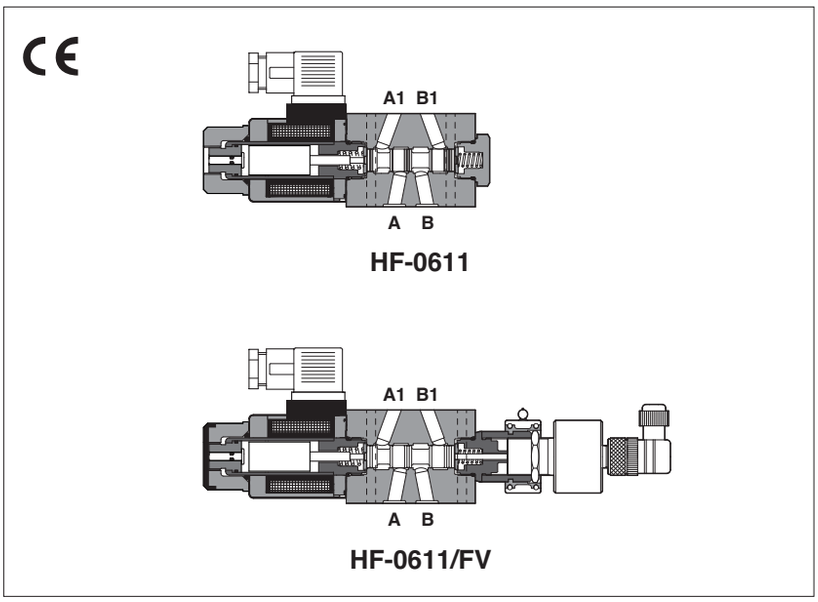
Modular safety valves with optional spool position monitoring

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 **TÜV** 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 **TÜV** certificate can be downloaded from 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

HF-0	61	1	/	A	/	FV	-	E	-	X	24DC	**	/*

HF-0: Modular directional valve size 06

61: **Valve configuration**, see section 2
61 = single solenoid, central plus external position, spring centered
67 = single solenoid, central plus external position, spring offset

1: **Spool type**: **1**, **3**, **4** see section 2

A: **Options**:
A = solenoid mounted at side of port B
B = orientation of coil and proximity connectors rotated of 180°
WP = prolunged manual override protected by a rubber cap (not for FV)

FV: **Optional spool position monitor**:
FV = inductive position switch (only for HF-0611, HF-0614, HF-0673)

E: **E** = solenoid OE for AC and DC supply

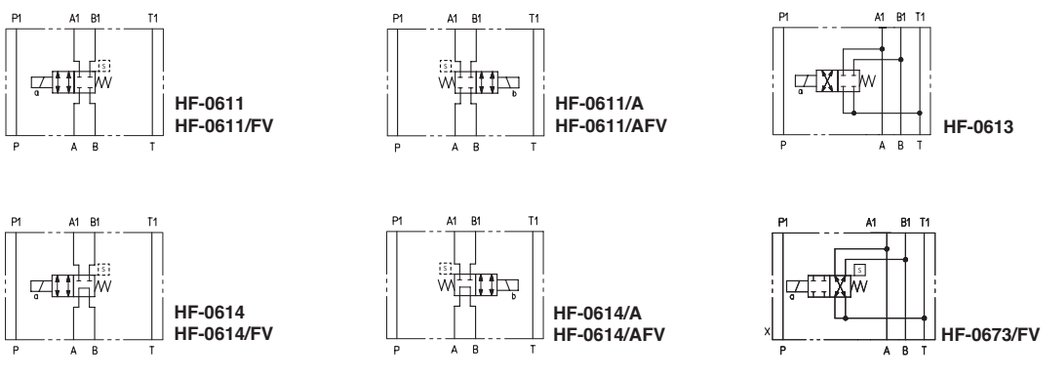
X:
00-AC = AC solenoids without coils (not for /FV)
00-DC = DC solenoids without coils (not for /FV)
X = without connector
See section 6 for available connectors, to be ordered separately
Coils with special connectors, see section 9 (not for /FV)
XJ = AMP Junior Timer connector
XK = Deutsch connector
XS = Lead Wire connection

24DC: **Voltage code**, see section 4

******: Series number

/*: Seals material
- = NBR
PE = FKM

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	**Standard** -30°C ÷ +70°C **/PE** option -20°C ÷ +70°C
Fluid	Hydraulic oil as per DIN 51524 .... 535; for other fluids see section 1
Recommended viscosity	15 ÷ 100 mm²/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 $\beta_{25} \geq 75$ 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
Operating pressure (standard and /FV version)	Ports P,A,B: **315** bar; Port T: **120** bar (DC solenoid); **160** bar (AC solenoid)
Maximum flow	**60 l/min**

3.1 Coils characteristics

Insulation class	**H** (180°C) for DC coils **F** (155°C) for AC coils Due to the occuring 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	**IP 65** (with connectors 666, 667, 669 correctly assembled)
Relative duty factor	100%
Supply voltage and frequency	See electric feature 4
Supply voltage tolerance	± 10%
Certification	**cURus** 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 FKM seals (/PE option) = -20°C ÷ +80°C		
Recommended viscosity	15÷100 mm²/s - max allowed range 2,8 ÷ 500 mm²/s		
Fluid contamination class	ISO 4406 class 21/19/16 NAS 1638 class 10, in line filters of 25 μm ($\beta 25 \geq 75$ recommended)		
Hydraulic fluid	**Suitable seals type**	**Classification**	**Ref. Standard**
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.

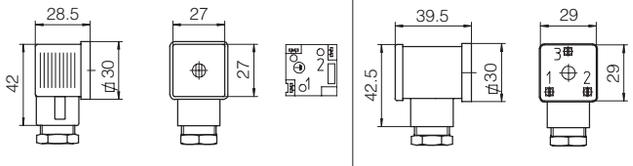
B = Orientation of coil and proximity connectors rotated of 180°

WP = Prolunged 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)

666, 667 (for AC or DC supply)	**669** (for AC supply)	**CONNECTOR WIRING**	
		666, 667 1 = Positive ⊕ 2 = Negative ⊖ ⊕ = Coil ground	**669** 1,2 = Supply voltage V_{AC} 3 = Coil ground
		SUPPLY VOLTAGES	
666	**667**	**669**	
All voltages	24 AC or DC 110 AC or DC 220 AC or DC	110/50 AC 110/60 AC 230/50 AC 230/60 AC	



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

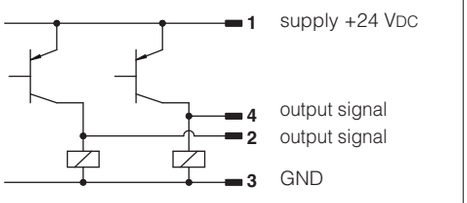
7 ELECTRIC FEATURES

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

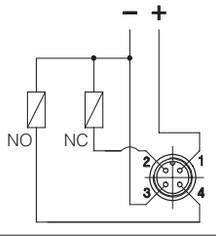


9 CONNECTING SCHEME OF FV INDUCTIVE POSITION SWITCH

single solenoid

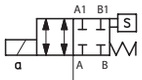
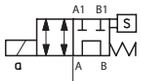
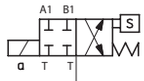
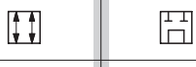
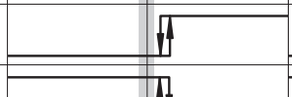
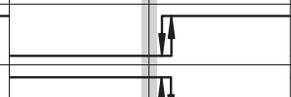
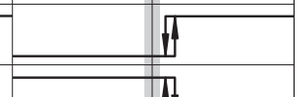
Connector type **ZBE-06**
(supplied with the valve)

1 = supply +24 VDC
2 = output signal NC
3 = GND
4 = output signal NO



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

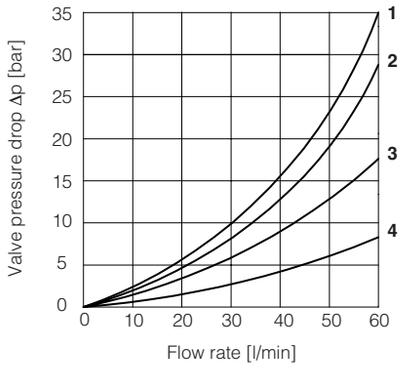
Hydraulic configuration	Configuration **611**	Configuration **614**	Configuration **673**
			
spool position			
pin 2 ON / OFF			
pin 4 ON / OFF			

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

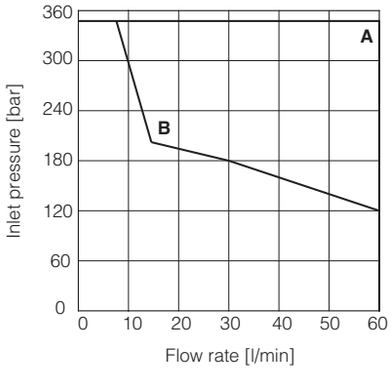
Flow direction / Valve type	A→A1	B→B1	A→B	A1→T	B1→T
HF-0611	1	2			
HF-0613	3	3		4	4
HF-0614	1	2	3		
HF-0673	3	3		4	4



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	**A**
HF-0613, HF-0614, HF-0673	**B**



13 DIMENSIONS [mm]