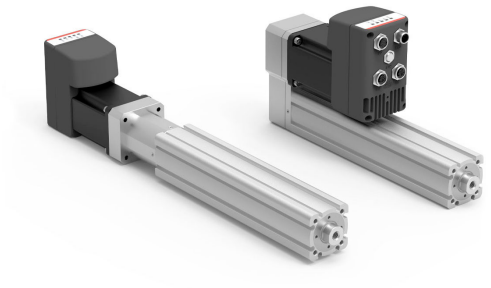
# COMPACT ELECTROMECHANICAL CYLINDERS
## SERIES 3E

News

Sizes 20, 32



- Flexibility
- Ease of use
- Reduced commissioning times
- Increased machine efficiency and productivity



Series 3E cylinders are electric rod actuators that combine a screw and motor to generate accurate linear motion. These are an alternative to pneumatic cylinders but possessing all the benefits of electric actuators in terms of speed, ease of parameter setting and flexibility in handling different load sizes and formats. Their compact design ensures easy integration with the machine, without affecting performance. Robust and quick, these actuators are ideal for multi-position applications and can be used with external proximity switches for homing operations or allowing extra-stroke readings to be performed.

Moreover, Series 3E can be supplied with the motor already assembled, to further reduce commissioning and wiring time. Series 3E electromechanical cylinders are the ideal solution for industrial applications that require rapid format changeovers or numerous production cycles. Their precision, reliability and flexibility, make these cylinders ideal for use in assembly lines, packaging systems or for material handling.

## GENERAL DATA

| | |
|---|---|
| **Construction** | electromechanical cylinder with recirculating ball screw |
| **Design** | profile with thread rolling screws based on the ISO 15552 standard |
| **Operation** | multi-position actuator with high precision linear movement |
| **Sizes** | 20, 32 |
| **Strokes min - max** | 10 ÷ 500 mm |
| **Anti-rotation function** | with anti-friction pads in technopolymer |
| **Mounting** | front flange, foot mounts, clamps or front / rear / swivel trunnion |
| **Mounting motor** | in line and parallel |
| **Operating temperature** | 0°C ÷ 50°C |
| **Storage temperature** | -20°C ÷ 80°C |
| **Protection class** | IP40 |
| **Lubrication** | not necessary. A pre-lubrication is performed on the cylinder |
| **Repeatability** | <± 0,02 |
| **Duty cycle** | 100% (if supplied with motor already assembled, the duty cycle depends on the motor selected) |
| **Max rotation play** | ± 0,4° |
| **Use with external sensors** | slots on four sides for sensors model CSD |

COMPACT ELECTROMECHANICAL CYLINDERS
SERIES 3E - CODING EXAMPLE



## CODING EXAMPLE

| 3E | 020 | BS | 0100 | P10 | M |
|---|---|---|---|---|---|

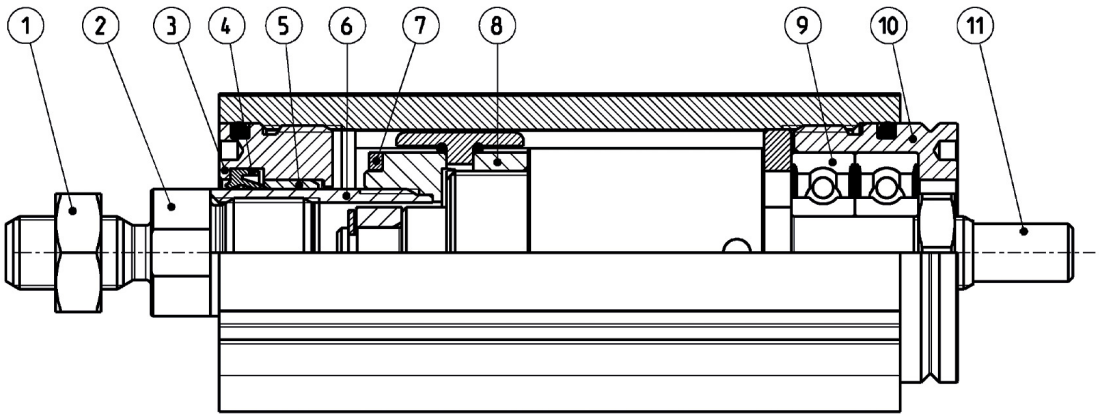
| | |
|---|---|
| **3E** | SERIES |
| **020** | SIZE<br>020 = 20<br>032 = 32 |
| **BS** | TRANSMISSION<br>BS = recirculating ball screw |
| **0100** | STROKE<br>See table of mechanical characteristics |
| **P10** | SCREW PITCH<br>P03 = 3 mm<br>P10 = 10 mm |
| **M** | CONSTRUCTION<br>M = male<br>F = female |
| | EXTENDED ROD<br>(___) = rod extended with ___ mm |

## MECHANICAL CHARACTERISTICS

| | | Size 20 | Size 20 | Size 32 | Size 32 |
|---|---|---|---|---|---|
| **Pitch "P"** | [mm] | 3 | 10 | 3 | 10 |
| **Dynamic load coefficient "C"** | [N] | 2100 | 1875 | 2800 | 2500 |
| **Average load**[A] | [N] | 177 | 236 | 236 | 315 |
| **Max torque applicable to screw's shaft** | [Nm] | 0,42 | 1,41 | 0,53 | 1,77 |
| **Max force applicable**[B] | [N] | 800 | 800 | 1000 | 1000 |
| **Max linear speed cylinder**[B] | [m/s] | 0,4 | 1,3 | 0,4 | 1,3 |
| **Maximum rotation speed of the cylinder shaft** | [rpm] | 8000 | 8000 | 8000 | 8000 |
| **Max accelleration of cylinder** | [m/s$^2$] | 25 | 25 | 25 | 25 |
| **Min Stroke** | [mm] | 10 | 25 | 10 | 25 |
| **Max Stroke** | [mm] | 300 | 300 | 500 | 500 |

[A]Value refers to a covered distance of 5000 Km (see the diagrams "Life of the cylinder according to the average axial force applied").
[B]This parameter varies as the stroke varies (see the diagrams "Maximum speed of the cylinder according to its stroke").

## SERIES 3E MATERIALS




| PARTS | Materials |
|---|---|
| **1. Rod nut** | Zinc-plated steel |
| **2. Front coupling piece** | Stainless steel |
| **3. Front cap** | Anodized aluminium alloy |
| **4. Rod seal** | PU |
| **5. Bushing** | Technopolymer |
| **6. Rod** | Stainless steel |
| **7. Magnet** | Plastoferrite |
| **8. Guiding element BS screw** | Aluminium alloy |
| **9. Bearing** | Steel |
| **10. Rear cap** | Anodized aluminium alloy |
| **11. BS ball screw** | Steel |

## ACCESSORIES FOR SERIES 3E CYLINDERS

**Piston rod socket joint Mod. GY**

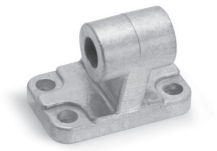
**Piston rod lock nut Mod. U**

**Clevis pin Mod. S**

**Rear trunnion ball-joint Mod. R**

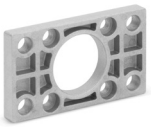
**Coupling piece Mod. GKF**

**90° male trunnion Mod. ZC**



**Swivel Combination Mod. C+L+S**

**Front flange Mod. D-E**

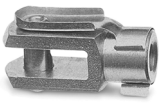


**Self aligning rod Mod. GK**

**Foot mount Mod. B-3E**

**Rear female trunnion Mod. C and C-H**

**Rod fork end Mod. G**



**Rear trunnion male Mod. L**

**Side clamping bracket Mod. BG**

**Kit for axial connection Mod. AM**

**Kit for parallel connection Mod. PM**

**Front/rear spot faced trunnion Mod. FN**



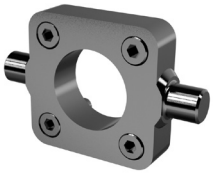
**Counter bracket for trunnion Mod. BF**



**Front/rear spot faced trunnion Mod. FN**







## HOW TO CALCULATE THE LIFE OF THE CYLINDER

To perform a correct dimensioning of the Series 3E cylinder, you need to consider some facts.

Among these, the most important are:
- Dynamics of the system
- Operation and pause cyclicity
- Work environment
- General performance requirements: repeatability, accuracy, precision, etc.

$$L_r = \left(\frac{C}{F_m \cdot f_w}\right)^3 \cdot 10^6$$

CALCULATE THE LIFE IN ROTATIONS where:

$L_r$ = Life of the cylinder in number of rotations of the BS ball screw
C = Dynamic load coefficient of the cylinder [N]
$F_m$ = Average axial force applied [N]
$f_w$ = Safety coefficient according to the working conditions (see table below)

$$L_{km} = \frac{L_r \cdot p}{10^6}$$

CALCULATION OF LIFE IN km where:

$L_{km}$ = Life of the cyllinder in km [km]
p = pitch of the BS ball screw [mm]

$$L_h = \frac{L_r}{n_m \cdot 60}$$

CALCULATION OF THE LIFE IN HOURS where:

$L_h$ = Life of the cylinder in hours
$n_m$ = average number of revolutions of the RDS ball screw [rpm]

| APPLICATION | ACCELERATION [ m/s² ] | SPEED [ m/s ] | DUTY CYCLE | $f_w$ COEFFICIENT |
|---|---|---|---|---|
| **light** | < 5,0 | < 0,5 | < 35% | 1,0 ÷ 1,25 |
| **normal** | 5,0 ÷ 15,0 | 0,5 ÷ 1,0 | 35% ÷ 65% | 1,25 ÷ 1,5 |
| **heavy** | > 15,0 | > 1,0 | > 65% | 1,5 ÷ 3,0 |

## ANALYSIS OF THE DUTY CYCLE AND OF SYSTEM PAUSES

The analysis of the duty cycle and of the pauses of the system is essential to calculate the average $F_m$ axial loads and the number of average revolutions nm that act on the cylinder. Normally, the duty cycle is composed by phases and for each single phase, we can have an acceleration, constant speed or deceleration.

$F_m$ = CALCULATION OF THE AVERAGE AXIAL FORCE
$n_m$ = CALCULATION OF THE AVERAGE NUMBER OF REVOLUTIONS

The table shown below reports the values of acceleration, speed and deceleration for each phase.

$$F_m = \sqrt[3]{\frac{(F_{a1}{}^3 \cdot n_{a1} \cdot t_{a1}) + (F_{vc1}{}^3 \cdot n_{vc1} \cdot t_{vc1}) + (F_{d1}{}^3 \cdot n_{d1} \cdot t_{d1}) + \ ... + \ (F_{an}{}^3 \cdot n_{an} \cdot t_{an}) + (F_{vcn}{}^3 \cdot n_{vcn} \cdot t_{vcn}) + (F_{dn}{}^3 \cdot n_{dn} \cdot t_{dn})}{(n_{a1} \cdot t_{a1}) + (n_{vc1} \cdot t_{vc1}) + (n_{d1} \cdot t_{d1}) + \ ... + \ (n_{an} \cdot t_{an}) + (n_{vcn} \cdot t_{vcn}) + (n_{dn} \cdot t_{dn})}}$$

$$n_m = \left\{\frac{(n_{a1} \cdot t_{a1}) + (n_{vc1} \cdot t_{vc1}) + (n_{d1} \cdot t_{d1}) + \ ... + \ (n_{an} \cdot t_{an}) + (n_{vcn} \cdot t_{vcn}) + (n_{dn} \cdot t_{dn})}{t_{a1} + t_{vc1} + t_{d1} + \ ... + \ t_{an} + t_{vcn} + t_{dn}}\right\}$$

| | | F [N] | n [rpm] | time % |
|---|---|---|---|---|
| **PHASE 1** | Acceleration | Fa1 | na1 | ta1 |
| | Constant speed | Fvc1 | nvc1 | tvc1 |
| | Deceleration | Fd1 | nd1 | td1 |
| **PHASE 2** | Acceleration | Fa2 | na2 | ta2 |
| | Constant speed | Fvc2 | nvc2 | tvc2 |
| | Deceleration | Fd2 | nd2 | td2 |
| **PHASE "n -1"** | Acceleration | Fan-1 | nan-1 | tan-1 |
| | Constant speed | Fvcn-1 | nvcn-1 | tvcn-1 |
| | Deceleration | Fdn-1 | ndn-1 | tdn-1 |
| **PHASE "n"** | Acceleration | Fan | nan-1 | tan-1 |
| | Constant speed | Fvcn | nvcn-1 | tvcn-1 |
| | Deceleration | Fdn | ndn-1 | tdn-1 |
| | TOTAL | | | 100% |

## APPLICATION EXAMPLE

$$F_{a1} = 142\ N; \quad F_{vc1} = 98\ N; \quad F_{d1} = 54\ N;$$
$$n_{a1} = 630\ rpm; \quad n_{vc1} = 1260\ rpm; \quad n_{d1} = 630\ rpm;$$
$$t_{a1} = 0{,}7\ \%; \quad t_{vc1} = 12{,}9\ \%; \quad t_{d1} = 0{,}7\ \%;$$

$$F_{a2} = 616\ N; \quad F_{vc2} = 589\ N; \quad F_{d2} = 562\ N;$$
$$n_{a2} = 450\ rpm; \quad n_{vc2} = 900\ rpm; \quad n_{d2} = 450\ rpm;$$
$$t_{a2} = 4{,}8\ \%; \quad t_{vc2} = 33{,}3\ \%; \quad t_{d2} = 4{,}8\ \%;$$

$$F_{a3} = 997\ N; \quad F_{vc3} = 981\ N; \quad F_{d3} = 965\ N;$$
$$n_{a3} = 240\ rpm; \quad n_{vc3} = 480\ rpm; \quad n_{d3} = 240\ rpm;$$
$$t_{a3} = 7{,}1\ \%; \quad t_{vc3} = 28{,}6\ \%; \quad t_{d3} = 7{,}1\ \%;$$

$$K_1 = (F_{a1}^3 \cdot n_{a1} \cdot t_{a1}) + (F_{vc1}^3 \cdot n_{vc1} \cdot t_{vc1}) + (F_{d1}^3 \cdot n_{d1} \cdot t_{d1}) \qquad n_1 = (n_{a1} \cdot t_{a1}) + (n_{vc1} \cdot t_{vc1}) + (n_{d1} \cdot t_{d1}) \qquad T_1 = t_{a1} + t_{vc1} + t_{d1}$$
$$K_2 = (F_{a2}^3 \cdot n_{a2} \cdot t_{a2}) + (F_{vc2}^3 \cdot n_{vc2} \cdot t_{vc2}) + (F_{d2}^3 \cdot n_{d2} \cdot t_{d2}) \qquad n_2 = (n_{a2} \cdot t_{a2}) + (n_{vc2} \cdot t_{vc2}) + (n_{d3} \cdot t_{d3}) \qquad T_2 = t_{a2} + t_{vc2} + t_{d2}$$
$$K_3 = (F_{a3}^3 \cdot n_{a3} \cdot t_{a3}) + (F_{vc3}^3 \cdot n_{vc3} \cdot t_{vc3}) + (F_{d3}^3 \cdot n_{d3} \cdot t_{d3}) \qquad n_3 = (n_{a3} \cdot t_{a3}) + (n_{vc3} \cdot t_{vc3}) + (n_{d3} \cdot t_{d3}) \qquad T_3 = t_{a3} + t_{vc3} + t_{d3}$$

$$F_m = \sqrt[3]{\frac{(K_1 + K_2 + K_3)}{(n_1 + n_2 + n_3)}} = 596{,}64\ N$$

$$n_m = \frac{n_1 + n_2 + n_3}{T_1 + T_2 + T_3} = 685{,}7\ rpm$$

| | | F [N] | n [rpm] | time % |
|---|---|---|---|---|
| **PHASE 1** | Acceleration | 142 | 630 | 0,7 |
| | Constant speed | 98 | 1260 | 12,9 |
| | Deceleration | 54 | 630 | 0,7 |
| **PHASE 2** | Acceleration | 616 | 450 | 4,8 |
| | Constant speed | 589 | 900 | 33,3 |
| | Deceleration | 562 | 450 | 4,8 |
| **PHASE 3** | Acceleration | 997 | 240 | 7,1 |
| | Constant speed | 981 | 480 | 28,6 |
| | Deceleration | 965 | 240 | 7,1 |
| | TOTAL | | | 100,0 |

## HOW TO CALCULATE THE DRIVING TORQUE [Nm]

$F_A$ = Total force acting from outside [N]
p = Pitch of the ball screw [mm]
η = Performance
$C_{M1}$ = Driving torque due to external agents [Nm]

$$C_{TOT} = C_{M1} + C_{M2} + C_{M3}$$

$$C_{M1} = \frac{F_A \cdot p}{2\pi \cdot 1000} \cdot \frac{1}{\eta}$$

$J_{TOT}$ = Moment of inertia of rotating components [kg·m²]
$J_F$ = Moment of inertia of fixed-length rotating components [kg·m²]
$J_V$ = Moment of inertia of variable-length rotating components [kg·m²]
$K_V$ = Coefficient of inertia of variable-length rotating components [kg·mm²/mm]
C = Rod stroke [mm]
$\dot{\omega}$ = Angular acceleration [rad/s²]
a = Linear acceleration of the ball screw [m/s²]
$C_{M2}$ = Driving torque due to rotating components [Nm]

$$J_{TOT} = (J_F + J_V) \cdot 10^{-6}$$

$$J_V = K_V \cdot C$$

$$\dot{\omega} = \frac{a \cdot 2\pi \cdot 1000}{p}$$

$$C_{M2} = J_{TOT} \cdot \dot{\omega} \cdot \frac{1}{\eta}$$

$F_{TT}$ = Force needed to move sliding components [N]
$F_{TF}$ = Force needed to move fixed-length sliding components [N]
$F_{TV}$ = Force needed to move variable-length sliding components [N]
$m_{C1}$ = Mass of the fixed-length sliding components [kg]
$K_{TV}$ = Mass coefficient of variable-length sliding components [kg/mm]
$C_{M3}$ = Driving torque due to sliding components [Nm]

$$F_{TT} = F_{TF} + F_{TV}$$

$$F_{TF} = m_{C1} \cdot a$$

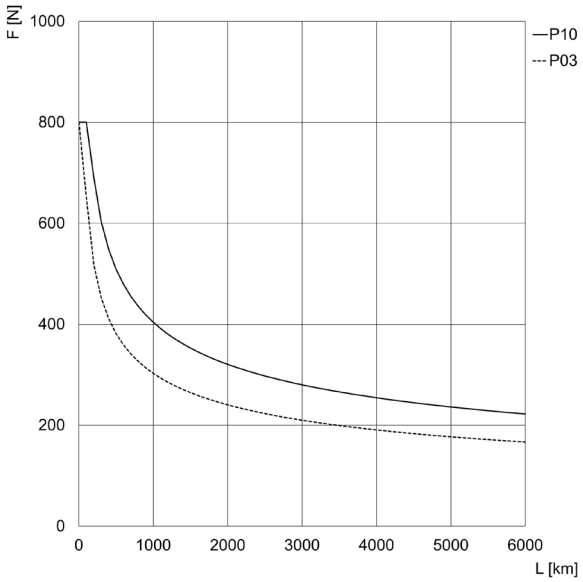
$$F_{TV} = K_{TV} \cdot C \cdot a$$

$$C_{M3} = \frac{F_{TT} \cdot p}{2\pi \cdot 1000} \cdot \frac{1}{\eta}$$

### Values of masses and fixed and rotating inertia moments of 3E components

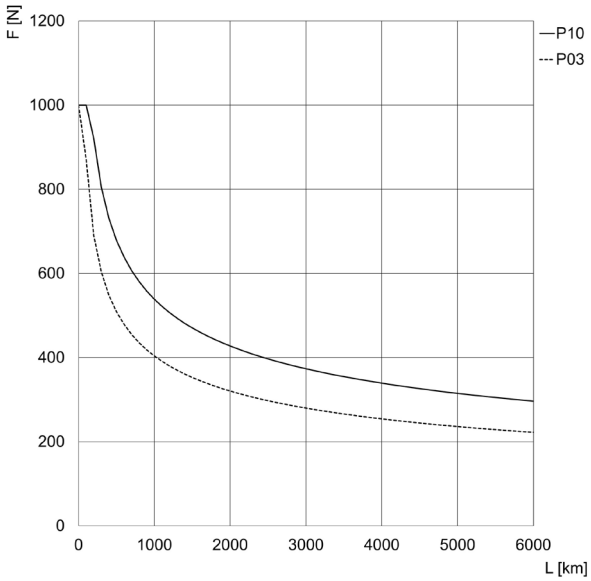
| Size | $J_F$ [ kg·mm² ] | $K_V$ [ kg·mm²/mm ] | $m_{C1}$ [ kg ] | $K_{TV}$ [ Kg·m ] |
|---|---|---|---|---|
| **20** | 2,1 | 6,13 | 0,12 | 0,46 |
| **32** | 2,1 | 6,13 | 0,13 | 0,46 |

## Life of the cylinder according to the average axial force applied (environmental T and standard conditions of use)




**Size 20**

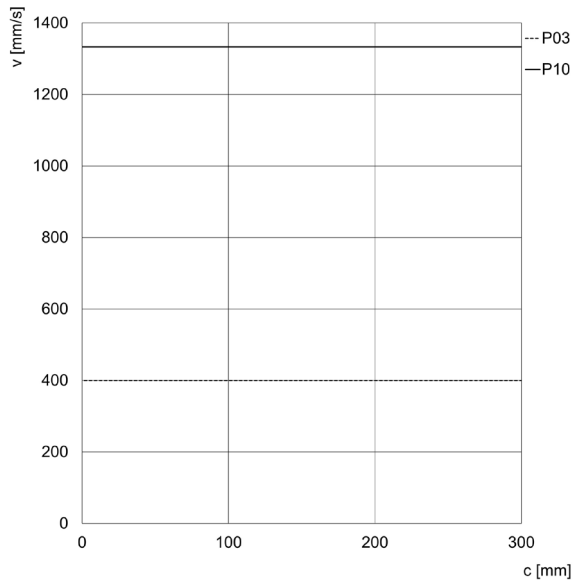
**F = Axial Force [N]**
**L = life [km]**
**Curves calculated with fw = 1**




**Size 32**

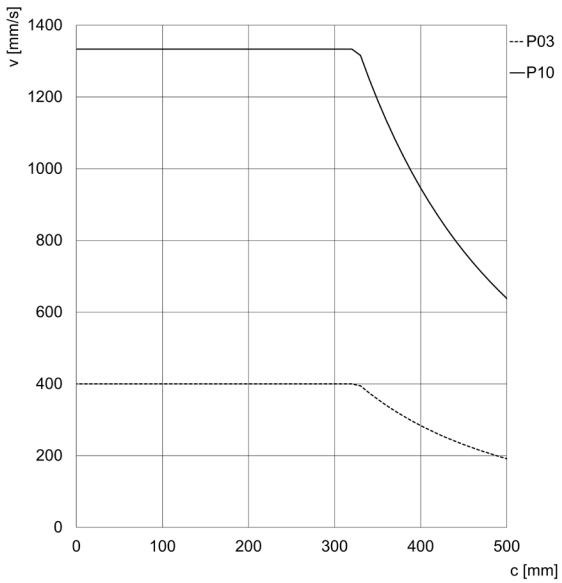
**F = Axial Force [N]**
**L = life [km]**
**Curves calculated with fw = 1**

## Maximum speed of the cylinder according to its stroke




**Size 20**

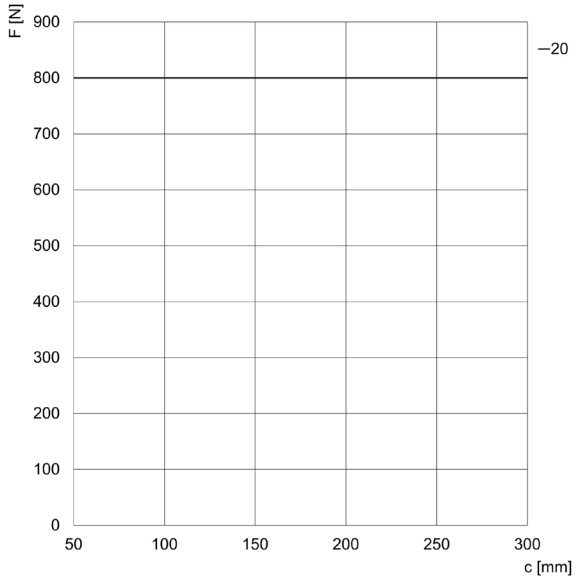
**v = speed [m/s]**
**c = stroke [mm]**




**Size 32**

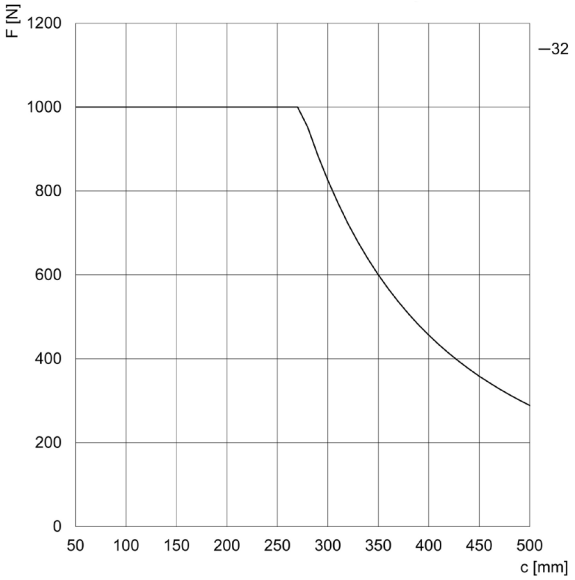
**v = speed [m/s]**
**c = stroke [mm]**

## Maximum force of the cylinder according to its stroke




**Size 20**

**F = static axial Force [N]**
**c = stroke [mm]**

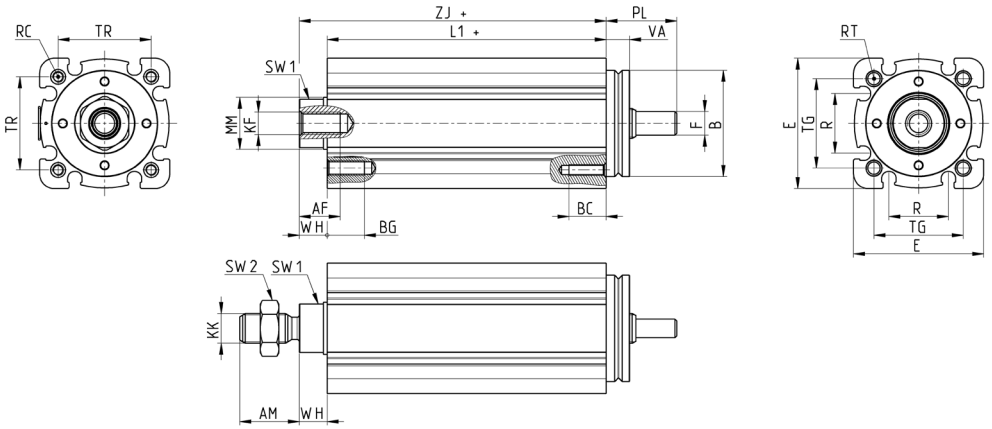



**Size 32**

**F = static axial Force [N]**
**c = stroke [mm]**

For longer strokes than the standard ones or for extended rods, please contact Camozzi.

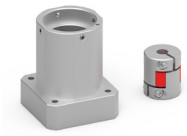
## Series 3E cylinders



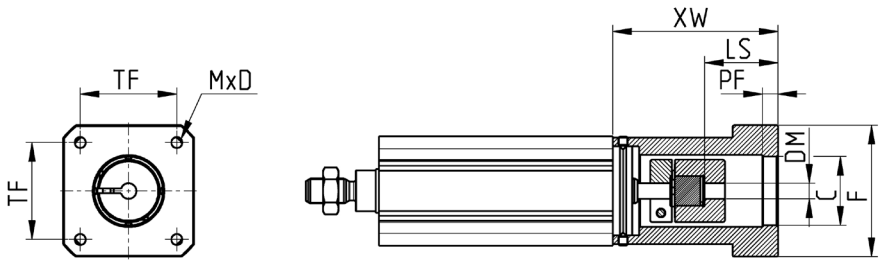

**+ = add the stroke**
***Dimension not in compliance with ISO 15552 standard**

| Size | AM | AF | ø B(h8) | BG | E | ø F(h8) | KF | KK | L1 + | ø MM | R | RT | PL | SW1 | SW2 | TG | VA | TR | RC | BC | WH | ZJ + | weight stroke 0 [g] | weight stroke [kg/m] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20** | 16 | 11 | 28,5 | 10 | 35 | 5 | M6 | M8x1,25 | 75 | 14 | 16 | M4 | 19 | 13 | 13 | 24 | 6,5 | 25 | M3 | 10 | 7,5 | 82,5 | 326 | 2,57 |
| **32** | 19 | 13 | 34 | 10 | 42 | 5 | M8 | M10x1,25 | 75 | 14 | 19 | M5 | 19 | 13 | 17 | 32,5 | 5,5 | 32,5 | M5 | 10 | 7,5 | 82,5 | 430 | 3,64 |

## Kit for axial connection Mod. AM



Supplied with:
1x housing
1x flexible coupling
4x nuts
4x motor connection screws

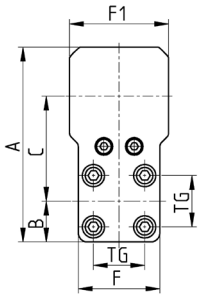


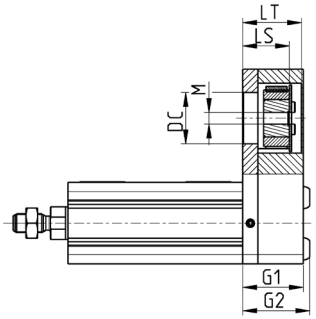

| Mod. | Size | Protection | ø C | ø DM | TF | MxD | PF | F | LS | XW | Nominal torque [Nm](A) | Max torque [Nm](A) | J[kgmm²] | Weight [g] | η |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AM-3E-20-0017** | 20 | IP40 | 22 | 5 | 31 | Ø3,5x14,5 | 5 | 42 | 24 | 53 | 5 | 10 | 0,85 | 127 | 0,78 |
| **AM-3E-32-0023** | 32 | IP40 | 38,1 | 6,35 | 47,14 | M4x15 | 9 | 56,4 | 20 | 49 | 5 | 10 | 0,85 | 152 | 0,78 |
| **AM-3E-32-0024** | 32 | IP40 | 38,1 | 8 | 47,14 | M4x15 | 9 | 56,4 | 20 | 49 | 5 | 10 | 0,85 | 152 | 0,78 |
| **AM-3E-32-0100** | 32 | IP40 | 30 | 8 | 31,8 | M3x9 | 5 | 41,5 | 25 | 54 | 5 | 10 | 0,85 | 144 | 0,78 |

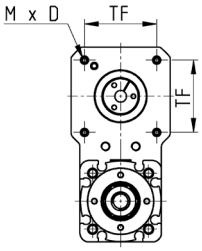
(A)Continuously applicable torque, under ideal mounting and operating conditions. For further details, please contact service@camozzi. com
(B)Torque applicable for short intervals, under ideal mounting and operating conditions. For further details, please contact service@ camozzi.com

## Kit for parallel connection Mod. PM

Supplied with:
1x front cover
1x rear cover
2x pulleys
2x locking sets
1x plate for pulley
1x toothed belt
3x nuts
4x rear cover screws
2-4x cover fixing screws
4x cylinder fixing screws
4x motor fixing screws

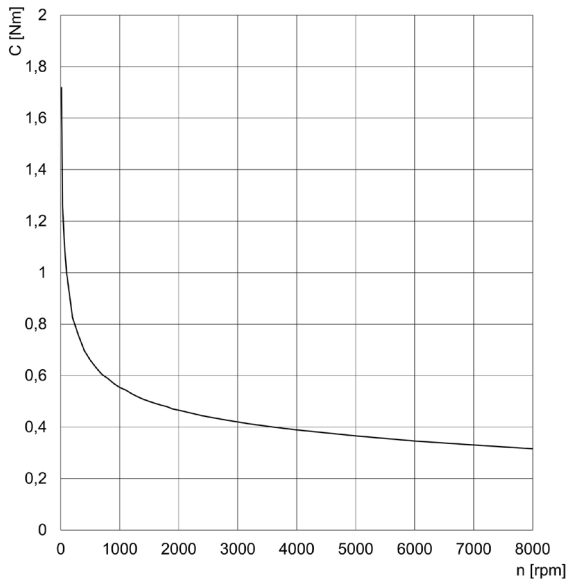


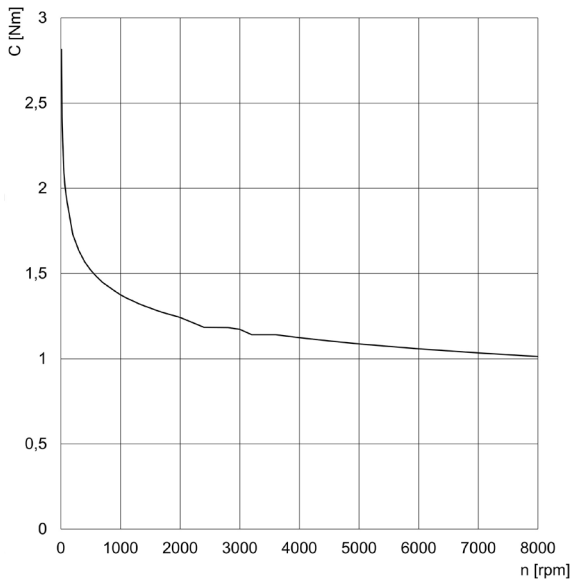

| Mod. | Size | Protection | A | B | C | F | F1 | TG | G1 | G2 | øDC | øM | LS | LT | TF | MxD | J[kgmm²] | Weight [g] | η |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PM-3E-20-0017** | 20 | IP40 | 83,5 | 17,5 | 45 | 35 | 42,5 | 22 | 26 | 29 | 22 | 5 | 20 | 25 | 32 | M3x4,5 | 3,96 | 218 | 0,62 |
| **PM-3E-32-0023** | 32 | IP40 | 116,5 | 21 | 67,5 | 42 | 56,5 | 32,5 | 28 | 31 | 38,1 | 6,35 | 19 | 26,5 | 47,14 | M4x6 | 5,84 | 390 | 0,62 |
| **PM-3E-32-0024** | 32 | IP40 | 116,5 | 21 | 67,5 | 42 | 56,5 | 32,5 | 28 | 31 | 38,1 | 8 | 19 | 26,5 | 47,14 | M4x6 | 5,84 | 390 | 0,62 |
| **PM-3E-32-0100** | 32 | IP40 | 87 | 21 | 45 | 42 | 42 | 32,5 | 28 | 31 | 30 | 8 | 19 | 26,5 | 31,82 | M3x6 | 5,82 | 245 | 0,62 |

## TRANSMISSIBLE POWER KIT PM




**PM-3E 20...**
**C = Torque [Nm]**
**n = number of revolutions per minute**

**The curves refer to a duty cycle of 70%**

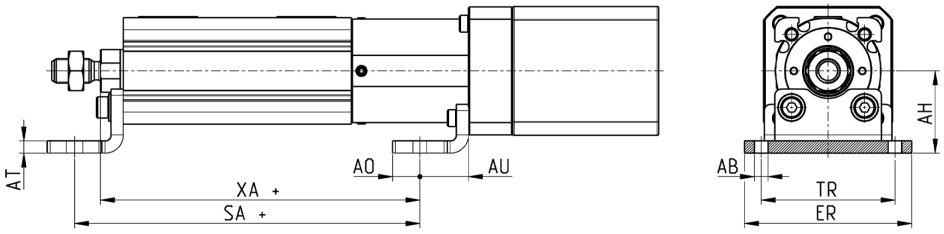



**PM-3E 32...**
**C = Torque [Nm]**
**n = number of revolutions per minute**

## Foot bracket Mod. B-3E-AM

Material:
zinc-plated steel

Supplied with:
2x foot brackets
4x screws



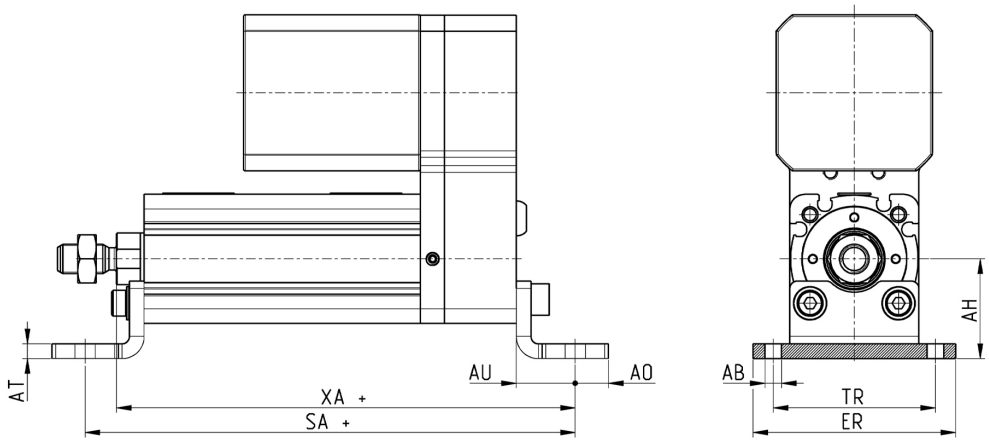

**+ = add the stroke**

| Mod. | Size | Compatible with | SA + | XA | AH | TR | AT | AU | AO | AB | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **B-3E-20-AM** | 20 | AM-3E-20-0017 | 113,5 | 105 | 27 | 44 | 4 | 16 | 9 | 4,5 | 55 |
| **B-3E-32-AM-1** | 32 | AM-3E-32-0023 / AM-3E-32-0024 | 109 | 100,5 | 36 | 52 | 4 | 16 | 9 | 4,5 | 62 |
| **B-3E-32-AM-2** | 32 | AM-3E-32-0100 | 99 | 90,5 | 36 | 52 | 4 | 16 | 9 | 4,5 | 62 |

## Foot bracket Mod. B-3E-PM

Material:
zinc-plated steel

Supplied with:
2x foot brackets
4x screws



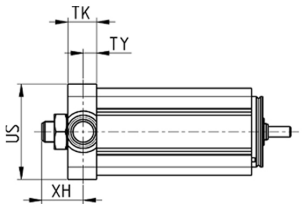

**+ = add the stroke**

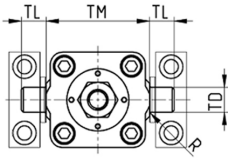
| Mod. | Size | Compatible with | SA + | XA | AH | TR | AT | AU | AO | ₀AB | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **B-3E-20-PM** | 20 | PM-3E-20-0017 | 133 | 124,5 | 27 | 44 | 4 | 16 | 9 | 4,5 | 55 |
| **B-3E-32-PM** | 32 | PM-3E-32-0023 / PM-3E-32-0024 / PM-3E-32-0100 | 135 | 126,5 | 36 | 52 | 4 | 16 | 9 | 4,5 | 62 |

## Front spot faced trunnion Mod. FN

Material:
zinc-plated steel

Supplied with:
1x spot faced trunnion
4x screws



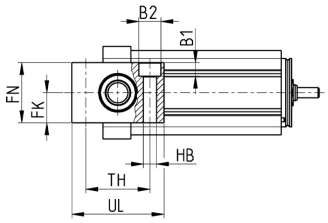



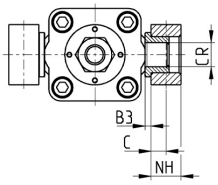

| Mod. | Ø | TK | TY | XH | US | TL | TM | øTD | R |
|---|---|---|---|---|---|---|---|---|---|
| **FN-3E-32** | 32 | 14 | 6,5 | 20 | 46 | 12 | 50 | 12 | 1 |

## Counter bracket for front trunnion Mod. BF

Material:
aluminium

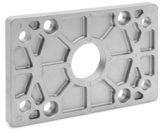
Supplied with:
2x supports



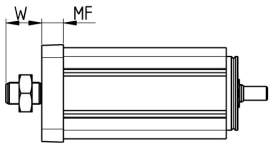

| Mod. | Ø | øCR | NH | C | B3 | TH | UL | FK | FN | B1 | øB2 | øHB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BF-32** | 32 | 12 | 15 | 7,5 | 3 | 32 | 46 | 15 | 30 | 6,8 | 11 | 6,6 |

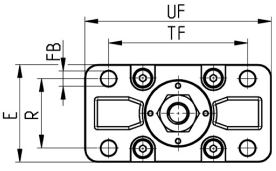
## Front flange Mod. D-E



Material:
aluminium for Ø 32

Supplied with:
1x flange
4x screws

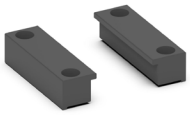



**+ = add the stroke**

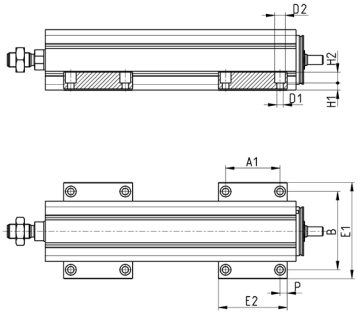
| Mod. | Ø | W | MF | TF | R | UF | E | øFB |
|---|---|---|---|---|---|---|---|---|
| **D-E-3E-32** | 32 | 16,5 | 10 | 64 | 32 | 80 | 45 | 7 |

## Side clamping bracket Mod. BG



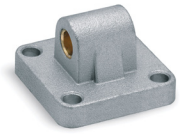
Material:
aluminium

Supplied with:
2x clamps



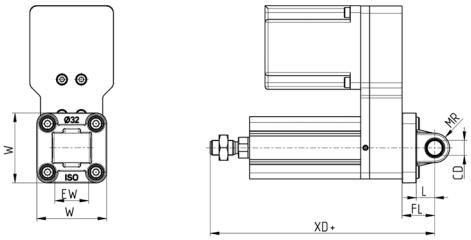

| Mod. | Ø | E1 | E2 | P | A1 | B | Screw | ⌀D1 | ⌀D2 | H1 | H2 | Weight [g] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BG-3E-20** | 20 | 60 | 48 | 5 | 38 | 47,5 | M4 | 4,5 | 7,5 | 5 | 5,5 | 31 |
| **BG-3E-32** | 32 | 67 | 48 | 5 | 38 | 54,5 | M4 | 4,5 | 7,5 | 5 | 7,5 | 35 |

## Rear male trunnion Mod. L



Material:
aluminium

Supplied with:
4x screws
1x male trunnion
1x centering pin



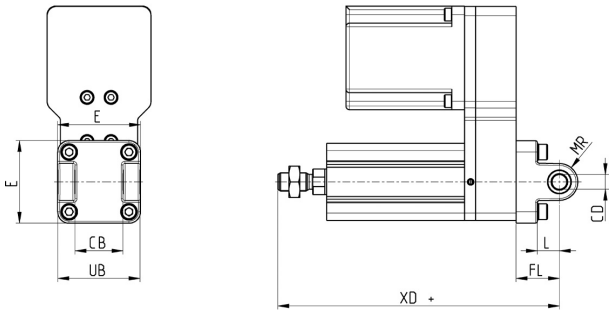

**+ = add the stroke**

| Mod. | Ø | ⌀CD | L | FL | XD + | MR | E | EW |
|---|---|---|---|---|---|---|---|---|
| **L-3E-20** | 20 | 8 | 14 | 20 | 151,5 | 8 | 34 | 16 |
| **L-3E-32** | 32 | 10 | 13 | 22 | 151,5 | 10 | 46 | 16 |

## Rear female trunnion Mod. C

Material:
aluminium

Supplied with:
1x female trunnion
4x screws




**+ = add the stroke**

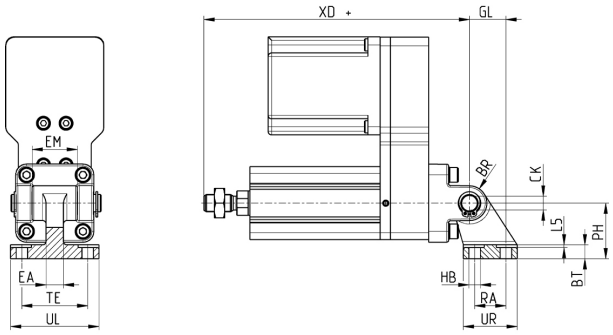
| Mod. | Ø | ⌀CD | L | FL | XD + | MR | E | CB | UB |
|---|---|---|---|---|---|---|---|---|---|
| **C-3E-32** | 32 | 10 | 13 | 22 | 212 | 10 | 46 | 26 | 45 |

## 90° male trunnion Mod. ZC

CETOP RP 107P

Material:
aluminium

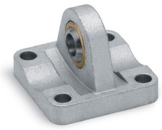
Supplied with:
1x male support




**+ = add the stroke**

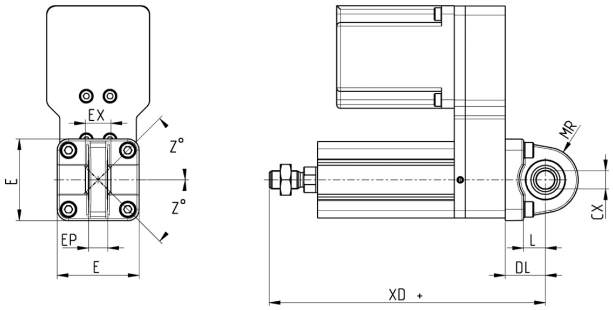
| Mod. | Ø | øEB | øCK | øHB | XD + | TE | UL | EA | GL | L5 | RA | EM | UR | PH | BT | BR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ZC-32** | 32 | 11 | 10 | 6,6 | 212 | 38 | 51 | 10 | 21 | 1,6 | 18 | 26 | 31 | 32 | 8 | 10 |

## Trunnion ball-joint Mod. R



Material:
aluminium

Supplied with:
1x trunnion ball joint
4x screws



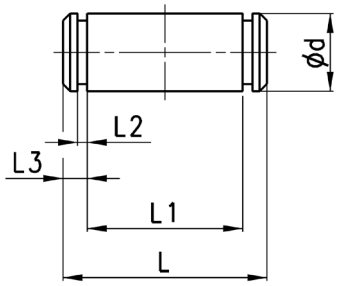

**+ = add the stroke**

| Mod. | Ø | øCX | L | DL | XN+ | MS | E | EX | EP | Z |
|---|---|---|---|---|---|---|---|---|---|---|
| **R-3E-32** | 32 | 10 | 12 | 22 | 212 | 18 | 45 | 14 | 10,5 | 4° |

## Clevis pin Mod. S

Materials:
Stainless steel Clevis pin,
Steel Seeger

Supplied with:
1x clevis pin
2x seeger in steel

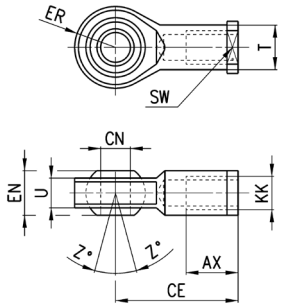



| Mod. | Ø | øD | L | L1 | L2 | L3 |
|---|---|---|---|---|---|---|
| **S-32** | 32 | 10 | 52 | 46 | 1,1 | 3 |

## Swivel ball joint Mod. GA

ISO 8139

Material:
zinc-plated steel

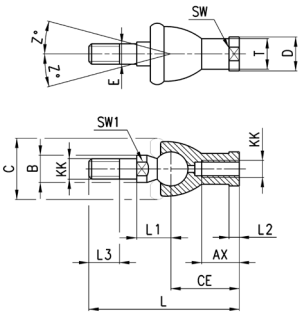



| Mod. | Ø | øCN | U | EN | ER | AX | CE | KK | øT | Z | SW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **GA-20** | 20 | 8 | 9 | 12 | 12 | 16 | 36 | M8x1,25 | 12,5 | 6,5 | 14 |
| **GA-32** | 32 | 10 | 10,5 | 14 | 14 | 20 | 43 | M10x1,25 | 15 | 6,5 | 17 |

## Piston rod socket joint Mod. GY

ISO 8139

Material:
zama and zinc-plated steel

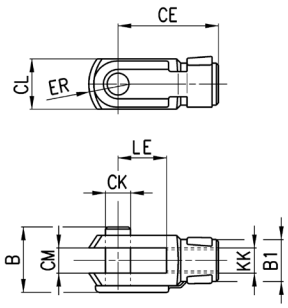



| Mod. | Ø | KK | L | CE | L2 | AX | SW | SW1 | L1 | L3 | øT | øD | E | øB | øC | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GY-20** | 20 | M8x1,25 | 65 | 32 | 5 | 16 | 14 | 10 | 16 | 12 | 12,5 | 13 | 6 | 10 | 20 | 15 |
| **GY-32** | 32 | M10x1,25 | 74 | 35 | 6,5 | 18 | 17 | 11 | 19,5 | 15 | 15 | 19 | 10 | 14 | 28 | 15 |

## Rod fork end Mod. G

ISO 8140

Material:
zinc-plated steel

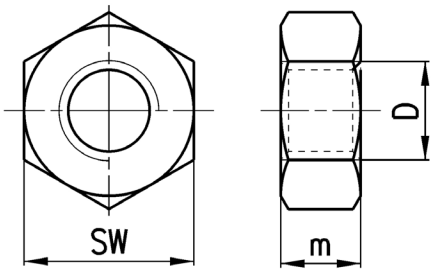



| Mod. | Ø | øCK | LE | CM | CL | ER | CE | KK | B | øB1 |
|---|---|---|---|---|---|---|---|---|---|---|
| **G-20** | 20 | 8 | 16 | 8 | 16 | 10 | 32 | M8x1,25 | 22 | 14 |
| **G-25-32** | 32 | 10 | 20 | 10 | 20 | 12 | 40 | M10x1,25 | 26 | 18 |

## Piston rod lock nut Mod. U

UNI EN ISO 4035

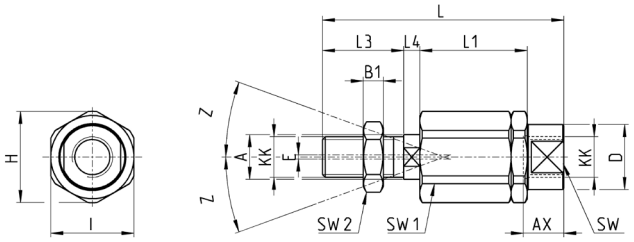
Material:
zinc-plated steel




| Mod. | Ø | D | m | SW |
|---|---|---|---|---|
| **U-20** | 20 | M8x1,25 | 5 | 13 |
| **U-25-32** | 32 | M10x1,25 | 6 | 17 |

## Self aligning rod Mod. GK

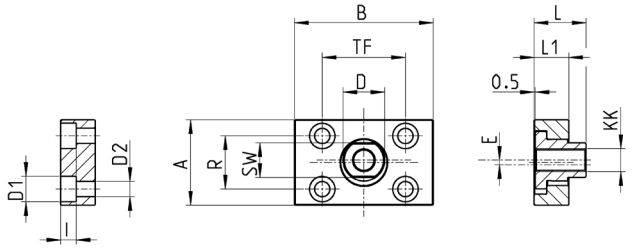
Material:
zinc-plated steel




| Mod. | Ø | KK | L | L1 | L3 | L4 | øA | øD | H | I | SW | SW1 | SW2 | B1 | AX | Z | E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GK-20** | 20 | M8x1,25 | 57 | 26 | 21 | 5 | 8 | 12,5 | 19 | 17 | 11 | 7 | 13 | 4 | 16 | 4 | 2 |
| **GK-25-32** | 32 | M10x1,25 | 71,5 | 35 | 20 | 7,4 | 14 | 22 | 32 | 30 | 19 | 12 | 17 | 5 | 22 | 4 | 2 |

## Coupling piece Mod. GKF

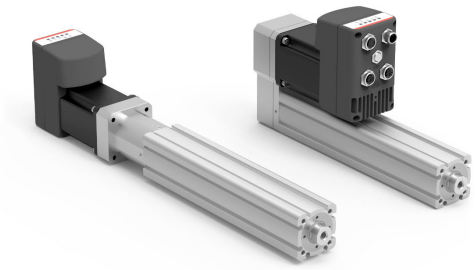
Material:
zinc-plated steel




| Mod. | Ø | KK | A | B | R | TF | L | L1 | I | øD | øD1 | øD2 | SW | E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **GKF-20** | 20 | M8x1,25 | 30 | 35 | 20 | 25 | 22,5 | 10 | - | 14 | 5.5 | - | 13 | 1,5 |
| **GKF-25-32** | 32 | M10x1,25 | 37 | 60 | 23 | 36 | 22,5 | 15 | 6,8 | 18 | 11 | 6,6 | 15 | 2 |

# CYLINDER CONFIGURATION WITH ASSEMBLED MOTOR
## SERIES 3E

Cylinder supplied with assembled motor and standard accessories AM and PM.



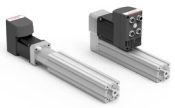


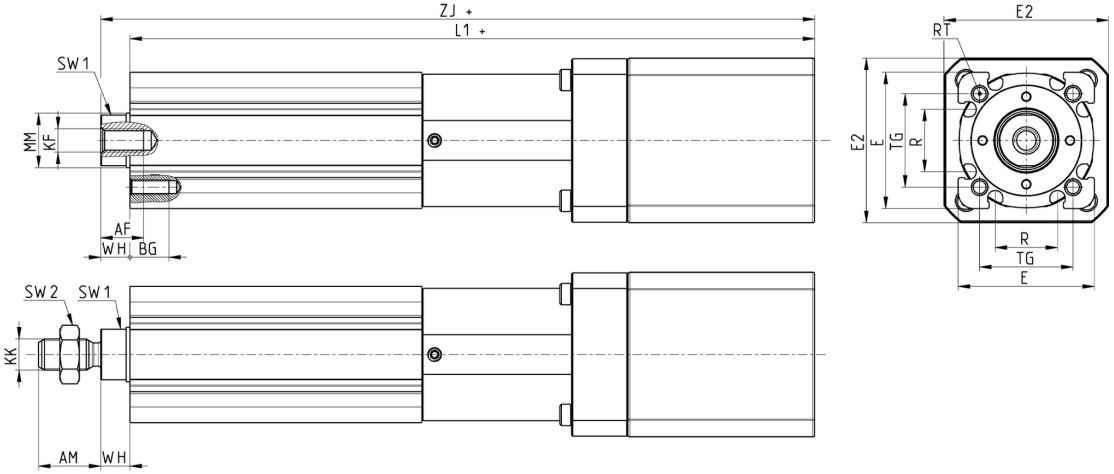
### CODING EXAMPLE

| 3E | 020 | BS | 0100 | P10 | M | / | AM | E | 0 | E | - | EC | SF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | |
|---|---|
| **3E** | SERIES |
| **020** | SIZE<br>020 = 20<br>032 = 32 |
| **BS** | TRANSMISSION<br>BS = recirculating ball screw |
| **0100** | STROKE<br>See table of mechanical characteristics |
| **P10** | SCREW PITCH<br>P03 = 3 mm<br>P10 = 10 mm |
| **M** | CONSTRUCTION<br>M = male<br>F = female |
| | EXTENDED ROD<br>(___) = rod extended with ___ mm |
| **AM** | MOTOR CONNECTION<br>AM = Kit Mod. AM<br>PM = Kit Mod. PM |
| **E** | MOTOR<br>A = MTS 17<br>B = MTS 23<br>C = MTS 24<br>E = DRVI-23ST (for size 32 only)<br>F = DRVI-24ST (for size 32 only)<br>G = DRVI-24EC (for size 32 only) |
| **0** | BRAKE<br>0 = without brake<br>B = with brake |
| **E** | ENCODER VARIANTS<br>0 = without encoder (for motor A, B, C only)<br>E = with encoder (for size 32 only) |
| **EC** | TYPE OF COMMUNICATION (for motor E, F, G only)<br>PN = Profinet<br>CO = CanOpen<br>EC = Ethercat<br>EI = Ethernet IP |
| **SF** | ADDITIONAL FUNCTIONS (for motor E, F, G only)<br>= No additional function<br>SF = STO (not certified) |

## Configuration of cylinder with in line motor AM

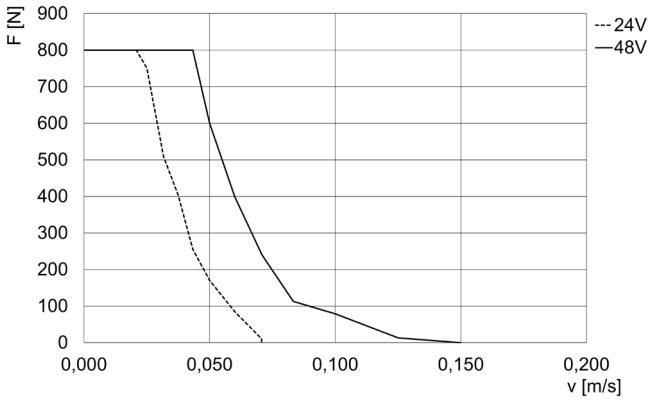





| Mod. | Size | Motor | AM | AF | BG | E | E2 | KF | KK | L1 + | øMM | R | RT | SW1 | SW2 | TG | WH | ZJ + | weight stroke 0 [g] | weight stroke [kg/m] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **.../AMA00** | 20 | MTS-17-18-050-0-0-S-C | 16 | 11 | 10 | 35 | 42,5 | M6 | M8x1,25 | 176 | 14 | 16 | M4 | 13 | 13 | 24 | 7,5 | 184 | 800 | 2,57 |
| **.../AMAB0** | 20 | MTS-17-18-050-0-F-S-C | 16 | 11 | 10 | 35 | 42,5 | M6 | M8x1,25 | 206 | 14 | 16 | M4 | 13 | 13 | 24 | 7,5 | 214 | 910 | 2,57 |
| **.../AMB00** | 32 | MTS-23-18-060-0-0-S-C | 19 | 13 | 10 | 42 | 56,4 | M8 | M10x1,25 | 163 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 171 | 1000 | 3,64 |
| **.../AMB0E** | 32 | MTS-23-18-060-0-0-E-C | 19 | 13 | 10 | 42 | 73,5 | M8 | M10x1,25 | 189 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 196 | 1100 | 3,64 |
| **.../AMBBE** | 32 | MTS-23-18-060-0-F-E-C | 19 | 13 | 10 | 42 | 73,5 | M8 | M10x1,25 | 230 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 237 | 1200 | 3,64 |
| **.../AMC00** | 32 | MTS-24-18-250-0-0-S-C | 19 | 13 | 10 | 42 | 60 | M8 | M10x1,25 | 211 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 218 | 1980 | 3,64 |
| **.../AMC0E** | 32 | MTS-24-18-250-0-0-E-C | 19 | 13 | 10 | 42 | 77,5 | M8 | M10x1,25 | 235 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 243 | 2080 | 3,64 |
| **.../AMCBE** | 32 | MTS-24-18-250-0-F-E-C | 19 | 13 | 10 | 42 | 77,5 | M8 | M10x1,25 | 276 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 284 | 2180 | 3,64 |

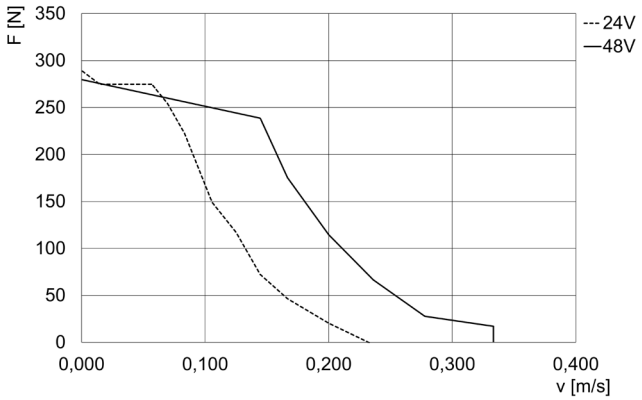
## FORCE-SPEED CURVES OF CYLINDER MOTOR IN LINE AM

With DRCS series drive



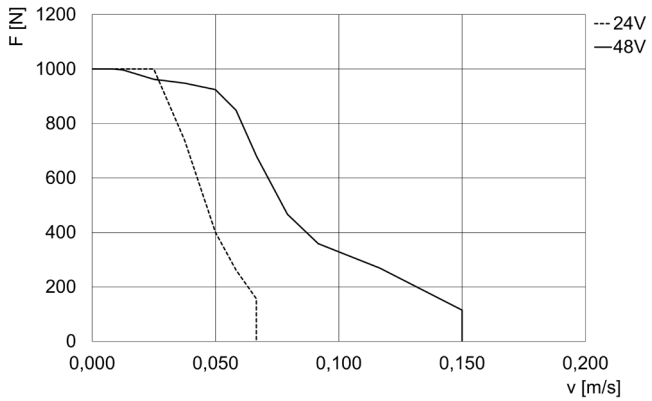

**3E020BS...P03.../AMA... (MTS 17)**

**F = force [N]**
**v = speed [m/s]**



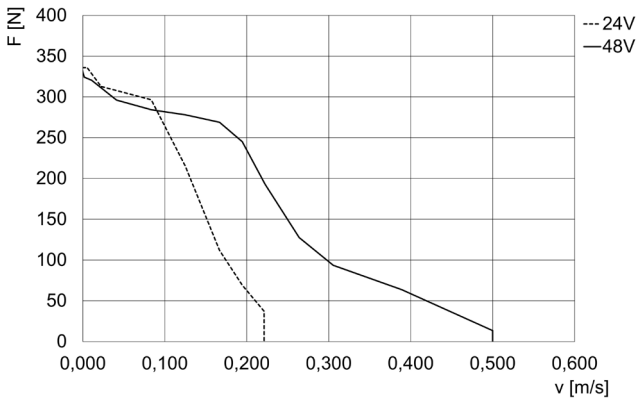

**3E020BS...P10.../AMA... (MTS 17)**

**F = force [N]**
**v = speed [m/s]**



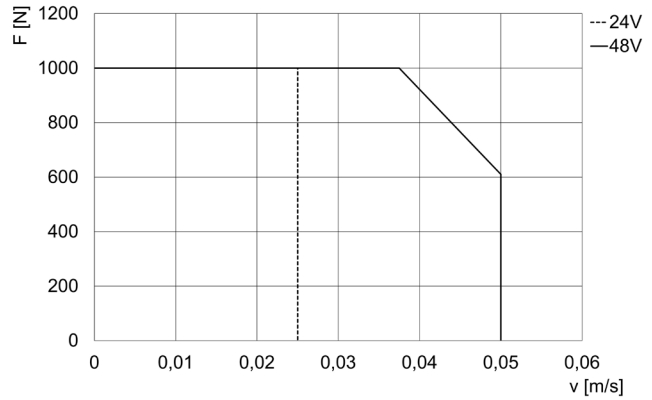

**3E032BS...P03.../AMB... (MTS 23)**

**F = force [N]**
**v = speed [m/s]**



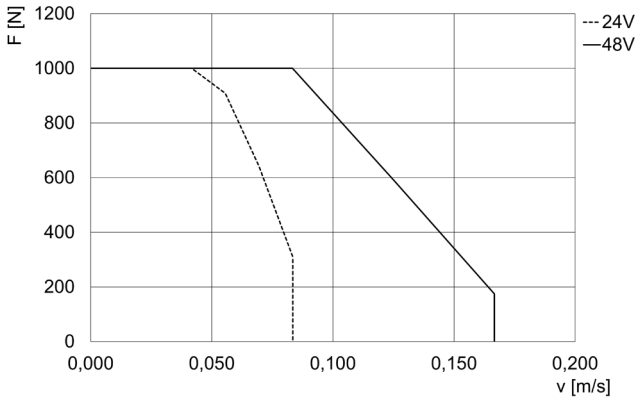

**3E032BS...P10.../AMB... (MTS 23)**

**F = force [N]**
**v = speed [m/s]**




**3E032BS...P03.../AMC... (MTS 24)**

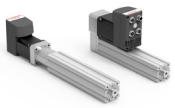
**F = force [N]**
**v = speed [m/s]**

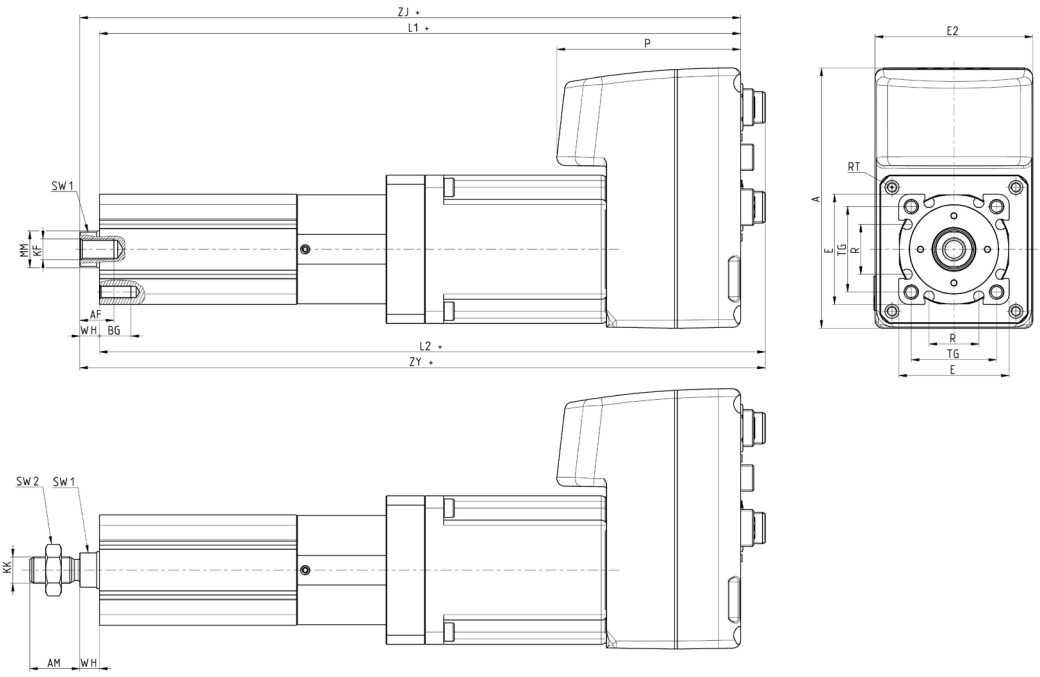



**3E032BS...P10.../AMC... (MTS 24)**

**F = force [N]**
**v = speed [m/s]**

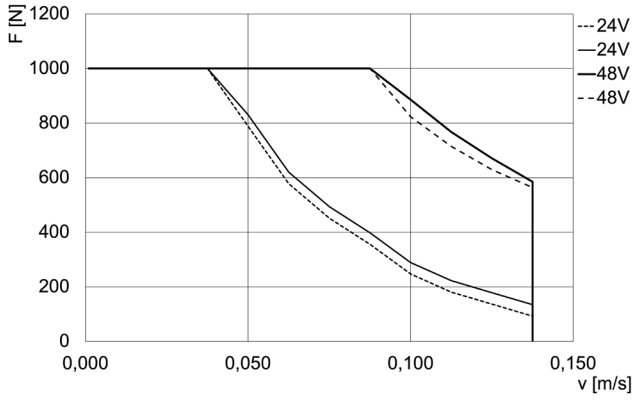
## Configuration of cylinder with in line motor AM + DRVI



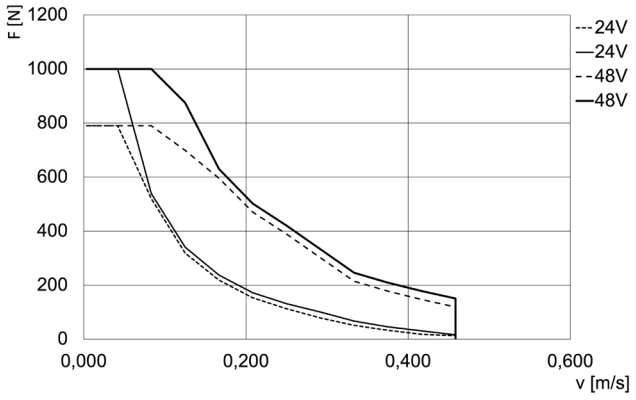



| Mod. | Size | Motor | AM | AF | BG | A | E | E2 | KF | KK | L1 + | ø MM | R | P | RT | SW1 | SW2 | TG | WH | ZJ + | L2+ | ZY+ | weight stroke 0 [g] | weight stroke [kg/m] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **.../AME0...** | 32 | DRVI-23ST | 19 | 13 | 10 | 99 | 42 | 60 | M8 | M10x1,25 | 249 | 14 | 19 | 70 | M5 | 13 | 17 | 32,5 | 7,5 | 256,5 | 259 | 266 | 1660 | 3,64 |
| **.../AMEB...** | 32 | DRVI-23ST | 19 | 13 | 10 | 99 | 42 | 60 | M8 | M10x1,25 | 290 | 14 | 19 | 70 | M5 | 13 | 17 | 32,5 | 7,5 | 298 | 300 | 307 | 2390 | 3,64 |
| **.../AMF0...** | 32 | DRVI-24ST | 19 | 13 | 10 | 99 | 42 | 60 | M8 | M10x1,25 | 275 | 14 | 19 | 70 | M5 | 13 | 17 | 32,5 | 7,5 | 282,5 | 285 | 292 | 2240 | 3,64 |
| **.../AMFB...** | 32 | DRVI-24ST | 19 | 13 | 10 | 99 | 42 | 60 | M8 | M10x1,25 | 316 | 14 | 19 | 70 | M5 | 13 | 17 | 32,5 | 7,5 | 324 | 326 | 333 | 2970 | 3,64 |
| **.../AMG0...** | 32 | DRVI-24EC | 19 | 13 | 10 | 99 | 42 | 60 | M8 | M10x1,25 | 254 | 14 | 19 | 70 | M5 | 13 | 17 | 32,5 | 7,5 | 261,5 | 264 | 271 | 1700 | 3,64 |
| **.../AMGB...** | 32 | DRVI-24EC | 19 | 13 | 10 | 99 | 42 | 60 | M8 | M10x1,25 | 295 | 14 | 19 | 70 | M5 | 13 | 17 | 32,5 | 7,5 | 303 | 305 | 312 | 2430 | 3,64 |

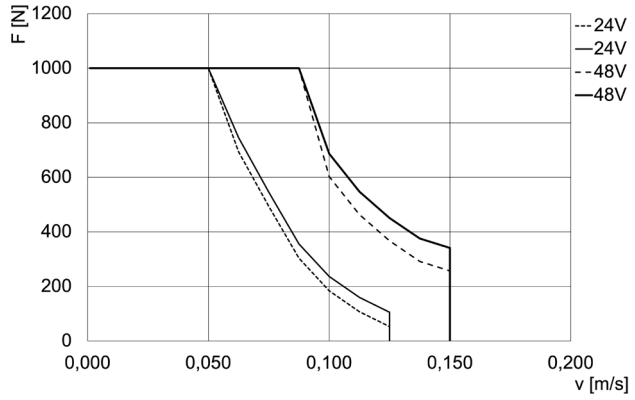
## FORCE-SPEED CURVES MOTOR CYLINDER IN LINE AM + DRVI



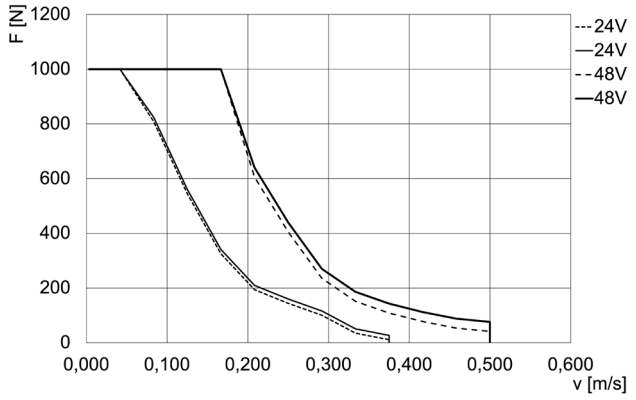

**3E032BS...P03.../AME (DRVI-23ST)**
**F = force [N]**
**v = speed [m/s]**
**Continuous lines = peak force of the actuator**
**Dashed lines = nominal force of the actuator**



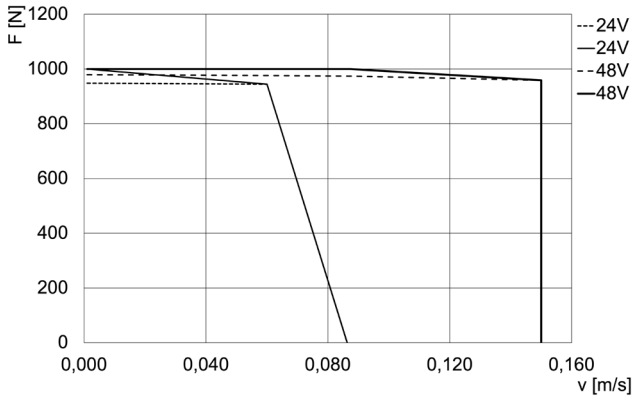

**3E032BS...P10.../AME (DRVI-23ST)**
**F = force [N]**
**v = speed [m/s]**
**Continuous lines = peak force of the actuator**
**Dashed lines = nominal force of the actuator**



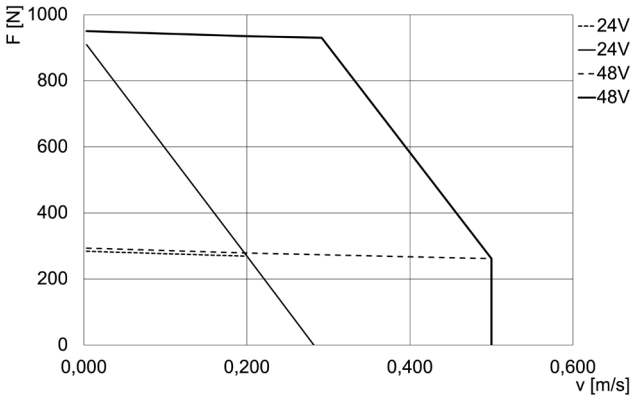

**3E032BS...P03.../AMF (DRVI-24ST)**
**F = force [N]**
**v = speed [m/s]**
**Continuous lines = peak force of the actuator**
**Dashed lines = nominal force of the actuator**




**3E032BS...P10.../AMF (DRVI-24ST)**
**F = force [N]**
**v = speed [m/s]**
**Continuous lines = peak force of the actuator**
**Dashed lines = nominal force of the actuator**

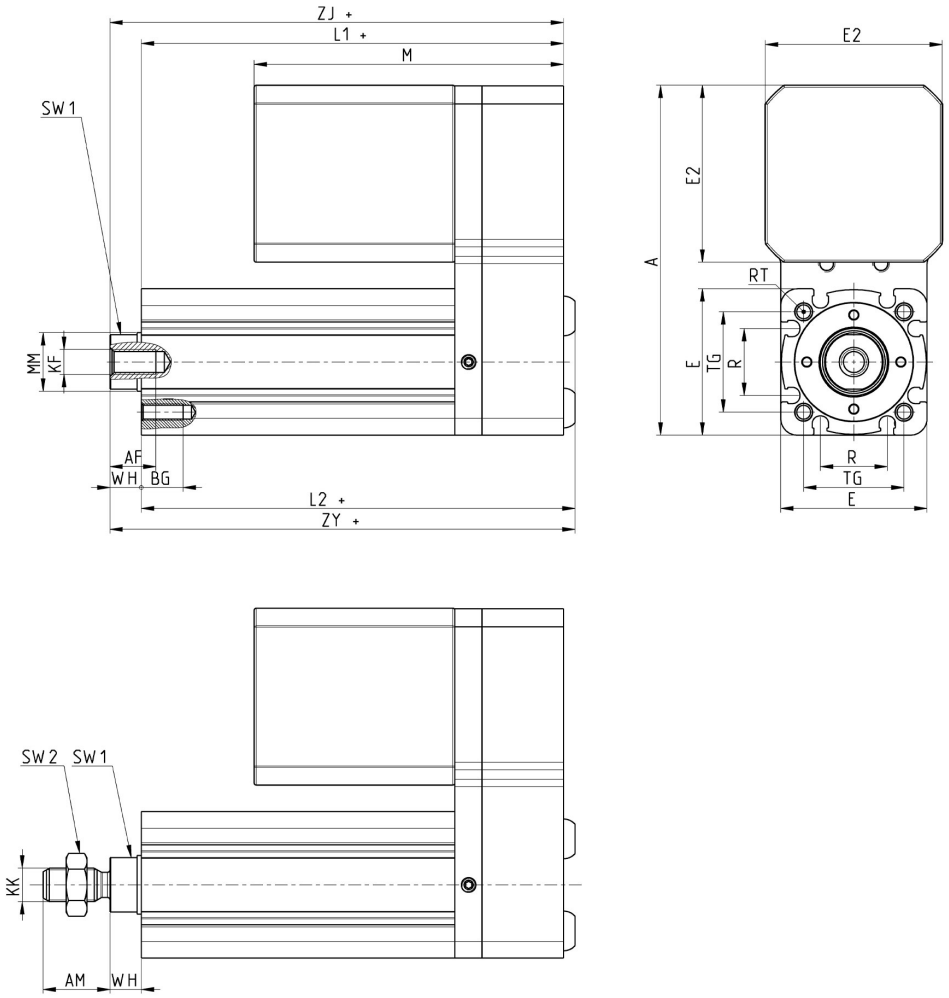



**3E032BS...P03.../AMG (DRVI-24EC)**
**F = force [N]**
**v = speed [m/s]**
**Continuous lines = peak force of the actuator**
**Dashed lines = nominal force of the actuator**




**3E032BS...P10.../AMG (DRVI-24EC)**
**F = force [N]**
**v = speed [m/s]**
**Continuous lines = peak force of the actuator**
**Dashed lines = nominal force of the actuator**

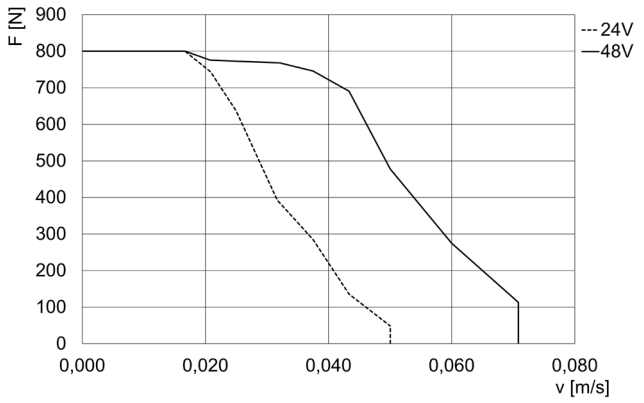
## Configuration of cylinder with parallel motor PM




| Mod. | Size | Motor | AM | AF | BG | E | E2 | KF | M | A | KK | L1 + | L2+ | ⌀MM | R | RT | SW1 | SW2 | TG | WH | ZJ + | ZY+ | minimum stroke suggested[A] | weight stroke 0 [g] | weight stroke [kg/m] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .../**PMA00** | 20 | MTS-17-18-050-0-0-S-C | 16 | 11 | 10 | 35 | 42,5 | M6 | 74 | 83,5 | M8x1,25 | 101 | 104 | 14 | 16 | M4 | 13 | 13 | 24 | 7,5 | 109 | 112 | 10 | 890 | 2,57 |
| .../**PMAB0** | 20 | MTS-17-18-050-0-F-S-C | 16 | 11 | 10 | 35 | 42,5 | M6 | 104 | 83,5 | M8x1,25 | 101 | 104 | 14 | 16 | M4 | 13 | 13 | 24 | 7,5 | 109 | 112 | 10 | 1000 | 2,57 |
| .../**PMB00** | 32 | MTS-23-18-060-0-0-S-C | 19 | 13 | 10 | 42 | 56,4 | M8 | 67 | 116,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 111 | 114 | 10 | 1240 | 3,64 |
| .../**PMB0E** | 32 | MTS-23-18-060-0-0-E-C | 19 | 13 | 10 | 42 | 56,4 | M8 | 92,5 | 134 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 111 | 114 | 10 | 1340 | 3,64 |
| .../**PMBBE** | 32 | MTS-23-18-060-0-F-E-C | 19 | 13 | 10 | 42 | 56,4 | M8 | 133,5 | 134 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | M5 | 17 | 32,5 | 7,5 | 111 | 114 | 40 | 1440 | 3,64 |
| .../**PMC00** | 32 | MTS-24-18-250-0-0-S-C | 19 | 13 | 10 | 42 | 60 | M8 | 114,5 | 118,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 111 | 114 | 20 | 2200 | 3,64 |
| .../**PMC0E** | 32 | MTS-24-18-250-0-0-E-C | 19 | 13 | 10 | 42 | 60 | M8 | 139 | 136 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 111 | 114 | 45 | 2320 | 3,64 |
| .../**PMCBE** | 32 | MTS-24-18-250-0-F-E-C | 19 | 13 | 10 | 42 | 60 | M8 | 180 | 136 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 111 | 114 | 85 | 2420 | 3,64 |

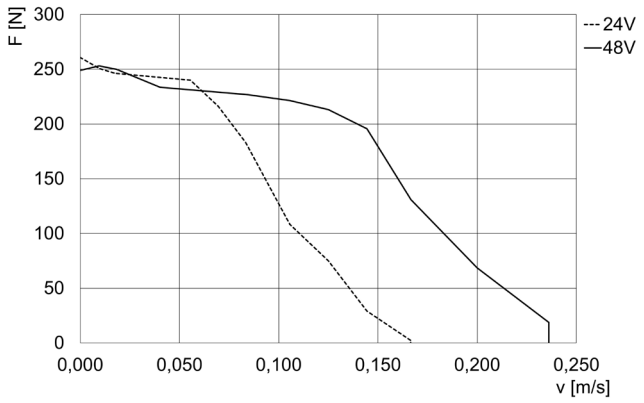
[A] Minimum stroke for L1 to be greater than M, see "mechanical characteristics" for minimum cylinder stroke.

## FORCE-SPEED CURVES MOTOR CYLINDER IN PARALLEL PM



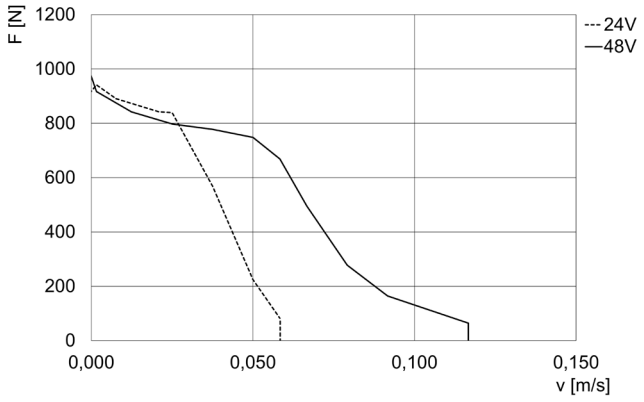

**3E020BS...P03.../PMA... (MTS 17)**

**F = force [N]**
**v = speed [m/s]**



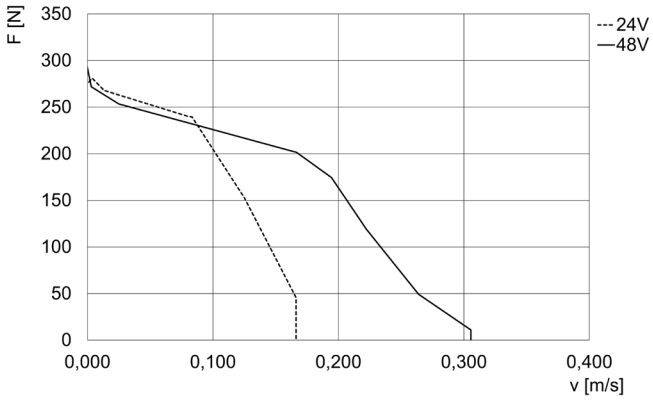

**3E020BS...P10.../PMA... (MTS 17)**

**F = force [N]**
**v = speed [m/s]**



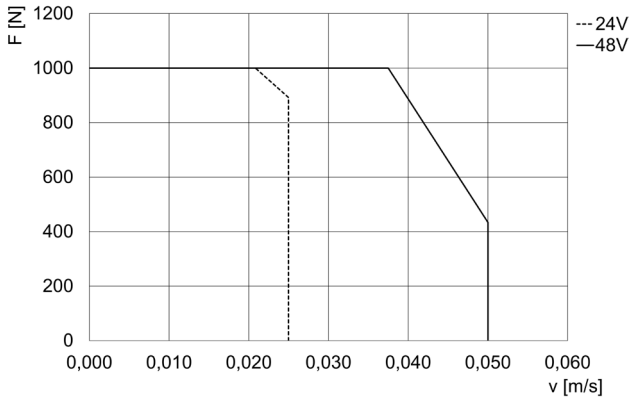

**3E032BS...P03.../PMB... (MTS 23)**

**F = force [N]**
**v = speed [m/s]**



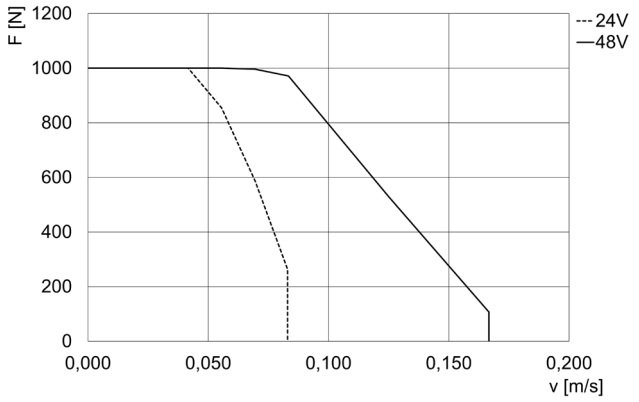

**3E032BS...P10.../PMB... (MTS 23)**

**F = force [N]**
**v = speed [m/s]**




**3E032BS...P03.../PMC... (MTS 24)**

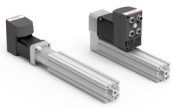
**F = force [N]**
**v = speed [m/s]**

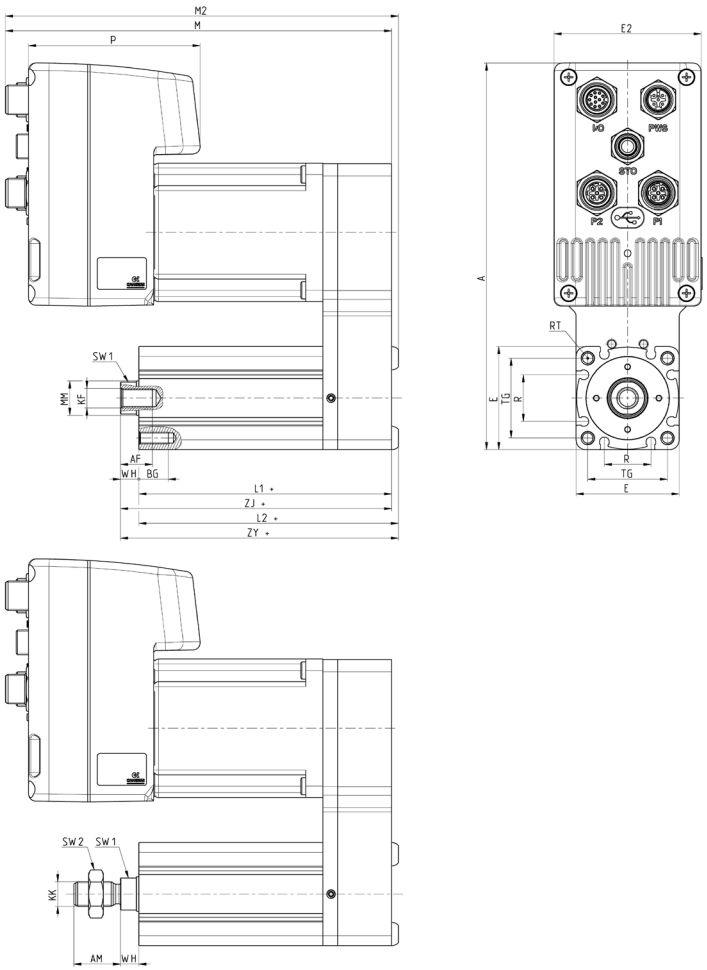



**3E032BS...P10.../PMC... (MTS 24)**

**F = force [N]**
**v = speed [m/s]**

## Configuration of cylinder with in parallel motor PM + DRVI

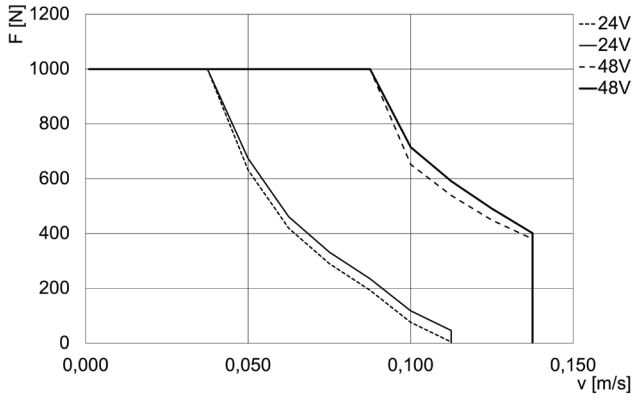




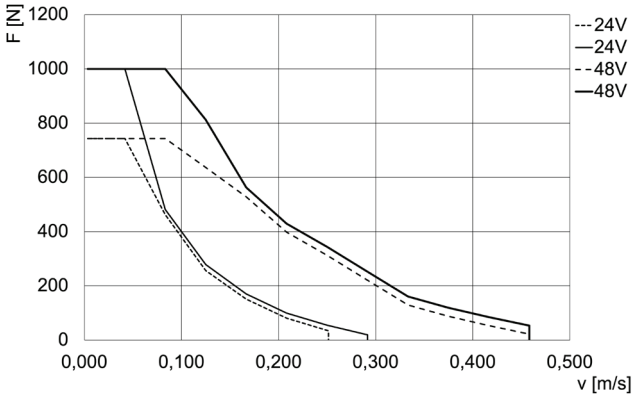

| Mod. | Size | Motor | AM | AF | BG | E | E2 | KF | M | P | A | KK | L1 + | L2+ | ø MM | R | RT | SW1 | SW2 | TG | WH | ZJ + | ZY+ | minimum stroke suggested[A] | weight stroke 0 [g] | weight stroke [kg/m] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .../PME0... | 32 | DRVI-23ST | 19 | 13 | 10 | 42 | 60 | M8 | 153 | 70 | 157,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 110,5 | 113,5 | 60 | 1900 | 3,64 |
| .../PMEB... | 32 | DRVI-23ST | 19 | 13 | 10 | 42 | 60 | M8 | 194 | 70 | 157,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 110,5 | 113,5 | 100 | 2630 | 3,64 |
| .../PMF0... | 32 | DRVI-24ST | 19 | 13 | 10 | 42 | 60 | M8 | 179 | 70 | 157,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 110,5 | 113,5 | 80 | 2480 | 3,64 |
| .../PMFB... | 32 | DRVI-24ST | 19 | 13 | 10 | 42 | 60 | M8 | 220 | 70 | 157,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 110,5 | 113,5 | 120 | 3210 | 3,64 |
| .../PMG0... | 32 | DRVI-24EC | 19 | 13 | 10 | 42 | 60 | M8 | 158 | 70 | 157,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 110,5 | 113,5 | 60 | 1940 | 3,64 |
| .../PMGB... | 32 | DRVI-24EC | 19 | 13 | 10 | 42 | 60 | M8 | 199 | 70 | 157,5 | M10x1,25 | 103 | 106 | 14 | 19 | M5 | 13 | 17 | 32,5 | 7,5 | 110,5 | 113,5 | 100 | 2670 | 3,64 |

[A] Minimum stroke for L1 to be greater than M, see "mechanical characteristics" for minimum cylinder stroke.

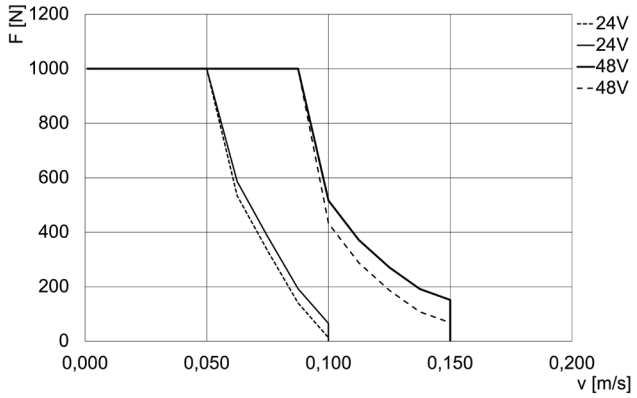
## FORCE-SPEED CURVES MOTOR CYLINDER IN PARALLEL PM + DRVI



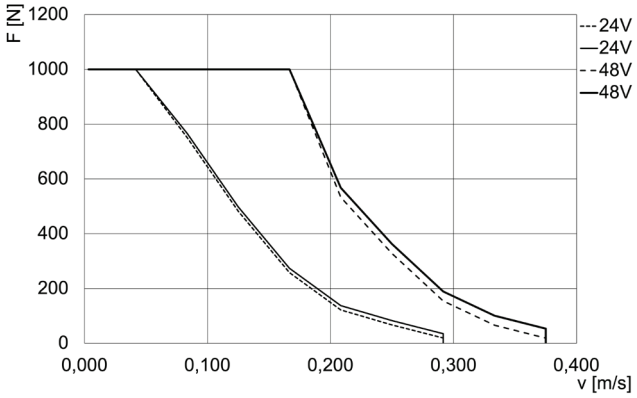

3E032BS...P03.../PME (DRVI-23ST)
F = force [N]
v = speed [m/s]
Continuous lines = peak force of the actuator
Dashed lines = nominal force of the actuator



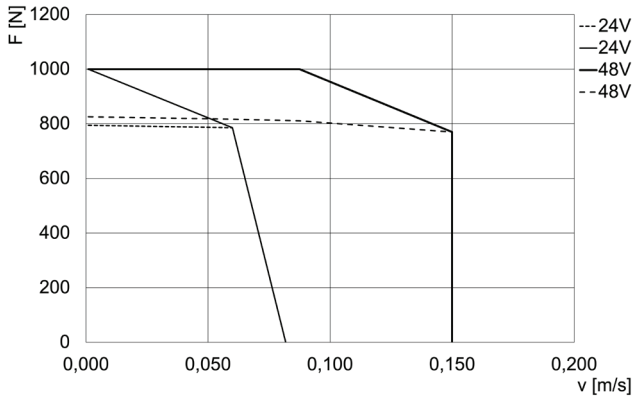

3E032BS...P10.../PME (DRVI-23ST)
F = force [N]
v = speed [m/s]
Continuous lines = peak force of the actuator
Dashed lines = nominal force of the actuator



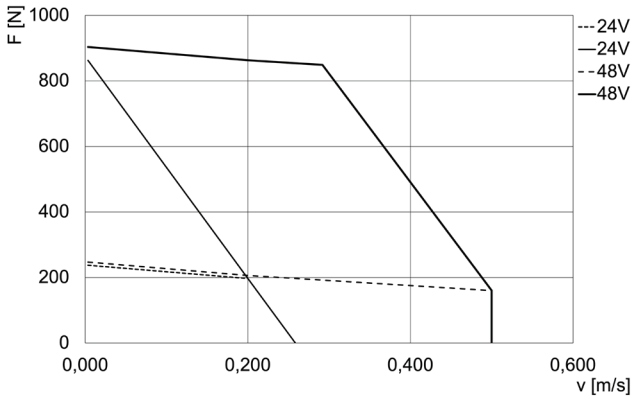

3E032BS...P03.../PMF (DRVI-24ST)
F = force [N]
v = speed [m/s]
Continuous lines = peak force of the actuator
Dashed lines = nominal force of the actuator




3E032BS...P10.../PMF (DRVI-24ST)
F = force [N]
v = speed [m/s]
Continuous lines = peak force of the actuator
Dashed lines = nominal force of the actuator




3E032BS...P03.../PMG (DRVI-24EC)
F = force [N]
v = speed [m/s]
Continuous lines = peak force of the actuator
Dashed lines = nominal force of the actuator




3E032BS...P10.../PMG (DRVI-24EC)
F = force [N]
v = speed [m/s]
Continuous lines = peak force of the actuator
Dashed lines = nominal force of the actuator