62	4,0	75
400/2.1	345...525 V AC	48-62	2,1	100
400/2.8	345...525 V AC	48-62	2,8	100
400/3.8	345...525 V AC	48-62	3,8	100

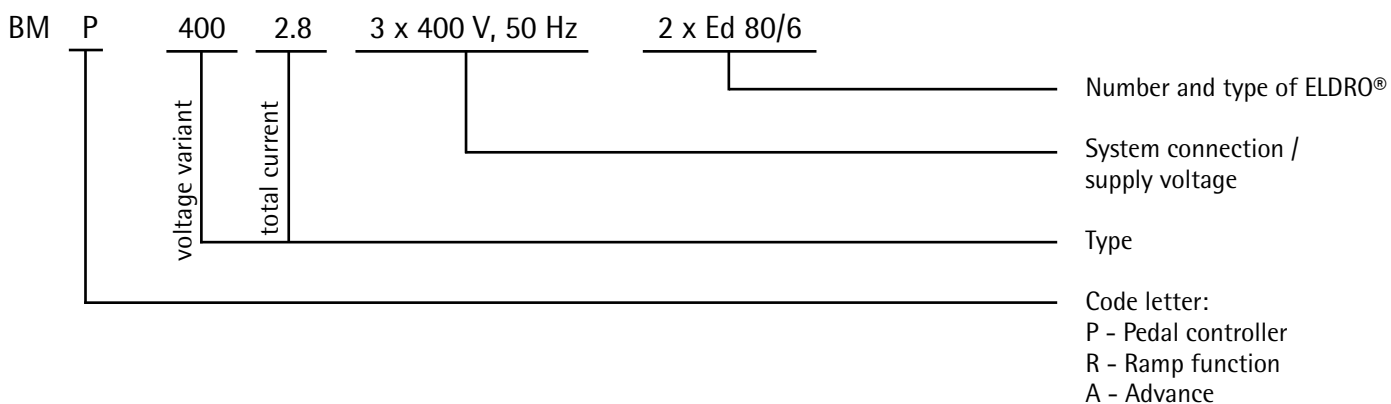
The control units are designed for wall-mounting with the protection class IP55. Other versions are available on request.

The pedal is intended for floor-mounting. All units comply with the valid standards and protection regulations.

Key of Types

The control units designation has the following structure

Pedal controller for 2 ELDRO® thrusters Ed 80/6 230/400 V; 2.1/1.2 A.
At 400 V, 50 Hz the total current is 2 x 1.2 A = 2.4 A.



Electro-hydraulic Thrusters

ELDRO®

Operating fluid maintenance for ELDRO® Thrusters

Oil quantity for ELDRO® Thrusters Ed 23 – Ed 350 Standard version

ELDRO® type	litres
Ed 23/5	1.6
Ed 30/5	1.9
Ed 50/6	4.2
Ed 80/6	4.2
Ed 50/12	5.5
Ed 80/12	5.5
Ed 121/6	9.4
Ed 201/6	9.4
Ed 301/6	9.2
Ed 121/12	9.4
Ed 201/12	9.4
Ed 301/12	9.2
Ed 185/16	9.2
Ed 301/15	12.1
Ed 350/20	12.1

Operating fluid maintenance

ELDRO® thrusters are supplied for a temperature range from -25 °C to +50 °C and filled with hydraulic oil Morlina 10 of class HL 10 DIN 51524. Different temperature ranges require special fluids. This "long life" filling is not subject to wear or contamination during operation, as long as the thruster is in perfect condition.

In case of refilling after repair, all other makes of class HL 10 DIN 51524 may be used. A list of equivalent hydraulic oil qualities of different makers is available through EMG.

All bearings in the ELDRO® thruster receive an original lubrication of grease with the "long life" grease K-L 3 n to DIN 51825 (for example Shell Alvania R 3).

Thus, ELDRO® thrusters are largely maintenance-free.

Important

In case of refilling in-situ, the thruster has to be filled in vertical position up to the overflow screw or to the filling limit of the charging connection, depending on the type of thruster.

In order to prevent possible inclusions of air, run the unit through several strokes. Then check oil level again and top up eventually. Finally, tighten charging connection and overflow screw.

Electro-hydraulic Thrusters

ELDRO®

Ordering instructions for ELDRO® exchange units

Exchange units are manufactured as special thrusters. Their usage on new installations is not recommended.

ELDRO® thruster former design	Assembly (A) dimension	Exchange unit new design	Assembly (A) dimension	Variation plus/minus	Equal assembly dimension is achieved by means of adapting pieces to the standard thruster
Typ	mm	Type	mm	mm	
Ed 10 with baseplate Ed 20 with baseplate Ed 22/5 with baseplate	284	Ed 23/5	286	2	none
Ed 10 without baseplate Ed 20 without baseplate Ed 22/5 without baseplate	254	Ed 23/5.2 flange version	272	18	none
Ed 10 c Ed 20 c Ed 22/5 c	314	Ed 23/5.1 c base-plate version	314	-	none
Ed 11 Ed 11 c	433 468	Ed 30/5.1 Ed 30/5.2 c	433 468	- -	adaptor E 30.U11 adaptor E 30.U12
Ed 21 Ed 21 c	433 468	Ed 50/6.2 Ed 50/6.3 c	435 468	2 -	pressure lug E 80.U 114 and 2 clamping sleeves 20x16x35 in fixing lugs pressure lug E 80.162 and 2 clamping sleeves 20x16x35 in fixing lugs
Ed 2 Ed 2 c	509 509	Ed 50/6.1 Ed 50/6.1 c	511 511	2 2	housing base E 80.243 and pressure lug E 80.U 114
Ed 3 Ed 3 c	509 509	Ed 80/6.1 Ed 80/6.1 c	509 509	- -	housing base E 80.242 and pressure lug E 80.U 114
Ed 4	609	Ed 80/12.1	606	3	housing base E 80.242 and pressure lug E 80.U 114
Ed 5 Ed 5 c	600 600	Ed 185/6 Ed 185/6 c	600 600	- -	none none
Ed 6	700	Ed 185/16	700	-	none
Ed 125/6 Ed 125/6 c	644 644	Ed 121/6 Ed 121/6 c	645 645	1 1	none none
Ed 200/6 Ed 200/6 c	644 644	Ed 201/6 Ed 201/6 c	645 645	1 1	none none
Ed 300/6 Ed 300/6 c	680 680	Ed 301/6 Ed 301/6 c	680 680	- -	base plate E 301.U 10 base plate E 301.U 10
Ed 125/12 Ed 200/12	764 764	Ed 125/12.1 Ed 200/12.1	765 765	1 1	base plate E 121.U 11 base plate E 121.U 11
Ed 300/12	800	Ed 301/12.1	800	-	base plate E 301.U 11

When exchanging ELDRO Thrusters of the former design with ab-springs, use ELDRO Thrusters of the new design with d-springs. In this case, the interchangeability is not entirely given, since the fixing of the pressure lug is different.

The exchange units Ed 201/6 (5) and Ed 201/6 c (5) with an assembly dimension of 654 mm are available on request.

The exchange units for Ed 5 c have a c-spring resistance which is by 250 N higher with 1/3 of the stroke.

As to accessory equipment, refer to the main list.

The ELDRO Thrusters Ed 20 and Ed 21 are filled with hydraulic fluid Clophen T 241 (toxic oil).

These units are to be disposed of acc. to the statutory provisions.

Electro-hydraulic Thrusters

ELDRO®

Installation Instructions

In General

See name plate for technical data (1).

The units delivered ready for operation are filled with the appropriate working fluid - for quality see plate (4).

Unauthorized opening of charging or overflow screws prohibited since oil loss will cause alteration of technical values or non-operatability.

For (Sch)-flameproof units to BVS, please refer to the regulation relating to the permissible hydraulic fluid - for quality see plate (4).

Mounting Positions

Vertical: pressure lug (2) uppermost.
Horizontal and intermediate positions: name plate (1) uppermost.
Other mounting positions are possible but further inquiries should be made.

Base mounting of ELDRO®-types Ed 50 to Ed 301 is bolted and may be mounted by 90° offset each.

Slewability of unit must be guaranteed, transverse forces may not act upon piston rod.

Electrical connection

Connect according to terminal diagram in terminal box cover.

Motor voltage may be switched over to delta (Δ) or star (Y) connection.

At delivery, all units are star (Y) connected. Any phase-sequence permitted for connection.

Voltage of (Sch)- or (Ex)-thrusters may not be switched over.

In case of additional heating, please observe terminal diagram in terminal box over.

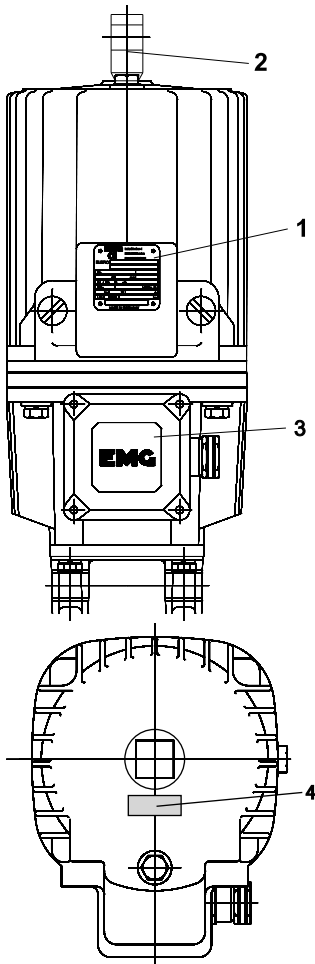
screw (7) and (8) respectively. Turn to the right = increase setting time. Turn to the left = decrease setting time. Don't turn adjusting screw beyond edge of housing. When fitted with valves, the units are adjusted at the works to have a setting time of 5 seconds. Tighten the screw plugs.

Braking Spring

Units with built-in brake spring are marked by a ,c' on their name plate. In this case, the brake may not have its own brake spring or weights.

Painting

If you paint the unit after installation do not damage the piston rod by painting it. You risk leakage problems!



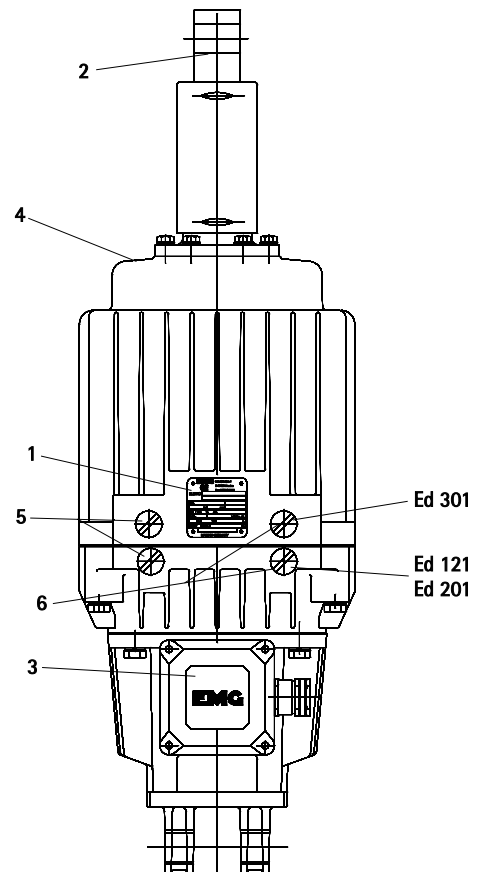
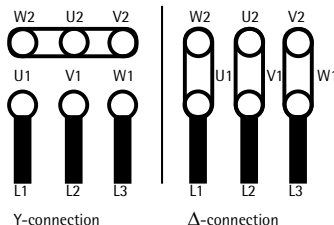
Keep the terminal box area clean. Ensure that the gasket is correctly positioned and undamaged. Close terminal box tightly. Tighten the cable entry clamping screw, if necessary seal it.

When protecting the units by motor circuit breakers the thermal trigger should be set on 1.5 times the holding current (see rating plate) for all types.

When connecting (Sch) or (Ex)-units, please take note of the appropriate regulations.

Valve Setting

Reference ,H' = Lifting valve
,S' = Lowering valve, see name plate (1).
Remove the screw plug marked either »H« (5) or »S« (6). Continuous prolongation of normal lifting and/or lowering times is achieved by adjusting setting

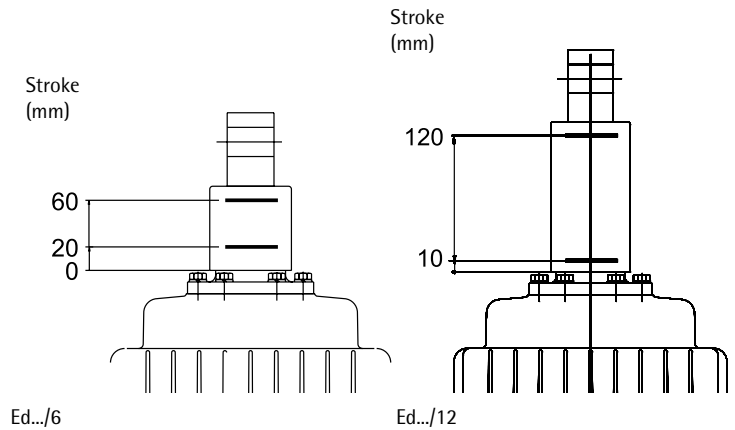


Installation Instructions

Lifting marks of thrusters:

Ed 121/6, Ed 201/6, Ed 301/6,
Ed 121/12, Ed 201/12, Ed 301/12

For easier setting and checking of the brake the piston guide bush of the thruster is marked. These marks can be read at the bottom edge of the piston rod protection tube (see drawing).



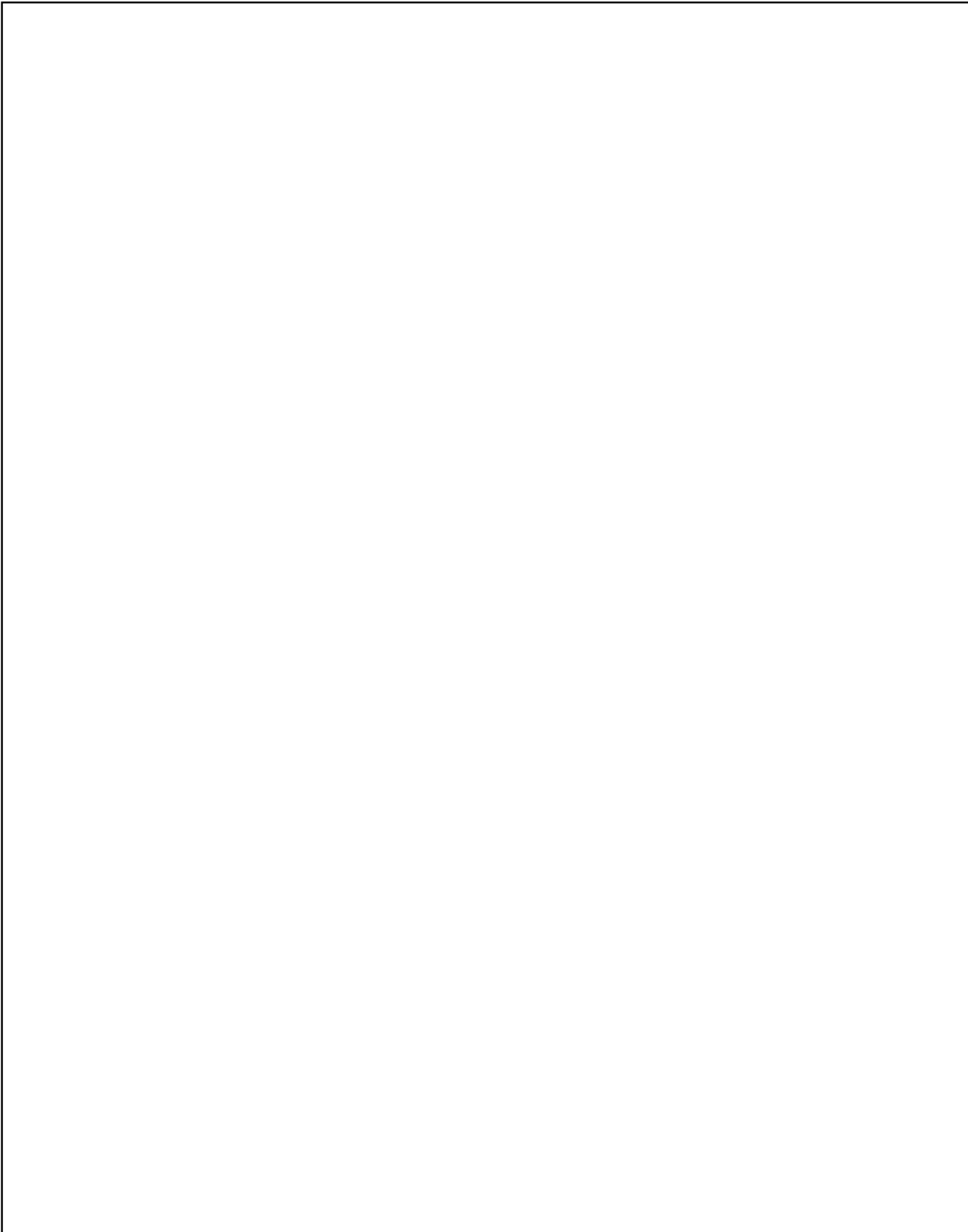
Declaration of Conformity

		Konformitätserklärung Declaration of conformity Certificat de conformité	EMG Elektro Mechanik GmbH Industriestraße 1 57482 Wenden / Germany Telefon: +49 (0) 27 62 / 6 12-0 Telefax: +49 (0) 27 62 / 6 12-2 37 Internet: www.emg-automation.com E-Mail: info@emg-automation.com Unternehmensgruppe
	Hiermit erklären wir, daß das Produkt We hereby declare that the following product Nous certifions ci-après que		
Elektrohydraulische Hubgeräte ELDRO® Electrohydraulic thrusters ELDRO® les vérins électro-hydrauliques ELDRO®			
Ed 23/5 - Ed 350/20 Eg 50/6 - Eg 301/12			
in der serienmäßigen Ausführung folgenden einschlägigen Bestimmungen entspricht:			
are conforming with the following relevant regulations: dans la version fournie par nos soins sont bien en conformité avec les normes ci-dessous:			
EG-Maschinenrichtlinie		98/37/EG	
EG-Niederspannungsrichtlinie		73/23/EWG	
EC recommendation for machines superseded by		98/37/EEC	
EC low voltage recommendation superseded by		73/23/EEC	
Norme européenne pour machines		CE 98/37	
Norme européenne pour basse tension		CE 73/23	
Angewendete harmonisierte Normen: Applied harmonized standards: Normes harmonisées appliquées:			
EN 292		Sicherheit von Maschinen	
EN 60204 Teil 1		Elektrische Ausrüstung von Maschinen	
EN 292		Safety of machines	
EN 60204 Part 1		Electric equipment of machines	
EN 292		Sécurité des machines	
EN 60204 partie 1		Equipment électrique des machines	
Wenden, den 03.07.2003			
 Koepp Geschäftsführung		 Schäfer Geschäftsführung	

Electro-hydraulic Thrusters

ELDRO®

Notes



Other EMG products and system resolving

- Servo-Technique/Strip guiding for the metals industry
- Quality assurance systems: IMPOC, SORM 3plus

Associated companies

BST, Bielefelder Servo-Technik GmbH

Web Guides for paper, foils, rubber, textiles

Web inspection system

Tire Control Systems for quality assurance in the production of tires

EMH, Electromecanica e Hidraulica, Belo Horizonte, Brazil

Electro-mechanical and hydraulic components

EMG Automation (Beijing) Ltd.

BST Pro Mark Technologies Inc., Elmhurst, IL USA

Web and strip guiding systems for metal, paper, foil, rubber, and textile industries, Web inspection systems

BST SAYONA AUTOMATIONS PRIVATE LTD., Mumbai, India

Web and strip guiding systems for metal, paper, foil, rubber, and textile industries, Web inspection systems

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BST International GmbH

EMG, Factory ELTMA

BST Sayona Automations Private Ltd.

EMG Automation (Beijing) Ltd.

