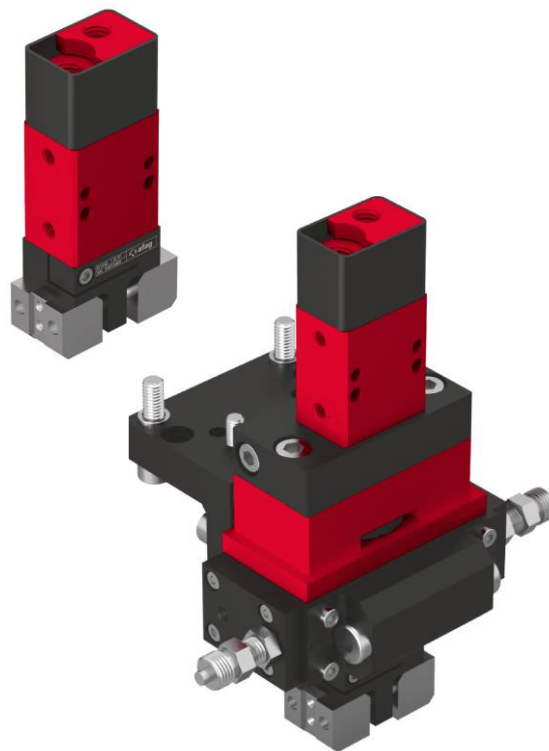


Assembly and operating instructions

Gripper Module GMQ 12



Rotary Gripper Module GMQ 12-RM 12



Translation of the Original Assembly Instructions EN

■ GMQ 12/P	⇒ Order no.: 11000495	■ GMQ 12/K-RMZ 12	⇒ Order no.: 50002133
■ GMQ 12/P-01	⇒ Order no.: 50000797	■ GMQ 12/P-RM 12-SD	⇒ Order no.: 50002129
■ GMQ 12/K	⇒ Order No.: 11010496	■ GMQ 12/K-RM 12-SD	⇒ Order no.: 50002132
■ GMQ 12/P-01-RM 12	⇒ Order no.: 50002137	■ GMQ 12/P-RMZ 12-SD	⇒ Order no.: 50002130
■ GMQ 12/P-RM 12	⇒ Order no.: 50002128	■ GMQ 12/P-01-RMZ 12-SD	⇒ Order no.: 50002139
■ GMQ 12/K-RM 12	⇒ Order no.: 50002131		

Dear Customer

Thank you for choosing our products and placing your trust and confidence in our company!

These assembly and operating instructions contain all essential information you need about your product. Our aim is to provide the required information as concisely and clearly as possible. If, however, you still have any questions on the contents or suggestions, please do not hesitate to contact us. We are always grateful for any feedback.

Our team will also be glad to answer any further question you may have regarding the stroke module or other options.

We wish you every success with our products!

With kind regards

Your Afag team

© Subject to modifications

The modules have been designed by Afag Automation AG according to the state of the art. Due to the constant technical development and improvement of our products, we reserve the right to make technical changes at any time.

Updates of our documentations



Unlike the printed documents, our digital instructions manuals, product data sheets and catalogues are being continuously updated on our website.

Please keep in mind that the digital documents on our website are always the latest versions.

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1 General

1.1 Contents and purpose of these assembly instructions

These assembly instructions contain important information on assembly, commissioning, functioning and maintenance of the GMQ modules to ensure safe and efficient handling and operation.

Consistent compliance with these assembly instructions will ensure:

- permanent operational reliability of the module,
- optimal functioning of the module,
- timely detection and elimination of defects (thereby reducing maintenance and repair costs),
- prolongation of the module service life.

The illustrations in this manual shall provide you with a basic understanding of the module and may vary from the actual design of your module.

1.2 Explanation of symbols

The safety notes are marked by a pictogram and a signal word. The safety notes describe the extent of the hazard.

DANGER



Danger!

This safety note indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING



Warning!

This safety note points out a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION



Caution!

This safety note points out a potentially dangerous situation which, if not avoided, can result in minor or slight injuries.

NOTICE

This safety note points out a potentially dangerous situation which, if not avoided, can cause substantial damage to property and the environment.



This note contains important additional information as well as useful tips for safe, efficient and trouble-free operation of the module.

Further warning signs:

Where applicable, the following standardised symbols are used in this manual to point out the various potential health risks.

	Warning - Dangerous electrical voltage.
	Warning - Risk of injury from contact with hot surfaces.
	Warning - Risk of hand and finger injury due to uncontrolled movements of components.
	Warning - Magnetic field
	Warning - back injury due to heavy lifting.
	Warning - Risk of injury as a result of parts being flung out!
	Warning - high noise levels.

1.3 Additional symbols

In these assembly instructions the following symbols are used to highlight instructions, results, references, etc..

Symbol	Description
1.	Instructions (steps ...)
⇒	Results of actions
↻	References to sections
■	Enumerations not ordered

1.4 Applicable documents

In addition to the assembly instructions, the following documents must be observed:

- Safety data sheets etc.
- Instructions for integrated components (↻supplier documentation).



Each Module is accompanied by a safety information sheet. This information sheet must be read carefully by every person who carries out work on and with the module.

1.5 Warranty

The warranty terms for Afag handling components and handling systems are the following:

- 24 months from initial operation and up to a maximum of 27 months from delivery.
- Wear parts (e.g. shock absorbers) are excluded from the warranty.*

The warranty covers the replacement or repair of defective Afag parts. Further claims are excluded.

* *However, a customer has a right to a defect-free product. This does also apply to defective accessories and wear parts. Normal wear and tear is excluded from the warranty.*

The warranty shall expire in the following cases:

- Improper use of the module
- Non-observance of the instructions regarding assembly, commissioning, operation and maintenance of the module.
- Improper assembly, commissioning, operation and maintenance
- Repairs and design changes carried out without prior technical instructions of Afag Automation AG
- Removing the serial number from the product
- Using the module without shock absorbers or with defective shock absorbers
- Inadequate checking of wear parts
- Non-observance of the EC Machinery Directive, the Accident Prevention Regulations, the Standards of the German Electrotechnology Association (VDE) and these safety and assembly instructions.

1.6 Liability

No changes shall be made to the GMQ modules axes unless described in this instructions manual or approved in writing by Afag Automation AG.

Afag Automation AG accepts no liability for unauthorized changes or improper assembly, installation, commissioning, operation, maintenance or repair work.

2 Safety instructions

2.1 General

This chapter provides an overview of all important safety aspects to ensure safe and proper use of the gripper and optimal protection of personnel.



Failure to follow the directions and safety instructions given in this instructions manual may result in serious hazards.

2.2 Intended use

The GMQ 12 and GMQ 12/RM 12 modules are used for shock-free rotating of loads in non-hazardous atmospheres under the ambient and operating conditions defined for these modules.

The modules are exclusively designed for gripping in any position of payloads up to a maximum of 15 N.

The GMQ modules can be used in combination with other modules as a pick & place station, whereby the permissible load capacity must not be exceeded.



The intended use of the module also includes:

- observance of all instructions given in this instructions manual.
 - compliance with the inspection and maintenance work and the specifications in the data sheets,
 - using only original spare parts.
-

2.3 Foreseeable misuse

Any use other than or beyond the intended use described is considered a misuse of the GMQ module.

Especially the following use is considered a misuse:

- Use in potentially explosive atmospheres.

WARNING

Risk of injury if the module is not used as intended!

The improper use of the module poses a potential hazard to the personnel.

- The modules may only be used in a technically perfect condition in accordance with its intended use and the instructions in this manual as well as in compliance with the safety requirements!
 - Any malfunctions, particularly those that could impair safety, must be eliminated immediately!
-





Risks can occur if the module is not used as intended. In the event of damages caused by improper use the following shall apply:

- the operating company shall be solely responsible for such damage, and
- Afag does not accept any liability for damage caused by improper use.

2.4 Obligations of the operator and the personnel

2.4.1 Observe the assembly instructions

A basic prerequisite for safe and proper handling of modules is a good knowledge of the basic safety instructions.



These assembly instructions, in particular the safety instructions contained therein, must be observed by all persons working with the modules.

2.4.2 Obligations of the operating company

In addition to the safety way given in this manual, the operating company must comply with the safety, accident prevention and environmental protection regulations valid for the field of application of the module.

The operating company is required to use only personnel who :

- have the necessary professional qualifications and experience,
- are familiar with the basic rules regarding occupational safety and accident prevention,
- have been instructed in the correct handling of the modules,
- have read and understood these assembly instructions.

The operating company is also required to:

- monitor on an ongoing basis that the personnel work safely considering any potential hazard involved and the assembly instructions are observed,
- ensure that the assembly instructions are always kept at hand at the installation in which the modules are mounted,
- observe and communicate universally applicable laws and regulations regarding accident prevention and environmental protection,
- provide the necessary personal protective equipment (e.g. protective gloves) and instruct the personnel to wear it,
- update the related safety data sheets.

2.4.3 Obligations of the personnel

All personnel working with the modules are required to:

- read and observe these assembly instructions (especially chapter safety),
- observe the occupational safety and accident prevention regulations,
- observe all safety and warning signs on the modules,
- refrain from any activity that might compromise safety and health.



In addition, the personnel must wear the personal protective equipment required for carrying out their work. (➔Chapter 2.6).

2.5 Personnel requirements

2.5.1 Personnel qualification

The activities described in the assembly instructions require specific requisites at the level of professional qualifications of the personnel.

Personnel not having the required qualification will not be able to assess the risks that may arise from the use of the module thus exposing himself and others to the risk of serious injury. Therefore, only qualified personnel may be permitted to carry out the described activities on the modules.

Persons whose ability to react is restricted due to the intake of medication or the like must not interact with the stroke module.

These installation instructions are intended for skilled personnel (installers, system integrators, maintenance personnel, technicians), electricians and operating personnel.

The following is a description of the professional skills (qualifications) required for carrying out the different activities:

Qualified personnel:

Qualified personnel with appropriate training who are qualified due to their special know-how and fully familiar with the machine and who have been given instructions on how to carry out the task entrusted to them safely.

Qualified electrician:

Persons who have obtained their electrical qualifications through appropriate professional training and complementary courses that enables them to identify risks and prevent possible hazards resulting from electricity.

Operator (trained personnel):

Authorized persons who due to their specialized professional training, expertise and experience can identify risks and preventing possible hazards arising from the use of the machine.





2.6 Personal protective equipment (PPE)

The personal protective equipment serves to protect the personnel from hazards affecting their safety and health at work.

When working on/with the RM modules, the personnel must wear the personal protective equipment assigned by the safety officer of the operating company or as required by safety regulations. In addition, the personnel are required to:

- wear the personal protective equipment provided by the operating company (employer),
- check the personal protective equipment for proper condition, and
- immediately notify the person responsible on site of any defects found on the personal protective equipment.

Personal protective equipment and the respective mandatory signs:

	<p><i>Protective clothing</i> is a close-fitting clothing specifically designed to protect personnel from hazards during work.</p>
	<p><i>Protective gloves</i> are specifically designed to protect the personnel against hand injuries (such as cuts, abrasion, burns).</p>
	<p><i>Safety shoes</i> are specifically designed to protect the personnel against foot injuries from crushing, falling objects or slipping on slippery surfaces.</p>
	<p>Hearing <i>protectors</i> are required to protect the personnel against excessive noise levels to prevent noise-induced hearing loss.</p>

2.7 Changes and modifications

No changes may be made to the GMQ module which have not been described in these assembly instructions or approved in writing by Afag Automation AG.

Afag Automation AG accepts no liability for unauthorised changes or improper assembly, installation, commissioning, maintenance or repair work.



The GMQ modules may not be changed or modified in any way, except with the prior written consent of Afag Automation AG.

2.8 General hazards / residual risks

Despite the safe design of the machine and the technical protective measures taken, there still remain residual risks that cannot be avoided, and which present a non-obvious residual risk when operating the rotary modules.

Observe the safety instructions in this chapter and in the other sections of this manual to avoid damage to property and dangerous situations for the personnel.

2.8.1 General hazards at the workplace

The modules has been built according to the state-of-the-art and the applicable health and safety requirements. However, improper use of the module may cause the following hazards to the personnel:

- danger to life and limb of the operator or third parties,
- on the modules themselves,
- property damage.



Always keep the assembly instructions ready at hand at the workplace! Please, also observe:

- the general and local regulations on accident prevention and environmental protection,
 - the safety information sheet for the module.
-

WARNING



Danger - Do not use in unsuitable environment !

The modules are designed for use in **non**-explosive atmospheres.

- Do **not** use the modules in potentially explosive atmospheres!
-

CAUTION



Danger of injury in the working area of the module!

Due to the decentralised control system, the operator of the modules not necessarily stand next to the modules during operation so that he may not have a complete view of the working area. Persons in the working area may be injured.

- When operating the modules, ensure a good overview of the entire working area.
 - Unauthorized persons must not stay within the working area during operation.
-

CAUTION



Risk of injuries due to uncontrolled parts movements!

When operating the modules uncontrolled movements may occur which can cause personal injury or property damage.

- Only qualified personnel may work with or on the module.
 - Read the assembly instructions carefully before carrying out any work on or with the module.
-

CAUTION



Risk of noise-induced hearing loss!

When modules are installed in a machine or plant, the permissible noise level may be exceeded depending on the various components, the environment and the resonance.

- The operating company is responsible for ensuring that the permissible noise levels are observed.
 - If the noise level exceeds 85 dB(A) in normal operation, the operator must wear hearing protectors at the workplace.
-

2.8.2 Danger due to electricity

WARNING



Danger! Risk of electric shock!

If work on electrical components is required, ensure that the work is carried out properly, failure to do so will cause serious or fatal injuries.

- Work on the machine's electrical equipment may only be performed by skilled electrician or trained personnel under the supervision of a skilled electrician in accordance with all relevant electrical regulations.

2.8.3 Mechanical hazards

CAUTION



Danger of injury by moving components!

Limbs can be crushed by moving components!

- Work on and with the modules may only be carried out by qualified personnel.

WARNING



Risk of injury - Do not reach into the system during operation!

There is a risk of injury if the personnel reaches into the system during normal operation.

- Never reach into the system during normal operation!

2.8.4 Danger due to pneumatics

WARNING



Risks by the pneumatic system!

The pneumatic system can pose various hazards that can cause serious or fatal injuries if the work is carried out improperly.

- Only qualified personnel may work with or on the pneumatic system!
- The necessary personal protective equipment must be provided and used.

2.8.5 Danger caused by omitting maintenance work

CAUTION



Danger of injury!

Poor or not regularly performed maintenance may cause component failures which may lead to injuries.

- The operator must exercise due care and only use trained maintenance maintenance to carry out the activities.

3 Technical data

3.1 Dimensional drawings

3.1.1 GMQ 12 Gripper Module

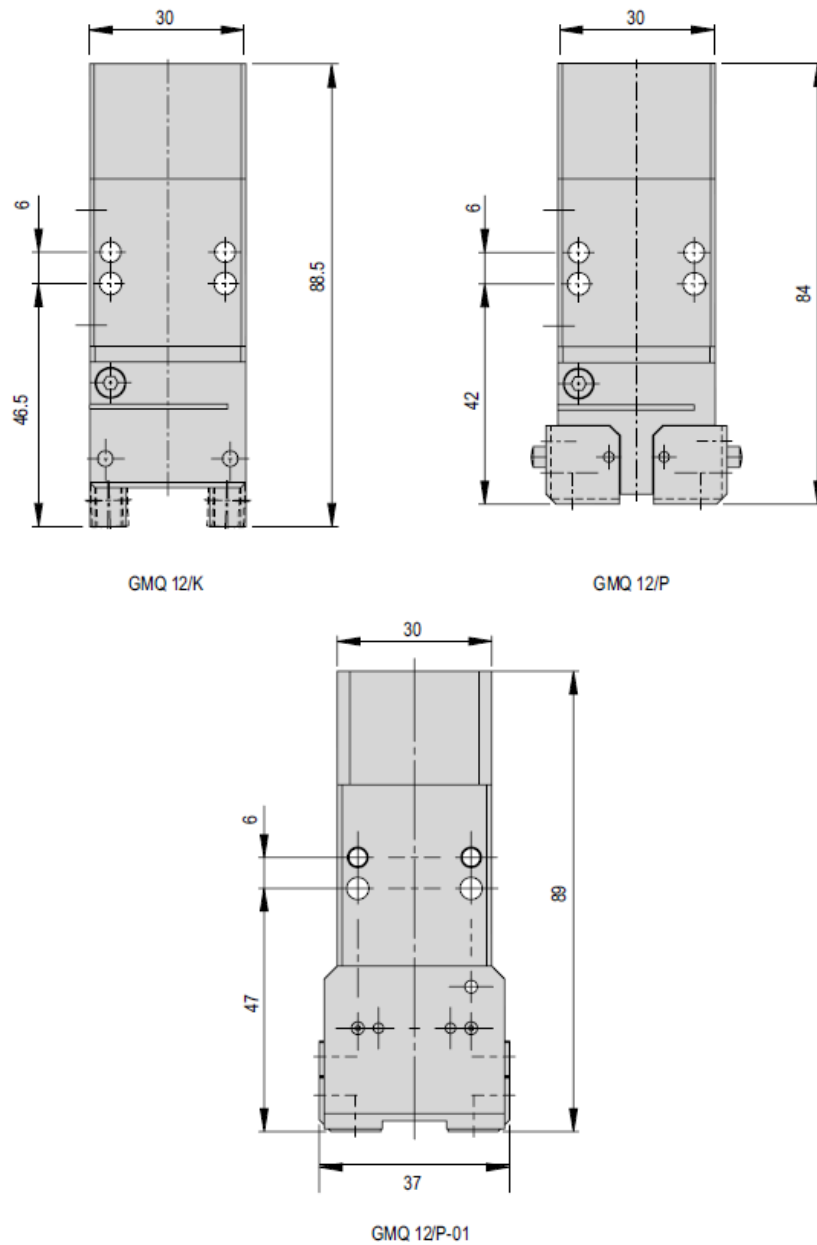


Fig. 1 Dimensional drawing - GMQ 12

3.1.2 Gripper module GMQ 12 / RM 12

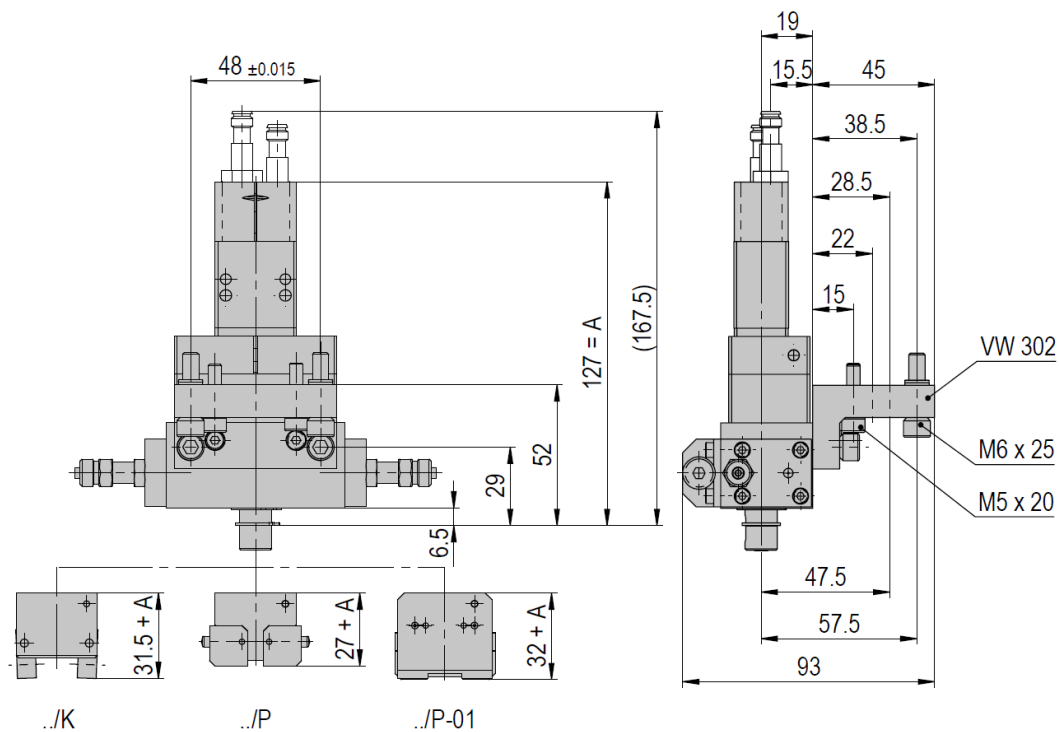


Fig. 2 Dimensional drawing - GMQ 12/RM 12

3.2 Technical data

3.2.1 GMQ 12 Gripper Module

GMQ 12	
Befestigungsraster	22 mm
Betriebsdruck	6 +/- 2 bar
Luftanschluss P	M5
Zylinder Ø	12 mm
Betriebstemperatur	0 - 50 °C
Lagerungstemperatur	0 - 50 °C

Typ	GMQ 12/K	GMQ 12/P	GMQ 12/P-01
Bestellnummer	11010496	11010495	50000797
Nettogewicht	0.157 kg	0.21 kg	0.26 kg
Max. zulässiges Gewicht pro Greiffinger	40 g	50 g	50 g
Luftverbrauch/Zyklus	0.005 NL	0.005 NL	0.005 NL
Greifzeit	* 0.1 s	* 0.08 s	* 0.08 s
Greifkraft	* 14 N	* 15 N	* 15 N
Federkraft		6 N	8 N
Öffnungswinkel	176 °		
Öffnungsweg		8 mm	9 mm
Wiederholgenauigkeit	+/- 0.02 mm	+/- 0.02 mm	+/- 0.02 mm
Einbaulage	✦	✦	✦

Die technischen Daten beziehen sich auf einen Nenndruck von 6 bar und Afag Standard-Testbedingungen.
Das Modul kann mit geölter oder ölfreier Luft betrieben werden
Reinraumklasse ISO 14644-1, Klasse ISO 7

* Greifkraft-Diagramme beachten
- Messungen bei langsam schließenden Fingern
- Alle Messungen bei Modul außerspannend durchgeführt.

Im Lieferumfang inbegriffen

- (Katalog HT Zubehör)
- 2x Zentrierstift Ø4x6
 - 2x Montageschraube M4x30
 - 2x Unterlegscheibe M4

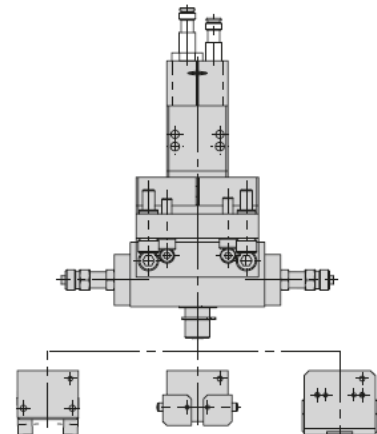
Zubehör

- (Katalog HT Zubehör)
- Anschlagsschraube AS 08/15
 - Anschlagstift M8x1/25
 - Stoßdämpfer SD M8x1 -2
 - INI d6.5x35-Sn1.5-PNP-NO-M8x1
 - INI d6.5x44-Sn1.5-PNP-NO-M8x1

Fig. 3 Technical data module GMQ 12

3.2.2 Gripper module GMQ 12/RM 12

GMQ 12/RM 12	
Betriebsdruck	6 +/- 2 bar
Betriebstemperatur	0 - 50 °C
Lagerungstemperatur	0 - 50 °C
Luftfeuchtigkeit	< 90 %



Zangen	..K	..P	..P-01
GMQ 12/./RM 12-SD	50002132	50002129	50002138
Nettogewicht	0.838 kg	0.908 kg	0.934 kg
GMQ 12/./RM 12	50002131	50002128	50002137
Nettogewicht	0.823 kg	0.89 kg	0.917 kg
GMQ 12/./RMZ 12	50002133	50002130	50002139
Nettogewicht	0.71 kg	0.938 kg	0.964 kg

Die technischen Daten beziehen sich auf einen Nenndruck von 6 bar und Afag Standard-Testbedingungen.
Das Modul kann mit geölter oder ölfreier Luft betrieben werden.
Reinraumklasse ISO 14644-1, Klasse ISO 7

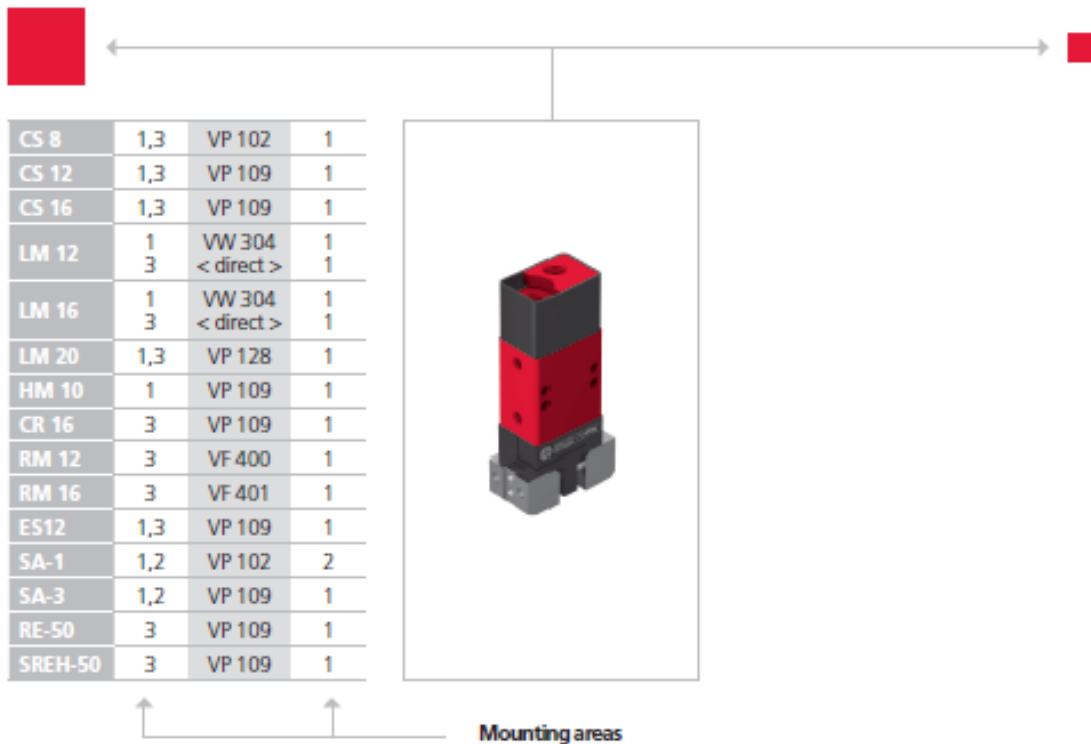
Im Lieferumfang inbegriffen

(Katalog HT Zubehör)

- 2x Zentrierhülse Ø9x4
- 2x Montageschraube M5x20
- 2x Montageschraube M6x25
- 2x Rippenscheibe M6
- 2x Rippenscheibe M5
- 1x Verbindungswinkel VW 302

Fig. 4 Technical data gripper module GMQ 12 / RM12

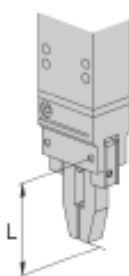
3.3 Preferred combinations GMQ 12



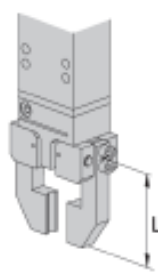
CS, ES 	LM 	HM 	SA 	UG, GM, SG, DG, PG, GE, SGE
PMP, PMP-c 	PEZ, PDZ 	PEL, PDL 	RM, RE 	CR, RM 32, RE, SREH, RA

Note that there might be different mounting positions from one module to another one.

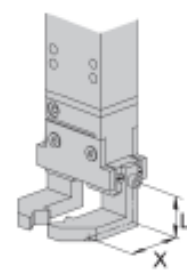
The required connection elements and the range of support columns are depicted in the catalogue HT accessories.



Finger length centric
GMQ/12K



Finger length centric
GMQ/12P
GMQ/12P-01



Finger length eccentric
GMQ/12/P
GMQ/12/P-01

3.4 Gripper loads GMQ 12

Greifkraft-Diagramme pro Backe

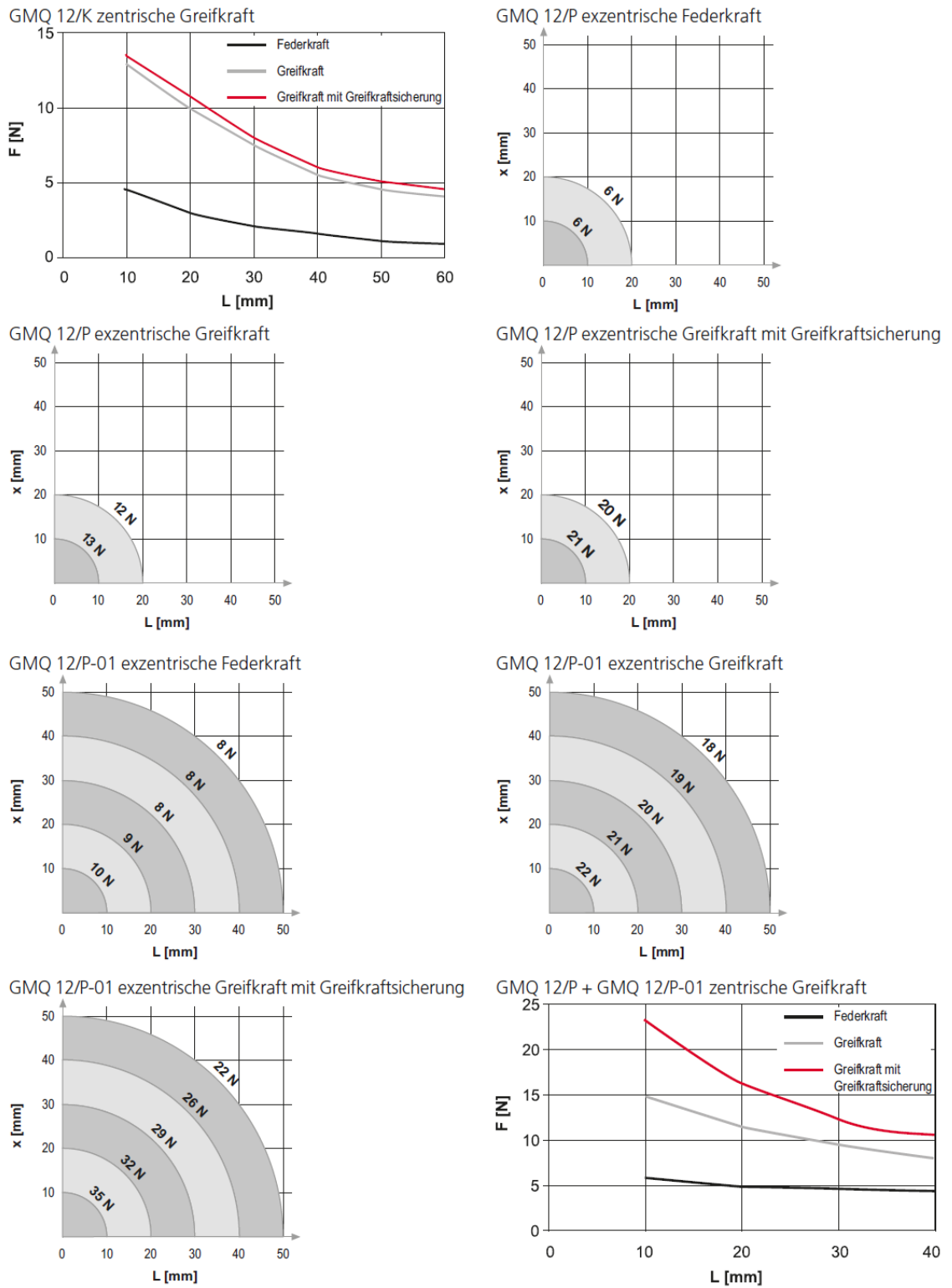
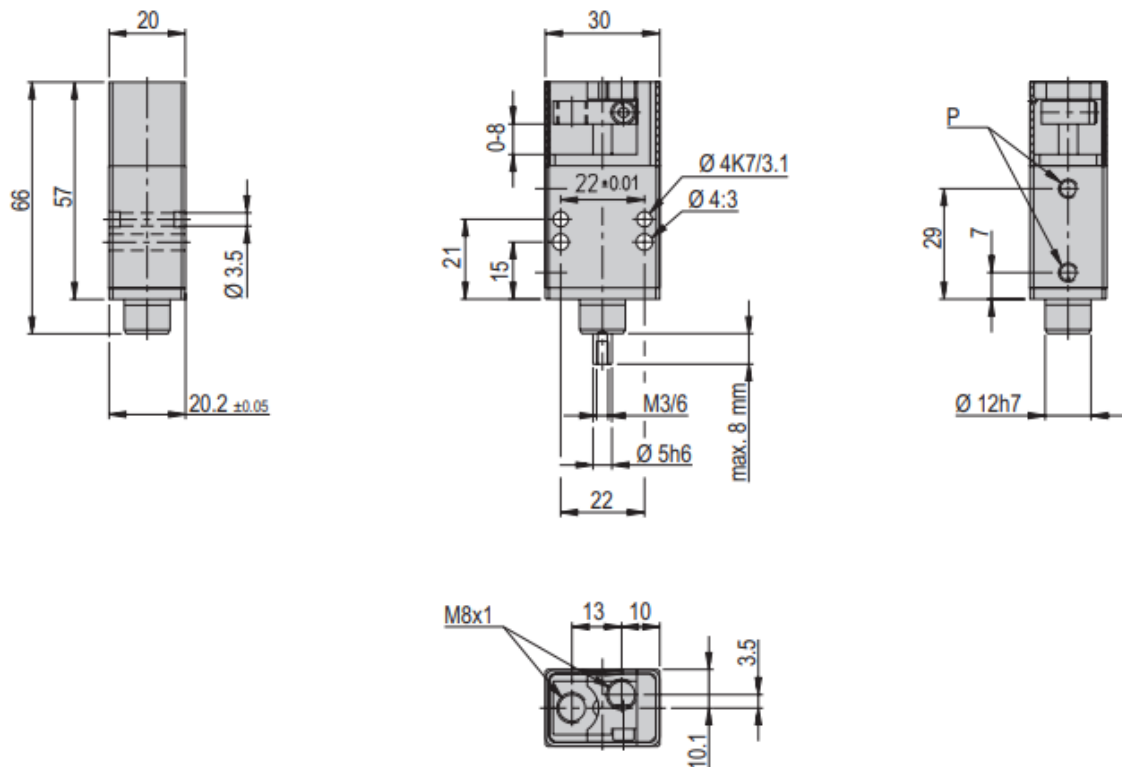


Fig. 5 Gripper loads - GMQ 12

3.5 Gripper drive GMQ 12

Greifantrieb GMQ 12	
Bestellnummer	11009173
Nettogewicht	0.104 kg
P	M5



Im Lieferumfang inbegriffen

(Katalog HT Zubehör)

- 2x Zentrierstift Ø4x6
- 2x Montageschraube M4x30
- 2x Unterlegscheibe M4

Zubehör

(Katalog HT Zubehör)

- Anschlagsschraube AS 08/15
- Anschlagstift M8x1/25
- Stoßdämpfer SD M8x1 -2
- INI d6.5x35-Sn1.5-PNP-NO-M8x1
- INI d6.5x44-Sn1.5-PNP-NO-M8x1

4 Transport, packaging and storage

4.1 Safety instructions for transport

CAUTION



Danger of injury when unpacking the rotary modules!

The GMQ modules are packed in the original packaging (cardboard box). The GMQ 12/RM 12 modules are delivered assembled and are not specially packaged. If handled incorrectly, the module may fall out of the box when unpacked and cause limb injuries.

- Carefully unpack the module!



Fig. 6 GMQ 12/RM 12 Unpack carefully!



Also observe the safety instructions in  Chap. 2 „Safety instructions“ in this manual.

4.2 Scope of supply

The modules are supplied with an operating and assembly manual and a safety data sheet (see scope of supply below).

[Unt]	GMQ 12/ RM12	[Unt]	GMQ 12
1 x	Mounting bracket	2 x	Centering pin 4x6 mm
2 x	Centering bushing Ø9x4 mm	2 x	Fastening screws M4x30 mm
2 x	Mounting screws M6x25	2 x	M4 washers
2 x	Mounting screws M5x20		
2 x	Ribbed washers M6		
2 x	Ribbed washers M5		

4.3 Transport



No liability can be assumed for damages caused by improper installation on the part of the operating company.








The following conditions must be complied with for transport and storage:

- Storage temperature: 0-50 °C
- Relative air humidity: < 90%, non condensing

4.4 Packaging

The modules are packed in the most appropriate manner.

Standardized symbols for packages

Symbol	Note	Explanation
	Top	The package shall be transported, handled and stored with the arrows always pointing upwards (top side of the package).
	Fragile	Products marked with this symbol shall be handled with care and may never be turned upside down or tied up.
	Protect against moisture	The packages shall be protected against moisture and kept dry (keep covered during storage).
	Attachment points	The hosting equipment (chain, etc.) may only be attached to the points marked by this symbol.
	Centre of gravity	This symbol marks the centre of gravity of the packages (pay attention to the position of the centre of gravity).

NOTICE

Risk to the environment due to incorrect disposal of the packaging material

Environmental damage can be caused by incorrect disposal of the packaging material.

- Dispose of the packaging material in an environmentally sensitive way in accordance with the local environmental regulations.

4.5 Storage

If the module is stored for an extended period of time, observe the following:

- Do not store the modules outdoors or expose them to weather conditions.
- The storage space must be dry and dust free.
- Room temperature of the storage space: 0-50 °C.
- Relative air humidity: < 90% non condensing.
- Clean the module and protect the blank metal parts against corrosion using the appropriate means.
- Protect the module from dirt and dust.

5 Design and description

5.1 Design of GMQ 12

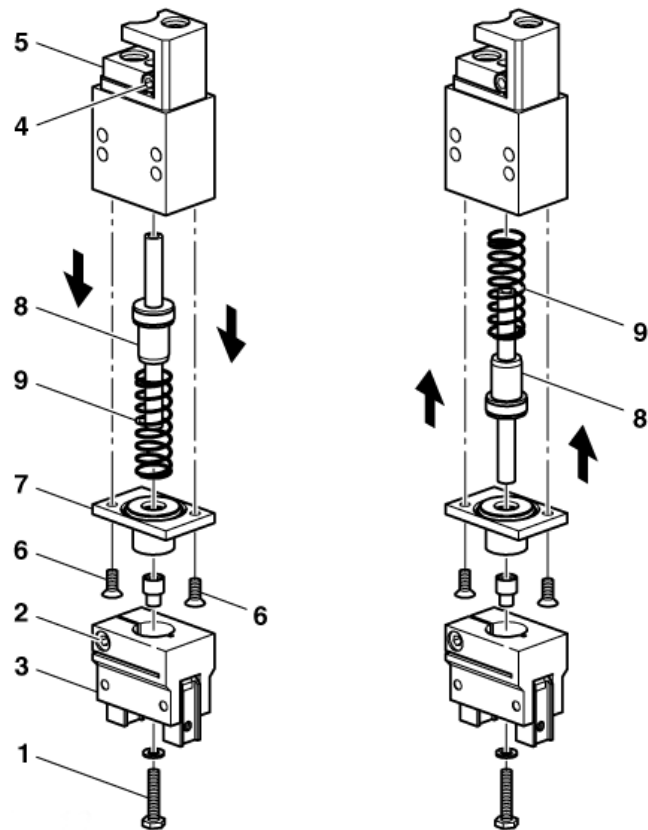


Fig. 7 GMQ 12 Internal or external clamping (exemplary)

- | | |
|------------------|-----------------------|
| 1. Screws | 6. Countersunk screws |
| 2. Screws | 7. Guide pin |
| 3. Gripping jaws | 8. Piston |
| 4. Screws | 9. Spring |
| 5. Lifting stop | |

5.2 Product description

GMQ 12 Gripper Module

The GMQ 12 gripper module has a gripping jaw and is designed for gripping small parts. The piston diameter value is 12 mm. A built-in spring (Fig. 4, 1) serves as a gripping force safety device in the depressurised state.

The GMQ 12 is designed in such a way that it can be operated in external (Fig. 1), internal (Fig. 2) or double-acting (Fig. 3) mode.

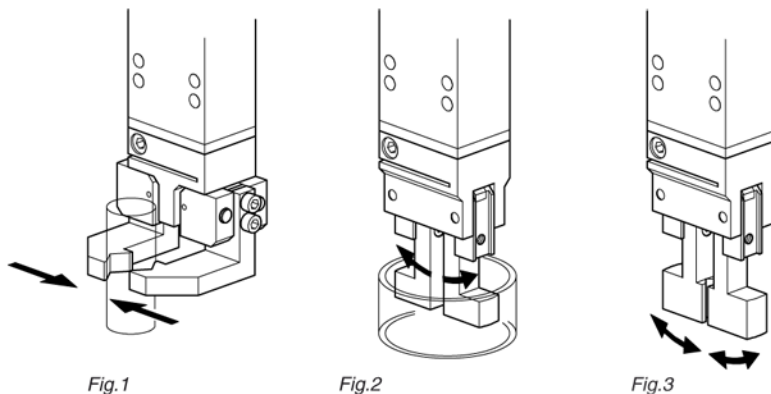


Fig.1

Fig.2

Fig.3

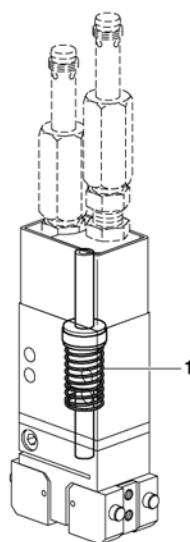


Fig.4



Fig.5

Fig. 8 GMQ 12, external clamping, internal clamping, double-acting

5.3 Design of GMQ 12 / RM 12

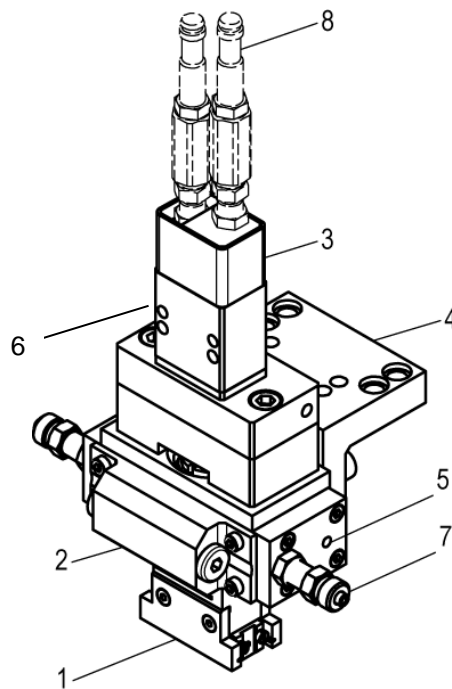


Fig. 9 Gripper module GMQ 12 / RM 12

- | | |
|---------------------|---|
| 1. Gripping jaws | 5. Pneumatic connections RM 12 |
| 2. Rotary module | 6. Pneumatic connections gripper drive |
| 3. Gripper drive | 7. Stop screw |
| 4. Mounting bracket | 8. Sensors (Not included in the delivery) |

5.4 Product description

The gripper module consists of a gripping jaw (1), the rotary module (2), the gripping drive (3) and the mounting bracket (4).

Pneumatic connections (5 and 6) are located on the rotary module and on the gripping drive.

The end positions are each adjusted via a stop screw (7). For sensing the end positions, the stop screw can be equipped with a holder and a 6.5 mm initiator. are not included in the scope of delivery.

The movement into the end positions can additionally be damped via hydraulic shock absorbers. Gripping rotary modules with shock absorbers must be ordered separately.

5.5 Accessories GMQ 12

Designation	Order no.
Stop screw AS 08/15	11011202
Stop screw AS 08/25	11004991
Stop pin M8x1/25	11009229
Shock absorber SD M8x1-2	11004990
INI d6.5x44-Sn1.5-PNP-NO-M8x1	11005439
INI 8x8x38.5-Sn2.0-PNP-NO-M8x1	50338170

6 Installation, assembly and setting

This chapter contains specific safety instructions and information regarding proper installation, assembly and setting of the modules including their connection to the control unit and the pneumatic system.

6.1 Safety instructions for Installation and assembly

CAUTION



Danger of injury when connecting the modules to the control unit and the compressed-air system!

When connecting the modules to the controller unit or the compressed-air system sudden, unpredictable movements may occur which can cause personal injury or property damage.

- The connecting work may only be carried out by qualified personnel!
 - Carefully read the assembly and safety instructions before working with or on the modules.
-

CAUTION



Danger of injury when handling the modules!


Careless handling of modules can cause personal injuries and damage to the modules.

- Only qualified personnel may work with or on the module!
 - Observe the assembly instructions!
-

NOTICE

No liability for damages can be assumed for damages caused by improper installation/assembling work of the operator.



Also observe the safety instructions in  Chap. 2 „Safety instructions“ in this manual.

6.2 Installation & Assembly

6.2.1 Mounting position and fastening



The GMQ modules can be mounted both in horizontal and vertical position.

Attachment options

There are different mounting options for each module.

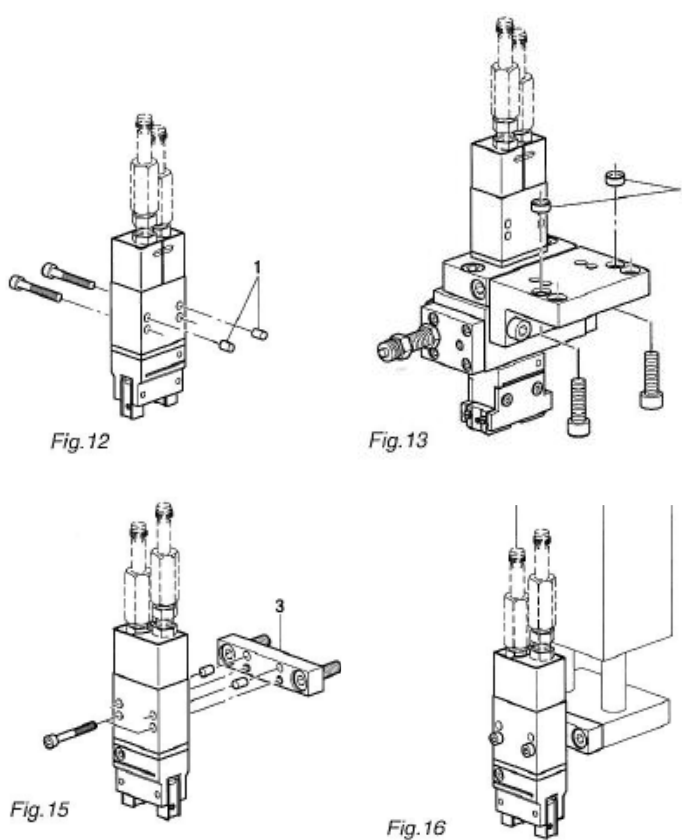


Fig. 10 Mounting options GMQ 12 & GMQ 12 / RM 12



The GMQ 12 module can be connected to a linear module by attaching a connector (3) (Fig. 10, Fig. 15-16).

6.2.2 Module centering

To ensure high and repetitive accuracy of fit during assembling, operation and exchanging of a module, the components of the Afag modules are provided with a precise module centering unit.

Centring bushing and hole grid

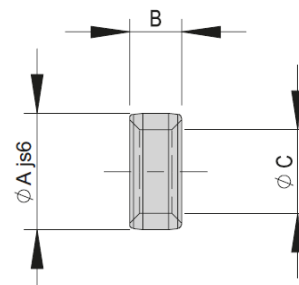
Designation	GMQ 12	GMQ 12 / RM 12
Hole grid	22mm	48 mm (30 mm)
Thread/Bore	M4	M6 (M4)
Centering bushing (H7)	4x6 mm	9x4 mm (7.4 mm)



Use the supplied centering bushings to position the modules. Insert the centering bushings in two diagonally opposite holes of the attachment grid.

The dimensions of the mounting holes and the distances between holes are indicated in the dimensional drawings in ➔ Chap. 3 „Technical Data“.

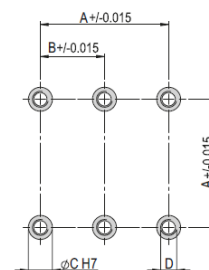
Centering bushings	Ø4x2	Ø5x2.5	Ø7x3	Ø8x3.5	Ø9x4	Ø12x4.8	Ø19x5.8
Order number	50332257	50035831	11016850	50263565	11004942	50187424	50189497
Net weight	0.001 kg	0.001 kg	0.001 kg	0.001 kg	0.001 kg	0.002 kg	0.006 kg
A	4 mm	5 mm	7 mm	8 mm	9 mm	12 mm	19 mm
B	2 mm	2.5 mm	3 mm	3.5 mm	4 mm	4.8 mm	5.8 mm
C	2.6 mm	3.2 mm	4.3 mm	5.4 mm	6.5 mm	8.5 mm	13 mm



Attachment grid	16x16 mm	20x20 mm	30x30 mm	38x38 mm	48x48 mm	60x60 mm	75x75 mm	96x96 mm
A	16 mm	20 mm	30 mm	38 mm	48 mm	60 mm	75 mm	96 mm
B	8 mm	10 mm	15 mm	19 mm	24 mm	30 mm	37.5 mm	48 mm
C	4x1.1 mm	5x1.3 mm	7x1.6 mm	8x1.8 mm	9x2.1 mm	12x2.5 mm	15x2.7 mm	19x3 mm
D	M2.5	M3	M4	M5	M6	M8	M10	M12

Module-centering, centering bushings

In order to guarantee a high and repetitive fit accuracy during installation, operation or replacement of a module, all components of the entire program are consequently provided with a precise module centering. Centering bushings or pins are supplied as standard with each module.



6.2.3 Tightening torques for screws

For assembling use screws with the following minimum specifications:

Standard	VDI 2230
Screw strength	Category 8.8
Surface:	Galvanized blue, oiled or greased

Thread	Tightening torque
M3	1.1 ... 1.4 Nm
M4	2.6 ... 3.3 Nm
M5	5.2 ... 6.5 Nm
M6	9.0 ... 11.3 Nm
M8	21.6 ... 27.3 Nm

6.2.4 Connection to the pneumatic system

WARNING



Danger when connecting to pneumatics!

The pneumatic system can pose various hazards that can cause serious or fatal injuries if the work is carried out improperly.

- Only qualified personnel may work with or on the pneumatic system!
- The necessary personal protective equipment must be provided and used.

NOTICE

Functional impairment to leaking compressed air connections!

Unused air connections that are not hermetically sealed lead to a pressure loss and thus to functional impairment.

- Before installing the module in a system, all unused compressed air connections must hermetically seal.
- Perform a leak test!



When connecting the compressed air supply for the first time, make sure that all compressed air throttles are closed.

Vent the system slowly!



The minimum compressed air quality shall comply with the specifications of ISO 8573-1:2010.

Pneumatic connections of module GMQ 12

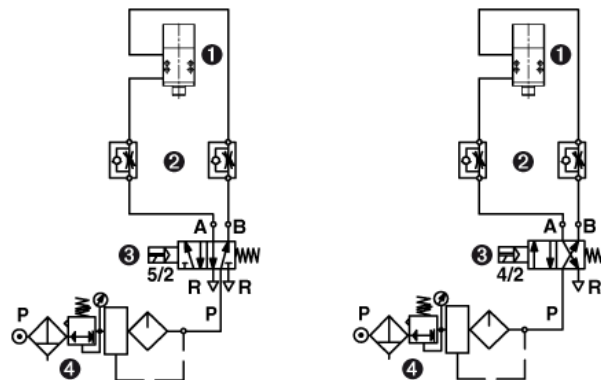


Fig. 11 Pneumatic circuit diagram gripper module GMQ 12

- | | |
|---|------------------------------|
| 1. Gripper drive | 4. Maintenance unit |
| 2. Throttle check valve | P. Compressed air connection |
| 3. Directional control valve (standard 5/2) | |

Pneumatic connections module GMQ 12 / RM 12

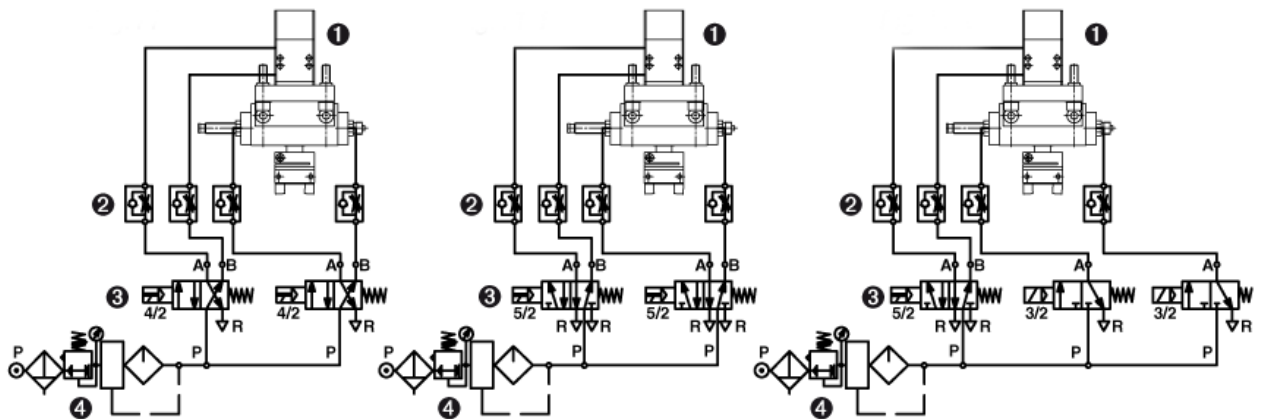


Fig. 12 Pneumatic circuit diagram gripper module GMQ 12 / RM 12

- | | |
|---|------------------------------|
| 1. Gripper drive | 4. Maintenance unit |
| 2. Throttle check valve | P. Compressed air connection |
| 3. Directional control valve (standard 5/2) | |



The base body of the rotary module is provided with M5 pneumatic connections on both sides. There are also two M5 pneumatic connections on the side of the gripper drive.

6.2.5 Mounting the initiators

Plug-in and screw-in proximity switches (6.5 mm or 8x8 mm) with proximity switch holder are used for end position detection of the modules. The initiators and holders are not included in the scope of delivery of the PMP module!

WARNING



Danger - Do not use in unsuitable environment !

The initiators are designed for use in **non**-explosive atmospheres.

- Do **not** use the initiators in potentially explosive atmospheres!



Depending on the control type, the switching type PNP or NPN of the initiators must be determined (fig. below).

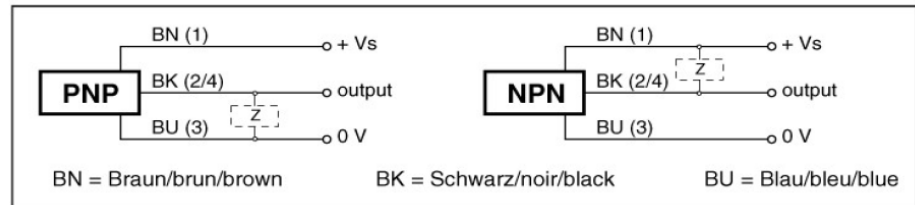


Fig. 13 Determining the switching type depending on the control type

Technical data	
Operating voltage range	10-30 VDC
Switching distance:	1.5mm
Type	Short circuit and reverse polarity protected



The proximity switches can only be used with the stop screws of the AS series!

Mounting the initiator 6.5 mm

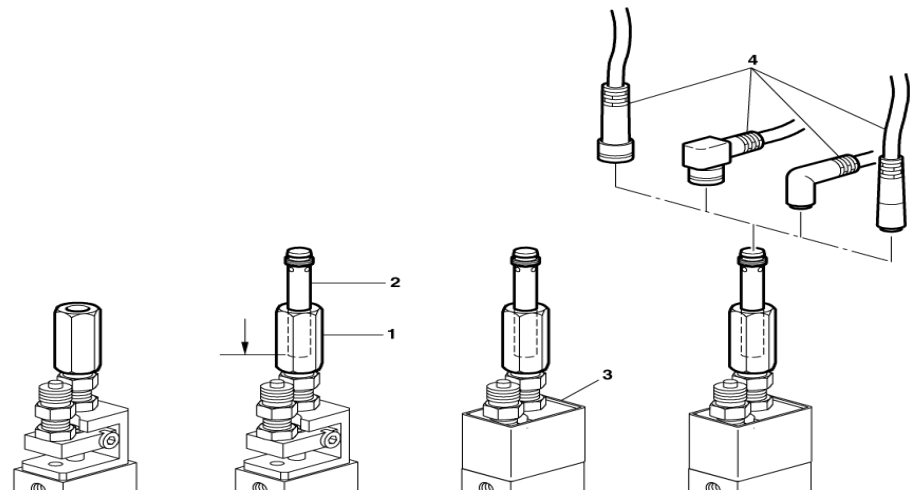


Fig. 14 Mounting the proximity switches (6.5 mm)

To install the 6.5 mm proximity switch, proceed as follows:

1. Screw the initiator holder (1) onto the stop screw.
 2. Insert the initiator (2) into the initiator holder as far as it will go.
 3. Slightly tighten the initiator holder (1).
 4. Mount the Cover (3).
 5. Mount the connector (4).
 6. Carry out function check.
- ⇒ The initiator is mounted.

Mounting initiator 8x8 mm

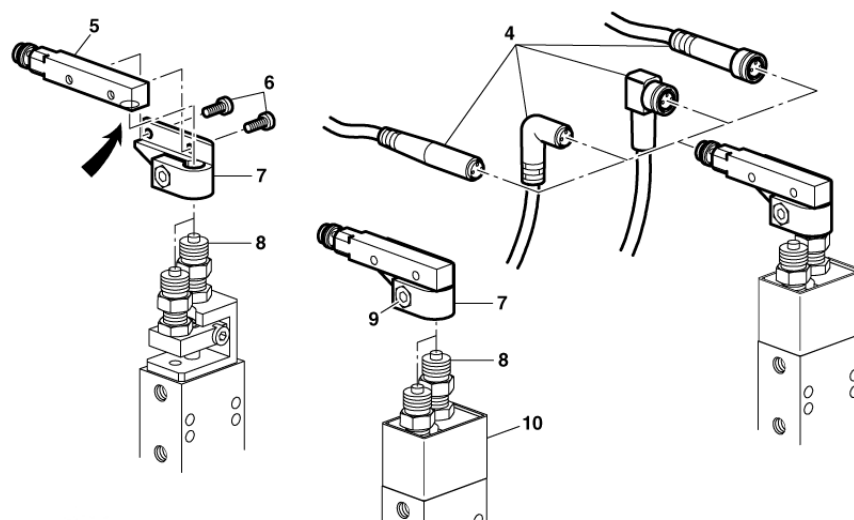


Fig. 15 Mounting the proximity switches (8x8 mm)

To install the 8x8 mm initiator, proceed as follows:

1. Screw the initiator (5) onto the initiator holder (7) with screws (6).
 - The switching point of the initiator must cover the hole of the initiator holder (see arrow).
2. Mount the Cover (10).
3. Push the initiator holder (7) with initiator (5) onto the stop screw (8) as far as it will go and clamp it with screw (9).
4. Mount the connector (4).
5. Carry out function check.
 - ⇒ The initiator is mounted.

6.2.6 Assembly/turning of the gripping jaws

When turning the gripping jaw, make sure that the middle screw (1) is loosened and tightened again after turning so that the gripping jaw is positioned correctly again. This applies to the module **GMQ12/P-01**.

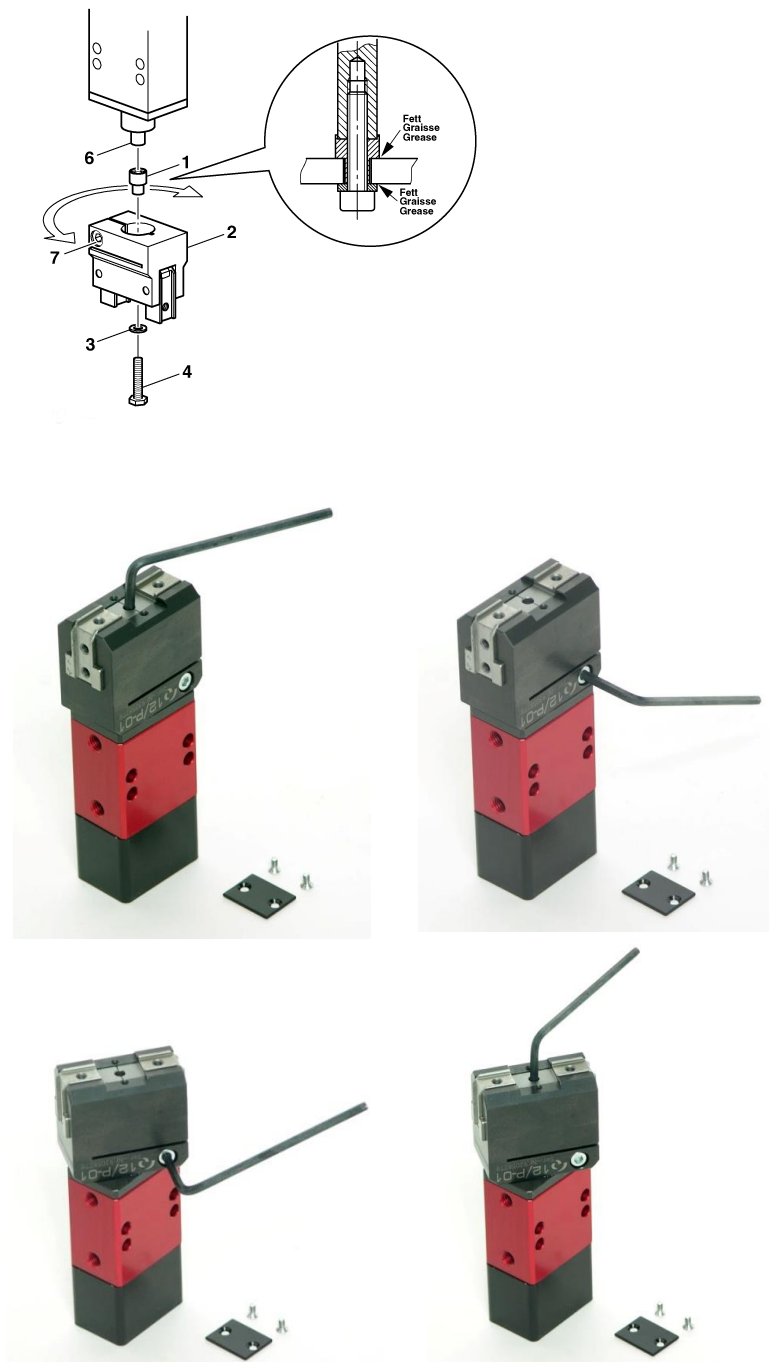


Fig. 16 Turn the gripping jaw

6.2.7 manufacture of the gripper fingers

The customer is responsible for manufacturing the gripper fingers. For this purpose, the jaws of the grippers are provided with a standard fit (6 H7).

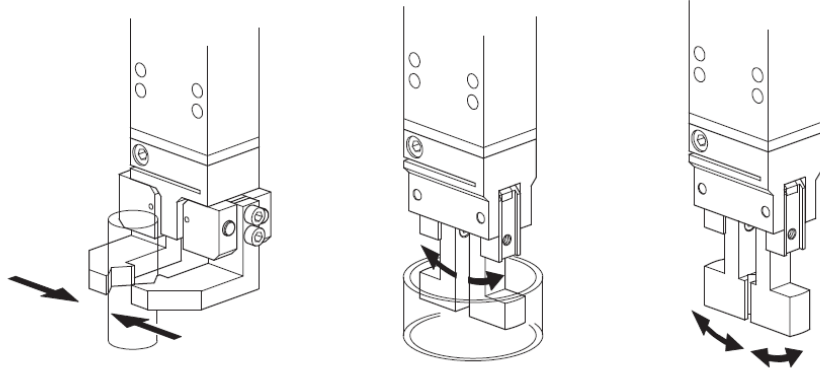


Fig. 17 Representation of the gripping fingers (exemplary)



The length (L) and the offset (X) of the gripper fingers must not exceed the recommended masses in the gripping force diagrams!

6.3 Settings

This chapter contains information on the adjustment work to be carried out on the modules.

NOTICE

No liability can be assumed for damages caused by accordance work carried out on the modules on the part of the operator.



The gripping modules can be adjusted to the desired combination and the module can be optimally set at the factory!

6.3.1 Safety notes for settings

WARNING



Risk of injuries due to uncontrolled movements!

Uncontrolled movements of parts can cause injury to third parties and damage to property.

- Ensure that there are no persons in the working area of the modules.
-

CAUTION



Danger of injury from uncontrolled restarting of the system/equipment!

Unintentional restarting of the controller or the pneumatic system can cause injuries and material damage.

- When working on the modules, make sure that the control unit and the pneumatic system are switched off and secured against being switched on again.
-

CAUTION



Danger arising from work carried out improperly!

Improper adjustment work can cause injuries and damage to property.

- Adjustment and conversion work may only be carried out by qualified personnel!
-



Also observe the safety instructions in  Chap. 2 „Safety instructions“ in this manual.

6.3.2 Adjusting the stop screw and stop pin

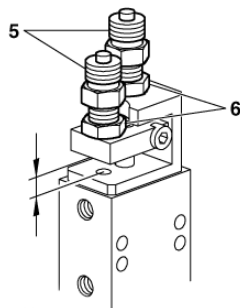
The GMQ 12 can be equipped with a wide range of stop screws. These must be ordered separately.



The stop screw can be combined with an initiator holder and initiator switch 6.5 mm or with an angle initiator holder 8x8 mm for end position detection.

Adjustment of stop screw AS 08/15

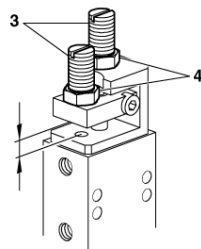
For Setting the positioning screw proceed as follows:



1. Adjust the stroke by adjusting the stop screw (5).
 - One turn = 1 mm
 2. Secure the stop screw with the locking nut (6).
 - Stopping accuracy: ± 0.01 mm
- ⇒ The process is complete.

Adjustment of stop pin M8x1/25 on the gripping module

For Setting the positioning pins proceed as follows:



1. Adjust the stroke by adjusting the stop pin (3).
 - One turn = 1 mm
 2. Secure stop pin with locknut (4).
 - Stopping accuracy: ± 0.01 mm
- ⇒ The process is complete.

6.3.3 Stroke adjustment of the GMQ 12 grippers

The gripper stroke can only be adjusted on the GMQ 12 module.

If the GMQ has been converted to internal clamping or the spring has been removed, the stroke stop (1) must be reconnected firmly and flush with the piston rod (2) (Fig. 18).

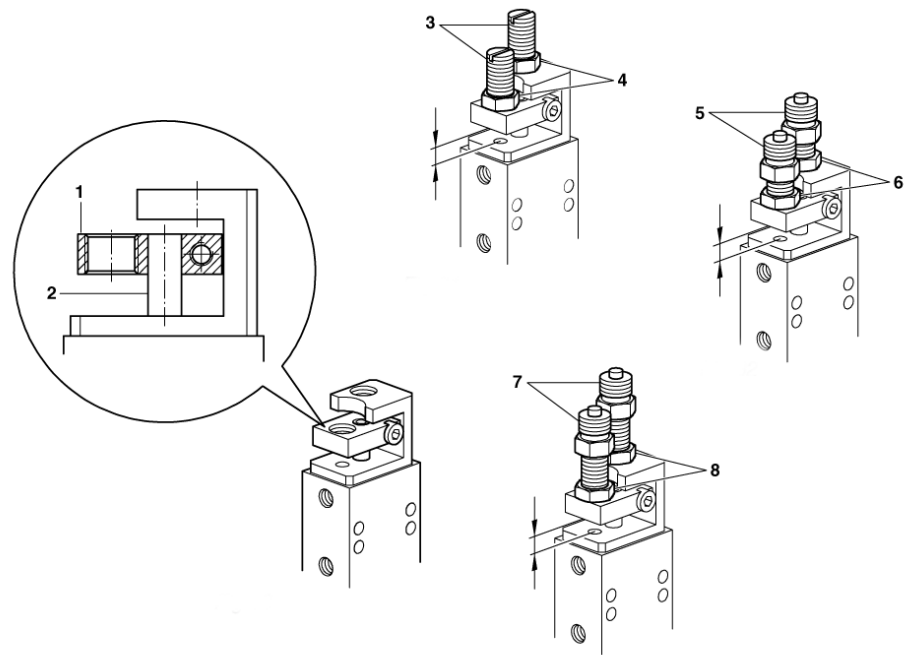


Fig. 18 Stroke adjustment of the gripper

6.4 Conversion of the GMQ module

The Afag modules are designed so that they can be operated both externally and internally clamping as well as single and double acting.

All gripping modules are supplied ex works externally clamped with gripping force safety device (closed without pressure). A built-in spring serves as a gripping force safety device in the depressurised state.

If required, the modules can be converted to another function.



Special tools must be used to convert the **GMQ 12 / RM 12** modules.

Therefore, the GMQ 12 / RM 12 must be sent to Afag for conversion.

6.4.1 Conversion of the GMQ 12 to internal clamping

To convert the GMQ 12 to internal clamping, proceed as follows:

1. Loosen screw (1+2).
 2. Dismount the gripping jaw (3).
 3. Loosen the screws (4+6).
 4. Remove the guide pin (7).
 5. Pull out piston (8) with spring (9).
 6. Remove the lifting stop (5).
 7. Replace the piston (8) with the spring (9) upside down.
 8. Reassemble the module in reverse order.
 9. Carry out function check.
- ⇒ The process is complete.

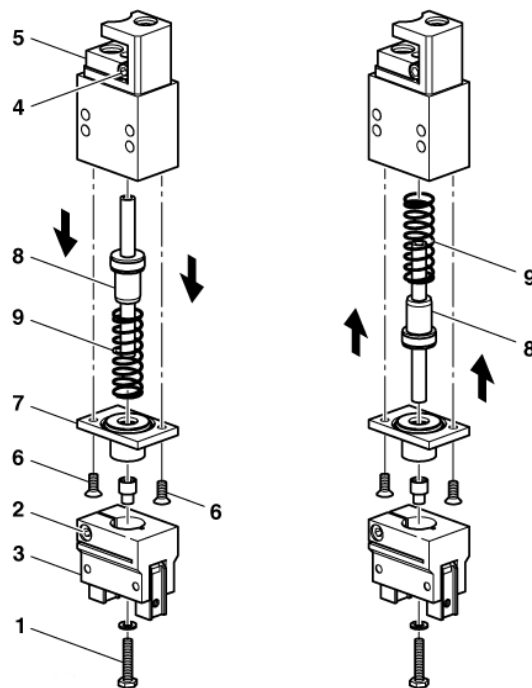


Fig. 19 Conversion to internal clamping

6.4.2 Conversion of the GMQ 12 to double-acting

To convert the GMQ 12 to internal clamping, proceed as follows:

1. Loosen screw (1+2).
 2. Dismount the gripping jaw (3).
 3. Loosen the countersunk screws (6).
 4. Remove the guide pin (7).
 5. Pull out the spring (9).
 6. Refit the guide pin (7) with countersunk screws (6).
 7. Refit the gripper (3).
 8. Carry out function check.
- ⇒ The process is complete.

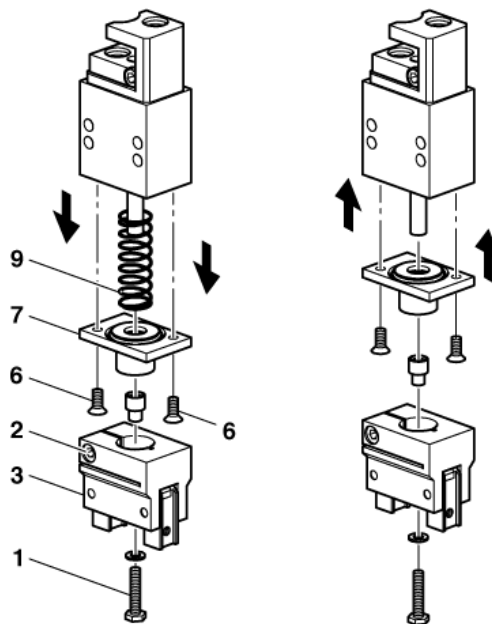


Fig. 20 Conversion to double-acting

7 Commissioning

7.1 Safety instructions for commissioning

CAUTION



Danger of injury by moving components!

Limbs can be crushed by moving components!

- Work on and with the modules may only be carried out by qualified personnel.
- Make sure that there are no persons or tools in the working area of the modules.

CAUTION



Danger of injury in the working area of the module!

During operation of the modules, persons within the working area of the modules may be injured.

- When operating the modules, ensure a good overview of the entire working area.
- Unauthorized persons must not stay within the working area during operation.



Also observe the safety instructions in ➔ Chap. 2 „Safety instructions“ in this manual.

7.2 Commissioning of the modules



Before commissioning, set the stroke stop screw and the module absorbers so that the desired stroke is damped correctly.

Proceed carefully and follow the instructions step by step when commissioning the modules for the first time:

1. Slowly ventilate the entire system.
 2. Note the permissible values of the module (➔ Chapter 3) for:
 - Payload
 - Movement frequency
 - mechanical stress
 3. Make sure that there are no persons or tools within the working area of the rotary module.
 4. Perform test run:
 - Start with slow traversing movements.
 - Then continue under normal operating conditions.
- ⇒ Commissioning is completed.

8 Fault elimination

8.1 General Notes

This chapter contains general information and safety instructions for troubleshooting.

8.2 Safety instructions for troubleshooting

WARNING**Danger of injury due to improper work!**

Poorly performed troubleshooting work can lead to serious injuries and damage to property.

- The due diligence obligations of the user include ensuring that the personnel working on eliminating faults appropriately trained and qualified.
-



Also observe the safety instructions in ➔ Chap. 2 „Safety instructions“ in this manual.

8.3 Table Fault causes and remedy GMQ 12 and GMQ 12 / RM12

Defective components must be replaced exclusively by Afag original spare parts.

Fault	Possible cause	Remedy:
Gripper does not open/close	<ul style="list-style-type: none"> ▪ No compressed air ▪ Module incorrectly connected to pneumatics 	<ul style="list-style-type: none"> ▪ Check connections ▪ Check connections
End position no signal	<ul style="list-style-type: none"> ▪ Limit stop screw incorrectly adjusted ▪ Initiator defect ▪ Cable break in sensor cable 	<ul style="list-style-type: none"> ▪ Readjust limit stop ▪ Replace initiator ▪ Replace proximity switch cable
Hard gripping of the workpiece	<ul style="list-style-type: none"> ▪ Exhaust flow control defective ▪ Speed too high 	<ul style="list-style-type: none"> ▪ Replace exhaust flow control ▪ Adjust exhaust flow control
Gripper cannot grip the workpiece / loses it	<ul style="list-style-type: none"> ▪ Mass of the workpiece too high ▪ Gripping point of the gripper too far outwards ▪ Construction of the gripper fingers not optimal 	<ul style="list-style-type: none"> ▪ Use larger gripper type ▪ Shift pressure point inwards ▪ Adapt construction (positive grip)
Gripping force too high/low	<ul style="list-style-type: none"> ▪ Highest gripping force ▪ Medium gripping force ▪ Lowest gripping force 	<ul style="list-style-type: none"> ▪ Spring action + pneumatic = gripping force retention ▪ Pneumatic only ▪ Spring action only
Initiator LED does not switch	<ul style="list-style-type: none"> ▪ Initiator defect 	<ul style="list-style-type: none"> ▪ Initiator must be replaced

9 Maintenance and repair

9.1 General notes

The modules are almost maintenance-free. Nevertheless, some maintenance work must be carried out to ensure an optimum operating condition of the modules. This chapter describes the required maintenance activities.



Each Module is accompanied by a safety information sheet. This information sheet must be read carefully by every person who carries out work on and with the module.

9.2 Safety instructions for maintenance and repair

WARNING



Danger of injury due to improper maintenance!

Improperly carried out maintenance activities can cause considerable damage to property and serious injury.

- The operator must exercise due care and only use trained maintenance personnel to carry out the activities.
- Always wear personal protective equipment when carrying out maintenance and repair work!

WARNING



Risk of injury due to uncontrolled movements of the compact slides!

Signals from the control system can trigger unintentional movements of the modules, which can cause injury.

- Before starting any work on the modules, switch off the control unit and secure to prevent it from being switched on. Observe the operating instructions of the controller used!
- Before starting any activities, switch off the media supply (pneumatics) and secure it from being switched on again!



Also observe the safety instructions in ➔ Chap. 2 „Safety instructions“ in this manual.

9.3 Maintenance activities and maintenance intervals

The modules are almost maintenance-free. Nevertheless, some maintenance work must be carried out to ensure an optimum operating condition of the modules.

9.3.1 Overview of the maintenance points

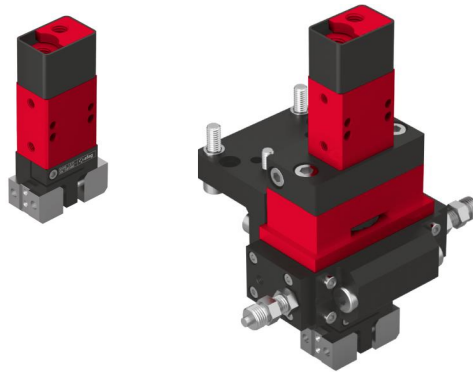






Fig. 21 Maintenance points GMQ 12 – GMQ 12 / RM12

No.	Maintenance point	Maintenance work	Interval	System [On/Off]	Remarks
1	Whole module	Cleaning and checking 	As required	[Off]	- <ul style="list-style-type: none">▪ Clean the module with a dry, lint-free cloth.- Do not spray the module with water, do not use aggressive cleaning agents.▪ Perform a visual inspection of the module.
2	Shock absorber*	Check functioning 	Monthly	[Off]	<ul style="list-style-type: none">▪ Check function of shock absorbers, replace if necessary
3	Stop screws	Check functioning 	Monthly	[Off]	- <ul style="list-style-type: none">▪ Check function of stop screws, replace if necessary
4	Module	Check 	Monthly	[On]	- <ul style="list-style-type: none">▪ Check module for unusual noise generation



*Shock absorbers and stop screws must be checked regularly for correct function and replaced if necessary. We recommend replacing the shock absorbers after max. 5 million load cycles.

Incorrectly adjusted, missing or defective shock absorbers impair the function of the module and can lead to its destruction!

NOTICE

Risk of corrosion due to ionized air environment

If the modules are used in an ionised air environment, there is a risk that exposed parts could corrode.

- Always grease exposed parts e.g., flanges, shafts, guides and jaws regularly.
- Afag standard lubrication: Staburax NBU8EP (flat guides), Blasolube 301 (piston rods)

9.3.2 Compressed air specifications

The modules are lifetime lubricated and can be operated with lubricated or non-lubricated compressed air.



Before operating the module with oil-free compressed air, make sure that the module has never been operated with oil-lubricated compressed air!

Compressed air specification
Dry (condensation-free)
Filtered (40 µm filter for lubricated air)
Filtered (5 µm filter non-lubricated air)

If the modules are operated with lubricated compressed air, we recommend that you use the following types of oil:

oil type	
Festo Special Oil	Shell Tellus Oel C 10
Avia Avilub RSL 10	Mobil DTE 21
BP Energol HPL 10	Blaser Blasol 154
Esso Spinesso 10	

Oil quantity: 5-10 drops of oil per 1000 ltr. Compressed air

Viscosity: 9 to 11 mm^{2/s} (= cST) at 40°C, ISO class VG 10, to ISO 3448

NOTICE

Risk of damage to property!

The operation of the modules with oil-lubricated compressed air causes the factory primary lubrication to be washed out. Therefore, it is absolutely essential that the modules continue to be operated with oil-lubricated compressed air in order to avoid damage to the modules.

- Once the modules have been operated with oil-lubricated compressed air, they **may never** be operated without oil-lubricated compressed air.

9.3.3 Further maintenance

Further maintenance is not required, if the ambient conditions listed below are complied with:

- Clean working area
- No use of splash water
- No abrasive or process dust and vapours
- Climate and temperature as specified in the technical data

9.4 Spare and wear parts lists

Afag Automation AG offers a reliable repair service. Defective modules can be sent to Afag for warranty repair within the warranty period.

After expiry of the warranty period, the customer may replace or repair defective modules or wear parts himself or send them to the Afag repair service.



Please note that Afag does not assume any warranty for modules that have not been replaced or repaired by Afag!

CAUTION

Risk of injury when removing the modules due to uncontrolled movements!

When disassembling the module from a system, there is a danger of uncontrolled movements.



- Disconnect the media supply (electrics, pneumatics) before removing the modules!
 - Disassembling should only be carried out by qualified personnel!
 - Bleed and deactivate the equipment before removing the module!
 - Before removing the module, switch off the control unit and secure it against being switched on again!
-



After the warranty period has expired, the customer can also carry out the repair himself and order the corresponding wearing parts sets.

9.4.1 Spare parts GMQ 12

Item	Designation	Dimensions	Supplier	number	Order no.
1	Housing		Afag	1	11009176
2	Piston		Afag	1	11002284
3	Guide pin		Afag	1	11009178
4	Lifting stop		Afag	1	11009179
5	Bearing bush		Afag	1	11009180
6	Cover		Afag	1	11009181
7	Pressure spring		Afag	1	11002292
8	Piston seal		Afag	1	50411317
9	Rod seal		Afag	2	11009072
10	O-ring	D 17 x 1 mm	Afag	1	11000848
11	Cyl./hex. Screw	M3 x 12 mm	Afag	1	11001426
12	Countersunk screw	M3 x 8 mm	Afag	2	11000569
13	Centering pin	D 4 x 6 mm	Afag	2	11005017
14	Pliers set	GM12/ P	Afag	1	11015008
14	Pliers set	GM 12/K	Afag	1	11015009
14	Pliers set	GM 12/ PS	Afag	1	11015010

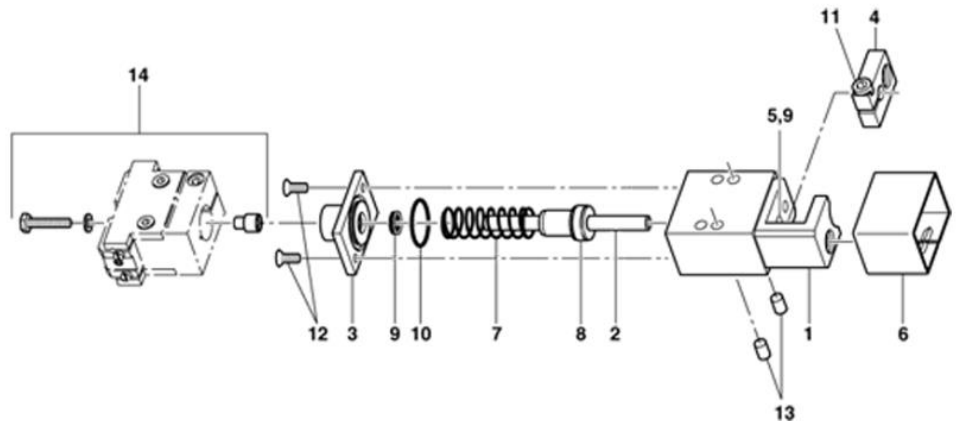


Fig. 22 Overview of spare and wear parts



The pliers fastening set (pos. 14) consists of a screw, a washer and a guide piece adapted to the corresponding pliers.

9.4.2 Wear parts



When replacing the wear parts, we recommend that you replace all wear parts at the same time and carefully so that the functional parts are not damaged.

Wearing parts set for GMQ 12 - Order no. 11002504

Item	Designation	Supplier	number	Order no. Set
8	Piston seal	Afag	1	see above
9	Rod seal	Afag	2	see above
10	O-ring	Afag	1	see above

Wear parts for RM 12

Item	Designation	Supplier	number	Order no.
1	Wear parts	Afag	1	11002521
2	Wear parts	Afag	1	11002523

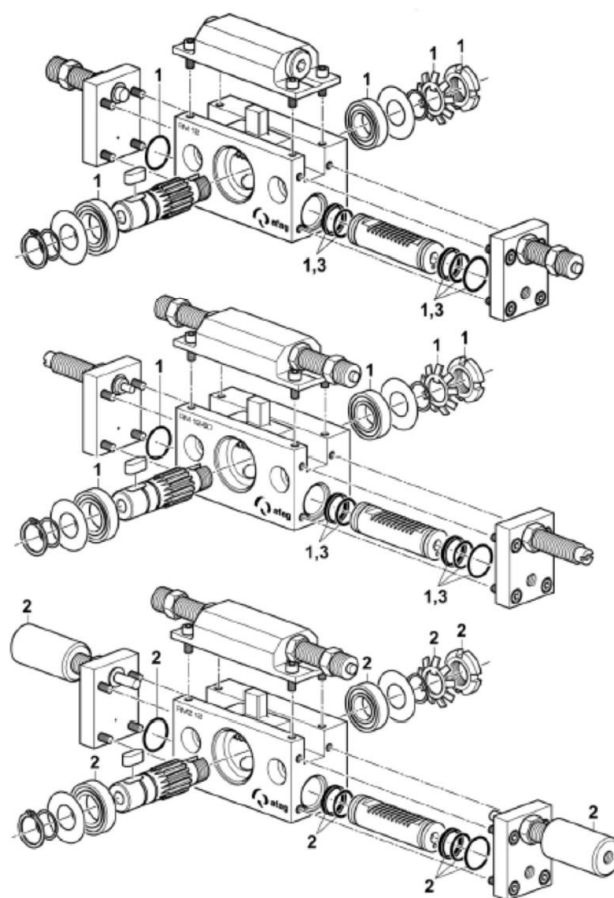


Fig. 23 Wear parts RM 12

10 Decommissioning, disassembly, disposal

The gantry modules must be properly dismantled after use and disposed of in an environmentally friendly manner.

10.1 Safety instructions for decommissioning, disassembling and disposal

WARNING



Risk of injury due to improper decommissioning, disassembly and disposal!

Improperly carried out activities can result in considerable material damage and serious injury.

- The operator must exercise due care and only use specially trained and qualified personnel for this work.



Also observe the safety instructions in ➔ chap. 2 „Safety instructions“ in this manual.

10.2 Decommissioning

If the modules are not used for a longer period, they must be properly commissioned and stored as described in ➔ Chapter 4.5.

10.3 Disassembly

The compact slides may only be dismantled by qualified personnel.

CAUTION



Risk of injury due to uncontrolled movements of the modules!

When disassembling the module from a system, there is a danger of uncontrolled movements. If pneumatic connections are disconnected under pressure, serious bodily injury may result.

- Disconnect the media supply (electrics, pneumatics) before removing the rotary modules!
- Disassembling should only be carried out by qualified personnel!
- Only remove module when the controller is switched off and secured!

10.4 Disposal

The module must be disposed of properly at the end of their service life and the raw materials used must be recycled. Observe the legal regulations and company requirements.

The modules must not be disposed of as a complete unit. Dismantle the modules and separate the various components according to type of material and dispose of them properly:

- Scrap the metallic materials.
- Hand over plastic parts for recycling.
- Sort the rest of the components by their material properties and dispose of them accordingly.

NOTICE

Risk to the environment due to incorrect disposal of the modules!

Environmental damage can be caused by improper disposal of the modules.

- Electronic parts, electrical scrap, auxiliary and operating materials must be disposed of by approved specialist companies.
 - Information on proper disposal can be obtained from the responsible local authorities.
-

11 Declaration of incorporation

Declaration of incorporation

for partly completed machinery according to the Machinery Directive 2006/42/EC, Annex II, 1.B

The manufacturer hereby declares:

Afag Automation AG, Luzernstrasse 32, CH-6144 Zell

that the partly completed machine:

Product description	Gripping modules / rotary gripper modules (pneumatic)
Type:	GMQ 12 / GMQ 12 RM 12
Consecutive serial no.	50XXXXXX

complies with the following essential health and safety requirements of the Machinery Directive 2006/42/EC at the time of declaration: 1.1; 1.1.1; 1.1.2; 1.2.3; 1.2.4.4; 1.3; 1.3.5; 1.3.6; 1.3.7; 1.3.9; 1.4.1; 1.5; 1.5.3; 1.6; 1.6.1; 1.6.3; 1.6.4; 1.7; 1.7.4; 1.7.4.1; 1.7.4.2

Harmonised standards applied, in particular:

EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction.
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Note: The partly completed machinery must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC.

The manufacturer undertakes to transmit, in response to a reasoned request by the national authorities, relevant technical documentation for the partly completed machinery.

The relevant technical documentation was created according to Annex VII, Part B of the above-mentioned Directive.

Authorised representative for compiling the technical documentation:

Niklaus Röthlisberger, Product Manager, Afag Automation AG, CH-6144 Zell

Zell, 31.05.2023

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