Precision gripper modules

PG 12 I PG 16 I PG 20

- **Declaration of Incorporation**
- **Assembly Instructions**
- **Operating Instructions**
- **Maintenance Instructions**

„Translation“ of the Original Operating Instructions

These operating instructions apply to: Precision gripper modules PG

Type	Order No.
PG 12	50332223
PG 16	50332224
PG 20	50332225

Version of this documentation: PG 12-PG 16-PG 20-OI-v.1.1 gb.17.01.12

Symbols:

Assembly and initial start-up must be carried out by qualified Personnel only and according to these operating instructions.

WARNING	
	Indicates a possibly dangerous situation. Non-compliance with this information can result in death or serious personal injuries (invalidity).

CAUTION	
	Indicates a possibly dangerous situation. Non-compliance with this information can result in damage to property or light to medium personal injuries.

NOTE	
	Indicates general notes, useful operator tips and operating recommendations which don't affect safety and health of the personnel.

Table of Contents

1 Déclaration of incorporation

Declaration of Incorporation in compliance with the EC Machinery Directive 2006/42/EC, Annexe. II, 1.B for partly complete machineries.

Manufacturer:	Afag Automation AG Fiechtenstrasse 32 4950 Huttwil Switzerland
Person established within the community who is authorised to compile the relevant technical documents.	Beat Lanz, PM & Marketing-Services Afag Automation AG Fiechtenstrasse 32 4950 Huttwil Schweiz

Description and identification of the partly complete machinery:

Product:	**Precision gripper modules PG**
Types:	**PG 12** **PG 16** **PG 20**

We declare herewith that the following basic requirements of the Machinery Directive 2006/42/EC have been complied with:
We declare that the specific technical documentation was written according to Annex VII part B.
We expressly declare that the partly complete machinery corresponds to all applicable requirements of the following EC directives.

108:2004	EMC-Directive
95:2001	Product Safety Directive
95:2002	RoHS

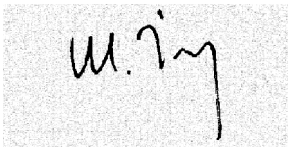
The manufacturer or the authorized person binds himself hereunder to transmit the specific documents of the partly complete machinery to any sovereign authorities if requested. The industrial property rights shall remain unaffected from this.

Important note!

The partly complete machinery may only be put into service after it was ascertained that the machine into which the partly complete machinery is to be incorporated complies with the requirements of this directive.

Place/Date : Huttwil, September 2011

Afag Automation AG (automatic manufacturing technology)



Marc Zingg
Managing Director Afag Automation AG

Mathias Schütz
Product Manager Afag Automation AG

2.0 Assembly Instructions

2.1 Safety instructions

Modifications to the PG precision gripper that are not described in this operating manual or have not been approved in writing by the company Afag Automation AG are not permitted. In case of improper changes or assembly, installation, operation, maintenance or repairs, Afag Automation AG rejects all liability.

2.2 Transport, handling, storage

The following conditions must be met for transport and storage:

Storage temperature: 0 - 50 ℃

Humidity: <90%, non condensing

⚠ CAUTION	
	The PG precision grippers are packed in the original box. In the case of improper handling the module may drop out of the box when it is unpacked and cause injuries to limbs.

NOTE	
	A package slip is supplied with every module from Afag Automation AG. Please follow the instructions before installing the module into a station or a system.

2.3 Description of the module parts

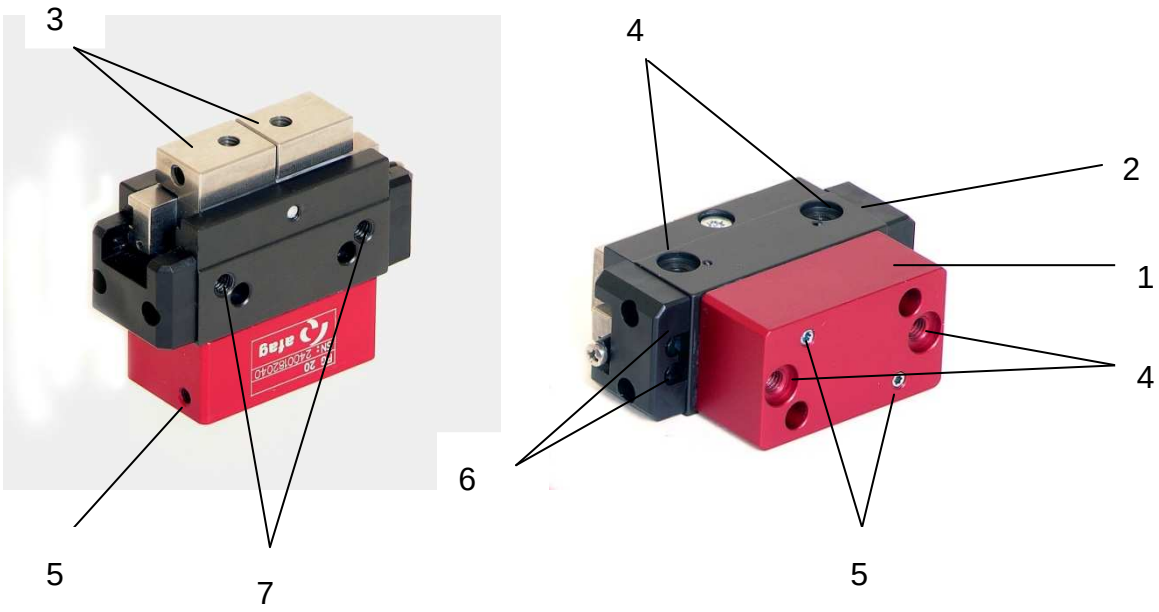
The Afag PG precision gripper is the right solution when it comes to gripping and precise insertion of parts.

The PG precision grippers are precise and compact gripping modules designed for gripping oriented serial parts. They can be combined with other modules from the Afag modular kit. The positions “open” and “close” can be queried by initiators (not included in the scope of delivery, must be ordered separately). The grippers have a repeatability of +/- 0.01 mm, the turning precision of the grippers is +/- 0.05 mm.

The gripping forces are indicated in the corresponding table of the gripper type in these instructions.

NOTE	
	Please note: Modifications to the PG precision gripper that are not described in this operating manual or have not been approved in writing by the company Afag Automation AG are not permitted. In case of improper changes or assembly, installation, operation, maintenance or repairs, Afag Automation AG rejects all liability.

2.4 Parts designation



1 Gripper housing

2 Gripping head

3 Gripper jaws

4 Mounting grid at the rear and at the sides

5 Air connections at the rear and at the sides

6 Holders for sensors

7 Mounting holes for options such as holding-down appliances

Figure 1: Module description

2.5 Mounting, connection

WARNING	
	The gripper fingers are moved by the pneumatic control. If the gripper fingers cannot move freely there is danger of injuries and bruises near the add-ons. If add-ons at the PG grippers could cause danger in connection with the gripper fingers a safe operation must be ensured.

WARNING	
	Due to the decentral controller the operator of the PG needs not to be near the product so that third persons might be endangered by the gripper operation. Always switch off the controller and disconnect the module from the compressed air supply and secure against being switched on again unintentionally when you work on the PG precision gripper. The signals of the control system may cause unintentional movements of the module which may lead to personal injuries.

2.6 Installation and fastening possibilities

The PG precision grippers can be installed in a vertical and horizontal position.

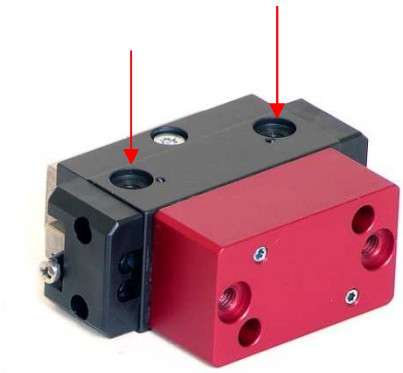
The Afag module components are provided with a precise module centring which guarantees a high and repetitive accuracy of fit during installation, operation and exchange of a module.

Installation of the precision grippers

The precision grippers can be mounted at the and at the sides.

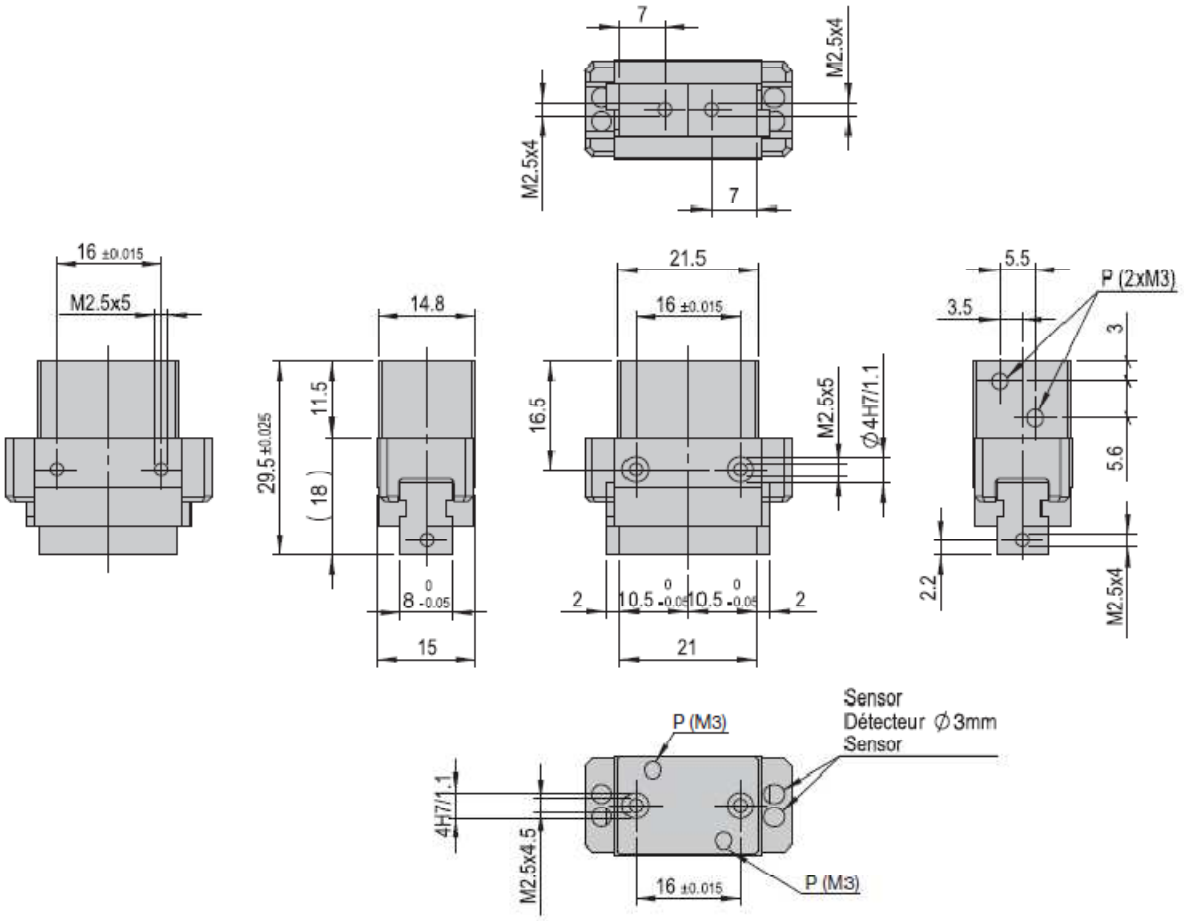
Montage von hinten

Attachment at the sides



Use the centring bushings included in the scope of delivery for positioning.

2.7 Dimensional drawing PG 12



ZENTRISCHE GREIFKRAFT-DIAGRAMME
DIAGRAMME DE SERRAGE CENTRAL
GRAPH OF GRIPPING FORCES CENTRAL

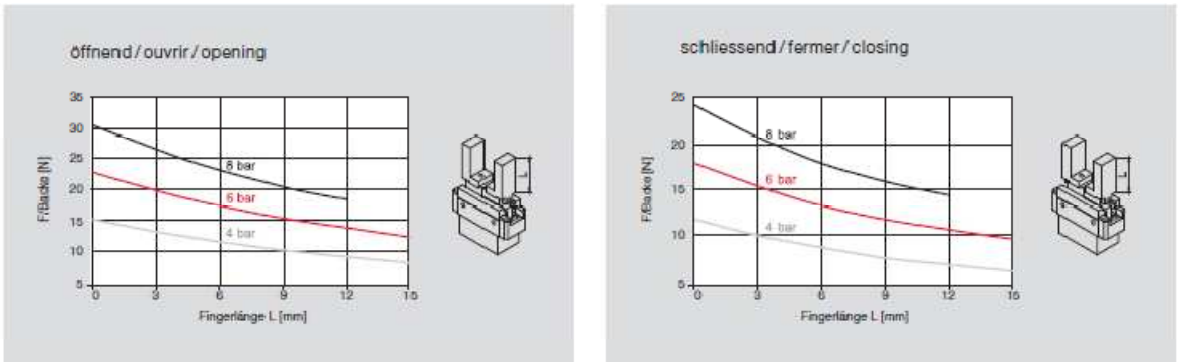


Figure 2: Installation and fastening possibilities

2.8 Technical data PG 12

Typ	Type	Type	PG 12
Bestellnummer	Article no.	Order No.	50332223
Zylinder	Cylindre	Cylinder	11 mm
Öffnungsweg	Course d'ouverture	Opening stroke	2 x 2 mm
*Greifkraft total – öffnend – schliessend	*Force de préhension total – ouverture – fermeture	*Clamping force total – opening – closing	 46 N 36 N
Positionen	Positions	Positions	2
Wiederholgenauigkeit	Précision de répétition	Repeating precision	+/- 0.01 mm
Umschlaggenauigkeit	Précision d'indexation	Indexing accuracy	+/-0.05 mm
Betriebstemperatur Lagertemperatur (nicht condensierend)	Température d'utilisation Temp. de stockage (pas de condensation)	Operation temperature Storage temperature (non condensing)	0 °C..+50 °C 0 °C..+50 °C
Luftanschlüsse Betriebsdruck Luftverbrauch / Zyklus (gefilterte Druckluft, ungeölt od. geölt)	Raccord d'air Pression d'alimantation Consomation d'air / Cycle (air comprimé filtré, extempt d'huille ou air huilé)	Air connections Operating pressure Air consumption / cycle (filtered compressed air, oil-free or oil-containing)	M3 6 bar +/-2 0.005 Nl
Modulgewicht	Poids du module	Weight of module	0.035 kg
Einbaulage	Position de montage	Installation position	✣
Befestigungsraster hinten	Trame de fixation derrière	Fixing grid behind	16 mm (M2.5)
Befestigungslöcher seitlich	Trucs de montage secondaires	Mounting hole side	16 mm (M2.5)

Die technischen Daten beziehen sich auf einen Nenndruck von 6 bar und Afag Standard-Testbedingungen.
*Greifkraft Diagramme beachten.

Les caractéristiques techniques se basent sur une pression de consigne de 6 bar et les tests standard Afag.
*Diagramme de serrage de noter.

The technical data refer to a nominal pressure of 6 bar under Afag standard test conditions
*Graph of gripping forces note.

Im Lieferumfang inbegriffen:
2 Zentrierhülsen ∅ 4 x 2 mm

La livraison comprend:
2 Douille de centrage ∅ 4 x 2 mm

Included in the delivery:
2 Centering bushing ∅ 4 x 2 mm

Der PG 12 kann mit geölter oder ölfreier Luft betrieben werden.

Pour la commande du module PG 12 on peut utiliser aussi bien de l'air huilé que de l'air exempt d'huile.

The PG 12 may be operated with oil-containing or oil-free air.

Reinraumklasse:
10 000 (Federal Standard 209E)

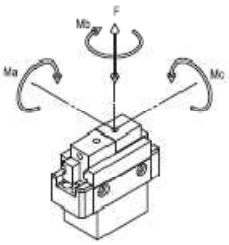
Classe de salle blanche:
10 000 (Federal Standard 209E)

Clean room class:
10 000 (Federal Standard 209E)

Garantie: 40 Mio. Lastwechsel / 2 Jahre

Garantie: 40 millions de courses / 2 ans

Warranty: 40 Mio load strokes / 2 years



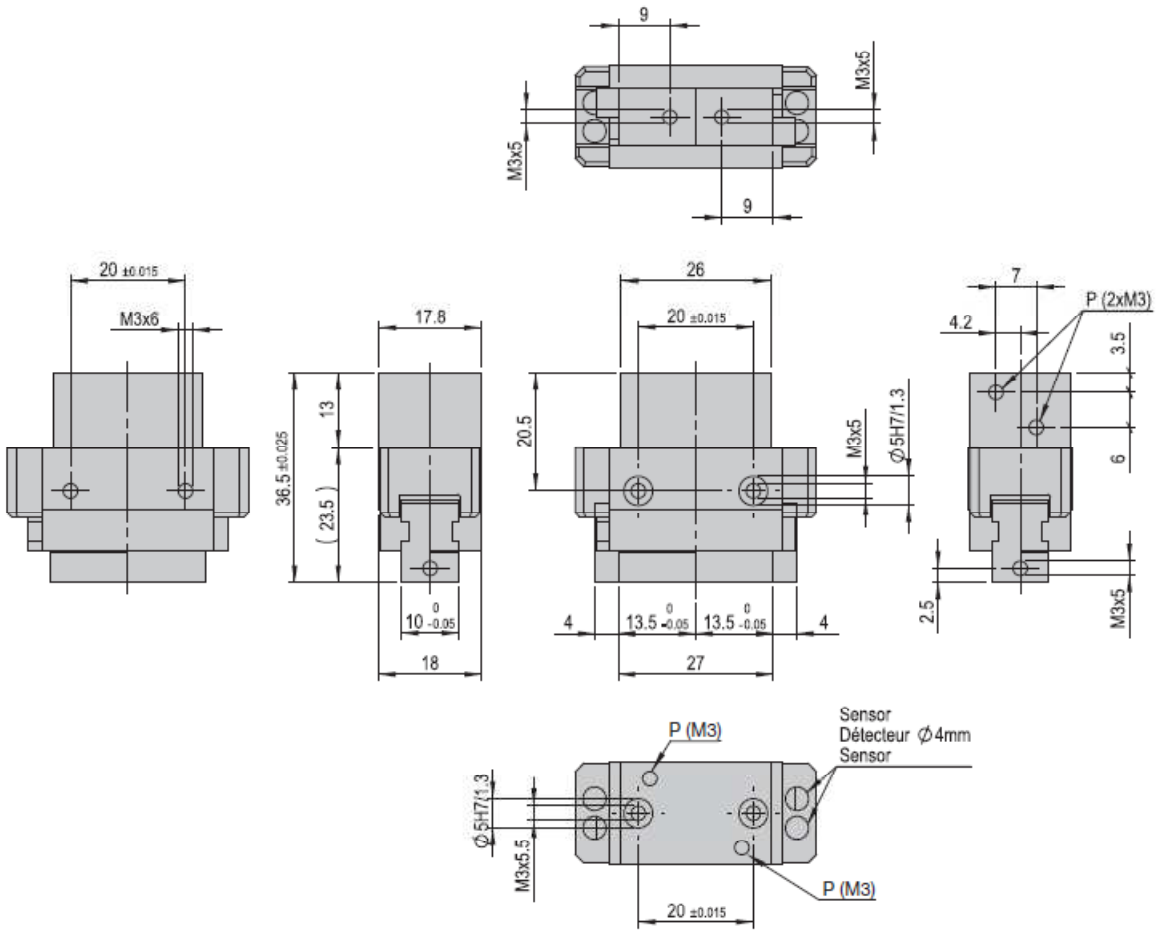
Typ	Type	Type		PG 12
Max. zul. stat. Momente (pro Greifbacke)	Moments stat. max. autorisés (par doigt)	Max. permittet stat. torque (per jaw)	Ma Mb Mc	1 Nm 1 Nm 1 Nm
Max. zul. dynamische Momente (pro Greifbacke)	Moments dyn. max. autorisés (par doigt)	Max. permitted dyn. torque (par jaw)	Ma Mb Mc	1 Nm 1 Nm 1 Nm
Max. statische Kraft	Force static max.	Max. static force	F	30 N
Max. dynamische Kraft	Force dyn. max.	Max. dyn. force	F	0.3 N

Min. Schliesszeiten (in Abhängigkeit des Gewichts der Finger)
Temps fermeture minimal (en dépendance de poids de doigt)
Minimal closing time (in the dependence weight of finger)

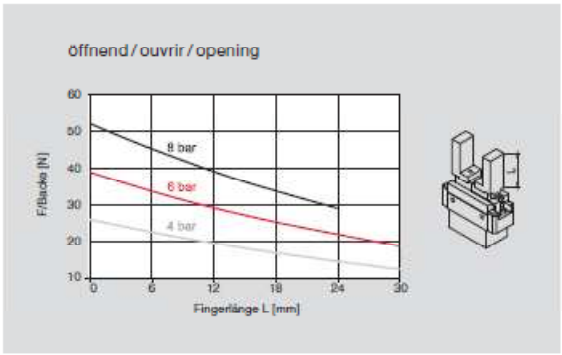
* Schliesszeiten im ungedrosselten Betrieb
Couvre-feu à l'exploitation sans éntranglement
Curfew in operation unthrottled

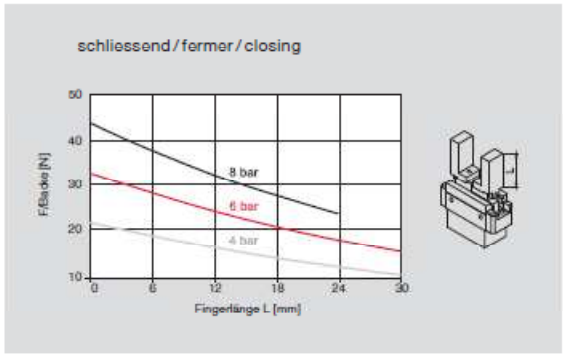
*Schliesszeit / Temps fermeture / Closing time		Fingergewicht / Poids de doigt / Weight of finger
50 ms	=	30 g
30 ms	=	20 g
20 ms	=	15 g
10 ms	=	10 g

2.9 Dimensional drawing PG 16



ZENTRISCHE GREIFKRAFT-DIAGRAMME
DIAGRAMME DE SERRAGE CENTRAL
GRAPH OF GRIPPING FORCES CENTRAL





2.10 Technical data PG 16

Typ	Type	Type	PG 16
Bestellnummer	Article no.	Order No.	50332224
Zylinder	Cylindre	Cylinder	16 mm
Öffnungsweg	Course d'ouverture	Opening stroke	2x4 mm
*Greifkraft total – öffnend – schliessend	*Force de préhension total – ouverture – fermeture	*Clamping force total – opening – closing	 78 N 66 N
Positionen	Positions	Positions	2
Wiederholgenauigkeit	Précision de répétition	Repeating precision	+/- 0.01 mm
Umschlaggenauigkeit	Précision d'indexation	Indexing accuracy	+/-0.05 mm
Betriebstemperatur Lagertemperatur (nicht condensierend)	Température d'utilisation Temp. de stockage (pas de condensation)	Operation temperature Storage temperature (non condensing)	0 °C..+50 °C 0 °C..+50 °C
Luftanschlüsse Betriebsdruck Luftverbrauch / Zyklus (gefilterte Druckluft, ungeölt od. geölt)	Raccord d'air Pression d'alimantation Consomation d'air / Cycle (air comprimé filtré, extempt d'huille ou air huilé)	Air connections Operating pressure Air consumption / cycle (filtered compressed air, oil-free or oil-containing)	M3 6 bar +/-2 0.0064 Nl
Modulgewicht	Poids du module	Weight of module	0.070 kg
Einbaulage	Position de montage	Installation position	✣
Befestigungsraster hinten	Trame de fixation derrière	Fixing grid behind	20 mm (M3)
Befestigungslöcher seitlich	Trucs de montage secondaires	Mounting hole side	20 mm (M3)

Die technischen Daten beziehen sich auf einen Nenndruck von 6 bar und Afag Standard-Testbedingungen.
*Greifkraft Diagramme beachten.

Les caractéristiques techniques se basent sur une pression de consigne de 6 bar et les tests standard Afag.
*Diagramme de serrage de noter.

The technical data refer to a nominal pressure of 6 bar under Afag standard test conditions.
*Graph of gripping forces note.

Im Lieferumfang inbegriffen:
2 Zentrierhülsen ∅ 5x2.5 mm

La livraison comprend:
2 Douille de centrage ∅ 5x2.5 mm

Included in the delivery:
2 Centering bushing ∅ 5x2.5 mm

Der PG 16 kann mit geölter oder ölfreier Luft betrieben werden.

Pour la commande du module PG 16 on peut utiliser aussi bien de l'air huilé que de l'air exempt d'huile.

The PG 16 may be operated with oil-containing or oil-free air.

Reinraumklasse:
10 000 (Federal Standard 209E)

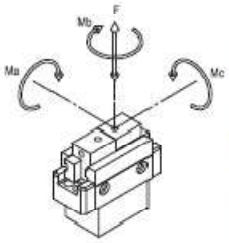
Classe de salle blanche:
10 000 (Federal Standard 209E)

Clean room class:
10 000 (Federal Standard 209E)

Garantie: 40 Mio. Lastwechsel / 2 Jahre

Garantie: 40 millions de courses / 2 ans

Warranty: 40 Mio load strokes / 2 years



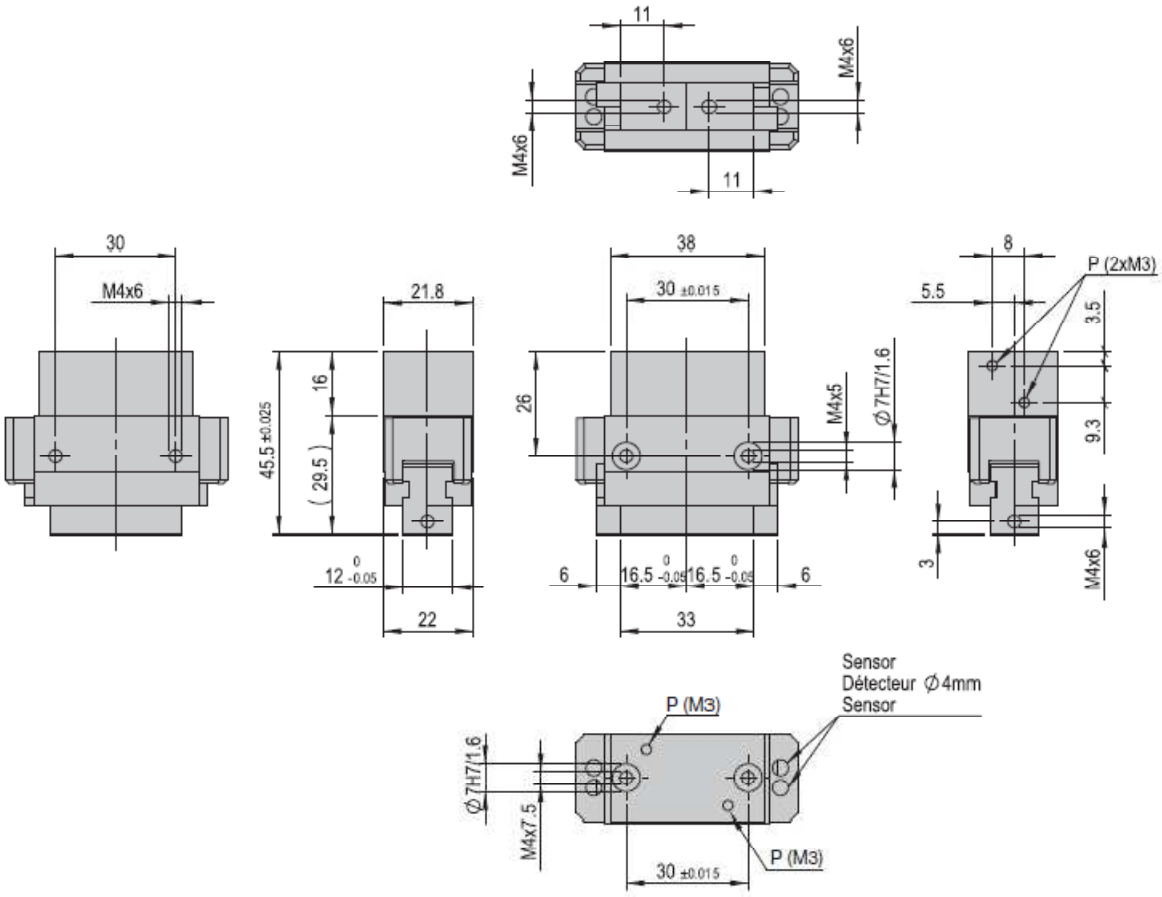
Typ	Type	Type		PG 16
Max. zul. stat. Momente (pro Greifbacke)	Moments stat. max. autorisés (par doigt)	Max. permittet stat. torque (per jaw)	Ma Mb Mc	3 Nm 3 Nm 3 Nm
Max. zul. dynamische Momente (pro Greifbacke)	Moments dyn. max. autorisés (par doigt)	Max. permitted dyn. torque (par jaw)	Ma Mb Mc	3 Nm 3 Nm 3 Nm
Max. statische Kraft	Force static max.	Max. static force	F	60 N
Max. dynamische Kraft	Force dyn. max.	Max. dyn. force	F	0.6 N

Min. Schliesszeiten (in Abhängigkeit des Gewichts der Finger)
Temps fermeture minimal (en dépendance de poids de doigt)
Minimal closing time (in the dependence weight of finger)

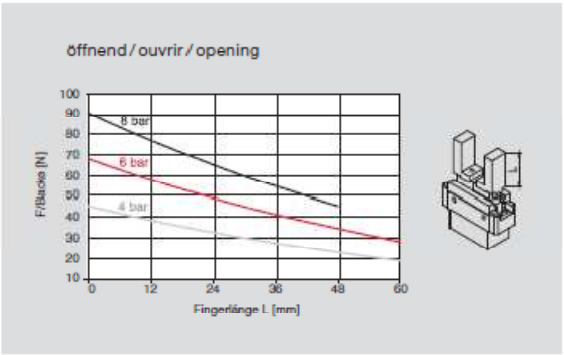
* Schliesszeiten im ungedrosselten Betrieb
Couvre-feu à l'exploitation sans éntranglement
Curfew in operation unthrottled

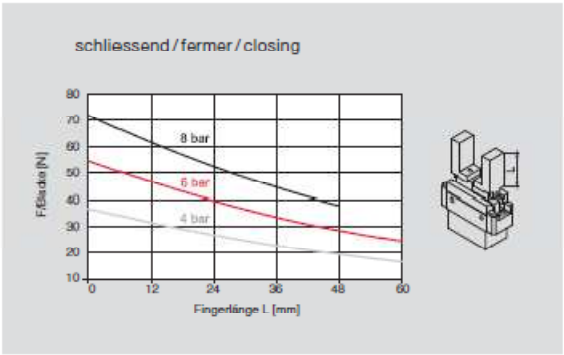
*Schliesszeit / Temps fermeture / Closing time		Fingergewicht / Poids de doigt / Weight of finger
50 ms	=	60 g
30 ms	=	40 g
20 ms	=	30 g
10 ms	=	-

2.11 Dimensional drawing PG 20



ZENTRISCHE GREIFKRAFT-DIAGRAMME
DIAGRAMME DE SERRAGE CENTRAL
GRAPH OF GRIPPING FORCES CENTRAL





2.12 Technical data PG 20

Typ	Type	Type	PG 20
Bestellnummer	Article no.	Order No.	50332225
Zylinder	Cylindre	Cylinder	20 mm
Öffnungsweg	Course d'ouverture	Opening stroke	2 x 6 mm
*Greifkraft total – öffnend – schliessend	*Force de préhension total – ouverture – fermeture	*Clamping force total – opening – closing	 136 N 108 N
Positionen	Positions	Positions	2
Wiederholgenauigkeit	Précision de répétition	Repeating precision	+/- 0.01 mm
Umschlaggenauigkeit	Précision d'indexation	Indexing accuracy	+/-0.05 mm
Betriebstemperatur Lagertemperatur (nicht condensierend)	Température d'utilisation Temp. de stockage (pas de condensation)	Operation temperature Storage temperature (non condensing)	0 °C..+50 °C 0 °C..+50 °C
Luftanschlüsse Betriebsdruck Luftverbrauch / Zyklus (gefilterte Druckluft, ungeölt od. geölt)	Raccord d'air Pression d'alimantation Consomation d'air / Cycle (air comprimé filtré, extempt d'huille ou air huilé)	Air connections Operating pressure Air consumption / cycle (filtered compressed air, oil-free or oil-containing)	M3 6 bar +/-2 0.010 Nl
Modulgewicht	Poids du module	Weight of module	0.132 kg
Einbaulage	Position de montage	Installation position	✣
Befestigungsraster hinten	Trame de fixation derrière	Fixing grid behind	30 mm (M4)
Befestigungslöcher seitlich	Trucs de montage secondaires	Mounting hole side	30 mm (M4)

Die technischen Daten beziehen sich auf einen Nenndruck von 6 bar und Afag Standard-Testbedingungen.
*Greifkraft Diagramme beachten.

Les caractéristiques techniques se basent sur une pression de consigne de 6 bar et les tests standard Afag.
*Diagramme de serrage de noter.

The technical data refer to a nominal pressure of 6 bar under Afag standard test conditions.
*Graph of gripping forces note.

Im Lieferumfang inbegriffen:
2 Zentrierhülsen ∅ 7x3 mm

La livraison comprend:
2 Douille de centrage ∅ 7x3 mm

Included in the delivery:
2 Centering bushing ∅ 7x3 mm

Der PG 20 kann mit geölter oder ölfreier Luft betrieben werden.

Pour la commande du module PG 20 on peut utiliser aussi bien de l'air huilé que de l'air exempt d'huile.

The PG 20 may be operated with oil-containing or oil-free air.

Reinraumklasse:
10 000 (Federal Standard 209E)

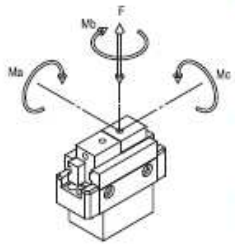
Classe de salle blanche:
10 000 (Federal Standard 209E)

Clean room class:
10 000 (Federal Standard 209E)

Garantie: 40 Mio. Lastwechsel / 2 Jahre

Garantie: 40 millions de courses / 2 ans

Warranty: 40 Mio load strokes / 2 years



Typ	Type	Type		PG 20
Max. zul. stat. Momente (pro Greifbacke)	Moments stat. max. autorisés (par doigt)	Max. permittet stat. torque (per jaw)	Ma Mb Mc	10 Nm 10 Nm 10 Nm
Max. zul. dynamische Momente (pro Greifbacke)	Moments dyn. max. autorisés (par doigt)	Max. permitted dyn. torque (par jaw)	Ma Mb Mc	10 Nm 10 Nm 10 Nm
Max. statische Kraft	Force static max.	Max. static force	F	100 N
Max. dynamische Kraft	Force dyn. max.	Max. dyn. force	F	1 N

Min. Schliesszeiten (in Abhängigkeit des Gewichts der Finger)
Temps fermeture minimal (en dépendance de poids de doigt)
Minimal closing time (in the dependence weight of finger)

* Schliesszeiten im ungedrosselten Betrieb
Couvre-feu à l'exploitation sans éntranglement
Curfew in operation unthrottled

*Schliesszeit / Temps fermeture / Closing time		Fingergewicht / Poids de doigt / Weight of finger
50 ms	=	100 g
30 ms	=	60 g
20 ms	=	-
10 ms	=	-

2.13 Preferred combinations to PG 12

CS 8	1,3 1,3	VP 153 VP 152	1 2
CR 12	3 3	VP 153 VP 152	1 2
RM 12	3	VF 400	1,2
SA-1	1,2 1,2	VP 153 VP 152	1 2
RME-080	1 1	VP 111 VP 151	1 2

Beachten Sie die möglichen Anbaulagen der Module zueinander.

Erforderliche Verbindungselemente und das Ständerprogramm finden Sie im Register: «Verbindungselemente und Ständerprogramm.»

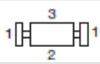
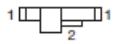
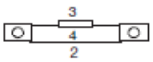
Noter que les situations de montage peuvent varier d'un module à l'autre.

Vous trouverez dans le registre «Eléments de jonction et supports/ colonnes» les éléments de jonction nécessaires ainsi que notre gamme de montants.

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

The connection elements required and the range of pedestals are depicted in the «Connection elements and supports/ columns» register.

Anbauflächen / areas de la montage / mounting areas

CS	PS	LM / LE	RM / RE	CR / RM32 / RME / RE	UG / GM / EG / SG / DG / PG
					
PMP / PMP-c	**SA**	**PME / PME-c**	**OZ**	**PEZ / PDZ**	**HM**
					

2.14 Preferred combinations to PG 16

CS 8	1 3	← direct → VP 101	1,2 1,2
CS 12	1,3	VP 111	1,2
LM 12	1	VW 305	1,2
LM 16	1	VW 305	1,2
CR 12	3	VP 101	1,2
CR 16	3	VP 101	1,2
RM 12	3	VF 400	1,2
RM 16	3	VF 403	1,2
SA-1	1 2 2	VS 503 VP 101 VP 100	1,2 1 2
SA-3	1 2 2	VP 111 VP 111 VP 151	1,2 1 2
RE-50	3	VP 111 VP 151	1 2
RME-080	1 1	VP 111 VP 151	1 2

PG 16

Beachten Sie die möglichen Anbaulagen der Module zueinander.

Erforderliche Verbindungselemente und das Ständerprogramm finden Sie im Register: «Verbindungselemente und Ständerprogramm.»

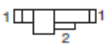
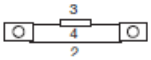
Noter que les situations de montage peuvent varier d'un module à l'autre.

Vous trouverez dans le registre «Eléments de jonction et supports/ colonnes» les éléments de jonction nécessaires ainsi que notre gamme de montants.

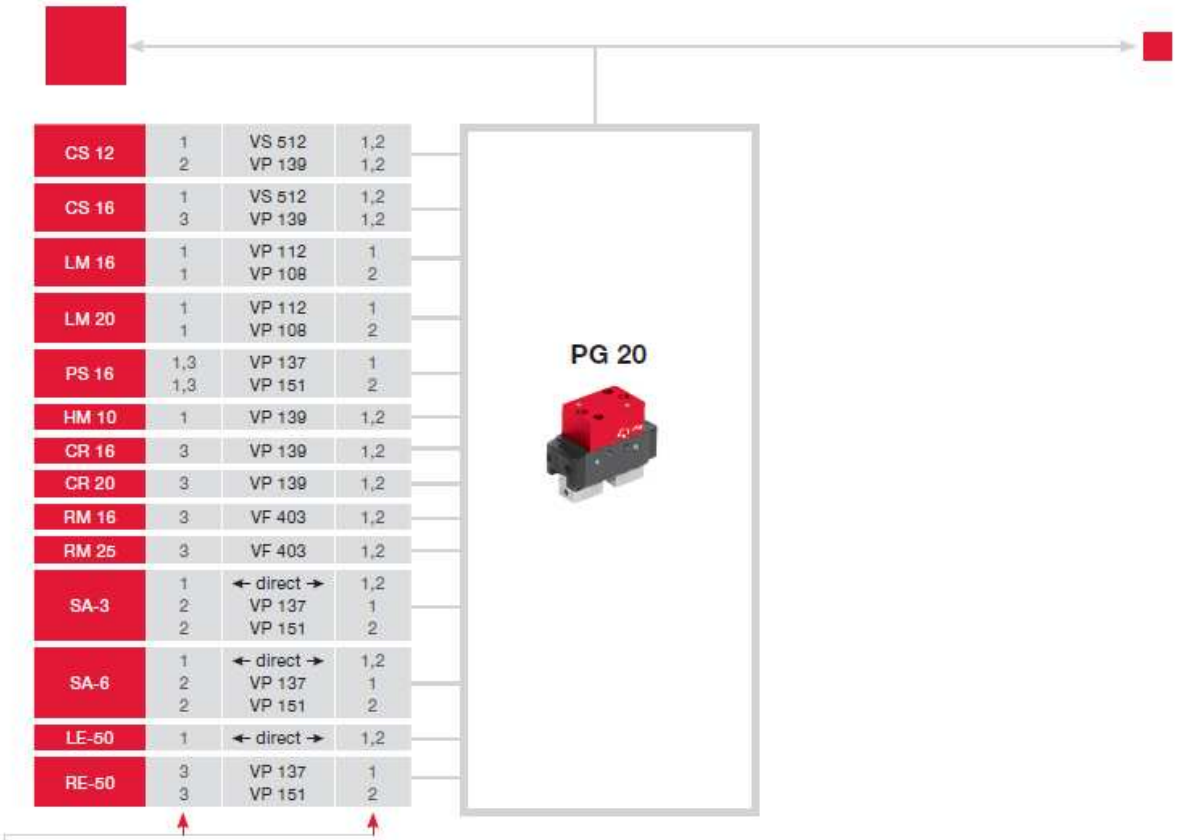
Note that there might be different mounting positions from one module to another one.

The connection elements required and the range of pedestals are depicted in the «Connection elements and supports/ columns» register.

Anbauflächen / areas de la montage / mounting areas

CS	PS	LM / LE	RM / RE	CR / RM32 / RME / RE	UG / GM / EG / SG / DG / PG
					
PMP / PMP-c	**SA**	**PME / PME-c**	**OZ**	**PEZ / PDZ**	**HM**
					

2.15 Preferred combinations to PG 20



Beachten Sie die möglichen Anbaulagen der Module zueinander.

Erforderliche Verbindungselemente und das Ständerprogramm finden Sie im Register: «Verbindungselemente und Ständerprogramm.»

Noter que les situations de montage peuvent varier d'un module à l'autre.

Vous trouverez dans le registre «Eléments de jonction et supports/ colonnes» les éléments de jonction nécessaires ainsi que notre gamme de montants.

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

The connection elements required and the range of pedestals are depicted in the «Connection elements and supports/ columns» register.

Anbauflächen / areas de la montage / mounting areas

CS	PS	LM / LE	RM / RE	CR / RM32 / RME / RE	UG / GM / EG / SG / DG / PG
PMP / PMP-c	SA	PME / PME-c	OZ	PEZ / PDZ	HM

2.16 Tightening moments for bolts

The screws to be used for assembly must at least satisfy the following conditions:

Standard: VDI 2230
Strength: class 8.8
Surface: galvanized blue, oiled or greased

Thread	Tightening moments
M2	0,3 … 0,35 Nm
M2,5	0,5 … 0,73 Nm
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

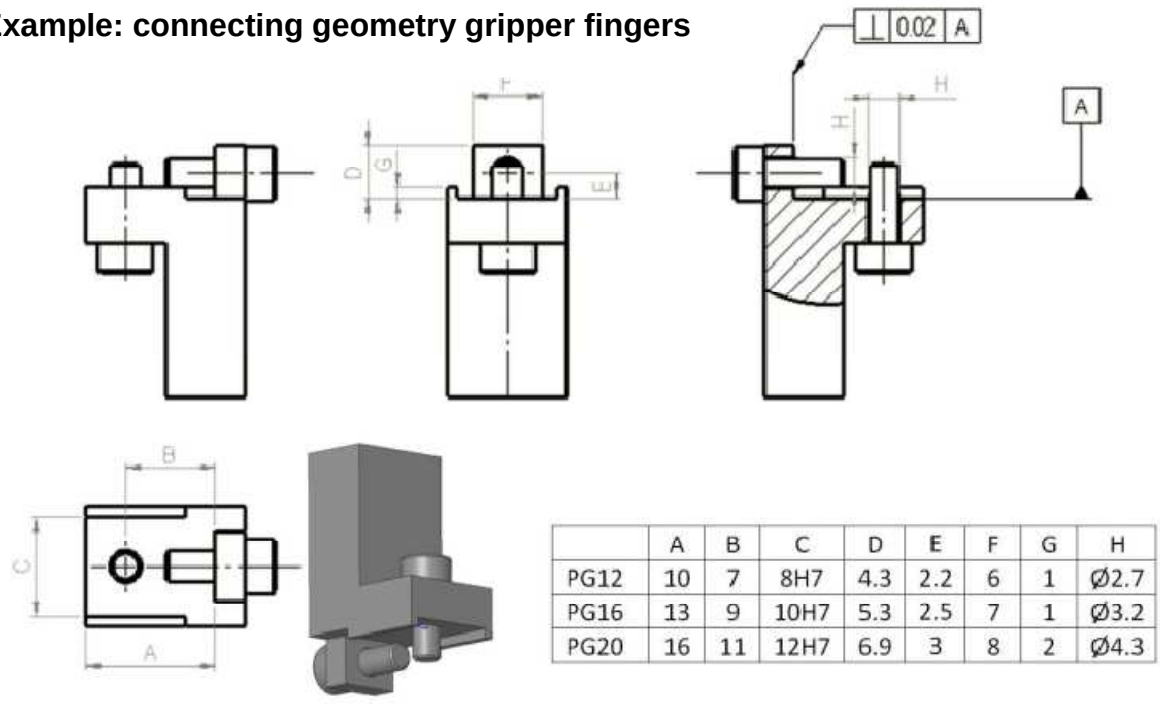
Table 1: Tightening moments for bolts

2.17 Assembly of the gripper fingers

NOTE

The gripper fingers are positioned by means of centring bushings; in addition we recommend to provide a recess or a groove on the gripper fingers to secure them against twisting
(see drawing below).

Example: connecting geometry gripper fingers



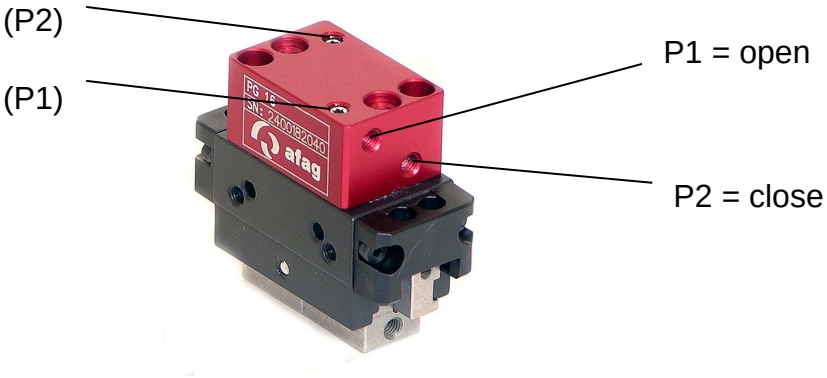
	A	B	C	D	E	F	G	H
PG12	10	7	8H7	4.3	2.2	6	1	Ø2.7
PG16	13	9	10H7	5.3	2.5	7	1	Ø3.2
PG20	16	11	12H7	6.9	3	8	2	Ø4.3

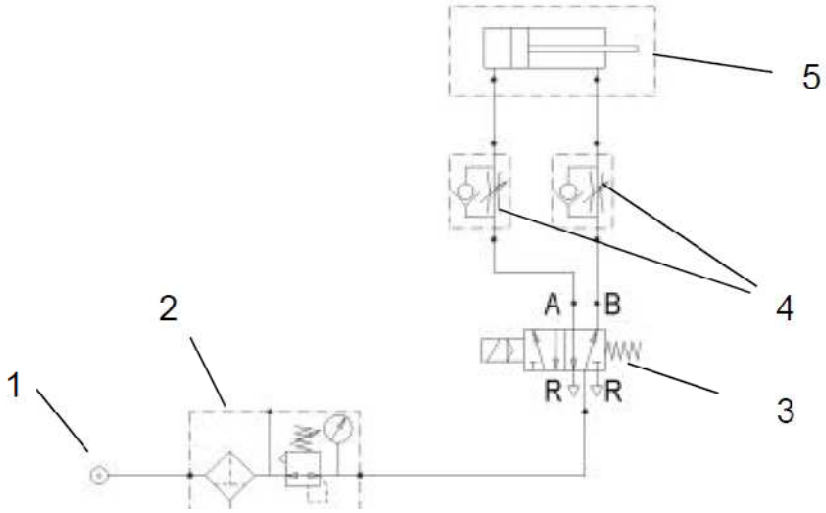
2.18 Pneumatic connection

Pneumatic diagram of the PG modules. Two pneumatic connections each are at the rear and at the sides of the base body of the PG pneumatic gripper. Please see the Technical dimensional drawings in this manual.

Operating pressure: 6 bar +/-2

NOTE	
	Please note: Close air connections which are not used air-tight before installing the module in a system. Carry out a leakage test.





1	Compressed air connection	4	One-way restrictor
2	Maintenance unit	5	Gripper (PG)
3	5/2 port directional control valve	P1/P2	Air connection

3.0 Operating Instructions

3.1 Manufacturer address: Afag Automation AG
Fiechtenstrasse 32
CH-4950 Huttwil

Sales Handling:
Tel. 0041 (0)62 959 87 02
www.afag.com

This operating manual applies to:

Product name: **Precision gripper modules PG**

Types: **PG 12**
PG 16
PG 20

This documentation was written according to:

The applicable EC Directive 2006/42/EG

Responsible person for the documentation:

Lanz Beat, PM & Marketing-Services
Afag Automation AG
Fiechtenstrasse 32
4950 Huttwil

3.2 Intended use

The PG precision gripper is used for the smooth gripping movement of loads in non-explosion hazardous ambient and operating conditions that are specified for this module (see Technical Data).

The PG precision grippers are exclusively intended for gripping useful loads (see Technical Data) which do neither impair the safety of persons nor present a danger to property and the environment. Combined with other modules they can be used as a pick&place station.

NOTE	
	Any use that exceeds the use mentioned above is regarded as improper. The manufacturer does not accept any liability for damage resulting from such use. The risk is that of the user alone.

Intended use also includes paying attention to the operating manual and observing the maintenance and repair instructions specified by the manufacturer.

⚠ CAUTION	
	The PG precision grippers may only be operated and serviced by correspondingly trained personnel who have also profound knowledge of the dangers. The applicable regulations for prevention of accidents and the other generally accepted safety-relevant and occupational safety and health regulations are to be followed.

3.2 Warranty

The PG precision grippers are designed for 40 million load changes / 2 years[1] operational performance under the ambient and operating conditions defined for this module (see “Technical Data”). Load data and design- and acceleration diagrams must be observed.

The PG precision grippers don’t have any wear parts.

The warranty includes the replacement or repair of defective module parts at Afag Automation AG.

When repairs are carried out by the customer without prior training or instruction from Afag Automation AG the warranty will become void. Any use which exceeds the intended purpose will result in the warranty becoming null and void.

Any additional claims are excluded.

3.3 Safety instructions

This operating manual should be read carefully before carrying out any activity on or with the module. The module may only be deployed in accordance with the intended use. Modifications on the module that are not described in this operating manual or have not been approved in writing by Afag are not permitted. In the case of improper changes or assembly, installation, operation, maintenance or repairs, Afag AG rejects all liability.

⚠ CAUTION	
	Connection of a control system or compressed air and operation of the PG precision grippers may lead to unpredictable movements which may result in personal injury or damage to property.

These operating instructions should be read carefully before carrying out any activity on or with the module.

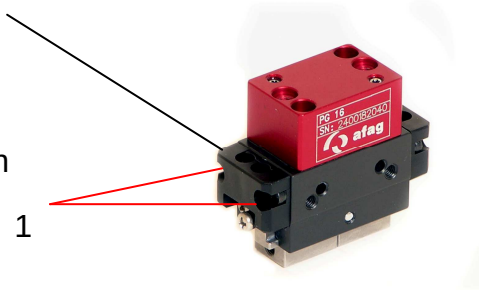
3.4 Preparation for start-up of the PG precision grippers

Attach the sensors and align them roughly when they are not under pressure.

⚠ CAUTION	
	**The PG precision grippers are precision-mechanical devices which must be transported and stored as well as operated, adjusted and assembled with utmost care.**

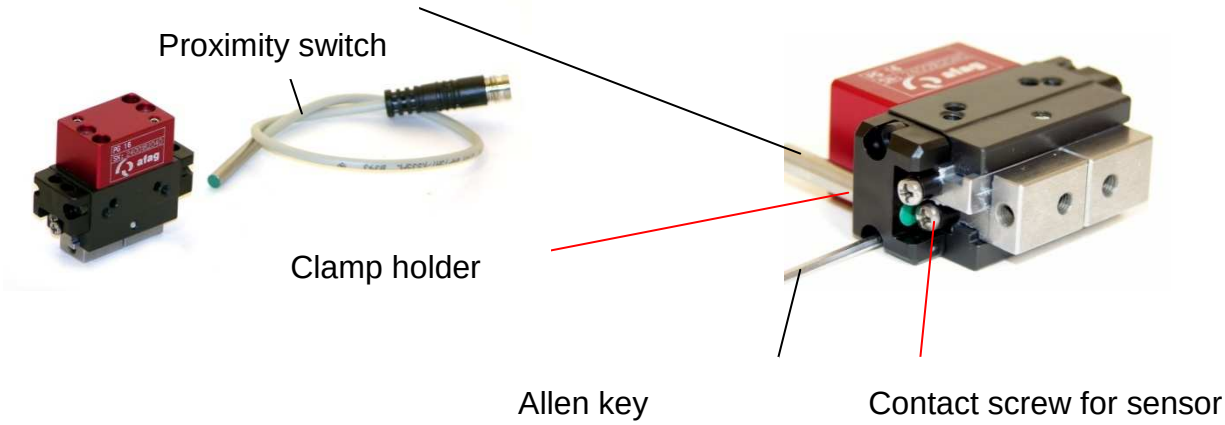
Setting the inductive sensors

- Loosen the clamping screws (1) on the holder (2)
- Mount sensor
- Tighten clamping screws (1) slightly
- Check the sensor for proper function and readjust, if necessary
- Tighten clamping screws (1)



3.5 Installation of the initiators

The opening and closing position can be checked with the initiators. The initiators can be inserted on both sides in the black pliers head (see picture). You can decide yourself on which side the initiators are to be mounted.
You can decide yourself whether the opening and closing position shall be checked.



3.6 Start-up

- Vent the total system slowly.
- Note the permissible values (see catalogue) regarding:
  - load capacity
  - motion frequency
  - moment loads on the guide system

⚠ CAUTION	
	**Limbs may be squeezed by moving components.**

- Make sure that there are no persons or tools within the operating range of the module.
- Carry out a test run.
  - At first at slow traverse speed,
  - afterwards under operating conditions.

Training

The unit may only be installed and operated by persons who are familiar with the contents of these operating instructions.

3.7 Adjustment, retrofitting

⚠ WARNING	
	The gripper fingers are moved by the electric control. If the gripper fingers cannot move freely there is danger of injuries and bruises near the add-ons. If add-ons at the PG could cause danger in connection with the gripper fingers a safe operation must be ensured.

WARNING	
	Due to the decentral controller the operator of the PG needs not to be near the product so that third persons might be endangered by the gripper operation. Always switch off the controller and disconnect the module from the compressed air supply and secure against being switched on again unintentionally when you work on the PG precision gripper. The signals of the control system may cause unintentional movements of the module which may lead to personal injuries.

3.8 Standard operation

WARNING	
	The gripper fingers are moved by the electric control. If the gripper fingers cannot move freely there is danger of injuries and bruises near the add-ons. If add-ons at the PG could cause danger in connection with the gripper fingers a safe operation must be ensured.

WARNING	
	Due to the decentral controller the operator of the PG needs not to be near the product so that third persons might be endangered by the gripper operation. Do not reach into the system during standard operation.

4.0 Maintenance Instructions

4.1 Maintenance and servicing

WARNING	
	The gripper fingers are moved by the electric control. If the gripper fingers cannot move freely there is danger of injuries and bruises near the add-ons. Observe the operating instructions of the system into which the PG precision gripper is incorporated. Maintenance and servicing may only be carried out by qualified personnel.

WARNING	
	Always switch off the controller and disconnect the module from the compressed air supply and secure against being switched on again unintentionally when you work on the PG precision gripper. The signals of the control system may cause unintentional movements of the module which may lead to personal injuries. Observe the operating instructions of the control system used.

Regular maintenance

Maintenance interval	Servicing
As required	Clean the module with a dry, lint-free cloth. The module must not be washed down; do not use any aggressive cleaners.

Table 2: Maintenance works

Further maintenance

Under the ambient conditions mentioned below the PG precision module does not require any further maintenance:

- clean workshop atmosphere
- no splash water
- no friction dust or dust from processing
- climate and temperature according to the technical data.

4.2 Maintenance

The PG precision gripper module is lubricated for life and can be operated with oiled and oil-free air.

⚠ CAUTION	
	Never operate the PG gripper module with oil-free air after it was operated with oiled air.

Air characteristics:

- Dry (free from condensation water)
- Filtered (40µm filter for oiled air)
- Filtered (5µm filter for unoiled air)

If the PG module is operated with oiled air, the oil types listed below should be used:

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

Oil quantity: 5 – 10 oil drops per 1000 l air

Viscosity range:

9 to 11 mm²/s (= cST) at 40℃, ISO-class VG 10 acco rding to ISO 3448

NOTE	
	Module inserts for ionized air environments (e.g. in case of high-voltage procedures such has corona processes) Open guides and piston rods should be covered with a grease layer to avoid formation of rust. Recommendation: Clean and grease once a month! Afag standard: - Staburax NBU8EP (flat guides) - Blasolube 301 (piston rods)

4.3 Troubleshooting

WARNING	
	The gripper fingers are moved by the electric control. If the gripper fingers cannot move freely there is danger of injuries and bruises near the add-ons. Observe the operating instructions of the system into which the PG precision gripper is incorporated.

WARNING	
	Due to the decentral controller the operator of the PG needs not to be near the product so that third persons might be endangered by the gripper operation. Always switch off the controller and disconnect the module from the compressed air supply and secure against being switched on again unintentionally when you work on the PG precision gripper. The signals of the control system may cause unintentional movements of the module which may lead to personal injuries.

Fault	Possible cause	Fault clearance
Gripper jaws do not move to the final position	Useful load too high	Reduce useful load
	Pressure too low	Increase pressure to max. 8 bar
	Module wrongly connected	Check pneumatic tubing
	One-way restrictor completely closed	Open one-way restrictor
	Module defective	Return module to Afag
Air escapes from module	Leakage of air connection	Check air connections and tighten if necessary
	Cylinder leaky	Return module to Afag

Table 3: Faults, causes, fault clearance

4.4 Spare parts

Repair of the PG precision grippers should only be carried out by Afag. There are no spare parts available.

4.5 Delivery

Number	Order No.
Centering bushings Ø4x2 mm	50332257 (PG 12)
Centering bushings Ø5x2.5 mm	50035831 (PG 16)
Centering bushings Ø7x3 mm	11016850 (PG 20)
Proximity switch INI Ø 3x16-Sn0.8-PNP-NO-M8x1	50332865 (PG 12)
Proximity switch INI Ø 4x25-Sn1.0_PNP-NO-M8x1	11016714 (PG 16 / PG 20)

Table 4: Accessories

4.6 Disassembly and repair

When the module is damaged it can be returned to Afag Automation AG for repair.

⚠ CAUTION

Switch off and secure the control system before the PG precision gripper is removed out of the system.

Disconnect the cables only after the control system was switched off.

NOTE

If the module turns out to be faulty during the guarantee it must be returned to Afag for repair.
Afag Automation AG offers a reliable repair service.
Please note that Afag does not guarantee for modules which were not repaired by the Afag Automation AG.

4.7 Disposal

NOTE	
	PG precision modules which cannot be used any more must not be disposed of as a complete unit, but must be disassembled and re-cydled according to the type of material. Materials than cannot be recycled must be disposed of in accordance with the legal regulations.

5.0 Appendix

5.1 List of figures

5.2 List of tables

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