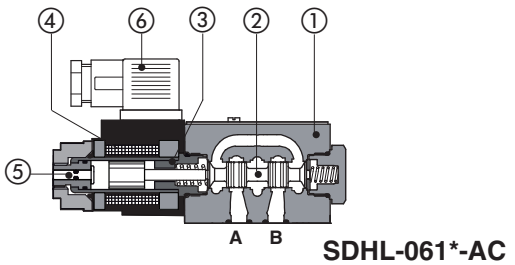
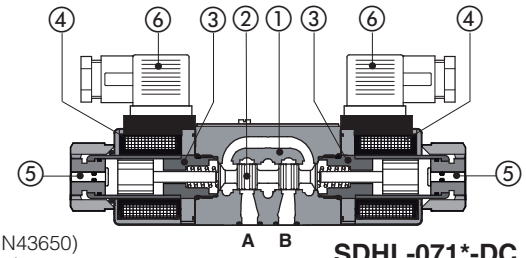
# Solenoid directional valves type SDHL

direct, spool type, **compact execution**




**SDHL-061*-AC**




**SDHL-071*-DC**

① Valve body
② Spool
③ Solenoid tube
④ Solenoid coil
⑤ Manual override pin
⑥ Electric connector (DIN43650) to be ordered separately

Spool type, two or three position direct operated valves size 06 in compact execution with reduced solenoids dimensions, ideal for applications in mini power packs, mobile and agricultural machines.

Solenoids are made by:

- wet type screwed tube ③, different for AC and DC power supply, with integrated manual override pin ⑤
- interchangeable coils ④, specific for AC or DC power supply, easily replaceable without tools - see section 5 for available voltages

Standard coils protection **IP65**

Wide range of interchangeable spools ②, see section 2.

The valve body ① is 3 chamber type made by shell-moulding casting with wide internal passages ensuring low pressure drops.

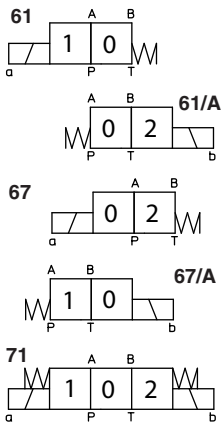
Mounting surface: **ISO 4401 size 06**
Max flow: **60 l/min**
Max pressure: **350 bar**

## 1 MODEL CODE

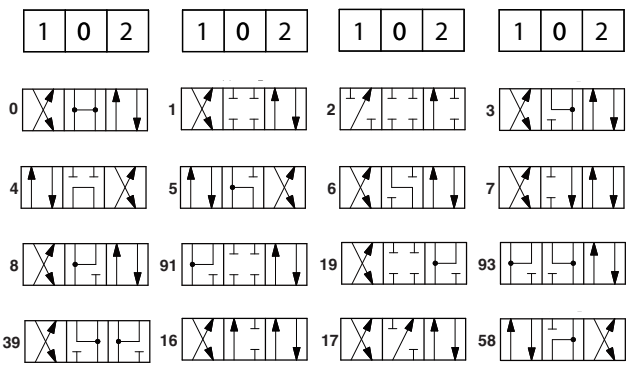
| SDHL - 0 | 61 | 1 | /A | - | X | 24 DC | ** | /* |
|---|---|---|---|---|---|---|---|---|
| Directional control valves size 06 compact execution | Valve configuration, see section 2<br>**61** = single solenoid, center plus external position, spring centered<br>**63** = single solenoid, 2 external positions, spring offset<br>**67** = single solenoid, center plus external position, spring offset<br>**71** = double solenoid, 3 positions, spring centered<br>**75** = double solenoid, 2 external positions, with detent<br>Spool type, see section 2.<br>Options: **A, MO, MV, WP,** see section 6 | | | | **00-AC** = AC solenoids without coils<br>**00-DC** = DC solenoids without coils<br>**X** = without connector<br>See section 11 for available connectors, to be ordered separately<br>Coils with special connectors, see section 12<br>**XK** = Deutsch connector | Voltage code, see section 5 | Series number | Seals material, see section 4:<br>**-** = NBR<br>**PE** = FKM |

## 2 CONFIGURATIONS and SPOOLS (representation according to ISO 1219-1)

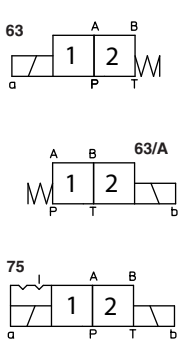
Configurations



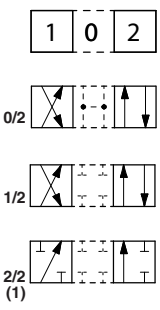

Spools




Configurations




Spools




**(1)** not available for configuration 75

### 2.1 Special spools

- spools type **0** and **3** are also available as **0/1** and **3/1** with restricted oil passages in central position, from user ports to tank.
- spools type **1, 4**, **5** and **58** are also available as **1/1, 4/8, 5/1** and **58/1.** They are properly shaped to reduce water-hammer shocks during the swiching.
- spools type **1, 1/2, 3, 8** are available as **1P, 1/2P, 3P, 8P** to limit valve internal leakages.
- Other types of spools can be supplied on request.

## 3 MAIN CHARACTERISTICS

| | |
|---|---|
| Assembly position / location | Any position |
| Subplate surface finishing | Roughness index Ra 0,4 - flatness ratio 0,01/100 (ISO 1101) |
| MTTFd valves according to EN ISO 13849 | 150 years, see technical table P007 |
| Ambient temperature | **Standard** execution = -30°C ÷ +70°C **/PE** option = -20°C ÷ +70°C |
| Flow direction | As shown in the symbols of table 2 |
| **Operating pressure** | Ports P,A,B: **350** bar;<br>Port T **210** bar for DC version; **160** bar for AC version |
| **Maximum flow** | **60 l/min**, see Q/Δp diagram at section 7 and operating limits at section 8 |

### 3.1 Coils characteristics

| | |
|---|---|
| Insulation class | **H** (180°C) for DC coils **F** (155°C) for AC coils<br>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 correctly assembled) |
| Relative duty factor | 100% |
| Supply voltage and frequency | See coil voltage 5 |
| Supply voltage tolerance | ± 10% |

## 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 ÷ +80°C, with HFC hydraulic fluids = -20°C ÷ +50°C<br>FKM seals (/PE option) = -20°C ÷ +80°C | | |
| Recommended viscosity | 15÷100 mm²/s - max allowed range 2,8 ÷ 500 mm²/s | | |
| Max fluid contamination level | ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog | | |
| **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 COIL VOLTAGE

| External supply nominal voltage ± 10% | **Voltage code** | Type of connector | Power consumption (2) | Code of spare coil |
|---|---|---|---|---|
| 12 DC | **12 DC** | 666 or 667 | 29W | COL-12DC |
| 14 DC | **14 DC** | | | COL-14DC |
| 24 DC | **24 DC** | | | COL-24DC |
| 28 DC | **28 DC** | | | COL-28DC |
| 110 DC | **110 DC** | | | COL-110DC |
| 220 DC | **220 DC** | | | COL-220DC |
| 110/50 AC (1) | **110/50/60 AC** | | 58VA (3) | COL-110/50/60AC |
| 230/50 AC (1) | **230/50/60 AC** | | | COL-230/50/60AC |

(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.

## 6 OPTIONS

**A** = Solenoid mounted at side of port B (only for single solenoid valves). In standard versions, solenoid is mounted at side of port A.
**MV, MO** = auxiliary hand lever positioned vertically (MV) or horizontally (MO).
Available for configuration: **61 - 63 - 71**, spools: **0 - 0/2 - 1 - 1P - 1/2 - 1/2P - 3 - 3P - 4 - 7**
**WP** = prolonged manual override protected by rubber cap.

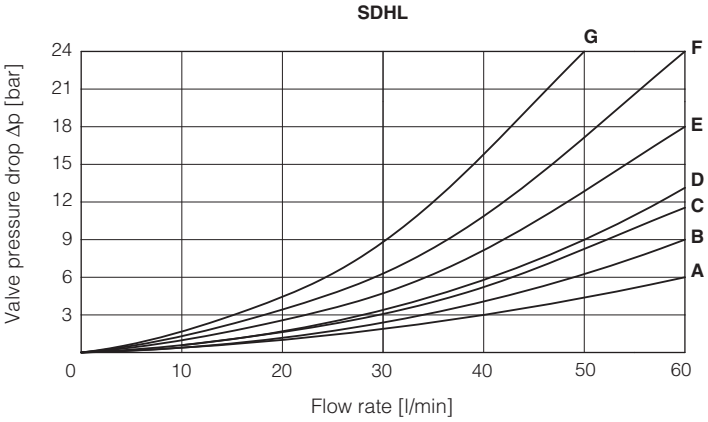
### 6.1 Accessories

**WPD/SHL** = (only for SDHL-***DC**) manual override with detent, to be ordered separatelly, see section 15

⚠ The manual override operation can be possible only if the pressure at T port is lower than 50 bar

## 7 Q/ΔP DIAGRAMS based on mineral oil ISO VG 46 at 50°C

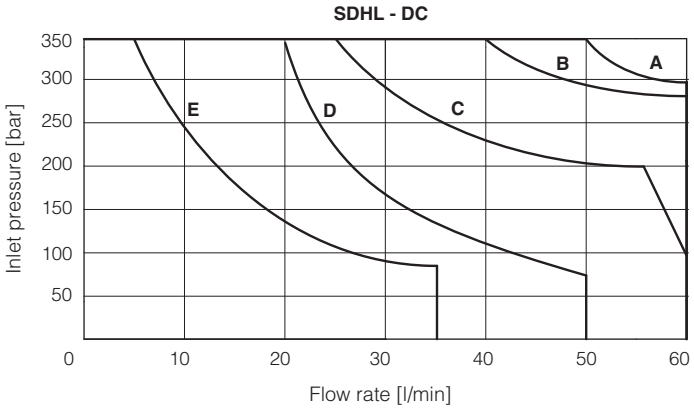
| Flow direction / Spool type | P→A | P→B | A→T | B→T | P→T |
|---|---|---|---|---|---|
| 0, 0/1 | A | A | C | C | D |
| 1, 1/1 | D | C | C | C | |
| 3, 3/1 | D | D | A | A | |
| 4, 4/8, 5, 5/1, 58, 58/1 | F | F | G | C | E |
| 1/2, 0/2 | D | D | D | D | |
| 6, 7, 16, 17 | D | D | D | D | |
| 8 | A | A | E | E | |
| 2 | D | D | | | |
| 2/2 | F | F | | | |
| 19, 91 | E | E | D | D | |
| 39, 93 | F | F | G | G | |



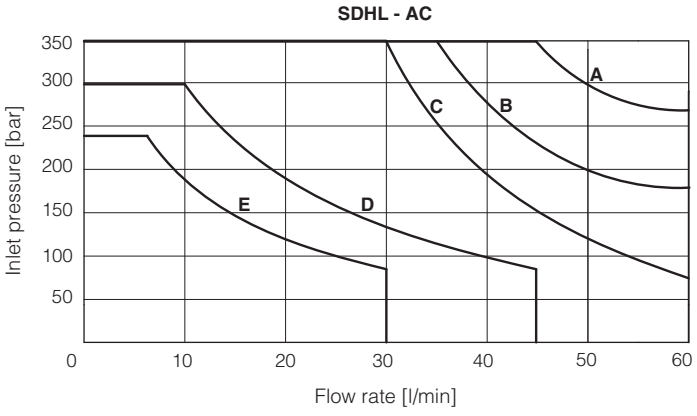

## 8 OPERATING LIMITS based on mineral oil ISO VG 46 at 50°C

The diagrams have been obtained with warm solenoids and power supply at lowest value ($V_{nom}$ - 10%). The curves refer to application with symmetrical flow through the valve (i.e. P→A and B→T). In case of asymmetric flow and if the valves have the devices for controlling the switching times the operating limits must be reduced.

| Curve | DC version, spool type: |
|---|---|
| A | 0, 0/1, 0/2, 1/2, 8 |
| B | 1, 1/1 |
| C | 3, 3/1, 6, 7 |
| D | 4, 4/8, 16, 17, 5, 5/1, 19, 39, 58, 58/1, 91, 93 |
| E | 2, 2/2 |




| Curve | AC version, spool type: |
|---|---|
| A | 0, 0/1, 0/2, 1/2, 8 |
| B | 1, 1/1 |
| C | 3, 3/1, 6, 7 |
| D | 4, 16, 17, 4/8, 5, 5/1, 19, 39, 58, 58/1, 91, 93 |
| E | 2, 2/2 |



## 9 SWITCHING TIMES (average values in msec)

Test conditions: - 20 l/min; 150 bar
- nominal voltage
- 2 bar of counter pressure on port T
- mineral oil: ISO VG 46 at 50°C

The elasticity of the hydraulic circuit and the variations of the hydraulic characteristics and temperature affect the response time.

| Valve | Switch-on AC | Switch-off AC | Switch-on DC | Switch-off DC |
|---|---|---|---|---|
| SDHL | 10 - 25 | 20 - 40 | 30 - 50 | 15 - 25 |

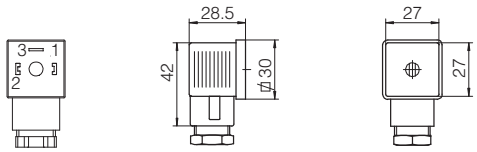
## 10 SWITCHING FREQUENCY

| Valve | AC (cycles/h) | DC (cycles/h) |
|---|---|---|
| SDHL + 666 / 667 | 7200 | 15000 |

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

**666** = standard connector IP-65, suitable for direct connection to electric supply source.
**667** = as 666, but with built-in signal led.

**666, 667** (for AC or DC supply)




**CONNECTOR WIRING**

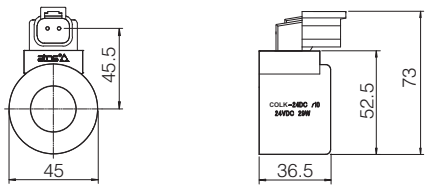
**666, 667**

1 = Positive ⊕
2 = Negative ⊖
⏚ = Coil ground

**SUPPLY VOLTAGES**

| **666** | **667** |
|---|---|
| All voltages | 24 AC or DC<br>110 AC or DC<br>220 AC or DC |

## 12 COILS WITH SPECIAL CONNECTORS only for voltage supply **12, 14, 24, 28** VDC




**Deutsch connector DT-04-2P**

**Options -XK**

Coil type COLK, Deutsch connector DT-04-2P male
Protection degree **IP67**

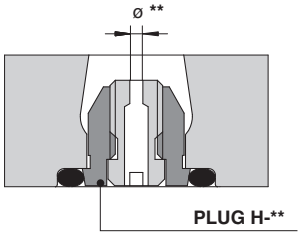
Note: For the electric characteristics refer to standard coils features - see section 5

## 13 PLUG-IN RESTRICTOR (to be ordered separately)

The use of plug-in restrictors in valve's ports P or A or B may be necessary is case of particular conditions as long flexible hoses or the presence of accumulators which could cause at the valve switching instantaneous high flow peaks over the max valve's operating limits.

Ordering code: **PLUG H** - ******

**08, 10, 12, 15** calibrated orifice diameter in tenths of mm
Example PLUG-H-**12** = orifice diameter **1,2 mm**
Other orifice dimensions are available on request



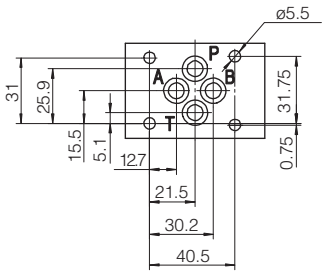
## 14 DIMENSIONS [mm]

**ISO 4401: 2005**
**Mounting surface: 4401-03-02-0-05**

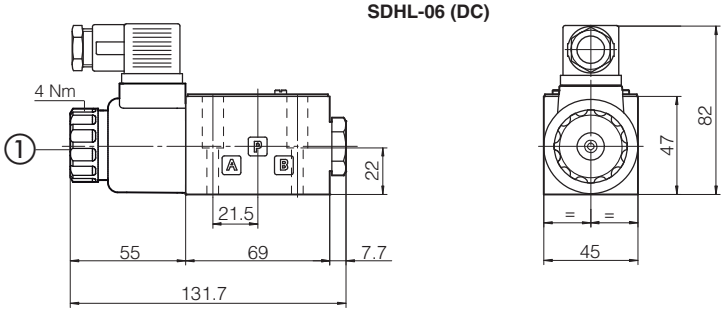
| Mass (Kg) | | |
|---|---|---|
| | DC | AC |
| SDHL-06 | 1,3 | 1,2 |
| SDHL-07 | 1,6 | 1,4 |

**P** = PRESSURE PORT
**A, B** = USE PORT
**T** = TANK PORT

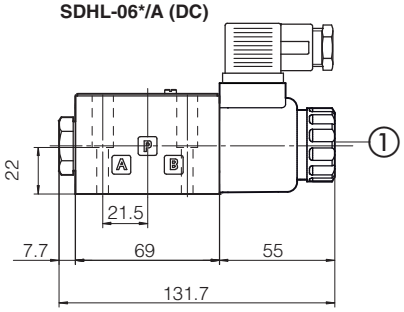
Valve's bottom view



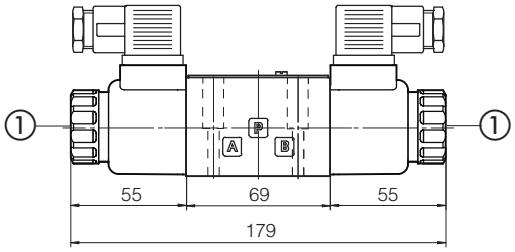

**SDHL-06 (DC)**



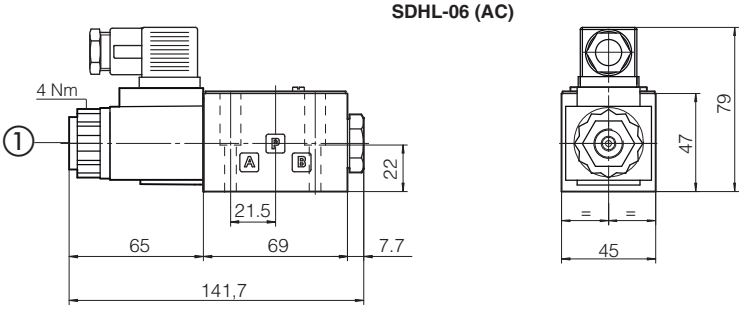

**SDHL-06*/A (DC)**




**SDHL-07 (DC)**




**SDHL-06 (AC)**

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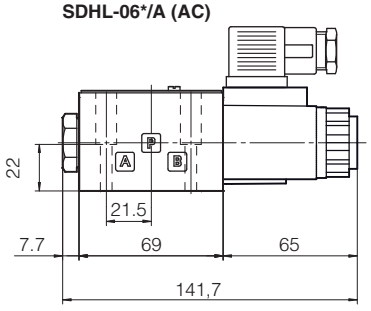
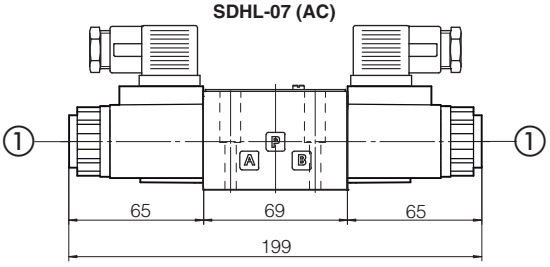



**SDHL-07 (AC)**




① Standard manual override PIN

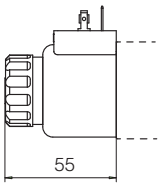
Overall dimensions are referred to valves with connector 666

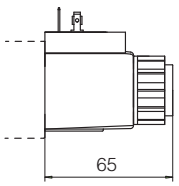
⚠ The manual override operation can be possible only if the pressure at T ports is lower than 50 bar

## 15 MANUAL OVERRIDE

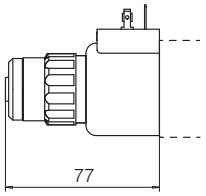
**DC Solenoids** | **AC Solenoid**

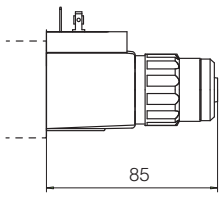
**STD**
execution



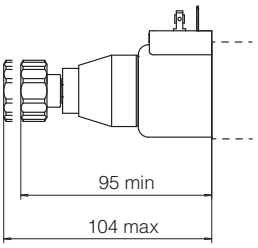




option / **WP**



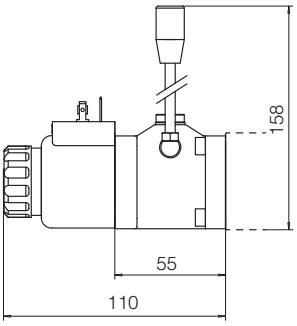

**WPD/SHL**
to be ordered
separately

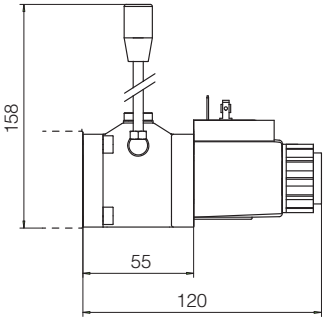



Not available
for AC version

option / **MV**

Mass:
+ 0,9 kg




option / **MO**

Mass:
+ 0,9 kg