Application handbook

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be in motion be in motion

BAUMÜLLER

b maXX 3300
b maXX 5000

Servo pump function

Firmware-Version V2

E	5.17016.03

Read the Instruction handbook before starting any work!

Preliminary information

Warning Insofar as this document is identified as being preliminary information, the following applies:
this version is regarded as providing advance technical information to users of the described devices and their functions at an early enough time in order to adapt to any possible changes or expanded functionality.
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Table of Contents

Table of Contents

1

GENERAL INFORMATION

The application manual provides important information regarding handling the device. A prerequisite for safe working is compliance with all specified safety information and handling instructions.

Furthermore, the local accident prevention regulations and general safety requirements applicable to the area of application of the device must be observed.

Before starting any work on the device, completely read through this Application handbook and the Instruction handbook of the device, in particular the chapter on safety information. The handbooks are an integral part of the product and must be kept in the immediate vicinity of the device in order to be accessible to personnel at all times.

For commissioning of the device the parameter manual must be used. The parameter manual contains information to the parameters of the device.

NOTE!

The servo pump function V2 and V2+ is only available for:

- Single axis BM53XX
- Mono units BM55XX
- Compact units BM33XX (only available until firmware version 1.15)

The following versions (or newer) are required:

- ProDrive version 1.20.1.30
- The following combination of Firmware and SoftDrivePLC Project

Version V2 and V2+	Firmware 1.16	SdSP_103202
	Firmware 1.15	SdSP_102201
	Firmware 1.14	SdSP_101201
	Firmware 1.13	SdSP_100200

NOTE!

The servo pump function V2+ is only available in devices with type code:

- BM3XXX - XXXX - XXXX - XXXX - XX - XXXX - **E07**
- BM3XXX - XXXX - XXXX - XXXX - XX - XXXX - **E87**

or

- BM5XXX - XXXX - XXXX - XXXX - XX - XXXX - **E07**
- BM5XXX - XXXX - XXXX - XXXX - XX - XXXX - **E87**

The servo pump function V2 is only available in devices with type code:

- BM3XXX - XXXX - XXXX - XXXX - XX - XXXX - **E04**
- BM3XXX - XXXX - XXXX - XXXX - XX - XXXX - **E84**

or

- BM5XXX - XXXX - XXXX - XXXX - XX - XXXX - **E04**
- BM5XXX - XXXX - XXXX - XXXX - XX - XXXX - **E84**

NOTE!

The function servo pump V2+ has to be ordered in advance because an afterwards upgrade is not possible.

NOTE!

The SVP module and all SVP module related functions are **NOT** available for compact units BM33XX.

1.1 Explanation of symbols

Warnings

Warnings are identified by symbols in this Parameter Manual. The notices are introduced by signal words which express the magnitude of the danger.

Observe the notices without exception and exercise caution to prevent accidents, personal injury and damage to property.

DANGER!

....warns of an imminently dangerous situation which will result in death or serious injury if not avoided.

WARNING!

....warns of a potentially dangerous situation which may result in death or serious injury if not avoided.

CAUTION!

....warns of a potentially dangerous situation which may result in minor or slight injury if not avoided.

NOTICE!

....warns of a potentially dangerous situation which may result in material damage if not avoided.

Recommendations

NOTE!

....points out useful tips and recommendations, as well as information for efficient, trouble-free operation.

1.2 Limitation of liability

All specifications and information have been compiled taking account of the applicable standards and regulations, the state of the art and also our many years of expertise and experience.

The manufacturer accepts no liability for damage resulting from:

- Non-compliance with the Instruction handbook
- Non-intended use
- Use of untrained personnel

The product actually supplied may deviate from the versions and illustrations described here in the case of special versions, the use of additional ordering add-ons or as a result of the latest technical changes.

The user is responsible for carrying out servicing and maintenance in accordance with the safety regulations in the applicable standards and all other relevant national or local regulations concerning conductor dimensioning and protection, grounding, isolation switches, overcurrent protection, etc.

The person who carried out the assembly or installation is liable for damage arising during assembly or upon connection.

1.3 Copyright

Treat the Application handbook confidentially. It is intended exclusively for persons involved with the device. It must not be made available to third parties without the written permission of the manufacturer.

NOTE!

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NOTE!

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1.4 Guarantee conditions

The guarantee conditions are located as a separate document in the sales documents.

Operation of the devices described here in accordance with the stated methods/ procedures / requirements is permissible. Anything else, e.g. even the operation of devices in installed positions that are not shown here, is not permissible and must be checked with the factory in each individual case. If the devices are operated differently than described here, any guarantee will be invalidated.

1.5 Customer service

Our customer service department is available for technical information.

Information concerning the responsible contact person can be obtained at any time by telephone, fax, e-mail or over the Internet.

1.6 Other applicable documents

Instruction handbook

	Doc.-No.	Part No. German	Part No. English
Instruction handbook b maXX 3300	5.11018	441538	441539
Instruction handbook b maXX 5000	5.09021	439682	439683
Instruction handbook b maXX 5500	5.13008	446683	446684

Parameter manual

	Doc.-No.	Part No. German	Part No. English
Parameter manual b maXX 3300	5.12001	442289	442290
Parameter manual b maXX 5000	5.09022	428331	431082

1.6 Other applicable documents

2

CONTROL STRUCTURES

This chapter describes the structure of the servo pump function of the b maXX controller. The control model is described by using graphics.

2.1 Overview of operating pages

Servo pump functionalities can be set in 7 ProDrive pages:

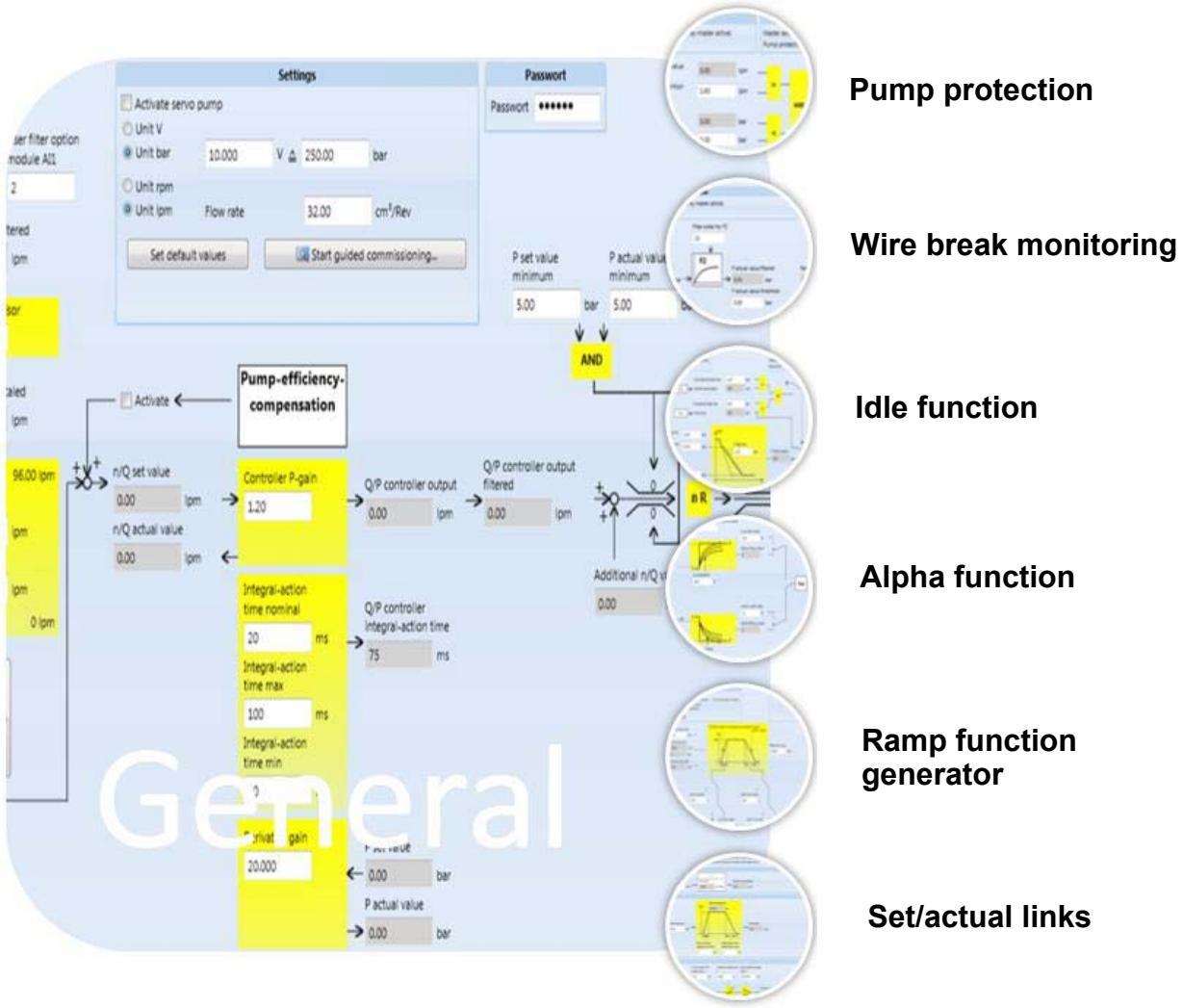


Figure 1: Overview of servo pump pages

2.2 Signal processing of set values

2.2.1 Setting the set/actual values mode

You can set the signal processing of set values. For more detailed information please see ▹Reading in of pressure and volume set/actual values◃ from page 36.
At the „V2 set/actual links“ page in ProDrive select the „Set/actual values“ given by:

- Analog
- Field bus with standard IO module
- Field bus with option SVP module

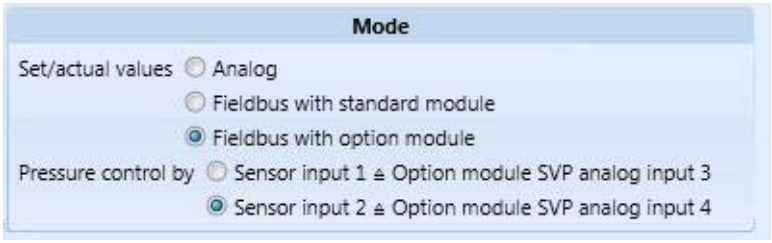


Figure 2: Selecting the mode using the SVP module

The servo pump software of the BM5000 has the functionality to switch between two pressure sensors for pressure control. If the used sensors have different pressure ranges, also scaling parameters must be adapted (dataset switch recommended).

Figure 3: Selecting the mode using standard IO module

It is possible to switch the pressure control in ▹P177.3◃ bit 7 between two analog inputs of the SVP module (▹Figure 2◃ on page 13) or between two analog inputs of the standard IO module (connector X6) (▹Figure 3◃ on page 13).

This option is useful, as soon there are two pressure sensors in one hydraulic-system, e. g. a hydraulic cylinder.

Bit 7 in control word 1 (▹P177.3◃)

- 0: Pressure control using sensor 2
- 1: Pressure control using sensor 1

The default used pressure sensor (▹P177.3◃ bit 7 = 0) is connected to analog input 4 of SVP module or analog input 2 of standard IO module X6.

A second pressure sensor has to be connected at analog input 3 of SVP module or analog input 1 of standard IO module X6.

2.2.2 Volume set values and pressure set values via analog inputs

The „Value analog input 1“ (▹P176.8◃) is the volume set value for the analog inputs.

- The corresponding filter can be set in „User filter option module AI1“ (▹P177.62◃).
- Additionally an offset can be set in „User offset option module AI1“ (▹P177.61◃).
- The scaling can be changed in „User scaling factor module AI1“ (▹P177.60◃).

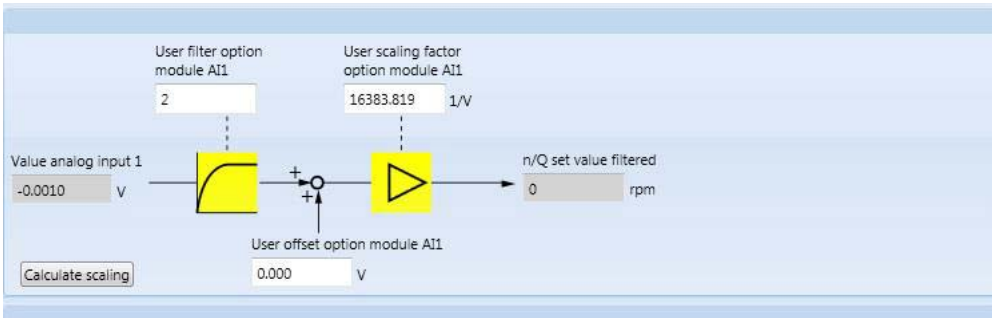


Figure 4: Set/actual values via analog inputs 1

By clicking on „Calculate scaling“ button, you can set the scaling of the set values by changing the sliders. The range of analog input signal corresponds then to the range of the target volume set parameter.

The pressure set value via analog input is set in „Value analog input 2“ (▹P176.9◃).

- The corresponding filter can be set in „User filter option module AI2“ (▹P177.62◃).
- The scaling can be changed in „User scaling factor module AI2“ (▹P177.63◃).
- Additionally an offset can be set in „User offset option module AI2“ (▹P177.61◃).

The value is sent to the ramp function generator.

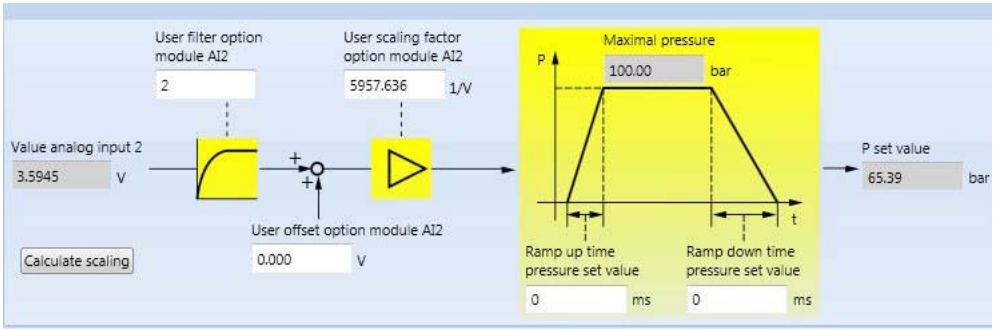


Figure 5: Set/actual values via analog inputs 2

2.2.3 Interface pressure actual values if SVP module is available

The analog value from the sensor is read at „Value analog input 3/4“.

- An offset can be added in „User offset option module AI3/4“ ▹P176.67◃ /▹P176.70◃
- The value is sent to the „User scaling factor option module AI3/4“ ▹P176.66◃ /▹P176.69◃ in order to scale the value,
- filtered by a PT1 filter, whose time-constant can be set in „User filter SVP module AI3/4“ ▹P176.68◃ /▹P176.71◃

and then sent to „P actual value“ (▹P177.119◃)

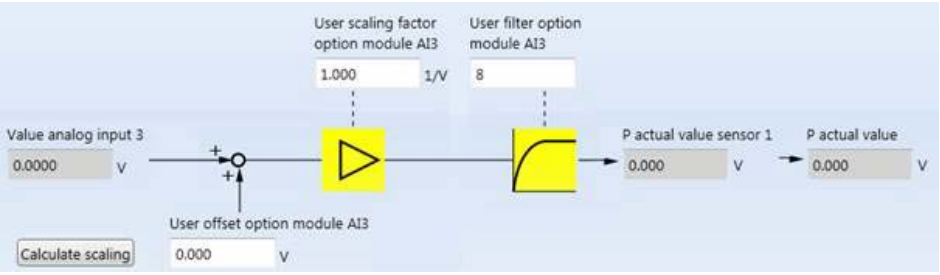


Figure 6: Pressure actual value via SVP module

2.2.4 Interface pressure actual values if no SVP module is available

The analog value from the sensor is read at „Value analog input 1/2“ ▹P176.8◃/▹P176.9◃ and

- filtered by a PT1 filter, whose time-constant can be set in „Time constant PT1 analog input 1/2“.
- An offset can be added in „Offset analog input 1/2“.
- The „Threshold analog input 1/2“ defines at which voltage value the value is sent to „Scaling factor analog input 1/2“

and then to „P actual value“ (▹P177.119◃).

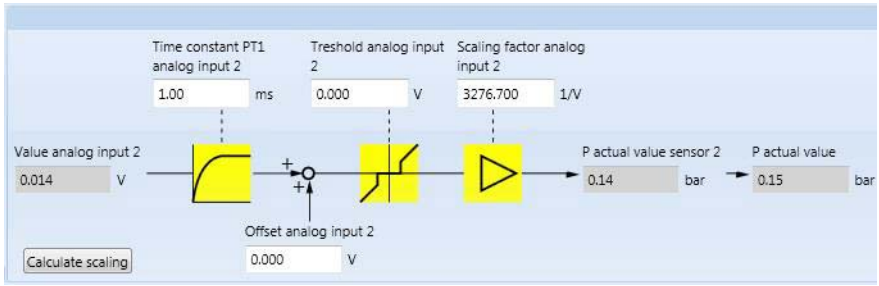


Figure 7: Pressure actual value without SVP module

2.2.5 Volume set values and pressure set values via field bus

Volume set values via field bus are set in

- „Q set value bus“ (▹P177.42◃) as milliliter per minute.
- It is scaled then via „Flow rate“ (▹P177.8◃)

and sent to „n/Q set value filtered“ (▹P177.35◃).

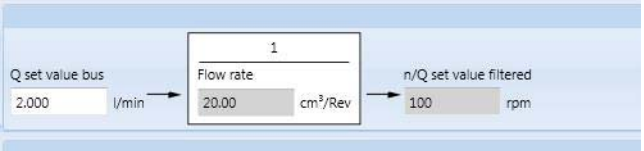


Figure 8: Volume and pressure set values via field bus 1

- The pressure set value is set via field bus in „P set value bus as millibar“ (▹P177.20◃).
- It is sent to a ramp function generator for the pressure with a maximal pressure limit (▹P177.6◃).
- The „Ramp up time pressure set value“ (▹P177.206◃) and „Ramp down time pressure set value“ (▹P177.207◃) define the rising and falling time for the pressure.

The processed pressure value is sent to „P set value“ (▹P177.120◃).

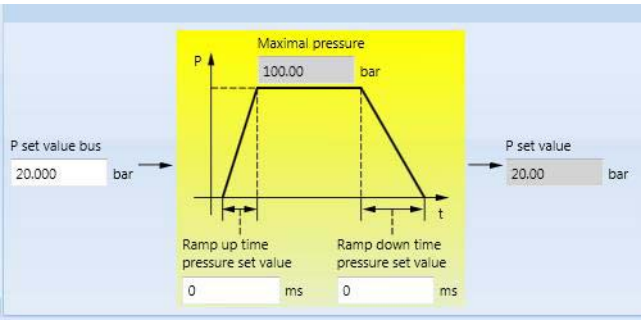


Figure 9: Volume and pressure set values via field bus 2

2.3 Ramp function generator for Q-values

This scaling defines the scaling-relationship between the voltage-value of the Q-Set filtered (▹P177.35◃) in respect to the output drive-speed (nSet).
The nSet-value is then sent to the ramp function generator, see ▹Ramp function generator (RFG)◃ on page 18.

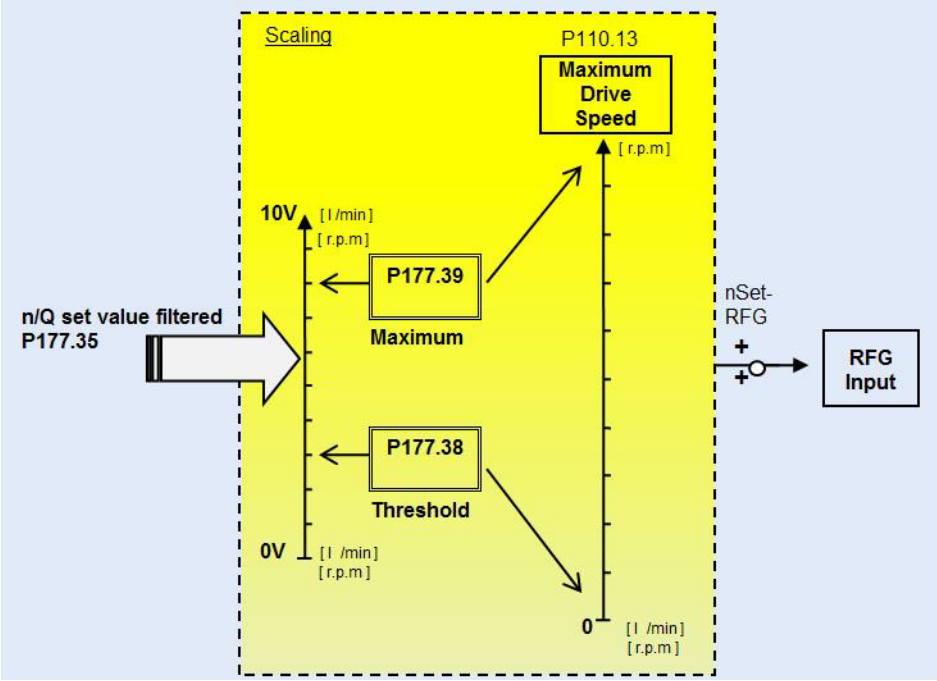


Figure 10: Scaling of volume set values

2.4 Ramp function generator (RFG)

The Ramp function generator (RFG) generates a function with rising and falling ramps. It defines the time for the volume rising and falling between 0 % and 100 % of the maximum volume.

- In slave mode the up time can be defined in ▹P177.49◃ and the down time in ▹P177.47◃.
- In master mode the up time can be set in ▹P177.48◃ and the down time in ▹P177.46◃.
- If the idle function (▹Idle function◃ from page 24) is enabled and in active state in master mode, the up time is then set to „0“ and the down time to ▹P177.45◃.
- It is possible to set different ramp times for master, slave and idle mode.

By activating the master/slave mode, a slave drive is then following the speed of the master drive [rpm].

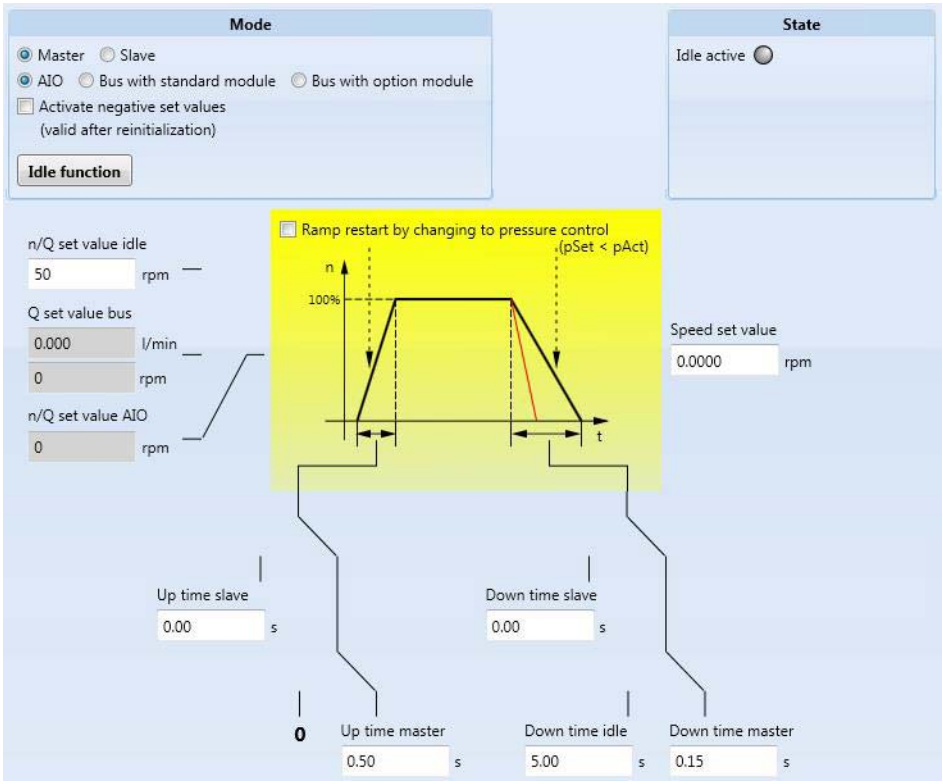


Figure 11: Ramp function generator for drive-speed

2.5 Master slave configuration

The servo pump software is capable of interacting with other drives by defining master and slave modes for each drive. Only the master drive is getting pressure- and volume set values (via field-bus or analog) and the actual pressure value from the pressure sensor. As shown in figure 1 the slave is only following the master in speed control.

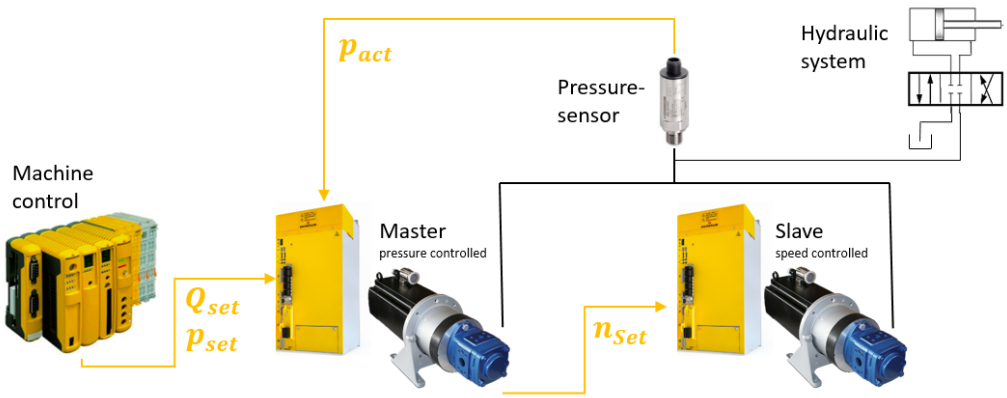


Figure 12: Connection of the pressure sensor in a master slave configuration

Attention:

The volume set value from the PLC and the master's flow rate (▹P177.8◃), which can be defined on ProDrive's general servo pump site, must always correspond together. If the flow rate (▹P177.8◃) is given by the displacement volume of one single pump, the total volume set value of all pumps, must be divided by the number of pumps, before sending it to the drive. If the flow rate (▹P177.8◃) is given by the total displacement volume of all pumps, the volume set value must also be given as the total value of all pumps.

2.5.1 Master and slave via analog inputs and outputs only

When using a master slave combination via analog inputs and analog outputs only, the master drive has to be equipped with a SVP module. The slave drive does not necessarily require a SVP module.

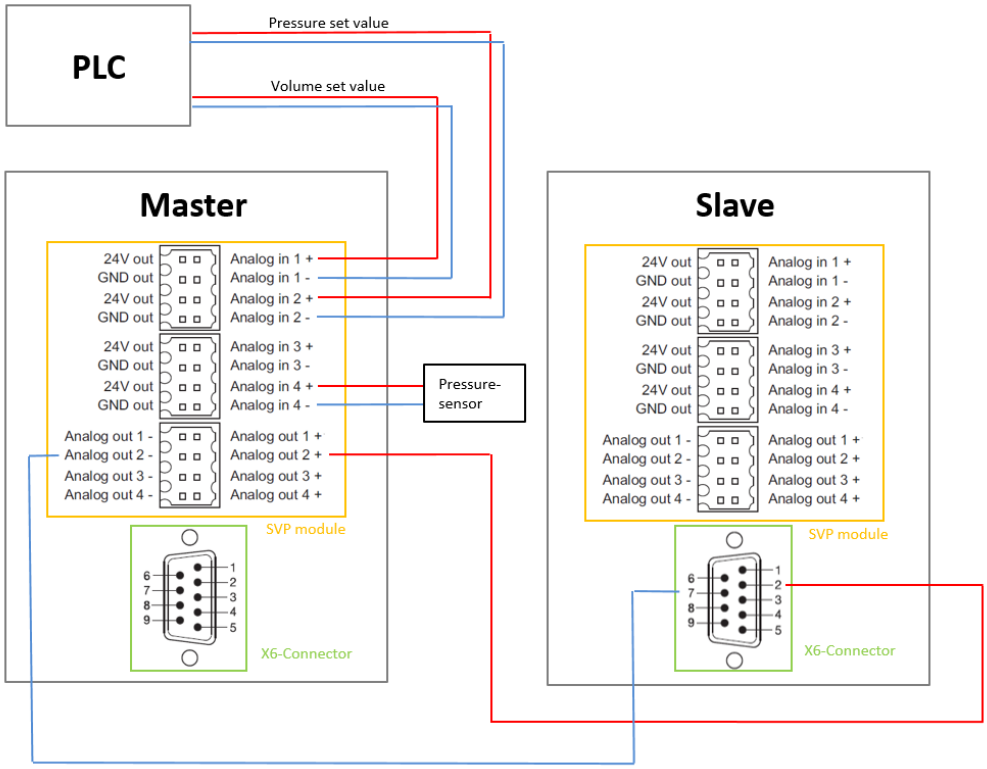


Figure 13: Connection of master and slave via analog inputs and outputs

In this configuration the master is controlling pressure and volume of the hydraulics according to analog set values, which are given by the PLC. The slave is only following the master in speed control. For this purpose the actual speed value from the master is sent directly via analog output 2 of the SVP module to the X6 analog input 2 of the slave. To enable the analog output linking of the actual values on the master, the bit 7 in Control word 3 (▹P177.5◃) has to be set to „1“.

The target number (▹P144.15◃) of the slave's analog input 2 needs to be set manually on ProDrive's analog input page. To achieve the fastest connection between master and slave the speed additional value (▹P18.68◃) has to be selected as target parameter. To calculate the scaling factor of the analog input 2 (▹P144.11◃) the „calculate scaling“ button can be used. Due to this parameter is an additional set value, the standard input value (▹P110.5◃) of the ramp function generator has to be set once to value „0“.In standard configuration a voltage range of -10 to 10 V and a speed range from the negative max. speed to the positive max. speed (▹P110.1◃) of the master drive has to be used. Due to the slave is only running in speed control, it must be ensured that the servo pump is deactivated on the slave and that there is no PLC-Project running on the slave. Furthermore the checkboxes „Disable negative set values“ (Bit 0 of ▹P110.2◃) and „Inverting input values“ (Bit 2 of ▹P110.2◃) on the slave's ramp function generator page must be deactivated. In this configuration, it is not possible to switch master and slave roles during operation.

2.5.2 Master and slave via analog connection and set values via fieldbus

In this configuration the pressure set value (▹P177.20◃) and the volume set value (▹P177.42◃) are transferred via fieldbus to the master drive, but the speed value of the master is transferred to the slave via analog inputs and outputs.
If the master is equipped with a SVP module the connection of master and slave can be realized as given in chapter ▹Ramp function generator (RFG)◃ on page 18. If the master is not equipped with an SVP module the connection of master and slave has to be carried out as shown in ▹Figure 14◃ on page 21, by using the master's analog output 1 of connector X6. In this case the analog output configuration must be set manually on ProDrive's analog output page by setting the source parameter id to the total speed set value (▹P18.21◃). To calculate the correction gain of the analog output (▹P125.18◃), the „calculate scaling“ button can be used. In standard configuration a voltage range of -10 V - +10 V and a speed range from the negative speed limit (▹P177.215◃) to the positive speed limit (▹P177.214◃) of the master drive should to be used. In this configuration it is not possible to switch master and slave roles during operation.

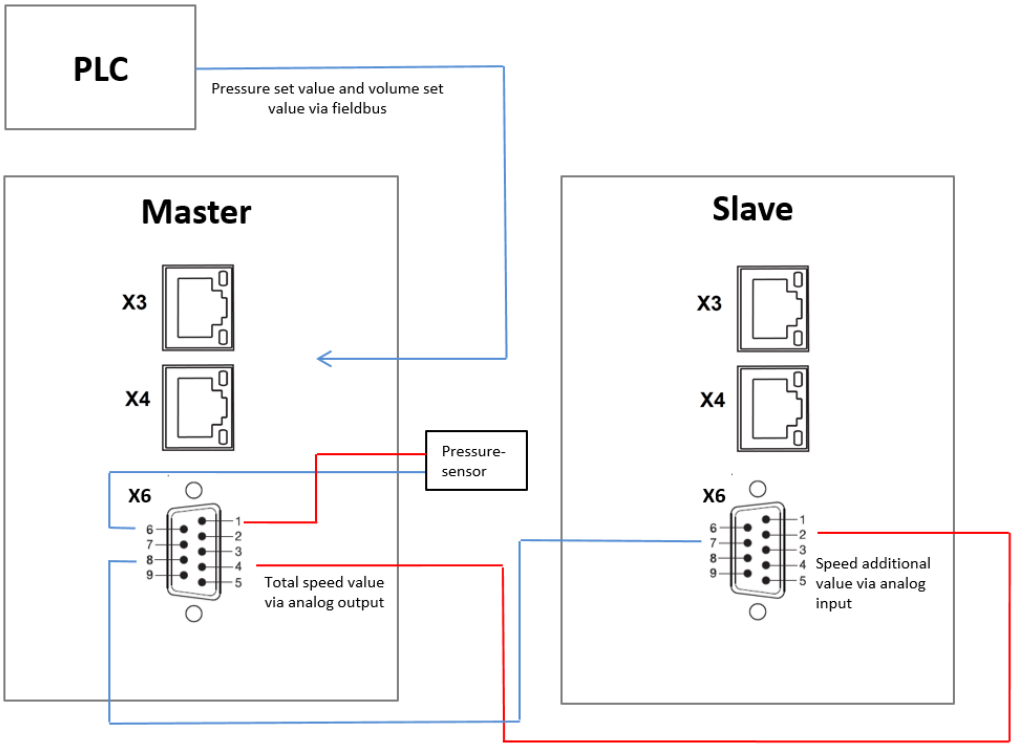


Figure 14: Connection of master and slave via analog inputs and outputs with fieldbus

2.5.3 Master and slave with fieldbus only

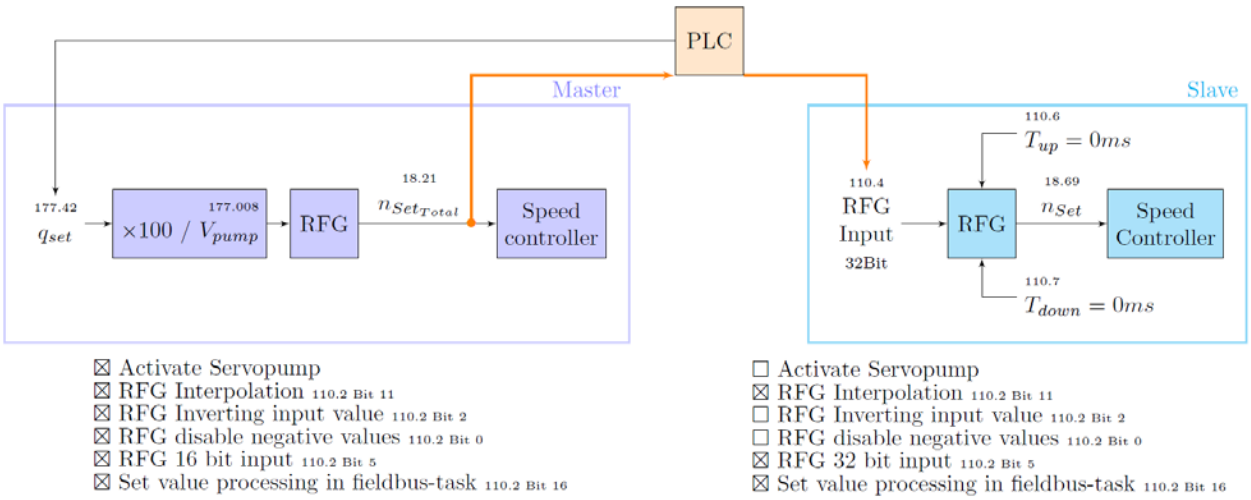


Figure 15: Parameter connection of master and slave with fieldbus only

As shown in ▹Figure 15◃, in this configuration the master is receiving the set values from an overlaid PLC and is sending back its total speed value (▹P18.21◃). The overlaid PLC is then sending the masters total speed value to the slave drives ramp function generator input (▹P110.4◃). The slave follows the master while bypassing its own pressure control. Due to no pressure control is running on the slave drive, the servo pump function needs to be activated on the master drive only, and must be deactivated on the slave drive (=stop SoftDrivePLC). The ramp function generator mode (▹P110.2◃) of master and slave has to be set as depicted in ▹Figure 15◃. In this configuration, it is not supported to switch the master and slave roles during operation.

2.5.4 Master and slave switching roles during operation

In this configuration it is possible to switch from master to slave during operation. When using analog set values it is necessary that both drives are equipped with an SVP module. Furthermore on both drives an activated servo pump SoftDrivePLC project is necessary. In addition, the automatic linking of analog inputs must be activated by setting bit 10 of Control word 1 (▹P177.3◃) to „0“ in the parameter list. To enable the analog output linking of the actual values, on the master and the slave drive the bit 7 in Control word 3 (▹P177.5◃) has to be set to „1“.

▹Figure 16◃ on page 23 shows the connection schematic for the switchable analog Input/Output configuration. The PLC's set value path is connected to both drives. The volume set value is connected to analog in 1 of the SVP module and the pressure set value is connected to analog in 2 of the SVP module. The analog out 2 of each SVP module is connected to the pin 2 of the corresponding X6-Connector for transmitting the speed value.

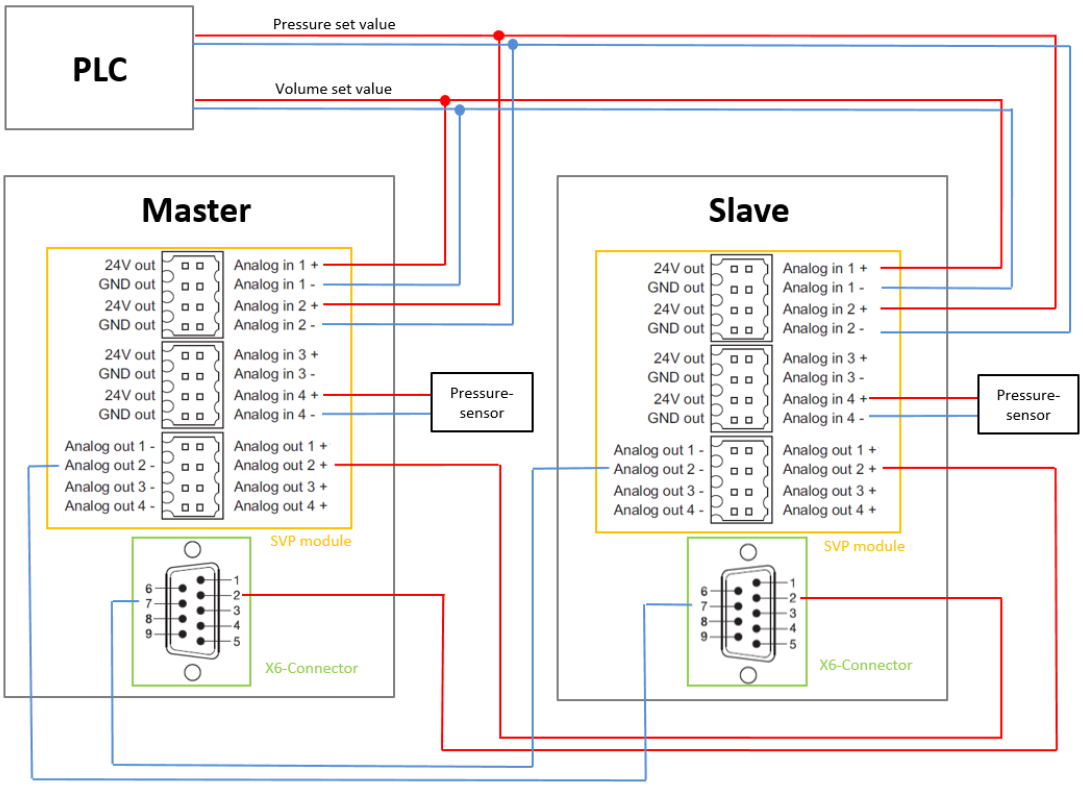


Figure 16: Master/Slave connection for switching between master and slave mode during operation

Switching between master and slave mode can be achieved by setting the bit 0 in Control word 3 (▹P177.5◃) to „0“ for master mode and to „1“ for slave mode in the parameter list or on the servo pump ramp function generator ProDrive page.

The switchable configuration can be established with a field bus as well, by sending the set values according to chapter ▹Master and slave with fieldbus only◃ on page 22 to the master. But contrary to this chapter the actual volume value (▹P177.22◃) of the slave has to be written on volume set value (▹P177.42◃) and the servo pump must remain activated on the slave as well. Furthermore, it is recommended to switch the parameters datasets when master and slave roles are changed during operation.

2.6 Idle function

The idle function ensures a remaining flow and rotating pump as soon as the Q- or P- set values are lower than the Q threshold (▹P177.55◃) or the P threshold (▹P177.53◃).

The function is available in master mode (bit 0 = 0 in control word 3 ▹P177.5◃) only.

- It can be enabled via bit 7 in control word 2 (▹P177.4◃).

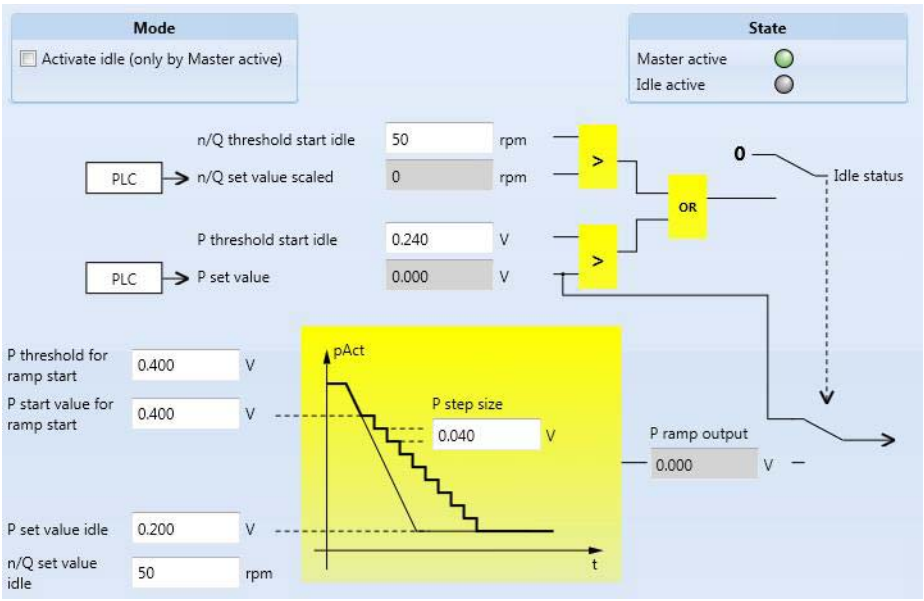


Figure 17: Idle function

Once the „Idle active“ (▹P177.58◃) is 1

- the ramp for pressure down is started with a pressure step-size (▹P177.50◃).
- The ramp starts at the „P threshold for ramp start“ (▹P177.56◃) and
- sets the P set value to „P start value for ramp start“ (▹P177.51◃).

After the ramp function is finished an idle state is held. The P set and Q set values are switched to the idle values „P set value idle“ (▹P177.53◃) and „n/Q set value idle“ (▹P177.44◃).

The ramp function is shown in figure.

2.7 Wire break monitoring

The wire break monitoring can detect a interruption/disconnection of the pressure sensor.

The function is available in master mode (bit 0 = 0 in control word 3 ▹P177.5◃) only.

- Wire break monitoring is activated by bit 8 = 1 in control word 2 (▹P177.4◃).

- The „P actual value“ (▹P177.119◃) is filtered by a PT-1 filter.
- The time constant by default is 10 ms and can be set in ▹P177.160◃.
- If the „P actual value filtered“ (▹P177.162◃) is lower than the „P actual value threshold“ (▹P177.163◃) for the „recognition time“ (▹P177.164◃), the wire break stops the drive after the rest time ▹P177.161◃ with error „wire break“, code 1202.

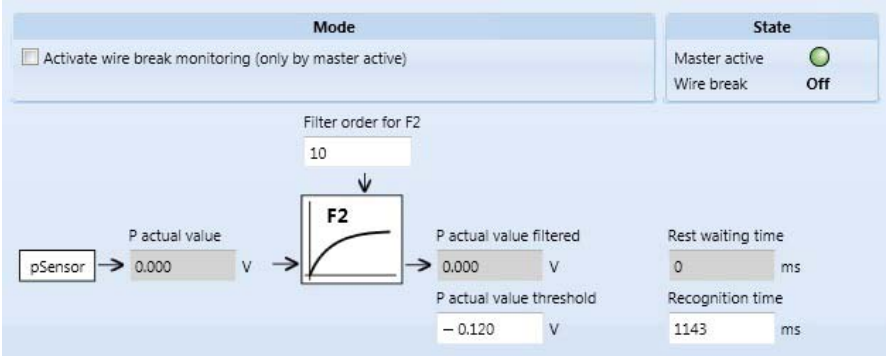


Figure 18: Wire break monitoring

In this case it is necessary to check the connection between the pressure sensor and the drive. The recognition time counter stops and will be reset immediately as soon as the filtered pressure actual value is bigger than the pressure actual value threshold.

NOTE!

The wire break monitoring can only be used with sensors beginning with a voltage-/ current-value > 0 for zero pressure.
For example: 1 - 10 V ⇔ 0 - 250 Bar.

2.8 Pump protection

The pump protection functionality recognizes a missing oil flow or wrong rotating direction of the pump.

Pump protection servo pump V2.0 and firmware version up to 1.14

The function is available in master mode (bit 0 = 0 in control word 3 ▹P177.5◃) only.

- If the „n/Q actual value inverted“ (▹P177.169◃) is higher than „n/Q recognition threshold“ (▹P177.167◃) and
- the „P actual value“ (▹P177.119◃) is lower than „P actual value threshold“ (▹P177.168◃), the error 1202 „Pump protection error“ is generated.

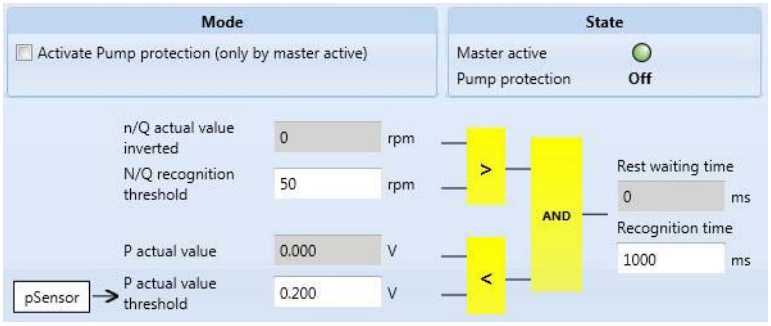


Figure 19: Pump protection V2.0

2.9 Speed stop at minimum pressure values

If pressure actual value (P actual value, ▹P177.119◃) is smaller than „P actual value minimum“ (▹P177.145◃) **and** pressure set value (P set value, ▹P177.120◃) is smaller than „P set value minimum“ (▹P177.144◃) speed limitations are set to 0.

As a result in this low pressure no pressure controller is active. The speed limitation is suspended, if the „P set value“ is greater than „P set value minimum“.

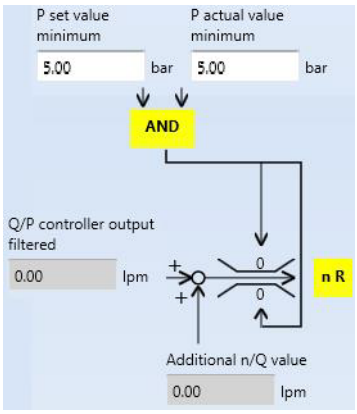


Figure 20: Speed stop at minimum pressure values

„P set value minimum“ and „P actual value minimum“ set pressure values to stop the drive if actual values are falling below this threshold value.

This function prevents the drive from drifting slowly during the pressure control procedure in the event of small set and actual pressure values.

The speed stop is inactive until both (**AND**) limits have been fallen below. Typical values (5 Bar) were already entered by the default values. The function is only activated in the pressure control system.

2.10 Dataset switching

Servo pump software V2 of BM3300/BM5000 supports an online (drive enabled) switching of (up to seven) datasets. Only changes to a valid dataset are possible.

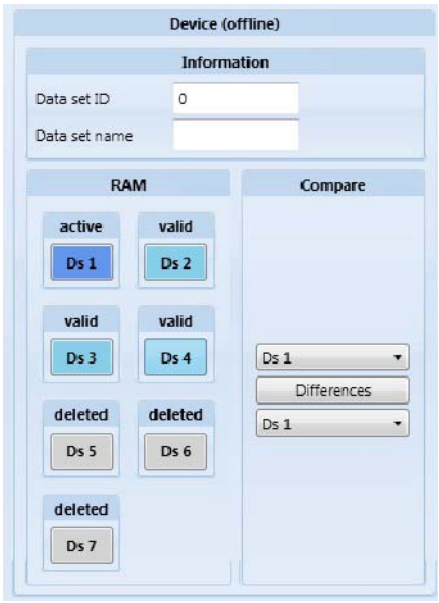


Figure 21: Dataset switching

The servo pump software V2 provides the parameter „Active data set“ (▹P177.228◃) for switching drive datasets. This parameter can be written cyclically via field bus.

2.11 Maximum positive speed

If the „n/Q set value“ (▹P177.214◃) is set to 0 rpm, the pump only rotates in an clockwise direction.

For quicker depressurization it may be necessary for the pump to rotate briefly in the other (clockwise) direction. The maximum permissible (clockwise) speed must be calculated based on the pump manufacturer's documentation.

The negative (▹P177.215◃) speed limit, limits the maximum speed of the pump in clockwise direction.

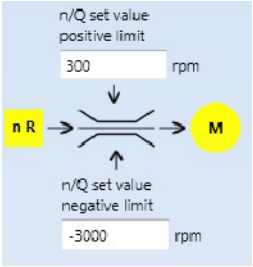


Figure 22: Positive limit setting on the „V2 general“ page

2.12 Alpha function

The α function is a pre-control function which causes the pressure controller to begin its output earlier, before the pressure actual value reaches the pressure set value. This function is for reducing pressure over- and undershot.

The α -function differentiates between two pressure-states:

1. Pressure up / rising pressure
2. Pressure down / falling pressure

The α -function while rising pressure prevents an overshoot of the pressure actual value, while falling pressure the function prevents pressure undershoot.

- The „α up/down start value“ (▹P177.109◃/ ▹P177.108◃) defines the offset of the start.
- The „α up/down gradient“ (▹P177.111◃/ ▹P177.110◃) defines the steepness of the actual pressure. The higher the gradient, the longer it takes to reach the pressure set value.

Both, the start values and gradient values defining the values when the pre-control is activated.

Setting a bigger α -value causes a more smooth pressure controlling, and reduces the overshoot.

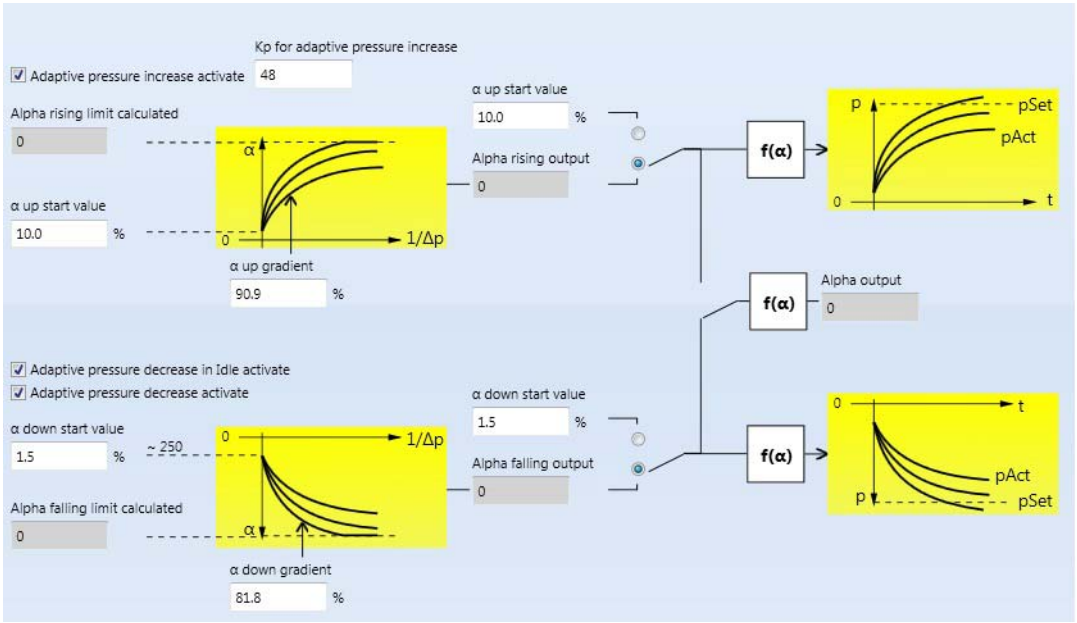


Figure 23: Alpha function page in ProDrive

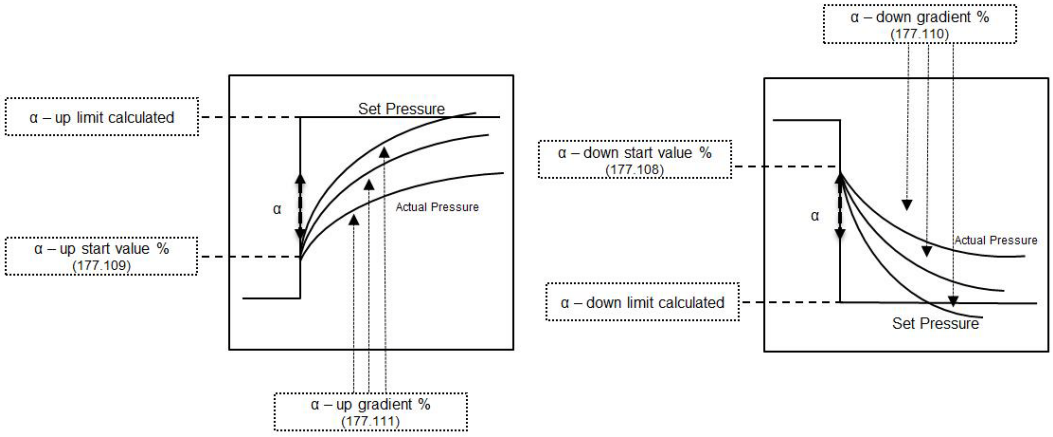


Figure 24: Alpha function graphs

The adaptive pressure increase compensates different volume set values, it adapts on different pressure rising speeds.

At high volume values the α output will be gained more. The „k_p for adaptive pressure increase“ (▹P177.186◃) is the gain-factor for the adaptive pressure increase.

It is possible to switch between „α rising output“ (▹P177.104◃) and „α up start value“ (▹P177.109◃) in order to provide a fixed α output for the up state.
It is also possible to switch between „α falling output“ (▹P177.103◃) and „α down start value“ (▹P177.108◃) in order to provide a fixed α output for the down state.

2.13 General servo pump page

The general page in ProDrive provides the main settings for the servo pump software.

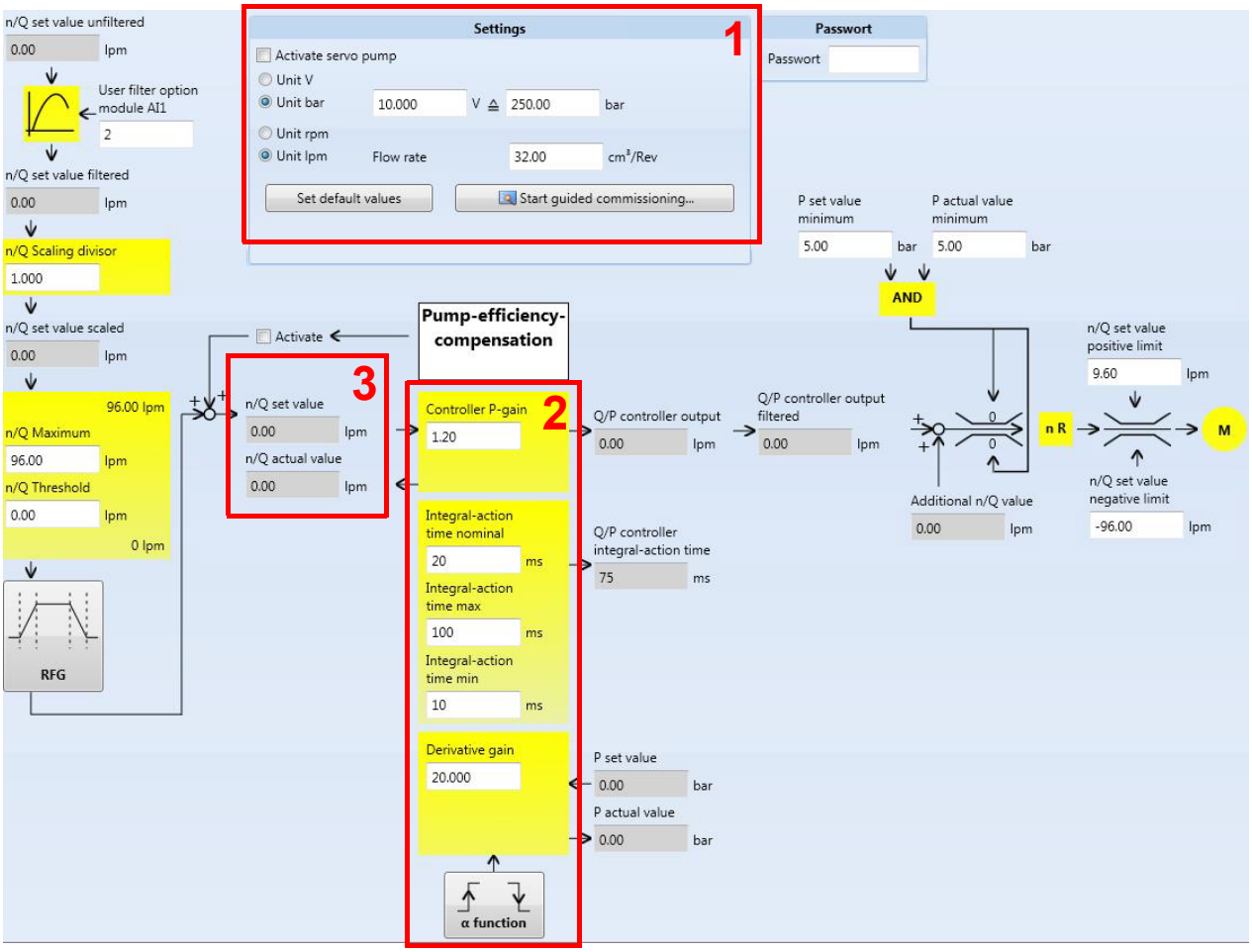


Figure 25: Servo pump V2 general page

1) Settings

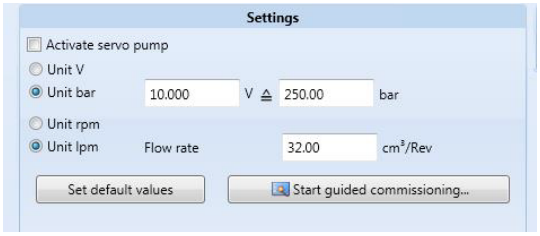


Figure 26: Servo pump V2 general page: Settings

- It is possible to set the default values before starting the „Guided commissioning“.
- The servo pump can be activated via the check box.
- The units can be switched between voltage or pressure units for the pressure and between „rotations per minute“ and „liter per minute“. The units of all servo pump pages are affected.
- The „Volt value“ (sensor pressure output, ▹P177.7◃), the „Bar value“ (▹P177.6◃) and the „Flow rate“ (▹P177.8◃) can be changed in the settings.

2) Controller settings

- The „Controller P-gain“ (▹P177.122◃) is the gain-factor for the pressure controller.
- The „Integral-action time nominal“ (▹P177.62◃) is a nominal value. The Integral-action time is calculated by the drive in the range of „Integral-action time min“ (▹P177.60◃) and „Integral-action time max“ (▹P177.61◃). The nominal action time is affecting the pressure controller in a steady controller state.
- The calculated value is then shown in „Q/P controller integral-action time“ (▹P177.63◃).

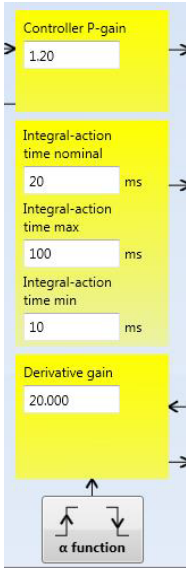


Figure 27: Servo pump V2 general page: Controller settings

3) n/Q set and actual value

The „n/Q set value“ (▹P177.218◃) is always the set value. In pressure control it is different from „n/Q actual value“ (▹P177.210◃), the difference is the pressure control deviation.

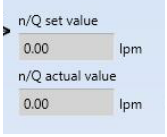


Figure 28: Servo pump V2 general page: n/Q settings

3

INSTALLATION

This chapter describes the servo pump-specific controller connections. This is applicable, in particular, to the set and actual value sources.

For the connection of the b maXX 5000 device and the remaining control connections, see Instruction handbook b maXX 5000, b maXX 5500 or b maXX 3300, see ▹Other applicable documents◃ on page 9.

WARNING!

All notes and in particular safety notes of the Instruction handbook b maXX 5000, b maXX 5500 and b maXX 3300 must be considered.

NOTICE!

It is important to ensure that the pump in every operating point is operated within its specifications. The limitation values for minimal-pressure, pressure-acceleration and the characteristic-lines for pressure and speed can be found in the technical documentation of the pump-manufacturer.

3.1 General information

In general there are different possibilities for reading in the set values for pressure and volume and the actual value of pressure:

- Analog
- Field bus with SVP module
- Field bus with standard IO module X6

Furthermore a subdivision can be done depending on the signal form of analog signals.
In this chapter the different possibilities are described in detail.

3.2 Reading in of pressure and volume set/actual values

It is possible to switch the interface using the bit numbers 8 and 9 in ▹P177.3◃ according to the following table:

▹P177.3◃ = XXXX XX**XX** XXXX XXXX

11 | SVP module as analog interface (see ▹page 36◃)

01 | Field bus combined with SVP module (see ▹page 38◃)

10 | Field bus combined with standard IO module X6 (see ▹page 40◃)

NOTE!

When using a BM3300 a configuration with field bus and standard module is possible, only.

3.2.1 SVP module as analog interface

In this case the volume set value is set using analog module SVP-001-00X in slot B of the b maXX 5000/b maXX 5500 controller.

The set pressure value and actual value are also provided via analog module SVP-001-00X in slot B of the b maXX 5000/b maXX 5500 controller.

The pressure actual value can be read in from 0/4 - 20 mA or 0 - 10 V.

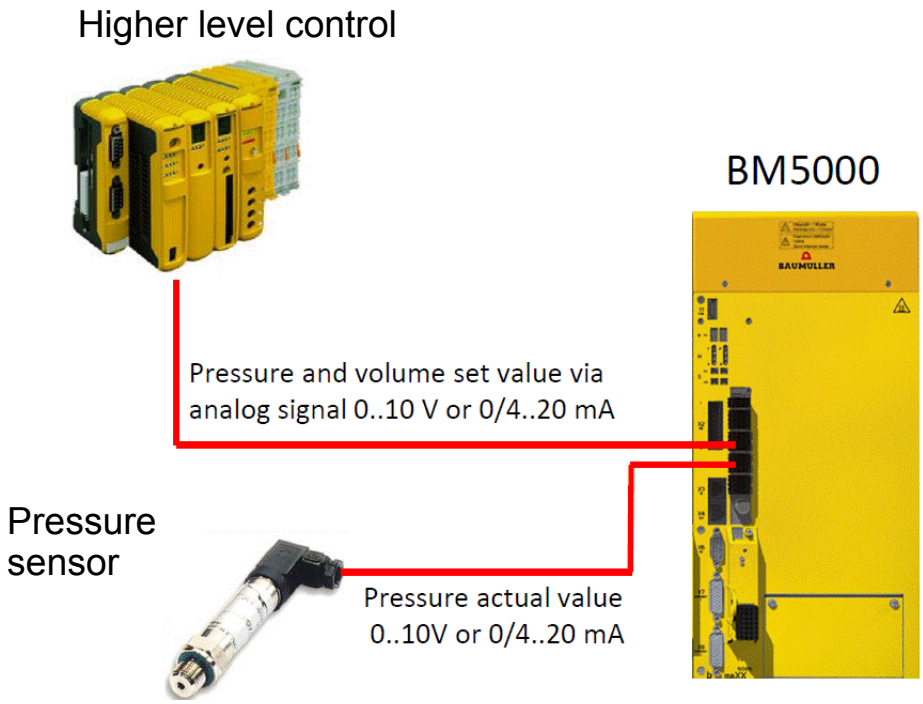


Figure 29: SVP as analog interface

Pin assignment

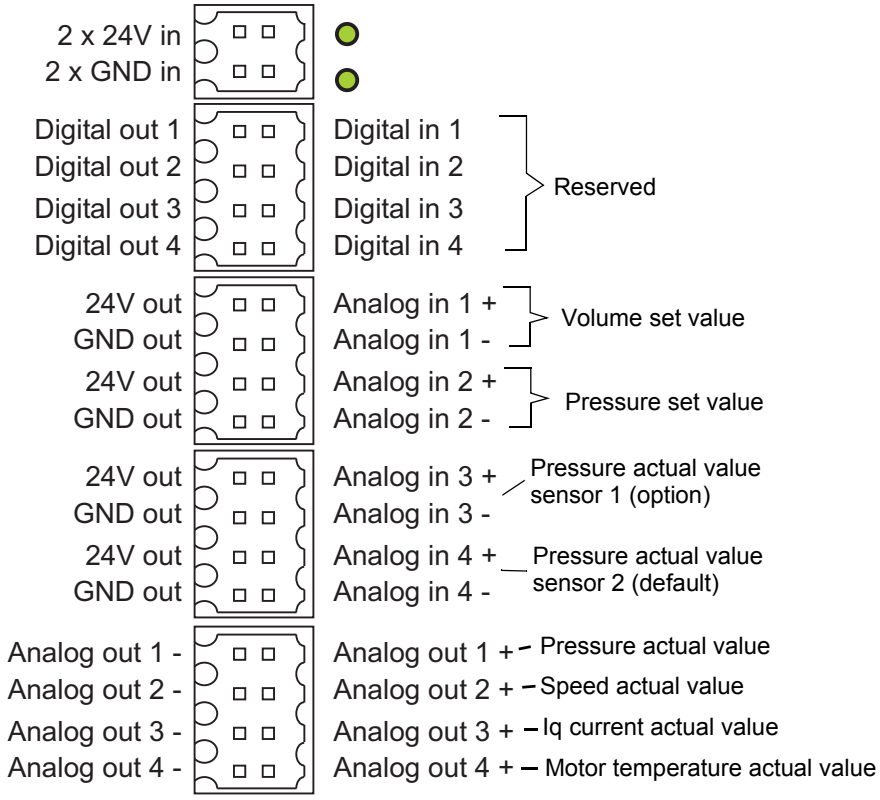


Figure 30: Pin assignment SVP-001-00X as analog interface

NOTE!

SVP-001-00X module requires an own 24 V-supply.

Depending on the used SVP module the following signal forms are required:

- Volume set value interface (Analog input 1 of SVP module):

SVP-001 -001/-002 /-003
Voltage input (0 - 10 V) ⇒ Volume set value from 0 - 10 V is required.
Current input (0/4 - 20 mA) ⇒ Volume set value from 0/4 - 20 mA is required.

- Pressure set value interface (Analog input 2 of SVP module):

SVP-001 -001/-002 /-003
Voltage input (0 - 10 V) ⇒ Pressure set value from 0 - 10 V required.
Current input (0/4 - 20 mA) ⇒ Pressure set value from 0/4 - 20 mA required.

- Pressure actual value interface (analog input 3 or 4 of SVP module):

SVP-001 -001/-002 /-003
Voltage input (0 - 10 V) ⇒ Pressure sensor with voltage output (0 - 10 V) is required.
Current input (0/4 - 20 mA) ⇒ Pressure sensor with current output (0/4 - 20 mA) is required.

3.2.2 Field bus combined with SVP module

In the case the pressure and volume set value are set via field bus parameters:

- Volume set value interface:

▹P177.42◃ Q set value field bus DINT Scaling: ml/min

- Pressure set value interface:

▹P177.20◃ P set value field bus DINT Scaling: mBar

The pressure actual value is provided via analog module SVP-001-00X in slot B of the b maXX controller. The pressure actual value can be read in from 0/4 - 20 mA or 0 - 10 V.

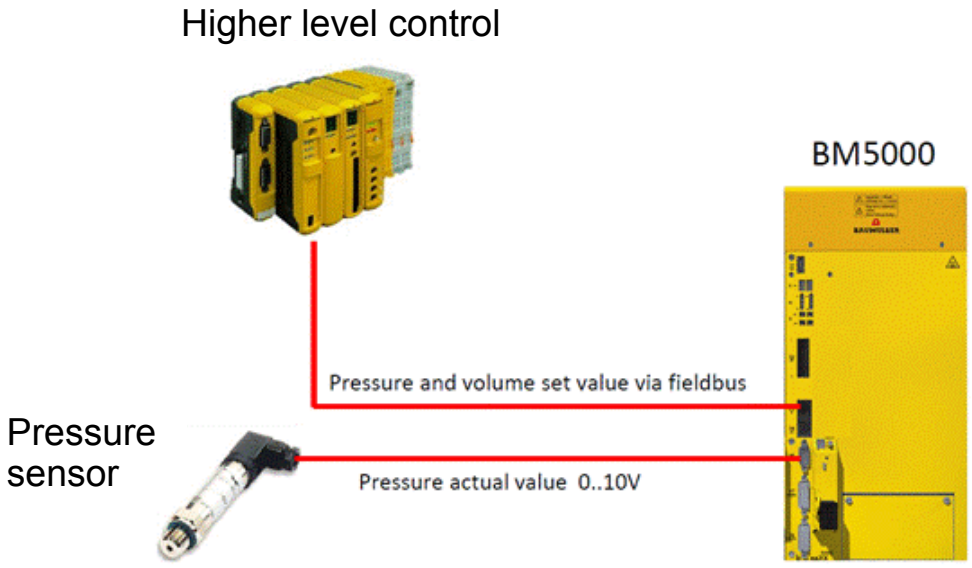


Figure 31: Field bus combined with SVP module

Pin assignment

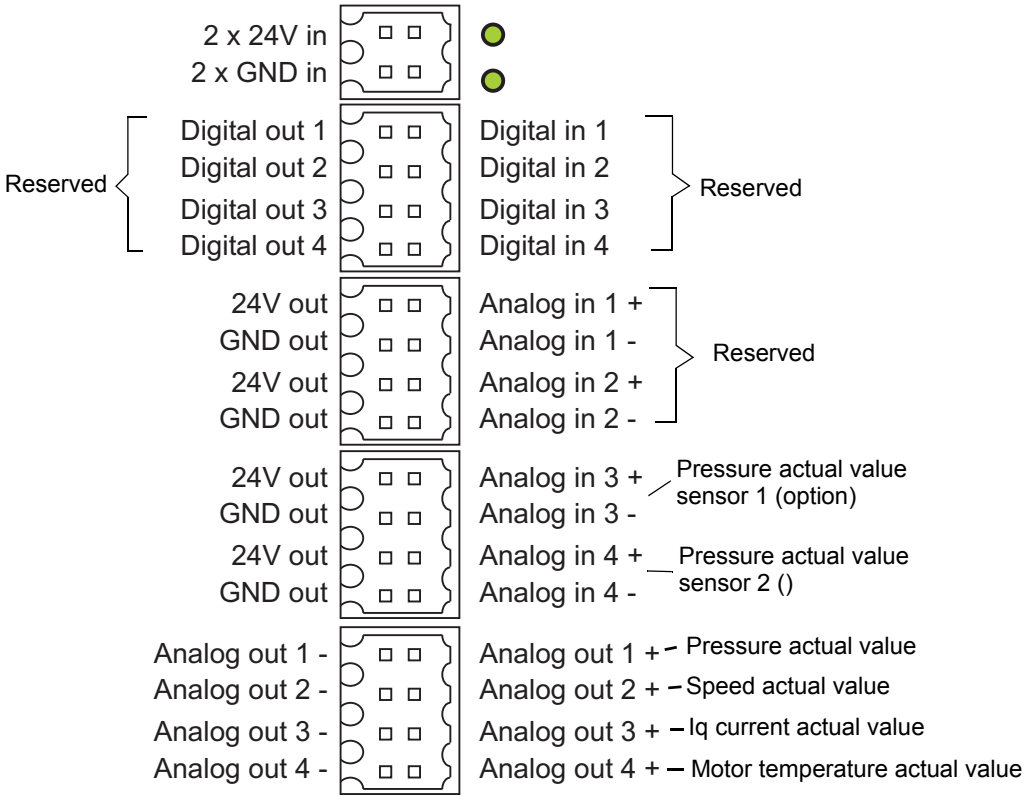


Figure 32: Pin assignment field bus combined with SVP-001-00X

Depending on the used SVP module, the following signal forms are required:

- Pressure actual value interface (analog input 3 or 4 of SVP module):

SVP-001-001 Voltage input (0-10 V) ⇒
Pressure sensor with voltage output (0-10 V) is required.

SVP-001-002/-003 Current input (0/4 - 20 mA) ⇒
Pressure sensor with current output (0/4 - 20 mA) is required.

NOTE!

SVP-001-00X module requires an own 24 V-supply.

3.2.3 Field bus combined with analog input X6

In this case the pressure and volume set value is set via field bus parameter:

- Volume set value interface:

▹P177.42◃ Q set value field bus DINT Scaling: ml/min

Pressure set value interface:

▹P177.20◃ P set value field bus DINT Scaling: mBar

The pressure actual value can only be read in at analog input 1 or 2 of connector X6 range 0 - 10 V.

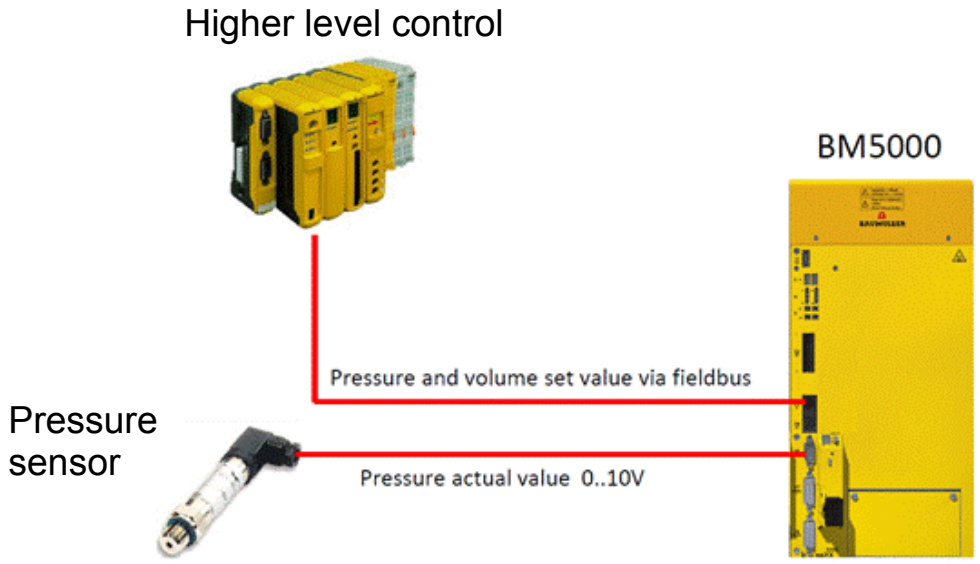
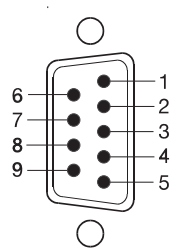


Figure 33: Field bus combined with analog input X6

NOTE!

In this configuration no SVP module is necessary.

Pin assignment



D-sub connector 9-pin

Pin No.	Assignment
1	Actual pressure value sensor 1 +
2	Actual pressure value sensor 2 +
3	OUT 1 - , OUT 2 -
4	OUT 1 +
5	OUT 2 +
6	Actual pressure value sensor 1 -
7	Actual pressure value sensor 2 -
8	OUT 1 - , OUT 2 -
9	OUT 1 - , OUT 2 -

Typical connection pressure sensor on standard analog input X6 with extern 24 V supply

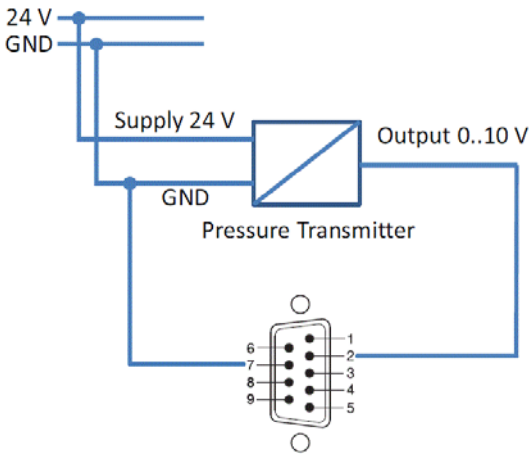


Figure 34: Typical connection pressure sensor on standard analog input X6

3.3 SVP module (for b maXX 5000 only)

The SVP module provides an I/O-extension. The SVP module has to be mounted in production, it's not pluggable or can be retrofitted. The SVP module also provides the 24 volts for the pressure sensor

Up to now there are three types of SVP modules.

Module with additional analog/digital inputs/outputs, BM5XXX-XXXX-XX**04**
BM5XXX-XXXX-XX**05**
BM5XXX-XXXX-XX**06**

Types

Version	Analog in 1 / 2	Analog in 3 / 4	Analog out 1 ... 4	Digital in 1 ... 4 Digital out 1 ... 4
SVP-001-001 BM5XXX-XXXX-XX**04**	Analog voltage inputs ±10 V resolution 14 bit	Analog voltage inputs ±10 V resolution 14 bit	4 analog voltage outputs ±10V resolution 12 bit	4 digital inputs 24 V / 4 digital outputs 24 V
SVP-001-002 BM5XXX-XXXX-XX**05**	Analog voltage inputs ±10 V resolution 14 bit	Analog current inputs (0) 4…20 mA resolution 14 bit		
SVP-001-003 BM5XXX-XXXX-XX**06**	Analog current inputs (0) 4…20 mA resolution 14 bit	Analog current inputs (0) 4…20 mA resolution 14 bit		

The SVP module is required at servo pump systems with

- Analog set value interface or
- Pressure sensor with current interface or
- High precision applications

Digital inputs/outputs

Evaluation:	edges, programmable
Input current (per input):	2 mA digital input
Time delay input:	Max. 4 ms,
Level:	Low (0 ... 5 V); High (12 … 28 V)
Output current of each output:	Max. 500 mA
Electrical isolation:	Optocoupler
Short circuit proof:	Current limited, switch-off via temperature

Analog outputs

Resolution	12 bit
Output voltage	-10 V to +10 V
Output current max.	1 mA
Updating rate	125 µs
Short circuit proof	Limited, max. 10 s

Analog inputs

	Voltage input	Current input
Resolution	14 bit	
Type	differential input	
Input resistance	ca. 50 kΩ	ca. 100 Ω
Input current	max. 250 µA	min. (0) → 4 A, max. 20 mA
Input voltage	-10 V to +10 V	max. 2 V
Sampling rate	125 µs	
Power supply encoder	max. 250 mA per connection	

NOTE!

Connect the shielding of the cables of the analog channels.

Blade terminals with 6.3 mm width are available for shielding.

Pin assignment

The pin assignment of the SVP module is hard coded in servo pump software and cannot be changed:

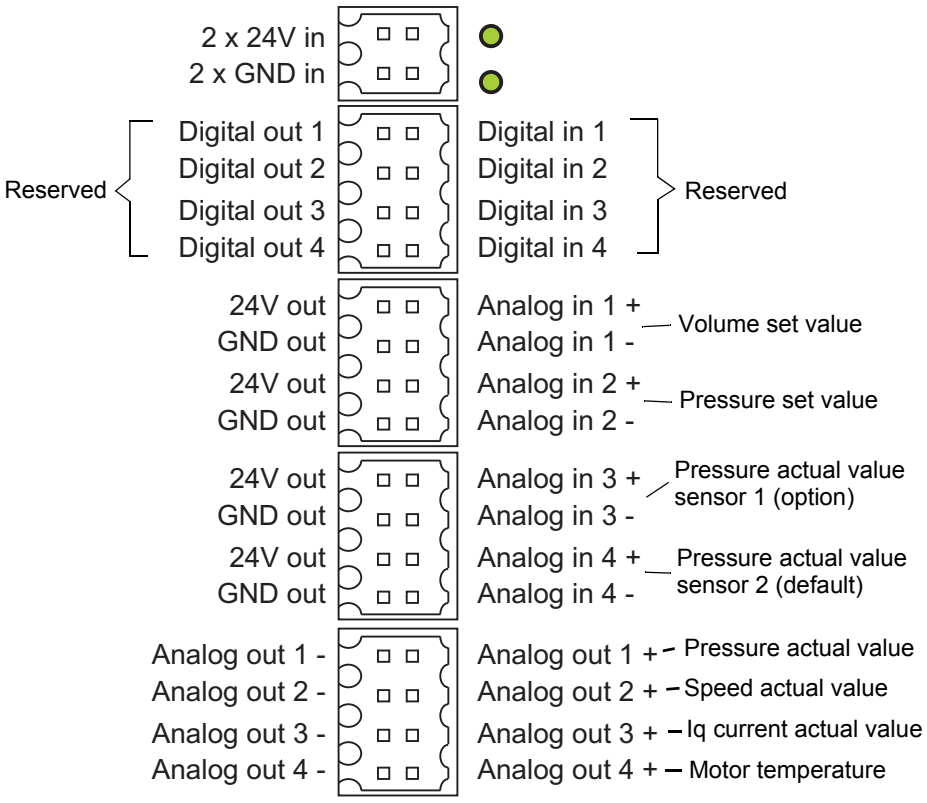


Figure 35: Pin assignment SVP

All analog inputs/outputs must be released via the SVP module mode ▹P176.1◃. In the analog input mode ▹P176.2◃ an oversampling can be set and furthermore the range of current signal (0 - 20 mA or 4 - 20 mA) can be selected.

In the following table is defined which SVP module is required regarding set and actual value signal form.

Set values pressure and volume			**Pressure actual value**		**Required SVP module**	**Resolution pressure actual value**	**Dataset setting**
Field bus	Voltage 0 – 10 V	Current 0/4 - 20 mA	Voltage 0 – 10 V	Current 0/4 - 20 mA			
x			x		-	12 bit	Field bus with standard IO X6
x			x		SVP-001-001	14 bit	Field bus with SVP module
x				x	SVP-001-002/3	14 bit	Field bus with SVP module
	x		x		SVP-001-001	14 bit	Analog
	x			x	SVP-001-002	14 bit	Analog
		x		x	SVP-001-003	14 bit	Analog

3.3.1 Connection pressure sensor with current interface

Connection example for a pressure sensor with current output (2-wire version):

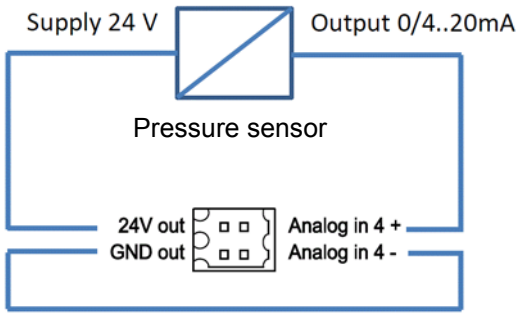


Figure 36: Typical connection pressure sensor with current interface

The 24 V supply of pressure sensor is directly supplied by the SVP module.

The same applies to a pressure sensor with current output (0/4-20 mA) and 3-wires, see below.

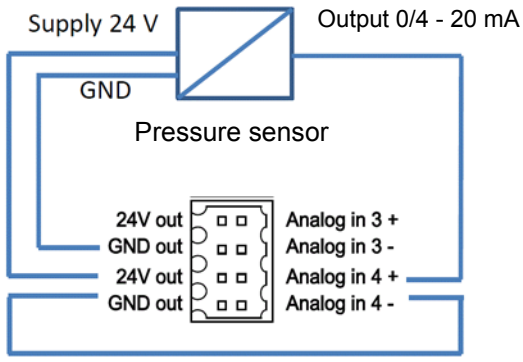


Figure 37: Typical connection pressure sensor with current interface

3.3.2 Connection pressure sensor with voltage interface

Connection example for a pressure sensor with voltage output (3-wire version):

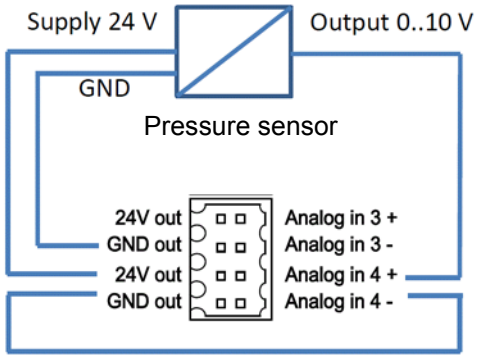


Figure 38: Typical connection pressure sensor with voltage interface

4

GUIDED COMMISSIONING

This chapter describes the guided commissioning function of the servo pump in the b maXX 3300/5000. The guide is described using graphics and a short of explanation.

4.1 Start

- Start the guided commissioning by clicking on „Start guided commissioning“ at the „Applications → Servo pump V2 → SP v2general“ tab.

  Follow this assistant.

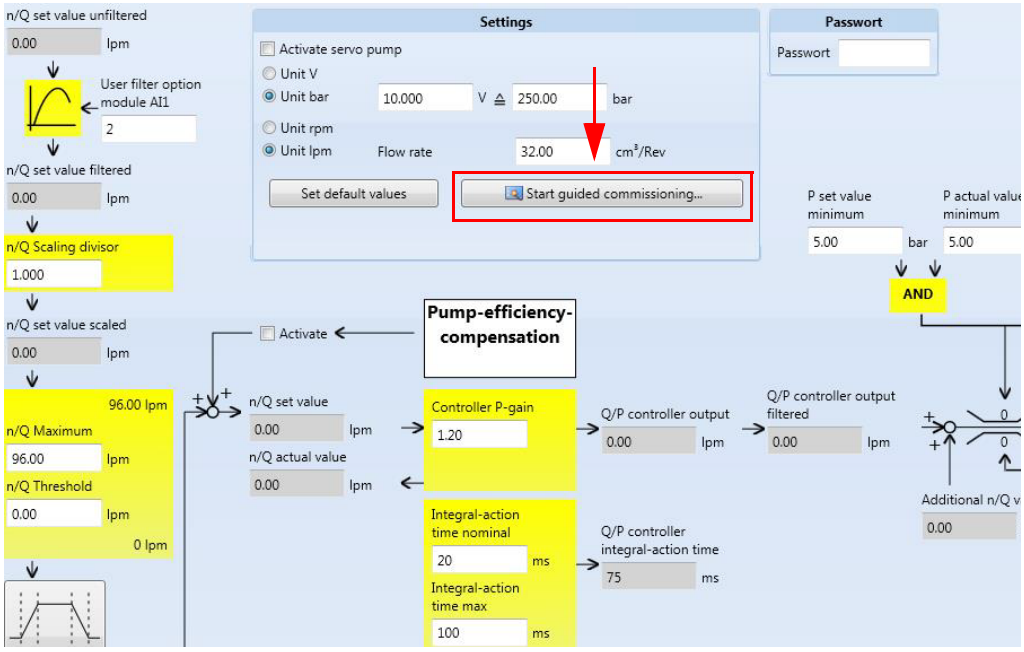


Figure 39: Servo pump start guided commissioning

- Select the desired add-on to begin the commissioning.

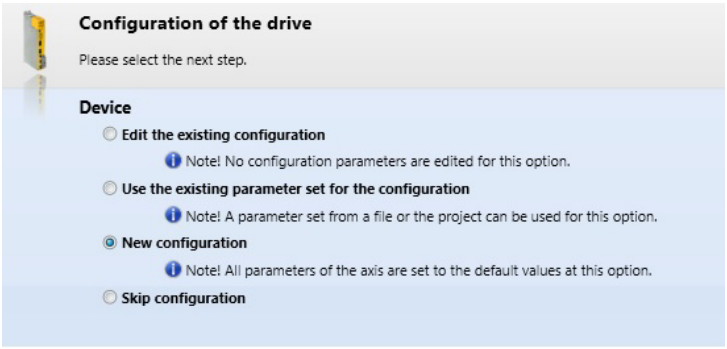


Figure 40: Guided commissioning: First window

- Click on „**Continue**“

Device data: The actual drive-type.
PWM frequency: Select the desired PWM frequency for running the motor.
DC link voltage: Shows the actual DC link voltage.

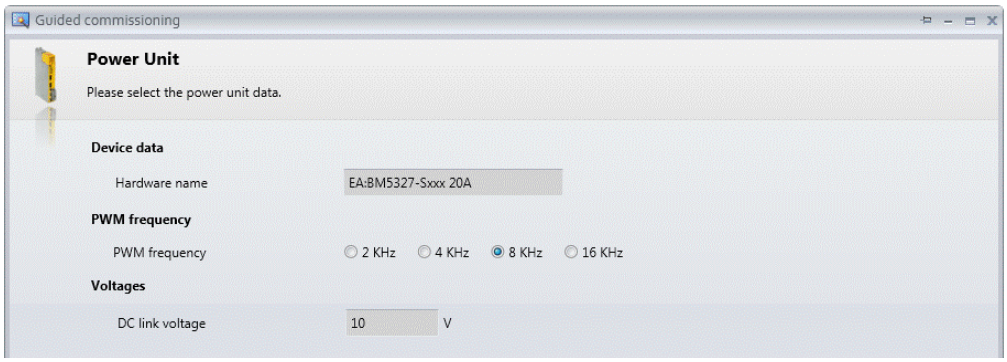


Figure 41: Guided commissioning: Power unit

- Click on „**Continue**“

- Select the used encoder type by clicking on „**Encoder database**“.
  Please ensure you select the right encoder to prevent any damage to the used encoder due to overvoltage.

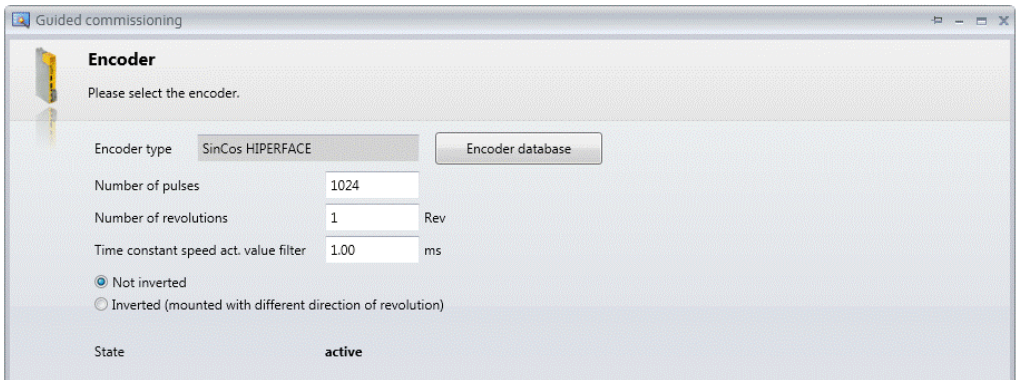


Figure 42: Guided commissioning: Selecting the encoder

- Click on „**Continue**“

- Select a motor either from the „Motor database“ or enter motor data manually if your motor is not listed in the database.

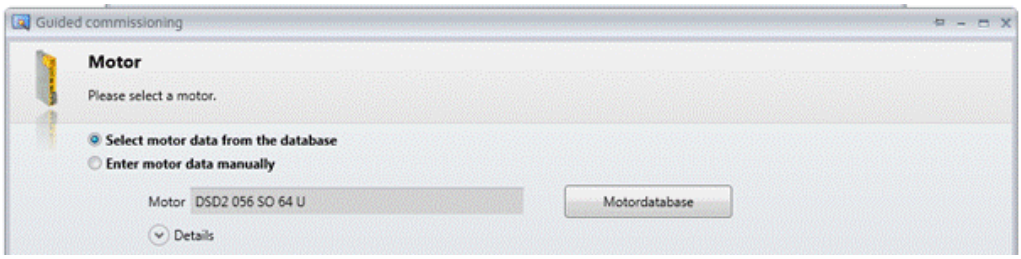


Figure 43: Guided commissioning: Selecting the motor

- Click on „**Continue**“

- If connected, select the type of temperature sensor connected to the controller and check values.

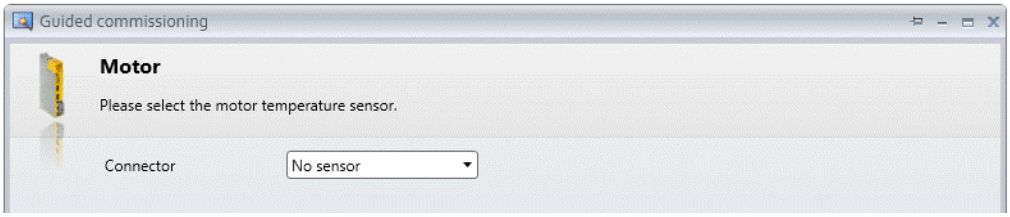


Figure 44: Guided commissioning: Selecting the temperature sensor

- Click on „**Continue**“
- Check, and if necessary change values.

NOTE!

It is advised to set the **„Speed set value positive limit“** on beginning to zero, to prevent any damage of the servo pump.

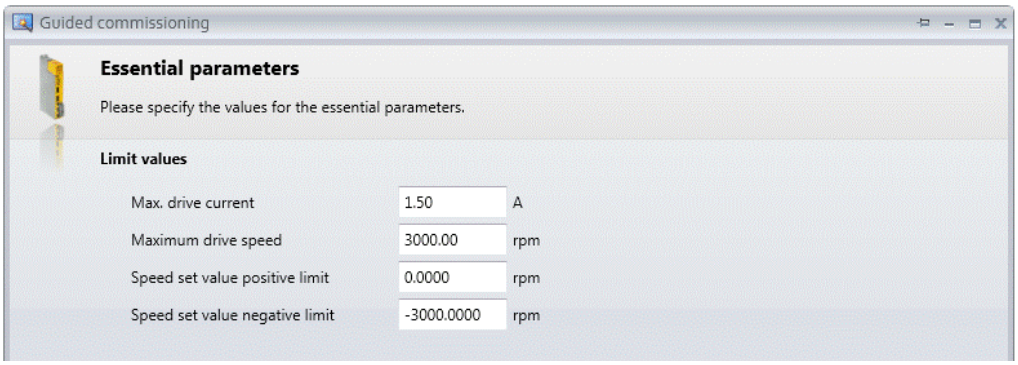


Figure 45: Guided commissioning: Essential parameter settings

- Click on „**Continue**“

- If known, set the load inertia.
  Set the controller settings to „**hard**“.
  The controller calculates the Kp, Tn and Ks values, which are accepted by clicking on „**Download data**“.

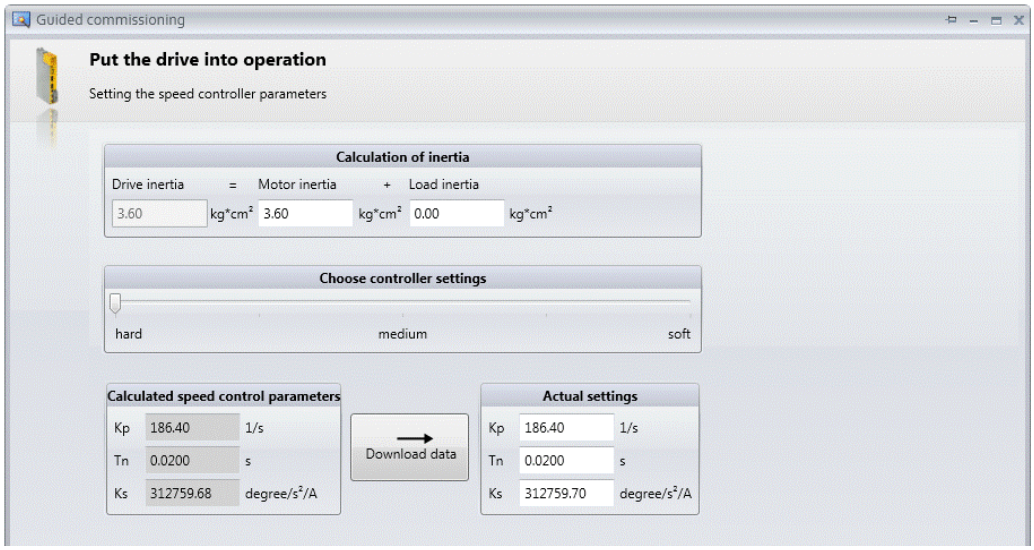


Figure 46: Guided commissioning: Speed controller parameters

- Click on „**Continue**“

- Click on „**Accept operator's control**“ and click on „**Yes**“ on the occurred dialog.

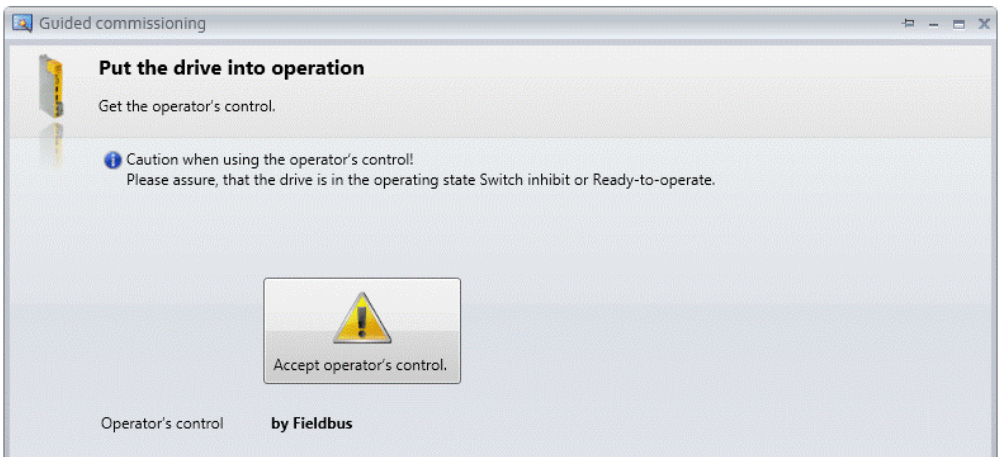


Figure 47: Guided commissioning: Operator‘s control

- Click on „**Continue**“
- Click on „**Reset errors**” if necessary (errors displayed under „**Error**“).

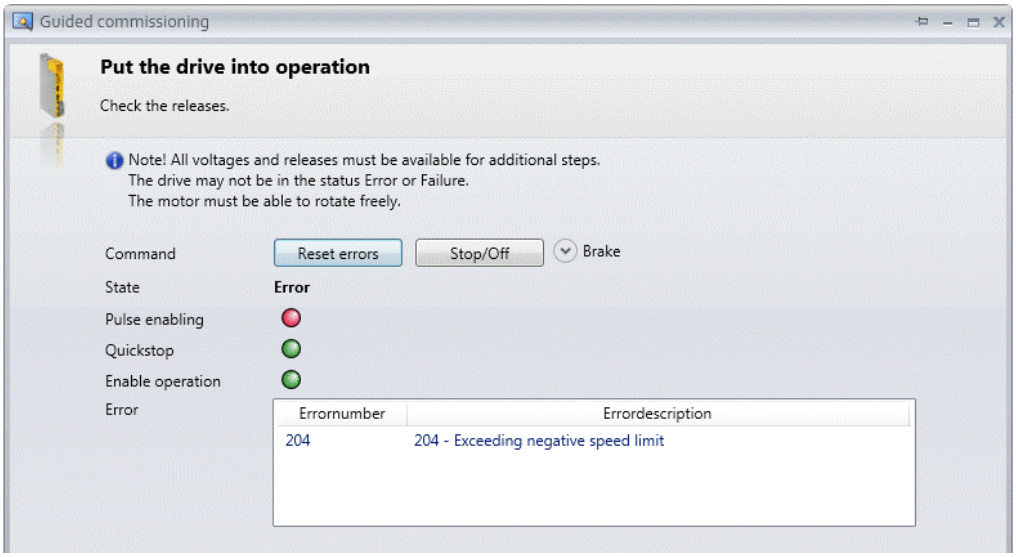


Figure 48: Guided commissioning: Check the releases

- Click on „**Continue**“

- Click on „**Start**“ to begin the Self-optimization of the current controller.
  The stator resistance, inductance Lq and the inductance Ld of the motor are measured. Wait until the measurement is done.

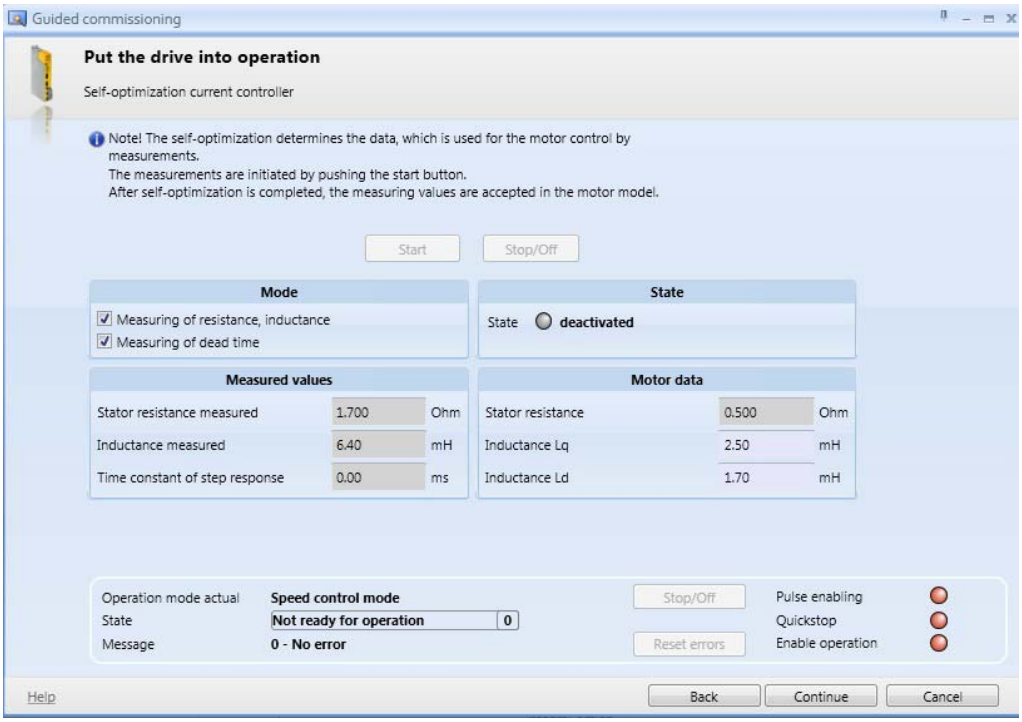


Figure 49: Guided commissioning: Self-optimization

- Click on „**Continue**“

- Find the notch position if not known.
  Click on „**Start**“ and wait until the notch position has been found.

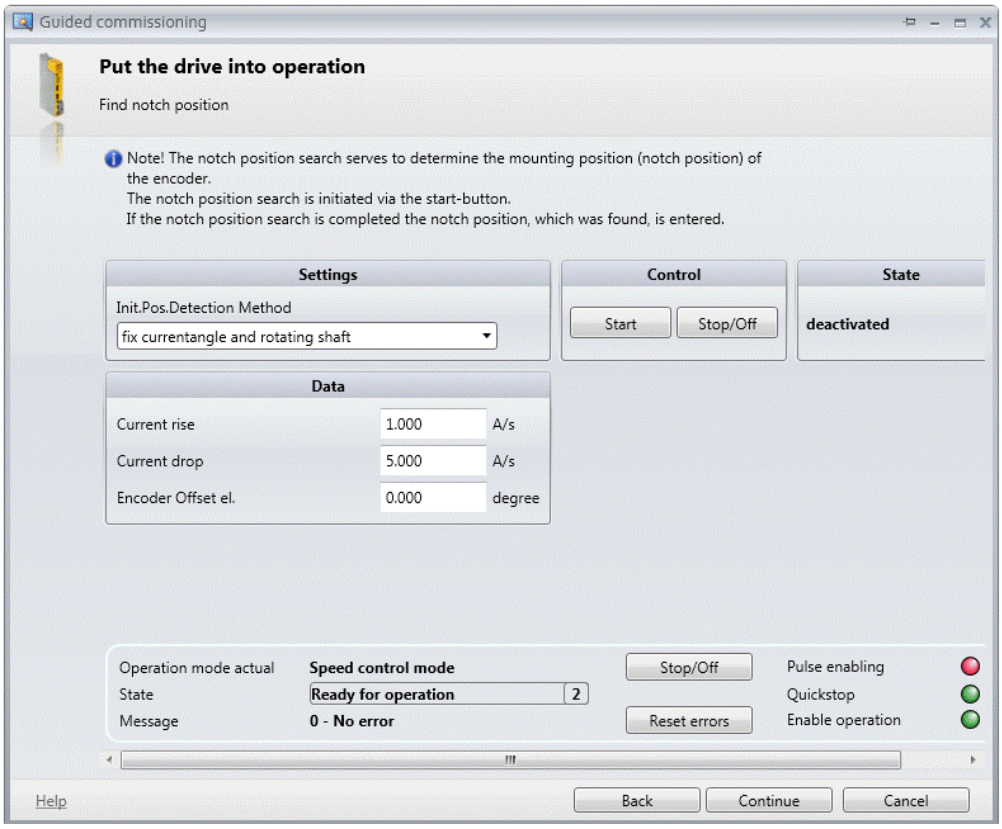


Figure 50: Guided commissioning: Finding the notch position

- Click on „**Continue**“

- Check now whether the motor is rotating or not.

NOTICE!

Make sure that the valves are turned in the way that the pump delivers directly into the tank. Otherwise damage may occur.

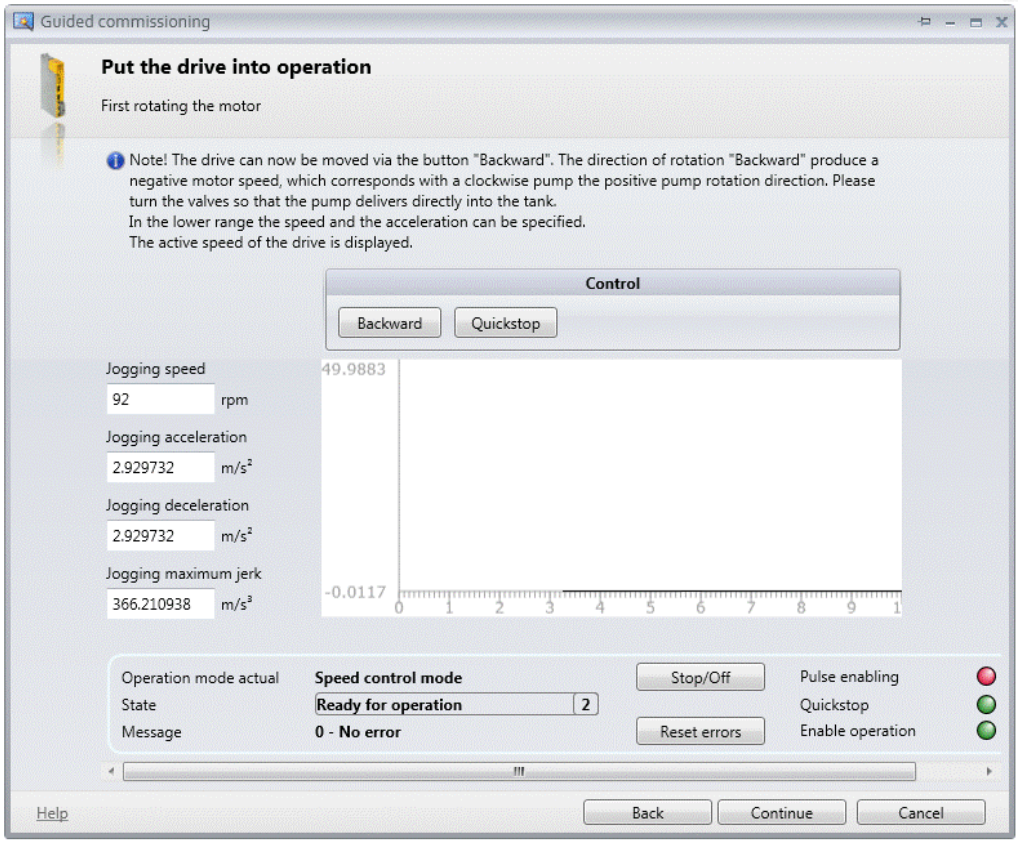


Figure 51: Guided commissioning: Rotating the motor

- Click on „**Continue**“

- Click on „**Activate servo pump**“.
  Check whether the PLC state is running (green) or not.
- If there are any error's, please contact the Application-Department of Baumüller.

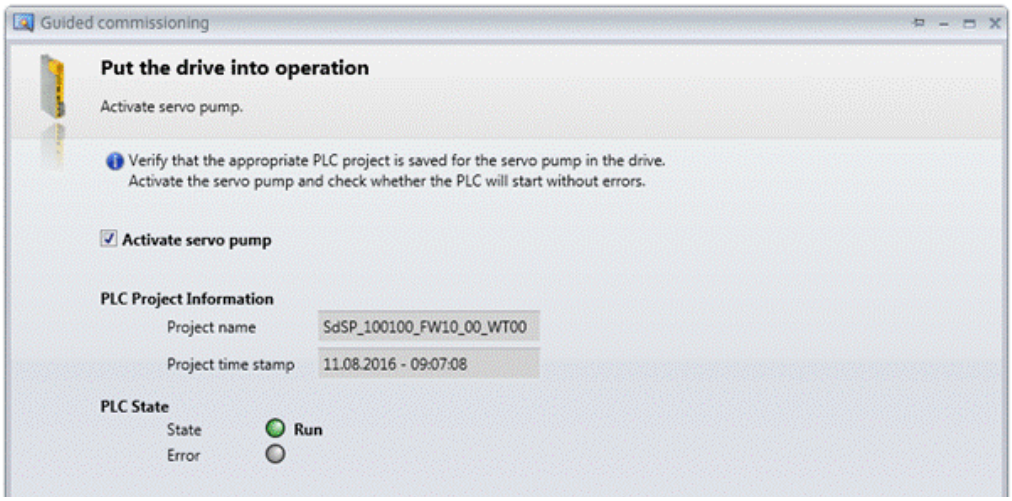


Figure 52: Guided commissioning: Activate the servo pump

- Click on „**Continue**“
- Set the pressure range for the pressure sensor and the flow rate of the pump.

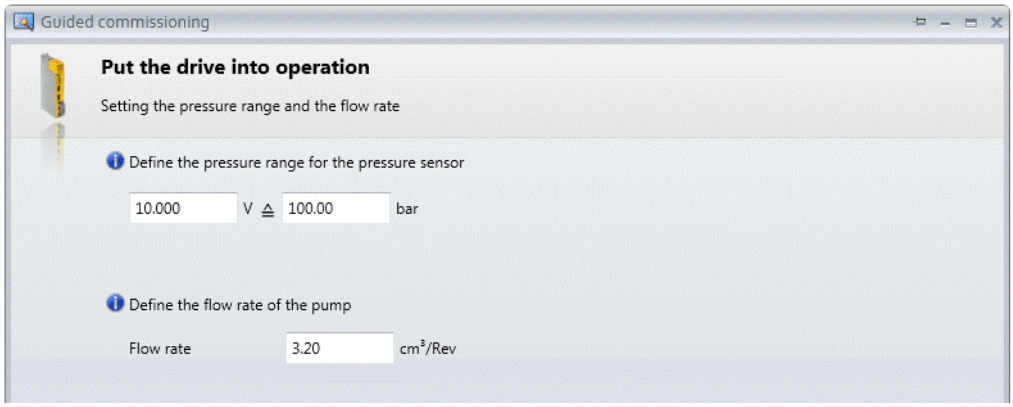


Figure 53: Guided commissioning: Pressure range and flow rate

- Click on „**Continue**“

- Set here the „Speed set value positive limit“ ▹P177.214◃ and the „Speed set value negative limit“ ▹P177.215◃.

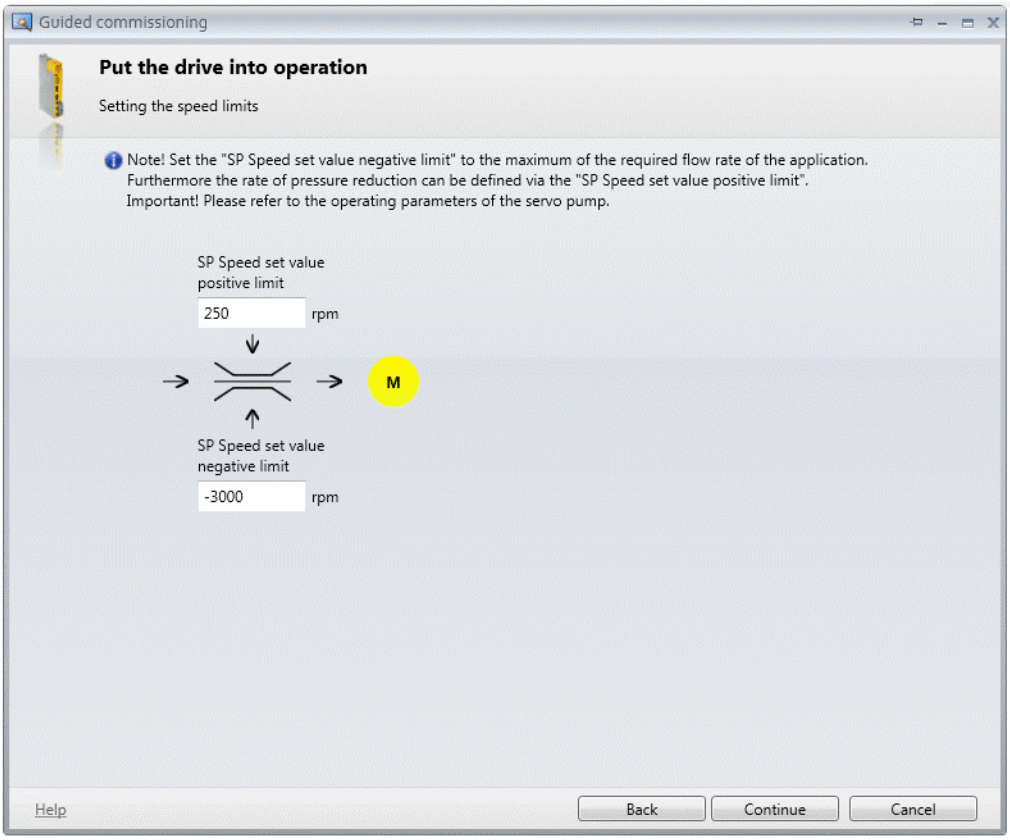


Figure 54: Guided commissioning: Speed limits

- Click on „**Continue**“

- Select the set value and actual value interface

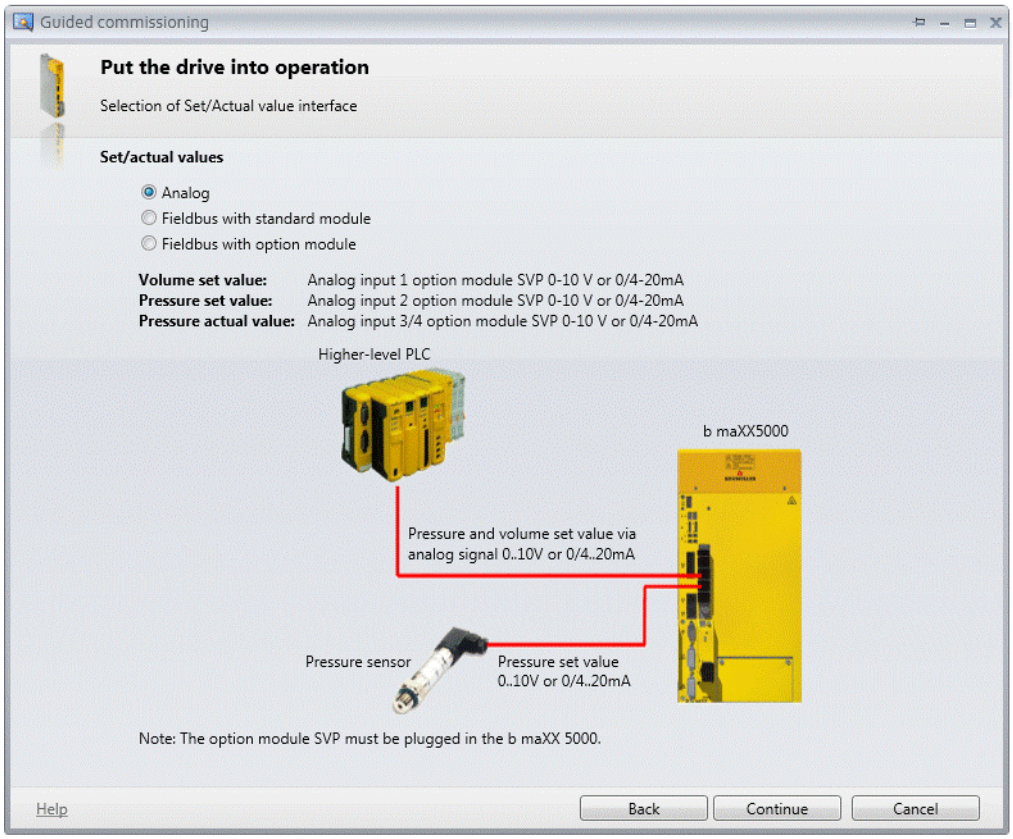


Figure 55: Guided commissioning: Set value and actual value interface

- Click on „**Continue**“
- If your choice is „**Analog**“, continue reading ▹page 61◃.

4.2 Commissioning set/actual values via field bus

- Select „**Synchronizing off or on**“ as needed and set the field bus values depending on your application.

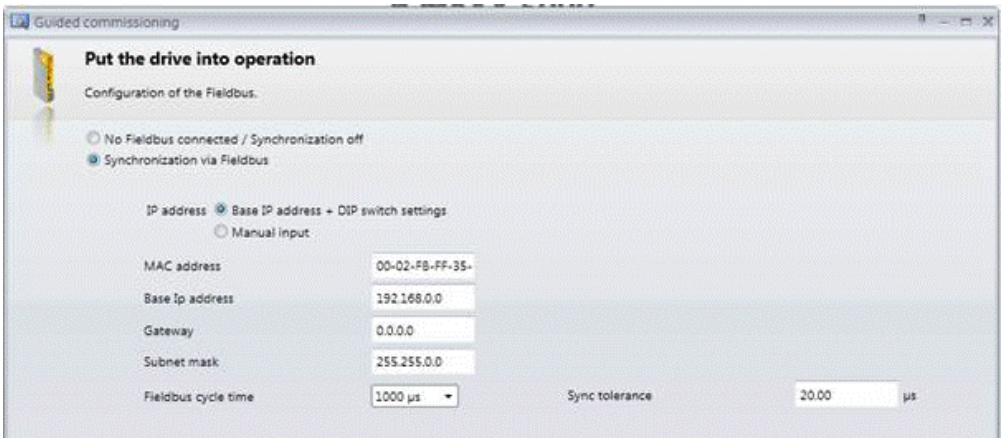


Figure 56: Guided commissioning: field bus configuration

- Click on „**Continue**“

- Check the field bus process data mapping.

Figure 57: Guided commissioning: Data mapping

- Click on „**Continue**“

- Reset the operator's control by clicking on it.

Figure 58: Guided commissioning: Operation control

- Click on „**Continue**“

- Set the scaling of the volume value, and check the signal.

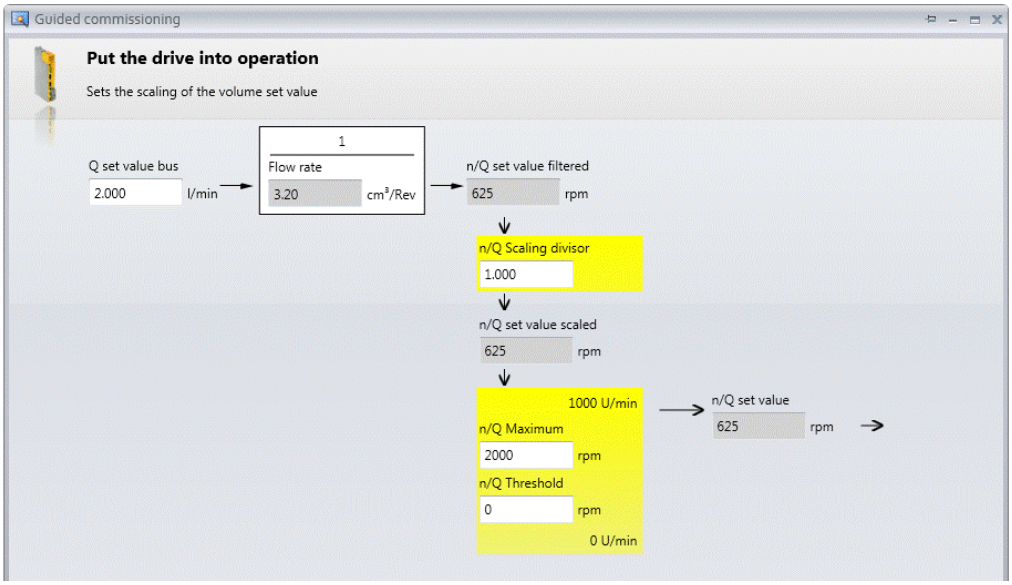


Figure 59: Guided commissioning: Scaling volume set value

- Click on „**Continue**“

- Set the ramps of the pressure value.

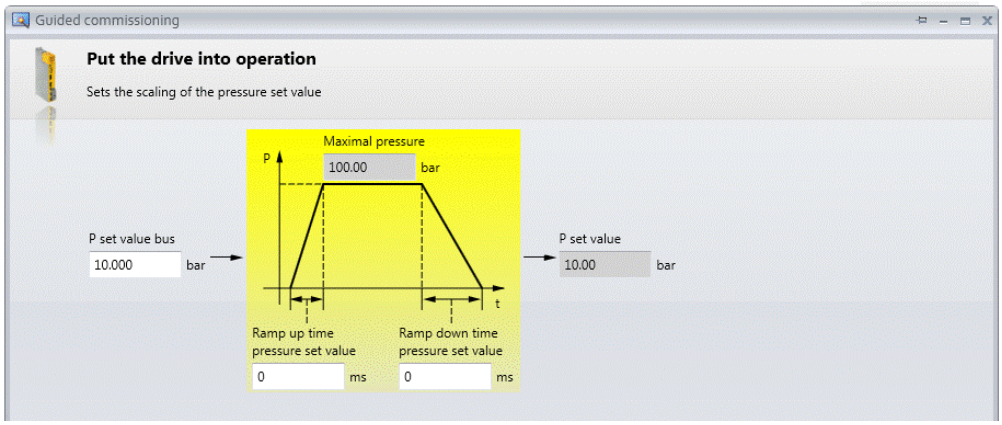


Figure 60: Guided commissioning: Scaling pressure set value

- Click on „**Continue**“

If you have set either „**field bus with standard IO module**“ or „**field bus with SVP option module**“, continue reading ▹page 63◃.

4.3 Commissioning set /actual values via analog interface

- Set the scaling of the „**Volume set value**“.

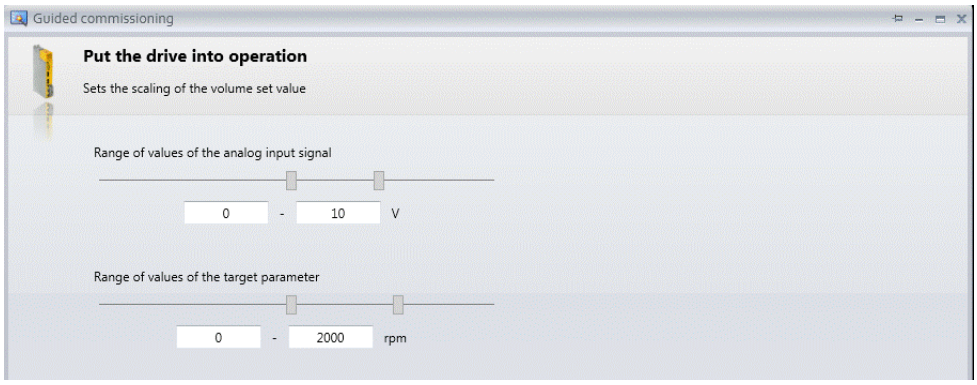


Figure 61: Guided commissioning: Scaling pressure set value

- Click on „**Continue**“

Here you can check the previous made scaling settings for the „**Volume set value**“.

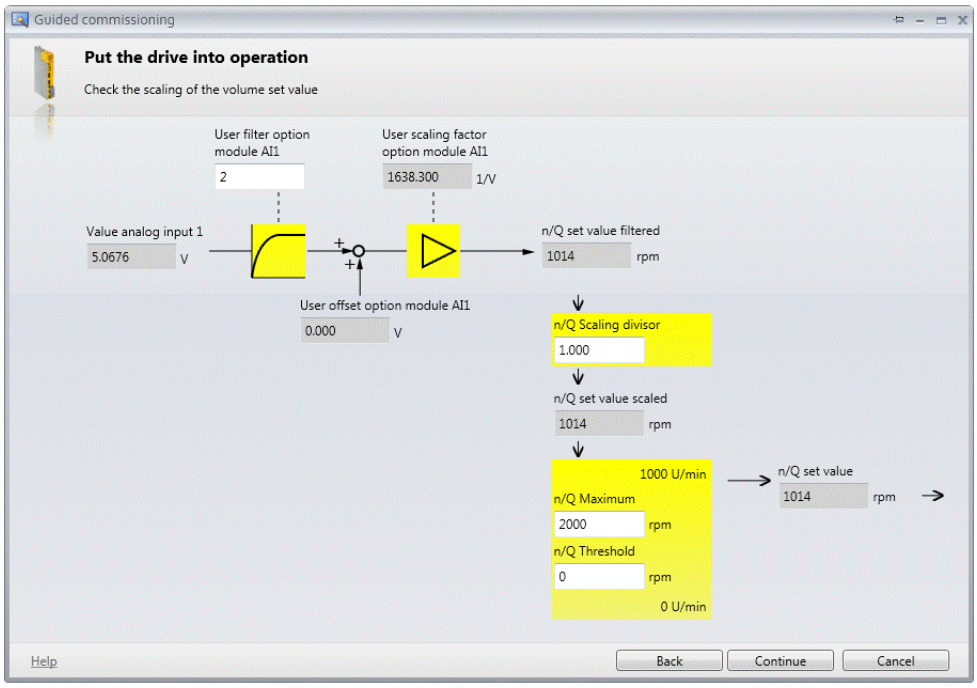


Figure 62: Guided commissioning: Check volume set scaling

- Click on „**Continue**“

- Set the scaling of the „**Pressure set value**“.

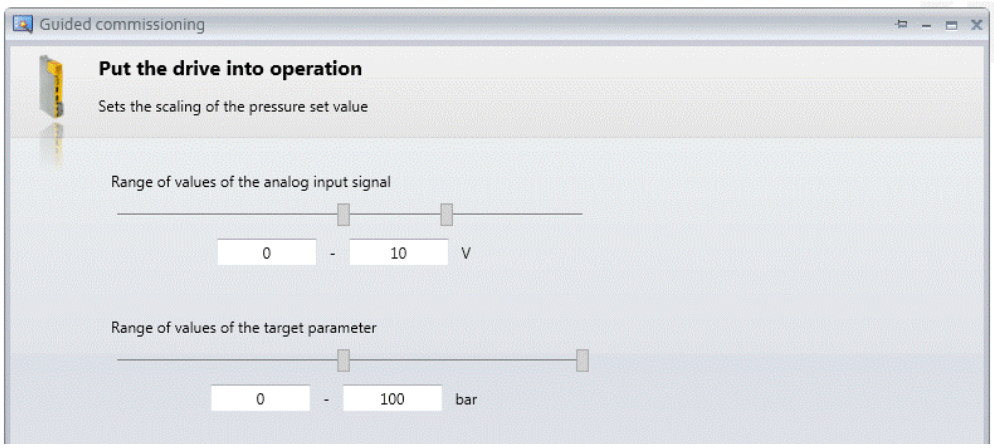


Figure 63: Guided commissioning: Scaling pressure set value

- Click on „**Continue**“

- Here you can check the previous made scaling settings for the „**Pressure set value**“.

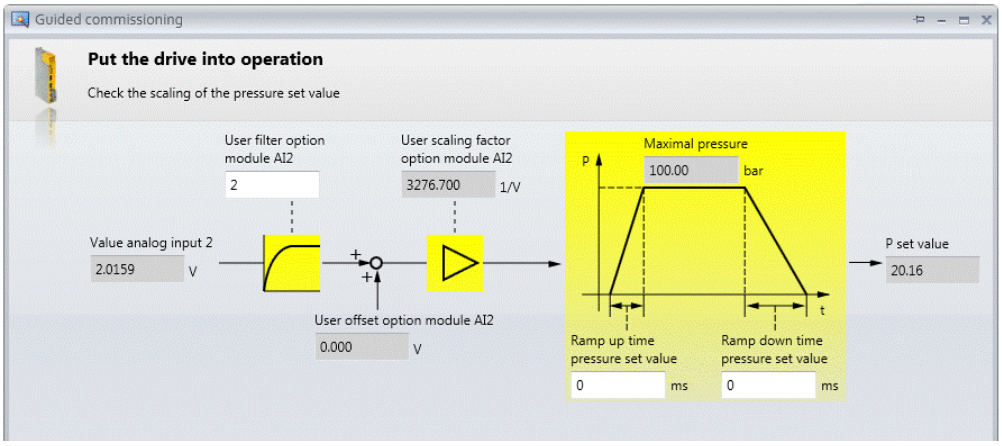


Figure 64: Guided commissioning: Check scaling pressure set value

- Click on „**Continue**“

4.4 Setting the pressure sensor inputs

- Select the input on which the pressure Sensor is connected to.

Sensor input 1 with SVP module:	SVP, analog input	3
Sensor input 1 without SVP module:	Standard IO X6, analog input	1
Sensor input 2 with SVP module:	SVP, analog input	4
Sensor input 2 without SVP module:	Standard IO X6, analog input	2

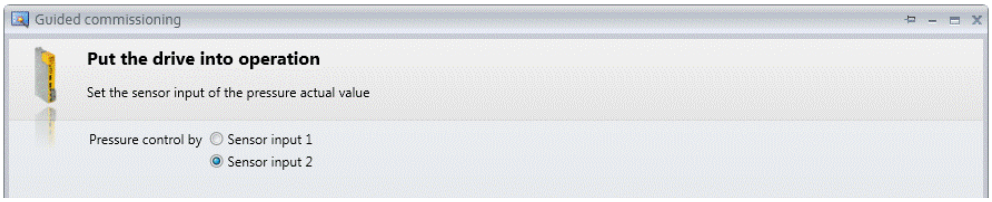


Figure 65: Guided commissioning: Sensor input

- Click on „**Continue**“

- Set the scaling of the „**Pressure actual value**“.

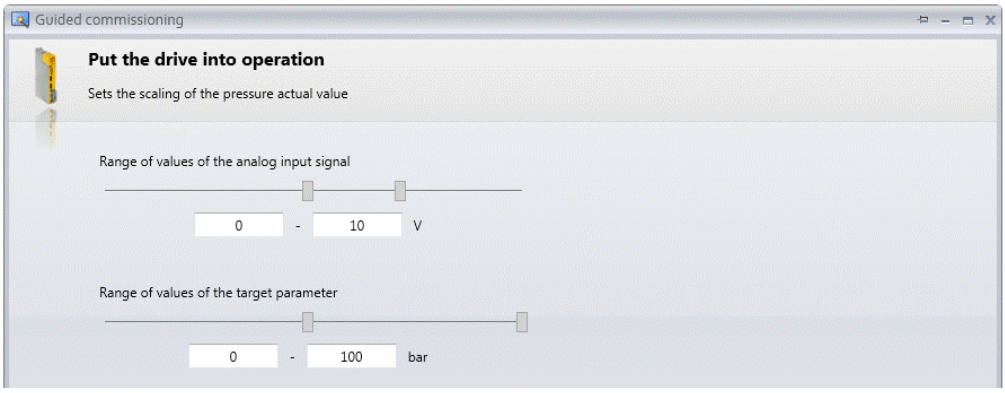


Figure 66: Guided commissioning: Scaling pressure actual value

- Click on „**Continue**“

- Check the scaling of the „**Pressure actual value**“.

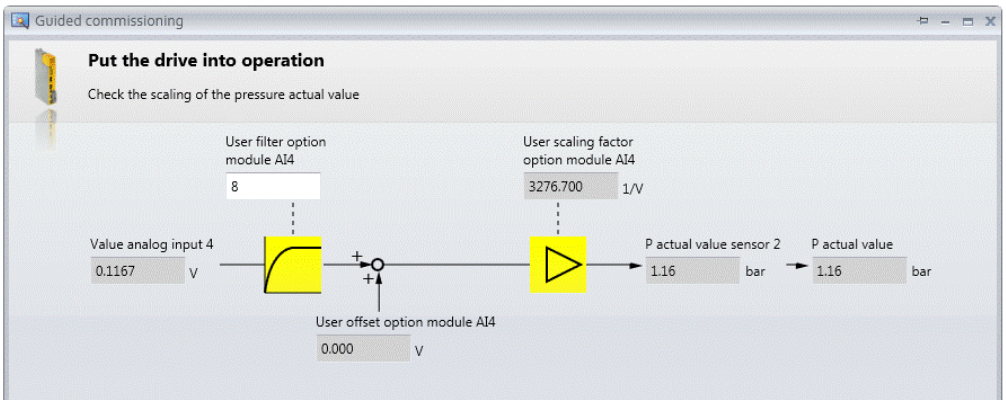


Figure 67: Guided commissioning: Check scaling pressure actual value

- Click on „**Continue**“

- Set the pressure control parameters between soft and hard for the Kp and Tn values.
- Download the data to the controller.

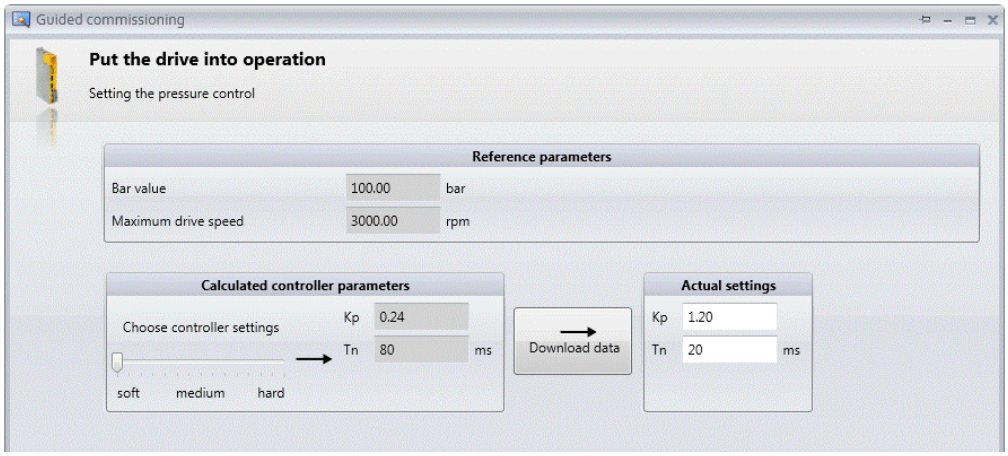


Figure 68: Guided commissioning: Setting the pressure control

- Click on „**Continue**“

- Only if necessary, activate the pump protection and set the pump protection values.

If the „**N/Q actual value**“ ▹P177.210◃ is greater than the threshold value ▹P177.167◃ AND if the „**P actual value**“ ▹P177.119◃ is smaller than the threshold value ▹P177.168◃, an error is generated after the set „**Recognition time**“ ▹P177.166◃ has elapsed.

Figure 69: Guided commissioning: Setting pump protection

- Click on „**Continue**“

- Click on reset operator's control.

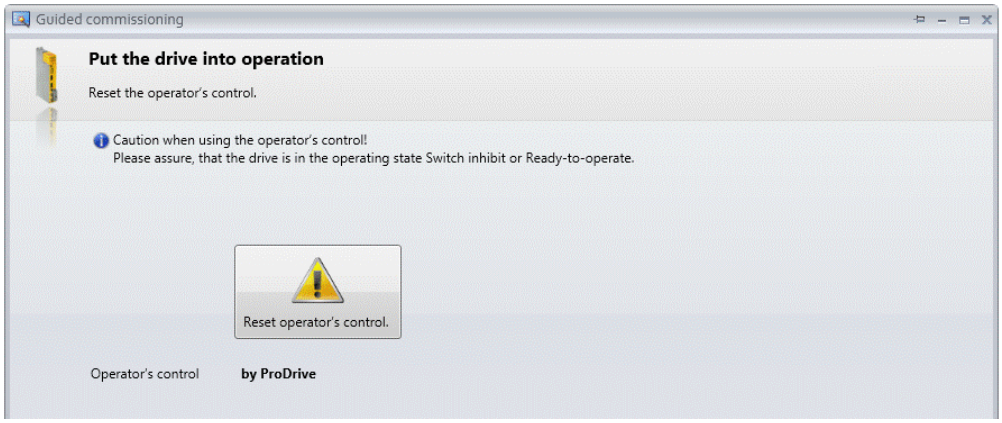


Figure 70: Guided commissioning: Operator control

- Click on „**Continue**“

- By clicking on „**Save all**“ you can now save your settings in the Flash.
- By clicking on „**Upload“** you are able to save all your settings on a local computer.

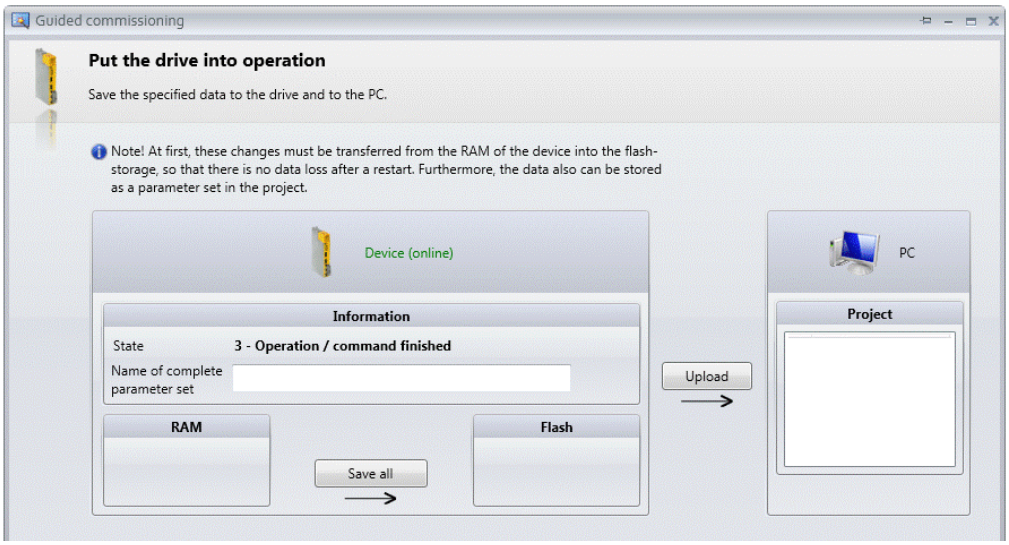
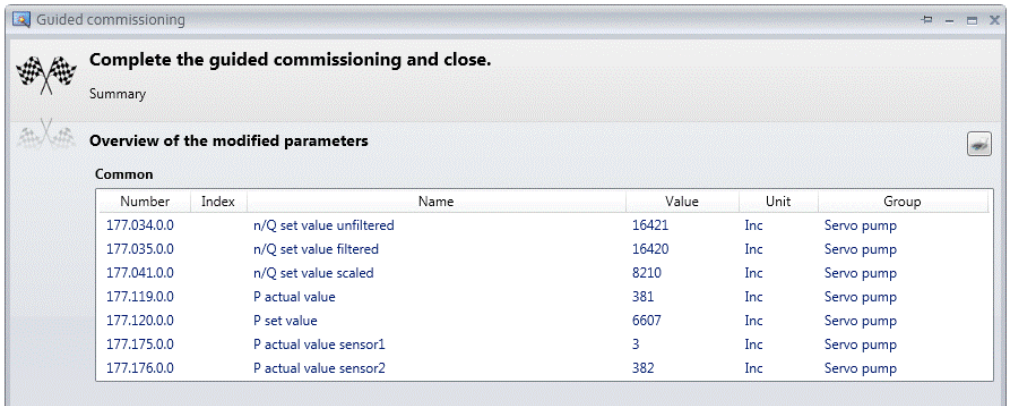


Figure 71: Guided commissioning: Save data

- Click on „**Continue**“

An overview of all modified parameters is displayed.



Number	Index	Name	Value	Unit	Group
177.034.0.0		n/Q set value unfiltered	16421	Inc	Servo pump
177.035.0.0		n/Q set value filtered	16420	Inc	Servo pump
177.041.0.0		n/Q set value scaled	8210	Inc	Servo pump
177.119.0.0		P actual value	381	Inc	Servo pump
177.120.0.0		P set value	6607	Inc	Servo pump
177.175.0.0		P actual value sensor1	3	Inc	Servo pump
177.176.0.0		P actual value sensor2	382	Inc	Servo pump

Figure 72: Guided commissioning: Summary

- Click on „**Finish**“

The servo pump should now be generally functional.

5

ERROR MESSAGES

The following table shows all Servo pump related errors with the Code, RC value, reaction and description:

Code	RC	Description
1200	RC_INCOMPATUBLE_PLC_PRJ	Firmware and PLC project versions does not match.
1201	RC_WIRE_BRAKE	Sensor wire brake occurred.
1202	RC_PUMP_PROTECTION	Missing oil flow.

6

PARAMETERS

In this chapter we describe the parameters which are available, sorted by numbers.

WARNING!

Danger from modification of the parameter settings!

The danger is: **mechanical and electrical danger**

- The change of parameters affects the behavior of the Baumüller-unit and consequently the behavior of the construction and its components. If you change the adjustments of the parameters, you may cause a dangerous behavior of the construction and/or of its components.
- After each modification of the parameter settings, a commissioning with consideration to all safety instructions and safety regulations must be executed.

NOTE

Parameters, which are perhaps signaled by the drive, but are not specified, are not supported. The use of this parameter can lead to undefined behavior of the drive.

6.1 Structure of the parameters

Every parameter has

- a name,
- an unique number,
- a data type,
- and fixed attributes or characteristics.

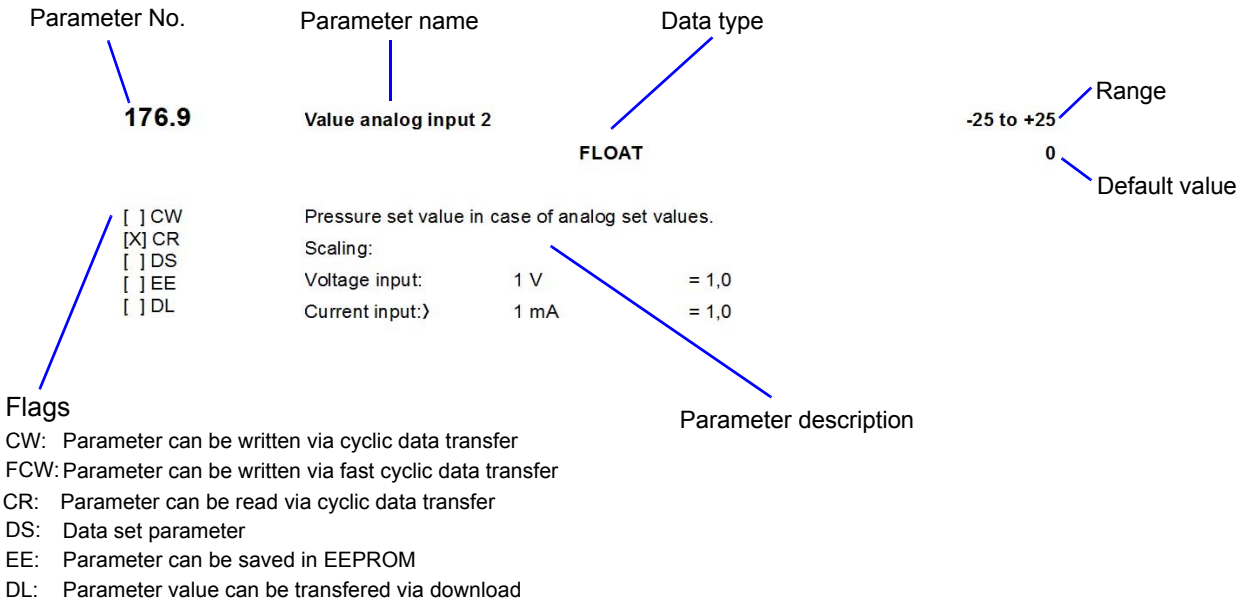


Figure 73: Structure of parameters

6.2 Reserved bits

In the description of parameters, especially in mode parameters and status parameters, some bits are identified as reserved. In future additions the bits may have a meaning. The following is applicable to these reserved bits.

- In setting parameters these bits may not be changed.
- In status parameters these bits do not have to be assessed.

6.3 Parameter description

176.1 Mode

0x00000000 to 0xFFFFFFFF

DWORD **0x00000000**

[ ] CW
[X] CR
[ ] DS
[ ] EE
[X] DL

Activation of the analog input and output channels of the SVP module:

Bit	Meaning
0	1: Switch on channel analog input 1 0: Switch off channel analog input 1
1	1: Switch on channel analog input 2 0: Switch off channel analog input 2
2	1: Switch on channel analog input 3 0: Switch off channel analog input 3
3	1: Switch on channel analog input 4 0: Switch off channel analog input 4
4 … 7	Reserved
8	1: Switch on channel analog output 1 0: Switch off channel analog output 1
9	1: Switch on channel analog output 2 0: Switch off channel analog output 2
10	1: Switch on channel analog output 3 0: Switch off channel analog output 3
11	1: Switch on channel analog output 4 0: Switch off channel analog output 4
12 … 31	Reserved

176.2 Mode analog inputs

0x00000000 to 0xFFFFFFFF

DWORD **0x00000000**

[ ] CW
[X] CR
[ ] DS
[ ] EE
[X] DL

Configuration of the analog inputs

Bit	Meaning
	Bit 0 … 23: Oversampling Oversampling factor: 0 … 8
3 … 0	Oversampling factor analog input 1
7 … 4	Oversampling factor analog input 2
11 … 8	Oversampling factor analog input 3
15 … 12	Oversampling factor analog input 4
16 … 23	Reserved
	Only if the relevant analog input is a current input: Bit 24 … 27: Current input range 0: 0 … 20 mA (⇒ no wire break detection) 1: 4 … 20 mA (⇒ wire break detection active)
24	Analog input 1
25	Analog input 2
26	Analog input 3
27	Analog input 4
28 … 31	Reserved

176.6 Status digital inputs

0x0000 to 0xFFFF

WORD **0x0000**

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Status of the digital inputs of the SVP module.

Bit	Meaning
0	Status digital input 1: 0: Disabled 1: Active
1	Status digital input 2: 0: Disabled 1: Active
2	Status digital input 3: 0: Disabled 1: Active
3	Status digital input 4: 0: Disabled 1: Active
4 … 15	Reserved

176.7 Status digital outputs

0x0000 to 0xFFFF

WORD **0x0000**

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Status of the digital outputs of the SVP module.

Bit	Meaning
0	Status digital output 1: 0: Disabled 1: Active
1	Status digital output 2: 0: Disabled 1: Active
2	Status digital output 3: 0: Disabled 1: Active
3	Status digital output 4: 0: Disabled 1: Active
4 … 15	Reserved

The digital outputs of SVP module are fixed assigned:

Output 1: Active ⇔ 24 V ⇔ Drive enabled

Output 2: Active ⇔ 24 V ⇔ No error message on the drive

Output 3: Active ⇔ 24 V ⇔ Motor temperature warning threshold 1 exceeded

176.8 Value analog input 1

-25 to +25

FLOAT

0

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Volume set value in case of analog set values.

Scaling: Voltage input: 1 V ≙ 1.0
Current input: 1 mA ≙ 1.0

176.9 Value analog input 2

-25 to +25

FLOAT

0

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Pressure set value in case of analog set values.

Scaling: Voltage input: 1 V ≙ 1.0
Current input: 1 mA ≙ 1.0

176.10 Value analog input 3

-25 to +25

FLOAT

0

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Sensor 1 pressure actual value from SVP module.

Scaling: Voltage input: 1 V ≙ 1.0
Current input: 1 mA ≙ 1.0

176.11 Value analog input 4

-25 to +25

FLOAT

0

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Sensor 2 pressure actual value from SVP module.

Scaling: Voltage input: 1 V ≙ 1.0
Current input: 1 mA ≙ 1.0

176.16 Value analog output 1

-11 V to +11 V

FLOAT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Analog output 1 of SVP module is fixed assigned to pressure actual value (▹P177.119◃).

Scaling: 10 V ≙ Maximum pressure (▹P177.6◃)

176.17 Value analog output 2

-11 V to +11 V

FLOAT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Analog output 2 of SVP module is fixed assigned to speed actual value (▹P18.22◃).

Scaling: 10 V ≙ Maximum speed of drive (▹P110.13◃)

176.18 Value analog output 3

-11 V to +11 V

FLOAT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Analog output 3 of SVP module is fixed assigned to Iq actual value (P47.3).

Scaling: 10 V ≙ Maximum drive current (▹P119.6◃)

176.19 Value analog output 4

-11 V to +11 V

FLOAT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Analog output 4 of SVP module is fixed assigned to motor temperature (▹P128.3◃).

Scaling: 10 V ≙ 0 °C - 200 °C

176.60 User scaling factor option module AI1

-1000000000.000 to 1000000000.000

FLOAT **1**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Scaling factor of the volume set value in case of analog set values using an SVP module.

176.61 User offset option module AI1

-25 to +25

FLOAT **0**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Offset of volume set value in case of analog set values using an SVP module.

176.62 User filter option module AI1

0 to 3000

INT **2**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Filter of volume set value in case of analog set values using an SVP module.

Scaling: 1 Inc ≙ 125 µs

176.63 User scaling factor option module AI2

-1000000000.000 to 1000000000.000

FLOAT **1**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Scaling factor of volume set value in case of analog set values using an SVP module.

176.64 User offset option module AI2

-25 to +25

FLOAT

0

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Offset of pressure set value in case of analog set values using an SVP module.

176.65 User filter option module AI2

0 to 3000

INT

2

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Filter of pressure set value in case of analog set values using an SVP module.

176.66 User scaling factor option module AI3

-1000000000.000 to 1000000000.000

FLOAT

1

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Scaling factor of pressure actual value sensor 1 using an SVP module.

176.67 User offset option module AI3

-25 to +25

FLOAT

0

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Offset of pressure actual value sensor 1 using an SVP module.

176.68 **User filter option module AI3** **0 to 3000**

INT **8**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Filter of pressure actual value sensor 1 using an SVP module.

176.69 **User scaling factor option module AI4** **-1000000000.000 to 1000000000.000**

FLOAT **1**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Scaling factor of pressure actual value sensor 2 using an SVP module.

176.70 **User offset option module AI4** **-25 to +25**

FLOAT **0**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Offset of pressure actual value sensor 2 using an SVP module.

176.71 **User filter option module AI4** **0 to 3000**

INT **8**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Filter of pressure actual value sensor 2 using an SVP module.

176.112 n/Q expected at P actual

0 to 2147483647

DINT **0**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Scaling: 1 Inc ≙ 1 U/min

Available in pump protection servo pump V2.1 and firmware version from 1.15.

176.113 n/Q warn threshold for P set 1

0 to 100

DINT **15**

[X] CW
[X] CR
[ ] DS
[X] EE
[X] DL

Warning threshold for P set 1 defines at which amount of deviation a warning is triggered.

Scaling: 1 Inc ≙ 1 %

Available in pump protection servo pump V2.1 and firmware version from 1.15.

176.114 n/Q warn threshold for P set 2

0 to 3000

DINT **25**

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

Warning threshold for P set 2 defines at which amount of deviation a warning is triggered.

Scaling: 1 Inc ≙ 1 %

Available in pump protection servo pump V2.1 and firmware version from 1.15.

177.2 Status word

0x00000000 to 0xFFFFFFFF

DWORD **0x00000000**

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Status word of servo pump.

Bit	Meaning
0	α state 0: α down is active 1: α up is active
1 ... 5	Reserved
6	Slip speed determination 0: Not found 1: Found and stored
7 ... 10	Reserved
11	FW Initialization finished

Bit	Meaning		
12	PLC initialization finished		
13	Pump protection	0: No error	1: Error
14	Checking the firmware:	0: Correct Firmware	1: Wrong Firmware
15	Wire break detection:	0: No error	1: Wire break error
16 ... 23	Reserved		
24	SVP module recognition:	0: Error	1: No error
25	SVP module found:	0: Not found	1: Found
26	Option/add-on module:	0: Correct	1: Wrong
27	Reserved		
28	No option/add-on module found, checking: 0: Not done	1: Done	
29	No option/add-on module found, checking: 0: Not in progress	1: In progress	
30 ... 31	Reserved		

177.3 Controlword 1

0x0000 to 0xFFFF

WORD **0x318**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Control word 1 of servo pump function.

Bit	Meaning
0	Reserved
1	Pump efficiency compensation 0: Compensation switched off 1: Compensation switched on
2	Reserved
3	Volume value is set to the RFG input This bit must always be activated
4	Invertation of RFG Input in slave mode 0: RFG input is inverted 1: RFG input is not inverted
5	Speed clamping to 0 rpm below pressure threshold 0: while positive and negative speed 1: only while positive speed
6	Reserved
7	Switching pressure sensor 0: Sensor 2 (input 2 standard IO X6 / input 4 SVP module) 1: Sensor 1 (input 1 standard IO X6 / Input 3 SVP module)

Bit	Meaning
8 ... 9	Interface set and actual values 00: Reserved 01: Set values via field bus, pressure actual value via SVP module 10: Set values via field bus, pressure actual value via standard IO X6 11: Set values and pressure actual value via SVP module
10	0: ProDrive assigns the BM3300/BM5000 standard analog inputs according to bits 8..9. 1: The BM3300/BM5000 standard analog inputs are not assigned by ProDrive (the inputs must be assigned by user manually).
11	0: dp/dt x 25 multiplication in adaptive pre-control OFF 1: dp/dt x 25 multiplication in adaptive pre-control ON
13	Version conflict between controller firmware and servo pump software 0: No version conflict 1: Version conflict detected
14	Display pressure in unit 0: Volt 1: Bar
15	Display volume in unit 0: rpm 1: liters/min

177.4 Controlword 2

0x0000 to 0xFFFF

WORD **0x623**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Control word 2 of servo pump function.

Bit	Meaning
0	1: α function is activated during pressure up
1	1: α function is activated during pressure down
2 ... 3	Reserved
3	1: Positive speed limit via DI2 is activated
4	1: Pump protection is activated
5	1: Dataset change is activated
6	Reserved
7	1: Idle function, minimum value for pressure and speed
8	1: Wire break monitoring for pressure sensor is activated
9 ... 10	Reserved
11	1: PID out PT1-filter and speed-acceleration-limit is activated
12	Reserved
13 ... 15	1: Initiate servo pump specific errors

177.5 Controlword 3

0x0000 to 0xFFFF

WORD **0x623**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Control word 3 of servo pump function.

Bit	Meaning
0	0: Master mode 1: Slave mode
1	1: Restart RFG when changing to pressure control
2	1: Activate adaptive pressure increase
3	Reserved
4	0: Adaptive pressure decrease in Idle is active
5	0: Adaptive pressure decrease is active
6	Reserved
7	Connecting actual values to the analogue SVP-Module outputs
8	Write actual q-value and actual p-value in mBar and ccm/min
9 ... 14	Reserved
15	1: Alpha ramp function active

177.6 Bar value

1 to 100000

DINT **25000**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Maximum pressure value of pressure sensor.

Scaling: 100000 Inc ≙ 1000 Bar

177.7 Volt value

1 to 100000

DINT **10000**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Maximum voltage/current output of pressure sensor.

Scaling: 10000 Inc ≙ 10 V / 20 mA

177.8 Flow rate

1 to 1000000

DINT

3200

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Maximum voltage/current output of pressure sensor.

Scaling: 3200 Inc ≙ 32.0 cm³/rev

177.17 Function Selection „A9“

0x0000 to 0xFFFF

WORD

0x0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Function selection of servo pump.

Bit	Meaning
0	1: Pressure control active
1	1: Overflow check of the pressure control I-component active
2	1: Automatic scaling of the SVP Module active
3 ... 7	Reserved
8	1: Disable negative speed-set-vales in slave mode
9 ... 31	Reserved

Available in pump protection servo pump V2+ and firmware version from 1.15.

177.20 P set value bus

0 to 2147483647

DINT

0

[X] FCW
[X] CR
[ ] DS
[X] EE
[X] DL

Pressure set value for field bus interface.

Scaling: 1 Inc ≙ 1 mBar

177.34 n/Q set value unfiltered

-32768 to 32767

DINT

0

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Input value of the volume set value.
Display in ProDrive depending on the settings of page „Servo pump - general“ in rpm or in l/min.
Scaling: 16383 Inc ≙ Maximum drive speed (▹P110.13◃)

177.35 n/Q set value filtered

DINT

-32768 to 32767

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Input value of the volume set value.
Display in ProDrive depending on the settings of page „Servo pump - general“ in rpm or in l/min.
Scaling: 16383 Inc ≙ Maximum drive speed (▹P110.13◃)

177.38 n/Q Threshold

0 to 16383

DINT

0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

As from this threshold the input value starts to function.
Display in ProDrive depending on the settings of page „Servo pump - general“ in rpm or in l/min.
Scaling: 16383 Inc ≙ Maximum drive speed (▹P110.13◃)

177.39 n/Q Maximum

0 to 16383

INT

16383

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Upper limit in order to reach the maximum speed.
Display in ProDrive depending on the settings of page „Servo pump - general“ in rpm or in l/min.
Scaling: 16383 Inc ≙ Maximum drive speed (▹P110.13◃)

177.40 n/Q scaling divisor

1 to 16383

INT **1000**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Scaling divisor for „n/Q set value scaled“ (▹P177.41◃).
When scaling ensure that in case of max. volume set value default ▹P177.41◃ does not exceed the maximum drive speed.

Scaling: 1000:1

177.41 n/Q set value scaled

-32768 to +32767

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Set volume value according to the scaling divisor parameter ▹P177.40◃.
Display in ProDrive depending on the settings on page „Servo pump - general“ in rpm or in l/min.

Scaling: 32767 Inc ≙ 2 * Maximum drive speed (P110.13)

177.42 n/Q set value bus

-2147483648 to +2147483647

DINT **0**

[X] FCW
[X] CR
[ ] DS
[X] EE
[X] DL

Set volume value from a field bus chart.

Scaling: 1 Inc ≙ 1 ml/min

177.44 n/Q set value idle

0 to +16383

DINT **273**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Speed set value for the idle mode in rpm.

Scaling: 16383 Inc ≙ Maximum drive speed (▹P110.13◃)

177.45 Down time idle

0 to +6553

DINT

500

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Time for n/Q decrease from 100 % to 0 % in idle mode.

Scaling: 1 Inc ≙ 1 ms

177.46 Down time master

0 to +6553

DINT

15

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Time for n/Q decrease from 100 % to 0 % in master mode.

Scaling: 1 Inc ≙ 1 ms

177.47 Down time slave

0 to +6553

DINT

0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Time for n/Q decrease from 100 % to 0 % in slave mode.

Scaling: 1 Inc ≙ 1 ms

177.48 Up time master

0 to +6553

DINT

50

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Time for n/Q increase from 0 % to 100 % in master mode.

Scaling: 1 Inc ≙ 1 ms

177.49 Up time slave

0 to +6553

DINT

0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Time for n/Q increase from 0 % to 100 % in slave mode.

Scaling: 1 Inc ≙ 1 ms

177.50 P step size

6 to +6553

DINT

131

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Step size for pressure decrease at activation of idle mode.

Scaling: 6553 Inc ≙ $^1/_5$ * ▹P177.6◃

177.51 P start value for ramp start

0 to +32767

DINT

1311

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Start value for ramp start at activation of idle mode.

Scaling: 32767 Inc ≙ ▹P177.6◃

177.52 P threshold start idle

0 to +32767

DINT

786

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Defines the pressure start value at activation of idle mode.

Scaling: 32767 Inc ≙ ▹P177.6◃

177.53 P set value idle

0 to +32767

DINT

655

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Defines the end pressure value for idle mode. This set value remains constant after reaching.

Scaling: 32767 Inc ≙ ▹P177.6◃

177.55 n/Q threshold start idle

0 to +16383

DINT

273

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Defines the actual n/Q speed at activation of idle mode.

Scaling: 16383 Inc ≙ Maximum drive speed (▹P110.13◃)

177.56 P compare value for ramp start

0 to +32767

DINT

1311

Scaling: 32767 Inc ≙ ▹P177.6◃

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

177.58 Idle active

0 to 1

UINT

0

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Indicates the idle status whether it is active or not:

1: Active 0: Inactive

177.60 Integral action time min

0 to 1000

UINT

0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Minimum integral action time in ms of pressure controller.

Scaling: 1 Inc ≙ 1 ms

177.61 Integral action time max

0 to 1000

UINT

500

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Maximum integral action time in ms of pressure controller.

Scaling: 1 Inc ≙ 1 ms

177.62 Integral action time nominal

0 to 1000

UINT

20

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Calculated integral action time of pressure controller, range between ▹P177.60◃ and ▹P177.61◃.

Scaling: 1 Inc ≙ 125 ms

177.63 Q/P controller integral-action time

0 to 1000

UINT

0

[ ] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Display of the calculated value of integral action time.

Scaling: 1 Inc ≙ 1 ms

177.103 Alpha falling output

-2147483684 to 2147483684

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

The output value of α in falling state.

177.104 Alpha rising output

-2147483684 to 2147483684

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

The output value of α in rising state.

177.106 Alpha rising output

-2147483684 to 2147483684

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

The main output of α transmitted to the controller.

177.108 Alpha down start value

100 to 16000

DINT **250**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

The start value (offset) for the α at down state.

177.109 Alpha up start value

100 to 16000

DINT **2000**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

The start value (offset) for the α at up state.

177.110 Alpha down gradient

50 to 600

DINT **150**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

The gradient of the α function from 0 to 100 % in down state.
The parameter defines the steepness.

177.111 Alpha up gradient

50 to 600

DINT **150**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

The gradient of the α function from 0 to 100 % in up state.
The parameter defines the steepness.

177.112 Alpha falling limit calculated

-2147483684 to +2147483684

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

The calculated limit value for falling state. It is the maximum value of the α function.

177.113 Alpha rising limit calculated

-2147483684 to +2147483684

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

The calculated limit value for rising state. It is the minimum value of the α function.

177.119 P actual value

-32768 to +32767

INT **0**

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Actual pressure value for PI pressure controller.

Depending on the active sensor for pressure control (compare bit 7 in ▹P177.3◃), „P actual value“ is written by „P actual value sensor 1“or „P actual value sensor 2“.

Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.120 P set value

-32768 to +32767

INT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Set pressure value for PI pressure controller

Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.122 P-gain

0 to 65535

UINT **120**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

P-Gain value of PI pressure controller

Scaling: 100:1

177.125 Integral part PI controller

-2147483648 to +2147483647

DINT

0

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Integral part of PI pressure controller

Scaling: 1073741823 Inc ≙ Maximum drive speed (▹P110.13◃)

177.144 P set value minimum

0 to 32767

INT

655

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Limit for pressure set value.
If actual pressure is smaller than „P act value minimum“ and set pressure is smaller than „P set value minimum“ then speed set value is set to 0.

Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.145 P act value minimum

0 to 32767

INT

655

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Limit for pressure actual value.
If actual pressure is smaller than „P act value minimum“ and set pressure is smaller than „P set value minimum“ then speed set value is set to 0.

Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.148 Filter order for F4

0 to 1000

DINT

10

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Defines the order of filter for slip speed determination.

Available in pump protection servo pump V2.1 and firmware version from 1.15.

177.150 P set value 1

0 to 32767

DINT **16383**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Defines the pressure value for slip speed determination.

Available in pump protection servo pump V2.1 and firmware version from 1.15.

177.151 P set value 2

0 to 32767

DINT **1638**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Defines the pressure value for slip speed determination.

Available in pump protection servo pump V2.1 and firmware version from 1.15.

177.152 P fluctuation range

0 to 1311

INT **262**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Available in pump protection servo pump V2.1 and firmware version from 1.15.

177.158 Waiting time for P set value 1

57 to 5714

INT **2286**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Waiting time for P set value 1.

Scaling: 1 Inc ≙ 1 ms

Available in pump protection servo pump V2.1 and firmware version from 1.15.

177.159 Waiting time for P set value 2

		57 to 5714
	INT	**2286**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Waiting time for P set value 2.

Available in pump protection servo pump V2.1 and firmware version from 1.15.

177.160 Wire break monitoring time constant

		0 to 65535
	INT	**10**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Time constant filter.

Scaling: 1 Inc ≙ 1 ms

177.161 Wire break monitoring rest waiting time

		0 to 65535
	INT	**0**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Time until wire break error is generated.

Scaling: 1 Inc ≙ 1 ms

177.162 Wire break monitoring P actual value filtered

		-65535 to +65535
	INT	**0**

[ ] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Filtered P actual value for wire break monitoring.

Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.163 Wire break monitoring P actual value threshold

0 to +6553
INT
393

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

The wire break monitoring starts recognition time ▹P177.164◃ at this threshold.

Scaling: 6553 ≙ $^1/_5$ * ▹P177.6◃

177.164 Wire break monitoring recognition time

0 to +6553
INT
393

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

▹P177.162◃ must be lower than ▹P177.161◃ for this time before a wire break is recognized and the wire break monitoring starts rest waiting time ▹P177.161◃. This parameter compensates possible signal distortion. The wire break error is generated when ▹P177.161◃ has elapsed.

Scaling: 6553 ≙ $^1/_5$ * ▹P177.6◃

177.165 Pump protection rest waiting time

0 to 65535
UDINT
0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Actual value for wait counter of pump protection functionality.

Scaling: 1 Inc ≙ 1 ms

177.166 Pump protection recognition time

100 to 10000
INT
1000

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Recognition time for wait counter of pump protection functionality.

Scaling: 1 Inc ≙ 1 ms

177.167 Pump protection n/Q recognition threshold

0 to 2147483647

DINT

17895697

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Speed threshold of pump protection functionality.

Scaling: 2147483647 Inc ≙ 2 * Maximum drive speed (▹P110.13◃)

177.168 Pump protection P actual value threshold

-32768 to +32767

DINT

655

[ ] CW
[X] CR
[X] DS
[X] EE
[X] DL

Actual pressure threshold of pump protection functionality.

Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.169 n/Q actual value inverted

0 to 4294967295

UDINT

0

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Absolute value of actual speed.

Scaling: 1073741823 Inc ≙ Max. drive speed (▹P110.13◃)

177.175 P actual value sensor 1

-32768 to +32767

INT

0

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Pressure actual value of sensor 1.
Hardware connection to input 1 of standard analog IO (connector X6) or input 3 of SVP module.
The active sensor of pressure control can be selected via bit 7 of control word SP 1 (▹P177.3◃).

Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.176 P actual value sensor 2

-32768 to +32767

INT

0

[ ] CW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Pressure actual value of sensor 2.
Hardware connection to input 2 of standard analog IO (connector X6) or input 4 of SVP module.
The active sensor of pressure control can be selected via bit 7 of control word SP 1 (▹P177.3◃).
Scaling: 32767 Inc ≙ ▹P177.6◃ or ▹P177.7◃

177.186 Kp for adaptive pressure increase

1 to 50

UINT

3

[X] CW
[X] CR
[X] DS
[X] EE
[X] DL

The gain value for the adaptive pressure increase.

177.206 Ramp up time pressure set value

0 to 4096

DINT

0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Ramp up time of set values for pressure ramp function generator.
The ramp up time is related to a change from 0 Bar to maximum pressure.
Scaling: 1 Inc ≙ 1 ms

177.207 Ramp down time pressure set value

0 to 4096

DINT

0

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

Ramp down time of set values for pressure ramp function generator.
The ramp down time is related to a change from maximum pressure to 0 Bar.

177.210 Speed actual value

-2147483648 to +2147483647

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

The actual speed of the drive.

Scaling: 1073741823 Inc ≙ Max. drive speed (▹P110.13◃)

177.214 Speed set value positive limit

-1073741824 to 1073741823

DINT **1073741823**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

This parameter overwrites P18.71 „Speed set value positive limit“.

Scaling: 1073741823 Inc ≙ Max. drive speed (▹P110.13◃)

177.215 Speed set value negative limit

-1073741824 to 1073741823

DINT **-1073741824**

[X] FCW
[X] CR
[X] DS
[X] EE
[X] DL

This parameter overwrites P18.72 „Speed set value negative limit“.

Scaling: 1073741823 Inc ≙ Max. drive speed (▹P110.13◃)

177.218 Ramp function input

-16384 to +16383

DINT **0**

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

n/Q set value ramp function generator.

Scaling: 16384 Inc ≙ Motor maximum speed

177.228 Active data set

1 to 7

UINT

1

[X] FCW
[X] CR
[ ] DS
[ ] EE
[ ] DL

Parameter for dataset switching. This parameter can be cyclically written via field bus.

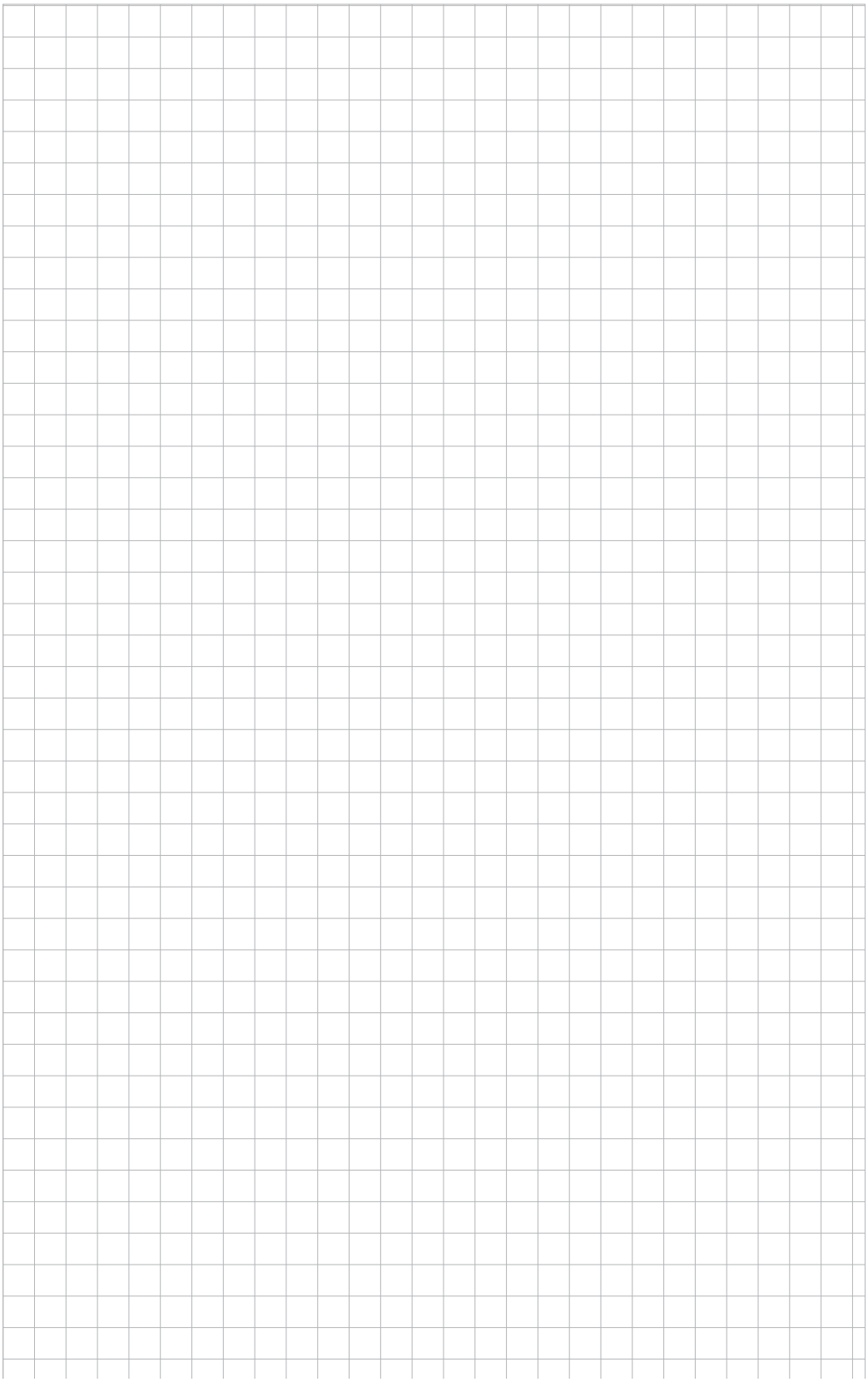
Table of Figures

Table of Figures

Revision Survey

Version	Status	Changes
5.17016.01	2-May-2018	First edition Servo pump V2
5.17016.03	31-May-2021	Revision

Notes



be in motion

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