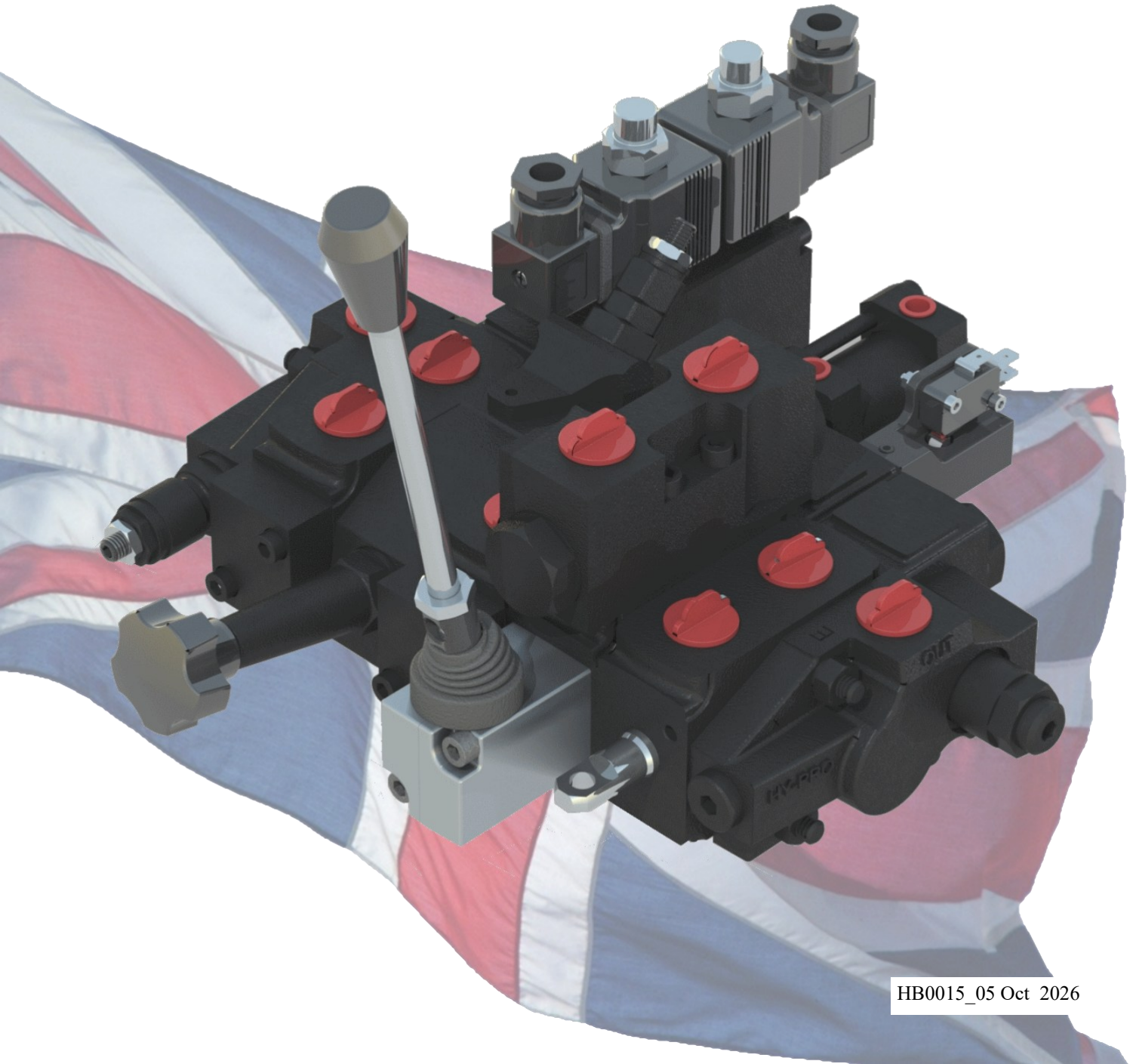
Hy-Pro

motion and control solutions

# Hydraulic Directional Control Valve Catalogue



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# WHO WE ARE

## Hydraulic Engineering Quality and British Manufacturing Excellence

Hydraulic Projects Ltd was first incorporated in 1966, having been started in a boat yard in Teignmouth by its founder Dick Hammond. Dick, a skilled engineer and designer, recognised the need for a robust, compact and economic range of hydraulic valves for smaller OEMs. In 1984, a new purpose-built factory was commissioned in Devon, England.

The company now produces three ranges of modular valves, a selection of line mounted valves, two ranges of pumps for autopilots (reversing and constant running) and a Design Award winning hydraulic actuator with combined pump and reservoir. The business boasts state of the art production machinery, assembly shops and design facilities all in one facility on the Devon coast. Products are designed in-house using solid modelling techniques and more than 90% of components are manufactured on site. All products are assembled and tested at the Devon base. Quality is paramount and the company is certified to ISO 9001 quality standards. Still a family owned business, the directors intend to expand further into new markets and products for generations to come.

## Our Customers

The Hy-Pro range and other bespoke products are popular with small to medium OEMs around the UK and Europe producing mobile equipment. These include customers such as Teagle Machinery, McConnel, Atlas Copco, Forum Energy Technology, Spencer Carter, Schuitemaker Machines (Holland) and STS Olbramovice (Czech Republic).

Our durable and reliable products can be found in agricultural and fruit picking equipment, car recovery trucks, car transporters, construction equipment, railway maintenance equipment, pipeline construction, drilling rigs, industrial applications and fishing boats.

Our OEM customers enjoy expert guidance and advice as well as specially designed valves to suit specific applications. With qualified engineers, an experienced technical sales team and manufacturing equipment on the same site, new products and product modifications can be produced within weeks.

Website: www.hypro.co.uk
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# IMPORTANT INFORMATION

Any samples or weights, measurements, capacities or other particulars contained in illustrations or descriptive material, including information contained in the Hydraulic Projects Ltd's brochures, website, advertising material or elsewhere, shall not form part of the contract and shall be treated as approximate and for guidance only unless specifically stated otherwise. Hydraulic Projects Ltd may at its discretion from time to time vary the design of the Goods from that advertised. The buyer shall be responsible to Hydraulic Projects Ltd for ensuring the accuracy of the terms of any order including any applicable specification and for giving Hydraulic Projects Ltd any necessary information relating to the Goods. Hydraulic Projects Ltd assumes no responsibility for ascertaining that the Goods are suitable and sufficient for the buyer's purposes.

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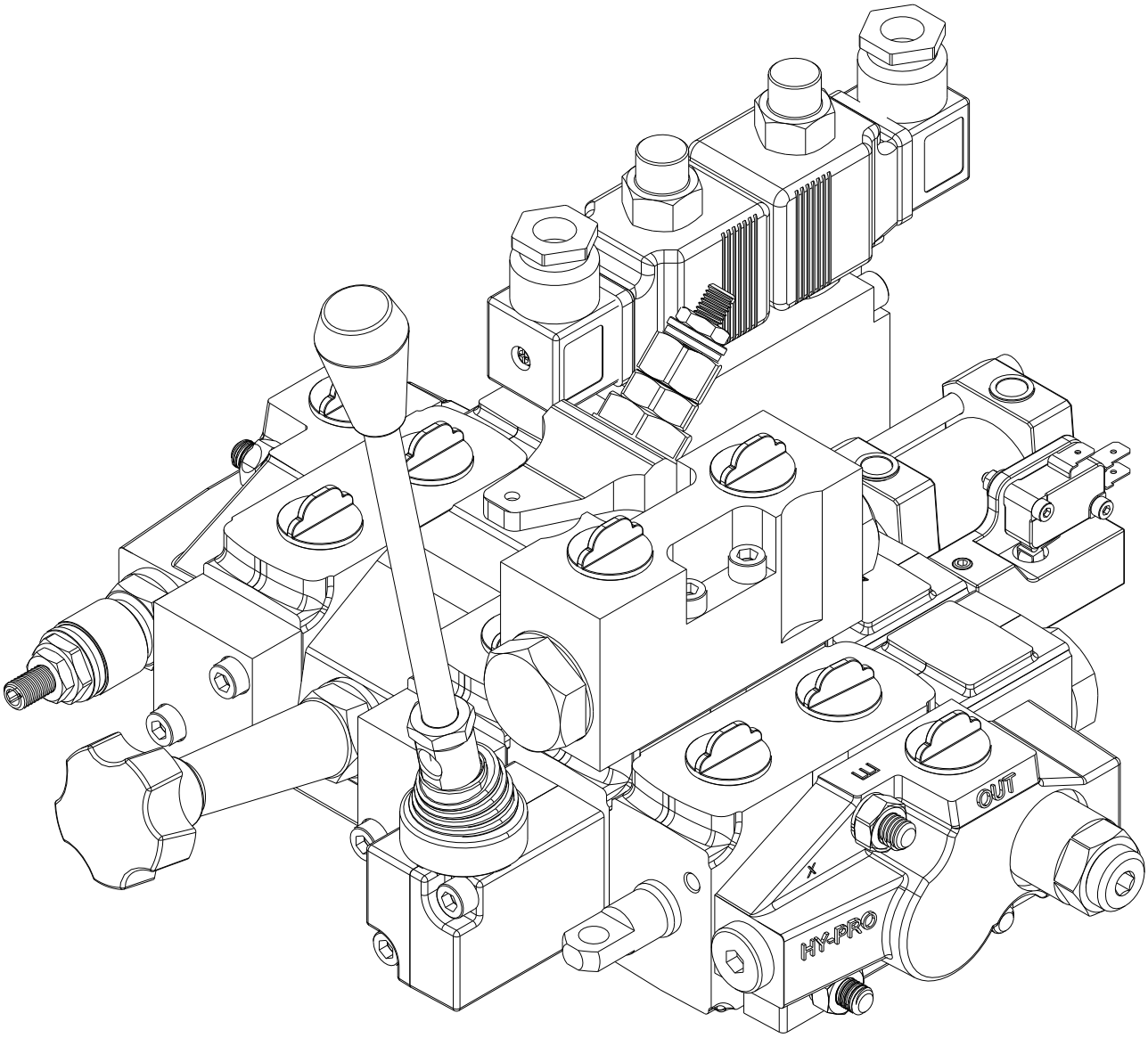
# TECHNICAL DATA

The following data applies to all Hy-Pro sectional and line mounted valves except where otherwise stated:

| | |
|---|---|
| Maximum pressure | 250 bar<br>210 bar (assemblies containing solenoid sections) |
| Maximum back pressure | 25 bar |
| Temperature rating minimum | -20°c |
| Temperature rating maximum | +65°c |
| Recommended fluid type | Mineral based hydraulic ISO VG37 |
| Fluid cleanliness | ≥ ISO 19/14/11 |
| Materials | |
| Cast Iron | BS 1452-250 |
| Aluminium manifolds | BS 1490 |
| External protection | |
| Stainless steel | BS 10088-3 |
| Steel | Zinc chromate BS 1706 Zn3<br>Nitrotech NQ3<br>Black paint HTS1006 |
| Seals | |
| Static | Nitrile |
| Reciprocating | Viton |
| Spool High Pressure | PTFE |
| Anti-extrusion rings | PTFE |
| Relief valves | Unless otherwise requested set 'full open' at 20 L/min / ISO VG37 @ 30 to 40 degrees C |
| Service line relief valves | Unless otherwise requested are set at 'crack' ISO VG37 @ 30 to 40 degrees C |
| Electrical | |
| Coil Voltage | 12/24 VDC |
| Coil power | 24W |
| Protection | IP67 |
| Connection | DIN 43650 |
| Cable Ø (not supplied) | 6 - 8mm |
| Pneumatic supply | 5-10 bar |

# V4-40 & V5-60 DIRECTIONAL CONTROL VALVE



# V4-40 & V5-60 DIRECTIONAL CONTROL VALVE

## DESCRIPTION

A low parallel connected sectional spool valve, lever, solenoid, pneumatic or cable operated. Suitable for open or closed centre series circuits. Spool mechanisms for 2, 3 & 4 position valves, all with excellent metering characteristics and with fine metering spools also available.
Direct acting or pilot operated main relief valves can be incorporated into the inlet cover. Extensive range of lever options, inter-sections, solenoid sections and ancillaries are available.

On the solenoid sections the internal oil pilot system is switched by solenoid operated cartridges using compact 24-Watt DC coils. A damping orifice fitted in the pilot line eliminates the harshness associated with standard direct acting solenoid valves, giving a positive feel to the control system. Solenoid sections can be built in to a valve assembly containing manual sections and any of the extensive range of ancillary valves.

## Application

Designed to be used in many applications requiring a compact, rugged sectional spool valve and suitable for use in the industrial, mobile, marine and agricultural markets. Using the comprehensive range of options, a valve bank can be assembled to control a variety of hydraulic circuits.

## Features

- Excellent metering characteristics.
- Excellent load holding.
- Integral load check valve.
- Open and closed centre assemblies.
- Direct acting or piloted adjustable relief valves.
- Robust enclosed lever mechanism.
- Extensive range of ancillaries and intersections.
- Open and closed centre options.
- 100% production testing.

## As well as the above the solenoid valves further feature

- 12 and 24V DC 24 Watt Coils
- Soft spool action.
- Manual and solenoid sections together in the same bank.
- Lever override option.

# V4-40 & V5-60 OPERATING CONDITIONS

| | |
|---|---|
| Maximum pressure | 250 bar |
| | 210 bar* |
| Maximum back pressure | 25 bar |

* Assemblies with solenoids

| | |
|---|---|
| Rated flow V4-40 | 40 L/min |
| Rated flow V5-60 | 60 L/min |

Materials
Cast Iron BS1452-250
Aluminium BS1490
Spools Case Harden BS6507
Tie studs BS970/191 817M40T

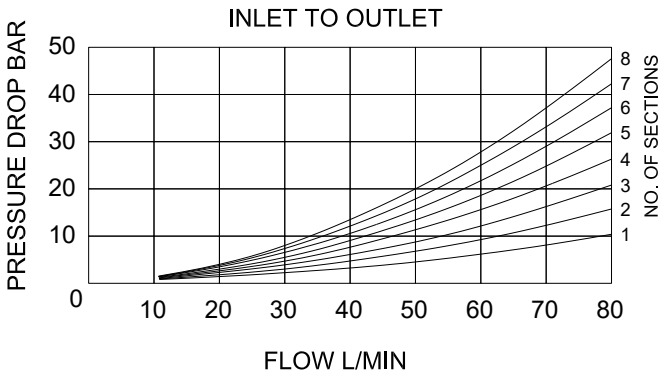
Tie stud torque 13.5Nm

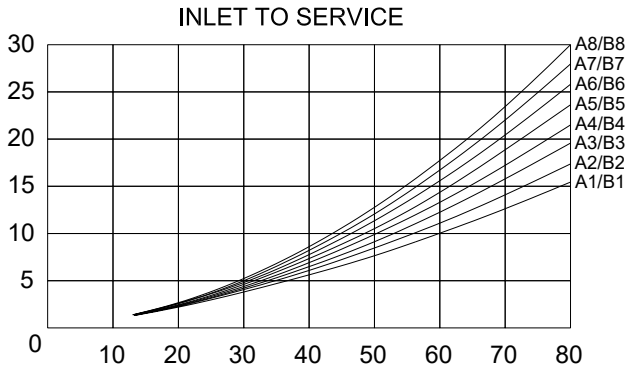
External protection
Black Paint to HTS1006

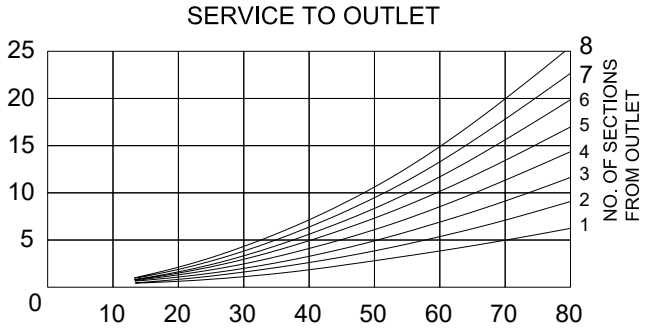
Steel Parts
Zinc chromate BS 1706 Zn3
Nitrotech NQ3

| | |
|---|---|
| Seals static | Nitrile |
| Reciprocating | Viton |
| Spool High Pressure | PTFE |
| Anti extrusion | PTFE |

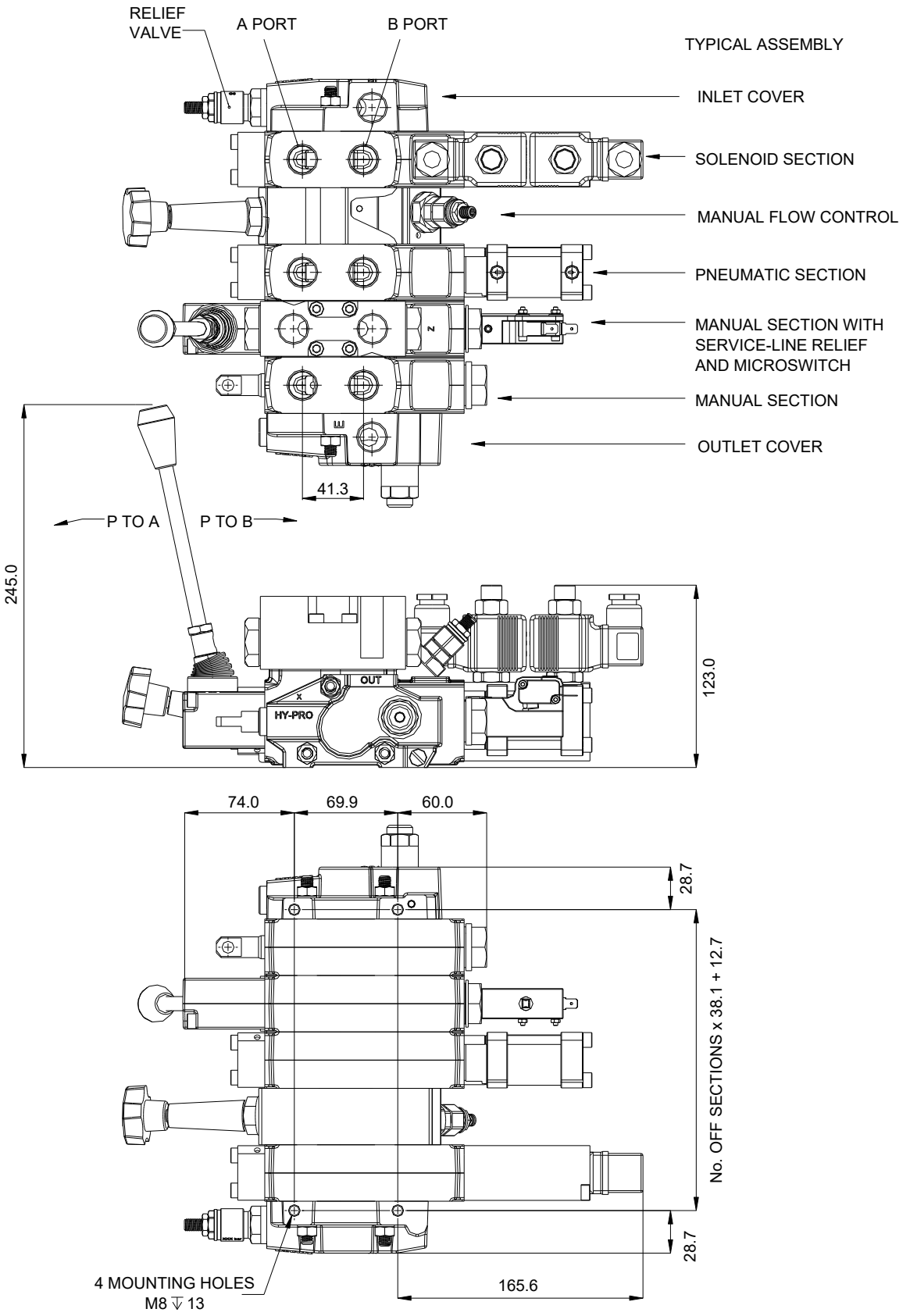
| | |
|---|---|
| Electrical | |
| Coil Voltage | 12 or 24VDC |
| Max cont. Voltage | 12V = 13.8V |
| | 24V = 27.5V |
| Coil Power | 24W |
| Protection | IP67 |
| Connection | DIN 43650 |
| Cable Ø | 6 - 8mm |
| (not supplied) | |



# V4-40 & V5-60 INSTALLATION DETAILS



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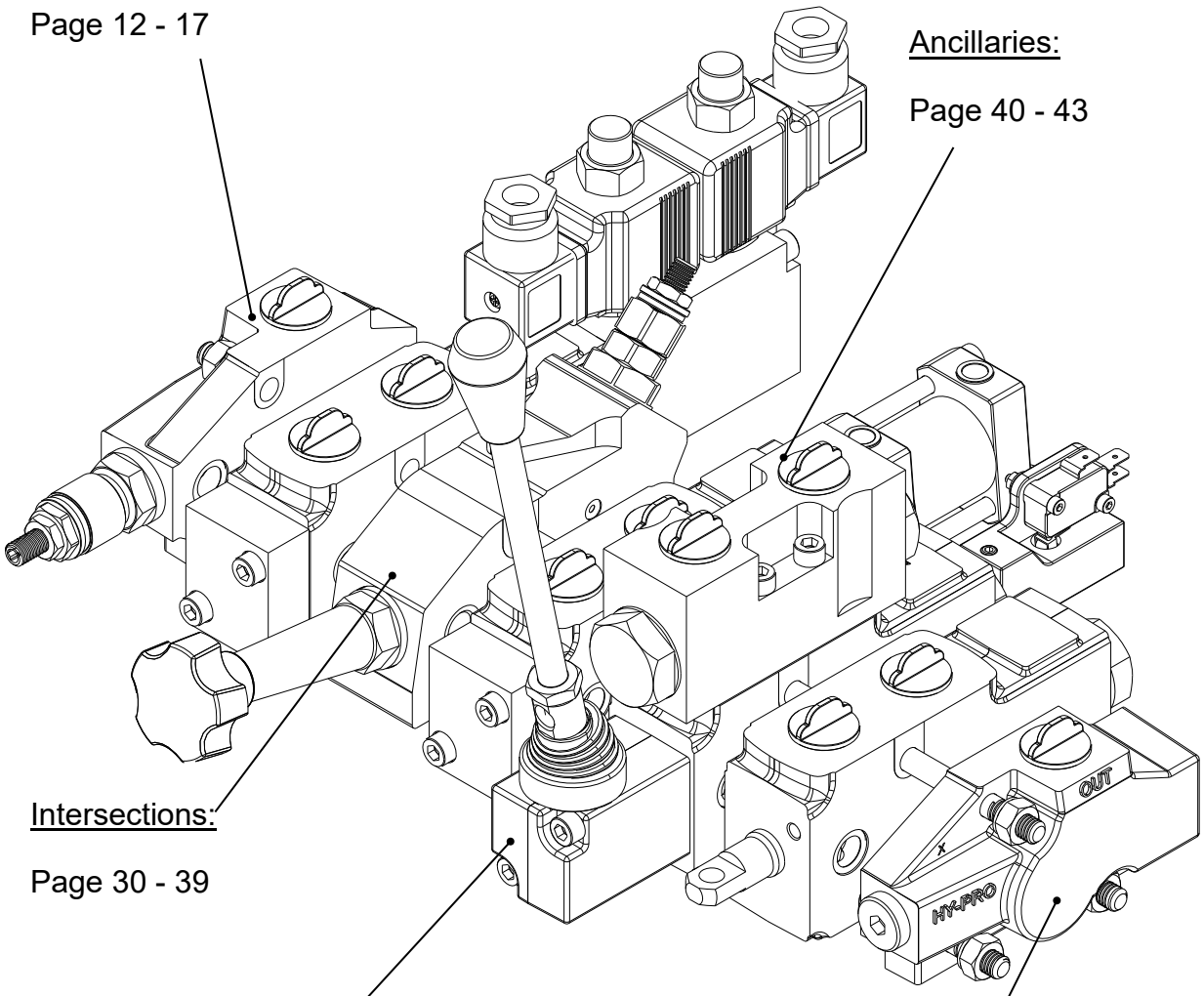


# V4-40 & V5-60 INLET COVERS

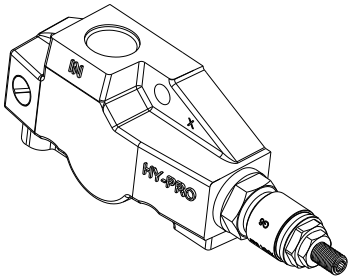
## STANDARD INLETS

The inlet covers come with G(BSP) ports in either top or side positions.
They can be fitted with or without a relief valve. They are supplied in open centre configuration as standard but can be specified for use in closed centre systems.

If a solenoid spool section is used in the assembly an ‘E’ type inlet is used which contains additional drillings for the pilot connections.

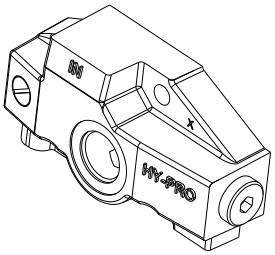
We can also include an auxiliary port for fitment of a pressure gauge.

Top port

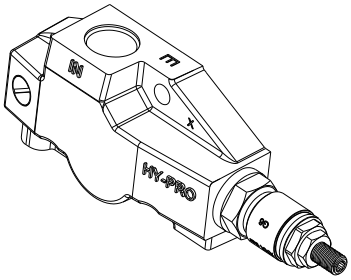



Relief Valve

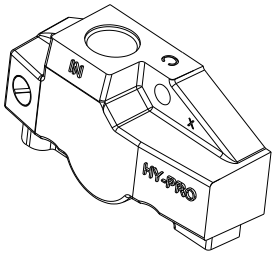
Side port




Solenoid
Top Port




Closed centre
Top Port




**Relief Valve**
Adjustable.
Pilot Operated or Direct Acting.

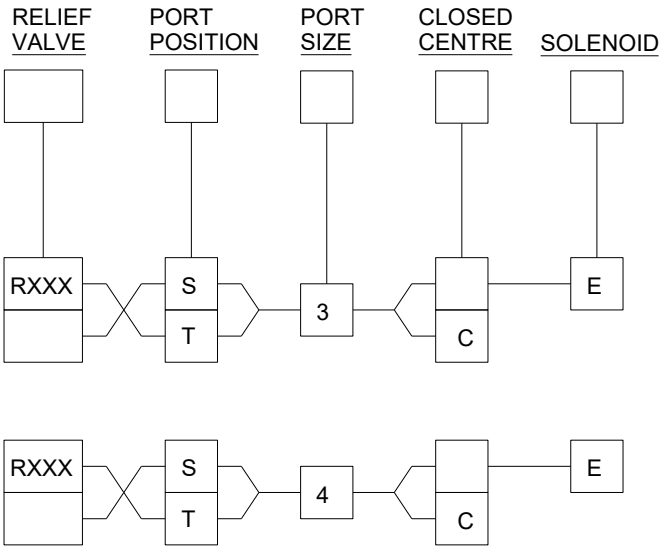
**Material** Cast Iron
**Weight** 0.75kg

# V4-40 & V5-60 INLET COVERS

| **Option** | **Code** |
|---|---|
| Relief valve | RXXX |
| Side port | S |
| Top port | T |
| Port size G3/8 | 3 |
| Port size G1/2 | 4 |
| Closed centre* | C |
| Solenoid | E |

‘XXX’ = relief valve setting in bar.

* On solenoid valves the closed centre is made at the outlet cover.




Example codes

| | | | |
|---|---|---|---|
| R190 | T | 3 | |
| R140 | T | 4 | |
| R140 | T | 4 | E |
| | T | 4 | C |

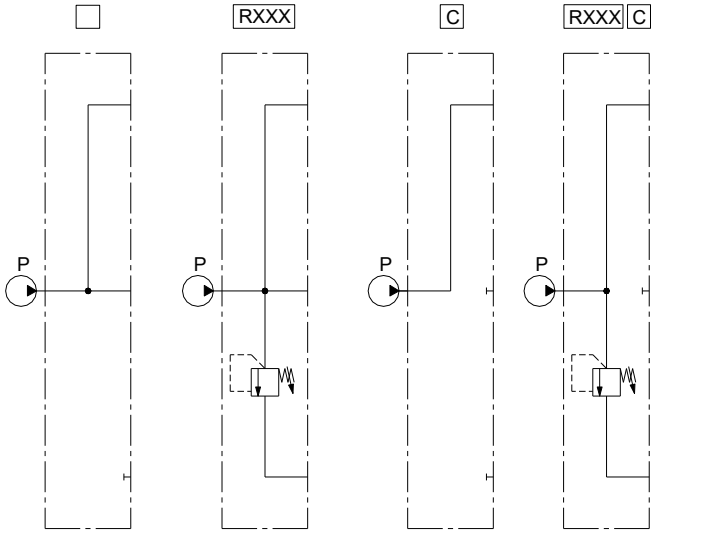
Relief Valve set 190 Bar with G3/8 Top port

Relief Valve set 140 Bar with G1/2 Top port

Relief Valve set 140 Bar with G1/2 Top port for solenoid sections

No Relief Valve, G1/2 Top port Closed centre

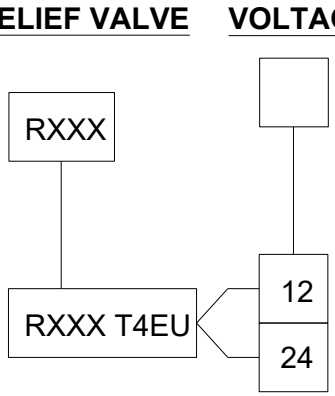
Solenoid pilot drillings omitted for clarity



# V4-40 & V5-60 INLET COVERS

## INLET WITH FLOW SOLENOID UNLOADER

| Option | Code |
|---|---|
| Relief valve | RXXX |
| Top G1/2 Port | T4 |
| Solenoid | E |
| 12VDC | 12 |
| 24VDC | 24 |

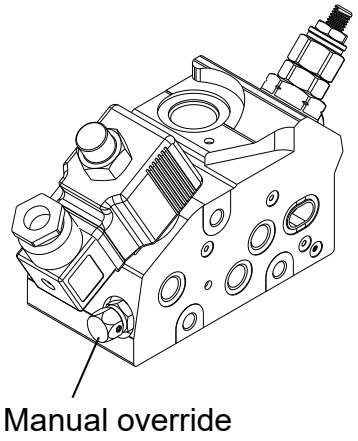



'XXX' = relief valve setting in bar.

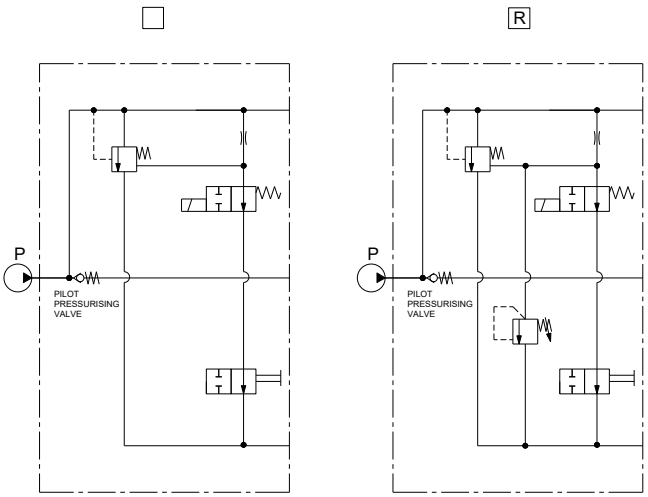
Example code

| | | |
|---|---|---|
| R210 | T4E U | 24 |

Relief Valve set 140 Bar, 24VDC




This special inlet includes the pilot pressurising valve for solenoid sections so is used with a standard outlet cover.

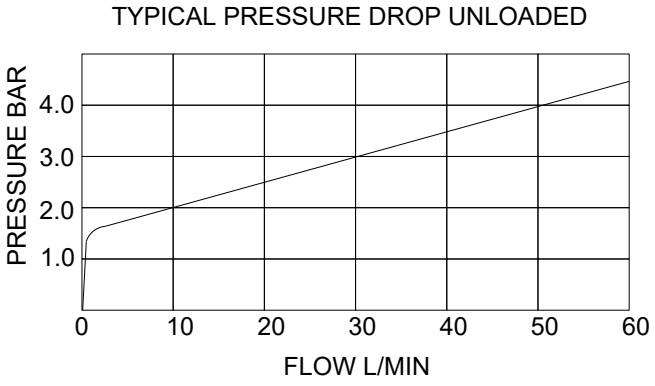



**Unloader**
NO Normally open
Unloads P to T unless energised

**Relief Valve**
Adjustable. Pilot Operated

**Manual Override**
Screw in to operate

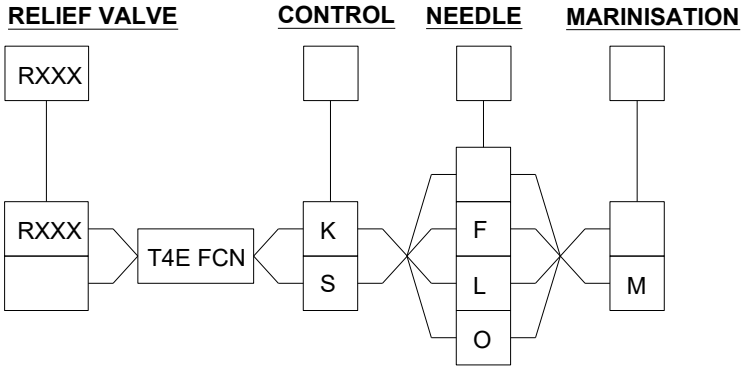
| | |
|---|---|
| **Body** | Aluminium |
| **Weight** | 1.7kg |
| **Width** | N/a |



# V4-40 & V5-60 INLET COVERS

## INLET WITH FLOW CONTROL

| Option | Code |
|---|---|
| Relief valve | RXXX |
| Top G1/2 Port | T4 |
| Solenoid | E |
| Handwheel | K |
| Screw & lock nut | S |
| Standard needle | |
| Fine needle | F |
| 1 Turn needle | L |
| No shut off needle | O |
| Marinised | M |




'XXX' = relief valve setting in bar.

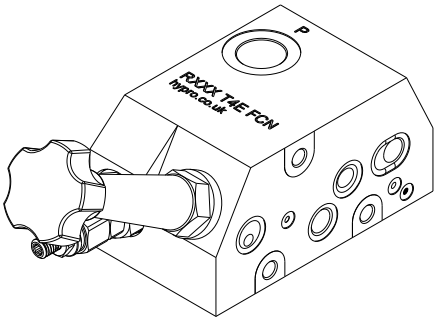
Example codes

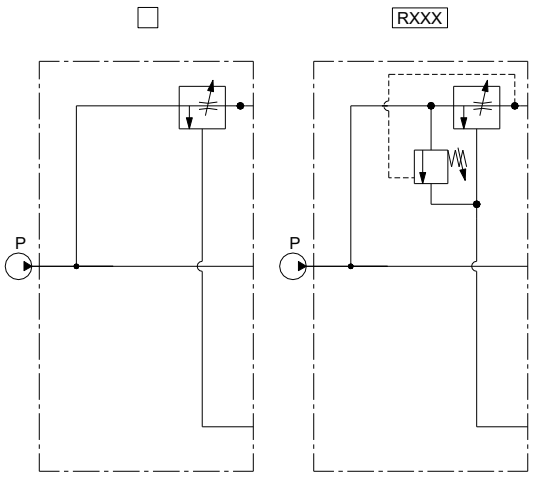
| | | | | | |
|---|---|---|---|---|---|
| R140 | T4E | FCN | K | | |

Relief Valve set 140 Bar, Standard needle & handwheel

| | | | | | |
|---|---|---|---|---|---|
| R140 | T4E | FCN | S | F | M |

Relief Valve set 140 Bar, Fine needle, Screw adjusted & Marinised




**Adjustable range** 0-60 L/min
**ΔP Inlet to outlet 40 L/min** 0.6 bar
**ΔP Inlet to service 40 L/min** 4.6 bar

**Relief Valve**
Adjustable. Pilot Operated

**Mounting** 2x M8x1.5p-6H
**Body** Aluminium
**Weight** 2.0kg

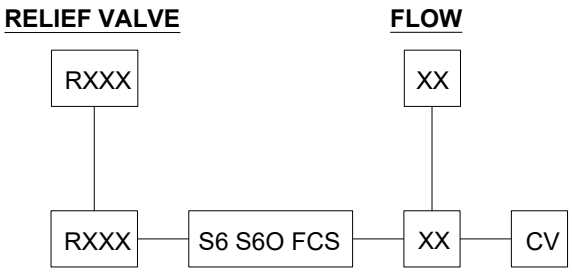
# V4-40 & V5-60 INLET COVERS

## INLET WITH FLOW CONTROL (100L/min)

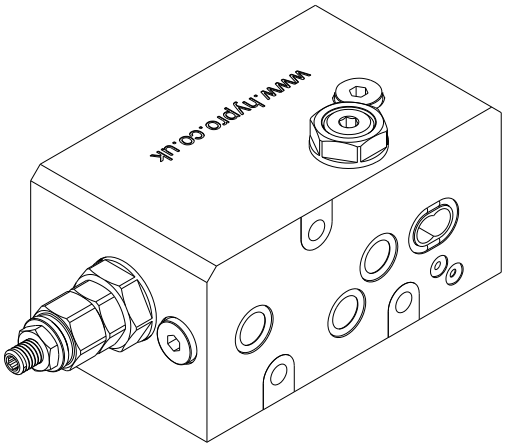
This special unloading inlet cover maintains 60 L/min to the valve regardless of the inlet flow (up to a maximum of 100 L/min.

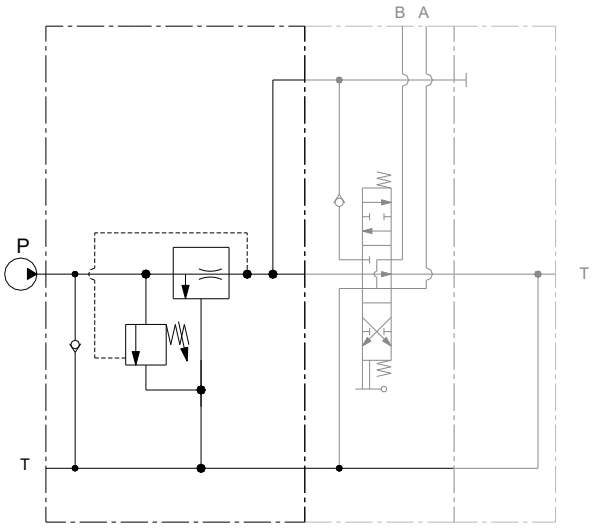
Excess flow is returned to the outlet port.

Features internal check valve for reverse connection protection.




'XXX' = relief valve setting in bar.



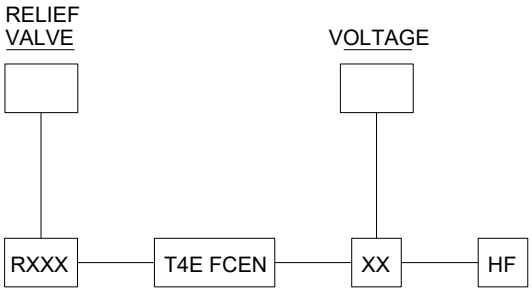




| | |
|---|---|
| **Input flow** | 100L/min Max |
| **Output flow** | 60L/min |
| **Ports** | Inlet G3/4<br>Outet G3/4 |
| **Relief Valve** | Adjustable. Pilot Operated |
| **Body** | Aluminium |
| **Weight** | 2.0kg |

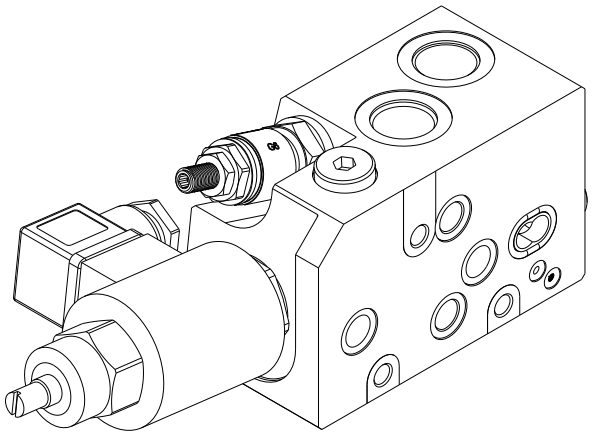
# V4-40 & V5-60 INLET COVERS

## INLET WITH PROPORTIONAL FLOW CONTROL

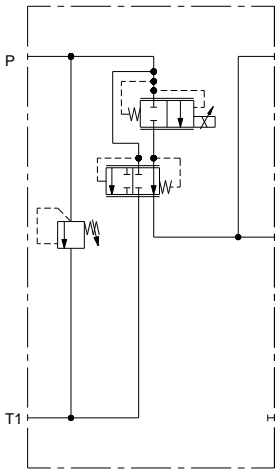
This special inlet includes its own return line which is separate from the adjacent spool sections and must be connected to tank.




'XXX' = SETTING IN BAR
'XX' = 12 OR 24VDC



**Adjustable range** 0-60 L/min
**Voltage** 12 or 24VDC




**Relief Valve**
Adjustable. Direct Acting.

**Mounting** 2x M8x1.5p-6H
**Body** Aluminium
**Weight** 2.0kg

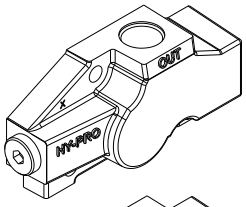
# V4-40 & V5-60 OUTLET COVERS

## STANDARD OUTLETS

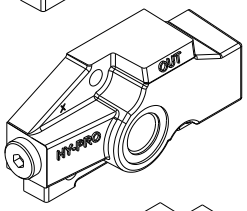
The outlet covers come with G (BSP) ports in either top or side positions. Pressure Carry Over is available by selection of an alternative outlet cover.

If a solenoid spool section is used in the bank an ‘E’ type outlet is used which contains the pilot pressurising valve and the additional drillings for the connections. Note that if a combined inlet/unloader is fitted the ‘E’ type outlet is not required.

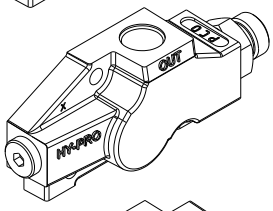
Top port



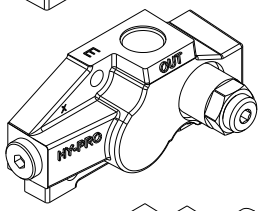

Side port



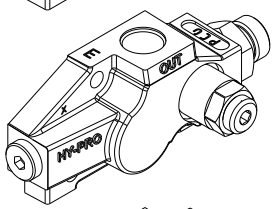

Pressure Carry Over



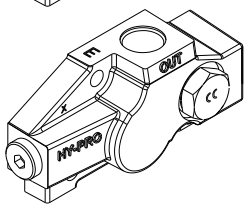

Solenoid




Solenoid Pressure Carry Over



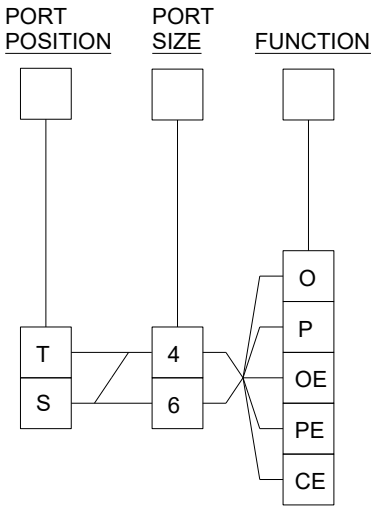

Solenoid Closed Centre




| | |
|---|---|
| **Body** | Cast Iron |
| **Weight** | 0.8kg |

# V4-40 & V5-60 OUTLET COVERS

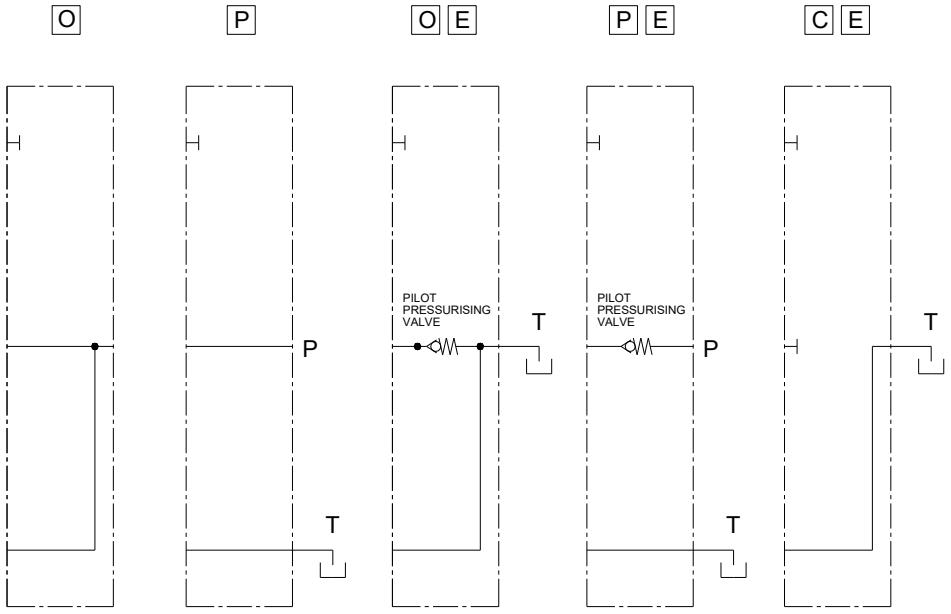
| Option | Code |
|---|---|
| Top port | T |
| Side port | S |
| G1/2 Port | 4 |
| G3/4 port | 6 |
| Outlet | O |
| Pressure Carry Over | P |
| Outlet - solenoid | OE |
| Pressure Carry Over - Solenoid | PE |
| Closed Centre - Solenoid | CE |




Example codes

| | | | |
|---|---|---|---|
| T | 3 | O | G3/8 Top port |
| S | 6 | P | G3/4 Side port and Pressure Carry Over |
| T | 4 | OE | G1/2 Top port for Solenoid sections |
| T | 4 | CE | G1/2 Top port, Closed centre for Solenoid sections |

Pilot drillings omitted for clarity



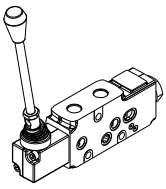

| Outlet | Outlet with PCO | Outlet for Solenoid Sections | Outlet with PCO for Solenoid Sections | Outlet Closed Centre for Solenoid Sections |
|---|---|---|---|---|

# V4-40 & V5-60 WORKING SECTIONS

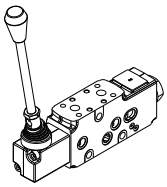
## DESCRIPTION

The V4-40 and V5-60 working sections have family of spools to suit most applications. There are standard or fine metering options and 2, 3 and 4 position detent / spring centring mechanism combinations.
Actuation options are manual levers – standard / rotary / dual axis (x & +), cable, direct link to the spool, pnuematic or pilot solenoid (with or without manual lever override).
The standard manual lever assembly has four orientation options and is universal across the range. Lever knobs are available in a variety of colours.
Spool operated single or twin V3 series micro-switch assembles can be fitted to manual sections with the option of IP67 environmental protection.
Body options consist of standard threaded ports or an interface for the fitment of ancillary valves.

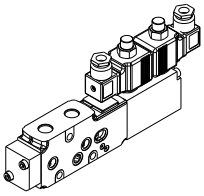
V4-40



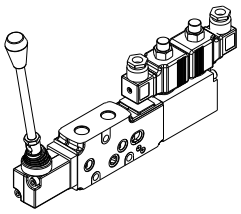
Manual



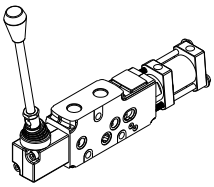
Interface



Solenoid

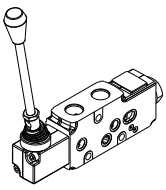


Solenoid with Lever Override

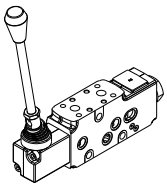


Pneumatic with Lever Override

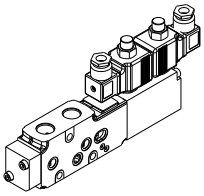
V5-60



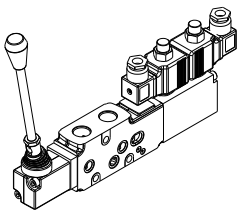
Manual



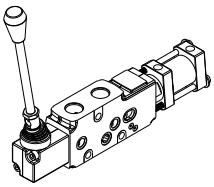
Interface



Solenoid



Solenoid with Lever Override



Pneumatic with Lever Override

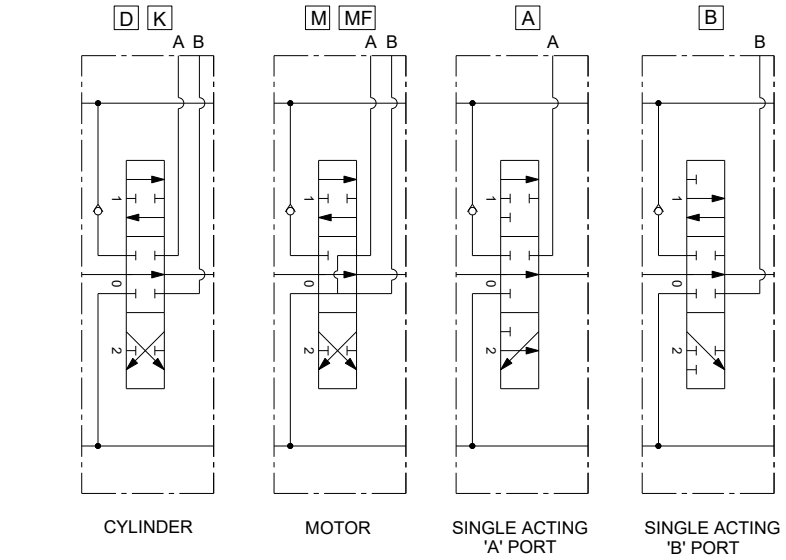
# V4-40 & V5-60 WORKING SECTIONS

## SPOOL OPTIONS

| Manual | Code |
|---|---|
| Cylinder | D |
| Cylinder - fine metering | K |
| Motor | M |
| Motor - fine metering | MF |
| Single acting A port | A |
| Single acting B port | B |
| 4 Position float | 4 |
| Regenerative | R |
| Unloading (Dead mans handle) | P |

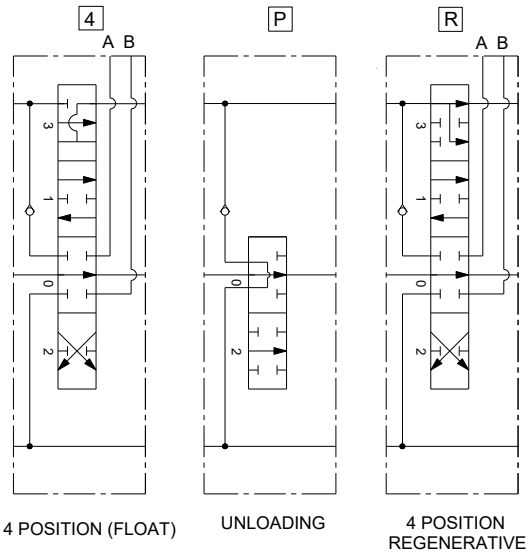
| Solenoid | Code |
|---|---|
| Cylinder | D |
| Motor* | M |
| Single acting A port | A |
| Single acting B port | B |

| Pneumatic | |
|---|---|
| Cylinder | D |
| Motor | M |
| Single acting A port | A |
| Single acting B port | B |




*For flows <5 L/min please contact us.

SOLENOID PILOT LINES OMITTED FOR CLARITY



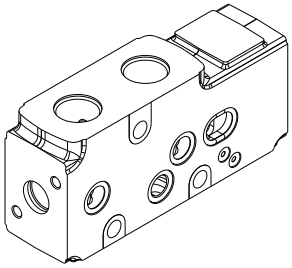
# V4-40 & V5-60 WORKING SECTIONS

## BODY OPTIONS

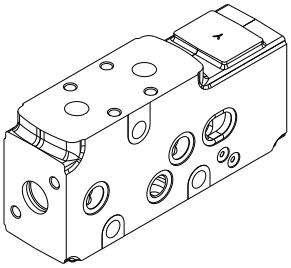
Body options are available with standard G (BSP) ports or with an ancillary interface to facilitate the fitment of Pilot Check, Service Line Relief or Solenoid 4th Position manifolds.

| Option | Code |
|---|---|
| Standard ports | - |
| Ancillary interface - Pilot check | Y |
| Ancillary interface - Service relief | Z |

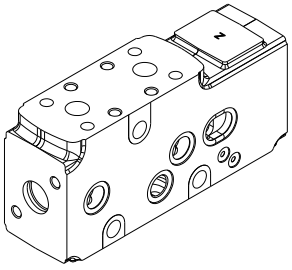
□



Y



Z



| | |
|---|---|
| **Material** | Cast Iron |
| **Weight** | 2.0kg Manual<br>2.5 kg Solenoid |
| **Width** | 38.1mm |

# V4-40 & V5-60 WORKING SECTIONS

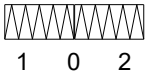
## SPOOL POSITIONING OPTIONS

2, 3 and 4 position centring mechanisms in a combination of spring return and detent location.

| **Manual** | **Code** |
|---|---|
| Spring - 3 Position | C |
| Spring - 2 position P-B | 2C |
| Detent - 3 Position | L |
| Detent - 2 position P-B | 2L |
| Detent - 2 position P - A | 2Li |
| Detent friction - 3 Position | O |
| Spring / Detent - 3 Position | F |
| Float - 4 Position | 4C |
| Detent - 4 position | 4L |
| **Solenoid** | |
| Solenoid - 3 Position | E |
| Solenoid - 2 position | 2E |
| **Pneumatic** | |
| Pneumatic - 3 Position | P |
| Pneumatic - 2 position | 2P |

Spring - 3 Position

C

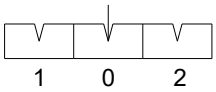



Spring - 2 Position P to B

2C

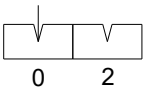
Detent - 3 Position

L



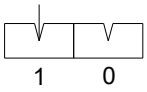

Detent - 2 Position P to B

2L



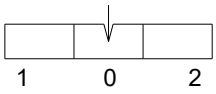

Detent - 2 Position P to A

2Li



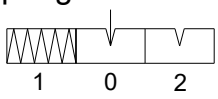

Detent Friction - 3 Position

O



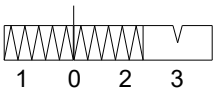

Spring / Detent - 3 Position

F



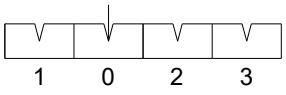

Float - 4 Position

C




Detent - 4 Position

L




Solenoid - 3 Position

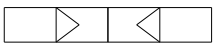
E

Solenoid - 2 Position

2E

Pneumatic - 3 Position

P



Pneumatic - 2 Position

2P

# V4-40 & V5-60 WORKING SECTIONS

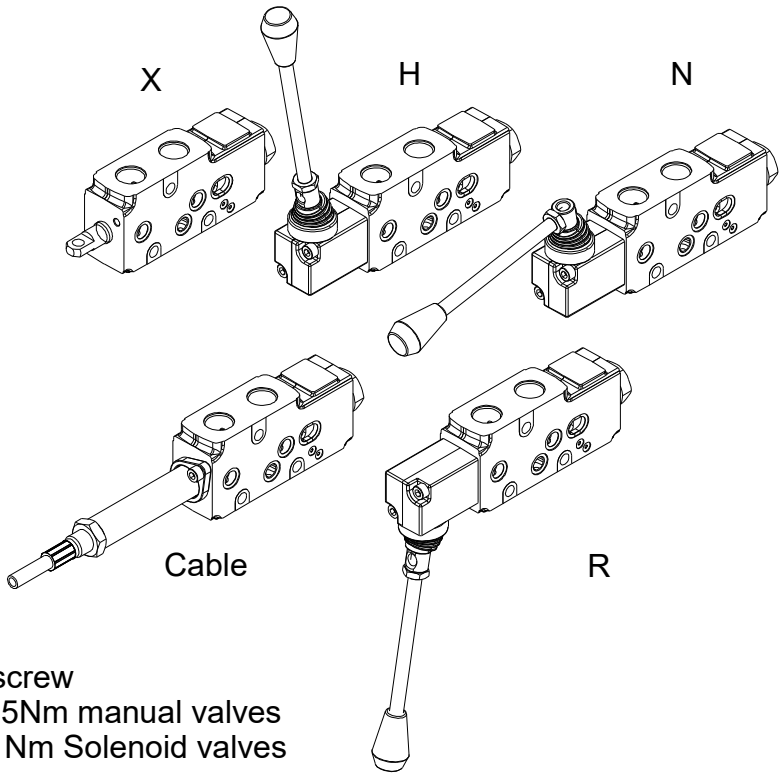
## CONTROL OPTIONS - STANDARD LEVER & CABLE

The standard lever is common across the sectional valve range. It can be supplied as standard or with environmental protection.

A further option on manual and solenoid sections is to have the lever fitted 'sideways' on - contact us for details.

| Option | Code |
|---|---|
| No Lever* | X |
| No Lever - solenoid sections | - |
| Standard Lever | H |
| Standard Lever - 90º | N |
| Standard Lever - Reversed | R |

* For cable operation select code X. The mounting holes for the lever accept a standard 'Morse' type cable.




| | |
|---|---|
| **Fixing** | 2x M6 Cap screw<br>Torque - 13.5Nm manual valves<br>8 Nm Solenoid valves |
| **Knob** | Black standard,<br>Red, Blue, Green,<br>Yellow or Ident' type |
| **Body** | Aluminium LM24TF |
| **Fasteners** | Deltatone |
| **Weight** | 0.3kg |

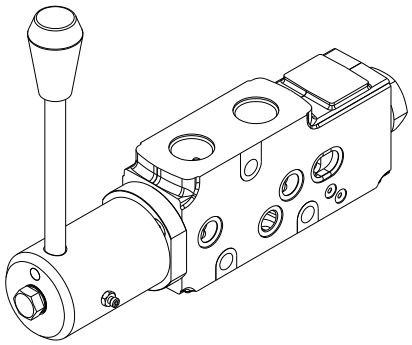
# V4-40 & V5-60 WORKING SECTIONS

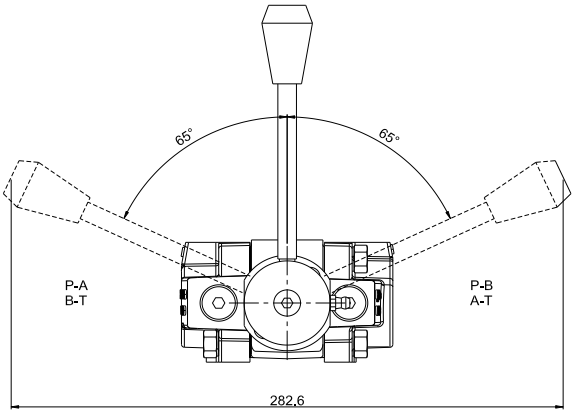
## CONTROL OPTIONS - ROTARY LEVER

Used extensively in the forestry and fishing industry to control the speed of conveyors and winches. The Hy-Pro rotary lever has been developed specifically to enable the operator precise control of motors and cylinders. The lever rotates through a ± 65° arc and operates a scroll which converts the rotary action of the lever into axial movement of the spool.
The mechanism has a friction detent feature which positively holds the spool in neutral or will maintain the selected position when operated.
Because of the geometry of the lever it is not possible to include it in multi-section valves but it is a retro-fit to existing single section assemblies.

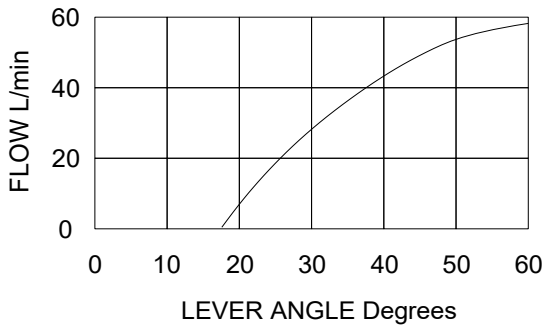
Refer to page 29 for full ordering code.

**ROTARY LEVER**






TYPICAL METERING CHARACTERISTIC




| | |
|---|---|
| **Body** | Manganese bronze CZ114 |
| **Lever** | Stainless steel |
| **Weight** | 2.0kg |
| **Width** | N/a |

# V4-40 & V5-60 WORKING SECTIONS

## CONTROL OPTIONS - MULTI AXIS

The V4 and V5 dual axis levers operate two sections either simultaneously or individually, allowing the operator to have total control of two sections using 360 degrees of movement.

The H+ version controls section one in the north and south planes and section two in the east and west . Combinations of movement are achieved between these points.

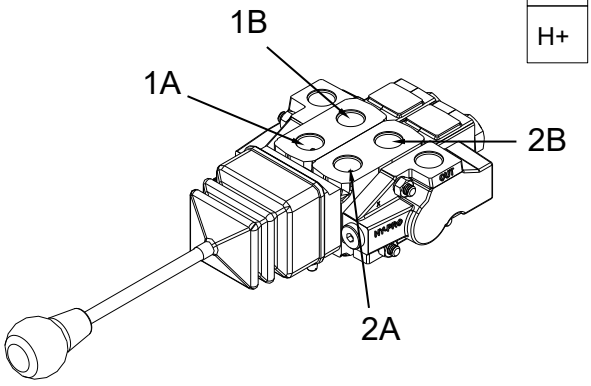
The Hx version controls both sections in the north, south, east and west planes and individual sections between these points.

Refer to page 29 for full ordering code.

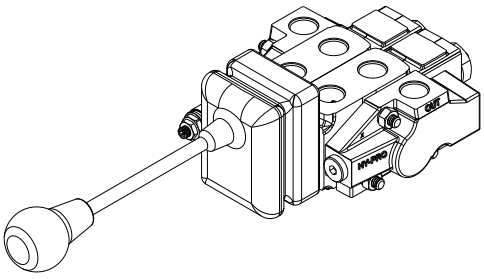
**MULTI AXIS**

HX
H+

H+

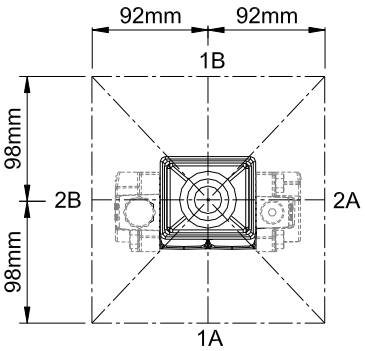



Hx

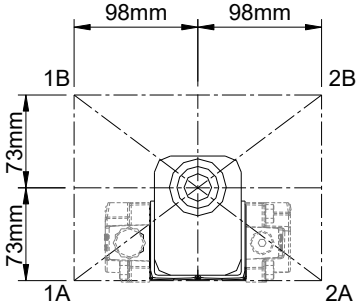


| | |
|---|---|
| **Minimum operating Force** | |
| One spool | 2.5 kg |
| Two spool | 5.0 kg |
| **Body** | Aluminium |
| **Pivots** | Carburised steel |
| **Width** | N/a |

H+




Hx



# V4-40 & V5-60 WORKING SECTIONS

## ENVIRONMENTAL PROTECTION OPTIONS

The valves are available with a marinised finish to withstand harsh environments. It comprises black anodised lever housings with stainless steel handles and locknuts. For further protection such as in marine applications the spool can be supplied with electro-less nickel plating.

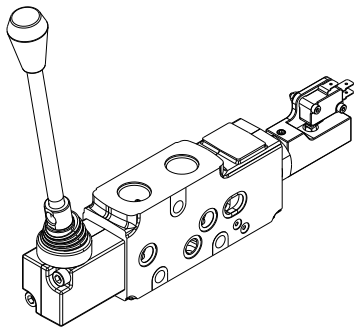
Refer to the order and example codes on pages 28 and 29.

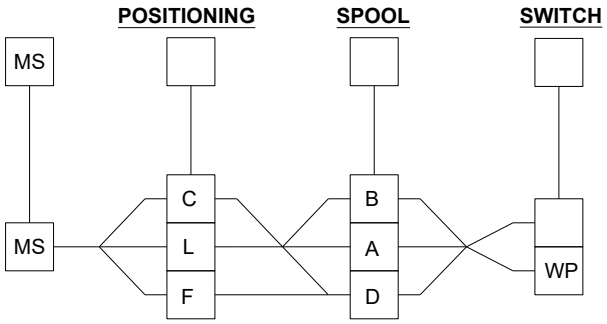
| | Code |
|---|---|
| Standard | - |
| Stainless steel lever & Anodised housing | S |
| Stainless steel lever, Anodised housing & Nickel plated spool | M |

## WORKING SECTIONS - MICRO-SWITCH OPTIONS

The V4-40 and V5-60 ranges can be fitted with a micro-switch to enable the activation of auxiliary functions with spool operation.

| **Micro-switch Options** | **Code** |
|---|---|
| Spring centred | C |
| Detent | L |
| Spring/Detent | F |
| Main spool S/Acting B | B |
| Main spool S/Acting A | A |
| Main spool D/Acting | D |
| Standard V3 Switch | - |
| IP67 V3 Switch | WP |

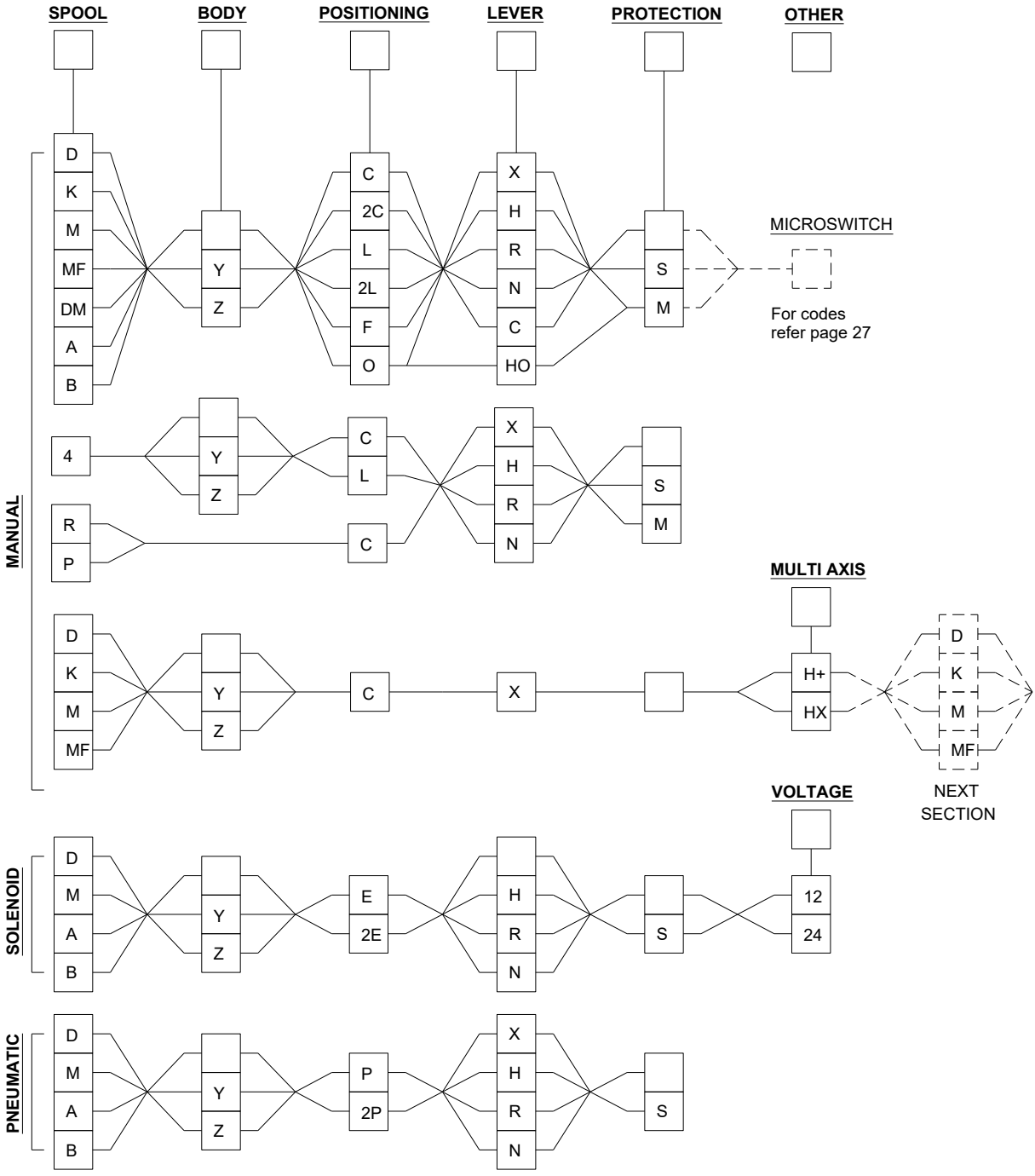




# V4-40 & V5-60 WORKING SECTIONS

## ORDER CODES

Create the order code by reading left to right, following the paths between options.
A selection of typical codes are shown on the next page.



# V4-40 & V5-60 WORKING SECTIONS

## ORDER CODES - EXAMPLES

A selection of typical spool section order codes generated by the matrix shown on the previous page. Manual, solenoid and pneumatic spool sections can be used in the same valve assembly.

**MANUAL**

| SPOOL | BODY | POSITIONING | LEVER | PROTECTION | OTHER | |
|---|---|---|---|---|---|---|
| D | | C | H | | | Cylinder spool<br>Standard ports<br>Spring centred<br>Standard lever |
| M | | L | H | S | | Motor spool<br>Standard ports<br>Detented<br>Marinised lever |
| K | | L | H | M | | Fine metering cylinder spool<br>Standard ports<br>Detented<br>Marinised lever and spool |
| M | Z | C | R | S | | Motor spool<br>Interface for service line relief manifold<br>Spring centred<br>Reversed marinised lever |
| A | | C | x | | | Single acting cylinder spool<br>Standard ports<br>Spring centred<br>No lever |

**SOLENOID**

| SPOOL | BODY | POSITIONING | LEVER | PROTECTION | VOLTAGE | |
|---|---|---|---|---|---|---|
| D | | E | H | S | 12 | Cylinder spool<br>Standard ports<br>Solenoid control<br>Marinised lever<br>12VDC |
| M | Z | 2E | | | 24 | Motor spool<br>Interface for service line relief manifold<br>2 position solenoid control<br>24VDC |
| M | Y | E | | | 24 | Motor spool<br>Manifod interface for pilot check valves<br>Solenoid control<br>24VDC |

**PNEUMATIC**

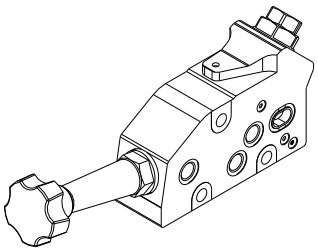
| | | | | | | |
|---|---|---|---|---|---|---|
| D | | P | H | | | Cylinder spool<br>Standard ports<br>Pneumatic control<br>Standard lever |

# V4-40 & V5-60 INTERSECTIONS

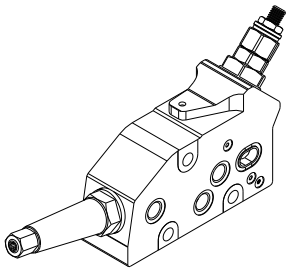
## FLOW CONTROL SECTION - MANUAL

A fully pressure and flow-compensated metering type flow control, which can be included in V4 and V5 manual and solenoid valve assemblies. The regulated flow is supplied via the pressure gallery to down stream sections, while those up stream are unaffected. A variety of controls are available to allow the flow to be pre-set or continually adjustable. A relief valve option limits the maximum pressure within the pressure gallery and a series link version can be supplied to ensure full pump flow is available to the regulated sections even when up-stream sections are in use.

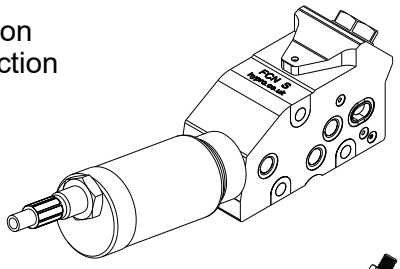
Handwheel adjustment



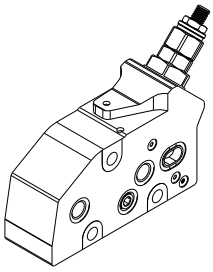
Screw adjustment with Relief valve



Cable operation
Series connection



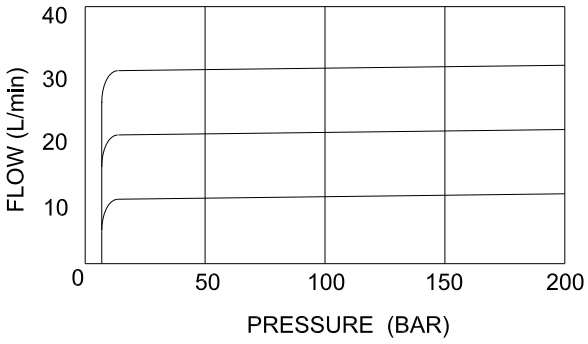
Fixed flow
With relief valve



| | |
|---|---|
| **Adjustable range** | 0-60 L/min |
| **∆P Inlet to outlet 40 L/min** | 0.6 bar |
| **ΔP Inlet to service 40 L/min** | 4.6 bar |

**Relief Valve**
Adjustable. Pilot Operated

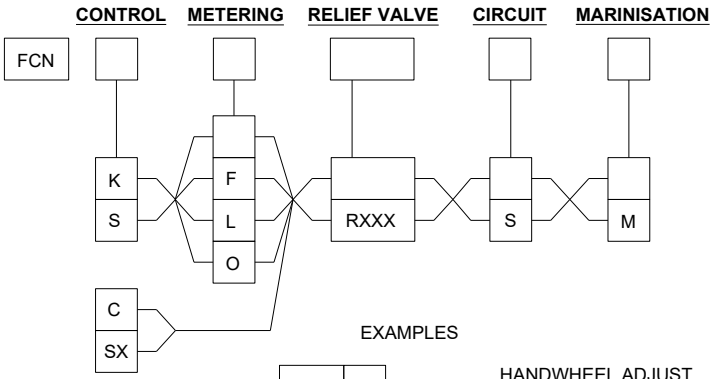
| | |
|---|---|
| **Body** | Aluminium |
| **Weight** | 2.0kg |
| **Width** | 38.1mm |
| | 50.8mm (Series |



# V4-40 & V5-60 INTERSECTIONS

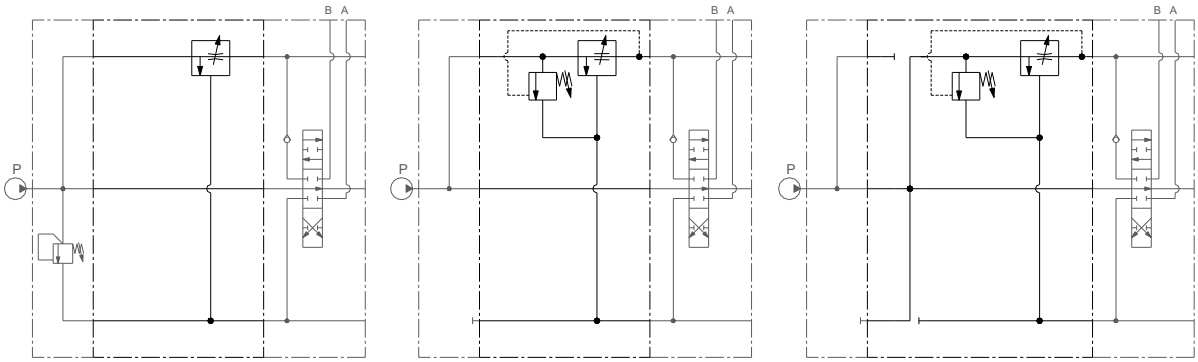
| Option | Code |
|---|---|
| Handwheel | K |
| Screw & lock nut | S |
| Cable | C |
| Fixed Flow | SX |
| Standard metering | - |
| Fine metering | F |
| 1 Turn metering | L |
| No shut off metering | O |
| Marinisation | M |
| Relief valve | RXXX |
| Series connection | S |

‘X’ = flow setting L/min
‘XXX’ = relief valve setting in bar.




EXAMPLES

| | | | | |
|---|---|---|---|---|
| FCN | K | | | HANDWHEEL ADJUST<br>STANDARD NEEDLE |
| FCN | S | R210 | | SCREW ADJUST<br>RELIEF VALVE SET 210 BAR |
| FCN | C | S | | CABLE OPERATION<br>SERIES CIRCUIT |
| FCN | S5 | R80 | M | FLOW FIXED AT 5.0 L/MIN<br>RELIEF VALVE SET 80 BAR<br>MARINISATION |

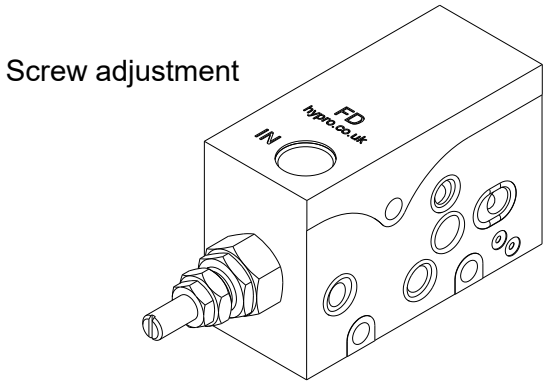


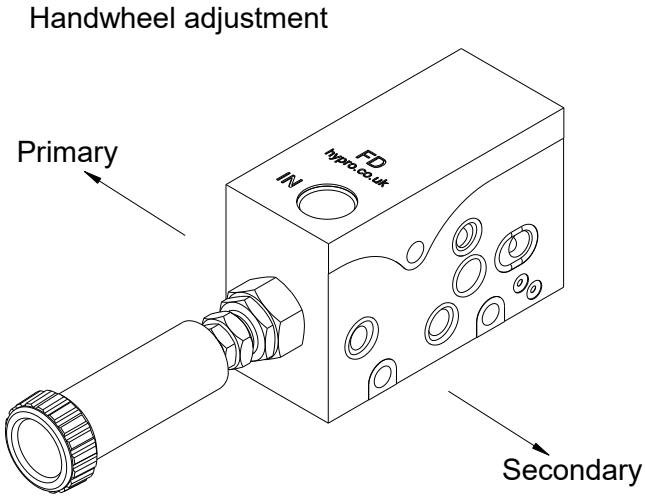

Standard | Relief valve | Relief valve & Series link

# V4-40 & V5-60 INTERSECTIONS

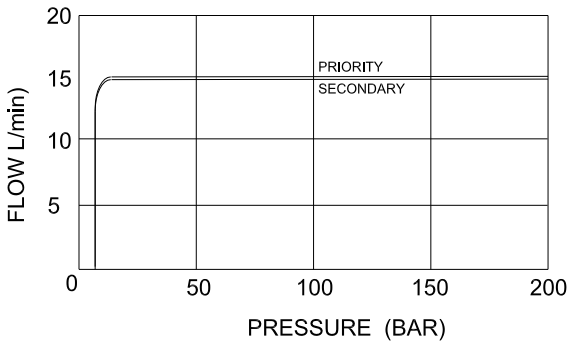
## FLOW DIVIDER SECTION - MANUAL

The flow divider inter-section allows two hydraulic circuits to be built into one valve assembly. Flow is fed directly to the section. The adjustable priority flow is fed to the left hand sections and the remaining flow to the right hand sections, thus allowing two circuits to be run simultaneously and independently. A series link can be incorporated in the flow divider section, re-combining the flow and feeding the full flow to the right hand sections, whilst maintaining priority flow to the left hand sections.
The pressure compensated flow divider can be supplied with either a graduated handwheel for continous adjustment or preset with a lock nut.



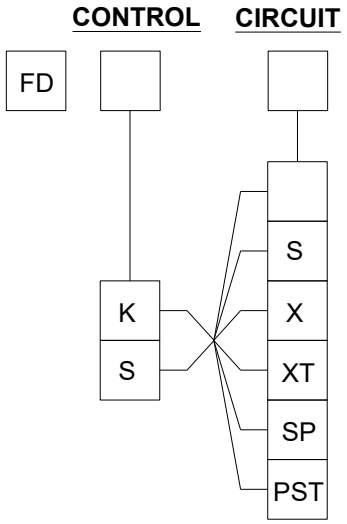



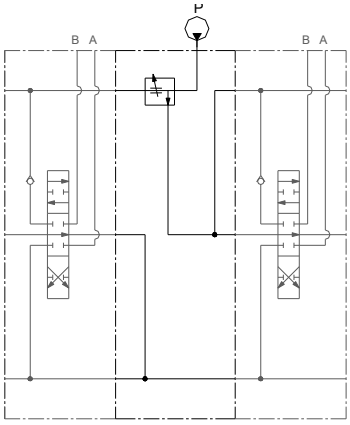

| | |
|---|---|
| **Input flow @ 60 L/min** | |
| **Priority flow maximum** | 36 L/minute |
| **Priority flow minimum** | 0 L/minute |
| **Secondary flow maximum** | 60 L/minute |
| **Secondary flow minimum** | 24 L/minute |
| **∆P inlet to service** | 6.9 bar |
| | |
| **Body** | Aluminium |
| **Weight** | 0.9 Kg |
| **Width** | 50mm |



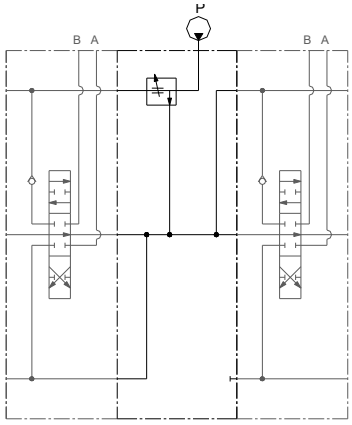
# V4-40 & V5-60 INTERSECTIONS

| Option | Code |
|---|---|
| Handwheel | K |
| Screw & lock nut | S |
| Parallel Connection | |
| Series Connection | S |
| Parallel - Priority to Tank Internal connection | X |
| Parallel - Priority Tank External Port | XT |
| Series - Priority Flow Available when no Upstream section Selected | SP |
| Parallel - Priority Flow to External Port | PST |

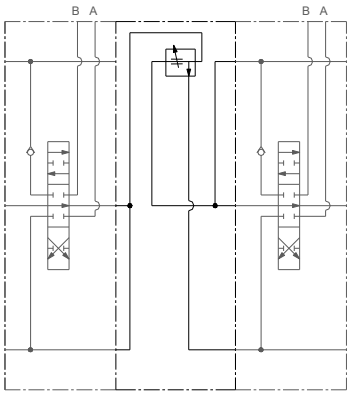


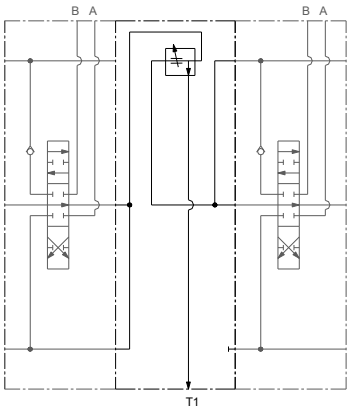

Parallel



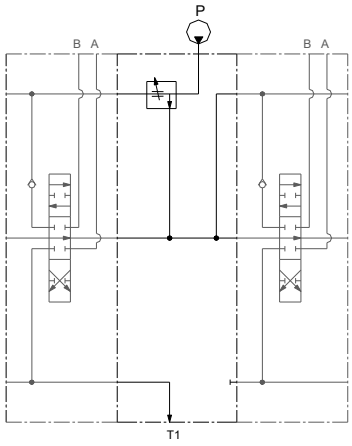

Series S



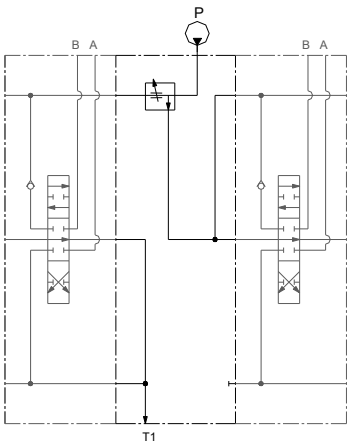

Parallel with Priority Flow to Tank X




Parallel with Priority Flow to Port XT




Series with Priority Tank port SP




Parallel with Priority Tank port PST

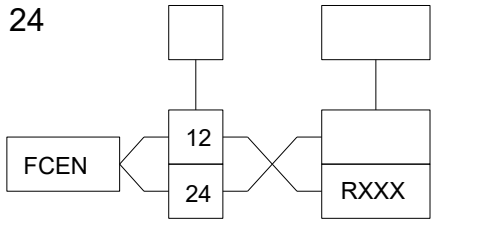
# V4-40 & V5-60 INTERSECTIONS

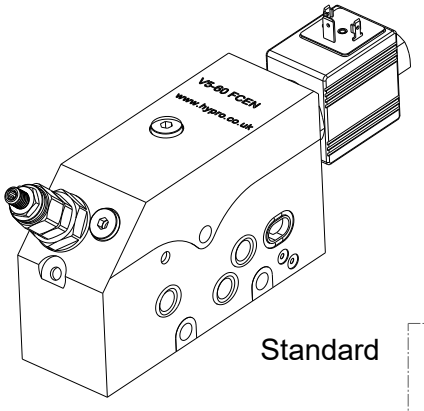
## FLOW CONTROL SECTION - ELECTRIC

The priority type pressure compensated flow control varies the flow available to the down stream sections in the valve assembly. If used in conjunction with solenoid sections complete remote control can be achieved electronically.
When used in conjunction with a proportional PWM driver plug, the control is obtained with a 10k Ω potentiometer or 0 to 10V DC external signal.

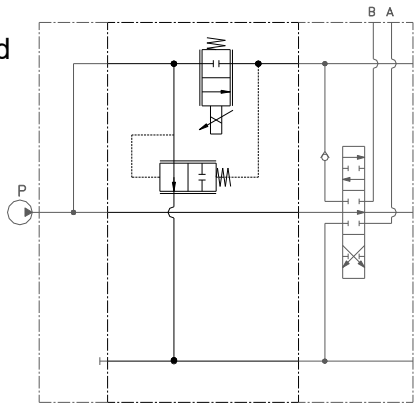
| Option | Code |
|---|---|
| Proportional 12 VDC | 12 |
| Proportional 24 VDC | 24 |
| Relief valve | RXXX |

'XXX' = relief valve setting inbar.




Standard

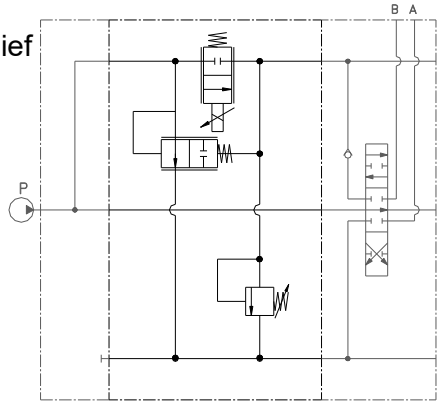



| | |
|---|---|
| **Adjustable range** | 0–35 L/min |
| **Δp inlet to outlet 60L/min** | 0.9 bar |
| **Δp inlet to service** | 6.9 bar |
| **Maximum pressure** | 210 bar |
| **Coil Power** | 28 Watts |
| **Coil Max Current** | 3.4 Amps @ 20°C |

**Relief Valve**
Adjustable.
Pilot Operated

| | |
|---|---|
| **Body** | Aluminium |
| **Weight** | 2.0kg |
| **Width** | 51mm |

With relief valve

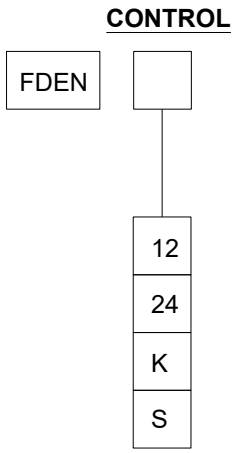


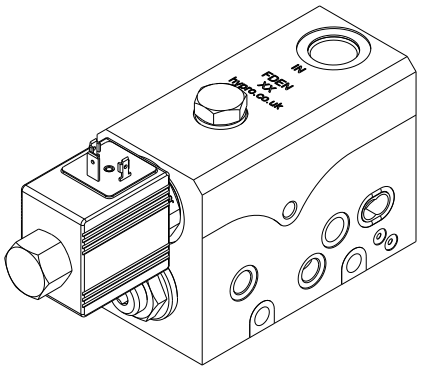
# V4-40 & V5-60 INTERSECTIONS

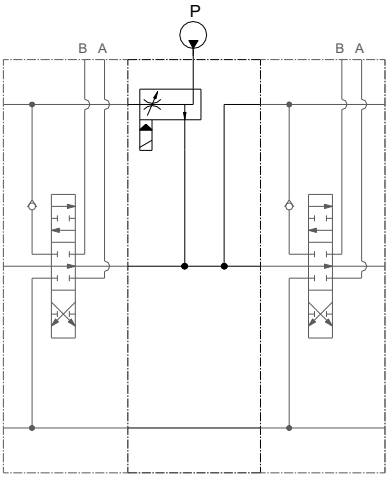
## FLOW DIVIDER SECTION - ELECTRIC

The adjustable priority flow is unaffected by variable pump delivery or pressure changes in either priority or secondary circuits. Control is via a proportional driver plug and 10KΩ Potentiometer. A manually controlled version is also available.

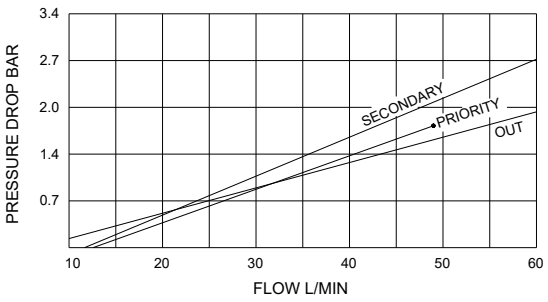
| Option | Code |
|---|---|
| Proportional 12 VDC | 12 |
| Proportional 24 VDC | 24 |
| Manual handwheel | K |
| Manual Screw Adjuster | S |




| | |
|---|---|
| **Priority flow** | 0-60 L/min |
| **Secondary flow** | 0-60 L/min |
| **∆P inlet to tank 40 lpm** | 2.0 bar |
| **∆P inlet to priority service 40 L/min** | 1.6 bar |
| **∆P inlet to secondary service 40 L/min** | 2.0 bar |
| **Maximum pressure** | 210 bar |
| **Coil Power** | 28 Watts |
| **Coil Max Current** | 3.4 Amps @ 20°C |
| **Body** | Aluminium |
| **Weight** | 1.5 Kg |
| **Width** | 70mm |



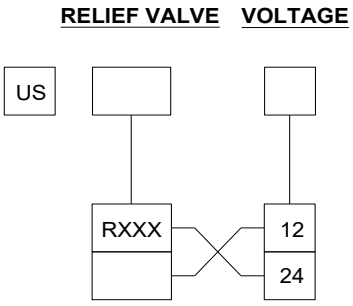
# V4-40 & V5-60 INTERSECTIONS

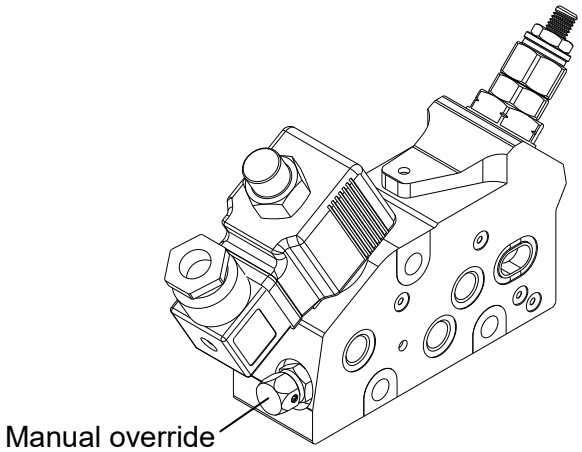
## SOLENOID UNLOADER SECTION

Designed to rapidly unload the pressure gallery to tank when power to the coil is interrupted. Can be used in both manual and solenoid operated valve assemblies to override the other controls of the valve bank.

| Option | Code |
|---|---|
| Relief valve | RXXX |
| 12VDC | 12 |
| 24VDC | 24 |

'XXX' = relief valve setting in bar.



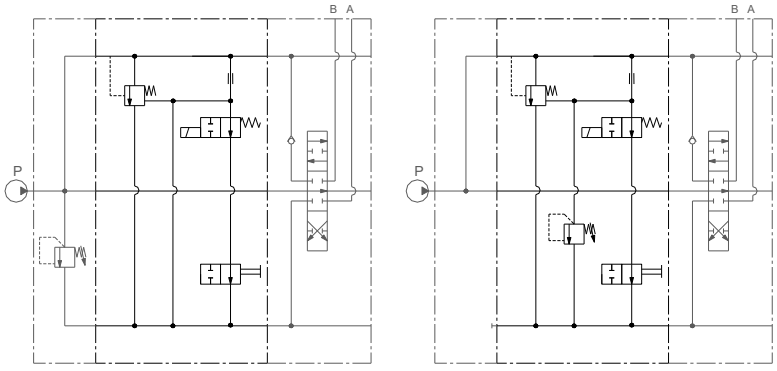




**Relief Valve**
Adjustable.
Pilot Operated

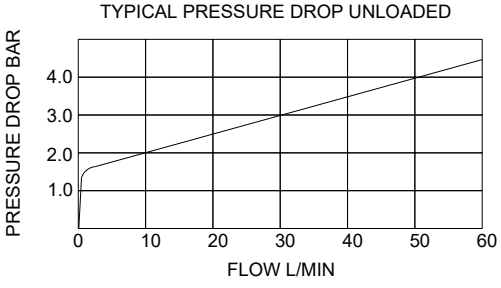
**Manual Override**
Screw in to operate

**Unloader**
NC Normally closed
Unloads P to T
unless energised

**Material** Aluminium
**Weight** 1.7kg
**Width** 38.1mm




STANDARD RELIEF VALVE

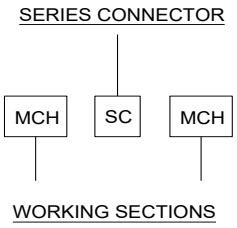


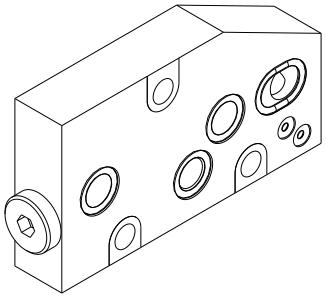
# V4-40 & V5-60 INTERSECTIONS

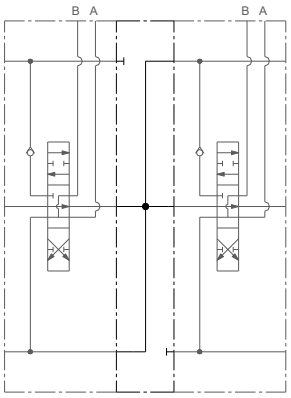
## SERIES CONNECTOR SECTION

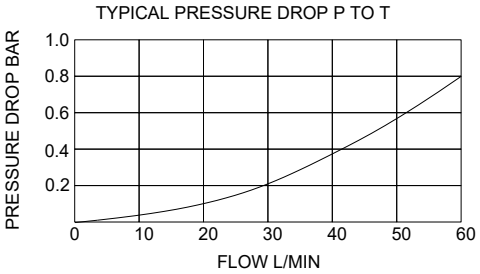
Series connector sections are designed to be fitted between two working sections, connecting in series the actuators that they control. Series connectors can be used to synchronize two hydraulic motors where the return oil from one is fed to the inlet of the second.

The series connector effects only the valve sections immediately upstream and downstream of its position in the valve bank. Other sections remain connected in parallel. When using the series connectors, consideration must be given to upstream sections. This is because the normally open tank gallery in the valve bank is pressurized when the series connected actuators are on load. If this is a problem specially designed inlet covers are available which contain a separate outlet port for the relief valve bypass flow. Special provision has also to be made for ancillary valves when used with series-connected valve banks. In such cases, customers are advised to discuss their circuit design with Hy-Pro.






| | |
|---|---|
| **Material** | Aluminium |
| **Weight** | 0.3kg |
| **Width** | 19.0mm |

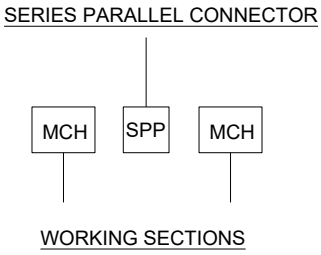
# V4-40 & V5-60 INTERSECTIONS

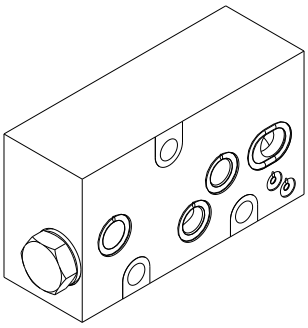
## SERIES PARALLEL SECTION

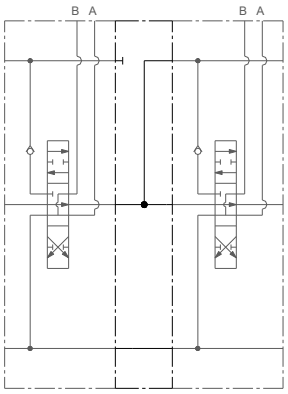
The series parallel section is used to give priority to up stream sections.

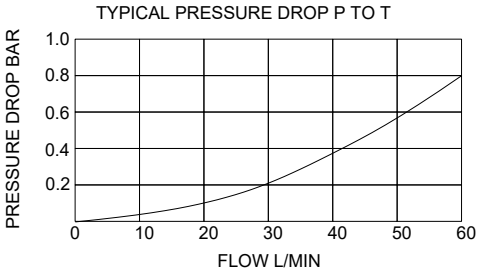
The pressure gallery is isolated from down stream sections when the up stream section is selected. If the up stream section is single acting, the pressure gallery is only closed when in the raised position, i.e. the down stream sections will have a pressure feed when in the lower position.

The series parallel connector can be used in manual and solenoid valve assemblies to provide an interlock or ensure a service is activated in the correct sequence.





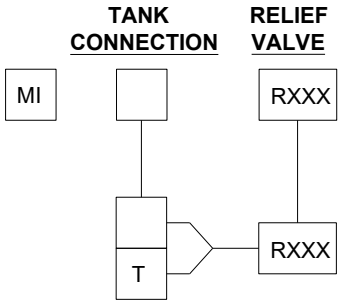

| | |
|---|---|
| **Body** | Aluminium |
| **Weight** | 0.5 kg |
| **Width** | 38.1mm |

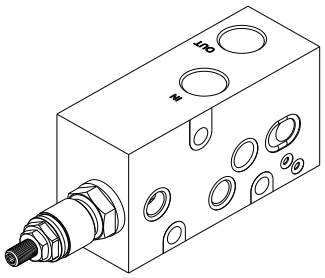
# V4-40 & V5-60 INTERSECTIONS

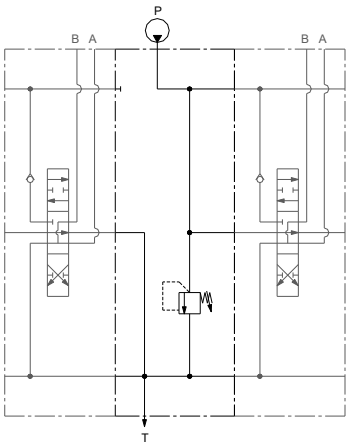
## MID INLET SECTION

A mid inlet section is used to enable two separate control valves to be built into one assembly. The first valve is fed from the inlet cover whilst the second is fed by the mid-inlet intersection. An adjustable relief valve is included to protect the pump supplying the sections fed by the mid-inlet. The mid inlet section combines elements of our standard inlet and outlet covers thus permitting a very compact installation with less hoses and connections than two separate valve banks. Options are available to have the outlet flow from both sides of the assembly combined into one outlet (MI) or as 2 separate outlets if the combined return flow is greater than 60 lpm (MIT).

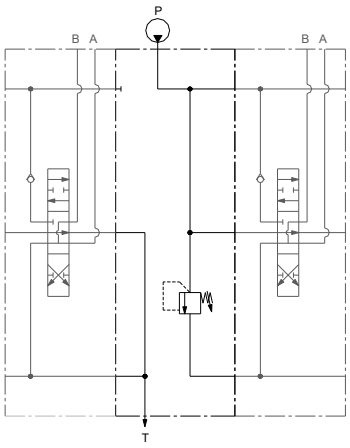
| **Option** | **Code** |
|---|---|
| Internal tank connection | - |
| External tank connection | T |
| Relief Valve | RXXX |






MI RXXX




MI T RXXX

| | |
|---|---|
| **∆p at rated flow P to T** | 0.5 bar |
| **Body** | Aluminium |
| **Weight** | 0.6 kg |
| **Width** | 38.1mm |

# V4-40 & V5-60 ANCILLARIES

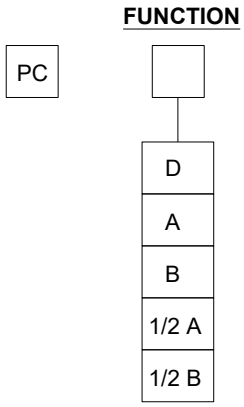
## PILOT OPERATED CHECK VALVE

The check valves are mounted on the service port face of a 'Y' type spool section. Where a single acting check valve is used, the section must be fitted with an 'M' spool to ensure pilot pressure is available to unlock the check valve.

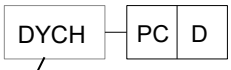
When used with cylinders, whose rod is large in relation to the diameter of the bore, it is possible for pressures to be generated in the rod end which can not be unloaded. To avoid this the ratio of the cylinder full area to the rod annular area must not be greater that 4:1, which is the pilot ratio of this check valve.

When lowering a loaded cylinder, the pump may not maintain the pilot pressure. This can result in jerky operation caused by oscillation of the pilot piston. This can be overcome by restricting the flow out of the cylinder to maintain pilot pressure at the check valve.

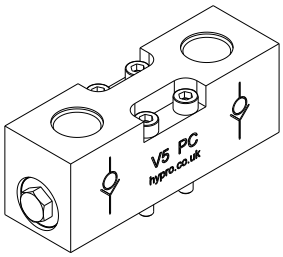
| Option | Code |
|---|---|
| Double Acting | D |
| Single Acting 'A' Port | A |
| Single Acting 'B' Port | B |
| Double Acting 'A' Port Only | 1/2 A |
| Double Acting 'B' Port Only | 1/2 B |

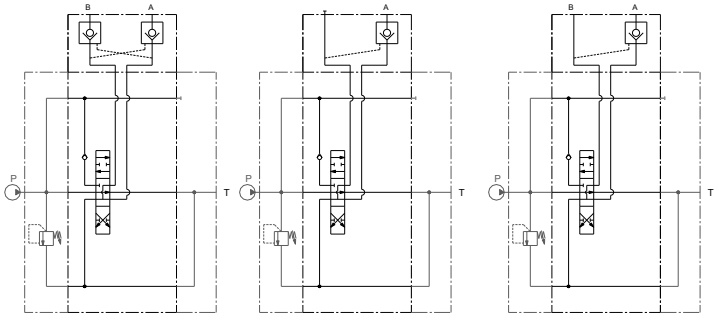



Example code



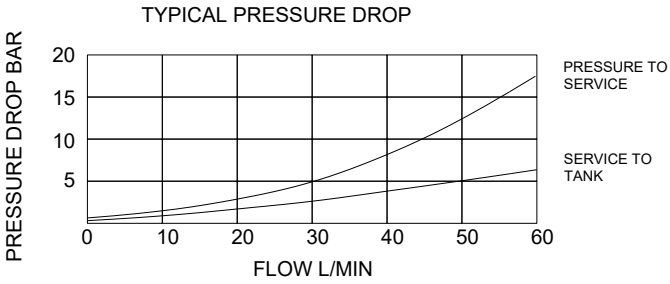

Working section with 'Y' type interface



Double Acting | Single Acting | 1/2 Double Acting

| | |
|---|---|
| **Opening pressure** | 3.0 bar |
| **Leakage @210 bar** | 0 cc/min |
| **Ratio** | 4:1 |
| **Body** | Cast iron |
| **Mounting interface** | Y |
| **Ports V4-40** | G3/8 |
| **Ports V5-60** | G1/2 |
| **Weight** | 1.2kg |



# V4-40 & V5-60 ANCILLARIES

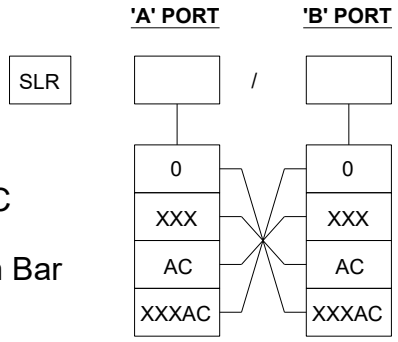
## SERVICE LINE RELIEF & ANTI-CAVITATION VALVE

The service line relief valve is used to limit the pressure in individual service lines and provide anti-cavitation protection in circuits with overrun situations to maintain oil in the actuators.

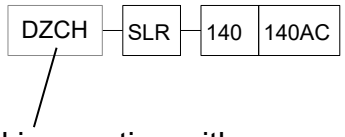
The valve is mounted onto the service port face of a "Z" type valve section using four cap screws. The body has a cavity for each service line. This will accept one of four cartridges, relief, anti-cavitation, relief and anti-cavitation or a blanking cartridge.
Relief valves are pre-set but are fully adjustable retrospectively using the socket screw located under the cap nut.
The service line relief and anti-cavitation valves can be used on manual and solenoid operated sections.

| Option | Code |
|---|---|
| No Function | 0 |
| Service Line Relief | XXX |
| Anti-Cavitiation | AC |
| Service Line Relief & Anti-Cavitiation | XXXAC |

XXX = Relief valve setting in Bar

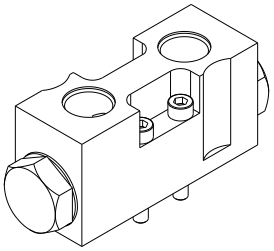


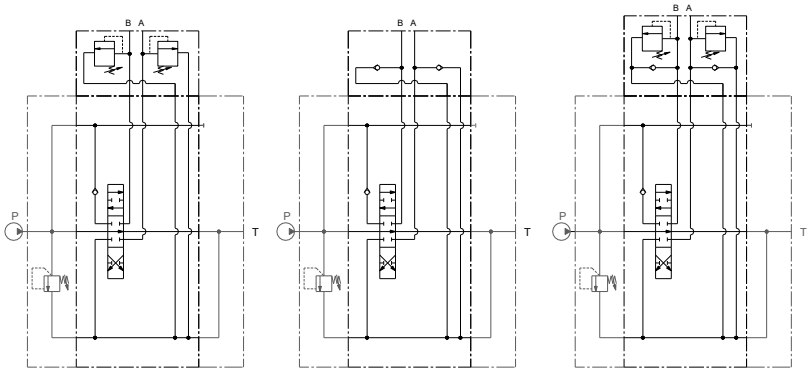

Example code




140 Bar A port
140 Bar & AC B port

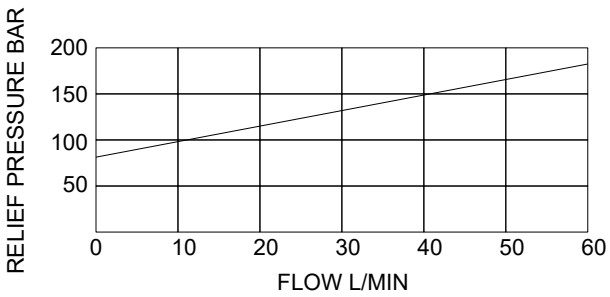
Working section with
'Z' type interface






XXX/XXX AC/AC XXXAC/XXXAC

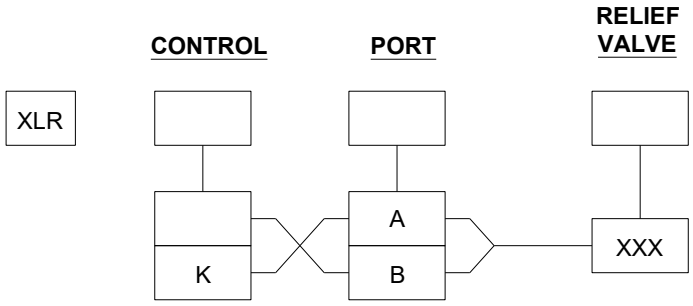
| | |
|---|---|
| **Relief valve range** | 20 bar to 205 bar |
| **Adjustment (approx)** | 35 bar per turn |
| **Anti-cavitation** | 0.5 bar |
| **Mounting interface** | Z type |
| **Body** | Aluminium |
| **Ports V4-40** | G3/8 |
| **Ports V5-60** | G1/2 |
| **Weight** | 0.5 kg |



# V4-40 & V5-60 ANCILLARIES

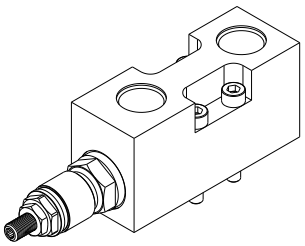
## CROSS-LINE RELIEF VALVE

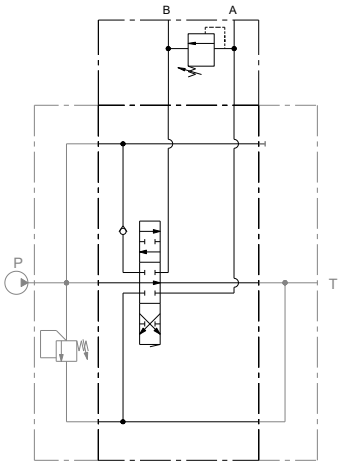
| Option | Code |
|---|---|
| Screw & Locknut | - |
| Handwheel | K |
| Acting on A port | A |
| Acting on B port | B |



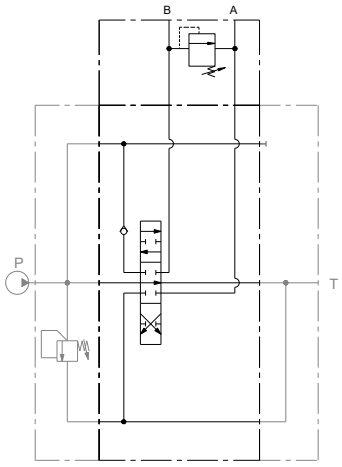

'XXX' = SETTING IN BAR

The cross line relief valve relieves pressure in the service port and unloads it into the tank port. It is uni-directional but the manifold can be rotated so that the relief valve acts upon either the A service port or B service port. Note that on solenoid sections B port relief only is possible. Adjustment is made by either screw and locknut or by a handwheel






XLR A XXX

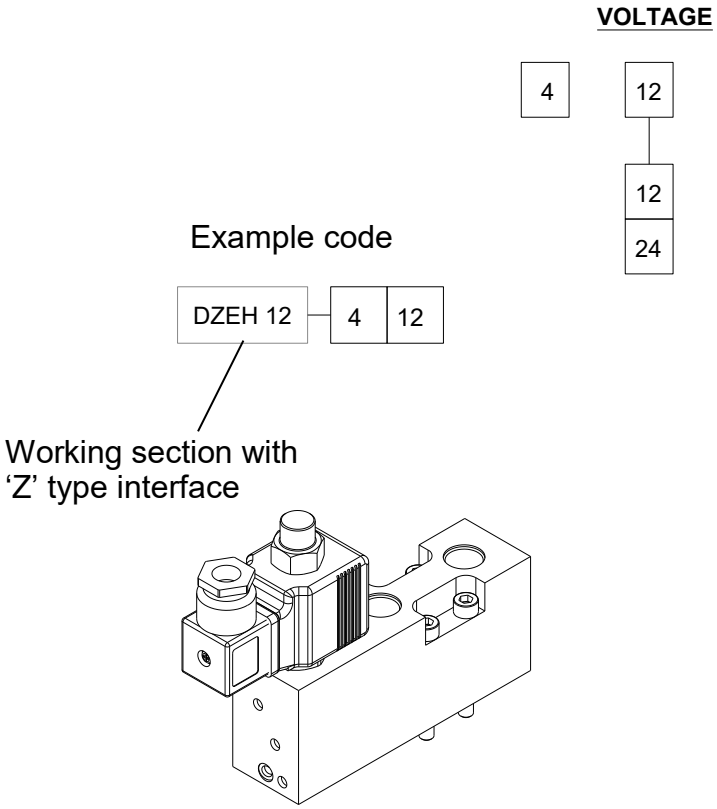


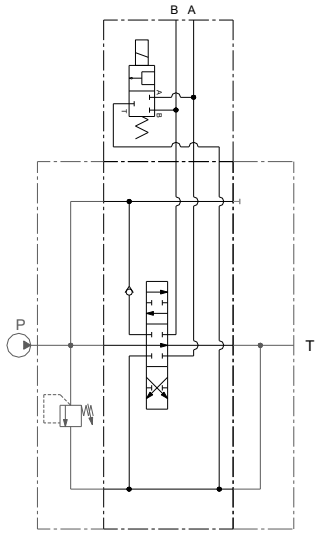

XLR B XXX

| | |
|---|---|
| **Relief Valve Range** | 20 bar to 250 bar |
| **Adjustment** | 35 bar per turn |
| **Mounting interface** | Y Type |
| **Body** | Aluminium |
| **Ports V4-40** | G3/8 |
| **Ports V5-60** | G1/2 |
| **Weight** | 0.5 kg |
| **Width** | N/a |

## SOLENOID 4 POSITION VALVE

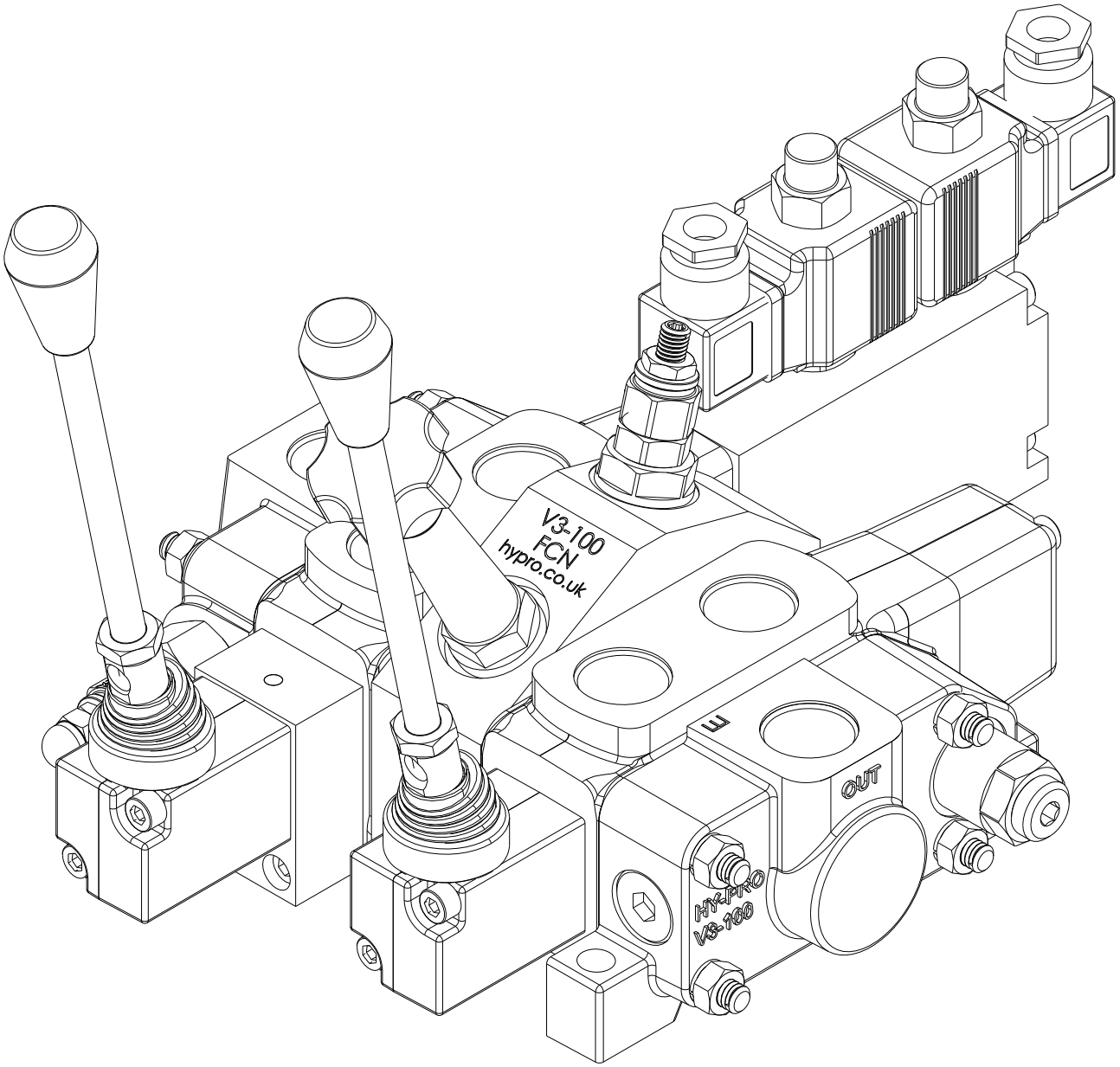
The solenoid 4 position valve connects both sides of a double acting cylinder to tank allowing it to float. For example when used with a D spool solenoid section on grass cutting or snow ploughing equipment the blades will follow the contours of the ground when the solenoid is actuated.




| | |
|---|---|
| **Coil Power** | 24 Watt |
| **Connector** | IP67 |
| **Mounting interface** | Z Type |
| **Ports** | G3/8 |
| **Body** | Aluminium |
| **Weight** | 1.0kg |
| **Width** | N/a |

# V3-100 LPM DIRECTIONAL CONTROL VALVE



# V3-100 LPM DIRECTIONAL CONTROL VALVE

## DESCRIPTION

The V3-100 directional sectional spool valve is one of the most compact 100 l/min valve available. Designed for pressures up to 250 bar the valve is available with two, three and four position spool control options and a range of spool types. The lever mechanism is a pressure die casting which totally encloses the spool for added protection. A range of optional ancillary valves are also available to be able to match the requirements of the most complicated and demanding circuits.

The V3-100 is also available with solenoid control. It uses 12V and 24V 24 Watt DC coils to switch the internal oil pilot to engage the main spool. A damping orifice fitted in the pilot line eliminates the harshness usually associated with standard direct acting solenoid valves and gives a positive feel to the control system.

Both manual and solenoid sections can be built into a valve assembly and the solenoid sections have the options of lever override.

### Application

Designed to be used in applications requiring a rugged, compact control valve with the option of remote control. Typically in the automotive recovery, recycling and agricultural industries where a mix of manual and solenoid control is essential.

### Features

- Excellent metering characteristics.
- Excellent load holding.
- Integral load check valve.
- Open and closed centre option.
- Adjustable, pilot operated relief valve.
- Robust enclosed lever mechanism.
- Flow control option.
- 100% production testing.
- Environmental protection option.
- 12 and 24V DC 24 Watt coils.
- Soft spool action.
- Interchangeable with manual sections.
- Lever override option.

# V3-100 OPERATING CONDITIONS

Maximum pressure 250 bar
210 bar*
Maximum back pressure 25 bar

* Assemblies with solenoids
Rated flow 100 l/min

Materials
Cast Iron BS1452-250
Aluminium BS1490
Spools Case Harden BS6507
Tie studs BS970/191 817M40T

Tie stud torque 13.5Nm

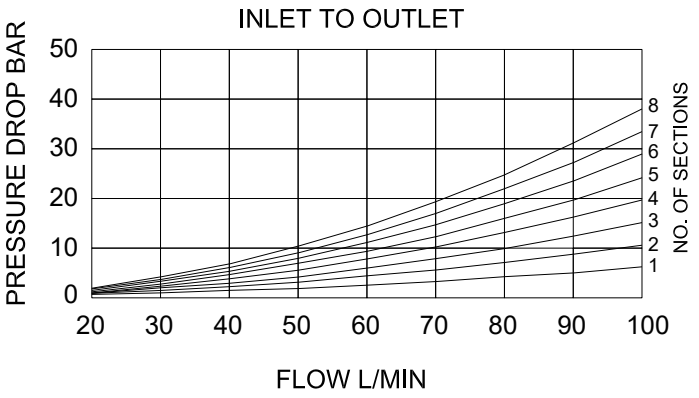
External protection
Black Paint to HTS1006

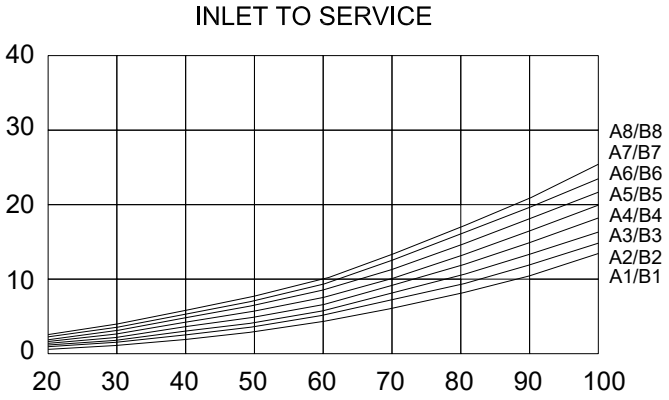
Stainless steel
BS 10088-3
Steel
Zinc chromate BS 1706 Zn3
Nitrotech NQ3
Black paint HTS1006

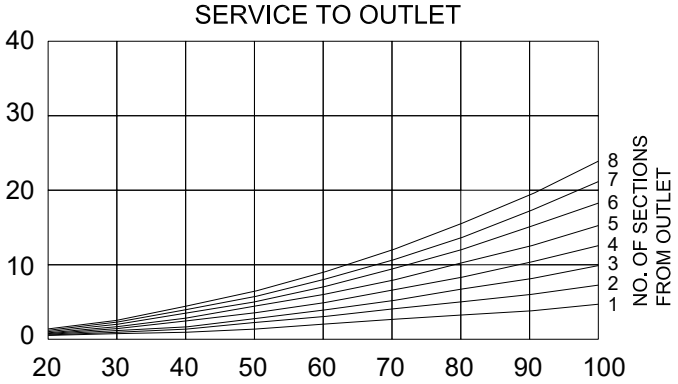
| | |
|---|---|
| Static Seals | Nitrile |
| Reciprocating | Viton |
| Spool High Pressure | PTFE |
| Anti Extrusion | PTFE |

Electrical

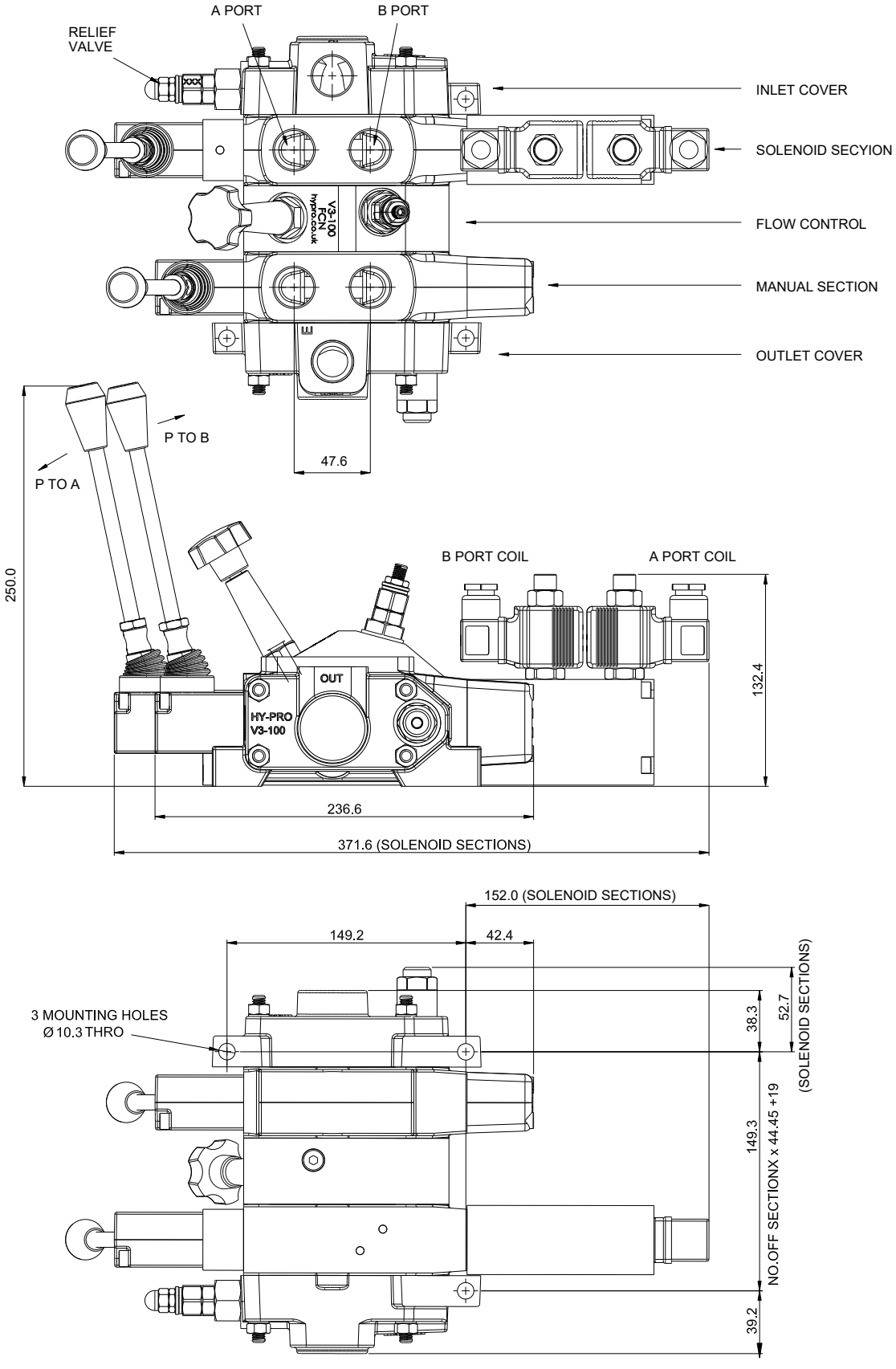
| | |
|---|---|
| Coil Voltage | 12 or 24VDC |
| Max cont. Voltage | 12V = 13.8V |
| | 24V = 27.5V |
| Coil Power | 24W |
| Protection | IP67 |
| Connection | DIN 43650 |
| Cable Ø | 6 - 8mm |
| (not supplied) | |



# V3-100 INSTALLATION DETAILS



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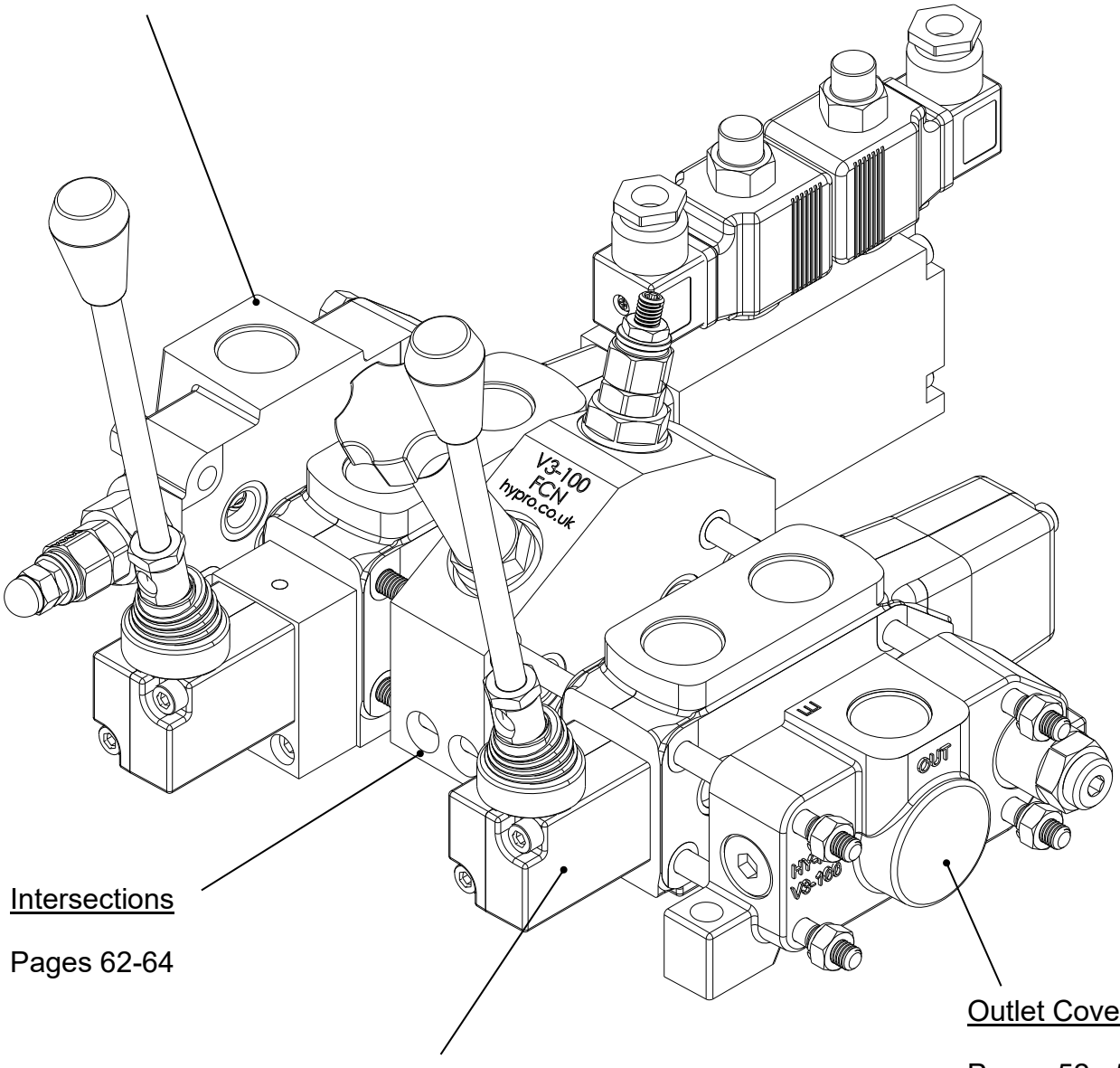


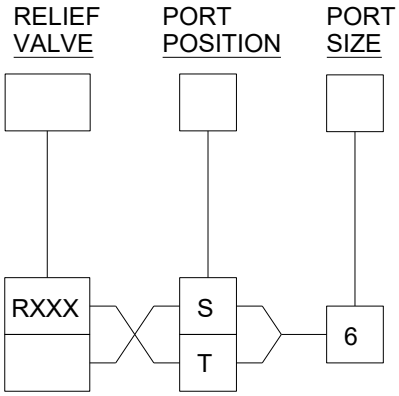
# V3-100 INLET COVERS

## STANDARD INLET

The inlet covers come with G(BSP) ports in either top or side positions.
They can be fitted with or without a relief valve.

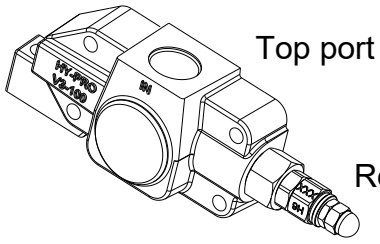
| **Option** | **Code** |
|---|---|
| Relief valve | RXXX |
| Side port | S |
| Top port | T |
| Port size G3/4 | 6 |

'XXX' = relief valve setting in bar.



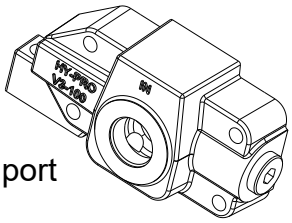

Example codes

| | | | |
|---|---|---|---|
| | T | 6 | Inlet with Top G3/4 port |
| | S | 6 | Inlet with Side G3/4 port |
| RXXX | T | 6 | Inlet with Top G3/4 port and Relief valve |
| RXXX | S | 6 | Inlet with Side G3/4 port and Relief valve |

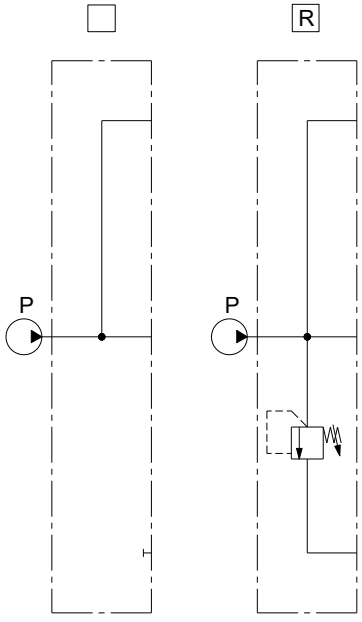


Top port

Relief Valve



Side port




No Relief Valve  Relief Valve

**Relief Valve**
Adjustable. Pilot Operated

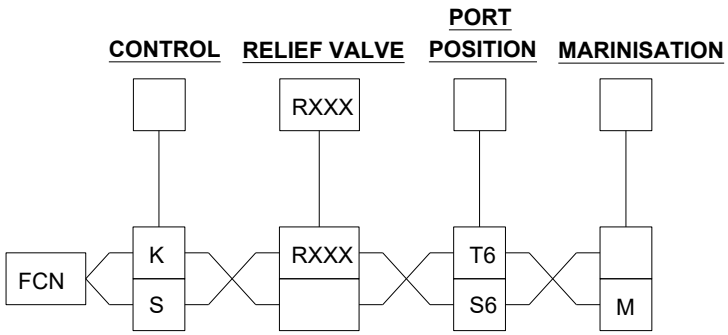
**Mounting** 1 x Ø10.3 Through Holes
**Material** Cast Iron
**Weight** 0.75kg
**Width** N/a

# V3-100 INLET COVERS

## INLET WITH FLOW CONTROL

| Option | Code |
|---|---|
| Handwheel | K |
| Screw & lock nut | S |
| Relief valve | RXXX |
| Top port G3/4 | T6 |
| Side port G3/4 | S6 |
| Marinisation | M |

'XXX' = relief valve setting in bar.

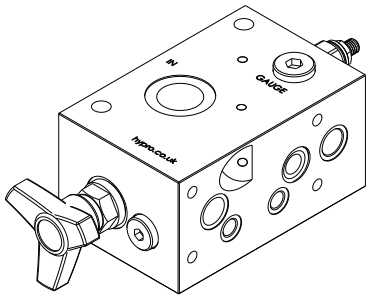



Example codes

| | | | |
|---|---|---|---|
| FCN | K | R210 | T6 |
| FCN | S | | S6 |

Handwheel, relief valve set 210 Bar, Top G3/4 port

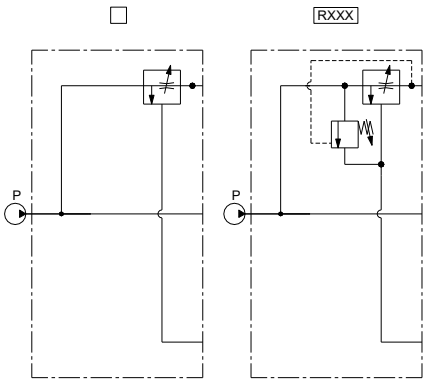
Screw adjuster, no relief valve, SideG3/4 port



**Pressure & flow compensated**

| | |
|---|---|
| **Adjustable range** | 0-100 L/min |
| **∆P Inlet to outlet 40 L/min** | 0.6 bar |
| **Inlet to service 40 L/min** | 4.6 bar |
| **Max Pressure** | 210 bar |

**Relief Valve**
Adjustable. Pilot Operated




| | |
|---|---|
| **Mounting** | 2 x Ø10.3 Through Holes |
| **Body** | Aluminium |
| **Weight** | 2.0kg |

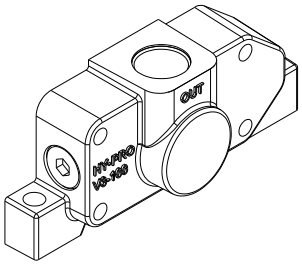
# V3-100 OUTLET COVERS

## STANDARD OUTLETS

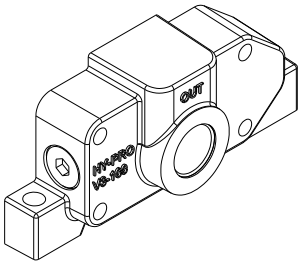
The outlet covers come with G(BSP) ports in either top or side positions. Pressure carry over is available by selection of an alternative outlet cover.

If a solenoid spool section is used in the assembly an 'E' type outlet is used which contains the pilot pressurising valve and the additional drillings for the pilot connections.

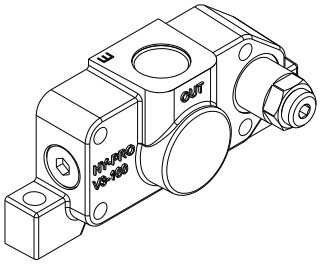
Top port



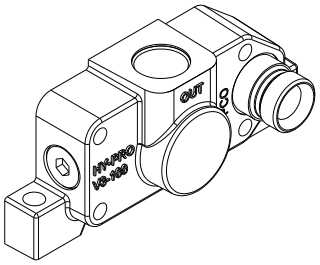

Side port



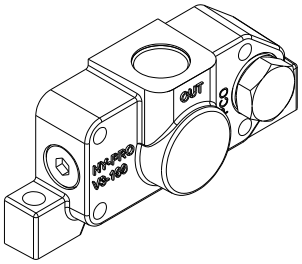

Solenoid




Pressure Carry



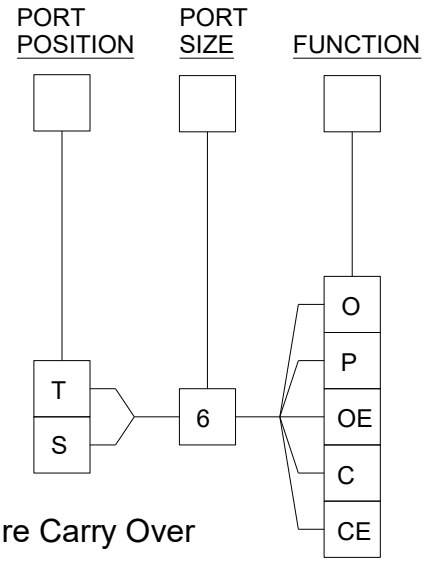

Closed Centre




| | |
|---|---|
| **Body** | Cast Iron |
| **Weight** | 1.7kg |

# V3-100 OUTLET COVERS

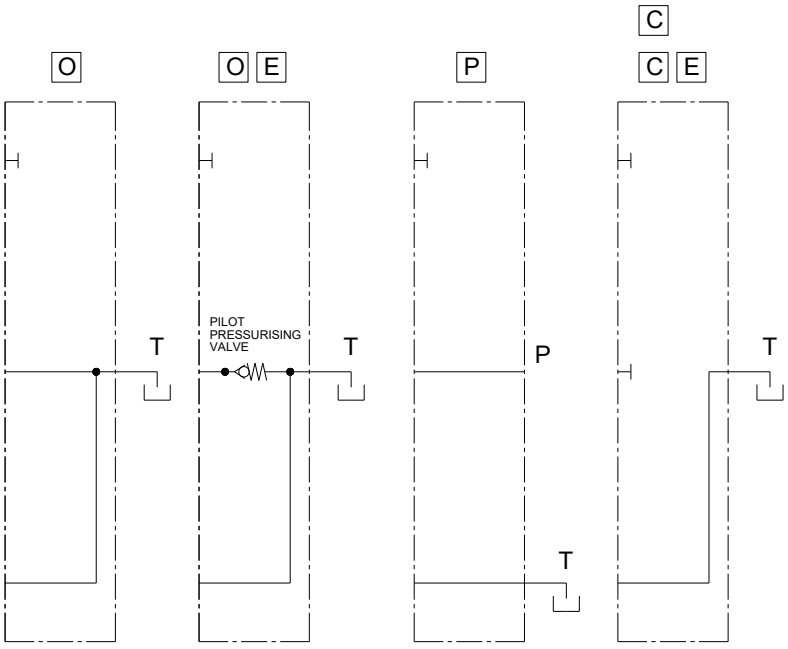
| **Option** | **Code** |
|---|---|
| Top port | T |
| Side port | S |
| G3/4 port | 6 |
| Outlet | O |
| Outlet - solenoid | OE |
| Pressure Carry Over | P |
| Closed Centre - Solenoid | CE |




Example codes

| | | | |
|---|---|---|---|
| T | 6 | O | Outlet with G3/4 Top port |
| S | 6 | P | Outlet with G3/4 Side port and Pressure Carry Over |
| T | 6 | OE | Outlet with G1/2 Top port for Solenoid sections |
| T | 6 | CE | Outlet with G1/2 Top port, Closed centre for Solenoid sections |

Pilot connections omitted for clarity




Outlet

Outlet for solenoid sections

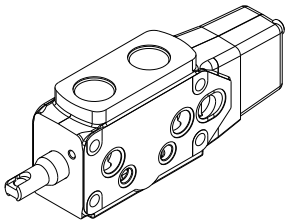
Outlet with PCO

Outlet Closed centre manual and solenoid sections

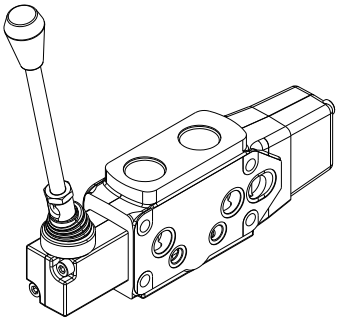
# V3-100 WORKING SECTIONS

## DESCRIPTION

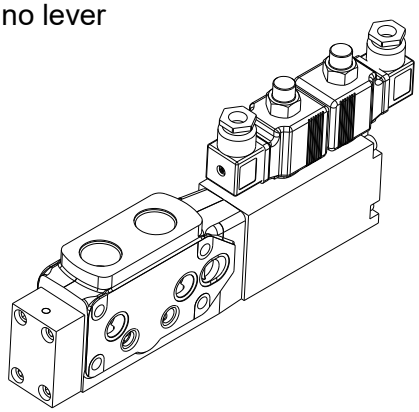
The V3-100 working sections spools to suit most applications. There are positioning options for 2, 3 and 4 position detent / spring centring mechanism combinations. Actuation options are manual levers – standard, rotary, cable, direct link to the spool, or pilot solenoid (with or without manual lever override).
The standard manual lever assembly has four orientation options and is universal across the range. Lever knobs are available in a variety of colours.



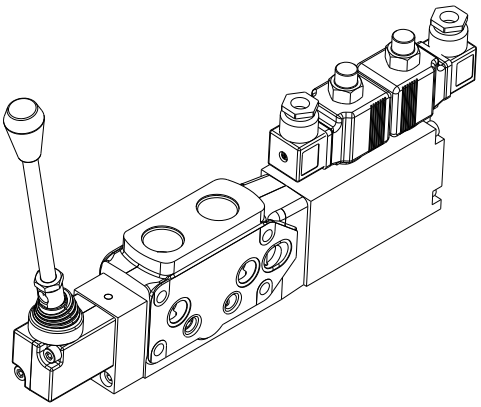
Manual
no lever



Manual
With Lever



Solenoid



Solenoid with
Lever Override

| | |
|---|---|
| **Weight** | 3.0kg Manual<br>4.9kg Solenoid |
| **Width** | 44.5mm |

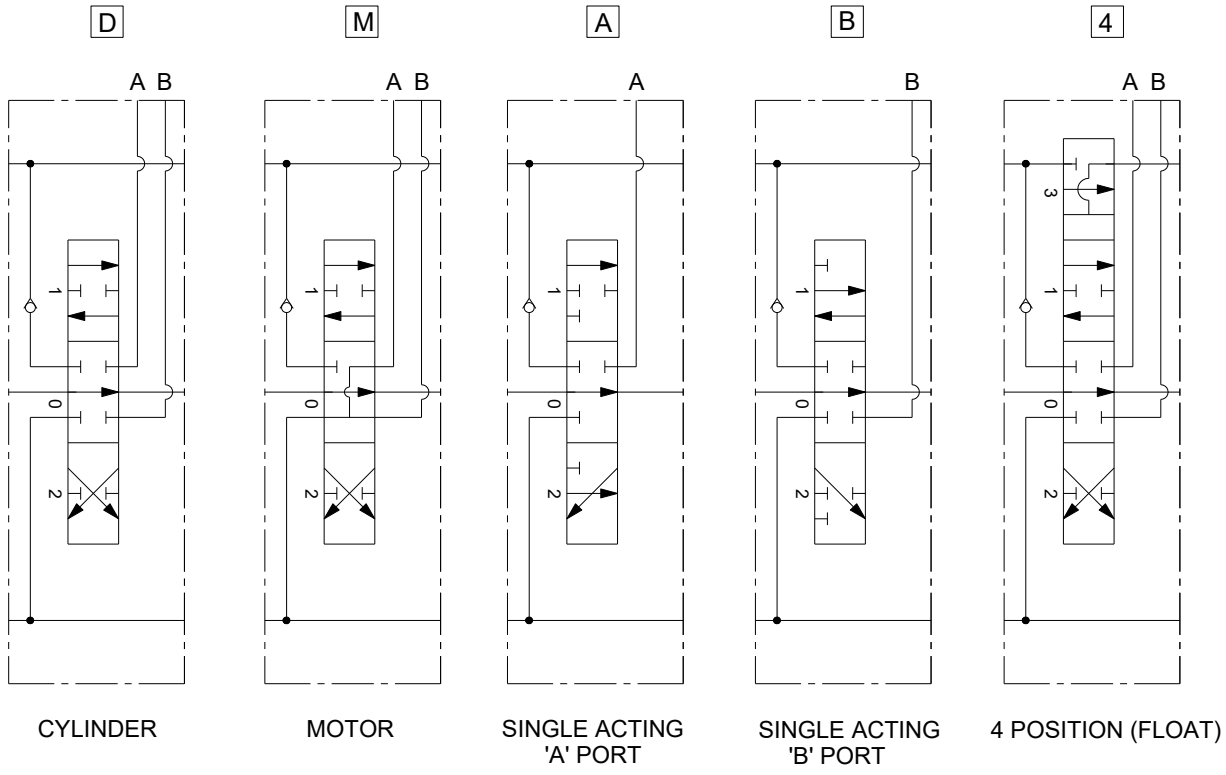
# V3-100 WORKING SECTIONS

## SPOOL OPTIONS

There are spools to suit most applications, all with excellent metering characteristics.

| Manual | Code | Solenoid | Code |
|---|---|---|---|
| Cylinder | D | Cylinder | D |
| Motor | M | Motor | M |
| Single acting A port | A | Single acting A port | A |
| Single acting B port | B | | |
| 4 Position float | 4 | | |

Solenoid pilot connections
Omitted for clarity.



# V3-100 WORKING SECTIONS

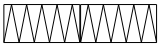
## SPOOL POSITIONING MECHANISMS

2, 3 and 4 position control mechanisms in a combination of spring return and detent location.

| **Manual** | **Code** |
|---|---|
| Spring - 3 Position | C |
| Spring - 2 position | 2C |
| Detent - 3 Position | L |
| Detent - 2 position | 2L |
| Detent friction - 3 Position | O |
| Spring / Detent - 3 Position | F |
| Float - 4 Position | 4C |
| **Solenoid** | |
| Solenoid - 3 Position | E |
| Solenoid - 2 position | 2E |

Spring - 3 Position

C




Spring - 2 Position

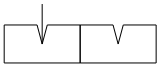
2C

Detent - 3 Position

L

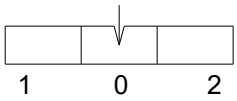
Detent - 2 Position

2L



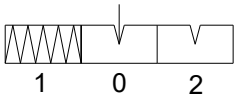

Detent Friction - 3 Position

O



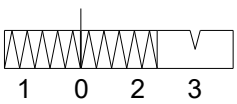

Spring / Detent - 3 Position

F



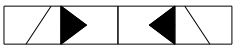

Float - 4 Position

C




Solenoid - 3 Position

E



Solenoid - 2 Position

2E

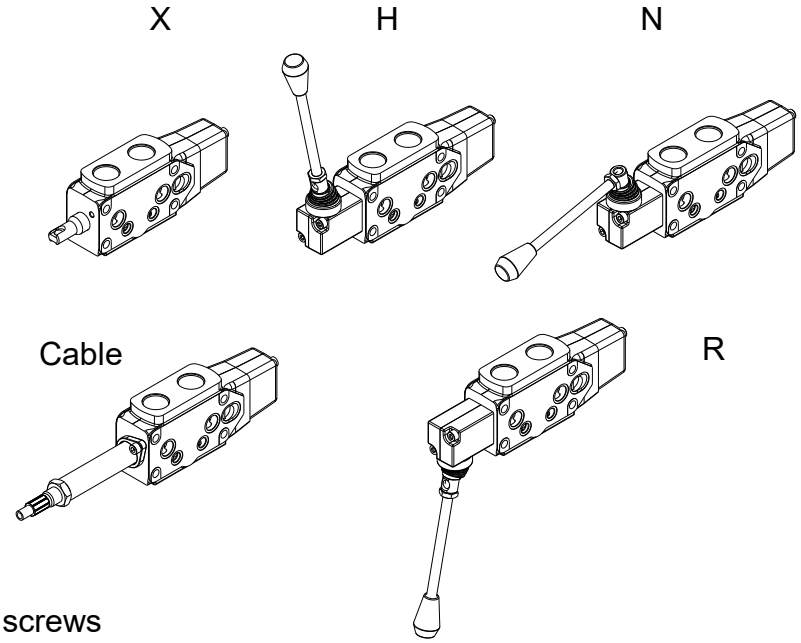
# V3-100 WORKING SECTIONS

## CONTROL OPTIONS

The standard lever is common across the sectional valve range. It can be supplied with environmental protection.

| Option | Code |
|---|---|
| No Lever* | X |
| No Lever - solenoid sections | - |
| Standard Lever | H |
| Standard Lever - 90º | N |
| Standard Lever - Reversed | R |

* For cable operation select code X. The mounting holes for the lever accept a standard ‘Morse’ type cable.




| | |
|---|---|
| **Fixing** | 2x M6 Cap screws<br>Torque - 13.5Nm |
| **Knob** | Black standard,<br>Red, Blue, Green,<br>Yellow or Ident’ type |
| **Body** | Aluminium LM24TF |
| **Fasteners** | Deltatone |
| **Width** | N/a |

# V3-100 WORKING SECTIONS

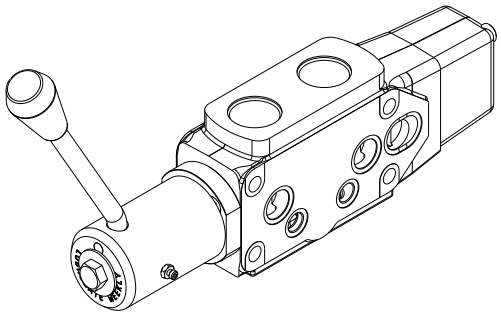
## CONTROL OPTIONS - ROTARY LEVER

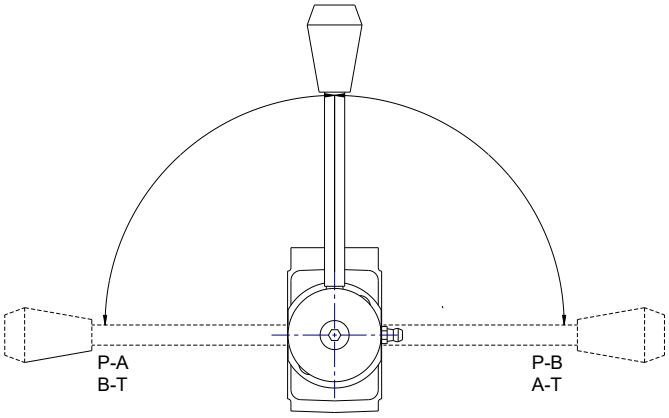
Used extensively in the forestry and fishing industry to control the speed of conveyors and winches. The Hy-Pro rotary lever has been developed specifically to enable the operator precise control of motors and cylinders. The lever rotates through a ± 90° arc and operates a scroll which converts the rotary action of the lever into axial movement of the spool.
The mechanism has a friction detent feature which positively holds the spool in neutral or will maintain the selected position when operated.
Because of the geometry of the lever it is not possible to include it in multi-section valves but it is a retro-fit to existing single section assemblies.

Refer to page 58 for full ordering code.

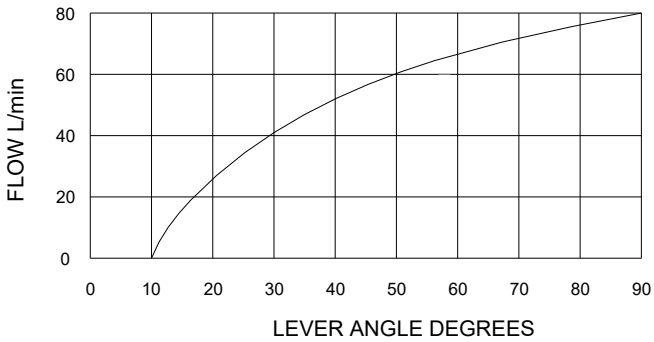
**ROTARY LEVER**

HO






TYPICAL METERING CHARACTERISTIC




| | |
|---|---|
| **Body** | Manganese bronze CZ114 |
| **Lever** | Stainless steel |
| **Weight** | 2.0kg |
| **Width** | N/a |

# V3-100 WORKING SECTIONS

## ENVIRONMENTAL PROTECTION OPTIONS

The valves are available with a marinised finish to withstand harsh environments. It comprises black anodised aluminium housings with stainless steel levers and locknuts. For further protection such as in marine applications the spool can be supplied with electro-less nickel plating.

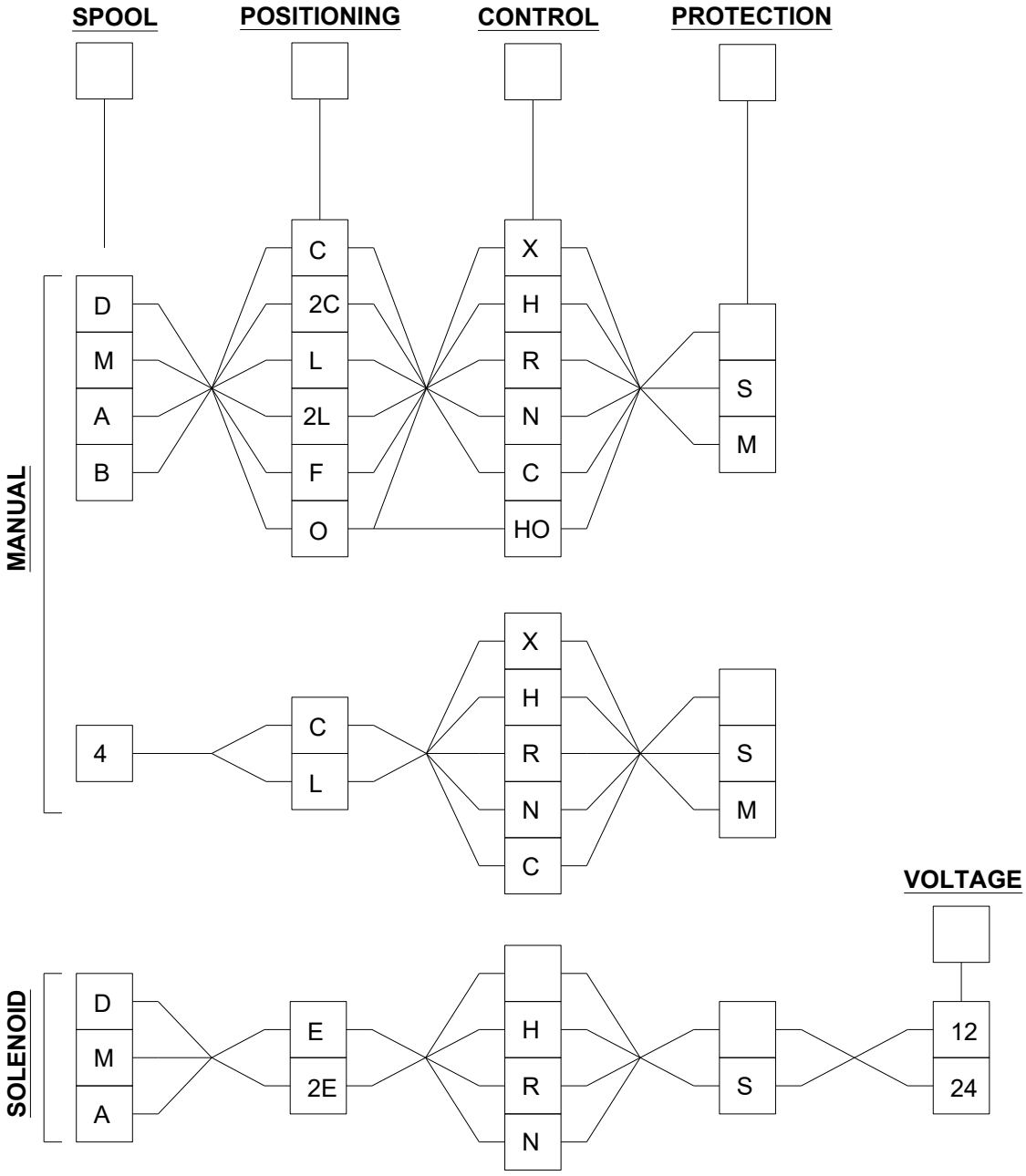
Refer to the order codes and examples on pages 58 and 59.

| Option | Code |
|---|---|
| Standard | - |
| Stainless steel lever & Anodised housing | S |
| Stainless steel lever, Anodised housings & Nickel plated spool | M |

# V3-100 WORKING SECTIONS

## ORDER CODES

Create the order code by reading left to right, following the paths between options.
A selection of typical codes are shown on the next page.



# V3-100 WORKING SECTIONS

## ORDER CODES - EXAMPLES

A selection of typical spool section order codes generated by the matrix shown on the previous page. Manual and solenoid spool sections can be used in the same valve assembly.

**MANUAL**

| SPOOL | POSITIONING | CONTROL | PROTECTION | |
|---|---|---|---|---|
| D | C | H | | Cylinder spool<br>Spring centred<br>Standard lever |
| M | 2L | H | S | Motor spool<br>2 position detent<br>Marinised lever |
| D | O | HO | M | Cylinder spool<br>Rotary lever<br>Marinised spool |
| M | C | R | S | Motor spool<br>Spring centred<br>Reversed marinised lever |
| A | C | X | | Single acting cylinder spool<br>Spring centred<br>No lever |

**SOLENOID**

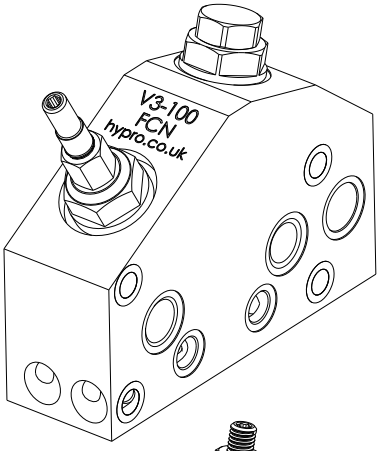
| SPOOL | POSITIONING | CONTROL | PROTECTION | VOLTAGE | |
|---|---|---|---|---|---|
| D | E | H | S | 12 | Cylinder spool<br>12V solenoid control<br>with manual override<br>Marinised lever |
| M | 2E | | | 24 | Motor spool<br>2 position<br>24V solenoid control |

# V3-100 INTERSECTIONS

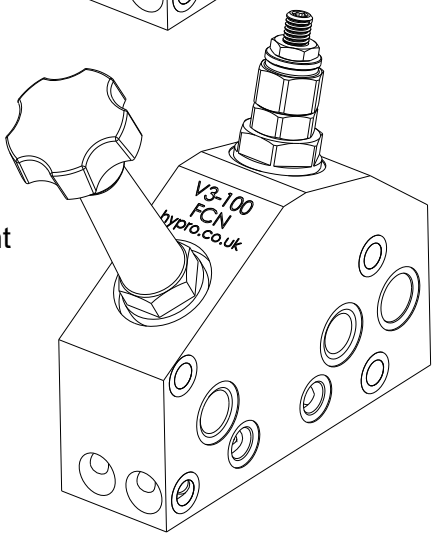
## FLOW CONTROL SECTION - MANUAL

A pressure and flow compensated meter-in type flow control which can be included in V3-100 valve manual or solenoid assemblies. The regulated flow is supplied via the pressure gallery to 'down stream' sections, while 'up stream' are unaffected. The flow can be continuously adjusted using a handwheel or preset with a screw and lock nut. A relief valve can be fitted to protect the circuit. There are options for alternate metering and environmental protection.

Screw adjustment




Handwheel adjustment
With relief valve




| | |
|---|---|
| **Adjustable range** | 0-100 L/min |
| **∆P Inlet to outlet 40 L/min** | 0.6 bar |
| **ΔP Inlet to service 40 L/min** | 4.6 bar |

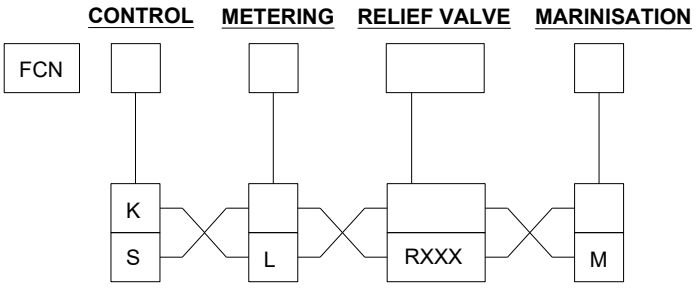
**Relief Valve**
Adjustable. Pilot Operated

| | |
|---|---|
| **Body** | Aluminium |
| **Weight** | 2.5kg |
| **Width** | 44.5mm |

# V3-100 INTERSECTIONS

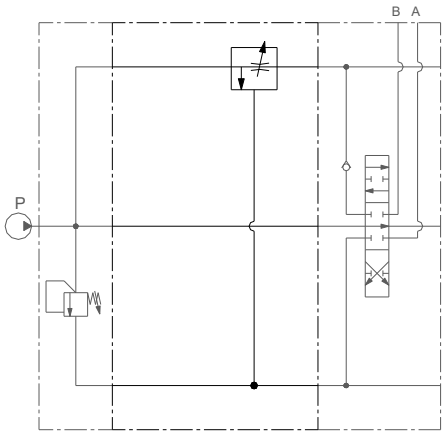
| Option | Code |
|---|---|
| Handwheel | K |
| Screw & lock nut | S |
| Standard metering | |
| Fine metering | F |
| 1 Turn 64 L/min metering | L |
| Marinisation | M |
| Relief valve | RXXX |

'XXX' = relief valve setting in bar.

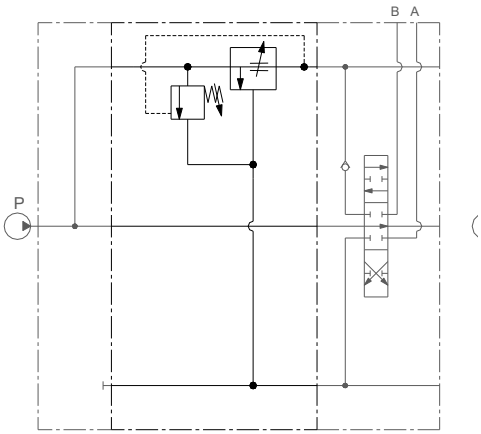



EXAMPLES

| | | | |
|---|---|---|---|
| FCN | K | | HANDWHEEL ADJUST<br>STANDARD NEEDLE |
| FCN | S | R210 | SCREW ADJUST<br>RELIEF VALVE SET 210 BAR |
| FCN | K | M | HANDWHEEL ADJUST<br>STANDARD NEEDLE<br>MARINISED BODY |




Standard



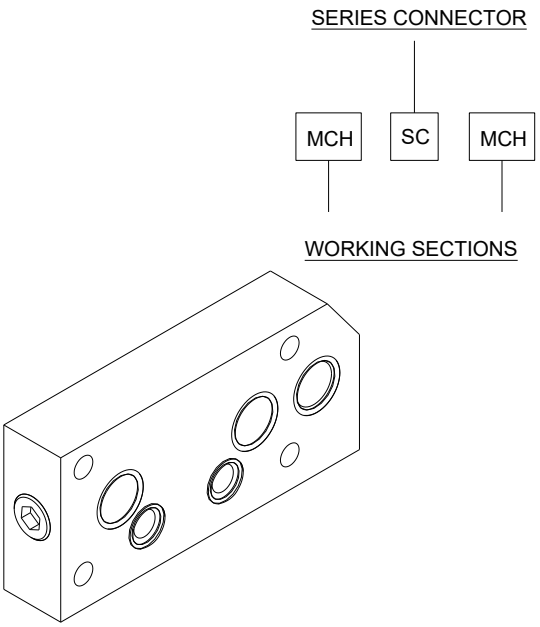

Relief valve

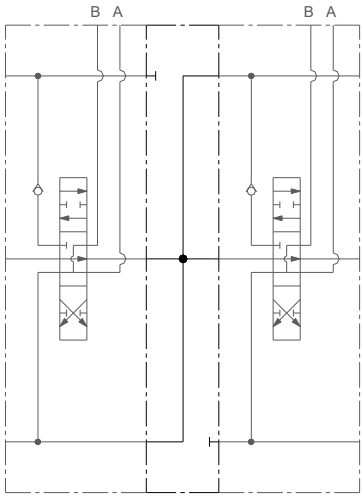
# V3-100 INTERSECTIONS

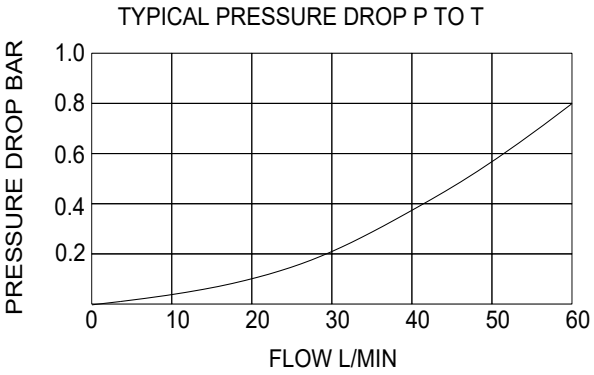
## SERIES CONNECTOR SECTION

Hy-Pro series connectors are designed to be fitted between two valve sections, connecting in series the actuators that they control. Series connectors are often used to synchronize two hydraulic motors where the return oil from one is fed to the inlet of the second.

The series connector effects only the valve sections immediately upstream and downstream of its position in the valve bank. Other sections remain connected in parallel. When using the series connectors, consideration must be given to upstream sections. This is because the normally open tank gallery in the valve bank is pressurized when the series connected actuators are on load. If this is a problem specially designed inlet covers are available which contain a separate outlet port for the relief valve bypass flow.

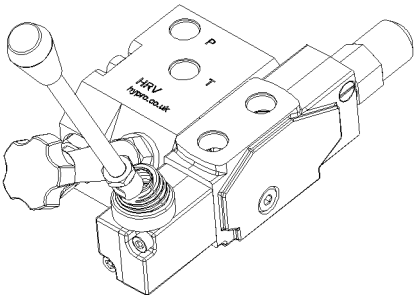


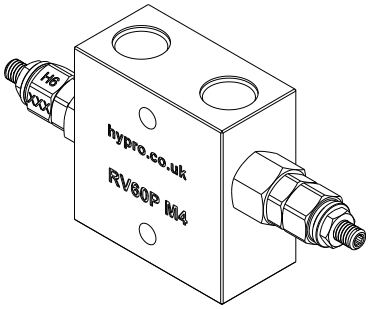



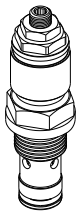



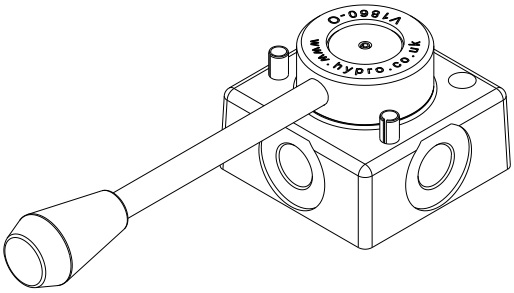

| | |
|---|---|
| **Body** | Aluminium |
| **Weight** | 0.5kg |
| **Width** | 24mm |

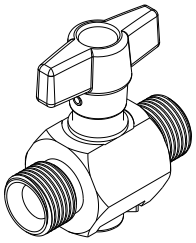
# ANCILLARY VALVES

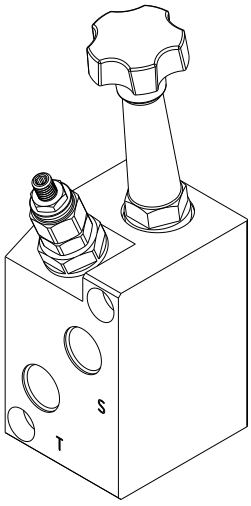


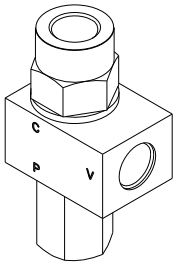



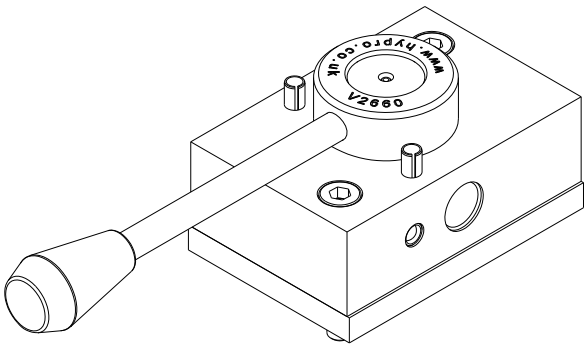







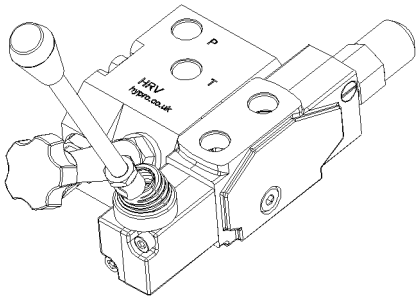



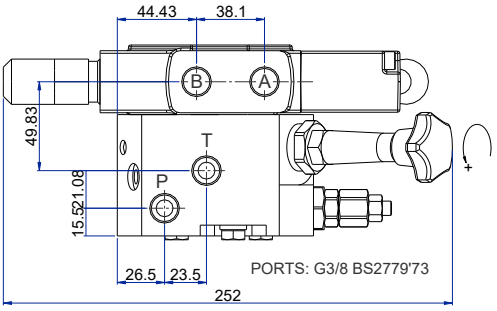



# HRV HOSE-REEL VALVE

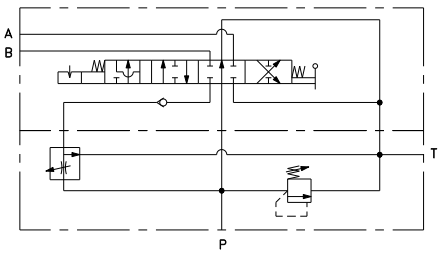
This compact valve has been specifically designed to operate hose and cable reels. It features a pressure compensated speed control with integral relief valve combined with a 4 positon spool valve.

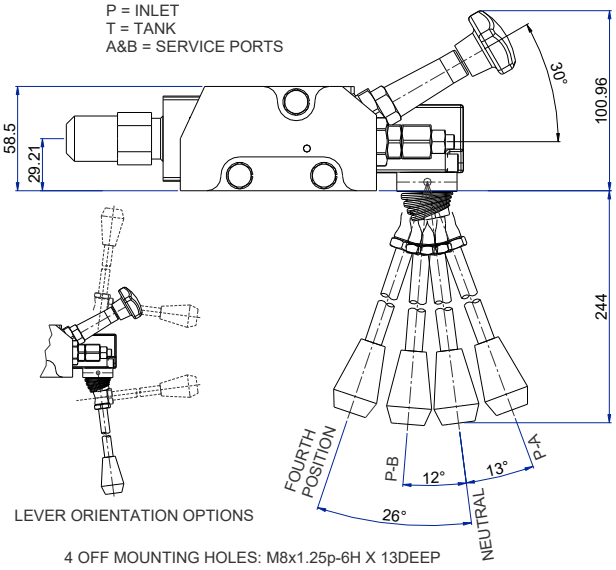
The desired speed is selected using the handwheel then the direction of rotation is selected using the spring centred lever. The lever can also be detented into a fourth position which allows the reel to ‘free wheel’. In the neutral position the reel is locked hydraulically.



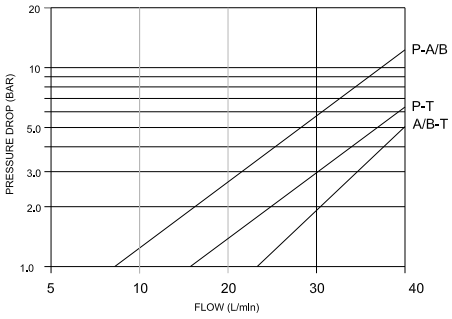

P = INLET
T = TANK
A&B = SERVICE PORTS



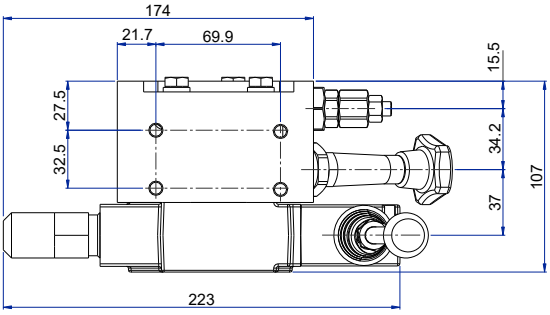




LEVER ORIENTATION OPTIONS

TYPICAL PRESSURE DROP




4 OFF MOUNTING HOLES: M8x1.25p-6H X 13DEEP



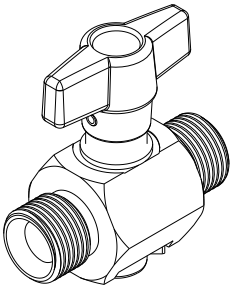

| | |
|---|---|
| Rated flow | 40 L/min |
| Flow control adjustment: | 0-40 L/min |
| Relief valve adjustment: | 7-250 bar |
| Relief valve range: | 20-250 bar |
| Weight | 3.3kg |

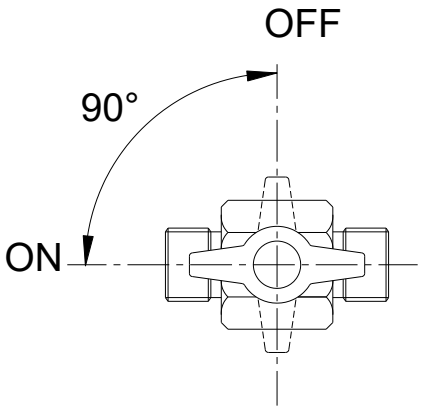
# V1830 SHUT-OFF VALVE

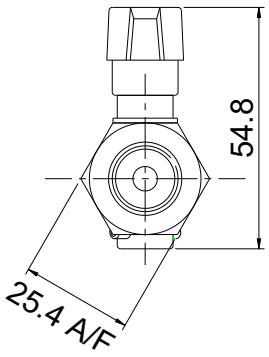
The V1830 is a two-way design with flow from A to B open in the on position and closed in the off.

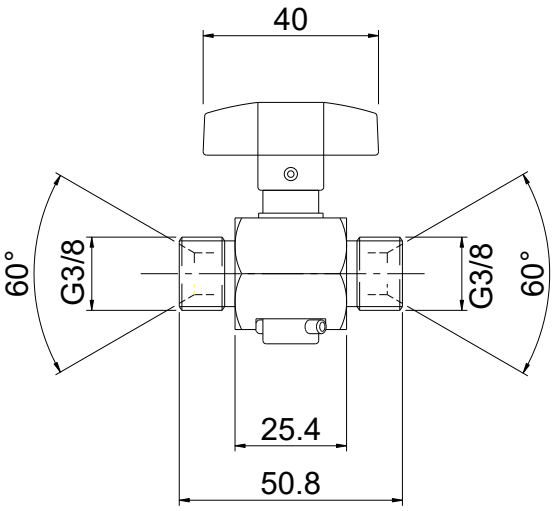
It features male threads with 60 degree sealing cones for connection to either rigid or flexible pipe-work.

Typically used to isolate components in a hydraulic circuit.





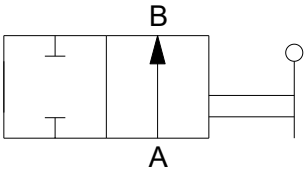




| | |
|---|---|
| Ports | G3/8 |
| Rated flow | 27 l/min |
| Internal leakage @210 bar | <2cc/min |

**Materials**

| | |
|---|---|
| Body | Steel zinc plated |
| Knob | Thermoplastic |
| Spool | Hardened & ground |

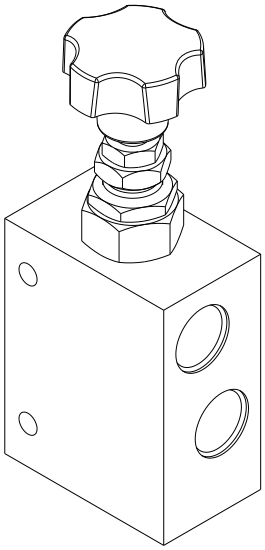


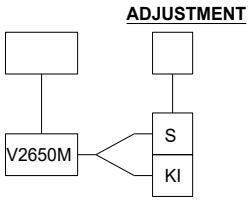

**Weight** 0.18kg

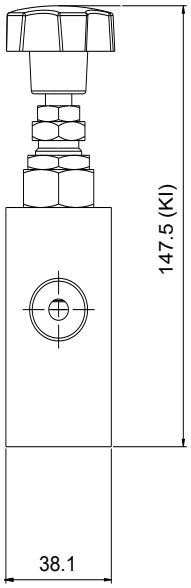
# V2650M FLOW DIVIDER VALVE

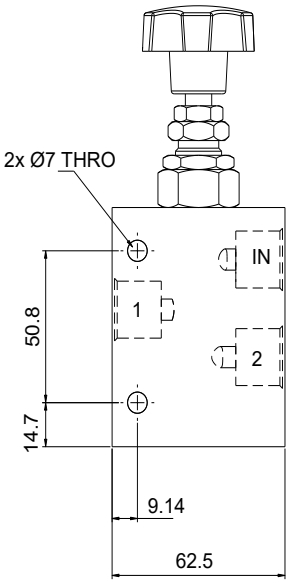
The Hy-Pro in-line flow divider valve allows independent control of two hydraulic circuits from one input. The flow is split into a controlled ‘Priority’ (1) flow to feed one circuit and ‘a secondary’ (2) flow to feed the other. The priority flow is unaffected by varying pump delivery or pressure changes in either circuit.

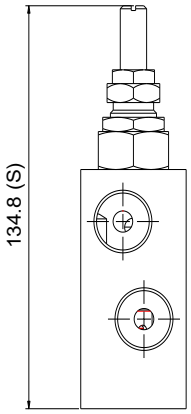
Control is either by handwheel (KI) or Screw and locknut (S).

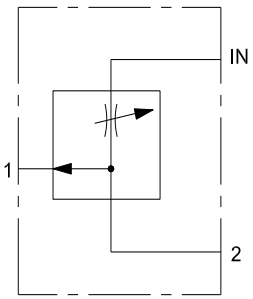




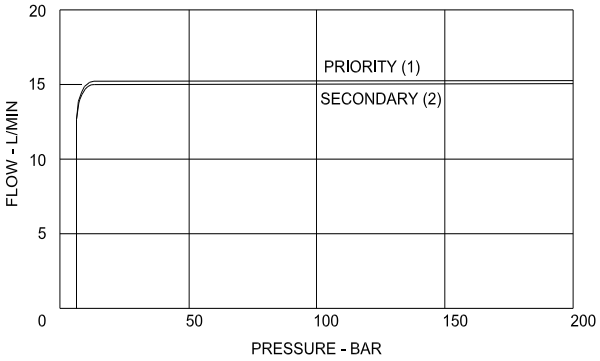




**Performance**

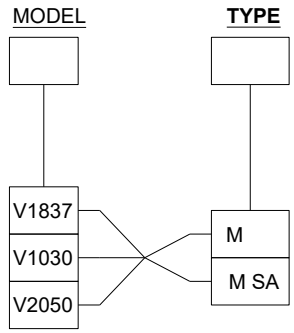
| | |
|---|---|
| Rated flow | 60 L/min |
| Priority flow maximum | 36 L/min |
| Priority flow minimum | 0 L/min |
| ΔP inlet to service | 6.9 bar |
| Maximum pressure | 250 bar |
| Ports | G1/2 |

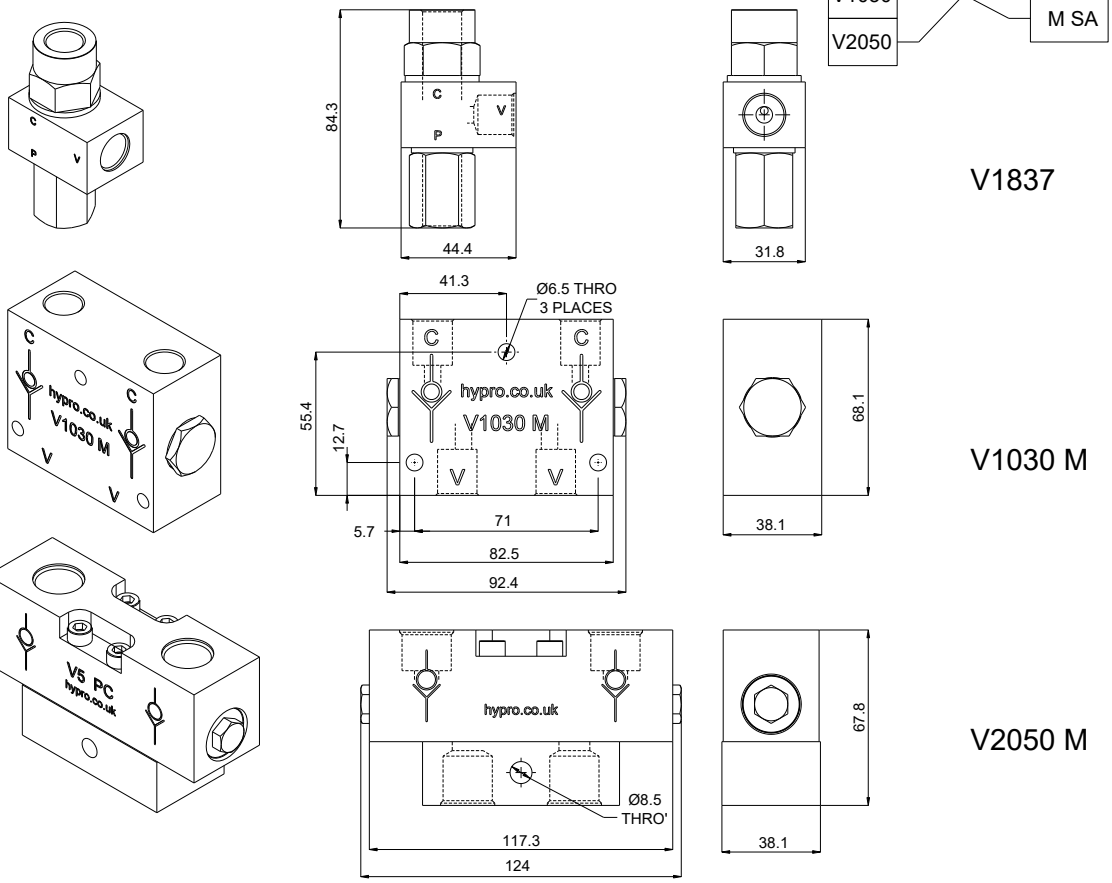
**Weight** 0.63 kgs



# PILOT OPERATED CHECK VALVES

| Option | Code |
|---|---|
| 27 L/min | V1837 |
| 40 L/min | V1030 |
| 60 L/min | V2050 |
| Double acting | M |
| Single acting | M SA |




V1837

V1030 M

V2050 M

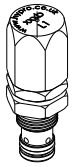
| Performance | V1837 | V1030 M | V2050M |
|---|---|---|---|
| Rated flow litres per minute | 27 | 40 | 60 |
| Maximum pressure bar | 210 | 210 | 210 |
| Pilot ratio | 2.25:1 | 4:1 | 3.28:1 |
| Port size | G3/8 | G3/8 | G1/2 |

**Weights**

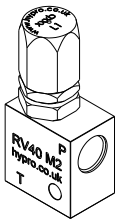
| | |
|---|---|
| V1837 | 0.28 kg |
| V1030 M | 0.95 kg |
| V2050 M | 1.28 kg |

# RV40 DIRECT ACTING RELIEF VALVE

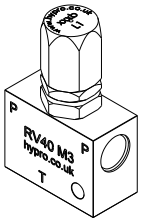
The RV40 is a direct acting cartridge valve. It is used in a range of inline mounted manifolds with 3 or 4 G3/8 Ports or as a stand lone cartridge for incorporation in to your manifold. The dual line manifold with two cartridges is commonly used to prevent shock loads in hydraulic motors and equal ended cylinders.
Adjustments are made using the cap and lock nut, which can be supplied tamper evident and pre-set if desired.



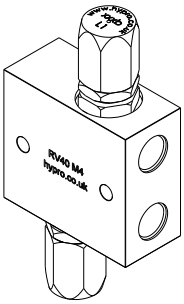
RV40DSNXXXC




RV40DSNXXXM2




RV40DSNXXXM3




RV40DSNXXXM4

**Performance**

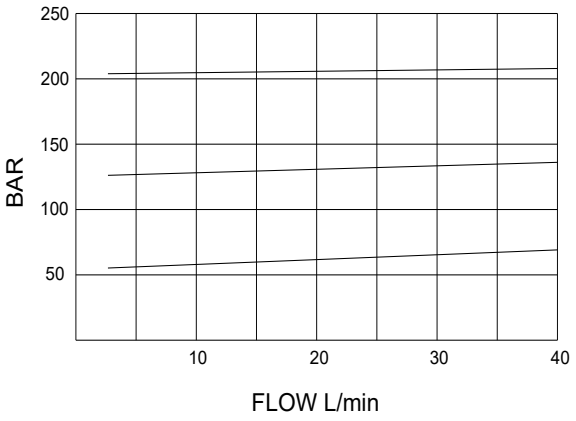
| | |
|---|---|
| Rated flow | 40 l/min |
| Max pressure | 250 bar |
| Manifold ports | G3/8 |
| Relief re-seat | 80% of setting |
| Range | 30-250 bar (ref options) |

**Installation Torque**

| | |
|---|---|
| Cartridge | 27 Nm |
| Lock Nut | 8 Nm |

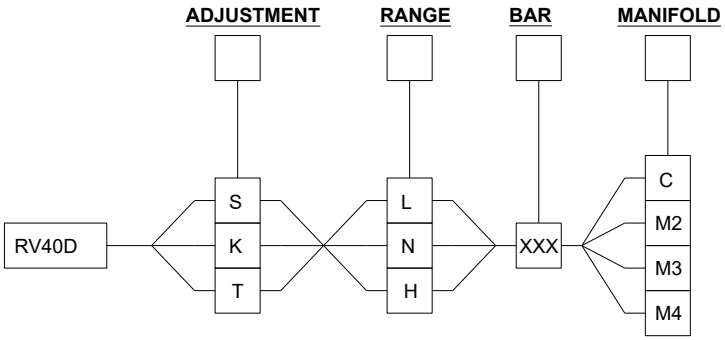
**Weights**

| | |
|---|---|
| RV40DSNC | 0.13 kg |
| RV40DSNM2 | 0.20 kg |
| RV40DSNM3 | 0.22 kg |
| RV40DSNM4 | 0.54 kg |



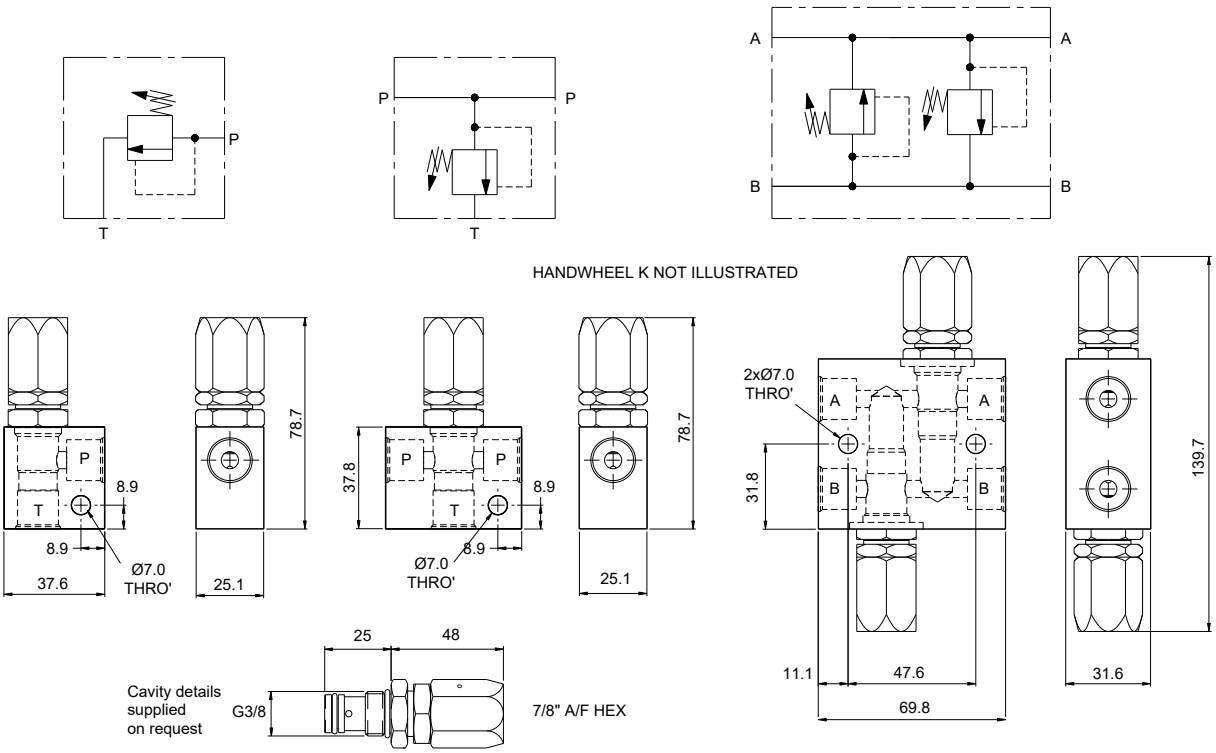
# RV40 DIRECT ACTING RELIEF VALVE

| Option | Code |
|---|---|
| Screw adjustment | S |
| Knob adjustment | K |
| Tamper Evident | T |
| 30-70 Bar | L |
| 50-200 Bar | N |
| 100-250 Bar | H |
| Setting | XXX |
| Cartridge only | C |
| 2 Port manifold | M2 |
| 3 Port manifold | M3 |
| Dual relief valves | M4 |



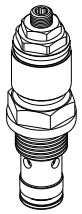

**'XXX' = relief valve setting in bar**

RV40DSNXXXM2 RV40DSNXXXM3 RV40DSNXXXM4

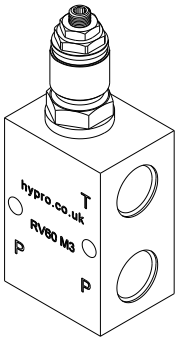


# RV60 DIRECT ACTING RELIEF VALVE

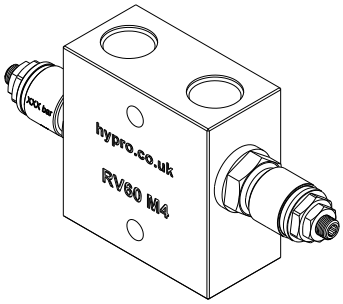
The 60 L/min relief valve is a fast acting direct acting cartridge valve. It is used in a range of inline mounted manifolds with 3 or 4 G1/2 Ports or as a stand lone cartridge for incorporation in to your manifold. The dual line manifold with two cartridges is commonly used to prevent shock loads in hydraulic motors and equal ended cylinders.
Adjustments are made using the socket screw and lock nut, which can be fitted with an optional tamper evident cap. Alternatively a hand wheel adjuster can be specified.



RV60DSNXXXC




RV60DSNXXXM3




RV60DSNXXXM4

**Performance**

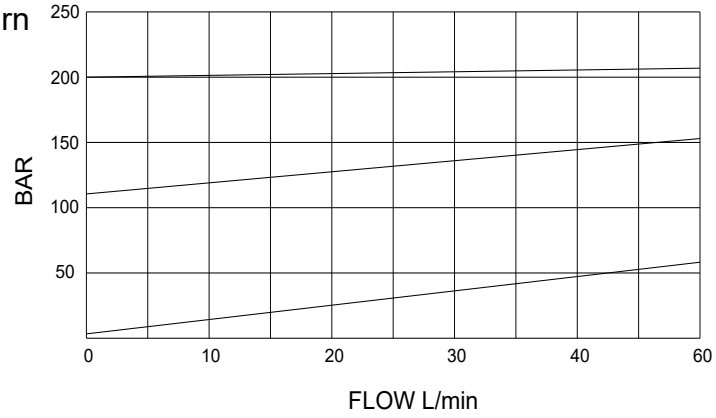
| | |
|---|---|
| Rated flow | 60 L/min |
| Max pressure | 250 bar |
| Range | 25 to 250 bar |
| Rate | 25 bar per turn |
| Manifold ports | G1/2 |

**Installation Torque**

| | |
|---|---|
| Cartridge | 27 Nm |
| Lock Nut | 8 Nm |

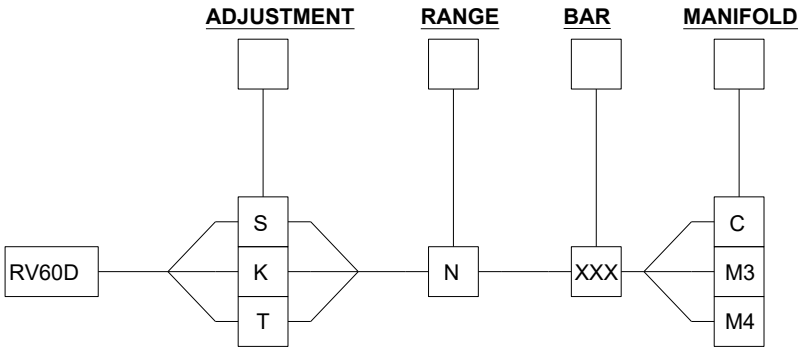
**Weights**

| | |
|---|---|
| RV60DSNC | 0.13 kg |
| RV60DSNM3 | 0.44 kg |
| RV60DSNM4 | 0.73 kg |



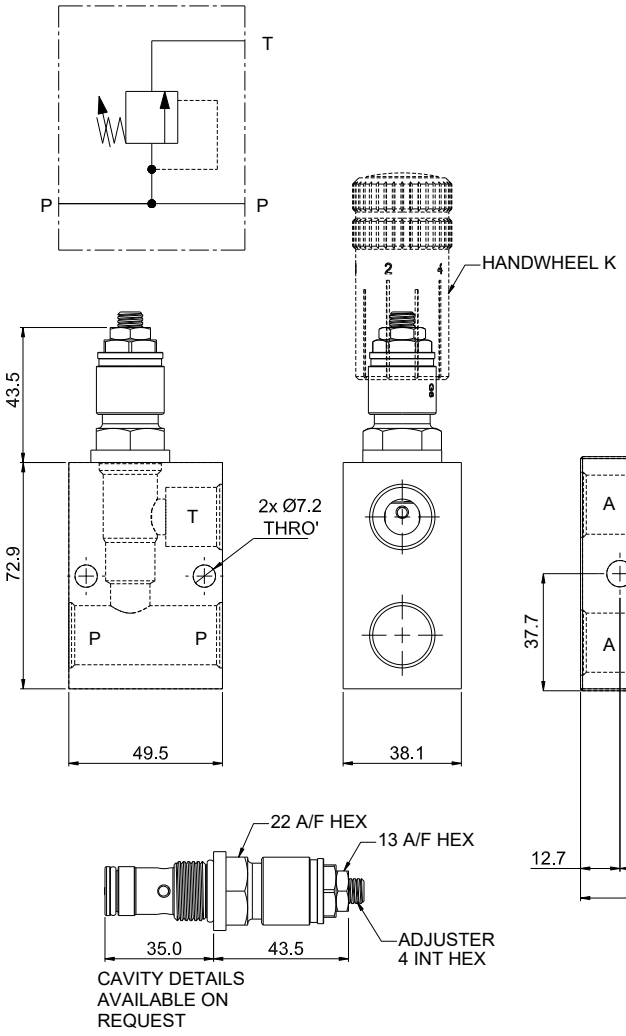
# RV60 DIRECT ACTING RELIEF VALVE

| Option | Code |
|---|---|
| Screw adjustment | S |
| Hand wheel | K |
| Tamper Evident | T |
| 25 -250 bar | N |
| Setting | XXX |
| Cartridge only | C |
| 3 Port manifold | M3 |
| Dual relief valves | M4 |

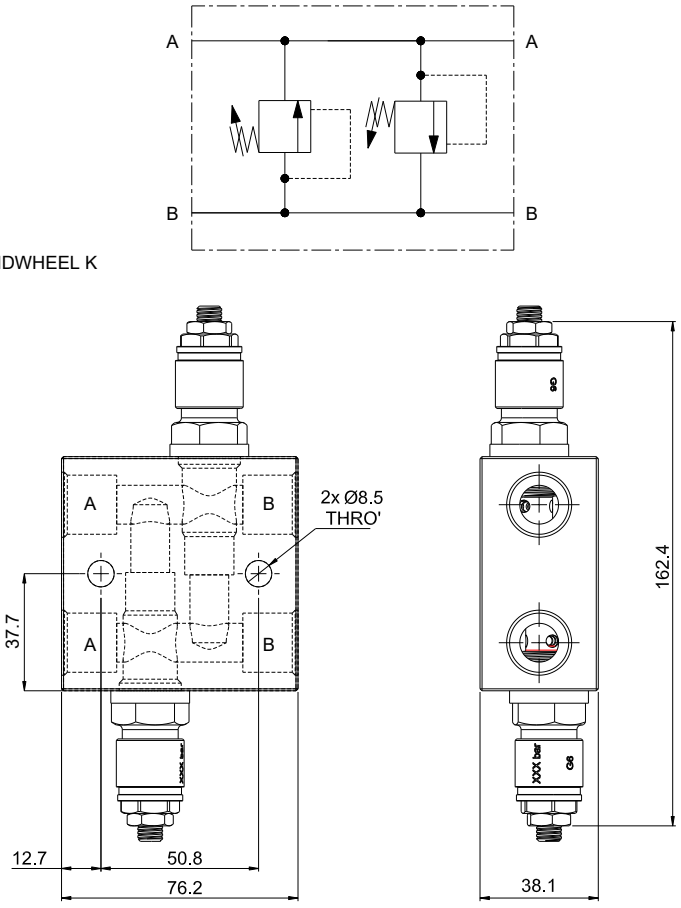



'XXX' = relief valve setting in bar

RV60DSNXXXM3

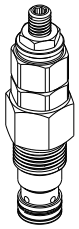



RV60DSNXXXM4

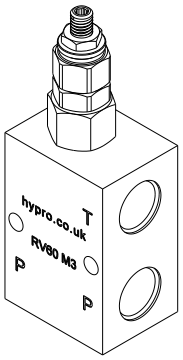


# RV60 PILOT OPERATED RELIEF VALVE

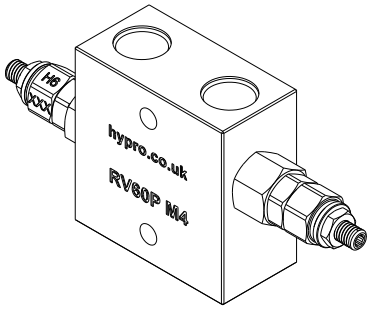
The RV60P is a pilot operated relief valve cartridge. They can be used in the Hy-Pro range or V4-40 and V5-60 sectional valves or as an inline valve with a manifold. Two relief valves together in a manifold give dual line relief commonly used to prevent shock loads in hydraulic motors and equal ended cylinders.



RV60PSNXXXC




RV60PSNXXXM3




RV60PSNXXXM4

**Performance**

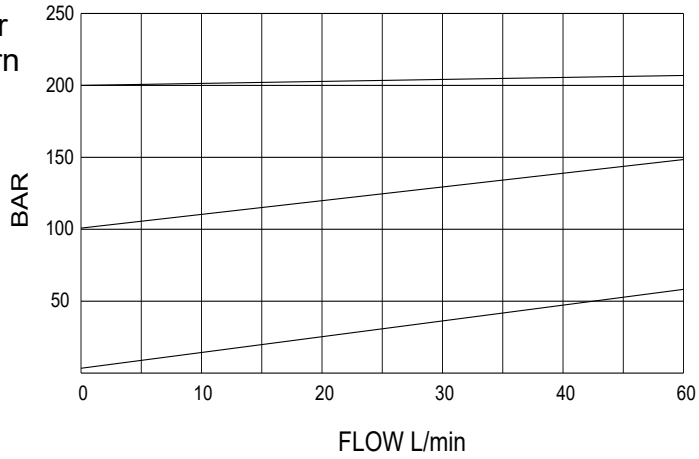
| | |
|---|---|
| Rated flow | 60 L/min |
| Max pressure | 250 bar |
| Range | 20 to 250 bar |
| Rate | 63 bar per turn |
| Manifold ports | G1/2 |

**Installation Torque**

| | |
|---|---|
| Cartridge | 27 Nm |
| Lock Nut | 8 Nm |

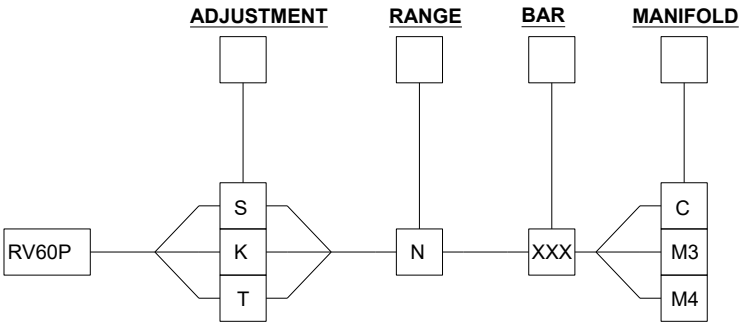
**Weights**

| | |
|---|---|
| RV60PSNC | 0.13 kg |
| RV60PSNM3 | 0.44 kg |
| RV60PSNM4 | 0.73 kg |



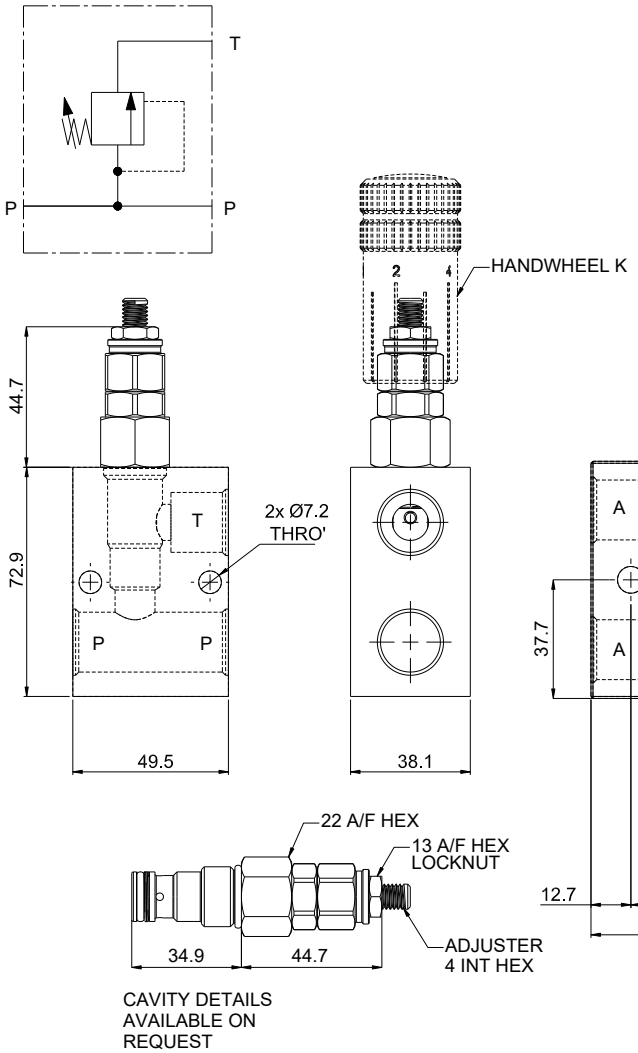
# RV60 PILOT OPERATED RELIEF VALVE

| Option | Code |
|---|---|
| Screw adjustment | S |
| Handwheel | K |
| Tamper Evident | T |
| 20 - 250 bar | N |
| Setting | XXX |
| Cartridge only | C |
| 3 Port manifold | M3 |
| Dual relief valves | M4 |

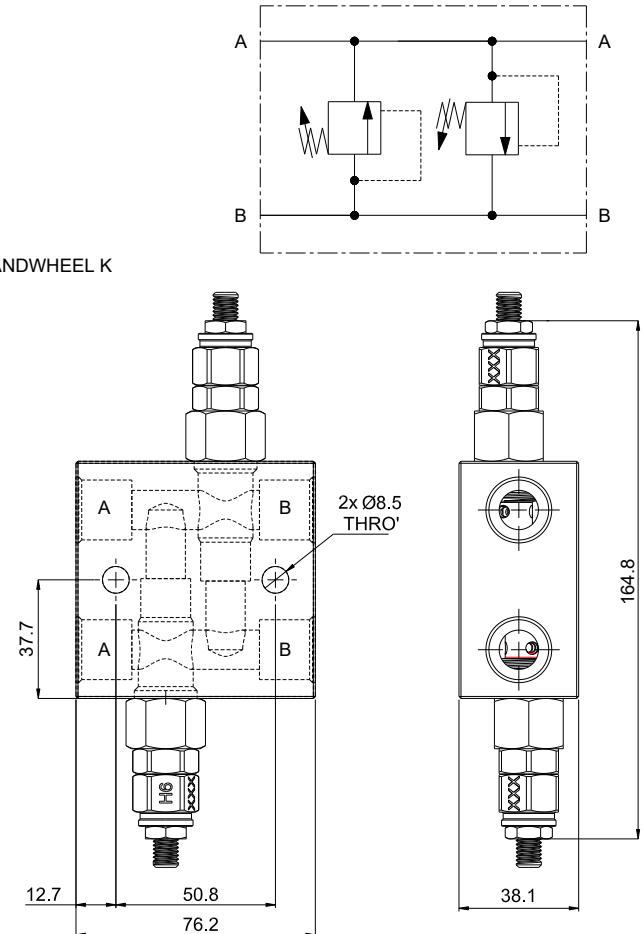



'XXX' = relief valve setting in bar

RV60PSNXXXM3

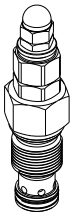



RV60PSNXXXM4

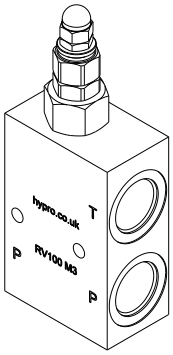


# RV100 PILOT OPERATED RELIEF VALVE

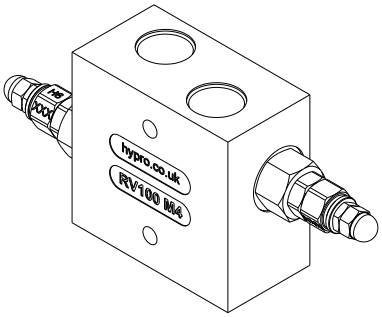
The RV100 relief valve is a very reliable, pilot operated cartridge valve, with excellent repeatability. Available as a cartridge to fit a standard Hy-Pro cavity or in a range of single and twin cartridge manifolds. The twin cartridge, 4 ported manifold is commonly used to prevent shock loads in hydraulic motors and equal ended cylinders.



RV100PSNXXXC




RV100PSNXXXM3




RV100PSNXXXM4

**Performance**

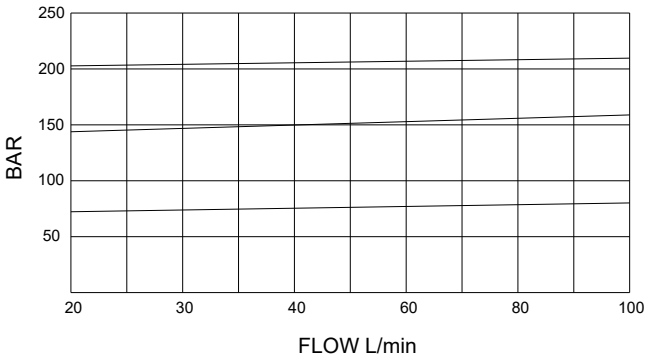
| | |
|---|---|
| Rated flow | 100 L/min |
| Max pressure | 250 bar |
| Manifold ports | G3/4 |
| Adjustment | 70 Bar/turn |

**Installation Torque**

| | |
|---|---|
| Cartridge | 27 Nm |
| Lock Nut | 8 Nm |

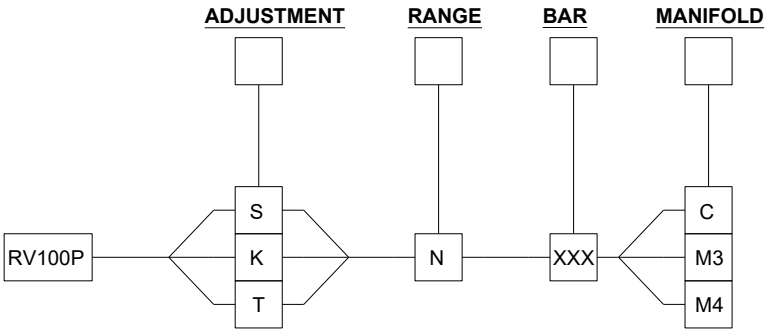
**Weights**

| | |
|---|---|
| RV100 PSNXXXC | 0.19 kg |
| RV100PSNXXXM3 | 0.64 kg |
| RV100PSNXXXM4 | 1.23 kg |



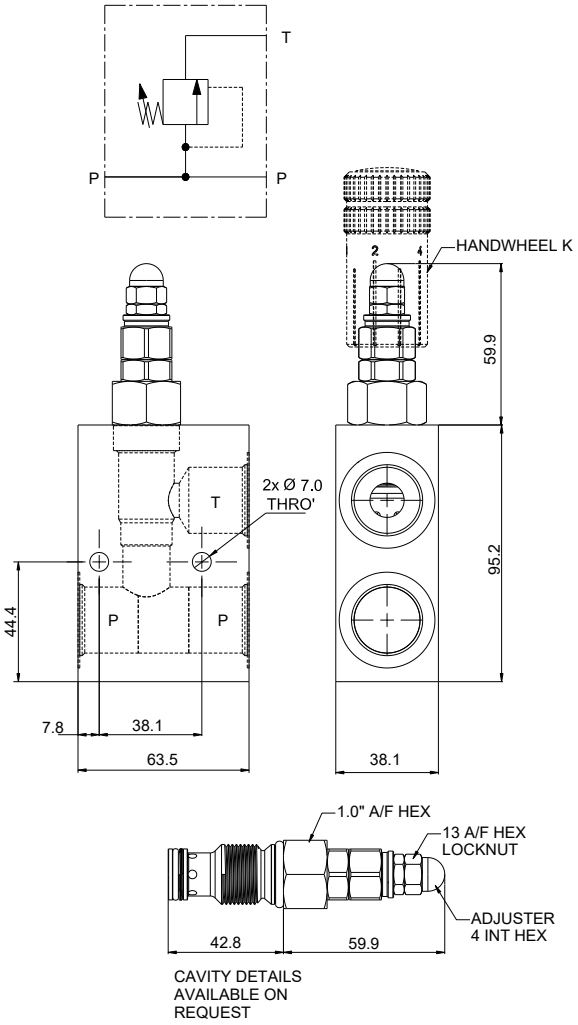
# RV100 PILOT OPERATED RELIEF VALVE

| Option | Code |
|---|---|
| Screw adjustment | S |
| Handwheel | K |
| Tamper Evident | T |
| 20-250 bar | N |
| Setting | XXX |
| Cartridge only | C |
| 3 Port manifold | M3 |
| Dual relief valves | M4 |

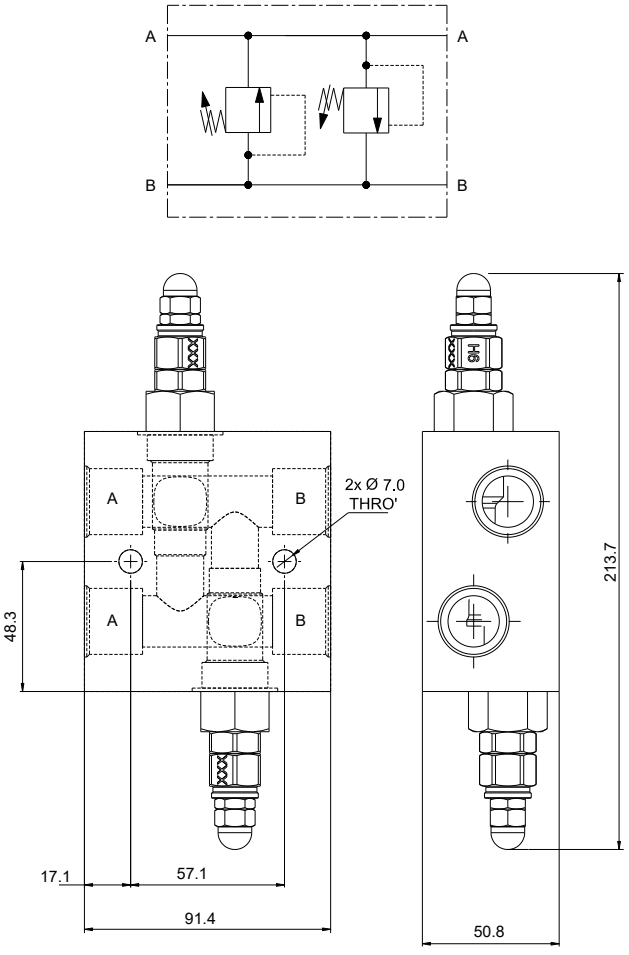



'XXX' = relief valve setting in bar

RV100PSNXXXM3

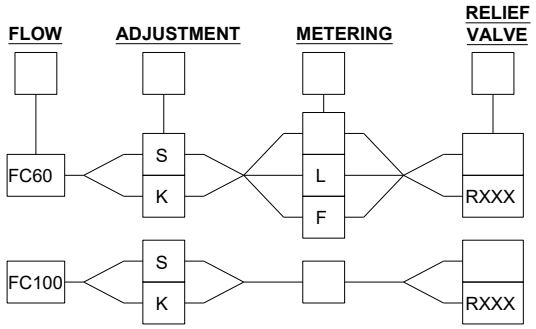



RV100PSNXXXM4

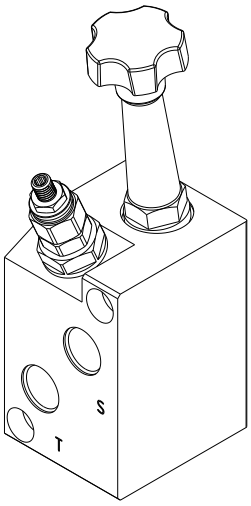


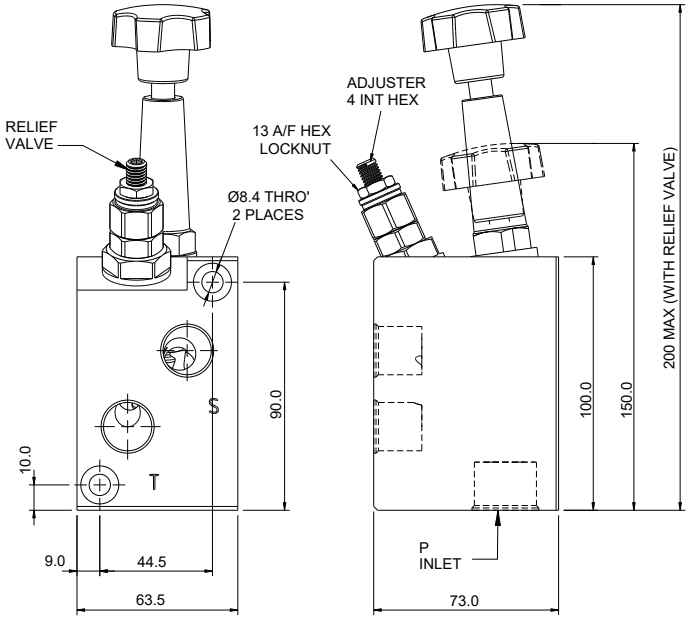
# FC60 & FC100 FLOW CONTROL VALVES

| Option | Code |
|---|---|
| 60 L/min | FC60 |
| 100 L/min | FC100 |
| Hand wheel | K |
| Screw adjust | S |
| Standard metering | - |
| Fine metering | F |
| 1 Turn metering | L |
| Setting | RXXX* |



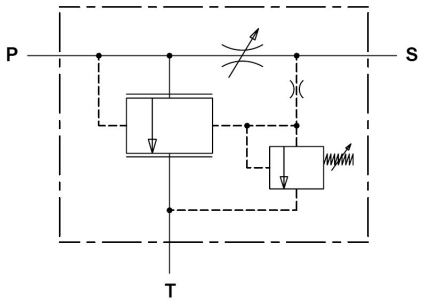

*XXX = Relief valve setting in Bar




## Performance

| | | |
|---|---|---|
| Flow Range | FC60 | 0-60 L/min |
| | FC100 | 0-100 L/min |
| Relief Valve Range | | 20-250 bar |
| ΔP Inlet to service | | 6.9 bar |
| Max pressure | | 250 bar |
| Max back pressure bar | | 25 |
| Pressure port | | G3/4 |
| Service ports FC60 | | G1/2 |
| Service ports FC100 | | G3/4 |
| **Weight** | | 1.5kg |

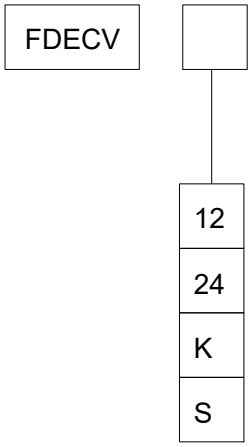


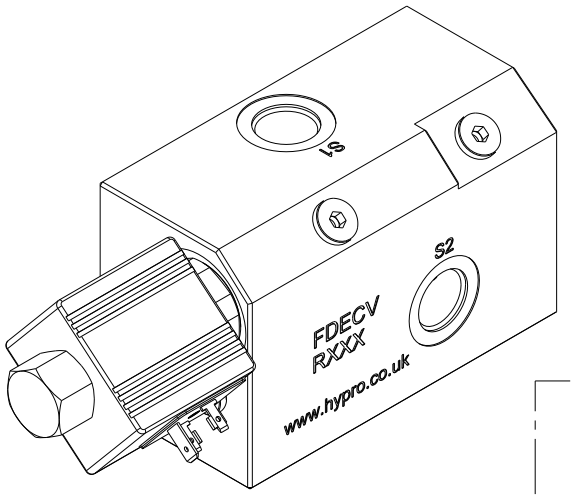
# LINE MOUNTED PROPORTIONAL FLOW DIVIDER

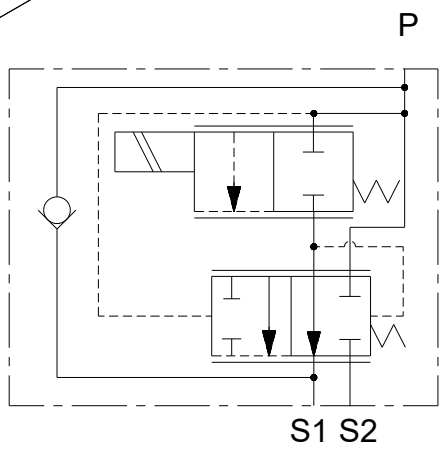
The adjustable priority flow is unaffected by variable pump delivery or pressure changes in either priority or secondary circuits. Control is via a proportional driver plug and 10KΩ Potentiometer. A manually controlled version is also available.

| **Option** | **Code** |
|---|---|
| Proportional 12 VDC | 12 |
| Proportional 24 VDC | 24 |
| Manual handwheel | K |
| Manual Screw Adjuste | S |

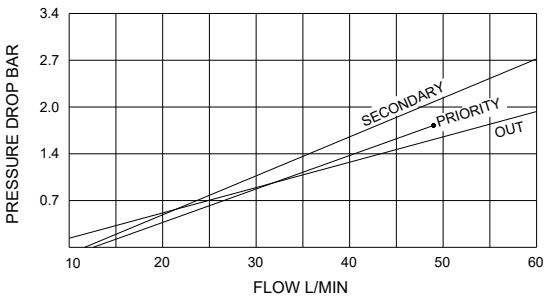
CONTROL



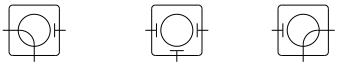
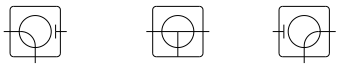
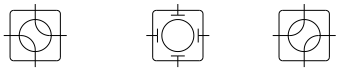
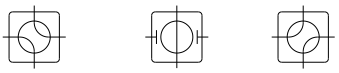
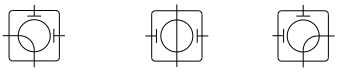



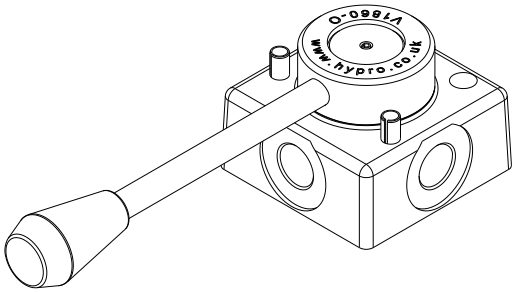



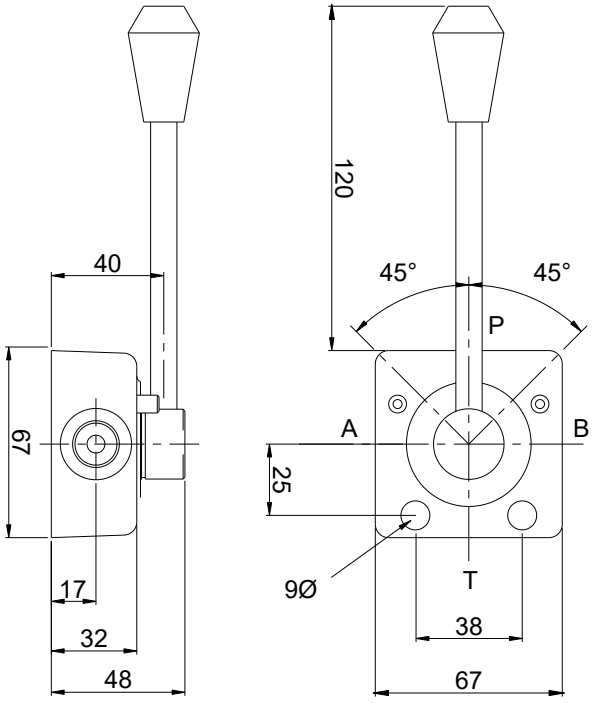

| | |
|---|---|
| **Priority flow** | 0-60 L/min |
| **Secondary flow** | 0-60 L/min |
| **∆P inlet to tank 40 lpm** | 2.0 bar |
| **∆P inlet to priority service 40 L/min** | 1.6 bar |
| **∆P inlet to secondary service 40 L/min** | 2.0 bar |
| **Maximum pressure** | 210 bar |
| **Coil Power** | 28 Watts |
| **Coil Max Current** | 3.4 Amps @ 20°C |
| **Body** | Aluminium |
| **Weight** | 1.5 Kg |
| **Width** | 70mm |



# G3/8 ROTARY DIVERTER VALVES

| | | |
|---|---|---|
| V1660 C |  | 3 Port closed centre - red knob |
| V1660 O |  | 3 Port open centre - black knob |
| V1860 C |  | 4 Port closed centre - blue knob |
| V1860 O |  | 4 Port open centre - black knob |
| V1860 D |  | 4 Port diverter - blue knob |



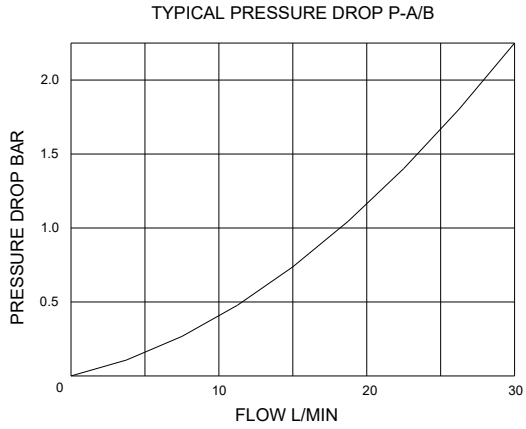




**Performance**

| | |
|---|---|
| Ports | G3/8 |
| Rated flow | 27 l/min |
| ΔP at rated flow | 1.7 bar |
| Maximum pressure | 210 bar |

**Weights**

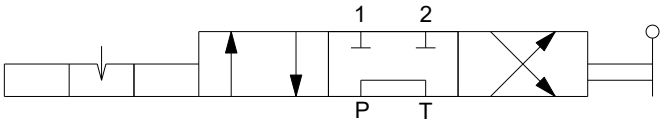
| | |
|---|---|
| Three port | 1.14 kg |
| Four port | 1.03 kg |

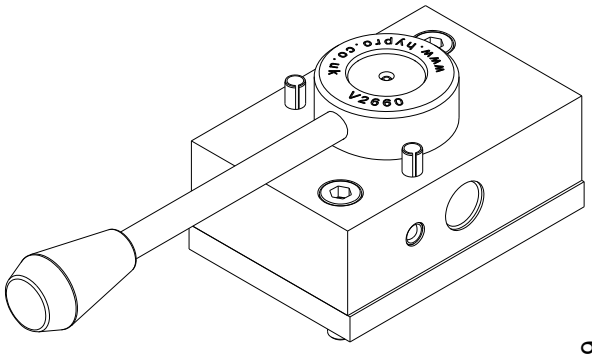


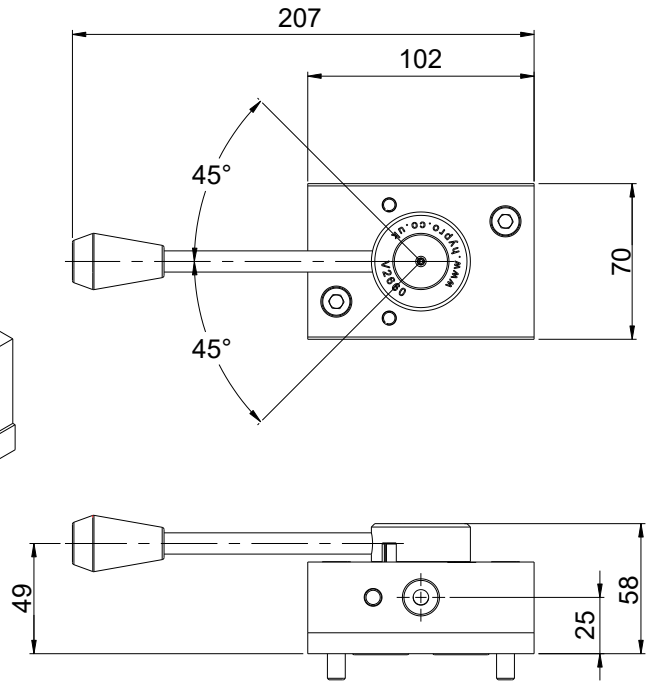
# MOTOR REVERSING VALVE

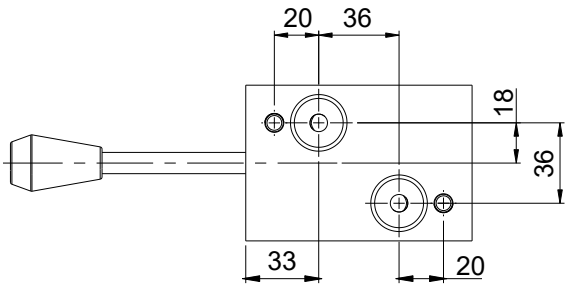
Designed to fit the Danfoss
OMP. OMH and OMR motors.

| **Option** | **Code** |
|---|---|
| Reversing Valve | V2660 |
| Sub-Plate<br>OMP OMH OMR | V2661 |




**Performance**

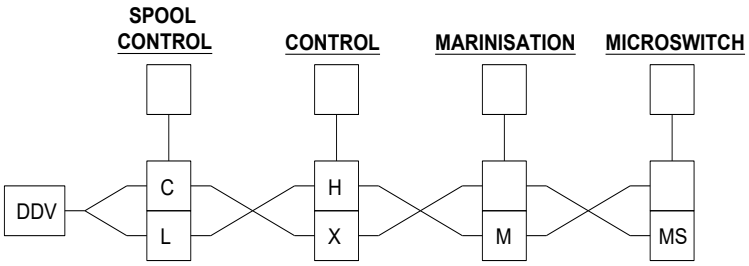
| | |
|---|---|
| Ports | G3/8 |
| Maximum pressure | 210 bar |

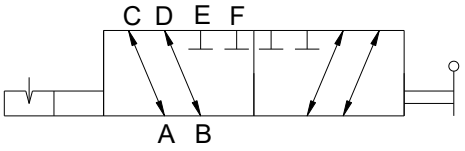
**Weights**

| | |
|---|---|
| Including sub plate | 1.85kg |

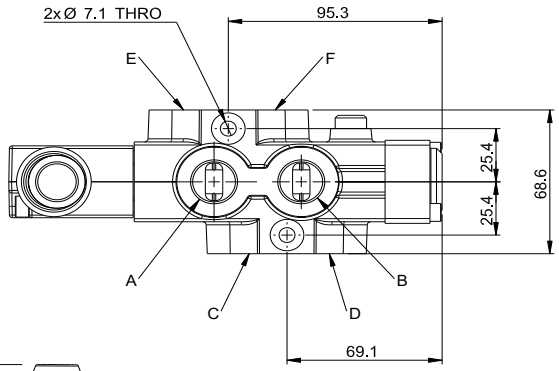
# G1/2 6 PORT DIVERTER VALVE

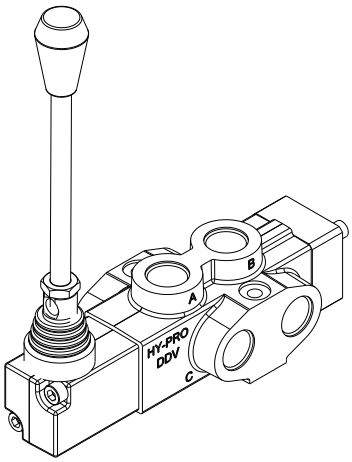
| Option | Code |
|---|---|
| Spring centred | C |
| Detent | L |
| Lever | H |
| No lever | X |
| Marinisation | M |
| Microswitch | MS |

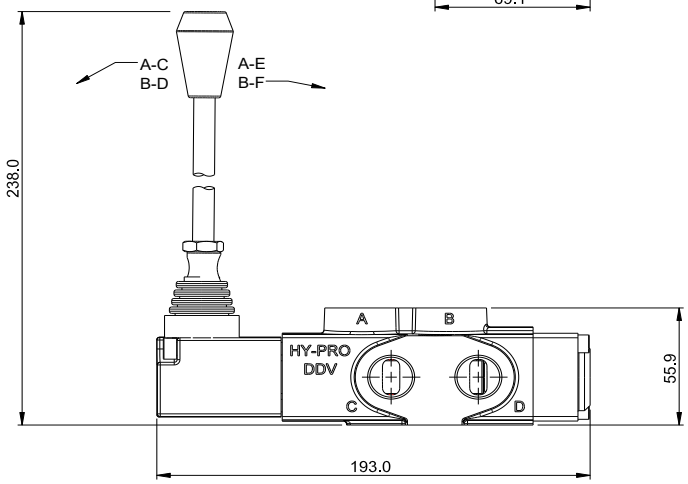



Underlapped spool



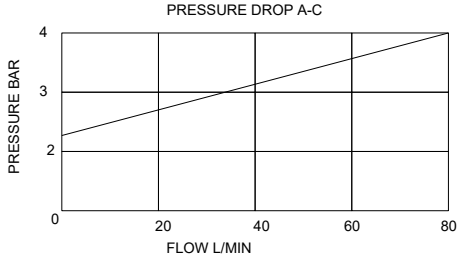




**Performance**

| | |
|---|---|
| Rated flow | 60 L/min |
| Maximum pressure | 250 bar |
| Ports | G1/2 |
| Spool Leakage 25°C | <10cc/min at 210bar |

**Weight** 2.1 kg

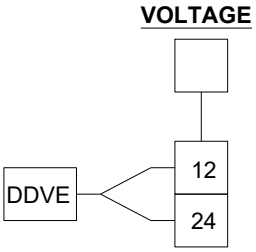


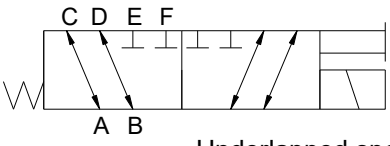
# G1/2 6 PORT SOLENOID DIVERTER VALVE

The 6 port diverter valve is available with either solenoid or manual control. The manual version is available with either detent or spring-centred spool control.
A further option is the fitment of a micro-switch.

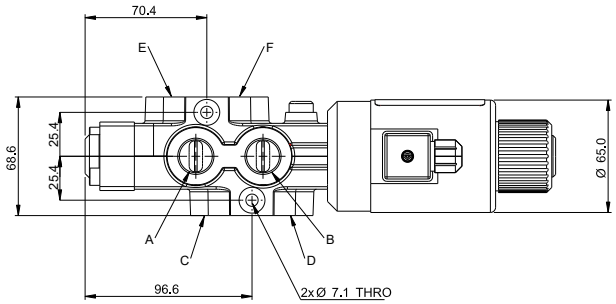
Both versions can be fitted with a pilot operated check valve acting on the E and F ports. Please contact us for details.

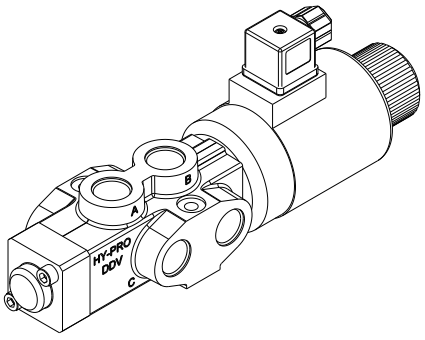
| **Option** | **Code** |
|---|---|
| 12 VDC | 12 |
| 24 VDC | 24 |

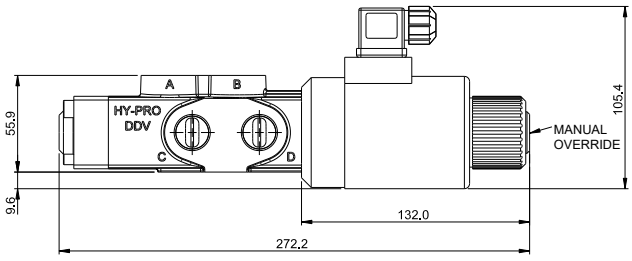



Underlapped spool



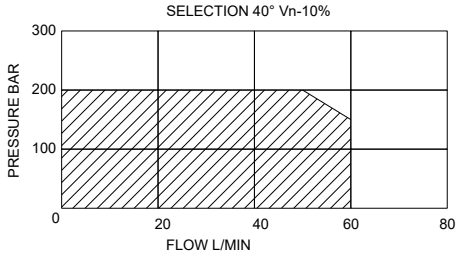



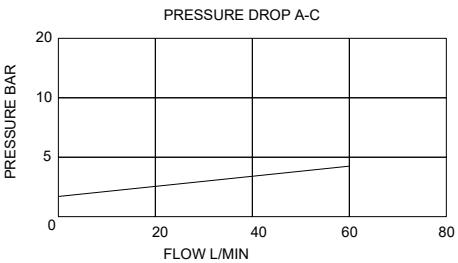

**Performance**

| | |
|---|---|
| Rated flow | 60 l/min |
| Maximum pressure | 210 bar |
| Ports | G1/2 |
| Spool Leakage @25°C | <10cc/min at 210 bar |

**Coil**

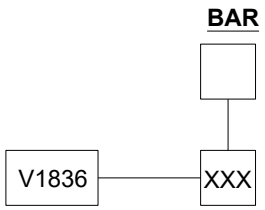
| | |
|---|---|
| Voltage | 12 or 24 VDC |
| Power | 60 Watts |
| Voltage | 12 or 24 VDC ±10% |
| Connection | DIN43650 |
| Protection | IP54 |
| **Weight** | 3.5 kg |



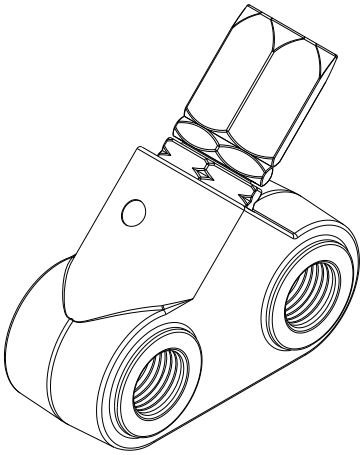



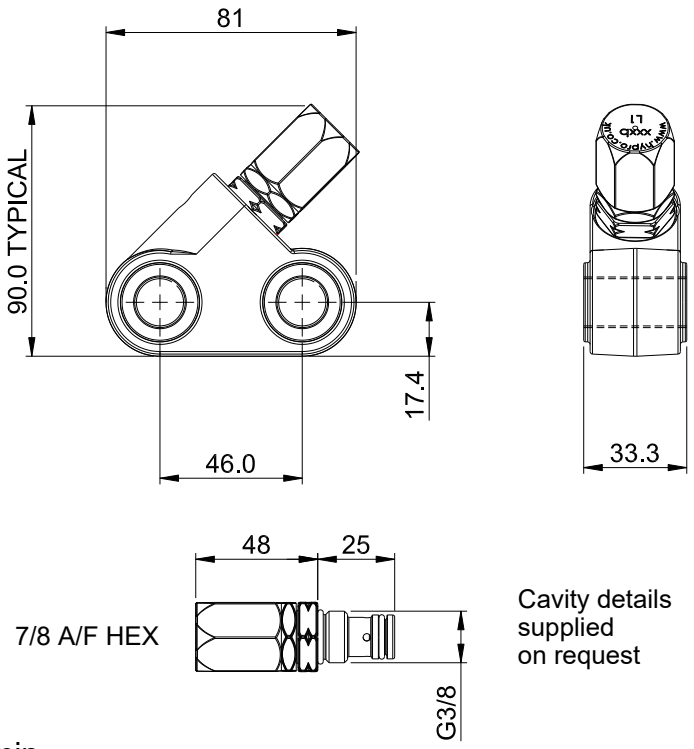
# V1836 CROSS LINE RELIEF VALVE

The V1836 cross-line relief valve incorporates a special cartridge which can relieve pressure in 2 directions i.e pressure can be applied to both the nose and shoulder of the cartridge. This allows its manifold to be very compact. The setting is adjusted and set by means of the hex cap and locknut. They are commonly used with motors and balanced cylinders to prevent shock loads.




**'XXX' = relief valve setting in bar (Supplied at 140 unless stated)**






**Performance**

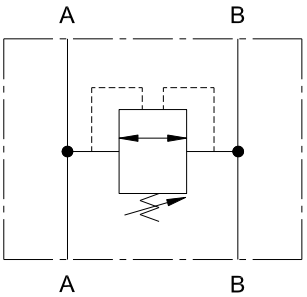
| | |
|---|---|
| Rated flow | 40 l/min |
| Max pressure | 250 bar |
| Manifold ports | G3/8 |
| Relief re-seat | 80% of setting |
| Range | 30-210 bar |

**Installation Torque**

| | |
|---|---|
| Cartridge | 27 Nm |
| Lock Nut | 8 Nm |

**Weight**

| | |
|---|---|
| V1836 | 0.33 kg |



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