## XL4 disc valve motor series

### About the XL4 series

Danfoss' Xcel™ series low speed high torque disc valve motors offer the most popular features and options from the parallel Danfoss Char-Lynn range and are optimized to bring the highest value in medium duty applications.

### XL4 features, benefits, applications

#### Features

- 6 displacements, a variety of mounting flanges and output shafts
- Reliable, proven design
- High efficiency

#### Benefits

- Flexiblilty in designing this motor into a system
- Options that fit well into tough applications

#### Applications

- Mowers
- Snow Removal
- Sprayers
- Trenching machines
- Wood Processing Machines

## XL4 disc valve motor series

### XL4 specifications overview

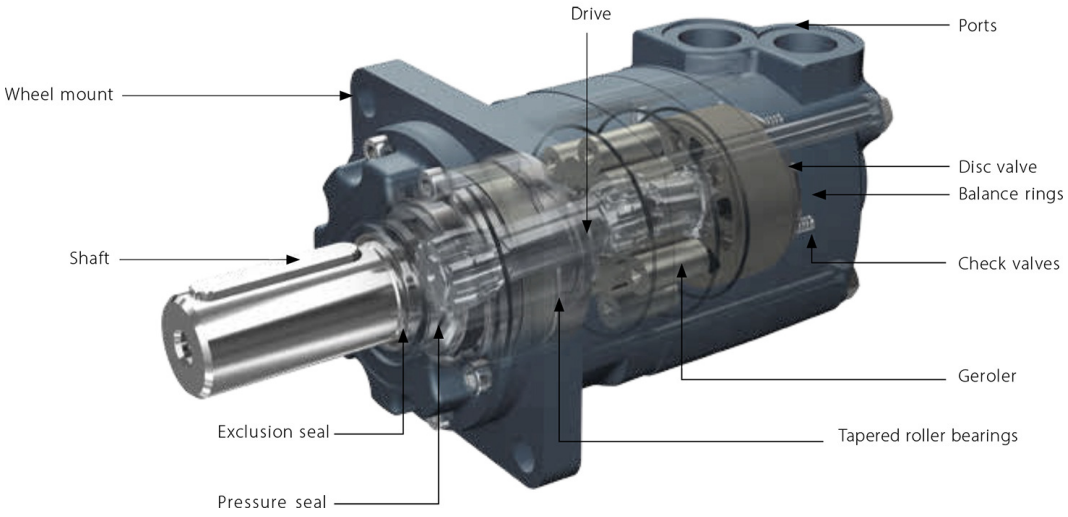
| Specification | Data |
|---|---|
| Geroler element | 6 displacements |
| Flow<br>l/min [US gal/min] | 95 [25] continuous<br>150 [40] intermittent |
| Speed<br>RPM | 582 continuous<br>693 intermittent |
| Pressure<br>bar [psi] | 205 [3000] continuous<br>310 [4500] intermittent |
| Torque<br>N·m [lb·in] | 945 [8400] continuous<br>1170 [10350] intermittent |

**Continuous** motor may run continuously at the listed ratings

**Intermittent** 10% of every minute

## XL4 disc valve motor series

### XL4 part identification




### XL4 technical data

*XL4 160cc-490cc technical data*

| **Displacement cm³/r [in³/r]** | | **160 [9.8]** | **205 [12.5]** | **245 [15.0]** | **310 [19.0]** | **395 [24.0]** | **495 [30]** |
|---|---|---|---|---|---|---|---|
| Flow l/min [US gal/min] | Continuous | 95 [25] | 95 [25] | 95 [25] | 95 [25] | 95 [25] | 95 [25] |
| | Intermittent | 115 [30] | 115 [30] | 130 [35] | 130 [35] | 150 [40] | 150 [40] |
| Max speed RPM | Continuous | 582 | 459 | 383 | 303 | 239 | 191 |
| | Intermittent | 693 | 546 | 532 | 422 | 376 | 305 |
| Pressure Δbar [Δpsi] | Continuous | 205 [2973] | 205 [2973] | 205 [2973] | 205 [2973] | 190 [2750] | 140 [2000] |
| | Intermittent | 310 [4500] | 310 [4500] | 310 [4500] | 260 [3750] | 240 [3500] | 170 [2500] |
| Torque N·m [lb·in] | Continuous | 485 [4292] | 600 [5310] | 705 [6239] | 850 [7523] | 930 [8240] | 945 [8375] |
| | Intermittent | 705 [6239] | 800 [7080] | 845 [7478] | 1065 [9425] | 1185 [10470] | 1170 [10350] |
| Weight kg [lbs] | Standard or wheel mount | 18.1 [39.9] | 18.4 [40.6] | 18.6 [41] | 19.5 [43] | 20.4 [45] | 21.8 [48.1] |
| | Bearingless | 14.1 [31.1] | 14.5 [32] | 14.7 [32.4] | 15.6 [34.4] | 16.6 [36.6] | 17.9 [39.5] |

For maximum case pressure, see case pressure seal limitation graph.

| | |
|---|---|
| **Δ bar [psi]** | The true pressure difference between inlet port and outlet port. |
| **Continuous rating** | Motor may be run continuously at these ratings. |
| **Intermittent operation** | 10% of every minute. |

To ensure best motor life, run motor for approximately 1 hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

## XL4 disc valve motor series

### Recommended operating parameters

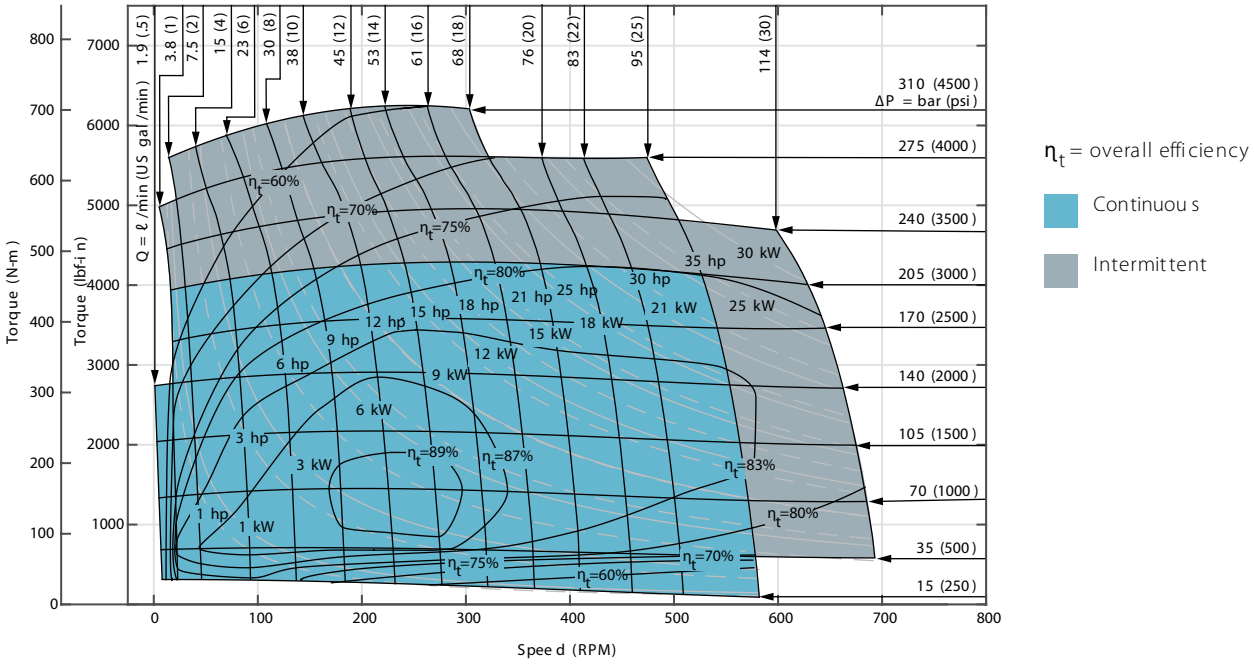
| Data | Recommended |
|---|---|
| Max. inlet pressure | 310 bar [4500 psi]<br>**Caution**<br>Do not exceed Δ pressure rating |
| Max. return pressure | 310 bar [4500 psi] with case drain line installed<br>**Caution**<br>Do not exceed Δ pressure rating |
| Fluids | Premium quality, anti-wear type hydraulic oil with a viscosity of no less than 13 cSt [70 SUS] at operating temperature. |
| Operating temperature | -34 to 82 °C [-30 to 180 °F] |
| Filtration | Per ISO cleanliness code 4406:20/18/13 |

## XL4 disc valve motor series

### XL4 performance data

Performance data is typical at 25 cSt (120 SUS). Actual data may vary slightly from unit to unit in production.

*XL4 160cc motor*

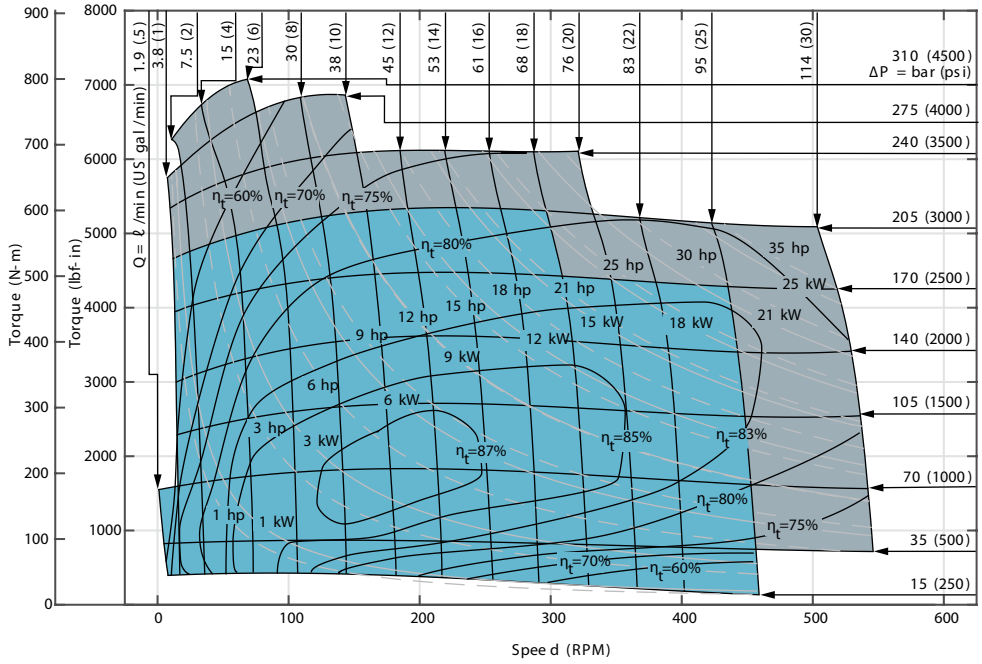



ηt = overall efficiency

Continuous

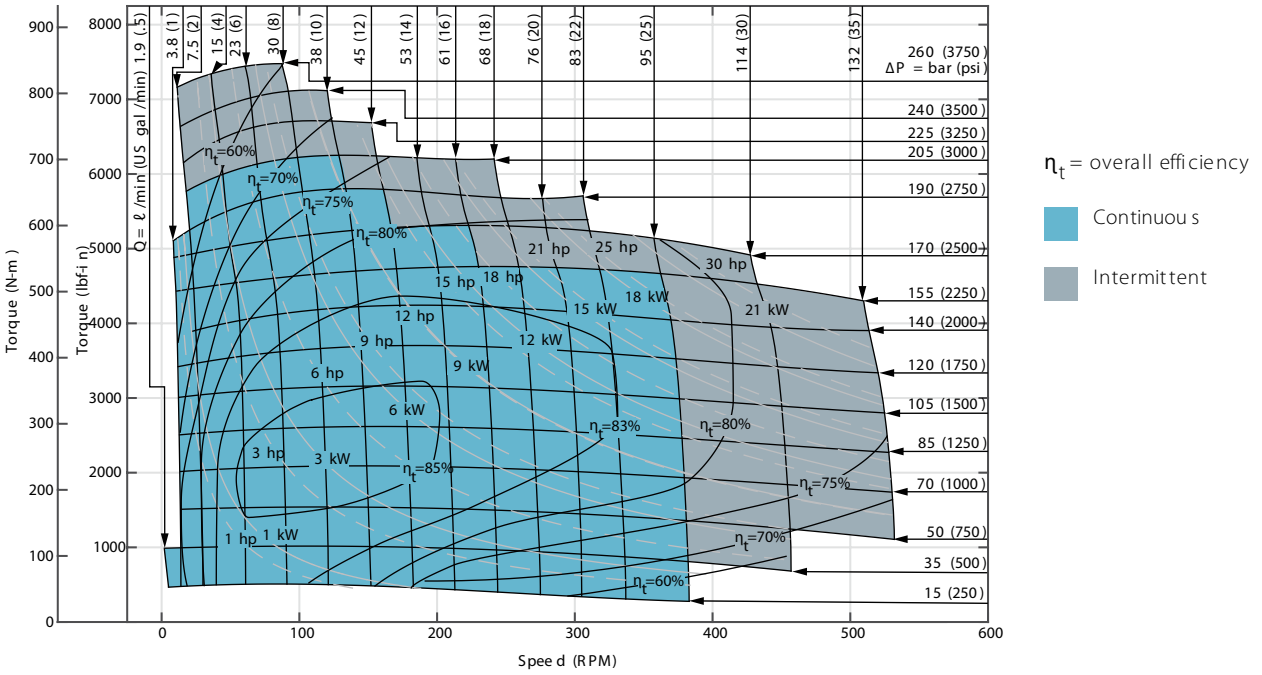
Intermittent

*XL4 205cc motor*

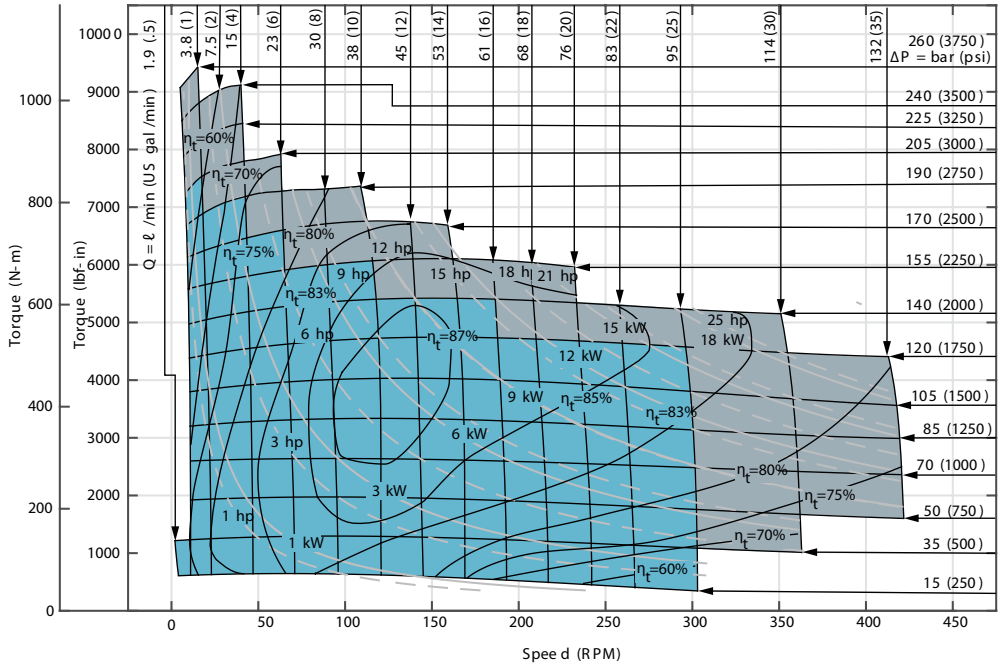


## XL4 disc valve motor series

*XL4 245cc motor*

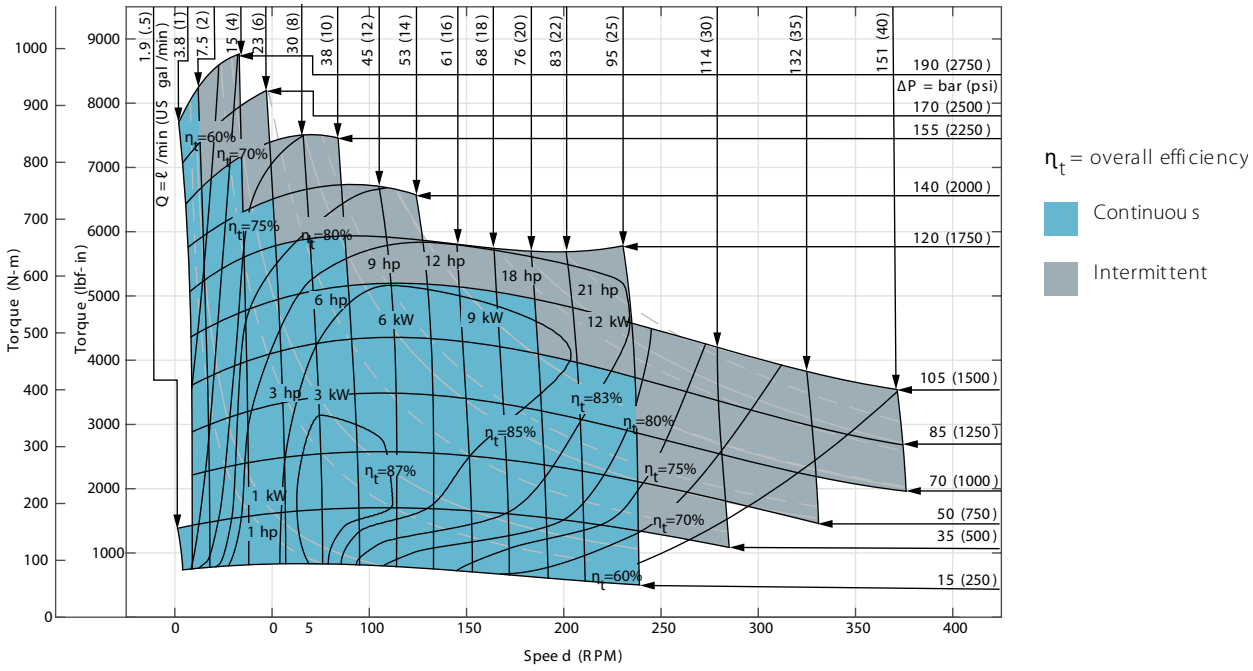



*XL4 310cc motor*

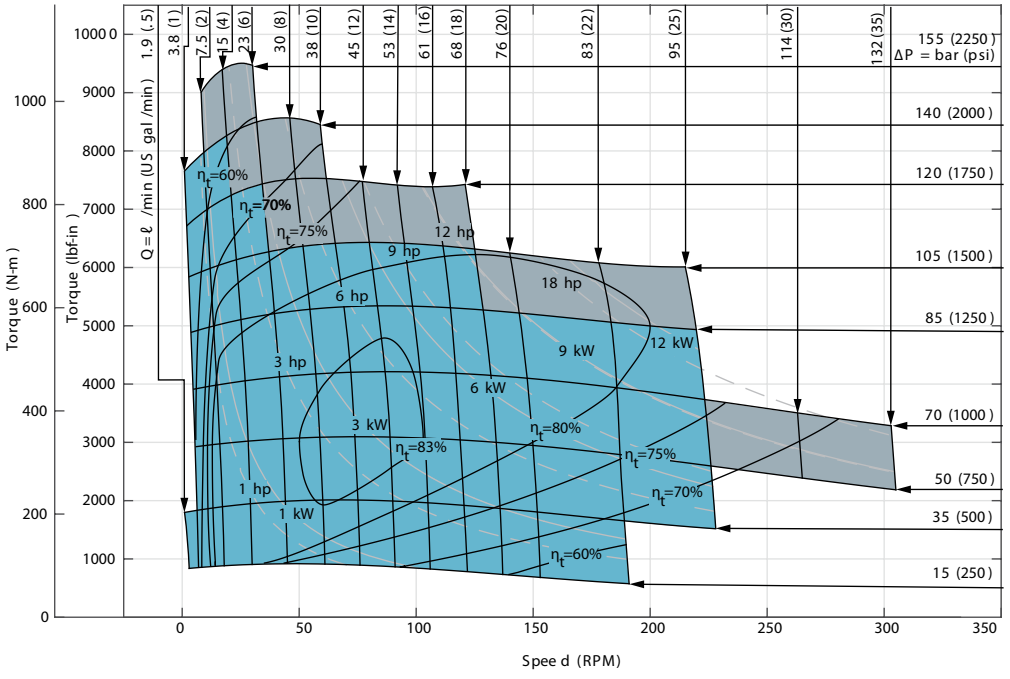


## XL4 disc valve motor series

*XL4 395cc motor*




*XL4 495cc motor*



## XL4 disc valve motor series

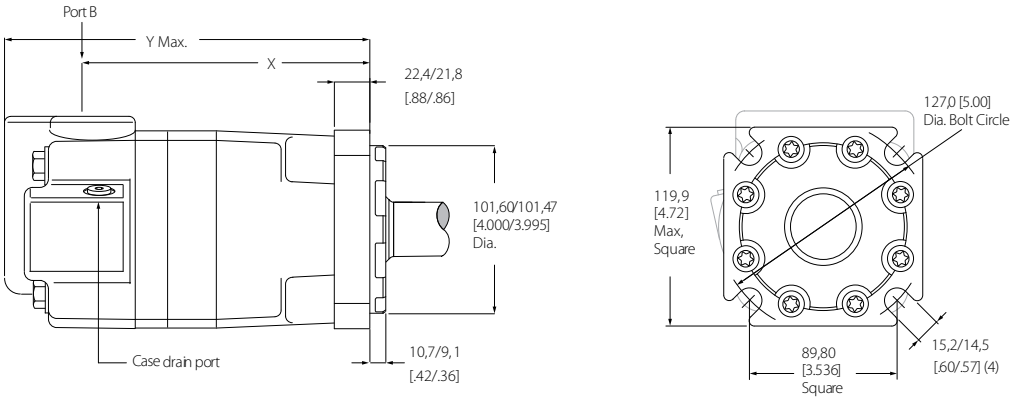
### Mounting dimensions

#### XL4 standard and wheel mount dimensions

Standard rotation viewed from shaft end

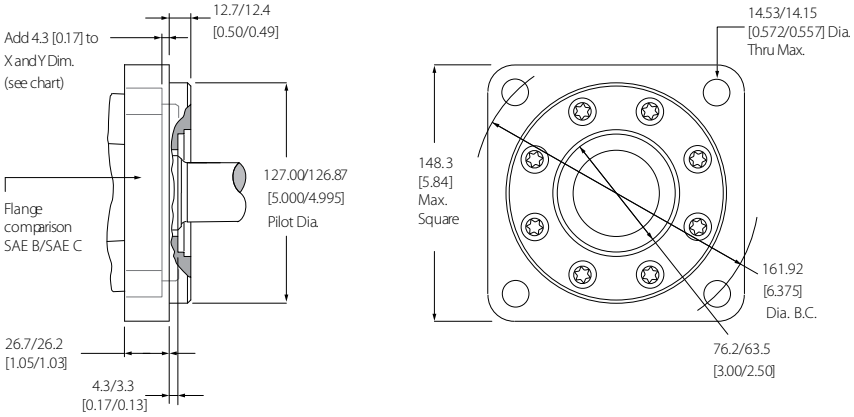
- Port A pressurized - CW
- Port B pressurized - CCW
- XL4 standard shaft seal and section seal kit number: Z331-32

*Standard mount (code AB)*




#### XL4 SAE C flange dimensions

*SAE C flange (code AC)*




*Standard mount motor dimensions*

| Displacement $cm^3/r$ [$in^3/r$] | Dimensions in mm [in] | |
|---|---|---|
| | X | Y |
| 160 [9.9] | 168.7 [6.64] | 224.7 [8.85] |
| 205 [12.5] | 177.2 [6.98] | 233.2 [9.18] |
| 245 [15.0] | 168.7 [6.64] | 224.7 [8.85] |
| 310 [19.0] | 177.2 [6.68] | 233.2 [9.18] |
| 395 [24.0] | 187.9 [7.40] | 243.9 [9.60] |
| 495 [30.0] | 200.7 [7.90] | 256.8 [10.11] |

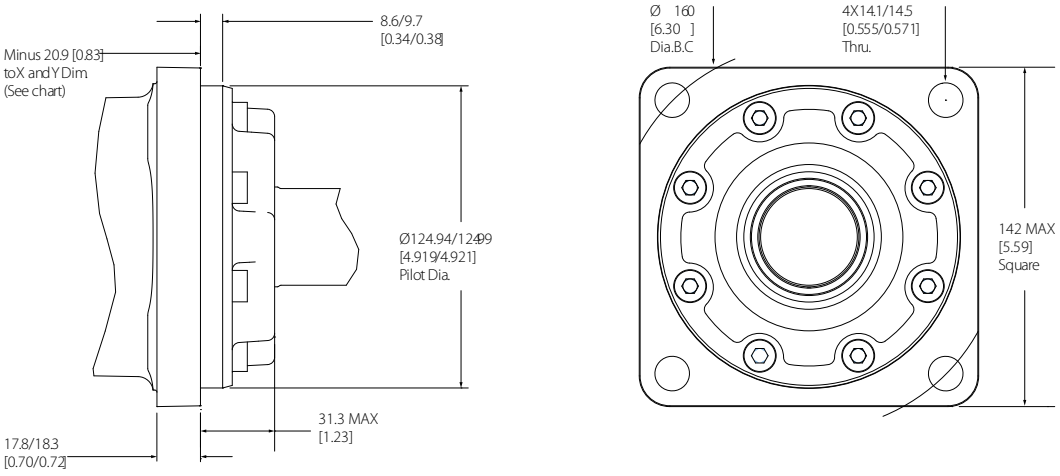
## XL4 disc valve motor series

### XL4 ISO 125 B4HW flange dimensions

Standard rotation viewed from shaft end

- Port A pressurized - CW
- Port B pressurized - CCW

*ISO 125 B4HW flange (code AD)*




*Dimensions*

| Displacement $cm^3/r$ [$in^3/r$] | Dimensions in mm [in] | |
|---|---|---|
| | X | Y |
| 160 [9.9] | 168.7 [6.64] | 224.7 [8.85] |
| 205 [12.5] | 177.2 [6.98] | 233.2 [9.18] |
| 245 [15.0] | 168.7 [6.64] | 224.7 [8.85] |
| 310 [19.0] | 177.2 [6.68] | 233.2 [9.18] |
| 395 [24.0] | 187.9 [7.40] | 243.9 [9.60] |
| 495 [30.0] | 200.7 [7.90] | 256.8 [10.11] |

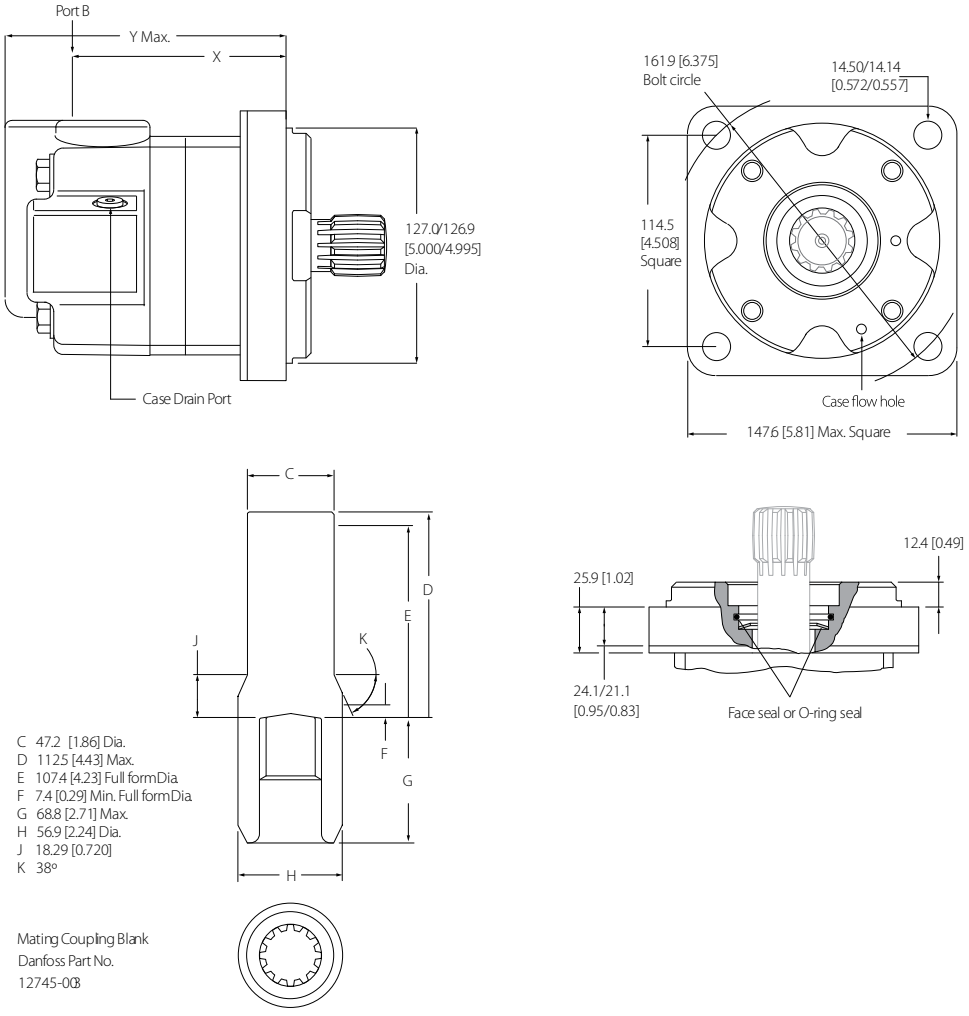
## XL4 disc valve motor series

### XL4 bearingless mount dimensions

Standard rotation viewed from shaft end

- Port A pressurized - CW
- Port B pressurized - CCW

*Bearingless mount (code AA)*




*Dimensions*

| Displacement $cm^3/r$ [$in^3/r$] | Dimensions in mm [in] | |
|---|---|---|
| | X | Y |
| 160 [9.9] | 101.4 [4.00] | 157.1 [6.19] |
| 205 [12.5] | 109.9 [4.33] | 165.7 [6.52] |
| 245 [15.0] | 101.4 [4.00] | 157.1 [6.19] |
| 310 [19.0] | 109.9 [4.33] | 165.7 [6.52] |
| 395 [24.0] | 120.6 [4.75] | 176.3 [6.94] |
| 495 [30.0] | 133.5 [5.26] | 189.2 [7.45] |

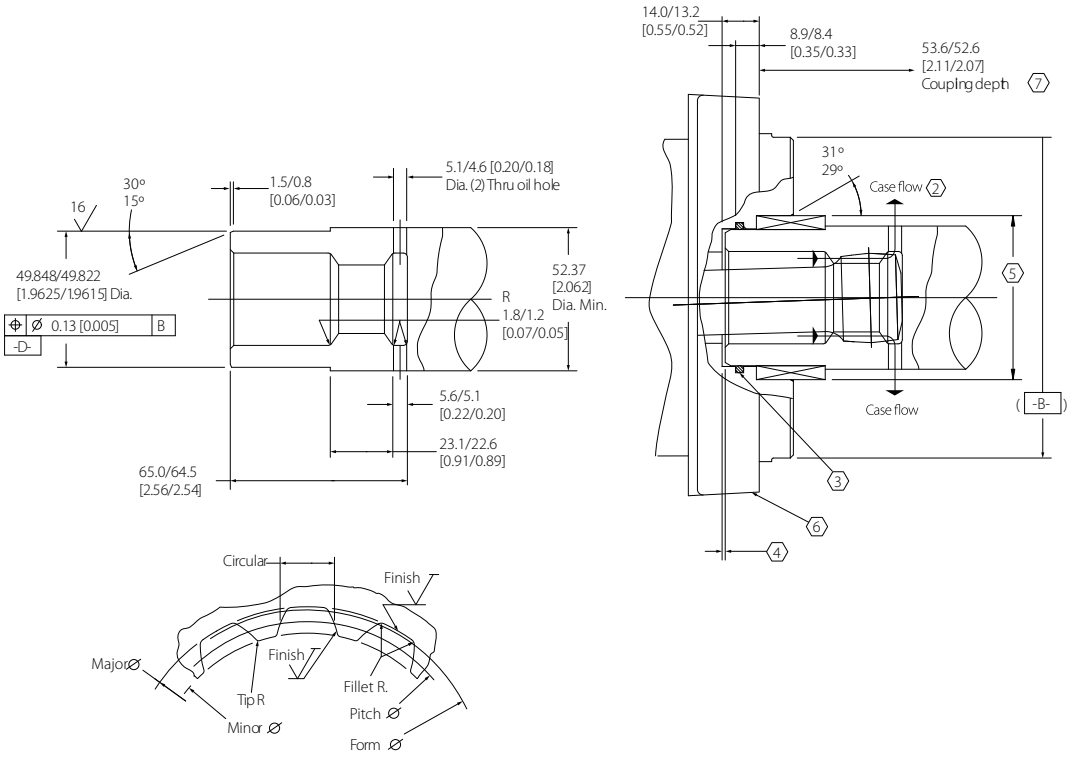
For Xcel XL4 Series bearingless motor application information contact your Danfoss representative. Mating coupling blanks are available from Danfoss.

After machining blank, part must be hardened per Danfoss specification.

## XL4 disc valve motor series

### XL4 bearingless motor installation information

- Internal spline in mating part to be as follows: Material to be ASTM A304, 8620H. Carbonize to a hardness of 60-64 HRc with case depth (to 50HRc) of 0.076 - 1.27 [0.030 - 0.050] (dimensions apply after heat treat).
- Mating part to have critical dimensions as shown. Oil holes must be provided and open for proper oil circulation.
- Seal to be furnished with motor for proper oil circulation thru splines.
- Some means of maintaining clearance between shaft and mounting flange must be provided.
- Counterbore designed to adapt to a standard sleeve bearing 50.010 - 50.040 [1.9689 - 1.9700] ID by 60.050 - 60.080 [2.3642 - 2.3653] (Oilite bronze sleeve bearing).
- Similar to SAE C four bolt flange.
- 52.8 [2.08] M ax . dimension to be maintained when assembling shipping and installing unit to insure valve drive engagement with valve.




*Installation information*

| Specification | Data |
|---|---|
| Spline pitch | 10/20 |
| Pressure angle | 30° |
| Number of teeth | 12 |
| Class of fit | Ref. 5 |
| Type of fit | Side |
| Pitch diameter | Ref. 30.480000 [1.2000000] \| 0,.0 [.008] \| D |
| Base diameter | Ref. 26.396455 [1.0392305] |
| Major diameter | 33.43 [1.316] Max. 33.23 [1.308] min. |
| Minor diameter | 28.40 - 28.58 [1.118 - 1.125] |
| Form diameter, min | 32.59 [1.283] |

## XL4 disc valve motor series

*Installation information (continued)*

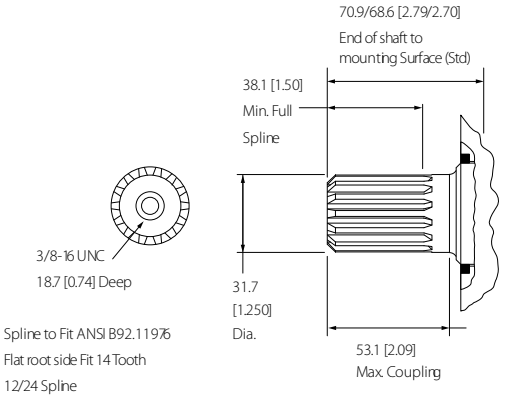
| Specification | Data |
|---|---|
| Fillet radius | 0.63 - 0.76 [0.025 - 0.030] |
| Tip radius | 0.26 - 0.51 [0.010 - 0.020] |
| Finish | 1.6 (63) |
| Involute profile variation | +0.000 -0.025 [+0.0000 -0.0010] |
| Total index variation | 0.038 [0.0015] |
| Lead variation | 0.013 [0.0005] |
| Circular space width | Maximum actual: 5.045 [0.1986] |
| | Minimum effective: 4.995 [0.1951] |
| | Maximum effective: Ref. 5.009 [0.1972] |
| | Minimum actual: Ref. 4.986 [0.1963] |
| Dimension between two pins | Ref. 22.783 - 22.929 [0.8970 - 0.9027] |
| Pin diameter | 5.334 [0.2100] pins to have 3.73 [0.147]<br>Wide flat for root clearance |

## XL4 disc valve motor series

### Shaft dimensions

#### XL4 14 tooth splined (code 02) dimensions

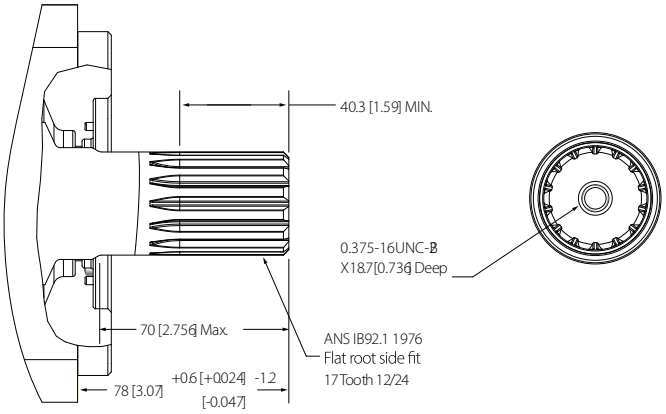
*31.75 [1.25] 14 tooth splined (code 02)*




768 N·m [6800 in·lb] max. torque

#### XL4 17 tooth splined (code 03) dimensions

*38.1 [1.50] 17 tooth splined (code 03)*

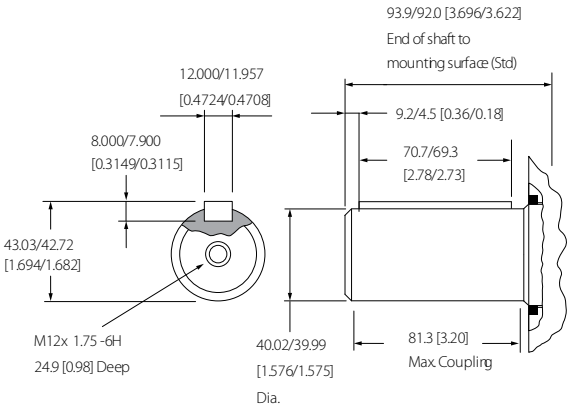



972 N·m [8600 in·lb] max. torque

## XL4 disc valve motor series

### XL4 40mm straight (code 04) dimensions

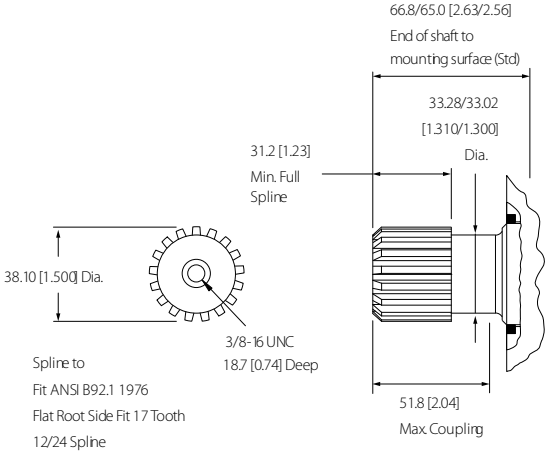
*40mm straight (code 04)*




972 N·m [8600 in·lb] max. torque

### XL4 17 tooth splined (code 05) dimensions

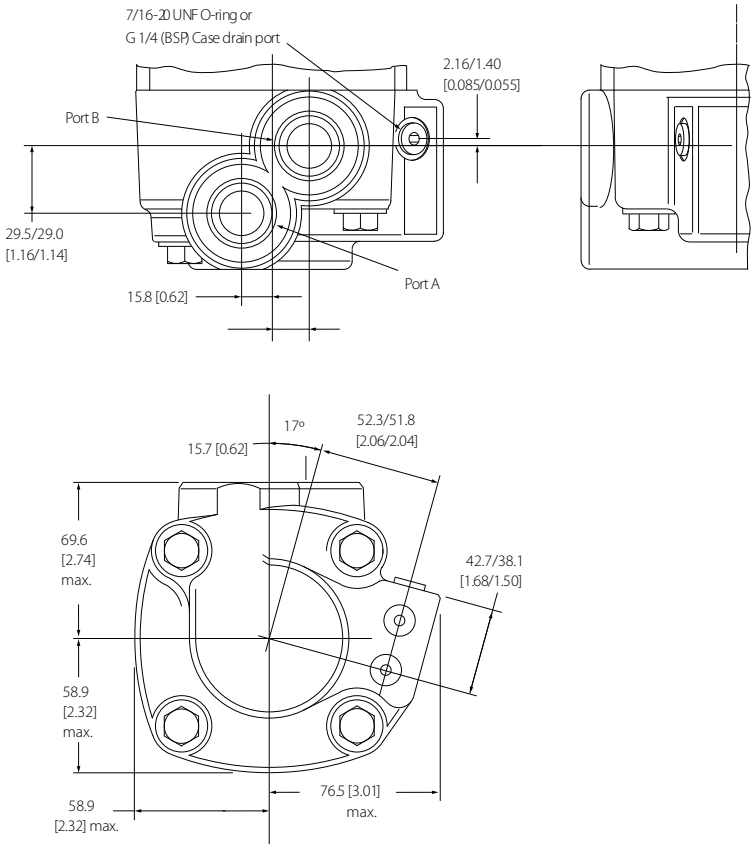
*38.1 [1.50] 17 tooth splined (code 05)*




972 N·m [8600 in·lb] max. torque

## XL4 disc valve motor series

### XL4 ports dimensions




*Preferred ports*

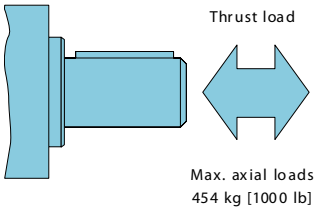
| Option | Description |
|---|---|
| AC and 03 | AC: 1 1/16 -12 UN-2B SAE O-ring staggered ports (2)<br>03: 7/16 -20 UNF-2B SAE O-ring case drain port (1) |
| AB and 02 | AB: G3/4 (B SP) staggered ports (2)<br>02: G1/4 (B SP) case drain port (1) |
| AA and 01 | AA: M 27x2 staggered ports (2)<br>01: M14x1.5 case drain port (1) |

## XL4 disc valve motor series

### Shaft side load capacity

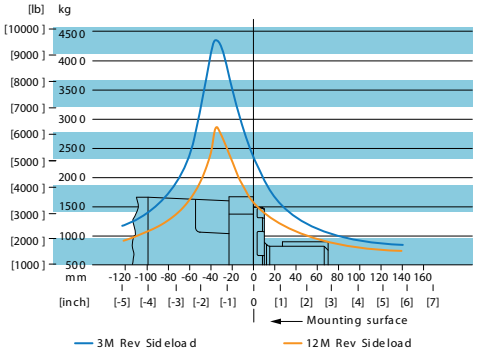
These curves indicate the radial load capacity on the motor shaft(s) at various locations with an allowable external thrust load of 454 kg [1000 lb].

Case pressure will increase the allowable inward thrust load and decrease the allowable outward thrust load. Case pressure will push outward on the shaft at 94 kg/7 bar [208 lb/100 psi].

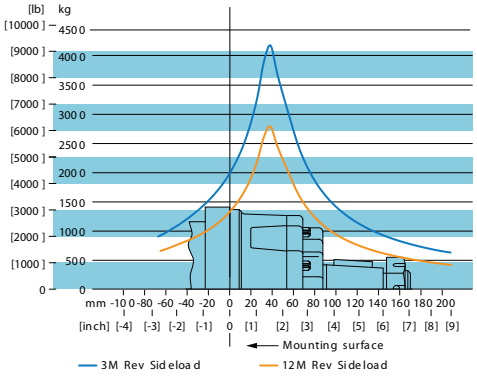



Each curve is based on a B10 bearing life of 2000 hours. The 12,000,000 revolution curve represents 100 RPM. The 3,000,000 revolution curve represents 25 RPM.

*Standard motor straight and splined shafts*




*Wheel motor tapered shaft*




To determine radial load at speeds other than 25 RPM and 100 RPM, multiply the load values on the 12M revolution curve by the factors in the table below.

| RPM | Multiplication factor |
|---|---|
| 50 | 1.23 |
| 100 | 1.00 |
| 200 | 0.81 |
| 300 | 0.72 |
| 400 | 0.66 |
| 500 | 0.62 |

### XL4 disc valve motor series

| RPM | Multiplication factor |
|---|---|
| 600 | 0.58 |
| 700 | 0.56 |
| 800 | 0.54 |

## XL4 disc valve motor series

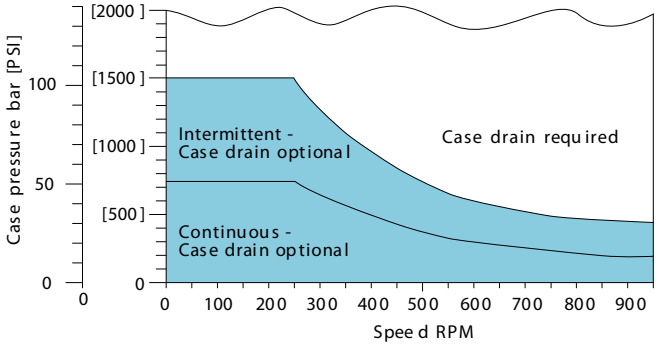
### XL4 pressure seal limitation

Xcel XL4 Series motors are durable and have long life as long as the recommended case pressure is not exceeded.

Allowable case pressure is highest at low shaft speeds. Consequently, motor life will be shortened if case pressure exceeds these ratings (acceptability may vary with application). Determine if an external case drain is required from the case pressure seal limitation chart.

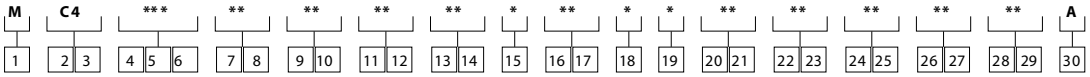
| | |
|---|---|
| **Case porting advantage contamination control** | Flushing motor case |
| **Cooler motor** | Exiting oil draws motor heat away |
| **Extended motor seal life** | Maintain low case pressure with a preset restriction in the case drain line |

*Case pressure seal limitation*



## XL4 disc valve motor series

### XL4 model code




### XL4 product, series, displacement options

*1 - product*

| Code | Description |
|---|---|
| M | Motor |

*2, 3 - series*

| Code | Description |
|---|---|
| C4 | Xcel XL4 series |

*4, 5, 6 - displacement*

| Code | Description |
|---|---|
| 160 | 162.2 [9.90] |
| 205 | 205.5 [12.54] |
| 245 | 246.3 [15.03] |
| 310 | 311.8 [19.03] |
| 395 | 393.9 [24.04] |
| 495 | 492.6 [30.06] |

### XL4 mounting flange and output shaft options

*7, 8 - mounting flange*

| Code | Description |
|---|---|
| AA | Bearingless, 4 bolt: 127.00 [5.000] pilot dia. 14.27 [0.562] dia. holes on 161.92 [6.375] dia. bolt circle |
| AB | Standard, 4 bolt: 101.60 [4.000] pilot dia. 14.7 [0.58] slots on 127.00 [5.000] dia. bolt circle (SAE B) |
| AC | Standard, 4 bolt: 127.00 [5.000] pilot dia. 14.27 [0.562] dia. holes on 161.92 [6.375] dia. bolt circle (SAE C) |
| AD | Standard: ISO flange 125 B 4HW (ISO 3019/2) 124.97 [4.920] pilot dia. 14.27 [0.562] dia. holes on 160.00 [6.299] dia. bolt circle |

*9, 10 - output shaft*

| Code | Description |
|---|---|
| 00 | None (bearingless) |
| 02 | 31.75 [1.250] dia. flat root side fit, 14 tooth, 12/24 DP 30° involute spline, 38.1 [1.50] minimum full spline length, with 0.375-16UNC-2B thread in end |
| 03 | 38.10 [1.500] dia. flat root side fit, 17 tooth, 12/24 DP 30° involute spline, 40.3 [1.59] minimum full spline length, with 0.375-16 UNC-2B thread in end |
| 04 | 40.00 [1.575] dia. straight with M12 x 1.75-6H thread, 7.955 [0.3132] x 11.979 [0.4716] wide x 69.98 [2.755] straight key |
| 05 | 38.10 [1.500] dia. flat root side fit, 17 tooth, 12/24 DP 30° involute spline, 31.2 [1.23] minimum full spline length, with 0.375-16 UNC-2B thread in end |

## XL4 disc valve motor series

### XL4 ports, case flow, pressure relief options

*11, 12 - ports*

| Code | Description |
|---|---|
| AA | M 27x2- staggered ports |
| AB | G 3/4 ports -staggered ports |
| AC | 1 1/16-12UN-2B SAE O-ring ports - staggered ports |

*13, 14 - case flow*

| Code | Description |
|---|---|
| 01 | M 14x1 .5 straight thread with check valve |
| 02 | G 1/4 B SP straight thread with check valve |
| 03 | 7/16-20UNF-2B SAE O-ring port with check valve |

*15 - low pressure relief*

| Code | Description |
|---|---|
| 0 | None |

*16, 17 - pressure/flow setting*

| Code | Description |
|---|---|
| 00 | None |

### XL4 geroler, seal, accessories, special feature options

*18 - geroler*

| Code | Description |
|---|---|
| 0 | Standard |

*19 - seal*

| Code | Description |
|---|---|
| 0 | Standard |

*20, 21 - accessories*

| Code | Description |
|---|---|
| 00 | None |

*22, 23 - special features (hardware)*

| Code | Description |
|---|---|
| 00 | None |

*24, 25 - special features (assembly)*

| Code | Description |
|---|---|
| 00 | None (standard) |

## XL4 disc valve motor series

### XL4 paint, identification, design code options

*26, 27 - paint/packaging*

| Code | Description |
|---|---|
| AA | Blue |
| AB | Black |

*28, 29 - customer identification or nameplate*

| Code | Description |
|---|---|
| 00 | None |

*30 - design code*

| Code | Description |
|---|---|
| A | First |