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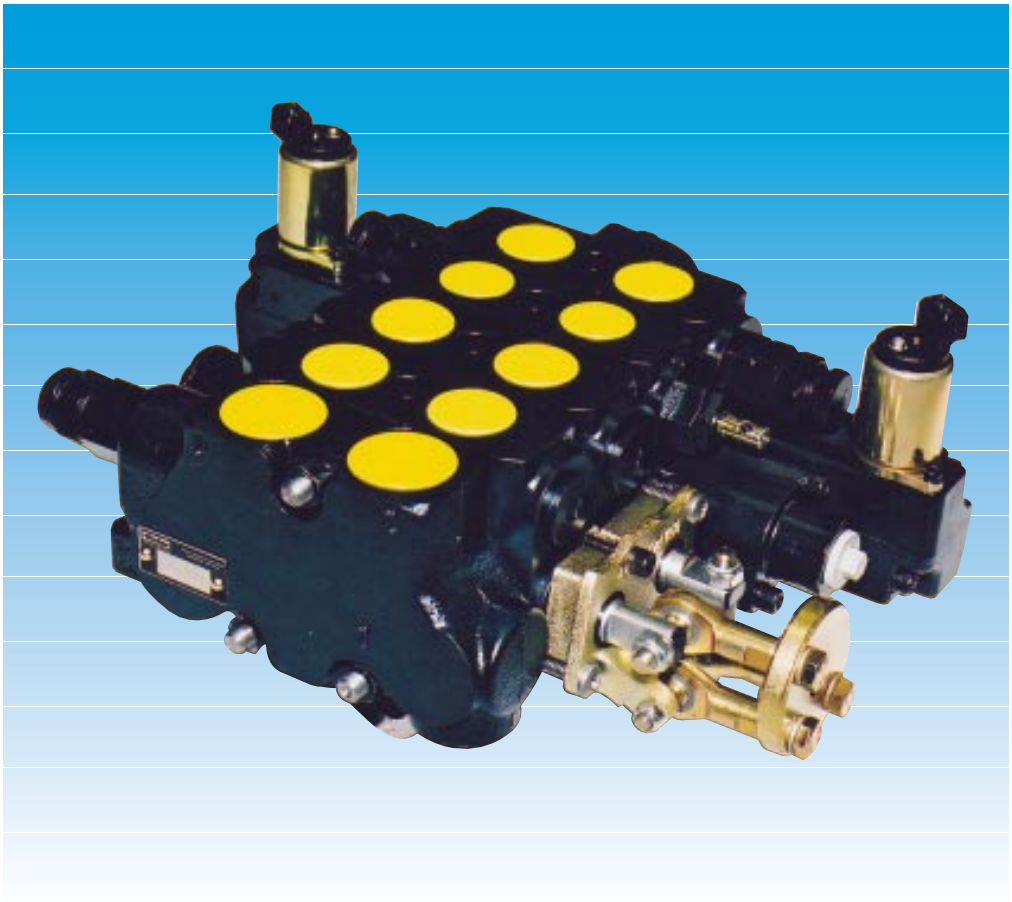
Parker
Mobile Hydraulics

Directional Control Valve KA18

KA Valve Series

Catalogue HY17-8550/UK
September 2000



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Directional Control Valve KA18

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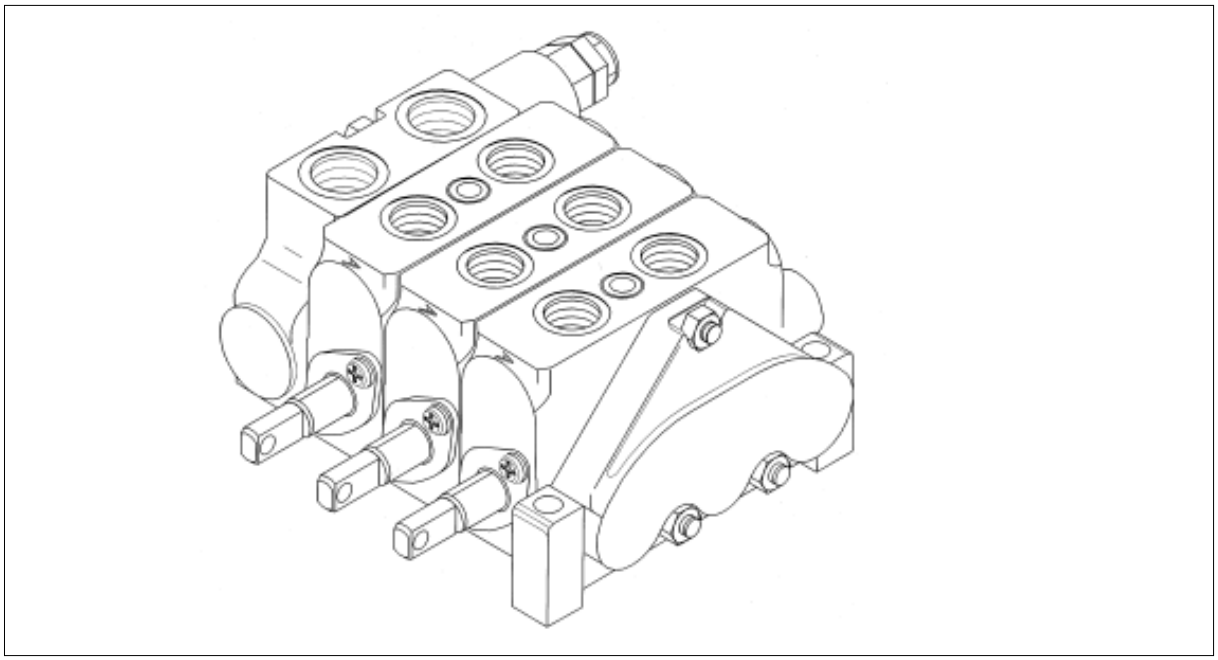
General Information



KA18 Valve Range

Parker's KA18 directional control valves for open and closed centre circuits are of a sectional construction with low pressure losses.

The KA18 series is designed for parallel, tandem and series circuits, and can accommodate up to nine sections of various types. These can be randomly combined, thus providing the optimum circuit for a wide range of different applications.

Each work section is supplied with hard chrome plated spool types, designed to give good control and feel, as standard. Load hold check valves are also incorporated to prevent interaction between services.

With a wide range of options available for spool types, hydraulic system protection, work sections, plus inlet and outlet port locations, the KA valve series is a versatile design that can be built to meet most application requirements.

Build Options

A number of build options are available:

Valve Circuits

■ Single or double acting, cylinder or motor, fourth position float or regenerative valve circuits are available.

Flow Control

■ Split or combined flow mid-inlet sections, with or without main relief valve, allow the output from a secondary pump to be piped into the valve bank. Tank return ports are also an option.

■ Flow control valve sections to regulate flow downstream with screw or handwheel adjustment are stackable with work sections.

■ Preferential adjustable flow divider valve sections, with inlet port and option main relief valve.

Inlet & Outlet

■ Inlets and outlets are available with various port locations for ease of installation.

■ Outlet covers are also available with tank return, pressure beyond, closed centre or without ports.

Work Sections

■ The following actuation methods are available for KA series worksections:

- Spring return
- Detent in one, two or three positions
- Fourth position feel or detent
- Kick out detent with spring return
- Lever or cable operated spools
- Twin spool actuator to operate two spools with one lever
- Direct acting solenoid on/off
- Electro-hydraulic proportional & on/off
- Hydraulic pilot
- Pneumatic remote

System Protection

■ Protection for the main hydraulic system is provided by a cartridge type differential area main relief valve. Direct acting, differential type full flow port relief valves with or without anti-cavitation check valves, as well as anti-cavitation valves, are available for all work sections.

■ Relief valves are offered with preset, adjustable or tamper-proof features.

■ Port restrictors and subplate mounted pilot operated lock valves double, half-double or single acting type are optional.

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Technical Data

Pressure

Main	320 bar / 4640 psi
Port	305 bar / 5075 psi
Tank	35 bar / 507.5 psi

Nominal Flow Rate

Low Flow	45 l/min (12 US gpm)
Standard Flow	82 l/min (22 US gpm)

Port Options

Inlet & Outlet Ports	SAE 12, 3/4" BSPP M27 ISO 6149
Service Ports	SAE 10, 1/2" BSPP M22 ISO 6149

Temperature

Oil temperature, function range	-20 to 80 ˚C (-4 to 176 ˚F)

Fluids

Mineral Oil, HFB, HFC, HFD

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

Viscosity

Recommended viscosity range	5 to 1000 cSt

Filtration

Recommended filtration level ISO 4406	17 / 14

Average Weight

Inlet	2.1 Kgs
Mid-inlet	2.4 Kgs
Work section	3.0 Kgs
Outlet - ported	1.3 Kgs
Outlet - unported	1.3 Kgs

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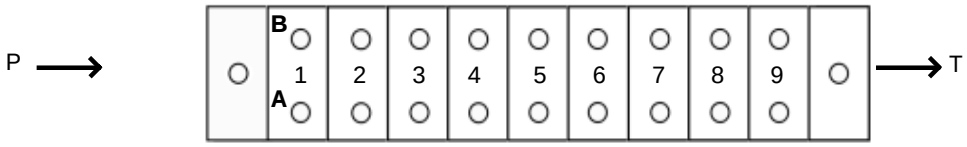
Performance Data

Parallel Circuit

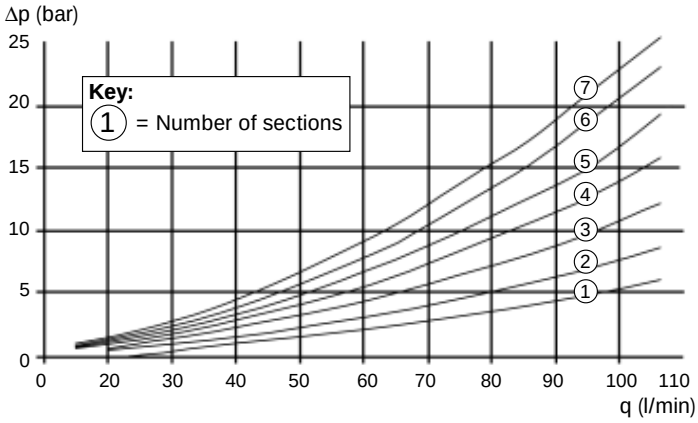
Tests run with mineral oil at 50 ˚C and 24 cSt.



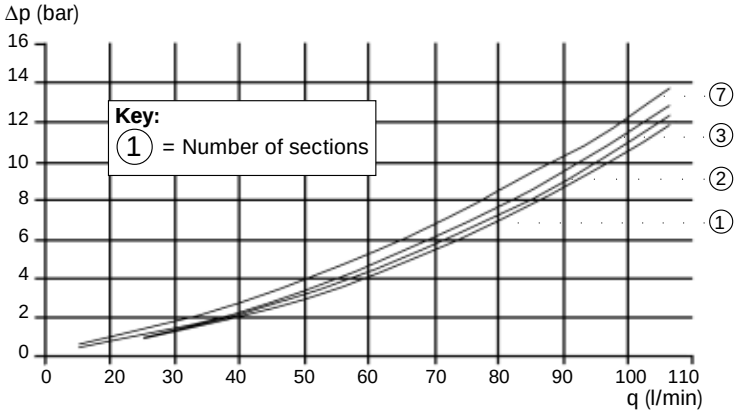
Internal Pressure Drop

Tests run with mineral oil at 50 ˚C and 24 c

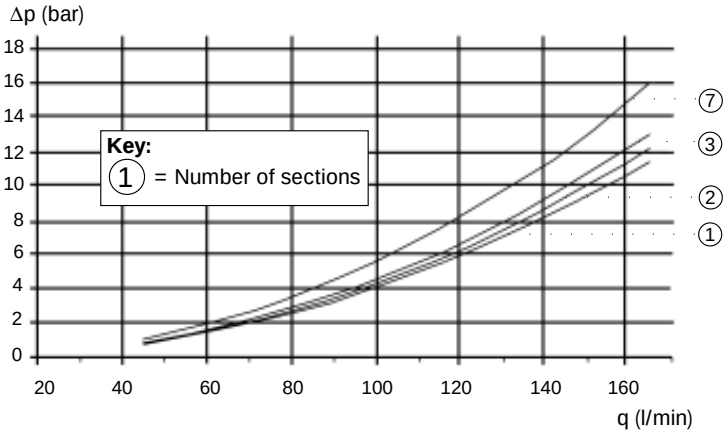
Pressure drop P - T



Pressure Drop P - A,B



Pressure Drop A,B - T



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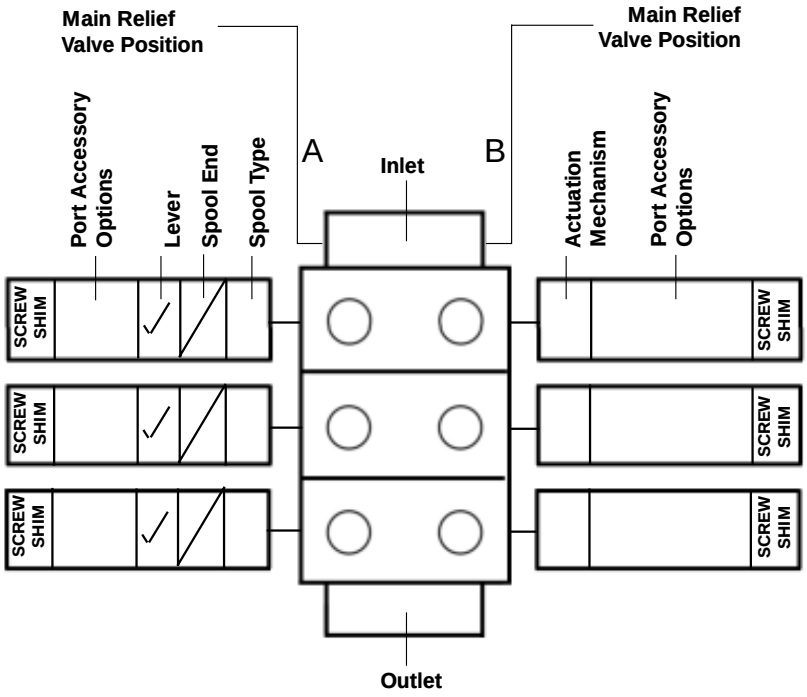
Configuration Summary

The configuration below shows a typical left hand, 3 section standard build.



Inlet
- ~ Top 'In'
- ~ Top 'Out'
- ~ Side 'In'
- ~ Side 'Out'

Spool Type
- ~ Double Acting
- ~ Single Acting
- ~ Double Acting Motor
- ~ Float In
- ~ Float Out

Spool End
- ~ Spade
- ~ Fork

Lever Options
- ~ Type Required

Actuation Mechanism
- ~ Spring Centre
- ~ 3 Position Detent
- ~ Spring Return 4th Position Detent
- ~ Spring Centre Detent Out
- ~ Spring Return Detent In
- ~ Pneumatic Operated
- ~ Solenoid
- ~ Hydraulic Pilot Operated

Outlet
- ~ Top Tank
- ~ Side HPCO
- ~ Side Tank

Note:
Please refer to specific sections for coding.

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Inlet Section Options

The KA Valve comes with a variety of inlet options - shown below.

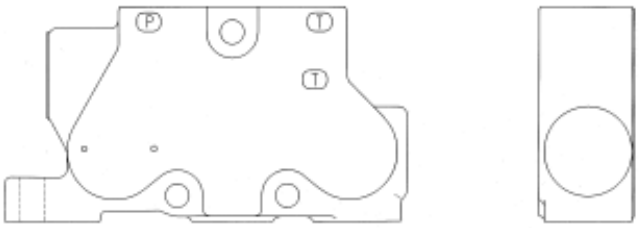
Rated to 320 bar, each offers various porting options and can be supplied with or without steel blanking plugs or relief valves.

Please refer to page 12 for coding.

Standard Inlet Section

Allows complete tank gallery loop around the valve for low pressure drops, and is recommended when direct acting solenoid worksections are specified in the valve assembly.

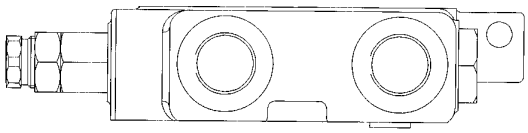
The inlet can be machined with top inlet, side inlet, top outlet and side outlet. Top porting and main relief port machining are always included due to the core in the casting.



Port Options:
If top inlet and outlet ports or main relief are not required, then these must be blanked with steel plugs.

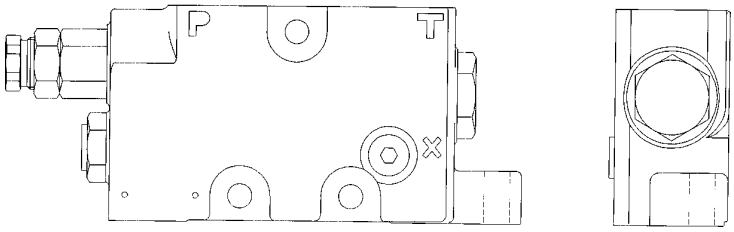
If side inlet and top inlet are both required, only one may be a full size port due to the rating of the cover (i.e. if 3/4" BSPP side inlet is required, top inlet can only be 1/2" BSPP).

Pilot Generating Inlet Cover



The KA pilot generating inlet cover is designed to internally feed the electrohydraulic worksections with pilot (servo) pressure.

Pressure maintaining and reducing elements within the cover control the pilot signal pressure range so that correct valve function is achieved under all normal operating conditions. However, the connection of a 'boot strap' accumulator into the pilot line is also possible wiht this cover to optimise neutral and low flow performance.



The cover is prepared with a check valve downstream of the reducing element to prevent early depressurisation of the accumulator when fitted.

Port Options:
A standard inlet cover providing three options for porting: Top inlet, side inlet and top outlet.

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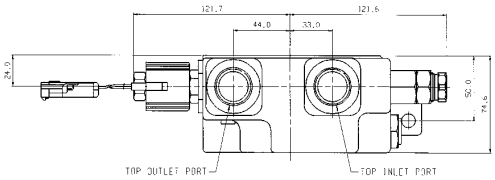
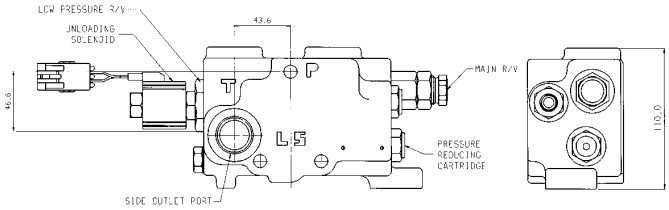
Pilot Generating Inlet Cover with Unloader
This inlet has a solenoid unloader (optional) which can be used to unload the pressure maintaining element when the machine functions are not being used to reduce the neutral loss.



Port Options:
A standard inlet cover providing three options for porting: Top inlet, side inlet and top outlet.



Inlet Section Porting Size Options

Each of the above inlet sections are available with any of the following porting sizes:

Porting Description	Porting Code
No Port	0
1/2" BSPP	1
3/4" BSPP	2
SAE-10 (7/8" JIC)	4
SAE-12 (1 1/16" JIC)	5
M22 ISO 6149	6
M27 ISO 6149	B

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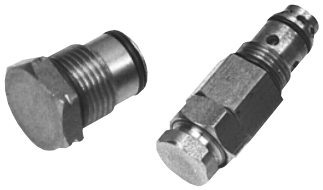
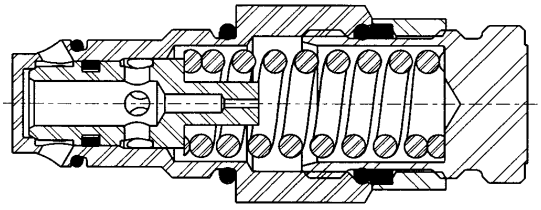
Directional Control Valve KA18

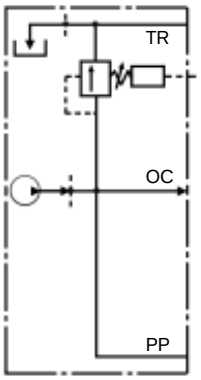
Inlet Relief Valve Options

Each of our inlets offer a range of relief valve options to suit every valve build requirement.



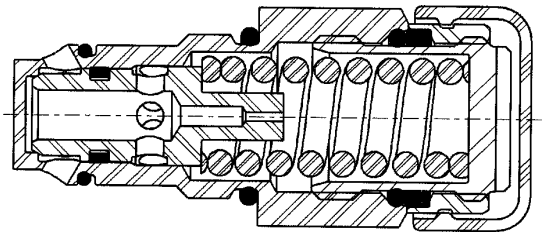
Screw Adjustable Relief Valve
Code AS

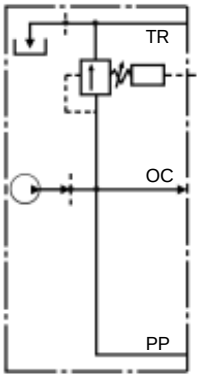




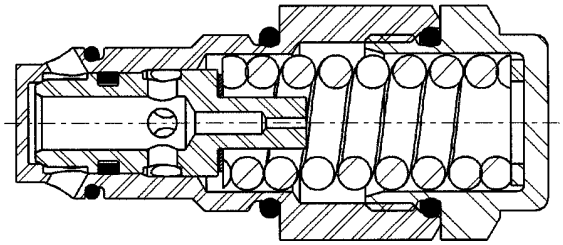
Screw Adjustable, Tamper Proof Relief Valve
Code AT

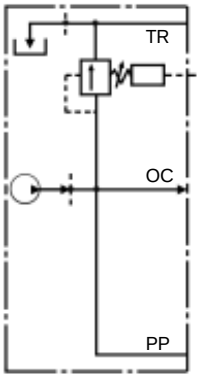
Plastic Cap





Shim Adjustable Relief Valve
Code AY





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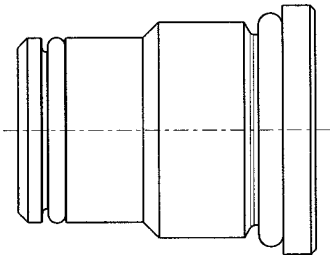
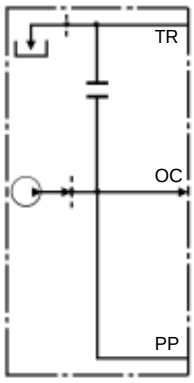
Without Relief Valve (plugged)
Code CA





Inlet Section Coding Summary

To summarise the inlet sections available:

Description	Code
Inlet with screw adjustable RV	AS
Inlet with screw adjustable tamper proof RV	AT
Inlet with RV port (RV = Steel Blank)	CA
Inlet without RV	CB
Inlet with shim adjustable RV	AY
Inlet with RV port (RV = plastic plug)	CP

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Inlet Section Valve Coding

In order to assist you in correctly ordering the inlet section assembly you require, the following coding system should be used. The code is based on two letters designating the type of build, followed by numbers indicating porting size and position.

NOTE:
For relief valve options, always state the pressure and flow at which the relief valve is to be set. If not flow is stated, it will be assumed that crack pressure is required.

KA18	Relief Valve Option	High Pressure Port Top	Low Pressure Port Top	High Pressure Port Side	Low Pressure Port Side	End Port

Example: KA10 Valve with Inlet with screw adjustable RV.
Porting options = 3/4" BSPP top inlet, 3/4" BSPP top outlet, no side ports, no end ports.

KA18	AS	2	2	0	0	0

Mid-Inlet Section Options

Mid-inlet sections are available for the KA valve range, each offering system protection options.

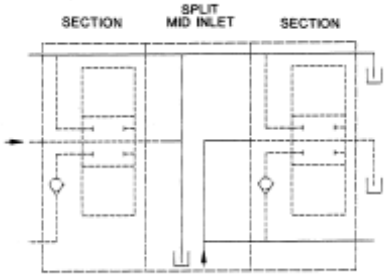
Three alternatives are available: Split flow, Combined flow, or flow control.

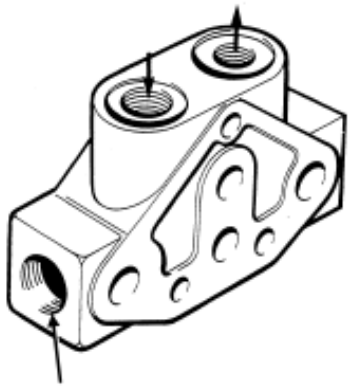
Split Flow Mid-Inlet Section

The Split flow mid-inlet section allows an outlet for upstream flow and an inlet for downstream flow.

Relief valves and plug are used for service port protection.

Port Options:
Top inlet and top outlet options are available





Relief Valve Position

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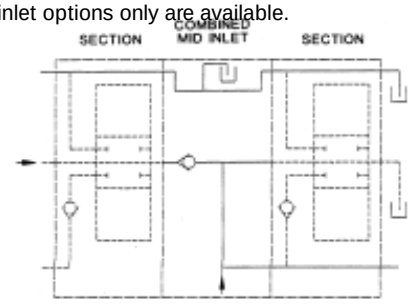
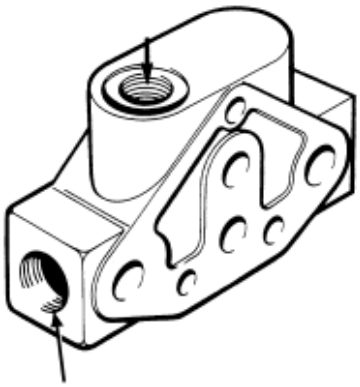
Combined Flow Mid-Section Inlet

The combined flow section allows an extra inlet to combine with the original flow.

Relief valves and plug are used for service port protection.

Port Options:
Top inlet options only are available.



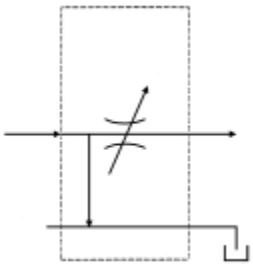


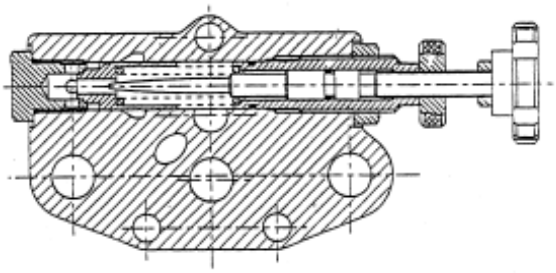
Relief Valve Position

Flow Control Mid-Inlet Section

The flow control mid-inlet section maintains constant flow to downstream sections by metering flow across an orifice. The flow can be adjusted by the spindle.

Port Options:
Porting options are not available for this mid-inlet section.





Mid-Inlet Section Porting Size Options

Each of the above mid-inlet sections (not including flow control section) are available with any of the following porting sizes:

Porting Description	Porting Code
No Port	0
1/2" BSPP	1
3/4" BSPP	2
SAE-10 (7/8" JIC)	4
SAE-12 (1 1/16" JIC)	5
M27 ISO 6149	6
Plugged	9

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Mid-Inlet Section Coding Summary

To summarise, the options for mid-inlet sections available are as follows:

Description	Code
Split Flow Mid-Inlet Sections	
Split flow with screw adjustable RV	SAS
Split flow with screw adjustable tamper proof RV	SAT
Split flow with shim adjustable RV	SAY
Split flow with no RV	SCA
No relief plastic plug	SCP
Combined Flow Mid-Inlet Sections	
Combined flow with screw adjustable RV	CAS
Combined flow with screw adjustable tamper proof RV	CAT
Combined flow with shim adjustable RV	CAY
Combined flow with no relief valves	CCA
No relief plastic plug	CCP
Preferential Flow Divider	PFD
Flow Control Section	FCS

NOTE: Please refer to pages 10/11 for Relief Valve descriptions.

Mid-Inlet Section Valve Coding

In order to assist you in correctly ordering the mid-inlet section assembly you require, the following coding system should be used. The code is based on two letters designating the type of build, followed by numbers indicating porting size and position.

NOTE:
For relief valve options, always state the pressure and flow at which the relief valve is to be set. If not flow is stated, it will be assumed that crack pressure is required.

Mid-Inlet & RV Option	High Pressure Port Top	Low Pressure Port Top	Low Pressure Port End

Example: Split flow, mid-inlet section with screw adjustable RV
Porting options = 3/4" BSPP top inlet, 3/4" BSPP top outlet, no end ports.

SAS	2	2	0

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Outlet Section Options

Various outlet sections for the KA valve range are available, ranging from the standard outlet without porting, through to the regenerative outlet sections.

A sample of the variations have been shown within this brochure.

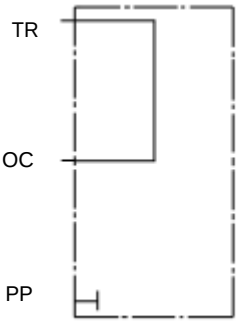
For a full listing of outlet sections available, please refer to the outlet section coding summary shown on page 17.

Standard KA Outlet

The standard KA outlet cover can be supplied with or without tank ports.

In its most basic format (without ports), it should be noted that the tank return must be incorporated within the valve inlet cover.

Available port threads are as follows:
3/4" BSPP, SAE-10, SAE-12, M22 - ISO 6149, M27 - ISO 6149.

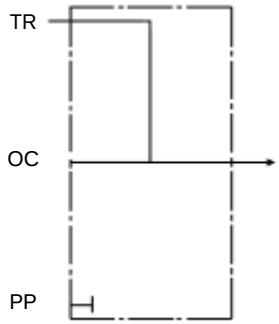


Standard Tank Return
- No Ports

(Code B)

Example of Standard Outlet without porting.

Code B.

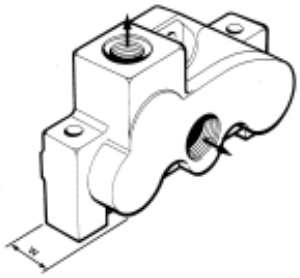


Standard Tank Return

(Code Z)

Example of Standard Outlet with ports.

Code Z.



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Directional Control Valve KA18

Convertible Outlet Section / Pressure Beyond Outlet Section

The Convertible outlet section in its basic format is supplied as an open centre outlet with a plugged pressure side port.

However, Pressure beyond can be achieved by replacing the plug with the Pressure beyond adaptor.

The outlet can be supplied as either a standard convertible section complete with blanking plug, or as a Pressure beyond section, complete with adaptor.

The pressure beyond adaptor, however, can be supplied seperately if required.

Both the convertible and pressure beyond sections can be supplied with or without machined tank ports.

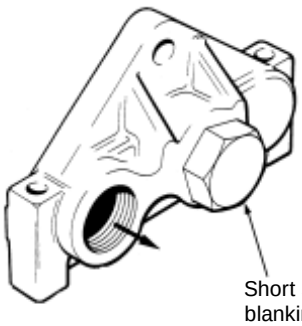
Available port threads are as follows:

Convertible Section
- 3/4" BSPP, SAE-12, M27.

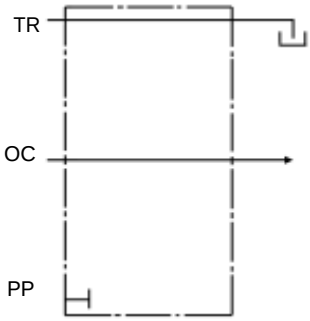
Pressure Beyond
- Port threads tank - 3/4" BSP, SAE-12, M27
- Port threads pressure - 1/2" BSPP, SAE-10, M22.

Example of convertible outlet section. No top porting

Code DY



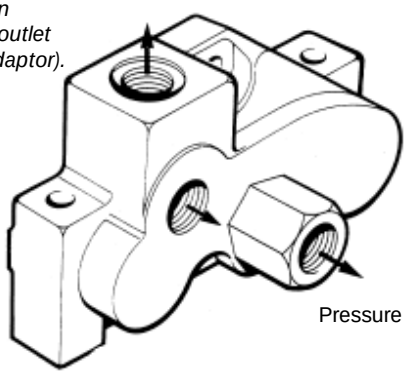
Pressure Beyond & Tank Return (Code Y)



Example of Pressure Beyond outlet section (convertible outlet fitted with adaptor).

Top porting

Code Y.

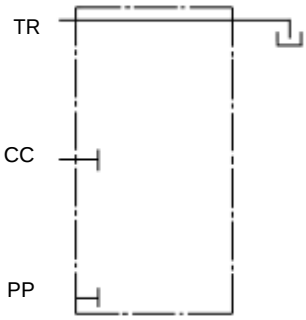


Closed Centre Outlet Section

Parker also offer a closed centre outlet section for the KA valve.

Closed Centre

(Code CC)



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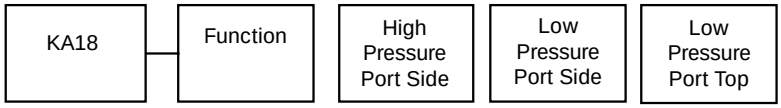
Outlet Section Coding Summary

To summarise the inlet sections available:

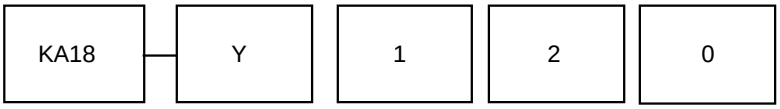
Description	Code
Thin outlet cover, no ports	B
Standard low pressure outlet	Z
Standard pressure beyond outlet	Y
Standard Closed centre outlet	CC
Convertible outlet, low pressure all ports pressure byond port blanked with steel plug	DY

Outlet Section Valve Coding

In order to assist you in correctly ordering the outlet section assembly you require, the following coding system should be used. The code is based on two letters designating the type of build, followed by numbers indicating porting size and position.



Example: KA18 Valve with pressure beyond outlet cover.
Porting options = Pressure beyond port 1/2" BSPP, 3/4" BSPP side outlet, no top outlet ports.



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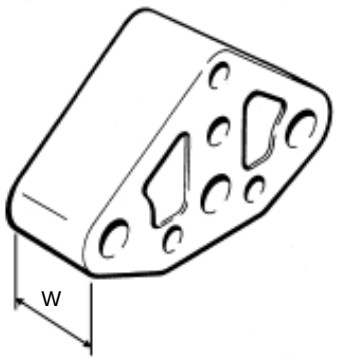
Directional Control Valve KA18

Intersection Spacers

On occassions, extra space between work sections may be required, for example to allow spool alignment to OEM's specifications.

Parker offer a choice of intersection spacers to meet configuration requirements, including wet pin solenoid options.



Intersection Spacer Coding

Description	Width (W)	Code
General Purpose	12mm	X04
One wet pin solenoid	15mm	X06
Two wet pin solenoids	30mm	X11
Work section width	41mm	X16

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Directional Control Valve KA18

Work Section Options

The KA valve series is available with a wide range of work section options, for parallel, series and tandem circuits.

Each element of the section, i.e. spool type, mechanism, etc can be configured specifically to meet the individual application's requirements.

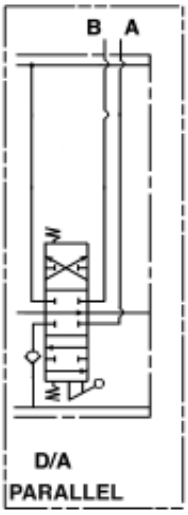
Circuit Options

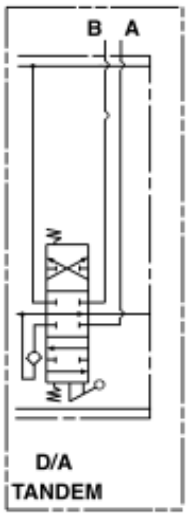
Parallel Circuit
Allows the available oil supply to be shared by all worksections selected at the same time. As oil naturally will flow along the path of least resistance, the movement control (degree of sharing) is achieved by the good spool metering characteristics.

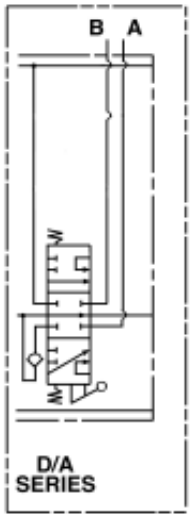
Tandem Circuit
This fundamentally gives priority of available oil flow, and any work section upstream of it, to this section relative to those downstream of it. This type of spool is sometimes referred to as SERIES/PARALLEL.

Series Circuit
Allows more than one service to be operated at a time with full pump flow. Consideration must be taken of the combined worksection operating pressures, as these are additive, and limited by the main relief valve setting.

Note: The KA valve series can be built with a combination of all three sections in the same assembly. It should be noted however, that if there are series sections used, then a tandem section MUST be the next section in the assembly if further non-series sections are required downstream of it.







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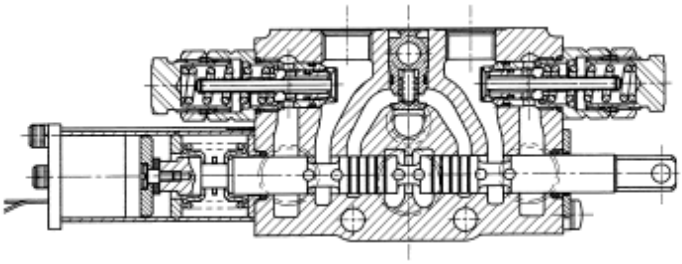
Directional Control Valve KA18

Mechanisms

Electro-Magnetic Detent Work Section Mechanism

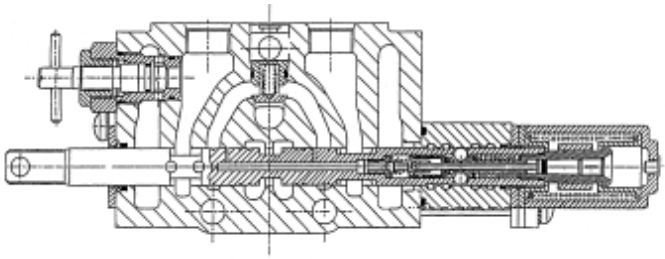
The mechanism for this assembly is held in a "detent" by electro magnetic force. For more information, please contact the Parker Technical Services Department.



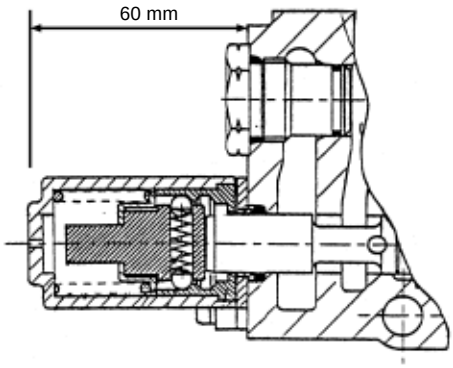
Hydraulic Detent Kick Out Mechanism

This mechanism is operated by internal hydraulic pressure.

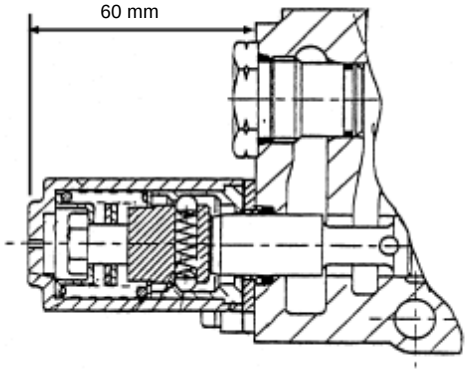
The spool is held in detented operating positions and kicked out to neutral when the required pressure is reached.



Spring Centre with Detent Spool Out Mechanism

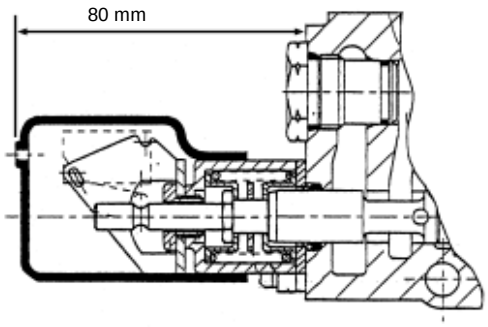


Spring Centre with Detent Spool In Mechanism

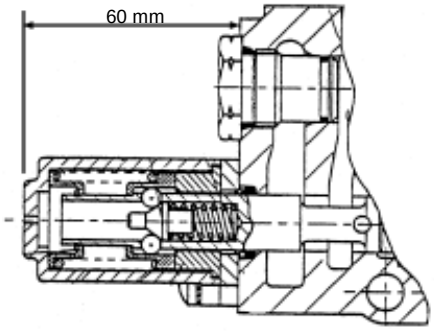


Directional Control Valve KA18

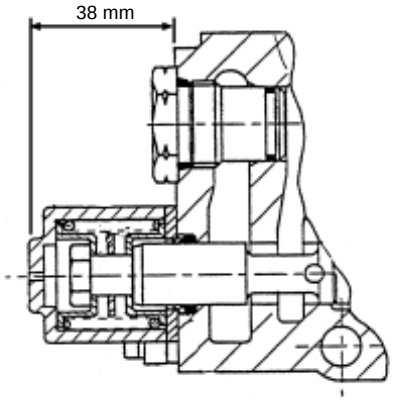
Mechanism for Micro Switch Activation



Float Spool Mechanism Spring Centred with Detent In Float



3 Position Spring Centre Mechanism



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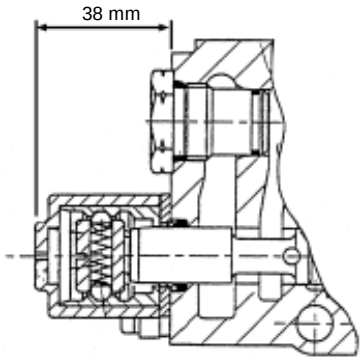
Directional Control Valve KA18

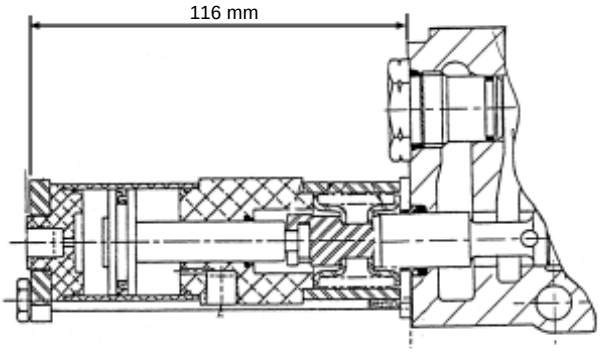
Mechanisms - Continued

3 Position Detent Mechanism



Pneumatic Mechanism

Note: 5.5 bar pressure required to operate (13 bar maximum)



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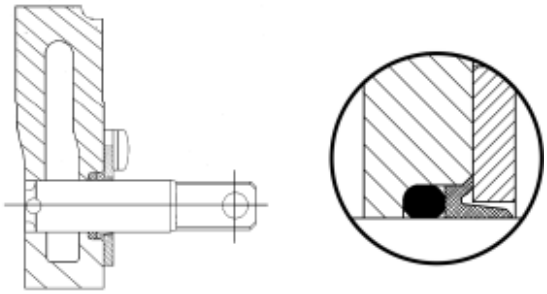
Directional Control Valve KA18

Spool Seal Arrangement

Standard Spool Seal

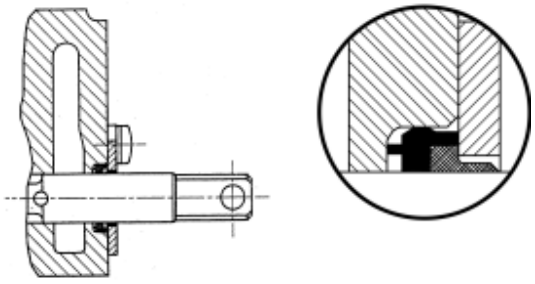
This is the standard seal supplied with the Parker range of KA18 valves.



Dry Wipe Seal

The Parker dry wipe seal has been specifically designed for fork lift trucks used in the food industry.

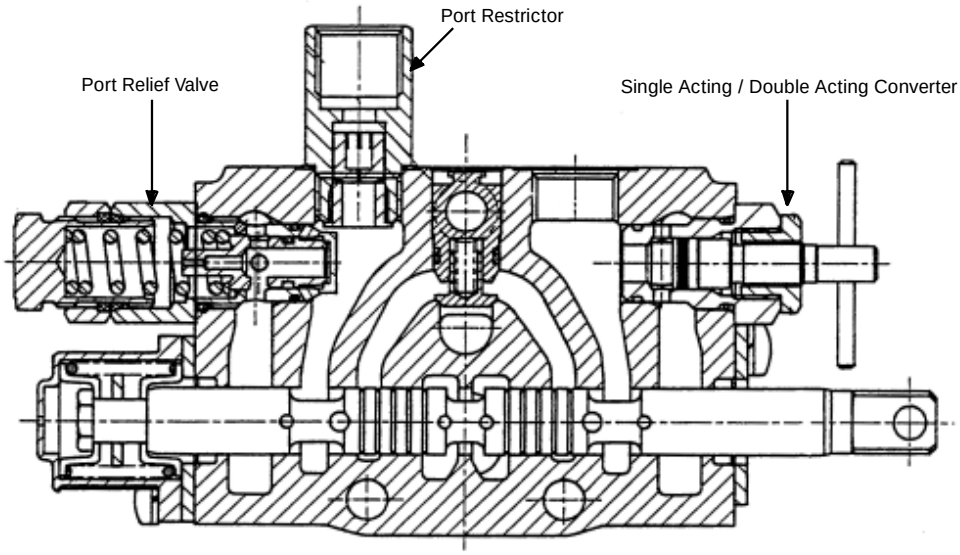
This sealing arrangement cannot be fitted in standard housings. Specific part numbers should be supplied. Please contact the Parker Technical Services Department for further information.



Directional Control Valve KA18

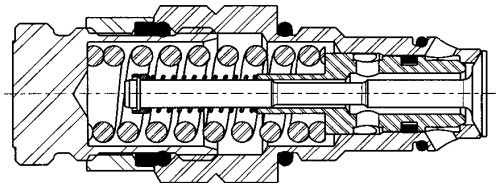
Service Port Accessories

A wide range of service port accessories are available for the KA18 valve series. Ranging from 35 to 350 bar pressure ratings, options are available to meet most work section protection requirements.

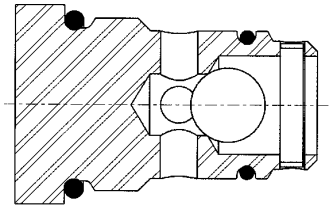


Service Port Accessory Options

Differential area screw adjusted relief valve with anti-cavitation



Anti-cavitation valve



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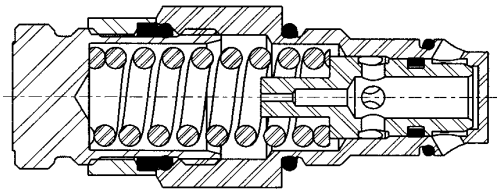
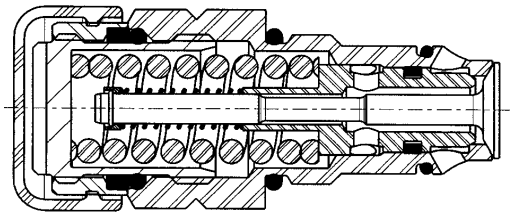
Directional Control Valve KA18

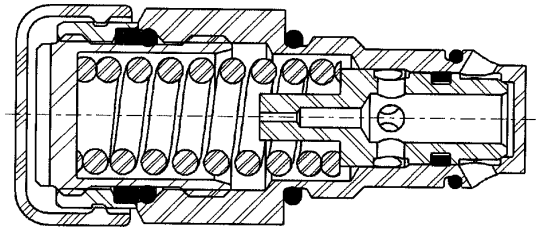
Differential area screw adjusted relief valve



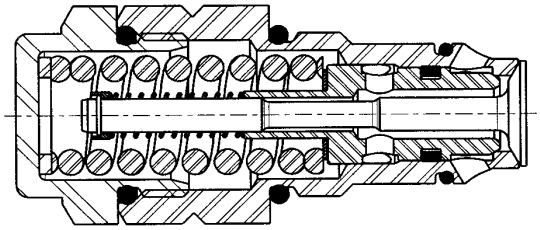
Differential area screw adjusted relief valve with anti-cavitation, tamper proof



Differential area screw adjusted relief valve, tamper proof



Differential area shim adjusted relief valve with anti-cavitation



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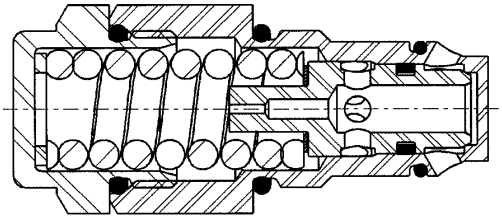
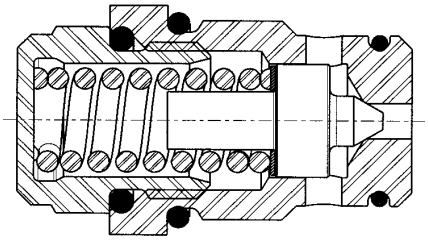
Directional Control Valve KA18

Service Port Accessories - Continued

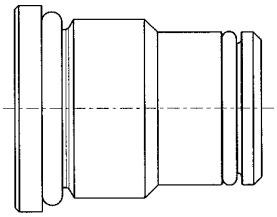
Differential area screw adjusted relief valve



Direct acting shim adjusted relief valve

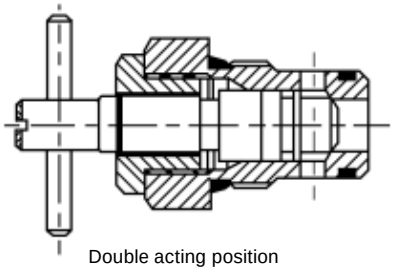


Steel blanking plug



Double acting / Single acting converter

Converter plug fits into service accessory port. When wound fully out converts section from double acting to single mode.



Double acting position

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Directional Control Valve KA18

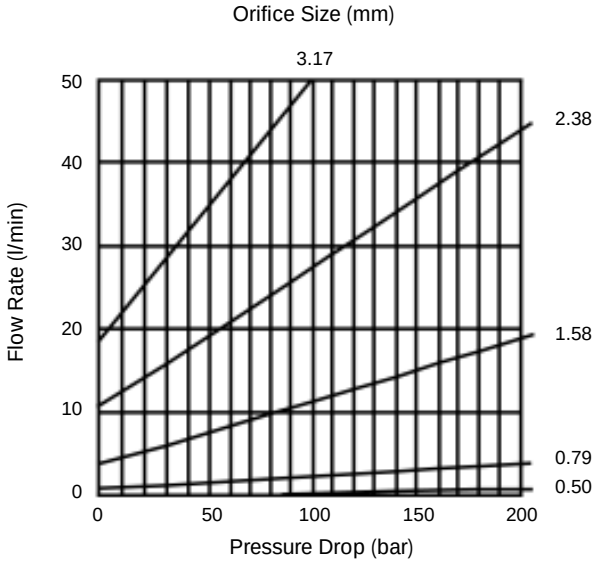
Flow Restrictors
Flow restrictors are used to restrict the flow through the service ports. Three options are available and shown on page 28.

Orifice Ø (mm)	Orifice Diameter (inch)
0.50	0.019
0.79	0.031
1.58	0.062
2.38	0.094
3.17	0.125

Graph based on the formula:

$Q = 0.6 \times A \times \sqrt{\Delta P}$: Q = Flow rate (l/min)
Key: *A = Orifice area (mm^2)*
ΔP = Pressure drop (bar)

$Q = 24.12 \times A \times \sqrt{\Delta P}$: Q = Flow rate (GPM)
Key: *A = Orifice area ($inch^2$)*
ΔP = Pressure drop (psi)



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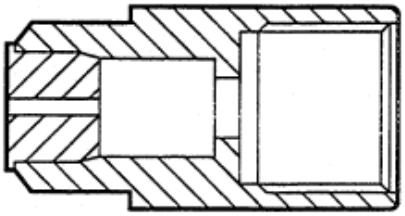
Directional Control Valve KA18

Port Accessories - Continued

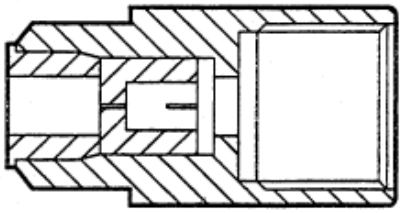
Restricted IN and OUT - Flow restrictor

Port Thread	Orifice Ø
B1/2	0.5 mm
B1/2	0.79 mm
B1/2	1.58 mm
B1/2	2.38 mm
B1/2	3.12 mm



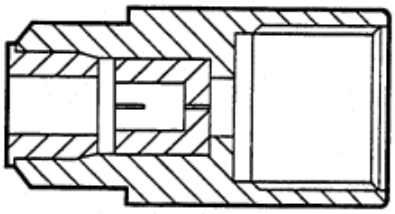
Restricted INTO valve - Flow restrictor

Port Thread	Orifice Ø
B1/2	0.5 mm
B1/2	0.79 mm
B1/2	1.58 mm
B1/2	2.38 mm
B1/2	3.12 mm



Restricted OUT of valve - Flow restrictor

Port Thread	Orifice Ø
B1/2	0.5 mm
B1/2	0.79 mm
B1/2	1.58 mm
B1/2	2.38 mm
B1/2	3.12 mm



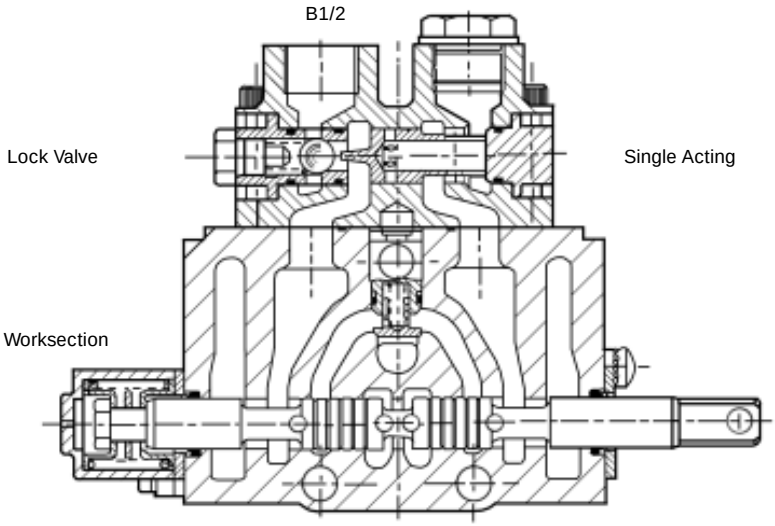
Directional Control Valve KA18

Lock Valve Service Port Accessories

Please Note:
Worksections for the lock valve mounting are dedicated to this assembly.
For further information, please consult your Parker Technical Services department.

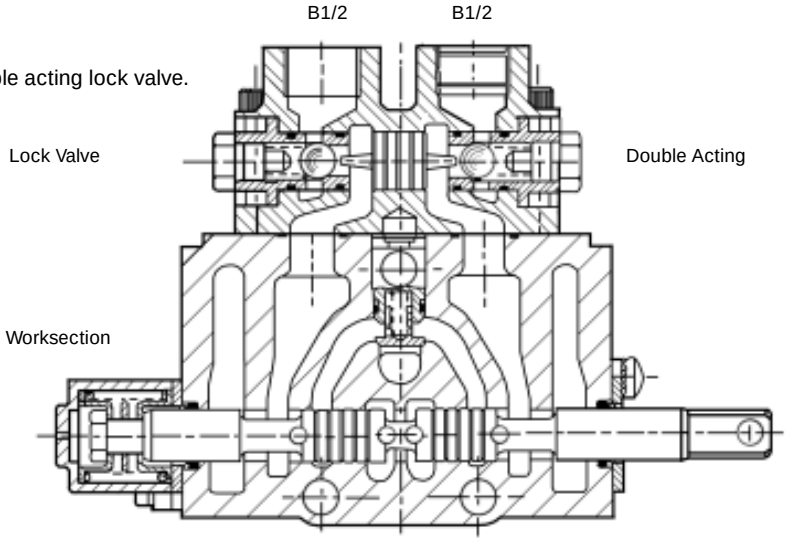
Single Acting Lock Valve

Motor work section fitted with single acting lock valve.



Double Acting Lock Valve

Motor work section fitted with double acting lock valve.



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Directional Control Valve KA18

Work section configuration options

Due to the many configurations of work sections available, it is necessary to code each individual element option.
To summarise the inlet sections available:

Circuit Options

Description	Code
Parallel	No letter
Tandem	Q
Series	W

Function Options

Description	Code
Tilt counter-balance A + B	A
Tilt counter-balance Port A	B
Tilt counter-balance Port B	C
Direct acting 4 position float in	F
D/A 4 position float out	G
D/A cylinder	H
S/A cylinder port "B"	J
S/A Cylinder port "A"	K
D/A motor	L
D/A half motor port "A"	M
D/A half motor port "B"	N
Regeneration 4 position out	R
Regeneration 3 posiiton out	T
Regeneration 3 position in	U

Operator Options

Description	LH (Std)* Code	RH Code
Spring return	A	E
3 position detent	B	F
Spring return 4th position detent	C	S
Spring return detent spool out	D	P
Direct acting solenoid	G	N/A
Spring return detent spool in	H	Q
2 position spring return, spool in	J	W
Kick-out detent both directions	K	N/A
On/off electrohydraulic	L	N/A
2 position spring return, spool out	M	N/A
2 position detent	N	Y
Hydraulic pilot operation	R	N/A
Spring return 4th position feel	T	N/A
Single ended pneumatic	V	N/A
Proportional electrohydraulic	Z	N/A

*Key: LH (Std) = Left hand standard
RH = Right hand

"A" & "B" Porting Options

Description	Code
1/2" BSPP	1
SAE-8	3
SAE-10	4
M22 ISO 6149	6
MB-18	7
MB-22	8
3/8" BSPP	9
M18 ISO 6149	A

Accessory Valve Options - Port"A" & "B"

Description	Port A Code	Port B Code
Not machined	0	0
R/V & A/C screw adjustable	1	1
Anti-cavitation	2	2
R/V only scew adjustable	3	3
R/V & A/C scew adjustable tamperproof	4	4
Plastic closure	5	5
R/V & A/C shim adjustable	6	6
R/V only shim adjustable	7	7
R/V only screw adjustable tamperproof	8	8
Plugged	9	9
R/V only direct act shim adjustable	A	A
D/A S/A Change over plug	B	B

Port Valve Options - Port"A" & "B"

Description	Port A Code	Port B Code
None	0	0
Restrictor (in)	1	1
Restrictor (out)	2	2
Restrictor (fixed)	3	3
Lock valve D/A	4	4
Lock valve S/A	5	5

*Key: D/A = Double Acting
S/A = Single Acting
R/V = Relief Valve

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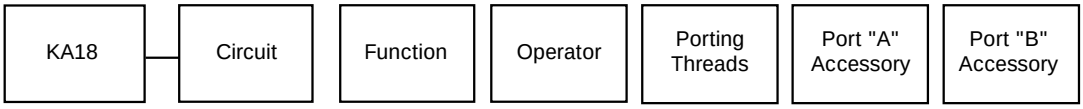
Directional Control Valve KA18

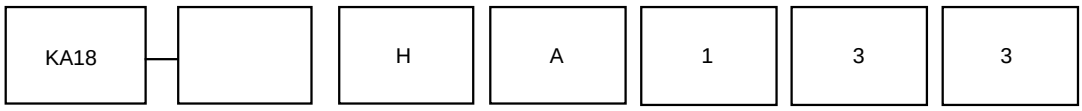
Work Section Coding

In order to assist you in correctly ordering the work section assembly you require, the following coding system should be used. The code is based on two or three letters giving the circuit, function and operation of the section, followed by five digits giving porting, port accessory and port valves.

Summary:
1. The first letter designates whether the section is parallel, tandem or series (Parallel has no letter).
2. The second letter designates the function of the section (Spool type).
3. The third letter designates the operator of the section (Action or mechanism).
4. The first number designates the porting threads.
5. The second number designates the port accessory for port "A".
6. The third number designates the port accessory for port "B".
7. The fourth and fifth numbers designate the port valve for "A" and "B" respectively.



Example: KA18 Valve. Parallel circuit, double acting spring return with 1/2" BSPP ports. Screw adjustable relief valve to ports "A" and "B".



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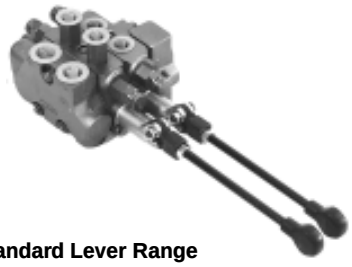
Directional Control Valve KA18

Handle Assemblies

The KA18 valve range can be supplied with standard or industrial handle assemblies. Vertical or horizontal operation is available, plus a selection of assembly options.

Horizontal Style



Vertical Style

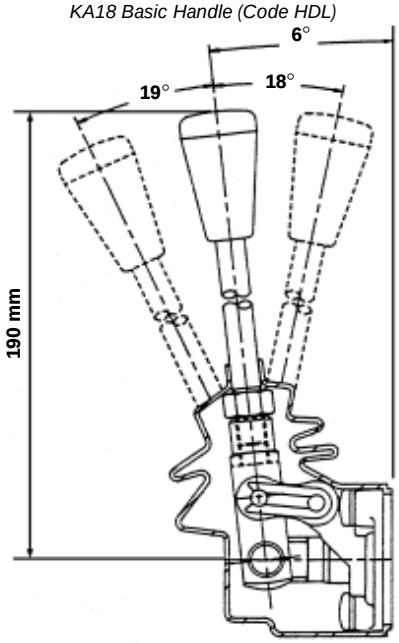
Mechanical joystick (available with boot)

Standard Lever Range

Note: * Reversed orientation also available. Please consult Technical Services Department for further information.

Code	Description
HDL	KA18 Basic handle
HDLB	KA18 Basic handle with boot
HP-1 Left Hand Standard*	KA18 Plus axis joystick
HP-2 Right Hand Standard*	KA18 Plus axis joystick
HPB	KA18 Boot for joystick

Standard Range:
KA18 Basic Handle (Code HDL)



Industrial Lever Range

Approximate Lever Length: 210mm (8¼")	273 mm (10¾")	330 mm (13")	Description
HH-1	HH-2	HH-3	KA18 Horizontal (industrial)
HV-1	HV-2	HV-3	KA18 Vertical (industrial)

Further Industrial Assembly Options

Code	Description
HIB	KA18 Boot (industrial)

Relief valve compatibility with handle assemblies

R/V Code	Description	Standard Range			Industrial Range	Plus Axis Joystick	
		Std	Std + boot	Reversed	Hori. or Vert.	Std	Reversed
0	None	√	√	√	√	√	√
1	R/V & A/C Screw Adjustable	x	x	√	√	√	x
2	Anti Cav (R/V)	√	√	√	√	√	√
3	R/V Screw Adjustable	x	x	√	√	√	√
4	R/V & A/C Tamperproof	x	x	√	√	√	x
5	Plastic Closure	-	-	-	-	-	-
6	R/V & A/C Shim Adjustable	x	x	√	√	√	x
7	R/V Shim Adjustable	x	x	√	√	√	x
8	R/V Shim Adjustable	x	x	√	√	√	x
9	Steel Plug	√	√	√	√	√	√
A	Direct Acting R/V Shim Adjustable	√	√	√	√	√	√
B	D/A - S/A Convertor	x	x	√	√	√	x

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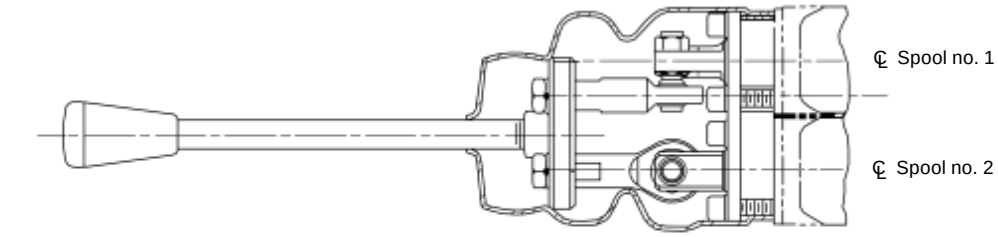
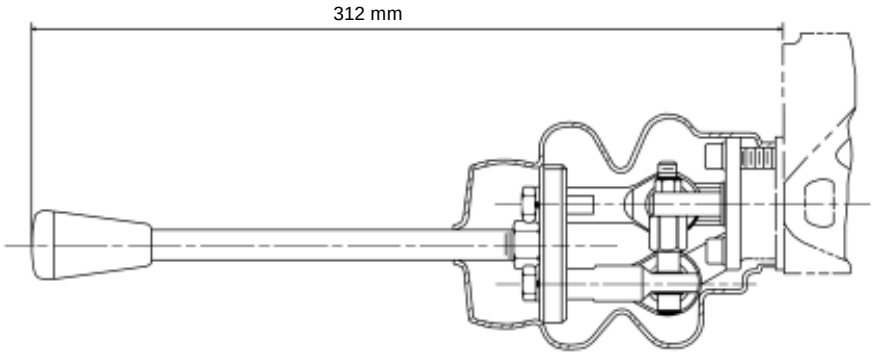
Directional Control Valve KA18

Handle Assemblies - Plus Axis

For the operation of two spools from one handle, the following assemblies are available.
Options and part numbers are available from the Parker Technical Services Department.

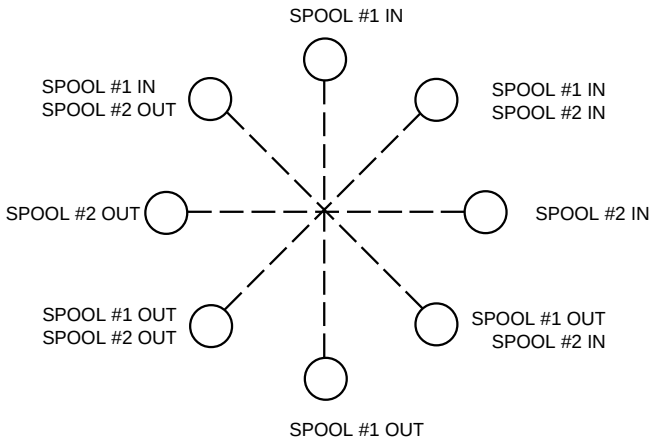




Handle Assemblies - Plus Axis Orientation Options

A number of orientation options are available for the KA18 series. Please note, reversed orientation is also available upon request. Please consult our Technical Services Department for further information.

Left Hand Standard Orientation
Code HP-1



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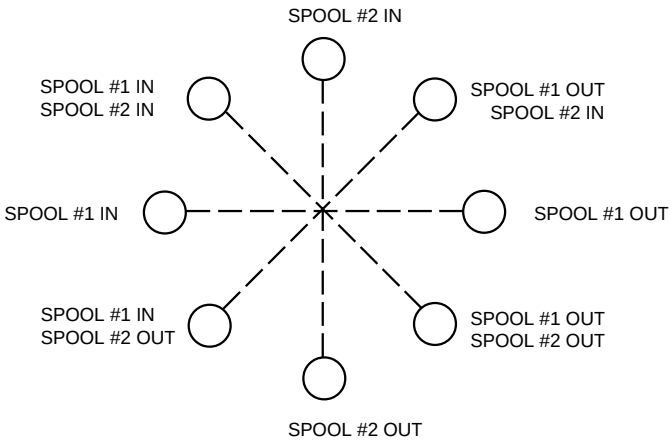
Directional Control Valve KA18

Handle Assemblies - Plus Axis Orientation Options ~ continued

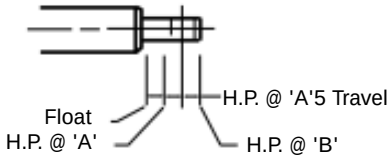
Right Hand Standard Orientation
Code HP-2



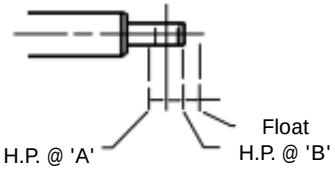
Handle Assemblies - Spool End Details

KA18 valves are supplied with spade end spool's as standard. Fork ends are available as optional.

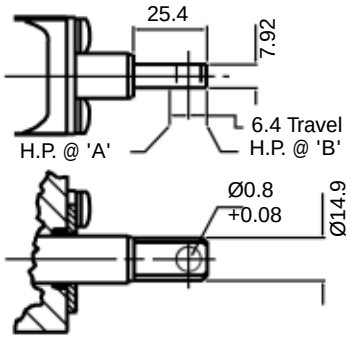
Float In Action



Float Out Action



KA18 Spool End Details



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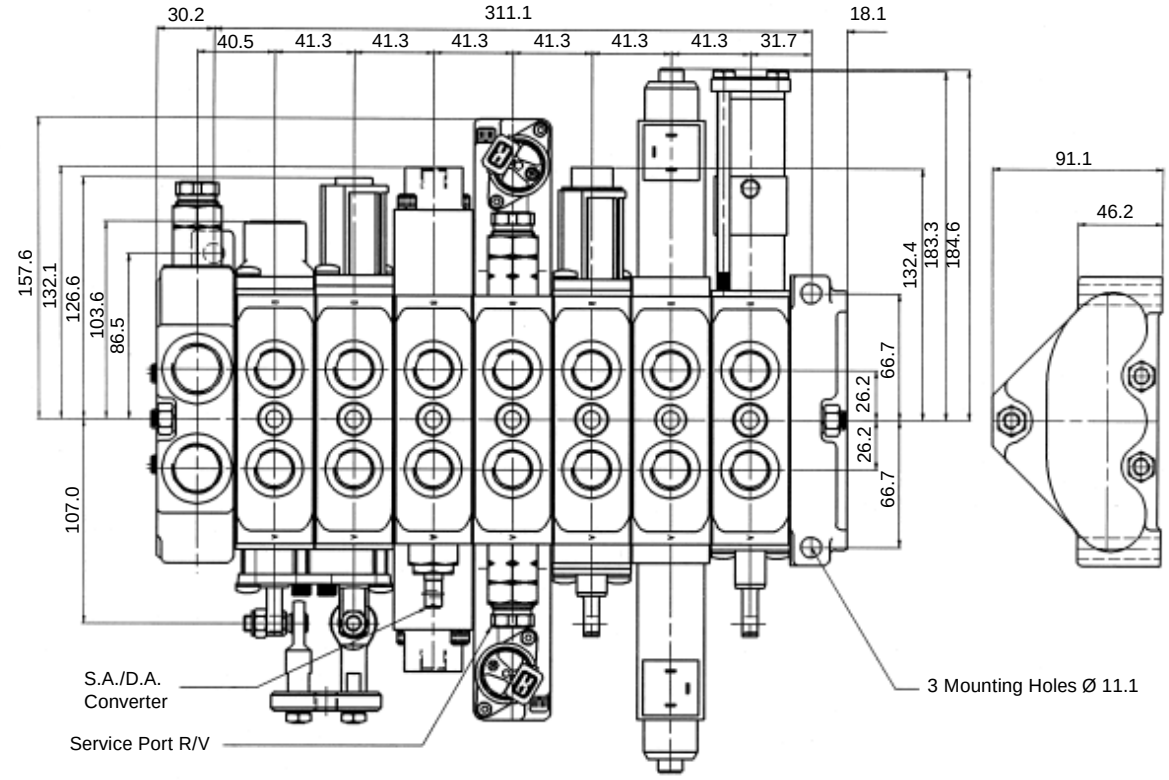
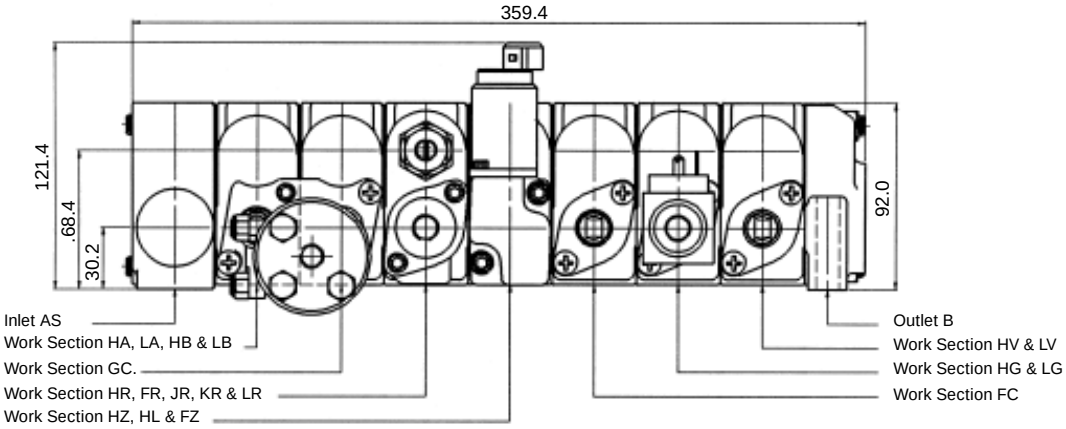
Directional Control Valve KA18

Installation Diagram

The following drawing provides basic installation information for each configuration item of the KA series. For specific information, please consult our Technical Services Department who can provide you with a precise installation drawing.





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