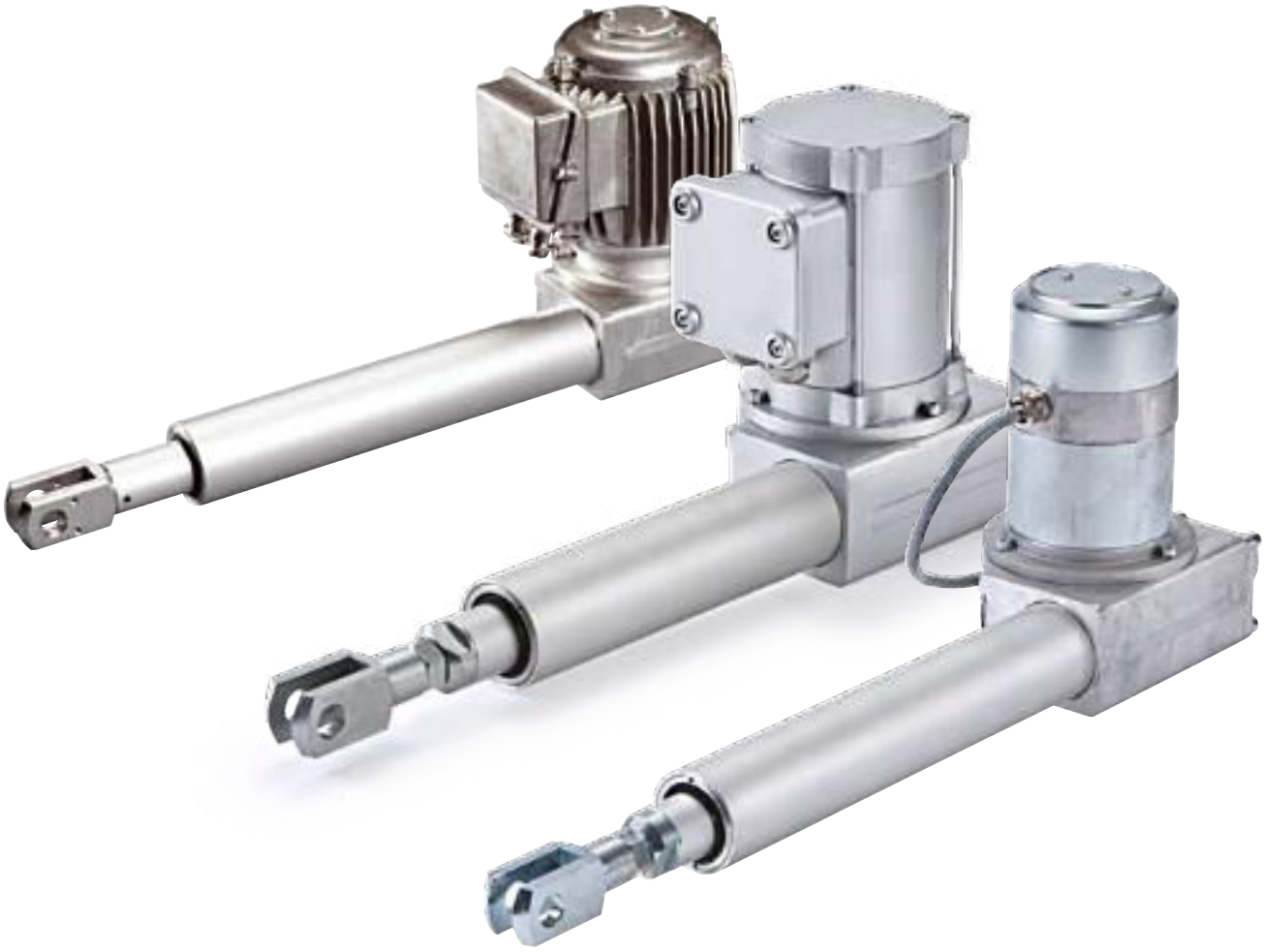
Installation, operation
and maintenance manual

Magforce STD/STG/STW/SKD/SKS/STN

Linear Actuators



Read this manual before installing, operating or maintaining this actuator. Failure to follow safety precautions and instructions could cause actuator failure and result in serious injury, death or property damage.

Operating instructions
Linear drives
MAGFORCE
- STD - STG - STW -
- SKD - SKG - SKW -
- STN -

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1. Overview linear drives

STD... (three phase current),
STG... (direct current),
STW... (alternating current),
SKD... (three phase current),
SKG... (direct current),
SKW... (alternating current),
STN... (three phase current)

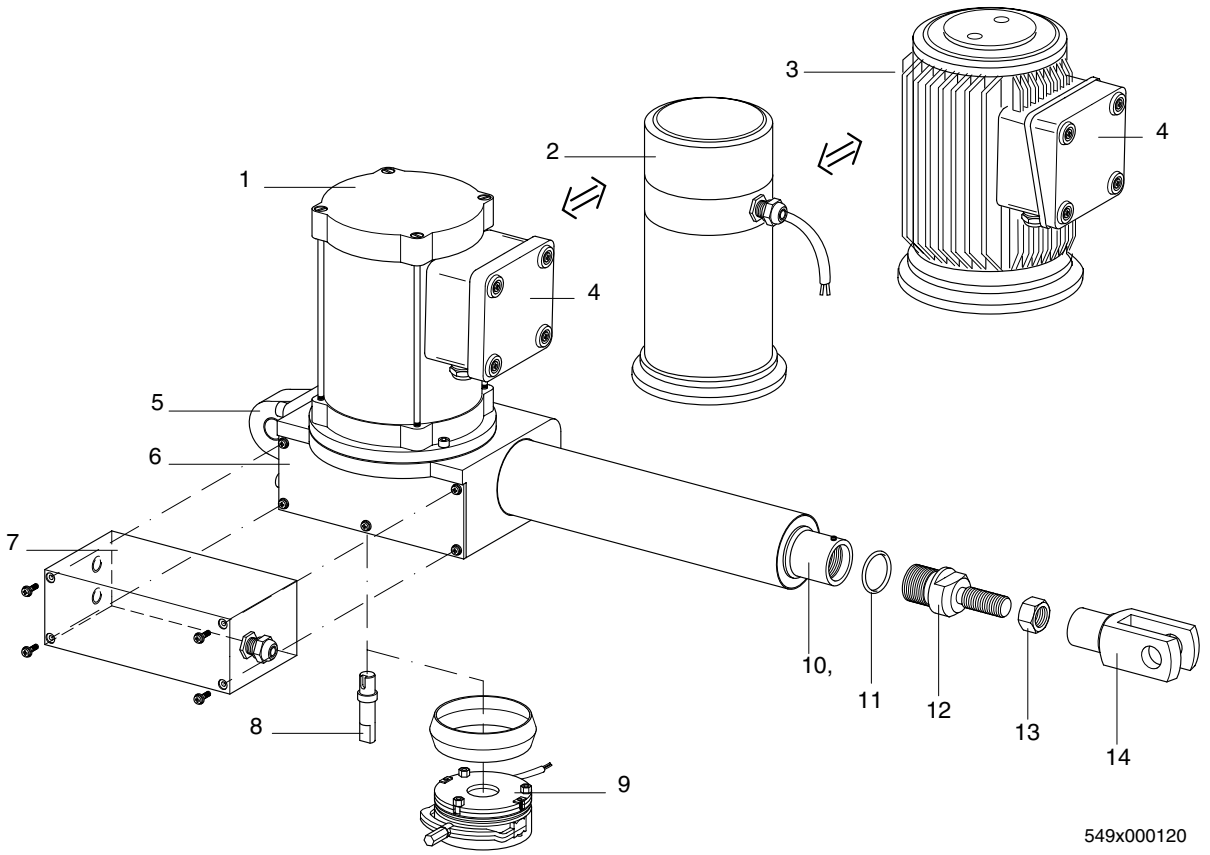


Fig. 1 Overview linear drive MAGFORCE

1. Motor unit MAGFORCE STW/STD/SKD (alternating current / three phase current)
2. Motor unit MAGFORCE STG/SKG (direct current)
3. Motor unit MAGFORCE SKW/STN (alternating current / three phase current)
4. Connecting terminal case STW/STD/SKW/SKD/STN
5. Rear Trunion
6. Housing (identical for all models)
7. Stroke limit switch or potentiometer (optional)
8. Motor axle adapter (optional)
9. Electro-magnetic brake (optional)
10. Push Tube
11 O-washer
12. Fixing Adapter
13. Locking nut
14. Fork head

2. Safety

2.1 General safety instructions

MAGFORCE linear drives have been designed, built and inspected for safe operation in accordance with state-of-the-art technology the standards (Machine Directive 89/392 EWG, Low Voltage Directive 73/23 EWG and EMV Directive 897 336 EWG) and have left the factory in a perfect and safe state. Despite this, the drive can be dangerous to persons and objects if they are not fitted and operated correctly. Therefore these Operating instructions must be read in detail and understood and the safety instructions must be taken note of.
In the case of incorrect use and for incorrect purposes, the manufacturer rejects any kind of liability and guarantee.
The linear drives described in Chapter 1 are machine parts in terms of the Machine Directive. They are only to be installed in machines and systems by specialist companies and institutions taking into account the valid guidelines and statutory regulations.
Especially the following directives and the resulting laws and standards must be taken into consideration:

89/ 392	EWG	EU machine directive
72/ 23	EWG	EU low voltage directive
897 336	EWG	EU-EMV guideline

Depending on the use of the machine or system into which the linear drive is to be installed, additional product or product group specific guidelines and standards may apply. It is the machine or system manufacturer who is responsible for ensuring that these guidelines and standards are complied with .
Linear drives may not be operated after they have been into the machine or system until all requirements specified in the EU machine directives regarding safety and health have been fulfilled.
In terms of EMV guidelines, linear drives are classified as supplied parts for the exclusive use and processing by specialist companies. The measures required to comply with the MEV Safety regulations must be taken by the manufacturer of the end product taking into consideration the fitting conditions, wiring, control and switching and must be checked in accordance with its use.

2.2 Use in accordance with the regulations

MAGFORCE linear drives are only to be used for lifting purposes.
Every other type of use is not permitted. Reconstruction and changes to the linear drives or the electrical installation is not permitted.
Only original replacement parts and accessories from Magnetic may be used.

2.3 Identification of dangers

Throughout the Operating instructions, possible dangers and information is identified by the following symbols:

Warning!
In the Operating instructions, this symbol identifies actions and conditions which can present danger to life and limb of persons.
Read the instructions carefully.

Attention!
In the Operating instructions this symbol identifies all actions and conditions which can cause damage to objects.
Read the instructions carefully!

Information!
This symbol identifies factual and useful information for the user.

The instructions regarding safety at work must be taken into account.

2.4 Safety at work

- Depending on the location of where the linear drive will be used, pro tective devices must be installed which protect persons from crush injuries. Please read the relevant insurance liability and product specific regulations.
- If this drive is used in lifting gear or in applications which might endanger persons, please contact Magnetic. In these cases, special safety nuts or secured fork heads which are available as an option must be used.
- The safety nuts which are available optionally are only effective in one direction of load. This must be taken into account when ordering and installing the drive.
- If the linear drive is in operation, persons or objects must not be positioned in the vicinity of the stroke area of the linear drive.
- Electrical connections at the client's site must be designed so that in the case of a power failure and subsequent supply of power, the drive cannot start up again.
- Assembly and connection lines as well as technical data (load limits, operating times, ...) must be adhered to precisely in all aspect for the linear drives. Changes must be agreed with Magnetic beforehand.
- Without additional cooling measures, the housing of the linear drive can reach a temperature of 130°C. If there is a danger of persons or inflammable objects coming into contact with the housing, a touch guard must be fitted.
- The inner limits must not be used as stroke limits. This can destroy the drive.

The drive is not always self-locking. Static loads resting on the drive can cause the drive to move. Check data sheet and specity brake where necassary.

- Connection, wiring etc. may only be performed by specialist electricians or trained personnel taking into account the applicable standards and safety regulations.
- Before opening the device (connection case), the mains supply must be disconnected.
- No technical changes may be made to the drive.

2.5 Technical progress

The manufacturer reserves the right to adapt technical data to the progress in technology without making any special announcements. Magnetic will gladly provide information regarding possible changes and extensions to the operating instructions and whether they are up to date.

2.6 Guarantee

Assuming that the operating conditions have been adhered to and no prohibited changes have been made to the interior of the device and the devices show no mechanical damage, the manufacturer grants a guarantee of 2 years and a maximum of 3 years after delivery on all mechanical and electrical components.

3. Assembly and installation

3.1 Assembling the linear drive

The linear drive is fitted to the rear trunion and the fork head (see Fig. 2). We recommend that an adapter piece and fork head are used to fix to the push tube. Rotation of the push tube during operation is not permitted. The load to be moved may only act centrally on the push tube, lateral forces must be avoided.
The drive can be mounted in any position, but it must not be tilted.
Fixing regulations: Use fixing bolts with a shear strength of at least 1.2 times the nominal force of the drive. The maximum static load is 16 kN.

WARNING!
The load to be moved must always act centrally on the connecting rod. Forces acting from the side must be avoided. When using in areas which could endanger people, a special securing nut and secured fork heads must be used in order to prevent the load moving in the case of overloading and the supporting nut breaking (see also Chapter 2.4 Working safety).
The securing nut is only effective in one direction. This must be taken into consideration during installation.

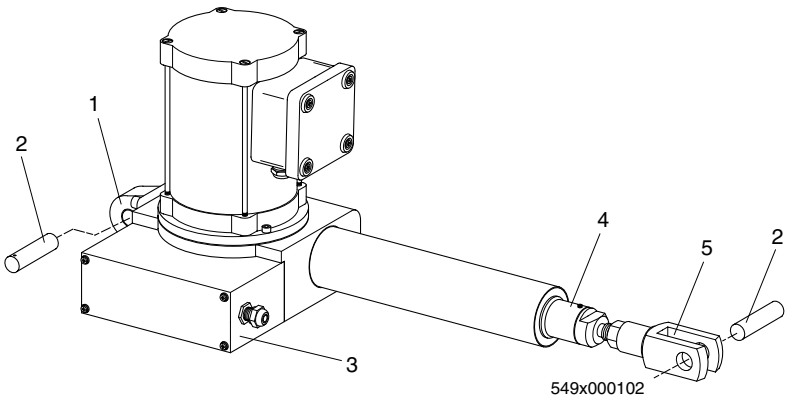


Fig. 2 Fitting the drive

1. Rear fixing trunion
2. Fixing bolt
3. limit switch or potentiometer housing
4. push tube
5. Fork head

In areas where people might be endangered, the locking nut (1), see Fig. 3, must be tightened with 140 Nm and the fork head must be secured with a spiral pin (2) DIN 7344.
1. Locking nut (140 Nm) torque
2. Spiral pin DIN 7344

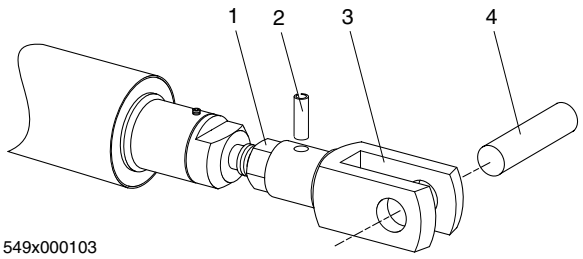


Fig.3 Securing the fork head when using the drive in areas where people might be endangered.

3. Fork head
4. Fixing bolts

4. Electrical connection

4.1 Electrical connections for linear drives

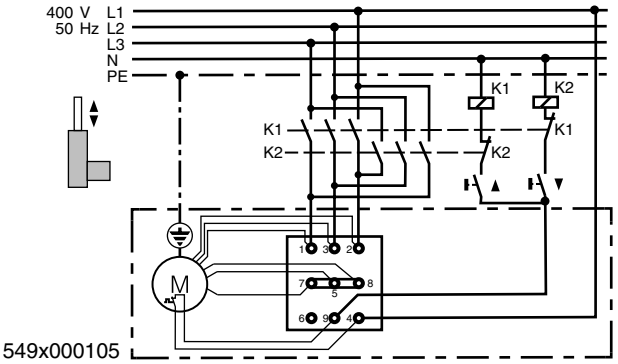
WARNING!
The installation must be performed by trained electricians. Before installation, the mains supply to the devices must be disconnected!

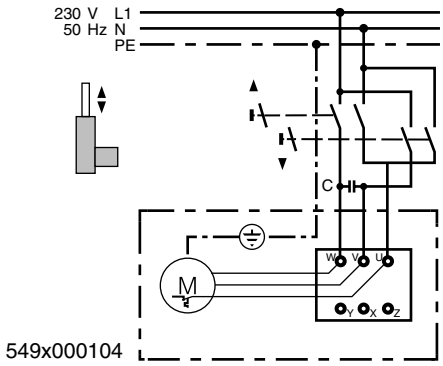
Before connecting, please note the type designation STD, STG, STW, SKD, SKG, SKW and STN and the appropriate connecting information (see rating plate).

The electrical cables must be positioned such that they cannot be damaged by crushing, bending or tension. The cable entrance must be checked for tightness.

If the operating time is exceeded, the thermal-switch is triggered:
- switch motor off,
- secure against accidental switching on.

The motors must be connected in accordance with Fig. 4. The direction of rotation is reversed by polarity reversal via relays or push buttons.
Direct polarity reversal must be avoided due to the inertia force and to protect the switching elements.
The key or switch must return to the zero position automatically if the appropriate operating element has been enabled. At the stroke limits, the motor must only meet with resistance briefly before cutting out. Otherwise the use of stroke limit switches is necessary. Stroke limit switching is
available as an option.





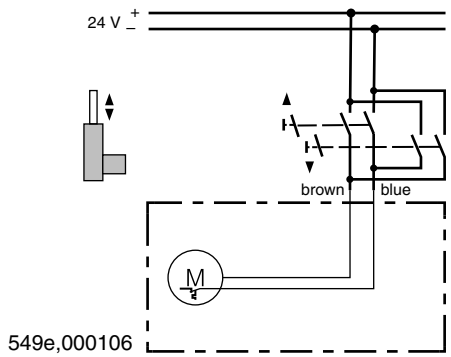


Fig. 4 Connection diagrams for linear drives

WARNING
The installation must be performed by trained electricians. Before installation, the mains supply to the devices must be disconnected!

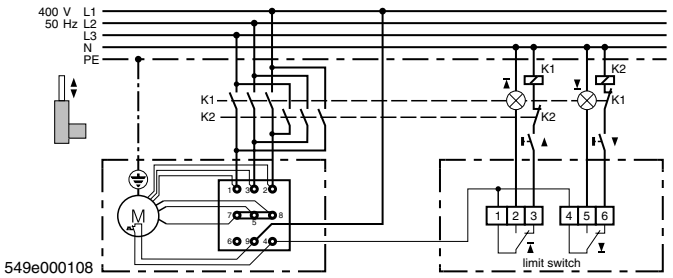
Before connecting, please note the type designation STD, STG, STW, SKD, SKG, SKW and STN and the appropriate connecting information (see rating plate).

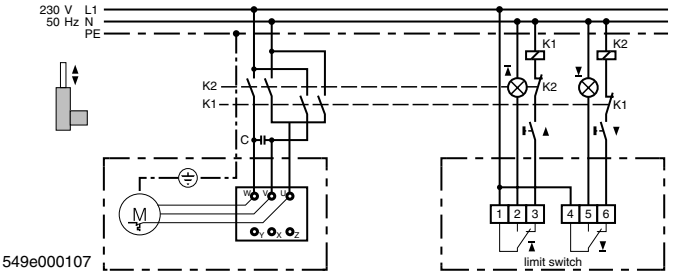
The electrical cables must be positioned such that they cannot be damaged by crushing, bending or tension. The cable entrance must be checked for tightness.

If the operating time is exceeded, the thermal-switch is triggered:
- switch motor off,
- secure against accidental switching on.

4.2 Electrical connection of linear drives with stroke limit switching

If the linear drive is equipped with end stroke limit switches, the drive must be connected in accordance with Fig. 5.
After the electrical connections have been made, it is necessary to see whether the direction of rotation (polarity, phase) of the motor is correct by briefly switching the motor on. If the direction of rotation is not correct, there is a danger that the stroke limits switches will be exceeded and therefore damaged.





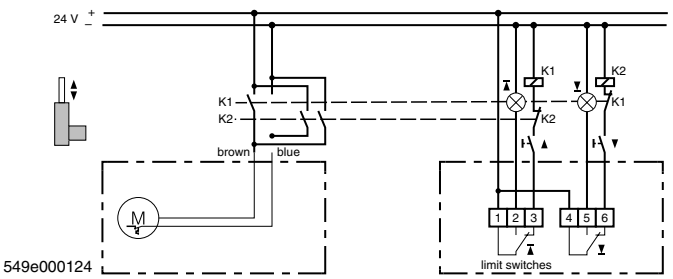


Fig. 5: Connecting diagrams for linear drives with end stroke limit switches.

4.3 Electrical connection of potentiometer

If the linear drive is equipped with a potentiometer, the potentiometer must be connected in accordance with Fig. 6. The motor is connected according to voltage rating as described in Chapter 4.1.

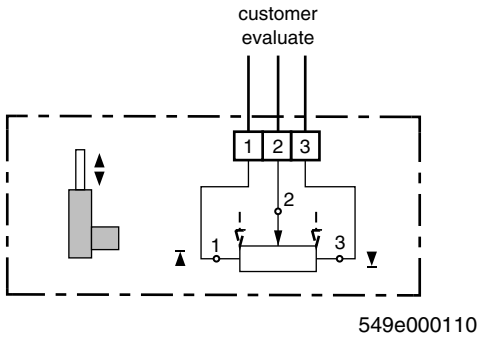


Fig. 6: Connecting the potentiometer

4.4 Setting the end stroke limit switch (optional)

ATTENTION!
If the stroke limit switches have been set at the factory, the push tube may not be rotated as otherwise the setting of the stroke limit switch position is no longer correct.

The optional stroke limit switches are fitted to the housing of the drive (see Fig. 2). There are two openings in the cover through which the stroke limit switches are adjusted using an Allan key. The openings must be closed after adjustment. The stroke limit is adjusted by positioning the two stroke limit switches on the respective spindle (see Fig. 7). The push tube is secured to the rod housing with adhesive tape. If the push tube is rotated by hand, the setting of the lower stroke limit is not longer correct.
The stroke limit switches have been set to allow the greatest possible stroke (= 1...2 mm before the limit) at the factory before delivery.
Procedure:

Fit the cover of the end stroke limit switches once you have performed all electrical installations (see Chapter "Electrical connections") and have understood and checked the mechanical function of the limit switches. Remember that the connecting terminals carry voltage!

Then make sure that the motor is turning in the correct direction; if necessary change phase sequence/polarity.

Move the drive to the desired lower limit.

Now turn the stroke limit switch for the lower limit against the control cam so that it connects.

Now proceed in the same manner for the upper limit.

Move the linear drive up and down a number of times and if necessary make fine adjustments

WARNING!
Danger of electric shock! The installation work must be performed by trained electricians. Close the casing before you adjust the stroke limit switch. Terminals carry voltage.

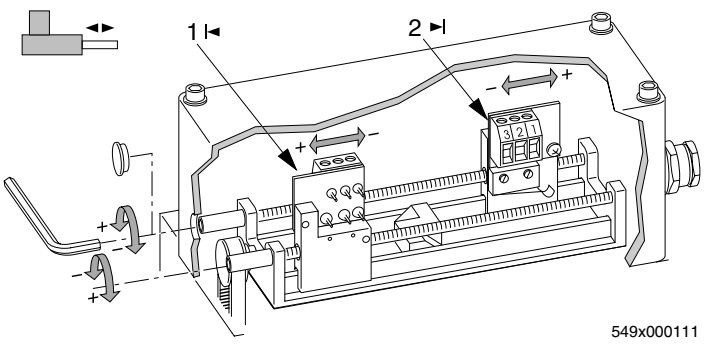


Fig. 7: Stroke limit switch

4.5 Setting the potentiometer (optional)

The optional potentiometer is fitted to the drive casing (see Fig. 2). The electrical connections are described in Chapter 4.3.
The data for the potentiometer are as follows:

Resistance: max. 1 kOhm ± 5%, linear characteristic curve
nominal load capacity 3 W at 40°C, 2 W at 70°C

Procedure:

Fit the cover of the potentiometer after you have completed all electrical connections (see Chapter 4.3).

By moving the drive to different stroke lengths, changes in the resistance can be determined.
If whilst fitting the drive the push tube was rotated by hand, the setting of the potentiometer is not longer correct (drive lower stroke limit = 0 Ohm).
Move the drive into the lower stroke limit and the basic setting of the potentiometer is reset. Otherwise the resistance values are incorrect. The potentiometer is equipped with a sliding clutch.

ATTENTION!
If the potentiometer was installed at the factory, the push tube may not be rotated manually as otherwise the setting of to the limit switches is not longer correct.

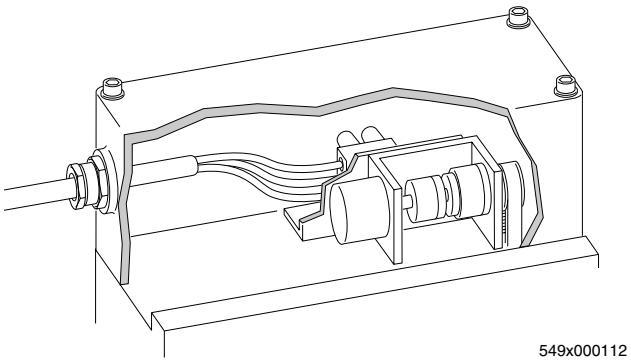


Fig. 8 Potentiometer

5. Operating / Starting up

After the mechanical and electrical installations have been performed correctly, the drive can be started up. By applying short switch-on impulses you can see whether the drive is rotating in the correct direction. It is important that it rotates in the correct direction especially if the drive is equipped with a stroke limit switches device as otherwise a fault is possible.
The linear drive is controlled using push button or relays (Up / Down).
The push button or switch must return to the zero setting automatically when the respective operating element is enabled.
Once the drive has reached the stroke limits the motor must switch off. Direct polarity reversal of the direction of rotation must be avoided to treat the motor with care.
The load stated on the rating plate and in the section listing technical data may not be exceeded; the drive could be damaged if overloaded.

6. Technical data

6.1 Mechanical and electrical data

Type STD (Three-phase current)		STD 10007-...	STD 12010-...	STD 15020-...	STD 15040-...
Pressure / tensile strength	[kN]	10	12	15	15
Automatic locking device		no	no	no	yes
Static load	[kN]	16	16	16	16
Thrust speed	[mm/sec]	10	8	4	2
Stroke length	[mm]	max. 700 mm			
Mains supply	[V/50 Hz]	3 x 400	3 x 400	3 x 400	3 x 400
Power consumption	[W]	920	800	700	500
Current consumption	[A]	1,8	1,7	1,6	1,4
Operating time (S3 10 min.)	[%]	25	10	10	10
Ambient temperature	[°C]	-10...+40	-10...+40	-10...+40	-10...+40
Safety class/isolation class		I/E	I/E	I/E	I/E
System of protection	[IP]	54	54	54	54
Weight	[kg]	16,3	16,3	16,3	16,3

Dimensions see 6.2

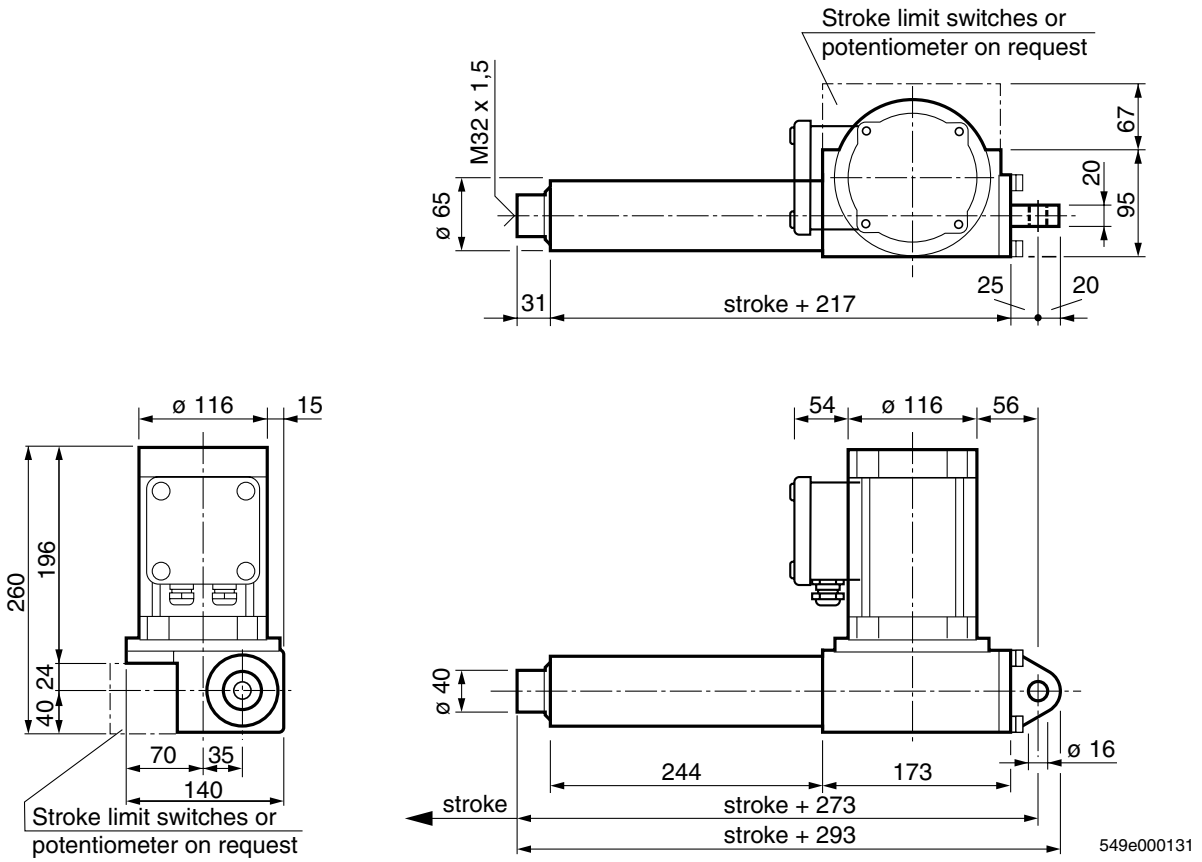


Fig.6.2
To scale drawing of STD

Typ STG (Direct current)		STG10007-...	STG 12010-...	STG 15020-...	STG 15040-...
Pressure / tensile strength	[kN]	10	12	15	15
Automatic locking device		no	no	no	yes
Static load	[kN]	16	16	16	16
Thrust speed	[mm/sec]	14	11	5	3
Stroke length	[mm]	max. 700 mm			
Mains supply	[V DC]	24	24	24	24
Power consumption	[W]	840	840	768	528
Current consumption	[A]	35	35	32	22
Operating time (S3 10 min.)	[%]	10	10	10	10
Ambient temperature	[°C]	-10...+40	-10...+40	-10...+40	-10...+40
Safety class/isolation class		III/E	III/E	III/E	III/E
level of protection	[IP]	54	54	54	54
Weight	[kg]	14,6	14,6	14,6	14,6

Dimensions see 6.2

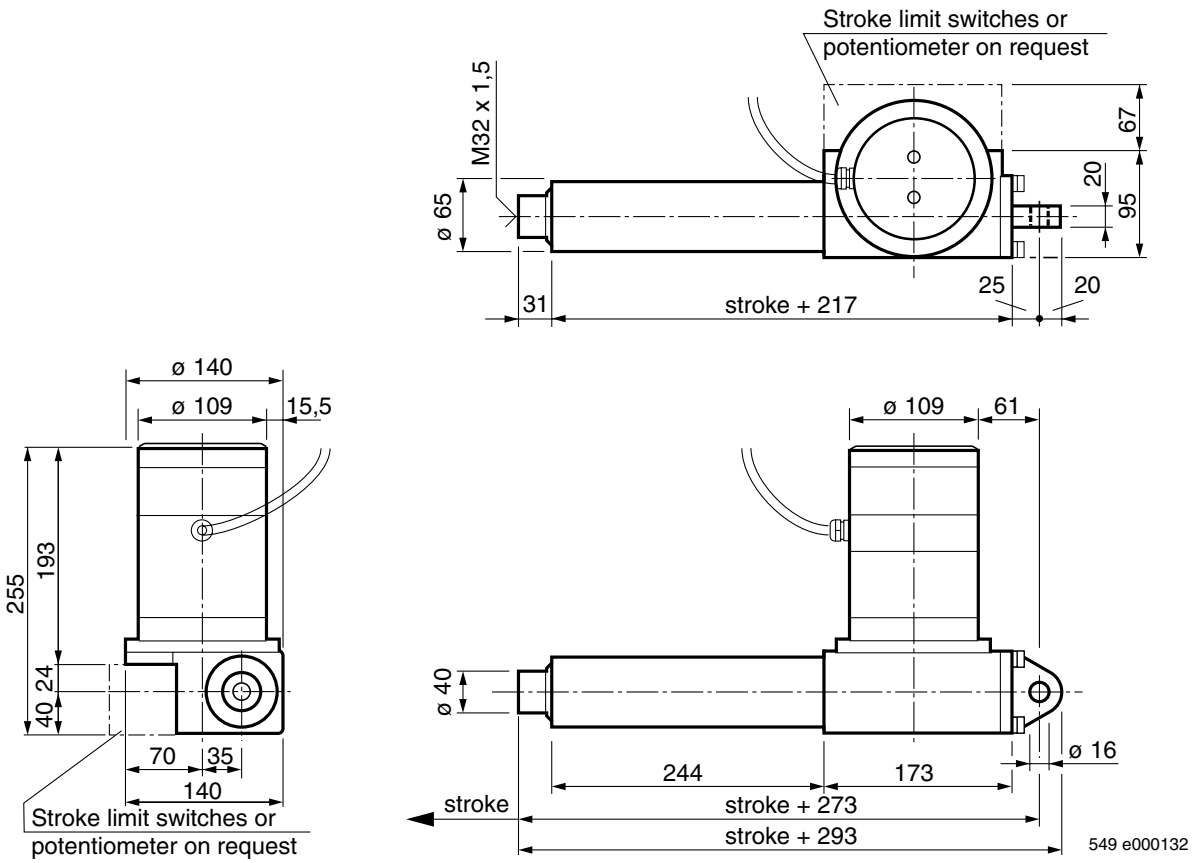


Fig.6.2
To scale drawing of STG

Type STW (Alternating current)		STW 5007-...	STW7010-...	STW 10020-...	STW 15040-...
Pressure / tensile strength	[kN]	5	7	10	15
Automatic locking device		no	no	no	yes
Static load	[kN]	16	16	16	16
Thrust speed	[mm/sec]	12	89	4	2
Stroke length	[mm]	max. 700 mm			
Mains supply	[V/50 Hz]	1 x 230	1 x 230	1 x 230	1 x 230
Power consumption	[W]	700	710	710	750
Current consumption	[A]	3,3	3,5	3,5	3,5
Operating time (S3 10 min.)	[%]	15	10	10	10
Ambient temperature	[°C]	-10...+40	-10...+40	-10...+40	-10...+40
Safety class/isolation class		I/E	I/E	I/E	I/E
level of protection	[IP]	54	54	54	54
Weight	[kg]	14,6	14,6	14,6	14,6

Dimensions see 6.2

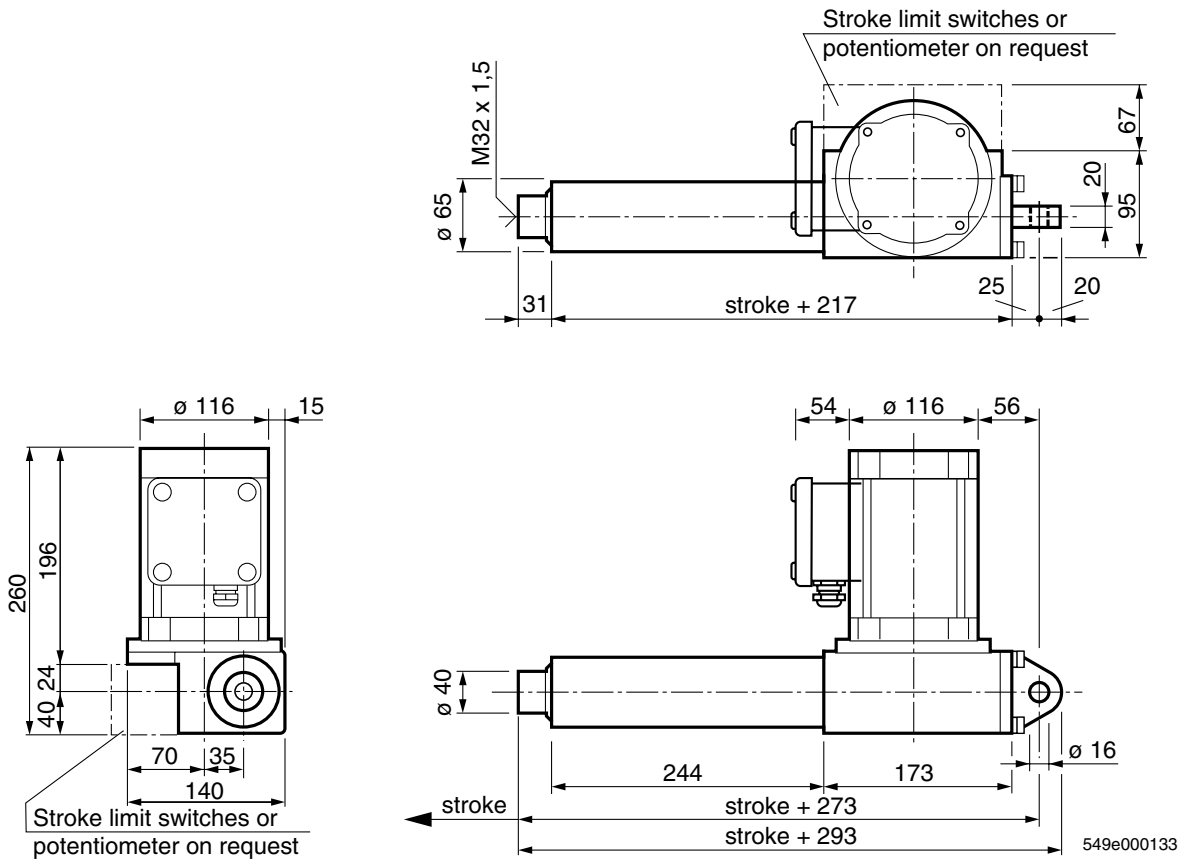


Fig.6.2
To scale drawing of STW

Type SKD (Three-phase current)		SKD 10007-...	SKD 12010-...	SKD 15020-...	SKD 15040-...
Pressure / tensile strength	[kN]	10	12	15	15
Automatic locking device		no	no	no	yes
Static load	[kN]	27	27	27	27
Thrust speed	[mm/sec]	24,5	20,6	10,6	5,3
Stroke length	[mm]	max. 700 mm			
Mains supply	[V/50 Hz]	3 x 400	3 x 400	3 x 400	3 x 400
Power consumption	[W]	800	720	630	560
Current consumption	[A]	1,7	1,5	1,6	1,4
Operating time (S3 10 min.)	[%]	25	10	10	10
Ambient temperature	[°C]	-10...+40	-10...+40	-10...+40	-10...+40
Safety class/isolation class		I/E	I/E	I/E	I/E
level of protection	[IP]	54	54	54	54
Weight	[kg]	16,3	16,3	16,3	16,3

Dimensions see 6.2

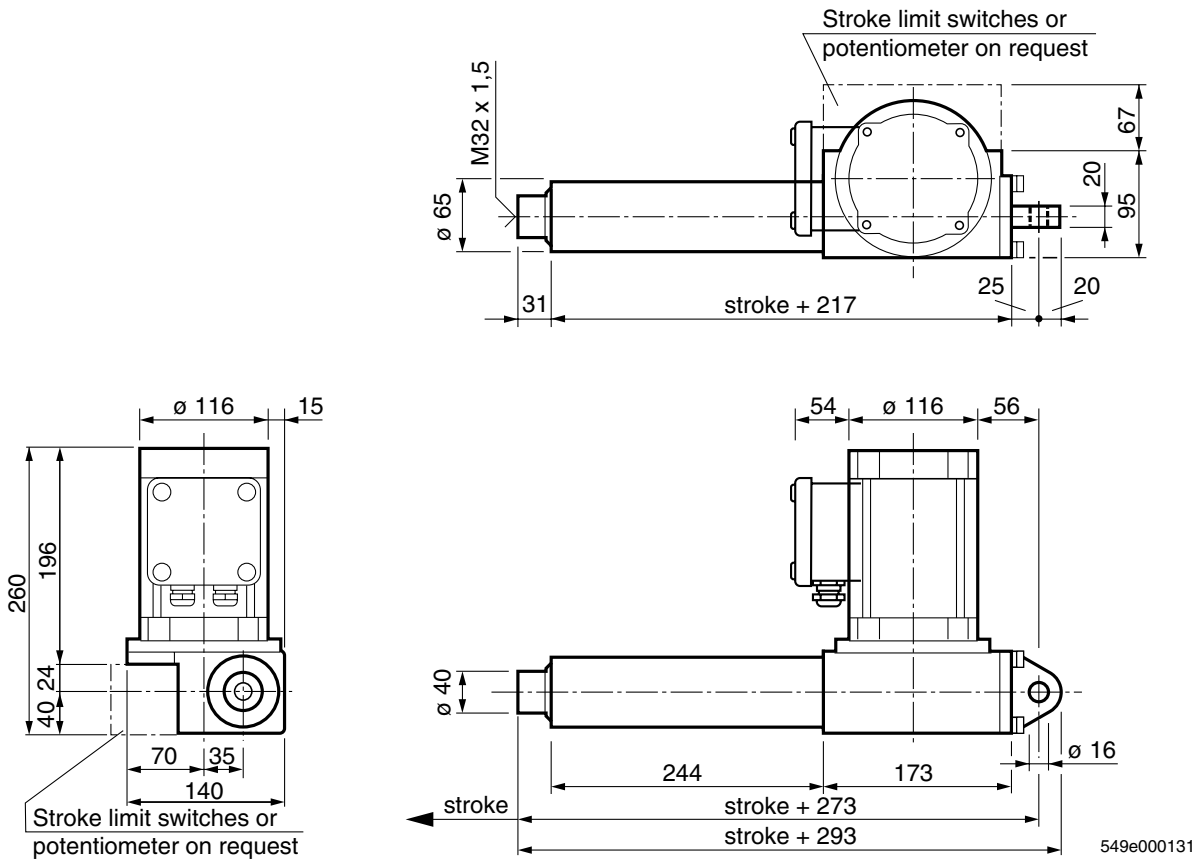


Fig.6.2
To scale drawing of SKD

Type SKG (Direct current)		SKG 6005-...	SKG 10010-...	SKG 13020-...	SKG 15040-...
Pressure / tensile strength	[kN]	6	10	13	15
Automatic locking device		no	no	no	yes
Static load	[kN]	16	16	16	16
Thrust speed	[mm/sec]	55	30	15	8
Stroke length	[mm]	max. 700 mm			
Mains supply	[V]	24	24	24	24
Power consumption	[W]	720	672	624	504
Current consumption	[A]	30	28	26	21
Operating time (S3 10 min.)	[%]	30	10	10	10
Ambient temperature	[°C]	-10...+40	-10...+40	-10...+40	-10...+40
Safety class/isolation class		III/E	III/E	III/E	III/E
level of protection	[IP]	54	54	54	54
Weight	[kg]	14,6	14,6	14,6	14,6

Dimensions see 6.2

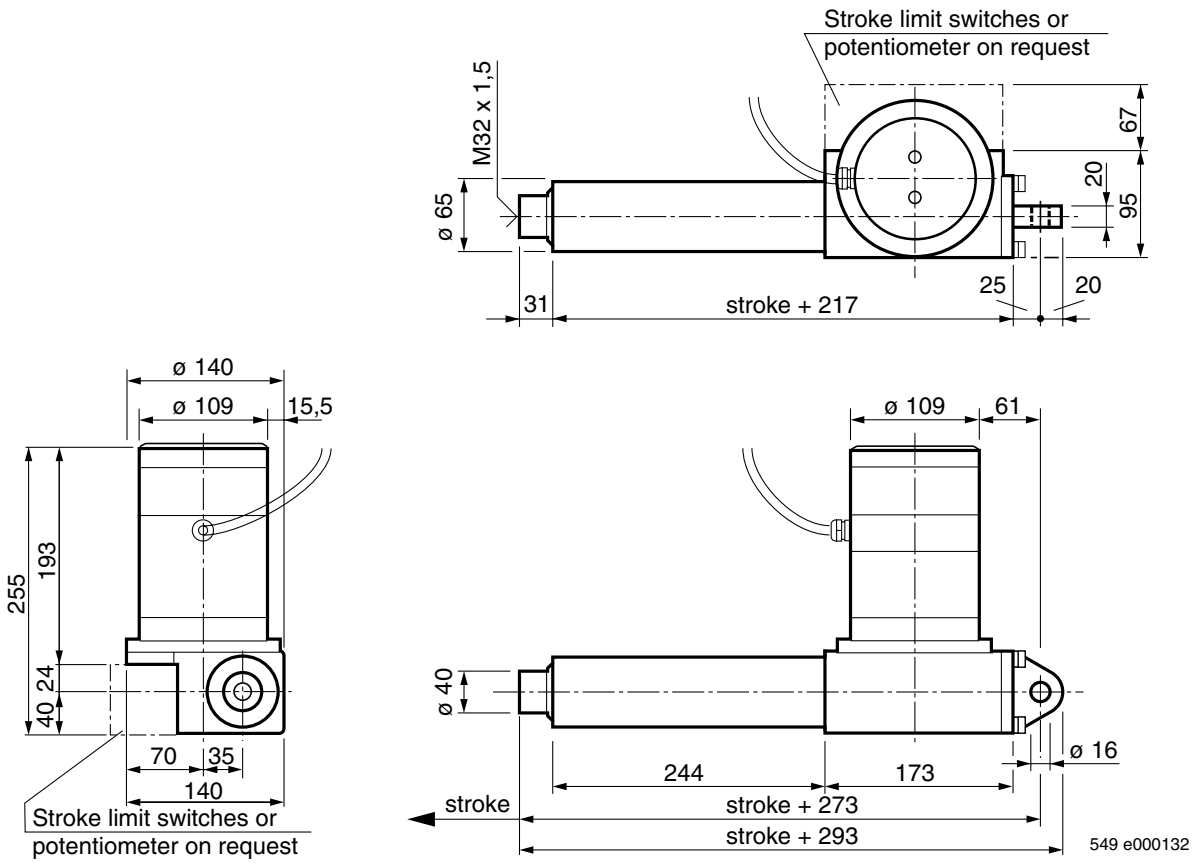


Fig.6.2
To scale drawing of SKG

Type SKW (Alternating current)		SKW 4005-...	SKW 7010-...	SKW 10020-...	SKW 13040-...
Pressure / tensile strength	[kN]	4	7	10	13
Automatic locking device		no	no	yes	yes
Static load	[kN]	16	16	16	16
Thrust speed	[mm/sec]	75	37	18	9
Stroke length	[mm]	max. 700 mm			
Mains supply	[V/50 Hz]	1 x 230	1 x 230	1 x 230	1 x 230
Power consumption	[W]	1400	1400	1400	1400
Current consumption	[A]	7	7	7	7
Operating time (S3 10 min.)	[%]	10	10	10	10
Ambient temperature	[°C]	-10...+40	-10...+40	-10...+40	-10...+40
Safety class/isolation class		I/E	I/E	I/E	I/E
level of protection	[IP]	54	54	54	54
Weight	[kg]	20	20	20	20

Dimensions see 6.2

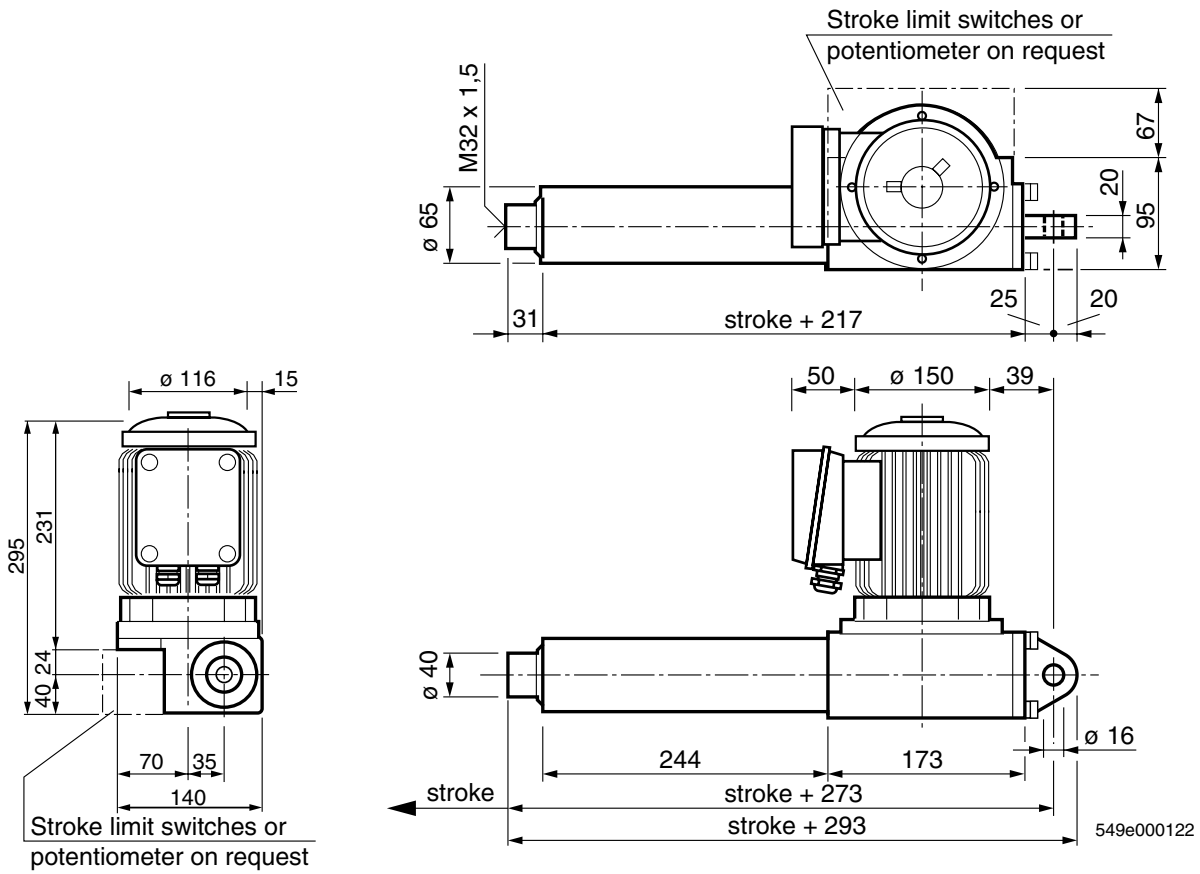


Fig.6.2
To scale drawing of SKW

Type STN (Three-phase current)		STN 5007-...	STN 10007-...	STN 10010-...
Pressure / tensile strength	[kN]	5	10	10
Automatic locking device		yes	no	no
Static load	[kN]	16	16	16
Thrust speed	[mm/sec]	26,5	12	8
Stroke length	[mm]	max. 700 mm		
Mains supply	[V/50 Hz]	3 x 400	3 x 400	1 x 230
Power consumption	[W]	618	700	830
Current consumption	[A]	2,3	3,3	3,5
Operating time (S3 10 min.)	[%]	20	10	10
Ambient temperature	[°C]	-10...+40	-10...+40	-10...+40
Safety class/isolation class		I/E	I/E	I/E
level of protection	[IP]	54	54	54
Weight	[kg]	15,6	17	17

Dimensions see 6.2

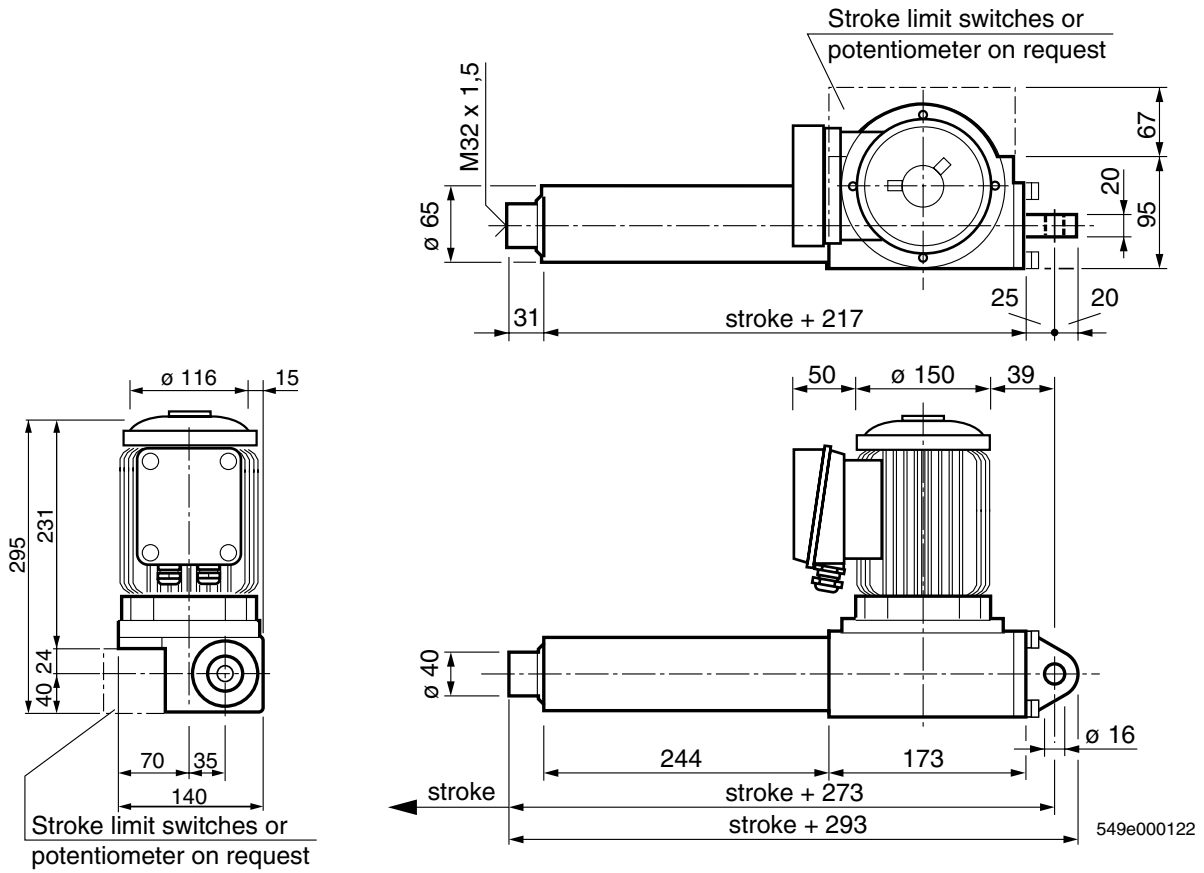


Fig.6.2
To scale drawing of STN

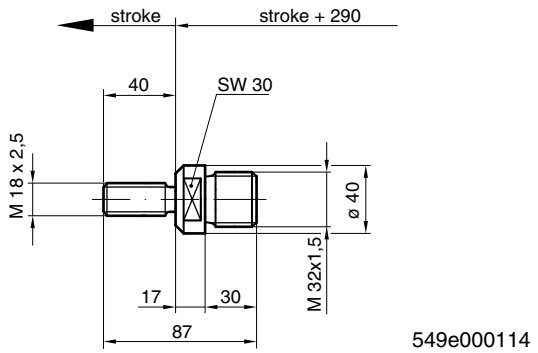


Fig.9
To scale drawing of adapter

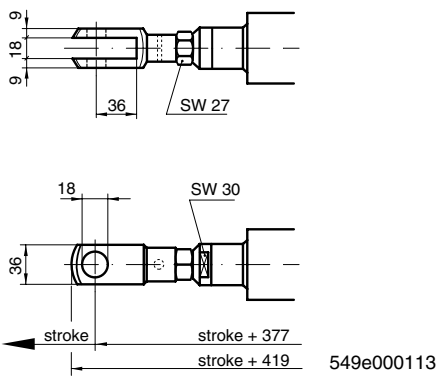


Fig.10
To scale drawing of fork head

7. Maintenance and care

The linear drive is equipped with a special nut and sufficient lubrication reserve and therefore requires no maintenance.
The service life of the drive depends on the operating location and the operating period.
The push tube must be cleaned and lubricated from time to time. Defective motors must be repaired by Magnetic or by one of their authorised dealers.

For customer specific applications where the path-force-cycle ratios and environmental influences are known, the maintenance intervals are specified in the order confirmation or in a separate document.

8. Trouble shooting and rectification of faults.

Repairs must be performed by Magnetic or by one of their authorised dealers. Therefore please return a defective drive.
However, first check all electrical connections and mechanical components for possible defects.
If the Drive nut is broken, the actuator can continue to work under light loads on the safety nut. A low power output and high power consumption point towards this type of damage. Regular operation is not permissible in this case. The device must be repaired at the manufacturer.

9. Technical support

If faults occur during the operation or guarantee period which cannot be rectified by trained electricians, please contact our internal experts.

10. Replacement parts and accessories

Accessory		Article number
Stroke limit switch-end device	0 ...300 mm stroke	1043,0268
Stroke limit switch-end device	100 ... 370 mm stroke	1043,0252
Stroke limit switch-end device	200 ... 720 mm stroke	1043,0266
Potentiometer stroke 475 mm (built-on type) 1 kOhm		1063,0011
Potentiometer max. stroke 944 mm (built-on type)1 kOhm		1063,0012
Adapter, complete see Fig. 9		1031,0106
Fork head, complete see Fig. 10		1061,9038
Motor axle adapter, complete		1043,0042

Customer specific drives are defined on the order confirmation.

11 End of life disposal

Your new set contains materials which can be recycled and reused. Specialized companies can recycle your product to increase the amount of reusable materials and minimize th eamount of materials to be disposed of.

Please inform yourself on local regulations on disposal of your old set.

Manufacturer's address

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