

# HY1

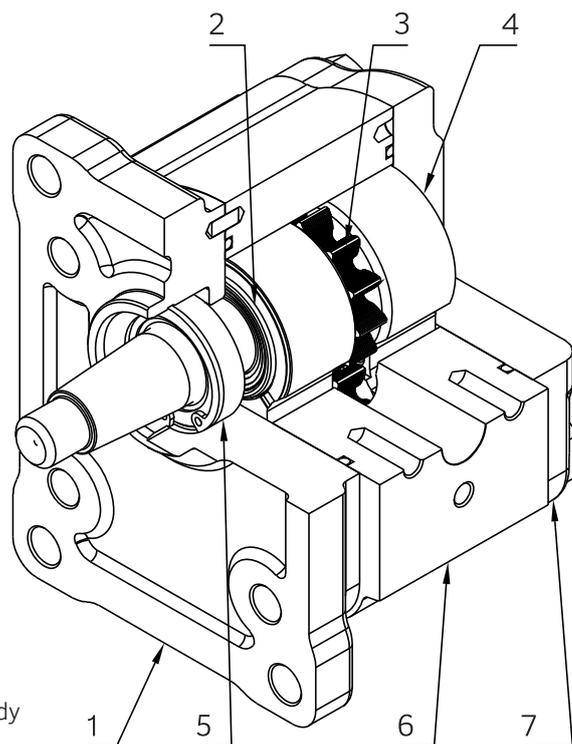
## EXTERNAL GEAR PUMP GROUP 1

From 1 to 9.5 cc/rev  
Up to 260 bar



Hydreco is pleased to introduce a brand new range of gear pumps and motors. Based on the experience and knowledge acquired over many years of engineering and manufacturing, the HY series is provided with an aluminum alloy housing, two gear wheels supported by sleeve bearings and cast iron flange and cover.

The HY1 series, available as pumps and motors, offers high efficiency, low noise level and can be applied in standard and heavy duty application, thanks to the high reliability and the accuracy of design and production. The pumps can be supplied as single, or as multiple units with a huge variety of options and flanges, shafts and ports, providing the right setup on each application. Feel free to contact your Hydreco representative to find out and to get the proper support in your selection.



- 1 - Cast Iron Flange
- 2 - Gaskets
- 3 - Gears
- 4 - Bushings
- 5 - Shaft Seal
- 6 - Aluminium Alloy Body
- 7 - Cast Iron Cover

### Displacements

From 1 cm<sup>3</sup>/rev to 9.5 cm<sup>3</sup>/rev  
From 0.06 in<sup>3</sup>/rev to 0.58 in<sup>3</sup>/rev

### Pressures

Max continuous 260 bar (3770 psi)  
Max intermittent 280 bar (4060 psi)  
Max peak 300 bar (4350 psi)

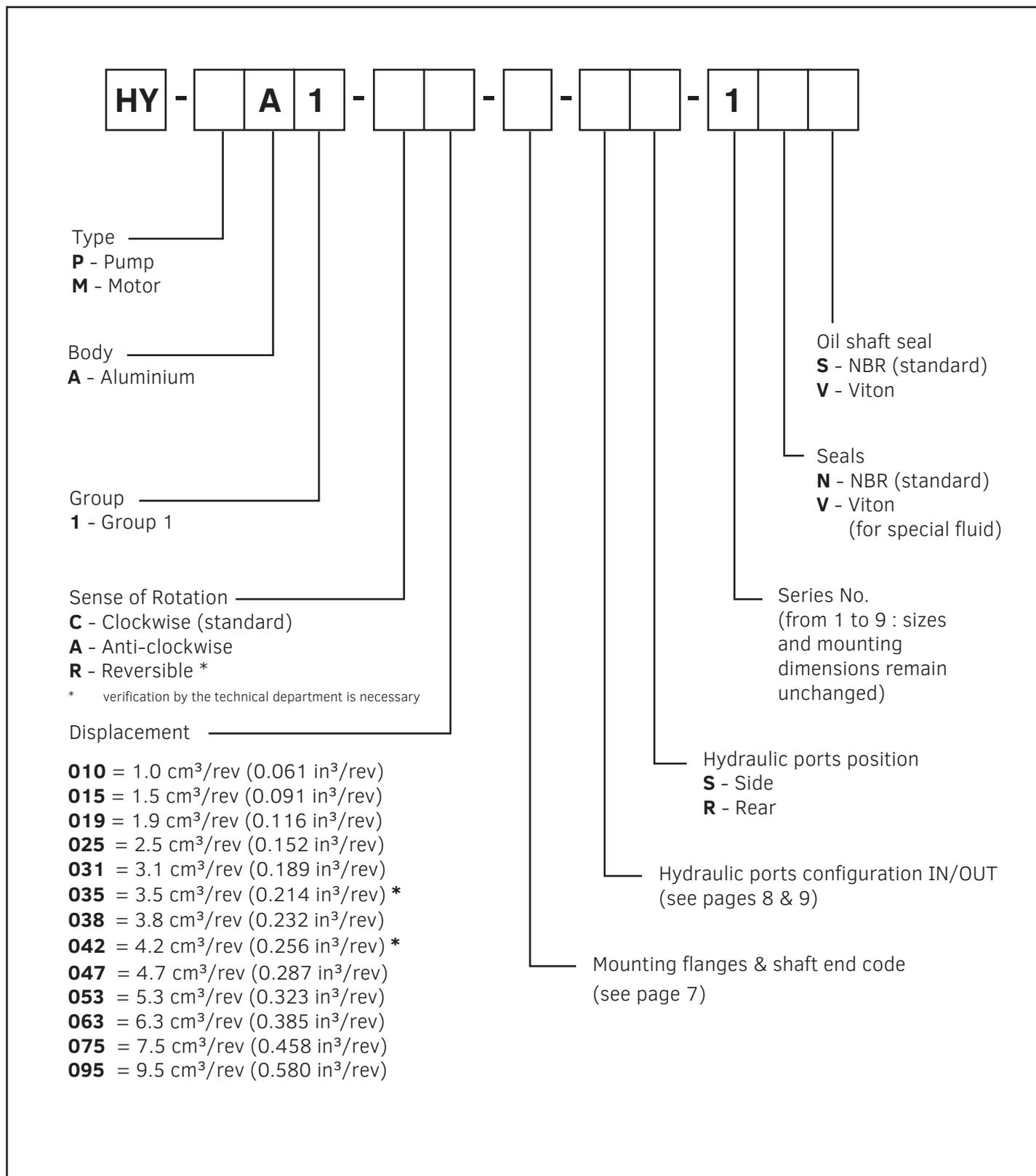
### Max Speed

4000 rpm



- H1300P002C = Pump / Motor part number
- P C015+015+019-E10T1 = Abbreviate model code  
Ex. Triple pump 1.5cc+1.5cc+1.9cc - European Standard Clockwise
- C21 1544 = Serial number - Ex. C ( month ) - 21 ( year ) - 0189 ( Production order )  
- 1544 ( identification num. )
- Arrow = Direction of rotation
- QR CODE = Complete model code

## ORDERING CODE IDENTIFICATION FOR SINGLE PUMPS



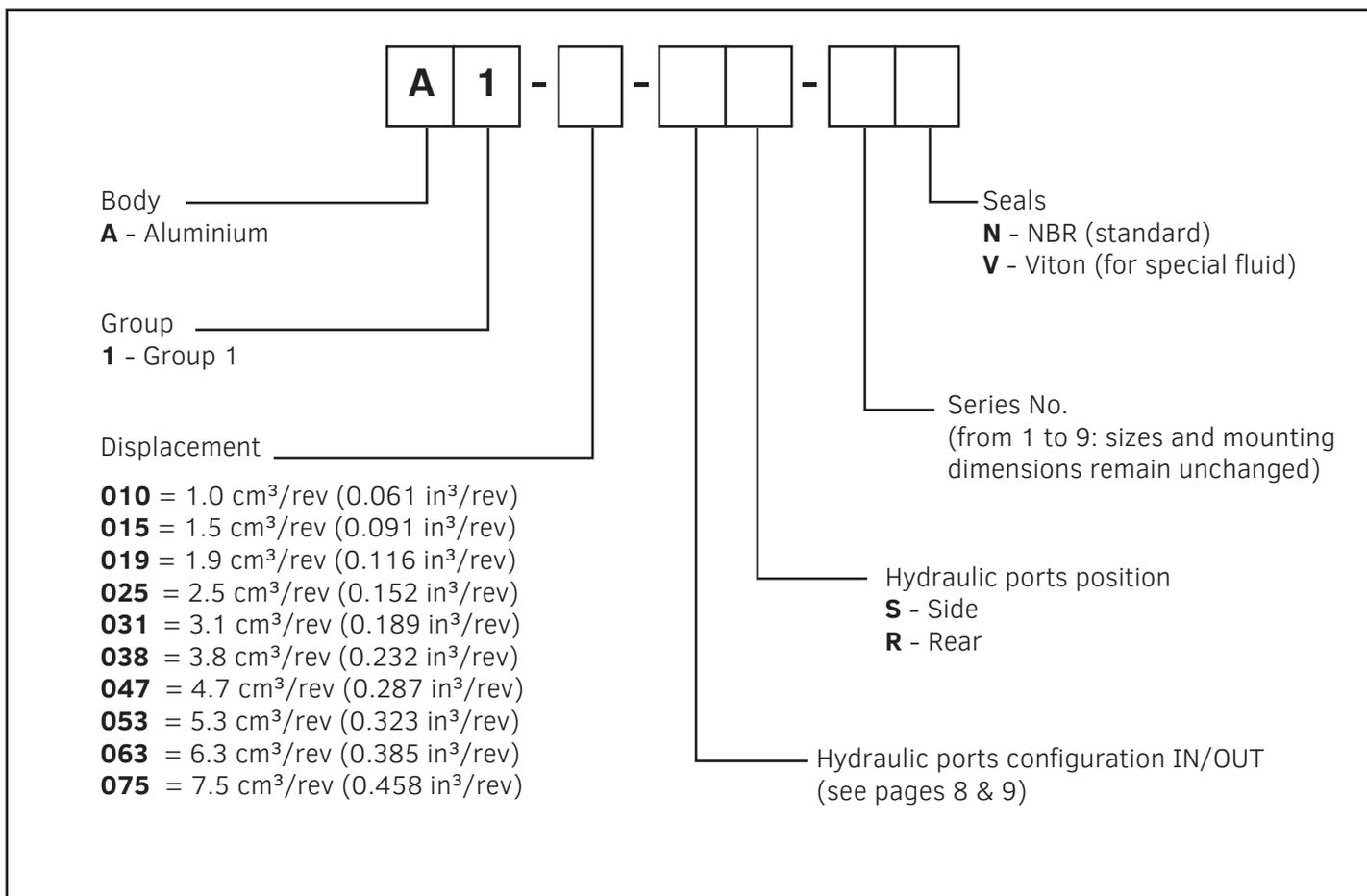
### Example

HY-PA1-C015-E10T1-FG2/2S-1NS

Single pump GR1 - clockwise rotation - European flange with tapered shaft 1:8 - German flanged ports

\* **Displacements available only with T11 shaft**

## ORDERING CODE IDENTIFICATION FOR MULTIPLE PUMPS



### Example

HY-PA1-C015-E10T1-FG2/2S-1NS+A1-015-FG2/2S-1N

GR1 double pump - clockwise rotation - European flange with tapered shaft 1:8 - German flanged ports

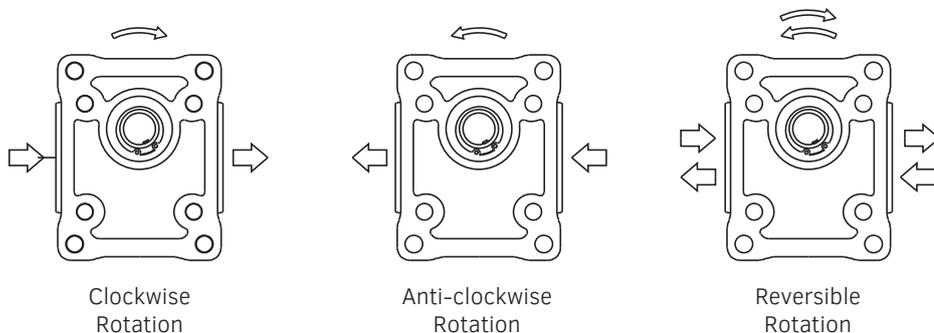
| GROUP | SIZE | DISPLACEMENT<br>cm <sup>3</sup> /rev (in <sup>3</sup> /rev) | WEIGHT<br>Kg | MAX PRESSURE<br>bar (psi) |            |            | SPEED<br>rpm |      |
|-------|------|---|--------------|---------------------------|------------|------------|--------------|------|
|       |      |   |              | P1                        | P2         | P3         | min          | max  |
| HY1   | 010  | 1.0 (0.061)   | 1.35         | 250 (3620)                | 270 (3920) | 290 (4200) | 650          | 4000 |
|       | 015  | 1.5 (0.091)   | 1.35         | 260 (3770)                | 280 (4050) | 300 (4350) |              |      |
|       | 019  | 1.9 (0.116)   | 1.40         |                           |            |            |              |      |
|       | 025  | 2.5 (0.125)   | 1.40         |                           |            |            |              |      |
|       | 031  | 3.1 (0.189)   | 1.40         |                           |            |            |              |      |
|       | 035  | 3.5 (0.214)   | 1.45         |                           |            |            |              |      |
|       | 038  | 3.8 (0.232)   | 1.45         |                           |            |            |              |      |
|       | 042  | 4.2 (0.256)   | 1.45         |                           |            |            |              |      |
|       | 047  | 4.7 (0.287)   | 1.50         | 240 (3480)                | 260 (3770) | 280 (4050) |              |      |
|       | 053  | 5.3 (0.323)   | 1.55         |                           |            |            |              |      |
|       | 063  | 6.3 (0.385)   | 1.60         |                           |            |            |              |      |
|       | 075  | 7.5 (0.458)   | 1.65         | 180 (2610)                | 220 (3190) | 240 (3480) | 3500         |      |
|       | 095  | 9.5 (0.580)   | 1.80         | 140 (2030)                | 180 (2610) | 200 (2900) | 3000         |      |

The data in the table refer to unidirectional pumps and motors.  
 The maximum pressures of reversible pumps and motors are 15% lower than unidirectional ones.

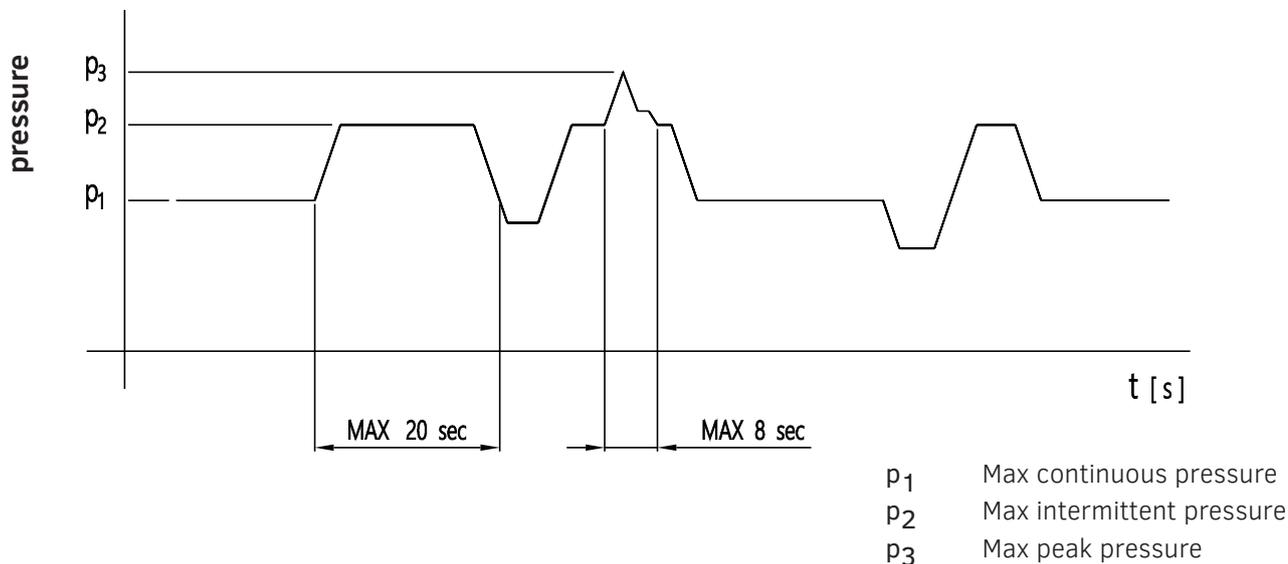
For different working conditions please contact Hydreco Technical Support.

**GENERAL CHARACTERISTICS**

**ROTATION DIRECTION**



**DEFINITION OF PRESSURES**



## GENERAL CHARACTERISTICS

It is essential that pumps are installed so that they can always fill with fluid.  
'HY' Series pumps inlet porting is designed to facilitate full volume fill but the following machine design recommendations should be followed.

|   |  |
|---|--|
| Direction of rotation<br>(Viewed from shaft end)  | Clockwise (C) – Anticlockwise (A) – Reversible (R)   |
| Range inlet pressure – pump   | 0.7 ÷ 3 bar (10 ÷ 43 psi)  |
| Max back pressure on the unidirectional motors<br>and reversible with internal drainage | P <sub>1</sub> (continue) max 5 bar (72 psi)<br>P <sub>2</sub> (for 20 sec) max 8 bar (115 psi)<br>P <sub>3</sub> (for 5 sec) max 15 bar (215 psi) |
| Reversible Motor Max pressure in drain  | 5 bar  |
| Temperature fluid (MIN, MAX, PEAK) °C   | -25, 80, 100      NBR<br>-25, 110, 125      VITON  |
| Range of viscosity  | From 10 to 100 mm <sup>2</sup> /s (cSt) IDEAL<br>Up to 750 mm <sup>2</sup> /s (cSt) RECOMMENDED<br>Up to 1000 mm <sup>2</sup> /s (cSt) START       |
| Fluid type  | Mineral oil  |

## RECOMMENDED FILTRATION

| Working pressure bar (psi)        | $\Delta p < 140$ (2030) | $140$ (2030) $< \Delta p < 210$ (3040) | $\Delta p > 210$ (3040) |
|-----------------------------------|-------------------------|--|-------------------------|
| Class contamination NAS 1638      | 10                      | 9                                      | 8                       |
| Class contamination ISO 4406:1999 | 21/19/16                | 20/18/15                               | 19/17/14                |

|                       |                        |
|-----------------------|------------------------|
| Q = flow rate         | (L/min)                |
| V = displacement      | (cm <sup>3</sup> /rev) |
| n = speed             | (min <sup>-1</sup> )   |
| M = torque            | (Nm)                   |
| P = power             | (kW)                   |
| $\Delta p$ = pressure | (bar)                  |

|   | PUMPS  | MOTORS |
|---|--------|--------|
| <b>PERFORMANCE</b>                        |        |        |
| $\eta_v$ = volumetric efficiency          | ≈ 0.96 | ≈ 0.95 |
| $\eta_{hm}$ = hydro-mechanical efficiency | ≈ 0.88 | ≈ 0.85 |
| $\eta_t$ = total efficiency               | ≈ 0.84 | ≈ 0.81 |

**DETERMINATION OF A PUMP**

$$Q_{\text{theor}} = \frac{V \times n}{1000} \text{ (l/min)} \quad Q_{\text{real}} = Q_{\text{theor}} \times \eta_v$$

$$M_{\text{real}} = \frac{M_{\text{theor}}}{\eta_{\text{hm}}} \text{ (Nm)} \quad M_{\text{theor}} = \frac{\Delta p \times V}{62.8} \text{ (Nm)}$$

$$P_{\text{OUT}} = \frac{\Delta p \times Q}{600} \text{ (kW)} \quad P_{\text{IN}} = \frac{P_{\text{OUT}}}{\eta_t}$$

**DETERMINATION OF A MOTOR**

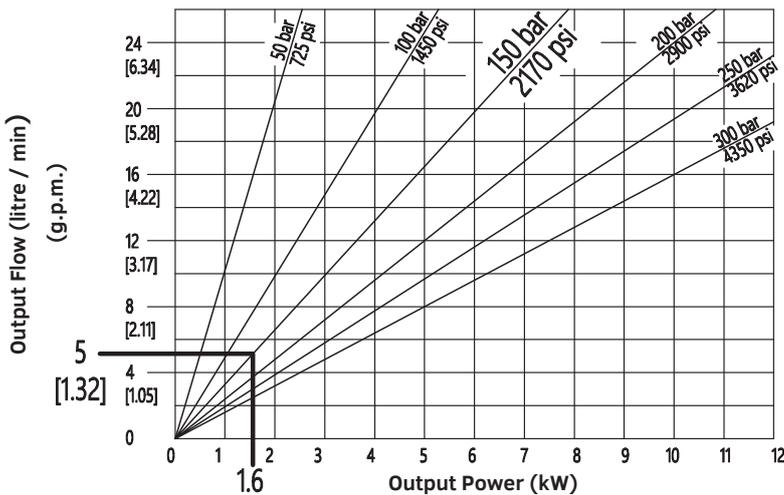
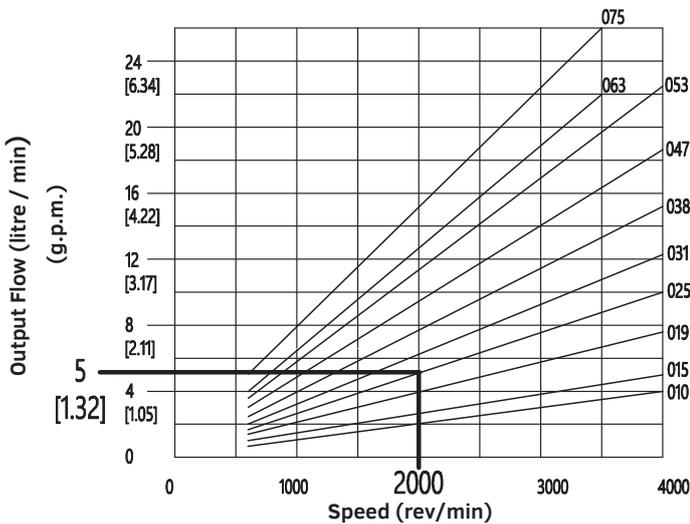
$$Q_{\text{theor}} = \frac{V \times n}{1000} \text{ (l/min)} \quad Q_{\text{real}} = \frac{Q_{\text{theor}}}{\eta_v}$$

$$M_{\text{theor}} = \frac{\Delta p \times V}{62.8} \text{ (Nm)} \quad M_{\text{real}} = M_{\text{theor}} \times \eta_{\text{hm}}$$

$$P_{\text{OUT}} = \frac{\Delta p \times Q}{600} \text{ (kW)} \quad P_{\text{IN}} = P_{\text{OUT}} \times \eta_t$$

**PUMP SELECTION**

Curves at 40°C – fluid viscosity 46 mm<sup>2</sup>/sec



**Example**

Working conditions:  
 Pump 2.5cc  
 Speed 2000 r.p.m.  
 Pressure: 150 bar [2170 psi]  
 Motor: 1.6 kW

**NOTE:**

Diagrams provide approximate selection data

OUTPUT FLOWS are theoretical.

Generally volumetric efficiencies are in excess of 95%.

Please contact your Hydreco representative for specific working conditions.

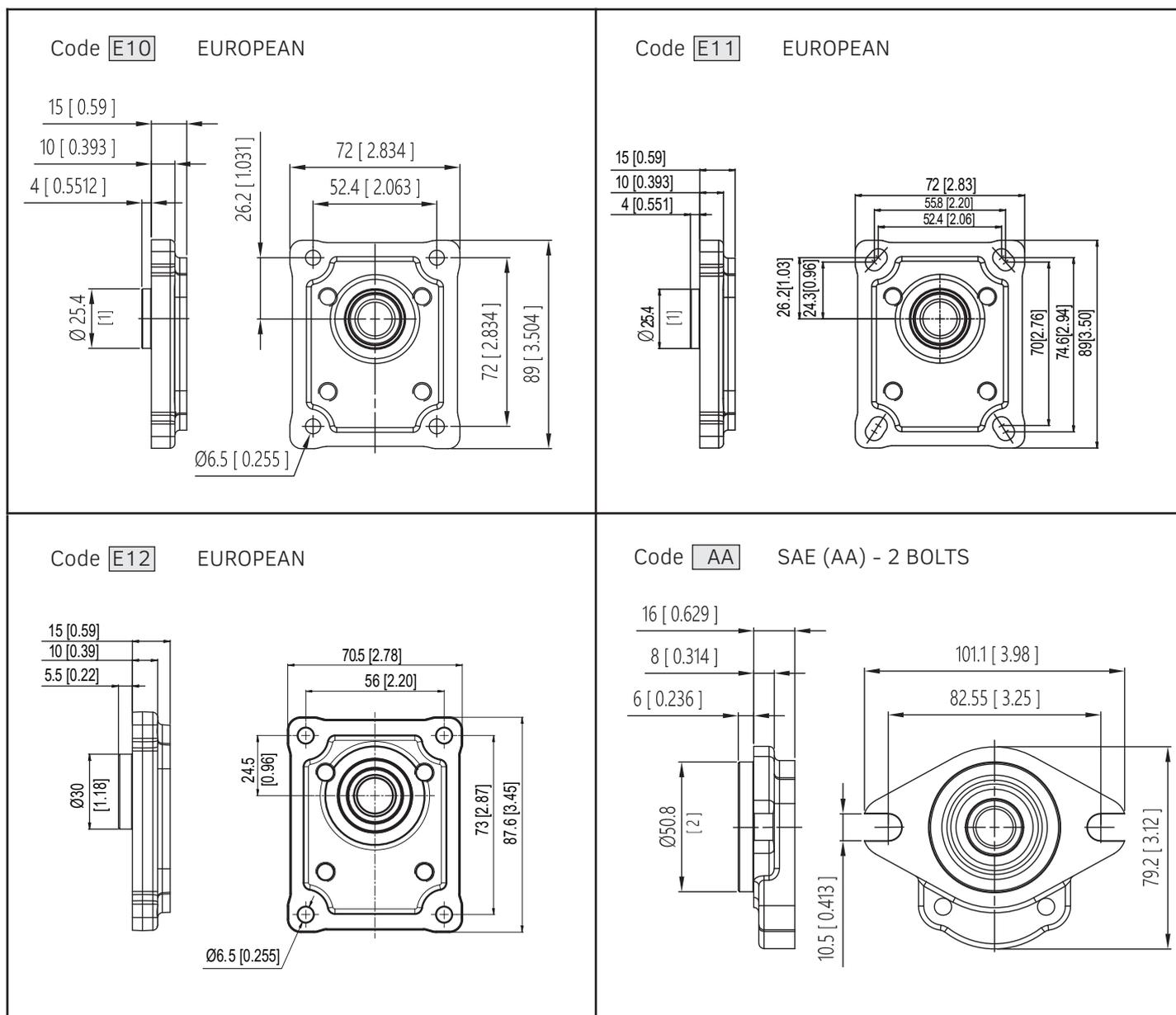
INPUT POWERS are theoretical taking into account average efficiencies.

| EUROPEAN standard CODE | FLANGE  | SHAFT                           |
|------------------------|---|---------------------------------|
| E10T1                  | E10 = European flange pilot Ø25.4               | T1 = Tapered shaft 1:8 - M7x1   |
| E10T11                 | E10 = European flange pilot Ø25.4               | T11 = Tapered shaft 1:8 - M10x1 |
| E11T1                  | E11 = European flange pilot Ø25.4<br>Oval Holes | T1 = Tapered shaft 1:8 - M7x1   |
| E11T11                 | E11 = European flange pilot Ø25.4<br>Oval Holes | T11 = Tapered shaft 1:8 - M10x1 |
| E12T11                 | E11 = European flange pilot Ø30                 | T11 = Tapered shaft 1:8 - M10x1 |

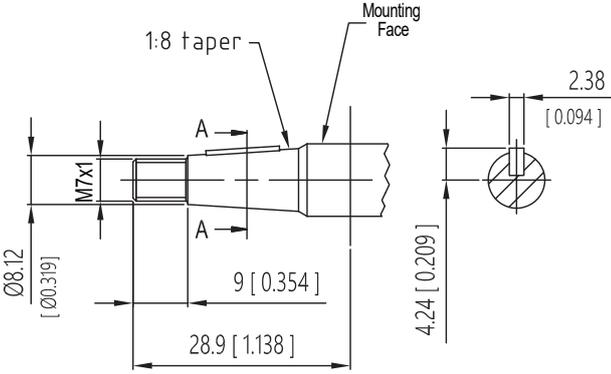
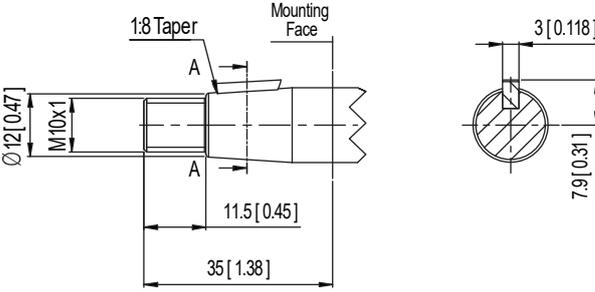
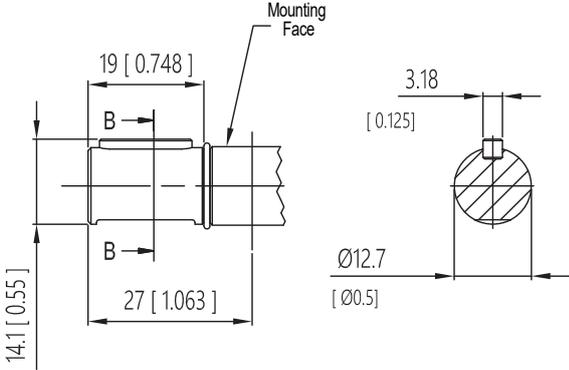
| AMERICAN standard CODES | FLANGE                              | SHAFT                      |
|-------------------------|-------------------------------------|----------------------------|
| AA012P                  | AA = American flange SAE AA 2 bolts | 012P = SAE AA 1/2 Parallel |

For other configurations than those indicated, please contact Hydreco technical support.

**FLANGES OPTIONS**



**SHAFTS OPTIONS**

|  |  |
|--|--|
| <p>Code <b>T1</b> European Tapered 1:8</p>  <p>Max Torque = 20 Nm (177 lbf in)</p>      | <p>Code <b>T11</b>* European Tapered 1:8</p>  <p>Max Torque = 90 Nm (797 lbf in)</p> |
| <p>Code <b>O12P</b> SAE (AA) 1/2" Parallel</p>  <p>Max Torque = 30 Nm (266 lbf in)</p> |  |

\* Shaft available for displacements : 025 – 031 – 035 – 038 – 042 - 052  
For different displacements, please contact Hydreco Technical Support.

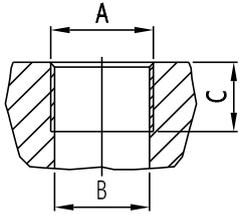
**SHAFT OIL SEAL**

Code **T1** = 12 x 22 x 7

Code **T11** = 14 x 22 x 7

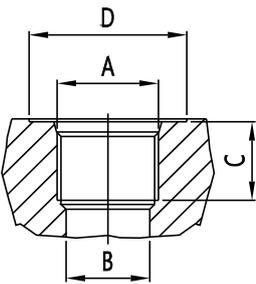
Code **O12P** = 13 x 22 x 7

**PORTS OPTIONS**

| <b>BSPP THREADED PORTS (B)</b><br>Compliant with ISO 228<br> | Ordering Code | Dimension mm (inches) |               |          | Tightening Torque Nm [lbf in] |               |
|---|---------------|-----------------------|---------------|----------|-------------------------------|---------------|
|   |               | A                     | B             | C        | Low Pressure                  | High Pressure |
| 15  | 3/8"          | 15<br>(0.59)          | 12<br>(0.472) | 15 [130] | 25 [220]                      |               |
| 2   | 1/2"          | 19<br>(0.748)         | 14<br>(0.551) | 20 [180] | 50 [440]                      |               |

**STANDARD PORT CONFIGURATION**

| CODE    | SUCTION   | PRESSURE  | POSITION | SIZE       |
|---------|-----------|-----------|----------|------------|
| B15/15S | 3/8" BSPP | 3/8" BSPP | side     | 010 to 031 |
| B2/15S  | 1/2" BSPP | 3/8" BSPP | side     | 038 to 095 |

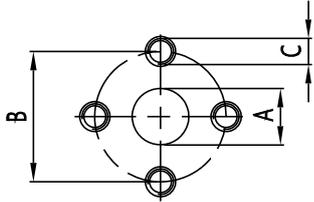
| <b>SAE THREADED PORTS (U)</b><br>Compliant with SAE J514<br> | Ordering Code  | Dimensions mm (inches) |               |               |          | Tightening Torque Nm [lbf in] |               |
|--|----------------|------------------------|---------------|---------------|----------|-------------------------------|---------------|
|  |                | A                      | B             | C             | D        | Low Pressure                  | High Pressure |
| 15   | 9/16" - 18 UNF | 13<br>(0.511)          | 15<br>(0.590) | 26<br>(1.023) | 15 [135] | 25 [220]                      |               |
| 2  | 3/4"-16 UNF    | 17 (0.669)             | 15<br>(0.590) | 32<br>(1.259) | 20 [180] | 45 [400]                      |               |

**STANDARD PORT CONFIGURATION**

| CODE   | SUCTION       | PRESSURE     | POSITION | SIZE       |
|--------|---------------|--------------|----------|------------|
| U2/15S | 3/4" - 16 UNF | 9/16"-18 UNF | side     | 010 to 095 |

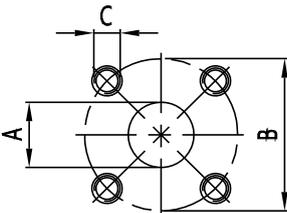
INLET PORTS = For multiple pumps with single inlet please contact Hydreco Technical Support.

'U' PORTS ARE AVAILABLE ONLY FOR QUANTITIES OF AT LEAST 50 PIECES/CODE

| EUROPEAN FLANGED PORTS (FE)   | Ordering Code | Dimensions mm (inches) |               |    | Tightening Torque Nm [lbf in] |               |
|---|---------------|------------------------|---------------|----|-------------------------------|---------------|
|   |               | A                      | B             | C  | Low Pressure                  | High Pressure |
|  | 2             | 13<br>(0.511)          | 30<br>(1.181) | M6 | 8 [70]                        | 8 [70]        |

| STANDARD PORT CONFIGURATION |         |          |          |                    |
|-----------------------------|---------|----------|----------|--------------------|
| CODE                        | SUCTION | PRESSURE | POSITION | SIZE               |
| FE2/2S                      | Ø13 mm  | Ø13 mm   | side     | Only 038, 042, 053 |

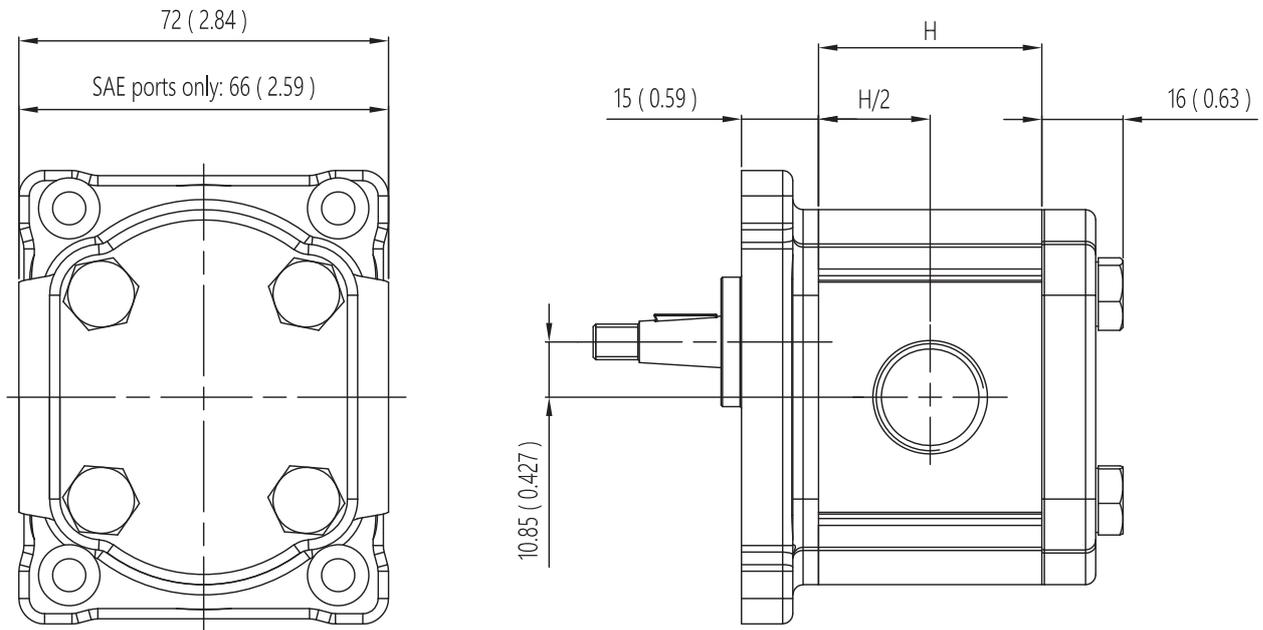
'FE' PORTS FOR DIFFERENT DISPLACEMENTS ARE AVAILABLE FOR QUANTITIES OF MINIMUM 50 PIECES PER P/N

| GERMAN FLANGED PORTS (FG)   | Ordering Code | Dimensions mm (inches) |               |    | Tightening Torque Nm [lbf in] |               |
|---|---------------|------------------------|---------------|----|-------------------------------|---------------|
|   |               | A                      | B             | C  | Low Pressure                  | High Pressure |
|  | 2             | 13<br>(0.511)          | 30<br>(1.181) | M6 | 8 [70]                        | 8 [70]        |

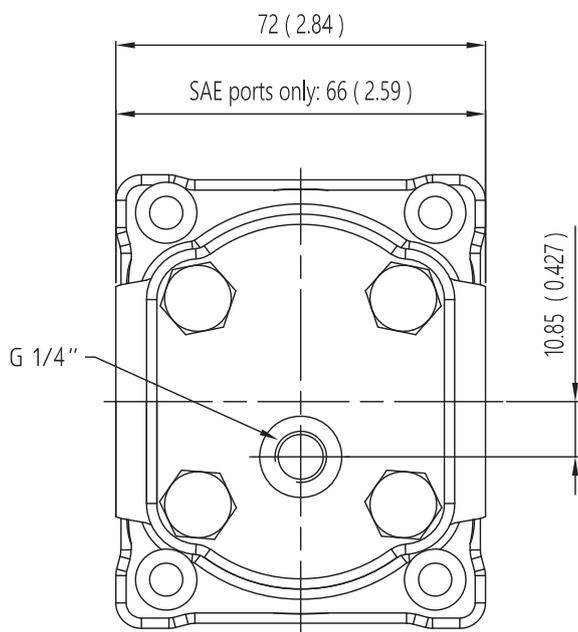
| STANDARD PORT CONFIGURATION |         |          |          |      |
|-----------------------------|---------|----------|----------|------|
| CODE                        | SUCTION | PRESSURE | POSITION | SIZE |
| FG2/2S                      | Ø13 mm  | Ø13 mm   | side     | all  |

INLET PORTS = For multiple pumps with single inlet please contact Hydreco Technical Support.

**UNIDIRECTIONAL PUMPS / MOTORS**



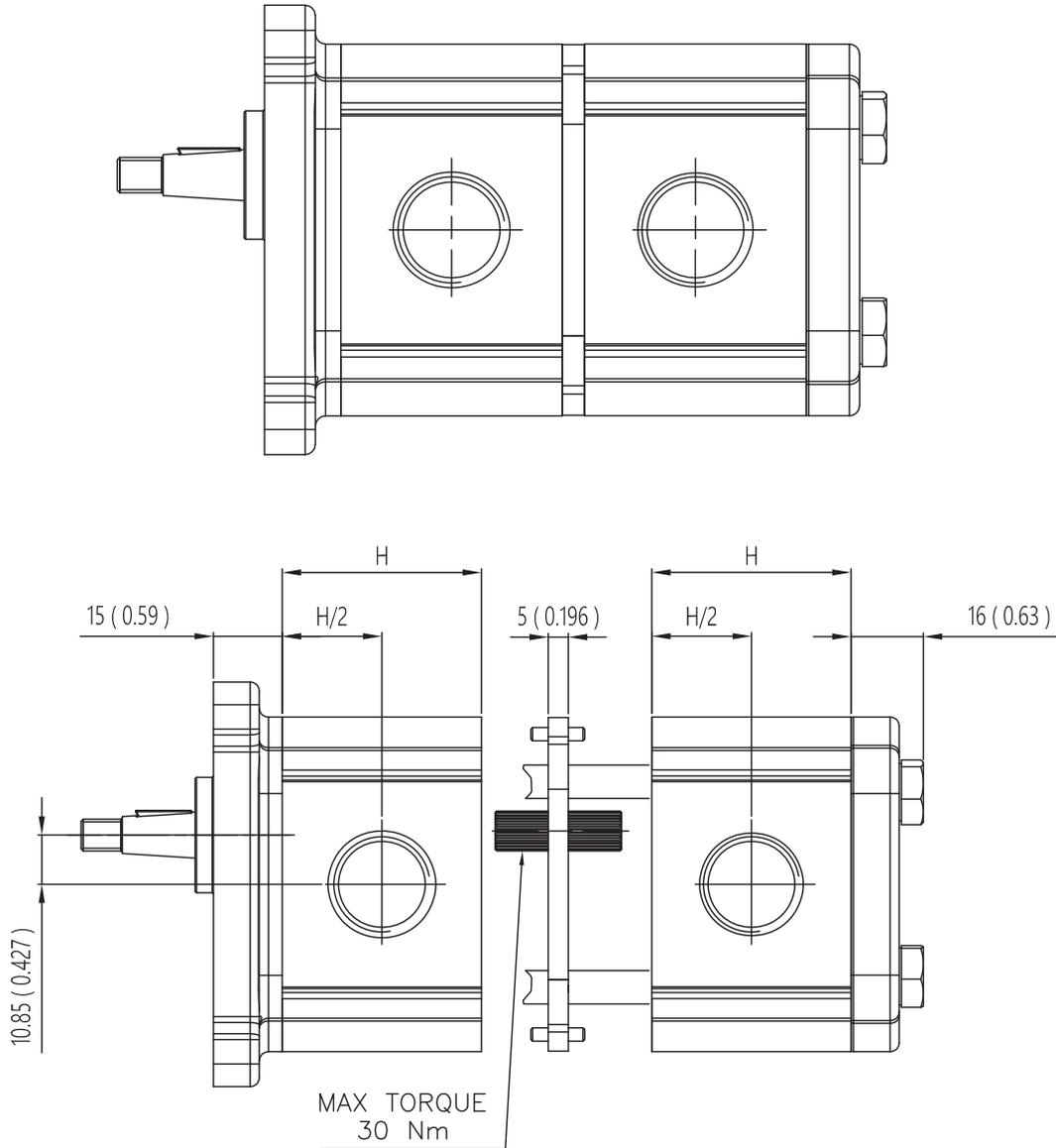
**REVERSIBLE PUMPS / MOTORS**



| GROUP      | SIZE | H<br>mm (inch) | WEIGHT<br>kg (lbs) |
|------------|------|----------------|--------------------|
| <b>HY1</b> | 010  | 35.7 (1.405)   | 1.45 (3.20)        |
|            | 015  | 37.5 (1.476)   | 1.45 (3.20)        |
|            | 019  | 39.0 (1.535)   | 1.50 (3.31)        |
|            | 025  | 41.3 (1.626)   | 1.50 (3.31)        |
|            | 031  | 43.5 (1.712)   | 1.50 (3.31)        |
|            | 035  | 45.0 (1.772)   | 1.53 (3.37)        |
|            | 038  | 46.1 (1.814)   | 1.55 (3.42)        |
|            | 042  | 47.5 (1.870)   | 1.57 (3.46)        |
|            | 047  | 49.5 (1.949)   | 1.60 (3.53)        |
|            | 053  | 51.7 (2.035)   | 1.65 (3.64)        |
|            | 063  | 55.5 (2.180)   | 1.70 (3.75)        |
|            | 075  | 59.2 (2.330)   | 1.75 (3.86)        |
|            | 095  | 68.0 (2.677)   | 1.85 (4.08)        |

**TANDEM PUMPS**

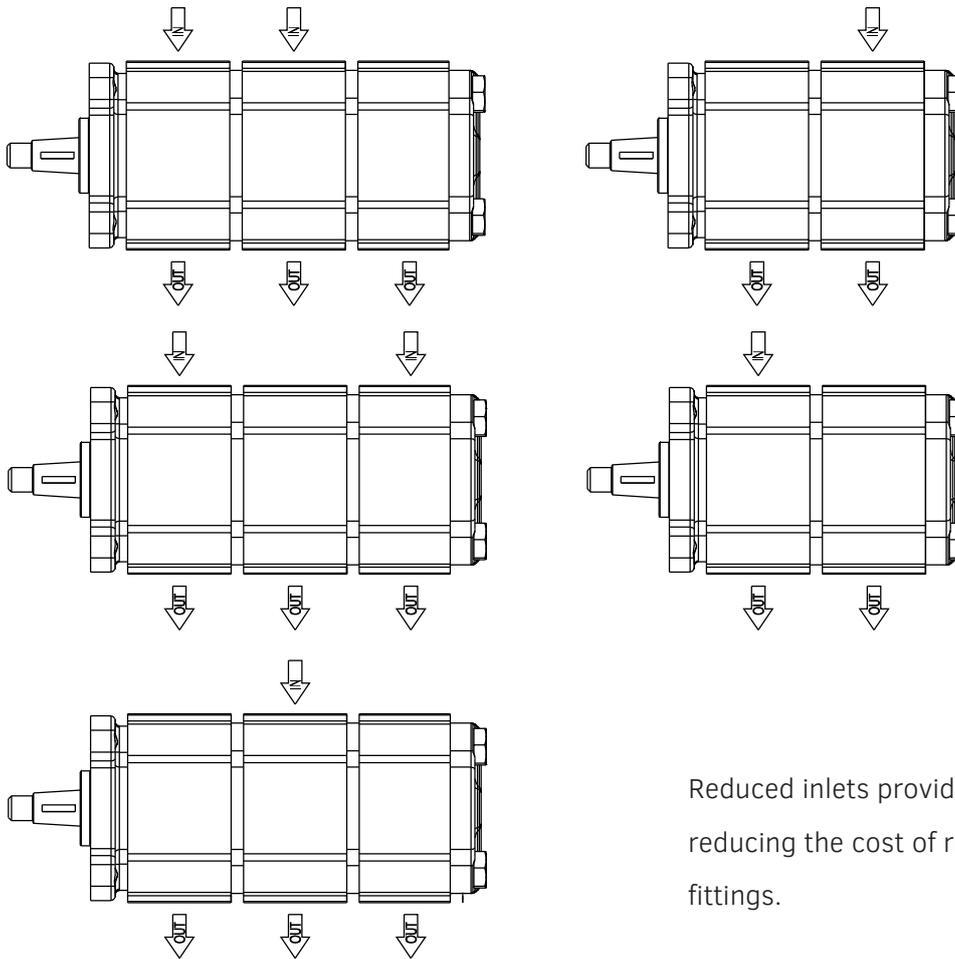
Standard configuration



| GROUP      | SIZE | H<br>mm (inch) | WEIGHT<br>kg (lbs) |
|------------|------|----------------|--------------------|
| <b>HY1</b> | 010  | 35.7 (1.405)   | 1.10 (2.43)        |
|            | 015  | 37.5 (1.476)   | 1.10 (2.43)        |
|            | 019  | 39.0 (1.535)   | 1.15 (2.54)        |
|            | 025  | 41.3 (1.626)   | 1.15 (2.54)        |
|            | 031  | 43.5 (1.712)   | 1.15 (2.54)        |
|            | 035  | 45.0 (1.772)   | 1.15 (2.54)        |

| GROUP      | SIZE | H<br>mm (inch) | WEIGHT<br>kg (lbs) |
|------------|------|----------------|--------------------|
| <b>HY1</b> | 038  | 46.1 (1.814)   | 1.20 (2.65)        |
|            | 042  | 47.5 (1.870)   | 1.25 (2.76)        |
|            | 047  | 49.5 (1.949)   | 1.25 (2.76)        |
|            | 053  | 51.7 (2.035)   | 1.30 (2.87)        |
|            | 063  | 55.5 (2.180)   | 1.35 (2.98)        |
|            | 075  | 59.2 (2.330)   | 1.40 (3.09)        |

**EXAMPLES WITH COMMON INLET (top view)**

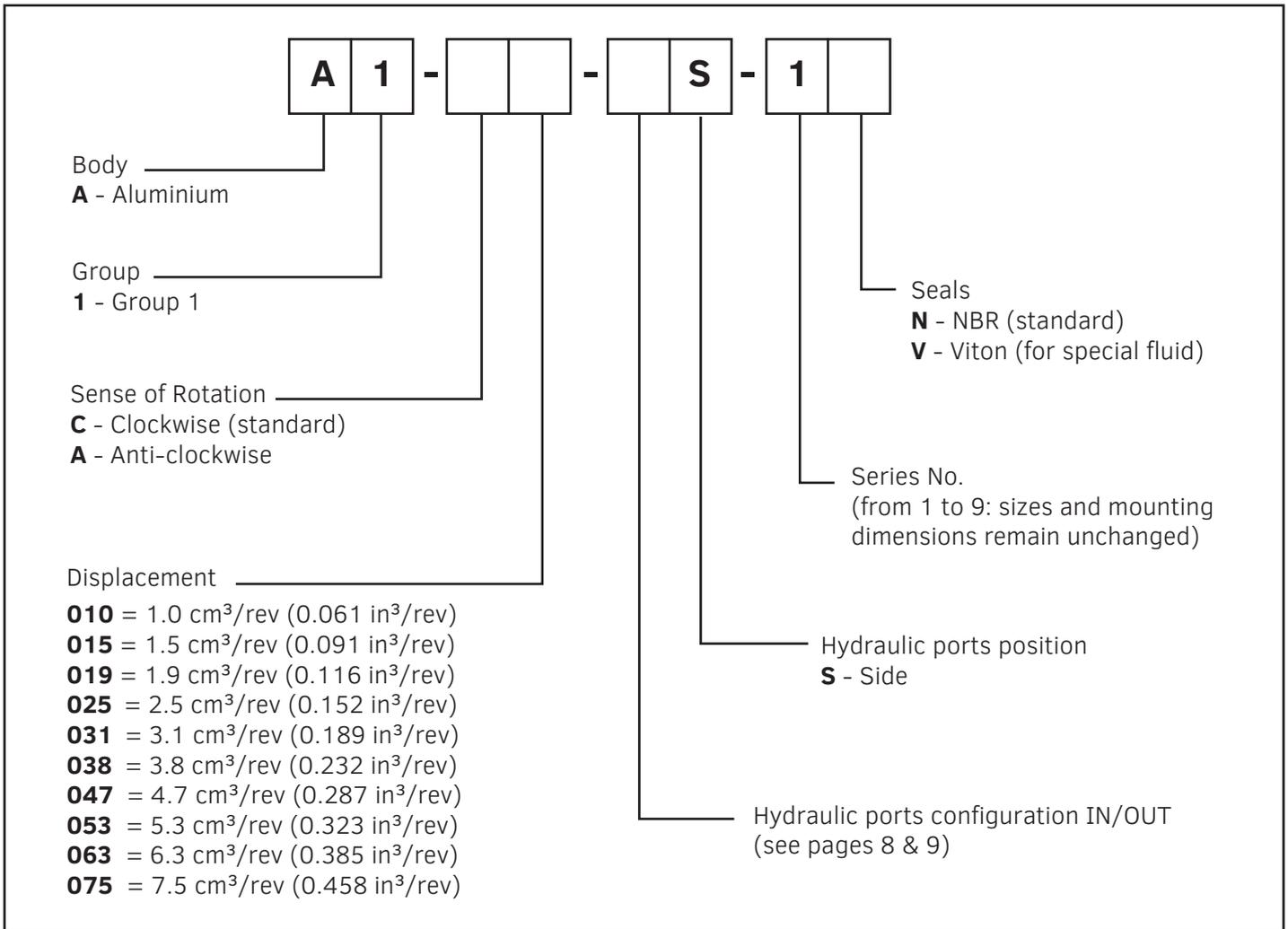


Reduced inlets provide overall systems savings by reducing the cost of redundant inlet hose and fittings.

For the correct choice or other combinations please contact Hydreco Technical Support.

**NOTE:** multiple pumps with common inlet will be provided with a special body

**ORDERING CODE IDENTIFICATION FOR INTERMEDIATE PUMPS**



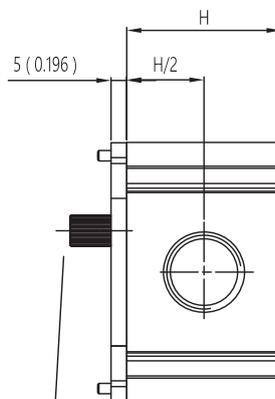
**Example**

A1-C015-FG2/2S-1N

GR1 intermediate pump - clockwise rotation - (splined shaft - fixed choice) - German flanged ports

**DIMENSIONS (side view)**

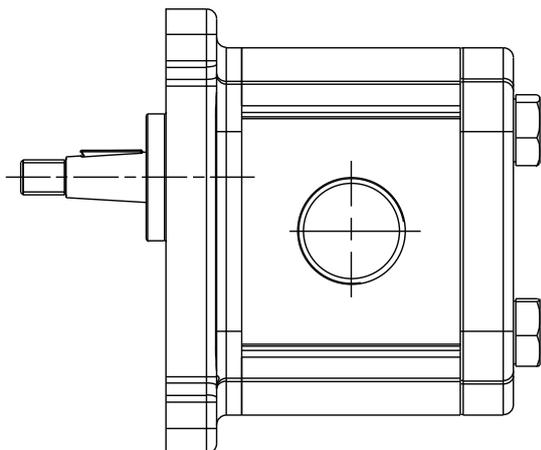
The HY1 intermediate pumps include the intermediate flange and coupling to easily assemble tandem or multiple pumps.



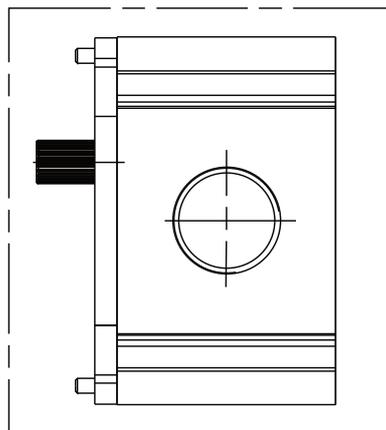
Max Torque = 30 Nm (266 lbf in)

| GROUP      | SIZE | H<br>mm (inch) | WEIGHT<br>kg |
|------------|------|----------------|--------------|
| <b>HY1</b> | 010  | 35.7 (1.405)   | 1.10         |
|            | 015  | 37.5 (1.476)   | 1.10         |
|            | 019  | 39.0 (1.535)   | 1.15         |
|            | 025  | 41.3 (1.626)   | 1.15         |
|            | 031  | 43.5 (1.712)   | 1.15         |
|            | 038  | 46.1 (1.814)   | 1.20         |
|            | 047  | 49.5 (1.949)   | 1.25         |
|            | 053  | 51.7 (2.035)   | 1.30         |
|            | 063  | 55.5 (2.180)   | 1.35         |
|            | 075  | 59.2 (2.330)   | 1.40         |

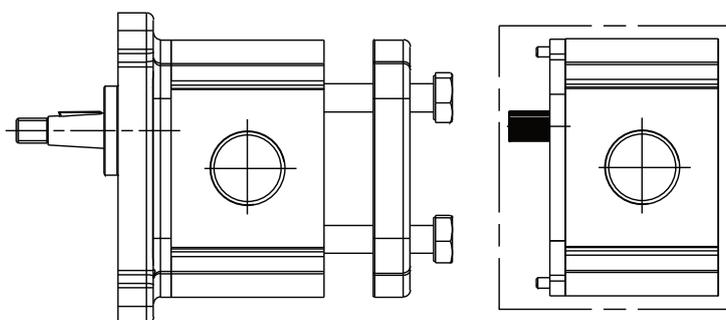
## HOW TO MAKE TANDEM PUMPS USING AN INTERMEDIATE PUMP (side view)



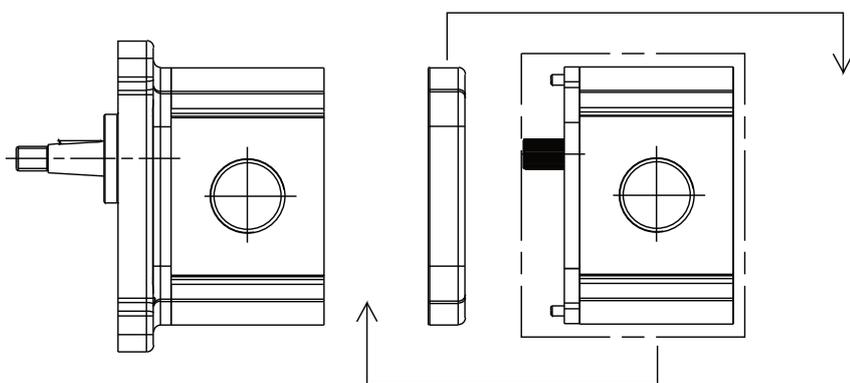
**STANDARD PUMP**



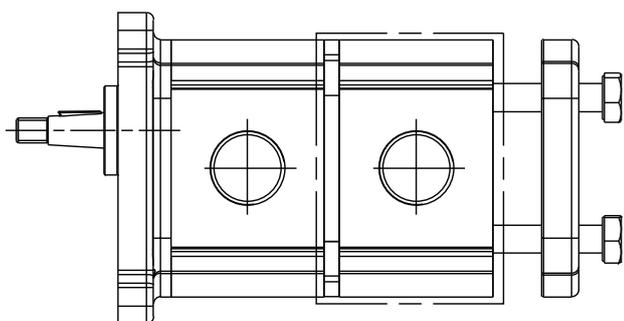
**INTERMEDIATE PUMP**



**A.** Loosen and remove the clamp screws, and remove the cover.



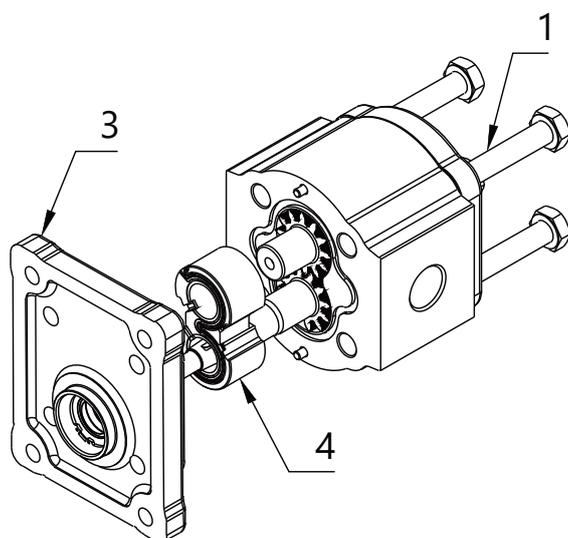
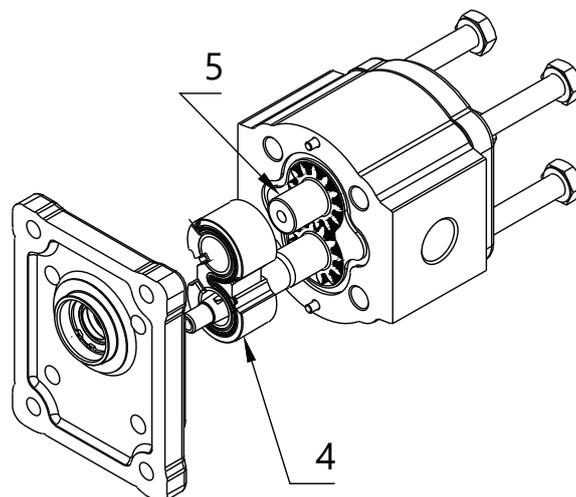
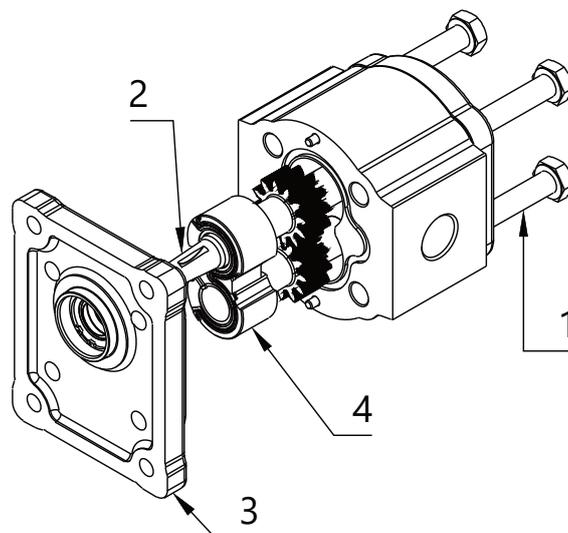
**B.** Connect the intermediate pump



**C.** Assembling the tandem pump.  
Refit the clamp screws.  
SCREWS TIGHTENING TORQUE =  $29 \pm 1$  Nm  
For length of closure screws = see page 11

## UNITS ROTATING CHANGING INSTRUCTIONS

- A. Clean the pump externally with care
- B. Coat the sharp edges of the drive shaft ( 2 ) with adhesive tape and smear a layer of clean grease on the shaft and extension to avoid damaging the lip of the shaft seal when removing the mounting flange
- C. Lay the pump on the working area in order to have the mounting flange turned upside.
- D. Loosen, and remove, the clamp screws ( 1 ).
- E. Remove the mounting flange ( 3 ), taking care to keep the flange as straight as possible during removal.
- F. Ensure that while removing the front mounting flange, the drive shaft and other components remain in position.
- G. Ease the drive gear ( 2 ) up to facilitate removal of bearings ( 4 ), taking care that the precision ground surfaces do not become damaged, and removed the drive gear
- H. Remove the driven gear ( 2 ) without overturning. The rear flange has not to be removed.
- I. Re-locate the driven gear in the position previously occupied by the drive gear ( 2 ).
- J. Re-locate the drive gear ( 2 ) in the position previously occupied by the driven gear ( 5 ).
- K. Re-locate the bushing ( 4 ) without rotating. Refit the front mounting flange ( 3 ) turned by 180°.
- L. Refit the clamp screws ( 1 ).  
SCREW TIGHTENING TORQUE =  $29 \pm 1\text{Nm}$
- M. Check that the pump rotates freely when the drive shaft ( 2 ) is turned by hand.
- N. If not a pressure plate seal may be pinched.
- O. The pump is ready for installation with the new direction of rotation.



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