## *Content*





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# Technical description

D-M-TD-e2/11.13



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## *Technical description*

### 1.Design

Linear actuators from Framo Morat are electromechanical drives which convert the rotating motion of the integrated electric motor into a linear forward or backward motion.
Framo Morat actuators are primarily designed for industrial use. They are particularly robust and equipped with many safety standards. All installation positions are permissible.
Special technical features are:
Complete stainless steel housing (for type Mini 0, 01 and 1) which protects all mechanical and electrical parts (including terminal board). Only the connecting cables and the movable piston rod needs to be retracted.

### 2. Piston rod

The stainless steel piston rod is ground (except for Mini 3).
The piston rod is not locked to prevent torsion. The customer must provide a locking facility with the part that is moved.
Radial forces are generally not allowed.

### 3. Motors

The built-in electric motor has a hollow rotor shaft which permits the lifting spindle and the piston rod to be guided through it and therefore allows particularly short dimensions.

Depending on the size, the motors can be delivered with three-phase, single-phase or direct current (special voltage on request). With the exception of the direct current motor, all motors are fitted with a thermal protection switch (trigger temperature +125°C. The motor winding is ISO class B. Standard protection class: IP 54. The three-phase motors can be connected to 3 x 230 or 3 x 400 V AC. As an option, the neutral point can be brought on.

### 3.1 DC actuators

Separate power tables are available for DC actuators (only Mini 0).
If the DC motor operates as an individual unit, a suitable EMC interference suppressor shall be provided close to the motor terminal drive. For unit installation, the unit has to be suppressed.
For this reason direct interference elimination is not always necessary and the interference suppressor is not located in the drive, therefore the customer has to plan for this possible requirement.

### 4. Duty cycle

The indicated duty cycles relate to a maximum load time of 10 minutes, a maximum ambient temperature of 40°C and a maximum installation height of 1000 m above sea level.

### 5. Gears, stroke lengths

Implementation without gears or the installation of 1- to 3-stage planetary gears allows the selection of different stroke speeds for every type (0.5 to 136 mm/s). Special travel lengths are possible.

### 6. Spindle

Mini actuators with a rolled acme lead screw are predominantly dynamically self-locking.



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### 7. Limit switches

A limit switch is incorporated for each stroke-end position. The Mini 01 up to Mini 3 are also equipped with a safety limit switch (forced separator) which protects the actuator against destruction in case of faulty wiring or if a limit switch fails. The limit switches are installed in a fixed position and cannot be adjusted.

### 8. Brake

At stroke speeds of more than 20 mm/s, three-phase and single-phase actuators should be equipped with a brake because of their tendency to overrun (DC actuators see performance table notes).
We also recommend that a brake is installed if the drive has a spindle that is not self-locking and if the demands on disconnection accuracy are exacting. A magnetic-electric single-disc brake is available for all sizes.

### 9. Connection cables

The standard actuators are supplied with external connection cables (1m length). Longer or shielded cables are available.

### 10. Fixing options, connection heads

Flange, foot and attachment bolts can be supplied in addition to standard attachment configuration A (attachment eye to eye). The drive can also be delivered with different connection heads (see dimensional drawings).

### 11. Paint coating (only Mini 2 and 3)

The standard drive housing (tubular steel) is sprayed with a special acrylic resin lacquer (RAL 7031, bluish grey) which is also suitable as primer for other lacquers (artificial or acrylic).

### 12. Reliability and quality assurance

Every actuator is produced according to order and tested under nominal load conditions. A proven modular system makes it possible to produce a large number of different models and to adapt them to customer requirements. All individual parts and sub-assemblies are generally kept in stock.

### 13. Conditions of use

The conditions of actuator use prohibit the movement of loads whereby persons can be directly or indirectly endangered.
The application of actuators in equipment intended to transport passengers is not permitted without first consulting the manufacturer (or responsible representative).
In this context we refer to EU Machinery Directive 98 / 37 / EC and the Act on Technical Equipment (Equipment Safety Act) where the user is responsible for the implementation of "protective guards/barriers" to prevent touching (crushing hazard) during operation.
This also applies for the application of actuators with suspended loads where persons can be endangered.



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## 14. Safety option

It is possible to bring the actuators of size 01, 1 and 2 to a higher safety standard by using the force-dependent shut-off.
Generally, enough safety features should be included when choosing the actuator size.

## 15. Self-locking ability

The self-locking ability depends on the spindle pitch, the surface quality of the spindle/nut, the sliding speed, lubrication and temperature. We distinguish between dynamic (out of motion) and static (stationary) self-locking.

Vibrations can eliminate self-locking. A certain number of factors such as lubrication, sliding speed and load can also create such favorable sliding characteristics that the self-locking is negatively influenced. A theoretically self-locking spindle cannot therefore replace a brake. Therefore it is impossible to assume guarantee obligations regarding self-locking.

**Important:** Self-locking is not intended to satisfy security-related characteristics!

To minimize additional dangers, observe the usual care for technical products.

## 16. Options

The following options allow individual applications:

1. **IP 65** (water jet proof)
2. **Force-dependent shut-off** (as protection for block movement or if a preset stroke force is exceeded except Mini 0 and Mini 3)
3. **Adjustable connection head** (for small changes to the attachment position)
4. **Adjusting ring on piston rod** (for simple retracting position adjustment)
5. **Brake** (for precise switch-off and non-self-locking actuators)
6. **Integrated helical potentiometer** (for travel monitoring and/or position control)
7. **Rotary pulse encoder** (for digital pulse processing for position and speed control)
8. **Different fixing possibilities** (installation conditions can be taken into account)
9. **Humidification seal coating** of rotor and stator and/or condensation hole (if there is danger of condensation).
10. **Explosion proof** according to directive 94 / 9 / EG (ATEX 95)
11. **Connection cable** for motor and/or helical potentiometer shielded (for frequency converter operation etc.) on request



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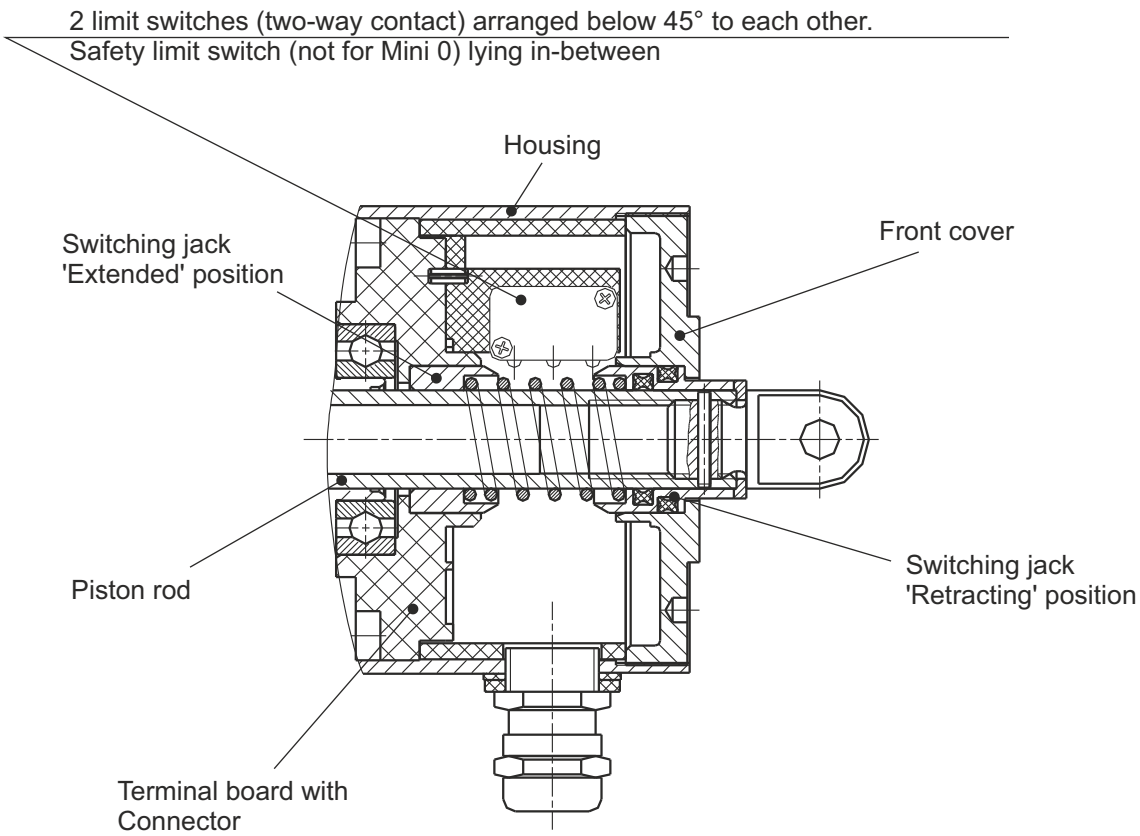
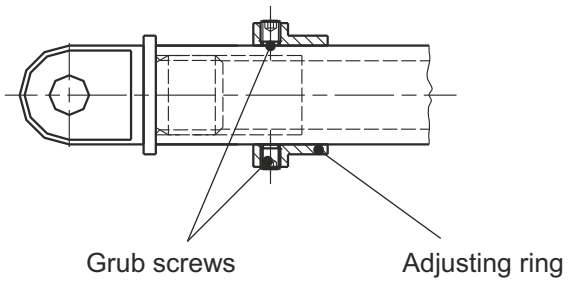
## *Limit switches*




**System advantages:**

- No continuous contact of limit switch and piston rod
- Improved insulation and more stability, no switching grooves
- End of stroke damping through installed spring
- Better control of the piston rod

**Adjusting ring for retracted position**



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# Mini 0



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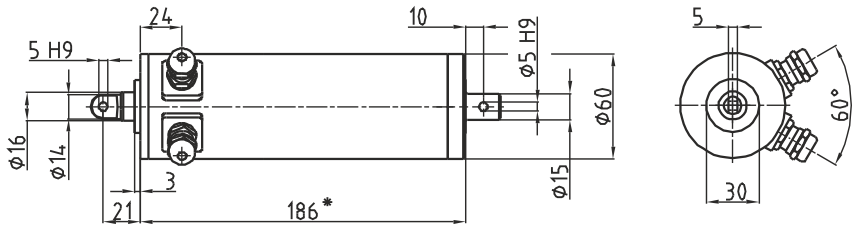
# Framo Morat Linear actuator Mini 0

## *Dimensions of standard drive and fixing versions* [mm]

**Standard version: AC, stroke 100 mm, transmission ratio 1-stage or 1-st., fixing version A**



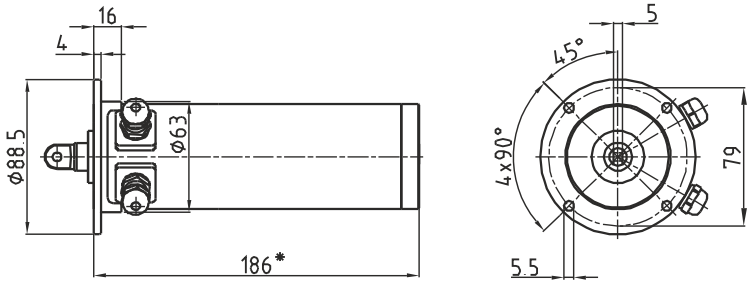

The * marked dimensions specify the drive lengt, of a standard drive (that means stroke length 100mm and transmission ratio 1-stage). For longer stroke length and/or gear stages please add the corresponding dimensions **x** and **y** from the table below.

| Gear | 1-stage | 2-stage | 3-stage |
|---|---|---|---|
| **x** | 0 | 12 | 24 |

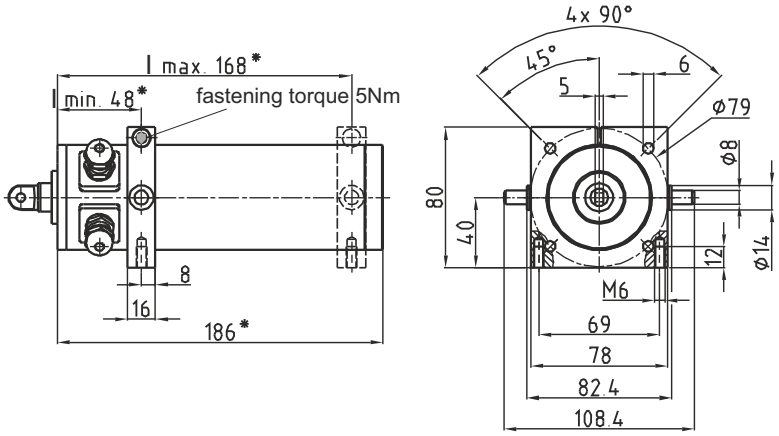
+

| Stroke length | 100 | 150 | 200 | 250 | 300 |
|---|---|---|---|---|---|
| **y** | 0 | 50 | 100 | 150 | 200 |

**Fixing version C**




**Fixing version D, E, F** (Please define dimension l in order or inquiry)



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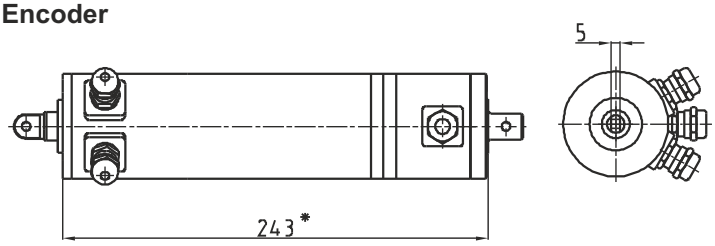
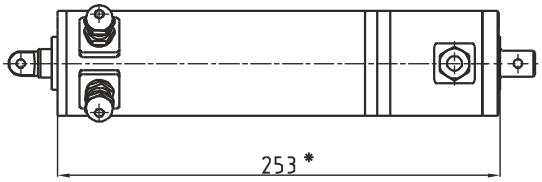
# FramoMorat Linear actuator Mini 0

## *Dimensions options* [mm]

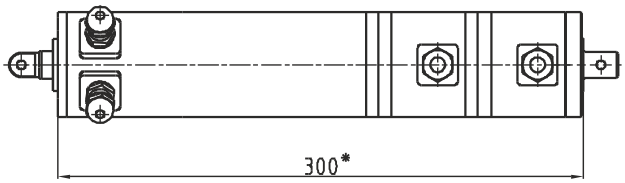
**Brake** or
**Encoder**



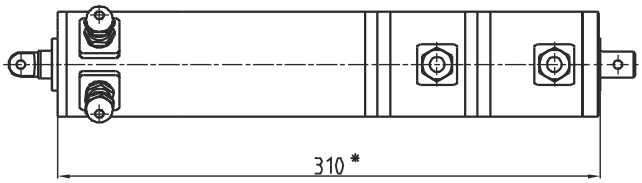

**Potentiometer**




**Brake and Encoder**

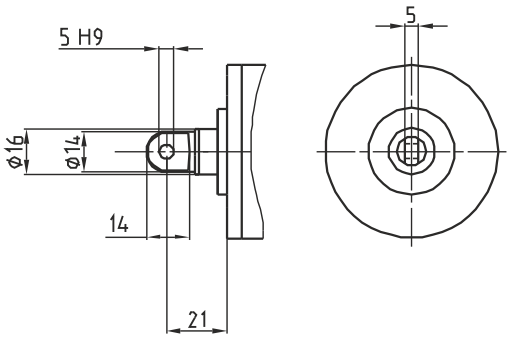



**Brake and Potentiometer**

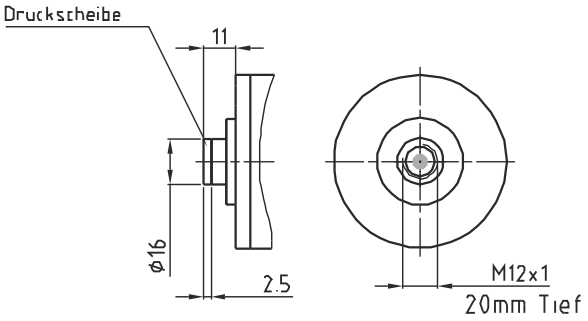



## *Dimensions connection heads* [mm]

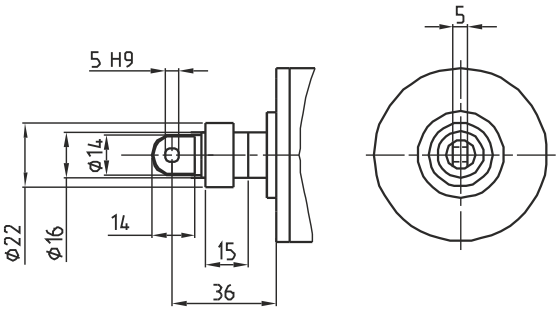
**Standard connection head**



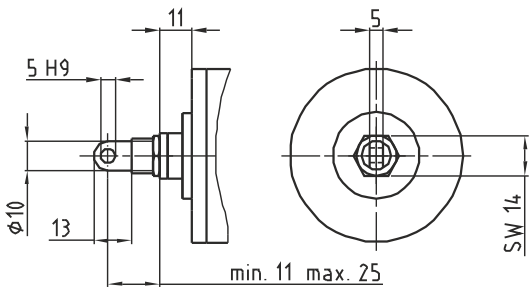

**without connection head**




**Adjustment ring**




**Adjustable connection head**



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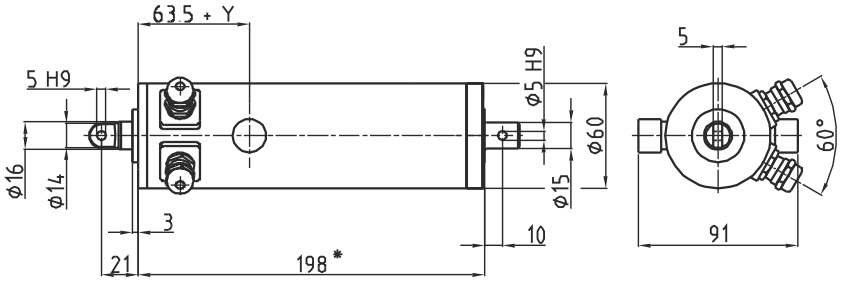
## *Dimensions DC-version* [mm]

**Standard version: AC, stroke 100 mm, transmission ratio 1-stage, fixing version A**

### DC fixing version A



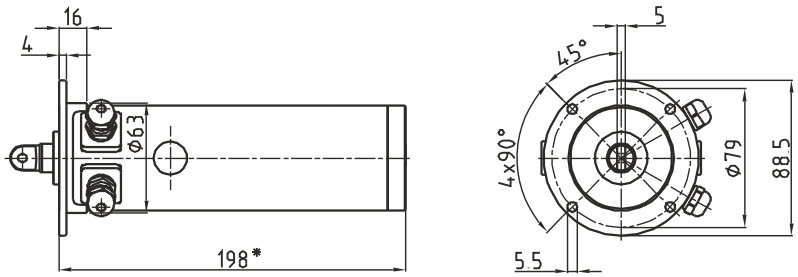

The * marked dimensions specify the drive length, of a standard drive (that means stroke length 100mm and transmission ratio 1-stage). For longer stroke length and/or gear stages please add the corresponding dimensions **x** and **y** from the table below.

| Gear | 1-stage | 2-stage | 3-stage |
|---|---|---|---|
| **x** | 0 | 12 | 24 |

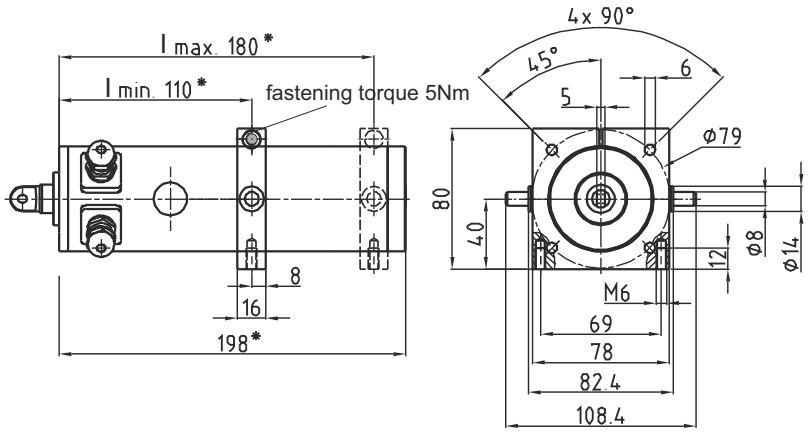
+

| Stroke length | 100 | 150 | 200 | 250 | 300 |
|---|---|---|---|---|---|
| **y** | 0 | 50 | 100 | 150 | 200 |

### DC fixing version C




### DC fixing version D, E, F (Please define dimension I in order or inquiry)



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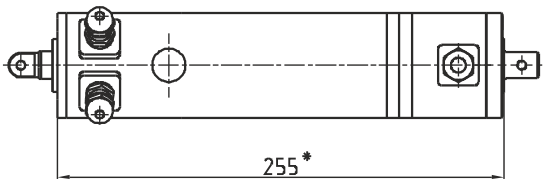
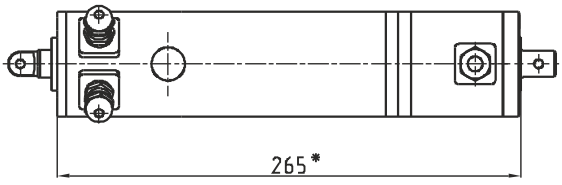
# FramoMorat Linear actuator Mini 0

## *Dimensions DC options* [mm]

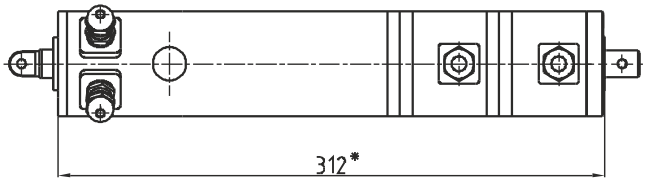
**Brake** or
**Encoder**



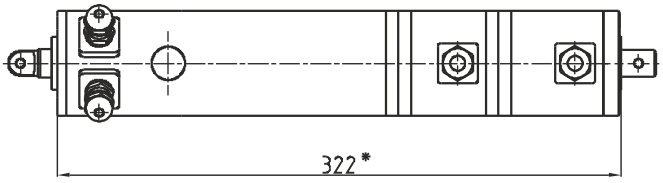

**Potentiometer**




**Brake and Encoder**




**Brake and Potentiometer**




## *Power tables*

### AC 1 x 230 V - 50 Hz

| Motor speed | Motor power | Duty cycle | Planetary gear stages | Trapezoidal thread | Stroke speed | maximum stroke force [N] at stroke length [mm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 100 | 150 | 200 | 250 |
| $min^{-1}$ | kW | % | | mm | mm/s | | | | 300 |
| 1200 | 0,030 | 15 | 1-st. | 10x6 So | 30* | 450 | 450 | 450 | 450 |
| 1200 | 0,030 | 15 | 1-st. | 10x3 Sd | 15 | 600 | 600 | 600 | 600 |
| 1200 | 0,030 | 15 | 1-st. | 10x2 Sd | 10 | 600 | 600 | 600 | 600 |
| 1200 | 0,030 | 15 | 2-st. | 10x6 So | 8 | 1000 | 1000 | 1000 | 600 |
| 1200 | 0,015 | 30-40 | 2-st. | 10x3 Sd | 4 | 1000 | 1000 | 1000 | 600 |
| 1200 | 0,015 | 30-40 | 2-st. | 10x2 Sd | 2,7 | 1000 | 1000 | 1000 | 600 |
| 1200 | 0,015 | 50-60 | 3-st. | 10x6 So | 2 | 1000 | 1000 | 1000 | 600 |
| 1200 | 0,015 | 50-60 | 3-st. | 10x3 Sd | 1 | 1000 | 1000 | 1000 | 600 |
| 1200 | 0,015 | 50-60 | 3-st. | 10x2 Sd | 0,7 | 1000 | 1000 | 1000 | 600 |

### DC 24 V DC

| Motor speed | Motor power | Duty cycle | Planetary gear stages | Trapezoidal thread | Stroke speed | maximum stroke force[N] at stroke lenght [mm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 100 | 150 | 200 | 250 |
| $min^{-1}$ | kW | % | | mm | mm/s | | | | 300 |
| 1600 | 0,055 | 25 | 1-st. | 10x6 So | 40* | 450 | 450 | 450 | 450 |
| 2000 | 0,055 | 25 | 1-st. | 10x3 Sd | 25* | 600 | 600 | 600 | 600 |
| 2000 | 0,055 | 25 | 1-st. | 10x2 Sd | 16* | 600 | 600 | 600 | 600 |
| 2100 | 0,055 | 25 | 2-st. | 10x6 So | 14* | 900 | 900 | 900 | 600 |
| 2300 | 0,055 | 50 | 2-st. | 10x3 Sd | 7,5 | 1000 | 1000 | 1000 | 600 |
| 2500 | 0,055 | 50 | 2-st. | 10x2 Sd | 5,5 | 1000 | 1000 | 1000 | 600 |
| 2600 | 0,055 | 50 | 3-st. | 10x6 So | 4,5 | 1000 | 1000 | 1000 | 600 |
| 2600 | 0,055 | 50 | 3-st. | 10x3 Sd | 2,2 | 1000 | 1000 | 1000 | 600 |
| 2600 | 0,055 | 50 | 3-st. | 10x2 Sd | 1,5 | 1000 | 1000 | 1000 | 600 |

So = no self-locking; Ss = static self-locking; Sd = dynamic self-locking
1-stage = 3,9:1
2-stage = 15,2:1
3-stage = 59,3:1

* Brake requested.
Duty cycle applies to 10 min. duty time.
For tensile loading applies the maximum stroke force of the particular stroke speed.



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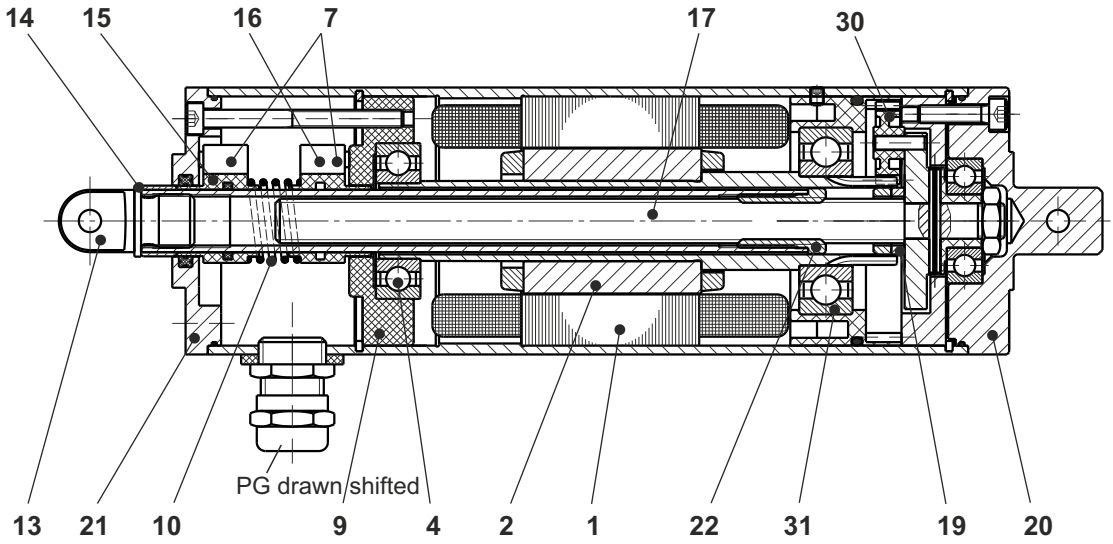
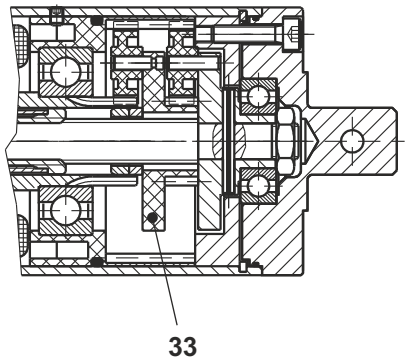
# Framo Morat Linear actuator Mini 0

## *Spare parts list*

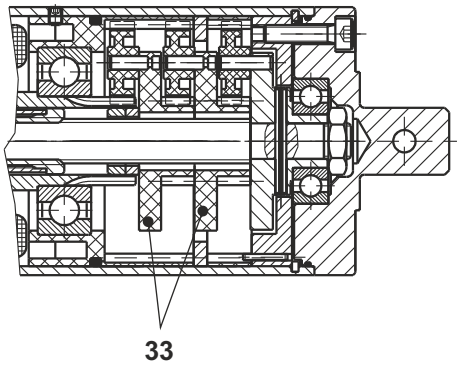
**AC**




**2-stage planetary gear**




**3-stage planetary gear**




| Item | Part name | Article-No. |
|---|---|---|
| 1 | Stator | Serial-No. |
| 2 | Rotor cpl. | Serial-No. |
| 4 | Grooved ball bearing | 00300100600383 |
| 7 | Limit switch | 02450100000760 |
| 9 | Terminal board cpl. | Serial-No. |
| 10 | Pressure spring | 8-2000-01.02 |
| 13 | Connection head | Serial-No. |
| 14 | Pressure disc | Serial-No. |
| 15 | Switch jack 1 with quadring and limit switch | 8-2000-05.00 |
| 16 | Switch jack 2 with limit switch | 8-2000-06.00 |
| 17 | Spindle cpl. | Serial-No. |
| 19 | Felt ring | 8-2001-01.12 |
| 20 | Gear cover | Serial-No. |
| 21 | Bearing plate with quadring | 8-2000-01.12N |
| 22 | Spindlenut, piston tube | Serial-No. |
| 30 | Planet wheel | 8-2000-60.03R |
| 31 | Internal ring gear with grooved ball bearing | Serial-No. |
| 33 | Planet wheel carrier toothed | Serial-No. |



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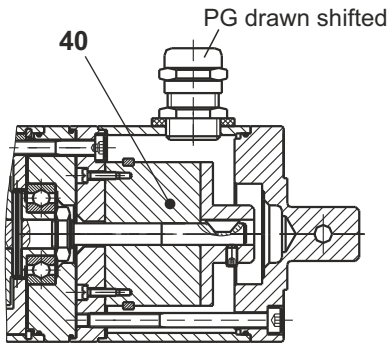
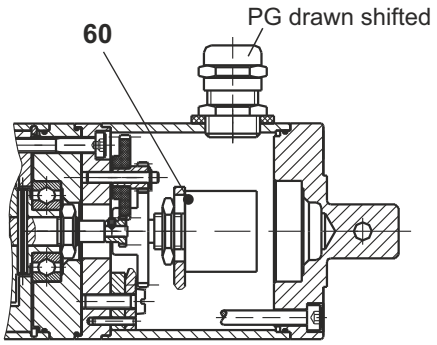
## *Spare parts list*

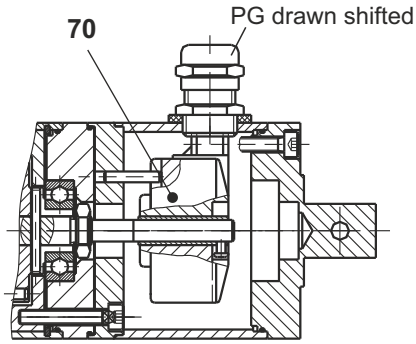
### Spring applied single disc brake




### Potentiometer




### Encoder




| Item | Part name | Article-No. |
|---|---|---|
| 40 | Spring applied single disc brake ..... | Serial-Nr. |
| 60 | Potentiometer ..... | Serial-Nr. |
| 70 | Encoder ..... | Serial-Nr. |



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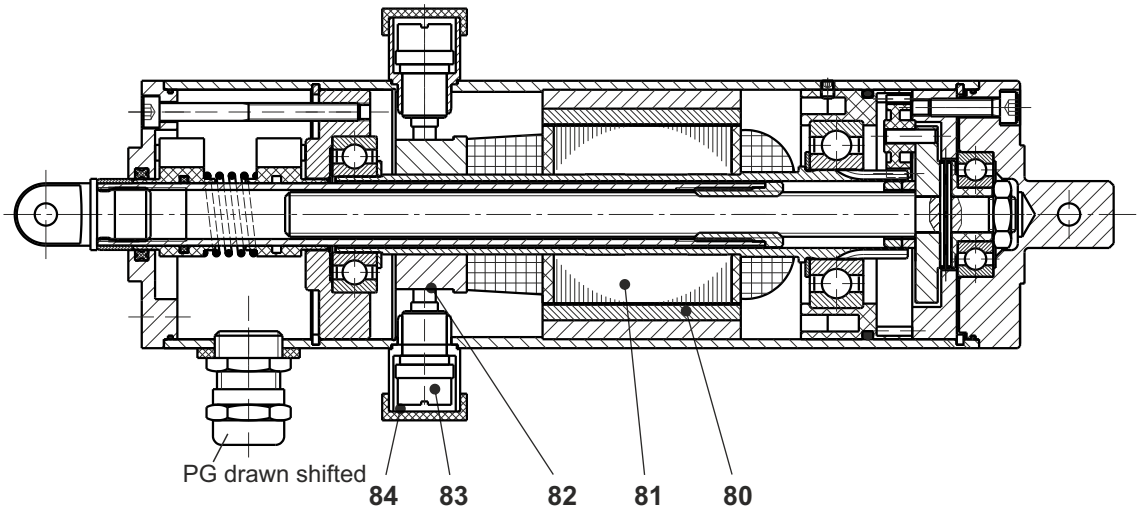
## *Spare parts list*

**DC**




| Item | Part name | Article-No. |
|---|---|---|
| 80 | DC field | Serial-Nr. |
| 81 | DC armature | 8-2000-21.00 |
| 82 | Bronze-carbon | 8-2000-10.05 |
| 83 | Brush holder | 8-2000-10.03 |
| 84 | Jack | 8-2000-10.04 |



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# Mini 01



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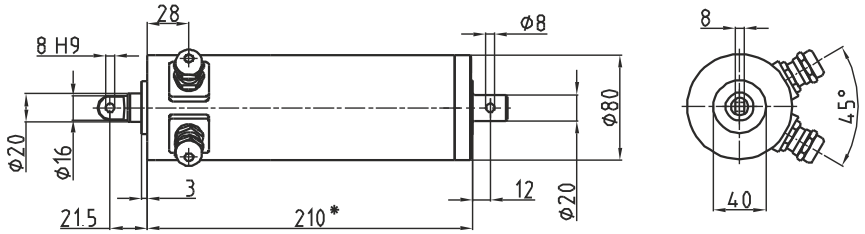
## *Dimensions of standard drive and fixing versions* [mm]

**Standard version: Three-phase/AC, stroke 100 mm, transmission 1-stage, fixing A**



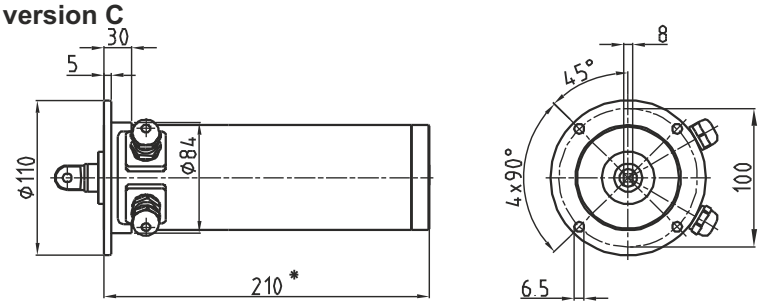

The * marked dimensions specify the drive length of a standard drive (that means stroke length 100mm and transmission ratio 1-stage). For longer stroke length and/or different gear stages please add the corresponding dimensions **x** and **y** from the table below.

| Gear | 1:1 | 1-stage | 2-stage | 3-stage |
|---|---|---|---|---|
| **x** | 0 | 0 | 17 | 32 |

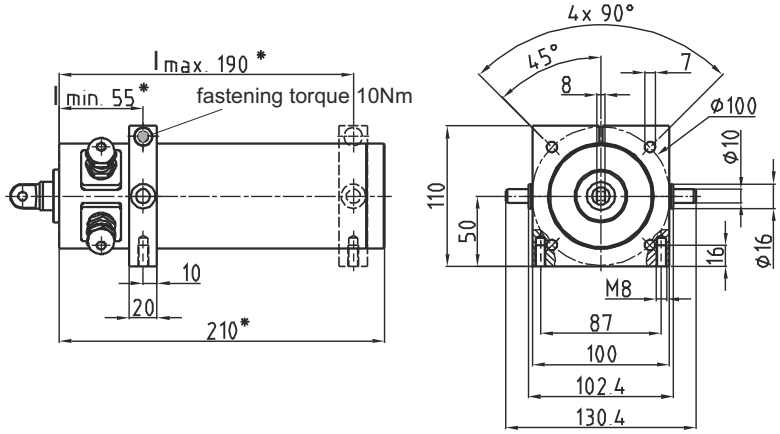
+

| stroke length | 100 | 150 | 200 | 250 | 300 |
|---|---|---|---|---|---|
| **y** | 0 | 50 | 100 | 150 | 200 |

**Fixing version C**




**Fixing version D, E, F** (Please define dimension l in order or inquiry)



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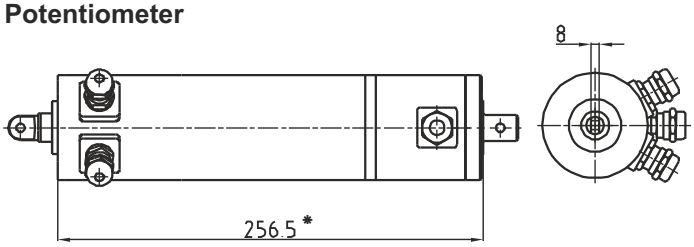
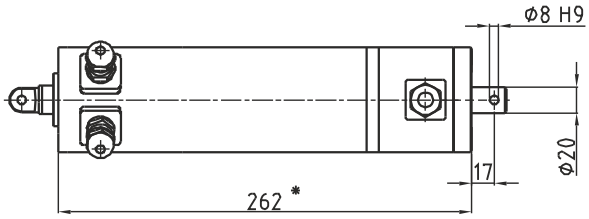
# FramoMorat Linear actuator Mini 01

## *Dimensions options* [mm]

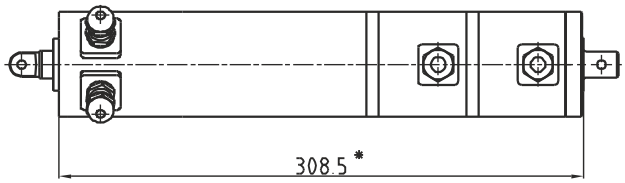
**Brake** or
**Encoder** or
**Potentiometer**



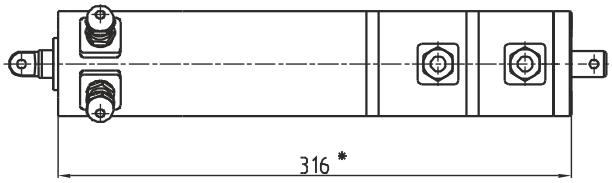

**Force dependent shut off**




**Brake and Encoderer** or
**Brake and Potentiometer**

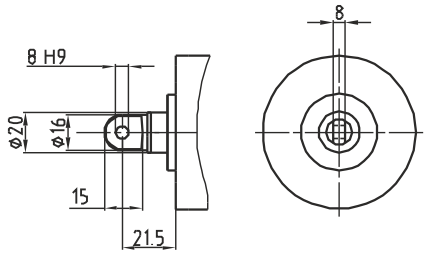



**Brake and force dependent shut off**

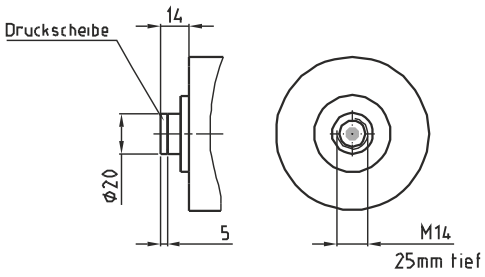



## *Dimensions connection heads* [mm]

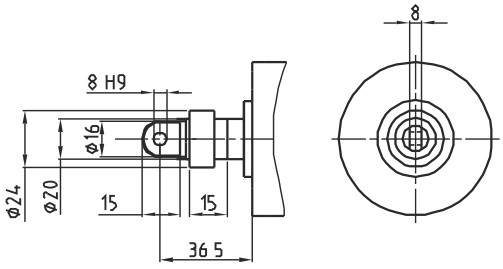
**Standard connection head**



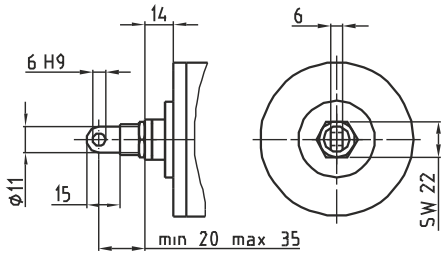

**Without connection head**




**Adjustment ring**




**Adjustable connection head**



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## *Power tables*

### AC 3 x 230 / 400 V - 50 Hz

| Motor speed | Motor power | Duty cycle | Planetary-gear | Trapezoidal-thread | Stroke speed | maximum Stroke force [N] at stroke length [mm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 100 | 150 | 200 | 250 300 |
| $min^{-1}$ | kW | % | | | mm/s | | | | |
| 1300 | 0,05 | 15 | 1:1 | 10x6 So | 130* | 200 | 200 | 200 | 200 |
| 1300 | 0,05 | 15 | 1:1 | 10x3 Sd | 65* | 280 | 280 | 280 | 280 |
| 1300 | 0,05 | 15 | 1:1 | 10x2 Sd | 43* | 310 | 310 | 310 | 310 |
| 1300 | 0,05 | 15 | 1-st. | 10x6 So | 30* | 700 | 700 | 700 | 540 |
| 1300 | 0,05 | 15 | 1-st. | 10x3 Sd | 15 | 1000 | 1000 | 1000 | 540 |
| 1300 | 0,05 | 15 | 1-st. | 10x2 Sd | 10 | 1000 | 1000 | 1000 | 1000 |
| 1300 | 0,032 | 40 | 2-st. | 10x6 So | 7 | 1500 | 1500 | 1000 | 540 |
| 1300 | 0,032 | 40 | 2-st. | 10x3 Sd | 3 | 1500 | 1500 | 1000 | 540 |
| 1300 | 0,022 | 50-60 | 2-st. | 10x2 Sd | 2 | 1500 | 1500 | 1500 | 1000 |
| 1300 | 0,022 | 50-60 | 3-st. | 10x6 So | 1,5 | 1600 | 1600 | 1000 | 540 |
| 1300 | 0,022 | 50-60 | 3-st. | 10x3 Sd | 1 | 1600 | 1600 | 1000 | 540 |
| 1300 | 0,022 | 50-60 | 3-st. | 10x2 Sd | 0,5 | 1600 | 1600 | 1600 | 1000 |

### AC 1 x 230 V - 50 Hz

| Motor speed | Motor power | Duty cycle | Planetary-gear | Trapezoidal-thread | Stroke speed | maximum stroke force [N] at stroke length [mm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 100 | 150 | 200 | 250 300 |
| $min^{-1}$ | kW | % | | | mm/s | | | | |
| 1300 | 0,043 | 15 | 1:1 | 10x6 So | 130* | 120 | 120 | 120 | 120 |
| 1300 | 0,043 | 15 | 1:1 | 10x3 Sd | 65* | 170 | 170 | 170 | 170 |
| 1300 | 0,043 | 15 | 1:1 | 10x2 Sd | 43* | 190 | 190 | 190 | 190 |
| 1300 | 0,043 | 15 | 1-st. | 10x6 So | 30* | 420 | 420 | 420 | 420 |
| 1300 | 0,043 | 15 | 1-st. | 10x3 Sd | 15 | 600 | 600 | 600 | 540 |
| 1300 | 0,043 | 15 | 1-st. | 10x2 Sd | 10 | 600 | 600 | 600 | 600 |
| 1300 | 0,032 | 15/40 | 2-st. | 10x6 So | 7 | 1500/900 | 1500/900 | 1000/600 | 540 |
| 1300 | 0,032 | 15/40 | 2-st. | 10x3 Sd | 3 | 1500/900 | 1500/900 | 1000/600 | 540 |
| 1300 | 0,022 | 15/50-60 | 2-st. | 10x2 Sd | 2 | 1500/900 | 1500/900 | 1500/900 | 1000 |
| 1300 | 0,022 | 15/50-60 | 3-st. | 10x6 So | 1,5 | 1600/960 | 1600/960 | 1000/600 | 540 |
| 1300 | 0,022 | 15/50-60 | 3-st. | 10x3 Sd | 1 | 1600/960 | 1600/960 | 1000/600 | 540 |
| 1300 | 0,022 | 15/50-60 | 3-st. | 10x2 Sd | 0,5 | 1600/960 | 1600/960 | 1600/960 | 1000 |

So = no self-locking; Ss = static self-locking; Sd = dynamic self-locking
1-stage = 4,3:1
2-stage = 18,9:1
3-stage = 82,3:1

* Starting at stroke speed of 20 mm/sec. a brake is requested.
Duty cycle applies to 10 min. duty time.
For tensile loading applies the maximum stroke force of the particular stroke speed.
Actuators with single phase motors reach only 60% of the force and motor power of those with 3-phase motors and 15 % stated duty cycle.
The force and motor power stated at 40% and 60% won't change if the actuator is operated at 15% duty cycle.



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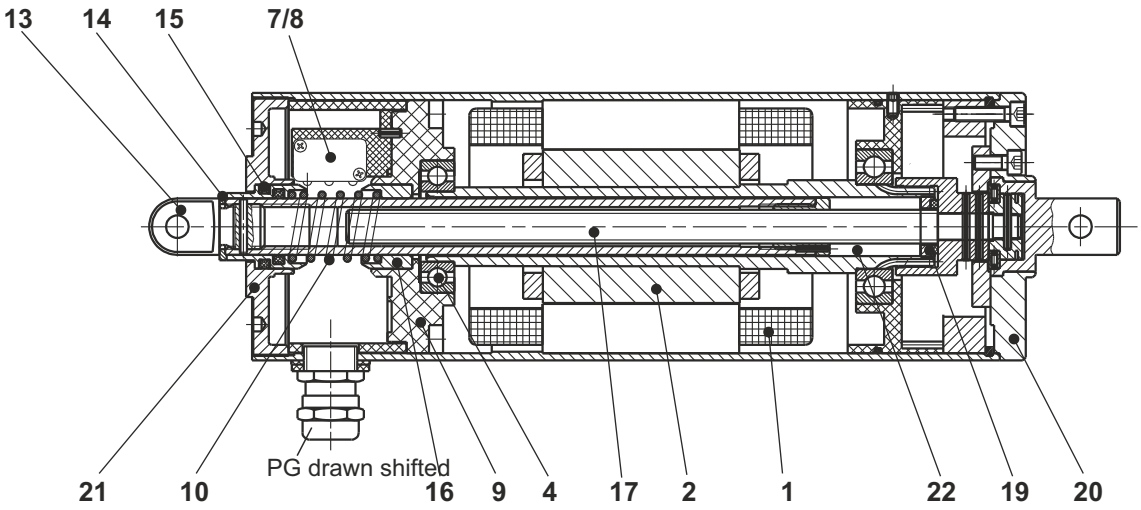
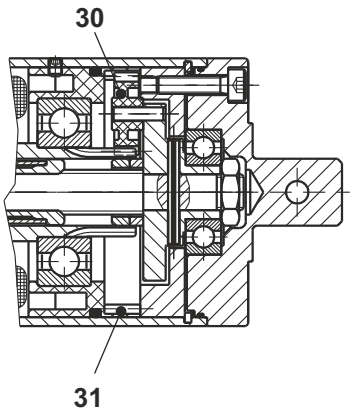
# FramoMorat Linear actuator Mini 01

## *Spare parts list*

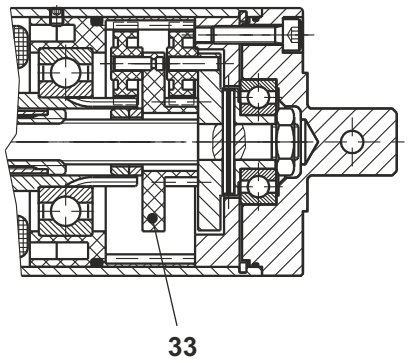
**AC 3x230V / 110V, transmission ratio 1:1**



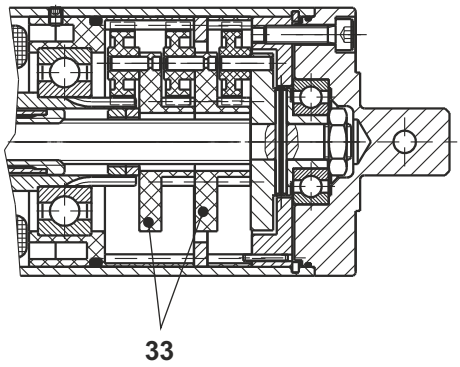

**1-stage planetary gear**




**2-stage planetary gear**




**3-stage planetary gear**




| Item | Part name | Article-No. |
|---|---|---|
| 1 | Stator | Serial-No. |
| 2 | Rotor cpl. | Serial-No. |
| 4 | Grooved ball bearing | 00300100600483 |
| 7 | Limit switch | 02450100000600 |
| 8 | Safety limit switch | 02450100000250 |
| 9 | Terminal board cpl. | Serial-No. |
| 10 | Pressure spring | 00155002470120 |
| 13 | Connection head | Serial-No. |
| 14 | Pressure disc | Serial-No. |
| 15 | Switch jack 1 with quadrings | 8-2001-01.05N |
| 16 | Switch jack 2 | 8-2001-01.06A |
| 17 | Spindle cpl. | Serial-No. |
| 19 | Felt ring | 8-2001-01.12 |
| 20 | Gear cover | Serial-No. |
| 21 | Bearing plate | 8-2001-01.08N |
| 22 | Spindlenut, piston tube | Serial-No. |
| 30 | Planet wheel | 8-2001-130.04 |
| 31 | Internal ring gear cpl. | Serial-No. |
| 33 | Planet wheel carrier toothed | Serial-No. |



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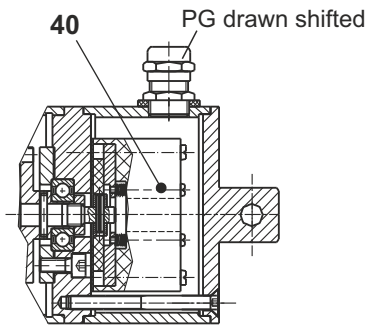
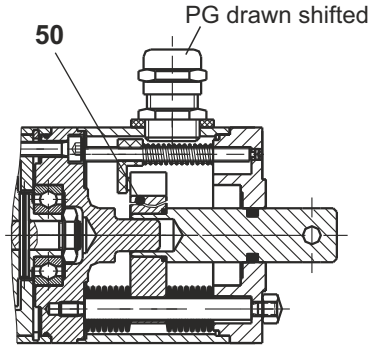
## *Spare parts list*

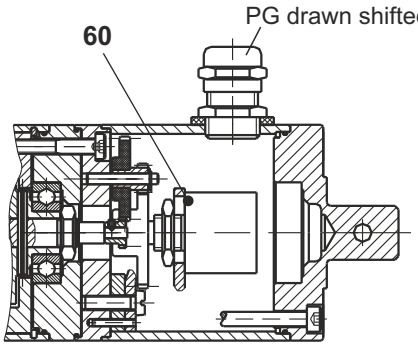
### Spring applied single disc brake



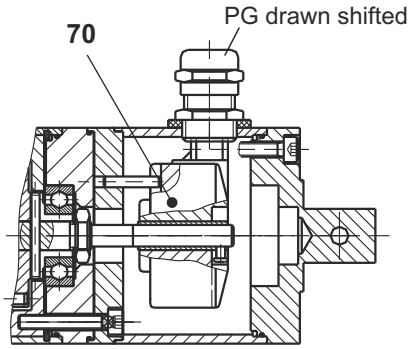

### Force dependent shut off




### Potentiometer




### Encoder




| Item | Part name | Article-No. |
|---|---|---|
| 40 | Spring applied single disc brake ..... | Serial-Nr. |
| 50 | Force dependent shut off ..... | Serial-Nr. |
| 60 | Potentiometer ..... | Serial-Nr. |
| 70 | Encoder ..... | Serial-Nr. |



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# Mini 1



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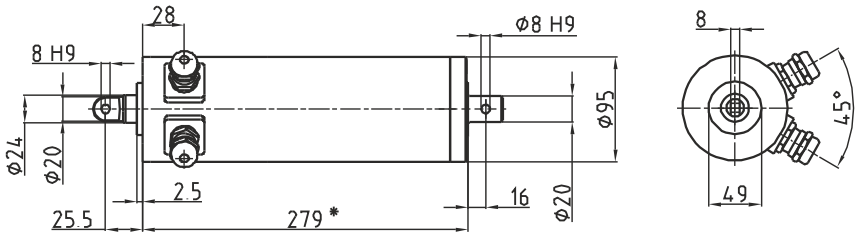
## *Dimensions of standard drive and fixing versions* [mm]

**Standard version: Three-phase/AC, stroke 150 mm, transmission 1-stage, fixing A**



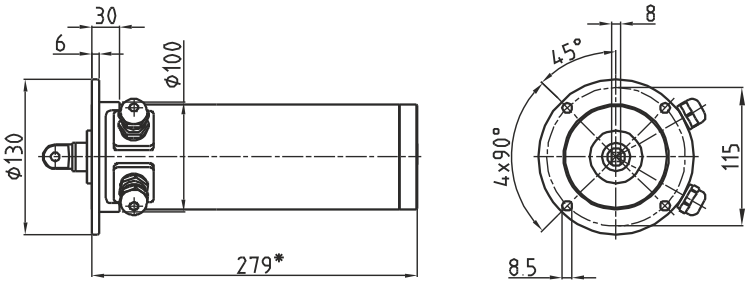

The * marked dimensions specify the drive length of a standard drive (that means stroke length 150mm and transmission ratio 1-stage). For longer stroke length and/or different gear stages please add the corresponding dimensions **x** and **y** from the table below.

| Gear | 1:1 | 1-stage | 2-stage | 3-stage |
|---|---|---|---|---|
| **x** | 0 | 0 | 20 | 40 |

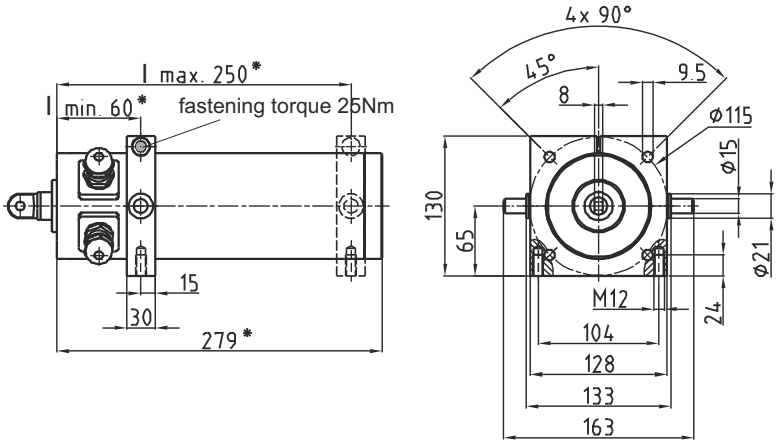
+

| Stroke length | 150 | 200 | 250 | 300 | 350 | 400 |
|---|---|---|---|---|---|---|
| **y** | 0 | 50 | 100 | 150 | 200 | 250 |

**Fixing version C**




**Fixing version D, E, F** (Please define dimension l in order or inquiry)



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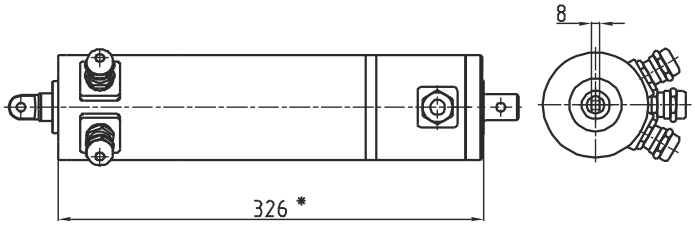
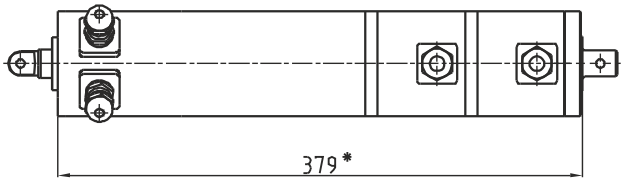
# FramoMorat Linear actuator Mini 1

## *Dimensions options* [mm]

**Brake** or
**Encoder** or
**Potentiometer**

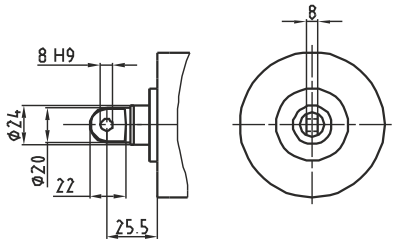



**Brake and Encoder** or
**Brake and Potentiometer**

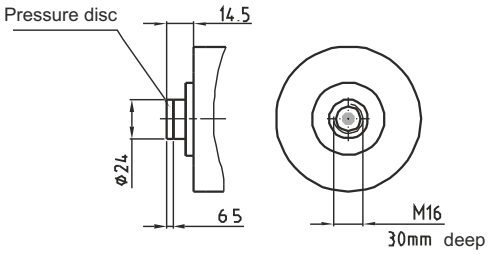



## *Dimension connection heads* [mm]

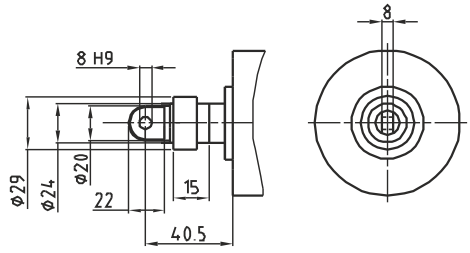
### Standard connection head



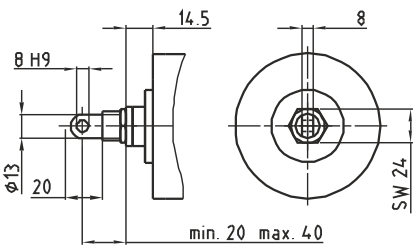

### Without connection head




### Adjustment ring




### Adjustable connection head



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# Framo Morat Linear actuator Mini 1

## *Power tables*

### AC 3 x 230 / 400 V - 50 Hz

| Motor speed | Motor power | Duty cycle | Planetary gear | Trapezoidal thread | Stroke speed | maximum stroke force [N] at stroke length [mm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 150 | 200 | 250 | 350 |
| min$^{-1}$ | kW | % | | | mm/s | | | 300 | 400 |
| 1360 | 0,18 | 15 | 1:1 | 12x6 So | 136* | 600 | 600 | 600 | 600 |
| 1360 | 0,18 | 15 | 1:1 | 12x3 Sd | 68* | 850 | 850 | 850 | 850 |
| 1360 | 0,18 | 15 | 1:1 | 12x2 Sd | 45* | 900 | 900 | 900 | 900 |
| 1360 | 0,18 | 15 | 1-st. | 12x6 So | 32* | 2200 | 2200 | 1560 | 940 |
| 1360 | 0,18 | 15 | 1-st. | 12x4 Ss | 21* | 2500 | 2500 | 2500 | 1640 |
| 1360 | 0,18 | 15 | 1-st. | 12x3 Sd | 16 | 2510 | 2510 | 1560 | 940 |
| 1360 | 0,18 | 15 | 1-st. | 12x2 Sd | 10,5 | 3300 | 3300 | 2740 | 1640 |
| 1360 | 0,11 | 40 | 2-st. | 12x6 So | 7 | 3500 | 3000 | 1560 | 940 |
| 1360 | 0,11 | 40 | 2-st. | 12x4 Ss | 5 | 3500 | 3500 | 2740 | 1640 |
| 1360 | 0,11 | 40 | 2-st. | 12x2 Sd | 2,5 | 3500 | 3500 | 2740 | 1640 |
| 1360 | 0,06 | 50-60 | 3-st. | 12x4 Ss | 1 | 3500 | 3500 | 2740 | 1640 |
| 1360 | 0,06 | 50-60 | 3-st. | 12x2 Sd | 0,5 | 3500 | 3500 | 2740 | 1640 |

### AC 1 x 230 V - 50 Hz

| Motor speed | Motor power | Duty cycle | Planetary gear | Trapezoidal thread | Stroke speed | maximum stroke force [N] at stroke length [mm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 150 | 200 | 250 | 350 |
| min$^{-1}$ | kW | % | | | mm/s | | | 300 | 400 |
| 1360 | 0,14 | 15 | 1:1 | 12x6 So | 136* | 360 | 360 | 360 | 360 |
| 1360 | 0,14 | 15 | 1:1 | 12x3 Sd | 68* | 500 | 500 | 500 | 500 |
| 1360 | 0,14 | 15 | 1:1 | 12x2 Sd | 45* | 540 | 540 | 540 | 540 |
| 1360 | 0,14 | 15 | 1-st. | 12x6 So | 32* | 1300 | 1300 | 1300 | 940 |
| 1360 | 0,14 | 15 | 1-st. | 12x4 Ss | 21* | 1500 | 1500 | 1500 | 1500 |
| 1360 | 0,14 | 15 | 1-st. | 12x3 Sd | 16 | 1500 | 1500 | 1500 | 940 |
| 1360 | 0,14 | 15 | 1-st. | 12x2 Sd | 10,5 | 2300 | 2300 | 2300 | 1640 |
| 1360 | 0,11 | 15/40 | 2-st. | 12x6 So | 7 | 3500/2100 | 3000/1800 | 1560/940 | 940 |
| 1360 | 0,11 | 15/40 | 2-st. | 12x4 Ss | 5 | 3500/2100 | 3500/2100 | 2740/1640 | 1640 |
| 1360 | 0,11 | 15/40 | 2-st. | 12x2 Sd | 2,5 | 3500/2100 | 3500/2100 | 2740/1640 | 1640 |
| 1360 | 0,05 | 15/50-60 | 3-st. | 12x4 Ss | 1 | 3500/2100 | 3500/2100 | 2740/1640 | 1640 |
| 1360 | 0,05 | 15/50-60 | 3-st. | 12x2 Sd | 0,5 | 3500/2100 | 3500/2100 | 2740/1640 | 1640 |

So = no self-locking; Ss = static self-locking; Sd = dynamic self-locking
1-stage = 4,3:1
2-stage = 18,9:1
3-stage = 82,3:1

* Starting at stroke speed of 20 mm/sec. a brake is requested.
Duty cycle applies to 10 min. duty time.
For tensile loading applies the maximum stroke force of the particular stroke speed.
Actuators with single phase motors reach only 60% of the force and motor power of those with 3-phase motors and 15 % stated duty cycle.
The force and motor power stated at 40% and 60% won't change if the actuator is operated at 15% duty cycle.



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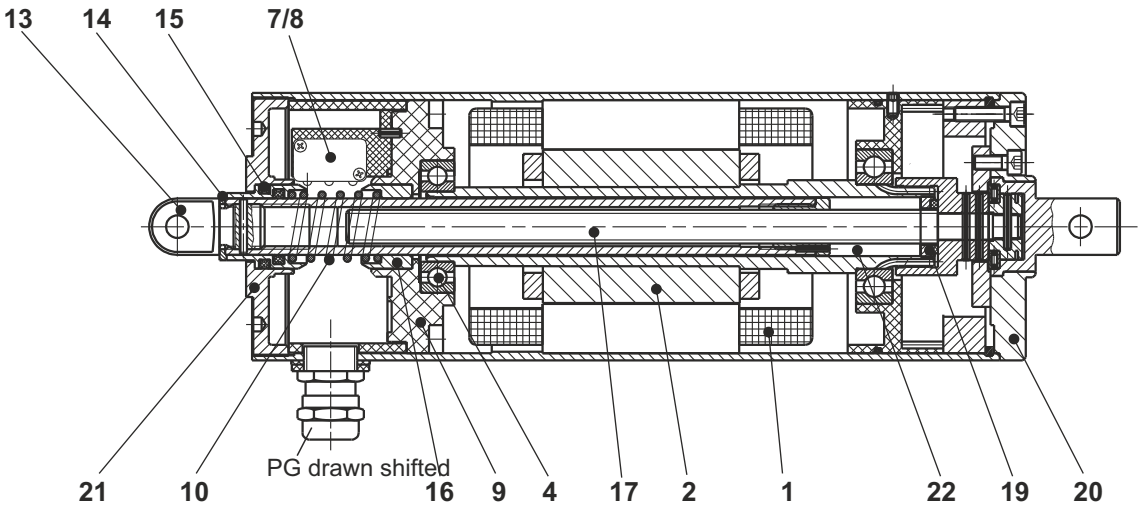
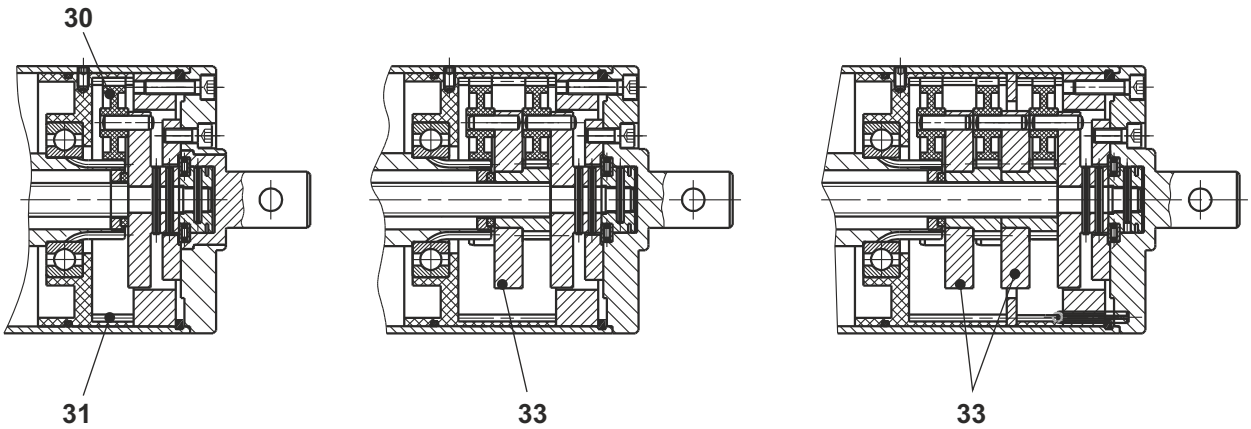
# FramoMorat Linear actuator Mini 1

## *Spare parts list*

**AC 3x230V / 110V, transmission ratio 1:1**




**1-stage planetary gear** **2-stage planetary gear** **3-stage planetary gear**




| Item | Part name | Article-No. |
|---|---|---|
| 1 | Stator | Serial-No. |
| 2 | Rotor cpl | Serial-No. |
| 4 | Grooved ball bearing | 00300100600583 |
| 7 | Limit switch | 02450100000600 |
| 8 | Safety limit switch | 02450100000250 |
| 9 | Terminal board cpl | Serial-No. |
| 10 | Pressure spring | 8-2010-01.12 |
| 13 | Connection head | Serial-No. |
| 14 | Pressure disc | Serial-No. |
| 15 | Switch jack 1 with quadrings | 8-2010-01.05N |
| 16 | Switch jack 2 | Z8-2010-01.06A |
| 17 | Spindle cpl | Serial-No. |
| 19 | Feltring | 8-2010-01.13 |
| 20 | Gear cover | Serial-No. |
| 21 | Bearing plate | 8-2010-01.07N |
| 22 | Spindlenut, piston tube | Serial-No. |
| 30 | Planet wheel | 8-2010-130.04 |
| 31 | Internal ring gear cpl | Serial-No. |
| 33 | Planet wheel carrier toothed | Serial-No. |



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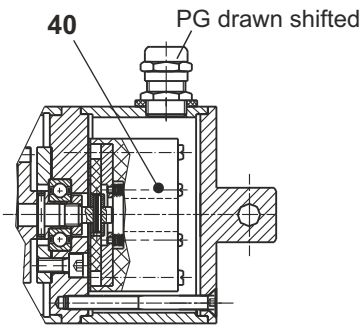
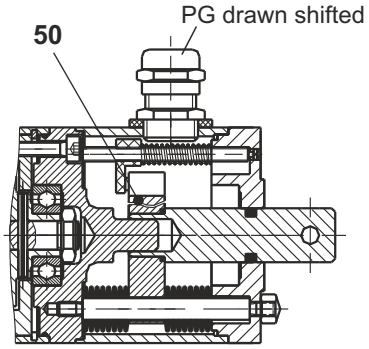
## *Spare parts list*

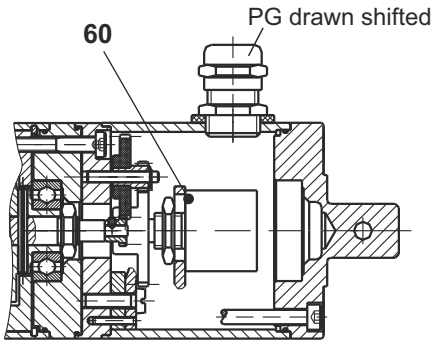
### Spring applied single disc brake



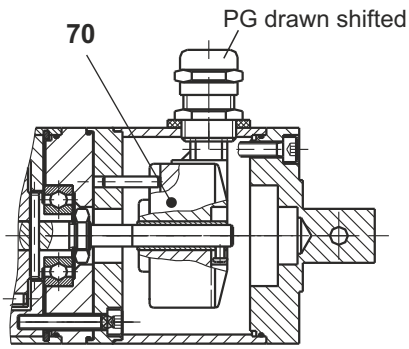

### Force dependent shut off




### Potentiometer




### Encoder




| Item | Part name | Article-No. |
|---|---|---|
| 40 | Spring applied single disc brake ..... | Serial-Nr. |
| 50 | Force dependent shut off ..... | Serial-Nr. |
| 60 | Potentiometer ..... | Serial-Nr. |
| 70 | Encoder ..... | Serial-Nr. |



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# Mini 2



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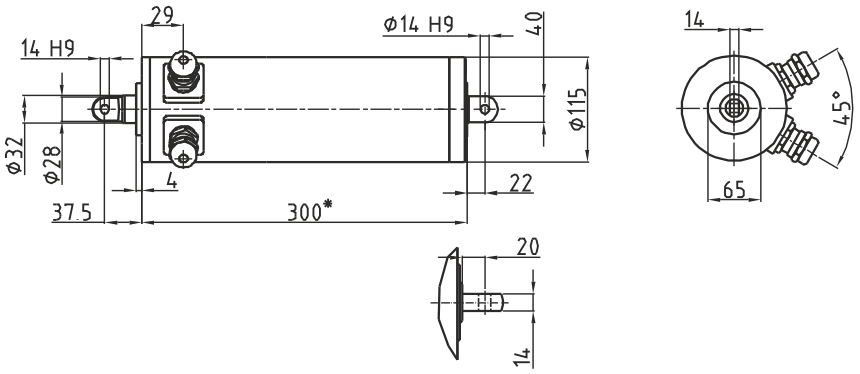
## *Dimensions of standard drive and fixing versions* [mm]

**Standard version: Three-phase/AC, stroke 175 mm, transmission 1-stage, fixing A**



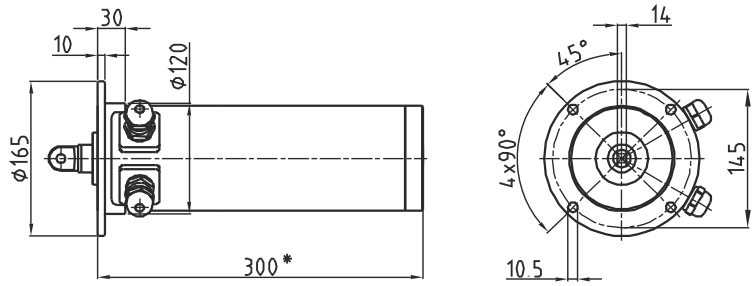

The * marked dimensions specify the drive lengt, of a standard drive (that means stroke length 175mm and transmission ratio 1-stage). For longer stroke length and/or different gear stages please add the corresponding dimensions **x** and **y** from the table below.

| Gear | 1-stage | 2-stage | 3-stage |
|---|---|---|---|
| **x** | 0 | 24 | 48 |

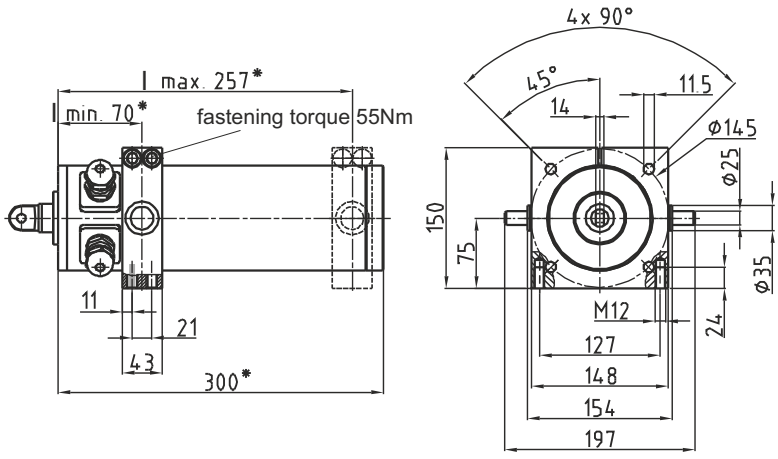
+

| Stroke lenght | 175 | 250 | 300 |
|---|---|---|---|
| **y** | 0 | 75 | 125 |

**Fixing version C**




**Fixing version D, E, F** (Please define dimension l in order or inquiry)



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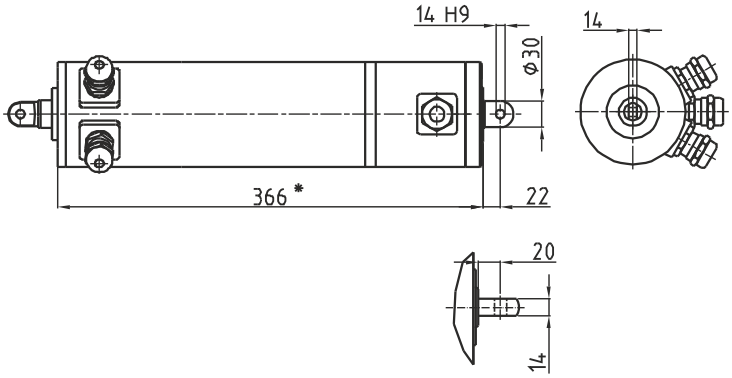
# Framo Morat Linear actuator Mini 2

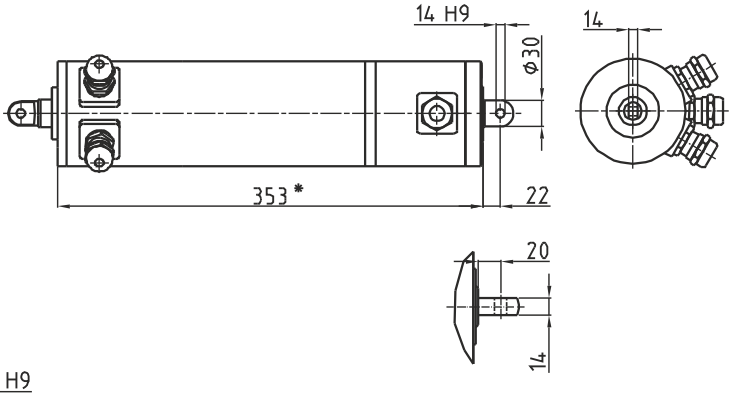
## *Dimensions options*

**[mm]**

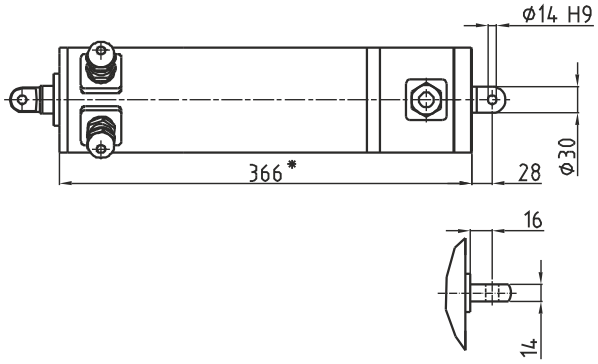
### Brake



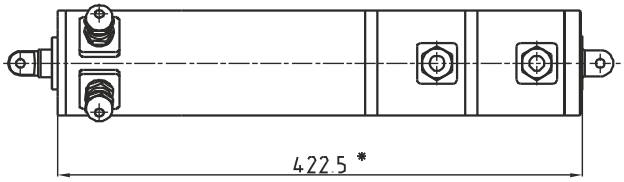

### **Encoder** or **Potentiometer**



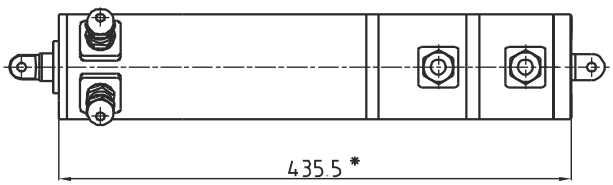

### Force dependent shut off




### **Brake and Encoder** or **Brake and Potentiometer**




### Brake and Force dependent shut off



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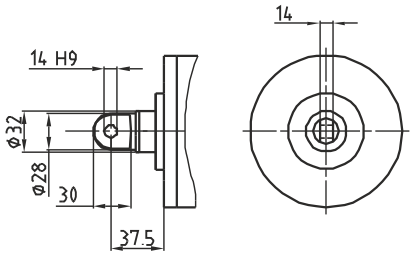
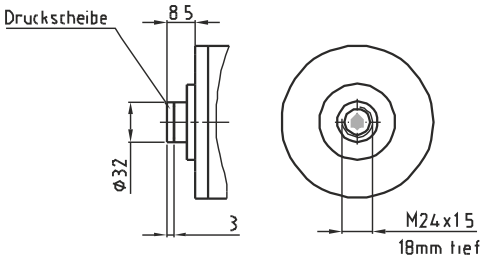
## *Dimensions connection heads*

[mm]

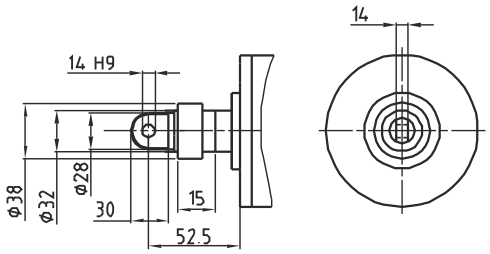
### Standard connection head



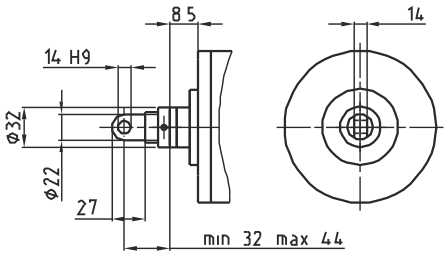

### without connection head




### Adjustmen ring




### Adjustable connection head




## *Power tables*

### AC 3 x 230 / 400 V - 50 Hz

| Motor speed | Motor power | Duty cycle | Planetary gear stages | Trapezoidal thread | Stroke speed | maximum stroke force [N] at stroke length [mm] | |
|---|---|---|---|---|---|---|---|
| | | | | | | 175 | 250 |
| min$^{-1}$ | kW | % | | | mm/s | | 300 |
| 1360 | 0,5 | 15 | 1-st. | 18x8 So | 49* | 3800 | 3800 |
| 1360 | 0,5 | 15 | 1-st. | 18x4 Ss | 24,5* | 5000 | 5000 |
| 1360 | 0,5 | 15 | 1-st. | 18x3 Sd | 18 | 5300 | 5300 |
| 1360 | 0,5 | 15 | 2-st. | 18x8 So | 13 | 10000 | 9080 |
| 1360 | 0,3 | 40 | 2-st. | 18x4 Ss | 6 | 10000 | 9080 |
| 1360 | 0,3 | 40 | 2-st. | 18x3 Sd | 5 | 10000 | 10000 |
| 1360 | 0,15 | 50-60 | 3-st. | 18x4 Ss | 2 | 14000 | 9080 |
| 1360 | 0,15 | 50-60 | 3-st. | 18x3 Sd | 1,5 | 14000 | 12000 |

So = no self-locking; Ss = static self-locking; Sd = dynamic self-locking
1-stage = 3,7:1
2-stage = 14,1:1
3-stage = 52,7:1

* Starting at stroke speed of 20 mm/sec. a brake is requested.
Duty cycle applies to 10 min. duty time.
For tensile loading applies the maximum stroke force of the particular stroke speed.
Actuators with single phase motors reach only 60% of the force and motor power of those with 3-phase motors and 15 % stated duty cycle.
The force and motor power stated at 40% and 60% won't change if the actuator is operated at 15% duty cycle.



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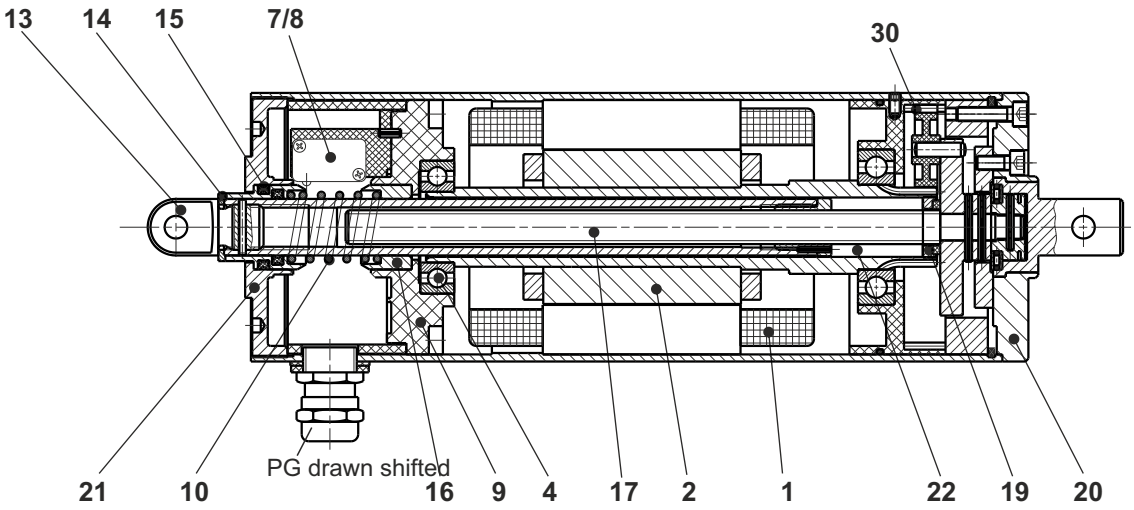
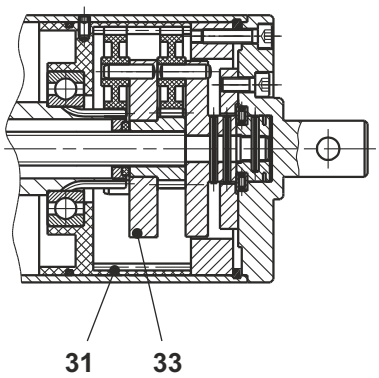
# FramoMorat Linear actuator Mini 2

## *Spare parts list*

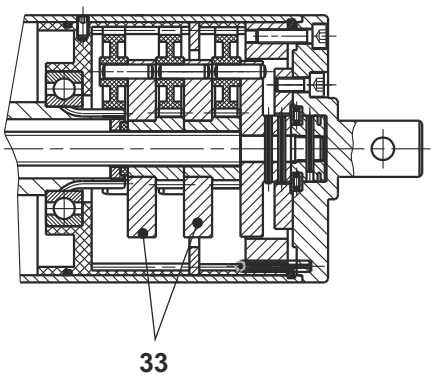
**AC 3x230V / 110V,**




**2-stage planetary gear**




**3-stage planetary gear**




| Item | Part name | Article-No. |
|---|---|---|
| 1 | Stator | Serial-No. |
| 2 | Rotor cpl | Serial-No. |
| 4 | Grooved ball bearing | 00300100600780 |
| 7 | Limit switch | 02450100000600 |
| 8 | Safety limit switch | 02450100000250 |
| 9 | Terminal board cpl | Serial-No. |
| 10 | Pressure spring | 00155002940100 |
| 13 | Connection head | Serial-No. |
| 14 | Pressure disc | Serial-No. |
| 15 | Switch jack 1 with quadrings | 8-2020-01.10 |
| 16 | Switch jack 2 | 8-2020-01.11 |
| 17 | Spindle cpl | Serial-No. |
| 19 | Feltring | 8-2020-60.06 |
| 20 | Gear cover | Serial-No. |
| 21 | Bearing plate | 8-2020-01.13A |
| 22 | Spindlenut, piston tube | Serial-No. |
| 30 | Planet wheel | Z8-2020-60.04 |
| 31 | Internal ring gear cpl | Serial-No. |
| 33 | Planet wheel carrier toothed | Serial-No. |



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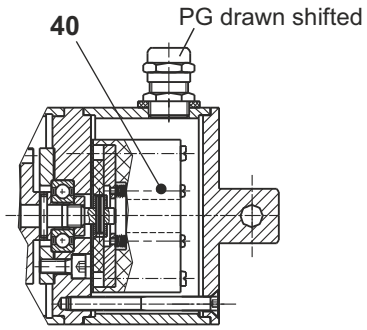
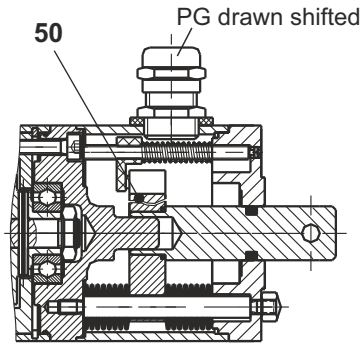
## *Spare parts list*

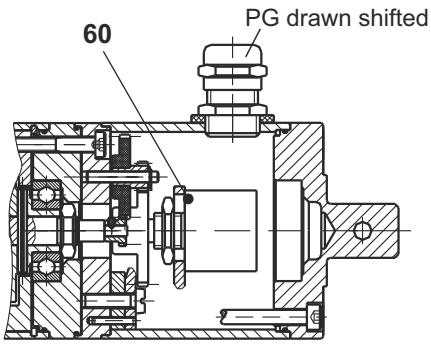
### Spring applied single disc brake



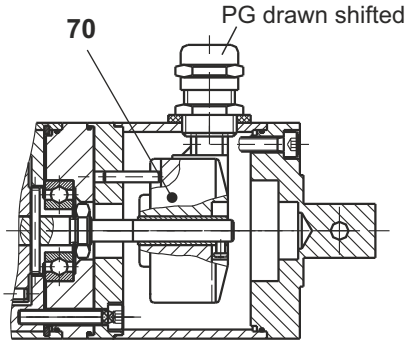

### Force dependent shut off




### Potentiometer




### Encoder




| Item | Part name | Article-No. |
|---|---|---|
| 40 | Spring applied single disc brake ..... | Serial-Nr. |
| 50 | Force dependent shut off ..... | Serial-Nr. |
| 60 | Potentiometer ..... | Serial-Nr. |
| 70 | Encoder ..... | Serial-Nr. |



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# Mini 3



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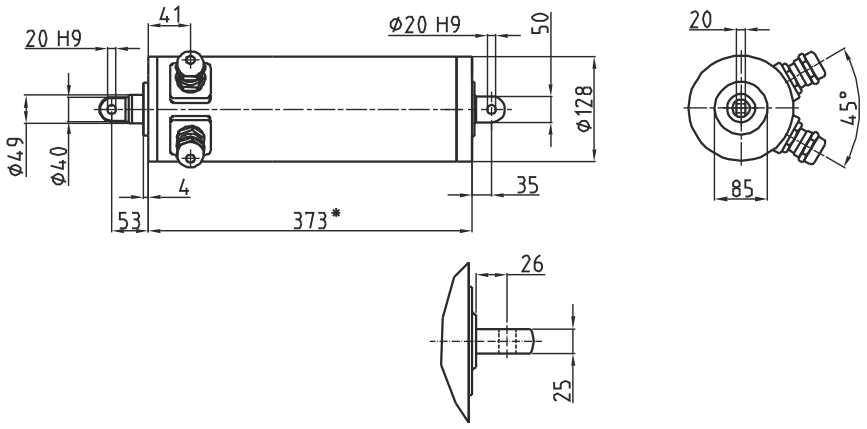
## *Dimensions of standard drive and fixing versions* [mm]

**Standard version: Three-phase/AC, stroke 175 mm, transmission 1-stage, fixing A**



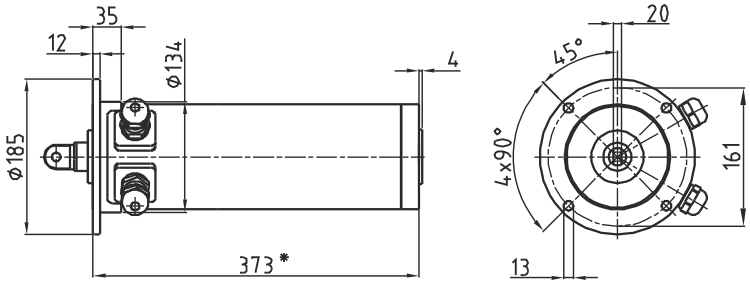

The * marked dimensions specify the drive lengt of a standard drive (that means stroke length 175mm and transmission ratio 1-stage). For longer stroke length and/or different gear stages please add the corresponding dimensions **x** and **y** from the table below.

| Gear | 1-stage | 2-stage | 3-stage |
|---|---|---|---|
| **x** | 0 | 35 | 70 |

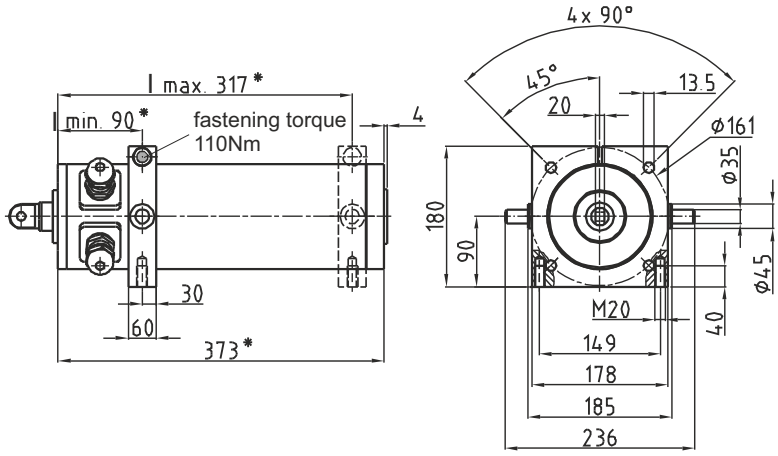
+

| stroke length | 175 | 250 | 300 | 350 | 400 | 450 | 500 |
|---|---|---|---|---|---|---|---|
| **y** | 0 | 75 | 125 | 175 | 225 | 275 | 325 |

**Fixing version C**




**Fixing version D, E, F** (Please define dimension l in order or inquiry)



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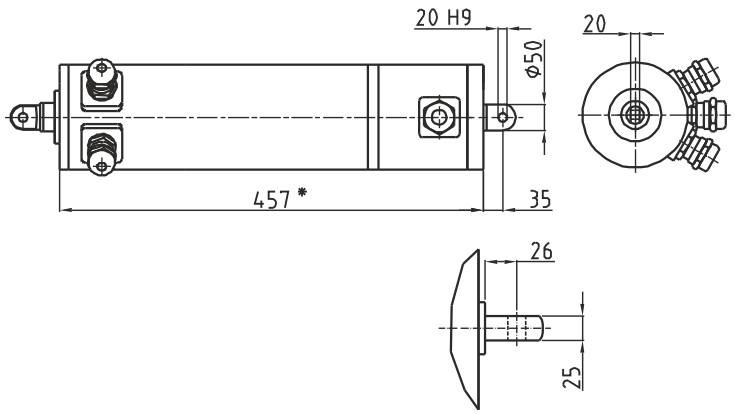
# FramoMorat Linear actuator Mini 3

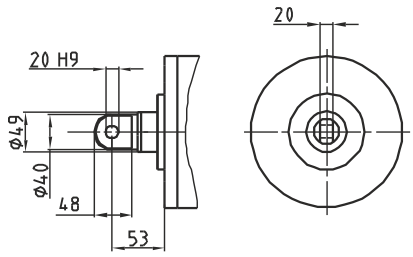
## *Dimensions options* [mm]

**Brake** or
**Encoder** or
**Potentiometer**

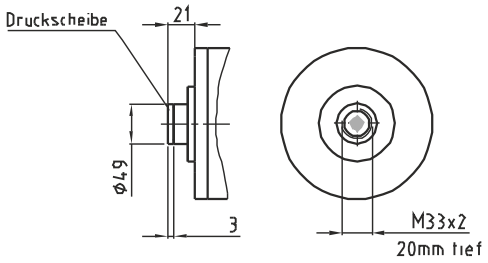



## *Dimensions connection heads* [mm]

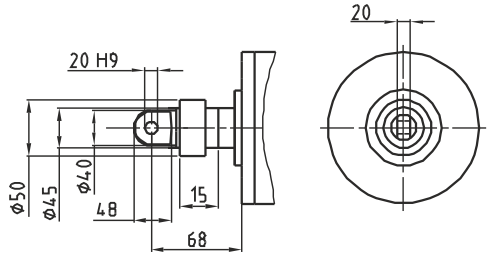
### Standard connection head



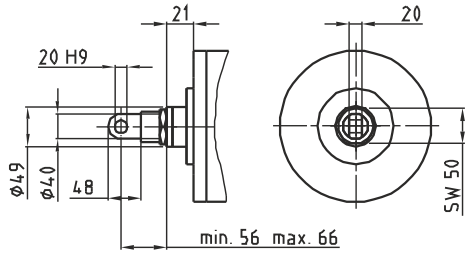

### Without connection head




### Adjustment




### Adjustable connection head



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# Framo Morat Linear actuator Mini 3

## *Power table*

### AC 3 x 230 / 400 V - 50 Hz

| Motor speed | Motor power | Duty cycle | Planetary gear stages | Trapezoidal thread | Stroke speed | maximum stroke force [N] at stroke length [mm] | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 175 | 250 | 350 | 450 |
| $min^{-1}$ | kW | % | | | mm/s | | 300 | 400 | 500 |
| 1400 | 1,5 | 15 | 1-st. | 28x8 Ss | 47* | 8100 | 8100 | 8100 | 8100 |
| 1400 | 1,5 | 15 | 1-st. | 28x5 Sd | 29* | 8900 | 8900 | 8900 | 8900 |
| 1400 | 1,5 | 15 | 1-st. | 28x3 Sd | 17,5 | 9900 | 9900 | 9900 | 9900 |
| 1400 | 1,5 | 15 | 2-st. | 28x8 Ss | 12 | 20000 | 20000 | 19400 | 13120 |
| 1400 | 1,5 | 15 | 2-st. | 28x5 Sd | 7,3 | 20000 | 20000 | 20000 | 20000 |
| 1400 | 0,75 | 40 | 2-st. | 28x3 Sd | 4,4 | 20000 | 20000 | 20000 | 20000 |
| 1400 | 0,5 | 50-60 | 3-st. | 28x8 Ss | 2,9 | 26000 | 26000 | 19400 | 13120 |
| 1400 | 0,5 | 50-60 | 3-st. | 28x5 Sd | 1,8 | 26000 | 26000 | 26000 | 20000 |
| 1400 | 0,5 | 50-60 | 3-st. | 28x3 Sd | 1,1 | 26000 | 26000 | 26000 | 26000 |

So = no self-locking; Ss = static self-locking; Sd = dynamic self-locking
1-stage = 4:1
2-stage = 16:1
3-stage = 64:1

* Starting at stroke speed of 20 mm/sec. a brake is requested.
Duty cycle applies to 10 min. duty time.



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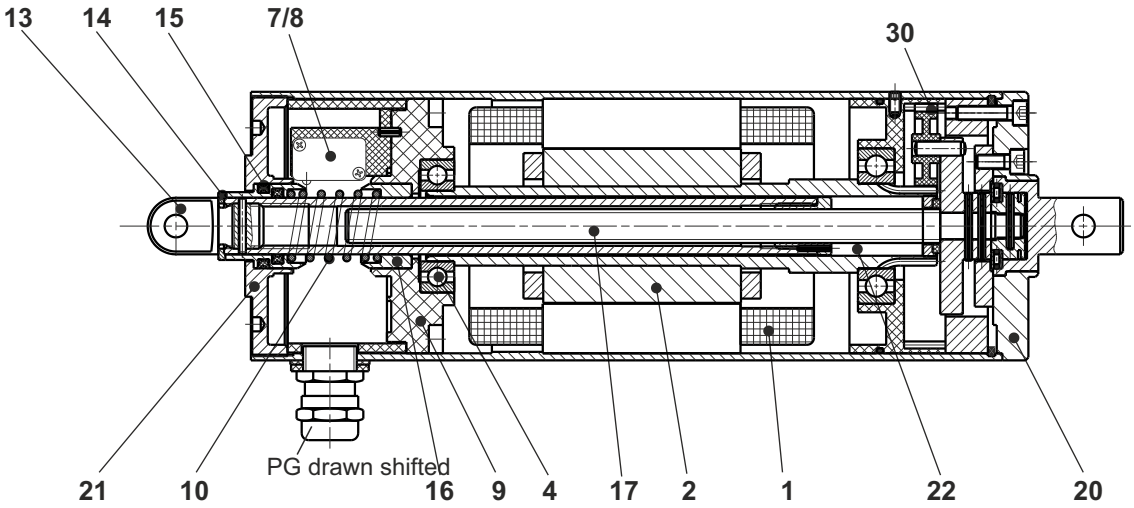
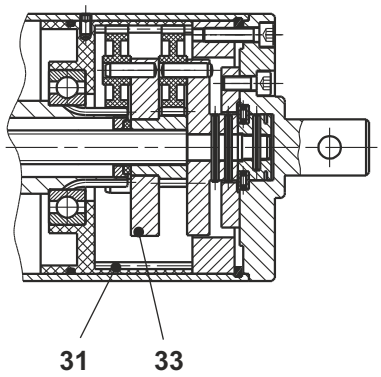
# FramoMorat Linear actuator Mini 3

## *Spare parts list*

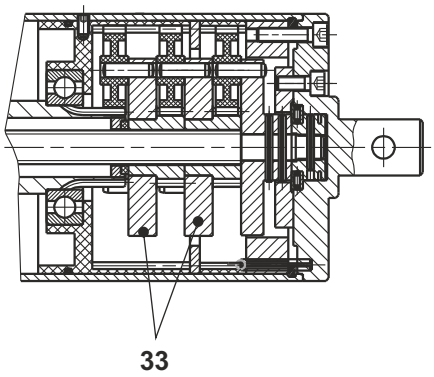
**AC 3x230V / 110V**




**2-stage planetary gear**




**3-stage planetary gear**




| Item | Part name | Article-No. |
|---|---|---|
| 1 | Stator | Serial-No. |
| 2 | Rotor cpl | Serial-No. |
| 4 | Grooved ball bearing | 00300100601080 |
| 7 | Limit switch | 02450100000600 |
| 8 | Safety limit switch | 02450100000250 |
| 9 | Terminal board cpl | Serial-No. |
| 10 | Pressure spring | 00155002890130 |
| 13 | Connection head | Serial-No. |
| 14 | Pressure disc | Serial-No. |
| 15 | Switch jack 1 with quadrings | 8-2030-01.11 |
| 16 | Switch jack 2 | 8-2030-01.12 |
| 17 | Spindle cpl | Serial-No. |
| 20 | Gear cover | Serial-No. |
| 21 | Bearing plate | Z8-2030-01.14 |
| 22 | Spindlenut, piston tube | Serial-No. |
| 30 | Planet wheel | 8-2030-70.03 |
| 31 | Internal ring gear cpl | Serial-No. |
| 33 | Planet wheel carrier toothed | Serial-No. |



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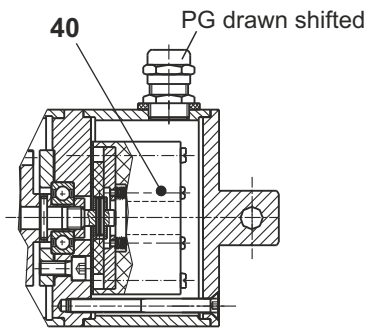
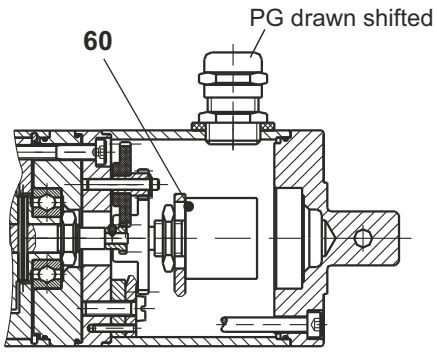
## *Spare parts list*

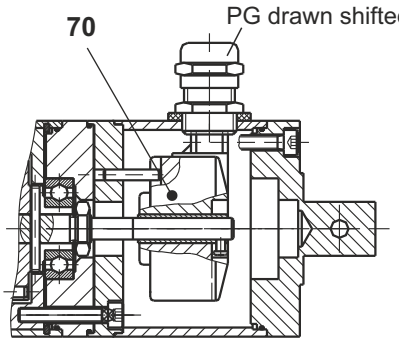
### Spring applied single disc brake




### Potentiometer




### Encoder




| Item | Part name | Article-No. |
|---|---|---|
| 40 | Spring applied single disc brake ..... | Serial-Nr. |
| 60 | Potentiometer ..... | Serial-Nr. |
| 70 | Encoder ..... | Serial-Nr. |



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# Connection diagrams



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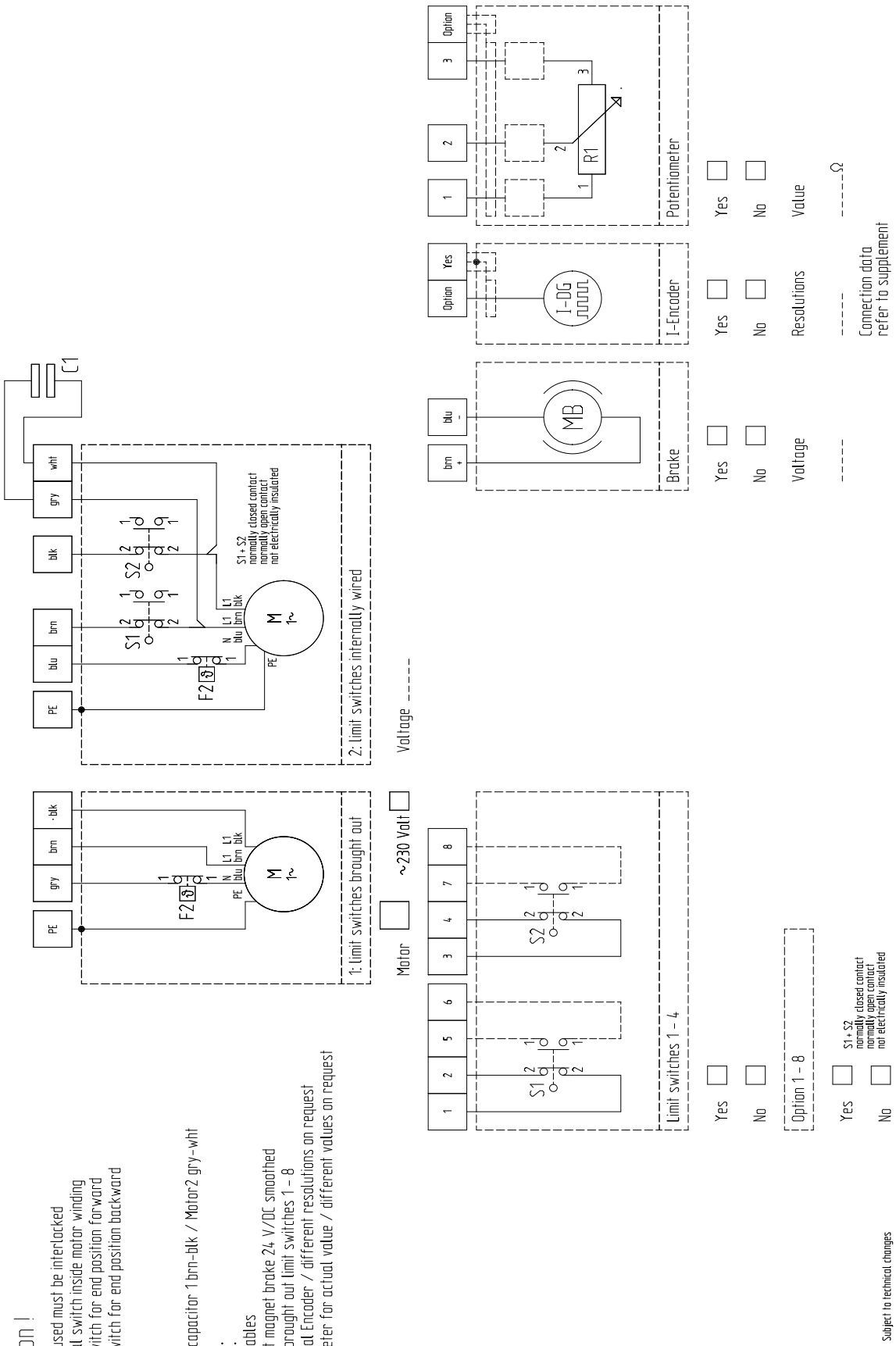
# FramoMorat Linear actuator Mini 0

## Connection diagram Version AC



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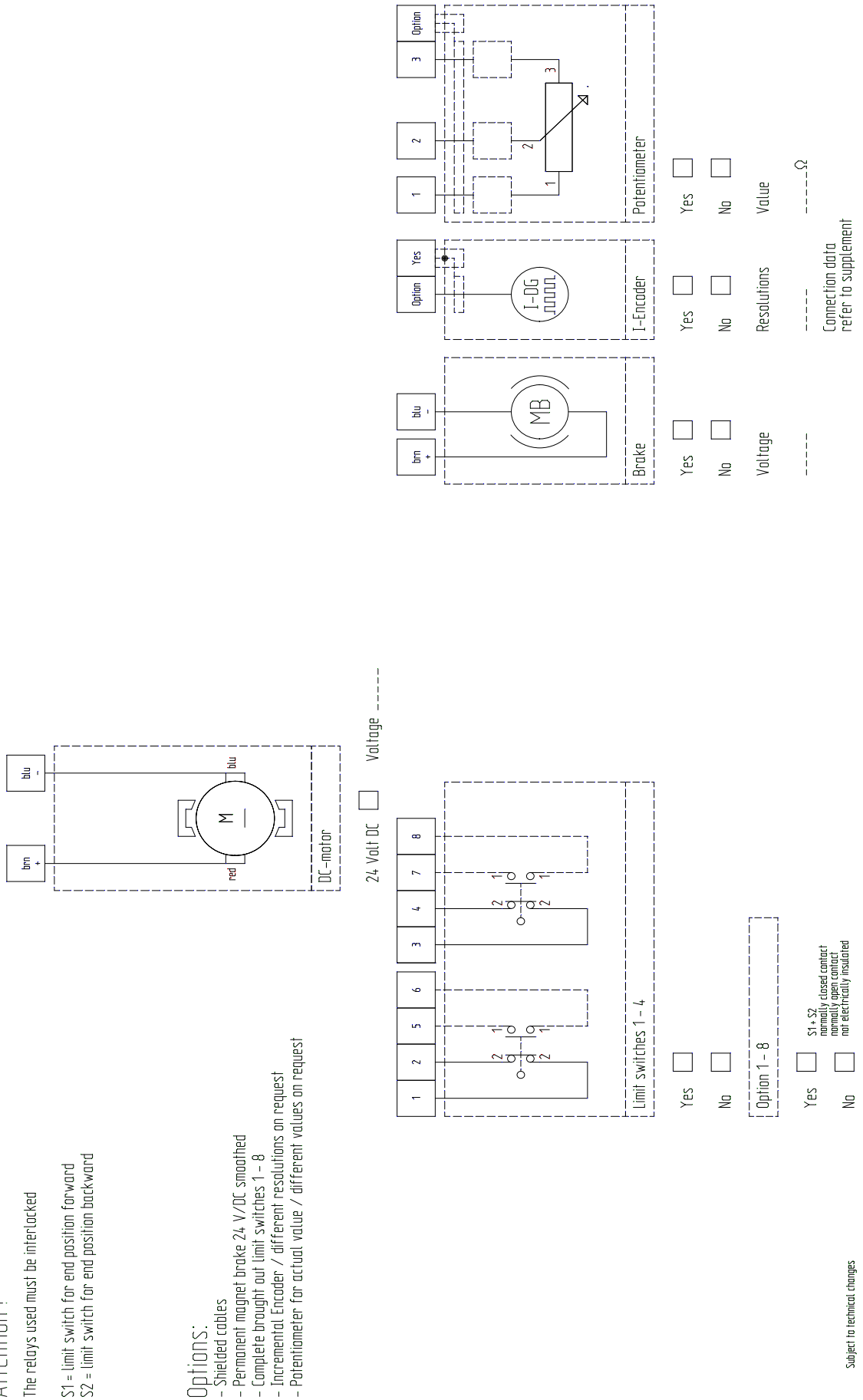
# FramoMorat Linear actuator Mini 0

## Connection diagram version D.C. with permanent magnetic field




Attention !

The relays used must be interlocked

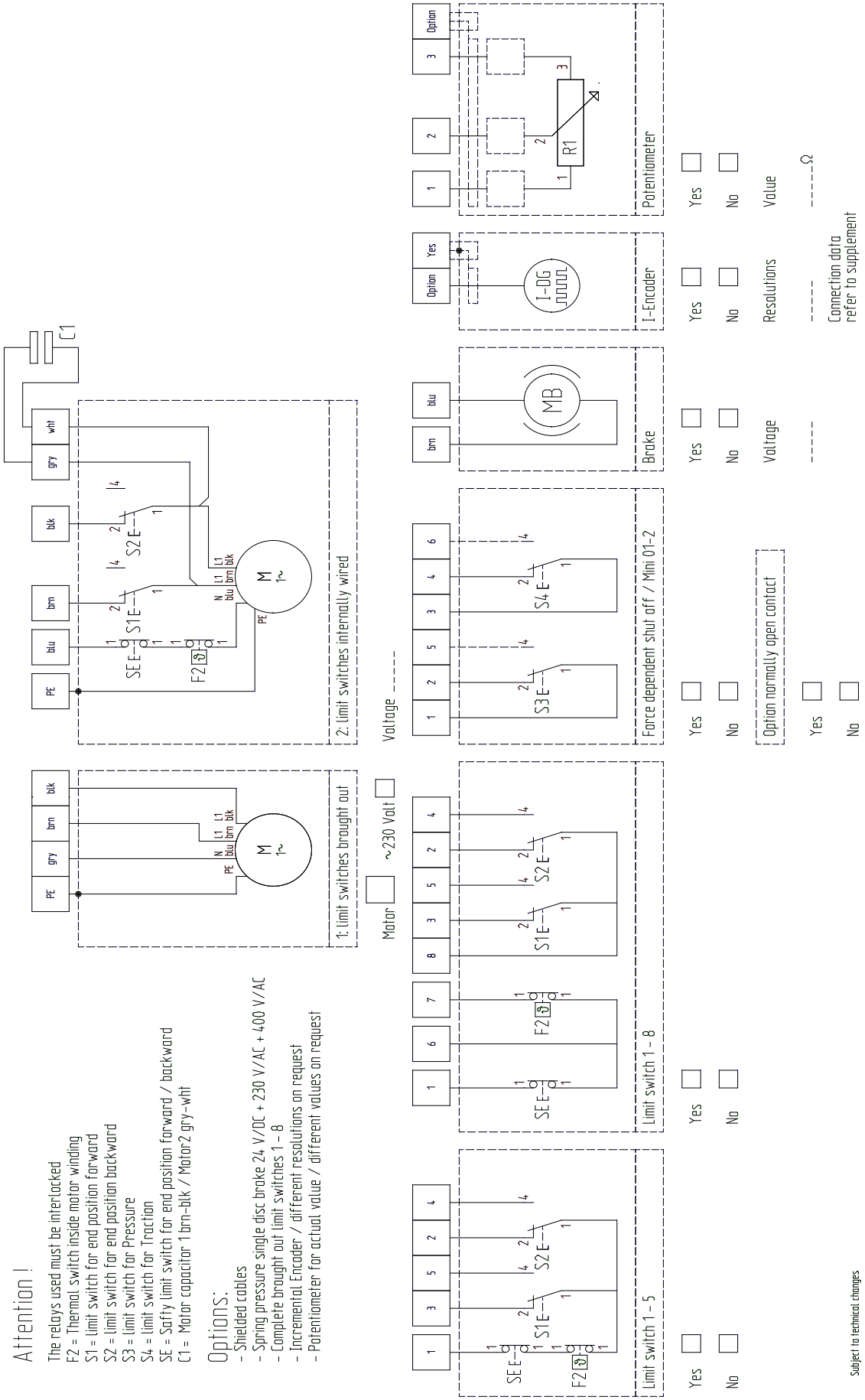
S1 = limit switch for end position forward
S2 = limit switch for end position backward

Options:
- Shielded cables
- Permanent magnet brake 24 V/DC smoothed
- Complete brought out limit switches 1 - 8
- Incremental Encoder / different resolutions on request
- Potentiometer for actual value / different values on request

Subject to technical changes

# Framo Morat Linear actuator Mini 01, 1

## Connection diagram version A.C.



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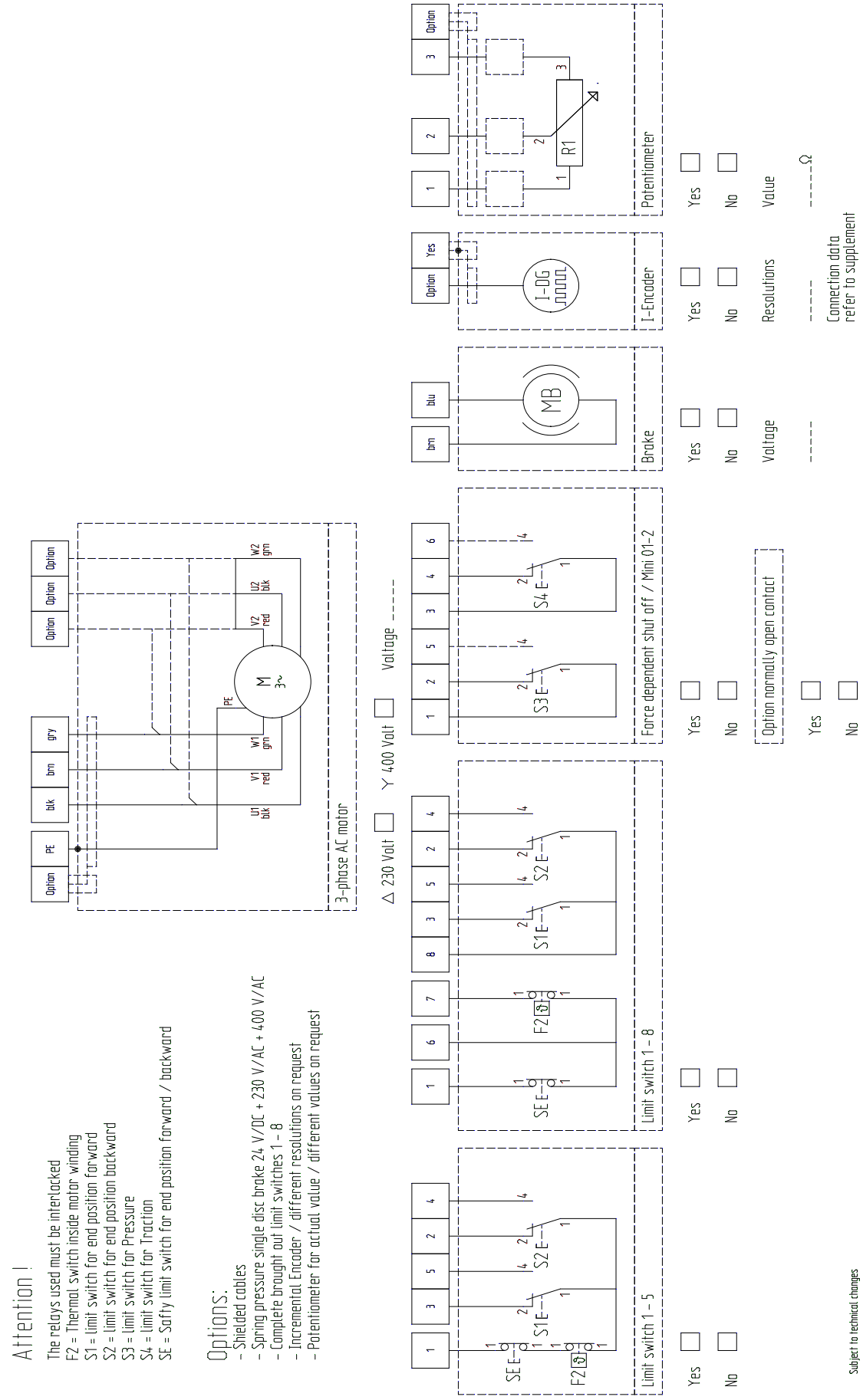
# FramoMorat Linear actuator Mini 01, 1, 2, 3

## Connection diagram version 3-phase



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# Framo Morat Linear actuator Mini

## Technical questionnaire

Company

Date: _____

Correspondant: _____

Tel. / Fax: _____

| | | |
|---|---|---|
| For which purpose is the drive umit to be used? | | |
| Type/Version | | |
| Pulling force/pushing force | [N] | / |
| Statical load | [N] | |
| Stroke speed desired | [mm/s] | |
| Stroke length | [mm] | |
| Self locking | | |
| Fixing version | | |
| Operating voltage | [V] | [Hz] |
| Protection class desired | | |
| Duty cycle | [%ED] | |
| Switch frequency | [s/h] | |
| Radial forces (avoid if possible!) | [N] | |
| Surrounding medium/temperature | [°C] | |
| Expected service life | [h] | |
| Stroke cyles | | |
| Connection head | | |
| Positioning accuracy desired | [mm] | |
| Spring applied single disc brake | [V] | |
| Potentiometer / Encoder | [kOhm] | |
| Adjusting ring for retracted stroke position | | |
| Force dependent shut off | | |
| Traction/Pull | [N] | |
| Further options | | |
| **In case of actuator failure danger to persons?** | | |
| **Special regulations** | | |

**Should be filled out by Framo Morat!**

Branch key: _____

External duty _____

Planned quantity

| Year | 20.. | 20.. | 20.. |
|---|---|---|---|
| Units | | | |

Price idea €: _____

Idea of delivery date: _____

Offer till CW: _____

Delivery of sample till CW: _____

Poss. serial delivery till CW: _____

Competitor? _____

Type _____

Modification _____

New development _____

Other _____

### Installation position

DMTQe1/04.10



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