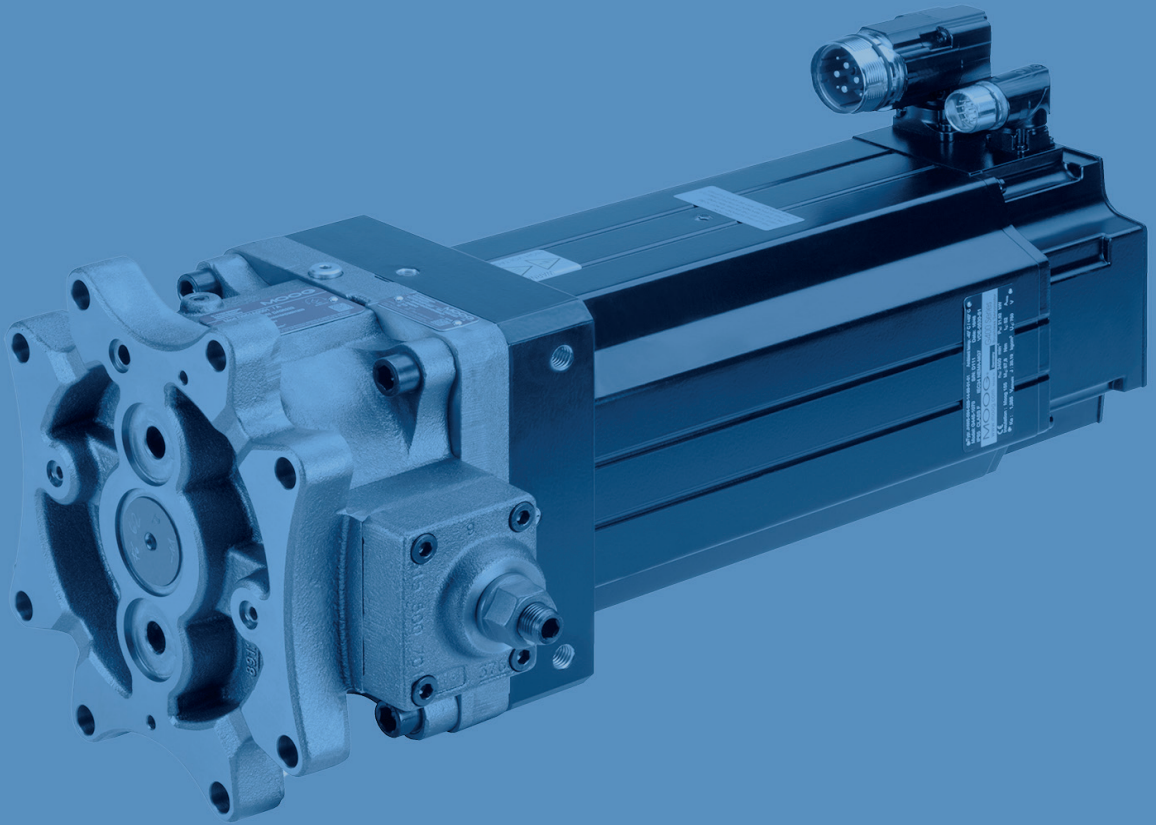


# ELECTROHYDROSTATIC PUMP UNIT



Rev. K, December 2024

MODULAR ELECTROHYDROSTATIC PUMP UNIT  
FOR INDUSTRIAL APPLICATIONS

**MOOG** | Shaping the way our world moves™

Whenever the highest levels of motion control performance and design flexibility are required, you'll find Moog expertise at work. Through collaboration, creativity and world-class technological solutions, we help you overcome your toughest engineering obstacles, enhance your machine's performance, and help take your thinking further than you ever thought possible.

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This catalog is for users with technical knowledge. To ensure all necessary characteristics for function and safety of the system, the user has to check the suitability of the products described herein. The products described in this document are subject to change without notice. In case of doubt, please contact Moog.

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For the most current information, visit [www.moog.com/industrial](http://www.moog.com/industrial) or contact your local Moog office.

## PRODUCT OVERVIEW

### Moog Electrohydrostatic Pump Unit and Electrohydrostatic Actuation System

Moog Electrohydrostatic Pump Units are emerging as a viable option for industrial machine builders as the design combines the best of both electromechanical and electrohydraulic technologies. These highly integrated, compact alternatives to traditional hydraulic solutions offer superior performance and efficiency.

This catalog details the EPU and EPU-G used in electrohydrostatic actuation systems, such as the Moog EAS. They are capable of operating in both 2-quadrant and 4-quadrant modes and feature a mechanical interface that allows direct connection to hydraulic cylinders or manifolds.

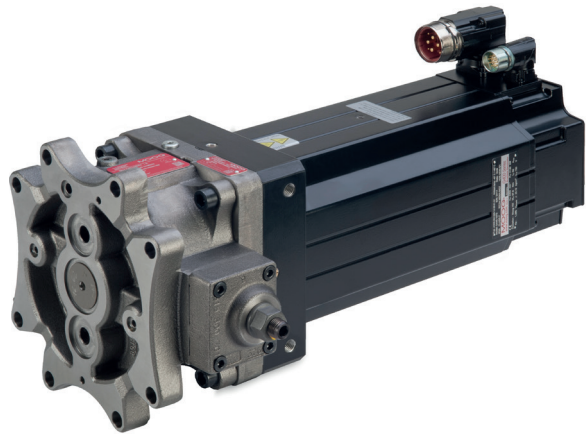
The EPU-G in sizes 13 and 20 utilize an internal gear pump to generate flow.

The EPU in sizes 19, 32, 80, 140 and 250 use a radial piston pump available in two versions: Fixed or dual displacement. As a fixed displacement pump, the pump permanently delivers a certain volume per revolution. The dual displacement pump version can be switched between two fixed volumes ( $V_{\max}$  and  $V_{\min}$  adjustable) during operation, see table in section "Ordering Code" on page 82.

The Moog EAS is a modular actuation system comprised of an EPU(-G), Servo Drive (MSD) and manifold. Adding a cylinder as part of the system is also a common option.



EPU-G



EPU

# PRODUCT OVERVIEW

## EPU-G - Sizes 13 and 20

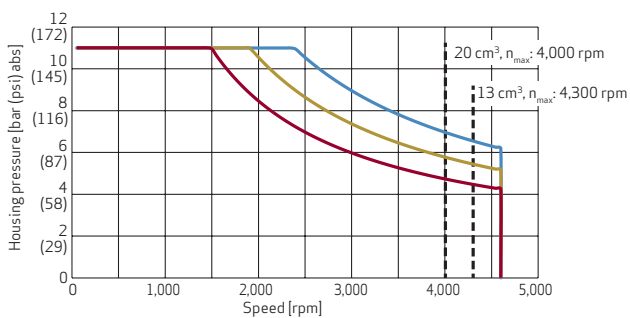
### Performance Specifications

|   |   |                     |
|---|---|---------------------|
| <b>Size</b>                                   | <b>013</b>  | <b>020</b>          |
| <b>Pump version</b>                           | Internal gear pump  |                     |
| <b>Maximum flow</b>                           | 57 l/min (15.1 gpm)   | 83 l/min (21.9 gpm) |
| <b>Maximum pressure ports A and B</b>         | 345 bar (5,004 psi)   |                     |
| <b>Maximum housing pressure <sup>1)</sup></b> | Refer to speed/pressure curve   |                     |
| <b>Motor version</b>                          | Brushless servo motor: natural, fan or liquid (oil/water) cooled  |                     |
| <b>Temperature range</b>                      |   |                     |
| Ambient                                       | -20 to +60 °C (-4 to 140 °F)  |                     |
| Fluid   | -20 to +80 °C (-4 to 176 °F) (leakage oil on port L)  |                     |
| <b>Seal material</b>                          | FKM/NBR   |                     |
| <b>Operating fluid</b>                        | Mineral oil according to DIN 51524, HFD and others upon request   |                     |
| <b>Viscosity <sup>2)</sup></b>                | <ul style="list-style-type: none"> <li>Allowable viscosity operational range from 12 to 100 mm<sup>2</sup>/s (12 to 100 cSt).</li> <li>Recommended hydraulic fluid viscosity class VG 46 to VG 100 according to ISO 3448.</li> <li>Maximum viscosity 500 mm<sup>2</sup>/s (500 cSt) during start-up with electric motor at 1,800 rpm</li> </ul> |                     |
| <b>System filtration</b>                      | <ul style="list-style-type: none"> <li>NAS 1638, class 9</li> <li>ISO 4406 class 19/17/14; obtained with filter fineness of <math>\beta_{20} = 75</math></li> </ul>   |                     |
| <b>Installation position</b>                  | Any   |                     |
| <b>Installation note</b>                      | Load holding up to 15% of the duty cycle and a maximum cycle time of 1 minute.  |                     |

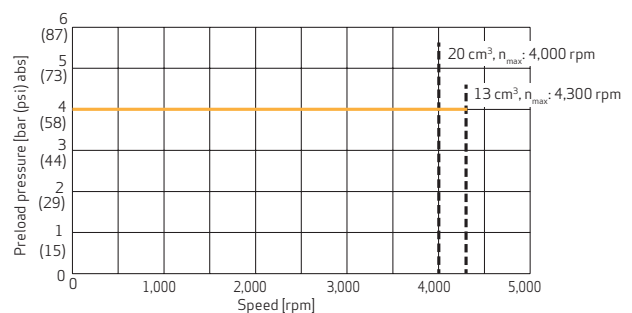
1) Maximum housing pressure  $p_{L,max}, p_F = f(n)$ , see diagram below.

2) For more information see EPU user manual.

### Housing Pressure ( $p_F$ )



### Preload Pressure Suction Port ( $p_A, p_B$ )



|                    |     |     |     |
|--------------------|-----|-----|-----|
| 13 cm <sup>3</sup> | SOC | SOF | SOW |
|                    | MOC | MOF | MOW |
|                    | HOC | HOE | HOW |
| 20 cm <sup>3</sup> | SOC | SOF | SOW |
|                    | MOC | MOF | MOW |
|                    | HOC | HOE | HOW |



# PRODUCT OVERVIEW

## EPU - Sizes 19, 32, 80, 140 and 250

### Performance Specifications

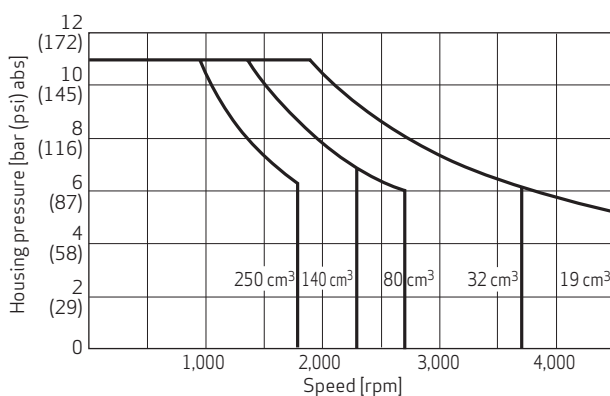
| Size  | 019  | 032                     | 080                     | 140                     | 250                      |
|---|--|-------------------------|-------------------------|-------------------------|--------------------------|
| <b>Pump version</b>                           | Radial piston pump, constant, dual or variable displacement  |                         |                         |                         |                          |
| <b>Maximum flow</b>                           | 85 l/min<br>(22.5 gpm)   | 118 l/min<br>(31.2 gpm) | 216 l/min<br>(57.1 gpm) | 322 l/min<br>(85.1 gpm) | 450 l/min<br>(118.9 gpm) |
| <b>Maximum pressure ports A and B</b>         | 350 bar (5,076 psi)  |                         |                         |                         |                          |
| <b>Maximum housing pressure <sup>1)</sup></b> | 10 bar (145 psi)   |                         |                         |                         |                          |
| <b>Motor version</b>                          | Brushless servo motor: natural, fan or liquid cooled   |                         |                         |                         |                          |
| <b>Temperature range</b>                      |  |                         |                         |                         |                          |
| Ambient                                       | -15 to +60 °C (-5 to +140 °F)  |                         |                         |                         |                          |
| Fluid   | -15 to +80 °C (-5 to +176 °F)  |                         |                         |                         |                          |
| <b>Seal material</b>                          | FKM  |                         |                         |                         |                          |
| <b>Pilot pressure supply <sup>2)</sup></b>    | External   |                         |                         |                         |                          |
| <b>Operating fluid</b>                        | Mineral oil according to DIN 51524, HFD, others upon request   |                         |                         |                         |                          |
| <b>Viscosity <sup>3)</sup></b>                | <ul style="list-style-type: none"> <li>Allowable viscosity operational range 12 to 100 mm<sup>2</sup>/s (12 to 100 cSt)</li> <li>Recommended hydraulic fluid viscosity class VG 46 to VG 100 according to ISO 3448</li> <li>Maximum viscosity 500 mm<sup>2</sup>/s during start-up with electric motor at 1,800 rpm</li> </ul>   |                         |                         |                         |                          |
| <b>System filtration</b>                      | <ul style="list-style-type: none"> <li>NAS 1638, class 9</li> <li>ISO 4406, class 20/18/15; obtained with filter fineness of <math>\beta_{20} = 75</math></li> </ul>   |                         |                         |                         |                          |
| <b>Installation position</b>                  | Any  |                         |                         |                         |                          |
| <b>Installation note</b>                      | <p>To avoid pump damages the housing pressure <math>p_L</math> must not exceed the pressure in the low pressure line (<math>p_A</math> or <math>p_B</math>) by more than 1 bar. Design the drain line with lowest possible pressure losses. Maximal pump speed is preload pressure dependent on suction line, see diagram below.</p> <p>The fluid temperature in the tank shall not exceed the temperature of the pump by more than +25 °C (+77 °F). If this should occur, the pump shall be jog started for intervals of approximately 1 to 2 seconds until pump casing has heated up.<sup>3)</sup></p> |                         |                         |                         |                          |

1) Maximum housing pressure  $p_{Lmax}$ ,  $p_{Sp} = f(n)$ , see diagram below.

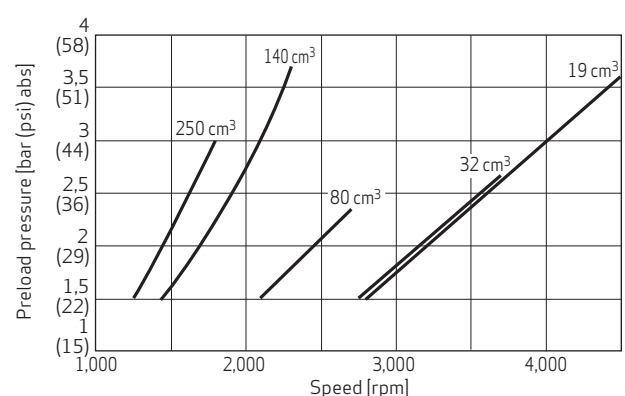
2) For option N1 (dual displacement) only.

3) For more information see EPU user manual.

### Housing Pressure ( $p_{Sp}$ )



### Preload Pressure ( $p_A, p_B$ )



## EPU-G SIZE 13

## Natural Cooling, S EPU 013 x D GP xx C

## Characteristics Table

| Performance class                                    |                 | Small   | Medium  | High   |
|--|-----------------|---|---|--|
| S EPU 013 x D GP                                     |                 | S0 C  | M0 C  | H0 C   |
| <b>Pump</b>  |                 |   |   |  |
| Displacement   | $V_{max}$       | 13 cm <sup>3</sup> /rev (0.79 in <sup>3</sup> /rev)                       |   |  |
| Maximum pump speed                                   | $n_{max}$       | 4,300 rpm   |   |  |
| Maximum pump acceleration                            | $\dot{n}_{max}$ | 10,100 rad/s <sup>2</sup>   |   |  |
| Maximum housing pressure <sup>1)</sup>               | $p_{Lmax}, p_F$ | Refer to speed/pressure curve   |   |  |
| Maximum flow   | $Q_{max}$       | 57 l/min (15.1 gpm)   |   |  |
| Maximum pressure ports A and B                       | $p_A, p_B$      | 345 bar (5,004 psi)   |   |  |
| Flushing flow rate <sup>4)</sup>                     | $Q_F$           | 1.5 to 2 l/min (0.4 to 0.5 gpm)   |   |  |
| <b>Motor</b>   |                 |   |   |  |
| Continuous stall torque <sup>3)</sup>                | $M_0$           | 24 Nm (212 lbf in)  | 39 Nm (345 lbf in)  | 77 Nm (682 lbf in)   |
| Rated torque <sup>3)</sup>                           | $M_n$           | 15 Nm (133 lbf in)  | 21 Nm (186 lbf in)  | 41 Nm (363 lbf in)   |
| Maximum torque                                       | $M_{max}$       | 134 Nm (1,186 lbf in)   | 225 Nm (1,991 lbf in)   | 267 Nm (2,363 lbf in)  |
| Rated speed  | $n_n$           | 2,125 rpm   | 2,100 rpm   | 1,200 rpm  |
| Maximum speed  | $n_{max}$       | Maximum speed see $M = f(n)$ performance curve                            |   |  |
| Continuous stall current                             | $I_0$           | 20.73 A <sub>rms</sub>  | 24.77 A <sub>rms</sub>  | 48.74 A <sub>rms</sub>   |
| Maximum current                                      | $I_{max}$       | 126 A <sub>rms</sub>  | 158 A <sub>rms</sub>  | 211 A <sub>rms</sub>   |
| Torque constant                                      | $k_t$           | 1.17 Nm/A <sub>rms</sub><br>(10.4 lbf in/A <sub>rms</sub> )               | 1.56 Nm/A <sub>rms</sub><br>(13.8 lbf in/A <sub>rms</sub> )               | 1.59 Nm/A <sub>rms</sub><br>(14.1 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                     | $k_e$           | 82.93 V <sub>rms</sub> /1,000 rpm   | 110.33 V <sub>rms</sub> /1,000 rpm  | 105.89 V <sub>rms</sub> /1,000 rpm   |
| Thermal time constant                                | $t_{th}$        | 2,600 s   | 4,333 s   | 2,550 s  |
| Winding resistance at 25 °C                          | $R_{tt}$        | 0.296 Ω   | 0.287 Ω   | 0.121 Ω  |
| Winding inductance                                   | $L_{tt}$        | 2.370 mH  | 2.515 mH  | 1.387 mH   |
| Power connector                                      |                 | Size 1.5 rotatable  |   |  |
| Feedback connector                                   |                 | Signal resolver connector rotatable                                       |   |  |
| Thermal sensor                                       |                 | NTC 220 kOhm, Pt1000  |   |  |
| <b>EPU unit</b>                                      |                 |   |   |  |
| Inertia  | $J$             | 30.65 kg cm <sup>2</sup><br>(271 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 47.44 kg cm <sup>2</sup><br>(420 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 263.25 kg cm <sup>2</sup><br>(2,330 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | $m$             | 46.7 kg (103.0 lb)  | 56.7 kg (125.0 lb)  | 94.0 kg (207.2 lb)   |
| Tightening torque 4xM16x45 -10.9 cylinder head screw |                 | 310 Nm (2,744 lbf in)   |   |  |
| <b>Servo drive</b>                                   |                 |   |   |  |
| Recommended drive size <sup>2)</sup>                 |                 | G392-032 size 4   | G392-045 size 5   | G392-072 size 5  |

1) See diagram "Housing Pressure ( $p_r$ )" on page 4.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

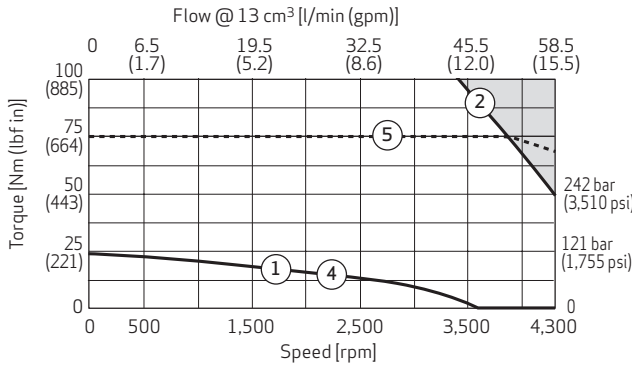
4) Optional via F port (flushing port).

# EPU-G SIZE 13

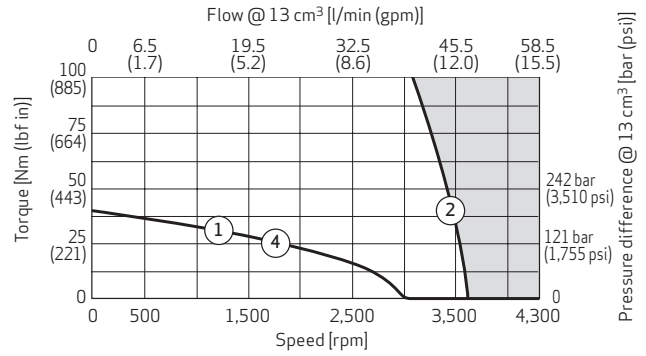
## Natural Cooling, S EPU 013 x D GP xx C

### Motor Performance Curves

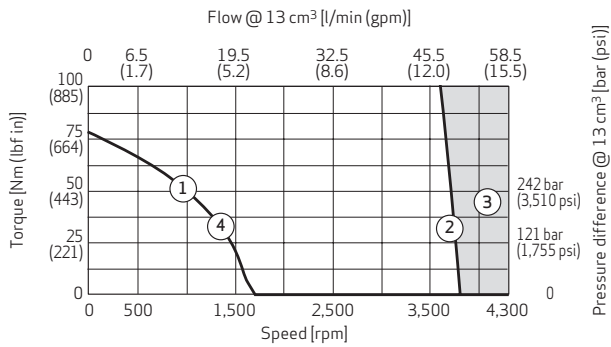
50 C



M0 C



H0 C



- ① Continuous torque at 110K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

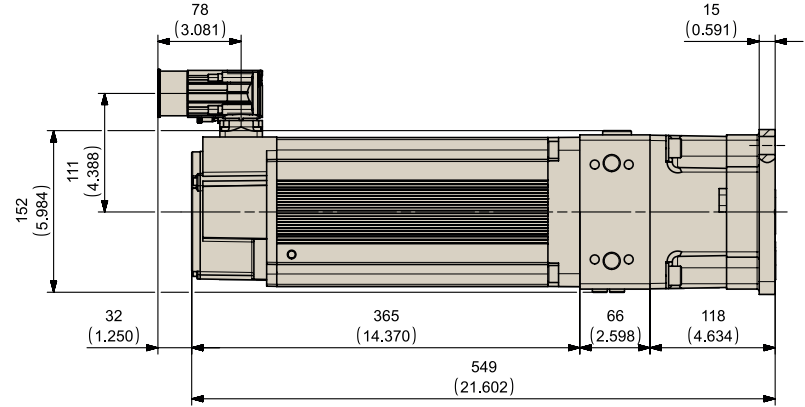
Pressure difference  $\Delta p = p_A - p_B$

# EPU-G SIZE 13

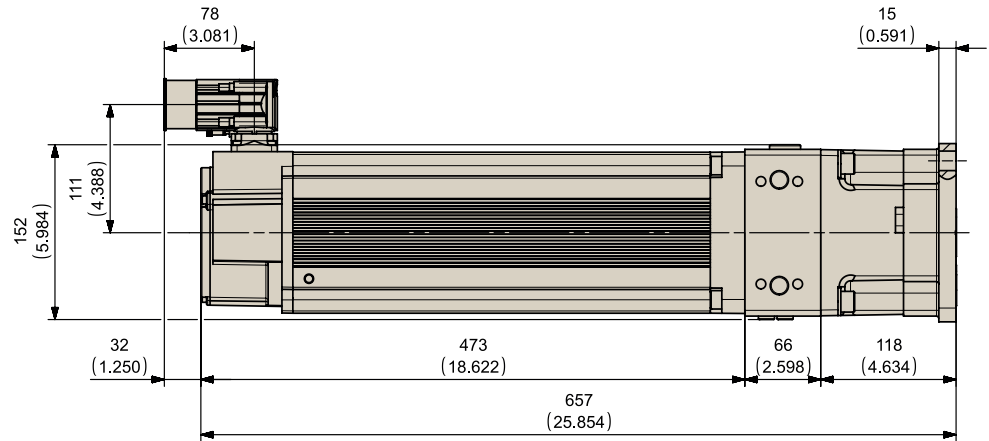
## Natural Cooling, S EPU 013 x D GP xx C

### Installation Drawings

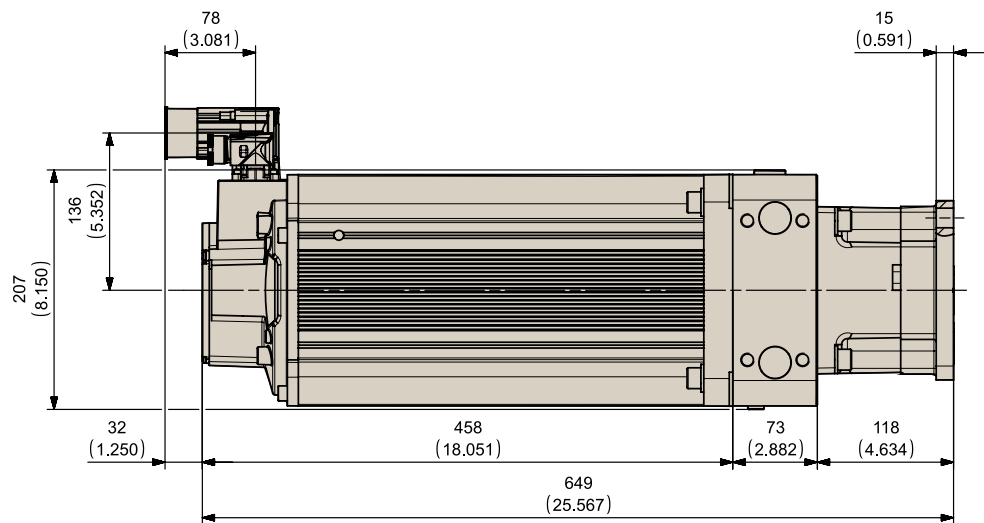
50 C



M0 C



H0 C



Note: Dimensions mm (inch)

## EPU-G SIZE 13

## Fan Cooling, S EPU 013 x D GP xx F

## Characteristics Table

| Performance class                                    |                 | Small   | Medium  | High  |
|--|-----------------|---|---|---|
| S EPU 013 x D GP                                     |                 | S0 F  | M0 F  | H0 F  |
| <b>Pump</b>  |                 |   |   |   |
| Displacement   | $V_{max}$       | 13 cm <sup>3</sup> /rev (0.79 in <sup>3</sup> /rev)                       |   |   |
| Maximum pump speed                                   | $n_{max}$       | 4,300 rpm   |   |   |
| Maximum pump acceleration                            | $\dot{n}_{max}$ | 10,100 rad/s <sup>2</sup>   |   |   |
| Maximum housing pressure <sup>1)</sup>               | $p_{Lmax}, p_F$ | Refer to speed/pressure curve   |   |   |
| Maximum flow   | $Q_{max}$       | 57 l/min (15.1 gpm)   |   |   |
| Maximum pressure ports A and B                       | $p_A, p_B$      | 345 bar (5,004 psi)   |   |   |
| Flushing flow rate <sup>4)</sup>                     | $Q_F$           | 1.5 to 2 l/min (0.4 to 0.5 gpm)   |   |   |
| <b>Motor</b>   |                 |   |   |   |
| Continuous stall torque <sup>3)</sup>                | $M_0$           | 25.5 Nm (226 lbf in)  | 34 Nm (301 lbf in)  | 61 Nm (540 lbf in)  |
| Rated torque <sup>3)</sup>                           | $M_n$           | 18 Nm (159 lbf in)  | 24 Nm (212 lbf in)  | 40 Nm (354 lbf in)  |
| Maximum torque                                       | $M_{max}$       | 95 Nm (841 lbf in)  | 134 Nm (1,186 lbf in)   | 225 Nm (1,991 lbf in)   |
| Rated speed  | $n_n$           | 3,300 rpm   | 3,400 rpm   | 2,600 rpm   |
| Maximum speed  | $n_{max}$       | Maximum speed see $M = f(n)$ performance curve                            |   |   |
| Continuous stall current                             | $I_0$           | 20.4 A <sub>rms</sub>   | 28.81 A <sub>rms</sub>  | 38.8 A <sub>rms</sub>   |
| Maximum current                                      | $I_{max}$       | 85 A <sub>rms</sub>   | 126 A <sub>rms</sub>  | 158 A <sub>rms</sub>  |
| Torque constant                                      | $k_t$           | 1.25 Nm/A <sub>rms</sub><br>(11.1 lbf in/A <sub>rms</sub> )               | 1.17 Nm/A <sub>rms</sub><br>(10.4 lbf in/A <sub>rms</sub> )               | 1.57 Nm/A <sub>rms</sub><br>(13.9 lbf in/A <sub>rms</sub> )               |
| Voltage constant                                     | $k_e$           | 88.12 V <sub>rms</sub> /1,000 rpm   | 82.93 V <sub>rms</sub> /1,000 rpm   | 110.33 V <sub>rms</sub> /1,000 rpm  |
| Thermal time constant                                | $t_{th}$        | 1,722 s   | 2,600 s   | 4,333 s   |
| Winding resistance at 25 °C                          | $R_{tt}$        | 0.576 Ω   | 0.296 Ω   | 0.287 Ω   |
| Winding inductance                                   | $L_{tt}$        | 3.969 mH  | 2.356 mH  | 2.501 mH  |
| Power connector                                      |                 | Size 1 rotatable  | Size 1.5 rotatable  |   |
| Feedback connector                                   |                 | Signal resolver connector rotatable                                       |   |   |
| Fan connector  |                 | Size 1 rotatable  |   |   |
| Thermal sensor                                       |                 | NTC 220 kOhm, Pt1000  |   |   |
| <b>EPU unit</b>                                      |                 |   |   |   |
| Inertia  | J               | 22.26 kg cm <sup>2</sup><br>(197 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 30.65 kg cm <sup>2</sup><br>(271 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 47.44 kg cm <sup>2</sup><br>(420 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m               | 44.3 kg (97.7 lb)   | 49.6 kg (109.2 lb)  | 60.0 kg (132.3 lb)  |
| Tightening torque 4xM16x45 -10.9 cylinder head screw |                 | 310 Nm (2,744 lbf in)   |   |   |
| <b>Servo drive</b>                                   |                 |   |   |   |
| Recommended drive size <sup>2)</sup>                 |                 | G392-032 size 4   | G392-045 size 5   |   |

1) See diagram "Housing Pressure ( $p_r$ )" on page 4.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

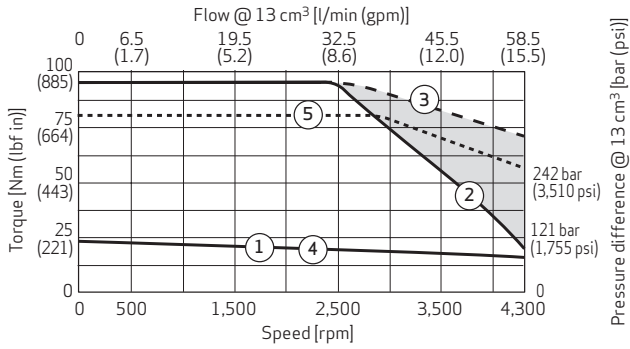
4) Optional via F port (flushing port).

# EPU-G SIZE 13

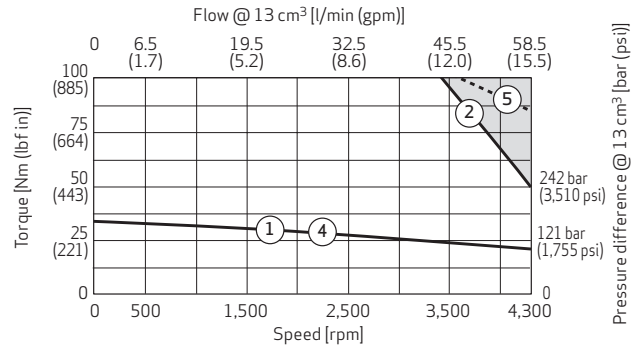
## Fan Cooling, S EPU 013 x D GP xx F

### Motor Performance Curves

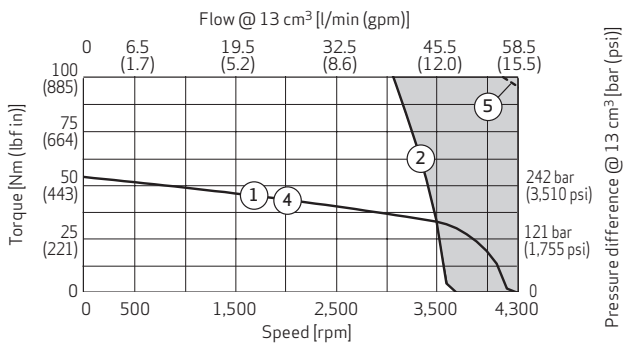
S0 F



M0 F



H0 F



- ① Continuous torque at 110K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

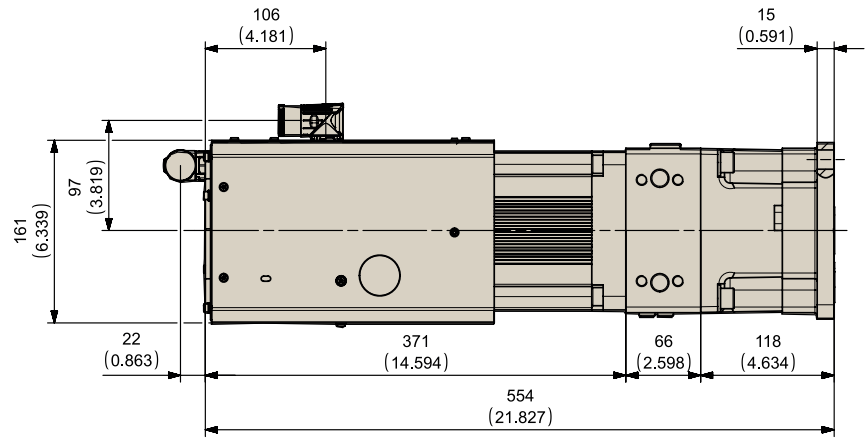
Pressure difference  $\Delta p = p_A - p_B$

# EPU-G SIZE 13

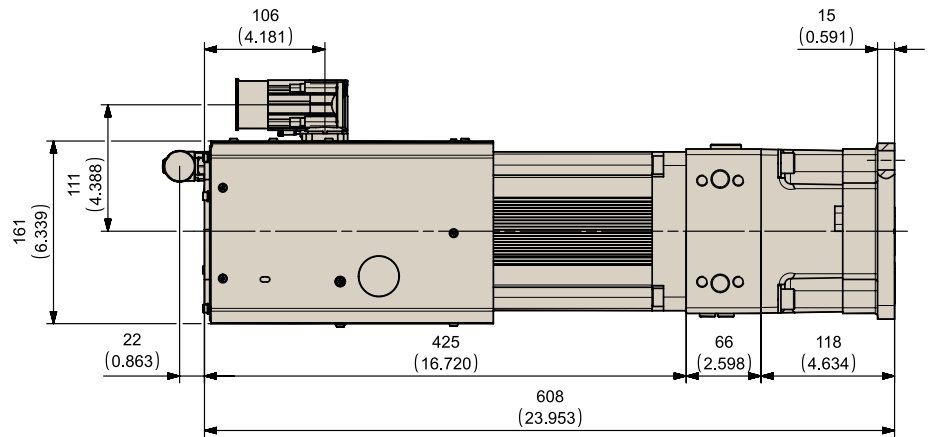
## Fan Cooling, S EPU 013 x D GP xx F

### Installation Drawings

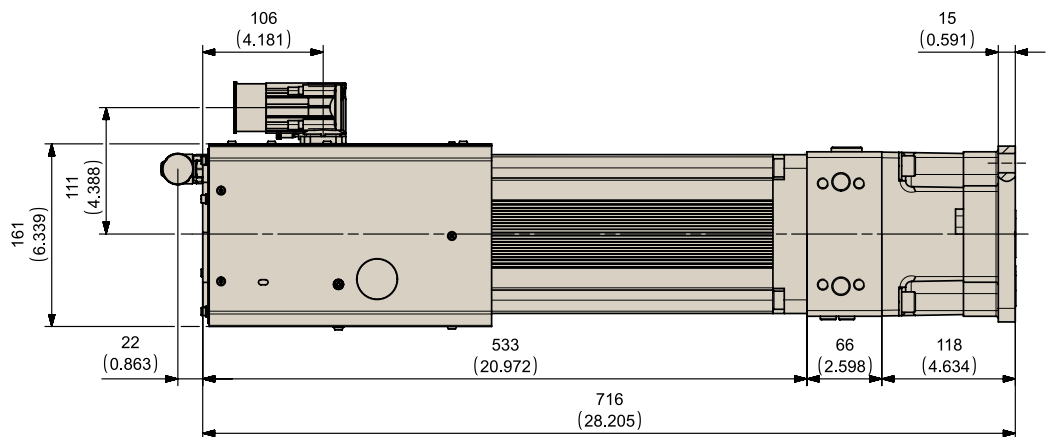
S0 F



M0 F



H0 F



Note: Dimensions mm (inch)



## EPU-G SIZE 13

## Liquid Cooling, S EPU 013 x D GP xx W

## Characteristics Table

| Performance class                                    |                 | Small   | Medium  | High  |
|--|-----------------|---|---|---|
| S EPU 013 x D GP                                     |                 | S0W   | M0W   | H0W   |
| <b>Pump</b>  |                 |   |   |   |
| Displacement   | $V_{max}$       | 13 cm <sup>3</sup> /rev (0.79 in <sup>3</sup> /rev)                       |   |   |
| Maximum pump speed                                   | $n_{max}$       | 4,300 rpm   |   |   |
| Maximum pump acceleration                            | $\dot{n}_{max}$ | 10,100/min/s  |   |   |
| Maximum housing pressure <sup>1)</sup>               | $p_{Lmax}, p_F$ | Refer to speed/pressure curve   |   |   |
| Maximum flow   | $Q_{max}$       | 57 l/min (15.1 gpm)   |   |   |
| Maximum pressure ports A and B                       | $p_A, p_B$      | 345 bar (5,004 psi)   |   |   |
| Flushing flow rate <sup>4)</sup>                     | $Q_F$           | 1.5 to 2 l/min (0.4 to 0.5 gpm)   |   |   |
| <b>Motor</b>   |                 |   |   |   |
| Continuous stall torque <sup>3)</sup>                | $M_0$           | 27 Nm (239 lbf in)  | 40 Nm (354 lbf in)  | 60 Nm (531 lbf in)  |
| Rated torque <sup>3)</sup>                           | $M_n$           | 25 Nm (221 lbf in)  | 37 Nm (327 lbf in)  | 54 Nm (478 lbf in)  |
| Maximum torque                                       | $M_{max}$       | 53 Nm (469 lbf in)  | 95 Nm (841 lbf in)  | 135 Nm (1,195 lbf in)   |
| Rated speed  | $n_n$           | 3,100 rpm   | 3,000 rpm   | 3,400 rpm   |
| Maximum speed  | $n_{max}$       | Maximum speed see $M = f(n)$ performance curve                            |   |   |
| Continuous stall current                             | $I_0$           | 22.15 A <sub>rms</sub>  | 31.9 A <sub>rms</sub>   | 51.08 A <sub>rms</sub>  |
| Maximum current                                      | $I_{max}$       | 47 A <sub>rms</sub>   | 85 A <sub>rms</sub>   | 126 A <sub>rms</sub>  |
| Torque constant                                      | $k_t$           | 1.23 Nm/A <sub>rms</sub><br>(10.9 lbf in/A <sub>rms</sub> )               | 1.24 Nm/A <sub>rms</sub><br>(11.0 lbf in/A <sub>rms</sub> )               | 1.17 Nm/A <sub>rms</sub><br>(10.4 lbf in/A <sub>rms</sub> )               |
| Voltage constant                                     | $k_e$           | 94.8 V <sub>rms</sub> /1,000 rpm  | 88.12 V <sub>rms</sub> /1,000 rpm   | 82.93 V <sub>rms</sub> /1,000 rpm   |
| Thermal time constant                                | $t_{th}$        | 1,800 s   | 234 s   | 353 s   |
| Winding resistance at 25 °C                          | $R_{tt}$        | 1.147 Ω   | 0.576 Ω   | 0.296 Ω   |
| Winding inductance                                   | $L_{tt}$        | 7.729 mH  | 3.972 mH  | 2.357 mH  |
| Power connector                                      |                 | Size 1 rotatable  | Size 1.5 rotatable  | Size 1.5 rotatable  |
| Feedback connector                                   |                 | Signal resolver connector rotatable                                       |   |   |
| Thermal sensor                                       |                 | NTC 220 kOhm, Pt1000  |   |   |
| Cooling water flow rate                              | $Q_w$           | 6 l/min (1.6 gpm)   | 8 l/min (2.1 gpm)   | 8 l/min (2.1 gpm)   |
| <b>EPU unit</b>                                      |                 |   |   |   |
| Inertia  | J               | 16.85 kg cm <sup>2</sup><br>(149 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 22.26 kg cm <sup>2</sup><br>(197 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 30.65 kg cm <sup>2</sup><br>(271 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m               | 40.5 kg (89.3 lb)   | 43.5 kg (95.9 lb)   | 49 kg (108.0 lb)  |
| Tightening torque 4xM16x45 -10.9 cylinder head screw |                 | 310 Nm (2,744 lbf in)   |   |   |
| <b>Servo drive</b>                                   |                 |   |   |   |
| Recommended drive size <sup>2)</sup>                 |                 | G392-024 size 4   | G392-045 size 5   | G392-060 size 5   |

1) See diagram "Housing Pressure ( $p_r$ )" on page 4.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with water temperatures from +25 °C (+77 °F) up to +40 °C(+104 °F). Winding temperature measure up to +110 °C (+230 °F) over water.

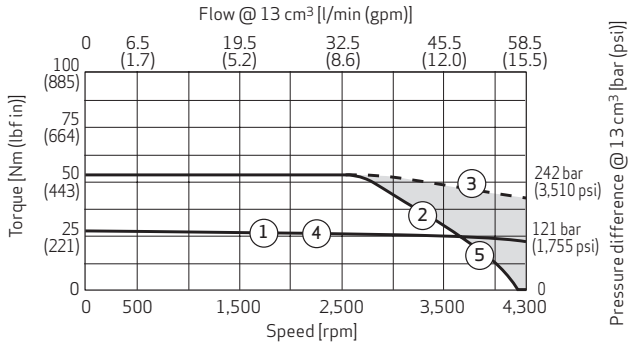
4) Optional via F port (flushing port).

# EPU-G SIZE 13

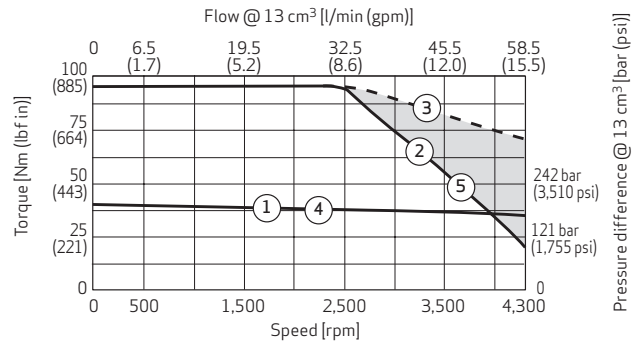
## Liquid Cooling, S EPU 013 x D GP xx W

### Motor Performance Curves

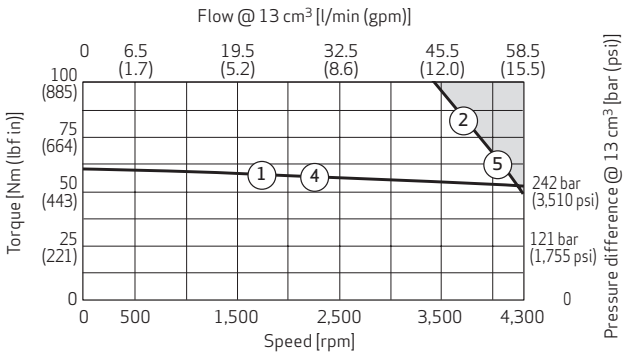
50 W



M0 W



H0 W



- ① Continuous torque at 110 K temperature difference over water, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Motor performance determined with respective max. cooling water flow rate, see characteristic table

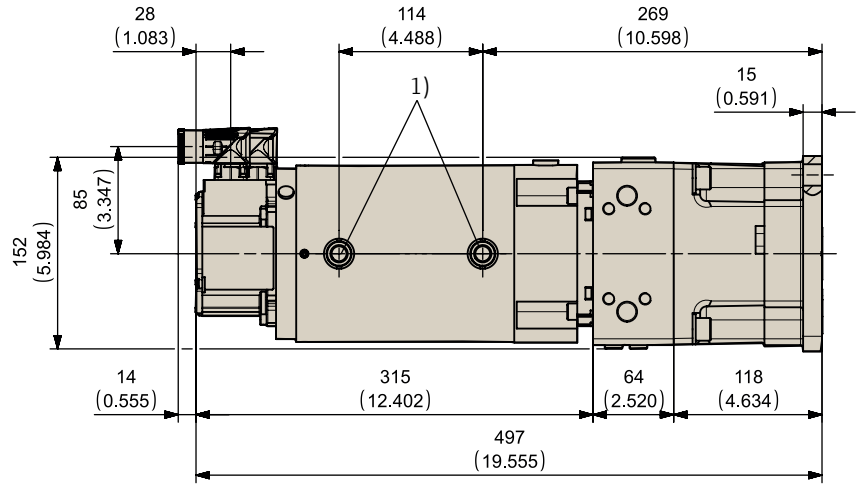
Pressure difference  $\Delta p = p_A - p_B$

# EPU-G SIZE 13

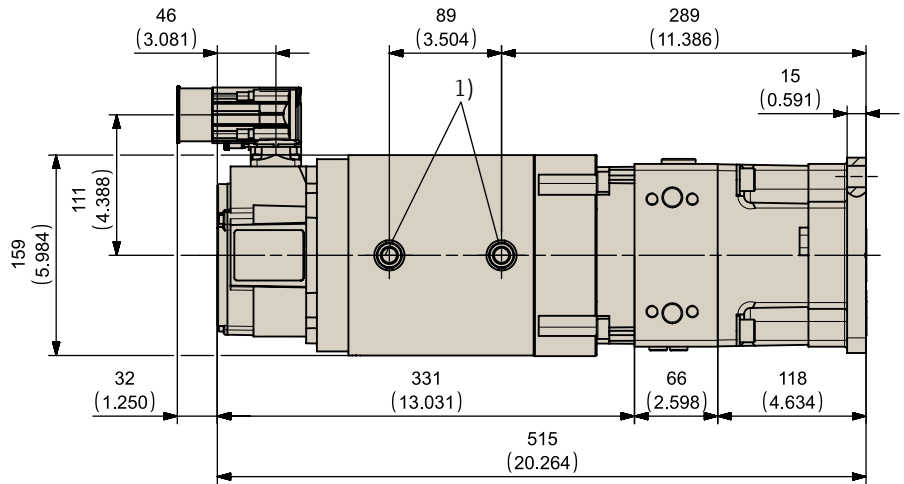
## Liquid Cooling, S EPU 013 x D GP xx W

### Installation Drawings

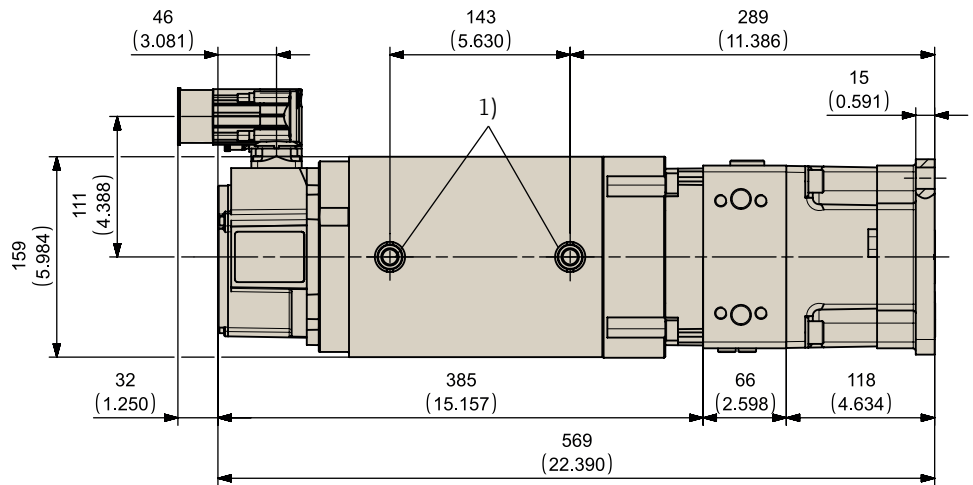
SO W



MO W



HO W



1) Cooler outlet G3/8" (thread depth max. 7 mm)

Note: Dimensions mm (inch)

# EPU-G SIZE 20

## Natural Cooling, S EPU 020 x D GP xx C

### Characteristics Table

| Performance class                                    |                  | Small   | Medium   | High   |
|--|------------------|---|--|--|
| S EPU 020 x D GP                                     |                  | S0 C  | M0 C   | H0 C   |
| <b>Pump</b>  |                  |   |  |  |
| Displacement   | $V_{max}$        | 20 cm <sup>3</sup> /rev (1.22 in <sup>3</sup> /rev)                       |  |  |
| Maximum pump speed                                   | $n_{max}$        | 4,000 rpm   |  |  |
| Maximum pump acceleration                            | $\dot{n}_{max}$  | 9,000 rpm/s   |  |  |
| Maximum housing pressure <sup>1)</sup>               | $p_{L,max}, p_F$ | Refer to speed/pressure curve   |  |  |
| Maximum flow   | $Q_{max}$        | 83 l/min (21.9 gpm)   |  |  |
| Maximum pressure ports A and B                       | $p_A, p_B$       | 345 bar (5,004 psi)   |  |  |
| Flushing flow rate <sup>4)</sup>                     | $Q_F$            | 2 to 3 l/min (0.53 to 0.79 gpm)   |  |  |
| <b>Motor</b>   |                  |   |  |  |
| Continuous stall torque <sup>3)</sup>                | $M_0$            | 39 Nm (345 lbf in)  | 77 Nm (682 lbf in)   | 124 Nm (1,097 lbf in)  |
| Rated torque <sup>3)</sup>                           | $M_n$            | 21 Nm (186 lbf in)  | 41 Nm (363 lbf in)   | 58 Nm (513 lbf in)   |
| Maximum torque                                       | $M_{max}$        | 225 Nm (1,991 lbf in)   | 267 Nm (2,363 lbf in)  | 448 Nm (3,965 lbf in)  |
| Rated speed  | $n_n$            | 2,100 rpm   | 1,200 rpm  | 1,000 rpm  |
| Maximum speed  | $n_{max}$        | Maximum speed see $M = f(n)$ performance curve                            |  |  |
| Continuous stall current                             | $I_0$            | 24.77 A <sub>rms</sub>  | 48.74 A <sub>rms</sub>   | 69.94 A <sub>rms</sub>   |
| Maximum current                                      | $I_{max}$        | 158 A <sub>rms</sub>  | 211 A <sub>rms</sub>   | 317 A <sub>rms</sub>   |
| Torque constant                                      | $k_t$            | 1.56 Nm/A <sub>rms</sub><br>(13.8 lbf in/A <sub>rms</sub> )               | 1.59 Nm/A <sub>rms</sub><br>(14.1 lbf in/A <sub>rms</sub> )                  | 1.78 Nm/A <sub>rms</sub><br>(15.8 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                     | $k_e$            | 110.33 V <sub>rms</sub> /1,000 rpm  | 105.89 V <sub>rms</sub> /1,000 rpm   | 118.47 V <sub>rms</sub> /1,000 rpm   |
| Thermal time constant                                | $t_{th}$         | 4,333 s   | 2,550 s  | 3,300 s  |
| Winding resistance at 25 °C                          | $R_{tt}$         | 0.287 Ω   | 0.121 Ω  | 0.076 Ω  |
| Winding inductance                                   | $L_{tt}$         | 2.515 mH  | 1.387 mH   | 0.978 mH   |
| Power connector                                      |                  | Size 1.5 rotatable  |  |  |
| Feedback connector                                   |                  | Signal resolver connector rotatable                                       |  |  |
| Thermal sensor                                       |                  | NTC 220 kOhm, Pt1000  |  |  |
| <b>EPU unit</b>                                      |                  |   |  |  |
| Inertia  | J                | 48.48 kg cm <sup>2</sup><br>(429 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 264.29 kg cm <sup>2</sup><br>(2,339 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 431.29 kg cm <sup>2</sup><br>(3,817 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m                | 57.8 kg (127.4 lb)  | 95.1 kg (209.7 lb)   | 127.1 kg (280.2 lb)  |
| Tightening torque 4xM16x45 -10.9 cylinder head screw |                  | 310 Nm (2,744 lbf in)   |  |  |
| <b>Servo drive</b>                                   |                  |   |  |  |
| Recommended drive size <sup>2)</sup>                 |                  | G392-045 size 5   | G392-072 size 5  |  |

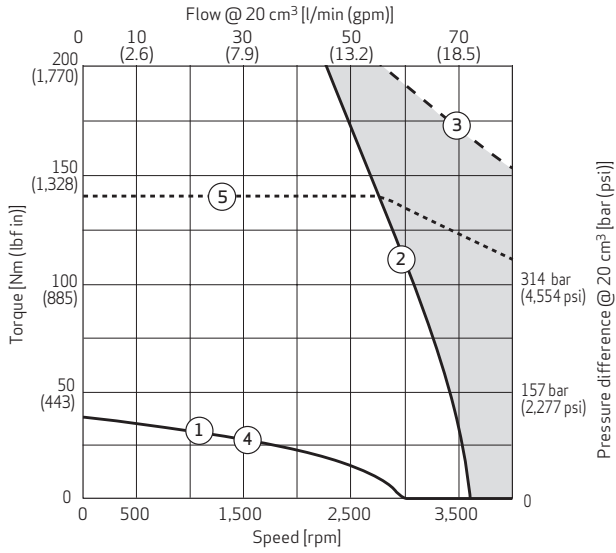
- 1) See diagram "Housing Pressure (p<sub>r</sub>)" on page 4.
- 2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".
- 3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.
- 4) Optional via F port (flushing port).

# EPU-G SIZE 20

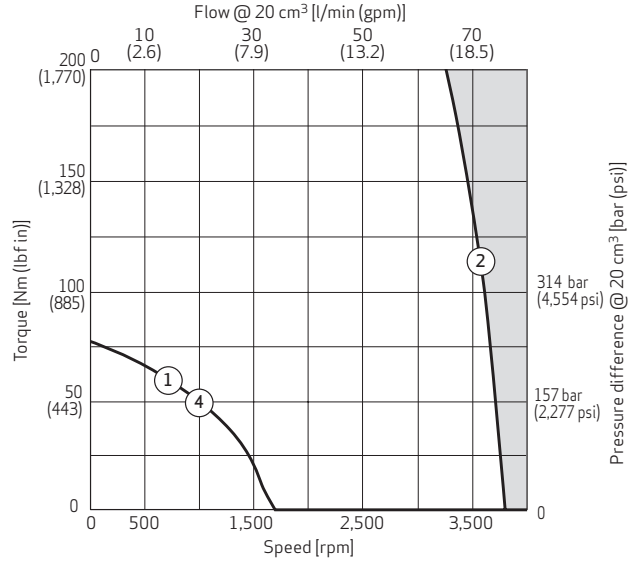
## Natural Cooling, S EPU 020 x D GP xx C

### Motor Performance Curves

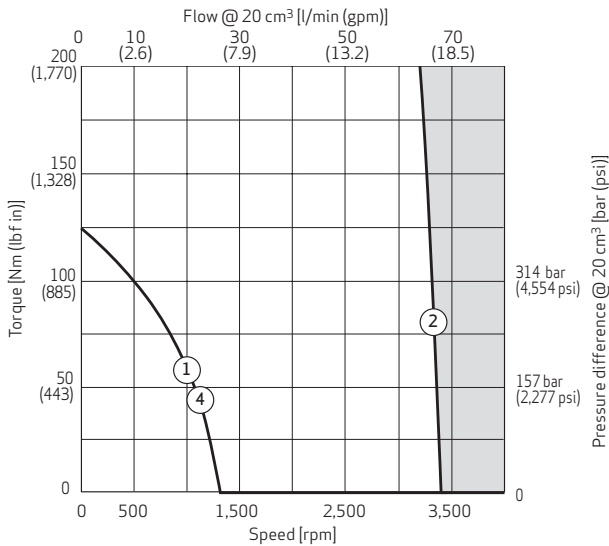
50 C



M0 C



H0 C



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

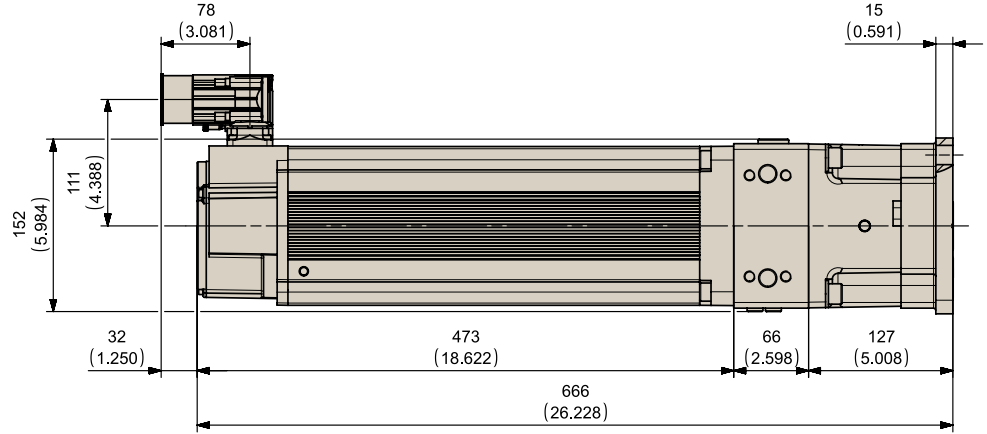
Pressure difference  $\Delta p = p_A - p_B$

# EPU-G SIZE 20

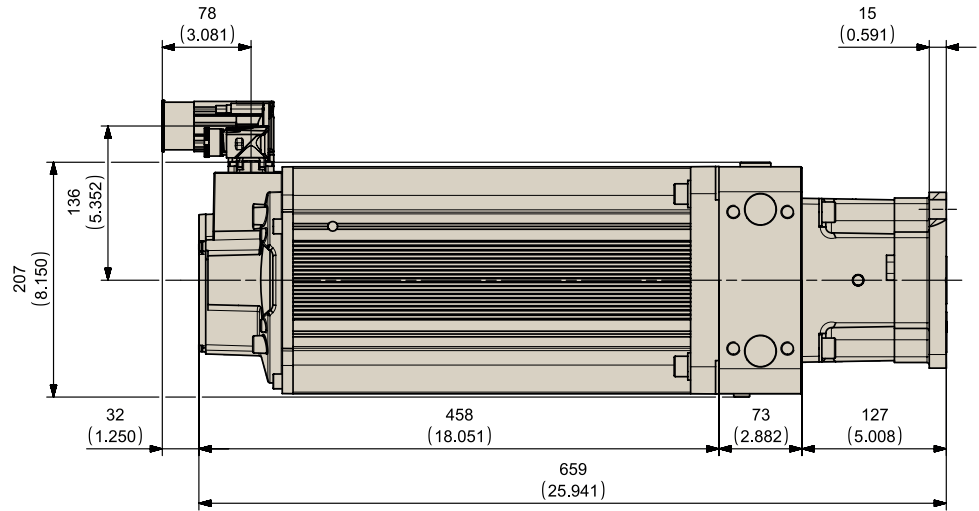
## Natural Cooling, S EPU 020 x D GP xx C

### Installation Drawings

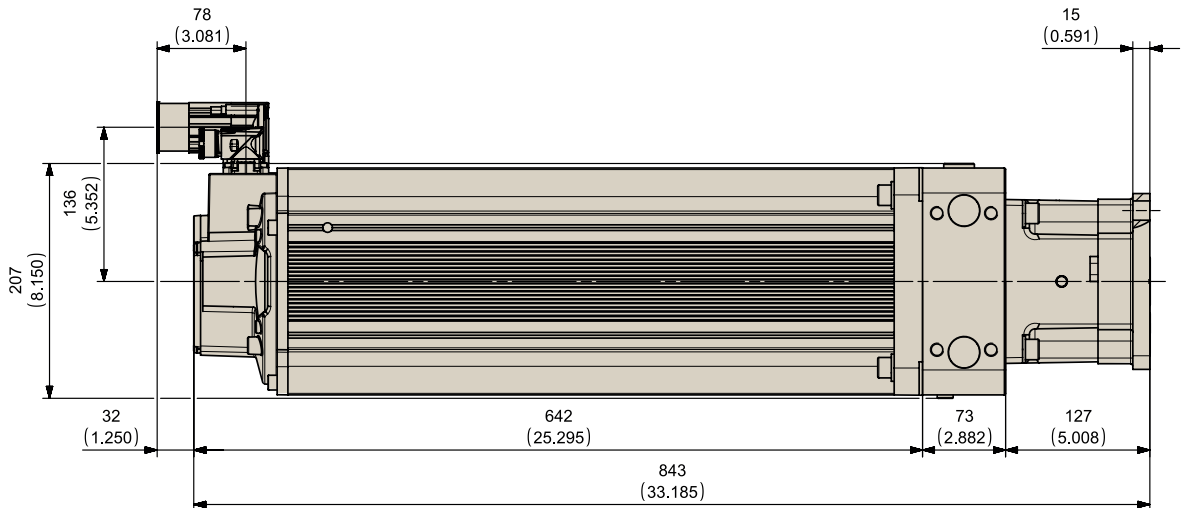
S0 C



M0 C



H0 C



Note: Dimensions mm (inch)

## EPU-G SIZE 20

## Fan Cooling, S EPU 020 x D GP xx F

## Characteristics Table

| Performance class                                    |                 | Small   | Medium  | High   |
|--|-----------------|---|---|--|
| S EPU 020 x D GP                                     |                 | S0 F  | M0 F  | H0 F   |
| <b>Pump</b>  |                 |   |   |  |
| Displacement   | $V_{max}$       | 20 cm <sup>3</sup> /rev (1.22 in <sup>3</sup> /rev)                       |   |  |
| Maximum pump speed                                   | $n_{max}$       | 4,000 rpm   |   |  |
| Maximum pump acceleration                            | $\dot{n}_{max}$ | 9,000 rpm/s   |   |  |
| Maximum housing pressure <sup>1)</sup>               | $p_{Lmax}, p_F$ | Refer to speed/pressure curve   |   |  |
| Maximum flow   | $Q_{max}$       | 83 l/min (21.9 gpm)   |   |  |
| Maximum pressure ports A and B                       | $p_A, p_B$      | 345 bar (5,004 psi)   |   |  |
| Flushing flow rate <sup>4)</sup>                     | $Q_F$           | 2 to 3 l/min (0.53 to 0.79 gpm)   |   |  |
| <b>Motor</b>   |                 |   |   |  |
| Continuous stall torque <sup>3)</sup>                | $M_0$           | 34 Nm (301 lbf in)  | 61 Nm (540 lbf in)  | 105 Nm (929 lbf in)  |
| Rated torque <sup>3)</sup>                           | $M_n$           | 24 Nm (212 lbf in)  | 40 Nm (354 lbf in)  | 45 Nm (398 lbf in)   |
| Maximum torque                                       | $M_{max}$       | 134 Nm (1,186 lbf in)   | 225 Nm (1,991 lbf in)   | 267 Nm (2,363 lbf in)  |
| Rated speed  | $n_n$           | 3,400 rpm   | 2,600 rpm   | 2,400 rpm  |
| Maximum speed  | $n_{max}$       | Maximum speed see $M = f(n)$ performance curve                            |   |  |
| Continuous stall current                             | $I_0$           | 28.81 A <sub>rms</sub>  | 38.8 A <sub>rms</sub>   | 66.83 A <sub>rms</sub>   |
| Maximum current                                      | $I_{max}$       | 126 A <sub>rms</sub>  | 158 A <sub>rms</sub>  | 211 A <sub>rms</sub>   |
| Torque constant                                      | $k_t$           | 1.17 Nm/A <sub>rms</sub><br>(10.4 lbf in/A <sub>rms</sub> )               | 1.57 Nm/A <sub>rms</sub><br>(13.9 lbf in/A <sub>rms</sub> )               | 1.57 Nm/A <sub>rms</sub><br>(13.9 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                     | $k_e$           | 82.93 V <sub>rms</sub> /1,000 rpm   | 110.33 V <sub>rms</sub> /1,000 rpm  | 105.89 V <sub>rms</sub> /1,000 rpm   |
| Thermal time constant                                | $t_{th}$        | 2,600 s   | 4,333 s   | 1,800 s  |
| Winding resistance at 25 °C                          | $R_{tt}$        | 0.296 Ω   | 0.287 Ω   | 0.121 Ω  |
| Winding inductance                                   | $L_{tt}$        | 2.356 mH  | 2.501 mH  | 1.400 mH   |
| Power connector                                      |                 | Size 1.5 rotatable  |   |  |
| Feedback connector                                   |                 | Signal resolver connector rotatable                                       |   |  |
| Fan connector  |                 | Size 1 rotatable  |   |  |
| Thermal sensor                                       |                 | NTC 220 kOhm, Pt1000  |   |  |
| <b>EPU unit</b>                                      |                 |   |   |  |
| Inertia  | J               | 31.69 kg cm <sup>2</sup><br>(280 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 48.48 kg cm <sup>2</sup><br>(429 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 264.29 kg cm <sup>2</sup><br>(2,339 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m               | 50.7 kg (111.7 lb)  | 61.1 kg (134.7 lb)  | 99.5 kg (219.4 lb)   |
| Tightening torque 4xM16x45 -10.9 cylinder head screw |                 | 310 Nm (2,744 lbf in)   |   |  |
| <b>Servo drive</b>                                   |                 |   |   |  |
| Recommended drive size <sup>2)</sup>                 |                 | G392-045 size 5   |   | G392-072 size 5  |

1) See diagram "Housing Pressure (p<sub>r</sub>)" on page 4.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

4) Optional via F port (flushing port).

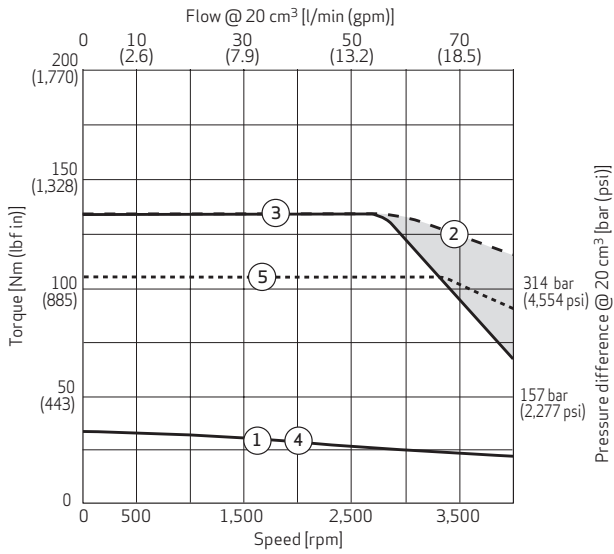


# EPU-G SIZE 20

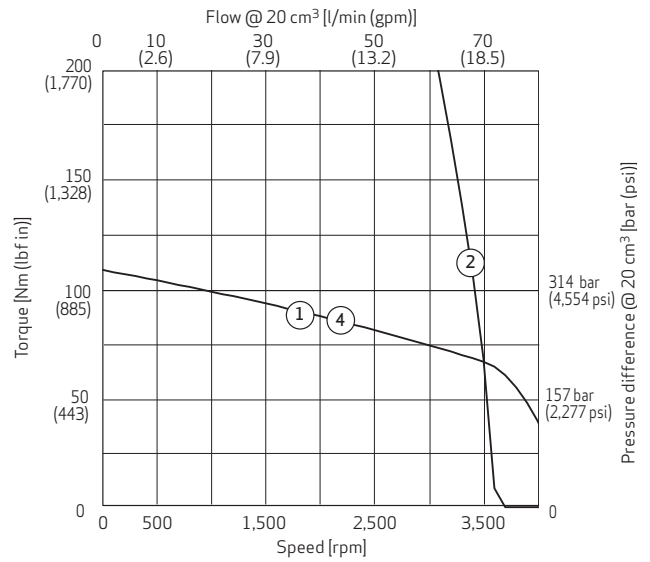
## Fan Cooling, S EPU 020 x D GP xx F

### Motor Performance Curves

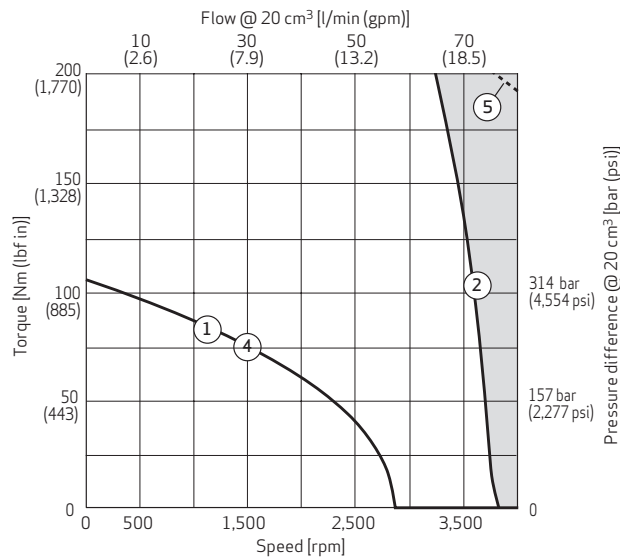
S0 F



M0 F



H0 F



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

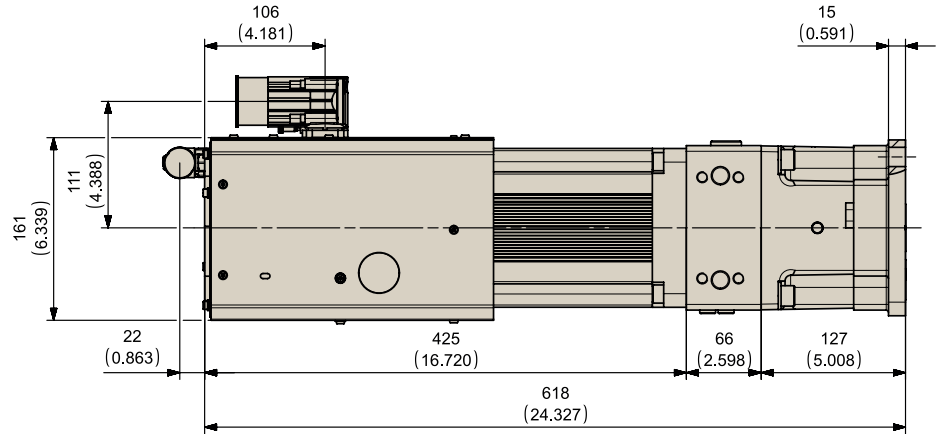
Pressure difference  $\Delta p = p_A - p_B$

# EPU-G SIZE 20

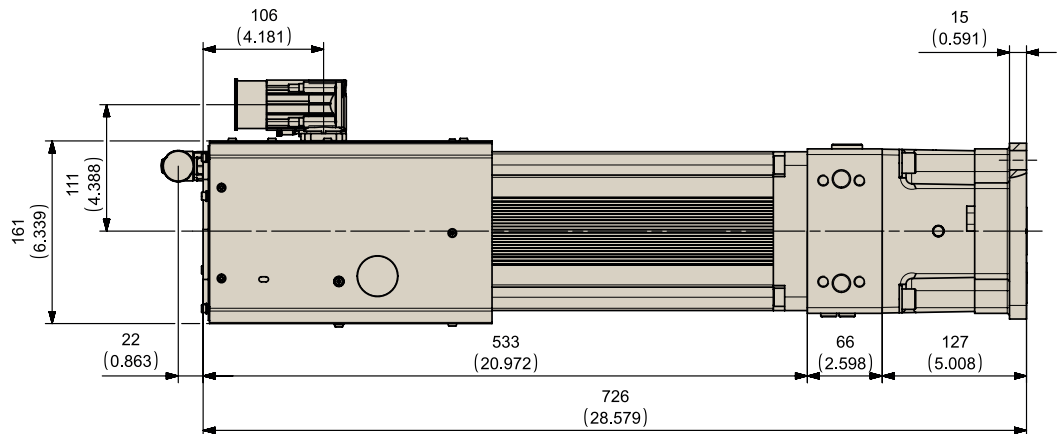
## Fan Cooling, S EPU 020 x D GP xx F

### Installation Drawings

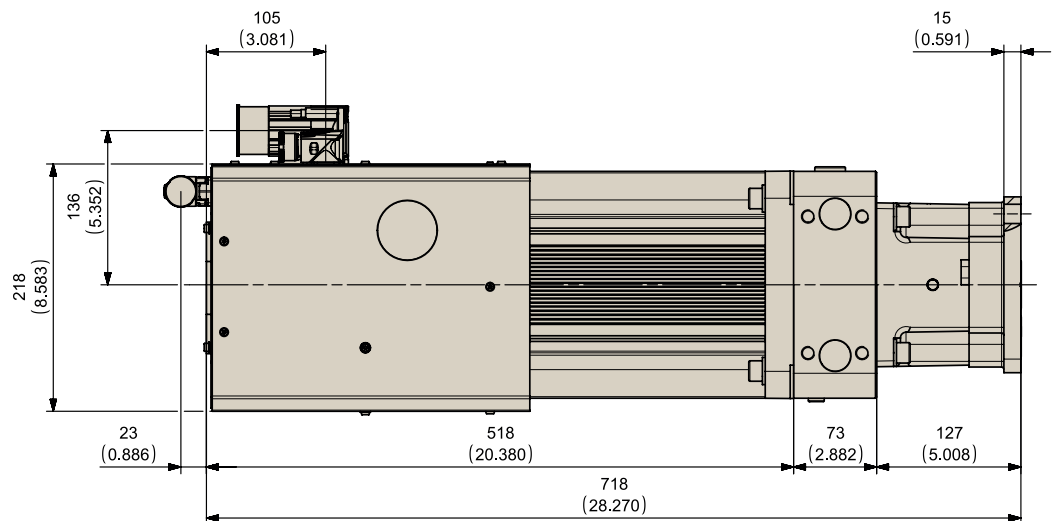
S0 F



M0 F



H0 F



Note: Dimensions mm (inch)

## EPU-G SIZE 20

## Liquid Cooling, S EPU 020 x D GP xx W

## Characteristics Table

| Performance class                                    |                 | Small  | Medium   | High   |
|--|-----------------|--|--|--|
| S EPU 020 x D GP                                     |                 | S0W  | M0W  | H0W  |
| <b>Pump</b>  |                 |  |  |  |
| Displacement   | $V_{max}$       | 20 cm <sup>3</sup> /rev (1.22 in <sup>3</sup> /rev)                      |  |  |
| Maximum pump speed                                   | $n_{max}$       | 4,000 rpm  |  |  |
| Maximum pump acceleration                            | $\dot{n}_{max}$ | 9,000 rpm/s  |  |  |
| Maximum housing pressure <sup>1)</sup>               | $p_{Lmax}, p_F$ | Refer to speed/pressure curve  |  |  |
| Maximum flow   | $Q_{max}$       | 83 l/min (21.9 gpm)  |  |  |
| Maximum pressure ports A and B                       | $p_A, p_B$      | 345 bar (5,004 psi)  |  |  |
| Flushing flow rate <sup>4)</sup>                     | $Q_F$           | 2 to 3 l/min (0.53 to 0.79 gpm)  |  |  |
| <b>Motor</b>   |                 |  |  |  |
| Continuous stall torque <sup>3)</sup>                | $M_0$           | 40 Nm (354 lbf in)   | 60 Nm (531 lbf in)   | 99 Nm (876 lbf in)   |
| Rated torque <sup>3)</sup>                           | $M_n$           | 37 Nm (327 lbf in)   | 54 Nm (478 lbf in)   | 90 Nm (797 lbf in)   |
| Maximum torque                                       | $M_{max}$       | 95 Nm (841 lbf in)   | 135 Nm (1,195 lbf in)  | 225 Nm (1,991 lbf in)  |
| Rated speed  | $n_n$           | 3,000 rpm  | 3,400 rpm  | 3,000 rpm  |
| Maximum speed  | $n_{max}$       | Maximum speed see $M = f(n)$ performance curve                           |  |  |
| Continuous stall current                             | $I_0$           | 31.9 A <sub>rms</sub>  | 51.08 A <sub>rms</sub>   | 63.06 A <sub>rms</sub>   |
| Maximum current                                      | $I_{max}$       | 85 A <sub>rms</sub>  | 126 A <sub>rms</sub>   | 158 A <sub>rms</sub>   |
| Torque constant                                      | $k_t$           | 1.24 Nm/A <sub>rms</sub><br>(11.0 lbf in/A <sub>rms</sub> )              | 1.17 Nm/A <sub>rms</sub><br>(10.4 lbf in/A <sub>rms</sub> )              | 1.57 Nm/A <sub>rms</sub><br>(13.9 lbf in/A <sub>rms</sub> )              |
| Voltage constant                                     | $k_e$           | 88.12 V <sub>rms</sub> /1,000 rpm  | 82.93 V <sub>rms</sub> /1,000 rpm  | 110.33 V <sub>rms</sub> /1,000 rpm                                       |
| Thermal time constant                                | $t_{th}$        | 234 s  | 353 s  | 588 s  |
| Winding resistance at 25 °C                          | $R_{tt}$        | 0.576 Ω  | 0.296 Ω  | 0.287 Ω  |
| Winding inductance                                   | $L_{tt}$        | 3.972 mH   | 2.357 mH   | 2.501 mH   |
| Power connector                                      |                 | Size 1.5 rotatable   |  |  |
| Feedback connector                                   |                 | Signal resolver connector rotatable                                      |  |  |
| Thermal sensor                                       |                 | NTC 220 kOhm, Pt1000   |  |  |
| Cooling water flow rate                              | $Q_w$           | 8 l/min (2.1 gpm)  |  |  |
| <b>EPU unit</b>                                      |                 |  |  |  |
| Inertia  | J               | 23.3 kg cm <sup>2</sup><br>(206 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 31.7 kg cm <sup>2</sup><br>(280 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 48.5 kg cm <sup>2</sup><br>(429 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m               | 44.6 kg (98.3 lb)  | 50.1 kg (110.5 lb)   | 63.4 kg (139.8 lb)   |
| Tightening torque 4xM16x45 -10.9 cylinder head screw |                 | 310 Nm (2,744 lbf in)  |  |  |
| <b>Servo drive</b>                                   |                 |  |  |  |
| Recommended drive size <sup>2)</sup>                 |                 | G392-045 size 5  | G392-060 size 5  | G392-072 size 5  |

1) See diagram "Housing Pressure ( $p_r$ )" on page 4.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with water temperatures from +25 °C(+77 °F) up to +40 °C(+104 °F). Winding temperature measure up to +110 °C (+230 °F) over water.

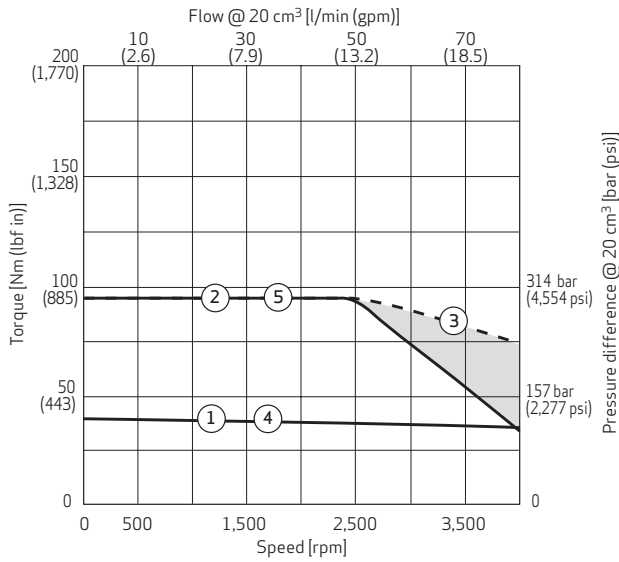
4) Optional via F port (flushing port).

# EPU-G SIZE 20

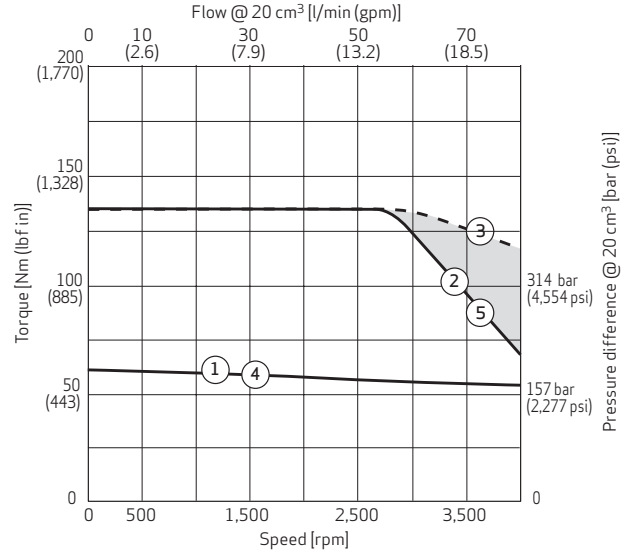
## Liquid Cooling, S EPU 020 x D GP xx W

### Motor Performance Curves

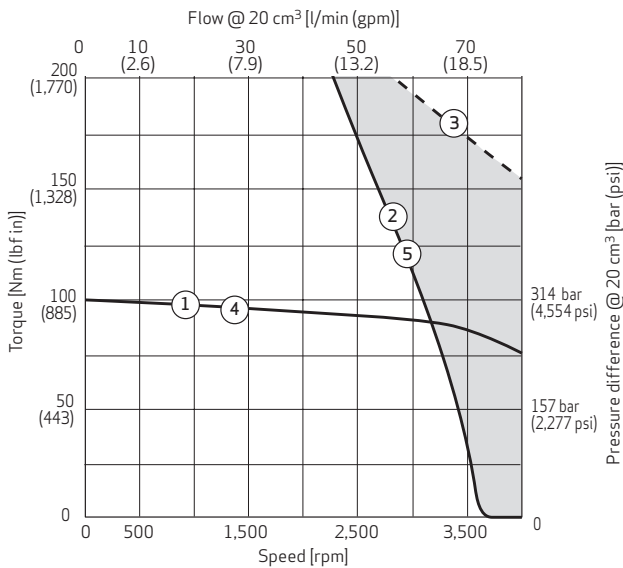
50 W



M0 W



H0 W



- ① Continuous torque at 110 K temperature difference over water, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Motor performance determined with respective max. cooling water flow rate, see characteristic table

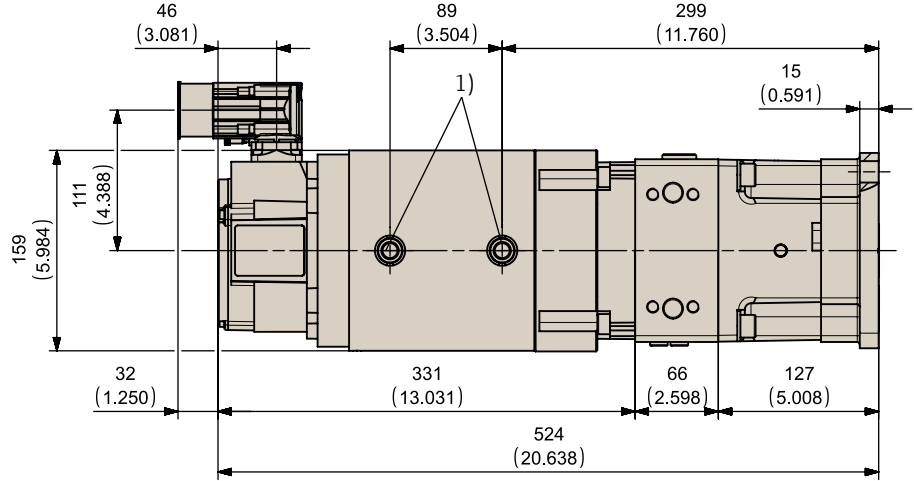
Pressure difference  $\Delta p = p_A - p_B$

# EPU-G SIZE 20

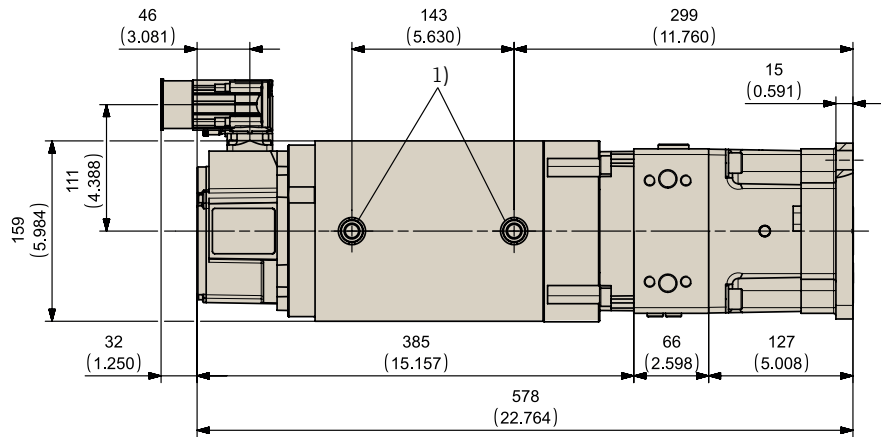
## Liquid Cooling, S EPU 020 x D GP xx W

### Installation Drawings

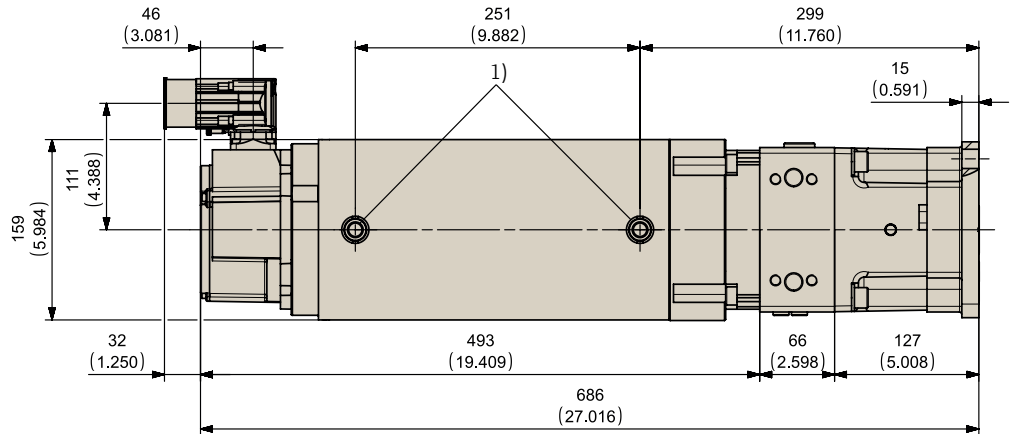
50 W



MO W



HO W



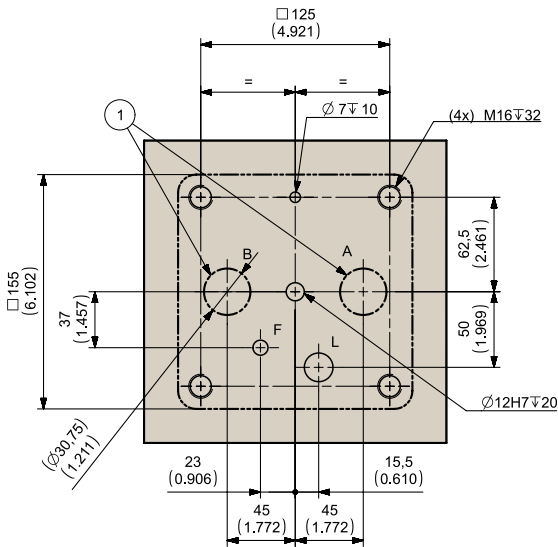
1) Cooler outlet G3/8" (thread depth max. 7 mm)

Note: Dimensions mm (inch)

# EPU-G SIZE 13 AND 20 - MOUNTING PATTERN AND PUMP FRONT VIEW

## Mounting Pattern and Pump Front View

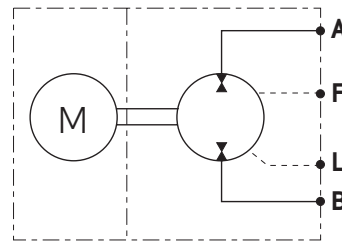
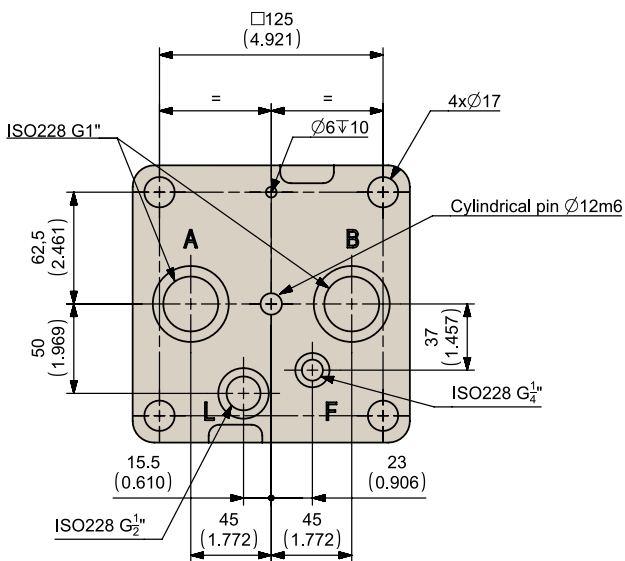
### Mounting Pattern



① Place holes inside marked circle

| Port | d           |
|------|-------------|
| A+B  | 15 to 26 mm |
| F    | 10 mm       |
| L    | 19 mm       |

### Pump Front View



| Port | Designation     | Pressure [bar (psi)]  | Port dimension in counter surface |                     |
|------|-----------------|-----------------------|-----------------------------------|---------------------|
|      |                 |                       | Minimum Ø [mm (in)]               | Maximum Ø [mm (in)] |
| A, B | Operating ports | 345 bar (5,004 psi)   | 15 (0.59)                         | 26 (1.02)           |
| F    | Flushing port   | See diagram on page 4 | 10 (0.39)                         |                     |
| L    | Leakage port    |                       | 19 (0.75)                         |                     |

## EPU SIZE 19

## Natural Cooling, S EPU 019 A D xx xx C

## Characteristics Table

| Performance class                                     |                    | Small  | Medium   | High   |
|---|--------------------|--|--|--|
| S EPU 019 A D xx                                      |                    | S0 C   | M0 C   | H0 C   |
| <b>Pump</b>   |                    |  |  |  |
| Displacement  | $V_{max}$          | 19 cm <sup>3</sup> /rev (1.16 in <sup>3</sup> /rev)                    |  |  |
| Maximum pump speed at 3.6 bar (abs)                   | $n_{max}$          | 4,500 rpm  |  |  |
| Maximum pump acceleration                             | $\dot{n}_{max}$    | 112,500 rpm/s  |  |  |
| Maximum housing pressure <sup>1)</sup>                | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)   |  |  |
| Maximum flow  | $Q_{max}$          | 85 l/min (22.5 gpm)  |  |  |
| Maximum pressure ports A and B                        | $p_A, p_B$         | 350 bar (5,076 psi)  |  |  |
| Flushing flow rate <sup>4)</sup>                      | $Q_{Sp}$           | 2 to 3 l/min (0.5 to 0.8 gpm)  |  |  |
| <b>Motor</b>  |                    |  |  |  |
| Continuous stall torque <sup>3)</sup>                 | $M_0$              | 40 Nm (354 lbf in)   | 93 Nm (823 lbf in)   | 137 Nm (1,213 lbf in)  |
| Rated torque <sup>3)</sup>                            | $M_n$              | 22 Nm (195 lbf in)   | 45 Nm (398 lbf in)   | 52 Nm (460 lbf in)   |
| Maximum torque  | $M_{max}$          | 141 Nm (1,248 lbf in)  | 391 Nm (3,461 lbf in)  | 595 Nm (5,266 lbf in)  |
| Rated speed   | $n_n$              | 3,000 rpm  | 2,500 rpm  |  |
| Maximum speed   | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                         |  |  |
| Continuous stall current                              | $I_0$              | 23.08 A <sub>rms</sub>   | 52.61 A <sub>rms</sub>   | 69.17 A <sub>rms</sub>   |
| Maximum current                                       | $I_{max}$          | 101 A <sub>rms</sub>   | 250 A <sub>rms</sub>   | 340.5 A <sub>rms</sub>   |
| Torque constant                                       | $k_t$              | 1.72 Nm/A <sub>rms</sub><br>(15.2 lbf in/A <sub>rms</sub> )            | 1.77 Nm/A <sub>rms</sub><br>(15.7 lbf in/A <sub>rms</sub> )                  | 1.98 Nm/A <sub>rms</sub><br>(17.5 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                      | $k_e$              | 103.67 V <sub>rms</sub> /1,000 <sub>rpm</sub>                          | 106.63 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                | 119.96 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                |
| Thermal time constant                                 | $t_{th}$           | 3,882 s  | 4,200 s  | 5,200 s  |
| Winding resistance at 25 °C                           | $R_{tt}$           | 0.351 Ω  | 0.096 Ω  | 0.074 Ω  |
| Winding inductance                                    | $L_{tt}$           | 4.254 mH   | 1.719 mH   | 1.433 mH   |
| Power connector                                       |                    | Size 1 rotatable   | Size 1.5 rotatable   |  |
| Feedback connector                                    |                    | Signal resolver connector rotatable                                    |  |  |
| Thermal sensor  |                    | NTC 220 kOhm, Pt1000   |  |  |
| <b>EPU unit</b>                                       |                    |  |  |  |
| Inertia   | J                  | 38 kg cm <sup>2</sup><br>(336 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 121.52 kg cm <sup>2</sup><br>(1,076 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 172.37 kg cm <sup>2</sup><br>(1,526 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight  | m                  | 50.1 kg (110.3 lb)   | 82.7 kg (182.2 lb)   | 105.4 kg (232.4 lb)  |
| Tightening torque 8x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                              |  |  |
| <b>Servo drive</b>                                    |                    |  |  |  |
| Recommended drive size <sup>2)</sup>                  |                    | G392-024 size 4  | G392-032 size 4  | G392-045 size 5  |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

4) Optional via Sp port (flushing port).

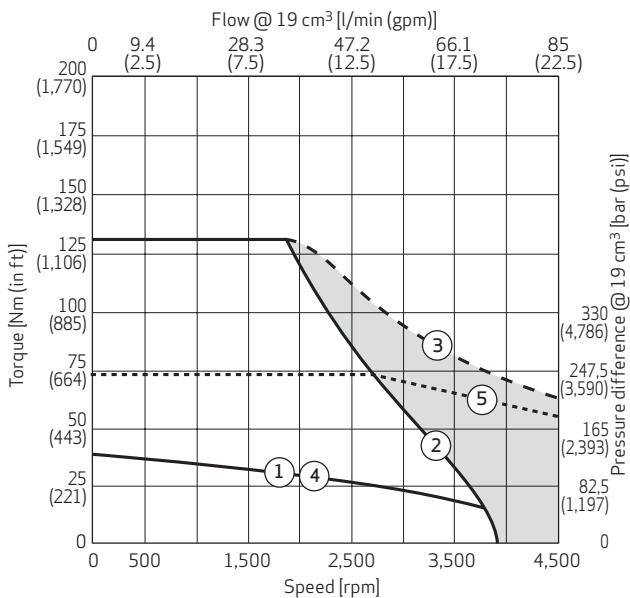


# EPU SIZE 19

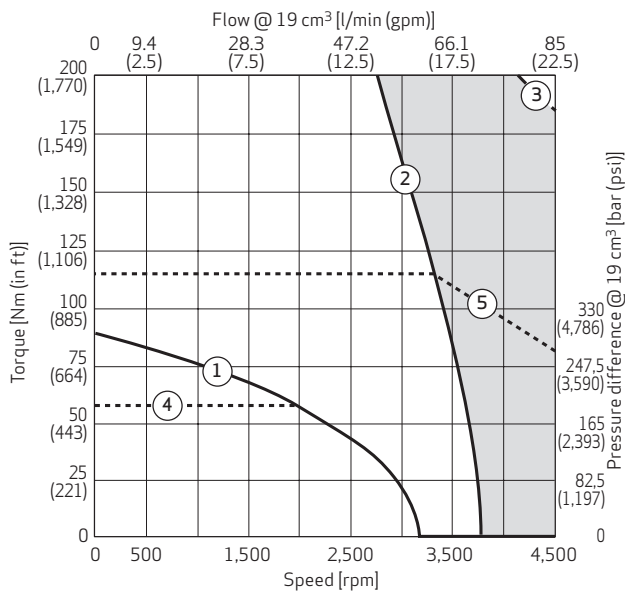
## Natural Cooling, S EPU 019 A D xx xx C

### Motor Performance Curves

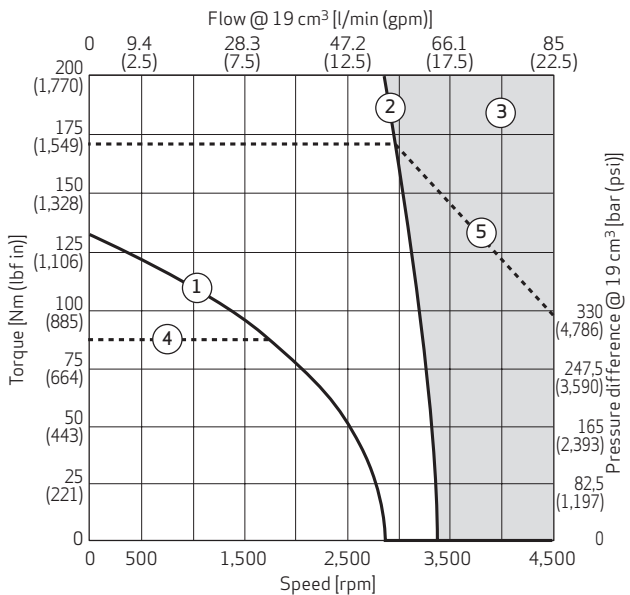
50 C



M0 C



H0 C



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

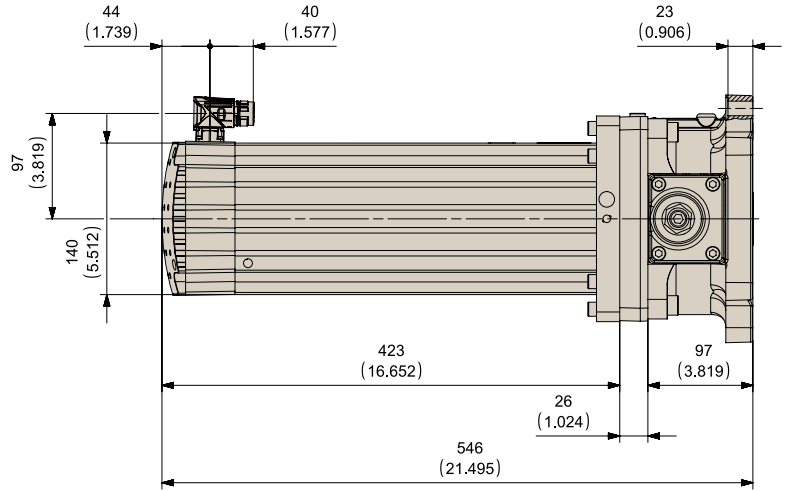
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 19

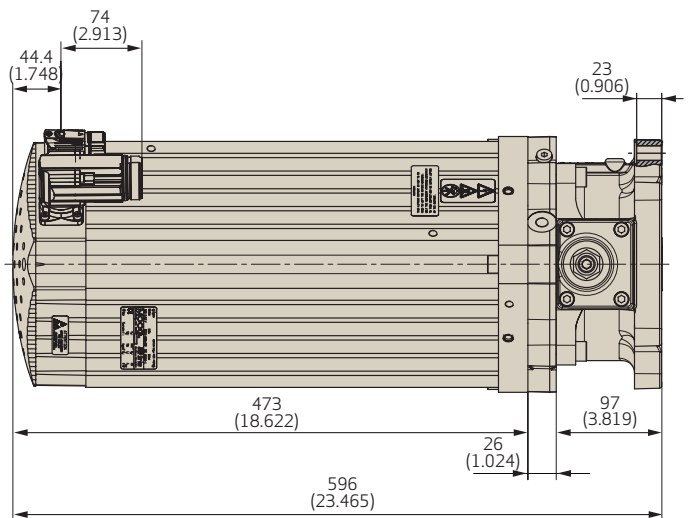
## Natural Cooling, S EPU 019 A D xx xx C

### Installation Drawings

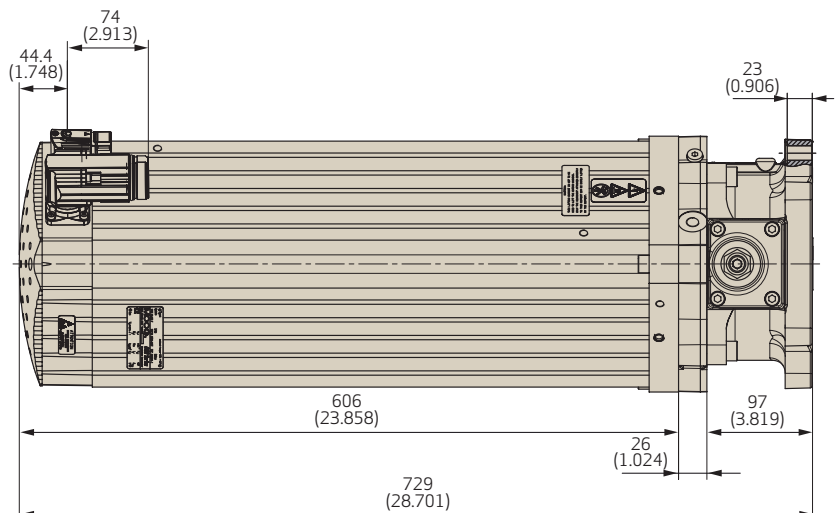
S0 C



M0 C



H0 C



Note: Dimensions mm (inch)

## EPU SIZE 19

## Fan Cooling, S EPU 019 A D xx xx F

## Characteristics Table

| Performance class                                     |                         | Small  | Medium   | High  |
|---|-------------------------|--|--|---|
| S EPU 019 A D xx                                      |                         | S0 F   | M0 F   | H0 F  |
| <b>Pump</b>   |                         |  |  |   |
| Displacement  | $V_{max}$               | 19 cm <sup>3</sup> /rev (1.16 in <sup>3</sup> /rev)                      |  |   |
| Maximum pump speed at 3.6 bar (abs)                   | $n_{max}$               | 4,500 rpm  |  |   |
| Maximum pump acceleration                             | $\dot{n}_{max}$         | 112,500 rpm/s  |  |   |
| Maximum housing pressure <sup>1)</sup>                | $p_{Lmax} \cdot p_{Sp}$ | 10 bar (145 psi)   |  |   |
| Maximum flow  | $Q_{max}$               | 85 l/min (22.5 gpm)  |  |   |
| Maximum pressure ports A and B                        | $p_A, p_B$              | 350 bar (5,076 psi)  |  |   |
| Flushing flow rate <sup>4)</sup>                      | $Q_{Sp}$                | 2 to 3 l/min (0.5 to 0.8 gpm)  |  |   |
| <b>Motor</b>  |                         |  |  |   |
| Continuous stall torque <sup>3)</sup>                 | $M_0$                   | 33.5 Nm (296 lbf in)   | 47.5 Nm (420 lbf in)   | 111.5 Nm (987 lbf in)   |
| Rated torque <sup>3)</sup>                            | $M_n$                   | 25.8 Nm (228 lbf in)   | 34.2 Nm (398 lbf in)   | 76.7 Nm (678 lbf in)  |
| Maximum torque  | $M_{max}$               | 88 Nm (779 lbf in)   | 132 Nm (3,461 lbf in)  | 391 Nm (3,461 lbf in)   |
| Rated speed   | $n_n$                   | 3,000 rpm  | 3,000 rpm  | 2,500 rpm   |
| Maximum speed   | $n_{max}$               | Maximum speed see $M = f(n)$ performance curve                           |  |   |
| Continuous stall current                              | $I_0$                   | 25.62 A <sub>rms</sub>   | 27.69 A <sub>rms</sub>   | 69.21 A <sub>rms</sub>  |
| Maximum current                                       | $I_{max}$               | 80 A <sub>rms</sub>  | 92 A <sub>rms</sub>  | 250 A <sub>rms</sub>  |
| Torque constant                                       | $k_t$                   | 1.31 Nm/A <sub>rms</sub><br>(11.6 lbf in/A <sub>rms</sub> )              | 1.72 Nm/A <sub>rms</sub><br>(15.2 lbf in/A <sub>rms</sub> )            | 1.76 Nm/A <sub>rms</sub><br>(15.6 lbf in/A <sub>rms</sub> )                 |
| Voltage constant                                      | $k_e$                   | 78.71 V <sub>rms</sub> /1,000 <sub>rpm</sub>                             | 103.30 V <sub>rms</sub> /1,000 <sub>rpm</sub>                          | 106.63 V <sub>rms</sub> /1,000 <sub>rpm</sub>                               |
| Thermal time constant                                 | $t_{th}$                | 3,400 s  | 3,882 s  | 4,200 s   |
| Winding resistance at 25 °C                           | $R_{tt}$                | 0.326 Ω  | 0.351 Ω  | 0.096 Ω   |
| Winding inductance                                    | $L_{tt}$                | 3.843 mH   | 4.386 mH   | 1.721 mH  |
| Power connector                                       |                         | Size 1 rotatable   | Size 1.5 rotatable   |   |
| Feedback connector                                    |                         | Signal resolver connector rotatable                                      |  |   |
| Fan connector   |                         | Size 1 rotatable   |  |   |
| Thermal sensor  |                         | NTC 220 kOhm, Pt1000   |  |   |
| <b>EPU unit</b>                                       |                         |  |  |   |
| Inertia   | $J$                     | 31.7 kg cm <sup>2</sup><br>(281 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 38 kg cm <sup>2</sup><br>(336 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 121.5 kg cm <sup>2</sup><br>(1,076 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight  | $m$                     | 49.3 kg (18.7 lb)  | 56.1 kg (123.7 lb)   | 93.2 kg (205.5 lb)  |
| Tightening torque 8x M12x45 -12.9 cylinder head screw |                         | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                |  |   |
| <b>Servo drive</b>                                    |                         |  |  |   |
| Recommended drive size <sup>2)</sup>                  |                         | G392-032 size 4  |  | G392-060 size 5   |

1) See diagram "Maximum housing pressure  $p_{Lmax} \cdot p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

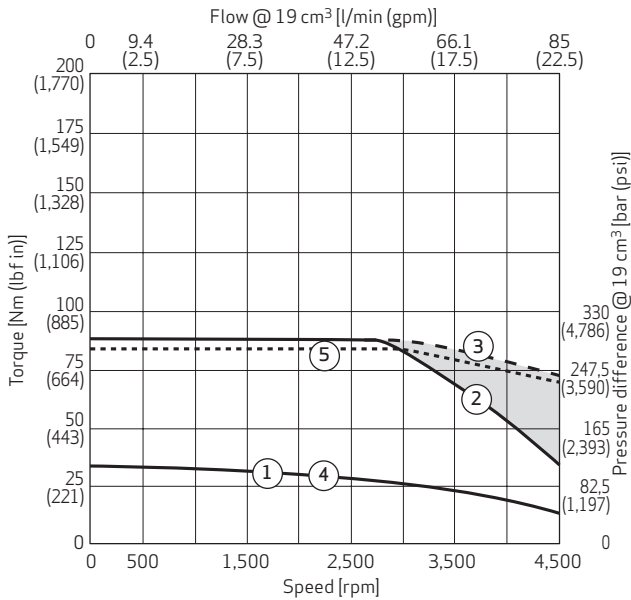
4) Optional via Sp port (flushing port).

# EPU SIZE 19

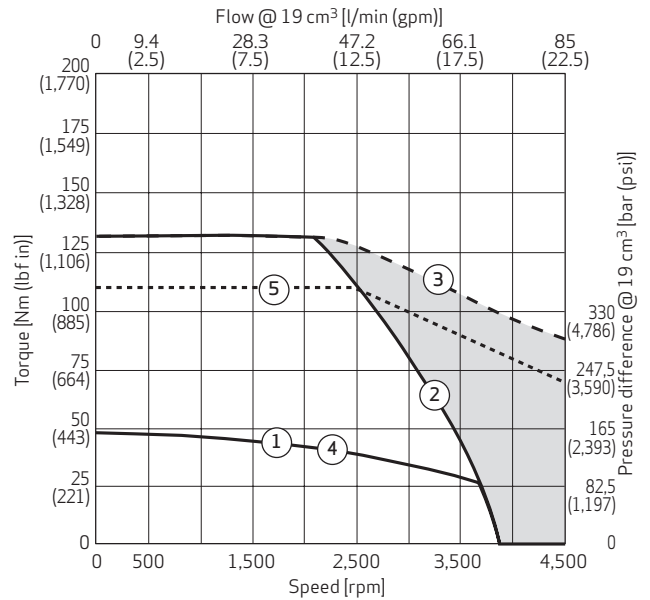
## Fan Cooling, S EPU 019 A D xx xx F

### Motor Performance Curves

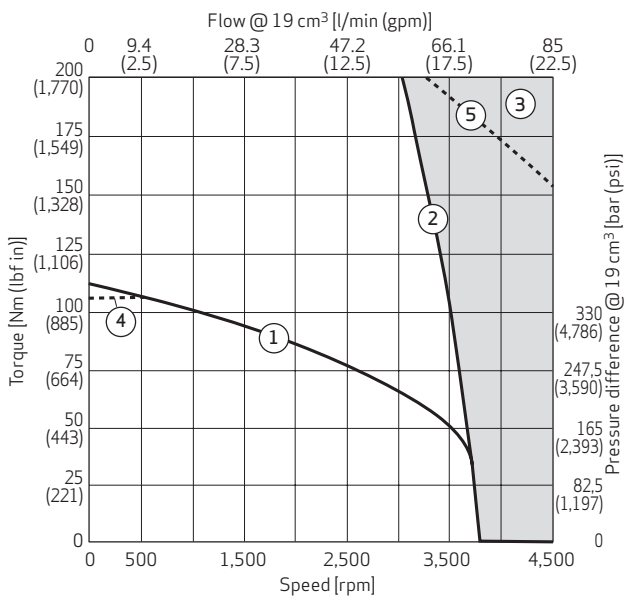
S0 F



M0 F



H0 F



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

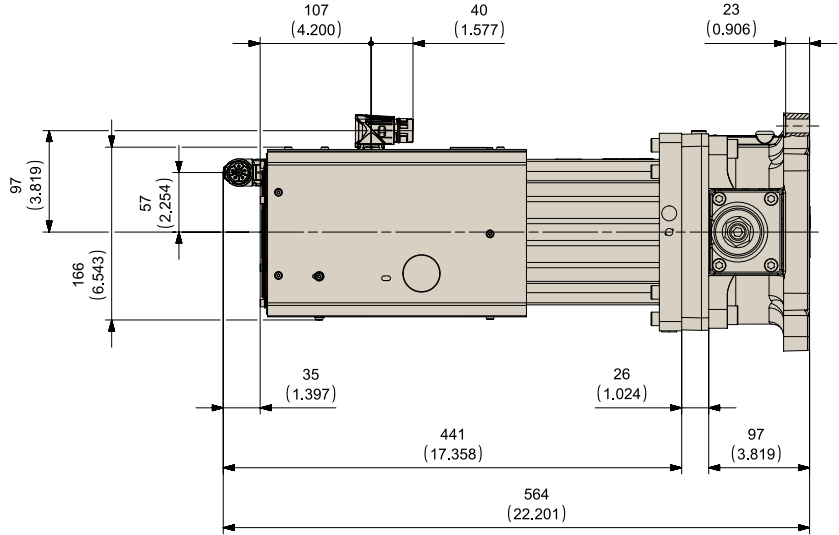
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 19

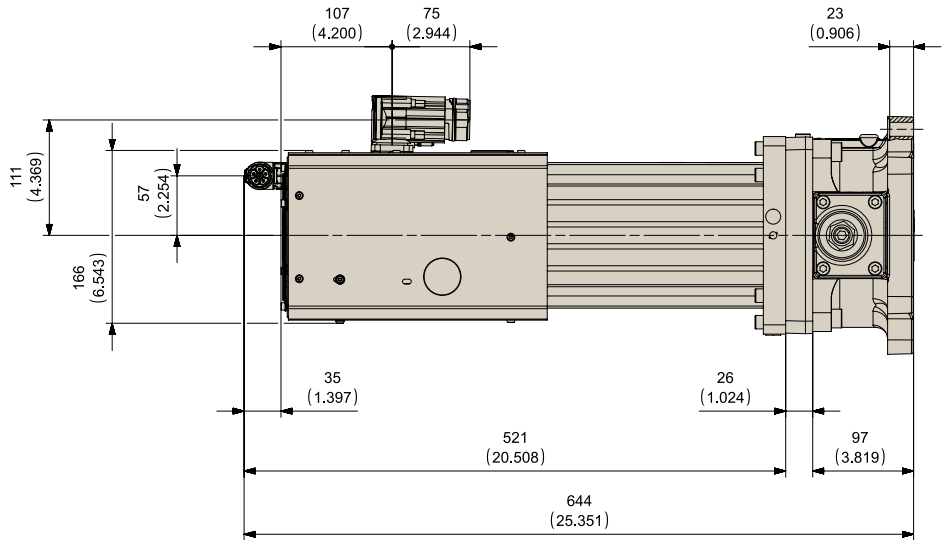
## Fan Cooling, S EPU 019 A D xx xx F

### Installation Drawings

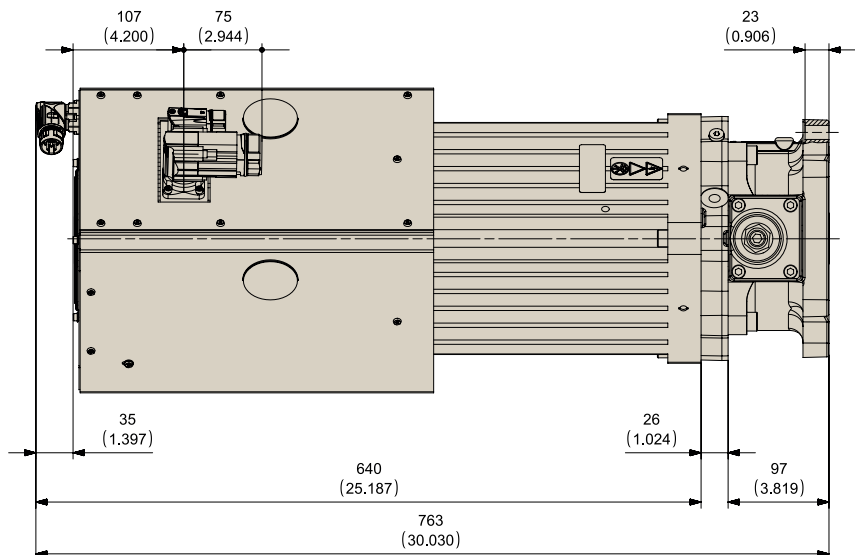
S0 F



M0 F



H0 F



Note: Dimensions mm (inch)

## EPU SIZE 19

## Liquid Cooling, S EPU 019 A D xx xx W

## Characteristics Table

| Performance class                                     |                    | Medium  | High  |
|---|--------------------|---|---|
| S EPU 019 A D xx                                      |                    | M0 W  | H0 W  |
| <b>Pump</b>   |                    |   |   |
| Displacement  | $V_{max}$          | 19 cm <sup>3</sup> /rev (1.16 in <sup>3</sup> /rev)                   |   |
| Maximum pump speed at 3.6 bar (abs.)                  | $n_{max}$          | 4,500 rpm   |   |
| Maximum pump acceleration                             | $\dot{n}_{max}$    | 112,500 rpm/s   |   |
| Maximum housing pressure <sup>1)</sup>                | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)  |   |
| Maximum flow  | $Q_{max}$          | 85 l/min (22.5 gpm)   |   |
| Maximum pressure ports A and B                        | $p_A, p_B$         | 350 bar (5,076 psi)   |   |
| Flushing flow rate <sup>4)</sup>                      | $Q_{Sp}$           | 2 to 3 l/min (0.5 to 0.8 gpm)   |   |
| <b>Motor</b>  |                    |   |   |
| Continuous stall torque <sup>3)</sup>                 | $M_0$              | 62 Nm (549 lbf in)  | 91 Nm (805 lbf in)  |
| Rated torque <sup>3)</sup>                            | $M_n$              | 58 Nm (513 lbf in)  | 85 Nm (752 lbf in)  |
| Maximum torque  | $M_{max}$          | 94 Nm (832 lbf in)  | 140 Nm (1,239 lbf in)   |
| Rated speed   | $n_n$              | 3,000 rpm   |   |
| Maximum speed   | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                        |   |
| Continuous stall current                              | $I_0$              | 48.45 A <sub>rms</sub>  | 54.22 A <sub>rms</sub>  |
| Maximum current                                       | $I_{max}$          | 88 A <sub>rms</sub>   | 100 A <sub>rms</sub>  |
| Torque constant                                       | $k_t$              | 1.27 Nm/A <sub>rms</sub> (11.2 lbf in/A <sub>rms</sub> )              | 1.68 Nm/A <sub>rms</sub> (14.9 lbf in/A <sub>rms</sub> )              |
| Voltage constant                                      | $k_e$              | 78.49 V <sub>rms</sub> /1,000 <sub>rpm</sub>                          | 103.67 V <sub>rms</sub> /1,000 <sub>rpm</sub>                         |
| Thermal time constant                                 | $t_{th}$           | 460 s   | 525 s   |
| Winding resistance at 25 °C                           | $R_{tt}$           | 0.319 Ω   | 0.345 Ω   |
| Winding inductance                                    | $L_{tt}$           | 3.551 mH  | 4.047 mH  |
| Power connector                                       |                    | Size 1.5 rotatable  |   |
| Feedback connector                                    |                    | Signal resolver connector rotatable                                   |   |
| Thermal sensor  |                    | NTC 220 kOhm, Pt1000  |   |
| Cooling water flow rate                               | $Q_W$              | 3 to 5 l/min (0.8 to 1.3 gpm)   |   |
| <b>EPU unit</b>                                       |                    |   |   |
| Inertia   | $J$                | 31.7 kg cm <sup>2</sup> (281 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 37.9 kg cm <sup>2</sup> (335 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight  | $m$                | 47.5 kg (104.7 lb)  | 56.3 kg (124.1 lb)  |
| Tightening torque 8x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                             |   |
| <b>Servo drive</b>                                    |                    |   |   |
| Recommended drive size <sup>2)</sup>                  |                    | G392-045 size 5   | G392-060 size 5   |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with water temperatures from +25 °C(+77 °F) up to +40 °C(+104 °F). Winding temperature measure up to +110 °C (+230 °F) over water.

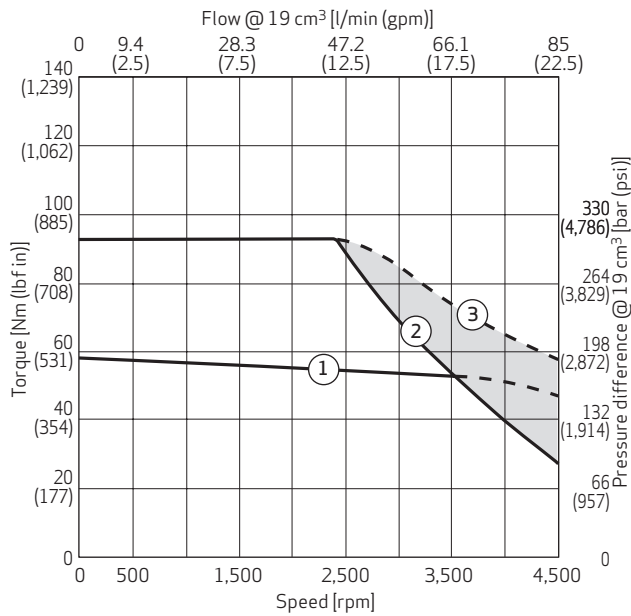
4) Optional via Sp port (flushing port).

# EPU SIZE 19

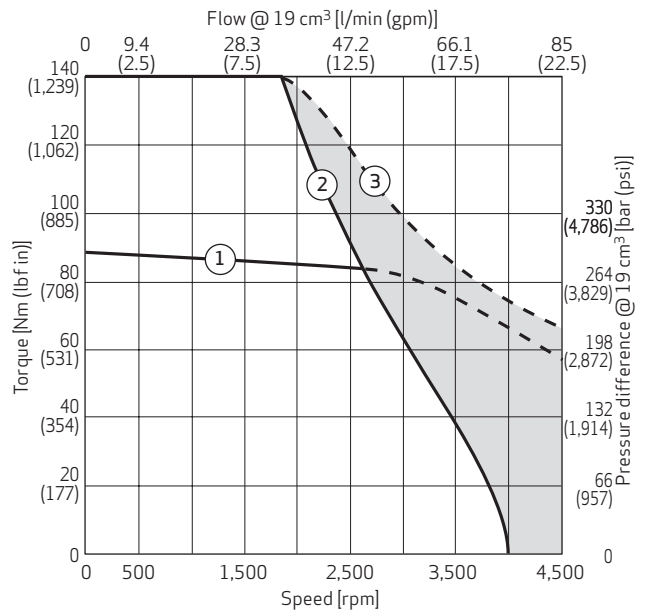
## Liquid Cooling, S EPU 019 A D xx xx W

### Motor Performance Curves

M0 W



H0 W



- ① Continuous torque at 110 K temperature difference over water, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Pressure difference  $\Delta p = p_A - p_B$

Motor performance determined with respective max. cooling water flow rate, see characteristic table

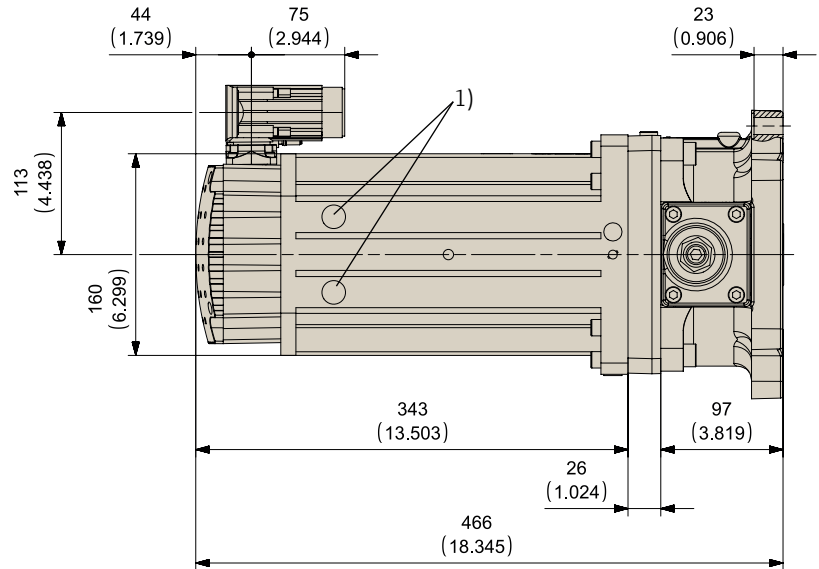


# EPU SIZE 19

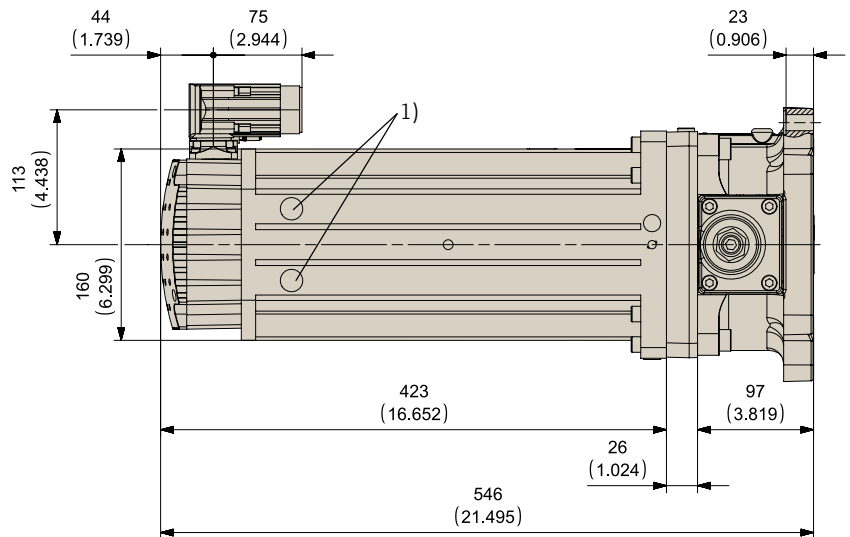
## Liquid Cooling, S EPU 019 A D xx xx W

### Installation Drawings

MOW



HOW



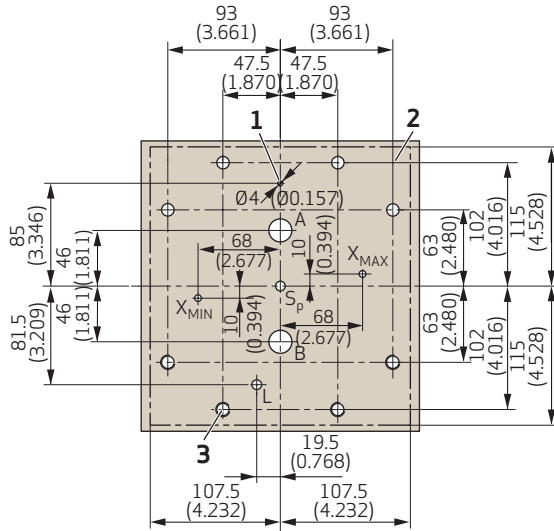
1) Cooler outlet G3/8" (thread depth max. 7 mm)

Note: Dimensions mm (inch)

# EPU SIZE 19

## Mounting Pattern and Pump Front View

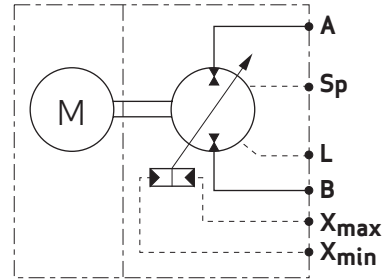
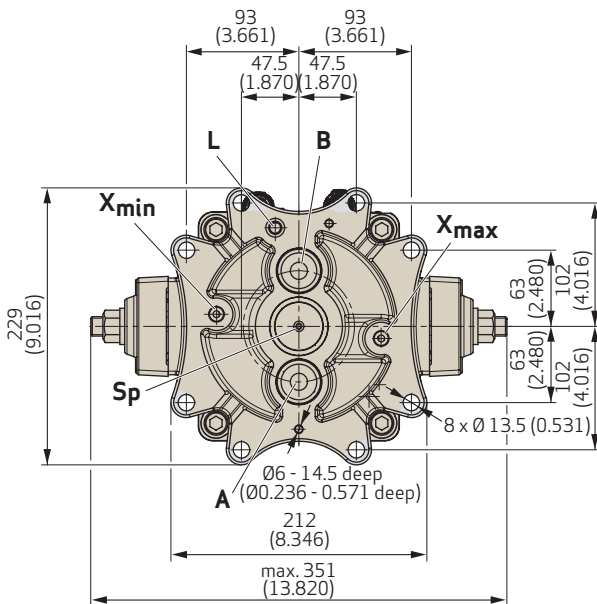
### Mounting Pattern



1. Use a spring-type pin with nominal diameter of 4 mm (0.16 in) (e.g. 4x12) according to ISO 13337
2. Area of
  - surface flatness:  $\square 0.02$
  - surface roughness:  $\sqrt{Rz4}$
3. M12, minimum 25 mm (0.98 in) deep.  
Recommended: Use 8 cylinder head screws M12 (property class 12.9, minimum length 45 mm (1.8 in)) according to ISO 4762. Tightening torque 120 + 10 Nm (1,062 lbf in + 89 lbf in).

Note: Dimensions mm (inch)

### Pump Front View



| Port             | Designation  | Pressure [bar (psi)] | Port dimension in counter surface |                     |
|------------------|--|----------------------|-----------------------------------|---------------------|
|                  |  |                      | Minimum Ø [mm (in)]               | Maximum Ø [mm (in)] |
| A, B             | Operating ports  | 350 (5,076)          | 14 (0.55)                         | 20 (0.79)           |
| Sp               | Flushing port  | 10 (145)             | 5 (0.20)                          | 15 (0.60)           |
| L                | Leakage port   | 10 (145)             | 8 (0.31)                          | 9 (0.35)            |
| X <sub>max</sub> | Control port for maximum displacement (option N1 only) | 350 (5,076)          | 5 (0.20)                          | 5.5 (0.22)          |
| X <sub>min</sub> | Control port for minimum displacement (option N1 only) | 350 (5,076)          | 5 (0.20)                          | 5.5 (0.22)          |

## EPU SIZE 32

### Natural Cooling, S EPU 032 A D xx xx C

#### Characteristics Table

| Performance class                                     |                    | Small  | Medium   |
|---|--------------------|--|--|
| S EPU 032 A D xx                                      |                    | S0 C   | M0 C   |
| <b>Pump</b>   |                    |  |  |
| Displacement  | $V_{max}$          | 32 cm <sup>3</sup> /rev (1.95 in <sup>3</sup> /rev)                      |  |
| Maximum pump speed at 2.7 bar (abs.)                  | $n_{max}$          | 3,700 rpm  |  |
| Maximum pump acceleration                             | $\dot{n}_{max}$    | 80,400 rpm/s   |  |
| Maximum housing pressure <sup>1)</sup>                | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)   |  |
| Maximum flow  | $Q_{max}$          | 118 l/min (31.2 gpm)   |  |
| Maximum pressure ports A and B                        | $p_A, p_B$         | 350 bar (5,076 psi)  |  |
| Flushing flow rate <sup>4)</sup>                      | $Q_{Sp}$           | 3 to 4 l/min (0.8 to 1.1 gpm)  |  |
| <b>Motor</b>  |                    |  |  |
| Continuous stall torque <sup>3)</sup>                 | $M_0$              | 93 Nm (823 lbf in)   | 137 Nm (1,213 lbf in)  |
| Rated torque <sup>3)</sup>                            | $M_n$              | 45 Nm (398 lbf in)   | 52 Nm (460 lbf in)   |
| Maximum torque  | $M_{max}$          | 391 Nm (3,461 lbf in)  | 595 Nm (5,266 lbf in)  |
| Rated speed   | $n_n$              | 2,500 rpm  |  |
| Maximum speed   | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                           |  |
| Continuous stall current                              | $I_0$              | 52.61 A <sub>rms</sub>   | 69.17 A <sub>rms</sub>   |
| Maximum current                                       | $I_{max}$          | 250 A <sub>rms</sub>   | 340.5 A <sub>rms</sub>   |
| Torque constant                                       | $k_t$              | 1.77 Nm/A <sub>rms</sub> (15.7 lbf in/A <sub>rms</sub> )                 | 1.98 Nm/A <sub>rms</sub> (17.5 lbf in/A <sub>rms</sub> )                 |
| Voltage constant                                      | $k_e$              | 106.63 V <sub>rms</sub> /1,000 <sub>rpm</sub>                            | 119.96 V <sub>rms</sub> /1,000 <sub>rpm</sub>                            |
| Thermal time constant                                 | $t_{th}$           | 4,200 s  | 5,200 s  |
| Winding resistance at 25 °C                           | $R_{tt}$           | 0.096 Ω  | 0.074 Ω  |
| Winding inductance                                    | $L_{tt}$           | 1.719 mH   | 1.433 mH   |
| Power connector                                       |                    | Size 1.5 rotatable   |  |
| Feedback connector                                    |                    | Signal resolver connector rotatable                                      |  |
| Thermal sensor  |                    | NTC 220 kOhm, Pt1000   |  |
| <b>EPU unit</b>                                       |                    |  |  |
| Inertia   | J                  | 164.8 kg cm <sup>2</sup> (1,459 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 215.7 kg cm <sup>2</sup> (1,909 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight  | m                  | 100.3 kg (221.0 lb)  | 123 kg (271.2 lb)  |
| Tightening torque 8x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                |  |
| <b>Servo drive</b>                                    |                    |  |  |
| Recommended drive size <sup>2)</sup>                  |                    | G392-045 size 5  |  |

1) See diagram “Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ ” and “Installation note” on page 5.

2) See catalog “Modular Multi-Axis Servo Drive Systems (MSD)”.

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

4) Optional via Sp port (flushing port).

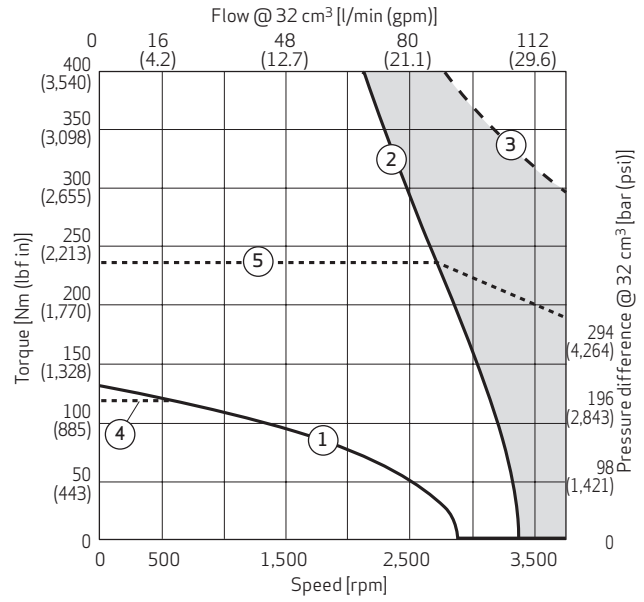
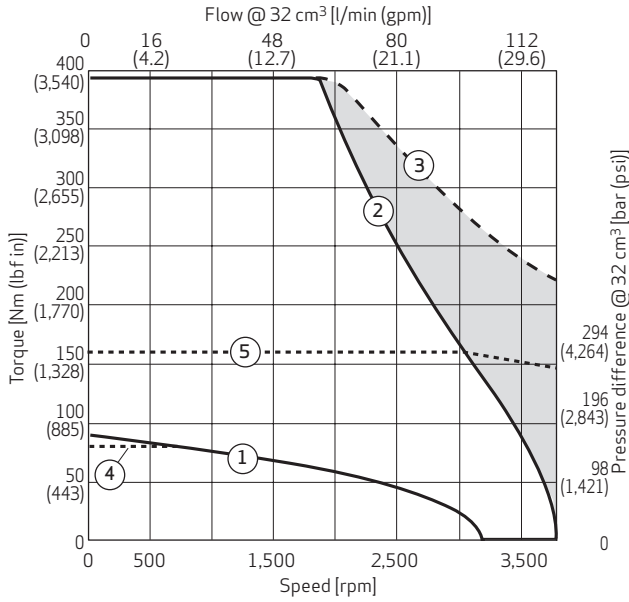
# EPU SIZE 32

## Natural Cooling, S EPU 032 A D xx xx C

### Motor Performance Curves

50 C

M0 C



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

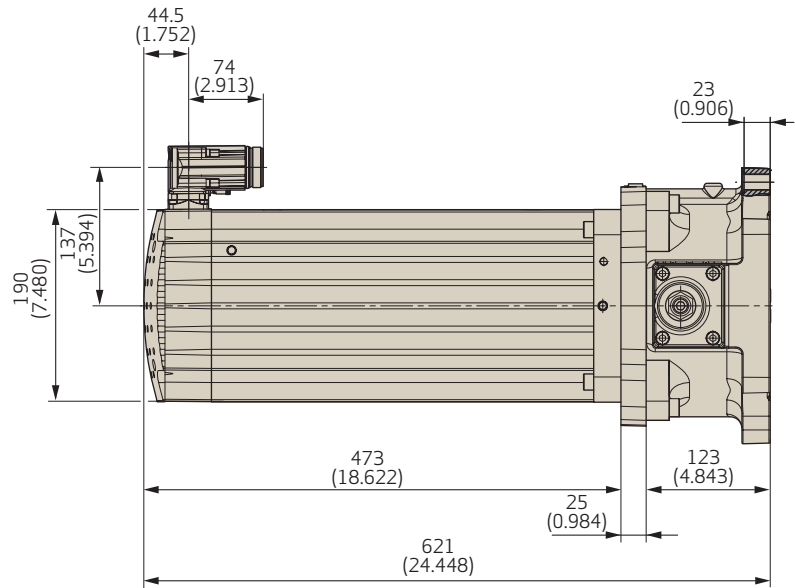
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 32

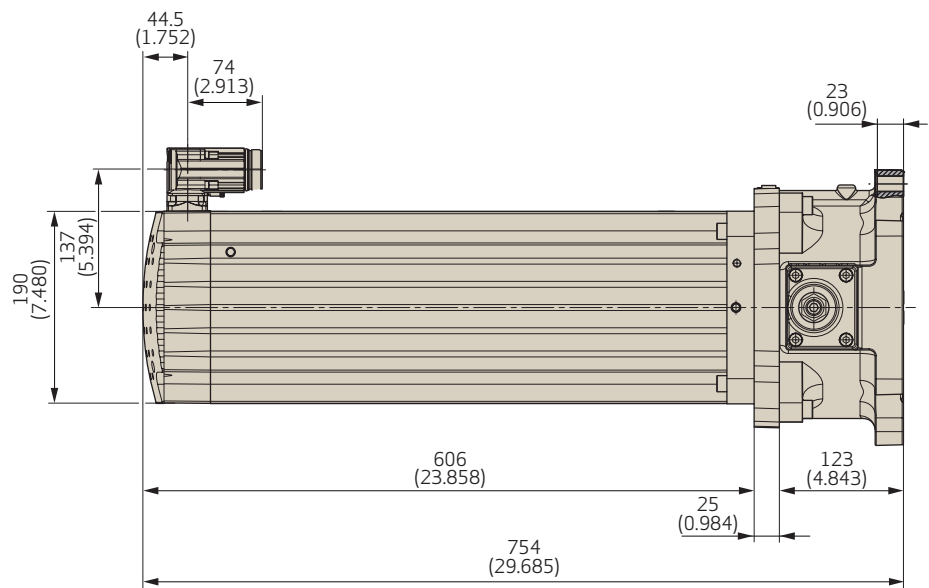
## Natural Cooling, S EPU 032 A D xx xx C

### Installation Drawings

S0 C



M0 C



Note: Dimensions mm (inch)

## EPU SIZE 32

## Fan Cooling, S EPU 032 A D xx xx F

## Characteristics Table

| Performance class                                      |                    | Small  | Medium  | High  |
|--|--------------------|--|---|---|
| S EPU 032 A D xx                                       |                    | S0 F   | M0 F  | H0 F  |
| <b>Pump</b>  |                    |  |   |   |
| Displacement   | $V_{max}$          | 32 cm <sup>3</sup> /rev (1.95 in <sup>3</sup> /rev)                      |   |   |
| Maximum pump speed at 2.7 bar (abs.)                   | $n_{max}$          | 3,700 rpm  |   |   |
| Maximum pump acceleration                              | $\dot{n}_{max}$    | 80,400 rpm/s   |   |   |
| Maximum housing pressure <sup>1)</sup>                 | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)   |   |   |
| Maximum flow   | $Q_{max}$          | 118 l/min (31.2 gpm)   |   |   |
| Maximum pressure ports A and B                         | $p_A, p_B$         | 350 bar (5,076 psi)  |   |   |
| Flushing flow rate <sup>4)</sup>                       | $Q_{Sp}$           | 3 to 4 l/min (0.8 to 1.1 gpm)  |   |   |
| <b>Motor</b>   |                    |  |   |   |
| Continuous stall torque <sup>3)</sup>                  | $M_0$              | 47.5 Nm (420.5 lbf in)   | 111.5 Nm (986.9 lbf in)   | 165 Nm (1,460.4 lbf in)   |
| Rated torque <sup>3)</sup>                             | $M_n$              | 34.2 Nm (302.8 lbf in)   | 76.7 Nm (678.4 lbf in)  | 105.6 Nm (934.6 lbf in)   |
| Maximum torque   | $M_{max}$          | 132 Nm (1,168.3 lbf in)  | 391 Nm (3,460.6 lbf in)   | 595 Nm (5,266.2 lbf in)   |
| Rated speed  | $n_n$              | 3,000 rpm  | 2,500 rpm   | 2,500 rpm   |
| Maximum speed  | $n_{max}$          | Max. speed see M=f(n) performance curve                                  |   |   |
| Continuous stall current                               | $I_0$              | 27.7 A <sub>rms</sub>  | 63.2 A <sub>rms</sub>   | 83.2 A <sub>rms</sub>   |
| Maximum current  | $I_{max}$          | 92 A <sub>rms</sub>  | 250 A <sub>rms</sub>  | 340 A <sub>rms</sub>  |
| Torque constant  | $k_t$              | 1.7 Nm/A <sub>rms</sub><br>(15.2 lbf in/Arms)                            | 1.8 Nm/A <sub>rms</sub><br>(15.6 lbf in/Arms)                               | 2.0 Nm/A <sub>rms</sub><br>(17.5 lbf in/Arms)                               |
| Voltage constant                                       | $k_e$              | 103.3 V  | 106.6 V   | 120 V   |
| Thermal time constant                                  | $t_{th}$           | 3,882 s  | 4,200 s   | 5,200 s   |
| Winding resistance at 25 °C                            | $R_{tt}$           | 0.35 Ohm   | 0.10 Ohm  | 0.07 Ohm  |
| Winding inductance                                     | $L_{tt}$           | 4.4 mH   | 1.7 mH  | 1.4 mH  |
| Power connector  |                    | Size 1.5 rotatable   |   |   |
| Feedback connector                                     |                    | Signal resolver connector rotatable                                      |   |   |
| Fan connector  |                    | Size 1 rotatable   |   |   |
| Thermal sensor   |                    | NTC 220 kOhm, Pt1000   |   |   |
| <b>EPU unit</b>  |                    |  |   |   |
| Inertia  | J                  | 81.3 kg cm <sup>2</sup><br>(720 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 164.8 kg cm <sup>2</sup><br>(1,459 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 215.7 kg cm <sup>2</sup><br>(1,909 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m                  | 73.7 kg (162.5 lb)   | 110.8 kg (244.3 lb)   | 134.5 kg (296.5 lb)   |
| Tightening torque: 8x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                |   |   |
| <b>Servo drive</b>                                     |                    |  |   |   |
| Recommended drive size <sup>2)</sup>                   |                    | G392-045 size 5  | G392-060 size 5   | G392-072 BG5  |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

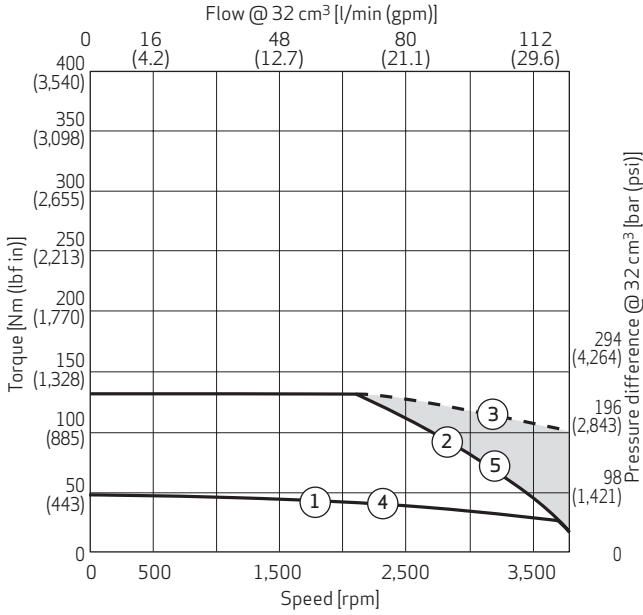
4) Optional via Sp port (flushing port).

# EPU SIZE 32

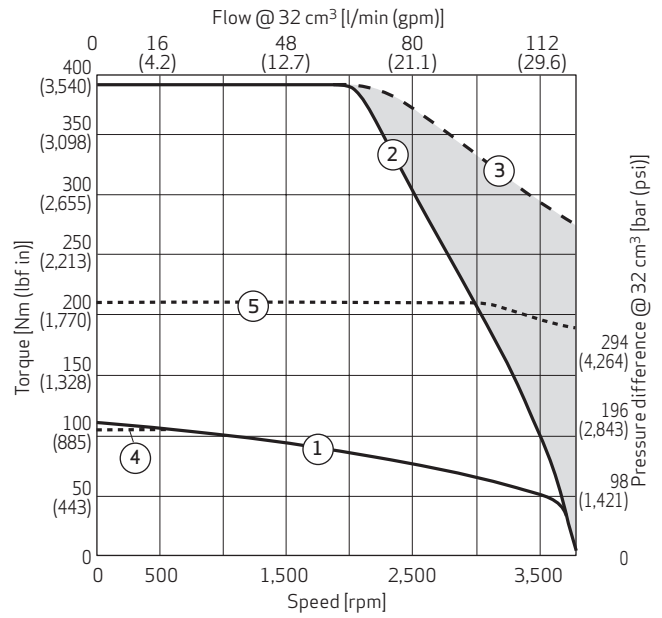
## Fan Cooling, S EPU 032 A D xx xx F

### Motor Performance Curves

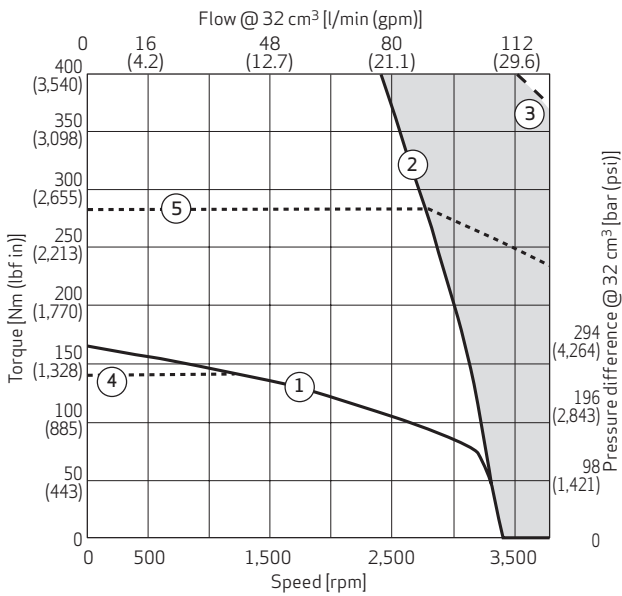
S0 F



M0 F



H0 F



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

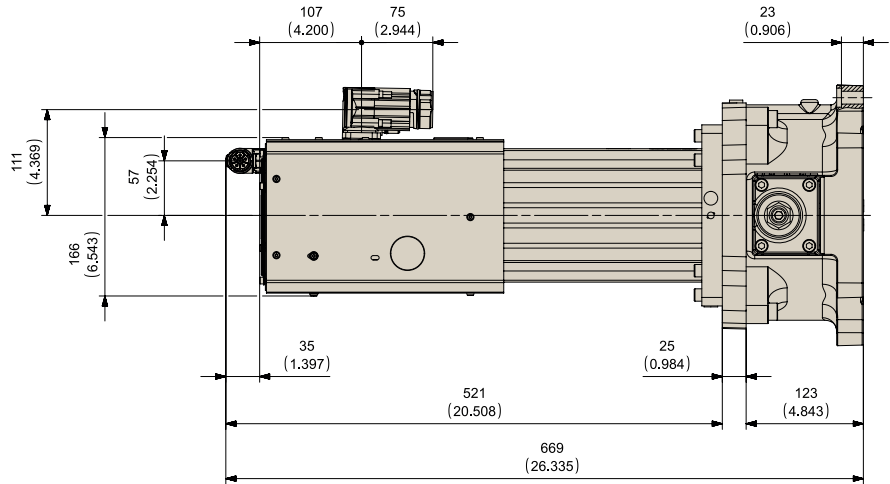
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 32

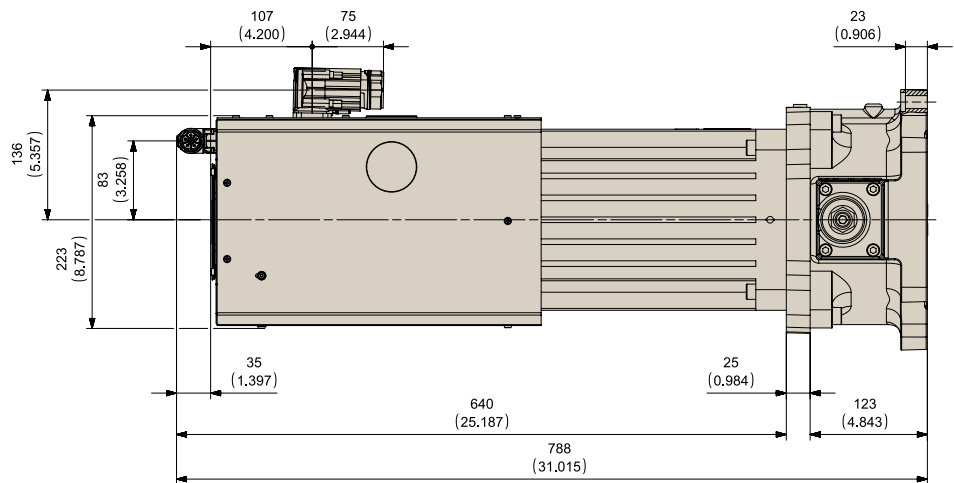
## Fan Cooling, S EPU 032 A D xx xx F

### Installation Drawings

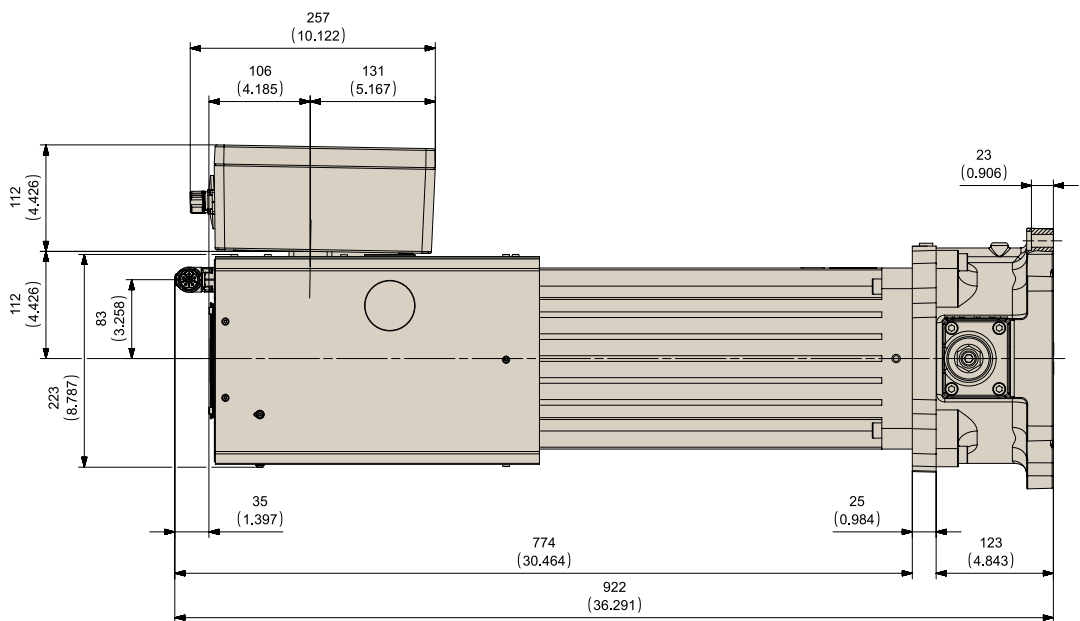
S0 C



M0 C



H0 C





## EPU SIZE 32

### Liquid Cooling, S EPU 032 A D xx xx W

#### Characteristics Table

| Performance class                                     |                    | Small   | Medium  | High   |
|---|--------------------|---|---|--|
| S EPU 032 A D xx                                      |                    | S0 W  | M0 W  | H0 W   |
| <b>Pump</b>   |                    |   |   |  |
| Displacement  | $V_{max}$          | 32 cm <sup>3</sup> /rev (1.95 in <sup>3</sup> /rev)                 |   |  |
| Maximum pump speed at 2.7 bar (abs.)                  | $n_{max}$          | 3,700 rpm   |   |  |
| Maximum pump acceleration                             | $\dot{n}_{max}$    | 80,400 rpm/s  |   |  |
| Maximum housing pressure <sup>1)</sup>                | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)  |   |  |
| Maximum flow  | $Q_{max}$          | 118 l/min (31.2 gpm)  |   |  |
| Maximum pressure ports A and B                        | $p_A, p_B$         | 350 bar (5,076 psi)   |   |  |
| Flushing flow rate <sup>4)</sup>                      | $Q_{Sp}$           | 3 to 4 l/min (0.8 to 1.1 gpm)                                       |   |  |
| <b>Motor</b>  |                    |   |   |  |
| Continuous stall torque <sup>3)</sup>                 | $M_0$              | 62 Nm (549 lbf in)  | 91 Nm (805 lbf in)  | 151 Nm (1,336 lbf in)  |
| Rated torque <sup>3)</sup>                            | $M_n$              | 58 Nm (513 lbf in)  | 85 Nm (752 lbf in)  | 128 Nm (1,133 lbf in)  |
| Maximum torque  | $M_{max}$          | 94 Nm (832 lbf in)  | 140 Nm (1,239 lbf in)   | 391 Nm (3,461 lbf in)  |
| Rated speed   | $n_n$              | 3,000 rpm   |   | 2,500 rpm  |
| Maximum speed   | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                      |   |  |
| Continuous stall current                              | $I_0$              | 48.45 A <sub>rms</sub>  | 54.22 A <sub>rms</sub>  | 85.95 A <sub>rms</sub>   |
| Maximum current                                       | $I_{max}$          | 88 A <sub>rms</sub>   | 100 A <sub>rms</sub>  | 250 A <sub>rms</sub>   |
| Torque constant                                       | $k_t$              | 1.27 Nm/A <sub>rms</sub>  | 1.68 Nm/A <sub>rms</sub>  | 1.76 Nm/A <sub>rms</sub>   |
| Voltage constant                                      | $k_e$              | 78.49 V <sub>rms</sub> /1,000 rpm                                   | 103.67 V <sub>rms</sub> /1,000 rpm                                    | 106.63 V <sub>rms</sub> /1,000 rpm                                       |
| Thermal time constant                                 | $t_{th}$           | 460 s   | 525 s   | 568 s  |
| Winding resistance at 25 °C                           | $R_{tt}$           | 0.319 Ω   | 0.345 Ω   | 0.096 Ω  |
| Winding inductance                                    | $L_{tt}$           | 3.551 mH  | 4.047 mH  | 1.727 mH   |
| Power connector                                       |                    | Size 1.5 rotatable  |   | Cable box A  |
| Feedback connector                                    |                    | Signal resolver connector rotatable                                 |   | Signal resolver connector  |
| Thermal sensor  |                    | NTC 220 kOhm, Pt1000  |   |  |
| Cooling water flow rate                               | $Q_w$              | 3 to 5 l/min (0.8 to 1.3 gpm)                                       | 3 to 5 l/min (0.8 to 1.3 gpm)   | 6 to 8 l/min (1.6 to 2.1 gpm)  |
| <b>EPU unit</b>                                       |                    |   |   |  |
| Inertia   | J                  | 75 kg cm <sup>2</sup> (664 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 81.2 kg cm <sup>2</sup> (719 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 170.5 kg cm <sup>2</sup> (1,509 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight  | m                  | 65.1 kg (143.5 lb)  | 73.9 kg (162.9 lb)  | 107.9 kg (237.9 lb)  |
| Tightening torque 8x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                           |   |  |
| <b>Servo drive</b>                                    |                    |   |   |  |
| Recommended drive size <sup>2)</sup>                  |                    | G392-045 size 5   | G392-060 size 5   | G392-072 size 5  |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with water temperatures from +25°C(+77°F) up to +40°C(+104°F). Winding temperature measure up to +110 °C (+230 °F) over water.

4) Optional via Sp port (flushing port).

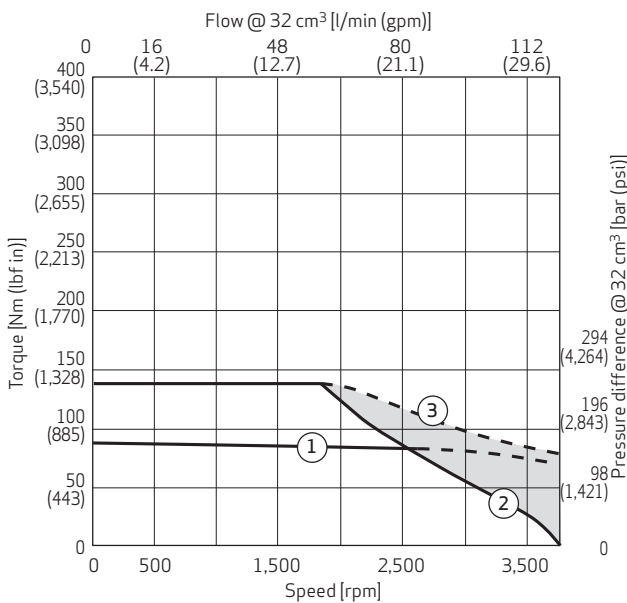
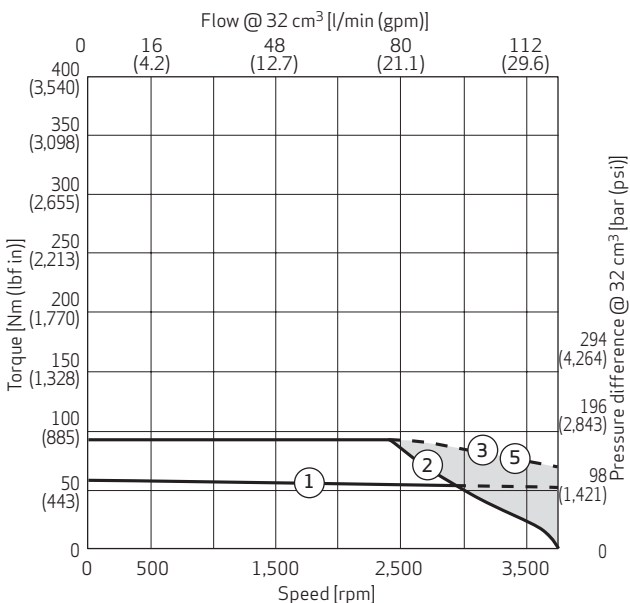
# EPU SIZE 32

## Liquid Cooling, S EPU 032 A D xx xx W

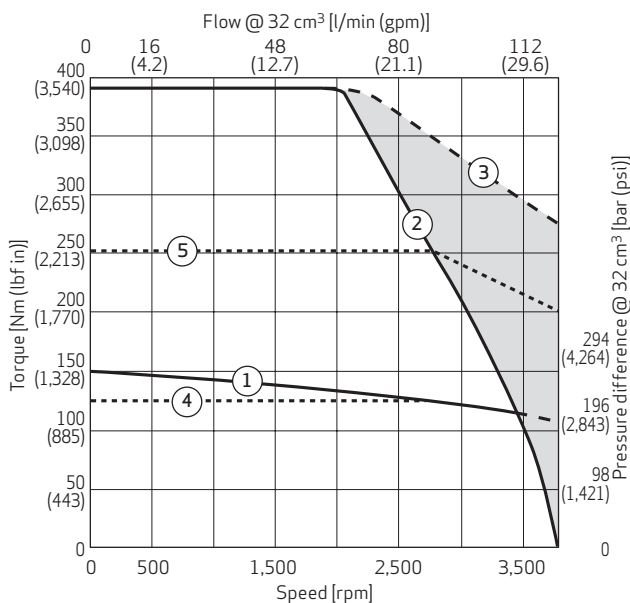
### Motor Performance Curves

50 W

M0 W



H0 W



- ① Continuous torque at 110K temperature difference over water, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Pressure difference  $\Delta p = p_A - p_B$

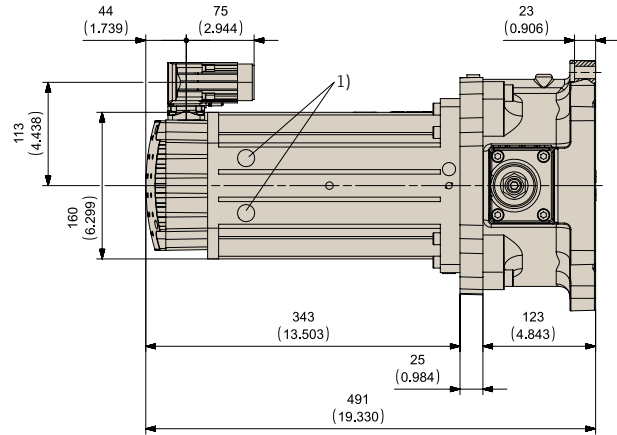
Motor performance determined with respective max. cooling water flow rate, see characteristic table

# EPU SIZE 32

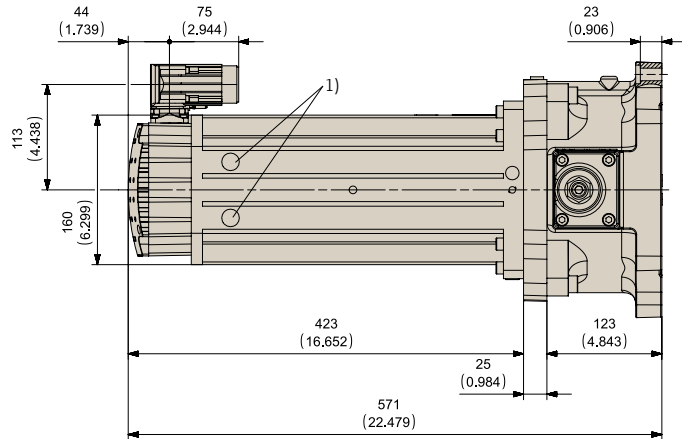
## Liquid Cooling, S EPU 032 A D xx xx W

### Installation Drawings

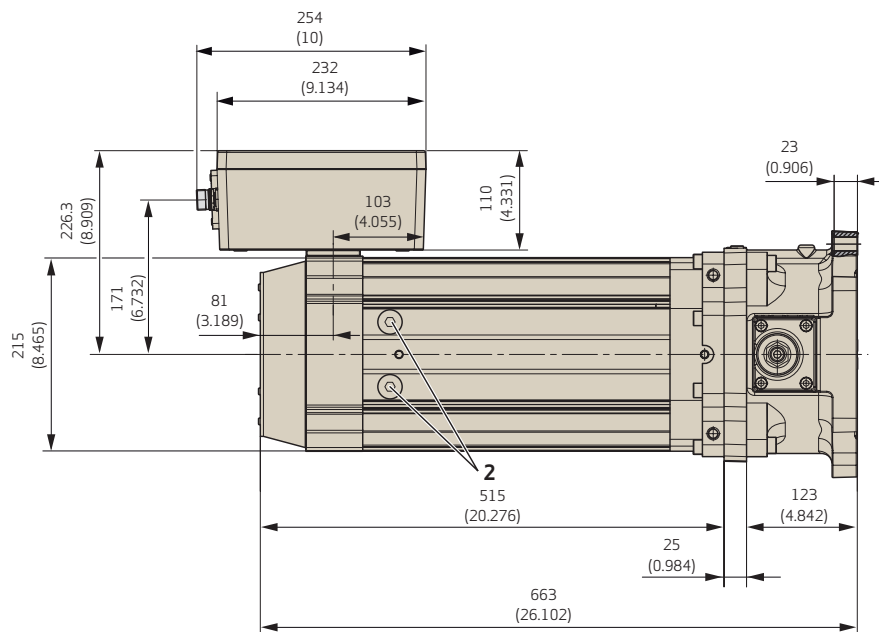
50 W



M0 W



H0 W



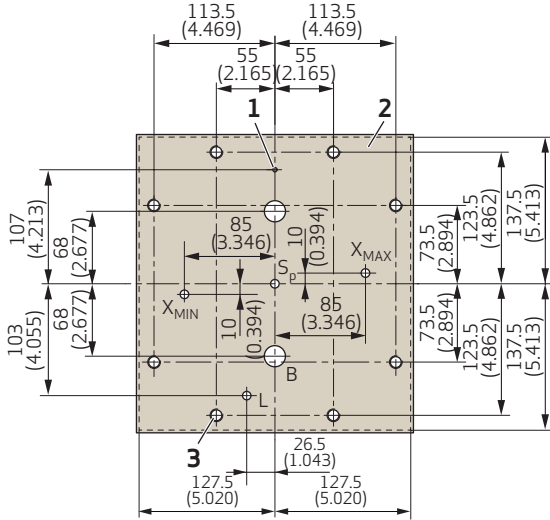
Note: Dimensions mm (inch)

- 1) Cooler outlet G3/8" (thread depth max. 7 mm)
- 2) Cooler outlet G1/2" (thread depth max. 7 mm)

# EPU SIZE 32

## Mounting Pattern and Pump Front View

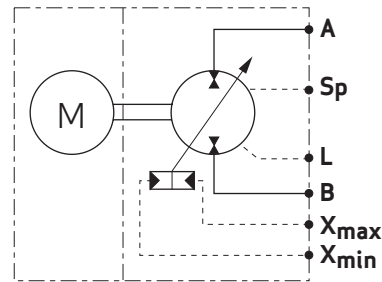
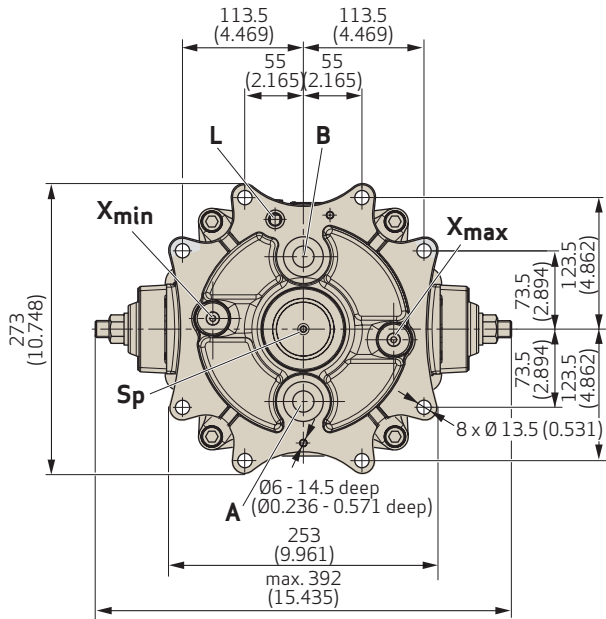
### Mounting Pattern



1. Use a spring-type pin with nominal diameter of 4 mm (0.16 in) (e.g. 4x12) according to ISO 13337
2. Area of
  - surface flatness:  $\square 0.02$
  - surface roughness:  $\sqrt{Rz4}$
3. M12, minimum 25 mm (0.91 in) deep.  
Recommended: Use 8 cylinder head screws M12 (property class 12.9, minimum length 45 mm (1.8 in)) according to ISO 4762. Tightening torque 120 + 10 Nm (1,062 lbf in + 89 lbf in)

Note: Dimensions mm (inch)

### Pump Front View



| Port             | Designation  | Pressure [bar (psi)] | Port dimension in counter surface |                     |
|------------------|--|----------------------|-----------------------------------|---------------------|
|                  |  |                      | Minimum Ø [mm (in)]               | Maximum Ø [mm (in)] |
| A, B             | Operating ports  | 350 (5,076)          | 20 (0.79 in)                      | 25 (0.98 in)        |
| Sp               | Flushing port  | 10 (145)             | 7 (0.28 in)                       | 15 (0.60 in)        |
| L                | Leakage port   | 10 (145)             | 11 (0.43 in)                      | 11.5 (0.45 in)      |
| X <sub>max</sub> | Control port for maximum displacement (option N1 only) | 350 (5,076)          | 5 (0.20 in)                       | 5.5 (0.22 in)       |
| X <sub>min</sub> | Control port for minimum displacement (option N1 only) | 350 (5,076)          | 5 (0.20 in)                       | 5.5 (0.22 in)       |

## EPU SIZE 80

### Natural Cooling, S EPU 080 A D xx xx C

#### Characteristics Table

| Performance class                                     |                    | Small  | Medium   | High  |
|---|--------------------|--|--|---|
| S EPU 080 A D xx                                      |                    | S0 C   | M0 C   | H0 C  |
| <b>Pump</b>   |                    |  |  |   |
| Displacement  | $V_{max}$          | 80 cm <sup>3</sup> /rev (4.88 in <sup>3</sup> /rev)                          |  |   |
| Maximum pump speed at 2.4 bar (abs.)                  | $n_{max}$          | 2,700 rpm  |  |   |
| Maximum pump acceleration                             | $\dot{n}_{max}$    | 45,000 rpm/s   |  |   |
| Maximum housing pressure <sup>1)</sup>                | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)   |  |   |
| Maximum flow  | $Q_{max}$          | 216 l/min (57.1 gpm)   |  |   |
| Maximum pressure ports A and B                        | $p_A, p_B$         | 350 bar (5,076 psi)  |  |   |
| Flushing flow rate <sup>4)</sup>                      | $Q_{Sp}$           | 4 to 6 l/min (1.1 to 1.6 gpm)  |  |   |
| <b>Motor</b>  |                    |  |  |   |
| Continuous stall torque <sup>3)</sup>                 | $M_0$              | 137 Nm (1,213 lbf in)  | 235 Nm (2,080 lbf in)  | 298 Nm (2,638 lbf in)   |
| Rated torque <sup>3)</sup>                            | $M_n$              | 52 Nm (460 lbf in)   | 169 Nm (1,496 lbf in)  | 230 Nm (2,036 lbf in)   |
| Maximum torque  | $M_{max}$          | 595 Nm (5,266 lbf in)  | 1,477 Nm (13,073 lbf in)   | 1,972 Nm (17,454 lbf in)  |
| Rated speed   | $n_n$              | 2,500 rpm  | 900 rpm  | 700 rpm   |
| Maximum speed   | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                               |  |   |
| Continuous stall current                              | $I_0$              | 69.17 A <sub>rms</sub>   | 106.32 A <sub>rms</sub>  | 100.63 A <sub>rms</sub>   |
| Maximum current                                       | $I_{max}$          | 340.5 A <sub>rms</sub>   | 795 A <sub>rms</sub>   | 795 A <sub>rms</sub>  |
| Torque constant                                       | $k_t$              | 1.98 Nm/A <sub>rms</sub><br>(17.5 lbf in A <sub>rms</sub> )                  | 2.21 Nm/A <sub>rms</sub><br>(19.6 lbf in A <sub>rms</sub> )                    | 2.96 Nm/A <sub>rms</sub><br>(26.2 lbf in A <sub>rms</sub> )                   |
| Voltage constant                                      | $k_e$              | 119.96 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                | 148.09 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                  | 197.70 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                 |
| Thermal time constant                                 | $t_{th}$           | 5,200 s  | 5,900 s  | 6,850 s   |
| Winding resistance at 25 °C                           | $R_{tt}$           | 0.074 Ω  | 0.024 Ω  | 0.03 Ω  |
| Winding inductance                                    | $L_{tt}$           | 1.433 mH   | 0.583 mH   | 0.778 mH  |
| Power connector                                       |                    | Size 1.5 rotatable   | Cable box A  |   |
| Feedback connector                                    |                    | Signal resolver connector rotatable  | Signal resolver connector  |   |
| Thermal sensor  |                    | NTC 220 kOhm, Pt1000   |  |   |
| <b>EPU unit</b>                                       |                    |  |  |   |
| Inertia   | $J$                | 340.97 kg cm <sup>2</sup><br>(3,018 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 1207.69 kg cm <sup>2</sup><br>(10,689 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 1528.3 kg cm <sup>2</sup><br>(13,527 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight  | $m$                | 159.4 kg (351.4 lb)  | 198.6 kg (437.8 lb)  | 249.5 kg (550.1 lb)   |
| Tightening torque 8x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                    |  |   |
| <b>Servo drive</b>                                    |                    |  |  |   |
| Recommended drive size <sup>2)</sup>                  |                    | G392-072 size 5  | G392-090 size 6  |   |

1) See diagram “Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ ” and “Installation note” on page 5.

2) See catalog “Modular Multi-Axis Servo Drive Systems (MSD)”.

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

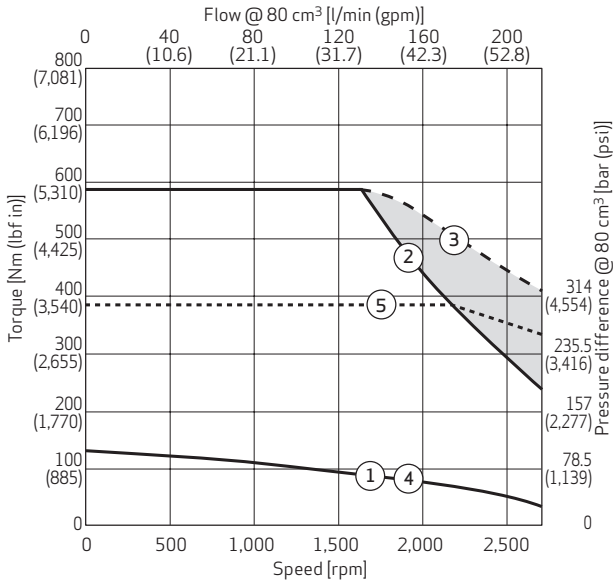
4) Optional via Sp port (flushing port).

# EPU SIZE 80

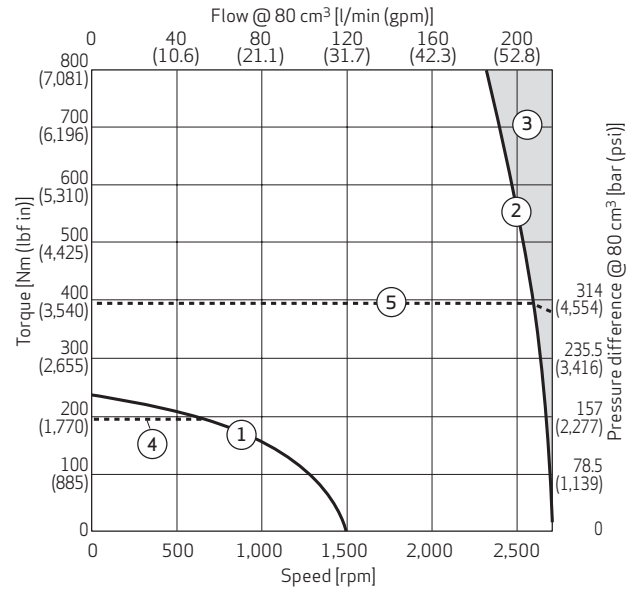
## Natural Cooling, S EPU 080 A D xx xx C

### Motor Performance Curves

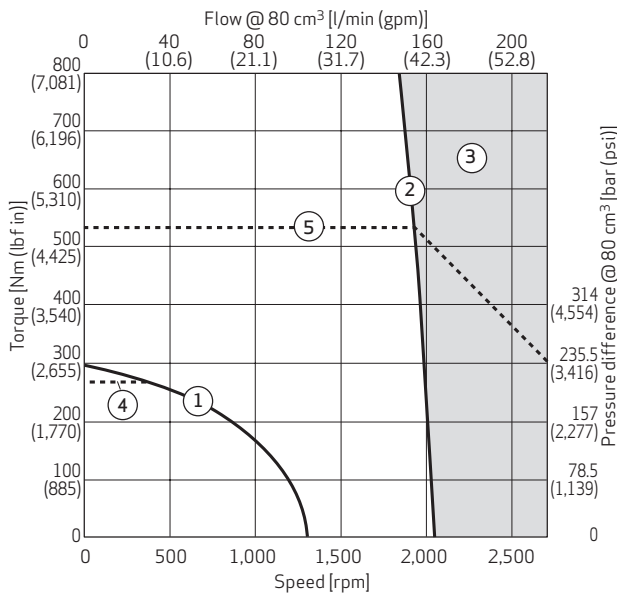
50 C



M0 C



H0 C



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

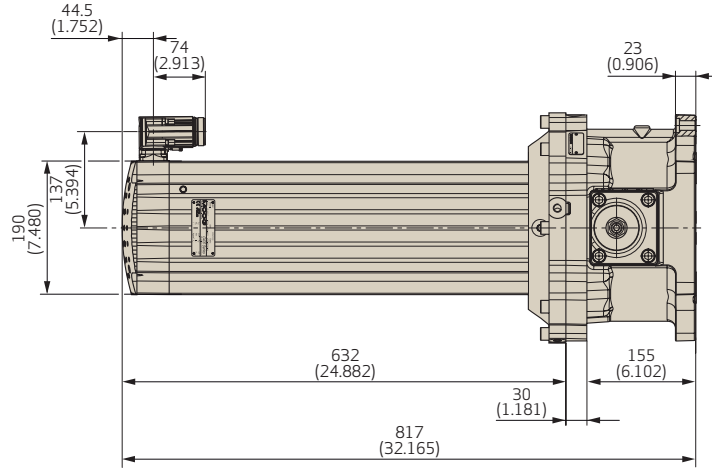
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 80

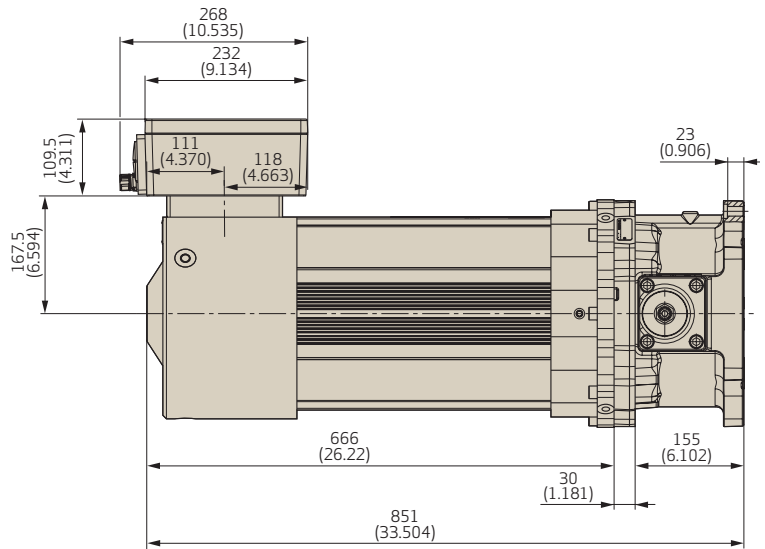
## Natural Cooling, S EPU 080 A D xx xx C

### Installation Drawings

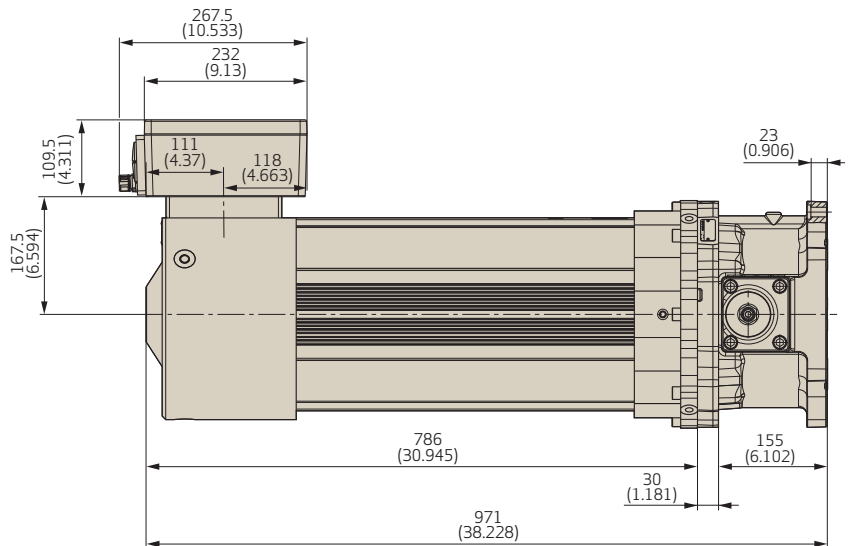
50 C



M0 C



H0 C



Note: Dimensions mm (inch)

## EPU SIZE 80

## Fan Cooling, S EPU 080 A D xx xx F

## Characteristics Table

| Performance class                                    |                         | Small   | Medium  | High   |
|--|-------------------------|---|---|--|
| S EPU 080 A D xx                                     |                         | S0 F  | M0 F  | H0 F   |
| <b>Pump</b>  |                         |   |   |  |
| Displacement   | $V_{max}$               | 80 cm <sup>3</sup> /rev (4.88 in <sup>3</sup> /rev)                         |   |  |
| Maximum pump speed at 2.4 bar (abs.)                 | $n_{max}$               | 2,700 rpm   |   |  |
| Maximum pump acceleration                            | $\dot{n}_{max}$         | 45,000 rpm/s  |   |  |
| Maximum housing pressure <sup>1)</sup>               | $p_{Lmax} \cdot p_{Sp}$ | 10 bar (145 psi)  |   |  |
| Maximum flow   | $Q_{max}$               | 216 l/min (57.1 gpm)  |   |  |
| Maximum pressure ports A and B                       | $p_A, p_B$              | 350 bar (5,076 psi)   |   |  |
| Flushing flow rate <sup>4)</sup>                     | $Q_{Sp}$                | 4 to 6 l/min (1.1 to 1.6 gpm)   |   |  |
| <b>Motor</b>   |                         |   |   |  |
| Continuous stall torque <sup>3)</sup>                | $M_0$                   | 111.5 Nm<br>(987 lbf in)  | 165 Nm<br>(1,460 lbf in)  | 359.1 Nm<br>(3,178 lbf in)   |
| Rated torque <sup>3)</sup>                           | $M_n$                   | 76.7 Nm<br>(678 lbf in)   | 105.6 Nm<br>(935 lbf in)  | 304.5 Nm<br>(2,695 lbf in)   |
| Maximum torque                                       | $M_{max}$               | 391 Nm<br>(3,461 lbf in)  | 595 Nm<br>(5,266 lbf in)  | 1,972 Nm<br>(17,454 lbf in)  |
| Rated speed  | $n_n$                   | 2,500 rpm   |   | 700 rpm  |
| Maximum speed  | $n_{max}$               | Maximum speed see M = f(n) performance curve                                |   |  |
| Continuous stall current                             | $I_0$                   | 63.21 A <sub>rms</sub>  | 83.2 A <sub>rms</sub>   | 121.42 A <sub>rms</sub>  |
| Maximum current                                      | $I_{max}$               | 250 A <sub>rms</sub>  | 340 A <sub>rms</sub>  | 795 A <sub>rms</sub>   |
| Torque constant                                      | $k_t$                   | 1.76 Nm/A <sub>rms</sub><br>(15.6 lbf in A <sub>rms</sub> )                 | 1.98 Nm/A <sub>rms</sub><br>(17.5 lbf in A <sub>rms</sub> )                 | 2.96 Nm/A <sub>rms</sub><br>(26.2 lbf in A <sub>rms</sub> )                    |
| Voltage constant                                     | $k_e$                   | 106.63 V <sub>rms</sub> /1,000 <sub>rpm</sub>                               | 119.96 V <sub>rms</sub> /1,000 <sub>rpm</sub>                               | 197.48 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                  |
| Thermal time constant                                | $t_{th}$                | 4,200 s   | 5,200 s   | 6,850 s  |
| Winding resistance at 25 °C                          | $R_{tt}$                | 0.096 Ω   | 0.074 Ω   | 0.03 Ω   |
| Winding inductance                                   | $L_{tt}$                | 1.721 mH  | 1.434 mH  | 0.778 mH   |
| Power connector                                      |                         | Size 1.5 rotatable  | Cable box A   |  |
| Feedback connector                                   |                         | Signal resolver connector rotatable   | Signal resolver connector   |  |
| Thermal sensor                                       |                         | NTC 220 kOhm, Pt1000  |   |  |
| <b>EPU unit</b>                                      |                         |   |   |  |
| Inertia  | J                       | 290.1 kg cm <sup>2</sup><br>(2,568 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 340.9 kg cm <sup>2</sup><br>(3,018 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 1,528.3 kg cm <sup>2</sup><br>(13,527 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m                       | 147.2 kg (324.5 lb)   | 170.9 kg (437.8 lb)   | 256.5 kg (565.5 lb)  |
| Tightening torque 8xM12x45 -12.9 cylinder head screw |                         | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                   |   |  |
| <b>Servo drive</b>                                   |                         |   |   |  |
| Recommended drive size <sup>2)</sup>                 |                         | G392-110 size 6   |   |  |

1) See diagram "Maximum housing pressure  $p_{Lmax} \cdot p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

4) Optional via Sp port (flushing port).

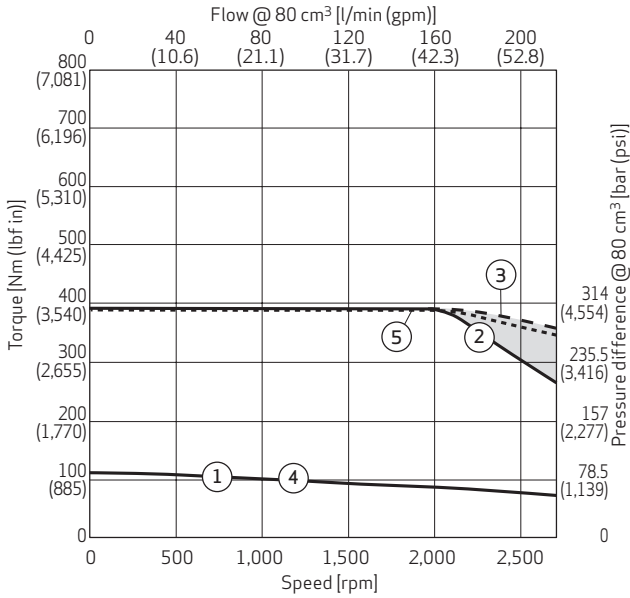


# EPU SIZE 80

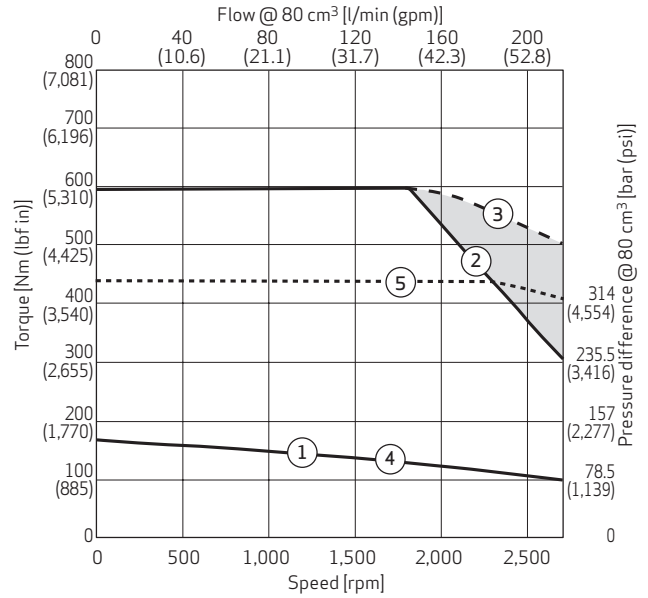
## Fan Cooling, S EPU 080 A D xx xx F

### Motor Performance Curves

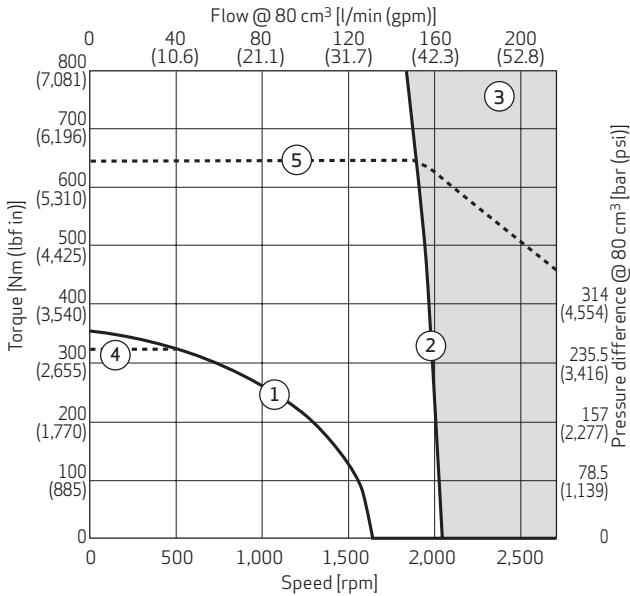
S0 F



M0 F



H0 F



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

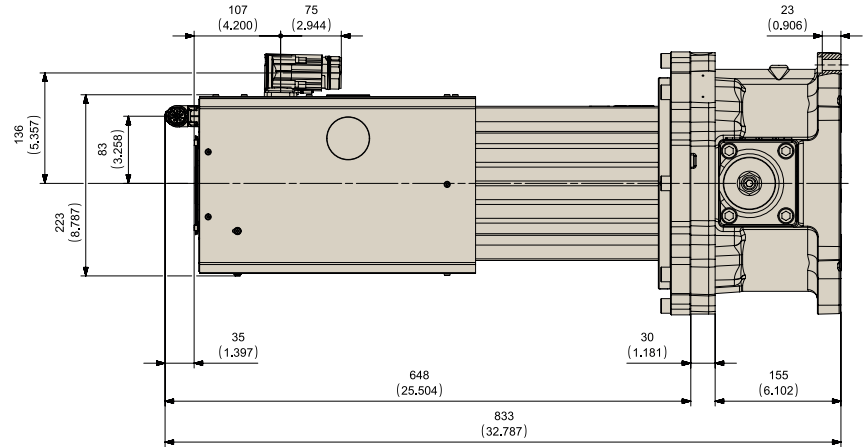
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 80

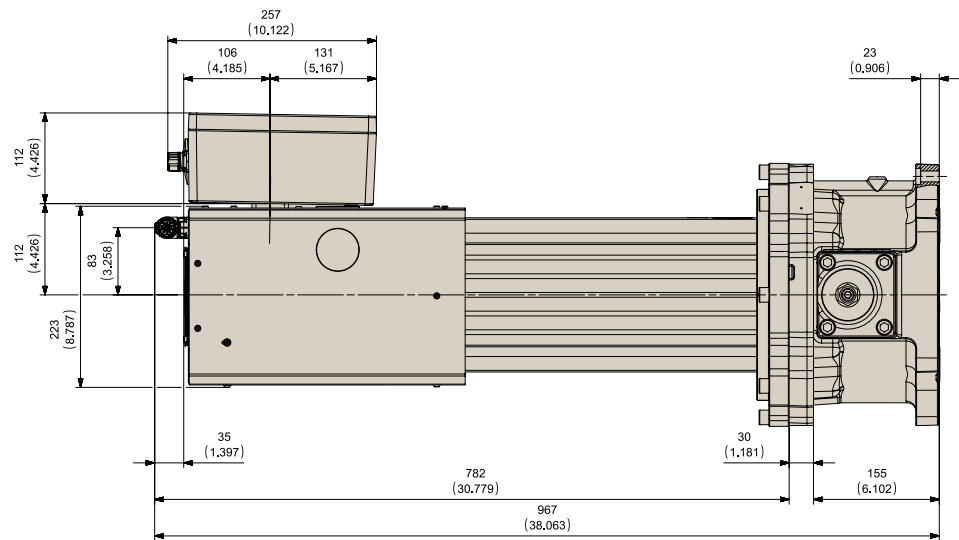
## Fan Cooling, S EPU 080 A D xx xx F

### Installation Drawings

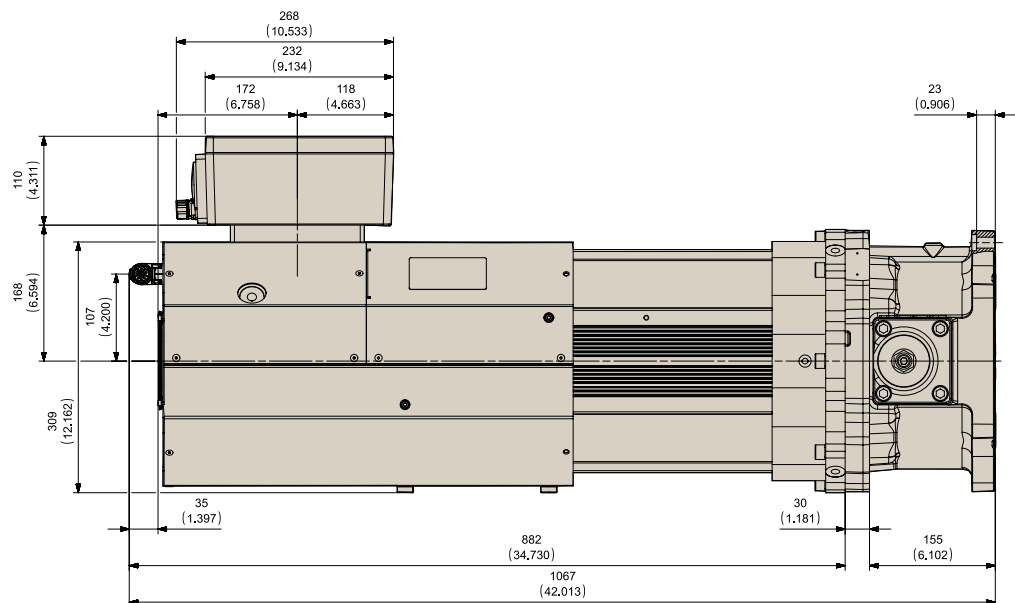
S0 F



M0 F



H0 F



Note: Dimensions mm (inch)

## EPU SIZE 80

## Liquid Cooling, S EPU 080 A D xx xx W

## Characteristics Table

| Performance class                                     |                         | Small   | Medium  | High   |
|---|-------------------------|---|---|--|
| S EPU 080 A D xx                                      |                         | SO W  | MO W  | HO W   |
| <b>Pump</b>   |                         |   |   |  |
| Displacement  | $V_{max}$               | 80 cm <sup>3</sup> /rev (4.88 in <sup>3</sup> /rev)                         |   |  |
| Maximum pump speed at 2.4 bar (abs.)                  | $n_{max}$               | 2,700 rpm   |   |  |
| Maximum pump acceleration                             | $\dot{n}_{max}$         | 45,000 rpm/s  |   |  |
| Maximum housing pressure <sup>1)</sup>                | $p_{Lmax} \cdot p_{Sp}$ | 10 bar (145 psi)  |   |  |
| Maximum flow  | $Q_{max}$               | 216 l/min (57.1 gpm)  |   |  |
| Maximum pressure ports A and B                        | $p_A, p_B$              | 350 bar (5,076 psi)   |   |  |
| Flushing flow rate <sup>4)</sup>                      | $Q_{Sp}$                | 4 to 6 l/min (1.1 to 1.6 gpm)   |   |  |
| <b>Motor</b>  |                         |   |   |  |
| Continuous stall torque <sup>3)</sup>                 | $M_0$                   | 151 Nm (1,336 lbf in)   | 227 Nm (2,009 lbf in)   | 498 Nm (4,408 lbf in)  |
| Rated torque <sup>3)</sup>                            | $M_n$                   | 128 Nm (1,133 lbf in)   | 189 Nm (1,673 lbf in)   | 347 Nm (3,071 lbf in)  |
| Maximum torque  | $M_{max}$               | 391 Nm (3,461 lbf in)   | 595 Nm (5,266 lbf in)   | 1,387 Nm (12,276 lbf in)   |
| Rated speed   | $n_n$                   | 2,500 rpm   |   | 1,800 rpm  |
| Maximum speed   | $n_{max}$               | Maximum speed see $M = f(n)$ performance curve                              |   |  |
| Continuous stall current                              | $I_0$                   | 85.95 A <sub>rms</sub>  | 114.87 A <sub>rms</sub>   | 235.21 A <sub>rms</sub>  |
| Maximum current                                       | $I_{max}$               | 250 A <sub>rms</sub>  | 340 A <sub>rms</sub>  | 750 A <sub>rms</sub>   |
| Torque constant                                       | $k_t$                   | 1.76 Nm/A <sub>rms</sub><br>(15.6 lbf in/A <sub>rms</sub> )                 | 1.97 Nm/A <sub>rms</sub><br>(17.4 lbf in/A <sub>rms</sub> )                 | 2.12 Nm/A <sub>rms</sub><br>(18.8 lbf in/A <sub>rms</sub> )                    |
| Voltage constant                                      | $k_e$                   | 106.63 V <sub>rms</sub> /1,000 <sub>rpm</sub>                               | 119.96 V <sub>rms</sub> /1,000 <sub>rpm</sub>                               | 145.87 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                  |
| Thermal time constant                                 | $t_{th}$                | 568 s   | 704 s   | 1,680 s  |
| Winding resistance at 25 °C                           | $R_{tt}$                | 0.096 Ω   | 0.074 Ω   | 0.024 Ω  |
| Winding inductance                                    | $L_{tt}$                | 1.727 mH  | 1.44 mH   | 0.608 mH   |
| Power connector                                       |                         | Cable box A   |   |  |
| Feedback connector                                    |                         | Signal resolver connector   |   |  |
| Thermal sensor  |                         | NTC 220 kOhm, Pt1000  |   |  |
| Cooling water flow rate                               | $Q_w$                   | 6 to 8 l/min<br>(1.6 to 2.1 gpm)  | 6 to 8 l/min<br>(1.6 to 2.1 gpm)  | 8 l/min<br>(2.1 gpm)   |
| <b>EPU unit</b>                                       |                         |   |   |  |
| Inertia   | $J$                     | 295.8 kg cm <sup>2</sup><br>(2,618 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 346.3 kg cm <sup>2</sup><br>(3,065 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 1,207.3 kg cm <sup>2</sup><br>(10,686 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight  | $m$                     | 144.3 kg (318.1 lb)   | 168.1 kg (370.6 lb)   | 227.5 kg (501.6 lb)  |
| Tightening torque 8x M12x45 -12.9 cylinder head screw |                         | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                   |   |  |
| <b>Servo drive</b>                                    |                         |   |   |  |
| Recommended drive size <sup>2)</sup>                  |                         | G392-110 size 6   |   | G392-143 size 6A   |

1) See diagram "Maximum housing pressure  $p_{Lmax} \cdot p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with water temperatures from +25 °C(+77 °F) up to +40 °C(+104 °F). Winding temperature measure up to +110 °C(+230 °F) over water.

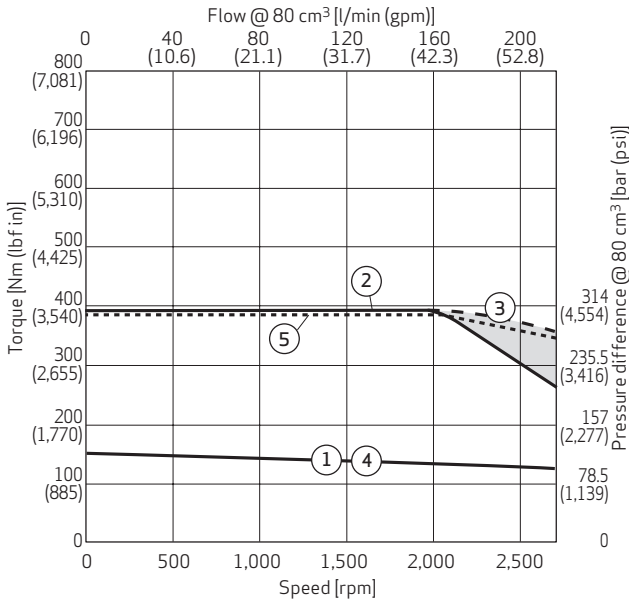
4) Optional via Sp port (flushing port).

# EPU SIZE 80

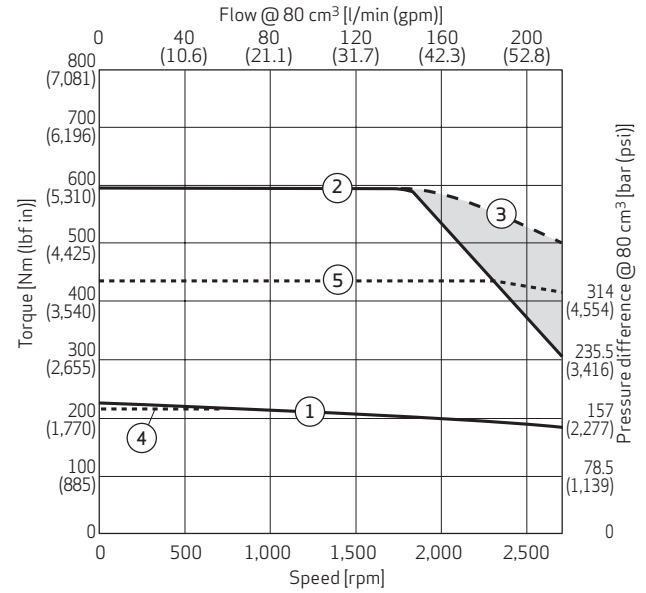
## Liquid Cooling, S EPU 080 A D xx xx W

### Motor Performance Curves

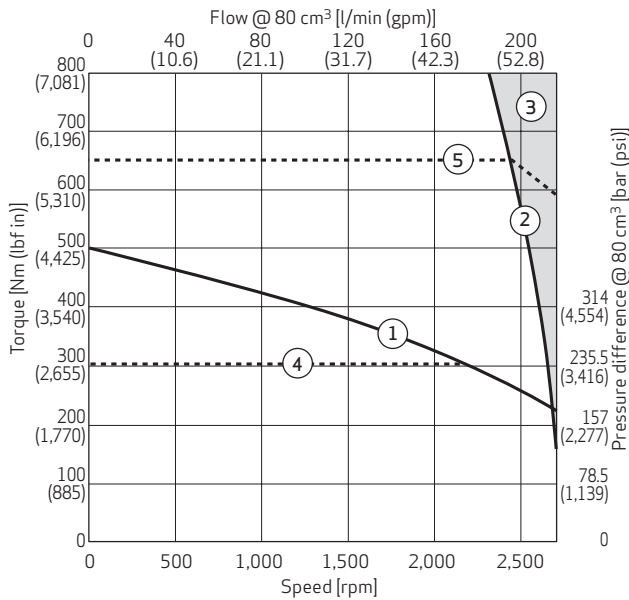
50 W



M0 W



H0 W



- ① Continuous torque at 110 K temperature difference over water, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Pressure difference  $\Delta p = p_A - p_B$

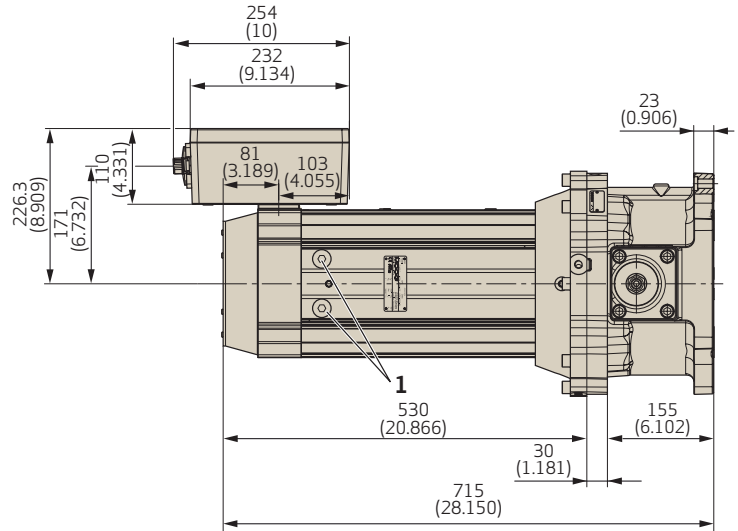
Motor performance determined with respective max. cooling water flow rate, see characteristic table

# EPU SIZE 80

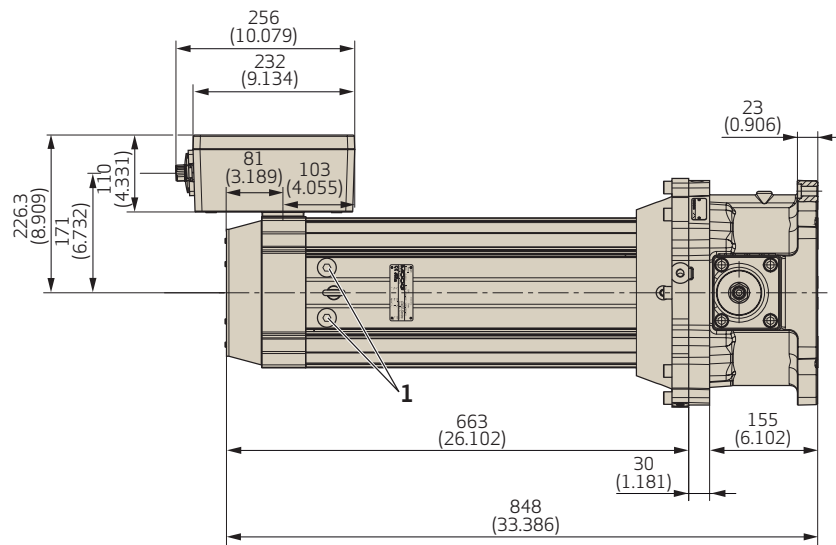
## Liquid Cooling, S EPU 080 A D xx xx W

### Installation Drawings

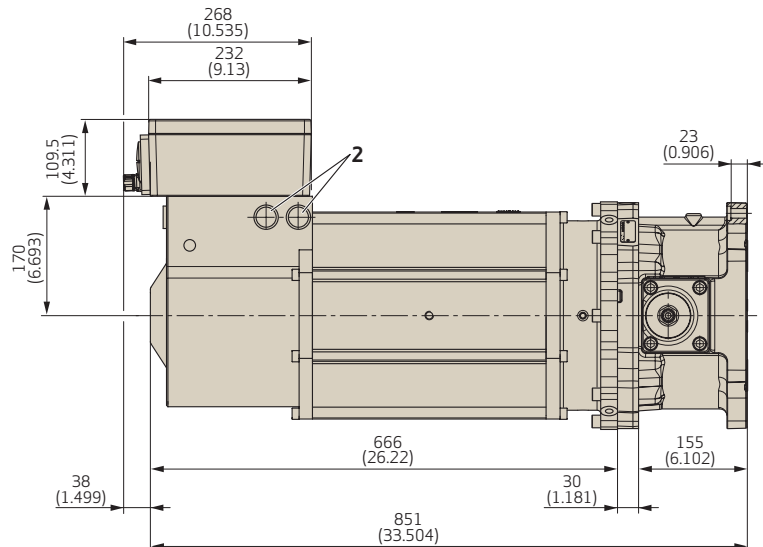
50 W



M0 W



H0 W



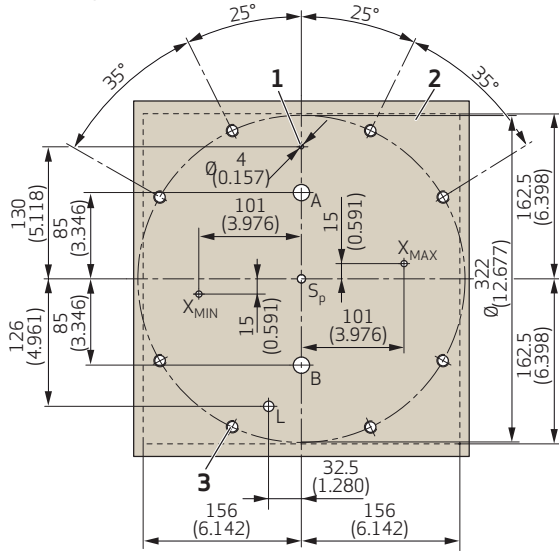
Note: Dimensions mm (inch)

- 1) Cooler outlet G1/2" (thread depth max. 7 mm)
- 2) Cooler outlet G3/4" (thread depth max. 16 mm)

# EPU SIZE 80

## Mounting Pattern and Pump Front View

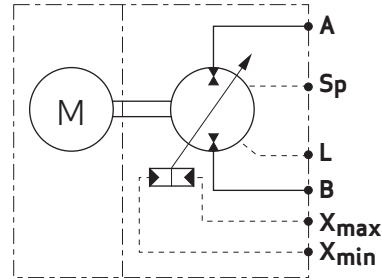
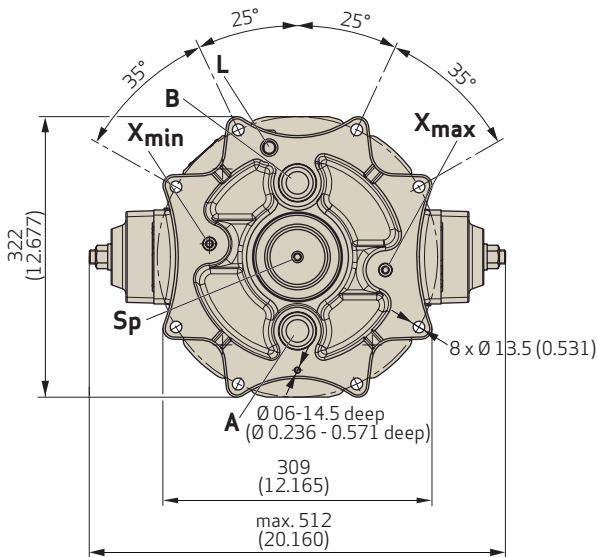
### Mounting Pattern



1. Use a spring-type pin with nominal diameter of 4 mm (0.16 in) (e.g. 4x12) according to ISO 13337
2. Area of
  - surface flatness:  $\square 0.02$
  - surface roughness:  $\sqrt{Rz4}$
3. M12, minimum 25 mm (0.9 in) deep.  
Recommended: Use 8 cylinder head screws M12 (property class 12.9, minimum length 45 mm (1.8 in)) according to ISO 4762. Tightening torque 120 + 10 Nm (1,062 lbf in + 89 lbf in).

Note: Dimensions mm (inch)

### Pump Front View



| Port             | Designation  | Pressure [bar (psi)] | Port dimension in counter surface |                     |
|------------------|--|----------------------|-----------------------------------|---------------------|
|                  |  |                      | Minimum Ø [mm (in)]               | Maximum Ø [mm (in)] |
| A, B             | Operating ports  | 350 (5,076)          | 26 (1.02)                         | 32 (1.26)           |
| Sp               | Flushing port  | 10 (145)             | 10 (0.39)                         | 20 (0.79)           |
| L                | Leakage port   | 10 (145)             | 16.5 (0.65)                       | 17 (0.67)           |
| X <sub>max</sub> | Control port for maximum displacement (option N1 only) | 350 (5,076)          | 7 (0.28)                          | 7,5 (0.30)          |
| X <sub>min</sub> | Control port for minimum displacement (option N1 only) | 350 (5,076)          | 7 (0.28)                          | 7,5 (0.30)          |

# EPU SIZE 140

## Natural Cooling, S EPU 140 A D xx xx C

### Characteristics Table

|  |                    |   |
|--|--------------------|---|
| <b>Performance class</b>                               |                    | <b>Small</b>  |
| <b>S EPU 140 A D xx</b>                                |                    | <b>S0C</b>  |
| <b>Pump</b>  |                    |   |
| Displacement   | $V_{max}$          | 140 cm <sup>3</sup> /rev (8.54 in <sup>3</sup> /rev)                      |
| Maximum pump speed at 3.7 bar (abs.)                   | $n_{max}$          | 2,300 rpm   |
| Maximum pump acceleration                              | $\dot{n}_{max}$    | 28,750 rpm/s  |
| Maximum housing pressure <sup>1)</sup>                 | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)  |
| Maximum flow   | $Q_{max}$          | 322 l/min (85.1 gpm)  |
| Maximum pressure ports A and B                         | $p_A, p_B$         | 350 bar (5,076 psi)   |
| Flushing flow rate <sup>4)</sup>                       | $Q_{Sp}$           | 6 to 8 l/min (1.6 to 2.1 gpm)   |
| <b>Motor</b>   |                    |   |
| Continuous stall torque <sup>3)</sup>                  | $M_0$              | 298 Nm (2,638 lbf in)   |
| Rated torque <sup>3)</sup>                             | $M_n$              | 230 Nm (2,036 lbf in)   |
| Maximum torque   | $M_{max}$          | 1,972 Nm (17,454 lbf in)  |
| Rated speed  | $n_n$              | 700 rpm   |
| Maximum speed  | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                            |
| Continuous stall current                               | $I_0$              | 100.63 A <sub>rms</sub>   |
| Maximum current  | $I_{max}$          | 795 A <sub>rms</sub>  |
| Torque constant  | $k_t$              | 2.96 Nm/A <sub>rms</sub> (26.2 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                       | $k_e$              | 197.70 V <sub>rms</sub> /1,000 <sub>rpm</sub>                             |
| Thermal time constant                                  | $t_{th}$           | 6,850 s   |
| Winding resistance at 25 °C                            | $R_{tt}$           | 0.03 Ω  |
| Winding inductance                                     | $L_{tt}$           | 0.778 mH  |
| Power connector  |                    | Cable box A   |
| Feedback connector                                     |                    | Signal resolver connector   |
| Thermal sensor   |                    | NTC 220 kOhm, Pt1000  |
| <b>EPU unit</b>  |                    |   |
| Inertia  | J                  | 1,722 kg cm <sup>2</sup> (15,241 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m                  | 280.8 kg (619.1 lb in)  |
| Tightening torque 12x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                 |
| <b>Servo drive</b>                                     |                    |   |
| Recommended drive size <sup>2)</sup>                   |                    | G392-143 size 6   |

1) See diagram “Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ ” and “Installation note” on page 5.

2) See catalog “Modular Multi-Axis Servo Drive Systems (MSD)”.

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

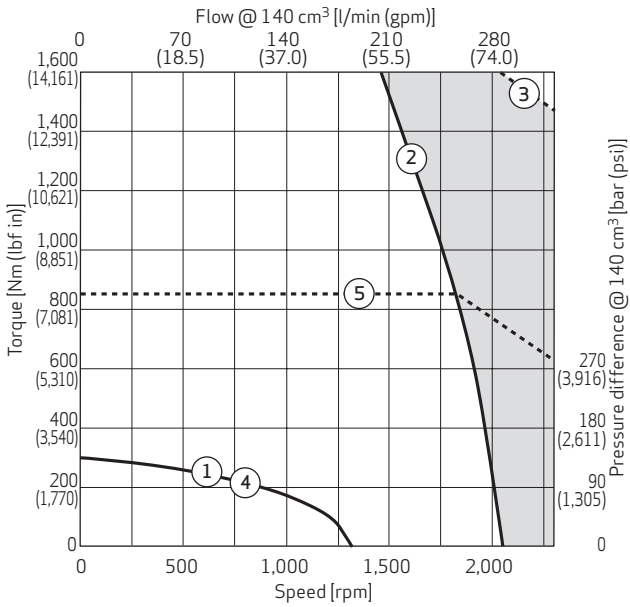
4) Optional via Sp port (flushing port).

# EPU SIZE 140

## Natural Cooling, S EPU 140 A D xx xx C

### Motor Performance Curves

50 C



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Pressure difference  $\Delta p = p_A - p_B$

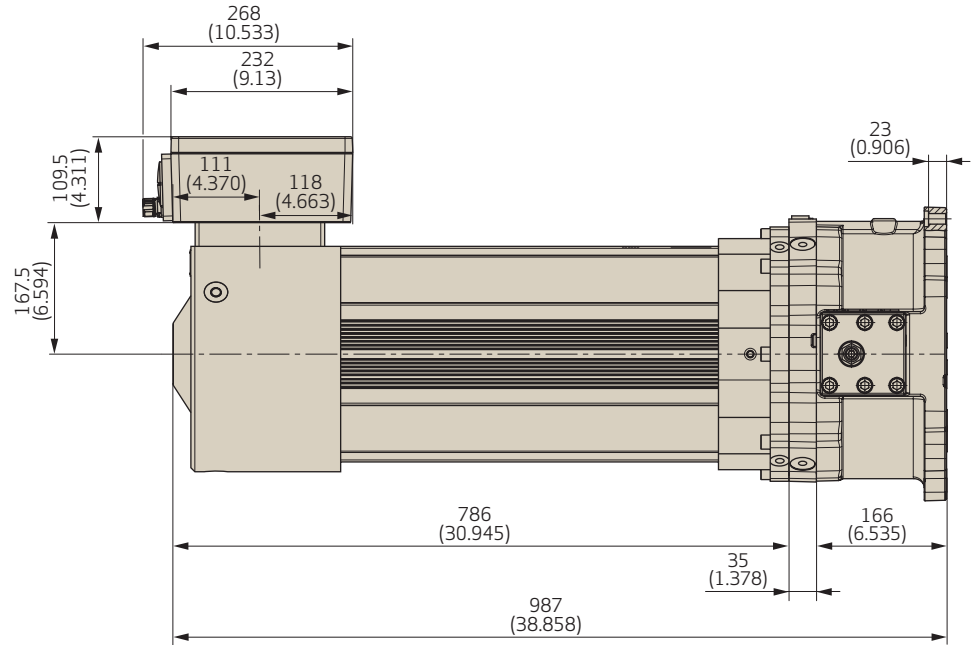


# EPU SIZE 140

## Natural Cooling, S EPU 140 A D xx xx C

### Installation Drawings

S0 C



Note: Dimensions mm (inch)

## EPU SIZE 140

## Fan Cooling, S EPU 140 A D xx xx F

## Characteristics Table

| Performance class                                      |                    | Small  | Medium  |
|--|--------------------|--|---|
| S EPU 140 A D xx                                       |                    | S0 F   | M0 F  |
| <b>Pump</b>  |                    |  |   |
| Displacement   | $V_{max}$          | 140 cm <sup>3</sup> /rev (8.54 in <sup>3</sup> /rev)                   |   |
| Maximum pump speed at 3.7 bar (abs.)                   | $n_{max}$          | 2,300 rpm  |   |
| Maximum pump acceleration                              | $\dot{n}_{max}$    | 28,750 rpm/s   |   |
| Maximum housing pressure <sup>1)</sup>                 | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)   |   |
| Maximum flow   | $Q_{max}$          | 322 l/min (85.1 gpm)   |   |
| Maximum pressure ports A and B                         | $p_A, p_B$         | 350 bar (5,076 psi)  |   |
| Flushing flow rate <sup>4)</sup>                       | $Q_{Sp}$           | 6 to 8 l/min (1.6 to 2.1 gpm)  |   |
| <b>Motor</b>   |                    |  |   |
| Continuous stall torque <sup>3)</sup>                  | $M_0$              | 165 Nm (1,460 lbf in)  | 359.1 Nm (3,178 lbf in)   |
| Rated torque <sup>3)</sup>                             | $M_n$              | 105.6 Nm (935 lbf in)  | 304.5 Nm (2,695 lbf in)   |
| Maximum torque   | $M_{max}$          | 595 Nm (5,266 lbf in)  | 1,972 Nm (17,453 lbf in)  |
| Rated speed  | $n_n$              | 2,500 rpm  | 700 rpm   |
| Maximum speed  | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                         |   |
| Continuous stall current                               | $I_0$              | 83.2 A <sub>rms</sub>  | 121.42 A <sub>rms</sub>   |
| Maximum current  | $I_{max}$          | 340 A <sub>rms</sub>   | 795 A <sub>rms</sub>  |
| Torque constant  | $k_t$              | 1.98 Nm/A <sub>rms</sub> (17.5 lbf in/A <sub>rms</sub> )               | 2.96 Nm/A <sub>rms</sub> (26.2 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                       | $k_e$              | 119.96 V <sub>rms</sub> /1,000 rpm                                     | 197.48 V <sub>rms</sub> /1,000 rpm  |
| Thermal time constant                                  | $t_{th}$           | 5,200 s  | 6,850 s   |
| Winding resistance at 25 °C                            | $R_{tt}$           | 0.074 Ω  | 0.03 Ω  |
| Winding inductance                                     | $L_{tt}$           | 1.434 mH   | 0.778 mH  |
| Power connector  |                    | Cable box A  |   |
| Feedback connector                                     |                    | Signal resolver connector rotatable                                    |   |
| Fan connector  |                    | Size 1 rotatable   |   |
| Thermal sensor   |                    | NTC 220 kOhm, Pt1000   |   |
| <b>EPU unit</b>  |                    |  |   |
| Inertia  | J                  | 535 kg cm <sup>2</sup> (4,732 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 1,722 kg cm <sup>2</sup> (15,241 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | m                  | 202.2 kg (445.8 lb)  | 287.8 kg (634.4 lb)   |
| Tightening torque 12x M12x50 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                              |   |
| <b>Servo drive</b>                                     |                    |  |   |
| Recommended drive size <sup>2)</sup>                   |                    | G392-143 size 6  | G392-110 size 6   |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

4) Optional via Sp port (flushing port).

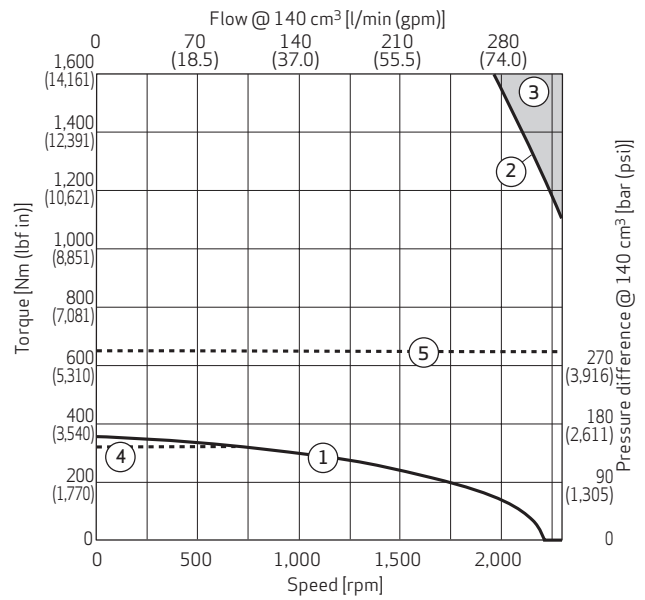
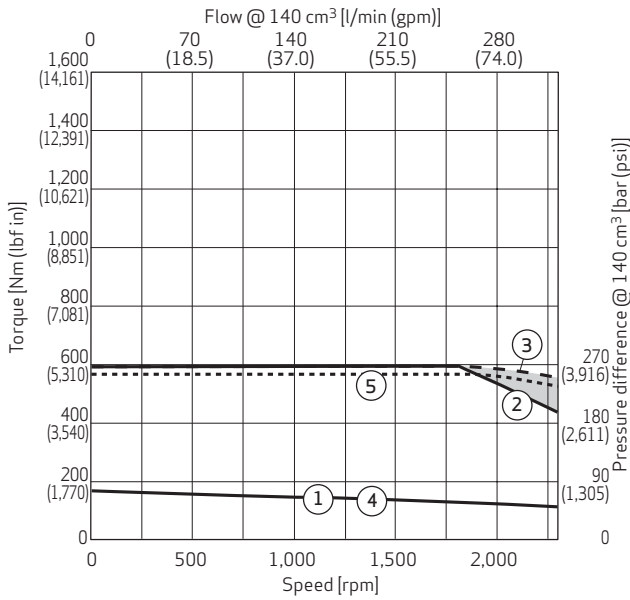
# EPU SIZE 140

## Fan Cooling, S EPU 140 A D xx xx F

### Motor Performance Curves

S0 F

M0 F



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

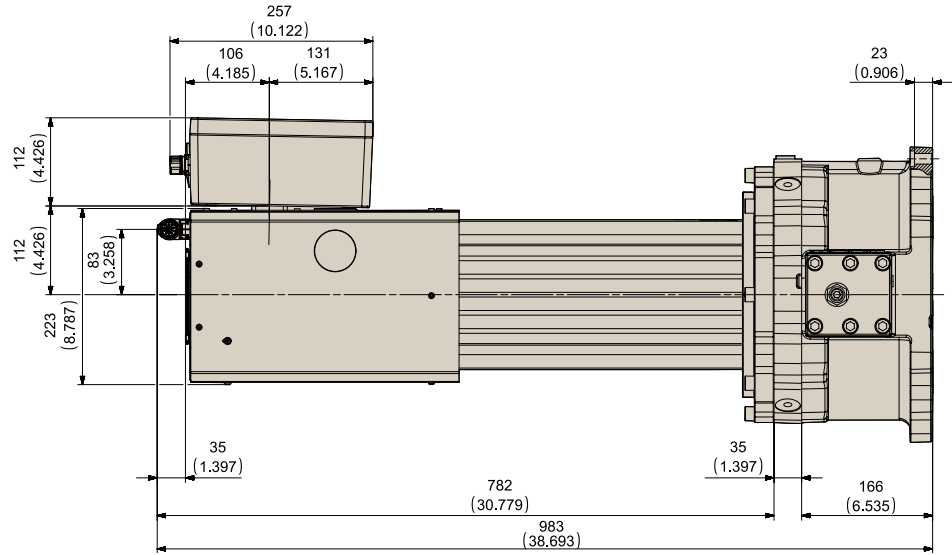
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 140

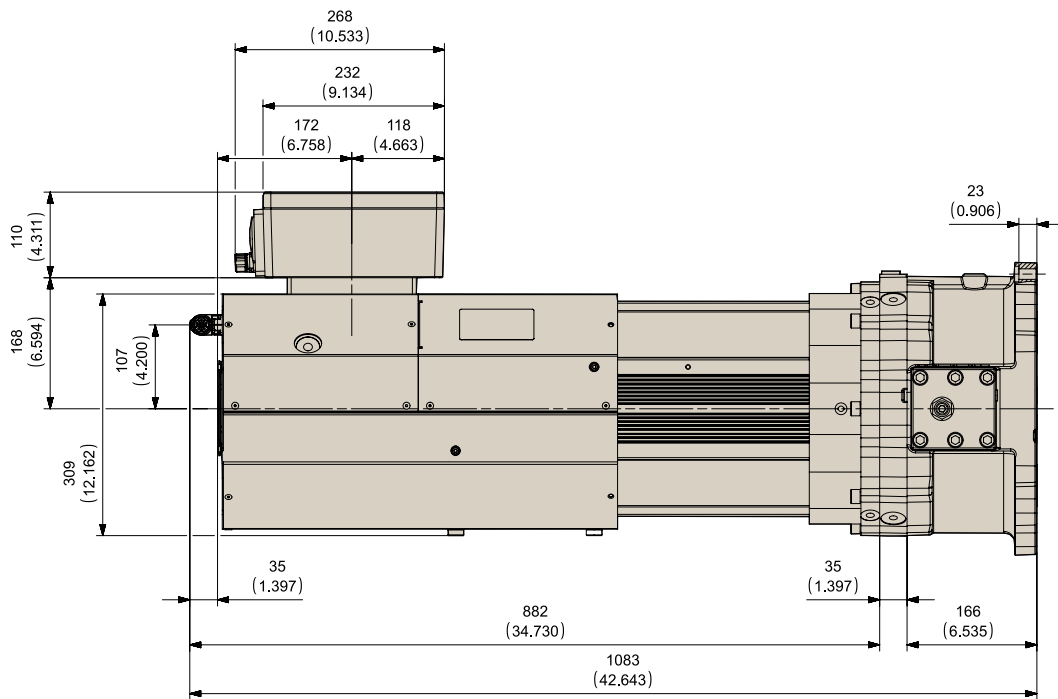
## Fan Cooling, S EPU 140 A D xx xx F

### Installation Drawings

S0F



M0F



Note: Dimensions mm (inch)

## EPU SIZE 140

## Liquid Cooling, S EPU 140 A D xx xx W

## Characteristics Table

| Performance class                                      |                    | Small   | Medium   | High   |
|--|--------------------|---|--|--|
| S EPU 140 A D xx                                       |                    | SO W  | MO W   | HO W   |
| <b>Pump</b>  |                    |   |  |  |
| Displacement   | $V_{max}$          | 140 cm <sup>3</sup> /rev (8.54 in <sup>3</sup> /rev)                      |  |  |
| Maximum pump speed at 3.7 bar (abs.)                   | $n_{max}$          | 2,300 rpm   |  |  |
| Maximum pump acceleration                              | $\dot{n}_{max}$    | 28,750 rpm/s  |  |  |
| Maximum housing pressure <sup>1)</sup>                 | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)  |  |  |
| Maximum flow   | $Q_{max}$          | 322 l/min (85.1 gpm)  |  |  |
| Maximum pressure ports A and B                         | $p_A, p_B$         | 350 bar (5,076 psi)   |  |  |
| Flushing flow rate <sup>4)</sup>                       | $Q_{Sp}$           | 6 to 8 l/min (1.6 to 2.1 gpm)   |  |  |
| <b>Motor</b>   |                    |   |  |  |
| Continuous stall torque <sup>3)</sup>                  | $M_0$              | 227 Nm (2,009 lbf in)   | 498 Nm (4,408 lbf in)  | 654 Nm (5,788 lbf in)  |
| Rated torque <sup>3)</sup>                             | $M_n$              | 189 Nm (1,673 lbf in)   | 347 Nm (3,071 lbf in)  | 427 Nm (3,779 lbf in)  |
| Maximum torque   | $M_{max}$          | 595 Nm (5,266 lbf in)   | 1,387 Nm (12,276 lbf in)   | 1,950 Nm (17,259 lbf in)   |
| Rated speed  | $n_n$              | 2,500 rpm   | 1,800 rpm  | 1,800 rpm  |
| Maximum speed  | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                            |  |  |
| Continuous stall current                               | $I_0$              | 114.87 A <sub>rms</sub>   | 235.21 A <sub>rms</sub>  | 230.9 A <sub>rms</sub>   |
| Maximum current  | $I_{max}$          | 340 A <sub>rms</sub>  | 750 A <sub>rms</sub>   | 795 A <sub>rms</sub>   |
| Torque constant  | $k_t$              | 1.97 Nm/A <sub>rms</sub><br>(17.4 lbf in/A <sub>rms</sub> )               | 2.12 Nm/A <sub>rms</sub><br>(18.8 lbf in/A <sub>rms</sub> )                  | 2.83 Nm/A <sub>rms</sub><br>(25.0 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                       | $k_e$              | 119.96 V <sub>rms</sub> /1,000 <sub>rpm</sub>                             | 145.87 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                | 195.48 V <sub>rms</sub> /1,000 <sub>rpm</sub>                                |
| Thermal time constant                                  | $t_{th}$           | 704 s   | 1,680 s  | 1,970 s  |
| Winding resistance at 25 °C                            | $R_{tt}$           | 0.074 Ω   | 0.024 Ω  | 0.03 Ω   |
| Winding inductance                                     | $L_{tt}$           | 1.44 mH   | 0.608 mH   | 0.804 mH   |
| Power connector  |                    | Cable box A   |  |  |
| Feedback connector                                     |                    | Signal resolver connector   |  |  |
| Thermal sensor   |                    | NTC 220 kOhm, Pt1000  |  |  |
| Cooling water flow rate                                | $Q_W$              | 6 to 8 l/min<br>(1.6 to 2.1 gpm)  | 8 l/min (2.1 gpm)  |  |
| <b>EPU unit</b>  |                    |   |  |  |
| Inertia  | $J$                | 540 kg cm <sup>2</sup><br>(4,779 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 1,401 kg cm <sup>2</sup><br>(12,400 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 1,722 kg cm <sup>2</sup><br>(15,241 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | $m$                | 199.4 kg (439.6 lb)   | 258.8 kg (570.6 lb)  | 295.8 kg (652.1 lb)  |
| Tightening torque 12x M12x45 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                 |  |  |
| <b>Servo drive</b>                                     |                    |   |  |  |
| Recommended drive size <sup>2)</sup>                   |                    | G392-143 size 6A  | G395-210 size 6A   |  |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with water temperatures from +25 °C (+77 °F) up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over water.

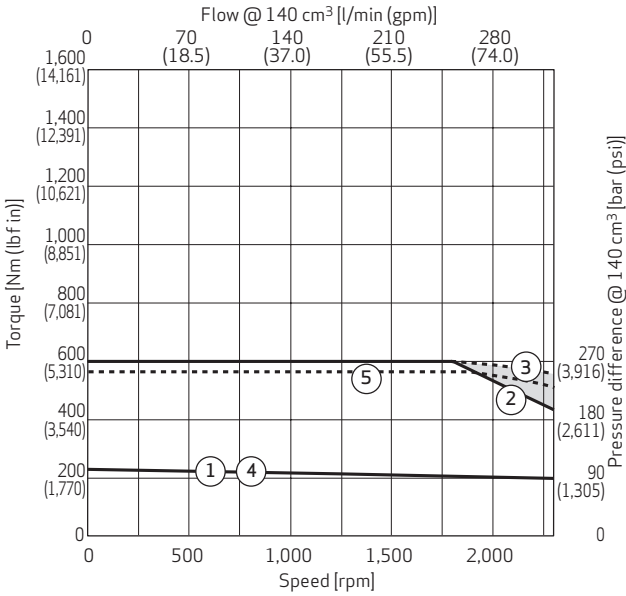
4) Optional via Sp port (flushing port).

# EPU SIZE 140

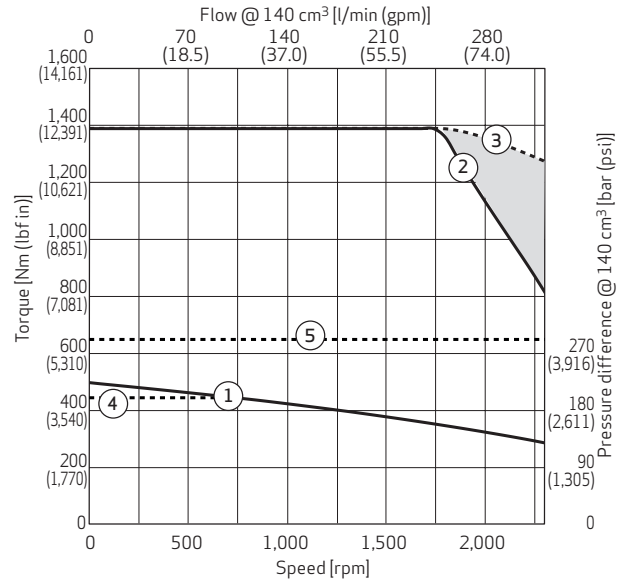
## Liquid Cooling, S EPU 140 A D xx xx W

### Motor Performance Curves

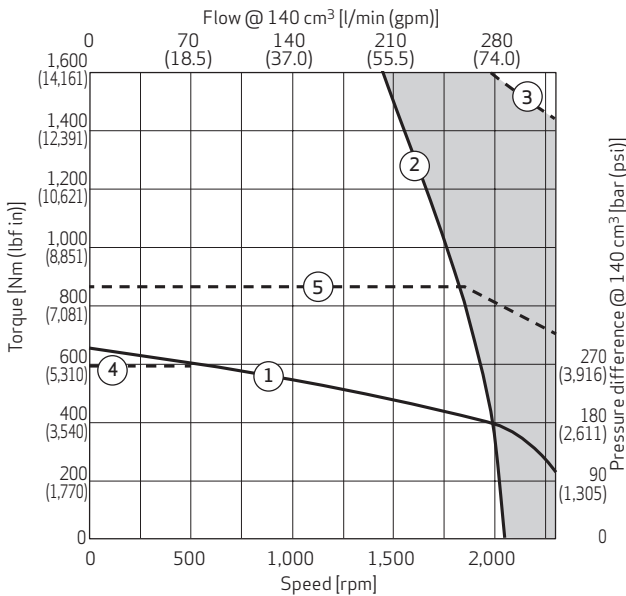
50 W



M0 W



H0 W



- ① Continuous torque at 110 K temperature difference over water, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Pressure difference  $\Delta p = p_A - p_B$

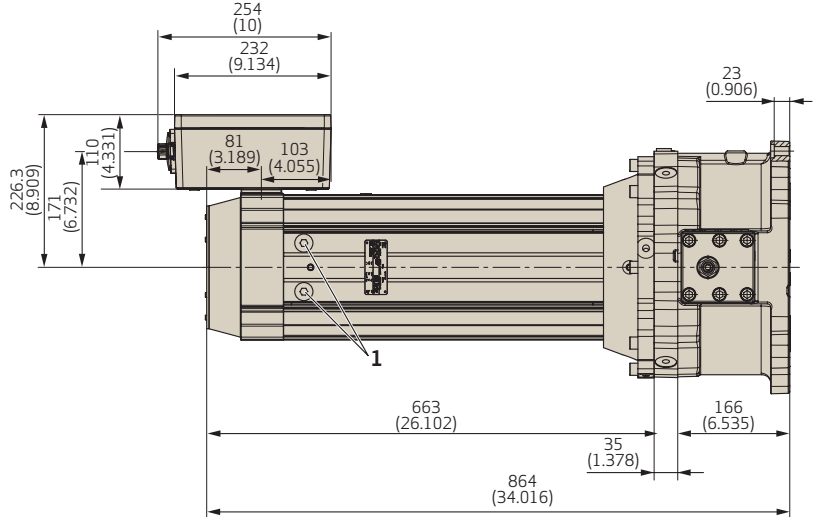
Motor performance determined with respective max. cooling water flow rate, see characteristic table

# EPU SIZE 140

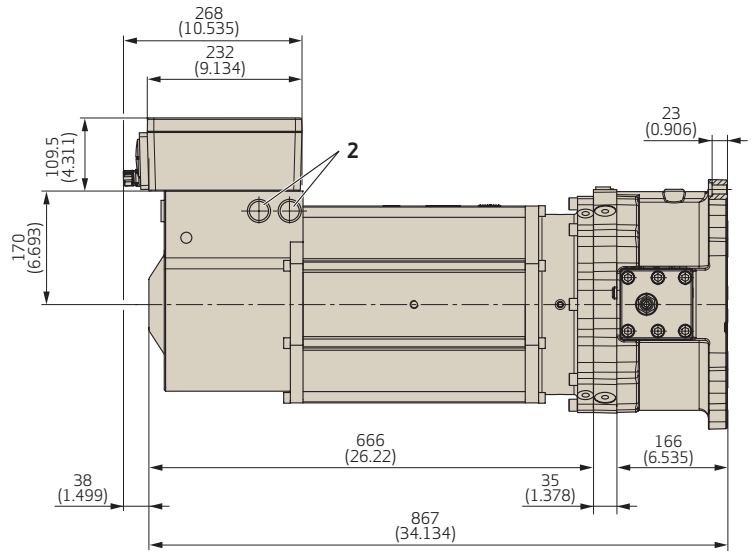
## Liquid Cooling, S EPU 140 A D xx xx W

### Installation Drawings

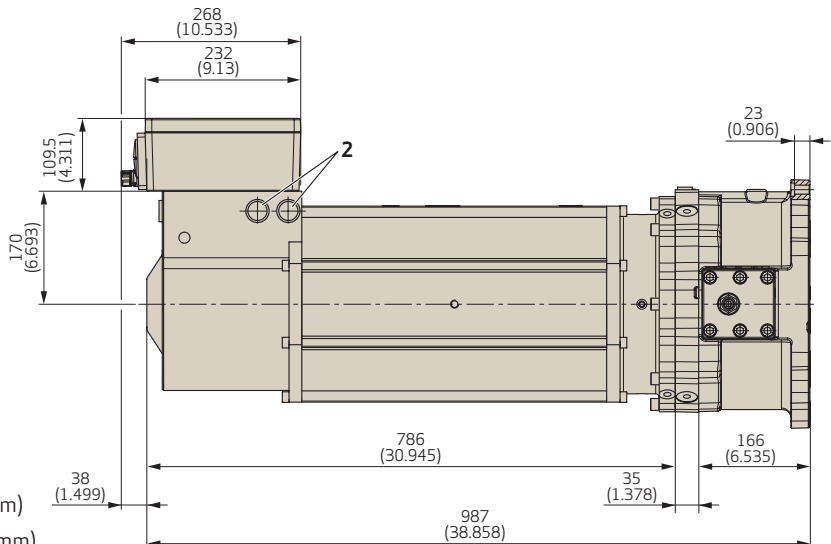
50 W



M0 W



H0 W



Note: Dimensions mm (inch)

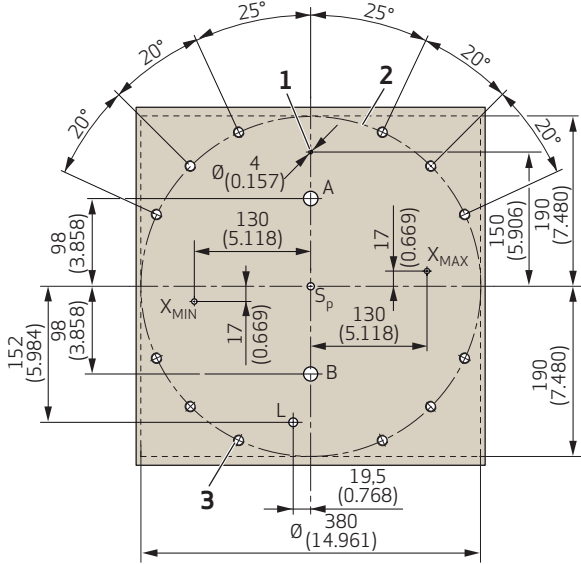
1) Cooler outlet G1/2" (thread depth max. 7 mm)

2) Cooler outlet G3/4" (thread depth max. 16 mm)

# EPU SIZE 140

## Mounting Pattern and Pump Front View

### Mounting Pattern



1. Use a spring-type pin with nominal diameter of 4 mm (0.16 in) (e.g. 4x12) according to ISO 13337

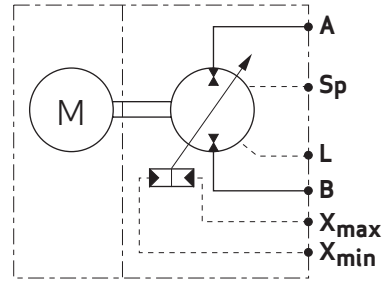
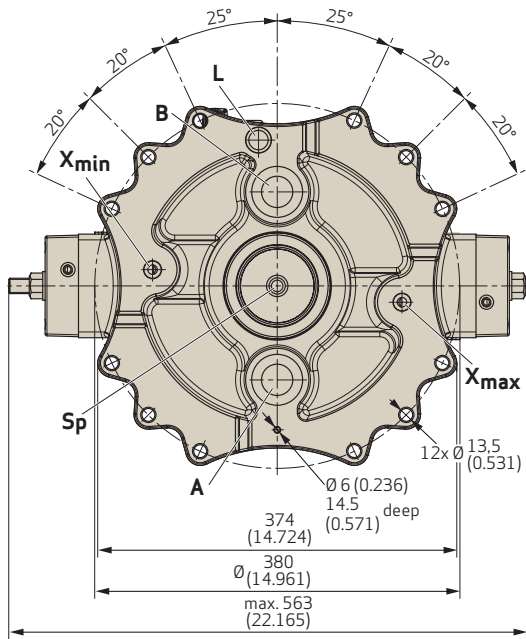
2. Area of  
- surface flatness:  $\square 0.02$

- surface roughness:  $\sqrt{Rz4}$

3. M12, minimum 25 mm (0.9 in) deep.  
Recommended: Use 12 cylinder head screws M12 (property class 12.9, minimum length 45 mm (1.8 in)) according to ISO 4762. Tightening torque 120 + 10 Nm (1,062 lbf in + 89 lbf in).

Note: Dimensions mm (inch)

### Pump Front View



| Port             | Designation  | Pressure [bar (psi)] | Port dimension in counter surface |                     |
|------------------|--|----------------------|-----------------------------------|---------------------|
|                  |  |                      | Minimum Ø [mm (in)]               | Maximum Ø [mm (in)] |
| A, B             | Operating ports  | 350 (5,076)          | 32.5 (1.28)                       | 38 (1.50)           |
| Sp               | Flushing port  | 10 (145)             | 12 (0.47)                         | 25 (0.98)           |
| L                | Leakage port   | 10 (145)             | 19.5 (0.77)                       | 20 (0.79)           |
| X <sub>max</sub> | Control port for maximum displacement (option N1 only) | 350 (5,076)          | 9.5 (0.37)                        | 10 (0.39)           |
| X <sub>min</sub> | Control port for minimum displacement (option N1 only) | 350 (5,076)          | 9.5 (0.37)                        | 10 (0.39)           |



## EPU SIZE 250

## Natural Cooling, S EPU 250 A D xx xx C

## Characteristics Table

| Performance class                                      |                    | Small   |
|--|--------------------|---|
| S EPU 250 A D xx                                       |                    | S0 C  |
| <b>Pump</b>  |                    |   |
| Displacement   | $V_{max}$          | 250 cm <sup>3</sup> /rev (15.25 in <sup>3</sup> /rev)                     |
| Maximum pump speed at 3 bar (abs.)                     | $n_{max}$          | 1,800 rpm   |
| Maximum pump acceleration                              | $\dot{n}_{max}$    | 18,000 rpm/s  |
| Maximum housing pressure <sup>1)</sup>                 | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)  |
| Maximum flow   | $Q_{max}$          | 450 l/min (118.9 gpm)   |
| Maximum pressure ports A and B                         | $p_A, p_B$         | 350 bar (5,076 psi)   |
| Flushing flow rate <sup>4)</sup>                       | $Q_{Sp}$           | 10 to 12 l/min (2.6 to 3.2 gpm)   |
| <b>Motor</b>   |                    |   |
| Continuous stall torque <sup>3)</sup>                  | $M_0$              | 418 Nm (3,700 lbf in)   |
| Rated torque <sup>3)</sup>                             | $M_n$              | 330 Nm (2,921 lbf in)   |
| Maximum torque   | $M_{max}$          | 2,100 Nm (18,587 lbf in)  |
| Rated speed  | $n_n$              | 575 rpm   |
| Maximum speed  | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                            |
| Continuous stall current                               | $I_0$              | 141.11 A <sub>rms</sub>   |
| Maximum current  | $I_{max}$          | 800 A <sub>rms</sub>  |
| Torque constant  | $k_t$              | 2.96 Nm/A <sub>rms</sub> (26.2 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                       | $k_e$              | 197.70 V <sub>rms</sub> /1,000 rpm  |
| Thermal time constant                                  | $t_{th}$           | 8,600 s   |
| Winding resistance at 25 °C                            | $R_{tt}$           | 0.019 Ω   |
| Winding inductance                                     | $L_{tt}$           | 0.548 mH  |
| Power connector  |                    | Cable box B   |
| Feedback connector                                     |                    | Signal resolver connector   |
| Thermal sensor   |                    | NTC 220 kOhm, Pt1000  |
| <b>EPU unit</b>  |                    |   |
| Inertia  | $J$                | 3,540 kg cm <sup>2</sup> (31,332 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | $m$                | 535 kg (1,179.5 lb)   |
| Tightening torque 12x M12x50 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                 |
| <b>Servo drive</b>                                     |                    |   |
| Recommended drive size <sup>2)</sup>                   |                    | G392-170 size 6A  |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

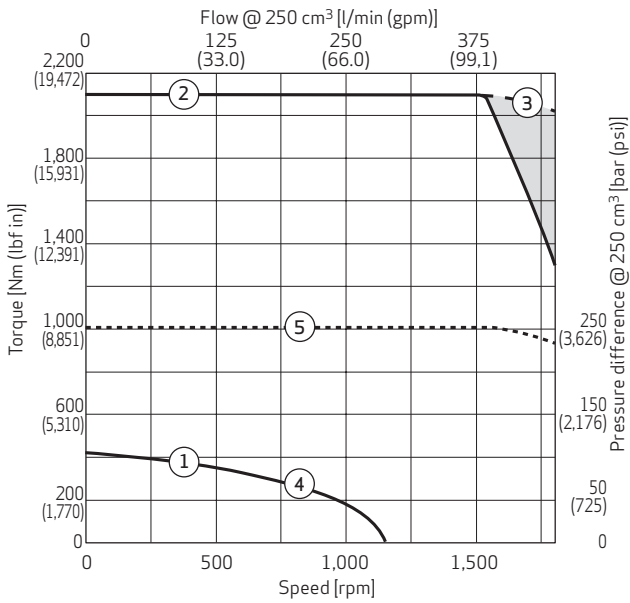
4) Optional via Sp port (flushing port).

## EPU SIZE 250

### Natural Cooling, S EPU 250 A D xx xx C

#### Motor Performance Curves

50 C



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

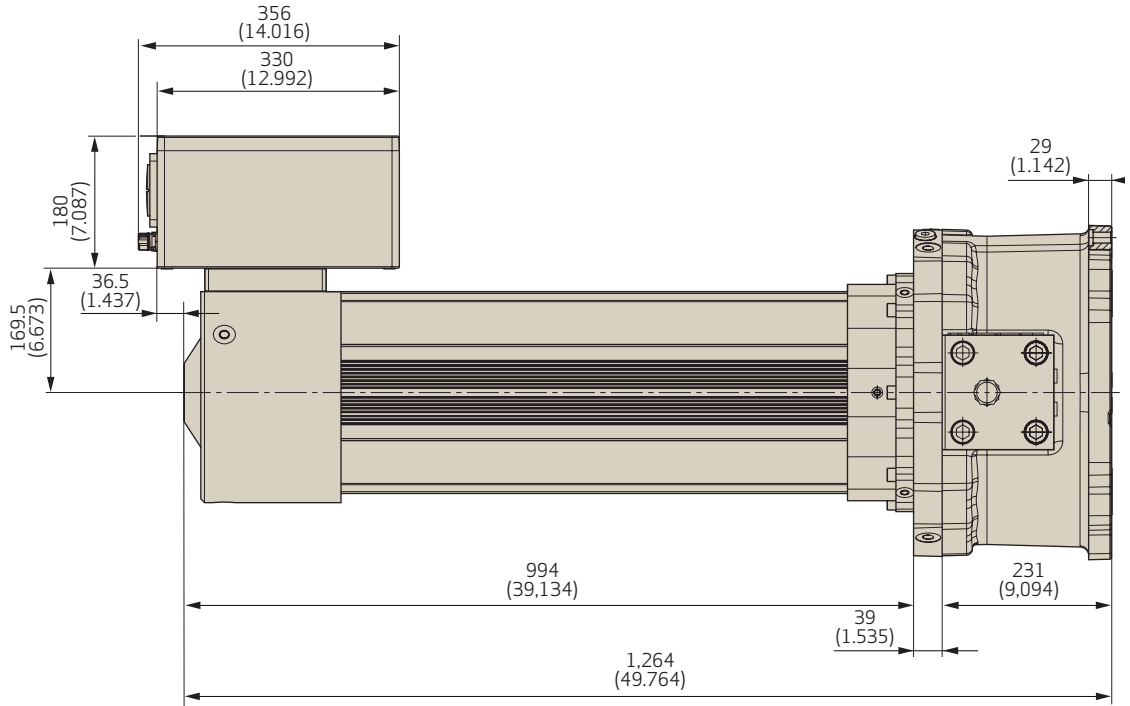
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 250

## Natural Cooling, S EPU 250 A D xx xx C

### Installation Drawings

S0 C



Note: Dimensions mm (inch)

## EPU SIZE 250

### Fan Cooling, S EPU 250 A D xx xx F

#### Characteristics Table

|  |                    |   |
|--|--------------------|---|
| <b>Performance class</b>                               |                    | <b>Medium</b>   |
| <b>S EPU 250 A D xx</b>                                |                    | <b>M0 F</b>   |
| <b>Pump</b>  |                    |   |
| Displacement   | $V_{max}$          | 250 cm <sup>3</sup> /rev (15.25 in <sup>3</sup> /rev)                     |
| Maximum pump speed at 3 bar (abs.)                     | $n_{max}$          | 1,800 rpm   |
| Maximum pump acceleration                              | $\dot{n}_{max}$    | 18,000 rpm/s  |
| Maximum housing pressure <sup>1)</sup>                 | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)  |
| Maximum flow   | $Q_{max}$          | 450 l/min (118.9 gpm)   |
| Maximum pressure ports A and B                         | $p_A, p_B$         | 350 bar (5,076 psi)   |
| Flushing flow rate <sup>4)</sup>                       | $Q_{Sp}$           | 10 to 12 l/min (2.6 to 3.2 gpm)   |
| <b>Motor</b>   |                    |   |
| Continuous stall torque <sup>3)</sup>                  | $M_0$              | 506.6 Nm (4,484 lbf in)   |
| Rated torque <sup>3)</sup>                             | $M_n$              | 435 Nm (3,853 lbf in)   |
| Maximum torque   | $M_{max}$          | 2,100 Nm (18,587 lbf in)  |
| Rated speed  | $n_n$              | 575 rpm   |
| Maximum speed  | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                            |
| Continuous stall current                               | $I_0$              | 170.97 A <sub>rms</sub>   |
| Maximum current  | $I_{max}$          | 800 A <sub>rms</sub>  |
| Torque constant  | $k_t$              | 2.96 Nm/A <sub>rms</sub> (26.2 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                       | $k_e$              | 197.93 V <sub>rms</sub> /1,000 <sub>rpm</sub>                             |
| Thermal time constant                                  | $t_{th}$           | 8,600 s   |
| Winding resistance at 25 °C                            | $R_{tt}$           | 0.018 Ω   |
| Winding inductance                                     | $L_{tt}$           | 0.548 mH  |
| Power connector  |                    | Cable box B   |
| Feedback connector                                     |                    | Signal resolver connector rotatable                                       |
| Thermal sensor   |                    | NTC 220 kOhm, Pt1000  |
| <b>EPU unit</b>  |                    |   |
| Inertia  | $J$                | 3,540 kg cm <sup>2</sup> (31,332 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight   | $m$                | 542 kg (1,194.9 lb)   |
| Tightening torque 12x M12x50 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                 |
| <b>Servo drive</b>                                     |                    |   |
| Recommended drive size <sup>2)</sup>                   |                    | G395-210 size 6A  |

1) See diagram “Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ ” and “Installation note” on page 5.

2) See catalog “Modular Multi-Axis Servo Drive Systems (MSD)”.

3) Operation in still air with ambient temperatures up to +40 °C (+104 °F). Winding temperature measure up to +110 °C (+230 °F) over ambient.

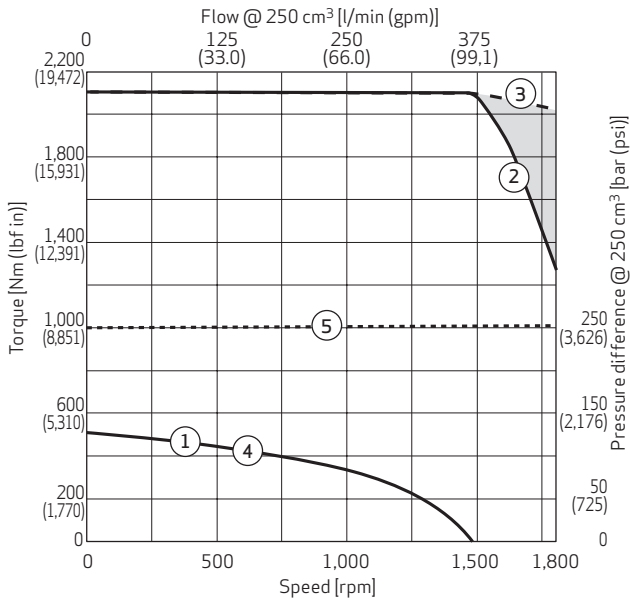
4) Optional via Sp port (flushing port).

# EPU SIZE 250

## Fan Cooling, S EPU 250 A D xx xx F

### Motor Performance Curves

M0 F



- ① Continuous torque at 110 K temperature difference over ambient, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

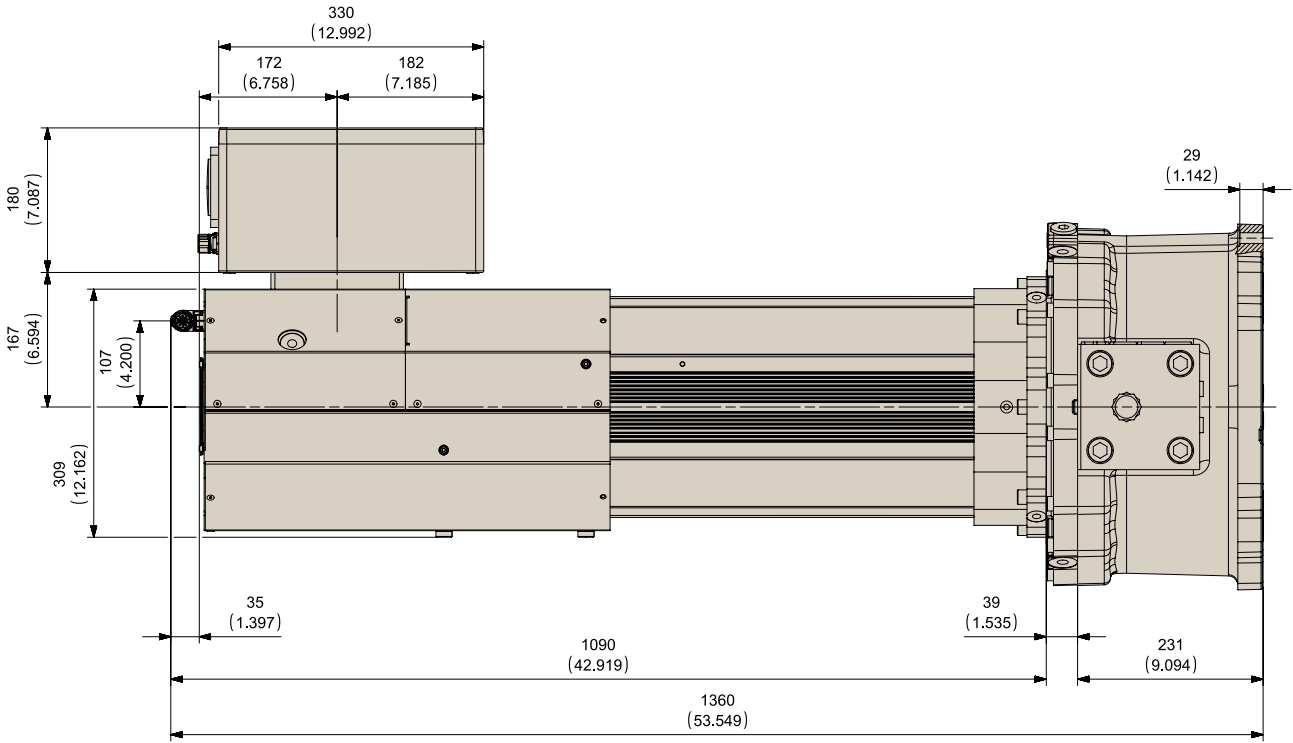
Pressure difference  $\Delta p = p_A - p_B$

# EPU SIZE 250

## Fan Cooling, S EPU 250 A D xx xx F

### Installation Drawings

M0 F



Note: Dimensions mm (inch)

## EPU SIZE 250

## Liquid Cooling, S EPU 250 A D xx xx W

## Characteristics Table

| Performance class                                      |                    | Small  | Medium   | High   |
|--|--------------------|--|--|--|
| S EPU 250 A D xx                                       |                    | SO W   | MO W   | HO W   |
| <b>Pump</b>  |                    |  |  |  |
| Displacement   | $V_{max}$          | 250 cm <sup>3</sup> /rev (15.26 in <sup>3</sup> /rev)                        |  |  |
| Maximum pump speed at 3 bar (abs.)                     | $n_{max}$          | 1,800 rpm  |  |  |
| Maximum pump acceleration                              | $\dot{n}_{max}$    | 18,000 rpm/s   |  |  |
| Maximum housing pressure <sup>1)</sup>                 | $p_{Lmax}, p_{Sp}$ | 10 bar (145 psi)   |  |  |
| Maximum flow   | $Q_{max}$          | 450 l/min (118.9 gpm)  |  |  |
| Maximum pressure ports A and B                         | $p_A, p_B$         | 350 bar (5,076 psi)  |  |  |
| Flushing flow rate <sup>4)</sup>                       | $Q_{Sp}$           | 10 to 12 l/min (2.6 to 3.2 gpm)  |  |  |
| <b>Motor</b>   |                    |  |  |  |
| Continuous stall torque <sup>3)</sup>                  | $M_0$              | 498 Nm (4,408 lbf in)  | 654 Nm (5,788 lbf in)  | 967 Nm (8,559 lbf in)  |
| Rated torque <sup>3)</sup>                             | $M_n$              | 347 Nm (3,071 lbf in)  | 427 Nm (3,779 lbf in)  | 605 Nm (5,355 lbf in)  |
| Maximum torque   | $M_{max}$          | 1,387 Nm (12,276 lbf in)   | 1,950 Nm (17,259 lbf in)   | 1,969 Nm (17,427 lbf in)   |
| Rated speed  | $n_n$              | 1,800 rpm  | 1,800 rpm  | 1,700 rpm  |
| Maximum speed  | $n_{max}$          | Maximum speed see $M = f(n)$ performance curve                               |  |  |
| Continuous stall current                               | $I_0$              | 235.21 A <sub>rms</sub>  | 230.9 A <sub>rms</sub>   | 340.35 A <sub>rms</sub>  |
| Maximum current  | $I_{max}$          | 750 A <sub>rms</sub>   | 795 A <sub>rms</sub>   | 750 A <sub>rms</sub>   |
| Torque constant  | $k_t$              | 2.12 Nm/A <sub>rms</sub><br>(18.9 lbf in/A <sub>rms</sub> )                  | 2.83 Nm/A <sub>rms</sub><br>(25.0 lbf in/A <sub>rms</sub> )                  | 2.84 Nm/A <sub>rms</sub><br>(25.1 lbf in/A <sub>rms</sub> )                  |
| Voltage constant                                       | $k_e$              | 145.87 V <sub>rms</sub> /1,000 rpm   | 195.48 V <sub>rms</sub> /1,000 rpm   | 195.48 V <sub>rms</sub> /1,000 rpm   |
| Thermal time constant                                  | $t_{th}$           | 1,680 s  | 1,970 s  | 2,500 s  |
| Winding resistance at 25 °C                            | $R_{tt}$           | 0.024 Ω  | 0.03 Ω   | 0.018 Ω  |
| Winding inductance                                     | $L_{tt}$           | 0.608 mH   | 0.804 mH   | 0.572 mH   |
| Power connector  |                    | Cable box A  |  | Cable box B  |
| Feedback connector                                     |                    | Signal resolver connector  |  |  |
| Thermal sensor   |                    | NTC 220 kOhm, Pt1000   |  |  |
| Cooling water flow rate                                | $Q_W$              | 8 l/min (2.1 gpm)  |  |  |
| <b>EPU unit</b>  |                    |  |  |  |
| Inertia (pump and motor)                               | $J$                | 2,576 kg cm <sup>2</sup><br>(22,800 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 2,897 kg cm <sup>2</sup><br>(25,641 10 <sup>-4</sup> lbf in s <sup>2</sup> ) | 3,540 kg cm <sup>2</sup><br>(31,332 10 <sup>-4</sup> lbf in s <sup>2</sup> ) |
| Weight (pump and motor)                                | $m$                | 443 kg (976.6 lb)  | 480 kg (1,058.21 lb)   | 555 kg (1,223.5 lb)  |
| Tightening torque 12x M12x50 -12.9 cylinder head screw |                    | 120 Nm + 10 Nm (1,062 lbf in + 89 lbf in)                                    |  |  |
| <b>Servo drive</b>                                     |                    |  |  |  |
| Recommended drive size <sup>2)</sup>                   |                    | G395-210 size 6A   |  | G395-450 size 7  |

1) See diagram "Maximum housing pressure  $p_{Lmax}, p_{Sp} = f(n)$ " and "Installation note" on page 5.

2) See catalog "Modular Multi-Axis Servo Drive Systems (MSD)".

3) Operation in still air with water temperatures from +25 °C(+77 °F) up to +40 °C(+104 °F). Winding temperature measure up to +110 °C(+230 °F) over water.

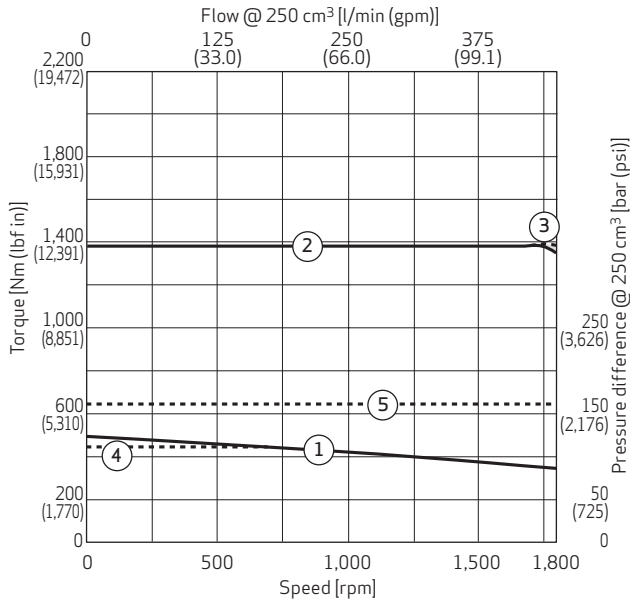
4) Optional via Sp port (flushing port).

# EPU SIZE 250

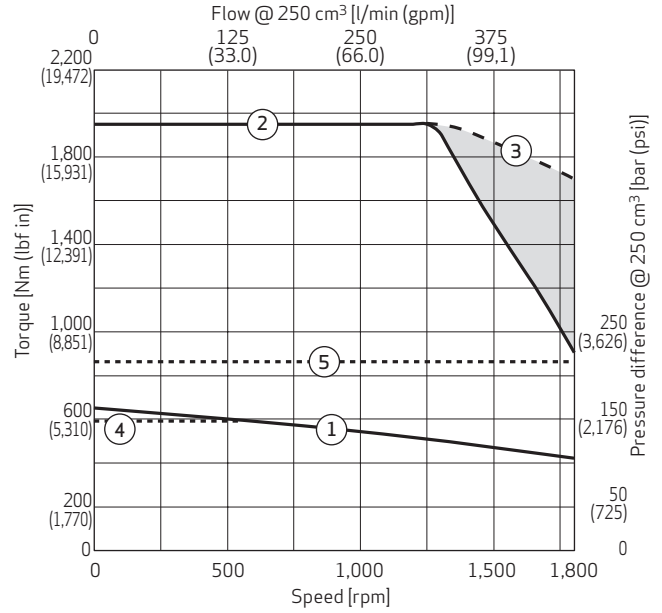
## Liquid Cooling, S EPU 250 A D xx xx W

### Motor Performance Curves

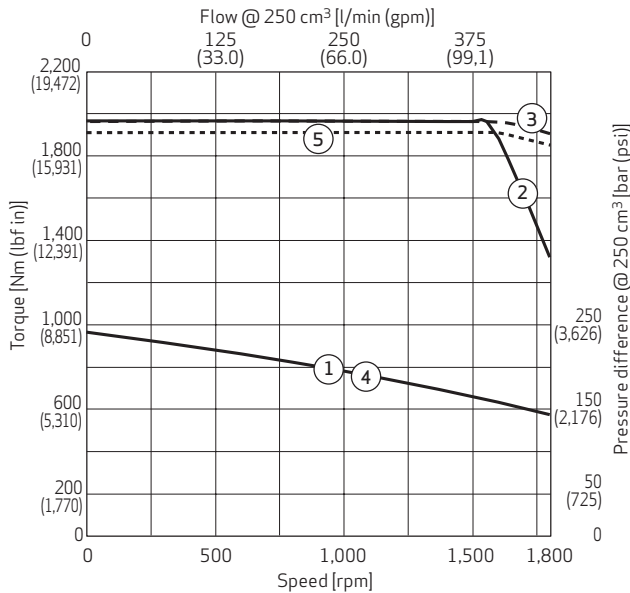
50 W



M0 W



H0 W



- ① Continuous torque at 110 K temperature difference over water, max. winding temperature 150 °C (302 °F)
- ② Maximum torque without field weakening
- ③ Maximum torque with field weakening
- ④ Continuous torque if recommended drive size is used
- ⑤ Maximum torque with field weakening if recommended drive size is used

Notes:

Motor performance with 565 V<sub>DC</sub> link voltage

Motor performance doesn't take the pump efficiency into account

Pressure difference  $\Delta p = p_A - p_B$

Motor performance determined with respective max. cooling water flow rate, see characteristic table

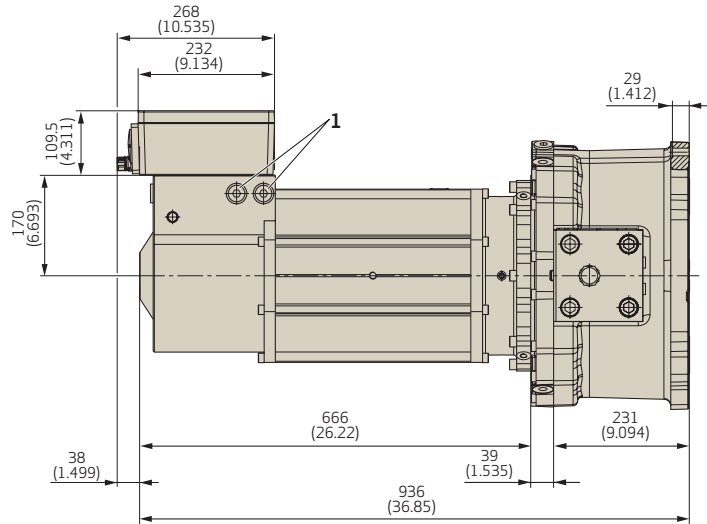


# EPU SIZE 250

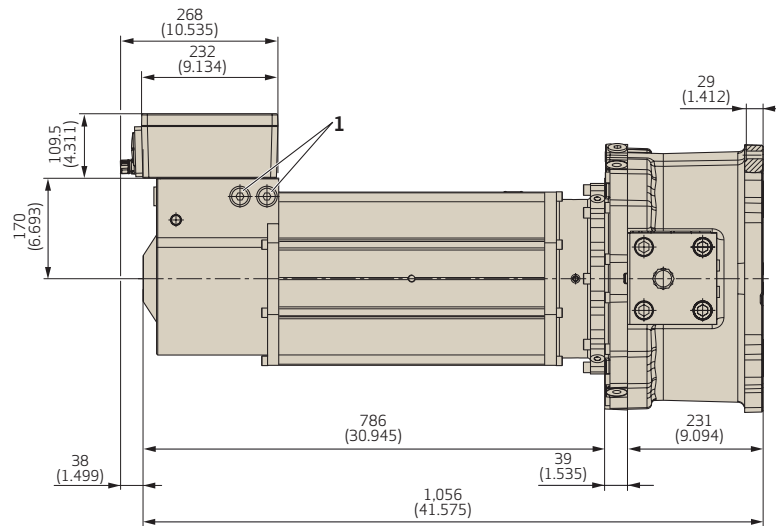
## Liquid Cooling, S EPU 250 A D xx xx W

### Installation Drawings

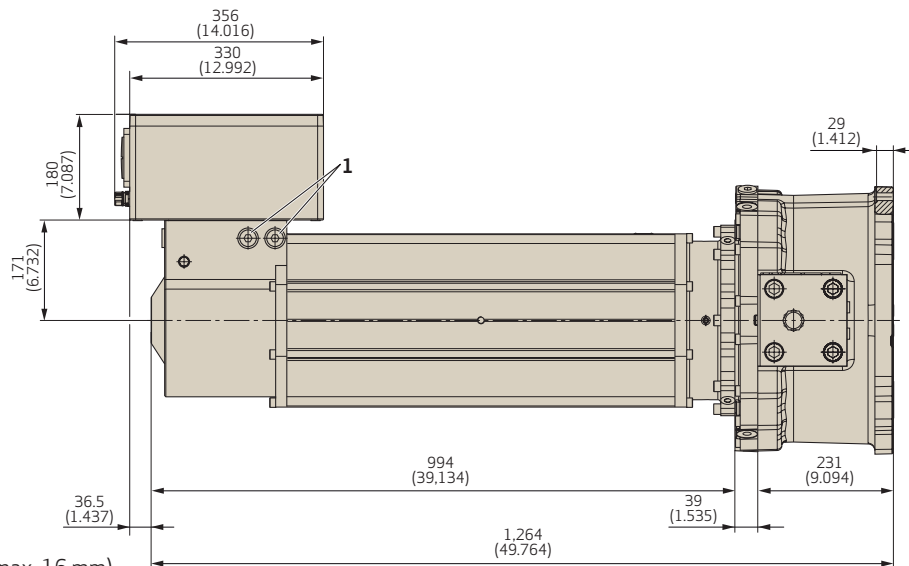
50 W



M0 W



H0 W



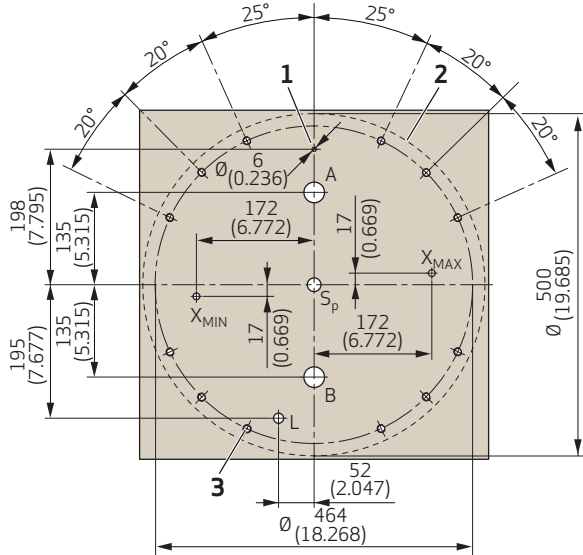
Note: Dimensions mm (inch)

1) Cooler outlet G3/4" (thread depth max. 16 mm)

# EPU SIZE 250

## Mounting Pattern and Pump Front View

### Mounting Pattern



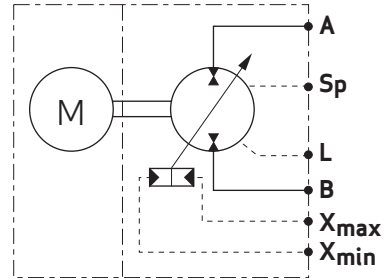
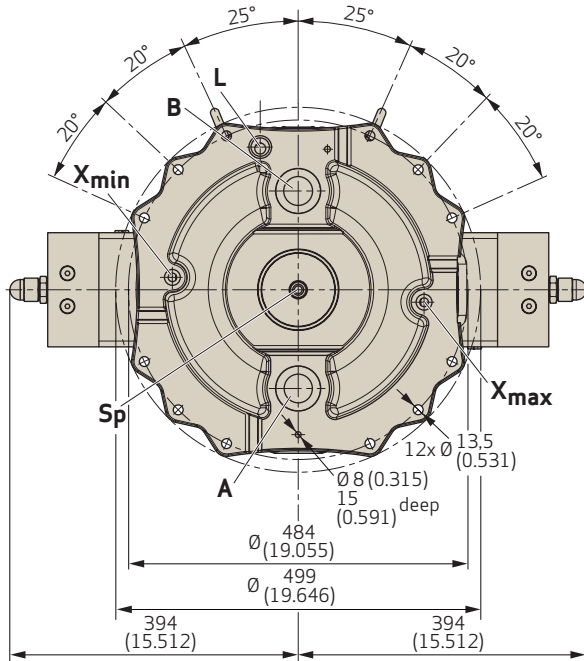
1. Use a spring-type pin with nominal diameter of 6 mm (0.236 in) (e.g. 4x12) according to ISO 13337

2. Area of  
 - surface flatness:  $\square 0.02$   
 - surface roughness:  $\sqrt{Rz4}$

3. M12, minimum 25 mm (0.9 in) deep.  
 Recommended: Use 12 cylinder head screws M12 (property class 12.9, minimum length 50 mm (1.8 in)) according to ISO 4762. Tightening torque 120 + 10 Nm (1,062 lbf in + 89 lbf in).

Note: Dimensions mm (inch)

### Pump Front View

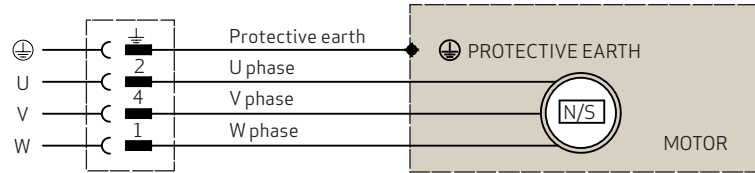
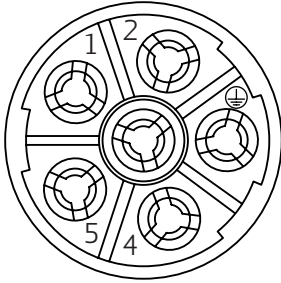


| Port             | Designation  | Pressure [bar (psi)] | Port dimension in counter surface |                     |
|------------------|--|----------------------|-----------------------------------|---------------------|
|                  |  |                      | Minimum Ø [mm (in)]               | Maximum Ø [mm (in)] |
| A, B             | Operating ports  | 350 (5,076)          | 39 (1.53)                         | 45 (1.77)           |
| Sp               | Flushing port  | 10 (145)             | 10 (0.39)                         | 25 (0.98)           |
| L                | Leakage port   | 10 (145)             | 24 (0.94)                         | 25 (0.98)           |
| X <sub>max</sub> | Control port for maximum displacement (option N1 only) | 350 (5,076)          | 12 (0.47)                         | 13 (0.51)           |
| X <sub>min</sub> | Control port for minimum displacement (option N1 only) | 350 (5,076)          | 12 (0.47)                         | 13 (0.51)           |

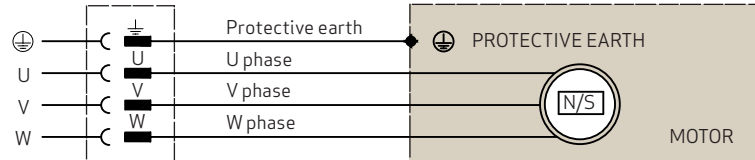
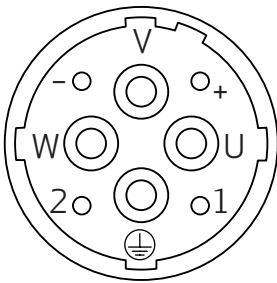
# ELECTRICAL INTERFACES

## Power Connectors

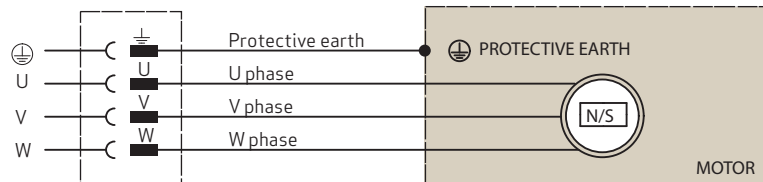
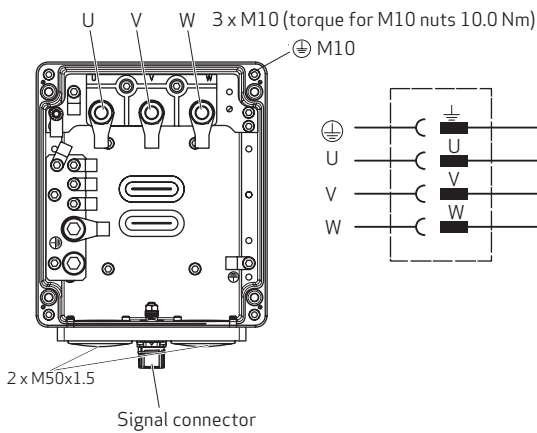
### Size 1



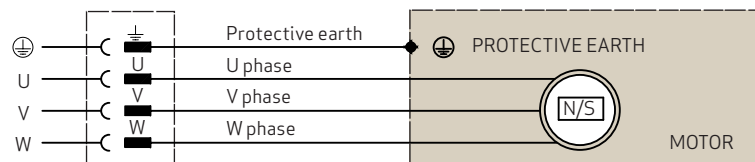
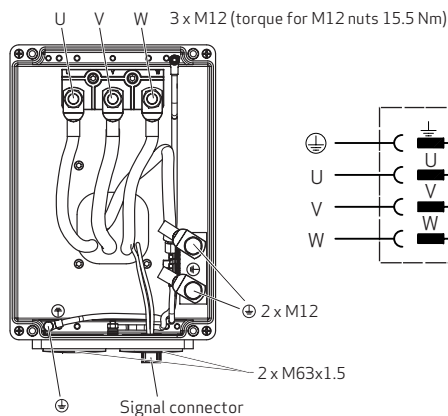
### Size 1.5



### Cable box A



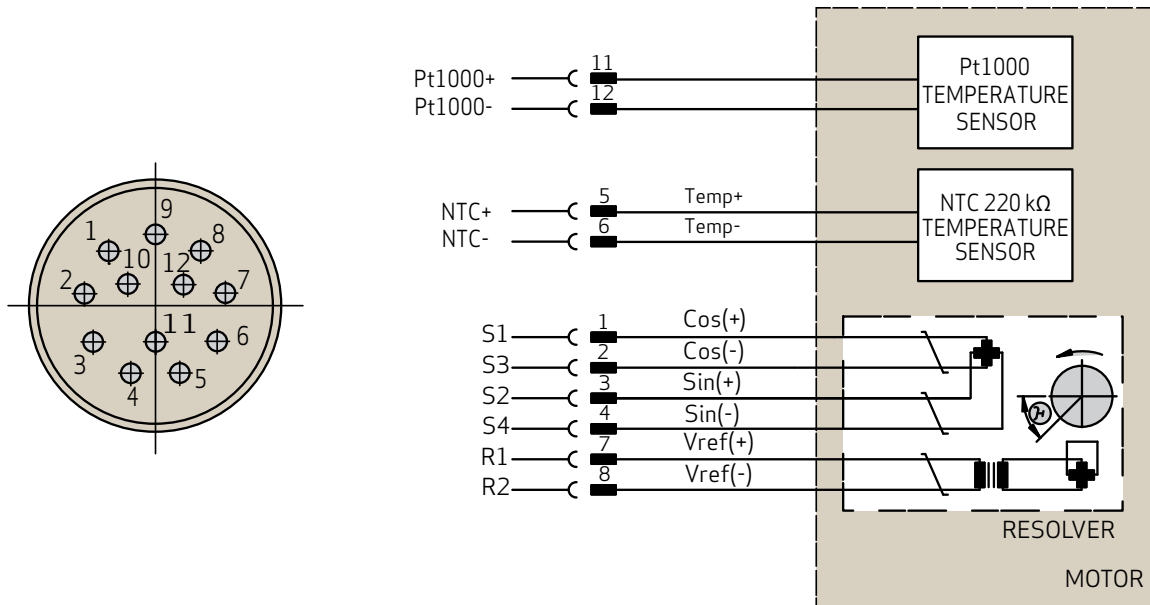
### Cable box B



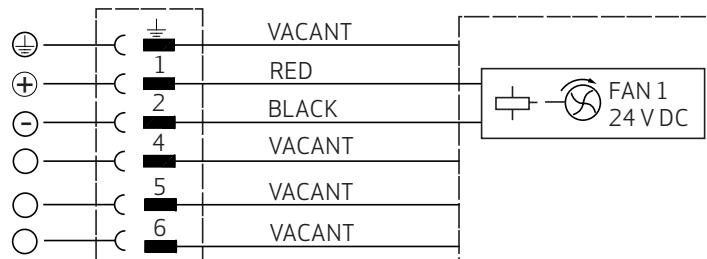
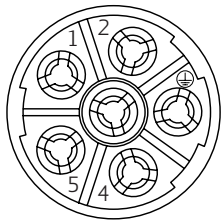
For more information on connectors, please see Moog Maximum Dynamic Brushless Servo Motor User Manual.

## ELECTRICAL INTERFACES

### Signal Resolver Connector



### Fan Connector



## Calculations

$$M = \frac{V \cdot \Delta p}{2\pi \cdot 10}$$

M [Nm] = Torque  
 V [cm<sup>3</sup>] = Displacement  
 Δp [bar] = Pressure difference  
 P<sub>A</sub> - P<sub>B</sub>

$$n = \frac{Q \cdot 1,000}{V}$$

n [rpm] = Speed  
 Q [l/min] = Flow

## ELECTRICAL INTERFACES

### Motor Power Cables



| Ordering number                        | CB05708-001-yyy <sup>1)2)</sup>                 |                   | CA44958-001-yyy <sup>1)2)</sup>                 |                   | CB00076-001-yyy <sup>1)2)</sup>                  |                   | CA98676-001-yyy <sup>1)2)</sup>                  |                |
|--|---|-------------------|---|-------------------|--|-------------------|--|----------------|
| Continuous rated current <sup>3)</sup> | 25 A  |                   | 44 A  |                   | 61 A   |                   | 82 A   |                |
| Cable cross-section                    | 4 x 4 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup> |                   | 4 x 6 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup> |                   | 4 x 10 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup> |                   | 4 x 16 mm <sup>2</sup> + 2 x 1.5 mm <sup>2</sup> |                |
| Temperature range <sup>3)</sup>        | -50 to +80 °C<br>(-58 to 194 °F)                |                   | -50 to +80 °C<br>(-58 to 194 °F)                |                   | -50 to +80 °C<br>(-58 to 194 °F)                 |                   | -50 to +80 °C<br>(-58 to 194 °F)                 |                |
| Wiring                                 | Connector pin                                   | Wiring            | Connector pin                                   | Wiring            | Connector pin                                    | Wiring            | Connector pin                                    | Wiring         |
|  | 2   | U                 | U   | U                 | U  | U                 | U  | U              |
|  | 4   | VV                | V   | VV                | V  | VV                | V  | VV             |
|  | 1   | WWW               | W   | WWW               | W  | WWW               | W  | WWW            |
|  | PE  | Yellow / green    | PE  | Yellow / green    | PE   | Yellow / green    | PE   | Yellow / green |
|  | 5   | N. c. / white     | +   | N. c. / white     | +  | N. c. / white     | +  | N. c. / white  |
|  | 6   | N. c. / black     | -   | N. c. / black     | -  | N. c. / black     | -  | N. c. / black  |
| Connector housing                      | Screen  | Connector housing | Screen  | Connector housing | Screen   | Connector housing | Screen   |                |
| Connector type                         | Size 1  |                   | Size 1.5  |                   |  |                   |  |                |

| Ordering number<br>connector only | C08365-002 | CA37698-001 |
|-----------------------------------|------------|-------------|
|-----------------------------------|------------|-------------|

- 1) 001 for standard configuration option, others upon request.
- 2) yyy stands for length in meters  
Standard length: 1 m, 5 m, 10 m, 15 m, 20 m, 50 m  
Further lengths upon request
- 3) Installation type: fixed. Maximum current carrying capacity at 30 °C (following DIN VDE 0298-4). The final maximum current carrying capacity depends, among other things, on the ambient conditions, the type of installation and the number of loaded cores.

# ELECTRICAL INTERFACES

## Motor Power Cables

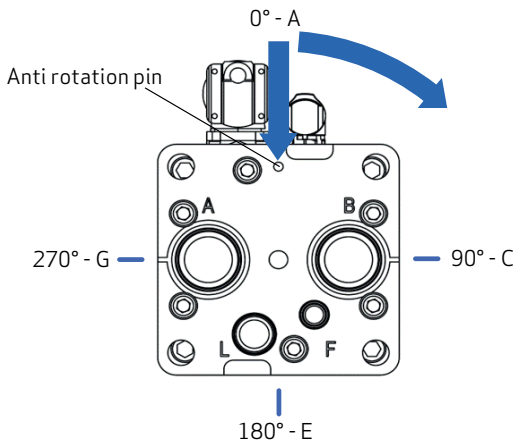


|                              |   |                                      |
|------------------------------|---|--------------------------------------|
| <b>Ordering number</b>       | <b>C08335-013-yyy <sup>1)</sup></b>                                   | <b>CC75041-002-yyy <sup>1)</sup></b> |
| Motor feedback system        | Resolver, NTC temperature sensor                                      | Resolver, Pt1000 temperature sensor  |
| Cable-end assignment         | Sub-D 9pol  | Open end                             |
| Configuration                |   |                                      |
| Capable for energy chains    | Yes   |                                      |
| Minimum bend radius          | 90 mm   |                                      |
| Temperature range            | -40 to +85 °C   |                                      |
| Cable diameter approximately | 8.8 mm  |                                      |
| Material of outer sheath     | Polyurethane  |                                      |
| Resistance                   | Resistant to oil, hydrolysis and microbic attack (VDE0472)            |                                      |
| Approvals                    | UL-Style 20233,+80 °C -300 V<br>CSA-C22.2N.210-M90, +75 °C -300 V FT1 |                                      |

|                                       |                    |
|---------------------------------------|--------------------|
| <b>Ordering number connector only</b> | <b>CA46373-001</b> |
|---------------------------------------|--------------------|

1) yyy stands for length in meters.  
Standard length: 1 m, 5 m, 10 m, 15 m, 20 m, 50 m.  
Further lengths upon request.

# ORIENTATION OF ELECTRICAL CONNECTORS AND LIQUID COOLING PORTS EPU-G Sizes 13 and 20



Note:

- Angle starts on anti-rotation pin
- Natural and fan cooled options use Z in model number pos. 12
- Angle between electrical and liquid cooling ports is fixed at -90°

## Available Connector Orientations

### Convection Cooling

|   |     |     |   |   |    |    |   |    |   |   | A | Z | C | Z | E | Z | G | Z |     |  |
|---|-----|-----|---|---|----|----|---|----|---|---|---|---|---|---|---|---|---|---|-----|--|
| x | EPU | 005 | x | x | GP | x0 | C | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |
| x | EPU | 008 | x | x | GP | x0 | C | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |
| x | EPU | 013 | x | x | GP | x0 | C | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |
| x | EPU | 020 | x | x | GP | x0 | C | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |

### Fan Cooling

|   |     |     |   |   |    |    |   |    |   |   | A | Z | C | Z | E | Z | G | Z |     |  |
|---|-----|-----|---|---|----|----|---|----|---|---|---|---|---|---|---|---|---|---|-----|--|
| x | EPU | 005 | x | x | GP | x0 | F | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |
| x | EPU | 008 | x | x | GP | x0 | F | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |
| x | EPU | 013 | x | x | GP | x0 | F | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |
| x | EPU | 020 | x | x | GP | x0 | F | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □ | ... |  |

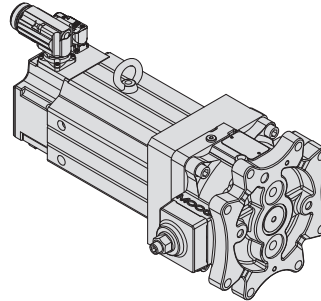
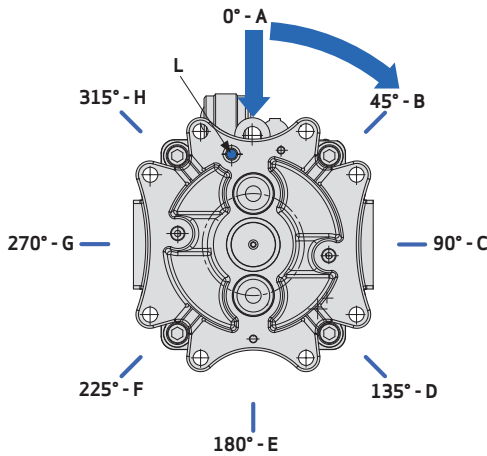
### Water Cooling

|   |     |     |   |   |    |    |   |    |   |   | A | G | C | A | E | C | G | E   |     |  |
|---|-----|-----|---|---|----|----|---|----|---|---|---|---|---|---|---|---|---|-----|-----|--|
| x | EPU | 005 | A | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □   | ... |  |
| x | EPU | 008 | A | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □   | ... |  |
| x | EPU | 013 | A | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □   | ... |  |
| x | EPU | 020 | A | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ | □ | □ | □   | ... |  |
| x | EPU | 005 | F | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ |   |   | ... |     |  |
| x | EPU | 008 | F | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ |   |   | ... |     |  |
| x | EPU | 013 | F | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ |   |   | ... |     |  |
| x | EPU | 020 | F | x | GP | x0 | W | xx | ■ | ■ | □ | □ | □ | □ | □ |   |   | ... |     |  |

- Standard option
- Available option

# ORIENTATION OF ELECTRICAL CONNECTORS AND LIQUID COOLING PORTS

## EPU Sizes 19 to 250



Note: • Angle starts on port L  
 • Natural and fan cooled options use Z in model number pos. 12  
 • Angle between electrical and liquid cooling ports is fixed at -90°

Example shows:  
 Connector orientation = A,  
 Cooling connection = G

### Available Connector Orientations

#### Natural Cooling

|   |     |     |   |   |    |    |   |   |   |   |   | A | Z | B | Z | C | Z | D | Z | E | Z | F | Z | G | Z | H | Z   |     |     |
|---|-----|-----|---|---|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|-----|-----|
| x | EPU | 019 | x | x | xx | S0 | C | x | x | ■ | ■ |   |   |   |   |   |   | □ | □ |   |   |   |   |   |   |   | ... |     |     |
| x | EPU | 019 | x | x | xx | M0 | C | x | x |   |   |   | □ | □ |   |   |   |   |   |   | □ | □ |   |   |   |   | ■   | ■   | ... |
| x | EPU | 019 | x | x | xx | H0 | C | x | x |   |   |   | □ | □ |   |   |   |   |   |   | □ | □ |   |   |   |   | ■   | ■   | ... |
| x | EPU | 032 | x | x | xx | xx | C | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |     | ... |     |
| x | EPU | 080 | x | x | xx | xx | C | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |     | ... |     |
| x | EPU | 140 | x | x | xx | xx | C | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |     | ... |     |
| x | EPU | 250 | x | x | xx | xx | C | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |     | ... |     |

#### Fan Cooling

|   |     |     |   |   |    |    |   |   |   |   |   | A | Z | B | Z | C | Z | D | Z | E | Z | F | Z | G | Z | H | Z |     |
|---|-----|-----|---|---|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-----|
| x | EPU | 019 | x | x | xx | S0 | F | x | x | ■ | ■ |   |   |   |   |   |   | □ | □ |   |   |   |   |   |   |   |   | ... |
| x | EPU | 019 | x | x | xx | M0 | F | x | x | ■ | ■ |   |   |   |   |   |   | □ | □ |   |   |   |   |   |   |   |   | ... |
| x | EPU | 019 | x | x | xx | H0 | F | x | x |   |   |   | □ | □ |   |   |   |   |   |   | □ | □ |   |   |   | ■ | ■ | ... |
| x | EPU | 032 | x | x | xx | xx | F | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |   | ... |
| x | EPU | 080 | x | x | xx | xx | F | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |   | ... |
| x | EPU | 140 | x | x | xx | xx | F | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |   | ... |
| x | EPU | 250 | x | x | xx | xx | F | x | x | ■ | ■ |   |   | □ | □ |   |   |   |   |   |   |   |   | □ | □ |   |   | ... |

#### Liquid Cooling

|   |     |     |   |   |    |    |   |   |   |   |   | A | G | C | A | E | C | G | E   |  |
|---|-----|-----|---|---|----|----|---|---|---|---|---|---|---|---|---|---|---|---|-----|--|
| x | EPU | 019 | x | x | xx | xx | W | x | x | ■ | ■ |   |   |   | □ | □ |   |   | ... |  |
| x | EPU | 032 | x | x | xx | xx | W | x | x | ■ | ■ |   |   |   | □ | □ |   |   | ... |  |
| x | EPU | 080 | x | x | xx | xx | W | x | x | ■ | ■ | □ | □ | □ | □ | □ | □ |   | ... |  |
| x | EPU | 140 | x | x | xx | xx | W | x | x | ■ | ■ | □ | □ | □ | □ | □ | □ |   | ... |  |
| x | EPU | 250 | x | x | xx | xx | W | x | x | ■ | ■ | □ | □ | □ | □ | □ | □ |   | ... |  |

- Standard option
- Available option



# ORDERING CODE

## Sizes 13 and 20 with Internal Gear Pump

### Model Type Designation

|   |   |     |   |   |   |    |   |   |   |    |    |    |    |
|---|---|-----|---|---|---|----|---|---|---|----|----|----|----|
| <b>Model Number (assigned at the factory)</b> | 1 | 2   | 3 | 4 | 5 | 6  | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|   | S | EPU |   |   | D | GP |   |   | S |    |    |    | 1  |

|                           |          |
|---------------------------|----------|
| <b>1 Product division</b> |          |
| S                         | Standard |

|                       |  |
|-----------------------|--|
| <b>2 Product type</b> |  |
| EPU                   | Electrohydrostatic Pump Unit with internal gear pump |

|                                    |  |
|------------------------------------|--|
| <b>3 Nominal displacement pump</b> |  |
| 013                                | 13 cm <sup>3</sup> (0.79 in <sup>3</sup> ) |
| 020                                | 20 cm <sup>3</sup> (1.22 in <sup>3</sup> ) |

|                           |             |
|---------------------------|-------------|
| <b>4 Mounting options</b> |             |
| A                         | Axial       |
| F                         | Footbracket |

|                |                  |
|----------------|------------------|
| <b>5 Fluid</b> |                  |
| D              | Mineral oil. HFD |

|                       |                    |
|-----------------------|--------------------|
| <b>6 Pump options</b> |                    |
| GP                    | Internal gear pump |

|                            |                          |
|----------------------------|--------------------------|
| <b>7 Performance class</b> |                          |
| S0                         | Small performance class  |
| M0                         | Medium performance class |
| H0                         | High performance class   |

|                           |                  |
|---------------------------|------------------|
| <b>13 Feedback option</b> |                  |
| 1                         | 2-poles resolver |

|   |                   |
|---|-------------------|
| <b>12 Cooling connection (liquid cooling)</b> |                   |
| A   | 0°                |
| C   | 90°               |
| E   | 180°              |
| G   | 270°              |
| Z   | Not liquid cooled |

|                                 |      |
|---------------------------------|------|
| <b>11 Connector orientation</b> |      |
| A                               | 0°   |
| C                               | 90°  |
| E                               | 180° |
| G                               | 270° |

|                                 |                 |
|---------------------------------|-----------------|
| <b>10 Electrical connection</b> |                 |
| 3                               | Angle rotatable |
| 4                               | Cable box       |

|                             |         |
|-----------------------------|---------|
| <b>9 Motor construction</b> |         |
| S                           | Sealing |

|                  |                 |
|------------------|-----------------|
| <b>8 Cooling</b> |                 |
| C                | Natural cooling |
| F                | Fan cooling     |
| W                | Liquid cooling  |

The Electrohydrostatic Pump Unit is delivered with seal kit to the manifold.

# ORDERING CODE

## Sizes 19 to 250 with Radial Piston Pump

### Model Type Designation

**Number (assigned at the factory)**

|   |     |   |   |   |   |   |   |   |    |    |    |    |    |    |
|---|-----|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1 | 2   | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| S | EPU |   |   | D |   |   |   | S |    |    |    | 1  | -  | /  |

|  |     |   |
|--|-----|---|
| <b>1 Product division</b>                      | S   | Standard  |
| <b>2 Product type</b>                          | EPU | Electrohydrostatic Pump Unit  |
| <b>3 Nominal displacement pump</b>             | 019 | 19 cm <sup>3</sup> (1.16 in <sup>3</sup> )                                  |
|  | 032 | 32 cm <sup>3</sup> (1.95 in <sup>3</sup> )                                  |
|  | 080 | 80 cm <sup>3</sup> (4.88 in <sup>3</sup> )                                  |
|  | 140 | 140 cm <sup>3</sup> (8.54 in <sup>3</sup> )                                 |
|  | 250 | 250 cm <sup>3</sup> (15.26 in <sup>3</sup> )                                |
| <b>4 Pump ports</b>                            | A   | 2 operating ports (for half-open system)                                    |
|  | P   | 2 operating ports (for self-contained system)                               |
| <b>5 Fluid</b>                                 | D   | Mineral oil. HFD  |
| <b>6 Controllers</b>                           | B1  | Mechanical stroke adjustment (V = constant)                                 |
|  | N1  | Dual displacement   |
| <b>7 Performance class</b>                     | S0  | Small performance class   |
|  | M0  | Medium performance class  |
|  | H0  | High performance class  |
| <b>8 Cooling</b>                               | C   | Natural cooling   |
|  | F   | Fan cooling   |
|  | W   | Liquid cooling  |
| <b>9 Motor construction</b>                    | S   | Sealing   |
| <b>10 Electrical connection</b>                | 3   | Angle rotatable   |
|  | 4   | Cable box   |
| <b>11 Connector Orientation</b>                |     | See chapter "Orientation of Electrical Connectors and Liquid Cooling Ports" |
| <b>12 Cooling connection (liquid cooling)</b>  | Z   | Not liquid cooled   |
| <b>13 Feedback option</b>                      | 1   | 2-poles resolver  |
| <b>14 Maximum displacement V<sub>max</sub></b> | XXX | V <sub>max</sub> (see table below)  |
| <b>15 Minimum displacement V<sub>min</sub></b> | YYY | V <sub>min</sub> (see table below)  |
|  | 000 | Controller B1 (V = constant)  |

The Electrohydrostatic Pump Unit is delivered with seal kit to the manifold

### V<sub>max</sub> and V<sub>min</sub> Options for Ordering Code (Positions 14, 15)

| Nominal displacement V <sub>n</sub> [cm <sup>3</sup> ] | Maximum displacement V <sub>max</sub> [cm <sup>3</sup> ] | Ratio V <sub>n</sub> /V <sub>min</sub> |     |     |     |     |  |     |
|--|--|--|-----|-----|-----|-----|--|-----|
|  |  | 1.5                                    | 2   | 2.5 | 3   | 4   | Minimum displacement V <sub>min</sub> [cm <sup>3</sup> ] |     |
| 019  | 019  | 015                                    | 010 | 013 | 010 | 008 | 006  | 005 |
| 032  | 032  | 028                                    | 024 | 021 | 016 | 013 | 011  | 008 |
| 080  | 080  | 064                                    | 048 | 053 | 040 | 032 | 027  | 020 |
| 140  | 140  | 120                                    | 100 | 093 | 070 | 056 | 047  | 035 |
| 250  | 250  | 215                                    | 180 | 167 | 125 | 100 | 083  | 063 |

**Standard option**

**NOTES**

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# MORE PRODUCTS. MORE SUPPORT.

Moog designs a range of motion control products to complement those featured in this document. Moog also provides service and support for all of our products. For more information, contact the Moog facility closest to you.

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Electrohydrostatic Pump Unit  
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