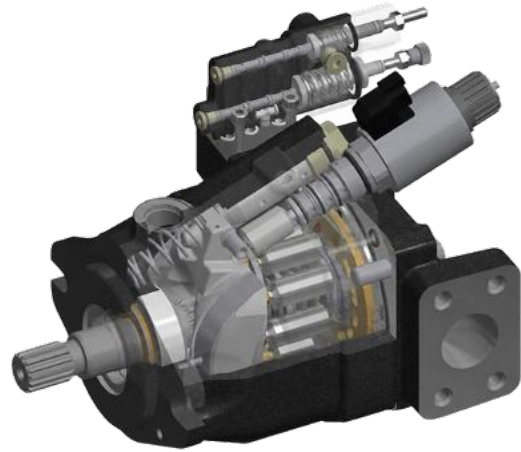


# HA10V Series 5 & Series 5 SUPER

Hydraulic Variable Piston Pump SAE



**HA10V Series 5 Hydraulic Piston Pump have the following advantages;**

- Compact Design,
- Economical Conception,
- High Power Density,
- High Overall Efficiency,
- High Rotating Speeds,
- High Output Pressure,
- 260 bar Cont. Work. Pressure,
- 320 bar Peak Pressure,
- From 18cc to 100cc,
- Reduced Noise Level,
- Increased Reliability,
- 100% compatible interchangeability
- Smaller Installation Dimensions,
- Extremely fast response time,
- Long service life
- Series 5 SUPER available with 280/350 bar pressure limits.



ISO 9001:2015 - ISO 14001:2015

# HA10V Series 5 Hydraulic Piston Pump

www.hidrocel.com.tr

## Ordering Code of HA10V Series 5 Hydraulic Piston Pump

| 01    | 02 | 03 | 04 | 05 | 06       | 07 | 08 | 09 | 10 | 11 | 12 | 13 |
|-------|----|----|----|----|----------|----|----|----|----|----|----|----|
| HA10V |    |    |    | /  | Series 5 | -  | V  |    |    |    |    |    |

Axial piston unit

| 01                                                                              | 18 | 28 | 45 | 63 | 72 | 85 | 100 |       |
|---------------------------------------------------------------------------------|----|----|----|----|----|----|-----|-------|
| Swashplate design, variable, nominal pressure 260 bar, maximum pressure 320 bar | •  | •  | •  | •  | •  | •  | •   | HA10V |

Operation mode

|    |                        |  |
|----|------------------------|--|
| 02 | Standard, Open circuit |  |
|----|------------------------|--|

Size (NG)

|    |                                                        |    |    |    |    |    |    |     |
|----|--------------------------------------------------------|----|----|----|----|----|----|-----|
| 03 | Geometric displacement, see table of values on page 10 | 18 | 28 | 45 | 63 | 72 | 85 | 100 |
|----|--------------------------------------------------------|----|----|----|----|----|----|-----|

Control devices

|                                         |                                               |                                             |                                       |                |          |   |   |   |   |   |      |      |      |
|-----------------------------------------|-----------------------------------------------|---------------------------------------------|---------------------------------------|----------------|----------|---|---|---|---|---|------|------|------|
| 04                                      | Pressure controller                           | hydraulic                                   |                                       | •              | •        | • | • | • | • | • | PR   |      |      |
|                                         | with flow controller                          | hydraulic                                   | X-T open                              | •              | •        | • | • | • | • | • | LS   |      |      |
|                                         |                                               |                                             | X-T plugged with flushing function    | •              | •        | • | • | • | • | • | LS1  |      |      |
|                                         |                                               |                                             | X-T plugged without flushing function | •              | •        | • | • | • | • | • | LSC  |      |      |
|                                         |                                               |                                             |                                       |                |          |   |   |   |   |   |      |      |      |
|                                         | with pressure cut-off                         | hydraulic                                   | remotely operated                     |                | •        | • | • | • | • | • | •    | PRR  |      |
|                                         |                                               |                                             |                                       |                |          |   |   |   |   |   |      |      |      |
|                                         |                                               | electric                                    | negative control                      | U = 12 V       | –        | • | – | • | • | • | •    | EN12 |      |
|                                         |                                               |                                             |                                       | U = 24 V       | –        | • | – | • | • | • | •    | EN24 |      |
|                                         |                                               | electric                                    | positive control                      | U = 12 V       | –        | • | – | • | • | • | •    | EP12 |      |
|                                         |                                               |                                             |                                       | U = 24 V       | –        | • | – | • | • | • | •    | EP24 |      |
|                                         |                                               |                                             |                                       |                |          |   |   |   |   |   |      |      |      |
|                                         |                                               |                                             |                                       |                |          |   |   |   |   |   |      |      |      |
|                                         | Pressure-flow power control                   |                                             | electric control (negative control)   |                | ○        | ○ | ○ | ○ | ○ | • | •    | EPFP |      |
|                                         | Power control with pressure cut-off           | hydraulic                                   | start of control from                 | 10 to 35 bar   | •        | • | • | • | • | • | •    | L5D  |      |
|                                         |                                               |                                             |                                       | 36 to 70 bar   | •        | • | • | • | • | • | •    | L6D  |      |
|                                         |                                               |                                             |                                       | 71 to 105 bar  | •        | • | • | • | • | • | •    | L7D  |      |
|                                         |                                               |                                             |                                       | 106 to 140 bar | •        | • | • | • | • | • | •    | L8D  |      |
|                                         |                                               |                                             |                                       | 141 to 230 bar | •        | • | • | • | • | • | •    | L9D  |      |
|                                         | remotely operated                             | hydraulic                                   | start of control                      | see L.D        | •        | • | • | • | • | • | •    | L.DG |      |
|                                         | flow control, X-T plugged                     | hydraulic                                   | start of control                      | see L.D        | •        | • | • | • | • | • | •    | L.DS |      |
|                                         |                                               | electrically overridable (negative control) | start of control                      | see L.D        | •        | • | • | • | • | • | •    | LN.S |      |
|                                         | Electro-proportional control                  |                                             | positive control                      |                |          |   |   |   |   |   |      |      |      |
|                                         | with pressure control                         |                                             |                                       |                | U = 12 V | • | • | • | • | • | •    | •    | E1D  |
|                                         |                                               |                                             |                                       |                | U = 24 V | • | • | • | • | • | •    | •    | •    |
|                                         | with pressure and flow control (load-sensing) |                                             | X-T open                              | U = 12 V       | •        | • | • | • | • | • | •    | E1DF |      |
|                                         |                                               |                                             |                                       | U = 24 V       | •        | • | • | • | • | • | •    | E2DF |      |
|                                         | with pressure and flow control (load-sensing) |                                             | X-T plugged                           | U = 12 V       | •        | • | • | • | • | • | •    | E1DS |      |
| U = 24 V                                |                                               |                                             |                                       | •              | •        | • | • | • | • | • | E2DS |      |      |
| with electro-hydraulic pressure control |                                               |                                             |                                       | U = 12 V       | •        | • | • | • | • | • | •    | E1ED |      |
|                                         |                                               |                                             |                                       | U = 24 V       | •        | • | • | • | • | • | •    | •    | E2ED |

# HA10V Series 5 Hydraulic Piston Pump

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## Ordering Code of HA10V Series 5 Hydraulic Piston Pump

| Control devices       |                                                            |                     | 18                                                                         | 28 | 45 | 63 | 72 | 85 | 100  |      |
|-----------------------|------------------------------------------------------------|---------------------|----------------------------------------------------------------------------|----|----|----|----|----|------|------|
| 04                    | Electro-proportional control                               | positive control    |                                                                            |    |    |    |    |    |      |      |
|                       | with pressure control                                      |                     | U = 12 V                                                                   | •  | •  | •  | •  | •  | •    | E1D  |
|                       |                                                            |                     | U = 24 V                                                                   | •  | •  | •  | •  | •  | •    | E2D  |
|                       | with pressure and flow control (load-sensing)              | X-T open            | U = 12 V                                                                   | •  | •  | •  | •  | •  | •    | E1DF |
|                       |                                                            |                     | U = 24 V                                                                   | •  | •  | •  | •  | •  | •    | E2DF |
|                       | with pressure and flow control (load-sensing)              | X-T plugged         | U = 12 V                                                                   | •  | •  | •  | •  | •  | •    | E1DS |
|                       |                                                            |                     | U = 24 V                                                                   | •  | •  | •  | •  | •  | •    | E2DS |
|                       | electro-hydraulic pressure control with controller cut-off |                     | U = 12 V                                                                   | •  | •  | •  | •  | •  | •    | E1ED |
| U = 24 V              |                                                            |                     | •                                                                          | •  | •  | •  | •  | •  | E2ED |      |
| Series                |                                                            |                     |                                                                            |    |    |    |    |    |      |      |
| 05                    | Series 5                                                   |                     |                                                                            | •  | •  | •  | •  | •  | •    | 5    |
| Direction of rotation |                                                            |                     |                                                                            |    |    |    |    |    |      |      |
| 06                    | View on drive shaft                                        |                     | clockwise                                                                  |    |    |    |    |    |      | R    |
|                       |                                                            |                     | counter-clockwise                                                          |    |    |    |    |    |      | L    |
| Sealing material      |                                                            |                     |                                                                            |    |    |    |    |    |      |      |
| 07                    | FKM (fluor-caoutchouc)                                     |                     |                                                                            |    |    |    |    |    |      | V    |
| Drive shaft           |                                                            |                     |                                                                            |    |    |    |    |    |      |      |
| 08                    | Splined shaft ANSI B92.1a                                  | standard shaft      | •                                                                          | •  | •  | •  | •  | •  | •    | S    |
| Mounting flange       |                                                            |                     |                                                                            |    |    |    |    |    |      |      |
| 09                    | ISO 3019-1 (SAE)                                           |                     | 2-hole                                                                     | •  | •  | •  | •  | •  | •    | C    |
|                       |                                                            |                     | 4-hole                                                                     | –  | –  | –  | •  | •  | •    | •    |
| Working port          |                                                            |                     |                                                                            |    |    |    |    |    |      |      |
| 10                    | SAE flange port fastening thread, metric                   | rear                | not for tandem                                                             | •  | •  | •  | •  | •  | •    | 11   |
|                       |                                                            | at side, opposite   | for tandem                                                                 | •  | •  | •  | •  | •  | •    | 12   |
|                       |                                                            | at side, offset 90° | not for tandem; available only for counter-clockwise direction of rotation | –  | –  | •  | –  | –  | –    | 13   |

# HA10V Series 5 Hydraulic Piston Pump

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## Ordering Code of HA10V Series 5 Hydraulic Piston Pump

| 01    | 02 | 03 | 04 | 05 | 06       | 07 | 08 | 09 | 10 | 11 | 12 | 13 |
|-------|----|----|----|----|----------|----|----|----|----|----|----|----|
| HA10V |    |    |    | /  | Series 5 | -  | V  |    |    |    |    |    |

### Tandem

| 11 | Flange ISO 3019-1 Diameter | Hub for splined shaft Diameter | 18 | 28 | 45 | 63 | 72 | 85 | 100 |     |
|----|----------------------------|--------------------------------|----|----|----|----|----|----|-----|-----|
|    | without tandem             |                                | •  | •  | •  | •  | •  | •  | •   | N00 |
|    | 82-2 (A)                   | 5/8 in                         | •  | •  | •  | •  | •  | •  | •   | K01 |
|    |                            | 3/4 in                         | •  | •  | •  | •  | •  | •  | •   | K52 |
|    | 101-2 (B)                  | 7/8 in                         | -  | •  | •  | •  | •  | •  | •   | K68 |
|    |                            | 1 in                           | -  | -  | •  | •  | •  | •  | •   | K04 |
|    | 127-4 (C)                  | 1 1/4 in                       | -  | -  | -  | •  | •  | •  | •   | K15 |
|    |                            | 1 1/2 in                       | -  | -  | -  | -  | -  | •  | •   | K16 |
|    | 127-2 (C)                  | 1 1/4 in                       | -  | -  | -  | -  | -  | •  | •   | K07 |
|    |                            | 1 1/2 in                       | -  | -  | -  | -  | -  | •  | •   | K24 |

### Connectors for solenoids

| 12 | Without connector (without solenoid, with hydraulic control only, without code)      | • | • | • | • | • | • | • |   |
|----|--------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|
|    | DEUTSCH - molded connector, 2-pin - without suppressor diode (for electric controls) | • | • | • | • | • | • | • | P |

● = Available   ○ = On request   - = Not available

# HA10V Series 5 Hydraulic Piston Pump

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## Technical data of HA10V Series 5 Hydraulic Piston Pump

### Technical data, standard unit

| Size                                    |                                                  | NG                     |        | 10     | 18     | 28     | 45    | 60     | 63     | 72     | 85     | 100    |
|-----------------------------------------|--------------------------------------------------|------------------------|--------|--------|--------|--------|-------|--------|--------|--------|--------|--------|
| Displacement, geometric, per revolution |                                                  | $V_{g \text{ max}}$    | cm3    | 10.5   | 18     | 28     | 45    | 60     | 63     | 72     | 85     | 100    |
| Speed maximum                           | at $V_g$ max                                     | $n_{nom}$              | rpm    | 3600   | 3300   | 3000   | 2600  | 2700   | 2600   | 2600   | 2500   | 2300   |
|                                         | at $V_g < V_{gmax}$                              | $n_{max \text{ perm}}$ | rpm    | 4320   | 3960   | 3600   | 3120  | 3140   | 3140   | 3140   | 3000   | 2500   |
| Flow                                    | at $n_{nom}$ and $V_g$ max                       | $q_{v \text{ max}}$    | l/min  | 37     | 59     | 84     | 117   | 162    | 163    | 187    | 212    | 230    |
|                                         | at $n_E$ = 1500 rpm                              | $q_{vE \text{ max}}$   | l/min  | 15     | 27     | 42     | 68    | 90     | 95     | 108    | 128    | 150    |
| Power                                   | at $n_{nom}$ , $V_g$ max<br>$\Delta p$ = 250 bar | $P_{max}$              | kW     | 16     | 25     | 35     | 49    | 65     | 68     | 77     | 89     | 96     |
|                                         | at $n_E$ = 1500 rpm                              | $P_{Emax}$             | kW     | 7      | 11     | 18     | 28    | 37     | 39     | 45     | 53     | 62     |
| Torque                                  | at $V_g$ max<br>$\Delta p$ = 250 bar             | $T_{max}$              | Nm     | 42     | 71     | 111    | 179   | 238    | 250    | 286    | 338    | 398    |
|                                         | at $V_g$ max<br>$\Delta p$ = 100 bar             | $T$                    | Nm     | 17     | 29     | 45     | 72    | 95     | 100    | 114    | 135    | 159    |
| Rotary stiffness of drive shaft         | S                                                | $c$                    | Nm/rad | 9200   | 11000  | 22300  | 37500 | 65500  | 65500  | 65500  | 143000 | 143000 |
|                                         | R                                                | $c$                    | Nm/rad | -      | 14800  | 26300  | 41000 | 69400  | 69400  | 69400  | 152900 | -      |
|                                         | U                                                | $c$                    | Nm/rad | 6800   | 8000   | 16700  | 30000 | 49200  | 49200  | 49200  | 102900 | 102900 |
|                                         | W                                                | $c$                    | Nm/rad | -      | -      | 19900  | 34400 | 54000  | 54000  | 54000  | 117900 | 117900 |
|                                         | P                                                | $c$                    | Nm/rad | 10700  | -      | -      | -     | -      | -      | -      | -      | -      |
| Moment of inertia for rotary group      |                                                  | $J_{TW}$               | kgm2   | 0.0006 | 0.0009 | 0.0017 | 0.003 | 0.0056 | 0.0056 | 0.0056 | 0,012  | 0,012  |
| Maximum angular acceleration            |                                                  | $\alpha$               | rad/s2 | 8000   | 6800   | 5500   | 4000  | 3300   | 3300   | 3300   | 2700   | 2700   |
| Case volume                             |                                                  | $V'$                   | l      | 0.2    | 0.25   | 0.3    | 0.5   | 0.8    | 0.8    | 0.8    | 1      | 1      |
| Weight <b>without</b> tandem (approx.)  |                                                  | $m$                    | kg     | 8      | 11.5   | 15     | 18    | 22     | 22     | 22     | 36     | 36     |
| Weight <b>with</b> tandem (approx.)     |                                                  |                        |        | -      | 13     | 18     | 24    | 28     | 28     | 28     | 45     | 45     |

| Determining the operating characteristics                        |                                                                                             |         |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------|
| Flow                                                             | $q_v = \frac{V_g \times n \times \eta_v}{1000}$                                             | [l/min] |
| Torque                                                           | $T = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{hm}}$                            | [Nm]    |
| Power                                                            | $P = \frac{2 \pi \times T \times n}{60000} = \frac{q_v \times \Delta p}{600 \times \eta_t}$ | [kW]    |
| Key                                                              |                                                                                             |         |
| $V_g$ Displacement per revolution [cm <sup>3</sup> ]             |                                                                                             |         |
| $\Delta p$ Differential pressure [bar]                           |                                                                                             |         |
| $n$ Rotational speed [rpm]                                       |                                                                                             |         |
| $\eta_v$ Volumetric efficiency                                   |                                                                                             |         |
| $\eta_{hm}$ Hydraulic-mechanical efficiency                      |                                                                                             |         |
| $\eta_t$ Total efficiency ( $\eta_t = \eta_v \times \eta_{hm}$ ) |                                                                                             |         |

#### Notice

• Theoretical values, without efficiency and tolerances; values rounded

- Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit.

# HA10V Series 5 Hydraulic Piston Pump

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## Technical data II of HA10V Series 5 SUPER Hydraulic Piston Pump

### Technical data, SUPER unit

#### HA10V Series 5 SUPER

Technical data, standard unit | 280 bar nominal • 350 bar peak

| Size                                    |                                                            | NG           |                 | 18   | 28   | 45   | 63   | 72   | 85   | 100  |
|-----------------------------------------|------------------------------------------------------------|--------------|-----------------|------|------|------|------|------|------|------|
| Displacement, geometric, per revolution |                                                            | $V_g \max$   | cm <sup>3</sup> | 18   | 28   | 45   | 63   | 72   | 85   | 100  |
| Speed maximum                           | at $V_g \max$                                              | $n_{nom}$    | rpm             | 3300 | 3000 | 2600 | 2600 | 2600 | 2500 | 2300 |
|                                         | at $V_g < V_g \max$                                        | $n_{max}$    | rpm             | 3960 | 3600 | 3120 | 3140 | 3140 | 3000 | 2500 |
| Flow                                    | at $n_{nom}$ and $V_g \max$                                | $q_{v,max}$  | l/min           | 59   | 84   | 117  | 163  | 187  | 212  | 230  |
|                                         | at $n_E = 1500$ rpm                                        | $q_{vE,max}$ | l/min           | 27   | 42   | 68   | 95   | 108  | 128  | 150  |
| Power                                   | at $n_{nom}$ and $V_g \max$<br>$\Delta p = 280$ bar        | $P_{cont}$   | kW              | 28   | 39   | 55   | 76   | 87   | 99   | 107  |
|                                         | at $n_{max}$ and $V_g \max$<br>$\Delta p = 350$ bar (peak) | $P_{peak}$   | kW              | 42   | 59   | 82   | 115  | 132  | 149  | 146  |
| Torque                                  | at $V_g \max$<br>$\Delta p = 280$ bar                      | $T_{cont}$   | Nm              | 80   | 125  | 201  | 281  | 321  | 379  | 446  |
|                                         | at $V_g \max$<br>$\Delta p = 350$ bar (peak)               | $T_{peak}$   | Nm              | 100  | 156  | 251  | 351  | 401  | 473  | 557  |
| Case volume                             |                                                            | $V$          | l               | 0,25 | 0,3  | 0,5  | 0,8  | 0,8  | 1    | 1    |
| Weight without tandem (approx.)         |                                                            | $m$          | kg              | 11,5 | 15   | 18   | 22   | 22   | 36   | 36   |
| Weight with tandem (approx.)            |                                                            | $m$          | kg              | 13   | 18   | 24   | 28   | 28   | 45   | 45   |

#### CALCULATION BASIS

Continuous pressure

280

bar

Peak pressure

350

bar

Continuous power uses  $n_{nom}$ ; peak power uses  $n_{max}$ . Power and torque are theoretical hydraulic values; volumetric and mechanical efficiencies are not applied.

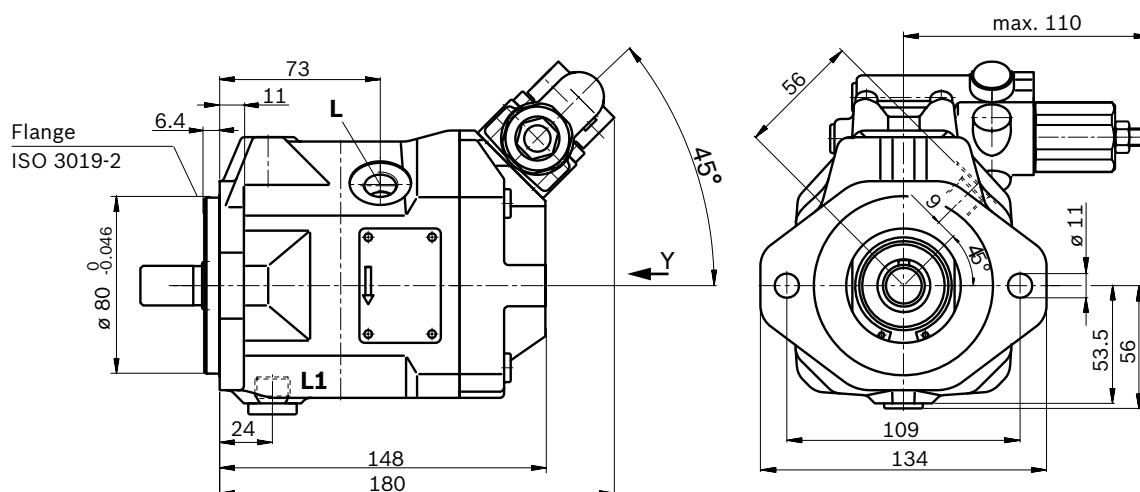
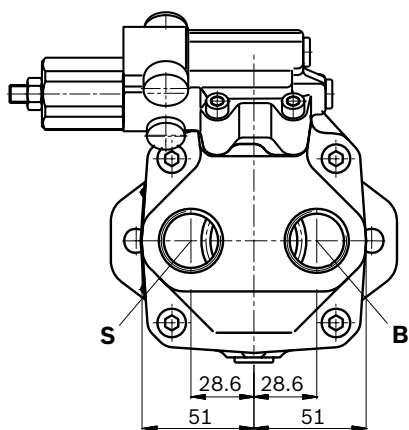
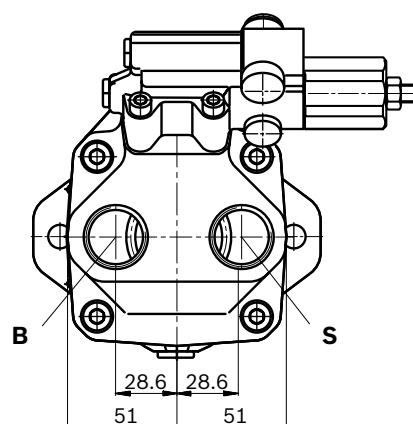
#### Determining the operating characteristics

|                                                                  |                                                                                             |         |
|------------------------------------------------------------------|---------------------------------------------------------------------------------------------|---------|
| Flow                                                             | $q_v = \frac{V_g \times n \times \eta_v}{1000}$                                             | [l/min] |
| Torque                                                           | $T = \frac{V_g \times \Delta p}{20 \times \pi \times \eta_{hm}}$                            | [Nm]    |
| Power                                                            | $P = \frac{2 \pi \times T \times n}{60000} = \frac{q_v \times \Delta p}{600 \times \eta_t}$ | [kW]    |
| Key                                                              |                                                                                             |         |
| $V_g$ Displacement per revolution [cm <sup>3</sup> ]             |                                                                                             |         |
| $\Delta p$ Differential pressure [bar]                           |                                                                                             |         |
| $n$ Rotational speed [rpm]                                       |                                                                                             |         |
| $\eta_v$ Volumetric efficiency                                   |                                                                                             |         |
| $\eta_{hm}$ Hydraulic-mechanical efficiency                      |                                                                                             |         |
| $\eta_t$ Total efficiency ( $\eta_t = \eta_v \times \eta_{hm}$ ) |                                                                                             |         |

#### Notice

- Theoretical values, without efficiency and tolerances; values rounded
- Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit.

\* 5.2 design: No longer in production. Please see the 5.3 design.

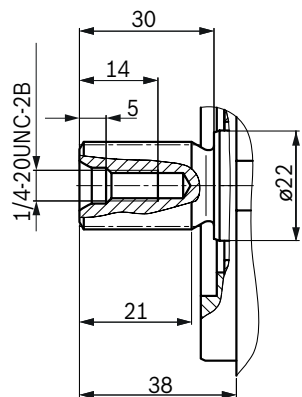
**Dimensions - Displacement 10****PR - Pressure controller; metric A mounting flange; 5.2 design\*****▼ View Y**Valve mounting  
for clockwise  
rotation**▼ View Y**Valve mounting  
for counter-clockwise  
rotation

\* 5.2 design: No longer in production. Please see the 5.3 design.



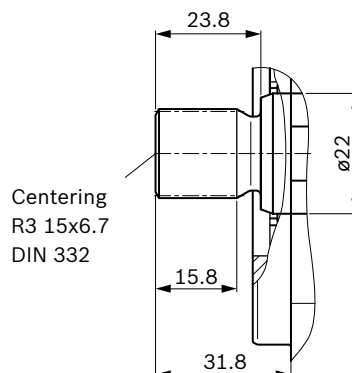
▼ Splined shaft 3/4 in (SAE J744)

**S** – 11T 16/32DP



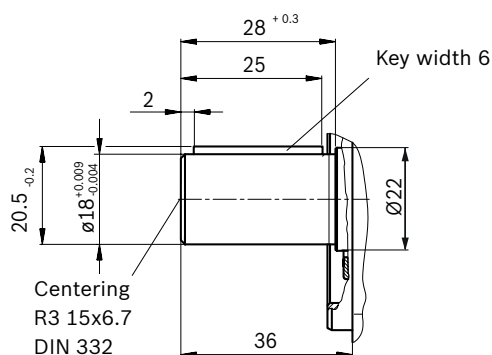
▼ Splined shaft 5/8 in (SAE J744)

**U** – 9T 16/32DP



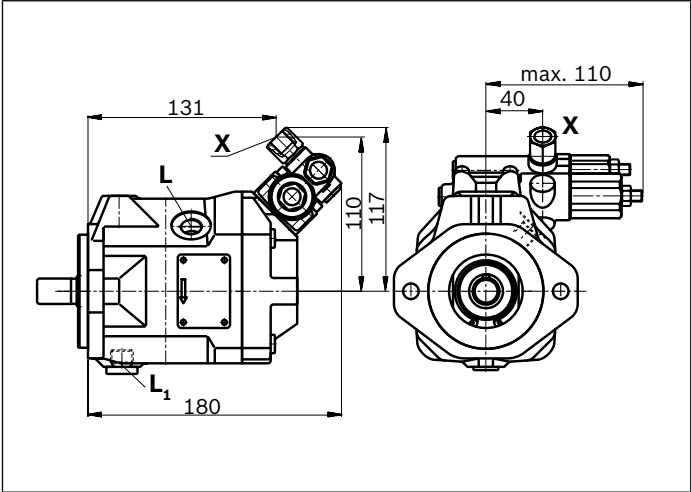
▼ Parallel keyed shaft DIN 6885

**P** – A6x6x25

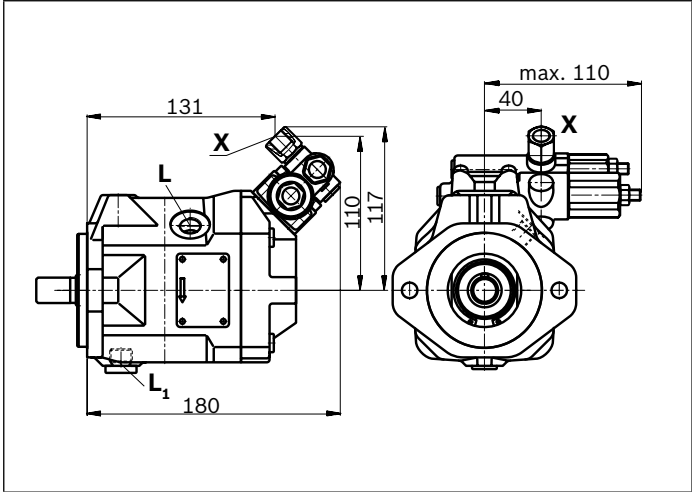


| Ports                                    |                  | Standard  | Displacement             | $p_{\max \text{ abs}}$ [bar] | State |
|------------------------------------------|------------------|-----------|--------------------------|------------------------------|-------|
| <b>B</b>                                 | Working port     | DIN 3852  | M27 × 2; 16 deep         | 315                          | O     |
| <b>S</b>                                 | Suction port     | DIN 3852  | M27 × 2; 16 deep         | 5                            | O     |
| <b>Ports at mounting flange A metric</b> |                  |           |                          |                              |       |
| <b>L</b>                                 | Drain port       | DIN 3852  | M16 × 1.5; 12 deep       | 2                            | O     |
| <b>L<sub>1</sub></b>                     | Drain port       | DIN 3852  | M16 × 1.5; 12 deep       | 2                            | X     |
| <b>X with adapter</b>                    | Control pressure | DIN 3852  | M14 × 1.5; 12 deep       | 315                          | O     |
| <b>Ports at mounting flange C SAE</b>    |                  |           |                          |                              |       |
| <b>L</b>                                 | Drain port       | DIN 11926 | 9/16-18UNF-2B; 10 deep   | 2                            | O     |
| <b>L<sub>1</sub></b>                     | Drain port       | DIN 11926 | 9/16-18UNF-2B; 10 deep   | 2                            | X     |
| <b>X without adapter</b>                 | Control pressure | DIN 11926 | 7/16-20UNF-2B; 11.5 deep | 315                          | O     |

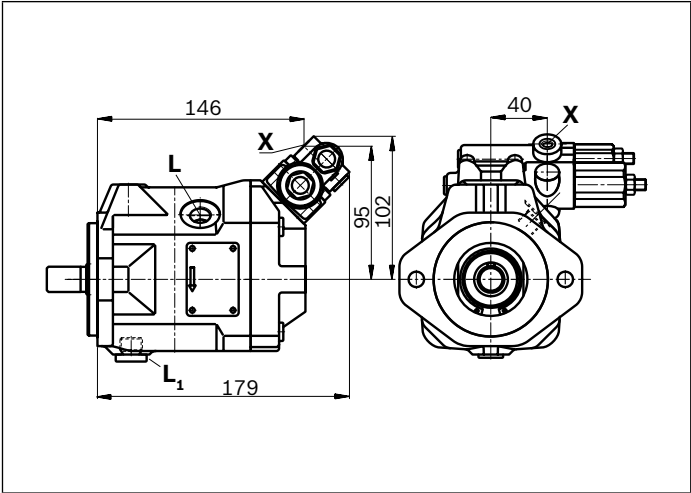
▼PRR - Pressure controller, remotely operated (metric)



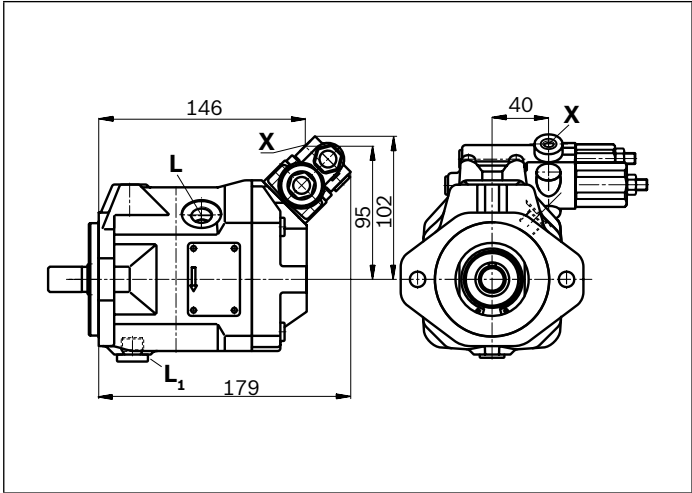
▼LS/LS1 - Pressure/flow control (load-sensing, metric)



▼PRR - Pressure controller, remotely operated (SAE)



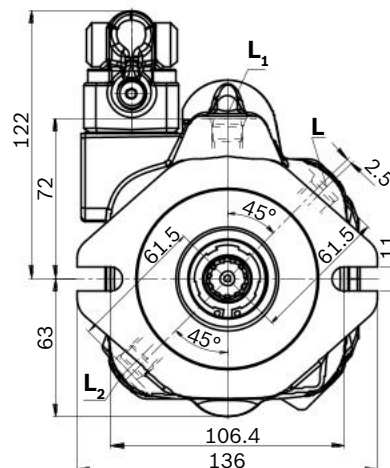
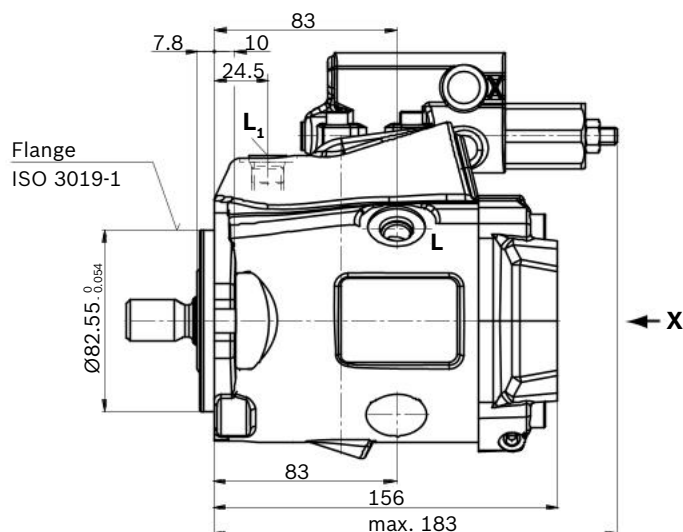
▼LS/LS1 - Pressure/flow control (load-sensing, SAE)



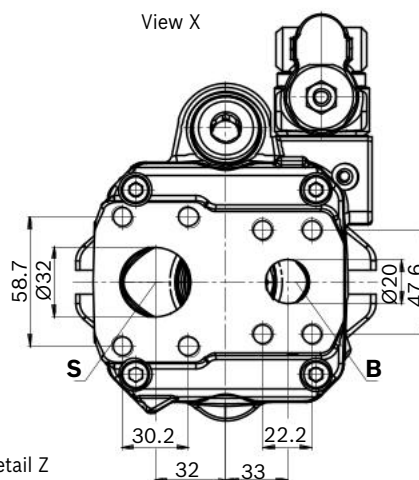
## Dimensions - Displacement 18

**PR - Hydraulic pressure controller, clockwise rotation, 5.3 design**

### ▼ Port plate 11

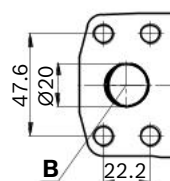
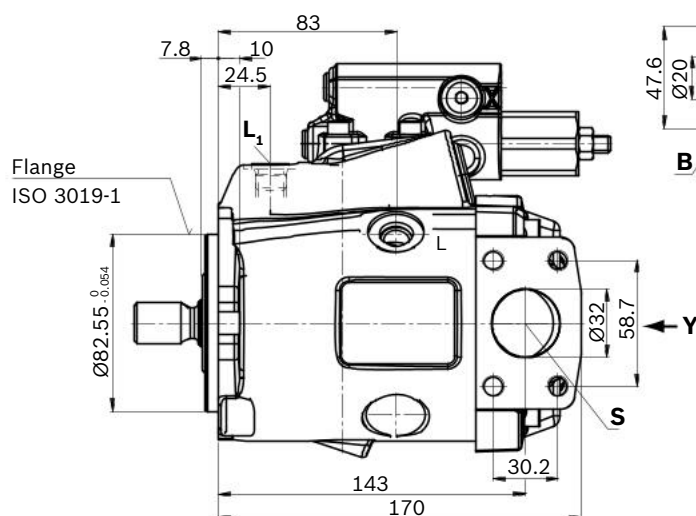


View X

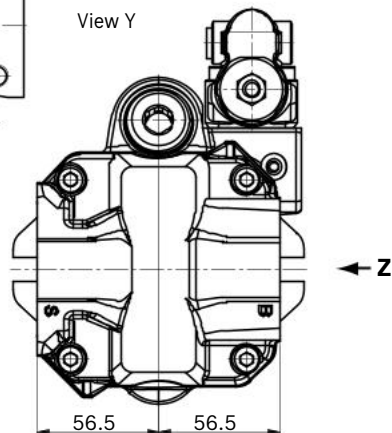


Detail Z

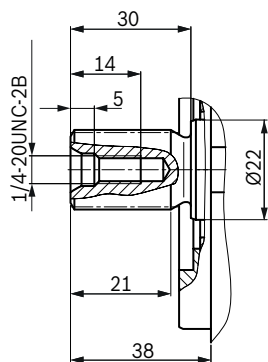
### ▼ Port plate 12



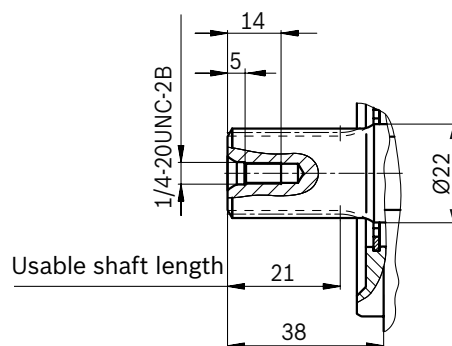
View Y



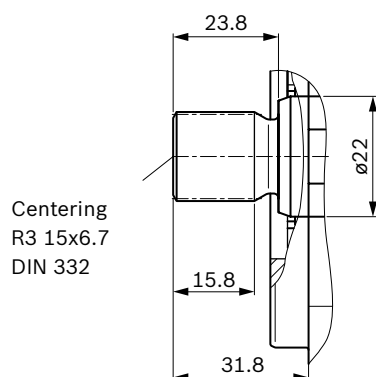
## ▼ Splined shaft 3/4 in (SAE J744)

**S** – 11T 16/32DP

## ▼ Splined shaft 3/4 in (SAE J744)

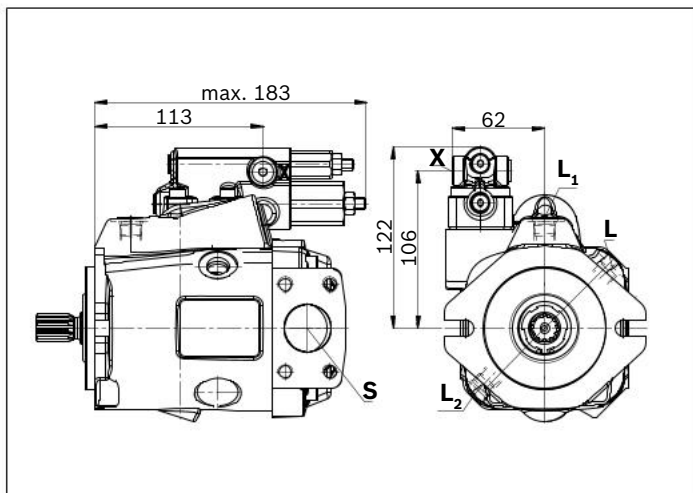
**R** – 11T 16/32DP

## ▼ Splined shaft 5/8 in (SAE J744)

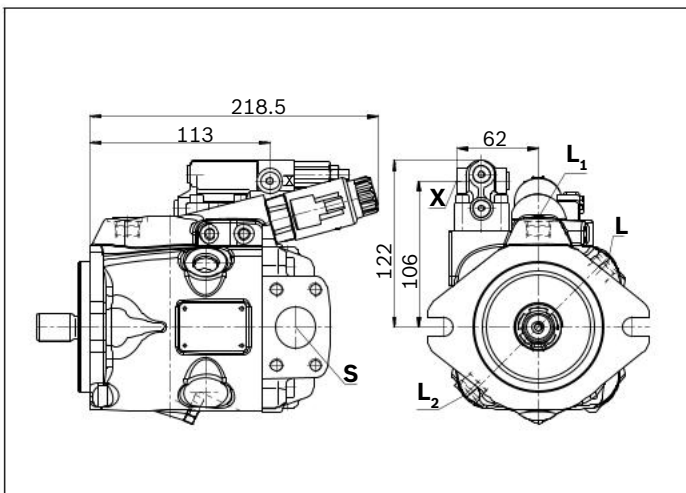
**U** – 9T 16/32DP

| Ports                               |                                                             | Standard           | Displacement                   | $p_{\max \text{ abs}}$ [bar] | State |
|-------------------------------------|-------------------------------------------------------------|--------------------|--------------------------------|------------------------------|-------|
| <b>B</b>                            | Working port (Standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 3/4 in<br>M10 × 1.5; 17 deep   | 315                          | O     |
| <b>S</b>                            | Suction port (standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 1 1/4 in<br>M10 × 1.5; 17 deep | 5                            | O     |
| <b>L</b>                            | Drain port                                                  | DIN 11926          | 3/4-16UNF-2B; 12 deep          | 2                            | O     |
| <b>L<sub>1</sub>, L<sub>2</sub></b> | Drain port                                                  | DIN 11926          | 3/4-16UNF-2B; 12 deep          | 2                            | X     |
| <b>X</b>                            | Control pressure                                            | DIN 11926          | 7/16-20UNF-2A; 11.5 deep       | 315                          | O     |

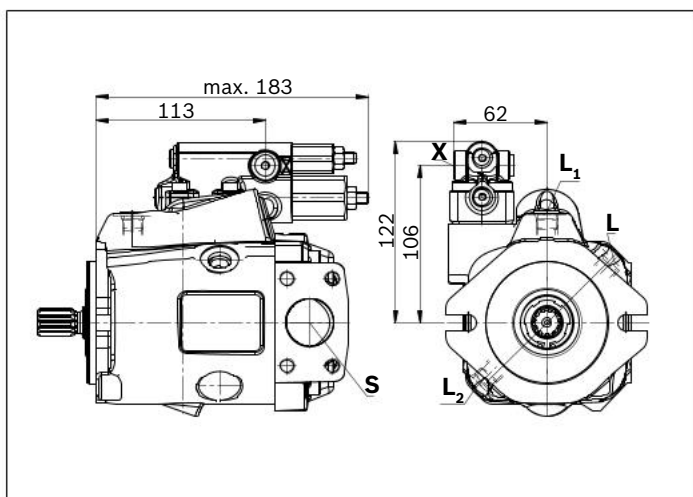
▼PRR - Pressure controller, remotely operated, 5.3 design



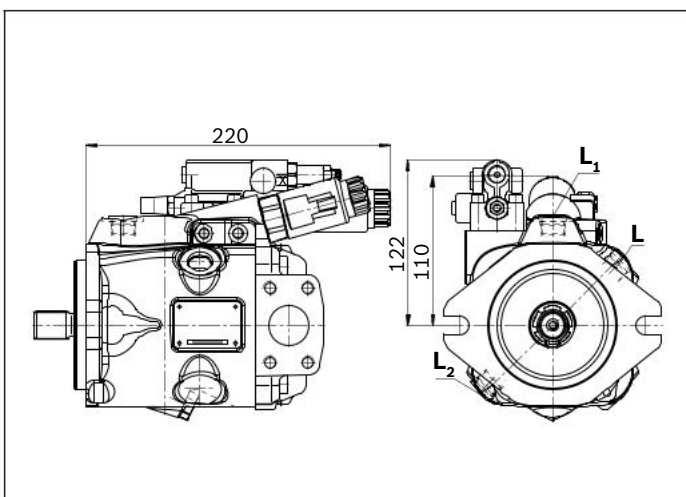
▼E1D / E2D - Electro-proportional pressure control, 5.3 design



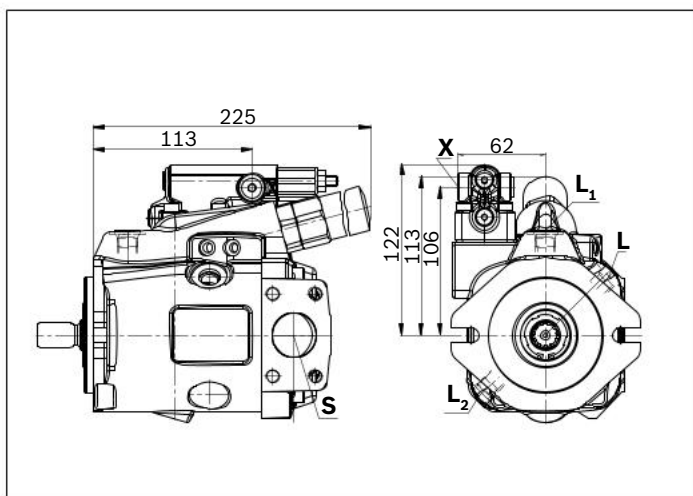
▼LS/L.DS/LSC - Pressure/flow control (load-sensing), 5.3 design



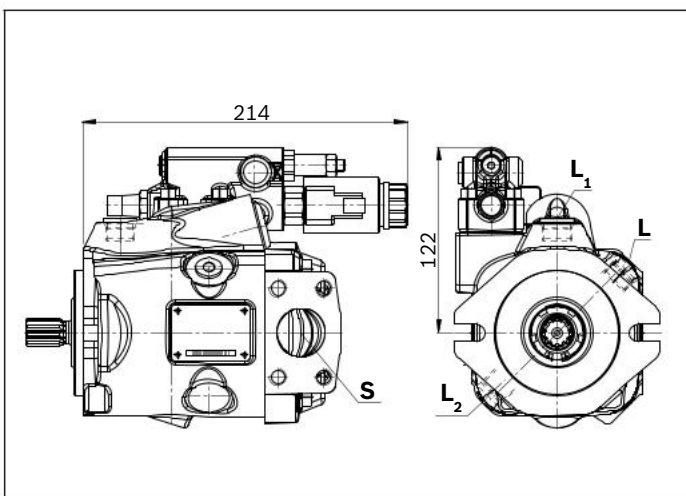
▼E1ED / E2ED - Electro-hydraulic pressure control, 5.3 design

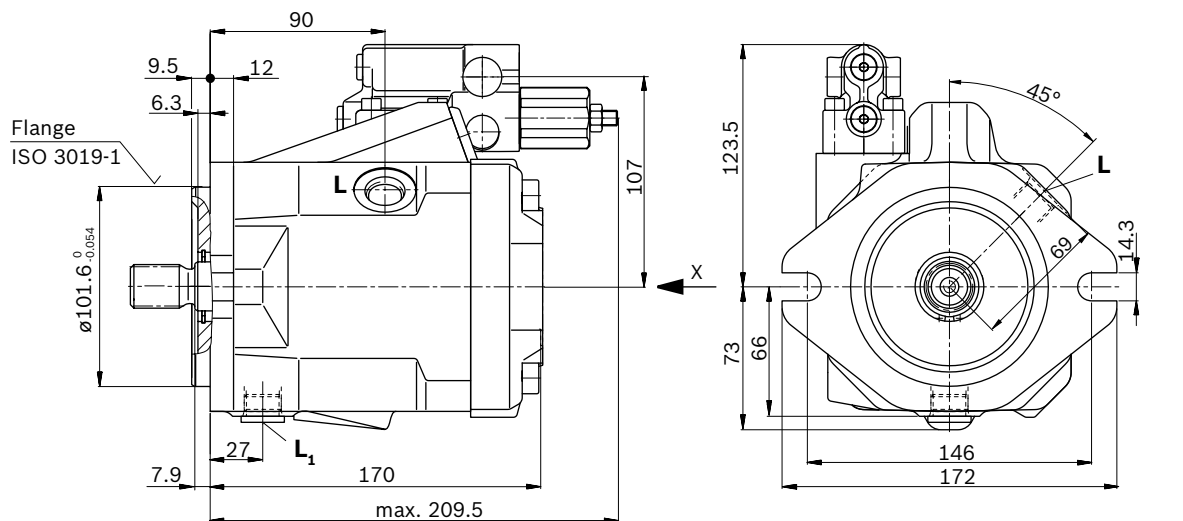


▼L5D-L9D - Power control with pressure cut-off, 5.3 design

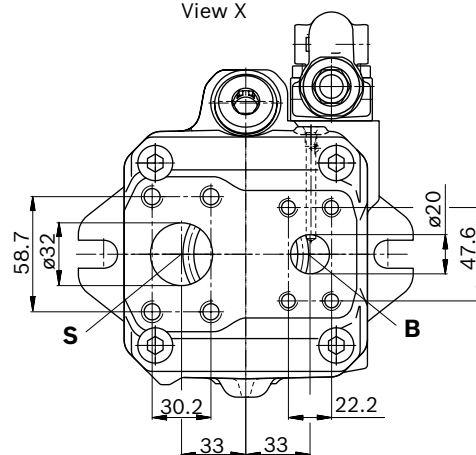


▼EN12/EN24 / EP12/EP24 - Electric pressure cut-off control, 5.3 design

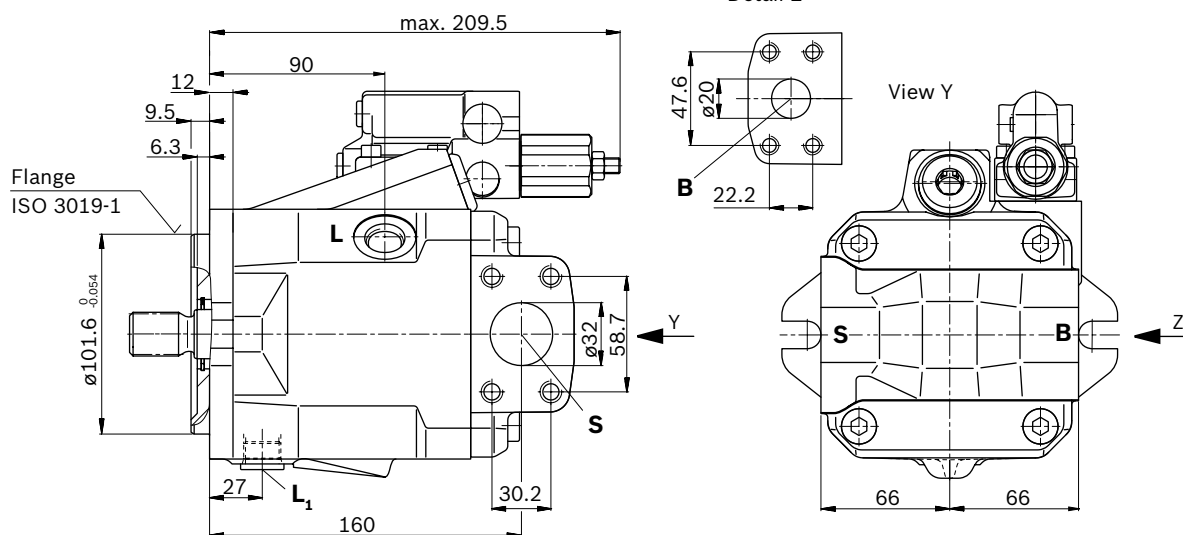


**Dimensions - Displacement 28****PR - Hydraulic pressure controller, clockwise rotation, 5.2 design\*****▼ Port plate 11**

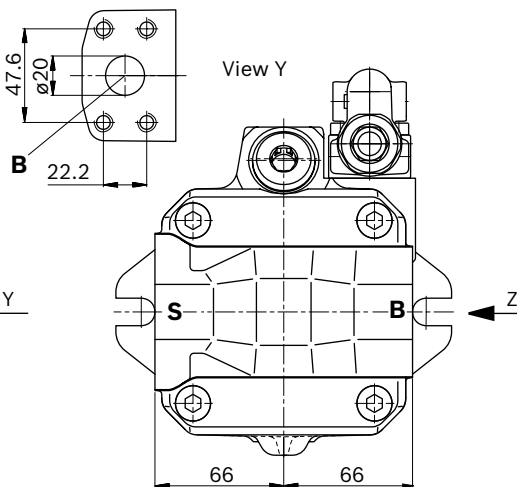
View X



Detail Z

**▼ Port plate 12**

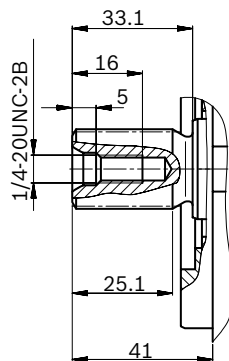
View Y



\* 5.2 design: No longer in production. Please see the 5.3 design.

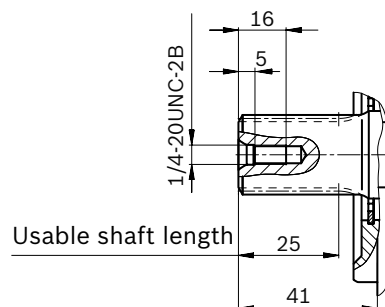
▼ Splined shaft 7/8 in (SAE J744)

**S** – 13T 16/32DP



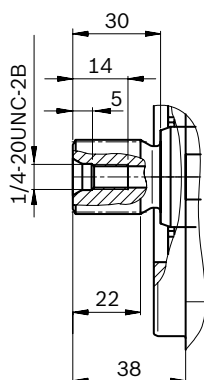
▼ Splined shaft 7/8 in (SAE J744)

**R** – 13T 16/32DP



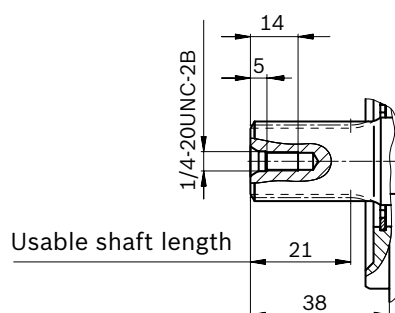
▼ Splined shaft 3/4 in (SAE J744)

**U** – 11T 16/32DP



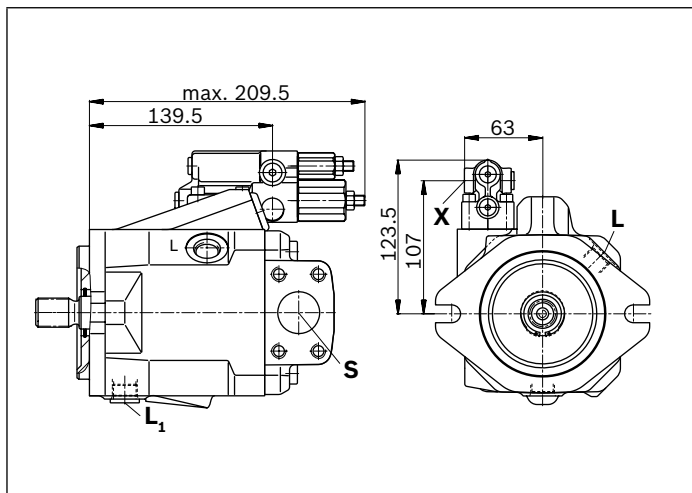
▼ Splined shaft 3/4 in (SAE J744)

**W** – 11T 16/32DP

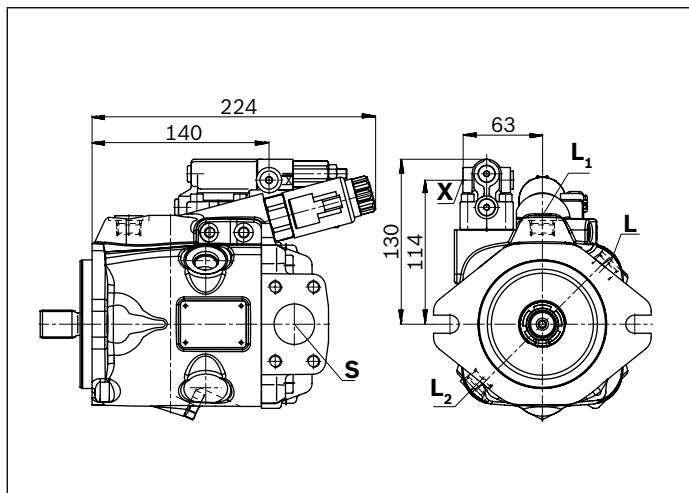


| Ports                               |                                                             | Standard           | Displacement                   | $p_{\max \text{ abs}}$ [bar] | State |
|-------------------------------------|-------------------------------------------------------------|--------------------|--------------------------------|------------------------------|-------|
| <b>B</b>                            | Working port (Standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 3/4 in<br>M10 × 1.5; 17 deep   | 315                          | O     |
| <b>S</b>                            | Suction port (standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 1 1/4 in<br>M10 × 1.5; 17 deep | 5                            | O     |
| <b>L</b>                            | Drain port                                                  | ISO 11926          | 3/4-16UNF-2B; 12 deep          | 2                            | O     |
| <b>L<sub>1</sub>, L<sub>2</sub></b> | Drain port                                                  | ISO 11926          | 3/4-16UNF-2B; 12 deep          | 2                            | X     |
| <b>X</b>                            | Control pressure                                            | ISO 11926          | 7/16-20UNF-2B; 11.5 deep       | 315                          | O     |

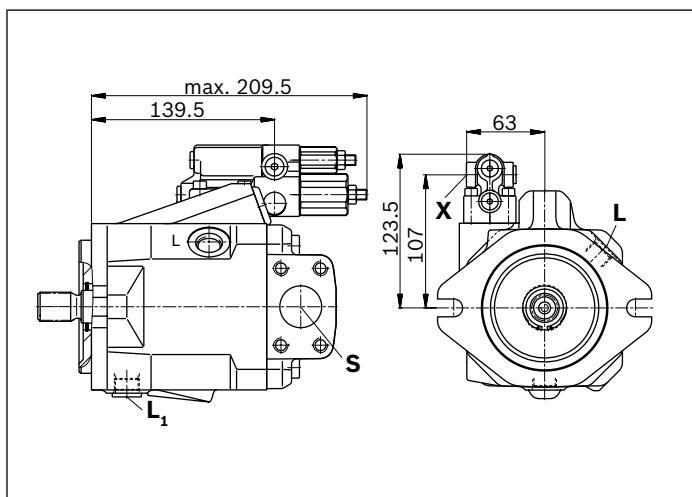
**▼PRR - Pressure controller, remotely operated, 5.2 design\* / 5.3 design**



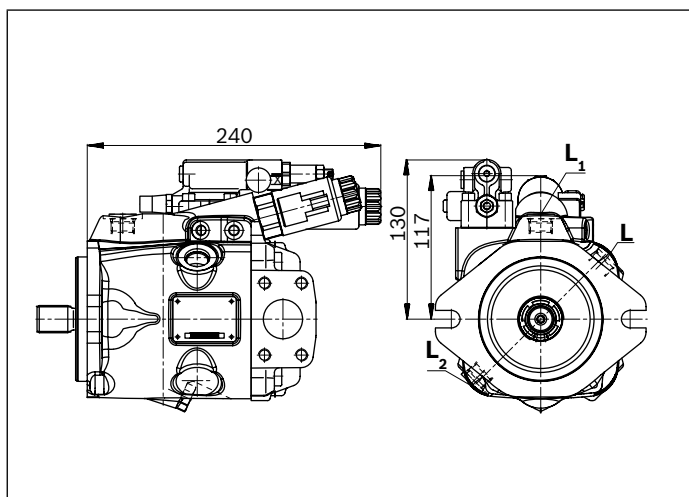
**▼E1D / E2D - Electro-proportional pressure control, 5.3 design**



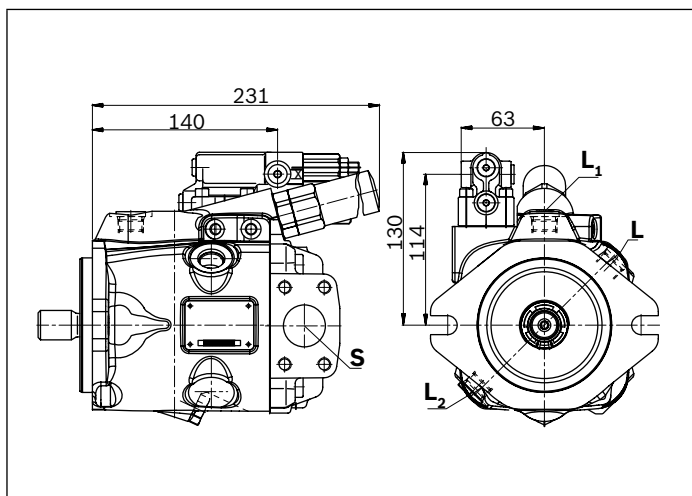
**▼LS/LS1/LSC - Pressure/flow control (load-sensing), 5.2 design\* / 5.3 design**



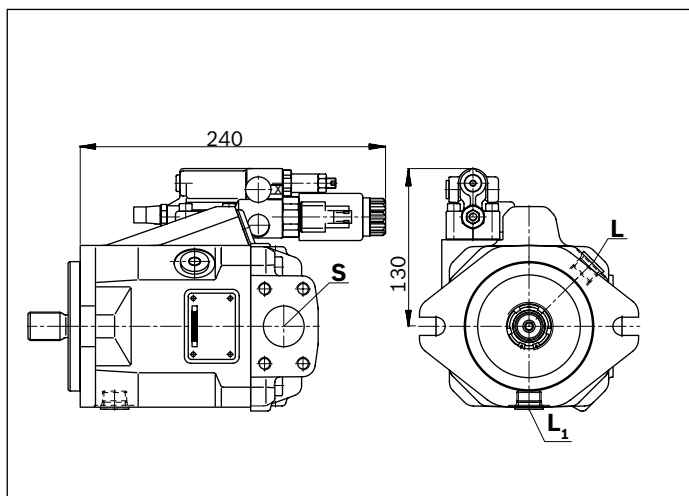
**▼E1ED / E2ED - Electro-hydraulic pressure control, 5.3 design**



**▼L5D-L9D - Power control with pressure cut-off, 5.3 design**



**▼EN12/EN24 / EP12/EP24 - Electric pressure cut-off control, 5.2 design\* / 5.3 design**

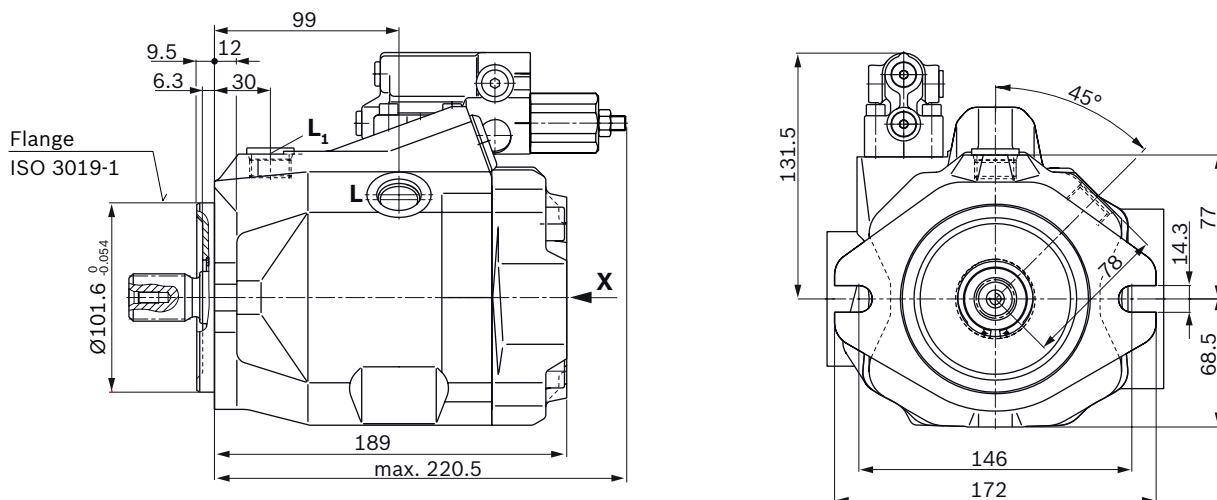




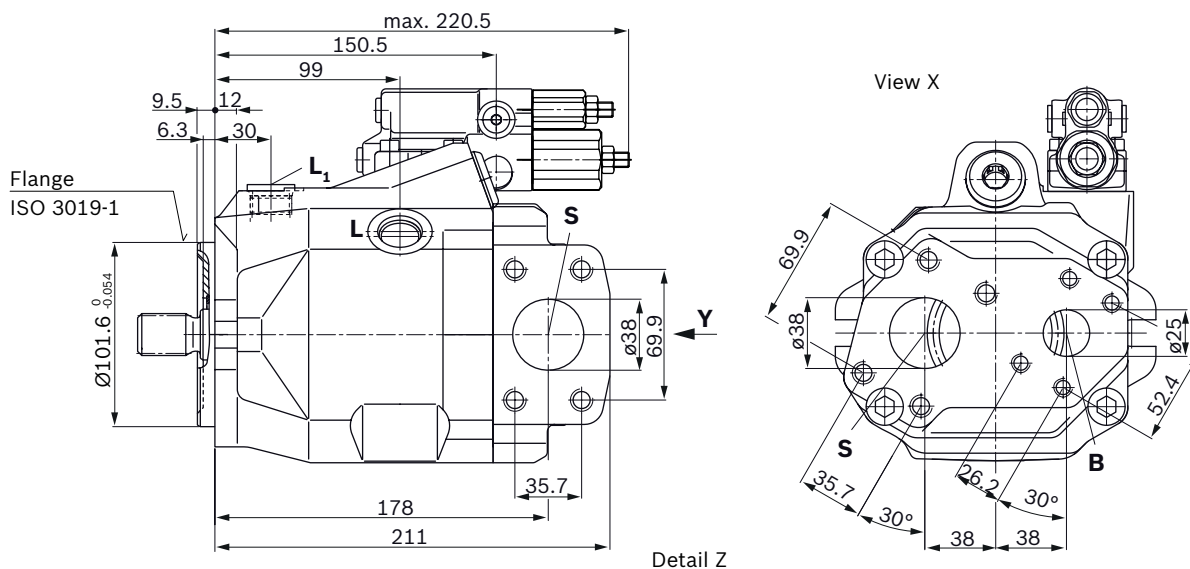
## Dimensions - Displacement 45

**PR - Hydraulic pressure controller, clockwise rotation, 5.2 design\***

### ▼ Port plate 11

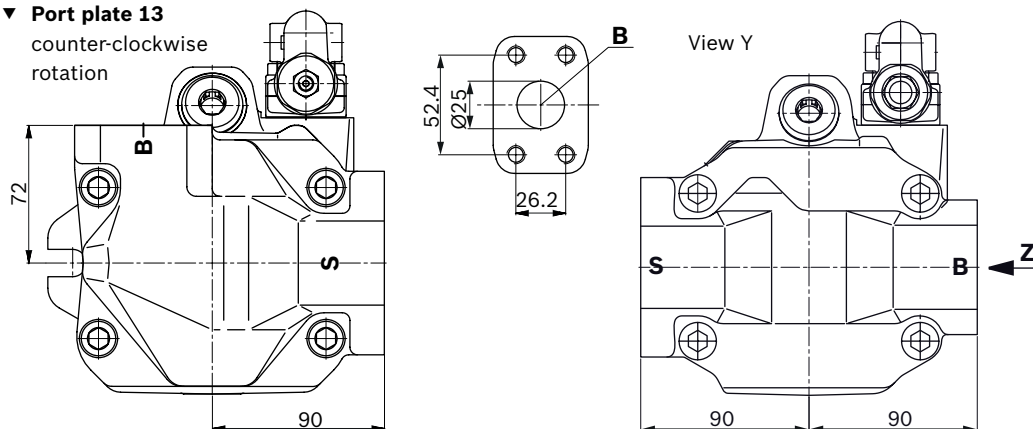


### ▼ Port plate 12



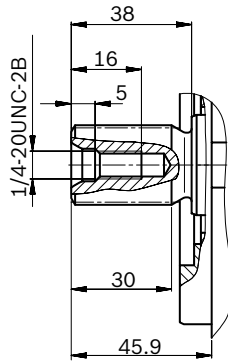
### ▼ Port plate 13

counter-clockwise rotation

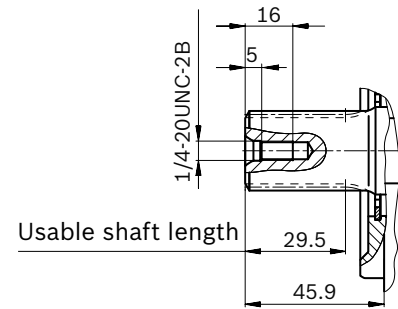


\* 5.2 design: No longer in production. Please see the 5.3 design.

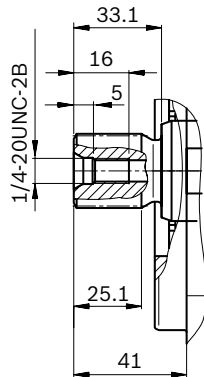
## ▼ Splined shaft 1 in SAE J744

**S** – 15T 16/32DP


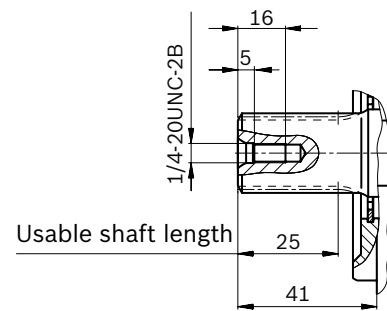
## ▼ Splined shaft 1 in SAE J744

**R** – 15T 16/32DP


## ▼ Splined shaft 7/8 in SAE J744

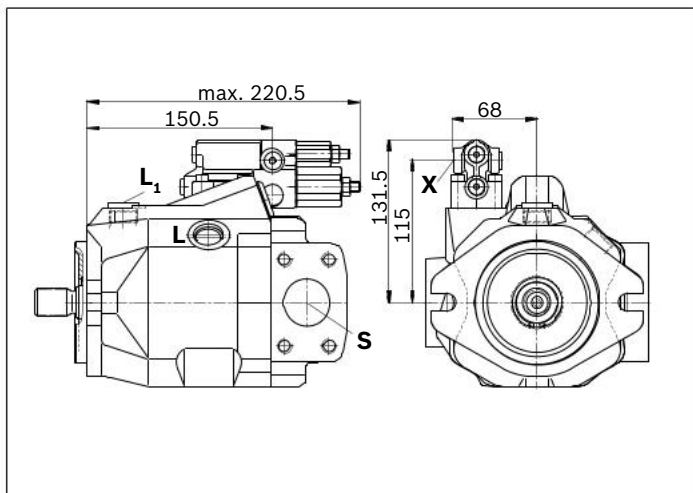
**U** – 13T 16/32DP


## ▼ Splined shaft 7/8 in SAE J744

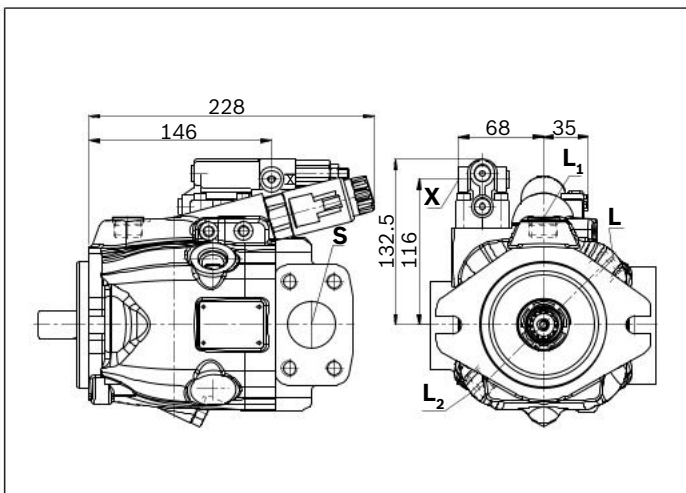
**W** – 13T 16/32DP


| Ports                               |                                                             | Standard           | Displacement                    | $p_{\max \text{ abs}}$ [bar] | State |
|-------------------------------------|-------------------------------------------------------------|--------------------|---------------------------------|------------------------------|-------|
| <b>B</b>                            | Working port (Standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 1 in<br>M10 × 1.5; 17 deep      | 315                          | O     |
| <b>S</b>                            | Suction port (standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 1 1/2 in<br>M12 × 1.75; 20 deep | 5                            | O     |
| <b>L</b>                            | Drain port                                                  | ISO 11926          | 7/8-14UNF-2B; 13 deep           | 2                            | O     |
| <b>L<sub>1</sub>, L<sub>2</sub></b> | Drain port                                                  | ISO 11926          | 7/8-14UNF-2B; 13 deep           | 2                            | X     |
| <b>X</b>                            | Control pressure                                            | ISO 11926          | 7/16-20UNF-2A; 11.5 deep        | 315                          | O     |

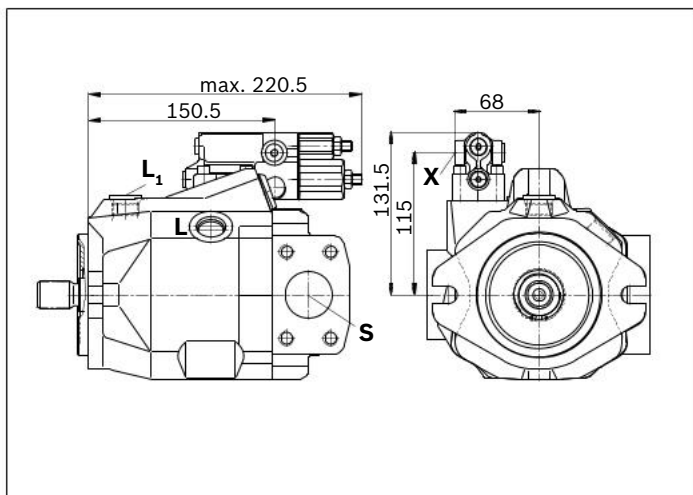
▼PRR - Pressure controller, remotely operated, 5.2 design\* / 5.3 design



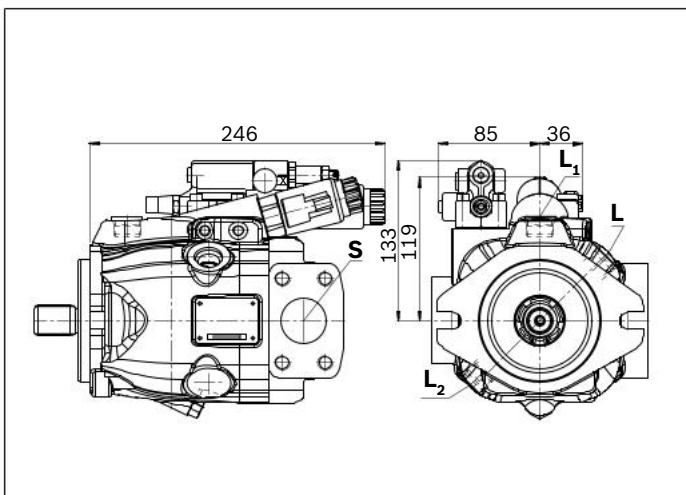
▼E1D / E2D - Electro-proportional pressure control, 5.3 design



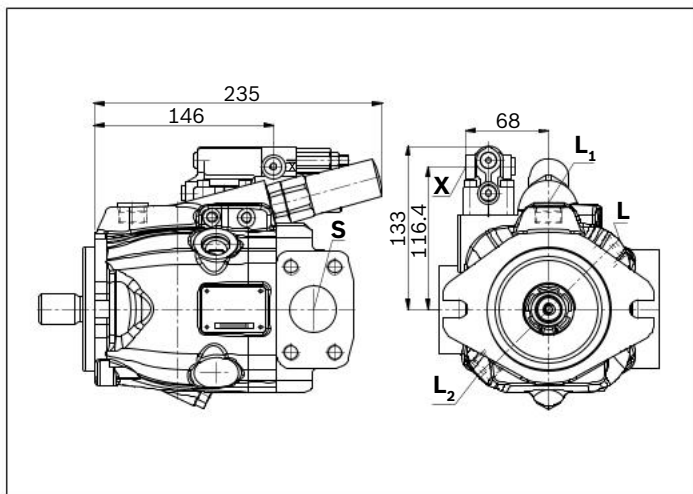
▼LS/LS1/LSC - Pressure/flow control (load-sensing), 5.2 design\* / 5.3 design



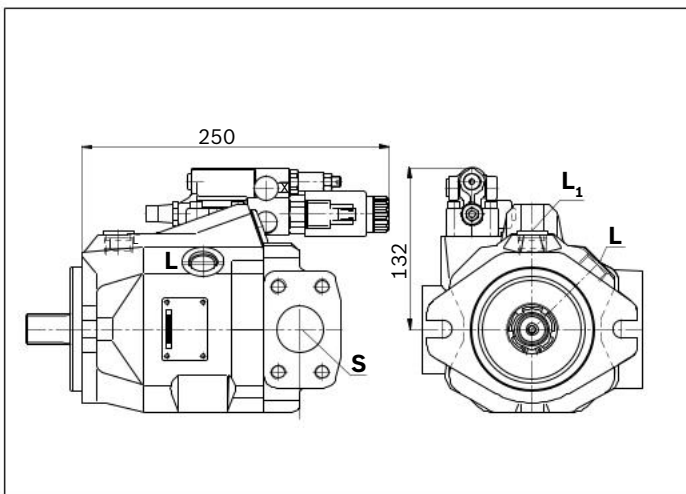
▼E1ED / E2ED - Electro-hydraulic pressure control, 5.3 design



▼L5D-L9D - Power control with pressure cut-off, 5.3 design



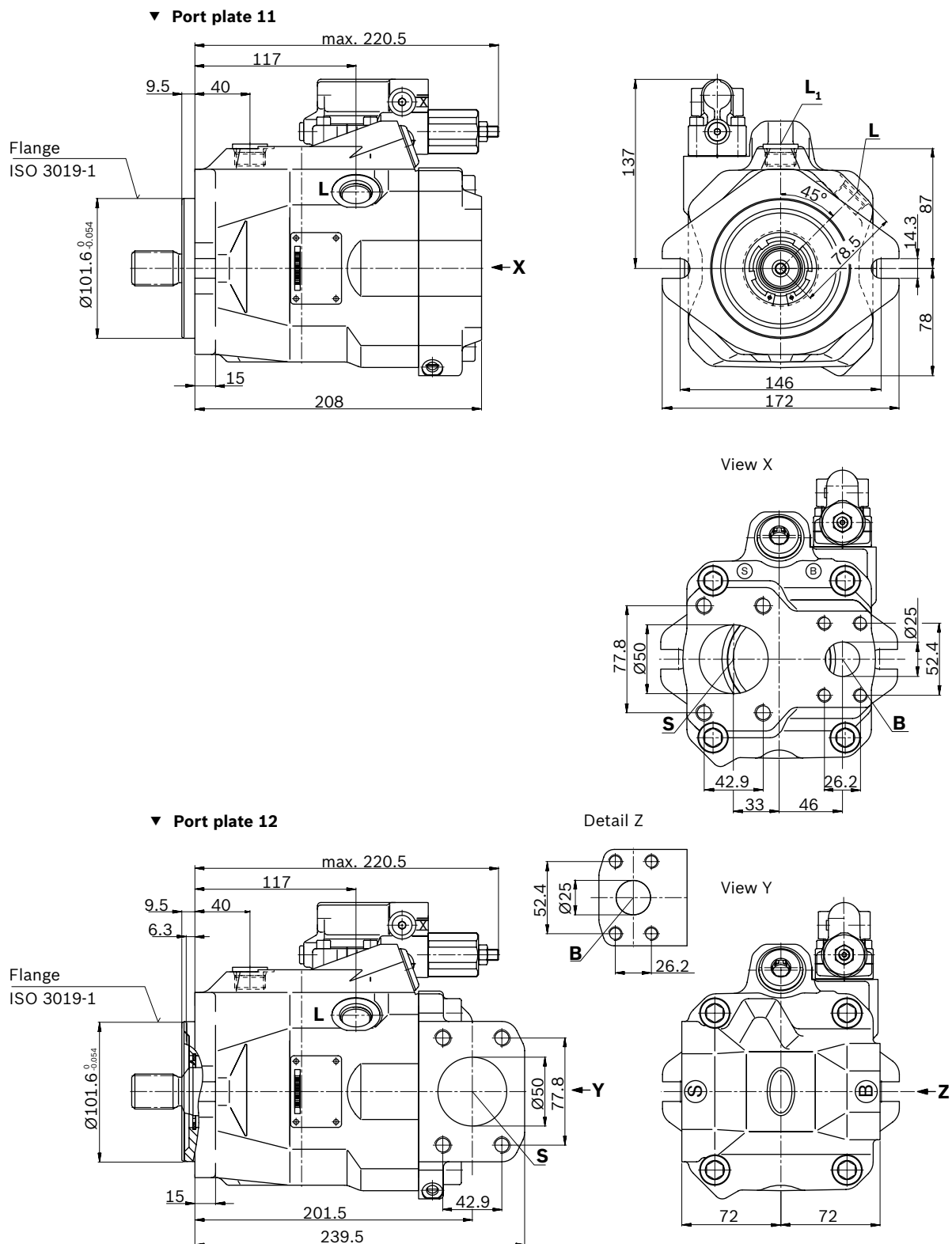
▼EN12/EN24 / EP12/EP24 - Electric pressure cut-off control, 5.2 design\*



\* 5.2 design: No longer in production. Please see the 5.3 design.

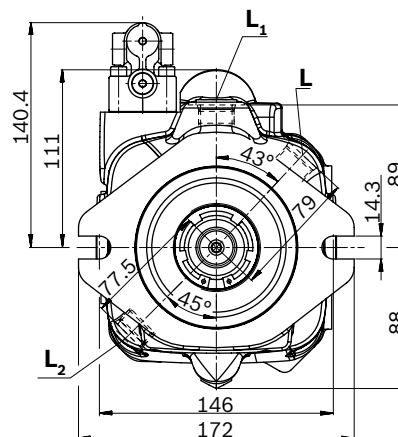
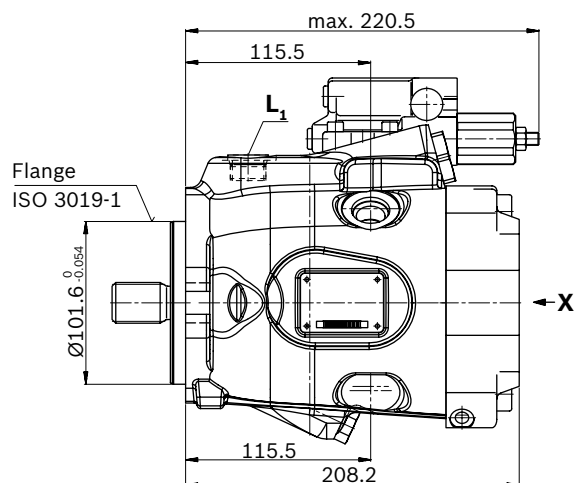
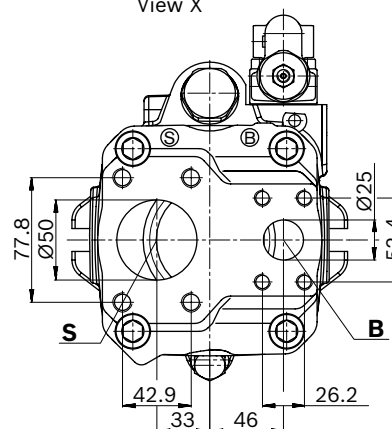
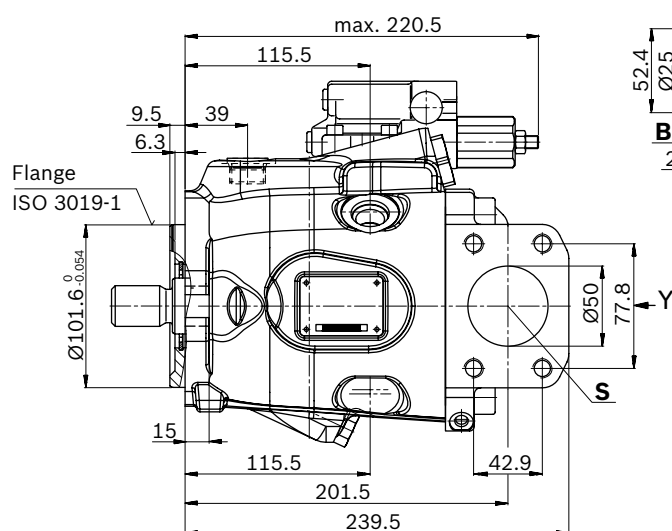
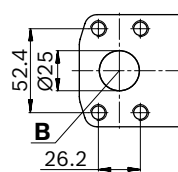
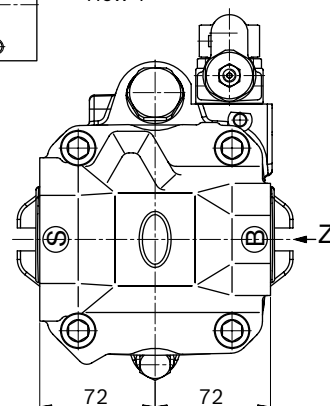
## Dimensions - Displacement 60

**PR - Hydraulic pressure controller, clockwise rotation, mounting flange C, 5.2 design\***



\* 5.2 design: No longer in production. Please see the 5.3 design.

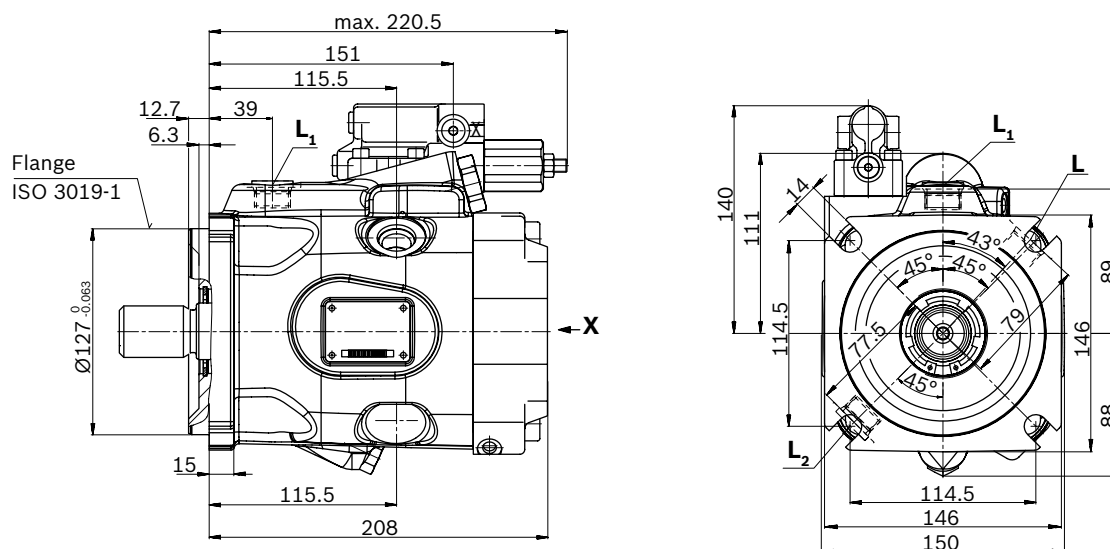
\* 5.2 design: No longer in production. Please see the 5.3 design.

**Dimensions - Displacement 63****PR - Hydraulic pressure controller, clockwise rotation, mounting flange C, 5.3 design****▼ Port plate 11****View X****▼ Port plate 12****Detail Z****View Y**

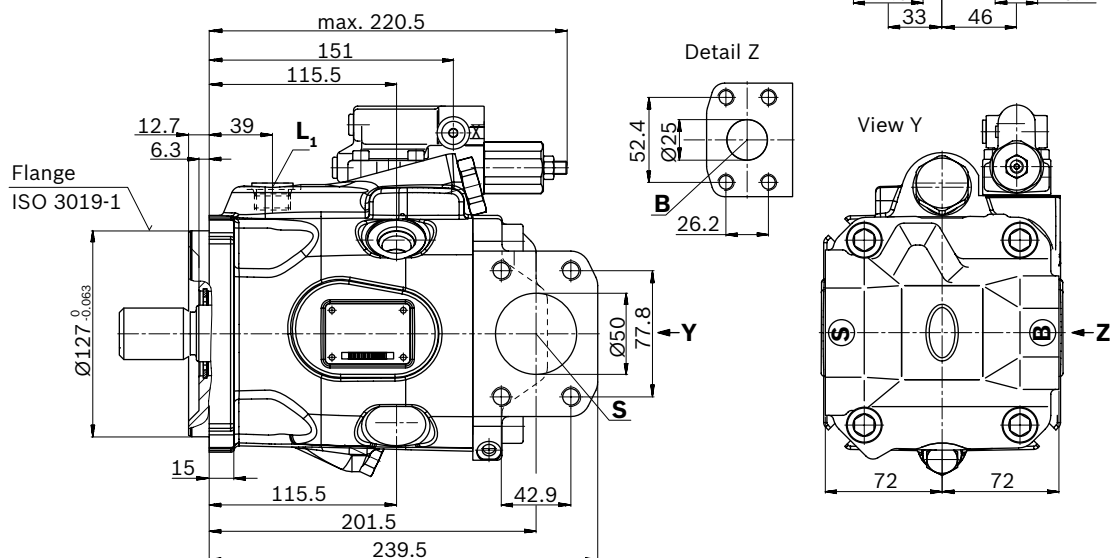
## Dimensions - Displacement 63

**PR - Hydraulic pressure controller, clockwise rotation, mounting flange D, 5.3 design**

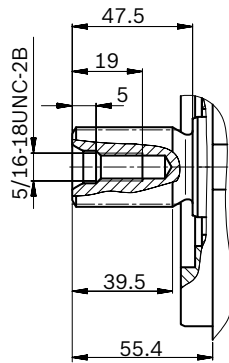
### ▼ Port plate 11



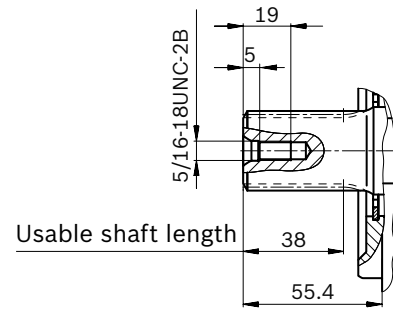
### ▼ Port plate 12



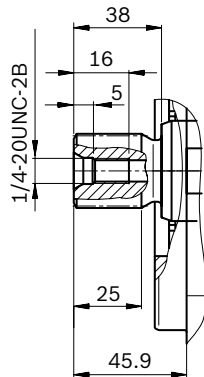
## ▼ Splined shaft 1 1/4 in SAE J744

**S** – 14T 12/24DP


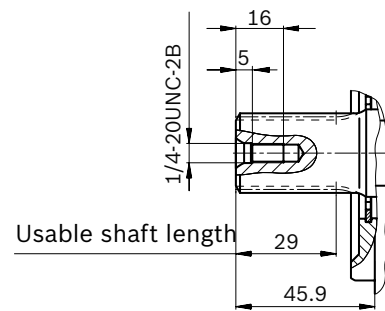
## ▼ Splined shaft 1 1/4 in SAE J744

**R** – 14T 12/24DP


## ▼ Splined shaft 1 in SAE J744

**U** – 15T 16/32DP


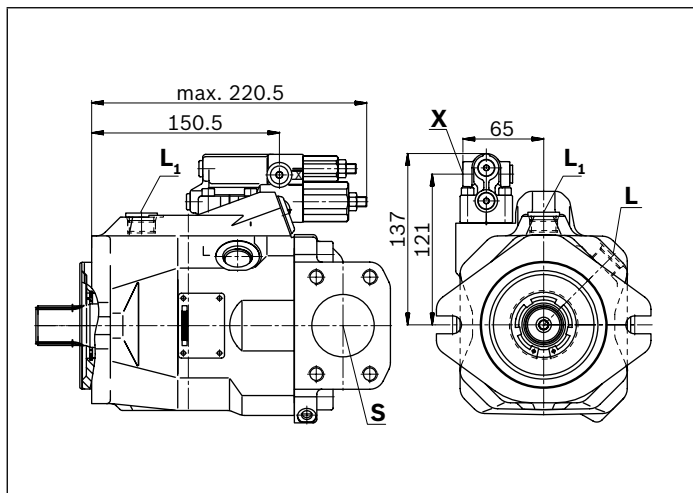
## ▼ Splined shaft 1 in SAE J744

**W** – 15T 16/32DP


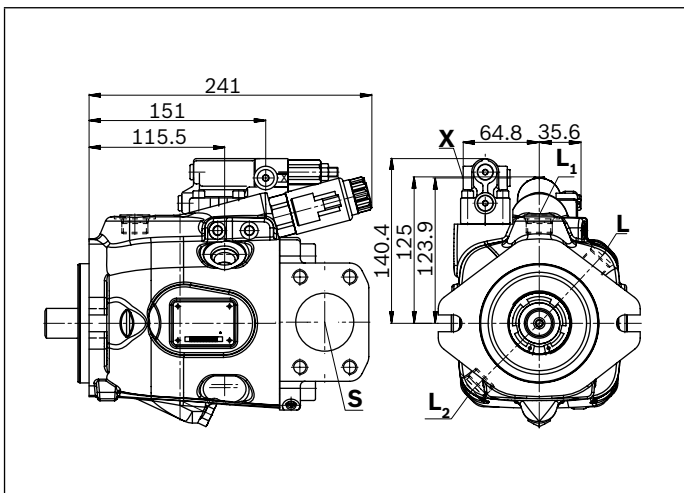
| Ports                               |                                                             | Standard           | Displacement                | $p_{\max \text{ abs}}$ [bar] | State |
|-------------------------------------|-------------------------------------------------------------|--------------------|-----------------------------|------------------------------|-------|
| <b>B</b>                            | Working port (Standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 1 in<br>M10 × 1.5; 17 deep  | 315                          | O     |
| <b>S</b>                            | Suction port (standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 2 in<br>M12 × 1.75; 20 deep | 5                            | O     |
| <b>L</b>                            | Drain port                                                  | ISO 11926          | 7/8-14UNF-2B; 13 deep       | 2                            | O     |
| <b>L<sub>1</sub>, L<sub>2</sub></b> | Drain port                                                  | ISO 11926          | 7/8-14UNF-2B; 13 deep       | 2                            | X     |
| <b>X</b>                            | Control pressure                                            | ISO 11926          | 7/16-20UNF-2A; 11.5 deep    | 315                          | O     |



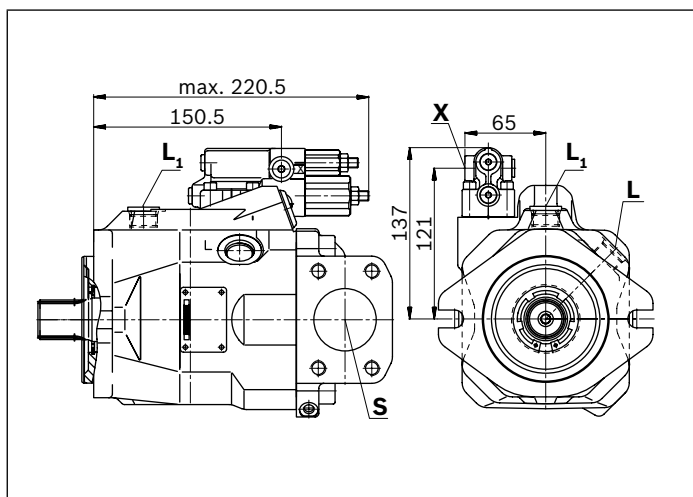
▼PRR - Pressure controller, remotely operated, 5.3 design / 5.2 design\*



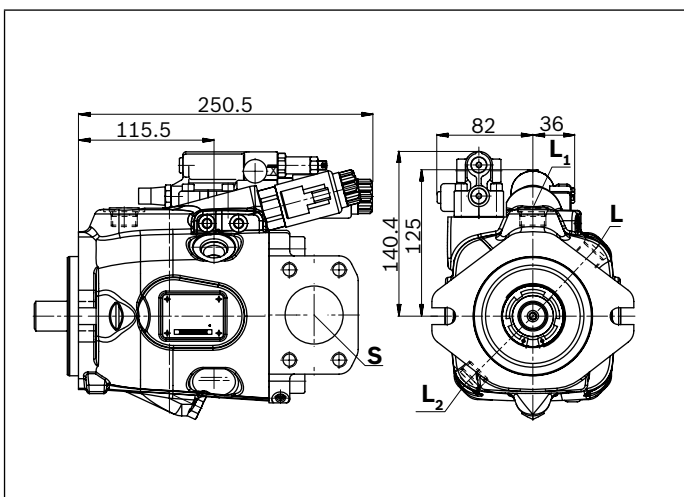
▼E1D / E2D - Electro-proportional pressure control, 5.3 design



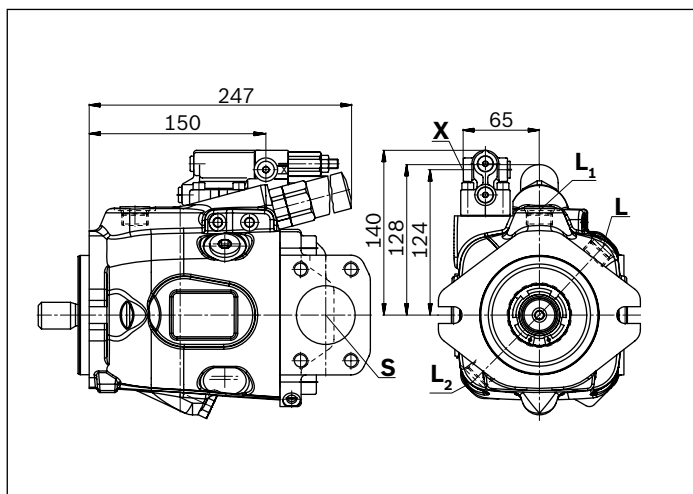
▼LS/LS1/LSC - Pressure/flow control (load-sensing), 5.3 design / 5.2 design\*



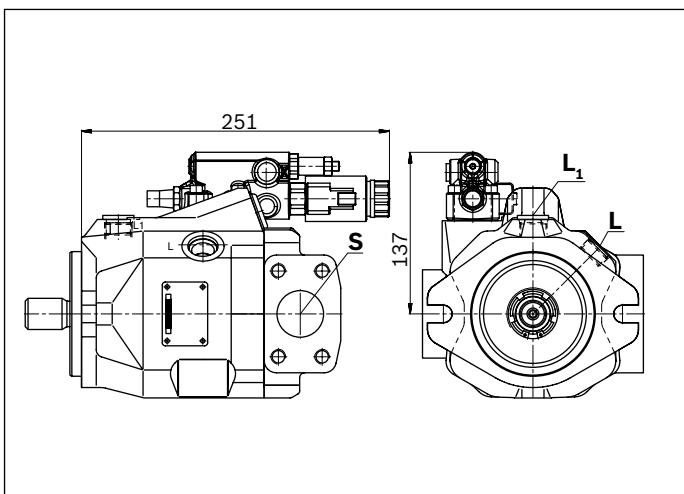
▼E1ED / E2ED - Electro-hydraulic pressure control, 5.3 design



▼L5D-L9D - Power control with pressure cut-off, 5.3 design

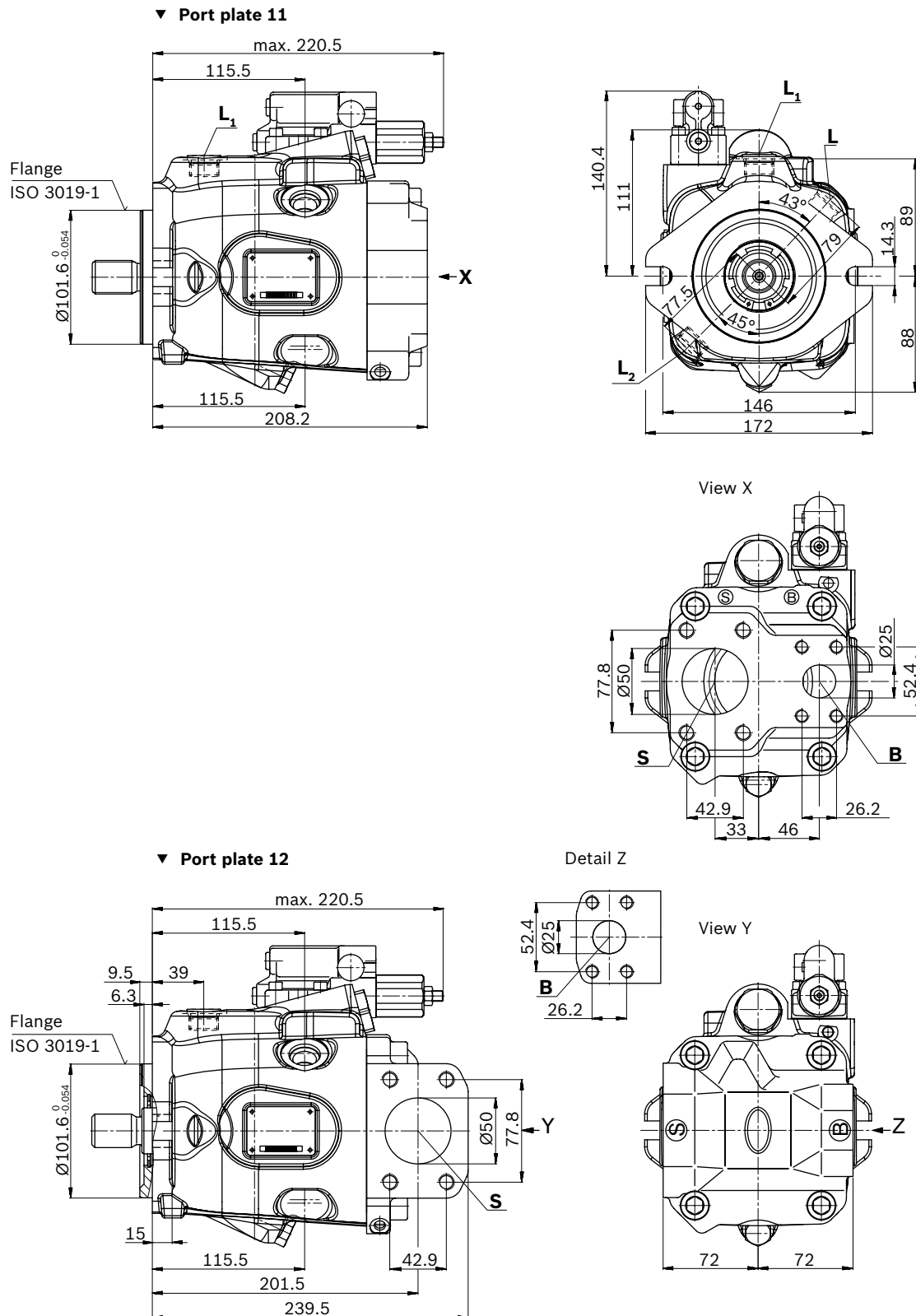


▼EN12/EN24 / EP12/EP24 - Electric pressure cut-off control, 5.3 design / 5.2 design\*



## Dimensions - Displacement 72

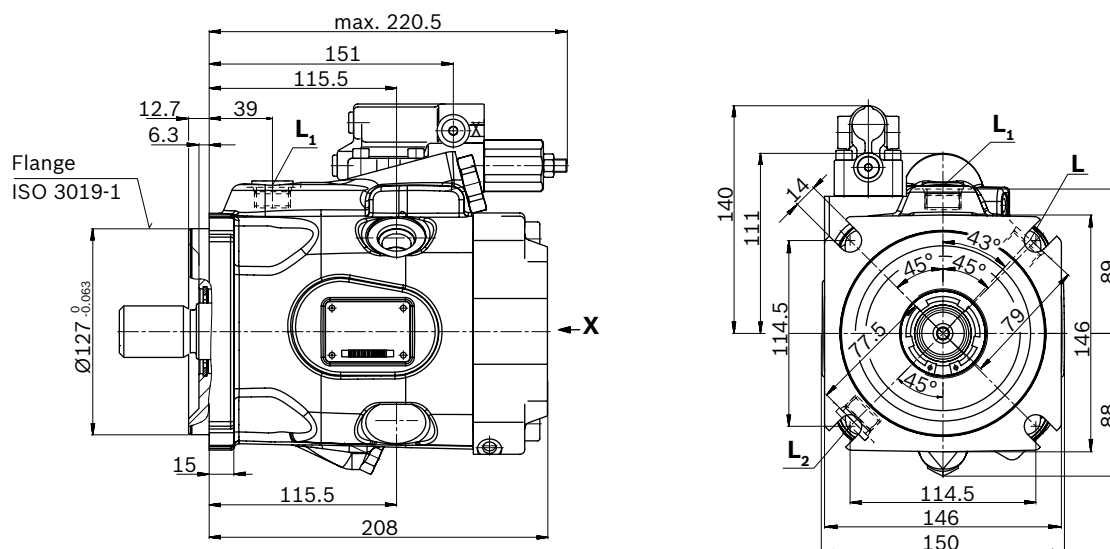
**PR - Hydraulic pressure controller, clockwise rotation, mounting flange C, 5.3 design**



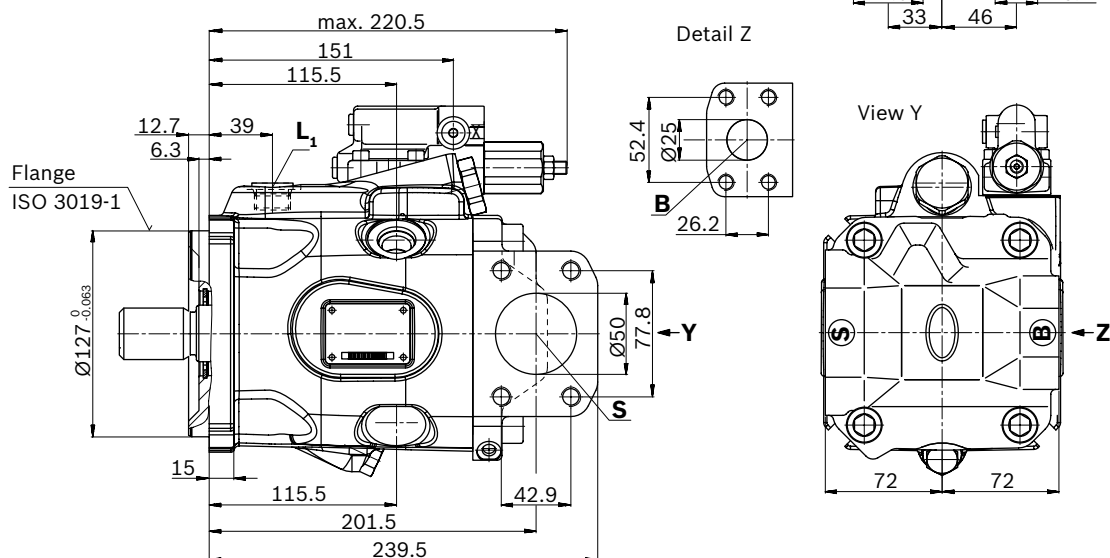
## Dimensions - Displacement 72

**PR - Hydraulic pressure controller, clockwise rotation, mounting flange D, 5.3 design**

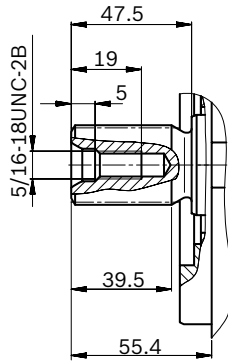
### ▼ Port plate 11



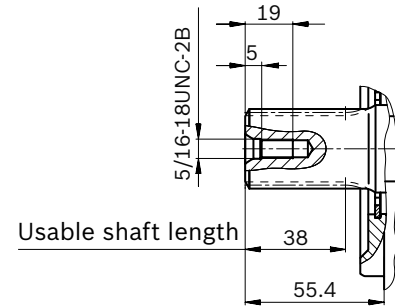
### ▼ Port plate 12



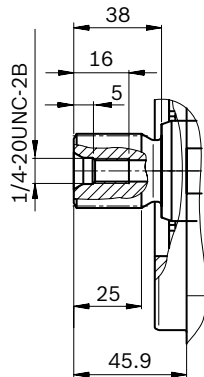
## ▼ Splined shaft 1 1/4 in SAE J744

**S** – 14T 12/24DP


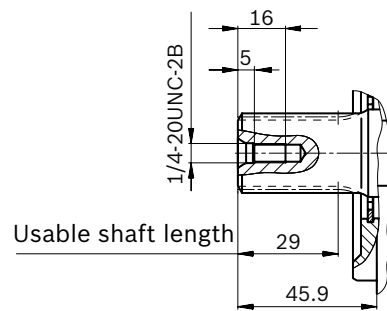
## ▼ Splined shaft 1 1/4 in SAE J744

**R** – 14T 12/24DP


## ▼ Splined shaft 1 in SAE J744

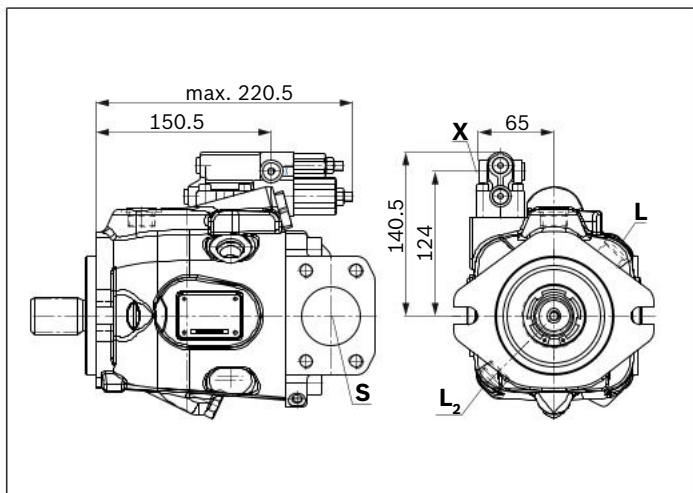
**U** – 15T 16/32DP


## ▼ Splined shaft 1 in SAE J744

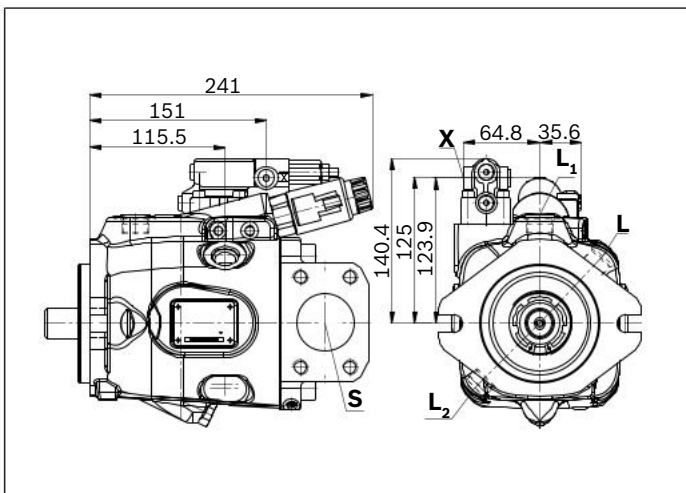
**W** – 15T 16/32DP


| Ports                               |                                                             | Standard           | Displacement                | $p_{\max \text{ abs}}$ [bar] | State |
|-------------------------------------|-------------------------------------------------------------|--------------------|-----------------------------|------------------------------|-------|
| <b>B</b>                            | Working port (Standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 1 in<br>M10 × 1.5; 17 deep  | 315                          | O     |
| <b>S</b>                            | Suction port (standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 2 in<br>M12 × 1.75; 20 deep | 5                            | O     |
| <b>L</b>                            | Drain port                                                  | ISO 11926          | 7/8-14UNF-2B; 13 deep       | 2                            | O     |
| <b>L<sub>1</sub>, L<sub>2</sub></b> | Drain port                                                  | ISO 11926          | 7/8-14UNF-2B; 13 deep       | 2                            | X     |
| <b>X</b>                            | Control pressure                                            | ISO 11926          | 7/16-20UNF-2A; 11.5 deep    | 315                          | O     |

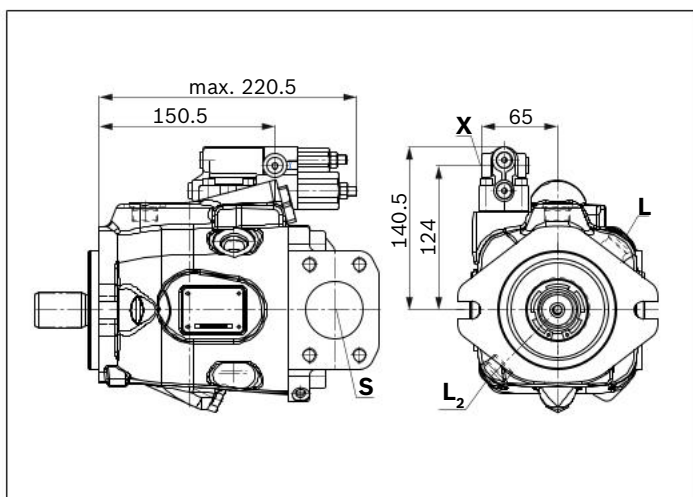
▼PRR - Pressure controller, remotely operated, 5.3 design



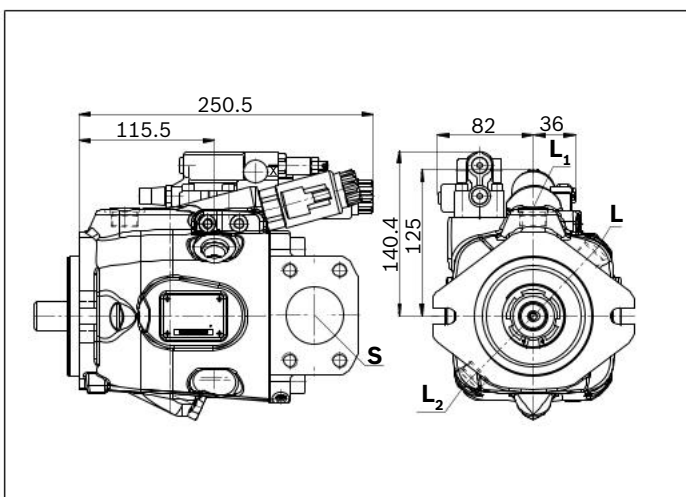
▼E1D / E2D - Electro-proportional pressure control, 5.3 design



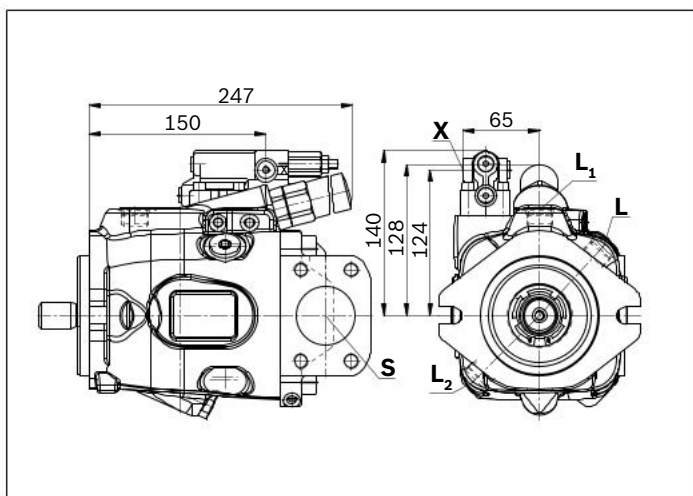
▼LS/L.DS/LSC - Pressure/flow control (load-sensing), 5.3 design



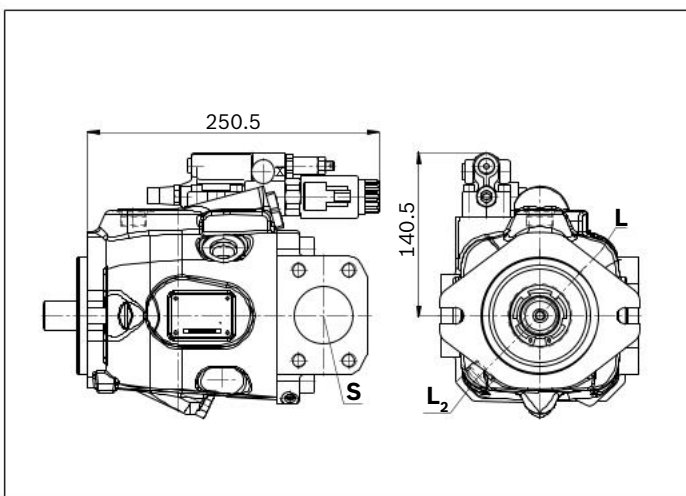
▼E1ED / E2ED - Electro-hydraulic pressure control, 5.3 design



▼L5D-L9D - Power control with pressure cut-off, 5.3 design

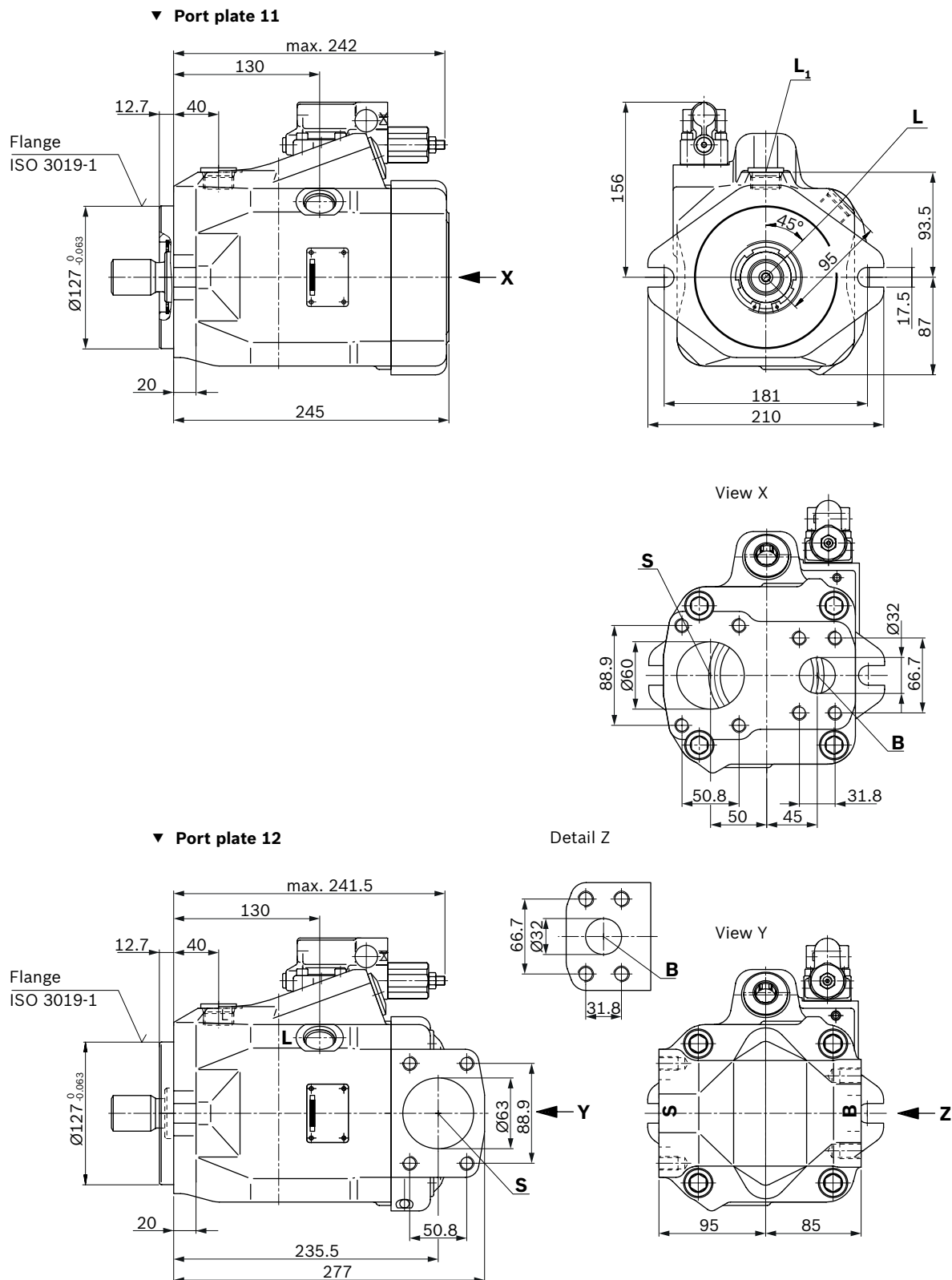


▼EN12/EN24 / EP12/EP24 - Electric pressure cut-off control, 5.3 design



## Dimensions - Displacement 85

**PR - Hydraulic pressure controller, clockwise rotation, mounting flange C, 5.2 design\***

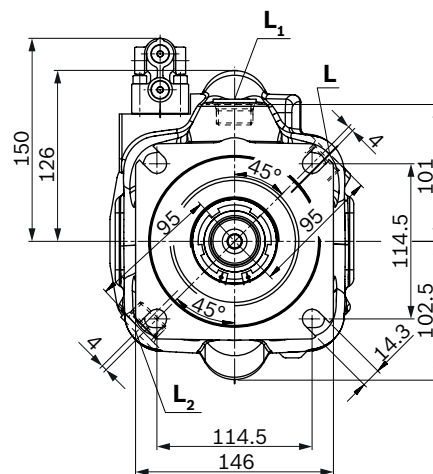
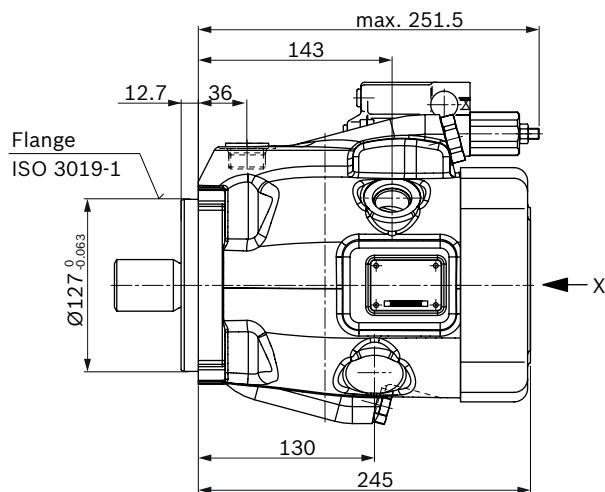


\* 5.2 design: No longer in production. Please see the 5.3 design.

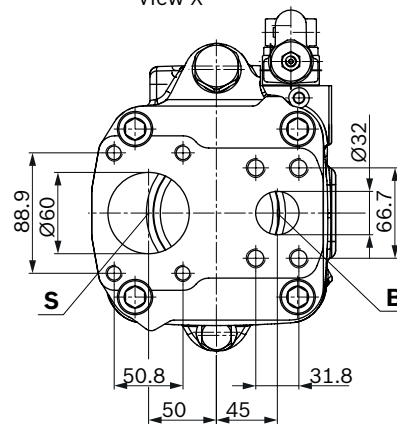
## Dimensions - Displacement 85

**PR - Hydraulic pressure controller, clockwise rotation, mounting flange D, 5.3 design**

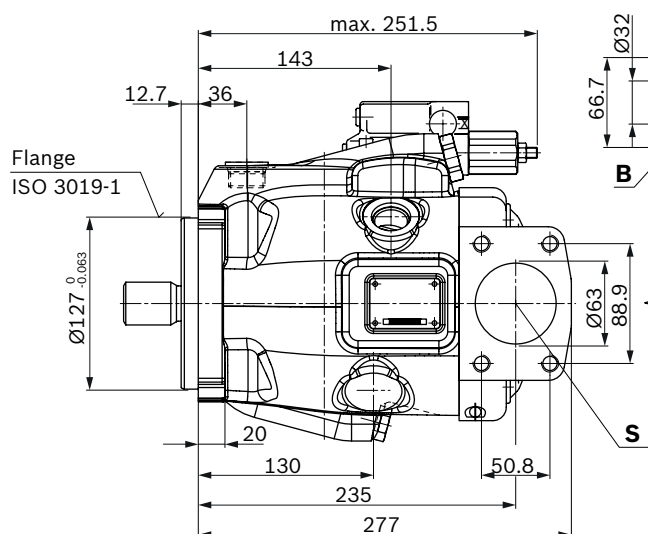
### ▼ Port plate 11



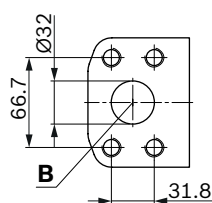
View X



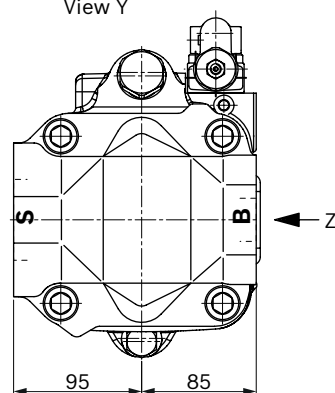
### ▼ Port plate 12



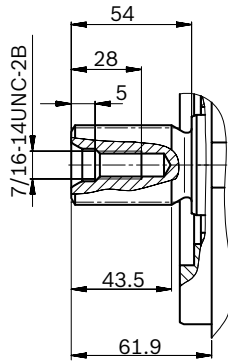
Detail Z



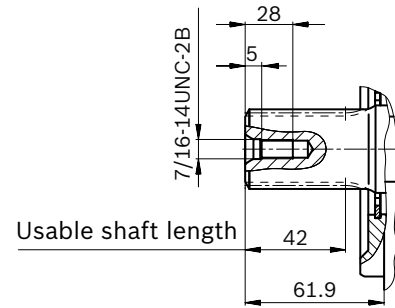
View Y



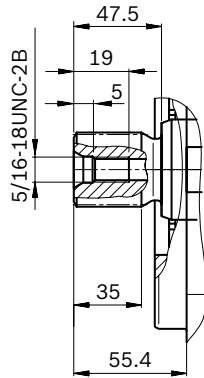
## ▼ Splined shaft 1 1/2 in SAE J744

**S** – 17T 12/24DP


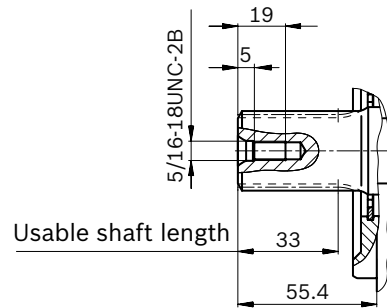
## ▼ Splined shaft 1 1/2 in SAE J744

**R** – 17T 12/24DP


## ▼ Splined shaft 1 1/4 in SAE J744

**U** – 14T 12/24DP


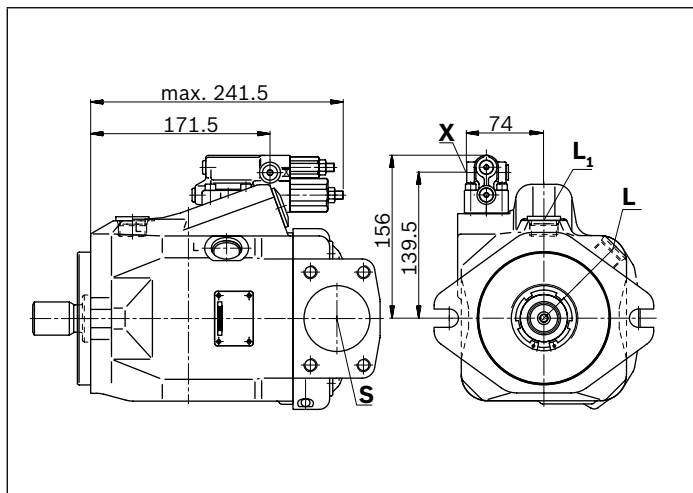
## ▼ Splined shaft 1 1/4 in SAE J744

**W** – 14T 12/24DP


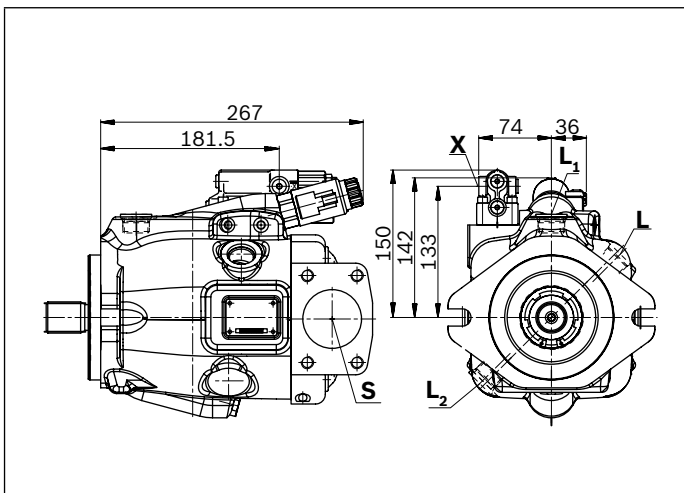
| Ports                               |                                                             | Standard           | Displacement                    | $p_{\max \text{ abs}}$ [bar] | State |
|-------------------------------------|-------------------------------------------------------------|--------------------|---------------------------------|------------------------------|-------|
| <b>B</b>                            | Working port (high-pressure series)<br>Fastening thread     | SAE J518<br>DIN 13 | 1 1/4 in<br>M14 × 2; 19 deep    | 315                          | O     |
| <b>S</b>                            | Suction port (standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 2 1/2 in<br>M12 × 1.75; 17 deep | 5                            | O     |
| <b>L</b>                            | Drain port                                                  | ISO 11926          | 1 1/16-12UNF-2B; 15 deep        | 2                            | O     |
| <b>L<sub>1</sub>, L<sub>2</sub></b> | Drain port                                                  | ISO 11926          | 1 1/16-12UNF-2B; 15 deep        | 2                            | X     |
| <b>X</b>                            | Control pressure                                            | ISO 11926          | 7/16-20UNF-2A; 11.5 deep        | 315                          | O     |



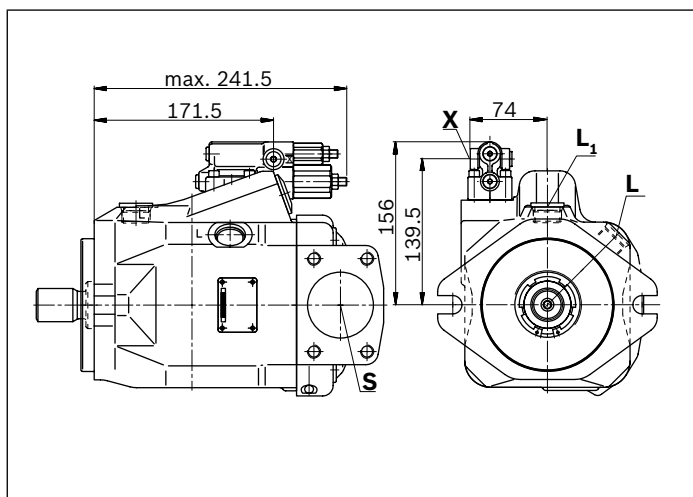
▼PRR - Pressure controller, remotely operated, 5.2 design\* / 5.3 design



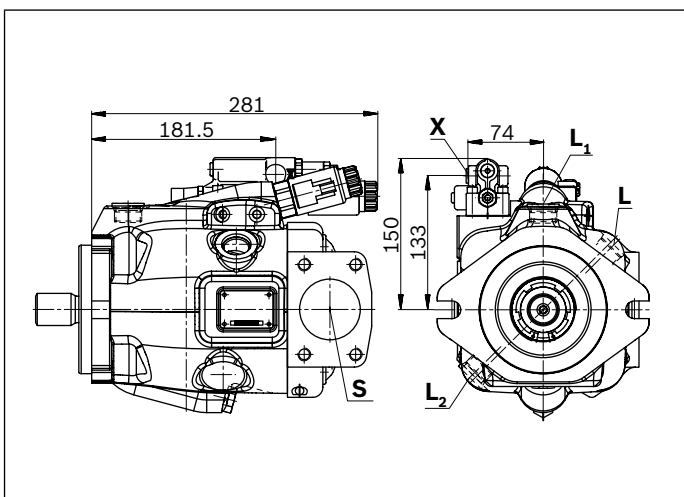
▼E1D / E2D - Electro-proportional pressure control, 5.3 design



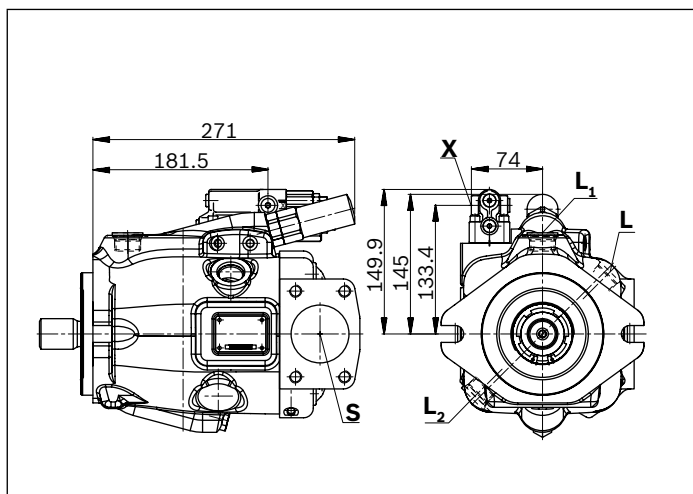
▼LS/L.DS/LSC - Pressure/flow control (load-sensing), 5.2 design\* / 5.3 design



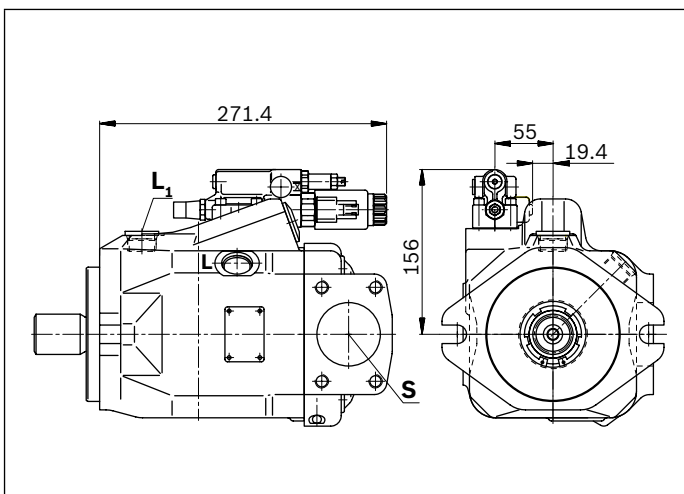
▼E1ED / E2ED - Electro-hydraulic pressure control, 5.3 design

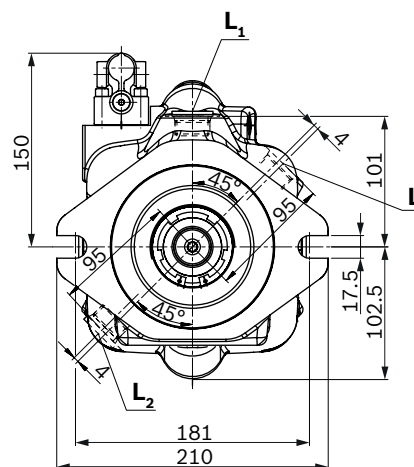
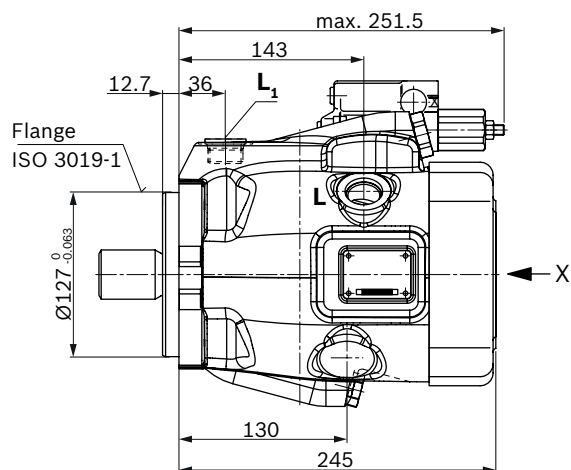
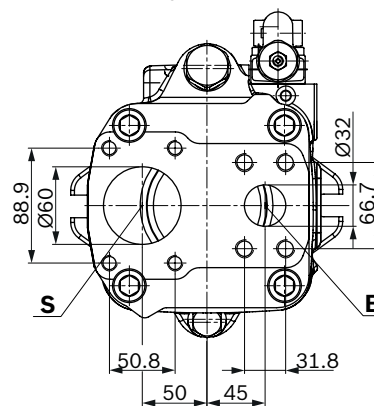
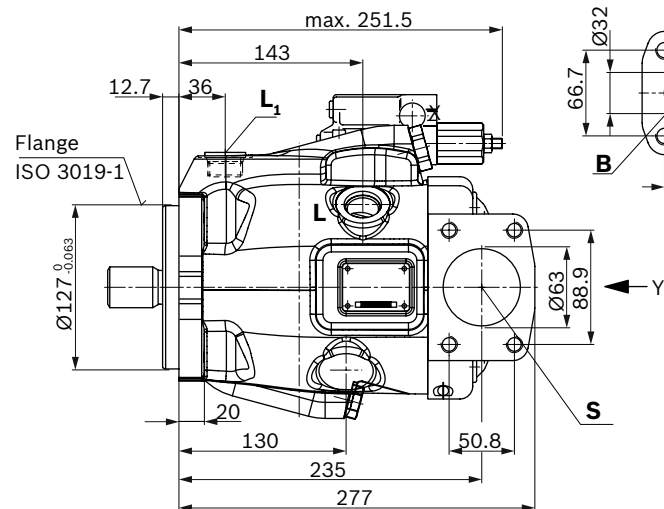
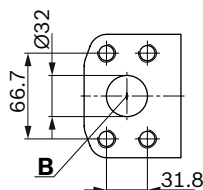
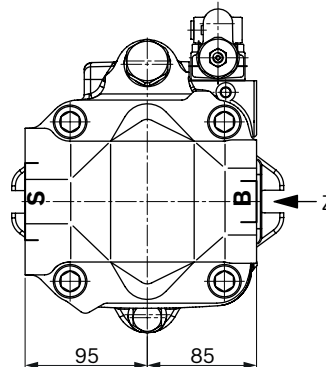


▼L5D-L9D - Power control with pressure cut-off, 5.3 design



▼EN12/EN24 / EP12/EP24 - Electric pressure cut-off control, 5.2 design\* / 5.3 design

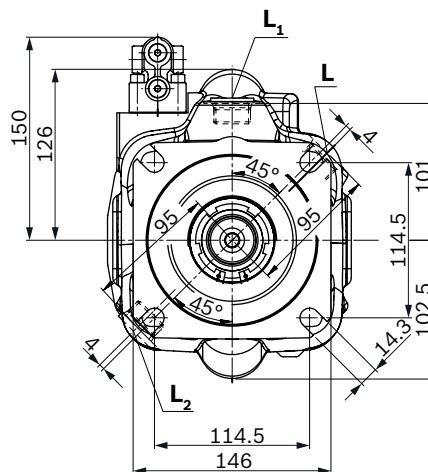
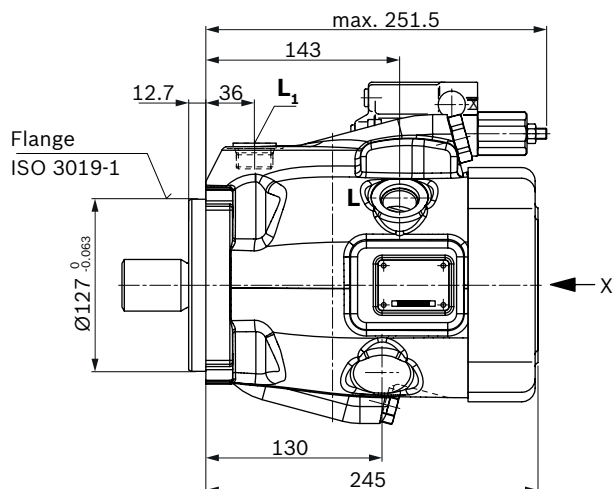


**Dimensions - Displacement 100****PR - Hydraulic pressure controller, clockwise rotation, mounting flange C, 5.3 design****▼ Port plate 11****View X****▼ Port plate 12****Detail Z****View Y**

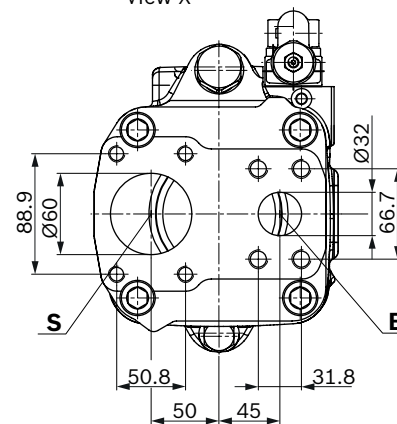
## Dimensions - Displacement 100

**PR - Hydraulic pressure controller, clockwise rotation, mounting flange D, 5.3 design**

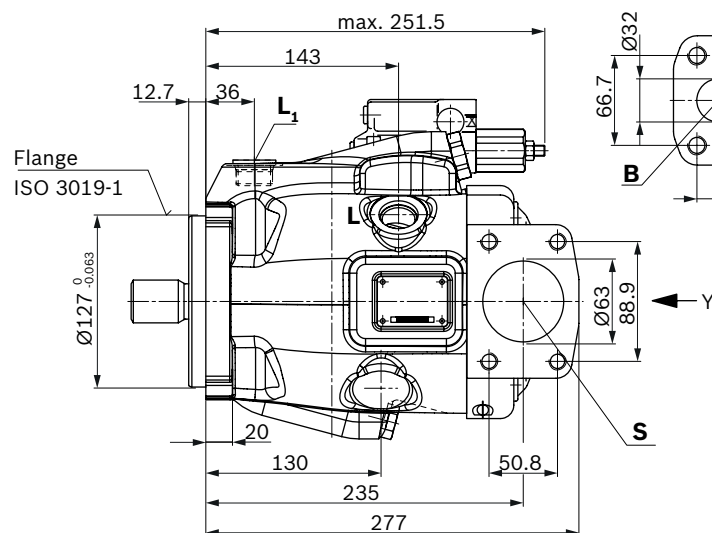
### ▼ Port plate 11



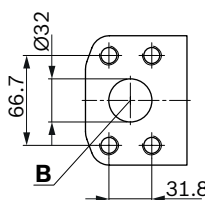
View X



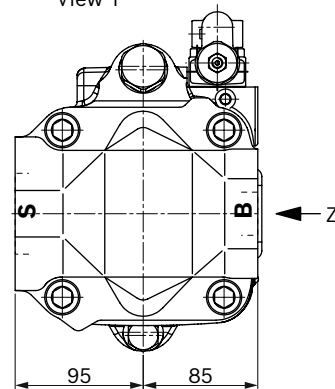
### ▼ Port plate 12



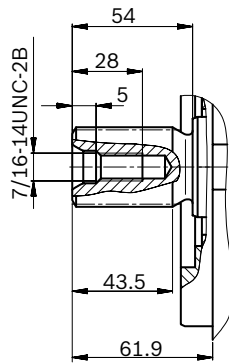
Detail Z



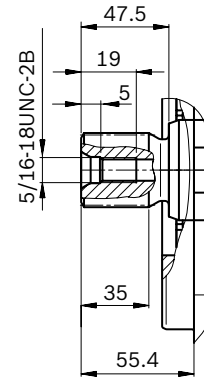
View Y



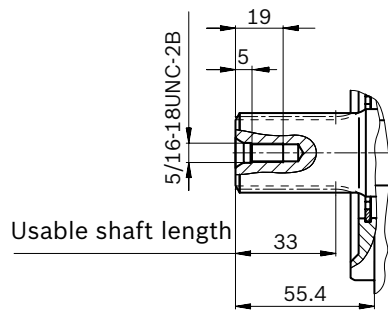
## ▼ Splined shaft 1 1/2 in SAE J744

**S** – 17T 12/24DP


## ▼ Splined shaft 1 1/4 in SAE J744

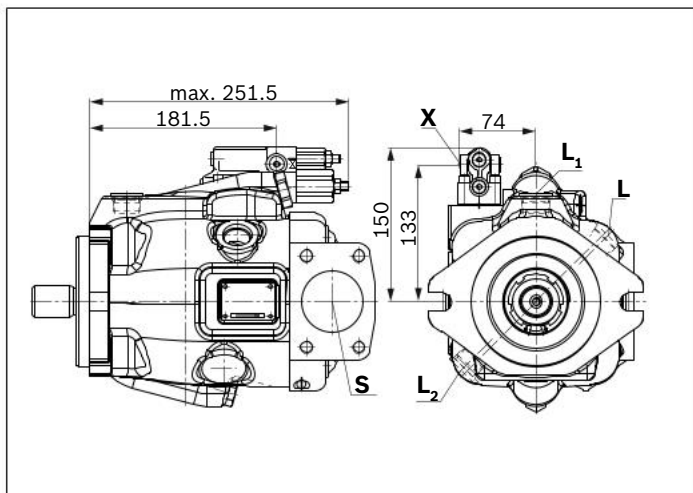
**U** – 14T 12/24DP


## ▼ Splined shaft 1 1/4 in SAE J744

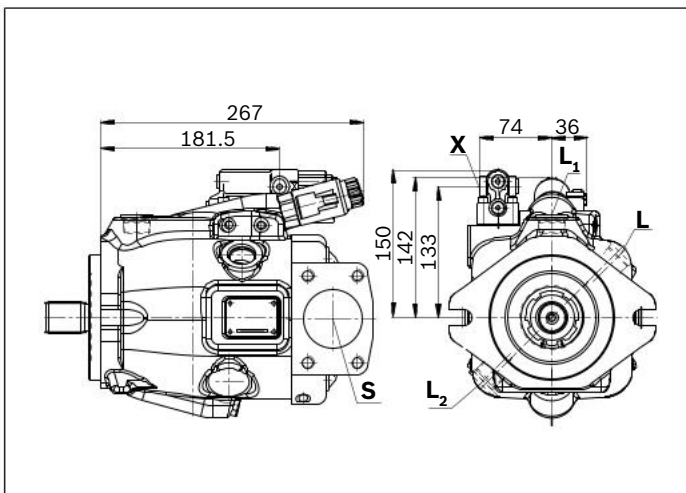
**W** – 14T 12/24DP


| Ports                               |                                                             | Standard           | Displacement                    | $p_{\max \text{ abs}}$ [bar] | State |
|-------------------------------------|-------------------------------------------------------------|--------------------|---------------------------------|------------------------------|-------|
| <b>B</b>                            | Working port (high-pressure series)<br>Fastening thread     | SAE J518<br>DIN 13 | 1 1/4 in<br>M14 × 2; 19 deep    | 315                          | O     |
| <b>S</b>                            | Suction port (standard pressure series)<br>Fastening thread | SAE J518<br>DIN 13 | 2 1/2 in<br>M12 × 1.75; 17 deep | 5                            | O     |
| <b>L</b>                            | Drain port                                                  | ISO 11926          | 1 1/16-12UNF-2B; 15 deep        | 2                            | O     |
| <b>L<sub>1</sub>, L<sub>2</sub></b> | Drain port                                                  | ISO 11926          | 1 1/16-12UNF-2B; 15 deep        | 2                            | X     |
| <b>X</b>                            | Control pressure                                            | ISO 11926          | 7/16-20UNF-2A; 11.5 deep        | 315                          | O     |

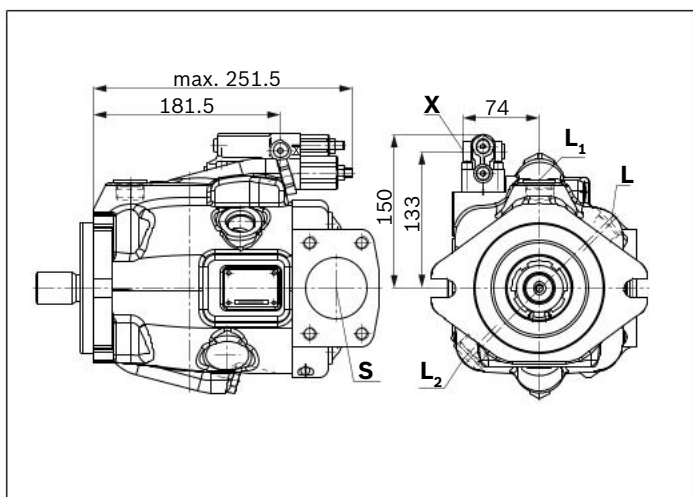
▼PRR - Pressure controller, remotely operated, 5.3 design



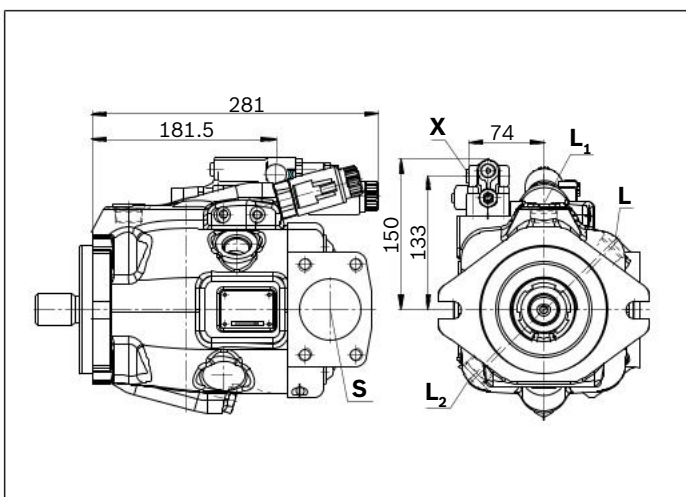
▼E1D / E2D - Electro-proportional pressure control, 5.3 design



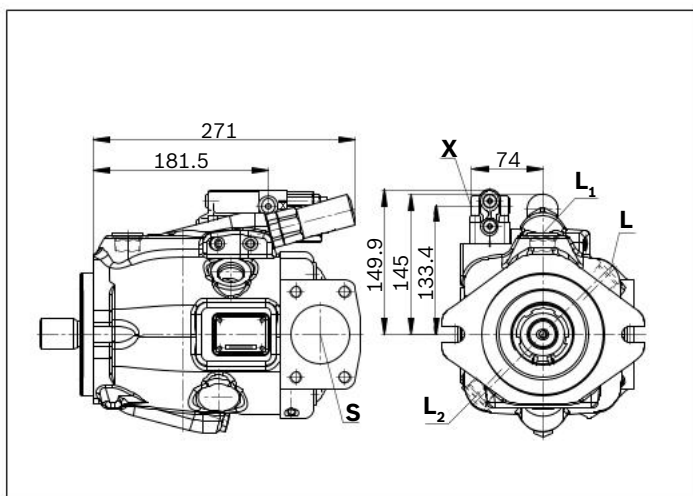
▼LS/L.DS/LSC - Pressure/flow control (load-sensing), 5.3 design



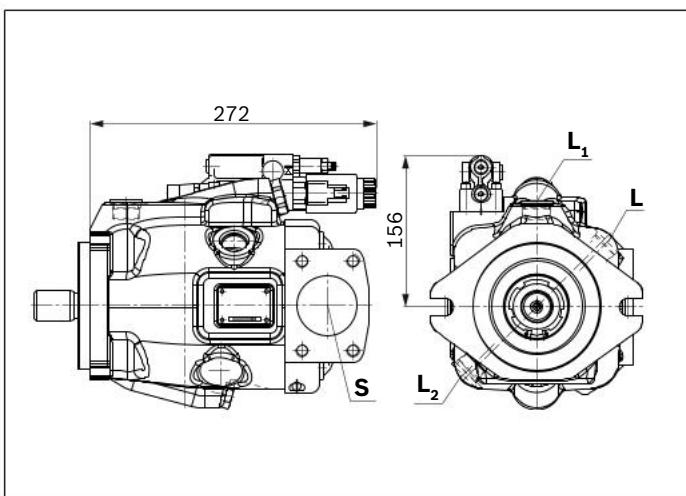
▼E1ED / E2ED - Electro-hydraulic pressure control, 5.3 design



▼L5D-L9D - Power control with pressure cut-off, 5.3 design



▼EN12/EN24 / EP12/EP24 - Electric pressure cut-off control, 5.3 design

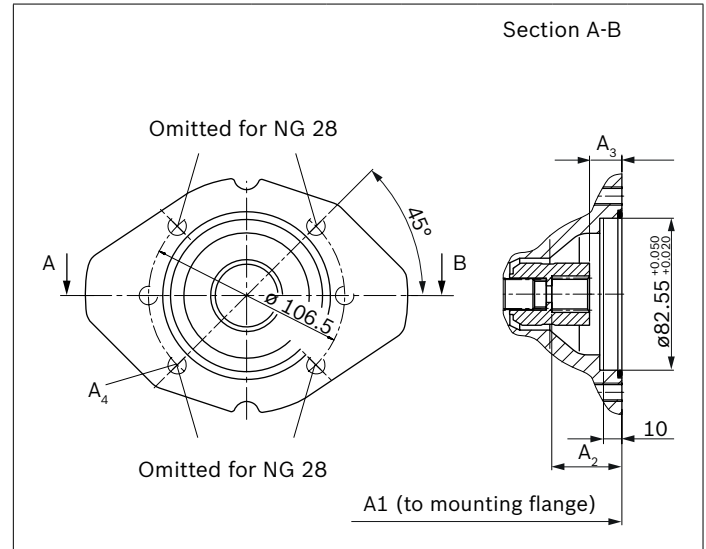
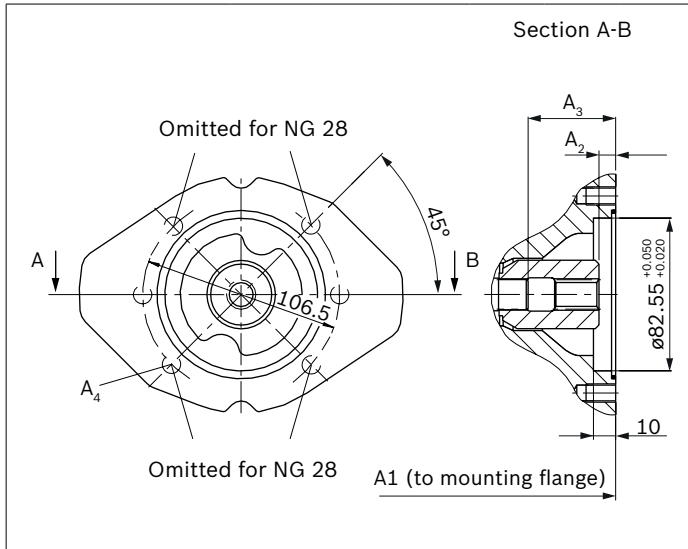


**Tandem dimensions**

| Flange ISO 3019-1 (SAE) |                   | Hub for splined shaft |             | Availability by displacement |    |    |       |    |    |     | Code |
|-------------------------|-------------------|-----------------------|-------------|------------------------------|----|----|-------|----|----|-----|------|
| Diameter                | Attachment        | Diameter              |             | 18                           | 28 | 45 | 60/63 | 72 | 85 | 100 |      |
| 82-2 (A)                | $\phi$ , $\infty$ | 5/8 in                | 9T 16/32DP  | ●                            | ●  | ●  | ●     | ●  | ●  | ●   | K01  |
|                         |                   | 3/4 in                | 11T 16/32DP | ●                            | ●  | ●  | ●     | ●  | ●  | ●   | K52  |

● = Available    ○ = On request

## ▼ 82/-2



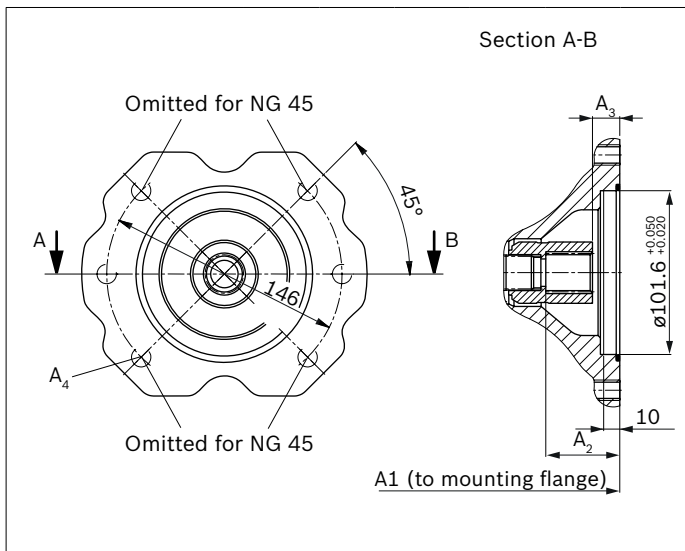
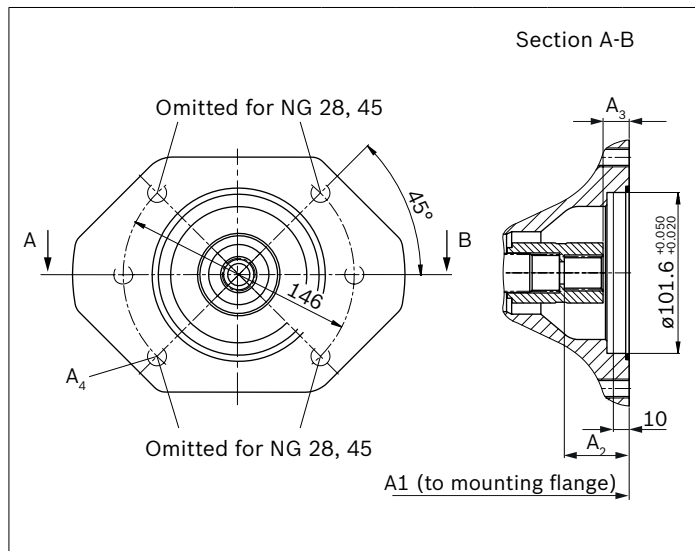
| K01<br>(SAE J744 16-4 (A)) | NG       | A1  | A2   | A3   | A4                    |
|----------------------------|----------|-----|------|------|-----------------------|
|                            | 18       | 182 | 9.3  | 43.3 | M10×1.5;<br>14.5 deep |
|                            | 28       | 204 | 9.9  | 47   | M10×1.5;<br>16 deep   |
|                            | 45       | 229 | 10.7 | 53   | M10×1.5;<br>16 deep   |
|                            | 60<br>63 | 255 | 9.5  | 59   | M10×1.5;<br>16 deep   |
|                            | 72       | 255 | 9.5  | 59   | M10×1.5;<br>16 deep   |
|                            | 85       | 302 | 13.4 | 68   | M10×1.5;<br>20 deep   |
|                            | 100      | 302 | 13.4 | 68   | M10×1.5;<br>20 deep   |

| K52<br>(SAE J744 19-4 (A-B)) | NG       | A1  | A2   | A3   | A4                    |
|------------------------------|----------|-----|------|------|-----------------------|
|                              | 18       | 182 | 39   | 18.8 | M10×1.5;<br>14.5 deep |
|                              | 28       | 204 | 39.3 | 18.8 | M10×1.5;<br>16 deep   |
|                              | 45       | 229 | 39.4 | 18.9 | M10×1.5;<br>16 deep   |
|                              | 60<br>63 | 255 | 39.4 | 18.9 | M10×1.5;<br>16 deep   |
|                              | 72       | 255 | 39.4 | 18.9 | M10×1.5;<br>16 deep   |
|                              | 85       | 302 | 44.1 | 23.6 | M10×1.5;<br>20 deep   |
|                              | 100      | 302 | 44.1 | 23.6 | M10×1.5;<br>20 deep   |

| Flange ISO 3019-1 (SAE) |            | Hub for splined shaft |             | Availability by displacement |    |    |       |    |    |     | Code |
|-------------------------|------------|-----------------------|-------------|------------------------------|----|----|-------|----|----|-----|------|
| Diameter                | Attachment | Diameter              |             | 18                           | 28 | 45 | 60/63 | 72 | 85 | 100 |      |
| 101-2 (B)               | ⌀, ∞       | 7/8 in                | 13T 16/32DP | -                            | ●  | ●  | ●     | ●  | ●  | ●   | K68  |
|                         |            | 1 in                  | 15T 16/32DP | -                            | -  | ●  | ●     | ●  | ●  | ●   | K04  |

● = Available    ○ = On request

▼ 101/-2



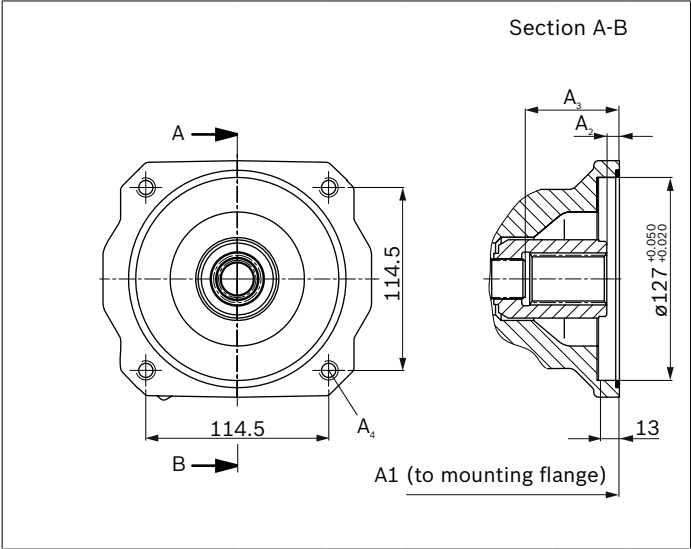
| K68<br>(SAE J744 22-4 (B)) | NG       | A1  | A2   | A3   | A4                   |
|----------------------------|----------|-----|------|------|----------------------|
|                            | 28       | 204 | 42.3 | 17.8 | M12×1.75;<br>18 deep |
|                            | 45       | 229 | 42.4 | 17.9 | M12×1.75;<br>18 deep |
|                            | 60<br>63 | 255 | 42.4 | 17.9 | M12×1.75;<br>18 deep |
|                            | 72       | 255 | 42.4 | 17.9 | M12×1.75;<br>18 deep |
|                            | 85       | 302 | 46.5 | 22   | M12×1.75;<br>20 deep |
|                            | 100      | 302 | 46.5 | 22   | M12×1.75;<br>20 deep |

| K04<br>(SAE J744 25-4 (B-B)) | NG       | A1  | A2   | A3   | A4                   |
|------------------------------|----------|-----|------|------|----------------------|
|                              | 45       | 229 | 47.9 | 18.9 | M12×1.75;<br>18 deep |
|                              | 60<br>63 | 255 | 47.4 | 18.4 | M12×1.75;<br>18 deep |
|                              | 72       | 255 | 47.4 | 18.4 | M12×1.75;<br>18 deep |
|                              | 85       | 302 | 51.2 | 22.2 | M12×1.75;<br>20 deep |
|                              | 100      | 302 | 51.2 | 22.2 | M12×1.75;<br>20 deep |

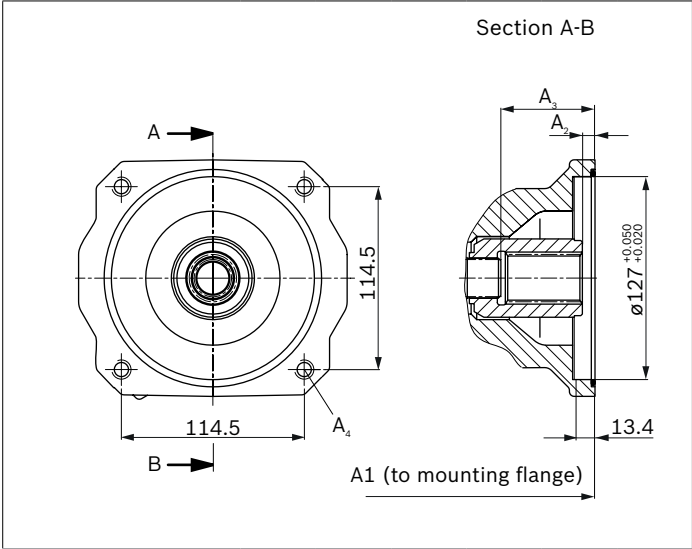
| Flange ISO 3019-1 (SAE) |                                                                                   | Hub for splined shaft |             | Availability by displacement |    |    |       |    |    |     | Code |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------|-------------|------------------------------|----|----|-------|----|----|-----|------|
| Diameter                | Attachment                                                                        | Diameter              |             | 18                           | 28 | 45 | 60/63 | 72 | 85 | 100 |      |
| 127-4 (C)               |  | 1 1/4 in              | 14T 12/24DP | -                            | -  | -  | •     | •  | •  | •   | K15  |
|                         |                                                                                   | 1 1/2 in              | 17T 12/24DP | -                            | -  | -  | -     | -  | •  | •   | K16  |

• = Available      ○ = On request

▼ 127/-4



| K15                 | NG    | A1 | A2   | A3                | A4 |
|---------------------|-------|----|------|-------------------|----|
| (SAE J744 32-4 (C)) |       |    |      |                   |    |
| 60/63               | 255   | 8  | 59   | M12×1.75; 16 deep |    |
| 72                  | 255   | 8  | 59   | M12×1.75; 16 deep |    |
| 85                  | 301.5 | 13 | 67.9 | M12×1.75; through |    |
| 100                 | 301.5 | 13 | 67.9 | M12×1.75; through |    |



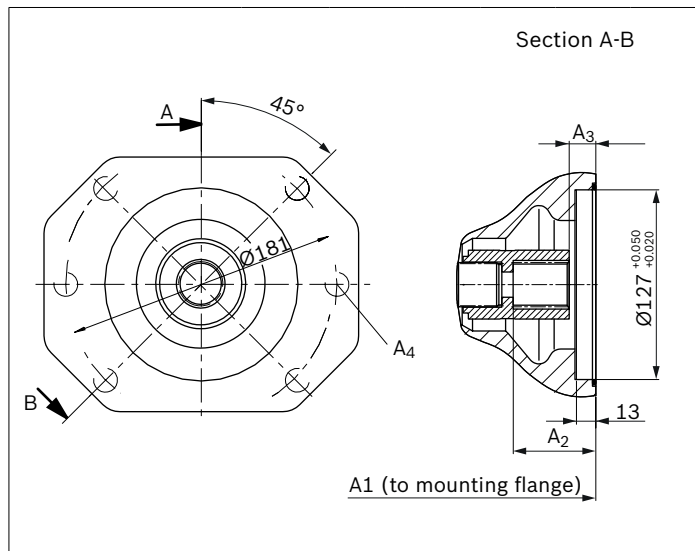
| K16                 | NG    | A1 | A2   | A3                | A4 |
|---------------------|-------|----|------|-------------------|----|
| (SAE J744 32-4 (C)) |       |    |      |                   |    |
| 85                  | 301.5 | 13 | 67.9 | M12×1.75; through |    |
| 100                 | 301.5 | 13 | 67.9 | M12×1.75; through |    |



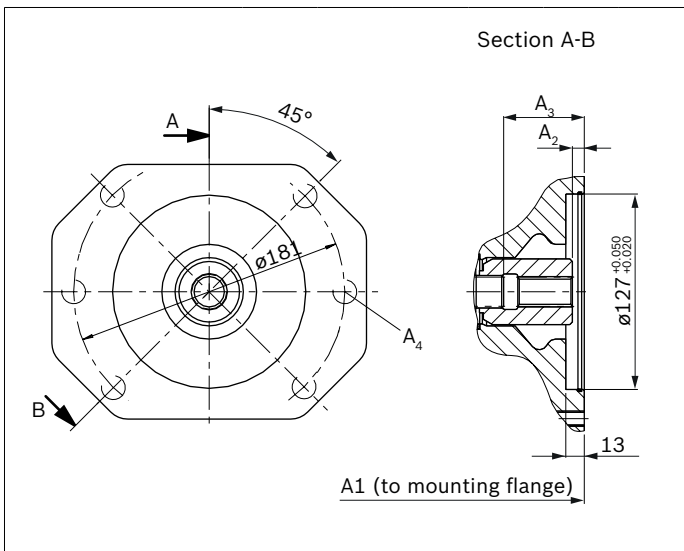
| Flange ISO 3019-1 (SAE) |            | Hub for splined shaft |             | Availability by displacement |    |    |       |    |    |     | Code |
|-------------------------|------------|-----------------------|-------------|------------------------------|----|----|-------|----|----|-----|------|
| Diameter                | Attachment | Diameter              |             | 18                           | 28 | 45 | 60/63 | 72 | 85 | 100 |      |
| 127-2 (B)               | ⌀, ∞       | 1 1/4 in              | 14T 12/24DP | -                            | -  | -  | -     | -  | ●  | ●   | K07  |
|                         |            | 1 1/2 in              | 17T 12/24DP | -                            | -  | -  | -     | -  | ●  | ●   | K24  |

● = Available    ○ = On request

▼ 127/-2



| K07<br>(SAE J744 32-4 (C)) | NG  | A1    | A2 | A3   | A4                |
|----------------------------|-----|-------|----|------|-------------------|
|                            | 85  | 301.5 | 13 | 67.9 | M16×2;<br>24 deep |
|                            | 100 | 301.5 | 13 | 67.9 | M16×2;<br>24 deep |



| K24<br>(SAE J744 38-4 (C-C)) | NG  | A1  | A2 | A3 | A4                |
|------------------------------|-----|-----|----|----|-------------------|
|                              | 85  | 302 | 8  | 68 | M16×2;<br>24 deep |
|                              | 100 | 302 | 8  | 68 | M16×2;<br>24 deep |

Overview of attachment options

| Tandem               |                          | Attachment options – 2nd pump |                                         |                           |                    |               |
|----------------------|--------------------------|-------------------------------|-----------------------------------------|---------------------------|--------------------|---------------|
| Flange<br>ISO 3019-1 | Hub for<br>splined shaft | Code                          | HA10V Series 5 NG (shaft)               | HA10V Series 5 NG (shaft) | A1VO/10 NG (shaft) | External gear |
| 82-2 (A)             | 5/8 in                   | K01                           | 10 (U), 18 (U)                          | 18 (U)                    | 18 (S2)            | AZPF          |
|                      | 3/4 in                   | K52                           | 10 (S), 18 (S, R)                       | 18 (S, R)                 | 18 (S3)            |               |
| 101-2 (B)            | 7/8 in                   | K68                           | 28 (S, R)<br>45 (U, W)                  | 28 (S, R)<br>45 (U,W)     | 35 (S4)            | AZPN/AZPG     |
|                      | 1 in                     | K04                           | 45 (S, R)<br>60, 63 (U, W)<br>72 (U, W) | 45 (S, R)                 | 35 (S5)            | –             |
| 127-4 (C)            | 1 1/4 in                 | K15                           | 60, 63 (S, R)<br>72 (S, R)              | –                         | –                  | –             |
|                      | 1 1/2 in                 | K16                           | 85 (S)<br>100 (S)                       | –                         | –                  | –             |
| 127-2 (C)            | 1 1/4 in                 | K07                           | 85 (U,W)<br>100 (U,W)                   | 71 (S, R)                 | –                  | PGH5          |
|                      | 1 1/2 in                 | K24                           | 85 (S)<br>100 (S)                       | –                         | –                  | –             |

## Combination pumps HA10V Series 5 + HA10V Series 5

By using combination pumps, it is possible to have independent circuits without the need for splitter gearboxes. When ordering a combination pump, use the designations of the first and second pumps, joined by a "+".

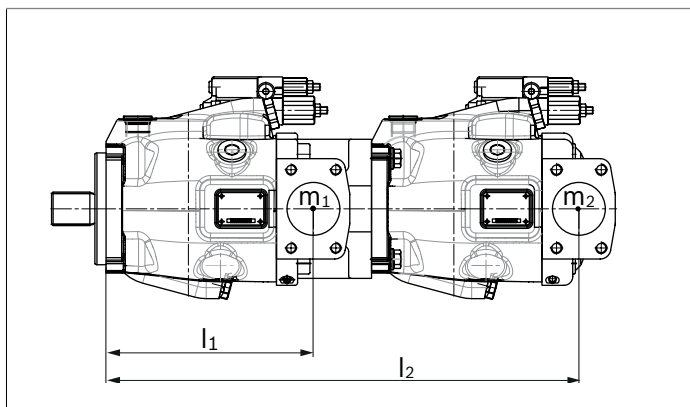
**Order example:**

**HA10V Series 5 85L.DS/5.3R-VSC12K04+**

**HA10V Series 5 45LS/5.3R-VSC11N00**

It is permissible to use a combination of two single pumps of equal displacement (tandem pump), with a dynamic mass acceleration of maximum 10 g (= 98.1 m/s<sup>2</sup>) without additional support brackets.

For combination pumps consisting of more than two pumps, the mounting flange must be rated for the permissible mass torque (please consult us).



|                 |                   |      |
|-----------------|-------------------|------|
| $m_1, m_2, m_3$ | Weight of pump    | [kg] |
| $l_1, l_2, l_3$ | Center of gravity | [mm] |

$$T_m = (m_1 \times l_1 + m_2 \times l_2 + m_3 \times l_3) \times \frac{1}{102} \quad [\text{Nm}]$$

### Permissible mass moment of inertia

| NG                                             |                       |       |    | 10   | 18 | 28  | 45  | 60/63 | 72   | 85   | 100  |
|------------------------------------------------|-----------------------|-------|----|------|----|-----|-----|-------|------|------|------|
| static                                         | $T_m$                 | Nm    | –  | –    | –  | 890 | 900 | 1370  | 1370 | 3080 | 3080 |
| dynamic at 10 g (98.1 m/s <sup>2</sup> )       | $T_m$                 | Nm    | –  | –    | –  | 89  | 90  | 137   | 137  | 308  | 308  |
| Weight with tandem plate                       | $m$                   | kg    | –  | 13   | 18 | 24  | 28  | 28    | 28   | 45   | 45   |
| Weight without tandem plate (e.g. second pump) |                       |       | 8  | 11.5 | 15 | 18  | 22  | 22    | 22   | 36   | 36   |
| Center of gravity                              | <b>without</b> tandem | $l_l$ | mm | –    | 78 | 85  | 96  | 105   | 105  | 122  | 122  |
| Center of gravity                              | <b>with</b> tandem    | $l_l$ | mm | –    | 87 | 99  | 115 | 127   | 127  | 150  | 150  |





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