Directional control valve RS 210

Solutions that power your visions

Nordhydraulic AB
P.O Box 189 (Industrivägen 15)
SE-872 24 KRAMFORS
Sweden

Telephone: Int. +46 612 71 72 00
Telefax: Int. +46 612 71 72 15
E-mail: info@nordhydraulic.se
Web: www.nordhydraulic.se
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.

Key valve features
RS 210 is a sectional valve, designed for system pressures up to 350 bar and pump flows up to 70 l/min.

It 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 remote control.

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.

Applications
The RS 210 is ideal for applications where you need excellent control characteristics such as cranes, excavators, backhoe-loaders, skid loaders and tipping gear.

Further RS 210 properties and possibilities
- Several different in- and outlet alternatives offering possibility for electrical unloading, connecting and dimensional flexibility.
- Very wide programme of different spools optimised 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.

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 RS 210 and available components, please contact Nordhydraulic.
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</tr>
</tbody>
</table>
Technical data - weight - dimensions

Pressures / flow
Max. system pressure* ........................................350 bar (35.0 MPa)
Max continuous return line pressure .................. 20 bar (2.0 MPa)
Rated pump flow........................................... 50 l/min
With Q-inlet .................................................. 70 l/min
*depending on configuration and application

Weight

<table>
<thead>
<tr>
<th>Inlet section</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>I01A</td>
<td>1,8</td>
</tr>
<tr>
<td>I06B</td>
<td>1,7</td>
</tr>
<tr>
<td>I02C</td>
<td>2,5</td>
</tr>
<tr>
<td>I01E</td>
<td>2,3</td>
</tr>
<tr>
<td>I02Q</td>
<td>4,5</td>
</tr>
<tr>
<td>I06Q</td>
<td>4,5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outlet section</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>U01A</td>
<td>1,0</td>
</tr>
<tr>
<td>U01B</td>
<td>1,4</td>
</tr>
<tr>
<td>U01C</td>
<td>0,7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Working section</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>S01A</td>
<td>2,4</td>
</tr>
<tr>
<td>S01B</td>
<td>2,4</td>
</tr>
<tr>
<td>S01H</td>
<td>2,8</td>
</tr>
<tr>
<td>S02C</td>
<td>1,9</td>
</tr>
<tr>
<td>S10A</td>
<td>2,4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermediate section</th>
<th>Weight kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>M01A</td>
<td>1,7</td>
</tr>
<tr>
<td>M01B</td>
<td>1,7</td>
</tr>
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</table>

Dimensions, spool controls

<table>
<thead>
<tr>
<th>Type</th>
<th>LA mm</th>
<th>LB mm</th>
</tr>
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<tbody>
<tr>
<td>910</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>74</td>
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<tr>
<td>11</td>
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<td>14</td>
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<tr>
<td>L61</td>
<td>97</td>
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<td>L62</td>
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<td>L63</td>
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<tr>
<td>P</td>
<td>103</td>
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<td>EP</td>
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<tr>
<td>HPD</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>LE11</td>
<td>95</td>
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<tr>
<td>M19</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>M29</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>M111</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>M211</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>9</td>
<td></td>
</tr>
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</table>
Inlet and outlet type A - side connection

I01A 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.

With this configuration the max system pressure can be 300 bar.

For information regarding the outlet - see outlet sections.

1. Inlet type A................................................................. I01A
2. Main relief valve ...................................................... TBD131
3. Plug ................................................................. PL131

Oil temperature/viscosity for all graphs: +50°C / 32 cSt
Inlet and outlet section type B - top connection

**I06B** has one pump port and one tank port, both facing upwards. The main relief cavity is on the B-side.

With this configuration the max system pressure can be 300 bar.

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 ................................................................. I06B
2. Main relief valve ....................................................... TBD131

<table>
<thead>
<tr>
<th>No. of sections</th>
<th>L mm</th>
<th>LF mm</th>
<th>LK mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>103</td>
<td>87</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>146</td>
<td>130</td>
<td>111</td>
</tr>
<tr>
<td>3</td>
<td>189</td>
<td>173</td>
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<td>4</td>
<td>232</td>
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<td>5</td>
<td>275</td>
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<td>6</td>
<td>318</td>
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<td>7</td>
<td>361</td>
<td>345</td>
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</tr>
<tr>
<td>8</td>
<td>404</td>
<td>388</td>
<td>369</td>
</tr>
</tbody>
</table>

**Pressure drop, P1 - T1, inlet I06B, outlet U01B**

**Pressure drop A/B - T, inlet I06B, outlet U01B**
**Inlet and outlet section type C - end plate**

**I02C** 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 ..................................................................... I02C
2. Main relief valve ........................................................ TBD131

<table>
<thead>
<tr>
<th>No. of sections</th>
<th>L mm</th>
<th>LK mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>98</td>
<td>61</td>
</tr>
<tr>
<td>2</td>
<td>141</td>
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<tr>
<td>3</td>
<td>184</td>
<td>147</td>
</tr>
<tr>
<td>4</td>
<td>227</td>
<td>190</td>
</tr>
<tr>
<td>5</td>
<td>270</td>
<td>233</td>
</tr>
<tr>
<td>6</td>
<td>313</td>
<td>276</td>
</tr>
<tr>
<td>7</td>
<td>356</td>
<td>319</td>
</tr>
<tr>
<td>8</td>
<td>399</td>
<td>362</td>
</tr>
</tbody>
</table>

Pressure drop, \( P_1 \) - \( T_4 \), inlet I02C, outlet U01C

**Pressure drop, \( P_1 \) - \( T_1/T_3 \), inlet I02C, outlet U01B**
Inlet type E - with electrical unloading

I01E has one pump port and one tank port, both facing upwards. The main relief cavity is facing upwards. Main relief options: TBD160 up to 300 bar and TBS400 up to 350 bar.

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

1. Inlet type E ................................................................. I01E
2. El. unloading valve .................................................... E912
3. El. unloading valve .................................................... E926
3. Main relief valve .................................................... TBD160
3. Main relief valve .................................................... TBS400

Pressure drop, P1 - T4, inlet I01E, unloaded

Pressure drop, P1 - T1/T3, inlet I01E, outlet U01B
Inlet type I02Q - with by-pass and electrical unloading

I02Q is an inlet section with flow control, main relief valve and unloading function.

When the system is idling a small regulated flow passes the centre 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.

I02Q also is equipped with main relief valve TB12, which together with flow control FKA283, function as a pilot operated main relief valve. 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 ......................................................... I02Q
2. El. unloading valve ............................................. E912
3. El. Unloading valve .......................................... E926
4. Main relief valve ............................................ TB12
5. Metering orifice, diam 5,4 mm ......................... PF11
6. Metering orifice, diam 5,7 mm ......................... PF12

Pressure drop, P1 - T4, inlet I02Q/306Q, with flow control FKA283/2 and PF12, outlet U01B
**Inlet type I06Q - with by-pass and electrical unloading**

1. Inlet type Q ................................................................. I06Q
2. El. unloading valve .................................................... E912
3. El. Unloading valve ................................................... E926
4. Main relief valve ..................................................... TB12
5. Damp check valve ................................................... FSB3
6. Flow control ......................................................... FKA283/2
7. Flow control ......................................................... FKA283/3
8. Metering orifice, Ø 5,4 mm ................................. PF11
9. Metering orifice, Ø 5,7 mm ................................. PF12

**Pressure drop P1 - T4, inlet I02Q/I06Q, unloaded**

**Table:**

<table>
<thead>
<tr>
<th>No. of sections</th>
<th>L mm</th>
<th>LF mm</th>
<th>LK mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>135</td>
<td>113</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>178</td>
<td>156</td>
<td>111</td>
</tr>
<tr>
<td>3</td>
<td>221</td>
<td>199</td>
<td>154</td>
</tr>
<tr>
<td>4</td>
<td>264</td>
<td>242</td>
<td>197</td>
</tr>
<tr>
<td>5</td>
<td>307</td>
<td>285</td>
<td>240</td>
</tr>
<tr>
<td>6</td>
<td>350</td>
<td>328</td>
<td>283</td>
</tr>
<tr>
<td>7</td>
<td>393</td>
<td>371</td>
<td>326</td>
</tr>
<tr>
<td>8</td>
<td>436</td>
<td>414</td>
<td>369</td>
</tr>
</tbody>
</table>

**I06Q** has the same functions as I02Q but with an added special check valve FSB3 in the signal gallery to damp the unloading function of the flow control valve FKA. I06Q also provides an additional pump port.
Working sections

**S01A, for 3-position spool and cavities for service port valves**

1. Spool section .................................................. S01A
2. Spool
3. Checkvalve ..................................................... MB01
4. Port relief valve ............................................. TBD121
5. Port relief and anticavitation valve ............... TBS121

**S01B, for 3-position spool without cavities for service port valves**

1. Spool section .................................................. S01B
2. Spool
3. Checkvalve ..................................................... MB01

**S01H, for 4-position spool and cavities for service port valves**

1. Spool section .................................................. S01H
2. Spool
3. Checkvalve ..................................................... MB03
4. Plug ............................................................ P121

**S02C, for 3-position spool without service port valve possibility**

1. Spool section .................................................. S02C
2. Spool
3. Checkvalve ..................................................... MB01

**S10A, for 3-position spool and cavities for service port valves for tandem circuits**

1. Spool section .................................................. S10A
2. Spool
3. Checkvalve ..................................................... MB01
4. Plug ............................................................ P121
**Intermediate sections**

**M01A** 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 M01A is not used, both pump flows are available for use downstream of M01A. The tank gallery is common for all sections.

**M01B** 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 tank gallery is common for all sections.

**Outlet sections**

**U01A** 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.

**U01B** 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.
**Electrical unloading valve**

The electrical unloading valve is a 2-way, normally open, solenoid type cartridge valve. It is an option in inlet sections I02Q, I06Q and I01E.

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

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

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

**Data**

- Rated flow: 40 l/min
- Power consumption: 17 W
- Rated voltage: 12 or 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.

**Codes**

- E912: push and twist type override 12 V
- E926: push and twist type override 26 V
Main relief valves

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 101E.

Setting range: 35 - 350 bar (3.5 - 35.0 MPa).

Setting range step: 5 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: 35 - 350 bar (3.5 - 35.0 MPa).

Setting range step: 5 bar.
Main relief valves

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 I01A, I06B, I02C and intermediate sections M01A and M01B.

Setting range: 35 - 300 bar (3.5 - 30.0 MPa).
Setting range step: 5 bar.

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 I01E.

Setting range: 35 - 300 bar (3.5 - 30.0 MPa).
Setting range step: 5 bar.
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 Nordhydraulic for advice on choosing spools in order to optimize your valve configuration.

**Spools for general use**

<table>
<thead>
<tr>
<th>Function</th>
<th>10-30</th>
<th>25-50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double acting spool</td>
<td>1D</td>
<td>1K</td>
</tr>
<tr>
<td>Slewing spool, gentle operating</td>
<td>-</td>
<td>1M</td>
</tr>
<tr>
<td>Single acting spool P - A</td>
<td>2D</td>
<td>2K</td>
</tr>
<tr>
<td>Motor spool</td>
<td>-</td>
<td>4K</td>
</tr>
<tr>
<td>Motor spool A - T</td>
<td>-</td>
<td>4KA</td>
</tr>
<tr>
<td>Motor spool B - T</td>
<td>-</td>
<td>4KB</td>
</tr>
<tr>
<td>Double acting spool with 4th pos. for float</td>
<td>3D</td>
<td>3K</td>
</tr>
</tbody>
</table>

**Spools designed for cranes**

<table>
<thead>
<tr>
<th>Function</th>
<th>20-30</th>
<th>30-45</th>
<th>35-50*</th>
</tr>
</thead>
<tbody>
<tr>
<td>For slewing function. In combination with spool control 918 only.</td>
<td>12SA</td>
<td>14SA</td>
<td>124SA</td>
</tr>
<tr>
<td>For use with load holding valves. Asymmetric. B-port to be connected to piston side of cylinder.</td>
<td>12ZA</td>
<td>14ZA</td>
<td>124ZA</td>
</tr>
<tr>
<td>For use with load holding valves.</td>
<td>12ZB</td>
<td>14ZB</td>
<td>124ZB</td>
</tr>
<tr>
<td>For use with load holding valves. Asymmetric. A-port to be connected to piston side of cylinder.</td>
<td>12XA</td>
<td>14XA</td>
<td>124XA</td>
</tr>
<tr>
<td>For use with load holding valves. Asymmetric. B-port to be connected to piston side of cylinder.</td>
<td>12YA</td>
<td>14YA</td>
<td>124YA</td>
</tr>
</tbody>
</table>

* Note: Spools for flow range 35-50 l/min in combination with Q-inlets only.
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 12**
  - Spring centered with detent at position 2.

- **Spool control 13**
  - Spring centering with detent at position 3.

- **Spool control 14**
  - Spring centering with detent at position 3.

- **Spool control P**
  - Pneumatic*.

- **Spool control EP**
  - Electro/pneumatic on/off**.

- **Spool control HPD**

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

**
- Power consumption .......................................................... 4,8 W
- Rated voltage ................................................................. 24 V
- Max voltage variation .................................................. +/- 10%
- Duty factor: ................................................................. 100%
- Connection ................................................................. according to EN175301-803/B
- Protection class ............................................................. IP 65

*** Connection G 1/4” BSP

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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 spools with 3 or 4 position.
Spool controls - B-side

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

Remote control
As a part of the RS210 modular system is also a sub system for electrical remote available.

The main parts in that system are a pilot supply unit, spool controls with 12 Volt or 24 Volt proportional solenoid operated valves and piping.

The spool control is for control of 3-positional solenoids. It is possible to use the remote control spool controls with any 1 recommended to use inlets of type "Q".

The pilot supply unit builds up supply pressure but includes also a pressure reducing valve that limits the supply pressure.

The spool control is designed as a double acting cylinder that assembles on the valves A-side why the spool end on the B-side are available for manual over ride by a lever. The spool controls are designed with an interface for internal connection between the controls of both supply pressure as well as return flow.

It is possible to have the valve delivered complete assembled with spool controls, pilot supply and piping. The modular and easy to handle design makes the remote controls suitable also for complete assembly on existing valves.

Pilot supply block
The pilot supply block includes a pressure build up valve that gives an initial pressure depending of flow but in the range of 10 to 14 bar. That pressure is enough for start of the maneuver of the spool that will raise up the system pressure. The supply pressure to the spool controls is limit to 23 bar which is the pressure set for the pressure reducing valve. Both the supply to the spool controls and the return from them is piped to the block.

The spool shall be assembled on the valves A-side. The design is a double acting cylinder that positions the spool against a spring. The proportional solenoid valves are available both for 12 Volts as well as for 24 Volts and for PWM supply.

The spool controls can also be delivered with a spool position indicator included.
Service port valves

Port relief valve TBD121
TBD121 is a differential area, direct acting relief valve for the secondary circuit. It is adjustable and sealable.
Setting range: 35 - 300 bar (3.5 - 30.0 MPa).
Setting range step: 5 bar.

Port relief and anticavitation valve TBD121
See TBD121 and SB160 for functional principles
Setting range: 35 - 300 bar (3.5 - 30.0 MPa).
Setting range step: 5 bar.

Anticavitation valve SB160
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.
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 a strong recommendation to pipe up the system in that way in order to avoid high pressure and pressure peaks in the return line.