ROEMHELD
HILMA ▪ STARK

Operating Manual

Including installation and assembly instructions
For incomplete machines as per Machinery Directive 2006/42/EC

Pull clamp

Double-acting type	**218X-160**
	218X-200
Special versions	**8.218X.8XXX**

BA 2180-E
Juni 13- Printed in Germany - Subject in modification

Hilma-Römheld GmbH

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

Table of contents

In order to ensure safe operation of the equipment for its intended purpose, please read the operating manual before installation and before putting the system into operation for the first time!

1 General information, safety information and manufacturer's declaration

1.1 General

Hilma-Römheld pull clamps have been thoroughly checked taking due account of all safety aspects. They are designed for use as specified in the technical data. If the technical instructions are not observed, the safety of the operator and the proper functioning of the machine may be put at risk. Unauthorized modifications or alterations to Hilma-Römheld pull clamps are prohibited for reasons of safety, and, if any such changes are made, our guarantee will be invalid.

Due observance of this operating mode is essential for reliable operation of the pull clamps. Malfunctions during commissioning and press operation are often due to improper installation and connection or to operating and control errors (see also chapter 5.0 'Trouble shooting')

1.2 Application

Hilma-Römheld pull clamps are intended for a variety of clamping tasks. The element is preferably used in hydraulic quick-acting clamping systems for press dies.
The *pull clamp* can be installed as a multiple arrangement in the press bed or the press slide.

1.3 Operating characteristics

Hilma Römheld pull clamps must not be exposed to higher loads than those specified. The maximum operating pressure must not be exceeded.

.

1.4 Temperatures

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

1.5 Safety information

- Installation of the hydraulic system is fo be carried out only with suitable connecting elements (see chapter 4, ‘Installation’).
- Tighten mounting bolts applying the specified torque (see chapter 4, ‘Installation’).
- Installation and repair work should only be carried out when the system is de-pressurised.
- Do not exceed the specified operating pressures and temperatures.
- Never place hands or tools into the moving area of the pull clamps.

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 permitted to operate the clamps under supervision as part of their apprenticeship. The operating instructions must be readily accessible. The operator must inform any third parties involved of any danger in the working area.

1.6 Manufacturer's declaration

The pull clamps have been developed, designed and manufactured in accordance with the "Machinery" directive 2006/42/EC. The manufacturer’s declaration is attached to this operating manual.

2 Design and function

2.1 Design

Pull clamps mainly consist of the flange cylinder housing with cover and the pull-type piston with hammer head. The inductive proximity switches for monitoring the clamping and unclamping positions are integrated into the housing.

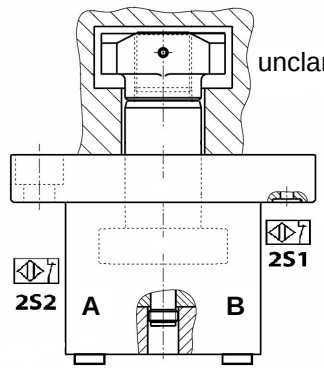
2.2 Functional description

The pull clamp works like a double-acting cylinder; both pistons are designed to cope with the maximum operating pressure.

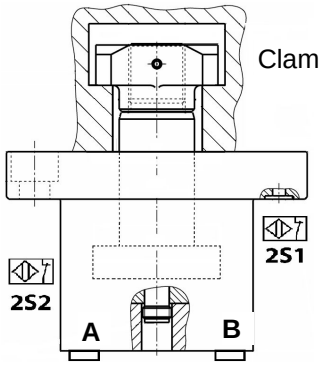
1. Unclamping position
The piston is completely extended. The die can be easily changed by lateral shifting. Proximity switch 2S1 monitors this position.

2. Clamping position
Pressure has been applied to port A (rod side). The tie rod is retracted. After a linear stroke it is above the clamping point.
The die is clamped. Proximity switch 2S2 monitors this position.

3. Unclamping position
Pressure has been applied to port B. After a linear stroke the tie rod has moved as far as the end position. Proximity switch 2S1 monitors this position.
The die is unclamped.



unclamping position



Clamping position

(For the function block diagrams and the hydraulic plans as well as the pin assignment for the proximity switches, see chapters 4.2 'Hydraulic plan, flow diagram' and 4.3 'Electrical Installation, pin assignment')

Due to lack of mechanical coupling, different friction of the components and different lengths of pipes and hoses several pull clamps in one hydraulic circuit will perform unequal piston movements (no synchronous extension and retraction of the elements). Therefore, piston movements of ALL pull clamps in one hydraulic circuit once started must be continued until the end position is reached and hydraulic pressure has been applied.

The signals of the proximity switches ‚Clamping position' and the pressure switches of ALL elements must be present!

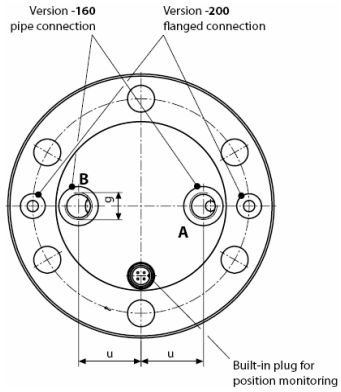
2.2.1 Tie rod position control

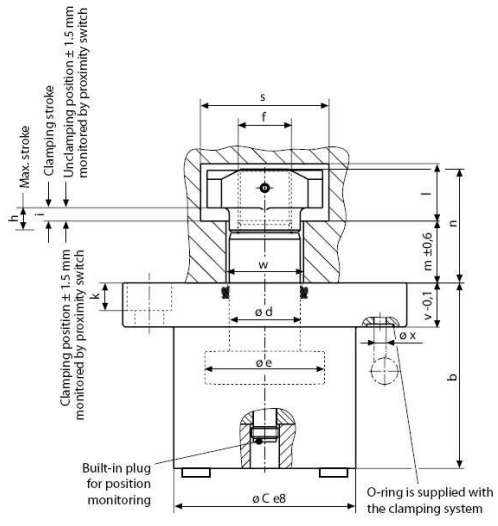
In order to ensure the functional safety of the pull clamps it is necessary to monitor the unclamping and clamping position, so that signals for die change and machine run are available and any malfunctioning is immediately displayed. For this purpose inductive proximity switches are integrated into the cylinder housing. The proximity switches react on switching points in the piston rod. The signals for the clamping and unclamping position can be visualized on the control desk to facilitate trouble shooting in the event of a problem. In the control system these signals, together with the signals from the pressure switches of the pump unit, are required to ensure trouble-free cycles of the pull clamps.
For proximity switches, see chapter 4.3 'Electrical installation and pin assignment'.

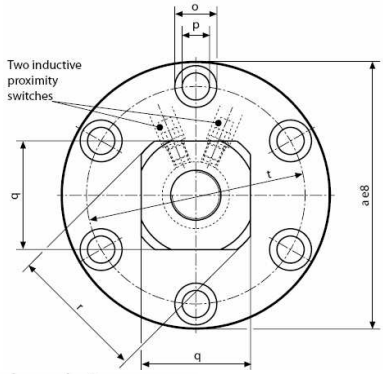
3 Technical data, main dimensions

Pulling force at 400 bar (kN)	60	104	164
Pulling force at 100 bar (kN)	15	26	41
Piston Ø e (mm)	54	70	88
Piston rod Ø d (mm)	32	40	50
Max. stroke h (mm)	10	10	10
Oil consumption clamping (cm³)	10	16	25
Oil consumption unclamping (cm³)	15	23	37
a (mm)	128	160	192
b (mm)	84	104	122
c (mm)	82	104	126
f (mm)	M 24 x 1,5	M 30 x 1,5	M36 x 1,5
g	G ¼	G ⅜	G 3/8
i (mm)	6	6	6
k (mm)	13	17	21
l (mm)	26	35	41
m (mm)	28	37	48
n (mm)	51	68	85
o (mm)	20	26	33
p (mm)	13	18	22
q (mm)	□ 52	Ø 74	□ 84
r (mm)	65	74	95
s (mm)	58	82	92
t (mm)	104	130	156
u (mm)	30	38	45
v (mm)	20	28	35
w (mm)	38	48	58
x (mm)	5,5	7	7
Weight (kg)	4,4	9	15
with pipe connection Part no.	**2184-160**	**2185-160**	**2186-160**
with flanged connection Part no.	**2184-200**	**2185-200**	**2186-200**

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







4. Installation, connection and commissioning

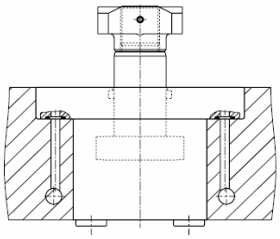
4.1 Installation

- The installation work should only be carried out without pressure in the system
- Prepare the hole pattern in accordance with the drawing / the catalogue
- Tighten the pull clamp using bolts as per DIN by applying the nominal torque

Recommended installation

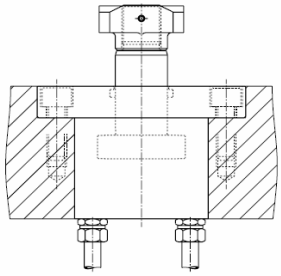
In order to ensure ease of servicing, two alternatives are offered for connecting the pull clamps.

Flanged connection



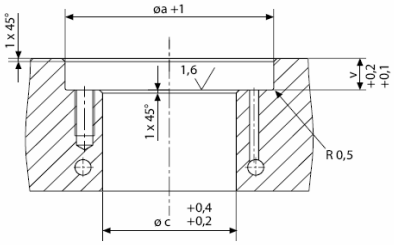
Hydraulic oil is fed through the drilled holes in the bed and in the ram. There are no exposed pipes or screw fittings.
O-rings supplied with the clamping element provide for tight fitting. Easy installation, ease of servicing.

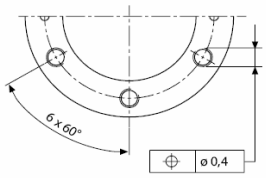
Pipe connection



Pipes are recommended in applications where screw fittings are easily accessible and where pipes do not impede installation and dismantling of the pull clamping elements.

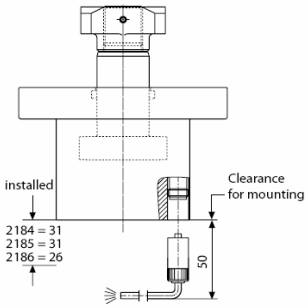
Drilled hole for flanged or pipe connection





Flanged connection requires a plain and neat surface.

Connection of the monitoring system for clamping and unclamping position



Both proximity switches are connected to the base of the pull clamp through a connecting lead with a screw coupling [IP 67]. The connecting lead must be ordered separately. Further installation may be carried out using a distribution block with an LED display, see page 4

4.1.1 Rear accessibility

For the purpose of installation, maintenance and dismantling hydraulic ports A and B should be easily accessible.

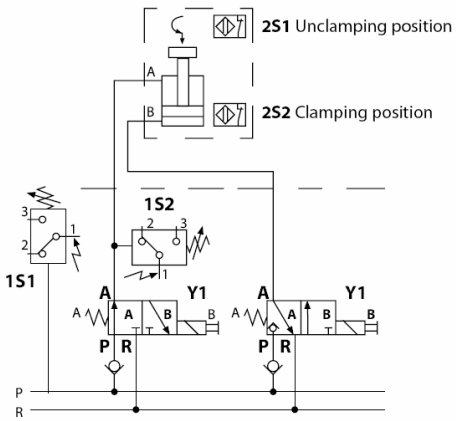
4.1.2 Clamping and unclamping times

When changing dies, the time required for hydraulic clamping and unclamping is relatively short. The delivery rate of the hydraulic pump unit should be adjusted in such a way that clamping and unclamping times of between 2 and 10 seconds are achieved. For reasons of functional safety, shorter clamping and unclamping times are not recommended:

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

t = clamping / unclamping time (s)
V = oil consumption per pull clamp (cm^3)
z = number of pull clamps
Q_p = pump delivery (l/min)

Hydraulic schematics



4.2 Hydraulic installation

Connect the pull clamps using screw fittings DIN 2353 (heavy-duty series).
The hydraulic pipework on the machine side must be of an adequate size, 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 all pipes, high-pressure hoses and screw fittings are cleaned and blown through.
- Plugs should only be removed immediately before making connection..
- Pull clamps which belong together should be connected to connection blocks.
- Series connections should be avoided.
- Install pipes with a larger diameter towards the pump unit to avoid excessive back pressure.
- Provide each hydraulic port with a pressure gauge connection to allow operational data to be checked and adjusted. In this way, a malfunction can be easily localized.
- Fasten pipes using pipe clamps.

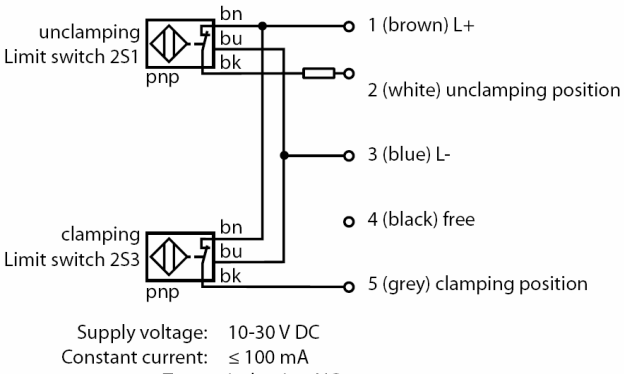
If in doubt, please send the installation plan for checking.

4.3 Electrical installation, pin assignment

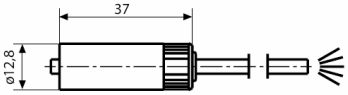
Each pull clamp is provided with 2 proximity switches to indicate the clamping and unclamping positions.

Electrical installation

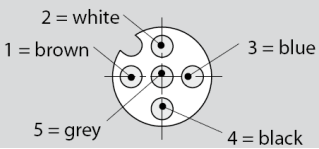
Pin assignment for three-wire proximity switches



5-pole connecting lead with screw coupling



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



A well arranged and easy-to-maintain installation is achieved when the cables are first connected to a manifold block on the bed or the slide. From here, the cables of all connected pull clamps can be bundled to form 16-wire cables and connected to the control cubicle. See Hilma-Römheld catalogue.

4.4 Commissioning

Read the operating manual before commissioning!

- Fit the pressure generator with a pressure control valve set to the operating pressure.
- Make the working area secure.
- Only use clean, fresh oil.
- Bleed the complete system with the pump running at low pressure (=20 bar) from the highest point until the emerging oil is free of bubbles.
- Apply pressure to the element and clamp and unclamp the element several times. Carry out a visual check.
- Check the hydraulic installation for tightness. Visually check all pipes, hoses, screw fittings and clamping elements under pressure.

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

5. Trouble shooting

The pull clamps have left our premises in perfect condition. All functions have been tested, and all necessary adjustments have been made.
If any malfunction should occur, even though the conditions stipulated in chapter 4.0 (Installation and commissioning) have been duly observed, please try to establish the cause using the table below:

Fault	Cause	Remedial action
The clamp does not clamp nor unclamp	-Hydraulic supply interrupted / not correct -Hydraulic system has not been bled -Operating pressure not correctly adjusted - Pump unit is not working / is not in operation.	Check hydraulic pipes / hoses up to the pump unit.. Check for correct connection (clamping / unclamping). Bleed hydraulic system. Readjust operating pressure.
Proximity switches provide no signal	- Proximity switches have become detached / are defective - Wiring defective	Readjust or replace proximity switches, check wiring. For easy adjustment of the sensors move the element into the position to be checked.

6. Maintenance and repair

Under normal conditions, pull clamps do not need any special maintenance. Visual checking of the clamps and the pipework should be carried out once a month.

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 all electrical connections (plugs, cables) for damage
- check the hydraulic system for tightness.

Please note: Design of the hydraulic system is in accordance with **DIN EN 982** 'Safety of machinery - Safety requirements for fluid power systems and their components – Hydraulics.'

.

After replacement, the element must be clamped and unclamped several times in order to bleed it using the pump unit (this also applies if any hydraulic connections have been undone).

For commissioning, please observe chapter 4.0 'Installation, connection and commissioning').

Manufacturer's declaration for incomplete machines

in conformity with directive

'Machinery' EC-RL 2006/42/EC
dated June 09, 2006.

We , **Hilma- Römheld**
Schützenstrasse 74
D 57271 Hilchenbach,

hereby confirm that the incomplete machine and its variants

pull clamps

type 218X-160
type 218X-200
special versions **type 8.218X.8XXX**

as supplied by us has been specifically designed for installation in a machine taking due account of standard DIN-EN ISO 13857. The documentation has been prepared taking account of appendix VII B.
On request, the national authorities will receive the documentation as a printout by mail or as a .pdf file by e-mail.

The pull clamp must only be put into operation after the conformity of the machine with the EC directives has been demonstrated.
The design of our products is in accordance with DIN EN 982, and EN 60204-1.

Responsible for documentation:
Berthold Ginsberg
Schützenstraße 74
57271 Hilchenbach

Hilchenbach 30.09.2011
Hans Joachim Molka
Management