Operation Manual
Series PWDXXA-40X
Design >10

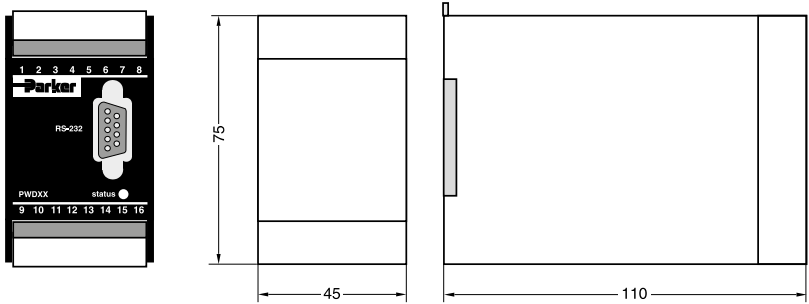## Electronic for Proportional DC Valves

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Note

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

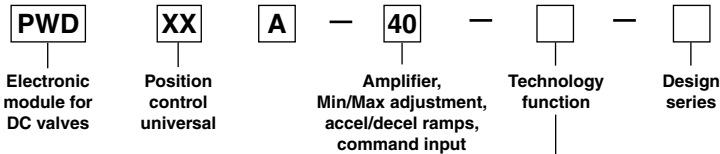To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Content

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1. Introduction
1.1. Front view / dimensions

1.2. Ordering code

| PWD | XX | A | — | 40 | — | ☐ | — | ☐ |

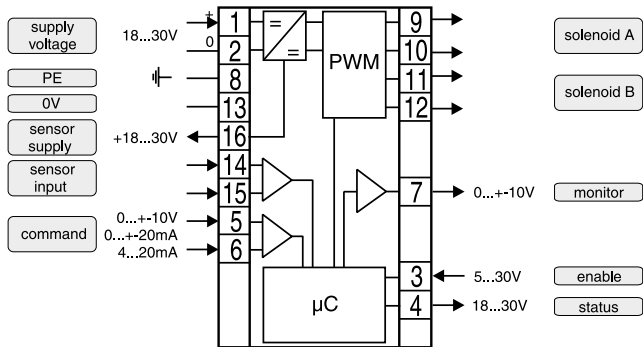|	
Electronic module for DC valves	
Position control universal	
Amplifier, Min/Max adjustment, accel/decel ramps, command input	
Technology function	
Design series	

Code	Function
0	Standard
1	Linearization

1.3. Name plate
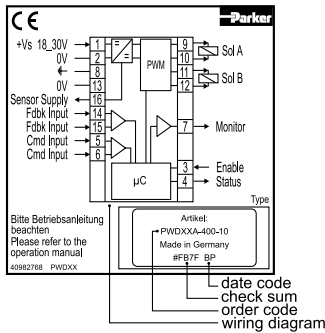
1.4. Block diagram

Parker electronic modules PWDXXA-40X for rail mounting are compact, easy to install and provide time-saving wiring by disconnectable terminals. The digital design of the circuit results in good accuracy and optimal adaption for proportional directional control valves with position sensor by a comfortable interface program.

1.5. Characteristics

The described electronic unit combines all necessary functions for the optimal operation of proportional directional control valves with position sensor. The most important features are:

- digital circuit design
- parametrizable control as position control for valve spool or external closed loop control

- constant current control
- differential input stage with different signal options
- monitor output for spool stroke/feedback, status output
- four quadrant ramp function
- enable input for solenoid driver
- status indicator
- parametering by serial interface RS-232
- connection by disconnectable terminals
- compatible to the relevant European EMC-standards
- comfortable interface program
- optional technology function "linearization"

CE

1.6. Technical data

General		
Model		Module package for snap-on mounting on EN 50022 rail
Package material		Polycarbonate
Inflammability class		V2..V0 acc. UL 94
Installation position		Any
Ambient temperature range	[°C]	-20...+60
Protection class		IP 20 acc. EN 60529
Weight	[g]	160
Electrical		
Duty ratio	[%]	100
Supply voltage	[VDC]	18...30, ripple < 5% eff., surge free
Switch-on current typ.	[A]	22 for 0.2 mS
Current consumption max.	[A]	2.0
Pre-fusing	[A]	2.5 A medium lag
Command signal options	[V]	+10...0...-10, ripple < 0.01 % eff., surge free, Ri = 100 kOhm
	[mA]	+20...0...-20, ripple < 0.01 % eff., surge free, Ri = 200 Ohm
	[mA]	4...12...20, ripple < 0.01 % eff., surge free, Ri = 200 Ohm
		< 3.6 mA = solenoid output off,
		> 3.8 mA = solenoid output on (acc. NAMUR NE43)
Input signal resolution	[%]	0.025
Differential input voltage max.	[V]	30 for terminals 5 und 6 against PE (terminal 8)
Enable signal	[V]	0...1: Off / 3...30: On / Ri = 100 kOhm
Status signal	[V]	0...0.5: Off / Us: On / rated max. 15 mA
Monitor signal	[V]	+10...0...-10, rated max. 5 mA, signal resolution 0.4 %
Adjustment ranges Min	[%]	0...50
Max	[%]	50...100
Ramp	[s]	0...32.5
Zero offset	[%]	+100...-100
Current	[A]	1.3 / 2.7 / 3.5
Initial current	[%]	0...25
Interface		RS 232C, DSub 9p. male for null modem cable
EMC		EN 61000-6-2, EN 61000-6-4
Connection		Screw terminals 0.2...2.5 mm², disconnectable
Cable specification	[AWG]	16 overall braid shield for supply voltage and solenoids
	[AWG]	20 overall braid shield for sensor and signal
Cable length	[m]	50
Options		
Technology function	Code1	Software adjustable transfer function with 10 compensation points for linearization of valve behaviour.

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1.7. Signal flow diagram
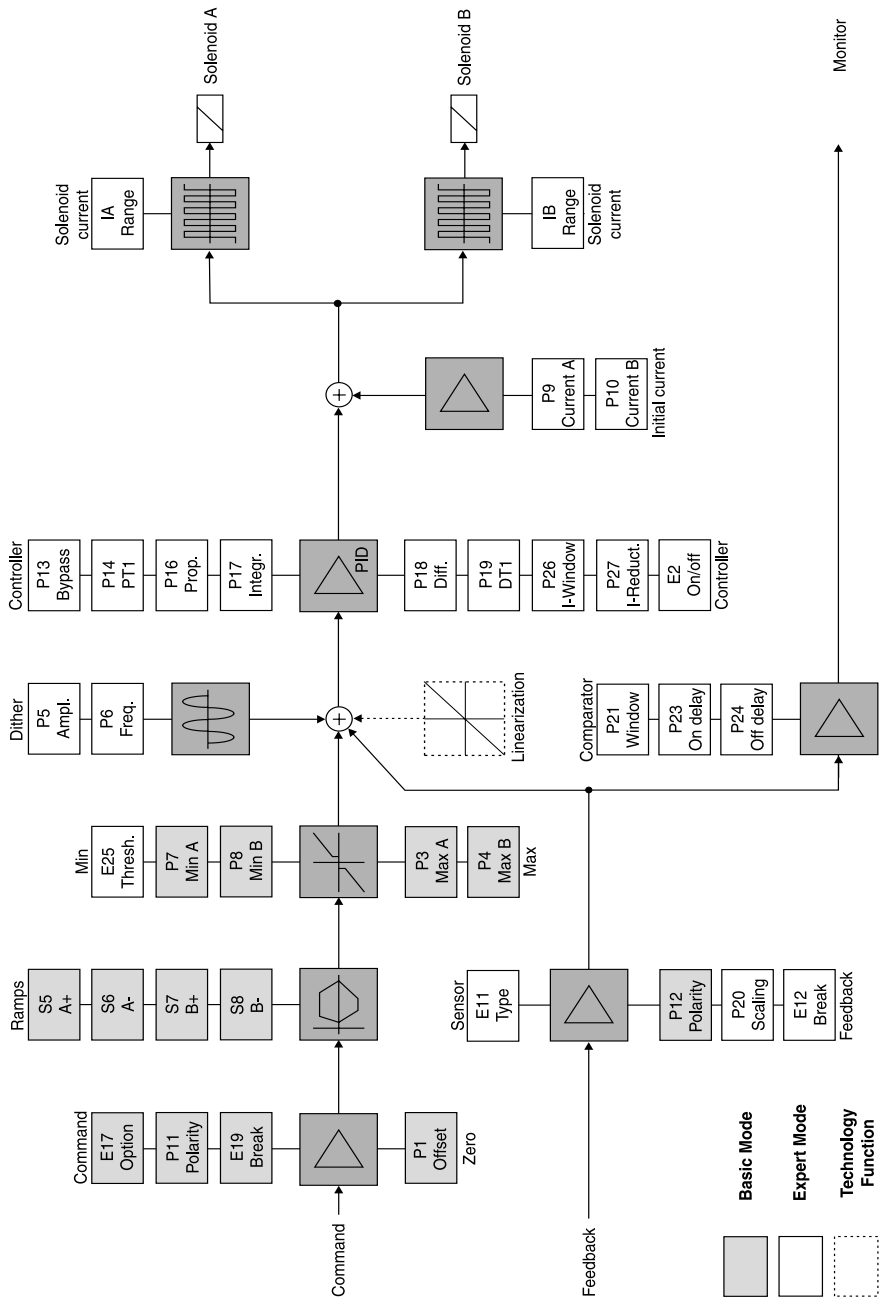
2. Safety instructions

Please read the operation manual before installation, startup, service, repair or stocking! Paying no attention may result in damaging the electronics or incorporated system parts.

2.1. Symbols

This manual uses symbols which have to be followed accordingly:

⚠ **Instructions with regard to the warranty**

⚠ **Instructions with regard to possible damaging of the electronics or linked system components**

☞ **Helpful additional instructions**

2.2. Marking, name plates

Instructions applied on the electronics, i.e. wiring diagrams and name plates, must be observed and maintained legibly.

2.3. Work at the electronics

Working in the area of installation and commissioning of the electronics may only be allowed by qualified personnel. This means persons who due to education, experience and instruction, have sufficient knowledge of relevant directives and approved technical rules.

3. Important details
3.1. Intended usage

This operation manual is valid for module electronics PWDXXA-40X series. Any use diverging or going beyond is deemed to be as not intended. The manufacturer is not liable for warranty claims resulting from this.

3.2. Common instructions

We reserve the right of technical modifications of the described product. Illustrations and drawings within this manual are simplified representations. Due to further development, improvement and modification of the product, the illustrations might not match precisely with the described valve. The technical specifications and dimensions are not binding. No claim may resulting from it. Copyrights reserved.

3.3. Liability

The manufacturer does not assume liability for damage due to the following failures:
• incorrect mounting / installation
• improper handling
• lack of maintenance
• operation outside the specifications
•

⚠ Do not disassemble the electronics! In case of suspicion for a defect please return the unit to the factory.

3.4. Storage

In case of temporary storage the electronics must be protected against contamination, atmospheric exposure and mechanical damages.

Operation Manual

Electronic for proportional DC valves
Series PWDXXA-40X

4. Mounting / Installation

4.1. Scope of supply

Please check immediately after receiving the electronics, if the content is matching with the specified scope of supply. The delivery includes:

- module electronics
- operation manual

☞ Please check the delivery immediately after receiving the shipment for apparent damages due to shipping. Report shipment losses at once to the carrier, the insurance company and the supplier!

4.2. Mounting

- Compare electronics type (located on the name plate) with part list resp. circuit diagram.
- The module may be mounted in any direction.
- The module has to be mounted within a shielded environment (i.e. control cabinet).
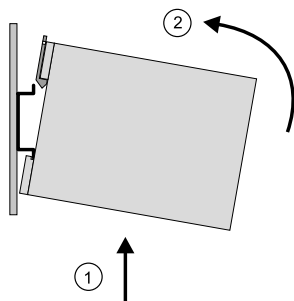- For mounting an assembly rail acc. EN 50022 is required.

Dimensions assembly rail
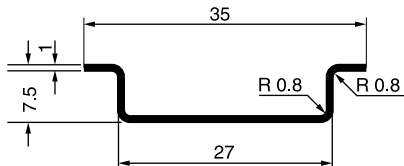
Work flow for module installation
Mounting:
1. Apply the module with the assembly rail guide at the lower edge of the rail.
2. Engage the module upward.

Removing:
1. Lift the metal socket lock with a suitable screwdriver (approx. 4 x 1 mm blade) against the spring force.
2. Unmount the module at the top edge of the assembly rail.
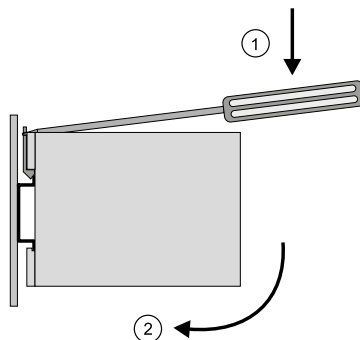
4.3. Operation limits

The electronics may be operated within the determined limits only. Please refer to the "technical data" section.

⚠ Follow the environmental conditions! Unallowable temperatures, shock load, moisture exposure, radiation exposure, illegal electromagnetic emmissions may result in operating trouble and may lead to failure! Follow the operating limits listed in the "specifications" table!

4.4. Electrical connection

The electrical connection of the module electronics takes place by disconnectable screw terminal blocks.

☞ This easy-to-install connection type allows a fast module replacement and a visible separation of the electrical connection. An additional folding unlocking lever allows simple removing of the terminal blocks and serves at once as shock hazard protection and marking strip.

The connecting wires have to comply to the following specification:

Wire type: hookup cable, stranded

Cross sections: supply and solenoids min. AWG 16/1.5mm²

sensor and signals min. AWG 20/0.5mm²

Wire length: max. 50m

☞ For wire lengths > 50 m consult factory.

Skinning length for the connection wires

The screw terminals are designed to allow termination of all kinds of copper wires without the need for preparation. Copper made wire end sleeves may usable as conductor stripping protection for the stranded wires.

⚠ Soldering of the connection wires is not permitted.

To ensure EMC-compatibility the wiring of the module has partly to be undertaken by shielded cables. Detailed information can be read from the chapter "Electrical Interfacing".

⚠ The installation has to take place by qualified personnel! A short between individual conductors, loose wires as well as improper shield connection may result in malfunction and breakdown of the electronics resp. the connected valve!

⚠ The mounting surface of the valve has to be carefully tied to the earth grounded machine frame. The earth ground wire from terminal 8 as well as the cable shields have to be tied to the protective earth terminal within the control unit. It is necessary to use a low ohmic potential connection between control unit and machine frame to prevent earth loops (cross section min. AWG 6 / 10mm²).

4.5. Electrical interfacing

Supply Voltage:

The supply voltage for the electronics will be connected to the terminals 1 and 2 of the module electronics and has to cover the range of 18...30V. The residual ripple may not exceed 5% eff.

⚠ The applied power supply must comply to the relevant regulations (DIN EN 61558) and must carry a CE-mark. The operating voltage for the electronics must be free of inductive surges. Do not exceed the max. value of 30V! Non-observance of this rule may result in permanent damaging of the electronics resp. the connected valve!

⚠ The increased inrush current of the valve should be considered when selecting the power supply. A stabilized power supply with overcurrent limiting feature should not be used. Due to the inrush current of the electronics the current limit circuit may respond prematurely and create problems during energizing of the supply voltage.

Wiring diagram of supply voltage
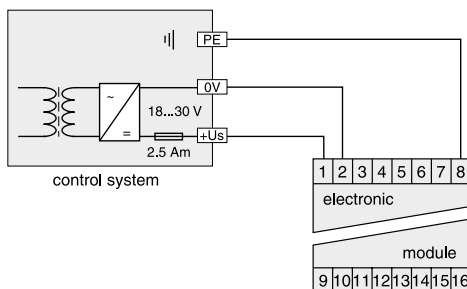
⚠ The operation of the electronics is blocked if the supply voltage polarity is interchanged.

⚠ Each electronics requires a separate pre-fuse of 2.5 Amp time lag. Non-observance of this instruction may create irreparable damage of electronics resp. incorporated system parts.

Enable input

A signal voltage applied to the terminals 3 and 13 enables the solenoid output of the electronics. Continuous operation of the electronics requires a permanent voltage 5...30V (i.e. the supply voltage). In case of disabling the signal the solenoid output of the electronics will be switched off in no time independently from the command signal value. At the same time the position controller output will be clamped. In case of restarting the enable signal, the valve spool takes its position always out of the fail safe position. Preferable the enable signal should be switched on together with the hydraulic pressure supply. This forces the valve solenoid into drop out condition when the hydraulic system is switched off, and it avoids needless heating of the actuator.

⚠ The enable function represents no safety arrangement against unwanted valve operation in terms of rules for accident prevention! To block the valve function under all conditions, more advanced steps are necessary, i.e. the installation of additional safety check valves.

Wiring diagram of enable input

enable signal	solenoid output
U 3-13 < 2,5 V	disabled
U 3-13 > 5...30 V	active
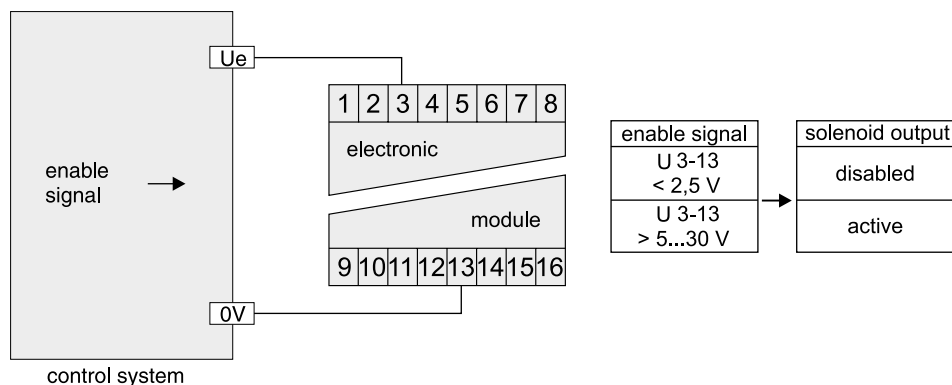
Command signal input

The command signal to the valve will be connected to the terminals 5 and 6 of the difference signal input of the electronics. The connection has to be performed shielded.

The stroke of the valve spool behaves proportional to the command signal amplitude. Depending on the selected electronic parameters different versions of command signal processing are available, which are decribed below.

For the function description terminal 6 is assumed as signal reference (0V).

☞ Details are shown from the technical specifications. The parameter options for the command signal input are described in the chapter "Operating Instructions).
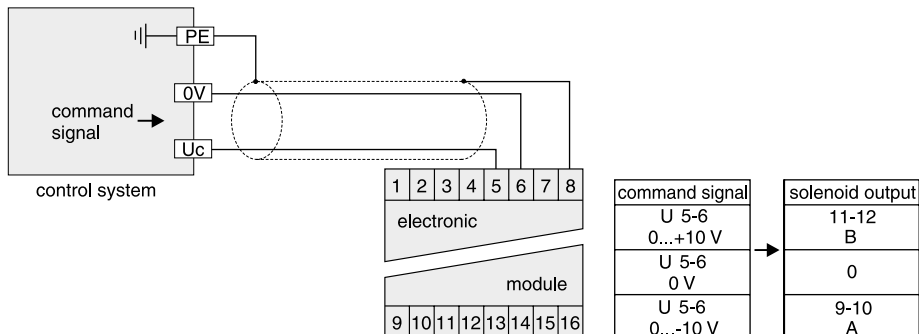
⚠ The command input signal needs to be filtered as well as free of inductive surges and modulations. To prevent malfunctions a high signal quality is recommended.

⚠ Incorrect signal amplitude levels may disturb the functionality and can damage the unit!

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Wiring diagram of voltage command input +10...0...-10V

command signal	solenoid output
U 5-6 0...+10 V	11-12 B
U 5-6 0 V	0
U 5-6 0...-10 V	9-10 A

Wiring diagram of voltage command input +20...0...-20mA

command signal	solenoid output
I 5-6 0...+20 mA	11-12 B
I 5-6 0 mA	0
I 5-6 0...-20 mA	9-10 A
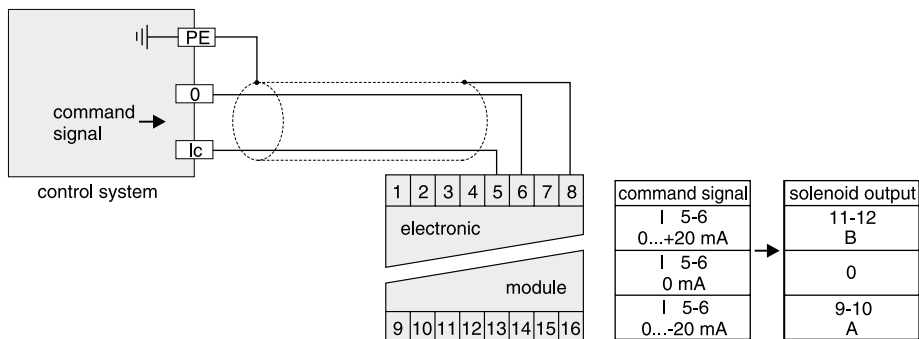
Wiring diagram of current input 4...12...20mA

command signal	solenoid output
I 5-6 12...20 mA	11-12 B
I 5-6 12 mA	0
I 5-6 4...12 mA	9-10 A
I 5-6 < 3.6 mA	solenoid output off
I 5-6 > 3.8 mA	solenoid output on
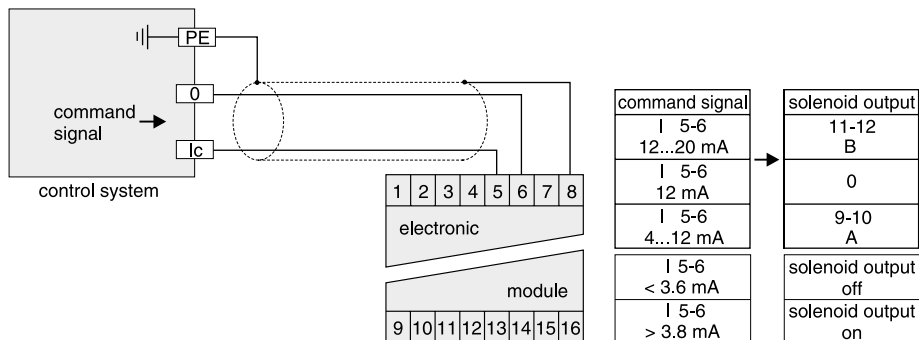
☞ The option 4...20mA uses the "0mA" condition as breakdown-information. This means the presence of an evaluable failure information if the input signal line is interrupted. In this case the solenoid output will be switched off. The output will switched on when the input signal reaches a value of 3.8mA, it switches off when the command falls below 3.6mA. This determination follows the NAMUR-specification NE43. If necessary, the command signal cable break detection can be disabled by selecting the parameter E19.

NAMUR is an association of users of process control technology.

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Monitor output (optional comparator output)

A voltage information representing the feedback signal (i.e. the valve stroke) is available from the terminals 7 and 13. Herewith a voltage span of +10V...0...-10V means +100...0...-100% feedback signal range. The signal resolution of this output averages 8 bit = 0,4%. In case of a breakdown within the sensor cable the monitor output will be switched off, provided that the feedback signal cable break detection is in use (parameter E12).
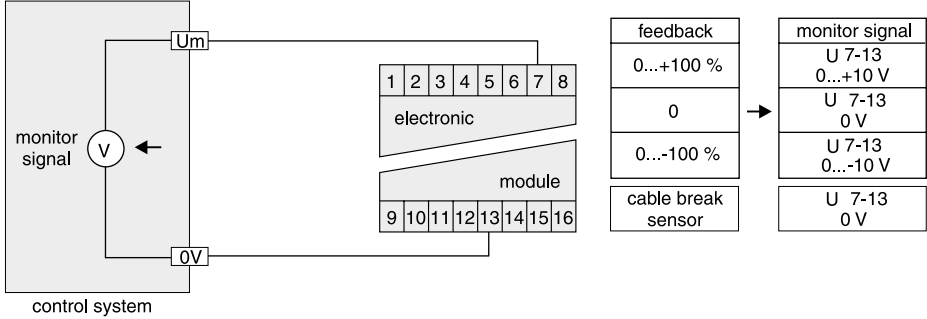
If a comparator window for the feedback signal monitoring is defined via parameter P21, the output generates a voltage signal of 0V if the upper or lower threshold is detected. Within the window the output value is typ. 10V.

☞ The monitor output is not calibrated and represents simply a trend indicator.

⚠ The output may drive a load of max. 5mA. Exceeding this limit leads to malfunction.

Wiring diagram of monitor output

feedback	monitor signal
0...+100 %	U 7-13 0...+10 V
0	U 7-13 0 V
0...-100 %	U 7-13 0...-10 V
cable break sensor	U 7-13 0 V

Status output

The terminals 4 and 13 distributes a signal information about the status of the electronics. The following information is available:

• feedback signal cable break
  (not for options voltage / ±20mA)
• command signal cable break
  (only for option 4...20mA)
• internal processor fault
• enable off

⚠ The output may drive a load of max. 15mA. Exceeding this limit leads to malfunction.

Wiring diagram of status output

condition	status signal
system o.k.	U 4-13 Us 18...30V
cable break sensor	U 4-13 < 0.5 V
cable break command (f. option 4..20 mA)	U 4-13 < 0.5 V
processor failure	U 4-13 < 0.5 V
enable off	U 4-13 < 0.5 V

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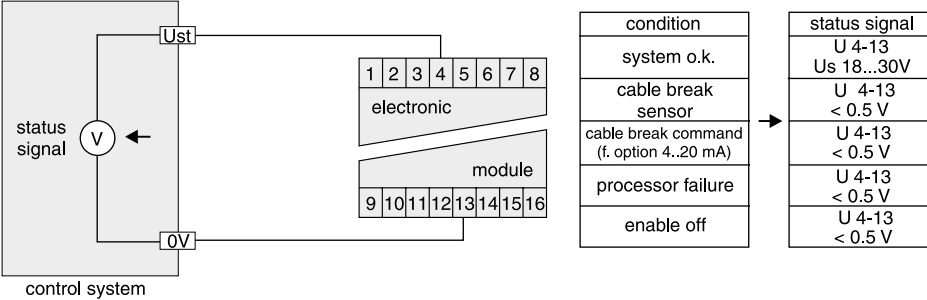
Solenoid outputs

The valve solenoids have to be connected to the terminals 9 and 10 as well as 11 and 12, while the earth ground connection of the solenoids is made via terminal 8. The connection has to be shielded.

⚠ The solenoid connectors may not contain any protective or indication components, i.e. recovery diodes or lamps, otherwise function disturbances and permanent damages may occur to the electronics module.

Wiring diagram of solenoid output

solenoid A

PE
1
2

1 2 3 4 5 6 7 8
electronic
module
9 10 11 12 13 14 15 16

2
1
PE

solenoid B
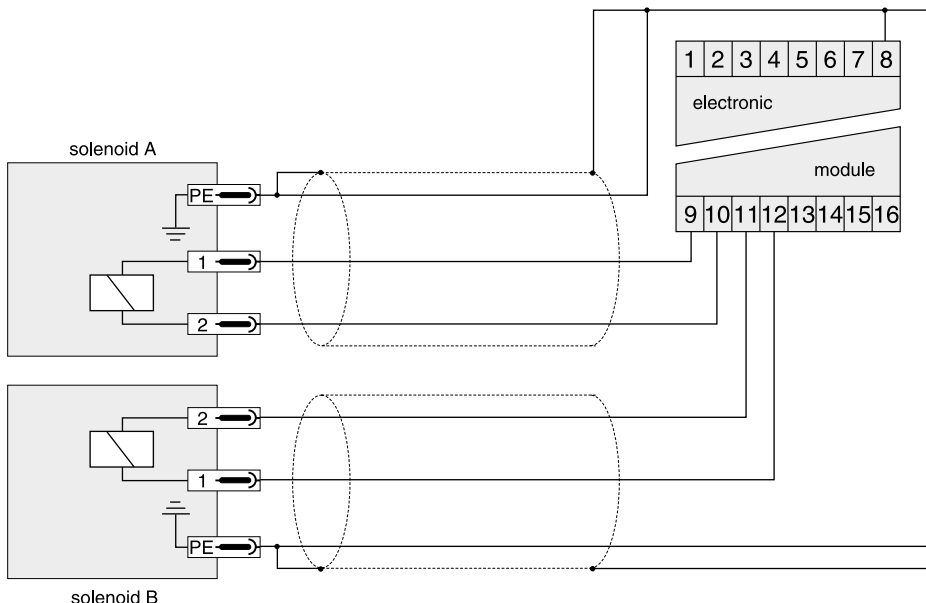
Sensor input

The sensor has to be wired to the terminals 13 and 16, the earth ground connection will be made via terminal 8. The connection has to be shielded. The sensor type is selectable via software parameter E11.

⚠ Connection of an unusable sensor may lead to permanent damage to the electronics module.

☞ The module is usable for valves of design series D*FC, D*FS, RLL*R, WLL*R (standard connection). On appropriate selection of the parameter E11, sensors with other signal spans may be connected.

Wiring diagram of standard sensor input (Parker valves)
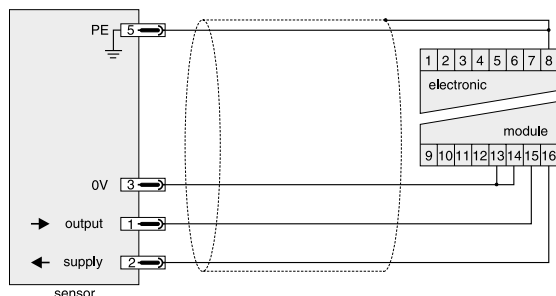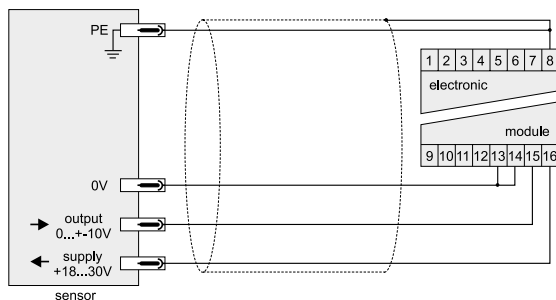
PE [5]
1 2 3 4 5 6 7 8
electronic
module
9 10 11 12 13 14 15 16

0V [3]
output [1]
supply [2]
sensor

Wiring diagram of sensor input 0...±10V

PE
1 2 3 4 5 6 7 8
electronic
module
9 10 11 12 13 14 15 16

0V
output 0...+-10V
supply +18...30V
sensor

Wiring diagram of sensor input 0...+20mA / 4...12...20mA, 3-wire

PE
1 2 3 4 5 6 7 8
electronic
module
9 10 11 12 13 14 15 16

0V
output 0...+-20mA 4..12..20mA
supply +18...30V
sensor

Wiring diagram of sensor input 0...+20mA / 4...12...20mA, 2-wire

PE
1 2 3 4 5 6 7 8
electronic
module
9 10 11 12 13 14 15 16
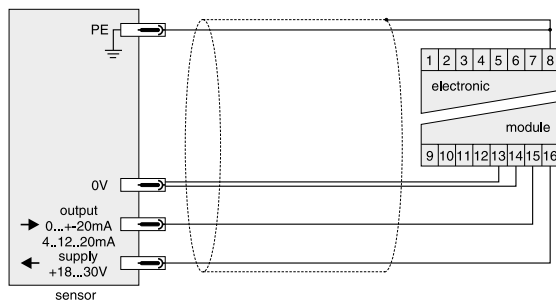
output 0...+-20mA 4..12..20mA
supply +18...30V
sensor
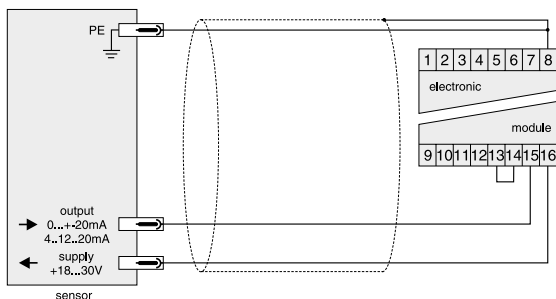
5. Operating instructions

Basically the electronics performs the task of converting a command signal into a proportional control value via the connected valve with the highest possible dynamic. For these purposes the input value will be electronically compared with the feedback of the process value (i.e. the spool position) within the module. The signal difference feeds a position controller, that in turn provides via a power amplifier stage the required current for the solenoids of the valve.

5.1. Operating software program

ProPxD parameterizing software:
The ProPxD software permits comfortable parameter setting for the module electronics. Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets to floppy or hard disk is possible as well as printout or record as a text file for further documentation. Stored parameter sets may be loaded anytime and transmitted to the module electronics in the same manner as the basic parameters which are available for all usable valve series. Inside the electronics a nonvolatile memory stores the data with the option for recalling or modification.

⚠ The connected valve may not operated before loading an appropriate parameter set from the PC into the module electronics!

Features
- comfortable editing of all parameters
- depiction and documentation of parameter sets
- storage and loading of optimized parameter adjustments
- executable with all actual Windows® operating systems from Windows® 95 upwards
- plain communication between PC and electronics via serial interface RS-232C and nullmodem cable

The ProPxD operating software may be ordered under code 5715543. Alternatively, the program is ready for download from the Parker internet homepage address

http://www.parker.com/euro_hcd

ProPxD screenshot
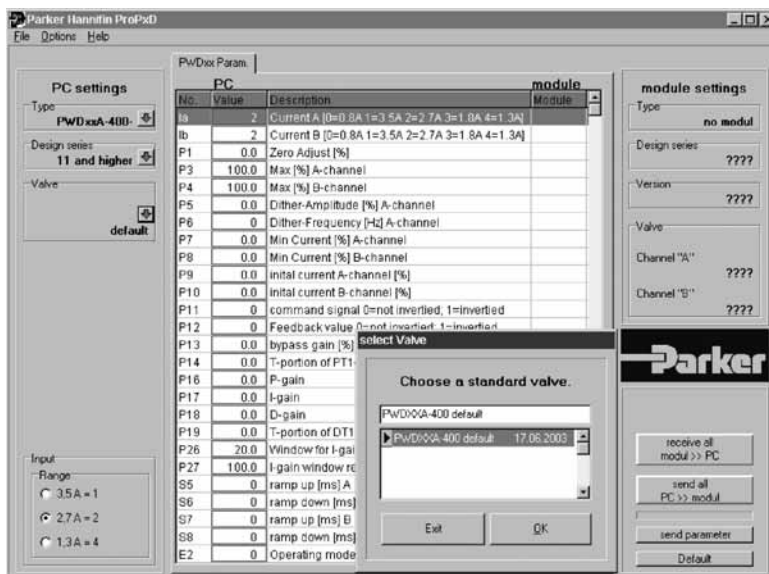
Hardware requirements

- PC with operating system from Windows® 95 upwards
- interface RS-232
- display resolution min. 800 x 600
- nullmodem connection cable between PC and electronics module
- storage requirement approx. 4 MB

  It is recommended to select "small fonts" at the display setting, otherwise distortion of the display may occur.

Null modem cable

The connection of the module electronics to a PC requires a so-called "null modem cable". Such a cable can normally be obtained from computer shops as well as from catalog distributors for electronic components. A proper function of the data communication requires in this case at least the following described cable configuration. The cable has to be inserted between an unused serial port COM1 or COM2 of the PC and the 9pole socket connector of the module.
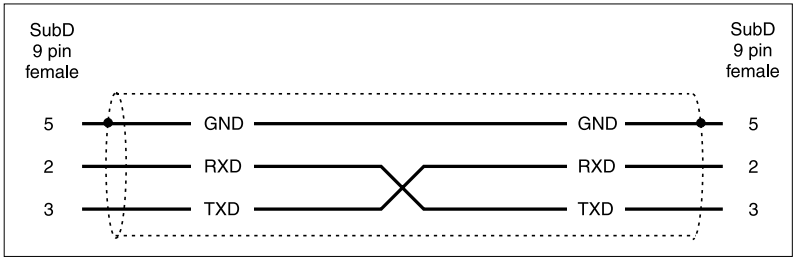
Connection diagram of the null modem cable

Buying sources for the null modem cable

Supplier	Order-nr.
Viking	G2E-71B10
Farnell	976880
DisData	672786
Staples	IM1511680
Newark	83F7101
DigiKey	AE1033-ND
CompUSA	50023590

5.2.   Program installation

Please check before installation if the above hardware requirements are met. If your PC has already stored an older version of the "ProPxD" program, it has to be deinstalled by using the Windows® - system control feature.

Program installation sequence

- Terminate the execution of other programs.
- Insert ProPxD-software CD.
- Execute the file "setup.exe".
- Follow the instructions on the screen.

Answer the question, if an older version should be overwritten, with "*ok*". During the installation you may change destination drive resp. installation path, if needed (i.e. if the storage space on drive "c" is not sufficient).

Please answer also "*ok*" if at the end of the installation the program reports any system information. After successful installation the desktop display shows the ProPxD icon for starting the program.

PWDXXA_10 5715-602 UK.indd CM 05.06.12

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5.3. Software operating

⚠ Incorrect settings may lead to malfunction! In case of parameter changes shut the drive down!

Brief instruction for first startup

- Connect the module electronics to the supply voltage.
- Connect the module to a PC via null modem cable.
- Click on the ProPxD icon to start the operating program.
- After displaying the program resp. data base version a program window opens and the connected electronics will be automatically identified (possibly a manual identification via the button *"Receive all"* is necessary).
- Select the desired version via the menu *"Options/Optionen"* with the menu item *"Language/ Sprache"*.
- Select the engaged valve from the provided type table via the menu *"Options"* and the item *"Valve type"*.
- Subsequently the program inserts the valve specific default parameters into the parameter table.
- Individual parameters may be selected via mouse or the arrow buttons at the center of the program screen.
- Parameter changes are possible via mouse or the arrow buttons on the bottom left within the program screen, also the parameter values may be edited via the keyboard.
- Modified parameters will be stored via the *"Enter"* key or via the button *"Update list"*.
- After completing of all modifications, the entire parameter set may be transmitted to the electronics via the button *"send all"*, also the parameters will be nonvolatile stored.
- The chosen parameters may be optionally stored on the PC via the *"File"* menu with the menu item *"Save as"*, data retrieving is always possible via the function *"Load out of database"*

Extended functions

The user software is shared into 2 parameter ranges:
- basic mode
- expert mode

For normal startup the basic mode is absolutely sufficient. It permits the setting of all **application** specific parameters to match the valve function with the task setting, the **valve** specific parameters will be selected from the valve library. In case of special applications the valve parameters may be adapted via the expert mode.
The operating mode may be selected from the *"Options"* menu and remains after termination and re-start of the program.

⚠ Changing of expert parameters is only permitted for qualified personnel.

To prevent an unauthorized access for the expert mode, a password is requested. The name is *"parker"* and cannot be changed. Thus additionally to the button *"Default"* for loading of the default parameters, the button *"Send parameter"* appears in the *"Expert"*-operating mode. This button transmits only the setting of one single parameter to the connected module electronics. Thus a quick tuning of single parameters is permitted during the setup.

☞ A horizontal bar graph readout between the communication buttons shows the data transfer state.

Additional to the device parameters, the electronics also stores the device types, selected from the valve library. Via the button *"receive all"* the valve parameters will be read out of the electronics and stored including the valve type. If expert parameters will be modified and transfered, the valve information memory inside the electronics will be erased and the word *"customized"* is shown within the valve display area. Via an arrow button located beside the view boxes of *"Type"*, *"Design series"* and *"Valve"*, the corresponding selection table may be reached directly.

☞ Because the ProPxD program has also offline (i.e. without connection to the electronics) functionality, a manual pre-selection of the parameters is possible. After selection of the electronics type via the menu *"Options"* the parameters may be set and stored for later transmission. Note the design series while selection of the electronics!

The *"File"* menu provides the functions *"Printer setup"*, *"Print preview"* and *"Print"*. The print preview includes the option for parameter set storage as text file (format *.txt*) prior to further processing. The *"Options"* menu provides also the selection of the RS-232 interface port via the menu item *"Port"*. Via the menu item *"Load out of database"* previously stored parameter sets may be loaded.

☞ Information on the technology functions is provided within the help function of the operating software.

5.4. Adjustment parameters

The available parameters may be divided into multiple groups and are characterized by different letters:

S-parameters   internal commands and ramps
P-parameters   operating parameters
E-parameters   extended parameters
I-parameters   solenoid current parameters

Parameter overview for basic mode

Parameter	Description	Unit	Parameter range from	up to	Default setting
S5	ramp accel. channel A	ms	0	32500	0
S6	ramp decel. channel A	ms	0	32500	0
S7	ramp accel. channel B	ms	0	32500	0
S6	ramp decel. channel B	ms	0	32500	0
P1	zero	%	-100.0	+100.0	0.0
P3	MAX channel A	%	50.0	100.0	100.0
P4	MAX channel B	%	50.0	100.0	100.0
P7	MIN channel A	%	0.0	50.0	0.0
P8	MIN channel B	%	0.0	50.0	0.0
P11	polarity command	–	0	1	0
P12	polarity feedback	–	0	1	0
E17	option command	–	1 = ±10V 2 = ±20mA 3 = 4 ... 20mA		1 = ±10V
E19	cable break detection command	–	0	±10V: 0 ±20mA: 0 4 ... 20mA: 1	0

Individual description of basic parameters

S5 ramp accel. channel A	Adjustment of ramp rate for increasing of valve side A. To avoid switching noise.
S6 ramp decel. channel A	Adjustment of ramp rate for decreasing of valve side A. To avoid switching noise.
S7 ramp accel. channel B	Adjustment of ramp rate for decreasing of valve side B. To avoid switching noise.
S8 ramp decel. channel B	Adjustment of ramp rate for decreasing of valve side B. To avoid switching noise.
P1 offset	Adjustment of zero position shifting (offset). To compensate for unbalances within the zero position of the valve.
P3 MAX channel A	Adjustment of maximum stroke for valve side A at 100% command signal. To match the command signal span to the valve operating range.
P4 MAX channel B	Adjustment of maximum stroke for valve side B at 100% command signal. To match the command signal span to the valve operating range.
P7 MIN channel A	Adjustment of stroke step for valve side A at 0,1% command signal. To compensate for the overlap of the valve spool.
P8 MIN channel B	Adjustment of stroke step for valve side B at 0,1% command signal. To compensate for the overlap of the valve spool.
P11 command signal polarity	Adjustment of the command signal polarity. To match the command signal polarity to the valve operating direction.
P12 feedback signal polarity	Adjustment of the feedback signal polarity. To match the sensor signal polarity to the solenoid polarity of the valve.
E17 type of com. sig. device	Adjustment of the command signal option. To match the command signal input to the input signal mode.
E19 cable break detection command	Adjustment of the operating mode for the command cable break detection. To turn on resp. off the cable break detection for the command signal at a selected command signal option of 4...20mA.

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Parameter overview for expert mode

Parameter	Description	Unit	Parameter range		Default set-ting
			from	up to	
P5	dither amplitude	%	0	10.0	0
P6	dither frequncy	Hz	0	300	0
P9	quiescent current channel A	%	0	25.0	0
P10	quiescent current channel B	%	0	25.0	0
P13	bypass gain	–	0	100.0	0
P14	T-portion PT1-element	–	0	100.0	0
P16	P-portion	–	0	100.0	0
P17	I-portion	–	0	100.0	0
P18	D-portion	–	-100.0	+100.0	0
P19	T-portion DT1-element	–	0	100.0	0
P20	feedback scaling	%	0	200.0	100.0
P21	comparator function window	%	0	200.0	0
P23	comparator rise delay time	ms	0	10000	0
P24	comparator turn-off delay time	ms	0	10000	0
P26	window I-portion	–	0	20	20
P27	reduct. window I-portion	–	0100.0	100.0	100.0
E2	closed loop control	–	0 = inactive (open loop) 1 = active (int. closed loop) 2 = active (ext. closed loop)		0 = inaktiv
E11	position transducer type	–	1 = ±10V 2 = ±20mA 3 = 4-20mA bipolar 4 = D1FC/WLL NG06 5 = D3FC/WLL NG10 6 = RLL NG06 7 = D31FS 8 = D41FS 9 = D81FS 10 = D91FS 11 = D111FS 12 = 4-20mA unipolar 13 = TEL 50/70 14 = TEL 90/125		1 = ±10V
E12	cable break detection feedback	–	0	voltage: 0 current ±20mA: 0 current 4-20mA: 1	0 = voltage
E25	MIN operating threshold	–	0 = 1% 1 = 0.01%		0 = 1%
IA	solenoid current channel A	–	1 = 3.5A 2 = 2.7A 4 = 1.3A		2 = 2.7A
IB	solenoid current channel B	–	1 = 3.5A 2 = 2.7A 4 = 1.3A		2 = 2.7A

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Individual description of expert parameters

P5 dither amplitude	Adjustment of dither amplitude. To reduce the influence of solenoid friction.
P6 dither frequency	Adjustment of dither frequency. To match the dither signal to the valve dynamic.
P9 initial current channel A	Adjustment of the bias current for the solenoid of the valve side A. To compensate for the solenoid initial current.
P10 initial current channel B	Adjustment of the bias current for the solenoid of the valve side B. To compensate for the solenoid initial current.
P13 bypass gain	Adjustment of the bypass gain for the controller. To improve the control dynamic.
P14 T-portion of PT1	Adjustment of the integral action time for the PT1-portion of the controller. To attenuate for the P-portion.
P16 P-portion	Adjustment of the P-portion for the controller. For the basic tuning of the controller.
P17 I-portion	Adjustment of the I-portion for the controller. To reduce the control failure.
P18 D-portion	Adjustment of the D-portion for the controller. To improve the control dynamic.
P19 T-portion of DT1	Adjustment of the pre-hold time for the DT1-portion of the controller. To attenuate for the D-portion.
P20 feedback scaling	Adjustment of the scaling factor for the feedback signal. To match the feedback signal span to the operating range.
P21 window for comparator function	Adjustment of the comparator window for the feedback monitoring. To adjust the feedback monitoring range.
P23 comparator rise delay time	Adjustment of the comparator rise delay time. To delay the rise threshold for the comparator function.
P24 comparator turn-off delay time	Adjustment of the comparator turn-off delay time. To delay the turn-off threshold for the comparator function.
P26 window for I-gain activation	Adjustment of the I-portion active range in terms of the control difference. To limit the I-portion on a certain range.
P27 I-gain window reduction	Adjustment of the I-portion outside the window in terms of the control diffe-rence. To match the response behaviour to the I-portion.
E2 control mode	Adjustment of the operating mode for the controller. To select the control function.
E11 type of feedback device	Adjustment of the feedback device type. To match the feedback input to the signal device features.
E12 cable break detection feedback	Adjustment of the operating mode for the feedback cable break detection. To turn on resp. off of the cable break detection for the feedback signal.
E25 MIN operating threshold	Adjustment of the MIN operating threshold. To match the response sensitivity for the MIN-stroke step.
IA nominal current solenoid A	Adjustment of the maximum current for the solenoid of the valve side A. To match the solenoid output to the nominal current of the solenoid.
IB nominal current solenoid B	Adjustment of the maximum current for the solenoid of the valve side B. To match the solenoid output to the nominal current of the solenoid.

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5.5.   Error messages

Malfunctions when using the ProPxD software program will be indicated via appropriate failure messages.

Failure messages and corrective actions

Failure message	Description / corrective action
The Com Port is not available!	Terminate the other program, or quit the message and select another RS-232 port via the menu "Options > Port". Afterwards reconnect the null modem cable.
Unable to open COM port	Com port is not available. Quit the message and select another RS-232 port via the menu "Options > Port". Afterwards reconnect the null modem cable.
There is no module connected or the communication is disturbed!	No data exchange possible. Either the electronics has been removed, the port is mismatched, or the connection will be disturbed by strong electrical fields. Check if the Com port is set for "9600, 8, 1. none, none" via the menu "Options > Port".
Wrong password!	Retype the password, notice the exact spelling (case sensitivity).
Wrong input!	An unvalid character or a value outside the permitted range has been used at parameter entry.
Keep the entered parameters?	During parameter loading from the electronics module memory the preset parameters from the left hand screen display may be rejected or maintained.
The chosen module isn´t the same as the connected hardware!	In principle, parameters dedicated to a type which deviates from the connected electronics module may be edited. However, for data transmitting the correct module has to be connected. If parameters will be loaded from a module which deviates from the selected one, the parameters from the left hand side screen display of the program will be overwritten.
file name.pxd already exists. Do you want to replace the file?	The file name already exists within the indicated directory. Select another name, another directory or overwrite the existing file with "OK".

6.   Maintenance

Periodical maintenance is essential for the longevity of the unit and guarantees reliability and availability.

The following properties of the electronics have to be checked in continuous short time intervals:
- tight fit on the mounting rail
- tight fit of the disconnectable terminals
- tight fit of the terminal screws
- environmental temperature level
- supply voltage level
- cleanliness of the ambience

⚠ Service work may only be carried out by qualified personnel. Detailed knowledge of the machine functions concerning switching on and off as well as of the required safety relevant technical tasks is necessary!

7.   Trouble-shooting

Basis of trouble-shooting is always a systematic approach. At first the following questions have to be checked:
- Are there practical experiences with similar failures?
- Have system adjustments been changed?

☞ In either case the available diagnostic options should be used. The electronics permits a diagnostic of the valve function via the monitor output. The status output monitors the working condition of the electronics, an additional visual status results from an LED indicator.

Location of status indicator

status indicator
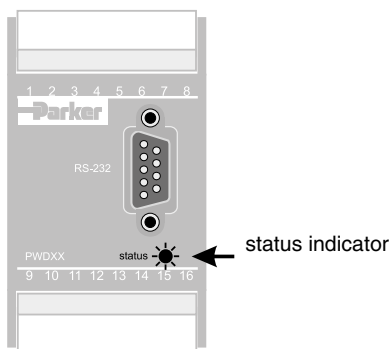
Function assignment

Operating condition	LED-display
no failure	green
no supply voltage	off
no enable signal	yellow
cable break feedback sensor (not for options voltage / +-20 mA)	red
cable break command signal (only for option 4...20 mA)	red
internal processor fault	red

Afterwards starting of trouble-shooting by means of a priority list of the **most likely** reasons.

malfunction at runtime of a connected valve

possible reasons for malfunction	generally no function	high frequent oscillation	low frequent oscillation	one way operation only	spool stroke variations at unchanging command	operates too ruggedly	spool stroke too low	drifting without command	corrective actions
too low system / pilot pressure	X						X		check hydraulic pump resp. motor, pressure / relief valves
drive overloaded		X	X	X	X	X	X		reduce pressure resp. speed, increase valve size
valve contaminated	X	X	X	X		X	X		clean pressure fluid, filter / flush valve
hydraulic fluid too viscous / too cold			X	X	X	X	X		change fluid grade, provide operational temperature
too low oil level within tank	X						X		refill pressure fluid
filter contaminated						X	X		clean resp. replace filter
electronic supply voltage too low	X		X				X		keep supply voltage range
electronic supply voltage contains too much ripple		X							reduce ripple
command signal too low	X			X			X		increase command signal
command signal contains too much ripple			X						reduce ripple
enable signal too low	X								keep enable signal range
incorrect electronic parameters	X	X	X	X	X	X	X		check parameters
electronic terminals contaminated	X	X		X	X	X			clean terminals
interrupted cable at electronic or valve	X			X					fix cable
wiring sequence incorrect	X	X		X	X		X		correct wiring sequence
cables partly or totally without shielding	X	X			X				change cable grade
electronic defective	X							X	keep characteristics, check wiring, replace electronic
valve solenoid defective	X	X					X		check solenoids resp. wiring, replace valve
valve sensor defective	X						X		check sensor resp. wiring, replace valve

⚠ For suspect of a sluggish spool the valve may be flushed with clean pressure fluid.

⚠ Trouble-shooting in a hydraulic system requires in either case a systematic approach. The work may exclusively be performed by qualified personnel, as it requires detailed knowledge about function and construction of the system. Reversals or dissassemblings may not be taken imprudently! Prior to the works it has to be clarified, if the system has been operated properly until the failure occured.

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8. Repair / Service

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- direct replacement for parts subject to wear at our Service Center in Kaarst, Germany
- technical training in theory and practice

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