RAPHAEL

Product Brochure

# PILOTS & ACCESSORIES

# PLASTIC PILOT PC

## 3 WAY PRESSURE AND FLOW PILOT CONTROL

Valve size: 1"-4"

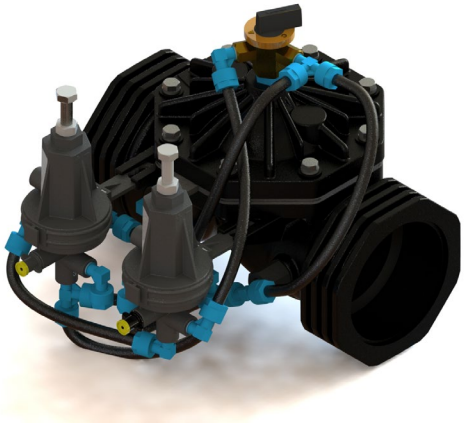
The pressure and flow plastic pilot is a 3-way pressure pilot available in 3 different versions:

PMSR Universal pilot to control valve as pressure reducing or pressure sustaining valve

PMR High performance pilot for pressure reducing control

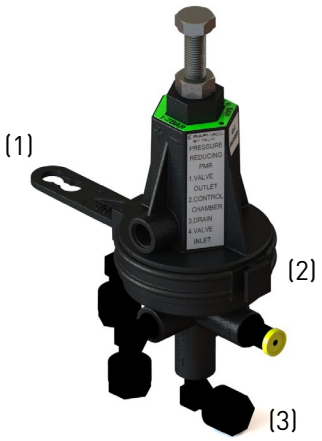
PMF Flow control pilot

* The Plastic Pilot is specially design for irrigation application.
* Two pilots can be combined together on a single valve to form a bi functional valve operation.
* The pressure-regulating model is available in normal pressure or low-pressure configurations.
* The Plastic Pilot´s body is made of high quality reinforced plastic.
* The screw located on top of the valve does the calibration of the pilot.



The pilot can be fix on the valve in 2 different orientation to allow an easy connection of the different version.
This modification is done by moving the fixing part (1) to the groove (2).
This modification could ease the access of some of the connections.

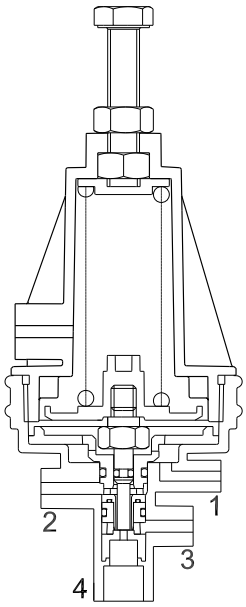
Additional port (3) - allow optional assembling of Pressure check point.



# PLASTIC PILOT PC

## PMR PLASTIC PILOT
### 3 WAY PRESSURE REDUCING PILOT
**High performance pilot for pressure reducing control**

**Valve size: 1"-4"**




**PRM** 2-W Pressure Reducing Mode

Equipped with four connections:

1. Sensor connection - Connected to valve outlet.
2. Command connection - Connected to valve control chamber.
3. Drain - open to the atmosphere
4. Pressure connection - Connected to valve inlet.

## PRESSURE REDUCING VALVE

Maintains a constant downstream pressure, as set on the 3-W plastic pilot, regardless of flow or upstream pressure changes.

**Adjusting**

Turning the adjusting screw counter clockwise (-) pressure will decrease.
Turning the adjusting screw clockwise (+) pressure will increase.

**Spring selection pressure sustaining pilot**

| Setting range [Bar] | Color of spring |
|---|---|
| 1 - 6 (standard) | Green |
| 0.6 - 2.7 | Red |

| TECHNICAL DATA | |
|---|---|
| Pressure rating | 10 bar (150 psi) |
| Pressure adjustment range | 0.3-7.5 bar (5-100 psi) |
| Maximum temperature | 50°C (120°F) |
| Port Connections | 1/8"BSP X 8 mm |

# PLASTIC PILOT PC

## PMSR PLASTIC PILOT

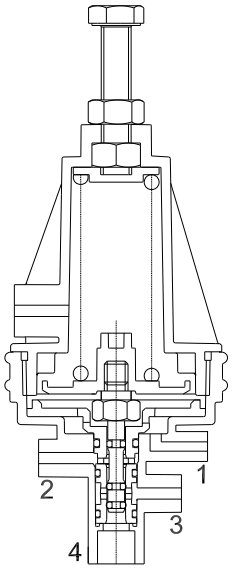
**3-WAY Universal pilot to control valve as pressure reducing or pressure sustaining valve**

### PRESSURE SUSTAINING MODE

Valve size: 1"-4"

Equipped with four connections:

1. Sensor connection - Connected to valve inlet.
2. Pressure connection- Connected to valve inlet.
3. Command connection - Connected to valve control chamber.
4. Drain - open to the atmosphere




**PMSR** 3-W Pressure Sustaining Mode
**PMSR** 3-W Pressure Reducing Mode

#### PRESSURE SUSTAINING VALVE

Maintains a minimum upstream pressure, as set on the 3-W pressure sustaining plastic pilot, regardless of flow changes.

| Setting range [Bar] | Color of spring |
|---|---|
| 1 - 7 (standard) | Green |
| 0.8 - 3 | Red |

### PRESSURE REDUCING MODE

Valve size: 1"-4"

Equipped with four connections:

1. Sensor connection - Connected to valve outlet.
2. Drain - open to the atmosphere
3. Command connection - Connected to valve control chamber.
4. Pressure connection- Connected to valve inlet.

#### PRESSURE REDUCING VALVE

Maintains a constant downstream pressure, as set on the 3-W plastic pilot, regardless of flow or upstream pressure changes.

| Setting range [Bar] | Color of spring |
|---|---|
| 1 - 6 (standard) | Green |
| 0.6 - 2.7 | Red |

**Adjusting for Sustaining or Reducing Mode**

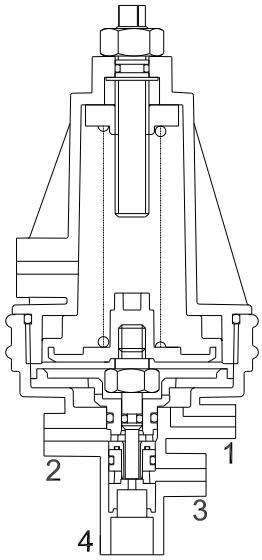
Turning the adjusting screw counter clockwise (-) pressure will decrease.

Turning the adjusting screw clockwise (+) pressure will increase.

| TECHNICAL DATA | |
|---|---|
| Pressure rating | 10 bar (150 psi) |
| Pressure adjustment range | 0.3-7.5 bar (5-100 psi) |
| Maximum temperature | 50°C (120°F) |
| Port Connections | 1/8"BSP X 8 mm |

# PLASTIC PILOT PC

## PMF PLASTIC PILOT
### 3-WAY FLOW CONTROL PILOT




**PMF** 3-W Flow Control Mode

### Valve size: 1“-4“

Equipped with four connections:

1. Connected to the valve downstream
2. Connected to the valve upstream
3. Connected to the valve control chamber
4. Drain, open to the atmosphere
5. Connected to calibrated orifice

**Adjusting**
Turning the adjusting screw clockwise (+) flow will increase
Turning the adjusting screw counter clockwise (-) flow will decrease

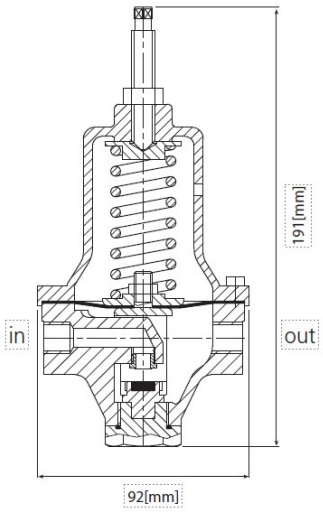
| TECHNICAL DATA | |
|---|---|
| Pressure rating | 10 bar (150 psi) |
| Maximum temperature | 50°C (120°F) |
| Port Connections | 1/8”BSP X 8 mm |

# METAL PILOT

## P-161
### 2 WAY PRESSURE REDUCING PILOT
**Valve size: 1"-16"**

The P-161, 2-W pilot, operates when hydraulic pressure is applied below the spring loaded membrane wich is connected to the pilot's seal trim. The P-161 is a Normally Open (N.O) pilot.
Once pipeline pressure is built downstream of the main valve, it will be conveyed to the pilot's membrane through the sensor port. When the pressure surpasses the set point (pre adjusted through the pilot's adjusting screw) the membrane moves upwards and water passage closes, closing the main valve. When the downstream pressure reduces below the pilot's set point, the membrane moves downwards and opening the water passage.

### Adjusting
To verify the spring's pressure range, check the label specifications and compare to the spring range table. Verify that the needle valve is only 1/2 turn open. Turning adjusting screw clockwise will increase the set point and turning the counter clockwise will decrease it.
Pay attention, the valve takes a while to reach its new set point after changing the preset pressure. Turn adjusting screw 1/2 turn at a time and wait until the valve reaches stability. If necessary, turn again until reaching the desired set point.
After reaching the desired set point, lock the adjusting screw by tightening the locking nut firmly to the cover.




### General Information
Pressure Rating: PN-16
Regulation Ratio: 5:1
Kv Rate: 0.25 [l/sec]
Senstivity: 0.1 [bar]
Max Temperature: 90[°C
Ports: 1/4"
Weight: 2.0[kg]

### Spring Selection Pilot P-161

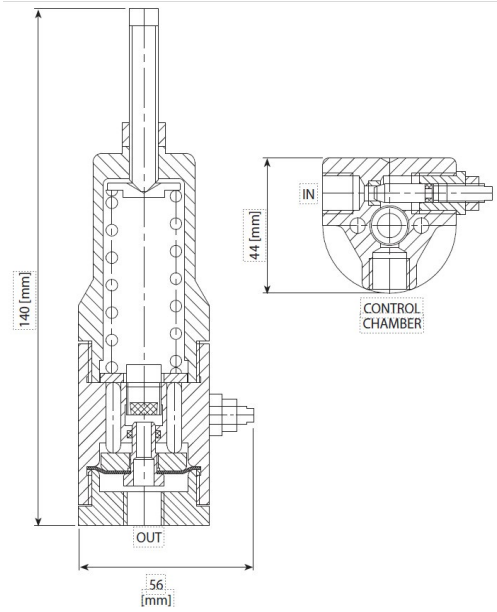
| Setting range [Bar] | Color of spring |
|---|---|
| 2-10 (standard) | Green |
| 0.5-4 | Blue |
| 0,5-6 | Red |
| 2-16 | Yellow |

# METAL PILOT

## P-162
### 2 WAY PRESSURE REDUCING PILOT
**Valve size: 1"-4"**

The P-162, 2-W pilot, operates when hydraulic pressure is applied below the spring loaded membrane wich is connected to the pilot's seal trim.
The P-162 is a Normally Open (N.O) pilot.
Once pipeline pressure is built downstream of the main valve, it will be conveyed to the pilot's membrane through the sensor port. When the pressure surpasses the set point (pre adjusted through the pilot's adjusting screw) the membrane moves upwards and water passage closes, closing the main valve. When the downstream pressure reduces below the pilot's set point the membrane moves downwards, opening the water passage and allowing the main valve to open.

### Adjusting
To verify the spring's pressure range, check the label specifications and compare to the spring range table. Verify that the needle valve is 1/2 turn open.
Turning adjusting screw clockwise will increase the set point and turning the counter clockwise will decrease it.
Pay attention, the valve takes a while to reach its new set point after changing the preset pressure. Turn adjusting screw 1/2 turn at a time and wait until the valve reaches stability. If necessary, turn again until reaching the desired set point.
After reaching the desired set point, lock the adjusting screw by tightening the locking nut firmly
to the cover.




### General Information
Pressure Rating: PN-16
Regulation Ratio: 4:1
Kv Rate: 0.25 [l/sec]
Senstivity: 0.1 [bar]
Max Temperature: 90[°C
Ports: 1/4"
Weight: 0.75 [kg]

### Spring Selection Pilot P-162

| Setting range [Bar] | Color of spring |
|---|---|
| 2-12 (standard) | Green |
| 0,5-8 | Red |

# METAL PILOT

## P-683/S
### 3 WAY PRESSURE SUSTAINING/REDUCING PILOT
### Valve size: 1“- 16“


The P-683, 3-W pilot, operates only if pipeline conditions changes, when hydraulic pressure is applied below the spring loaded membrane, wich is connected to the pilot's seal trim, alternating the pilot's water passage.
When the pilot reaches the desired set point, the seal trim locks all water passages, there is no water flow in the pilot and the pilot remains in this position until a change in the downstream pressure.
The P-683 can be used either as a Normally Open(N.O) or as a Normally Close (N.C) pilot.

### (N.O) Configuration

When the pressure head in the pilot's sensor port is lower than the set point, the membrane moves downwards, closing pressure supply to the control chamber and opening a water passage.
Once pressure head is built, the membrane moves upwards opening the pressure supply to the control chamber and closing the pilot's vent, allowing the main valve to close.

### Adjusting

To verify the spring's pressure range, check the label specifications and compare to the spring range table. The valve takes a while to reach its new set point after changing the preset pressure.
Turn adjusting screw 1/2 turn at a time and wait until the valve reaches stability.
If necessary, turn again until reaching the set point and lock the adjusting screw.
Try to avoid draining the water from the pilot on the valve's body, or near electric sources.

### General Information

Pressure Rating: PN-16

Regulation Ratio: 3:1

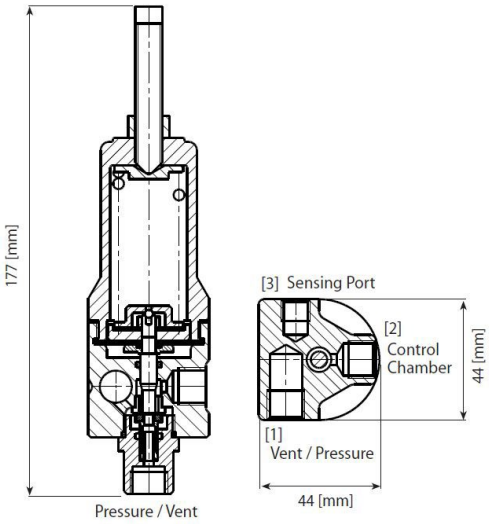
Kv Rate: 0.25 [l/sec]

Senstivity: 0.1 [bar]

Max Temperature: 90[°C

Ports: 1/4"

Weight: 0.9[kg]




### Spring Selection Pilot P-683

| Setting range [Bar] | Color of spring |
|---|---|
| 2-12 (standard) | Green |
| 0,5-8 | Red |
| 3-16 | Yellow |

# METAL PILOT

## P-181

### 2 WAY PRESSURE SUSTAINING/RELIEF PILOT

**Valve size: 1“- 16“**

The P-181, 2-W pilot, operates when hydraulic pressure is applied below the spring loaded membrane, wich is connected to the pilot's seal trim.
The P-181 is a Normally Close (N.C) pilot.
When no pressure is applied below the spring loaded membrane, the pilot commands the main valve to close. When the pressure surpasses the set point, the membrane moves upwards and water passage opens, allowing the main valve to open.
When the downstream pressure reduces below the pilot's set point, the membrane moves downwards, closing the water passage.
During the pilot's operation water circulates constantly through the pilot, it provides an immediate response to any changes in pipeline pressure.

### Adjusting

To verify the spring's pressure range, check the label specifications and compare to the spring range table. Verify that the needle valve is 1/2 turn open:
Turning adjusting screw clockwise will increase the set point and turning the counter clockwise will decrease it. The valve takes a while to reach its new set point after changing the preset pressure. Turn adjusting screw 1/2 turn at a time and wait until the valve reaches stability. If necessary, turn again until reaching the desired set point. After reaching the desired set point, lock the adjusting screw by tightening the locking nut firmly to the cover.

### General Information

Pressure Rating: PN-16

Regulation Ratio: 5:1

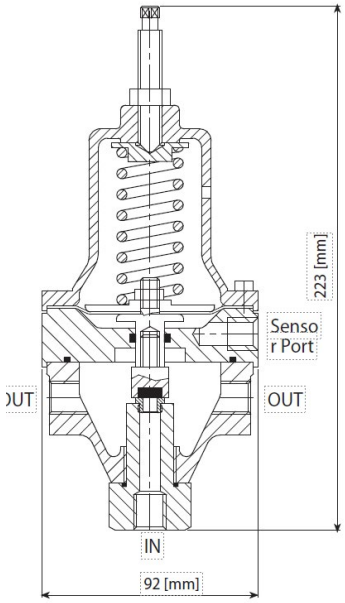
Kv Rate: 0.25 [l/sec]

Senstivity: 0.1 [bar]

Max Temperature: 90[°C

Ports: 1/4”

Weight: 2.0 [kg]




### Spring Selection Pilot P-181

| Setting range [Bar] | Color of spring |
|---|---|
| 2-10 (standard) | Green |
| 0.5-4 | Blue |
| 0,5-6 | Red |
| 2-16 | Yellow |

# METAL PILOT

## P-182

### 2 WAY PRESSURE SUSTAINING/RELIEF PILOT

**Valve size: 1“- 14“**

The P-182, 2-W pilot, operates when hydraulic pressure is applied below the spring loaded membrane wich is connected to the pilot's seal trim.
The P-182 is a Normally Close (N.C) pilot. When no pressure is applied below the spring loaded membrane, the pilot commands the main valve to close.
When the pressure surpasses the set poin, the membrane moves upwards and water passage opens, allowing the main valve to open. When the downstream pressure reduces below the pilot's set point, the membrane moves downwards, closing the water passage.
During the pilot's operation water circulates constantly through the pilot, it provides an immediate response to any changes in pipeline pressure.

### Adjusting

To verify the spring's pressure range, check the label specifications and compare to the spring range table. Verify that the pilot's built-in needle valve is 1/2 turn open. Turning adjusting screw clockwise will increase the set point and turning the counter clockwise will decrease it. The valve takes a while to reach its new set point after changing the preset pressure.
Turn adjusting screw 1/2 turn at a time and wait until the valve reaches stability. If necessary, turn again until reaching the desired set point.
After reaching the desired set point, lock the adjusting screw by tightening the locking nut firmly to the cover.

### General Information

Pressure Rating: PN-16

Regulation Ratio (Sustaining): 4:1

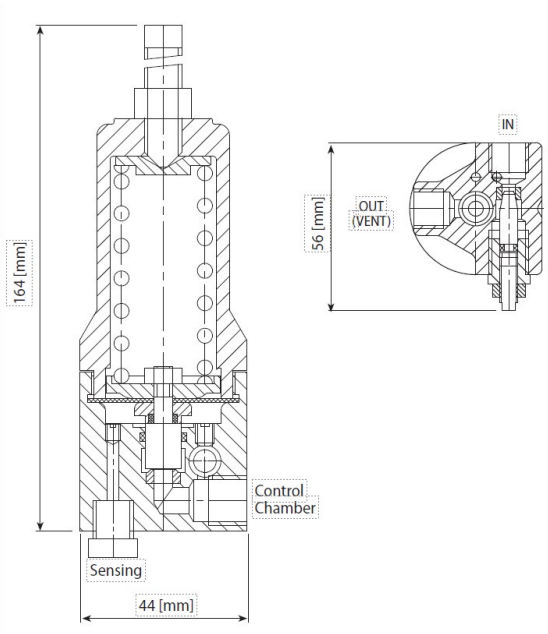
Regulation Ratio (Relief): 7:1

Kv Rate: 0.25 [l/sec]

Max Temperature: 90[°C

Ports: 1/4"

Weight: 0.75 [kg]




### Spring Selection Pilot P-182

| Setting range [Bar] | Color of spring |
|---|---|
| 2-10 (standard) | Green |
| 0,5-6 | Red |
| 2-16 | Yellow |

# FLOAT LEVEL PILOT

## P-10

### 2 WAY FLOAT LEVEL PILOT

**Valve size: 1“- 16“**

The P-10, 2-W,is a float pilot that interconnected by a lever arm. When water level reaches its maximum level, the float rises, closing the water passage of the pilot and commands the main valve to close. When water level drops, the float opens the water passage and main valve will open.
Every change in water level is conveyed to the pilot directly through the lever arm. The pilot's water passage will open proportionally to the water level.
The P-10 is usually used to command level control valves in small and medium water reservoirs. There is no need for energy other than line pressure, it offers an economic level control solution.

### Adjusting

The pilot should be installed in a location with no turbulent or wave. Verify that the pilot is installed in the reservoir at the maximum water level. Verify that the needle valve is 3/4 turn open.
Verify that the float is free to travel up and down without interference inside the reservoir.
It is recommended to wait at least one regulating cycle (closing of the valve at maximum water level) before determining that the pilot is set, to ensure water are not spilling from the reservoir.

### General Information

Pressure Rating: up to 5 bar

Range: 10 (cm)

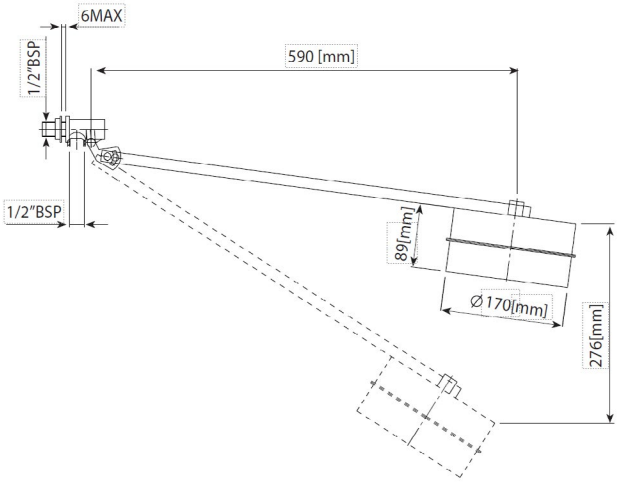
Kv Rate: 0.45 [l/sec]

Senstivity: 0.02 [bar]

Max Temperature: 90[°C

Ports: 1/2”

Weight: 1.2 [kg]

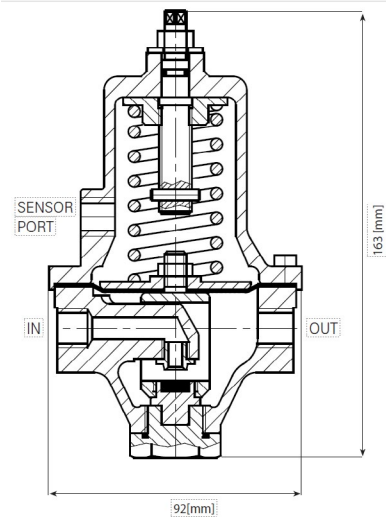


# FLOAT LEVEL PILOT

## P-100
### 2 WAY DIFFERENTIAL PILOT
**Valve size: 1“- 16“**

he P-100, 2-W, is a Normally Open (N.O) and a differential pilot. The P-100 operates when hydraulic pressure is applied below and above the spring loaded membrane wich is connected to the pilot's seal trim. Upper and lower chambers of the pilot are connected to upstream and downstream sides of a calibrated orifice plate, used as a flow sensor.
Differential pressure across the orifice changes with flow, and conveyed to the pilot through its sensing ports. When low pressure difference is presented across the orifice plate, the valve opens. When pressure difference increases, the valve tends to close, maintaining the requested flow.

### Adjusting
The Orifice plate installed should be appropriate and calculated according to the desired flow.
Verify that the needle valve is only 3/4 turn open. Check orifice plate installation.
Check flow according to the desired set point.
Pilot is delivered with adjusting screw fully loose. Possible set flow ranges from this condition to +20%. Turning adjusting screw clockwise will increase the flow and counter clockwise will decrease it. The valve takes a while to reach its new set point after changing the preset pressure. Turn adjusting screw 1 turn at a time and wait until stability. If necessary, turn again until reaching the desired set point. After reaching the desired set point, lock the adjusting screw by tightening the locking nut firmly to the cover.




### General Information
Pressure Rating: PN-16
Regulation Ratio :34:1
Kv Rate: 0.25 [l/sec]
Range: 10 (cm)
Sensitivity: 0.02 (bar)
Max Temperature: 90[°C
Ports: 1/4"
Weight: 2.0 [kg]

# ACCESSORIES

## METAL SOLENOID

### 3 WAY WP-16

**Valve size: 1“- 16“**


The 3-W metal solenoid (N.C) or (N.O) is recommended for heavy duty applications where high performance is required.
The 3-W metal solenoid (N.C) or (N.O) can be used for industrial, irrigation control and automation systems.

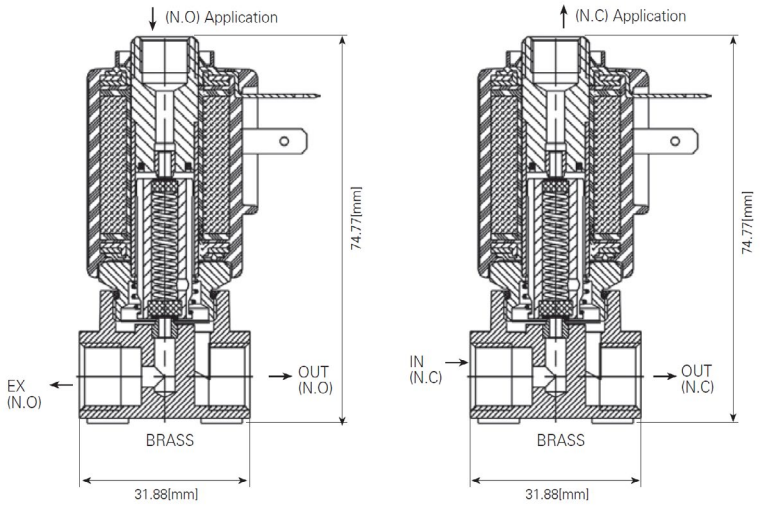
**General Information**

Pressure Rating: PN-16

Max Temperature: 80[°C]

Weight: 0.267[kg]

Power Source: 110/220 VAC & 9/12/24 VDC



# ACCESSORIES

## GALIT (HYDRAULIC RELAY

### 3 WAY PLASTIC SOLENOID N.C./N.O.

**Valve size: 1"- 6D"**


The hydraulic relay Galit is equipped with 4 hydraulic connections and a manual operator.

It converts an external hydraulic command that controls the valve. It also enables manual control of the valve.

The Galit is suitable for remote opening and closing of hydraulic valves and can be configured as (N.O.) or (N.C.).

**General Information**

Pressure Rating: PN-10
Min. Pressure: 5 bar
Senstivity: 0.3 bar
Max Temperature: 90 °C
Weight: 0.64 kg

**Spring options for Topographic compensation:**

| Relay type | Unit | Yellow | Green | White | Red |
|---|---|---|---|---|---|
| N.C. | m | 5-10 | 10-14 | 14-17 | 17-22 |
| N.O. | m | 5-10 | 10-15 | 15-20 | 20-25 |

* standard Galit comes without spring

# ACCESSORIES

## PLASTIC SOLENOID

### 3 WAY WP-8

**Valve size: 1“- 6D“**


Raphael plastic solenoid valves are mounted on PN-10 valves.

The Raphael plastic solenoid valve has an electric coil responding to different currents and includes manual override.

Plastic solenoid valve bases are available with or without flange conection.

**Applications:**

Raphael plastic solenoid is specially designed for irrigation control valves.

**General Information**

Pressure Rating: PN-8

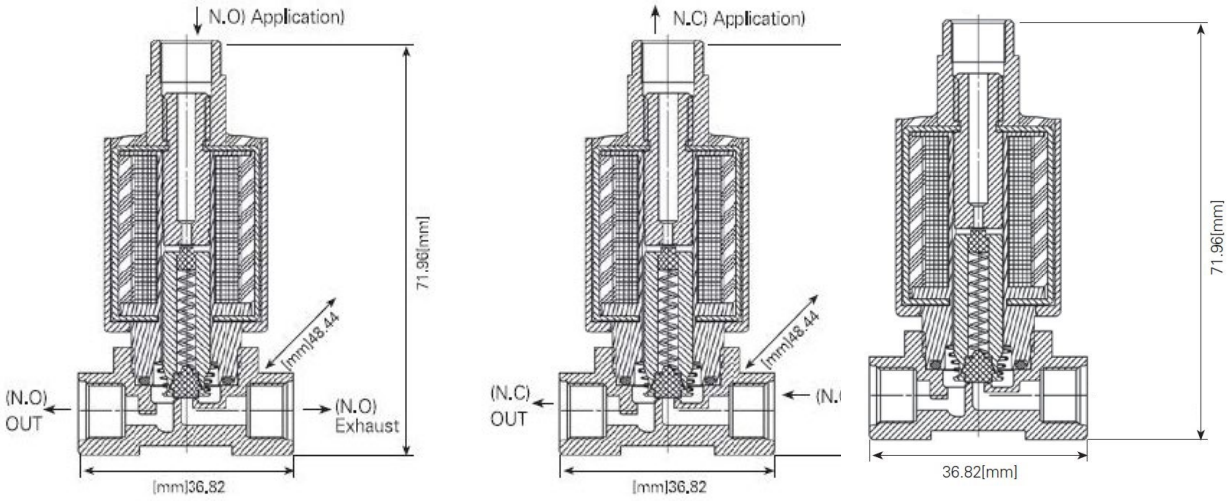
Max Pressure: 10 Kg/cm2

Max Temperature: 80 °C

Weight: 0.103 Kg

Power Source: 110/220 VAC & 9/12/24 VDC

| Function | Pressure (bar/psi) | | |
|---|---|---|---|
| | AC | DC | |
| 3-W-N.C. | 11/156 | 9/127 | 11/156 |
| 3-W-N.O. | 12/170 | 12/170 | 12/170 |



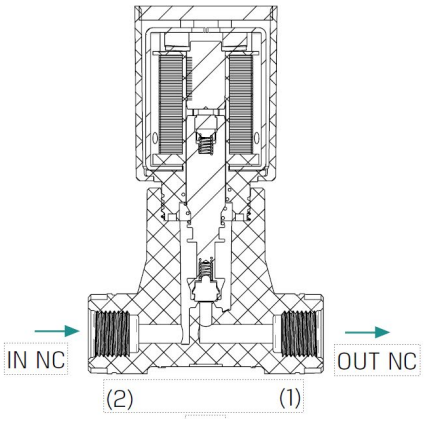
# ACCESSORIES

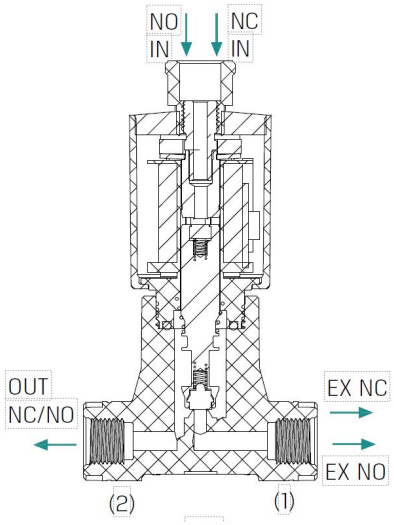
## SOLENOID VALVES
### LATCH 2 WAY, 3 WAY, NC, NO

### Technical Data

| | |
|---|---|
| Function | 2 Way, 3 Way, NC, NO |
| Ports size | 1/8" BSP & NPT |
| Orifice size | 2.6 mm |
| Pressure range | NC (2 Way, 3 Way): 8 bar<br>NO (3 Way): 10 bar |
| Temperature range | **Fluid**: 5°C to 50°C (no freezing)<br>**Ambient**: 10°C to 50°C |
| Materials in contact with media | **Manual override:** Plastic<br>**Main Valve**: UV Stabilized, Reinforced Nylon 6 30% GF<br>**Solenoid Operator:** Stainless Steel AISI 300 & 400 series<br>**Seals**: NBR |
| Mounting | 2 x Ø6 mm holes |
| Manual override | 3 positions (Open/Auto/Close) |
| Media | Air, water |
| Coil voltage | Latch |
| Switching time | 40-60 msec |
| Electric connection | 22AWG cable |
| Standard protection class | IP66 |

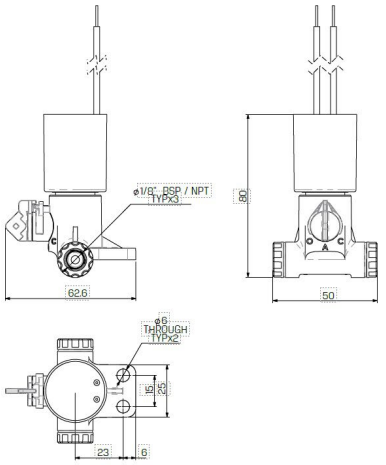
* Can only be operated with supplied coil



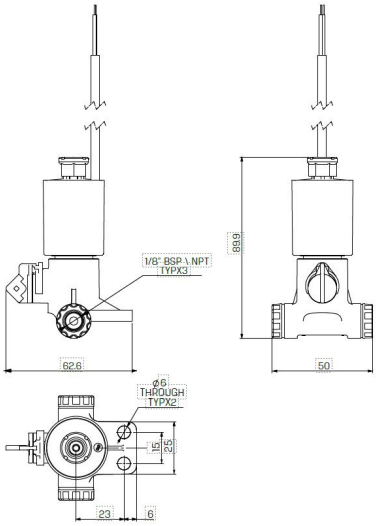



# ACCESSORIES

## Dimensions

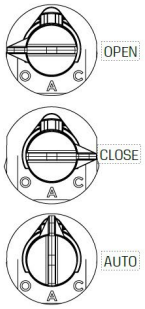



2W




3W

Manual Override Operation




To manually open the valve : turn selector switch to OPEN

**NO** : To change from OPEN to AUTO: turn the selector switch to AUTO

**NC** : To change from OPEN to AUTO: turn the selector switch to CLOSE, and then to AUTO

## Coil resistance vs input voltage range

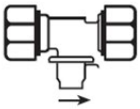
| Resistance (Ω) | Suitable input voltage range (V) |
|---|---|
| 1 | 8-12 |
| 4 | 12-18 |

# ACCESSORIES

## S.V. - SHUTTLE VALVE

**General Description**

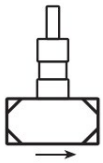
The shuttle valve is a 3-W hydraulic device, used to alternatively forward hydraulic command to the valve's control chamber, from two different pressure supply devices. When the higher pressure is conveyed into the central connection from one end, the other end will be shut.
The shuttle valves are available in metal and plastic versions to fit PN-10 and PN-16 control applications.



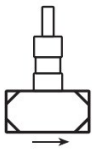
**Applications**

The shuttle valves are specifically designed for operating where 2 different hydraulic commands are present in a 3-W control system. Either remote operating and/or pilots control will alternatively operate by using the shuttle valves.

## BM - NEDLE VALVE



The needle valve is used in control system to enable the pilot control of modulating applications and provide an opening and closing regulated speed. The needle valve is used when valve operating speed and sensitivity are essential for the control system. Raphael's needle valve has a heavy duty stainless steel seat and needle construction, enabling high sensitivity and maintenance free operation.

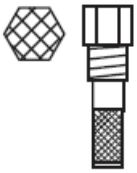


**Applications**

Use the needle valve in 2-W control systems for modulation purposes. Also use the needle valve in 2-W and 3-W control systems to regulate the valve's opening and closing speed. The needle valves are specially designed for both PN-10 and PN -16 irrigation systems.

## FI - FINGER FILTER

The finger filter is a self flushing screen filter installed in the water inlet of the valve's control system. It is used to prevent impurities from entering the control system and disturbing its operation by restricing, or even clogging water passages. Raphael's finger filters are designed to be maintenance free, screwed into the valves body sampling water from the main pipe. The finger filter will provide a safe water source into the control loop.



**Applications**

The finger filter is ideally designed for operation with RAF hydraulic control valve for irrigation applications as a main filter for the control system, for both PN-10 and PN-16 applications. Use the FI Finger filter in any control system to prevent eventual malfunction due to impurities, installing it in the water intake to the control loop.

# ACCESSORIES

## SY - 3-W COCK VALVE

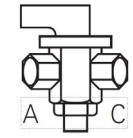
The SY 3-W cock valve is a 3 port spherical valve, mounted on the valve's control chamber and used to change water passage between control chamber and 3 other optional ports. The SY valve is equipped with 4 connections:

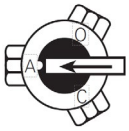
**1.** Common port connected to the valve's chamber.

**2.** « O »- to connect the chamber to the open air to manually open the valve.

**3.** « C »-to connect the chamber to the pressure supply to manually close the valve.

**4.** « A »-to connect the valve to the control system for an automatic control.




**Applications**

Use the SY 3-W cock valve with every RAF valve application where override option is necessary, enabling local opening and closing of the valve, regardless of the automatic control function command. The SY is designed for both PN-10 and PN-16 control systems.

**Important Notes**

When the SY 3W cock valve is used to manually open and close the main valve, the automatic function is eliminated. When the automatic function of the valve is eliminated, the valve will not function as a modulating valve, but as an On/Off valve.

## BK–2W BALL VALVE

The 2W Ball valve is a spherical valve used as isolating device in the pilot circuit. This valve is designed with a limited headloss and a maximum reliatbility to have no impact on the pilot circuit function

**Applications**

Use the BK 2-W ball valve as an isolation valve when the control system needs to be manipulated. The BK 2-W ball valve will eliminate water passage from the main pipe line and enable manipulation and maintenance without the need to shut down the water in the main pipeline.

**Important Notes**

When the BK 2-W ball valve is used to isolate the control system, the automatic function is eliminated. When the automatic function of the valve is eliminated, the valve will not function as a modulating valve, but as an On/Off valve.

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**RAPHAEL VALVES INDUSTRIES (1975) LTD**, founded in 1949, is the first Israeli manufacturer of water control valves. RAPHAEL's research department constantly strives to introduce new and innovative products and solutions for water control systems including water works, fire-protection, irrigation systems and other fields.


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