



# DPC130X

Pre-compensated Load Sensing  
sectional valves - ATEX version

SERVICE MANUAL



Thank you for choosing a **Walvoil** product.

Your product is the result of advanced technology, careful testing and an ongoing quest for reliability, safety, and higher performance.

The product must be operated within the parameters contained in technical manual **D1WWED03E**.

To obtain a long service life, follow the maintenance instructions contained in this manual.

### BEFORE READING THIS MANUAL

THIS PRODUCT IS INTENDED TO BE OPERATED CAREFULLY AND RESPONSIBLY BY A QUALIFIED WORKER. IF THIS PRODUCT IS USED IMPROPERLY, THE MANUFACTURER WILL NOT BE RESPONSIBLE FOR ANY RESULTING INJURY OR DAMAGE TO PERSONS OR PROPERTY.

Whenever the symbols shown below appear, follow the instructions that are given!

Be sure to perform all operations and maintenance in complete safety.

**WARNING** : identifies special instructions or procedures that may cause injury or damage to persons and property unless followed exactly.

### Additional information

This catalogue shows the product in the most standard configurations.

Please contact Sales Dpt. for more detailed information or special request.

### WARNING!

All specifications of this catalogue refer to the standard product at this date.

Walvoil, oriented to a continuous improvement, reserves the right to discontinue, modify or revise the specifications, without notice.

WALVOIL IS NOT RESPONSIBLE FOR ANY DAMAGE CAUSED BY AN INCORRECT USE OF THE PRODUCT.

1<sup>st</sup> edition - September 2018

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### Introduction

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This manual has been conceived to provide the necessary instructions for a correct and safe usage and handling of DPC130X control valve, in compliance with ATEX directive.

It contains:

- the control valve description;
- the general specifications;
- the storage rules;
- the installation procedures;
- the handling rules;
- the disassembling and assembling procedures;
- the standard maintenance rules;
- the disposal rules

**The customer commits to use the products only according the marking on the control valve and the Service Manual. The DPC130X is supplied comply with the basic safety and health requirements of the EU directive concerning design, construction and putting the model into circulation. This declaration is no longer valid if the valve (or the components) is modified without Walvoil S.p.A. agreement and/or it is used outside the technical specification specified in the manual.**

#### **WARNING**

- Before using the product you must read this Service Manual carefully and understand its contents in order to prevent accidents or damages.
- Do not carry out assembly, disassembly and/or maintenance activities before consulting this manual.
- Assembly, disassembly and/or maintenance activities must be carried out by qualified personnel.
- Always bear in mind that "all workers must act responsibly to ensure their own health and safety and that of others in the workplace since they can be affected by incorrect actions or omissions as well".
- Do not modify the product; in case the product is modified Walvoil cannot be held responsible for any damage and/or accident.
- Always observe standard workplace conditions.
- Before starting any activity, you must ensure that the machine, plant or system, on which this control valve has to be assembled, is compliant against the explosion risk. Moreover, you must draft the "document of protection against explosion" according with the ATEX Directive 99/92 EC.
- Walvoil is dedicated to constant product improvement. Hence there may be some differences between the product in your possession and this manual. If you note some differences, don't hesitate to contact our After-sales Department for further clarification.



## Valve description

### ATEX Directive 2014/34/UE

The ATEX Directive 2014/34/UE is applied, with the aim to reduce the risk of use, to the manufacture specifications of all those products to be used in potentially explosive atmosphere due to the presence of dust or gas. According to this directive an explosive atmosphere is made up from a mixture of inflammable substances (like gas, vapours, mists and dust) with air in determined atmospheric conditions in which, after triggering, the combustion propagates together with unburned substances. An atmosphere that could become an explosive atmosphere because of local and/or operative conditions is defined a potentially explosive atmosphere.

In order to define an adequate conformity evaluation procedure, depending on the purpose stated, the manufacturer must establish the product functioning conditions (e.g. for the working area, the type of the possible explosive mixture and the risk level of an explosive atmosphere), then to which Group the product belong and determine the category inside the Group.

Areas	Gas-Air-type explosive mixture (G)	Dust-Air-type explosive mixture (D)
With the Atex Directive 2014/34/UE (for the safety of workers) please find the working conditions for products in compliance with Atex Directive 2014/34/UE. These are expressed in Areas and defined according to the potential explosive atmosphere, respectively for every type of atmosphere (gas-air mix or dust-air mix).	The products due to work in environments characterized by this type of explosive atmosphere will be respectively indicated for Area 0, 1 or 2 depending on the Group and category of origin (see below) and they are marked with the letter G.	The products due to work in environments characterized by this type of explosive atmosphere will be respectively indicated for Area 20, 21 or 22 depending on the Group and category of origin (see below) and they are marked with the letter D.
<b>Area 0 and 20</b>		
Where an explosive atmosphere is constantly present or present for long periods or frequently.		
<b>Area 1 and 21</b>		
Where an explosive atmosphere is probable. It occurs in normal functioning and exercise conditions.		
<b>Area 2 and 22</b>		
Where an explosive atmosphere is scarcely possible or, if it occurs, it lasts only for a brief period of time.		

## Valve description

## ATEX Directive 2014/34/UE

Group I	Group II
Includes the equipment destined to be used in underground jobs in the mines and their surface plants, exposed to the risk of release of fire-damp and/or combustible dust. The subdivision into categories depends on the eventual power supply interruption in case of explosive atmosphere due to a mixture of air and gas, vapours mists (D) or a mixture of air and dust (G).	Includes the equipment to be used in different environments (from the mines) with possible explosive atmosphere. Their subdivision into categories depends on two factors: the place, where the product will be used and the possible potentially explosive atmosphere, due to the mixture of air and gas, vapours, mists (D) and the mixture of air and dust (G). It can occur in a constant or occasional manner and for long or brief period of time.
<b>Category M1: Very high protection level</b>	<b>Category 1: Very high protection level</b>
These products must keep on working, for safety reasons, in the presence of an explosive atmosphere and specific performances or protection configurations for breakdown in case of explosion.	These products have to work, in compliance with operative parameters established by the Manufacturer, in environments with a high probability of frequent or long lasting explosive atmospheres. They must present specific performances or protection configurations for breakdown in case of explosion.
<b>Category M2: High protection level</b>	<b>Category 2: High protection level</b>
The power supply to these products must be interrupted in case of an explosive atmosphere. Protection means must be incorporated to guarantee the protection level during normal functioning and also in oppressive working conditions or resulting from great stress.	These products have to work, in compliance with operative parameters established by the Manufacturer, in environments with a high probability of explosive atmospheres. Protection against explosions in this case must guarantee the required safety level even in presence of equipment functioning defects or in dangerous operative conditions, which frequently must be taken into consideration.
	<b>Category 3: Normal protection level</b>
	These products have to work, in compliance with operative parameters established by the Manufacturer, in environments with a slight probability of explosive atmosphere, which may occur, however only rarely or for a brief period of time. This type of product, belonging to the category concerned must guarantee the safety level required in normal functioning conditions.

Please find below the ATEX categories on Walvoil DPC130X valve

 II 2G Ex h IIC T4 Gb

 II 2D Ex h IIIC T130°C Db

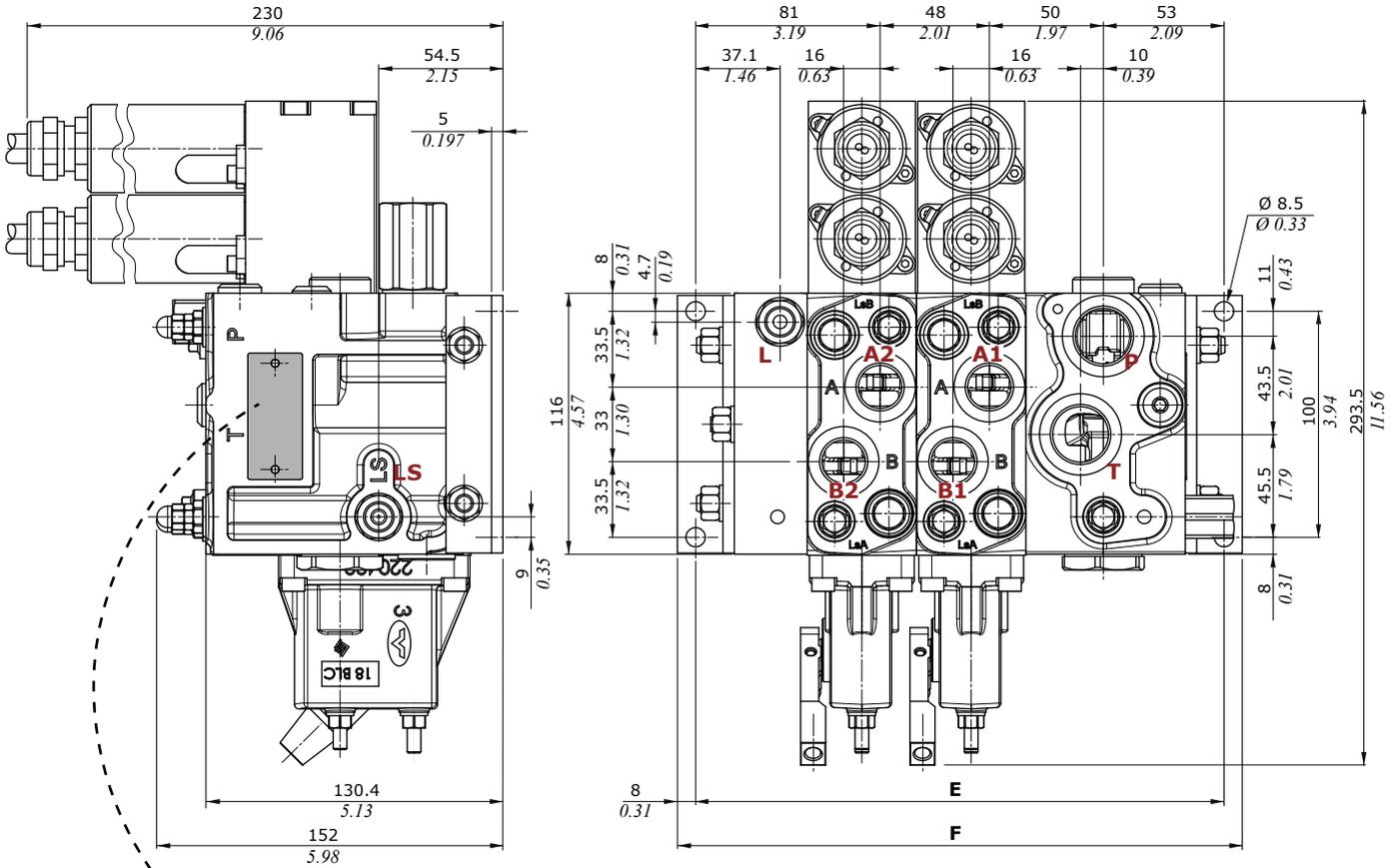
Mining category can be added in some specific DPC130X configurations.

 I M2 Ex h I Mb

The EPLs were chosen in accordance with possible ignition sources and normal operation and expected malfunctions analysis (Explosion Risk Assessment).

## Valve description

### Dimensional data



manufacturer reference

**walvoil** Via Adige 13/D  
42124 Reggio E. Italy

product name: DPC130X/6  
product code: 161X60001  
product serial number (production year included): PA1801568/001

ATEX category: II 2G Ex h II T4 Gb - II 2D Ex h IIIC T130°C Db  
I M2 Ex h Mb - T amb -20÷60°C T fluid -20÷80°C

environmental temperature

fluid temperature

DATAMATRIX

CE mark

ATEX mark

Type	E		F		Weight	
	mm	in	mm	in	Kg	lb
DPC130/1	184	7.24	200	7.87	12.4	27.3
DPC130/2	232	9.13	248	9.76	19.4	42.8
DPC130/3	280	11.02	296	11.65	25.3	55.8
DPC130/4	328	12.91	344	13.54	31.0	68.3
DPC130/5	376	14.80	392	15.43	36.5	80.5

Type	E		F		Weight	
	mm	in	mm	in	Kg	lb
DPC130/6	424	16.69	440	17.32	42.6	93.9
DPC130/7	472	18.58	488	19.21	48.7	107.0
DPC130/8	520	20.47	536	21.10	54.8	121.0
DPC130/9	568	22.36	584	22.99	60.9	134.0
DPC130/10	616	24.25	632	24.88	67.0	148.0

## General specifications

## Working conditions

This catalogue shows technical specifications and diagrams measured with mineral oil of 46 mm<sup>2</sup>/s - 46 cSt viscosity at 40°C - 104°F temperature.

Nominal flow rating (open center circuit)	on inlet port with compensator @ stand-by (margin pressure)	150 l/min - 39.6 US gpm @ 9 bar - 131 psi
	on working ports with compensator @ stand-by (margin pressure)	100 l/min - 26.4 US gpm @ 7 bar - 102 psi
	on working ports without compensator @ stand-by (margin pressure)	130 l/min - 34.3 US gpm @ 9 bar - 131 psi
Max. pressure	<b>P</b> inlet port	315 bar <sup>(1)</sup> - 4500 psi <sup>(1)</sup>
	<b>A</b> and <b>B</b> working ports	315 bar <sup>(1)</sup> - 4500 psi <sup>(1)</sup>
Back pressure (max.)	on <b>T</b> outlet port	25 bar - 363 psi
	on <b>L</b> drain port	2.5 bar - 36 psi
Standard internal leakage A(B)->T	$\Delta p=100$ bar - 1450 psi	16 cm <sup>3</sup> /min - 0.98 in <sup>3</sup> /min
	with port valves, $\Delta p=100$ bar - 1450 psi	21 cm <sup>3</sup> /min - 1.28 in <sup>3</sup> /min
Fluid	Mineral oil	
Fluid temperature range	with seals NBR (BUNA-N)	from -20°C to 80°C - from -4°F to 176°F
	with seals FPM (VITON)	from -20°C to 80°C - from -4°F to 176°F
Viscosity	operating range	from 15 to 75 mm <sup>2</sup> /s - from 15 to 75 cSt
	min.	12 mm <sup>2</sup> /s - 12 cSt
	max.	400 mm <sup>2</sup> /s - 400 cSt
Contamination level	max.	-/18/15 - ISO 4406 - NAS 1638 class 9
Environmental temperature for working conditions	from -20°C to 60°C <sup>(2)</sup> - from -4°F to 140°F <sup>(2)</sup>	
Environmental pressure for working conditions	from +0.8 to + 1.1 bar - from +11.6 to 16 psi	

NOTES: <sup>(1)</sup> According to NFPA T 2.6.1., fatigue rating verified for 1 million cycles on 6 sample valves with test Pressure = 1.23 x Max. pressure indicated - <sup>(2)</sup> DPC130X can operate with gases with an ignition temperature above 135°C - 275°F and powders with an ignition temperature above 130°C - 266°F.

## Standard thread

REFERENCE STANDARD			PORTS		BSP	UN-UNF
	BSP	UN-UNF				
THREAD	ISO 228/1	ISO 263	<b>P</b> inlet	G 3/4	1 1/16-12 (SAE 12)	
ACCORDING TO	BS 2779	ANSI B1.1 unified	<b>A</b> and <b>B</b> ports	G 1/2	7/8-14 (SAE10)	
CAVITY	ISO 1179	11926	<b>T</b> outlet	G 3/4	1 1/16-12 (SAE 12)	
DIMENSION	SAE	J1926	<b>LS</b> Load Sensing	G 1/4	9/16-18 (SAE 6)	
ACCORDING TO	DIN 3852-2, X or Y shape		<b>V1</b> pilot	G 1/4	9/16-18 (SAE 6)	
NOTES <sup>(3)</sup> : Standard pressure series - <sup>(4)</sup> : For pressure up to 350 bar (5100 psi)			<b>V2</b> pilot	depends on inlet section type: see pages from 14 to 17 <sup>(5)</sup>		
			<b>L</b> drain	G 1/4	7/16-20 (SAE 4)	
			<b>M</b> pressure gauge	G 1/4	9/16-18 (SAE 6)	
			Hydraulic control ports	G 1/4	9/16-18 (SAE 6)	

NOTES <sup>(5)</sup>: ATTENTION! V2 pilot port requires dedicated joints; please see Inlet section pages.

## General specifications

### WARNING

- Never use the control valve at a pressure exceeding the rated pressure in order to avoid to break it;
- use the control valve within the rated flow in order to avoid malfunction or a deterioration in the heat balance. If the control valve is used beyond the verified working conditions range, we shall not be responsible for any accident which may occur;
- do not use low-cleanless hydraulic fluid in order to avoid seal failure or damage to seal parts, which could cause the machine operation failure or an operation mistake;
- use the control valve at the environmental conditions specified in the previous datasheet. If the Control Valve is used outside the specified range, we shall not be responsible for any accident which may occur;
- Use the control valve with the working fluid specified in this manual. If the control valve is used beyond the specified range or with different working fluid properties, we shall not be responsible for any accident which may occur.

**For any doubt please contact our After-sales Department.**

All the material installed by the manufacturer are in accordance with UNI CEI EN ISO 80079-36:2016

Cast iron	O-ring seals & Parback	Spring steel	Other steel	Other
Cast iron EN-GJI-250	NBR 70 Sh	AISI 302	11SMnPb37	Sint. A50
Cast iron EN-GJL-300	VITON 75 Sh	VDSiCr EN10270-2	16CrNi4Pb	
Cast iron EN-GJV-300	NBR 90 Sh	FDCrSI	36SMnPb14	
	Teflon (PTFE)	Quench Steel	35SMnPb10	
	Poliurethane	AISI 302	Class B Steel	
		AISI 316	INOX Steel	
		OTEVA 60	INOX A2/304 Steel	
		OTEVA 70	X10CrNiS1809	
			3CD60 Steel	
			Class 8.8 Steel	
			Class 10 Steel	
			Class 10.9 Steel	
			Class 12.9 Steel	
			C43	
			ETG100	
			Fe37	
			MIM 4605	
			Sint. C39	
			Sint. D35	

## Storage

Do not store the Walvoil product:

- in places where it could be damaged;
- outside a temperature and pressure range specified in environmental datasheet (see pag.7);
- where it could get wet;
- where it could come in contact with organic solvents, acids, alkalis and/or dangerous gases;
- in places subject to sudden, significant temperature changes;
- in zones where a potential explosive atmosphere can occur also with a very low probability.
- remove the packaging only just before assembling the product;

### WARNING

- Walvoil is not responsible for any damage due to a storage not in compliance with our prescriptions;
- for any doubt, please contact our After-sales Department.

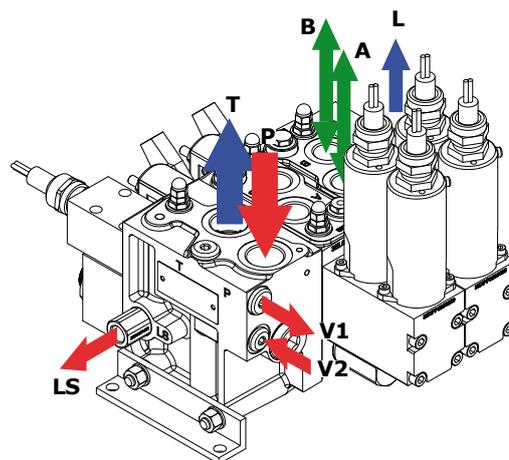
Installation

When you receive these Walvoil products, please check:

- if there are signs of damage of the packaging;
- that the dimensions of the product seat are compatible with those of the product itself;
- that the assembly seat is compatible with the part dimensions and that it has been prepared for the valve set-up (connection hoses ready etc.);

Before starting the assembling, be sure that the mounting zone is not a potential explosive atmosphere (even with a very low probability).

- remove the plastic plugs that protect the ports and be careful not to introduce any dirt or foreign matter inside the control valve as this could damage it;
- mount the control valve safely over a flat surface (recommended 3 fixing point); at the same time do not use a hammer for positioning by hitting; any assembly distortion can cause spool sticking and poor control;
- clean hoses before using them;
- prevent the presence of dust or foreign matters in port inlets;
- double check that hoses are correctly connected according to the prescription and indication of the hydraulic schema, especially:
  - (in case of electrohydraulic control) be sure that drain line is directly connected to tank (avoid any back pressure)
  - (in case of variable displacement system) be sure that LS signal line is correctly connected to the pump regulator
- tighten the port connectors safely with the recommended fastening torques (Nm) as shown in the following table;
- install the valve in a protected environment, avoiding direct exposure to weathering, water, salt or any other corrosion substances, powder or other potential explosive substances or gases.



FITTING TIGHTENING TORQUE - Nm / lbft

THREAD TYPE	P inlet port	A and B workports	T outlet port	LS signal port V pilot ports*	L drain port	Hydraulic control ports
BSP	G 3/4	G 1/2	G 3/4	G 1/4	G 1/4	G 1/4
With O-Ring seal	90 / 66.4	50 / 36.9	90 / 66.4	25 / 18.4	25 / 18.4	25 / 18.4
With copper washer	90 / 66.4	60 / 44.3	90 / 66.4	30 / 22.1	30 / 22.1	30 / 22.1
With steel and rubber washer	70 / 51.6	60 / 44.3	70 / 51.6	16 / 11.8	16 / 11.8	16 / 11.8
UN-UNF	1 1/16-12 (SAE 12)	7/8-14 (SAE 10)	1 1/16-12 (SAE 12)	9/16-18 (SAE 6)	9/16-18 (SAE 6)	9/16-18 (SAE 6)
With O-Ring seal	95 / 70	50 / 36.9	95 / 70	30 / 22.1	30 / 22.1	30 / 22.1

(\* ) V2 port is M14x1.5 threading: tightening torque value is the same of G1/4 thread

NOTE – These torque are recommended. Assembly tightening torque depends on many factors, including lubrication, coating and surface finish.

## Installation

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### WARNING

- A fall or a hit to the control valve could bend the spool and cause an accident due to an operation failure;
- in case the control valve is mounted on a uneven surface, the control valve body might be deformed and cause a malfunction or external leakage;
- in case foreign matters are present in each port, the control valve operation might fail and cause an accident;
- do not tighten fittings with torque at the higher value than the recommended one, so to avoid strains or damage to the control valve and serious accidents;
- in case the hoses are not connected to the correspondent ports, unintentional movements might cause a serious accident;
- Walvoil is not responsible for any damage due to an installation procedure not in compliance with our prescriptions;
- in case the control valve has to be painted, make sure that surface paint on the control valve does not exceed the maximum layer of 0.2 mm -  $7.87 \times 10^{-3}$  in (check if the paint is flammable and in compliance with the potential explosive working atmosphere of the control valve);
- in case of the presence of electrohydraulic controls or unloading valve, please cover these electronic parts (as well as the cables) before painting;
- avoid painting the marking label;
- for the electric parts please refer to the manuals of these certified components attached to the service manual. Pay particular attention to the wire connection and do not remove any part before reading the specific manual. Do not substitute wire, clamps and brass cable before reading these attachments. Pay attention to the special conditions for safe use at page 16 of the Thomas "Ex-relevant Additions to the Performance Specification for Ex-Valves" Manual;
- Walvoil advises to monitor steadily the fluid temperature through a proper sensor (at least SIL2) during the machine running. In case the fluid temperature exceeds the value shown in the general specifications, the machine must be stopped immediately.
- all the personnel involved in the installation, use, maintenance of this valve, must be instructed with the technical information about all the operations in order to work safely in ATEX atmosphere;
- any change made on this valve can invalidate the safety requirements. For any doubt, please contact our After-sales Department.

## Handling precautions

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When the control valve is handled, make sure:

- that you do not drop, hit or damage the product;
- that you do not hold the pilot cover or return spring cap of the spool or accessory valves such as main relief valves, anti-shock relief valves and hydraulic compensators plugs.

**Disassembly and assembly procedures**

Disassembly and assembly should be carried out by Walvoil technicians. In case the control valve doesn't work properly, we advise you to contact our After-sales Department.

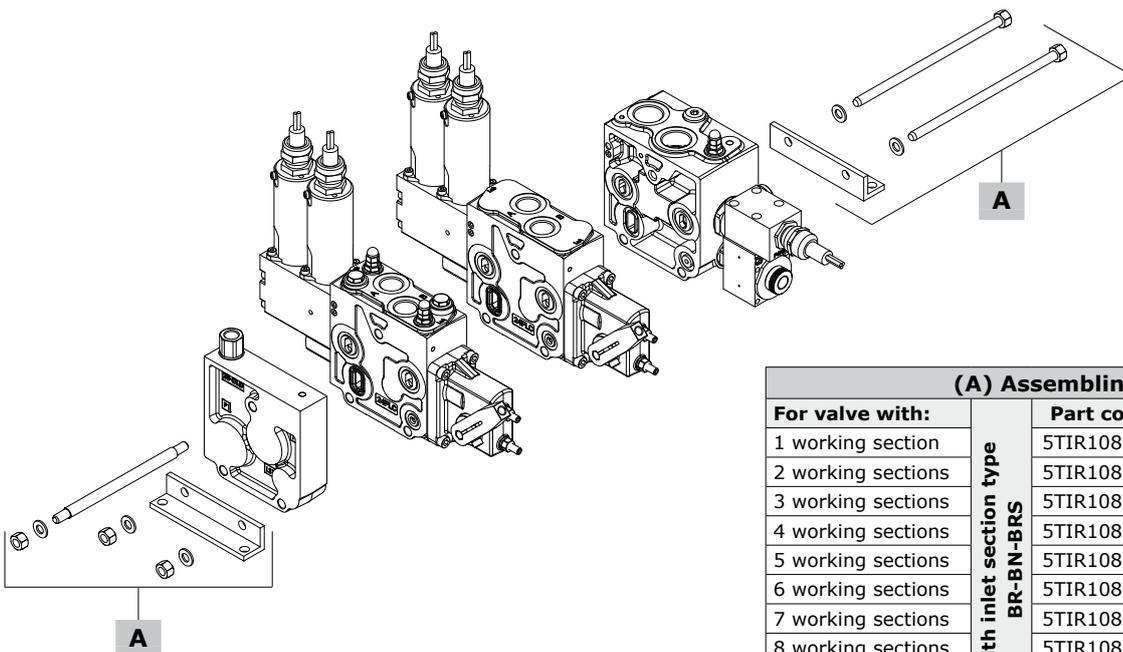
However in case the disassembly and assembly operations are absolutely unavoidable, you must observe the following prescriptions and assign these operations to highly qualified technicians in the field of hydraulics.

Do not disassemble the control valve when an explosive atmosphere is present and the control valve surface temperature is outside the environmental temperature range as specified before (see page 9).

- The valve can keep high internal pressure; release the inside pressure and make sure that all machine actuators are in a rest position before removing the piping. In any case unscrew safely and carefully connections and fittings, so to avoid a fall of load or high-temperature hydraulic fluid jet. Remind to wear the safety equipment and goggles;
- do not remove electrical parts by removing the cable or by opening these components; in case these operations are absolutely unavoidable, please contact our After-sales Department;
- since hydraulic devices are all precisely machined with very accurate clearances, carry out the disassembly and assembly work in a clean place;
- make sure to prevent dust, sand and other similar powder materials from entering into the device;
- before removing the hoses, attach suitable indications on them so to be able to locate their positions later on. It is also advisable to label dismantled parts and to write down their original location;
- before disassembling, read and strictly observe the assembly/disassembly instructions (shown in the following paragraph).
- since disassembled parts might show rust, apply them anticorrosive oil and seal them;
- before assembling the control valve on the operating machine, again make sure it has not been affected by the various hydraulic tests (e.g. relief valve setting, leak test...).

**First phase: preassembling**

- Collect tie rods kit according to the BOM.
- Collect inlet plate, sections and endplate according to the BOM.
- Collect OR kits according to the BOM.
- Clean carefully grinded planes.
- Starting from the inlet plate, screw by hand the tie rods (from the side of the shorter thread) on the inlet plate.
- Mount the working sections according to the scheme.
- Mount the end plate.
- Put on the spring-washers on the tie rods and screw the nuts by hands.
- Settle the control valve elements on a rigid plane and finally screw the nuts to the torque of 30 Nm - 22 lbft.



**(A) Assembling kit**

For valve with:	With inlet section type BR-BN-BRS	Part code	With inlet section type BRF	Part code
1 working section		5TIR108185		5TIR108153
2 working sections		5TIR108232		5TIR108201
3 working sections		5TIR108281		5TIR108249
4 working sections		5TIR108328		5TIR108297
5 working sections		5TIR108376		5TIR108339
6 working sections		5TIR108425		5TIR108393
7 working sections		5TIR108472		5TIR108440
8 working sections		5TIR108520		5TIR108488
9 working sections		5TIR108568		5TIR108536
10 working sections		5TIR108616		5TIR108584

### Disassembly and assembly procedures

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#### Second phase: valve and plug assembly

- Mount valves according to the BOM and scheme;
- mount plugs according to the BOM and scheme;
- screw valves and plugs to the required torque;
- if required, punch elements according to the scheme.

#### Third phase: control valve assembly

- Collect tie rods kit according to the BOM;
- collect inlet section, working sections and outlet section according to the BOM;
- collect OR kits according to the BOM;
- clean carefully grinded planes;
- starting from the inlet section, screw by hand the tie rods (from the side of shorter thread) on the inlet section;
- mount the working sections according to the scheme;
- mount the outlet section;
- put on the spring-washers on the tie rods and screw the nuts by hands;
- settle the control valve sections on a rigid plane and finally screw the nuts to the torque of 30 Nm - 22 *lbf*.

#### WARNING

- All the disassembly and assembly operations must strictly observe the procedures listed in this disassembly/assembly instruction;
- Walvoil is not responsible for any damage due to disassembly and assembly procedures not in compliance with our prescriptions;
- please remember that all these operations have to be carried out in a non potential explosive atmosphere at the environmental conditions required;
- for any doubt, please contact our After-sales Department.

**Standard maintenance rules**

Do not carry out maintenance operations on the control valve when an explosive atmosphere is present and the control valve surface temperature is outside the environmental temperature range as specified before.

It is advisable to periodically check the parts shown in the table below.

Reference	Item to be checked
<b>General installation</b>	Verify valve is correctly and safely fixed in its seat
	Check electric connector and wire condition and wear
	Clean the valve carefully, avoiding direct jet, especially on electric parts and connections
	In order to prevent rust, dry the valve after cleaning, avoiding scratching and damaging external surfaces
	Periodically check the tightening of: <ul style="list-style-type: none"> <li>- Tie rods</li> <li>- Lever box</li> <li>- Control kit screws</li> <li>- Unloading screw</li> <li>- Electrohydraulic valve screws</li> <li>- Hydraulic fittings</li> </ul>
	Constantly check oil contamination status and plant filter condition. Contamination may bring to several malfunctions
<b>Body</b>	Check presence of excessive rust and corrosion and replace parts or complete valve if needed
<b>Spool</b>	Check presence of scratch, rust and corrosion. It may bring to seals damage or spool sticking. Replace parts if needed
	Apply grease on spring, lever or positioning kits if the spool operation is not sliding
<b>Sealing</b>	Check and replace any possible hardened, de-formed or damaged O-ring. Check and replace the O-ring also in case its surface is dirty or shows particles.
<b>LS Valve and Auxiliary Valves</b>	Periodically check pressure setting values, if not correct adjust relief valves and safely lock the nut at appropriate torque
<b>Electric components</b>	Please refer to attached service manual of these components

**Disposal**

When the control valve has to be disposed, first drain the hydraulic fluid completely and dispose of it as industrial waste.



Innovation · Continuity · Integration  
————— It is Power —————

 **walvoil**  
FLUID POWER E|MOTION

D1WWTD02E  
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