HF - MFO
POWER TAKE OFF
**HFR** - FOR SIDE LOAD AND IN-LINE SELF SUPPORTING DESIGN
Eliminates side loads on the engine flywheel

- Self adjusting clutch
- Easy maintenance due to special clutch pack design
- Eliminates the pilot bearing inside the engine flywheel
- Grease and oil lubrication

**HFO** - FOR SIDE LOAD APPLICATIONS

- Large bearings for high side load capacity
- Rotary union protection
- Rotary union for high reliability
- Self adjusting clutch
- Easy maintenance due to special clutch pack design
- Eliminates the pilot bearing inside the engine flywheel

**MFO** - FOR SIDE LOAD AND IN-LINE SELF SUPPORTING DESIGN
Eliminates side loads on the engine flywheel

**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 and MFO)
- 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, standard discs available

**MFO**
The MFO mechanical power take-off consists of a lever actuated clutch with a shaft and bearings mounted in a rigid cast housing. It is designed for inline and sideload applications for internal combustion engines with standard SAE industrial flywheel/flywheel housing dimensions.

MFO mechanical power take-offs will allow:
- to simplify installation time (no pilot bearing alignment required)
- to increase uptime and engine life
- to reduce inventory

**OPTIONAL:**

- remote control operation by push button engagement
- self adjusting; no operator adjustment required
- compact design
- high torque capacity
- eliminates the engine flywheel pilot bearing (HFO)
- 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, standard discs available

**REMOTE CONTROL**
- MFCB R5
- Air power pack
- Oil power pack

**MPCB R5**
Oil power pack
Air power pack

**Self adjusting clutch**
Easy maintenance due to special clutch pack design

**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, standard discs available
HF-MFO power take off - 2004

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

- For permissible radial loads see selection instructions
- Dimensions are subject to alteration without notice
- For inline applications, with radial load, the limit decreases

**Technical data**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>MAX SPEED rpm</th>
<th>MAX INPUT TORQUE KEVLAR (at 12 bar) Nm</th>
<th>MAX INPUT TORQUE STANDARD (at 12 bar) Nm</th>
<th>THERMAL CLUTCH CAPACITY Q</th>
<th>OUTPUT BEARING LUBRICATION</th>
<th>WEIGHT kg</th>
<th>CENTER OF GRAVITY G dimension</th>
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<tbody>
<tr>
<td>210</td>
<td>2800</td>
<td>1300</td>
<td>517</td>
<td>Grease</td>
<td>63</td>
<td>48</td>
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<td>211</td>
<td>2800</td>
<td>1400</td>
<td>514</td>
<td>Grease</td>
<td>78</td>
<td>54</td>
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<tr>
<td>211</td>
<td>2800&quot;</td>
<td>1700</td>
<td>747</td>
<td>Grease</td>
<td>127</td>
<td>84</td>
<td></td>
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<tr>
<td>314</td>
<td>2100</td>
<td>4900</td>
<td>1128</td>
<td>Oil</td>
<td>206</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>318</td>
<td>2100</td>
<td>7700</td>
<td>1980</td>
<td>Oil</td>
<td>368</td>
<td>155</td>
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**HFO - MFO POWER TAKE OFF**

**Dimensions**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>SAE Housing size</th>
<th>SAE Flywheel size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>U</th>
<th>Ø Nm.</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
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</thead>
<tbody>
<tr>
<td>314</td>
<td>1-0</td>
<td>14&quot;</td>
<td>96</td>
<td>236</td>
<td>245</td>
<td>275</td>
<td>225.5</td>
<td>466.7</td>
<td>49.9</td>
<td>150.3</td>
<td>140.26</td>
<td>254.7</td>
<td>273.3</td>
<td>27</td>
<td>15</td>
<td>12.7</td>
<td>31.77</td>
<td>314</td>
<td>73.4</td>
<td>-</td>
<td>56.6</td>
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**Technical data**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>MAX INPUT TORQUE KEVLAR (at 25 bar) Nm</th>
<th>MAX INPUT TORQUE STANDARD (at 25 bar) Nm</th>
<th>THERMAL CLUTCH CAPACITY Q</th>
<th>OUTPUT BEARING LUBRICATION</th>
<th>WEIGHT kg</th>
<th>CENTER OF GRAVITY G dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFO110</td>
<td>4 10&quot;</td>
<td>57.1 146 165.1</td>
<td>58</td>
<td>314.3</td>
<td>415.8</td>
<td>251.6</td>
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<tr>
<td>MFO111</td>
<td>3 11½&quot;</td>
<td>57.1 146 158.7</td>
<td>58</td>
<td>322.4</td>
<td>466.2</td>
<td>200.7</td>
</tr>
<tr>
<td>MFO114</td>
<td>1 14&quot;</td>
<td>76.2 171.4</td>
<td>190.5</td>
<td>222.2</td>
<td>95.6</td>
<td>350.7</td>
</tr>
<tr>
<td>MFO214</td>
<td>88.9 196.8</td>
<td>222.2</td>
<td>251.7</td>
<td>95.6</td>
<td>656.8</td>
<td>413.5</td>
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</tbody>
</table>

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**MFO: MECHANICAL POWER TAKE OFF**

**Dimensions**

<table>
<thead>
<tr>
<th>SIZE</th>
<th>CENTER OF GRAVITY G dimension</th>
<th>MAX SPEED rpm</th>
<th>MAX INPUT TORQUE KEVLAR Nm</th>
<th>MAX INPUT TORQUE STANDARD Nm</th>
<th>WEIGHT kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFO110</td>
<td>73 73</td>
<td>2600</td>
<td>-</td>
<td>-</td>
<td>610</td>
</tr>
<tr>
<td>MFO111</td>
<td>86 86</td>
<td>2500</td>
<td>1000</td>
<td>770</td>
<td>74</td>
</tr>
<tr>
<td>MFO114</td>
<td>111 2300</td>
<td>-</td>
<td>2050</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>MFO214</td>
<td>148 2300</td>
<td>-</td>
<td>4050</td>
<td>167</td>
<td></td>
</tr>
</tbody>
</table>

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- For permissible radial loads see selection instructions
- Dimensions are subject to alteration without notice
- Dimensions are subject to alteration without notice

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**Heat exchanger only on HFR 314 - 318**

**OIL / AIR INLET 12 bar Min. 14 bar Max.**

**Support plate (see TF6229)**
HF-MFO Power Take Off - 2004

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 pack: a compact power system which delivers either oil or air with suitable pressure
- By MPCB R5 with oil pack only for HFO

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 oil supply 25 bar side load application.

MFO
- No installation related engine thrust bearing damage
- Equipment with ball-bearing engagement collars
- No direct loading to engine crankshaft enhances life of engine bearings
- Dual spherical roller main bearing design
- Driving rings are nodular iron or steel

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 pressure switch.

The HFR range of power take offs is designed for heavy duty applications. For heavy shock applications, such as the grinding of metal, the HFR clutches provide increased life and reduced maintenance costs especially on heavy duty applications where plate wear is typical.

Additional to the HFO is the HFF design (flanged shaft by QD). 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 : max input torque (Nm) - see table pages 3 & 4
J : inertia (kgm²) = G O D 2 i 4
t : starting time (seconds) - actual slip
Q : thermal clutch capacity - see table pages 3 & 4

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.
STEP 3 - PERMISSIBLE SIDE LOAD CHART 3

- 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

Actual applied side load “T”

\[ T \approx \frac{S \cdot kW \cdot L \cdot 191 \cdot 100}{D \cdot n} \]

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

IMPORTANT NOTICE
- Disregarding system torsional compatibility could cause damage to components in the drive train resulting in loss of 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.
- 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.

Selection of HFR/HFO/MFO 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 above indicated value, contact TRANSFLUID for application approval.

<table>
<thead>
<tr>
<th>Service Factor</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chain or gear drive</td>
<td>1.0</td>
</tr>
<tr>
<td>V-Belts</td>
<td>2.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Life Factor</th>
<th>L</th>
</tr>
</thead>
<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>

<table>
<thead>
<tr>
<th>Tab. 2</th>
<th>Max overlap allowable*</th>
<th>Min pulley ID*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFO 314</td>
<td>60</td>
<td>245</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tab. 3</th>
<th>Max overlap allowable*</th>
<th>Min pulley ID*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFR 210</td>
<td>71</td>
<td>155</td>
</tr>
<tr>
<td>211</td>
<td>71</td>
<td>155</td>
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<td>311</td>
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<td>314</td>
<td>83</td>
<td>233</td>
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<tr>
<td>318</td>
<td>102</td>
<td>263</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Tab. 4</th>
<th>Max overlap allowable*</th>
<th>Min pulley ID*</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFO 110</td>
<td>55</td>
<td>165</td>
</tr>
<tr>
<td>111</td>
<td>85</td>
<td>160</td>
</tr>
<tr>
<td>114</td>
<td>85</td>
<td>165</td>
</tr>
<tr>
<td>214</td>
<td>60</td>
<td>220</td>
</tr>
</tbody>
</table>

* Dimensions are limits. Space for rotating parts must be added.

PERMISSIBLE SIDE LOAD T vs DISTANCE X Chart 3