WEST

Technical Documentation

PQP-176-P-PFN

Universal pump control module with integrated power stage and Profinet interface

Electronics
Hydraulics meets
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CONTENTS

1 General Information

1.1 Order number

PQP-176-P-PFN	pump control module for cascade regulation in the open hydraulic circuit with analogue control output and integrated power stage and ProfinetIO interface

Alternative products:

PQP-176-P	pump control module for cascade regulation in the open hydraulic circuit with analogue control output, integrated power stage and analogue setpoint inputs

1.2 Scope of supply

The scope of supply includes the module plus the terminal blocks which are part of the housing.
The Profibus plug, interface cables and further parts which may be required should be ordered separately.
This documentation can be downloaded as a PDF file from www.w-e-st.de.

1.3 Accessories

WPC-300 - Start-Up-Tool (downloadable from our homepage – products/software)

Any standard cable with USB-A and USB-B connector can be used as the programming cable.

1.4 Symbols used

General information

Safety-related information

1.5 Legal notice

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Date: 08.01.2025

1.6 Safety instructions

Please read this document and the safety instructions carefully. This document will help to define the product area of application and to put it into operation. Additional documents (WPC-300 for the start-up software) and knowledge of the application should be taken into account or be available.
General regulations and laws (depending on the country: e. g. accident prevention and environmental protection) must be complied with.

These modules are designed for hydraulic applications in open or closed-loop control circuits. Uncontrolled movements can be caused by device defects (in the hydraulic module or the components), application errors and electrical faults. Work on the drive or the electronics must only be carried out whilst the equipment is switched off and not under pressure.

This handbook describes the functions and the electrical connections for this electronic assembly. All technical documents which pertain to the system must be complied with when commissioning.

This device may only be connected and put into operation by trained specialist staff. The instruction manual must be read with care. The installation instructions and the commissioning instructions must be followed. Guarantee and liability claims are invalid if the instructions are not complied with and/or in case of incorrect installation or inappropriate use.

CAUTION!
All electronic modules are manufactured to a high quality. Malfunctions due to the failure of components cannot, however, be excluded. Despite extensive testing the same also applies for the software. If these devices are deployed in safety-relevant applications, suitable external measures must be taken to guarantee the necessary safety. The same applies for faults which affect safety. No liability can be assumed for possible damage.

Further instructions

- The module may only be operated in compliance with the national EMC regulations. It is the user's responsibility to adhere to these regulations.
- The device is only intended for use in the commercial sector.
- When not in use the module must be protected from the effects of the weather, contamination and mechanical damage.
- The module may not be used in an explosive environment.
- To ensure adequate cooling the ventilation slots must not be covered.
- The device must be disposed of in accordance with national statutory provisions.

2 Characteristics

This device represents a pump controller for the displacement, pressure and power/torque control of servo pumps. The demands are given via ProfinetIO. Actual values and status information are read back via this connection.

The module can control a directional valve for swivel angle adjustment of the pump with one or two solenoids. For controlling valves with integrated electronic the power stage can be deactivated.

Control structure is a cascade regulation which makes it universal for using with many different pumps of several producers. Negative swiveling for active pressure reducing (mooring mode) can also parameterized.

Miscellaneous parameters allow an optimal adaption to the relating application.

The feedback values can be read in as voltage or current signals in the range of 0… 10 V respectively 4… 20 mA. The inputs are scalable for adapting individual signal ranges. When using current signals the inputs are cable break monitored. For the swivel angle sensor also voltage signals can be monitored.

The output current is closed loop controlled and therefore independent from the supply voltage and a varying solenoid resistance. The output stage includes a broken wire detection and switches off in case of a detected error.

Because of the easy and job-oriented handling a very short training period is guaranteed.

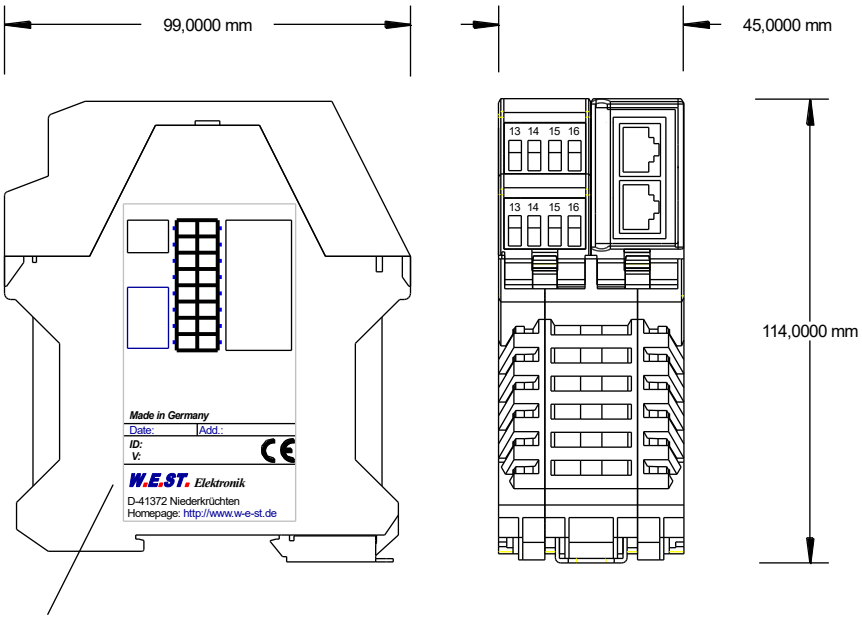
The fieldbus interface provides a continuous monitoring of actual values and operating states.

Typical applications: Swivel angle control, pressure control and power limitation control.

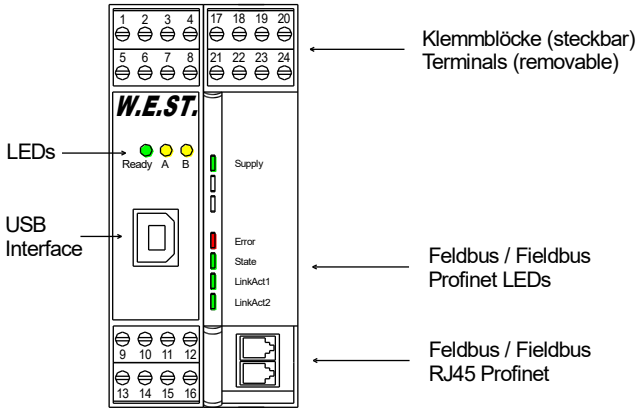
Features

- **Displacement, pressure and power limitation control**
- **Digital reproducible adjustments**
- **Two input channels for the actual pressure value, switchover via bus command possible**
- **Compact housing**
- **Optimized control function**
- **Application oriented parameterizing**
- **Two parameter sets for the pressure controller**
- **Controlling and monitoring via fieldbus**
- **Integrated power stage**
- **Alternative analogue output for controlling valves with OBE**
- **Fault diagnosis and extended function checking**
- **Simplified parameterization with WPC-300 software**

2.1 Device description



Typenschild und Anschlussbelegung
Type plate and terminal pin assignment



3 Use and application

3.1 Installation instructions

- This module is designed for installation in a shielded EMC housing (control cabinet). All cables which lead outside must be screened; complete screening is required. It is also necessary to avoid strong electro-magnetic interference sources being installed nearby when using our open and closed loop control modules.

- **Typical installation location:** 24 V control signal area (close to PLC)
  The devices must be arranged in the control cabinet so that the power section and the signal section are separate from each other.
  Experience shows that the installation place close to the PLC (24 V area) is most suitable. All digital and analogue inputs and outputs are fitted with filters and surge absorbers in the device.

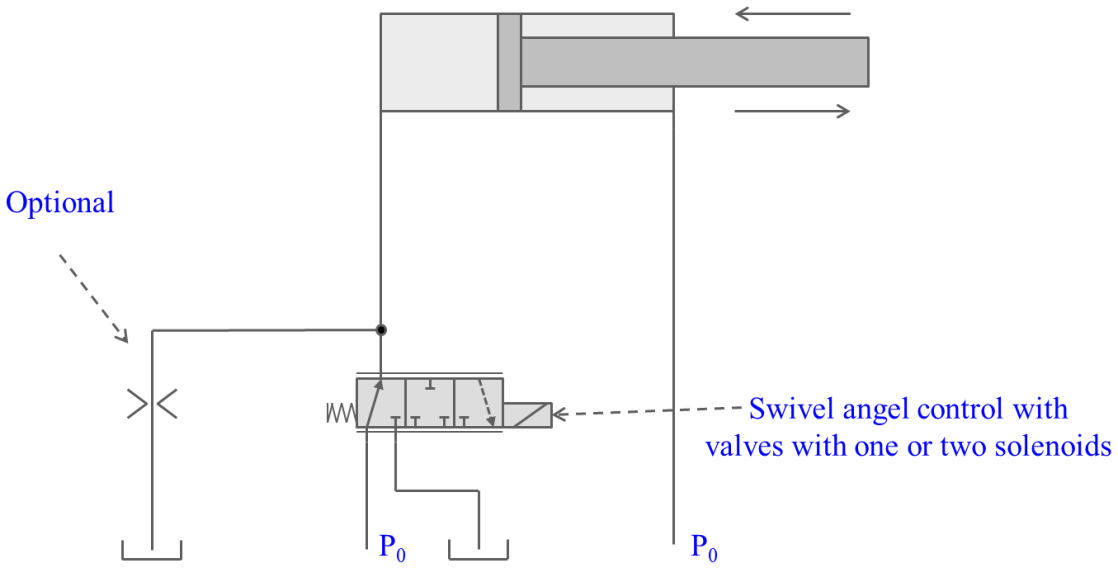
- The module should be installed and wired in accordance with the documentation bearing in mind EMC principles. If other consumers are operated with the same power supply, a star-shaped ground wiring scheme is recommended. The following points must be observed when wiring:
  - The signal cables must be laid separately from power cables.
  - Analogue signal cables **must be screened**.
  - All other cables must be screened if there are powerful interference sources (frequency converters, power contactors) and cable lengths > 3 m. Inexpensive SMD ferrites can be used with high-frequency radiation.
  - The screening should be connected to PE (PE terminal) as close to the module as possible. The local requirements for screening must be taken into account in all cases. The screening should be connected to at both ends. Equipotential bonding must be provided where there are differences between the connected electrical components.
  - If having longer lengths of cable (> 10 m), the diameters and screening measures should be checked by specialists (e. g. for possible interference, noise sources and voltage drop). Special care is required if using cables of over 40 m in length, and if necessary the manufacturer should be consulted if necessary.

- A low-resistance connection between PE and the mounting rail should be provided. Transient interference is transmitted from the module directly to the mounting rail and from there to the local earth.
- Power should be supplied by a regulated power supply unit (typically a PELV system complying with IEC364-4-4, secure low voltage). The low internal resistance of regulated power supplies gives better interference voltage dissipation, which improves the signal quality of high-resolution sensors in particular. Switched inductances (relays and valve coils) which are connected to the same power supply must always be provided with appropriate overvoltage protection directly at the coil.

3.2 Method of operation

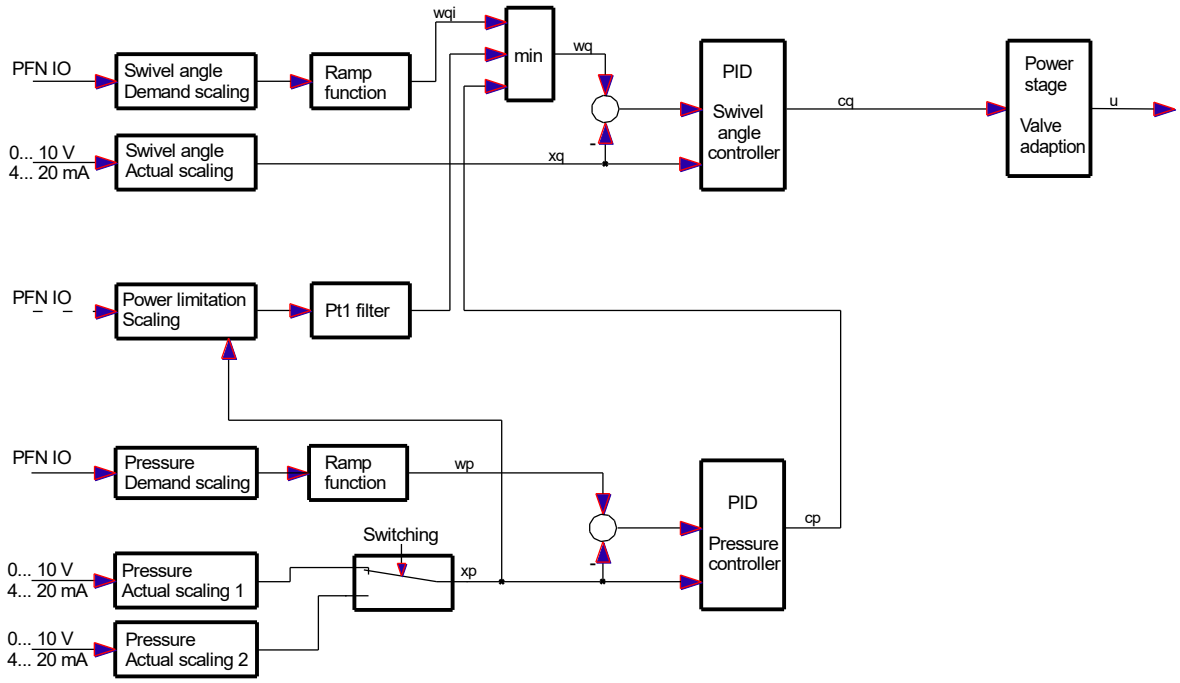
The device described here realizes a pump control by controlling its swivel angle valve. Similar to the movement of a cylinder in a positioning control the swivel angle can be controlled in order to reach the requested demand respective opening level. The external setpoint can be influenced by several parameters and functions. A volume flow correction factor can be added as well as a limitation function can come into action. The integrated power limitation function and the pressure controller, which can be activated and deactivated, can limit the swivel angle command value. If an active pressure reducing (mooring mode) is provided by the pump, the pressure controller can be released for the negative control range.

Because of its relative low mass the actuator has a high natural frequency. This results in the swivel angle valve determining the dynamic behavior predominantly. From this it follows that the quality of the control is depending on the quality and capacity of the valve.



3.3 Control structure

The control structure describes the common behavior of the system. The swivel angle demand value WQI can be limited by the power limitation or the pressure controller. So the lowest of the active signals will be taken over for the swivel angle controller. The pressure controller can also be parameterized for controlling negative swivel angle values to achieve an active pressure reduction (mooring mode).



The swivel angle feedback input can be set to 0… 10 V or 4… 20 mA whereby an inverting can be realized by the following scaling function.

3.4 Commissioning

Step	Task
Installation	Install the device in accordance with the circuit diagram. Ensure it is wired correctly and that the signals are well shielded. The device must be installed in a protective housing (control cabinet or similar).
Switching on for the first time	Ensure that no unwanted movement is possible in the drive (e. g. switch off the hydraulics). Connect an ammeter and check the current consumed by the device. If it is higher than specified, there is an error in the wiring. Switch the device off immediately and check the wiring.
Setting up communication	Once the power input is correct the PC (notebook) should be connected to the serial interface. Please see the WPC-300 program documentation for how to set up communication. The operating software supports further commissioning and diagnosis. Afterwards the fieldbus communication can be established. For defining the interface the relating GSDML file should be provided to the fieldbus master
Pre-parameterization	Parameterize now (with the help of the system dimensioning and the connection diagram) the following parameters: Output signal, valve adaption and scaling of the inputs. Pre-parameterization is necessary to minimize the risk of an unintentional movement / pressure. Please read up the required information or talk to the responsible persons.
Control signal	Check the control signal to the valve. At the current state it should be 0 mA, at the analogue output as well as the power stage.
Switching on the hydraulics	The hydraulics can now be switched on. The module is not yet generating a signal, means there should no (unwanted) reaction occur.
Activating ENABLE	**CAUTION!** With the ENABLE the output stage gets activated. Depending on the settings now the valve will be controlled. Wrong parameterization can cause uncontrolled behavior. *Swivel angle controller* and *power limitation controller* (if activate) are enabled now.
Activating PRESSURE CONTROLLER	With ENABLE_P the pressure controller gets activated. The system now works in closed loop control for the pressure control (PQ mode). **CAUTION!** Wrong parameterization can cause uncontrolled behavior.
Controller optimization	Now optimize the settings. The PID parameters have to be adapted depending on the application.

4 Technical description

4.1 Input and output signals

Connection	Supply
PIN 3	Power supply (see technical data).
PIN 4	0 V (GND) connection.
PIN 22	Power supply (see technical data) of the extended stage.
PIN 24	0 V (GND) connection of the extended stage.
Connection	**Analogue signals**
PIN 6	Feedback value swivel angle (XQ), signal range 0… 10 V or 4… 20 mA, scalable.
PIN 13	Feedback value 1 pressure (XP), signal range 0… 10 V or 4… 20 mA, scalable.
PIN 14	Feedback value 2 pressure (XP), signal range 0… 10 V or 4… 20 mA, scalable.
PIN 11	0 V (GND) reference potential for analogue input signals.
PIN 12	0 V (GND) reference potential for analogue output signals.
PIN 15	Control output (U) 0… 10 V or 4… 20 mA.
PIN 16	Control output (U) 0… 10 V.
Connection	**Digital inputs and outputs**
PIN 8	**ENABLE input:** Generally enabling of the application.
PIN 1	**READY output:** **ON:** The module is enabled; there are no discernable errors. **OFF:** ENABLE is not available or an error has been detected.
Connection	**Valve outputs**
PIN 17 / 19	Solenoid A
PIN 18 / 20	Solenoid B

4.2 LED definitions

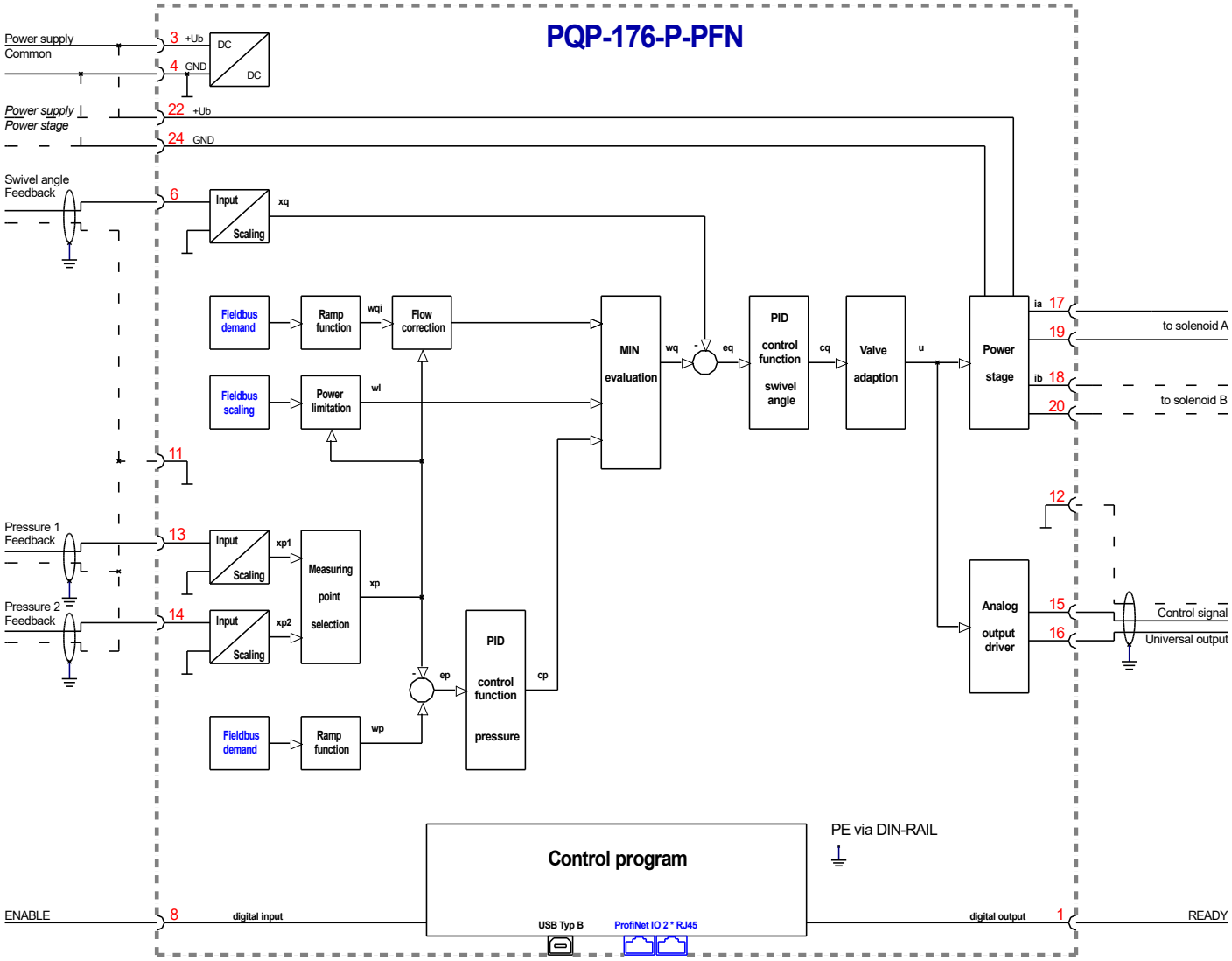
4.2.1 First section

LEDs	Description of the LED function
GREEN	Identical to the READY output. **OFF:** No power supply or ENABLE is not activated. **ON:** System is ready for operation. ***Flashing:*** Error discovered Not active if SENS = OFF.
YELLOW A	**OFF:** No active power limitation. **ON:** System is in power limitation.
YELLOW B	**OFF:** No active pressure limitation. **ON:** System is in pressure limitation.
	Error messages
GREEN + YELLOW	1. **Chasing light (over all LEDs):** The bootloader is active. No normal functions are possible. 2. **All LEDs flash shortly every 6 s:** An internal data error was detected and corrected automatically! The module still works regularly. To acknowledge the error the module has to be cycle powered.
YELLOW A + YELLOW B	**Both yellow LEDs flash oppositely every 1 s:** The nonvolatile stored parameters are inconsistent! To acknowledge the error, data has to be saved with the SAVE command or the corresponding button in the WPC.

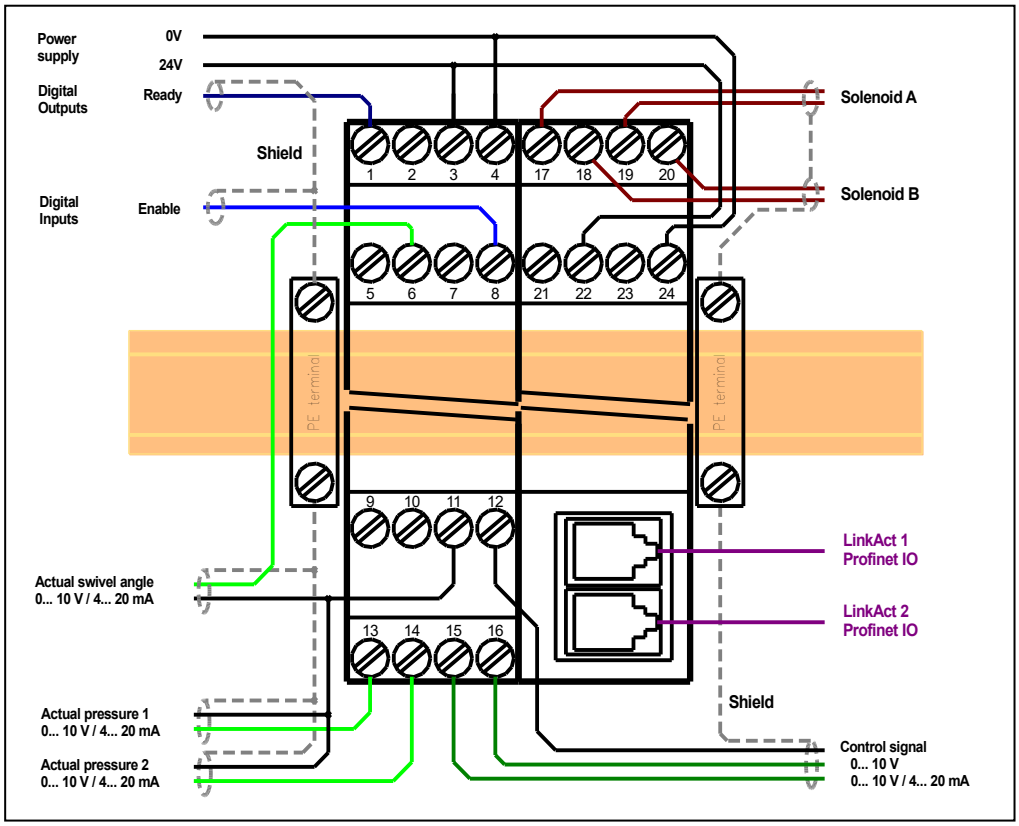
4.2.2 Overview fieldbus (2. section)

LEDs	Description of the LED functionality (device)
GREEN	Supply: **OFF:** No power supply for the fieldbus module. **ON:** 3.3 V system voltage is available.
LEDs	**Description of the LED functionality (fieldbus)**
RED	Error: **OFF:** No fieldbus error. **ON:** Error at the fieldbus communication. **FLASHING:** Participant flash test of the Profinet.
GREEN	State: **OFF:** Bus not started yet. **ON:** Connection established. **FLASH 2Hz:** Configuration mode (bus was started, waiting for connection). **FLASH 10Hz:** Error state.
GREEN	LinkAct1: **OFF:** No connection at port 1. **ON (Pulse):** Working network connected to port 1. **FLICKERING:** Data traffic with network at port 1.
GREEN	LinkAct2: **OFF:** No connection at port 2. **ON (Pulse):** Working network connected to port 2. **FLICKERING:** Data traffic with network at port 2.

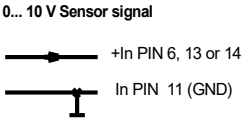
4.3 Circuit diagram

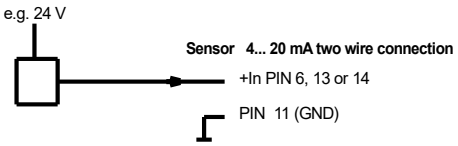


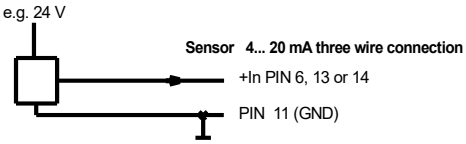
4.4 Typical wiring



4.5 Connection examples







4.6 Technical data

Supply voltage (Ub)	**[VDC]**	12… 30 (incl. ripple)
Power consumption	**[W]**	max. 1,2 + consumption of the connected coils
External protection	**[A]**	3 medium time lag
Digital inputs		
OFF	**[V]**	< 2
ON	**[V]**	> 10
Input resistance	**[kOhm]**	25
Digital outputs		
OFF	**[V]**	< 2
ON	**[V]**	max. Ub
Maximum current	**[mA]**	50
Analogue inputs		Unipolar / differential
Voltage	**[V]**	0… 10 / -10… 10
Input resistance	**[kOhm]**	min. 25
Signal resolution	**[%]**	0,003 incl. Oversampling
Current	**[mA]**	4… 20
Burden	**[Ohm]**	240
Signal resolution	**[%]**	0,006 incl. Oversampling
Analogue outputs		
Voltage	**[V]**	0… 10, +/- 10 differential
Maximum load	**[mA]**	10
Current	**[mA]**	4… 20
Maximum load	**[Ohm]**	390
Signal resolution	**[%]**	0,007
PWM output		Wire break and short circuit monitored
Max. output current	**[A]**	2,6
Frequency	**[Hz]**	60… 2941 selectable in defined steps
Controller cycle times		
Solenoid current control	**[µs]**	125
Signal processing	**[ms]**	1
Serial interface	**-**	USB - virtual COM Port
Transmission rate	**[kBaud]**	9,6… 115,2
Housing		Snap -on module acc. EN 50022
Material	**-**	PA 6.6 polyamide
Flammability class	**-**	V0 (UL94)
Weight	**[kg]**	0,34
Protection class	**[IP]**	20
Temperature range	**[°C]**	-20… 60
Storage temperature	**[°C]**	-20… 70
Humidity	**[%]**	< 95 (non-condensing)
Connections		
Communication	**-**	USB type B
Plug connectors		4 x 4-pole terminal blocks
PE		via the DIN mounting rail
EMC	**-**	EN 61000-6-2: 8/2005 EN 61000-6-4: 6/2007 + A1:2011

4.7 Parameter overview

Group	Command	Default	Unit	Description
	MODE	SYSTEM	-	Visible parameter group
Basic parameters				
	LG	EN	-	Selecting language
	SENS	ON	-	Malfunction monitoring
	PASSFB	0	-	Password for fieldbus parameterization
System configuration				
	CTRLOUT	2SOL	-	Configuration of the control output
	LIM:XQ	0	0.01 %	Cable break monitoring swivel angle feedback
Input signal adaption				
Pressure demand				
	SYS_RANGE	100	bar	Range of the system pressure demand value
	RAP:UP **RAP:DOWN**	100 100	ms ms	Ramp times pressure demand
Pressure feedback 1				
	SIGNAL:XP1	U0-10	-	Type of input signal
	N_RANGE:XP1	100	bar	Nominal pressure of the sensor
	OFFSET:XP1	0	mbar	Sensor Offset
Pressure feedback 2				
	SIGNAL:XP2	U0-10	-	Type of input signal
	N_RANGE:XP2	100	bar	Nominal pressure of the sensor
	OFFSET:XP2	0	mbar	Sensor offset
Swivel angle command				
	RAQ:UP **RAQ:DOWN**	100 100	ms ms	Ramp times for the swivel angle demand value
	CORR:Q	0	0.01 %	Volume flow correction factor
Swivel angle feedback				
	SIGNAL:XQ	U0-10	-	Type of input signal
	ZERO:XQ **MAX:XQ**	0 10000	0.01 % 0.01 %	Scaling swivel angle feedback signal

Group	Command	Default	Unit	Description
Control parameters				
Swivel angle				
	CQ:FF	5000	0.01 %	Offset value for neutral position of valves with one solenoid
	CQ:P **CQ:I** **CQ:I_LIM** **CQ:D** **CQ:T1**	100 4000 2500 0 10	0.01 0.1 ms 0.01 % 0.1 ms 0.1 ms	PID controller (swivel angle)
Pressure				
	CP:LLIM	0	0.01 %	Lower limit of the pressure controller
	CP1:P **CP1:I** **CP1:I_TH** **CP1:D** **CP1:T1**	100 4000 5 0 10	0.01 0.1 ms - 0.1 ms 0.1 ms	PID controller (pressure) parameter set 1
	CP2:P **CP2:I** **CP2:I_TH** **CP2:D** **CP2:T1**	100 4000 5 0 10	0.01 0.1 ms - 0.1 ms 0.1 ms	PID controller (pressure) parameter set 2
Power limitation				
	PL:RPM **PL:QMAX** **PL:EFF** **PL:PL** **PL:T1**	1500 100 7850 318 500	1/min cm³ 0.01 % 0.1 kW 0.1 ms	Power limitation function
Output signal adaption				
	SIGNAL:UP	+	-	Polarity of the control signal to the power stage
	SIGNAL:U	U+-10	-	Type and polarity of the control signal
	MIN:A **MIN:B**	0 0	0.01 % 0.01 %	Deadband compensation
	MAX:A **MAX:B**	10000 10000	0.01 % 0.01 %	Output scaling
	TRIGGER	200	0.01 %	Deadband compensation trigger point
	CURRENT	1000	mA	Rated solenoid current
Power stage				
	DFREQ	121	Hz	Dither frequency
	DAMPL	500	0.01 %	Dither amplitude
	PWM	2604	Hz	PWM frequency
	ACC	ON	-	Current loop auto adjustment
	PPWM **IPWM**	7 40	- -	Closed loop current controller

5 Parameters

5.1 Basic parameters

5.1.1 MODE (Parameter view)

Command	Parameters	Unit	Group
MODE x	x= SYSTEM|IO_CONF|Q_CTRL| P_CTRL|PL_CTRL|ALL	-	-

This command changes the actual view on the parameter list. For a better overview only the parameters of the selected group are displayed. Alternatively all active parameters can be shown.

5.1.2 LG (Changing the language)

Command	Parameters	Unit	Group
LG x	x= DE|EN	-	**SYSTEM**

Either German or English can be selected for the help texts.

5.1.3 SENS (Malfunction monitor)

Command	Parameters	Unit	Group
SENS x	x= ON|OFF|AUTO	-	**SYSTEM**

This command is used to activate/deactivate the monitoring functions (4… 20 mA sensors, output current, signal range and internal failures) of the module.

ON: All monitoring functions are active. Detected failures can be reset by deactivating the ENABLE input.

OFF: No monitoring function is active.

AUTO: Auto reset mode. All monitoring functions are active. If the failure doesn't exist anymore, the module automatically resumes to work.

Normally the monitoring functions are always active because otherwise no errors are detectable via the READY output. Deactivating is possible mainly for troubleshooting.

5.1.4 PASSFB (Password for fieldbus)

Command	Parameters	Unit	Group
PASSFB x	x= 0… 10000000	-	**SYSTEM**

The value inputted here serves as password for the parameterizing function via fieldbus. In order to enable a parametrization it has to be send via fieldbus to the relating address. If **PASSFB** is “0” (factory setting) the password protection is not active.

5.1.5 CTRLOUT (Chosing control signal)

Command	Parameters	Unit	Group
CTRLOUT x	x= ANA|1SOL|2SOL	-	**SYSTEM**

The output stage is designed for the universal control of valves with OBE or standard proportional valves (4/3 directional valves) with one or two solenoids.

ANA: Control signal via universal analog output to control valves with OBE.

1SOL: Control signal via power stage to valves with one solenoid and offset.

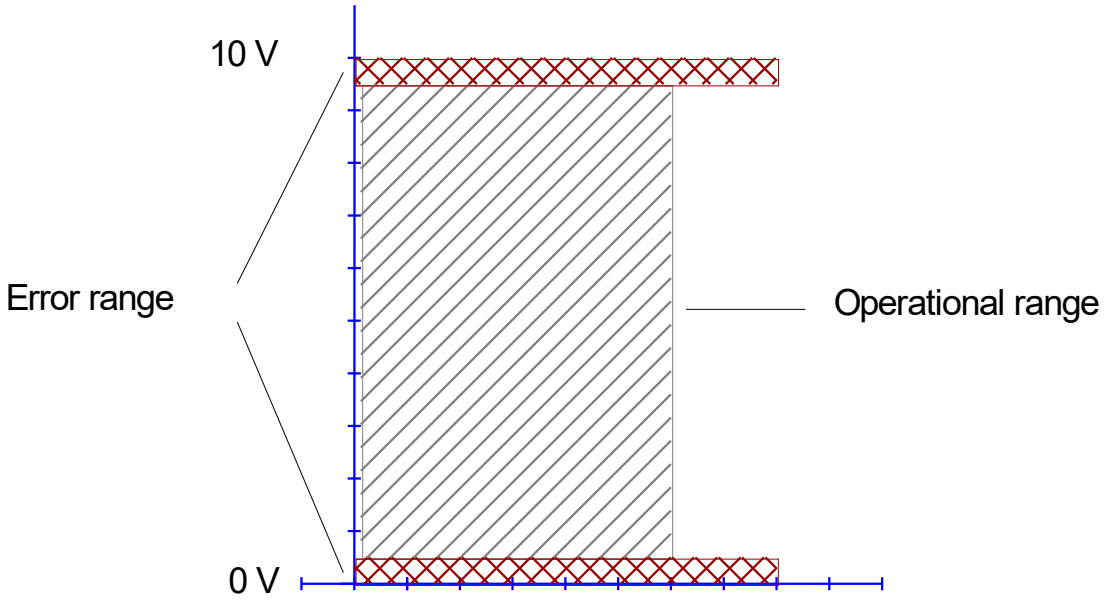
2SOL: Control signal via power stage to valves with two solenoid.

5.1.6 LIM:XQ (Cable break monitoring swivel angle)

Command	Parameter	Unit	Group
LIM:XQ X	x= 0… 2000	0.01 mV	**SYSTEM**

This parameter defines the range above 0 V and below 10 V in which the signal will be regarded as valid. LIM:XQ = “0” disables the monitoring.

If a current signal is used, the monitoring is automatically active (but depending on SENS). A value below 3 mA is interpreted as cable break.



5.2 Input signal adaptation

5.2.1 SYS_RANGE (System pressure)

Command	Parameters	Unit	Group
SYS_RANGE x	x= 10… 1000	bar	**IO_CONF**

The system pressure which refers to 100% of the command input signal is defined here. Wrong settings may lead to incorrect system settings and depending parameters cannot be calculated correctly.

5.2.2 SIGNAL (Type of input signal)

Command	Parameters	Unit	Group
SIGNAL:XQ x SIGNAL:XP1 x SIGNAL:XP2 x	x= U0-10|I4-20 x= OFF|U0-10|I4-20| U10-0|I20-4	-	**IO_CONF**

These commands are used to define the type of the input signals (voltage or current) and to set the direction of the signal. They are available for all analogue inputs.

5.2.3 N_RANGE:X (Sensor nominal pressure)

Command	Parameter	Unit	Group
N_RANGE:X X	x= 10… 1000	bar	**IO_CONF**

This command defines the nominal working range of the feedback sensor. Wrong parameterization causes wrong system settings. The control parameters cannot be calculated correctly in case of wrong values.

5.2.4 OFFSET:X (Sensor offset)

Command	Parameter	Unit	Group
OFFSET:X X	x= -60000… 60000	mbar	**IO_CONF**

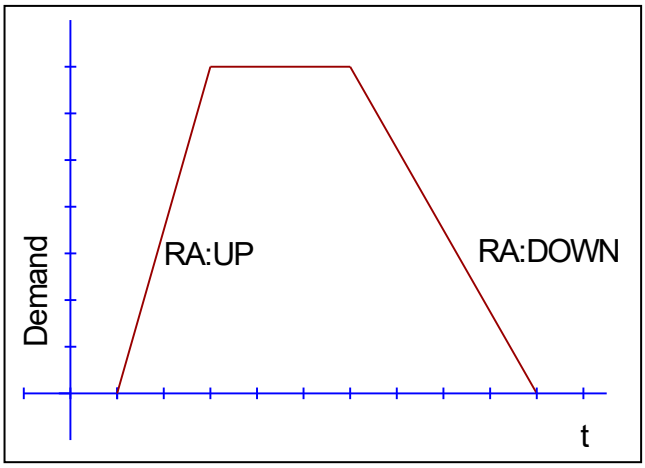
Adjustment of the zero point of the sensor.

5.2.5 RA (Command signal ramp time)

Command	Parameter	Unit	Group
RAP:I X	i= UP|DOWN		**P_CTRL**
RAQ:I X	x= 1… 600000	ms	**Q_CTRL**

Two quadrant ramp function, input in ms.

The ramp time is separately set for UP and DOWN ramps. There are two independent ramp functions for swivel angle and pressure demand.



5.2.6 CORR:Q (Volume flow correction)

Command	Parameter	Unit	Group
CORR:Q x	x= 0.. 1000	0.01 %	**Q_CTRL**

With this command the pressure dependent loss of volume flow can be compensated. Usually the volume flow of a pump decreases linearly with increasing pressure.

It is recommended to additionally use the ramp function in order to avoid unwanted oscillations.

5.2.7 XQ (Scaling function for the swivel angle feedback)

Command	Parameter	Unit	Group
ZERO:XQ x	x= 0.. 10000	0.01 %	**IO_CONF**
MAX:XQ x	x= 0.. 10000	0.01 %	

The sensor at the pump delivers a unipolar signal of 0… 10 V or 4… 20 mA. This signal has to be scaled with these parameters.

The physical input signals for 100% position (MAX:XQ) and 0% position (ZERO:XQ) have to be put in. This enables also negative values for the mooring mode. The raw (physical) input is provided as process data XQA. In order to set ZERO:XQ and MAX:XQ, move the swivel angle to neutral and max. position and enter the read XQA values here.

5.3 Control parameters

5.3.1 CQ (PID controller swivel angle)

Command	Parameter	Unit	Group
CQ:I X	i= FF|P|I|I_LIM|D|T1|		**Q_CTRL**
	:FF x= 0… 10000	0.01 %	
	:P x= 0… 10000	0.01	
	:I x= 0… 30000	0.1 ms	
	:I_LIM x= 0… 10000	0.01 %	
	:D x= 0… 1200	0.1 ms	
	:T1 x= 10… 1000	0.1 ms	

The control function Q will be parameterized via this command. It is realized as classic PID controller.

Explanation:

CQ:FF - Offset value for adjusting the neutral position of the valve (1 solenoid). Typical value = 5000.

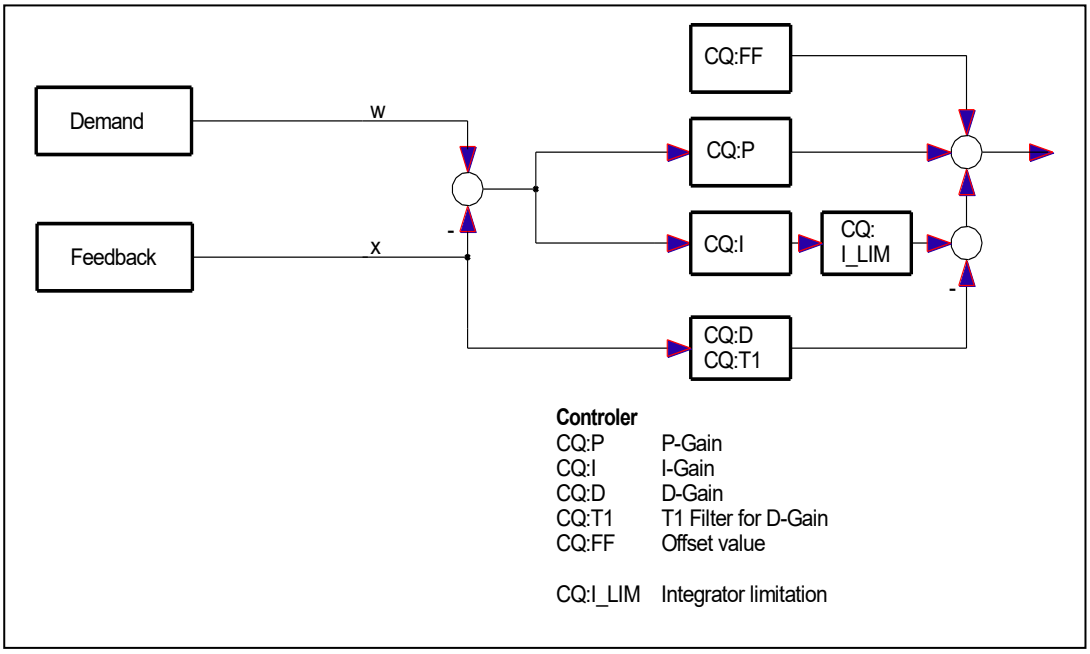
CQ:P - P gain of the controller.

CQ:I - I-gain of the controller. The integrator can be deactivated with a programmed value of 0.

CQ:I_LIM - Limitation of the working range. This value should be chosen as low as possible because only the nonlinearity of the system has to be compensated by it.

CQ:D - D-gain of the controller.

CQ:T1 - The T1 factor is used for the D-gain in order to suppress high-frequency noise.



5.3.2 CP (PID controller pressure)

Command	Parameter	Unit	Group
CP:LLIM X	x= 0… -10000	0.01 %	**P_CTRL**
CP1:I X	i= P|I|I_TH|D|T1		
CP2:I X	:P x= 0… 10000	0.01	
	:I x= 0… 30000	0.1 ms	
	:I_TH x= 0… 20	-	
	:D x= 0… 1200	0.1 ms	
	:T1 x= 10… 1000	0.1 ms	

The pressure controller will be parameterized via these commands.
There are two parameter sets selectable by the “SELECT CP“ control bit via Profinet.

Explanation:

CP:LLIM - Lower limit for the pressure controller. It can be expanded from 0% to -100%. (Mooring mode)

CP:P - P gain of the controller.

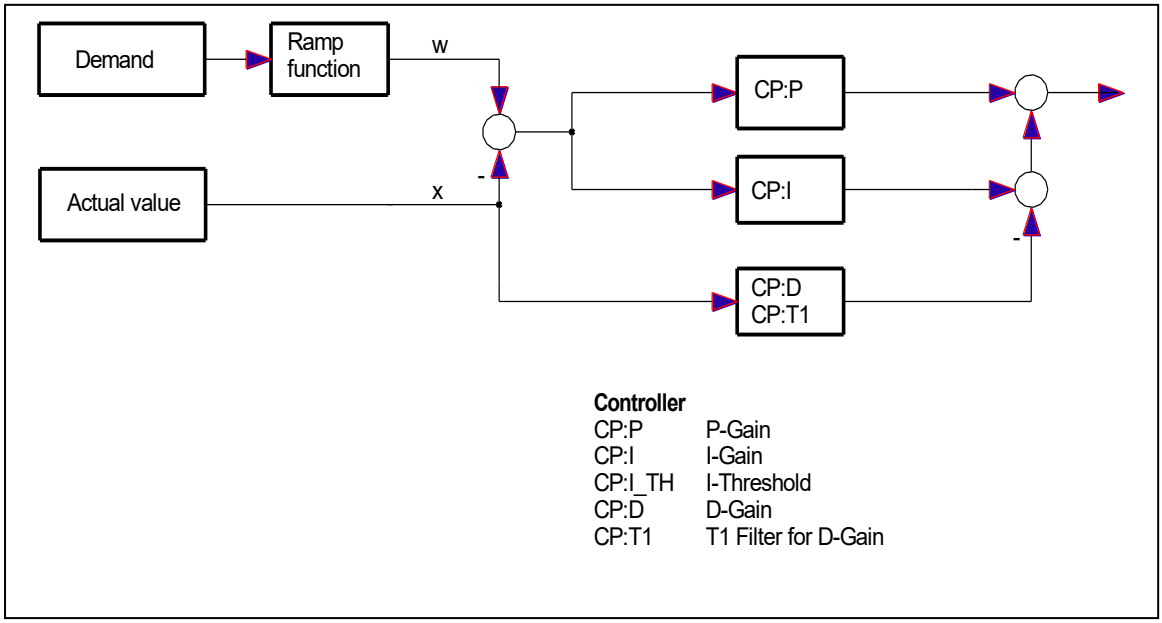
CP:I - I-gain of the controller. The integrator can be deactivated with a programmed value of 0.

CP:I_TH - Terminal command: If the pressure rise exceeds a threshold which can be determined here, an increase of the integrational part is suppressed temporarily. This function reduces pressure overshooting. Changes of this parameter are only required in exceptional cases after consulting W.E.St..

CP:D - D-gain of the controller.

CP:T1 - The T1 factor is used for the D-gain in order to suppress high-frequency noise.

The limitation for the integrator in positive direction is the swivel angle command. The limit for the negative direction is parameterized by LLIM (integrator and simultaneously controller output).



5.3.3 PL (Power limitation function)

Command		Parameter	Unit	Group
PL:RPM	X	x = 300… 3000	1/min	**PL_CTRL**
PL:QMAX	X	x = 1… 1000	cm³	
PL:EFF	X	x = 5000… 10000	0.01 %	
PL:PL	X	x = 1… 10000	0.1 kW	
PL:T1	X	x = 10… 10000	0.1 ms	

These commands are used to parameterize the power limitation function. It can be activated via control bit. In this case the power limitation demand WL which scales the limit PL:PL has to be set via the fieldbus, too.

Explanation:

PL:RPM - Engine speed
PL:QMAX - Displacement of the pump
PL:EFF - Degree of efficiency
PL:PL - Power limit
PL:T1 - Time factor

Depending on this input the theoretical maximum power is calculated:

$$P_{MAX} = \frac{QMAX \cdot RPM \cdot P_{\text{SYS\_RANGE}}}{Eff \cdot 600}$$

If changes of the containing parameters are done, the value of P:MAX is recalculated automatically.

The parameterizable capacity limit PL is limited automatically by this maximum power. The lowest adjustable value is 20% of P:MAX. PL can further be limited by a scaling demand WL via fieldbus if the ENABLE_PL bit is activated. 100 % corresponds to the capacity limit PL.

The time factor determines the dynamics of the power limitation. Typical values are between 20 and 50 ms.

5.4 Output signal adaptation

5.4.1 SIGNAL (Type / polarity of the output)

Command	Parameter	Unit	Group
SIGNAL:U x	x= OFF|U+-10|I4-20| U-+10|I20-4	-	**IO_CONFIG**
SIGNAL:UP x	X= +|-	-	

This command is used to define the type of output signal and / or its polarity.

Explanation:
SIGNAL:U - Type and polarity of the control signal at PIN 15 / 16 if analogue control is selected.
SIGNAL:UP - Polarity of the control signal to the power stage if direct solenoid control is selected.

5.4.2 CURRENT (Rated solenoid current)

Command	Parameter	Unit	Group
CURRENT X	x= 500… 2600	mA	**IO_CONFIG**

The nominal current of the solenoid is set here. Dither and also MIN/MAX always refer to this current value.

5.4.3 MIN (Deadband compensation)

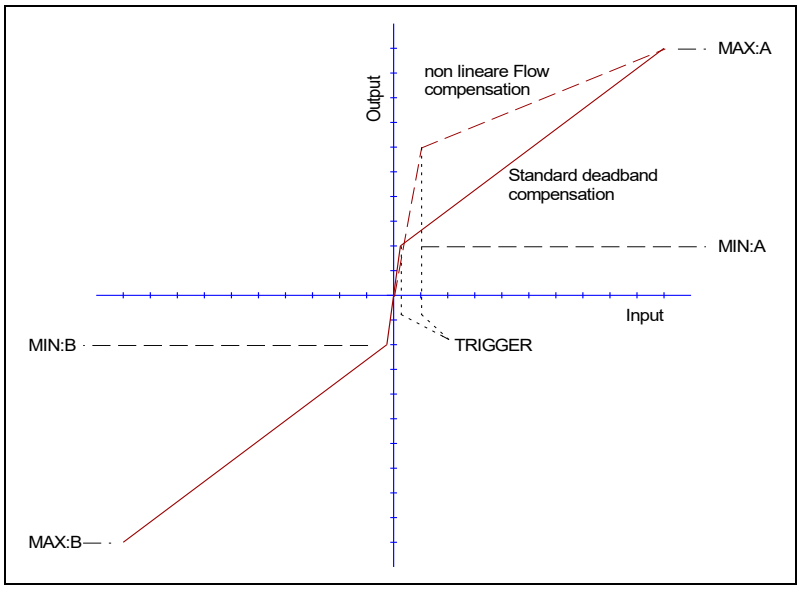
5.4.4 MAX (Output scaling)

5.4.5 TRIGGER (Response threshold for the MIN parameter)

Command		Parameter	Unit	Group
		i= A|B		**Q_CTRL**
MIN:I	X	x= 0… 6000	0.01 %	
MAX:I	X	x= 5000… 10000	0.01 %	
TRIGGER	X	x= 0… 3000	0.01 %	

The output signal to the valve is adjusted by means of these commands. A kinked volume flow characteristic is used for the swivel angle control valve instead of the typical overlap step. The advantage is better and more stable (positioning) behavior.

CAUTION: If there should also be adjustment options for deadband compensation on the valve or valve amplifier, it must be ensured that the adjustment is performed either at the power amplifier or in the module.
If the MIN value is set too high, this has an effect on the minimum valve opening, which can then no longer be adjusted. In extreme cases this leads to oscillation around the controlled position.



5.5 Power stage

5.5.1 DITHER (Dither settings)

Command		Parameter	Unit	Group
DFREQ	X	x= 60… 400	Hz	**IO_CONFIG**
DAMPL	X	x= 0… 3000	0.01 %	

The dither signal can be defined with these commands. Different amplitudes or frequencies may be required depending on the valve. The dither amplitude is defined in % (peak to peak value) of the nominal output current.

CAUTION: *The PPWM and IPWM parameters influence the effect of the dither setting. These parameters should not be changed after the dither has been optimized. If the PWM frequency is less than 500 Hz, the dither amplitude DAMPL should be set to zero.*

5.5.2 PWM (PWM Frequency)

Command		Parameter	Unit	Group
PWM	X	x= 60… 2941	Hz	**IO_CONFIG**

The frequency can be changed in defined steps (60 Hz, 70 Hz, 80 Hz, 90 Hz, 100 Hz, 110 Hz, 120 Hz, 130 Hz, 150 Hz, 199 Hz, 230 Hz, 280 Hz, 336 Hz, 405 Hz, 511 Hz, 1069 Hz, 1470 Hz, 1960 Hz, 2252 Hz, 2941 Hz). The optimum frequency depends on the valve.

Attention: *The PPWM and IPWM parameters should be adapted when using low PWM frequencies because of the longer dead times which forces a reduced stability of the closed loop control. This settings are done automatically if ACC is set to ON.*

5.5.3 ACC (Current loop auto adjustment)

Command		Parameter	Unit	Group
ACC	X	x= ON|OFF	-	**IO_CONFIG**

Operation mode of the closed loop current control.

ON: In automatic mode PPWM and IPWM are calculated depending on the PWM-frequency.

OFF: Manual adaption by the user is necessary.

5.5.4 PPWM (P gain of the current loop)

5.5.5 IPWM (I gain of the current loop)

Command	Parameter	Unit	Group
PPWM X	x= 0… 30	-	**IO_CONFIG**
IPWM X	x= 1… 100	-	

The PI current controller for the solenoid control is parameterized with these commands.
A higher P-gain increases the dynamic of the closed current loop and so its influence on the dither. The I-gain should only be changed if having detailed knowledge about the current control.

CAUTION: These parameters should not be changed without adequate measurement facilities and experience. Changes are only possible if ACC is set to OFF.

Having a PWM frequency > 1000 Hz, the dynamics of the current controller can be increased.
Possible values of PPWM = 7 and IPWM = 40 can be chosen.
At an adjusted PWM frequency < 250 Hz, the dynamic of the current controller has to be decreased.
Typical values are: PPWM = 1… 3 and IPWM = 40… 80.

5.5.6 ST (Status request)

Commando	Parameter	Unit	Group
ST	-	-	**TERMINAL**

The control words, status words and demands which are send via the fieldbus as well as the state of the hardware enable of the module are displayed by this command. It can only be requested in the terminal window.
The message is structured as follows:

	(high byte / low byte)
control word :	0000 0000 / 0000 0000
status word :	0000 0000 / 0000 0000
pressure demand:	0000 (transmitted HEX value)
swivel angle demand:	0000 (transmitted HEX value)
power limitation demand:	0000 (transmitted HEX value)
HW-enable :	disabled (Digital input at PIN 8)
para address :	0000 (Address for parameterizing via fieldbus)
para value :	0000 (Parameter value for parameterizing via fieldbus)

5.6 PROCESS DATA (Monitoring)

Command	Description	Unit
WQI	Swivel angle demand (input)	%
WQ	Swivel angle command value (ramped, limited)	%
XQ	Swivel angle actual value	%
EQ	Control deviation swivel angle	%
CQ	Output signal swivel angle controller	%
WP	Pressure command value	bar
XP	Pressure actual value	bar
XP1	Pressure feedback 1	bar
XP2	Pressure feedback 2	bar
EP	Control deviation pressure	bar
CP	Output signal pressure controller	%
WL	External power limitation demand	%
XL	Output of the power limitation function	%
XQA	Swivel angle feedback signal before scaling	%
U	Control signal to the valve	%
IA	Valve current solenoid A	mA
IB	Valve current solenoid B	mA

The process data are the variables which can be observed continuously on the monitor or on the oscilloscope.

6 Appendix

6.1 Failure monitoring

Following possible error sources are monitored continuously when SENS = ON / AUTO:

Source	Fault	Characteristic
Analogue input PIN 6	Out of range or broken wire	The power stage and the READY output will be deactivated.
Analogue input 13 4… 20 mA	Out of range or broken wire	The power stage and the READY output will be deactivated.
Analogue input 14 4… 20 mA	Out of range or broken wire	The power stage and the READY output will be deactivated.
Solenoid A on PIN 17 + 19	Wrong cabling, broken wire	The power stage and the READY output will be deactivated.
Solenoid A on PIN 18 + 20	Wrong cabling, broken wire	The power stage and the READY output will be deactivated.
EEPROM (when switching on)	Data error	The power stage and the READY output will be deactivated. Module can be activated by saving the parameters.
Profinet	Interruption of the connection Livebit error Internal data processing (buffer overflow, checksum)	The power stage and the READY output will be deactivated.

6.2 Troubleshooting

It is assumed that the device is in an operable state and there is communication between the module and the WPC-300. Furthermore, the valve control parameterization has been set with the assistance of the valve data sheets.
The RC in monitor mode can be used to analyze faults.

CAUTION: All safety aspects must be thoroughly checked when working with the RC (Remote Control) mode. In this mode the module is controlled directly and the machine control cannot influence the module.

FAULT	CAUSE / SOLUTION
ENABLE is active, the module does not respond, and the READY LED is off.	There is presumably no power supply or the ENABLE signal is not present. Other errors are displayed via the READY LED. If there is no power supply, there is also no communication via our operating program. If a connection has been made, then a power supply is also available. In this case in monitor window the ENABLE input can be checked.
ENABLE is active, the READY LED is flashing.	The flashing READY LED signals that a fault has been detected by the module. The fault could be: • A broken cable or bad signal at an analogue input if 4… 20 mA signals are used. • Signal out of range of the dwivel angle sensor • A broken cable or incorrect cabling to the solenoids. • Internal data error: press the command/SAVE button to delete the data error. The system reloads the DEFAULT data. • The field bus communication is faulty or a livebit – error exists. Reset the error by a state change of the ENABLE signal. With the operating program the fault can be localized directly via the monitor.
ENABLE is active, the READY LED is active and the pressure is instable.	In many cases you may have a hydraulic problem. Electrical problems may be: • Electrical noise at the wire of the power supply. • Very long solenoid wiring (> 40 m), disturbance in the current control loop[1]. • Instable current control loop. The adjustments of the PWM-frequency and the dither (frequency and amplitude) have to be checked carefully. Good experiences are made with: a. PWM-frequency = 2600 Hz (higher frequency), the dither has to be aligned to the valve (amplitude and frequency). b. PWM-frequency = 100… 400 Hz (lower frequency), the dither amplitude is set to 0 % (disabled). • Instable PID control loop (swivel angle). The control parameter P, I, D have to be checked, first steps:: a. Decrease P (e.g. to half of the actual value) b. Increase I (slow integration time) c. Decrease D d. Observe the behavior and notice the differences after your changes. Relating to this you can evaluate the next steps for optimizing.

[1] Maybe you have to adjust / optimize the solenoid control loop (P and I).

7 PROFINET IO RT interface

7.1 PROFINET IO function

PROFINET is the standard for Industrial Ethernet based on IEEE 802.xx. PROFINET is based on the 100 Mb/s-version of full duplex and switched Ethernet. PROFINET IO is designed for the fast data exchange between Ethernet-based controllers (master functionality) and field devices (slave functionality) with cycle times up to 10 ms.

CAUTION!
If the communication load becomes too high, the gateway circuit may fail until the module is powered off and on again. In order to avoid this new data should not be send earlier than every 8 ms.

7.2 PROFINET address assignment

All the PROFINET IO slave devices need name and IP address to initiate communication. The IP address is assigned to the device by the ProfiNet-IO-controller (PLC). For it, the gateway has a device name on which it is addressed. The IP address of the PROFINET IO device is stored in persistent memory in the device. An IO controller can modify it. Take care that the IP address is not same as any other device on the network.

Default address:	
IP Address:	0.0.0.0
Subnet-Mask:	0.0.0.0
IP Address Gateway:	0.0.0.0

Address Example.:	
IP Address:	192.168.1.111
Subnet-Mask:	255.255.255.0
IP Address Gateway:	192.168.1.111

7.3 Device data file (GSDML)

The characteristics of an IO Device are described by the device manufacturer in a General Station Description (GSD) file. The language used for this purpose is the GSDML (GSD Markup Language) - an XML based language. For I/O data, the GSDML file describes the structure of the cyclic input and output data transferred between the Programmable Controller and the PROFINET IO device. Any mismatch between the size or structure of the input and output data and the actual internal device structure generates an alarm to the controller.

In the configuration of transmission, 32 bytes for input and 32 bytes for output must be pre-adjusted.

7.4 IO Description

The demand values are set in a range up to 0x3FFF (16383 for 100%) and reported the same way.
Pressure signals are set and reported with an resolution of 0.1 bar.
For the control and status bits “1” means activation respective activity.
Error bits are displayed inverted because a “0” reports an active error.

The module is controlled with a control word consisting of following bits

ENABLE	General activation of the system linked with the hardware enable. Swivel angle controller and output stage get activated.
ENABLE P	Activation of the pressure controller.
ENABLE RAMP	Activation of the ramp function.
ENABLE PL	Activation of the power limitation function (Including scaling via fieldbus). If activated the demand WL has to be preset. It scales the limit value PL:PL. 100% correspond to 16383 respectively 3FFF.
SELECT CP	Select the active parameter set for the pressure controller (activation for CP2).
SELECT XP	Select the active feedback input for the pressure controller (activation for XP2).
PARAREAD	Reads out the value of the parameter which is determined by PARA ADDRESS and returns this value in PARA VALUE of the data sent to the fieldbus. If the address is not valid the function will return „0xffffffff“.
PARAMODE	Enables the ability to set parameters.
PARA VALID	Parameter value is transmitted at the rising edge of this control bit.
LIVEBIT IN	If this bit is set in the “ready” – state of the module, an internal watchdog function will be activated. In the further course it is monitored if there is a value change in the data received by the bus at least once per second. This could be e.g. this bit. If there is a period longer than 1s without data change, the “ready” – state of the module will be deactivated. The value read here will be returned by the bit “LIVEBIT OUT” in the status word.

Further data words to the module:

DEMAND SWIVEL ANGLE	Demand value for maximum valve opening, unit per cent
DEMAND PRESSURE	Pressure demand in 0.1 bar units
DEMAND POWER LIMITATION	Scaling demand of PL:PL for the power limitation function
PARAMETER VALUE	Value of the parameter to be transmitted
PARAMETER ADDRESS	Address of the parameter which should be changed or read out

Feedback takes place with a status word including following bits:

READY	Common readiness of the system (enable available and no error occurred)
POWER LIM	System is in power limitation
P ACTIVE	System is in pressure limitation
XQ ERROR	Error at swivel angle feedback
XP1 ERROR	Error at pressure feedback 1
XP2 ERROR	Error at pressure feedback 2
IA ERROR	Error at solenoid A
IB ERROR	Error at solenoid B
DERROR	Internal data error (parameters have to be saved)
BUS ERROR	Error in the processing of the field bus data (buffer overflow, checksum- or livebit error)
PARA ACTIVE	Parameterization via fieldbus was enabled
PARA READY	Parameter value was transferred correctly. This bit will be reset by resetting the control bit PARAVALID likewise.
LIVEBIT OUT	Monitoring of the fieldbus communication. Return of the **LIVEBIT** IN signal.

Further feedback values to the fieldbus:

ACTUAL SWIVEL ANGLE	Measured swivel angle of the pump (XQ)
ACTUAL PRESSURE 1	Measured pressure value at sensor 1 (XP1)
ACTUAL PRESSURE 2	Measured pressure value at sensor 2 (XP2)
ACTIAL VALUE LIMITATION	Actual output value of the limitation function (XL)
CONTROL SIGNAL	Control signal to the valve (U)
SOLENOID CURRENT A	Current at solenoid A (IA)
SOLENOID CURRENT B	Current at solenoid B (IB)
PARAMETER VALUE	parameter value, requested by PARA READ

7.5 Commands via Profinet

7.5.1 Overview

Nr.	Byte	Function	Type	Range	Unit
1	0	Control word 1 High Control word 1 Low	int		
2	1				
3	2	Control word 2 High Control word 2 Low	int		
4	3				
5	4	Swivel angle demand High Swivel angle demand Low	int	0… 16383	% 100% = 0x3FFF
6	5				
7	6	Pressure demand High Pressure demand Low	int	0… 10000	0.1 bar
8	7				
9	8	Power limitation demand High Power limitation demand Low	int	0… 16383	% 100 % = 0x3FFF
10	9				
11	10	---			
12	11	---			
13	12	---			
14	13	---			
15	14	---			
16	15	---			
17	16	---			
18	17	---			
19	18	---			
20	19	---			
21	20	---			
22	21	---			
23	22	---			
24	23	---			
25	24	---			
26	25	---			
27	26	Parameter value High (MSB)	long	Depending on the selected parameter	Depending on the selected parameter
28	27				
29	28				
30	29	Parameter value Low (LSB)			
31	30	Parameter address High Parameter address Low	int	0… 0x2065	-
32	31				

7.5.2 Definition control word 1

Byte 0 – control word High			
No.	**Bit**	**Function**	
1	0	SELECT XP	Select active feedback input for the pressure controller
2	1	SELECT CP	Select active parameter set for the pressure controller
3	2	---	
4	3	---	
5	4	ENABLE PL	Activation of the power limitation function
6	5	ENABLE RAMP	Activation of the ramp function
7	6	ENABLE P	Activation of the pressure controller
8	7	ENABLE	Enabling of the system and activation of the swivel angle controller

Byte 1 – control word Low			
No.	**Bit**	**Function**	
1	0	---	
2	1	---	
3	2	---	
4	3	---	
5	4	---	
6	5	---	
7	6	---	
8	7	---	

7.5.3 Definition control word 2

Byte 2 – control word High			
No.	**Bit**	**Function**	
1	0	LIVEBIT IN	(Start of the) fieldbus monitoring
2	1	---	
3	2	---	
4	3	---	
5	4	---	
6	5	---	
7	6	---	
8	7	---	

Byte 3 – control word Low			
No.	**Bit**	**Function**	
1	0	---	
2	1	---	
3	2	---	
4	3	---	
5	4	---	
6	5	PARA READ	Reading out the selected address
7	6	PARA VALID	Transmitting parameterization
8	7	PARA MODE	Activation of the parameterizing mode

7.6 Feedback via Profinet

7.6.1 Overview

Nr.	Byte	Function	Type	Range	Unit
1	0	Status word 1 High Status word 1 Low	int		
2	1				
3	2	Status word 2 High Status word 2 Low	int		
4	3				
5	4	Swivel angle actual value High Swivel angle actual value Low	int	+/- 16383	% 100% = 0x3FFF
6	5				
7	6	Pressure actual value 1 High Pressure actual value 1 Low	Int	0… 10000	0.1 bar
8	7				
9	8	Pressure actual value 2 High Pressure actual value 2 Low	Int	0… 10000	0.1 bar
10	9				
11	10	Output signal power limitation High Output signal power limitation Low	Int	0… 16383	% 100% = 0x3FFF
12	11				
13	12	Control signal to the valve High Control signal to the valve Low	Int	+/- 16383	% 100% = 0x3FFF
14	13				
15	14	Solenoid current A High Solenoid current A Low	Int	0… 2600	mA
16	15				
17	16	Solenoid current B High Solenoid current B Low	Int	0… 2600	mA
18	17				
19	18				
20	19				
21	20				
22	21				
23	22				
24	23				
25	24				
26	25				
27	26				
28	27				
29	28	Parameter value High (MSB)	long	Depending on Parameter	Depending on Parameter
30	29				
31	30	Parameter value Low (LSB)			
32	31				

7.6.2 Definition status word 1

Byte 0 – status word High			
No.	**Bit**	**Function**	
1	0	---	
2	1	---	
3	2	---	
4	3	---	
5	4	---	
6	5	PRESSURE LIM	Pressure controller is leading
7	6	POWER LIM	Power limitation is leading
8	7	READY	System is enabled and no errors are detected

Byte 1 – status word Low			
No.	**Bit**	**Function**	
1	0	---	
2	1	---	
3	2	$\overline{\text{IB ERROR}}$	Error at solenoid B
4	3	$\overline{\text{IA ERROR}}$	Error at solenoid A
5	4	$\overline{\text{XQ ERROR}}$	Error swivel angle feedback
6	5	$\overline{\text{XP2 ERROR}}$	Error pressure feedback 2
7	6	$\overline{\text{XP1 ERROR}}$	Error pressure feedback 1
8	7	$\overline{\text{ERROR}}$	Accumulated error

7.6.3 Definition status word 2

Byte 2 – status word High			
No.	**Bit**	**Function**	
1	0	---	
2	1	---	
3	2	---	
4	3	---	
5	4	---	
6	5	$\overline{\text{BUS ERROR}}$	Field bus communication error
7	6	---	
8	7	$\overline{\text{DERROR}}$	Internal data error

Byte 3 – status word Low			
No.	**Bit**	**Function**	
1	0	LIVEBIT OUT	Monitoring of the communication
2	1	---	
3	2	---	
4	3	---	
5	4	---	
6	5	---	
7	6	PARA READY	Parameterization successful
8	7	PARA ACTIVE	Parameterization via fieldbus active

7.7 Parameterizing via Profibus

7.7.1 Mode of operating

Preparation:

- Power supply of the different sections has to be available.
- For safety issues the system should not be active.
  If active, the ENABLE bit in the control word has to be reset.
  Attention: Parameterization via fieldbus can also be done having an active system. In this case it should be done very carefully because changes are directly operative.

Parameterization:

- At first the **PARA MODE** bit has to be set to enable parameterizing via ProfiNet.
  This will be reported via the **PARA ACTIVE** bit.
- Provide **address** and new **value** of the parameter which should be changed.
- Setting the **PARA VALID** bit to high will transmit the data.
  The **PARA READY** bit will report a successful parameterization.
  Attention: A missing **para ready** bit means parameterization was not performed.

Storing:

- Same procedure as parameterizing standard parameters.
- Selecting **2100** as **address**, written **value** does not matter (below 60000).

Password protection:

- If a password was set this has to be entered first for enabling parameterization. Procedure is the same as if parameterizing standard parameters.
- Select **2200** as **address** and send the password (PASSFB) as **value**.
- After **PARA READY** reports success, subsequently parameterizing can be done as long as **PARA MODE** stays active. If is reset, the protection becomes active again. This means, in order to change more parameters after setting **PARA MODE** first the password itself needs to be send. See above.

If the password was transferred incorrectly three times, the parameterization mode gets locked (reported by deactivated **PARA ACTIVE** bit). Only restarting the device enables three new attempts.

Please note that a storage of the parameterization via Profinet is limited in the number of writing cycles. Means it should be done only when necessary.

7.7.2 Parameterlist

Nr.	Address	Parameter	Value range Hex	Value range Dez
1	0x2001	SYS_RANGE	0xA… 0x3E8	10… 1000
2	0x2002	Q:CORR	0x0… 0x3E8	0… 1000
3	0x2003	CP:LLIM	0x0… 0xD8F0	0… -10000
4	0x2011	RAQ:UP	0x1... 0x927C0	1… 600000
5	0x2012	RAQ:DOWN	0x1... 0x927C0	1… 600000
6	0x2013	RAP:UP	0x1... 0x927C0	1… 600000
7	0x2014	RAP:DOWN	0x1... 0x927C0	1… 600000
8	0x2021	CQ:FF	0x0… 0x2710	0… 10000
9	0x2022	CQ:P	0x0… 0x2710	0… 10000
10	0x2023	CQ:I	0x0… 0x7530	0… 30000
11	0x2024	CQ:I_LIM	0x0… 0x2710	0… 10000
12	0x2025	CQ:D	0x0… 0x4B0	0… 12000
13	0x2026	CQ:T1	0xA… 0x64	10… 1000
14	0x2031	CP1:P	0x0… 0x2710	0… 10000
15	0x2032	CP1:I	0x0… 0x7530	0… 30000
16	0x2035	CP1:D	0x0… 0x4B0	0… 12000
17	0x2036	CP1:T1	0xA… 0x64	10… 1000
18	0x2041	CP2:P	0x0… 0x2710	0… 10000
19	0x2042	CP2:I	0x0… 0x7530	0… 30000
20	0x2045	CP2:D	0x0… 0x4B0	0… 12000
21	0x2046	CP2:T1	0xA… 0x64	10… 1000
22	0x2051	PL:RPM	0x12C… 0xBB8	300… 3000
23	0x2052	PL:PL	0x0… *0x2710*	0… *10000*
24	0x2061	MIN:A	0x0 … 0x1770	0… 6000
25	0x2062	MAX:A	0x1388… 0x2710	4000… 10000
26	0x2063	MIN:B	0x0… 0x1770	0… 6000
27	0x2064	MAX:B	0x1388… 0x2710	4000… 10000
28	0x2065	TRIGGER	0x0… 0xBB8	0… 3000
29	0x2100	SAVE	(0x0000… 0xEA60)	(0… 60000)
30	0x2200	PW	0x0001… 0x989680	1… 10000000

PL:PL – The parameterizable upper limit is defined by the calculated maximum power.

8 Updating driver for Profinet

If the driver for the Profinet interface needs to be updated, the user will receive a new firmware update from W.E.St.. The approaching is described in the WPC help file. After updating the firmware the fieldbus script can be updated. For that please proceed as follows:

1. Be sure the application is not active.
2. Choose the terminal window of the WPC program.
3. Put in the command “SCRDL” and confirm with enter button.
4. The message UNIGATE_IC_RESET reports a successful start of the update.
5. After some lines of text the message “Exiting script download” indicates the completion.

This operation maybe has to be done once after a firmware update. It is only required if the fieldbus driver was changed and will be announced by W.E.St.. Otherwise such an update is not necessary, but it can be done without negative effects.

9 Notes