

# Parker Series TDP 2-Way High-Response Valve Service Manual

## Operation Manual

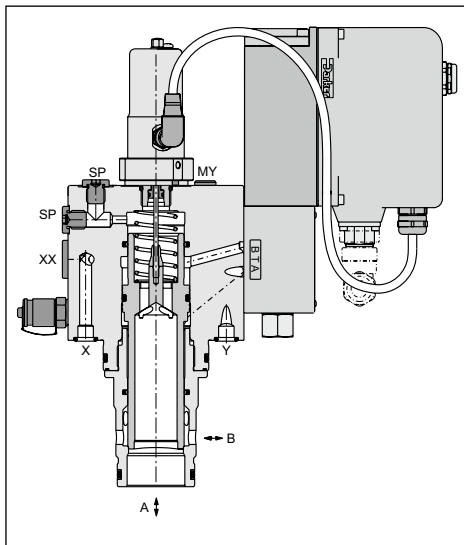
### 1. Introduction

Parker 2-way servo proportional valves with VCD® technology have an integrated electronics and require only one sole electrical common for the control system. Different flow sizes are available to achieve an optimal adaption for different applications. Series TEP base on the TDP range. Additionally, TEP valves are equipped with a direction control valve for shutting off the pilot system.

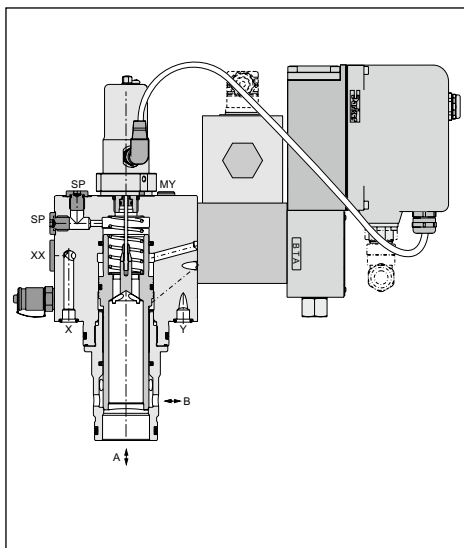
### Characteristics of Valve Driver

The described integral electronic driver combines all necessary functions for the optimal operation of the valves. Thanks to its excellent dynamic the valves are usable within closed loop control applications. The most important features are:

- high dynamic actuator principle with special designed electronic driver
- closed loop controlled spool position
- constant current actuator control with overcurrent shutoff
- excellent properties for response sensitivity and temperature drift
- differential input stage with various command signal options
- diagnostic output for spool stroke
- standard central connection
- compatible to the relevant European EMC-standards



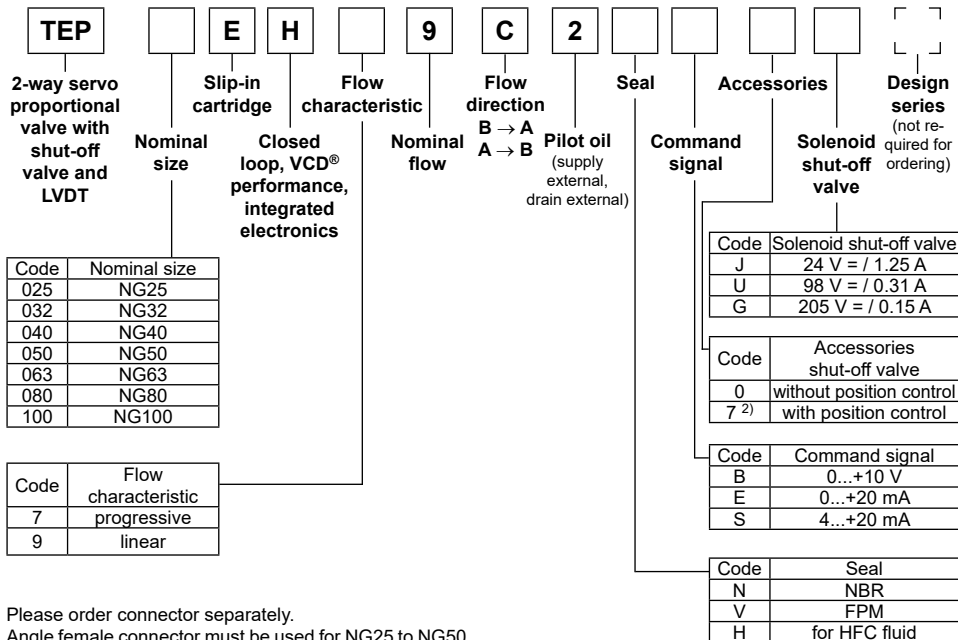
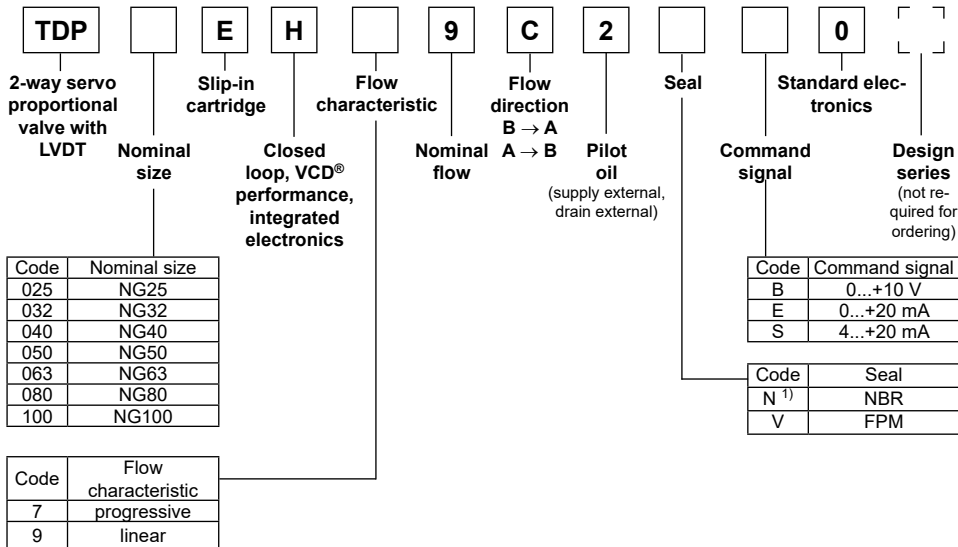
TDP



TEP

## Operation Manual

### Ordering Code



Please order connector separately.

Angle female connector must be used for NG25 to NG50.

<sup>1)</sup> For HFC fluids suitable

<sup>2)</sup> Please order female connector M12 x 1 separately (order no.: 5004109).

## Technical Data

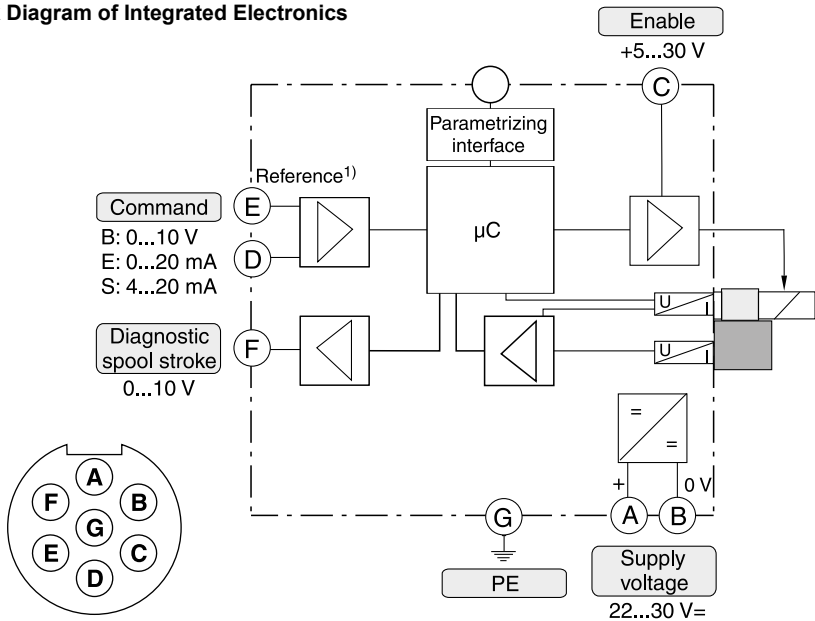
| General  |   |  |      |      |      |      |       |       |
|--|---|--|------|------|------|------|-------|-------|
| Design   | Proportional throttle valve with LVDT and integrated electronics, slip-in cartridge according to ISO 7368 |  |      |      |      |      |       |       |
| Nominal size   | DIN   | NG25   | NG32 | NG40 | NG50 | NG63 | NG80  | NG100 |
| Mounting position  | unrestricted  |  |      |      |      |      |       |       |
| Ambient temperature  | [°C]  | -20...+50  |      |      |      |      |       |       |
| Weight   | [kg]  | 11   | 13   | 15   | 26   | 52   | 105   | 157   |
| Vibration resistance   | [g]   | 10 sinus 5...2000 Hz acc. IEC 68-2-6<br>10 (RMS) random noise 20...2000 Hz acc. IEC 68-2-36<br>15 shock acc. IEC 68-2-27 |      |      |      |      |       |       |
| Hydraulic  |   |  |      |      |      |      |       |       |
| Max. operating pressure  | [bar]   | Ports A, B, X, SP up to 350, XX observe accumulator pressure rating, port Y max. 35                                      |      |      |      |      |       |       |
| Fluid  | Hydraulic oil according to DIN 51524  |  |      |      |      |      |       |       |
| Fluid temperature  | [°C]  | -20 ... +60 (NBR: -25...+60)   |      |      |      |      |       |       |
| Viscosity recommended  | [cSt] / [mm²/s]   | 30 ... 80  |      |      |      |      |       |       |
| permitted  | [cSt] / [mm²/s]   | 20 ... 400   |      |      |      |      |       |       |
| Filtration   | ISO 4406; 18/16/13  |  |      |      |      |      |       |       |
| Nominal flow at $\Delta p=5$ bar (linear)                                | [l/min]   | 420  | 850  | 1500 | 1900 | 3600 | 4500  | 8000  |
| Recommended max. flow (linear)   | [l/min]   | 800  | 2000 | 3000 | 4500 | 8000 | 13000 | 20000 |
| Nominal flow at $\Delta p=5$ bar (progressive)                           | [l/min]   | 380  | 750  | 1300 | 1700 | 3200 | 3900  | 6800  |
| Recommended max. flow (progressive)                                      | [l/min]   | 700  | 1750 | 2600 | 4000 | 7000 | 11250 | 17000 |
| Flow direction   | B to A and A to B   |  |      |      |      |      |       |       |
| Pilot pressure   | [bar]   | must be as high as system pressure   |      |      |      |      |       |       |
| Pilot oil supply   | external via X  |  |      |      |      |      |       |       |
| drain  | external via Y  |  |      |      |      |      |       |       |
| Leakage in pilot valve at 100 bar  | [ml/min]  | < 400  |      |      |      |      |       |       |
| Pilot valve size   | NG06  |  |      |      | NG10 |      |       |       |
| Max. pilot flow at 140 bar pilot press.                                  | [l/min]   | 23   | 30   | 40   | 40   | 70   | 80    | 100   |
| Static/dynamic   |   |  |      |      |      |      |       |       |
| (for optimal dynamics see installation recommendation in main catalogue) |   |  |      |      |      |      |       |       |
| Step response at pilot press. >140 bar                                   | [ms]  | 10.5   | 12   | 14   | 20   | 17   | 23    | 28    |
| Frequency response at pilot press. >140 bar                              |   |  |      |      |      |      |       |       |
| Amplitude -3 dB; 10 % $\pm$ 5 %  | [Hz]  | 95   | 80   | 74   | 66   | 52   | 46    | 41    |
| Phase -90°; 10 % $\pm$ 5 %   | [Hz]  | 85   | 63   | 59   | 52   | 56   | 51    | 47    |
| Hysteresis   | [%]   | < 0.1  |      |      |      |      |       |       |
| Sensitivity  | [%]   | < 0.05   |      |      |      |      |       |       |
| Temperature drift  | [%/K]   | < 0.025  |      |      |      |      |       |       |

<sup>1)</sup> If valves with onboard electronics are used in safety-related parts of control systems, in case the safety function is requested, the valve electronics voltage supply is to be switched off by a suitable switching element with sufficient reliability.

Technical Data

| Electrical               |                    |  |
|--------------------------|--------------------|--|
| Duty ratio               | [%]                | 100  |
| Protection class         |                    | IP65 in acc. with EN 60529 (with correctly mounted plug-in connector)                              |
| Supply voltage / ripple  | [V]                | 22...30, electric shut-off at <19, ripple < 5 % eff., surge free                                   |
| Current consumption max. | [A]                | 3.5  |
| Pre-fusing               | [A]                | 4.0 medium lag   |
| Input signal             |                    |  |
| Code B Voltage           | [V]                | 0...+10, ripple < 0.01 % eff., surge free  |
| Impedance                | [kOhm]             | 100  |
| Code E Current           | [mA]               | 0...+20, ripple < 0.01 % eff., surge free  |
| Impedance                | [Ohm]              | < 250  |
| Code S Current           | [mA]               | 4...20, ripple < 0.01 % eff., surge free   |
| Impedance                | [Ohm]              | < 3.6 mA = disable > 3.8 mA = enable on according to NAMUR NE43 < 250                              |
| Differential input max.  | [V]                | 30 for terminal D and E against PE (terminal G)<br>11 for terminal D and E against 0V (terminal B) |
| Enable signal            | [V]                | 5...30, Ri = > 8 kOhm  |
| Diagnostic signal        | [V]                | 0...+10 / +12.5 error detection, rated max. 5 mA   |
| EMC                      |                    | EN 61000-6-2, EN 61000-6-4   |
| Electrical connection    |                    | 6 + PE acc. EN 175201-804  |
| Wiring min.              | [mm <sup>2</sup> ] | 7 x 1.0 (AWG16) overall braid shield   |
| Wiring lenght max.       | [m]                | 50   |

Block Diagram of Integrated Electronics



<sup>1)</sup> Do not connect with the supply voltage zero.

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## 2. Safety Instructions

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

### 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 valve or linked system components**



**Helpful additional instructions**

### Service

Workings in the area of installation, commissioning, maintenance and repair of the valve may only be allowed by qualified personnel. This means persons which have, because of education, experience and instruction, sufficient knowledge on relevant directives and approved technical rules.

## 3. Important Details

### Intended Usage

This operation manual is valid for 2-way high-response valves series TDP and TEP. Any different or beyond it usage is deemed to be as not intended. The manufacturer is not liable for warranty claims

resulting from this.

### Common Instructions

We reserve the right for 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 out of it. Copyrights are reserved.

### 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 valve! In case of suspicion for a defect please contact Parker.**

### Storage

In case of temporary storage the valve must be protected against contamination, atmospheric exposure and mechanical damages. Each valve has been factory tested with hydraulic oil, resulting in protection of the core parts against corrosion. Yet

| Storage period | Storage requirements   |
|----------------|--|
| 12 months      | constant humidity < 60 % as well as constant temperature < 25 °C |
| 6 months       | varying humidity as well as varying temperature < 35 °C          |

this protection is only ensured under the following conditions:



**Outdoor storage or within sea and tropical climate will lead to corrosion and might disable the valve!**

## Operation Manual


### 4. Mounting / Installation

#### Scope of Supply

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

- valve
- operation manual

The central connector has to be ordered separately and is not included in the delivery.

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


#### Mounting


- Compare valve type (located on the name plate) with part list resp. circuit diagram.
- The valve may be mounted fix or movable in any direction.
- Verify the mounting surface for the valve. Unevenness of 0.01 mm/100 mm, surface finish of 6.3 µm are tolerable values.

 Keep valve mounting surface and work en-

vironment clean!


- Remove protection plate from the valve mounting surface
- Check the proper position of the valve ports and the O-rings.
- Mounting bolts: use property class 12.9, ISO 4762

 Insufficient condition of the valve mounting surface might create malfunction! Incorrect mounting resp. bolt torque may result in abrupt leakage of hydraulic fluid on the valve ports.

 Y-port has always to be tied directly and separately to tank!

#### Limits of Use

The valve may be operated within the determined limits only. Please refer to the "technical data" section as well as to the "characteristic curves" in the Parker catalogue HY11-3500/UK "Hydraulic Valves Industrial Standard".


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

#### Available Bolt Kits

| Size       | Ordering no. | Mounting bolt  | Torque  |
|------------|--------------|----------------|---------|
| TDP/TEP025 | BK504        | 4 pcs. M12x100 | 108 Nm  |
| TDP/TEP032 | BK529        | 4 pcs. M16x100 | 264 Nm  |
| TDP/TEP040 | BK481        | 4 pcs. M20x110 | 517 Nm  |
| TDP/TEP050 | BK481        | 4 pcs. M20x110 | 517 Nm  |
| TDP/TEP063 | BK518        | 4 pcs. M30x160 | 1775 Nm |
| TDP/TEP080 | BK530        | 8 pcs. M24x160 | 890 Nm  |
| TDP/TEP100 | BK531        | 8 pcs. M30x150 | 1775 Nm |

#### Pressure Fluids

The following rules applies for the operation with various pressure fluids:

 This information serves for orientation and does not substitute user tests among the particular operating conditions. Particularly no liability for media compatibility may be derived out of it.


Mineral oil: usable without restriction.

HFC: choose the right seal option for series TEP.

Choose seal option code N for series TDP.

|     |                                  |
|-----|----------------------------------|
| HFA | Oil-in-water emulsion            |
| HFB | Water-in-oil emulsion            |
| HFD | Unhydrus fluids (Phosphor-Ester) |

For operation with the following pressure fluids please consult Parker:

 For detailed information concerning pressure fluids note VDMA-document 24317 as well as DIN 51524 & 51502.

Special gaskets may be available depending on the utilized fluid.

In case of doubt please consult Parker.

## Installation recommendation

An insufficient pilot oil supply (e.g. due to long distances and/or small diameters) can negatively influence the dynamics of the TDP/TEP valve.

To avoid this, an accumulator can be connected to port XX at the valve body of the TDP/TEP. A short-term undersupply with pilot oil can be compensated via this accumulator.

| Nominal size | Required accumulator volume |                          |
|--------------|-----------------------------|--------------------------|
|              | 1 stroke close              | 2 strokes close and open |
| NG40         | 0.01                        | 0.02                     |
| NG50         | 0.013                       | 0.03                     |
| NG63         | 0.02                        | 0.04                     |
| NG80         | 0.03                        | 0.06                     |
| NG100        | 0.04                        | 0.08                     |

The required accumulator size is dependent on the pilot oil pressure.

Please also consider the Parker accumulator product range and the Parker Accumulator Sizing Software.

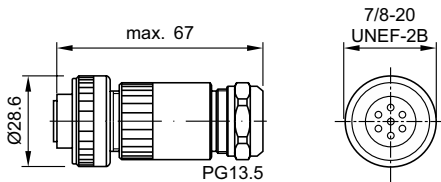
## Electrical Connection

The electrical connection of the valve takes place by one common cable, which is coupled to the integrated electronic driver by a central connector assembly.

The connection requires a 6 + PE female connector EN 175201-804.

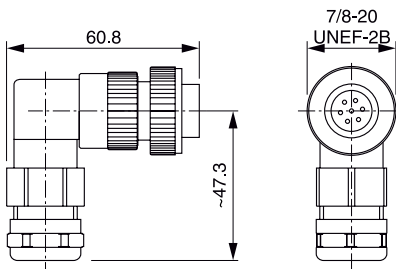
Female connector (ordering no. 5004072)

For NG63 up to NG100



Angled female connector (ordering no. 5005160)

For NG25 up to NG50



**⚠** A female connector with metal housing is required! Plastic made models may create function problems due to insufficient EMC-characteristics.

**⚠** Do not disconnect cable socket under tension!

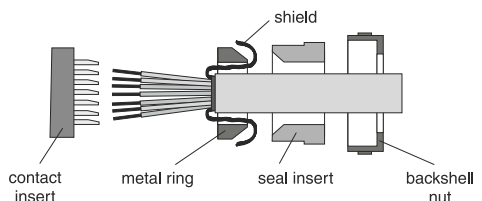
The connecting cable has to comply to the following specification:

Cable type control cable, flexible, 7 conductors, overall braid shield  
 Cross section min. AWG16  
 Outer dimension 8...12 mm  
 Cable length max. 50 m

**👉** For cable lengths > 50 m consult Parker.

The connection cable is coupled to the female connector by solder joints.

Skinning lengths for the connecting cable:



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The backshell nut of the cable gland has to be tightened with a suitable tool. The target value for the tightening torque is 4 Nm. Tighten the cap nut with a torque of 5 Nm after attaching the female connector on the socket.

**⚠** Incomplete tightening of backshell nut respectively cap nut may result in undesired release of the connection as well as degradation of the water tightness.

When using female connectors of other manufacturers, the relevant regulations must be observed.

**⚠** The cable may only be connected to the female connector by authorized and qualified personnel. A short between individual conductors resp. to the connector housing, bad soldering as well as improper shield connection may result in malfunction and breakdown of the valve.

**⚠** The mounting surface of the valve has to be connected to the earth grounded machine frame. The earth ground wire from the valve connecting cable as well as the cable shield 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 AWG 6).

**Electrical Interfacing**

**Supply Voltage**

The supply voltage for the valve has to cover the range of 22...30 V. Valve is de-energized below 19 V. The residual ripple may not exceed 5 % eff.

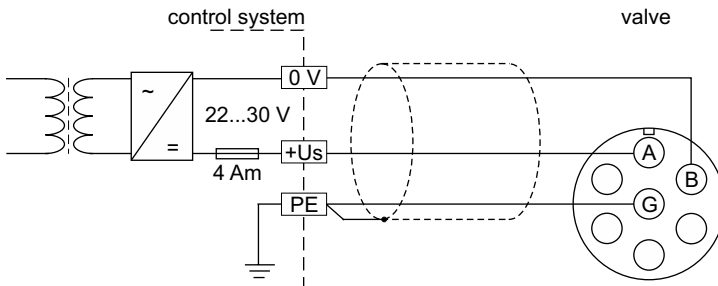
**⚠** The applied power supply must comply to the relevant regulations (DIN EN 61558) and must carry a CE-mark. The operating voltage for the valve must be free of inductive surges. Do not exceed the max. value of 30 V! Higher voltage can lead to failure of the valve.

**⚠** 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 valve the current limit circuit may respond prematurely and create problems during energizing of the supply voltage.

**⚠** The operation of the valve is blocked if the supply voltage polarity is interchanged.

**⚠** Each valve requires a separate pre-fuse of 4 Amp semi time-lag. Failure to observe this instruction may create irreparable damage of valve respectively incorporated system parts.

**Wiring Diagram of Supply Voltage**





## Enable Input

A signal voltage enables the actuator drive of the valve. Continuous operation of the valve requires a permanent voltage 5...30 V (i.e. the supply voltage). In case of disabling the signal the valve will reach its power down position spring-actuated independently from the command signal value.



The enable function represents no safety arrangement against unwanted valve operation in terms of rules for accident prevention!

## Command Signal Input

The spool stroke behaves proportional to the command signal amplitude.



The command input signal needs to be filtered as well as free of inductive surges and modulations. Due to the sensitivity of the valve a high signal quality is recommended, this will prevent malfunction.



The option 4...20 mA uses the "3.6 mA" condition as breakdown-information. If the input signal line is interrupted, an evaluable failure information is available. In this case the actuator drive will be switched off. The drive will switch on when the input signal reaches a value of 3.8 mA, it switches off when the command falls below 3.6 mA. This determination follows the NAMUR-specification NE43.

## Diagnostics Output

A diagnostics signal is available. Its voltage represents the operating condition of the valve.



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

## Valves NG25 to NG50

| Code command signal | Command signal | VCD actuator | Diagnostic signal      |
|---------------------|----------------|--------------|------------------------|
| B                   | 0...+10 V      | on           | 0...+10 V              |
|                     | 0...-10 V      | on           | 0...-10 V              |
|                     | Overload       | off          | 12.5 V                 |
| E                   | 0...+20 mA     | on           | 0...+10 V              |
|                     | 0...-20 mA     | on           | 0...-10 V              |
|                     | Overload       | off          | 12.5 V                 |
| K                   | 0...+10 V      | on           | 0...-10 V              |
|                     | 0...-10 V      | on           | 0...+10 V              |
|                     | Overload       | off          | 12.5 V                 |
| S                   | 4...12 mA      | on           | 0...-10 V              |
|                     | 12...20 mA     | on           | 0...+10 V              |
|                     | 0...3.6 mA     | off          | Cable break,<br>12.5 V |
|                     | Overload       | off          | 12.5 V                 |

## Valves NG63 to NG100

| Code command signal | Command signal | VCD actuator | Diagnostic signal      |
|---------------------|----------------|--------------|------------------------|
| B                   | 0...+10 V      | on           | 0...-10 V              |
|                     | 0...-10 V      | on           | 0...+10 V              |
|                     | Overload       | off          | 12.5 V                 |
| E                   | 0...+20 mA     | on           | 0...-10 V              |
|                     | 0...-20 mA     | on           | 0...+10 V              |
|                     | Overload       | off          | 12.5 V                 |
| K                   | 0...+10 V      | on           | 0...+10 V              |
|                     | 0...-10 V      | on           | 0...-10 V              |
|                     | Overload       | off          | 12.5 V                 |
| S                   | 4...12 mA      | on           | 0...+10 V              |
|                     | 12...20 mA     | on           | 0...-10 V              |
|                     | 0...3.6 mA     | off          | Cable break,<br>12.5 V |
|                     | Overload       | off          | 12.5 V                 |

**Operation Manual**

**5. Operating Instructions**

**⚠ Attention!** Supply pressure must be ensured before valve is energized!  
To reach the closed position in case of valve electronic failure, pilot pressure is required.

**Switch on/off Series TEP**

**⚠** When switching on the complete valve, the D3DW shut-off valve has to be switched at least 50 ms before enable of the DFplus pilot valve. When switching off, this order must be reversed. If this is not observed, vibrations can occur in the main stage.

**Solenoid Current Monitoring**

If the actuator current time interval exceeds 10 seconds, the actuator is switched off to prevent overheating. For normal operating conditions this state will not be reached, but it may occur with a contaminated sluggish valve.

**⚠** In this case the reason for the contamination should be repaired (hydraulic fluid exchange, filtration review, valve flushing).

The overcurrent shutoff condition may be reset by temporary disconnection of the enable signal.

**👉** The shutoff of the VCD actuator due to overload will be indicated via the diagnostics output.

**ProPxD Parameterizing Software**

The ProPxD software permits comfortable parameter setting for the module electronic. Via the clearly arranged entry mask the parameters can be noticed and modified. Storage of complete parameter sets is possible as well as printout or record as a text file for further documentation.

The PC software can be downloaded free of charge at [www.parker.com/isde](http://www.parker.com/isde) - see page "Support" or directly at [www.parker.com/propxd](http://www.parker.com/propxd).

For program installation and software operating please see operation manual 5715-687. The manual can be downloaded at [www.parker.com/isde](http://www.parker.com/isde) – see page "Support"

Please check periodical for updates.

**Hardware Requirements**

- PC with operating system from Windows® XP upwards
- interface RS232C
- display resolution min. 800 x 600
- connection cable between PC and electronic module
- storage requirement approx. 40 MB

**👉** If your PC has no serial interface according to RS232 standard you require in addition an USB-RS232C adapter.

**Cable Specification**

**⚠ Attention!** The valve electronic provides no USB interface, but can only be parametrized via an RS232C connection. Therefore the usage of USB standard cables is not allowed and may result in damaging of valve resp. PC.

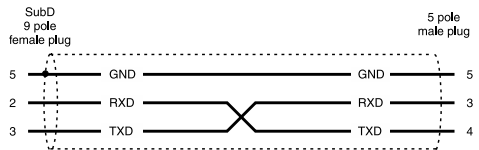
**Parametrizing**

Ordering code: 40982923

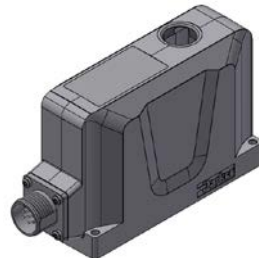


PC side connection

valve side connection



Plug for parametering interface



**⚠** The cover plug has to be re-installed after completion of the parametrizing work.

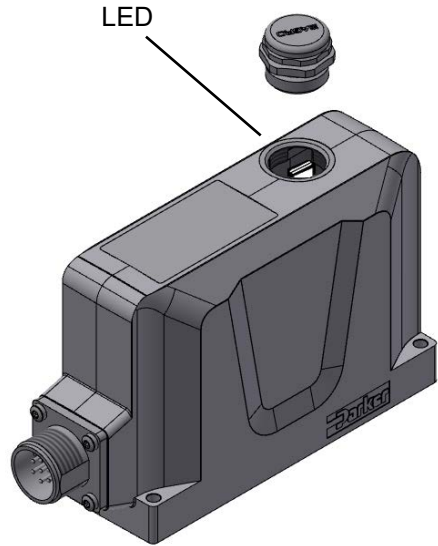
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## LED flashing signals of the valve electronics

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enable valve OK: approx. 0.5 Hz (slowly, green)  
disable valve OK: approx. 1 Hz (fast, green)  
valve error: approx. 10 Hz (very fast, green)

Closer information can be can be displayed via the ProPxD Parametrier software.



### Error code

| Error code (additive) | Error description           |
|-----------------------|-----------------------------|
| 0                     | no errors                   |
| 1                     | over current                |
| 2                     | cable break command signal  |
| 4                     | cable break feedback signal |
| 8                     | undervoltage error          |
| 16                    | bus communication error     |
| 32                    | hardware failure            |