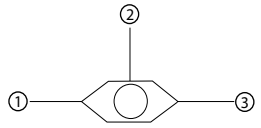
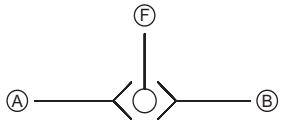
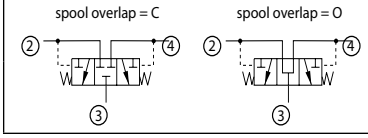
ENGINEERING TOMORROW

Shuttle Valves Technical Information

Quick Reference

Cartridge	Model No.	Cavity	Description	Flow*	Pressure	Page
	**CP124-1**	**CP04-3**	Load Shuttle Valves, Normal direction	3.7 l/min [1 US gal/min]	350 bar [5075 psi]	**SH - 4**
	CP128-1	**SDC08-3**		22 l/min [5.8 US gal/min]	315 bar [4570 psi]	**SH - 5**
	SV04	**NCS04/3**		15 l/min [4 US gal/min]	315 bar [4570 psi]	**SH - 6**
	CP120-4	**SDC10-3**		25 l/min [7 US gal/min]	330 bar [4800 psi]	**SH - 7**
	SV06	**NCS06/3**		48 l/min [12.7 US gal/min]	350 bar [5075 psi]	**SH - 8**

In-line	Model No.	Cavity	Description	Flow*	Pressure	Page
	**VS 06**	none	Load shuttle Valve, In-line	35 l/min [9 US gal/min]	350 bar [5075 psi]	**SH - 9**
	VS 10	none		45 l/min [12 US gal/min]	350 bar [5075 psi]	**SH - 10**

Hot oil shuttle	Model No.	Cavity	Description	Flow*	Pressure	Page
	**CP720-3**	SDC10-4	Hot Oil Shuttle	25 l/min [7 US gal/min]	350 bar [5075 psi]	**SH - 11**
	CP721-3	CP12-3M		90 l/min [24 US gal/min]	350 bar [5075 psi]	**SH - 12**

* Flow ratings are based on a pressure drop of 7 bar [100 psi] unless otherwise noted. They are for comparison purposes only.

OVERVIEW

There are two types of shuttle valves -- load shuttle valves and hot oil shuttle valves.

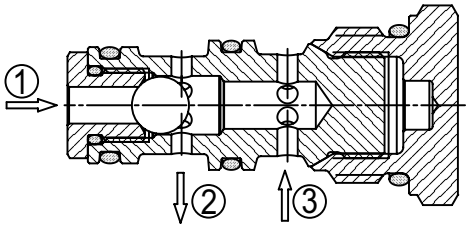
Shuttle valves

LOAD SHUTTLE VALVE

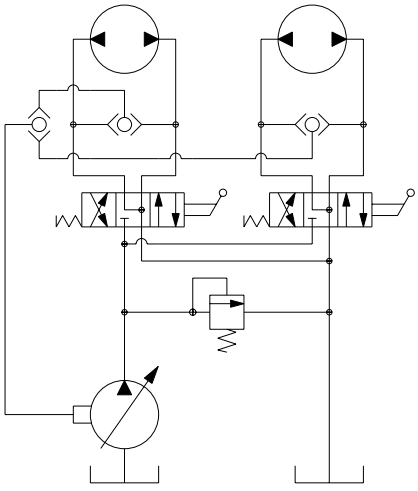
A load shuttle valve communicates the higher of two inlet pressures at 1 and 3 to the outlet at 2. A steel ball is used to seal the lower pressure. Load shuttles have several common applications including:

- Logic for load sensing circuits
- Bi-directional motor brake release valve

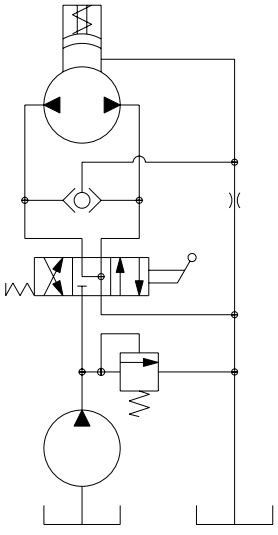
Load shuttle valve



Load sensing circuit



Bi-directional motor brake release valve

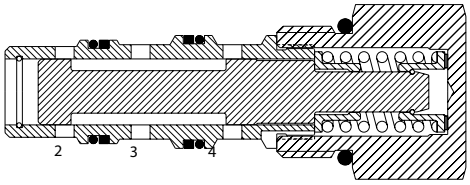


HOT OIL SHUTTLE VALVE

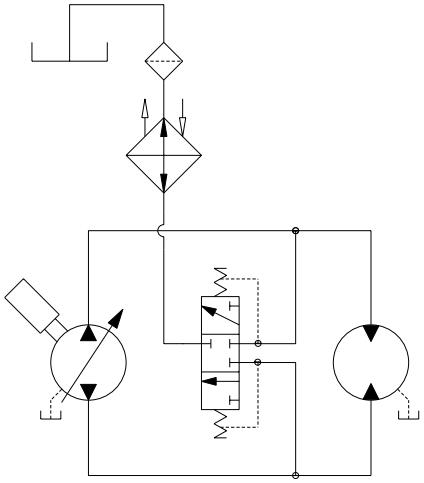
Hot oil shuttles are spool-type valves that use internal piloting at 2 and 4 to direct oil from the lower of the two input pressures to the outlet at 3.

A common application for a hot oil shuttle is diverting fluid from the low pressure side of a closed-circuit hydrostatic loop for cooling and/or filtering.

Hot oil shuttle valve



Closed-circuit hydrostatic loop



ENGINEERING
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Shuttle Valves Technical Information

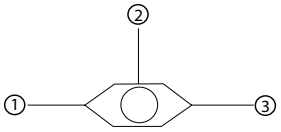
Load Shuttle Valve - Normal Direction

CP124-1

OPERATION

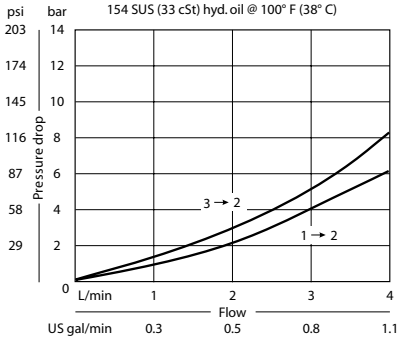
This valve senses the higher of the two input pressures at ports 1 and 3 and routes it to the output port 2.

Schematic



SPECIFICATIONS

Theoretical performance



Specifications

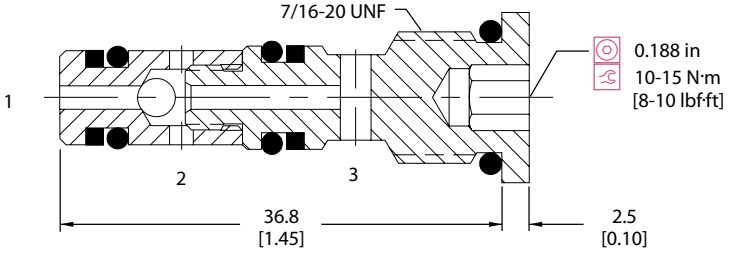
Rated pressure*	350 bar [5075 psi]
Rated flow at 7 bar [100 psi]	3.7 l/min [1 US gal/min]
Leakage	6 drops/min @ Rated pressure
Weight	0.02 kg [0.04 lb]
Cavity	**CP04-3**

*Rated pressure based on NFPA fatigue test standard (at 1 million cycles)

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

CP124 - 1 - B - 4S

Seals

	Seal kit
B = Buna-N	120111
V = Viton	120282

Housing and ports

		Housing P/N
0	= No Housing	No Housing
2B	= AL, 1/4 BSP	CP04-3-2B
4S	= AL, #4 SAE	CP04-3-4S

Other housings available

ENGINEERING TOMORROW

Shuttle Valves Technical Information

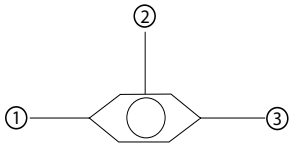
Load Shuttle Valve - Normal Direction

CP128-1

OPERATION

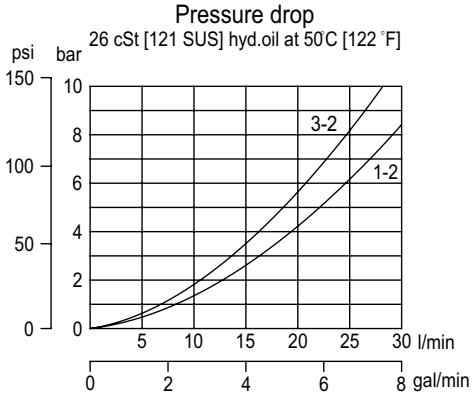
This valve senses the higher of the two input pressures at ports 1 and 3 and routes it to the output port 2.

Schematic



SPECIFICATIONS

Theoretical performance



Specifications

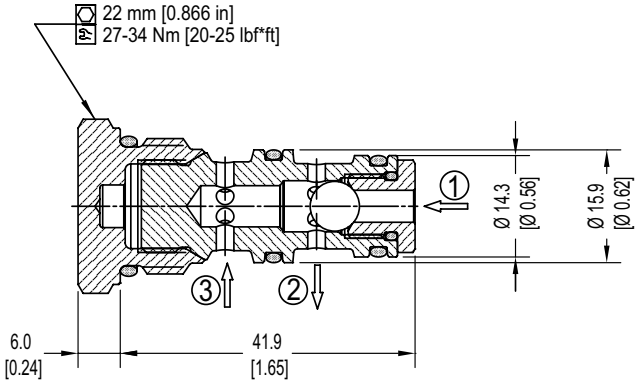
Rated pressure*	315 bar [4570 psi]
Rated flow at 7 bar [100 psi]	22 l/min [5.8 US gal/min]
Leakage	6 drops/min @ Rated pressure
Weight	0.06 kg [0.14 lb]
Cavity	**SDC08-3**

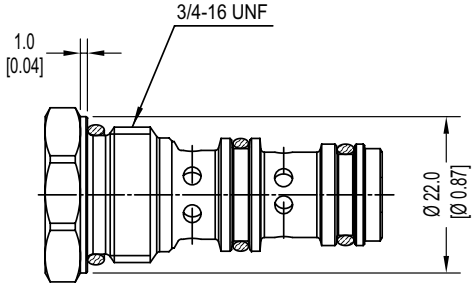
*Rated pressure based on NFPA fatigue test standard (at 1 million cycles)

DIMENSIONS

mm [in]

Cross-sectional view





ORDERING INFORMATION

CP128-1-B-0

Load Shuttle Valve
Normal Direction

Seal Option	Seal kit
B = Buna-N	120238
V = Viton	120239

Code	Ports & Material	Body Nomenclature
0	0 = Cartridge only	No Body
SE2B	AL, 1/4 BSP	SDC08-3-SE-2B
SE3B	AL, 3/8 BSP	SDC08-3-SE-3B
4S	AL, #4 SAE	CP08-3-4S
6S	AL, #6 SAE	CP08-3-6S

**Aluminum bodies to be used for pressures less than 210 bar (3000 psi)
***Other housings available

ENGINEERING TOMORROW

Shuttle Valves Technical Information

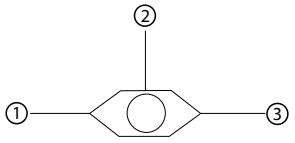
Load Shuttle Valve - Normal Direction

SV04

OPERATION

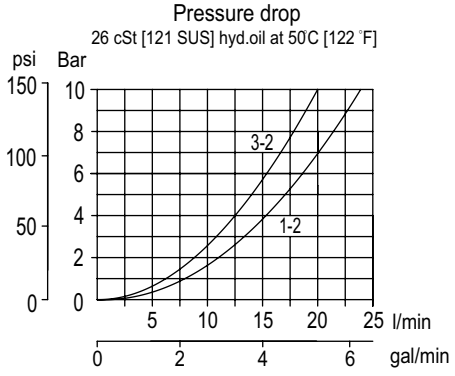
This valve senses the higher of two input pressures at 1 and 3, and routes it to the output 2.

Schematic



SPECIFICATIONS

Theoretical performance



Specifications

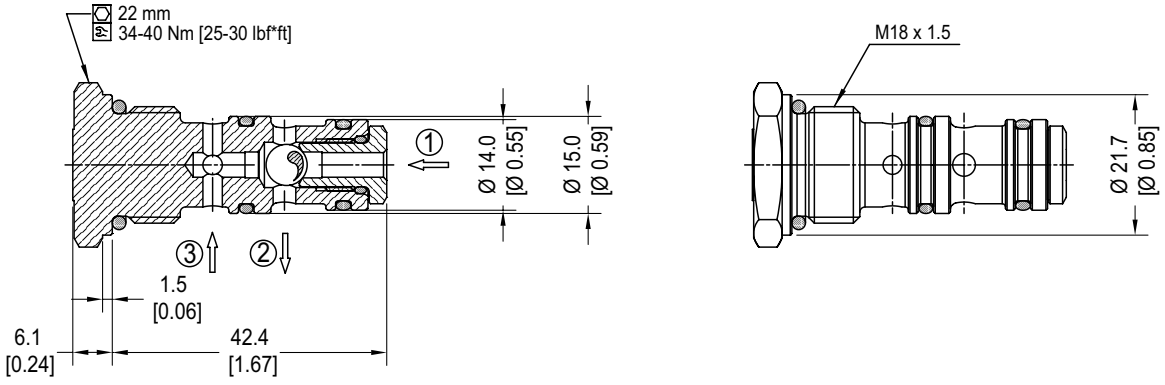
Rated pressure*	315 bar [4570 psi]
Rated flow at 7 bar [100 psi]	15 l/min [4 US gal/min]
Leakage	6 drops/min @ Rated pressure
Weight	0.07 kg [0.15 lb]
Cavity	**NCS04/3**

*Rated pressure based on NFPA fatigue test standard (at 1 million cycles)

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

SV04-00-V

Load Shuttle Valve
Normal Direction

Seal Option	Seal Kit
Omit = Buna-N	230000160
V = Viton	230000450

Code	Ports & Material	Body Nomenclature
00	00 = Cartridge only	No Body
SE1/4	AL, 1/4 BSP	NCS04/3-SE-1/4
SE4S	AL, #4 SAE	NCS04/3-SE-4S
SE6S	AL, #6 SAE	NCS04/3-SE-6S

** Aluminum bodies are to be used for pressures less than 210 bar (3000 psi).
*** Other housings available

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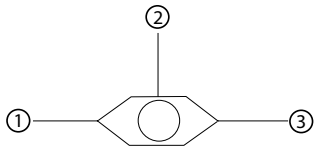
Shuttle Valves Technical Information

Load Shuttle Valve - Normal Direction
CP120-4

OPERATION

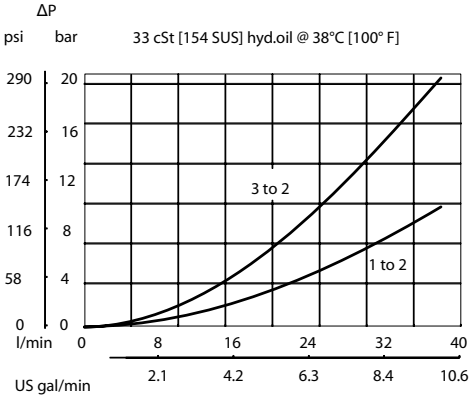
This valve senses the higher of two input pressures at 1 and 3, and routes it to the output 2.

Schematic



SPECIFICATIONS

Theoretical performance

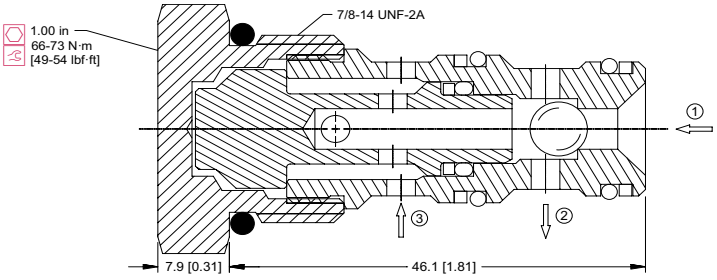


Specifications

Rated pressure	330 bar [4800 psi]
Rated flow at 7 bar [100 psi]	25 l/min [7 US gal/min]
Leakage	6 drops/min @ Rated pressure
Weight	0.10 kg [0.22 lb]
Cavity	**SDC10-3**

DIMENSIONS
mm [in]

Cross-sectional view



ORDERING INFORMATION

CP120 - 4 - B - 8S

Seals	Seal kit
B = Buna-N	120027
V = Viton	120028

Housing and ports		Housing P/N
00	= No Housing	No Housing
SE3B	= AL, 3/8 BSP	SDC10-3-SE-3B
SE4B	= AL, 1/2 BSP	SDC10-3-SE-4B
6S	= AL, #6 SAE	CP10-3-6S
8S	= AL, #8 SAE	CP10-3-8S
S6S	= Ductile, #6 SAE	CP10-3-S6S
S8S	= Ductile, #8 SAE	CP10-3-S8S

Other housings available

Shuttle Valves Technical Information

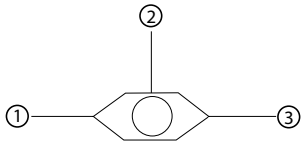
Load Shuttle Valve - Normal Direction

SV06

OPERATION

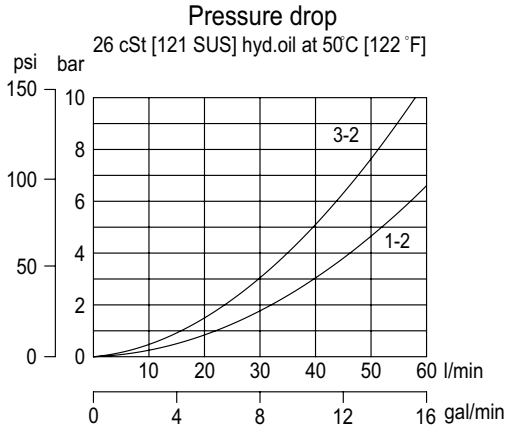
This valve senses the higher of two input pressures at 1 and 3, and routes it to the output 2.

Schematic



SPECIFICATIONS

Theoretical performance



Specifications

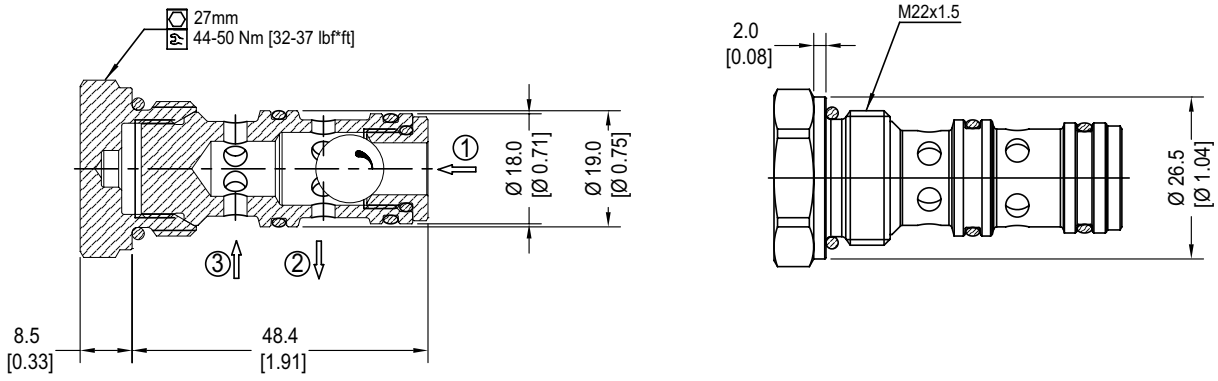
Rated pressure*	350 bar [5075 psi]
Rated flow at 7 bar [100 psi]	48 l/min [12.7 US gal/min]
Leakage	6 drops/min @ Rated pressure
Weight	0.11 kg [0.24 lb]
Cavity	**NCS06/3**

*Rated pressure based on NFPA fatigue test standard (at 1 million cycles)

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

SV06-00-V

Load Shuttle Valve
Normal Direction

Seal Option	Seal kit
Omit = Buna-N	230000070
V = Viton	230000110

Code	Ports & Material	Body Nomenclature
00	00 = Cartridge only	No Body
SE3/8	AL, 3/8 BSP	NCS06/3-SE3/8
SE1/2	AL, 1/2 BSP	NCS06/3-SE1/2
SE6S	AL, #6 SAE	NCS06/3-SE-6S
SE8S	AL, #8 SAE	NCS06/3-SE-6S

**Aluminum bodies are to be used for pressures less than 210 bar (3000 psi)
***Other housings available

ENGINEERING TOMORROW

Shuttle Valves Technical Information

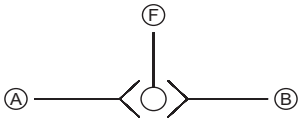
Load Shuttle Valve - In-Line

VS 06

OPERATION

This valve senses the higher of the two input pressures and routes it to the output port.

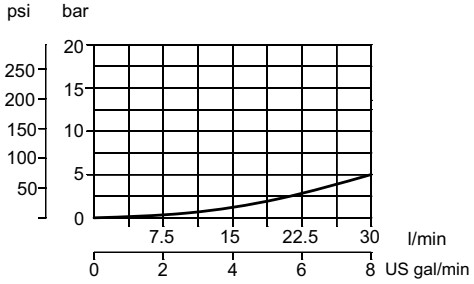
Schematic



SPECIFICATIONS

Theoretical performance

Pressure drop
26 cSt [121 SUS] hyd.oil at 50°C [122 °F]
Free flow from A⟹F or B⟹F



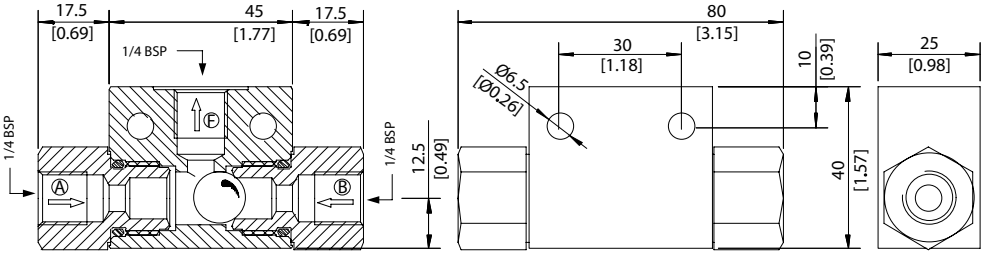
Specifications

Rated pressure	350 bar [5075 psi]
Rated flow at 7 bar [100 psi]	35 l/min [9 US gal/min]
Leakage	6 drops/min @ Rated pressure
Weight	0.22 kg [0.49 lb]
Cavity	none

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

VS 06-G-V

SEALS
Omit = Buna
V = Viton

ENGINEERING TOMORROW

Shuttle Valves Technical Information

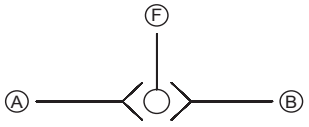
Load Shuttle Valve - InLine

VS 10

OPERATION

This valve senses the higher of two input pressures and routes it to the output port.

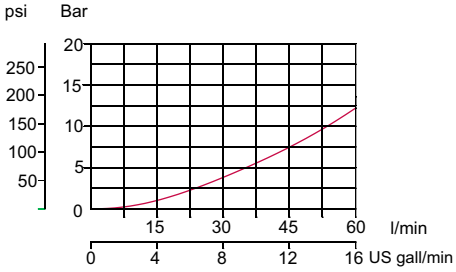
Schematic



SPECIFICATIONS

Theoretical performance

Pressure drop
26 cSt [121 SUS] hyd.oil at 50°C [122 °F]
Free flow from A⇒F or B⇒F



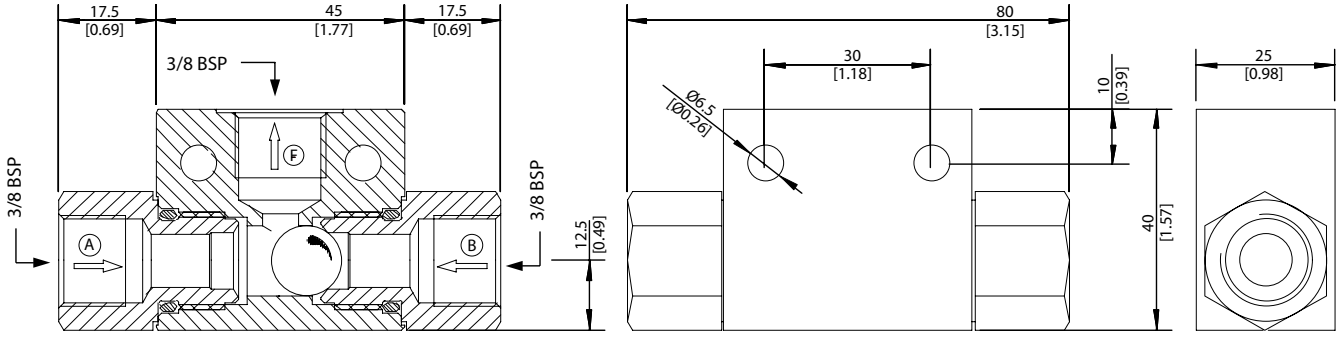
Specifications

Rated pressure	350 bar [5075 psi]
Rated flow at 7 bar [100 psi]	45 l/min [12 US gal/min]
Leakage	6 drops/min @ Rated pressure
Weight	0.19 kg [0.42 lb]
Cavity	none

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

VS 10-G-V

SEALS
Omit = Buna
V = Viton

ENGINEERING TOMORROW

Shuttle Valves Technical Information

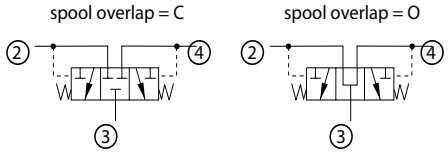
Hot Oil Shuttle

CP720-3

OPERATION

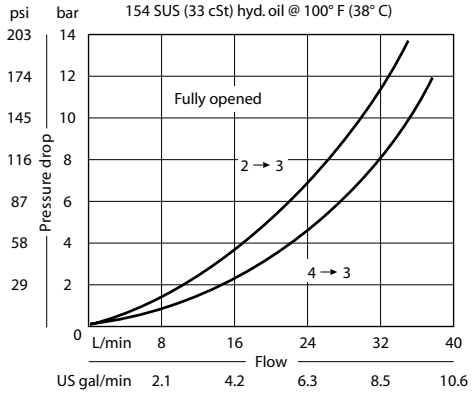
This valve has an internally piloted spool that directs flow from the lower pressure inlet, 2 or 4, to the output at 3.

Schematic



SPECIFICATIONS

Theoretical performance



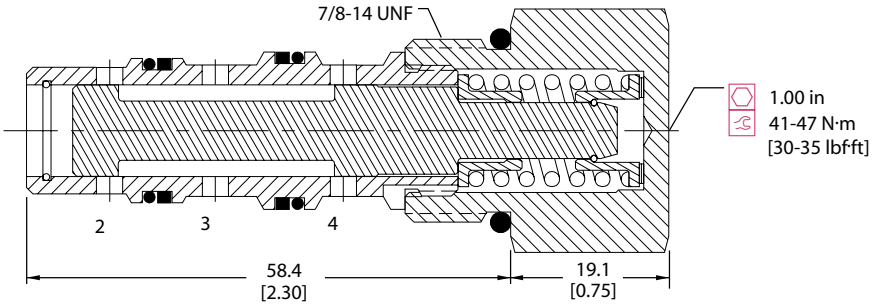
Specifications

Rated pressure	350 bar [5075 psi]
Rated flow at 7 bar [100 psi]	25 l/min [7 US gal/min]
Leakage	82 cm^3/min [5 in^3/min] @ 207 bar [3000 psi]
Weight	0.15 kg [0.34 lb]
Cavity	**SDC10-4**

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

CP720 - 3 - B - 8S - 080 - C

Seals

B = Buna-N
V = Viton

Seal kit
11032943
11032944

Housing and ports

		Housing P/N
0	= No Housing	No Housing
L3B	= AL, 3/8 BSP	SDC10-4-L-3B
L4B	= AL, 1/2 BSP	SDC10-4-L-4B
6S	= AL, #6 SAE	CP10-4-6S-X1
8S	= AL, #8 SAE	CP10-4-8S-X1
S6S	= Ductile, #6 SAE	CP10-4-S6S
S8S	= Ductile, #8 SAE	CP10-4-S8S

Other housings available

Spool overlap

O = Open
C = Closed

Shift pressure

	bar	[psi]
050	= 3.4	[50]
080	= 5.5	[80]

ENGINEERING TOMORROW

Shuttle Valves Technical Information

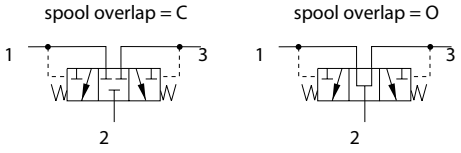
Hot Oil Shuttle

CP721-3

OPERATION

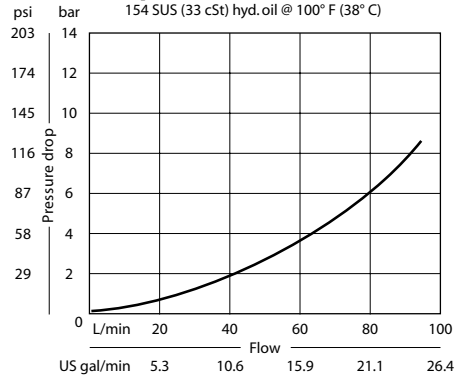
This valve has an internally piloted spool that directs flow from the lower pressure inlet, 1 or 3, to the output at 2.

Schematic



SPECIFICATIONS

Theoretical performance



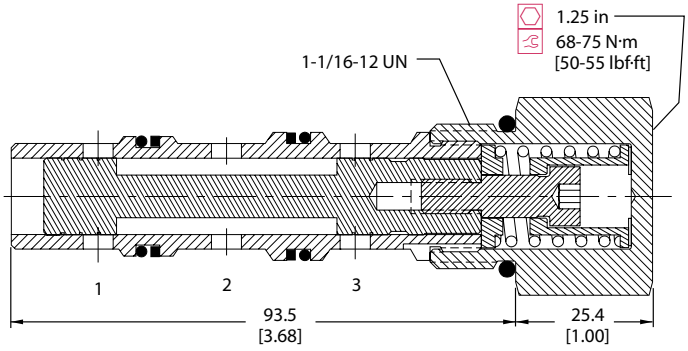
Specifications

Rated pressure	350 bar [5075 psi]
Rated flow at 7 bar [100 psi]	90 l/min [24 US gal/min]
Leakage	82 cm^3/min [5 in^3/min] @ 207 bar [3000 psi]
Weight	0.34 kg [0.75 lb]
Cavity	**CP12-3M**

DIMENSIONS

mm [in]

Cross-sectional view



ORDERING INFORMATION

CP721 - 3 - B - 12S - 100 - C

Seals

B = Buna-N
V = Viton

Seal kit

120098
120099

Housing and ports

0 = No Housing
4B = AL, 1/2 BSP
6B = AL, 3/4 BSP
10S = AL, #10 SAE
12S = AL, #12 SAE
S12S = Ductile, #12 SAE
Other housings available

Housing P/N

No Housing
CP12-3M-4B
CP12-3M-6B
CP12-3M-10S
CP12-3M-12S
CP12-3M-S12S

Spool overlap

O = Open
C = Closed

Shift pressure

	bar	[psi]
025	1.6	[25]
050	3.4	[50]
100	6.9	[100]