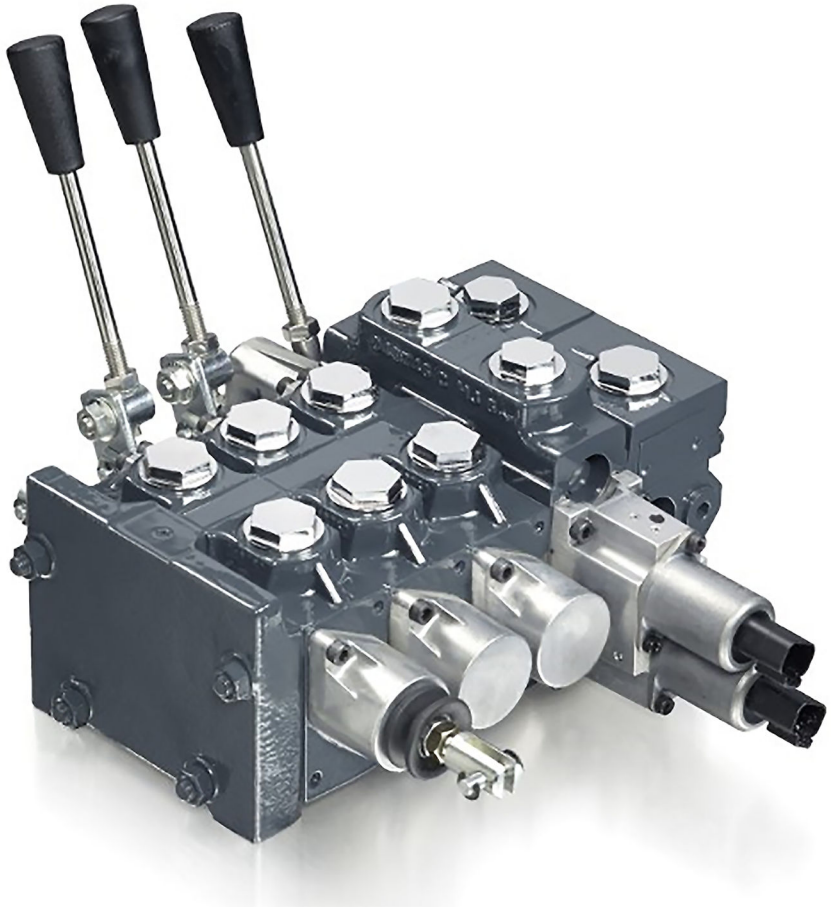
ENGINEERING
TOMORROW

Technical Information

Directional Control Valve
ECO 80



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Revision history

Table of revisions

Date	Changed	Rev
September 2020	Document entirely re-worked - new version of document	0301
February 2020	Updated document number to match online reference	0201
August 2019	Updated code numbers for EVO end plates	0103
March 2017	Updated schematic	0102
October 2016	First edition	0101

Contents

Contents

General information

General description

The ECO 80 LS is a hydraulic load sensing proportional valve group designed to give maximum flexibility in design and build concept. The ECO 80 LS is designed as a load sensing directional control valve which will lead to increased machine performance, higher efficiency, reduced cooling requirements and fuel saving compared to conventional directional control valves.

ECO 80 LS features

PVG load-sensing proportional valves features and benefits summarized inb bullets below:

- Load sensing directional control:
  - Proportional control of oil flow to a work function
- Modular build concept:
  - Up to 12 basic modules per ECO 80 LS valve group
  - Different, interchangeable spool variants
  - System pressure up to 280 bar
  - Work port pressure up to 320 bar
  - Compact design and installation

ECO modules

EVP, pump side modules

- Built-in pressure relief valve
- Pressure gauge connection
- Versions:
  - Open center version for systems with fixed displacement pumps
  - Closed center version for systems with variable displacement pumps
  - Integrated 25 bar pilot oil supply for hydraulic and electrohydraulic actuaqtion
  - Versions prepared for electrical LS unloading valve

EVB, basic modules

- Interchangeable spools
- Load holding check valve in channel P
- Option for shock and suction valves for port A and B

Actuation modules

The basic module could be fitted with three main different actuation modules:

- Mechanical
- Electrical
- Hydraulic
- Pneumatic

Safety in systems

All makes and all types of control valves (incl. proportional valves) can fail, thus the necessary protection against the serious consequences of function failure should always be built into the system. For each application an assessment should be made for the consequences of pressure failure and uncontrolled or blocked movements.

General information

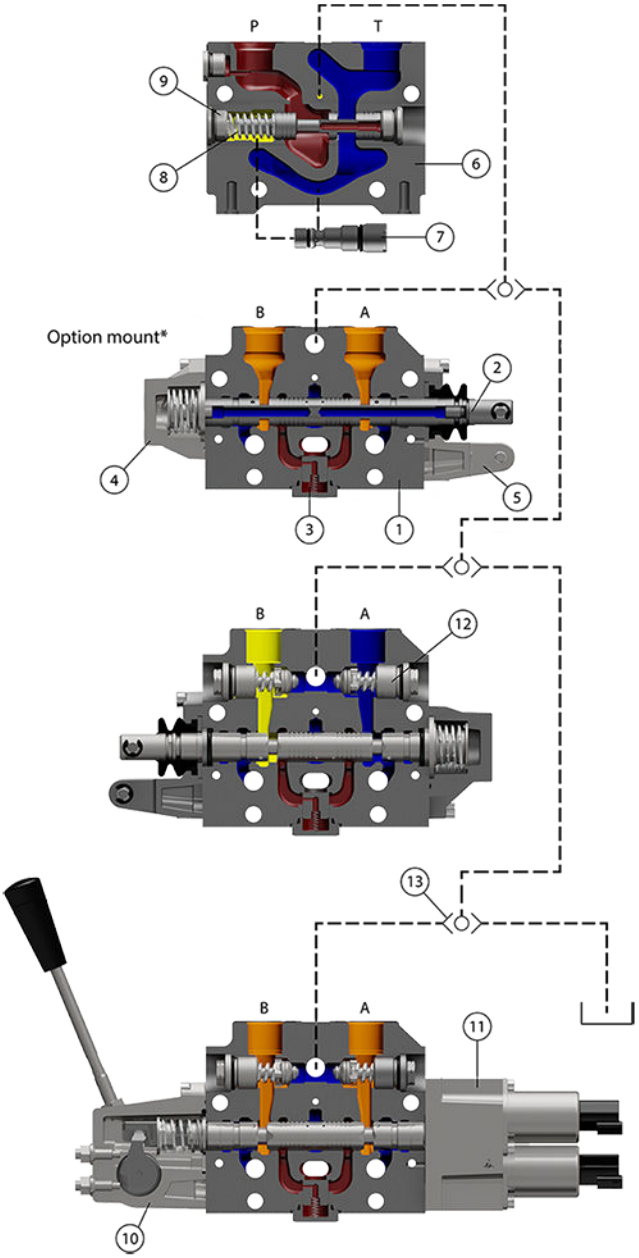
Warning

All makes/brands and types of directional control valves – inclusive proportional valves – can fail and cause serious damage. It is therefore important to analyze all aspects of the application.

Because the proportional valves are used in many different operation conditions and applications, the manufacturer of the application is alone responsible for making the final selection of the products – and assuring that all performance, safety and warning requirements of the application are met.

The process of choosing the control system – and safety levels – is governed by the machine directives EN 13849 (Safety related requirements for control systems).

ECO 80 LS sectional view



General information

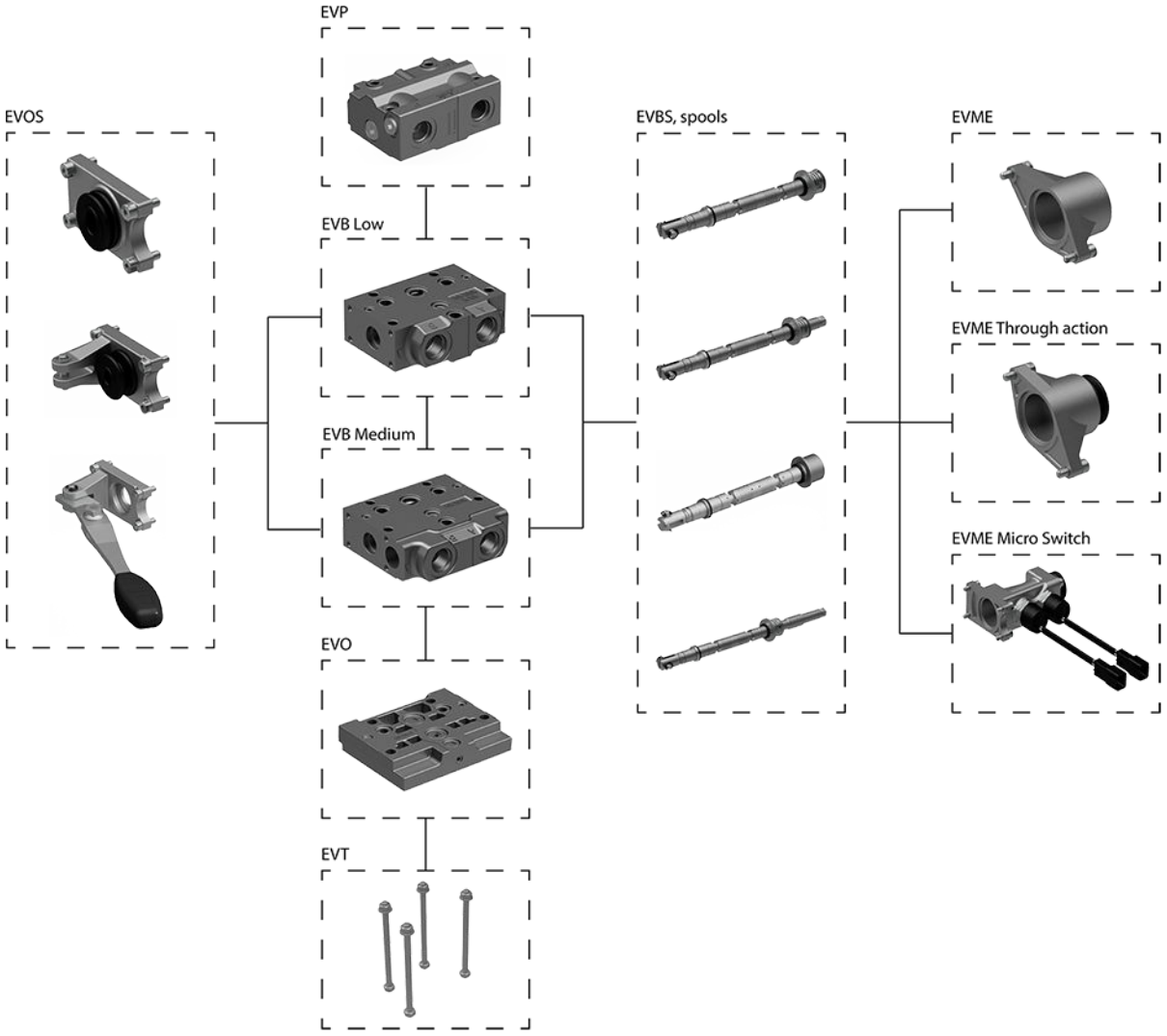
1	Work Section (EVB)
2	Spool (EVBS)
3	Check valve
4	Open spool centering (EVME)
5	Mechanical actuator (EVOS)
6	Inlet module (EVP)
7	Load sense relief valve
8	Unloader spool
9	Uloader spool spring
10	Mechanical actuator (EVM)
11	Electrical actuator (EVHC)
12	Shock valve (PVLP)
13	Shuttle disc

Option moutn only possible with EVOS/EVME configuration

Mechanical acting ECO 80

This section will only be about the mechanical acting modules of the ECO 80 portfolio. For information on the electrical actuated modules of the ECO80 portfolio, see *Electrical actuated ECO 80* on page 39.

ECO 80 mechanical modules overview

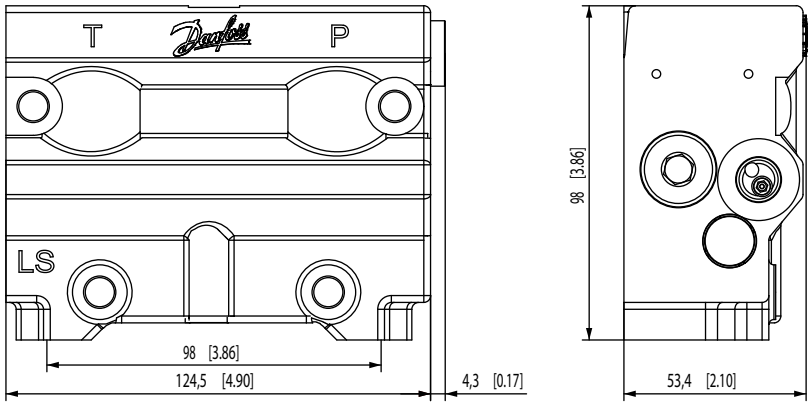


EVP inlet modules - mechanical acting

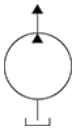
The ECO 80 EVP inlet modules, also referred to as pump side modules, act as an interface between the ECO 80 directional valve group and the hydraulic pump and tank reservoir.

EVP Inlet module

EVP Inlet module dimensions



Fixed displacement pump symbol



Variable displacement pump symbol

The EVP inlet module variants are based on a generic platform with a selection of additional features, enabling you to tailor the EVP to suit the demands of any hydraulic system:

- Open center EVP (for fixed displacement pumps)
- Closed center EVP (for variable displacement pumps)

EVP inlet modules - mechanical acting

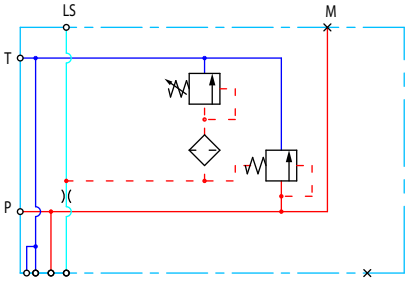
Open center EVP

The basic Open Center EVP inlet module is intended for use with fixed displacement pumps in applications, where a valve group with mechanically controlled work sections is desired.

The Open Center EVP features:

- Integrated LS pressure relief valve
- Threaded ports for P/T/LS and M measuring gauge

Open center EVP schematic



Technical specification for EVP

Max. P-port continuous	Max. T-port static/dynamic	Max. rated flow
280 bar [4061 psi]	25/40 bar [365/580 psi]	100 l/min [26.4 US gal/min]

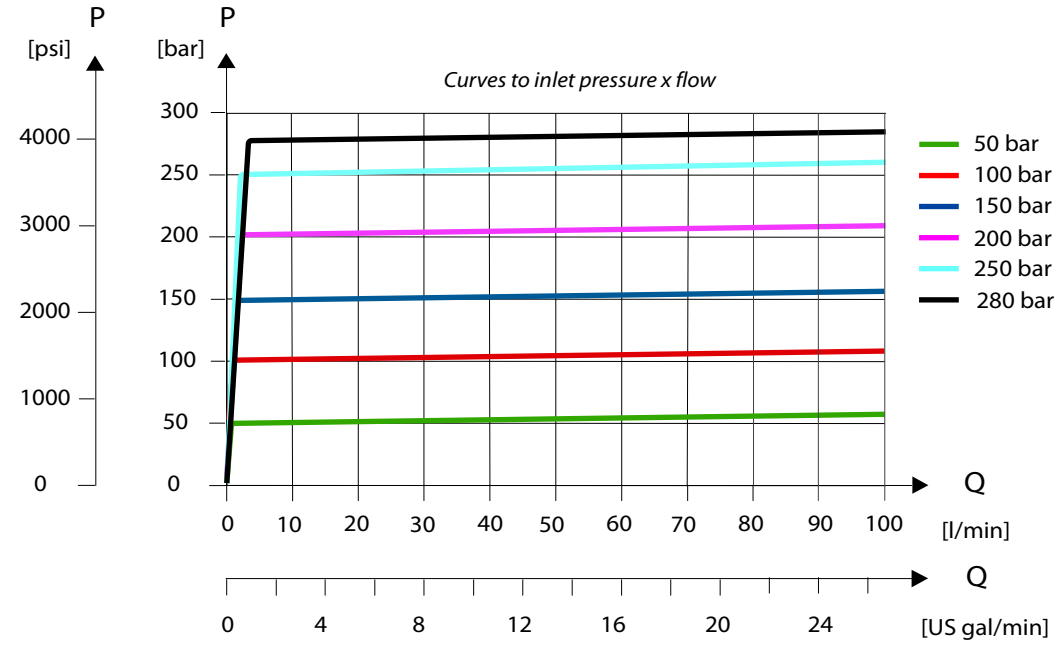
Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

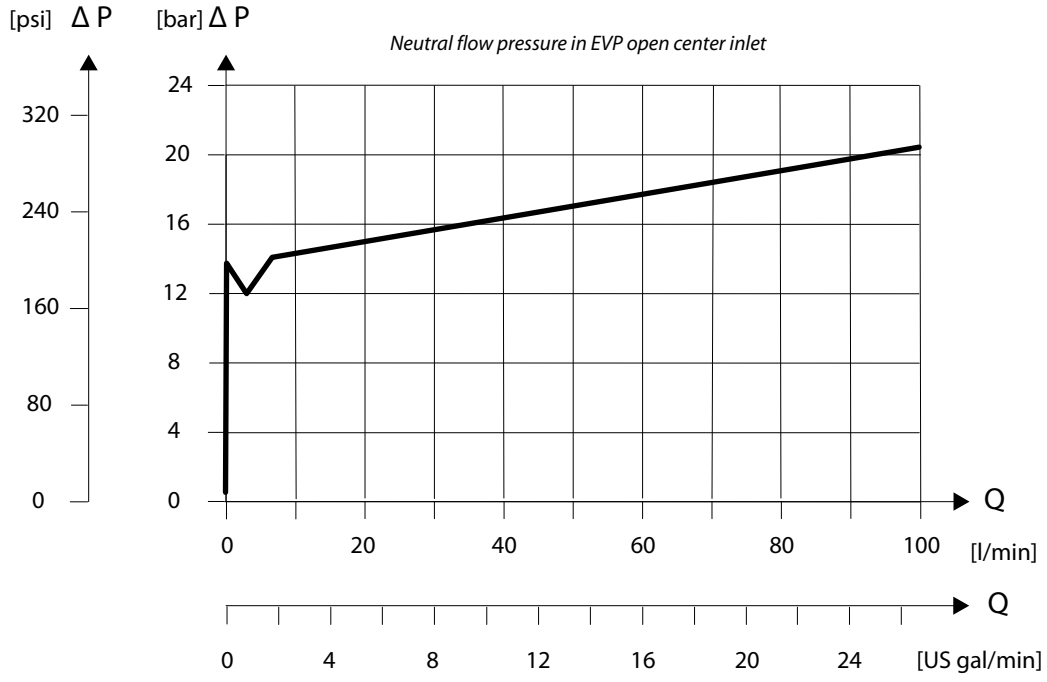
EVP inlet modules - mechanical acting

Theoretical performance graphs

Pressure relief valve characteristics



Neutral by-pass pressure drop characteristics (open center)



Part numbers for Open Center EVP

Part numbers	P-port	T-port	M-, LS-port	Mounting
11173005	G 1/2	G 1/2	G 1/4	M8 x 1.25
11172981	7/8-14 UNF	7/8-14 UNF	9/16-18 UNF	M8 x 1.25

EVP inlet modules - mechanical acting

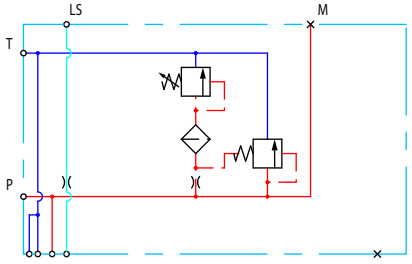
Closed center EVP

The basic Closed Center EVP inlet is intended for use with variable displacement pumps in applications where a valve group with mechanically controlled work sections is desired.

The Closed Center EVP features:

- Integrated LS pressure relief valve
- Threaded ports for P/T/LS and M measuring gauge

Closed center EVP schematic



Technical specification for EVP

Max. P-port continuous	Max. T-port static/dynamic	Max. rated flow
280 bar [4061 psi]	25/40 bar [365/580 psi]	100 l/min [26.4 US gal/min]

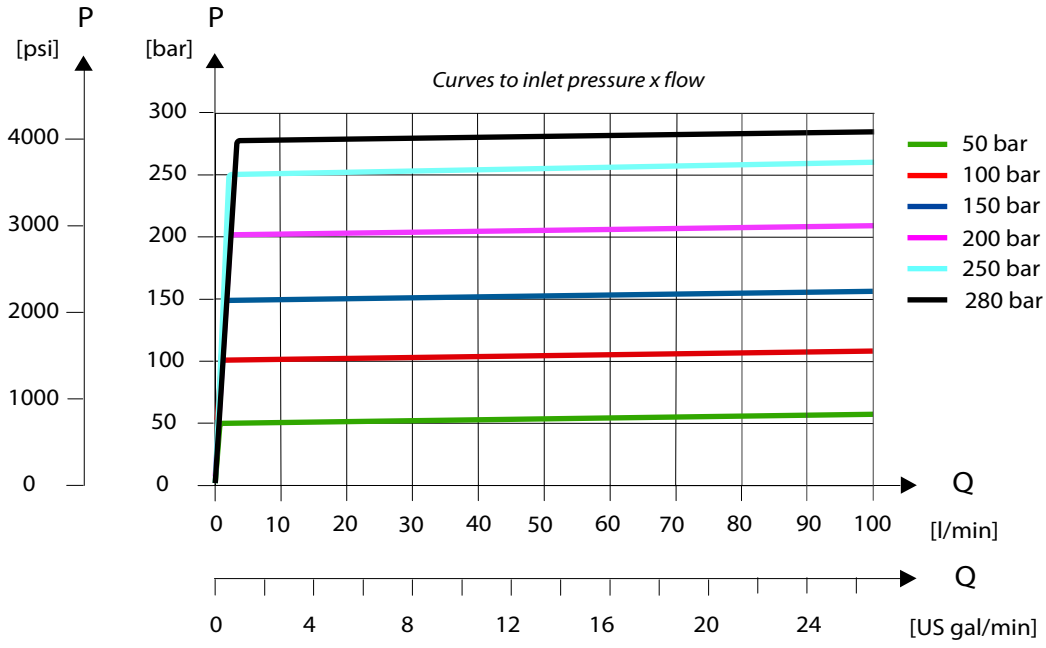
Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

EVP inlet modules - mechanical acting

Theoretical performance graphs

Pressure relief valve characteristics



Part numbers for Mechanical Acting Closed Center EVP

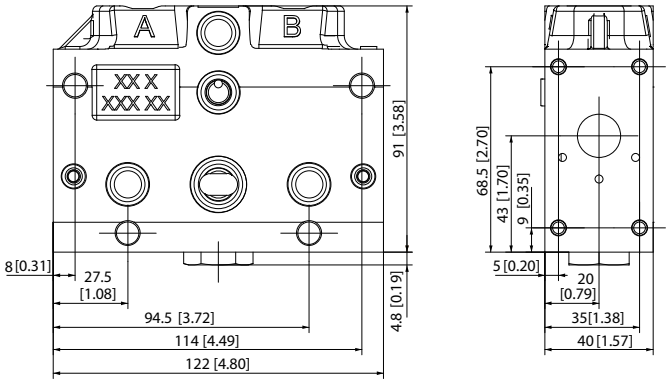
Part numbers	P-port	T-port	M-, LS-port	Mounting
11173006	G 1/2	G 1/2	G 1/4	M8 x 1.25
11173002	7/8-14 UNF	7/8-14 UNF	9/16-18 UNF	M8 x 1.25

EVB basic modules - mechanical acting

The ECO 80 EVB basic modules, also referred to as work sections, are the interface between the ECO 80 directional control valve and the work function such as a cylinder or a motor. The EVB comes in two main variants – a low body and a medium body with shock/anti-cavitation valve facility (PVLP)

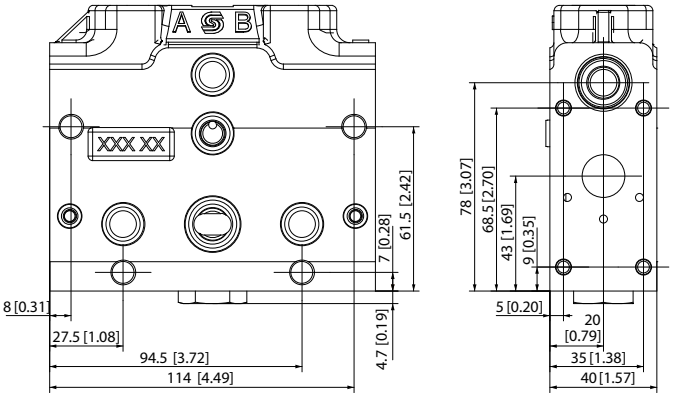
EVB low basic module

EVB low basic module dimensions



EVB medium basic module

EVB medium basic module dimensions



The EVB basic module variants are based on a generic platform with a selection of additional features, enabling you to tailor the EVB to suit the demands of any hydraulic system:

- EVB low body
- EVB medium body

EVB basic modules - mechanical acting

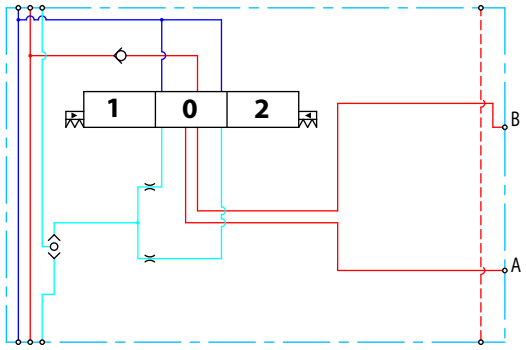
EVB low body

The EVB low body is intended for controlling a work function where the function behavior in terms of flow and pressures allows dependency on the load pressure of other functions used simultaneously. The integrated load drop check valve prevents flow back from work ports influencing other functions.

The EVB low body features:

- Integrated LS shuttle network
- Load drop check valve

Schematic



Technical specification for A/B-port

Max. continuous pressure	Max. intermittent pressure	Max. rated flow
280 bar [4061 psi]	320 bar [4641 psi]	100 l/min [26.4 US gal/min]

Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers

Part numbers	A/B-port
11168505	G 1/2
11168504	7/8-14 UNF

EVB basic modules - mechanical acting

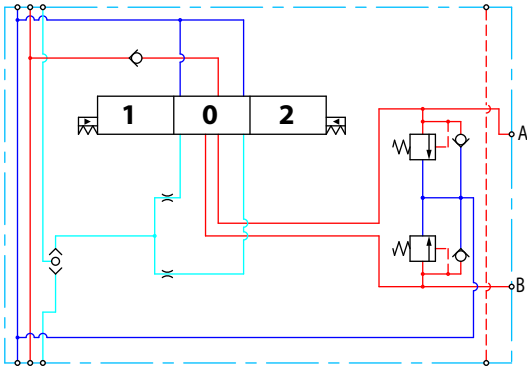
EVB medium body

The EVB low body is intended for controlling a work function where the function behavior in terms of flow and pressures allows dependency on the load pressure of other functions used simultaneously. The integrated load drop check valve prevents flow back from work ports influencing other functions. Compared to the EVB low body the medium body has the option of adding PVLP/PVLA to the work section.

The EVB medium body features:

- Integrated LS shuttle network
- Load drop check valve
- Shock/anti-cavitation valve and suction facility (PVLP/PVLA)

Schematic



Technical specification for A/B-port

Max. continuous pressure	Max. intermittent pressure	Max. rated flow
280 bar [4061 psi]	320 bar [4641 psi]	100 l/min [26.4 US gal/min]

Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers

Part number	A/B-port
11168503	G 1/2
11168502	7/8-14 UNF

EVB basic modules accessories

The generic EVB module accessory platform include the PVLP shock and anti-cavitation valve and PVLA suction valve.

- PVLP Shock and Anti-cavitation valve
- PVLA Suction valve
- Cavity plug

EVB basic modules accessories

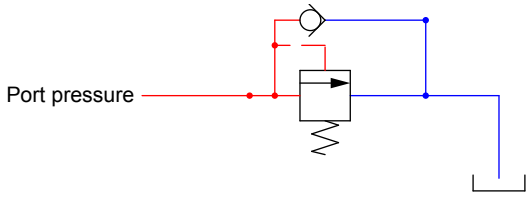
PVLP shock/anti-cavitation valve

The PVLP will relief a pressure peak to the internal tank galleries and will furthermore suck oil from the tank to the work port to prevent cavitation. Pressure settings range 32-320 bar [460-4641 psi].

Features:

- Shock valve
- Anti-cavitation
- Lifetime of 200,000 actuations
- Optional fixed or adjustable

PVLP schematic



Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers for fixed PVLP

Part number	Pressure setting in bar [psi]
157B2032	32 [460]
157B2050	50 [725]
157B2063	63 [914]
157B2080	80 [1160]
157B2100	100 [1450]
157B2125	125 [1813]
157B2140	140 [2031]
157B2150	150 [2175]
157B2160	160 [2320]
157B2175	175 [2538]
157B2190	190 [2755]
157B2210	210 [3045]
157B2230	230 [3335]
157B2240	240 [3480]
157B2250	250 [3625]
157B2265	265 [3845]
157B2280	280 [4061]
157B2300	300 [4351]
157B2320	320 [4641]

EVB basic modules accessories

Part numbers for adjustable PVLP

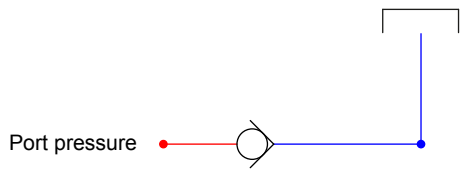
Part number	Pressure setting in bar [psi]
11006594	121-250 [1755-3626]
11006595	251-285 [3640-4134]

EVB basic modules accessories

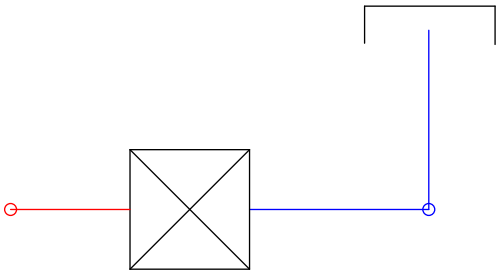
PVLA suction valve and cavity plug

The PVLA will suck oil from the tank to the work port to prevent cavitation by the 0.5 bar spring. The plug will ensure that when using a single acting spool, all flow returning through the work port is led to tank.

PVLA schematic



Cavity plug schematic



Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers for PVLA and plug

PVLA	Cavity plug
157B2001	11177714

EVBS mechanical flow control spools

The mechanical acting EVBS spools determine the flow out of the work section and are based on a generic platform with a wide selection of additional features, enabling you to tailor the EVBS to suit the demands of any hydraulic system and any function.

The mechanical acting EVBS spool comes in four different main variants:

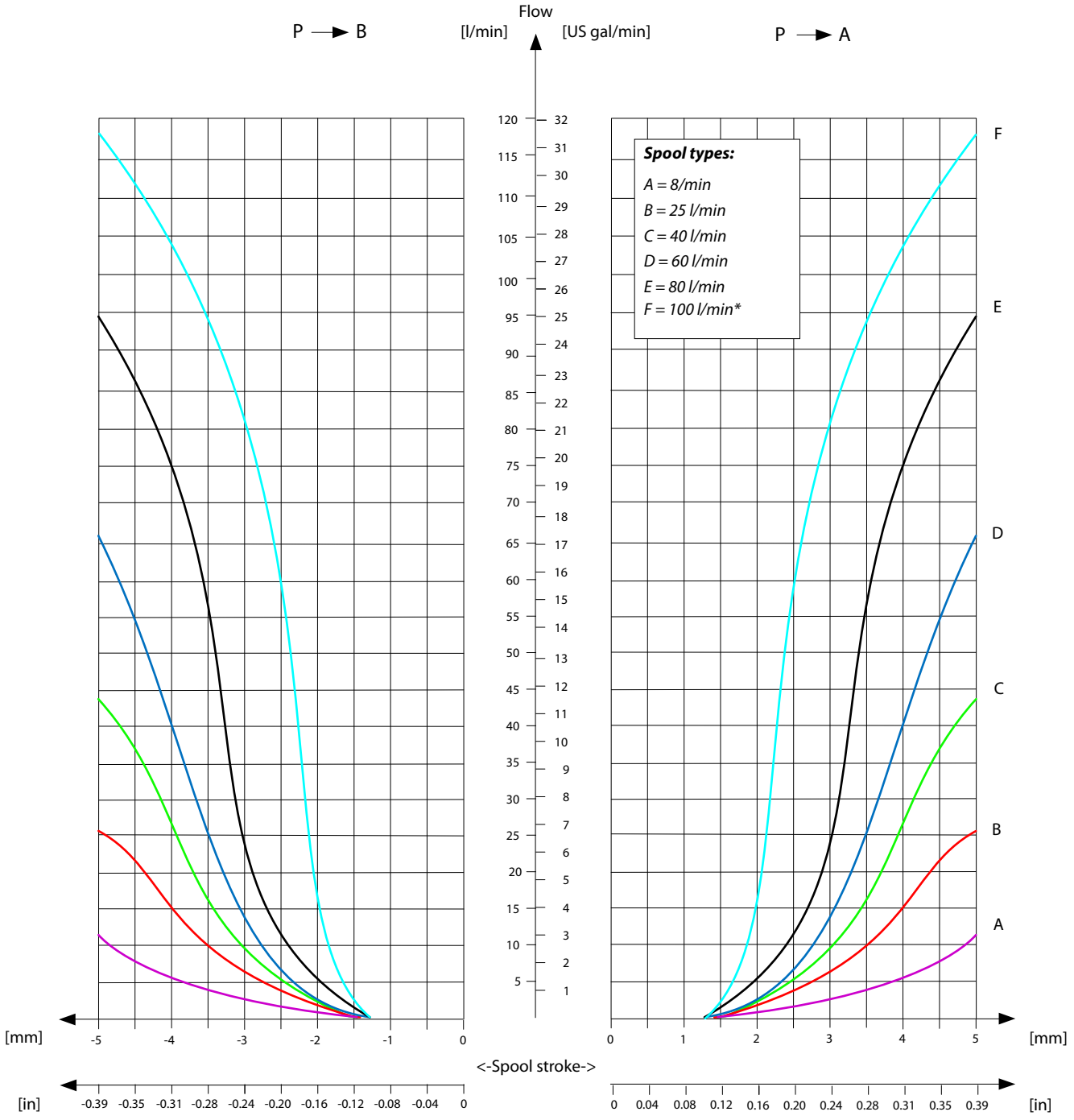
- EVBS Female Extension
- EVBS Female Extension and through acting
- EVBS Female Extension and Detent 03 position and 02 position spool out or in[1]
- EVBS Female Extension and Micro Switch

[1] For 02 position detent spool out is necessary to use an accessory part number 11173406, see *EVME, detent 02 position spool to A or B*

EVBS mechanical flow control spools

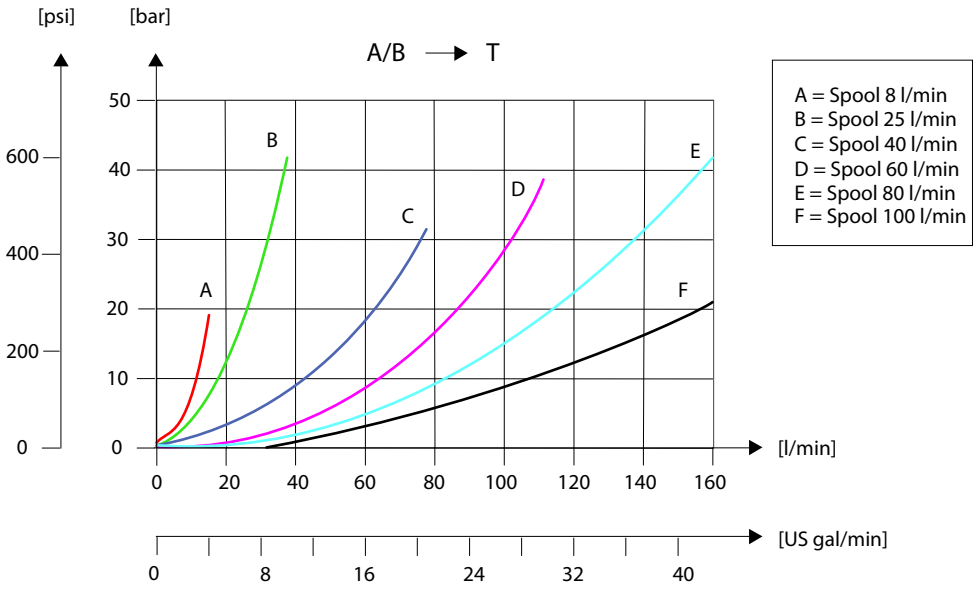
EVBS fluid flow characteristics - Theoretical performance

Oil flow as a function of spool travel



EVBS mechanical flow control spools

Pressure drop at maximum spool travel (A/B-T)

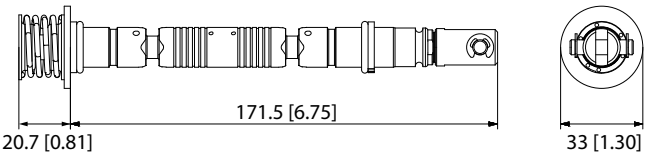


EVBS mechanical flow control spools

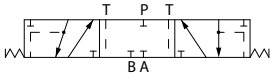
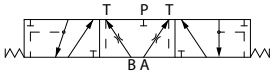
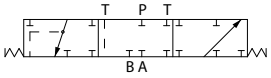
EVBS - female extension

EVBS Female Extension

EVBS Female Extension dimensions mm [in]



Part numbers for EVBS Female Extension

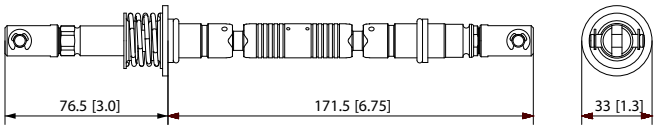
Type	Schematic	Flow, l/min [US gal/min]					
		8 [2.11]	25 [6.61]	40 [10.57]	60 [15.85]	80 [21.13]	100 [26.42]
4-way, 3-position Closed neutral position		11169728	11169733	11169737	11169741	11169745	11182571
4-way, 3-position Throttled open neutral position		11169725	11169730	11169735	11169739	11169743	11182572
3-way, 3-position Closed neutral position		11169729	11169734	11169738	11169742	11169746	-

EVBS mechanical flow control spools

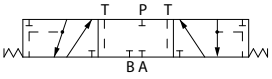
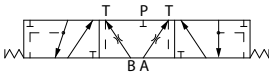
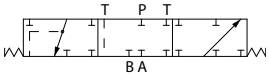
EVBS - female extension and through acting

EVBS Female Extension and through acting

EVBS Female Extension and through acting dimensions mm [in]



Part numbers for EVBS Female Extension

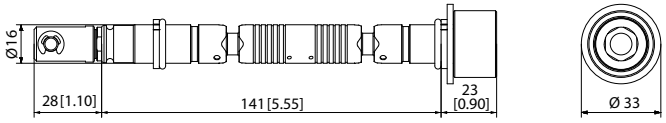
Type	Schematic	Flow, l/min [US gal/min]					
		8 [2.11]	25 [6.61]	40 [10.57]	60 [15.85]	80 [21.13]	100 [26.42]
4-way, 3-position Closed neutral position		11170744	11170747	11170750	11170753	11170756	11187072
4-way, 3-position Throttled open neutral position		11170743	11170746	11170749	11170752	11170755	11187061
3-way, 3-position Closed neutral position		11170745	11170748	11170751	11170754	11170757	-

EVBS mechanical flow control spools

EVBS - female extension and Detent 03 and 02 position spool out or in

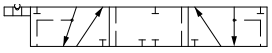
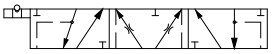
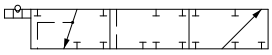
EVBS Female Extension and Detent

EVBS Female Extension and Detent dimensions mm [in]



For 02 position detent spool out is necessary to use an accessory part number 11173406, see EVME, detent 02 position spool to A or B

Part numbers for EVBS Female Extension

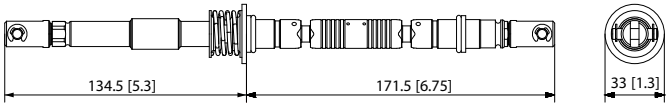
Type	Schematic	Flow, l/min [US gal/min]					
		8 [2.11]	25 [6.61]	40 [10.57]	60 [15.85]	80 [21.13]	100 [26.42]
4-way, 3-position Closed neutral position		11170627	11170634	11170638	11170642	11170646	11182609
4-way, 3-position Throttled open neutral position		11170625	11170632	11170636	11170640	11170644	11182610
3-way, 3-position Closed neutral position		11170631	11170635	1117639	11170643	11170647	-

EVBS mechanical flow control spools

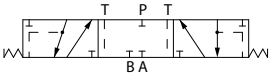
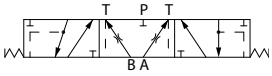
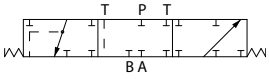
EVBS - female extension and Micro Switch

EVBS Female Extension and Micro Switch

EVBS Female Extension and Micro Switch dimensions mm [in]



Part numbers for EVBS Female Extension

Type	Schematic	Flow, l/min [US gal/min]					
		8 [2.11]	25 [6.61]	40 [10.57]	60 [15.85]	80 [21.13]	100 [26.42]
4-way, 3-position Closed neutral position		11170264	11170268	11170272	11170276	11170280	11187073
4-way, 3-position Throttled open neutral position		11170262	11170266	11170270	11170274	11170278	11187074
3-way, 3-position Closed neutral position		11170265	11170269	11170273	11170277	11170281	-

ECO 80 mechanical - actuation

ECO80 Mechanical actuation can be done manually or mechanically

ECO80 mechanical actuation overview:

- EVOS - Open spool through action
- EVOS - Open spool mechanical actuation
- EVME - Open spool centering
- EVME - Micro switch NO

ECO 80 mechanical - actuation

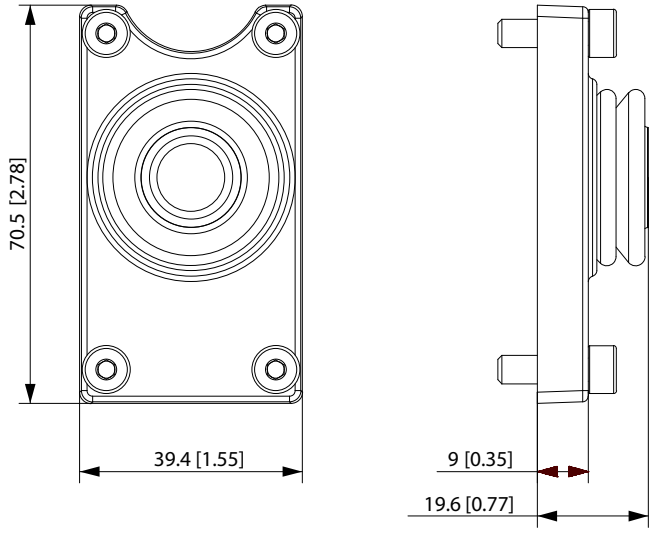
EVOS - open spool through action

The EVOS open spool through action consists of an aluminum base with a rubber boot to protect the spool, mounted on the end of the valve slice, the connection with application is a female extension assembled on the main spool.

The valve is actuated by directly pulling or pushing the main spool inside the valve hence controlling the flow. Actuating the spool fully will move all 5 mm and give full flow. The EVOS should be used with open spool mechanical actuation and can be combined with any EVME, spring center, detent, through action and micro switch.

EVOS through action

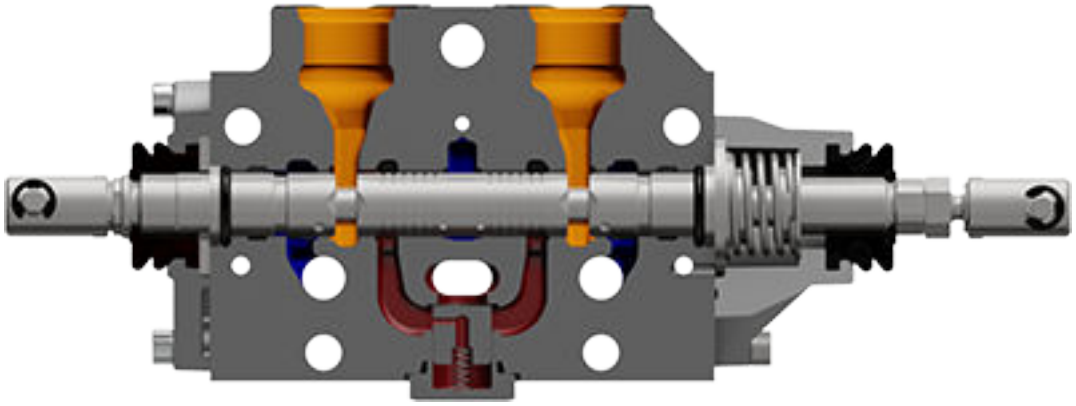
EVOS through action dimensions mm [in]



Operating force for EVOS through action

Spool displacement	Operating linear force
	EVOS + EVME (Through Acting)
From neutral position	135 ± 5 [N]
Maximum spool travel	180 ± 5 [N]

EVOS through action function



ECO 80 mechanical - actuation

Part numbers for EVOS mechanical actuation

Description	Part number
EVOS80LS Through action	11172533

ECO 80 mechanical - actuation

EVOS - open spool mechanical actuation

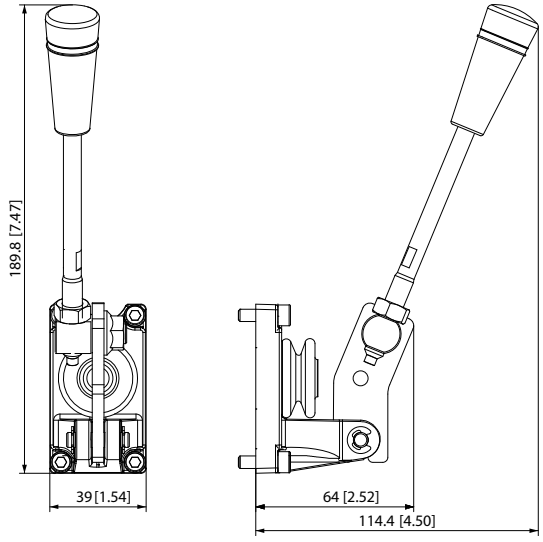
The EVOS mechanical actuation consists of an aluminum base with a lever and a rubber boot to protect the spool, mounted on the end of the valve slice. When actuating the lever, the operator is directly pulling or pushing on the main spool inside the valve hence controlling the flow.

The lever has a travel of 14° in either direction from neutral. Actuating the lever fully will move the spool all 5 mm and give full flow. The lever can be mounted / removed without having to remove the EVOS base.

The EVOS should be used with open spool mechanical actuation and can be combined with any EVME, spring center, detent, through action and micro switch.

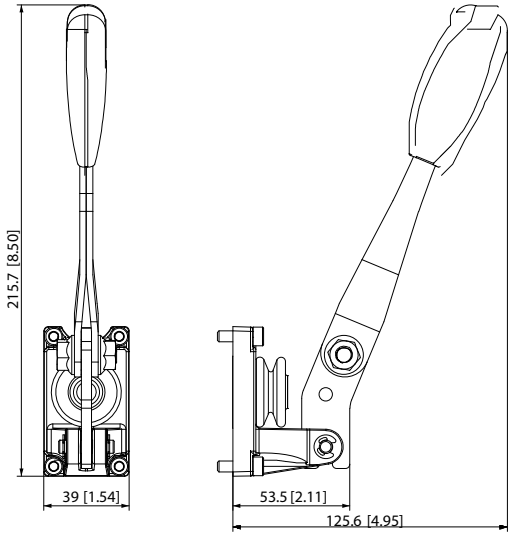
EVOS mechanical actuation

Dimensions in mm [in]



EVOS mechanical actuation power lever

Dimensions in mm [in]



ECO 80 mechanical - actuation

Operating torque for EVOS mechanical actuation

Spool displacement	Operating torque N·m
	EVOS + EVME (sspring center, Micro Switch)
From neutral position	3.5 ± 0.2
Maximum spool travel	4.5 ± 0.2
No control level position	2 x 6
Control lever range	±14°

Part numbers for EVOS mechanical actuation

Description	**Part number**
EVOS80LS Mechanical Actuator	047768
EVOS80 Mechanical Actuator with lever	11175314
EVOS80 Mechanical Actuator with power lever	11227308
Accessories - Base handle black	11170923
Accessories - Base handle black power lever	11194826

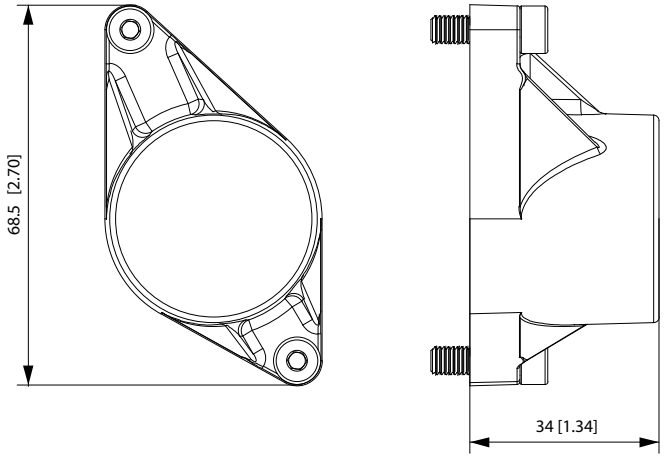
ECO 80 mechanical - actuation

EVME - open spool centering

The EVME spring centering consists of an aluminum cover mounted on the end of the valve slice which ensures the position of the spool in neutral positions and spool in/out. The EVME spring centering should be used with spool option: Mechanical flow control spools, Female Extension. And can be combined with any EVOS, Open spool actuators.

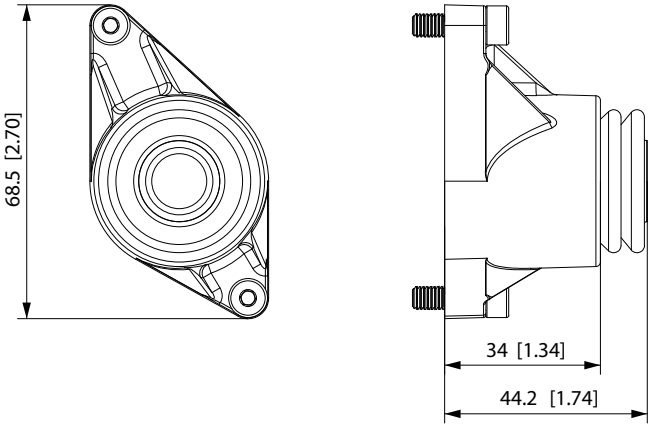
EVME spring centering

Dimensions in mm [in]



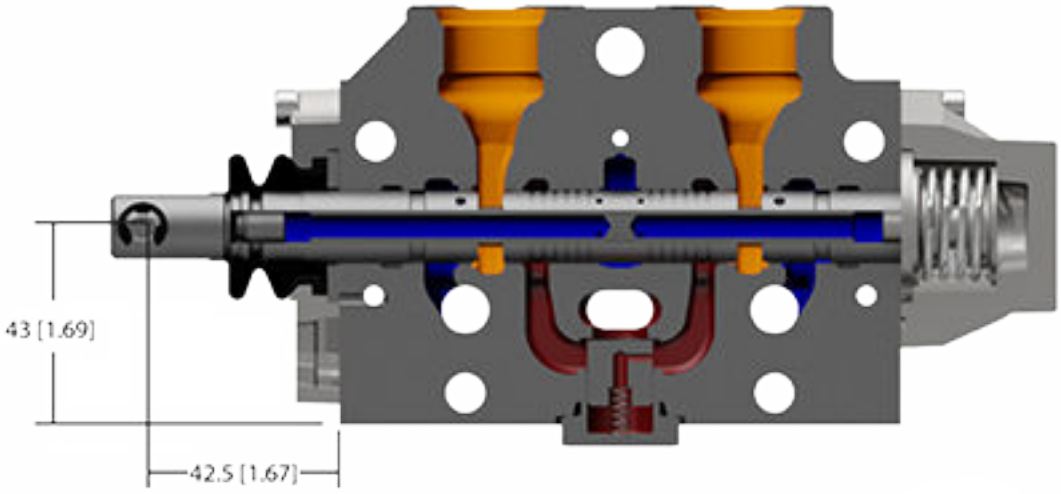
EVME through action

Dimensions mm [in]



ECO 80 mechanical - actuation

Detent positions



EVME, detent 03 position

The EVME detent 03 positions consists of an aluminum cover mounted on the end of the valve slice which keep the position of the spool in neutral positions and spool in/out.

The EVME detent 03 positions should be used with spool option: Mechanical flow control spools, Female Extension and Detent 03 position. And can be combined with any EVOS, Open spool actuators.

EVME, detent 02 position spool to A or B

The EVME detent 02 positions consists of an aluminum cover mounted on the end of the valve slice which keep the position of the spool in neutral positions and spool out, position spool in is blocked.

The EVME detent 02 positions should be used with spool option: Mechanical flow control spools, Female Extension and Detent 03 position with accessory part number 11173406. And can be combined with any EVOS, Open spool actuators.

EVME, through action

The EVME through action consists of an aluminum cover with a rubber boot to protect the spool, mounted on the end of the valve slice which ensures the position of the spool in neutral positions and spool in/out.

The valve is actuated by directly pulling or pushing the main spool inside the valve hence controlling the flow. Actuating the spool fully will move all 5 mm and give full flow. The EVME through action should be used with spool option: Mechanical flow control spools, Female Extension and through acting. Can be combined with any EVOS, Open spool actuators.

Part numbers for EVME Spring centering

Description	Part number
EVME80LS-COVER	11169579
Accessory Detent 02 Position	11173406
EVME80LS Through action	11169580

ECO 80 mechanical - actuation

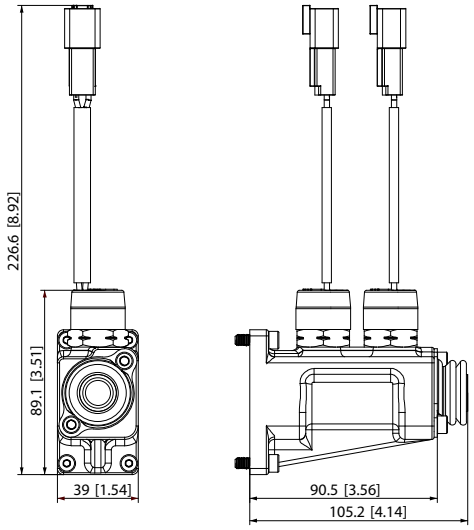
EVME - micro switch NO

The EVME Micro Switch consists of an aluminum cover mounted on the end of the valve slice, which enables by two micro switches know which side the spool is being stroked, in or out.

The micro switches can have contacts in the configuration normally open “NO”. The EVME Micro Switch should be used with spool option: Mechanical flow control spools, Female Extension and Micro Switch. And can be combined with any EVOS, Open spool actuators.

EVME Micro switch

Dimensions mm [in]



Technical data for EVME Micro Switch

Parameter	Voltage	
	12 V	24 V
Max. current	10 A	
Resistance	0.010 Ω ± 15 %	

Part numbers for EVME micro switch

Description	Connector type	Protection class	Part number
EVME80LS Micro Switch	DEUTSCH DT04-2P	IP 67	11170841

ECO 80 mechanical - actuation

EVOS x EVME combination overview

Work port A		Work port B					
		EVOS, Open spool mechanical actuation			EVME, Open spool centering		
		Mechanical actuator	Mechanical actuator with lever/power lever	Through action	Cover, Spring center and detent	Cover through action	Micro Switch
EVME, Open spool centering	Cover, Spring center and detent	x	x	x			
	Cover through action	x	x	x			
	Micro Switch	x	x	x			
EVOS, Open spool mechanical actuation	Mechanical actuator				x	x	x
	Mechanical actuator with lever/power lever				x	x	x
	Through action				x	x	x

EVO - end plate

The ECO80 EVO end plates close off the valve stack section by placing them at the end. Furthermore, the end plate is ensuring Load Sense (LS) is relieved to tank pressure when the valve is not operated.

The EVO end plate variants are based on a generic platform with a selection of additional features, enabling you to tailor the EVO to suit the demands of any hydraulic system.

The generic EVO end plate platform includes the following main variants:

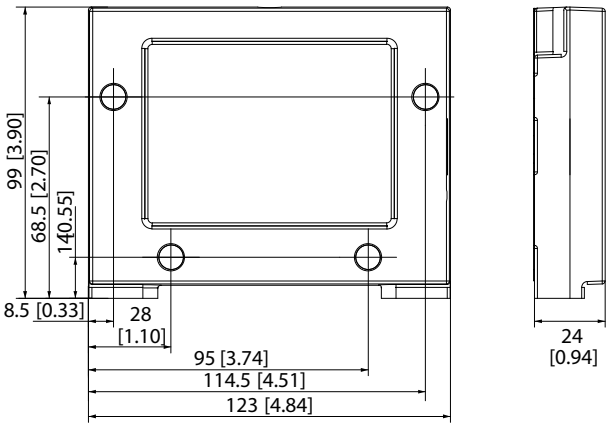
- EVO
- EVO with LX-connection and pneumatic port
- EVO with pneumatic port

EVO

The EVO end plate closes off the valve stack section by placing it at the end. Furthermore, the end plate is ensuring Load Sense (LS) is relieved to tank pressure when the valve is not operated

EVO

EVO dimensions mm [in]



Schematic

Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers for EVO end plate

Part number	Description	Mounting
11191585	EVO End plate	M8

EVO with LX-connection

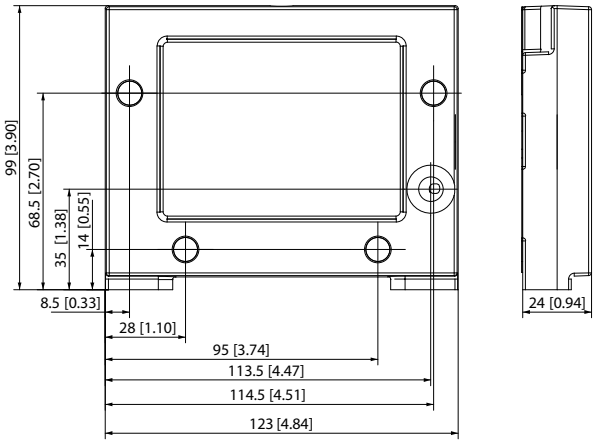
The EVO end plate closes off the valve stack section by placing it at the end. Furthermore, the end plate is ensuring Load Sense (LS) is relieved to tank pressure when the valve is not operated. The LX port enables

EVO - end plate

other remote valves to be connected onto the Load Sense shuttle network. The end plate also features a blocked pneumatic port.

EVO with LX-connection

Dimensions mm [in]



Schematic

Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers for EVO wioth LX-connection end plate

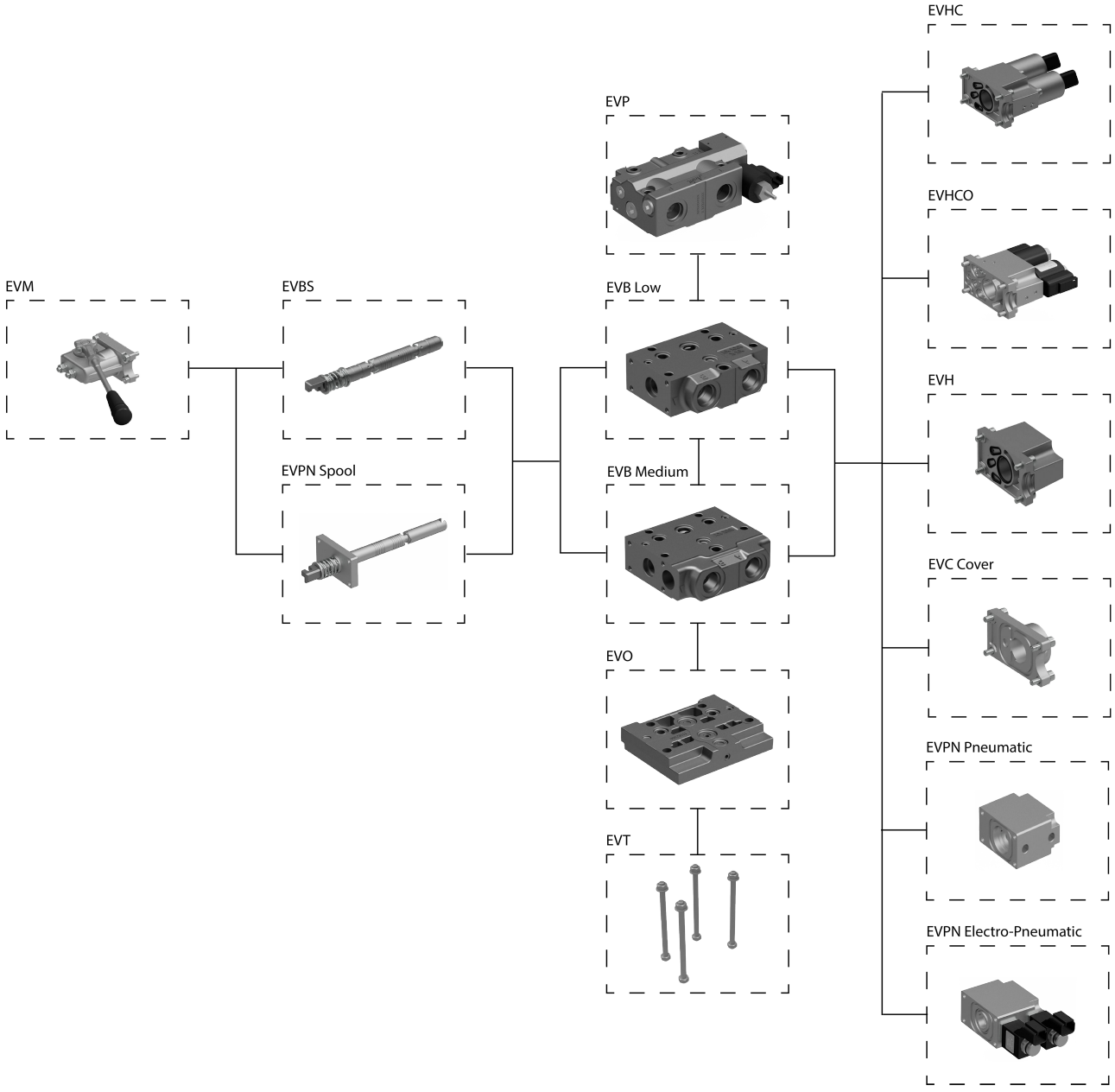
Part number	Description	LX port	Pneumatic port	Mounting
11191583	EVO End plate with LX connection	G1/8-28	G1/8-28	M8
11191582		7/16-20 UNF	G1/8-28	M8

Electrical actuated ECO 80

This section will only be about the electrical actuated modules of the ECO 80 portfolio. For information on the mechanical acting modules of the ECO80 portfolio, see…

ECO 80 electrical modules overview

Electrical modules exploded view

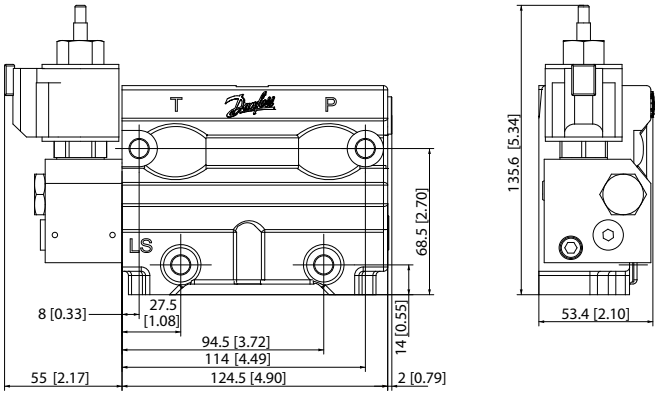


EVP inlet modules - electrical

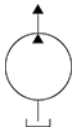
The ECO 80 EVP inlet modules, also referred to as pump side modules, act as an interface between the ECO 80 directional valve group and the hydraulic pump and tank reservoir.

EVP Inlet Module

Dimensions mm [in]



Fixed displacement pump symbol



Variable displacement pump symbol

The EVP inlet module variants are based on a generic platform with a selection of additional features, enabling you to tailor the EVP to suit the demands of any hydraulic system:

- *Open center EVP with PPRV* on page 41 (for fixed displacement pumps)
- *Closed center EVP with PPRV* on page 44 (for variable displacement pumps

EVP inlet modules - electrical

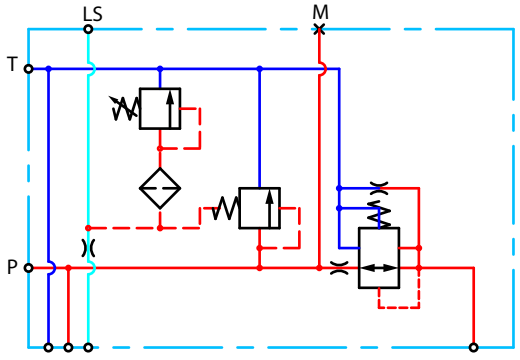
Open center EVP with PPRV

The Open Center EVP inlet with integrated pilot pressure reduction valve (PPRV) is intended for use with fixed displacement pumps in applications, where a valve group with electro-hydraulically or hydraulically controlled work sections is desired (EVH, EVHC or EVHCO).

The Open Center EVP with PPRV features:

- Integrated LS pressure relief valve
- Threaded ports for P/T/LS and M measuring gauge
- Integrated pilot pressure Reducing valve (PPRV) for EVH, EVHC, or EVHCO
- Optional LS unloading valve, EVPX
- Optional plug for external pilot oil supply

Schematic



Technical specification for EVP with PPRV

Max. P-port continuous	Max. T-port static/dynamic	Max. rated flow
280 bar [4061 psi]	25/40 bar [365/580 psi]	100 l/min [26.4 US gal/min]

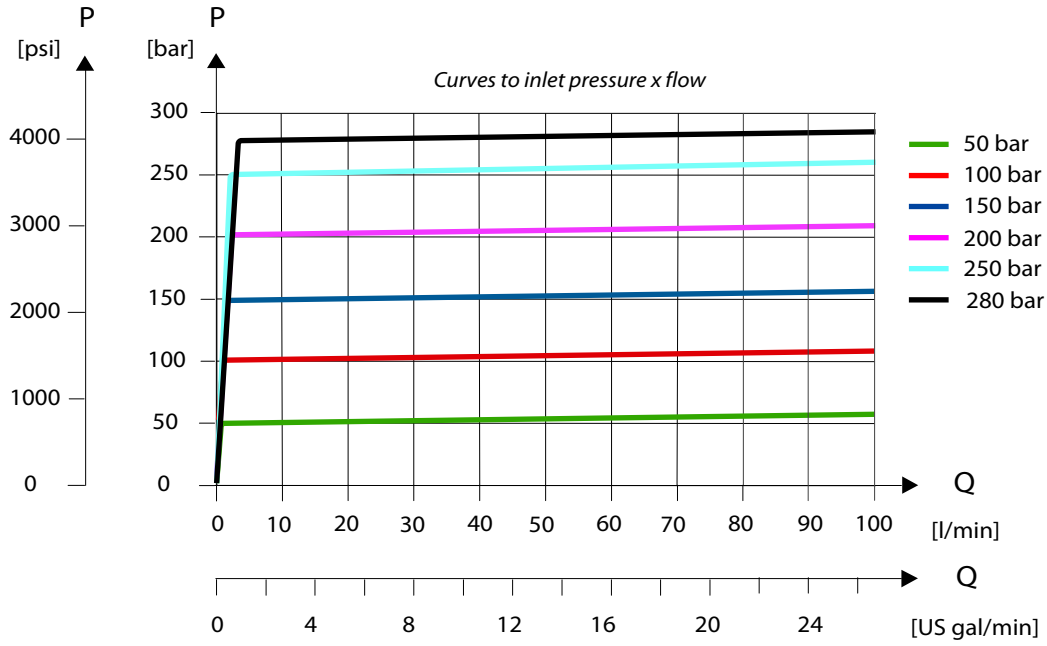
Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

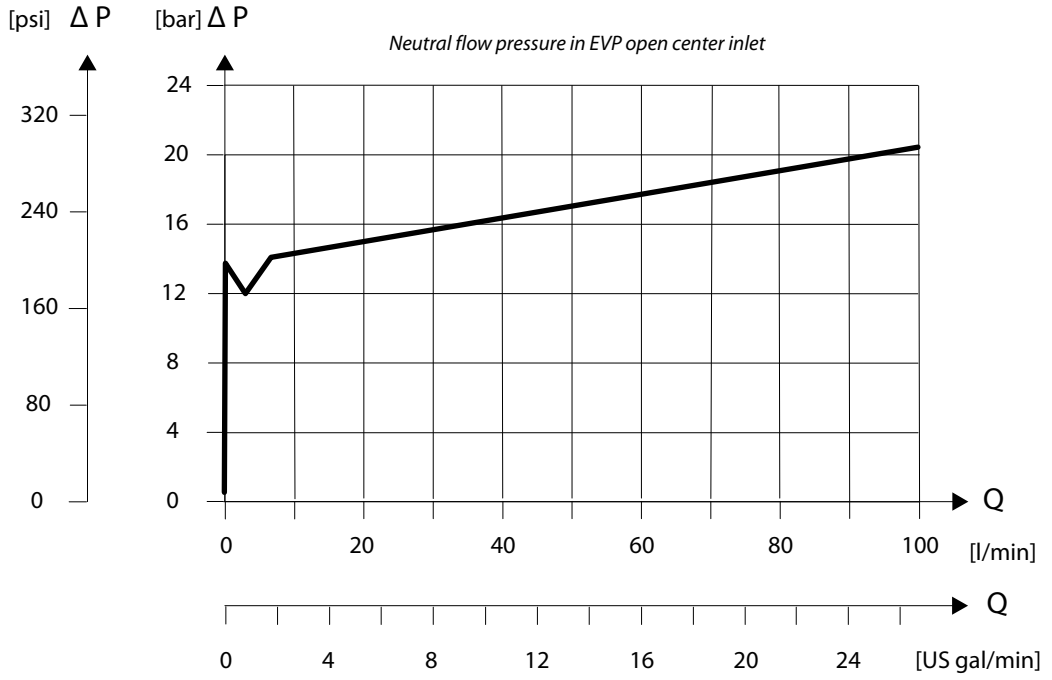
EVP inlet modules - electrical

Theoretical performance graphs

Pressure relief valve characteristics



Neutral by-pass pressure drop characteristics (open center)



Part numbers for Open Center EVP with PPRV

Part numbers	P-port	T-port	M-, S-port	Mounting	EVPX
11172996	G 1/2	G 1/2	G 1/4	M8 x 1.25	-
11173010	7/8-14 UNF	7/8-14 UNF	9/16-18 UNF	M8 x 1.25	-

EVP inlet modules - electrical

Part numbers for Open Center EVP with PPRV (continued)

Part numbers	P-port	T-port	M-, S-port	Mounting	EVPX
11173023	G 1/2	G 1/2	G 1/4	M8 x 1.25	Yes
11173000	7/8-14 UNF	7/8-14 UNF	9/16-18 UNF	M8 x 1.25	Yes

EVP inlet modules - electrical

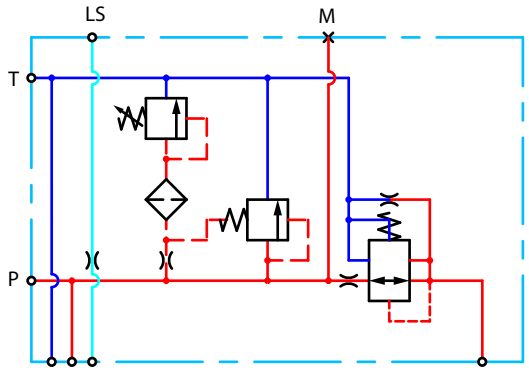
Closed center EVP with PPRV

The Closed Center EVP inlet with integrated pilot pressure reduction valve (PPRV) is intended for use with variable displacement pumps in applications, where a valve group with electro-hydraulically or hydraulically controlled work sections is desired (EVH, EVHC or EVHCO).

The Closed Center EVP with PPRV features:

- Integrated LS pressure relief valve
- Threaded ports for P/T/LS and M measuring gauge
- Integrated pilot pressure Reducting valve (PPRV) for EVH, EVHC, or EVHCO
- Optional plug for external pilot oil supply

Closed center EVP with PPRV schematic



Technical specification for EVP with PPRV

Max. P-port continuous	Max. T-port static/dynamic	Max. rated flow
280 bar [4061 psi]	25/40 bar [365/580 psi]	100 l/min [26.4 US gal/min]

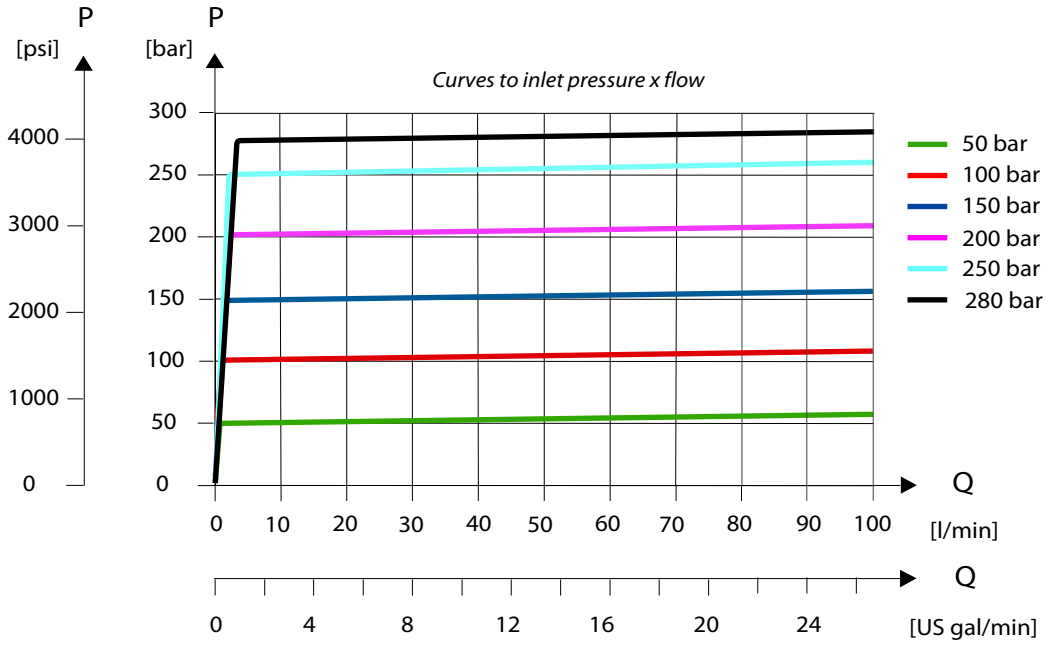
Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	-30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194°F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

EVP inlet modules - electrical

Theoretical performance graphs

Pressure relief valve characteristics



Part numbers for Closed Center EVP with PPRV

Part number	P-port	T-port	M-, LS-port	Mounting
11172997	G 1/2	G 1/2	G 1/4	M8 x 1.25
11173011	7/8-14 UNF	7/8-14 UNF	9/16-18 UNF	M8 x 1.25

EVP inlet module accessories

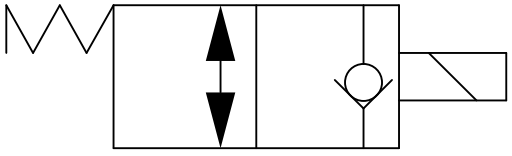
The generic EVP inlet module accessory platform includes the EVPX Electrical LS pressure unloading valve and a plug for external pilot oil supply.

- EVPX Electrical LS Pressure Unloading Valve
- PLug for external pilot oil supply

EVPX electrical LS pressure unloading valve

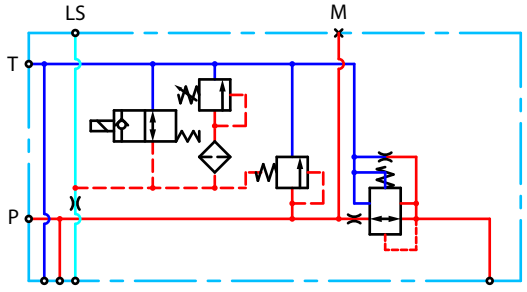
The electrical LS pressure unloading valve is an accessory available for EVP inlet modules with EVPX facility. The EVPX consist of a solenoid valve and a magnetic coil package, allowing the operator to relieve the LS pressure to tank electrically.

Normally open (NO)



Relieving the LS pressure to tank results in a reduced system pressure level, which is determined by the sum of the tank and neutral by-pass pressure drop in an Open Center PVP configuration

Open center EVP with PPRV and EVPX (NO)



EVPX technical data

Voltage supply	12/24 V ± 10 %
Resistance @ 12 V	7.2 Ω ± 7 %
Resistance @ 24 V	28.2 Ω ± 7 %
Power consumption	20 W
Maximum LS response time	300 ms
Max. pressure drop @ 0.1 l/min [2.6 US gal/min]	2 bar [30 psi]
Max. coil surface temperature	155°C [311°F]

Part numbers for EVPX electrical LS pressure unloading valve

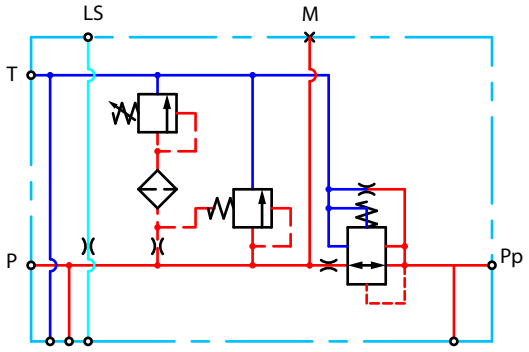
Part number	Description	Voltage supply	Thread
11172430	EVPX	12 V	-
11172429	EVPX	24 V	-

EVP inlet module accessories

Plug for external pilot oil supply

The plug for external pilot oil supply is an accessory available for EVP inlet modules with integrated pilot pressure reducing valve (PPRV), this plug consists in a connection to send out of the EVP inlet a signal with 27 bar and 5 l/min.

Closed center EVP with PPRV and Pp-port



Closed center EVP with PPRV and Pp-port

Part number	Description	Voltage supply	Thread
11177014	Plug for external pilot oil supply	-	G1/4-19 in
11177013	Plug for external pilot oil supply	-	9/16-18 UNF

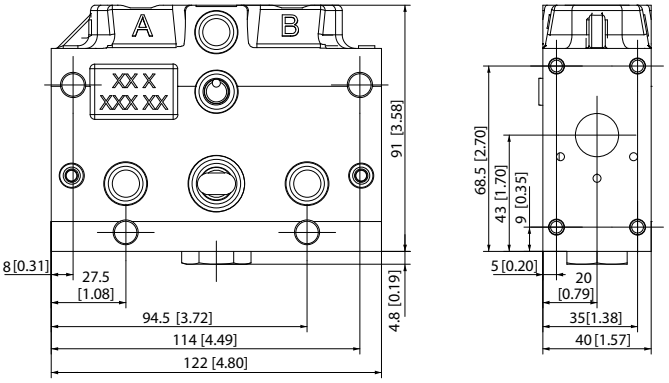
EVB basic modules - electrical actuation

The ECO 80 EVB basic modules, also referred to as work sections, are the interface between the ECO 80 directional control valve and the work function such as a cylinder or a motor.

The EVB comes in two main variants – a low body and a medium body with shock/anti-cavitation valve facility (PVLP)

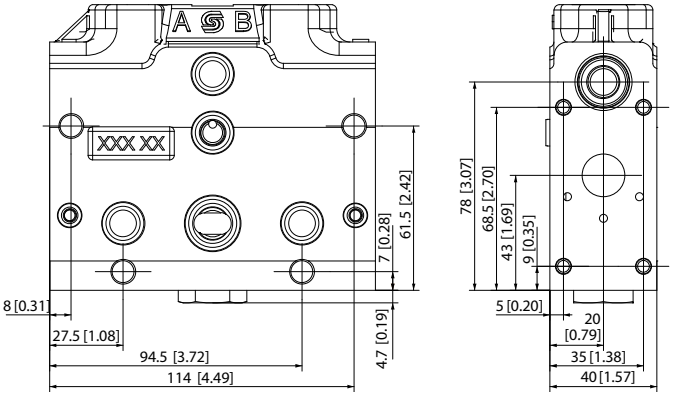
EVB low basic module

EVB low basic module dimensions



EVB medium basic module

EVB medium basic module dimensions



The EVB basic module variants are based on a generic platform with a selection of additional features, enabling you to tailor the EVB to suit the demands of any hydraulic system:

- EVB low body
- EVB medium body

EVB basic modules - electrical actuation

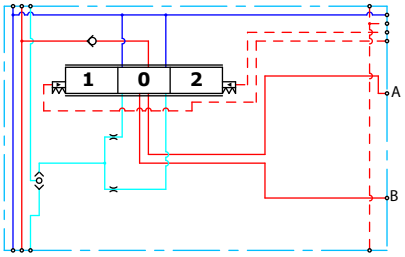
EVB low body

The EVB low body is intended for controlling a work function where the function behavior in terms of flow and pressures allows dependency on the load pressure of other functions used simultaneously. The integrated load drop check valve prevents flow back from work ports influencing other functions.

The EVB low body features:

- Integrated LS shuttle network
- Load drop check valve

Schematic



Technical specifications for A/B port

Max. continuous pressure	Max. intermittent pressure	Max. rated flow
280 bar [4061 psi]	320 bar [4641 psi]	100 l/min [26.4 US gal/min]

Technical specifications

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Ordering information

Part numbers	A/B-port
11168506	G 1/2
11168507	7/8-14 UNF

EVB basic modules - electrical actuation

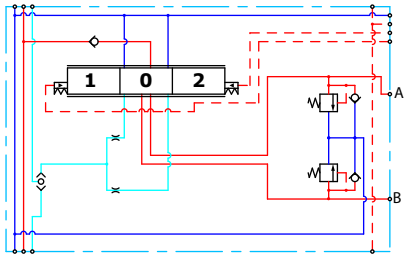
EVB medium body

The EVB low body is intended for controlling a work function where the function behavior in terms of flow and pressures allows dependency on the load pressure of other functions used simultaneously. The integrated load drop check valve prevents flow back from work ports influencing other functions. Compared to the EVB low body the medium body has the option of adding PVLP/PVLA to the work section.

EVB medium body features

- Integrated LS shuttle network
- Load drop check valve
- Shock/anti-cavitation valve and suction facility (PVLP/PVLA)

Schematic



Technical specifications for A/B port

Max. continuous pressure	Max. intermittent pressure	Max. rated flow
280 bar [4061 psi]	320 bar [4641 psi]	100 l/min [26.4 US gal/min]

Technical specifications

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Ordering information

Part numbers	A/B-port
11168509	G 1/2
11168508	7/8-14 UNF

EVB basic modules accessories

The generic EVB module accessory platform include the PVLP shock and anti-cavitation valve and PVLA suction valve.

- PVLP Shock and Anti-Cavitation Valve
- PVLA Suction Valve
- Cavity plug

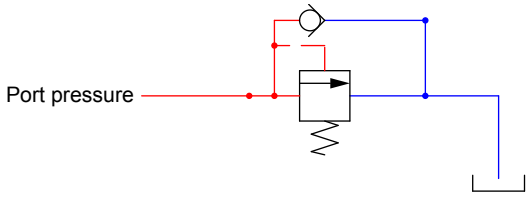
PVLP shock/anti-cavitation valve

The PVLP will relief a pressure peak to the internal tank galleries and will furthermore suck oil from the tank to the work port to prevent cavitation. Pressure settings range 32-320 bar [460-4641 psi].

Features

- Shock valve
- Anti-cavitation
- Lifetime of 200,000 actuations

PVLP schematic



Technical specifications

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers for fixed PVLP

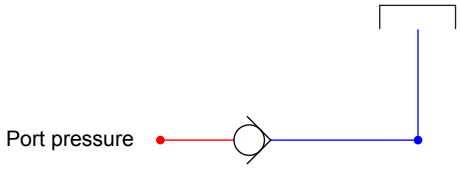
Part number	Pressure setting in bar [psi]	Part number	Pressure setting in bar [psi]
157B2032	32 [460]	157B2190	190 [2755]
157B2050	50 [725]	157B2210	210 [3045]
157B2063	63 [914]	157B2230	230 [3335]
157B2080	80 [1160]	157B2240	240 [3480]
157B2100	100 [1450]	157B2250	250 [3625]
157B2125	125 [1813]	157B2265	265 [3845]
157B2140	140 [2031]	157B2280	280 [4061]
157B2150	150 [2175]	157B2300	300 [4351]
157B2160	160 [2320]	157B2320	320 [4641]
157B2175	175 [2538]		

EVB basic modules accessories

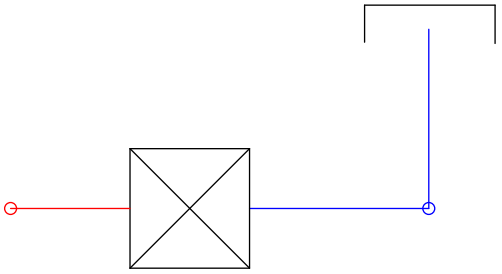
PVLA suction valve and cavity plug

The PVLA will suck oil from the tank to the work port to prevent cavitation by the 0.5 bar spring. The plug will ensure that when using a single acting spool, all flow returning through the work port is led to tank.

PVLA schematic



Cavity plug schematic



Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

PVLA	Cavity plug
157B2001	11177714

EVBS electrical flow control spools

The electrical acting EVBS spools determine the flow out of the work section and are based on a generic platform with a wide selection of additional features, enabling you to tailor the EVBS to suit the demands of any hydraulic system and any function.

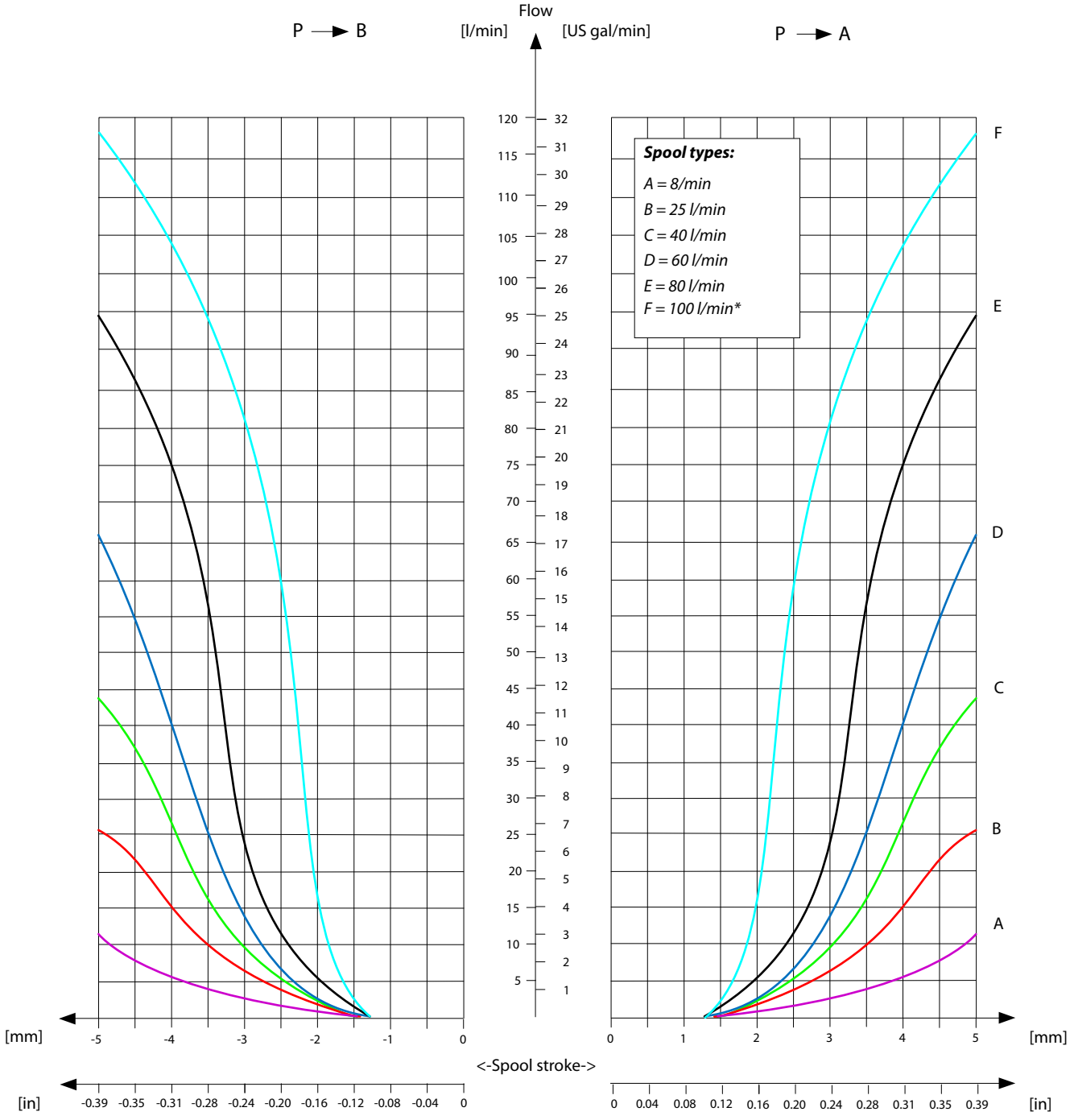
The electrical acting EVBS spool comes in three different main variants:

- EVBS electrical flow control spool
- EVBS electrical flow control spool with soft spring
- EVBS EVPN Spool

EVBS electrical flow control spools

EVBS fluid flow characteristics - Theoretical performance

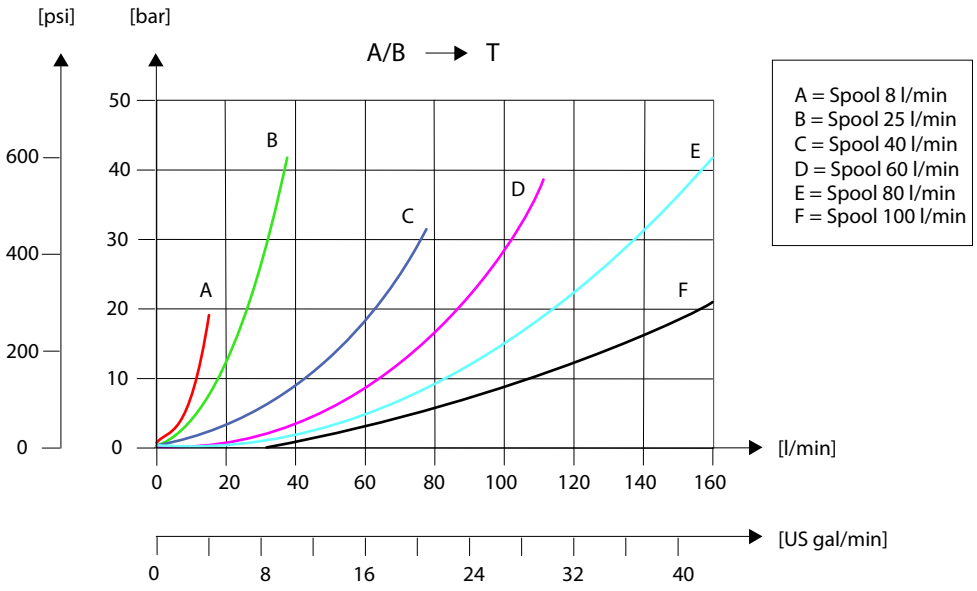
Oil flow as a function of spool travel



EH spools size F = 100 l/min are not recommended to use as proportional control due to curve characteristic

EVBS electrical flow control spools

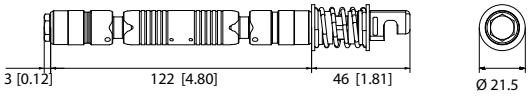
Pressure drop at maximum spool travel (A/B-T)



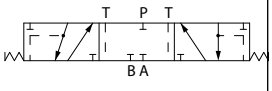
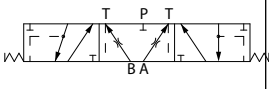
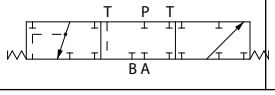
EVBS - electrical flow control spool

EVBS electrical flow controls spool

Dimensions



Part numbers

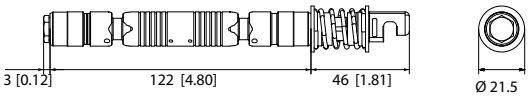
Type	Schematic	Flow, l/min [US gal/min]					
		8 [2.11]	25 [6.61]	40 [10.57]	60 [15.85]	80 [21.13]	100 [26.42]
4-way. 3-position Closed neutral position		11170445	11170449	11170453	11170457	11170461	11182178
4-way. 3-position Throttled open neutral position		11170443	11170447	11170451	11170455	11170459	11182177
3-way. 3-position Closed neutral position		11170446	11170450	11170454	11170458	11170462	-

EVBS electrical flow control spools

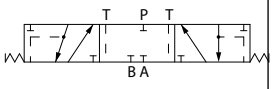
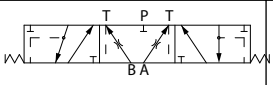
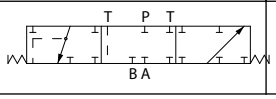
EVBS - electrical flow control spool with soft spring for EVHCO

EVBS electrical flow controls spool

Dimensions



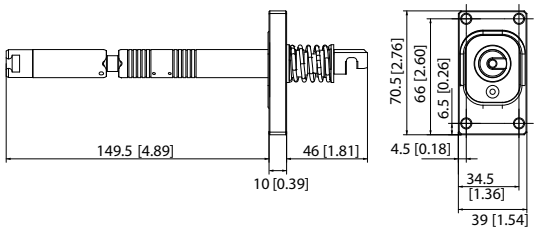
Part numbers

Type	Schematic	Flow, l/min [US gal/min]					
		8 [2.11]	25 [6.61]	40 [10.57]	60 [15.85]	80 [21.13]	100 [26.42]
4-way. 3-position Closed neutral position		11192205	11192207	11192209	11192252	11192257	11192264
4-way. 3-position Throttled open neutral postion		11192206	11192208	11192239	11192262	11192259	11192265
3-way. 3-position Closed neutral position		11192236	11192238	11192241	11192255	11192263	-

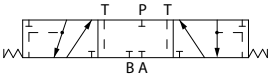
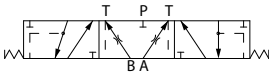
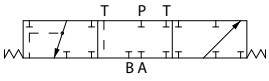
EVBS - EVPN spool

EVBS EVPN spool

Dimensions



Part numbers

Type	Schematic	Flow, l/min [US gal/min]	
		40 [10.57]	80 [21.13]
4-way, 3-position Closed neutral position		11194018	11194024
4-way, 3-position Throttled open neutral position		11194019	11194025
3-way, 3-position Closed neutral position		11194020	11194026

ECO 80 electrical - actuation

ECO 80 electrical actuation can be done mechanically, hydraulically and electrically.

ECO 80 actuation overview:

- EVM mechanical actuation
- EVC cover for mechanical actuation
- EVH hydraulic actuation
- EVHC electrical actuation
- EVHCO On/Off Electrical actuation

EVM mechanical actuation

The EVM consists of an aluminum base with a lever mounted on the end of the valve slice on side B. When actuating the lever the operator is directly pulling or pushing on the main spool inside the valve hence controlling the flow. Actuating the lever fully will move the spool all 5 mm and give full flow. The lever can be mounted / removed without having to remove the EVM base. The EVM should be used with Electrical flow control spools and can be combined with any EVHC, EVH or Pneumatic actuator.

EVM without adjustment screws

The standard EVM without adjustment screws will allow a spool travel of 5 mm in either direction. Full lever movement to one side will give full flow to the work ports. When the spool is moved 5mm it will stop due to a mechanical limitation build into the EVM base.

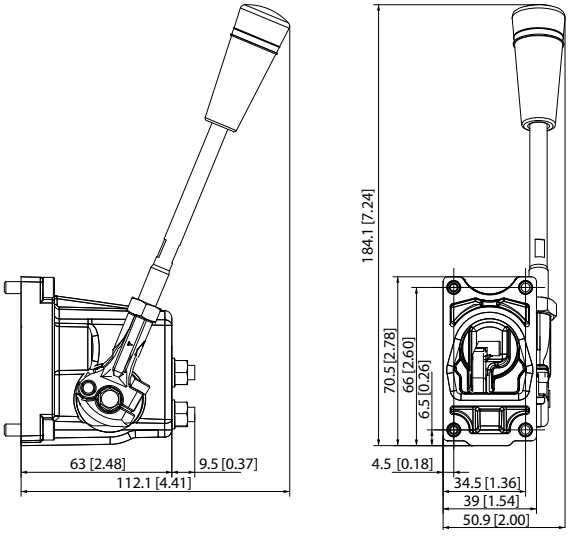
EVM with adjustment screws

The spool travel in either direction can be limited by the adjustment screws. This will limit the flow out of the work ports thereby reducing the speed of an application. The spool travel is adjusted by first loosening the nut then adjusting the pin screw. After adjustment the nut must be tightened again applying 8 ±1 [N•m] of torque.

EVM dimensions, torque, and part numbers

EVM cover

Dimensions



ECO 80 electrical - actuation

Operating torque

Spool displacement	Operating torque for EVM + EVHC and EVM + EVH	Operating torque for EVM + EVHCO
From neutral position	1.5 ± 0.2 N·m [13.3 ± 1.8 in·lbs]	2 ± 0.2 N·m [17.7 ± 1.8 in·lbs]
Maximum spool travel	6.6 ± 0.2 N·m [58.4 ± 1.8 in·lbs]	2.7 ± 0.2 N·m [23.9 ± 1.8 in·lbs]
No control lever position	2 x 6	
Control lever range	± 13.8°	

Part numbers

Part number	Description	Lever	Adjustment screws
11119157	EVM-ACTUATOR	-	-
11167001	EVM-ACTUATOR-LEVER	Yes	-
11145204	EVM-ACTUATOR-ADJ SCREW	-	Yes
11167002	EVM-ACTUATOR-ADJ SCREW-LEVER	Yes	Yes

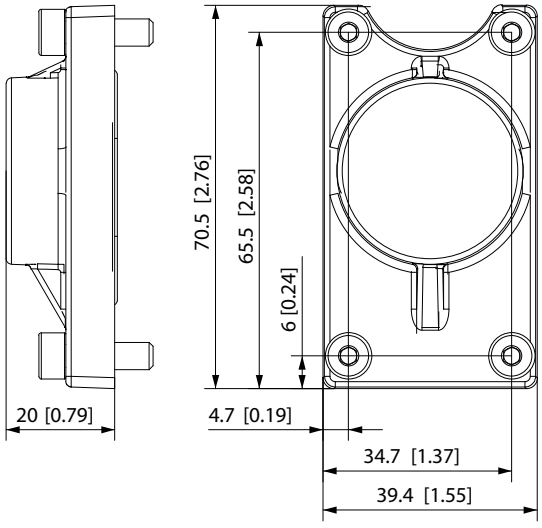
ECO 80 electrical - actuation

EVC - cover for mechanical actuation

The EVC is an aluminum plate mounted on the end of the valve slice on side A for purely mechanically operated valve with EVM style. The EVC is to be combined with an EVM.

EVC cover

Dimensions



Part numbers

Part number	Description
11171318	EVC-COVER

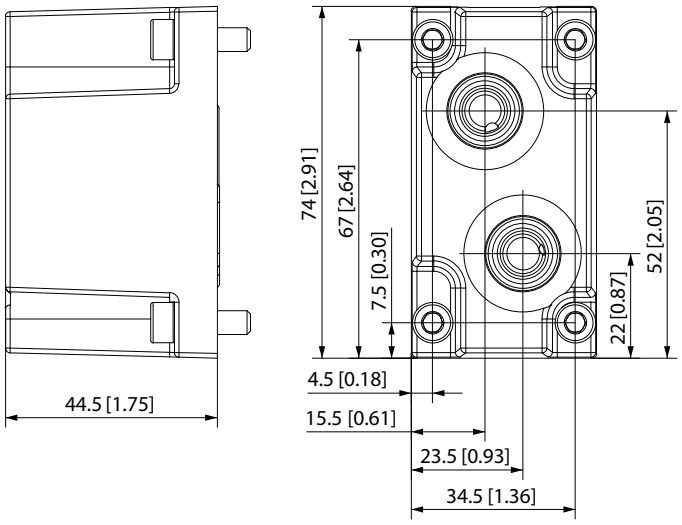
ECO 80 electrical - actuation

EVH - hydraulic actuation

The EVH is an aluminum plate with two threaded connections mounted on the end of the valve slice on side A. When applying pressure through one of the ports, one side of the spool is pushed to one direction hence flow is coming from the work ports. The EVH is to be combined with an EVM.

EVH

Dimensions



Technical data

Control range pressure from neutral to max A/B	3.5-18 bar [50-261 psi]
Maximum pilot pressure	35 bar [507 psi]
Maximum pressure on port T[1]	10 bar [145 psi]

[1] The hydraulic remote-control lever should be connected directly to tank

Part numbers

Part number	Name	Connection
11169486	EVH-ACTUATOR-BSP	1/4 BSP
11169487	EVH-ACTUATOR-SAE	9/16 SAE

ECO 80 electrical - actuation

EVHC - electrical actuation

The EVHC consists of an aluminum base with two solenoids pressure reducing valves mounted on the end of the valve slice. When actuating with electrical proportional actuation, the main spool position is adjusted so that its position corresponds to an electrical control signal.

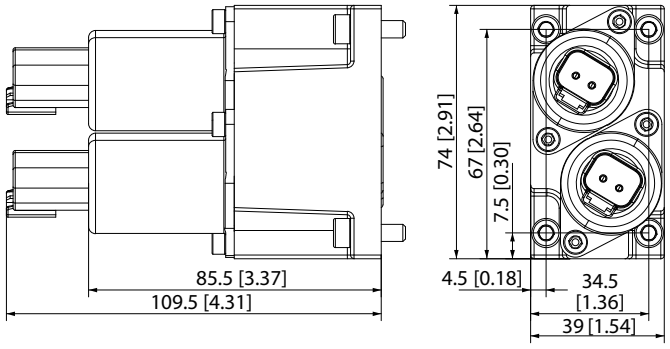
The control signal is converted into a hydraulic pressure signal that moves the main spool in the EVB. This is done by means of two proportional pressure-reducing valves. The electrical actuator can be controlled either by a current amplifier card, or directly from a programmable microcontroller.

The actuator controls the spool by building up pilot oil pressure on the end of the spool. For the EVHC is necessary a pilot oil pressure between 25 and 30 bar.

The EVHC should be used with Electrical FLOW CONTROL spools and can be combined with any EVM.

EVHC

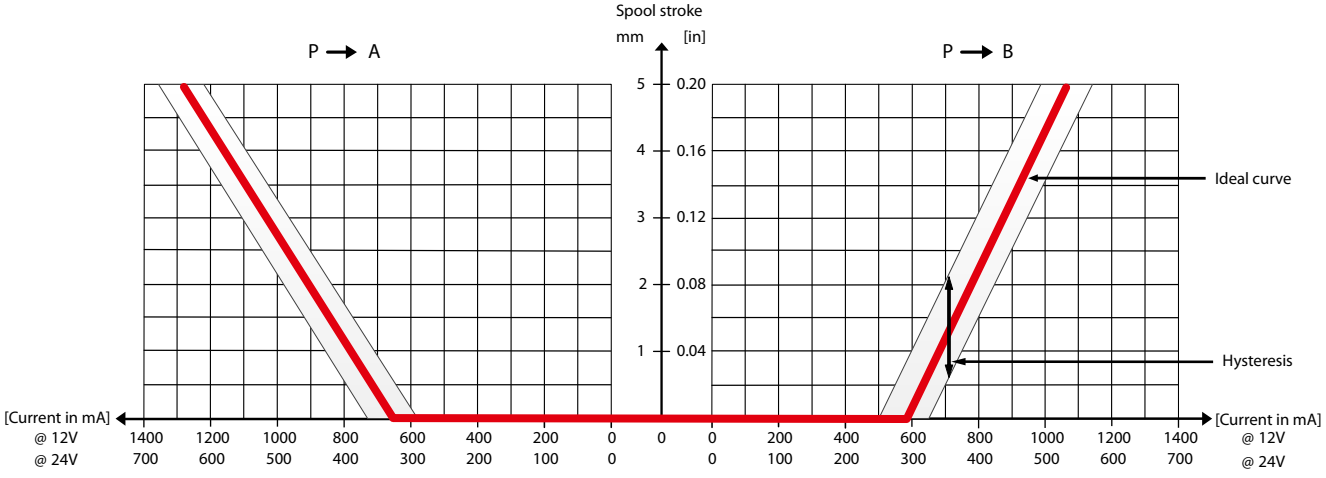
Dimensions



Schematic

Schematic is not available.

EVHC spool stroke vs current characteristics



EVHC current response and hysteresis @ 25 bar Pp, 32 ctS, 55 °C. The ideal curve (red line) is determined by the main spool neutral spring. The EVHC hysteresis is around ±7.5% (grey region).

The hysteresis is affected by viscosity, friction, flow forces, dither frequency and modulation frequency. The spool position will shift when conditions are changed e.g. temperature change.

ECO 80 electrical - actuation

Technical data

Parameter	Supply voltage	
	12 V	**24 V**
Controller output current range	0 - 1500 mA	0 - 750 mA
Resistance	4.75 Ω ± 5%	20.8 Ω ± 5%
Frequency	100 - 400 Hz	
Pilot oil pressure range	25 - 30 bar [362 – 435 psi]	
Pressure control range	8 – 23 bar [116 – 333 psi]	
Ambient temperature range	-30°C to 80°C [-22 °F to 176°F]	
Temperature range	-20°C to 80°C [-4 °F to 176°F]	
Fluid cleanliness	23/19/16 (according to ISO 4406)	

Operating conditions

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers

Part number	Voltage supply	Connector type	Protection class
11162297	12 V	2x2 DEUTSCH	IP 67
11162298	24 V	2x2 DEUTSCH	IP 67

ECO 80 electrical - actuation

EVHCO - Low current on/off electrical actuation

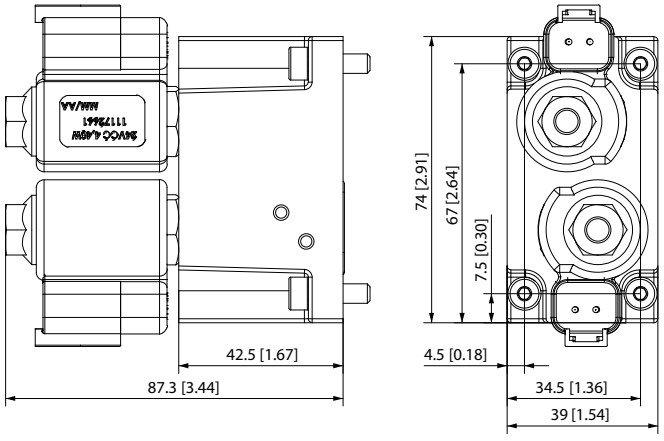
The EVHCO consists of an aluminum base with two solenoids valves mounted on the end of the valve slice. When active with electrical signal the main spool goes straight to end of stroke, A or B side.

The electrical signal is converted into a hydraulic pressure signal that moves the main spool in the EVB. This is done by means of two on/off solenoid valves.

The actuator controls the spool by building up pilot oil pressure on the end of the spool. For the EVHCO is necessary a pilot oil pressure between 10 and 28 bar. The EVHCO should be used with Electrical flow control soft spring spools and can be combined with any EVM.

EVHCO

Dimensions



Schematic

Schematic is unavailable.

Technical data

Supply voltage (Udc)	Rated	12 V	24 V
	Range	11 – 15 Vdc	22 – 30 Vdc
Current	22°C [71°F]– Coil temperature	0.36 A	0.18 A
Power	22°C [71°F]– Coil temperature	4.33 W	4.40 W
Resistance at 20°C [68°F]		33.26 Ω ± 10%	130.91 Ω ± 10%
Pressure control range		10 – 28 bar [145 – 406 psi]	
Duty cycle		100 %	
Reaction time from neutral position to max. spool travel		max. 300 ms	

Operating conditions

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers

Part number	Voltage supply	Connector type	Protection class
11186922	12 V	2x2 DEUTSCH	IP 67
11186911	24 V	2x2 DEUTSCH	IP 67

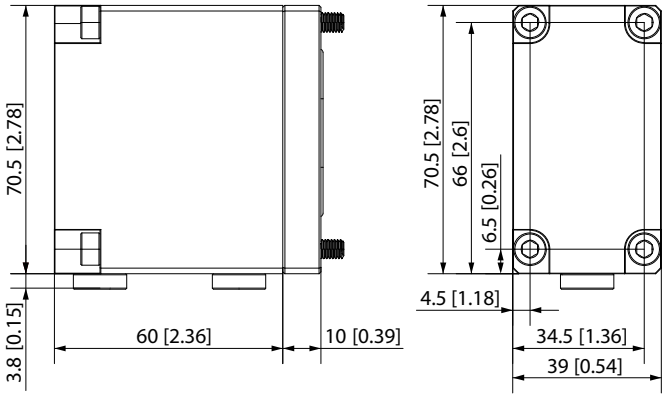
ECO 80 electrical - actuation

EVPN - pneumatic actuation

The EVPN is an aluminum plate with two threaded connections mounted on the end of the valve slice on side A. When applying pressure through one of the ports, one side of the spool is pushed to one direction hence flow is coming from the work ports. The EVPN is to be combined with an EVM and a special EVBS spool for EVPN.

EVPN

Dimensions



The two plugs in the bottom of the EVPN actuator is for option mount for upside down pneumatic ports.

Technical data

Pilot air supply	Minimum	5 bar [72 psi]
	Maximum	21 bar [304 psi]

Part numbers

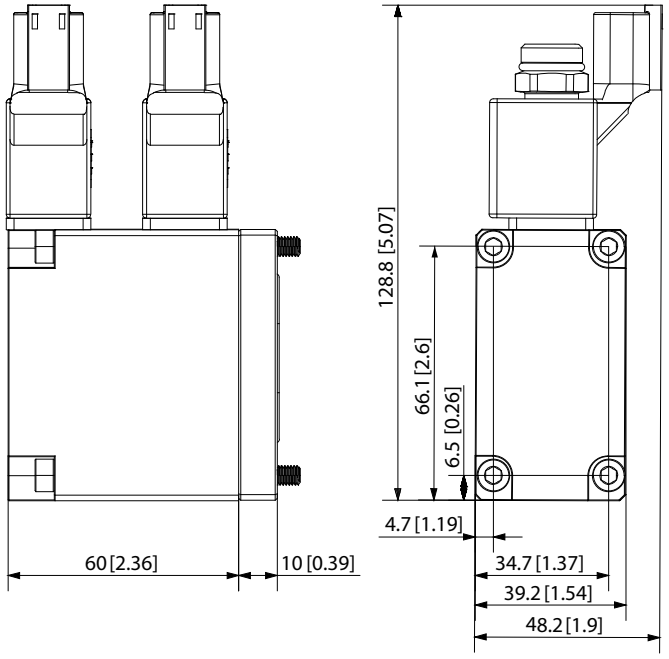
Part number	Name	Port size
11198492	EVPN Pneumatic actuator	1/8 BSP

ECO 80 electrical - actuation

EVPN - electrical pneumatic action

EVPN electrical actuator

Dimensions



Operating conditions

Pilot air supply	Minimum	5 bar [72 psi]
	Maximum	12 bar [174 psi]

Control specifications

Supply Voltage (Udc)	Rated	12 Vdc	24 Vdc
	Range	11 to 15 Vdc	22 to 30 Vdc
Current	22°C [71°F]– Coil temperature	500 mA	250 mA
Power	22°C [71°F]– Coil temperature	6 W	6 W
Resistance		24 Ω	96 Ω
Reaction time from neutral position to max. spool travel		Max. 50 ms	

Technical specifications

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

ECO 80 electrical - actuation

Part numbers

Part number	Voltage supply	Connector type	Protection class
11193722	12 V	DEUTSCH	IP 67
11193723	24 V	DEUTSCH	IP 67
11194345	24 V	AMP	IP 66

EVO - end plate

The ECO80 EVO end plates close off the valve stack section by placing them at the end. Furthermore, the end plate is ensuring Load Sense (LS) is relieved to tank pressure when the valve is not operated.

The EVO end plate variants are based on a generic platform with a selection of additional features, enabling you to tailor the EVO to suit the demands of any hydraulic system.

The generic EVO end plate platform includes the following main variants.

- EVO – *See EVO for details*
- EVO with LX-connection – see *EVO with LX-connection for details*
- EVO with pneumatic port

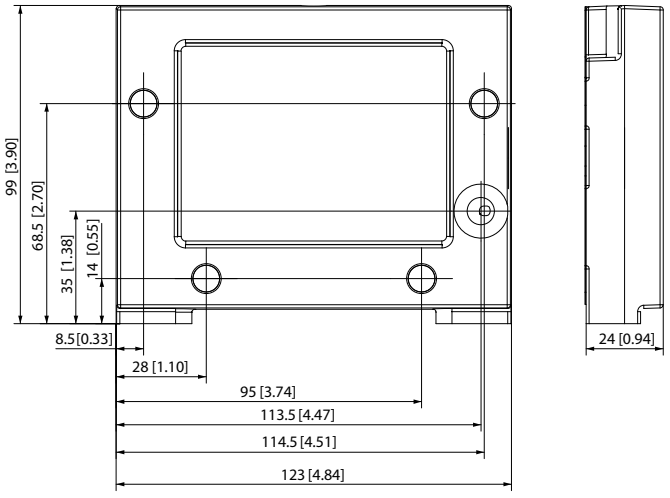
EVO - end plate

EVO with pneumatic port

The EVO end plate closes off the valve stack section by placing it at the end. Furthermore, the end plate is ensuring Load Sense (LS) is relieved to tank pressure when the valve is not operated. The pneumatic port works as air inlet supply for when using the electro pneumatic actuator.

EVO with pneumatic port

Dimensions



Schematic

Technical specification

Parameter	Minimum	Recommended range	Maximum
Fluid temperature	- 30°C [-22°F]	30 to 60°C [86 to 140°F]	90°C [194 °F]
Fluid viscosity	4 mm^2/s [39 SUS]	12 to 75 mm^2/s [65 to 347 SUS]	460 mm^2/s [2128 SUS]
Fluid cleanliness	23/19/16 (according to ISO 4406)		
Operating temperature	Ambient: -30 to 60°C [-22 to 140°F]		

Part numbers

Part number	Description	Pneumatic port	Mounting
11191584	EVO End plate with pneumatic port	G1/8-28	M8

EVT - assembly kit for both mechanical and electrical acting

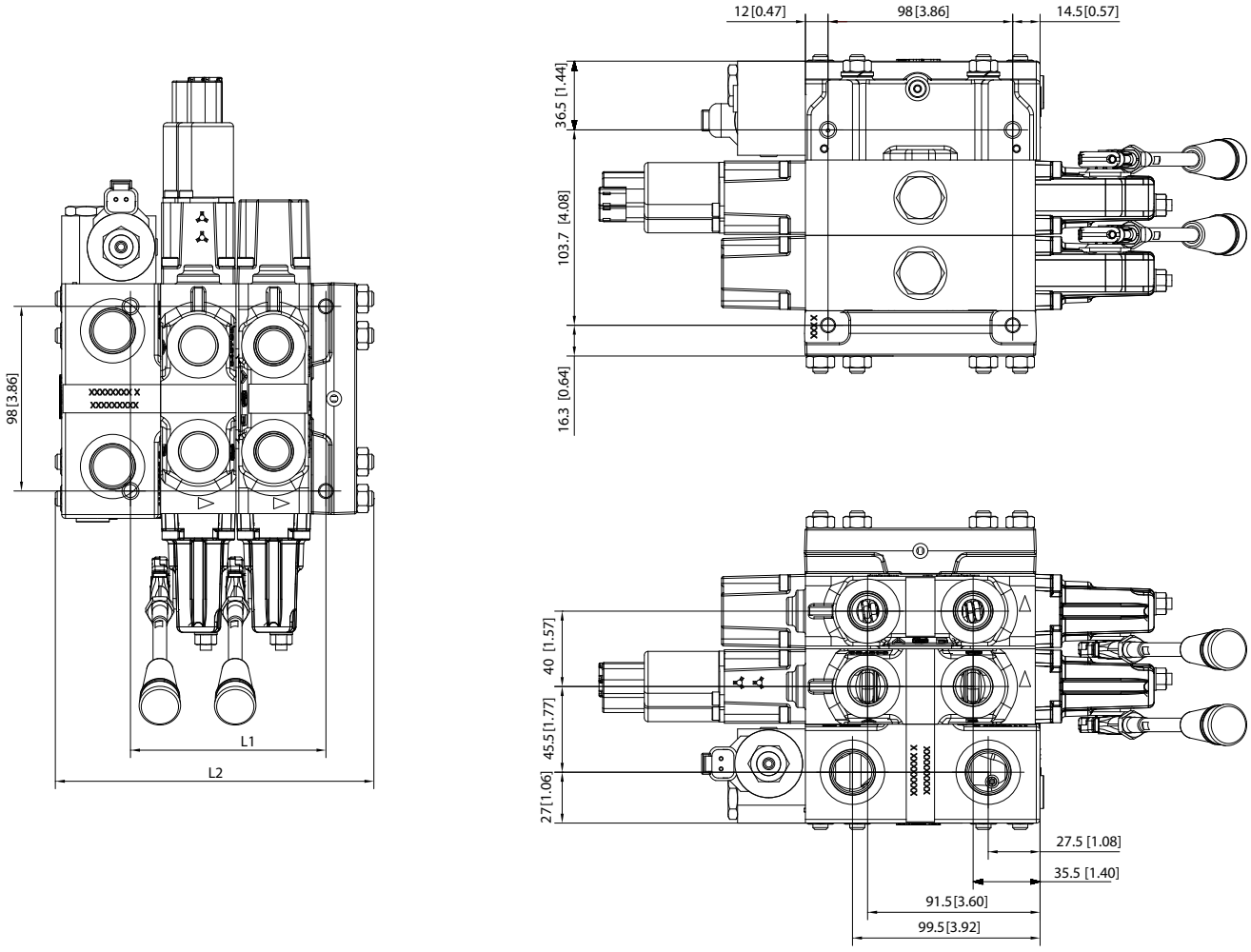
EVT assembly kit for various ECO 80 combinations consist of four tie rods, eight washers, eight nuts and O-ring. Use the guide and reference tables how to choose PVAS kit.

The tie rods are inserted through the entire length of the PVG valve stack. The nuts are tightened at the pump side and at the end plate.

Part numbers

Number of EVB's	Part number	Number of EVB's	Part number
1	11173102	7	11173108
2	11173103	8	11173109
3	11173104	9	11173110
4	11173105	10	11173111
5	11173106	11	11173112
6	11173107	12	11173113

ECO 80 dimension overview



Number of EVB's		1	2	3	4	5	6	7	8	9	10	11	12
L1	mm [in]	65 [2.56]	105 [4.13]	145 [5.71]	185 [7.28]	225 [8.86]	265 [10.43]	305 [12.01]	345 [13.58]	385 [15.16]	425 [16.73]	465 [18.31]	505 [19.88]
L2	mm [in]	130 [5.12]	170 [6.69]	210 [8.27]	250 [9.84]	290 [11.42]	330 [12.99]	370 [14.57]	410 [16.14]	450 [17.72]	490 [19.29]	530 [20.87]	570 [22.44]

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