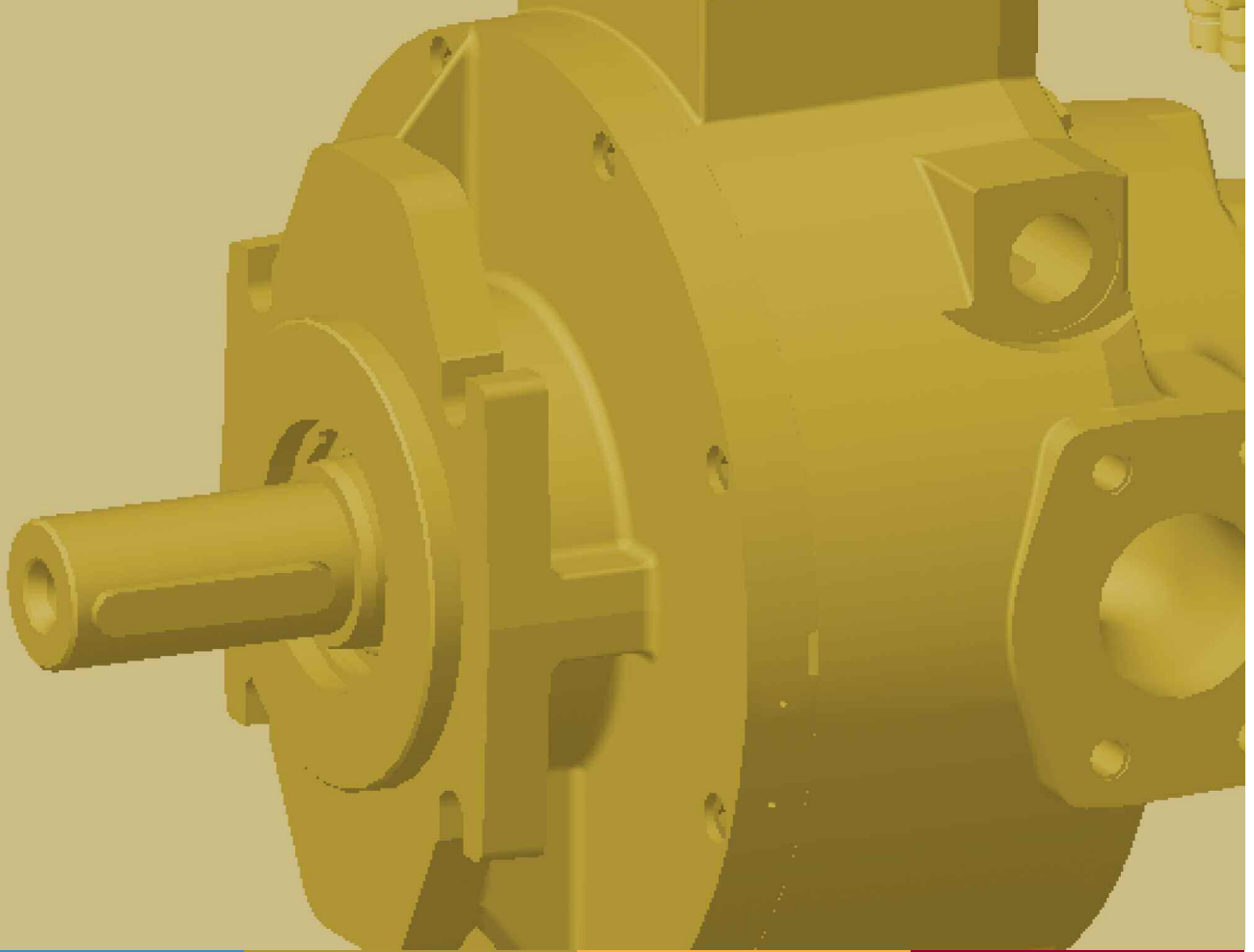


APPLICATION INSTRUCTION

RKP-D



Radial Piston Pump (RKP-D) with CAN Bus Interface

CA58548-001; Version 1.3, 06/11

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1 General Information

1.1 References for the Application Instruction

The present application instruction is only for Radial Piston Pump RKP-D with digital on-board electronic and is a part of the product. The document describes various possibilities of the commissioning of the pump.

This application instruction is an additional documentation to the User Manual Radial Piston Pump RKP-II. For correct mounting und operation the instructions and warnings of the User Manual Radial Piston Pump RKP-II must be carefully attended to.

Non observance can result in to damage to people and property.

It is obligatory to read and understand the Product Manual Radial Piston Pump RKP-II.

The current version of the user manual Radial Piston Pump RKP-II is available under:

<http://www.moog.com/industrial>

1.2 Subject to Change and Validity

The information in this Application Instruction is valid as of the date this version of the Application Instruction is released. Version number and release date of this Application Instruction are noted in the footer. The Application Instruction at hand is subject to change at any time and such may be made without justification.

1.3 Exclusion of Liability

This Application Instruction was prepared with the greatest possible care and the contents generated according to the best of the author's knowledge. However, the possibility of error cannot be prevented and improvements may be possible. We would be pleased to receive your comments about possible errors or incomplete information. Nevertheless, Moog does not offer any guarantee that the contents conform with applicable legal regulations, nor does Moog accept any liability for possible remaining incorrect or incomplete information and the consequences thereof.

1.4 Trademarks

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1.5 Warning Labels

DANGER



Denotes safety instructions, which are meant to warn of an imminent danger of death or serious bodily injury or of significant property damage.

Non-observance of these safety instructions will inevitably lead to death, serious injuries (crippling injuries) or significant damage to property!

WARNING



Denotes safety instructions, which are meant to warn of possible danger of death or serious bodily injury or of possible significant property damage.

Non-observance of these safety instructions may lead to death, serious injuries (crippling injuries) or significant damage to property!


CAUTION



Denotes safety instructions, which are meant to warn of the risk of slight injuries or minor property damage.

Non-observance of these safety instructions may lead to slight injuries or minor damage to property!

1.6 Symbols

-  Denotes important instructions
- bzw. - Denotes lists
- ⇒ Denotes reference to another chapter, another page, table or figure in the User Manual as well as supplemental documentation

1.7 Safety

1.7.1 Safe Operation

WARNING It is the responsibility of the manufacturer and the operator of the machinery to ensure safe operation of the Radial Piston Pump.




WARNING As in any electronic control system, the failure of certain components in RKP-D as well might lead to an uncontrolled and/or unpredictable operational sequence. All types of failure on a system level must be taken into consideration and appropriate protective measures must be taken.



For RKP-D all hints and instructions of the User Manual RKP-II, are relevant.

Additionally for RKP-D the following standard to the safety of machinery is relevant:

- DIN EN 60204 Safety of machinery – Electrical equipment of machinery

WARNING The protective conductor connection () (if provided) is connected to the electronics housing or valve body. The insulation materials employed are designed for use in the safety extra –low-voltage range. The field bus circuit connections (if provided) are only functionally galvanically isolated from other connected circuits.



To comply with safety regulations requires isolation from the mains according to EN 61558-1 and EN 61558-2-6 and limiting all voltages according to EN 60204-1.

We recommend using SELV/PELV power supplies.

1.7.2 Work Safety

⇒ User Manual RKP-II, additionally is relevant:

WARNING The magnets of the permanent magnetic linear motor of the digital valve may be the cause of strong magnetic fields. These magnetic fields cause interferences to sensitive devices like pace makers. Maintain the respective device-related safety clearance.



1.7.3 General Safety Instructions

⇒ User Manual RKP-II

1.7.4 ESD (Electrostatic Discharge)

WARNING Electrically discharge may damage components of the valve of RKP-D. Mountings and spare parts must be saved of electrostatic charging! Particularly avoid the direct contact with the pins of connectors.



1.8 Environmental Safety, Disposal ⇨ User Manual RKP-II

1.9 Additional documentation

Additional documentations to the Application Instruction RKP-D:

- **User Manual RKP-II Radial Piston Pump**
- **User Manual Firmware Radial Piston Pumps (RKP-D) with CAN Bus Interface**
- **Benutzerinformation elektrische Schnittstellen (only available in German language)**
- **Mounting and Installation Notes RKP-II Radial Piston Pump**
- **RKP-D Catalogue**
- **TN353, Protective grounding and electrical shielding of hydraulic valves with integrated electronics**
- **TN494, Cable lengths for servo valves with integrated electronics**

The current versions are available under:

<http://www.moog.com/industrial>

2 Installation of RKP-D

2.1 Mechanic and hydraulic installation

Danger



It is necessary to install the RKP-D according to the rules and recommendations given in the

- **User Manual RKP-II Radial Piston Pump**
- **User Manual Firmware Radial Piston Pumps (RKP-D) with CAN Bus Interface**
- **Benutzerinformation elektrische Schnittstellen (only in German language)**
- **RKP-D Catalogue**
- **TN353, Protective grounding and electrical shielding of hydraulic valves with integrated electronics**
- **TN494, Cable lengths for servo valves with integrated electronics**

in regards of mechanic and hydraulic installation.

The hints given there have to be taken into account in order to avoid any damage to persons and to the pump and to provide maximum service life. It is of special importance to limit the hydraulic pressure to a maximum of 280 bar. This must be done by means of a correctly sized pressure relief valve that has to be installed in the pressure line directly connected to the pressure port of the pump. If a pressure sequence manifold is used, the pressure relieve valve is typically part of the manifold design. In this case the customer still has to take care of the correct adjustment of the pressure relieve valve.

2.2 Electric connections

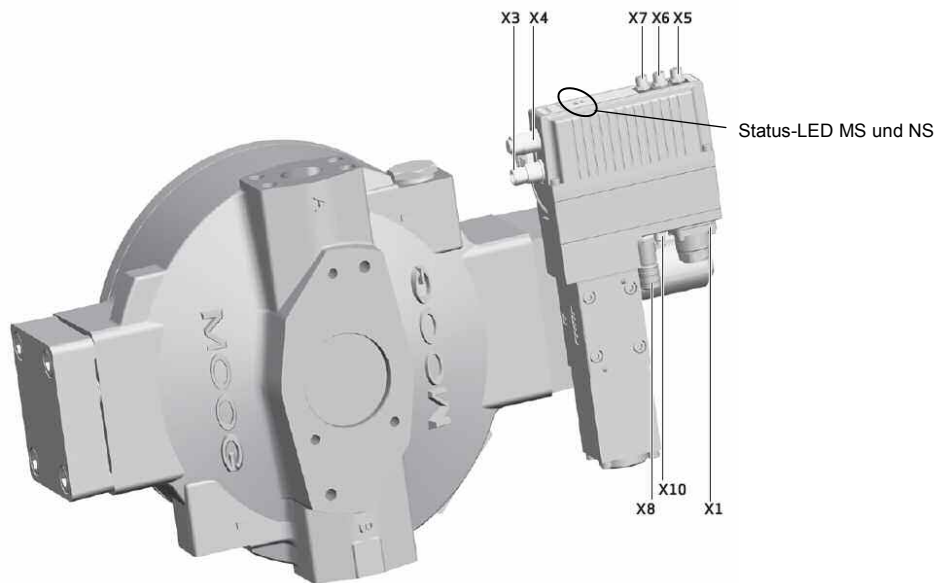


Figure 1: Electric connections of RKP-D

- Degree of protection for valve and LVDT: IP65 (with connected plugs or appropriate protecting caps)
- The appropriate protecting caps have to remain on the not used connectors.

No.	Description	Typ
X1	Main Connector	11+PE
X3	CAN	M12x1 5 pin
X4	CAN	M12x1 5 slots
X5	Pressure Sensor 2	M8x1 4 slots
X6	Pressure Sensor 1	M8x1 4 slots
X7	Analog Operation Mode Selection	M8x1 4 slots
X8	Linear Variable Displacement Transducer (LVDT)	M12x1 5 slots
X10	Local CAN for Master/Slave operation (optional)	M8x1 3 pin

Table 1: Electric connections of RKP-D

Modul-Status-LED (MS)

The Modul Status LED displays operational and error states.

Module status (MS) LED	Description	Valve State Machine (Status Word) According to VDMA Profil
Off	No supply power	
Blinking green	Valve standby mode	Init or Disabled
Green	Normal operation	Hold or Active
Blinking red	Recoverable error (see "Fault Reaction Settings"; FAULT_DISABLE, FAULT_HOLD)	Fault Disable or Fault Hold
Red	Unrecoverable error (see "Fault Reaction Settings", FAULT_STOP)	Not Ready

Table 2: Modul-Status-LED (MS)

Network-Status-LED (NS)

The network status LED displays the status of the CAN network.

Network Status (NS) LED	Description	Network Management State (NMT) According to CANopen
Off	No supply power or in state "stopped"	No supply power or in state "stopped"
Blinking green	This status is reached after boot up. SDO communication is possible. (steady state condition in analog operation)	Pre-Operational
Green	SDO and PDO communication is possible.	Operational

Table 3: Network-Status-LED (NS)

2.2.1 11+PE Pole Connector (X1)


Pin	Function	Factory settings	
		Differential voltage inputs 0 V to 10 V, floating	Configurable settings Current inputs 4 mA to 20 mA, floating
1	Not used		
2	Not used		
3	Enable signal	8,5 V to 32 V DC based on pin 10: operation of the pilot valve enabled < 6,5 V DC based on pin 10: pilot valve fail-safe condition	
4	Set point signal Q	$U_{in} = U_{4-5}$ $R_{in} = 20 \text{ k}\Omega$	$I_{in} = I_4 = -I_5$ (with $I_7 = 0$) ¹⁾ $R_{in} = 200 \Omega$
5	Reference input rated command	reference to ground for pin 4 and pin 7	common feedback for pin 4 and pin 7
6	Output ³⁾ actual stroke ring position	Voltage signal output: $U_{out} = 2 \text{ V to } 10 \text{ V to GND}$. At 6 V the stroke ring is positioned in centered position. The RKP-D delivers 0% flow. ⁴⁾ Current signal output: $I_{out} = 4 \text{ mA to } 20 \text{ mA to GND}$. I_{out} is proportional to actual stroke ring position. Output is short-circuit proof; $R_L = 0$ to 500Ω	
7	Set point signal P	$U_{in} = U_{7-5}$ $R_{in} = 20 \text{ k}\Omega$	$I_{in} = I_7 = -I_5$ (with $I_4 = 0$) ¹⁾ $R_{in} = 200 \Omega$
8	Output ³⁾ actual pressure	Voltage signal output: $U_{out} = 2 \text{ V to } 10 \text{ V to GND}$. 2 V corresponds to 0% pressure. 10 V corresponds to 100% pressure. ⁴⁾ Current signal output: $I_{out} = 4 \text{ mA to } 20 \text{ mA to GND}$. I_{out} is proportional to actual pressure. Output is short-circuit proof; $R_L = 0 \Omega$ to 500Ω	
9	Supply voltage	24 V DC (18 V to 32 V DC); $P_{max} = 28,8 \text{ W}$	
10	Supply ground	0 V (GND)	
11	Fault indication	error control: $U < 0,5 \text{ V}$ ²⁾ means fault	
	Protective conductor contact		

Table 4: Wiring for 11+PE pole connector (X1)

<p>The potential difference from pin 4, 5 and 7 (measured against pin 10) each must be between – 15 V and +32 V.</p> <p>¹⁾ As pin 5 is the common feedback for pin 4 and pin 7, $-I_5 = I_4 + I_7$ applies.</p> <p>²⁾ Reference to pin 10 (supply-ground).</p> <p>³⁾ Note: Type of signal can NOT be switched via software and has to be specified when designating the model code</p> <p>⁴⁾ Warning: voltage metering directly at the connector, pin10. The measurement signal will be falsified by output resistance of GND.</p> <p>With voltage level > 0,5V at pin11 - X1 the RKP-D signalize operating to the superior control. The voltage level < 0,5V signalize fault.</p>	<p>Suitable Mating Connector 11+PE: Moog Order Code B97067-111</p> <p>Important note: Only the use of specified mating connector (metal shell) in combination with proper shielding to meet the EMC requirements.</p>
--	--

2.2.2 Local-CAN for Master-Slave Combinations (X10)

Pin	Signal	
1	CAN_H	Transciever H
3	CAN_GND	
4	CAN_L	Transciever L

Table 5: Wiring Local-CAN-Connector

Available from Moog or C. Escha Bauelemente GmbH

L = 0.3 m: Moog (Ordering No C43395-001)
 or Escha (Type 8031233)
 (IP65; 3 x 0.25 mm²; PUR; screened),
 not included in delivery of RKP-D.

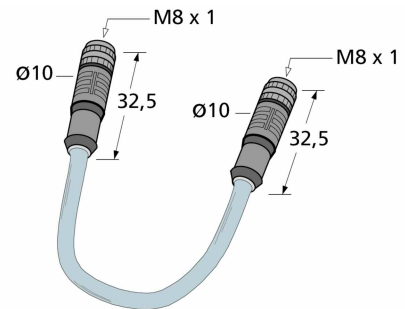
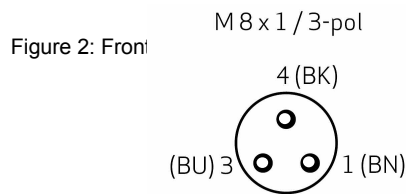


Figure 3: Junction cable for master-slave combinations

2.2.3 CAN Connector (X3 and X4)

Pin	Signal	
1	CAN_SHLD	Shield
2	CAN_V+	No connection in the valve
3	CAN_GND	
4	CAN_H	Transciever H
5	CAN_L	Transciever L

Table 6: Wiring CAN connector

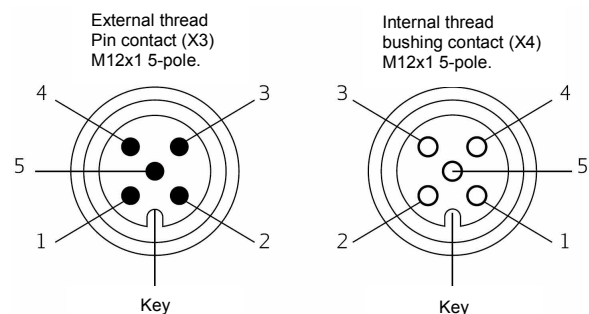


Figure 4: CAN Connector (X3, X4)

2.2.4 External Pressure Sensor Inputs

Factory settings: sensor signal 0 ... 10 V; 4-wire-type

Pin	Signal
1	Supply 24 V DC (max.200 mA)
2	Signal GND
3	Supply GND
4	Pressure signal (0 to+10 V bzw. 4 mA to 20 mA)

Table 7: Wiring, connector of pressure sensor

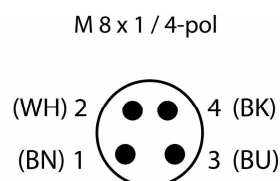


Figure 5: Front view on the cable, external thread, Pin contact

Supported types of pressure sensors

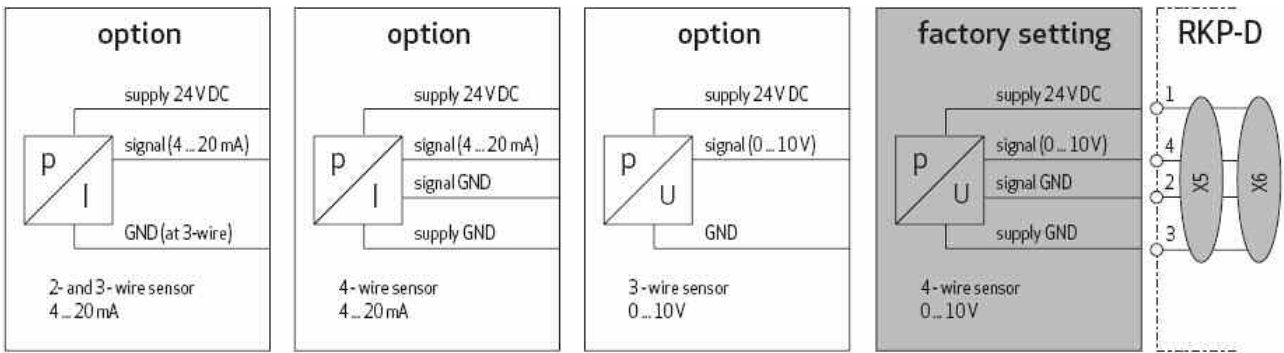


Figure 6: Supported types of pressure sensors

i Note: Each option requires adequate setting of the analog interface via the Moog Configuration Software

2.2.5 Analogue Operation Mode Switching (X7)

Factory settings: Differential input signal 0 to 10 V

Pin	Signal
1	Supply 24 V DC (max.200 mA)
2	Signal GND
3	Supply GND
4	Signal (0 to +10 V)

Table 8: Wiring, connector of analogue operation mode switching

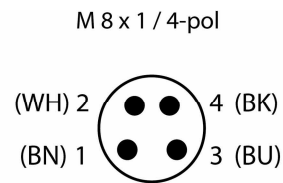


Figure 7: Front view on the cable, external thread, Pin contact

2.2.6 Mate Connector with Connection Cable for Inputs X5, X6, X7

Available from Moog or C. Escha Bauelemente GmbH

L = 2 m: Moog (ordering No C72977-002) or Escha (Type 8028332)

L = 5 m: Moog (ordering No C72977-005) or Escha (Type 8028333)

(IP65; 4 x 0.25 mm²; PUR; screened), not included in delivery of RKP-D.

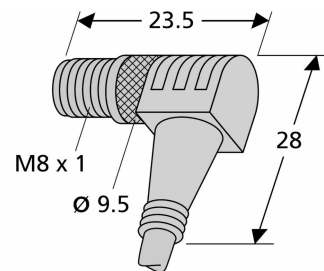


Figure 8: Mate connector for X5, X6, X7

Connector pin assignment:

Pin	Signal
1	brown (BN)
2	white (WH)
3	blue (BU)
4	black (BK)

Table 9: Connector pin assignment X5, X6, X7

2.2.7 General Requirements for Pump Electronics

Supply	24 Volt DC (min. 18 Volt DC, max. 32 Volt DC) with a single fault proof power supply
Shielding	<ul style="list-style-type: none"> All signal lines, including those applied in connection with external transducers, shielded Shielding on power supply side connected radially to GND (0V) and connected to the mating connector housing (because of EMC)
EMC	Meets the requirements of emission: EN61000-4-4: 2001-10 and immunity: EN61000-6-2:1999
External fusing	1,6 A slow blow for each pump
Duty cycle	100%
Maximum power consumption	28,8 W (1.2 A at 24 VDC)
Minimum cross section of all leads	$\geq 0,75 \text{ mm}^2$ (18 AWG); Consider voltage losses between cabinet and RKP-D.

Table 10: General requirements for pump electronics



Note: When making electric connections to the RKP-D (shield, protective earth), appropriate measures must be taken to ensure, that locally different earth potentials do not result in excessive ground currents.

(⇒ Moog Technical Note TN353)

Command signals and wiring for RKP-D with analogue activation

Command signals 0...10V, floating (= factory setting)
<ul style="list-style-type: none"> The stroke ring position (= volumetric flow) of the RKP-D is proportional ($U_4 - U_5$) at the 11+PE connector (X1). The command signal ($U_4 - U_5$) = + 10V equals 100% flow, whereas ($U_4 - U_5$) = 0V equals zero flow. The pressure function controls the pressure measured by an external pressure transducer. The pressure is proportional ($U_7 - U_5$) at 11+PE pole connector (X1). ($U_7 - U_5$) = + 10V equals 100% regulated pressure. ($U_7 - U_5$) = 0V results in 0% regulated pressure. The absolute size of 0% and 100% pressure depends on the signal range of the assembled pressure transducer respectively the software adjustment of current input.

Command signals 4 ... 20mA, floating (= software adjustable)
<ul style="list-style-type: none"> The stroke ring position (= volumetric flow) of the RKP-D is proportional to I_4 at the 11+PE connector (X1). The command signal I_4 = 20 mA equals 100% flow, whereas I_4 = 4 mA equals zero flow (or I_4 = 12 mA, depends from settings). The pressure function controls the pressure measured by an external pressure transducer. The pressure is proportional to I_7 at 11+PE pole connector (X1). I_7 = 20 mA equals 100% regulated pressure whereas I_7 = 4 mA results in 0% regulated pressure. Pin 5 is the common return wire for I_4 and I_7, which means: $I_4 + I_7 = - I_5$. The absolute size of 0% and 100% pressure depends on the signal range of the assembled pressure transducer respectively the software adjustment of current input.

Output actual value 2V...10V to GND (Note: Type of signal is fixed and not switchable via software)

- The actual stroke ring position can be measured at pin 6, the actual pressure at pin 8 of the 11+PE pole connector (X1).
- These signals can be used for monitoring, fault detection and visualization purposes.
- The pressure range (0 ... 100%) and the flow rate (-100% ... +100%) correspond to the output signal range of 2 ... 10 V.
- At 6 V(pin 6) the stroke ring is in its centered position and the RKP-D delivers zero flow;
- at 10 V (pin 6) the RKP-D delivers +100% flow; at 2 V(pin 6) the RKP-D delivers 100% flow.
- At 2 V(pin 8) the actual pressure corresponds to 0%.
- At 10 V(pin 8) the actual pressure corresponds to 100%.
- The actual output signal allows to detect a cable break, when $U_{6-10} = 0 \text{ V}$ and $U_{8-10} = 0 \text{ V}$ respectively.

Actual value feedback signals 4mA...20mA, ground related (Note: Type of signal is fixed and not switchable via software)

- The actual stroke ring position, can be measured at pin 6, the actual pressure can be measured at pin 8 at the 11+PE connector (X1) (see diagrams in page 15).
- Those signals can be used for monitoring, fault reaction and visualization purposes.
- The stroke ring position respectively pressure range corresponds to 4 to 20 mA.
- At 12 mA (pin 6), the stroke ring is in centered position (= zero flow).
- At 20 mA (pin 6), the RKP-D delivers + 100% flow, whereas at 4 mA (pin 6) the RKP-D delivers – 100% flow.
- At 4 mA (pin 8), the actual pressure corresponds to 0%.
- At 20 mA (pin 8), the actual pressure corresponds to 100%.
- The actual value signal outputs allow to detect a cable break, when $I_6 = 0 \text{ mA}$, respectively $I_8 = 0 \text{ mA}$.

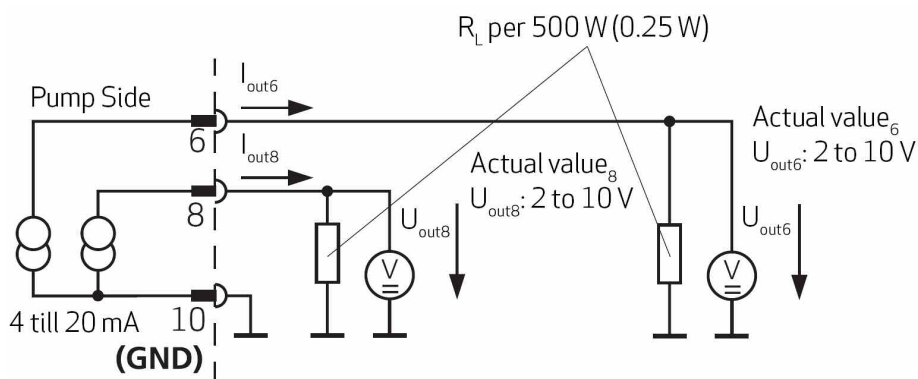


Figure 9: Circuit diagram for measurement of actual value I_6 (stroke ring position) and I_8 (actual pressure) as voltage signals 2...10 V

2.3 Connecting a Pressure Sensor

In order to allow the use of the pressure control functionality of the RKP-D, a suitable pressure sensor has to be installed and connected to the RKP-D. In case of the use of a pressure sequence cartridge the pressure sensor is usually placed behind this cartridge. Appropriate pressure sensors are for example HYDAC type HDA or Danfoss type MBS.

Any other sensor can be used, as long as it is appropriate for the application in regards of robustness, signal quality and sufficient dynamic behavior.

Ex works the RKP-D is preset for the connection of a pressure sensor to plug X6. The analog interface is set by factory for a 0..10V output signal in 4 wire mode. Connector X6 provides a (unstabilized) supply voltage of 18..32V DC and a maximum current rating of 200mA. The connecting schematic illustrates the situation, ⇔ Figure 6.

When the supply voltage and the enable signal applied, the RKP-D electronic is operational. This is indicated by a LED on the housing of the electronics of the pilot valve. If the valve is operational, this LED labeled «MS» is illuminated green. If this LED is off or illuminated red, a malfunction is indicated.

3 Commissioning without Moog Valve Configuration Software-MoVaCo

3.1 Behavior of the RKP-D with default settings (ex factory)

If the RKP-D is mounted as delivered from the factory and - as described initially – connected electrically, this results due to the default settings ex factory in following behavior: The examples relate to voltage-values (set point/actual). Also applicable for current signals.

- The pump is automatically in „p/Q“ mode (flow control with superimposed pressure limitation)
- The pump delivers 0 l/min at a flow set point signal of 0V ($U_{4-5} = 0V - X1$)
- The pump delivers its maximum flow at a flow set point signal of 10V ($U_{4-5} = 10V - X1$)
- At negative values of flow set point the pump changes the direction of flow. Up to minus 100% flow are possible.
- At a pressure set point of x V ($U_{7-5} = xV / X1$) the pump limits its displacement ensuring, that the pressure, corresponding to the x V-output signal of the pressure transducer connected to the connector X6, will not be exceeded.
- The pressure controller applies the pre-defined parameter set No.1, which has been created for the smallest oil volume in the system. With this selected parameter set, a stable behavior without oscillation of the pressure controller is expected. This can be used as a starting point for further optimization of dynamics.
- Leakage compensation will be performed by the RKP-D automatically. As the system pressure increases, the given internal flow set point will be increased to compensate the internal, pressure-dependent pump leakage and to achieve actuator velocities, which are nearly independent of the system pressure.

3.2 How to use the analogue operation mode switching

In order to obtain an optimal setting (maximum dynamics and optimal transient behavior of the pressure controller), it is recommended to optimize the pressure controller parameters for the current oil volume of the system.

The RKP-D is equipped with 16 pre-defined operation modes. These operation modes are to be called up via a 0...10V analogue signal at the connector X7 (PIN 4-2).

Parameter Set	Oil Volume	Control Mode	Operational Mode	Pressure Sensor	U at X7 ³⁾
1	0,1 liters	p/Q	Solo	Input X6	0...1,5 V
2	2,5 liters	p/Q	Solo	Input X6	2,0 V
3	5,0 liters	p/Q	Solo	Input X6	2,5 V
4	7,5 liters	p/Q	Solo	Input X6	3,0 V
5	10,0 liters	p/Q	Solo	Input X6	3,5 V
6	12,5 liters	p/Q	Solo	Input X6	4,0 V
7	15,0 liters	p/Q	Solo	Input X6	4,5 V
8	20,0 liters	p/Q	Solo	Input X6	5,0 V
9	25,0 liters	p/Q	Solo	Input X6	5,5 V
10	30,0 liters	p/Q	Solo	Input X6	6,0 V
11	35,0 liters	p/Q	Solo	Input X6	6,5 V
12	40,0 liters	p/Q	Solo	Input X6	7,0 V
13	50,0 liters	p/Q	Solo	Input X6	7,5 V
14	p-regulator off	Q	Solo	-	8,0 V
15	0,1 liters	p/Q	Hybrid ¹⁾	Input X6	8,5 V
16	p-regulator off	Q	Solo (Slave) ²⁾	-	9,0...10 V

¹⁾ Requires initial calibration of the hybrid flow-adjustment by the end user.
²⁾ The RKP-D stages initially need to be designated as master or slave by the end user.
³⁾ Voltage levels apply ± 100 mV

Table 11: Default settings of operation modes and the according pressure controller settings

⇒ Table 11 shows the assignment of the impressed voltage at X7 to the corresponding operation mode.

- The operation modes 1...13 are created for optimization of pressure controller.
- In operation mode 14 the pressure controller is deactivated. Regardless of the current pressure set point the RKP-D will follow the flow set point solely.
- Operation modes 15 and 16 have been created for special modes of operation, namely Hybrid- and Master-Slave-mode. However it requires some extra work prior to the pump set-up, which will be explained more explicitly in the upcoming chapters.
- The selection of the operation modes can be both static (one parameter set for the complete cycle) as well as dynamic (different parameter sets for different phases within the process).
- For “static” selection it would be sufficient to provide a fixed voltage to X7. The voltage can be created by means of a voltage divider, just to name an example. For “dynamic” selection of different operation modes, an analogue output signal (in range of 1,5V..9V) provided by machine controller has to be connected with the connector X7 of RKP-D.
- It is important that the transition time between voltage steps at X7 be **< 1 ms**. Further, the specified voltage levels have to be kept stable with noise nominally no more than +/- 50mV. This is to avoid constant switching from one operation mode to the other.
- Operation mode 1 will automatically be activated, as long as X7 is not connected.



Even if another operation mode has been selected and saved via MoVaCo, a restart of the RKP-D will activate that operation mode defined by the voltage signal at X7. (If X7 is not connected, then operation mode 1 applies). To avoid this happening, the input X7 has to be set OFF via MoVaCo see corresponding chapter)

- Input X7 operates edge-triggered. A transition from one voltage step to the other will be recognized and leads to a operation mode switching over.



The supply voltage, output at X7 – PIN1+3 can be applied to supply a voltage divider for obtaining a signal for the analogue operation mode selection. Be aware that this 24V voltage supply is not stabilized and consequently fluctuates with the power consumption of the RKP-D. An additional voltage stabilization must be provided for the supply of the voltage divider on the unregulated 24V.

Data for the lay-out of the voltage divider:

– Input resistance of the analogue input = 20 kΩ
– Current drawn from the 24V voltage supply must not exceed 100 mA

4 Commissioning with Moog Valve Configuration Software MoVaCo

The Moog Valve Configuration Software, abbr. MoVaCo, is a supporting tool applied on configuration and set-up of Moog digital interface valves (DIV) and pumps with digital control (RKP-D) and last but not least, as a diagnosis tool.

In the case that the factory settings of the RKP-D for the desired use are not likely to, MoVaCo allows easy access to a variety of parameters, to adjust the RKP-D for each application individually.



The following information and images are related to the MoVaCo version 3.x. With this version of MoVaCo the firmware DV001, DV007 and DV010 can be equally configured. Depending on the existing firmware, the valve configuration window may differ.

4.1 Set-up of the CAN-communication

The communication between the MoVaCo software (installed on a computer) and the RKP-D happens via CAN bus according to CAN open standards (CiA DS 301, 305 a. 408).

4.1.1 Requirements

Hardware:

- IBM-compatible computer (minimum requirements: 800 MHz processor, Windows 95/98/ME/NT/2000/XP/VISTA, 128 MB RAM, 10 MB free hard disk memory, Monitor 640x480 resolution, keyboard, mouse)
- USB-to-CAN adapter card (Moog order code: C43094-001)
- CAN cable with 5 poles CAN female connector and 9 poles D-Sub female connector (incl. a terminating resistor for one-on-one-connection between notebook and valve, without further bus participants. Moog order code: TD 3999-137)



Figure 10: USB-to-CAN-adapter card
(Moog order code: C43094-001)



Figure 11: CAN-cable
(Moog order code: TD 3999-137)

Software: Moog Valve Configuration inclusive a matching runtime version.

4.1.2 Installation of CAN-to-USB-adapter card

Install the adapter card with the supplied driver software. MoVaCo supports the driver version VCI2 and VCI3.

4.1.2.1 Driver version VCI2

To ensure that the installation has been carried out successfully, it is necessary to perform a hardware test after the installation:

- Go to the Windows menu under „Control panel“ on the icon „**IXXAT Interfaces**“.
- Select the item "USB-to-CAN compact" and click on "Default hardware", if the characters are not of blue color.

After USB-to-CAN compact is selected (adapter has to be connected for this test), click on the software button „**Test**“. A window with the message „**Hardware Test was successful**“ will appear immediately, if the communication works properly.

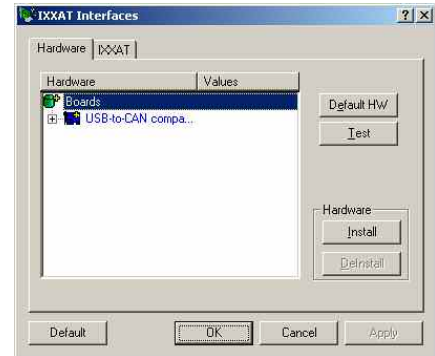


Figure 12: Hardware Test „USB-to-CAN-adapter card“

4.1.2.2 Driver version VCI3

When using the operating systems VISTA the driver version VCI3 is required.

- ⓘ Before installing the driver version VCI3 the pre-installed drivers for lower version (eg VCI2.x) must be removed. The current driver versions and tools to uninstall older IXXAT-drivers are available on the producer side or:

<http://info.moog.com/industrial/downloads>
<http://mooginfo.com/industrial/downloads>

- ⓘ **Recommendation:** connect the USB-to-CAN adapter always on the same USB port, because the IXXAT drivers for every available USB port must be installed separately.

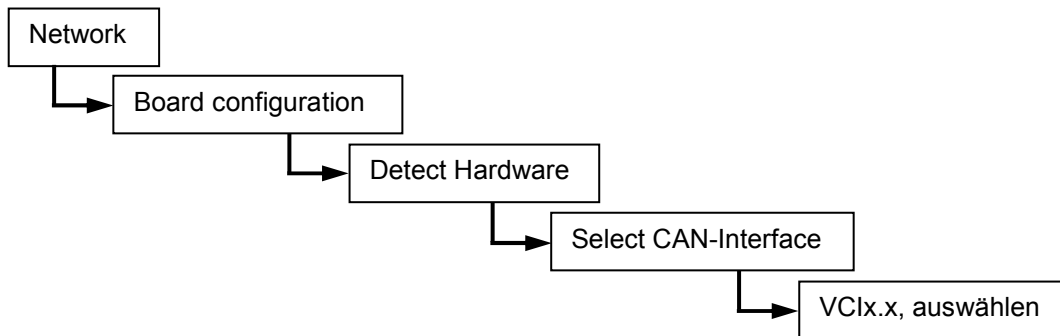
4.1.3 Installation of the Moog Valve Configuration Software-MoVaCo

The installation on the computer will be proceeded in 2 steps.

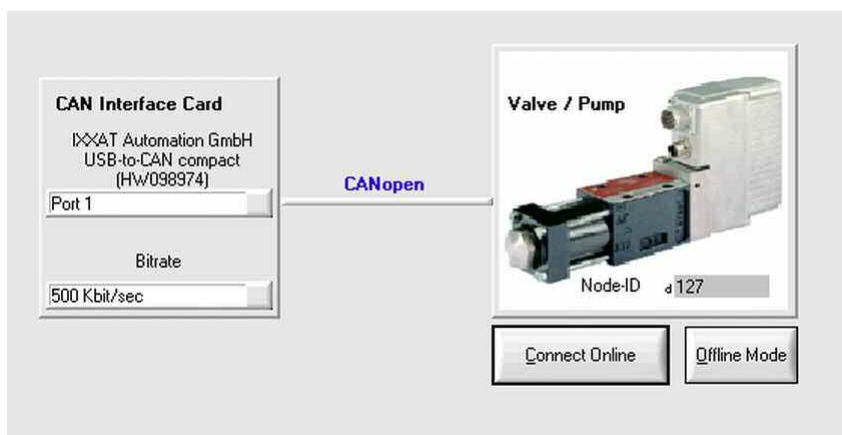
1. Installation of the runtime version 7.11: If an older version is already installed, it will be uninstalled at the first setup. In this case the setup must be executed again.
2. Installation of MoVaCo 3.x: If an older version is already installed, it will be uninstalled at the first setup. In this case the setup must be executed again.

4.2 How to run MoVaCo

When you first start MoVaCo, after successful driver installation, the following steps must be executed:



After starting MoVaCo the following menu will start:



The bit rate and CANopen node number („Node-ID“) must be identical with the parameters which have been installed on the valve. Otherwise a communication with the valve is impossible.

For valves and pumps with CAN interface the pre-setting (ex factory) for bit rate is 500 Kbit/sec and the node number is 127.

Figure 13: Start menu; adjustment of baud rate and node number



In case the bit rate is known, but not the node number, the valve can be brought to send a boot-up message by turning the power off and on. This boot-up message contains an information about the node number of the connected component.

You can choose between the following operation modes:

- Communication with a valve, Push the button „**Connect Online**“
- Offline mode, Push the button „**Offline Mode**“



Figure 14: Selection between online and offline mode

4.2.1 Connection to the valve of the pump

After the „**Ok**“-button is pushed MoVaCo starts with the set-up of communication with the valve/pump. As soon as the communication has been built up successfully, the parameters which are installed on the valve will be uploaded automatically.

4.2.2 Offline mode

The corresponding xml-file is named accordingly to the software version (⇔ Figure 15).

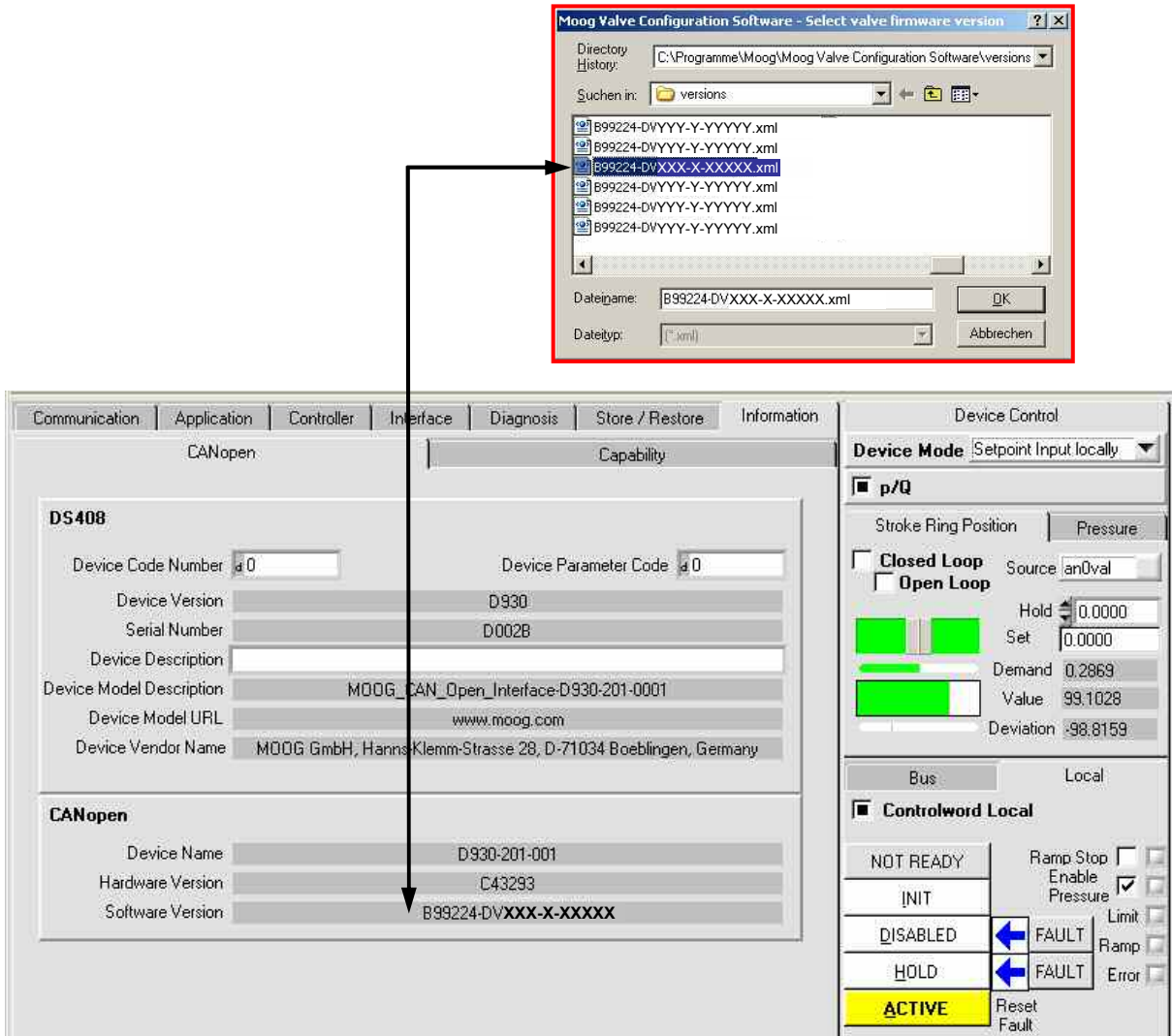


Figure 15: Description of the software version identical with the name of the corresponding xml-files

For training and demonstration purposes MoVaCo can also be applied in offline mode, i.e. physically not connected to the valve. After selection of the „Offline“ button a browser appears. By means of this browser a “xml”-type file can be selected, which corresponds to the firmware of the valve to be simulated. The name of the corresponding file accords with the software version number installed on the valve and to be found under the tab **Information / CANopen**, (⇔ Figure 15).

4.2.3 Hints for HMI

4.2.3.1 Basic information

In order to keep the load on the CAN-bus low, the data shown on the display is usually not updated automatically nor on a cyclic basis. To make sure, that the displayed data reflects the actual value or status on the valve it is recommended to click with the right mouse button on the corresponding data cell on the display. A drop down menu will appear, which allows to select (among other opportunities) „upload“ and „upload continuous“.

„Upload“ will lead to a single upload of the corresponding data, „upload continuous“ will lead to a continuous upload of the same. The latter opportunity is limited to a certain number of data fields (usually 6 fields), depending on the bus load. Data cells that are updated on a continuous basis are marked by a black rectangular frame (⇐ Figure 16).

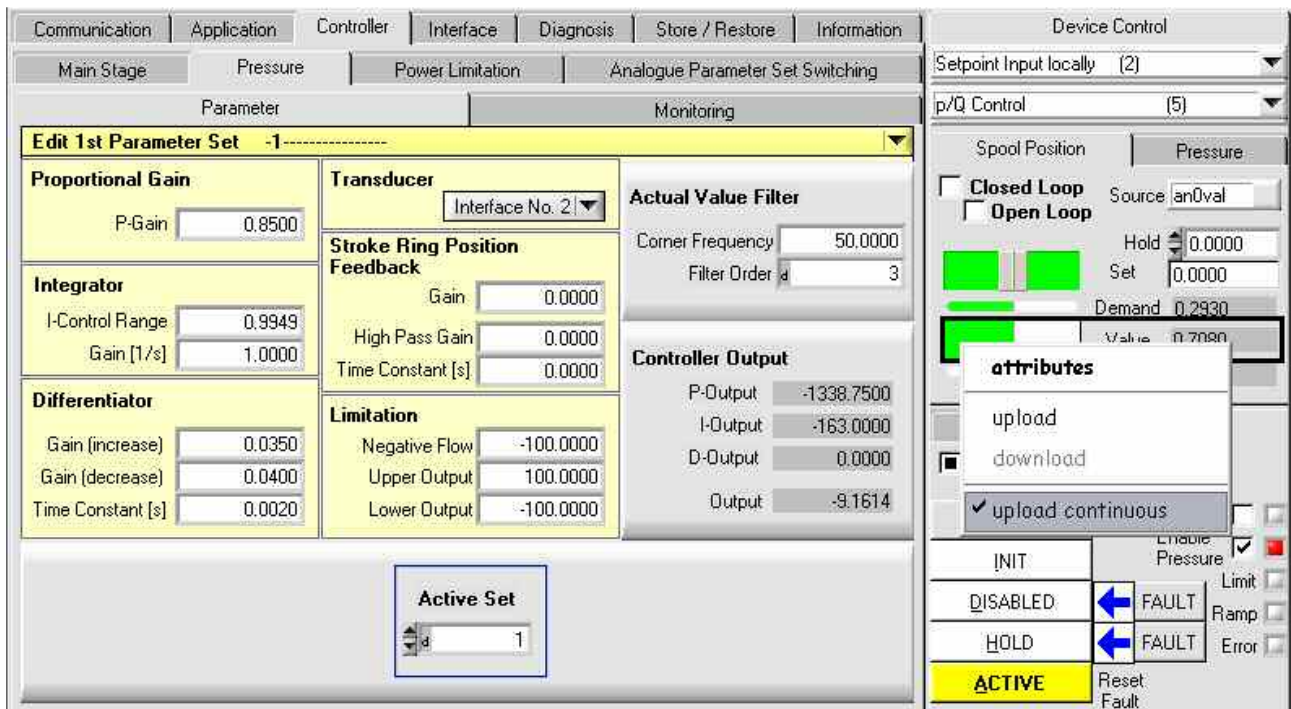


Figure 16: Uploading data for a specific file (here: continuous upload)

Clicking on the option „attributes“ will show a window containing information on the selected parameter, such as for instance the internal name of the parameter, it’s data type, read/write access and whether it can be stored in non-volatile memory.

The option „download“ allows to explicitly write a parameter into the valve (though this is normally done automatically whenever the input of a new parameter value is confirmed by pushing „enter“ on the keyboard).

4.2.3.2 Device control (set points, actual values, state machine)

MoVaCo-Version 2.54c:

Overview: state of the control variable

Switchover of set points (not stored in nonvolatile memory)
Set point Input locally means set point via analogue inputs X1
Set point via Bus means set point via the field "Set" or via CAN-Bus with the specified address.

Switchover of the display
 Control loop stroke ring position – Control loop pressure

Control mode:
 Via these switching points the control loops (position control loop stroke ring, pressure control loop) can be activated and deactivated. (not stored in nonvolatile memory)

Field "Hold": This set point is active, when the status machine is in the hold status.

Field "Set": This set point is active, when the status machine is in the Active status and the Device Mode is set to 'Set point via Bus'.

Field "Demand": Current set point corrected via slope, limiting and scaling function as well as leakage compensation. Values are readable only, input for the control loop

Field "Value": Current actual value (readable only)

Field "Deviation": Current control deviation (readable only)

State machine

acting Control word

MoVaCo 3.x

Selection of Control Mode with MoVaCo-Version 3.x only via pull-down menu.

Closed Loop/ Open Loop will be elected automatically

The other options of MoVaCo-Version 2.54c remain unchanged.

Figure 17: Displayed information on the control parameters on the right hand part of the MoVaCo-HMI

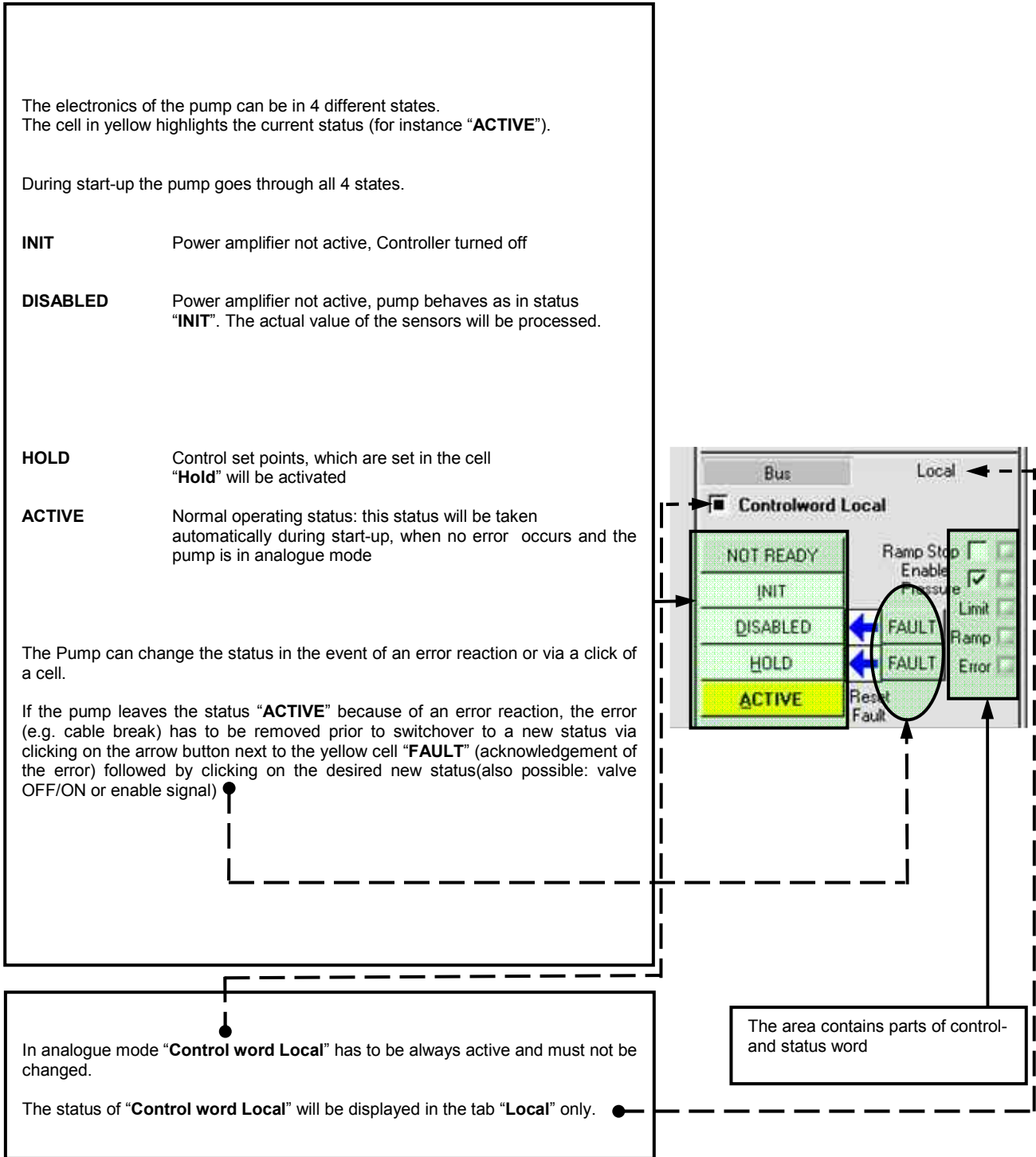


Figure 18: Displayed information for status machine

4.3 Configuration of RKP-D

4.3.1 Pressure transducer adjustment

Should the pump be operated in p (pressure) control or p/Q (pressure flow) control mode, it is required to equip the system with an external pressure transducer to gather the actual pressure. The pressure transducer is to be connected with the X5 or X6 analogue inputs. Typically it is connected with the second analogue input (connector X6), in accordance with the default setting ex factory. Hence the (⇨Figure 20) shows an example for pressure transducer adjustment with the 2nd external analogue input X6.

i In contrary to a Moog valve with digital interface - an internal pressure transducer („**Integrated Pressure Transducer**“) is not available for pumps with digital electronics.

As for the type of sensor it is to select „**pressure transducer**“ in case a pressure transducer is applied.

As for „**Sign**“ the sign of the signal will be selected (most commonly used: „positive“).

As for „**Nominal Pressure**“ the pressure (in bar) should be entered, which corresponds to 100% internal, actual value. Till firmware DV001 the relation between the normalized pressure value and the actual physical pressure is used for calculating the leakage compensation and performance limitations. It does not play a role in the pressure control itself.

Up from firmware DV007 and the % value of maximum

$$P(\%) = \frac{p(\%) \cdot StrokeRingPosition(\%)}{100}$$

higher the power limitation is power.

In the example below the signal of a 400 bar pressure transducer (0...10V, 3 wire) is normalized so that 75% of the signal (in this case 7,5 Volt at 300 bar) correspond to an internal actual pressure value of 100% (“maximum pressure”). In addition the value measured at the analogue input is offset via “Pressure Offset” so that 0 bar in the system correspond to approximately 0% internal actual pressure value.

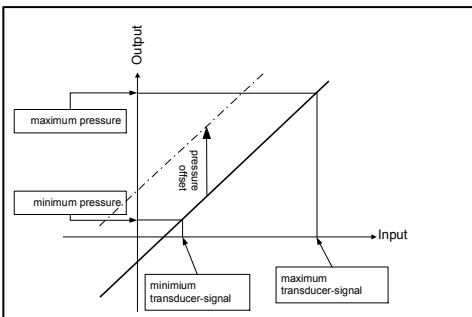


Figure 19: Relation between transducer signal and internal actual pressure value

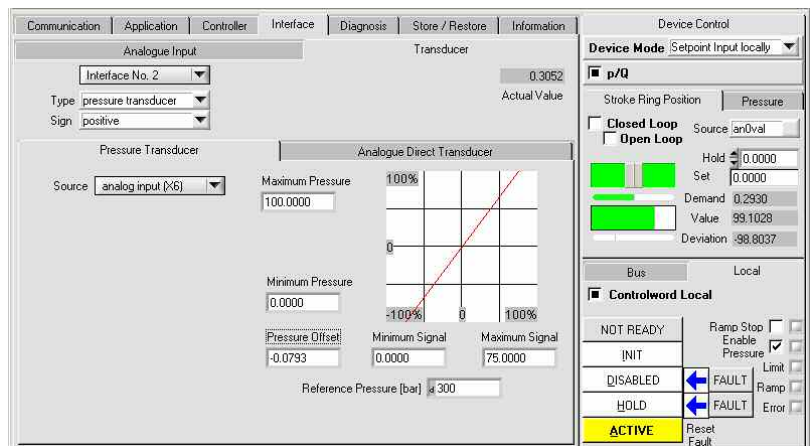


Figure 20: Adjustment analogue Input X6 for a pressure transducer

For the selected analogue input the signal must be specified (for instance 0...10 V potential-free, 4-wire or 4...20 mA grounded, 3-wire) (⇒Figure 21 and 22).

Now the internal value, received from analogue input X6, must assign to the pressure control. See Illustration 13 the field „**Transducer**“. In this case choose the before configured „**Interface No.2**“ with source analogue input X6. (⇒Figure 21 and 22)

In ⇒ Figure 21 and Figure 22, a 0...10 V, 4-wire pressure sensor is configured.

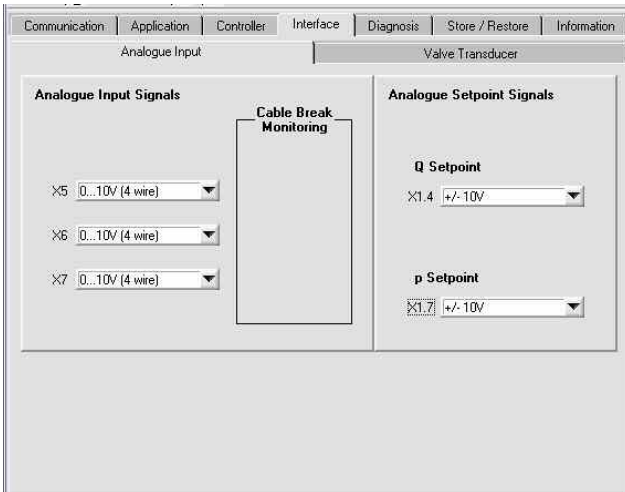


Figure 21: Configuration of analogue Input X1.4, X1.7, X5, X6, X7, Firmware DV001

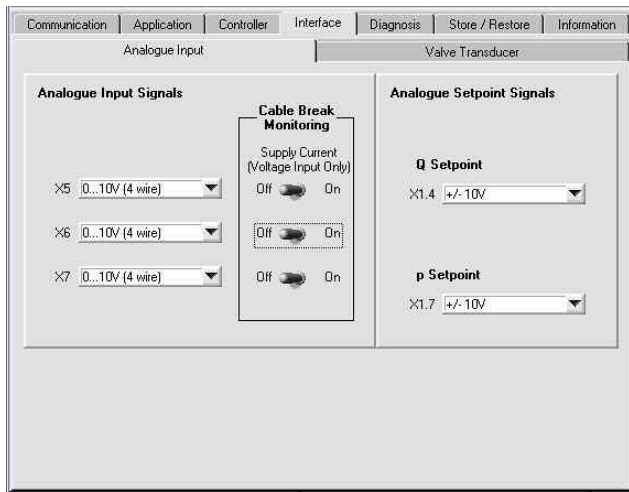


Figure 22: Configuration of analogue Input X1.4, X1.7, X5, X6, X7, Firmware DV007 and DV010

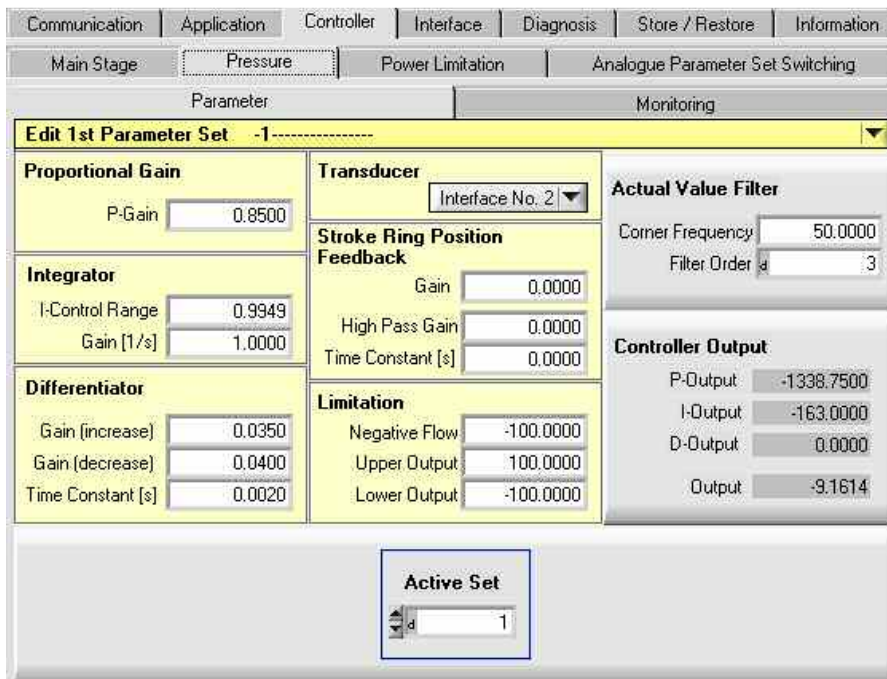


Figure 23: Allocation of the analogue signal from X6 as pressure actual value (here valid for parameter set 1) for pressure control, Firmware DV007 and DV010

Interface No.3 with source X7 won't be configured like the pressure transducer. X7 is a **analogue input 0..10V** and will be used for analogue operation mode switching

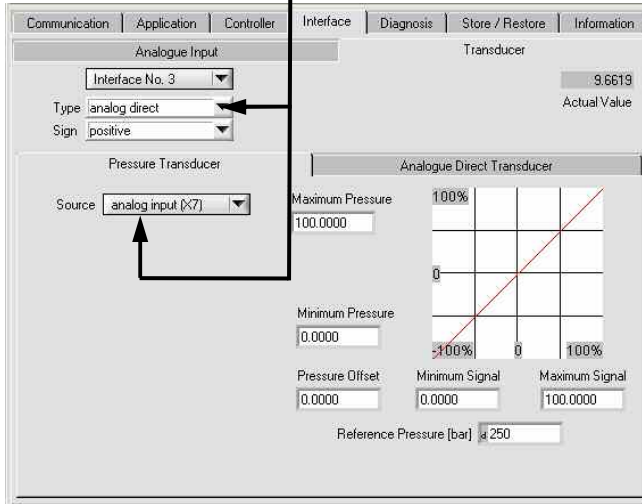


Figure 24: Adjustment of interface No.3 (X7)

The same logic is used for analogue operation mode switching. **Interface No.3** is connected with X7.

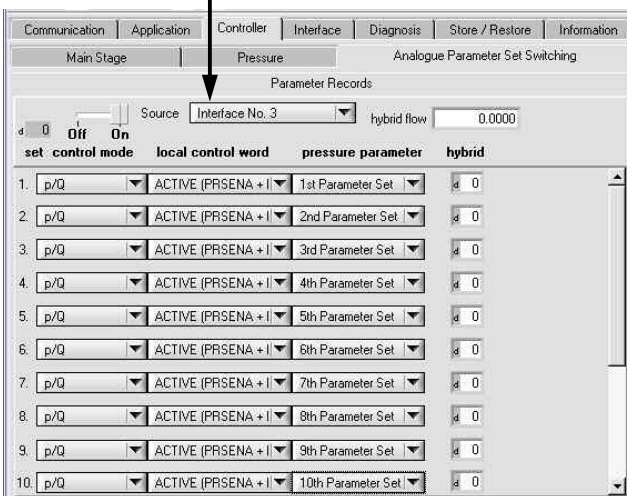


Figure 25: Adjustment for analogue parameter set switching, Firmware DV001

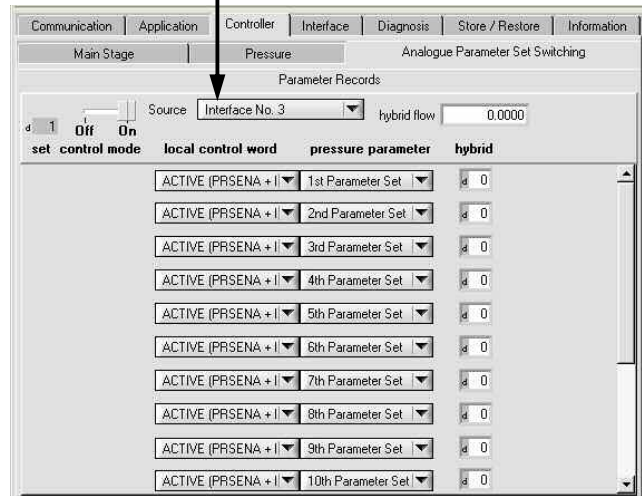


Figure 26: Adjustment for analogue parameter set switching, Firmware DV007 and DV010

4.3.2 Adjustment of the set point values

The signal type of the analogue set point values for pressure and flow will be specified (⇒Figure 20) as well as the external analogue inputs (X5 to X7) will be adjusted on the same page.
(⇒Chapter 4.3.1, Pressure transducer adjustment)

Offset and gain are adjusted under the tab **Application / Main Stage Position / Scale** for the flow set point value, respectively under the tab **Application / Pressure / Scale** for the pressure set point value.



For „Demand Factor“ there are both a single field (in the illustration below with the value „100.0000“) and next to this, two fields, one arranged below the other (in illustration 18 both are shown with the value 100.0000). Both describe the same “Demand Factor”, while the latter one describes it in the form of numerator-denominator (resultant of the device profile DS408).

The example(⇒Figure 27) shows $100 / 100 = 1$, which corresponds to 100%.

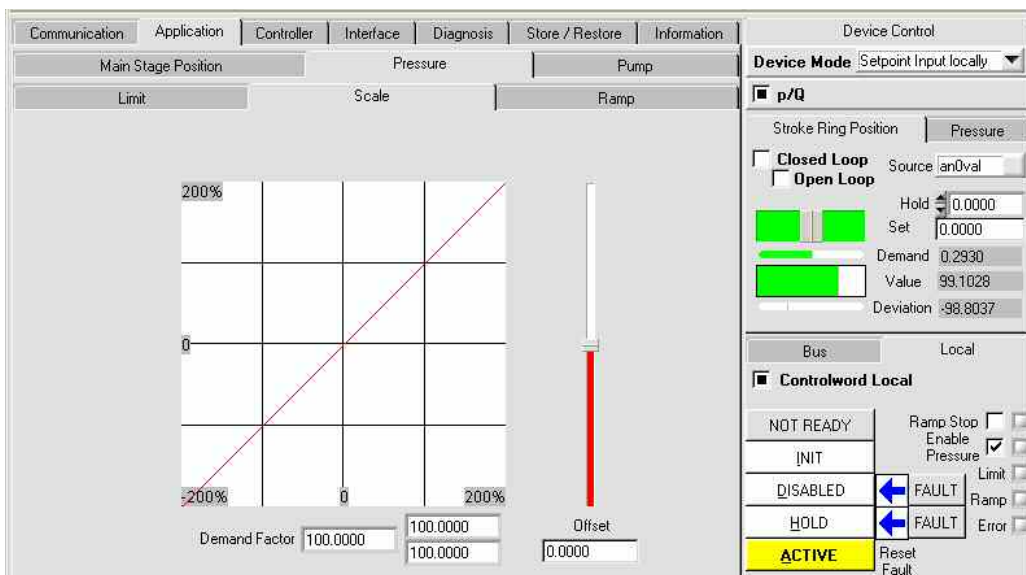


Figure 27: Adjustment of the input for the pressure set point value

Under the tab “**Application / Main Stage Position**” and “**Application / Pressure**” respectively there also is the tab “**Limit**” and “**Ramp**”. Under “**Limit**” the limiting values for predefined values for flow (stroke ring position) and pressure can be set, under “**Ramp**” ramps can be generated for these set point values.

For example.: Under the tab „**Application / Main Stage Position**“ tab „Zero“ can be found. Here the mechanical zero of the stroke ring can be adjusted.

Overall Gain for external LVDT (stroking position):

There is also the possibility to apply an “Offset” and an “Overall Gain” to the actual stroking position value. You’ll find the adjustment under the tab “**Interface / External LVDT**”

Attention: in this case you change the factory setting of the LVDT adjustment !

4.3.3 Optimization of the pressure control

In order to allow adaptation of the pressure control to different circumstances, 16 pressure-control parameter settings are selectable. The first 13 parameter sets are pre-configured ex factory for increasing hydraulic volumes. While parameter set 1 has been generated for 0.1 liters system volume, parameter set 13 has been generated for a system volume of 50 liters. All parameter sets can be modified by users, if required.

In the event that no specific parameter set has been selected (via bus or by means of analogue operation mode switching), the parameter set with the uncritical but inertial parameter setting (factory preset: operation mode 1 – 1st Parameter Set) will be activated.

Derived from this stable parameter set further optimization steps can be taken to improve the dynamics. One practical approach is to go step by step with the next parameter set, until the optimal one has been found.

This can be executed by using the operation mode switching function. In dependency of the voltage level at the analogue input X7 one specified operation mode (out of 16) assigned to this voltage level will become active. The voltage level, configuration and the corresponding volume is described in

⇒ Chapter 4.4

Alternatively the selection of a pressure control parameter set can be executed by means of MoVaCo. Under the tab **Controller / Pressure / Parameter** the desired pressure control parameter set can be selected in the field „Active Set“.

In this case the analogue operation mode switching function should be deactivated by going to **Controller / Analogue Parameter Set Switching** and setting the control mode move bar to “off”.

Figure 28: Selection of parameter set for pressure control, Firmware DV007 and DV010

By default, the signal of the pressure sensor is filtered by cut-off frequency 50 Hz and 3rd order. With Firmware DV007 or higher, it is possible to set the filter of actual pressure value manually.

4.3.3.1 Individual adjustment

Should the “parameter set by parameter set” approach turn out to be not sufficient, again the best fitted pressure parameter set can be applied as a starting point for further optimization of each of the pressure control parameters. The setting of pressure control parameters is to be found under the tab **Controller / Pressure / Parameter** (⇒ Figure 30).

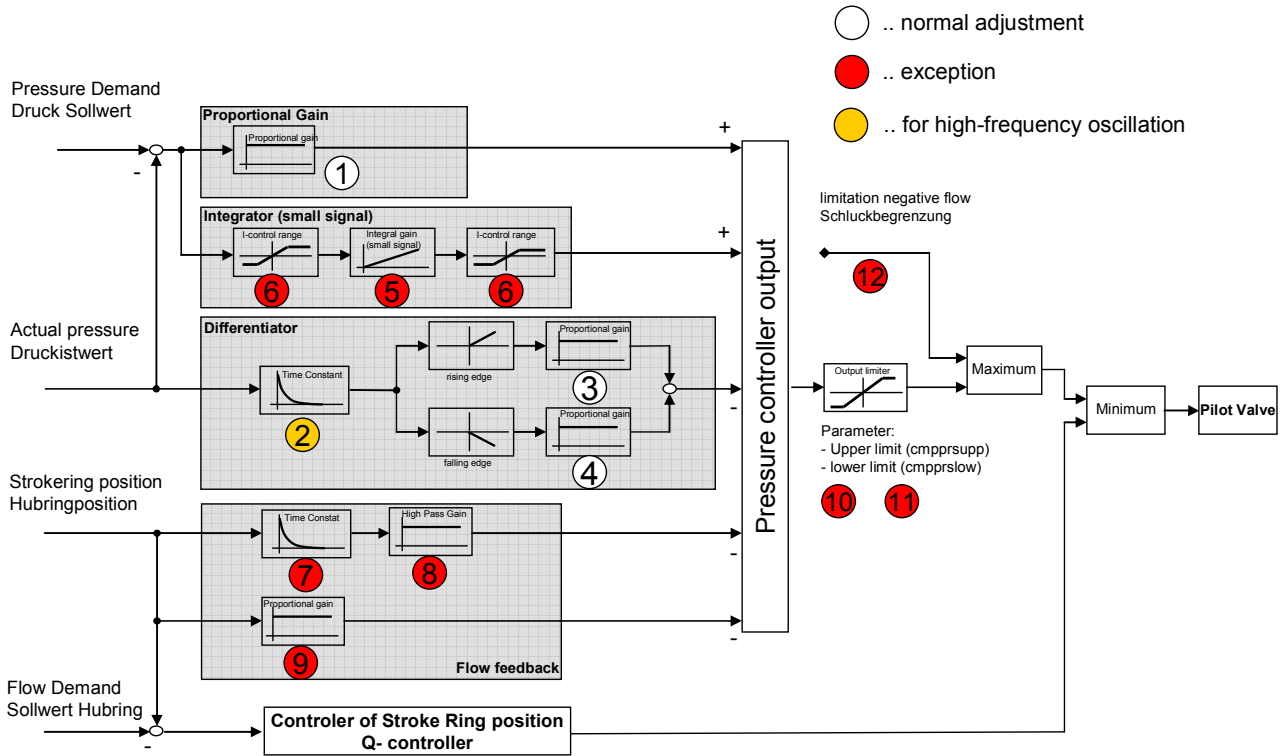


Figure 29: Block diagram, control of RKP-D

- parameter 1, 3 und 4 use for optimization
- change parameter 2 conditional
- use all other parameters for special applications only

Figure 30: Editing of the pressure control parameter (example shown with pressure control parameter set 1)

- Via the pull-down menu select the pressure control-parameter. The selection of a specific parameter set is simply for editing and has no effect if the parameter set is active.
- The desired P gain (= proportional to control deviation) can be entered in the field „**Proportional Gain**“.
- Enter the value in the field „**Gain**“ to optimize the I-gain, so the control deviation will be applied for a definite range.
- The value for „**I-Control Range**“ has two meanings. Both the input and the output of the integrator will be limited to this value (positive and negative). The (unlimited) value at the input of the integrator corresponds to the control deviation between demand and actual pressure (control window), in percentage of nominal pressure.
- The output of the integrator is frozen whenever Q-control takes over. The behavior of the DT1-gain will be tuned via the parameter „**Gain**“ (separately definable for increasing and decreasing pressure actual values) as well as via the parameter „**Time constant**“. In the present control architecture the DT1-gain does not depend on the course of the control deviation, but on the actual pressure value. At first, the DT1-gain is used to damp the system.
- Stroke Ring Position Feedback: The position of the stroke ring (flow rate) is proportional to pressure change in closed volume. That means that the rating of this state quantity (⑨ ⇒ Fig. 29, 30) in pressure control is similar to the D-rate. But it results in to a stationary control deviation. The stationary control deviation will be avoiding if the Stroke Ring Signal uses a high-pass.

⑦ ⇒ Fig. 29, 30 is the time constant T in [s] of the high-pass.

$$T = \frac{1}{\omega} = \frac{1}{2 \cdot \pi \cdot f}$$

- In pressure control mode the responsiveness of the stroke ring can be reduced by limiting the pressure control input to the pilot valve with the fields „**Upper Output**“ and „**Lower Output**“. 100% „**Upper Output**“ means full dynamics for displacement of the stroke ring, 0% means no displacing movement. For most of the applications the default settings (100%) „**Upper Output**“ and „**Lower Output**“ can be kept without any modifications. The limitation of dynamics will be typically applied in order to avoid cavitations, e.g. when conditions for suction are not optimal.

4.3.3.2 Help for adjustment of pressure control parameters

Optimum run, fast pressure build-up and pressure release with low overshooting. (⇒ Figure 31)

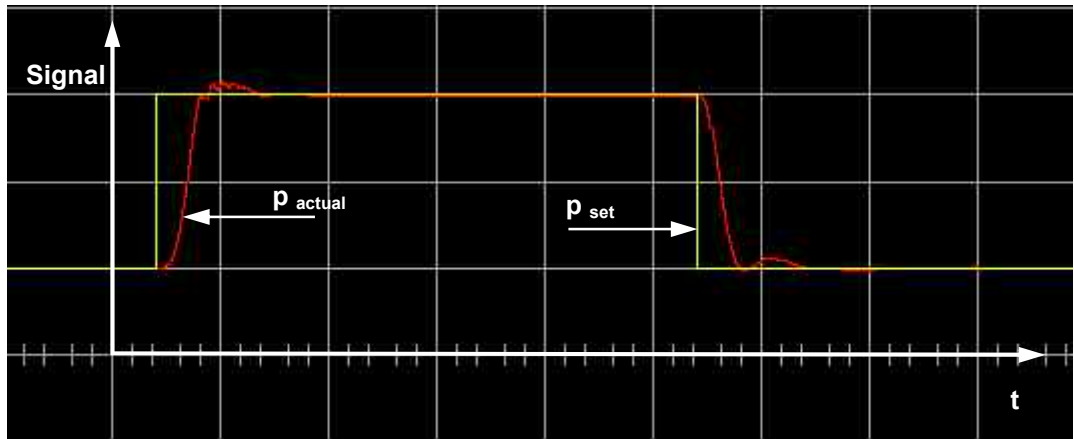


Figure 31: Optimum run, fast pressure build-up and pressure release

Is the P-gain too low, the desired pressure value will lead to setting up very slowly. (Also identifiable that the valve is not open enough.) (⇒ Figure 32)

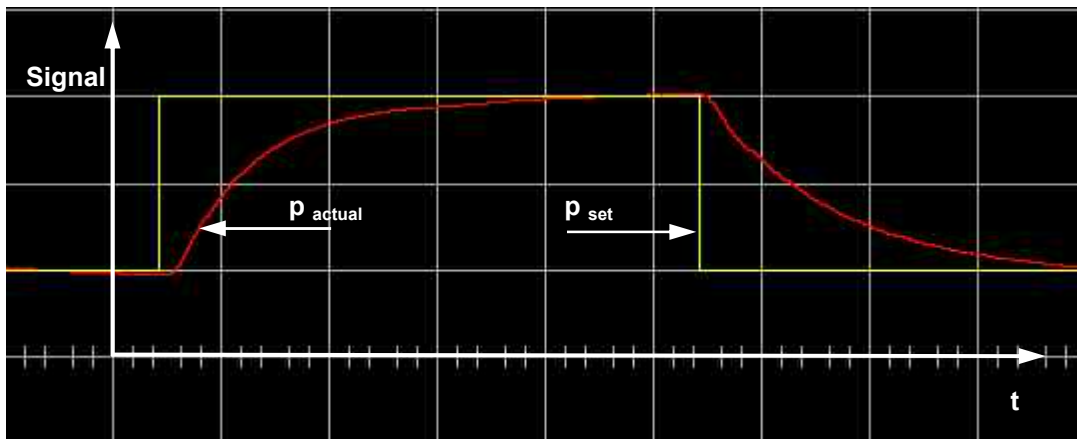


Figure 32: Low P-gain

Is the P-gain too high the effect is extreme fast pressure build-up/pressure release with high-frequency overshooting. (⇒ Figure 33)

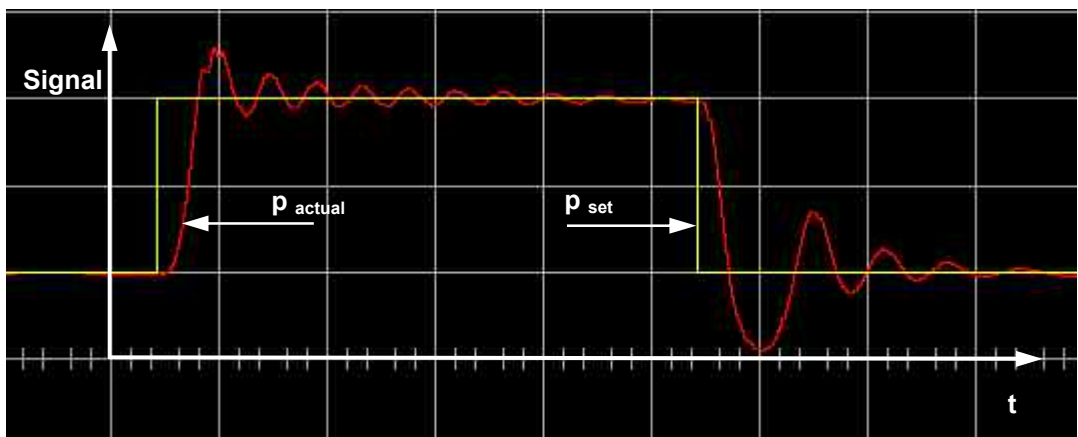


Figure 33: P-gain too high

Is the D-gain too high (increase/decrease), (the P-gain is correct) the effect is the damping of pressure build-up/pressure release is too high. So the desired adjustment of pressure is too slow. (⇒ Figure 34)

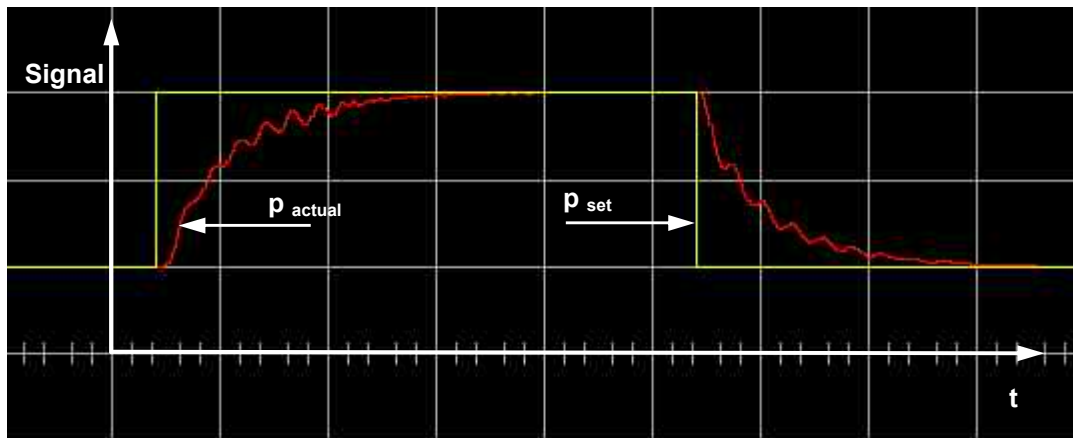


Figure 34: D-Gain (increase) and D-Gain (decrease) too high

Is the D-gain too low (increase/decrease), (the P-gain is correct) the effect is the damping of pressure build-up/pressure release is too low. So low-frequency overshooting will be the result. (⇒ Figure 35)

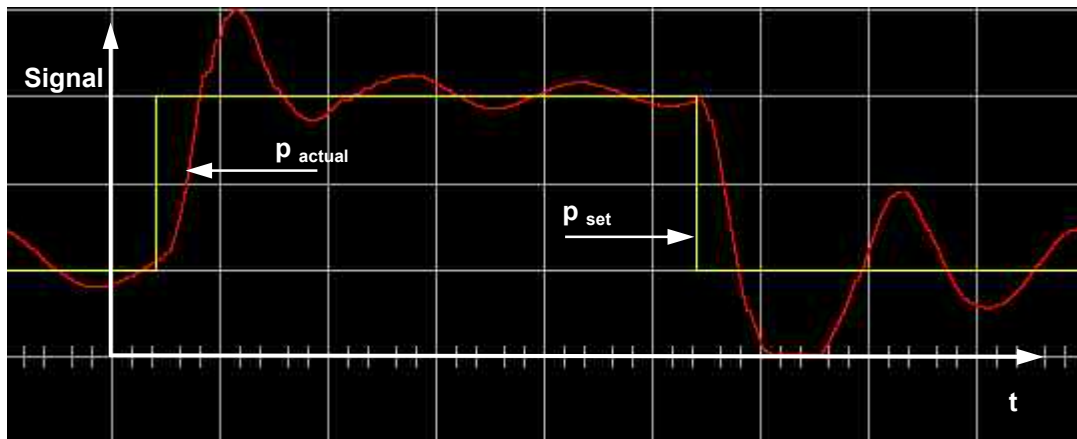


Figure 35: D-Gain (increase) and D-Gain (decrease) too low

Is the Time Constant too high, the effect is higher-frequency oscillation of pressure. (⇒ Figure 36)

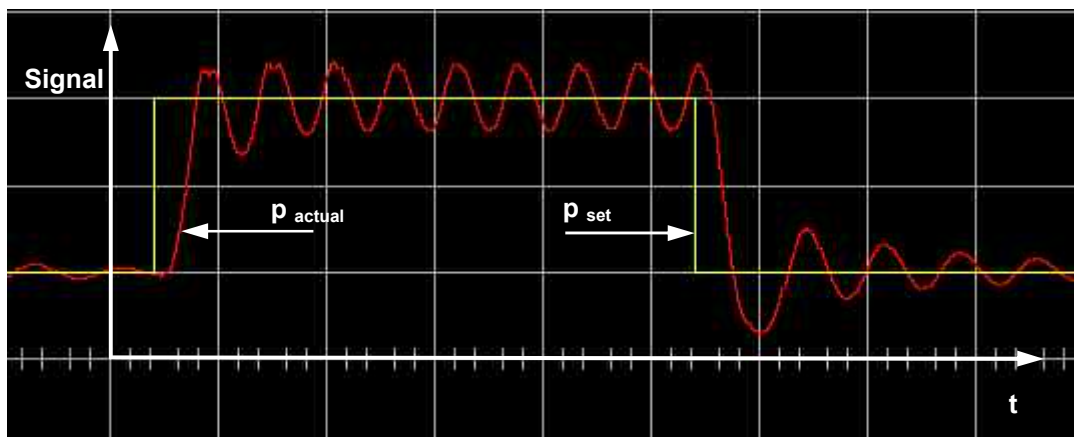


Figure 36: Time Constant too high

4.4 Power Control

In MoVaCo it is possible to give a threshold for power limitation. The **“control word”** activates the power limitation.

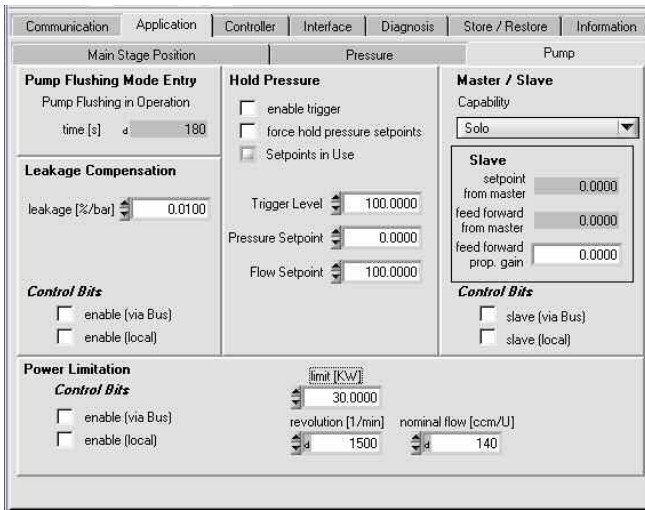


Figure 37: Power control, Firmware DV001

Firmware DV001:

The designation of power is indicated in kilowatt [KW]. The value of power limitation of the pump is depending on the size of the pump and the rotation-speed.

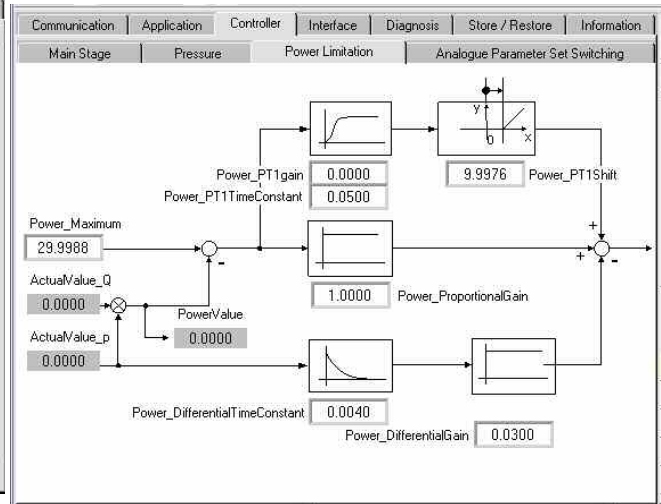


Figure 38: Power control, Firmware DV007 and DV010

Firmware DV007 and DV010:

The designation of power is a percentage rate of maximum power based on 100% of the stroke and 100% of the internal pressure signal. The control parameters are freely selectable. The default adjustment is equal to the adjustment of the pressure controller in 1st parameter set.

4.5 Analogue operation mode switching

It is possible to choose a parameter record which contains control word and (pressure control) parameter set by an analogue voltage input. X 7 only voltage 0...10V is possible. (⇔ Tab. 11)

- Content of parameter set:
- Local Control Word
 - Pressure Control-Parameter Set
 - Information of Hybrid-Mode
 - Control Mode is possible only up to Firmware DV001

This value correspond to the active record if uploaded

Hybrid Mode:

hybrid flow = (size of the fix pump / size of the RKP-D) x 100% ●

hybrid = (1 ⇔ activated, 0 ⇔ deactivated) ●

This adjustments only effects the flow demand calculation.
In the case the flushing mode has to be switched off (please contact Moog) if you are using a RKP-D with internal pressure supply.

Firmware DV001

Control Mode only with Firmware DV001

Figure 39: Analogue parameter set switching, Firmware DV001, DV007 and DV010

Local control word settings

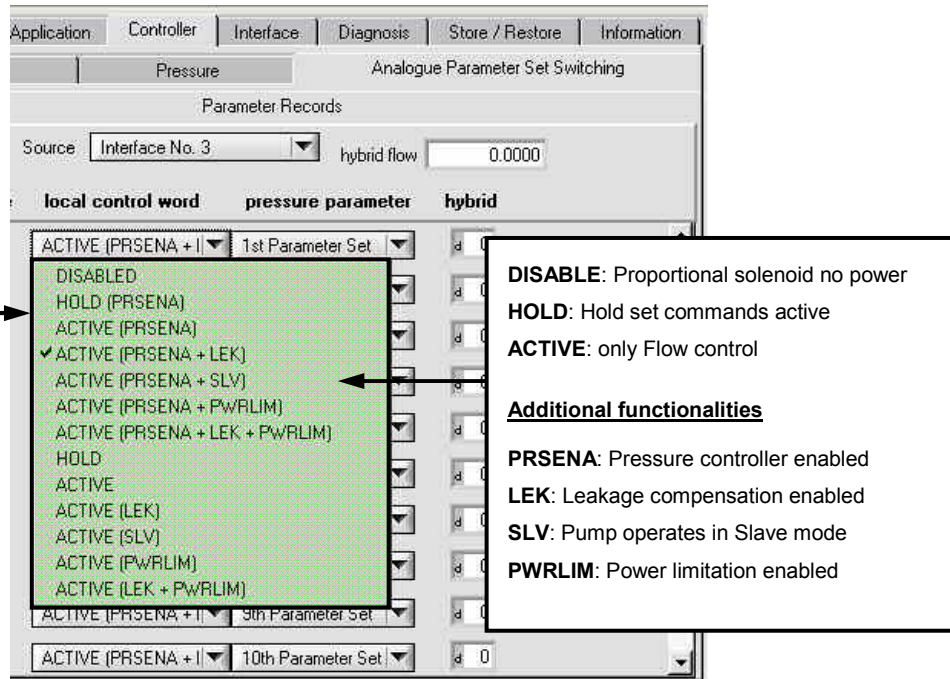


Figure 40: Local control word setting in analogue parameter set switching

4.6 Leakage compensation

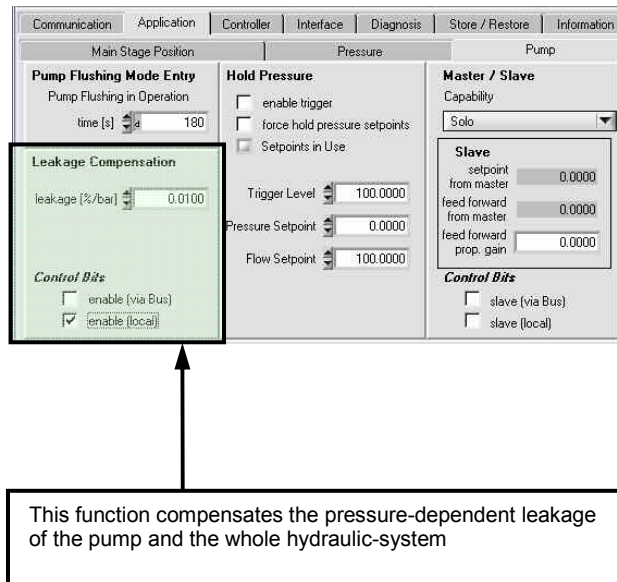


Figure 41: Leakage compensation

A pressure-dependent part will be added to the external Q-set value.

$$Q_{SET_compensated} = Q_{SET_extern} + (p \cdot factor_{LC})$$

$p = pressure$

- This functionality can be used in CAN-mode and analogue mode.
- The factor of leakage compensation is adjusted ex factory.
- The factor itself can only be changed via CAN-communication.

Procedure for individual balancing:

Find out the stroke ring position during the process of pressure control in closed hydraulic system with high value of pressure (Q_{p1} and Q_{p2} in [%])

The difference of the stroke ring positions divided by pressure difference Δp [bar] is the compensation-factor:

$$factor_{LC} = \frac{(Q_{p2} - Q_{p1})}{\Delta p}$$

4.7 Fault reaction management

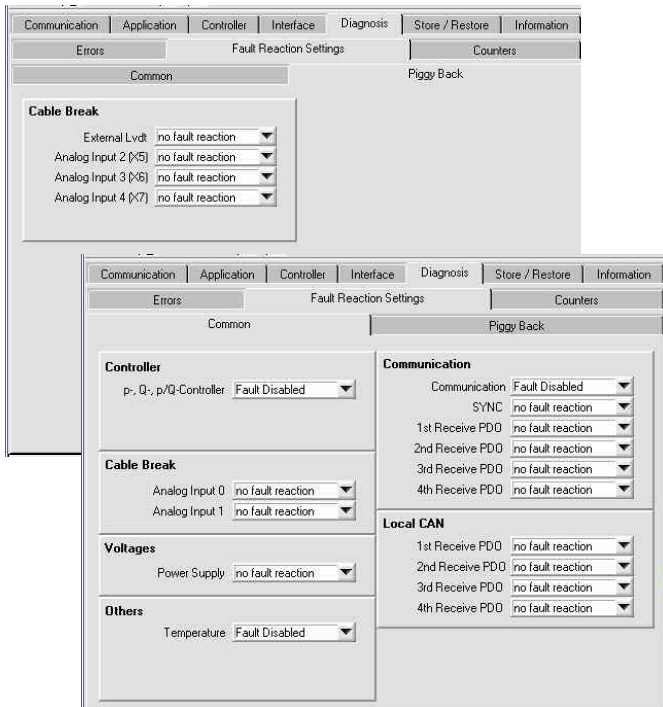
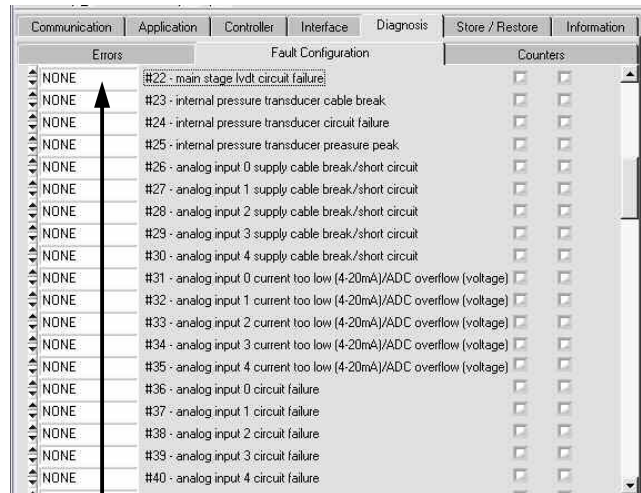


Figure 42: Configuration of fault reactions, Firmware DV001



With this settings it is possible to assign a special fault reaction to a certain fault.

Figure 43: Configuration of fault reactions, Firmware DV007 and DV010

Firmware DV001:

The fault reactions displayed in ⇔Figure 42 are configurable in the customer level of MoVaCo.

Firmware DV007 and DV010:

All possible fault reactions are documented in the User Manual Firmware Radial Piston Pumps (RKP-D) with CAN Bus Interface, Table 63, page 112 et seq.

Example: #29-cable break analog input 3 (pressure sensor input X6), Firmware DV007 and DV010, (⇔ Figure 44)

Possible fault reactions:

- NONE
- EMERGENCY
- FAULT DISABLE
- FAULT HOLD
- FAULT STOP (voreingestellt, nicht veränderbar)

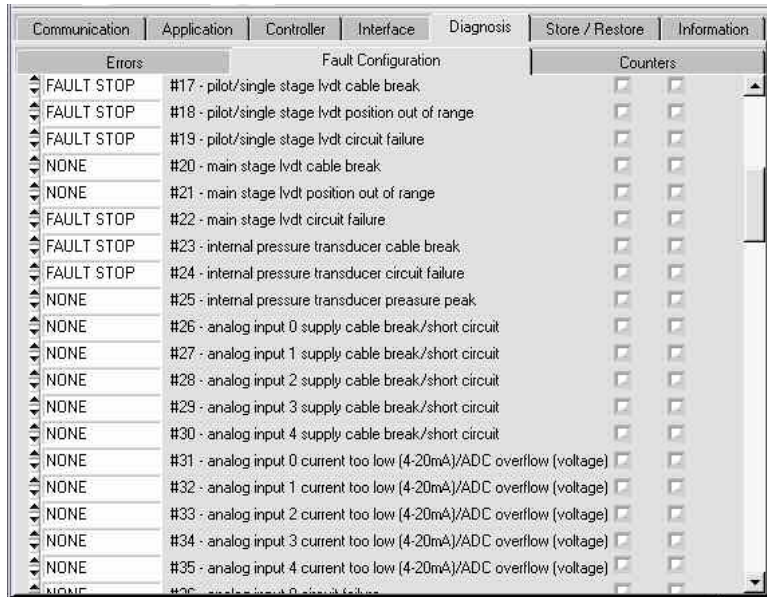


Figure 44: Example fault reactions – #29-cable break analog input 3 (pressure sensor input X6), Firmware DV007 and DV010



Due to the change from Firmware DV001 to Firmware DV007 respectively DV010 in MoVaCo, the CAN-addresses have changed.

This has to be considered if a valve is to be configured by loading a log-file or by generating the CAN-addresses directly (⇔ Table 12).

Fault-type	Firmware - DV001		Firmware - DV007 and DV010	
	MoVaCo	CAN-address	MoVaCo	CAN-address
Controller	ctlfautyp	0x4017 sub-index: 0x00	faurea[65] faurea[67]	0x2830 sub-index: 0x42 0x2830 sub-index: 0x44
Analog Input 0	anafautyp[0]	0x4019 sub-index: 0x02	faurea[31]	0x2830 sub-index: 0x20
Analog Input 1	anafautyp[1]	0x4019 sub-index: 0x02	faurea[32]	0x2830 sub-index: 0x21
Power Supply	pwrfautyp	0x4015 sub-index: 0x00	faurea[6]	0x2830 sub-index: 0x07
Temperature	tmpfautyp	0x4016 sub-index: 0x00	faurea[13] faurea[15]	0x2830 sub-index: 0x0e 0x2830 sub-index: 0x10
Communication	comfautyp	0x401b sub-index: 0x00	faurea[90]	0x2830 sub-index: 0x5b
SYNC	snCFautyp	0x401d sub-index: 0x00	faurea[112]	0x2830 sub-index: 0x71
1st Receive PDO	pdrfautyp[0]	0x401e sub-index: 0x01	faurea[94] faurea[98]	0x2830 sub-index: 0x60 0x2830 sub-index: 0x64
2nd Receive PDO	pdrfautyp[1]	0x401e sub-index: 0x02	faurea[95] faurea[99]	0x2830 sub-index: 0x60 0x2830 sub-index: 0x64
3rd Receive PDO	pdrfautyp[2]	0x401e sub-index: 0x03	faurea[96] faurea[100]	0x2830 sub-index: 0x61 0x2830 sub-index: 0x65
4th Receive PDO	pdrfautyp[3]	0x401e sub-index: 0x04	faurea[97] faurea[101]	0x2830 sub-index: 0x62 0x2830 sub-index: 0x66
1st Receive PDO local CAN	locpdrfautyp[0]	0x5a04 sub-index: 0x01	faurea[74] faurea[78]	0x2830 sub-index: 0x4b 0x2830 sub-index: 0x4f
2nd Receive PDO local CAN	locpdrfautyp[1]	0x5a04 sub-index: 0x02	faurea[75] faurea[79]	0x2830 sub-index: 0x4c 0x2830 sub-index: 0x50
3rd Receive PDO local CAN	locpdrfautyp[2]	0x5a04 sub-index: 0x03	faurea[76] faurea[80]	0x2830 sub-index: 0x4d 0x2830 sub-index: 0x51
4th Receive PDO local CAN	locpdrfautyp[3]	0x5a04 sub-index: 0x04	faurea[77] faurea[81]	0x2830 sub-index: 0x4e 0x2830 sub-index: 0x52
External LvdT	extlvdfautyp	0x401a sub-index: 0x00	faurea[20]	0x2830 sub-index: 0x15
Analog Input 2	anafautyp[2]	0x4019 sub-index: 0x03	faurea[28]	0x2830 sub-index: 0x1d
Analog Input 3	anafautyp[3]	0x4019 sub-index: 0x04	faurea[29]	0x2830 sub-index: 0x1e
Analog Input 4	anafautyp[4]	0x4019 sub-index: 0x05	faurea[30]	0x2830 sub-index: 0x1f

Table 12: Comparison of the terms for fault reactions and CAN-addresses between Firmware DV001, DV007 and DV010

With firmware DV007 or higher, it is possible to detect cable break separately for supply-lines and signal-lines. In this case the switch of the accordant input must be activated, if a voltage sensor is used (⇒ Figure 45).

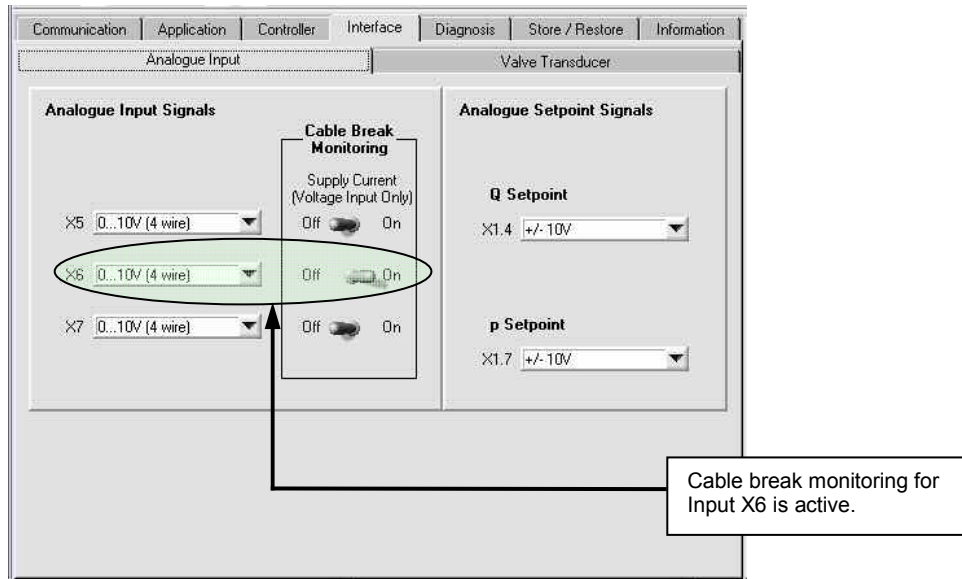


Figure 45: Example for cable break monitoring, Firmware DV007 and DV010

4.8 Storage and load of settings

4.8.1 Data storage in non-volatile memory of the valve electronics

As soon as the optimal parameter settings have been found, it is important to save the data into the non-volatile memory of the valve. Otherwise the parameter settings will get lost after switching off (by power off of the valve electronics).

Data storage into the non-volatile memory of the valve can be executed by going to the tab **“Store/Restore”** and activating the button **„all”** in the field **„Store Parameters”**. (⇒ Figure 46)

It is also possible to save a pre-defined section of the parameterization (via the buttons **„application”**, **„communication”** and **„manufacturer specific”**). However this is not of relevance to most of the pump set-ups. Hence those functions will not be explained here explicitly.

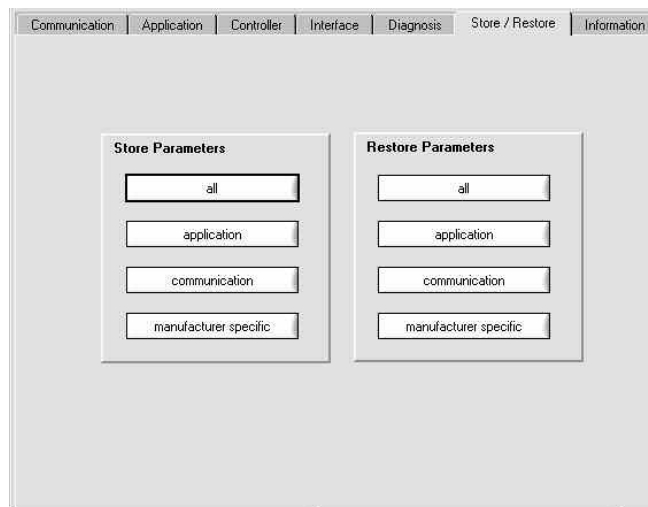


Figure 46: Menu for saving the parameter settings and restoring the factory settings

With pushing of the button „**all**“ in the field „**Restore Parameters**“, the default settings from the factory will be activated and written in the volatile memory.

This is useful, when the user is not satisfied with the current parameter settings and wishes to have the initial settings back in a simple way.

4.8.2 Saving of the parameter settings under an external data storage device

The current parameter settings can be saved in an external file. It is strongly recommended to do so, since this allows to reactivate them in a simple manner, in the event that they are needed. This can be executed by going to the menu bar under “**File**” and select the option “**Save...**”. (⇨ Figure 47)

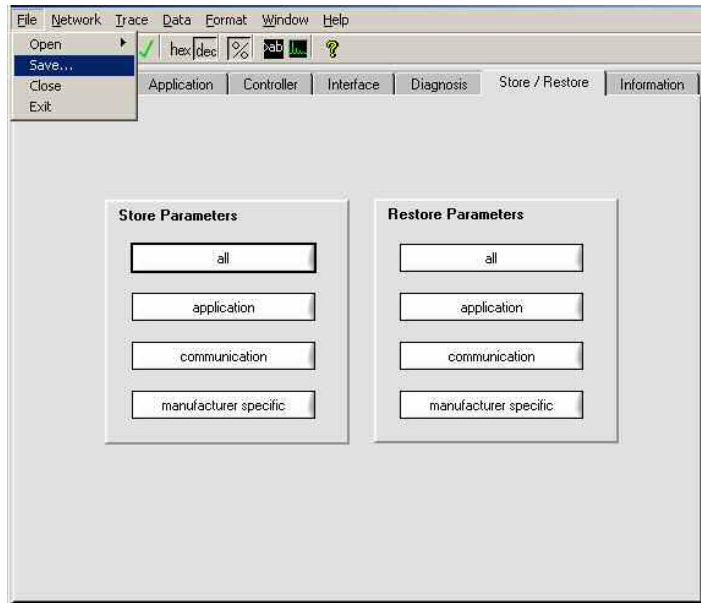


Figure 47: Save the parameter settings on an external data storage device via „Log-File“

As a result a browser appears. The user can browse and determine the directory the data should be saved under. (⇨ Figure 48)



Figure 48: Browser to store a „Log-Files“

4.8.3 Transmission of a log-file from an external data storage device

Via the menu option “File / Open / Data(*.log)” the user can download a saved file back to the volatile memory of the valve. (⇒ Figure 49)

i When the online mode is active, the parameters will be transmitted immediately to the valve after the file has been opened. In offline mode the parameters from the file will be shown on the screen only.

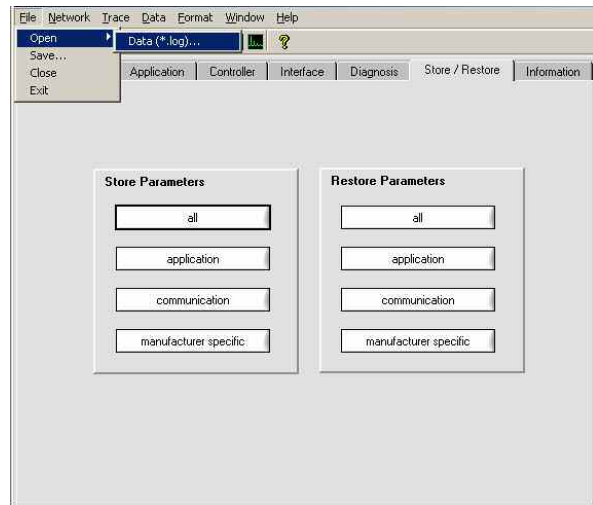


Figure. 49: Download of a log-file in the data storage device (volatile memory) of the valve electronics

4.9 Data Logger

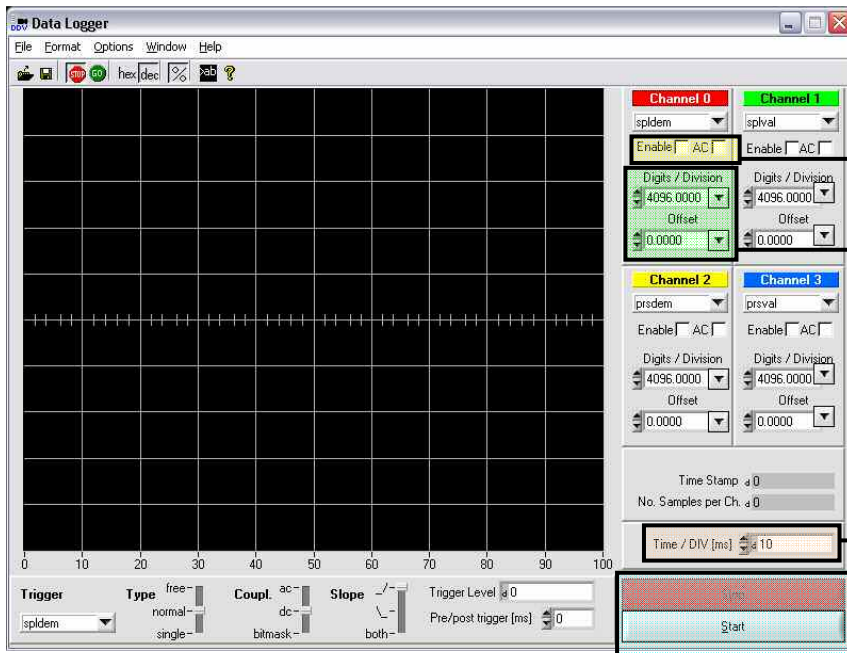
The Data Logger is able to display up to four signals at the same time. Default settings of the four channels ⇒ Table 13.

Further Signals ⇒ User Manual Firmware Radial Piston Pumps (RKP-D) with CAN Bus Interface, Table 75, page 135.

Stroke Ring position set point	spldem
Stroke Ring position actual value	splval
Pressure set point	prsdem
Pressure actual value	prsvval
Pilot Valve set point	spldemplt
Pilot Valve actual value	splvalplt

Table 13: Default settings-Data Logger

The possibilities to adjust the Data Logger are similar like to adjust a conventional oscilloscope.



If „Enable“ is selected the channel is activated.
If required, the AC-coupling can be activated.

Offset- und gain-scaling of the signal (16384 digits relates to 100%)

Scaling of the time axis: input value equates to Time [ms]/Division

Switching-on/off the Data Logger

Figure 50: Data Logger

Below the graphic display it is possible to change the trigger settings (Trigger signal, Type, Coupling, Slope, Level, Pre/post trigger)

5 Maintenance and Repair

WARNING



Repaired RKP-D with repaired valves or replacement valves are, like new valves, delivered with the factory settings. In the event of a repair job for defective valves, we and our authorized service centers shall not accept liability for software and data installed by the customer.

Valves must be checked prior to starting-up for correct configuration and possible altered parameters. Altering the configuration or the parameters may change the function of the valve to such an extent that it will no longer function as specified in these operating instructions.

Incorrect configuration will result in danger due to:

- Uncontrolled sequences of motions
- Destruction
- Malfunction

Authentic Moog-Repairs are performed exclusively by us or our authorized service centers. This is the only way of accessing the latest specifications required for repair work. With these specifications, the original valve performance data can be re-established and the customarily high reliability and long life cycle can be guaranteed even after repairs.



Figure 51: Repair quality seal

Our repair seal is a guarantee that an authentic Moog repair has been performed.



In the event of a repair job for defective valves, we and our authorized service centers reserve the right to perform a repair or, after consultation, alternatively to supply replacement valves with an identical or compatible equipment specification.

Moog Service Addresses



Please refer to the following page on our internet site for contact information relating to our service centers in your area: www.moog.com/worldwide

MOOG.COM/INDUSTRIAL

For the Moog location nearest you,
visit moog.com/industrial/globallocator.

Argentina	+54	11 4326 5916	info.argentina@moog.com
Australia	+61	3 9561 6044	info.australia@moog.com
Austria	+43	664 144 65 80	info.austria@moog.com
Brazil	+55	11 5523 8011	info.brazil@moog.com
China	+86	21 2893 1600	info.china@moog.com
Finland	+358	9 2517 2730	info.finland@moog.com
France	+33	1 4560 7000	info.france@moog.com
Germany	+49	7031 622 0	info.germany@moog.com
Hong Kong	+852	2 635 3200	info.hongkong@moog.com
India	+91	80 4120 8799	info.india@moog.com
Ireland	+353	21 451 9000	info.ireland@moog.com
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