

**Electric rotary multi-revolution
actuators for nuclear power plants**

- Outside containment

MODACT MOA

Type numbers 52 020 - 52 026

- Inside containment

MODACT MOA OC

Type numbers 52 070 - 52 074

CERTIFICATE **TUV NORD**

Management system as per
EN ISO 9001 : 2008

In accordance with TÜV NORD CERT procedures, it is hereby certified that

ZPA Pečky, a.s.
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Czech Republic



applies a management system in line with the above standard for the following scope

**Development and production of electric actuators,
switch boards and sheet metal working.**

Certificate Registration No. 04 100 950161
Audit Report No. 624 362/300

Valid until 2012-09-24
Initial certification 1995-03-01

Certification Body
at TÜV NORD CERT GmbH

Prüfer, 2009-09-25

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

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1. USE

Rotary multirevolution electric actuators are intended for remote control of special valves installed in crewed areas of nuclear power plants (**actuators MOA**) or under the containment and/or in hermetic boxes of nuclear power plants operating reactors VVER or RBMK (**actuators MOA OC**). They are intended for safety circuits as well as for normal use; they provide for direct connection with valves or connection by means of remote control elements.

The actuators are used for controlling slide valves and valves fitted with spindle nuts. For the valves, lead angle of the spindle nut must not exceed 5°.

The actuators **MOA** fitted with a position transmitter of unified signal 4 – 20 mA can also operate in circuits of automatic regulation with regime S4.

2. OPERATING ENVIRONMENT

The actuators for nuclear power plants must operate reliably with the following parameters of surrounding environment:

Normal operating regime

	Actuators MOA	Actuators MOA OC
Operating temperature	from -20 to 55 °C	from 5 to 70 °C
Operating pressure	0.1 MPa (1 kg/cm ²)	from 0.085 to 0.1032 MPa
Relative humidity	up to 90 %	up to 95 ±3 %
Radiation level		up to 1 Gy/h

Accident regime of small leakage – reactor VVER (actuators MOA and MOA OC):

Temperature	up to 90 °C
Pressure	up to 0.17 MPa
Relative humidity	air-steam mixture
Radiation level	up to 1 Gy/h
Duration of accident regime (accident pressure, temperature)	up to 5 hours
Duration of post-accident regime (post-accident pressure, temperature)	up to 720 hours
Post-accident pressure	0.05 – 0.12 MPa
Post-accident temperature	from 5 to 60 °C
Frequency of regime occurrence	once in 2 years

During as well as after the end of this regime, the actuators must operate reliably and must maintain their operating ability.

Accident regime of great leakage – reactor VVER (actuators MOA OC):

Temperature	up to 150 °C
Pressure	up to 0.5 MPa
Relative humidity	air-steam mixture
Radiation level	up to 1x 10 ³ Gy/h
Duration of regime (accident pressure, temperature)	up to 10 hours
Duration of post-accident regime (post-accident pressure, temperature)	up to 720 hours
Post-accident pressure	0.05 – 0.12 MPa
Post-accident temperature	from 5 to 60 °C
Frequency of regime occurrence	once in 30 years

In this accident regime, the actuators must perform min. 10 cycles (5 during the regime, 5 after the parameters have been reduced).

Resistance against action of radioactive gamma radiation

The electric actuators MOA OC must reliably operate until they receive integral dose of gamma radiation 1 x 10⁶ Gy (1 Gy = 100 rad). For the actuators MOA this integral dose is 78.8 kGy.

Resistance against seismic shock

The electric actuators **MOA** and **MOA OC** must be resistant against oscillations of acceleration 8 g in any direction, within the range of exciting frequencies from 20 to 50 Hz for the period of max. 20 s. Moreover, seismic resonance tests must be carried out in the frequency range from 5 to 20 Hz.

Resistance against deactivating agents

The actuators **MOA** and **MOA OC** are resistant against action of deactivating agents. Frequency of deactivation is once a year, duration of action max. 10 hours per year, temperature of solutions max. 60 °C. Composition of deactivating solutions is given in technical specifications.

Storage

The electric actuators for nuclear power plants should be stored in rooms protected against adverse climatic effects and other harmful effects (acids, alkalis, etc.) at temperatures from -50 °C to +50 °C. Maximum relative air humidity during the storage should not exceed 80 %.

3. TECHNICAL PARAMETERS

Basic technical parameters of the actuators are shown in **Tables of versions No. 1, 2, 3, 4, 5**

Supply voltage of electric motor	3 x 400 (380) V, 50 Hz (or according to specification on the rating plate)
Actuator protective enclosure	IP 55

Deviations of output parameters

Rated values of torques of the output shaft (including permissible deviations) apply to rated supply voltage with deviation -15 % +10 % and rated frequency with deviation ± 2 %; here, the deviations in voltage and frequency must not be opposite.

Actuators must be able to operate under the following conditions:

- permanent function must be ensured if voltage drops to 85 % of its rated value or increases to 110 % of its rated value, with frequency 50 Hz ± 2 % (deviations in voltage and frequency must not be opposite);
- if voltage drops to 80 % of its rated value and, at the same time, frequency drops by 6 % of its rated value for 15 s; if voltage increases to 110 % of its rated value and, at the same time, frequency increases by 3 % of its rated value for 15 s; in both cases, the actuators must not stop and possibility of starting must be ensured for this period.

Permitted deviations of respective parameters:

tripping torque	± 10 % of maximum value
shifting speed	-10 % +15 % of rated value (idle run)
setting of signalling switches	± 2.5 % of the highest value in the range (setting ranges are given in the instructions for assembly, operation, and maintenance (Mounting Instructions)).
setting of position switches	± 50 ° of turning angle of the output shaft.

Operating position

The actuators can operate in any position.

Switching frequency – operating cycle

The longest operating cycle (close - open - close) is 10 minutes with the run to idle ratio 1:3 (load factor 25 %). Medium load of the electric actuator during its run is 33 % of its maximum tripping torque; it is called rated torque.

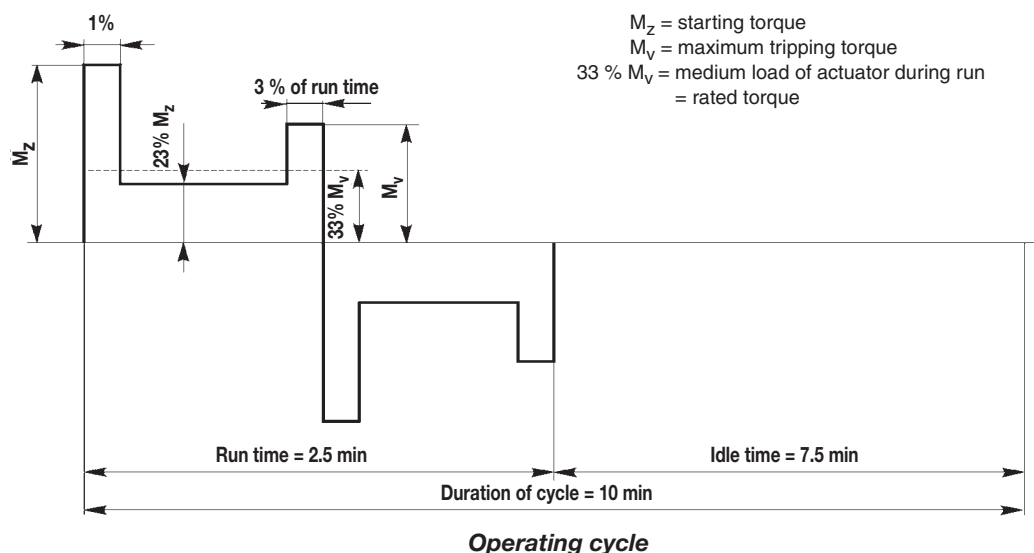
Maximum number of cycles per hour is 6 (12x switching on and off), while maintaining the run to idle ratio 1:3.

The actuators **MOA** can also operate in the regime of interrupted run with start-up S4 according to EN 60034-1 (e.g. in gradual opening of the valve etc.). The highest number of closings in automatic regulation is 1200 h⁻¹, with the load factor 25 % (ratio of run to idle time 1:3). Medium value of loading torque is max. 33 % of the value of maximum tripping torque.

Service life and reliability

Service life of the electric actuators **MOA** and **MOA OC** is 40 years; here, in their assembly, operation, and maintenance, it is necessary to follow the manufacturer's instructions, meet the operating conditions, and replace worn or damaged parts. Service life of sealing parts is min. 10 years.

The actuators belong to the group of repaired instruments and should operate reliably for at least 4 years (30,000 operating hours of the reactor). Guaranteed number of operating cycles (open - close - open), with observed operating parameters, is 3,000 during 4 years. Probability of faultless operation of the actuators (3,000 cycles during 4 years) must be at least 0.98.



Insulation resistance

Insulation resistance of the electric circuits against frame and between each other must not drop below 0.3 Mohm even under the most severe operating conditions; under dry conditions (temperature 20 °C and relative humidity from 30 to 80 %) it must not be smaller than 20 Mohm.

Electric strength of insulation of electric circuits

	Testing voltage
Electric circuits of actuator with rated voltage up to 250 V	1 500 V, 50 Hz
Electric motor with rated three-phase voltage 400 V (380 V)	1 800 V, 50 Hz
Position transmitter with rated voltage up to 50 V	500 V, 50 Hz

Load capacity of micro-switches

in AC circuits 230 V (220 V), current via closed contacts is from 20 to 500 mA, $\cos \gamma$ 0.6;

in DC circuits 24 and 48 V, current via closed contacts is from 5 mA to 1 A, where voltage loss on closed contacts must not exceed 0.25 V. $L/R = 0.04$ s.

Operating diagram of micro-switches

Operating diagrams of the torque, position, and signalling switches are shown in respective wiring schemes.

Torque tripping

The actuators are fitted with electro-mechanical double-side tripping for torque reduction; this allows the electric motor to be switched off by means of torque switches in end-limit positions and in any other position.

The torque tripping is regulated separately, both to the close side and to the open side.

The torque switches are fitted with a blocking that prevents the motor from being restarted spontaneously and provides for ensuring initial motion of the closing organ with maximum starting torque. As a standard, the actuators are delivered with blocking time between one and two revolutions of the actuator output shaft from the change in direction of rotation. On request, versions 52 07x.xxxx1 and 52 02x.xxxxS1 with the blocking time between 1/4 and 1/2 of revolution of the actuator output shaft can be delivered.

The actuators can also be ordered in versions 52 07x.xxxxM and 52 02x.xxxxSM. In this version, blocking of the torque switches is put out.

Position transmitters (actuators MODACT MOA only)

Resistance (potentiometer) position transmitter:

Total resistance 100 ohm with deviation +12 ohm. The highest load 100 mA, the highest direct voltage (against frame) 50 V.

Current position transmitter CPT1AA

Rated output signal	4 20 mA or 20 4 mA
Rated working stroke	0 60 to 0 120 (smoothly adjustable)
Non-linearity incl. gearings	± 2.5 % (for max. stroke 120)
Hysteresis incl. gearings	<5 % (for max. stroke 120)

Non-linearity and hysteresis are related to the value of signal	20 mA.
Loading resistance Rz	0 ohm 500 ohm
Supply voltage	18 28 V DC
Maximum waviness of supply voltage	5 %
Maximum power input of transmitter	560 mW
Insulation resistance	min. 20 Mohm at 50 V DC
Electric resistance of insulation	50 V DC
Temperature of operating environment	-25 °C to +80 °C (short-time up to +110 °C/ 2 h without functionality failure)

Limit value of supply voltage is 30 V. Voltage between the transmitter case and signal conductors must not exceed 50 V.

The user must ensure connection of the two-wire circuit of the current transmitter to electric earth of the linked-up regulator, computer, etc. The connection must be realized at a single point in any part of the circuit outside the electric actuator.

The current transmitter can be either active (feeding from a source built-in in the actuator) or passive (feeding from a source outside the actuator).

Parameters of power supply source ZPT 01AA

Type of operation	continuous
Input voltage	230 V (220 V) +6 % -10 % , 40 60 Hz
Electric power input	up to 2 VA
Output voltage	18 28 V DC, waviness max. 5 %
Output load	one current position transmitter CPT 1AA
Galvanic separation of input and output voltage by a safety transformer	
Rated insulation voltage of input circuit	380 V AC
Rated insulation voltage of low voltage circuits	50 V DC
Temperature of surrounding environment	-25 °C to +80 °C

Mechanical connecting dimensions

The actuators are designed for direct fitting onto the valve. The connection is realized by means of a flange:

Shape B3 according to ISO 5210 (shape E according to DIN 3210)

Shape C according to DIN 3338.

Particular dimensions are given in the annex to this catalogue. Actuators with connection according to the Russian standard GOST are also available.

Electric connecting dimensions

The electric actuators for nuclear power plants are fitted with a hermetic terminal box where all circuits of micro-switches and circuits of the position transmitter are connected to screw terminals. The terminals enable connection of copper conductors of cross-section 2.5 mm² or 1.5 mm².

The terminal boxes are fitted with cable bushings the number and size of which are shown in dimensional sketches of respective types of actuators.

Example of order

In the order, the electric actuators to be installed under the hermetic containment of a nuclear power plant, made of cast iron, with a worm gearbox, maximum tripping torque 250 Nm, shifting speed of the output part (shaft) 40 1/min, and connecting dimensions of the shape C are specified as follows:

Electric actuator **MOA OC 250 – 40**, type number 52 072.3010

Meaning of characters of the type designation:

MOA rotary multirevolution electric actuator for controlling special shut-off valves in nuclear power plants;

OC electric actuator to be installed under the hermetic containment and in boxes in safety systems as well as in systems of normal operation;

250 maximum tripping torque in Nm

40 r.p.m. of the output shaft.

Meaning of the numerical characters of the type number follows from Tables No. 1, 2, 3, 4, 5

4. DESCRIPTION OF ACTUATORS

Actuators MODACT MOA (for parameters see Tables No. 1 and No. 2)

The electric actuators **MOA** use a planet gearbox to reduce revolutions; they are made either of cast iron or aluminium (type number 52 02x.2xxxS or 52 02x.3xxxS).

The actuators are fitted with a three-phase asynchronous electric motor with a short-circuit armature. The motor is naturally cooled; it is fitted with cooling ribs and its own terminal board.

The actuators can be controlled directly by a hand wheel without changing-over (even if the electric motor is running). The hand wheel is fitted with a sprung fixation pin; this pin should be pulled out and turned; after finishing the manual control, it should be pushed back.

Outfit of actuators MOA

Micro-switches two micro-switches for position tripping (PO, PZ);
two micro-switches for position signalling (SO, SZ);
two torque micro-switches (MO, MZ).

All these micro-switches have one opening and one closing contact. Two voltages of different values or phases cannot be connected to contacts of the same micro-switch.

Position transmitter (one of the following variants):

Resistance transmitter 1 x 100 ohm;

Current transmitter CPT1 AA signal 4 20 mA;

Current transmitter CPT1 AA with power supply source signal 4 20 mA.

Position indicator

Local position indicator mechanically connected to the shaft of the resistance transmitter serves for orientational determination of position of the actuator output shaft. The version with the current transmitter does not include the local indicator.

Anti-condensation heater it serves to heat the control area (to prevent condensation of humidity). It is connected to the power supply voltage 230 V.

Actuators MODACT MOA OC

– Actuators MOA OC with worm gearbox (for parameters see Tables No. 3 and No. 4)

These electric actuators MOA OC use a worm gearbox to reduce revolutions; they can be fitted with electric motors AJSI or 1AC and 4AC (type number 52 07x.3xxxS or 52 07x.4xxxS).

The actuators are only made of cast iron; they are fitted with three-phase asynchronous electric motors; these motors do not have their own terminal board and their circuits are connected to the actuator terminal board.

The actuators MOA OC with the worm gearbox are fitted with a change-over lever and manual control that is automatically disconnected when the motor drive is started.

Outfit of actuators MOA OC with worm gearbox

Micro-switches two micro-switches for position tripping (PO, PZ);
two micro-switches for position signalling (SO, SZ);
two torque micro-switches (MO, MZ).

The torque micro-switches have a change-over contact; other micro-switches have one opening and one closing contact. Two voltages of different values or phases cannot be connected to contacts of the same micro-switch.

The special micro-switches are hermetically closed and filled with gas. This guarantees their reliable function even at high temperatures; they are resistant against of radiation dose up to min. 10^6 Gy.

These actuators are fitted neither with the transmitter or position indicator, nor with the anti-condensation heater.

– Actuators MOA OC with planet gearbox (for parameters see Table No. 5)

These electric actuators MOA OC use a planet gearbox to reduce revolutions; they are made either of cast iron or aluminium (type number 52 07x.6xxx or 52 07x.7xxx).

The actuators are fitted with three-phase asynchronous electric motors 1AC and 4AC. The motors are naturally cooled and fitted with their own terminal board.

The actuators can be controlled directly by a hand wheel without changing-over (even if the electric motor is running). The hand wheel is fitted with a sprung fixation pin; this fixation pin should be pulled out and turned; after finishing the manual control, it should be pushed back.

Outfit of actuators MOA OC with planet gearbox

Micro-switches two micro-switches for position tripping (PO, PZ);
two micro-switches for position signalling (SO, SZ);
two torque micro-switches (MO, MZ).

All these micro-switches have one opening and one closing contact. Two voltages of different values or phases cannot be connected to contacts of the same micro-switch.

These actuators are fitted neither with the transmitter or position indicator, nor with the anti-condensation heater.

**Table 1 – Basic technical parameters and characteristics of actuator type MODACT MOA or RBMK;
Cast iron version – first position of the complementary number: 2**

Size of connecting flange	ACTUATOR										
	Type designation	Type code		Torque tripping set range [Nm]	Scope of output volutions setting [revs]	Output shaft shifting rate [1/min]	Gear ratio from output shaft to motor	Gear ratio from output shaft to hand wheel	Max. force on hand wheel N ¹⁾	Min guaranteed M closing at U = 80 % U _{rated} [Nm] ³⁾	Actuator weight including electric meter [kg]
		Basic	Additional								
F 10	MOA 40-9	52 020 . 2x02S		20 – 40	2 – 250	9	1 : 90				35
	MOA 40-15	52 020 . 2x12S		20 – 40	2 – 250	15	1 : 56				35
	MOA 40-25	52 020 . 2x22S		20 – 40	2 – 250	25	1 : 56	100			35
	MOA 40-40	52 020 . 2x32S		20 – 40	2 – 250	40	1 : 34	70			37
	MOA 63-9	52 020 . 2x52S		40 – 63	2 – 250	9	1 : 90				35
	MOA 63-15	52 020 . 2x62S		40v63	2 – 250	15	1 : 56				35
	MOA 63-25	52 020 . 2x72S		40 – 63	2 – 250	25	1 : 56	100			35
	MOA 63-40	52 020 . 2x82S		40 – 63	2 – 250	40	1 : 34	134	57		37
F 14	MOA 160-9	52 021 . 2x42S		63 – 160	2 – 250	9	1 : 90				59
	MOA 160-16	52 021 . 2x52S		63 – 160	2 – 250	16	1 : 56			130	61
	MOA 160-25	52 021 . 2x62S		63 – 160	2 – 250	25	1 : 34				63
	MOA 160-40	52 021 . 2x12S		63 – 160	2 – 250	40	1 : 34	180			65
	MOA 160-63	52 021 . 2x22S		63 – 160	2 – 250	63	1 : 23	120			68
	MOA 125-100	52 021 . 2x32S		63 – 125	2 – 250	100	1 : 14	120	120		68
	MOA 250-9	52 022 . 2x42S		160 – 250	2 – 250	9	1 : 90			220	61
	MOA 250-16	52 022 . 2x52S		160 – 250	2 – 250	16	1 : 56			220	63
	MOA 250-25	52 022 . 2x62S		160 – 250	2 – 250	25	1 : 34			220	65
	MOA 250-40	52 022 . 2x12S		160 – 250	2 – 250	40	1 : 34	190			68
	MOA 220-63	52 022 . 2x22S		160 – 220	2 – 250	63	1 : 23	190	200		68
	MOA 250-80	52 022 . 2x32S		160 – 250	2 – 250	80	1 : 34	150			68
F 16	MOA 400-16	52 024 . 2x92S		250 – 400	2 – 240	16	1 : 42				121
	MOA 400-20	52 024 . 2x02S		250 – 400	2 – 240	20	1 : 42				116
	MOA 400-40	52 024 . 2x12S		250 – 400	2 – 240	40	1 : 23	280			129
	MOA 400-63	52 024 . 2x22S		250 – 400	2 – 240	63	1 : 23	280			127
	MOA 400-100	52 024 . 2x42S		250 – 400	2 – 240	100	1 : 14	340	385		131
	MOA 590-80	52 024 . 2x42S2		400 – 600	2 – 240	80	1 : 18	340			97
	MOA 250-100	52 024 . 2x32S		160 – 250	2 – 240	100	1 : 14	170			127
	MOA 630-16	52 024 . 2x72S		400 – 630	2 – 240	16	1 : 42			560	127
	MOA 630-20	52 024 . 2x82S		400 – 630	2 – 240	20	1 : 42			520	122
	MOA 630-40	52 024 . 2x52S		400 – 630	2 – 240	40	1 : 23	350	590		127
	MOA 630-63	52 024 . 2x62S		400 – 630	2 – 240	63	1 : 23	350	590		129
F 25	MOA 1220-33	52 025 . 2x12S		630 – 1220	2 – 240	33	1 : 21	400	970		210
	MOA 1150-45	52 025 . 2x02S		630 – 1150	2 – 240	45	1 : 23	400	1030		210
	MOA 1220-63	52 025 . 2x22S		630 – 1220	2 – 240	63	1 : 23	400	1080		212
	MOA 800-63	52 025 . 2x32S		630 – 800	2 – 240	63	1 : 23	400			212
F 30	MOA 2000-32	52 026 . 2x02S		1250 – 2000	1 – 100	32	1 : 45	400			318
	MOA 1850-42	52 026 . 2x12S		1000 – 1850	1 – 100	42	1 : 35	400			318

x - to be completed by the customer: 0...connection dimension, shape C } with resistance transmitter
 1...connection dimension, shape E }
 4...connection dimension, shape C } with current transmitter CPT1AA
 5...connection dimension, shape E }

for valves installed in crewed areas of nuclear power plants operating reactors VVER

ELECTRIC MOTOR										
Type designation	Power [kW]	Motor speed [1/min]	Nominal current [A]	Startup current [A]	Efficiency [%]	Power factor [cos γ]	Start up-to-nominal moment ratio	Start up-to-nominal current ratio	Start up torque [Nm]	Motor weight [kg]
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-4AB	0,25	1350	0,77	2,3	60	0,78	1,9	3,0	3,42	4,8
1LA 7073-4AB	0,37	1370	1,05	3,46	65	0,78	1,9	3,3	4,75	6,0
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-4AB	0,25	1350	0,77	2,3	60	0,78	1,9	3,0	3,42	4,8
1LA 7073-4AB	0,37	1370	1,05	3,46	65	0,78	1,9	3,3	4,75	6,0
1LA 7073-6AA	0,25	860	0,79	2,13	60	0,76	2,2	2,7	6,1	5,9
1LA 7080-6AA	0,37	920	1,2	3,72	62	0,72	1,9	3,1	7,3	8,6
1LA 7083-6AA	0,55	910	1,6	5,44	67	0,74	2,1	3,4	12,1	9,8
1LA 7090-4AA	1,1	1415	2,55	11,7	77	0,81	2,3	4,6	17	12,9
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7080-6AA	0,37	920	1,2	3,72	62	0,72	1,9	3,1	7,3	8,6
1LA 7083-6AA	0,55	910	1,6	5,44	67	0,74	2,1	3,4	12,1	9,8
1LA 7090-6AA	0,75	915	2,1	7,77	69	0,76	2,2	3,7	17,2	12,5
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7096-2AA	2,2	2880	4,55	28,6	82	0,85	2,8	6,3	20,4	15,7
1LA 7107-8AB	1,1	680	2,9	9,5	72	0,76	1,8	3,3	27,8	20,5
1LA 7096-6AA	1,1	915	2,9	11	72	0,77	2,3	3,8	26,4	15,7
1LA 7113-6AA	2,2	940	5,2	23,9	78	0,78	2,2	4,6	48,4	27
1LA 7107-4AA	3,0	1420	6,4	35,8	83	0,82	2,7	5,6	54,4	24
1LA 7113-4AA	4,0	1440	8,2	49,2	85	0,83	2,7	6,0	73	31
1LA 7113-4AA	4,0	1440	8,2	49,2	85	0,83	2,7	6,0	73	31
1LA 7107-4AA	3,0	1420	6,4	35,8	83	0,82	2,7	5,6	54,4	24
1LA 7113-8AB	1,5	705	3,9	14,4	74	0,76	1,8	3,7	36,5	26,5
1LA 7106-6AA	1,5	925	3,9	16,4	74	0,75	2,2	4,2	34	21,5
1LA 7113-6AA	2,2	940	5,2	23,9	78	0,78	2,2	4,6	48,4	27
1LA 7113-4AA	4,0	1440	8,2	49,2	85	0,83	2,7	6,0	73	31
1LA 7135-8AB	4,0	690	11,5	45	73	0,68	2,2	3,9	121	52,0
1LA 7134-6AA	5,5	950	12,8	64	83	0,76	2,3	5,0	126,5	54,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0

- 1) The table gives one force from a pair of forces acting on diameter of the hand wheel.
Actuator size – it is determined by size of the connecting flange according to ISO 5210.
- 2) Connection of actuators – via packed bushing to the terminal board.
- 3) The value recommended by the manufacturer to be set as the maximum so that the starting torque would be 1.3x higher than the closing torque at voltage reduced by 20 %.
- 4) Possible order of version: 52 02x.xxxxS1 and 52 02x.xxxxSM
- 5) Rated and starting currents are given for voltage 400 V, 50 Hz. For $U = 380$ V: rated current $I_{n 380} = I_{n 400} \times 400/380$
starting current $I_{z 380} = I_{z 400} \times 400/380$

**Table 2 – Basic technical parameters and characteristics of actuator type MODACT MOA or RBMK;
Aluminium version – first position of the complementary number: 3**

Size of connecting flange	ACTUATOR										
	Type designation	Type code		Torque tripping set range [Nm]	Scope of output volutions setting [revs]	Output shaft shifting rate [1/min]	Gear ratio from output shaft to motor	Gear ratio from output shaft to hand wheel	Max. force on hand wheel N ¹⁾	Min guaranteed M closing at U = 80 % U _{rated} [Nm] ³⁾	Actuator weight including electric meter [kg]
		Basic	Additional								
F 10	MOA 40-9	52 020 . 3x02S		20 – 40	2 – 250	9	1 : 90				25
	MOA 40-15	52 020 . 3x12S		20 – 40	2 – 250	15	1 : 56				25
	MOA 40-25	52 020 . 3x22S		20 – 40	2 – 250	25	1 : 56	100			25
	MOA 40-40	52 020 . 3x32S		20 – 40	2 – 250	40	1 : 34	70			27
	MOA 63-9	52 020 . 3x52S		40 – 63	2 – 250	9	1 : 90				25
	MOA 63-15	52 020 . 3x62S		40 – 63	2 – 250	15	1 : 56				25
	MOA 63-25	52 020 . 3x72S		40 – 63	2 – 250	25	1 : 56	100			25
	MOA 63-40	52 020 . 3x82S		40 – 63	2 – 250	40	1 : 34	134	57		27
F 14	MOA 160-9	52 021 . 3x42S		63 – 160	2 – 250	9	1 : 90				48
	MOA 160-16	52 021 . 3x52S		63 – 160	2 – 250	16	1 : 56			130	51
	MOA 160-25	52 021 . 3x62S		63 – 160	2 – 250	25	1 : 34				43
	MOA 160-40	52 021 . 3x12S		63 – 160	2 – 250	40	1 : 34	180			43
	MOA 160-63	52 021 . 3x22S		63 – 160	2 – 250	63	1 : 23	120			54
	MOA 125-100	52 021 . 3x32S		63 – 125	2 – 250	100	1 : 14	120	120		54
	MOA 250-9	52 022 . 3x42S		160 – 250	2 – 250	9	1 : 90			220	51
	MOA 250-16	52 022 . 3x52S		160 – 250	2 – 250	16	1 : 56			220	53
	MOA 250-25	52 022 . 3x62S		160 – 250	2 – 250	25	1 : 34			220	45
	MOA 250-40	52 022 . 3x12S		160 – 250	2 – 250	40	1 : 34	190			46
	MOA 220-63	52 022 . 3x22S		160 – 220	2 – 250	63	1 : 23	190	200		54
	MOA 250-80	52 022 . 3x32S		160 – 250	2 – 250	80	1 : 34	150			49
F 16	MOA 400-16	52 024 . 3x92S		250 – 400	2 – 240	16	1 : 42				96
	MOA 400-20	52 024 . 3x02S		250 – 400	2 – 240	20	1 : 42				90
	MOA 400-40	52 024 . 3x12S		250 – 400	2 – 240	40	1 : 23	280			94
	MOA 400-63	52 024 . 3x22S		250 – 400	2 – 240	63	1 : 23	280			90
	MOA 400-100	52 024 . 3x42S		250 – 400	2 – 240	100	1 : 14	340	385		97
	MOA 590-80	52 024 . 3x42S2		400 – 600	2 – 240	80	1 : 18	340			97
	MOA 250-100	52 024 . 3x32S		160 – 250	2 – 240	100	1 : 14	170	1 : 31		90
	MOA 630-16	52 024 . 3x72S		400 – 630	2 – 240	16	1 : 42			560	102
	MOA 630-20	52 024 . 3x82S		400 – 630	2 – 240	20	1 : 42			520	97
	MOA 630-40	52 024 . 3x52S		400 – 630	2 – 240	40	1 : 23	350	590		97
	MOA 630-63	52 024 . 3x62S		400 – 630	2 – 240	63	1 : 23	350	590		97
F 25	MOA 1220-33	52 025 . 3x12S		630 – 1220	2 – 240	33	1 : 21	400	970		158
	MOA 1150-45	52 025 . 3x02S		630 – 1150	2 – 240	45	1 : 23	400	1030		158
	MOA 1220-63	52 025 . 3x22S		630 – 1220	2 – 240	63	1 : 23	400	1080		158
	MOA 800-63	52 025 . 3x32S		630 – 800	2 – 240	63	1 : 23	400			158
F 30	MOA 2000-32	52 026 . 3x02S		1250 – 2000	1 – 100	32	1 : 45	400	1 : 67		241
	MOA 1850-42	52 026 . 3x12S		1000 – 1850	1 – 100	42	1 : 35	400	1 : 67		241

x - to be completed by the customer:

- 0...connection dimension, shape C } with resistance transmitter
- 1...connection dimension, shape E } with resistance transmitter
- 4...connection dimension, shape C } with current transmitter CPT1AA
- 5...connection dimension, shape E } with current transmitter CPT1AA
- 6...connection dimension, shape C } with current transmitter CPT1AA with supply source
- 7...connection dimension, shape E } with current transmitter CPT1AA with supply source
- 8...connection dimension, shape C } without transmitter with position indicator
- 9...connection dimension, shape E } without transmitter with position indicator

for valves installed in crewed areas of nuclear power plants operating reactors VVER

ELECTRIC MOTOR										
Type designation	Power [kW]	Motor speed [1/min]	Nominal current [A]	Startup current [A]	Efficiency [%]	Power factor [cos γ]	Start up-to-nominal moment ratio	Start up-to-nominal current ratio	Start up torque [Nm]	Motor weight [kg]
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-4AB	0,25	1350	0,77	2,3	60	0,78	1,9	3,0	3,42	4,8
1LA 7073-4AB	0,37	1370	1,05	3,46	65	0,78	1,9	3,3	4,75	6,0
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-6AA	0,18	850	0,74	1,70	50	0,70	2,1	2,3	4,25	4,9
1LA 7070-4AB	0,25	1350	0,77	2,3	60	0,78	1,9	3,0	3,42	4,8
1LA 7073-4AB	0,37	1370	1,05	3,46	65	0,78	1,9	3,3	4,75	6,0
1LA 7073-6AA	0,25	860	0,79	2,13	60	0,76	2,2	2,7	6,1	5,9
1LA 7080-6AA	0,37	920	1,2	3,72	62	0,72	1,9	3,1	7,3	8,6
1LA 7083-6AA	0,55	910	1,6	5,44	67	0,74	2,1	3,4	12,1	9,8
1LA 7090-4AA	1,1	1415	2,55	11,7	77	0,81	2,3	4,6	17	12,9
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7080-6AA	0,37	920	1,2	3,72	62	0,72	1,9	3,1	7,3	8,6
1LA 7083-6AA	0,55	910	1,6	5,44	67	0,74	2,1	3,4	12,1	9,8
1LA 7090-6AA	0,75	915	2,1	7,77	69	0,76	2,2	3,7	17,2	12,5
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7096-4AA	1,5	1420	3,4	18	79	0,81	2,4	5,3	24,2	15,6
1LA 7096-2AA	2,2	2880	4,55	28,6	82	0,85	2,8	6,3	20,4	15,7
1LA 7107-8AB	1,1	680	2,9	9,5	72	0,76	1,8	3,3	27,8	20,5
1LA 7096-6AA	1,1	915	2,9	11	72	0,77	2,3	3,8	26,4	15,7
1LA 7113-6AA	2,2	940	5,2	23,9	78	0,78	2,2	4,6	48,4	27
1LA 7107-4AA	3,0	1420	6,4	35,8	83	0,82	2,7	5,6	54,4	24
1LA 7113-4AA	4,0	1440	8,2	49,2	85	0,83	2,7	6,0	73	31
1LA 7113-4AA	4,0	1440	8,2	49,2	85	0,83	2,7	6,0	73	31
1LA 7107-4AA	3,0	1420	6,4	35,8	83	0,82	2,7	5,6	54,4	24
1LA 7113-8AB	1,5	705	3,9	14,4	74	0,76	1,8	3,7	36,5	26,5
1LA 7106-6AA	1,5	925	3,9	16,4	74	0,75	2,2	4,2	34	21,5
1LA 7113-6AA	2,2	940	5,2	23,9	78	0,78	2,2	4,6	48,4	27
1LA 7113-4AA	4,0	1440	8,2	49,2	85	0,83	2,7	6,0	73	31
1LA 7135-8AB	4,0	690	11,5	45	73	0,68	2,2	3,9	121	52,0
1LA 7134-6AA	5,5	950	12,8	64	83	0,76	2,3	5,0	126,5	54,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0
1LA 7133-4AA	7,5	1455	15,2	101	87	0,82	2,7	6,7	132	50,0

- 1) The table gives one force from a pair of forces acting on diameter of the hand wheel.
Actuator size – it is determined by size of the connecting flange according to ISO 5210.
- 2) Connection of actuators – via packed bushing to the terminal board.
- 3) The value recommended by the manufacturer to be set as the maximum so that the starting torque would be 1.3x higher than the closing torque at voltage reduced by 20 %.
- 4) Possible order of version: 52 02x.xxxxS1 and 52 02x.xxxxSM
- 5) Rated and starting currents are given for voltage 400 V, 50 Hz. For U = 380 V: rated current $I_{n 380} = I_{n 400} \times 400/380$
starting current $I_{z 380} = I_{z 400} \times 400/380$

Table 3 – Basic technical parameters and characteristics of actuators MODACT MOA OC operating reactors vver or rbmk; cast iron version, worm gearbox, electric

Size of connecting flange	ACTUATOR								
	Type designation	Type code	Torque tripping set range [Nm]	Scope of output volutions setting [revs]	Gear ratio from output shaft to motor	Gear ratio from output shaft to hand wheel	Max. force on hand wheel N ¹⁾	Start up torque [Nm]	Actuator weight including electric meter [kg]
		Ba sicAddi tional							
F 10	MOA OC 40-16	5 2 070.3x40	20 – 40	16	1:89,7	1:1	160	106	44,7
	MOA OC 40-25	5 2 070.3x00		25	1:57,3			66	44,7
	MOA OC 32-40	5 2 070.3x10	20 – 32	40	1:36,1			43	44,7
	MOA OC 40-63	5 2 070.3x20	20 – 40	63	1:22,5			67	54,5
	MOA OC 40-100 ⁺)	5 2 070.3x30		100	1:14,5		55	54,5	
	MOA OC 50-25	5 2 070.3x50	25 – 50	25	1:57,3		250	106	44,7
	MOA OC 63-25	5 2 070.3x60	25 – 63	25	1:57,3			169	54,5
	MOA OC 63-40	5 2 070.3x70		40	1:36,1			106	54,5
F 14	MOA OC 160-25	5 2 071.3x00	63 – 160	25	1:56,1	1:1		222	265
	MOA OC 130-40	5 2 071.3x40	63 – 130	40	1:36,1		170		75
	MOA OC 160-40	5 2 071.3x10	63 – 160	40	1:36,1		340		94
	MOA OC 160-63	5 2 071.3x20		63	1:23,2		210		94
	MOA OC 160-100 ⁺)	5 2 071.3x30	100	1:14,9	220		94		
	MOA OC 250-40	5 2 072.3x10	125 – 250	40	1:36,1		347	330	94
	MOA OC 250-63	5 2 072.3x20		63	1:23,2			420	108
	MOA OC 250-100 ⁺)	5 2 072.3x30		100	1:13,8			340	108
F 16	MOA OC 500-40	5 2 074.3x00		250 – 500	40	1:36,5		1:1	650
	MOA OC 630-40	5 2 074.3x10	250 – 630	40	1:36,5	1100	212		
	MOA OC 630-63	5 2 074.3x20		63	1:23,7	823	212		
	MOA OC 500-100 ⁺)	5 2 074.3x40	250 – 500	100	1:14,5	650	212		
	MOA OC 360-120 ⁺)	5 2 074.3x50	250 – 360	120	1:11,9	470	212		

x... to be added by the customer:

0 ... connecting dimension, shape C
1 ... connecting dimension, shape E

+) non-self-locking worm

**for shut-off valves installed under the hermetic containment of nuclear power plants
motors AJSI, voltage 400 V, 50 Hz**

ELECTRIC MOTOR									
Type designation	Power [kW]	Motor speed [1/min]	Efficiency [%]	Power factor [cos γ]	Start up-to-nominal moment ratio	Start up-to-nominal current ratio	Nominal current [A]	Motor weight [kg]	Start up torque [Nm]
AJSI 89B-4Z	0,12	1425	48,6	0,36	8,4	3,6	1,0	9,5	4,0
AJSI 89B-4Z	0,12	1425	48,6	0,36	8,4	3,6	1,0	9,5	4,0
AJSI 89B-4Z	0,12	1425	48,6	0,36	8,4	3,6	1,0	9,5	4,0
AJSI 116B-4Z	0,3	1455	64	0,36	7,8	4,8	1,9	19,5	10
AJSI 116B-4Z	0,3	1455	64	0,36	7,8	4,8	1,9	19,5	10
AJSI 89B-4Z	0,12	1425	48,6	0,36	8,4	3,6	1,0	9,5	4,0
AJSI 116B-4Z	0,3	1455	64	0,36	7,8	4,8	1,9	19,5	10
AJSI 116B-4Z	0,3	1455	64	0,36	7,8	4,8	1,9	19,5	10
AJSI 116C-4Z	0,55	1403	66	0,43	6,2	4,5	2,8	21	16
AJSI 116C-4Z	0,55	1403	66	0,43	6,2	4,5	2,8	21	16
AJSI 145B-4Z	1,2	1425	76,3	0,51	6,7	6,2	4,4	40	32
AJSI 145B-4Z	1,2	1425	76,3	0,51	6,7	6,2	4,4	40	32
AJSI 145B-4Z	1,2	1425	76,3	0,51	6,7	6,2	4,4	40	32
AJSI 145B-4Z	1,2	1425	76,3	0,51	6,7	6,2	4,4	40	32
AJSI 180B-4Z	2,2	1386	80,5	0,59	6,5	5,7	6,5	54	63
AJSI 180B-4Z	2,2	1386	80,5	0,59	6,5	5,7	6,5	54	63
AJSI 180B-4Z	2,2	1386	80,5	0,59	6,5	5,7	6,5	54	63
AJSI 215B-4Z	3,7	1432	85,8	0,64	6,2	8,0	9,8	93	120
AJSI 215B-4Z	3,7	1432	85,8	0,64	6,2	8,0	9,8	93	120
AJSI 215B-4Z	3,7	1432	85,8	0,64	6,2	8,0	9,8	93	120
AJSI 215B-4Z	3,7	1432	85,8	0,64	6,2	8,0	9,8	93	120

Notes:

- 1) The table gives one force from a pair of forces acting on circumference of the hand wheel.
Actuator size – it is determined by size of the connecting flange according to ISO 5210.
- 2) Range of setting the working stroke for all actuators is 2 – 250 rev.
- 3) Connection of actuators – via packed bushing to the terminal board.
- 4) Rated current is given for supply voltage 400 V. For supply voltage 380 V: $I_n 380 = I_n 400 \times 400/380$.

Table 4 – Basic technical parameters and characteristics of actuators MODACT MOA OC operating reactors VVER or RBMK; cast iron version, worm gearbox, electric

Size of connecting flange	ACTUATOR								
	Type designation	Type code	Torque tripping set range [Nm]	Scope of output volutions setting [revs]	Gear ratio from output shaft to motor	Gear ratio from output shaft to hand wheel	Max. force on hand wheel N ¹⁾	Start up torque [Nm]	Actuator weight including electric meter [kg]
		Basic Additonal							
F 10	MOA OC 40-16	52 070.4x40	20 – 40	16	1:89,7	1:1	160	72	45,5
	MOA OC 40-25	52 070.4x00		25	1:57,3			56	
	MOA OC 30-40	52 070.4x10	20 – 30	40	1:36,1		120	40	49,0
	MOA OC 30-63	52 070.4x20		63	1:22,5			38	
	MOA OC 63-25	52 070.4x60	25 – 63	25	1:57,3		250	83	
	MOA OC 45-40	52 070.4x70	25 – 45	40	1:36,1		180	58	
F 14	MOA OC 130-25	52 071.4x00	63 – 130	25	1:56,1	1:1	222	170	75
	MOA OC 160-40	52 071.4x10	63 – 160	40	1:36,1			470	79
	MOA OC 160-63	52 071.4x20		63	1:23,2			320	79,5
	MOA OC 160-100 ⁺⁾¹⁾	52 071.4x30		100	1:14,9		220		
	MOA OC 250-40	52 072.4x10		125 – 250	40		1:36,1	347	470
	MOA OC 250-63	52 072.4x20	63		1:23,2		520		
	MOA OC 250-100 ⁺⁾¹⁾	52 072.4x30	100		1:13,8		350		
F 16	MOA OC 500-40	52 074.4x00	250 – 500	40	1:36,5	1:1	692	800	138
	MOA OC 630-40	52 074.4x10	250 – 630				63	1:23,7	875
	MOA OC 630-63	52 074.4x20		100	1:14,5				
	MOA OC 450-100 ⁺⁾¹⁾	52 074.4x40		250 – 450	120		1:11,9	500	530

x... to be added by the customer:

0 ... connecting dimension, shape C
1 ... connecting dimension, shape E

+) non-self-locking worm

**for shut-off valves installed under the hermetic containment of nuclear power plants
motors 1AC, 4AC**

ELECTRIC MOTOR									
Type designation	Power [kW]	Motor speed [1/min]	Efficiency [%]	Power factor [cos γ]	Start up-to-nominal moment ratio	Start up-to-nominal current ratio	Nominal current [A]	Motor weight [kg]	Start up torque [Nm]
1AC-56A4A5B3	0,18	1371	48	0,60	2,2	5	0,95	10,3	2,54
1AC-63B4A5B3	0,25	1350	50	0,57			1,2	13,8	3,72
4AC71A4A5	0,63	1410	63	0,65	1,8	5	2,3		
4AC80B4A5	1,7	1400	64		2,5		6,2	25,5	30
4AC100S4A5	3,2	1410	75	0,76	2,3	6	7,9	39,5	49
4AC100L4A5	4,25		77		2,6		10,2	45	76,5

Notes:

- 1) The table gives one force from a pair of forces acting on circumference of the hand wheel.
Actuator size – it is determined by size of the connecting flange according to ISO 5210.
- 2) Range of setting the working stroke for all actuators is 2 – 250 rev.
- 3) Connection of actuators – via packed bushing to the terminal board.
- 4) Rated current is given for supply voltage 400 V. For supply voltage 380 V: $I_n 380 = I_n 400 \times 400/380$.

**Table 5 – Basic technical parameters and characteristics of actuators type MODACT MOA OC
ting reactors VVER or RBMK; planet gearbox, electric motors 1AC, 4AC, aluminium
version type no. 52 07x.6xxx (at the first position after the full stop in the type number**

Size of connecting flange	ACTUATOR									
	Type designation	Type code		Torque tripping set range [Nm]	Scope of output volutions setting [revs]	Gear ratio from output shaft to motor	Gear ratio from output shaft to hand wheel	Max. force on hand wheel N ¹⁾	Start up torque [Nm]	Actuator weight including electric meter [kg]
		Ba sic	Addi tional							
F 10	MOA OC 40-16	52 070.7x40	20 – 40	16	1:90	1:27	100	139	30	
	MOA OC 40-25	52 070.7x00		25	1:56			86		
	MOA OC 32-40	52 070.7x10	20 – 32	40	1:34			70		42
	MOA OC 63-25	52 070.7x60	40 – 63	25	1:56			100	86	
	MOA OC 45-40	52 070.7x70	25 – 45	40	1:34			134	73	34
F 14	MOA OC 160-25	52 071.7x00	63 – 160	25	1:56	1:27	120	400	64	
	MOA OC 160-40	52 071.7x10		40	1:36			350		
	MOA OC 160-70	52 071.7x20		70	1:20			250		
	MOA OC 160-100	52 071.7x30		100	1:14			630	62,5	
	MOA OC 250-25	52 072.7x00	160 – 250	25	1:56			150	600	64
	MOA OC 250-40	52 072.7x10		40	1:36				400	
	MOA OC 250-70	52 072.7x20		70	1:20					
F 16	MOA OC 400-33	52 074.7x00	250 – 400	33	1:42	1:31	280	750	93	
	MOA OC 400-63	52 074.7x10		63	1:23			700	106	
	MOA OC 400-95	52 074.7x20		95	1:15			780	111	
	MOA OC 630-33	52 074.7x40	400 – 630	33	1:42			350	1200	106
	MOA OC 630-63	52 074.7x50		63	1:23				1000	111

x... to be added by the customer: 0 ... connecting dimension, shape C
1 ... connecting dimension, shape E

for shut-off valves installed under the hermetic containment of nuclear power plants operation type no. 52 07x.7xxx (it is given in the type number column of this table) or cast iron column, the numeral 7 is replaced by 6)

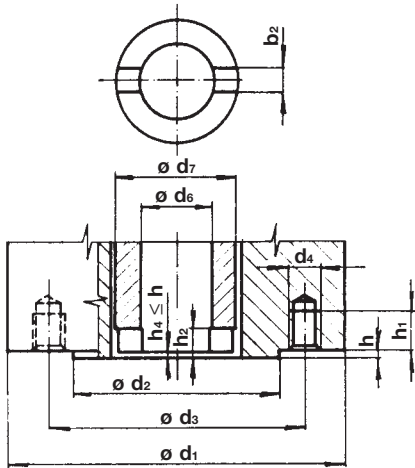
ELECTRIC MOTOR										
Type designation	Power [kW]	Motor speed [1/min]	Efficiency [%]	Power factor [cos γ]	Start up-to-nominal moment ratio	Start up-to-nominal current ratio	Nominal current [A]	Motor weight [kg]	Start up torque [Nm]	
1AC-56A4A5B3	0,18	1371	48	0,60	2,2	5	0,95	10,3	2,54	
1AC-63B4A5B3	0,25	1350	50	0,57			1,2	13,8	3,72	
4AC80A4A5	1,3	1380	62	0,70	2,2	5		24	20,5	
4AC80B4A5	1,7	1400	64	0,65	2,5		6,2	22,5	30	
4AC80A4A5	1,3	1380	62	0,70	2,2			24	20,5	
4AC80B4A5	1,7	1400	64	0,65	2,5		6,2	22,5	30	
4AC100S4A5	3,2	1410	75	0,76	2,3		6	7,9	39,5	49
4AC100L4A5	4,25		77		2,6			10,2	45	76,5
4AC100S4A5	3,2		75		2,3	7,9		39,5	49	
4AC100L4A5	4,25		77		2,6	10,2		45	76,5	

Notes:

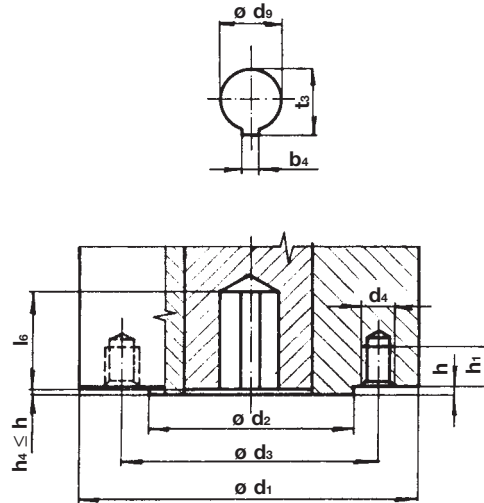
- 1) The table gives one force from a pair of forces acting on circumference of the hand wheel.
Actuator size – it is determined by size of the connecting flange according to ISO 5210.
- 2) Range of setting the working stroke for all actuators is 2 – 250 rev.
- 3) Connection of actuators – via packed bushing to the terminal board.
- 4) Rated current is given for supply voltage 400 V. For supply voltage 380 V: $I_n 380 = I_n 400 \times 400/380$.

Connecting dimensions of electric actuators **MODACT MOA** and **MOA OC**

Shape C (according DIN 3338)

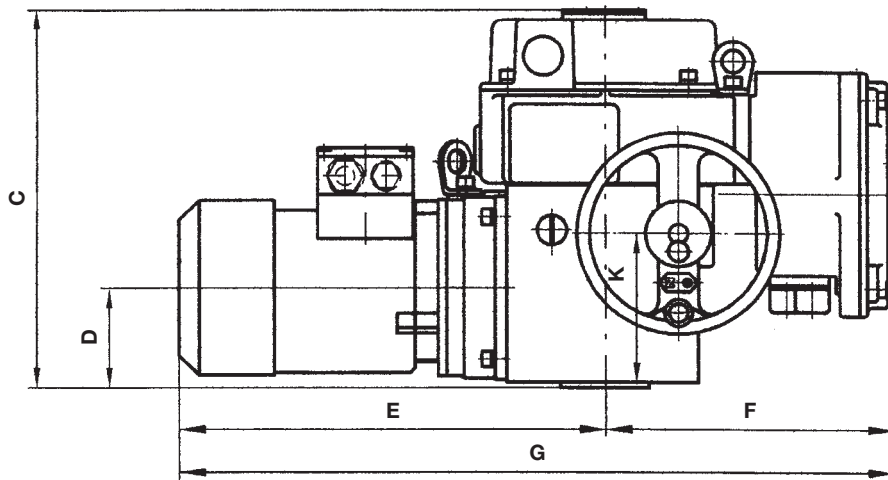
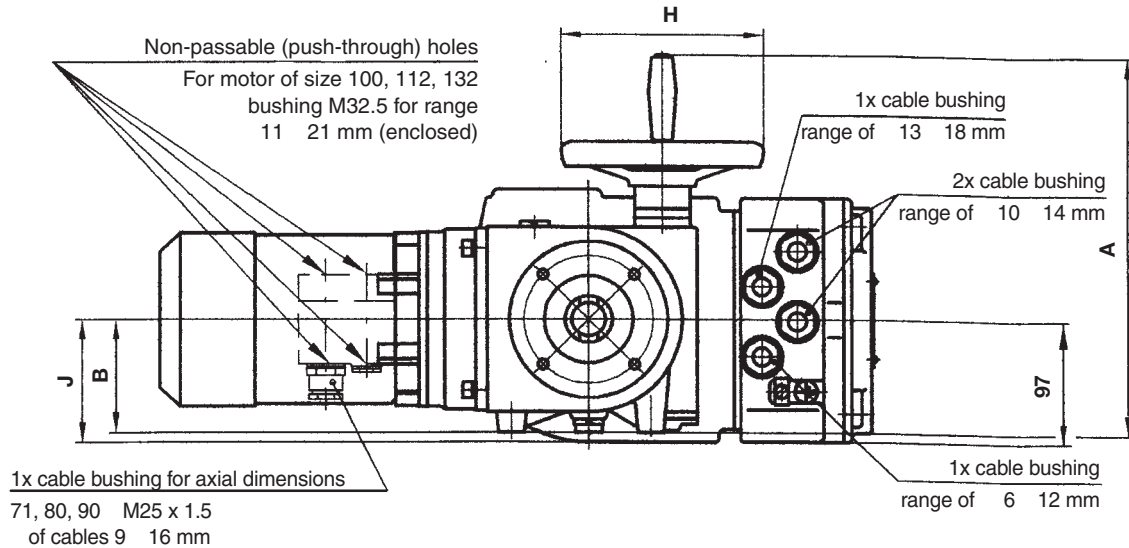


Shape B3 according ISO 5210
shape E according DIN 3210)



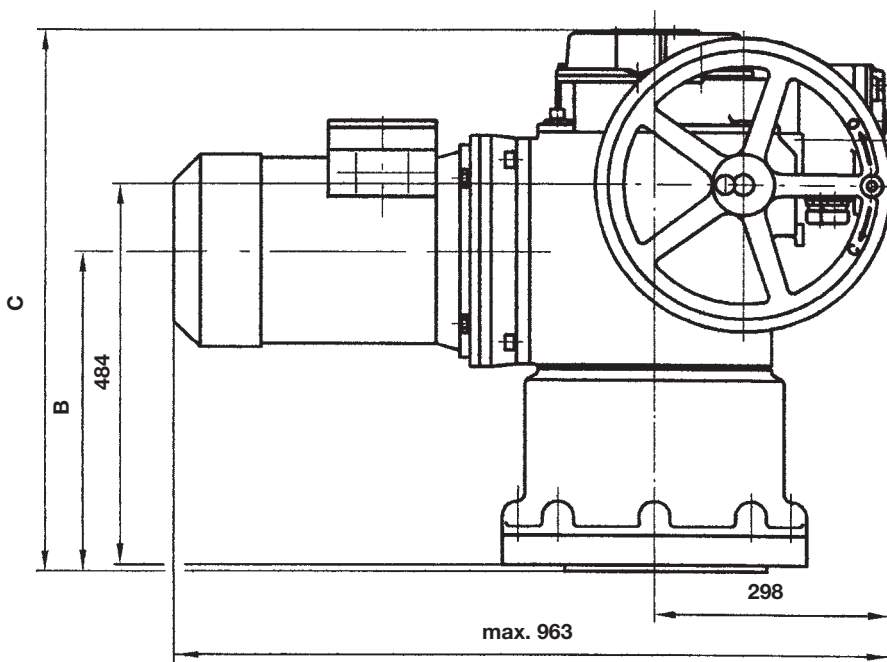
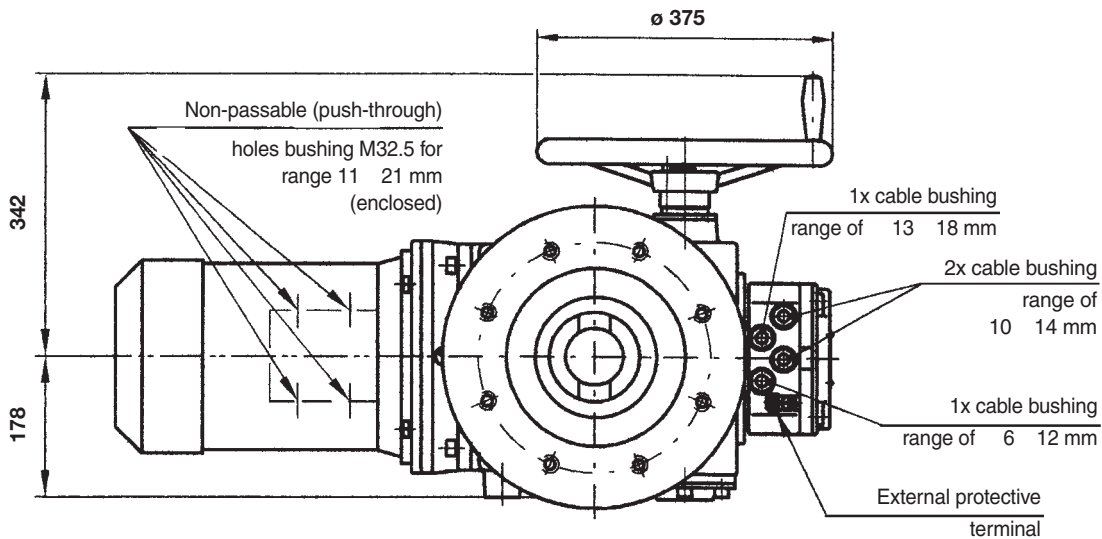
Shape	Dimension	Type number				
		52 020 52 070	52 021, 52 071 52 022, 52 072	52 024 52 074	52 025	52 026
Common values for both shapes C, B3 (E)	d_1 orientation values	125	175	210	300	350
	$d_2 f_8$	70	100	130	200	230
	d_3	102	140	165	254	298
	d_4	M 10	M 16	M 20	M 16	M 20
	number of threaded holes	4	4	4	8	8
	h_1 min. $1,25 d_4$	12,5	20	25	20	25
	h max.	3	4	5	5	5
Values for shape C	d_7	42	60	80	100	120
	h_2	10	12	15	16	18
	b_2 H11	14	20	24	30	40
	d_6	28	41,5	53	72	72
Values for shape B3 (E)	d_9 H8	20	30	40	50	60
	l_6 min.	55	76	97	117	127
	t_3	22,8	33,3	43,3	53,8	64,4
	b_4 Js9	6	8	12	14	18
The dimensions d_6 and l_6 must not be smaller than stated in the table. The dimensions are given in mm.						

Dimensional sketch of actuators **MODACT MOA** and **MOA OC**,
 aluminium version Type Nos. 52 020.3xxxS 52 025.3xxxS
 Type Nos. 52 070.7xxx 52 074.7xxx (planet gearbox)
 cast iron version Type Nos. 52 070.6xxx 52 074.6xxx (planet gearbox)



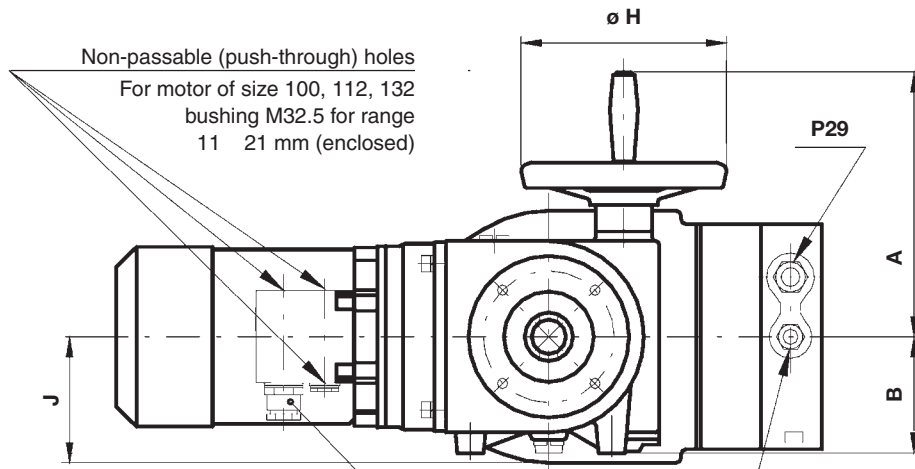
Type designation	A	B	C	D	E	F	G	H	J	K
52 020.3xxxS 52 070.6xxx, 52 070.7xxx	305	90	300	78	334	228	562	160	99	120
52 021.3xxxS, 52 022.3xxxS 52 071.6xxx, 52 072.6xxx 52 071.7xxx, 52 072.7xxx	376	120	328	92	436	228	664	200	-	144
52 024.3xxxS 52 074.6xxx, 52 074.7xxx	455	145	382	123	519	258	777	250	-	190
52 025.3xxxS	540	178	442	153	598	298	896	375	-	234

Dimensional sketch of electric actuators **MODACT MOA**
aluminium version Type No. 52 026.3xxxS

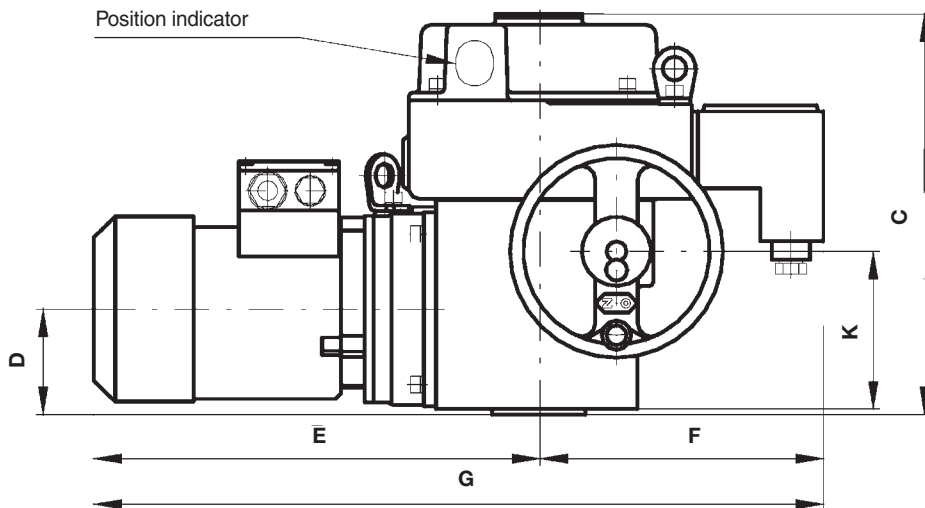


Type designation	B	C
52 026.3xxxS shape of connecting A	463	750
52 026.3xxxS shape of connecting B, C, D, E	418	705

Dimensional sketch of electric actuators **MODACT MOA**
 cast iron version Type Nos. 52 020.2xxxS 52 025.2xxxS

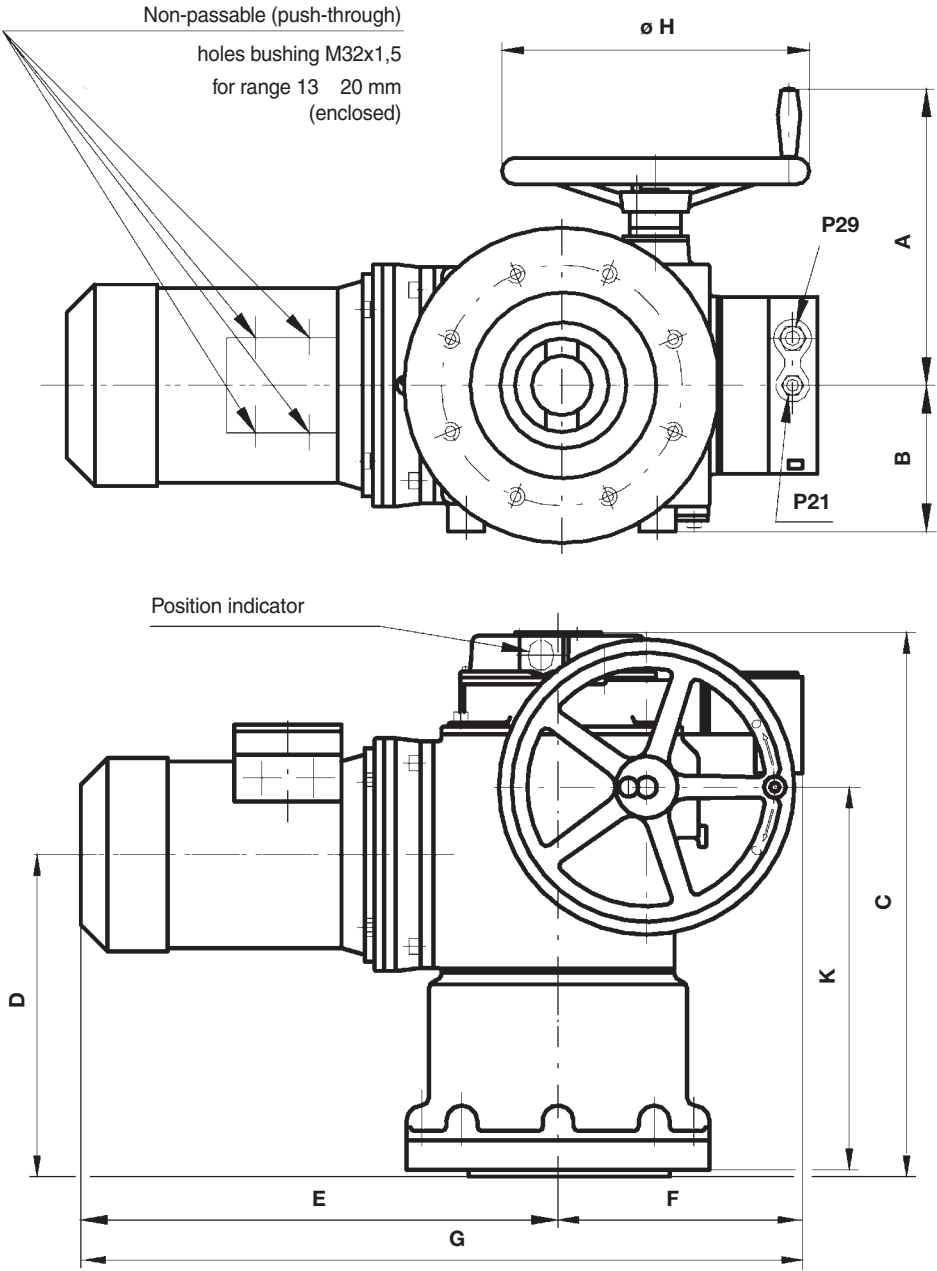


1x cable bushing for axial dimensions
 71, 80, 90 M25 x 1.5
 of cables 9 - 16 mm



Type designation	Dimension [mm]									
	A	B	C	D	E	F	G	H	J	K
52 020.2xxxS	200	90	310	80	310	165	475	160	99	120
52 021.2xxxS 52 022.2xxxS	240	120	320	92	408	230	638	224		144
52 024.2xxxS	290	145	380	123	553	256	809	300		190
52 025.2xxxS	345	178	440	153	665	290	955	375		234

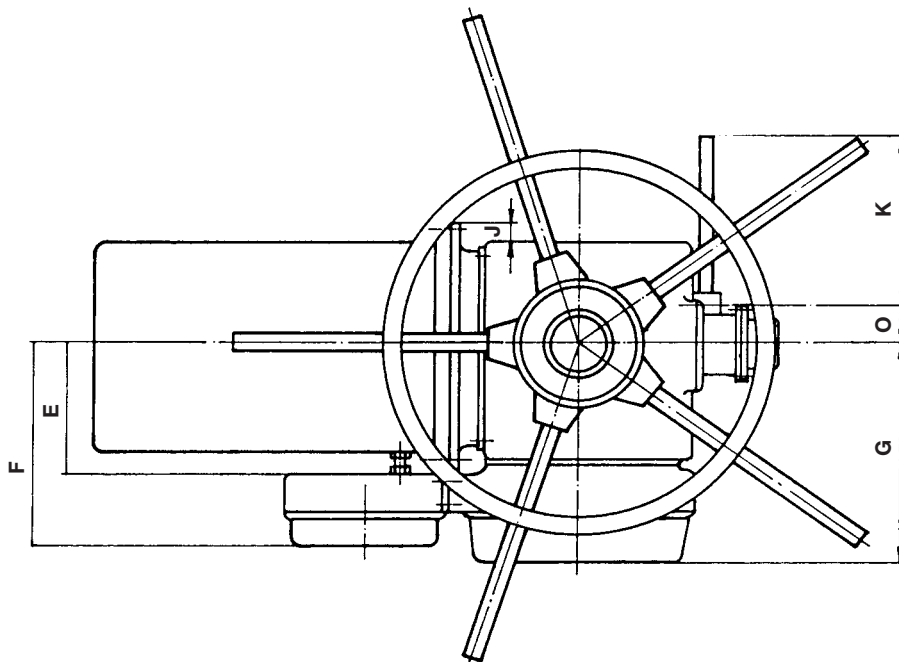
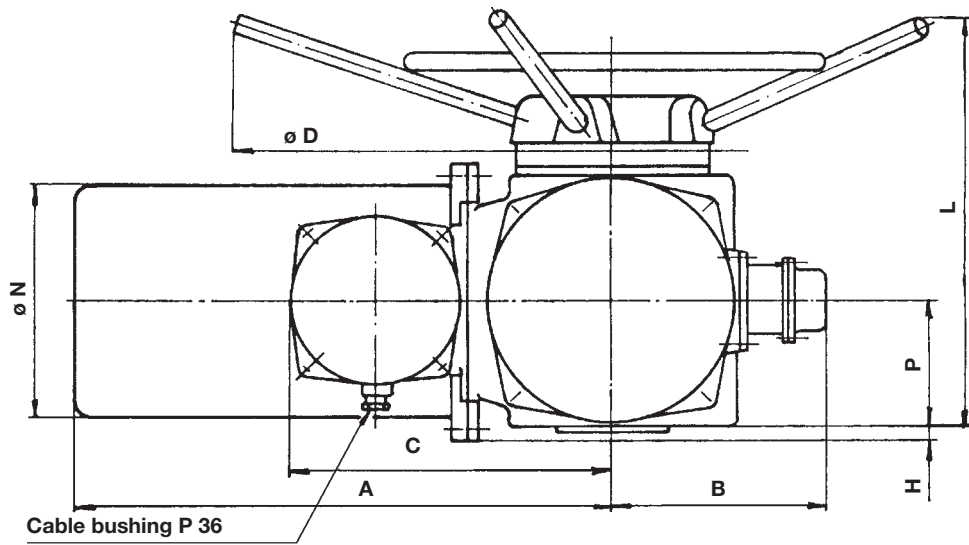
Dimensional sketch of electric actuators **MODACT MOA**
 cast iron version Type No. 52 026.2xxxS



Type designation	Dimension [mm]								
	A	B	C	D	E	F	G	H	K
52 026.2xxxS	345	178	690	415	665	290	955	375	450

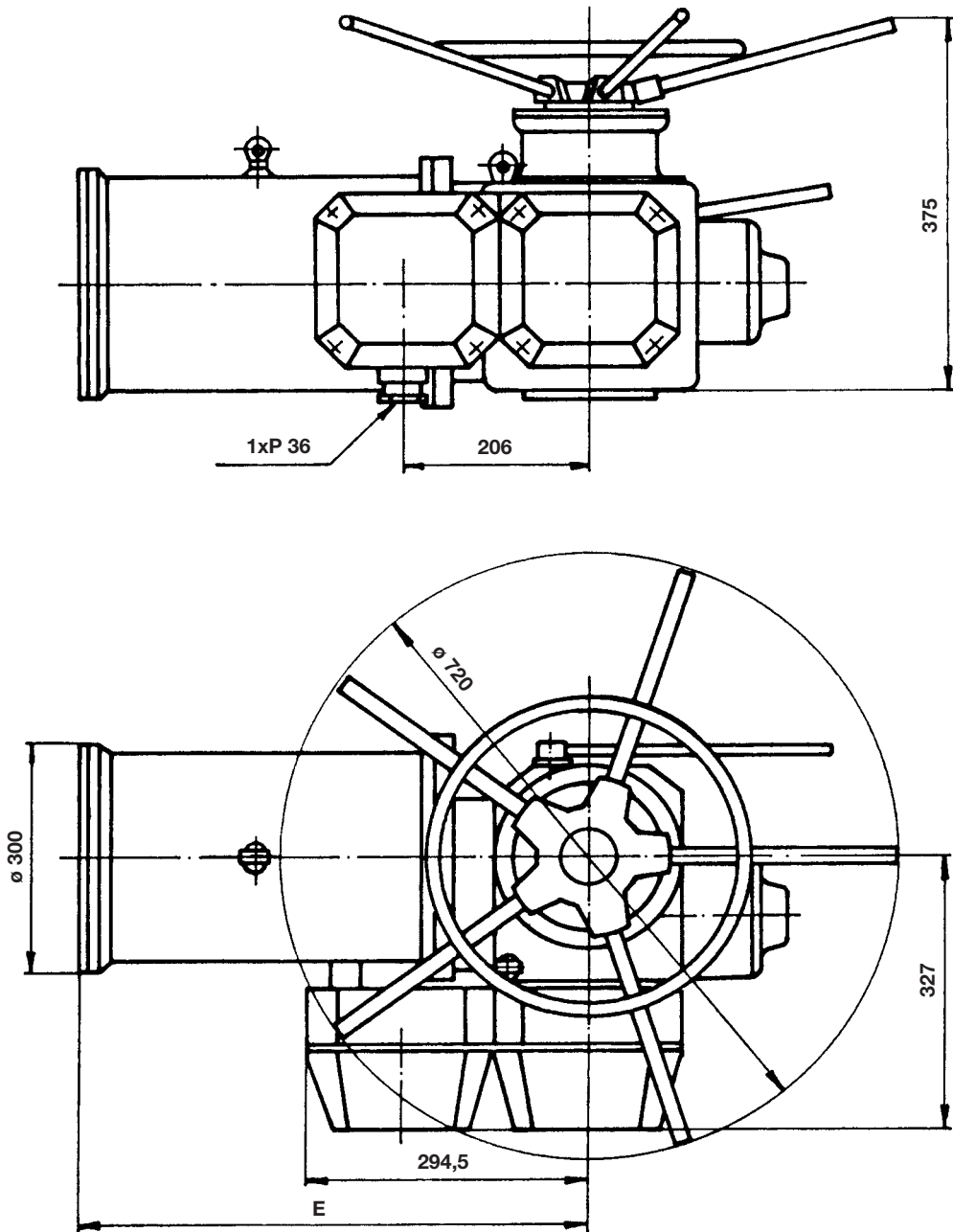
Dimensional sketch of electric actuators **MODACT MOA OC**

Type Nos. 52 070.3xxx, 52 071.3xxx, 52 072.3xxx (worm gearbox, cast iron version)



Type number	Dimension [mm]													
	A	B	C	D	E	F	G	H	J	K	L	N	O	P
52 070	365	185	290	250	100	250	240	-	-	150	255	153	85	90
52 071 52 072	488	206	290	720	128	295	252	21	23	240	300	225	100	105

Dimensional sketch of electric actuators **MODACT MOA OC**
 Type Nos. 52 074.3xxx (worm gearbox, cast iron version)

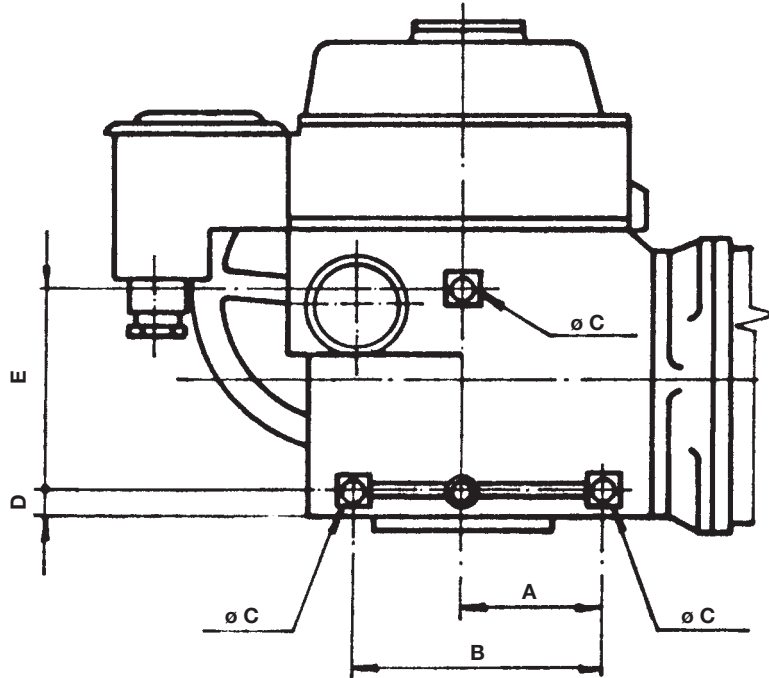


Type number	E
52 074.3x00	573
52 074.3x10, 52 074.3x20, 52 074.3x40, 52 074.3x50	620

Holes for fixing actuators to structure

Actuators **MODACT MOA** Type Nos. 52 020.xxxxS 52 026.xxxxS

Actuators **MODACT MOA OC** with planet gearbox and electric motors 1AC a 4 AC
(Type Nos. 52 070.7xxx 52 074.7xxx and Type Nos. 52 070.6xxx 52 074.6xxx)



	Type number				
	52 020.xxxxS 52 070.7xxx	52 021.xxxxS, 52 071.7xxx 52 022.xxxxS, 52 072.7xxx	52024.xxxxS 52 074.7xxx	52 025.xxxxS	52 026.xxxxS
Maximum force for accessory fixing of actuator	1000 N	2000 N	4000 N	6000 N	6000 N

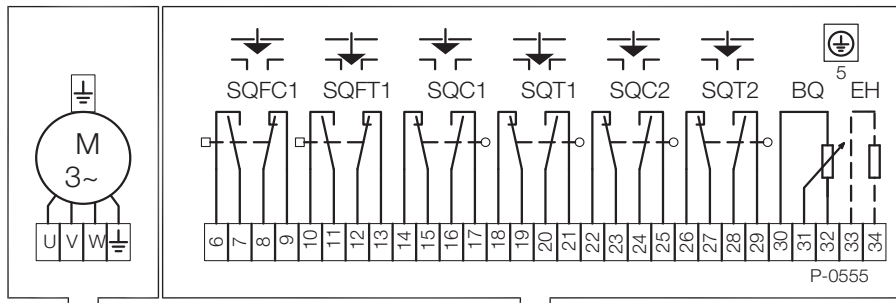
Type number	Dimension [mm]				
	A	B	C	D	E
52 020, 52 070.6xxx, 52 070.7xxx	61	110	M 10	16	120
52 021, 52 022, 52 071.6xxx, 52 072.6xxx 52 071.7xxx, 52 072.7xxx	90	160	M 12	21	140
52 024, 52 074.6xxx, 52 074.7xxx	110	210	M 16	23	200
52 025	120	240	M 20	47	220
52 026	120	240	M 20	47	220

Note:

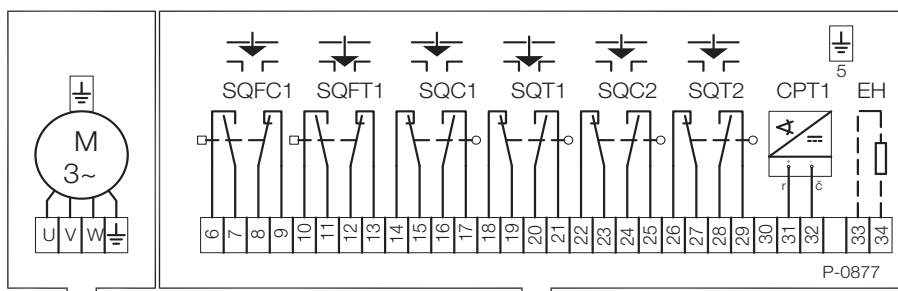
Total force higher than stated in the table must not act on the fixing elements of the actuator $\varnothing C$.

Diagram of internal electric wiring of actuators **MODACT MOA**

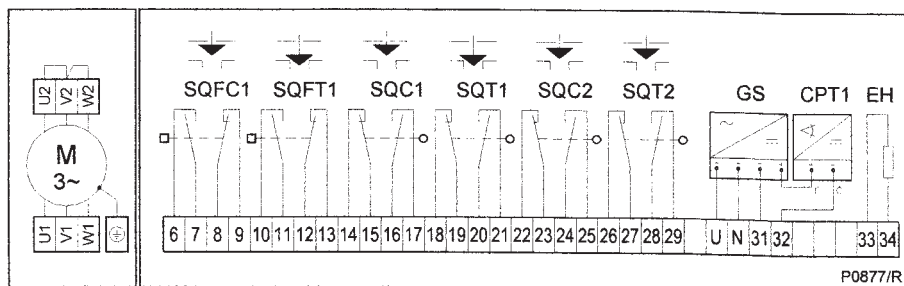
Position transmitter: resistance 100 ohm



Position transmitter: current 4 – 20 mA



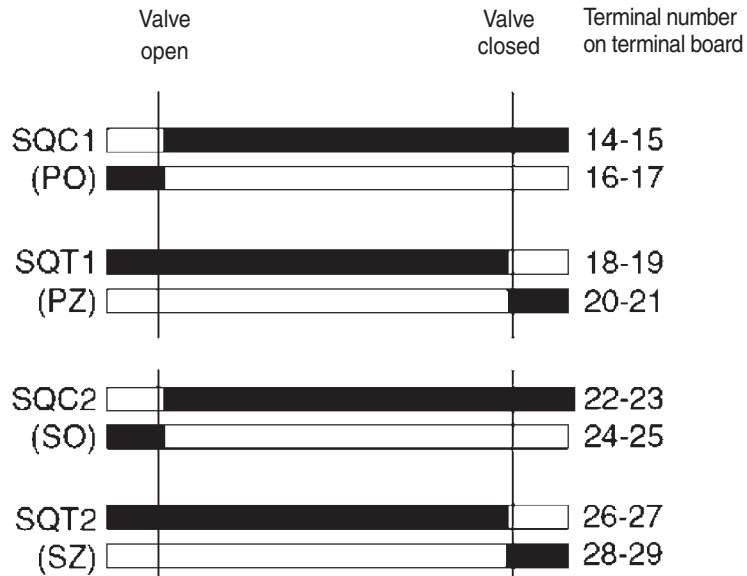
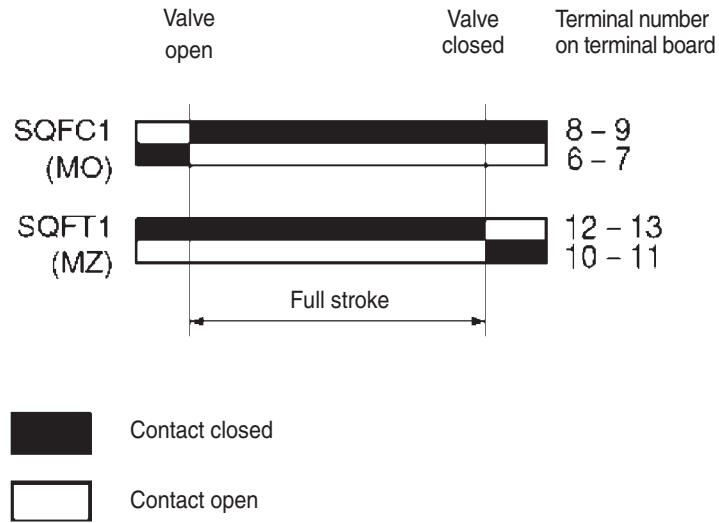
Position transmitter: current 4 – 20 mA with feeding source



LEGEND:

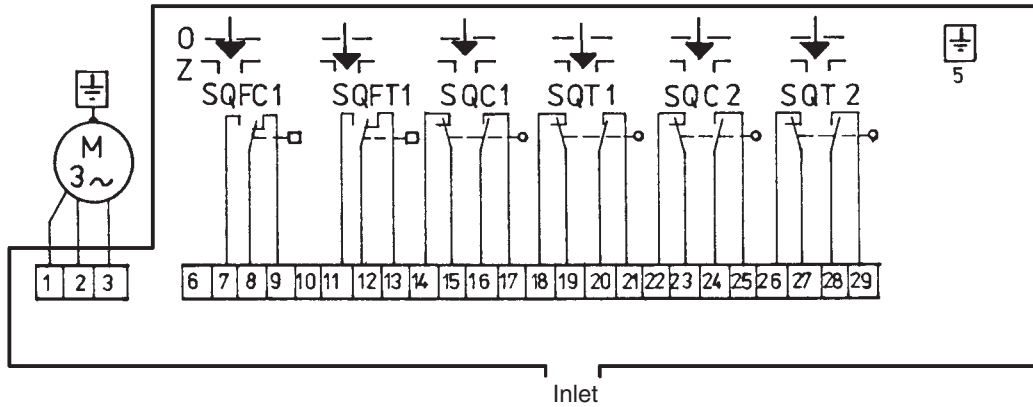
SQFC1 (MO)	torque-limit switch "open"	BQ	remote transmitter (potentiometer)
SQFT1 (MZ)	torque-limit switch "close"	M	three-phase asynchronous motor
SQC1 (PO)	position-limit switch "open"	EH	heating resistance
SQT1 (PZ)	position-limit switch "close"	CPT1	current transmitter
SQC2 (SO)	position signalling switch "open"	GS	feeding source
SQT2 (SZ)	position signalling switch "close"		

Operation diagram of torque, position-limit and signalling units
(actuator **MODACT MOA**)



The micro-switches can be used as single-circuit only. Two voltages of different magnitudes or phases must not be connected to contacts of the same micro-switch. The contacts of micro-switches are drawn in the intermediate position.

Diagram of internal electric wiring of actuators MODACT MOA OC
 cast iron version, worm gearbox, with electric motors AJSI or 1AC, 4AC
 Type Nos. 52 070.3xxx 52 074.3xxx or Type Nos. 52 070.4xxx 52 074.4xxx



Contacts are drawn in intermediate position of the actuator output shaft

LEGEND:

- SQFC1 (MO) torque-limit switch "open"
- SQFT1 (MZ) torque-limit switch "close"
- SQC1 (PO) position-limit switch "open"
- SQT1 (PZ) position-limit switch "close"
- SQC2 (SO) position signalling switch "open"
- SQT2 (SZ) position signalling switch "close"
- M three-phase asynchronous motor

Operation diagram of torque, position-limit and signalling units

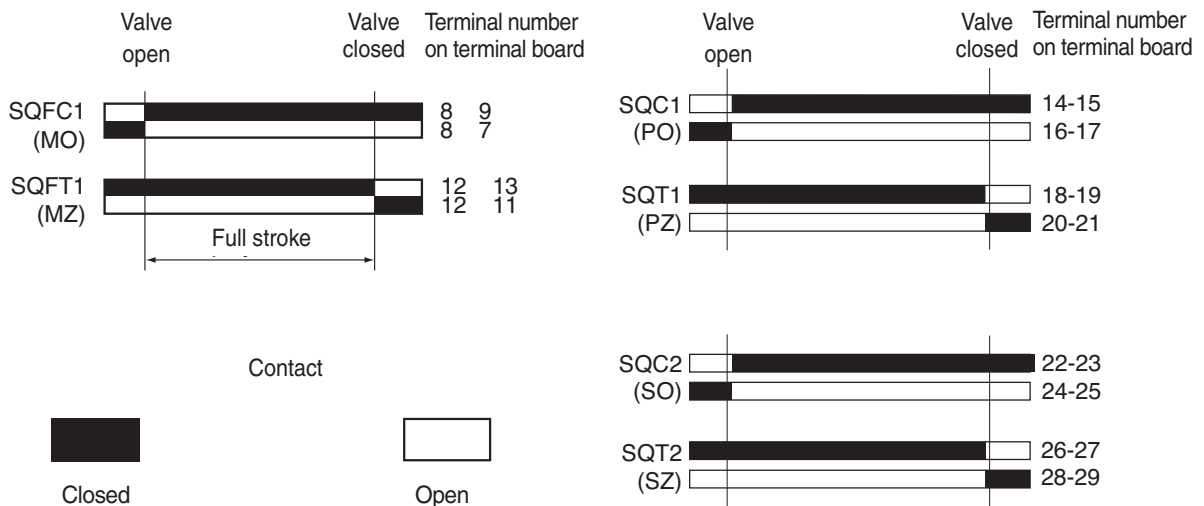
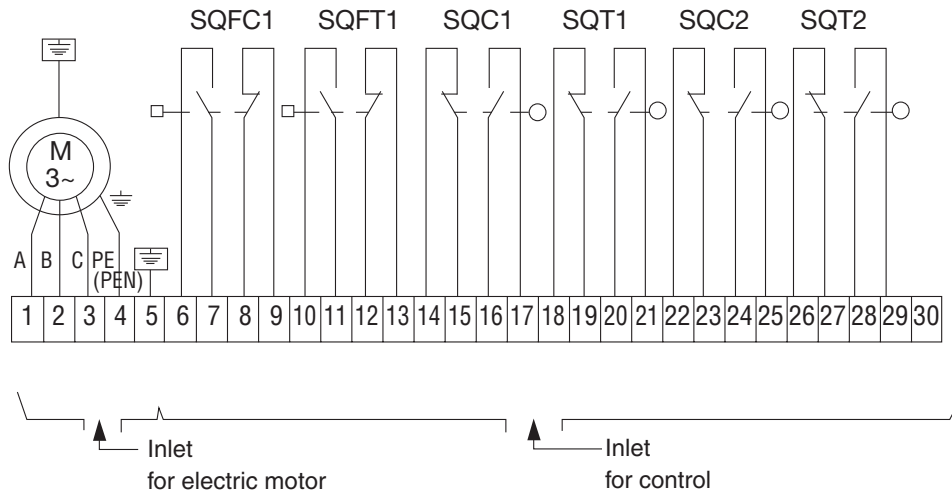


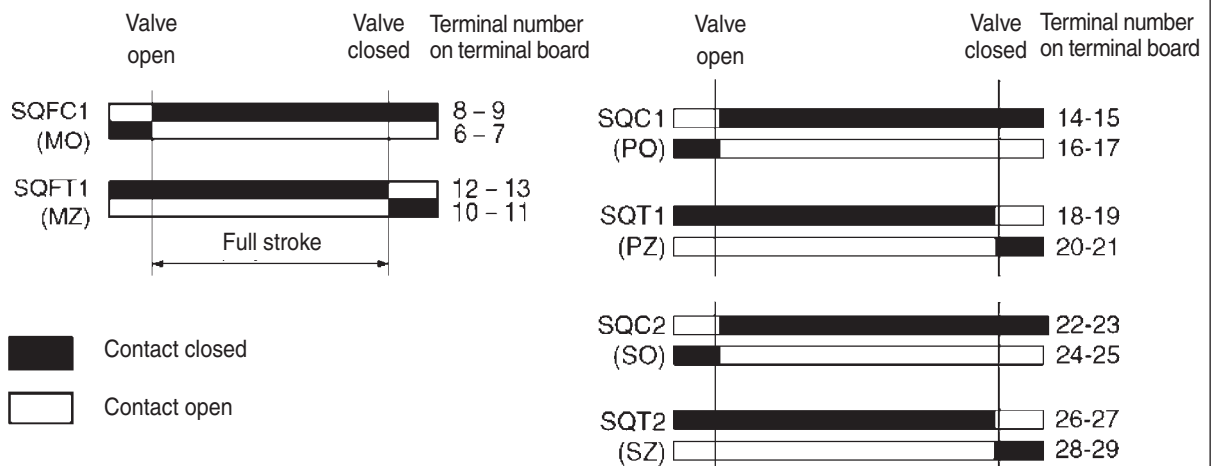
Diagram of internal electric wiring of actuators MODACT MOA OC
 cast iron version and aluminium version, planet gearbox, with electric motors 1AC, 4AC
 Type Nos. 52 070.6xxx 52 074.6xxx and 52 070.7xxx 52 074.7xxx



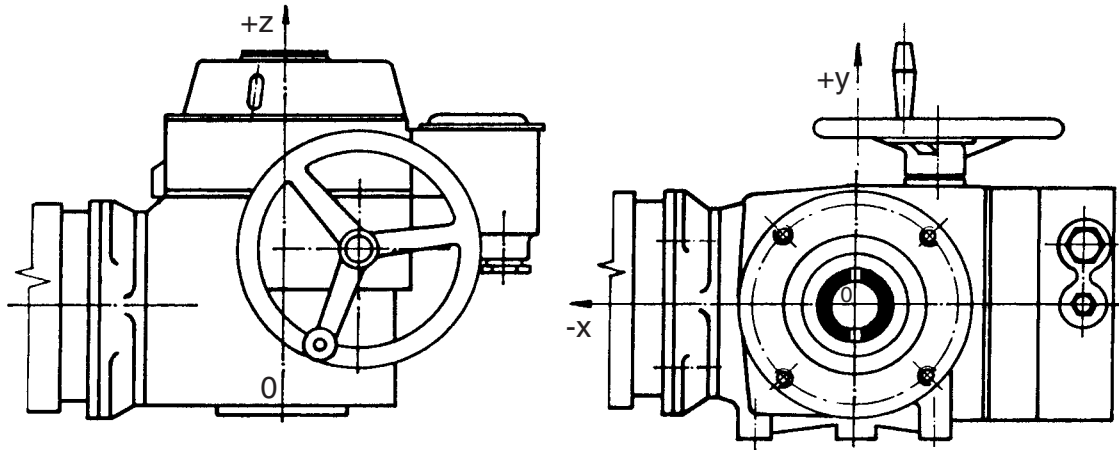
LEGEND:

- SQFC1 (MO) torque-limit switch "open"
- SQFT1 (MZ) torque-limit switch "close"
- SQC1 (PO) position-limit switch "open"
- SQT1 (PZ) position-limit switch "close"
- SQC2 (SO) position signalling switch "open"
- SQT2 (SZ) position signalling switch "close"
- M three-phase asynchronous motor

Operation diagram of torque, position-limit and signalling units

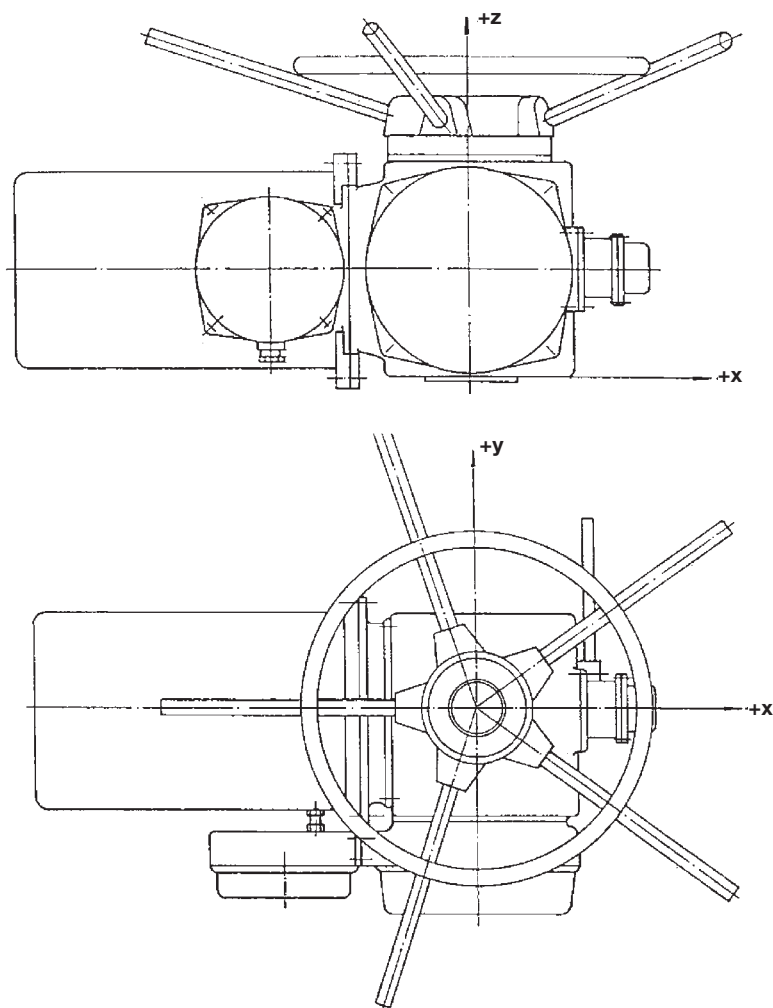


Centre of mass of actuators **MODACT MOA**
 cast iron version Type Nos. 52 020.2xxxS 52 025.2xxxS



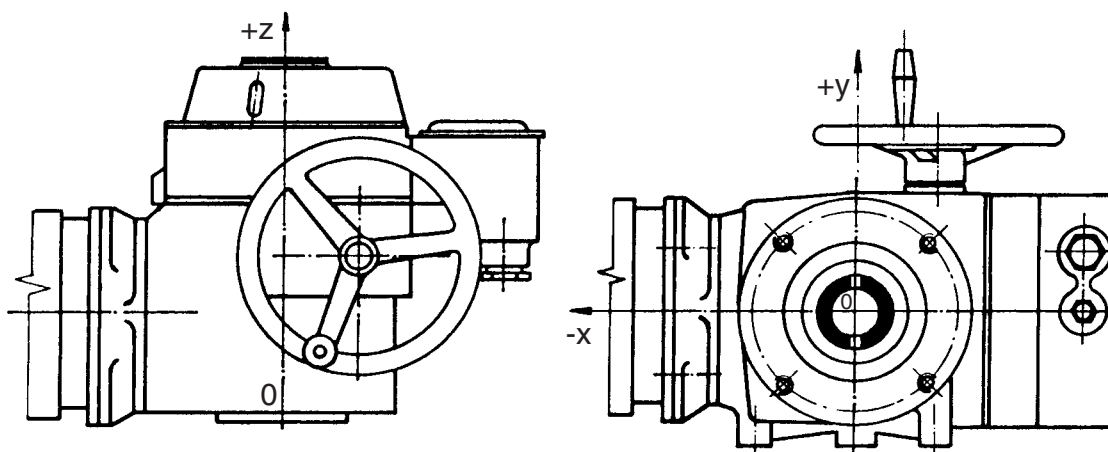
Type number of actuator	Coordinates of centre of mass			Actuator weight [kg]
	x [mm]	y [mm]	z [mm]	
52 020.2022S	-17	2	122	35
52 022.2012S	-56	0	135	68
52 024.2042S	-82	5	155	131
52 025.2022S	-153	6,5	161	236
52 026.2002S	-97	0	331	340

Centre of mass of actuators **MODACT MOA OC**
 cast iron version, worm gearbox, with electric motor AJSI
 Type Nos. 52 070.3xxx 52 074.3xxx

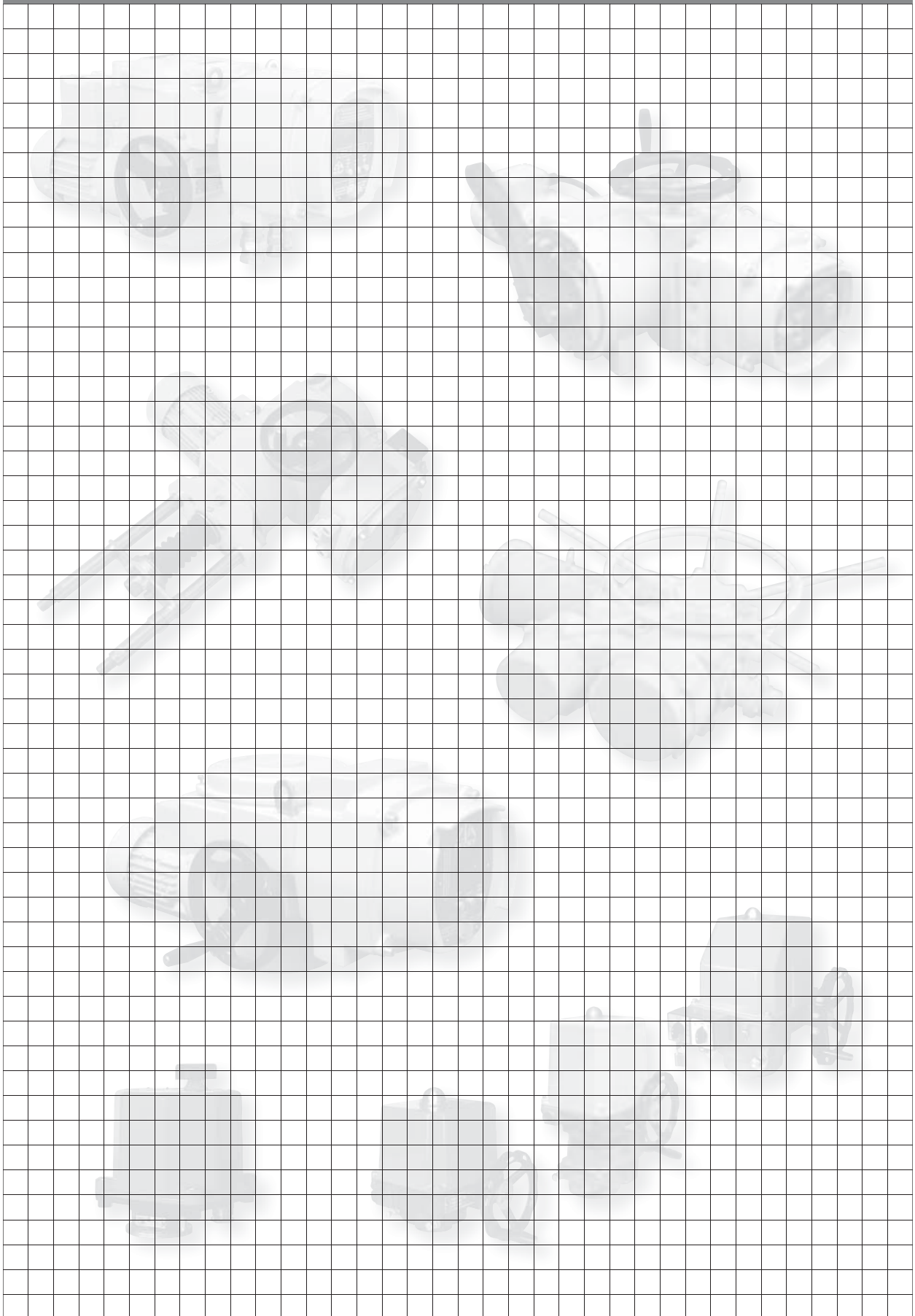


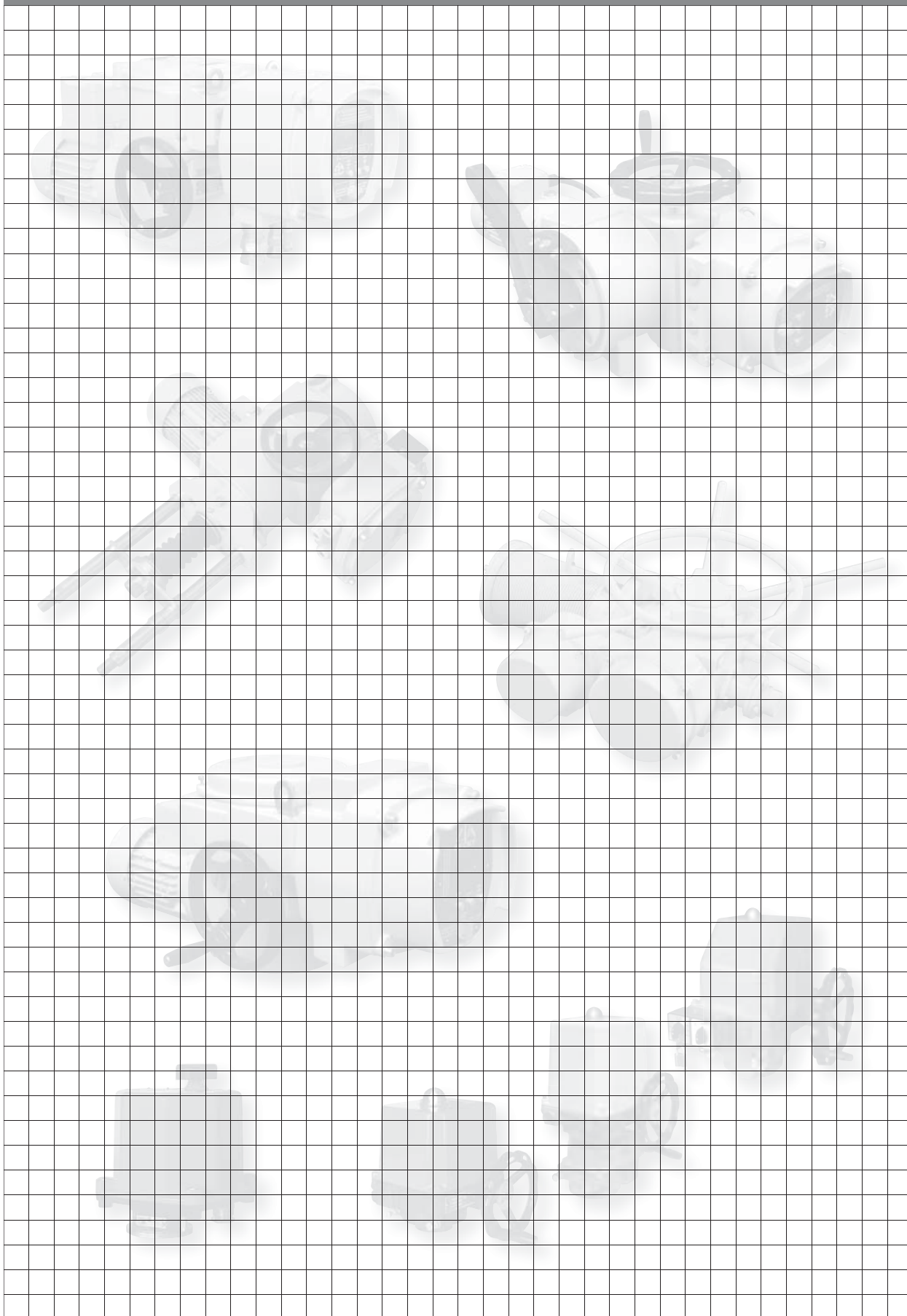
Type number of actuator	Coordinates of centre of mass			Actuator weight [kg]
	x (mm)	y (mm)	z (mm)	
52 070.3x20, .3x30; 52 070.3x60, .3x70	-104	-50	+93	54,5
52 070.3x00, .3x10; 52 070.3x40, .3x50	-63	-72	+88	44,7
52 072.3x20, .3x30	-167	-20	+113	108
52 074.3x00	-150	-54	+129	152
52 074.3x10, 20, 40 50	-215	-50	+134	212

Centre of mass of actuators **MODACT MOA OC**
aluminium version Type Nos. 52 070.7xxx 52 074.7xxx



Type number of actuator	Electric motor signification	Electric motor weight [kg]	Coordinates of centre of mass			Actuator weight [kg]
			x [mm]	y [mm]	z [mm]	
52 070.7x00	1AC56A4A5B3	10,3	-52	+5	+135	30
52 070.7x10	1AC56A4A5B3	10,3	-52	+5	+135	30
52 070.7x40	1AC56A4A5B3	10,3	-52	+5	+135	29
52 070.7x60	1AC56A4A5B3	10,3	-52	+5	+135	30
52 071.7.x00	4AC80A4A5	24	-120	+6	+150	57
52 071.7x10	4AC80A4A5	24	-120	+6	+150	57
52 071.7x20	4AC80B4A5	25,5	-115	+6	+152	57
52 071.7x30	4AC80B4A5	25,5	-115	+6	+152	57
52 072.7x00	4AC80A4A5	24	-120	+6	+150	56
52 072.7x10	4AC80B4A5	25,5	-115	+6	+152	58
52 072.7x20	4AC80B4A5	25,5	-115	+6	+152	57
52 074.7x10	4AC100S4A5	39,5	-130	+5	+162	96
52 074.7x20	4AC100L4A5	45	-150	+5	+162	102
52 074.7x40	4AC100S4A5	39,5	-130	+5	+162	98
52 074.7x50	4AC100L4A5	45	-150	+5	+162	102







Development, production and services of electric actuators and switchboards.
Top-quality sheet-metal processing (TRUMPF equipment), powder paint shop.

SURVEY OF PRODUCED ACTUATORS

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Electric rotary (90°) actuators (up to 30 Nm)

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Electric rotary (90°) actuators for ball valves and flaps

MODACT MOKA

Electric rotary (90°) actuators for nuclear power stations application outside containment

MODACT MONJ, MON, MOP, MONED, MONEDJ, MOPED

Electric rotary multi-turn actuators

MODACT MO EEX, MOED EEX

Explosion proof electric multi-turn actuators

MODACT MOA

Electric multi-turn actuators for nuclear power stations application outside containment

MODACT MOA OC

Electric multi-turn actuators for nuclear power stations application inside containment

MODACT MPR VARIANT

Electric rotary (160°) lever actuators with a variable output speed

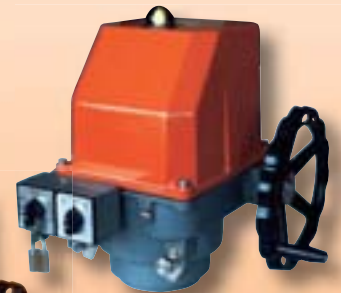
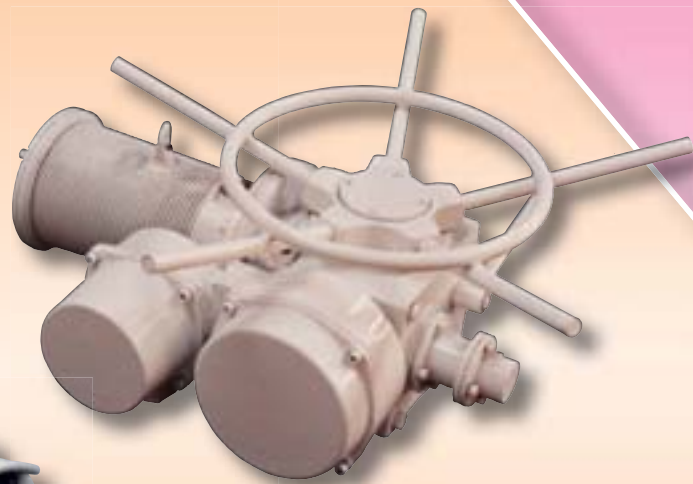
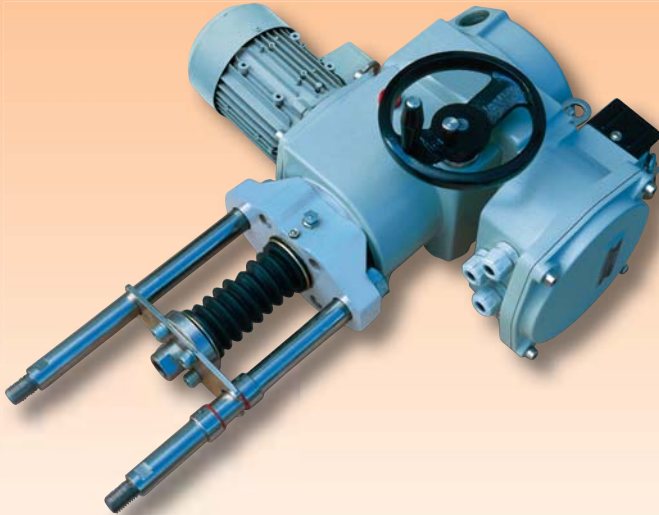
MODACT MPS KONSTANT, MPSED

Electric rotary (160°) lever actuators with a constant output speed

MODACT MTN, MTP, MTNED, MTPED

Electric linear thrust actuators with a constant output speed

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