SBW110

Mobile Directional Control Valve

Proportional, Load Sensing, Pre-compensated

Parker

ENGINEERING YOUR SUCCESS.

Catalogue layout

In addition to general information and basic technical data, this catalogue contains descriptions of the optional functions you can configure for the SBW110, so that we may customize it to control your machine optimally.

Each function area of the valve is given as a subheading, followed by a brief description. When different positions are available for a function area, the subheading has a position number in square brackets, e.g. [P1040] Connection thread. This is followed by a series of coded options, e.g. G and U, together with a brief description of for each code.

Alternatively, one or more pressure, flow or voltage options are given. The position number is also seen in the configurator code report and in the spare part list.

Documentation and ordering

SBW110 is configured as a customer unique valve in Parker's web based configurator, usually by Parker sales company in consultation with the customer. Every valve configuration gets a unique ID number, part number, detailed code report, 3D-model, 2D-model, instruction handbook, spare parts list and hydraulic schematics.

An order for valve is placed through Parker sales company. The ID number can be found on the valve's product tag and makes it possible to identify the product for e.g. placement of a new order or service.

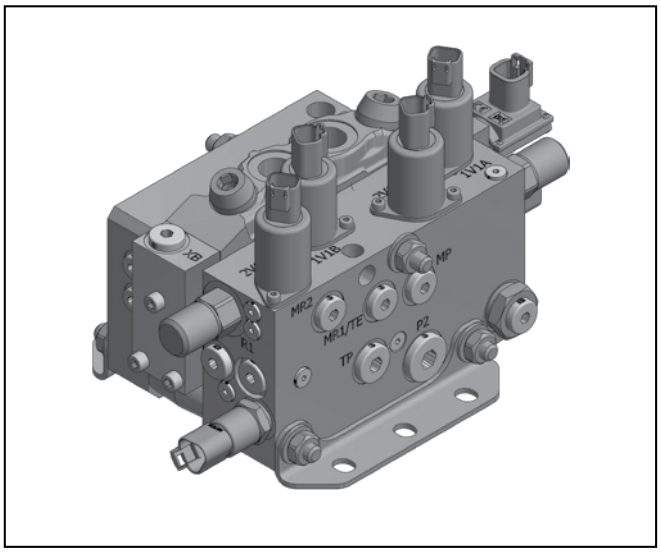
Save time and money with early consultations

Our experienced engineers have in-depth knowledge of different types of hydraulic systems and the ways in which they work. They are available to provide you with assistance in selecting a valve that meets your requirements.

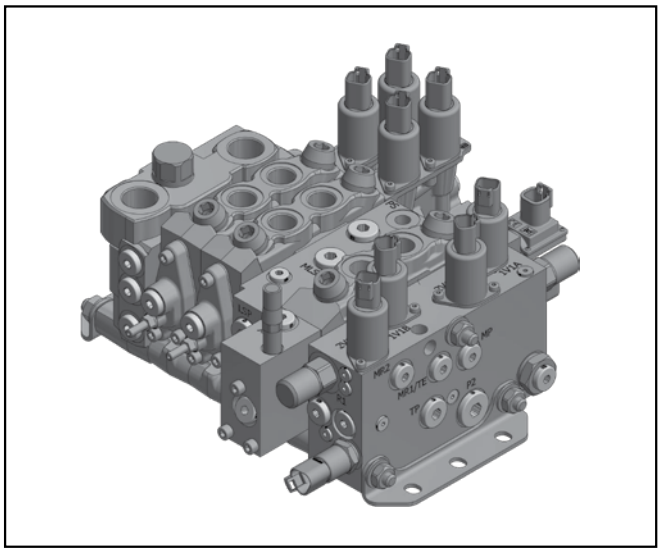
We recommend consulting Parker early in the project planning stage.

Parker reserves the right to modify products without prior notice. Typical curves and diagrams are used in this catalogue. Even though the catalogue is revised and updated continuously, there is always the possibility of errors. For more detailed information about the products, please contact Parker Hannifin.

Content



SBW110



FVC (combination of SBW110 and L90LS)

General description:

SBW110 is a mobile valve designed for steering, intended for use in Steer-by-Wire systems.

In a Steer-by-Wire system the SBW110 valve needs pump oil supply, tank connection and electric signal to the pilot valves. The flow from SBW110 workports control the steering function (no hydraulic steering unit, steering wheel or steering column is needed).

The SBW110 is a sectionally-built, pre-compensated, load sensing, directional control valve for mobile machinery.

The valve is characterised by industry leading properties regarding robustness, control precision and safety.

Each valve can be optimized to fit your machinery, with a range of spools, pressure relief valves, pressure compensators and signal pressure limiters.

The SBW110 can also be combined with the L90LS directional control valve in order to optimize the packaging of functions, the name of this configuration is FVC.

Document references:

Instruction handbook H318000 – Document from SBW110 configurator

Spare part list – Document from SBW110 configurator

Code report – Document from SBW110 configurator

3D model – Document from SBW110 configurator

2D drawing – Document from SBW110 configurator

Hydraulic circuit – Document from SBW110 configurator

Safety description:

The SBW110 can be used in systems requiring a level of risk reduction depending on the complete steering system layout. It is the OEM responsibility to fulfill the performance level for the complete Steer-by-Wire system where the SBW110 is a component.

SBW110 could be equipped with sensors used for diagnostic, failure detection shall be made in OEM control system.

SBW110 can be used in systems requiring ISO 13849-1:2015 PLr a to e.

Required performance level (PLr) for the steering is defined in the relevant C standard for the application or can be decided by the OEM.

The SBW110 is designed according to ISO 13849-1:2015 and ISO 13849-2:2012 with design architecture category 3 (single fault tolerant), and the requirements in ISO 5010:2019 for rubber tired machines that has a maximum speed > 20 km/h.

The valve main function (performance) is defined as flow to workport.

The SBW110 is designed with two safety functions in mind:

- No unintended steering, flow out from workport is not more than stated maximum leakage when there is no actuation current to the valve.
- Maintained steering, in case of single failure the valve will maintain >70% flow out from workport.

When fulfilling the requirements in instruction handbook H318000, the SBW110 is claimed to be single fault tolerant as a component in an OEM Steer-by-Wire system.

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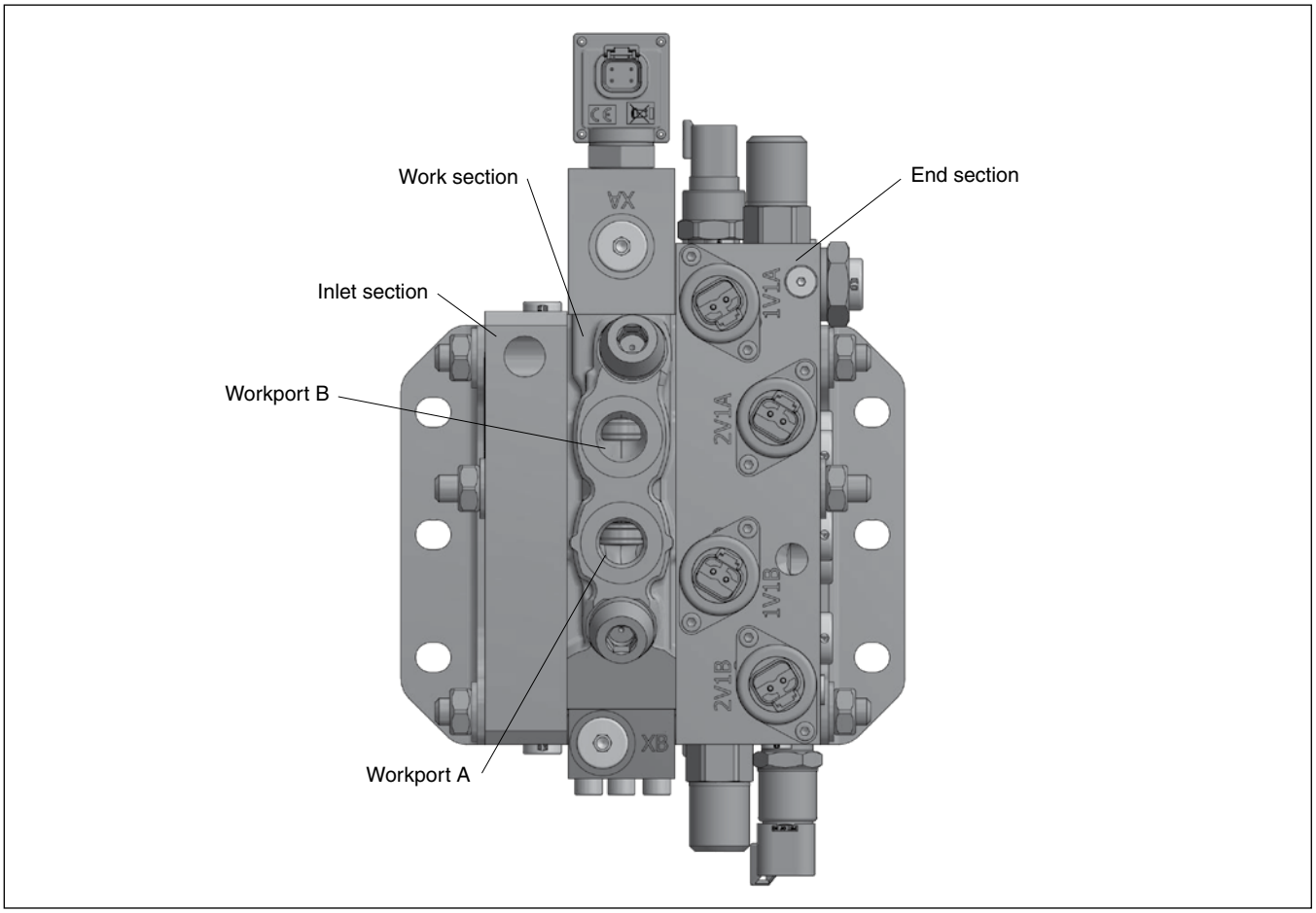

Pressures

Pump	max. 330 bar
Workports	max. 350 bar
Tank, static	max. 20 bar

Flow capacity

Workport, with pressure compensator*	110 l/min
Workport, without pressure compensator*	145 l/min

*Indicated at ΔP (Pump-LS) 15 bar, measured at the valve.

Weight

[P2010] Inlet section IP1	3.2 kg
[P3010] End section US1	7.2 kg
[P5020] PT Work section	5.2 kg

MTTFd

If valve is used in a safety application, demands for the steering system will be found in relevant C-standard for the application.

Reliability Data Category 3 Number of operations/year	$MTTF_D$
nop ≥ 1000000	50
1 000 000 > n_{op} ≥ 500 000	75
500 000 > n_{op} ≥ 250 000	100
250 000 > n_{op}	120

Temperature

Oil temperature, working range	+20°C to 90°C**
Oli temperature, start-up, functional range	-30°C to 90°C**

Filtration

Filtration must be arranged so that Target Contamination Class 18/16/13 according to ISO 4406 is not exceeded. Particle size is allowed to be max 1000 µm.

Hydraulic fluids

Best performance is obtained using mineral-base oil of high quality and cleanliness in the hydraulic system.

The following fluids should be used:

Hydraulic fluids of type HLP (DIN 51524)

Oil for automatic gearboxes of Type A and engine oil type API CD can be used

The following oil viscosities are recommended:

Viscosity, working range	15 – 380 mm^2/s (cSt)**
Viscosity, start up, functional range	15 – 2000 mm^2/s (cSt)**

** Product operating limits are broadly within the above range, but satisfactory operation within the specification may not be accomplished. Leakage and response time will be affected when used at temperature extremes and it is up to the user to determine acceptability at these levels. Performance efficiency will be reduced if the product is used outside the ideal values. These extreme conditions must be evaluated by the user to establish suitability of the product.

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[P1030] Pump regulator setting

The pressure differential from the valve between pump and load signal (MP-PL) is indicated here. The stated value applies when max. flow is taken off from the valve. The stated value applies when the pump is not overdemanded.

Connections

Unless stated otherwise, all standard connection ports are available in two versions: G or UNF-version.

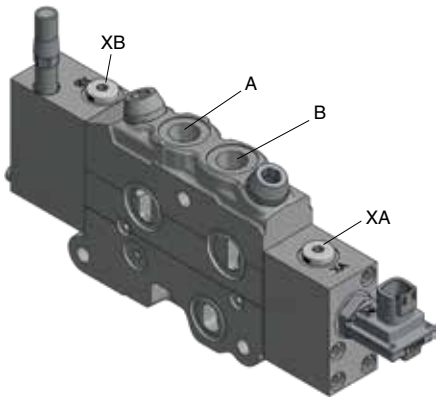
Depending on the configuration, some connections shown in pictures may be missing.

[P1040] Connection thread

G G-version (BSP pipe thread) for flat seal as per ISO 228/1

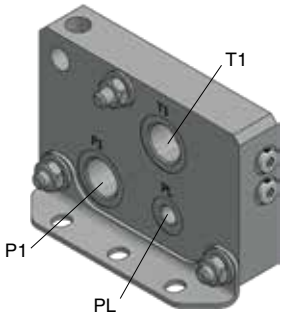
U UNF-version for O-ring seal as per ISO 11926-1.

Work section

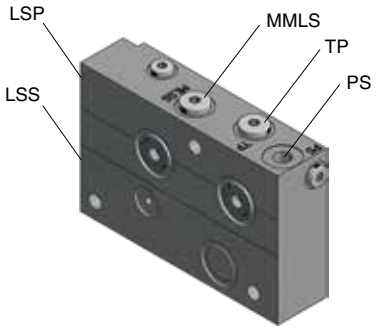


Work section		
Connection	[P1040] G	[P1040] U
A, B	G 1/2	7/8-14 UNF-2B
XA, XB	G 1/4	9/16-18 UNF-2B

Inlet sections

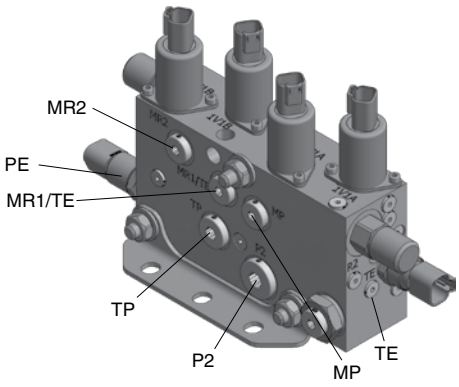


Inlet section [P2010] IP1		
Connection	[P1040] G	[P1040] U
P1	G 3/4	1 1/16-12 UN-2B
T1	G 3/4	1 1/16-12 UN-2B
PL	G 1/4	9/16-18 UNF-2B

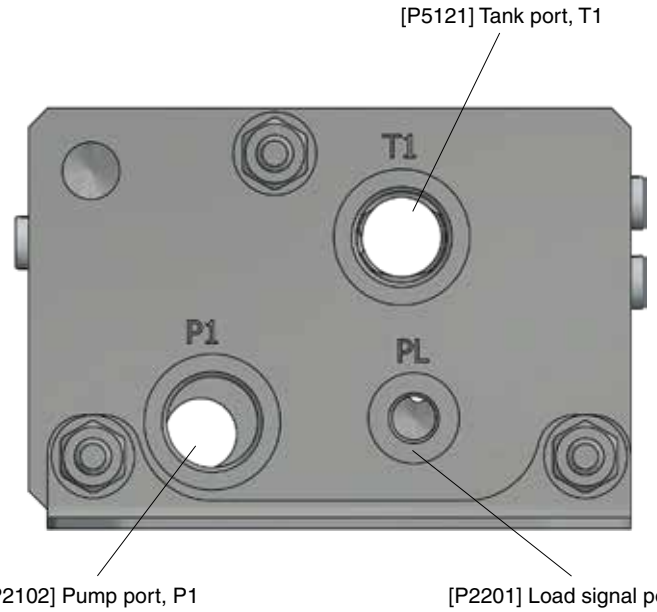


Inlet section [P2010] MM1		
Connection	[P04] G	[P04] U
MLSS, TP, PS, LSP, LSS	G 1/4	9/16-18 UNF-2B

End section



End section [P3010] US1		
Connection	[P1040] G	[P1040] U
P2	G 1/2	7/8-14 UNF-2B
TP	G 3/8	3/4 -16 UNF-2B
MR1/TE, MR2, MP	G 1/4	9/16-18 UNF-2B
TE	G 1/4	G 1/4
PE	9/16-18 UNF-2B	9/16-18 UNF-2B



[P2010-P2101] Inlet section

Inlet section for SBW110

[P2010] Inlet section

IP1 Inlet section for systems with variable pump.
Inlet section connection ports: P1, T1, PL

[P2101] P1, pump port

P1 Pump port P1 is open.

P1B Pump port P1 is plugged.

[P2151] T1, tank port

T1 Tank port T1 is open.

[P2101] PL, load signal port

PL Load signal port PL is open.

Inlet section for FVC

[P2010] Inlet section

MM1 Inlet section for FVC, which is a combination of directional control valve SBW110 and directional control valve L90LS for systems with a variable pump.

As a safety function the steering function should preferably be separate from other functions.

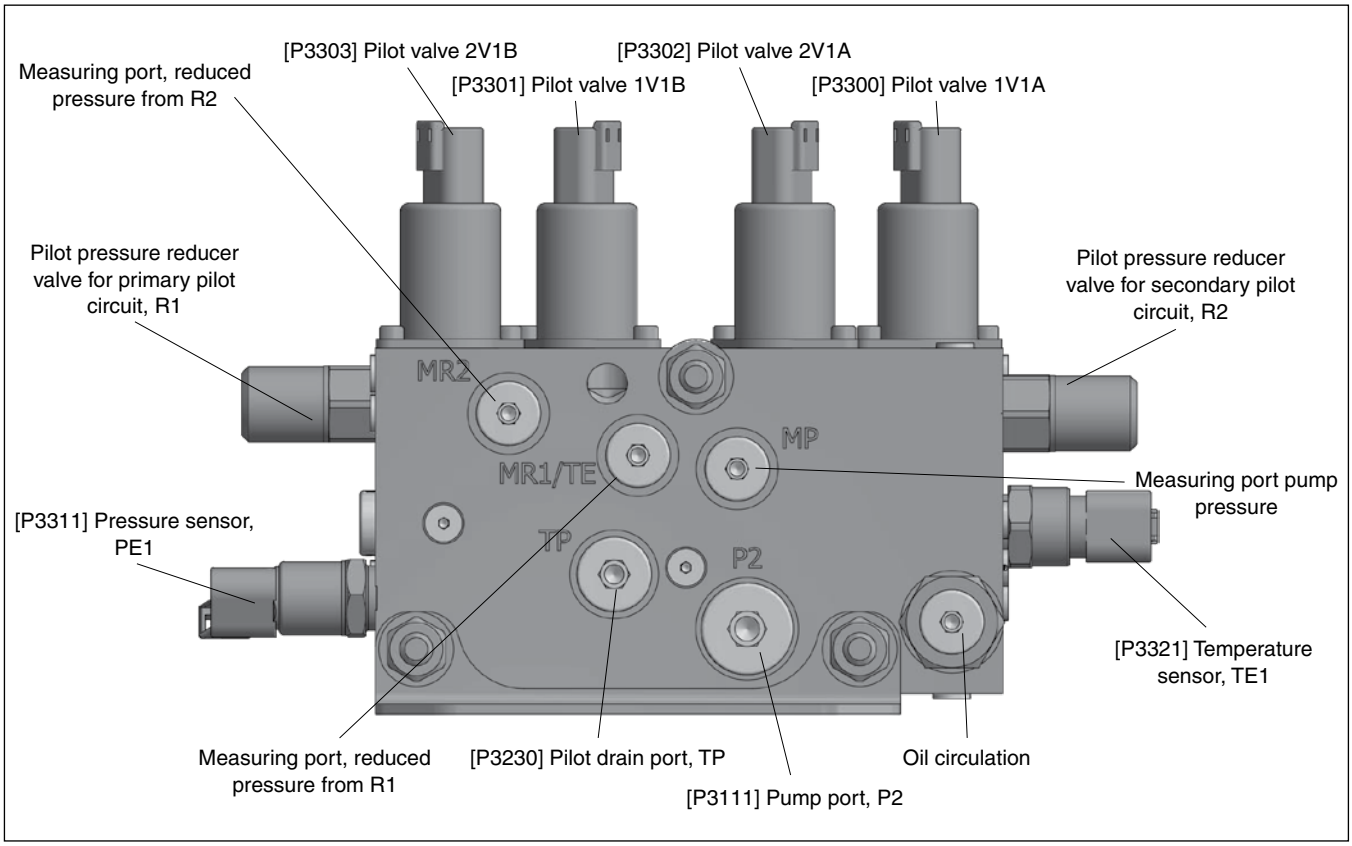
This inlet section separates the SBW110 pump, LS and pilot circuit from the L90LS.

The steering pump shall be connected to [P3111] P2 in the end section, and LS from steering in port LSS in the inlet section MM1.

Tank is common between SBW110 and L90LS and shall be connected to the L90LS part of the valve.

The choice of options for MM1 are made in the FVC and L90LS configurator.

(MM1 options: Pilot drain TP / TPB and LS from parallel connected valve LSP / LSPB, for more information see [P30] End section US in L90LS product catalogue).



[P3010-P3321] End section

[P3010] End section

US1 The end section contains the pilot circuit that through internal channels in the valve supplies the spool actuators in the work section with pilot pressure.

To achieve a single fault tolerant pilot circuit the end section contains independent pilot circuits, primary and secondary.

If anything would fail in the primary circuit the secondary circuit continues performing the function.

It also contains a temperature equalizing (temperature between valve and the oil) function that circulates oil (approx. 1 l/min) from pump to tank.

There is a temperature sensor and a pressure sensor for measuring the diagnostics.

[P3111] P2, pump port

P2 Pump port P2 is open.

P2B Pump port P2 is plugged.

[P3230] TP, pilot drain function

TP Separate pilot drain through port TP (recommended).

TPB Internal pilot drain to main tank.

[P3231] TP, pilot drain port

C Pilot drain port TP is closed.

O Pilot drain port TP is open.

Pilot valve connector type

[P3300]

1V1A Pilot valve 1V1A in primary pilot circuit.
Activates pump-workport A.

[P3301]

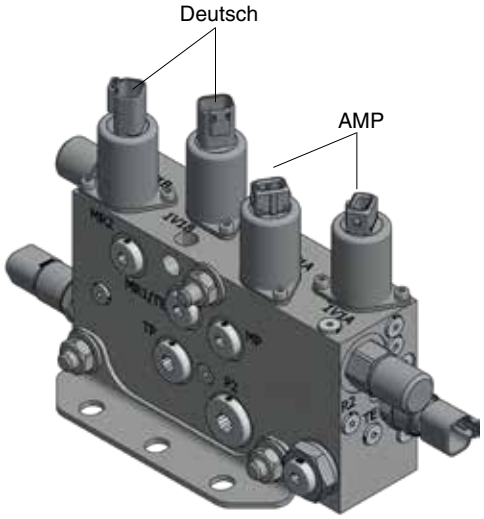
1V1B Pilot valve 1V1B in primary pilot circuit.
Activates pump-workport B.

[P3302]

2V1A Pilot valve 2V1A in secondary pilot circuit.
Activates pump-workport A.

[P3303]

2V1B Pilot valve 2V1B in secondary pilot circuit.
Activates pump-workport B.



The following connector types are selectable for the pilot valve:

A AMP Junior-Timer, mates with type C.

D Deutsch, type DT04-2P, mates with DT06-2S.

[P3311] Pressure sensor

Measures the pressure in the secondary pilot circuit.
Connector DT04-3P, mates with DT06-3S.

C Port PE is closed, no pressure sensor.

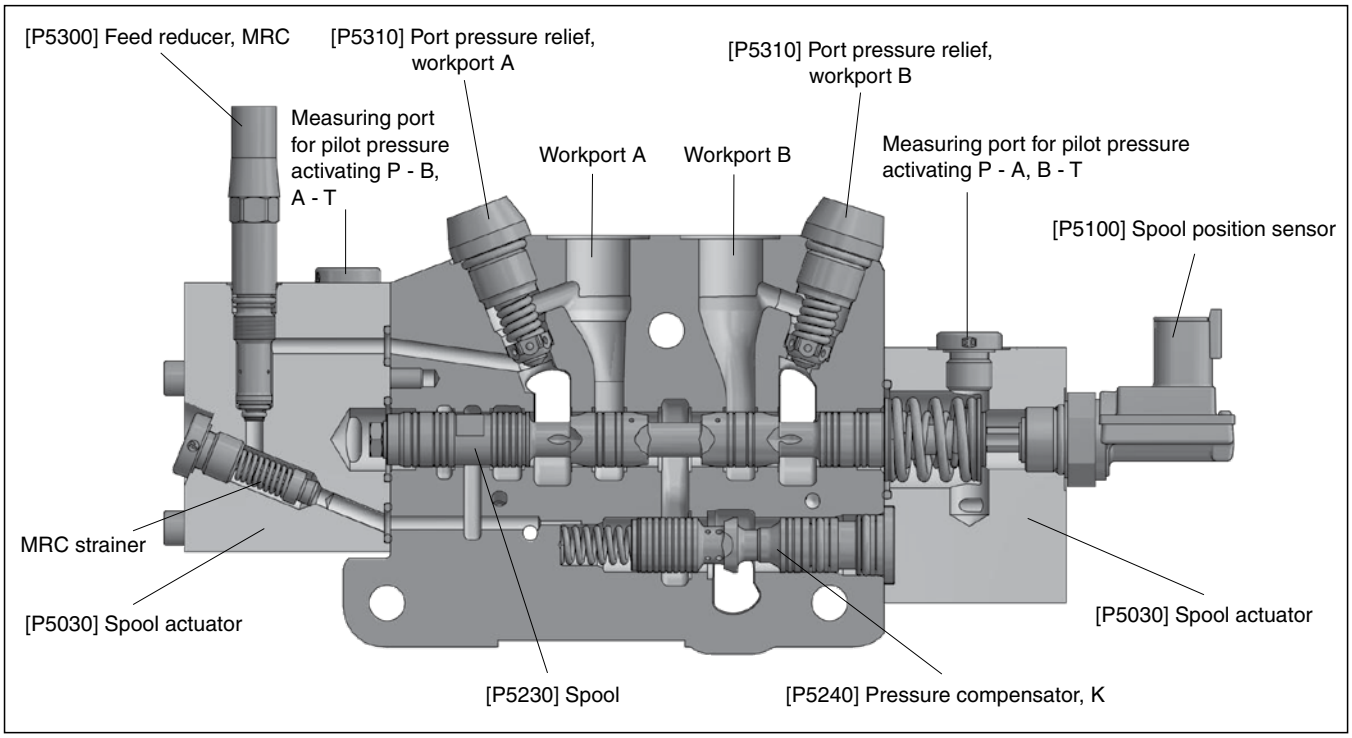
PE1 Pressure sensor in port PE.

[P3321] Temperature sensor

Measures the valve temperature.
Connector DT04-4P, mates with DT06-4S.

C Port TE is closed, no temperature sensor.

TE1 Temperature sensor in port TE.



[P5030-P5320] Work section

[P5030] Spool actuator

SA1 The SA1 is a proportional, electro-hydraulically controlled spool actuator with spring centering to the neutral position. Pilot-pressure oil is passed from pilot circuit in the end section to the spool actuators through internal channels in the valve. This means that only the electric cables from the control system to the pilot valves needs to be connected. The pilot valves are located in the end section [P3300] 1V1A, [P3301] 1V1B, [P3302] 2V1A, [P3303] 2V1B.

[P5100] Spool Position Sensor

Parker proportional spool position sensor. The spool position is measured to fault diagnostics. Connector DTM04-4P, mates with DTM06-4S.

ARC Supply voltage: 5 V
ABC Supply voltage: 6 V - 36 V

[P5230] Spool designation

Select the SBW110 spool with the configuration program.

[P5260A, B] Nominal flow to workport

Nominal flow to workport given at ΔP (PX-LS): 15 bar.

[P5240] Pressure compensator / load-hold check valve

The primary purpose of pressure compensation is to maintain a constant flow rate to a function, regardless of pressure variations in the system.

The load-hold check valve prevents oil passing from the workport to the pump gallery if the pump pressure falls below the workport load pressure.

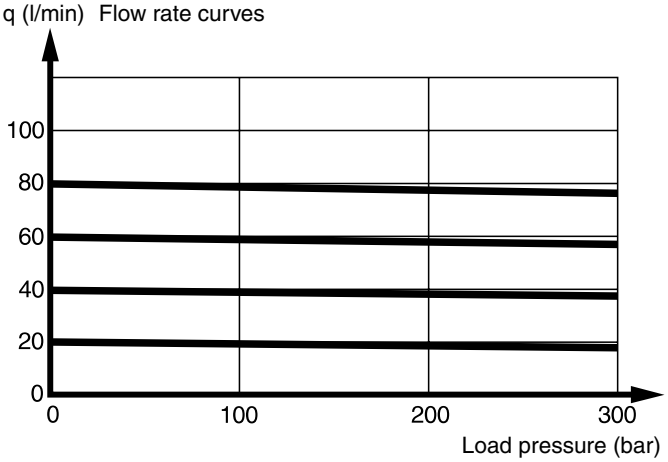
K Fixed pressure compensator with load-hold check valve.

KH Fixed pressure compensator with load-hold check valve. Provides approx. 20% more flow than K.

N Only load-hold check valve, provides no pressure compensation.

X Section without compensator or load-hold check valve. (Cavity is machined so it is possible to retrofit a pressure compensator or load-hold check valve).

q (l/min) Flow rate curves



Load-independent flow with pressure compensator.

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[P5300] Feed reducer valve

Feed reduction is used for system functions that require a lower maximum pressure compared with the normal working pressure in the system. The feed reducer valve is a signal pressure limiter on the load signal.

The signal pressure limiter limits the pressure in the workport by causing the compensator spool to close the pump-workport connection when the signal pressure limiter reaches a preset value. This closes the flow and the function consumes a total of no more than 2 l/min, thereby limiting the pressure with minimal flow/energy loss.

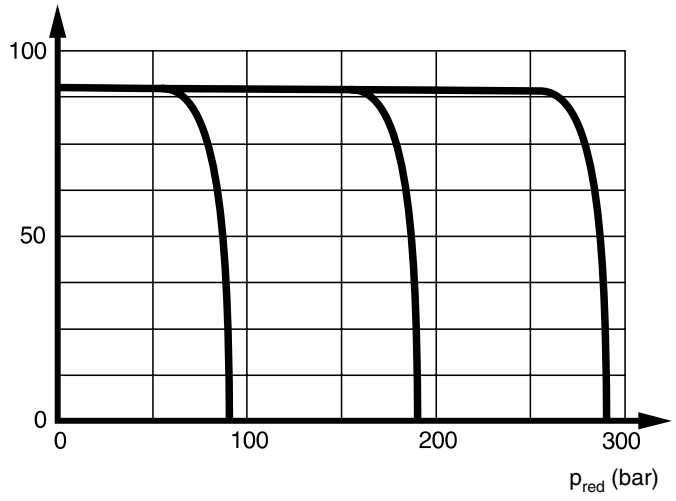
Ahead of the signal pressure limiter there is a strainer with bypass function. The feed reducer valve cannot handle external pressure peaks. If pressure peaks occur, it is recommended to use pressure relief valves in [P5310] and [P5320].

MRC Work section with common feed reducer valve for workports A and B, same setting in both ports.

[P5300S] Pressure setting of MRC

Selectable between 25-330 bar.

q_m (l/min) Feed reduction characteristics



p_{red} = reduced pressure in workport
q_m = flow rate in workport

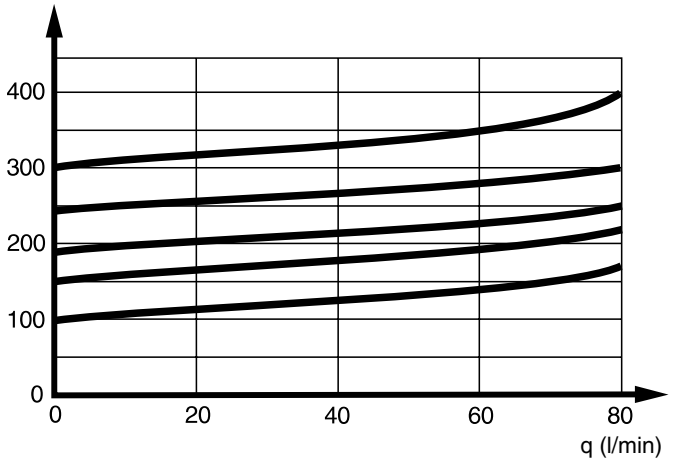
Port pressure relief and/or anti-cavitation valves
[P5310] Workport A
[P5320] Workport B

Y2 Connection workport to tank blocked with plug.

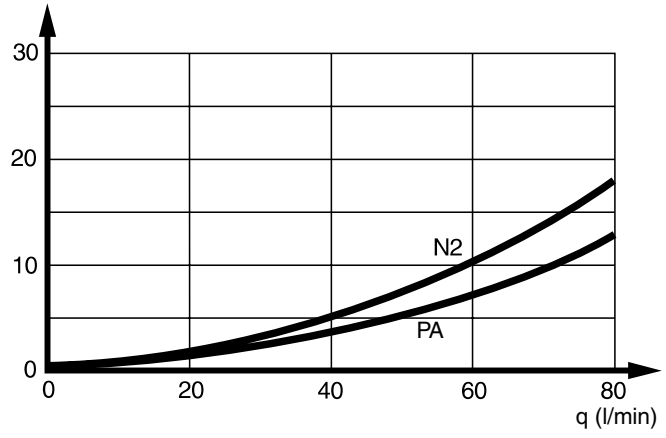
N2 Workports of section equipped with anti-cavitation valve. In the event of negative pressure in the workports, the anti-cavitation function allows oil to flow from the tank gallery to the workport.

PAU Pressure relief valve with anti-cavitation function for workport. In the case of negative pressure in the workports, the anti-cavitation function allows oil to flow from the tank gallery to the workport.
Selectable pressure settings in bar: 125, 140, 160, 175, 190, 210, 230, 240, 250, 260, 270, 280, 300.

Δp (bar) PA, pressure relief characteristics



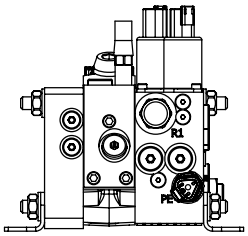
Δp (bar) Anti-cavitation characteristics

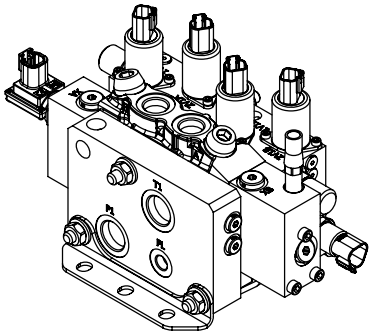


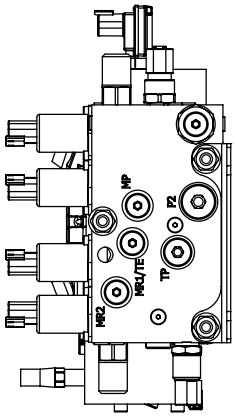
Dimensional drawing / 3D

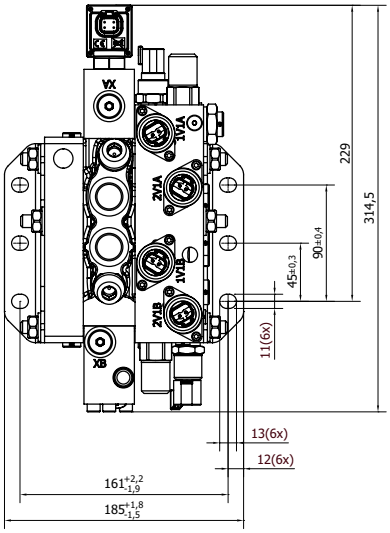
A 3D model and 2D drawing for the current configuration are accessible in Parker's configuration software.
The drawing shows the maximum external measurement and location of the mounting hole.
A port table is also included in the drawing.

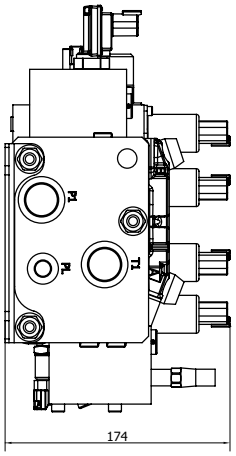
An example is shown below:

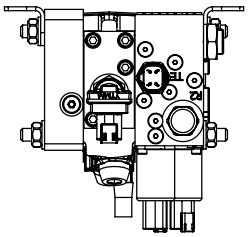


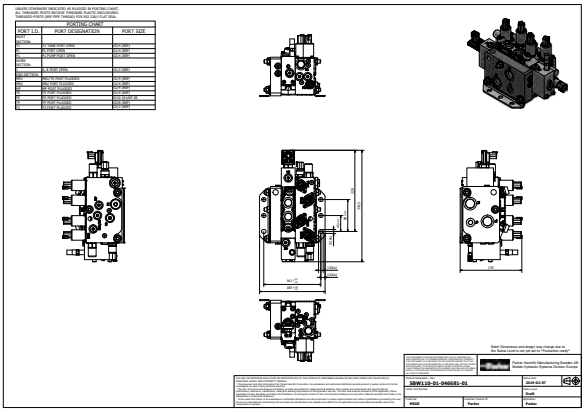












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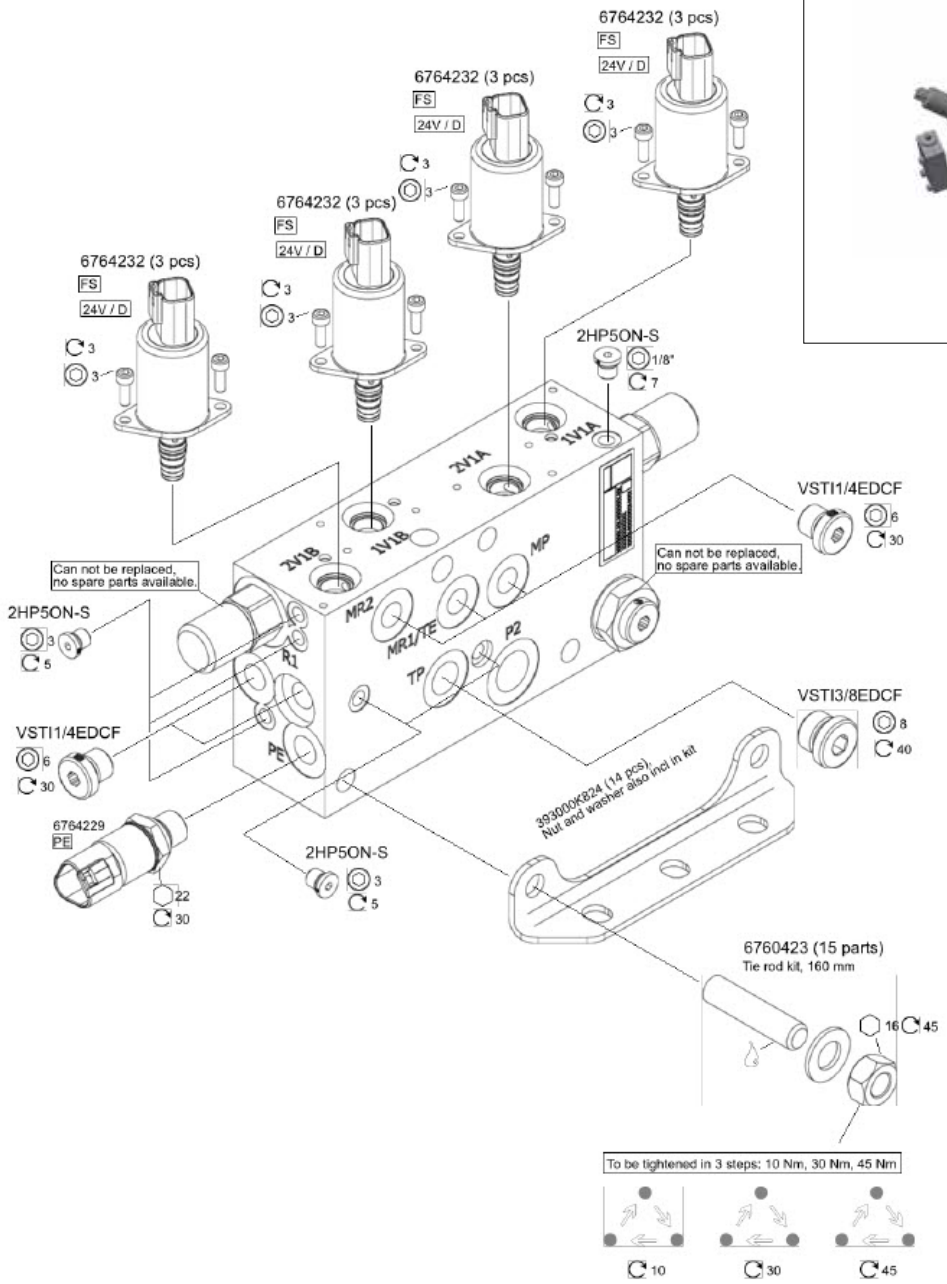
Spare parts

Parker´s configuration program for SBW110 has a Spare part list available for the current configuration.

An example is shown below:

Spare parts list

Product designation: **SBW110-01-047130-01**
Customer: **SBW110 Katalog**
Application: **SBW110 Katalog**



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