



Bulletin MSG11-5715-593/UK

Operation Manual



Proportional Valves for External Electronics

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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.

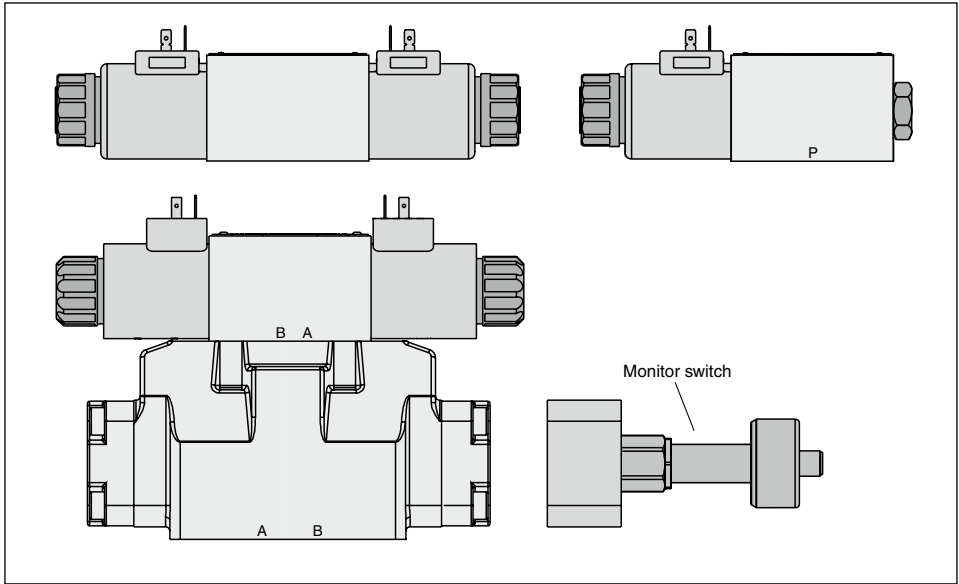
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Index	Page
1. Introduction	4
Order code	4
Name plate	5
Connections with the electronics	5
Characteristics of valves	5
Specifications	6
Scope of supply	7
Important information	7
Information on the process of technical changes	7
Information on warranty and liability	7
CE mark	7
Personnel requirements	7
Compliance with other rules and instructions	7
2. Safety Instructions	8
Safety instructions	8
Use of the product	8
Limits of use	8
Contaminations	8
Remaining risks	8
3. Use of the Product	9
Transport	9
Storage	9
Commissioning	10
Pressure fluids	10
Electrical connection	11
4. Operation Instructions	13
Electronic control unit	13
Solenoid selection	13
Air bleeding of hydraulic system	14
Filter	14
Flushing	14
5. Maintenance	14
6. Trouble-Shooting	15
7. Product Information	16
Accessories / spare parts	16

1. Introduction

Parker proportional DC valves are available with and without integrated electronics. In the latter case an external electronic is required, which matches

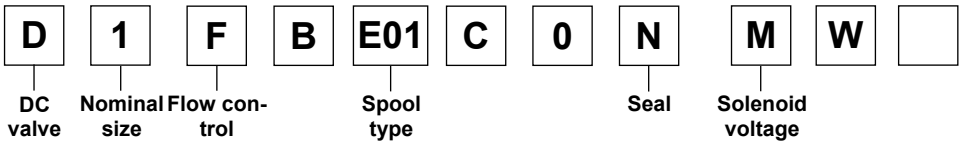
the characteristics of the valve. Parker provides an optimal tuned electronic for each valve equipped with different operating and configuring options.



Order code

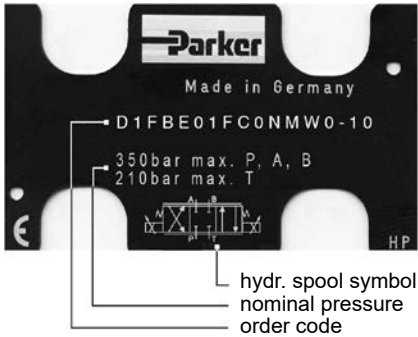
Each valve carries a name plate with the order code indicating the definite valve type. The meaning of the individual characters can be taken from the corresponding catalog sheet of the valve.

Example:



Name plate

Example:

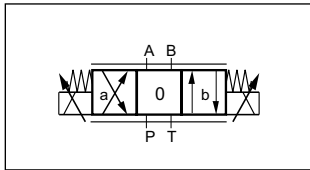


Characteristics of valves

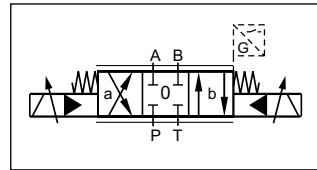
Parker proportional DC valves show all attributes which are essential for optimal and trouble-free operation under industrial conditions:

- Excellent valve characteristics
- Driven by modern DC-proportional solenoids
- Hydraulic connection via standard mounting interface
- Electrical connection via standard connectors
- Pilot operated proportional DC optional with position control

Symbols

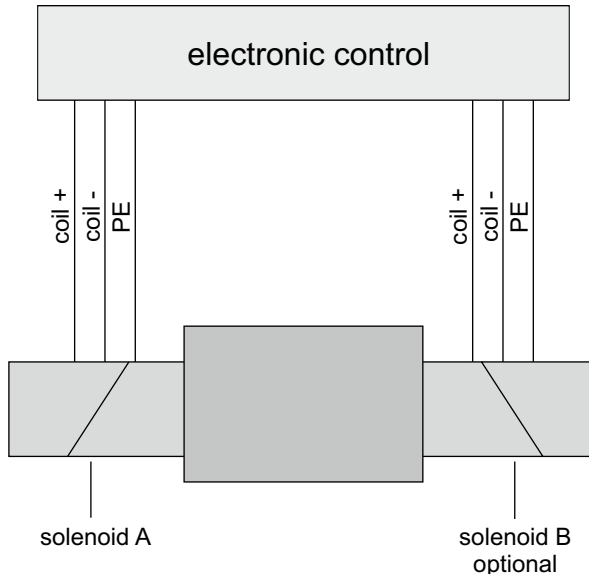


D*FB



D*1FB

Connections with the electronics



Specifications

General		
Model	[bar]	See catalog
Drive		Proportional solenoid
Installation position		Unrestricted
Ambient temperature range	[°C]	-20...+60
Hydraulic		
Fluid rate		Hydraulic oil acc. DIN 51524...535, other on request
Viscosity	[mm ² /s]	30...80 (max. 20...400)
Fluid temperature	[°C]	-20...+60 (NBR: -25...+60)
Cleanliness class		18/16/13 acc. to ISO 4406
Operating pressure max.	[bar]	See catalog
Electrical		
Duty ratio	[%]	100
Protection class		Standard (as per EN175301-803) IP65 in acc. with EN 60529 DT04-2P "Deutsch" IP69K (with correctly mounted plug-in connector)
Solenoid		
Supply voltage	[VDC]	See catalog
Current consumption	[A]	See catalog
Connection		2 + PE acc. EN 175301-803
Connection cable	[mm ² /s]	3 x 1.5 (AWG 16) overall braid shield
Insulation class		F (155°C)
Monitor switch (optional)		
Supply voltage	[VDC]	19.2...28.8, ripple < 10 % eff., surge free
Current consumption without load	[mA]	≤ 20
Connection		4 + PE acc. IEC 61076-2-101 (M12)
Connection cable	[mm ²]	4 x 0.5 (AWG 20) overall braid shield
EMC		EN 61000-6-2, EN 61000-6-4
Cable length max.	[m]	50

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 assembly 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, the insurance company and the supplier!

Intended usage

This operation manual is valid for proportional directional control valves D*FB/D*1FB series. Any different or beyond it usage is deemed to be as not intended. The manufacturer is not liable for warranty claims resulting from this.


Information on the process of technical changes

We reserve the right to make technical changes as a result of further development of the product described in these operating instructions. Figures and drawings in these instructions are simplified depictions. As a result of developments, improvements and changes to the product, it is possible that the figures are not fully consistent with the valve in operation. The technical details and dimensions are non-binding. They may not form the basis of any claims. Copyright reserved.

Information on warranty and 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 specification

 Do not disassemble the valve! In case of suspicion for a defect please return it to Parker.

CE mark

The CE mark appears on the main nameplate. If the product is installed as part of a larger machine, this larger machine is in turn subject to EU directives and must therefore obtain a general CE mark for the machine as a whole. The machine must not enter circulation in the EU until this is done. The legal requirements corresponding to the CE mark can be found in section "Other applicable standards / rules".

Personnel requirements

The product may only be used, installed, removed, operated and maintained by specialist personnel. For the purposes of these instructions, a specialist is defined as someone who, on the basis of their education, expertise and professional experience, is able to correctly evaluate and carry out the tasks and duties assigned to him/her, and identify and correct potential hazards. Skilled, semi-skilled or trained personnel may not use this product under their own responsibility unless they have the required specialist knowledge. Otherwise, they may only use the product under the constant supervision of a specialist person.

Compliance with other rules and instructions

Carry out transport and installation/repair activities only in accordance with the valid and applicable safety and accident prevention regulations issued by the trade associations.

The valve contains hydraulic oil. The normal local environmental protection requirements must therefore be met when handling the product. The particular circumstances of each place of installation mean that instructions must be followed in order to install and use the product safely.


2. Safety

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.


Use of the product

The product must only be used if it is perfect in working order. Problems that may impair safety must be corrected.

 This product is a safety component that may only be repaired by the manufacturer if it malfunctions. If the safety components are repaired by the user, the manufacturer's warranty is invalidated because the manufacturer is demonstrably unable to ensure that the product is used as specified.


Limits of use

The product may only be operated within the specified limits of use. The relevant details can be found in „Technical data“.

 Ambient conditions must be observed. Unauthorized temperatures, shocks, the effects of aggressive chemicals, radiation, unauthorized electromagnetic emissions may result in disruptions and failures. Observe the limits of operation set out in „Technical data“.

Contaminations

Function and service life of the valve are heavily dependent on the purity and quality of the pressure fluid and depend upon the operating conditions of the hydraulic components. Appropriate filters must be used and regular inspections of the medium must be carried out to prevent contamination of the pressure fluid. Permitted level of contamination is set out in the „Technical data“.

 Be aware of three important sources of contamination:


- Contaminations entering during installation
- Contaminations occurring during operation
- Dirt entering from the surroundings

Remaining risks


Allergic reactions

Hydraulic oil can cause allergic reactions on susceptible skin. This can be prevented by taking the precautions that are usual when handling mineral oil products and by using personal protective equipment.

Leaking plugs


 Leaking plugs can cause a malfunction. That is why the plugs must be checked for leaks at the regular maintenance interval. Leaking plugs may constitute a safety hazard, so the valve must be returned to Parker for repair.

Lightning


 If electronic components are exposed to electromagnetic fields as a result of lightning, they must be checked to ensure they are still working perfectly. If there is a malfunction, the product must be returned to Parker.

Temperature

The surface of our product may heat up in use.

 The service temperatures may exceed the temperature threshold for burn injury, 70 °C. Above this threshold, even brief contact with the surface may result in a burn. The only way to consistently prevent burn injuries is to use personal protective equipment and to remain safety-conscious at all times.

Power failure

 In a power failure the valve piston returns to the spring centred starting position. You must check whether this creates potential hazards when the system/machine is used.

Hydraulic


D*FB/D*1FB valves are tested and approved with an even flow. If the flow becomes asymmetrical, the safety function of the valve may be compromised. You should therefore carry out tests before commissioning to verify that the valve is in good working order.

If the valve piston has been under pressure and stationary in the end position for an extended period, oil particles may cause the piston to seize. For this reason the valve should be actuated regularly.

3. Use of the product

Transport

Depending on size, lifting equipment or transport aids are needed. Our product leaves the factory in perfect working order, and appropriate packaging is used to protect it from damage.

 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!


When transporting the product within your premises, make sure it is kept in a safe position and protected in its original packaging until it is ready to use. Note also the information in sections “Warranty and liability”, “Basic information on using the manual”, “Other applicable standards/rules”, “Personnel requirements”, “Remaining risks”.


Storage

If the product needs to be temporarily stored, it must be protected from dirt, the weather, and damage. Each valve is tested with hydraulic oil in the factory, so that the internal components are protected from corrosion. However, this protection can only be guaranteed under the following conditions:

Storage time	Conditions
12 months	Stable air humidity 60 % and stable temperature < 25 °C
6 months	Fluctuating air humidity and fluctuating temperature < 35 °C


The product is delivered with adequate corrosion protection, provided our recommendations for the ambient conditions are followed.

 Storage outside or in maritime or tropical climates without appropriate packaging leads to corrosion and may make the product unusable.


 Make sure the product is stored so that no injuries can be caused by tipping or falling. In particular, make sure that the safety rules for high-bay racking are followed.


Commissioning


After installing our product in a system/machine, make sure that the requirements of the Machinery Directive are met if applicable. Access should be provided to the hydraulic diagram, the equipment list and the logic diagram for the system/machine.

 The product must be checked for damage and missing parts (e.g. seals) before installation, especially in the area of the sealing surfaces and the safety devices. If the safety devices or sealing surfaces are damaged or are missing individual parts with relevance to the product's function, the product may not be used.

Remove all transport securing devices, protective covers and packaging.

 Check for foreign objects in the open hydraulic passages. Contaminations may impair operational reliability and shorten the service life.


 Make sure that the hydraulic system/machine is unpressurised before the product is installed.

 Before commissioning, the specialist personnel must verify that the entire hydraulic system has been installed correctly. Commissioning must be carried out with care, taking account of all safety regulations.

If necessary, erect warning signs to prevent unintended operation. Note also the information in sections "Warranty and liability", "Basic information on using the manual", "Other applicable standards/rules", "Personnel requirements", "Remaining risks".

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 clean valve mounting surface and work environment!

- Remove protection plate from the valve mounting surface
- Check the proper position of the valve ports and the O-rings.

- Mounting bolts:
 D1FB: 4 pcs. M5x30
 D3FB: 4 pcs. M6x40
 D31FB: 4 pcs. M6x40
 D41FB: 2 pcs. M6x55 / 4 pcs. M10x60
 D91FB: 6 pcs. M12x75
 D111FB: 6 pcs. M20x90
 Use property class 12.9, ISO 4762

Tighten the bolts crisscross with the following torque values:

D1FB: 7.6 Nm	D31FB: 13.2 Nm
D3FB: 13.2 Nm	D41FB: 13.2/63 Nm
	D91FB: 108 Nm
	D111FB: 517 Nm

 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.

Pressure fluids

The following rules apply for the operation with various pressure fluids: The above 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 restrictions

For operation with the following pressure fluids please consult Parker:

HFA	Oil-in-water emulsion
HFB	Water-in-oil emulsion
HFC	Aqueous solution (glycols)
HFD	Unhydrous fluids (Phosphor-Ester)

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 insecurity please consult Parker.

Electrical connection

The electrical connection of the valve takes place by separate cables for solenoids resp. position sensor.

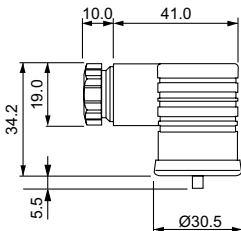
Solenoid connection:

Each solenoid requires one connector assembly 2 + PE acc. to EN 175301-803.

☞ The connector assemblies have to be ordered separately.

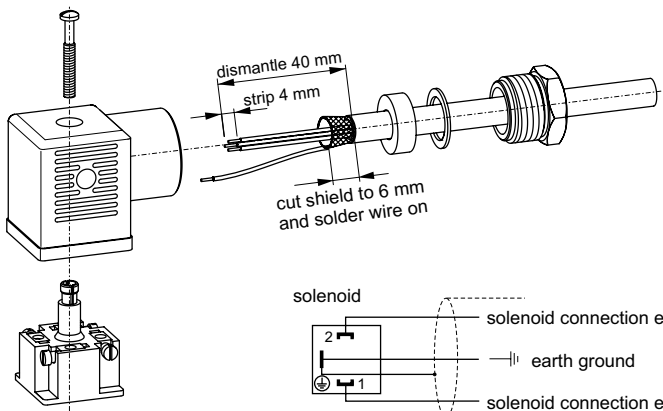
Available types

Thread	Color	Imprint	Order no.
PG9	grey	A	5001711
PG9	black	B	5001710
PG11	grey	A	5001717
PG11	black	B	5001716



⚠ The applied connector assemblies may not contain adaptive circuits, as signal lamps or recovery diodes, otherwise malfunctions and irreparable damages may occur on the electronic control unit!

Connection of the female connector assembly



The connection cable has to comply to the following specification:

- Cable type: control cable, flexible, 3 conductors, overall braid shield
- Cross section: min. 1.5 mm² (AWG 16)
- Outer dimension: PG9: 4,5...7 mm / PG11: 6...9 mm
- Cable length: max. 50 m

☞ For cable lengths > 50 m consult factory.

⚠ The mounting surface of the valve has to be carefully tied to the earth grounded machine frame. The earth ground wires as well as the cable shields have to be tied to the protective earth terminal within the control unit.

The connection cable will be coupled to the connector assembly via terminal screws.


The backshell nut of the cable gland has to be tightened with a suitable tool.

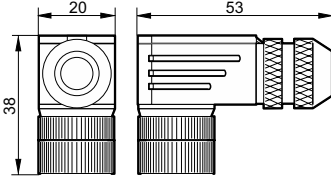
⚠ Incomplete tightening of the screw threads may result in automatic release of the connection as well as degradation of the water tightness. Follow the "instructions for use" for installation of female connectors made by other manufacturers!


⚠ The cable connection to the female connector has to take place by qualified personnel! A short between individual conductors resp. to the connector housing, bad workmanship as well as improper shield connection may result in malfunction and breakdown of the valve.

Monitor switch

The sensor requires one connector assembly 4 + PE acc. to IEC61076-2-101 (M12).


 The connector assembly has to be ordered separately.



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


The connection cable has to comply to the following specification:


- Cable type: control cable, flexible, 4 conductors, overall braid shield
- Cross section: min. 0.5 mm² (AWG 20)
- Outer dimension: 6...8 mm
- Cable length: max. 50 m

 For cable lengths > 50 m consult Parker.

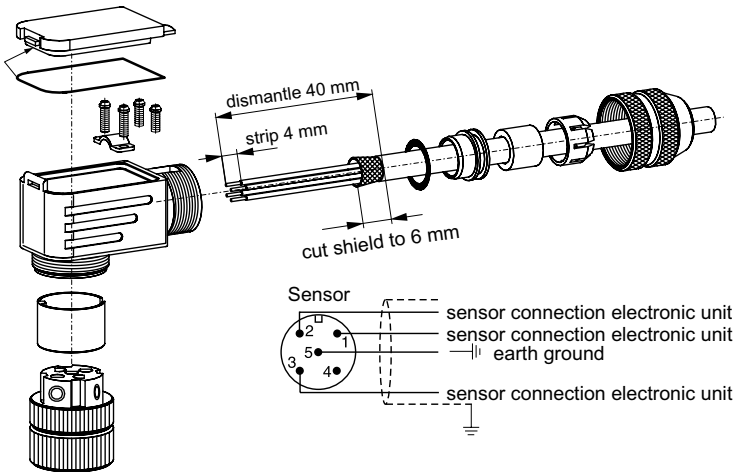
The connection cable will be coupled to the connector assembly via terminal screws.

The backshell nut of the cable gland has to be tightened with a suitable tool. The target value for the tightening torque is 10...20 Nm.

 Incomplete tightening of the screw threads may result in automatic release of the connection as well as degradation of the water tightness. Follow the "instructions for use" for installation of female connectors made by other kind of brands!

 The cable connection to the female connector has to take place by qualified personnel! A short between individual conductors resp. to the connector housing, bad workmanship as well as improper shield connection may result in malfunction and breakdown of the valve.


Connection of the female connector assembly




4. Operating Instructions

Electronic control unit


The valve has to be driven by a suitable electronic control unit.

 The compatible electronic may be selected from the catalog (chapter "Electronics"). When insecure, please consult Parker.


 Connection to an unsuitable electronic may cause irreparable damages to valve resp. electronic control!

Solenoid selection


The selection of the suitable solenoid actuator is most important for the reliability of the valve. Miscellaneous valve series are available with multiple options concerning the nominal solenoid voltage. If the electronic provides a selection of solenoid parameters, the matching solenoid option has to be chosen.


 Instruction for using of valves with 24 V-solenoids:

Because of the increasing coil resistance up to 40% at heating, the electronic increases the solenoid voltage to keep the adjusted current constant. On solenoids with nominal voltages of 24 V this may result in an electronic supply voltage requirement of more than 24 V, to keep the nominal solenoid current constant. This denotes for example, that the supply voltage of the electronic unit for driving a solenoid with nominal data of 24 V / 0.8 A respectively 24 V / 1.1 A has to be increased up to 30 V to ensure the proper energizing of the solenoid. Therefore use preferably solenoids with lower voltage option!

 Do not exceed the nominal max. supply voltage value of the electronic unit! Non-observance of this rule may result in permanent damaging the electronic!

Operation


 If any of the safety features of the product are not operational, the system/machine must be shut down immediately.

 Do not carry out any activities that might jeopardize safety.

Note also the information in sections "Warranty and liability", "Use of operating instructions)", "Compliance with other rules and instructions", "Personnel requirements", "Remaining risks".

Modification

We define modification as the replacement of a defective valve with a new valve of the same series. In particular, it is not permitted to open the valve.

 Make sure that the hydraulic system/machine is unpressurised before the product is installed/removed.

Air bleeding of hydraulic system

During initial startup, after an oil change as well as after the opening of lines or valves the hydraulic system must be air bled.

Filter

The function and lifetime of the valve are strongly affected by the cleanliness of the fluid. Purity level class of 18/16/13 acc. ISO 4406 is required.


Flushing

It is recommended to flush the pipelines by short circuiting the pressure and return lines. This prevents the installation dirt from entering the valve.


Decommissioning

Make sure that the hydraulic system/machine is unpressurised before the product is removed. Note also the information in sections "Warranty and liability", "Use of operating instructions", "Compliance with other rules and instructions", "Personnel requirements", "Remaining risks".

Disposal


-  At the end of the service life of this product
- all escaping pressure fluids must be removed and disposed of properly
 - any significant fluids remaining in the product must be removed and disposed of properly
 - all materials must be segregated for recycling when they are removed and taken to a suitable recycling center.

Please segregate the packaging material properly (e.g. paper, plastic). None of the components of the product contain hazardous materials.

-  The normal local environmental protection laws must always be met when disposing the product.

Note also the information in sections "Warranty and liability", "Basic information on using the manual", "Other applicable standards/rules", "Personnel requirements", "Remaining risks".

5. Maintenance

-  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 required!

Periodical maintenance is essential for the longevity of the system and guarantees reliability and availability. The following properties of the system has to be checked in continuous short time intervals:

- oil level in the tank
- max. working temperature
- condition of the pressure fluid (visual inspection, color and smell of hydraulic fluid)
- working pressure levels
- gas pre-load pressure on the pressure accumulator
- leakage on all system components
- condition of filter elements
- condition of hose lines
- cleanliness of components

After a certain operating duration a change of the hydraulic fluid is required. The frequency of change depends from the following circumstances:


- kind resp. grade of the pressure fluid
- filtering
- operating temperature and environmental conditions

6. Trouble-Shooting

Basis of troubleshooting 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?

Afterwards starting of troubleshooting by means of a priority list of the most likely reasons.

 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 disassemblies may not be taken imprudently! Prior to the works it has to be clarified, if the system has been operated properly until the failure occurred.

malfunction at hydraulic load runtime								
- generally no function								
- high frequent oscillation								
- low frequent oscillation								
- one way operation only								
- speed variations at unchanging command								
- different speeds depending on travel direction (for directional control valves)								
- speed too low								
- drifting without command								
				possible reasons for malfunction		corrective actions		
X							hydraulic pump resp. motor defective	replace hydraulic pump resp. motor
X	X	X	X	X	X		drive overloaded (for directional control valves)	reduce pressure resp. speed, increase valve size
X	X	X	X	X	X	X	valve contaminated	clean pressure fluid, filter / flush valve
			X		X		hydraulic fluid too viscous / too cold	change fluid grade, provide operational temperature
X	X	X					too low oil level within tank	refill pressure fluid
			X	X	X		filter contaminated	clean resp. replace filter
X	X				X	X	electronic supply voltage too low	keep supply voltage range
X	X						electr. supply voltage carries too much ripple	reduce ripple
X			X			X	electr. command signal too low	increase command signal
X	X						electr. command signal carries too much ripple	reduce ripple
X			X		X		electr. enable signal too low / missing	keep enable signal range
X	X		X		X	X	center position adjustment incorrect	check center position adjustment
X							contacts of connections contaminated	clean contacts / replace plugs
X							feed cable interrupted	fix feed cable
X	X	X	X	X		X	wiring sequence incorrect	correct wiring sequence
X						X	feed cable without shielding	change cable grade

7. Product Information

Other applicable standards / rules

- ISO 4406:1999-12 Hydraulic fluid power - Fluids - Method for coding the level of contamination by solid particles
- ISO 4401:2005-07 Hydraulic valves; mounting surfaces and connecting plates
- DIN EN 60204-1; VDE 0113-1:2007-06 Safety of machinery – Electrical equipment of machines – Part 1: General requirements
- DIN EN 60529; VDE 0470-1:2000-09 Degrees of protection provided by enclosures (IP code)
- DIN EN 61000-4-2/3/4/6/8 Electromagnetic compatibility
- DIN 51524-1:2006-04 Pressure fluids - HLP hydraulic oils - Part 1: Minimum requirements
- DIN 51525-2:2006-04 Pressure fluids - HLP hydraulic oils - Part 2: Minimum requirements
- German Occupation Safety Ordinance (Betriebssicherheitsverordnung)
- German Labour Protection Act (Arbeitsschutzgesetz)

Accessories / spare parts

Accessories

The following accessories are available for the valves series D*FB/D*1FB:

D1FB: bolt kit	ordering code BK375
D3FB: bolt kit	ordering code BK385
D31FB: bolt kit	ordering code BK385
D41FB: bolt kit	ordering code BK320
D91FB: bolt kit	ordering code BK360
D111FB: bolt kit	ordering code BK386

Spare parts

The following spare parts are available:

D1FB: seal kit NBR	ordering code SK-D1FB
D3FB: seal kit NBR	ordering code SK-D3FB
D31FB: seal kit NBR FPM	ordering code SK-D31FB SK-D31FB-V
D41FB: seal kit NBR FPM	ordering code SK-D41FB SK-D41FB-V
D91FB: seal kit NBR FPM	ordering code SK-D91FB SK-D91FB-V
D111FB: seal kit NBR FPM	ordering code SK-D111FB SK-D111FB-V

Please direct technical product enquiries to:

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 41564 Kaarst, Germany
 E-mail: valveside@parker.com

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