



# MAKİNE SANAYİ TİCARET LİMİTED ŞİRKETİ

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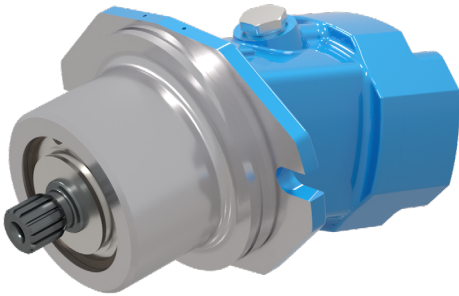
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F1



## Index

|                                      |    |
|--------------------------------------|----|
| General information - Features.....  | F2 |
| Technical data .....                 | F4 |
| Ordering code .....                  | F5 |
| Dimensions 2 Bolts flange (OL) ..... | F8 |
| Special version .....                | F9 |

| Type     | Displacement<br>cm <sup>3</sup> /rev [in <sup>3</sup> /rev] | Max. flow<br>l/min [U.S. gpm] | Max. pressure cont.<br>bar [psi] |
|----------|-------------------------------------------------------------|-------------------------------|----------------------------------|
| H1CR 045 | 44.3 [2.67]                                                 | 186 [49]                      | 350 [5100]                       |

H1CR series are a family of fixed displacement motors, bent axis piston design for operation in both open and closed circuit. H1CR series motors are mainly intended for installation in mechanical gearboxes such as track drive and winches gear boxes.

The proven design incorporating the lens shape valve plate, the high quality components and manufacturing techniques make the H1CR series motors able to provide up to 350 bar [5100 psi] continuous and 450 bar [6500 psi] peak performance.

Fully laboratory tested and field proven, these motors provide maximum efficiency and long life. Heavy duty bearings permit high radial and axial loads.

Flangeable valves, both for open and closed circuit, enable H1CR series motors to meet the requirements of the most different types of applications.



Simbology:

|                           |                                             |                                 |
|---------------------------|---------------------------------------------|---------------------------------|
| <b>C</b>                  | N/bar<br>[lbf/psi]                          | Load                            |
| <b>F<sub>ax max</sub></b> | N<br>[lbf]                                  | Axial pushing load              |
| <b>F<sub>ax max</sub></b> | N<br>[lbf]                                  | Axial pulling load              |
| <b>F<sub>q</sub></b>      | N<br>[lbf]                                  | Radial load                     |
| <b>F<sub>q max</sub></b>  | N<br>[lbf]                                  | Maximum permissible radial load |
| <b>J</b>                  | kg·m <sup>2</sup><br>[lbf·ft <sup>2</sup> ] | Moment of inertia               |
| <b>m</b>                  | kg<br>[lbs]                                 | Weight                          |
| <b>n<sub>o max</sub></b>  | rpm                                         | Maximum speed                   |
| <b>p<sub>nom</sub></b>    | bar<br>[psi]                                | Maximum cont. pressure          |
| <b>p<sub>max</sub></b>    | bar<br>[psi]                                | Maximum pressure peak           |

|                        |                                                |                                   |
|------------------------|------------------------------------------------|-----------------------------------|
| <b>q<sub>max</sub></b> | l/min<br>[U.S. gpm]                            | Maximum flow                      |
| <b>q<sub>d</sub></b>   | l/min<br>[U.S. gpm]                            | External drain flow               |
| <b>T<sub>k</sub></b>   | Nm/bar<br>[lbf.ft/psi]                         | Torque costant                    |
| <b>T<sub>nom</sub></b> | Nm<br>[lbf.ft]                                 | Maximum torque at pressure cont.  |
| <b>T<sub>max</sub></b> | Nm<br>[lbf.ft]                                 | Maximum torque at pressure peak   |
| <b>V<sub>g</sub></b>   | cm <sup>3</sup> /rev<br>[in <sup>3</sup> /rev] | Displacement                      |
| <b>P<sub>max</sub></b> | kW<br>[hp]                                     | Maximum power at p <sub>nom</sub> |
| <b>η<sub>hm</sub></b>  | %                                              | Mech-hyd. efficiency              |
| <b>η<sub>v</sub></b>   | %                                              | Volumetric efficiency             |

#### Hydraulic fluids:

Use fluids with mineral oil basis and anticorrosive, antioxidant and wear preventing addition agents (HL or HM). Viscosity range at operating temperature must be of 15÷40 cSt. For short periods and upon cold start, a max. viscosity of 800 cSt is allowed. Viscosities less then 10 cSt are not allowed. A viscosity range of 10÷15 cSt is allowed for extreme operating conditions and for short periods only. For further information see at Fluids and filtering section.

#### Temperature ranges:

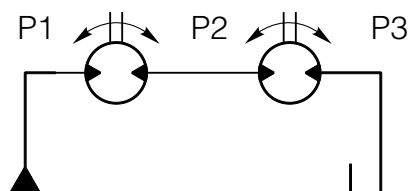
The operating temperature of the oil must be within -25°C÷90°C [-13°F÷194°F]. The running of the axial piston unit with oil temperature higher than 90°C [194°F] or lower than -25°C [-13°F] is not allowed. For further information see at Fluids and filtering section.

#### Filtering:

A correct filtration helps to extend the service life of axial piston units. In order to ensure a correct functioning of the unit, the max. permissible contamination class is 21/19/16 according to ISO 4406:1999. For further details see at Fluids and filtering section.

#### Operating pressure:

The maximum permissible pressure on pressure ports is 350 bar [5100 psi] continuos and 450 bar [6500 psi] peak. If two motors are connected in series, working pressure has to be limited to following values: P1 400 bar max. [5800 psi] and P2 200 bar max. [2900 psi].



**Case drain pressure:**

Maximum permissible case drain pressure is 1.5 bar [22 psi]. A higher pressure can damage the main shaft seal or reduce its life.

**Seals:**

Seals used on standard H1CR series axial piston motors are of NBR (Acrylonitrile-Butadiene Elastomer). For special uses (high temperatures or corrosive fluids) it is possible to order the unit with FKM seals (Fluoroelastomer). In case of use of special fluids, contact Dana.

**Loads on output shaft:**

Main shaft has bearings that can bear both radial and axial loads. As for loads permissible values, see relevant section at Bearing life on axial piston unit Service life of bearings for axial piston units.

**Minimum rotation speed:**

Under "minimum rotating speed" we mean the minimum speed ensuring a smooth running of the piston motor. Operation smoothness at low speeds depends on many factors, as type of load and operating pressure. At a speed higher than 150 rpm, a smooth running is ensured almost in every case. Lower speeds are, usually, possible. For special applications please contact Dana.

**Installation:**

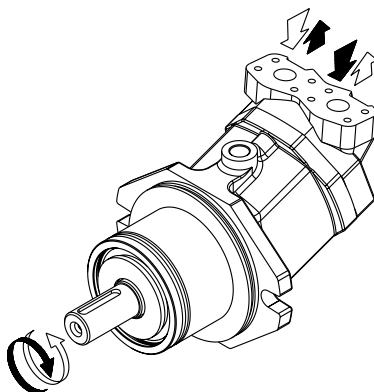
H1CR motors can be installed in various position and directions; however, installation in vertical position with shaft towards upper is not allowed. These axial piston units have separated ports and drain chambers and so must be always drained. For further detail see at General installation guidelines.

**Flangeable valves:**

Flangeable valves are available for motors both in open and closed loop. VSC06F, VSC09F, VSC15F AND VSC21F flushing valves are for closed loop, VCD/M overcentre valve is for open loop. For further details see at Valves section.

**Relation between direction of rotation and direction of flow:**

The relation between direction of rotation of shaft and direction of flow in H1CR piston motors is shown in the picture below.



|                                                  |                               |                                                |                  |
|--------------------------------------------------|-------------------------------|------------------------------------------------|------------------|
| <b>Displacement</b>                              | <b><math>V_g</math></b>       | cm <sup>3</sup> /rev<br>[in <sup>3</sup> /rev] | 44.3<br>[2.67]   |
| <b>Max. Press. cont.</b>                         | <b><math>p_{nom}</math></b>   | bar<br>[psi]                                   | 350<br>[5100]    |
| <b>Max. Press. peak</b>                          | <b><math>p_{max}</math></b>   | bar<br>[psi]                                   | 450<br>[6500]    |
| <b>Max. speed</b>                                | <b><math>n_{0 max}</math></b> | rpm                                            | 4200             |
| <b>Max. flow</b>                                 | <b><math>q_{max}</math></b>   | l/min<br>[U.S.gpm]                             | 186<br>[49]      |
| <b>Max. power at <math>p_{nom}</math></b>        | <b><math>P_{max}</math></b>   | kW<br>[hp]                                     | 108<br>[145]     |
| <b>Torque constant</b>                           | <b><math>T_k</math></b>       | Nm/bar<br>[lbf.ft/psi]                         | 0.70<br>[0.036]  |
| <b>Max. torque cont. at <math>p_{nom}</math></b> | <b><math>T_{nom}</math></b>   | Nm<br>[lbf.ft]                                 | 247<br>[182]     |
| <b>Max torque peak at <math>p_{max}</math></b>   | <b><math>T_{max}</math></b>   | Nm<br>[lbf.ft]                                 | 317<br>[233.6]   |
| <b>Moment of inertia <sup>(1)</sup></b>          | <b><math>J</math></b>         | kg·m <sup>2</sup><br>[lbf.ft <sup>2</sup> ]    | 0.004<br>[0.094] |
| <b>Weight <sup>(1)</sup></b>                     | <b><math>m</math></b>         | kg<br>[lbs]                                    | 20<br>[44.1]     |
| <b>External drain flow <sup>(2)</sup></b>        | <b><math>q_d</math></b>       | l/min<br>[U.S.gpm]                             | 0.7<br>[0.18]    |

Theoretical values, without considering  $\eta_{hm}$  and  $\eta_v$ ; approximate values. Peak operations must not exceed 1% of every minute. A simultaneous maximum pressure and maximum speed not recommended. Pump values refer to open circuit operation.

**Notes:**

(1) Approximate values.

(2) Average values at 250 bar [3600 psi] with mineral oil at 45°C [113°F] and 35 cSt.

The following alphanumeric codes system has been developed to identify all of the configuration options for the H1CR series. Use the model code below to specify the desired features. All alphanumeric digits system of the code must be present when ordering. We advise to carefully read the catalogue before filling the ordering code.

| 1      | 2     | 3    | 4       | 5            | 6         | 7          | 8                     | 9    | 10    | 11             | 12             | 13              | 14       |
|--------|-------|------|---------|--------------|-----------|------------|-----------------------|------|-------|----------------|----------------|-----------------|----------|
| Series | Motor | Size | Version | Mount flange | Shaft end | Port cover | Direction of rotation | Seal | Valve | Valves feature | Flushing valve | Special feature | Painting |
| H1CR   | M     | 045  | GE      | OL           | SAI       | LM2        | RV                    | V    | VCDM  | 000            | 06             | RD              | 01       |

| 1    |                                               |
|------|-----------------------------------------------|
|      | Series                                        |
| H1CR | Plug-in fixed displacement motors for gearbox |

| 2 |       |
|---|-------|
|   | Motor |
| M | Motor |

| 3   |                                                       |
|-----|-------------------------------------------------------|
|     | Size                                                  |
| 045 | 44.3 cm <sup>3</sup> /rev [2.67 in <sup>3</sup> /rev] |

| 4  |                    |
|----|--------------------|
|    | Version            |
| GE | ISO 3019-2 metric. |

| 5  |                                |
|----|--------------------------------|
|    | Flange                         |
| OL | 2 bolts Ø 160 mm h6 [Ø 6.3 in] |

| 6   |                              |
|-----|------------------------------|
|     | Shaft end                    |
| SAI | Splined W30x2x14x9g DIN 5480 |

|      |   |     |   |    |     |     |    |   |      |     |    |    |    |
|------|---|-----|---|----|-----|-----|----|---|------|-----|----|----|----|
| 1    | 2 | 3   | 4 | 5  | 6   | 7   | 8  | 9 | 10   | 11  | 12 | 13 | 14 |
| H1CR | M | 045 | G | OL | SAI | LM2 | RV | V | VCDM | 000 | 06 | RD | 01 |

7

## Port cover

|     |                         |
|-----|-------------------------|
| FM1 | Frontal ports           |
| LM2 | Lateral ports           |
| VM2 | Lateral ports same side |

8

## Direction of rotation (viewed from shaft side)

|    |            |
|----|------------|
| RV | Reversible |
|----|------------|

9

## Seal

|   |     |
|---|-----|
| N | NBR |
| V | FKM |

10

## Valve

## Port cover

|      |                                       | Port cover |     |     |
|------|---------------------------------------|------------|-----|-----|
|      |                                       | FM1        | LM2 | VM2 |
| XXXX | None                                  | ●          | ●   | ●   |
| VCDM | VCD/M Pilot assisted overcentre valve | –          | –   | ●   |
| VCR3 | VCR3 Control Rotation Valve           | –          | –   | ●   |

11

## Valve feature

## Valve

|     |                                                                                         | XXXX | VCDM | VCR3 |
|-----|-----------------------------------------------------------------------------------------|------|------|------|
|     |                                                                                         |      |      |      |
| 000 | None                                                                                    | ●    | –    | –    |
| 004 | Not Set 30÷350 bar [435 to 5075 psi]<br>Piloting ratio 6.2:1<br>Control of rotation CW  | –    | ●    | –    |
| 005 | Not Set 30÷350 bar [435 to 5075 psi]<br>Piloting ratio 6.2:1<br>Control of rotation CCW | –    | ●    | –    |
| 012 | Not Set (Piloting ratio 8:1)                                                            | –    | –    | ●    |

– : Not available

● : Available

Please contact Technical department for valve which require specific setting. For the technical specifications see catalogue valves.

|      |   |     |   |    |     |     |    |   |      |     |    |    |    |
|------|---|-----|---|----|-----|-----|----|---|------|-----|----|----|----|
| 1    | 2 | 3   | 4 | 5  | 6   | 7   | 8  | 9 | 10   | 11  | 12 | 13 | 14 |
| H1CR | M | 045 | G | OL | SAI | LM2 | RV | V | VCDM | 000 | 06 | RD | 01 |

| 12             |                                                   | Port cover |     |     |
|----------------|---------------------------------------------------|------------|-----|-----|
| Flushing valve |                                                   | FM1        | LM2 | VM2 |
| XX             | None                                              | ●          | ●   | ●   |
| 06             | VSC/F Flushing valve - 6 l/min [1.58 U.S. gpm]    | –          | ●   | ●   |
| 09             | VSC/F Flushing valve - 10.5 l/min [2.77 U.S. gpm] | –          | ●   | ●   |
| 15             | VSC/F Flushing valve - 15 l/min [3.96 U.S. gpm]   | –          | ●   | ●   |
| 21             | VSC/F Flushing valve - 20 l/min [5.28 U.S. gpm]   | –          | ●   | ●   |

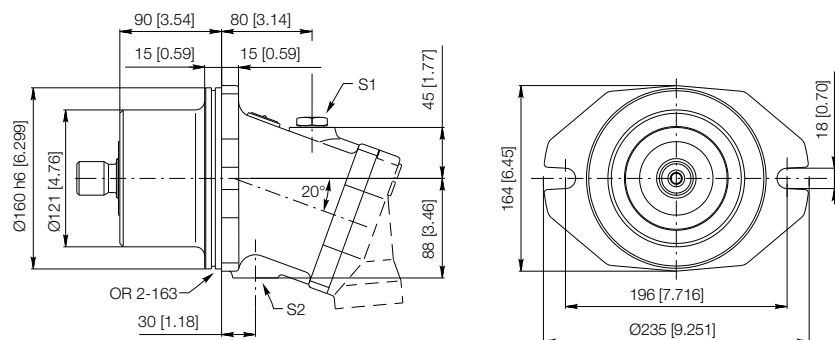
– : Not available

● : Available

It is not possible to combine the flushing valves with valve in pos.10. For the technical specifications see catalogue valves.

| 13 |                      | Special feature |
|----|----------------------|-----------------|
| XX | None                 |                 |
| RD | Drain plugs reversed |                 |

| 14 |                        | Painting |
|----|------------------------|----------|
| XX | None                   |          |
| 01 | Black Painted RAL 9005 |          |
| 02 | Blue Painted RAL 5015  |          |

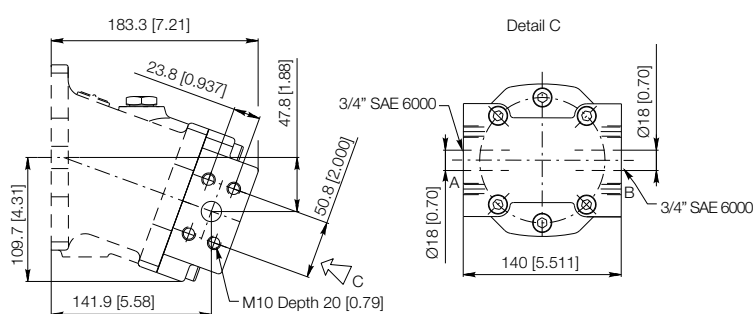


S1, S2: Drain ports - 1/2 G (BSPP)  
A, B: Service line ports

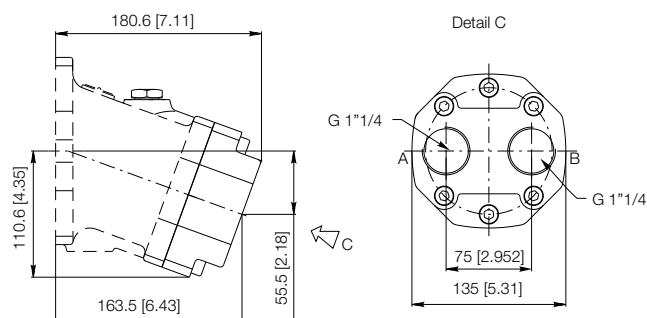
7

Port cover

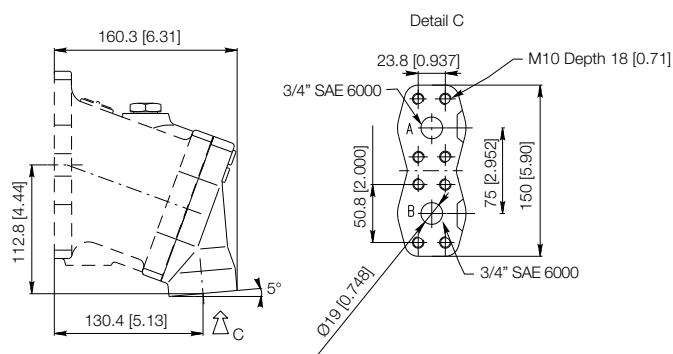
LM2



FM1



VM2

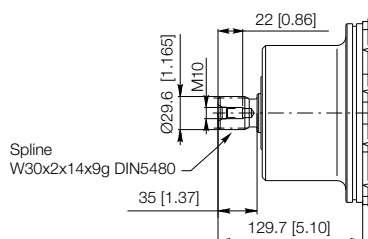


6

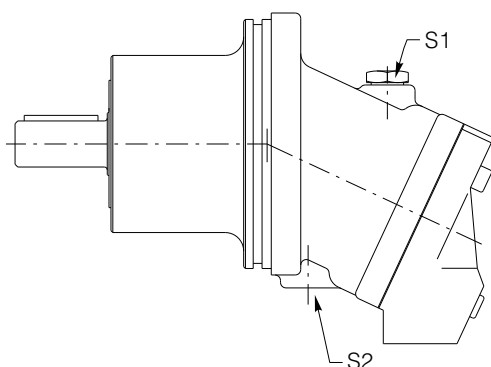
Shaft end

SAI

Splined shaft

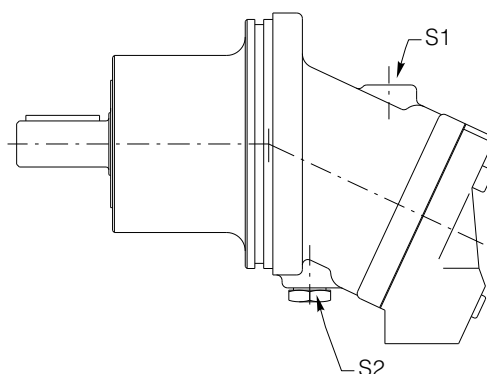


STANDARD VERSION



S1 - Metallic plug.  
S2 - Plastic plug.

"RD" VERSION



S1 - Plastic plug.  
S2 - Metallic plug.

For the H1CR motors it is possible to request the drain plug reversed compared to standard.  
If it is necessary the motor with this configuration, to specify in the purchase order the value "RD" (See position 13 of ordering code).