



Program Summary

SWING CLAMPS

hydraulically operated
high pressure and low pressure

single and double acting
with and without overload
protection device

metallic wiper
position monitoring

6 different body types

maximum clamping force
from 0.6 to 41 kN

maximum clamping stroke
from 7 to 50 mm

electrically operated
24 V DC





Program Summary SWING CLAMPS

High pressure








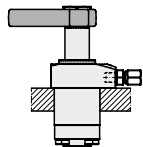
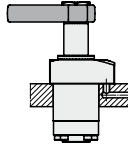
Body type	Bottom flange															
Max. operating pressure	350 bar				350 bar				500 bar				500 bar		500/160 bar (2)	
Type	compact				sturdy				overload protection				reinforced		pendulum eye / fork head	
Data sheet	B 1.8491				B 1.854				B 1.881				B 1.8811		B 1.8812	
• double acting	B 1.849				-				B 1.881				-		-	
• single acting																
Hydraulic connection	pipe thread or drilled channels															
Overload protection	-				-				●				-		-	
Reinforced or sturdy swing mechanism	● *				●				VI				●		●	
Position monitoring	-				○				-				○		○	
Clamping arm seat	cone				cone				cone				cone		pendulum eye / fork head	
Seals / wipers	NBR/FKM				NBR/FKM				NBR/FKM				NBR/FKM		NBR/FKM	
Metallic wiper	-				○				○				○		○	
Max. operating temperature	+80 °C				+80 °C				+80 °C				+80 °C		+80 °C	
Piston rod diameter	10 mm				16 20 25 32 mm				20 32 40 50 mm				32 40 50 mm		20 32 mm	
Piston diameter	14 mm				23 28 36 45 mm				25 40 50 63 mm				40 50 63 mm		25 40 mm	
Max. clamping force (1)	2.2 kN				6 8.4 15 22 kN				2.8 6.8 10.5 16.5 kN				6.8 10.5 16.5 kN		4.4/1.4 11,2/3,6 kN(2)(3)	
Clamping stroke for double-acting version	8 mm				12 12 15 15 mm				11 14 15 15 mm 25 25 25 25 mm 50 50 50 50 mm				22 20 20 mm		25 22 mm	
Max. flow rate for clamping	5 $\frac{\text{cm}^3}{\text{s}}$				10 14 32 57 $\frac{\text{cm}^3}{\text{s}}$				3 10 18 28 $\frac{\text{cm}^3}{\text{s}}$				20 36 55 $\frac{\text{cm}^3}{\text{s}}$		8 20 $\frac{\text{cm}^3}{\text{s}}$	
Clamping time reference value for the shortest stroke	0.25 s				0.5 s				1 s				0.75 s		0.75 s	

Legend:

- series
- option
- not available
- * only for double-acting version
- VI without overload protection device available on request



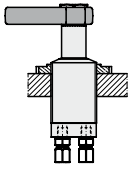
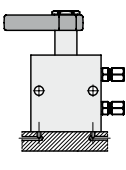
- (1) with the pictured one-sided series clamping arm with contact bolt. shorter or longer clamping arms as well as double clamping arms see data sheet.
- (2) version with pendulum eye 500 bar / fork head 160 bar
- (3) at max. operating pressure and double clamping arm per side
- (4) only for double-acting version with O-ring sealing
- (5) standard elements with metallic wiper edge

Top flange


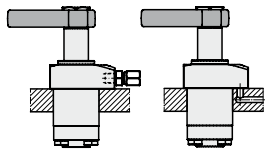
350 bar		350 bar			500 bar				500 bar			500/160 bar (2)		250 bar		350 bar			
																			
compact		sturdy			overload protection				reinforced				pendulum eye / fork head		piston rod locking			without swing stroke	
B 1.8491 B 1.849		B 1.853 -			B 1.880 B 1.880				B 1.8801 -				B 1.8802 -		B 1.8805 -			B 1.8806 -	
pipe thread					or					drilled channels									
																			
-	-			●				-			-		-		-				
●*	●			VI				●			●		●		●				
-	○			-				○			○		○		○				
cone	cone			cone				cone			pendulum eye / fork head		cone		cone				
NBR/FKM	NBR/FKM			NBR/FKM				NBR/FKM			NBR/FKM		NBR/FKM		NBR/FKM				
○ (4)	○			○				○			○		○		○				
+80 °C	+80 °C			+80 °C				+80 °C			+80 °C		+80 °C		+80 °C				
10 mm	16	20	25	32	40 mm	20	32	40	50 mm	32	40	50 mm	20	32 mm	32	40 mm	20	32	40 mm
14 mm	23	28	36	45	55 mm	25	40	50	63 mm	40	50	63 mm	25	40 mm	40	50 mm	25	40	50 mm
2.2 kN	6	8.4	15	22	30 kN	2.8	6.8	10.5	6.5 kN	6.8	10.5	16.5 kN	4.4/1.4	11.2/3.6 kN(2)(3)	6.8	10.5 kN	2.8	6.8	10.5 kN
8 mm	12	12	15	15	15 mm	11	14	15	15 mm	22	20	20 mm	25	22 mm	22	20 mm	12	16	20 mm
						25	25	25	25 mm										
						50	50	50	50 mm										
5 $\frac{\text{cm}^3}{\text{s}}$	10	14	32	57	87 $\frac{\text{cm}^3}{\text{s}}$	3	10	18	28 $\frac{\text{cm}^3}{\text{s}}$	20	36	55 $\frac{\text{cm}^3}{\text{s}}$	8	20 $\frac{\text{cm}^3}{\text{s}}$	20	36 $\frac{\text{cm}^3}{\text{s}}$	9	32	60 $\frac{\text{cm}^3}{\text{s}}$
0.25 s	0.5 s			1 s				0.75 s			0.75 s		1 s		0.75 s				

Threaded-body type								Cartridge type										
150 bar		350 bar		500 bar		500 bar		500 bar		500 bar				350 bar				
mini		compact		overload protection		overload protection		reinforced		overload protection				sturdy				
B 1.848		B 1.8491 B 1.849		B 1.891 B 1.891		B 1.892 B 1.892		B 1.8921		B 1.8803				B 1.852				
-								-		-				-				
drilled channels								drilled channels										
-	-	●	●	-	-	-	-	●	●	-	-	-	-	-	-	-	-	
●	●*	-	VI	-	-	○	○	VI	VI	-	-	○	○	○	○	○	○	
-	-	-	-	-	-	○	○	-	-	-	-	○	○	○	○	○	○	
cylindrical	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	cone	
FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	NBR/FKM	
(5)	○*	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
+150 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	
6 mm	10 mm	20 mm	20	32	50 mm	32	50 mm	20	32	40	50 mm	16	20	25	32 mm	20	25	32 mm
10 mm	14 mm	23 mm	25	40	50 mm	40	63 mm	25	40	50	63 mm	23	28	36	45 mm	28	36	45 mm
0.6 kN	2.2 kN	4.0 kN	2.8	6.8	16.5 kN	6.8	16.5 kN	2.8	6.8	10.5	16.5 kN	6	8.4	15	22 kN	8.4	15	22 kN
8 mm	8 mm	7 mm	11	14	15 mm	22	20 mm	11	14	15	15 mm	12	12	15	15 mm	12	12	15 mm
								25	25	25	25 mm	25	25	25	25 mm	25	25	25 mm
6 $\frac{\text{cm}^3}{\text{s}}$	5 $\frac{\text{cm}^3}{\text{s}}$	1.5 $\frac{\text{cm}^3}{\text{s}}$	3	10	28 $\frac{\text{cm}^3}{\text{s}}$	20	55 $\frac{\text{cm}^3}{\text{s}}$	3	10	18	28 $\frac{\text{cm}^3}{\text{s}}$	10	14	32	57 $\frac{\text{cm}^3}{\text{s}}$	14	32	57 $\frac{\text{cm}^3}{\text{s}}$
0.2 s	0.25 s	1 s	1 s	1 s	1 s	0.75 s	0.75 s	1 s	1 s	1 s	1 s	1 s	1 s	1 s	1 s	0.5 s	0.5 s	0.5 s




Thread				Block		
500 bar				500 bar		
						
overload protection				overload protection		
B 1.881				B 1.890		
B 1.881				-		
pipe thread				pipe thread or drilled channels		
						
●				●		
-				-		
-				-		
cone				cone		
NBR/FKM				NBR/FKM		
○				○		
+80 °C				+80 °C		
20	32	40	50 mm	20	32	50 mm
25	40	50	63 mm	25	40	63 mm
2.8	6.8	10.5	16.5 kN	2.8	6.8	16.5 kN
11	14	15	15 mm	7	8	11 mm
25	25	25	25 mm			
50	50	50	50 mm			
3	10	18	28 $\frac{\text{cm}^3}{\text{s}}$	3	10	28 $\frac{\text{cm}^3}{\text{s}}$
1 s				1 s		

Low pressure

Top flange			
70 / 120 bar			
			
sturdy			
B 1.8500 / B 1.8510			
pipe thread or drilled channels			
			
-			
●			
○			
cone			
NBR/FKM			
○			
+80 °C			
14	22	30	36 mm
25	36	52	65 mm
2	3.8	8.3	13.3 kN
3.4*	6.5*	14.2*	22.8* kN
8	8	10	10 mm
13	33	96	167 $\frac{\text{cm}^3}{\text{s}}$
0.2 s			

* 120 bar (B 1.8510)

Electric swing clamps

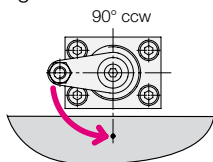
Top flange	
	
B 1.8310	
swing clamps with DC motor, gear and threaded spindle nominal voltage: 24 VDC	
with electrical position monitoring and extended self-monitoring with error messages	
Clamping force control	●
Position monitoring	●
Clamping arm seat	cone
Seals / wipers	NBR/FKM
Operating temperature	-10...+40 °C
Metallic wiper	○
Clamping time approx.	3 s
Rod diameter	36 mm
Axial pulling force adjustable	3...9 kN
Max. clamping force	approx. 6.9 kN
Clamping stroke (usable)	20 mm
Swing stroke	3 mm
Total stroke (mechanical)	26 mm
Swing angle	0°/90°/180°*

* Further swing angles are available on request (min. 45°).



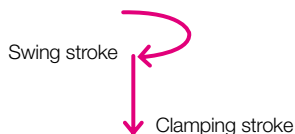
Application

Hydraulic swing clamps are used for clamping of workpieces when it is essential to keep the clamping area free of straps and clamping components for unrestricted workpiece loading and unloading.



Function

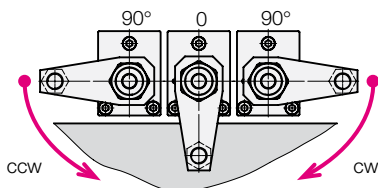
A swing clamp is a pull-type cylinder where a part of the total stroke is used to swing the piston (swing stroke) and the screwed-on clamping arm.



Swing direction

The swing clamps are available with clockwise and counterclockwise swing motion or without swing motion (0°).

"Swing direction cw" designates the clockwise rotation of the piston starting from the extended position (off-position). Accordingly, the "swing direction ccw" is a counterclockwise rotation.



Standard swing angles are 90°, 60° and 45°

Special angles on request.

0° version

Use as pure pull-type cylinder with a piston which is secured against torsion and which allows eccentric load as per clamping force diagram.

Tolerance of the swing angle

is $\pm 2^\circ$, if not otherwise indicated. For swing clamps with reinforced swing mechanism the tolerance is $\pm 1^\circ$.

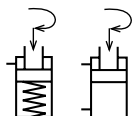
Single or double acting

Single-acting swing clamps retract to the off-position with spring force.

Advantages: simple valve control and only one supply line.

Double-acting swing clamps retract with hydraulic pressure.

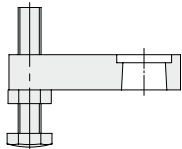
Advantages: short calculable unclamping times and higher process safety in automatic mode.



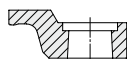
Accessory - clamping arm

As accessories different clamping arms are available. Material 42CrMo4

- One-sided clamping arm with contact bolt



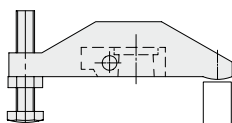
- One-sided short, cranked clamping arm



- Clamping arm assembly

The design of the clamping arm assembly is asymmetric. The bearing pin is mounted on the side of the carrier. Thereby an asymmetric lever ratio is generated that provides a higher clamping force.

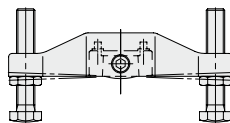
The second support point of the clamping arm assembly on the right is not used for clamping but only for support.



- Double clamping arm

The double clamping arm is designed symmetrically. A carrier provides the connection to the piston. Thereby 2 workpieces can be clamped at the same time, the pulling force of the piston is reduced by half.

Two pressure springs keep the clamping arm in horizontal position.



Clamping arm seat

To locate clamping arms or clamping arm assemblies, normally a cone seat at the piston of the swing clamp is used.

The cone ratio is 1 to 10. This location is the same for all types of one size.

Clamping arm mounting

When tightening and untightening the fixing screw, the clamping arm has to be backed up to avoid the introduction of moments to the piston rod and thereby any deterioration of the swing mechanism.

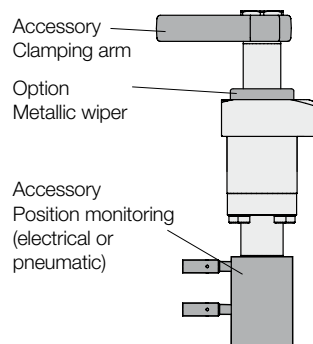
Adjustment of contact bolt

The contact bolt may only contact the workpiece after completion of the swing motion. When tightening and untightening the lock nut, the clamping arm has to be backed up.

Accessory - position monitoring

Position monitoring is available as an accessory for some swing clamp types.

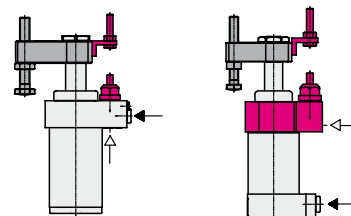
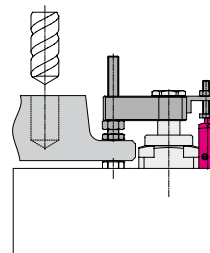
The positions "Unclamped" and "Clamped" are acknowledged.



Position monitoring is operated by an "extended rod". This rod protrudes at the bottom of the swing clamp and is hydraulically sealed. It forms one unit together with the helix rod and allows a pneumatic or electrical monitoring of the piston position outside the swarf area.

With the pneumatic position monitoring the positions can be controlled by pressure switches or differential pressure switches. In the case of electrical position monitorings the controls are effected by inductive proximity switches.

An alternative control are the pneumatic position monitorings as per data sheet B 1.852, B 1.853 and B 1.854. The position "Clamped" is directly controlled at the clamping arm.



Option - metallic wiper

In addition to the FKM wiper many double-acting swing clamps can be equipped with a metallic wiper.

The metallic wiper protects the FKM wiper against mechanical damage, e.g. by hot swarf or high coolant pressure. The metallic wiper is not suitable for dry machining, minimum quantity lubrication and in case of accumulation of very small grinding swarf.



Materials

Piston material

high alloy steel, nitrated or chromium-plated

Body material

high alloy steel, nitrated

By nitrating piston and body, wear is reduced and protection against corrosion increased.

Sealing materials

Series:

- NBR = nitrile butadiene rubber
Trade name e.g.: Perbunan
Operating temperature: -30 up to +80 °C

On request:

- FKM = fluoro rubber
Trade name e.g.: VITON®
Operating temperature: -20 up to +150 °C

Maximum operating pressure

For one-sided clamping arms the maximum admissible operating pressure depends on the length of the clamping arm. These values are indicated in the diagrams on the corresponding data sheets.

When using a double clamping arm or a clamping arm assembly, the complete operating pressure can be applied.

Admissible flow rate

The admissible flow rate has to be kept to avoid overload, increased wear and malfunctions of the swing clamp.

Throttling has to be made in the oil supply line to the swing clamp to rule out a possible pressure intensification. Use only flow control valves which allow oil return from the swing clamp without any impediments.

During unclamping the admissible oil flow rate can obtain a higher value, since the piston area is correspondingly bigger.

Unimpeded swing motion

The swing motion must not be impeded and the clamping arm may only contact the workpiece after completion of the swing stroke.

Overload protection device

A preloaded coupling between piston and helix rod disengages when the overload torque is exceeded (see technical data). This protects the swing mechanism from damage in the event of

- blocked swing motion
- too high swing speed
- improper fixing of clamping arm.

After pressure relief, the piston can be engaged again by hand.

VI version without overload protection device

Some series can be supplied in VI version on request.

VI = **V** - reinforced swing mechanism
+ **I** - hexagon socket in the piston rod

Advantages

- Higher process safety in automatic mode
- Halving of the clamping and unclamping time with possible doubling of the flow rate.
- Easier mounting of the clamping arm

Reinforced or sturdy swing mechanism

Some series are only available with a reinforced or sturdy swing mechanism. They are also named in this way on the corresponding data sheets.

Advantages

- High process safety in automatic mode
- Endures a collision of the clamping arm with the workpiece up to a clamping pressure of 100 bar.
- Optionally available with extended piston rod for position monitoring.

Danger of injury

Hydraulic clamping elements can generate considerable forces. Due to the swing motion, the exact clamping and unclamping position cannot be determined in advance.

Considerable injuries can be caused to fingers in the effective area of the clamping arm.

Remedy: protection device with electrical locking.

Dimension tolerances

Dimensions without tolerance data correspond to the general tolerances in accordance with DIN ISO 2768 -mH.

Fittings

Fittings suitable for the Whitworth G pipe thread correspond to DIN 2353, screwed plug type B or E according to DIN 3852 sheet 2 (with sealing edge or soft seal).

Important: No additional sealing materials, such as Teflon ribbon, must be used!

Leakage rate

ROEMHELD swing clamps are leakage-free in static condition.

During displacement of the piston a residual lubricating film will be tolerated with regard to the life of sealings and guides.

A leakage in the form of oil drops indicates a necessary replacement of wear parts.

Bleeding

Air in the oil prolongs the clamping time considerably and leads to function troubles. Therefore bleeding has to be effected during start up.

Venting of the spring area of single-acting swing clamps

If there is a possibility that aggressive cutting lubricants and coolants penetrate through the sintered metal air filter into the cylinder's interior, a vent hose has to be connected and be placed in a protected position.

For further notes and provisions see data sheet A 0.100.



**Elements and systems
for production engineering**



Römheld GmbH

Friedrichshütte
Römheldstraße 1–5
35321 Laubach
Germany
Tel.: +49 6405/89-0
Fax: +49 6405/89-211
E-mail: info@roemheld.de
www.roemheld-group.com

**Workholding systems and standard fixtures
for metal cutting and non-cutting manufacturing**



Hilma-Römheld GmbH

Schützenstraße 74
57271 Hilchenbach
Germany
Tel.: +49 2733/281-0
Fax: +49 2733/281-169
E-mail: info@hilma.de
www.roemheld-group.com

Magnetic clamping systems



Römheld Rivi GmbH

Schützenstraße 74
57271 Hilchenbach
Germany
Tel.: +49 2733/281-100
Fax: +49 2733/281-102
E-mail: info@roemheld-rivi.de
www.roemheld-group.com

Intelligent zero point clamping systems



Stark Spannsysteme GmbH

Römergrund 14
6830 Rankweil
Austria
Tel.: +43 5522/374 00-0
Fax: +43 5522/374 00-700
E-mail: info@stark-inc.com
www.stark-inc.com