A unique, global, universal and compact solenoid valve system

Instant control for all pneumatic actuators

Modular valve islands or stand-alone valves

Catalogue: PD0C00013GB04ev
Valves are the centre of electro-pneumatic automation. They are now designed into compact islands that are easily configured to each application.

For full efficiency in this enhanced automation practice, machine designers are helped by 3 complementary design tools:

1 - the Moduflex valve island configurator, an easy to use CD-ROM (see p.52 and 53);

2 - the Moduflex functional poster, a "one glance synopsis" of the Moduflex System;

3 - this catalogue, that includes "The manual of modular pneumatic valves islands".

Make sure your Moduflex workshop is complete.
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### Ordering guide

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### Manual

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</tr>
<tr>
<td>electro-pneumatic industrial automation</td>
<td>to</td>
</tr>
<tr>
<td></td>
<td>M35</td>
</tr>
</tbody>
</table>
With high performance technology, Moduflex opens a new era in the field of electro-pneumatic automation. Valves are easily assembled into compact islands that conform to any application requirement.

1 adaptive pneumatic

With the Moduflex valve design, pneumatic automation is now totally flexible.

- Valves may be stand-alone or assembled into short or long islands, depending on application.
- IP 65-67 water and dust protection allows valve to be installed near the cylinders for shorter response time and lower air consumption.
- Valve island electrical connections may be integrated.
- Push-in pneumatic connectors may be straight or elbow, for 4, 6, 8 or 10 mm OD tubes.
- A given island may incorporate different valve sizes in order to fulfill each cylinder flow requirement. A single island will accommodate all cylinders, up to 100 mm bore size.
- Island modifications are easy: add or remove a valve, change a valve function, change tubing size, change piloting in minutes.
- Manual overrides are also adaptive: locking for set up, non-locking for production, ...

2 easy man-machine dialog

- Moduflex incorporates LED indicators, manual overrides (MAN), in conjunction with valve symbols and identification.
- As compared to traditional 5/2 valve islands, Moduflex offers a more user friendly dialog: each marking, LED and MAN are all lined up with the corresponding cylinder output.

Island with traditional 5/2 spool valves: Before any action, LED and MAN have to be carefully related to the corresponding output. Man-machine dialog is difficult.

Island with Moduflex 4/2 slides valves: Each marking, LED and MAN line up with the corresponding output. Man-machine dialog is easy.
**high performance technology**

The unique Moduflex super-compact 4/2 slide valve concept features:

- a very short stroke (2.5 mm) slide and spool arrangement for short response times;
- a large spool diameter (14 mm) provides higher actuation force for totally reliable piloting with dry or lubricated air, 40µ filtration.
- a lapped ceramic plate and slide arrangement for total sealing and long life (100 M operations);
- The best flow / size ratio.

For robotic applications, valve impact resistance, and valve weight permit mounting on fast moving machine components.
Valve functions, flows and tube connections

Moduflex valves offer all functions required for standard electro-pneumatic automation applications: 4 or 3 way valves, 2 position monostable or bistable valves, 3 position valves, different flows and tube connections to control all pneumatic cylinders and actuators.

- 4/2 valves have 1 exhaust port
- 5/2 valves have 2 exhausts

Moduflex has chosen to offer 4/2 valves rather than 5/2 valves. For the same function and flow, 4/2 valves are more compact and easier to use: for example, collecting exhaust is simpler.

4/2 and 5/2 valves are user equivalent

<table>
<thead>
<tr>
<th>4/2 Valve</th>
<th>5/2 Valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 ports</td>
<td>5 ports</td>
</tr>
<tr>
<td>2 position</td>
<td>2 position</td>
</tr>
</tbody>
</table>

Both of the above are 4 way valves and may control any double acting cylinder.

- 4/2 valves have 1 exhaust port
- 5/2 valves have 2 exhausts

For the same function and flow, 4/2 valves are more compact and easier to use: for example, collecting exhaust is simpler.

4/2 monostable (single solenoid pilot)
Control signal has to be maintained

4/2 bistable (double solenoid pilot)
Control signals may be momentary

3/2 monostable (Normally Closed + Normally Closed)
Outputs when energised

3/2 monostable (Normally Open + Normally Open)
Outputs when de-energised

3/2 NC: Output when energised
3/2 NO: Output when de-energised

Double 3/2 valve modules achieve these 3 position valve functions (5/3 or 4/3) as explained by opposite box.
Flows and tube connections

2 valves sizes lead to a global choice of 4 tubes sizes, thus covering all usual applications

<table>
<thead>
<tr>
<th>Size 1</th>
<th>Size 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flow</strong>: Qmax. &gt; 400 NL/min</td>
<td><strong>Flow</strong>: Qmax. &gt; 1200 NL/min*</td>
</tr>
<tr>
<td>12 mm² flow channel, for 4 and 6 mm OD tubes</td>
<td>40 mm² flow channel, for 8 and 10 mm OD tubes</td>
</tr>
</tbody>
</table>

Valve outputs are equipped with clip-on push-in tube connectors with a choice of:
- straight or elbow
- 2 tube sizes

- to cylinders
  - 6 to 25 mm bore size
  - 25 to 40 mm bore size
  - 40 to 63 mm bore size
  - 63 to 100 mm bore size

Typical cylinder speeds are shown on page 36. Module size, tube diameter and length, cylinder size and load and exhaust collection are taken into account.

Double 3/2 valves replace all 3 position valves for a better performance

- **3 position vented centre**
  - A traditional 5/3 vented centre valve is now replaced by a double 3/2 NC+NC valve module (version with no exhaust check valves). Both cylinder chambers are exhausted and rod and piston are free to move.

- **3 position closed centre**
  - A traditional 5/3 closed centre valve is now replaced by a double 3/2 NC+NC valve module and a dual P.O. check module that will block the flows close to the cylinder. Cylinder positioning is more precise.

- **3 position pressure centre**
  - A traditional 5/3 pressure centre valve is now replaced by a double 3/2 NO+NO valve module. The function is identical.

For more information, see chapter 11 on manual.
Moduflex system®:
module series selection

Moduflex system provides a complete choice of either stand-alone valves, short build valve islands or large valve islands configurations. Electrical control connections may be individual or island integrated. Peripheral modules add complementary functions: flow control, pressure regulation or cylinder positioning.

**stand-alone valve modules: S series**

For isolated cylinders on a machine, it is preferable to locate the valve close by. Therefore a stand-alone module is ideal. Response time and air consumption are then reduced to a minimum.

**valve island modules with individual connectors: T series**

For small groups of cylinders requiring short localised valve islands, it is convenient to use individual electrical connector islands.

**valve island modules with integrated connections: V series**

When the number of valves is larger, modular islands are easily assembled using the integrated electrical connection series. These islands are then connected to the control PLC, with a multi-connector cable or with a field bus connection.
**Individual connectors**

This M8 standard IP67 plug-in connector is used with:
- the stand-alone modules (S series);
- the modules for individual connector islands (T series).

Each connector is equipped with:
- LED indicator;
- voltage surge suppressor.

The 24V DC connection is polarity insensitive and thus compatible with both, PNP and NPN logic.

**Integrated connections**

Each integrated connection valve island module is equipped with a 20 plug-in modular circuit that includes:
- multiple connections between island modules;
- connections to solenoid pilots;
- LED indicators;
- voltage surge suppressor.

The resulting island is IP 65 protected and compatible with both, PNP and NPN logic.

**Peripheral modules installation selection**

1 - Dual flow control modules

By controlling the exhaust flows of a double acting cylinder, this module can adjust both speeds: forward and backward. It may be plugged into the valve module outlet ports or mounted close to the cylinder in its in-line version.

In the manual, chapter 10 gives full details.

2 - Pressure regulation modules

The thrust developed by a cylinder often requires adjustment by controlling pressure to the front or back of the piston. The pressure regulation module enables manual adjustment of pressure with visual indication provided by the pressure gauge.

In the manual, chapter 10 gives full details.

3 - Dual P.O. check valve modules

Combined with a double 3/2 NC + NC valve, this module will block both flows and stop cylinder movement as soon as the valve’s outputs are both exhausted. Better than a 3 position valve, it provides more precise positioning when close to the cylinder.

In the manual, chapter 11 gives full details.

**Peripheral modules : P series**

1 - Dual flow control modules

By controlling the exhaust flows of a double acting cylinder, this module can adjust both speeds: forward and backward. It may be plugged into the valve module outlet ports or mounted close to the cylinder in its in-line version.

In the manual, chapter 10 gives full details.

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In the manual, chapter 11 gives full details.
Moduflex system®:
new opportunities in machine design

Moduflex is totally flexible. As a system, it combines valve functions with modularity to obtain the best solution for a wide range of applications.
The following are typical arrangements found in standard automation applications.

A - different installations

1 - stand-alone valve module close to a cylinder : S series

For isolated cylinders, a stand-alone valve module positioned close to the cylinder may be the best option. This takes advantage of the module IP 67 protection. The machine will then have better response times and a lower air consumption.

![Diagram of S series module](image)

2 - small valve island close to a cylinder group : T series

In order to reduce response time and air consumption, remote small valve islands located close to a cylinder group are ideal.

Individual connector T series islands can be configured according to the flow requirements: size 1 only or size 1 and size 2 both mixed in the same island, single or double P and E connections,...

![Diagram of T series island](image)

3 - valve island close to actuators and cylinders : V series

Most cylinders on a machine may be close enough to be controlled by a larger island. The V series (integrated electrical connections) is then preferred in order to reduce electrical wiring to a minimum.

![Diagram of V series island](image)
4 - centralised valve island enclosed in control cabinet : V series

The applications on page 10 show the valves installed outside enclosures taking advantage of the Moduflex IP65-67 rating. However, for some applications, particularly food process and medical industries with specific hygiene requirements or aggressive environments, an enclosure is usually preferred.

Therefore, as Moduflex collects all exhausts including pilot exhausts, the electro-pneumatic valve island can be safely installed inside the electrical or control cabinet.

B - different control connections

In addition to the numerous possibilities in value installation, Moduflex also provides a complete choice of electrical connections and controls. The overview below gives a summary of the options available for both wired and serial bus connections. Additional information can be found on the following pages.

<table>
<thead>
<tr>
<th>wired connections</th>
<th>serial bus connections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S series</strong></td>
<td><strong>T series</strong></td>
</tr>
<tr>
<td></td>
<td><strong>V series</strong></td>
</tr>
<tr>
<td>[Diagram of S series]</td>
<td>[Diagram of T series]</td>
</tr>
<tr>
<td>[Diagram of V series]</td>
<td>[Diagram of serial bus connections]</td>
</tr>
</tbody>
</table>

- S series: see manual chapter 7.
- T series: see manual chapter 16.
- V series (Valvetronic™): see manual chapter 8.
- Serial bus connections: see manual chapters 17 and 18.
Moduflex specifications answer most industries automation requirements. Applications run from clean room electronic manufacturing to process industries in aggressive environments.

### Pneumatic specification

#### General specification

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid</td>
<td>Air, inert gas, filtered 40 μg, dry or lubricated</td>
</tr>
<tr>
<td>Operating pressures</td>
<td>- 0.9 to 8 bar</td>
</tr>
<tr>
<td>Piloting pressure</td>
<td>3 to 8 bar, for operating pressures below, use external pilot supply available on all head modules</td>
</tr>
<tr>
<td>Pilot supply</td>
<td>Internal with S series, mixed internal/external with T and V series</td>
</tr>
<tr>
<td>Exhaust collection</td>
<td>All exhausts are collectable, including solenoid pilot exhaust</td>
</tr>
<tr>
<td>Life cycle</td>
<td>100 million operations, with dry air, 3 Hz, 20°C, 6 bar</td>
</tr>
<tr>
<td>Operating temperatures</td>
<td>- 15°C to 60°C, (0°C to 55°C for field bus systems)</td>
</tr>
<tr>
<td>Stocking temperatures</td>
<td>- 40°C to 70°C</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>According to IEC 68 - 2 - 6, 2G 2 to 150 Hz</td>
</tr>
<tr>
<td>Impact resistance</td>
<td>According to IEC 68 - 2 - 27, 15G 11 ms</td>
</tr>
</tbody>
</table>

1: class 5 according to ISO 8573-1  
2: class 4 according to ISO 8573-1  
3: with lubricated air, we recommend external pilot supply with non lubricated air  
4: 4/2 valve

#### Flow specification

**Size 1**  
for tubes  
4 mm OD and 6 mm OD

- **Valve construction**: 4/2  
- **Flow channel**: 12 mm²  
- **Qmax**: 400 Nl/mn

- **Valve construction**: double 3/2  
- **Flow channel**: 12 mm²  
- **Qmax**: 400 Nl/mn

**Size 2**  
for tubes  
8 mm OD and 10 mm OD

- **Valve construction**: 4/2  
- **Flow channel**: 40 mm²  
- **Qmax**: 1200 Nl/mn

- **Valve construction**: double 3/2  
- **Flow channel**: 28 mm²  
- **Qmax**: 800 Nl/mn
### Electrical specification

#### Solenoid pilot specification

In order to simplify selection, mounting and maintenance, only one solenoid pilot is required for all Moduflex.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated coil voltage</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Allowable voltage fluctuation</td>
<td>-15% to +10% of nominal voltage</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>Polarity insensitive: PNP and NPN compatible</td>
</tr>
<tr>
<td>Coil insulation type</td>
<td>Class B</td>
</tr>
<tr>
<td>Power consumption</td>
<td>1 W (42 mA)</td>
</tr>
<tr>
<td>Manual override</td>
<td>Locking or non-locking, isolated if required</td>
</tr>
<tr>
<td>Response time of the complete valve</td>
<td>9.6 ms ± 1.2 on 4/2 bistable valve size 1</td>
</tr>
<tr>
<td></td>
<td>14.8 ms ± 2 on 4/2 bistable valve size 2</td>
</tr>
<tr>
<td>Duty factor</td>
<td>100%</td>
</tr>
<tr>
<td>Dust and water protection</td>
<td>According to EN 60 529 S and T series: IP 67 V series: IP 65</td>
</tr>
</tbody>
</table>

### Serial bus specification

#### All buses

| EMC / CE mark.                          | According to EN 61 000-6-2 EN 50081-2 |

#### AS-i bus

| AS-i line                               | According to EN 50295                      |
| Solenoid pilot voltage                  | 24 V DC                                     |
| Module consumption                      | max. 70 mA (2 slaves)                       |
| Max. supply for all inputs              | 240 mA (including internal input consumption) |
| Internal input consum.                  | 9 mA for each active input                  |
| Inputs                                  | According to IEC 1131-2 class 2             |

#### Device bus

| Bus line                                 | According to each bus specification          |
| Module voltage                           | 20 to 30 V DC                                |
| Solenoid pilot voltage                   | 24 V DC                                     |
| Module consumption                       | Profibus DP max. 1.5 W                      |
|                                          | DeviceNet max. 1.5 W                        |
|                                          | Interbus S max. 2 W                         |
| Outputs                                  | Overload protection                          |
Ordering guide

Depending on the application requirements and production methods, Moduflex may be ordered as follows:

- **basic modules**, supplied without connectors, the choice of plug-in connectors enables total flexibility in the field;

- **complete modules**, supplied complete with specific connectors, and suitable for inclusion in valve island or as stand-alone valves or peripheral modules;

- **assembled valve islands**, supplied fully assembled to specifications and complete with pneumatic and electrical connectors.

---

0 marked on following pages

1 marked on following pages

2 marked on following pages
**Basic Modules (Order Code)**

- **V series**
  - 1. Complete modules for valve islands with integrated connections (p. 20 - 23)
  - 2. Assembled valve islands (p. 24 - 25)

- **T series**
  - 1. Complete modules for valve islands with individual connectors (p. 26 - 27)
  - 2. Assembled valve islands (p. 28 - 29)

- **S series**
  - 1. Complete stand-alone valves (p. 30 - 31)

- **P series**
  - 1. Complete peripheral modules (p. 32 - 33)

**Electrical and Pneumatic Clip-on Connectors (Order Code)**

- p. 18 - 19
Moduflex

V, T, S and P series

Moduflex assembly procedure using basic modules

Moduflex gives machine builders maximum flexibility to assemble each automation system step by step using basic modules as shown on the opposite page.

Valve islands can be easily assembled using the following procedure.

1 - Assemble the required valve island with the basic modules shown opposite.

2 - Mount the valve island on the machine together with any stand alone valves and peripheral modules.

3 - Select and install the required clip-on pneumatic and electrical connectors, see page 19 for order codes.

The advantage of this approach is that each specialist can have input to benefit the automation system:

- The machine designer can specify the basic modules and where they are installed on the machine.
- The pneumatic specialist can select the optimum connections and tube sizes.
- The electrician can select the optimum electrical connections.

The basic island is mounted on the machine and then, pneumatic connections are made, using the plug-in connectors.

The basic island is mounted on the machine and then, electrical and pneumatic connections are made, using the plug-in connectors.

The basic island is mounted on the machine, and then, pneumatic connections are made, using the plug-in connectors.

The basic island is mounted on the machine, and then, electrical and pneumatic connections are made, using the plug-in connectors.

V series
basic island assembly
(no connector)

T series
basic island assembly
(no connector)

S series
stand-alone valve modules

P series peripheral modules

4 mm Allen wrench

20 pin electrical connector

Pressure regulator
Flow control
Dual P.O. check valve

straight or elbow pneumatic connectors
straight or elbow pneumatic connectors
straight or elbow pneumatic connectors

individual electrical connectors

V series
basic island assembly
(no connector)
# Moduflex V, T, S and P series

## 0 basic modules

### size 1 electro-pneumatic valve modules, 24V DC

<table>
<thead>
<tr>
<th>Monostable</th>
<th>Bistable</th>
<th>Double</th>
<th>Single</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/2</td>
<td>3/2</td>
<td>3/2</td>
<td>4/2</td>
</tr>
<tr>
<td>(single sol.)</td>
<td>(double sol.)</td>
<td>NC + NC</td>
<td>NC</td>
</tr>
<tr>
<td>P2M1V4ES2CV</td>
<td>P2M1T4ES2C</td>
<td>P2M1S4ES2C</td>
<td>P2M1V3ES2CV</td>
</tr>
<tr>
<td>Weight 94 g</td>
<td>Weight 80 g</td>
<td>Weight 85 g</td>
<td>Weight 76 g</td>
</tr>
</tbody>
</table>

### size 2 electro-pneumatic valve modules, 24V DC

<table>
<thead>
<tr>
<th>Monostable</th>
<th>Bistable</th>
<th>Double</th>
<th>Single</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/2</td>
<td>3/2</td>
<td>3/2</td>
<td>4/2</td>
</tr>
<tr>
<td>(single sol.)</td>
<td>(double sol.)</td>
<td>NC + NC</td>
<td>NC</td>
</tr>
<tr>
<td>P2M2V4ES2CV</td>
<td>P2M2T4ES2C</td>
<td>P2M2S4ES2C</td>
<td>P2M2V3ES2CV</td>
</tr>
<tr>
<td>Weight 100 g</td>
<td>Weight 80 g</td>
<td>Weight 95 g</td>
<td>Weight 90 g</td>
</tr>
</tbody>
</table>

## island head, tail and intermediate modules

- Pneumatic head and tail module set, common to both T and V series
- Island intermediate supply module with a set of 4 configurations plates
- Multi-connector electrical head module for V series only
- Field bus electrical head module for V series only

## peripheral modules P series

### size 1

<table>
<thead>
<tr>
<th>Dual Flow Control Module</th>
<th>Dual Pilot Operated Check Valve Module</th>
<th>Pressure Regulation Module without Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2M1PXFA</td>
<td>P2M1PXCA</td>
<td>P2M1K0GN</td>
</tr>
<tr>
<td>Weight 30 g</td>
<td>Weight 25 g</td>
<td>Weight 30 g</td>
</tr>
</tbody>
</table>

### size 2

<table>
<thead>
<tr>
<th>Dual Flow Control Module</th>
<th>Dual Pilot Operated Check Valve Module</th>
<th>Pressure Regulation Module without Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2M2PXFA</td>
<td>P2M2PXCA</td>
<td>P2M2K0GL</td>
</tr>
<tr>
<td>Weight 45 g</td>
<td>Weight 40 g</td>
<td>Weight 30 g</td>
</tr>
</tbody>
</table>
The advantage of using the Moduflex basic module approach was explained on page 16.

Initially, the basic valve islands and modules without connectors are mounted on the machine.

At this stage, the pneumatic connectors are chosen from an available selected inventory in order to obtain step by step the best result for each valve to cylinder connection: tube size and connector type (straight or elbow).

At a further stage, the same process is applied to the electrical connections with the choice of the optimum cable.

For such operations, a convenient connectors inventory must be available to the pneumatic specialist and to the electrician. To assist this inventory selection, this page shows basic modules and connector options, the opposite page lists all Moduflex plug-in connectors and their order codes.

This information is a guide to selection, taking into account:
- module size, 1 or 2.
- series used, V, T, S or P.
- the application criteria, connection distances, type of installation...

In order to ease push-in connector assembly, use a short tube, present it up inclined, push and lever down.

Island head supply and intermediate modules
- pneumatic connectors for 6, 8, 10 or 12 mm OD tube.
- V series island head: electrical multi-connector or field bus connections.
## Moduflex V, T, S and P series

### Separate clip-on connectors

#### Pneumatic connectors for size 1 modules

<table>
<thead>
<tr>
<th>Pack Qty.</th>
<th>Weight (g) per unit</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>CMD04-1</td>
<td>2 FMD04-1</td>
</tr>
<tr>
<td>5</td>
<td>CMD06-1</td>
<td>3 FMD06-1</td>
</tr>
</tbody>
</table>

#### Pneumatic connectors for size 2 modules, head and intermediate island modules

<table>
<thead>
<tr>
<th>Pack Qty.</th>
<th>Weight (g) per unit</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>CMD06-2</td>
<td>3 FMD06-2</td>
</tr>
<tr>
<td>6</td>
<td>CMD08-2</td>
<td>4 FMD08-2</td>
</tr>
<tr>
<td>7</td>
<td>CMD10-2</td>
<td>5 FMD10-2</td>
</tr>
<tr>
<td>8</td>
<td>CMD12-2</td>
<td>6 FMD12-2</td>
</tr>
</tbody>
</table>

#### M8 female individual connectors (for solenoid pilots)

<table>
<thead>
<tr>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m. cable 62 P8LS08L226C</td>
</tr>
<tr>
<td>5 m. cable 155 P8LS08L526C</td>
</tr>
<tr>
<td>9 m. cable 280 P8LS08L926C</td>
</tr>
</tbody>
</table>

#### Standard threaded IP 67 electrical connectors

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Pack Qty.</th>
<th>Weight (g) per unit</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M8</td>
<td>cablequickconnect</td>
<td>10</td>
<td>12</td>
<td>P8CS0803J</td>
</tr>
<tr>
<td>M12</td>
<td>cablequickconnect</td>
<td>10</td>
<td>15</td>
<td>P8CS1204J</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>Pack Qty.</th>
<th>Weight (g) per unit</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12</td>
<td>two M12</td>
<td>10</td>
<td>30</td>
<td>P8CSY1212A</td>
</tr>
</tbody>
</table>

#### Electrical 20 pin multi-connector and flying lead cable

<table>
<thead>
<tr>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m. cable 311 P8LMH20M2A</td>
</tr>
<tr>
<td>5 m. cable 777 P8LMH20M5A</td>
</tr>
<tr>
<td>9 m. cable 1400 P8LMH20M9A</td>
</tr>
</tbody>
</table>
In this catalog:
- valve island dimensions and mountings: p. 38.
- valve island port sizing: p. 35.
- cylinder working speed charts: p. 36 - 37.
- 3 position valves: manual chap. 11.
- intermediate modules: manual chap. 5.
- islands with integrated connections: manual chap. 8.
- field bus electrical head module: p. 23.

V series modules are easily assembled to form a complete island that includes:
- common pressure channel P;
- common exhaust channel E;
- an integrated electrical circuit connecting each solenoid pilot to the island head module. Modules with different functions and flow passages may be combined in the same island, giving total flexibility to adapt to all machine requirements.

The table opposite may be used to select:
- electro-pneumatic valve modules, size 1 or 2 with 4/2, 3/2 or 4/3 functions;
- island head and tail pneumatic module set;
- multi-connector or field bus electrical head module;
- if required, an intermediate module to double air supply to the island or to divide it in separate sections.

With 20 integrated connections an island will have 19 solenoid pilots maximum. With field bus head modules, other limitations occur (see page 23).

The overall width of the island is obtained by adding each module width as shown below.

Special case: 4/3 closed centre

Page 7 showed that a 3 position closed centre valve is efficiently replaced by a double 3/2 NC + NC valve and a dual P.O. check module.

Depending upon the application, the following options can be selected:

- **Complete module within island**
  The complete module order code for such configuration is:
  - size 1: P2M1VBEE2CV00
  - size 2: P2M2VBEE2CV00

- **Separate module**
  The double 3/2 NC + NC remains in the island while the in-line dual P.O. check module is mounted close to the cylinder for more precise positioning.

Page 33 gives the order code for this in-line module.

**Typical multi-connector V series island combining different valve flows and functions.**
Moduflex, V series

valve island modules with integrated connections

1. complete modules

complete with pneumatic connectors

size 1 electro-pneumatic valve modules, 24V DC

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>monostable (single sol.) 104</td>
<td>P2M1V4ES2CV00</td>
</tr>
<tr>
<td>bistable (double sol.) 113</td>
<td>P2M1V4EE2CV00</td>
</tr>
<tr>
<td>double NC+NC with exhaust check valves 116</td>
<td>P2M1VDEE2CV00</td>
</tr>
<tr>
<td>double NO+NO with exhaust check valves 116</td>
<td>P2M1VCEE2CV00</td>
</tr>
<tr>
<td>double NC+NO with exhaust check valves 116</td>
<td>P2M1VEE2CV00</td>
</tr>
<tr>
<td>single NC with exhaust check valve 112</td>
<td>P2M1V3ES2CV00</td>
</tr>
<tr>
<td>vented centre = double 3/2 NC + NC with no exhaust check valve 116</td>
<td>P2M1VGEE2CV00</td>
</tr>
</tbody>
</table>

outlet ports pneumatic connectors

<table>
<thead>
<tr>
<th>straight elbow</th>
</tr>
</thead>
<tbody>
<tr>
<td>tube</td>
</tr>
<tr>
<td>F4</td>
</tr>
<tr>
<td>C4</td>
</tr>
<tr>
<td>F6</td>
</tr>
<tr>
<td>C6</td>
</tr>
<tr>
<td>no connector : use order code for basic modules p.17</td>
</tr>
</tbody>
</table>

Note: dummy modules for V series islands:

When the same island configuration is used for different variations of a given machine, some island stations remain non-active. Please consult us to equip them with dummy modules.

size 2 electro-pneumatic valve modules, 24V DC

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>monostable (single sol.) 114</td>
<td>P2M2V4ES2CV00</td>
</tr>
<tr>
<td>bistable (double sol.) 124</td>
<td>P2M2V4EE2CV00</td>
</tr>
<tr>
<td>double NC+NC with exhaust check valves 130</td>
<td>P2M2VDEE2CV00</td>
</tr>
<tr>
<td>double NO+NO with exhaust check valves 130</td>
<td>P2M2VCEE2CV00</td>
</tr>
<tr>
<td>double NC+NO with exhaust check valves 130</td>
<td>P2M2VEE2CV00</td>
</tr>
<tr>
<td>single NC with exhaust check valve 124</td>
<td>P2M2V3ES2CV00</td>
</tr>
<tr>
<td>vented centre = double 3/2 NC + NC with no exhaust check valve 130</td>
<td>P2M2VGEE2CV00</td>
</tr>
</tbody>
</table>

head and tail pneumatic module set 65 P2M2HXT01 |

intermediate supply module with a set of 4 configuration plates 82 P2M2BXV0A

multi-connector electrical head module with flying lead multi-cable 2 m cable 335 P2M2HEV2A

5 m cable 802 P2M2HEV5A

9 m cable 1425 P2M2HEV9A

field bus electrical head module : to be chosen on page 23.
Moduflex, V series bus connections
valve island electrical head modules
for bus connections and control

- Assembly
  **V series** islands with direct field bus connections assemble in the same way as other **V series** (p. 20).

- Maintenance
  Once mounted and connected, the island provides separate access to pneumatic and to electronic sections in order to facilitate maintenance (see below).

AS-i bus connection
Chap. 17 in the manual explains how the AS-i cables are to be connected to the island with vampire type connections and how input signals may be collected with M8 or M12 connections. Page 48 gives addressing, diagnostic and input wiring informations.

Device bus connection
Chap. 18 in the manual explains how device bus cables are to be connected to the island through threaded standard connections and how input signals are to be collected separately. Pages 49 to 51 give addressing, diagnostic and bus cable connections.

- Fields bus electrical head module
  width : 62 mm
- Head and tail pneumatic module set
  width : 48 mm
- Modules size 1
  width : 25 mm
- Module size 2
  width : 37.5 mm
- Intermediate module
  width : 25 mm

Pneumatic

22
Moduflex, V series bus connections
valve island electrical head modules
for bus connections and control

Standard AS-i protocol (up to 31 nodes)
electrical head modules

<table>
<thead>
<tr>
<th>Input connections</th>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>module for 8 outputs max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(V series islands may have up to 8 solenoid pilots)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2 nodes per module, 4 I / 4 O per node)</td>
<td>no input</td>
<td>150</td>
</tr>
<tr>
<td>8 M8 inputs</td>
<td>200</td>
<td>P2M2HBVA10808A</td>
</tr>
<tr>
<td>8 inputs on 4 M12</td>
<td>200</td>
<td>P2M2HBVA10808B</td>
</tr>
</tbody>
</table>

For versions with 1 node per module (4I + 4O)
please, consult us.

AS-i version 2-1 protocol (up to 62 nodes)
electrical head modules

<table>
<thead>
<tr>
<th>Input connections</th>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>module for 6 outputs max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(V series islands may have up to 6 solenoid pilots)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2 nodes per module, 4 I / 3 O per node)</td>
<td>none</td>
<td>150</td>
</tr>
<tr>
<td>8 M8 inputs</td>
<td>200</td>
<td>P2M2HBVA20608A</td>
</tr>
<tr>
<td>8 inputs on 4 M12</td>
<td>200</td>
<td>P2M2HBVA20608B</td>
</tr>
</tbody>
</table>

Device bus electrical head modules

<table>
<thead>
<tr>
<th>Bus protocol</th>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profibus DP</td>
<td>250</td>
<td>P2M2HBVP11600</td>
</tr>
<tr>
<td>DeviceNet</td>
<td>250</td>
<td>P2M2HBVD11600</td>
</tr>
<tr>
<td>Interbus S</td>
<td>300</td>
<td>P2M2HBVS11600</td>
</tr>
</tbody>
</table>

Device bus accessories

<table>
<thead>
<tr>
<th>Bus protocol</th>
<th>Connector type</th>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profibus DP</td>
<td>M12 type A</td>
<td>25</td>
<td>P8CS1205AA</td>
</tr>
<tr>
<td>or Interbus S</td>
<td>M12 type B</td>
<td>25</td>
<td>P8CS1205AB</td>
</tr>
<tr>
<td>DeviceNet</td>
<td>M12 type A</td>
<td>25</td>
<td>P8BPA00MA</td>
</tr>
<tr>
<td>or DeviceNet</td>
<td>M12 type B</td>
<td>25</td>
<td>P8BPA00MB</td>
</tr>
<tr>
<td>line termination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profibus DP</td>
<td>M12 type B</td>
<td>25</td>
<td>P8BPA00MB</td>
</tr>
<tr>
<td>or DeviceNet</td>
<td>M12 type A</td>
<td>25</td>
<td>P8BPA00MA</td>
</tr>
<tr>
<td>disk for configuration file</td>
<td>Profibus DP or DeviceNet</td>
<td>P8BPDISK</td>
<td></td>
</tr>
</tbody>
</table>

Note:
for bus connections, use the standard cables and connectors available from your usual electrical supplier.

In this catalogue:
- V series valve island dimensions and mountings : p.38.
- AS-i bus module addressing : p.49.
- Device bus module addressing : p.49.
The island example specified with the form above is shown on the left: a typical 7 module V series island with a choice of valve functions and flows, and a choice of pneumatic connectors.

The island specification form proposed on the opposite page may be photocopied and filled in to order a specific island that will be assembled before delivery. The example shown on this page may guide the use of the island specification form.

For each type of module selected, the following needs to be specified:

A - outlet port pneumatic connectors: OD size and type (straight or elbow) chosen from table I;
B - station numbers, giving each module position in the island (see drawing below);
C - quantity of such modules in the island;
D - combined module width.

Then, the island’s pneumatic head and tail module code order is completed with the appropriate connectors for P and E ports (table II). The electrical head module (multi-connector or field bus) is then added.

Depending on the island’s requirements, an intermediate supply module may be added with one of its 4 configurations (see chap. 5, manual).

The island’s total width is then obtained by adding the widths of all the selected modules.

Such a specification easily defines any V series island may be ordered totally assembled.

Note: an island configuration software on CDROM is available: see use p.52 and 53.
**Moduflex, V series**

*island specification form*

**2 assembled valve island**

complete with pneumatic connectors

---

### Pneumatic Connectors

<table>
<thead>
<tr>
<th>Tube</th>
<th>OD</th>
<th>F</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mm</td>
<td></td>
<td>6</td>
<td>C</td>
</tr>
<tr>
<td>6 mm</td>
<td></td>
<td>F</td>
<td>6</td>
</tr>
<tr>
<td>8 mm</td>
<td></td>
<td>F</td>
<td>8</td>
</tr>
<tr>
<td>10 mm</td>
<td></td>
<td>F</td>
<td>0</td>
</tr>
<tr>
<td>12 mm</td>
<td></td>
<td>F</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: on an island, standard elbow orientation is downward. If upward orientation is required, please notify here.

---

**Ordering Guide**

<table>
<thead>
<tr>
<th>Station Number</th>
<th>Qty.</th>
<th>Width (mm)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2M11V4ES2CV00</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>P2M11V4EE2CV00</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>P2M11VDEE2CV00</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>P2M11VCEE2CV00</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>P2M11V3ES2CV00</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

---

**Island Head, Tail and Intermediate Supply Modules**

**Pneumatic Connectors**

<table>
<thead>
<tr>
<th>Tube</th>
<th>OD</th>
<th>F</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mm</td>
<td></td>
<td>F</td>
<td>6</td>
</tr>
<tr>
<td>8 mm</td>
<td></td>
<td>F</td>
<td>8</td>
</tr>
<tr>
<td>10 mm</td>
<td></td>
<td>F</td>
<td>0</td>
</tr>
<tr>
<td>12 mm</td>
<td></td>
<td>F</td>
<td>2</td>
</tr>
</tbody>
</table>

---

**Order Code**: P2M2HXT01

---

**Intermediate Supply Module**

- **2 m cable**: P2M2HEV2A
- **5 m cable**: P2M2HEV5A
- **9 m cable**: P2M2HEV9A

---

**Field Bus Electrical Head Module**

To choose on page 23 and to specify here.

**Total Width of the Island (mm)**: 

---

**Valvetronic™**
Moduflex, T series
valve island modules with individual connectors

**Complete modules**
complete with pneumatic and electrical connectors

T series modules are easily assembled to form a complete island that includes:
- common pressure channel P;
- common exhaust channel E;

All electrical connectors remain individual. All pneumatic connectors are of the push-in tube type.

Modules with different functions and flow passages may be combined in the same island, giving total flexibility to adapt to all machine requirements.

The table opposite may be used to select:
- electro-pneumatic valve modules, size 1 or 2 with 4/2, 3/2 or 4/3 functions;
- pneumatic island head and tail module set;
- if required, an intermediate module to double air supply to the island or to divide it into separate sections.

Each module is complete with electric and pneumatic connectors specified at the end of the order code.

The overall width of the island is obtained by adding each module width as shown below.

### Special case : 4/3 closed centre

Page 7 showed that a 3 position closed centre valve is efficiently replaced by a double 3/2 NC + NC valve and a dual P.O. check module.

Depending upon the application, the following options can be selected:

- **A Complete module within island**
  The complete module order code for such configuration is:
  - size 1: P3M1TBE2E2C0
  - size 2: P2M2TBE2E2C0

- **B Separate module**
  The double 3/2 NC + NC remains in the island while the in-line dual P.O. check valve module is mounted close to the cylinder for more precise positioning.

Page 33 gives the order code for this in-line module.

In this catalog:

- valve island dimensions and mountings: p. 40.
- valve island port sizing: p. 35.
- 3 position valves: manual chap. 11.
- intermediate modules: manual chap. 5.
- island with individual connectors: manual chap. 7.
- cylinder working speed charts: p. 36 - 37.

<table>
<thead>
<tr>
<th>Typical T series</th>
<th>Typical T series</th>
</tr>
</thead>
<tbody>
<tr>
<td>short island for single and double acting small cylinders.</td>
<td>high flow island for both small and large cylinders.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pneumatic head and tail module width</th>
<th>Modules size 1</th>
<th>Modules size 2</th>
<th>Intermediate module size 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>48 mm</td>
<td>25 mm</td>
<td>37.5 mm</td>
<td>25 mm</td>
</tr>
</tbody>
</table>

---

Parker Pneumatic
# Moduflex, T series

**valve island modules with individual connectors**

## 1 complete modules

Complete with pneumatic and electrical connectors

<table>
<thead>
<tr>
<th>size 1 electro-pneumatic valve modules, 24V DC</th>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>monostable (single sol.) 4/2</td>
<td>78</td>
<td>P2M1T4ES2C01</td>
</tr>
<tr>
<td>bistable (double sol.) 3/2</td>
<td>87</td>
<td>P2M1T4EE2C01</td>
</tr>
<tr>
<td>double NC+NC with exhaust check valves 4/2</td>
<td>90</td>
<td>P2M1TDEE2C01</td>
</tr>
<tr>
<td>double NO+NO with exhaust check valves 3/2</td>
<td>90</td>
<td>P2M1TCEE2C01</td>
</tr>
<tr>
<td>double NC+NO with exhaust check valves 4/2</td>
<td>90</td>
<td>P2M1TEE2C01</td>
</tr>
<tr>
<td>single NC with exhaust check valve</td>
<td>86</td>
<td>P2M1T3ES2C01</td>
</tr>
<tr>
<td>vented centre = double 3/2 NC + NC 4/3</td>
<td>90</td>
<td>P2M1TGEE2C01</td>
</tr>
</tbody>
</table>

### outlet ports pneumatic connectors
- **straight**
  - 4 mm OD F4 C4
  - 6 mm OD F6 C6
  - no connector blank

### outlet ports pneumatic connectors
- **elbow**
  - 2 m. cable V2
  - 5 m. cable V5
  - 9 m. cable V9

### pneumatic connectors
- **plug**
  - MM
- **muffler**
  - C2

<table>
<thead>
<tr>
<th>size 2 electro-pneumatic valve modules, 24V DC</th>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>monostable (single sol.) 4/2</td>
<td>92</td>
<td>P2M2T4ES2C01</td>
</tr>
<tr>
<td>bistable (double sol.) 3/2</td>
<td>101</td>
<td>P2M2T4EE2C01</td>
</tr>
<tr>
<td>double NC+NC with exhaust check valves 4/2</td>
<td>104</td>
<td>P2M2TDEE2C01</td>
</tr>
<tr>
<td>double NO+NO with exhaust check valves 3/2</td>
<td>104</td>
<td>P2M2TCEE2C01</td>
</tr>
<tr>
<td>double NC+NO with exhaust check valves 4/2</td>
<td>104</td>
<td>P2M2TEE2C01</td>
</tr>
<tr>
<td>single NC with exhaust check valve</td>
<td>100</td>
<td>P2M2T3ES2C01</td>
</tr>
<tr>
<td>vented centre = double 3/2 NC + NC 4/3</td>
<td>104</td>
<td>P2M2TGEE2C01</td>
</tr>
</tbody>
</table>

### outlet ports pneumatic connectors
- **straight**
  - 8 mm OD F8 C8
  - 10 mm OD F0 C0
  - no connector blank

### outlet ports pneumatic connectors
- **elbow**
  - 2 m. cable V2
  - 5 m. cable V5
  - 9 m. cable V9

### pneumatic connectors
- **plug**
  - MM
- **muffler**
  - C2

---

**Intermediate supply module**

With a set of 4 configuration plates

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>P2M2BXT0A</td>
</tr>
</tbody>
</table>
Moduflex, T series
island specification form

2 assembled valves islands
complete with electrical and pneumatic connectors

an example of island specification

The island specification form proposed on the opposite page may be photocopied and filled in, to order a specific island that will be assembled before delivery. The example shown on this page may guide the use of the island specification form.

For each type of module selected, the following needs to be specified:
- A - individual electrical connectors with the required cable length chosen from table I;
- B - outlet port pneumatic connectors: OD size and type (straight or elbow) chosen from table II;
- C - station numbers, giving each module’s position in the island (see drawing below);
- D - quantity of such modules in the island;
- E - combined module width.

Then, the island’s head and tail pneumatic module set code order is completed with the appropriate connectors for P and E ports (table III). Depending on the island’s requirements, an intermediate supply module may be added with one of its 4 configurations (see chap. 5, manual).

The island’s total width is then obtained by adding the widths of all the selected modules.

Such a specification easily defines any T series island that may be ordered totally assembled.

Note: an island configuration software on CD Rom is available: see use p.52 and 53.

The island example specified with the form above is shown on the left: a typical 4 module T series island with a choice of valve functions and flows, and a choice of pneumatic connectors.
Moduflex, T series

island specification form

2 assembled valves islands
complete with electrical and pneumatic connectors

<table>
<thead>
<tr>
<th>Size 1 Electro-Pneumatic Valve Modules, 24V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order Code</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>4/2</td>
</tr>
<tr>
<td>4/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>4/3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size 2 Electro-Pneumatic Valve Modules, 24V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order Code</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>4/2</td>
</tr>
<tr>
<td>4/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>3/2</td>
</tr>
<tr>
<td>4/3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Island Head, Tail and Intermediate Supply Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order Code</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>P2M2HXT01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermediate Supply Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order Code</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>P2M2BXT0A</td>
</tr>
</tbody>
</table>

Note: On an island, standard elbow orientation is downward. If upward orientation is required, please notify here.

<table>
<thead>
<tr>
<th>Electrical Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 m. cable V 2</td>
</tr>
<tr>
<td>5 m. cable V 5</td>
</tr>
<tr>
<td>9 m. cable V 9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pneumatic Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>straight</td>
</tr>
<tr>
<td>elbow</td>
</tr>
<tr>
<td>tube</td>
</tr>
<tr>
<td>4 mm OD F 4</td>
</tr>
<tr>
<td>6 mm OD F 6</td>
</tr>
<tr>
<td>no connector blank</td>
</tr>
<tr>
<td>8 mm OD F 8</td>
</tr>
<tr>
<td>10 mm OD F 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Muffler</th>
</tr>
</thead>
<tbody>
<tr>
<td>M M</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mm OD F 4</td>
</tr>
<tr>
<td>6 mm OD F 6</td>
</tr>
<tr>
<td>8 mm OD F 8</td>
</tr>
<tr>
<td>10 mm OD F 0</td>
</tr>
<tr>
<td>12 mm OD F 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note: 2 m. cable V 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 m. cable V 5</td>
</tr>
<tr>
<td>9 m. cable V 9</td>
</tr>
</tbody>
</table>
Moduflex, S series
stand-alone valve modules

P and E connectors selection
To provide the optimum flow and simplify installation stand alone valve modules may require different P and E connectors to the outlet connectors. The module order codes shown opposite include a * which can be replaced with a letter to give the option shown below.

With the configurations shown above, all pneumatic connectors use the same tube size. Starting with basic modules (p.17) it is also possible to use upstream connectors bigger than the output connectors.

Important:
This configuration is the most popular and can be supplied fully assembled.

To obtain all other configurations, please use basic modules (p.17) and plug-in connectors and mufflers (p.19). Assembly is easy.

Installation selection
All stand-alone valve modules are supplied complete with mounting options:
- side screw mountings
- foot mounting (retractable brackets)

In this catalog:
- Stand-alone valve module dimensions and mountings: p.41.
- Cylinder working speed charts: p.36 - 37.
- 3 position valves: manual chap.11.
Moduflex, S series
stand-alone valve modules
1 complete modules
complete with pneumatic and electrical connectors

size 1 electro-pneumatic valve modules, 24V DC

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
<th>electrical connectors with LED and surge protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>monostable (single sol.) 92</td>
<td>P2M1S4ES2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>bistable (double sol.) 107</td>
<td>P2M1S4EE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>double NC+NC without exhaust check valves 105</td>
<td>P2M1SDEE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>double NO+NO without exhaust check valves 105</td>
<td>P2M1SCEE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>single NC without exhaust check valve 100</td>
<td>P2M1S3ES2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>vented centre = double 3/2 NC + NC without exhaust check valve 105</td>
<td>P2M1SGEE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>closed centre equivalent to double 3/2 NC + NC and dual P.O. check valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>outlet ports pneumatic connectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>straight  elbow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 mm OD  F4  C4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 mm OD  F6  C6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>no connector  blank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>★ P and E ports pneumatic connectors → see opposite page</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

→ P and E ports pneumatic connectors

size 2 electro-pneumatic valve modules, 24V DC

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
<th>electrical connectors with LED and surge protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>monostable (single sol.) 102</td>
<td>P2M2S4ES2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>bistable (double sol.) 117</td>
<td>P2M2S4EE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>double NC+NC without exhaust check valves 124</td>
<td>P2M2SDEE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>double NO+NO without exhaust check valves 124</td>
<td>P2M2SCEE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>double NC+NO without exhaust check valves 124</td>
<td>P2M2SEE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>single NC without exhaust check valve 120</td>
<td>P2M2S3ES2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>vented centre = double 3/2 NC + NC without exhaust check valve 124</td>
<td>P2M2SGEE2C</td>
<td>● ● ● ●</td>
</tr>
<tr>
<td>closed centre equivalent to double 3/2 NC + NC and dual P.O. check valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>outlet ports pneumatic connectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>straight  elbow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 mm OD  F8  C8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 mm OD  F0  C0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>no connector  blank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>★ P and E ports pneumatic connectors → see opposite page</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

→ P and E ports pneumatic connectors

add electrical connectors weight page 19.
Module installation selection

1 - Plug-in modules
Complete with clip-on double male unions enabling connection directly into the valve module outlet ports.

2 - In-line modules
Peripheral modules are also proposed in their in-line version for better cylinder speed control or positioning: flow control and P.O. check valves are more efficient when close to the cylinder. For pressure regulation, the in-line version is often installed for better access.

Module function selection

1 - Dual flow control
By controlling the exhaust flows of a double acting cylinder, this module can adjust both speeds: forward and backward. It may be plugged into the valve module output ports or, mounted close to the cylinder in its in-line version.

2 - Pressure regulation
The thrust developed by a cylinder often requires adjustment by controlling pressure to the front or back of the piston. The pressure regulation module enables manual adjustment of pressure with visual indication provided by the pressure gauge. This module completes the function of the filter/regulator located in front of the valve island which filters and stabilizes the pressurized air delivered from the compressor.

3 - Dual P.O. check valve
Combined with a double 3/2 NC + NC valve, this module will block both flows and stop cylinder movement as soon as the valve’s outputs are both exhausted. Better than a 3 position valve, it provides more precise positioning when fitted close to the cylinder.

In this catalog:
- Peripheral modules dimensions and mountings: p.42.
- Peripheral modules functions: manual chap.6, 10, and 11.

As shown on opposite page, peripheral modules are available in 2 versions:

1 - Plug-in modules
2 - In-line modules

Pressure gauge:
A pressure regulation module may be supplied:
- with a gauge equipped with a damper to protect it from pressure oscillations
- or with a 4 mm OD tube elbow connector to reach a remote gauge that should be protected.
Starting from basic modules (page 17) other gauge connectors size 1 are available (page 19).
# Moduflex, P series peripheral modules

## complete modules

complete with pneumatic connectors

### size 1 pneumatic modules

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
<th>pneumatic connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>in line</td>
<td>50</td>
<td>P2M1PXFA</td>
</tr>
<tr>
<td>plug-in</td>
<td>56</td>
<td>P2M1PXFAJJ</td>
</tr>
</tbody>
</table>

#### dual flow control module

- in line: 50 g
- plug-in: 56 g

#### dual P.O. check valve module

- in line: 50 g
- plug-in: 55 g

#### pressure regulation module

- 0 to 2 bar: 135 g
- 0 to 4 bar: 140 g
- 0 to 8 bar: 140 g

#### pressure regulation module (with gauge)

with inlet outlet pneumatic connectors

### size 2 pneumatic modules (futur availability)

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
<th>pneumatic connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>in line</td>
<td>75</td>
<td>P2M2PXFA</td>
</tr>
<tr>
<td>plug-in</td>
<td>80</td>
<td>P2M2PXFAJJ</td>
</tr>
</tbody>
</table>

#### dual flow control module

- in line: 75 g
- plug-in: 80 g

#### dual P.O. check valve module

- in line: 70 g
- plug-in: 75 g

#### pressure regulation module

- 0 to 2 bar: 165 g
- 0 to 4 bar: 170 g
- 0 to 8 bar: 170 g

#### pressure regulation module (with gauge)

with inlet outlet pneumatic connectors

with 4 mm OD tube elbow connector to remote gauge
All information, data and recommendations to assist with the choice and the use of Moduflex components can be found in this section.

1- Sizing
- island head module port sizing .......................................................... 35
- cylinder working charts, that will help sizing valves and tubes ........................................... 36 - 37

2 - Dimensions and mountings
- components dimensions and mounting options are detailed, in order to help for their implementation on machines .......................................................... 38 - 43

3 - Maintenance
- recommendations and maintenance components .................................................................. 44 - 45

4 - Special applications
- making machines to US tube standard (inch size OD tubes) ........................................... 46

5 - V series
- the electrical multi-connector and its addressing .......................................................... 47
- AS-i bus addressing, diagnostic, power wiring .............................................................. 48
- Device bus addressing, diagnostic, connections ........................................................... 49 - 51

6 - Valve island configurator
- use of the valve island CD-Rom .................................................................................. 52 - 53
Island head module port sizing

Moduflex is totally flexible: islands may have from 2 to 19 valves, with a choice of 2 valve sizes, depending on the required flow. Thus, each island has specific needs for the size of its pressure supply and its exhaust collection.

Choice of connections to an island P and E ports

Valve island pressure supply and exhaust collection are connected onto the head module and, if flows require it, onto intermediate supply modules added into the island.

For this purpose, the choice of clip-on connectors is very open: from 6 to 12 mm OD tubing connectors, either straight or elbows. A clip-on muffler and a clip-on plug complete this offer.

Sizing recommendations

The 3 valve islands above present typical situations for sizing islands pressure supply and exhaust collection.

In a given island, valves do not deliver their flow at the same moment. Thus, the number of valves in an island is not the major factor to consider. More important is the size of the largest valve and of the largest output tubes to the cylinders.

We would recommend the following:

- air supply connection at least equivalent to largest output tube to cylinders;
- exhaust collection at least twice the section area of the largest output tube to cylinders.

For islands with high flows, the following options are possible:

- use tubes up to 12 mm OD or mufflers providing exhaust collection is not necessary;
- provide additional P and/or E connection ports by inclusion of intermediate supply modules, thus keeping tube size small.

At the machine commissioning stage, the supply and exhaust connections can be easily modified until the required performance is achieved.

ID section areas of standard tubings

<table>
<thead>
<tr>
<th>ID section areas of standard tubings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 4 mm : 3 mm²</td>
</tr>
<tr>
<td>2.7 x 4 mm : 6 mm²</td>
</tr>
<tr>
<td>4 x 6 mm : 12 mm²</td>
</tr>
<tr>
<td>6 x 8 mm : 50 mm²</td>
</tr>
<tr>
<td>8 x 10 mm : 50 mm²</td>
</tr>
</tbody>
</table>

Parker Pneumatic
cylinder working speed charts

The charts below give the cylinder working speeds at 6 bar, under different conditions:
- non loaded or 50 % loaded double acting cylinder;
- exhaust piped through 2 m. long tubing, or exhaust muffled.

### Cylinder Working Speeds, in cm/s

#### Standard Conditions:
- double acting cylinder
- working pressure: \( P = 6 \text{ bar} \)

#### Specific Conditions:
- exhaust piped through tube 2 m long, with next ID above ID tube from valve to cylinder.
- non loaded cylinder

#### Cylinder Bore Size

<table>
<thead>
<tr>
<th>Tube ID (mm)</th>
<th>Tube OD (mm)</th>
<th>Tube Length (m)</th>
<th>25 mm</th>
<th>32 mm</th>
<th>40 mm</th>
<th>50 mm</th>
<th>63 mm</th>
<th>80 mm</th>
<th>100 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 x 4</td>
<td>1 m.</td>
<td></td>
<td>32 cm/s</td>
<td>20 cm/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 m.</td>
<td>21</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.7 x 4</td>
<td>1 m.</td>
<td></td>
<td>65</td>
<td>43</td>
<td>25 cm/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 m.</td>
<td>43</td>
<td>27</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 6</td>
<td>1 m.</td>
<td></td>
<td>100</td>
<td>85</td>
<td>53</td>
<td>36 cm/s</td>
<td>22 cm/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 m.</td>
<td>93</td>
<td>75</td>
<td>44</td>
<td>30</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 m.</td>
<td>83</td>
<td>62</td>
<td>36</td>
<td>24</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 m.</td>
<td>68</td>
<td>46</td>
<td>27</td>
<td>18</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Size 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 x 8</td>
<td>1 m.</td>
<td></td>
<td>83</td>
<td>67</td>
<td>44</td>
<td>27 cm/s</td>
<td>18 cm/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 m.</td>
<td>79</td>
<td>54</td>
<td>35</td>
<td>21</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 x 8</td>
<td>1 m.</td>
<td></td>
<td>77</td>
<td>51</td>
<td>32</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 m.</td>
<td>69</td>
<td>43</td>
<td>26</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 x 10</td>
<td>1 m.</td>
<td></td>
<td>88</td>
<td>59</td>
<td>37</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 m.</td>
<td>81</td>
<td>51</td>
<td>30</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 x 10</td>
<td>1 m.</td>
<td></td>
<td>63</td>
<td>39</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 m.</td>
<td>58</td>
<td>35</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Technical

**field of application:**
- stand-alone valve modules **S** series
- valve island modules, **T** series and **V** series

Note: a complete machine cycle includes:
- the cylinder displacement times that can be deducted from the cylinder speeds given below
- the cylinders starting times that depend on the cylinder strokes and thus could not be included in the charts below.

#### Cylinder Working Speeds, in cm/s

**standard conditions:**
- double acting cylinder
- working pressure: $P = 6$ bar

**specific conditions:**
- muffled exhaust (non collected)
- non loaded cylinder

<table>
<thead>
<tr>
<th>Valve Module ID</th>
<th>Tube OD</th>
<th>Tube Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 4 mm</td>
<td>1 m.</td>
<td>43 cm/s</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>27 cm/s</td>
</tr>
<tr>
<td>2.7 x 4 mm</td>
<td>1 m.</td>
<td>88 cm/s</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>55 cm/s</td>
</tr>
<tr>
<td>4 x 6 mm</td>
<td>1 m.</td>
<td>170 cm/s</td>
</tr>
<tr>
<td></td>
<td>2 m.</td>
<td>150 cm/s</td>
</tr>
<tr>
<td></td>
<td>4 m.</td>
<td>125 cm/s</td>
</tr>
<tr>
<td></td>
<td>8 m.</td>
<td>95 cm/s</td>
</tr>
<tr>
<td>5.5 x 8 mm</td>
<td>1 m.</td>
<td>181 cm/s</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>134 cm/s</td>
</tr>
<tr>
<td>6 x 8 mm</td>
<td>1 m.</td>
<td>139 cm/s</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>112 cm/s</td>
</tr>
<tr>
<td>7 x 10 mm</td>
<td>1 m.</td>
<td>148 cm/s</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>125 cm/s</td>
</tr>
<tr>
<td>8 x 10 mm</td>
<td>1 m.</td>
<td>102 cm/s</td>
</tr>
</tbody>
</table>

#### Cylinder Bore Size

<table>
<thead>
<tr>
<th>Cylinder Bore Size</th>
<th>25 mm</th>
<th>32 mm</th>
<th>40 mm</th>
<th>50 mm</th>
<th>63 mm</th>
<th>80 mm</th>
<th>100 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 4 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.7 x 4 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 x 6 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5 x 8 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Valve Module Tube ID OD Length

<table>
<thead>
<tr>
<th>Valve Module ID</th>
<th>Tube ID</th>
<th>Tube OD</th>
<th>Tube Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 4 mm</td>
<td>1 m.</td>
<td>35 cm/s</td>
<td>22 cm/s</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>23 cm/s</td>
<td>14</td>
</tr>
<tr>
<td>2.7 x 4 mm</td>
<td>1 m.</td>
<td>67 cm/s</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>44 cm/s</td>
<td>28</td>
</tr>
<tr>
<td>4 x 6 mm</td>
<td>1 m.</td>
<td>100 cm/s</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>2 m.</td>
<td>93 cm/s</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>4 m.</td>
<td>83 cm/s</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>8 m.</td>
<td>69 cm/s</td>
<td>46</td>
</tr>
<tr>
<td>5.5 x 8 mm</td>
<td>1 m.</td>
<td>102 cm/s</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>87 cm/s</td>
<td>61</td>
</tr>
<tr>
<td>6 x 8 mm</td>
<td>1 m.</td>
<td>91 cm/s</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>77 cm/s</td>
<td>46</td>
</tr>
<tr>
<td>7 x 10 mm</td>
<td>1 m.</td>
<td>98 cm/s</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>87 cm/s</td>
<td>54</td>
</tr>
<tr>
<td>8 x 10 mm</td>
<td>1 m.</td>
<td>88 cm/s</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>3 m.</td>
<td>87 cm/s</td>
<td>38</td>
</tr>
</tbody>
</table>

### Field of Application:
- Stand-alone valve modules **S** series
- Valve island modules, **T** series and **V** series

Note: A complete machine cycle includes:
- The cylinder displacement times that can be deducted from the cylinder speeds given below.
- The cylinders starting times that depend on the cylinder strokes and thus could not be included in the charts below.
Moduflex, V series
valve island dimensions and mounting

1 - Multi-connector valve island

Multi-connector electrical head module width: 15 mm
Head and tail pneumatic module set width: 48 mm
Modules size 1 width: 25 mm
Modules size 2 width: 37.5 mm
Intermediate module width: 25 mm

Island head and intermediate modules

<table>
<thead>
<tr>
<th>Tube OD</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mm</td>
<td>8</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>8 mm</td>
<td>9</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>10 mm</td>
<td>13</td>
<td>18</td>
<td>22</td>
</tr>
<tr>
<td>12 mm</td>
<td>13</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Muffler</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Island valves modules

<table>
<thead>
<tr>
<th>OD tube</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mm</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>6 mm</td>
<td>8</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>8 mm</td>
<td>9</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>10 mm</td>
<td>13</td>
<td>18</td>
<td>22</td>
</tr>
</tbody>
</table>

Special case: 4/3 closed centre function within island version: as shown on page 20 add the dimensions of the dual PO check valve module plugged into the island. See page 42 for dimensions.
2 - Field bus connected islands

- **Electrical field bus head module**
  - width: 62 mm

- **Head and tail pneumatic module set**
  - width: 48 mm

- **Modules size 1**
  - width: 25 mm

- **Modules size 2**
  - width: 37.5 mm

- **Intermediate module**
  - width: 25 mm

**Island total width depending on valve composition**

- **Electrical field bus head module**
- **Pneumatic head module**
- **Module size 1**
- **Intermediate module**
- **Module size 2**
- **Tail plate**

**AS-i bus islands**

- 2 mounting holes 4.3 mm dia

**Device bus islands**

- 2 mounting holes 4.3 mm dia

2 screws
4 mm dia.
surface mounting

or
DIN rail mounting

DIN rail 35x7 mm or 35x15 mm

2 pivoting locks for DIN rail mounting

2 locks for DIN rail mounting
Moduflex, T series
valve island dimensions and mounting

Island total width depending on valve composition

Pneumatic head module
Module size 1
Intermediate module
Module size 2
Tail plate

2 mounting holes 4.3 mm dia
2 pivoting locks for DIN rail mounting

Pneumatic head and tail module width ⇒

Modules
Module size 1
Module size 2
Intermediate module

width
48 mm
25 mm
37.5 mm
25 mm

Island head and intermediate modules

<table>
<thead>
<tr>
<th>Tube OD</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mm</td>
<td>8</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>8 mm</td>
<td>9</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>10 mm</td>
<td>13</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>12 mm</td>
<td>13</td>
<td>19</td>
<td>25</td>
</tr>
<tr>
<td>Muffler</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Island valves modules

<table>
<thead>
<tr>
<th>Tube Ø ext.</th>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mm</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>6 mm</td>
<td>8</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>8 mm</td>
<td>9</td>
<td>16</td>
<td>19</td>
</tr>
<tr>
<td>10 mm</td>
<td>13</td>
<td>18</td>
<td>22</td>
</tr>
</tbody>
</table>

Special case: 4/3 closed centre function within island version:
as shown on page 26 add the dimensions of the dual P.O. check valve
module plugged into the island. See page 42 for dimensions.
Moduflex, S series
stand-alone valve dimensions and mounting

Stand-alone valve size 1

Surface mounting with screws
4 mm dia. into retractable brackets 3 mm thick

or

Side mounting with 2 screws 4 mm dia.

Stand-alone valve size 2

Surface mounting with screws
4 mm dia. into retractable brackets 3 mm thick

or

Side mounting with 2 screws 4 mm dia.

Dimensions and mountings of the stand-alone valves presented on page 31:
4/2, double and single 3/2, 4/3 vented centre and 4/3 pressure centre.

Special case: 4/3 closed centre.
Add the dual P.O. check valve module that has been plugged in the basic valve.
Dimensions are given page 42.

<table>
<thead>
<tr>
<th>Size 1 modules</th>
<th>4 mm tube OD</th>
<th>6 mm tube OD</th>
<th>muffler</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>b</td>
<td>13</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Size 2 modules</td>
<td>8 mm tube OD</td>
<td>10 mm tube OD</td>
<td>muffler</td>
</tr>
<tr>
<td>a</td>
<td>9</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>b</td>
<td>16</td>
<td>22</td>
<td>40</td>
</tr>
</tbody>
</table>

Parker Pneumatic
Moduflex, P series

peripheral modules dimensions and mounting

Reminder: peripheral modules may either be plugged in the valve output ports or mounted in line separate from the valve (p.32)

Dual flow control module size 1

Pressure regulation module size 1

- with gauge

- without gauge

Dual P.O. check valve module size 1
Dual flow control module size 2

Pressure regulation module size 2
- with gauge
- without gauge

Dual P.O. check valve module size 2

Possible mounting with 2 screws 3 mm dia.

Possible mounting with 2 screws 4 mm dia. on retractable brackets

Swivel elbow push-in connector 4 mm OD tube

Mounting with 2 screws 4 mm dia. on retractable brackets

Possible mounting with 2 screws 3 mm dia.
**Moduflex, V, T, S, and P series maintenance recommendations**

### Maintenance procedure

The latest generations of compact pneumatic valves have a life expectancy which generally exceeds the equipment they control. Therefore, although maintenance is seldom required, when necessary the solenoid pilot, valve or connector can be easily replaced without removing the island base, as shown below.

With only one universal solenoid pilot for all configurations, maintenance is simple

24V DC is now a global standard for all machines.

The Moduflex 24V DC unique solenoid pilot is supplied with the multi-function manual override that can be adapted to all requirements, as explained by the drawings.

Because all Moduflex valve and island configurations are supplied with this unique solenoid pilot, maintenance operations remain very simple.

For more informations : chap. 9, manual section.

---

**Multi-function adaptable manual override**

1 - push - release
2 - push - twist - lock
3 - remove lock capability
4 - manual override is totally isolated

---

Please, use a 3.5 mm screw driver or prefer a pozidriv screw driver PZ size 1.
## Moduflex, V, T, S, and P series

**maintenance components**

### valve module solenoid pilot 24 V DC

<table>
<thead>
<tr>
<th>Order code</th>
<th>Weight (g)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P2D8V32C5</td>
<td>15</td>
<td>solenoid pilot (without plug-in electrical connector)</td>
</tr>
</tbody>
</table>

### size 1 valve modules without solenoid pilot and without sub-base

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>P2M1X4ES</td>
</tr>
<tr>
<td>25</td>
<td>P2M1X4EE</td>
</tr>
<tr>
<td>28</td>
<td>P2M1XDEEE</td>
</tr>
<tr>
<td>28</td>
<td>P2M1XCEEE</td>
</tr>
<tr>
<td>28</td>
<td>P2M1XEEE</td>
</tr>
<tr>
<td>25</td>
<td>P2M1X3ES</td>
</tr>
</tbody>
</table>

### size 2 valve modules without solenoid pilot and without sub-base

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>P2M2X4ES</td>
</tr>
<tr>
<td>30</td>
<td>P2M2X4EE</td>
</tr>
<tr>
<td>32</td>
<td>P2M2XDEEE</td>
</tr>
<tr>
<td>32</td>
<td>P2M2XCEEE</td>
</tr>
<tr>
<td>32</td>
<td>P2M2XEEE</td>
</tr>
<tr>
<td>28</td>
<td>P2M2X3ES</td>
</tr>
</tbody>
</table>

### Set of maintenance parts

<table>
<thead>
<tr>
<th>Weight (g)</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>P2M2K0CA</td>
</tr>
<tr>
<td>6</td>
<td>P2M2K0JA</td>
</tr>
<tr>
<td>8</td>
<td>P2M2K0FA</td>
</tr>
</tbody>
</table>

---

*Parker Pneumatic*
Moduflex, recommendations for building machines with imperial OD tubes (US usual standard)

Moduflex being a global product is available in the US with the two standards that are commonly used in this country:
- metric OD tubes with the metric connectors shown in this catalog,
- imperial OD tubes with specific connectors for the US.

Machine builders exporting to the US may propose to their clients one of the following solutions:
- Machines equipped with Moduflex components connected with metric tubes found in this catalog. Parker will provide products locally for maintenance.
- Or machines equipped with Moduflex components connected with imperial size OD tubes. In this case, use the following procedure to order Moduflex and to build the machine.

### Imperial OD tube and metric OD tube comparison

<table>
<thead>
<tr>
<th>metric standard tube OD</th>
<th>imperial US standard tube OD</th>
<th>metric equivalent</th>
<th>Moduflex clip-on connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mm</td>
<td>5/32&quot;</td>
<td>4 mm</td>
<td>imperial and metric connectors identical</td>
</tr>
<tr>
<td>6 mm</td>
<td>1/4&quot;</td>
<td>6.35 mm</td>
<td>specific imperial connector</td>
</tr>
<tr>
<td>8 mm</td>
<td>5/16&quot;</td>
<td>8 mm</td>
<td>imperial and metric connectors identical</td>
</tr>
<tr>
<td>10 mm</td>
<td>3/8&quot;</td>
<td>9.53 mm</td>
<td>specific imperial connector</td>
</tr>
<tr>
<td>12 mm</td>
<td>1/2&quot;</td>
<td>12.7 mm</td>
<td>specific imperial connector</td>
</tr>
</tbody>
</table>

### Moduflex selection for imperial size OD tubes

Such components will easily be obtained with the following procedure:

1. Select from page 17 the required basic modules (with no connector), as explained on page 16.
2. Select from the list below the clip-on connectors for the required imperial OD tubes.
3. Push-in the connectors into the basic modules ports in order to obtain complete modules.

#### pneumatics connectors for size 1 modules

<table>
<thead>
<tr>
<th>head and intermediate island modules</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>OD tube</th>
<th>Weight (g) per unit</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/32&quot; - 4 mm OD</td>
<td>10</td>
<td>CMD04-1</td>
</tr>
<tr>
<td>1/4&quot; OD</td>
<td>10</td>
<td>CMD07-1</td>
</tr>
</tbody>
</table>

#### pneumatics connectors for size 2 modules

<table>
<thead>
<tr>
<th>OD tube</th>
<th>Weight (g) per unit</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot; OD</td>
<td>10</td>
<td>CMD07-2</td>
</tr>
<tr>
<td>5/16&quot; - 8 mm OD</td>
<td>10</td>
<td>CMD08-2</td>
</tr>
<tr>
<td>3/8&quot; OD</td>
<td>10</td>
<td>CMD09-2</td>
</tr>
<tr>
<td>1/2&quot; OD</td>
<td>10</td>
<td>CMD13-2</td>
</tr>
</tbody>
</table>
The valve island head multi-connector

On the island head module, the multi-connector integrates the HE10 connector standard in its 20 pin version.

Its plug-in function is secured in position with a guillotine lock with easy access from the front of the island.

Just like the whole island, the multi-connector follows the IP 65 protection standard.

Cable specification:
8.6 mm dia., UL, 20 wires, 0.22 mm², AWG 24.
Minimum static radius: 6.5 mm.
Available with 2 m, 5 m and 9 m lengths.

Multi-connector addressing

When assembling a V series island, modules are automatically connected to the head module through the modular principle of the integrated electrical connections, as explained on chap. 8 of the manual.

The color code addressing given below conforms to the DIN 47100 standard.
To each wire color code corresponds a solenoid pilot position in the island.

<table>
<thead>
<tr>
<th>color code</th>
<th>color code</th>
<th>color code</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 pink - brown</td>
<td>7 white - green</td>
<td>14 grey</td>
</tr>
<tr>
<td>1 white - pink</td>
<td>8 red - blue</td>
<td>15 yellow</td>
</tr>
<tr>
<td>2 grey - brown</td>
<td>9 grey - pink</td>
<td>16 green</td>
</tr>
<tr>
<td>3 white - grey</td>
<td>10 violet</td>
<td>17 brown</td>
</tr>
<tr>
<td>4 yellow - brown</td>
<td>11 red</td>
<td>18 white</td>
</tr>
<tr>
<td>5 white - yellow</td>
<td>12 blue</td>
<td>common: black</td>
</tr>
<tr>
<td>6 brown - green</td>
<td>13 pink</td>
<td></td>
</tr>
</tbody>
</table>
Moduflex, V series

AS-i bus module addressing, diagnostic, input wiring

### Bus addressing, first and second node

#### In this catalogue:

#### AS-i standard
2 nodes of 4I / 4O  1st node 2nd node

#### AS-i version 2-1
2 nodes of 4I / 3O  1st node 2nd node

- The extern supply shall have protective isolation in accordance with IEC 364-4-41 (PELV).

### Bus diagnostic

<table>
<thead>
<tr>
<th>Power supply</th>
<th>off</th>
<th>green</th>
<th>red</th>
</tr>
</thead>
<tbody>
<tr>
<td>sol. pilot supply</td>
<td>normal operation</td>
<td>solenoid overload</td>
<td></td>
</tr>
</tbody>
</table>

#### System condition
- Normal operation
- No module + sensor supply
- Input overload
- No AS-i communication
- Address first node = 0
- Address second node = 0

### Input wiring

- Physical input (I, II, III, IV) = D (0 1 2 3) first node,
- Physical input (V, VI, VII, VIII) = D (0 1 2 3) second node

Examples: physical input III = logical input 6.2,
physical input V = logical input 7.0

#### M8 female connectors

<table>
<thead>
<tr>
<th>pin out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 24 V DC / AS-i</td>
</tr>
<tr>
<td>2 - second input</td>
</tr>
<tr>
<td>3 - 0 V DC / AS-i</td>
</tr>
<tr>
<td>4 - first input</td>
</tr>
<tr>
<td>5 - not connected</td>
</tr>
</tbody>
</table>

#### M12 female connectors

Note: with only one node, the inputs II and IV are connected to the connections on the right.
Moduflex, V series

Device bus modules: common connections

Power supply common to all types of device bus modules

1 - Connection
All bus modules have an M12 male connector for power supply. Their A or B type have been chosen to make them non compatible with M12 bus connectors thus avoiding any connection mistake.

2 - Diagnostic
The two «power» indicators shown on the illustrations provide visual indication of the module and solenoid supply status.

Note: output power to the solenoids can be wired to allow the user to turn the outputs off while allowing the communications to remain on.

Bus cable protection shield connections for Profibus DP and DeviceNet

To provide protection against electro-magnetic interferences, the bus cables are shielded. The module «bus in» and «bus out» connectors each includes a pin for connecting the cable shield (see next pages). It is safer to connect the shield to the protected earth (PE) at both ends of the bus.

Within the bus module, provision is made to enable shield continuity by connection between the two shield pins.

The protected earth have to be connected locally on each module for CE accordance.
Moduflex, V series

Device bus module: connections, addressing, diagnostic

**Bus cable connections**

- **Profibus DP** standard male and female type B M12 connectors.
- Use of prefabricated cables available from your usual electrical supplier is recommended.
- Line termination, P8BPA00MB, is necessary on the «bus out» connector of the last station.

**Addressing**

- Use the GSD file on web site, or the disk P8BPDISK proposed page 23.
- The coding wheels enable configuration of the decimal address.

**Diagnostic**

- Diagnostic according to the module dialog shown on the illustration.

---

**DeviceNet™**

**Bus cable connections**

- **DeviceNet** standard male and female type A M12 connectors.
- Use of prefabricated cables available from your usual electrical supplier is recommended.
- Line termination, P8BPA00MA, is necessary on the «bus out» connector of the last station.

**Addressing**

- Use the EDS file on web site, or the disk P8BPDISK proposed page 23.
- The coding wheels enable configuration of the address (MAC ID) and the transmission speed.

**Diagnostic**

- Diagnostic according to the module dialog shown on the illustration.
**InterBus-S**

*Bus cable connections*

The M23 connectors conform to «Interbus remote bus».

Use of prefabricated cables available from your electrical usual supplier is recommended.

*Addressing*

Interbus S is self addressing. Thus it does not need any software or hardware configuration.

*Diagnostic*

Diagnostic according to the module dialog shown on the illustration.

This diagnostic conforms to the Interbus S standard.

---

**Solenoid pilot diagnostic common to all device bus modules**

Red LEDs detecting solenoid valve short-circuits

- A : sol. pilots 0 to 3
- B : sol. pilots 4 to 7
- C : sol. pilots 8 to 11
- D : sol. pilots 12 to 15

- The solenoid pilot power supply indicator, green when supply is OK.
- The red LEDs detecting solenoid valve short-circuits with code shown above.

Inside the bus module, solenoid valve control is protected against short-circuits, with the following visual indication provided:

- The green sol. pilot supply OK.
Moduflex, V or T series
use of the valve island configurator CD Rom

CD-Rom «standard valve island» configuration

From pages 20 to 29, this catalogue shows how to configurate the Modufex V or T series valve island that a given application requires, and how to order it. As shown above on an example, you may do this as well with the Moduflex valve island configurator CD-Rom.

With the CD-Rom, once the valve island is configurated, the following items may be edited for the application:

1 - valve island print with symbols and marking:
This graphic gathers all informations required:
- for assembling, marking and connecting the valve island;
- for commissioning and maintaining the machine.
No additional valve circuit is necessary

2 - report: 4 page report (1)
- page 1: valve island complete modules part numbers
- page 2: valve island basic modules and connectors listing
- page 3: bill of material
- page 4: warnings

3 - 2D drawings exported DX file
This transfer on the machine drawings enables to define the valve island mounting onto the machine.

Note: 3D files (IGES, STEP and PRO-ENG) are available in the CD-Rom, for import in your CAD software of separate basic modules and connectors.

(1) If an assembled valve island is ordered, please join this 4 page report to the order.
**Moduflex, V or T series**

use of the valve island configurator CD-Rom

---

### CD-Rom «simple valve island» configuration

The CD-Rom presents also a «simple valve island configuration» that generates a single order code for the whole island, (sufficient to place orders for assembled islands) providing that it conforms to the following restrictions.

A «simple island»:
- has a maximum of 5 different types of modules, all mounted side by side in the valve island;
- has 9 modules maximum for each type;
- has only one pneumatic connector type for all size 1 valve modules, and only one pneumatic connector type for all size 2 valve modules;
- may have intermediate modules but with the same connector and muffler selection than the island head module;
- will include no peripheral module added to the island.

In this frame it is easy to configure a simple valve island with the CD-Rom as shown by the illustration. The benefits are the same than with the standard valve island configuration (see opposite page) plus the following advantage: you may order your assembled valve island with the single order code, automatically generated by the CD-Rom.

---

### Simple valve island order code system organisation

The order code is automatically generated by the CD-Rom when you use the simple valve island configuration.

For your information, it follows the organisation described here, in order to fit into the Parker order codes with 15 digits maximum.

<table>
<thead>
<tr>
<th>Moduflex</th>
<th>X</th>
<th>X</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
<th>XX</th>
</tr>
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<tbody>
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<td>valve island and electrical connection for valve modules</td>
<td>pneumatic connection for valve modules</td>
<td>pneumatic connection for head module</td>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>

5 sets maximum of identical modules mounted side by side in this order

number of identical modules

**type of identical modules**

---

**Ask for your Moduflex valve island configurated CD-Rom**

Order code: **PD0C00014CD02EV**

This multi-language CD-Rom allows installation in English, French, German, Swedish, Italian and Spanish.
Manual

The previous sections explain in detail the features and functions of a specific valve line: Moduflex.

More generally, modern pneumatic valve generations open up new possibilities for electro-pneumatic automation.

Valves are at the center of automation. The progress in valve design facilitates each step: design, installation, machine commissioning, machine maintenance. This results in a more efficient solution for each application.

The following manual explains the evolution of valve design and defines the principles of more simple and more efficient automation practice.
Electro-pneumatic automation techniques have progressed through use of PLC's, field buses, cylinder integrated sensors and modular pneumatic valve islands. Pneumatic valves are now designed into compact islands that are easily configured for specific installation requirements. They are at the center of both the automation network and the man-machine dialog.

Defining the best valve island assembly for each application is now the key answer to performance. This manual presents the numerous possibilities that are offered by the latest modular pneumatic valve islands.

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</table>
1 Valve Islands change automation practice

Automation practice is in continual evolution. The latest pneumatic valve island generation offers advantages at several stages: design, installation, machine commissioning and maintenance.

A Design

New compact modular pneumatic valve islands offer numerous possibilities for automation design.

Depending on the machine complexity and the environment, the designer will choose either to centralise or to decentralise the pneumatic valves.

B Installation

The configuration and the installation of a valve island for a given machine has been simplified with the latest generation of products.

This manual explains each step, from assembling the valve island to plug-in.

Valve Islands change automation practice

Central valve island in a cabinet

Remote short islands located close to the cylinder

Valve island plug-in connection to PLC
C Machine commissioning

Automation is a step by step procedure. Electro-pneumatic machines generally have a final commissioning procedure stage to ensure they fully achieve their task.

This manual explains how valve islands of the latest generation can easily be configured and re-configured until all cylinders on the machine achieve the required performance.

D Machine maintenance

Man-machine dialog has been much improved with the latest pneumatic valve islands. They now provide a key function for machine troubleshooting.

This manual shows how each island module, with its identification marking, LED indicators and manual overrides, improves and simplifies the troubleshooting of a machine.
The manual of modular pneumatic valve islands

2 History : from stand-alone to pneumatic valve islands

To answer the needs of more and more complex and compact machines, pneumatic automation has continuously progressed:
- in order to be compatible with PLC’s, it became low power electrically controlled;
- what were originally stand-alone valves are now manifolded together into compact, flexible valve islands that include a complete range of functions.

The stand-alone valves

The sketches represent the basic sub-assembly of a double acting cylinder that is controlled by a 4 way valve. The «5/2» specification indicates the number of ports (5) and the number of spool positions (2). The spool valve design requires an exhaust port at each end (5 ports for a 4 way valve).

The valve manifolds

As early as the 80’s, large numbers of stand-alone valves on each machine made the installation and piping work long and costly. As with hydraulic valves, designers developed manifolded pneumatic valves, thus reducing the number of tube connections to be made.

The sketches show a typical 5/2 valve manifold incorporating 3 common channels: common pressure supply 1 and exhaust collection channels 3 and 5. Depending on the valve and manifold design, output ports to cylinders can either be on top of the valve or in the bottom or on the side of the manifold.

Installation and piping time was tremendously reduced. This manifold design led the way for more than 10 years.
M - 5

The 3 channel compact islands

In the 90's, with the number of pneumatic valves still increasing on the machines, valve manifolds appeared big and bulky. On the same 3 channel principle, compact islands were developed and took over, with also a wider choice of options.

- Pilot exhaust collection for cleaner environment,
- 5/2 valves (4 ways) as well as 3/2 valves (3 ways) as shown on sketches below.

5/2 module (4 way) for double acting cylinder

[Sketch of 5/2 module]

3/2 module (3 way) for single acting cylinder

[Sketch of 3/2 module]

The 2 channel compact islands

Today, additional needs must be satisfied: more flexible islands, different valve sizes in the same island,... With appropriate valve designs (see sketches below), islands with only 2 common channels represent a new generation still more compact, with a complete solution for all needs. This allows to new and efficient automation practice.

4/2 module (4 way) for double acting cylinder

[Sketch of 4/2 module]

double 3/2 module (3 way) for single acting cylinder

[Sketch of double 3/2 module]

This 2 channel compact island generation allows considerable progress in automation practice. This manual's target is to describe the progress made.
### 3 Basic valve choice for a given island

**Compact pneumatic valve ranges have been developed and proven. They can now be adapted to all practical situations:**
- different island sizes: long islands, short remote islands near the cylinders, stand-alone valves....
- in a given island, different flows and different valve functions.

---

#### The right valve module for each cylinder

**A- Valve flow passage**

One island may control both large and small cylinders. This is why valve modules of different flow capabilities can be combined into the same island.

- **Valve module size**
  - Size 1: 4 mm OD
    - Tube size to cylinder: Ø6 to Ø25 mm
    - Cylinder bore size: 4/2 single sol.
  - Size 2: 6 mm OD
    - Tube size to cylinder: Ø25 to Ø40 mm
    - Cylinder bore size: 4/2 double sol.

- **Valve flow passage**
  - Size 1: 8 mm OD
    - Tube size to cylinder: Ø40 to Ø63 mm
    - Cylinder bore size: double 3/2 NC or NO
  - Size 2: 10 mm OD
    - Tube size to cylinder: Ø63 to Ø100 mm

**B- Valve function**

One island may control single or double acting cylinders, requiring 3/2 or 4/2 valves.

Control may require single or double solenoid pilot valves, or both.

All these valve functions can be combined into the same island together with 3 position valve functions (chapter 11) and peripheral flow control and pressure regulation modules (chapter 10).

---

The *manual* of modular pneumatic valve islands
Pneumatic valves and islands for all applications

The flow and function variations that have been explained on the previous page are completed with the following additional ones.

A- Stand-alone modules

For isolated cylinders on a machine, it is preferable to locate the valve close by. Thus a stand-alone module is required. Response time and air consumption are then reduced to a minimum.

B - Modules for islands with individual electrical connectors

For small groups of cylinders, short valve islands can be used. In this case, it is practical to use individual electrically connected valves.

C - Modules for islands with integrated connections

When the number of valves is larger, modular islands are easily assembled with their integrated electrical connection series. Such islands are then connected to the control PLC with an electric multi-connector that plugs into the island head module or with a field bus connection.
4 A valve island for each application

Valve modules selected from the previous pages are assembled into a specific island for each application.

The valve island features push-in connections that clip into the valve modules. For each application, the most effective configuration may be obtained.

## Tube connections to cylinders

Each valve module is equipped with push-in tube connectors of the required size and configuration. All connectors simply clip into the basic modules to obtain the required complete modules for valve islands.

<table>
<thead>
<tr>
<th>Valve module size</th>
<th>Size 1</th>
<th>Size 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube OD</td>
<td>4 mm</td>
<td>6 mm</td>
</tr>
</tbody>
</table>

-- basic module -- complete module for valve island

- straight connector or elbow connector
- straight push-in connector
- elbow push-in connector

## Valve island assembly and installation

To assemble the valve island, modules are fastened side by side at their base. The resulting island is compact and rigid, and can be mounted directly onto the machine or inside an enclosure.

-- screw mounting and DIN rail mounting --
Valve island pressure supply and exhaust collection

Pressure supply and exhaust connections are provided on the head module, at the left end of the island.

Push-in tube connectors are simply clipped into the head module and are available in various sizes as either straight or elbow connections to suit a particular application.

On some large and/or noisy machines, the exhaust may not need to be piped away. Therefore, in such cases, a clip-on muffler will provide the best options for flow and noise reduction.

Valve island configurations to meet flow requirements

Depending on the island size (short or long) and on the size of its valves, the flow requirements can be very different. Each island is easily configured to conform to the flow requirements, and can be easily modified if the cylinder speeds are insufficient.

- **Short islands**

  With only size 1 valves, a short island requires limited flow supply: the tail module is a simple plate. When a size 2 valve is integrated into the island, its flow needs drive the island supply and exhaust choices.

  In all cases, the exhaust section area must be bigger than the supply section area.

- **Long islands**

  The double exhaust connector E (Ø 12 mm) with maximum flow is generally required, while only one pressure supply connector P is necessary.
In order to simplify machine commissioning procedures, valve islands must be flexible.

Totally modular, they can easily be expanded or reconfigured until they precisely answer the application needs: different cylinders, different flows to achieve the required cylinder speeds, different sections in a given island, ....

**Island composition adaptations**

The initial island may be modified until it achieves all requirements. As an example, on the island shown above, the last valve module is being changed for a higher flow and in consequence, the pressure supply and exhaust collection are being doubled.

1 - This size 2 valve module will provide the required speed for the cylinder.

2 - This additional intermediate module will increase the island flow supply and exhaust connection to the required levels.

**Easy island assembly and disassembly**

When assembling a valve island, the screw head must be orientated (see drawing) so that the following module will prevent the screw from turning.

This facilitates the disassembly of the island in the correct order.

**Tube connection variations**

For each application, the valve flow passage and the tube size are independently selected.

If however a cylinder does not reach the required speed, the flexible valve island design allows a change in tube size with the valve island in place. Simply remove the solenoid pilot and the valve, pull out the clip, and replace the tube connector with a larger one.
Valve islands may require two or more different pressure sections. The universal intermediate supply module is available to provide any required combination, as shown by the following examples.

The universal intermediate supply module is supplied with four configuration plates that achieve two functions:
- block P or E channel, or none, or both
- present a simple diagram on the island front to indicate the internal configuration.
Peripheral control modules add to the valve island flexibility. These modules answer the complementary needs of the cylinders: flow controls, pressure regulation or positioning. They may be plugged-in directly to the valve island or installed in-line closer to the cylinder.

Valve islands output functions

**A- Dual flow control module**

This dual flow control module is suitable for adjusting cylinder speeds by:
- controlling exhaust flows from a double acting cylinder;
- controlling supply flow to a single acting cylinder.

Chap. 10 gives full details.

**B- Pressure regulation module**

Adjusting the thrust developed by a cylinder is often necessary. This pressure regulation module enables adjustment of the P1 pressure required for a given cylinder, and to read it on the attached pressure gauge.

Chap. 10 gives full details.

**C- Dual pilot operated check module**

With two internally piloted check valves, this module will block both flows and stop cylinder movement as soon as the valve's outputs are both exhausted.

Chap. 11 gives full details.
Peripheral flexibility with control modules

- Sizes and flows

Corresponding to the two valve sizes, peripheral control modules are available in 2 sizes:
- size 1,
- size 2.

All cylinders can thus be accommodated, from 6 mm to 100 mm in bore size.

- Different installations

In order to accommodate machine design, and depending on cylinder requirements, the peripheral modules may be plugged into the island or installed in-line, between the valve island and the cylinder.

Flow controls and dual P.O. check valve modules are more efficient when close to the cylinder, while the location of a pressure regulation module makes no difference.

The control modules enable flexibility in designing machines as well as improving their performance during machine commissioning.
## 7 Modules with individual electrical connectors

For stand-alone modules, or for short valve islands, individual electrical connectors are generally appropriate.

These plug-in connectors are dust and waterproof (IP 67), and include the LED indicator and the voltage surge suppressor.

### The plug-in dust and waterproof connector

This electric connector plugs onto the solenoid pilot standard M8 male thread. It features a LED indicator and a voltage surge suppressor with a cable for a polarity insensitive connection.

All stand alone modules incorporate solenoid pilots with individual "plug-in" connectors. With short valve islands, the individual connector is still preferred. However, for longer island, integrated electrical connections become more viable (see next chapter).
Connections to PLC’s and other controls

The 2 wires of each connector cable can be taken directly to the output terminals of a PLC or field bus module. If all outputs have a single common terminal, it will be necessary to use an intermediate terminal block with the commons linked as shown in the drawing below.

Connections outside enclosures may be IP 67 protected, using the standard M8 or M 12 connectors of a terminal box, as shown in the drawing below.

---

Pneumatic valve islands conform to the latest electrical requirements

Pneumatic valve islands now have to withstand many different conditions in their various applications:
- installed inside or outside enclosures;
- combined with electrical components sensitive to solenoid «spikes» and inside machines subjected to voltage drop;
- integrated with either positive logic or negative logic controls.

Therefore, the latest generation of valve islands has been developed to satisfy the following requirements in both their individual or integrated connection forms.

1- **IP 65-67 dust and water protection.**

Valve islands may be installed close to the cylinders they control; this can prove to be a difficult environment. Therefore the electrical parts are dust and water protected. They conform to the the following standard: IP 67 for individual connector valves and islands, IP 65 for integrated electric connections islands.

2- **Collection of exhausts, including pilot exhausts.**

Increasingly, valve islands are incorporated into the electrical enclosure of a machine. Therefore, in this case and applications involving clean rooms or food industry, the latest valve islands enable collection of all air exhaust including these of the solenoid pilots.

3- **Protection of controls from voltage surges.**

The voltage surge generated when a coil is de-energised is a common problem and can disrupt control circuits upstream of the valve island. To overcome this problem, the latest generations of valve islands incorporate a voltage surge suppressor with each solenoid pilot.

4- **Positive logic (PNP) and negative (NPN) compatibility.**

The increasing use of global automation components and machines can raise problems of compatibility between «PNP» and «NPN» circuit design. The latest generation valves and islands overcome this problem as the solenoid pilots are polarity insensitive and can accept 24 VDC in any orientation.

5- **Dependability even with voltage drop.**

Electro-pneumatic automation is often integrated to machines that are submitted to voltage drop for example when an electrical motor is started. In order to overcome such working conditions, standard requirements state that the solenoid pilot should still operate 15 % under the voltage rating, i.e. 20.4 V for a 24 V rating. To fulfill such a specification, the solenoid pilot power has to be sufficiently high: for example, 1 W is better than 0.5 W.
### Islands with integrated electrical connections

This valve island configuration considerably simplifies installation: with the multi-connector, the time taken in connecting the valve island to controls is reduced to a minimum.

Inside the island, modular integrated circuitry conveys the signals from the multi-connector to each solenoid pilot.

---

#### Integrated electrical connections

The island’s pneumatic modularity is complemented by the electrical connection modularity. When modules are assembled into an island they are automatically inter-connected. They follow the electrical connection modularity principle that is described in the box below.

The island connections to controls are then made from the electrical head module by one of the methods shown on the next page.

---

#### Valve self-addressing modularity principle

The schematic on the left illustrates the connection principle between each island module:
- an electrical common crosses the whole island connecting one pole of each of the solenoid pilots;
- connections from the head module are self-addressing; one step adjusted at each pilot, they step by step progress upwards until they reach the solenoid that they will control.

All modules are standard and easily assembled to build the valve island.
Valve island connection to PLCs and other controls

An electrical multi-connector is simply added to the basic pneumatic head module, to form the complete island with each pin of the connector self addressed to the corresponding solenoid pilot.

**Wired connection to PLC**

A multiple cable is plugged into the island head module and each individual wire is connected to the PLC’s terminals.

The multi-colored cable is a guide to addressing, with each color unique to a solenoid pilot row within the island.

When compared with the individual electrical connector (see chapter 7) the integrated electrical connection island with multi-connector reduces the connections to be made by almost one half.

**Plug-in connection to PLC**

It is possible with some well known PLC models to have a dedicated double multi-connector cable enabling the PLC plug-in card to connect directly to the standard valve island.

**Field-bus communication with PLC**

The multi-connector at the head of the island can be replaced by a field-bus connection and decoding module.

Valve islands with this option can be connected at any point along the field bus that the PLC controls (see chapter 15, 16 and 17).
9 Man-machine dialog through valve islands

Pneumatic valves are at the center of electro-pneumatic automation systems. This is why pneumatic valve islands with built-in features enable efficient man-machine dialog.

This achieved with their method of identification, the LED indicator and the manual overrides, all of which simplify troubleshooting on the machine.

### Identification marking on valve islands

It is often useful to relate a module to a movement within the machine. This is made possible with the ability for each module to have an identification marking corresponding to each movement. The LED reading and manual override action can now be easily identified for a particular movement within the machine.

Valve island marking process

Valve islands have standard 9 x 17 mm identification areas.

Depending on the application, one can choose between the different marking procedures shown here, from a simple hand marking to a more permanent label or tag marking using computerized equipment.

- **Hand made marking** with an indeleble pencil
- **Sticking label marked** with a laser printer standard label 9 x 17 mm
- **Sticking tag marked** with a tracing table standard tag 9 x 17 mm
**Unique solenoid pilot with multi-function and adaptable manual override**

For safety and standardisation reasons, most machine builders now use 24 VDC. This convergence towards only one voltage leads to a more simple system with a unique solenoid pilot. In order to cater for the man-machine dialog requirements this solenoid pilot manual override is both multi-function and adaptable to each stage, from the machine installation to its maintenance.

The standard modules have solenoid pilots with multifunction manual overrides:
- push-release function;
- push-twist-lock function.

Man-machine dialog is then complete facilitating the commissioning of each machine sub-assembly. Later, when electrical controls are connected, the manual override may be adapted.

Depending on the machine and its conditions of use, one may either:
- keep complete multi-function manual overrides;
- or delete the lock capability by removing the locking stop: this will prevent the manual override being left in the locked position;
- or make completely inoperative the manual override when automatic controls take care of access for maintenance: an isolation fork is available for this operation.
As automation develops, pneumatic cylinders require better controls.
- Speed controls: for this purpose, flow adjustment means are continuously improved for better efficiency and easier access.
- Thrust controls: for this purpose, pressure regulation to the cylinder is now easily added to a circuit that requires it.

### Flow adjustment = speed control

On a double acting cylinder, forward and retract speeds are adjusted separately by control of air flow exhaust. The control becomes more precise when the flow adjustment is close to the cylinder. The examples show different solutions which are dependant upon the valve to cylinder distance and accessibility to the cylinder.

#### Dual flow control module

This valve island control module (see chapter 6) may also be used close to the cylinder.

1. Dual flow control module is plugged into valve island.
2. Dual flow control module is installed close to the cylinder.
3. Flow control fittings are fitted directly unto the cylinder ports if access is good.

**Note:** Flow control to single acting cylinders.

For controlling supply flow instead of exhaust flow, the module may be reversed. This may be used in conjunction with single acting cylinders.

1. Dual flow control module is plugged into valve island.
2. Dual flow control module is installed close to the cylinder.
3. Flow control fittings are fitted directly unto the cylinder ports if access is good.

**Note:** Flow control to single acting cylinders.
Pressure regulation module

An integrated pressure regulator reduces the P pressure to the P1 pressure required. The regulator is of the vented type. Therefore, when lowering the pressure level, it exhausts the excess pressure to the new level.

It also includes a non-return valve allowing full exhaust flow. This module is normally installed downstream of the valve. Depending on the application, the pressure gauge may be remotely mounted, or integrated into the machine control panel.

Typical applications of pressure regulation to cylinders

1. Single port regulation: regulation module is plugged into valve island.
2. Single port regulation: regulation module is remotely installed for easy access.
3. Double port common regulation: regulation module is upstream of valve island section that feeds both chambers with P3 regulated pressure.

- Press cylinder at controlled thrust.
- Stamping cylinder controlling the tension of a thread or a cable.
- Clamping cylinder
- Loaded vertical cylinder: the pressure difference balances the load, allowing faster movements with better cushioning.
11 Islands for 3 position valve applications

3 position valves are traditional for positioning, blocking or venting pneumatic cylinders.

Because pneumatic valves are now commonly assembled into islands, 3 position valve functions have to be adapted in order to meet all applications allowing for exhaust back pressures and long distances between valves and cylinders.

- 3 position vented centre: pressure free cylinder

  Traditional configuration: New generation: double 3/2 NC + NC

  ![Diagram showing traditional configuration and new generation of 3 position vented centre valve with pressure free cylinder]

  **Problem:** Island exhaust back pressures reach the cylinder and move it unexpectedly.

  **Solution:** Common exhaust balances back pressure effect on the cylinder.

- 3 position pressure centre: cylinder fitted with locking device

  Traditional configuration: New generation: double 3/2 NO + NO

  ![Diagram showing traditional configuration and new generation of 3 position pressure centre valve with cylinder and locking device]

  **Cylinder positioning is achieved with both chambers under pressure.**

  ![Diagram showing locking device in new generation of 3 position pressure centre valve]
3 position, closed centre : cylinder positioning

Traditional configuration:

Problem: In centre position, compact valves are not perfectly sealed: cylinder position cannot be held indefinitely.

Solution: A dual P.O. check module is totally sealed.

Double 3/2 NC + NC and dual P.O. check valve

At the outputs of a double 3/2 NC + NC valve, the dual P.O. check valve module achieves efficient and stable cylinder positioning. As soon as both lines are exhausted by the main control valve, the two internally piloted check valves close tight. The cylinder is then stabilised. The manual pressure releases may then eventually be used for an adequate machine positioning.

Typical application using cylinder positioning

Depending on each part's requirements, cylinder A will position them either in front of cylinder B or C or D. A double 3 way NC + NC valve and a double check module will easily control cylinder A for such positioning.
The problems associated with exhaust back pressures are well known already with traditional valve manifolds.

The latest generation of valve islands provides new solutions to this problem: either to block exhaust back pressures or to limit them to a level that would not affect the application.

### Blocking exhaust back pressures with 3/2 modules

From the example shown below, one can see the followings:

- C cylinder, large and fast moving, may feed the island exhaust channel with an exhaust back pressure PE. Such a back pressure is normaly under 1 bar. Thus, it will not affect double acting cylinders such as B since the opposite pressure P is high.
- However such a back pressure may affect a single acting cylinder A if its pressure threshold is low.

Such single acting cylinders may pop out unexpectedly whenever an exhaust back pressure rises into the island. To avoid such malfunctions 3/2 valves modules feature integrated exhaust non-return valves that will block any exhaust back pressure from reaching acting cylinders that they control.
Blocking exhaust back pressures inside the island

Another method to block exhaust back pressures when they may affect the application is to isolate in the island the valves that control the largest and fastest cylinders. The illustration below shows how this may be easily achieved with an intermediate module (see chap. 5).

Limiting exhaust back pressures in a valve island

In a valve island, it is important to limit exhaust back pressures to about 1 bar maximum so that all double acting cylinders efficiently achieve their function at 6 bar.

By reducing the exhaust flows of the largest cylinders, one kills back pressures at their birth, particularly for their return stroke that does not affect the cycle time.

a - collected exhaust

Depending on the sizes of the cylinders and the speed required by the application, exhaust back pressures may still remain too high in the island after cylinder exhaust flow adjustment.

Such back pressures in the island may be efficiently evacuated through multiple exhaust collections using the intermediate module (see chap. 5).

b - exhaust through mufflers

For applications that do not require the exhausts to be collected, a plug-in muffler into each exhaust port of the island will evacuate exhaust back pressures.
Valve islands internal / external pilot supply and exhaust

Valve islands of the last generation integrate:
- an x channel to supply pressure to the pilots,
- an e channel to collect exhaust from the pilots.

The island universal pneumatic head module provides selectors for different types of pilot supply and exhaust:
- internal or external pressure supply through x,
- internal or external exhaust collection through e.

External / internal pilot supply

In all valve islands, sub-bases incorporate an auxiliary channel x to supply pressure to the solenoid pilots. Depending on the application, this channel:
- may be fed by the main pressure P if it is between 3 to 8 bar;
- this is the “internal pilot supply” of the valve island,
- may be fed separately, when pressure P is lower than 3 bar (3 bar being the minimum pressure to pilot the valves); this is the “external pilot supply” of the valve island.

The new valve island generations have a universal pneumatic head module that allows these two types of pilot supplies. This head module incorporates a 2 position x selector:
- The internal pilot supply position is the normal position: no connection port is visible since no external supply is necessary.
- If required, the external pilot supply position can be obtained manually by rotating the selector; it then presents a push-in connection port for a 4 mm OD tubing that will feed the pilot pressure (3 to 8 bar) to the x channel.

Special case: multi-section valve island.
The intermediate module that separates two island sections is crossed by the auxiliary channel x. Thus, when an island includes several sections working at different pressures, an internal pilot supply pressure is satisfactory, if the first section operates at 3 to 8 bar pressure.
External / internal pilot exhaust collection

In all valve islands, sub-bases also incorporate an auxiliary channel e to collect the solenoid pilot exhausts. Depending on the application, this channel:

- may exhaust directly into the main exhaust channel E if no important exhaust back pressure is to be feared (see chapter. 12).
- may be collected separately when a persistent back pressure will possibly delay the de-piloting of some of the valves into the island, or for vacuum applications (see chap.14).

In order to choose between the internal or the external collection of the island pilot exhaust a second two position selector is integrated into the pneumatic island head module, as shown here.

Special case: multi-section valve island.
The intermediate module that separates two island sections is crossed by both auxiliary channel x and e. Thus, when an island includes several sections including a section working with vacuum where no exhaust should pollute the vacuum drawn (see chapter 14), an internal collection of pilot exhaust is satisfactory, if the first section is the one that works at a usual pressure.
**14 Valve islands for vacuum applications**

Pneumatic automation is often combined with vacuum applications:
- to pick-up parts and to move them;
- to vacuum pack or to process under vacuum.

Within electro-pneumatic circuits and machines, new generation pneumatic valve islands can simplify circuit design and installation of combined pneumatic and vacuum systems.

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**Providing controls for vacuum venturi devices**

The venturi device is also called an «ejector» or a vacuum generator and is well known to pneumatic engineers. It produces vacuum from an air pressure supply: the air jet generates a fast moving flow stream that draws the surrounding atmospheric air; the resulting air movement creates a vacuum when the entry of atmospheric air is blocked by a part.

This simple and compact system replaces costly and cumbersome vacuum pumps and their piping. It is mostly used to pick-up and move parts. The vacuum pad that picks-up the part is ideally combined with the venturi device.

In order to supply the venturi, a single 3/2 NC valve is integrated into the closest valve island. To limit air consumption, it is advantageous to adjust the pressure that reaches the venturi. This is easily done by adding a pressure regulation module to the valve island.

If besides the venturi supply an automatic blow off is required, a double 3/2 NC + NC will control the complete system:
- one 3/2 for the venturi supply;
- one 3/2 for the automatic blow off: the integrated exhaust non return valve in all 3/2 modules size 1 (chap. 12) will prevent external air from polluting the venturi vacuum.

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*The manual of modular pneumatic valve islands*
Valve island in a vacuum distribution network

When the vacuum level or the flow requirement is high, an electric vacuum pump is installed on the machine with a vacuum distribution network.

In this case, 3/2 pneumatic valves are used to control the different vacuum circuits or 4/2 pneumatic valves when a bistable function is necessary. 3/2 pneumatic valves should be Normally Open, in order to obtain vacuum outputs when electrical signals will be on. Vacuum controls generally require large flows: most of the time, size 2 valves are necessary.

In the valve island, vacuum is drawn through the channel normally used for the common exhaust while the other channel may be used differently, depending on the application:

1 - no blow off or permanent blow off
The top illustration presents a typical vacuum valve island whose channel normally used for the main pressure supply is either connected to atmosphere (no blow off) or to a low pressure supply that will act as permanent blow off towards the vacuum pads when they are not connected to vacuum.

2 - intermittent blow off
The second illustration presents a vacuum valve island equipped with a head blow off valve that will send a pressure for blow off only when required. A size 1 single 3/2 is sufficient for this purpose.

In both cases, the auxiliary channel  will be supplied with a 3 or 8 bar pressure for solenoid pilots (chap. 13). In the first case, the auxiliary channel  is collected externally in order to avoid pressurizing the vacuum channel with the pilot exhausts.

Pressure and vacuum combined in the same island

Chap. 5 describes how a valve island may be easily divided into different sections separated by an intermediate supply module with configuration plate. As shown here, the island end section may be a vacuum section totally separated from the front pressure section.

Since  and  channels cross all intermediate modules, the island head module feeds the  channel for the whole island, and collects the  channel for the whole island, including the vacuum section.
Pneumatic cylinder/valve circuit design must take into account the machine positioning in case of electrical supply cut-off or other emergency events.

Valve islands now offer many means to do so, with bistable and monostable valves, peripheral modules, integrated dump valves, etc...

**Bistable/monostable valve choice for adequate emergency positioning**

Designers of electro-pneumatic machines have to define the cylinder positioning when electrical supply happens to be cut-off, for example for an emergency requirement.

A clamping cylinder will maintain its action so that the part it is holding does not take off under the action of a cutting tool.

On the contrary, a stamping cylinder will retract in its initial position, and a transfer cylinder may be blocked along its stroke.

Pneumatic valve islands provide all means to obtain these emergency machine positioning. The different solutions are presented on the valve island above.

- A, B and C double acting cylinders are controlled with bistable valves: these will keep their position in case of electrical cut-off. The cylinders will maintain their positions and actions.
- D and E double acting cylinders are controlled with monostable valves. Their spring return will bring them back in the initial position corresponding to the required initial position of the cylinder.
- F, G, and H single acting cylinders will retract as well with the help of their spring.
- Controlled with a monostable double 3/2 NC+NC valve, the double acting J cylinder will be exhausted on both chambers when an electrical cut-off will happen (see chap. 11).
- Due to the double P.O. check valve module, the double acting K cylinder will be blocked along its stroke (see chap. 11).

These cylinders maintain their last position and action in case of electrical cut-off.

These cylinders retract in a chosen position.

This cylinder becomes totally pressure free.
Valve island with integrated dump functions

In case of emergency electrical supply cut-off, a general dump action on many cylinders may often be required. This is easily done with a valve island by mounting a dump valve controlling the island pressure supply channel. The dump valve will be monostable in order to automatically dump the pressure when electrical is cut-off. A 4/2 size 2 valve will have enough flow to dump a whole size 1 valve island.

The dump action will either concern:
- all the cylinders controlled by the valve island: the dump valve will then be at the island’s head (top drawing).
- or just a few cylinders among the ones controlled by the valve island: the dump valve will concern only the valves on its right (second drawing).
- or several valve islands all controlled by only one dump valve (third drawing).

The dump action will either concern:
- all the cylinders controlled by the valve island: the dump valve will then be at the island’s head (top drawing).
- or just a few cylinders among the ones controlled by the valve island: the dump valve will concern only the valves on its right (second drawing).
- or several valve islands all controlled by only one dump valve (third drawing).

Dump valve
4/2 monostable
size 2

A dump valve may control several valves islands.

Dump and soft start functions

Double acting cylinders have adjustable cushions at the end of their stroke. Such cushioning is necessary for loaded cylinders. They are efficient when the movement is controlled by the working pressure but also by the exhausting back-pressure that limits the speed through external flow control. When such an exhausting back-pressure has been previously totally exhausted by a dump action, when restarting, the cylinder movement may be brutal and the cushioning less efficient.

Thus, for average and big loaded double acting cylinders, a dump action will have to be followed by a soft start. For this purpose, a dump and soft start FFL unit will replace the dump valve into the valve island.

The circuit of such an FRL unit describes the two following functions:
- the dump 2/2 valve, solenoid pilot controlled:
- the slow start pneumatic circuit: the downstream valve and cylinders receive a small flow supply until the pressure reaches a sufficient level to pilot the main flow 2/2 valve whose pilot pressure may be adjusted.
Industrial automation has progressed with the introduction of remote input / output modules which can be adapted to most electro-pneumatic applications and communicate via a field bus system. Offered as IP 20 only (non protected), these field bus connected I/O are very modular and lead to efficient and competitive electro-pneumatic applications.

The evolution of bus connected IP 20 input/output modules

Field bus systems and their remote input/outputs were first developed for large and complex automation applications:
- sophisticated bus protocols, difficult to implement and maintain;
- I/O modules with a minimum of 16 outputs and 16 inputs.

In this context, only a few complex and large electro-pneumatic applications could use the field bus system.

Later, simpler bus protocols and standard connections were developed for more standard applications, example ASI (see next chapter).

More recent developments include modular designs for remote input/outputs where modules of 2 or 4 I/O can be assembled together with a head module that connects to the field bus.

This progress in field bus automation provides solutions for more electro-pneumatic applications. As with electro-pneumatic valve islands, input/output bus islands can be assembled to suit the specific requirements of machine control. This has resulted in even very simple control systems becoming a viable and competitive option.
Electro-pneumatic applications with IP 20 inputs/outputs

In most electro-pneumatic applications, IP 20 would need additional protection within an enclosure.

Depending upon the applications, the valve island can be mounted in the same enclosure.

Alternatively, the IP 65 valve island could be mounted outside the enclosure and closer to the cylinders as shown on the diagram.

A typical example

The application shown is a fairly typical simple electro-pneumatic sub-assembly which may form only a small part of a larger application covered by the field bus.

This application demonstrates:
- the ease of mounting and interconnecting the I/O island and a valve island.
- typical I/O ratio, average 2 to 3 inputs to 1 output.
Remote short valve islands with AS-i bus

The «Actuator Sensor interface» (AS-i) bus protocol is ideally suited to most electro-pneumatic applications. AS-i standards also include transmission cables for easy IP65 protected vampire connections.

New generations of pneumatic valve islands now include specific modules for AS-i bus connections.

Valve islands for AS-i bus connections

Valve islands with integrated connections can be supplied with an AS-i bus head enabling the following:

1. IP65 vampire connections for the two AS-i bus cables.
2. Decoding the bus signals and energising the required solenoid.
3. Supply of power to sensors, receive input signals and coding them for the AS-i bus transmission.

Any type of electrical or electronic sensor may be connected to AS-i bus island head modules.

Outputs and inputs have separate power supplies, thus preventing any interference.
AS-i bus electro-pneumatic automation practice

Separate access to pneumatic and to electronic sections

When the valve island has been installed, it is a simple operation to separate the AS-i head module from the valve island as shown in the diagram.

This will ease maintenance if necessary as the electronic and pneumatic sections of the island can be completely separated.
18 Valve islands with device bus connections

Some applications require device bus controls with IP 65 - 67 protection requirements;

The IP 65 integrated electrical connections valve islands with their electrical head module version for direct device bus connections, are designed for this purpose.

Valve islands with device bus connections

Device bus may be Profibus DP, Interbus S, Device Net, ... ie any protocol that may be useful to industrial automation.

Modular valve island is configured to the application: up to 16 solenoid pilots per island. 3/2, 4/2, double 3/2 and 4/3 functions, monostable or bistable valves,...

Device bus towards next station

24 V DC module and sol. pilot supply

pneumatic outputs to cylinders

electrical input feed-back signals

Device bus IP 67 input blocks available from your usual electrical automation supplier. They may be either non modular, or modular, or adaptable with electrical inputs and outputs.
from short remote valve islands.................to longer valve islands

Depending upon the application, the valve islands may either be:
- short and remote, each valve island being close to a small group of cylinders.
- or longer (up to 16 solenoid pilots) in order to control a larger number of cylinders.

Electrical feedback signals may be collected either:
- by non modular blocks (8 inputs),
- or by modules assembled together, each presenting 4 inputs.

Separate access to pneumatic and to electronic sections

When the valve island has been installed, it is a simple operation to separate the bus head module from the valve island as shown in the diagram.

This will ease maintenance if necessary as the electronic and pneumatic sections of the island can be completely separated.