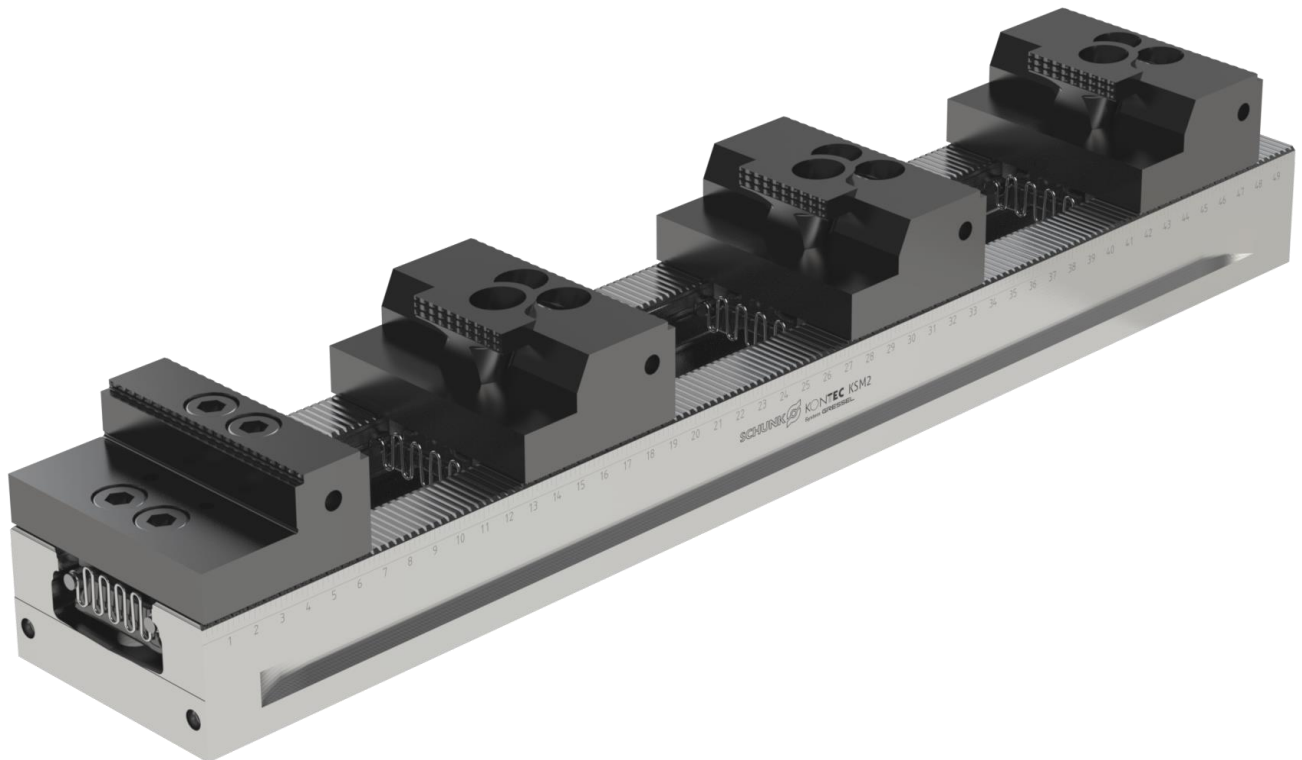


Montage- und Betriebsanleitung Installation- and operating instruction

Mehrfachspanner Multiple vice

KSM2



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1 User information



1.1 Purpose of document, validity

These instructions are an integral part of the product supplied and contain important information for the safe installation, commissioning, operation, servicing and maintenance. These instructions must be read before using the product and must be observed during operation, in particular the "General safety instructions" section.


1.2 Illustration of safety features

DANGER 	
	<p>Indicates imminent danger. If the information is ignored, death or serious injury (permanent disability) will result.</p>


WARNING 	
	<p>Indicates a potentially dangerous situation. If the information is ignored, it is possible that death or serious injury (permanent disability) will result.</p>

WARNING 	
	<p>Indicates a potentially dangerous situation. If the information is ignored, it is possible that material damage and light to medium injury will result.</p>

Information on useful tips or for preventing material damage

NOTE	
	<p>Indicates general information, useful tips for users and work recommendations which do not impact on the health and safety of operators.</p> <p>... underscores useful tips and recommendations as well as information for efficient and trouble-free operation.</p>

Important for preventing more extensive material damage

CAUTION	
	<p>Indicates a potentially dangerous situation. If the information is ignored, material damage will result.</p> <p>... points out a potentially dangerous situation that can lead to material damage if it is not avoided.</p>

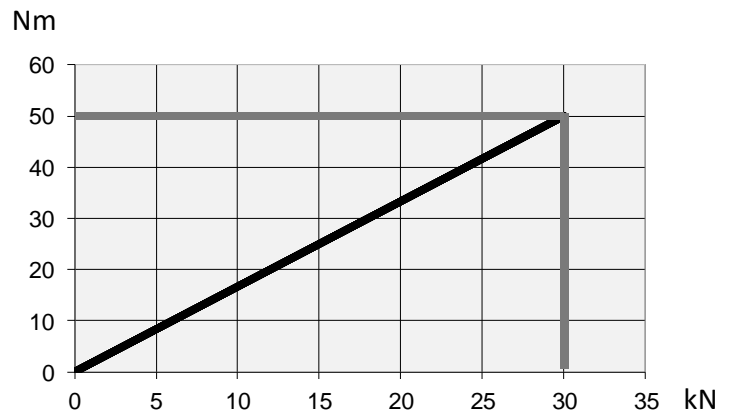
2 General safety instructions

2.1 Intended use

The clamping device may only be used in accordance with the technical data and has been designed for stationary application on milling machines in an industrial environment. Using the device in accordance with the intended purpose includes compliance with the commissioning, installation and operating instructions, and with the environmental and service conditions as provided by the manufacturer. The manufacturer accepts no liability for damage resulting from non-intended use.

2.1.1 Technical data

Version	max. torque	max. clamping force
KSM2 40	50 Nm	30 kN
KSM2 65	50 Nm	30 kN
KSM2 90	50 Nm	30 kN



Exposure to loads in excess of the max. pull-in torque results in damage to the clamping mechanism.



Weight:

5.0 kg to 12.5 kg without system jaws and depending on model.

For further data, please see the catalogue >> [Schunk stationary Workholding](#) <<

2.2 Reasonably foreseeable misapplication

Any application that is not in accordance with the "Intended use" or exceeds such intended use is considered not in accordance with the regulations, and is forbidden. Any other use of the device is subject to confirmation from the manufacturer.



Examples of foreseeable misapplication

- Clamping device used on rotating systems.
- Clamping widely protruding workpieces.
- Clamping workpieces with a weight of over 20 kg in vertical position without an additional protection against the workpiece falling out as a protective measure for the operator.

2.2.1 Alterations and modifications

In the case of unauthorised alterations and modifications of the clamping device, the manufacturer's liability ceases and any warranty is voided.

2.2.2 Spare and wear parts and auxiliary material

Only use original parts or parts approved by the manufacturer. Using spare and wear parts by third party manufacturers may lead to risk.

2.3 Residual risk



The user is responsible for applying the correct workpiece clamping.

New clampings have to be carefully checked by qualified personnel with relevant training.

One always needs to allow for the risk that the workpiece may slip or be dislodged, even when the clamping device is functioning correctly. This is due to the different geometries to be clamped, contact surfaces, clamping friction values, processing force, wrong manipulation of the milling machine etc.

Protective devices are to be attached to the processing machine that will protect the operator from any tool or workpiece parts that may be ejected.

It is mandatory that operators and others in the proximity of the processing machine wear protective goggles.

Do not use methods of operation that impair the function and operational safety.

2.3.1 Jaw change

Damage may result if system jaws are insufficiently tightened.



2.3.2 Notes on clamping technology

The operator is responsible for ensuring that the clamping geometry and clamping forces are suitable for the intended processing.

We recommend that clamping be carried out with a torque wrench in order to achieve consistent clamping results.

The clamping forces can only be achieved if the clamping device functions correctly and the workpiece is correctly held in the device.

Regular servicing and cleaning in accordance with the operating instructions is mandatory in order to ensure correct function.

With elastic thin-walled workpieces, e.g. pipes or packages, it is possible that the clamping force is much reduced due to the response of the workpieces.



2.4 Duties of the organisation in charge

The organisation in charge of the device undertakes to only allow operatives to work on the device:

- who are familiar with the basic health and safety regulations and regulations for the prevention of accidents.
- who have completed appropriate induction for working with the machine.
- who have read and understood these operating instructions.

The requirements of the EC Directive 2007/30/EC on the use of work machinery must be complied with.

2.5 Operator duties



All persons who have been instructed to work with the machine undertake to:

- observe the basic regulations for health and safety and for the prevention of accidents.
- read and understand the section on safety and the safety instructions in these operating instructions prior to working with the machine, and to observe these instructions.

2.6 Operator qualification

The installation, initial setup, fault analysis and periodic monitoring have to be carried out by competent personnel with the relevant qualifications.

2.7 Personal protective equipment

WARNING 	
	<p>Risk of eye injury through ejected, hot fragments! Ejected hot fragments can lead to serious eye injury. The regulations for safety at work and the prevention of accidents always have to be observed when working with the machine. Personal protection equipment must be worn at all times, in particular safety boots, gloves and safety goggles.</p>

2.8 Warranty

The warranty period is 24 months from the date of delivery ex-works, provided the machine is used as intended and subject to the following conditions:

- Compliance with the concurrent documents.
- Observance of environmental and work conditions.
- Observance of the specified servicing and lubrication intervals.
- Observance of the maximum service life.

Parts in contact with the workpiece are not covered by the warranty.

Warranty – Maximum service life

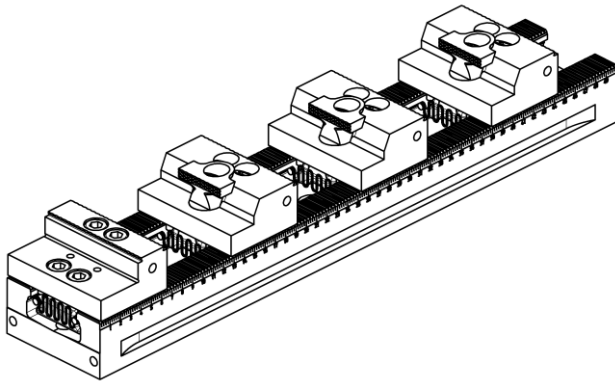
Period of warranty	24 months
Maximum service life [clamping cycles]	50,000

3 Description of the clamping device

The KSM2 multiple clamping system is based on a clamping rail with top-mounted gearing with a tooth pitch of 2 mm. The gearing is hardened, ground and wear-resistant. Several elements from the modular system can be placed and fixed to the clamping rail.

3.1 Function

3.1.1 Multiple vice (main application)

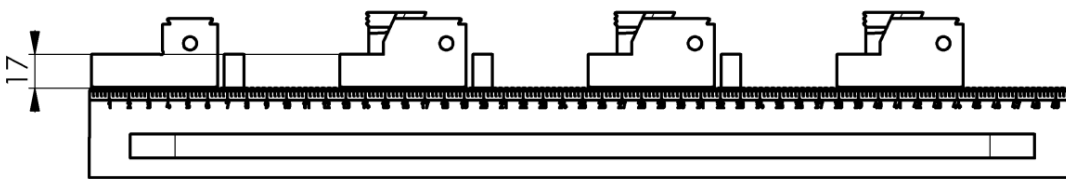


The KSM2 has been designed for clamping unprocessed and finished workpieces. When the device is used as a multiple vice, it is usual to position a fixed jaw and one or more adjustable jaws on the clamping rail and fix these with a buckle.

As a general principle the workpieces to be machined should not be placed on the gearing of the clamping rail; instead, appropriate workpiece supports should be used.

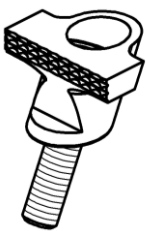
Attention:

The support surfaces of the fixed and adjustable jaws do not have high precision and should therefore only be used as a support for rough workpiece clamping (H=17 mm) .

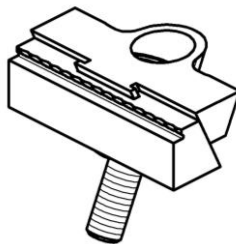


The adjustable jaws are fitted with suitable clamping jaws to suit the application:

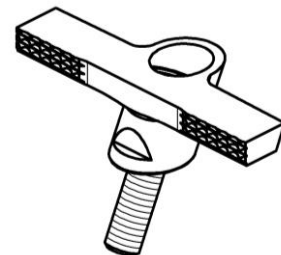
Pull-down jaw "grip"



Parallel clamping jaw



Pendulum jaw "grip"



The workpiece is clamped from above via the slanted clamping jaw, using an cylinder screw M10. The horizontal stroke of the clamping jaw is between 3.7 and 4.8 mm depending on the type.

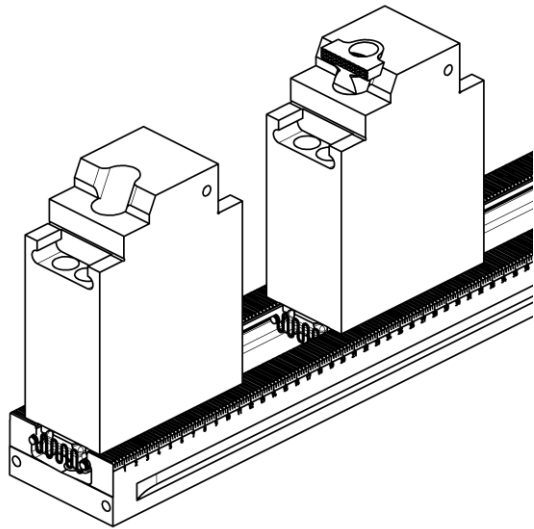
The clamping force is built up mechanically and the gear ratio of the force is linear throughout the clamping range.

The maximum clamping force of 30 kN is achieved with a torque of 50 Nm.

Exceeding the maximum torque results in damage to the clamping mechanism.



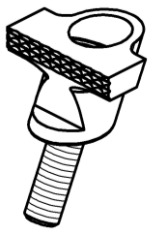
3.1.2 Multiple vice with adjustable jaws, H = 165 mm



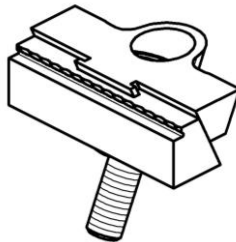
For better accessibility to the workpiece to be clamped it is also possible to position and fix the higher adjustable jaws (H = 165 mm) on the clamping rail instead of the normal adjustable jaws. In this case, no fixed jaw is needed but at least two H = 165 mm adjustable jaws are necessary, with one of them being used as a fixed jaw.

The H = 165 mm adjustable jaws are fitted with suitable clamping jaws in the same way as the normal adjustable jaws, depending on the application:

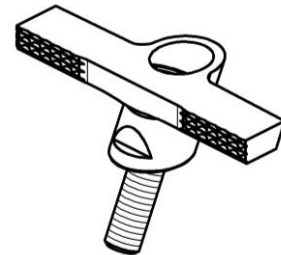
Pull-down jaw "grip"



Parallel clamping jaw

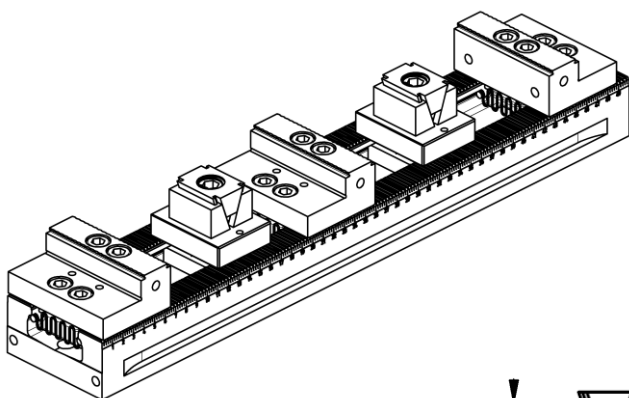


Pendulum jaw "grip"

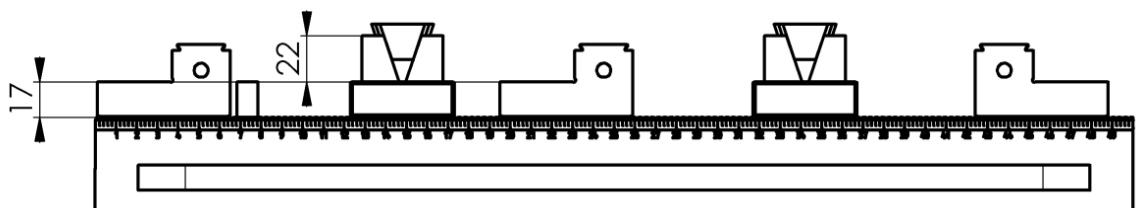


The workpiece is clamped from above via the slanted clamping jaw, using an cylinder screw M10. The horizontal stroke of the clamping jaw is between 3.7 and 4.8 mm depending on the type.

3.1.3 Multiple vice with wedge clamping elements



In place of the adjustable jaws, it is also possible to use wedge clamping elements with two-sided effect and with support. The max. clamping stroke of the wedge clamping element is 6 mm, i.e. 3 mm for each clamping jaw. The tension is applied via the vertical cylinder screw M12 with SW 8 hexagon socket. The max. clamping force is 30 kN at a torque of 70 Nm.



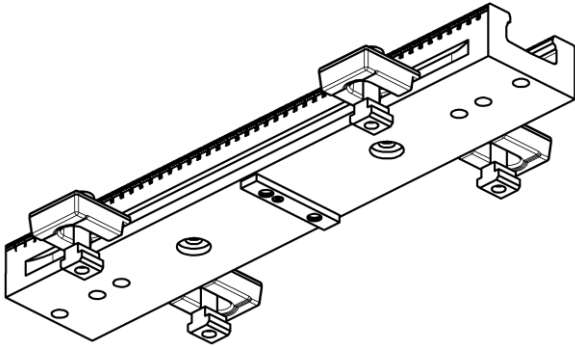
4 Operation (standard operation)

4.1 Clamping / aligning

The base of the clamping rail has a number of fixing and positioning holes. Depending on the length of the rail, the position and number of holes varies.



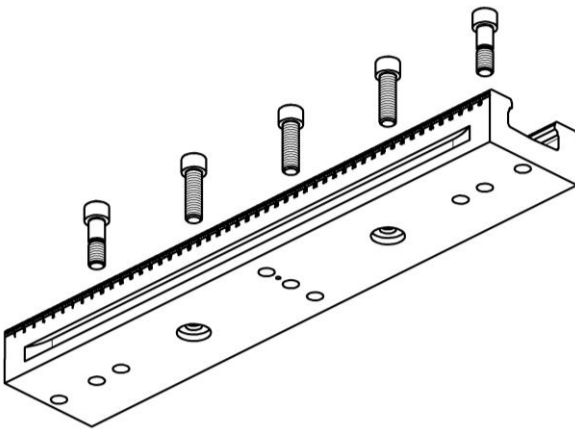
4.1.1 On machine table with T-slots



Alignment with alignment and centring set in T-slot.

Fastening with clamping claws and cylinder screws.

4.1.2 On machine table with Ø12/M12 grid holes and grid spacing 40 or 50 mm



The positioning holes have a tolerance of F7 so that, in the case of extreme tolerance positions, the clamping rails can be positioned without force.

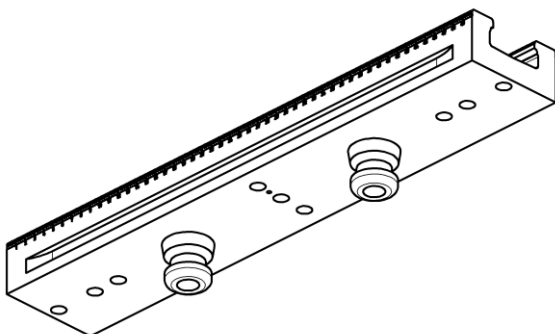
Positioning and fixing with two fitting screws Ø12 f7/M12, one each in the first and last positioning holes of the clamping rail.

Additional fixing is possible with normal cylinder screws M12 in the other fixing holes.

Torque max. 70 Nm



4.1.3 On VERO-S quick-change palleting system



The clamping rail is fitted with an interface to attaching the clamping pin for the VERO-S quick-change palleting system.

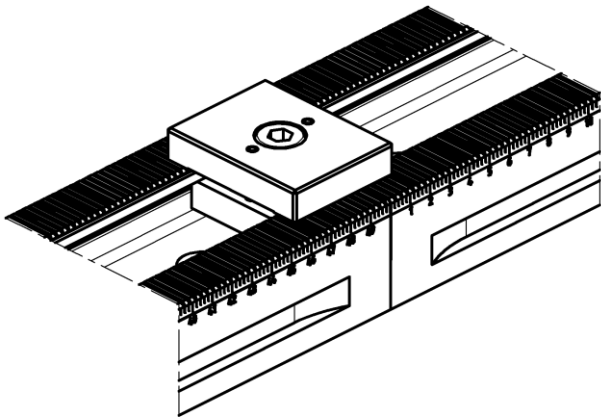
Clamping pins are fitted depending on the length of the rail:

- from above with cylinder screw M12x25.
- from below with cylinder screw M10x45.

Up to rail length of 500: with two clamping pins.

With rail lengths of 600 and 650: with three clamping pins.

4.1.4 Extension with second clamping rail



Clamping rails can be precisely linked using the top-mounted gearing and the linking element.

Each fixing of the clamping rails has to be individually ascertained.

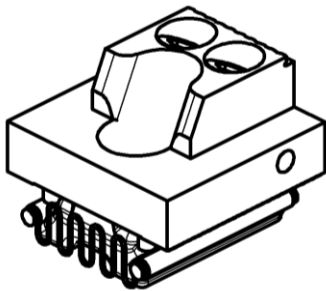


4.2 Jaw range

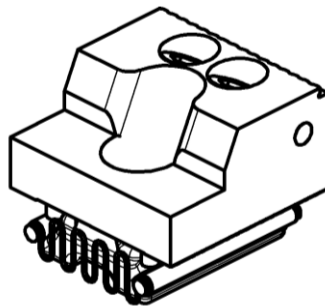
The reliable function of the clamping device is significantly affected by the selection of the correct top jaws.

4.2.1 Adjustable jaws and clamping jaws

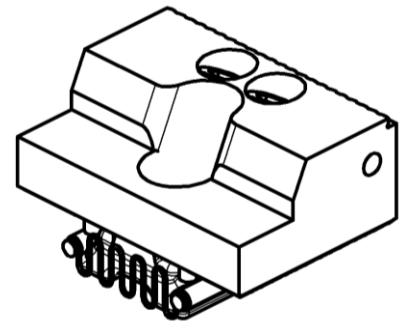
adjustable jaw 40 mm



adjustable jaw 65 mm



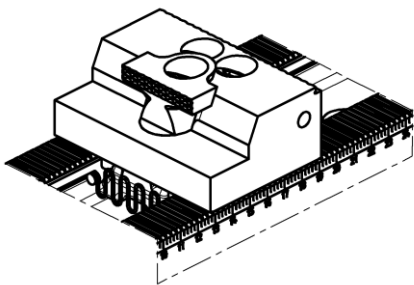
adjustable jaw 90 mm



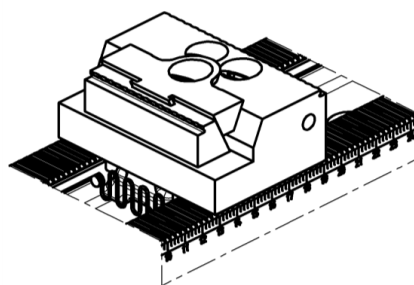
The adjustable jaws are fitted with suitable clamping jaws to suit the application.

Examples:

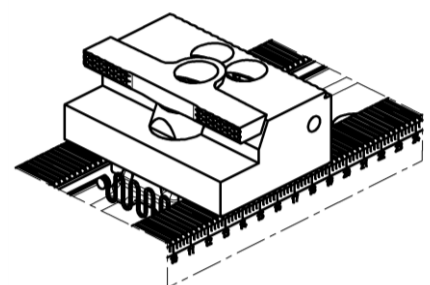
with "grip" pull-down jaw
W = 40 mm



with parallel clamping jaw
W = 65 mm

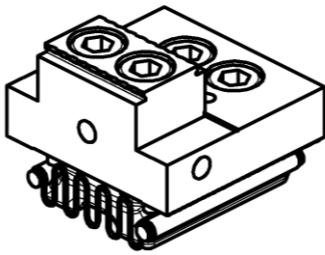


with "grip" pendulum jaw
W = 90 mm

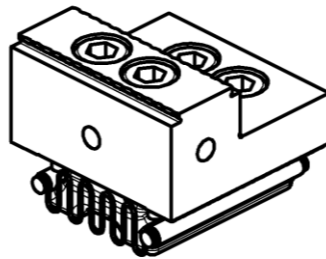


4.2.2 Fixed jaw and adjustable jaw

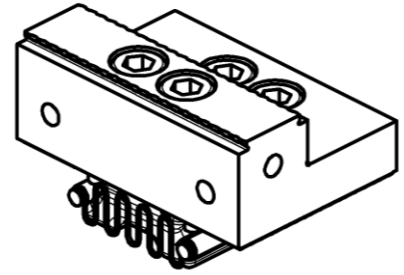
fixed jaw 40 mm



fixed jaw 65 mm



fixed jaw 90 mm



The back $H = 35$ mm of the fixed jaws respectively adjustable jaws has a clamping step of $H = 3$ mm.

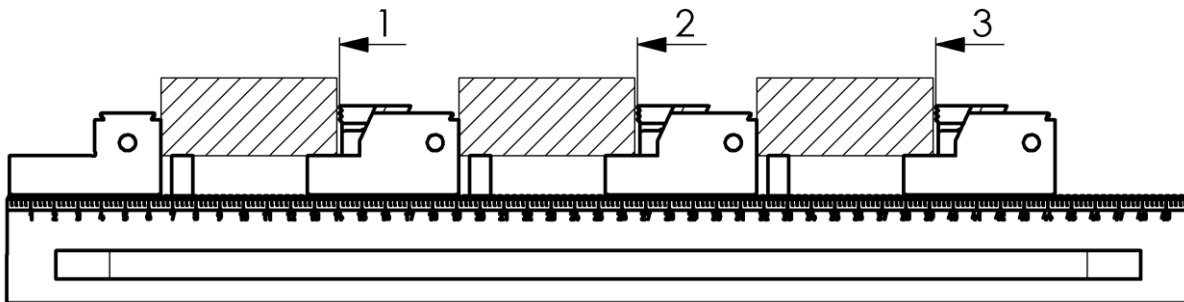
The clamping area on this step has a "grip" profile for clamping unprocessed parts.

A multi-sided jaw configuration can be adapted using the female threads in the face of the unit.

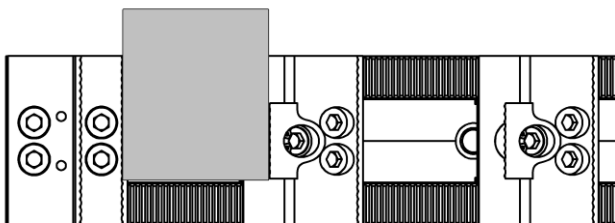
4.3 Setting up workpiece clamping

4.3.1 Sequence with multiple clamping

Recommended sequence of workpiece clamping.



4.3.2 One-sided workpiece clamping



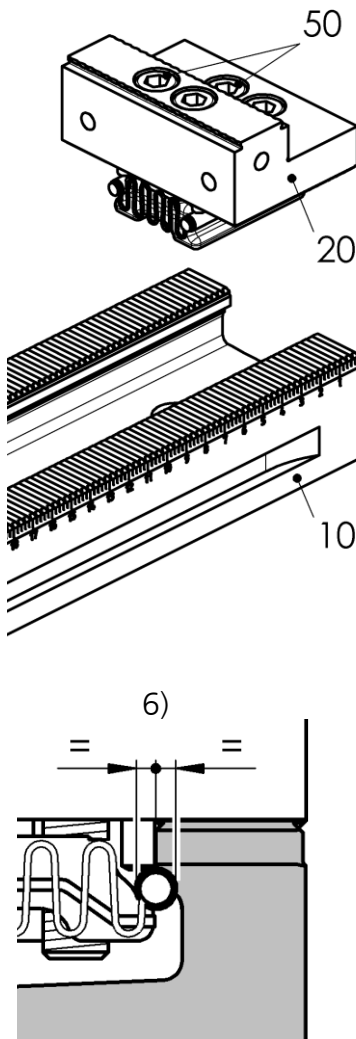
The workpiece must be covered by the full width of the clamping jaw as a minimum.

This prevents excessive twisting of the components.

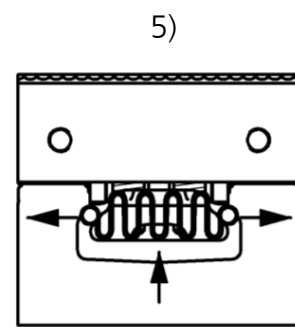
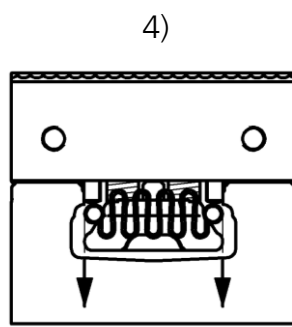
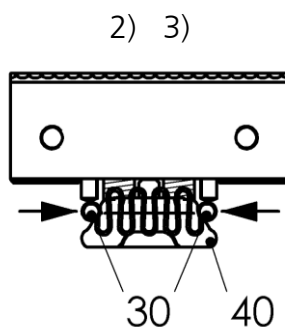


4.3.3 Setting up the jaw positions

Fixed jaws:



- 1) It is important to ensure that the gearing of the base plate and jaws is clean and free from chips.
- 2) The four cylinder screws M10 (pos. 50) have to be released far enough so that the locking rollers with the wave springs (pos. 30) are located in the upper indent of the clamping buckle (pos. 40).
- 3) When the fixed jaw (pos. 20) has already been clamped, release the cylinder screws by approx. 3 turns. This means that the locking rollers are in open position.
- 4) Insert respectively extend the fixed jaw from above into the base plate (pos. 10).
- 5) Tighten the four cylinder screws M10 crosswise. The clamping buckle is pulled upwards, the locking rollers are pushed outwards and clamped in close contact with the shape between the clamping buckle and base plate.
- 6) Visually check that the locking is correct; the locking rollers must make full contact on both sides with the round shape of the base plate, which means that they are exactly half-way under the base plate. If there is any doubt, the locking should be released and the process repeated.
- 7) Tighten the cylinder screws M10 with a torque of 50 Nm.



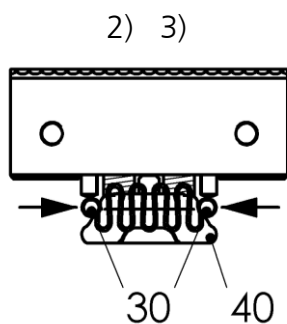
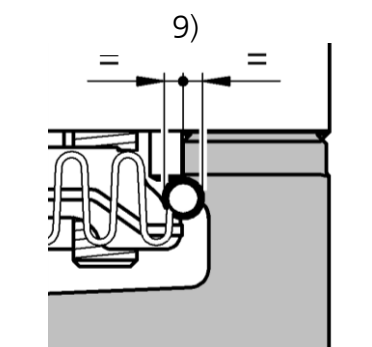
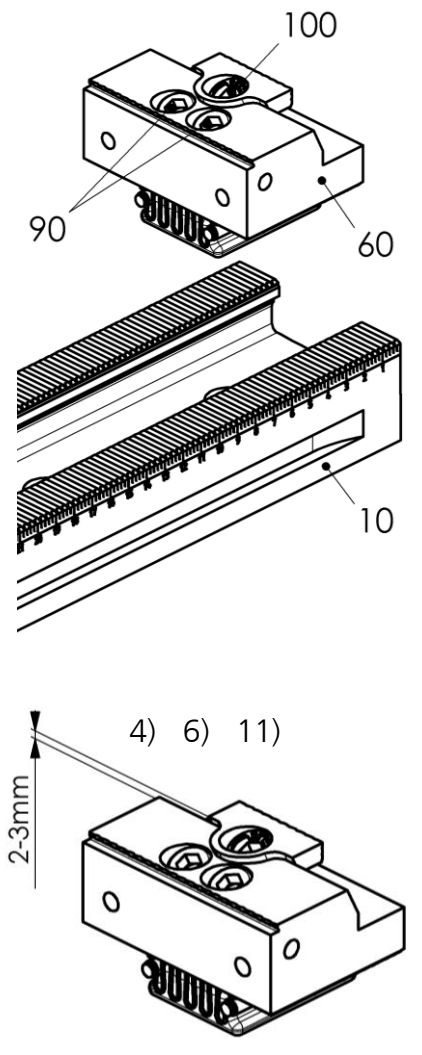
Attention:

Before clamping the workpiece, the cylinder screws M10 (pos. 50) have to be tightened with 50 Nm. Failure to observe this instruction can lead to inadequate workpiece clamping and hence to loss of the workpiece and damage.

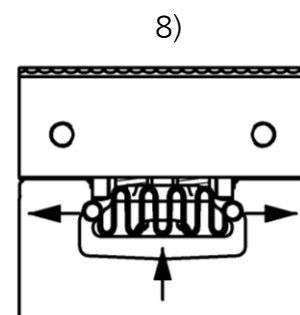
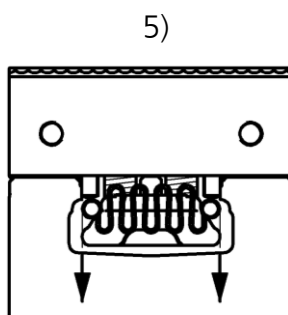
Note: the scale helps to position the jaws when the same positions have to be repeated.



Adjustable jaws:



- 1) It is important to ensure that the gearing of the base plate and jaws is clean and free from chips.
- 2) Release the two cylinder screws M10 (pos. 90) far enough so that the locking rollers with the wave springs (pos. 30) are located in the upper indent of the clamping buckle (pos. 40).
- 3) When the adjustable jaw (pos. 60) has already been clamped, release the screws by approx. 3 turns. This means that the locking rollers are in open position.
- 4) Use the cylinder screw (pos. 100) to open the clamping jaw far enough so that the upper surface of the clamping jaw projects by approx. 2 to 3 mm above the adjustable jaw.
- 5) Insert respectively extend the adjustable jaw from above into the base plate (pos. 10).
- 6) When positioning the adjustable jaw for the respective workpiece size it is important to ensure that the upper face of the clamping jaw projects by approx. 2 to 3 mm above the adjustable jaw; if necessary, the cylinder screw (pos. 100) has to be opened to achieve this.
- 7) Position the adjustable jaw in the gearing to suit the clamping opening.
- 8) Tighten the two cylinder screws M10. (pos. 90) The clamping buckle is pulled upwards, the locking rollers are pushed outwards and clamped in close contact with the shape between the clamping buckle and the base plate.
- 9) Visually check that the locking is correct; the locking rollers must make full contact on both sides with the round shape of the base plate, which means that they are exactly half-way under the base plate. If there is any doubt, the locking should be released and the process repeated.
- 10) Tighten the cylinder screws M10 (pos. 90) with a torque of
- 11) Use the clamping screw (pos. 100) to return the clamping jaw to its optimum home position with the top surface of the clamping jaw protruding by 2 to 3 mm above the adjustable jaw.



Important:

before clamping a workpiece the cylinder screws M10 (pos. 90) have to be tightened with 50 Nm. Failure to observe this instruction can lead to inadequate workpiece clamping and hence to loss of the workpiece and damage.

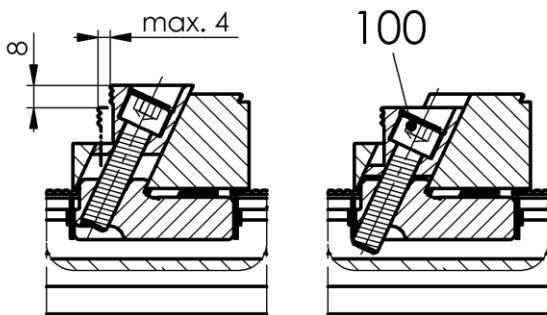


Note:

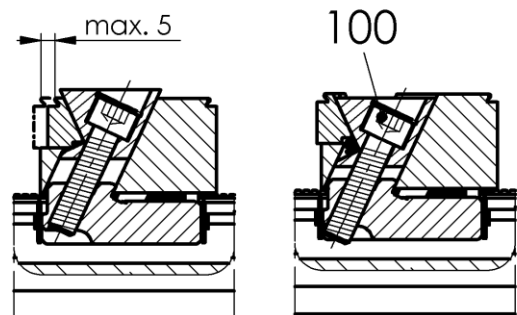
The scale helps to position the jaws when the same positions have to be repeated.

4.3.4 Workpiece clamping

With "grip" pull-down jaw or with "grip" pendulum jaw



With parallel clamping jaw



The workpiece is clamped with the slanted cylinder screw M10 (pos. 100).

Recommendation for clamping several workpieces:

- Slightly pre-tension the workpieces with an SW8 hexagonal key.
- Proceed to clamp all clamping points using the torque wrench to the required clamping force.

(clamping forces in accordance with clamping diagram in section 2.1.1).

Clamping with a torque wrench improves safety, quality and repeat accuracy.

When clamping several items, always proceed in the same sequence; this increases the repeat accuracy.



5 Servicing, cleaning and maintenance

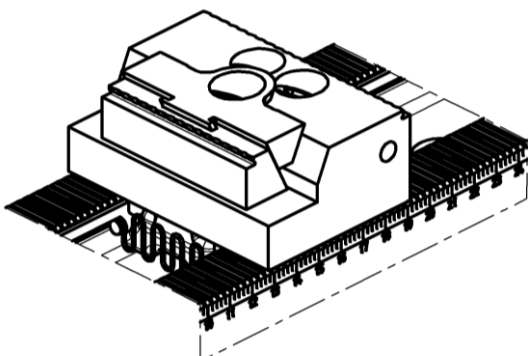
5.1 General cleaning / lubrication

Clean and oil the guides and gearing of the clamping rails on a regular basis, e.g. with MOTOREX Supergliss 68 K to ISO VG 68.

When moving the fixed jaw or adjustable jaws, chips must be thoroughly removed and the gearing must be cleaned.



5.2 Cleaning / lubricating the adjustable jaws



Guides and running surfaces of the clamping jaw have to be regularly cleaned and oiled, e.g. with MOTOREX Supergliss 68 K to ISO VG 68.

The head support and the thread of the clamping screw should be lubricated with Molykote grease every 3 to 4 weeks.

Running dry should be avoided as this will reduce the clamping force.

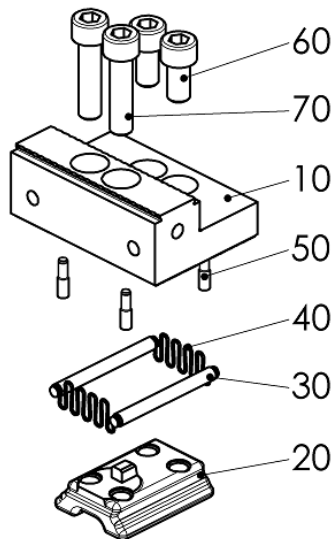
6 Troubleshooting, eliminating faults

Vice is hard to operate:

Dismantle, clean and damaged surfaces must be carefully levelled off with a honing stone.

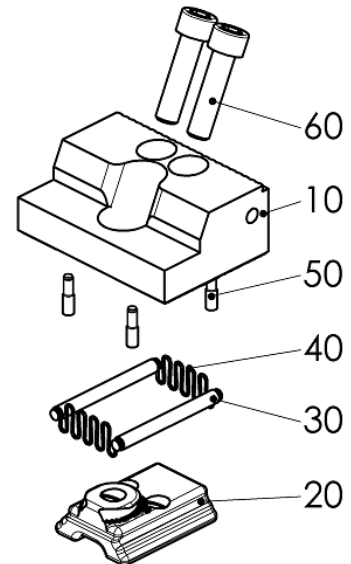
7 Assembly drawing

Fixed jaw



Pos.	Designation
10	Fixed jaw
20	Clamping buckle fixed jaw
30	Locking roller
40	Wave spring
50	Cylinder pin special Ø5/Ø4
60	Cylinder screw M10x25
70	Cylinder screw M10x45

Adjustable jaw



Pos.	Designation
10	Adjustable jaw
20	Clamping buckle adjustable jaw
30	Locking roller
40	Wave spring
50	Cylinder pin special Ø5/Ø4
60	Cylinder screw M10x45

Individual parts on request; always state the required jaw width

8 Taking out of service

The clamping device and all accessories can be disposed of as scrap metal without any risk.

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