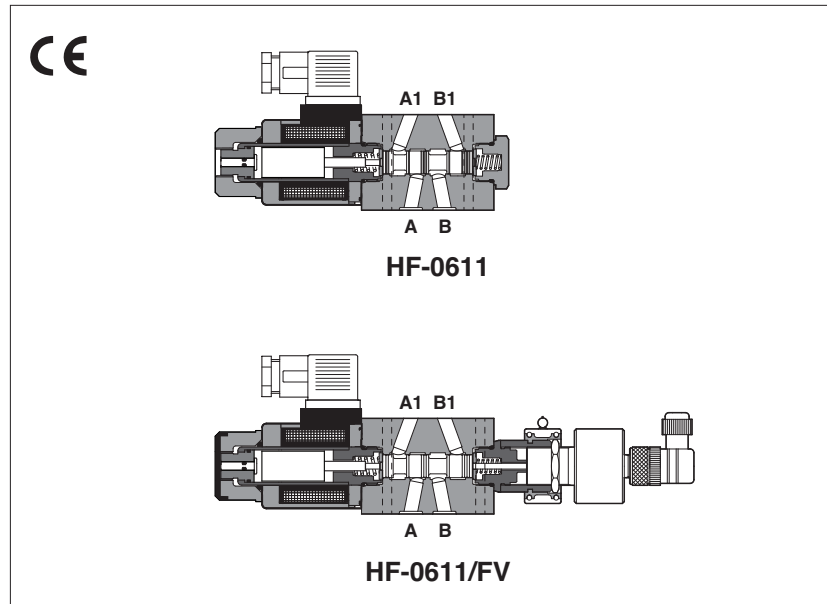


## Modular safety valves with optional spool position monitoring

On-off, direct operated, conforming to Machine Directive 2006/42/EC - certified by



**HF** are spool type, direct operated solenoid valves in modular execution, normally used for safety functions to shut-off or to by-pass the hydraulic user lines.

They are available with optional **FV** inductive position switch for spool position monitoring, **CE** marked and certified by **TUV** in accordance with safety requirements of Machine Directive 2006/42/EC.

### Technical characteristics

They are derived from standard directional valves type DHE (see KT tab. E015), but with special body for modular assembly with all ISO 4401 size 06 modular valves.

### Applications

Syncro press brakes, vertical presses, plastic injection, ceramic presses.

### Certification

The **TUV** certificate can be downloaded from [www.atos.com](http://www.atos.com), catalog on line, technical information section.

Mounting Surface: **ISO 4401 size 06**

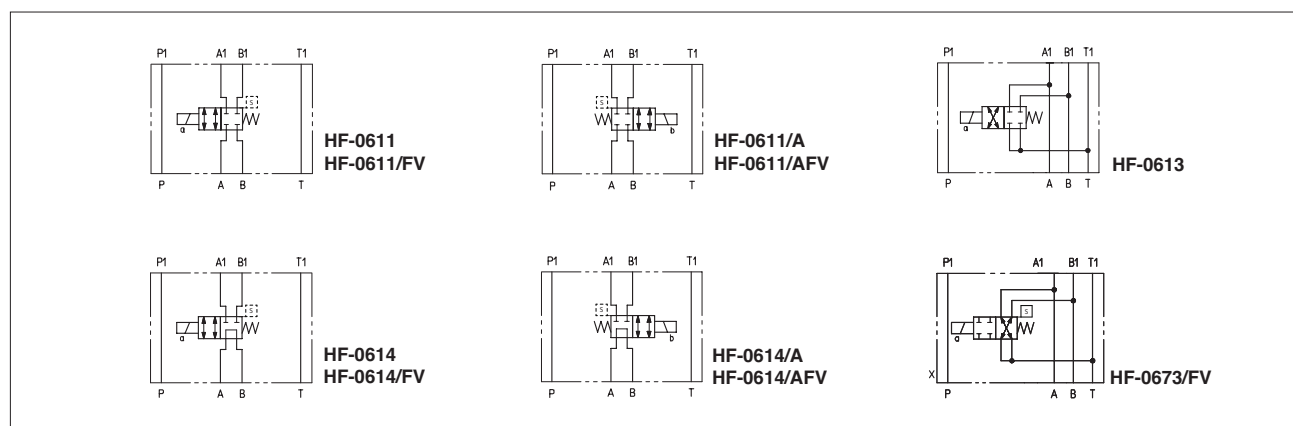
Max flow: **60 l/min**

Max pressure: **350 bar**

### 1 MODEL CODE

|  |           |          |          |           |          |          |             |           |   |
|--|-----------|----------|----------|-----------|----------|----------|-------------|-----------|---|
| <b>HF-0</b><br>Modular directional valve size 06   | <b>61</b> | <b>1</b> | <b>A</b> | <b>FV</b> | <b>E</b> | <b>X</b> | <b>24DC</b> | <b>**</b> | <b>/*</b><br>Seals material<br>- = NBR<br><b>PE</b> = FKM |
| <p><b>Valve configuration</b>, see section 2<br/> <b>61</b> = single solenoid, central plus external position, spring centered<br/> <b>67</b> = single solenoid, central plus external position, spring offset</p> <p><b>Spool type: 1, 3, 4</b> see section 2</p> <p><b>Options:</b><br/> <b>A</b> = solenoid mounted at side of port B<br/> <b>B</b> = orientation of coil and proximity connectors rotated of 180°<br/> <b>WP</b> = prolonged manual override protected by a rubber cap (not for FV)</p> <p><b>Optional spool position monitor:</b><br/> <b>FV</b> = inductive position switch (only for HF-0611, HF-0614, HF-0673)</p> |           |          |          |           |          |          |             |           |   |
| <p><b>24DC</b> = Voltage code, see section 4</p> <p><b>**</b> = Series number</p> <p><b>00-AC</b> = AC solenoids without coils (not for /FV)<br/> <b>00-DC</b> = DC solenoids without coils (not for /FV)<br/> <b>X</b> = without connector<br/>         See section 4 for available connectors, to be ordered separately<br/>         Coils with special connectors, see section 9 (not for /FV)<br/> <b>XJ</b> = AMP Junior Timer connector<br/> <b>XK</b> = Deutsch connector<br/> <b>XS</b> = Lead Wire connection</p> <p><b>E</b> = solenoid OE for AC and DC supply</p>  |           |          |          |           |          |          |             |           |   |

### 2 CONFIGURATION



### 3 MAIN CHARACTERISTICS OF HF-\* DIRECTIONAL VALVES

|   |  |
|---|--|
| Assembly position / location                            | Any position for all valves  |
| Subplate surface finishing                              | Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101)  |
| Ambient temperature                                     | <b>Standard</b> -30°C ÷ +70°C / <b>PE</b> option -20°C ÷ +70°C   |
| Fluid   | Hydraulic oil as per DIN 51524 .... 535; for other fluids see section 1                                  |
| Recommended viscosity                                   | 15 ÷ 100 mm <sup>2</sup> /s at 40°C (ISO VG 15 ÷ 100)  |
| Fluid contamination class                               | ISO 4401 class 21/19/16 NAS 1638 class 10 (filters at 25 µm value with β <sub>25</sub> ≥ 75 recommended) |
| Fluid temperature                                       | -20°C +60°C (standard seals) -20°C +80°C (/PE seals)   |
| Flow direction  | As shown in the symbols of section 2   |
| <b>Operating pressure</b><br>(standard and /FV version) | Ports P,A,B: <b>315</b> bar;<br>Port T: <b>120</b> bar (DC solenoid); <b>160</b> bar (AC solenoid)       |
| <b>Maximum flow</b>                                     | <b>60</b> l/min  |

#### 3.1 Coils characteristics

|                                   |  |
|-----------------------------------|--|
| Insulation class                  | <b>H</b> (180°C) for DC coils <b>F</b> (155°C) for AC coils<br>Due to the occurring surface temperatures of the solenoid coils, the European standards EN ISO 13732-1 and EN ISO 4413 must be taken into account |
| Protection degree to DIN EN 60529 | <b>IP 65</b> (with connectors 666, 667, 669 correctly assembled)   |
| Relative duty factor              | 100%   |
| Supply voltage and frequency      | See electric feature 4   |
| Supply voltage tolerance          | ± 10%  |
| Certification                     | <b>cURus</b> North American Standard   |

### 4 SEALS AND HYDRAULIC FLUID - for other fluids not included in below table, consult our technical office

|                                      |   |                            |                       |                      |
|--------------------------------------|---|----------------------------|-----------------------|----------------------|
| Seals, recommended fluid temperature | NBR seals (standard) = -20°C ÷ +60°C, with HFC hydraulic fluids = -20°C ÷ +50°C<br>FKM seals (/PE option) = -20°C ÷ +80°C |                            |                       |                      |
| Recommended viscosity                | 15÷100 mm <sup>2</sup> /s - max allowed range 2,8 ÷ 500 mm <sup>2</sup> /s  |                            |                       |                      |
| Fluid contamination class            | ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 µm (β <sub>25</sub> ≥75 recommended)                     |                            |                       |                      |
|                                      | <b>Hydraulic fluid</b>  | <b>Suitable seals type</b> | <b>Classification</b> | <b>Ref. Standard</b> |
| Mineral oils                         | NBR, FKM  | HL, HLP, HLPD, HVLP, HVLPD | DIN 51524             |                      |
| Flame resistant without water        | FKM   | HFDU, HFDR                 | ISO 12922             |                      |
| Flame resistant with water           | NBR   | HFC                        |                       |                      |

### 5 OPTIONS

- A** = Solenoid mounted at side of port B. In standard versions, solenoid is mounted at side of port A.  
**B** = Orientation of coil and proximity connectors rotated of 180°



**WP** = Prolonged manual override protected by a rubber cap (not for FV)

**WARNING:** the manual operation is not permitted for safety valves, than the valve is provided with solenoid blind rings to prevent the access to the manual override. The manual override protected by rubber cup (option /WP) is not available



### 6 ELECTRIC CONNECTORS ACCORDING TO DIN 43650 (to be ordered separately)

|                                       |  |   |  |  |  |   |
|---------------------------------------|--|---|--|--|--|---|
| <b>666, 667</b> (for AC or DC supply) |  | <b>669</b> (for AC supply)                  |  | <b>CONNECTOR WIRING</b>  |  |   |
|                                       |  |   |  | <b>666, 667</b><br>1 = Positive ⊕<br>2 = Negative ⊖<br>⊕ = Coil ground |  | <b>669</b><br>1,2 = Supply voltage V <sub>ac</sub><br>3 = Coil ground |
| <b>SUPPLY VOLTAGES</b>                |  |   |  |  |  |   |
| <b>666</b>                            |  | <b>667</b>                                  |  | <b>669</b>   |  |   |
| All voltages                          |  | 24 AC or DC<br>110 AC or DC<br>220 AC or DC |  | 110/50 AC<br>110/60 AC<br>230/50 AC<br>230/60 AC                       |  |   |

Note: for electronic connectors type **E-SD**, see tab. K500

## 7 ELECTRIC FEATURES

| External supply nominal voltage $\pm 10\%$ | Voltage code        | Type of connector | Power consumption (2) | Code of spare coil DHE |                     |
|--|---------------------|-------------------|-----------------------|------------------------|---------------------|
| 12 DC                                      | <b>12 DC</b>        | 666<br>or<br>667  | 30 W                  | COE-12DC               |                     |
| 14 DC                                      | <b>14 DC</b>        |                   |                       | COE-14DC               |                     |
| 24 DC                                      | <b>24 DC</b>        |                   |                       | COE-24DC               |                     |
| 28 DC                                      | <b>28 DC</b>        |                   |                       | COE-28DC               |                     |
| 48 DC                                      | <b>48 DC</b>        |                   |                       | COE-48DC               |                     |
| 110 DC                                     | <b>110 DC</b>       |                   |                       | COE-110DC              |                     |
| 125 DC                                     | <b>125 DC</b>       |                   |                       | COE-125DC              |                     |
| 220 DC                                     | <b>220 DC</b>       |                   |                       | COE-220DC              |                     |
| 110/50 AC                                  | <b>110/50/60 AC</b> |                   |                       | 58 VA (3)              | COE-110/50/60AC (1) |
| 230/50 AC                                  | <b>230/50/60 AC</b> |                   |                       | 80 VA (3)              | COE-230/50/60AC (1) |
| 115/60 AC                                  | <b>115/60 AC</b>    | 669               | 30 W                  | COE-115/60AC           |                     |
| 230/60 AC                                  | <b>230/60 AC</b>    |                   |                       | COE-230/60AC           |                     |
| 110/50 AC - 120/60 AC                      | <b>110 RC</b>       | 669               | 30 W                  | COE-110RC              |                     |
| 230/50 AC - 230/60 AC                      | <b>230 RC</b>       |                   |                       | COE-230RC              |                     |

(1) Coil can be supplied also with 60 Hz of voltage frequency: in this case the performances are reduced by 10 ÷ 15% and the power consumption is 52 VA.

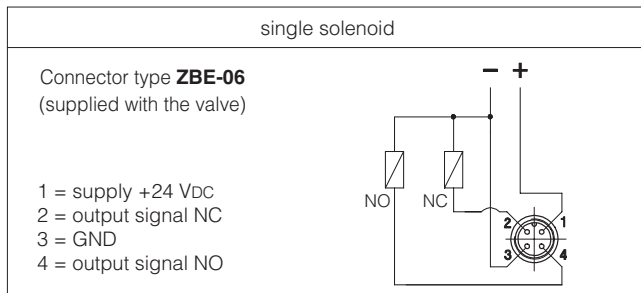
(2) Average values based on tests performed at nominal hydraulic condition and ambient/coil temperature of 20°C.

(3) When solenoid is energized, the inrush current is approx 3 times the holding current.

## 8 TECHNICAL CHARACTERISTICS OF FV INDUCTIVE POSITION SWITCH

| Type of switch          | contactless inductive position switch with integrated amplifier |                    |  |
|-------------------------|---|--------------------|--|
| Supply voltage [V]      |   | 20÷32              |  |
| Ripple max [%]          |   | ≤ 10               |  |
| Max current [mA]        |   | 400                |  |
| Reaction time [ms]      |   | 15                 |  |
| Max peak pressure [bar] |   | 400                |  |
| Mechanical life         |   | virtually infinite |  |
| Switch logic            |   | PNP                |  |

## 9 CONNECTING SCHEME OF FV INDUCTIVE POSITION SWITCH



**Note:** the /FV position switch is not provided with a protective earth connection

## 10 STATUS OF OUTPUT SIGNAL FOR MODULAR VALVES WITH /FV INDUCTIVE POSITION SWITCH

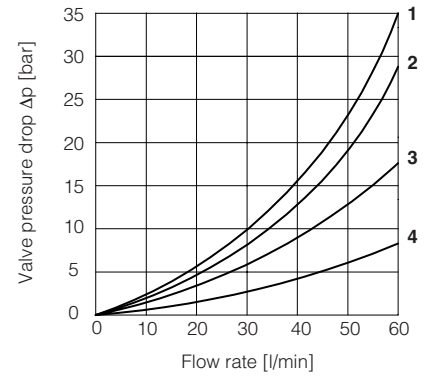
|                         | Configuration <b>611</b> | Configuration <b>614</b> | Configuration <b>673</b> |
|-------------------------|--------------------------|--------------------------|--------------------------|
| Hydraulic configuration |                          |                          |                          |
| spool position          |                          |                          |                          |
| pin 2                   | ON                       |                          |                          |
|                         | OFF                      |                          |                          |
| pin 4                   | ON                       |                          |                          |
|                         | OFF                      |                          |                          |

**Note:** FV position switch can be electrically wired by the customer as NO or NC and then the status of the output signal will be in accordance to the selected configuration

= intermediate spool position corresponding to the hydraulic configuration change

**11 Q/ΔP DIAGRAMS** based on mineral oil ISO VG 46 at 50°C

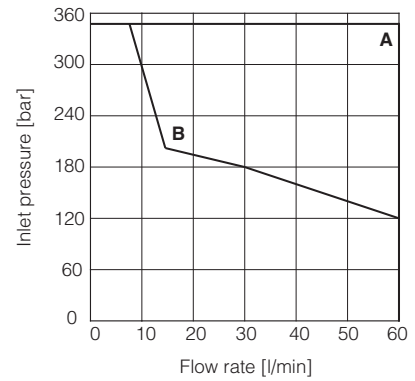
| Flow direction<br>Valve type | A→A1    | B→B1 | A→B | A1→T | B1→T |
|------------------------------|---------|------|-----|------|------|
|                              | HF-0611 | 1    | 2   |      |      |
| HF-0613                      | 3       | 3    |     | 4    | 4    |
| HF-0614                      | 1       | 2    | 3   |      |      |
| HF-0673                      | 3       | 3    |     | 4    | 4    |



**12 OPERATING LIMITS** based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value ( $V_{nom} - 10\%$ )

| Valve type                | Curve    |
|---------------------------|----------|
| HF-0611                   | <b>A</b> |
| HF-0613, HF-0614, HF-0673 | <b>B</b> |



**13 DIMENSIONS [mm]**

**ISO 4401: 2005**  
**Mounting surface: 4401-03-02-0-05**  
 Seals: 4 OR 108  
 Ports P, A, B, T:  $\varnothing = 7.5$  mm (max).

**HF-0611**  
**HF-0613**  
**HF-0614**  
**HF-0673**

**HF-0611/FV**  
**HF-0614/FV**  
**HF-0673/FV**

① = Power supply connector code 666, 667 or 669, to be ordered separately  
 ② = Inductive position switch connector code ZBE-06, supplied with the valve