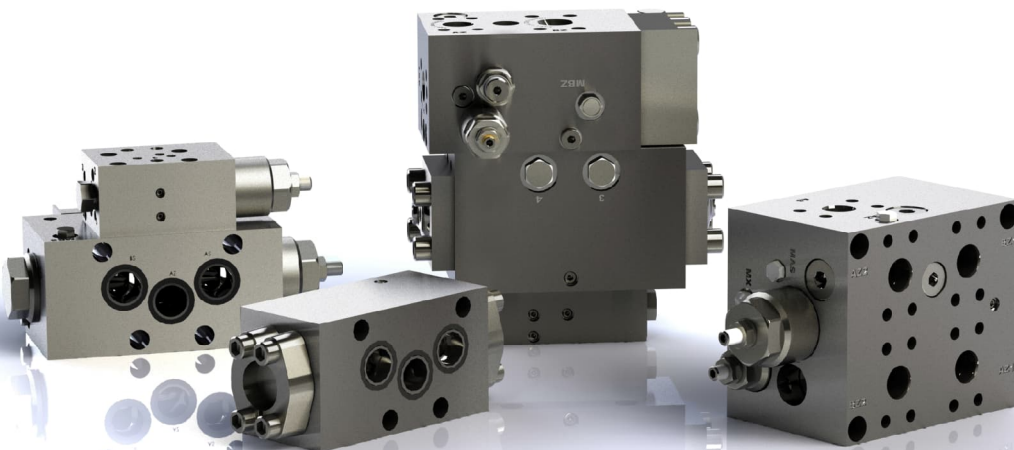


Speed up your cycle time

RECYCLING & DEMOLITION

- Speed Valves Type REG-2D und REG-2F
- Speed One – The new Generation of Speed
- Valve technology
- Booster
- Accessories



VISION

Our products are used worldwide in machines and systems that are used to work on the resource-saving future of people. The way we live, our mobility and our energy production will change. With the development and production of valve technology for the demolition and recycling industry through to safety valves for construction machinery and cranes, we want to be part of this change! The machines equipped with our valves should be as safe and effective and thus energy-saving as possible!

we engineer your progress
for a sustainable tomorrow



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1. Demolition Technology

In demolition technology, the components are often exposed to extreme loads. Just then it is important to use robust and reliable products. The cycle times and the breaking force of the attachment are of particular importance for the optimal demolition technology.

1.1 Demolition Shears

These attachments are required to e.g. cut steel, break concrete and pulverize it. A high breaking power is required from these attachments. In order to achieve this, the use of cylinders with a large diameter is necessary. However, they also take up a large volume when closing, which leads to corresponding closing times. For this reason, regeneration valves or pressure intensifiers from the field of booster technology are required, which increase the productivity of the shears.

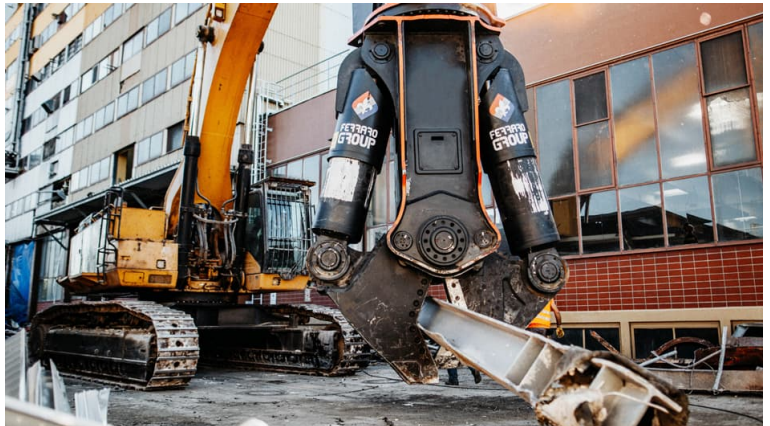
1.2 Types of Cylinder Technology

Demolition and scrap shear manufacturers typically use two types of cylinder techniques. A distinction can be made here between the 1-cylinder and the 2-cylinder technologies. With the 1-cylinder technology, the shears are operated via a differential cylinder. With the 2-cylinder technology, the shears are operated with two differential cylinders.

1-cylinder technology



2-cylinder technology



2. Basics - Regeneration Valve Technology

2.1 Differential Cylinder

Demolition shears are typically operated with differential cylinders. These have a piston rod on one side of the piston. This results in two different effective surfaces: the piston and rod side.

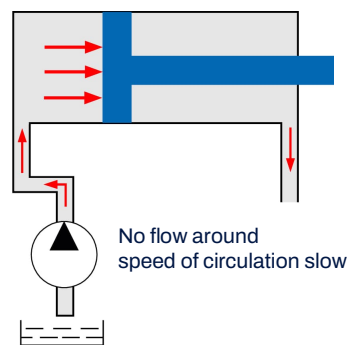
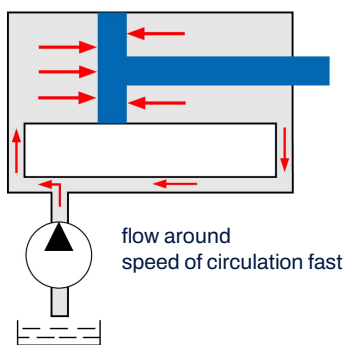
The surface on the piston side works completely and on the rod side only the ring surface works.

For this reason, a differential cylinder normally extends and retracts at two different speeds. The retraction speed is higher, but develops less force due to the smaller effective area. The speed when extending is slower, but develops more force due to the larger effective area.



2.2 Structure and use of a Regeneration Circuit (differential circuit)

With a regeneration circuit, a differential cylinder can be extended faster than retracted with the same pump volume flow. Regeneration controls are realized by connecting the bottom and rod sides of a cylinder. This can be achieved through valve technology.



v = Speed
 Q = Pump Volume Flow
 A_K = Piston Surface of the Cylinder
 A_S = Rod Surface of the Cylinder
 A_R = Ring Surface of the Cylinder
 s = Cylinder Stroke

$$v_{regen} = \frac{Q}{A_K - A_R}$$

$$v = \frac{Q}{A}$$

Sample Calculation:

$Q = 650 \text{ l/min}$; $d_K = 350 \text{ mm}$, $d_S = 220 \text{ mm}$, Surface Relation 1:1,65, $s = 1.120 \text{ mm}$

$$v = \frac{650 \text{ dm}^3/\text{min}}{(9,62 \text{ dm}^2 - 5,82 \text{ dm}^2)} = 171,05 \text{ dm/min} = 285,08 \text{ mm/s}$$

$$v = \frac{650 \text{ dm}^3/\text{min}}{9,62 \text{ dm}^2} = 67,65 \text{ dm/min} = 112,75 \text{ mm/s}$$

$$t_{regen} = \frac{1.120 \text{ mm}}{285,08 \text{ mm/s}} = 3,93 \text{ s}$$

$$t_{without regen} = \frac{1.120 \text{ mm}}{112,75 \text{ mm/s}} = 9,93 \text{ s}$$

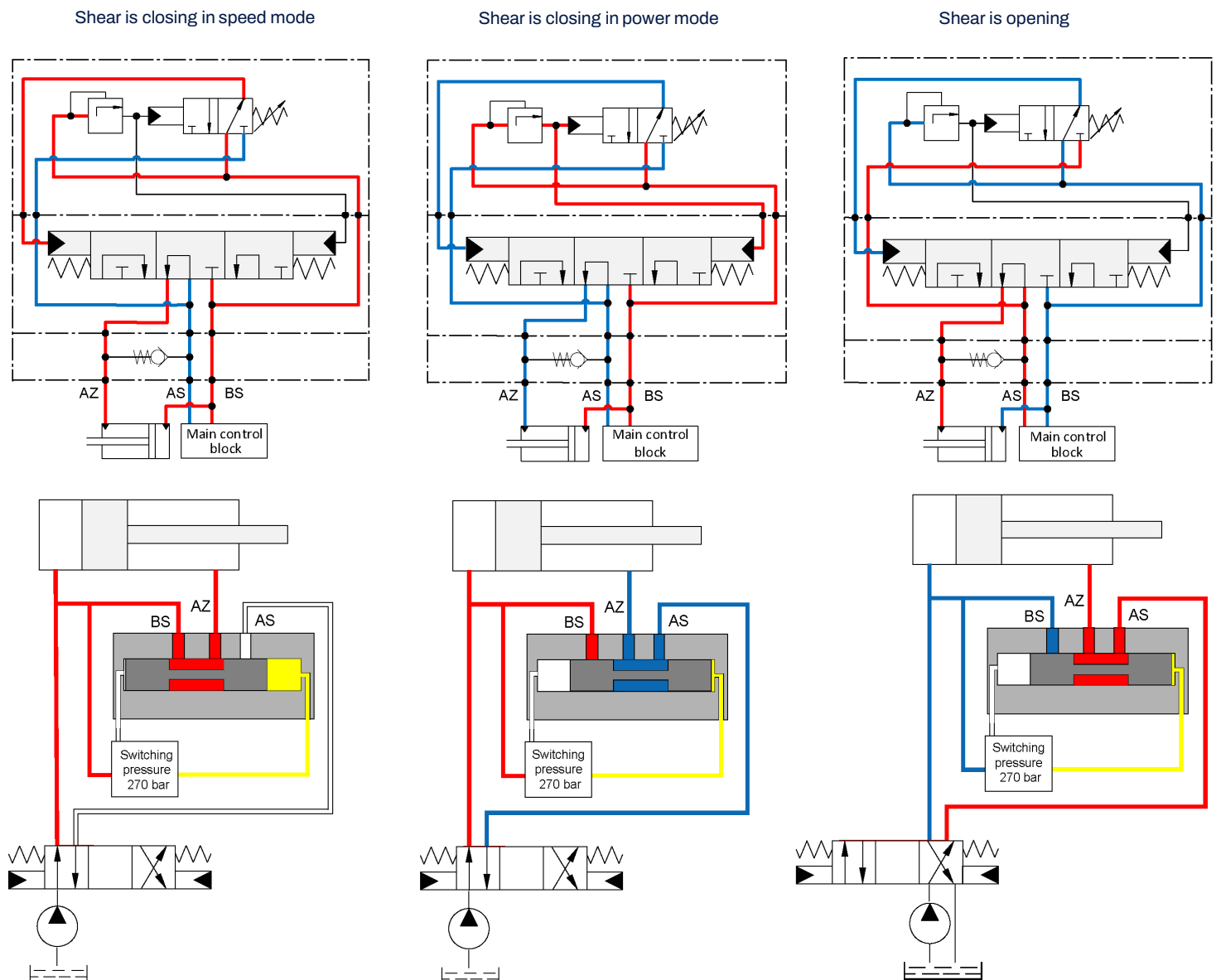
3. Valve Technology Regeneration Circuit

There are basically three types of technologies in regeneration valve technology: Spool, cartridge (screw-in) and cartridge (slip-in) technologies.

3.1 Spool Valve Technology

- The spool valve design impresses with its robust construction and high reliability and can be used for any volume flow range.

Regeneration valves for scrap and demolition shears connect the bottom and rod side of their cylinder by means of valve pistons in speed mode. As soon as the blades hit material, the pressure increases. At a certain pressure level, the valve spool switches to power mode by connecting the rod side to the return line. Due to the overlapping of the valve spool, the valves have a slightly longer response time to switch into speed mode. In addition, the switching behavior depends on the return pressure. The big advantage of this valve technology, however, is the high switching level, e.g. at 270 bar, which shortens the work cycles and thus increases productivity. The shear works in speed mode for as long as possible and only switch to power mode when a high cutting force is required. By that cutting in speed mode is possible when the required force is low.

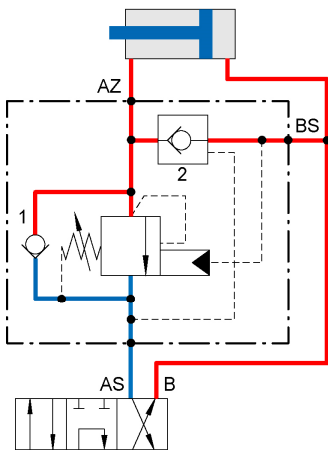


3.2 Cartridge Technology (Screw-in)

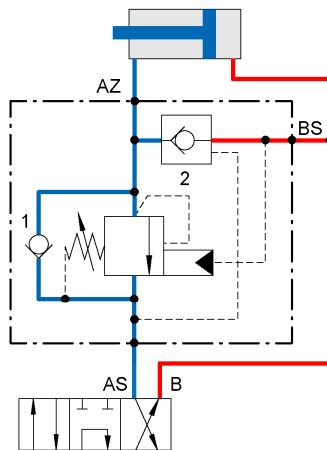
- Unbeatable in smaller volume flow ranges. Fast response behavior and independent of high return pressures.

The basic circuit includes a lowering brake valve and a check valve. When extending the cylinder (closing the shear) without load, the oil is routed via the check valve (2) from the rod side (AZ) to the bottom side (BS). When the pressure on the bottom side increases, the lowering brake valve opens and the oil from the rod side is routed to the tank (AS). The pump pressure thus develops the maximum force on the piston surface. The cylinder retracts (open the shear) via the check valve (1). The switching level into power mode depends on the opening ratio of the lowering brake valve cartridge. If the lowering brake valve with an opening ratio of 1:3 is set to 420 bar, for example, the valve switches into power mode at approx. 140 bar. If a pressure of only 150 bar is required for cutting, additional pressure remains caged on the rod side. That means that the inlet pressure is not only used for cutting, but also has to work against the caged pressure on the rod side. Cutting in speed mode is not possible with this design. In addition, small components which are used in the valve might get into the hydraulic system in the event of a fault.

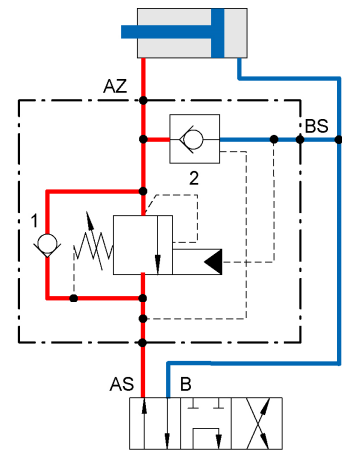
Shear is closing in speed mode



Shear is closing in power mode



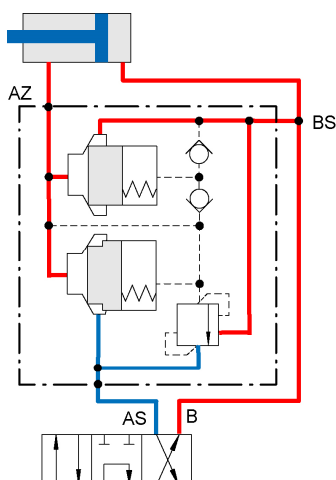
Shear is opening



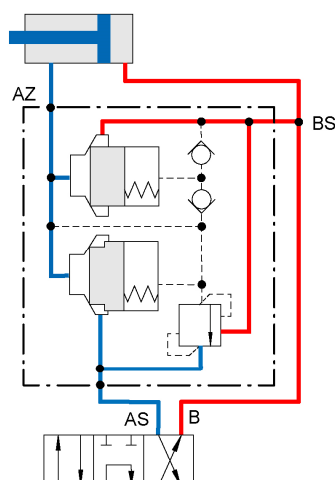
3.3 Two-Way Cartridge Technology (Slip-in)

- Compact design for large volume flows. Good response behavior and independent of the high return pressure.

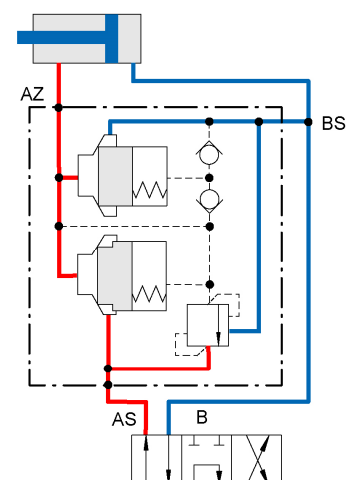
Shear is closing in speed mode



Shear is closing in power mode



Shear is opening



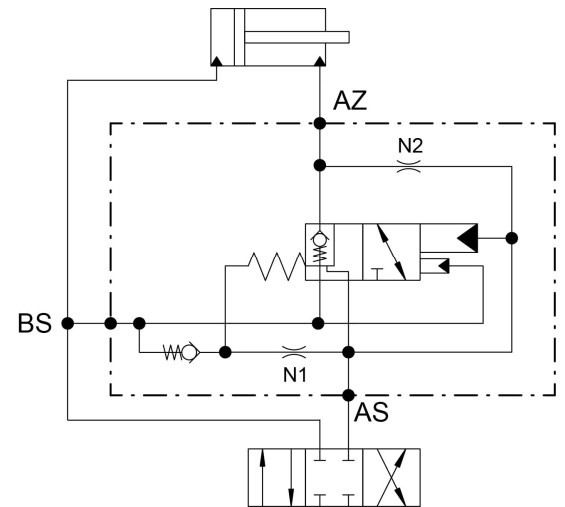
4. SpeedOne

- Very compact design
- Direct switching from rapid traverse mode to force mode
- Combination of slider/cartridge technology
- Faster cycle times due to optimized flow values
- Direct mounting onto the cylinder



NEW GENERATION

Hydraulic Schematic



Product Description

The regeneration function is implemented by a check valve (cartridge technology) integrated in the valve spool (AZ to BS).

The main piston does not move in this mode.

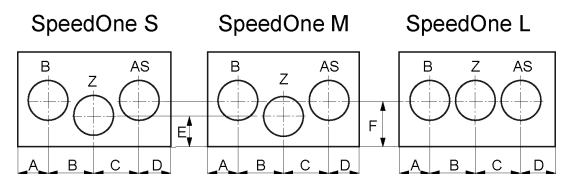
The main piston is deflected based on the pressure via a small pilot piston.

As soon as the activation pressure for the power mode is reached, the main piston moves out of its overlap and releases the oil from the rod side in direction to the main control block to the tank (AZ to AS).

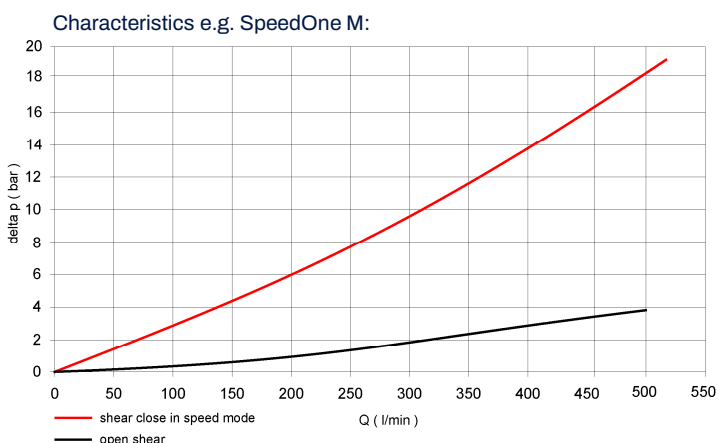
When the pressure drops, the main piston closes and the speed mode takes effect.

Fast opening behavior with a relatively weak spring and maximum stroke with low pressure loss ensures optimal closing / retraction of the cylinder.

Connection Ports



	S 250 l/min	M 500 l/min	L 1000 l/min
Z, AS, B	Ø20	Ø26 Ø27	Ø38
A	41	62	55
B	30	39	60
C	30	39	60
D	39	41	45
E	43	43	64
F	57	57	64

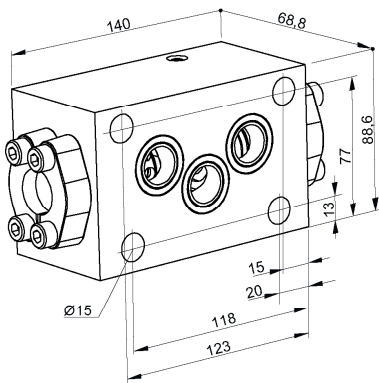


Technical Data

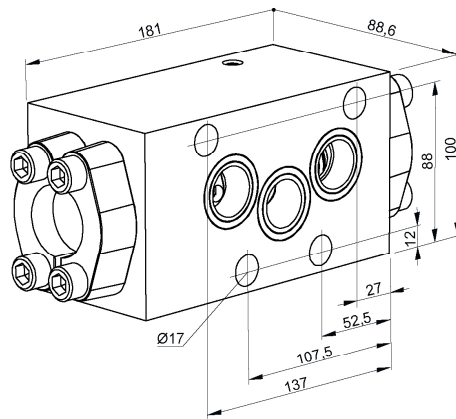
Mounting position	any
Weight	SpeedOne S = 5,1kg / SpeedOne M = 9,5 kg / SpeedOne L = 14,2 kg
Maximum Inlet Pressure	420bar
Adjustable switching level speed mode -> power mode	250bar bis 300bar, factory setting 270bar
Maximum Inlet Volume Flow	SpeedOne S, 250 l/min; SpeedOne M, 500 l/min; SpeedOne L,1000 l/min

Mounting Space

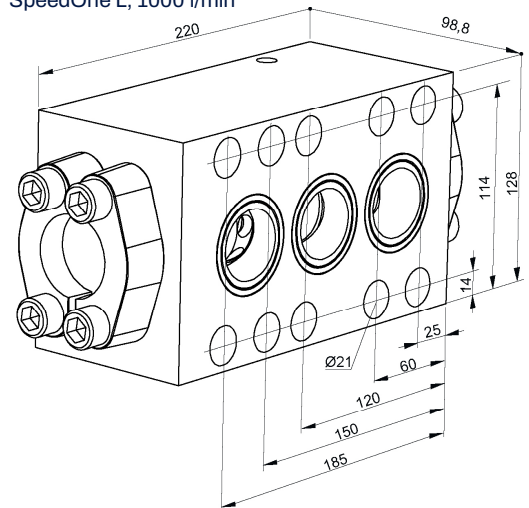
SpeedOne S, 250 l/min



SpeedOne M, 500 l/min



SpeedOne L, 1000 l/min

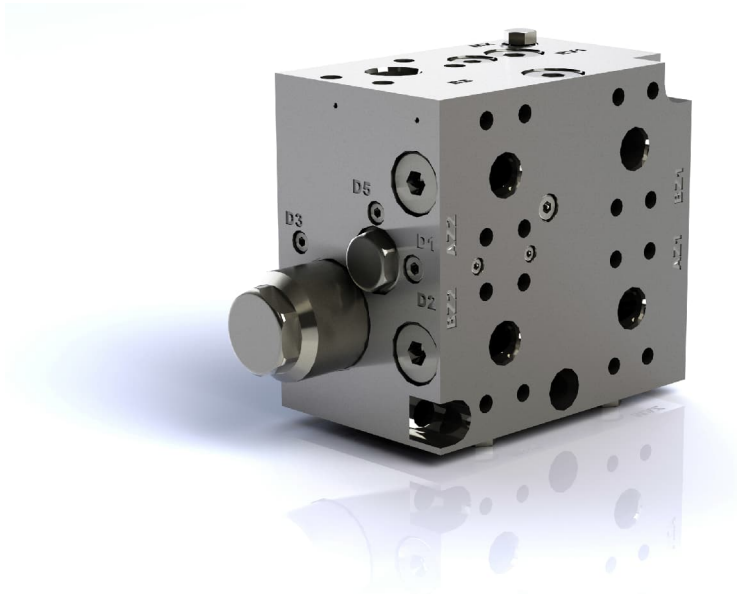


Type Code

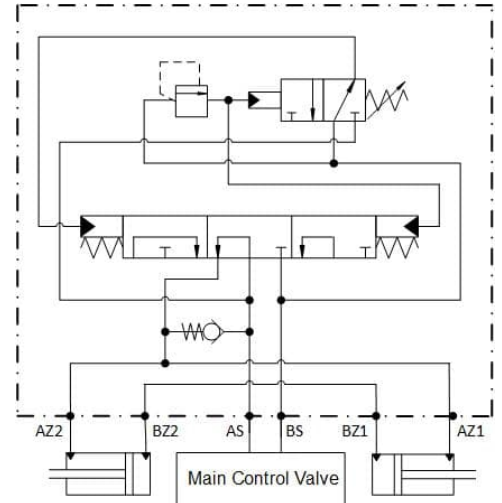
Speed One	-	XXX	-	XXX
Product Group Design		Inlet Volume Flow: 0250 l/min S 0500 l/min M 1000 l/min L		Switching Level: Standard 270 bar

5. REG-2F Regeneration Valve, Double Cylinder

- Ideal for double cylinder applications
- Automatic switching between rapid traverse mode and force mode
- **Compact design**
- Robust slider technology

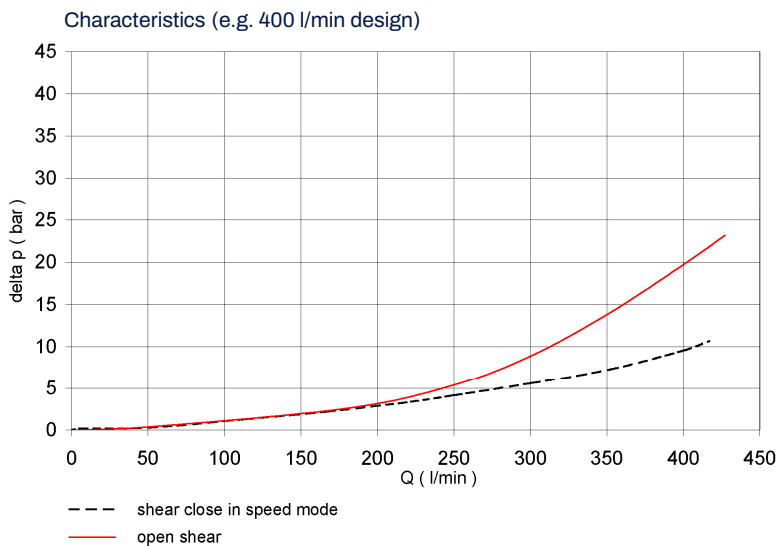


Hydraulic Schematic



Product Description

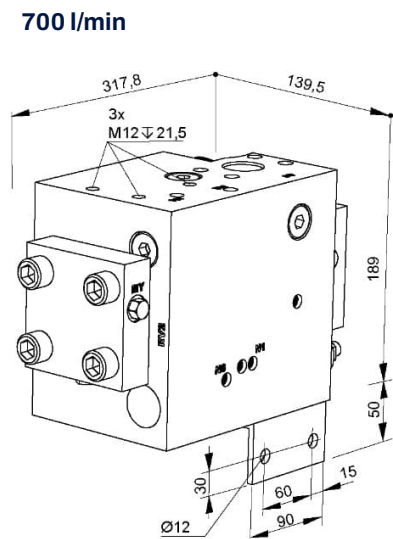
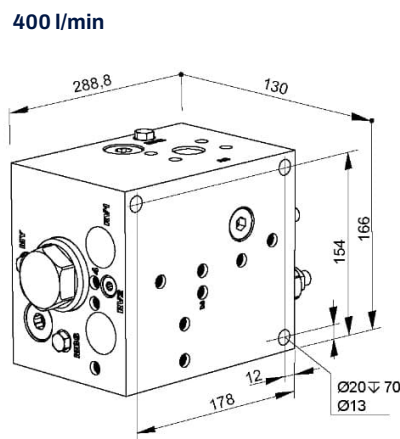
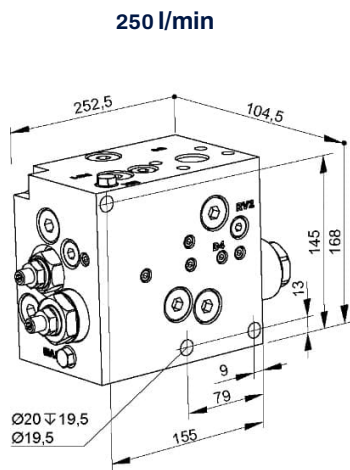
This valve is suitable for operating double cylinder shears. The function of this valve is identical to the REG-2D. The pilot control is built into the housing. The valve consists of a compact housing with the necessary valve technology integrated. It can be flanged on a base plate between the two cylinders.



Technical Data

Mounting Position	any
Weight	250 l/min=16,6kg; 400 l/min=25,1kg; 700 l/min=35,3kg
Maximum Inlet Pressure	350 bar
Adjustable switching level speed mode -> power mode	250bar bis 300bar, Factory Setting 270bar
Switching level power mode -> speed mode	If the inlet pressure decreases to approx. 15% of the switchover pressure.
Maximum Inlet Volume Flow	Depending on Valve Design 250 l/min; 400 l/min; 700 l/min
Flange ports	
AS, BS	250 l/min SAE 1“; 400 l/min SAE 1“; 700 l/min SAE 1 ¼“
AZ1, AZ2	250 l/min SAE 3/4“; 400 l/min SAE 1“; 700 l/min SAE 1“
BZ1, BZ2	250 l/min SAE 3/4“; 400 l/min SAE 1“; 700 l/min SAE 1 ¼“

Mounting Space



assembly example

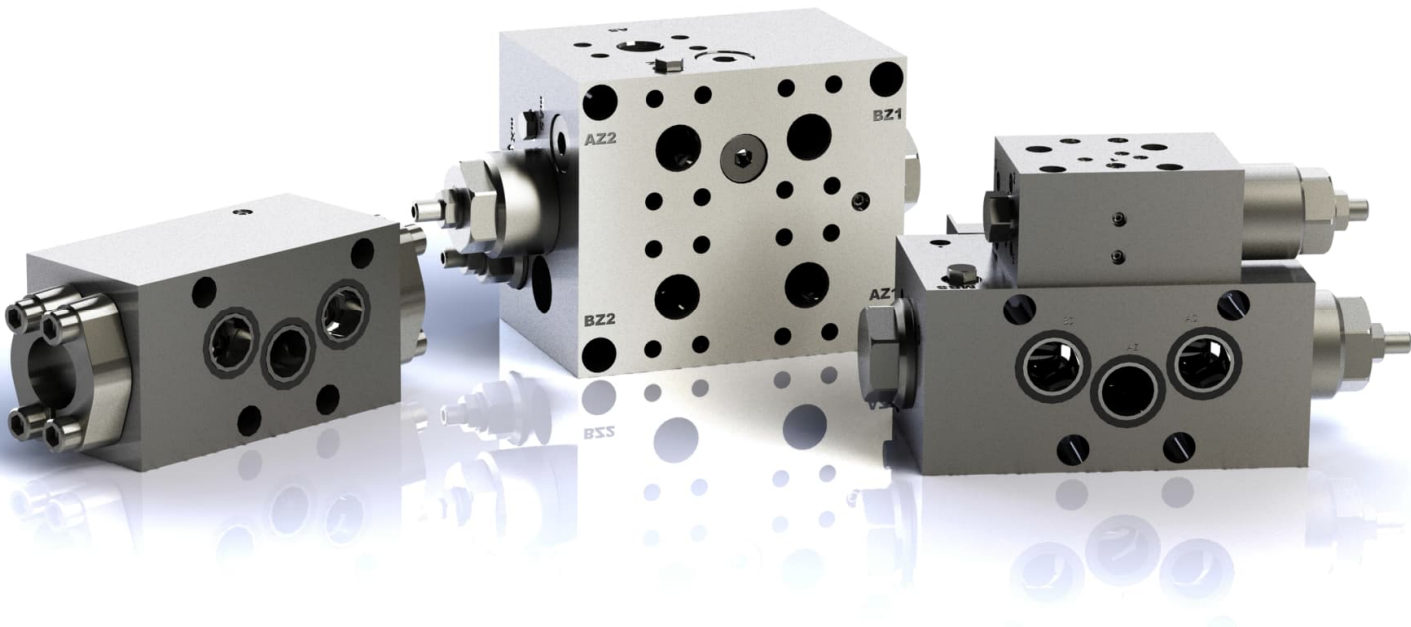
Type Code

REG-2F	-	XXX
Product Group Design		Inlet Volume Flow:
		0250 l/min
		0400 l/min
		0700 l/min

Selection example

Regeneration Valve	Q max Inlet	Attachment Weight (kg)	Excavator Weight (t)
REG-2F	250 l/min	250 – 2000	10 - 25
Speed One S	250 l/min	250 – 2500	10 - 30
REG-2F	400 l/min	2000 – 5000	25 - 65
Speed One M	500 l/min	2000 – 6500	30 – 85
REG-2F	700 l/min	6500 - 9000	70 – 105
Speed One L	1000 l/min	6500 - 18000	90 - 200

This information is based on experience with our customers and serves as a guide. We would be happy to help you choose the right valve for optimal use.



6. Booster Technology - Operation

Design

The base block contains a cartridge valve (1) which, in combination with the directional valve (2), controls the direction of the cylinder.

The pressure relief valve (6) limits the maximum pressure to the cylinder.

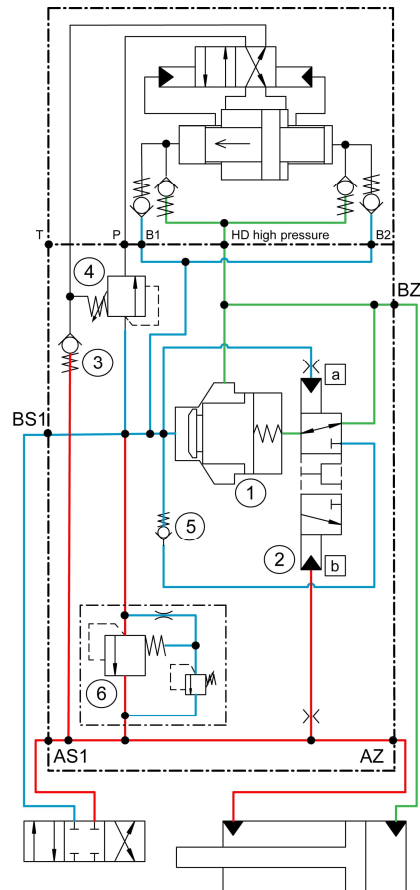
The switch-on point of the high pressure stage can be determined via the pressure sequence valve (4).

Additional check valves (3 + 5) complete the signal routing and ensure the function of the valve. The high pressure stage as well as the switch to increase the pressure in the cylinder is flanged onto the base block

Function: Opening the Shear

The pump volume flow is fed through the valve directly into the rod side of the cylinder via connection AS1.

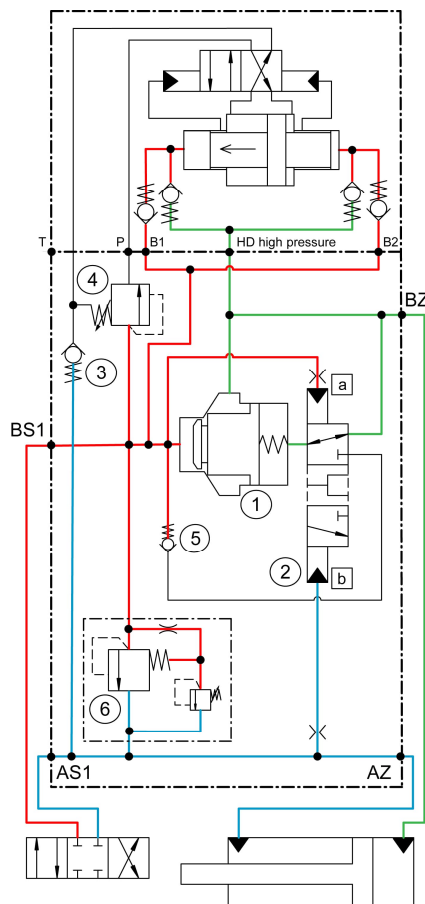
The oil from the bottom is returned to the tank through the cartridge valve via connection BS1.



Function: Closing the Shear

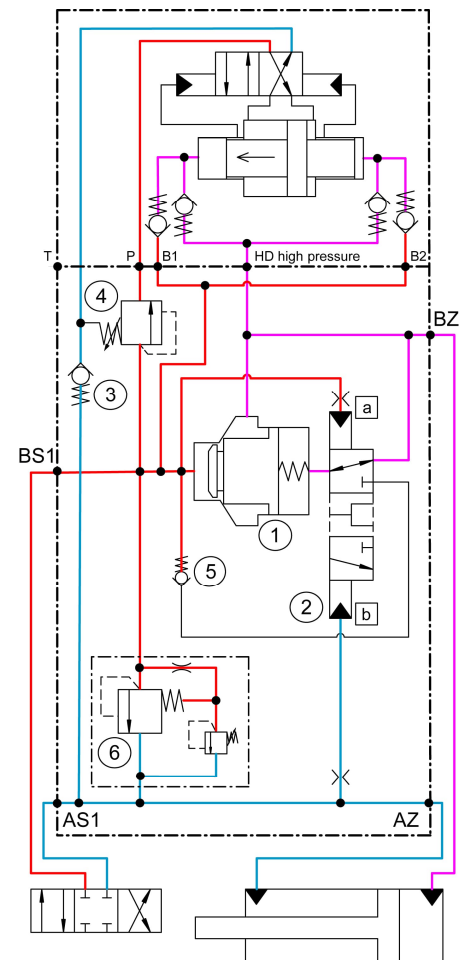
The supply takes place via the connection BS1. The oil flows through the cartridge valve into the bottom of the cylinder.

The pressure is applied to the pressure sequence valve.



Function: Booster Mode

If the pressure exceeds the set value of the pressure sequence valve, the signal is passed on to the high pressure stage and activates the booster mode.



6.1 Booster Technology additional Power for Breakers

Boosters are an innovation in the field of demolition technology. They offer a new way of working. The special about WESSEL Booster is the double-acting operation of the high pressure stage.

Faster cycle times can be achieved because the cylinder can be dimensioned smaller with the same force.

Advantages:

- Lower costs
- Smaller volume flows in booster mode
- Less pressure loss in the rotary couplings / quick coupler
- Energy saving

The high pressure stage is activated via an additional valve. The switch-off function of the high pressure stage takes place automatically when it is no longer required.

High Pressure Stages:

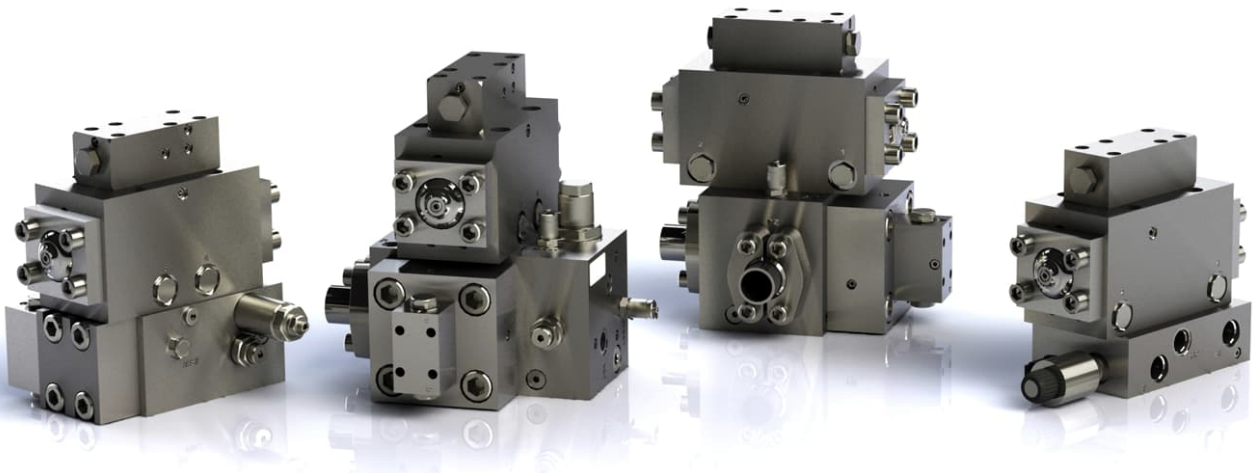
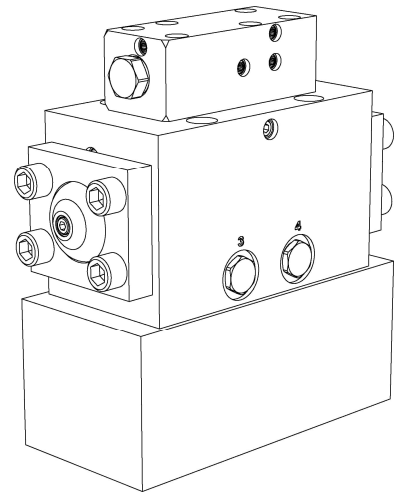
- V1: $P_{max}=700\text{bar}$, $Q_{in}=120\text{-}200\text{l/min}$ | $Q_{out}= 30\text{l/min}$
- V2: $P_{max}=700\text{bar}$, $Q_{in}=200\text{-}300\text{l/min}$ | $Q_{out}= 60\text{l/min}$

Principle Design

Individual base block with flanged high pressure stage.
The basic block is customized.

Customer-specific requirements can be:

- Volume flow
- Max. Cylinder pressure
- Flange pattern
- Installation space dimensions
- Connection sizes

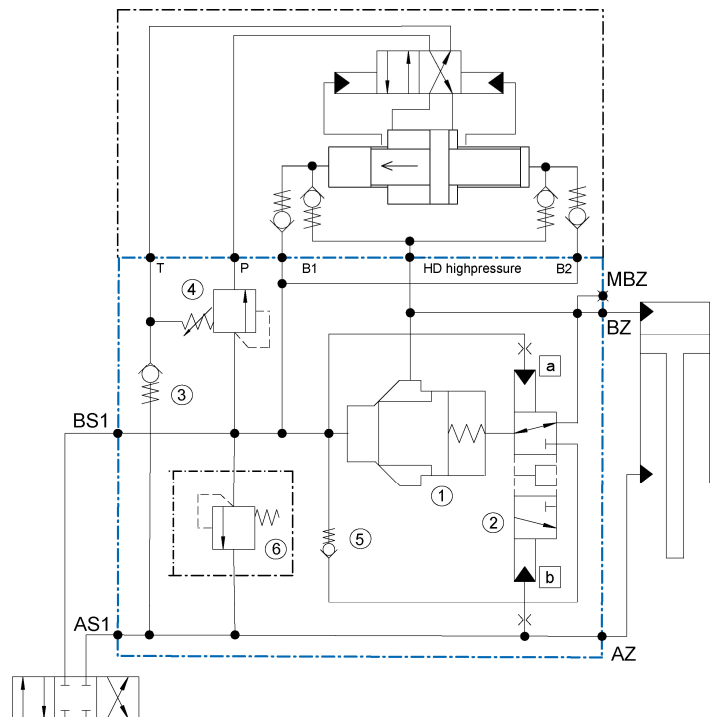


7. Typ V1

- Pmax = 700 bar
- Directly mounted onto the Cylinder



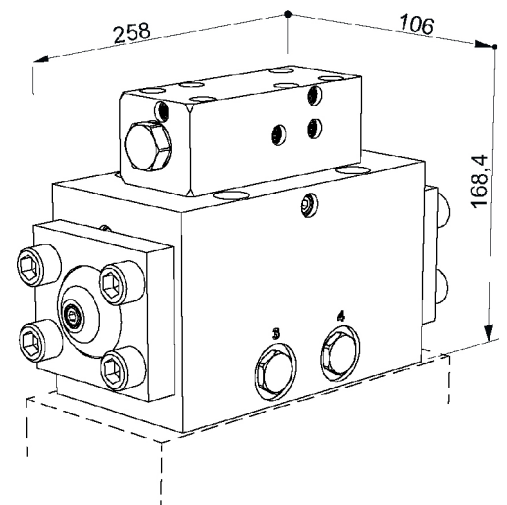
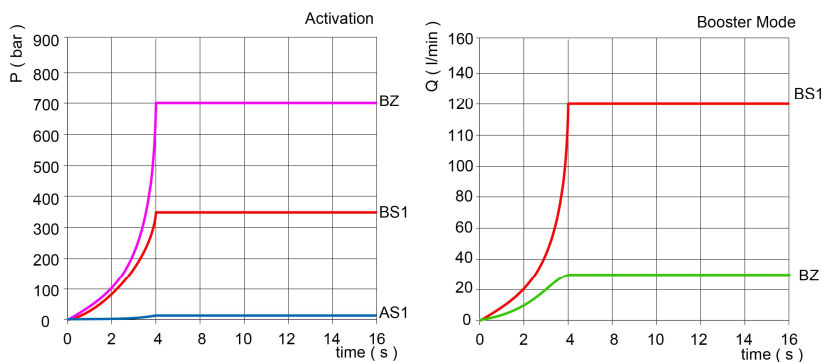
Hydraulic Schematic



Product Description

The base block (colored blue) is customized to the requirements and has a cartridge valve (1) which, together with the directional valve (2), controls the movement of the cylinder. The pressure valve (6) limits the maximum pressure of the cylinder. The booster mode is activated via the sequence valve (4). Additional check valves (3 + 5) ensure the correct function of the booster valve. The high pressure stage with switching valve is mounted on the base block.

Characteristics



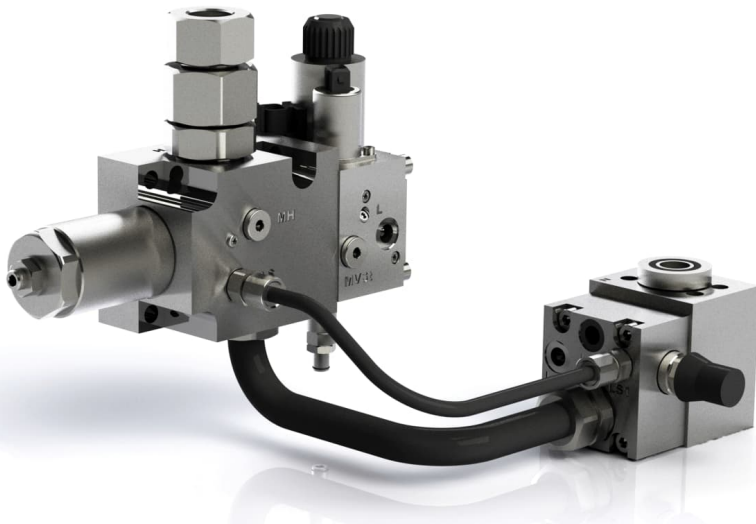
Technical Data

Weight	23,5 kg
Maximum Inlet Pressure	350 bar
Maximum Outlet Pressure	700 bar
Minimum Volume Flow	120 l/min
Switching Level Highpressure	260 bar
Pressure Protection	350 bar

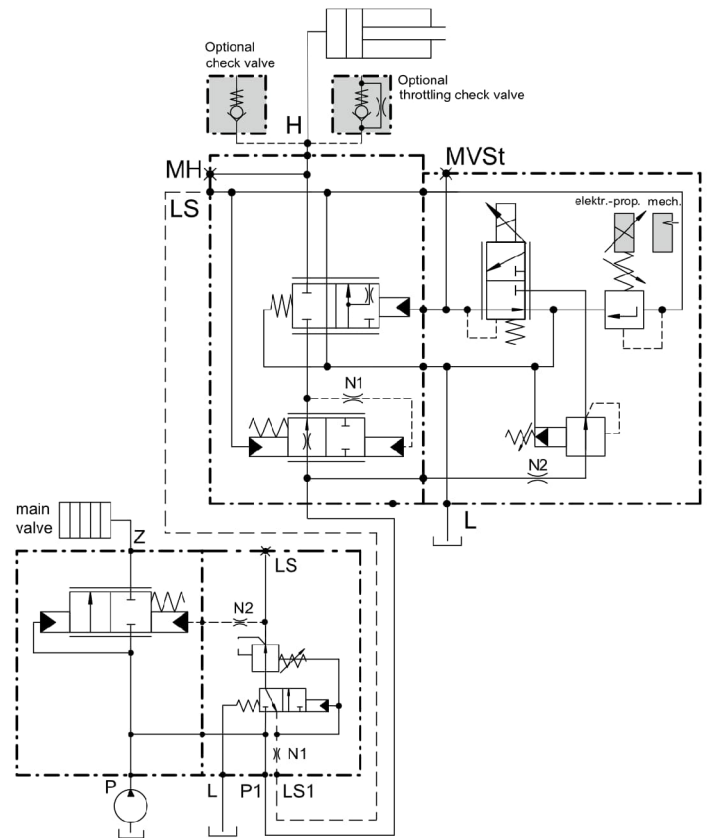
BS1, BZ	Supply Line	SAE 1 1/4" (M14) ISO 6162-2P32M / SAEJ 518-1 CD62
AS, AS1	Supply Line	SAE 1" ISO 6162-2P32M / SAEJ 518-1 CD62
MBZ	Gauge Port	9/16-18 UNF-2B ISO 11926-1

8. Accessory

8.1 FC1X-2P + FC1-1D More Power at the Shear

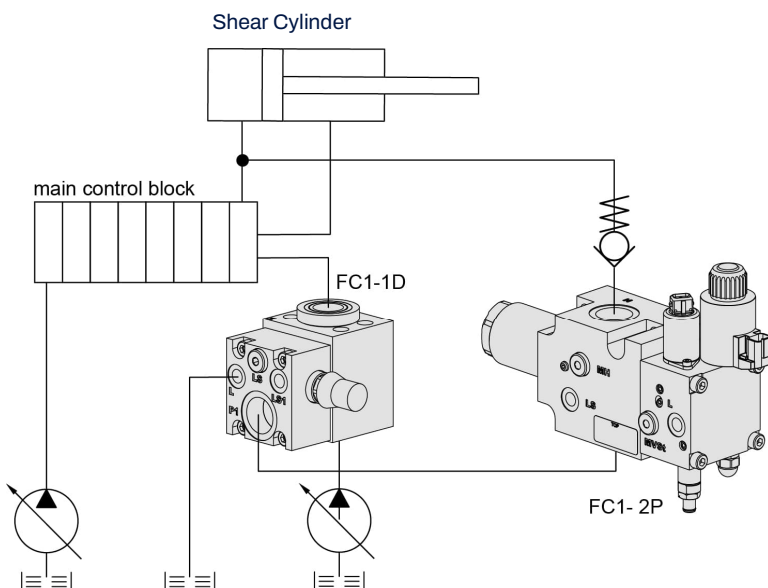


Hydraulic Schematic



Application Example

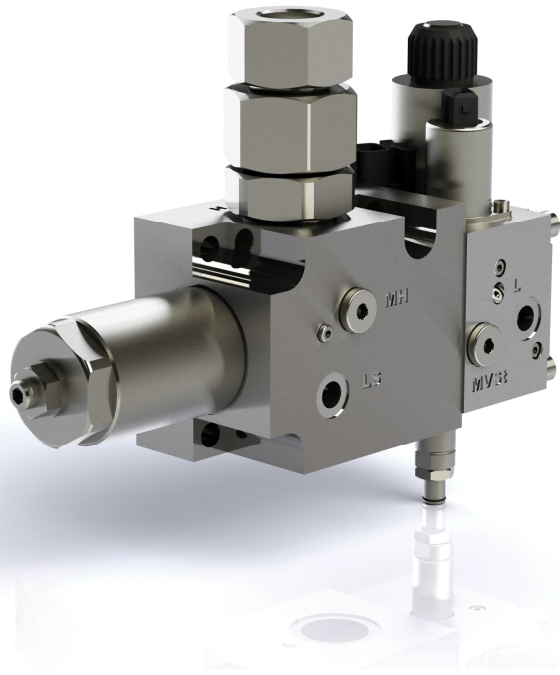
If more power is required on the shear, this can be done by simply installing the two valves FC1-1D and FC1-X2P. The priority valve FC1-1D is flanged directly onto the pump, providing a preferential flow rate. By combining it with the flow control valve FC1-X2P, on which the volume flow and pressure can be proportionally adjusted, a precisely defined volume flow is brought to the shear cylinder. This increases the performance or productivity even further. This volume flow can e.g. be branched off by a second pump.



Schematic description connection options may vary depending on the hydraulic system

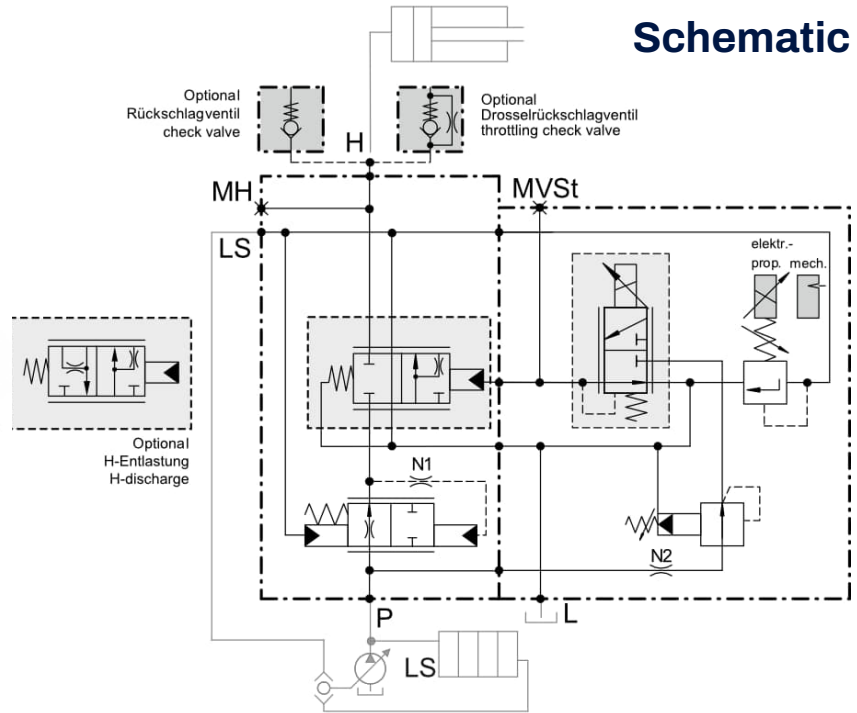
Description and ordering information for the valves FC1X-2P and FC1-1D can be found on the following pages.

8.2 Flow Control Valve FC1X-2P



- High Precision of the Volume Flow
- For changing attachment with different requirements to volume flow and pressure

Hydraulic Schematic



Product Description

With the flow control valve FC1X-2P, a defined volume flow and output pressure can be set electrically proportional for a single-acting consumer.

Technical Data

Weight	14,2 kg	Port P, Supply Line	G1" (ISO 1179-1)
Maximum Inlet Pressure	420 bar	Port H, Supply Line	G1" (ISO 1179-1)
Adjustable Pressure of the Consumer	120 – 420 bar	Port VSt, Vorsteueranschluss	G ¼" (ISO 1179-1)
Accuracy of the outlet Volume Flow	± 8 %	Port L, Drain	G ¼" (ISO 1179-1)
Maximum recommended Tank pressure (L)	< 1 bar	Port MH, MVSt, Gauge	G ¼" (ISO 1179-1)
Maximum Pilot Pressure VST (only with Option „VSt extern“)	< 50 bar	Port LS, Load Sensing	G ¼" (ISO 1179-1)
Maximum outlet volume flow (P)	230 l/min-350 l/min	Protection Class according DIN 43650: bis IP65	
Minimum outlet volume flow (P)	30	Protection Class according DIN 40050:	AMP - JT: bis IP67 Deutsch DT04-2P: to IP69

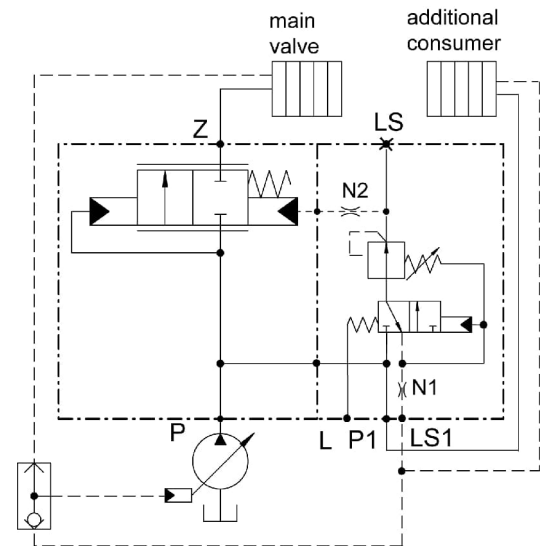
Type Code

FC1X-2P	XXX	XXXXXX	XXXXXX	XX	X	X
Product Group	Inlet Volume Flow	Operation Pressure Adjustment P	Operation Volume Flow Q	Check Valve CV Throttling Check Valve TCV	Pilot Pressure	Pressure release
	230 lpm	12P002 12V,AMP JPT Stecker	12P002 12V,AMP JPT Stecker	00 Kein CVS / TCV	1 intern	1 mit
	350 lpm	12P003 12V,DEUTSCH Stecker	12P003 12V,DEUTSCH Stecker	CV 25S	0 extern	0 ohne
		24P002 12V,AMP JPT Stecker	24P002 12V,AMP JPT Stecker	TCV 25S		
		24P003 12V,DEUTSCH Stecker	24P003 12V,DEUTSCH Stecker			
		MAN000 12V,mech.einstellbar	HYP03B Hydraulisch proportional			

8.3 Priority Valve FC1-1D



Hydraulic Schematic



Product Description

The priority valve is used to supply an additional consumer with a preferred volume flow. The remaining volume flow is provided to supply the existing main functions on the machine. The divided volume flow to the additional consumer has priority over the main functions. The valve is flanged directly onto the pump or onto the pump inlet of the main control. The valve is usually combined with other valves such as the flow control valve FC1X-2P.

Technical Data

Weight	4,6 kg
Maximum Inlet Pressure	420 bar mit SAE screw connection
Inlet Volume Flow	300 l/min (SAE ¾"), 400 l/min (SAE 1"), 600 l/min (SAE 1¼")
Port Sizes	
Port P, Z	Code 62, ISO 6162
Port P1	G 1", ISO 1179
Port LS, LS1, MP	G ¾, ISO 1179

Type Code

FC1-1D	-	XXX	-	XXX
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Product Group
Design

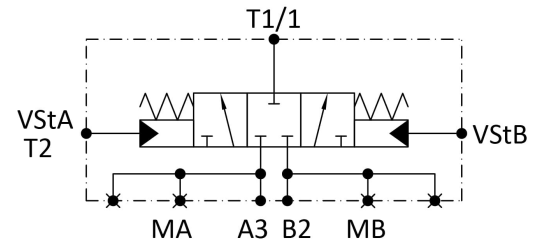
Ports:	Inlet Volume Flow:
05C – SAE ¾"	300 lpm (SAE ¾")
05E – SAE 1"	400 lpm (SAE 1")
05G – SAE 1¼"	600 lpm (SAE 1¼")

8.4 Return discharge Valve D33-NA

- Lowering Return Pressure -> Increase Performance



Hydraulic Schematic



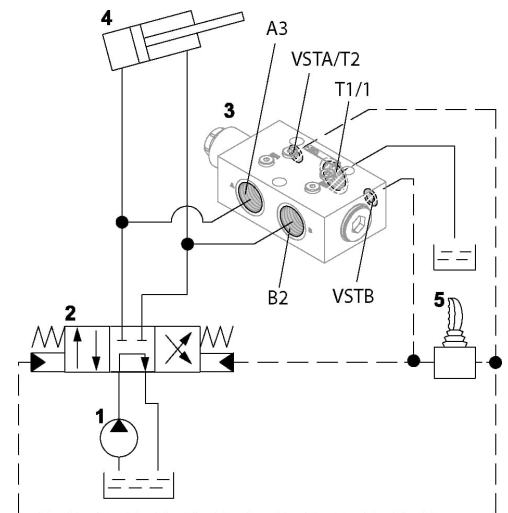
Product Description

The 3/3 directional valve is hydraulically piloted and opens port A3 or port A2 to the tank.

Application Example

The ratio of the shear cylinder results in volume flows out of the bottom side which is double the maximum inlet volume flow. This can result in high return pressures if the main control block and / or the return line of the excavator are not designed for this flow. With an additional direct relief to the tank by means of a 3/3 directional valve, the high return pressure and thus the loss can be significantly minimized.

The valve works as a bypass valve to the main control block. The bottom and rod sides of the cylinder are relieved towards the tank.



- 1 Pump
- 2 Main Control Valve
- 3 Return discharge Valve
- 4 Shear Cylinder
- 5 Piloting Device

Technical Data

Weight	D33-NA-03G-400LPM	9,5kg
	D33-NA-05K-550LPM	14,8 kg
Maximum inlet pressure		420 bar
Recommended piloting pressure		>10 bar, <50 bar

Connection Ports

G1 1/4"	A3, B2, T1/1= G1 1/4, ISO1179-1 VStA/T2, VStB, MA, MB = G1/4 ISO 1179-1
SAE 1 1/2"	A3, B2, T1/1= SAE 1 1/2" ISO6162 VStA/T2, VStB, MA, MB = G1/4 ISO 1179-1

Type Cde

D33-NA	-	XXX	-	XXX
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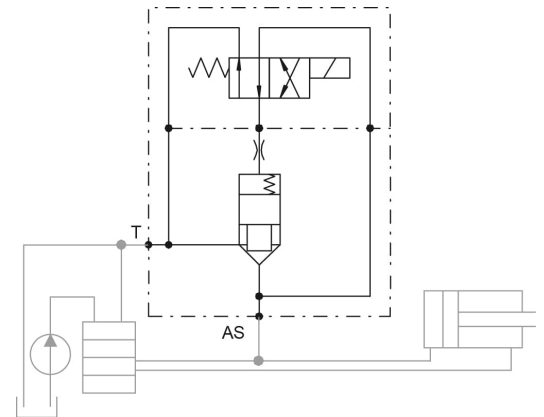
Product Group Design	Ports:	Inlet Volume Flow:
	03G – G1"	400 lpm
	05K - SAE 1/2"	550 lpm

8.5 Return discharge Valve D22-1N

- Flangeable directly onto the Cylinder



Hydraulic Schematic



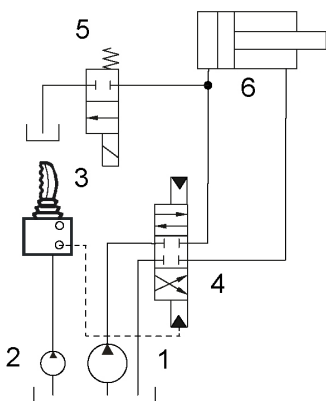
Product Description

The 2/2 directional valve is used to connect or disconnect a hydraulic line (similar to a ball valve). It is a pilot operated valve that is designed for high pressure and high volume flow and is therefore particularly suitable for mobile applications.

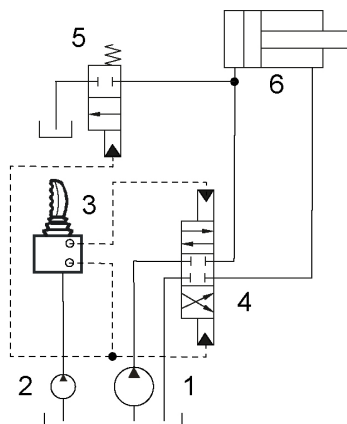
Application Example

The 2/2 directional valve also serves as a return relief valve, with the difference that the valve only releases the bottom side, because the cylinder's ratio (volume flow ratio) can lead to high return pressures here.

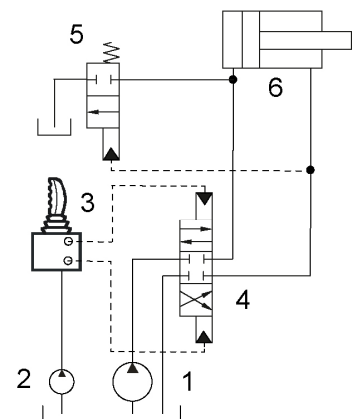
Electrical Actuation



Hydraulic Actuation



Actuation via inlet pressure



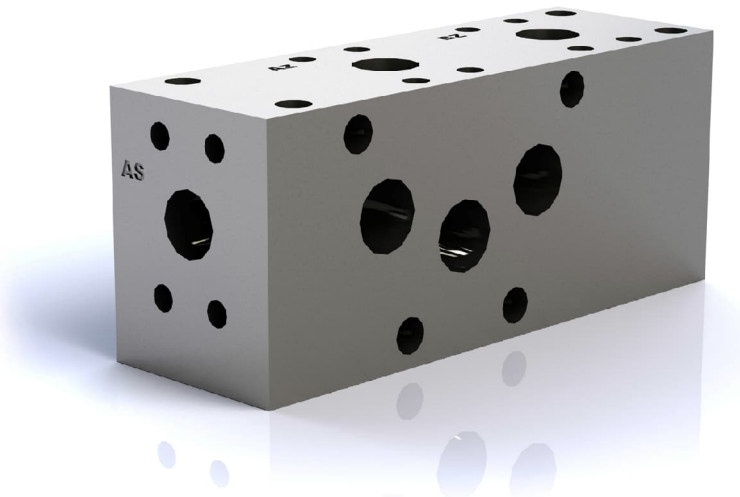
- 1 – Main Pump
- 2 – Piloting Pump
- 3 – Hand lever
- 4 – Main Control Valve
- 5 – Directional Valve 2/2
- 6 – Consumer

Type Code

D22-1N	-	XXX	-	XXXXXX	-	XX	-	XX	-	XX
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Product Group	Allowable maximum Pressure	Actuation	Idle Position	Switching Behavior	Main Stage
	420 bar hydr. Version	24S001 Connector ISO 4400	N0 closed	S0 standard, electrical switching	K0 not pressure compensated
	350 bar electr. Version	24S002 Junior Timer Plug	N1 open	S1 damped, hydraulic switching	K1 pressure compensated
		24S003 Deutsch Plug DT04-2P		S2 damped, electrical switching	
		HYS03B hydraulic switching			

8.6 Manifold

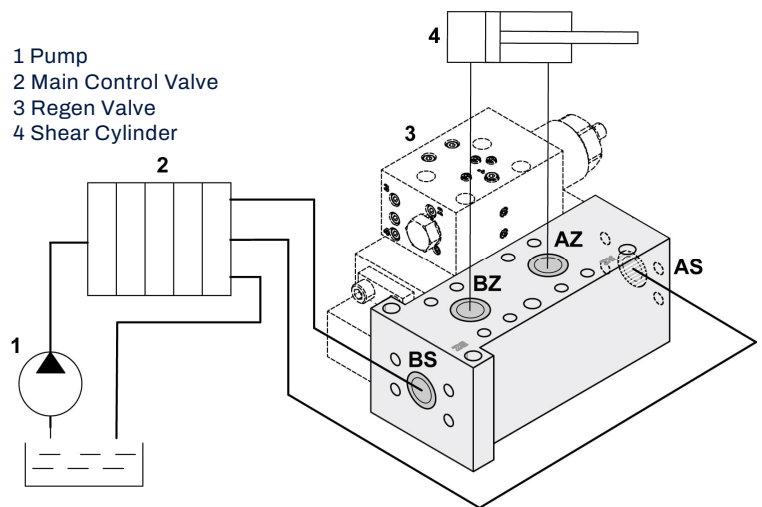


Product Description

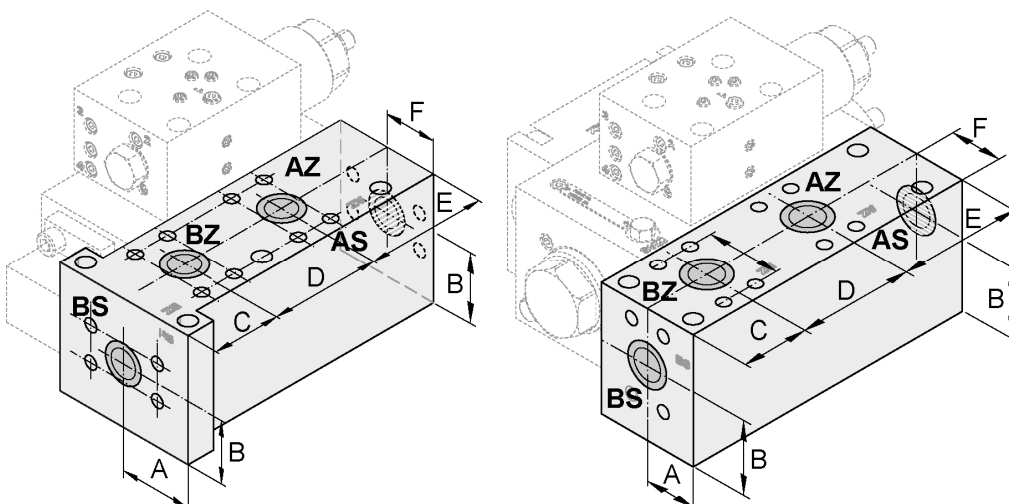
The regeneration valve is usually flanged directly onto the cylinder (3 connections). For applications with an unsuitable cylinder flange, the regen valve is optionally available with a connection plate (4 connections). The connection plate is available for the 250 l / min, 400 l / min and 800 l / min variant.

Connecting Example

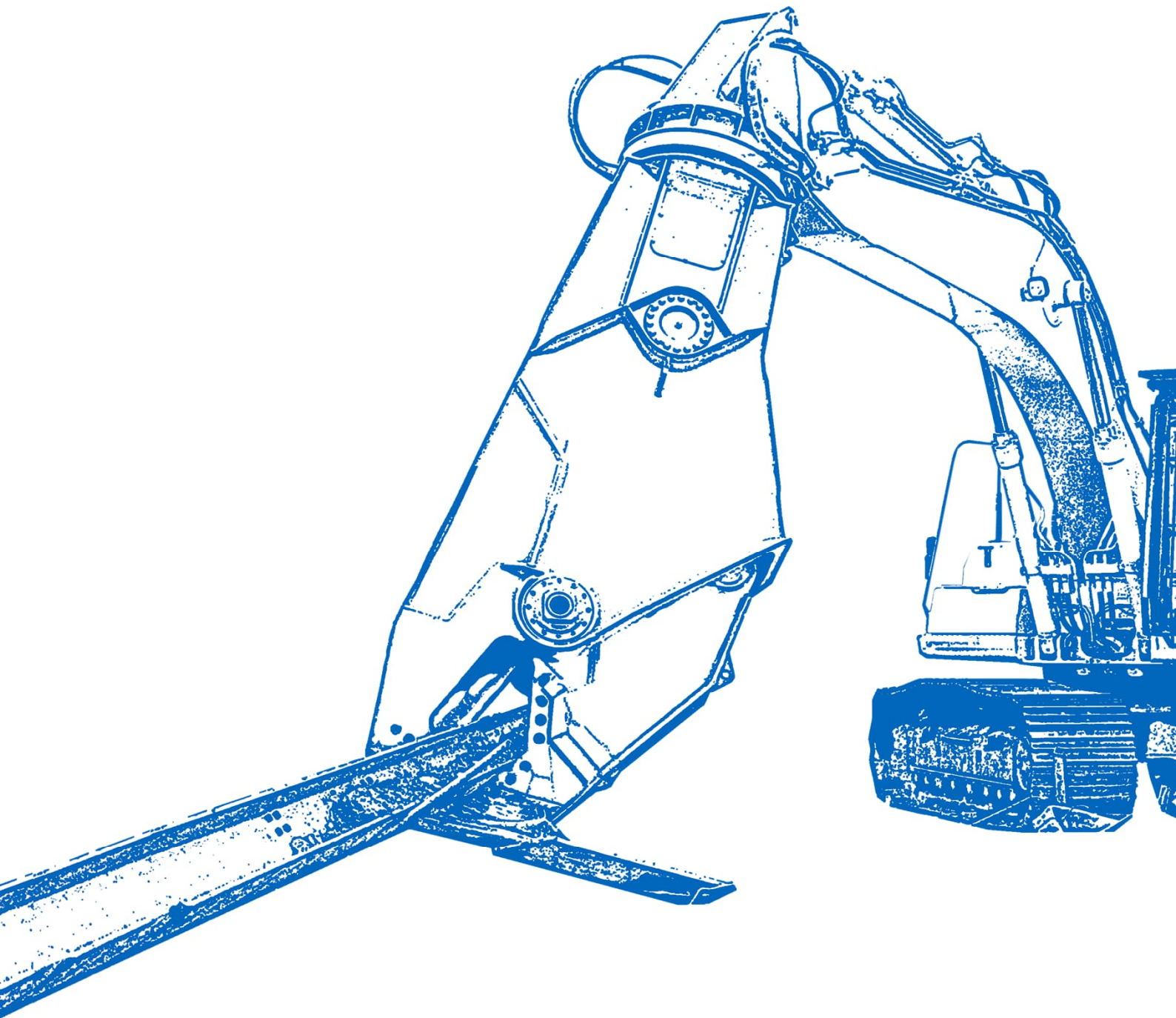
AS - Port: Opening the Shear
 BS - Port: Closing the Shear Regen and Power Mode
 BZ – Port: Cylinder Bore Side
 AZ – Port: Cylinder Rod Side



Connection Ports



	996 250 lpm	997 400 lpm
AS, AZ, BS, BZ	SAE 1"	SAE 1"
A	55	40
B	48	57
C	52	52
D	83	88
E	91	95
F	40	40
G	Ø 25	Ø 25



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