HF
OIL/AIR ACTUATED POWER TAKE OFF
HF POWER TAKE OFF

**HFO - FOR SIDE LOAD APPLICATIONS**

- Unique greased for life bearing design
- Eliminates the pilot bearing inside the engine flywheel
- Rotary union for high reliability
- Large bearings for high side load capacity
- Rotary union protection (for 314 only)
- Self adjusting clutch
  Easy maintenance due to special clutch pack design
- Grease and oil lubrication

HF oil/air actuated power take off - 1903
OIL / AIR ACTUATION
- remote control operation by push button engagement
- self adjusting; no operator adjustment required

UNIQUE CLUTCH DESIGN
- compact design
- high torque capacity
- eliminates the engine flywheel pilot bearing (HFO)
- no side load on flywheel (HFR)
- SAE standard interface
- dust proof for harsh environmental conditions
- simplified service in case of discs replacement
- easy installation
- Kevlar friction discs (with the exception of HFR210) for heavy duty and torsionally active applications

OPTIONALS
- MPCB R5 microprocessor controller for 12 to 24 Vdc systems with advanced clutch protection, operation and monitoring. Integrated hydraulic and air power pack drive logic, event logging (latest 1000 events registration), controlled engagement monitoring (including soft start granting full driveline protection), clutch overload protection, engine and load speed display and real time data acquisition capability. Communication via CAN BUS 2.0 extended according to SAE J1939 protocol. The display CAN BUS SAE J1939 is included.
- Hydraulic and air power pack (only for HFR), 12 or 24 Vdc, with motor relay, pressure switch and indicator. Avoids complicated actuation hydraulic circuits or modifications to existing ones. Compact, light, reliable with reduced maintenance. Particularly useful in retrofitting applications.
HFO OIL ACTUATED POWER TAKE OFF

Dimensions

| SIZE | SAE Housing size | SAE Flywheel size | A  | B  | C  | D  | E  | F  | L  | M  | N  | P  | Q  | R  | S  | T  | U  | V  | Ø Nr. | X  | Y  | W  |
|------|-----------------|------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|----|----|----|
| 211  | 3               | 11½”             | 70 | 137| -  | -  | 223.5| 352.4| 49.5| 235| 39.6| -  | -  | 11  | 47.6| -  | -  | 289 | 63  | 85  |
| 311  | 3-2-1           | 14”              | 80 | 189| 190.5| 225.4| 113| 66  | 270| 140| 182.5| 23 | 12  | 12  | 88  | 13.5| 6x60°| 71  | 60.8|
| 214  | 1-0             | 14”              | 90 | 236| 245 | 275| 225.5| 466.7| 49.9| 350.3| 25.4| 273.3| 27  | 15  | 12.7| 31.7| 15  | 56.8 | 73.4|
| 314  |                 |                  | 211 | 2500| 1400| 514 | Grease | 79  |        |
| 311  | 2400            | 2250             | 116 | 110 |
| 214  | 2400            | 3250             | 134 | 133 |
| 314  | 2400            | 4900             | 167 | 130 |

Technical data

<table>
<thead>
<tr>
<th>SIZE</th>
<th>MAX SPEED rpm</th>
<th>MAX INPUT TORQUE (at 25 bar) Nm</th>
<th>THERMAL CLUTCH CAPACITY Q</th>
<th>OUTPUT BEARING LUBRIFICATION</th>
<th>WEIGHT kg</th>
<th>CENTER OF GRAVITY G dimension</th>
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- For permissible radial loads see selection instructions
- Dimensions are subject to alteration without notice
HFR OIL/AIR ACTUATED POWER TAKE OFF

Dimensions

| SIZE | SAE Housing size | SAE Flywheel size | A | B | C | D | E | F | L | M | N | P | Q | R | S | T | U | V | Ø | Nr. | Z | X | Y | W | K |
| 210  | 4                | 10"               | 60| 155|   | 90| 314.3| 63| 220|   | 110| 53.8|   | 11| 47|   |   |   |   | 254| 83| 70|   |   |   |
| 211  | 3-2              | 11 1/2"           | 60| 177|   | 90| 352.4| 54.5| 235|   | 110| 39.6|   | 12| 80|   |   |   |   | 289| 68| 62|   |   |   |
| 311  | 3-2-1            | 14"               | 80| 177|   | 90| 223.5| 49.5| 280|   | 140| 25.4| 273.3| 15| 12.7| 15| 6X60°|   |   | 355| 45.2| 75| 650| 563|
| 314  | 1-0              | 14"               | 90| 234| 245| 270| 466.7| 43.2| 384.8| 180| 15.7| 380| 32| 18| 14| 16| 17| 457| 45| 85| 766| 750|
| 318  | 0                | 18"               | 110| 258| 265| 305| 385| 571.5| 40| 515| 180| 15.7| 380| 32| 18| 14| 16| 17| 457| 45| 85| 766| 750|

Technical data

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<th>THERMAL CLUTCH CAPACITY Q</th>
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<td>1980</td>
<td>Oil</td>
<td>368</td>
<td>155</td>
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</table>

- For permissible radial loads see selection instructions
- Dimensions are subject to alteration without notice
- All size are with kevlar discs (with exception of HFR 210)
* For online applications, with radial load, the limit decreases
HFO

oil supply 25 bar side load application

The HFO clutches have been developed by TRANSFLUID to meet the growing market demand for power take offs applied to high speed, high horse power industrial engines and having remote control operation.

The HFO consists of an oil actuated clutch assembly (dry plates) with a shaft and bearings suitable for high side loads mounted in a cast iron housing that provides easy engine installation.

The clutch actuation is provided by a rotating union mounted in the output shaft.

This system allows the use of HFO for belt driven applications only. The oil actuation permits remote control as well as a larger transmittable torque compared to the traditional overcenter PTOs.

In addition, due to the continuous pressure applied to the clutch plates, the HFO is a self adjusting clutch which drastically reduces the maintenance costs especially on heavy duty applications where plate wear is typical.

Additional to the HFO is the HFF design (flanged shaft by QD). This model is designed for road milling machines where a compact layout is required.

HFR

oil/air supply 12 bar in-line and side load application

The HFR clutches have been designed to complete the TRANSFLUID range of power take offs for new potential markets.

The oil-air actuation is provided by oil or air radial inlet instead of axial as the HFO; this configuration permits the mounting of couplings and/or cardan shafts on the output shaft. The actuation oil or air is controlled externally and enters the clutch radially directly into the bearing carrier.

Control and management of the HFO-HFR equipment:

• By customer hydraulic circuit
• By MPCB R5 with hydraulic control block, through continuous monitoring of some parameters proper transmission operation is assured. Any abnormal condition is promptly detected and countermeasures quickly enforced to protect the transmission as well as the engine
• By oil/air power pack: a compact power system which delivers either oil or air with suitable pressure
• By MPCB R5 with oil power pack only for HFO
## SELECTION GUIDE

**STEP 1 - QUICK SELECTION**

- Uniform load: marine propulsion, fan, centrifugal pump, compressor, generator, water jet.
- Moderate shock: road milling machine, cone crusher, volumetric pump, snow blower, drill, pump for dredge.
- Heavy shock 1: jaw crusher, impactor, wood chipper, shredder, grinder, hammer mills.
- Heavy shock 2: reciprocating compressor, piston pumps.

\[
P = kW \cdot F
\]

- PTO engagement has to be performed at approximate engine idling speed.
- Interval between starts should be 1 hour minimum (fluid coupling mounted on the PTO output shaft allows 3 starts/hour evenly spaced).
- For other technical information, consult the Installation and Maintenance Manual.

**KEVLAR FRICTION DISCS:**

- For heavy duty and torsionally aggressive applications, the use of Kevlar discs is recommended.
- For side load applications HFR with Kevlar discs must be used.

**STEP 2 - THERMAL CAPACITY VERIFICATION**

\[
T : \text{max input torque (Nm)} - \text{see table pages 3 & 4}
\]

\[
J : \text{inertia (kgm}^2\text{)} = \frac{GD^2}{4}
\]

\[
t : \text{starting time (seconds)} - \text{actual slip}
\]

\[
Q : \text{thermal clutch capacity - see table pages 3 & 4}
\]

\[
t = \frac{J \cdot n}{9.55 \cdot T}
\]

\[
kW \cdot t \leq Q
\]

In case of higher Q value than stated in the technical data table (see pages 3 & 4), size of the clutch has to be revised.

- 0.746 kW = 1 hp
- 25.4 mm = 1 inch
- 0.042 kgm\(^2\) = 1 lbs \cdot ft\(^2\)
- 1.356 Nm\(^2\) = 1 lbs \cdot ft
STEP 3 - HFO/HFR PERMISSIBLE SIDE LOAD CHART 2

- Calculated bearing life over 5000 hours
- Rim speeds over 35 m/s, the dynamic balancing of the pulley is recommended
- Timing belts must be approved by TRANSFLUID
- “X” distance is according to belt type & number
- HFR with Kevlar discs only

Actual applied side load “T”

(a) $T [kN] = \frac{S \times kW \times L \times 191 \times 100}{D \times n}$

D : pulley pitch diameter (mm)
Kw : gross engine power (kW)
S : service factor
L : life factor

<table>
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<th>Service Factor</th>
<th>S</th>
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<tbody>
<tr>
<td>Chain or gear drive</td>
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<tr>
<td>V-Belts</td>
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<table>
<thead>
<tr>
<th>Life Factor</th>
<th>L</th>
</tr>
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<tbody>
<tr>
<td>Cyclic and shock loads</td>
<td>2.1</td>
</tr>
<tr>
<td>High-medium side load</td>
<td>1.8</td>
</tr>
<tr>
<td>Low side load</td>
<td>1.2</td>
</tr>
<tr>
<td>Medium-low side load (hydraulic belt tensioner)</td>
<td>0.9</td>
</tr>
</tbody>
</table>

IMPORTANT NOTICE

- Disregarding system torsional compatibility could cause damage to components in the drive train resulting in loss off mobility or power transmission for which the drive is intended. At minimum, system torsional incompatibility could result in unwanted noise and vibration at low speeds.

Selection of HFR/HFO based on permissible side load:
- Calculate side load with formula (a).
- Enter side load and X distance.
- Select clutch.

EXAMPLE:
- T side load = 65 kN
- X distance = 30 mm
- select HFO 314
- Clutch reference speed in Chart 2 is 2100 rpm.
- If the engine speed is higher than boveindicated value, contact TRANSFLUID for application approval.

The responsibility for ensuring that the torsional load of the system is satisfactory rests with the assembler of the drive and driven equipment.

The acceleration of large inertial loads may require special applications or downsizing of the intended units. TRANSFLUID is prepared to assist in finding solutions to potential inertial problems that relate to the power take-off.

PERMISSIBLE SIDE LOAD T vs DISTANCE X Chart 2

<table>
<thead>
<tr>
<th>T [kN]</th>
<th>X [mm]</th>
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<tbody>
<tr>
<td>100</td>
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<tr>
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