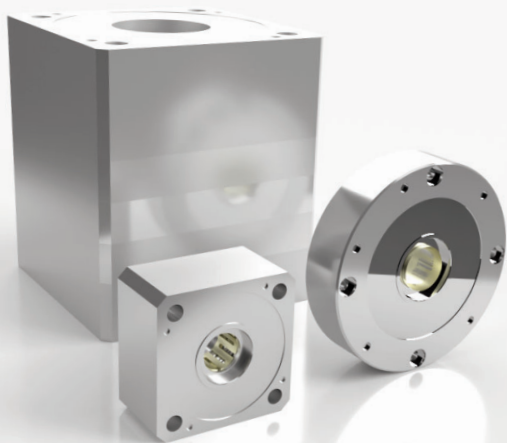


# OPERATING INSTRUCTIONS

## PCLAMP



N  
ISO  
E

ENGLISH



## OPERATING INSTRUCTIONS

Information status: 1.04.2021, Version 4.3

Language of original version: German

EN  
2

Specifications subject to modification without prior notice. Errors excepted

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## 1. IMPORTANT INFORMATION

These operating instructions describe how to use the PClamp N, ISO, E components properly. Warranty claims are valid only when these instructions have been observed.

It is therefore imperative that you please read these instructions before using the safety clamp and/or brake to the end.

- It is imperative that you observe the thresholds (e.g. for pressures, forces, torques, and temperatures) and tolerance ranges for the round piston rods and clamping pairing specified in these instructions.
- Make sure that the supplied compressed air has been properly treated
- Consider the environmental operating conditions.
- Observe the rules and regulations issued by the professional associations and the technical safety inspectorate TÜV, and the pertinent national, international, and European terms and conditions.
- Before installing for the first time, please remove all transport locks and guards like paper, foil, etc. Each of these materials must be introduced to the legally prescribed disposal cycle (recycling containers).
- The product may be installed and commissioned only by qualified, specialised personnel in accordance with these operating instructions.

### Symbols used



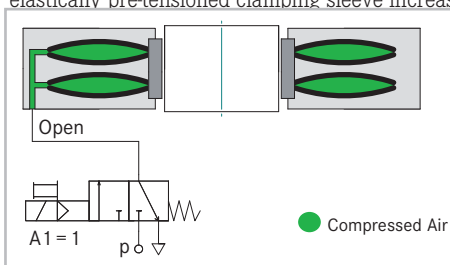
Warning



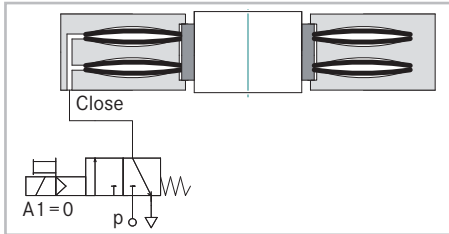
Note

## 2. GENERAL DESCRIPTION

- All models in the PClamp, PClamp N, ISO and E series are round-rod clamping and braking elements.
- All PClamp products open pneumatically and generate their clamping force via a spring accumulator.
- The retaining force is exerted by the friction applied by the clamping sleeve, which is pressed vertically against the contact surfaces on a round rod.
- Disengaging: pressure is applied to the chamber between the spring diaphragms. The diaphragm plates are elastically deformed and shortened in the radial direction. The elastically pre-tensioned clamping sleeve increases its diameter to release the round rod.



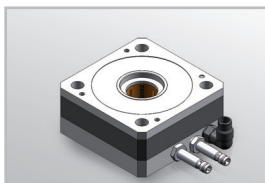
- Clamping: air is drawn out of the chamber between the spring diaphragms. The diaphragms relax and reduce the clamping sleeve's diameter. The clamping sleeve is pressed against the round rod. In this way, longitudinal movements can be stopped and held, rotating movements may only be held on systems that are at a standstill.



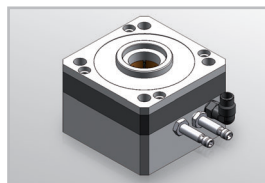
## 3. MODEL VARIANTS

The PClamp N, ISO, E components are available in different sizes. The sizes are derived from the sizes of standard ISO/VDMA cylinders. Cylinders and the PClamp N, ISO components possess identical footprints. The model variants differ in the following aspects:

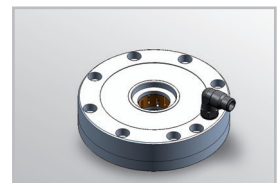
- number of clamping modules; depending on the type, up to four modules are possible
- different clamping diameters, depending on the application
- different base and cover plates, depending on the application
- number and size of air connections
- the operating pressure is generally 4 or 6 bars, other pressures are optionally available on inquiry
- Rod scraper, optional
- optional without preparations for inductive proximity switch
- housing material used
- the PClamp N, ISO, E components are also possible in customised special sizes and with other operating pressures



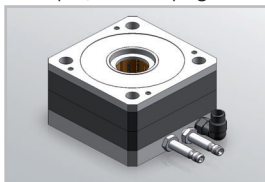
PClamp N, one clamping modul



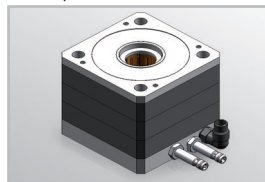
PClamp ISO



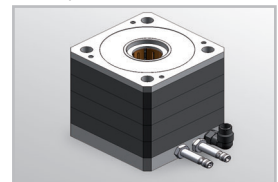
PClamp E



two clamping modules



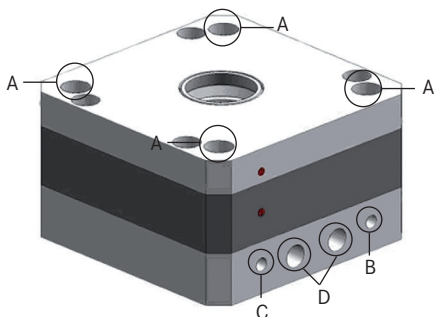
three clamping modules



four clamping modules

## 4. CONTROLS AND CONNECTIONS

Fastening options and connections:



- Through hole (A) in the housing.  
IMPORTANT! The fastening screws must be able to reliably take all loads that occur during the application.
- The control air connection for open and close (B) directly in the G 1/8 or M5 housing.
- Optional venting connection (C) directly in the G 1/8 or M5 housing.
- Optional preparation for inductive limit switch (D).

## 5. USE

- The clamping elements of the PClamp series are primarily designed for braking and holding piston rods on pneumatic cylinders and loads suspended from them. PClamps may also be used for braking and holding other machine elements that make translational movements and for holding machine elements with round cross-sections that make rotational movements. This applies insofar as the scope of application - particularly the retaining forces - specified for the clamping elements is observed. The direction of the introduction of force or the axis of rotation of the effective torques is identical to the clamping sleeve's central axis.
- The switching times for all the controls and the response times by the PClamp N, ISO, E components must be observed, the braking distances must be calculated and checked during commissioning. The PClamp N, ISO, E components may only be used with the specified operating pressure of 4 or 6 bars - depending on the type.
- The functioning of all PClamps depends on the combination of the PClamp with the clamping surface. The round rod's properties are therefore important factors. All PClamp clamping elements have been optimised for the following conditions: round rod diameter equal nominal diameter with a tolerance zone of h9 or better, round rod material (manufacturer-dependent), e.g. C45, hard chromed, roughness Ra 0.4 - 0.8  $\mu\text{m}$ .
- When using the PClamp N, ISO, E components for braking, the braking force must be dimensioned in accordance with the permissible braking distance. The force of the weight must be added to the braking force in vertical applications.

## 6. IMPROPER USE / WARNING

- Braking from already developed movements, of rotationally moved machine elements is not permitted.
- The retaining forces specified by HEMA can only be achieved under optimum conditions. Fats, wear, corrosion, soiling, defects, etc. may result in changing braking/retaining forces and moments.
- The optional rod scrapers must be used to prevent fats or accumulations of greasy dirt from negatively affecting performances.
- The optional inductive limit switches have been designed solely for the purposes of recognising the switching status and not for the purposes of carrying out function checks.
- The PClamp N, ISO, E clamping and braking systems are not designed to secure suspended loads when machines or machine parts are being manufactured, transported, assembled, installed, commissioned, used, cleaned, subjected to troubleshooting, shut down, disassembled or disposed of in personal danger areas without redundant safety systems.
- PClamp N, ISO, E cannot be used as guides or as bearings for moving machine elements.
- Shearing forces may result in reduced braking/retaining forces and torques, limit-switch malfunctions and/or defects.
- Deviations from the specified operating pressure may result in damage and/or cause the system to fail. Higher pressures don't equate with greater retaining forces.
- The braking effect or build-up of force may be delayed if the system has not been in use or has not been activated for a long time.
- The screwed connections must be able to absorb the maximum retaining forces during the application
- The limit switches' signals may cause the control to malfunction.

## 7. RESIDUAL RISKS



The PClamp N, ISO, E clamping and braking systems are not fitted with a second safety circuit. When the system is actuated intentionally or by accident, the clamp opens and therefore the retaining force is no longer transferred to the round rod so that the force or mass to be secured will no longer be held. As a consequence, during all operating modes and life-cycle phases without a redundant system there are mechanical dangers. Additional residual risks of crushing, cutting, shearing, abrasion, puncturing, accelerated components exist as a result of:

- unsecured connected structures, disruptions in the pneumatic air supply (e.g. pressure fluctuations)
- human error (e. g. stress, fatigue, »convenient shortcuts«)
- failure to observe the information and warning signs
- wrong use of the PClamp (see Section 6.)
- impacts, abrasion, cutting as a consequence of inadequate compressed air connections or loose compressed air lines or fastening screws
- wrong switching procedures as a result of wrong signals from the limit switches
- unintentionally fast-moving round or piston rods

## 8. WARRANTY

### **Valid for the following conditions of use:**

- The clamping and braking elements are used properly only when they are used in full compliance with the technical specifications. Any other use will exempt HEMA Maschinen- und Apparateschutz GmbH from providing any other services.
- Ambient temperature min 10°C and max 45°C
- Pneumatic operating pressure 4 or 6 bars, tolerance: ± 5%
- Dried, filtered and oil-free air (particles: Class 4, condensate: Class 4, oil content: Class 3)
- The warranty is valid for 12 months following delivery; however, but not in excess of 1,000,000 (one million) clamping cycles, without braking clamping. When submitting a warranty claim, the customer must present suitable verification of the actual number of clampings. No warranty can be assumed for braking clampings due to indefinable factors that affect the components.
- Installation, conversion, maintenance and repairs: observe the installation instructions and use the necessary equipment along with the original accessories. The respectively valid safety and installation instructions must be observed during all work on the clamping and braking elements.
- Use the supplied transport lock when the component has been dismantled. All PClamps may only be clamped when an appropriate transport lock or round rod is located inside the clamping sleeve.
- Removing, dismantling or machining the PClamp by the customer without prior consent issued in writing by HEMA reduces the operating safety and renders the warranty void.
- The clamping sleeve's interior size has been produced to an exact value at the factory. The largest possible retention force results from the smallest radial clearance between the clamping sleeve and round piston rod.
- The design peculiar to all PClamps requires that the tolerance range between the round piston rod and clamp lie within the thresholds defined by the application. Care must in particular be taken that the round rod is completely free when the clamp is open. A friction force of around 2% of the nominal retaining force and friction by the optional rod scrapers is normal.
- When exposed to fat (piston rod's lubrication condition), the clamping systems' retention forces may in certain circumstances be considerably reduced resulting in longer braking distances. The optional rod scrapers must be used to prevent fats or fatty accumulations of dirt from negatively affecting performances
- No NBR-incompatible media or media that facilitates corrosion
- Corrosion may occur as a result of the material. Any warranty claims made on this basis will not be recognised.



## 9. TRANSPORT, STORAGE, INTERMEDIATE STORAGE

- Only transport the clamping elements in their relaxed state
- The clamping elements should be placed in storage or interim storage in the preserved state and in the packaging selected by HEMA.
- Only store and transport the clamping elements with the supplied transport lock.

## 10. TYPE DESIGNATION

- The engraved type designation and serial number serve to clearly identify and track the clamping element. It is unique for every clamping element and therefore absolutely essential for tracking and chasing purposes. So never obliterate the engraving; the engraving must be legible at all times. Removing or obliterating the type designation renders all warranty claims void. The engraving describes the type and size. The engraving can be found on the intermediate panel under the air and sensor connections on the PClamp N and ISO type clamps; the engraving can be found on the front next to the air connection on E type clamps.



## II. INSTALLATION NOTES

- Check that the type designation engraved on the PClamp agrees with the PClamp you want to install
- PClamps cannot be fitted if they are not pressurised as they can only be opened under pressure.
- Make sure that all contact surfaces between the PClamp and installation surface on the connecting structures are clean and plane.
- Handle the PClamp so that it cannot sustain damage. This will reduce the operating safety and render the warranty void.
- Make sure that the installation is free of torsion and that the permissible loads set out in the terms of delivery and the operating instructions are fulfilled.
- The PClamp automatically centres itself on the round rod. This requires that the round rod's positioning is sufficiently precise and stiff.
- Screws of Property Class 8.8 or higher must be used to secure the PClamps. Tighten the screws with the recommended tightening torque. Use a screw locking product, e. g. Loctite. Recommended tightening torques:

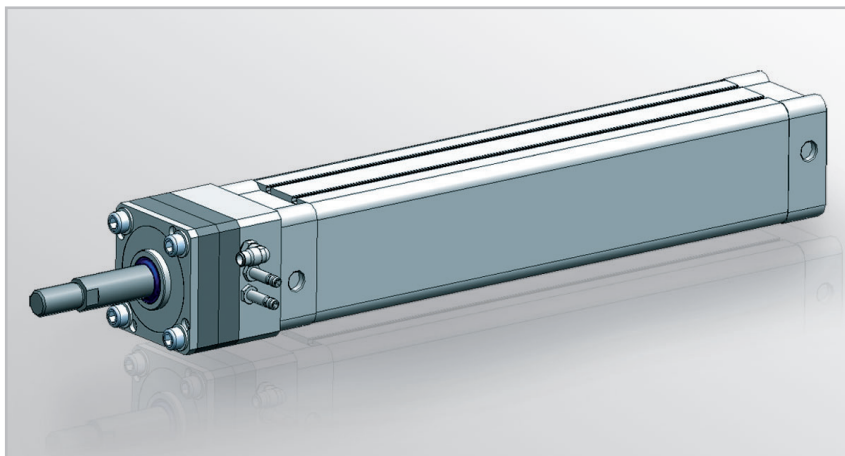
PClamp N and ISO	Size 63: 8 Nm	Size 80: 15 Nm	Size 125: 35 Nm
PClamp E	Size 63: 3 Nm	Size 80: 6 Nm	Size 125: 12 Nm

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- ⚠ ■ Important! In order to allow the specified retaining forces to be transferred in the best way possible, the clamping sleeve's inside surface and the round rod's surface must be thoroughly cleaned and any grease removed before installation.
- If desired, limit switches possessing an M8 x 1 thread may be fitted. Select limit switches with a low switching distance and low hysteresis (e.g. Sn 1.5 mm, hysteresis <10%). Minimum screw-in depth for Size 63 = 19 mm, Size 80 = 22 mm, Size 125 = 27 mm.
- ⚠ ■ The limit switches are exclusively for monitoring the condition, they are not suitable for use as safety-relevant control systems.
- The customer must implement suitable additional safety measures to prevent malfunctioning or risks.
- ⚠ ■ Important! Connections with high flow resistances (long, thin, tight radii, bends) may affect response times.
- High speed or fast ventilation valves can considerably reduce the response times of the PClamp!
- ⚠ ■ Never fit two or more PClamps above each other; HEMA supplies special solutions for such requirements.

## 12. INSTALLED STATE (SAMPLE)



## 13. INSTALLING THE PCLAMP

Carry out installation in the following steps:

- Open the PClamp with compressed air
- Position
- Venting and alignment
- Screw tight
- Optional, fitting and adjusting inductive limit switches.

### The individual steps in detail:

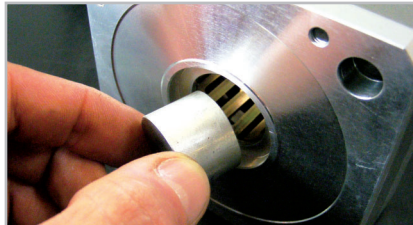
- Screw in an appropriate pneumatic connection:



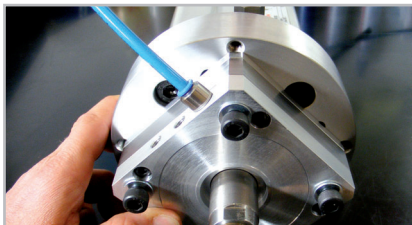
Size 63	M5
Size 80	G1/8
Size 125	G1/8

Then connect with air hose

- Apply nominal pressure to PClamp and remove the transport lock.



- Position the PClamp on the round rod, screw in the fastening screws **loosely**, do not tighten yet! See the following steps.

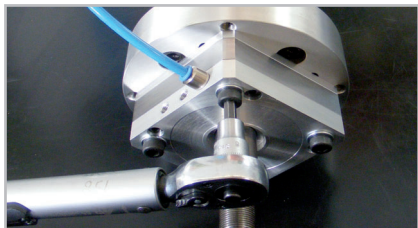


# PCLAMP

- Vent the PClamp. The PClamp will centre itself automatically on the round rod.



- Here, the PClamp should be as close to its final position as possible but sufficiently free so that it can align itself.
- Tighten the fastening screws crosswise over several circuits up to the defined tightening torque, please also refer to the installation instruction on Page 10. Open and close the PClamp several times between each step. The screws may only be tightened when the PClamp is closed and thus centred



- Do not exceed the recommended tightening torque (see Page 10), use bolt adhesive. Check the screw connections in regard to the occurring loads. HEMA assumes no warranty for this.
- Apply nominal pressure to the PClamp and check for ease of movement. If necessary, repeat the installation process.





## 15. MAINTENANCE AND CARE

- Before installation, clean the round rod's and the brake/clamp linings' contact surfaces with a soft cloth. Approved cleaning agents are all media that do not attack the materials (recommendation: Weicon: »S« spray cleaner).
- Check the clamping surfaces for wear and material abrasion.
- Regularly check the function, the PClamp must be regularly exposed to loads. Otherwise the braking/clamping effect may become delayed or reduced. Processes that negatively impact the effect must be expected in the event of very long downtimes.

## 16. CE MARKING

In the delivered state, the PClamp N, ISO, E clamping elements fulfil the requirements under the Machinery Directive 2006/42/EC and are marked with the CE symbol.

## 17. EC DECLARATION OF CONFORMITY

**In accordance with the EC Machinery Directive 2006/42/EC of 17 May 2006, Annex II A**  
We hereby declare that the design and type of the structurally identical safety components named in the following comply in their conception and build and the version we market with the fundamental safety and health requirements in the EC Machinery Directive 2006/42/EC. This declaration becomes void when any change is made without our consent to the safety components.

Manufacturer HEMA Maschinen- und Apparateschutz GmbH  
Am Klinggraben 2, 63500 Seligenstadt, Germany  
Phone: +49(0)6182/773-0, Fax: +49(0)6182/773-35  
www.hema-group.com

Description of the machine

Function: Clamping of stationary shafts and axles exposed to rotational loads  
Braking and clamping of round piston rods making linear movements.

Type/model: PClamp N, ISO, E

Applied harmonized standards, in particular:

- DIN EN ISO 12100: 2011-03  
Safety of machinery - General principles of design - Risk assessment and risk reduction  
German version EN ISO 20100: 20100
- DIN EN ISO 12100: 2013-08  
Safety of machinery - General principles of design - Risk assessment and risk reduction,  
Corrigendum to DIN EN ISO 20100: 2011-03  
German version EN ISO 20100: 20100
- DIN EN ISO 13849-1: 2016-06  
Safety-related parts of control systems, Part 1: General principles of design  
German Version he Fassung EN ISO 13849-1: 2015
- DIN EN ISO 13849-2: 2013-02: Safety-related parts of control systems,  
Part 2: Validation  
German Version EN ISO 13849-1: 2015

Other technical standards and specifications applied:

- DIN ISO 8573-1 2010-04 Compressed air - Part 1: Impurities and purity classes

HEMA Maschinen- und Apparateschutz GmbH



Steffen Walter  
Managing Director



Philipp Sendelbach  
CE authorized person

Am Klinggraben 2, 63500 Seligenstadt  
Seligenstadt, 1 April 2021

## 18. CAUSES OF FAULTS - SOLUTIONS

Malfunction	Possible cause	Remedy
Retaining force does not correspond to specifications	Air pressure at the pneumatic cylinders too high (more than 4 or 6 bars)	Call HEMA services
	Rod and clamping sleeve soiled with lubricant or fats	Clean rod with suitable cleaner, remove any soiling, check material pairing with HEMA services
	Round rod/shaft or round guide too small	Select round rod/shaft with matching diameter, contact HEMA services
	Clamp and screw-on surfaces not sufficiently parallel	Ensure that they are parallel, take constructional precautions, compensate differences with metal foil
	Tolerance dimensions between PClamp and shaft deviate from specifications	Adhere to tolerances as specified by HEMA, check tolerance and roundness
	Tightening torques and correct force transfer through screwed connection not perfect	Check tightening sequence of the connecting screws and tightening torque
	PClamp's life span exceeded	Call HEMA services
Clamp does not open properly	Diaphragm error	Check the PClamp's functioning; check it for leaks, contact HEMA services
	Round rod/shaft or round guide too large	Select round rod/shaft with matching diameter, contact HEMA services
	Clamp and screw-on surfaces not sufficiently parallel	Ensure that they are parallel, take constructional precautions, compensate differences with metal foil
	Pressure insufficient	Increase pressure up to max nominal pressure
	Alignment not precisely executed during installation	Check for sufficient clearance, check installation steps again
	Storage and transport temperature outside of specifications	Temperatures under 10°C can affect the rubber diaphragm. This then becomes hard and unsusceptible, and may leak temporarily
Response times too long	Air supply throttled too much	Valve too small, maintenance unit too small, supply line too long, too thin, not free or bent
	Venting insufficient	Check and ensure venting
	Unfavourable compressed-air circuit	Avoid long and thin hoses, tight radii, etc. high flow resistances produce long response times, call HEMA services
	Storage and transport temperature outside of specifications	Temperatures under 10°C can affect the rubber diaphragm. This then becomes hard and unsusceptible, and may leak temporarily
Loud air and purging noise	Diaphragm error	Check the PClamp's functioning; check it for leaks, contact HEMA services
	Storage and transport temperature outside of specifications	Temperatures under 10°C can affect the rubber diaphragm. This then becomes hard and unsusceptible, and may leak temporarily
	Screw connections on connecting parts leaking	Tighten screw connection, change sea
	PClamp's life span exceeded	Call HEMA services



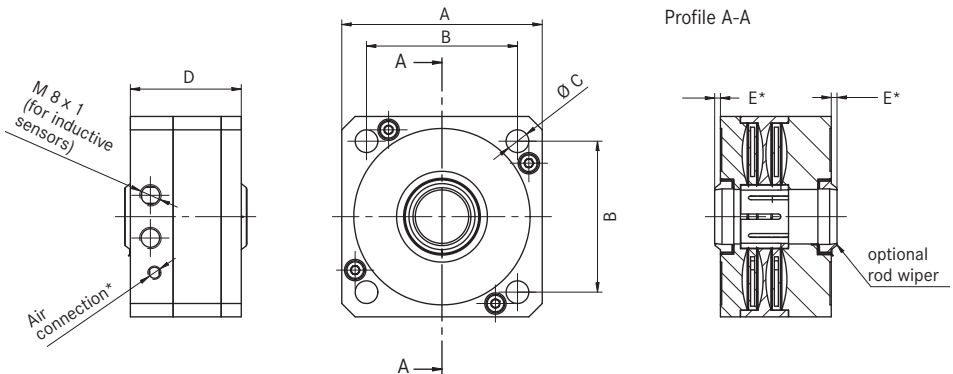
## 19. PCLAMP N

### Specifications and drawing

Size	A	B	C	D	E	Air connection	Holding force Version 4 bar	Holding force Version 6 bar	Holding torque Version 4 bar	Holding torque Version 6 bar	Standard rod	Mass max.
Unit	[mm]	[mm]	[mm]	[mm]	[mm]		[Nm]	[Nm]	[Nm]	[Nm]	[mm]	[kg]
PC 63-20-1 N	75	56,5	8,5	41,5	2,1	M5	1400	2000	15	20	20	0,7
PC 63-20-2 N	75	56,5	8,5	59,5	2,1	M5	2520	3600	25	35	20	1,13
PC 63-20-3 N	75	56,5	8,5	77,5	2,1	M5	3780	5400	35	50	20	1,56
PC 80-25-1 N	96	72	10,5	43,5	2,2	G1/8"	2100	3000	25	35	25	1,3
PC 80-25-2 N	96	72	10,5	63,5	2,2	G1/8"	3780	5400	40	60	25	2,2
PC 80-25-3 N	96	72	10,5	83,5	2,2	G1/8"	5670	8100	65	95	25	3,1
PC 80-25-4 N	96	72	10,5	83,5	2,2	G1/8"	7560	10800	85	125	25	3,1
PC 125-40-1 N	145	110	13	51,6	3	G1/8"	7000	10000	140	200	40	3,65
PC 125-40-2 N	145	110	13	75,2	3	G1/8"	12600	18000	250	360	40	5,85
PC 125-40-3 N	145	110	13	98,8	3	G1/8"	18900	27000	375	540	40	8,05
PC 125-40-4 N	145	110	13	122,4	3	G1/8"	25200	36000	500	720	40	10,25

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Subject to modifications. Only the written order confirmation is valid.



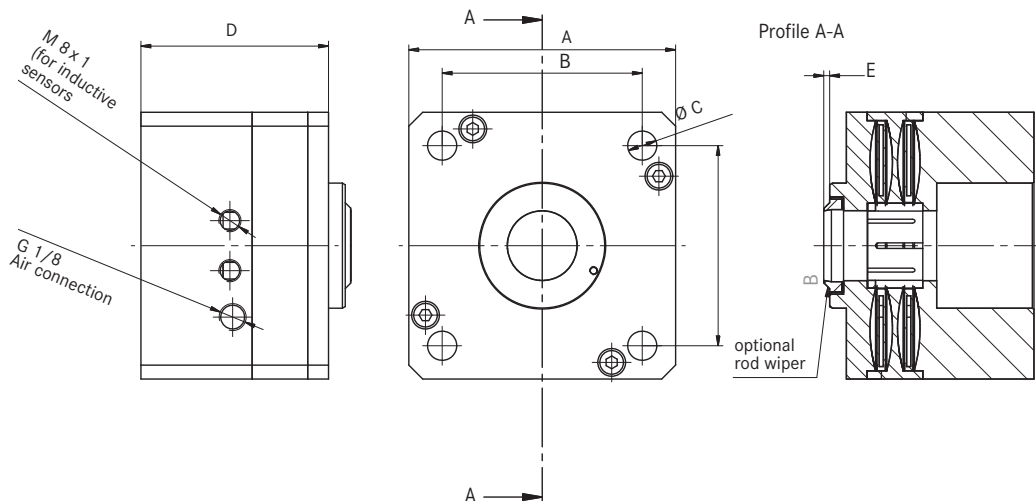
\* Number and size on request

## 20. PCLAMP ISO Specifications and drawing

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Size	A	B	C	D	E	Air connection	Holding force Version 4 bar	Holding force Version 6 bar	Holding torque Version 4 bar	Holding torque Version 6 bar	Standard rod	Mass max.
Unit	[mm]	[mm]	[mm]	[mm]	[mm]		[Nm]	[Nm]	[Nm]	[Nm]	[mm]	[kg]
PC 63-20-1 ISO	75	56,5	8,5	69,5	2,1	M5	1400	2000	15	20	20	1
PC 63-20-2 ISO	75	56,5	8,5	87,5	2,1	M5	2520	3600	25	35	20	1,43
PC 63-20-3 ISO	75	56,5	8,5	105,5	2,1	M5	3780	5400	35	50	20	1,86
PC 80-25-1 ISO	96	72	10,5	67,5	2,2	G1/8"	2100	3000	25	35	25	1,8
PC 80-25-2 ISO	96	72	10,5	87,5	2,2	G1/8"	3780	5400	40	60	25	2,7
PC 80-25-3 ISO	96	72	10,5	107,5	2,2	G1/8"	5670	8100	65	95	25	5,6
PC 125-40-1 ISO	145	110	13	95,6	3	G1/8"	7000	10000	140	200	40	5,65
PC 125-40-2 ISO	145	110	13	119,2	3	G1/8"	12600	18000	250	360	40	7,85
PC 125-40-3 ISO	145	110	13	142,8	3	G1/8"	18900	27000	375	540	40	10,05
PC 125-40-4 ISO	145	110	13	166,4	3	G1/8"	25200	36000	500	720	40	12,25

Subject to modifications. Only the written order confirmation is valid.



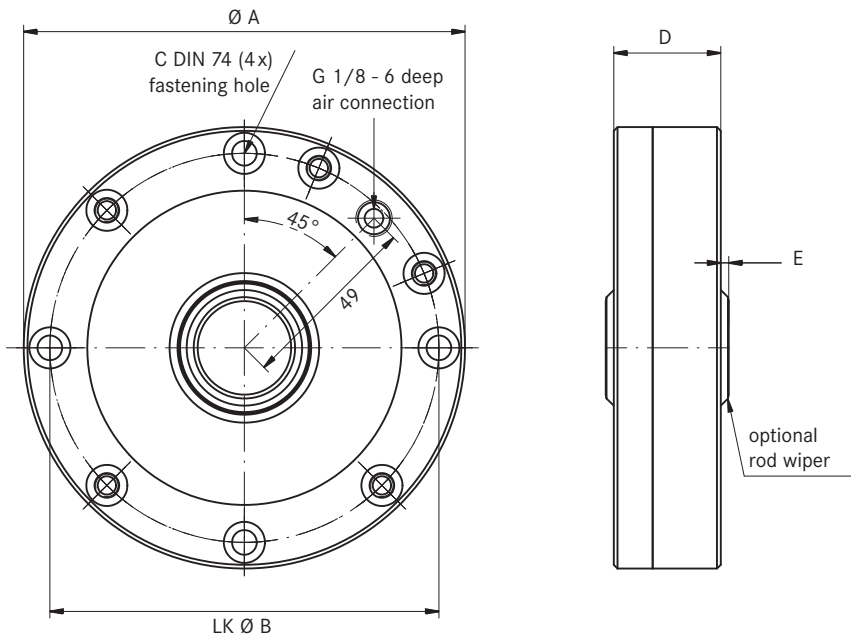
## 21. PCLAMP E

### Specifications and drawing

Size	A	B	C	D	E	Air connection	Holding force Version 4 bar	Holding force Version 6 bar	Holding torque Version 4 bar	Holding torque Version 6 bar	Standard rod	Mass max.
Unit	[mm]	[mm]		[mm]	[mm]		[Nm]	[Nm]	[Nm]	[Nm]	[mm]	[kg]
PC 63-20 E	92	80	M5	28	2,1	G1/8"	700	1000	7	10	20	1,15
PC 80-25 E	118	118	M6	30	2,14	G1/8"	1050	1500	12	17	25	2,1
PC 125-40 E	168	152	M6	34	3	G1/8"	3500	5000	70	100	40	4,9

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Subject to modifications. Only the written order confirmation is valid.



# PCLAMP

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