# Your Partner for Mobile Valves

## Results based on cooperation.

Integrated into the HYDAC Group, the specialized products and systems from HYDAC and Nordhydraulic together can provide highly individualized solutions, tailored to customer requirements,
in addition to standard products for mobile systems.

Our mobile valves are characterized by highly advanced design solutions, including customized spools. Our objective is to optimize the controllability and performance of the machine.

The HYDAC network of top-quality suppliers and partners, in combination with our own foundry and high performance production provides us with the capacity to serve and satisfy all customers, regardless of size and volumes.

## Global yet local.

With over 50 overseas subsidiaries, 1000's of sales and service partners and local production facilities in the US, HYDAC is one of the leading suppliers of fluid technology, hydraulic and electronic equipment, and is your reliable partner worldwide.

## Expertise with a firm foundation.

A team of technical product specialists has been appointed to pool the know-how and experience of both companies in mobile applications. We can support your projects with extensive engineering services, joint product development and testing.

Our wide range of products, combined with our expertise in development, manufacturing, sales and service enables industries worldwide to overcome the most diverse problems.

## System solutions. One supplier. One contact.

Wherever you need us, we are there to help you find the most effective solution – for every application, from components to a complete system. HYDAC Mobile Hydraulic Division is ready to help you develop the most **compact, cost effective, and energy efficient solution**.

# System Electronics / Ancillary Valves

## Wireless Remote Controls

A complete remote control system for the proportional operation of different applications.

## MWV Electric Selector Valve

2 Position / 6 Way, 3600 PSI; 32 gpm various connectors available.

## RV 713 Manual Selector Valve

2 Position / 3 Way, 3600 PSI; 42 gpm various actuators available.

# Mobile Valves & Integrated Solutions

## Hydraulic Valves with Various Actuator Methods and Exceptional Controllability

- Optional spool designs to minimize flow forces and the impacts of multi-function interference to meet the requirements of the most demanding applications.
- Beneficial valve options to significantly reduce back pressure and speed up gravity return of single acting, cylinders.
- Typical flows up to 42 gpm and pressure to 5000 psi
- Integrated packages reduce machine assembly time, potential leak points and total system cost
- Multiple spool actuators for machine design flexibility

The HYDAC design team will incorporate various machine functions with standard control valves into a single, cost effective system.



PN#02092408 / 01.14 / MHD1311-1577

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**HYDAC INTERNATIONAL GMBH**

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## HYDAC North America Locations

### USA

www.HYDACusa.com

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**Filter Division**
2260 City Line Road
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**HYDAC TECHNOLOGY CORPORATION**
**Accessory Division**
**Marketing**
2204 Avenue C
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**+1.610.266.0100**

**HYDAC TECHNOLOGY CORPORATION**
**Electronic Division**
**Process Filter Division**

**HYDAC CORPORATION**
**Accumulator Division**
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**HYDAC TECHNOLOGY CORPORATION**
**Filter System Division**
**Process Filter Division**
580 West Park Road
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**Hydraulic Division - Compact Hydraulics**
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**Cooling System Division**
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**HYDAC CORPORATION**
**Sales Office**
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www.HYDACmex.com

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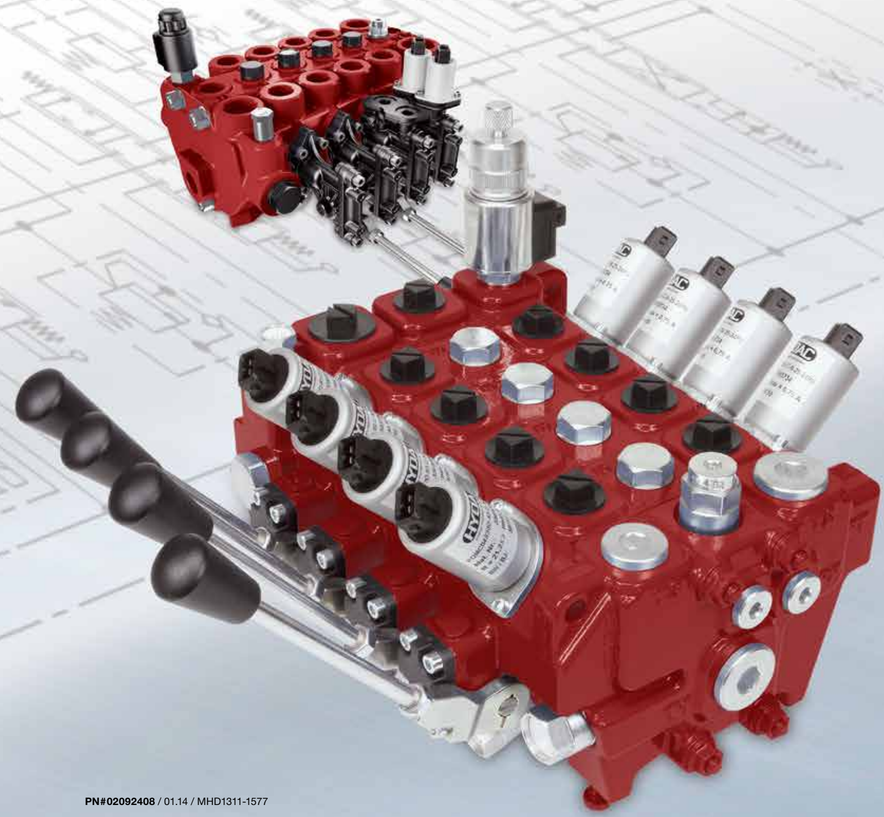
Tlalnepantla, CP. 54075
Edo. de Mexico
**+011.52.55.47771262**



**PN#02092408** / 01.14 / MHD1311-1577

HYDAC INTERNATIONAL

# Mobile Valves



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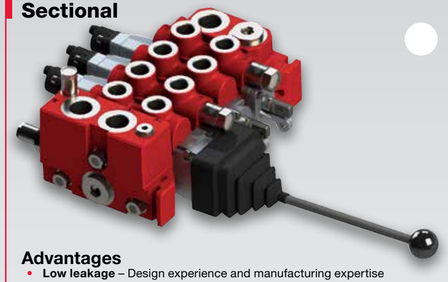
# Directional Control Valves

## RS 160
**Sectional**

### Advantages
- **Low pressure drops** – Fast lowering speeds due to low return line pressure drop
- **Safety Features** - Spool position & inlet unloading

### Main applications
Refuse Trucks - Tarp control, Small Drill Rigs, Service Cranes

## RS 210
**Sectional**

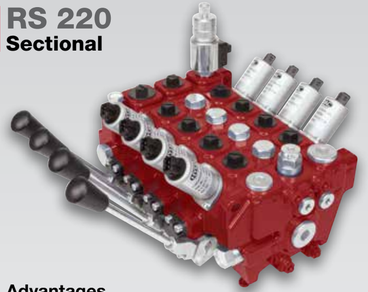


### Advantages
- **Low leakage** – Design experience and manufacturing expertise
- **Standardization** – Same valve for open center or load sense systems
- **Energy Savings** - Low pressure drop

### Main applications
Material Handling, Rough Terrain Forklifts, Small Construction Machines, Small Backhoes, Oil & Gas , Wreckers

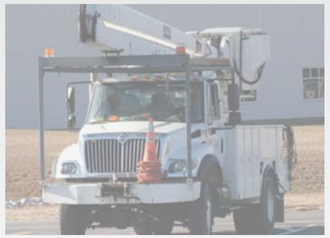
# Directional Control Valves

## RS 220
**Sectional**

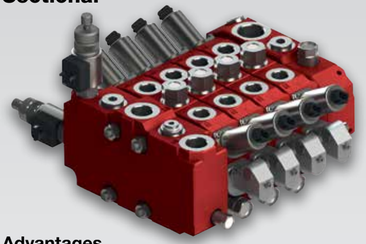


### Advantages
- **Precise Controllability** – Numerous spool designs ensure the best performance for each application
- **Safety features** – Overload protection, load holding valves
- **Energy savings** – Smart system solutions, reduce loss and overall cost

### Main applications
Service Trucks, Cranes, Trailers, Wreckers, Recovery Vehicles



## RSQ 240
**Sectional**



### Advantages
- **Space and weight savings** – Pioneers in compact design

### Main applications
Material Handling, Snow Plows, Cranes up to 10 ton

# Directional Control Valves

## RSM 290 (DX 6)
**Sectional**

### Advantages
- **Precise Controllability** – Numerous spool designs ensure the best performance for each application
- **Safety features** – Overload protection
- **Energy savings** – Smart system solutions, reduce loss and overall cost

### Main applications
Cranes - up to 40 ton, Refuse Trucks, Material Handling

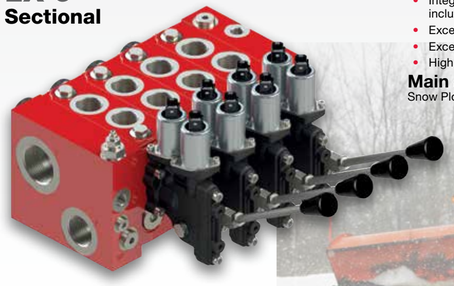
## RMU 270
**Monoblock**

### Advantages
**Environmental benefits** – Monoblock valve design

### Main applications
Roll-Off trucks, Refuse Trucks, Oil & Gas

# Load Sensing Directional Control Valves

## LX 6
**Sectional**



### Advantages
- Integrated solutions for open center and load sensing functions including spool and cartridge combinations.
- Exceptional resolution due to extended spool stroke.
- Excellent pressure compensation
- High power density

### Main applications
Snow Plows, Cranes, Drill Rigs, Telehandlers

# Technical Specifications

| Model | Rated Flow | System Pressure (psi) | No. of Sections | Valve Type | Remote Control Options | | | | | | | | | Work Port[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Cable | Pneumatic | Electro Pneumatic | Hydraulic Pilot | Electro Hydraulic (Prop and On/Off) | Electric Unloading | Q-Func.[3] | Hydraulic Spool Kickout | Electric Spool Position Sensor | |
| RS 160[2] | 15 | 4350 | 1 - 10 | Sect; Open Ctr | ● | ● | | ● | ● | ● | | | | SAE 8 |
| RS 210 | 20 | 4350 | 1 - 10 | Sect; Open Ctr | ● | ● | ● | ● | ● | ● | ● | ● | ● | SAE 8 |
| RS 220[2] | 25 | 4350 | 1 - 10 | Sect; Open Ctr | | | | ● | ● | ● | ● | ● | ● | SAE 10 |
| RSQ 240[2] | 26 | 5000 | 1 - 10 | Sect; Open Ctr | ● | ● | | ● | ● | ● | ● | ● | ● | SAE 10 |
| RMU 270 | 42 | 3000 | 1 - 4, 6 | Mono; Open Ctr | ● | ● | ● | | ● | | | | | SAE 12 |
| RSM 290 (DX 6)[2] | 45 | 5000 | 1 - 10 | Sect; Open Ctr | ● | ● | | ● | ● | ● | ● | | ● | SAE12 |
| LX 6 | 42 | 5000 | 1 - 10 | Sect; Load Sense | | | | ● | ● | | | | ● | SAE 12 |

1. Other port threads available upon request
2. Can be used with a variable pump with LS compensator
3. Q-Function defines a means of improving neutral pressure drop & flow forces

For manual operation of our valves we can supply a range of hand levers, linear and joystick versions.

Contact HYDAC Mobile Hydraulic Division at **Mobile.Valve.Info@hydacusa.com** or call your local HYDAC Sales Manager.

**HYDAC TECHNOLOGY CORPORATION**
**Mobile Hydraulic Division**
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Fax: (330)264-4088

| | |
|---|---|
| Description | Remote Control System G4 Handy-10 PWM AMP-JPT |

This is a complete remote control system solution using the Handy-10 controller with proportional push-buttons suited for a 4, 5 or 6 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors.

Quick system description:

- 12 or 24 VDC Supply voltage.
- Handy Control Unit equipped with 8 analog push buttons for control of 4 bi-directional analog functions (8 total proportional outputs).
- Function shift button allowing additional 2 bi-directional analog (proportional) functions as well as 6 digital(on/off) functions using the 4 push buttons.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- All analog functions programmable for final adjustment of speeds.
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charger and emergency stop button. See below for more detail.


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## Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G4 Portable Control Unite Handy-10 |
| 1 | G4 Central Unit |
| 1 | G4 Standard supply cable kit |
| 1 | Standard valve cable kit 1-6 A/B AMP-JPT |
| 1 | Standard battery charger adapter |
| 2 | Standard battery cell |
| 1 | Emergency stop button |
| 1 | Pairing plug |
| 1 | Instruction manual RC400 G4 |

## Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094455 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 3505460 |

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| | |
|---|---|
| Description | Remote Control System G4 Mini Linear 4 PWM AMP-JPT |

This is a complete remote control system solution using the PCU Mini Economy with linear levers suited for a 4, 5 or 6 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors

Quick system description:

- 12 or 24 VDC Supply voltage requirement.
- Portable Control Unit equipped with 4 linear levers for control of 4 (+2) bi-directional analog (proportional) functions.
- Function shift button allowing additional 2 bi-directional analog (proportional) functions as well as 6 digital (on/off) functions using the 4 linear levers.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- All analog functions programmable for final adjustment of speeds.
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batters, battery charger, neck strap and emergency stop button.


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## Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G4 Portable Control unit MINI Linear-4 |
| 1 | G4 Central Unit |
| 1 | G4 Standard supply cable kit |
| 1 | Standard valve cable kit 1-6 A/B AMP-JPT |
| 1 | Standard battery charger |
| 2 | Standard battery pack |
| 1 | Standard carrying strap |
| 1 | Emergency stop box |
| 1 | Pairing Plug |
| 1 | Instruction manual RC400 G4 |

## Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094454 |
| NAFTA (900 MHz) | 12 VDC | 500-1200mA (100 Hz) | Amp Jr timer | 3505459 |

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| | |
|---|---|
| Description | Remote Control System G2B Maxi 8 PWM AMP-JPT |

A complete remote control system solution using the Portable control Unit Maxi with linear levers suited for an 8 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors.

Quick system description:

- 12 or 24 VDC supply voltage.
- Portable Control Unit equipped with 8 linear levers for control of 8 bi-directional analog functions.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- Cable control option also available.
- All analog functions programmable for final adjustment of speeds.
- Digital functions available thru left switch panel toggles for engine control (requires compatible engine electronics).
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charger, cable com. Cable, neck strap and emergency stop button.

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## Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G2B Portable Control unit MAXI Linear 8 11-564 |
| 1 | G2B Central Unit |
| 1 | G2 Standard supply cable kit |
| 1 | Standard valve cable kit 1-8 A/B AMP-JPT |
| 1 | Standard battery charger 10-30 VDC |
| 2 | Standard battery pack |
| 1 | Standard 10 meter control cable |
| 1 | Standard carrying strap |
| 1 | Emergency stop button |
| 1 | Instruction manual RC400 G2 |

## Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094435 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 2094442 |

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| | |
|---|---|
| Description | Remote Control System G2B Mini Linear 6 PWM AMP-JPT |

A complete remote control system solution using the Portable Control Unit Mini with linear levers suited for a 6 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors.

Quick system description:

- 12 or 24 VDC Supply voltage.
- Portable Control Unit equipped with 6 linear levers for control of 6 bi-directional analog functions.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- Cable control option also available
- All analog functions programmable for final adjustment of speeds.
- Digital functions available thru left switch panel toggles for engine control (requires compatible engine electronics).
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charge, cable com. cable, neck strap and emergency stop button.

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## Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G2B Portable Control unit MINI Linear-6 11-564 |
| 1 | G2B Central Unit |
| 1 | G2 Standard supply cable kit |
| 1 | Standard valve cable kit 1-6 A/B AMP-JPT |
| 1 | Standard battery charger 10-30 VDC |
| 2 | Standard battery pack |
| 1 | Standard 10 meter control cable |
| 1 | Standard carrying strap |
| 1 | Emergency stop button |
| 1 | Instruction manual RC400 G2 |

## Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094443 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 2094436 |

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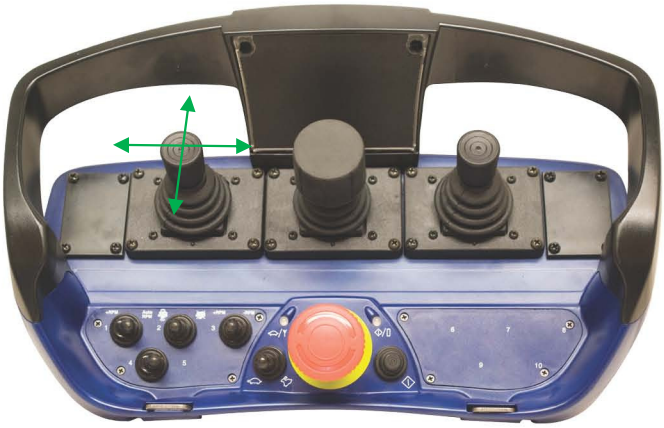
| | |
|---|---|
| Description | Remote Control System G2B Maxi Joystick 232 11-564 PWM AMP-JPT |

**A complete remote control system solution using the PCU Maxi controller with joysticks suited for a 7 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors.**

Quick system description:

- 12 or 24 VDC Supply voltage.
- Portable Control Unit equipped with two double axis, and one triple axis joystick for control of 7 bi-directional analog (proportional) functions.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- Cable control option also available
- All PWM analog functions programmable for final adjustment of speeds.
- Digital functions available thru left switch panel toggles for engine control (requires compatible engine electronics).
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charger, cable communication cable, neck strap and emergency stop button.



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## Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G2B Portable Control unit MAXI Joystick 232 |
| 1 | G2B Central Unit |
| 1 | G2 Standard supply cable kit |
| 1 | Standard valve cable kit 1-8 A/B AMP-JPT |
| 1 | Standard battery charger 10-30 VDC |
| 2 | Standard battery pack |
| 1 | Standard 10 meter control cable |
| 1 | Standard carrying strap |
| 1 | Emergency stop button |
| 1 | Instruction manual RC400 G2 |

## Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094438 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 2094445 |

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| | |
|---|---|
| Description | Remote Control System G2B Maxi Joystick 303 11-564 PWM AMP-JPT |

This is a complete remote control system solution using the Portable Control Unit Maxi joystick suited for a 6 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors

Quick system description:

- 12 or 24 VDC supply voltage.
- Portable Control Unit equipped with two triple-axis, joysticks for control of 6 bi-directional analog functions.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- Cable control option also available.
- All analog functions programmable for final adjustment of speeds
- Digital functions available thru left switch panel toggles for engine control (requires compatible engine electronics).
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charger, cable communication cable, neck strap and emergency stop button.

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## Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G2B Portable Control unit MAXI Joystick 303 |
| 1 | G2B Central Unit |
| 1 | G2 Standard supply cable kit |
| 1 | Standard valve cable kit 1-6 A/B AMP-JPT |
| 1 | Standard battery charger 10-30 VDC |
| 2 | Standard battery pack |
| 1 | Standard 10 meter control cable |
| 1 | Standard carrying strap |
| 1 | Emergency stop button |
| 1 | Instruction manual RC400 G2 |

## Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094437 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 2094444 |

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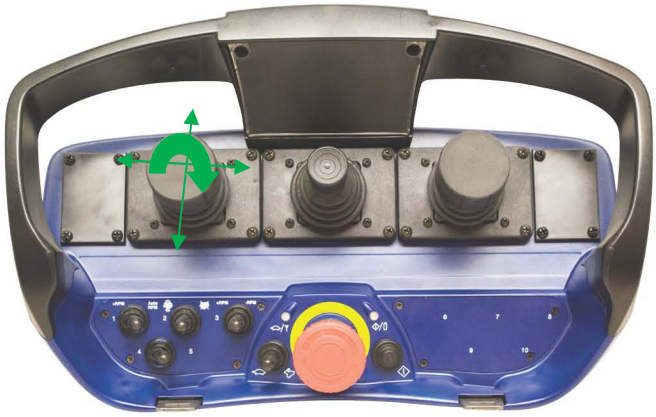
| | |
|---|---|
| Description | Remote Control System G2B Maxi Joystick 323 11-564 PWM AMP-JPT |

This is a complete remote control system solution using the Portable Control Unite Maxi joystick suited for an 8 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors.

Quick system description:

- 12 or 24 VDC Supply voltage.
- Portable Control Unit equipped with two triple-axis and one double-axis joystick for control of 8 bi-directional analog functions.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- Cable control option also available.
- All analog functions programmable for final adjustment of speeds.
- Digital functions available thru left switch panel toggles for engine control (requires compatible engine electronics).
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charger, cable communication cable, neck strap and emergency stop button.



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## Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G2B Portable Control unit MAXI Joystick 323 |
| 1 | G2B Central Unit |
| 1 | G2 Standard supply cable kit |
| 1 | Standard valve cable kit 1-8 A/B AMP-JPT |
| 1 | Standard battery charger 10-30 VDC |
| 2 | Standard battery pack |
| 1 | Standard 10 meter control cable |
| 1 | Standard carrying strap |
| 1 | Emergency stop button |
| 1 | Instruction manual RC400 G2 |

## Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094439 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 2094446 |

**HYDAC TECHNOLOGY CORPORATION**
**Mobile Hydraulic Division**
1660 Enterprise Parkway  Suite E
Wooster, Ohio 44691
Phone:  (800)775-2260 ext 1902
Fax:  (330)264-4088

| | |
|---|---|
| Description | Remote Control System G2B Mini Joystick 202 PWM AMP-JPT |

**A complete remote control system solution using the Portable Control Unit Mini with joysticks suited for a 4 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors**

Quick system description:

- 12 or 24 VDC Supply voltage.
- Portable Control Unit equipped with two double-axis joysticks for control of 4 bi-directional analog functions.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- Cable control option also available.
- All analog functions programmable for final adjustment of speeds.
- Digital functions available thru left switch panel toggles for engine control (requires compatible engine electronics).
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charger, cable com. cable, neck strap and emergency stop button.

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Phone: (800)775-2260 ext 1902
Fax: (330)264-4088

Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G2B Portable Control unit MINI Joystick 202 |
| 1 | G2B Central Unit EU |
| 1 | G2 Standard supply cable kit |
| 1 | Standard valve cable kit 1-6 A/B AMP-JPT |
| 1 | Standard battery charger 10-30 VDC |
| 2 | Standard battery pack |
| 1 | Standard 10 meter control cable |
| 1 | Standard carrying strap |
| 1 | Emergency stop button |
| 1 | Instruction manual RC400 G2 |

Order Information:

| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094441 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 2094448 |

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| | |
|---|---|
| Description | Remote Control System G2B Mini Joystick 222 PWM AMP-JPT |

This is a complete remote control system solution using the Portable Control Unit Mini with joysticks suited for a 6 section directional control valve using Hydac's PWM solenoid with AMP-JPT connectors.

Quick system description:

- 12 or 24 VDC Supply voltage.
- Portable Control Unite equipped with three double-axis joysticks for control of 6 bi-directional analog functions.
- Radio communication at 900 MHz (ISM-band) using frequency jumping technology.
- Cable control option also available.
- All analog functions programmable for final adjustment of speeds.
- Digital functions available thru left switch panel toggles for engine control (requires compatible engine electronics).
- Complete cable kits for simple installation of supply, digital functions, dump valve and analog functions.
- Standard accessories included such as batteries, battery charger, cable communication cable, neck strap and emergency stop button.

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**Mobile Hydraulic Division**
1660 Enterprise Parkway Suite E
Wooster, Ohio 44691
Phone: (800)775-2260 ext 1902
Fax: (330)264-4088

Scope of delivery:

| Qty | Description |
|---|---|
| 1 | G2B Portable Control unit MINI Joystick 222 11-564 |
| 1 | G2B Central Unit |
| 1 | G2 Standard supply cable kit |
| 1 | Standard valve cable kit 1-6 A/B AMP-JPT |
| 1 | Standard battery charger 10-30 VDC |
| 2 | Standard battery pack |
| 1 | Standard 10 meter control cable |
| 1 | Standard carrying strap |
| 1 | Emergency stop button |
| 1 | Instruction manual RC400 G2 |

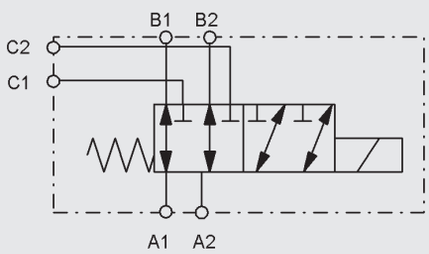
Order Information:

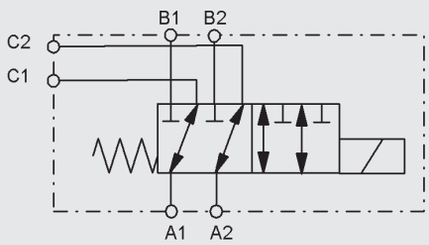
| Radio/Region | Supply voltage | PWM outputs/Current range (PWM Freq.) | Electrical Connection | Order reference |
|---|---|---|---|---|
| NAFTA (900 MHz) | 24 VDC | 250-640 mA (100Hz) | Amp Jr timer | 2094440 |
| NAFTA (900 MHz) | 12 VDC | 500-1200 mA (100 Hz) | Amp Jr timer | 2094447 |

HYDAC INTERNATIONAL

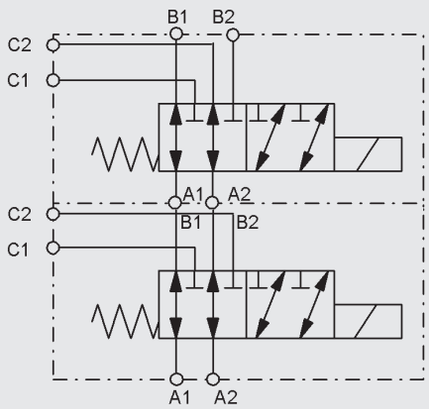
# Mobile Technology
# 6/2 Directional Valve
## MWV 6/2-12

**Switching symbols**
**Individual valves:**

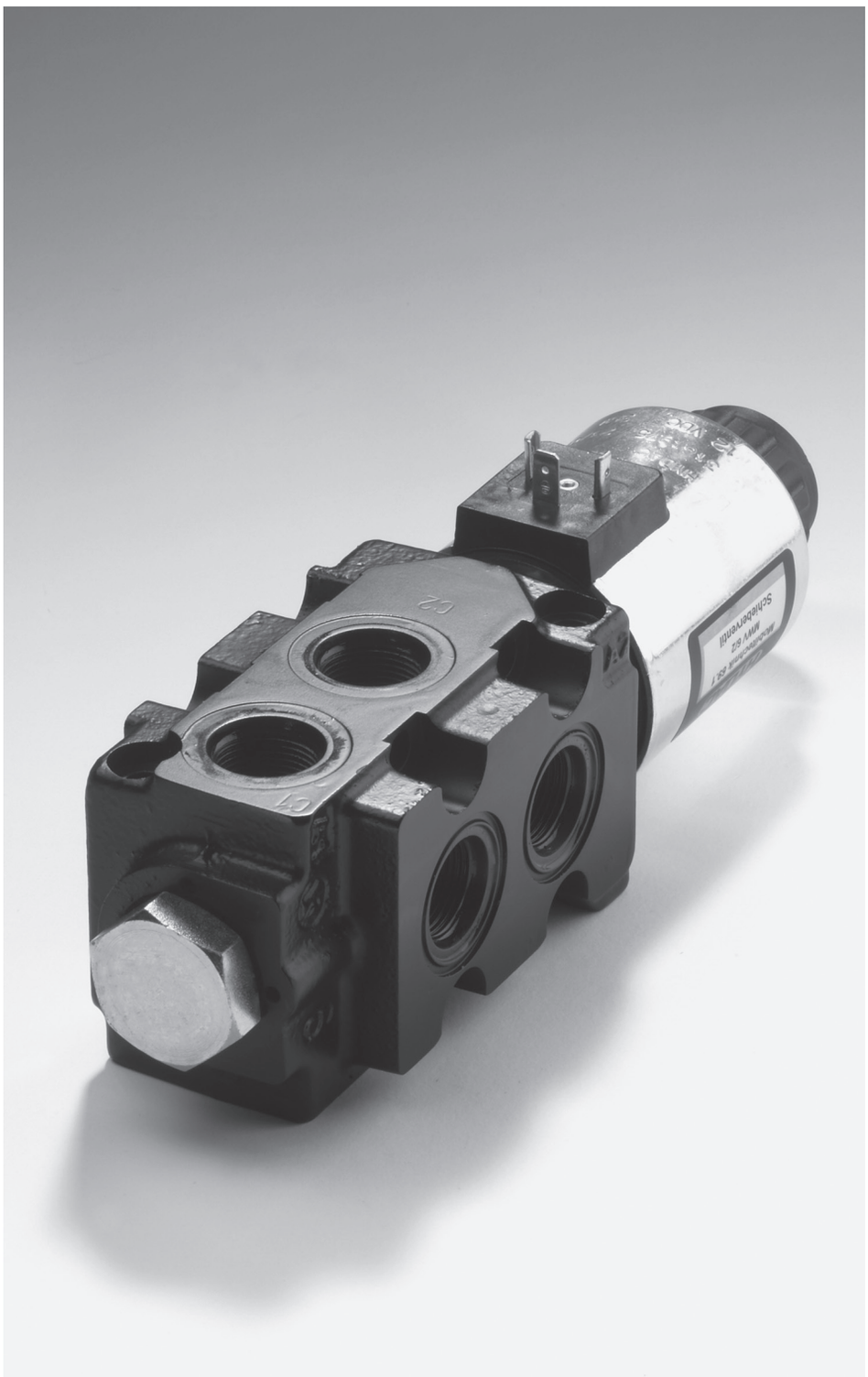



**Stacking possible:**




**Up to 250 bar**
**Up to 120 l/min**



E 10.116.1.1/12.10

# 1. DESCRIPTION

## 1.1. APPLICATIONS

The valve acts as a diverter between a supply and two hydraulic consumers.
For example, it enables two hydraulic cylinders to be controlled using one control unit.

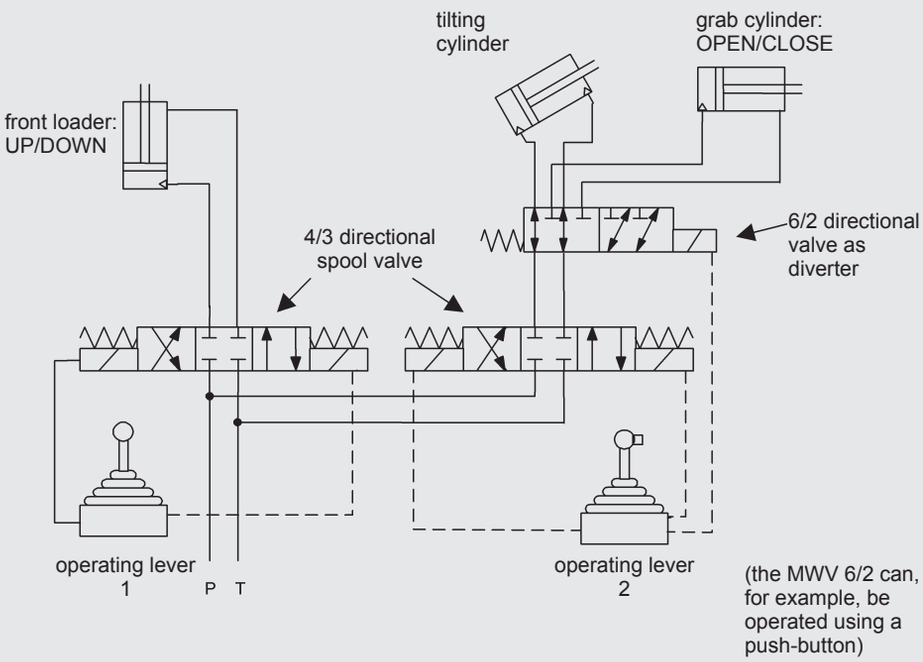
Typical applications are front loaders, telehandlers and attachments.

## 1.2. GENERAL

- The solenoid control can be on either side, fitted on the right or left of the valve housing.
  The switch position in the de-energised mode can therefore be decided according to customer requirement.
- The standard solenoid coil with AMP connector is protected against high switch-off surges by a bidirectional free-wheeling diode.
- The flange-housing of the valve means that up to three MWV 6/2 valves can be connected together.
- The valve can be operated under load.
- Valve can be retrofitted.
- Manual override is possible using an appropriate pin.

## 1.3. FUNCTION

**Example circuit of front loader:**




In the circuit diagram, both up and down movement in the front loader and the tilting movement of the grab are each controlled by a 4/3 directional spool valve. The additional open and close movement of the grab is made possible by the intermediate switching of the MWV 6/2. When energised, the 6/2 spool valve functions as a diverter and diverts the oil flow from the tilting cylinder to the grab cylinder.

# 2. TECHNICAL SPECIFICATIONS

## 2.1. GENERAL DATA

**Weight:**
approx. 5 Kg

**Housing material:**
EN-GJL-300 (GG 30)
(grey cast iron) primed

**Type of construction/operation:**
electrically operated

### 2.1.1 Hydraulic data

**Max. pressure**
$p_{max}$ = 250 bar

**Max. flow rate:**
$Q_{max}$ = 120 l/min

**Max. pressure drop:**
see graphs 1 and 2

**Operating limits:**
See graph 3

**Ports:**
Cartridge thread
DIN ISO 6149 M22 x 1.5

Cartridge thread
DIN 3852-X-G1/2

Cartridge thread
SAE J 514-3/4-16UNF

No drain port

**Type of mounting:**
Flange version

**Seal material:**
NBR

**Operating fluid:**
Mineral oil to DIN 51524
Part 1 and Part 2

**Viscosity range:**
2.8 ... 380 mm²/s

**Ambient temperature range:**
- 20 ... 60 °C

**Oil temperature range:**
- 20 ... 80 °C

**Oil cleanliness:**
Permissible cleanliness class of the operating fluid to ISO 4406
Class 20/18/15 or cleaner

### 2.1.2 Electrical specifications

**Type of solenoid:**
AMP Junior Power Timer
(2 pole, radial) with bidirectional free-wheeling diode

or connector to DIN 43650
without bidirectional free-wheeling diode

**Coil power:**
35W

**Nominal voltage:**
12V or 24 V DC with
voltage tolerance ±10 %

**Coil duty rating:**
100%

**Protection class:**
IP 65 to DIN 40050 when connector is fitted correctly

2.1.3 **Model code**
(also order example)

**MWV 6/2 - 12 - M22 - NBR - 12 - Z4 - 01 - X - BG2 - X**

**Mobile directional valve**

**Ports / switching positions**

**Nominal size**

**Ports**
M22 x 1.5
G1/2
¾ -16 UNF

**Material of seals**
NBR

**Coil voltage**
12 = 12V DC
24 = 24V DC

**Coil connector**
Z4 = connector to DIN 43650
AMP = AMP Junior Timer, 2-pole, radial

**Type**
01 = flow from A to C when de-energised
02 = flow from A to B when de-energised

**Series of the valve** (determined by manufacturer)

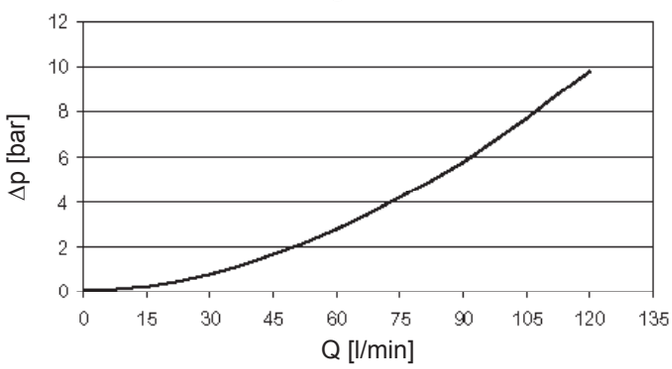
**Stacking modules**
Without details = individual valve
BG2 = stacking module comprising 2 valves
BG3 = stacking module comprising 3 valves

**Series of the assembly** (determined by manufacturer)
Without details = individual valve

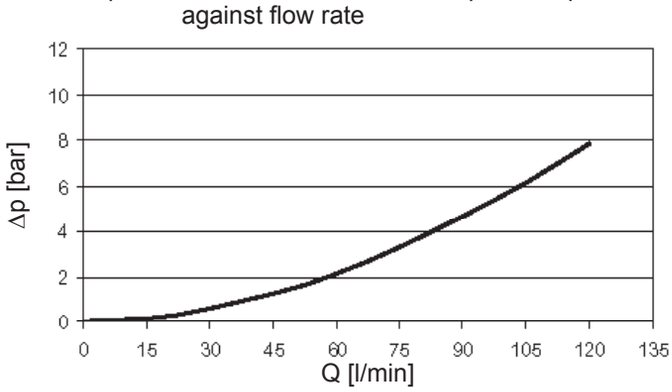
G 1/2, 3/4-16 UNF and other versions on request

## 2.2. GRAPHS

### 2.2.1 **Pressure differential against flow rate**

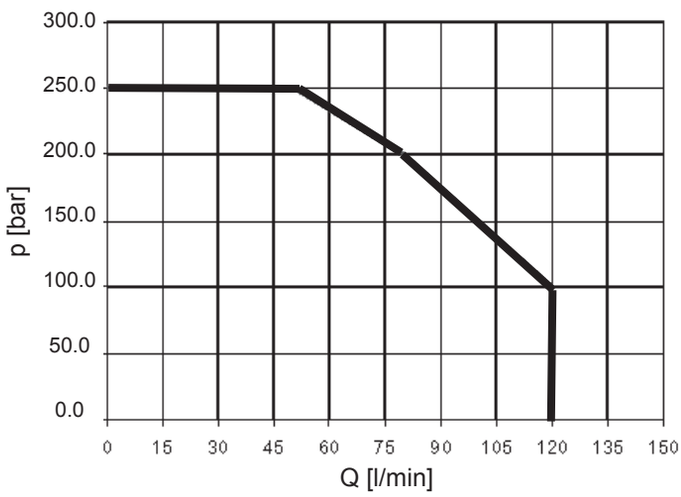



Graph 1: Pressure differential from port A to port B against flow rate




Graph 2: Pressure differential from port A to port C against flow rate

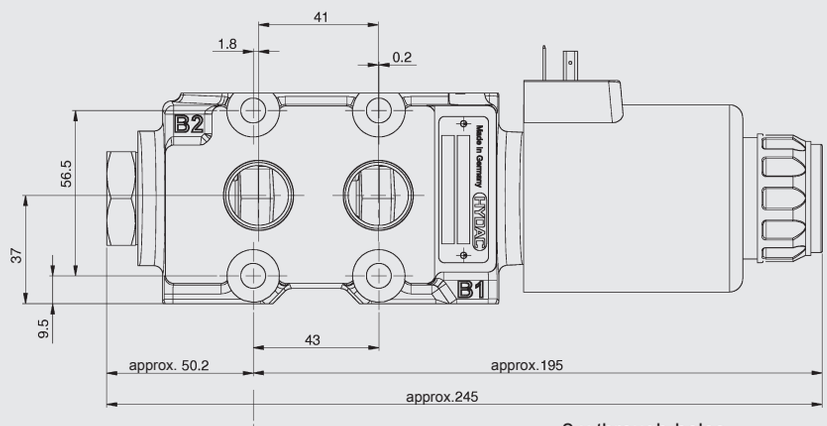
### 2.2.2 **Operating limits**

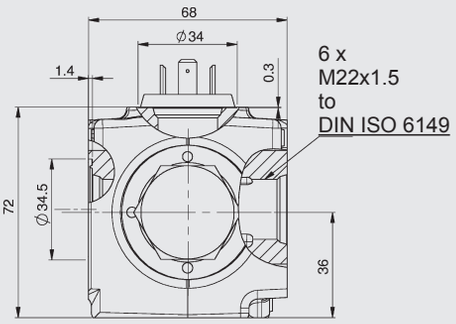


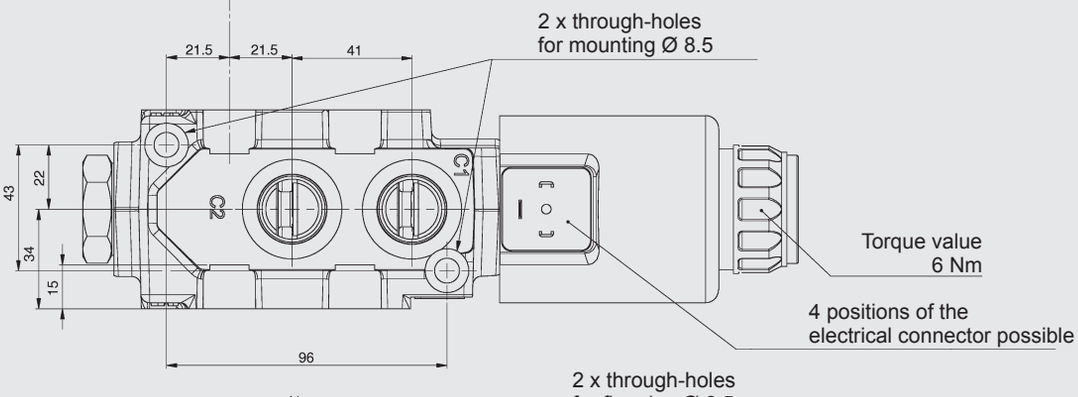

Graph 3: Operating limit of the valve
(35 Watt solenoid with 100% coil duty)

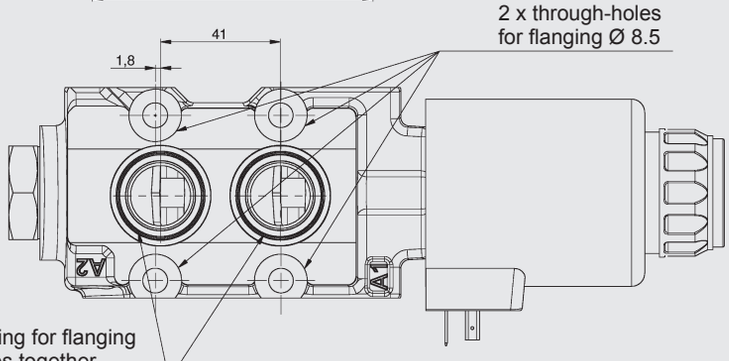
All tests were measured using oil ISO VG46 at 46°C.

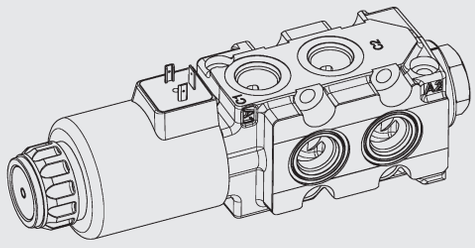
## 3. DIMENSIONS

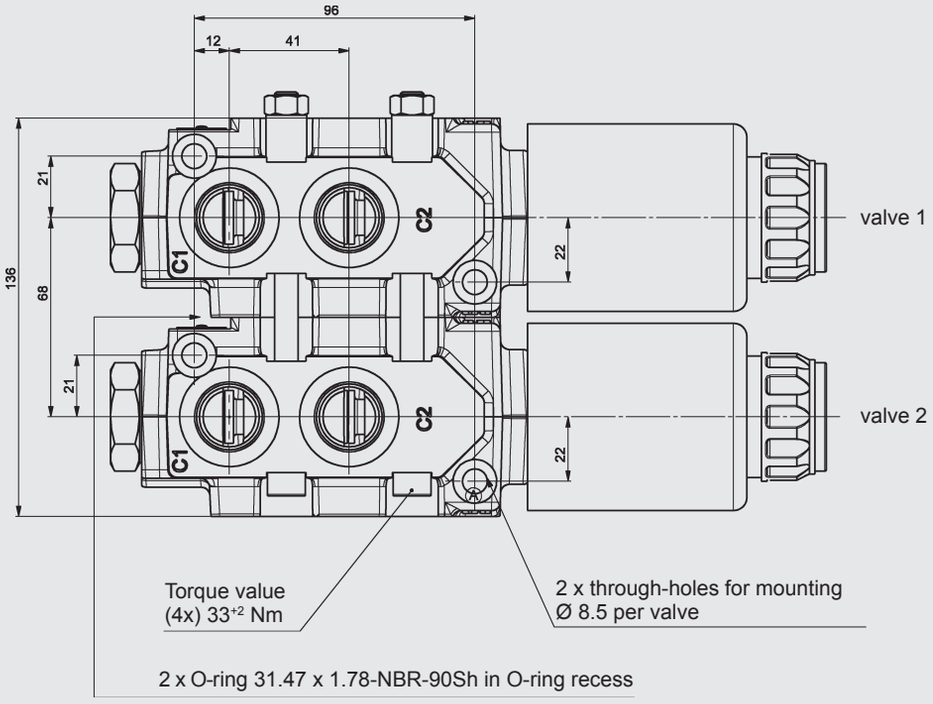




## 4. ACCESSORIES

**Mounting kits for assemblies for:**

4.1 MOUNTING 2 x MWV 6/2 VALVES
IN A 2-VALVE STACKING MODULE:

**MT mounting kit MWV6/2-BG2**
Part no. 3272809
consisting of:

| | |
|---|---|
| Int. hex. screw ISO 4762-M8x130-10.9-A3B<br>Torque value $33^{+2}$ Nm | 4 pcs. |
| MT threaded sleeve 14/9-16 | 4 pcs. |
| Hex. nut ISO 4032-M8-8-A3B | 4 pcs. |
| O-ring 31.47 x 1.78-NBR-90Sh | 2 pcs. |

4.2 MOUNTING 3 x MWV 6/2 VALVES
IN A 3-VALVE STACKING MODULE:

**MT mounting kit MWV6/2-BG3**
Part no. 3272251
consisting of:

| | |
|---|---|
| Int. hex. screw ISO 4762-M8x200-10.9-A3B<br>Torque value $33^{+2}$ Nm | 4 pcs. |
| MT threaded sleeve 14/9-16 | 4 pcs. |
| Hex. nut ISO 4032-M8-8-A3B | 4 pcs. |
| O-ring 31.47 x 1.78-NBR-90Sh | 4 pcs. |

4.3 ADDITIONAL WORK REQUIRED
FOR SELF-ASSEMBLY

In order to guarantee the seal between the flange-surfaces, the primer on the relevant flange surfaces must be removed professionally before assembling the module. If solvents are used, ensure that these do not corrode the metal surfaces.

## 5. NOTE

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC INTERNATIONAL

# Selector Valve
# RV 713

## Key valve features

RV 713 is a 3 way selector valve designed for flows up to 42gpm (160 Lpm) and max. operating pressures up to 3,625 psi (250 bar).

Spools, both 2 and 3 position, are available in various types including spools with built in check valves. Standard spools are designed with under lap.

A wide range of spool controls, both for manual operation as well as for remote control, are available.

## Applications

Typical applications for RV 713 are tipping gears and demountable bodies.

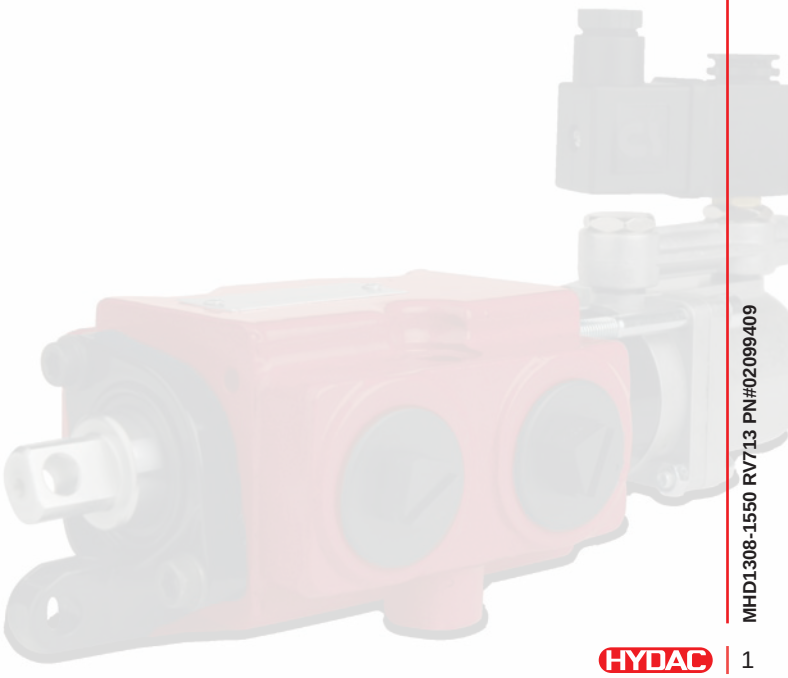
The configeration with check valve spools are typical used as a limit switch on trailers.

## Technical data

| | | |
|---|---|---|
| **Pressures / Flows** | | |
| Max. operating pressure per port: | | |
| A, B, C: | 3625 psi | 250 bar |
| Typical Nominal Inlet Flow: | 42 gpm | 160 Lpm |
| Fluid temperature range: | 5°F up to 176°F | -15°C up to +80°C |
| [1] Manual operated valves with spring centered or spring returned spools are only recommended when switching to neutral always takes place during pressure unloaded conditions. | | |
| **Further data** | | |
| Spool control force: | | |
| Neutral position: | 63 lbs | 280 N |
| Max spool stroke: | 90 lbs | 400 N |
| Permiss ble contamination level: | Equal or better than 20/18/14 as per ISO 4406 | |
| Viscosity range: | 10 – 400 cSt<br>Higher viscosity allowed at start up | |
| Leakage A, B -> T at 1,500 psi, 32 cSt and 104°F ‹ 40 cc/min (100 bar, 32 cSt and 40°C) | | |
| Pressure fluid: | Mineral oil and synthetic oil based on mineral oil HL, HLP according to DIN 51524 | |

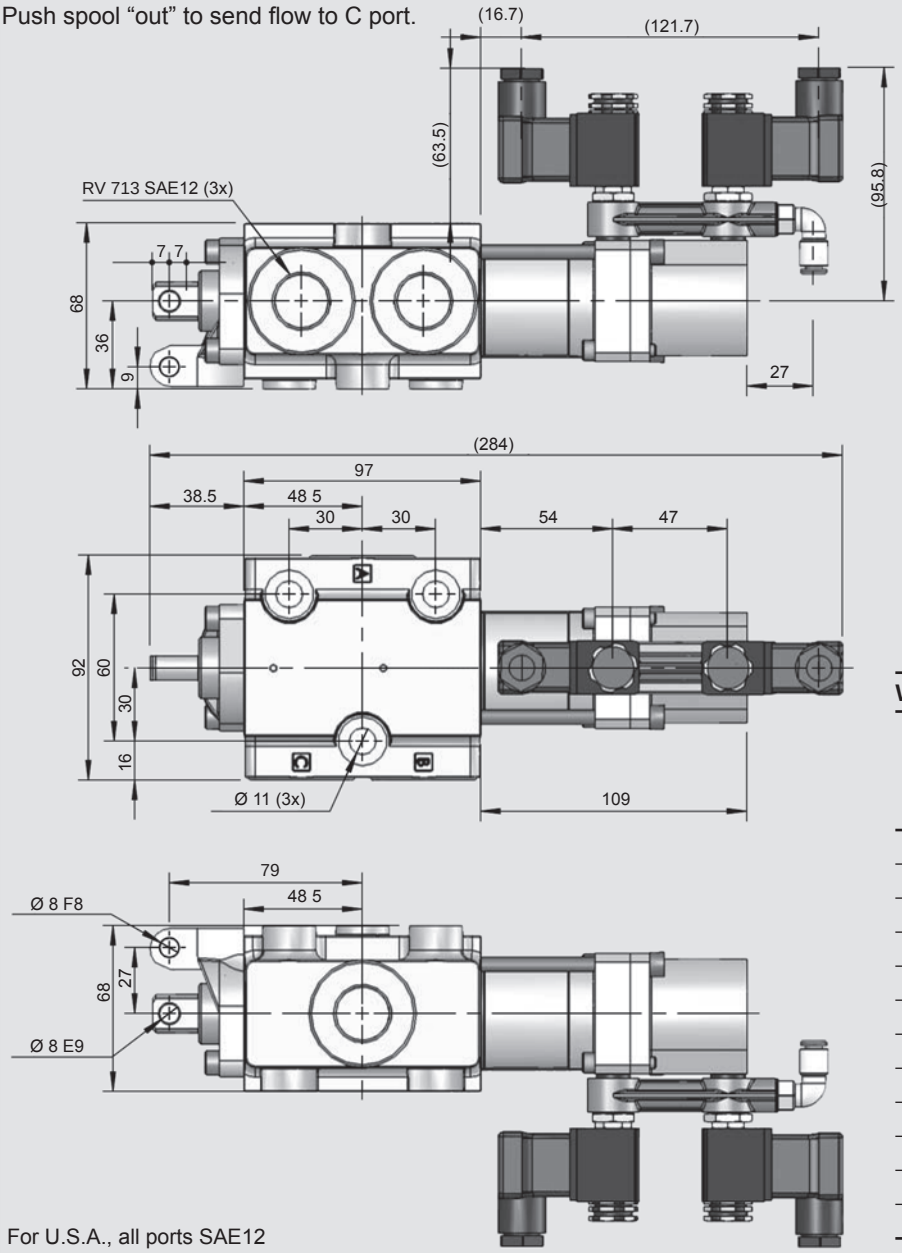
Higher values are possible, depending on application. For applications with demands that exceed stated data above, please contact us for consideration.

MTTFd value after consultation with HYDAC.

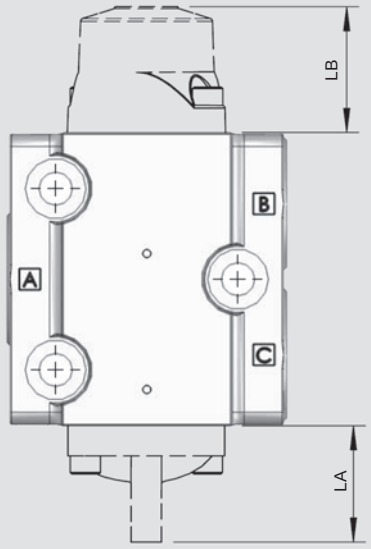


## Dimensions and weight

Push spool “in” to send flow to B port.
Push spool “out” to send flow to C port.




For U.S.A., all ports SAE12

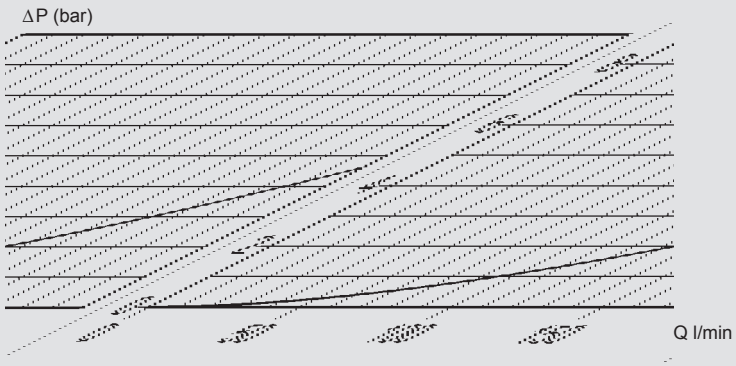



| Weight | 6.5 lbs | 3 kg |
|---|---|---|

| Type | LA (in) | LA (mm) | LB (in) | LB (mm) |
|---|---|---|---|---|
| 9 | 1.6 | 41.6 | | |
| 91 | 1.6 | 41.6 | | |
| 92 | 1.6 | 41.6 | | |
| 93 | 1.6 | 41.6 | | |
| 94 | 1.6 | 41.6 | | |
| 10 | 1.6 | 41.6 | | |
| 21 | 1.6 | 41.6 | | |
| 22 | 1.6 | 41.6 | | |
| P-P4 | 4.3 | 109.0 | | |
| EP | 5.6 | 142.0 | | |
| M19RV | | | 1.5 | 38.5 |
| M12 | | | 3.5 | 89.5 |

## Pressure drop

Oil temperature / viscosity for all graphs: +40 °C / 32 cSt




Pressure drop A - B, A - C

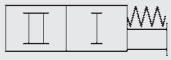
# Spool controls

**Spool control 9**

Spring centering

**Spool control 91**

Spring return from position II to position I



**Spool control 92**

Spring return from position III to position I

**Spool control 92B**

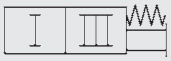
Spring return from position III to position I. OBS! B port must be plugged

**Spool control 93**

Spring return from position I to position II

**Spool control 94**

Spring return from position I to position III



**Spool control 10**

Detents in positions I, II and III

**Spool control 21**

Detents in positions I and II

**Spool control 22**

Detents in positions I and III

**Spool control P**

Pneumatic on/off spring centered*

**Spool control P1**

Pneumatic on/off spring return from position II to position I*

**Spool control P2**

Pneumatic on/off, spring return from position III to position I*

**Spool control P3**

Pneumatic on/off, spring return from position I to position II*

**Spool control P4**

Pneumatic on/off, spring return from position I to position III*

**Spool control EP24**

Electro-preumatic on/off 24 V, spring centered*/**

**Spool control EP12**

Electro-preumatic on/off 12 V, spring centered*/**

**Spool control EP124**

Electro pneumatic on/off, 24 V, spring return from position II to position I*/**

**Spool control EP112**

Electro pneumatic on/off, 12 V, spring return from position II to position I*/**

**Spool control EP224**

Electro pneumatic on/off, 24 V, spring return from position III to position I*/**

**Spool control EP212**

Electro pneumatic on/off, 12 V, spring return from position III to position I*/**

**Spool control EP324**

Electro pneumatic on/ off, 24 V, spring return from position I to position II*/**

**Spool control EP312**

Electro pneumatic on/off, 12 V, spring return from position I to position II*/**

**Spool control EP424**

Electro pneumatic on/off, 24 V, spring return from position I to position III*/**

**Spool control EP412**

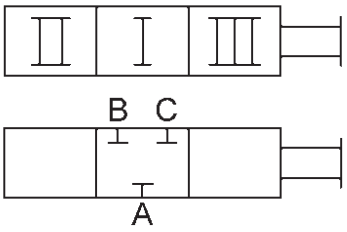
Electro pneumatic on/off, 12 V, spring return from position I to position III*/**

* Connection G 1/8" BSP, max pneumatic supply pressure 150 psi (10 bar)

**

| | |
|---|---|
| Power consumption | 4.8 W |
| Rated voltage | 12 and 24 V |
| Max voltage variation | +/- 10 % |
| Duty factor | 100 % |
| Connection | according to EN175301-803/B |
| Protection class | IP65 |

## Spools

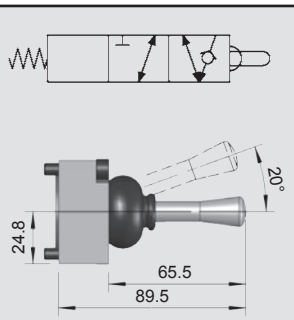



| Function | Code |
|---|---|
| Float spool, 2-position | 1A |
| Spool with built in check valve | 2B |
| Spool with built in check valve,<br>shall be used with the valve housing C-port plugged | 2C |
| Selector spool, 2-position | 3A |
| Selector spool, with float function in position I, 3-position | 4A |
| Spool with built in check vallve, normally B-port plugged.<br>For use with bracket M12 and spool control 92B | 4C |
| Selector spool with float in position III | 5A |
| Selector spool with all ports closed in position I | 7A |

## Brackets

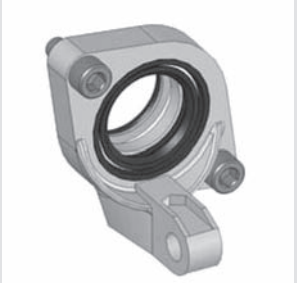
### Bracket M12

Bracket including maneuver pin.
To be used together with Spool 4C and Spool control 92B




### Bracket M19RV

Bracket for 2 or 3 positional spools with standard spool end



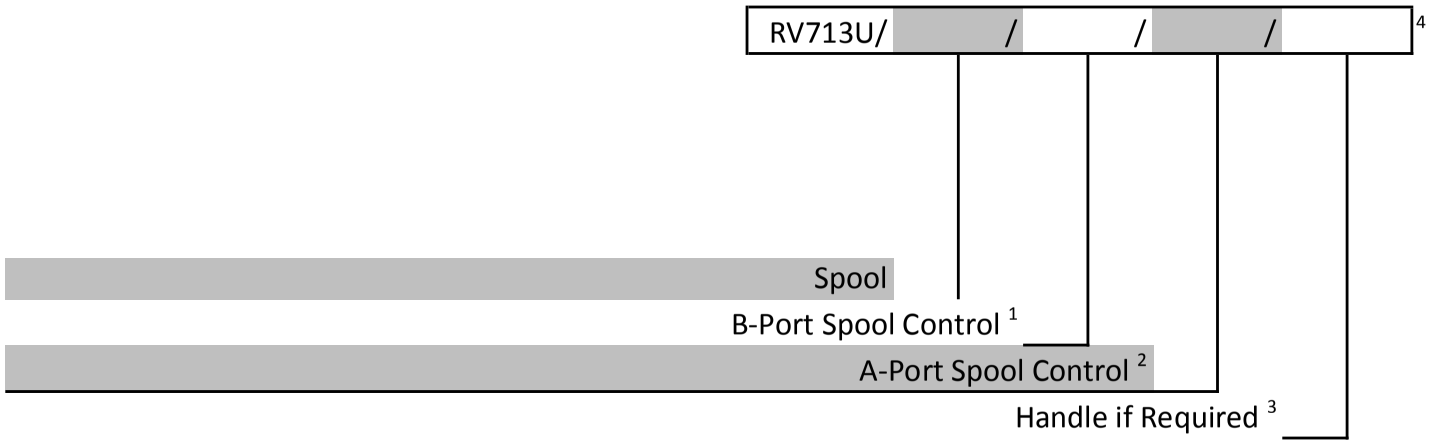
## Handles

### Handles

M262H - Handle mounts in a horizontal position on valve.

M200V - Handle mounts in a vertical position on valve.

# Ordering Details RV713 Selector Valve




1] Typical location for centering kit

2] Typical location for handle

3] Handles shipped separately

4] Code should include the "/" as shown.
i.e. RV713/1A/22/M19RV

**Application Information**

OEM: _____

Machine Type: _____

Pump Type: _____

Pump Flow: _____

System Pressure: _____

EAU: _____

Other Information: _____

_____

_____

## Notes

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**+011.52.55.47771262**

## Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.



**PN#02099409** / 08.13 / MHD1308-1552

HYDAC INTERNATIONAL

# Directional Control Valve
RS 160

## Key valve features

RS 160 is a sectional open center valve in a modular design that together with the wide range of standard parts offers maximum flexibility.

The valve is designed for high performance applications mainly in systems with fixed pumps but also for systems with variable pumps.

Two or more valves can be connected to each other in a range of different circuits.

The valve is very robust and well suited for demanding mobile applications. The sections are designed to meet the most stringent requirements on controllability.

The modular system includes different types of inlets, sections and outlets. The valve is available with 1 – 10 working sections per valve assembly.

The sections are symmetric which makes it possible to use the valve both as “Left Hand Inlet” and “Right Hand Inlet”.

## Applications

RS 160 is designed as a flexible valve for a wide range of applications, but typical applications are cranes, wheel loaders and agriculture applications within the flow range for the valve.

## Technical data

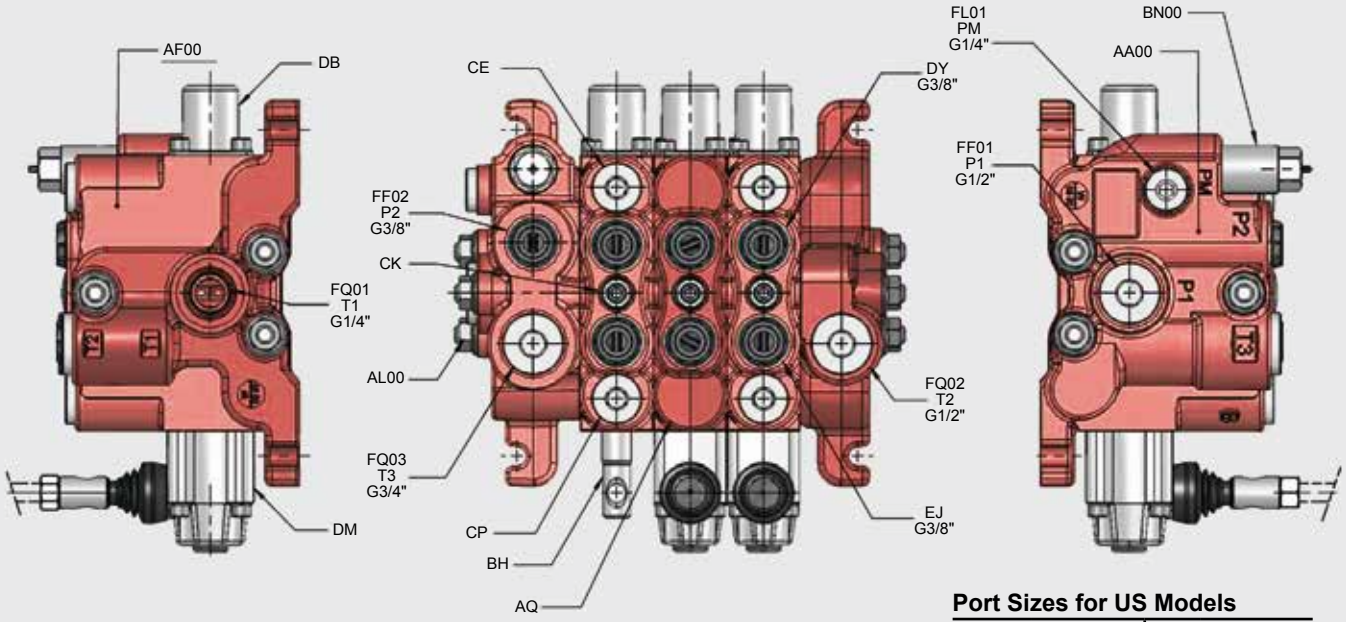
| **Pressures / Flows** | | |
|---|---|---|
| Max. operating pressure per port: | | |
| P1, P2, PM, A, B: | 3,625 psi | 250 bar |
| Typical Nominal Inlet Flow: | 16 gpm | Max. 60 Lpm |
| Recommended contamination level at normal duty: | Equal to or better than 18/14 as per ISO 4406 | |
| Hydraulic fluid viscosity range at continuous operation: | 10 – 400 $mm^2/s$(cSt). Higher viscosity allowed at start up | |
| Mineral oil and synthetic oil based on mineral oil are recommended | | |
| Recomended temperature range for continuous operation: | 5°F up to 176°F | -15°C up to +80°C |
| Spool leakage at 100 bar, 32 cSt and 40°C: | <10 $cm^3$/min | |

Higher values are possible, depending on application. For applications with demands that exceed stated data above, please contact us for consideration.

MTTFd value after consultation with HYDAC.

MHD 1308-1551 RS160 PN#02099403

# Overview

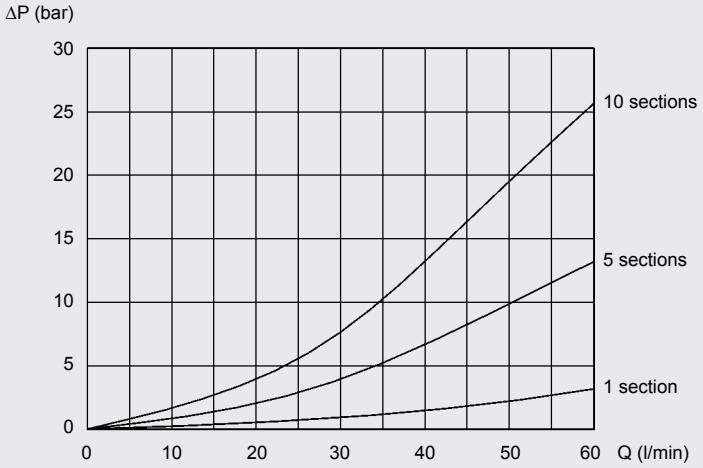



**Port Sizes for US Models**

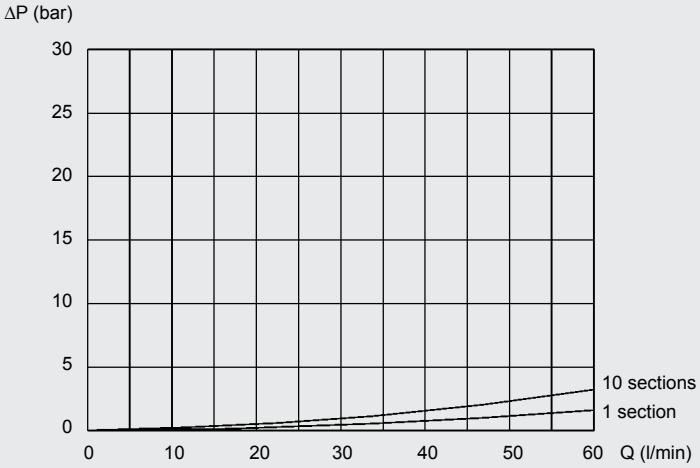
| | | | |
|---|---|---|---|
| P1 | SAE10 | P2 | SAE08 |
| T1 | SAE10 | T2 | SAE10 |
| T3 | SAE12 | PM | SAE04 |

## Pressure drop

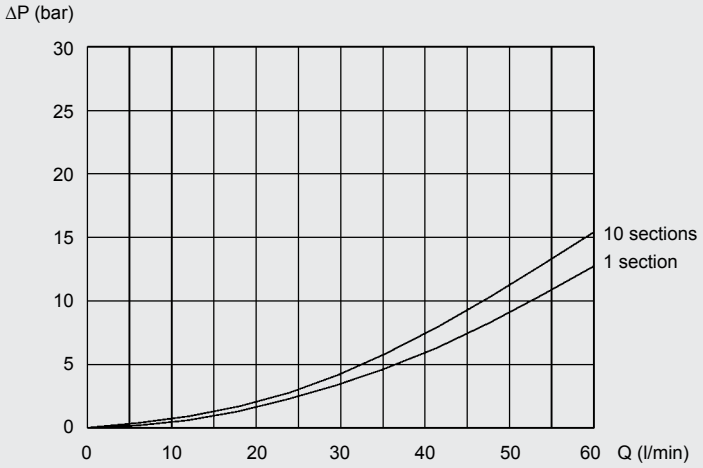
Oil temperature/viscosity for all graphs: 104°F (40 °C / 32 cSt)



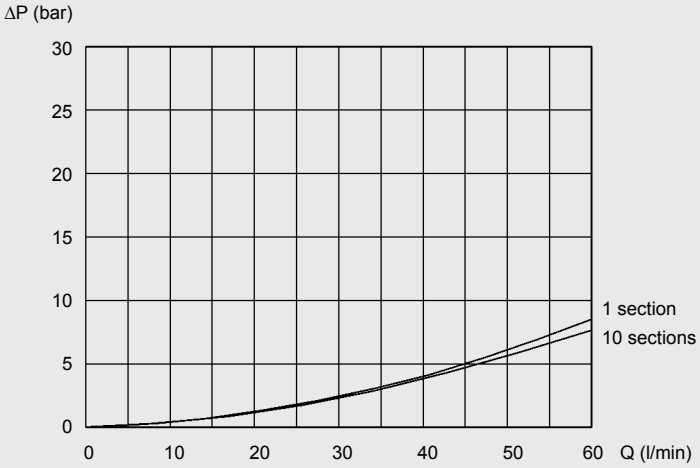

Pressure drop P – T




Pressure drop P – T unloaded




Pressure drop P – A/B



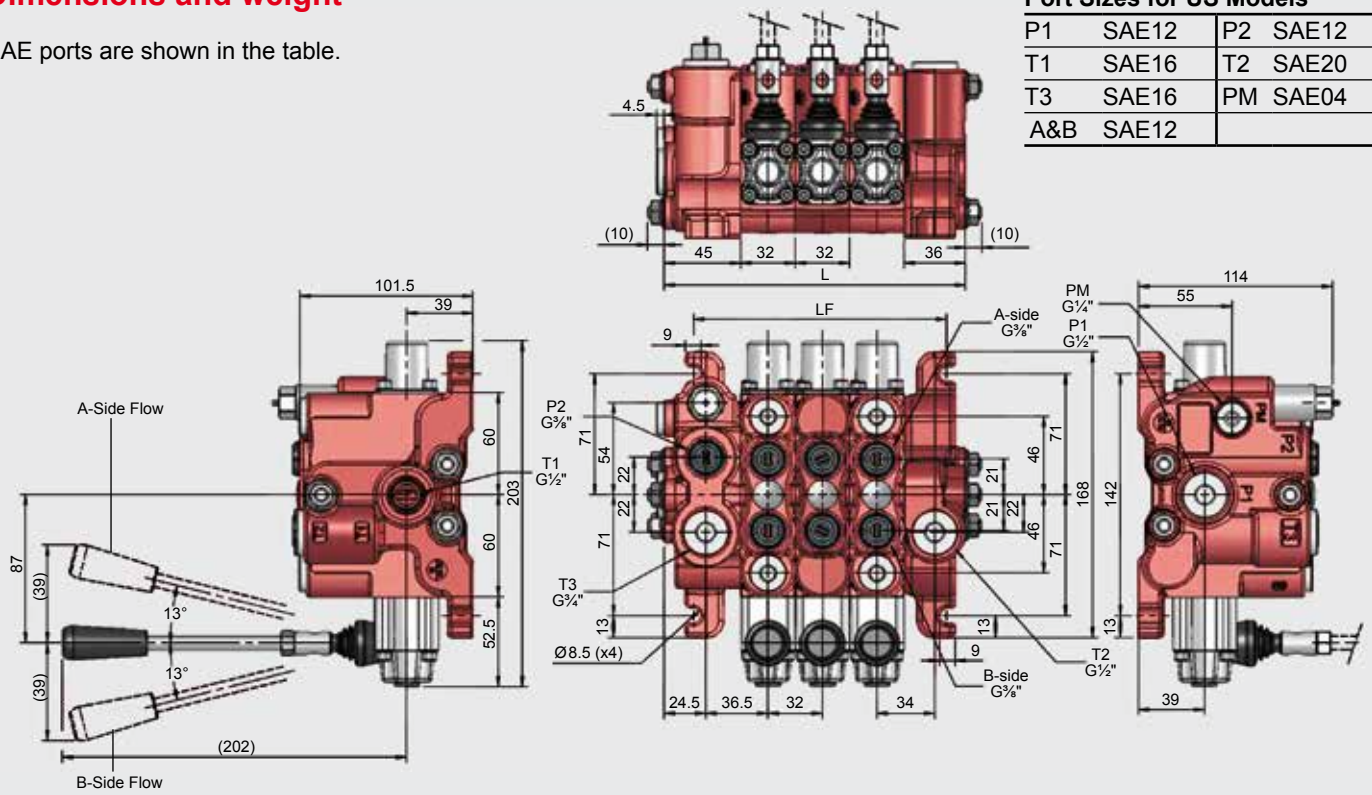

Pressure drop A/B – T

## Dimensions and weight

SAE ports are shown in the table.

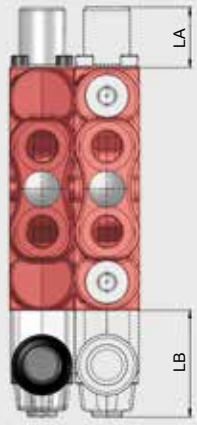
**Port Sizes for US Models**

| | | | |
|---|---|---|---|
| P1 | SAE12 | P2 | SAE12 |
| T1 | SAE16 | T2 | SAE20 |
| T3 | SAE16 | PM | SAE04 |
| A&B | SAE12 | | |




**Weight**

| | | |
|---|---|---|
| Inlet section I01U | 4.4 lbs | 2.0 kg |
| Inlet section I02U | 6.4 lbs | 2.9 kg |
| Working section | 4.8 lbs | 2.2 kg |
| Outlet section | 2.2 lbs | 1.0 kg |

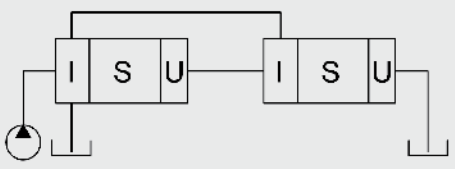



| Sections | L (in) | L (mm) | LF (in) | LF (mm) |
|---|---|---|---|---|
| 1 | 4.4 | 113 | 3.3 | 85 |
| 2 | 5.7 | 145 | 4.6 | 117 |
| 3 | 7.0 | 177 | 5.9 | 149 |
| 4 | 8.2 | 209 | 7.1 | 181 |
| 5 | 9.5 | 241 | 8.4 | 213 |
| 6 | 10.7 | 273 | 9.6 | 245 |
| 7 | 12.0 | 305 | 10.9 | 277 |
| 8 | 13.3 | 337 | 12.2 | 309 |
| 9 | 14.5 | 369 | 13.4 | 341 |
| 10 | 15.8 | 401 | 14.7 | 373 |

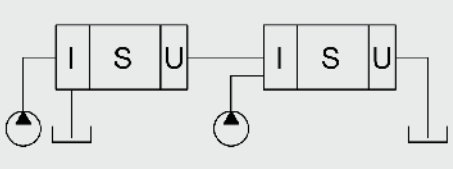
| Type | LA (in) | LA (mm) | LB (in) | LB (mm) |
|---|---|---|---|---|
| M1 | | | 2.1 | 53 |
| M2 | | | 2.8 | 72 |
| 9 | 1.2 | 30 | | |
| 10 | 1.4 | 36 | | |
| 14 | 2.4 | 62 | | |
| 16 | 2.9 | 74 | | |
| HP | 2.2 | 57 | 2.2 | 57 |
| P | 4.1 | 104 | | |
| 3W | | | 3.4 | 86 |
| 4W | | | 4.1 | 104 |
| 9LE2 | 3.3 | 83 | | |

## Configurations – system connection

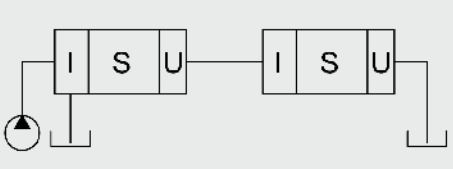
Example of how the RS 160 can be configured and connected for different systems. I stands for inlet, S for sections and U for outlet.




Circuit of type parallel

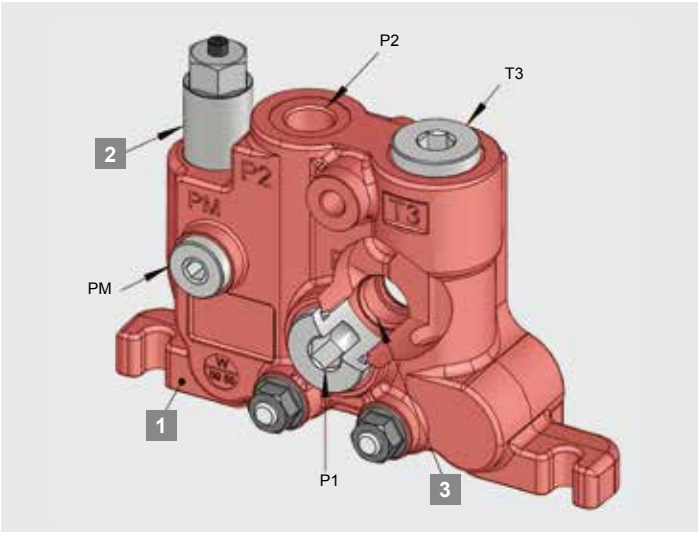



Tandem with a second pump to the second valve

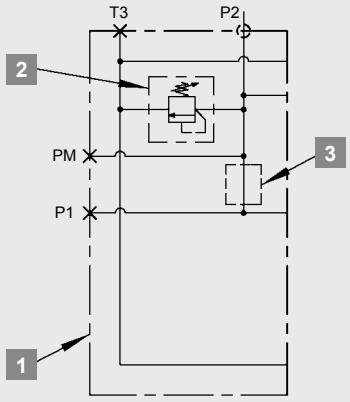



Tandem or series parallel. First valve has priority

## Inlet section I01U

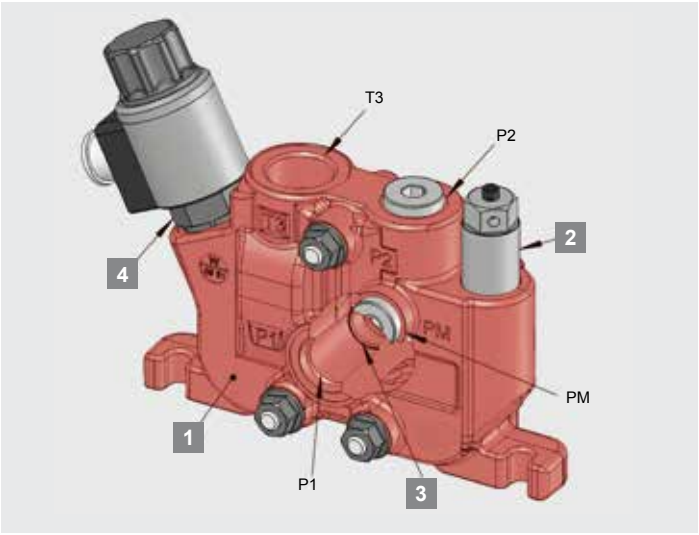



The standard inlet section I01U has two pump connections P1 and P2, a gauge port PM to monitor system pressure and a tank connection T3. The main relief valve either TBBS110 (adjustable) or TBS110 (fixed setting). Option cavity pos. 3 see below description.



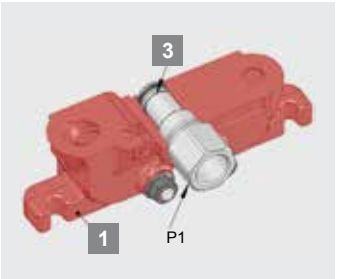

| | | |
|---|---|---|
| 1 | Inlet | I01U |
| 2 | Main relief valve | TBBS110 |
| 3 | Cavity for adaptor K16G | |

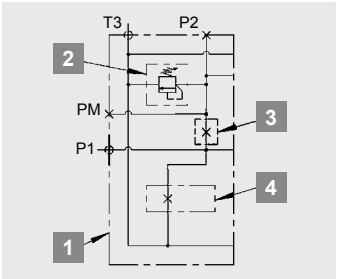
## Inlet section I02U

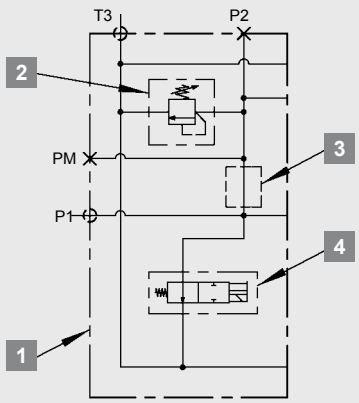



The inlet section I02U has two pump connections P1 and P2, a gauge port PM to monitor system pressure and a tank connection T3. The main relief valve either TBBS110 (adjustable) or TBS110 (fixed setting). Option cavity pos. 3 see below description.
The I02U inlet section has an unloading function via 2/2 solenoid valve (EV1XX) for emergency dump of pump flow.

**K16U**
As an option the adapter K16U can be assembled into the P1 port (pos. 3 cavity). When assembled the K16U will separate the center passage from the parallel gallery to accomplish systems such as parallel connections downstream of another valve or to control a variable displacement pump.




| | | |
|---|---|---|
| 1 | Inlet | I02U |
| 2 | Main relief valve | TBBS110 |
| 3 | Cavity for adaptor K16G | |
| 4 | Unloading valve | EV1XX |

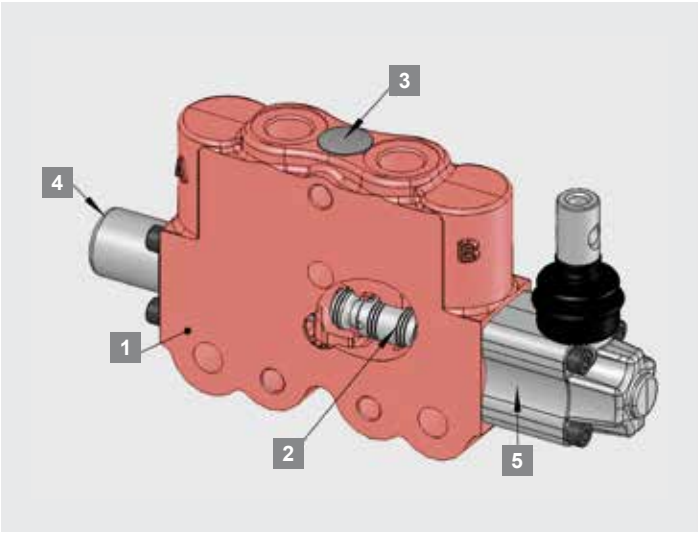
**Data EU912/EU926**

| | |
|---|---|
| Rated flow: | 15 gpm (60 Lpm) |
| Operating pressure: | 3,625 psi (250 bar) |
| Power consumption: | 27 W |
| Rated voltage EU912: | 12 V |
| Rated VoltageEU926: | 24 V |
| Max voltage variation: | +/- 15% |
| Duty factor*: | 100% |
| Connection: | EN 175301-803 form A |
| Protection class: | IP65 |

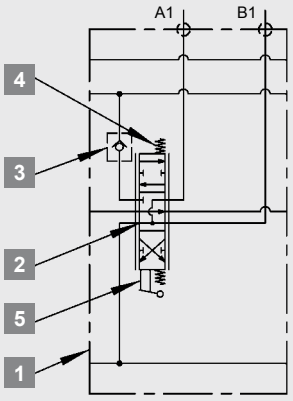
* Sufficient cooling must be secured

The unloading valve has manual override with push pin operation. PE1 is the plug for the cavity.

## Working section S01U

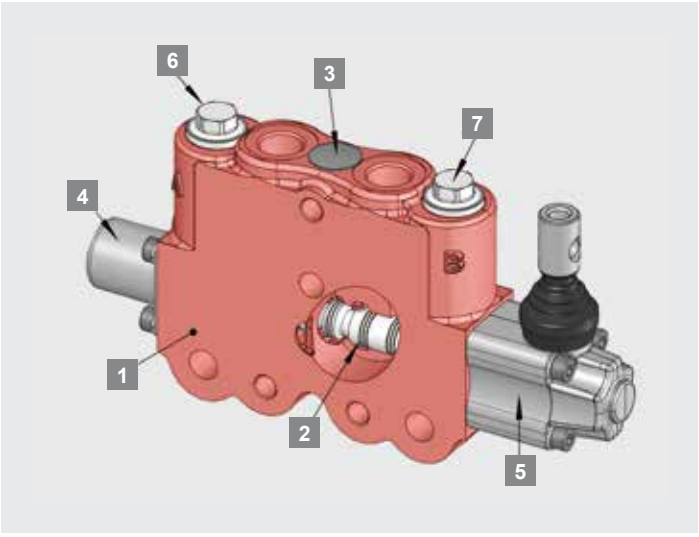



The working section S01U for parallel circuitry. The symmetrical design allows flexible configuration. This example shows manual operation with encapsulated lever, 3 position spring centered spool control and double acting motor spool. The S01U working section includes a load-check valve.



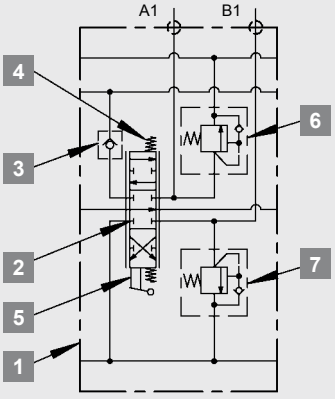

| | | |
|---|---|---|
| 1 | Working section | S01U |
| 2 | Spool | 4XXX |
| 3 | Load check valve | MB1 |
| 4 | Spool control A-side | 9 |
| 5 | Spool control B-side | M1 |

## Working section S02U



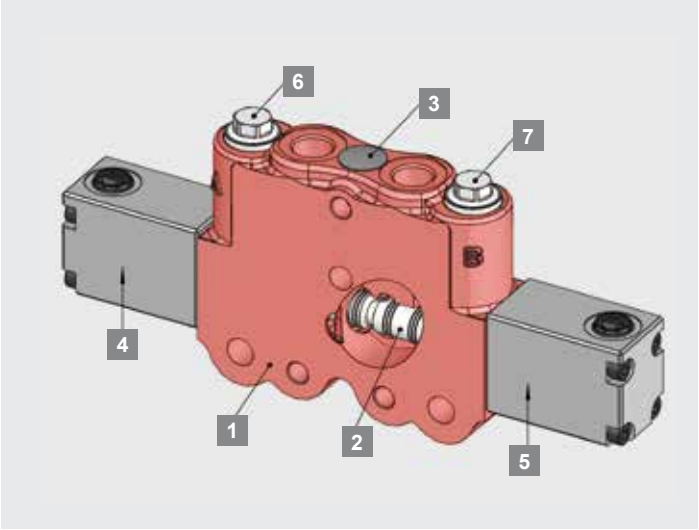

The working section S02U for parallel circuitry. The symmetrical design allows flexible configuration. This example shows manual operation with encapsulated lever, 3 position spring centered spool control and double acting cylinder spool.

The S02U working section includes a load-check valve and cavities for service port valves of type TBS110.



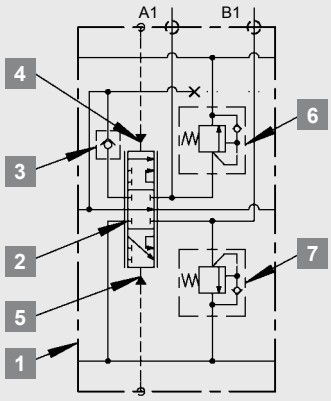

| | | |
|---|---|---|
| 1 | Working section | S02U |
| 2 | Spool | 1XXX |
| 3 | Load check valve | MB1 |
| 4 | Spool control A-side | 9 |
| 5 | Spool control B-side | M1 |
| 6 | Service port valve A-side | TBS110 |
| 7 | Service port valve B-side | TBS110 |

## Working section S03U



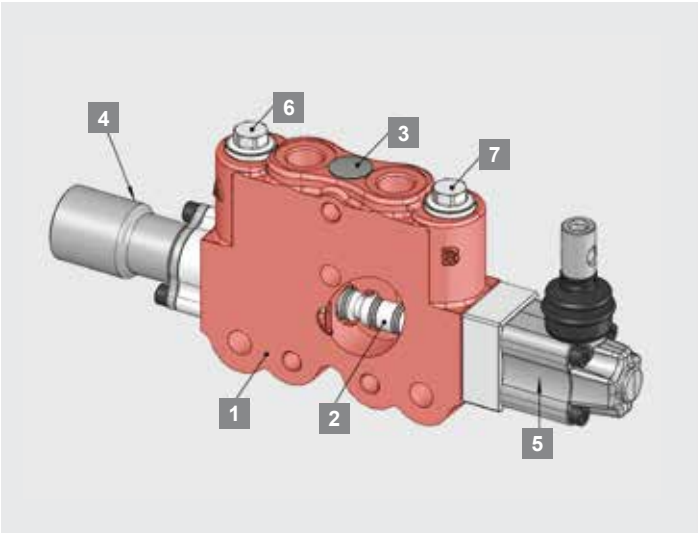

The working section S03U for series circuitry. The symmetrical design allows flexible configuration. This example shows hydraulic operated spool controls and double acting cylinder spool for series circuitry. The S03U working section includes a load-check valve and cavities for service port valves of type TBS110.

Working section, S03U, must only be used with spool type XXSX (see “spools”).




| | | |
|---|---|---|
| 1 | Working section | S03U |
| 2 | Spool | XXSX |
| 3 | Load check valve | MB1 |
| 4 | Spool control A-side | HPUA |
| 5 | Spool control B-side | HPUB |
| 6 | Service port valve A-side | TBS110 |
| 7 | Service port valve B-side | TBS110 |

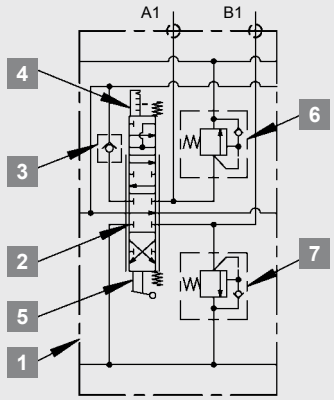
## Working section S04U




The working section S04U for tandem circuitry. The symmetrical design allows flexible configuration. This example shows manual operation with encapsulated lever, 4 position spring centered spool control with detent and double acting cylinder spool with float.

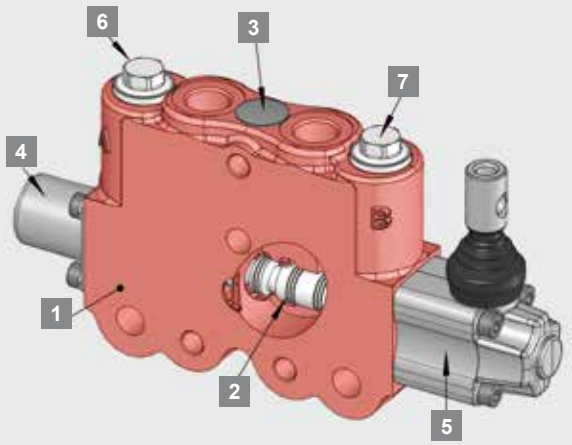
Float detent is engaged by moving handle beyond B power position away from the valve body.

The S04U working section includes a load-check valve and cavities for service port valves of type TBS110.



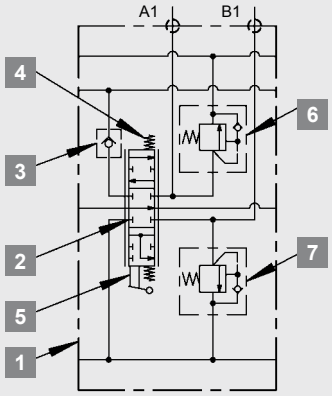

| | | |
|---|---|---|
| 1 | Working section | S04U |
| 2 | Spool | 3XXX |
| 3 | Load check valve | MB1 |
| 4 | Spool control A-side | 16 |
| 5 | Spool control B-side | M2 |
| 6 | Service port valve A-side | TBS110 |
| 7 | Service port valve B-side | TBS110 |

## Working section S08U



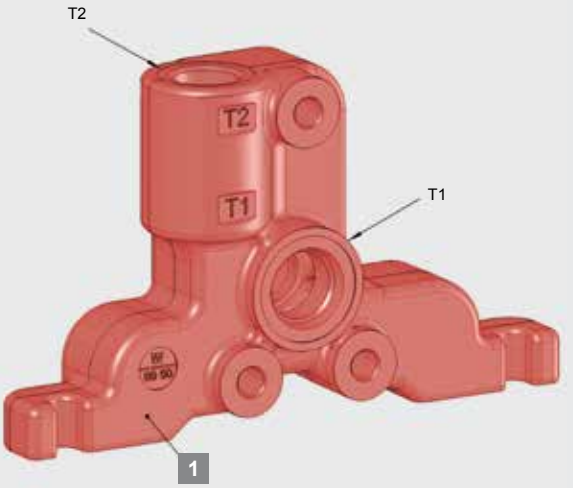

The working section S08U for parallel circuitry with regenerative functionality. This example shows manual operation with encapsulated lever, 3 position spring centered spool control and regenerative spool. The S08U working section includes a load-check valve and cavities for service port valves of type TBS110.

Working section, S08U, must only be used with spool type 8xxx (see “spools”).

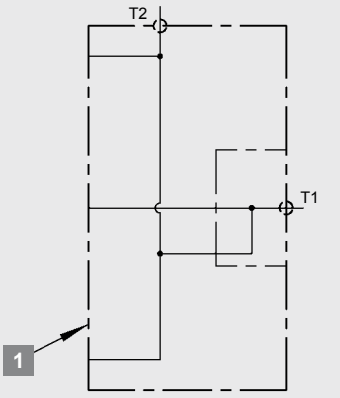



| | | |
|---|---|---|
| 1 | Working section | S08U |
| 2 | Spool | 8XXX |
| 3 | Load check valve | MB1 |
| 4 | Spool control A-side | 9 |
| 5 | Spool control B-side | M1 |
| 6 | Service port valve A-side | TBS110 |
| 7 | Service port valve B-side | TBS110 |

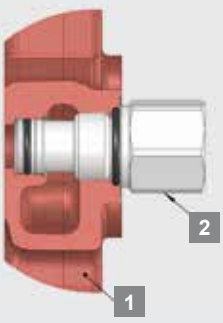
## Outlet section U01U

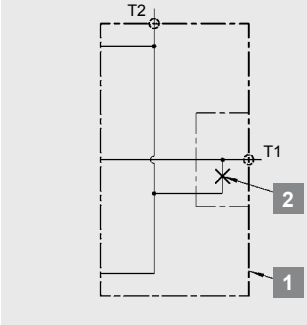



The standard outlet section U01U has two tank connections T1 and T2. Port T1 is used for high pressure carry over function (HPCO) when the adapter S16U is installed in the T1 port.




| | | |
|---|---|---|
| 1 | Outlet section | U01U |
| 2 | High pressure carry over adapter | S16U |




MHD 1308-1551 RS160 PN#02099403

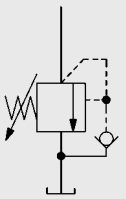
# Main relief and service port valves

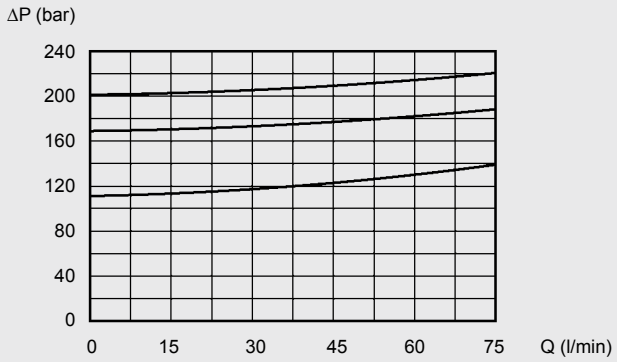
Oil temperature / viscosity for all graphs: 104°F (+40 °C / 32 cSt)

## Main relief and service port valve TBBS110

The adjustable type, TBBS110 is used as alternative main relief valve.

- Setting range: 100-4,500 psi (10-300 bar)
- Setting range step: 100 psi (7 bar)



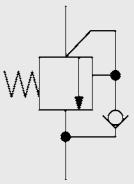


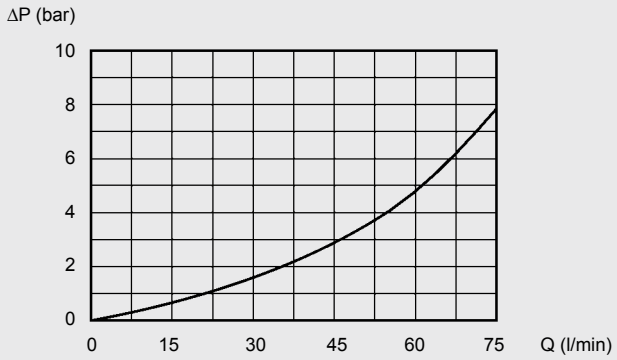

Pressure drop characteristics relief valve function

## Main relief and service port valve TBS110

Relief valve with anticavitations valve TBS110 is used both as chock valve and as main relief valve.

- Setting range: 300-4,500 psi (10-300 bar)
- Setting range step: 100 psi (7 bar)





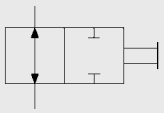

Anticavitation characteristics TBS, TBBS and SB 110

## Anticavitation valve SB110

The anticavitation valve service to ensure that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.

## Selector cartridge SBM110

SBM110 is a selector valve. Select between single or double acting function. In open position the cylinder port is connected direct to tank.



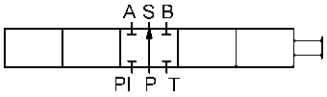
## Plug P110

Plug P110, for service port cavity. Replaces TBS110, SB110 and SBM110.

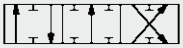
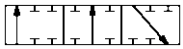
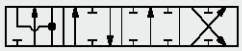
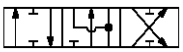
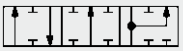
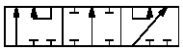
## Plug PK110

Plug PK110 for service port cavity, connecting port to tank.

## Spools


**Spools for general use**

| | Function | 20 l/min | 45 l/min | 65 l/min |
|---|---|---|---|---|
|  | Double acting spool | 12AA | 14AA | 16AA |
|  | Single acting spool P – A | 22AA | 24AA | 26AA |
|  | Double acting spool with 5th pos. for float | 32AB | 34AB | 36AB |
|  | Motor spool | 42AA | 44AA | 46AA |
|  | Regenerative spool, for section S08 | 82AA | 84AA | 86AA |
|  | Spool for series circuit, for section S03 | 12SA | 14SA | 16SA |

## Spool control A-side

**Spool control 9**

Spring centered spool control on A-side


**Spool control 10**

Detents at positions 1, 2 and 3


**Spool control 16**

Spring centering with detent at position 5


**Spool control 14**

Spring centering with detent at position 3


**Spool control P**

Pneumatic, connection G⅛" BSP

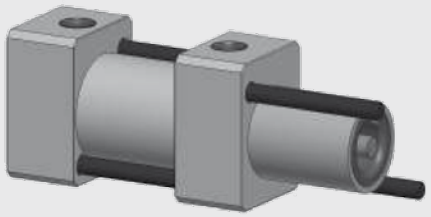

**Spool control HP**

Hydr. proportional,
connection SAE04


**Spool control 9LE2**

Spring centered with spool position indicator


Spring force for spool control 9 in neutral position: 12.4 lbs (55 N).
Spring force for spool control 9 with fully selected spool: 22.5 lbs (100 N).



Spool control P

# Spool control B-side

**Spool control M1**

Lever cup and lever mechanism
for 3-positional spools

**Spool control M2**

Lever cup and lever mechanism
for 4-positional spools

**Spool control HPB**

Hydr. proportional, connection G 1/4" BSP


**Spool control 3W**

Cable attachment for 3-positional spools


**Spool control 4W**

Cable attachment for 4-positional spools

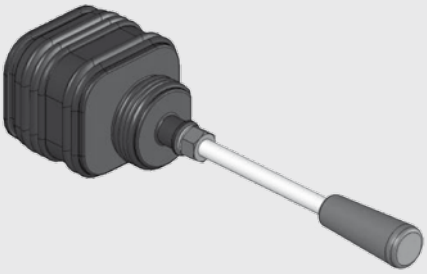

**Joy-stick lever MK1XX**

The spool control MK1XX is a mechanical joystick to operate two working sections with one lever. It is designed for four different setups determined by the spool layout.

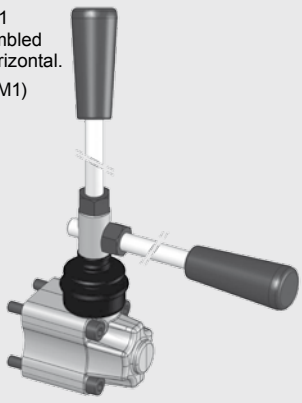
| | |
|---|---|
| **MK133** | Operating two work sections with 3 positional spools |
| **MK144** | Operating two work sections with 4 positional spools |
| **MK134** | Operating two work sections with one 3 positional spool (left hand section) and one 4 positional spool (right hand section) |
| **MK143** | Operating two work sections with one 4 positional spool (left hand section) and one 3 positional spool (right hand section) |

The mechanical joystick MK1XX must be placed on two adjacent working sections.

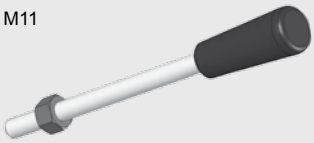
Enter, in the specification sheet, the spool control code for the working section that should have horizontal movement. The lever M11 is sold separately.



The lever M11 can be assembled vertical or horizontal.
(shown with M1)



Lever M11



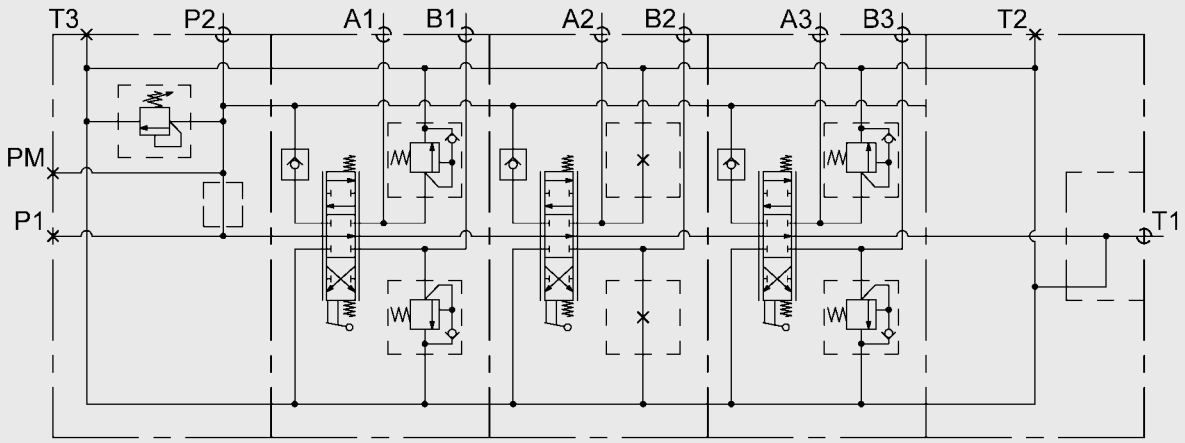
**Lever M11**

The lever M11 can be assembled vertical and horizontal for spool control M1 or M2. Includes a jam nut and a plastic knob. Length 135 mm. The lever M11 is sold separately.

# Typical hydraulic circuit diagrams

## Hydraulic diagram – Parallel circuit

In a parallel circuit the oil flows through the open center gallery when all spools are in neutral position.
When operating the spools the oil is diverted to the parallel gallery and available for each operated working section.



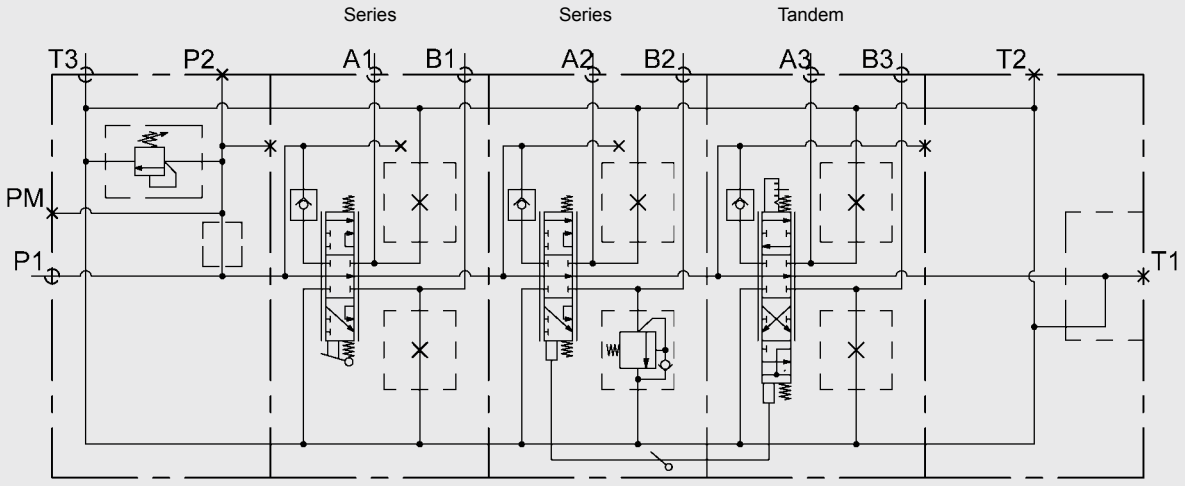

The example shows the RS 160 with three manual operated working sections.

## Hydraulic diagram – Series / tandem circuit

In a series/tandem circuit the oil flows through the open center gallery when all spools are in neutral position.
The parallel gallery is blocked between each section.

The series circuit spools directs the return oil from the actuator back into the open center gallery available for down-stream working sections.

Tandem section must be selected to connect the series circuitry to parallel circuitry.




The example shows the RS 160 with three manual operated working sections. Section 1 and 2 are configured with series circuitry and tandem section 3 with a 4-position float spool and spool control. Section 2 and 3 are controlled with a mechanical joystick.

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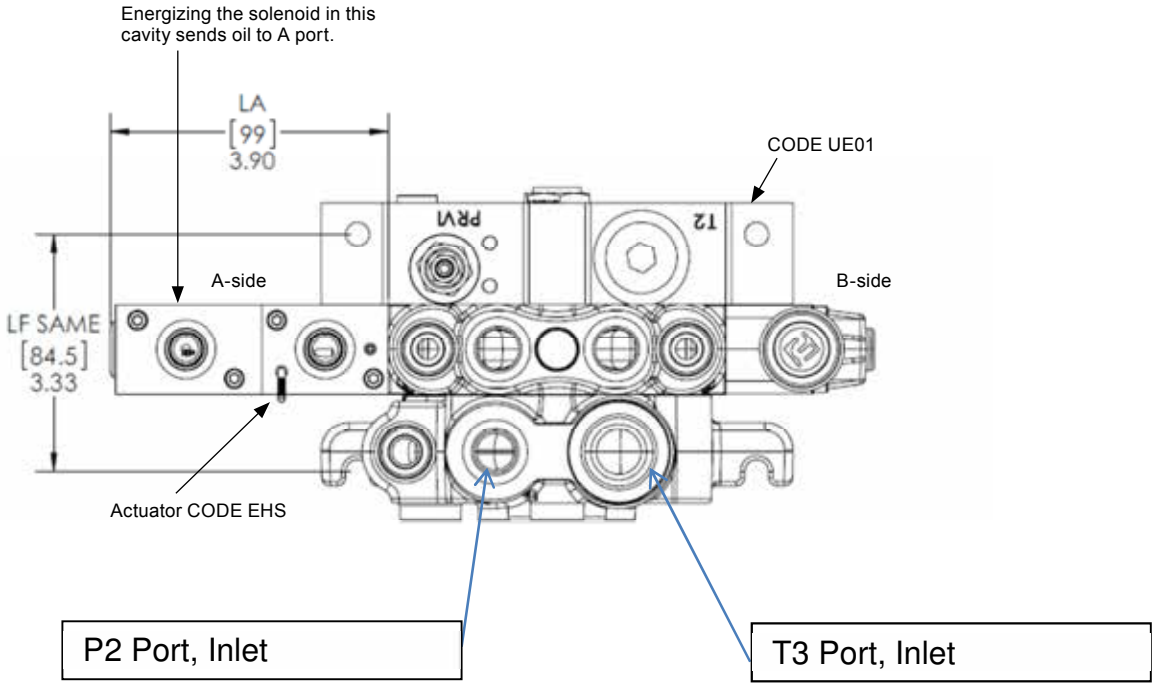
# Supplemental data sheet for RS160 with Electrical Configuration

**Dimensions remain the same as data sheet except as noted.**




**Port Sizes: Pressure and Tank ports: SAE-10, section workports, SAE-8.**

**Outlet configurable for external drain or internal drain. External drain recommended for EH applications.**

**Valve sections are operated by electrical pressure reducing valves which control the pressure acting on spool ends to vary the spool stroke.**

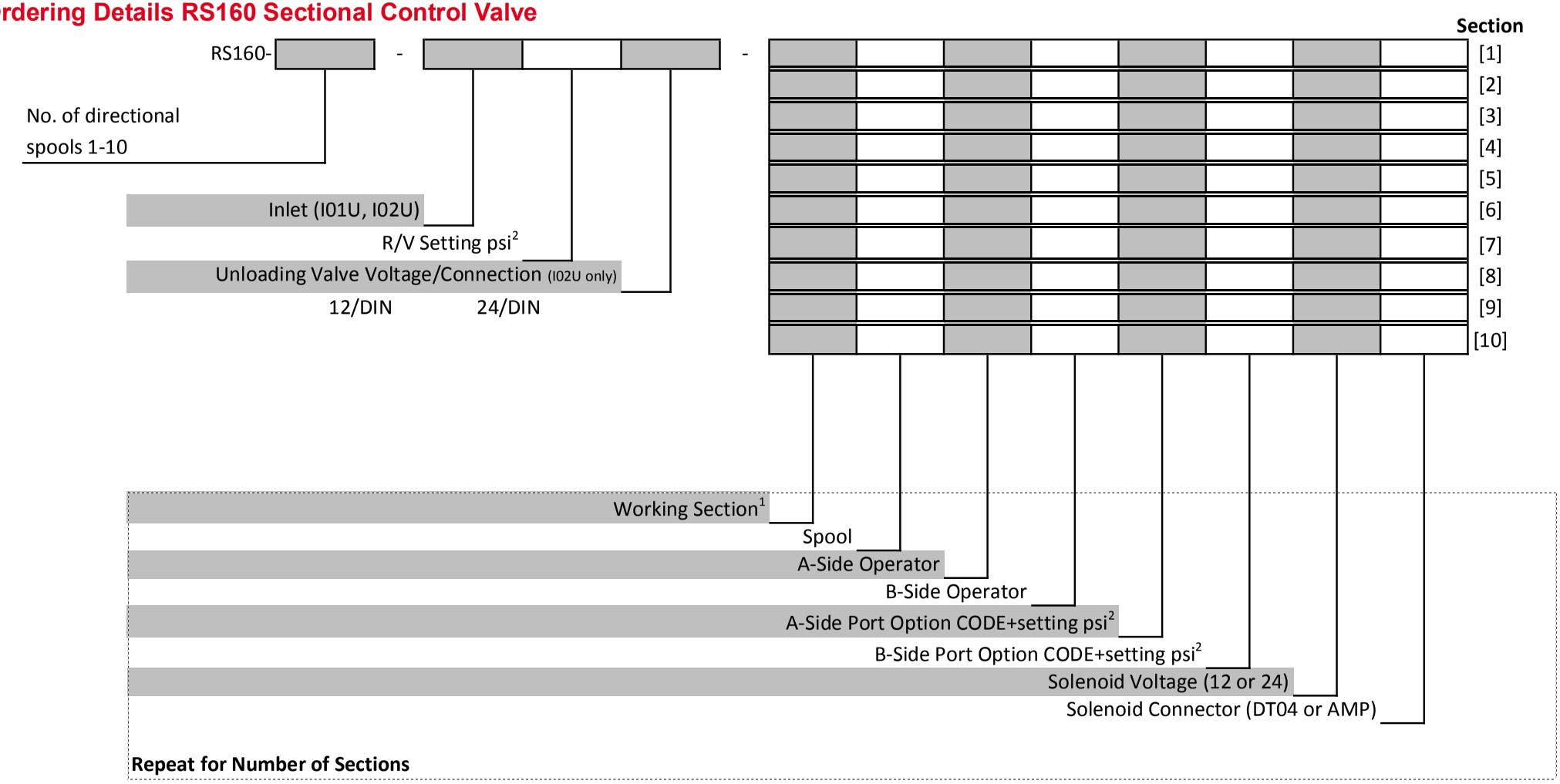
**Electrical Specifications:**

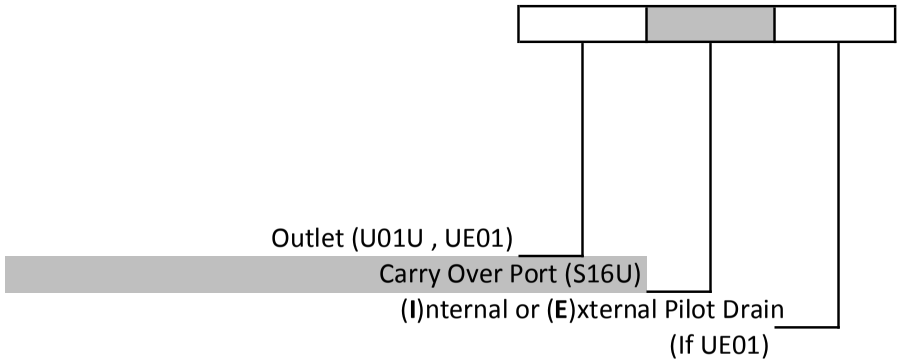
**Functional Principle……..PWM(Pulse Width Modulation, 100Hz)**
**Duty Factor……100%**
**Connection……AMP Junior Power Timer or Deutsch DT04-2P**
**Protection Class……IP65**
**Ambient Temperature……..-30-80 deg C**

**Solenoid Characteristics:**

| ER12 | ER24 |
|---|---|
| Voltage: 12VDC +/-2V | 24VDC +/-4V |
| Current Command: 0-1500mA | Current Command: 0-750mA |
| Resistance @ 20 deg C: 4.72 Ohm | Resistance @ 20 deg C: 20.8 Ohm |

# Ordering Details RS160 Sectional Control Valve




**Application Information**

OEM: _____

Machine Type: _____

Pump Type: _____

Pump Flow: _____

System Pressure: _____

EAU: _____

Other Information: _____

_____

_____

[1] All EU sections contain Port Options

## Notes

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## Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

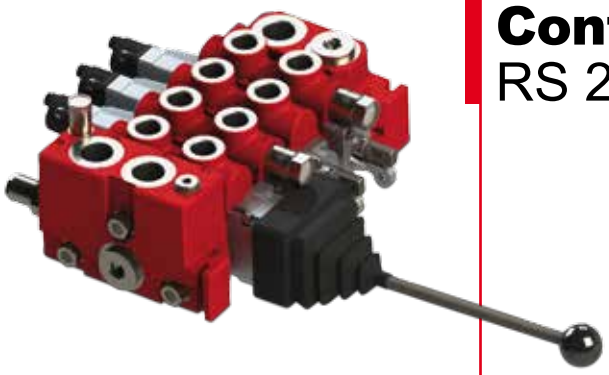
Subject to technical modifications.



**PN#02099406** / 08.13 / MHD1308-1551

HYDAC INTERNATIONAL

# Sectional Directional Control Valve
RS 210



## Key valve features

RS 210 is a sectional open center valve, designed for max. operating pressures up to 4,350 psi (300 bar) and max. pump flows up to 20 gpm (75 Lpm).

RS 210 is available with 1 to 10 working sections per valve assembly.

The valve can be used in different systems for parallel as well as tandem circuits. It is designed with an open center for fixed and variable displacement pumps.

The valve can be operated manually, with cable or by pneumatic and electro-pneumatic or electrohydraulic remote control.

RS 210 offers excellent operating characteristics because of the specially designed spools for different applications.

Low and uniform spool forces are the result of careful balancing of the flow forces.

## Q-function

The flow control (Q-function) of the inlet section by-passes the major part of the pump flow to tank when the system is idling, still giving access to full pump flow when the services are operated. Besides greatly reducing heat generation this also provides improved controllability characteristics.

## Applications

The RS 210 is ideal for applications where you need excellent control characteristics such as cranes, excavators, backhoe loaders, refuse trucks and trailers.

## Technical data

| **Pressures / Flows** | | |
|---|---|---|
| Max. operating pressure per port: | | |
| P1, P2, P3, P4, A, B[1]: | 4,350 psi | 300 bar |
| T1, T2, T3, T4[1]: | 300 psi | 20 bar |
| Typical Nominal Inlet Flow: | | |
| P1, P2 inlets type A, B, C, E: | 20 gpm | 75 Lpm |
| P1, P4 inlets type Q: | 20 gpm | 75 Lpm |
| Fluid temperature range: | 5°F up to 176°F | -15°C up to +80°C |

[1] Inlets type A and intermediate sections M uses “A” and “B” designation for P and T connections. Consider the detailed information for the respective part in this data sheet.

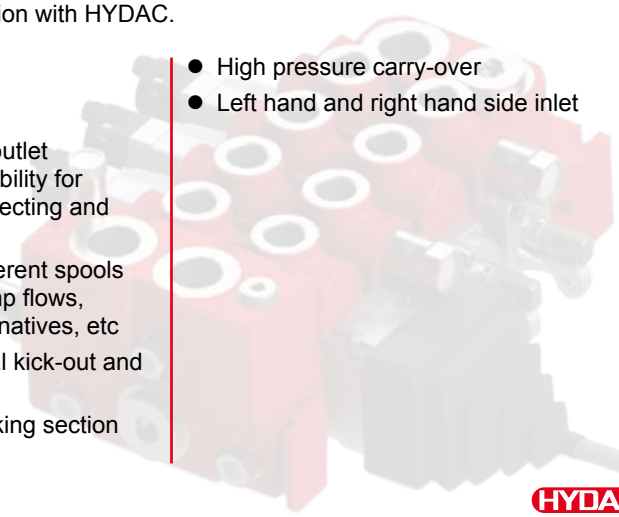
| **Further data** | | |
|---|---|---|
| Spool stroke: | | |
| Nominal: | ±0.25 in | ±6 mm |
| 4th position: | +0.45 in | +12 mm |
| Spool control force spool control 9: | | |
| Neutral position: | 24.7 lbs | 110 N |
| Max. spool stroke: | 31.5 lbs | 140 N |
| Detent in: | >67.4 lbs | >300 N |
| Detent out: | <22.5 lbs | <100 N |
| Permissible contamination level: Equal or better than 20/18/14 as per ISO 4406 | | |
| Viscosity range: | .4-15.7 in²/s (cSt)<br>Higher viscosity allowed at start up | 10 – 400 mm²/s (cst) |
| Leakage A, B → T at 1,500 psi, 32 cSt and 104°F ≤ 13 cc/min (100 bar, 32 cSt and 40°C) | | |
| Pressure fluid: Mineral oil and synthetic oil based on mineral oil HL, HLP according to din 51524 | | |

Higher values are possible, depending on application. For applications with demands that exceed stated data above, please contact us for consideration.

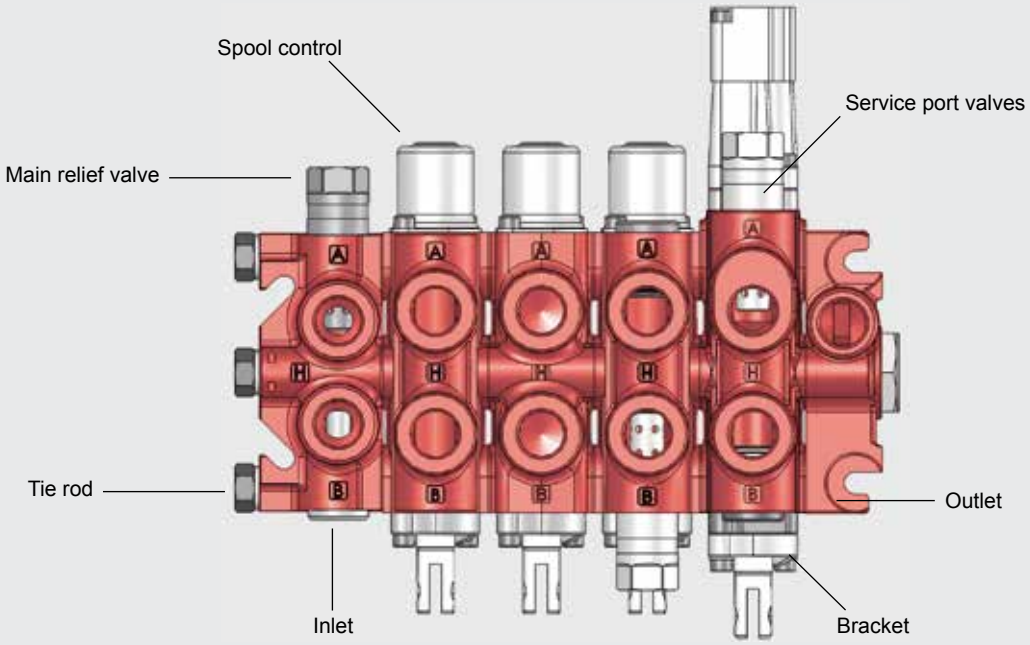
MTTFd value after consultation with HYDAC.

## Further properties and possibilities

- Several different in- and outlet alternatives offering possibility for electrical unloading, connecting and dimensional flexibility
- Very wide program of different spools optimized for various pump flows, applications, system alternatives, etc
- Spool controls for external kick-out and spool position sensing
- Load checks in each working section
- High pressure carry-over
- Left hand and right hand side inlet



## General overview




## Weight

| Inlet section | Weight | |
|---|---|---|
| I04A | 4.0 lbs | 1.8 kg |
| I04B | 3.7 lbs | 1.7 kg |
| I04C | 5.5 lbs | 2.5 kg |
| I03E | 5.1 lbs | 2.3 kg |
| I02Q | 9.9 lbs | 4.5 kg |
| I06Q | 9.9 lbs | 4.5 kg |

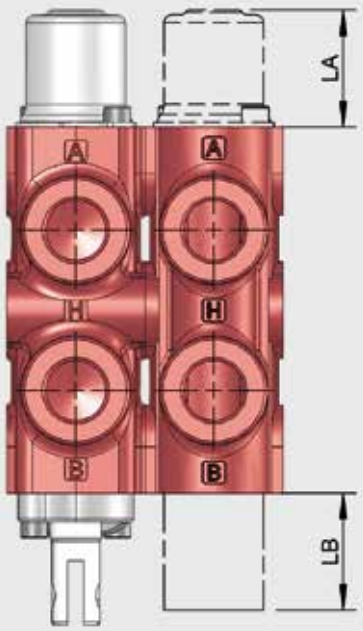
| Working section | Weight | |
|---|---|---|
| S04A | 5.3 lbs | 2.4 kg |
| S05B | 5.3 lbs | 2.4 kg |
| S04H | 6.2 lbs | 2.8 kg |
| S07C | 4.2 lbs | 1.9 kg |
| S13A | 5.3 lbs | 2.4 kg |

| Outlet section | Weight | |
|---|---|---|
| U03A | 2.2 lbs | 1.0 kg |
| U03B | 3.1 lbs | 1.4 kg |
| U01C | 1.5 lbs | 0.7 kg |

| Intermediate section | Weight | |
|---|---|---|
| M03A | 3.7 lbs | 1.7 kg |
| M03B | 3.7 lbs | 1.7 kg |

## Dimensions, spool controls

| Type | LA (in) | LA (mm) | LB (in) | LB (mm) |
|---|---|---|---|---|
| 910 | 1.5 | 37 | | |
| 10 | 2.9 | 74 | | |
| 11 | 3.3 | 83 | | |
| 13 | 2.9 | 74 | | |
| 14 | 2.9 | 74 | | |
| L61 | 3.8 | 97 | | |
| L62 | 3.8 | 97 | | |
| L63 | 3.8 | 97 | | |
| L64 | 4.0 | 101 | | |
| P | 4.1 | 103 | | |
| EP | 4.1 | 103 | | |
| HPD | 2.8 | 70 | 2.8 | 70 |
| LEF | 3.7, 4.1 | 94, 105 | | |
| M19 | | | 1.6 | 41 |
| M29 | | | 2.0 | 50 |
| M111 | | | 1.6 | 41 |
| M211 | | | 2.0 | 50 |
| M2 | | | 0.4 | 9 |



# Dimensions inlet and outlet type A – side connection

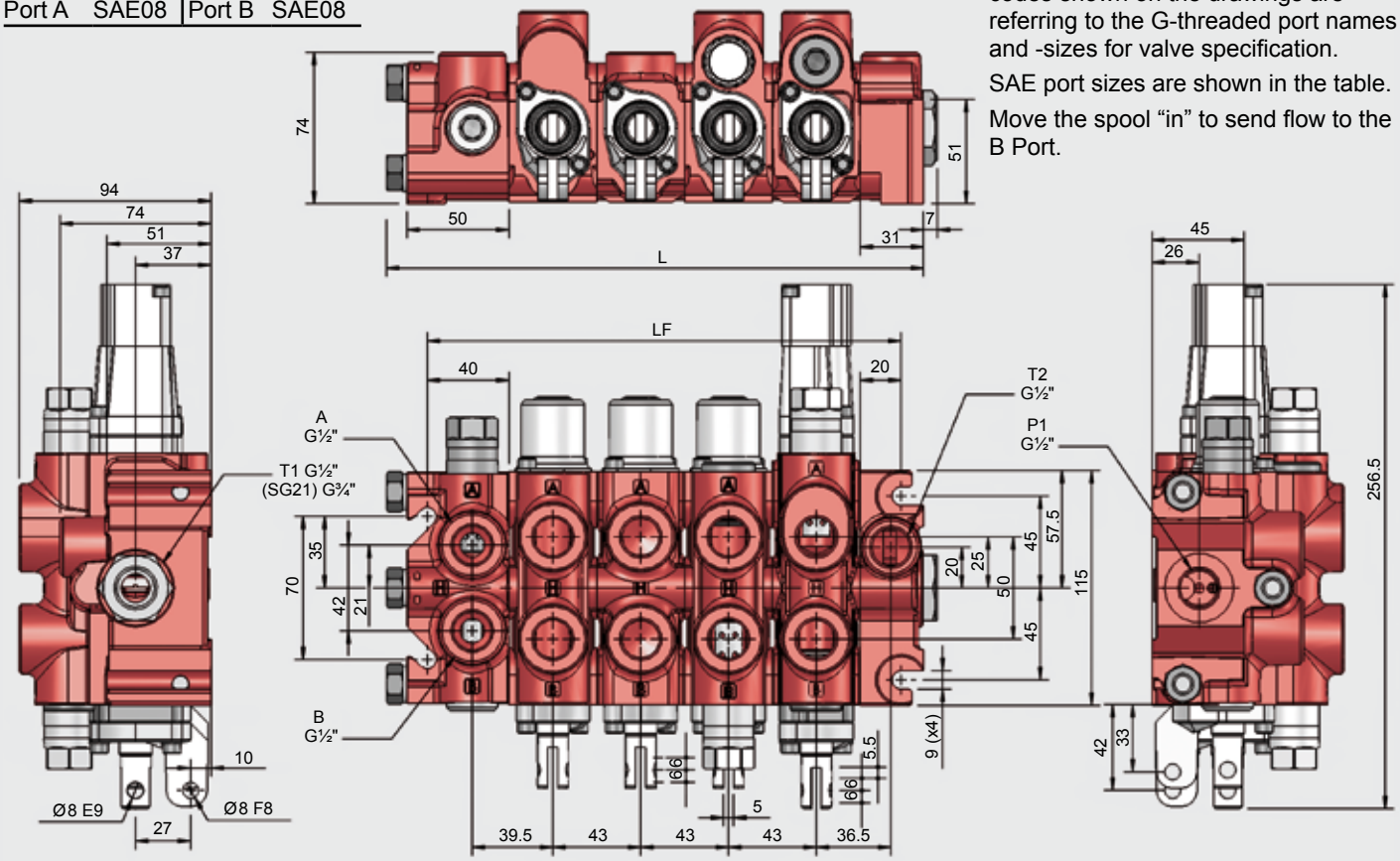
**Port Sizes for US Models**

| | | | |
|---|---|---|---|
| P1 | SAE10 | T1 | SAE12 |
| | | T2 | SAE10 |
| A | SAE10 | B | SAE10 |
| Port A | SAE08 | Port B | SAE08 |

The drawing shows a 4 sectional valve with an inlet and an outlet. The working sections are configured with various types of spool controls. The codes shown on the drawings are referring to the G-threaded port names and -sizes for valve specification.

SAE port sizes are shown in the table.

Move the spool “in” to send flow to the B Port.

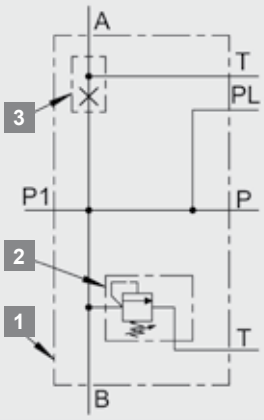



**I04A** has two pump ports and one tank port.

With the main relief valve fitted in the A-side cavity, the A-port is the pump port and the B-port is the tank port. If the main relief valve is fitted in the B-side cavity the opposite is valid for the pump and tank ports.

For information regarding the outlet – see outlet sections.

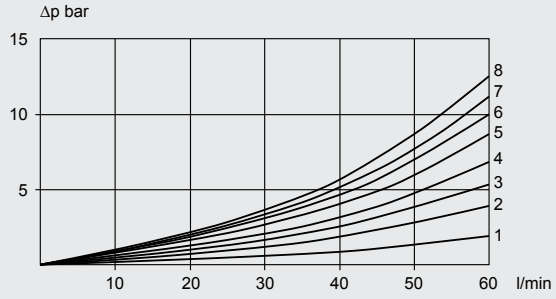
| | | |
|---|---|---|
| 1 | Inlet type A | I04A |
| 2 | Main relief valve | TBD131 |
| 3 | Plug | PL131 |



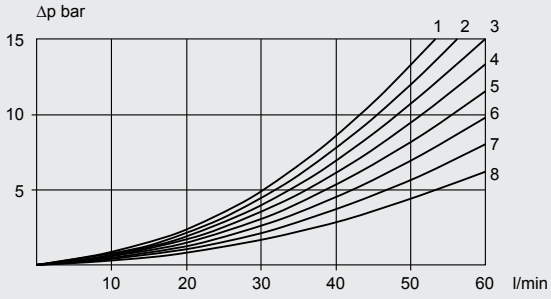

| No. of sections | L (in) | L (mm) | LF (in) | LF (mm) |
|---|---|---|---|---|
| 1 | 5.4 | 136 | 4.1 | 103 |
| 2 | 7.0 | 179 | 5.7 | 146 |
| 3 | 8.7 | 222 | 7.4 | 189 |
| 4 | 10.4 | 265 | 9.1 | 232 |
| 5 | 12.1 | 308 | 10.8 | 275 |
| 6 | 13.8 | 351 | 12.5 | 318 |
| 7 | 15.5 | 394 | 14.2 | 361 |
| 8 | 17.2 | 437 | 15.9 | 404 |

# Pressure drop

Oil temperature / viscosity for all graphs: 104°F (+40°C) / 32 cSt




Pressure drop 1-8 sections, P1 – T1, inlet I04A, outlet U03A

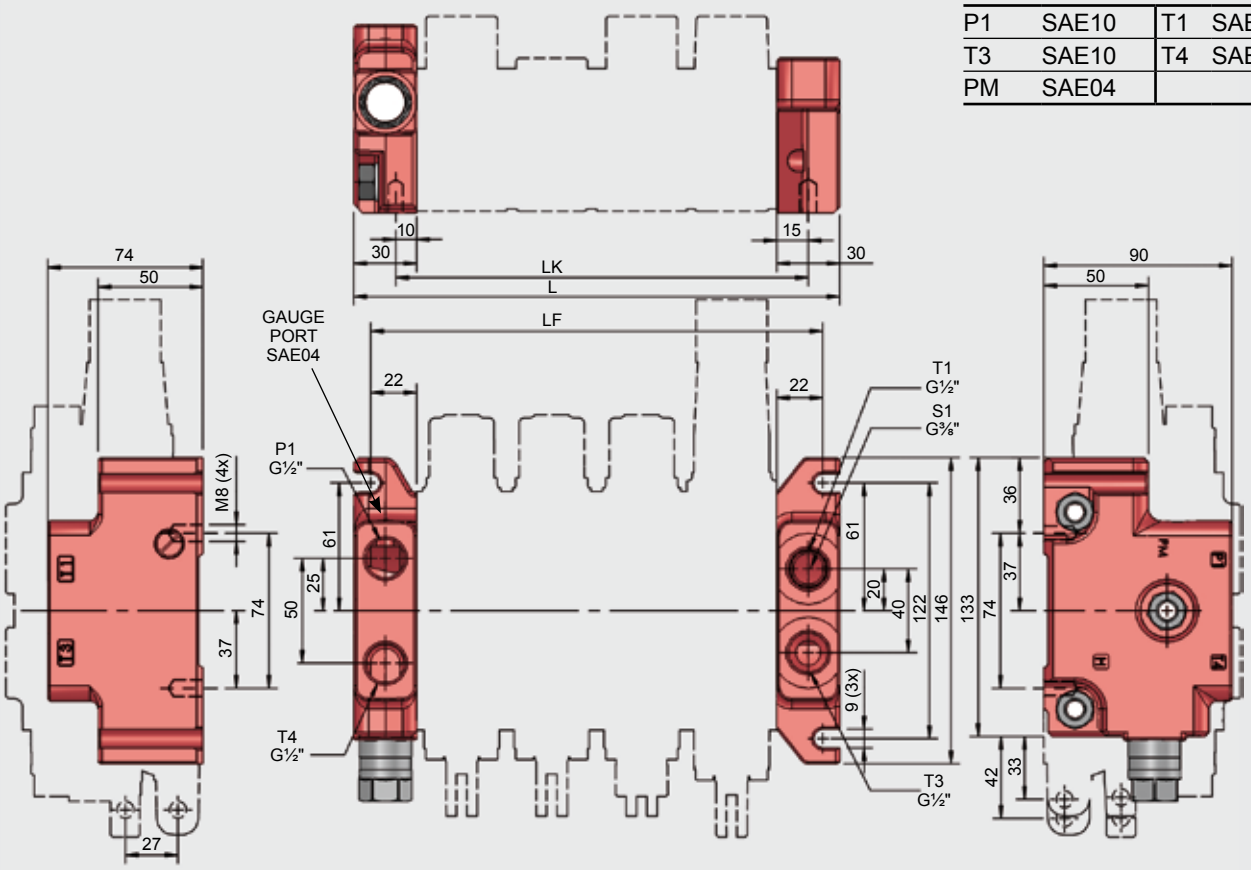



Pressure drop, A/B – T, inlet I04A, outlet 1-8 sections U03A

## Dimensions inlet and outlet type B – top connection

**Port Sizes for US Models**

| | | | |
|---|---|---|---|
| P1 | SAE10 | T1 | SAE10 |
| T3 | SAE10 | T4 | SAE10 |
| PM | SAE04 | | |

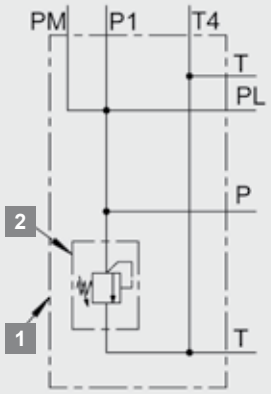



**I04B** has one pump port and one tank port, both facing upwards. The main relief cavity is on the B-side.

Note: Inlet of type B offers a connection between the tank galleries of A and B sides.

For information regarding the outlet – see outlet sections.

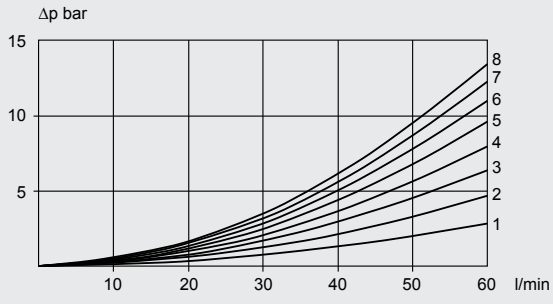
| | | |
|---|---|---|
| 1 | Inlet type B | I04B |
| 2 | Main relief valve | TBD131 |



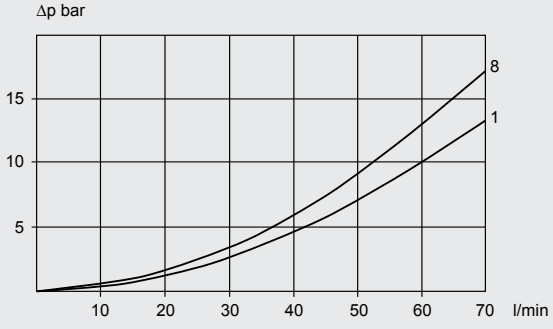

| No. of sections | L (in) | L (mm) | LF (in) | LF (mm) | LK (in) | LK (mm) |
|---|---|---|---|---|---|---|
| 1 | 4.1 | 103 | 3.4 | 87 | 2.7 | 68 |
| 2 | 5.7 | 146 | 5.1 | 130 | 4.4 | 111 |
| 3 | 7.4 | 189 | 6.8 | 173 | 6.1 | 154 |
| 4 | 9.1 | 232 | 8.5 | 216 | 7.8 | 197 |
| 5 | 10.8 | 275 | 10.2 | 259 | 9.4 | 240 |
| 6 | 12.5 | 318 | 11.9 | 302 | 11.1 | 283 |
| 7 | 14.2 | 361 | 13.6 | 345 | 12.8 | 326 |
| 8 | 15.9 | 404 | 15.3 | 388 | 14.5 | 369 |

## Pressure drop

Oil temperature / viscosity for all graphs: 104°F (+40°C) / 32 cSt

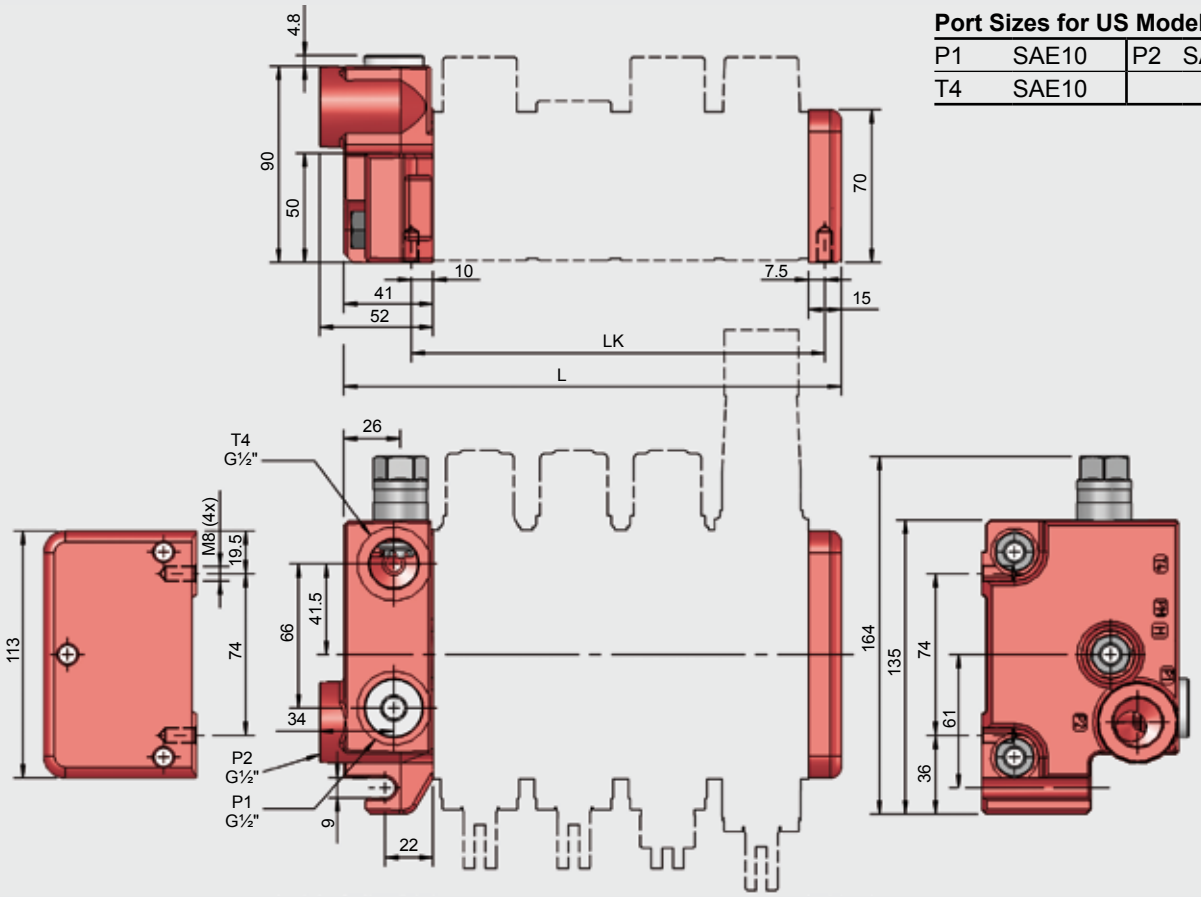



Pressure drop 1-8 sections, P1 – T1, inlet I04B, outlet U05B




Pressure drop 1 or 8 sections, A/B – T, inlet I04B, outlet U05B

## Dimensions inlet and outlet type C – end plate




**Port Sizes for US Models**

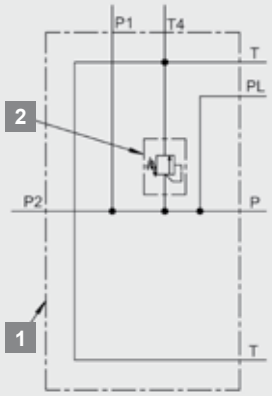
| | | | |
|---|---|---|---|
| P1 | SAE10 | P2 | SAE10 |
| T4 | SAE10 | | |

**I04C** has two pump ports and one tank port.
The main relief valve cavity is on the A-side.

Note: Inlet type C offers a connection between tank galleries of A and B sides.

For information regarding the outlet – see outlet sections.

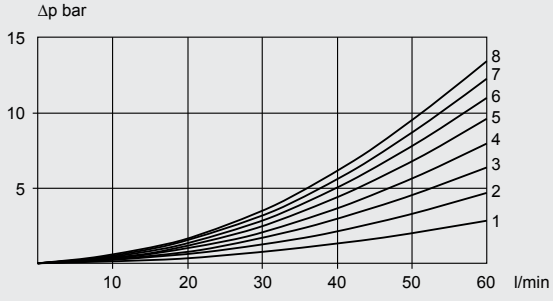
| | | |
|---|---|---|
| 1 | Inlet type C | I04C |
| 2 | Main relief valve | TBD131 |



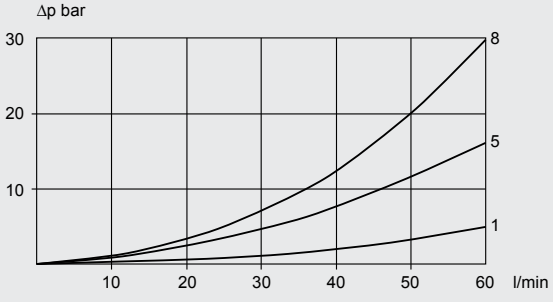

| No. of sections | L (in) | L (mm) | LK (in) | LK (mm) |
|---|---|---|---|---|
| 1 | 3.9 | 98 | 2.4 | 61 |
| 2 | 5.6 | 141 | 4.1 | 104 |
| 3 | 7.2 | 184 | 5.8 | 147 |
| 4 | 8.9 | 227 | 7.5 | 190 |
| 5 | 10.6 | 270 | 9.2 | 233 |
| 6 | 12.3 | 313 | 10.9 | 276 |
| 7 | 14.0 | 356 | 12.6 | 319 |
| 8 | 15.7 | 399 | 14.3 | 362 |

## Pressure drop

Oil temperature / viscosity for all graphs: 104°F (+40°C) / 32 cSt




Pressure drop 1-8 sections, P1 – T4, inlet I04C, outlet U01C

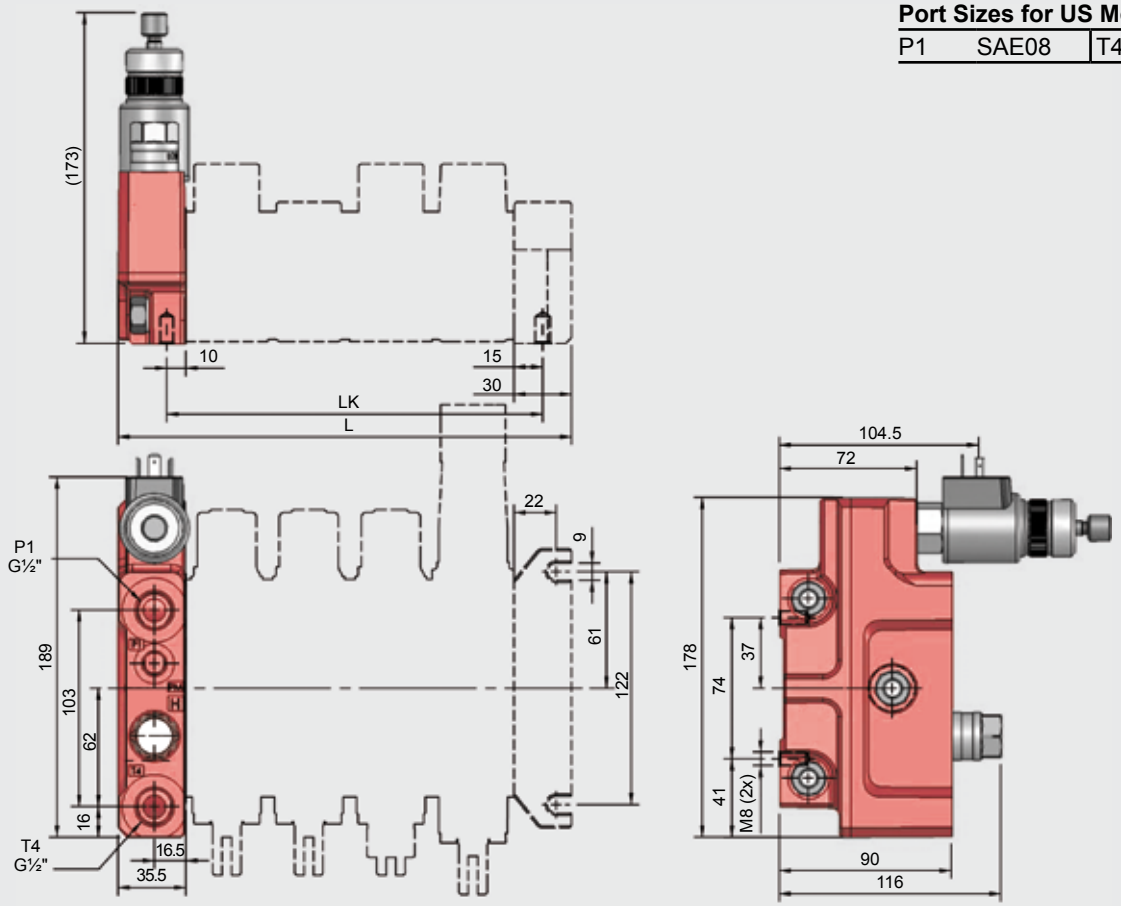



Pressure drop 1, 5 and 8 sections A,B – T, inlet I04C, outlet U01C

# Dimensions inlet type E – with electrical unloading

**Port Sizes for US Models**

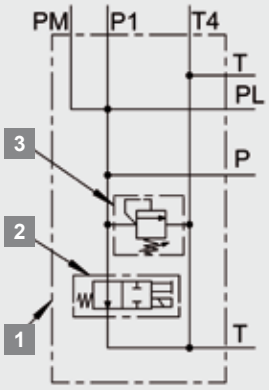
| | | | |
|---|---|---|---|
| P1 | SAE08 | T4 | SAE08 |




**I03E** has one pump port and one tank port, both facing upwards. The main relief cavity is facing upwards.
Main relief options: TBD160 or TBS400 up to max. 4,350 psi (300 bar).

The cavity for the electrical unloading valve is facing upwards. The A- and B-side tank channels are connected.

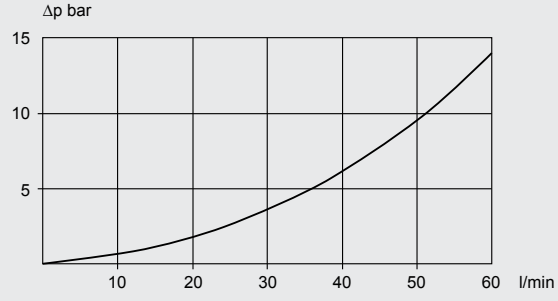
| | | |
|---|---|---|
| 1 | Inlet type E | I03E |
| 2 | Electrical unloading valve | EU912 |
| 2 | Electrical unloading valve | EU926 |
| 3 | Main relief valve | TBD160 |
| 3 | Main relief valve | TBS400 |



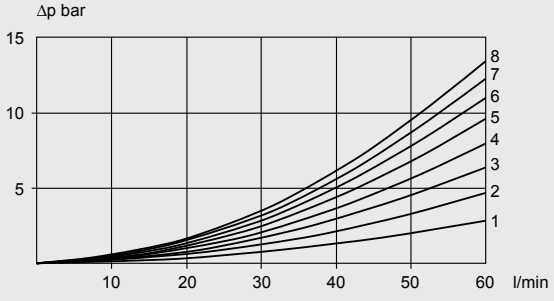

| No. of sections | L (in) | L (mm) | LK (in) | LK (mm) |
|---|---|---|---|---|
| 1 | 4.2 | 107 | 2.7 | 68 |
| 2 | 5.9 | 150 | 4.4 | 111 |
| 3 | 7.6 | 193 | 6.1 | 154 |
| 4 | 9.3 | 236 | 7.8 | 197 |
| 5 | 11.0 | 279 | 9.4 | 240 |
| 6 | 12.7 | 322 | 11.1 | 283 |
| 7 | 14.4 | 365 | 12.8 | 326 |
| 8 | 16.1 | 408 | 14.5 | 369 |

## Pressure drop

Oil temperature / viscosity for all graphs: 104°F (+40°C) / 32 cSt

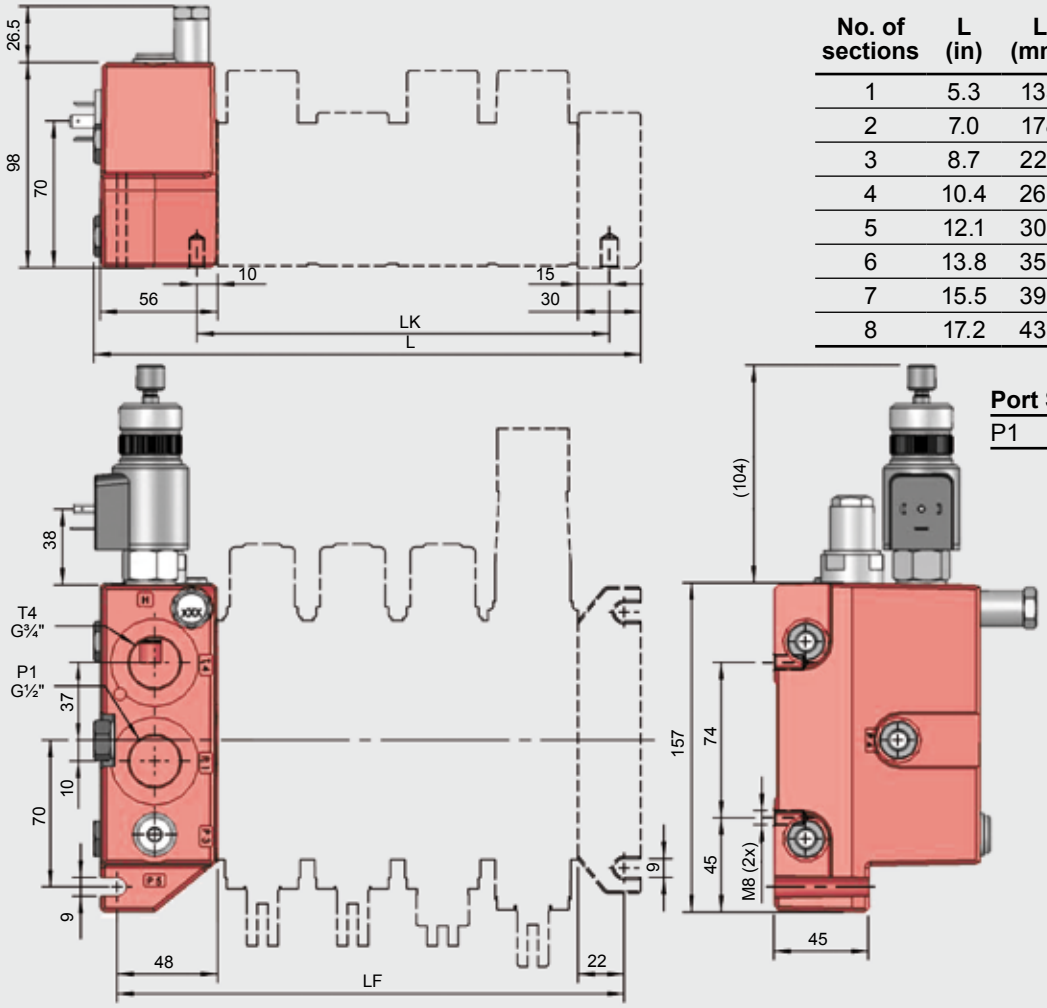



Pressure drop, P1 – T4, inlet I03E, unloaded




Pressure drop 1-8 sections, P1 – T1/T3, inlet I03E, outlet U05B

# Dimensions inlet type I02QU – with by-pass and electrical unloading




| No. of sections | L (in) | L (mm) | LF (in) | LF (mm) | LK (in) | LK (mm) |
|---|---|---|---|---|---|---|
| 1 | 5.3 | 135 | 4.4 | 113 | 2.7 | 68 |
| 2 | 7.0 | 178 | 6.1 | 156 | 4.4 | 111 |
| 3 | 8.7 | 221 | 7.8 | 199 | 6.1 | 154 |
| 4 | 10.4 | 264 | 9.5 | 242 | 7.8 | 197 |
| 5 | 12.1 | 307 | 11.2 | 285 | 9.4 | 240 |
| 6 | 13.8 | 350 | 12.9 | 328 | 11.1 | 283 |
| 7 | 15.5 | 393 | 14.6 | 371 | 12.8 | 326 |
| 8 | 17.2 | 436 | 16.3 | 414 | 14.5 | 369 |

**Port Sizes for US Models**

| | | | |
|---|---|---|---|
| P1 | SAE12 | T4 | SAE12 |

**I02QU** is an inlet section with flow control, main relief valve and unloading function.

When the system is idling a small regulated flow passes the center gallery of the valve. Excess pump flow is routed directly to tank.

The regulated flow is defined by the flow control valve FKA283 and the metering orifice PF.

When a spool is operated the whole pump flow is instantly available for the user. The low center gallery flow during idling conditions reduce pressure drop P – T through the valve body, and this facilitates higher pump flow without negative influence on the spool forces and heat generation.

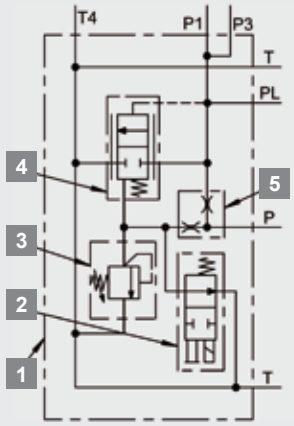
I02QU also is equipped with main relief valve TB12, which together with flow control FKA283, function as a pilot operated main relief valve. The Q-inlet can be equipped with a solenoid operated valve for electrical unloading.

The available metering orifices are PF11 and PF12.
In combination with FKA283 they provide:
PF11: 25 l/min; PF12: 28 l/min

A lower flow creates less pressure drop P – T.

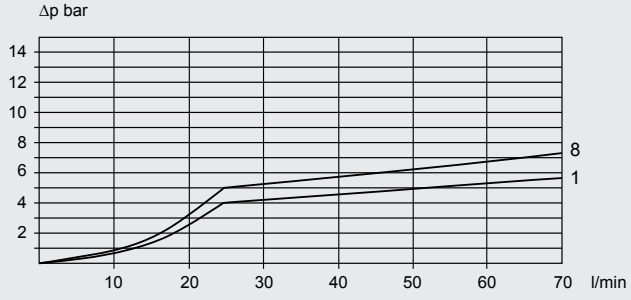
A spool that matches the flow improves the operating characteristics.

| | | |
|---|---|---|
| 1 | Inlet type Q | I02QU |
| 2 | Electrical unloading valve | EU912 |
| 2 | Electrical unloading valve | EU926 |
| 3 | Main relief valve | TB12 |
| 4 | Flow control | FKA283/2 |
| 5 | Metering orifice, diam 5.7 mm | PF12 |




## Pressure drop

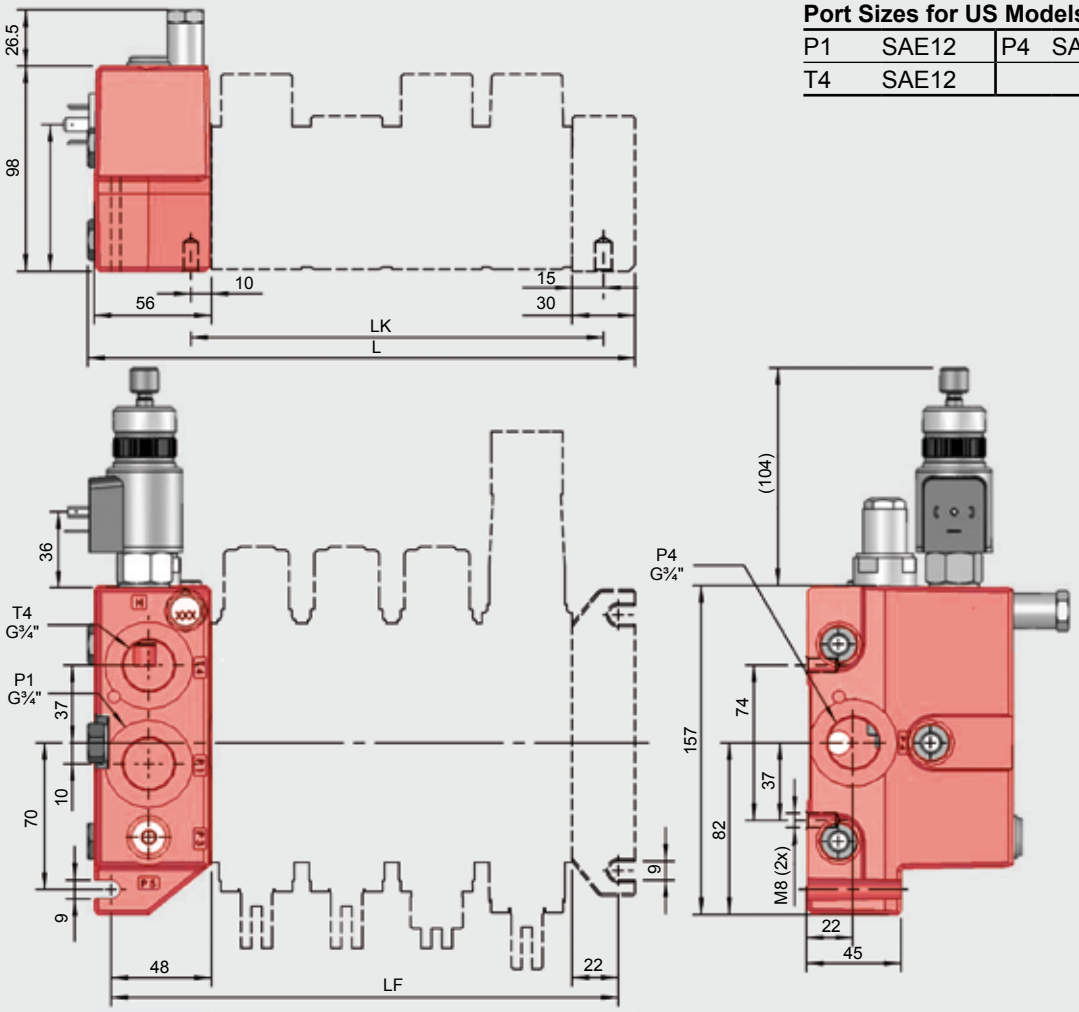
Oil temperature / viscosity for all graphs: 104°F (+40°C) / 32 cStt




Pressure drop 1 and 8 sections, P1 – T4,
inlet I02QU/I06QU, with flow control FKA283/2
and PF12, outlet U05B

# Dimensions inlet type I06QU – with by-pass and electrical unloading

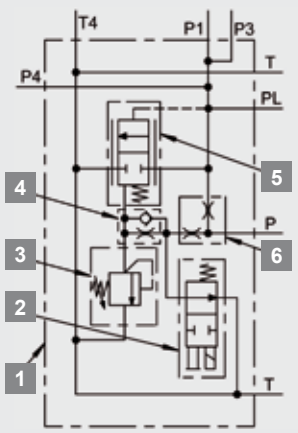
| Port Sizes for US Models | | | |
|---|---|---|---|
| P1 | SAE12 | P4 | SAE12 |
| T4 | SAE12 | | |




**I06QU** has the same functions as I02QU but with an added special check valve FSB3 in the signal gallery to damp the unloading function of the flow control valve FKA.

I06QU also provides an additional pump port.

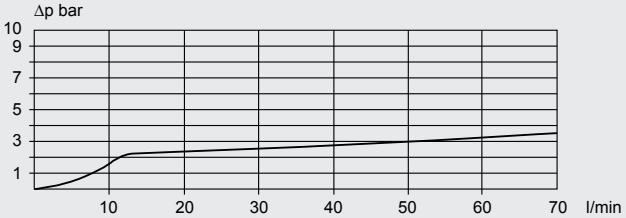
| | | |
|---|---|---|
| 1 | Inlet type Q | I06QU |
| 2 | Electrical unloading valve | EU912 |
| 2 | Electrical unloading valve | EU926 |
| 3 | Main relief valve | TB12 |
| 4 | Damp check valve | FSB3 |
| 5 | Flow control | FKA283/2 |
| 5 | Flow control | FKA283/3 |
| 6 | Metering orifice, diam 5.4 mm | PF11 |
| 6 | Metering orifice, diam 5.7 mm | PF12 |




| No. of sections | L (in) | L (mm) | LF (in) | LF (mm) | LK (in) | LK (mm) |
|---|---|---|---|---|---|---|
| 1 | 5.3 | 135 | 4.4 | 113 | 2.7 | 68 |
| 2 | 7.0 | 178 | 6.1 | 156 | 4.4 | 111 |
| 3 | 8.7 | 221 | 7.8 | 199 | 6.1 | 154 |
| 4 | 10.4 | 264 | 9.5 | 242 | 7.8 | 197 |
| 5 | 12.1 | 307 | 11.2 | 285 | 9.4 | 240 |
| 6 | 13.8 | 350 | 12.9 | 328 | 11.1 | 283 |
| 7 | 15.5 | 393 | 14.6 | 371 | 12.8 | 326 |
| 8 | 17.2 | 436 | 16.3 | 414 | 14.5 | 369 |

## Pressure drop

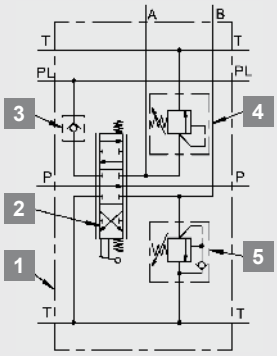
Oil temperature / viscosity for all graphs: 104°F (+40°C) / 32 cSt




Pressure drop, P1 – T4, inlet I02QU/I06QU, unloaded

## Working sections

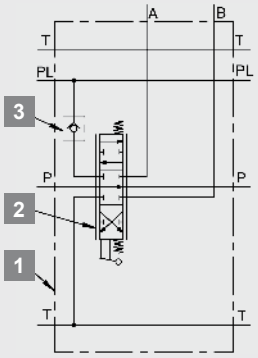
**S04A**




### S04A, for 3-position spool and cavities for service port valves

| | | |
|---|---|---|
| 1 | Spool section | S04A |
| 2 | Spool | |
| 3 | Check valve | MB01 |
| 4 | Port relief valve | TBD121 |
| 5 | Port relief and anticavitation valve | TBSD121 |

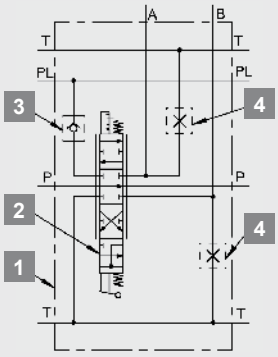
**S05B**




### S05B, for 3-position spool without cavities for service port valves

| | | |
|---|---|---|
| 1 | Spool section | S05B |
| 2 | Spool | |
| 3 | Check valve | MB01 |

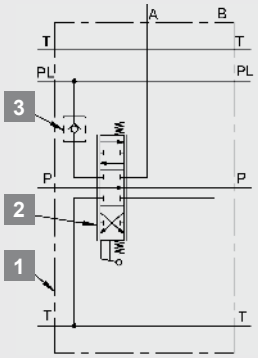
**S04H**




### S04H, for 4-position spool and cavities for service port valves

| | | |
|---|---|---|
| 1 | Spool section | S04H |
| 2 | Spool | |
| 3 | Check valve | MB03 |
| 4 | Plug | P121 |

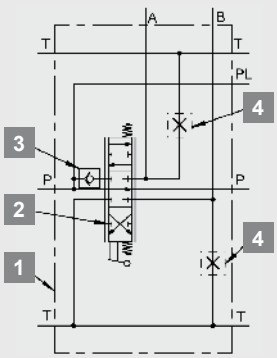
**S07C**




### S07C, for 3-position spool without service port valve possibility

| | | |
|---|---|---|
| 1 | Spool section | S07C |
| 2 | Spool | |
| 3 | Check valve | MB01 |

**S13A**

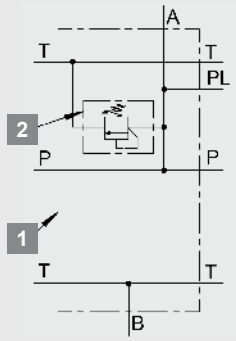



### S13A, for 3-position spool and cavities for service port valves for tandem

| | | |
|---|---|---|
| 1 | Spool section | S13A |
| 2 | Spool | |
| 3 | Check valve | MB01 |
| 4 | Plug | P121 |

## Intermediate sections

**M03A**



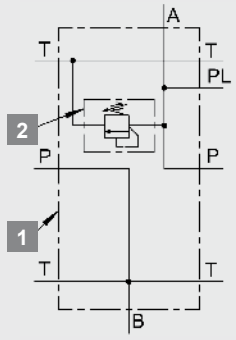

**M03A**

**M03A** is an intermediate inlet section used in dual circuit systems.

The A-port is for pump connection and the B-port is for tank connections. The main relief valve cavity is on the A-side. The second circuit pump is connected to port A. If the first circuit pump flow is connected to the inlet section and spool sections upstream of M03A is not used, both pump flows are available for use downstream of M03A. The sum of the pump flow should not exceed max. permissible flow of 50 l/min. The tank gallery is common for all sections.

| | | |
|---|---|---|
| 1 | Intermediate section | M03A |
| 2 | Main relief valve | TBD131 |

**M03B**




**M03B**

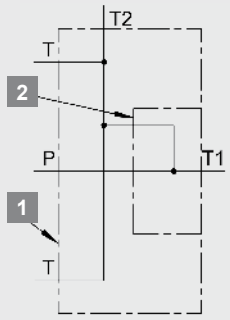
**M03B** is an intermediate inlet section used for two completely separated circuits.

The A-port is for pump connection and the B-port is for tank connections. The main relief valve cavity is on the A-side. The sum of the pump flow should not exceed max permissible flow of 50 l/min. The tank gallery is common for all sections.

| | | |
|---|---|---|
| 1 | Intermediate section | M03B |
| 2 | Main relief valve | TBD131 |

## Outlet sections

**U03A**



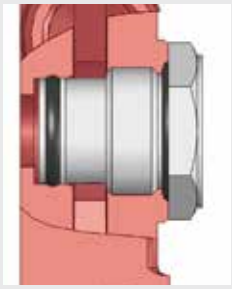

**U03A**

**U03A** has two tank ports, T2 on the top and T1 on the side. For series connection a high pressure carry-over nipple should be fitted in T1. In this case an alternative tank port always has to be connected to the tank.

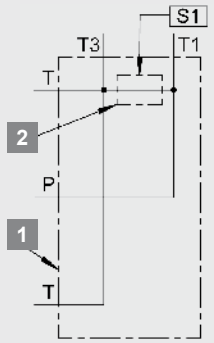
| | | |
|---|---|---|
| 1 | Outlet section | U03A |
| 2 | High pressure carry over nipple | SU23 |

**U03A**

High pressure carry-over nipple SU23 is fitted in port T1.



**U05B**




**U05B**

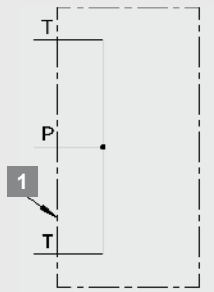
**U05B** has two tank ports, both facing upwards. For series connection a high pressure carry-over plug PS20 should be fitted in location S1 in port T1. In this case an alternative tank port always has to be connected to the tank.

| | | |
|---|---|---|
| 1 | Outlet section | U05B |
| 2 | Plug (S1) | PS20 |

**U05B**

High pressure carry-over plug PS20 is fitted through port T1 in location S1. T1 is now port for series connection.


**U01C**




## U01C

**U01C** is an end plate without porting.

| | | |
|---|---|---|
| 1 | Outlet section | U01C |

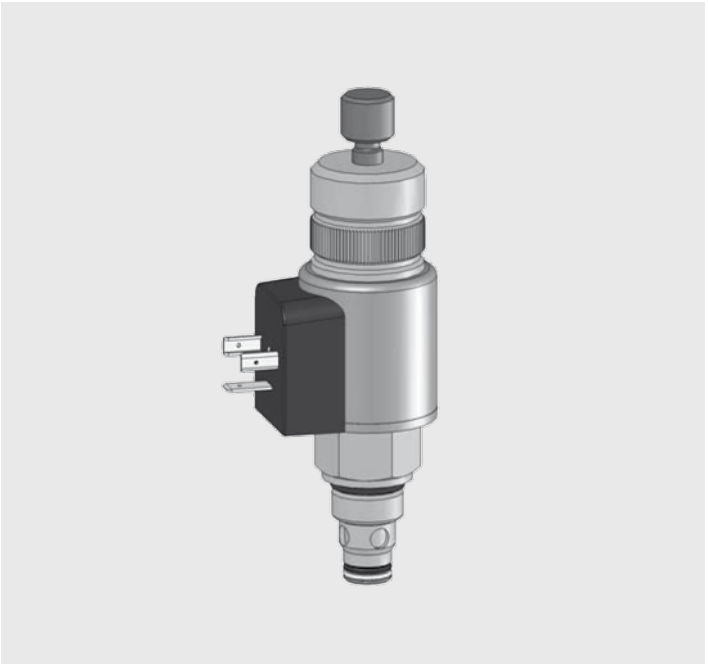
# Electrical unloading valve

The electrical unloading valve is a 2-way, normally open, solenoid type cartridge valve. It is an option in inlet sections I02QU, I06QU and I03E.

It is intended for emergency stop and for pressure drop / heat generation reduction.

In Q-inlets a de-energized unloading valve drains the pilot circuit so that the FKA283 spool dumps the whole pump flow directly to tank.

In inlet I01E a de-energized unloading valve dumps the whole pump flow to tank.



**Data**

| | |
|---|---|
| Rated flow: | 10.5 gpm (40 Lpm) |
| Power consumption: | 27 W |
| Rated voltage: | 12 or 24 V |
| Max voltage variation: | +/-15 % |
| Duty factor[1]: | 100 % |
| Connection: | Hirschmann ISO 4400 DIN 43650[2] |
| Protection class: | IP65 |

[1] Sufficient cooling must be secured
[2] Other Connections available upon request.

The unloading valve has manual override.

E912 and E926 has push and twist type pin operation.
This pin is sealable.
PE20 is the plug for the cavity.

**Codes**

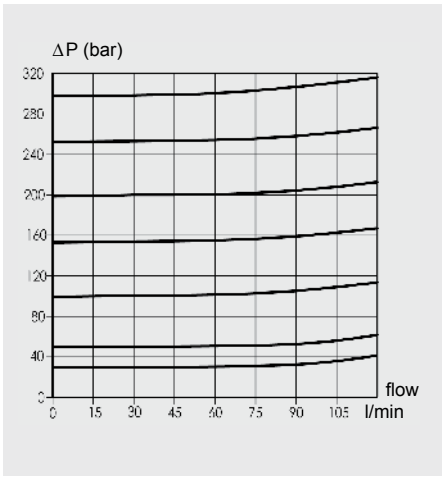
| | |
|---|---|
| EU912 | push and twist type override 12 V |
| EU926 | push and twist type override 24 V |

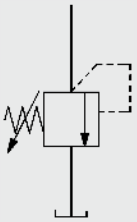
## Main relief valve TBS400

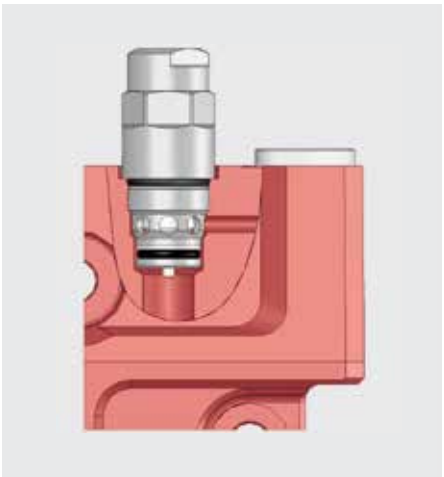
TBS400 is a pilot operated relief valve for the primary circuit. It is adjustable and sealable.

It is optional in inlet section I01E.

- Setting range: 500-4,350 psi (35-300 bar)
- Setting range step: 100 psi (7 bar)



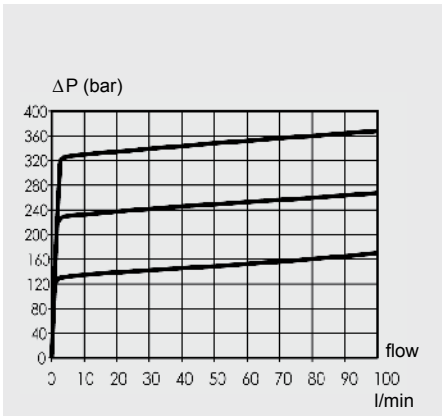


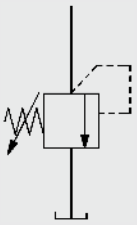
## Main relief function with TB12

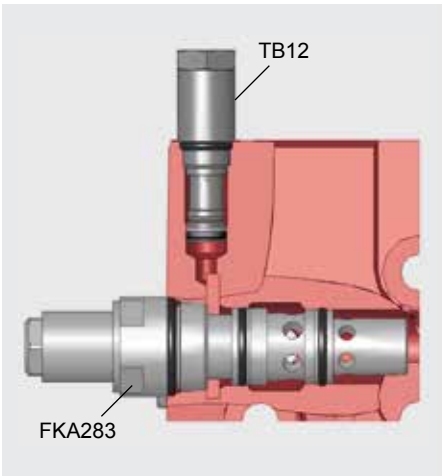
The flow control valve FKA283, in combination with the relief valve TB12, form the pilot operated main relief function of the Q-inlets.

TB12 is adjustable and sealable.

- Setting range: 500-4,350 psi (35-300 bar)
- Setting range step: 100 psi (7bar)



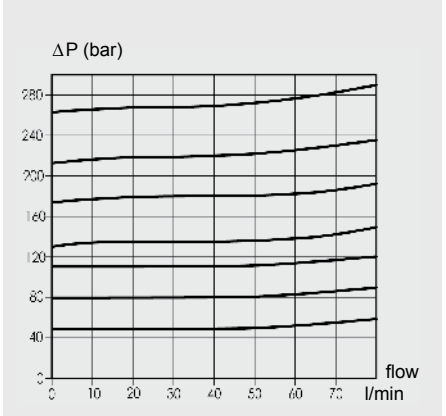


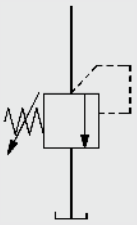

## Main relief valve TBD131

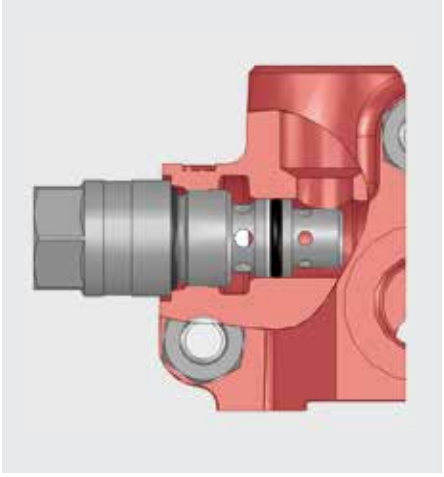
TBD131 is a differential area, direct acting relief valve for the primary circuit. It is adjustable and sealable.

TBD131 is used in inlet sections I04A, I04B, I04C and intermediate sections M03A and M03B

- Setting range: 500-4,350 psi (35-300 bar)
- Setting range step: 100 psi (7bar)



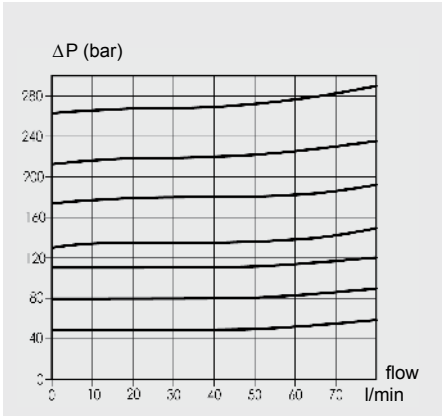


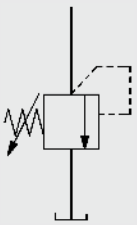
## Main relief valve TBD160

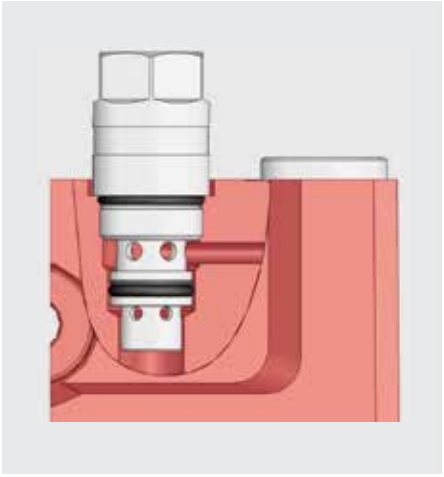
TBD160 is a differential area, direct acting relief valve for the primary circuit. It is adjustable and sealable.

TBD160 is optional in inlet I03E.

- Setting range: 500-4,350 psi (35-300 bar)
- Setting range step: 100 psi (7bar)

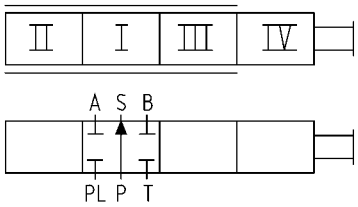




## Spools

The RS210 spools are available in variety of flows and styles to accommodate most design requirements.
Since the development of spools is a continuous process and all available spools are not described in this data sheet, contact HYDAC for advice on choosing spools in order to optimize your valve configuration.




**Spools for general use**

| Function | Standard spools[1] |
|---|---|
| Double acting spool | 1K |
| Slewing spool, gentle operating | 1M |
| Single acting spool P - A | 2K |
| Motor spool | 4K |
| Motor spool A - T | 4KA |
| Motor spool B - T | 4KB |
| Double acting spool with 4th pos. for float | 3K |

[1]Note: For other spools, consult factory.

**Spools designed for cranes**

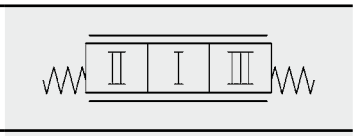
| Function | Flow range 5-8 gpm (20-30 Lpm) | 8-12 gpm (30-45 Lpm) | 9-13 gpm* (35-50 Lpm) |
|---|---|---|---|
| For slewing function. In combination with spool control 918 only. | 12SA | 14SA | 124SA |
| For use with load holding valves. Assymetric. B-port to be connected to piston side of cylinder. | 12ZA | 14ZA | 124ZA |
| For use with load holding valves. | 12ZB | 14ZB | 124ZB |
| For use with load holding valves. Assymetric. A-port to be connected to piston side of cylinder. | 12XA | 14XA | 124XA |
| For use with load holding valves. Assymetric. B-port to be connected to piston side of cylinder. | 12YA | 14YA | 124YA |

*Note: Spools for flow range 9-13 gpm (35 - 50 Lpm) only in combination with Q-inlets.
For higher flows, consult factory.

## Spool controls – A-side

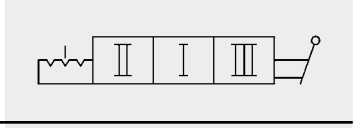
**Spool control 9**

9 Spring centered.
9W for cable control



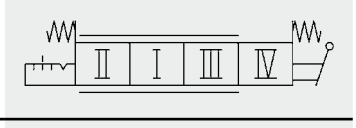
**Spool control 10**

Detents at positions 1, 2 and 3



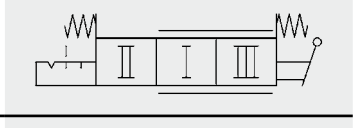
**Spool control 11**

Spring centering with detent at position 4



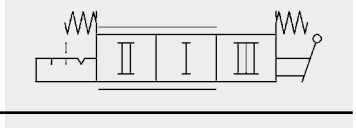
**Spool control 13**

Spring centering with detent at position 2



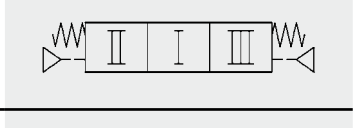
**Spool control 14**

Spring centering with detent at position 3



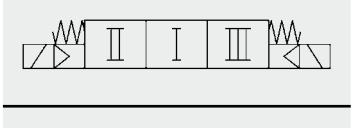
**Spool control P**

Pneumatic*



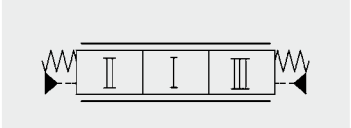
**Spool control EP**

Electro / pneumatic on / off**



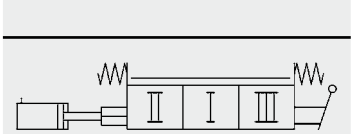
**Spool control HPD**

Hydr. proportional
Pilot pressure 87 - 232 psi (6-16 bar)
Max. pilot pressure 362 psi (25 bar)*



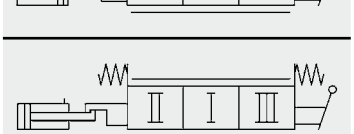
**Spool control L61**

External hydraulic kick-out from inserted spool*



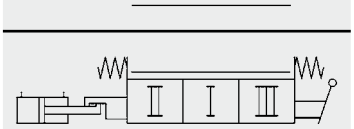
**Spool control L62**

External hydraulic kick-out from extended spool***



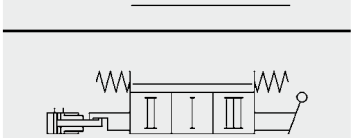
**Spool control L63**

External hydraulic kick-out from inserted and extended spool***



**Spool control L64**

External hydraulic kick-out from inserted and extended spool, locking neutral position*



**Spool Control HLS 200**

Spool position indicator.
Operating range 10 - 30 V

* Connection G 1/8" BSP

*** Connection G 1/4" BSP

** 

| | |
|---|---|
| Power consumption | 4.8 W |
| Rated voltage | 24 V |
| Max voltage variation | +/- 10 % |
| Duty factor | 100 % |
| Connection | according to EN175301-803/B |
| Protection class | IP65 |

## Spool controls – B-side

**Bracket M19**

Bracket for 3-position spool, gear ratio 9:1

**Bracket M29**

Bracket for 4-position spool, gear ratio 9:1

**Bracket M111**

Bracket for 3-position spool, gear ratio 11:1

**Bracket M211**

Bracket for 4-position spool, gear ratio 11:1

**Bracket M2**

Bracket for 3-position spool, without ear

**3W**

Cap for 3-position spool controlled by cable

**4W**

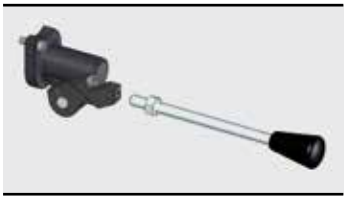
Cap for 4-position spool controlled by cable

**Lever M2K250**

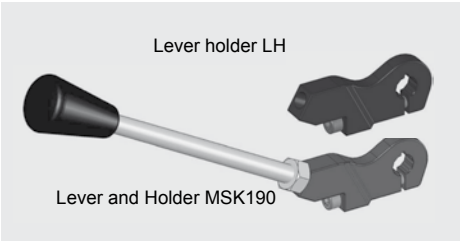
Coordinate lever for spool with 3 or 4 pos.

**Spool control M02**

M02 is a spool actuator that assures dry and sealed spool ends for a manual lever



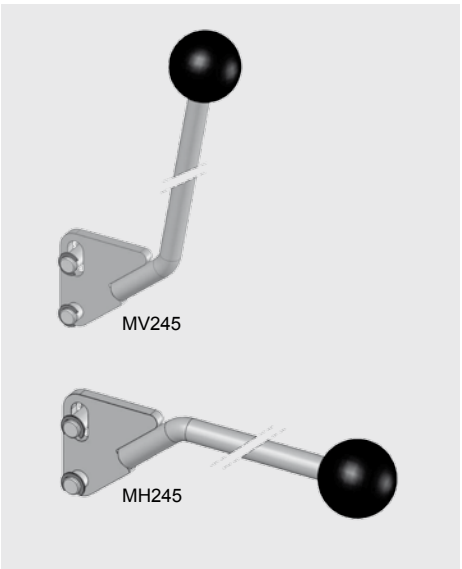
## Levers




**Lever and Holder MSK190**

The lever holder (LH) is for use together with spool actuator of type M1/EHM.

The lever holder is delivered in combination with a lever as MSK190



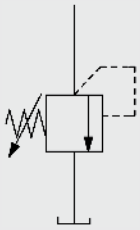

**Lever MV/MH**

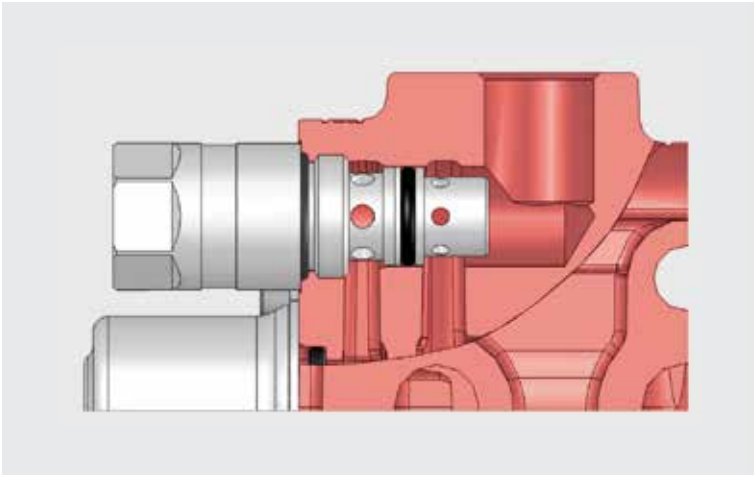
Lever for use in combination with open spool ends and a bracket M19/M29. When mounted on a valve, the lever MH stands in a horizontal position and MV stands in a vertical position. Lever length 145 or 245 mm.

## Port relief valve TBD121

TBD121 is a direct acting relief valve for the secondary circuit. It is adjustable and sealable.

- Setting range:
  500-4,350 psi (35-300 bar)
- Setting range step:
  100 psi (7bar)

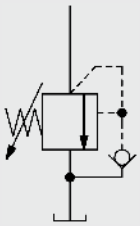


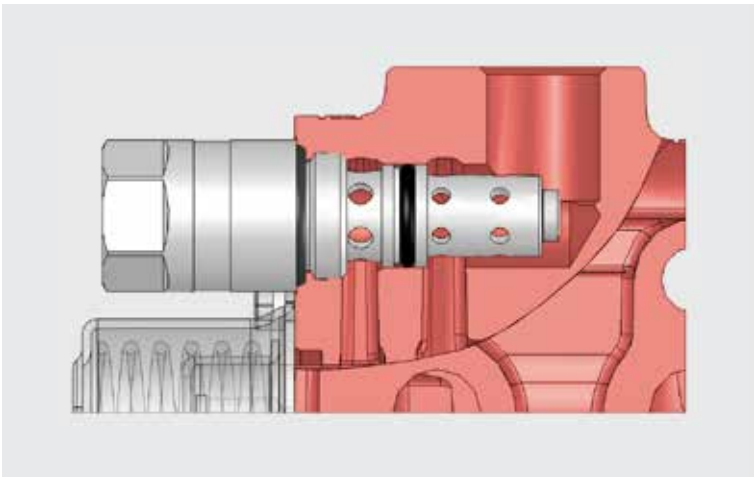


## Port relief and anticavitation valve TBSD121

See TBD121 and SB160 for functional principles.

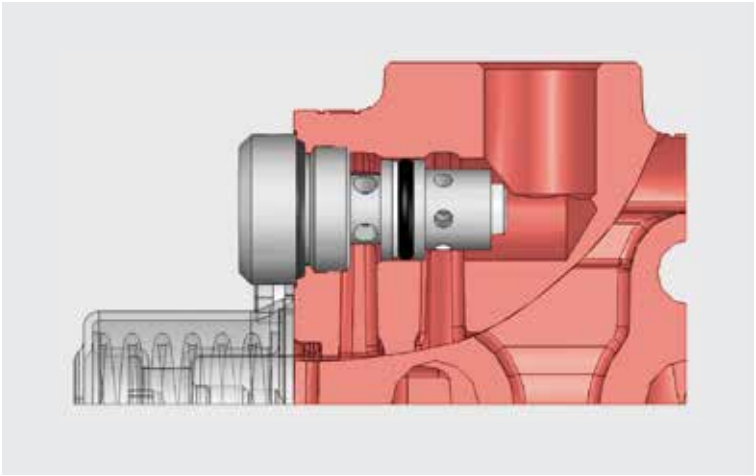
- Setting range:
  500-4,350 psi (35-300 bar)
- Setting range step:
  100 psi (7bar)



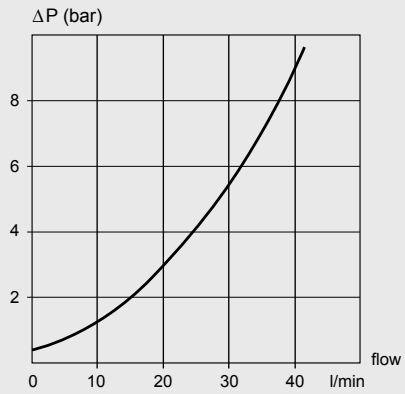


## Anticavitation valve SB160

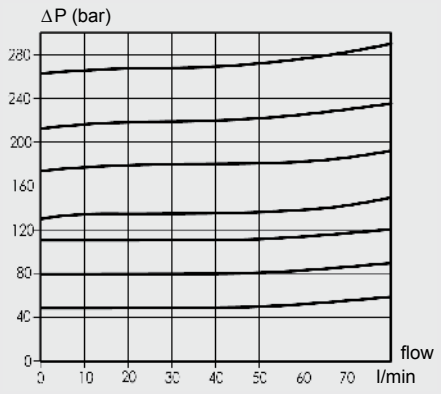
The anticavitation valve ensures that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.



## Anticavitation and pressure drop characteristics



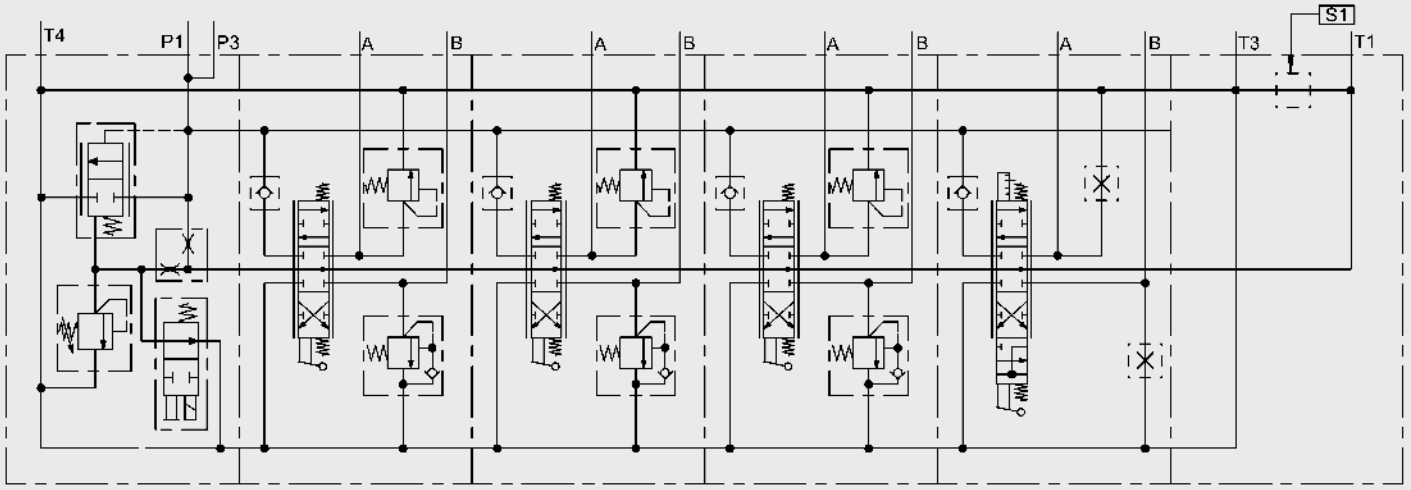

Anticavitation characteristics
TBSD121 and SB160



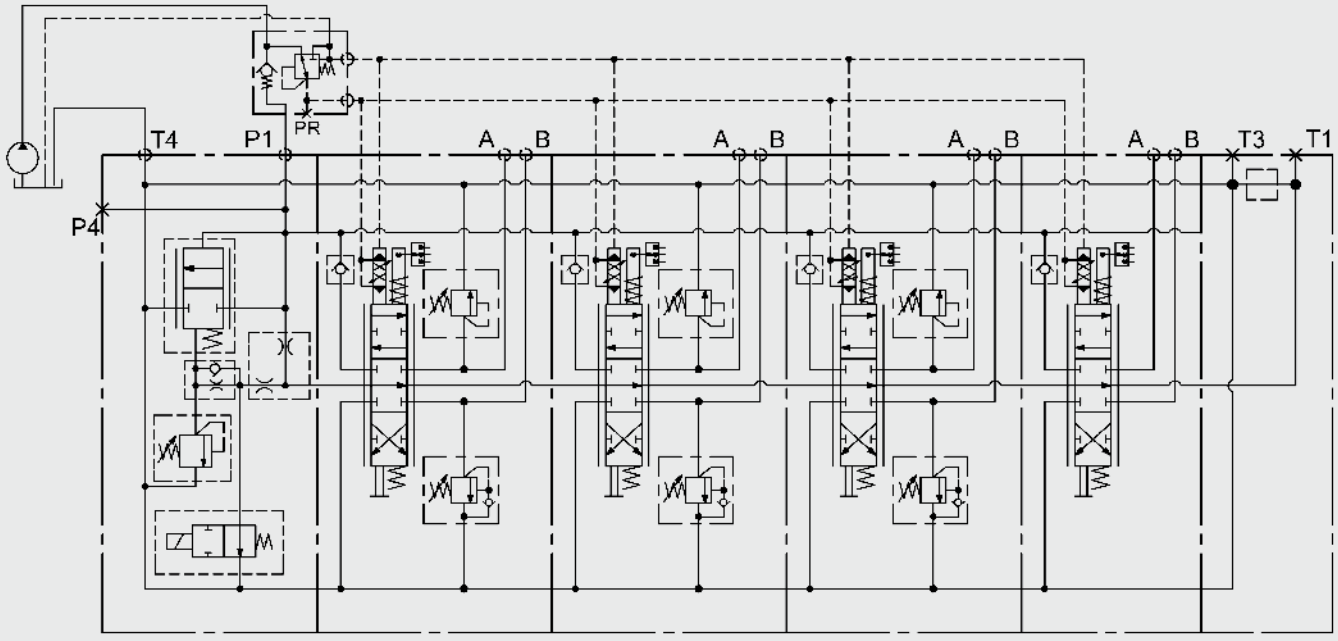

Pressure drop characteristics
TBD/TBSD121

MHD1308-1555 RS210 PN#02099404

# Typical hydraulic circuit diagrams

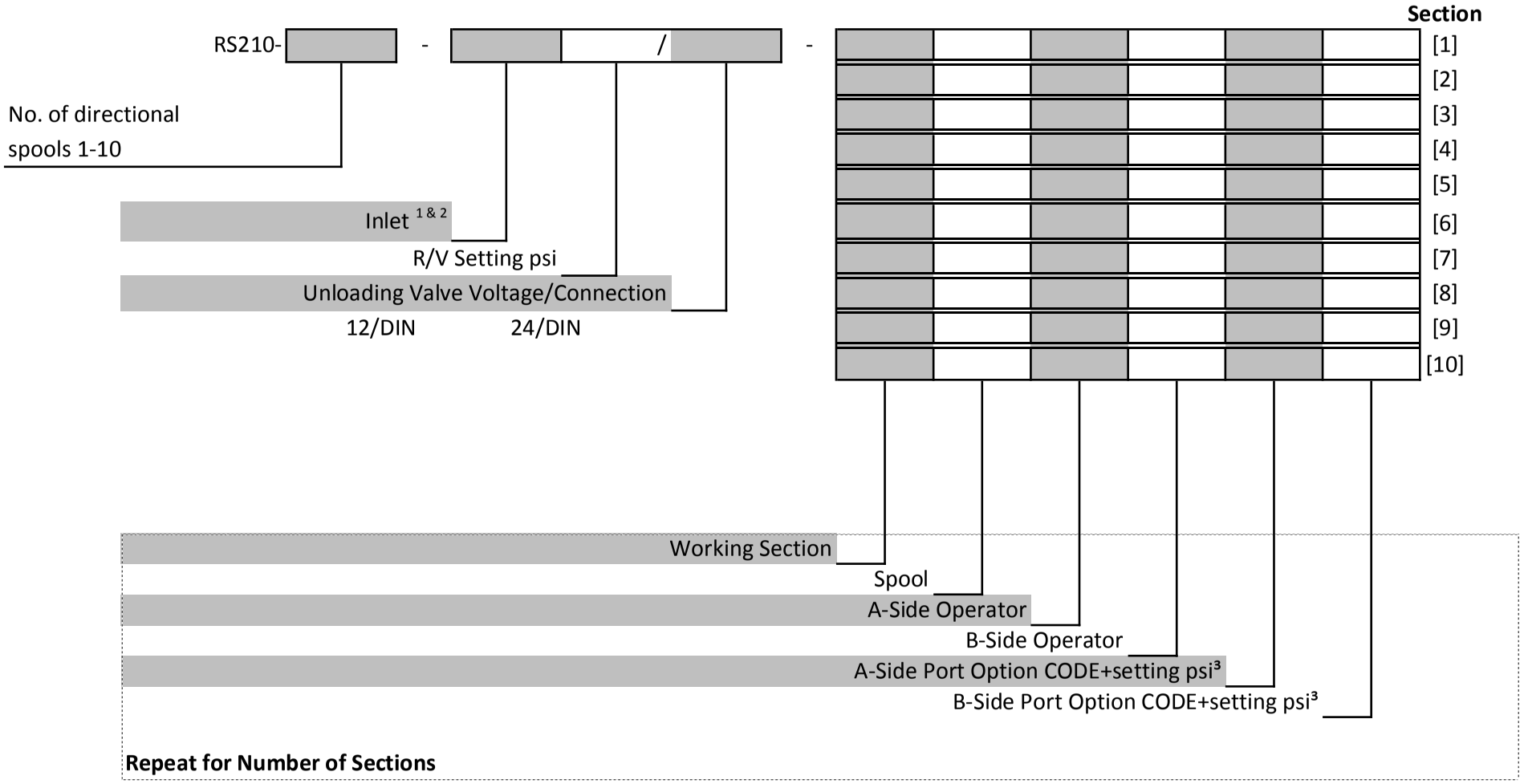


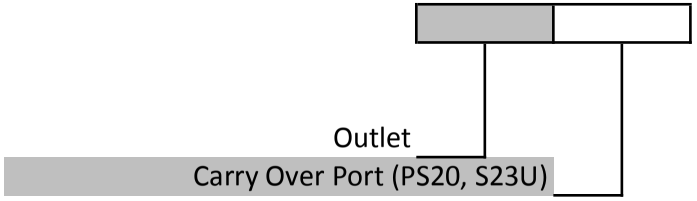

Hydraulic circuit diagram for a four sectional RS 210 valve.
It is fitted with a Q-inlet with electrical unloading.
The first three sections contain 3-positions spools for double acting functions and port relief and anticavitation valves.
The fourth section contains a 4-position spool for double acting functions with float position in position 4. The outlet gives possibility for high pressure carry-over (if S1 is plugged).




The circuit diagram shows a complete RS 210 valve, 4 sections with an inlet with flow regulator (“Q-inlet”) and completed with pilot supply and spool controls for remote control.
Note the separate piping to tank for the return flow from the remote control. It is required to pipe up the system in that way in order to avoid high pressure and pressure peaks in the return line.

# Ordering Details RS210 Sectional Control Valve




1] Standard inlet is I04B; corresponding outlet is U05B

2] Q-Inlet components (R/V type, Q cartridge, Q orifice) are selected by HYDAC based upon all other details of valve specification.

3] ie. TBSD121 + 3,000 psi

**Application Information**

OEM: _____

Machine Type: _____

Pump Type: _____

Pump Flow: _____

System Pressure: _____

EAU: _____

Other Information: _____

_____

_____

## Notes

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**Process Filter Division**

**HYDAC CORPORATION**
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## Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.



**PN#02099404** / 08.13 / MHD1308-1555

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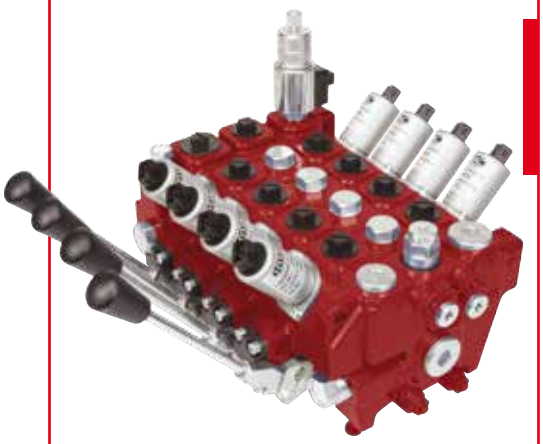


# Sectional Directional Control Valve
RS 220

## Key valve features

RS 220 is a sectional open center valve designed for max. operating pressures up to 4,350 psi (300 bar) and max. pump flows up to 30 gpm (110 Lpm).

It is available with 1 to 10 working sections per valve assembly.

RS 220 is designed with an open center for fixed pumps and a restricted open center for variable displacement pumps.

It is available with electro-hydraulic or hydraulic proportional remote control, but the valve can also be manually operated.

The electro-hydraulic proportional version in particular offers compact design with internal pilot oil supply, solenoids integrated in the valve body and integral hand levers for manual override/manual operation.

RS 220 can be fully adapted for marine applications.

The valve offers excellent operating characteristics because of the specially designed spools for different applications.

Low and uniform spool forces are the result of careful balancing of the flow forces.

## Q-function

The flow control (Q-function) of the inlet section by-passes the major part of the pump flow to tank when the system is idling, still giving access to full pump flow when the services are operated. Besides greatly reducing heat generation this also provides improved operating characteristics.

## Applications

The RS 220 is ideal for applications where you need excellent control characteristics such as cranes, sky-lifts, excavators, telescopic load handlers, skid-loaders, wheel loaders etc.

## Technical data

| **Pressures / Flows** | | |
|---|---|---|
| Max. operating pressure per port: | | |
| P1, A, B: | 4,350 psi | 300 bar |
| T1, T2, T3, T4: | 300 psi | 20 bar |
| Typical Nominal Inlet Flow: | 30 gpm | 110 Lpm |
| Fluid temperature range: | 5°F up to 176°F | -15°C up to +80°C |
| **Further data** | | |
| Spool control force: | | |
| Neutral position: | 25 lbs | 110 N |
| Max. spool stroke: | 29 lbs | 130 N |
| Permissible contamination level: | Equal or better than 20/18/14 as per ISO 4406 | |
| Viscosity range: | 10 – 400 $mm^2/s$ (cst)<br>Higher viscosity allowed at start up | |
| Leakage A, B → T at 1,500 psi, 32 cSt and 104°F ≤ 13 cc/min (100 bar, 32 cSt and 40°C) | | |
| Pressure fluid: | Mineral oil and synthetic oil based on mineral oil HL, HLP according to din 51524 | |

Higher values are possible, depending on application. For applications with demands that exceed stated data above, please contact us for consideration.

MTTFd value after consultation with HYDAC.

## Remote control

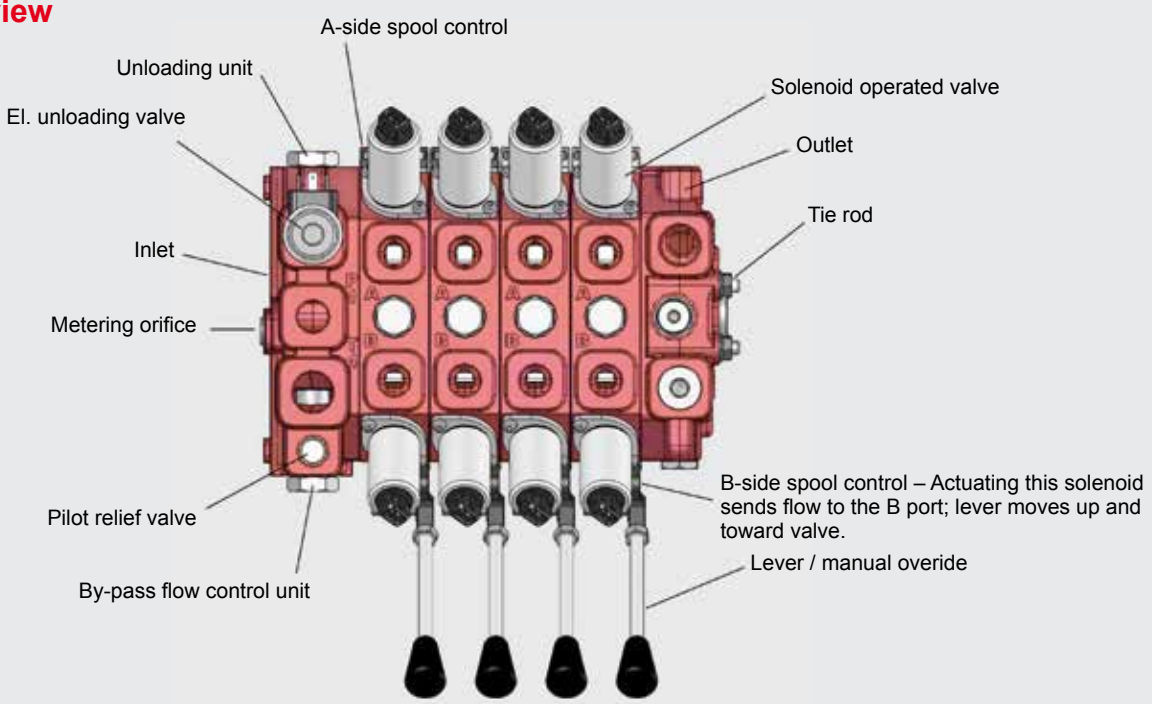
The RS 220 is designed with an integrated pilot supply system in order to achieve an easy installation and a reliable remote control function. It is also possible (and in some cases preferred) to supply the pilot system externally.

## Further properties and possibilities

- A wide choice of spools and spool controls for different flow combinations and for several applications and systems.
- A full range of service port valves.
- Possibility of high pressure carry-over.
- Electrical unloading for inlet safety function.
- Manual versions easily convertible to remote control.

MHD1309-1570 RS220 PN#02099490

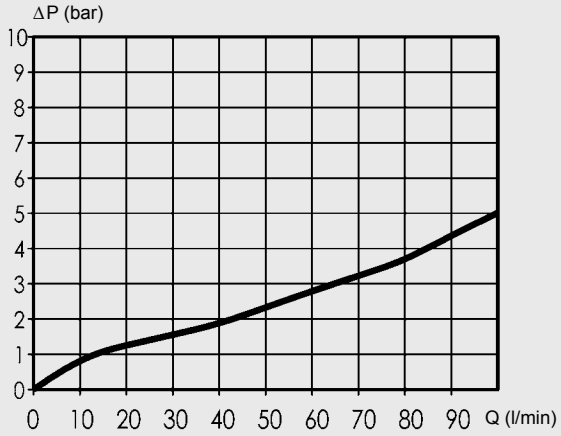
## General overview




## Pressure drop

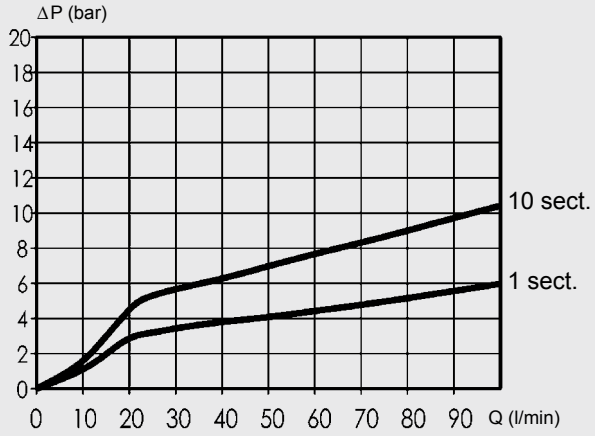
Oil temperature / viscosity for all graphs: +40 °C / 32 cSt

### Pressure drop P - T, unloaded valve

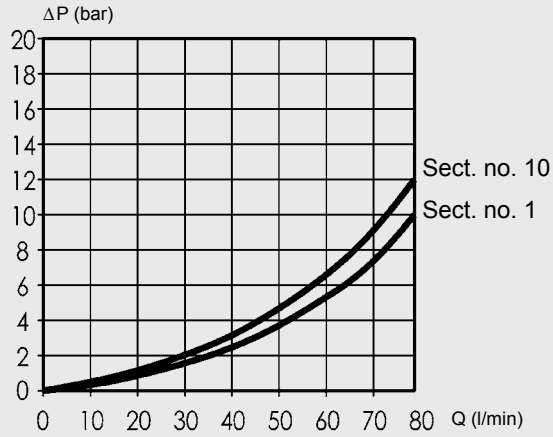



The pressure drops P - T are valid for a valve with a metering orifice PF305 for the center channel flow. Note that a valve in unloaded mode will have a small flow in the center channel.

### Pressure drop P - T (idling)

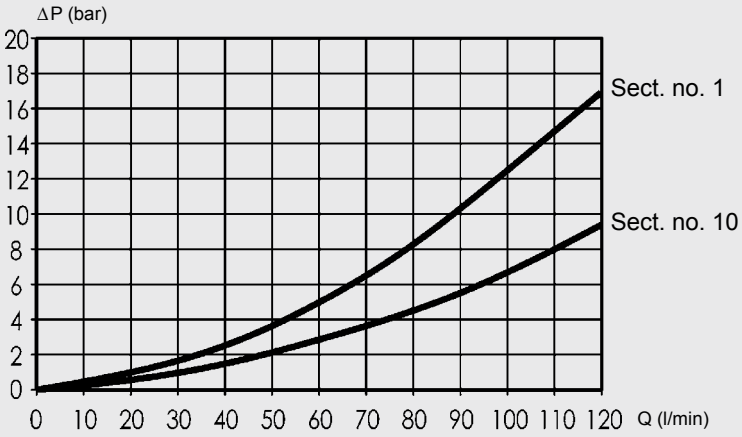



### Pressure drop P - A/B




Note that the pressure drop curves P - A/B and A/B - T are valid for sections equipped with spools that are fully open at maximum spool travel.

### Pressure drop A/B - T



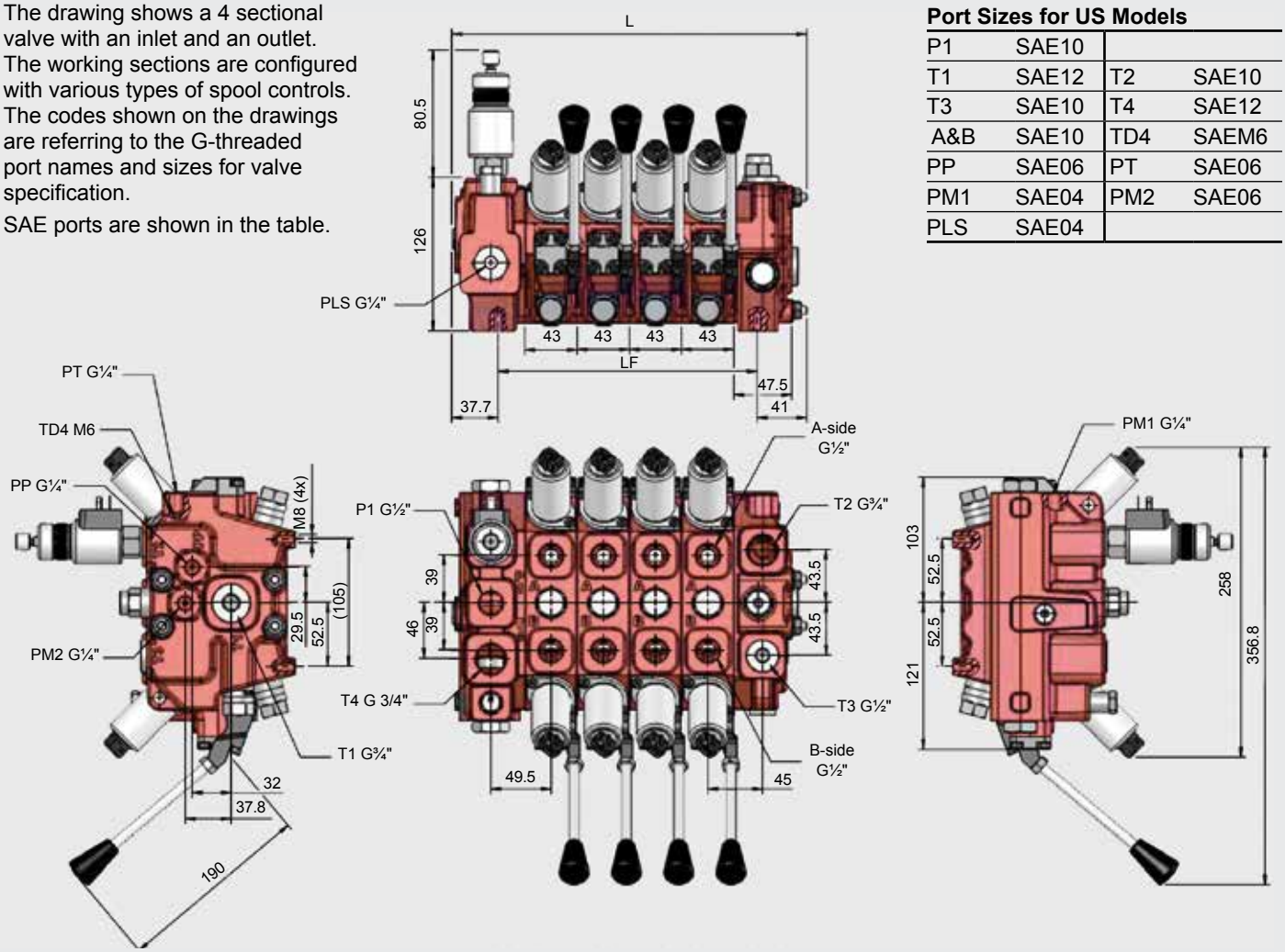
# Dimensions and weight

The drawing shows a 4 sectional valve with an inlet and an outlet. The working sections are configured with various types of spool controls. The codes shown on the drawings are referring to the G-threaded port names and sizes for valve specification.

SAE ports are shown in the table.

**Port Sizes for US Models**

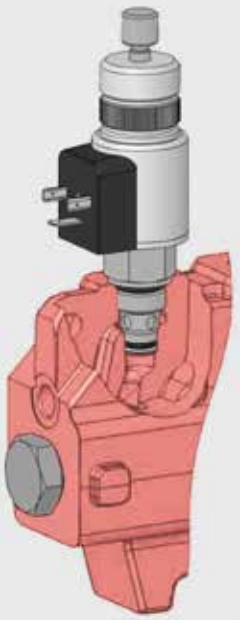
| | | | |
|---|---|---|---|
| P1 | SAE10 | | |
| T1 | SAE12 | T2 | SAE10 |
| T3 | SAE10 | T4 | SAE12 |
| A&B | SAE10 | TD4 | SAEM6 |
| PP | SAE06 | PT | SAE06 |
| PM1 | SAE04 | PM2 | SAE06 |
| PLS | SAE04 | | |




**Weight**

| | | |
|---|---|---|
| Inlet section | 13.9 lbs | 6.3 kg |
| Working section | 11.0 lbs | 5.0 kg |
| Outlet section | 10.1 lbs | 4.6 kg |

| No. of working sections | L (in) | L (mm) | LF (in) | LF (mm) |
|---|---|---|---|---|
| 1 | 6.4 | 163 | 3.3 | 84 |
| 2 | 8.1 | 206 | 5.0 | 127 |
| 3 | 9.8 | 249 | 6.7 | 170 |
| 4 | 11.5 | 292 | 8.4 | 213 |
| 5 | 13.2 | 335 | 10.1 | 256 |
| 6 | 14.9 | 378 | 11.8 | 299 |
| 7 | 16.6 | 421 | 13.5 | 342 |
| 8 | 18.3 | 464 | 15.2 | 385 |
| 9 | 20.0 | 507 | 16.9 | 428 |
| 10 | 21.7 | 550 | 18.5 | 471 |



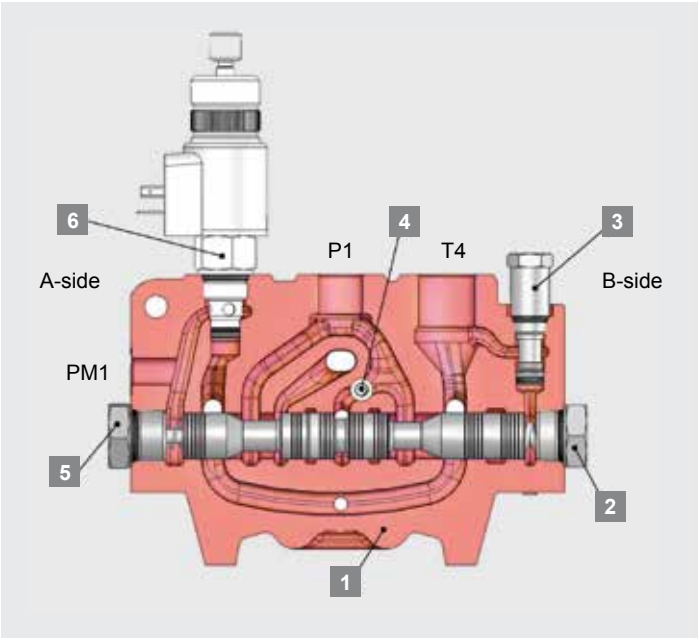
## Electrical unloading

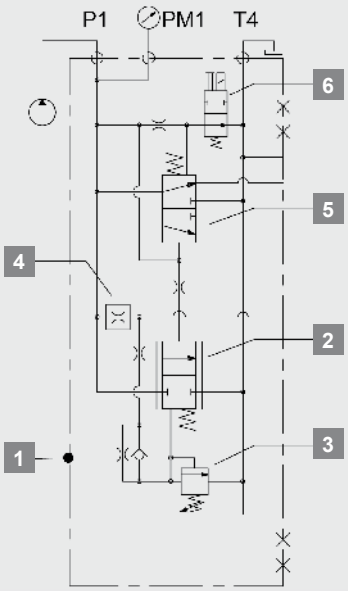
**Data**

| | | |
|---|---|---|
| Rated flow: | 10.5 gpm | 40 Lpm |
| Power consumption: | | 27W |
| Rated voltage EU912: | | 12V |
| Rated voltage EU926: | | 24V |
| Max voltage variation: | | +/-15% |
| Duty factor*: | | 100% |
| Connection: | EN 175301-803 form A | |
| Protection class: | | IP65 |

*Sufficient cooling must be secured.
The unloading valve has manual override, with twist pin operation.
PE20 is the plug for the cavity.

# Inlet section – with flow control and electrical unloading




| | | |
|---|---|---|
| 1 | Inlet | I01U |
| 2 | By-pass flow control unit | FK301 |
| 3 | Pilot relief valve | TB12 |
| 4 | Metering orifice for center channel flow | PF305 |
| 5 | Unloading unit | FU301 |
| 6 | Solenoid operated valve | EU926 |

**Main relief function**

The bypass flow control valve FK301 in combination with the relief valve TB12 form the pilot operated relief valve function of the inlet section for the primary circuit (valid for all configurations).

- TB12 is adjustable and sealable
- Setting range: 500-4,500 psi (35-300 bar)
- Setting range step: 100 psi (7 bar)

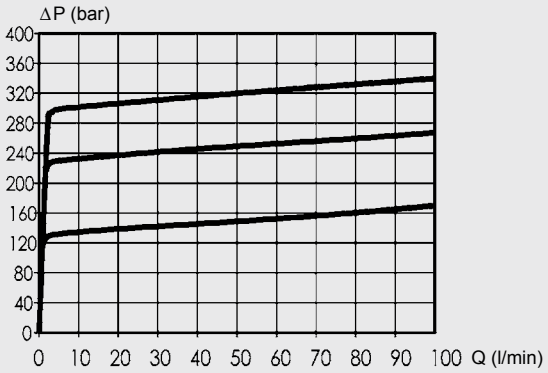
The I01U with its integral Q-function provides by-pass of pump flow to tank in idling condition, thereby reducing pressure drop and heat generation. The flow control function of the inlet also regulates the flow to the user corresponding to the travel of a partially selected spool. This, in addition to reduced flow forces and a control response to large extent unaffected by varying pump flows, contributes to the excellent operating characteristics achievable with RS 220.

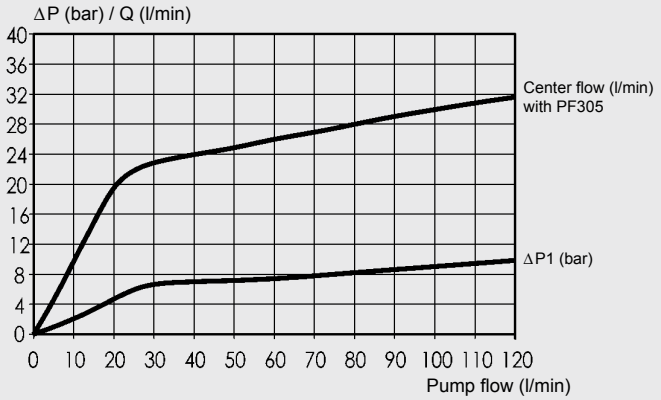
An integral and from the flow control separated spool, together with a solenoid operated electrical unloading valve, unloads the pump flow to tank and disconnects the oil supply to the valve sections.

Together with a load holding valve RS 220 achieves a very safe emergency dump of pump oil to tank.

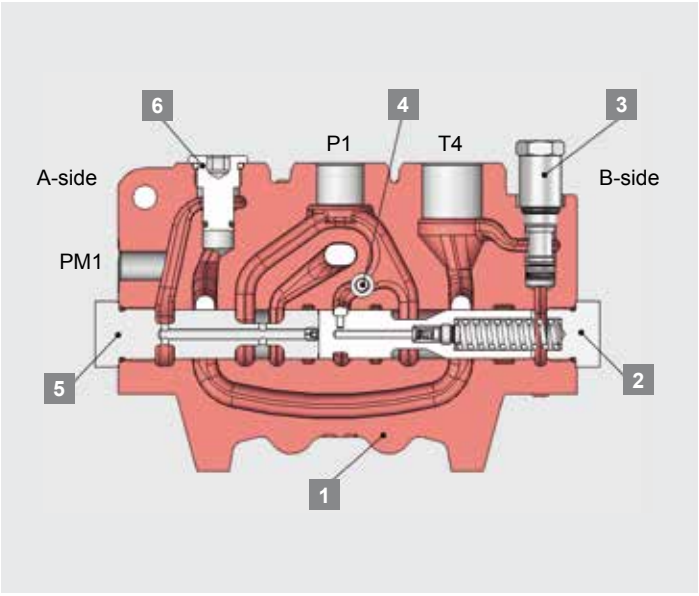
The maximum flow into the center channel is set by an exchangeable metering orifice.

The opening of the by-pass flow control spool is cushioned by a special check valve integrated in the spool.

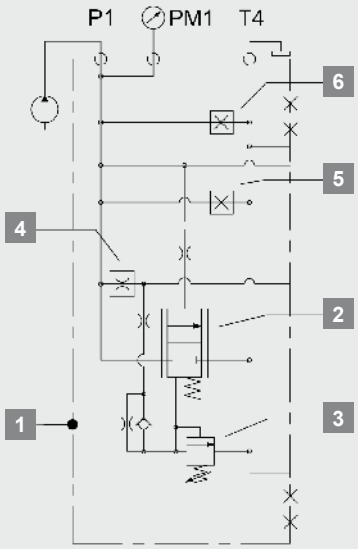


## Inlet section – with flow control and without unloading

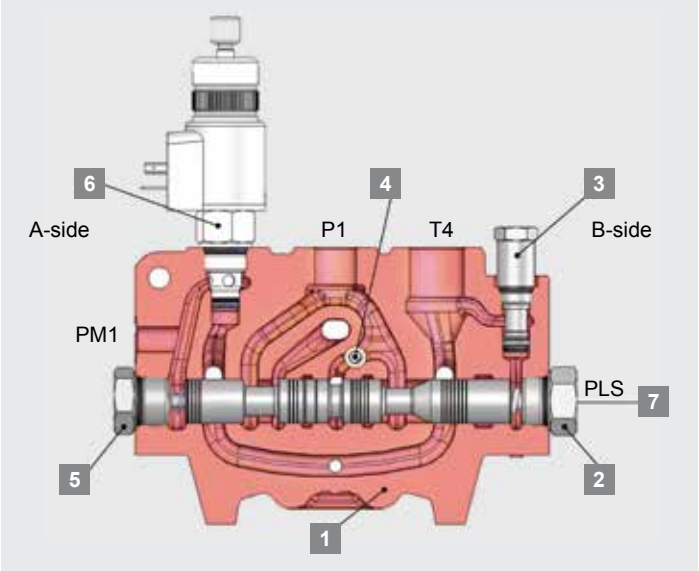



The inlet can also be delivered without the unloading function. The unloading spool and the solenoid operated valve in that case are replaced by plugs.




| | | |
|---|---|---|
| 1 | Inlet | I01U |
| 2 | By-pass flow control unit | FK301 |
| 3 | Pilot relief valve | TB12 |
| 4 | Metering orifice for center channel flow | PF305 |
| 5 | Plug replacing unloading unit | PU300 |
| 6 | Plug replacing electrical unloading valve | PE20 |

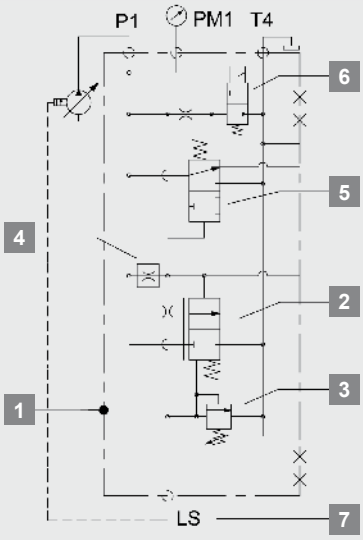
## Inlet section – variable displacement pumps




The I01U inlet can also be used in valves in systems with variable displacement pumps. The pump has to be of type LS-regulated. The inlet configured for variable pumps provides a modified Q-function. When the system is idling the pump delivers a regulated flow to the center channel. The regulated flow is set by the combination of metering orifice and actual stand-by pressure from the pump.

The maximum system pressure preferably is set in the pump but as an extra safety the inlet is equipped with a pilot operated primary relief valve. As the regulated flow is set by the combination of metering orifice and the stand by pressure, it is important to match the metering orifice to the actual pump.

Use PF302 if the stand-by pressure is 203 psi, PF303 if it is 290 psi and PF304 if it is 350 psi. Generally the stand-by pressure is significantly higher than the pressure drop over the metering orifice in an open center system and this means that the metering orifice in a system with variable pump has to be smaller.




| | | |
|---|---|---|
| 1 | Inlet | I01U |
| 2 | Primary relief valve | FK310 |
| 3 | Pilot relief valve | TB12 |
| 4 | Metering orifice for center channel flow | PF302 |
| 4 | Metering orifice for center channel flow | PF303 |
| 4 | Metering orifice for center channel flow | PF304 |
| 5 | Shut off unit | FU302 |
| 6 | Solenoid operated valve | EU926 |
| 7 | LS port | |

An integral spool which is isolated from the relief valve, together with a solenoid operated valve, shuts off the oil supply to the valve sections. Together with a load holding valve this achieves emergency shut off of the oil supply.

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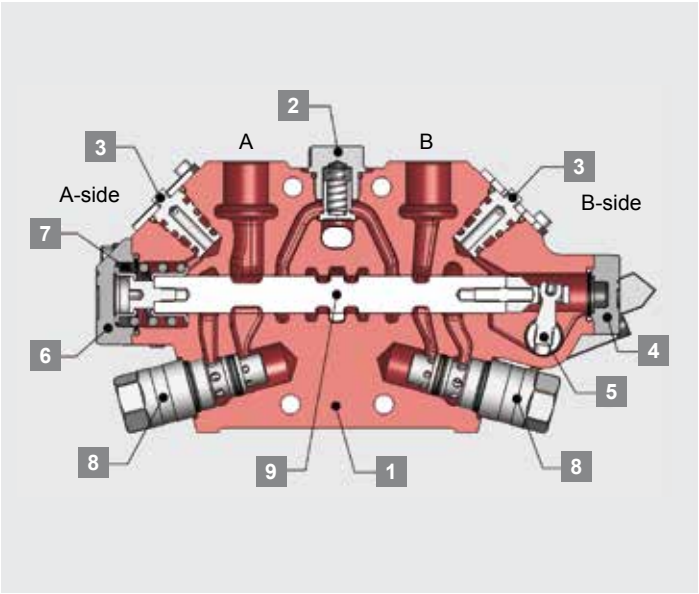
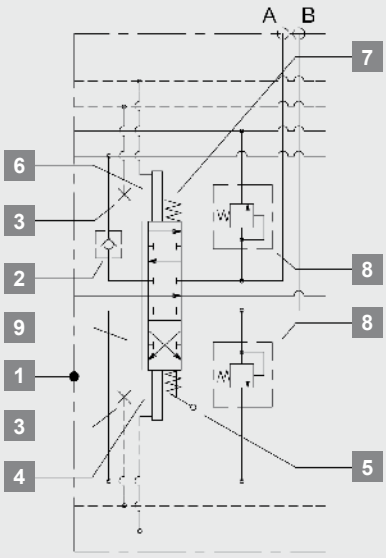
## Working section – manually operated

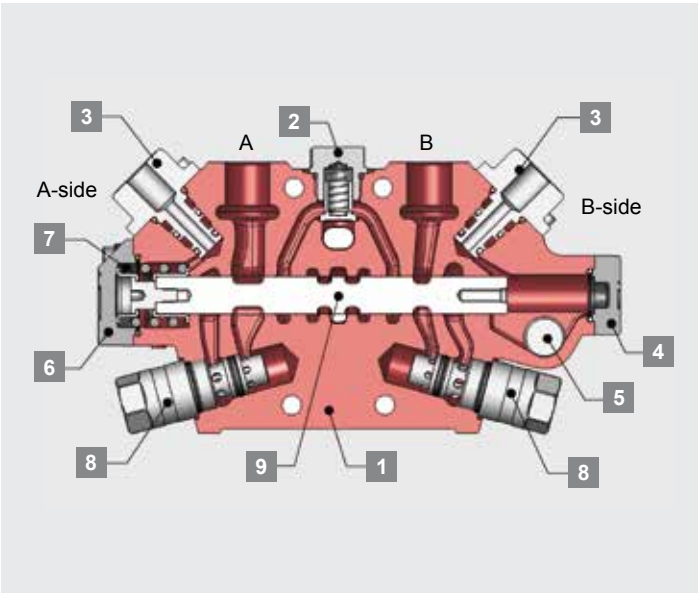



Section S01U equipped as manually operated. Existing cavities for solenoid valves are fitted with plugs (PE11) which connect (drain) the spool ends to the tank. That is necessary since no spool seals separate the return line galleries from the spool ends. This feature provides very good protection for spool ends (ideal for marine use) and minimizes external leakage risks.

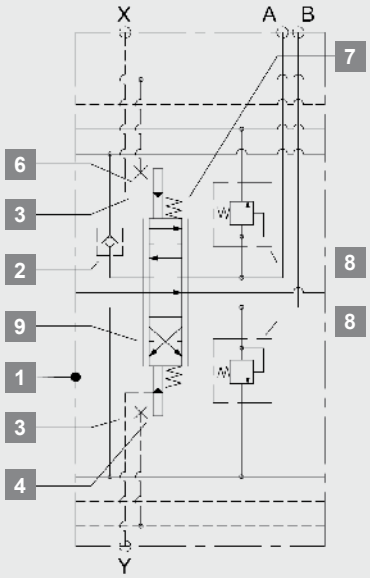



| | | |
|---|---|---|
| 1 | Section | S01U |
| 2 | Load check valve | MB22 |
| 3 | Plug | PE11 |
| 4 | Spool control, B-side | B01 |
| 5 | Lever mechanism | LMA |
| 6 | Spool control, A-side | 9 |
| 7 | Centering spring for manual control | MS |
| 8 | Service port valve | TBSD160 |
| 9 | Spool | |

## Working section – hydraulically operated

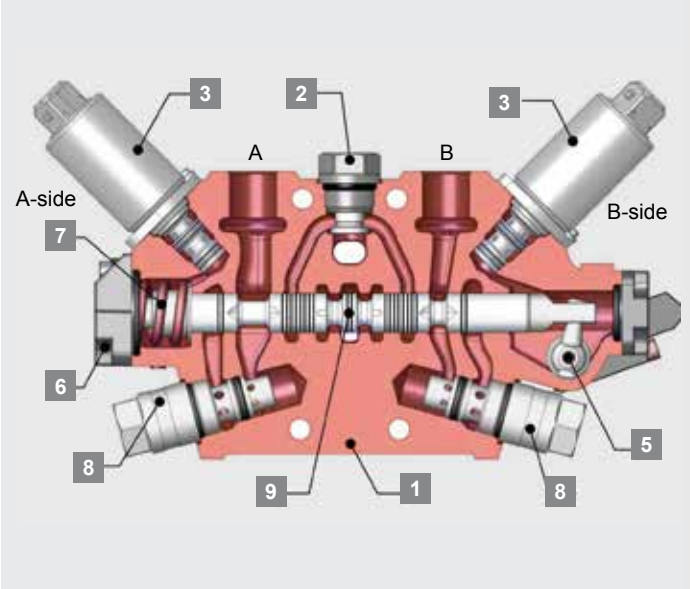


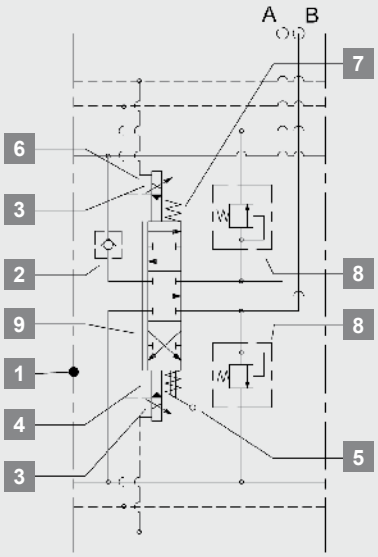

Section S01U equipped as hydraulically operated and without manual override. Adapters (HU10) are fitted into the solenoid valve cavities. They connect the pressure from a hydraulic control valve to the spool ends.




| | | |
|---|---|---|
| 1 | Section | S01U |
| 2 | Load check valve | MB22 |
| 3 | Adapter for hydraulic remote control | HU10 |
| 4 | Spool control, B-side | B01 |
| 5 | Plug, replacing lever mechanism | PM02 |
| 6 | Spool control, A-side | 9 |
| 7 | Centering spring for proportional control | PS |
| 8 | Service port valve | TBSD160 |
| 9 | Spool | |

## Working section – electro-hydraulically operated



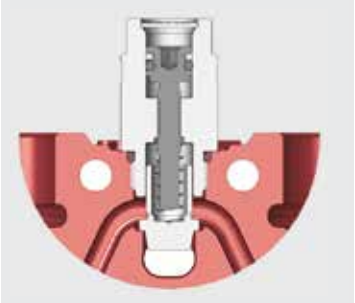

Section S01U equipped as electro-hydraulically operated and with manual override. The mechanism for the manual override is an option and can be replaced by a plug.

It is possible to mix valve sections that are configured for the different types of controls.

The centering springs are specified separately.

| | | |
|---|---|---|
| 1 | Section | S01U |
| 2 | Load check valve | MB22 |
| 3 | Solenoid operated valve for proportional control | ER54 |
| 4 | Spool control, B-side | B01 |
| 5 | Lever mechanism without lever | LMA |
| 6 | Spool control, A-side | 9 |
| 7 | Centering spring for proportional control | PS |
| 8 | Service port valve | TBSD160 |
| 9 | Spool | |

## Load check valve



Check valve MF22

The main function of the load check valve is to prevent the load from moving backwards if the load pressure is higher than pump pressure when operating.

**MB22**
Load check valve.

**MF22**
Load check valve with adjustable flow limitation. MF22 maximizes the flow out from a section. Typical application is a slewing function.

**MP22**
Plug without load check valve. This option is usable for example when the function is equipped with pilot operated load holding valves.

## Solenoid valve for EHP – ER52 / 54

**Note: If used as "on-off" it is recommended to limit the current by using for example a coupling resistance. Please contact HYDAC for detailed information.**

**Important**:
The capacity of the current source must be higher than the current demand of all parallel active solenoids in order to provide the PWM effect.

**ER62/64**

| | |
|---|---|
| Functional principle: | PWM (Pulse Width Modulation) |
| Duty factor: | 100 % |
| Connection: | Deutsch DT4 or AMP Junior-Power-Timer |
| Recommended PMW frequency: | 100 Hz |
| Protection class: | IP 65 |
| Ambient temperature: | -22°F up to 176°F (-30°C up to +80°C) |

**ER62**

| | |
|---|---|
| Rated voltage | 12 V DC |
| Starting current | 600 mA |
| Fully shifted | 1,500 mA |
| Coil resistance @ +20 °C | 4.72 Ohm |

**ER64**

| | |
|---|---|
| Rated voltage | 24 V DC |
| Starting current | 300 mA |
| Fully shifted | 750 mA |
| Coil resistance @ +20 °C | 20.8 Ohm |

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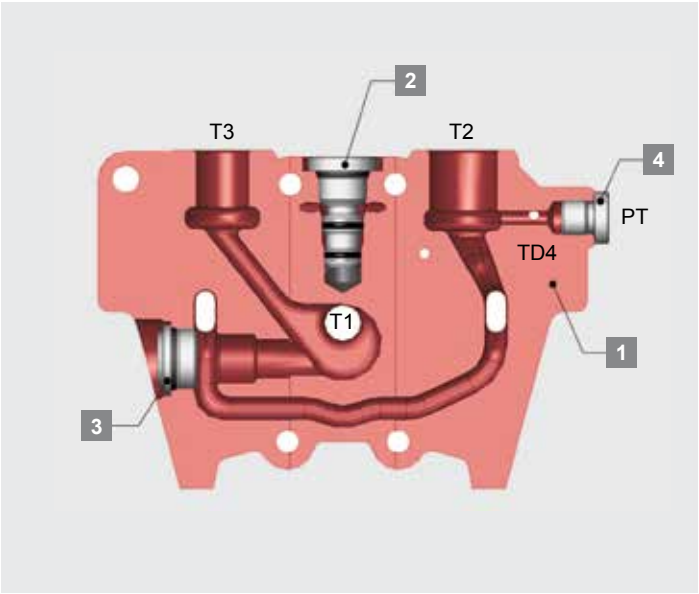
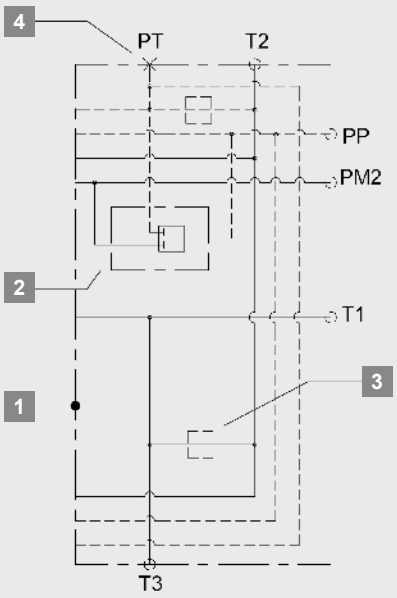
## Outlet section – without internal pilot oil supply function



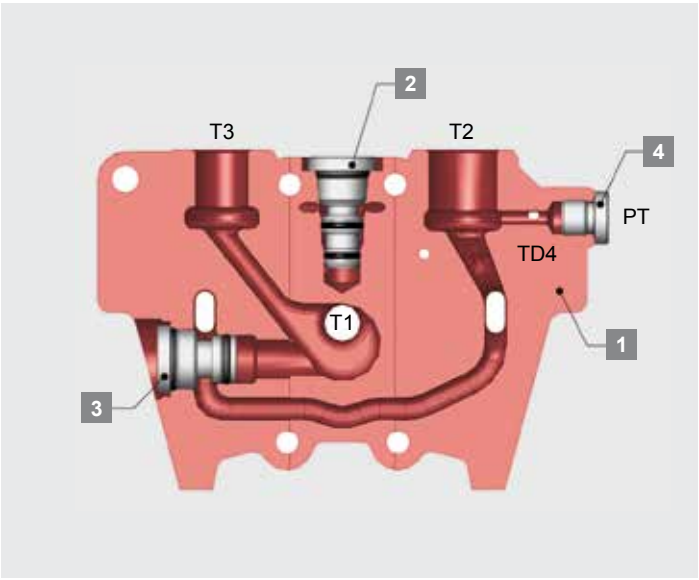

Outlet U01U equipped for hydraulically or manually operated sections.

The cavity for the pressure reducing valve is plugged, P63.



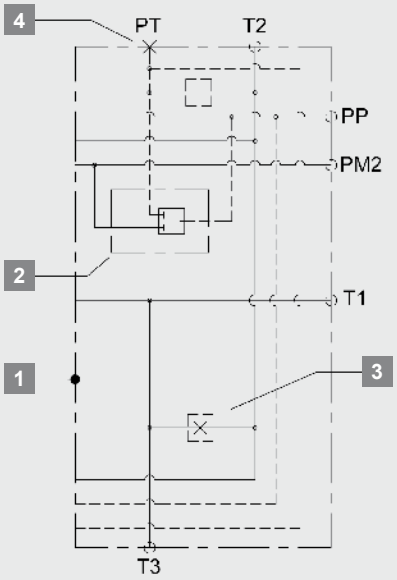

| | | |
|---|---|---|
| 1 | Outlet | U01U |
| 2 | Plug | P63 |
| 3 | Plug | PK400 |
| 4 | Plug | SAE06 |

## Outlet section – with high pressure carry-over function



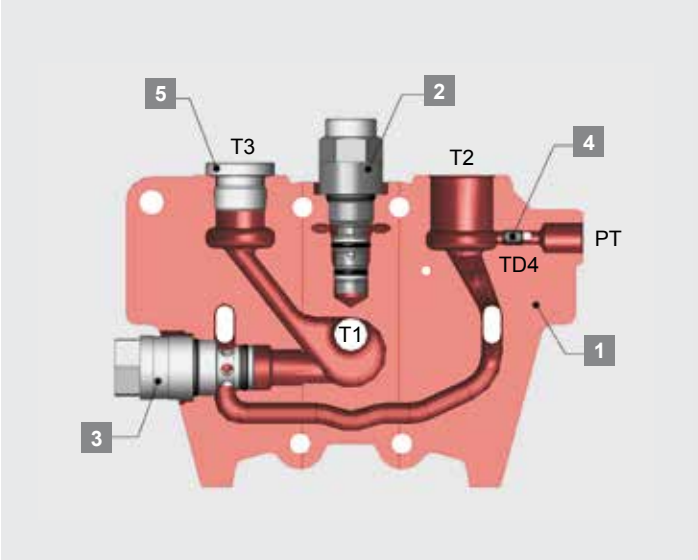

Outlet U01U equipped for hydraulically or manually operated sections and for high pressure carry-over function. Note that the carry-over flow is the flow that is regulated into the center channel i. e. the flow determined by the metering orifice of the inlet section. With PF305 - 6.5 gpm (25 Lpm). The plug P400 is fitted. High pressure carry-over ports can be either T1 or T3. The cavity for the pressure reducing valve is plugged with plug P63. Only T2 can be used as tank connection.

If in this case the plug P400 is replaced by the relief cartridge TBD160, it functions as relief valve for downstream services.




| | | |
|---|---|---|
| 1 | Outlet | U01U |
| 2 | Plug | P63 |
| 3 | Plug | P400 |
| 4 | Plug | SAE06 |

# Outlet section – with internal pilot oil supply function

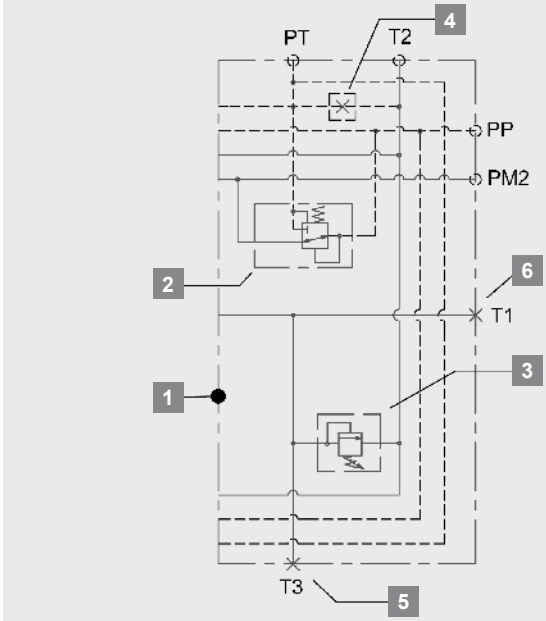



Outlet U01U equipped for use in an electro hydraulically operated valve. The outlet is configured for pilot supply to the valve sections.

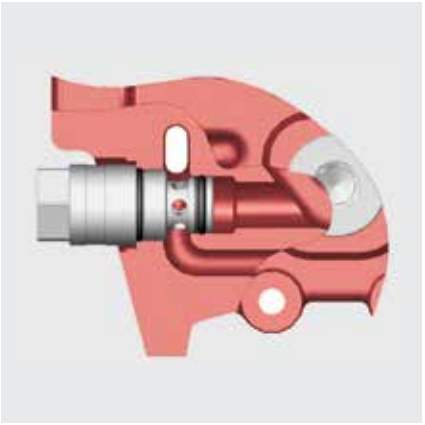
An initial pressure is built up by a pilot pressure valve in the center channel. Ports T1 and T3 have to be plugged.

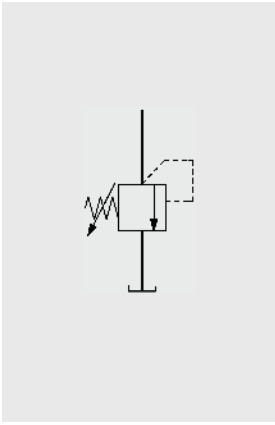
The pilot pressure is limited by a pressure reducing valve connected to the parallel channel. Due to the fact that the unloading unit in the inlet shuts off the flow supply to the parallel channel an emergency stop will also shut off the oil supply to the pilot circuit.

The return flow from the spool controls and the pressure reducing valve should be drained directly to tank in a separate piping. In order to achieve this it is recommended to use PT and plug the connection between pilot drain and ordinary tank line.




| | | |
|---|---|---|
| 1 | Outlet | U01U |
| 2 | Pilot pressure reducing valve | TRA63 |
| 3 | Pilot pressure valve | TMB210/2 |
| 4 | Plug for isolate pilot drain from ordinary tank line | PMS6 |
| 5 | Plug in T3 | SAE10 |
| 6 | Plug in T1 | SAE12 |

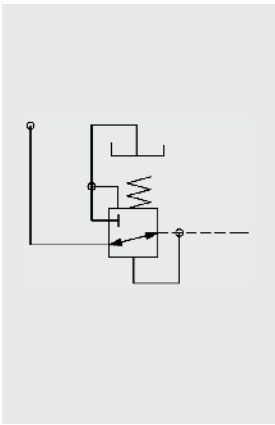




**Pilot pressure valve TMB210/2**

The cartridge type pilot pressure valve TMB210/2, normally set at minimum 200 psi, is used in outlet section to secure available pilot pressure build-up for remote control. Depending on system design this necessary starting pressure could also be achieved through downstream arrangements, for example a support leg valve.

TMB210/2 is adjustable and sealable.



**Pressure reducing valve TRA63**

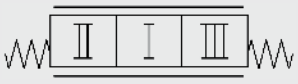
The cartridge type pressure reducing valve TRA63 is used in the outlet to provide pilot oil supply for remote control.

TRA63 is fixed set at 350 psi which consequently is the maximum available pressure level in the pilot system.

## Spool Controls – A-Side

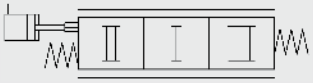
### Spool control 9

Spring centering



### Spool control LA

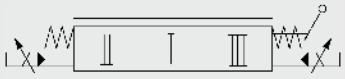
External hydraulic kick-out
from spool position III to I



### Spool control for remote control

**Electro hydraulic control is achived by using spool controls in combination with solenoid valves ER52/54 both on A-side and B-side.**

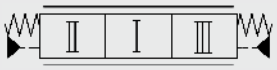
The control will be proportional
with the spring PS



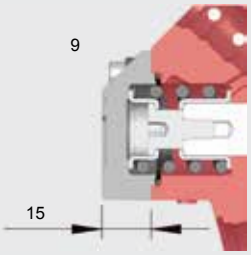
The control will be on-off
in combination with the spring MS

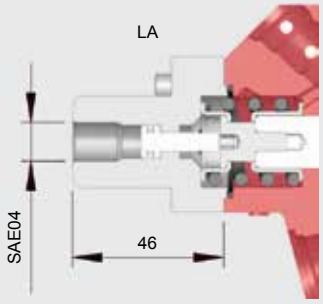
**Hydraulic control is achieved by using spool controls in combination with adapters HG10 both on A-side and B-side.**

The control will be proportional
in combination with the spring PS



The control will be on-off
in combination with the spring MS




### Spring - spool control

Type of centering spring has to be specified in the valve configuration

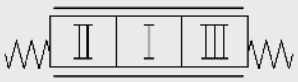
**MS** spring for manual operation, Forces 24.7-29.2 lbs (110-130 N)

**PS** spring for proportional remote control, Forces 27-71.9 lbs (120-320 N)

## Spool Controls – B-Side

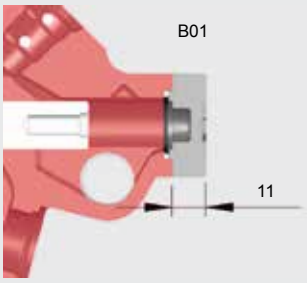
### Spool control B01

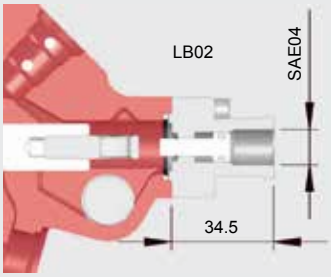
Cap.



### Spool control LB01

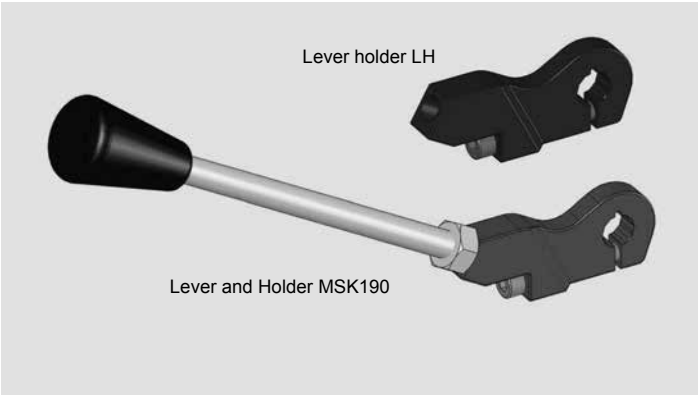
External hydraulic kick-out
from spool position II to I.
For sections with lever mechanism




**Note: Lever mechanism / cavity plugs as shown in pictures above are independent items to be separately configurated.**

## Lever mechanism on B-side




**LM2**
Lever mechanism without lever holder, lock nut and handle (9 mm HEX).

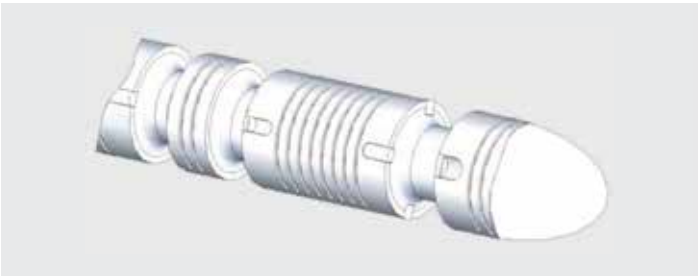
**PM02**
Plug replacing lever mechanism.

**Lever and Holder MSK190**

The lever holder (LH) is for use together with spool actuator of type M1/EHM.

The lever holder is delivered in combination with a lever as MSK190.

## Spools - main design parameters



The RS 220 spools are available in a variety of flows and styles to accommodate most design requirements. The spool matrix configurator below will help and guide you to select the correct spool for your application. The development of new spools is a continuous process and all available spools are not described in this data sheet.

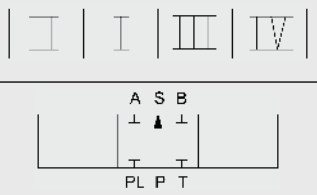
For further details on spools please contact HYDAC.

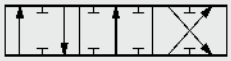
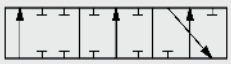
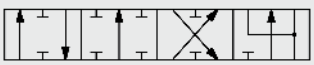
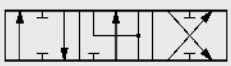
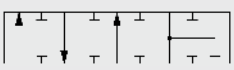
**Spool code**

| 6 | K | A | A |
|---|---|---|---|

**Type:** 1

**Symbol**




| | |
|---|---|
| Spool 1 |  |
| Spool 2 |  |
| Spool 3 |  |
| Spool 4 |  |
| Spool 8 |  |

**Type of application:**

| | |
|---|---|
| **A** | Spool general use |
| **K** | Crane optimized |
| **L** | Loader optimized |

**Pump flow, Q-inlet:**

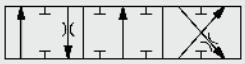
| | |
|---|---|
| **6** | 8-13 gpm (30-50 Lpm) |
| **8** | 13-20 gpm (50-75 Lpm) |

**Detailed demands:**

| | |
|---|---|
| **A** | Standard |
| | Example: |
| **–** | Restricted flow |
| **–** | Asymmetric |
| **–** | Spool end |

**Function:**

| | |
|---|---|
| **A** | Standard |



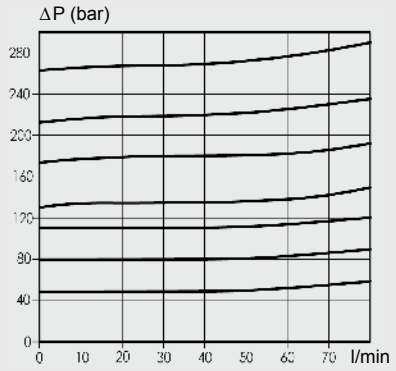

# Service port valves

**Port relief and anticavitation valve TBSD160**

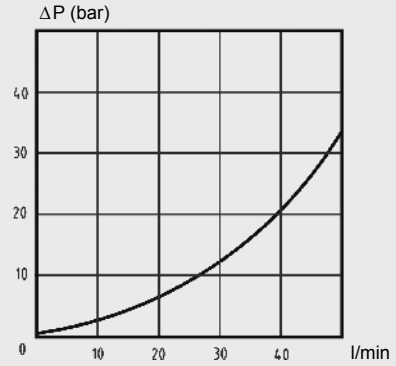
The TBD160 is a differential area, direct acting relief valve , for the secondary circuit.
It is adjustable and sealable.

Setting ranges for TBSD160:

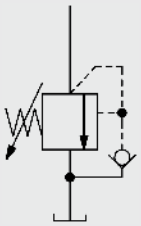
- 500-4550 psi (35-300 bar)
- Setting range step: 100 psi (7 bar)

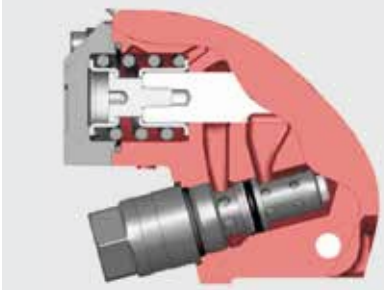



Relief characteristics TBD/TBSD160



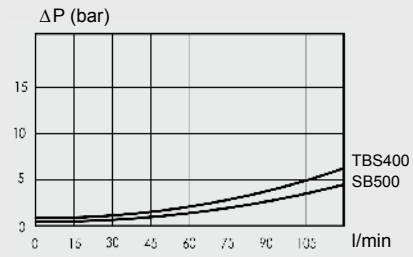

Anticavitation characteristics TBSD160



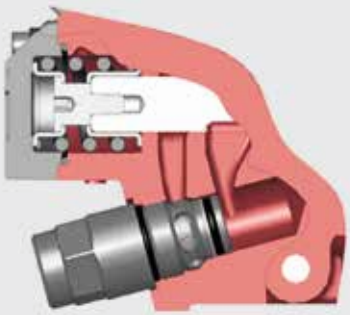


**Anticavitation valve SB500**

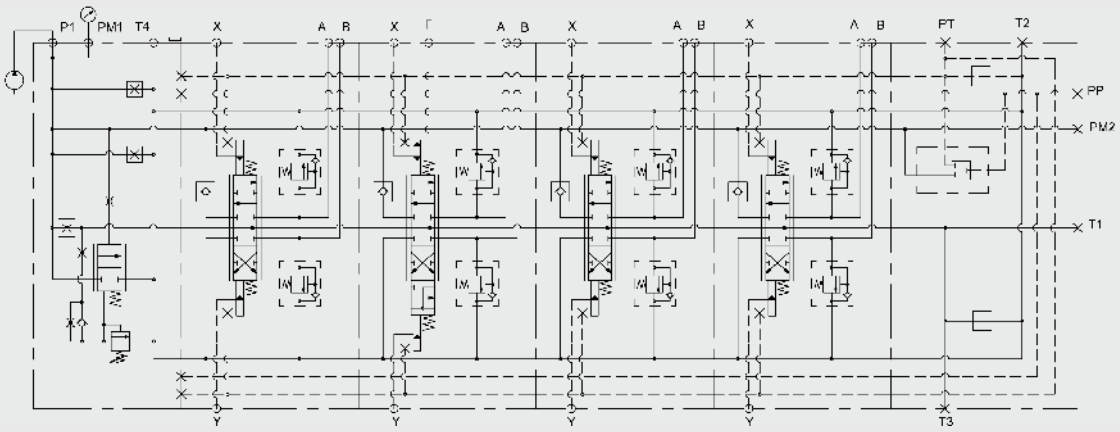
The anticavitation valve service to ensure that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.




Anticavitation characteristics
TBS400 and SB500

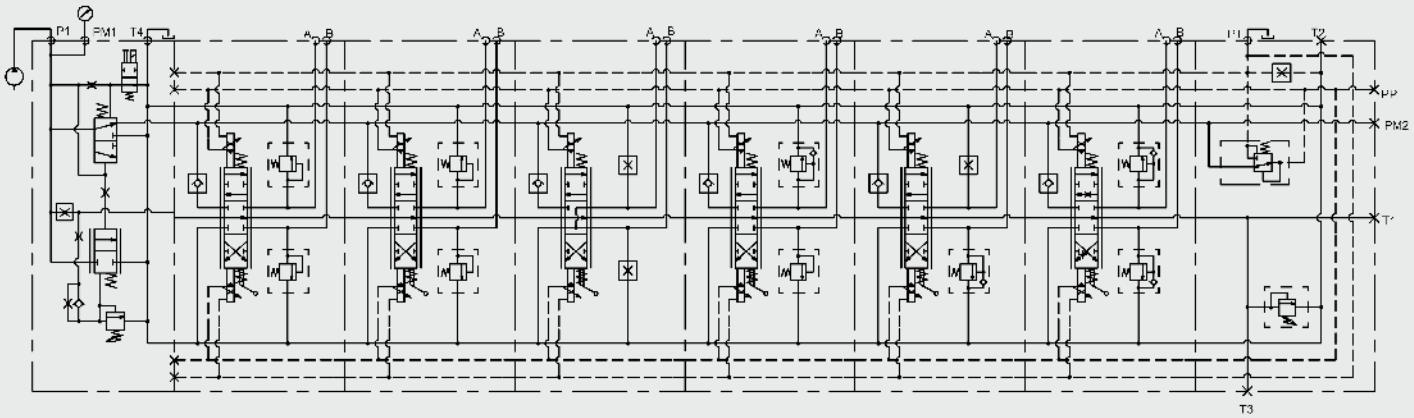


# Typical hydraulic circuit diagrams




Hydraulic remote controlled valve.
2nd section with 4-position spool.
Single circuit.

Inlet with flow control but without unloading.




Electro hydraulic remote controlled valve with internal pilot supply.
Single circuit. Inlet with flow control and unloading.

# Ordering Details RS220 Sectional Control Valve

RS220- [ ] - I01U [1] [ ] [ ] - S01U [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] / [ ]

Section

[1] [2] [3] [4] [5] [6] [7] [8] [9] [10]

No. of directional spools 1-10

R/V Setting (psi)

Unloading Valve Voltage/Connection

12/DIN 24/DIN

1] Inlet spools & metering orfices will be determined by HYDAC based upon pump type and pump flow.

Working Section (S01U)

Spool [2]

i.e. 9PS for EH operation — A-Side Operator (9 + MS or PS)

B-Side Operator

Handle Bracket Orientation [3]

i.e. TBSD205+3500 — A-Side Port Option CODE+setting psi

B-Side Port Option CODE+setting psi

i.e. MF22+10 or MB22 — Check Valve CODE+setting gpm

Actuator Cavity A/B side

Solenoid Voltage & Connector (DT6 or AMP)

2 Provide first two digits in code; balance must be reviewed with HYDAC technical representative

3] LM2 if no bracket; PM02 if no manual override

Repeat for Number of Sections

[ ] [ ] [ ] [ ]

Outlet (U13B, U13L)[2]

Pressure Reducing Valve

Carry Over Port

(**I**)nternal or (**E**)xternal Pilot Drain

2] Leave blank if US24L is used as last section body

**Application Information**

OEM: _____

Machine Type: _____

Pump Type: _____

Pump Flow: _____

System Pressure: _____

EAU: _____

Other Information: _____

## Notes

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**Process Filter Division**

**HYDAC CORPORATION**
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**Cooling System Division**

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## Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.



**PN#02099490** / 09.13 / MHD1309-1570

HYDAC INTERNATIONAL

MOBILE DIRECTIONAL CONTROL VALVES

# RSQ 240 Series

## Directional Control Valve

## Summary of North American Offering

INLETS *(Schematics per data sheets except SAE ports)*

Type I11D in SAE . . . . . P1, T1 (SAE-12), PPM (SAE-4)
Type I21A in SAE . . . . . T1 (SAE-16), P1 (SAE-12), P2 (SAE-10)
Type I21B in SAE . . . . . T1 (SAE-16), P1 (SAE-12), P2 (SAE-10)

WORKING SECTIONS *(Schematic per data sheets except SAE ports)*

Type S11B, S11C in SAE . . . . . .A, B (SAE-10)

OUTLETS (Schematic per data sheets except SAE ports)

Type U21A in SAE. . . . . .T2 (SAE-16), T4 (SAE-10)
Type U21B in SAE. . .T2 (SAE-16), T3, PPM (SAE-8), T4 (SAE-10)

INTERMEDIATE OUTLET *(Schematic per data sheets except SAE ports)*

Type U21C in SAE. . . . . T2 (SAE-16), PPM (SAE-8), T4 (SAE-10)

Spools Most Available

Type 112,114,116,119, 219, 412, 414, 416, 419, 314

Spool Controls Most Available

Hydraulic pilot, manual lever, electro-hydraulic (EHP), electrical on/off

Other options available *(check with factory for leadtimes)*

1.877.GO.HYDAC | www.HYDACusa.com

1.888.99.HYDAC | www.HYDAC.ca

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## Make use of the Nordhydraulic expertise

Our skilled and experienced design and application engineers are at your disposal, helping you to specify the valve configuration that meets your application requirements.

With the RSQ 240 Nordhydraulic is pioneering the development of open centre valve designs with a unique, patented, product.

## Key valve features

RSQ 240 is a sectional, parallel circuit valve, designed for system pressures up to 350 bar and pump flows up to 140 l/min.

It is available with 1 to 10 working sections per valve assembly.

RSQ 240 is designed with an open centre for fixed and variable displacement pumps.

RSQ 240 is characterised by the unique dual flow range possibility and its ability to facilitate simultaneous operation of several functions.

It is available with electro-hydraulic or hydraulic proportional remote control, but the valve can also be manually operated.

The electro-hydraulic proportional version in particular offers compact design with internal pilot oil supply, solenoids integrated in the valve body and integral hand levers for manual override/manual operation.

The valve offers excellent operating characteristics because of the specially designed spools for different applications.

Low and uniform spool forces are the result of careful balancing of the flow forces.

## Q-function

The flow control (Q-function) of the inlet section bypasses the major part of the pump flow to tank when the system is idling, thereby greatly reducing heat generation. But it also gives access to the full pump flow when the services are operated and provide improved operating characteristics.

Q-function, in combination with the dual parallel gallery functional principle unique for RSQ 240, and separate flow regulation in each working section, gives this valve a very high performance level.

## Applications

The RSQ is ideal for applications such as truck cranes, backhoe-loaders, excavators, drilling rigs, telescopic load handlers, sky-lifts, refuse vehicles and fork lift trucks.

## Remote control

The RSQ 240 is designed with an integrated pilot supply system in order to achieve an easy installation and a reliable remote control function. It is also possible (and in some cases to prefer) to supply the pilot system externally.

## Further RSQ 240 properties and possibilities

• Complete flow regulation control. At reduced flow the entire spool (lever) resolution is maintained.

• Raised working pressure level in low flow mode allowing increased pay-loads, for example in cranes.

• Separate adjustable flow limitation in each section, independent of pump flow.

• A wide choice of spools and spool controls for different flow combinations and for several applications and systems.

• A full range of service port valves.

• Load check valves in each working section.

• Spool actuators for external kick-out and spool position sensing.

• L. h. and r. h. inlet configurations are available.

• Intermediate outlet section for dual circuit systems.

• Easily convertible for systems with variable pump.

• Manual versions easily convertible to remote control.

• Pressure relief valve for downstream services.

• Electrical unloading.

• Regenerative function.

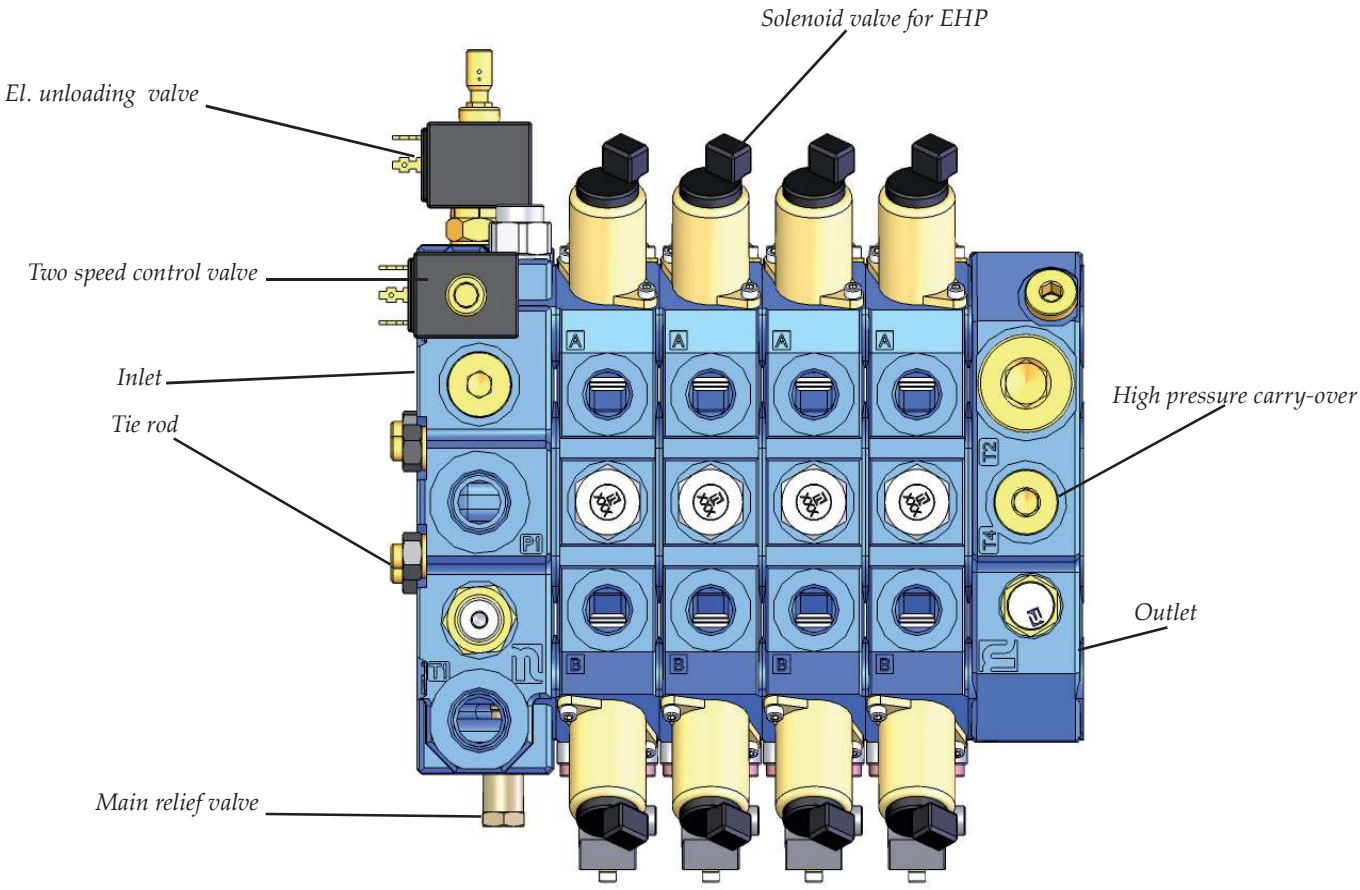
• Possibility of high pressure carry-over.

## Data sheet

This data sheet presents a selection of standard components and how to specify these in a valve assembly according to your application requirements. For further information on RSQ 240 and available components, please contact Nordhydraulic.

## Table of contents





# Technical data - weight - dimensions

## Pressures / flow

Max. system pressure* ..... 350 bar (35,0 MPa)
Max. continuous return line pressure..... 20 bar (2,0 MPa)
Max return line pressure, pilot oil circuit .....5 bar (0,5 MPa)
Rated pump flow** ..... 120 l/min
Max. recommended flow per section ..... 100 l/min

* Depending on application
** Pump flows above 100 l/min may require metering check valve MF24 in working sections

## Further data

Spring force for spool control 901 in neutral position: 110 N (11,0 kp).

Spring force for spool control 901 with fully selected spool: 130 N (13,0 kp).

Recommended contamination level at normal duty: equal to or better than 18/14 as per ISO 4406.

At high system pressure and/or for remote control: equal to or better than 17/13 as per ISO 4406.

Hydraulic fluid viscosity range: 10-400 $mm^2/s$ (cSt). Higher viscosity allowed at start up.

Mineral oil and synthetic oil based on mineral oil are recommended.

Max hydraulic fluid temperature range for continuous operation: -15°C - +80°C.

Spool leakage at 100 bar, 32 cSt and 40°C: < 13 $cm^3$/min.

*Attention:*
*To ensure proper function of remote control systems it is very important that the acceptable level of contamination is not exceeded.*

## Weight

| Inlet section | Weight kg |
|---|---|
| I11D | 8,2 |
| I21A | 6,2 |
| I21B | 6,1 |

| Outlet section | Weight kg |
|---|---|
| U21A | 6,0 |
| U21B | 5,9 |
| U21C | 5,8 |

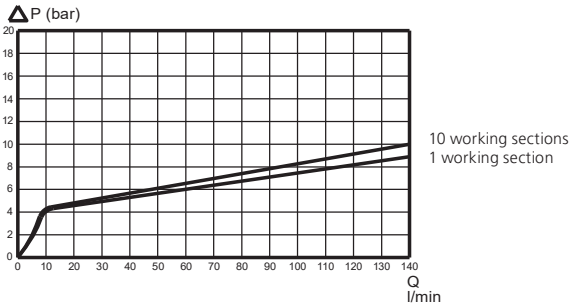
| Working section | Weight kg |
|---|---|
| S11B | 5,6 |
| S11C | 5,5 |

## Dimensions, spool controls

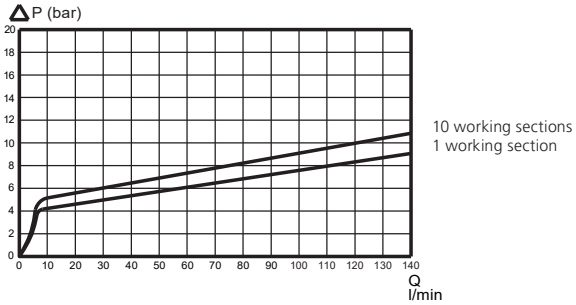
| Type | LA mm | LB mm |
|---|---|---|
| 901 | 27 | |
| 1001 | 64 | |
| 1101 | 64 | |
| HP04 | 32 | |
| HP02 | 70 | |
| L61 | 87 | |
| L64 | 91 | |
| HL61 | 87 | |
| HL64 | 96 | |
| LE11 | 85 | |
| M01 | | 38 |
| MP03 | | 70 |
| MH02 | | 57 |
| MH03 | | 57 |

# Technical data

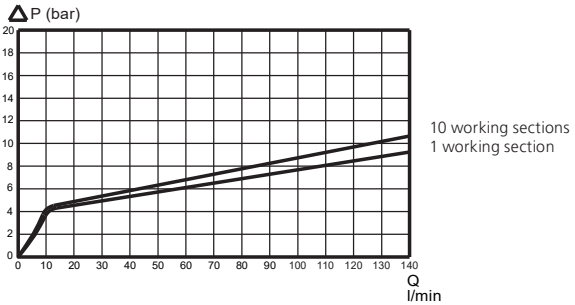
Oil temperature/viscosity for all graphs: + 50°C / 32 cSt



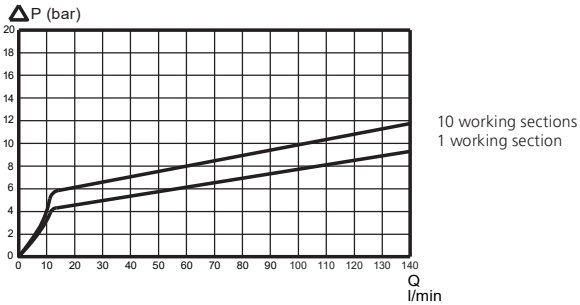

*Pressure drop el. unloaded, with PF505, FK501*



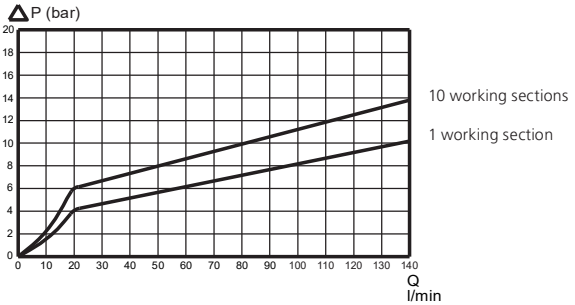

*Pressure drop P - T (idling), with PF505, FK501*



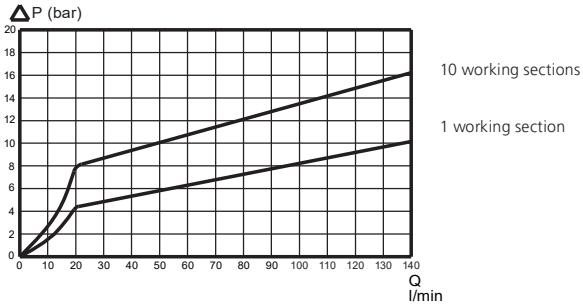

*Pressure drop el. unloaded, with PF507, FK502*



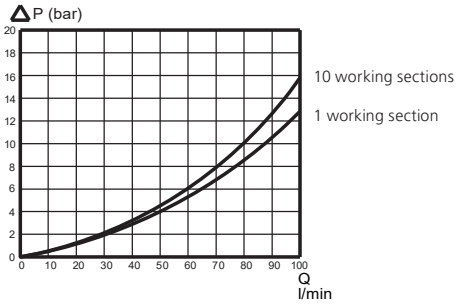

*Pressure drop P - T (idling), with PF507, FK502*



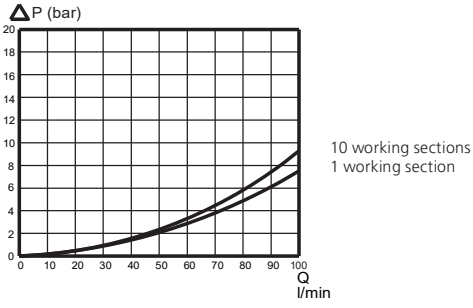

*Pressure drop El. unloaded, with PF511, FK505*




*Pressure drop P - T (idling), with PF511, FK505*



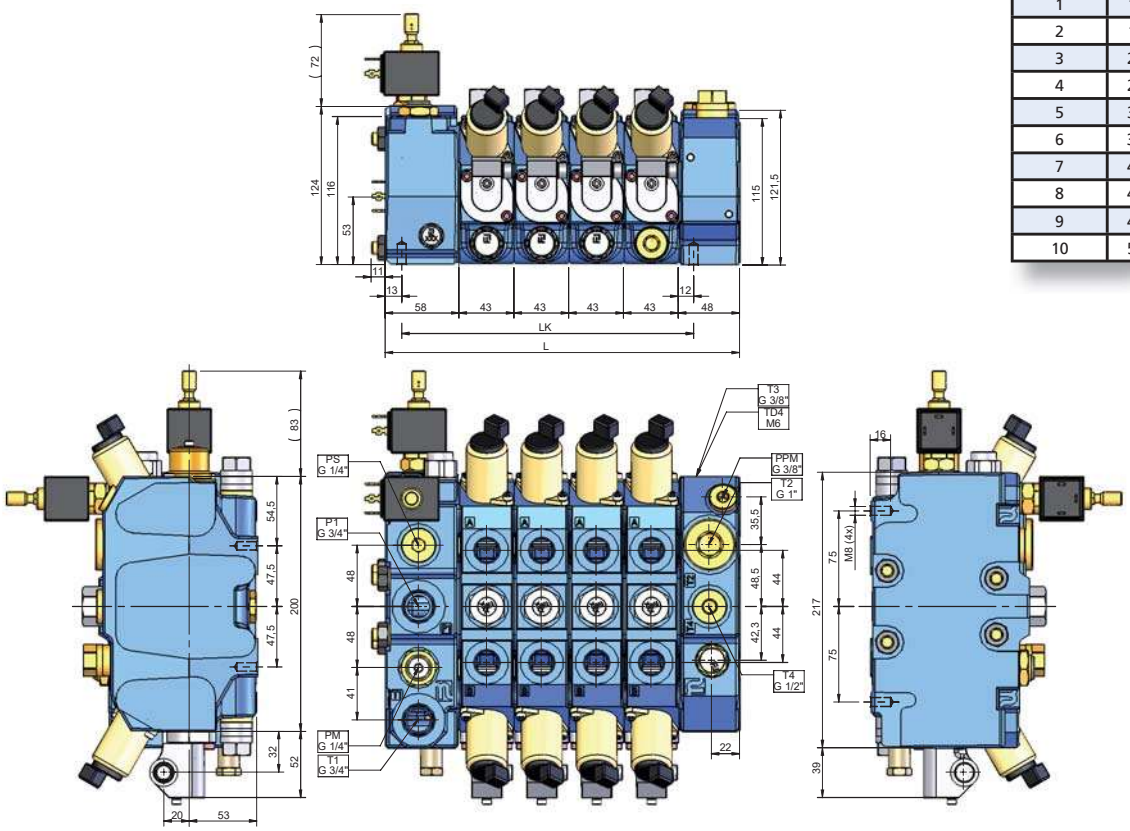

*Pressure drop P-A/B*




*Pressure drop A/B - T*

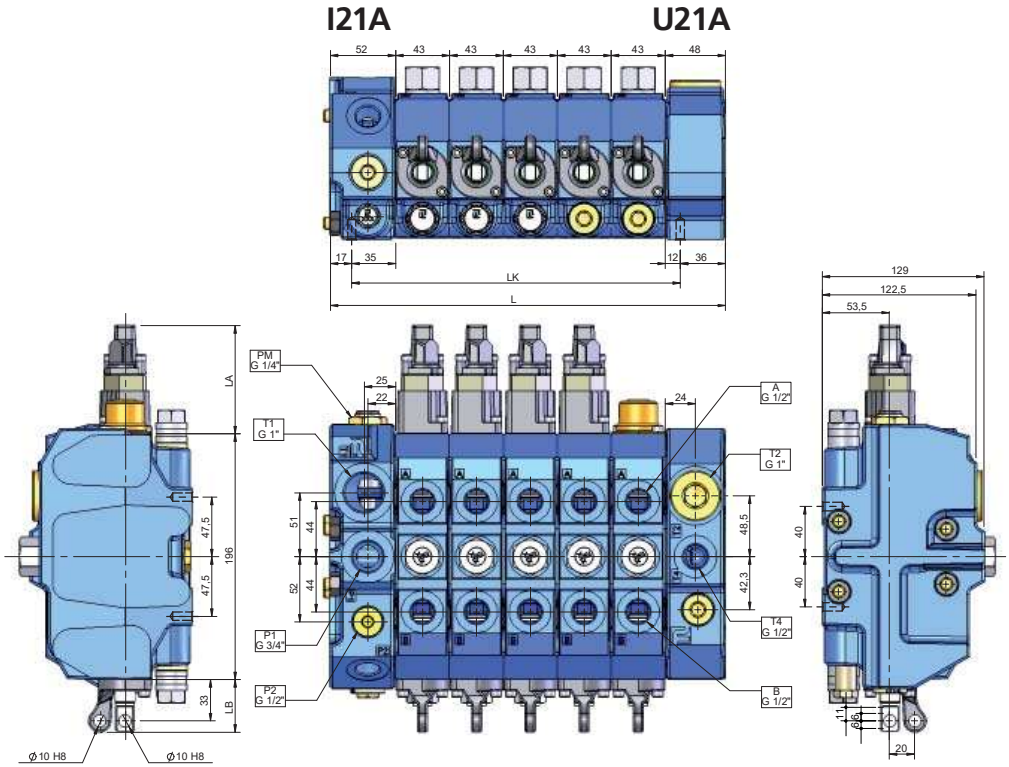
# Dimensions

## I11D U21B




| No. of sections | L mm | LK mm |
|---|---|---|
| 1 | 149 | 100 |
| 2 | 192 | 143 |
| 3 | 235 | 186 |
| 4 | 278 | 229 |
| 5 | 321 | 272 |
| 6 | 364 | 315 |
| 7 | 407 | 358 |
| 8 | 450 | 401 |
| 9 | 493 | 444 |
| 10 | 536 | 487 |

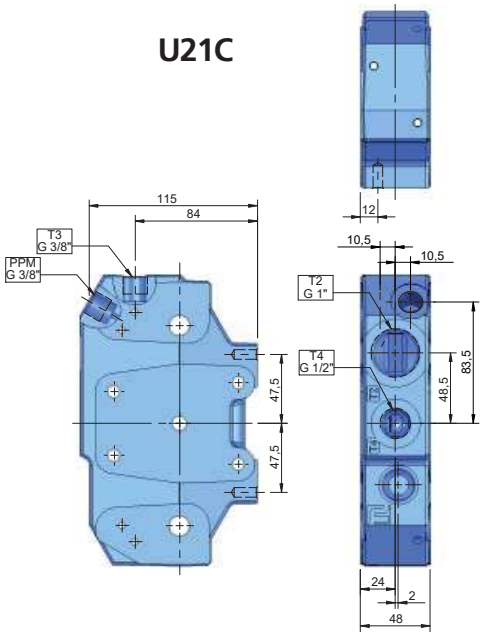
## I21A U21A




| No. of sections | L mm | LK mm |
|---|---|---|
| 1 | 143 | 90 |
| 2 | 186 | 133 |
| 3 | 229 | 176 |
| 4 | 272 | 219 |
| 5 | 315 | 262 |
| 6 | 358 | 305 |
| 7 | 401 | 348 |
| 8 | 444 | 391 |
| 9 | 487 | 434 |
| 10 | 530 | 477 |

# Dimensions

U21C




# Inlet section I11D - dual flow ranges

The unique RSQ 240 high – low flow property is achieved by the integral switching spool of I11D, which can be electrically operated by the use of an E926 valve.

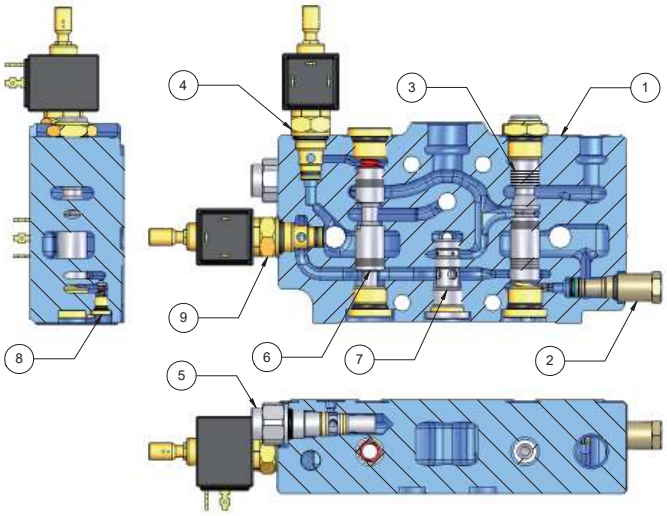
The I11D with its integral Q-function provides by-pass of pump flow to tank in idling condition thereby reducing pressure drop and heat generation, as well as accomplishing improved control characteristics.

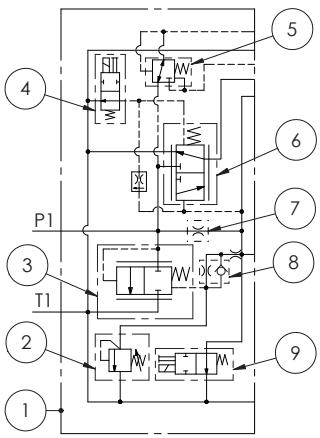
The by-pass flow control spool in combination with an el. unloading valve (E926) achieves emergency dump of all pump oil to tank.

I11D houses a small relief valve cartridge TB12 which together with the by-pass flow control spool provides the primary relief valve function of the RSQ 240. A choice of different metering orifice cartridges are available, determining low flow range, influencing pressure build-up to suit different applications and constituting flow from the high pressure carry-over for downstream services.

I11D when equipped with a pressure reducing cartridge TRA53, provides pilot oil supply for hydraulic and electro-hydraulic proportional remote controlled working sections.

I11D is equipped with a special check valve, FSB4, to cushion the opening of the by-pass control spool thereby eliminating unnecessary pressure peaks.




1. Inlet type D ..... I01D
2. Main relief valve ..... TB12
3. By-pass flow control spool unit ..... FK402
4. Solenoid valve for el. high-low flow control ..... E926
5. Pressure reducing valve ..... TRA53
6. High/low flow control spool unit ..... FV401
7. Metering orifice cartridge for low flow ..... PF505
8. Cushioning check valve ..... FSB4
9. Electrical unloading valve ..... E926

# Inlet section I21A - single flow range and manually operated

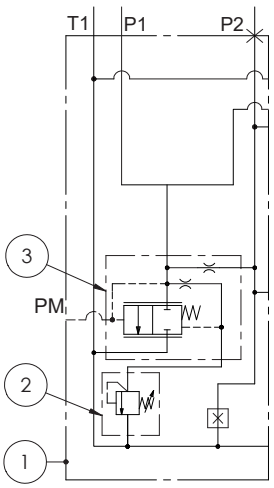
The I21A provides full RSQ 240 Q-function.

When equipped with an el. unloading valve (E926), emergency dump is achieved.

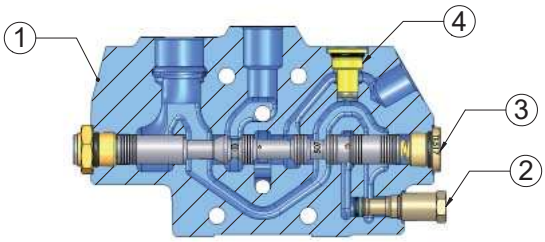
The integral TB12 in combination with flow control spool FK../TK.. form the primary relief valve function.

A number of by-pass flow control spools, with its integral metering orifice, are available to suit different system requirements in terms of pressure build-up, to achieve flow from the high pressure carry-over and to constitute max available service circuit flow by screwing home MF24 metering check valve.

I21A is equipped with a special check valve, FSB5, to cushion the opening of the by-pass control spool thereby eliminating unnecessary pressure peaks.

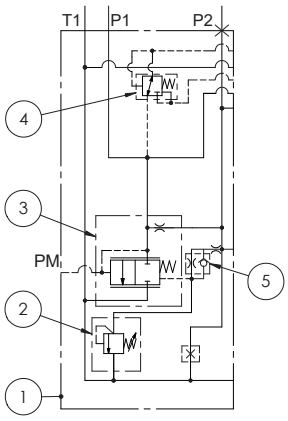



1. Inlet type A..... I21A
2. Main relief valve ..... TB12
3. By pass flow control spool unit ..... TK517
4. Plug.....PGT02

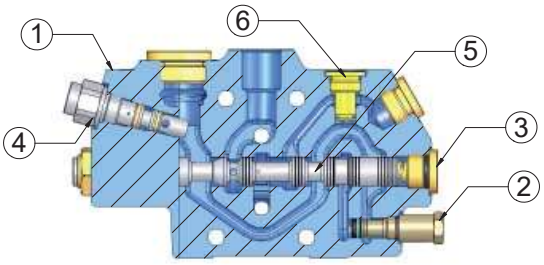



# Inlet section I21B - single flow range and remote controlled

The properties of the I21B are the same as for I21A, with the addition that it can be equipped with a pressure reducing cartridge (TRA53) providing pilot oil supply for remote control.



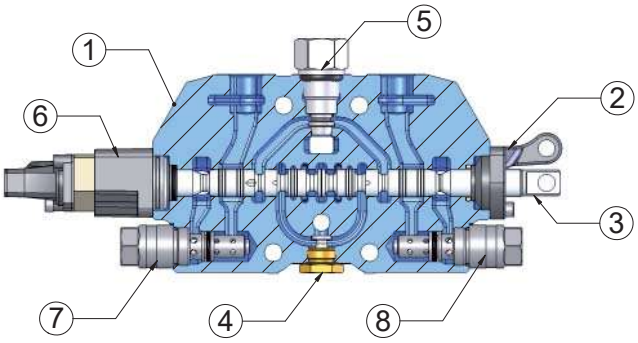

1. Inlet type B ..... I21B
2. Main relief valve ..... TB12
3. By-pass flow control spool unit.....FK512
4. Pressure recucing valve.....TRA53
5. Cushioning check valve.....FSB5
6. Plug.....PGT02

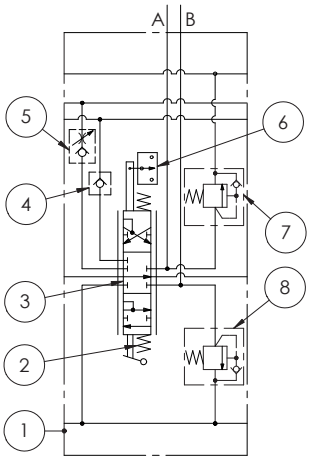


# Working section S11B manually operated

With cavities for service port valves.

1. Working section ..... S11B
2. Spool control bracket ..... M01
3. Spool
4. Low flow check valve ..... ML24
5. Full flow metering check valve ..... MF24
6. Spool control ..... LE11
7. Port relief/anticavitation valve ..... TBSD160
8. Port relief/anticavitation valve ..... TBSD160

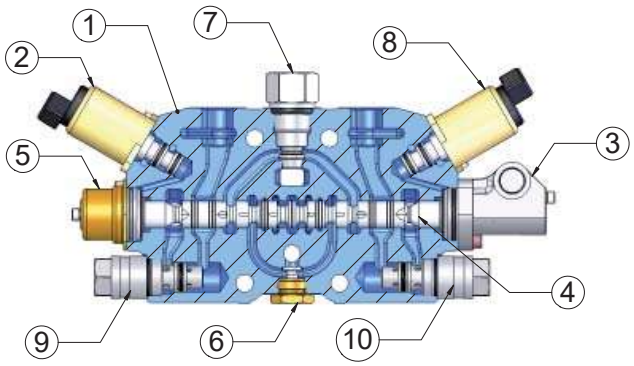


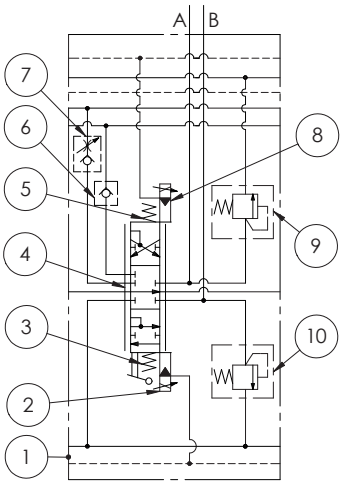




# Working section S11C remote controlled

With cavities for service port valves and for solenoid operated valves for EHP.

1. Working section ..... S11C
2. Solenoid valve EHP, 24 V ..... ER54
3. Spool control ..... MH02
4. Spool
5. Spool control ..... HP04
6. Low flow check valve ..... ML24
7. Full flow metering check valve ..... MF24
8. Solenoid valve EHP, 24 V ..... ER54
9. Port relief valve ..... TBD160
10. Port relief valve ..... TBD160



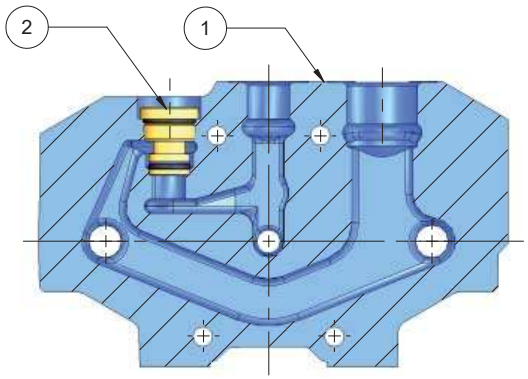



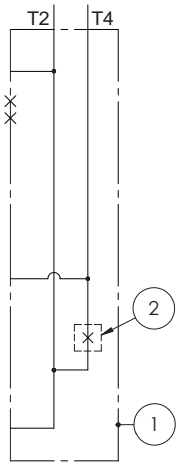
# Outlet section U21A manually operated

With cavity for high pressure carry-over plug.

Note that the carry-over flow is the flow that is regulated into the centre channel i. e. the flow determined by the metering orifice of the inlet section.

1. Outlet section type A.....U21A
2. Plug.....P400




# Outlet section U21B remote controlled

With cavity for high pressure carry-over plug.

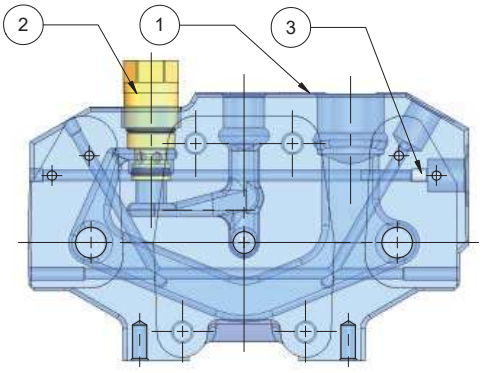
With port (PPM) for external pilot oil supply/pilot pressure gauge.

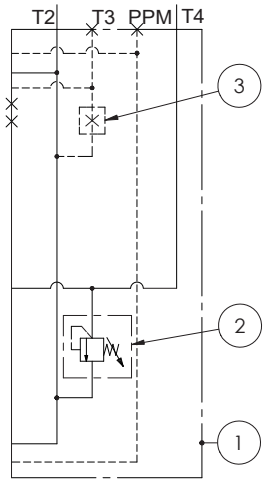
With port (T3) for external pilot oil drain (provided plug PMS6 fitted in TD4).

With cross drillings for pilot oil supply to B-side of S11C sections.

*For optimal function it is recommended that port T3 is directly connected to tank and plug PMS6 fitted in TD4.*

1. Outlet section type B..... U21B
2. Pilot pressure valve ..... TMB210
3. Plug.....PMS6



# Outlet section U21C - Intermediate outlet

Intermediate outlet allowing dual circuit system. Intended both for manually and remote controlled valves.

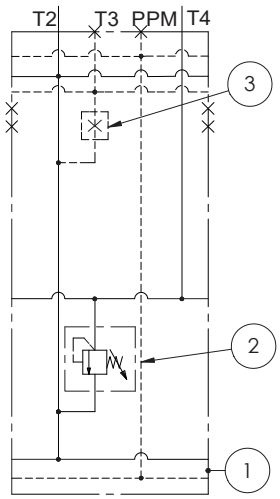
With cavity for high pressure carry-over plug.

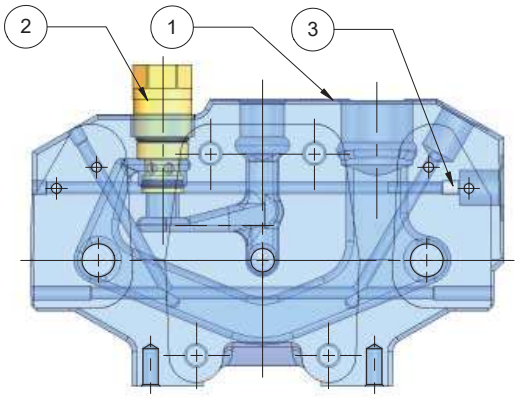
With port (PPM) for external pilot oil supply/pilot pressure gauge.

With port (T3) for external pilot oil drain (provided plug PMS6 fitted in TD4).

With cross drillings for pilot oil supply to B-side of S11C sections.

1. Outlet section type C.....U21C
2. Pilot pressure valve ..... TMB210
3. Plug ..... PMS6

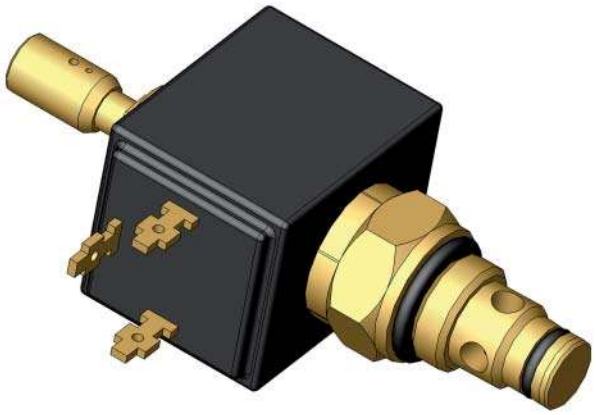


# Electrical unloading valve and two speed control

This electrical unloading valve is a 2-way, normally open, solenoid type cartridge valve. It is an option in all inlet sections.

It is intended for emergency stop and for pressure drop/ heat generation reduction.



## Data

Rated flow:.....40 l/min
Power consumption:.....17 W
Rated voltage: ..... 12 and 26 V
Max voltage variation: .....+/- 10%
Duty factor*: ..... 100%
Connection: ..... Hirschmann ISO 4400 DIN 43650
Protection class: ..... IP65
* Sufficient cooling must be secured

The unloading valve has manual override.

E912 and E926 has push and twist type pin operation. This pin is sealable.

PE20 is the plug for the cavity.

The HG10 plug is used when the valve is hydraulically remote controlled by a hydraulic servo valve.

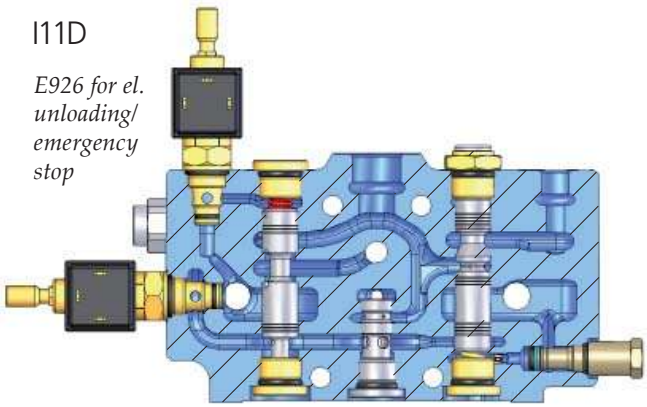
### Codes

E912.....push and twist type override 12 V
E926.....push and twist type override 26 V

*E926 for two speed function, high/low flow*

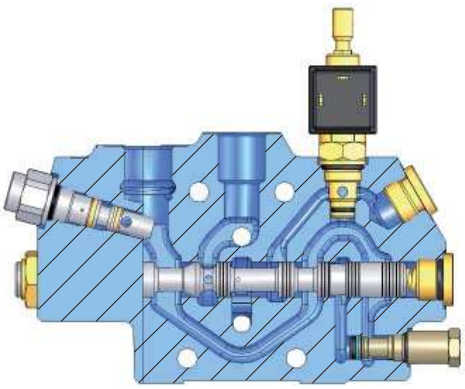
I11D

*E926 for el. unloading/ emergency stop*



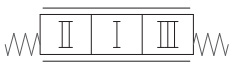
*E926 for el. unloading/emergency stop*

I21



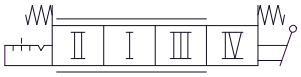
# Spool controls - A-side

### Spool control 901
Spring centered.

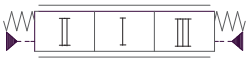


### Spool control 1001
Detents at positions 1, 2 and 3.

### Spool control 1101
Spring centering with detent at position 4.

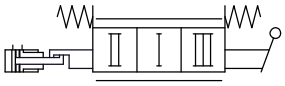


### Spool control HP
Hydr. proportional. For external pilot oil supply.Pilot pressure 6-16 bar Max pilot pressure 25 bar*.



### Spool control L61
External hydraulic kick-out from inserted spool*.

### Spool control L64
External hydraulic kick-out from inserted and extended spool, locking neutral position*.



### Spool control LE11
Spool position indicator. Operating range 10-30 V. Output voltage, spool centered : < 1V. External electronics are required.

* Connection 1/4" BSP

# Spool controls - B-side

### Bracket M01
Bracket.

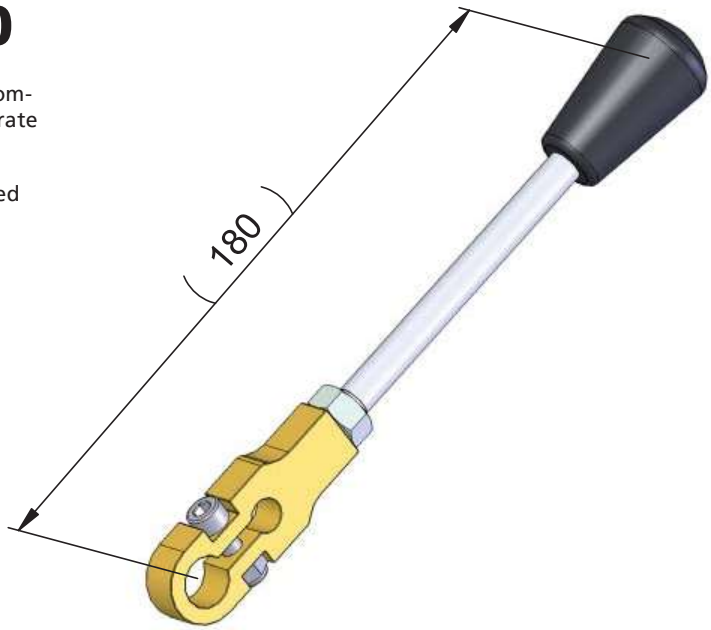
### Bracket MH02
Bracket for manual override.

For valves in standard configuration spool controls are mounted on the A-side of the valve and the lever brackets on the B-side.

# Hand lever ME180

The hand lever ME180 is designed to be used in combination with spool control MH02, but it is a separate item and must be ordered separately.

ME180 provides manual override for EHP controlled RSQ 240 valves.



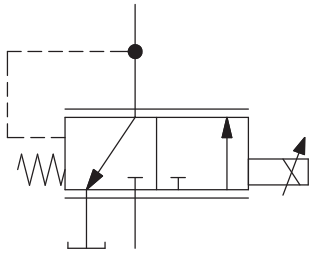
# Solenoid valve for EHP, ER52/54

## ER52/54

ER52/54 are 3/2-way electrically operated pressure reducing valves used to provide controlled pilot pressure to operate valve spools.

Functional principle .....PWM (Pulse Width Modulation)
Duty factor ..... 100%
Connection..... AMP Junior-Power-Timer
Recommended PMW frequency ..... 100 Hz
Protection class..... IP 65
Ambient temperature..... - 30°C-+ 80°C

***Note: If used as "on-off" it is recommended to limit the current as example by using a coupling resistance. Please contact Nordhydraulic for detailed information.***



## ER52

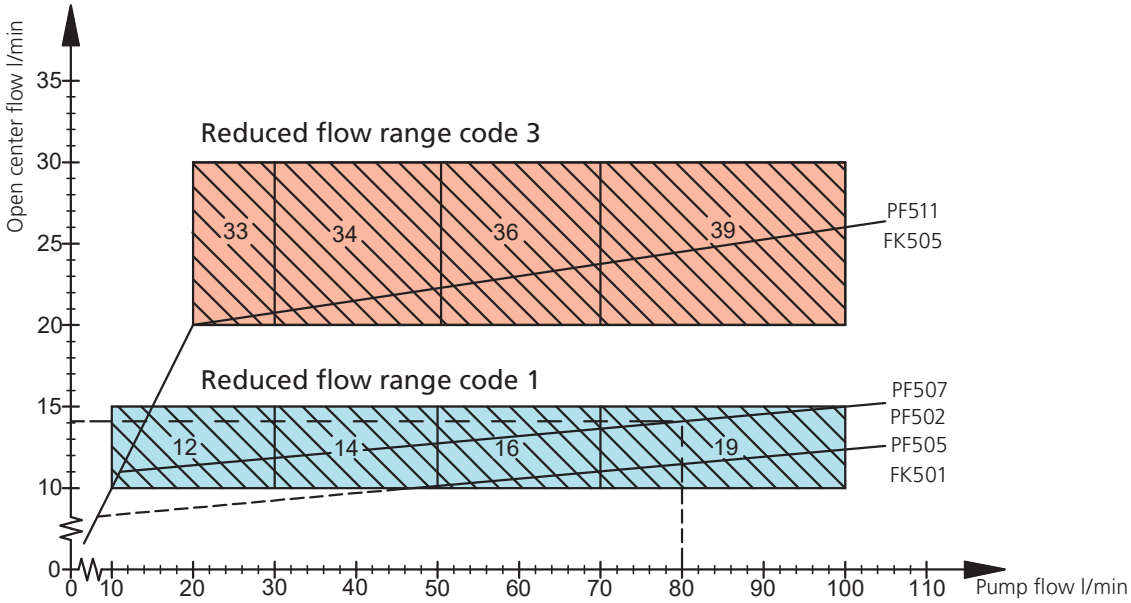
Rated voltage(+/- 2V) ..... 12 V DC
Starting current ..... 500 mA
Fully shifted .....1200 mA
Coil resistance + 20°..... 5,4 Ohm

## ER54

Rated voltage (+/- 4V) ..... 24 V DC
Starting current .....250 mA
Fully shifted ..... 600 mA
Coil resistance + 20°.....21,7 Ohm

# Spools

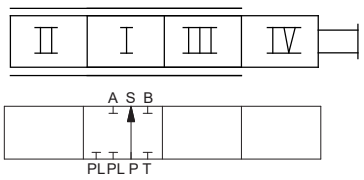
The RSQ 240 spools are available in variety of flows and styles to accomodate most design requrements. Since the development of spools is a continous process and all available spools are not described in this data sheet, contact Nordhydraulic for advice on choosing spools in order to optimize your valve configuration.

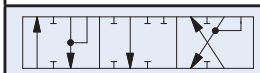
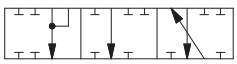
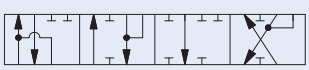
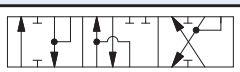



First digit in shaded squares represents reduced flow range code.
Second digit represents full flow range code.
PF5.. are metering orifices of I11D inlet.
FK5.. are flow control spool ( with integral metering orifice ) of I21.. inlets.)

How to choose metering orifice: If pump flow is 80 l/min, and wanted reduced speed flow is approx 15 l/min, then metering orifices PF507/FK502 will achieve an open centre flow of 14 l/min.

## Principle spool matrix




| | Flow range, l/min | | | |
|---|---|---|---|---|
| **Function/Type** | **10-30** | **30-50** | **50-70** | **70-100** |
|  Double acting spool / 1 | 112 | 114 | 116 | 119 |
|  Single acting spool/ 2 | 212 | 214 | 216 | 219 |
|  Motor spool / 4 | 412 | 414 | 416 | 419 |
|  Double acting spool with 4th pos. for float / 3 | 312 | 314 | 316 | 319 |

Spools in reduced flow code 3 (upper shaded area above) are also avalible. Spools specially developed for truck cranes (also for use in systems with load holding valves), as well as other application adapted spools are available. Contact Nordhydraulic! Recommended low flow range: 10- 30 l/min.

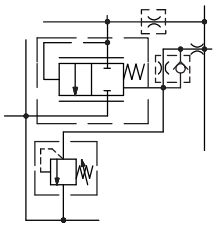
# Main relief valve

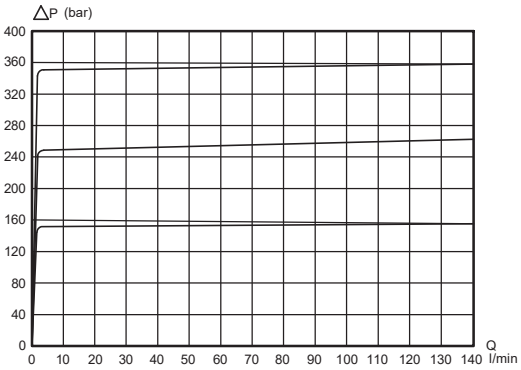
## Main relief valve TB12

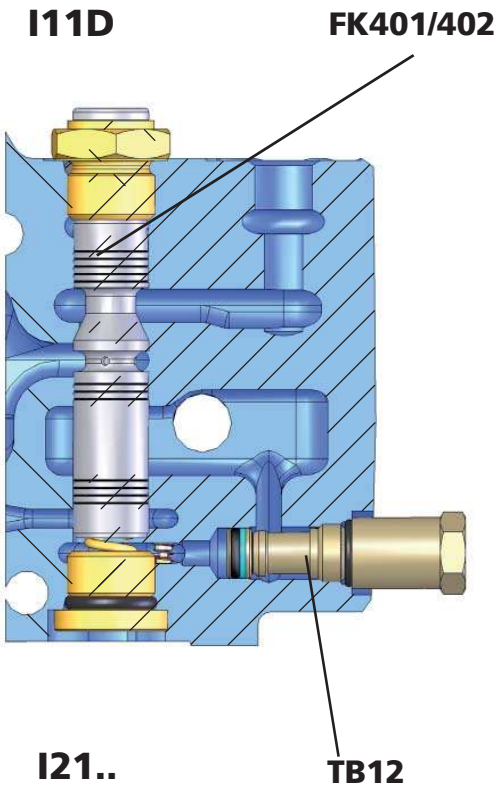
The bypass flow control valve FK.. in combination with the relief valve cartridge TB12 form the pilot operated relief valve function of the inlet sections for the primary circuit.

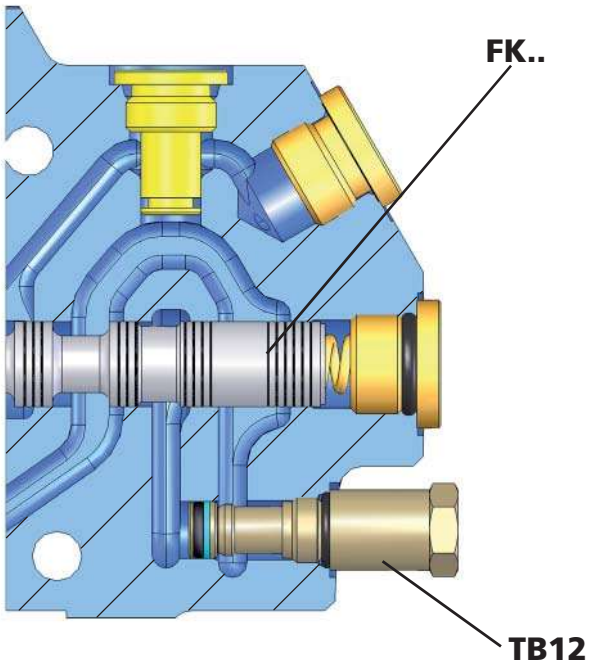
TB12 is adjustable and sealable.

Setting range: 35 - 350 bar (3,5 - 35 MPa).
Setting range step: 5 bar.





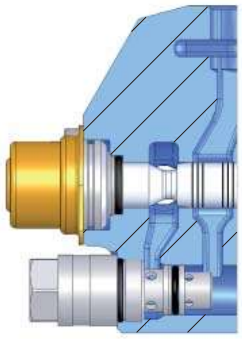
# Service port valves

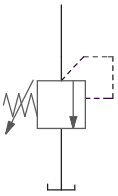
## Port relief valve TBD160

The TBD160 is a differential area, direct acting relief valve, for the secondary circuit.

TBD160 is adjustable and sealable.

Setting ranges for TBD and TBSD160:
Setting range: 35 - 350 bar (3,5 - 35,0 MPa).
Setting range step: 5 bar.

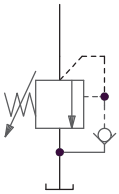


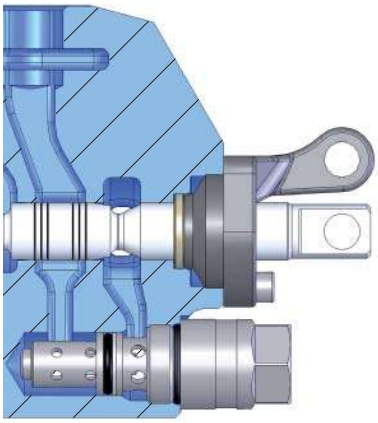


## Port relief and anticavitation valve TBSD160

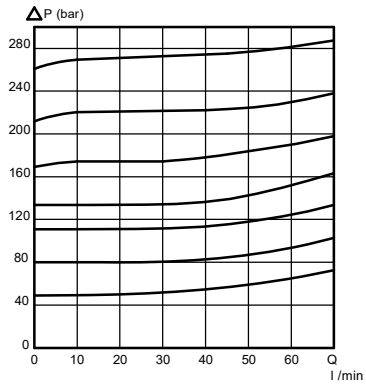
See TBD160 for functional principle.

TBSD160 is adjustable and sealable.

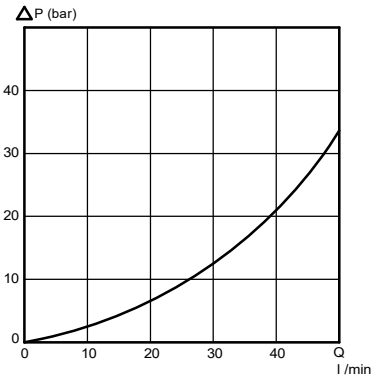




Relief characteristics TBD/TBSD160




Anticavitation characteristics TBSD160



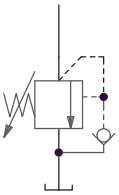
# Service port valves

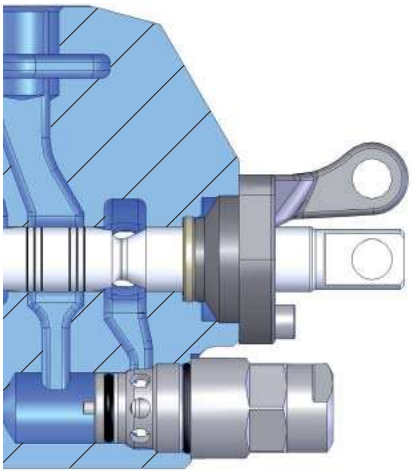
## Port relief and anticavitation valve TBS400

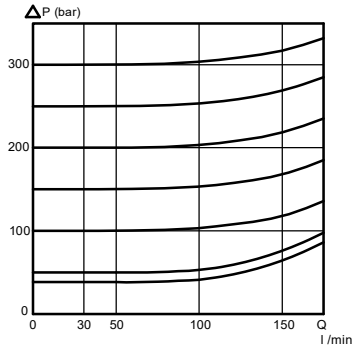
Combination of pilot operated relief and anticavitation valve.

TBS400 is adjustable and sealable.

Setting range: 35 - 350 bar (3,5 - 35,0 MPa).
Setting range step: 5 bar.

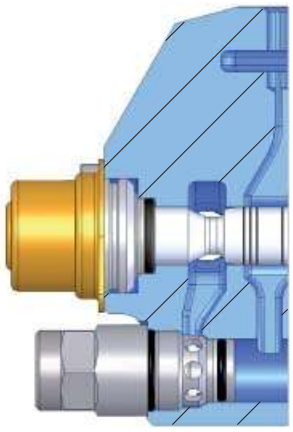


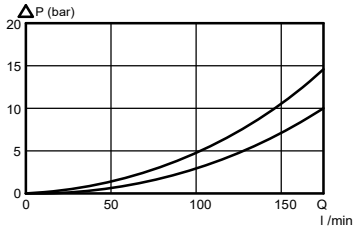





## Anticavitation valve SB500

The anticavitation valve service to ensure that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.



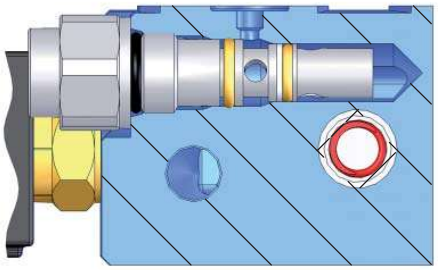


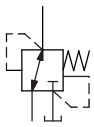
# Miscellaneous

## Pressure reducing valve TRA53

The cartridge type pressure reducing valve TRA53 is used in inlet section I11D and I21B to provide pilot oil supply for remote control.

TRA53 is fixed set at 24 bar which consequently is the maximum available pressure level in the pilot system.

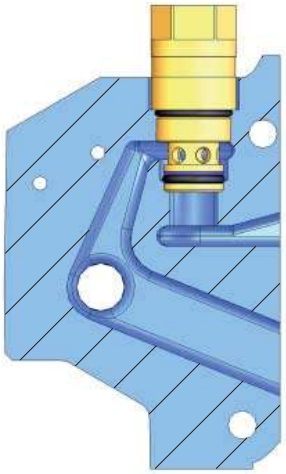


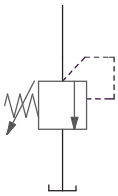


## Pilot pressure valve TMB210

The cartridge type pilot pressure relief valve TMB210, normally set at min 14 bar, is used in outlet section U21B and U21C to secure available pilot pressure build-up for remote control. Depending on system design this necessary starting pressure could also be achieved through downstream arrangements, for example a support leg valve.

TMB210 is adjustable and sealable.



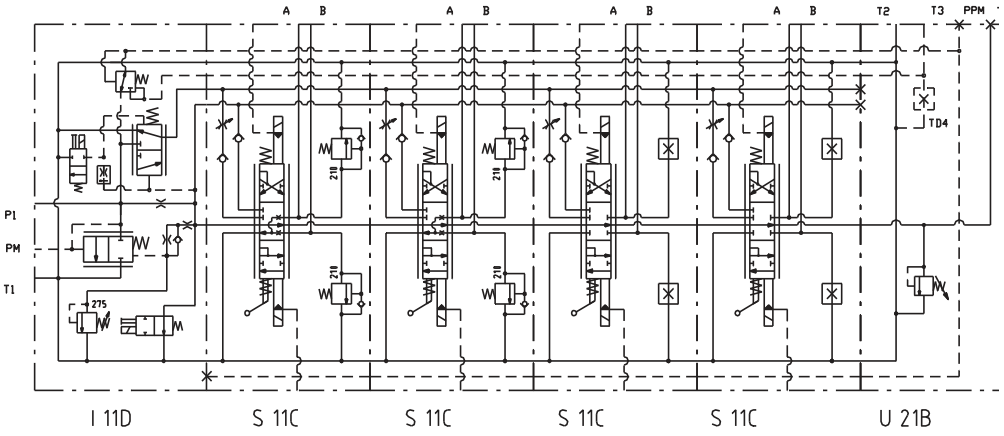


# Typical hydraulic circuit diagrams

For dual flow range

Single circuit

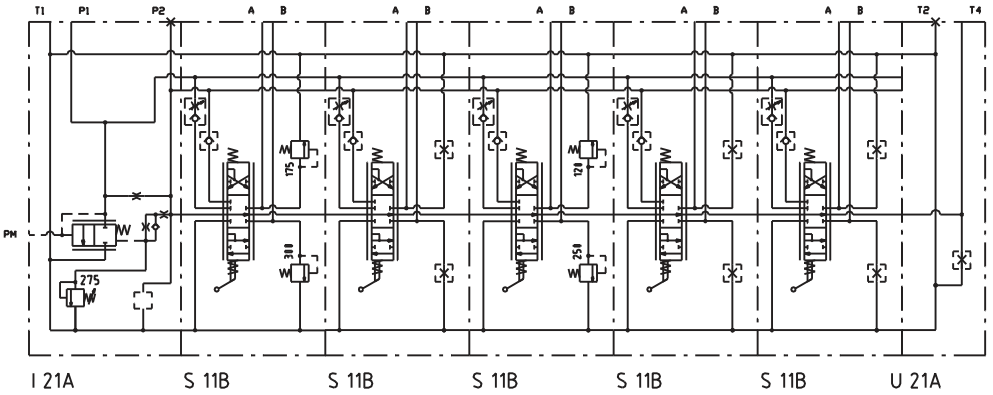
El. hydr. prop. remote control




For single flow range

Single circuit

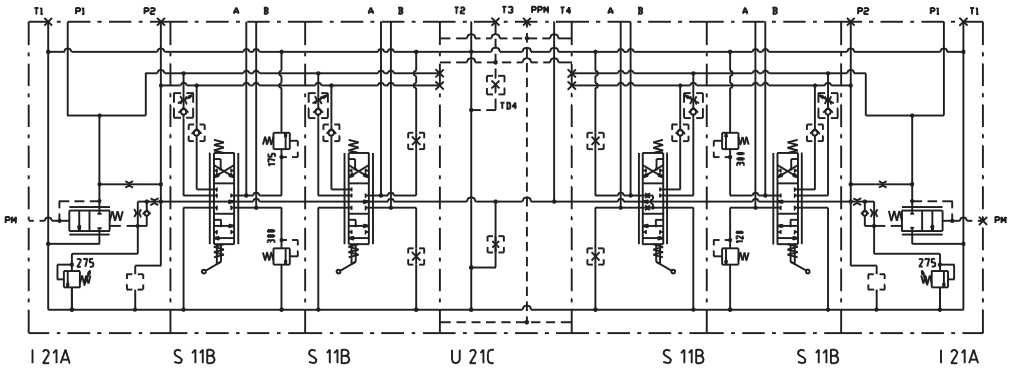
Manually operated




For single flow range

Dual circuit

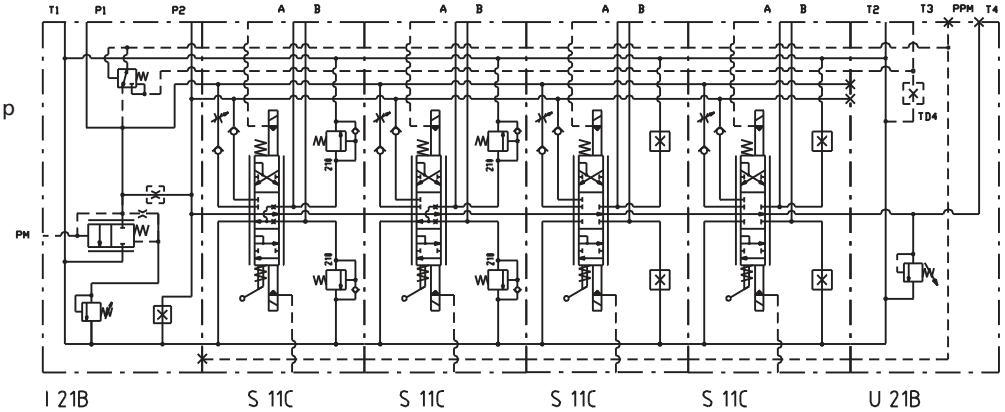
Manually operated



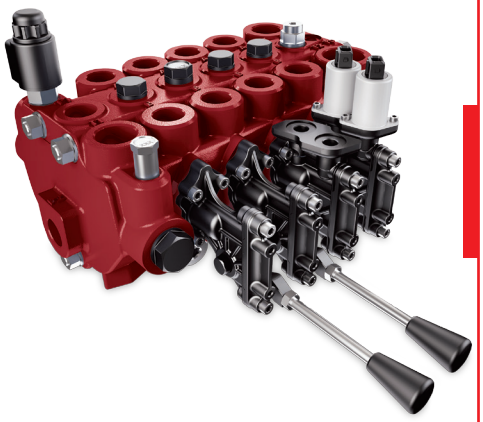

For single flow range

For systems with variable pump

El. hydr. prop. remote control



HYDAC INTERNATIONAL



# X-Series

# Directional Control Valve DX-6

Formerly the RSM290 Series

## Key valve features

DX-6 is a sectional valve designed for max. operating pressures up to 5000 psi (350 bar) and max. pump flows up to 180 l/min with “Q-inlet”. For standard inlets without flow regulator the recommended max. pump flows is 37 gpm (140 Lpm). The valve is available with 1 to 10 working sections per valve assembly.

DX-6 includes as standard a variety of sections, spools, spool controls and additional parts in a modular design. That makes the valve very flexible.

The valve is, as standard, setup for both manual and remote control. The manual controlled sections can either be with open spool ends or encapsulated. The encapsulation decreases in a significant way the risk for external leakage and makes the valve well adapted for applications in demanding environment. The spool controls for remote control are generally designed as complete modules for assembling on one of the valve sides.

DX-6 is in first place designed as an open center valve for fixed displacement pumps but can also be configured for variable displacement pumps. It is available with manual, hydraulic or electro hydraulic proportional remote control.

DX-6 can be fully adapted for marine applications. The valve offers excellent operating characteristics, and good controllability on a wide range of machinery due to the specially designed spools.

Low and uniform spool forces are the result of careful balancing of the flow forces.

## Q-inlet

The Q-inlet is designed with a flow control (Q-function) that by-passes the major part of the pump flow to tank when the system is idling, still giving access to full pump flow when the working sections are operated. Besides greatly reducing heat generation this also provides improved operating characteristics.

## Applications

The DX-6 is ideal for applications where you need excellent control characteristics such as cranes, sky-lifts, garbage trucks, demountable bodies, excavators, telescopic load handlers, skid-loaders, wheel loaders etc.

## Technical data

| | | |
|---|---|---|
| **Pressures / Flows** | | |
| Max. operating pressure set per port: | | |
| P1, P2, PM: | 5000 psi | 350 bar |
| A, B: | 5800 psi | 400 bar |
| T1, T2, T3: | 300 psi | 20 bar |
| Pp: | 450 psi | 30 bar |
| Tp: | 75 psi | 5 bar |
| X, Y: | 360 psi | 25 bar |
| Typical Nominal Inlet Flow: | | |
| Inlet without flow control function | 37 gpm | 140 Lpm |
| Inlet with flow control function | 48 gpm | 180 Lpm |
| Fluid temperature range | 5°F up to +176°F | -15°C up to +80°C |
| **Further data** | | |
| Spool stroke nominal: | ±0.27 in | ±7 mm |
| Spool control force spool control 9M1: | | |
| Neutral position: | 20 lb. | 90 N |
| Max. spool stroke: | 24 lb. | 105 N |
| Permissible contamination level: | | |
| Spool control M: Equal or better than 20/18/14 as per ISO 4406 | | |
| Spool control H, EH: Equal or better than 20/17/13 as per ISO 4406 | | |
| Viscosity range: 10 – 400 $mm^2/s$ (cSt); Higher viscosity allowed at start up. | | |
| Leakage at 1450 psi, 32 cSt, 100° F ≤ 12 cc/min (100 bar, 32 cSt and 40°C) | | |
| Pressure fluid: Mineral oil and syntetic oil based on mineral oil HL, HLP according to DIN 51524. | | |

Higher values are possible, depending on application. For applications with demands that exceed stated data above, please contact us for consideration.

MTTFd value after consultation with HYDAC.

## Remote control

As remote controlled the valve offers compact design with internal pilot oil supply, solenoids in a compact assembly on one side of the valve and integrated hand levers for manual override/manual operation.
The integrated pilot supply system for the electro hydraulic remote control makes the valve easy to install and gives a reliable remote control function. It is also possible to supply the pilot system externally.
The hydraulic remote control can also be configured both for internal and external pilot supply.

## Accessories

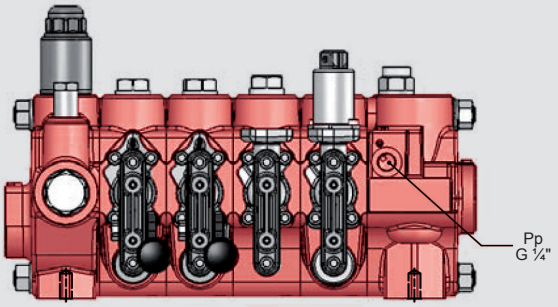
- A wide choice of spools and spool controls for different flow combinations and for several applications and systems
- A full range of service port valves
- Possibility of high pressure carry-over
- Inlet with electrical unloading valve
- Manual versions easily convertible to remote control

MHD1308-1550 DX6 PN#02099406

## General overview

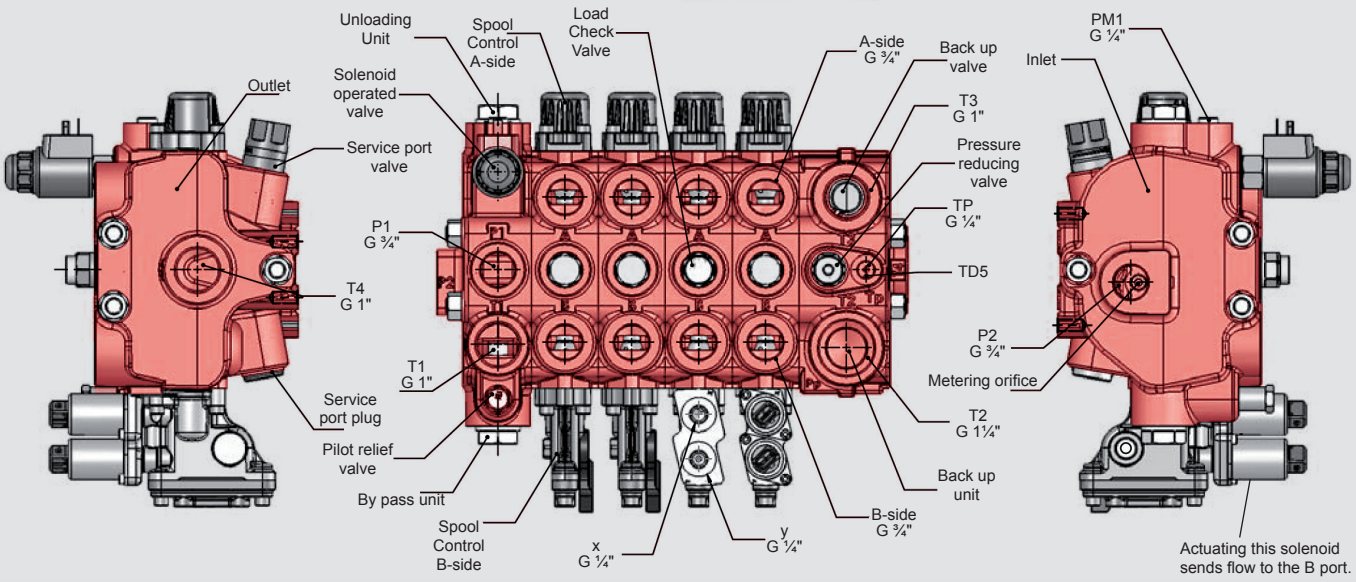
The drawing shows a 4-sectional valve with inlet and outlet. The sections are with various types of spool controls.

SAE ports are shown in the table.

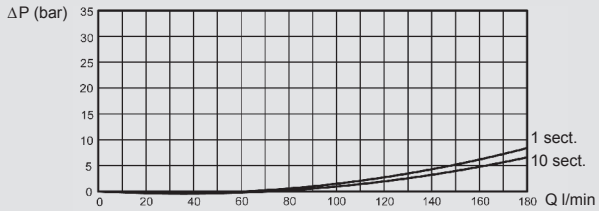



**Port Sizes for US Models**

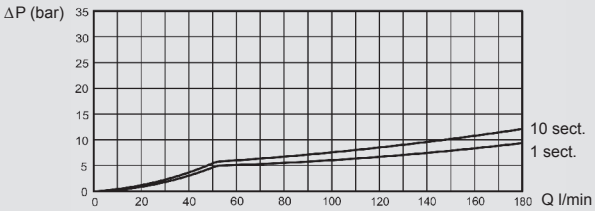
| | | | |
|---|---|---|---|
| P1 | SAE12 | P2 | SAE12 |
| T1 | SAE16 | T2 | SAE20 |
| T3 | SAE16 | T4 | SAE16 |
| A&B | SAE12 | | |
| X | SAE04 | Y | SAE04 |
| Pp | SAE06 | Tp | SAE06 |
| PM1 | SAE04 | | |



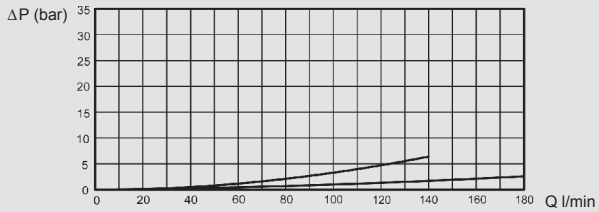

## Pressure drop Oil temperature/viscosity for all graphs: +40°C / 32 cSt



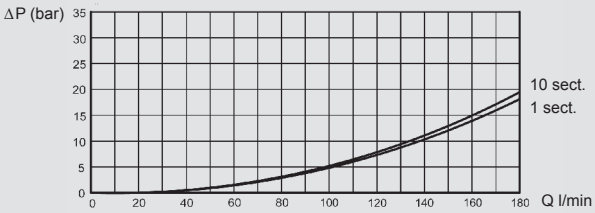

Pressure drop A/B - T



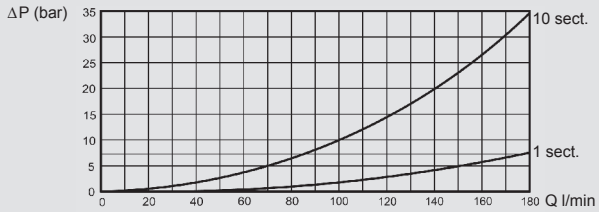

Pressure drop P-T with flow regulator and metering orifice PF60



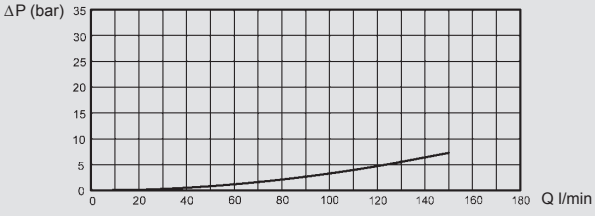

Pressure drop P - T, unloaded valve in inlet I11B



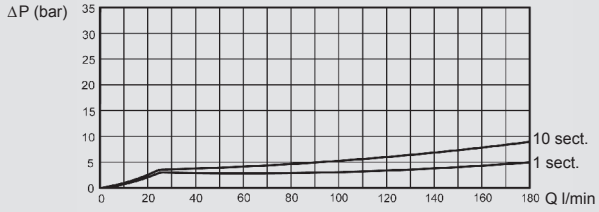

Pressure drop P - A/B




Pressure drop P - T without flow regulator




Pressure drop P - T, unloaded valve in inlet I11B - rated flow 150 l/min



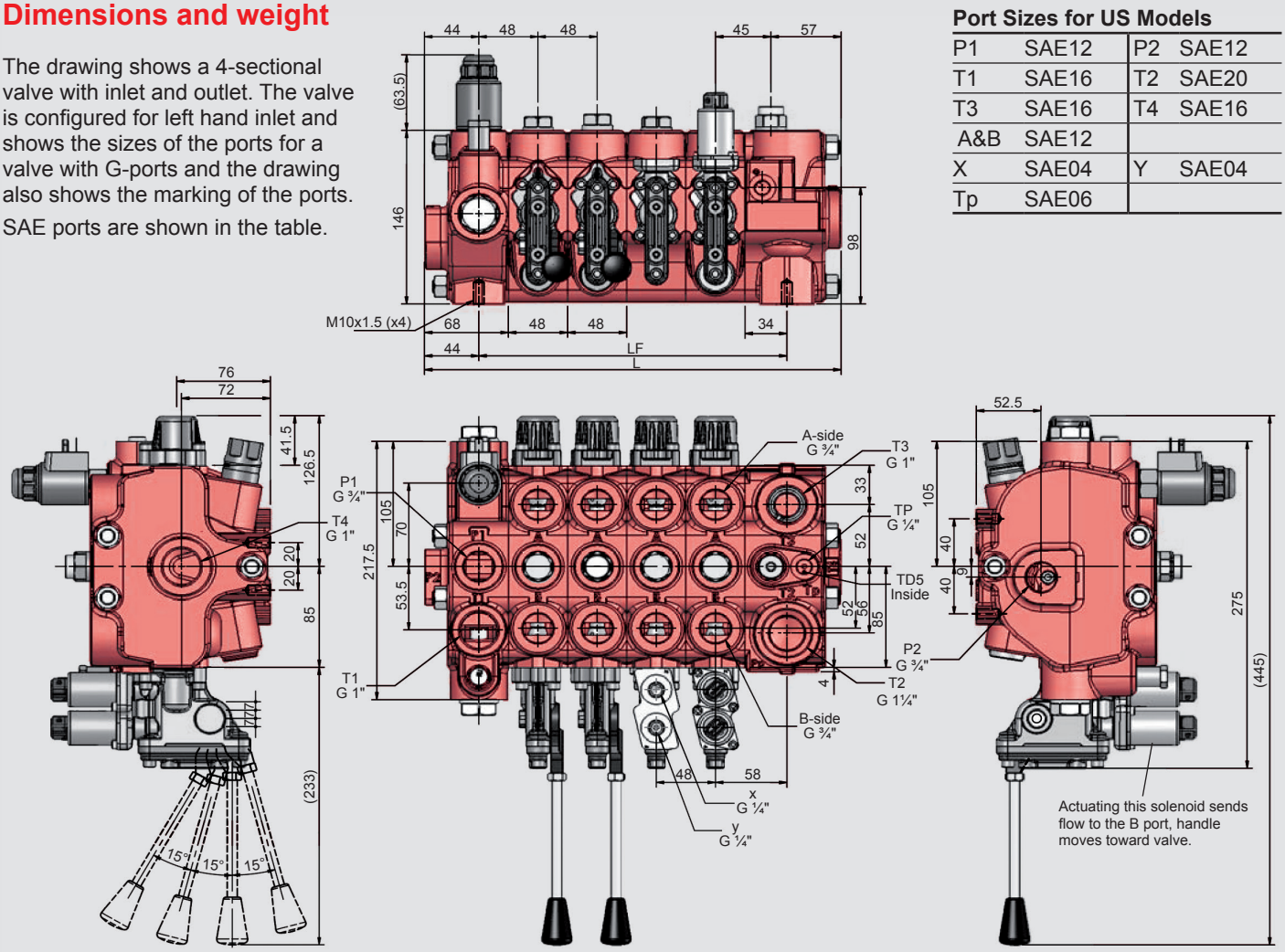

Pressure drop P - T with flow regulator and metering orifice PF30

Note: The pressure drop curves are valid for sections equipped with spools that are fully open at maximum spool travel.

## Dimensions and weight

The drawing shows a 4-sectional valve with inlet and outlet. The valve is configured for left hand inlet and shows the sizes of the ports for a valve with G-ports and the drawing also shows the marking of the ports.

SAE ports are shown in the table.




### Port Sizes for US Models

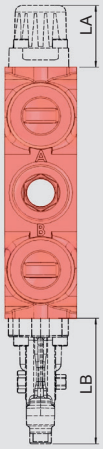
| | | | |
|---|---|---|---|
| P1 | SAE12 | P2 | SAE12 |
| T1 | SAE16 | T2 | SAE20 |
| T3 | SAE16 | T4 | SAE16 |
| A&B | SAE12 | | |
| X | SAE04 | Y | SAE04 |
| Tp | SAE06 | | |

### Weight

| | | |
|---|---|---|
| Inlet section I13B | 14.3 lbs | 6.5 kg |
| Inlet section I123B | 12.1 lbs | 5.5 kg |
| Working section | 12.1 lbs | 5.5 kg |
| Outlet section | 15.4 lbs | 7.0 kg |
| Outlet & working section US | 14.3 lbs | 6.5 kg |
| Mid outlet section | 15.4 lbs | 7.0 kg |

| No. of working sections | L(in) | L(mm) | LF(in) | LF(mm) |
|---|---|---|---|---|
| 1 | 7.6 | 194 | 4.2 | 106 |
| 2 | 9.5 | 242 | 6.1 | 154 |
| 3 | 11.4 | 290 | 8.0 | 202 |
| 4 | 13.3 | 338 | 9.8 | 250 |
| 5 | 15.2 | 386 | 11.7 | 298 |
| 6 | 17.1 | 434 | 13.6 | 346 |
| 7 | 19.0 | 482 | 15.5 | 394 |
| 8 | 20.9 | 530 | 17.4 | 442 |
| 9 | 22.8 | 578 | 19.3 | 490 |
| 10 | 24.6 | 626 | 21.2 | 538 |

## Measurements spool controls




| Type | LA (in) | LA (mm) | Type | LB (in) | LB (mm) |
|---|---|---|---|---|---|
| 9M1 | 1.7 | 42 | M1 | 3.3 | 85 |
| 9MO1 | 1.7 | 42 | MO3 | 2.1 | 53 |
| 9R1 | 1.7 | 42 | MO3F | 2.1 | 53 |
| 11M1 | 2.9 | 74 | H1 | 3.3 | 85 |
| 11MO1 | 2.9 | 74 | H1F | 3.3 | 85 |
| 11R1 | 3.7 | 95 | EHM112 | 3.3 | 85 |
| SM11 | 3.5 | 90 | EHM124 | 3.3 | 85 |
| SM21 | 4.3 | 109 | EHM112F | 3.3 | 85 |
| SMO11 | 3.5 | 90 | EHM124F | 3.3 | 85 |
| SMO21 | 4.3 | 109 | | | |
| SR11 | 3.5 | 90 | | | |
| SR21 | 4.3 | 109 | | | |

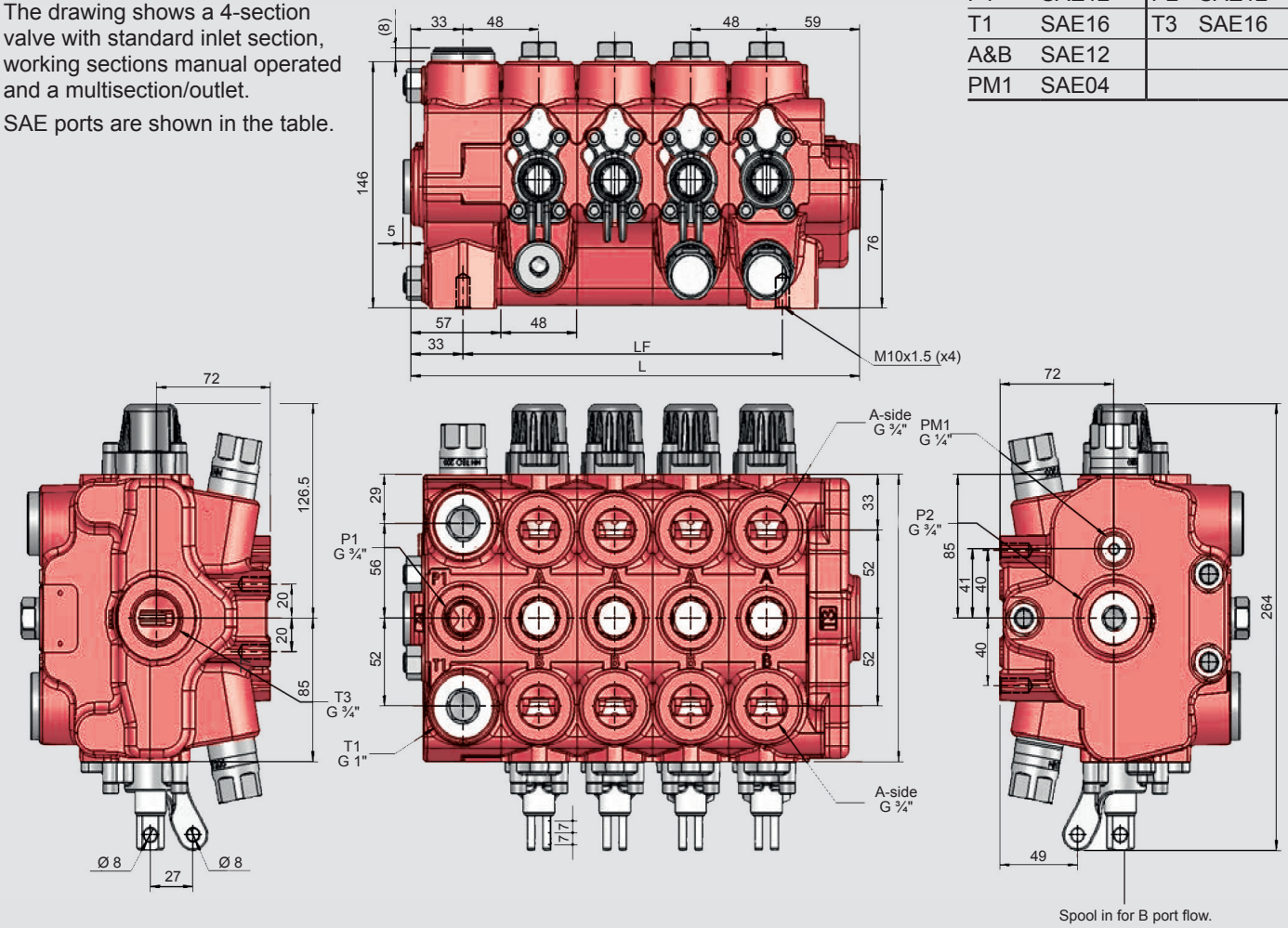
# Dimensions and weight

The drawing shows a 4-section valve with standard inlet section, working sections manual operated and a multisection/outlet.

SAE ports are shown in the table.

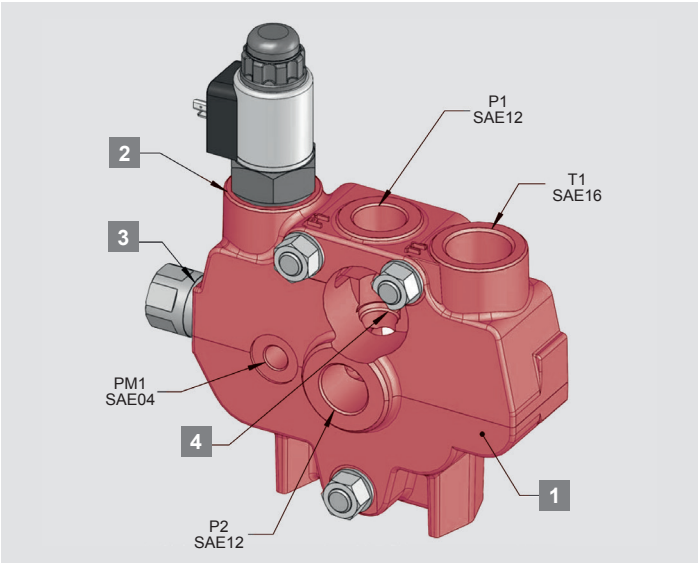
**Port Sizes for US Models**

| | | | |
|---|---|---|---|
| P1 | SAE12 | P2 | SAE12 |
| T1 | SAE16 | T3 | SAE16 |
| A&B | SAE12 | | |
| PM1 | SAE04 | | |




| No. of working sections | L (in) | L (mm) | LF (in) | LF (mm) |
|---|---|---|---|---|
| 1 | 5.5 | 140 | 2.3 | 58 |
| 2 | 7.4 | 188 | 4.2 | 106 |
| 3 | 9.3 | 236 | 6.1 | 154 |
| 4 | 11.2 | 284 | 8.0 | 202 |
| 5 | 13.1 | 332 | 9.8 | 250 |
| 6 | 15.0 | 380 | 11.7 | 298 |
| 7 | 16.9 | 428 | 13.6 | 346 |
| 8 | 18.7 | 476 | 15.5 | 394 |
| 9 | 20.6 | 524 | 17.4 | 442 |
| 10 | 22.5 | 572 | 19.3 | 490 |

# Inlet Section I23B




The standard inlet section I23B has two pump connections P1 and P2, a gauge port PM1 to monitor system pressure and a tank connection T1. Direct acting main relief valve (TBD201), and an unloading function via 2/2 solenoid valve (EU) for emergency dump of pump flow. The cavity (4) can be used to separate the parallel gallery from the center gallery to accomplish systems with parallel connection downstream of another valve or to control a variable pump.

**Main relief function**

TBD201 is adjustable and sealable for setting range 580 - 4,500 psi (40 - 300 bar) with setting step 100 psi (7 bar).

**Unloading valve EU12 and EU24**

EU12 and EU24 are 2-way, normally open, solenoid type cartridge valves. It is an option in all inlet sections.

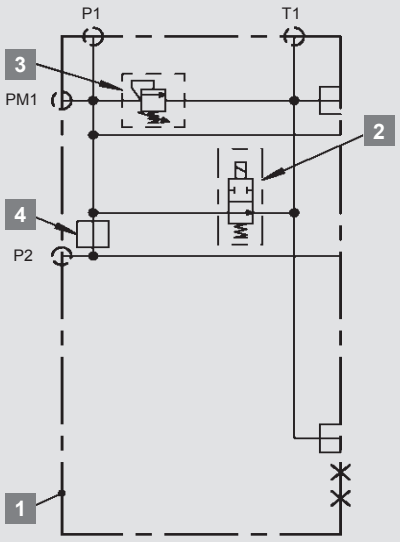
It is intended for emergency stop and for pressure drop/heat generation reduction.

| | |
|---|---|
| Rated flow: | 40 gpm, 4,000 psi (150 Lpm, 280 bar) |
| Rated flow: | 27 gpm, 5,000 psi (100 Lpm, 350 bar) |
| Power consumption: | 18 W |
| Rated voltage EU12: | 12 V |
| Rated voltage EU24: | 24 V |
| Max voltage variation: | +/-15% |
| Duty factor*: | 100% |
| Connection: | EN 175301-803 form A |
| Protection class: | IP65 |

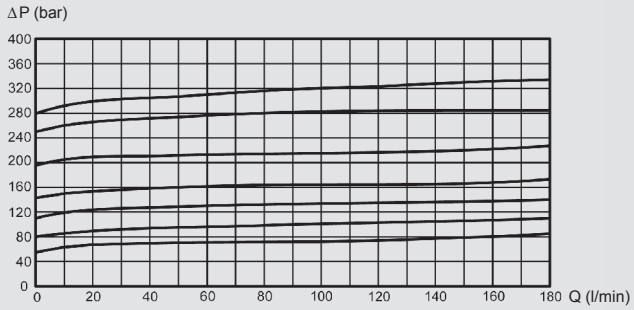
* Sufficient cooling must be secured.

The unloading valve has manual override, with twist pin operation.

PE21 is the plug for the cavity.

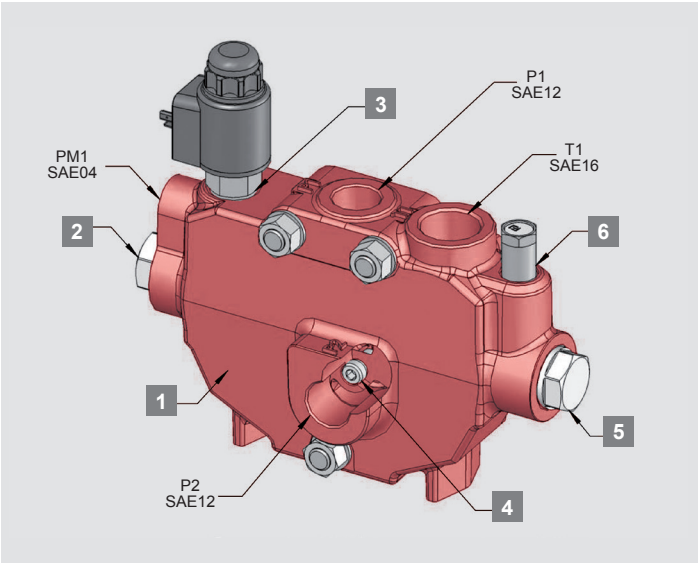


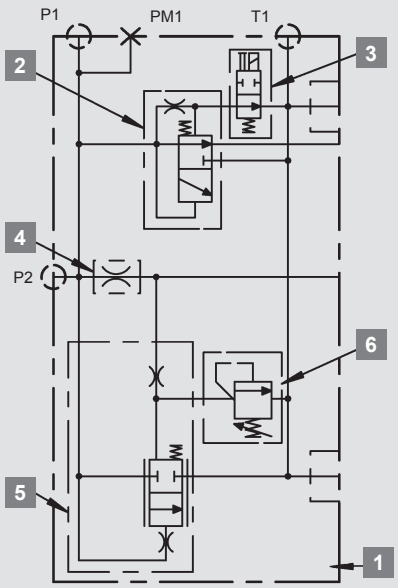

| | | |
|---|---|---|
| 1 | Inlet | I23B |
| 2 | Unloading valve | EU24 |
| 3 | Relief valve | TBD201 |
| 4 | Cavity for plug PM02 | N/A |




Characteristic main relief function (TBD201)

# Inlet section I13B




| | | |
|---|---|---|
| 1 | Inlet section | I13B |
| 2 | Unloading unit | FU29 |
| 3 | Solenoid operated valve | E926 |
| 4 | Metering orifice for centre channel flow | PF60 |
| 5 | By-pass flow control unit | FK29 |
| 6 | Pilot relief valve | TB12 |

### Flow control function

The inlet section I13B with its integral Q-function provides by-pass of pump flow to tank in idling condition, thereby reducing pressure drop and heat generation. It also reduces flow forces and makes the control response to large extent unaffected by varying pump flows. This contributes to the excellent operating characteristics achievable with DX-6.

The regulated flow into the centre passage is set by an exchangeable metering orifice (4).

In case the I13B inlet section is configured with metering orifice PF60, this orifice determines the high pressure carry over flow to downstream arrangements.

### Unloading function

An unloading spool along with an electrical operated pilot valve forms the unloading function. The unloading spool both unloads the pump flow to tank and as well disconnects the valve's parallel passage from the pump.

Together with a load holding valve, DX-6 achieves a very safe emergency dump of pump flow to tank.

EU912 and EU926 are 2-way, normally open, solenoid type cartridge valves. It is an option in all inlet sections. It is intended for emergency stop and for pressure drop/heat generation reduction.

| | |
|---|---|
| Rated flow: | 11 gpm (40 Lpm) |
| Power consumption: | 18 W |
| Rated voltage EU12: | 12 V |
| Rated voltage EU24: | 24 V |
| Max voltage variation: | +/-15% |
| Duty factor*: | 100% |
| Connection: | EN 175301-803 form A |
| Protection class: | IP65 |

* Sufficient cooling must be secured.

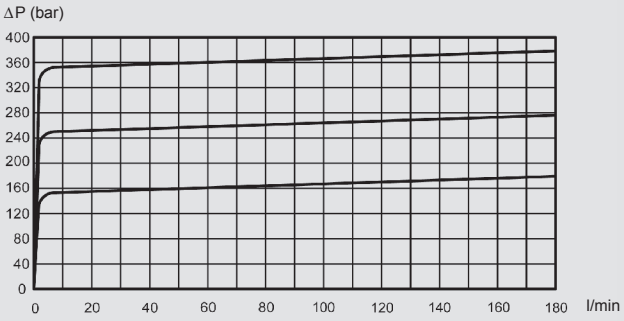
The unloading valve has manual override, with twist pin operation.

PE20 is the plug for the cavity.

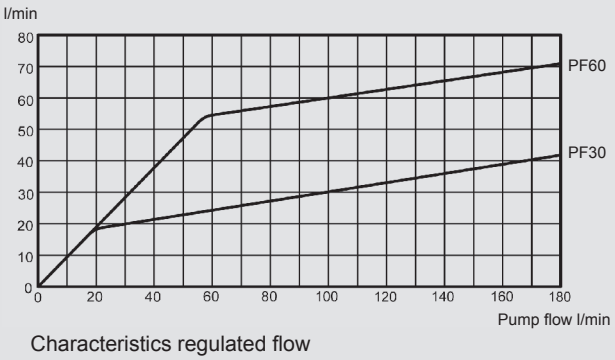
### Main relief function

The by pass unit FK29 in combination with the relief valve TB 12 form the pilot operated relief valve function.

TB12 is adjustable and sealable for setting range 200-5000 psi (40 – 350 bar) with setting step 100 psi (7 bar).



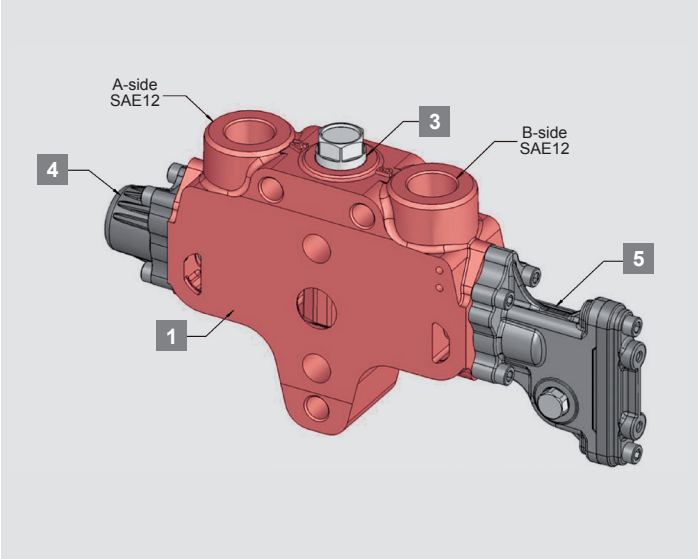

Characteristics main relief function




Characteristics regulated flow

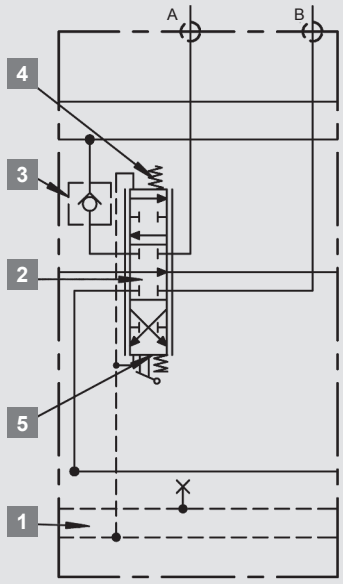
Oil temperature / viscosity for all graphs: 104°F (+40°C)

## Working section S14L



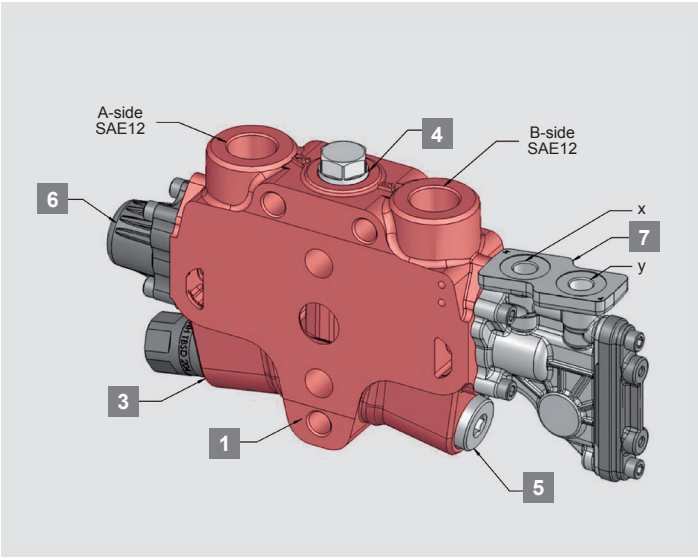

Working section S14L for both manual and remote operation.
The example shows a section configured for manual operation with the spring centering spool control on A-side and encapsulated lever mechanism on B-side spool actuator.

The section S14L includes a loadcheck valve.




| | | |
|---|---|---|
| 1 | Working section | S14L |
| 2 | Spool | 1XY |
| 3 | Load check valve | MF29 |
| 4 | Spool control, A-side | 9M1 |
| 5 | Spool actuator, B-side | M1 |

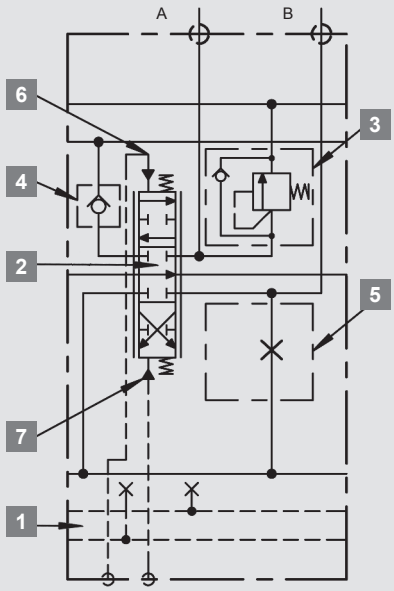
## Working section S24L




Working section S24L for both manual and remote operation.

The example shows a section configured for hydraulic remote control with the spring centering spool control on A-side and the ports for control pressure on the B-side spool actuator.

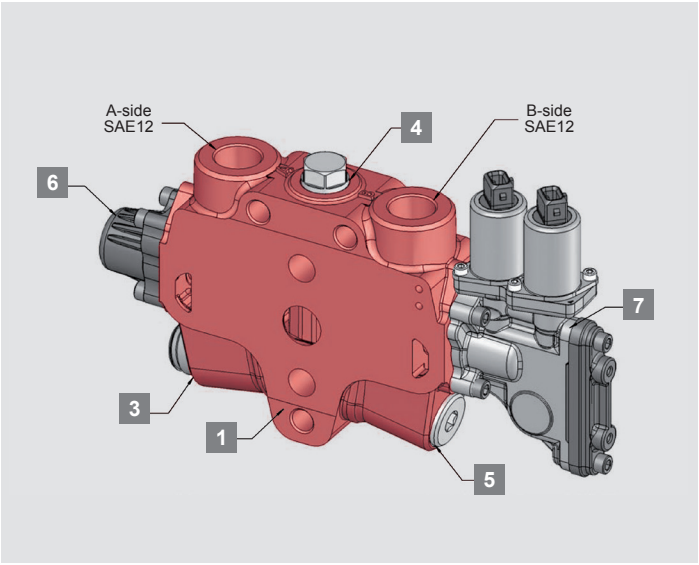
The section S24L includes loadcheck valve and cavities for service port valves of type TBD/TBSD205.




| | | |
|---|---|---|
| 1 | Section | S24L |
| 2 | Spool | 1XY |
| 3 | Service port valve | TSBD205 |
| 4 | Load check valve | MB29 |
| 5 | Service port plug | P204 |
| 6 | Spool control, A-side | 9R1 |
| 7 | Spool actuator, B-side | H1 |

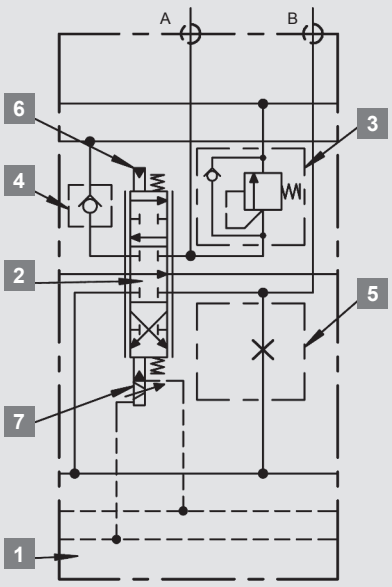
MHD1308-1550 DX6 PN#02099406

## Work section S34L




Working section S34L for both manual and remote operation. The example shows a section configured for electro hydraulic remote control with the spring centering spool control on A-side and the proportional solenoids on the B-side.

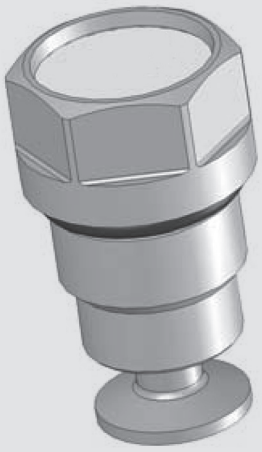
The section S34L includes loadcheck valve and cavities for service port valves of type TBSD280.

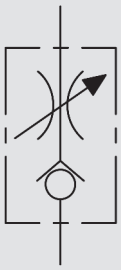



| | | |
|---|---|---|
| 1 | Section | S34L |
| 2 | Spool | 1XY |
| 3 | Service port valve | TSBD280 |
| 4 | Load check valve | MB29 |
| 5 | Service port plug | P280 |
| 6 | Spool control, A-side | 9R1 |
| 7 | Spool control, B-side | EH1XX |

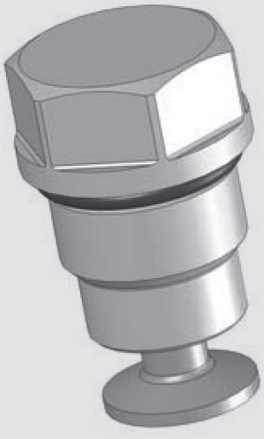
## Load check valve

MF29





MB29

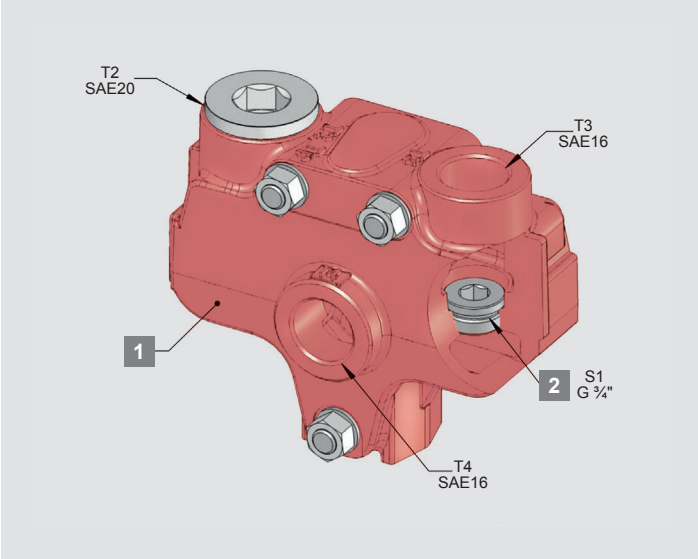


The main function of the load check valve is to prevent the load from moving backwards if the load pressure is higher than pump pressure when operating.

**MB29**
Load check valve.

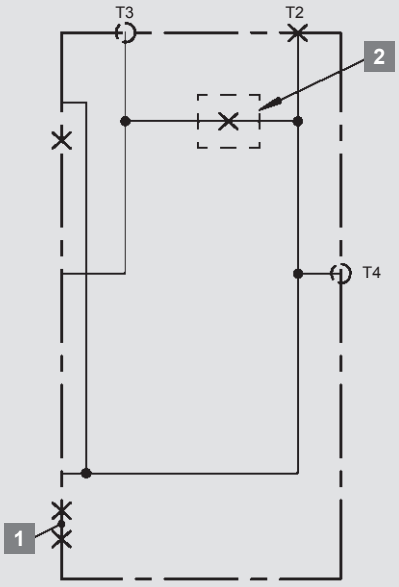
**MF29**
Load check valve with adjustable flow limitation.
MF29 restricts the flow out from a section.
Typical application is a slewing function.

## Outlet section U13B



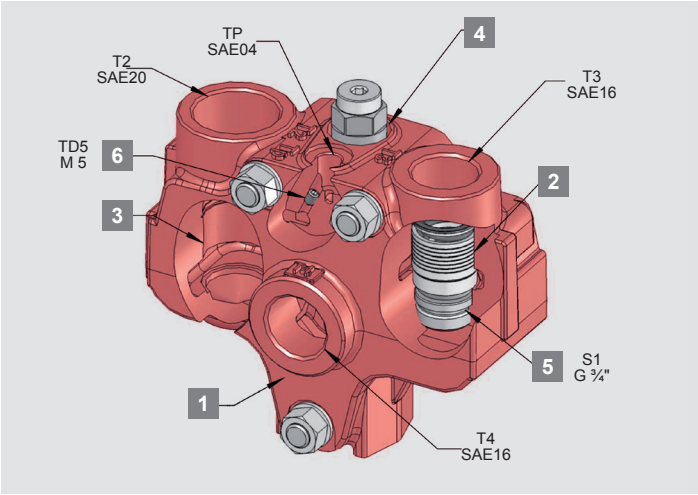

The standard outlet section U13B has three tank connection ports T2, T3 and T4.

Port T3 is used for high pressure carry over function (HPCO) when plug S29 is installed in the S1 cavity (see example).




| | | |
|---|---|---|
| 1 | Outlet selection | U13B |
| 2 | S1 Carry over plug | S29 |

## Outlet section U13L



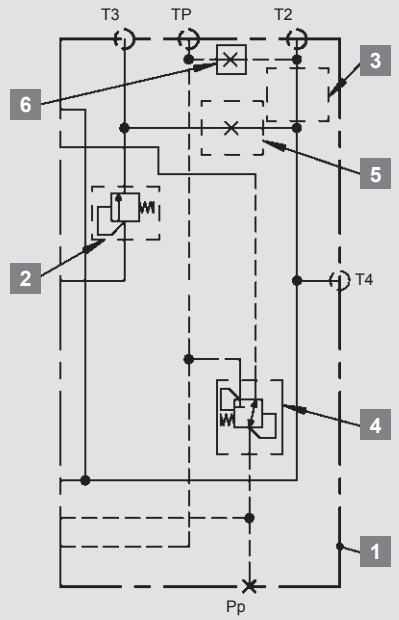

The outlet section U13L with integrated pilot pressure supply for a valve with electro-hydraulic remote controlled working sections. Same configuration can be used for pilot pressure supply, via port Pp, to a hydraulic controller for use with hydraulic remote controlled working sections.

To ensure sufficient pressure for the pilot circuit a start up pressure is generated by the back-up cartridge BUP14 installed in cavity 2. The back-up cartridge can be used in combination with HPCO plug S29. A pressure reducing valve TRA63 limits the pressure in the pilot circuit.

Because the pilot pressure is supplied from the parallel gallery an emergency stop will also unload the pilot pressure.

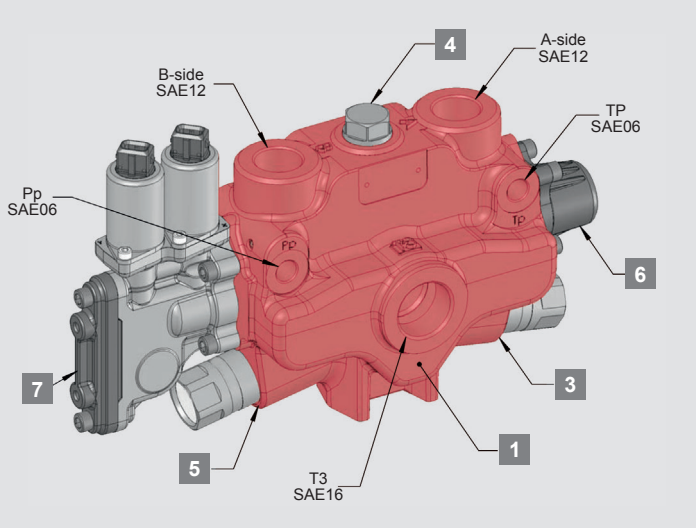
It is recommended to drain the return flow in the pilot circuit via port Tp direct to tank in separate piping. This is accomplished by PMS5 installed in cavity 6. Note: The port Tp must not be plugged when PMS5 is installed.

The outlet section U13L can be configured with a back-up cartridge (BUP14 installed in cavity 3) for an increased pressure in the return passage to prevent cavitation in severe conditions. This is accomplished without compromising the pressure drop P – T at idling.

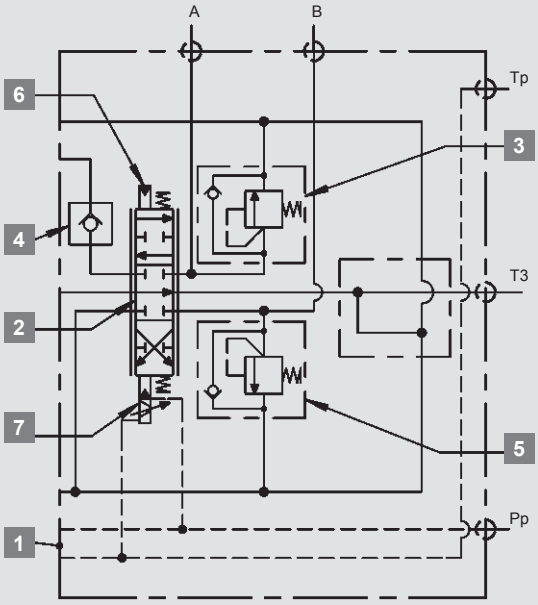



| | | |
|---|---|---|
| 1 | Outlet selection | U13L |
| 2 | Back up valve | BUP14 |
| 3 | Pilot pressure valve | BUP14 |
| 4 | Pressure reducing valve or plug | TRA63/P63 |
| 5 | Carry over plug | S29 |
| 6 | Plug for pilot drain | PMS5 |

## Outlet with working section US24L

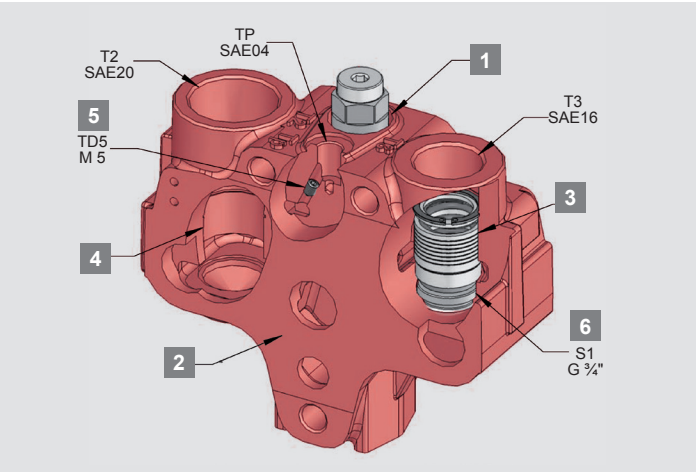



The US24L is an outlet section with integrated spool section, T3 port for tank connection for both manual operation and remote control with external pilot pressure supply. High pressure carry over function is achieved with SU31 installed in port T3.
Pp – supplied pilot pressure, Tp – pilot drain.




| | | |
|---|---|---|
| 1 | Outlet and working section | US24L |
| 2 | Spool | 1XY |
| 3 | Service port valve | TBSD205 |
| 4 | Load check valve | MB29 |
| 5 | Service port plug | TBSD205 |
| 6 | Spool control A-side | 9R1 |
| 7 | Spool actuator B-side | EH1XX |

## Mid outlet N13B

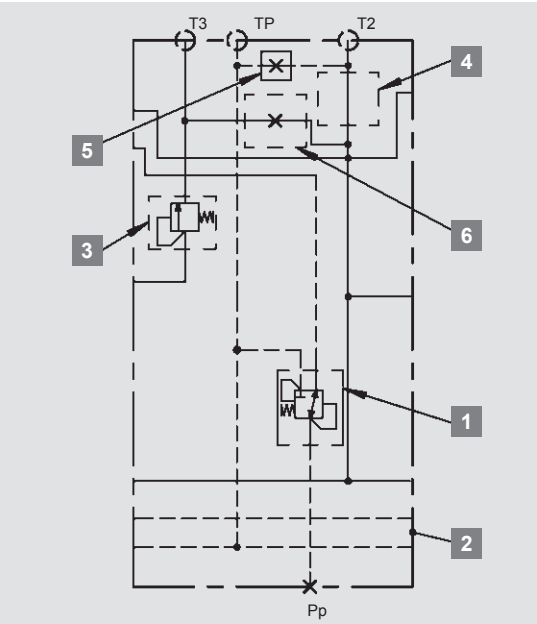



The mid-outlet section N13B with integrated pilot pressure supply for a valve with electro-hydraulic remote controlled working sections. Same configuration can be used for pilot pressure supply, via port Pp, to a hydraulic controller for use with hydraulic remote controlled working sections.

To ensure sufficient pressure for the pilot circuit a start up pressure is generated upstream of the mid-outlet by the back-up cartridge BUP14 installed in cavity 3. The back-up cartridge can be used in combination with HPCO plug S29. A pressure reducing valve TRA63 limits the pressure in the pilot circuit.

Because the pilot pressure is supplied from the parallel gallery an emergency stop will also unload the pilot pressure.

It is recommended to drain the return flow in the pilot circuit via port Tp direct to tank in separate piping. This is accomplished by PMS5 installed in cavity 5. Note: The port Tp must not be plugged when PMS5 is installed.




| | | |
|---|---|---|
| 1 | Pressure reducing valve | TRA63 |
| 2 | Mid outlet section | N13B |
| 3 | Back up valve | BUP14 |
| 4 | Pilot pressure valve | BUP14 |
| 5 | Plug for pilot drain | PMS5 |
| 6 | Carry over plug | S29 |

The mid-outlet section N13B can be configured with a back-up cartridge (BUP14 installed in cavity 4) for an increased pressure in the return passage to prevent cavitation in severe conditions. This is accomplished without compromising the pressure drop P – T at idling.

## Spool controls A-side

The spool controls are designed in a modular system for a high degree of flexibility.

The sections are basically symmetric but as standard machined either for left or right hand inlet with spool actuator on B-side and spool control on A-side.

### Spool control 9

9M1 Manual spring centered 3 pos. encapsulated.

9MO1 Manual spring centered 3 pos. open spool ends.

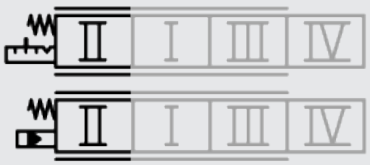
9R1 Remote spring centered 3 pos.

### Spool control 11

11M1 Manual spring centered 4 pos. encapsulated.

11MO1 Manual spring centered 4 pos. open spool ends.

11R1 Remote spring centered 4 pos.

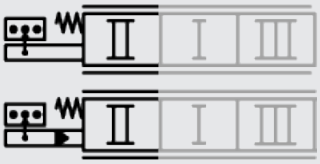


### Spool control S*

SM11 Manual spring centered 3 pos. spool position indicator.

SMO11 Manual spring centered 3 pos. open spool ends spool position indicator.

SR11 Remote spring centered 3 pos. spool position indicator.



## Spool controls B-side

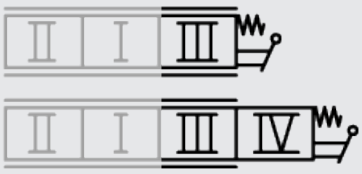
Remote spool actuators can be with or without manual override.
The valve is, as standard setup for both manual and remote control.

### Spool actuator/bracket M

M1 for manual lever 3 pos.

MO3 for manual lever 3 pos. open spool ends.

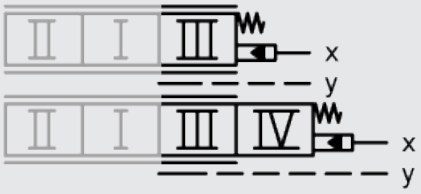
MO3F for manual lever 4 pos. open spool ends.



### Spool actuator H

H1 Hydraulically 3 pos. manual override available as option (H1M1).

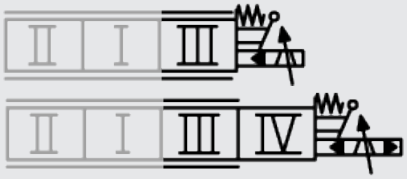
H1F Hydraulically 4 pos. Manual override available as option (H1M1F).




### Spool actuator EHM

EHM1** Electro hydraulically manual override 3 pos. Without manual override as option (EH1**).

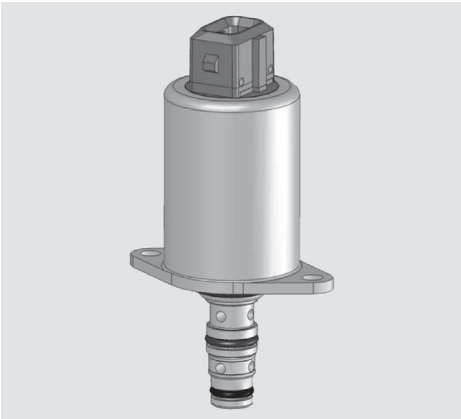
EHM**F Electro hydraulically manual override 4 pos. without manual override as option (EH1**F).



* standard connector M12x1, also available in Deutsch connector.

** 12 or 24 V DC.

## Solenoid valve for EHP – ER12 / 24



The solenoid valves are 3/2-way electrically operated pressure reducing valves used to provide controlled pilot pressure to operate valve spools.

| | |
|---|---|
| Functional principle: | PWM (Pulse Width Modulation) |
| Duty factor: | 100 % |
| Connection: | DEUTSCH DT04* |
| Recommended PMW frequency: | 100 Hz |
| Protection class: | IP 65 |
| Ambient temperature: | -30 °C up to +80 °C |

**ER12**

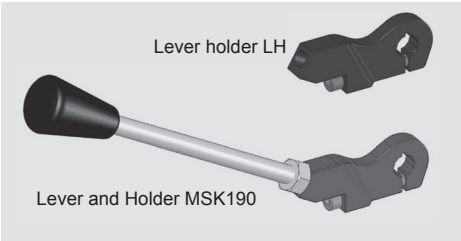
| | |
|---|---|
| Rated voltage: | 12 V DC |
| Starting current: | 600 mA |
| Fully shifted: | 1,500 mA |
| Coil resistance +20 °C: | 4.72 Ohm |

**ER24**

| | |
|---|---|
| Rated voltage: | 24 V DC |
| Starting current: | 300 mA |
| Fully shifted: | 750 mA |
| Coil resistance +20 °C | 20.8 Ohm |

*Also available with AMP Junior-Power-Timer

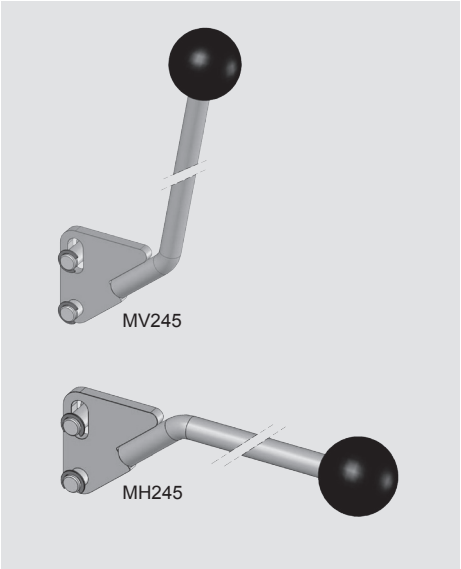
## Levers




**Lever and Holder MSK190**

The lever holder (LH) is for use together with spool actuator of type M1/EHM.

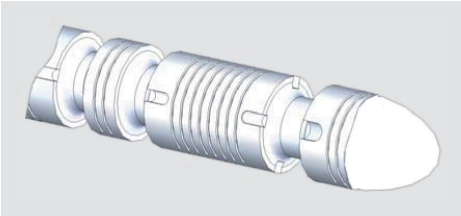
The lever holder is delivered in combination with a lever as MSK190.




**Lever MV/MH**

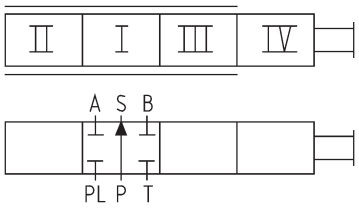
Lever for use in combination with open spool ends and a bracket M03/M03F. When mounted on a valve, the lever MH stands in a horizontal position and MV stands in a vertical position. Lever length 145 or 245 mm.

# Spools – main design parameters



Generally the spools are divided in 3 different flow ranges.
The position indicating **regulated** flow ranges is replaced by X.
The position indicating **pump** flow is replaced by Y.
The last three positions in the code are design parameters.
In the table only the accessibility of different functions are shown.

**Pos. 1 – Functionality**




**Spools for general use**

| Function | Code |
|---|---|
| Double acting | 1XY |
| Single acting | 2XY |
| Double acting, 4th pos. for float | 3XY |
| Motor spool A – T | 4XY |
| Regenerative | 8XY |

**Pos. 2 – Regulated center flow – X in the code above**

| |
|---|
| 0 = Full pump flow i. e. no regulated flow |
| 3 = 7.5 gpm (30 Lpm) regulated flow (use with inlet section I13B) |
| 6 = 15 gpm (60 Lpm) regulated flow (use with inlet section I13B) |

**Pos. 3 – Pump flow supplied – Y in the code above**

| |
|---|
| 3 = 20 gpm ± 2.5 gpm (80 Lpm ± 10 Lpm) |
| 4 = 30 gpm ± 5 gpm (110 Lpm ± 20 Lpm) |
| 6 = 160 l/min +/-w30 l/min |

Example:
Spool 136xxx – double acting spool with 7.5 gpm regulated flow and 40 gpm pump flow, xxx in the code are design parameter.

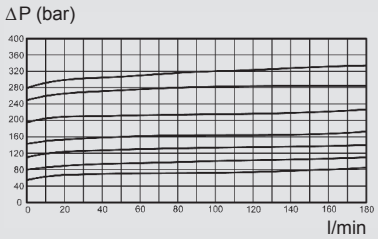
The DX-6 spools are available in a variety of flows and styles to accommodate most design requirements. Since the development of spools is a continous process and all available spools are not described in this data sheet, contact HYDAC for advice on choosing spools in order to optimize your valve configuration.

## Port relief valve TBD205

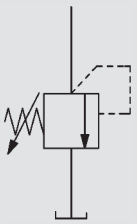
TBD205 is a differential area, direct acting relief valve, for the secondary circuit. It is adjustable and sealable.

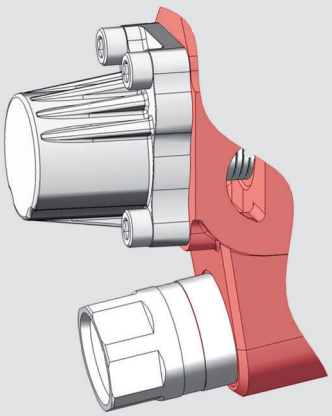
Setting range for TBD205:

- 600-4,350 psi (40-300 bar)
- Setting range step: 100 psi (7 bar)




Relief characteristics TBD205



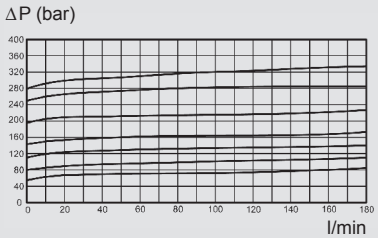


## Port relief valve TBSD205

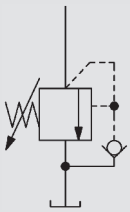
TBSD205 is a differential area, direct acting relief and anticavitation valve, for the secondary circuit. It is adjustable and sealable.

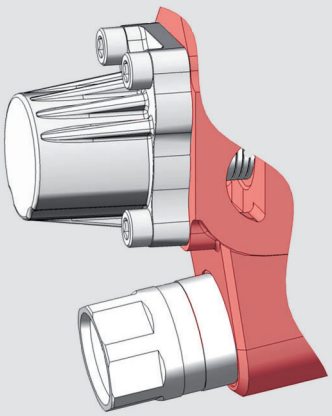
Setting ranges for TBSD205:

- 600-4,350 psi (40-300 bar)
- Setting range step: 100 psi (7 bar)




Relief characteristics TBSD205



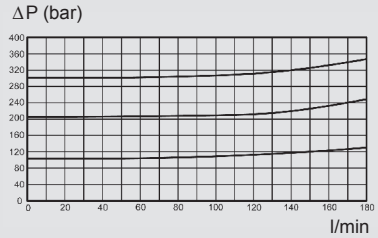


## Port relief and anticavitation valve TBSD280

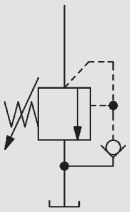
TBSD280 is a direct acting relief and anticavitation valve, for the secondary circuit. It is fixed and sealable.

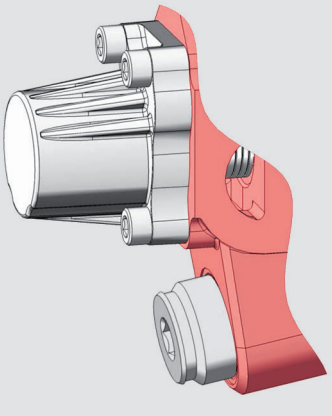
Setting ranges for TBSD280:

- 1,300-5,800 psi (90-400 bar)
- Setting range step: 100 psi (7 bar)



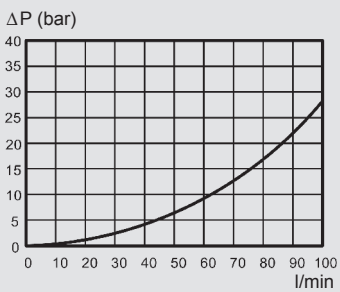

Relief characteristics TBSD280



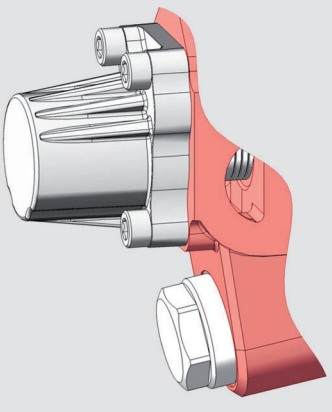


## Anticavitation valve SB204

The anticavitation valve service to ensure that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.



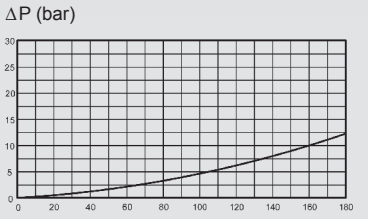

Anticavitation characteristics TBSD205 and SB204



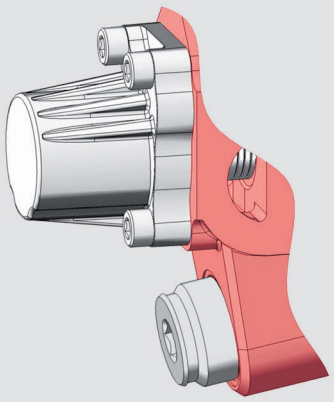
# Service port valves

## Anticavitation valve SB280

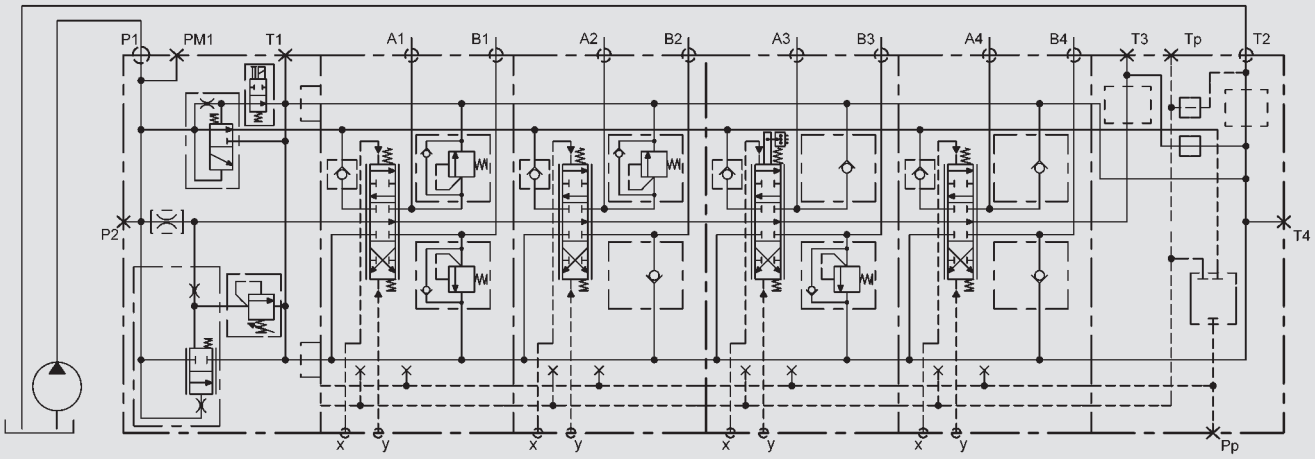
The anticavitation valve service to ensure that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.




Anticavitation characteristics
TBSD280 and SB280

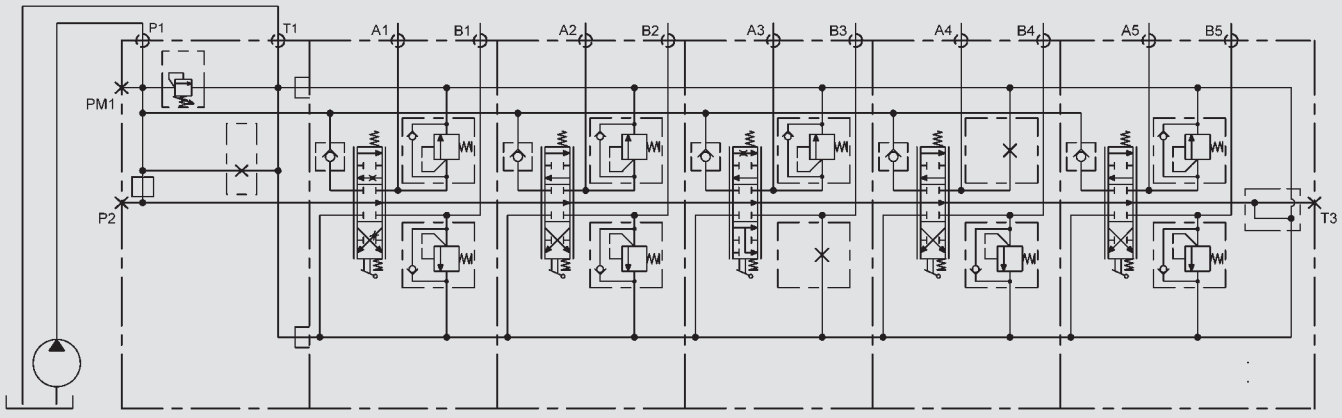


# Typical hydraulic circuit diagrams




This example shows a DX-6 with parallel circuitry.

The inlet section with flow control function and electrical unloading. A metering orifice determines the center passage flow.
A pilot operated relief valve in combination with the flow control performs the main relief valve function.
Four working sections all with double acting cylinder spools hydraulically actuated. Section 3 with a spool position indicator.
Outlet section machined for pilot pressure supply, back-up pressure and high pressure carry-over (HPCO)
but in the example configured with cavity plugs.




This example shows a DX-6 with parallel circuitry.

The inlet section of standard type with a direct acting main relief valve.
Five working sections all manual operated. Section 3 with 3-position regenerative spool.
The outlet section with integrated working section with option for HPCO.

# Ordering Details DX6 Sectional Control Valve

DX6- [ ] - [ ][ ][ ] - [ ][ ][ ][ ][ ][ ][ ][ ][ ]

Section [1] [2] [3] [4] [5] [6] [7] [8] [9] [10]

No. of directional spools 1-10

Inlet (I23B, I13B)[1]

R/V Setting (psi)

Unloading Valve Voltage/Connection

12/DIN 24/DIN

1] I13B includes FK29 by-pass flow control unit. Use of this inlet should be reviewed with your HYDAC applications consultant.

Working Section

Spool

A-Side Operator

B-Side Operator

i.e. TBSD205+3500 — A-Side Port Option CODE+setting psi

B-Side Port Option CODE+setting psi

i.e. MF24+10 — Check Valve CODE+setting gpm

Solenoid Voltage (12 or 24)

Solenoid Connector (DT4 or AMP)

Repeat for Number of Sections

Outlet (U13B, U13L)[2]

Pressure Reducing Valve

Carry Over Port

(**I**)nternal or (**E**)xternal Pilot Drain

2] Leave blank if US24L is used as last section body

**Application Information**

OEM: _____

Machine Type: _____

Pump Type: _____

Pump Flow: _____

System Pressure: _____

EAU: _____

Other Information: _____

_____

_____

## Notes

## Notes

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## Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.



**PN#02099406** / 08.13 / MHD1308-1550

HYDAC INTERNATIONAL

# Monoblock Directional Control Valve
## RM 270 light

**Preliminary Version**

## Key valve features

The RM 270 light is a monoblock valve, designed for max. operating pressures up to 210 bar and max. pump flows up to 120 l/min.

It is available with 1, 2, 3, 4, and 6 sections per valve.

The valve is designed with an open center for fixed displacement pumps.

The valve can be operated manually or by pneumatic and electro-pneumatic remote control.

The “SuperRapid”-range of the valve is optimized for maximum lowering flow of 185 l/min and allows lowering at the same time as another function is pressurized without the use of pump flow.

The valve offers excellent operating characteristics because of the specially designed spools for different applications.

Low and uniform spool forces are the result of careful balancing of the flow forces.

## Applications

Typical applications are cranes, tippers, refuse trucks, multi-bucket systems and roller container vehicles. Several special versions of RM 270 light fulfil many other applications.

## Technical data

| | |
|---|---|
| **Pressures / Flows** | |
| Max. operating pressure per port: | |
| P1, P2, A, B: | 210 bar |
| T1, T2: | 20 bar |
| Max. permissible flow either on port P1 or P2: | 120 l/min |
| Fluid temperature range: | -15 °C up to +80 °C |
| **Further data** | |
| Spool stroke: | |
| Nominal: | +/-7 mm |
| 4:th position: | +14 mm |
| Spool control force spool control 9: | |
| Neutral position: | 130 N |
| Max. spool stroke: | 155 N |
| Permissible contamination level: | Equal or better than 20/18/14 as per ISO 4406 |
| Viscosity range: | 10 – 400 mm²/s (cst)<br>Higher viscosity allowed at start up |
| Leakage A, B → T at 100 bar, 32 cst and 40 °C: | ≤20 cc/min |
| Pressure fluid: | Mineral oil and synthetic oil based on mineral oil HL, HLP according to din 51524 |

Higher values are possible, depending on application. For applications with demands that exceed stated data above, please contact us for consideration.

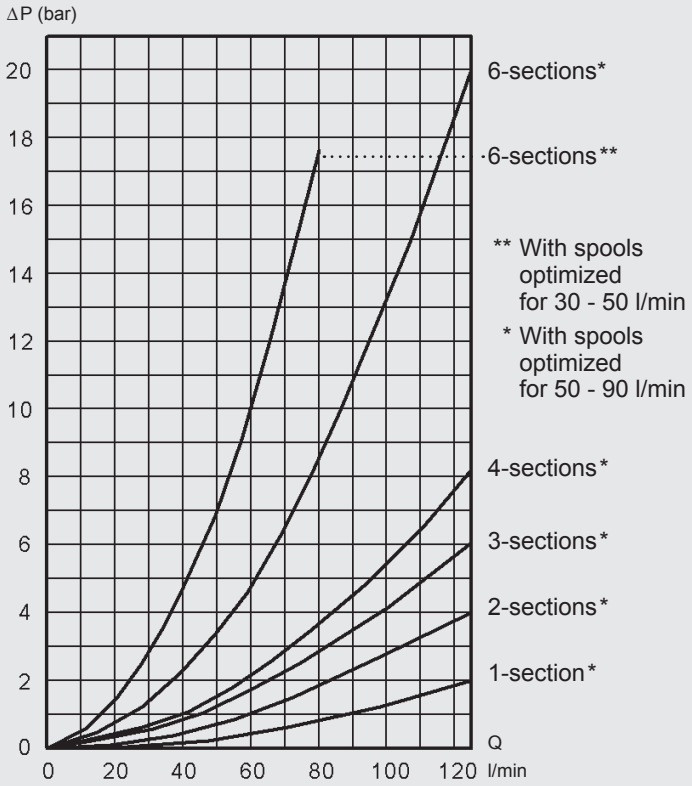
MTTFd value after consultation with HYDAC.

## Further properties and possibilities

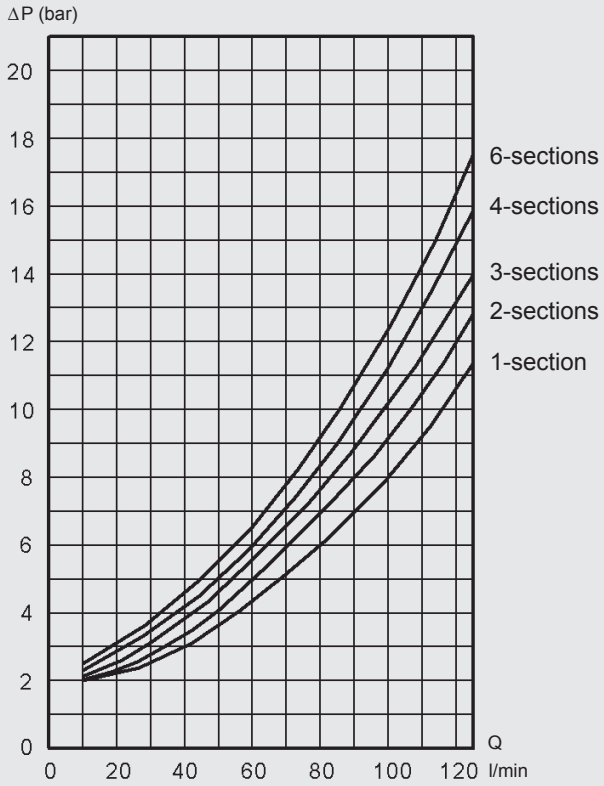
- Each section can be provided with a pressure relief valve, an anticavitation valve or a combination of these
- There are many varieties of spools and spool controls which make the valve suitable for a wide range of applications
- Two or more blocks can be connected in series
- The valve can be supplied with a built-in unloading valve, which in an emergency situation makes it possible to let all the pump flow go to tank at a very low pressure drop
- A combination of built-in flow control-, unloading- and counter pressure valves gives a compact solution and less mounting parts for refuse trucks
- Possibility for built-in load holding valves
- In systems with demand for both high and low flows the valve can be combined with RS 210. The adapter between the valves includes a flow control valve for reduced flow to the RS 210 working sections

## Pressure drop

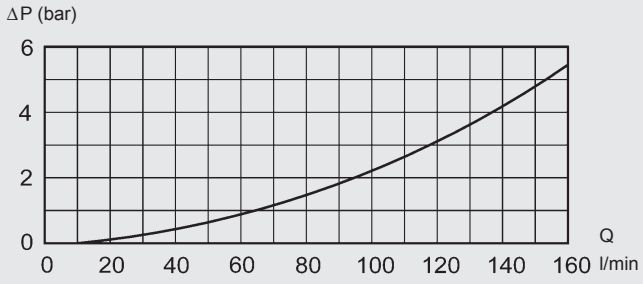
Oil temperature / viscosity for all graphs: +40 °C / 32 cSt



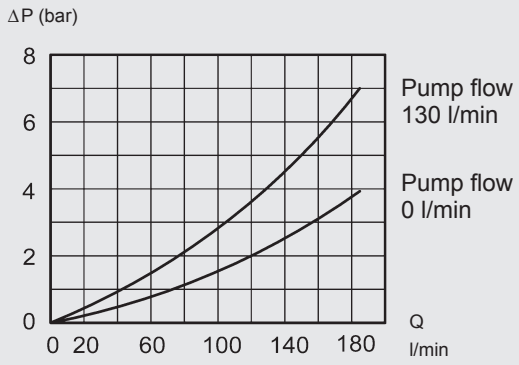

Pressure drop, P - T




Pressure drop, P - A/B

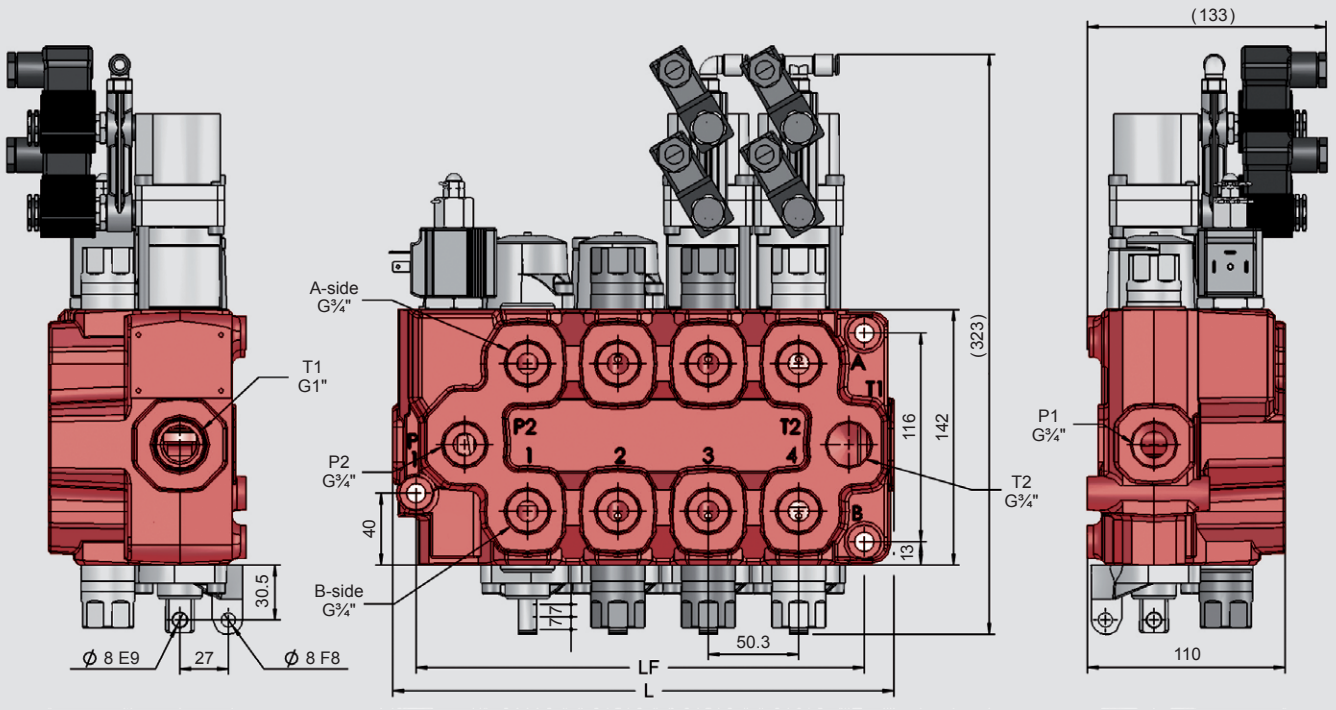



Pressure drop, P - T unloaded




Pressure drop, A - T Super Rapid 1-sect

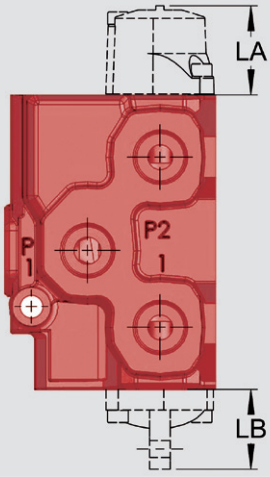
# Dimensions and Weight




| Weights | Complete valve |
|---|---|
| 1 section | 11 kg |
| 2 sections | 15 kg |
| 3 sections | 19 kg |
| 4 sections | 23 kg |
| 6 sections | 31 kg |

| Measurements | L [mm] | LF [mm] |
|---|---|---|
| 1 section | 128 | 100 |
| 2 sections | 178.3 | 150 |
| 3 sections | 228.6 | 200 |
| 4 sections | 278.9 | 250 |
| 6 sections | 379.5 | 350 |

| | |
|---|---|
| Spool storke: | +/-7 mm |
| Float position: | +14 mm |




| Type | LA [mm] | LB [mm] |
|---|---|---|
| 9 | 43 | |
| 10 | 43 | |
| 11 | 75 | |
| 13 | 75 | |
| 14 | 75 | |
| P | 109 | |
| P5 | 157 | |
| EP | 109 | |
| MSLA | 48.5 | |
| M19 | | 38.5 |
| M211 | | 32 |
| M212 | | 55.5 |

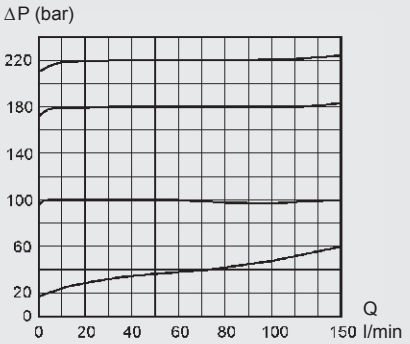
Preliminary Version

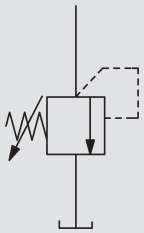
# Main Relief Valve

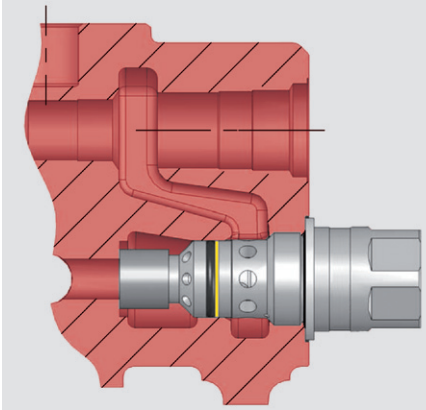
## Main Relief Valve TBD200

The TBD200 is a differential area, direct acting relief valve for the main circuit.

- Adjustable and sealable
- Setting range: 35 – 210 bar (3.5 – 21.0 MPa)
- Setting range step: 5 bar



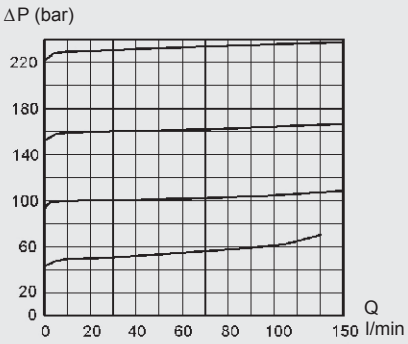


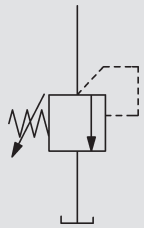
# Service Port Valves

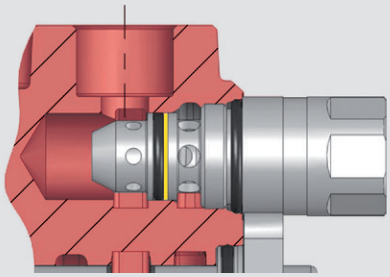
## Port Relief Valve TBD205

The TBD205 is a differential area, direct acting relief valve for the secondary circuit.

- Adjustable and sealable
- Setting range: 40 – 210 bar (4.0 – 21.0 MPa)
- Setting range step: 10 bar



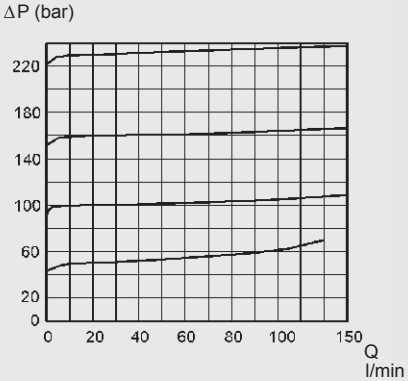



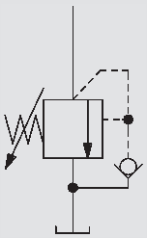


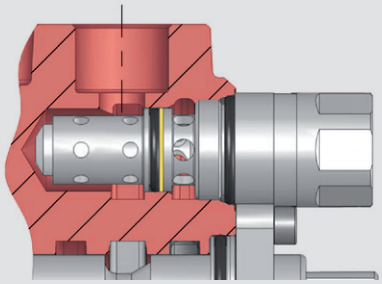
## Port Relief and Anticavitation Valve TBSD205

The TBSD205 is a differential area, direct acting relief and anticavitation valve for the secondary circuit.

- Adjustable and sealable
- Setting range: 40 – 210 bar (4.0 – 21.0 MPa)
- Setting range step: 10 bar

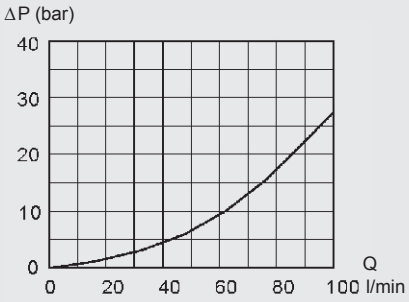


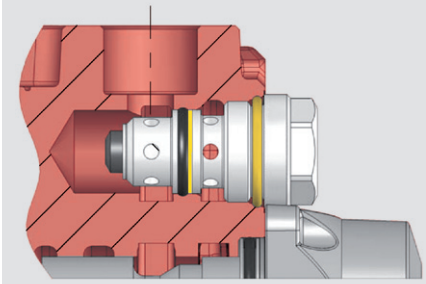





## Anticavitation Valve SB205

The anticavitation valve service to ensure that, in the event of a lower pressure in the cylinder port than in the tank, oil can be drawn from the system oil tank to the consumer.



## Electrical Unloading Valve

### IS12

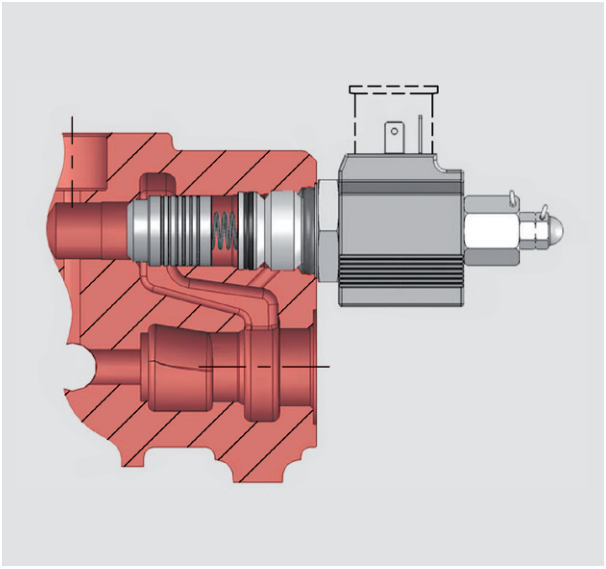
Manual override with push operation 12 V.

### IS24

Manual override with push operation 24 V.

**Data**

| | |
|---|---|
| Power consumption | 14 W |
| Rated voltage | 12 and 24 V |
| Max voltage variation | +/- 10 % |
| Duty factor | 100 % |
| Connection | Hirschmann ISO 4400-DIN 43650 |
| Protection class | IP65 |

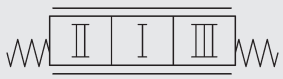


Preliminary Version

## Spool controls – A-side

**Spool control 9**

9 Spring centered
9W for cable control

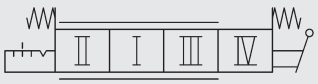


**Spool control 10**

Detents at positions 1, 2 and 3

**Spool control 11**

Spring centering with detent
at position 4



**Spool control 13**

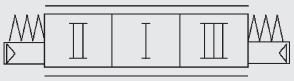
Spring centering with detent
at position 2

**Spool control 14**

Spring centering with detent
at position 3

**Spool control P**

Pneumatic*



**Spool control EP**

Electro / pneumatic on / off**

**Spool control P5**

Pneumatic control with detent at
position 4*

**Spool control EP5**

Electro / pneumatic on / off with
detent in position 4**

**Spool control MSLA**

Spool control, stroke limitation

* Connection G 1/8" BSP

** 

| | |
|---|---|
| Power consumption | 4.8 W |
| Rated voltage | 24 V |
| Max voltage variation | +/- 10 % |
| Duty factor | 100 % |
| Connection | according to EN175301-803/B |
| Protection class | IP65 |

## Spool controls – B-side

**Bracket M19**

Bracket for 3-position spool

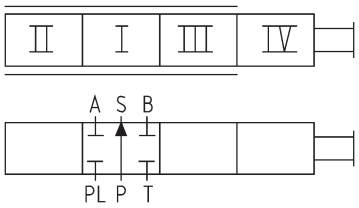
**Bracket M211**

Bracket for 4-position spool and
for 4-pos EP-spool control

**Bracket M212**

Bracket for 4-position spool
with manual control

# Spools




**Spools for general use**

| Function | Code |
|---|---|
| Double acting spool | 10XAA1 |
| Slewing spool, gentle operating | 10XKS1 |
| Single acting spool P – A | 20XAA1 |
| Single acting spool P – B | 20XAA2 |
| Motor spool | 40XAA1 |
| Motor spool A – T | 50XAA2 |
| Motor spool B – T | 60XAA1 |
| Double acting spool with 4th pos. for float | 30XAA1 |
| Regenerative spool | 80XAA1 |
| Single acting ”SR“ *185 lpm lowering flow | 713TA1 |

The RM 270 light spools are available in a variety of flows and styles to accommodate most design requirements.
Since the development of spools is a continuous process and all available spools are not described in this data sheet, contact HYDAC for advice on choosing spools in order to optimize your valve configuration.

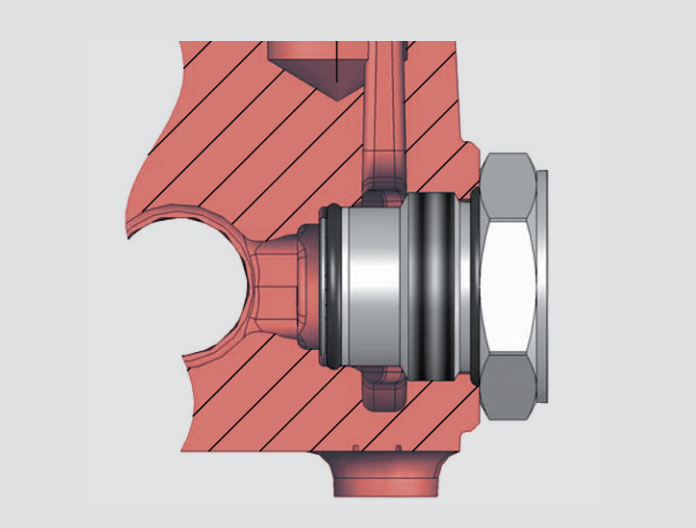
Generally the spools are divided in 5 different flow ranges. In the table only the accessibility of different functions are shown.
The letter indicating flow range is replaced with X, as some spool functions are available in several flow ranges.

3 = 20 – 40 lpm
4 = 30 – 50 lpm
5 = 40 – 60 lpm
7 = 50 – 90 lpm
12 = 90 – 120 lpm

## High pressure carry-over plug SG25

The type SG25 series nipple is used for series mounting of valve blocks when pipe or hose is used between the blocks.

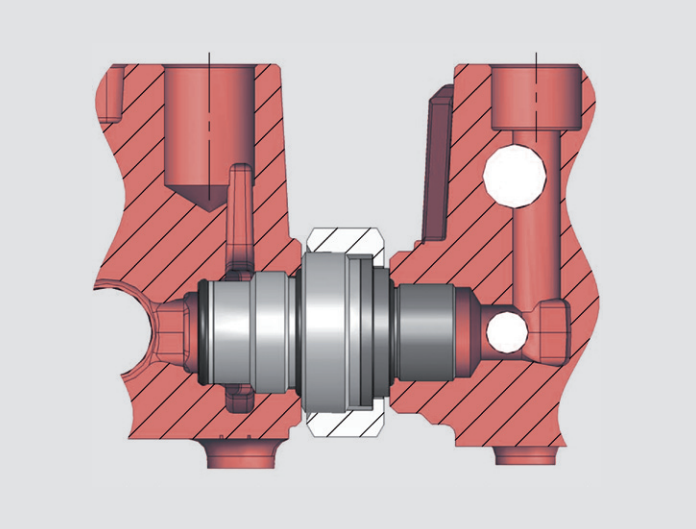
For RM 270 light Super Rapid see page 10.



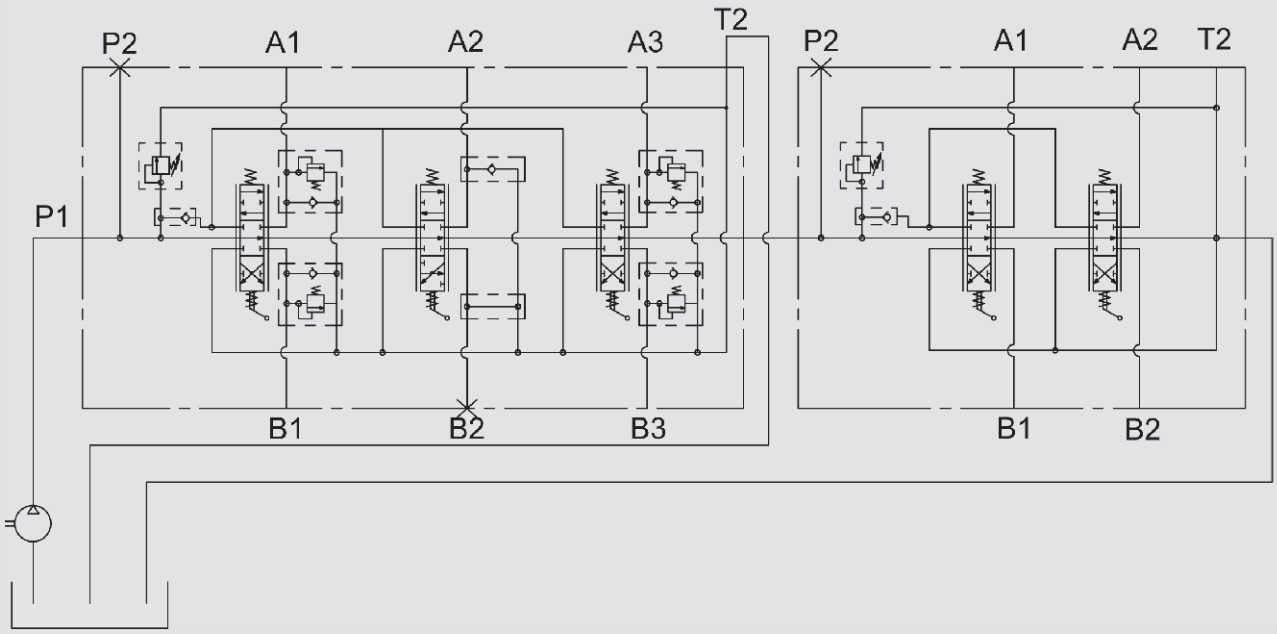
## High pressure carry-over flange kit SC250

The type SC250 flange kit is used to connect valve blocks in series, without any pipe or hose.

For RM 270 light Super Rapid see page 10.



## High pressure carry-over




When high pressure carry over SG25 or SC250 is used for series mounting, the tank connection T2 for the first valve must always be connected to the tank (see diagram above). Valve blocks connected in series give priority of flow to the first block in the series. This means that there will be no flow at block 2 if block 1 is fully activated.

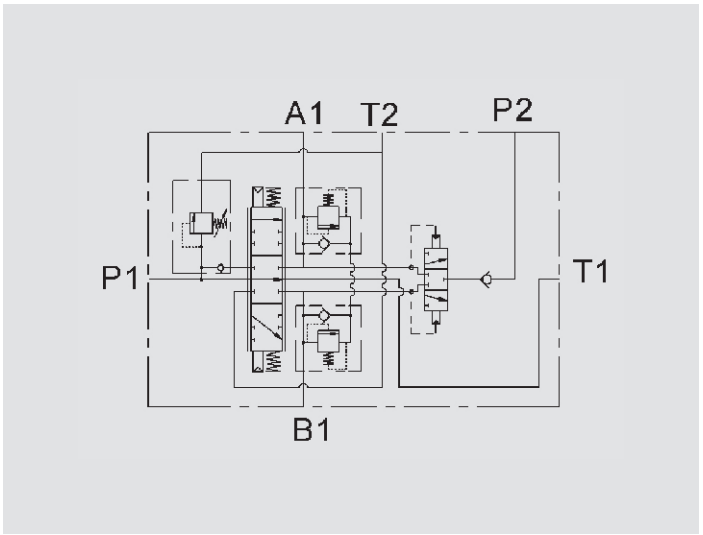
Preliminary Version

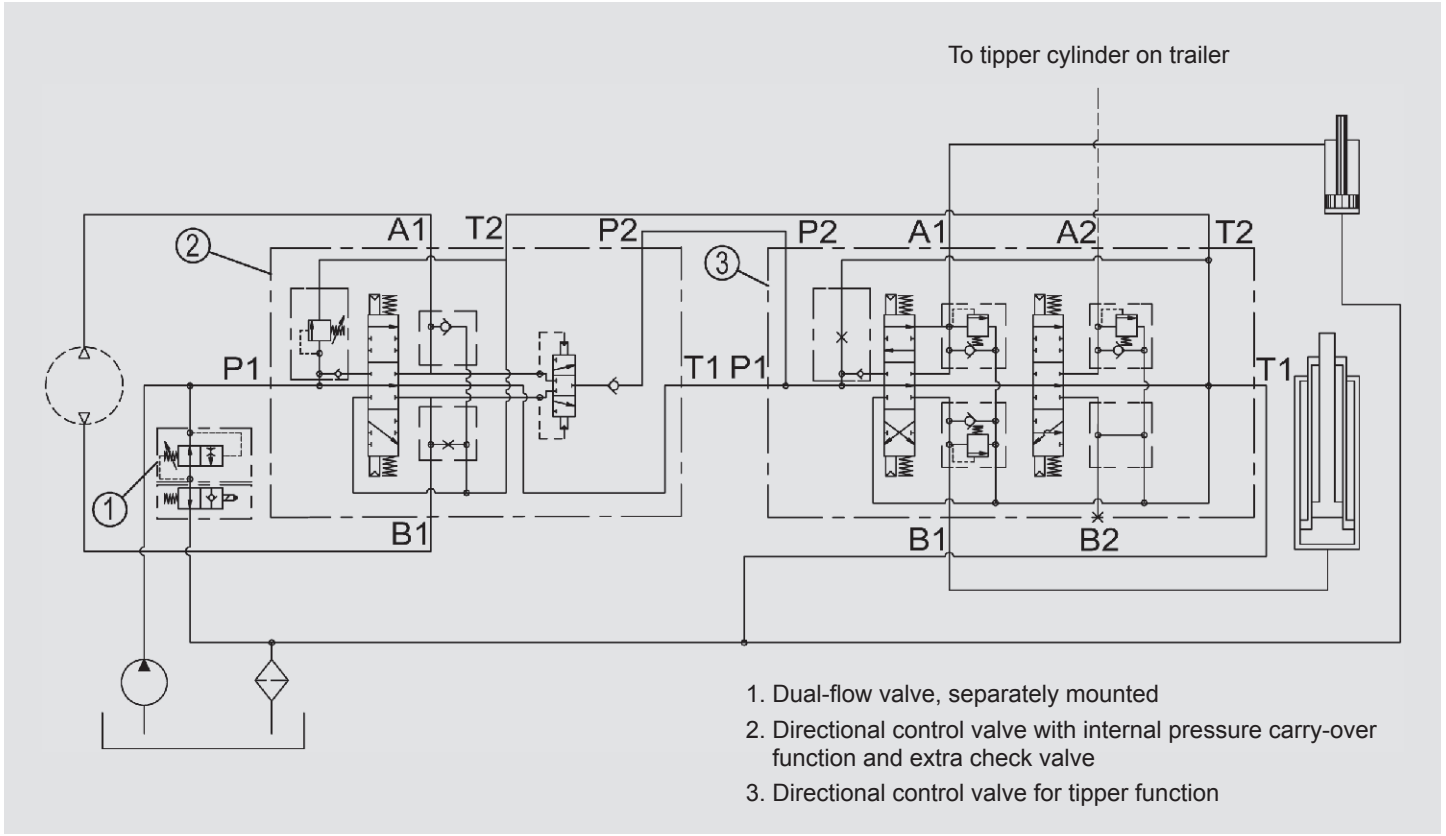
## Integrated pressure carry-over function and extra check valve

The valve is made from a 1 section valve with a shuttle spool to create the pressure carry-over function, and an extra check valve in the pressure line. Carry-over pressure can be obtained from both A and B port, depending of which is used.

The built in shuttle spool makes it possible to use the return flow from, for instance, a hydraulic winch motor on a cable lift, to regulate the downward movement of the tipper cylinder at the same time as the winch pulls the platform on the frame.

The check valve prevents the oil from running backwards in the system when only the tipper valve is used.




1. Dual-flow valve, separately mounted
2. Directional control valve with internal pressure carry-over function and extra check valve
3. Directional control valve for tipper function

# “Super Rapid” – tipping valve configuration

The “Super Rapid” tipping valve is optimized for maximum lowering flow. The multi section valves allows lowering at the same time as another function is pressurized. The valve can be equipped for variable pump operation. The valve is available with 1, 2 and 3 sections.

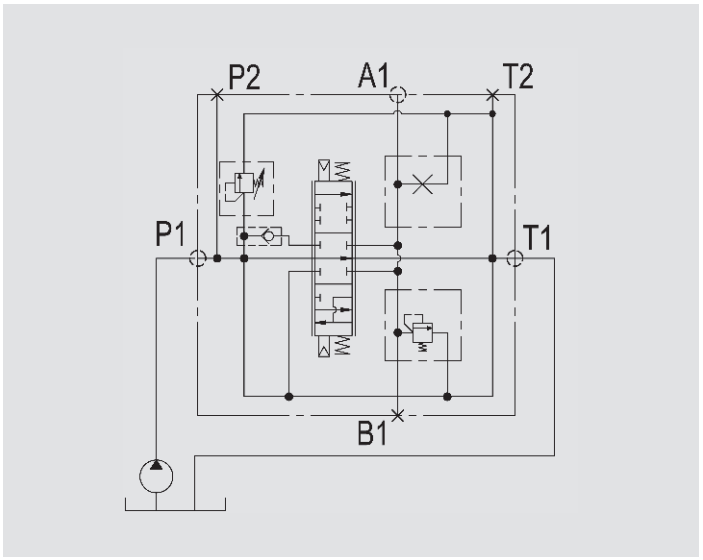
It is not possible to use a high pressure carry-over nipple SG25 or flange kit SC250 in a RM 270 light Super Rapid valve with only one section.

Each valve section can be provided with a pressure relief valve, an anticavitation valve or a combination of these.

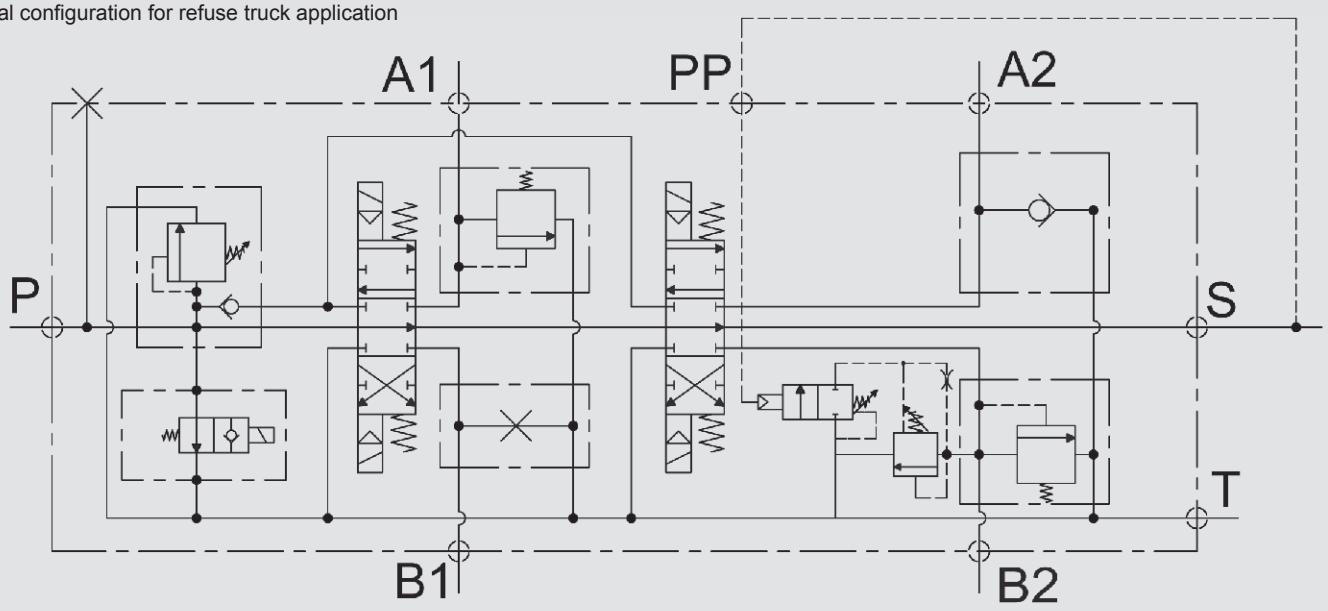
The valve can be provided with pneumatic or electro/pneumatic spool control.

**Technical data**

| | |
|---|---|
| Max. system pressure: | 210 bar (21.0 MPa) |
| Max. return pressure: | 20 bar (2.0 MPa) |
| Max. lowering flow: | 185 l/min |




Typical configuration for refuse truck application




The valve can be configured for refuse vehicles. Typical is 1 four-sectional valve or 2 two-sectional valves for the functions tailgate, packing and exhaust. The pressure to the exhaust cylinder is controlled of the packing pressure so that the pressure is low during the packing cycle but high during exhaust. The circuit shows a two sectional valve with the functions tailgate on section 1 and exhaust on section 2. The valve for the packing functions is supplied from port S.

## Notes

## Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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31-02-RM270-07/04.13

HYDAC INTERNATIONAL

X-Series

# Load-Sensing Sectional Control Block

## LX-6

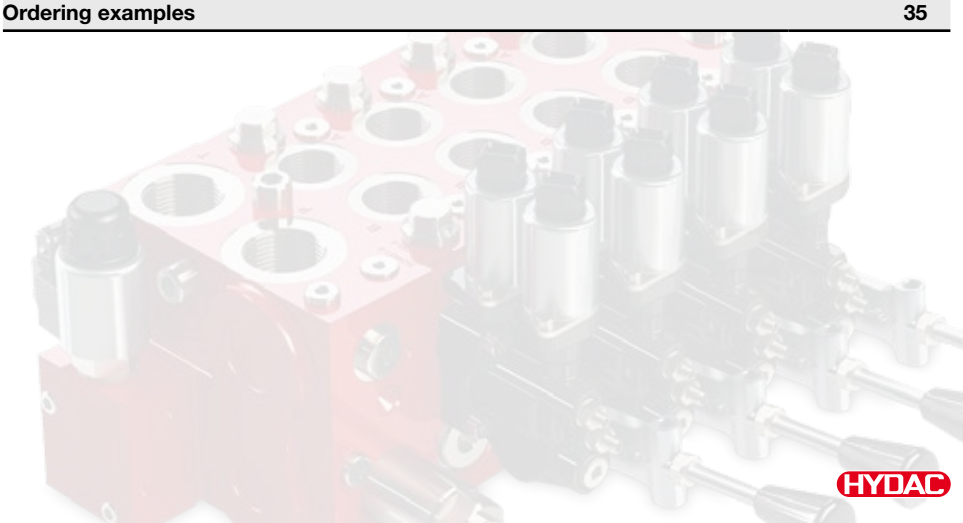
Nominal pressure: 5076 psi (350 bar)

Nominal flow rate

- Pump port: 66 gpm (250 l/min)
- Working ports: 42 gpm (160 l/min) with compensator and load holding function

## Table of contents





MHD1503-1675 LX6 PN#02202547

## Product features

- Load pressure independent flow control with
  - Open Center (OC) system for fixed displacement pump
  - Closed Center (CC) system for variable displacement pump
- Flow-optimized valve design
- High mechanical and electrical resolution
- Compact size and low weight
- Modular design up to 8 working sections
- Types of operation (with/without hand lever):
  - Hydraulic
  - Electrohydraulic (on/off, proportional)
- Application-specific main spools with adjustable stroke limiter
- Shock/anti-cavitation valves for protection of actuators
- Adjustable load sense pressure limitation (mechanically or electro proportionally) causes the compensator to block flow to the working ports A or B independently
- Direct-mounted option blocks for remote control of LS and pilot oil supply
- End plates with additional pilot oil supply options
- Areas of application:
  - Cranes
  - Lifting platforms
  - Drilling machinery
  - Construction
  - Agriculture
  - Forestry
  - Municipal vehicles
  - Truck applications
  - Stationary applications

## General information and functional description

The LX-6 is a proportional directional control valve according to the load-sensing principle pre compensated.

The nominal flow rate to the working ports A and B is 160 l/min. The main spool 2.1 determines the flow direction and magnitude of flow rate.

Pressure control valves 2.4.3 and 2.4.4 are providing shifting pressure to the left and right side of the main spool 2.1 to control its position. The level of electric current determines the level of pilot pressure and therefore the position of the main spool.

Adjustable stroke limiters 2.4.1 and 2.4.2 can be set mechanically to limit the maximum flow rate to the working ports A and B.

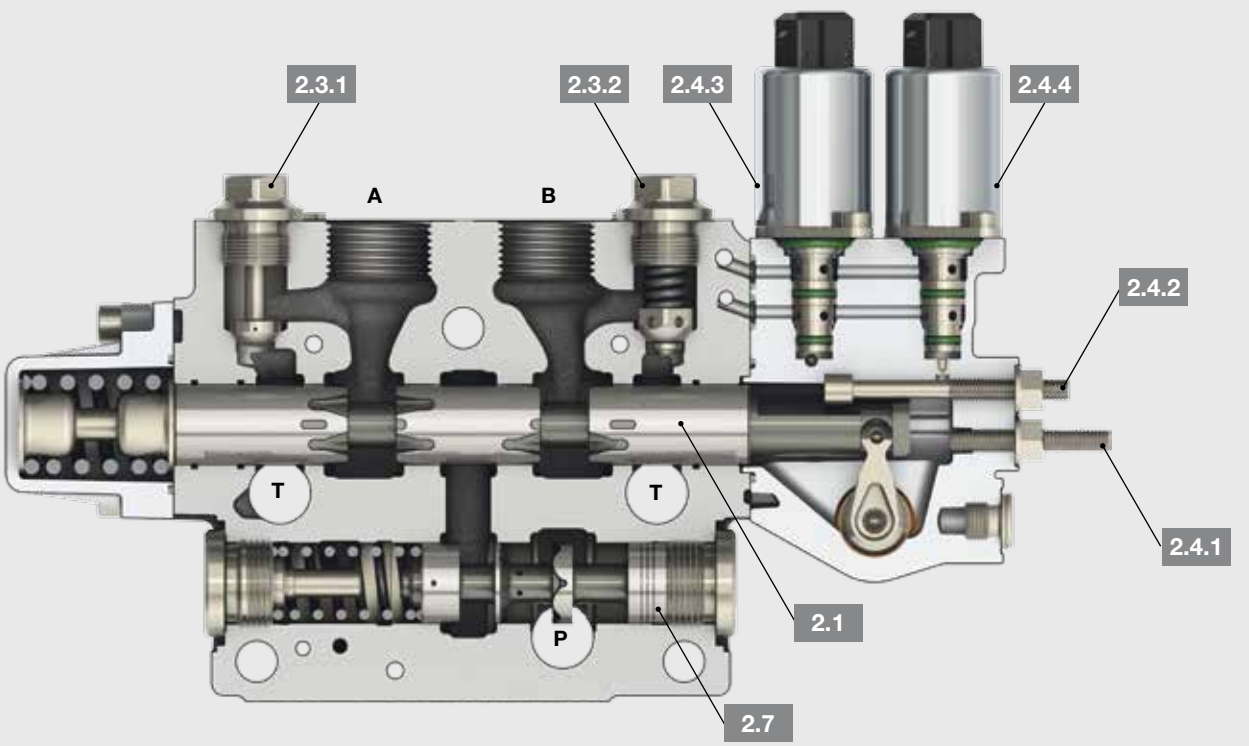
The pressure compensator 2.7 keeps the flow rate to the actuator constant, even if the system pressure varies. Pressure changes at the pump or working ports A and B are compensated for each working section individually.

The maximum operating pressure can be adjusted by LS pressure limitation for working ports A and B separately.

Shock / anti-cavitation valves 2.3.2 protect the working ports A and B from pressure peaks. Anti-cavitation valves 2.3.1 protect the system from cavitation.

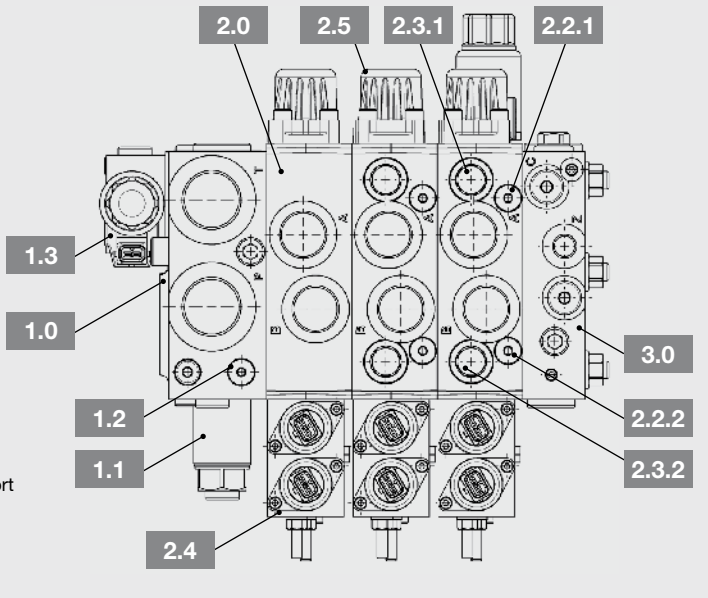
Shuttle valves are integrated into the working sections to signal the highest load pressure for the valve stack to the inlet plate or variable displacement pump.

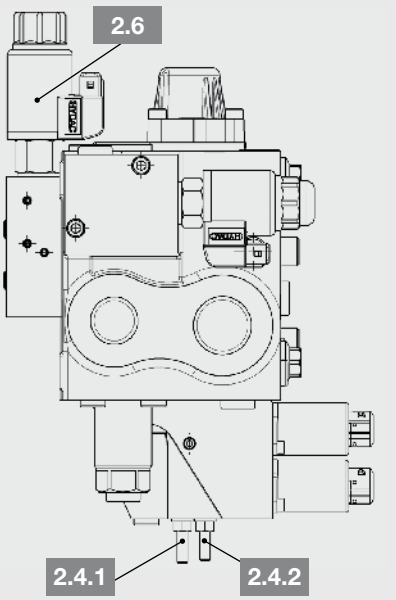
## Overview




| | | | |
|---|---|---|---|
| 2.7 | Pressure compensator | 2.4.1 | Stroke limiter port A (clockwise rotation) |
| 2.1 | Main spool | 2.4.2 | Stroke limiter port B (counterclockwise rotation) |
| 2.3.1 | Workport valve port A (anti-cavitation valve) | 2.4.3 | Pressure control valve port A |
| 2.3.2 | Workport valve port B (shock / anti-cavitation valve) | 2.4.4 | Pressure control valve port B |

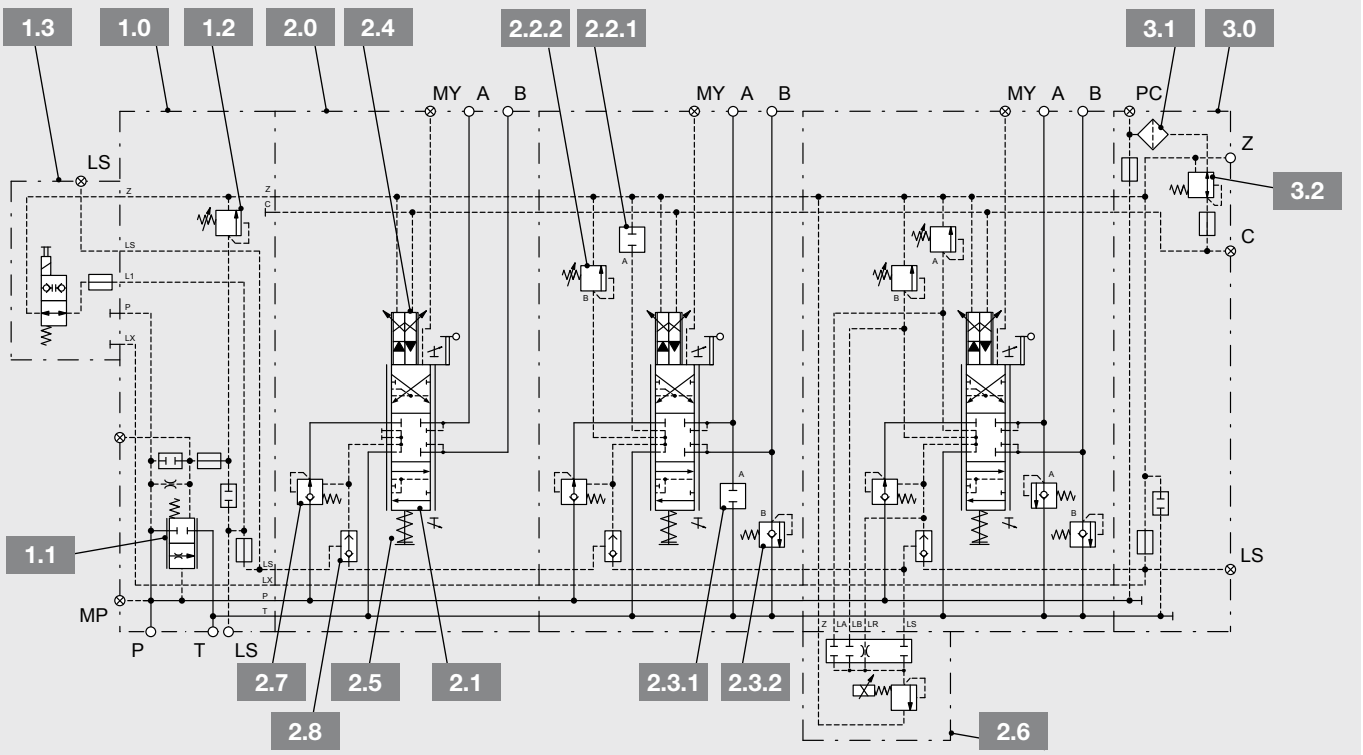
# Overview




**Ports**

| | |
|---|---|
| P | Pump |
| MP | Pump measuring port |
| T | Tank |
| LS | Load-sensing |
| A, B | Working ports |
| C | Pilot oil supply |
| Z | Pilot drain |
| MY | Pilot pressure measuring port (port B) |




| | | | |
|---|---|---|---|
| 1.0 | Inlet plate | 2.4 | Operation unit |
| 1.1 | Main axis of 3-way flow controller or pump pressure limiter | 2.4.1 | Stroke limiter of main spool port A |
| 1.2 | Pilot pressure relief valve of main axis 1.1 | 2.4.2 | Stroke limiter of main spool port B |
| 1.3 | Option block for inlet plate | 2.5 | Spring cap |
| 2.0 | Working section | 2.6 | Option block for working section |
| 2.1 | Main spool | 2.7 | Pressure compensator |
| 2.2.1 | LS pressure limitation port A | 2.8 | LS shuttle valve |
| 2.2.2 | LS pressure limitation port B | 3.0 | End plate |
| 2.3.1 | Workport valve port A | 3.1 | Filter element |
| 2.3.2 | Workport valve port B | 3.2 | Pressure reducing valve for internal pilot oil supply |

# Technical data

| | | |
|---|---|---|
| **General data and operating conditions** | | |
| No. of working sections: | | 1–8 [1] |
| Installation position: | | Optional |
| Mass in lbs (kg): | Inlet plate CL17 / UL17 / UL17F | 13.4 / 13.2 / 13.0 (6.1 / 6.0 / 5.9) |
| | Option block UD1 / UW 1... | 0.9 / 2.4 (0.4 / 1.1) |
| | Working section B6 / LS 6 / LS6F | 11.2 / 10.4 / 10.1 (5.1 / 4.7 / 4.6) |
| | Operation unit H... / E... | 0.9 / 2.0 (0.4 / 0.9) |
| | Hand lever 1 / 2 / 3 | 0.2 (0.1) |
| | Option block LD1 / LW... / LW1... | 0.7 / 2.6 / 3.5 (0.3 / 1.2 / 1.6) |
| | End plate ER1 / ER 2 / ER27 / ER2F | 8.8 / 8.6 / 9.3 / 8.6 (4.0 / 3.9 / 4.2 / 3.9) |
| | Option block E1C | 1.5 (0.7) |
| | Tie rod for working sections 2 / 4 / 6 / 8 | 0.7 / 1.1 / 1.5 / 1.8 (0.3 / 0.5 / 0.7 / 0.8) |
| Connection type (thread type): | | BSPP (acc. to ISO 1179-1); SAE (acc. to ISO 11926-1 or SAE J1626) |
| Ambient temperature range: | | -4 to 140°F (-20 to +60 °C) [1] |
| Hydraulic fluid temperature range: | | -4 to 176°F (-20 to +80 °C) [1] |
| Painting: | | Standard primer and top coat RAL 9005 on inquiry |
| **Hydraulic data** | | |
| Nominal flow rate | P / A, B | 66 gpm / 42 gpm (250 l/min / 160 l/min) |
| Nominal pressure | | 5076 psi (350 bar) |
| Max. operating pressure at port: | P / A, B | 5076 psi / 6092 psi (350 bar / 420 bar) |
| | T | 435 psi (30 bar) for external drained tank line Z<br>145 psi (10 bar) for internal connection Z → T |
| | Z | Drained to tank |
| Max. pilot pressure at port C / X, Y | | 435 psi (30 bar) |
| Pilot pressure range | | 94 to 290 psi (6.5 to 20 bar) hydraulic<br>65 to 290 psi (4.5 to 20 bar) electrohydraulic |
| Required control Δp at the control block | | 247 psi (17 bar) |
| Hydraulic fluid | | Mineral oil (HL/HLP) acc. to DIN 51524, other hydraulic fluids on inquiry |
| Viscosity range | | 10 – 400 $mm^2/s$ |
| Max. permitted degree of contamination of the hydraulic fluid | | 20/18/15 acc. to ISO 4406 (c)<br>Please contact HYDAC Filtration Technology to ensure system cleanliness |
| **Electrical data** | | |
| Supply voltages | | 12 V DC / 24 V DC |
| Solenoid data | | See section “Operation units” and “Solenoid valves and coils” |
| Connector type and IP protection class (with mating connector mounted and locked) | | AMP Junior Timer, 2-pin, axial / up to IP6K6 [2]<br>Deutsch DT04, 2-pin, axial / up to IPX9K [2] |
| Amplifiers and control devices | | See Product Catalogue 18.500 – Control Technology for Mobile Machines |

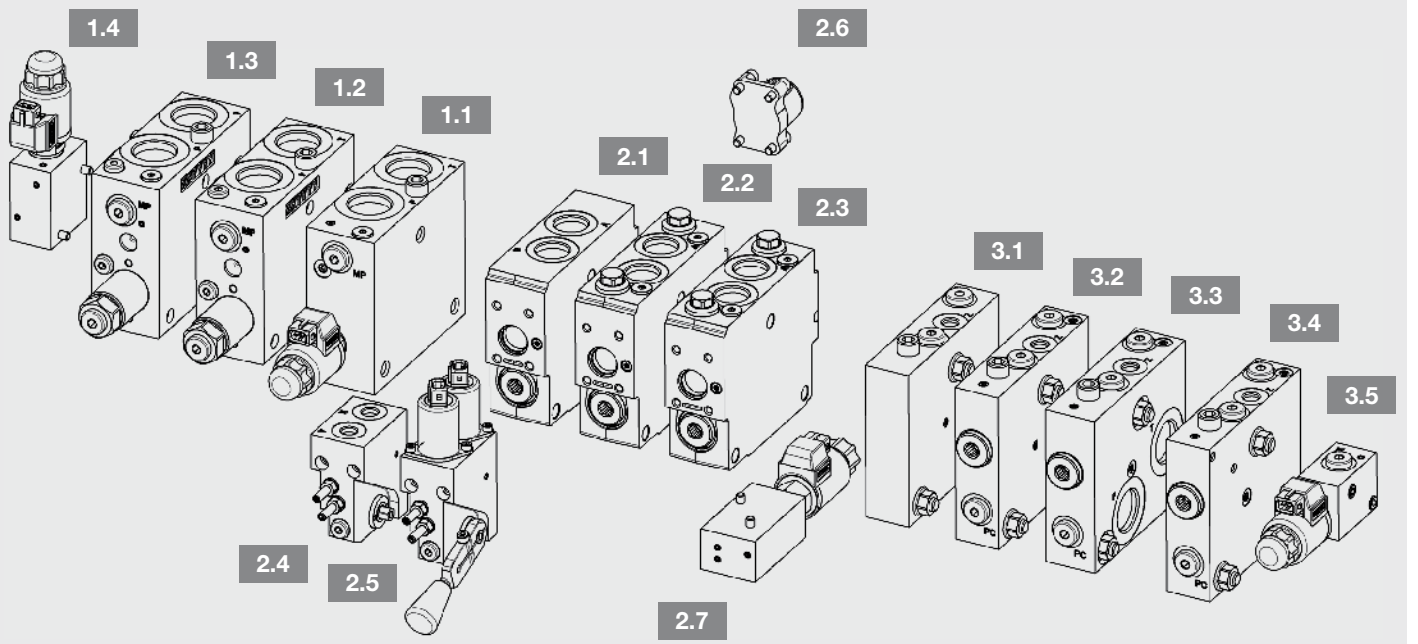
[1] Deviation of data on inquiry only
[2] Mating plug-in connectors are not included

⚠ The technical data and characteristic curves were determined at a viscosity of 32 $mm^2/s$

## Modular structure

The LX-6 can be customised to different applications and machines.
The principle sectional design and modular structure consists of an inlet plate, max. 8 working sections and an end plate.
A complete control block is defined by a type code system.

### Setup with left hand inlet plate




### Type code structure

General

**LX-6 _ _ / S 0**

- **Connection type B (BSPP) or S (SAE)**
- **No. of working sections (01-08)**

Inlet plate

**UL17F / ... / UW1...**

| | |
|---|---|
| 1.1 | Inlet plate CL17 |
| 1.2 | Inlet plate UL17 |
| 1.3 | Inlet plate UL17F |
| 1.4 | Option block UD1, UW1... |

Working section

**LS6F / ... / LW...**

| | |
|---|---|
| 2.1 | Working section B6 |
| 2.2 | Working section LS6 |
| 2.3 | Working section LS6F |
| 2.4 | Hydraulic operation HY |
| 2.5 | Electrohydraulic operation E1Y, EY |
| 2.6 | Spring cap |
| 2.7 | Option block LD1, LW..., LW1... |

End plate

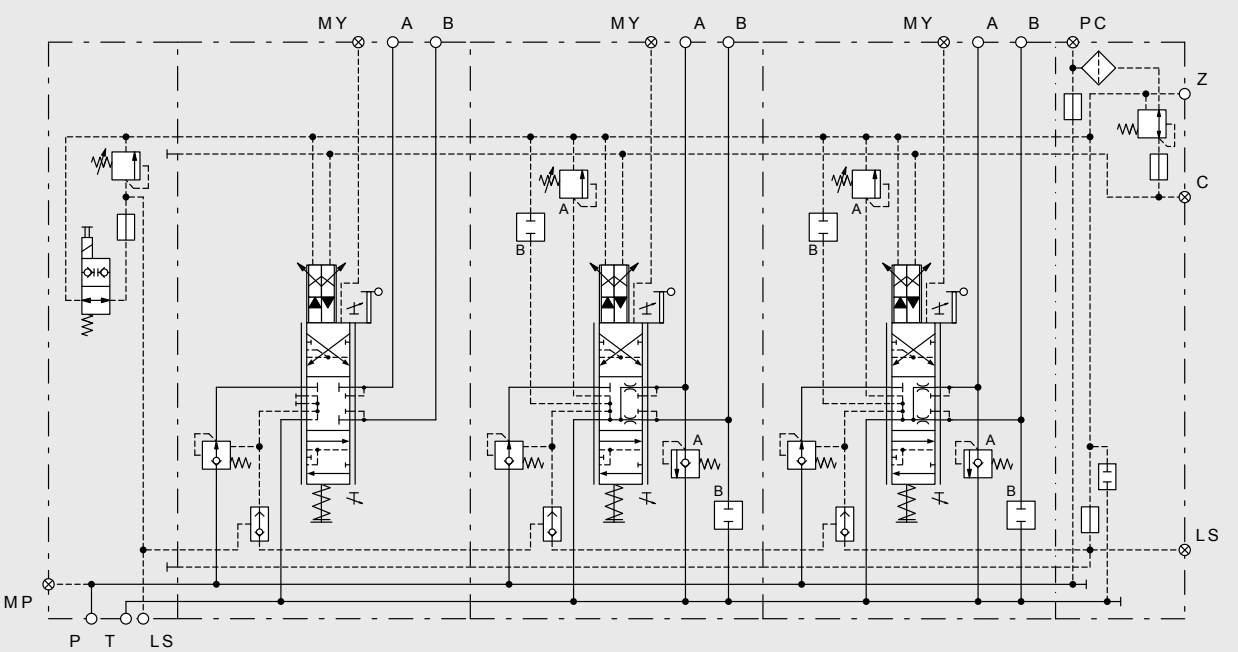
**ER2F / ... / E1C...**

| | |
|---|---|
| 3.1 | End plate ER1 |
| 3.2 | End plate ER2 |
| 3.3 | End plate ER27 |
| 3.4 | End plate ER2F |
| 3.5 | Option block E1C |

# Example of block specifications and type code

Example: control block for hydraulic system with variable displacement pump (CC system)

| Type code | Control block specification | |
|---|---|---|
| Valve type | LX-603 | LX-6 with 3 working sections |
| **LX-603 / S0** | S0 | SAE connection type, valve series 0 |
| Inlet plate | CL17 | Left hand inlet plate for CC systems, w/o primary pressure limiter |
| **CL17 / 300 / V2D** | 300 | LS pressure relief valve set to 300 bar |
| | V2D | LS unloading valve (normally open) with 24 V solenoid and connector type Deutsch DT04-2P |
| Working section 1 | B6 | Basic section type w/o LS or workport valves |
| **B6 / CS160-160RN / EYHS2D-1 / C1E** | CS – RN | - Main spool type CS (closed in neutral position)<br>- Flow rate at working port A and B 160 l/min<br>- Pressure compensator with load holding function, spring type N |
| | EYHS2D-1 | - Electrohydraulic operation and measuring port MY<br>- Hand lever axis and stroke limiter<br>- 24 V solenoid and connector type Deutsch DT04-2P<br>- Hand lever type 1 |
| | C1E | Spring cap for electrohydraulic operation |
| Working sections 2 and 3 | LS6 | Working section with LS and workport valves |
| **LS6 / CR050-050RG / 200 – P / 250 – P / EYHS2D-1 / C1E** | CR – RG | - Main spool type CR (unloaded in neutral position)<br>- Flow rate at working port A and B 50 l/min<br>- Pressure compensator with load holding function, spring type G |
| | 200 – P | LS pressure limitation port A 200 bar, port B plug screw |
| | 250 – P | Shock valve port A 250 bar, port B plug screw |
| | EYHS2D-1 | - Electrohydraulic operation and measuring port MY<br>- Hand lever axis and stroke limiter<br>- 24 V solenoid and connector type Deutsch DT04-2P<br>- Hand lever type 1 |
| | C1E | Spring cap for electrohydraulic operation |
| End plate | ER2 | Right hand end plate with internal pilot oil supply and external drained tank line |
| **ER2 / 0** | 0 | No options (standard) |



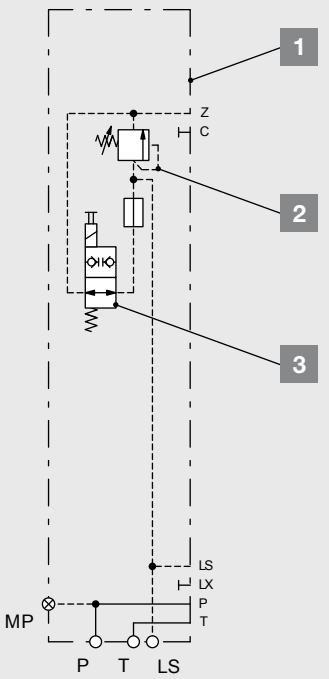
# Inlet plate CL17

## Type code

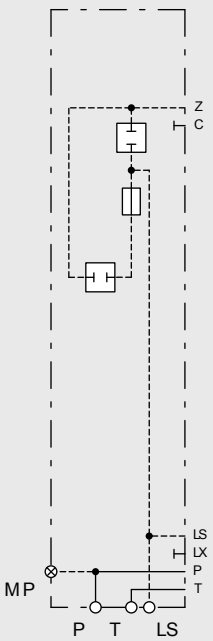
**CL17 / 300 / V2D**

| 1 | 2 | 3 |
|---|---|---|

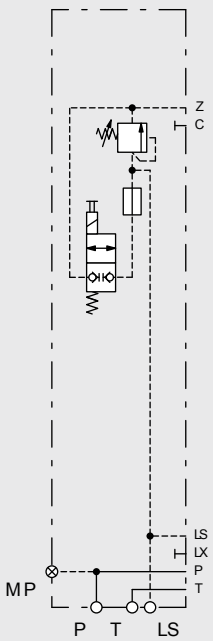
**CL17/_ _ _/_ _ _**



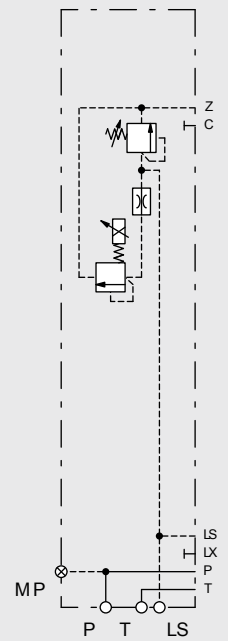

**CL17/P/P**




**CL17/250/W2A**




**CL17/300/P0A1D**




⚠ Unloading the LS circuit with the option valves V and W 3 will not block the flow to the working ports A and B completely when the main spool is out of neutral position.

Regardless of viscosity or parallel operation, the working pressure during blocking can be up to 15 bar depending on the selected pressure compensator spring type.

For working sections without pressure compensator (load holding function only), the stand-by pressure of the variable displacement pump has to be taken into account.

Note: Other inlet configurations available. Consult factory.

| | | |
|---|---|---|
| **1** | **Basic type** | |
| | **C** | Closed Center system for variable displacement pump |
| | **L** | Left hand side |
| | **1** | Version |
| | **7** | Port size P / T |
| **2** | **LS pressure relief valve** | |
| | **_ _ _** | Pressure setting in bar, 3-digit, max. 5076 psi (350 bar) |
| | **P** | Plug screw |
| **3** | **Option valve for LS circuit**[1] | |
| | **P** | Plug screw |
| | **V_ _** | LS unloading Normally open (Manual emergency operation) |
| | **W_ _** | LS unloading Normally closed (Manual emergency operation) |
| | **P0A_ _** | Electro-proportional pressure adjustment Pressure stage A: 350 bar<br>12 V: $I_{max}$ = 1,500 mA<br>24 V: $I_{max}$ = 750 mA |
| | ⚠ | The electro-proportional pressure relief valve P0A is not suitable for acting as an LS unloading valve.[1] |
| | **Solenoid (supply voltage, connector type)** | |
| | **1_** | 12 V |
| | **2_** | 24 V |
| | **_A** | AMP Junior Timer |
| | **_D** | Deutsch DT04-2P |

### Example configurations

**CL17/P/P**

- Basic type CL17
- w/o LS pressure relief valve (plug screw)
- w/o LS option valve (plug screw)

**CL17/300/P0A1D**

- Basic type CL17
- LS pressure relief valve set to 300 bar
- LS option valve type P0A, electro-proportional pressure adjustment (pressure stage A: 350 bar)
- 12 V solenoid and connector type Deutsch DT04-2P

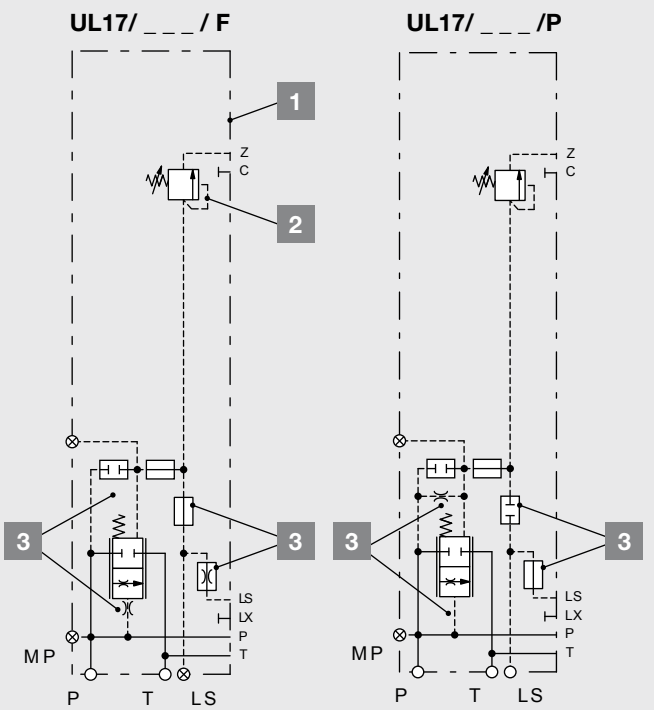
[1] See section “Solenoid valves and coils”

## Type code

**UL17 / 250 / F**

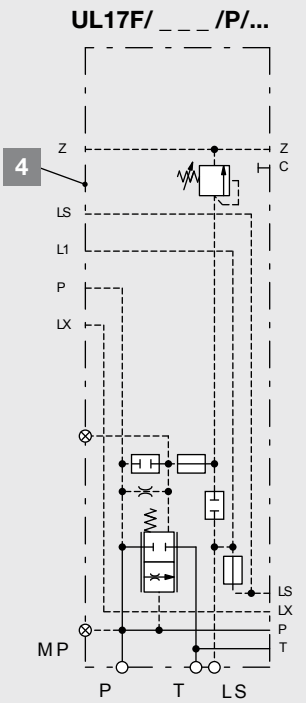
**UL17F / 300 / P / UW1V2D**

1 2 3 4




**Flange channels**

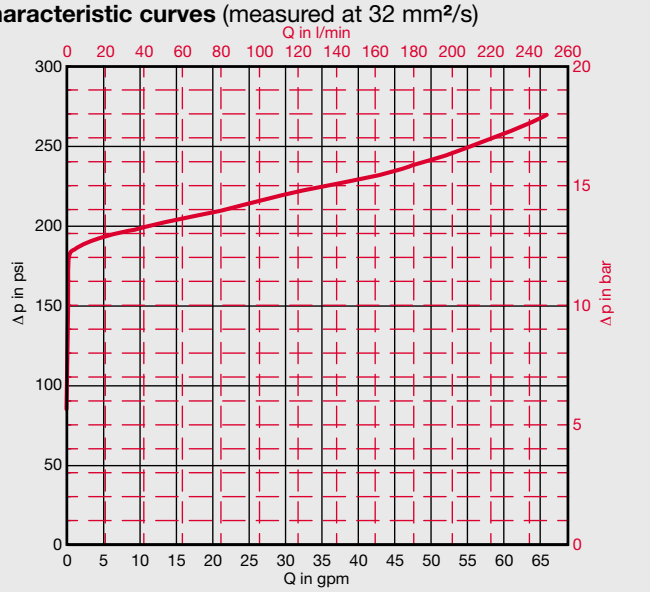
| | |
|---|---|
| Z | Pilot drain |
| LS | Load-sensing |
| L1 | Load signal 1 |
| P | Pump |
| LX | Load signal X[1)] |



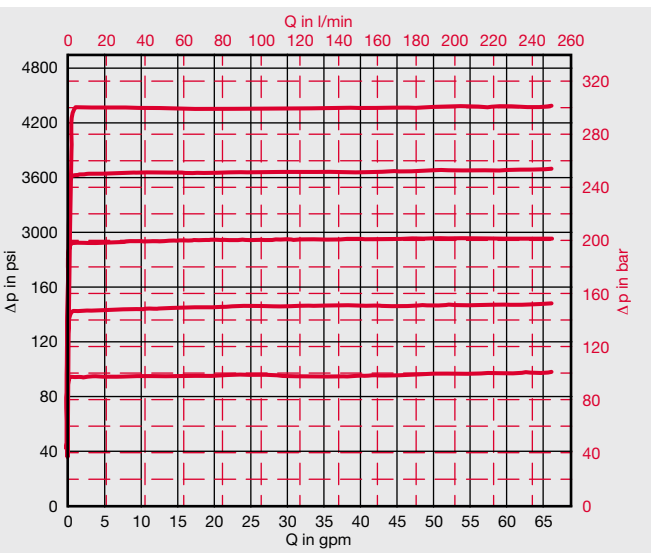

[1)] Separate, internal channel for optional functions

| | | |
|---|---|---|
| **1** | **Basic type** | |
| | U | Universal plate for OC and CC systems |
| | L | Left hand side |
| | 1 | Version |
| | 7 | Port size P / T |
| | F | Flange interface for option blocks |
| **2** | **Pilot pressure relief valve of main axis** | |
| | _ _ _ | Pressure setting in bar, 3-digit, max. 350 bar |
| | P | Plug screw |
| **3** | **Logic of main axis** | |
| | F | 3-way flow controller for fixed displacement pump |
| | P | Pump pressure relief valve for variable displacement pump |
| **4** | **Option block for basic type UL17F** | |

**Characteristic curves** (measured at 32 mm²/s)




Open Center circulation pressure P → T




Pressure relief function P → T

# Option blocks for inlet plate UL17F

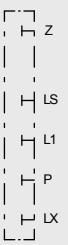
## Type code

**UL17F / 300 / P / UW1V2D**

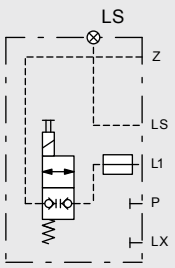
**Flange channels**

| | |
|---|---|
| Z | Pilot drain |
| LS | Load-sensing |
| L1 | Load signal 1 |
| P | Pump |
| LX | Load signal X |

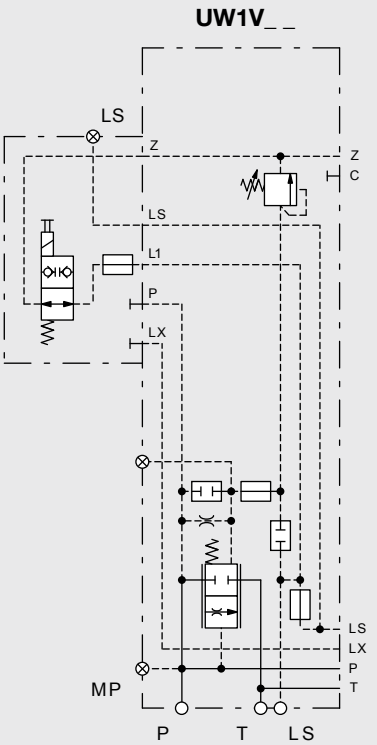
**UD1**



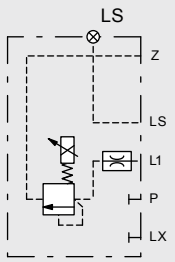

**UW1W_ _**




**UW1V_ _**




**UW1P0A_ _**




### Example configurations

**UW1W2A**

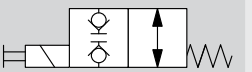
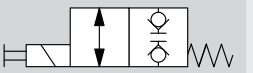
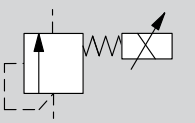
- Basic type UW1
- LS option valve type W, normally closed
- 24 V solenoid and connector type AMP Junior Timer

**UW1P0A1D**

- Basic type UW1
- LS option valve type P0A, electro-proportional pressure adjustment (pressure stage A: 350 bar)
- 12 V solenoid and connector type Deutsch DT04-2P

[1] See section “Solenoid valves and coils”

| Dummy plate | |
|---|---|
| UD | Basic type |
| 1 | Version 1 |

| LS option valves[1] | | |
|---|---|---|
| UW1 | Basic type | |
| V_ _ | LS unloading<br>Normally open<br>(Manual emergency operation) |  |
| W_ _ | LS unloading<br>Normally closed<br>(Manual emergency operation) |  |
| P0A_ _ | Electro-proportional<br>pressure adjustment<br>Pressure stage A: 350 bar<br>12 V: $I_{max}$ = 1,500 mA<br>24 V: $I_{max}$ = 750 mA |  |

⚠ The electro-proportional pressure relief valve P0A is not suitable for acting as an LS unloading valve.[1]

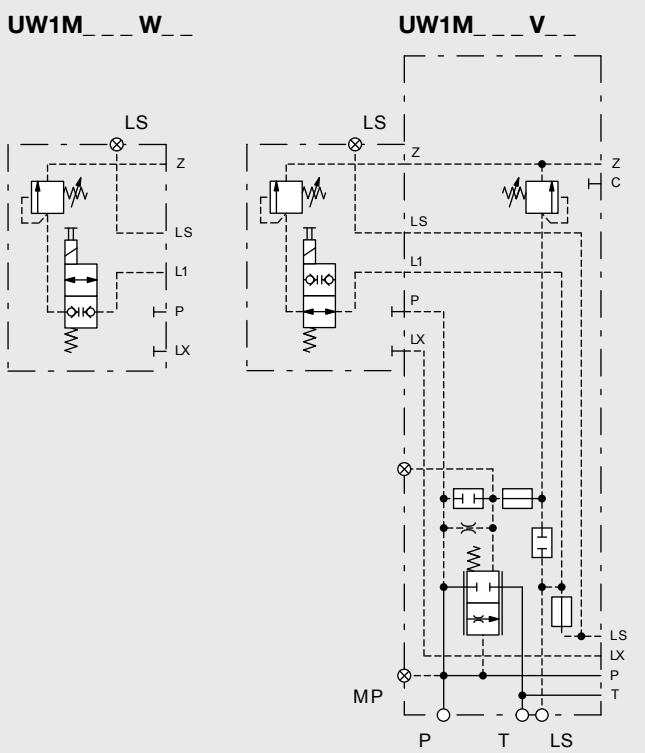
| Solenoid (supply voltage, connector type) | |
|---|---|
| 1_ | 12 V |
| 2_ | 24 V |
| _A | AMP Junior Timer |
| _D | Deutsch DT04-2P |

⚠ Unloading the LS circuit with the option valves V and W will not block the flow to the working ports A and B completely when the main spool is out of neutral position.

Regardless of viscosity or parallel operation, the working pressure during blocking can be up to 15 bar depending on the selected pressure compensator spring type.

For working sections without pressure compensator (load holding function only), the stand-by pressure of the variable displacement pump or circulation pressure of the fixed displacement pump has to be taken into account.

# Option blocks for inlet plate UL17F




**Example configurations**

**UW1M200W2A**

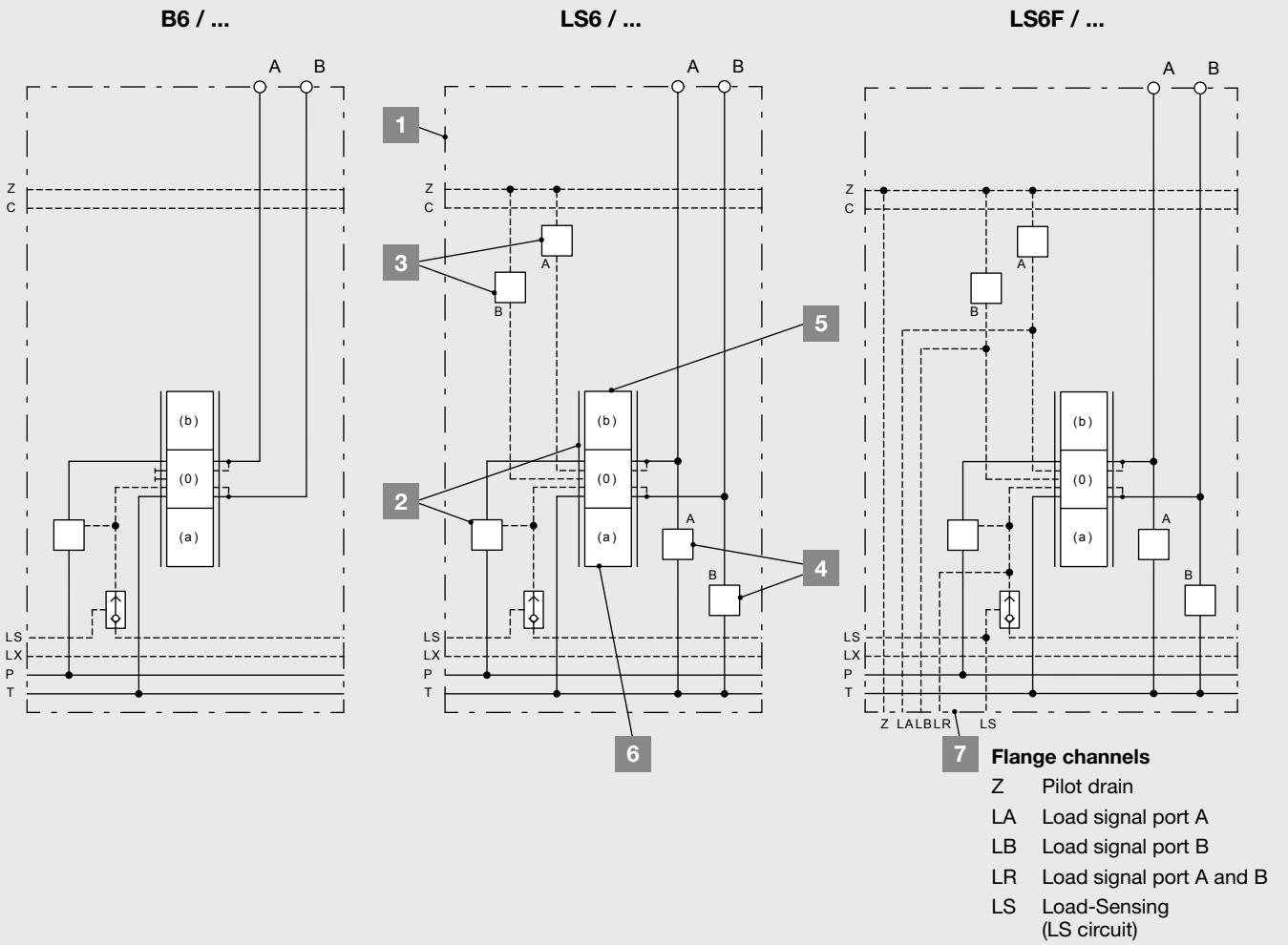
- Basic type UW1M
- LS pressure relief valve set to 200 bar
- LS option valve type W, normally closed
- 24 V solenoid and connector type AMP Junior Timer

| Switchable LS pressure limitation for LS circuit [1] | |
|---|---|
| UW1M | Basic type |
| _ _ _ | Pressure setting in bar, 3-digit, max. 350 bar |
| V_ _ | Normally open (Manual emergency operation) |
| W_ _ | Normally closed (Manual emergency operation) |

| Solenoid (supply voltage, connector type) | |
|---|---|
| 1_ | 12 V |
| 2_ | 24 V |
| _A | AMP Junior Timer |
| _D | Deutsch DT04-2P |

[1] See section “Solenoid valves and coils”

# Working sections B6 / LS6 / LS6F




**Flange channels**

| | |
|---|---|
| Z | Pilot drain |
| LA | Load signal port A |
| LB | Load signal port B |
| LR | Load signal port A and B |
| LS | Load-Sensing (LS circuit) |

## Type code

**B6** / CR160-160RN / EYHS2D-1 / C1E

**LS6** / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E

**LS6F** / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|

| | | |
|---|---|---|
| 1 | Basic type | |
| | B6 | Basic section type w/o LS pressure limitation and workport valves |
| | LS6 | Working section with LS pressure limitation and workport valves |
| | LS6F | Working section with LS pressure limitation and workport valves Flange interface for option blocks |
| | | Port size 6 for working ports A / B |
| 2 | Main spool and pressure compensator | |
| 3 | LS pressure limitation | |
| 4 | Workport valves | |
| 5 | Operation unit | |
| 6 | Spring cap | |
| 7 | Option block for basic type LS6F | |

# Main spool and pressure compensator

## Type code

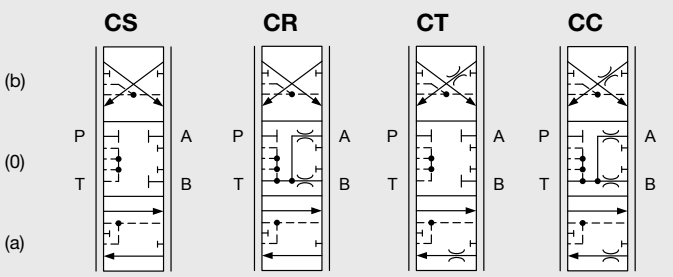
**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

**Examples**

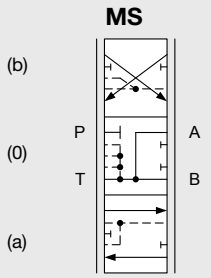
| | | | | | |
|---|---|---|---|---|---|
| **CR** | **160** | **-** | **160** | **R** | **N** |
| **MS** | **180** | **-** | **180** | **L** | |
| 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 |

| | |
|---|---|
| 2.1 | Basic type of main spool |
| 2.2 | Max. flow at port A to actuator in l/min |
| 2.3 | Characteristic curve and overlap |
| 2.4 | Max. flow at port B to actuator in l/min |
| 2.5 | Basic type of pressure compensator / load holding function |
| 2.6 | Pressure compensator spring type |

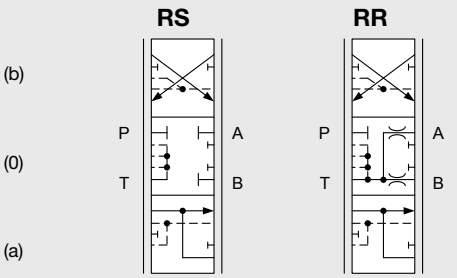
### Basic type of main spool




| Cylinder as actuator | |
|---|---|
| CS | 4/3 directional valve closed in neutral position |
| CR | 4/3 directional valve unloaded in neutral position |
| CT | 4/3 directional valve closed in neutral position<br>20 bar return orifice for A and B → T<br>to support system stability |
| CC | 4/3 directional valve unloaded in neutral position<br>20 bar return line orifice for port A and B → T<br>to support system stability |



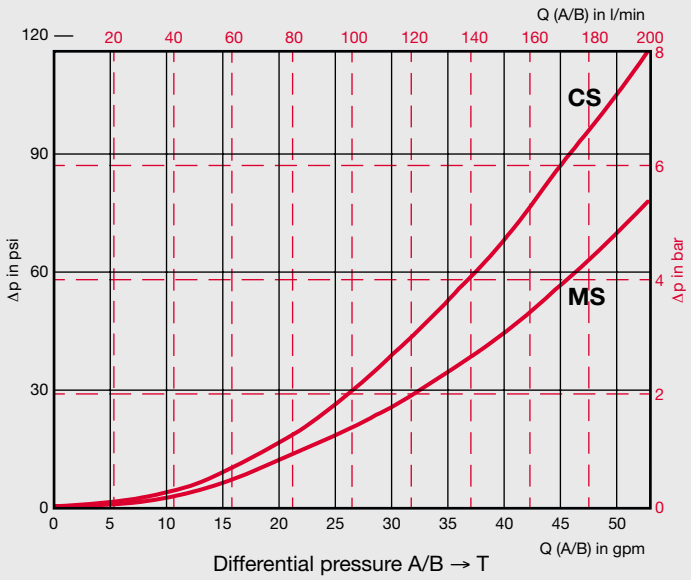

| Motor as actuator | |
|---|---|
| MS | 4/3 directional valve open in neutral position |




| Regeneration function | |
|---|---|
| RS | 4/3 directional valve closed in neutral position<br>Regeneration function in spool position (a) |
| RR | 4/3 directional valve unloaded in neutral position<br>Regeneration function in spool position (a) |

⚠ Other spool types and configurations on inquiry

**Characteristic curves** (measured at 32 mm²/s)




**CS**: Cylinder spool type – nominal control edge size: 08
**MS**: Motor spool type – nominal control edge size: 08

# Main spool and pressure compensator

## Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

| CR | 160 | - | 160 | R | N |
|---|---|---|---|---|---|
| 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 |

### Main spool flow range

**Symmetrical spools** 2.2 2.4 2.5 2.6

| Max. flow rate to actuator in l/min (Port A - Port B) | | | | | | | | Pressure compensator | Pressure compensator spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Type | Type | Identifier |
| 180 - 180 | 150 - 150 | 125 - 125 | 090 - 090 | 062 - 062 | 045 - 045 | 030 - 030 | 020 - 020 | R | Y | Yellow |
| 170 - 170 | 138 - 138 | 116 - 116 | 085 - 085 | 058 - 058 | 042 - 042 | 028 - 028 | 019 - 019 | R | W | Blue |
| **160 - 160** | **130 - 130** | **110 - 110** | **080 - 080** | **055 - 055** | **040 - 040** | **027 - 027** | **018 - 018** | **R** | **N** | **None** |
| - | - | 100 - 100 | 072 - 072 | 050 - 050 | 036 - 036 | 025 - 025 | 016 - 016 | R | G | Green |

| Nominal control edge size | | | | | | | |
|---|---|---|---|---|---|---|---|
| 08 - 08 | 07 - 07 | 06 - 06 | 05 - 05 | 04 - 04 | 03 - 03 | 02 - 02 | 01 - 01 |

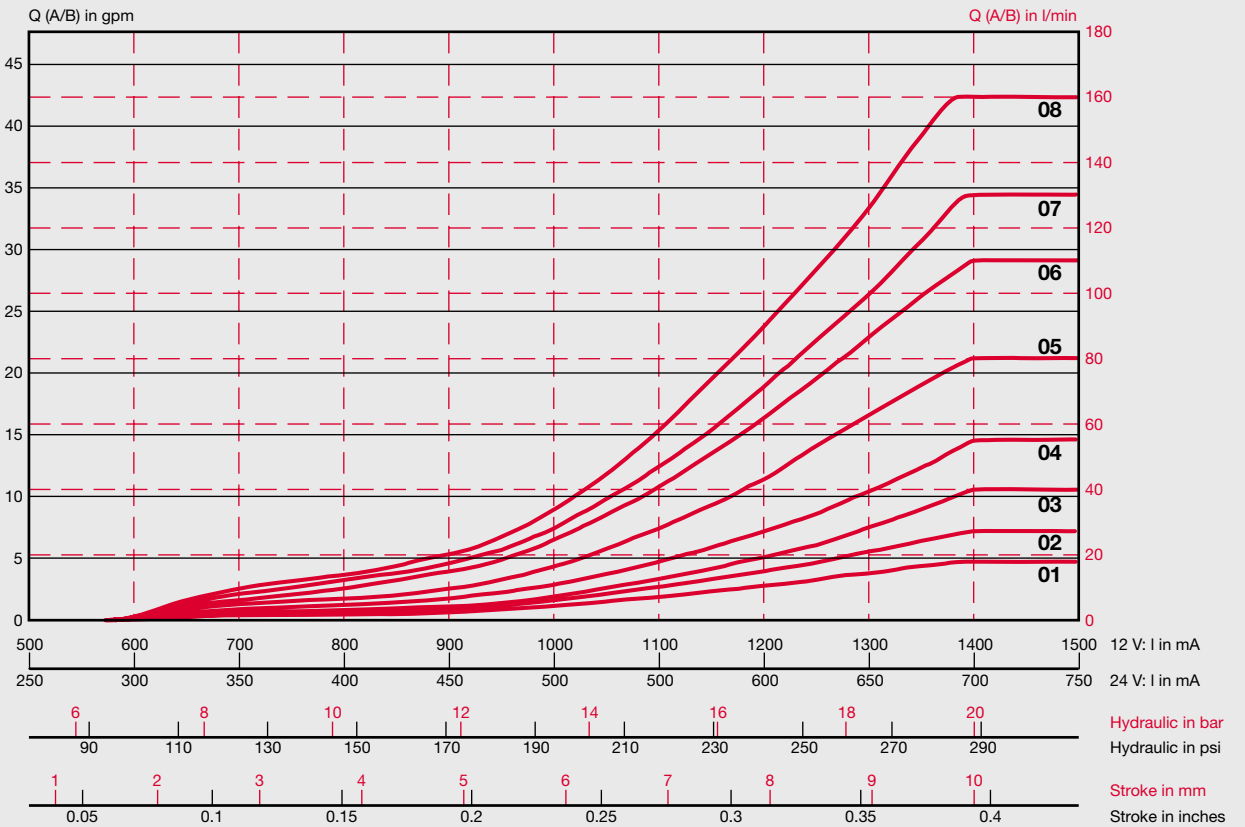
**Asymmetrical spools** (on inquiry)

The main spool for asymmetrical flow rates can only be defined within one row in the table above. The higher flow rate must be assigned to working port A (e.g. 160 – 130, 100 – 036, 150 – 090).

### Characteristic curve and overlap 2.3

| | |
|---|---|
| - | Progressive/positive (standard) |

**Characteristic curves for nominal flow rates of main spool** (measured at 32 mm²/s)




**Example:**

Max. flow to the actuator at working port A and B: 120 l/min

1. See table above: nominal control edge size 06 – 06 with pressure compensator spring Y → Q = 125 – 125 l/min
2. Setting to final target value 120 l/min by stroke limiter

# Main spool and pressure compensator

## Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

| CR | 160 | - | 160 | R | N |
|---|---|---|---|---|---|
| 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 |

### Flow control by section pressure compensator

**Figure A** Main spool in neutral position (Type CR – A/B unloaded to T)

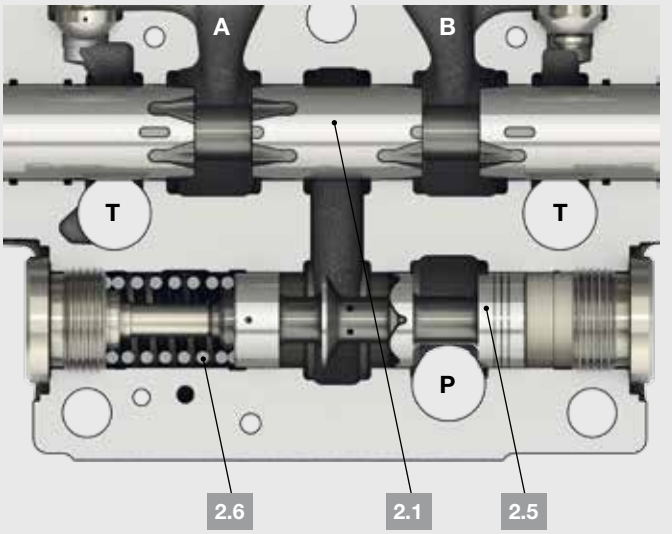
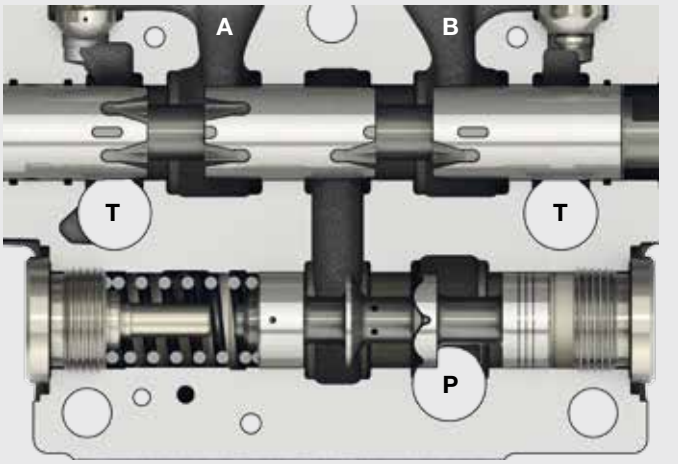



**Figure B** Main spool out of neutral position (P → B, A → T)

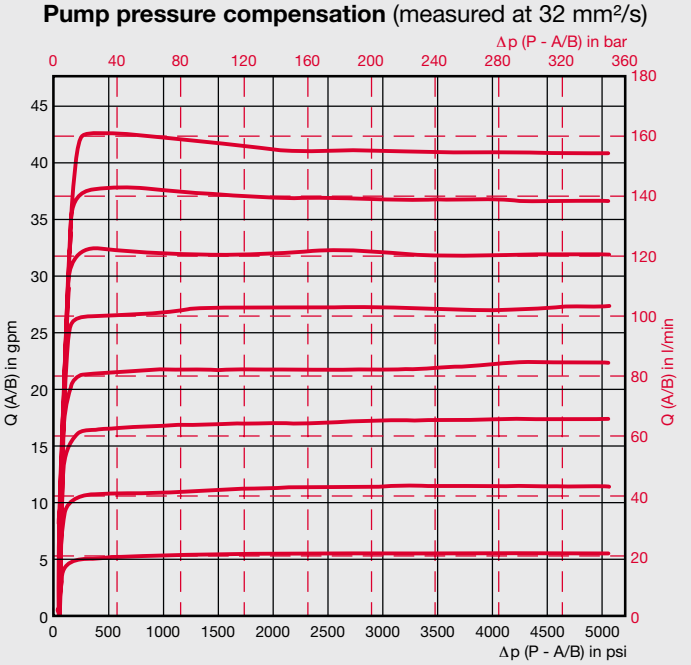



P is not connected to the working ports A and B when the main spool 2.1 is in neutral position(Fig. A). The compensator spool 2.5 is moved to left against the compensator spring 2.6 by pump pressure and blocks flow to the main spool.
When the main spool 2.1 is operated out of the neutral position (Fig. B), the load pressure (LS pressure) of the working port A or B is connected to the spring chamber of the pressure compensator and moves the compensator spool to the right into a corresponding controlled position.

The flow rate through the main spool (= metering orifice) is kept constant by the pressure compensator when sections are in parallel operation with different load or pump pressures.

The characteristic flow rate curve of a main spool can be adapted and optimized to each application by using the different pressure compensator spring types Y, B, N or G.

**Pump pressure compensation** (measured at 32 mm²/s)

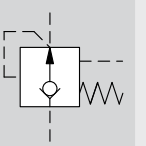



**Basic types of pressure compensator / load holding function**

**R**

Pressure compensator spool - released with load holding function (standard type)

⚠ The load holding function is not free of leak oil, the hydraulic schematic / symbol is simplified

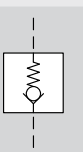


The pressure compensator R must always be indicated in the type code with the corresponding compensator spring type Y, B, N or G.

**L**

Load holding function only

⚠ The load holding function is not free of leak oil, the hydraulic schematic / symbol is simplified.



Different load or pump pressures are not compensated when sections are in parallel operation. The flow rate to the actuator depends on the pressure difference between pump pressure and load (LS pressure). Main spool definition and detailed system setup on inquiry.

The pressure compensator spring 2.6 is not indicated for the load holding function in the type code.

**Example:** MS180-180L

# LS pressure limitation

## Type code

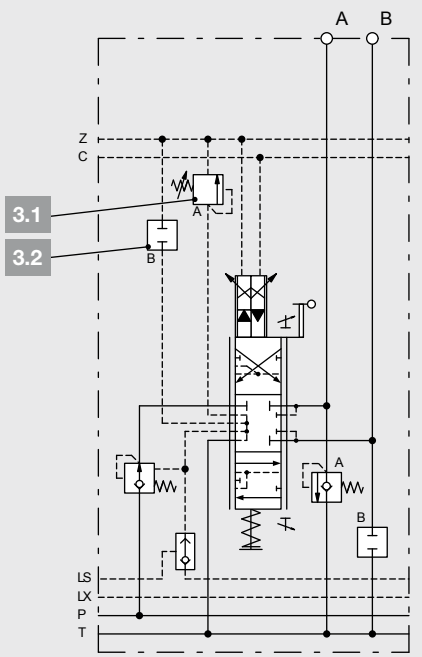
**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

**250 – P**

3.1 3.2

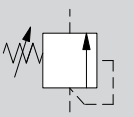
Adjustable LS pressure limitation by blocking the sectional flow rate to the working ports A and B.

For LS option valves and electro-proportional pressure adjustment, see section “Option blocks for working section LS6F”.

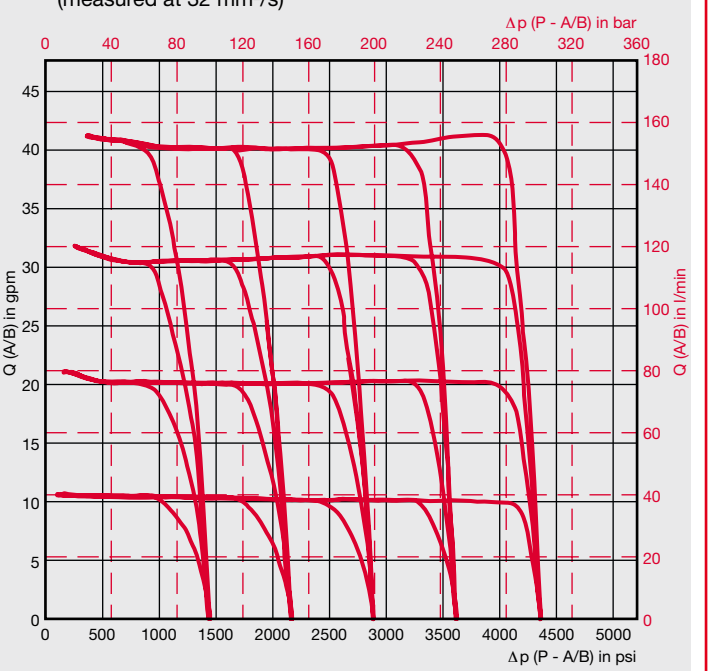



⚠ The max. pressure setting in the inlet plate has to be min. 20 bar higher than the LS pressure limitation in the working section.

| | |
|---|---|
| 3.1 | LS pressure limitation port A |
| 3.2 | LS pressure limitation port B |

| Basic type | | |
|---|---|---|
| ___ | Pressure setting in bar, 3-digit<br>Minimum setting: 050 bar<br>Maximum setting: 320 bar |  |
| P | Plug screw |  |
| U | LS unloading – permanent<br>(3/3 directional valve function) |  |

**Load pressure compensation / limitation**
(measured at 32 mm²/s)



## Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

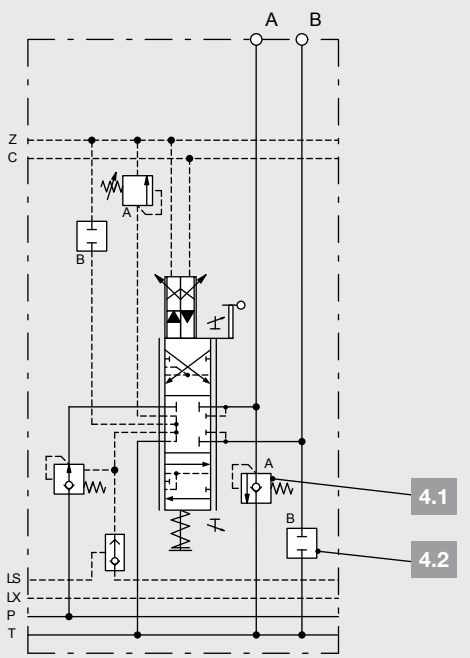
**300 – P**

**4.1** **4.2**

Fixed shock/anti-cavitation valves protect working ports A and B against pressure peaks and cavitation. Anti-cavitation valves protect the system against cavitation.

⚠ Shock/anti-cavitation valves are only for reduction of pressure peaks and should not be used as pressure relief valves.

⚠ The setting for shock/anti-cavitation valves are fixed ex works.
The pressure setting is defined at a flow rate of 10 l/min.

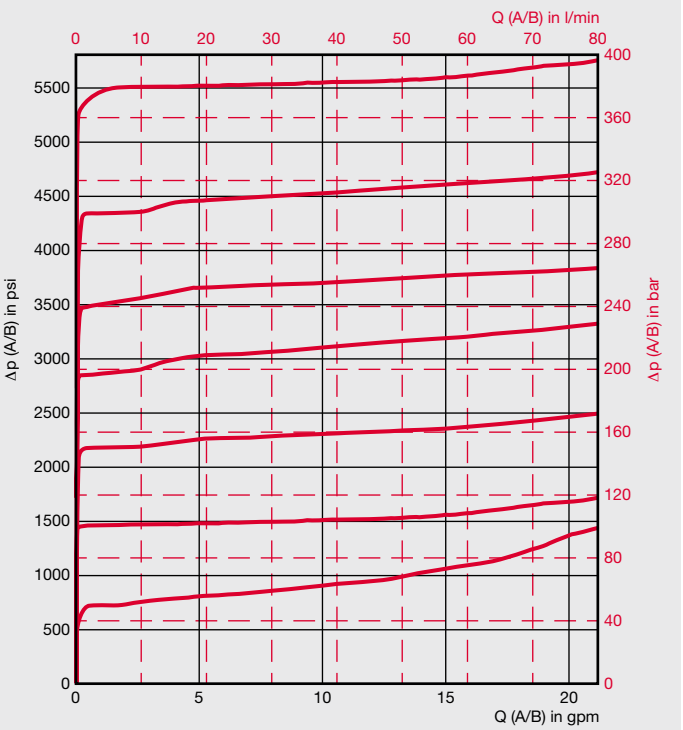



⚠ In case of shock/anti-cavitation valves for all working ports, the LS pressure relief valve in the inlet plate CL17 or UL17/.../F has to be defined min. 20 bar below the highest shock relief valve setting.

| | |
|---|---|
| **4.1** | Workport valve port A |
| **4.2** | Workport valve port B |

| **Basic type** | |
|---|---|
| --- | Shock/anti-cavitation valve<br>Pressure setting in bar, 3-digit (fixed)<br>See table on next page for settings |
| **A** | Anti-cavitation valve |
| **P** | Plug screw |

**Characteristic curves** (measured at 32 mm²/s)




Shock function A/B → T

## Workport valves

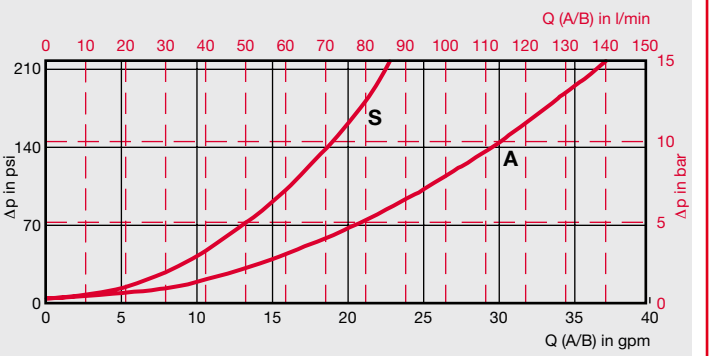
⚠ The maximum pressure setting for the shock/anti-cavitation valves depends on the chosen pressure settings for the LS limitations port A and B. To avoid interaction recommended values are shown in the following table.

The values listed in the table are calculated according to the following guidelines:

Shock valve setting $p_{shock} < 2200$ psi (150 bar):
$p_{shock} - p_{LS} > 290$ psi (20 bar)

Shock valve setting $p_{shock} \geq 2200$ psi (150 bar):
$p_{shock} - p_{LS} > 435$ psi (30 bar)

**Characteristic curves** (measured at 32 mm²/s)




Anti-cavitation function T → A/B

**S**: Shock/anti-cavitation valve
**A**: Anti-cavitation valve

**Shock / anti-cavitation valve pressure settings** (fixed)

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Settings | psi | 725 | 940 | 1160 | 1450 | 1800 | 2030 | 2176 | 2321 | 2538 | 2756 | 2900 | 3046 | 3336 | 3481 | 3626 | 3844 | 4061 | 4351 | 4641 | 5076 | 5511 |
| | bar | 050 | 065 | 080 | 100 | 125 | 140 | 150 | 160 | 175 | 190 | 200 | 210 | 230 | 240 | 250 | 265 | 280 | 300 | 320 | 350 | 380 |
| Tolerance range | ± psi | 72 | 72 | 72 | 72 | 100 | 100 | 100 | 100 | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 175 | 175 | 175 | 175 | 175 | 218 |
| | ± bar | 5 | 5 | 5 | 5 | 7 | 7 | 7 | 7 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 12 | 12 | 12 | 12 | 12 | 15 |
| Max. LS pressure cut-off | psi | - | 725 | 870 | 1160 | 1523 | 1740 | 1740 | 1885 | 2103 | 2321 | 2466 | 2611 | 2900 | 3046 | 3191 | 3408 | 3626 | 3916 | 4206 | 4641 | 4641 |
| | bar | - | 050 | 060 | 080 | 105 | 120 | 120 | 130 | 145 | 160 | 170 | 180 | 200 | 210 | 220 | 235 | 250 | 270 | 290 | 320 | 320 |

(Min./max. LS pressure limitation setting: 050/320 bar)

## Operation units

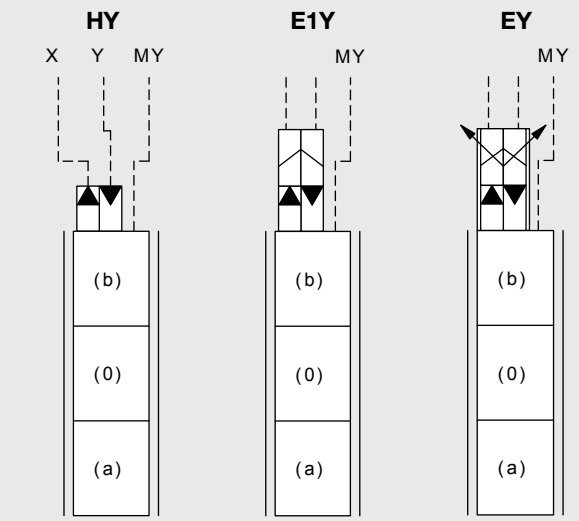
### Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

| | | | | |
|---|---|---|---|---|
| E Y | H | S | 2D | - 1 |
| H Y | | S | | |
| 5.1 | 5.2 | 5.3 | 5.4 | |

| | |
|---|---|
| 5.1 | Basic type |
| 5.2 | Hand lever axis/main spool stroke limiter |
| 5.3 | Electrical supply voltage, connector type |
| 5.4 | Hand lever |

**Basic types** 5.1




| | |
|---|---|
| HY | Unit for hydraulic operation:<br>Port X: spool position (a)<br>Port Y: spool position (b)<br>Pilot pressure measuring port MY: spool position (b) |
| E1Y | Unit for electrohydraulic operation, on/off:<br>orifice setup 1 (orifice 1,0 mm)<br>Pilot pressure measuring port MY: spool position (b) |
| EY | Unit for electrohydraulic operation, proportional:<br>Pilot pressure measuring port MY: spool position (b) |

# Operation units

**Technical data for electrohydraulic pilot valves** (on/off and proportional)

| General | | | |
|---|---|---|---|
| Supply voltage | V DC | 12 | 24 |
| Coil resistance at 20 °C (±5%) | Ω | 4.7 | 20.8 |
| Duty cycle | % | 100 | |
| Connector type and IP protection class (with mating connector mounted and locked) | | | |
| AMP Junior Timer, 2-pin, axial | | up to IP6K6 [2] | |
| Deutsch DT04, 2-pin, axial | | up to IPX9K [2] | |
| Protective screen | µm | 125 | |

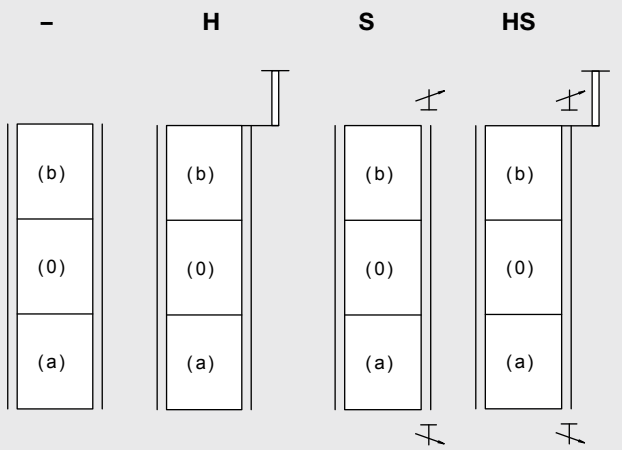
| Pressure control valve (proportional) | | | |
|---|---|---|---|
| Supply voltage | V DC | 12 | 24 |
| Max. control current | mA | 1,500 | 750 |
| PWM frequency (recommended) [1] | Hz | 100 ... 150 | |

[1] The PWM frequency is to be optimized depending on the application

[2] Mating plug-in connectors are not included

⚠ Standards ISO 13732-1 and ISO 4413 must be observed in regard to the surface temperatures occurring on the coils.

## Hand lever axis/main spool stroke limiter 5.2




| | |
|---|---|
| - | w/o hand lever axis – w/o stroke limiter *(n/a)* |
| H | Hand lever axis – w/o stroke limiter |
| S | Stroke limiter – w/o hand lever axis |
| HS | Hand lever axis – stroke limiter |

Interface of hand lever axis and hand lever: Hexagon WAF9

⚠ Stroke limiter must be used for the fine adjustment of max. flow rates to the working ports A and B. (see section “Main spool and pressure compensator”).

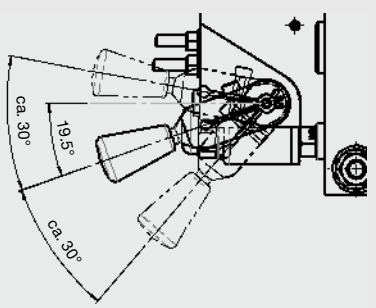
Dimension X for max. spool stroke: See section “Dimensions”

## Electrical supply voltage, connector type 5.3

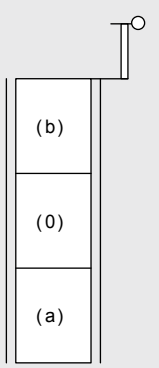
| | |
|---|---|
| 1_ | 12 V |
| 2_ | 24 V |
| _A | AMP Junior Timer |
| _D | Deutsch DT04-2P |

⚠ Electrohydraulic operation can be overruled by mechanical operation . The hand lever is directly connected to the main spool and follows the movement of the spool.

## Hand lever 5.4




**1 / 2 / 3 / 3_**




| | |
|---|---|
| - | w/o hand lever *(n/a)* |
| 1 | Standard lever |
| 2 | Standard lever, short for emergency operation |
| 3 | Universal clamp without hand lever |
| 3_ | Universal clamp with hand lever (standard length) |

Interface of hand lever axis and hand lever: Hexagon WAF9

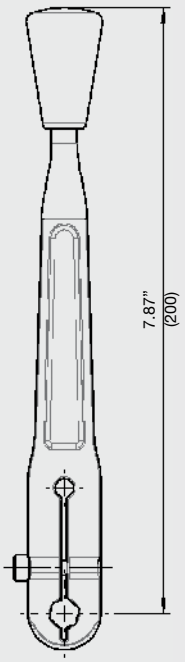
⚠ The hand lever is directly connected to the main spool and follows the movement of the spool.

A hand lever can only be specified in combination with a hand lever axis type H 5.2 .

## Operation units

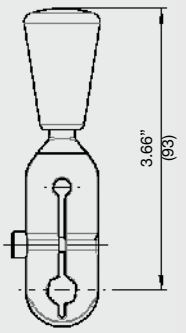
**Standard lever**

**1**



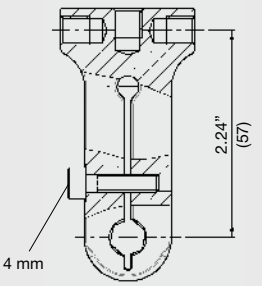

**Standard lever, short**
(Emergency operation)

**2**




**Universal clamp**

**3**

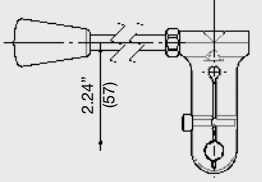



3x M8x1.25 / 8 deep

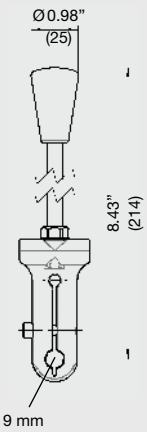
**Universal clamp with hand lever**

**3_**

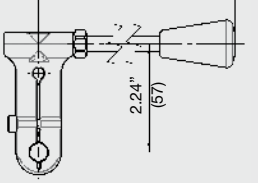
**31**
Left




**32**
Top




**33**
Right




Possible hand lever positions: see section “Dimensions”

Actuating torque on execution: - Hydraulic: min. 3.7 – 14 ft-lbs (5 – 19 Nm)
- Electrohydraulic: min. 2.2 – 14 ft-lbs (3 – 19 Nm)

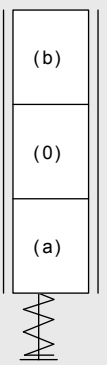
## Spring caps

### Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

**C1** (6.1) **E** (6.2)

**C1_**




| 6.1 | Basic type |
|---|---|
| C1 | Type 1 (standard)<br>w/o pilot pressure measuring port MX:<br>spool position (a) |

| 6.2 | Main spool spring package |
|---|---|

⚠ The spring package must be specified according to the operation unit 5.1.

| | |
|---|---|
| H | Hydraulic operation type HY |
| E | Electrohydraulic operation type E1Y, EY |

# Option blocks for working section LS6F

## Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRV2D**

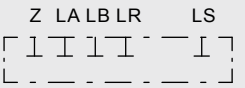
| LW | R | V | 2D |
|---|---|---|---|
| 7.1 | 7.2 | 7.3 | 7.4 |

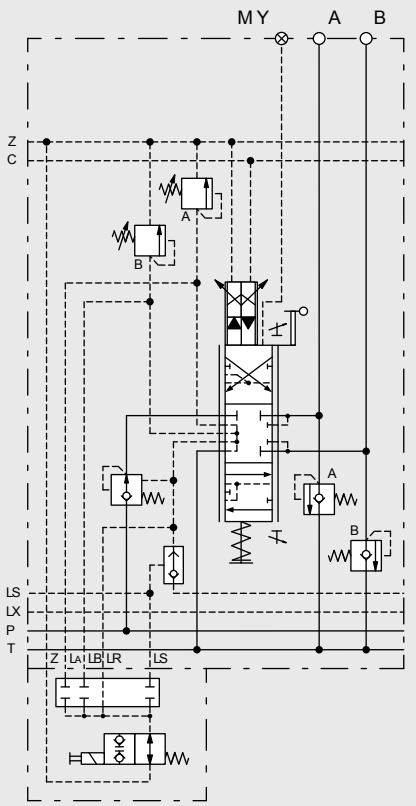
⚠ The LS option blocks can be used only in combination with the sectional pressure compensator type R

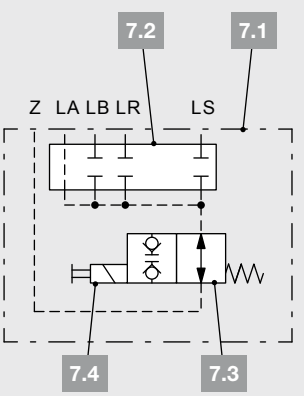
**Flange channels**

| | |
|---|---|
| Z | Pilot drain |
| LA | Load signal port A |
| LB | Load signal port B |
| LR | Load signal port A and B |
| LS | Load-Sensing (LS circuit) |

**LD1**




| Dummy plate | |
|---|---|
| LD | Basic type |
| 1 | Version 1 |

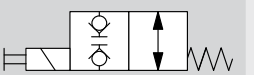
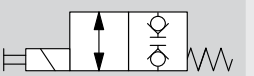
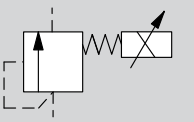
**LS option valves**[1)]

⚠ Unloading the load signal or LS circuit with the option valves V and W will not block the flow to the working ports A and B completely when the main spool is out of neutral position.

Regardless of viscosity or parallel operation, the working pressure during blocking can be up to 15 bar depending on the selected pressure compensator spring type.

| 7.1 | Basic type LW |
|---|---|

| 7.2 | Flange channel |
|---|---|
| A | Load signal port A |
| B | Load signal port B |
| R | Load signal port A and B |
| S | Load-Sensing (LS circuit) |

| 7.3 | Solenoid valve | |
|---|---|---|
| V | LS unloading<br>Normally open (Manual emergency operation) |  |
| W | LS unloading<br>Normally closed (Manual emergency operation) |  |
| P0A | Electro-proportional pressure adjustment<br>Pressure stage A: 5100 psi (350 bar)<br>12 V: $I_{max}$ = 1,500 mA<br>24 V: $I_{max}$ = 750 mA |  |

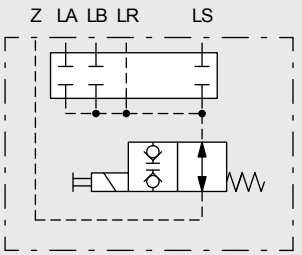
⚠ The electro-proportional pressure relief valve P0A is not suitable for acting as an unloading valve[1)]

| 7.4 | Solenoid (supply voltage, connector type) |
|---|---|
| 1_ | 12 V |
| 2_ | 24 V |
| _A | AMP Junior Timer |
| _D | Deutsch DT04-2P |

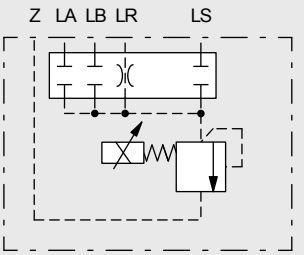
[1)] See section “Solenoid valves and coils”

# Option blocks for working section LS6F

**LWRV2A**




**LWRP0A1D**




**Example configurations**

**LWRV2A**

- Basic type LW
- Load signal port A and B
- LS option valve type V, normally open
- 24 V solenoid and connector type AMP Junior Timer

**LWRP0A1D**

- Basic type LW
- Load signal port A and B
- LS option valve type P0A, electro-proportional pressure adjustment (pressure stage A: 350 bar)
- 12 V solenoid and connector type Deutsch DT04-2P

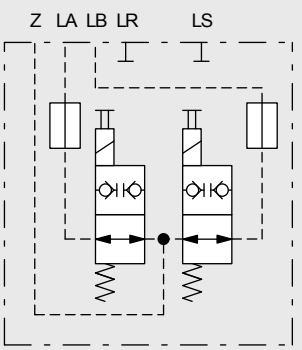
## Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LW1V-V2D**

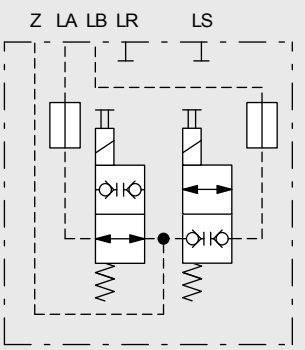
| LW1 | V | - | V | 2D |
|---|---|---|---|---|
| 7.1 | 7.2 | | 7.3 | 7.4 |

⚠ The LS option blocks can be used only in combination with the sectional pressure compensator type R

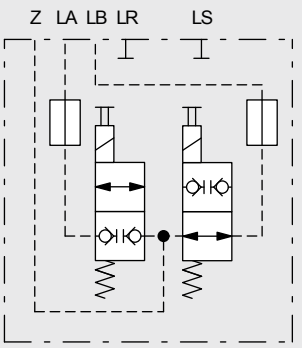
**LW1 V - V_ _**



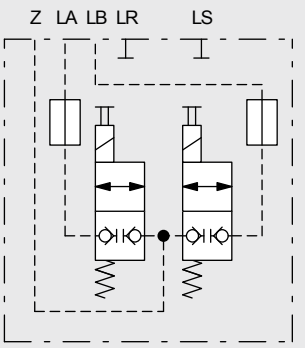

**LW1 V - W_ _**




**LW1 W - V_ _**




**LW1 W - W_ _**




| | | |
|---|---|---|
| 7.1 | Basic type LW1 | |
| 7.2 | Solenoid valve for load signal port A | |
| 7.3 | Solenoid valve for load signal port B | |
| | V | LS unloading<br>Normally open (Manual emergency operation) |
| | W | LS unloading<br>Normally closed (Manual emergency operation) |
| 7.4 | Solenoid (supply voltage, connector type) | |
| | 1_ | 12 V |
| | 2_ | 24 V |
| | _A | AMP Junior Timer |
| | _D | Deutsch DT04-2P |

# Option blocks for working section LS6F

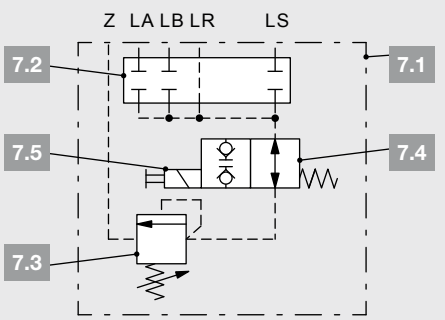
## Type code

**LS6F / CR160-160RN / 250 – P / 300 – P / EYHS2D-1 / C1E / LWRM100-V2D**

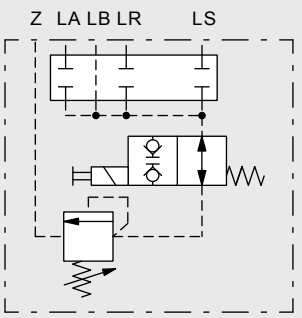
| LW | R | M_ _ _ | -V | 2D |
|---|---|---|---|---|
| 7.1 | 7.2 | 7.3 | 7.4 | 7.5 |

⚠ The LS option blocks can be used only in combination with the sectional pressure compensator type R

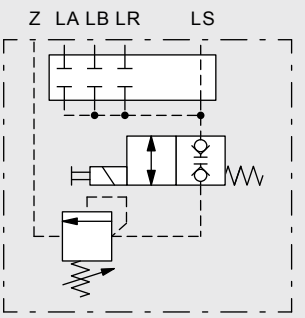
**LWRM_ _ _-V_ _**




**LWBM200-V1A**




**LWSM250-W2D**




| Switchable LS pressure limitation (2. pressure stage)[1] | | |
|---|---|---|
| 7.1 | Basic type LWM | |
| 7.2 | Flange channel | |
| | A | Load signal port A |
| | B | Load signal port B |
| | R | Load signal port A and B |
| | S | Load-Sensing (LS circuit) |
| 7.3 | LS pressure limitation | |
| | _ _ _ | LS pressure setting in bar, 3-digit<br>Minimum setting: 050 bar<br>Maximum setting: 320 bar |
| 7.4 | Solenoid valve | |
| | V | Normally open (Manual emergency operation) |
| | W | Normally closed (Manual emergency operation) |
| 7.5 | Solenoid (supply voltage, connector type) | |
| | 1_ | 12 V |
| | 2_ | 24 V |
| | _A | AMP Junior Timer |
| | _D | Deutsch DT04-2P |

### Example configurations

**LWBM200-V1A**

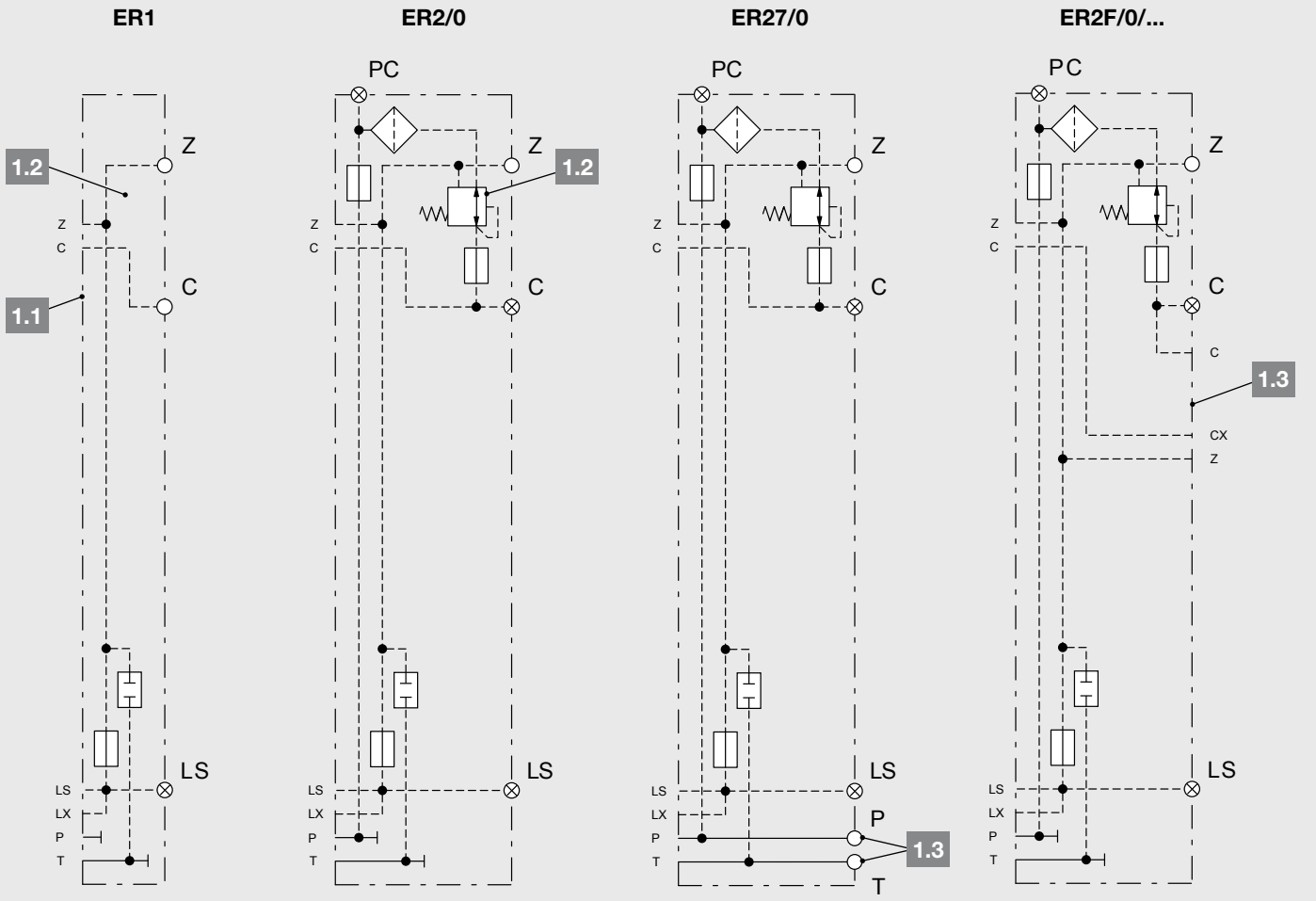
- Basic type LWM
- Load signal port B
- LS pressure limitation set to 200 bar
- LS option valve type V, normally open
- 12 V solenoid and connector type AMP Junior Timer

**LWSM250-W2D**

- Basic type LWM
- Load-Sensing (LS circuit)
- LS pressure limitation set to 250 bar
- LS option valve type W, normally closed
- 24 V solenoid and connector type Deutsch DT04-2P

[1] See section “Solenoid valves and coils”

# End plates




**Flange channels**

| | |
|---|---|
| C | Pilot oil |
| CX | Pilot oil X |
| Z | Pilot drain |

## Type code

| | | | | |
|---|---|---|---|---|
| ER1 | ... | | | |
| ER2 | ... | / 0 | | |
| ER27 | ... | / 0 | | |
| ER2F | ... | / 0 / | E1C2D | / * |
| 1 | 2 | 3 | 4 | 5 |

| | | |
|---|---|---|
| ER | 1 | |
| ER | 2 | F |
| 1.1 | 1.2 | 1.3 |

| | | |
|---|---|---|
| 1 | Basic type | |
| 1.1 | ER | End plate, right hand side |
| 1.2 | 1 | w/o or external pilot oil supply |
| | 2 | Internal pilot oil supply (channel P) |
| 1.3 | 7 | Port size P / T |
| | F | Flange interface for option blocks |
| 2 | Configuration [1] | |
| 3 | Options [1] | |
| 4 | Option block for basic type ER2F | |
| 5 | Reference to clear text<br>Special, customer-specific information | |

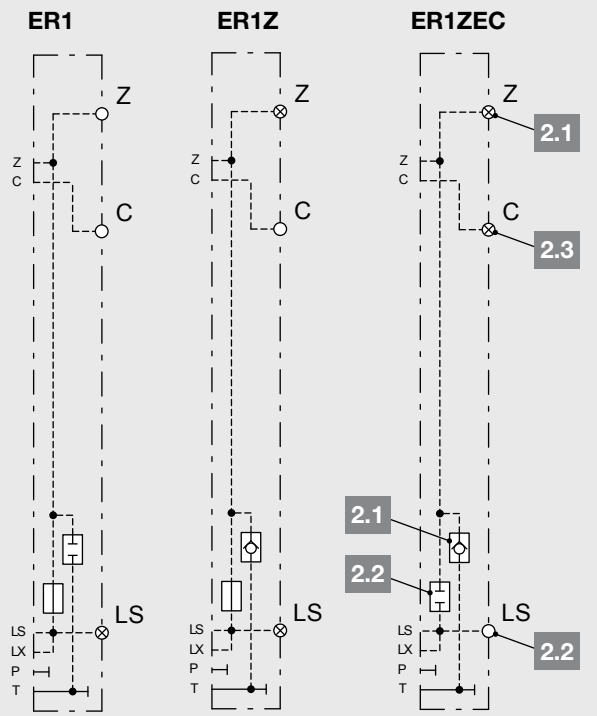
[1] Can also be retrofitted

# End plate ER1

## Type code

ER1 ...

1 2




| | | |
|---|---|---|
| 1 | **Basic type** | |
| | ER1 | End plate, right hand side<br>w/o or external pilot oil supply |
| 2 | **Configuration** | |
| | - | Standard *(n/a)* |
| 2.1 | Z | Internal connection Z → T with check valve<br>Port Z with plug screw |
| | ⚠ | For configuration Z, the max. permitted operating pressure at port T is 10 bar. |
| 2.2 | E | External LS signal input<br>Port LS open<br>Internal LS-unloading with plug screw |
| 2.3 | C | Port C with plug screw<br>w/o pilot oil supply for manual and hydraulic operation units only |

The individual configurations Z, E and C can be combined as follows: ZE, ZC, EC, ZEC

**Example configurations**

**ER1**
- Basic type ER1
- Standard configuration

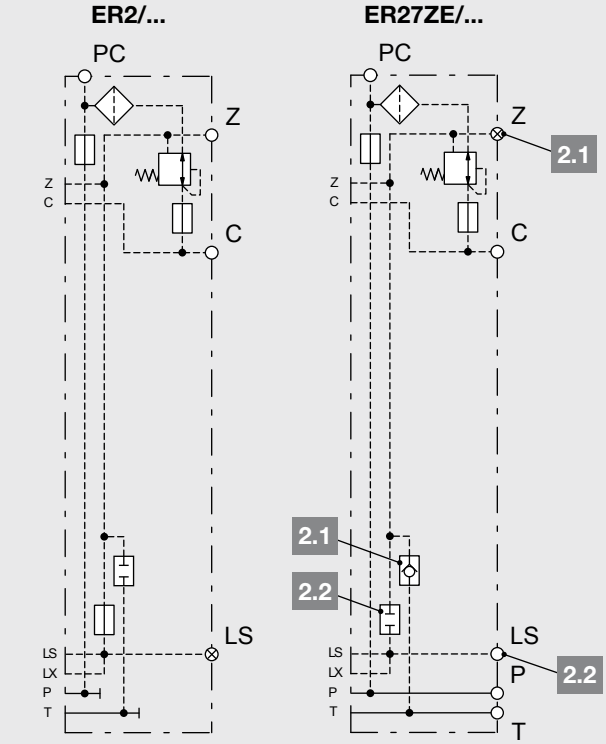
**ER1Z**
- Basic type ER1
- Internal connection Z → T with check valve
  Port Z with plug screw

# End plates ER2, ER27, and ER2F

## Type code

ER2 ... / 0

1 2 3




| | | |
|---|---|---|
| 1 | **Basic type** | |
| | ER2 | End plate, right hand side<br>Internal pilot oil supply (channel P) |
| | ER27 | Same as ER2, with additional P / T ports<br>Port size 7 |
| | ER2F | Same as ER2, with flange interface for option blocks |
| 2 | **Configuration** | |
| | - | Standard *(n/a)* |
| 2.1 | Z | Internal connection Z → T with check valve<br>Port Z with plug screw |
| | ⚠ | For configuration Z, the max. permitted operating pressure at port T is 10 bar. |
| 2.2 | E | External LS signal input<br>Port LS open<br>Internal LS-unloading with plug screw |

The individual configurations Z and E can also be combined: ZE

**Example configurations** (Options 3 see next page)

**ER2/...**
- Basic type ER2
- Standard configuration

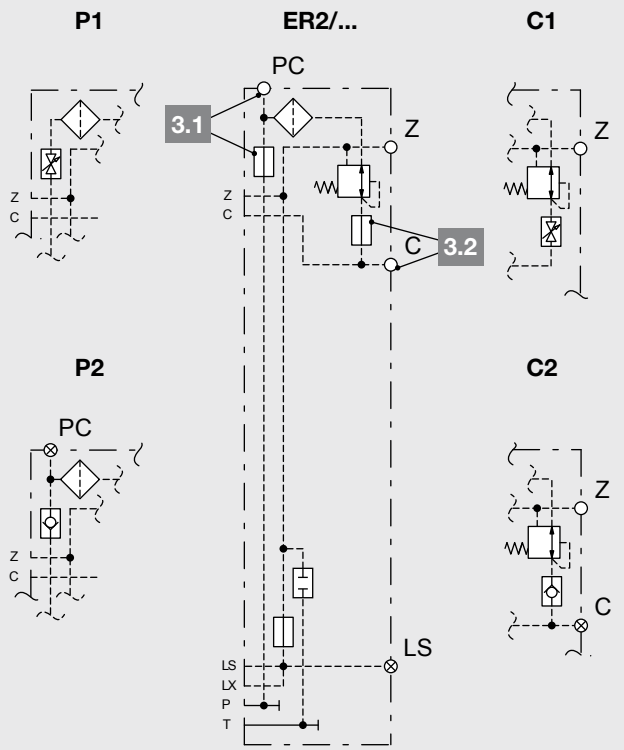
**ER27ZE/...**
- Basic type ER27
- Internal connection Z → T with check valve
  Port Z with plug screw
- External LS signal input, Port LS open
  Internal LS-unloading with plug screw

# End plate ER2

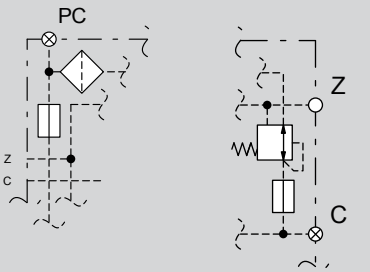
## Type code

**ER2 ... / 0**

| 1 | 2 | 3 |
|---|---|---|




| 3 | Options at port PC and C |
|---|---|
| 0 | w/o options (standard)<br>Port PC and C with plug screw |




| 3.1 | Options at port PC<br>(Port C with plug screw) |
|---|---|
| P1 | Cut-off valve, mechanical with knurled screw |
| ⚠ | Port PC not usable.<br>Operation of cut-off valve < 50 bar system pressure. |
| P2 | Check valve<br>Port PC with plug screw |

| 3.2 | Options at port C<br>(Port PC with plug screw) |
|---|---|
| C1 | Cut-off valve, mechanical with knurled screw |
| ⚠ | Port C not usable. |
| C2 | Check valve<br>Port C with plug screw |

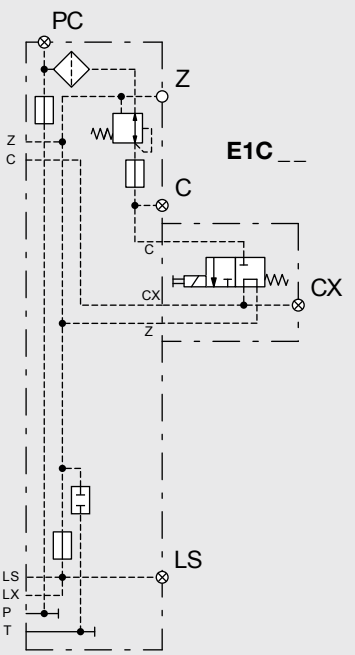
The individual options can be combined as follows:
P1C2, P2C1, P2C2

**Example:** ER2/P1C2

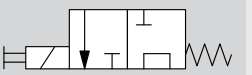
# Option blocks for end plate ER2F

## Type code

**ER2F ... / 0 / E1C2D**




| Pilot oil option valve[1] | |
|---|---|
| E1 | Basic type |
| C_ _ | Pilot oil unloading<br>Normally open<br>(Manual emergency operation) |



| Solenoid (supply voltage, connector type) | |
|---|---|
| 1_ | 12 V |
| 2_ | 24 V |
| _A | AMP Junior Timer |
| _D | Deutsch DT04-2P |

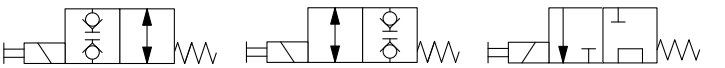
[1] See section “Solenoid valves and coils”

# Solenoid valves and coils

**Electrohydraulic pilot valves (on/off and proportional):** see section “Operation units”

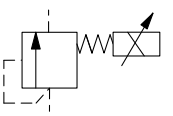
**Option valves for connecting plate CL17 and option blocks:**

**On/Off valves:**
With manual emergency operation (push-button)



| Valve type | | V | | W | | C | |
|---|---|---|---|---|---|---|---|
| Design | | Poppet valve | | Poppet valve | | Spool valve | |
| Nominal voltage $U_N$ | V DC | 12 | 24 | 12 | 24 | 12 | 24 |
| Nominal current $I_N$ | A | 1.50 | 0.80 | 2.20 | 1.10 | 1.50 | 0.80 |
| Min. current $I_{min}$ | A | 1.05 | 0.56 | 1.54 | 0.77 | 1.05 | 0.56 |
| Nominal power $P_N$ | W | 18 | 19 | 26 | 26.7 | 18 | 19 |
| Response time | On: ms | 40 | | 30 | | 85 | |
| | Off: ms | 60 | | 40 | | 80 | |
| Max. permitted voltage deviation from $U_N$ | % | ±15 | | | | | |
| Duty cycle at 115% $U_N$ | % | 100 | | | | | |
| Ambient temperature range[2] | °C | -4 to 140°F (-20 to +60°C) | | | | | |
| Max. permitted coil temperature[3] | °C | 180 °C | | | | | |
| Insulation class as per EN 60085 | | H | | | | | |
| Integrated free-wheeling diode | | Yes | | Yes | | Yes | |
| Coil length X | mm | 40 | | 50 | | 40 | |
| Connector type and IP protection class (with mating connector mounted) | | AMP Junior Timer, 2-pin – axial / up to IP6K6[4]<br>Deutsch DT04, 2-pin – axial / up to IPX9K[4] | | | | | |
| Valve body and coil surface protection | | Zinc-Nickel (ZnNi) | | | | | |

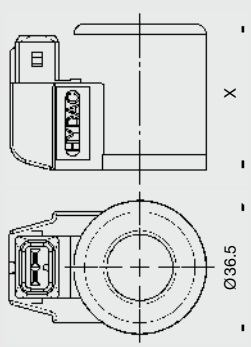
**Proportional pressure relief valve:** bleed screw below coil nut (torque 2.5 + 0.5 Nm)



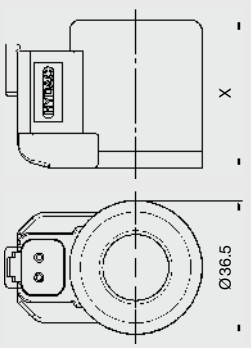
| Valve type | | P_ _ | |
|---|---|---|---|
| Nominal voltage $U_N$ | V DC | 12 | 24 |
| Coil resistance at +20 °C (±5%) | Ω | 4.1 | 17.6 |
| Max. control current $I_{max}$ | mA | 1,500 | 750 |
| PWM frequency (recommended)[1] | Hz | 150 – 200 | |
| Duty cycle at $I_{max}$ | % | 100 | |
| Ambient temperature range[2] | °F/(°C) | -4 to 140/(-20 to +60) | |
| Max. permitted coil temperature[3] | °F/(°C) | 356/(180) | |
| Insulation class as per EN 60085 | | H | |
| Coil length X | mm | 50 | |
| Connector type and IP protection class (with mating connector mounted) | | | |
| AMP Junior Timer, 2-pin – axial | | up to IP6K6[4] | |
| Deutsch DT04, 2-pin – axial | | up to IPX9K[4] | |
| Valve body and coil surface protection | | Zinc-Nickel (ZnNi) | |

⚠ In order to achieve optimal function, any trapped air should be vented with the bleed screw. Recommended installation position downwards (suspended for self-ventilation)

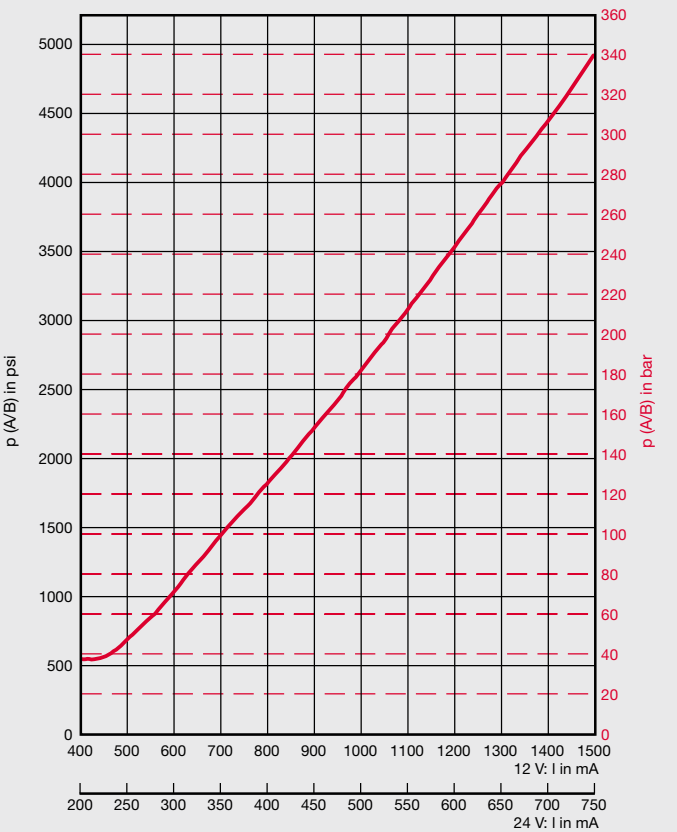
**AMP Junior Timer, axial**




**Deutsch DT04, axial**




**Characteristic curve** (measured at 32 mm²/s)
LS pressure limiting function p/I (rising curve)




⚠The electro-proportional pressure relief valve P_ _ is not suitable for acting as an LS unloading valve.

[1] The PWM frequency is to be optimized depending on the application
[2] Deviation of data on inquiry only
[3] Standards ISO 13732-1 and ISO 4413 must be observed in regard to the surface temperatures occurring on the coils
[4] Mating plug-in connectors are not included

# Connection type, fastening and tie rods

## Type code

**LX-6 03 / S 0**

1 2 3 4

⚠ Only use of fittings with deformable seal materials

| | | |
|---|---|---|
| 1 | Valve type | |
| 2 | Specification type | |
| | – – | Complete control block<br>No. of working sections (01-08) |
| | 0X | Single modules<br>(inlet plate, working section,<br>end plate, option block) |
| 3 | Connection type | |
| | B | BSPP acc. to ISO 1179-1 |
| | S | SAE acc. to ISO 11926-1 or SAE J1626 |
| 4 | Valve series | |

| Connection type | | | | B | Countersink Ø in mm | S | | Countersink Ø in mm |
|---|---|---|---|---|---|---|---|---|
| Inlet plate | CL17 | P | Pump | G 1 | 50 | 1 5/16-12 UN | SAE 16 | 49 |
| | UL17 | T | Tank | G 1 | 50 | 1 5/16-12 UN | SAE 16 | 49 |
| | UL17F | MP | Pump measuring port | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |
| | | LS | Load-sensing | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |
| Working section | B6 | A/B | Working ports | G 3/4 | 38 | 1 1/16-12 UN | SAE 12 | 38 |
| | LS6 | X | Hydraulic operation port (spool position a) | G 1/4 | 25 | 7/16-20 UNF | SAE 4 | 21 |
| | LS6F | Y | Hydraulic operation port (spool position b) | G 1/4 | 25 | 7/16-20 UNF | SAE 4 | 21 |
| | | MY | Pilot pressure measuring port (spool position b) | G 1/8 | 15 | G 1/8 | - | 15 |
| End plate | ER1 | PC | Pump measuring port (for options) | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |
| | ER2 | C | Pilot oil supply | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |
| | ER27 | Z | Tank, depressurized | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |
| | ER2F | LS | External Load-Sensing input | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |
| | | P | Pump | G 1 | 50 | 1 5/16-12 UN | SAE 16 | 49 |
| | | T | Tank | G 1 | 50 | 1 5/16-12 UN | SAE 16 | 49 |
| Option blocks | UW1… | LS | Load-sensing | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |
| | E1C… | CX | Pilot oil supply X | G 1/4 | 25 | 9/16-18 UNF | SAE 6 | 25 |

**Fastening:**

The control block must be mounted at three fixation points without tensioning. see also section “Dimensions”

| Fastening thread | | | | B | S | | |
|---|---|---|---|---|---|---|---|
| Inlet plate | CL17<br>UL17<br>UL17F | 2 x | 13 mm deep | M10x1.5 | 7/16-20 UNF | SAE 4 | |
| End plate | ER1<br>ER2<br>ER27<br>ER2F | 1 x | 13 mm deep | M10x1.5 | 7/16-20 UNF | SAE 4 | |

**Fastening screws:**

- Minimum screw-in depth: 10 mm
- Recommended screw clamp length: ≥30 mm

| Property class | 10.9 |
|---|---|
| Fastening torque | 53 ft-lb (72 Nm)<br>±2 (±3) |

**Tie rod:**

M10 tie rod with flange nut WAF 16, $M_Z$ = 29.5 ±1.5 ft-lb (40 ±2 Nm)

⚠ Only use of genuine LX-6 tie rod kits.

# Installation, usage, and maintenance information

Installation, adjustment, maintenance must be done by authorized and trained staff.
The use of this product outside the specified technical limits, use of non specified fluids and/or use of not genuine spare parts will cause the expiration of the warranty.

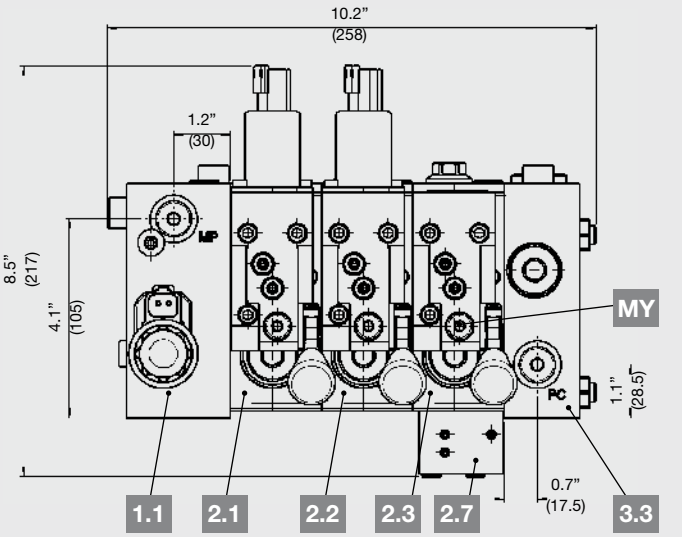
# Dimensions

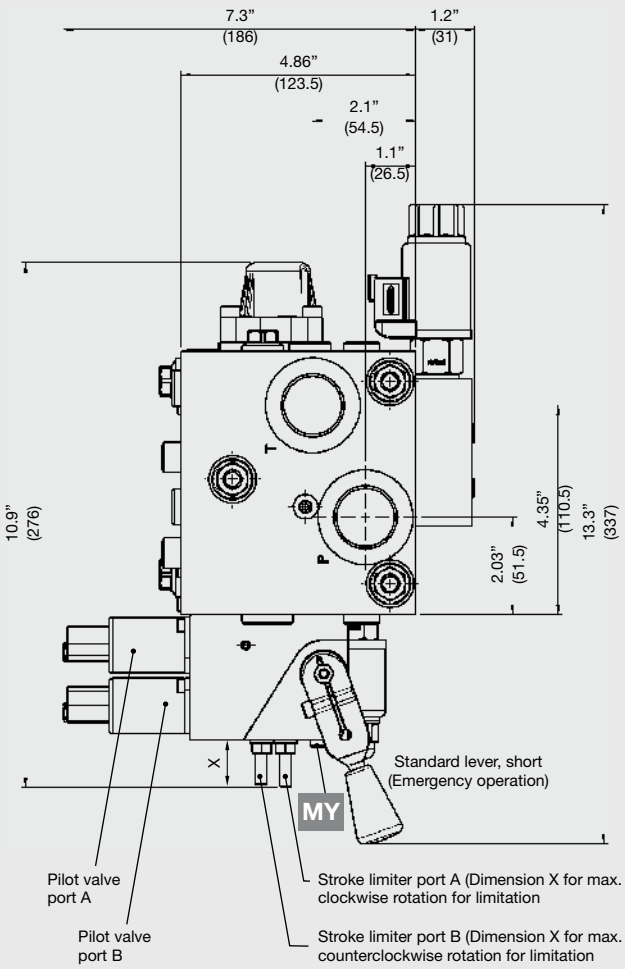
All dimensions in mm, subject to change.

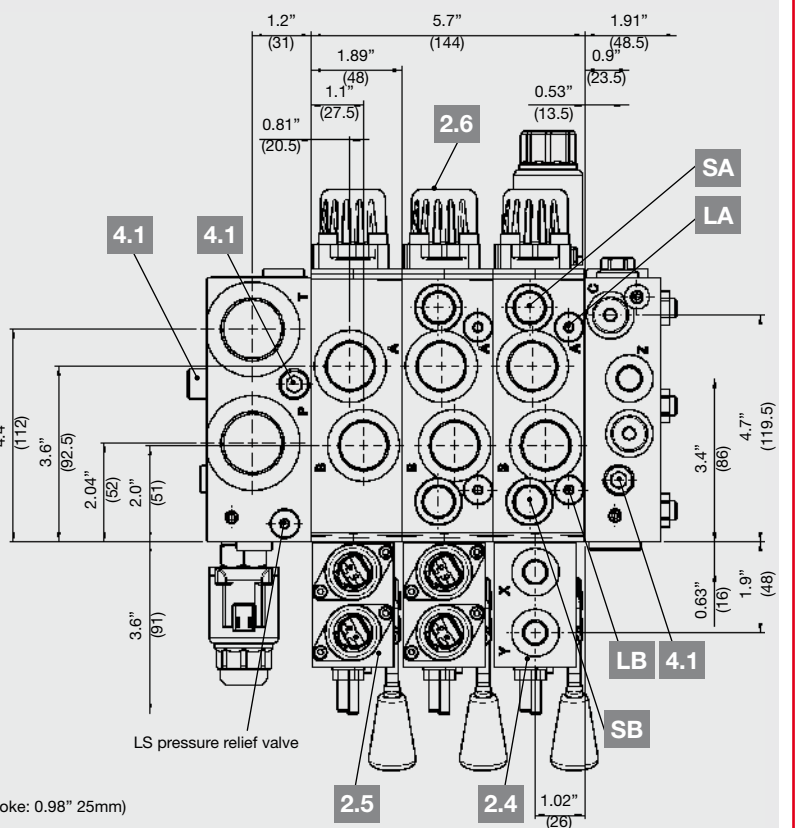
**Example for control block with Closed Center inlet plate and end plate with P/T ports** (see also section “Modular structure”)

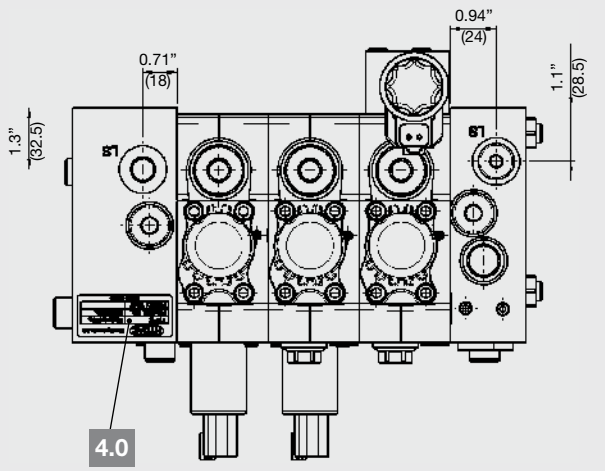
Connector types: Deutsch DT04, 2-pin, axial

| | |
|---|---|
| 1.1 | Inlet plate CL17 |
| 2.1 | Working section B6 |
| 2.2 | Working section LS6 |
| 2.3 | Working section LS6F |
| 2.4 | Hydraulic operation HY |
| 2.5 | Electrohydraulic operation E1Y, EY |
| 2.6 | Spring cap C1E |
| 2.7 | Option block LW.../LW...M...[1] |
| 3.3 | End plate ER27 |




| | |
|---|---|
| LA | LS pressure limitation port A |
| LB | LS pressure limitation port B |
| SA | Secondary valves port A |
| SB | Secondary valves port B |
| 4.0 | Type plate |
| 4.1 | 3x M10x1.5 – 12 deep for crane gear |

[1] Option block LW1... not shown

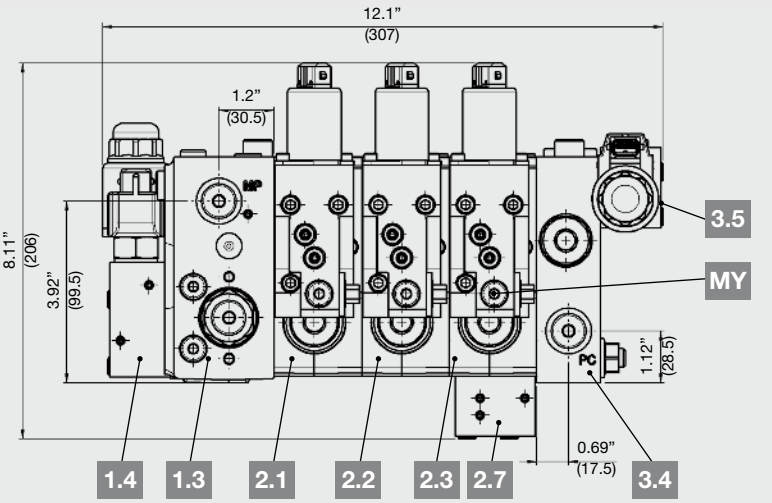
# Dimensions

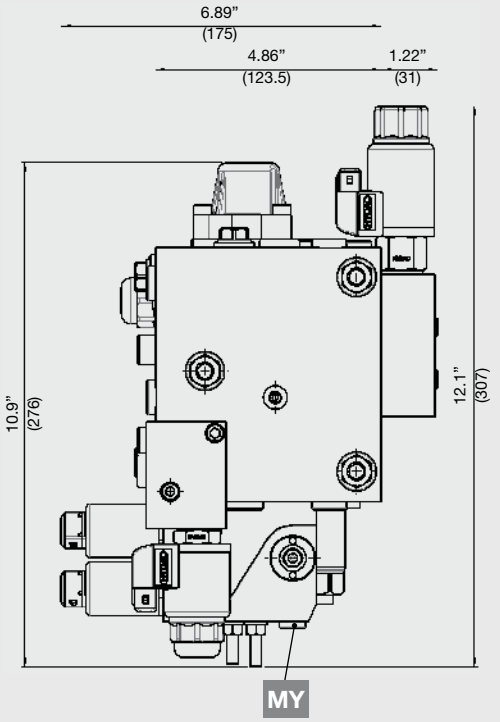
All dimensions in mm, subject to change.

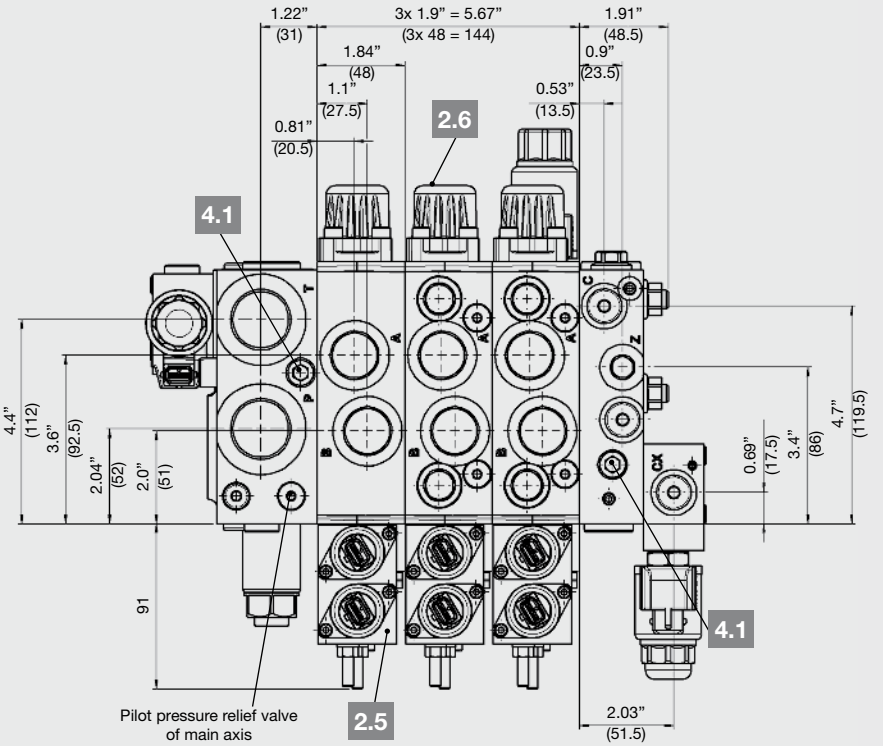
**Example for control block with universal inlet plate and option blocks** (see also section “Modular structure”)

Connector types: AMP Junior Timer, 2-pin, axial

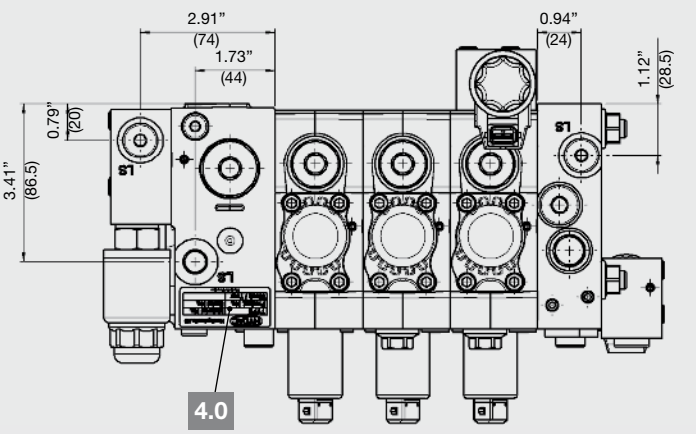
| | |
|---|---|
| 1.3 | Inlet plate UL17F[1] |
| 1.4 | Option block UW1... |
| 2.1 | Working section B6 |
| 2.2 | Working section LS6 |
| 2.3 | Working section LS6F |
| 2.5 | Electrohydraulic operation E1Y, EY |
| 2.6 | Spring cap C1E |
| 2.7 | Option block LW.../LW...M...[2] |
| 3.4 | End plate ER2F[3] |
| 3.5 | Option block E1C... |




| | |
|---|---|
| 4.0 | Type plate |
| 4.1 | 3x M10x1.5 – 12 deep for crane gear |




[1] Inlet plates UL17F and UL17 have the same dimensions

[2] Option block LW1... not shown

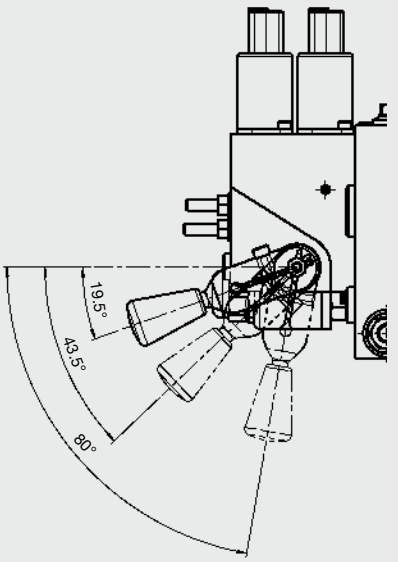
[3] End plates ER2F, ER2, and ER1 have the same dimensions

# Dimensions

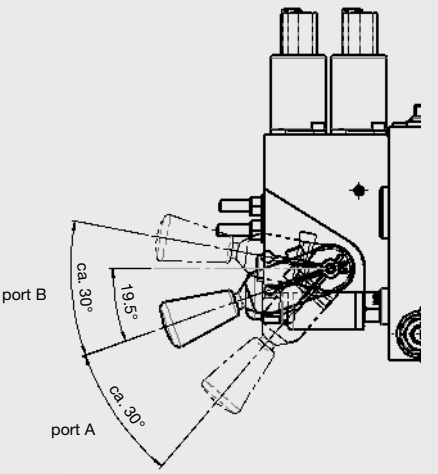
All dimensions in mm, subject to change.

**Hand lever: neutral positions and max. travel** (see also section “Operation units”)

Neutral positions: for all hand lever types 1 – 3:



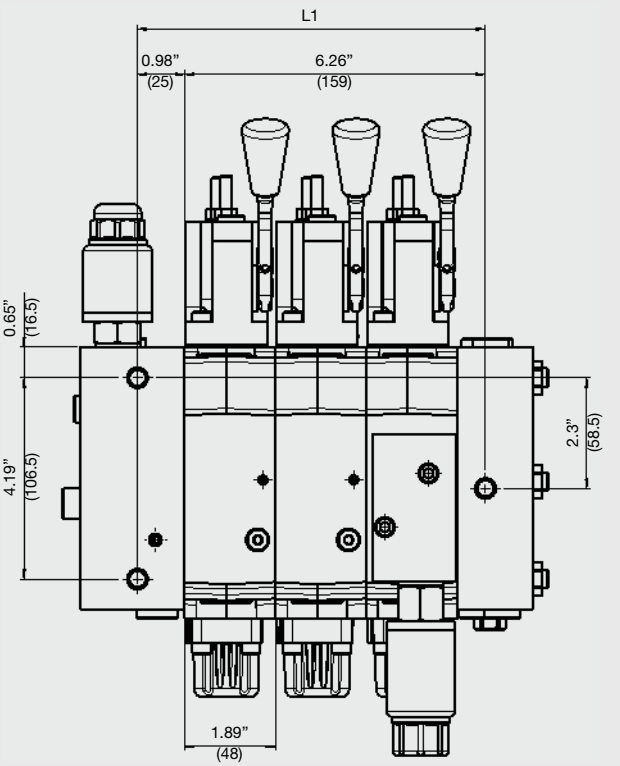

Max. travel for port A / port B




Shown: Standard lever, short (emergency operation) – Type 2

**Control block fastening points** (3x M10x1.5 – 13 deep)

The fastening points are equal for all types of inlet and end plates




| No. of working sections | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| L1 | inches | 3.46” | 5.35” | 7.24” | 9.13” | 11.02” | 12.91” | 14.8” | 16.69” |
| | mm | 88 | 136 | 184 | 232 | 280 | 328 | 376 | 424 |

# Type code

| Structure and sequence: | 1. | | General (control block always defined from left to right) |
|---|---|---|---|
| | 2. | | Inlet plate |
| | 3. | | Working section 1 |
| | | | Working section 2 |
| | | | Working section n |
| | 4. | | End plate |

| 1. | General | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Valve type: | | LX-6 | 03 | / | S | 0 | | |
| | Pos. | | 1 | 2 | | 3 | 4 | | |

| | Pos./designation: | | Type code: | Description/function | Comment: |
|---|---|---|---|---|---|
| | 1 Load-sensing valve series | | **LX-6** | **L**oad-sensing **X**-series Size **6** | |
| | 2 No. of working sections | 1) | _ _ | 2-digit, 01–08 | Max. 8 working sections |
| | Specification/identification of single modules | | **0X** | Inlet plate, working section, end plate or option block | |
| | 3. Connection thread | | **B** | **B**SPP acc. to ISO 1179-1 | |
| | | | **S** | **S**AE acc. to ISO 11926-1 or SAE J1626 | |
| | 4 Valve series | | **0** | Unchanged installation and connection dimensions | |

| 2. | Inlet plate | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type: | | CL17 | / | P | / | V2D | | | | |
| | | | UL17 | / | 250 | / | F | | | | |
| | | | UL17F | / | 350 | / | P | / | UW1V2A | | |
| | Pos. | | 1 | | 2 | | 3 | | 4 | | |

| | Pos./designation: | | Type code: | Description/function | Comment: |
|---|---|---|---|---|---|
| | **1 Basic type** | | | | |
| | Standard for variable displacement pump | | **CL17** | **C**C system **L**eft **1** version **7** port size P/T | Port size 7: |
| | Universal for fixed and variable displacement pump | | **UL17** | **U**niversal **L**eft **1** version **7** port size P/T | BSPP: G1; SAE: 1 5/16-12 UN |
| | Universal like UL17 with option block | | **UL17F** | **F**lange interface for option block | |
| | **2 Pressure relief valve** | | | | |
| | | | _ _ _ | Pressure setting in bar, 3-digit (mechanically adjustable) | Max. 350 bar |
| | | | **P** | **P**lug screw | w/o pressure relief valve |
| | **3 LS option valves** | | | | |
| ⚠ | For basic type **CL17** only | | **P** | **P**lug screw | w/o LS option valve |
| | | | **V** _ _ | LS unloading Valve type: **V** | Normally open |
| | | | **W**_ _ | LS unloading Valve type: **W** | Normally closed |
| | | | **P0A** _ _ | Electro-prop. pressure adjustment Valve type: **P**<br>Orifice setup: 1.**0** mm Pressure stage **A**: 350 bar | Rising curve |
| | Supply voltage DC | | **1** _ | **1**2 V | |
| | | | **2** _ | **2**4 V | |
| | Connector type | | _ **A** | **A**MP – Junior Timer, 2-pin, axial | |
| | | | _ **D** | **D**eutsch – DT04, 2-pin, axial | |
| | **Logic of main axis** | | | | |
| ⚠ | For basic types **UL17** and **UL17F** only | | **F** | **F**low controller (3-way) | For fixed displacement pump |
| | | | **P** | **P**ump pressure relief valve (pilot-operated) | For variable displacement pump |
| | **4. Option blocks** | | | | |
| ⚠ | For basic type **UL17F** only | | **UD1** | **D**ummy plate **1** version | |
| | For logic of main axis **F** or **P** | | **UW1V**_ _ | LS unloading L**1** channel Valve type **V** | Normally open |
| | For channel: | | **UW1W**_ _ | LS unloading L**1** channel Valve type **W** | Normally closed |
| | L1 Load signal 1 | | **UW1P0A**_ _ | Electro-proport. press. adjust. L**1** channel Valve type **P**<br>Orifice setup: 1.**0** mm Pressure stage **A**: 350 bar | Rising curve |
| | | | **UW1M**_ _ _**V**_ _ | Second pressure stage (On/Off) L**1** channel Valve type **V**<br>**M**echanically adjust. in bar, 3-digit | Second pressure level when de-energized |
| | | | **UW1M**_ _ _**W**_ _ | Second pressure stage (On/Off) L**1** channel Valve type **W**<br>**M**echanically adjust. in bar, 3-digit | Second pressure level when energized |
| | Supply voltage DC | | **1** _ | **1**2 V | |
| | | | **2** _ | **2**4 V | |
| | Connector type | | _ **A** | **A**MP – Junior Timer, 2-pin, axial | |
| | | | _ **D** | **D**eutsch – DT04, 2-pin, axial | |

[1] Deviation of data on inquiry only

# Type code

| 3. | Working sections | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | Working section 1 | | **B6** | / | **CR** | **160 – 160** | **RN** | | | | | | / | **EYHS2A** | - | **1** | / | **C1E** | | | | | | | | | | | | |
| | | Working section 2 | | **LS6** | / | **CS** | **150 – 035** | **RN** | / | **300 – 200** | / | **P – P** | | / | **EYHS2A** | | | / | **C1E** | | | | | | | | | | | | |
| | | Working section 3 | | **LS6F** | / | **CR** | **060 – 060** | **RY** | / | **300 – 300** | / | **350 – 350** | | / | **HYHS** | - | **1** | / | **C1H** | / | **LWRV2A** | | | | | | | | | | |
| | | Working section 4 | | | / | | – | | / | – | / | ... | | | | | | | | | | | | | | | | | | | |
| | **Pos.** | | | **1** | | **2** | **3** | **4** | | **5** | | **6** | | | **7** | | **8** | | **9** | | **10** | | | | | | | | | | |

| | Pos./designation: | | Type code: | | Description/function | | | Comment: |
|---|---|---|---|---|---|---|---|---|
| | **1.** | **Basic type** | | | | | | |
| | | Basic section w/o option valves | | **B6** | **B**asic section | | **6** port size A/B | Port size 6: |
| | | Section like B6 with option valves | | **LS6** | Like B6 with **LS** pressure limitation and **S**hock/anti-cavitation valves | | | BSPP: G3/4, SAE: 1 1/16-12 UN |
| | | Section like LS6 with option block | | **LS6F** | Like LS6 with **F**lange interface for option block | | | |
| | **2** | **Main spool** | | | | | | |
| | | | | **CS** | **C**ylinder spool | **S**tandard | **Pos. 0:** A, B closed | |
| | | | | **CR** | **C**ylinder spool | **R**eleased | **Pos. 0:** A, B unloaded to T | |
| | | | | **MS** | **M**otor spool | **S**tandard | **Pos. 0:** A, B open to T | |
| | | | | **...** | For other types, see section “Main spool and pressure compensator” | | | |
| | **3** | **Max. flow rate to actuator** | | **A** **B** | | | | See section “Main spool valve and pressure compensator” |
| | | | 1) | ___ - ___ | Maximum flow to port A / B in l/min, 3-digit | | | |
| | **4** | **Pressure compensator axis (spool + spring)** | | | | | | |
| | | Pressure compensator – released with load holding function (standard) | | **RY** | **R**eleased pressure compensator | **Y** spring identifier yellow | | 9.5 – 11.5 bar |
| | | | | **RB** | | **B** spring identifier blue | | 8.0 – 10.0 bar |
| | | | | **RN** | | **N** spring identifier unmarked | | 7.0 – 9.0 bar (nominal) |
| | | | | **RG** | | **G** spring identifier green | | 5.5 – 7.5 bar |
| | | Load holding function | | **L** | **L**oad holding function only w/o pressure compensation | | | Use of compensator spring type G |
| | **5.** | **LS pressure limitation** | | **A** **B** | | | | |
| ⚠ | | For basic types **LS6** and **LS6F** only | | ___ - ___ | Pressure setting for port A / B in bar, 3-digit (mechanically adjustable) | | | Min. 050 bar, max. 320 bar |
| | | | | **P** | **P**lug screw | | | w/o LS pressure limitation |
| | | | | **U** | **U**nloading - permanent | | | 3/3 directional valve function |
| | **6** | **Workport valves** | | **A** **B** | | | | |
| ⚠ | | For basic types **LS6** and **LS6F** only | | ___ - ___ | Shock/anti-cavitation valve for port A / B in bar, 3-digit | | | See section “Workport valves” |
| | | | | **A** | **A**nti-cavitation valve | | | |
| | | | | **P** | **P**lug screw | | | w/o workport valves |
| | **7** | **Operation units** | | | | | | |
| | | | | **HY** | **H** hydraulic | | **MY** port | Pilot pressure MY – spool position (b) |
| | | | | **E1Y** | **E1** electrohydraulic on/off, orifice setup 1 | | **MY** port | orifice 1.0 mm |
| | | | | **EY** | **E** electrohydraulic proportional | | **MY** port | |
| | | Other options: | | *n/a* | w/o hand lever axis - w/o stroke limiter | | | |
| | | | | **_ H** | **H**and lever axis | | | |
| | | | | **_ S** | **S**troke limiter | | | |
| | | | | **_ HS** | **H**and lever axis and **S**troke limiter | | | |
| ⚠ | | For operation unit **E...** only | | | | | | |
| | | Supply voltage DC | | **1 _** | **1**2 V | | | |
| | | | | **2 _** | **2**4 V | | | |
| | | Connector type | | **_ A** | **A**MP – Junior Timer, 2-pin, axial | | | |
| | | | | **_ D** | **D**eutsch – DT04, 2-pin, axial | | | |
| | **8.** | **Hand lever type** | | | | | | Hand lever does not come assembled |
| ⚠ | | For operation option **_H** only | | *n/a* | No hand lever | | | |
| | | Standard lever | | **1** | Standard | | | See section “Operation units” |
| | | Standard lever, short | | **2** | Standard for emergency operation | | | |
| | | Universal clamp without hand lever | | **3** | For application-specific solutions | | | |
| | | Universal clamp with standard lever | | **31** | Lever orientation: left | | | |
| | | | | **32** | Lever orientation: top | | | |
| | | | | **33** | Lever orientation: right | | | |
| | **9.** | **Spring caps** | | | | | | |
| | | Standard for operation unit **H...** | | **C1H** | **C** standard cap | **1** version | **H** hydraulic | Pilot pressure range: 6.5 – 20 bar |
| | | Standard for operation unit **E...** | | **C1E** | **C** standard cap | **1** version | **E** electrohydraulic | Pilot pressure range: 4.5 – 20 bar |

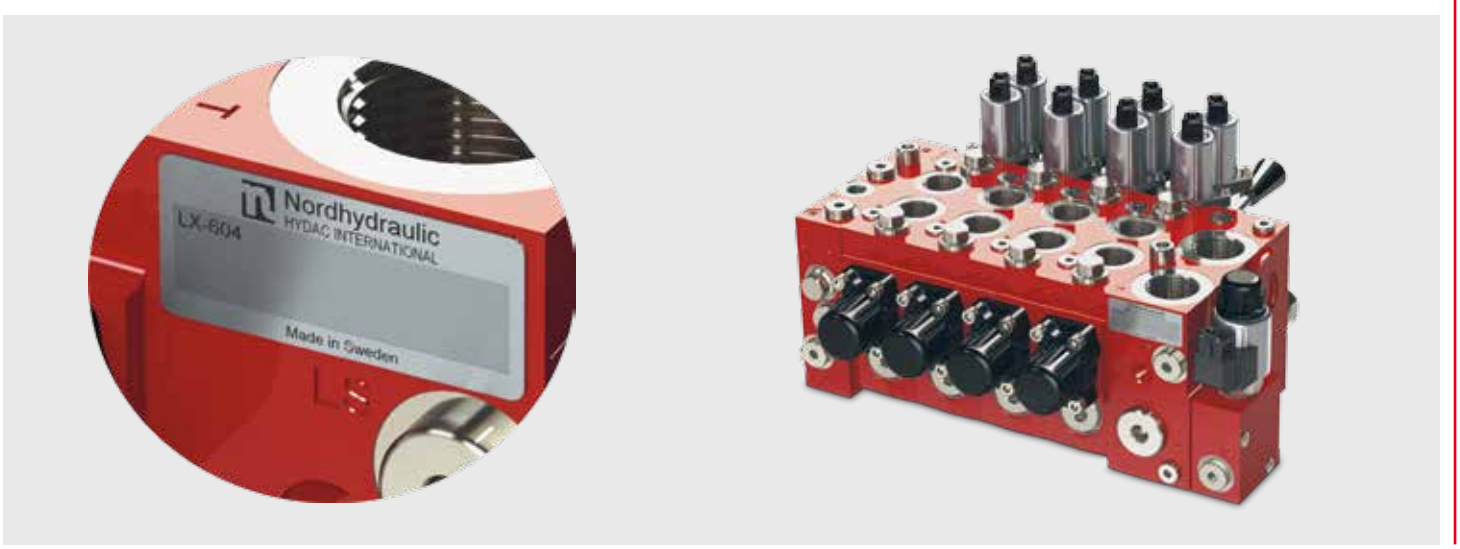
[1] Deviation of data on inquiry only

# Type code

| | 10 | Option blocks | | | | |
|---|---|---|---|---|---|---|
| ⚠ | | For basic type LS6F only<br>For channel:<br>LA Load signal port A<br>LB Load signal port B<br>LR Load signal port A and B<br>or<br>LS Load Sensing (LS circuit) | | **LD1** | **D**ummy plate **1** version | |
| | | | | **LW _ V _ _** | LS unloading LWA, LWB, LWR or LWS channel Valve type **V** | Normally open |
| | | | | **LW _ W _ _** | LS unloading LWA, LWB, LWR or LWS channel Valve type **W** | Normally closed |
| | | | | **LW _ P0A _ _** | Electro-prop. pres. adj. Orifice setup: 1.**0** mm LWA, LWB, LWR or LWS channel Pressure stage **A**: 350 bar Valve type **P** | Rising curve |
| | | | | **LW _ M _ _ _ V _ _** | Second pressure stage (On/Off) LWA, LWB, LWR or LWS channel **M**ech. adjustable in bar, 3-digit Valve type **V** | Second pressure level when de-energized |
| | | | | **LW _ M _ _ _ W _ _** | Second pressure stage (On/Off) LWA, LWB, LWR or LWS channel **M**ech. adjustable in bar, 3-digit Valve type **W** | Second pressure level when energized |
| | | For channel: LA and LB | | **LW1 V - V _ _** | **LW1** basic type Load signal port **A** - Load signal port **B** Valve type **V** – normally open Valve type **W** – normally closed | Valve type **V** and **W** selected as desired |
| | | Supply voltage DC | | **1 _** | **1**2 V | |
| | | | | **2 _** | **2**4 V | |
| | | Connector type | | **_ A** | **A**MP – Junior Timer, 2-pin, axial | |
| | | | | **_ D** | **D**eutsch – DT04, 2-pin, axial | |

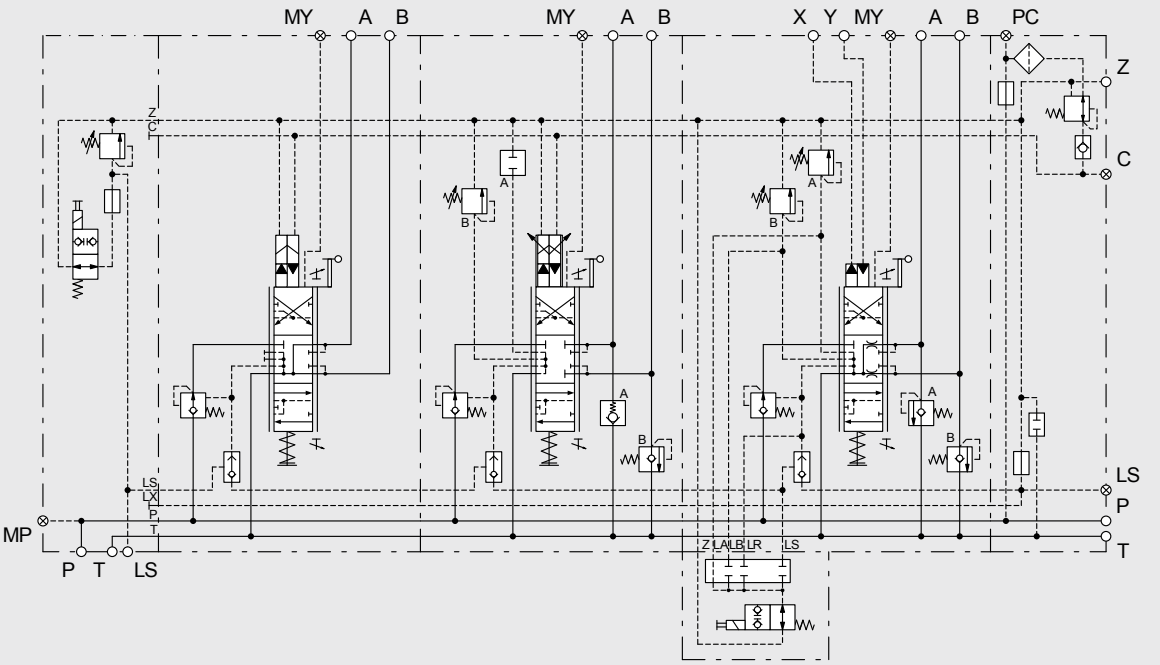
| **4.** | **End plate** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type:** | | **ER2** | | **/** | **0** | | | | | |
| | | | **ER2F** | **ZE** | **/** | **0** | **/** | **E1C2A** | **/** | * | |
| | **Pos.** | | **1** | **2** | | **3** | | **4** | | **5** | |

| | **Pos./designation:** | | **Type code:** | | | **Description/function** | **Comment** |
|---|---|---|---|---|---|---|---|
| | **1** | **Basic type** | | | | | |
| | | Standard with/without external pilot oil supply | | **ER1** | **E**nd plate **R**ight | **1** external pilot oil supply | |
| | | Standard with internal pilot oil supply | | **ER2** | | **2** internal pilot oil supply from channel P | |
| | | End plate like ER2 with ports P/T | | **ER27** | | **7** port size P/T | Port size 7:<br>BSPP: G1; SAE: 1 5/16 - 12 UN |
| | | End plate like ER2 with option block | | **ER2F** | | **F** flange interface for option block | |
| | **2** | **Configuration** | | | | | |
| | | For all basic types<br>For ports: Z, LS | | *n/a* | Standard | External depressurized drain line to Tank<br>No external LS signal input | Port Z open<br>Port LS closed |
| | | | | **Z** | Internal connection **Z** → T with check valve | | Port Z closed |
| | | | | **E** | **E**xternal LS signal input / internal LS-unloading with plug screw | | Port LS open |
| | | For basic type **ER1** only | | **C** | w/o external pilot oil supply for manual and hydraulic operations only | | Port C closed |
| | **3** | **Options** | | | | | |
| ⚠ | | For basic type **ER2...** only<br>For ports: PC and C | | **0** | Standard w/o options | | Ports PC and C closed |
| | | | | **P1** | Port PC: | Cut-off valve, mechanical with knurled screw | Port PC not usable |
| | | | | **P2** | Port PC: | Check valve | Port PC closed ex works |
| | | | | **C1** | Port C: | Cut-off valve, mechanical with knurled screw | Port C not usable |
| | | | | **C2** | Port C: | Check valve | Port C closed ex works |
| | **4** | **Option blocks** | | | | | |
| ⚠ | | For basic type **ER2F** only | | **E1C _ _** | **E1** Basic type | Pilot oil unloading Valve type **C** | Normally open |
| | | Supply voltage DC | | **1 _** | **1**2 V | | |
| | | | | **2 _** | **2**4 V | | |
| | | Connector type | | **_ A** | **A**MP – Junior Timer, 2-pin, axial | | |
| | | | | **_ D** | **D**eutsch – DT04, 2-pin, axial | | |
| | **5** | **Reference to clear text** | | * | Special, customer-specific information/data in attached clear text | | |



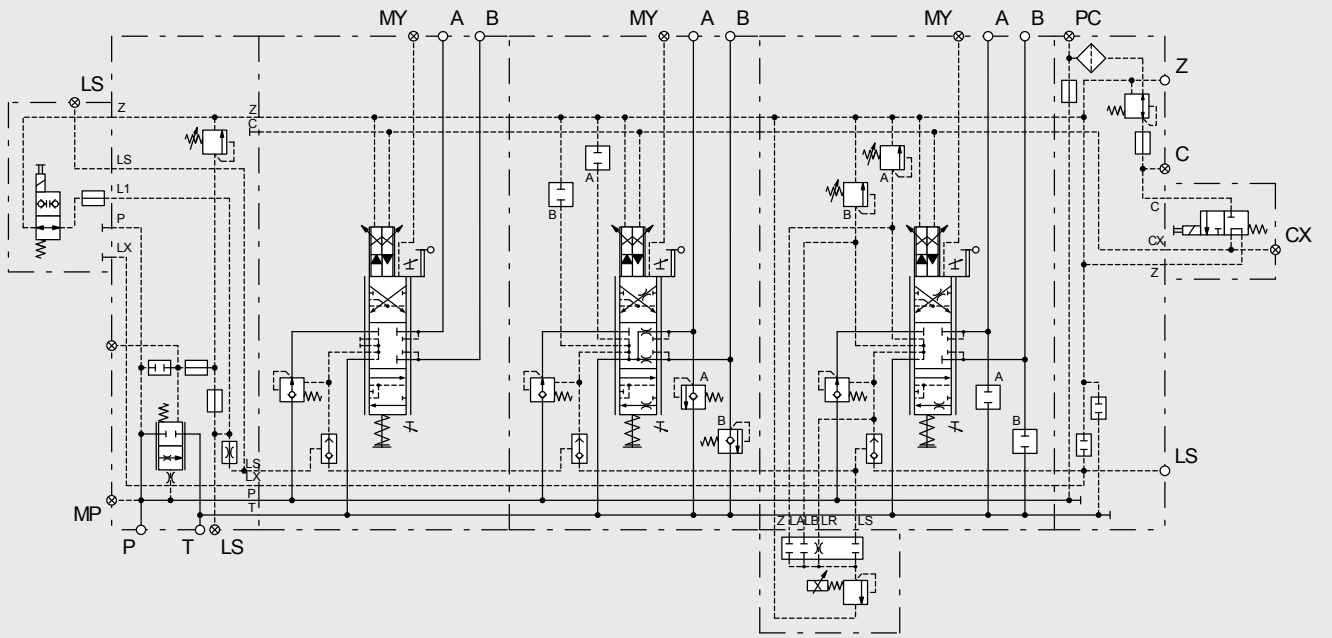
## Ordering examples

**Example for control block with Closed Center inlet plate and end plate with P/T ports**
(see also section “Dimensions”)




| | |
|---|---|
| **General** | LX-603/S0 |
| **Inlet plate** | CL17/300/V1D |
| **Working section 1** | B6/MS100-100RG/E1YHS1D-2/C1E |
| **Working section 2** | LS6/CS160-160RN/P - 200/A - 250/EYHS1D-2/C1E |
| **Working section 3** | LS6F/CR135-040RB/250 - 250/280 - 280/HYHS-2/C1H/LWAV1D |
| **End plate** | ER27/C2 |

**Example for control block with universal inlet plate and option blocks** (see also section “Dimensions”)




| | |
|---|---|
| **General** | LX-603/S0 |
| **Inlet plate** | UL17F/300/F/UW1V2A |
| **Working section 1** | B6/CS070-070RG/EYHS2A/C1E |
| **Working section 2** | LS6/CC160-055RN/P - P/350 - 350/EYHS2A/C1E |
| **Working section 3** | LS6F/CT150-150RY/250 - 250/P - P/EYHS2A/C1E/LWRP0A2A |
| **End plate** | ER2FE/0/E1C2A |

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