ROEMHELD
HILMA ▪ STARK

Operating Manual

including installation and assembly instructions
for incomplete machines as per Machinery Directive 2006/42/EC

for **swing sink clamping element**

double-acting type	**2154-160 / 2154-200** **2155-160 / 2155-200** **2156-160 / 2156-200** **special designs**
double-acting type for external clamping:	**2235-310 / 2235-410** **2237-310 / 2237-410** **special designs 2230-xxxx**

Hilma-Römheld GmbH

Schützenstraße 74
D - 57271 Hilchenbach
Telephone: +49 (0) 2733/281-0
Fax: +49 (0) 2733/281-169
Email: info@hilma.de
www.roemheld-gruppe.de

Table of contents

Jun-18 Printed in Germany - - Subject in modification

In order to ensure safe operation for the intended purpose, please read the operating manual before installation and before putting the swing sink clamping elements into operation for the first time!

In order to assist in understanding the functional interrelations of the swing sink clamping elements, especially the need for remedial action if the elements have fallen out of step with the others or if the overload protection devices have tripped, a computer-animated step-by-step instruction is available as a supplement to this operating manual.

https://www.roemheld-gruppe.de/en/products/die-clamping-technology/hydraulic-clamping-elements/swing-sink-clamping-elements.html

1 General information, safety information and manufacturer's declaration

1.1 General

The safety of Hilma-Römheld swing sink clamping elements has been thoroughly checked. They are designed for use as specified in the technical data. If all technical instructions are not observed, the safety of the operator and the proper functioning of the machine may be put at risk. Unauthorised modification or alterations to Hilma-Römheld carrying consoles is prohibited for reasons of safety. If this instruction is not observed, our guarantee will be invalid.

Thorough observance of this operating manual is essential for trouble-free operation of the swing sink clamping elements. Malfunction during commissioning and during press operation is often due to incorrect installation or to erroneous operation or control (see chapter 5.0 'Trouble shooting')

1.2 Field of application

The Hilma-Römheld swing sink clamping element is integral part of a hydraulic quick clamping system for press dies.
The swing sink clamping element may be installed as a multiple arrangement in the press bed or in the ram so that in the unclamped position no parts project over the bed upper edge or the lower edge of the ram so that dies / die carriers may be changed without any impediment.
The swing sink clamping element for external clamping may be installed as a multiple arrangement on the outside of the press bed or the ram, so that in the unclamped position, the tie rod is flush with the bed or ram level and no parts project over the upper edge of the bed or the lower edge of the ram so that dies / die carriers may be changed without any impediment.

1.3 Operating parameters

Hilma-Römheld swing sink elements must not be exposed to higher pressures / forces than those specified. The maximum operating pressure must not be exceeded.

1.4 Temperatures

The maximum operating temperature for the standard version is 70 °C.

1.5 Important safety information

- Only use suitable connectors for hydraulic installation (see chapter 4 'Installation').
- Tighten fastening screws by applying the specified torque (see chapter 4 'Installation').
- Installation and repair work must only be carried out in a depressurized condition.
- Specified operating pressures and temperatures must not be exceeded.
- When clamping and unclamping operations are carried out, keep your hands well away from the moving range of the swing sink elements.

Before putting the elements into operation, the operator must be fully trained.
Young people under 16 years old must not be allowed to operate the clamps. Staff over 16 years old are allowed to operate the consoles under supervision as part of their apprenticeship. The operating instructions must be readily accessible. The operator must inform third parties of any danger in the working area.

1.6 Declaration

The swing sink clamping elements have been developed, designed and manufactured in accordance with the EC Directive 'Machinery' 2006/42/EC. The complete declaration is available on request.

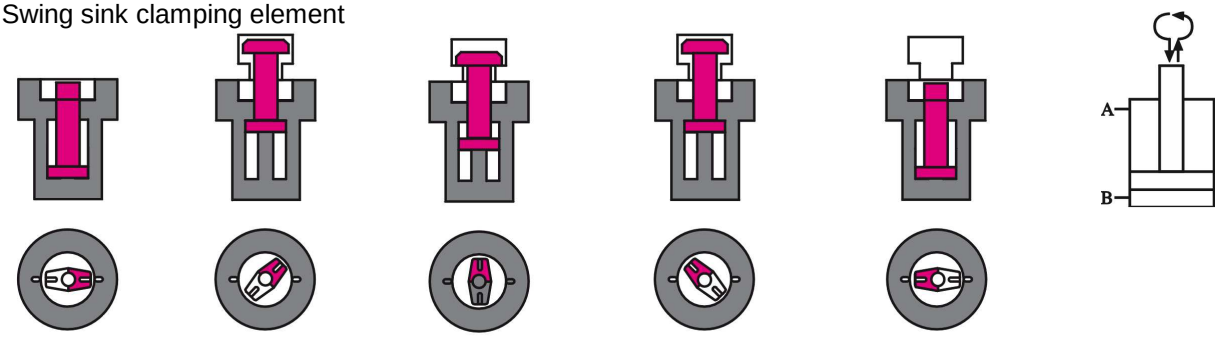
2 Design and function

2.1 Design

The swing sink clamping elements consist of the housing which accommodates the swing mechanism for the piston, inductive proximity switches for monitoring the unclamping, change-over and clamping position and the piston with the tie rod.
The swing mechanism consists of a guide pin which guides the piston in such a manner that it rotates during part of the stroke. The rotating movement is carried out just before reaching or after leaving the upper piston end position (change-over position).It always rotates to the left, whether the piston is retracting or extending.

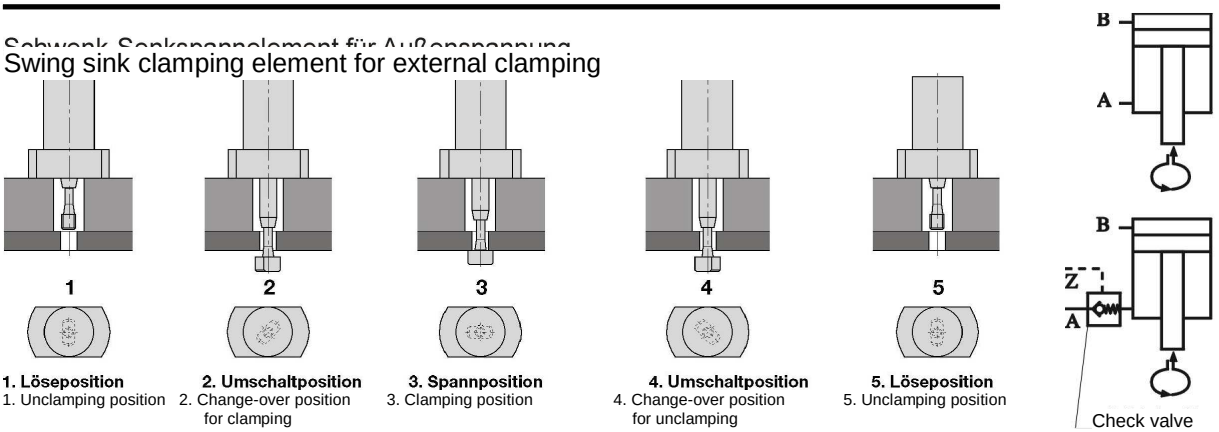
2.2 Functional description

Swing sink clamping element



Schwenk-Senkspannelement für Außenspannung

Swing sink clamping element for external clamping



1. Lösposition
1. Unclamping position

2. Umschaltposition
2. Change-over position for clamping

3. Spannposition
3. Clamping position

4. Umschaltposition
4. Change-over position for unclamping

5. Löseposition
5. Unclamping position

1. Unclamping position
The piston has completely retracted. Easy die change, as there are no parts projecting above bed or ram level. Proximity switch 2S1 monitors this position.

2. Change-over position for clamping
Pressure is applied to piston side B. The tie rod has moved through the slot of the clamping point and has then rotated by 45°. Proximity switch 2S2 monitors this position.

3. Clamping position
Pressure is applied to rod side A. The tie rod has once again rotated by 45° and has retracted. Following a linear stroke of 5 mm the tie rod is diagonally above the clamping point. *The die is clamped*. Proximity switch 2S3 monitors this position.

4. Change-over position for unclamping
Pressure is applied to piston side B. The tie rod is extended and then again rotated by 45°. Proximity switch 2S2 monitors this position.

5. Unclamping position
Pressure is applied to rod side A. After a further rotation of 45°, the tie rod has again moved through the slot of the clamping point and has reached the end position. Proximity switch 2S1 monitors this position. *The die is unclamped.*

(For functional and hydraulic schematics and fort he pin assignment of the proximity switches, see chapter 4.4.2, hydraulic schematics, flow chart and 4.3 'Electrical installation, pin assignment')

A number swing sink clamping elements in one hydraulic circuit will perform different piston movements due to lack of mechanical coupling, varying friction of the components and different lengths of the piping (extending of all elements is not synchronous!). Therefore, the piston movements of ALL swing sink clamping elements in one hydraulic circuit must be fully carried out once they have been started, until the change-over position has been reached.

The signals of the proximity switches "Change-over position' and of the pressure switches of ALL elements must be available! (See also chapter 4.4.5 'Stroke reverse protection**),** otherwise the clamping arms may fall out of step, and the swing mechanism, may be damaged (see also chapter 5.0 'Trouble shooting')

2.2.1 Monitoring of tie rod position

In order to ensure safe functioning of the swing sink clamping elements it is necessary to monitor the unclamping, change-over and clamping positions, so that signals for die change and machine operation are available and any malfunction is indicated immediately. For this purpose, inductive proximity switches are integrated into the cylinder housing. They react to switching positions of the piston rod. The signals for the clamping, change-over and unclamping positions can also be displayed on the control panel, in order to facilitate trouble shooting in the event of a failure. In the control system, the signals are required together with the signals emitted by the power unit pressure switches in order to ensure a trouble-free cycle of the swing sink clamping elements.

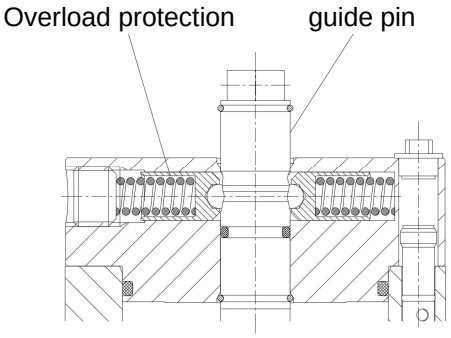
When using distribution block 5700-015, failures are indicated by LEDs and can be localized.

(For a description of the distribution block, see chapter 4.3 'Electrical installation'.
For functional dimensions for the tie rod position, see chapter 3.0 'Technical data, main dimensions'.)

2.2.2 Overload protection

Free swinging movement of the tie rod must be ensured.
If there is nevertheless an obstacle in the swinging range of the tie rod, the swing mechanism is protected by overload protection. In the case of a failure, the guide pin which is kept in position by spring-loaded balls will disengage.

(For repositioning the guide pin, see chapter 2.2.3, emergency hand control and chapter 5.0 'Trouble shooting')



2.2.3 Emergency manual control

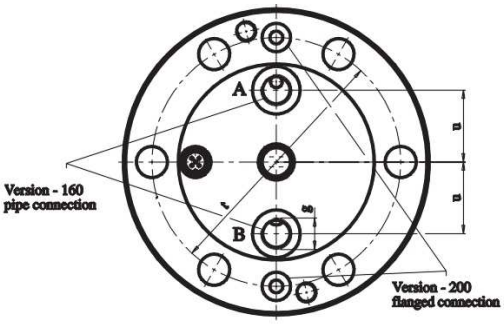
When the overload protection has tripped or the swing sink clamping elements have fallen out of step, the guide pin can be repositioned and the tie rods can be reset to give uniform movement by manually rotating the guide pin.
An external hexagon on the guide pin at the rear of the clamping element and an internal hexagon on the clamping head of the tie rod provide for manual resetting.

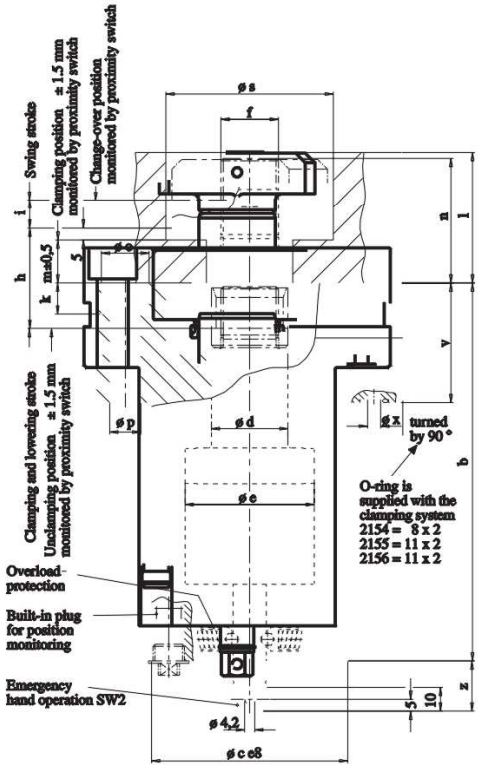
Free access to one of the two hexagons for emergency manual control must be ensured!
Access may be achieved by a firmly installed extension to the external hexagon on the guide pin (e.g. by a rod assembly with reversal of the direction or by a cardan joint)
Only apply emergency manual control in a depressurized condition!

3 Technical data, main dimensions

Swing sink clamping element

Clamping force at 400 bar (kN)	60	104	164
Clamping force at 100 bar (kN)	15	26	41
Piston-Ø e (mm)	54	70	88
Piston rod-Ø d (mm)	32	40	50
Swing stroke i (mm)	12	15	21
Clamping+lowering stroke h (mm)	42	54	65
Oil consumption clamping (cm ^{3})	150	318	630
Oil consumption unclamping (cm ^{3})	120	256	512
Max. volume flow (cm ^{3}/s)	15	32	63
a (mm)	128	160	192
b (mm)	158	197	242
c (mm)	82	104	126
f (mm)	M24x1,5	M30x1,5	M36x1,5
g	G 1/4	G 3/8	G 3/8
k (mm)	13	17	21
l (mm)	55	70	87
m (clamping edge) (mm)	18	23	28
n (mm)	53	68	85
o (mm)	20	26	33
p (mm)	13	18	22
q (mm)	34	42	52
r (mm)	65	80	95
s (mm)	70	86	103
t (mm)	104	130	156
u (mm)	30	38	45
v (mm)	50	61	72
w (mm)	38	47	59
x (mm)	5,5	8	8
y (mm)	70	86	103
z (mm)	21	24	29
(Emergency hand operation) SW1 (mm)	12	14	19
(Emergency hand operation) SW2 (mm)	6	8	10
Weight (kg)	7,4	14,7	25
Part no.			
with pipe connection	2154-160	2155-160	2156-160
with flanged connection	2154-200	2155-200	2156-200

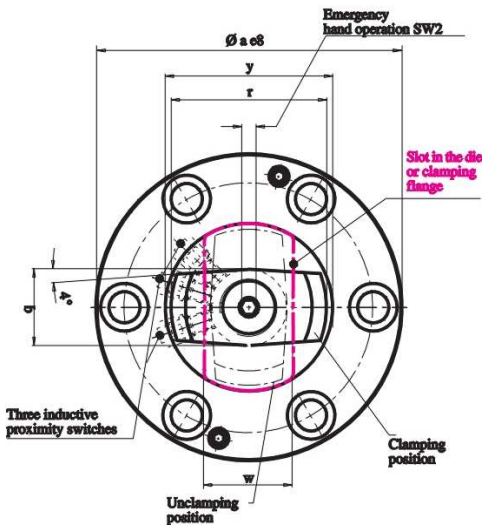




Max. operating pressure 400 bar
Other sizes and special versions are available on request.

Swing sink clamping element for clamping edge m = 50 mm

m (mm)	50	50	50
h (mm)	74	81	87
b (mm)	190	224	264
n (mm)	85	95	107
l (mm)	87	97	109
Oil consumption clamping (cm ^{3})	222	420	764
Oil consumption unclamping (cm ^{3})	174	342	601
Part no.			
with pipe connection	8.2154.8059	8.2155.8047	8.2156.8023
with flanged connection	8.2154.8082	8.2155.8050	8.2156.8027



Please note!
Access to one of the two emergency hand controls SW1 or SW 2 is essential.

In the case of special designs (215x-8xxx) please note the information on the following drawing!

Swing sink clamping element for external clamping

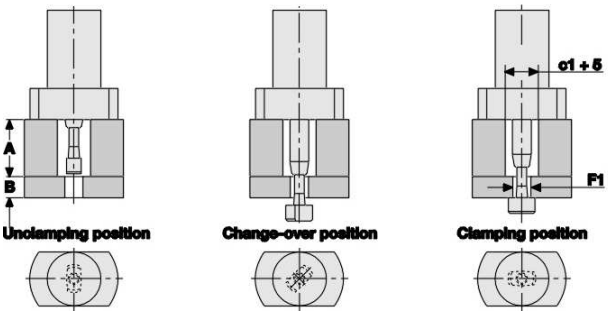
Clamping force at	400 bar (kN)	104	216
	100 bar (kN)	26	54
Piston Ø e	(mm)	70	100
Rod Ø d	(mm)	40	56
Max. clamping edge height	(mm)	68	68
Swivelling stroke (i)	(mm)	15	23
Clamping and lowering stroke (h)	(mm)	105	112
Oil consumption clamping	(cm^3)	514	1211
Oil consumption unclamping	(cm^3)	388	948
Max. volume flow	(cm^3/s)	50	120
a	(mm)	170	212
b	(mm)	240	270
c	(mm)	104	146
f	(mm)	M27x1,5	M36x2
g		G 3/8	G 1/2
j		G 1/4	G 1/4
k	(mm)	42	55
l	(mm)	50	71
m	(mm)	38	57
n	(mm)	25	34
o	(mm)	39,8	62
p	(mm)	14	18
q	(mm)	17,3	27,6
r	(mm)	62,5	84
s	(mm)	104	146
t	(mm)	10	23
u	(mm)	40	50
v	(mm)	60	65
w	(mm)	16,7	27,6
x	(mm)	22,6	22,6
y	(mm)	4,2	0
z	(mm)	24	31
SW	(mm)	14	22
Weight	(kg)	16,5	35
Part no.			
without check valve		**2235 310**	**2237 310**
with check valve pilot controlled		**2235 410**	**2237 410**

Max. operating pressure: 400 bar
Other sizes and special designs are available on request

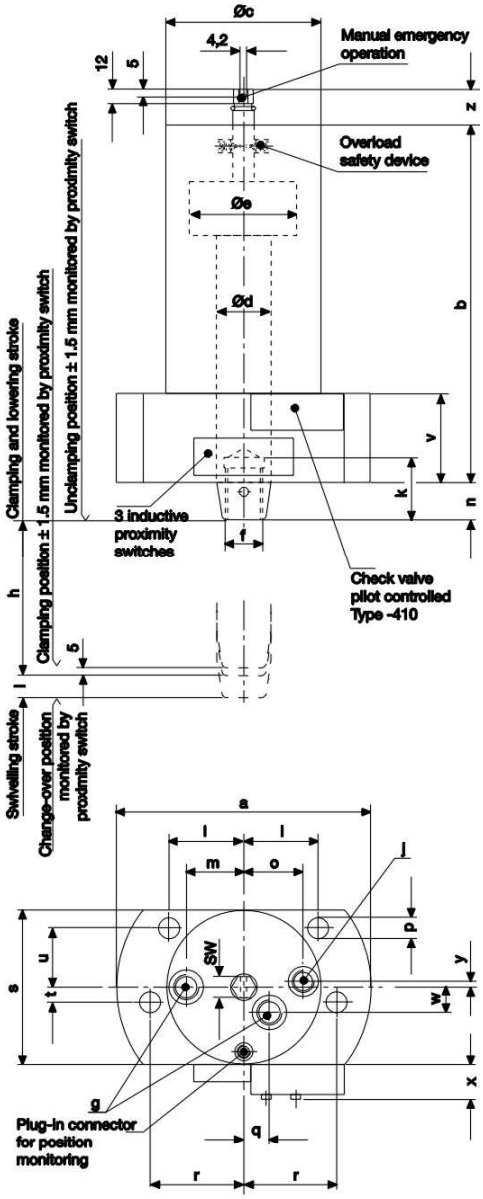
Tie rod dimensions

Swing sink clamp		2235-XXX				2237-XXX		
F1 clamping slot in the die	(mm)	32	40	45	50	45	50	60
a1	(mm)	22	22	22	22	32	32	32
b1	(mm)	28	28	28	28	40	40	40
c1	(mm)	54	62	67	72	77	82	92
d1	(mm)	28	28	28	28	40	40	40
e1	(mm)	30	30	30	30	37	37	37

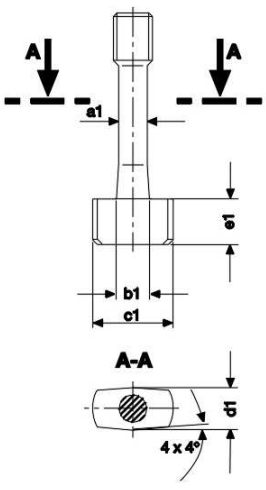
When ordering, please specify the dimensions A (slide plate), B (die clamping edge thickness) and F1 (clamping slot)



Clamping element



Tie rod



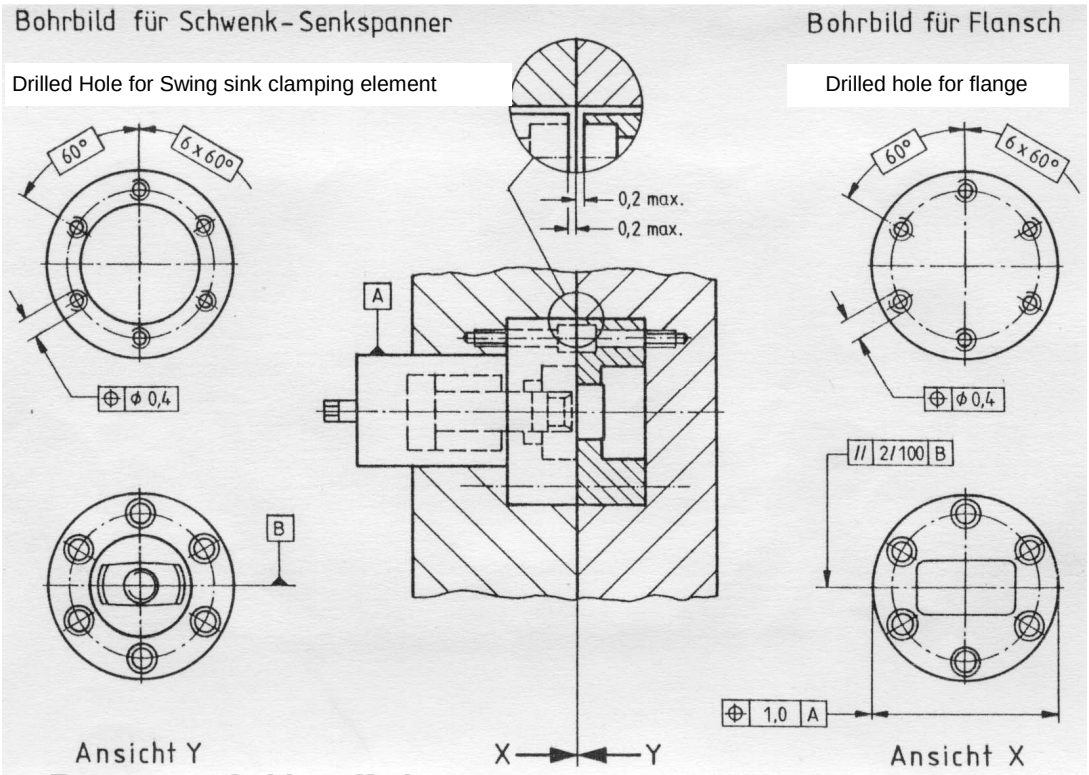
In the case of special designs (223x -8xxx) please note the information on the following drawing!

4 Installation, connection and putting into operation

If the incomplete machine 'Clamping bar' is installed, the following minimum conditions must be complied with, in order to ensure correct assembly with other components to form a complete machine without endangering personal health and safety.

4.1 Installation, accessories

In order to ensure perfect functioning, the holes for the swing sink clamping elements and the clamping flanges must be drilled into the press bed and ram and into the die taking due account of the indicated dimensions and tolerances.
Guides, end stops and fasteners, respectively, are required as limiting measures for the die.



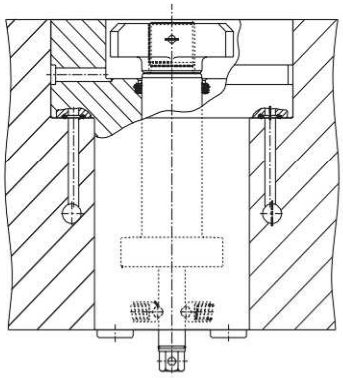
View Y

View X

Recommended installation

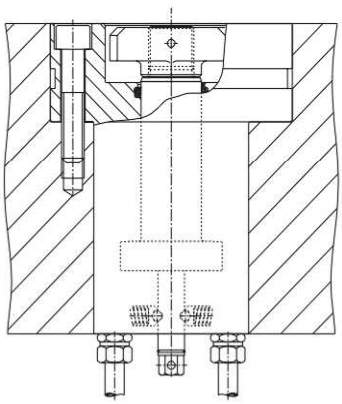
In order to ensure ease of servicing, two alternatives are offered for connecting the swing sink clamps.

Flanged connection



Hydraulic oil is fed through the drilled holes in the bed and in the ram. There are no exposed conduits or screw fittings. O-rings supplied with the clamping element provide for tight fitting. Easy installation, ease of servicing.

Pipe connection

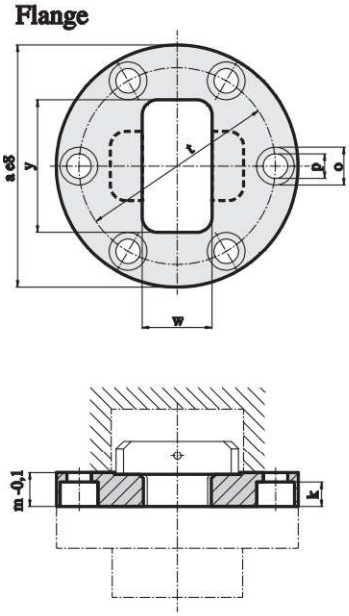


Pipes are recommended in applications where screw fittings are easily accessible and where pipes do not impede installation and dismantling of the swing sink clamps.

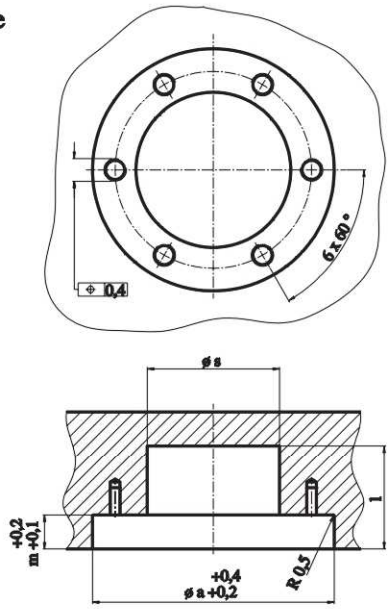
Accessories

Flange as a clamping point for installation in press dies

Flange

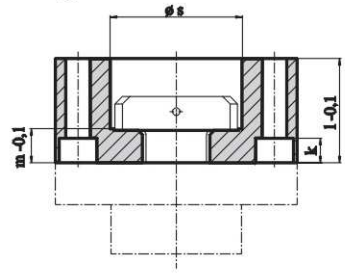


Location hole

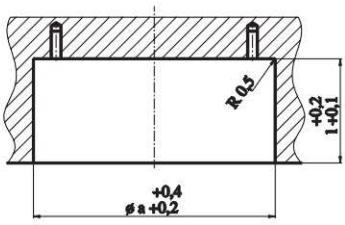


Part no.	for clamping element type	Dimensions in mm a	k	l	m	o	p	s	t	w	y
5700-016	2154-160 2154-200	128	13	55	18	20	13	70	104	38	70
5700-017	2155-160 2155-200	160	17	70	23	26	18	86	130	47	86
5700-018	2156-160 2156-200	192	21	87	28	33	22	103	156	59	103

Flange

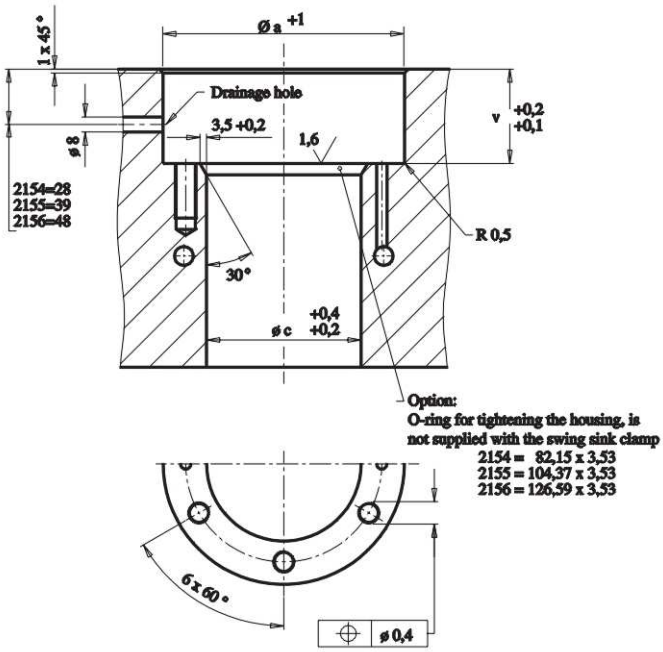


Location hole



Part no.	for clamping element type	Dimensions in mm a	k	l	m	o	p	s	t	w	y
5700-019	2154-160 2154-200	128	13	55	18	20	13	70	104	38	70
5700-020	2155-160 2155-200	160	17	70	23	26	18	86	130	47	86
5700-021	2156-160 2156-200	192	21	87	28	33	22	103	156	59	103

Drilled hole for flanged or pipe connection



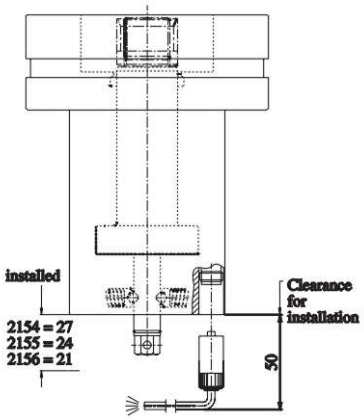
Flanged connection requires a plain and neat surface. The drainage hole may be drilled in any position provided that spray and separating agent can drain off freely.

4.1.1 Access from the rear

Hydraulic ports A and B must be easily accessible for installation, maintenance and dismantling purposes. If the installation space is tight, the swing sink clamps may be provided with an O-ring flange connection, in order to ensure easy replacement.

Furthermore, rotation of the guide pin must be assured in the case of failure, if necessary by means of a firmly installed extension (see chapter 2.2.3 'Emergency manual control')

Connection of the monitoring system for clamping and unclamping position



The three proximity switches are connected to the base of the swing sink clamp through a connecting lead with a screw coupling [IP 67].The connecting lead is not supplied with the swing sink clamp and it has a separate part number, see page 9. Further installation may be carried out using a distribution block with an LED display.

4.1.2 Clamping and unclamping time

When changing dies, the time required for hydraulic clamping and unclamping is rather short. The capacity of the power unit must be designed so that the clamping and unclamping cycle takes between 10 and 30 seconds. Shorter cycles are not recommended for the reason of functional safety.

Clamping and unclamping cycle:

$$Q_p = (V * z * 60) / (t * 1000) \quad in\ sec$$

t = Clamping / unclamping cycle (s)
V = Oil consumption / swing sink clamp (cm^3)
z = Number of swing sink clamps
Q_p = Pump capacity (l/min)

4.2 Hydraulic installation

Connect the swing sink clamping elements using DIN 2353 screw fittings (heavy design) (for connections, see chapter 3 'Technical data, main dimensions').
The hydraulic pipework on the machine side must be of sufficient size (type 2154: 8x2 DIN 2391-St35 NBK or larger; types 2155, 2156, 2235 and 2237: 12x2.5 DIN 2391-St35 NBK or larger) must be installed in accordance with the specifications (DIN EN 982) and must conform to up-to-date practice for high-pressure hydraulics.

- Pipes should be as short as possible; pipe bends should have a large radius.
- Neat installation is essential for trouble-free operation of the system.
- Make sure that the pipe ends are free from burrs and that pipes, high-pressure hoses and screw fittings are cleaned and blown through.
- Protective plugs should only be removed immediately before connecting the hydraulic system.
- Swing sink clamps that belong together should be connected to manifold blocks, series connection should be avoided.
- Pipes leading to the power unit should be of sufficient diameter to avoid back pressure.
- Area ratio A : B = 1 : 1.,5 ; ***max. back pressure to connection B = 50 bar***
- Provide each hydraulic port with a pressure gauge connection to enable check and adjustment of operational data.
  This allows the locality of functional errors to be established quickly.
- Pipes should be fastened using pipe clamps.

Please note: The use of pressure accumulators in hydraulic systems serving swing sink clamping elements is *not permitted*. Due to the way in which they function, pressure accumulators may cause irreversible damage to elements.

If the use of pressure accumulators is essential, they must be provided with one-way restrictors in order to avoid unacceptably high flows of hydraulic fluid.

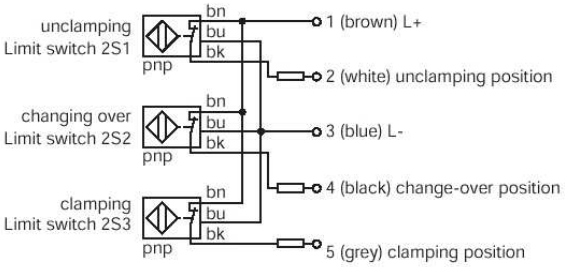
In case of doubt, please send installation schematics for check

4.3 Electrical installation, plug assignment

Each swing sink element is provided with 3 proximity switches for monitoring the clamping, change-over and unclamping position.

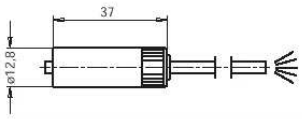
Clear, easy-to-maintain installation is achieved when the connecting cables are connected to a distributor block on the bed or on the ram. From here, the cables of all connected swing sink clamping elements are bundled and connected to the control cubicle in the form of 16-wire cables.

Pin assignment for three-wire proximity switches

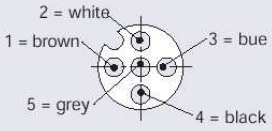


Supply voltage: 10-30 V DC
Constant current: ≤ 100 mA
Type: inductive, NC pnp

5-pole connecting lead with screw coupling

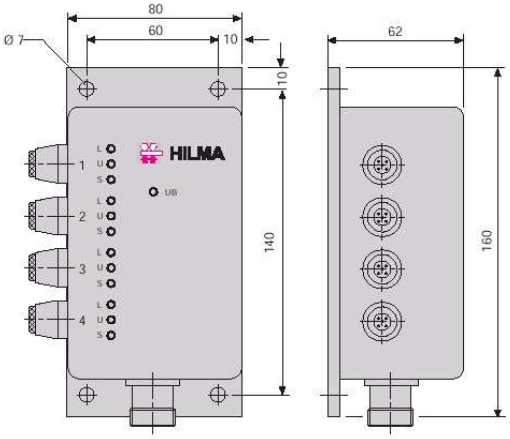


Cable length 5 m	**Part no. 5700-013**
Cable length 10 m	**Part no. 5700-014**



Distribution block with LED display for connecting 4 clamping elements

Easy installation!
LED display of the unclamping, change-over and clamping position of each clamping element.
Scope of delivery: 1 distribution block
4 coupler plugs, 5 poles
1 coupler plug, 16 poles



Part no. 5700-015

Wiring of output plug:

Pin 1 = L+
Pin 2 = L-
Pin 3 = 1L
Pin 4 = 1U
Pin 5 = 1S
Pin 6 = 2L
Pin 7 = 2U
Pin 8 = 2S
Pin 9 = 3L
Pin 10 = 3U
Pin 11 = 3S
Pin 12 = 4L
Pin 13 = 4U
Pin 14 = 4S
Pin 15 = free
Pin 16 = free

L = Unclamping position
U = Change-over position
S = Clamping position

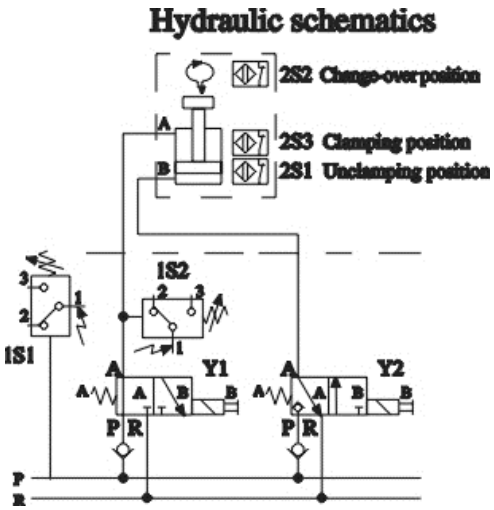
4.4 Controls

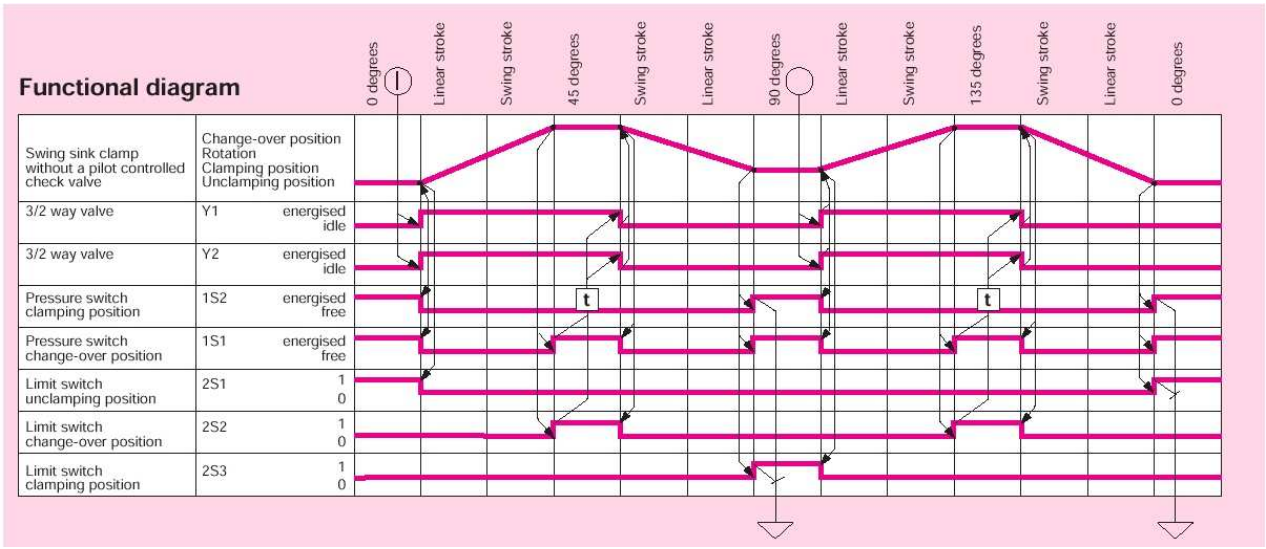
4.4.1 Hydraulic and electrical controls

The swing sink clamping elements are controlled by a power unit which, for reasons of safety, is completely separated from the hydraulic system of the machine.
As oil is only required for clamping and unclamping, the power unit operates intermittently. A pressure relief valve protects the hydraulic systems against overpressure. When the operating pressure (max. 400 bar) is reached, a pressure switch switches the motor off. If pressure drops 10% below the set value same pressure switch causes the motor to start again.
The valves are of the seat valve type. The 24V solenoids are designed for 100% duty and deenergized when the swing sink clamping elements are clamped. This ensures a long service life and furthermore, the clamping force is maintained even in the event of power failure.

4.4.2 Hydraulic schematics, flow chart

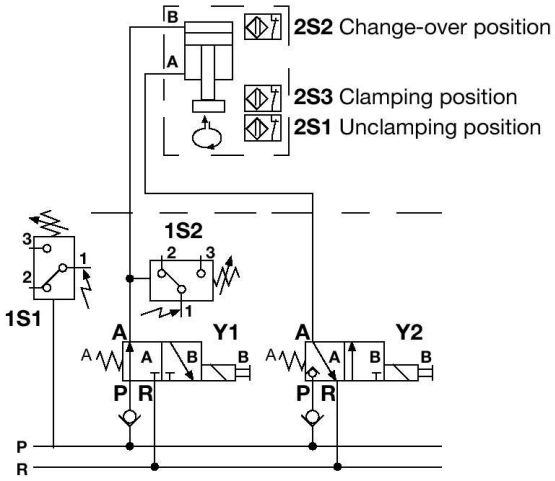
Swing sink clamping element type 215x



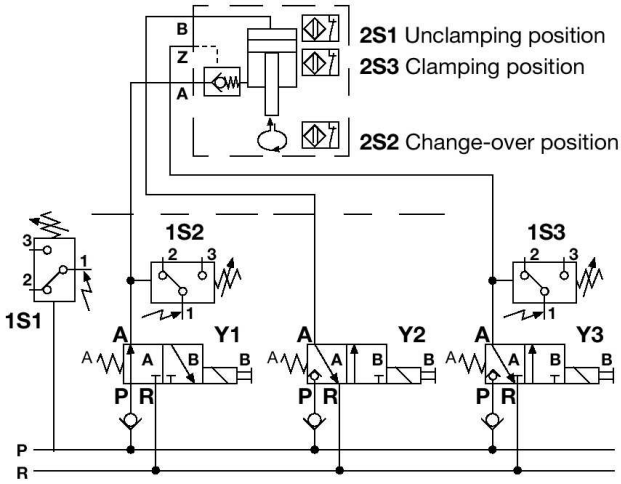


Swing sink clamping element for external clamping type 223x (with or without pilot-controlled check valve)

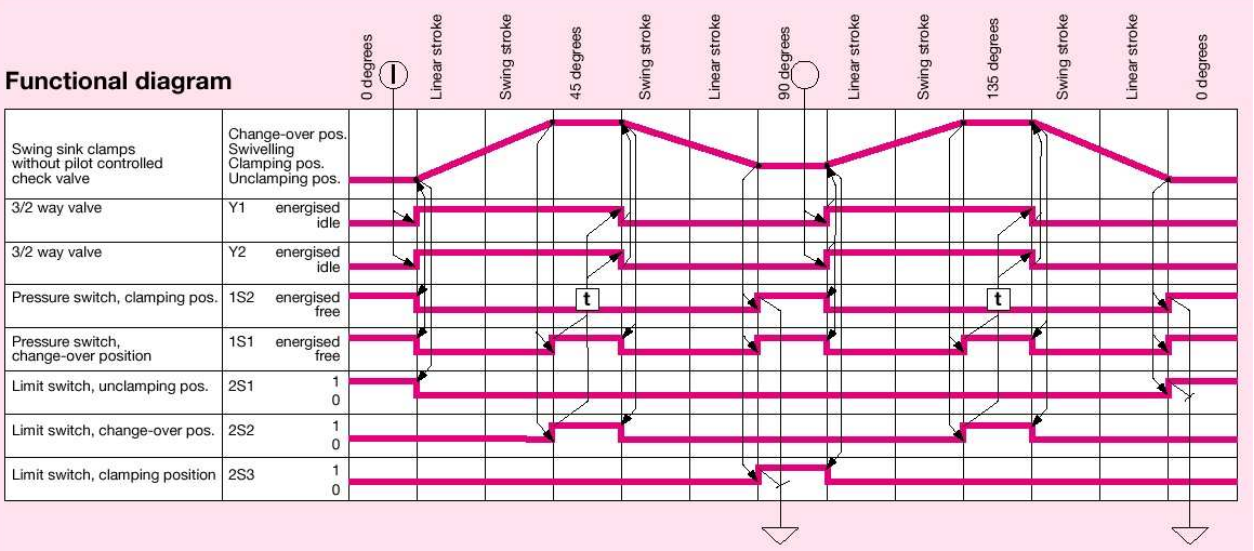
Hydraulic diagram without check valve



Hydraulic diagram with check valve

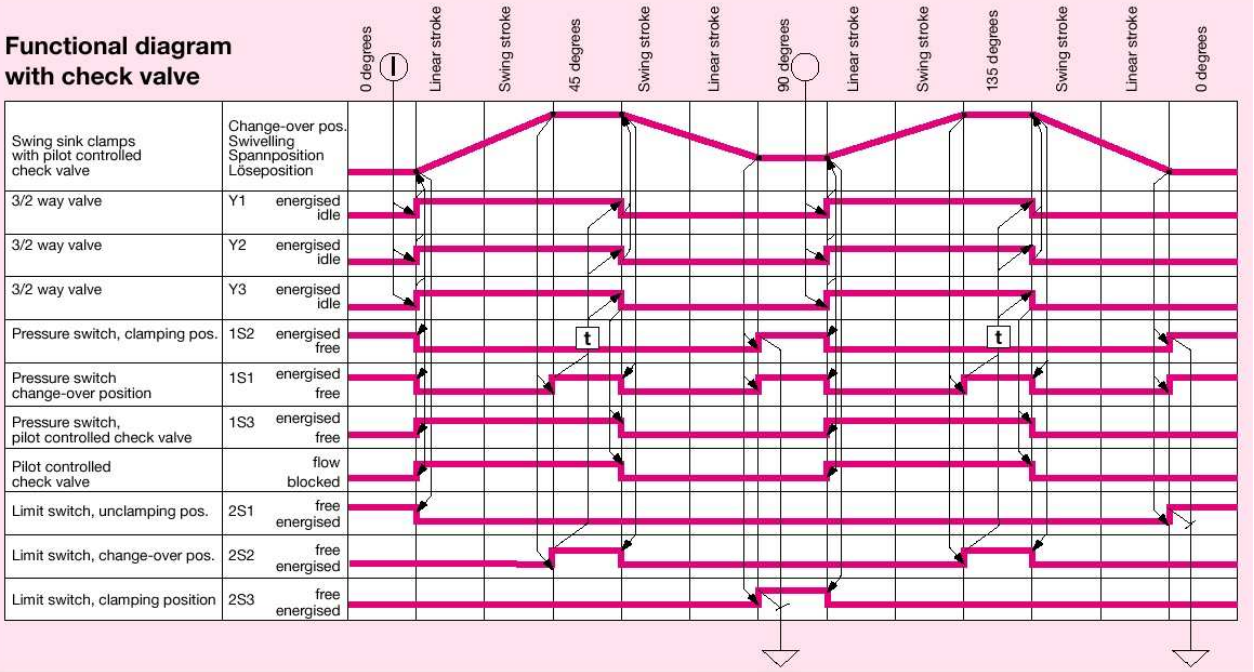


Functional diagram



Swing sink clamps without pilot controlled check valve	Change-over pos. Swivelling Clamping pos. Unclamping pos.		
3/2 way valve	Y1	energised	idle
3/2 way valve	Y2	energised	idle
Pressure switch, clamping pos.	1S2	energised	free
Pressure switch, change-over position	1S1	energised	free
Limit switch, unclamping pos.	2S1	1	0
Limit switch, change-over pos.	2S2	1	0
Limit switch, clamping position	2S3	1	0

Functional diagram with check valve



Swing sink clamps with pilot controlled check valve	Change-over pos. Swivelling Spannposition Löseposition		
3/2 way valve	Y1	energised	idle
3/2 way valve	Y2	energised	idle
3/2 way valve	Y3	energised	idle
Pressure switch, clamping pos.	1S2	energised	free
Pressure switch change-over position	1S1	energised	free
Pressure switch, pilot controlled check valve	1S3	energised	free
Pilot controlled check valve		flow	blocked
Limit switch, unclamping pos.	2S1	free	energised
Limit switch, change-over pos.	2S2	free	energised
Limit switch, clamping position	2S3	free	energised

4.4.3 Safety levels

Although malfunctions seldom occur on hydraulic quick clamping systems, failure of a component cannot be completely excluded.
In order to avoid the consequences of such a failure having an impact on the clamping safety, three safety levels are provided, and at least two of them should be installed.

Safety level no. 1:

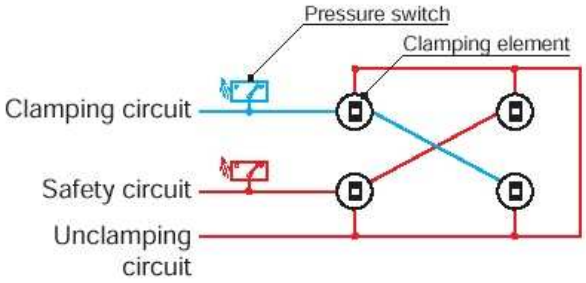
Preferably for presses with column-guided dies:

Pressure switches in every clamping circuit for controlling the clamping force, used for machine safety.

Two independent hydraulic circuits.

Clamping circuit = 50% of the clamping elements in bed and slide
Safety circuit = 50% of the clamping elements in bed and slide

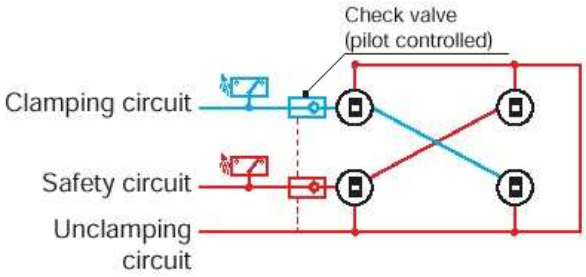
If one circuit fails, the upper or lower die is still clamped with 50% of the total clamping power.



Safety level no. 2:

For presses with dies which are not column-guided

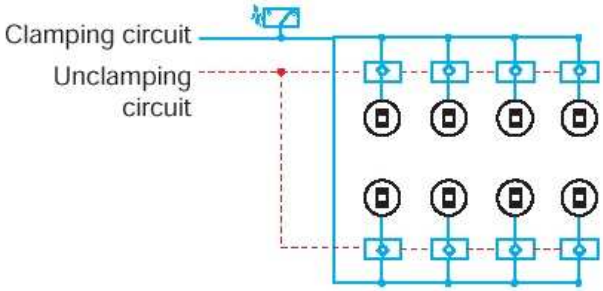
A check valve (pilot controlled) maintains pressure in the clamping and safety circuits even when the pressure drops in the remaining systems



Safety level no. 3:

For power presses and car body presses with dies which are not column-guided.

All clamping elements are secured by pilot controlled check valves. If pressure drops by more than 20% of the operating pressure, the pressure switch stops the press. The check valves maintain the clamping force for many days.



4.4.4 Position monitoring, die and ram

In order to protect the dies and the swing sink clamping elements, the correct die position must be monitored by a proximity switch.
Only once the die is correctly centred can clamping be carried out.
The ram, too, must be provided with a proximity switch which permits clamping after the ram is in contact with the die surface.

4.4.5 Stroke reverse protection

The electrical control must be designed in a way that during clamping or unclamping stroke reversal is not possible due to power failure or due to actuation of the EMERGENCY-OFF switch before ALL clamping arms have been fully retracted or extended (signal by proximity switches).

4.5 Putting into operation

Read the operating manual before putting the system into operation!

When all hydraulic and electrical connections have been checked the system can be put into operation.
As the possibility that the swing sink clamping elements might fall out of step cannot be excluded, a test run of all functions without a die is carried out.
In the test run / manual operation the position monitoring of die and ram must be circumvented (selector switch).
In the operating position of the selector switch (no test run) clamping and unclamping is initiated by a push-button and will then take place automatically.

ATTENTION: During all the time that the die is clamped, the pump unit must not be switched off. This also applies to week-ends. Exception: the die is closed, or the upper half of the die is mechanically locked!

4.5.1 Filling with oil

Only use clean, new hydraulic oil HLP 32 DIN 51524, viscosity 150 VG 32 as per DIN 51519.
(150= Viscosityindex; 32= Viscosityclass)

4.5.2 Starting and bleeding

Bleed the complete system with the pump running at low pressure (=20 bar, in the case of back pressure possibly higher) at the highest point. In order to achieve this, slightly open a screw fitting until the oil emerging is free from bubbles.

Operate all swing sink clamping elements several times until all movements are free from jerks and are completed in the calculated time.

Check the hydraulic installation for tightness. Visually check all pressurized pipes, hoses, screw fittings and clamping elements.

Check the oil level when the swing sink clamps are in an unclamped position. Refill with hydraulic oil, if necessary.

ATTENTION: When clamping and unclamping operations are carried out, keep your hands well away from the moving range of the swing sink elements.
DANGER OF INJURY!

4.5.3 Setting the operating pressure

- Set the pressure switch for pump control to the highest value.
- Switch on the pump.
- Set the operating pressure on the pressure relief valve approx. 10% above the desired operating pressure.
- Reset the pressure switch for pump until the pump switches off. Switch the pump on and off several times, thereby setting the pressure switch to the desired operating pressure.

ATTENTION: In order to prevent continuous running of the pump which might cause damage, the pressure relief valve must be set to a value which is approx. 10% above the tripping point of the pressure switch!

- Set the pressure switch for the machine controls approx. 15% below the operating pressure.

5 Trouble shooting

The swing sink clamping elements have left our premises in perfect condition. All functions have been tested, and necessary adjustments have been made.
If any malfunction should occur even though the conditions stipulated in chapter 4.0 (Installation and putting into operation) have been duly observed, please try to establish the cause using the table below.

ATTENTION: Only carry out repairs on the hydraulic system when no die is in the machine, the system is switched off and all circuits have been depressurized by manually operating the directional valves. Install the dies once all functions have been tested and they perform impeccably!

Failure 1 The clamping pressure is not maintained. The pump is running frequently.

Cause Loose screw fitting.
Remedial action Find leakage. Tighten the screw fitting in a depressurized condition.

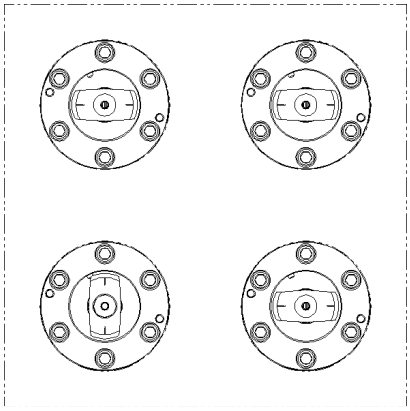
Cause Loose, dirty directional valve. Leakage from P to R.
Remedial action Check in which circuit pressure falls. Dismantle the directional seat valve and clean or replace it.

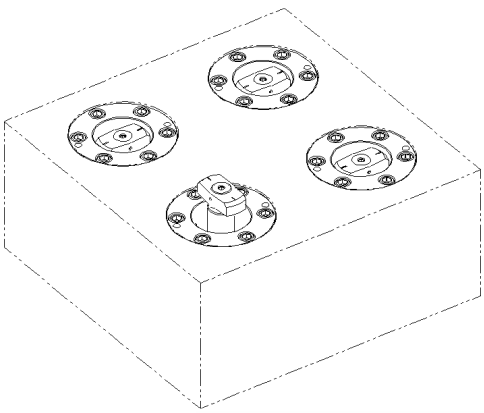
Cause Seals in the swing sink element, in the pressure switch or the directional seat valve are worn out.
Remedial action Have seals replaced by qualified personnel or send clamping element for repair.

Cause Check valve in the valve block is loose.
Remedial action Flush the check valve. To do this, manually actuate the directional seat valve (clamping circuit P) while the pump is switched on. If still loose, replace the check valve.

Failure 2 The clamping arms have fallen out of step or have disengaged

In order to assist in understanding the functional interrelations, a computer-animated step-by-step instructions is available.



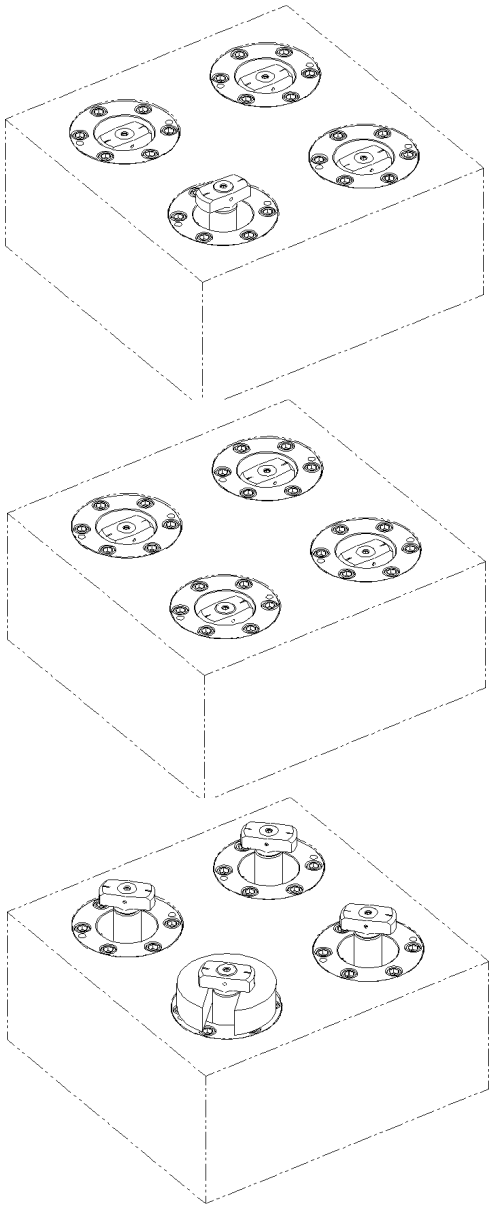


Cause
The tie rod has been impeded during swinging (e.g. collision due to incorrect die position => disengagement, see chapter 2.2.2, 'Overload protection'), or the swing movement was stopped before reaching the change-over position (=> clamping arms have fallen out of step, see chapter 2.2 'Functional description').
The tie rod of the swing sink clamping element has disengaged and/or has fallen out of step.

Remedial action

1. (Die still in the machine)
Actuate (unclamp) the system with the die closed in such a way that the tie rod which has fallen out of step clamps the die (there may be no signal from the proximity switch). All the other tie rods are in the unclamped position (signal from the proximity switch 'Unclamping position').

2. Switch off the power unit and depressurize all clamping circuits by manually operating all directional seat valves.



3. Manually rotate the guide pin of the swing sink clamping element which has fallen out of step until the signal of the proximity switch "clamped" lights up. Then rotate the guide pin by another 90°.

ATTENTION:
The guide pin has 2 positions of engagement which are staggered by 180°.
Disengaging torque:

type 2154	10 Nm
type 2155 / 2235	20 Nm
type 2156 / 2237	30 Nm

4. Switch on the power unit. The command 'Unclamp' causes the tie rod move into the unclamping position.

5. Take out the die.

6. Switch off the power unit and depressurize all clamping circuits.

7. Ensure that the guide pin of the swing sink clamping element is engaged (emergency hand control).).

=> *If all tie rods are in the same position and the signal of the proximity switch is "unclamped" for all swing sink clamping elements, the problem has been solved.*
If the clamping arm having fallen out of step does not show the 'unclamped' signal or is positioned at 90° position towards the other clamping arms, continue with paragraph 8.

8.1 Switch on the power unit and move all swing sink clamping elements in test operation in the change-over position.
Insert a blank for blocking the clamping arm which has fallen out of step.
Clamp and unclamp all clamping elements until synchronous operation of all clamping arms is achieved (normally 1x clamping + 1x unclamping + back into the change-over position)

or

8.2 If insertion of a blank is not possible due to restricted space, the clamping arm which has fallen out of step can be uncoupled hydraulically (undo hydraulic connections and close them). Clamp and unclamp the remaining clamping elements as described in 8.1 until simultaneous movement is again achieved.

In order to assist in understanding the functional interrelations of the swing sink clamping elements, especially the need for remedial action if the elements have fallen out of step with the others or if the overload protection devices have tripped, a computer-animated step-by-step instruction is available as a supplement to this operating manual.

https://www.roemheld-gruppe.de/en/products/die-clamping-technology/hydraulic-clamping-elements/swing-sink-clamping-elements.html

Failure 3 Tie rod position monitoring with permanent signal or without a signal.

ATTENTION: In the case of malfunction of the tie rod position check the function of the proximity switches using an initiator testing device on the terminal box (see chapter 4.3 'Electrical installation'). Then check the evaluation electronics.

Cause for a permanent signal	Short circuit in the control line, proximity switch defective or switching interval too long.
Cause for no signal	Control line interrupted, proximity switch defective or guide pin disengaged.
Remedial action	Check the electrical installation and the swing sink clamping element, have it repaired by HILMA experts, if necessary If the guide pin has disengaged, see failure 2.

6 Maintenance and repair

Hydraulic valves are sensitive to dirt. No impurities must get into the hydraulic oil. It is recommended that the oil be changed once a year.
When carrying out routine maintenance work on the press:
- visually check the electrical connections (plug, cable) for damage
- check the hydraulic system for tightness.

For spares and installation sketches, see chapter 7 (Technical appendix).

In the case of failure it is recommended that the swing sink clamping element is replaced, in order to avoid down times. The repair can then be made off the press (if necessary in our premises in Hilchenbach).

Repairs to swing sink clamping elements, especially to seals, on the clamping and swing mechanism and on the position control must be carried out by qualified staff only!

ATTENTION
Before dismantling swing sink clamping elements, undo all electrical and hydraulic connections.
Swing sink clamping elements must only dismantled with the tie rods in the unclamped position!

After changing a swing sink clamping element, the element must be clamped and unclamped several times without the die, in order to ensure bleeding though the power unit (this also applies if hydraulic connections have been disconnected.
For putting into operation, see chapter 4 ('Installation and putting into operation')

7 Technical appendix

The technical appendix comprises the list of spare parts and the installation plans.

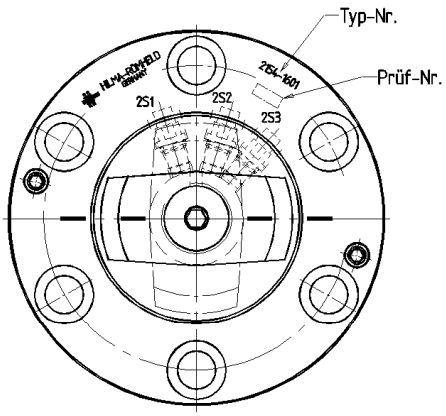
7.1 List of spare parts

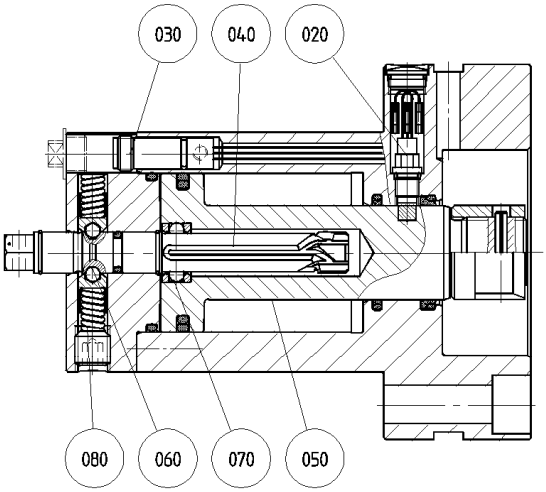
Position	Designation
010	Complete set of seals
020	Proximity switch
030	Build-in plug
040	Guide pin
050	Piston
060	Balls for overload protection
070	Balls for guide pin
080	Springs for overload protection
090	Check valve for swing sink clamping element for external clamping

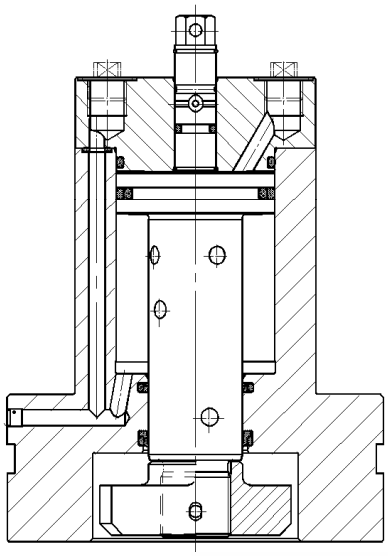
When ordering spare parts, please indicate the **designation** of the spare part, the **complete type number** (e.g. 2154-160 or 2156-8005) and the **check number** (e.g. 26-03X) des of the swing sink clamping element Both numbers are engraved on the front of the fastening flange.

If repair to the swing sink clamping elements, especially in the event of damage to the seals and the swing mechanism, we recommend that the defective swing sink clamp is sent to our Hilchenbach premises for repair!

7.2 Installation plan







Declaration of incorporation

as per

Machinery Directive EC-RL 2006/42/EC dated June 9, 2006.

We, **Hilma- Römheld**
Schützenstrasse 74
57271 Hilchenbach, declare, that the incomplete machine and its variants:

swing sink clamping elements

types
2154-160 / 2154-200
2155-160 / 2155-200
2156-160 / 2156-200
215x-8xxx
2235-310 / 2235-410
2237-310 / 2237-410
223x-8xxx

as supplied by us has been specifically designed for incorporation into a machine, taking full account of DIN-EN 294. The documentation has been prepared in conformity with appendix VII B. If required, the national authority may receive the documentation as a hard copy by post or by e-mail as a PDF format file. The machine into which the parts are to be integrated must only be put into operation after the conformity of the machine with the above EC directive has been demonstrated.
The design of our products is in accordance with DIN EN 982, DIN 24346 and EN 60204-1.

Responsible for the document:
Berthold Ginsberg
Schützenstraße 74
D-57271 Hilchenbach

Hilchenbach August 19, 2010
H.- J. Molka
Managing Director