L90LS Training

L90LS Load Sensing Valve

Leading with Purpose

January 10, 2024

ENGINEERING **YOUR** SUCCESS.

L90LS Valve Layout

Proportional, Load sensing, Pre-compensated

- 1-12 work sections

- Combinable with K220LS

- Pre-compensated with flow sharing capabilities

- Each work section individually configurable

- Custom manifold integration possible

- Unique online configurator

End section

Work section 4

Work section 3

Work section 2

Work section 1
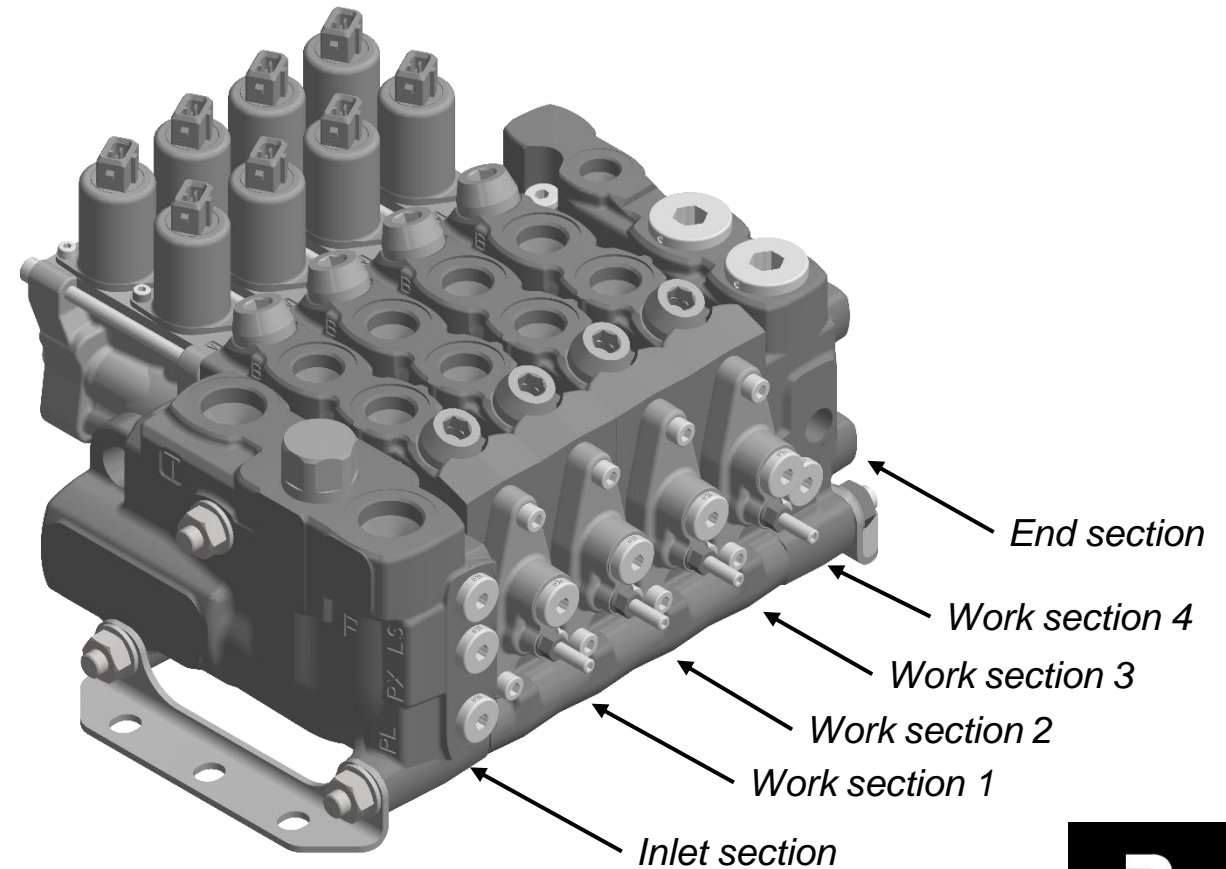
Inlet section

L90LS Technical Data

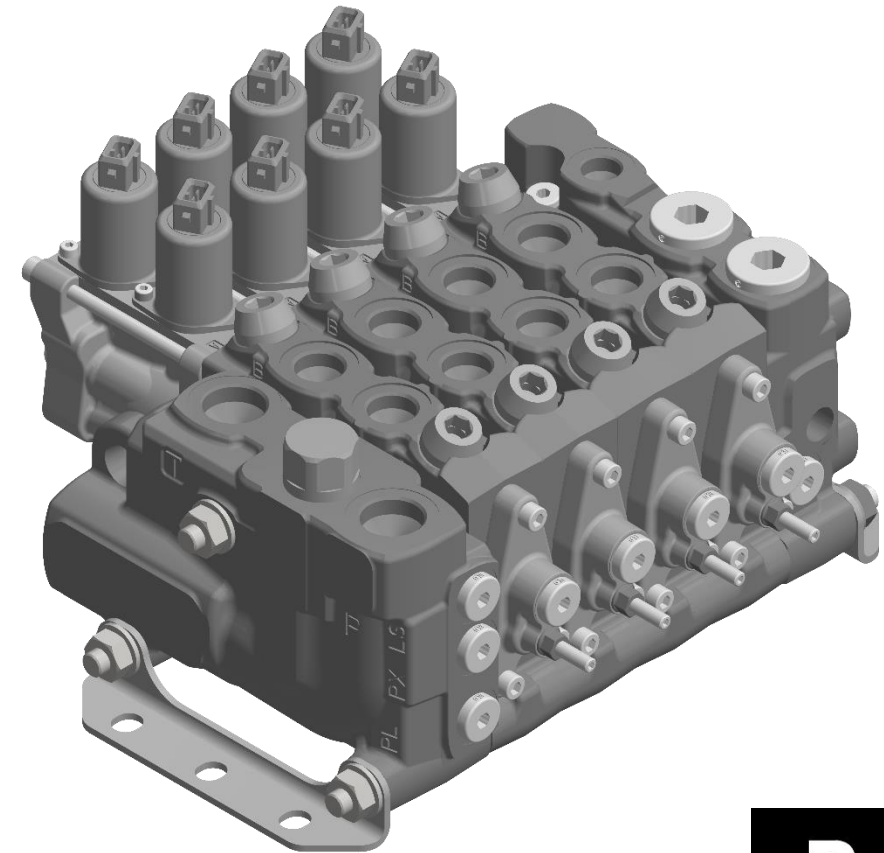**Max pressure, unlimited number of cycles:**

- Pump: 330 bar
- Workport: 350 bar
- Tank: 20 bar

Flow capacity:

- Compensated flow to workport: 130 l/min
- Uncompensated flow to workport: 160 l/min

Dimensions	Section width
Inlet section LS1, LS2, CFC:	55 mm
Inlet section IP:	30 mm
End section US:	51 mm
Work section:	40 mm

L90LS Applications
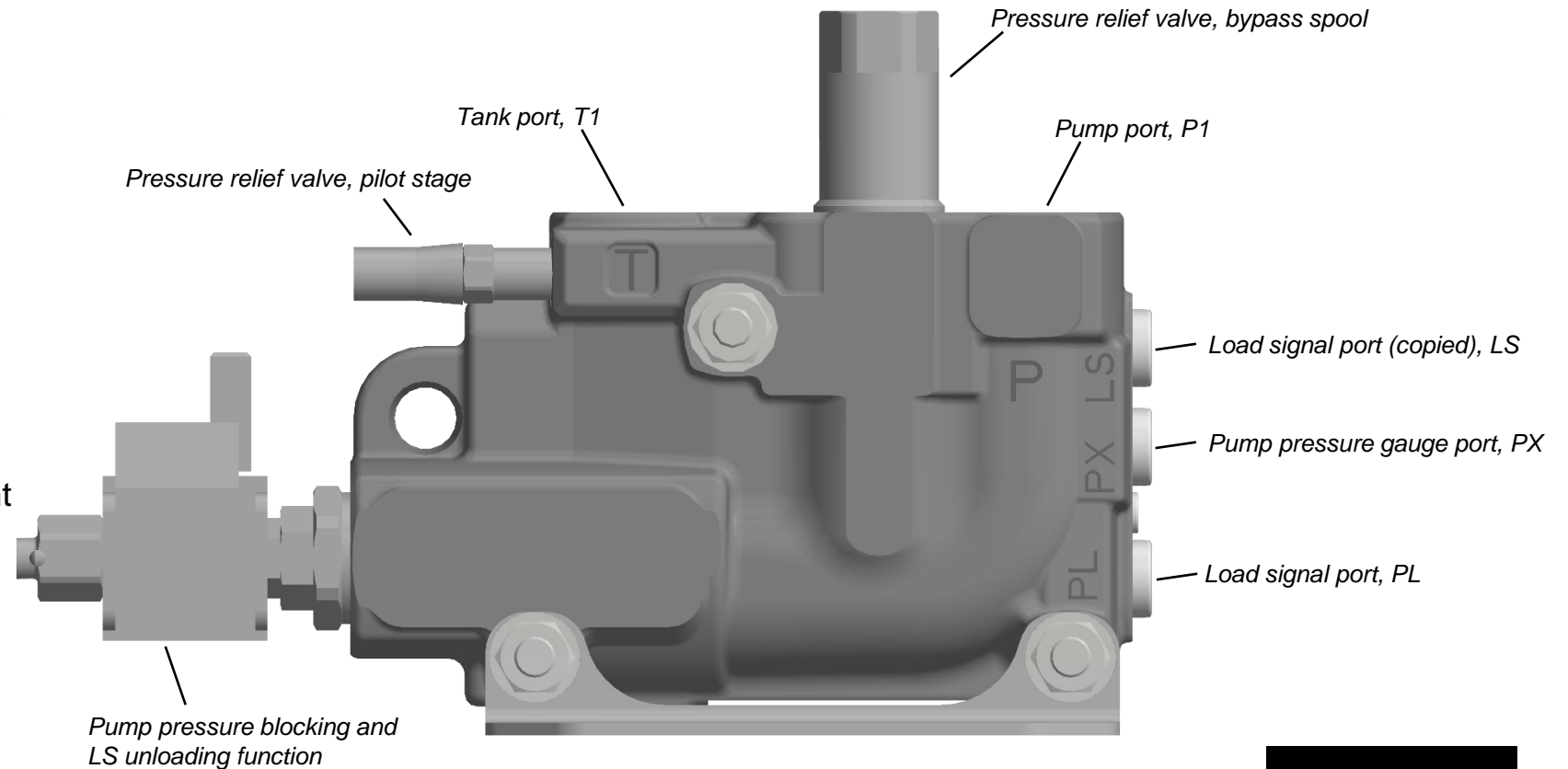
Target applications

- **Forestry** – Harvesters, forwarders, harvesting heads, forest cranes

- **Material handling** – Cranes, forklifts, reach stackers

- **Construction** – Multi-purpose machines, high-end backhoes, wheel loaders

- **Mining** – Drill rigs, loaders

- **Municipal** – Salt spreaders, sweepers, snowplows

- **Refuse vehicles** – Side loaders

- **Agriculture** – High-end tractors, veg. harvesters
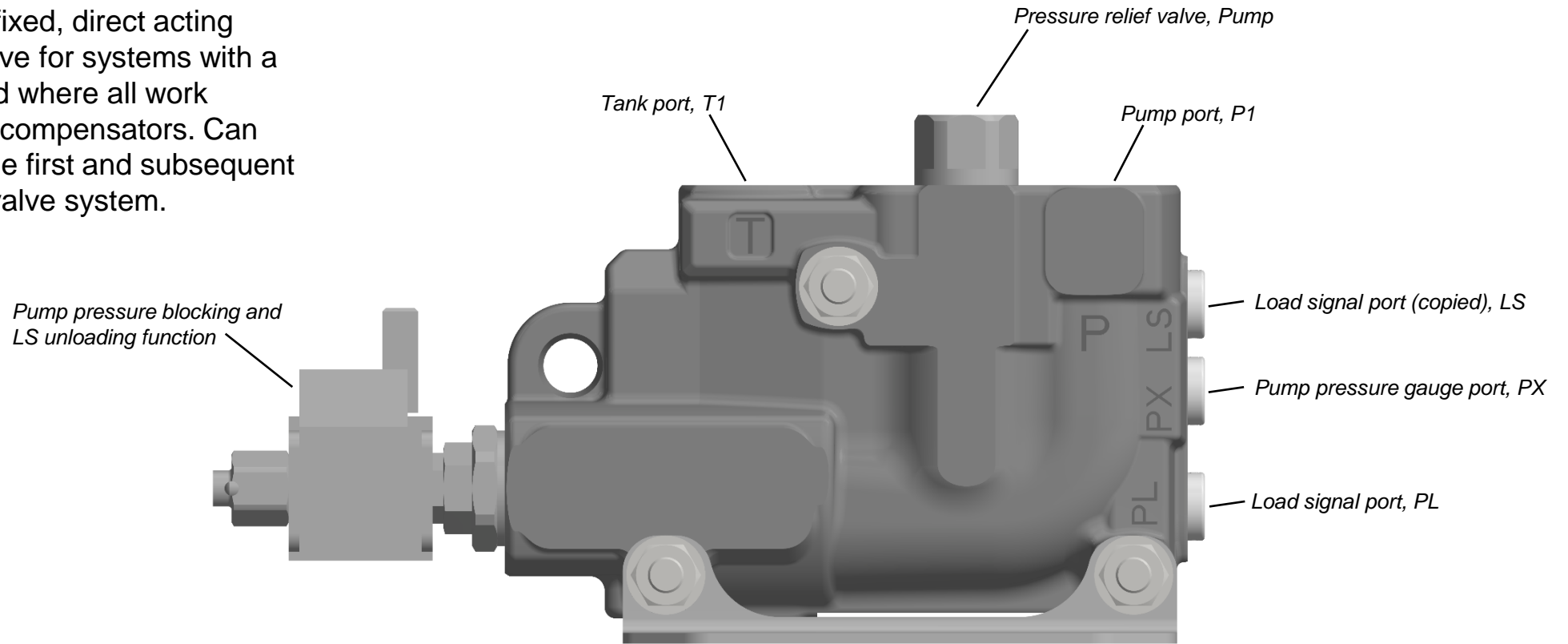
L90LS Inlet section

CFC / LS1

- **CFC** – Inlet section with an adjustable pressure relief valve for systems with a fixed pump and where all work sections have LS compensators. Can only be used in the first valve in a multi-valve system. Can be converted to LS1.

- **LS1** – Inlet section with an adjustable pressure relief valve for systems with a variable pump and where all work sections have LS compensators. Can be used in both the first and subsequent valves in a multi-valve system. Can be converted to CFC.

Pressure relief valve, bypass spool

Pump port, P1

Tank port, T1

Pressure relief valve, pilot stage

Load signal port (copied), LS

Pump pressure gauge port, PX

Load signal port, PL

Pump pressure blocking and LS unloading function
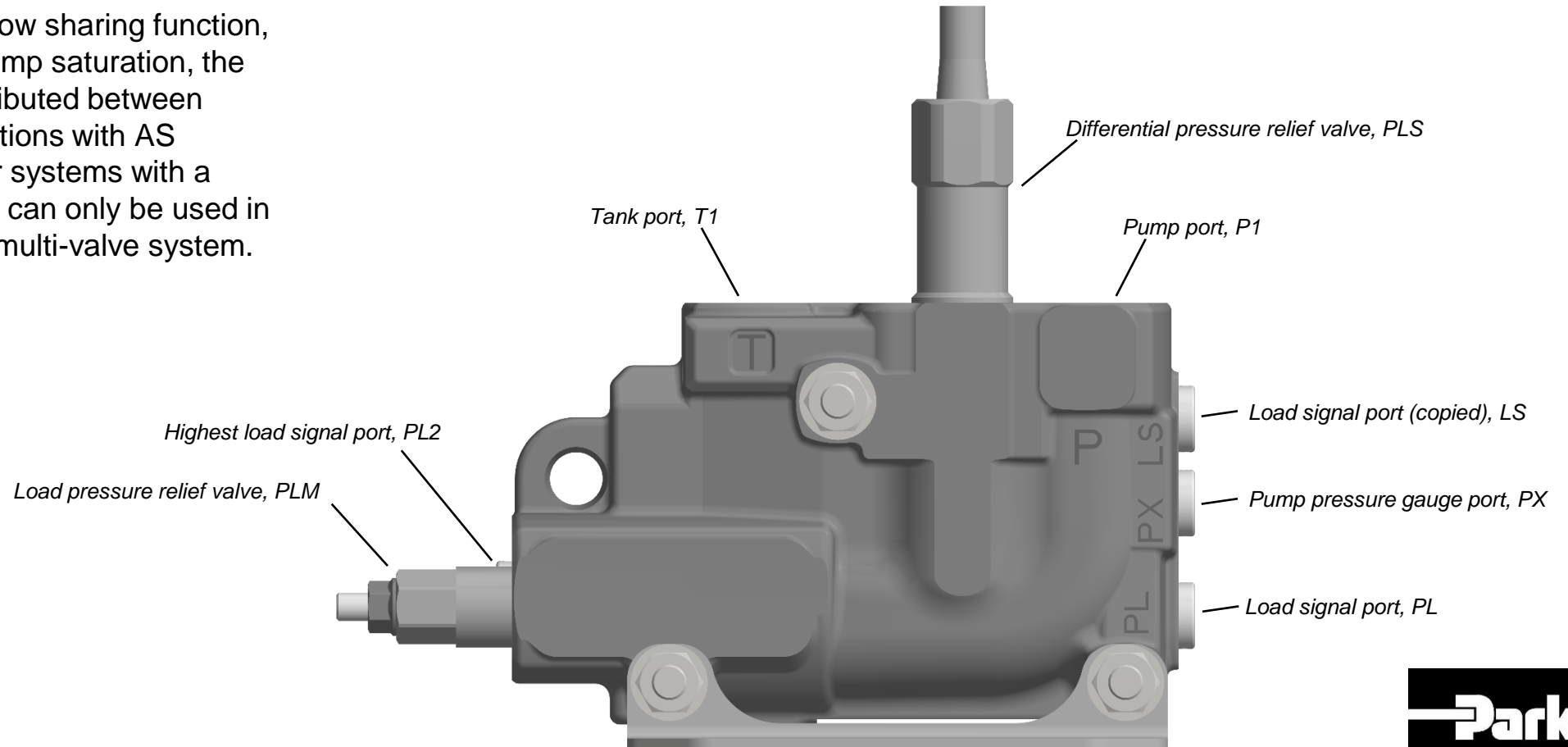
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L90LS Inlet section

LS2

- Inlet section with fixed, direct acting pressure relief valve for systems with a variable pump and where all work sections have LS compensators. Can be used in both the first and subsequent valves in a multi-valve system.

Pressure relief valve, Pump

Tank port, T1

Pump port, P1

Pump pressure blocking and LS unloading function

Load signal port (copied), LS

Pump pressure gauge port, PX

Load signal port, PL
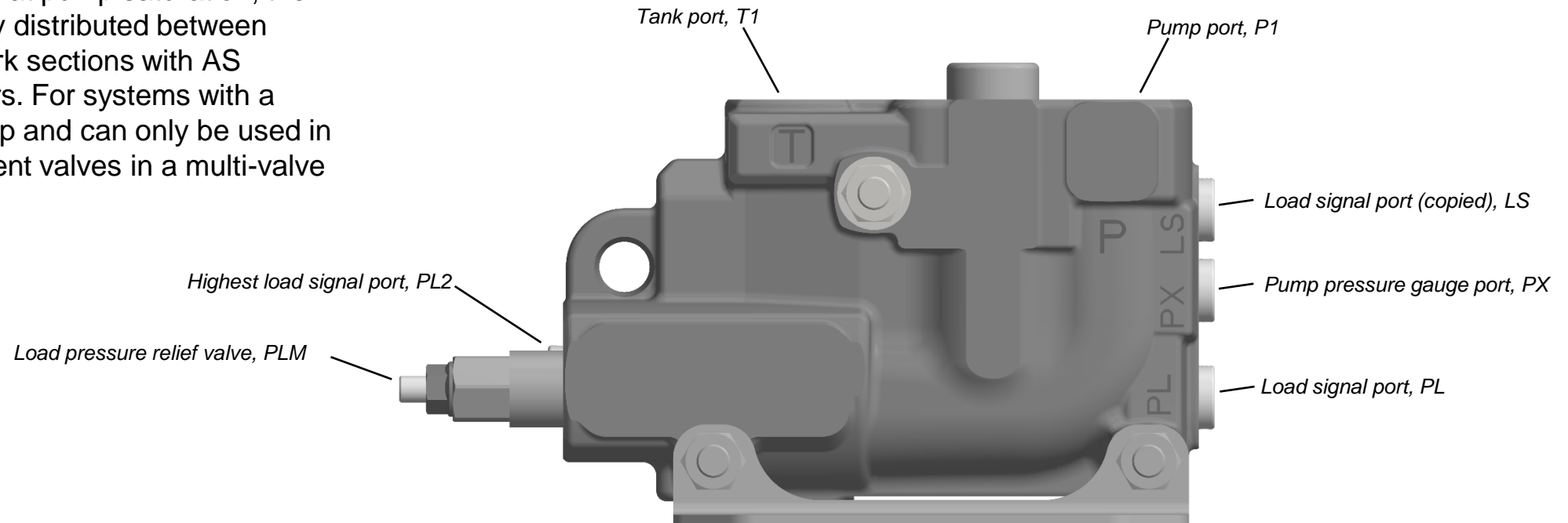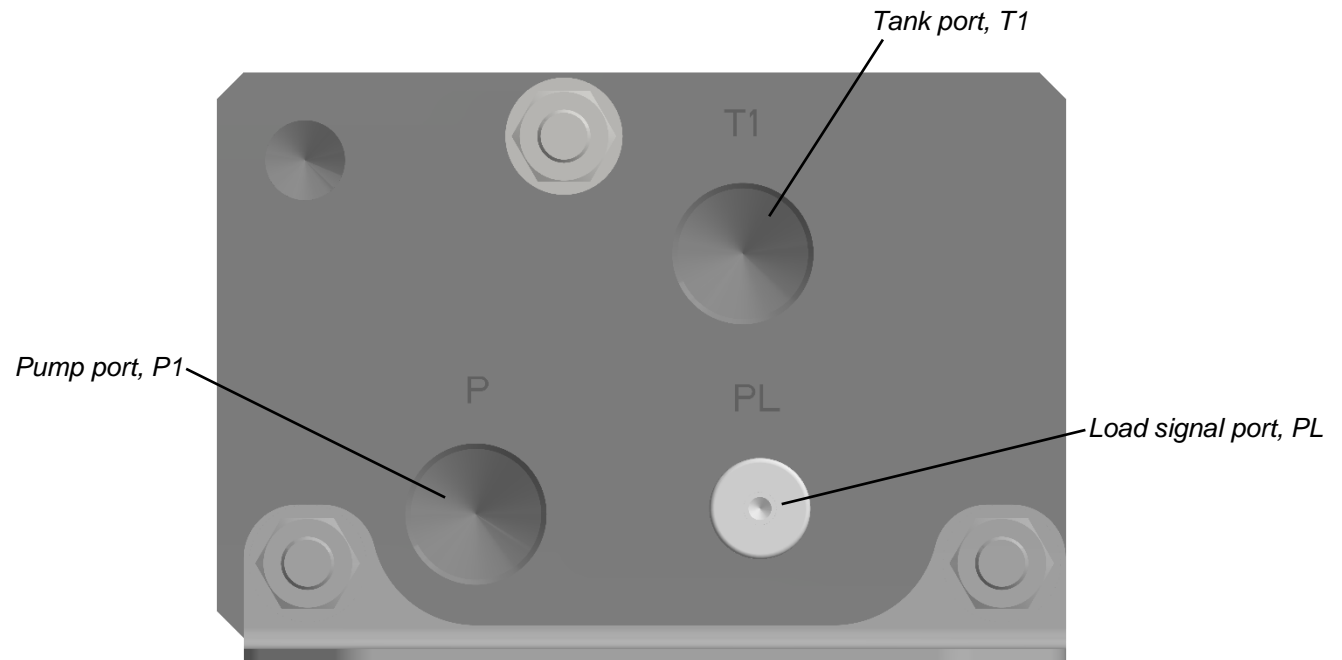
L90LS Inlet section
AS

- Inlet section with flow sharing function, meaning that at pump saturation, the flow is evenly distributed between activated work sections with AS compensators. For systems with a variable pump and can only be used in the first valve in a multi-valve system.

Differential pressure relief valve, PLS

Tank port, T1

Pump port, P1

Highest load signal port, PL2

Load pressure relief valve, PLM

Load signal port (copied), LS

Pump pressure gauge port, PX

Load signal port, PL

L90LS Inlet section

AS2

- Inlet section with flow sharing function, meaning that at pump saturation, the flow is evenly distributed between activated work sections with AS compensators. For systems with a variable pump and can only be used in the subsequent valves in a multi-valve system.


Tank port, T1

Pump port, P1

Load signal port (copied), LS

Pump pressure gauge port, PX

Load signal port, PL

Highest load signal port, PL2

Load pressure relief valve, PLM

L90LS Inlet section

IP

- Simplified inlet section with only connections for pump, tank and load signal. For systems with a variable pump and where all work sections have LS compensators. For systems with a variable pump and can only be used in the first valve in a multi-valve system.


Tank port, T1

Pump port, P1

Load signal port, PL

L90LS Inlet section

Pressure limitation

- **PA1** – Direct acting pressure relief valve
  - For inlet type LS2.
  - Protects the pump and valve from pressure peaks in the system.

- **PS** – Adjustable pilot operated pressure relief valve
  - For inlet CFC as a bypass function where max pressure is indirectly limited by limiting the dP (Pump-LS) to 10 bar.
  All excess oil is diverted directly to tank.
  - For inlet LS1 as a pilot operated relief valve protecting the pump and valve from pressure peaks in the system.
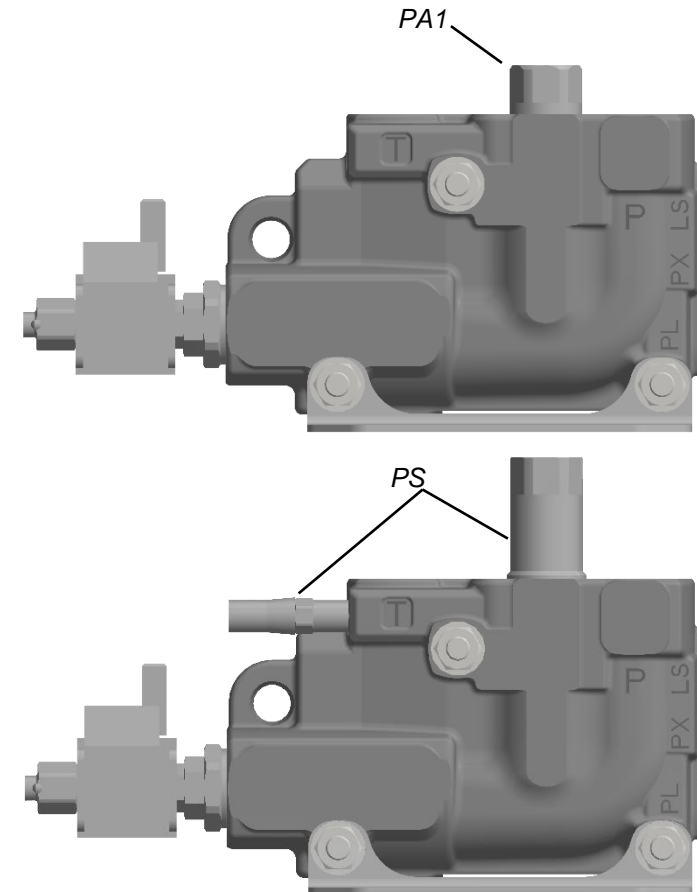
L90LS Inlet section

Pressure limitation

- **PLM** – Adjustable pressure relief valve on the load signal
  - For flow sharing inlets AS/AS2.
  - Limits the load signal to pump which together with the pump regulator setting corresponds to the maximum pressure in pump gallery.

- **PLS** – Differential pressure relief valve
  - For flow sharing inlet AS.
  - In flow sharing valves, the flow to workport is decided by the dP between pump and max load signal. The PLS maximizes the dP to prevent disruptions in functions with AS compensators.
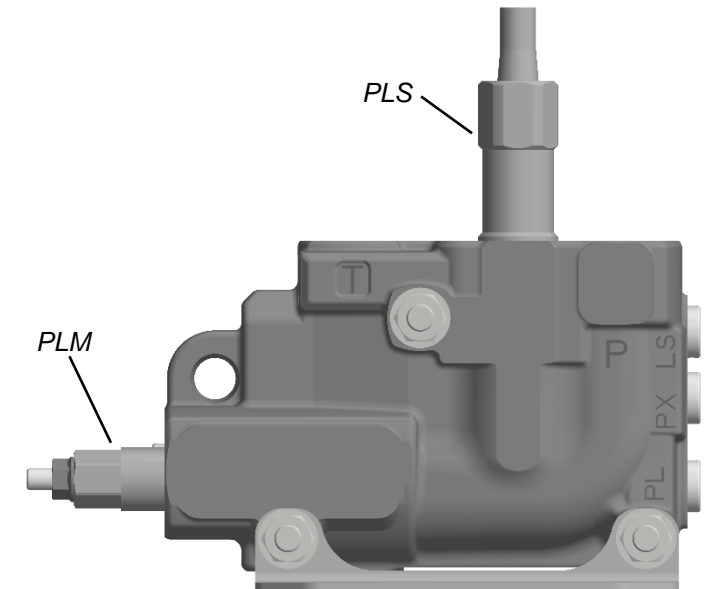
L90LS Inlet section

Load signal system

- Load signal copy function – Copies the highest load signal using pump oil and sends it to port LS. Avoids oil consumption from workport.

- Connection ports:
    - LS – Copied load signal. Primary port for connecting the load signal to the pump regulator. Oil supplied from pump.
   - PL – Uncopied load signal. Oil supplied from workport which can cause micro dipping during lifting.
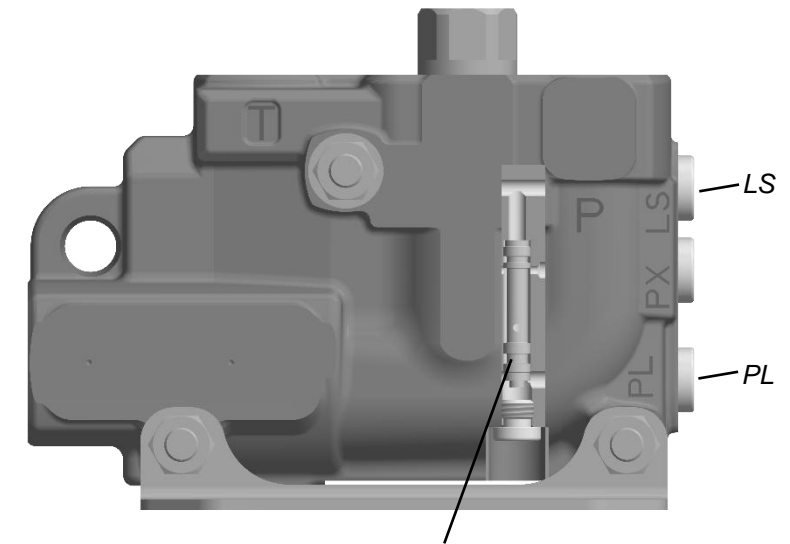

Internal load signal copy function

L90LS Inlet section

Pump pressure blocking and LS unloading function

- Safety function allowing OEMs to equip their machines with an emergency stop function to comply with the EC Machinery Directive. The function can be controlled either electrically or hydraulically.

- **BEN** – Electrically controlled. At no current to the solenoid, the pump pressure is blocked, and the load signal is drained to tank.

- **BX** – Hydraulically controlled. When the external signal is equal to or higher than the pump pressure, the pump pressure is blocked, and the load signal is drained to tank.

Electrically controlled emergency stop

Hydraulically controlled emergency stop

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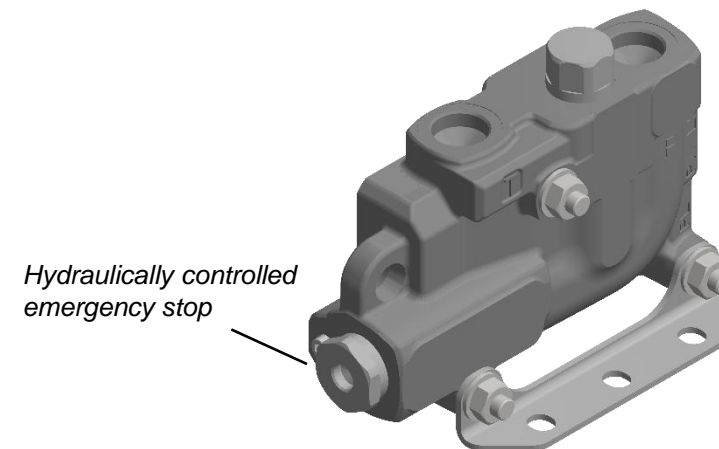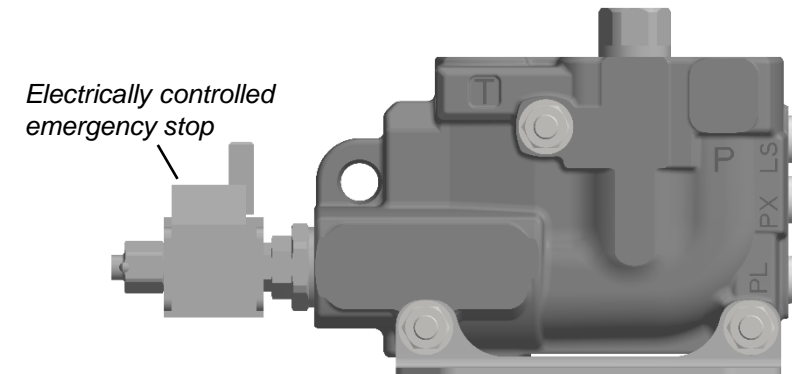
L90LS Work section

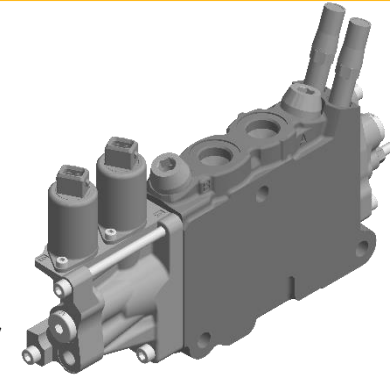## OOO, OOT, TCO, TCT, TOO, TOT, TTO, TTT
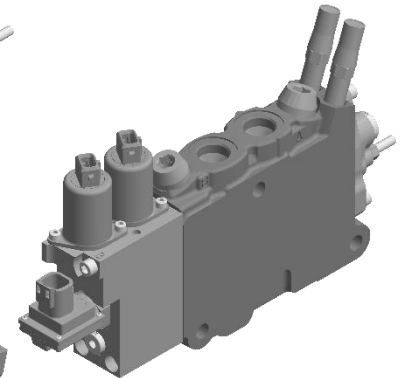

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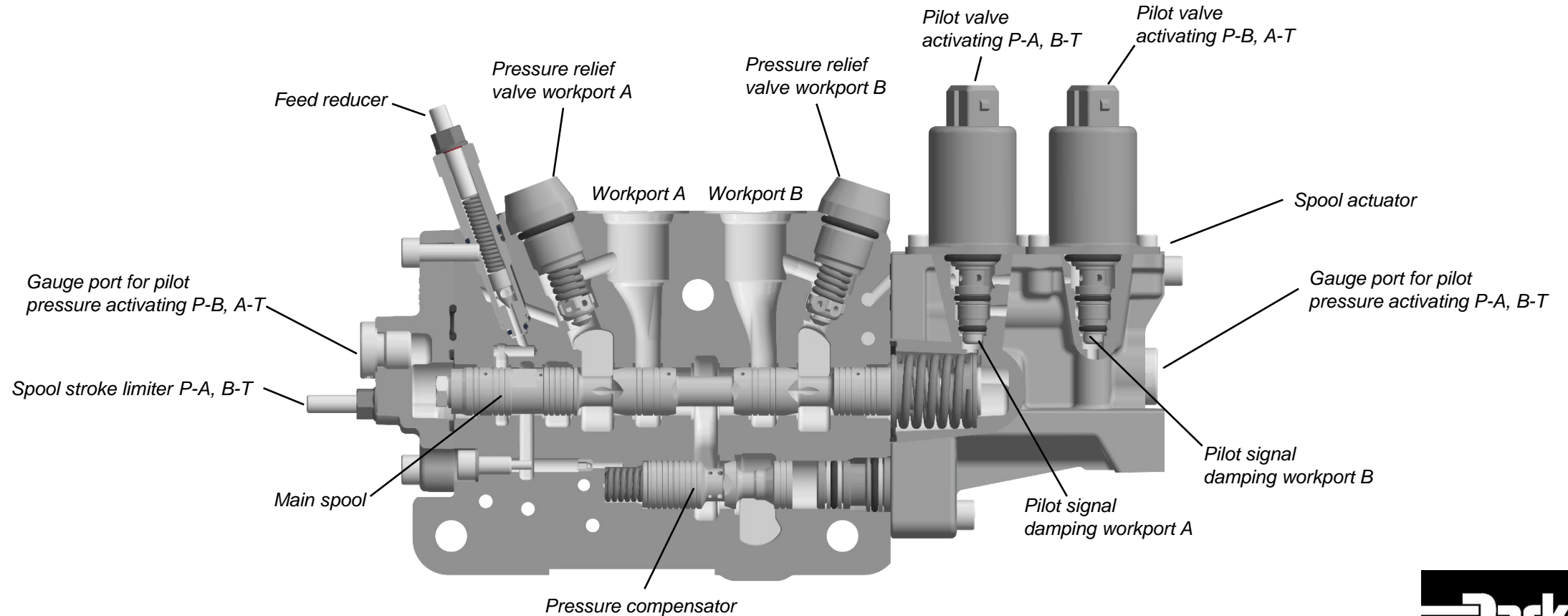
L90LS Work section

Spool actuator

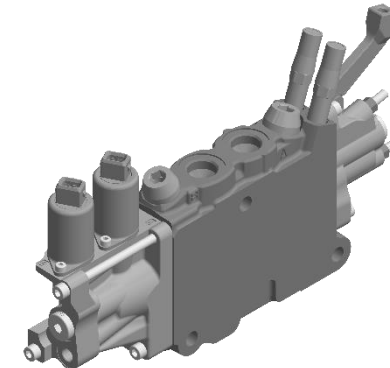- **Spool actuator – closed**
  - ECS2 – Electric proportional spool actuator controlled by two pilot valves. Supplied internally with pilot pressure oil.

  - ECS4 – Same as ECS2 but with possibility to add a spool position sensor

  - EC2 – Same as ECS2 but with manual override option for the pilot valves.

  - ECH3 – Same as ECS2 but with the possibility of manual control by means of a lever.

 - ECHL3 – Same as ECH3 but with a weaker centering spring.

ECS2, EC2

ECS4

ECH3, ECHL3
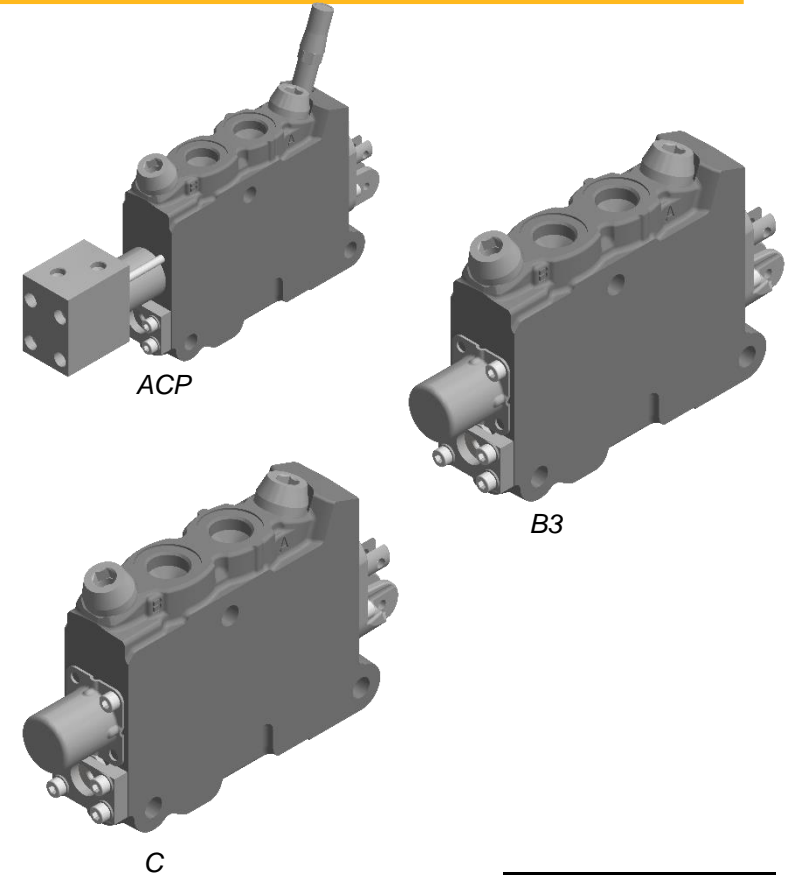
L90LS Work section

Spool actuator

- ECH4 – Same as ECH3 but with the possibility to add a spool position sensor.

- PC – Hydraulic, proportional spool actuator controlled by external pilot pressure.

- PC4 – Same as PC but with the possibility to add a spool position sensor.

- PCH2 – Same as PC but with the possibility of manual control by means of a lever.

- CH2 – Spring centered spool actuator for proportional operation by means of a lever.

- CHB32 – Same as CH2 but with 3-position mechanical detent.

ECH4

PC

PC4

CH2, CHB32
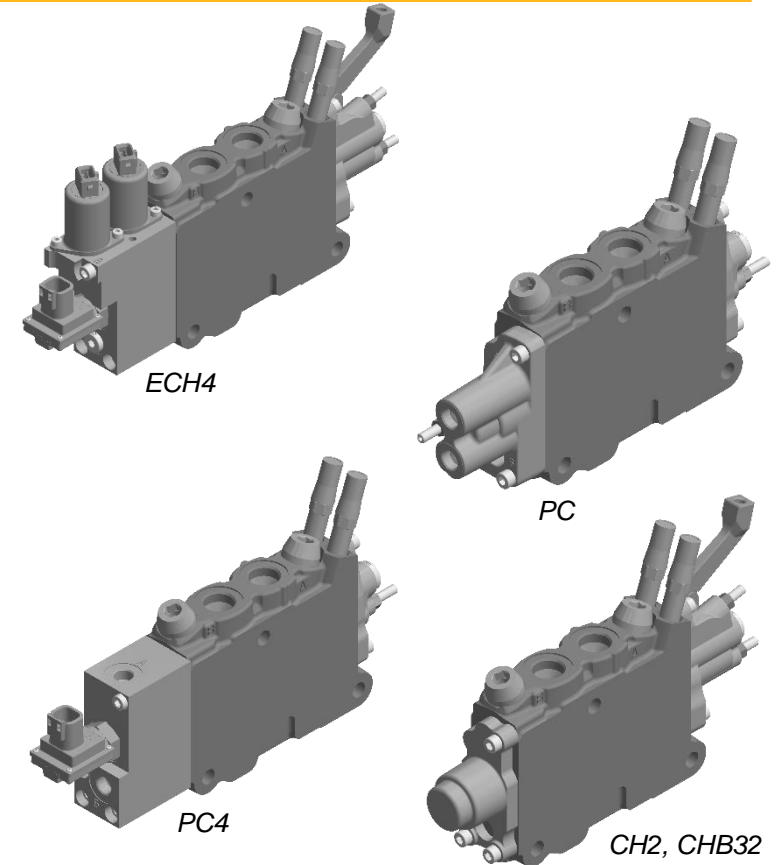
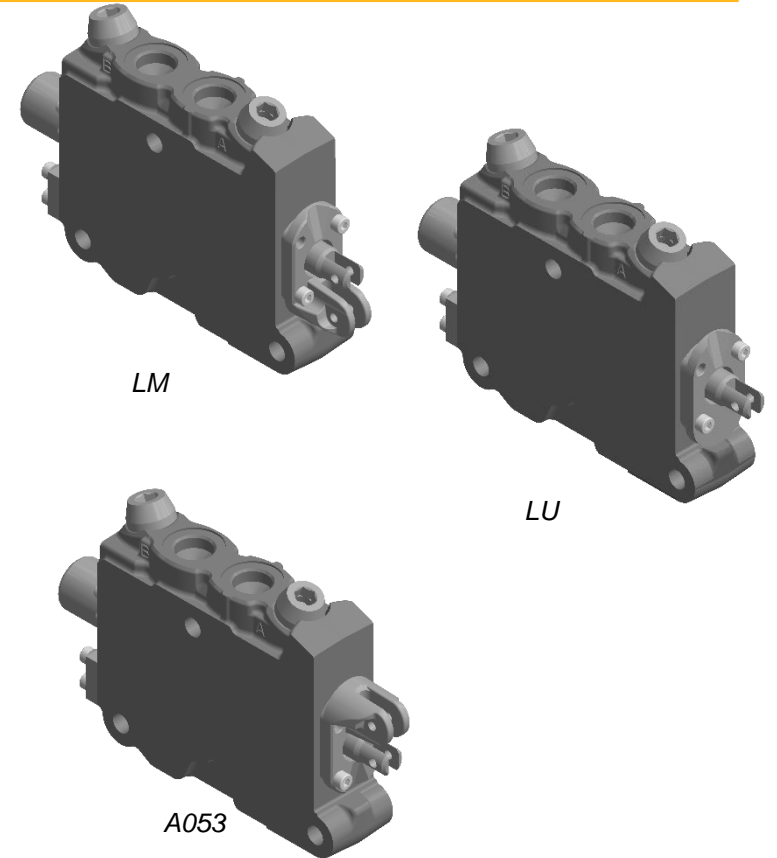# L90LS Work section

Spool actuator

- **Spool actuator – Open B-side**
  - ACP – Proportional pneumatic spool actuator.

  - B3 – Spring centered spool actuator with 3-position mechanical detent.

  - C – Spring centered spool actuator with manual operation by means of a lever.

ACP

B3

C

L90LS Work section

Spool actuator

- **Spool actuator – Open A-side**
  - LM – Lever attachment.

  - LU – Spool end cover.

  - A053 – As LM but rotated 180˚

LM

LU

A053

L90LS Work section

Spool actuator related functions

- Spool stroke limiters – Mechanically limit the spool stroke in either direction, adding flexibility in maximum flow to workport.

- Spool position sensor – Diagnostics of the spool's position.
  - For spool actuators ECS4, ECH4 and PC4
  - Analog – Output signal proportional to the spool position.
  - Digital – ON/OFF output signal for indication when spool is inside/outside neutral position.

- Pilot signal damping – Dampens the pilot signal to provide a smoother start and stop of a function.

Spool stroke limiter

Spool stroke limiter

Spool position sensor

Parker
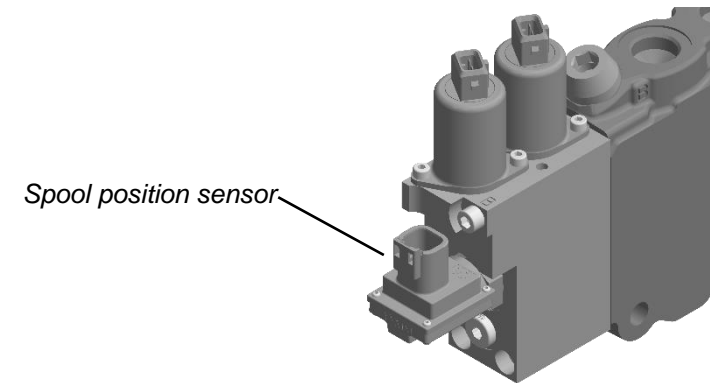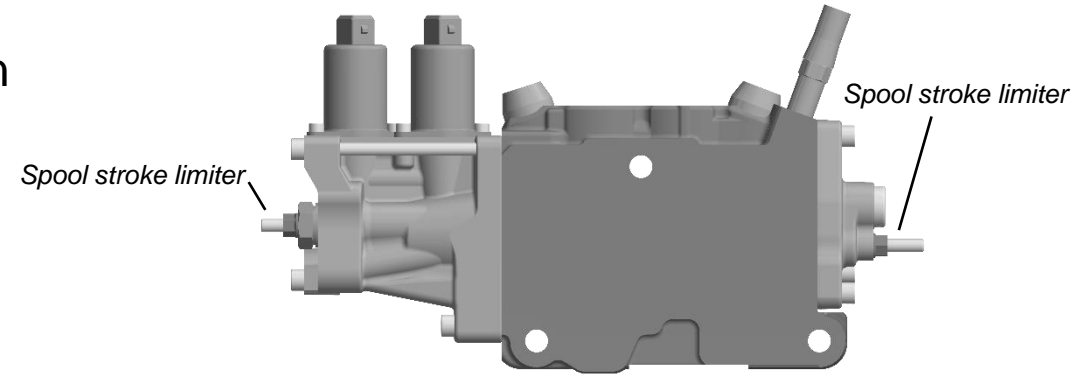
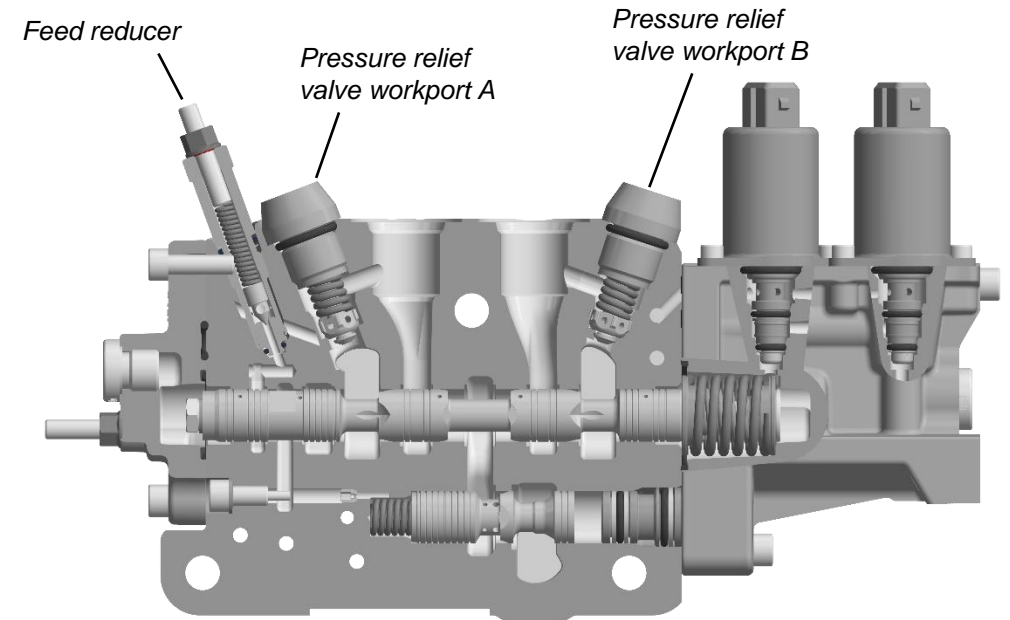# L90LS Work section

Spool related functions

- Main spool – Function adapted spools with pressure compensated flow rate up to 130 l/min.

- Pressure compensator – Maintains constant speed of function regardless of the load and pressure variations in the system.
  - Integrated check valve to prevent oil from going back to pump in case of lower pressure in pump gallery.

- Force feedback – Stabilizing effect on the hydraulic system providing a smoother operation when starting a high inertia load. The operator feels the increase/decrease in load pressure better.

Main spool

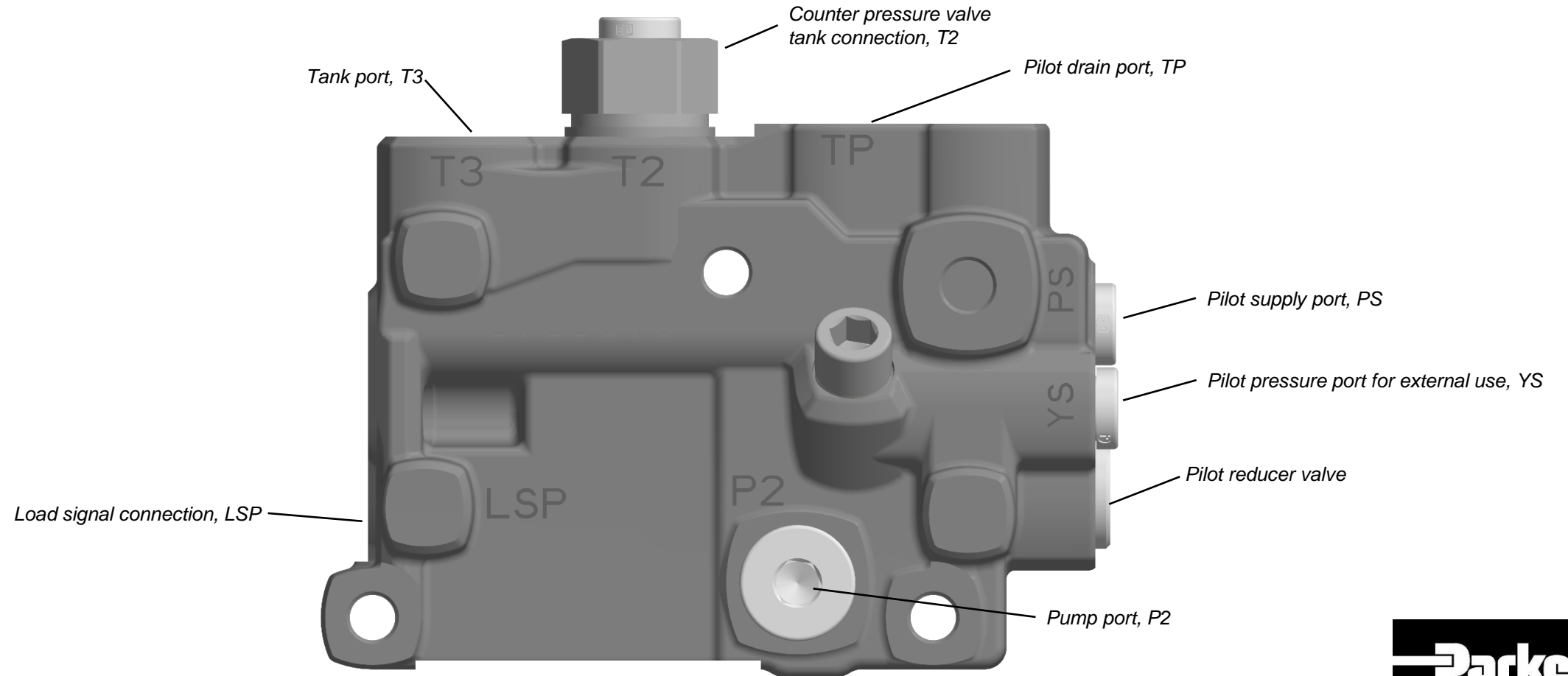*Pressure compensator*
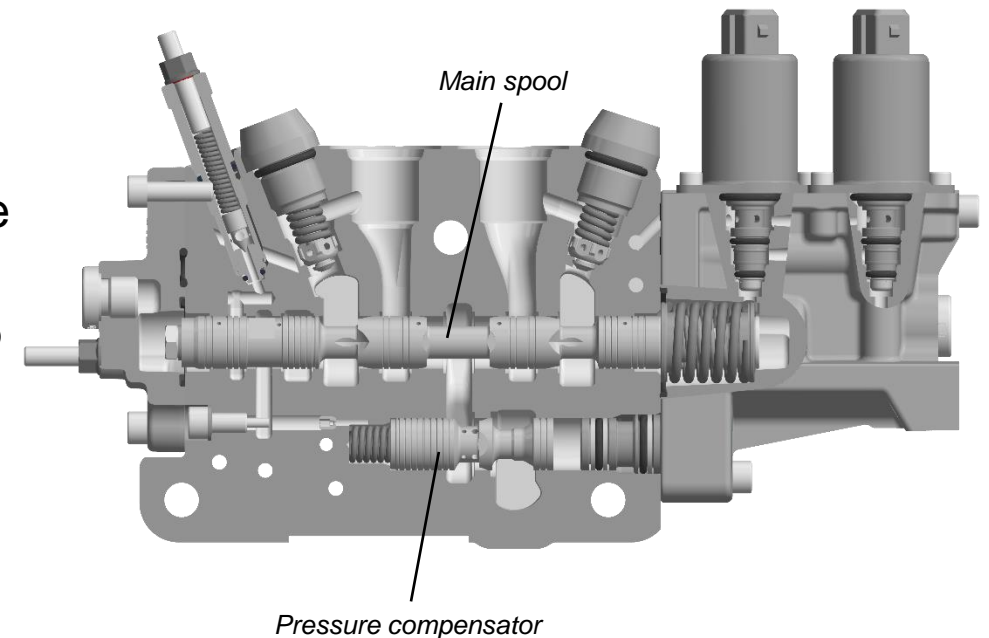
L90LS Work section

Workport related functions

- Feed reducer – Set maximum pressure in workport individually by limiting the load signal with low energy loss, consumes ~2 l/min.

- Pressure relief valve in workports – Protects the workports and consumer from pressure peaks.
  - Integrated anti-cavitation function allowing workports to be refilled with tank oil in the event of negative pressure in workport, lowering the risk for cavitation.
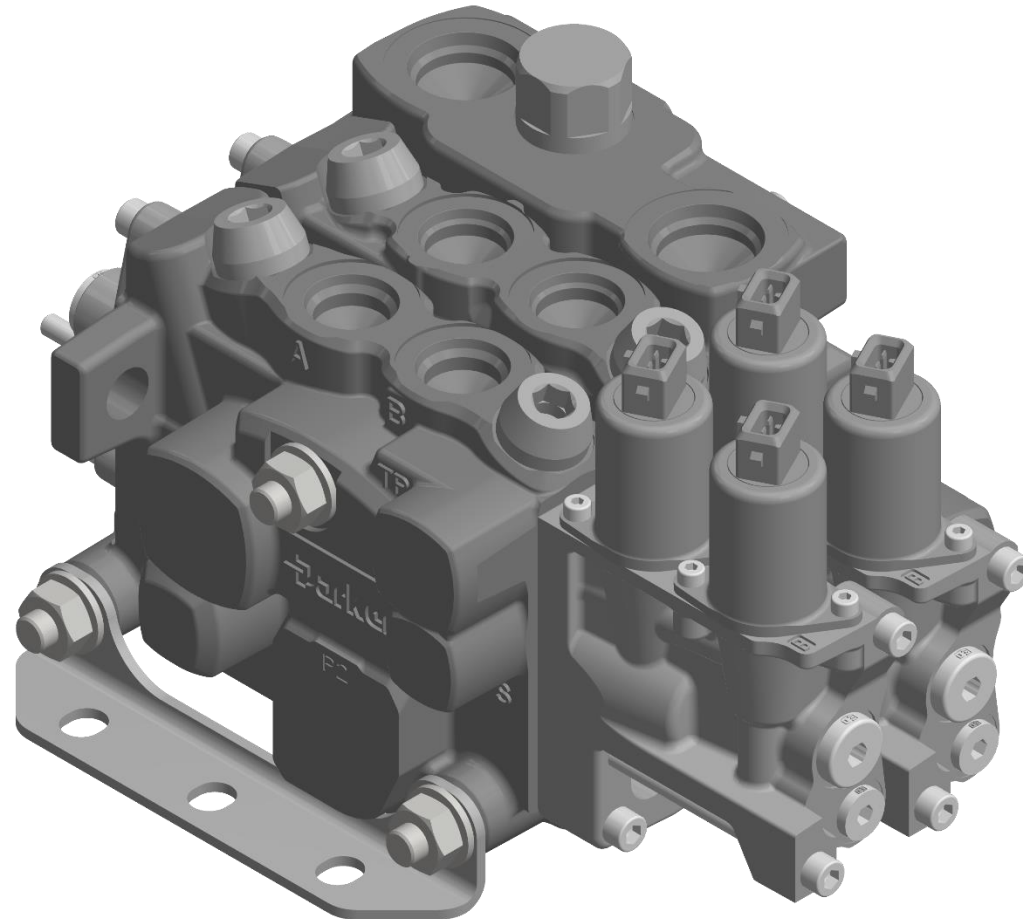
Feed reducer

Pressure relief valve workport A

Pressure relief valve workport B

L90LS End section

US

Counter pressure valve tank connection, T2

Tank port, T3

Pilot drain port, TP

Pilot supply port, PS

Pilot pressure port for external use, YS

Pilot reducer valve

Load signal connection, LSP

Pump port, P2

L90LS End section

MU* - Combined work- & end section

L90LS End section

End section functions

- Counter pressure valve – Increases the pressure in the valve's tank gallery to ensure the availability of oil to refill over the relief valves in the workports. This results in improved anti-cavitation characteristics.

- Pilot pressure supply function – Reduces pump pressure to a set level to ensure that there is enough pressure to supply the spool actuators. The reduced pressure can either be internally connected via a coarse filtration strainer directly or via e.g., an external filter. Also includes:
  - A pressure relief valve function to protect the pilot circuit.
  - A check valve to prevent oil from leaking back to pump.

Counterpressure valve

Pilot tank port

Internal check valve

Internal pressure reducing valve for pilot supply
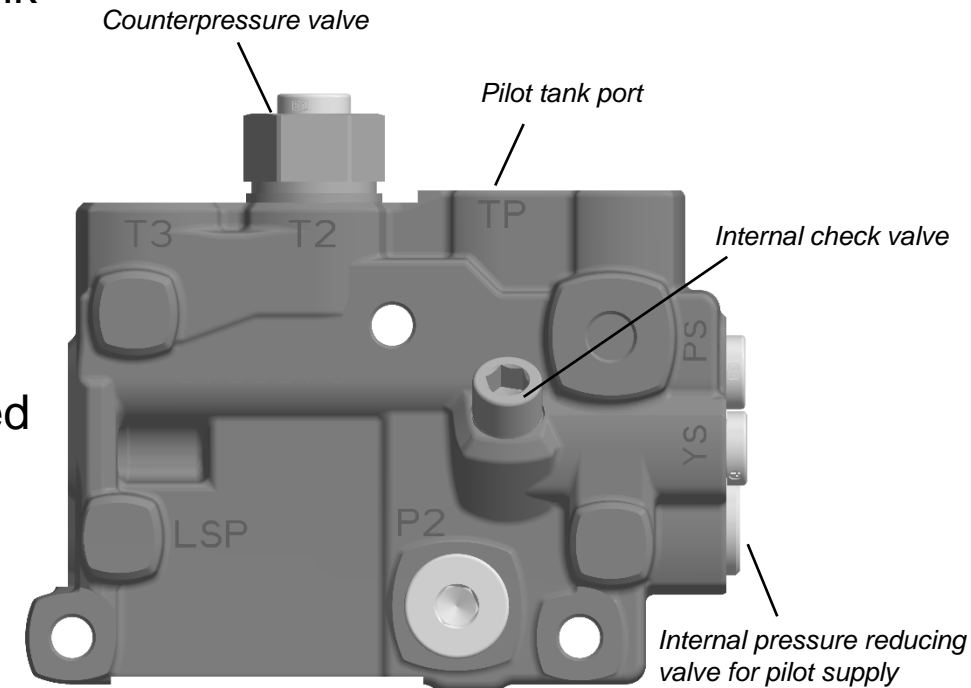
L90LS End section

End section functions

- Pilot drain function – The pilot return can either be internally connected directly to the main tank or via a check valve to raise the pressure in pilot tank, or externally drained.

- Connection ports:
  - YS – Port for external use of the reduced pressure. Can be connected to e.g., an external filter or remote-control valve.
  - PS – Pilot supply port.
  - TP – Pilot tank port for external drainage of pilot return.

- LSP port –Connection for the load signal from a parallelly connected valve.
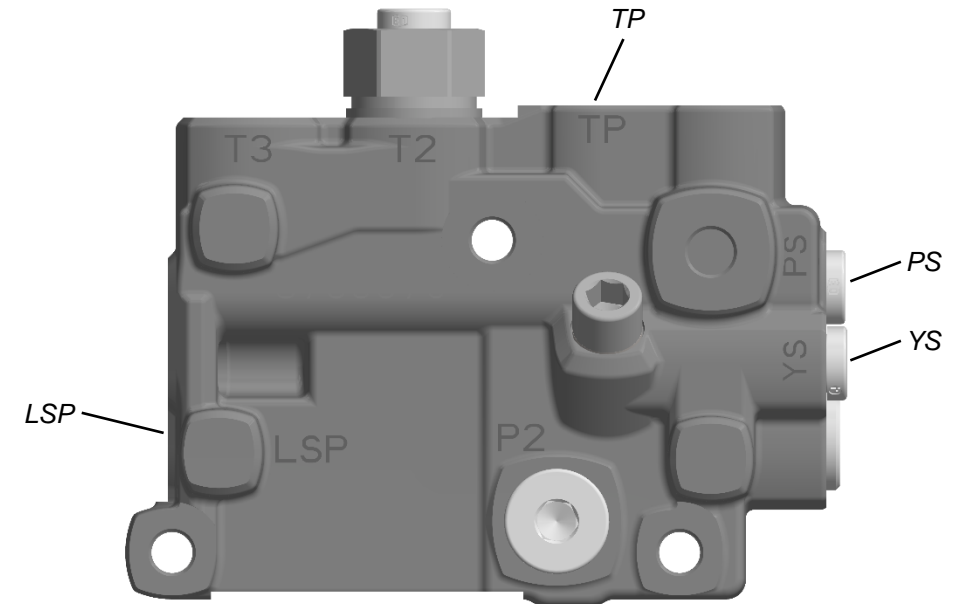
L90LS Manifold integration

Work section machining

- The work sections are available with extra machining allowing smart integration of function manifolds.
    - System signal lines with various code pins to connect desired load signal to desired signal line.
    - Internal connection of workports to following section.
    - Internal connection of workport to subsequent and following work section.

- Various existing generic function manifolds or customer unique manifolds designed completely in accordance with the customer's specific needs regarding functionality.

Internal connection of workports

Signal lines
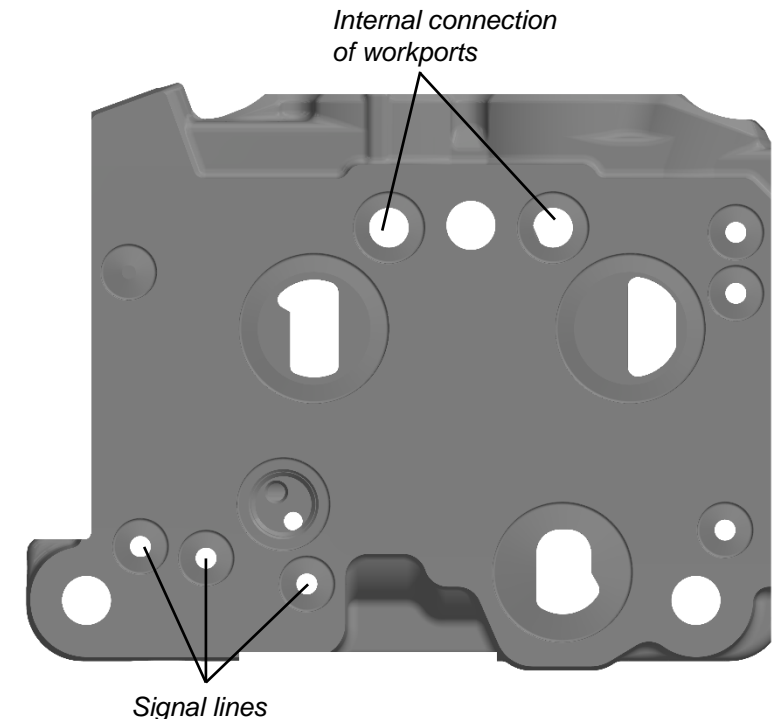
L90LS Manifold integration

Function manifolds

- M10 – The previous section's workports are connected via internal connection to the M12 manifold allowing the workports to be drained to tank providing float function. The float function can be selected for both or individually for workport A and B.

- M14 – The previous section's workports are connected via internal connection and load signal via a code pin to the M14 manifold allowing control of workport pressure.

- M16 – Pressure control previous section's workport A and following section's workport B.

L90LS Manifold integration

Function manifolds

- M15 – Mid inlet for separate pump supply of following sections. Includes a main pressure relief valve as protection for following sections.

- M17 – Function manifold for draining workports in nearby sections. Max drain flow per workport is 10 l/min.

L90LS Online configurator eSyber

Configuration documentation

- Online configurator with all information for the unique valve available in one place:
  - Code report
  - Hydraulic schematics
  - Spare parts list
  - 3D-model
  - 2D-drawing
  - Learn More files for each function