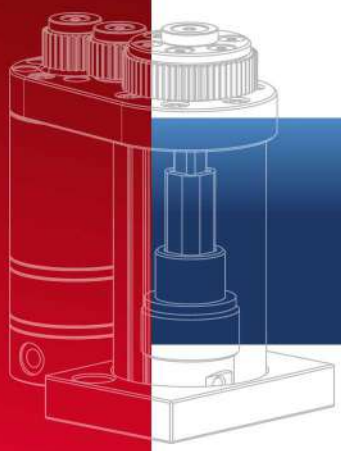

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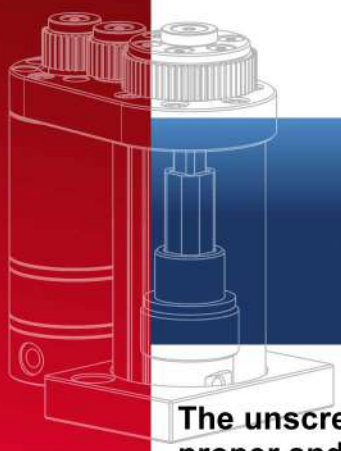
Operating Instructions

according to section 1.7.4 of Annex I to the EC Machinery Directive 98/37/EC of June 22, 1998

Designation of the machine:

Unscrewing Device

Table of contents:



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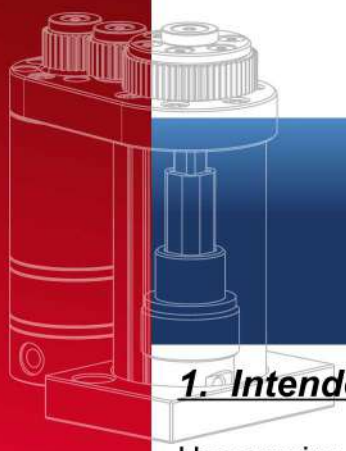
The unscrewing device must be operated and maintained correctly in order to give proper and reliable service. Every operator must therefore read and understand these operating instructions thoroughly and familiarize himself with the unscrewing device.

Unscrewing devices and the associated operating instructions are intended solely for commercial use. No unscrewing device shall be operated or put into service by a private user. In the following text, the term "operator", as related to an unscrewing device, is deemed to refer to any person who installs, starts up, operates, maintains or disassembles such unscrewing device. Every operator of an unscrewing device must read the present operating instructions carefully and entirely before engaging in any installation, maintenance, start-up, operation or disassembly of the device. It must be ensured that all operators have fully understood these operating instructions and will comply at all times with the instructions and recommendations contained herein. Any operator of the unscrewing device is therefore urged to re-read these operating instructions carefully at regular intervals. The responsibility for proper training of all operators of the unscrewing device rests with the operating company. Every operator must have a basic understanding of control technology as well as of electrical, mechanical and hydraulic engineering fundamentals. The operating company shall ensure that all operators have fully read and understood these operating instructions and are capable of implementing the contents hereof in practice, and that all provisions of these operating instructions will be fully observed. In the event of an unscrewing device being transferred to third parties (sale, rental, etc.), these operating instructions shall likewise be so transferred. It is not permitted to pass on any unscrewing device to any third party without the associated operating instructions.

Hazard symbols:

This symbol warns the operator of the unscrewing device that any failure to comply with the instructions so marked may result in personal injury.

This symbol draws the operator's attention to important information regarding the installation, operation, maintenance or start-up of the device, or to any associated injury hazard.



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1. Intended use:

Unscrewing devices are used to unscrew internal threads on plastic injection mouldings. The unscrewing device is attached to an existing mould in an injection moulding machine and forms a separate assembly.

The unscrewing device is electrically controlled and hydraulically actuated. Most injection moulding machines are prepared for the electrical control and hydraulic actuating functions of an unscrewing device through their core puller control system. The movements of the device are controlled electrically via inductive proximity switches. These unscrewing devices are particularly easy to install and operate.

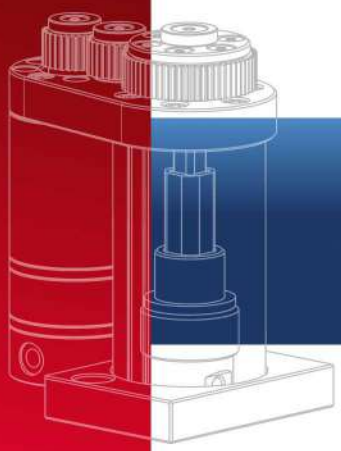
Technical specifications:

Unscrewing devices are currently equipped with motor types OMM8, OMM32 and OMM50

Unscrewing device

	Motor OMM8	Motor OMM32	Motor OMM50
Inlet pressure (max.):	40 bar (advance) up to 100 bar (return)	40 bar (advance) up to 100 bar (return)	40 bar (advance) up to 70 bar (return)
Oil flow rate (max.)	16 l/min (cont.) 20 l/min (interm.[1])	20 l/min (cont.) 25 l/min (interm.[1])	20 l/min (cont.) 25 l/min (interm.[1])
R.P.M. (max.)	1950 r.p.m. (cont.) 2450 r.p.m. (interm.[1])	630 r.p.m. (cont.) 800 r.p.m. (interm.[1])	400 r.p.m. (cont.) 500 r.p.m. (interm.[1])
Torque (max.)	11 Nm (cont.) 15 Nm (interm.[1]) 21 Nm (peak[2])	40 Nm (cont.) 57 Nm (interm.[1]) 64 Nm (peak[2])	46 Nm (cont.) 88 Nm (interm.[1]) 100 Nm (peak[2])
Output (max.):	1,8 kW (cont.) 2,6 kW (interm.[1])	2,4 kW (cont.) 3,2 kW (interm.[1])	1,8 kW (cont.) 3,2 kW (interm.[1])
Threaded connection on Sauer Danfoss hydraulic motors:	ISO 228/1 - G 3/8	ISO 228/1 - G 3/8	ISO 228/1 - G 3/8
Weight / motor:	approx. 1,9 kg	approx. 2,1 kg	approx. 2,1 kg
Dimensions (H x W x L) in mm of GA-01 unit with motor indicated across:	235 / 110 / 109	245 / 110 / 109	255 / 110 / 109

[1] Intermittent operation: device running for up 10% of each minute
[2] Peak load: device running for up to 1% of each minute



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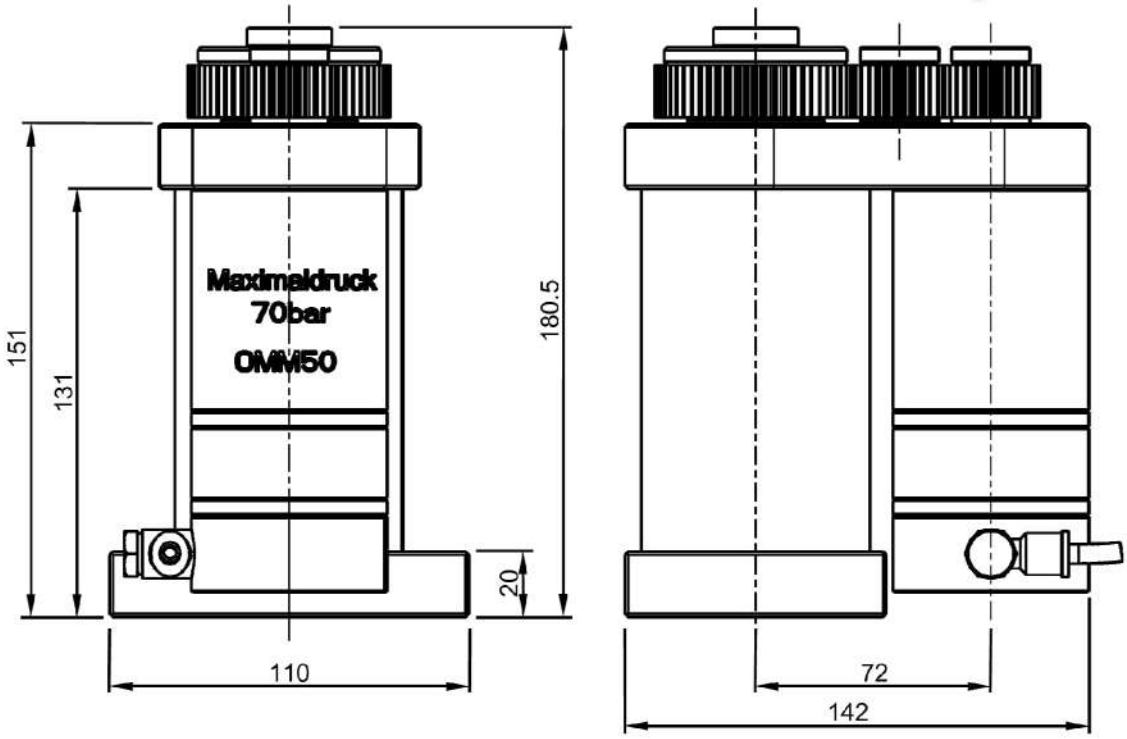
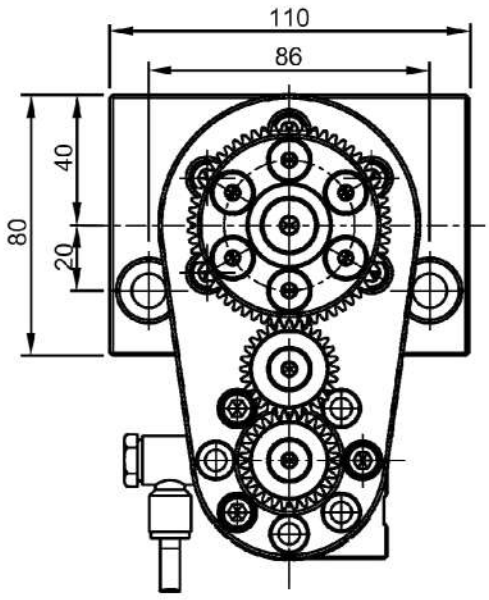
Standard Unit TGA-01





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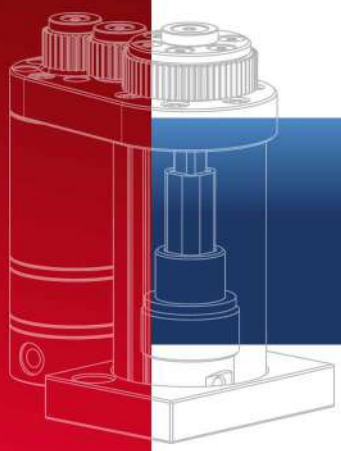

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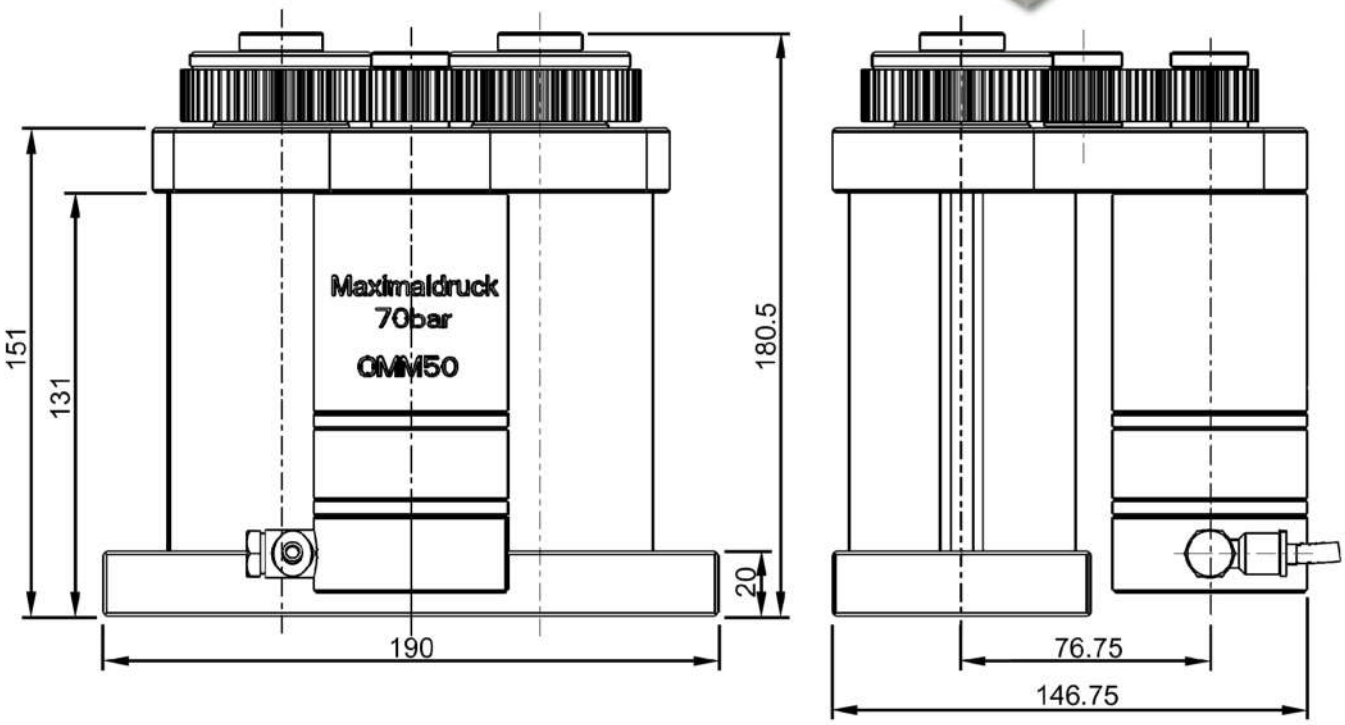
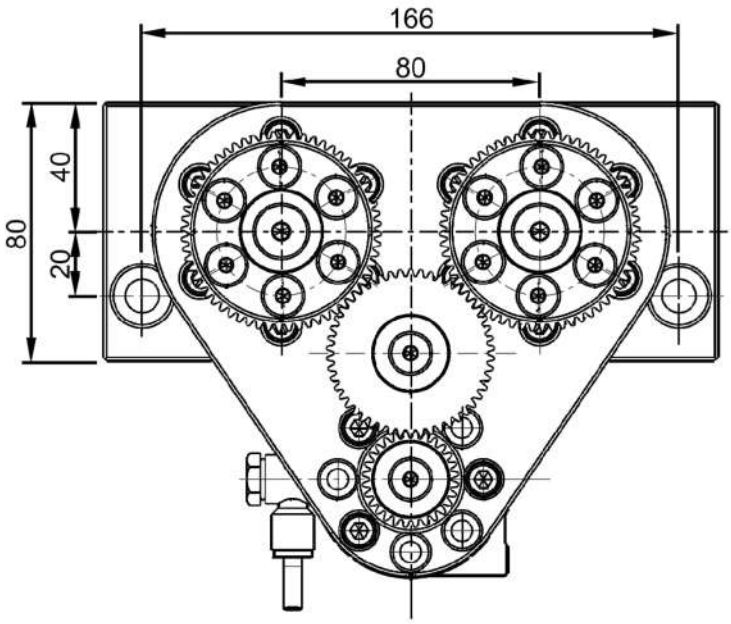
Standard Unit TGA-02





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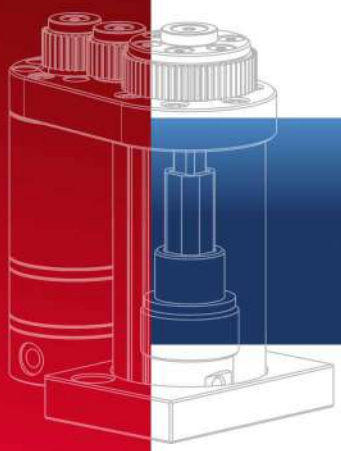

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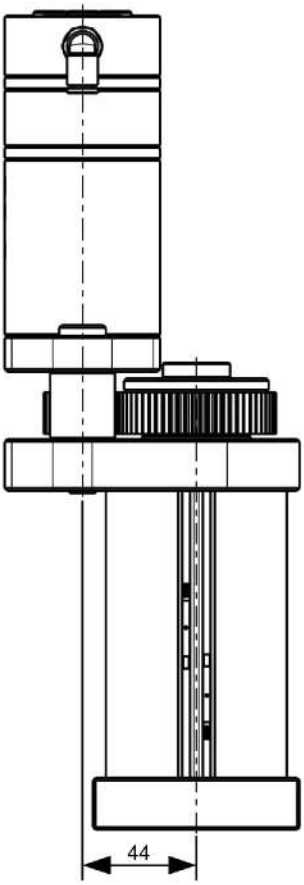
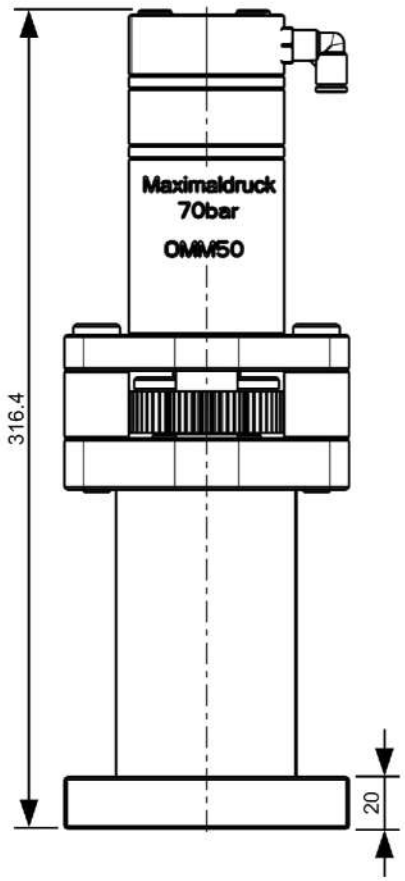
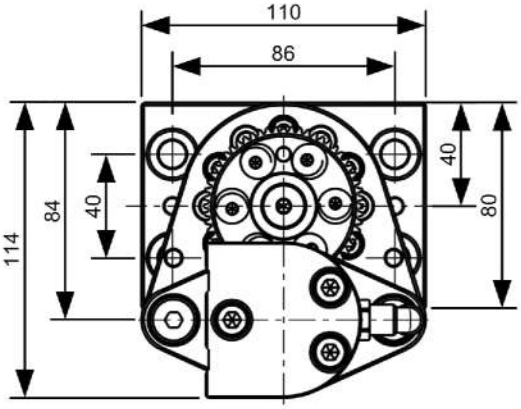
Standard Unit TGA-01S







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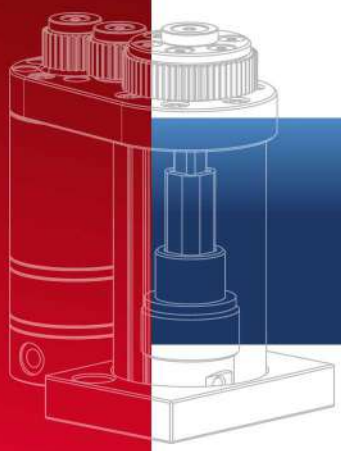

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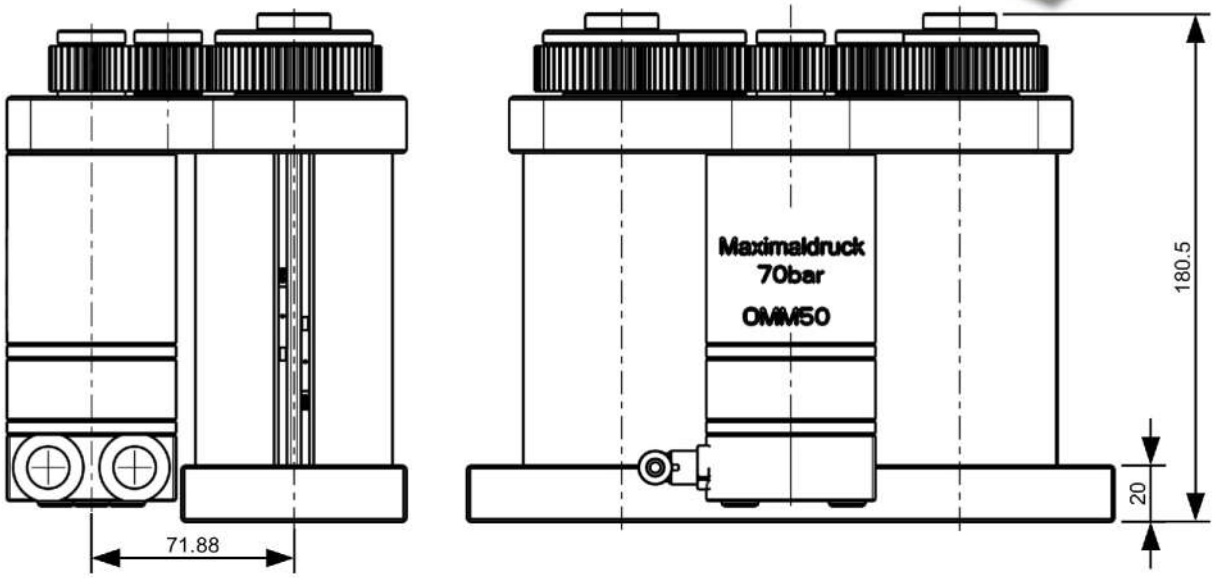
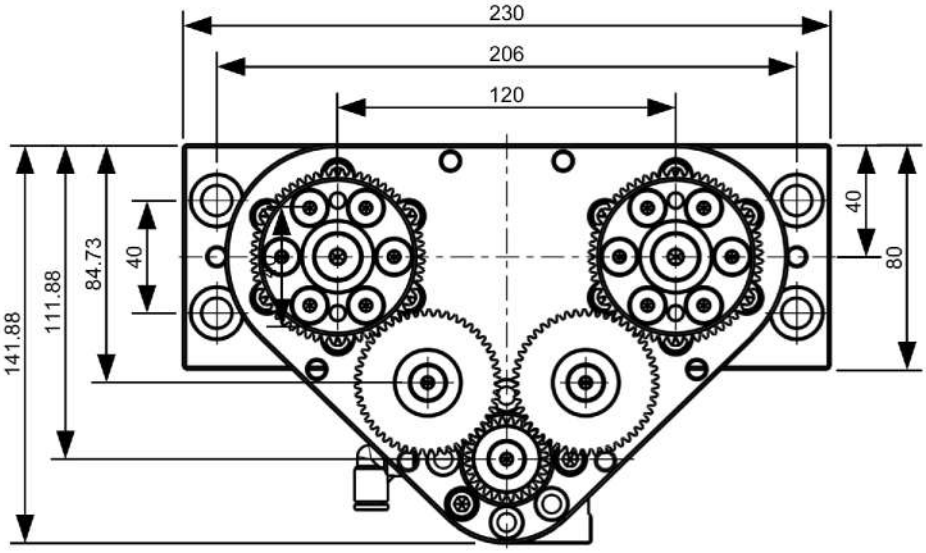
Standard Unit TGA-02 A120





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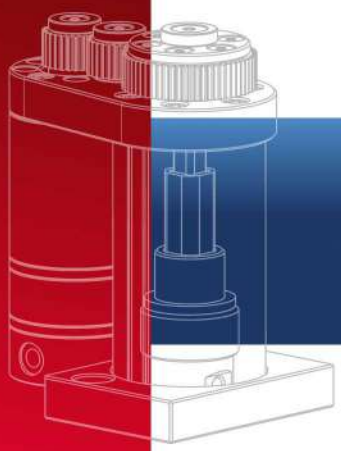

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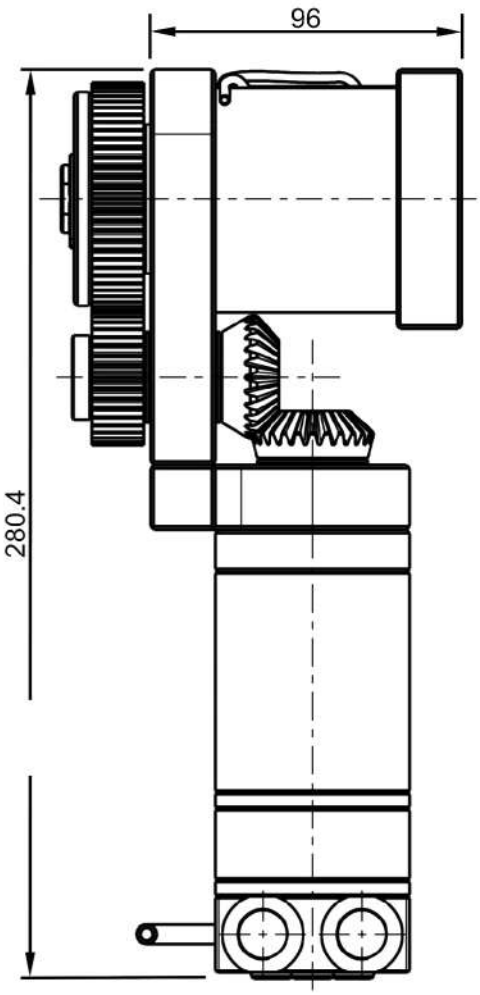
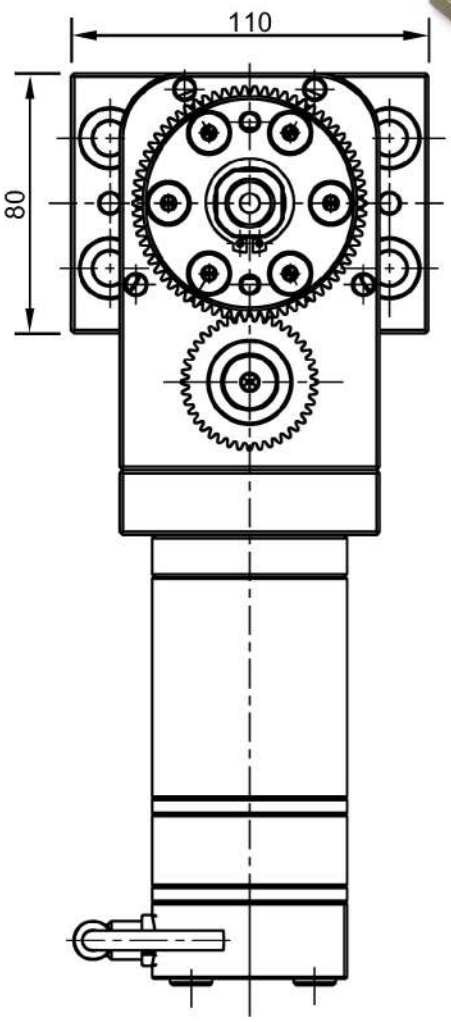
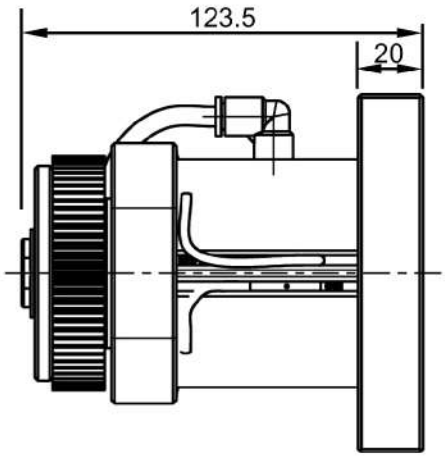
Low Height Unit NTGA-01







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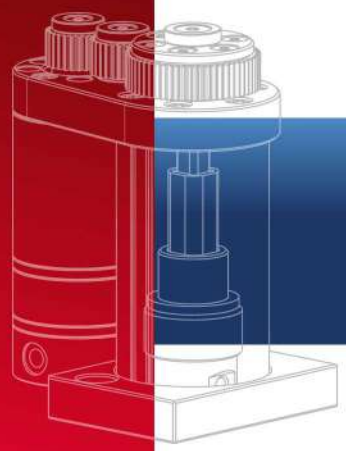

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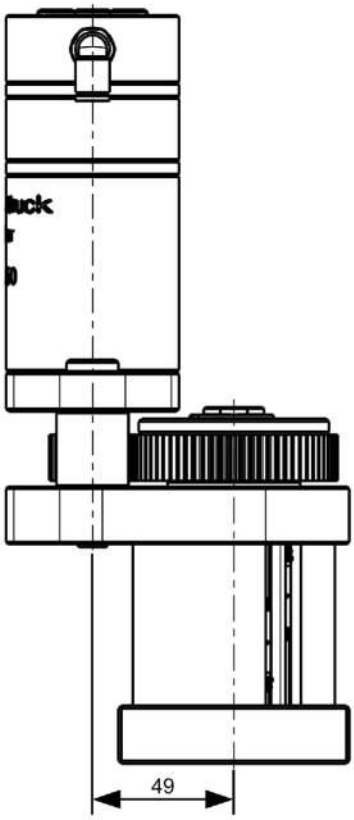
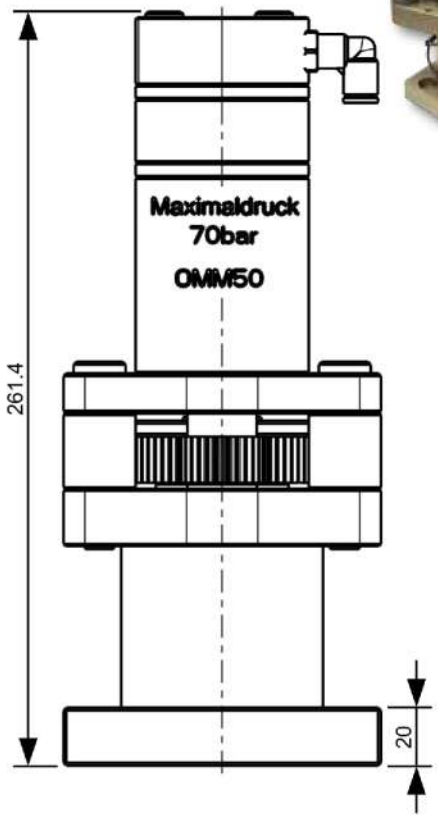
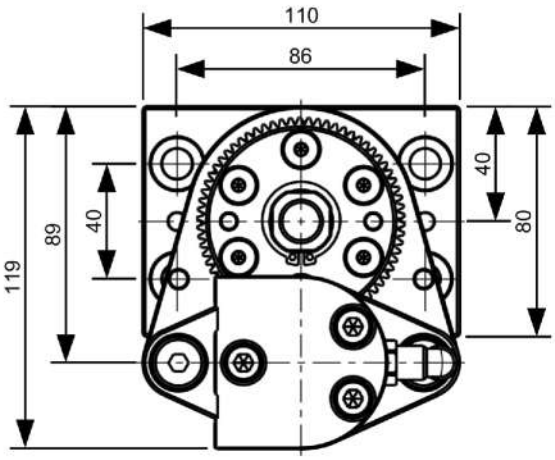
Low Height Unit NTGA-01S







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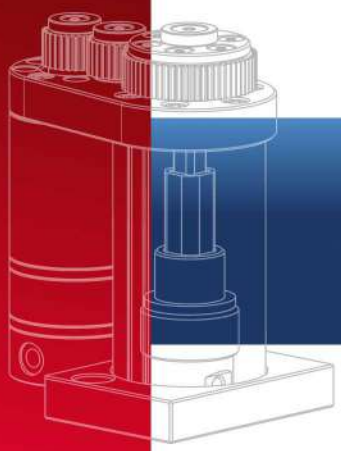

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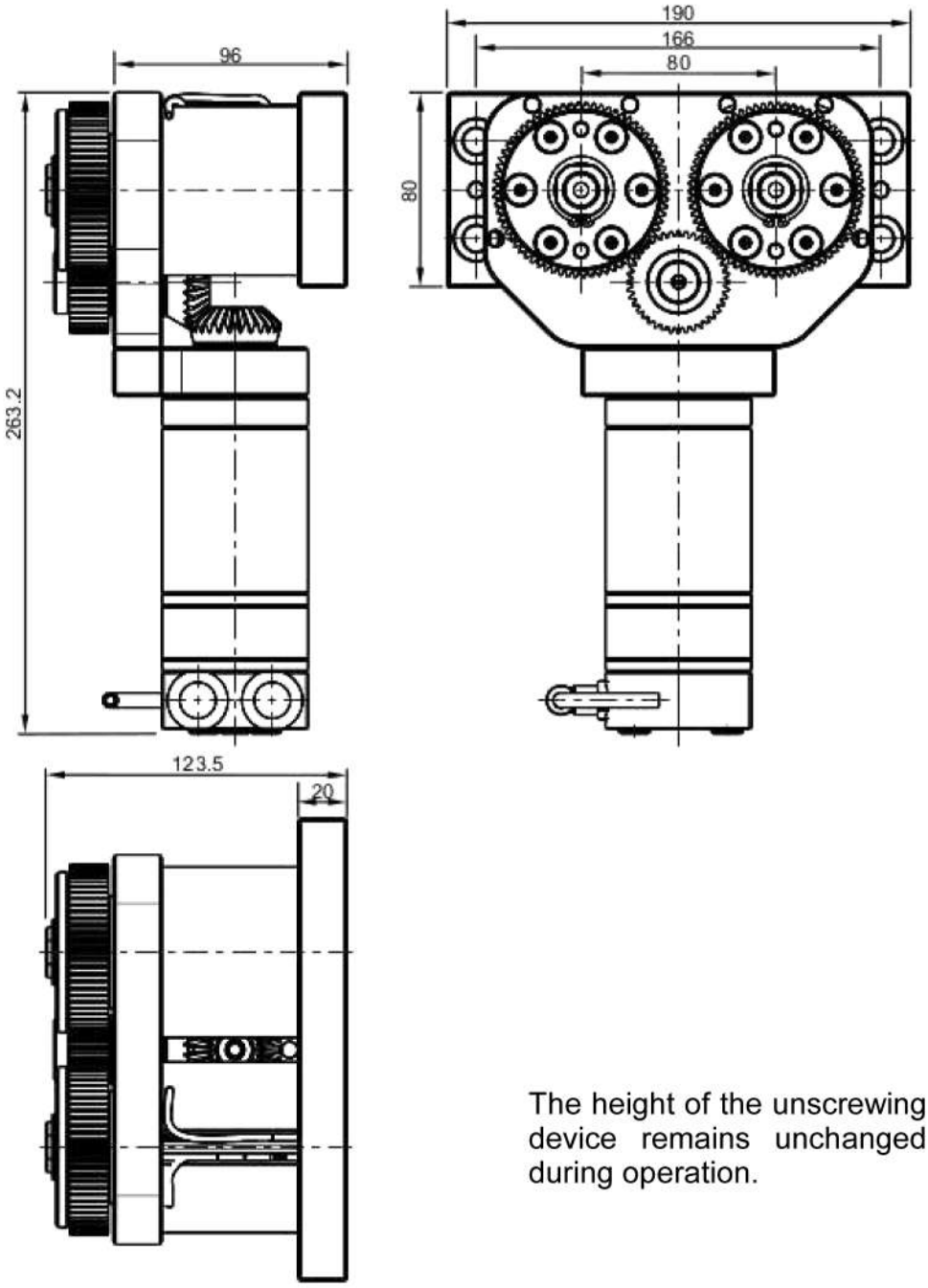
Low Height Unit NTGA-02



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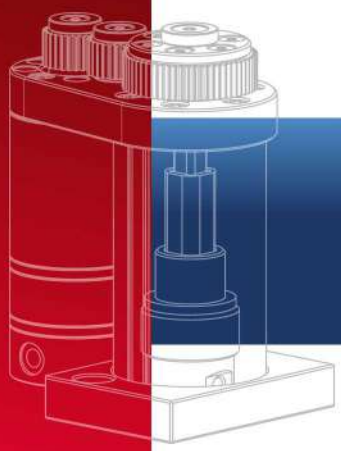

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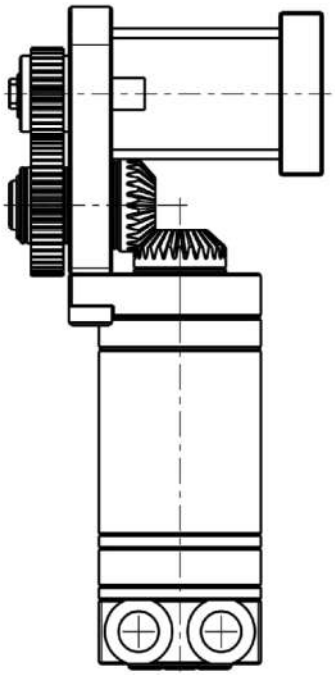
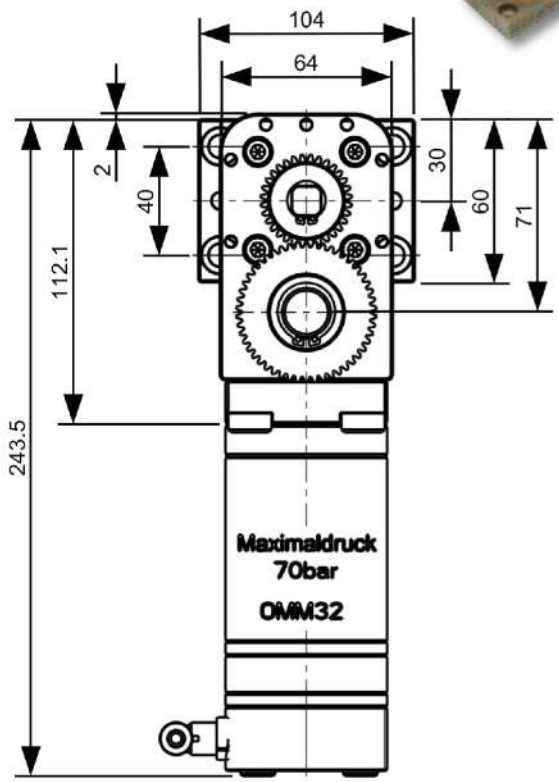
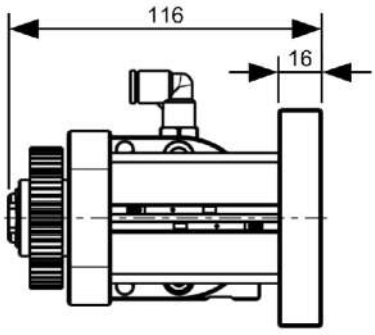
Mini Unit KNTGA-01







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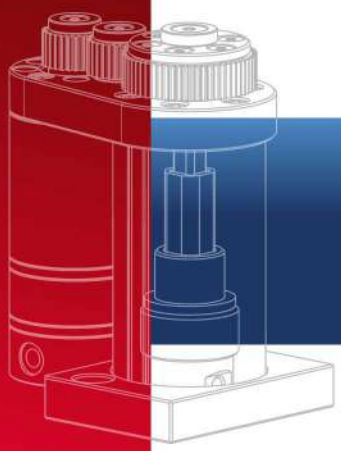

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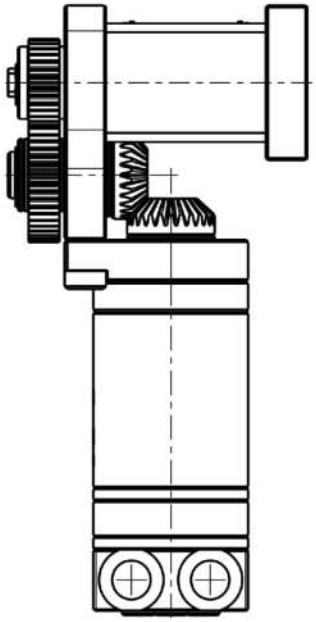
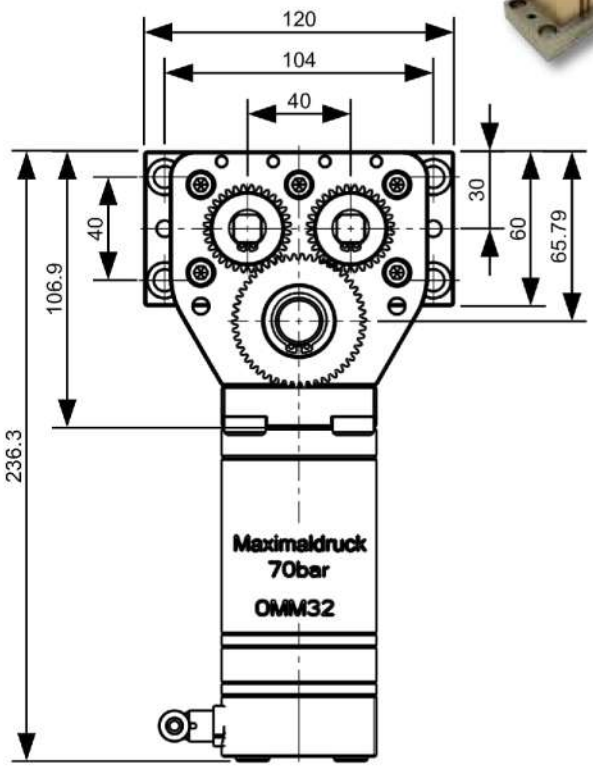
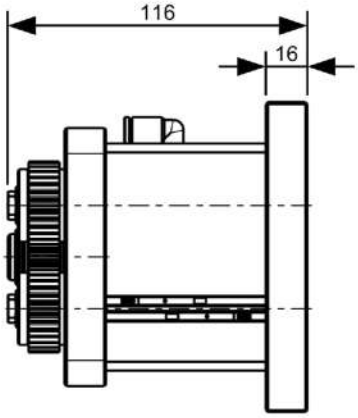
Mini Unit KNTGA-02







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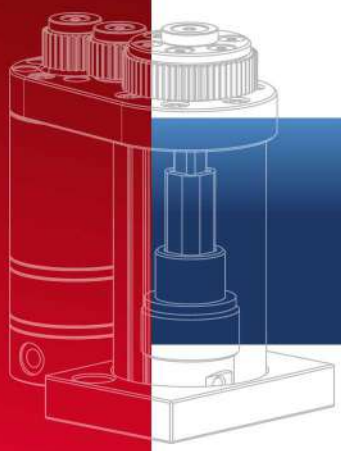

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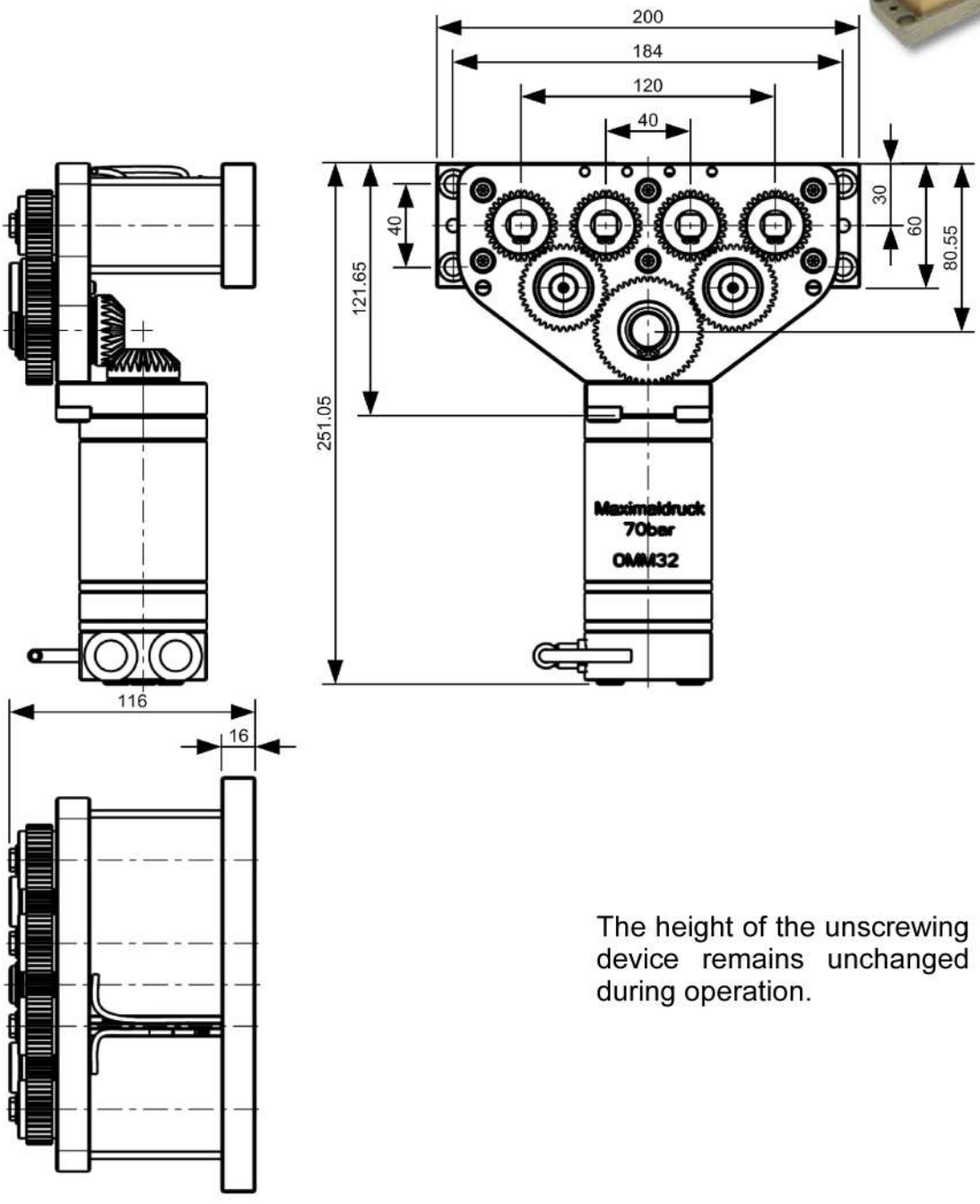
Mini Unit KNTGA-04



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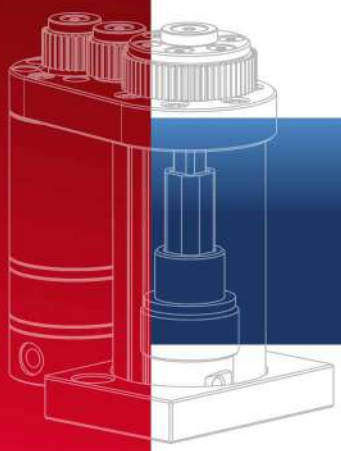

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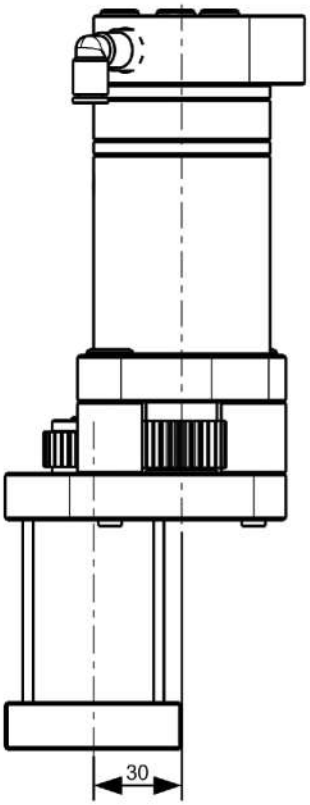
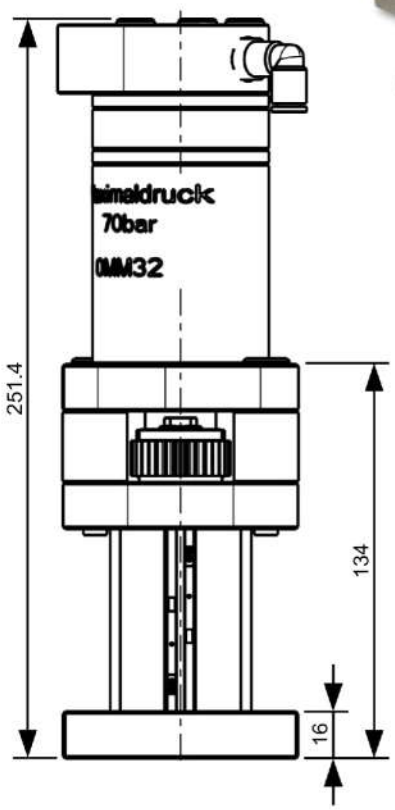
Mini Unit KTGA-01





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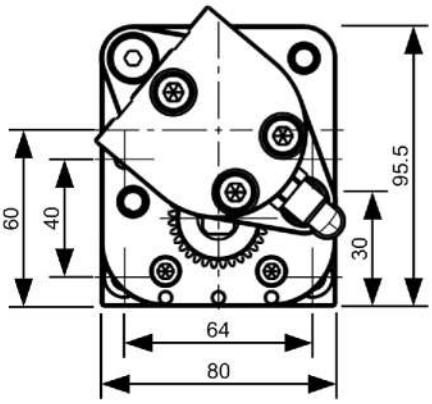

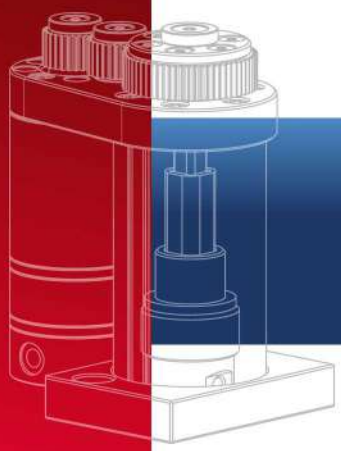

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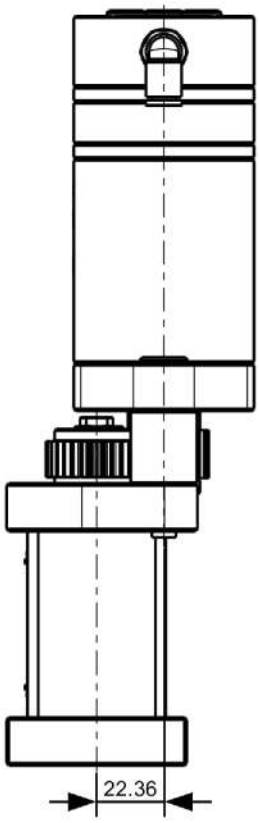
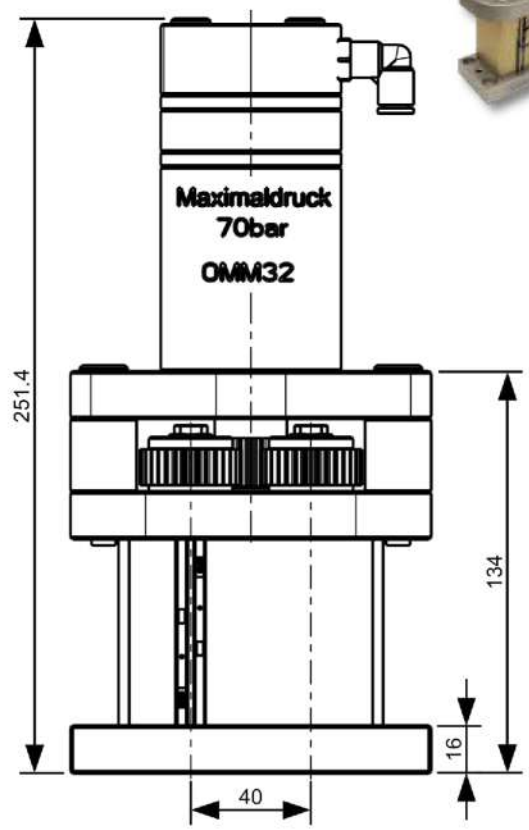
Mini Unit KTGA-02





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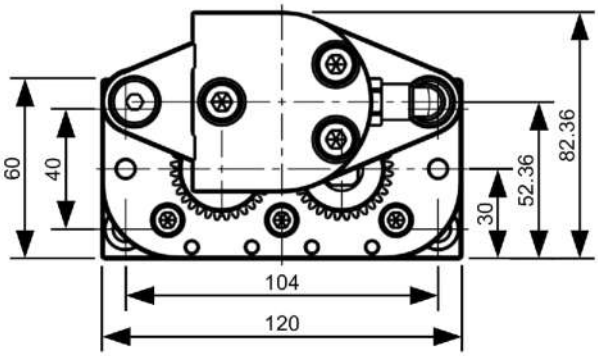

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Sauer-Danfoss hydraulic motors

Characteristics:

- Smooth operation over the entire speed range
- Constant torque over a broad r.p.m. band
- High starting torque
- High efficiency
- Long service life, even under extreme operating conditions
- Sturdy and compact design
- High axial and radial bearing capacity
- For application in both open and closed-loop hydraulic systems
- Suitable for a wide variety of hydraulic fluids

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1.1 Workstations likely to be occupied by operators

The unscrewing device must be firmly attached to the injection mould. It must neither become detached nor dislocated while the machine is in operation. Its mounting location must be selected so that the unscrewing device is not exposed to any falling objects. Where this cannot be achieved, a protective roof should be fitted over the unscrewing device. When installing the device, make sure that its controls are freely accessible.

1.2 General safety instructions

Upon receiving the unscrewing device, check its packaging and inspect the unit for potential damage sustained in transit.

Unscrewing devices operate with highly pressurized hydraulic fluid.

Improper handling may cause hydraulic fluid to escape at high pressure!

Any uncontrolled release of high-pressure hydraulic fluid may cause severe injuries or death. Strict compliance with all safety instructions is essential to prevent major damage to property.

When connecting the hydraulic motor of this unscrewing device, use only type- tested hydraulic couplings and hoses intended for this application.

Take care not to exceed the pressure limits indicated on the hydraulic hose, and observe maximum hose life specifications.

Check the unscrewing device visually for apparent defects before every shift. Any existing defects must be removed before work is started.

Observe the unscrewing device closely during operation.

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Personal safety

In order to protect the eyes, skin and respiratory passages, safety goggles, protective apparel, gloves and respirator equipment should be worn as appropriate. Observe the instructions of the hydraulic fluid manufacturer.

Strict compliance with the cleaning and maintenance instructions is essential.

This unscrewing device delivers high forces. Take care, therefore, not to get fingers or other body parts caught in the unit.

Alterations or modifications of this unscrewing device are not permitted and will result in forfeiture of the warranty and, possibly, malfunctions of the device

If an unscrewing device must be modified from its factory configuration or needs to be repaired, use only original parts, retrofits or accessories, or components manufactured from drawings approved by Superior Die Set.

No manufacturer's liability whatsoever will be accepted if the unit is used or equipped with accessories or spare parts made by a third party.

All controls of the unscrewing device must be freely accessible.

Avoid causing any hazard to humans or animals during operation of the unit.

Maintain work areas neat and tidy. Poor housekeeping in operating environments may give rise to accident hazards.

Keep these operating instructions readily at hand near the operating location of the unscrewing device.

Make sure to prevent any unauthorized access to the unscrewing device.

Store and operate this unscrewing device in a dry and closed room

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Personal safety

The flow of hydraulic fluid through hydraulic hoses at very high velocities may result in a build-up of static electricity that may give rise to electric shock. The unscrewing device and all other components must therefore be grounded (especially if the unit is fitted in a potentially explosive atmosphere).

Take care to depressurize the hydraulic circuit and disconnect the unscrewing device from all sources of energy (particularly the hydraulic port of the hydraulic motor) before embarking on repairs or maintenance interventions (disassembly of the unscrewing device).

As a general rule, the thread depth and shut-off function of the unscrewing device must be controlled exclusively via the magnetic field sensors supplied with the unit.

Never operate this unscrewing device without the magnetic field sensors supplied with it. Their use is absolutely essential for ensuring precise positioning at the respective advance and return travel end points.

When connecting the magnetic field sensors, review the electrical connecting diagrams for the core puller control system of the injection moulding machine on which the unscrewing device is to be fitted.

All relevant accident prevention regulations and other known rules of safety and labour medicine must be duly observed.

The unscrewing device must be operated by suitable, reliable individuals (machine operators) appointed by the operating company. These operators must have been trained in the operation and maintenance of the unscrewing device
and must be familiar with its operation.

Appropriate personal protection equipment must be provided by the company if the noise rating level at a given workplace exceeds 85 dB.

At noise levels of 90 dB or more, the use of such personal protection equipment by operators is mandatory.

These operating instructions should remain on hand near the unscrewing device at all times.

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Hydraulic system connections

This unscrewing device uses hydraulic fluid at a pressure of between 10 and 140 bar. A hydraulic hose conforming at least to Series 8S specifications must be run from the hydraulic unit of the injection moulding machine to the unscrewing device.

The shaft seal on Sauer-Danfoss hydraulic motors is equipped with a drain port which extends its service life many times over. To benefit from this feature, the supplied drain line (6 mm dia. plastic hose) must be connected between the hydraulic motor of the unscrewing device and the hydraulic fluid storage tank of the injection moulding machine to which this unscrewing device is to be fitted.

Ensure that hydraulic fluid from the drain port can flow without pressure into the hydraulic fluid storage tank of the injection moulding machine on which the unscrewing device is to be used.

Observe all other operating instructions for Sauer-Danfoss hydraulic motors, especially the max. operating pressure specifications.

Electrical connection

Never operate this unscrewing device without the supplied magnetic field sensors. Their use is absolutely essential for ensuring precise positioning at the respective advance and return travel end points. When connecting the inductive proximity switches, review the electrical connecting diagrams for the core puller control system of the injection moulding machine on which the unscrewing device is to be fitted.

Take care to ensure that the hydraulic motor of the unscrewing device is fully depressurized at the advance and return travel end points by the core puller control system of the injection moulding machine.

Do not control any additional equipment with the core puller control system intended for this unscrewing device. If your application requires a second unscrewing device or core pulling cylinder to be actuated in addition to this unscrewing device, the use of an injection moulding machine with a dual core puller control system is mandatory.

Copyright and intellectual property rights

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Caution - Hazard notes

This unscrewing device must be used exclusively for unscrewing internal threads in plastic injection mouldings.

The company owning and operating this device shall require all operating personnel to wear safety goggles, safety gloves and personal protection equipment as appropriate.

Use only compatible chemicals for cleaning this unscrewing device.

The temperature of the hydraulic fluid must not exceed 40°C at any time during operation of the unscrewing device.

This unscrewing device is to be operated with hydraulic fluid at a pressure of 10 - 140 bar. Higher pressures may result in injuries, equipment defects or damage to property.

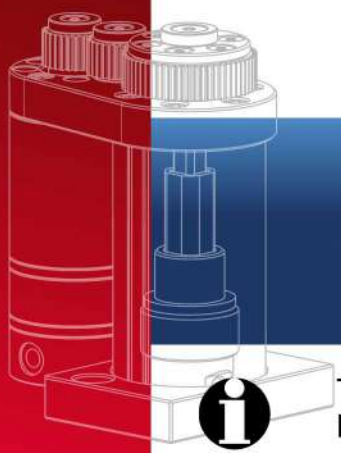
The maximum inlet pressure of 140 bars stated on the nameplate must never be exceeded.

Ensure that the hydraulic hoses and couplings used to connect the hydraulic motor of this unscrewing device are suitable for the hydraulic pressure generated by the hydraulic unit. Check all hydraulic hoses for defects or wear before starting work!

Hydraulic oil escaping at high pressures may cause severe injuries and extensive property damage. Do not perform maintenance or cleaning operations on the hydraulic motor of this unscrewing device, nor on hydraulic hoses or couplings, while the system is pressurized!

Certain hydraulic fluids may be aggressive, hazardous or dangerous to health. They may cause severe injuries and/or extensive damage to property. The hydraulic motor of this unscrewing device must not be sent to the factory or to a service center while still containing hazardous materials. Use only safe operating practices conforming to national laws and safety codes.

Obtain material safety data sheets from the manufacturer for all hydraulic fluids used. These safety data sheets must contain proper handling instructions. All personnel involved in the operation of this unscrewing device must be trained in safe work practices, understand the limits of the equipment employed, and wear safety goggles or personal protection equipment as appropriate.



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The unscrewing device must not be exposed to the load of any other objects. Ensure that all system components are properly fitted to prevent damage during operation.

This unscrewing device must be handled with care. Do not expose it to extreme loads, e.g., from impact or shock.

- Disconnect all electrical and hydraulic supply and return lines from the unscrewing device if the unit is to remain out of use for an extended period.
- Do not transport or store the unscrewing device in an upside down position.
- Use original spare parts only.

Maintenance / Disassembly

All disassembly, maintenance and repair operations shall be performed by trained personnel only. Disconnect the unscrewing device from all energy sources - especially from the hydraulic pressure and electric power source - before carrying out disassembly, maintenance or repair operations. Make sure that personal protection equipment is used as appropriate.

Always depressurize the hydraulic system before carrying out maintenance or repairs. Hydraulic oil escaping at high pressure from the hydraulic motor of the unscrewing device may result in severe injury or death.

The unscrewing device should be cleaned thoroughly before each installation (except initial installation). To prevent environmental or health hazards, take care to prevent any uncontrolled release of hydraulic fluid from the unscrewing device .

Check all threaded connections on the entire unscrewing device after the first two operating hours. Re-tighten connections as required. Repeat this inspection subsequently after every 100 operating hours.

The machined thread of the thread guide nut and thread guide core should be sprayed with a low-viscosity (WD-40 or similar) oil after every 100 operating hours.

Note the additional operating instructions for Sauer-Danfoss hydraulic motors, especially with regard to the maximum operating pressure.

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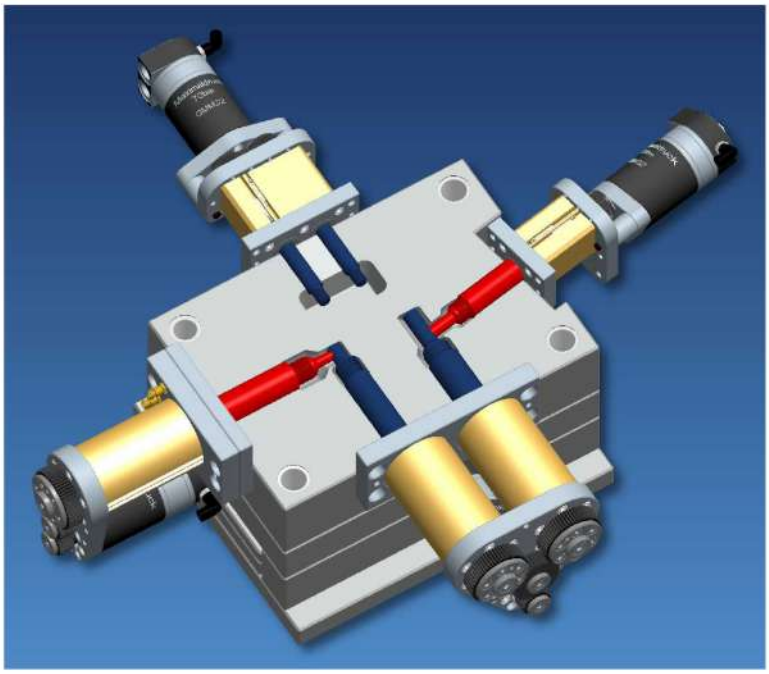
2. Start-up

The thread core is fitted in the core holder via a shank mounting receptacle.
The pitch of the thread to be demoulded is factory-machined into the thread guide nut and thread guide core per customer specifications before the unit is delivered.
Thus, only the geometry-defining thread core needs to be produced by the toolmaker.



Each thread unscrewing device is attached to the mould using two bolts:

- TGA and NTGA: 2 x M10
- KTGA and KNTGA: 2 x M8

Our unscrewing devices can be fitted at any angle, even within the mold.

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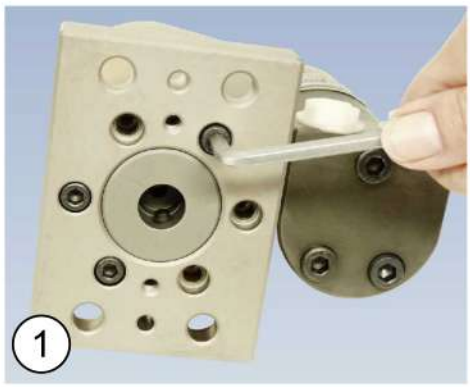
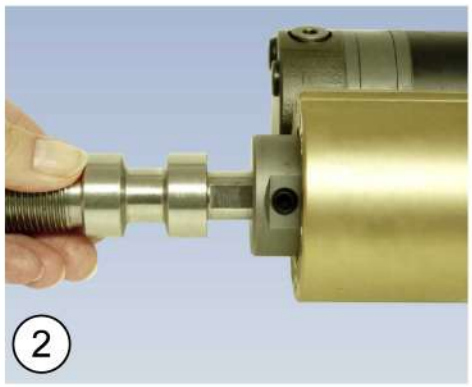
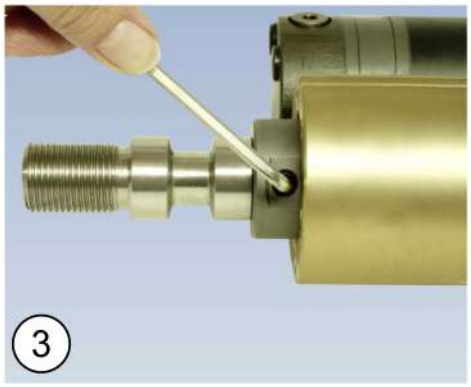
3. Installation example



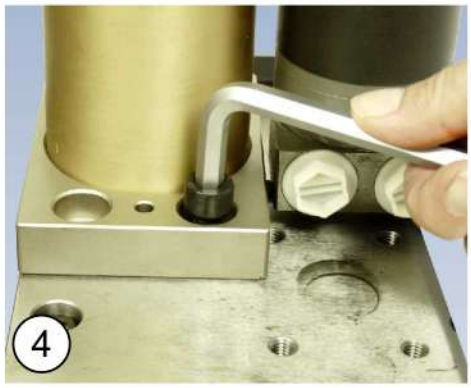
Unscrew the baseplate of the thread unscrewing device (on standard versions).



Fit the thread core in the core holder. While doing so, align the retaining surface of the core with the set screws.



Secure the assembly with set screws. No dowel pins are required.



Mount the baseplate of the unscrewing device by tightening the screws. Attach the unit to the mould.

Connect the hydraulic lines. Determine the correct direction of rotation in advance.

Connect the leakage-oil kit (enhancing the service life of the hydraulic motor).

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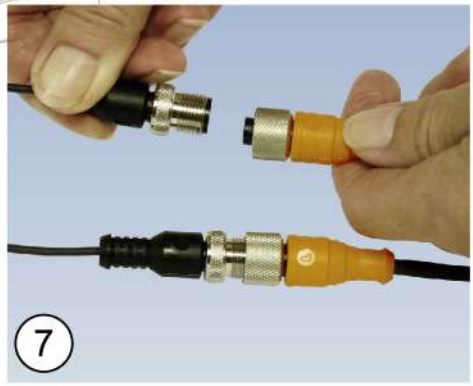
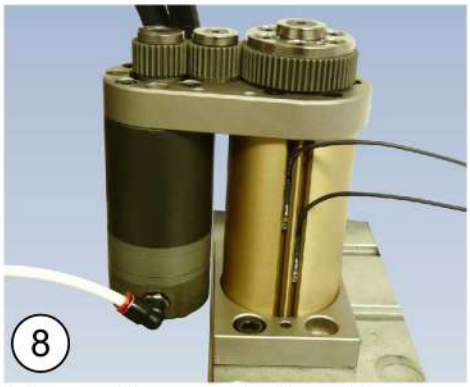


Fit the plug connectors to the magnetic field sensors and to the core puller control system in accordance with the circuit diagram.

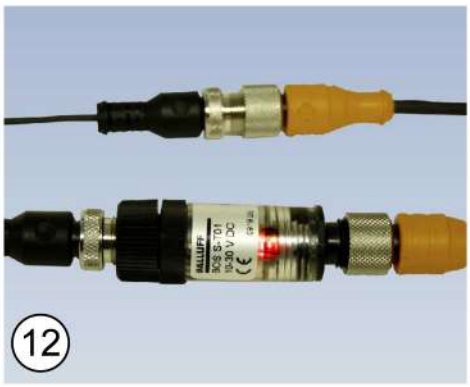


Advance the core holder with max. 40 bar into its permanent front stop position using the core puller control system.

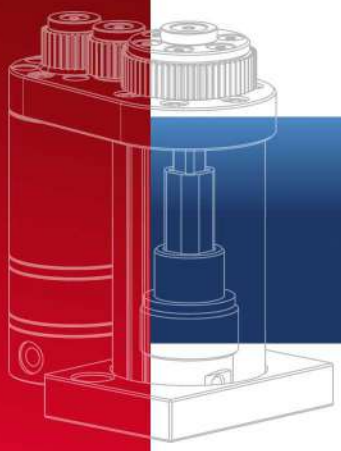
Carefully adjust the magnetic field sensor to set the forward actuating point, working from the baseplate, until the LED lights up.

Push the magnetic field sensor up by another 0.5 to 1.0 mm, then lock it in that position (time delay).

Using the core puller control system, move the core into the desired rear limit position. Proceed to adjust the magnetic field sensor, working from the flange plate, until the LED lights up.



Having adjusted the core puller system and sensors, fit the signal adapter between the magnetic field sensor for the forward limit position and the plug connector to ensure consistent positioning at the forward fixed stop.



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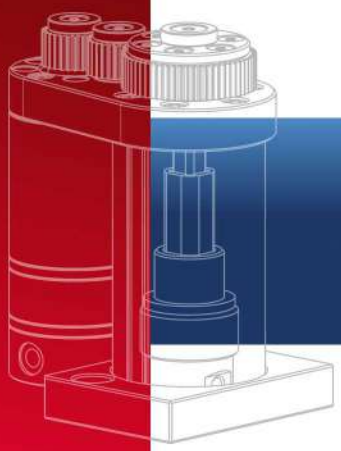
Instruction „magnet field sensors“

The red signal of the adapter lights up under operating voltage, when the connection is correct.

**The sensor gets the signal from the magnetic field.
The signal adapter keeps the signal for the programmed time period (preset time is 0.1 seconds) and forward it after this period first.**

The yellow LED of the sensor tester exactly lights up 0.1 seconds after the magnetic field sensor.



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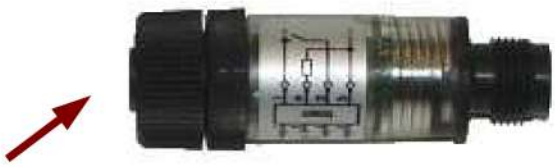
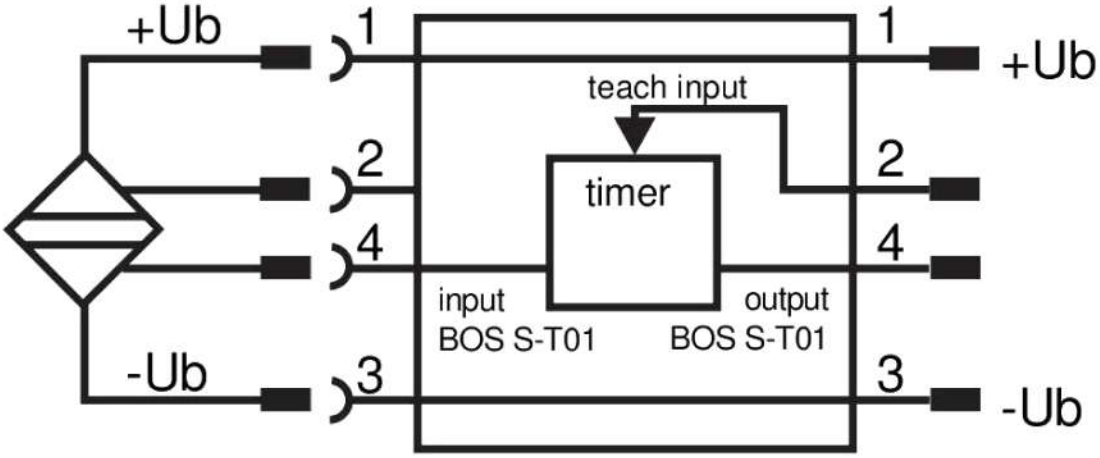


Signal adapter
Programmable timer for on-delay and off-delay



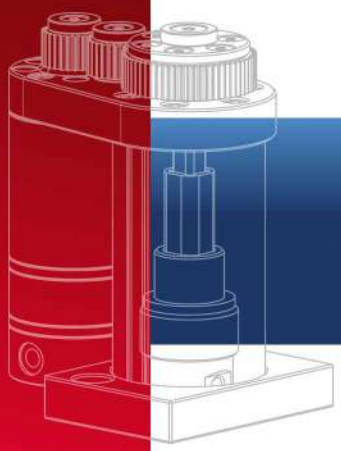
Connection:

The signal adapter BOS S-T is very easy to connect: it is plugged onto the M12 connector of a sensor and the connecting cable is connected to the other sie of the BOS S-T. The sensor configuration has to meet the standards (1 +Ub (BN) 3 -Ub (BU) 4 output (BK)).

The use of the signal adapter is necessary to compensate inaccuracies like

- inaccurate position of the magnet field sensor
- fluctuation of the magnet field power by heating
- changing of the oil viscosity

The use of the signal adapter is the guarantee, that an appearance of these inaccuracies can be avoided. The thread core gets more time to reach the fixed stop position.



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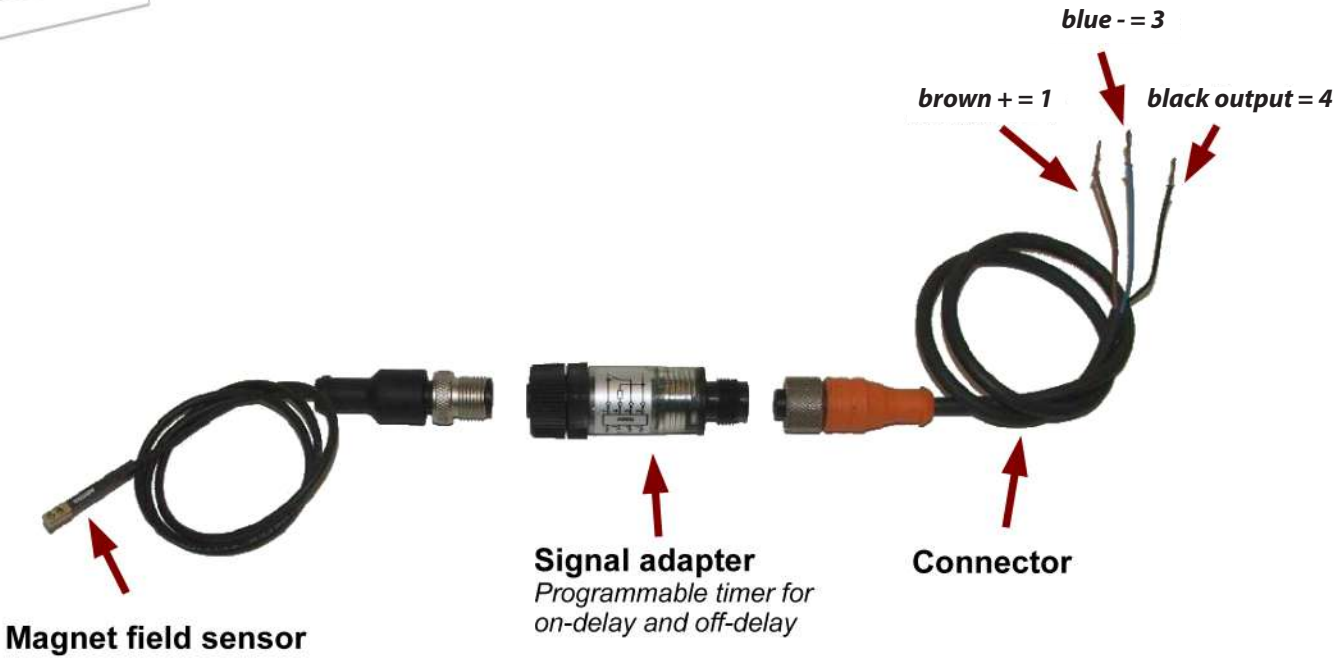
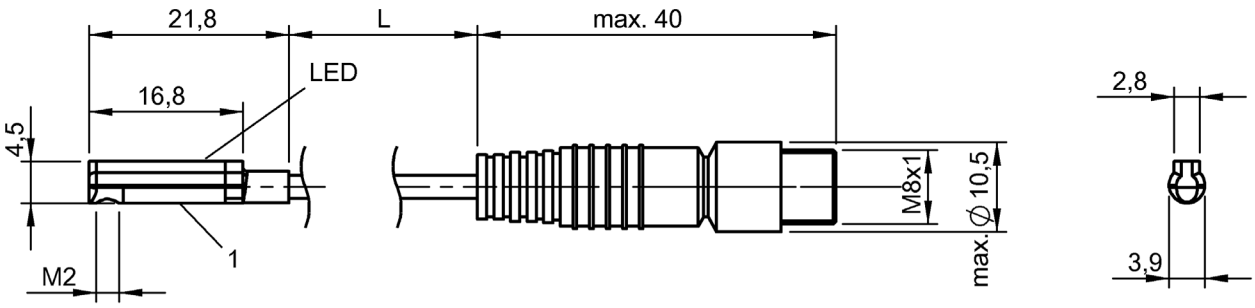
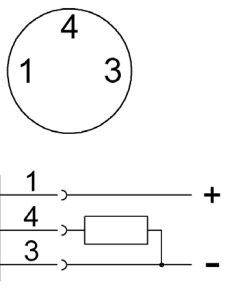


BMF 214K-PS-C-2A-SA2-S49-00,5
Ordering code: BMF00A3

Sensors for cylinders
BMF 214K
Cylinder housing: C-slot





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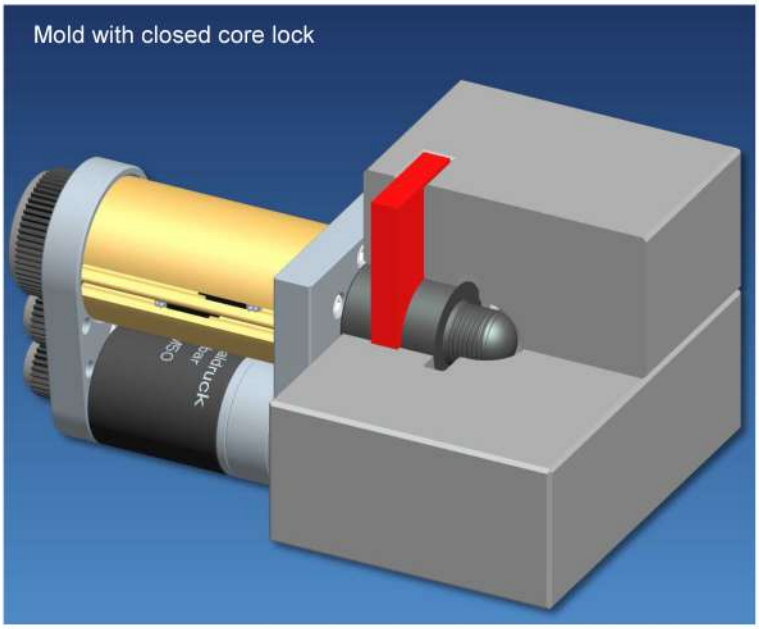
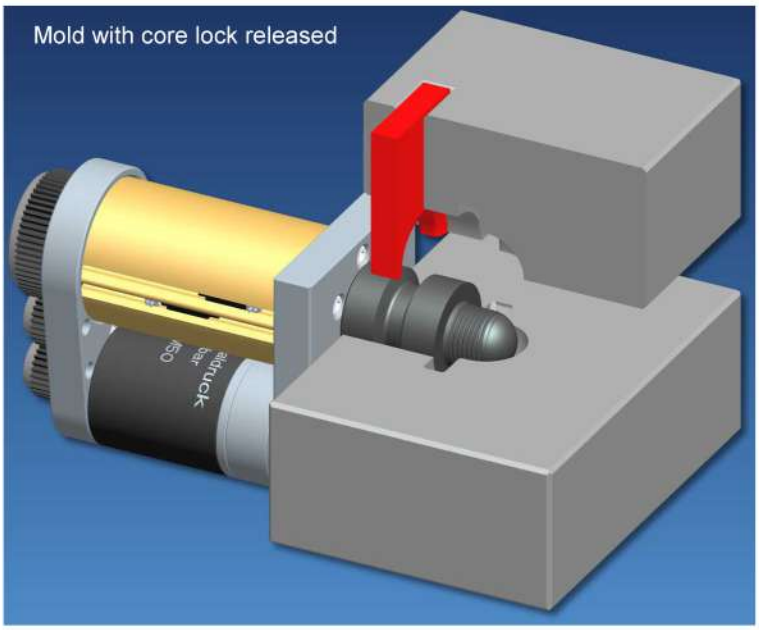
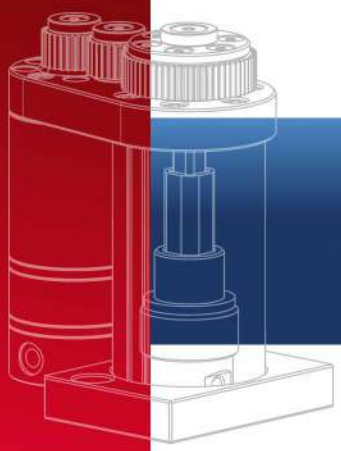
4.1 Installation instruction „Core Locks“





With large-diameter or blind-hole thread, it is necessary to lock the threaded core in order to protect the guide thread from axial forces resulting from the injection pressure.



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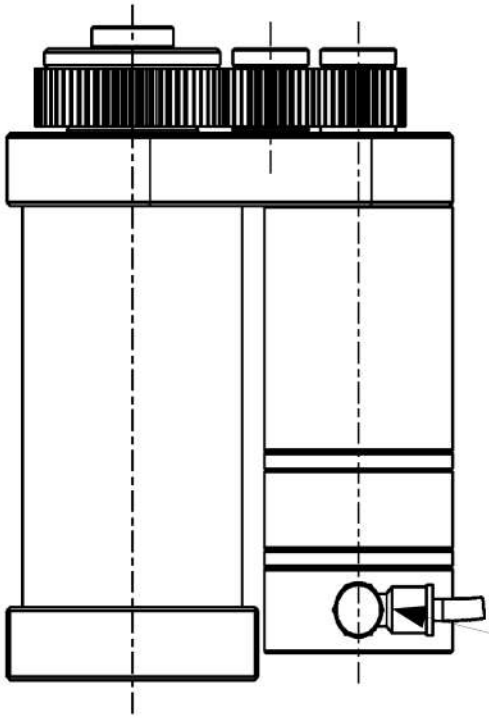

Instructions for use

- Use original parts only.
- Protect the unscrewing device from foreign objects (moulding parts, pellets/granules, etc.)
- Max. operating pressure inside the motor: 100 bar
- Always use the drain line.
- Ensure that one core puller control position is provided for each unscrewing device.
- Use only low-viscosity oil (WD40) for lubrication and protection.
- Max. service temperature (without insulation): 70℃
- Always use the magnetic field sensors for status polling.

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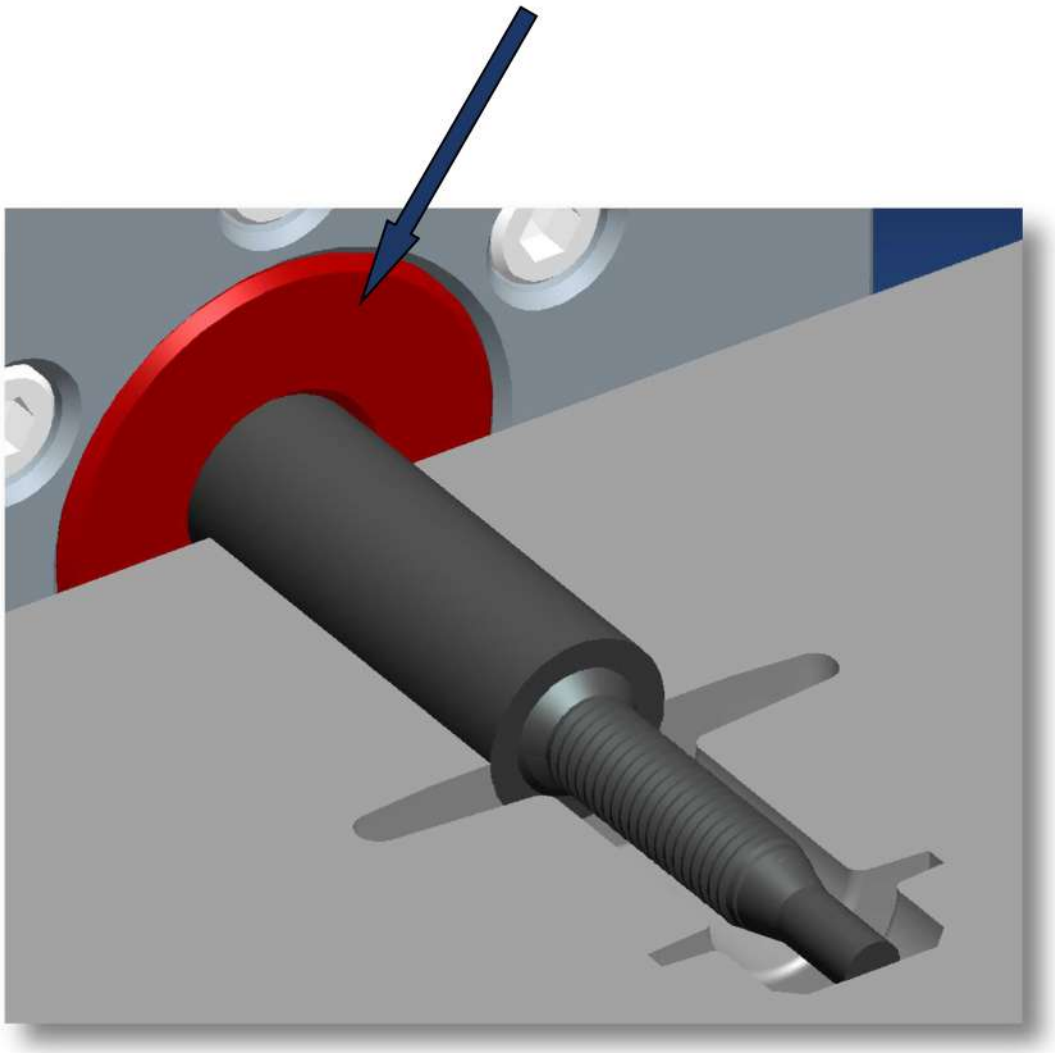
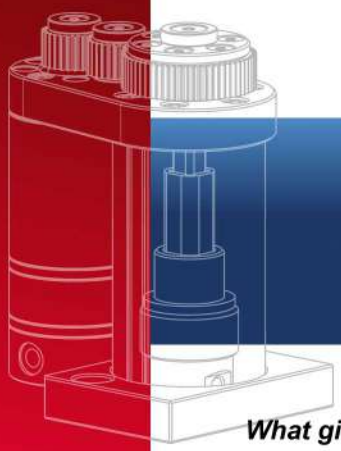
5. Positioning Accuracy

In order to maximize the positioning accuracy, the core holder must run against a fixed stop with its entire front surface area (see area marked in red). The thread core itself should not strike firmly against a surface. We recommend approx. 0.02 mm core play.





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What gives Superior unscrewing devices their high operating precision?

Hydraulic and electronic components are subject to various influences which may impair their accuracy. Thus, a hydraulic control system may be operated with hydraulic fluids of varying viscosities. Hydraulic valves, too, cannot guarantee absolute actuating precision. Hydraulic fluid may become contaminated or be subject to temperature fluctuations.
The same applies to electronic circuitry, controllers and switchgear. Even magnetic field sensors operate with some imprecision due to magnetic hysteresis.
As a result. any hydraulic injection moulding machine will exhibit some degree of "systemic" inaccuracy. We would therefore like to explain what gives Superior unscrewing devices their outstanding accuracy and precision.

The secret lies in the fixed stop of the core holder!

The core holder must run against a fixed stop with its entire front surface area. This can even ensure a precise thread start position, e.g., in the case of triangular caps for shampoo bottles which need to be aligned with the bottle geometry.

Once the holder lies flush against the fixed stop, the oil flow must be shut off by means of a magnetic field sensor.

In addition, different hydraulic pressures must be taken into account. When selecting pressure settings, it is important to ensure that the unscrewing pressure will exceed the screw-in pressure. For instance, a 40 bar screw-in pressure may be combined with an unscrewing pressure of up to 100 bar.

Consider this explanation:
When a car is run against a wall in a frontal collision crash test, it does not matter whether the car is moving at high or low speed. The wall will not move, but will invariably stop the car at the same point.

Thus, when the core holder is run against a fixed stop at the same pressure and speed, there can be no "overtravel" even if some control system inaccuracy exists. The fixed stop will arrest the core holder in exactly the right position.

Locking cannot occur as long as the retraction pressure is set higher than the screw-in pressure. Similarly, the core holder cannot seize because it possesses a nitrided outer skin with good sliding properties and is hardened to almost 70 HRC. The presence of a highly viscous oil (e.g., WD 40) on the contact surface will additionally facilitate its disengagement.

The rear limit position must likewise be defined by a magnetic field sensor which shuts off the oil flow. This will involve some overtravel. Care should be taken to ensure that the core holder does not run up against a fixed stop at this point. In case this has happened, the core holder must be released manually.

With through-thread, note that the core holder must not touch but should have up to 0.2 mm play upon reaching the thread start position. This amount of play will not yet result in melt film formation.

Core puller control system of the injection moulding machine:

A separate core puller control is required for each hydraulic motor. It is not possible to run two motors on a single control system. Similarly, the unscrewing device cannot, and must not, be actuated in parallel with other hydraulic equipment.

SUPERIOR DIE SET CORPORATION

900 West Drexel Avenue
Oak Creek, WI 53154

Phone: (800) 558-6040
Fax: (800) 657-5460
messages@supdie.com
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10. Warranty

A **12-month warranty**, commencing on the invoice date, is extended on

Unscrewing devices TGA-01, TGA-02 and NTGA-01

for any defect attributable to material or manufacturing flaws. Seals and wearing parts are excluded from this warranty. Moreover, this warranty does not cover defects caused by improper handling, overloads, use of force, modifications or unauthorized repair attempts.

Any non-compliance with these operating instructions, use of unsuitable hydraulic fluids, inadequate cleaning or maintenance, or improper use will likewise render this warranty null and void.

The unscrewing device shall not be opened except where instructions to this effect are contained in these operating instructions.

Beyond this, the unit shall not be opened or dismantled except by trained and specialized personnel.

In the unlikely event that operating problems are encountered, please call us or describe the malfunction per telefax or e-mail. We shall be glad to assist.

11. Declaration of conformity

EC Declaration of Conformity
in accordance with Annex IIa of the Machinery Directive 98/37/EC of June 1998

Superior Die Set Corporation
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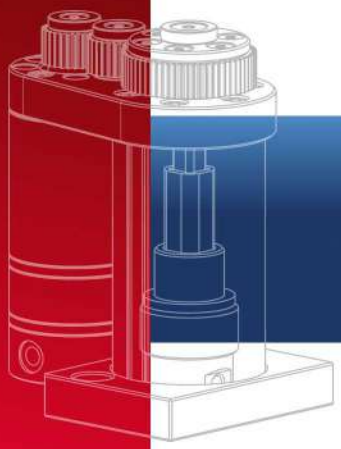
We herewith declare that the
Machine: Unscrewing device
Item No.: TGA-01, TGA-02, TGA-01S, TGA-02 A120, NTGA-01, NTGA-01S, NTGA-02, KTGA-01, KTGA-02, KNTGA-01, KNTGA-02 and KNTGA-04

meets the following relevant regulations:
EC Machinery Directive 98/37/EC
Equipment and Product Safety Act (GPSG) of January 6, 2004.

The following harmonized standards have been applied:
DIN EN 292-1/2 Safety of machines, appliances and systems

Complete technical documentation is available.



SUPERIOR DIE SET CORPORATION

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