

ELECTRIC PARALLEL GRIPPER MEG 40 EC AND CONTROLLER MEG C 40



Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

Kindest Regards,

Your SCHUNK GmbH & Co. KG
Precision Workholding Systems
Bahnhofstr. 106 - 134
D-74348 Lauffen/ Neckar

Tel. +49-7133-103-2503
Fax +49-7133-103-2189
automation@de.schunk.com
www.schunk.com

Document last updated: 12.06.2007



Contents

1	SAFETY	3
1.1	SYMBOL KEY	3
1.2	APPROPRIATE USE.....	3
1.3	SAFETY NOTES	3
2	WARRANTY	5
3	SCOPE OF DELIVERY	5
4	MEG 40 EC (GRIPPER)	6
4.1	TECHNICAL DATA	6
5	ASSEMBLY AND DIMENSIONS	7
5.1	PIN ASSIGNMENT	8
5.2	MAINTENANCE AND CARE	9
5.3	RESPONSE TO MALFUNCTIONS	9
5.4	ASSEMBLY DRAWING AND BILLS OF MATERIALS	10
6	MEG C 40 (CONTROLLER)	11
6.1	TECHNICAL DATA	11
6.2	ASSEMBLY AND DIMENSIONS	12
6.3	TERMINAL ASSIGNMENT	13
6.4	COMMISSIONING AND FUNCTION DESCRIPTION	13
6.4.1	<i>Notes on Commissioning</i>	13
6.4.2	<i>Description of MEG 40 EC and MEG C 40 Connections</i>	14
6.4.3	<i>Carrying out a Reference Movement</i>	15
6.4.4	<i>Positioning Mode</i>	16
6.4.5	<i>Power Mode</i>	18
6.4.6	<i>External Reset</i>	18
6.4.7	<i>Analog Preset Values</i>	18
6.4.8	<i>Example of a Possible Gripping Cycle</i>	22
6.4.9	<i>Function Overview Table</i>	24
6.5	RESPONSE TO MALFUNCTIONS	25
7	MANUFACTURER'S DECLARATION	26
8	INDEX	27
9	CONTACT	28

1 Safety

1.1 Symbol Key



You will find this symbol wherever **hazards for persons** or **damage to the product** are possible.



This symbol indicates **important information** on the product or its handling.

1.2 Appropriate Use

The unit must only be used within the scope of its technical data. Appropriate use also includes compliance with the conditions the manufacturer has specified for commissioning, assembly, operation, the environment and maintenance. Using the unit with disregard to even a minor specification will be deemed inappropriate use. The manufacturer assumes no liability for any injury or damage resulting from inappropriate use.

The electric two-finger parallel gripper is an interchangeable device for machines or systems in the manufacturing, packaging and laboratory industries. The gripper has been designed for form-fit gripping, secure holding and releasing of workpieces.

If the unit is used as a direct guide aid or holding mechanism, e.g. for lasers, drills, cutters or other similar tools, this will be deemed inappropriate use. Furthermore, the gripper is also not a pressing tool.

All uses which differ from that of the functions of gripping, holding or releasing an object are therefore to be viewed as misuse.

1.3 Safety Notes








The gripper has been built according to the level of technology available at the time of delivery and is safe to operate. However, the gripper may still be dangerous if, for example:

- the gripper is used, assembled or maintained inappropriately.
- the gripper is used for purposes other than those it is intended for.
- The EC Machine Directive, the accident prevention regulations, the VDE guidelines, or the safety information and assembly notes are not adhered to.

All persons responsible for assembly, commissioning and maintenance of the unit are obliged to have read and understood all the operating instructions, in particular Chapter 1 on "Safety". We recommend that the customer have this confirmed in writing.

The installation and deinstallation, assembly of the proximity switches, connection and commissioning may only be carried out by authorised, appropriately trained personnel.

Modes of operation and work methods that adversely affect the function and/or the operational safety of the gripper are to be refrained from.

-  Do not move any parts manually when the energy supply is connected.
-  Do not touch the mechanics when they are uncovered and do not reach between the gripper fingers.
-  Always disconnect the power supply lines during assembly, conversion, maintenance and adjustment work.
-  Carry out maintenance, conversion and add-on work outside of the hazard zone.
-  During assembly, connection, adjustment, commissioning and testing, it is imperative to exclude the possibility that the fitter or any other person could accidentally activate the unit.
-  When using handling modules, protective covers must be used in accordance with the EC Machine Directive, Point 1.4.
-  Risks could arise due to objects falling or being thrown out. Measures must be taken to prevent potentially dangerous objects (processed workpieces, tools, chippings, fragments, waste etc.) from falling or being thrown out.

Additional holes, threads or attachments which are not supplied as accessories by SCHUNK may only be applied after obtaining the prior consent of SCHUNK.

The maintenance and servicing intervals must always be adhered to. The intervals indicated refer to a standard working environment. Operating the gripper in an environment in which it is subjected to abrasive dusts or corrosive and/or aggressive vapours and/or liquids requires the prior consent of SCHUNK.

The gripper must be programmed so that it travels the complete stroke at least once every day.

The EMC guidelines must be adhered to when connecting the motor and the controller.

When in operation, the gripper has moving or rotating parts, as well as hot surfaces **up to 110°C!** – The gripper can therefore pose a threat to human life.

To avoid serious injury or considerable damage to property, it is important that only qualified persons, who are familiar with electrical drive equipment and with the setup, assembly and placing into operation of servo drives, work on the devices. These persons must read the operating manual carefully and observe the safety information before installing and placing into operation.

(Cf. IEC 364 or CENELEC HD 384 or DIN VDE 0100 and IEC report 664 or VDE 0110 and national accident prevention regulations or VBG 4.)

Repairs on the servo-electric gripper may only be performed by the manufacturer or by repair shops authorised by the latter.
Unauthorised opening and inappropriate tampering can lead to injury and/or damage to property.

The technical data is set out in the documentation and should be strictly adhered to.

The gripper must be protected against impermissible loads. In particular, no components may be bent during transport and handling and no insulation distances shall be changed.

Servo-electric grippers contain electrostatically endangered components which can easily be damaged as a result of improper handling. Electrical components must not be mechanically damaged or destroyed.

The gripper has a servo drive. The national accident prevention regulations (e.g. VG 4) must be observed when working on energised servo drives.

The electrical installation must be carried out in adherence to the pertinent regulations (e.g. conductor cross-section, fuse protections, protective conductor connection). Information going beyond this is contained in the documentation.

Electronic devices are generally not fail-safe. In case the device fails, the user himself is responsible for placing the drive into a safe condition.



If the servo drive is used for special applications (e.g. areas subject to risk of explosion), the relevant standards and requirements (e.g. EN 50014 and EN 50018) must be complied with without fail.

Above and beyond that, the safety and accident prevention regulations in force at the location of use also apply.

2 Warranty

The warranty period is 24 months after delivery date from the production facility, provided that the unit was used appropriately with one (1) shift operation and that the specified maintenance and lubrication intervals were observed. Components that come into contact with workpieces and wearing parts are never included in the warranty. In this context, please also see our General Terms and Conditions. These can also be found on our website www.schunk.com under "Service"/"General Business Terms".

3 Scope of Delivery

The scope of delivery of an MEG 40 EC consists of:

- MEG 40 EC (without top jaws)
- Enclosed pack (centering sleeves)

The scope of delivery of an MEG C 40 consists of:

- MEG C 40

The following accessories must be ordered separately (see catalog):

- Various connection cables
- Top jaws

4 MEG 40 EC (gripper)

4.1 Technical Data

Product designation	MEG-EC
ID No.	306 008
Stroke per finger [mm]	6 mm
Gripping force *	50 N
Workpiece weight (recommendation) **	0.25 kg
Power supply (nominal range)	Supply from MEG C 40
Current input	Input from MEG C 40
Minimum opening time with 6 mm stroke	0.62 s
Minimum closing time with 6 mm stroke	0.62 s
Weight	0.47 kg
Max. finger length	40 mm
Repeat accuracy ***	0.02 mm
Jaw play (hysteresis) ****	0.84 mm

Table 1: Technical data for MEG 40 EC

* The gripping force is the arithmetic total of the individual forces occurring on the claw jaws at distance P = 20 mm

** Values for friction coefficient $\mu = 0.1$ and safety factor $v = 2$. The values might be increased in the event of form-fit clamping.

*** Spread of the mechanical limit positions after 100 consecutive strokes.

**** Mechanically inherent backlash of the base jaws.

Minimum adjustable force on the workpiece to be gripped <35 N.

The airborne sound emitted from the unit is ≤ 70 dB(A)

A controller is needed to operate the gripper. We can provide the MEG C 40 (ID No. 307 004) for this purpose.

Please consult our catalog for further technical details. The latest version is valid in each case (in accordance with General Terms and Conditions document in chapter 2.3)

Please check whether your individual case has been reviewed using the calculation program for grippers (SSG). If not, liability will not be accepted. (The calculation program is available free of charge at: www.schunk.com > Service > Downloads)

5 Assembly and Dimensions

The gripper is mounted at the base or side using M5 threads. Centering is carried out using the centering sleeves supplied with the enclosed pack.

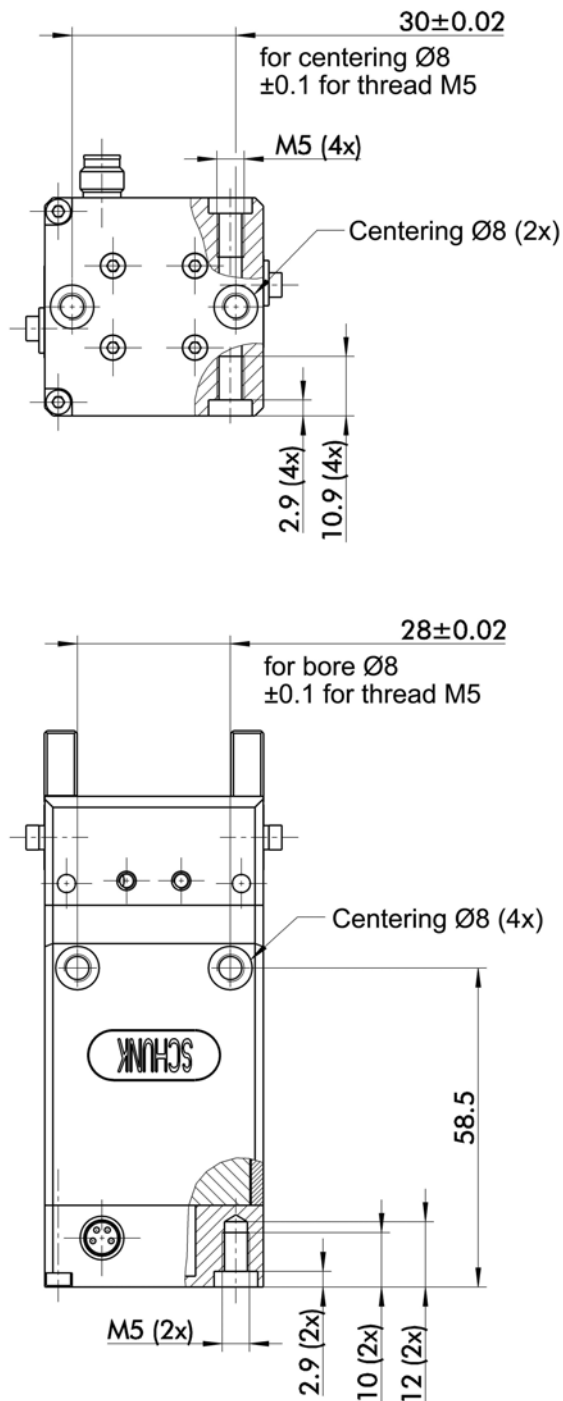


Fig. 1: Connecting dimensions for MEG 40 EC

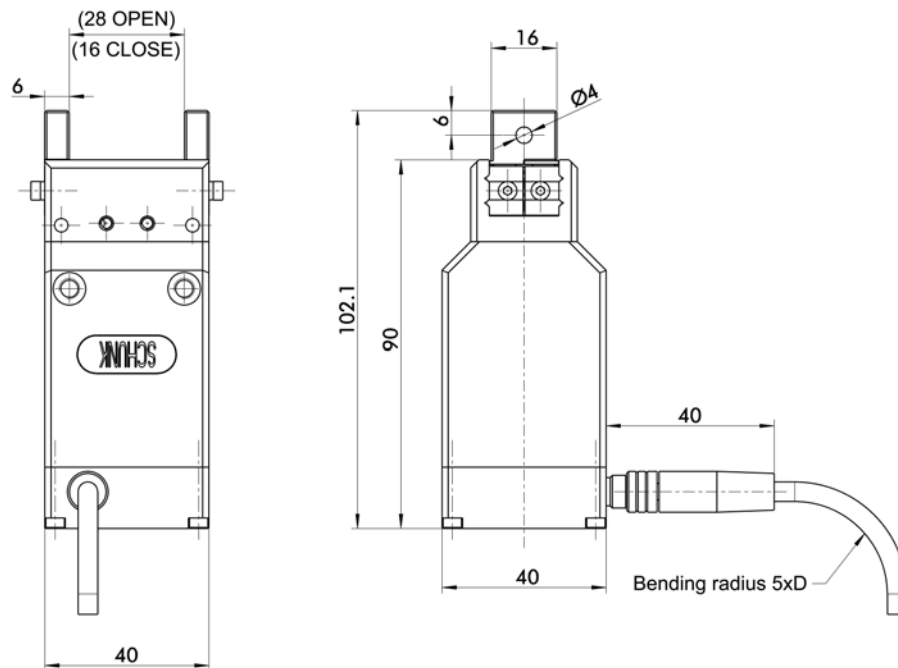
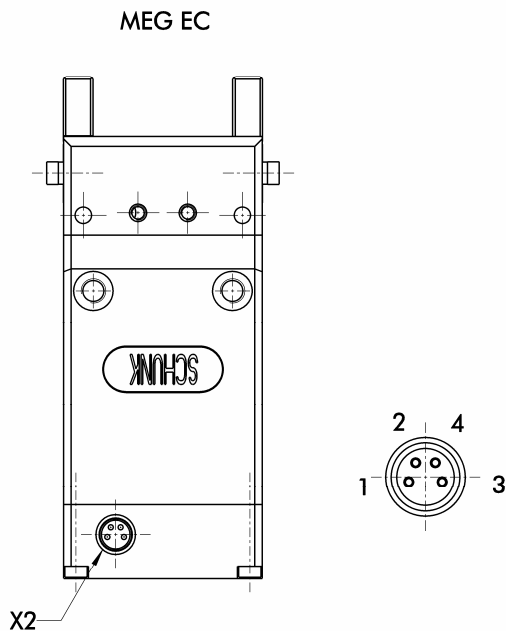


Fig. 2: MEG 40 EC dimensions (bending radius 5xD applies to Schunk connecting cable)

5.1 Pin Assignment



Pin assignment for X2 connector

Pin	Function
1	Connection 1 motor
2	Connection 2 motor
3	Connection 3 motor
4	Connection 4 motor

Table 2: Pin assignment for X2 connector

Fig. 3: X2 connector on the MEG 40 EC

5.2 Maintenance and Care

The base jaws and the guides in the housing are aligned with each other. To replace these parts, send the complete gripper to SCHUNK together with a repair order.

Please observe the following instructions to ensure correct functioning of the gripper:

1. The gripper must be programmed in such a way that it moves through a complete stroke at least 1x per day.
2. Bare external steel parts must be oiled or greased.
3. The gripper must be serviced every 2 million cycles. During maintenance work, certain parts must be fitted with oil or grease (basic greasing).
All metal slides must be treated with Molykote® TP42 (e.g. from Föhnle Technic GmbH or DOW CORNING GmbH) or a comparable lubricant.
4. If no other regulations apply, all bolts and nuts must be secured with Loctite No. 243 and tightened to a torque that conforms to DIN.
5. Do not expose the gripper to drilling emulsions.
6. Only operate the gripper at an ambient temperature of between +5 °C and +55 °C.
7. Note the bending radii when laying the cable. Torsion movements must be ruled out.
8. Gripping force repeat accuracy: $\pm 30\%$

The initial starting torque can differ greatly from gripper to gripper.

In the event that a gripper is changed, the initial starting torque must be determined with the master control device during start-up!

5.3 Response to Malfunctions

The gripper does not complete a full stroke:

- Remove dirt between the base jaws and the guide

The gripping force is decreasing:

- Clean the gripper and lubricate it again

The gripper opens or closes in jolts:

- Clean the gripper and lubricate it again

5.4 Assembly Drawing and Bills of Materials

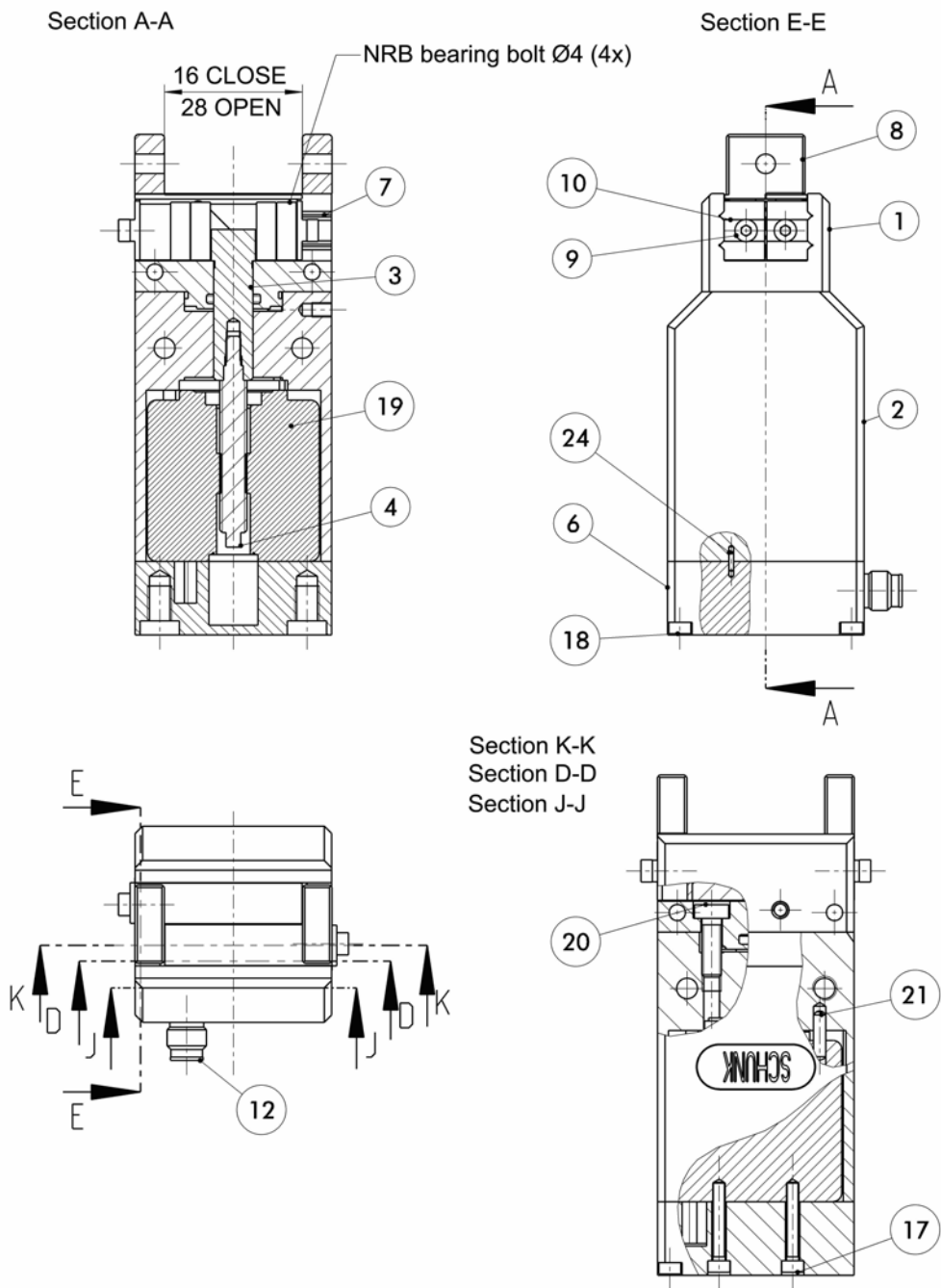


Table 3: Assembly drawing and sectional diagram of MEG 40 EC

Item	ID No.	Quantity	Designation	Wearing part
1	5515749	1	MEG 40 cover	
2	5515750	1	MEG 40 housing	
3	5515752	1	MEG 40 piston rod	
4	SNT007537	1	MEG 40 spindle	
6	5515746	1	MEG 40 base	
7	9632030	4	Roller cage AC 2 x 7 x 28	
8	5509834	2	MPG 40/KGA finger	
9	9982012	4	DIN 912/A2 M 2.5 x 6 mm bolt	
10	9646122	4	Bracket with collar, MPG 40	
12	9939532	1	4-pin connector, M8x1	
17	9935305	4	DIN 912/A2 M 2.5 x 16 mm bolt	
18	9935305	4	DIN 912/A2 M 2.5 x 16 mm bolt	
19	SNT007535	1	HSI 35F4J-05-001 motor	
20	9661500	2	DIN 6912/A2 M 4.0 x 12 mm bolt	
21	9682007	2	DIN 6325 3.0 M6 x 10 mm cylindrical pin	
42	9939728	2	DIN 6325 1.0 M6 x 4 mm cylindrical pin	
99	5515767	1	MEG 40 enclosed pack	
100	9941195	1	MEG 40 EC aluminum plate	

Table 4: Bill of materials for MEG 40 EC

6 MEG C 40 (controller)

6.1 Technical Data

Product designation	MEG C 40
ID No.	307 004
Power supply	24 VDC ±2%
Current input	Max. 1.5 A
Weight	0.3 kg
Protection class	IP 30
Nominal temperature range	-10 °C to 65 °C
Adjustment options	Force adjustment Closing and opening time (speed) Stroke adjustment
Interfaces	Digital/analog I/Os

Table 5: Technical data for MEG C 40

6.2 Assembly and Dimensions

The MEG C 40 controller is secured by means of the metal foot locking device to a mounting rail to EN 50022.

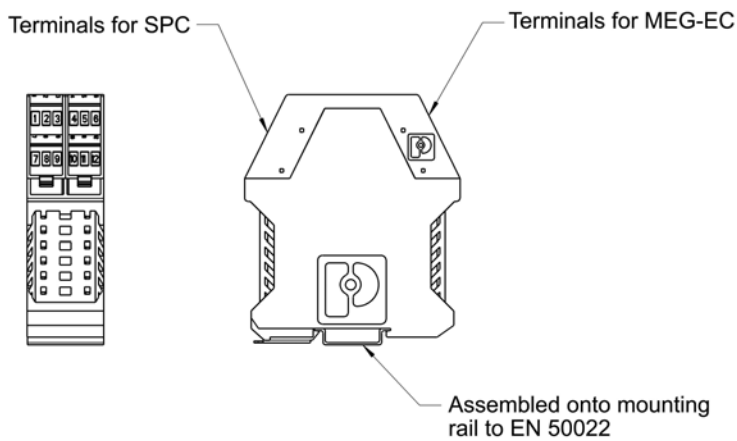


Fig. 4: Securing of MEG C 40

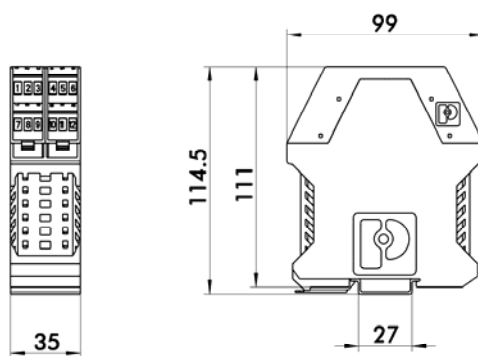


Fig. 5: MEG C 40 dimensions

6.3 Terminal Assignment

Terminal	Function	Other information	Cable color
1	Connection 1 motor	Connection for MEG 40EC	Blue
2	Protection (gripper connection cable (PE))	Connection for MEG 40EC	
3	Connection 2 motor	Connection for MEG 40EC	Black
4			
5			
6	GND for position output	GND analog output	
7	Connection 3 motor	Connection for MEG 40EC	Brown
8			
9	Connection 4 motor	Connection for MEG 40EC	White
10	Supply (+24 V)	24 VDC $\pm 2\%$	
11	External reset	Digital input	
12	Supply (GND)	GND	
13	Gripper stopped	Digital output	
14	Reference movement carried out	Digital output	
15	Analog position output (0–5 V)	Analog output	
16	24 V SPC	24 VDC $\pm 10\%$	
17	GND SPC	GND, potential from SPC	
18	Target position reached	Digital output	
19	Reference movement	Digital input	
20	Gripper close	Digital input	
21	Gripper open	Digital input	
22	Analog input, speed	0 V–10 V (to GND SPC)	
23	Analog input, steps	0 V–10 V (to GND SPC)	
24	Analog input, force	0 V–10 V (to GND SPC)	

Table 6: Terminal assignment for MEG C 40

6.4 Commissioning and Function Description

6.4.1 Notes on Commissioning

The control cable must have no voltage supply when being connected to the gripper. The relevant workpiece should then be gripped in “Power movement” mode.

The voltage to the input “Analog input, steps” [terminal 23] must correspond with the distance from the current position which you want to use for pre-positioning. The gripper moves inwards/outwards by the set distance when triggered by a rising edge at the “Gripper open” and “Gripper close” inputs. “Target pos. reached” output is monitored. Pre-position reached → output emits a high signal.

The gripper is pre-positioned in “Positioning movement” mode; the workpiece is then gripped in power mode.

- The gripper can be pre-positioned once more and the gripping cycle can begin again.

6.4.2 Description of MEG 40 EC and MEG C 40 Connections

The MEG 40 EC carries out one 6 mm stroke for each jaw. The stroke, force and speed can be adjusted by means of analog inputs or potentiometers on the external controller, MEG C 40. Gripper functions, such as opening, closing and reference movement, are specified via uncoupled digital inputs on the MEG C 40 controller. Status signals from the external MEG C 40 controller are reported to the master control device (e.g. SPC) via digital outputs. The current position is reported in the form of an analog value.

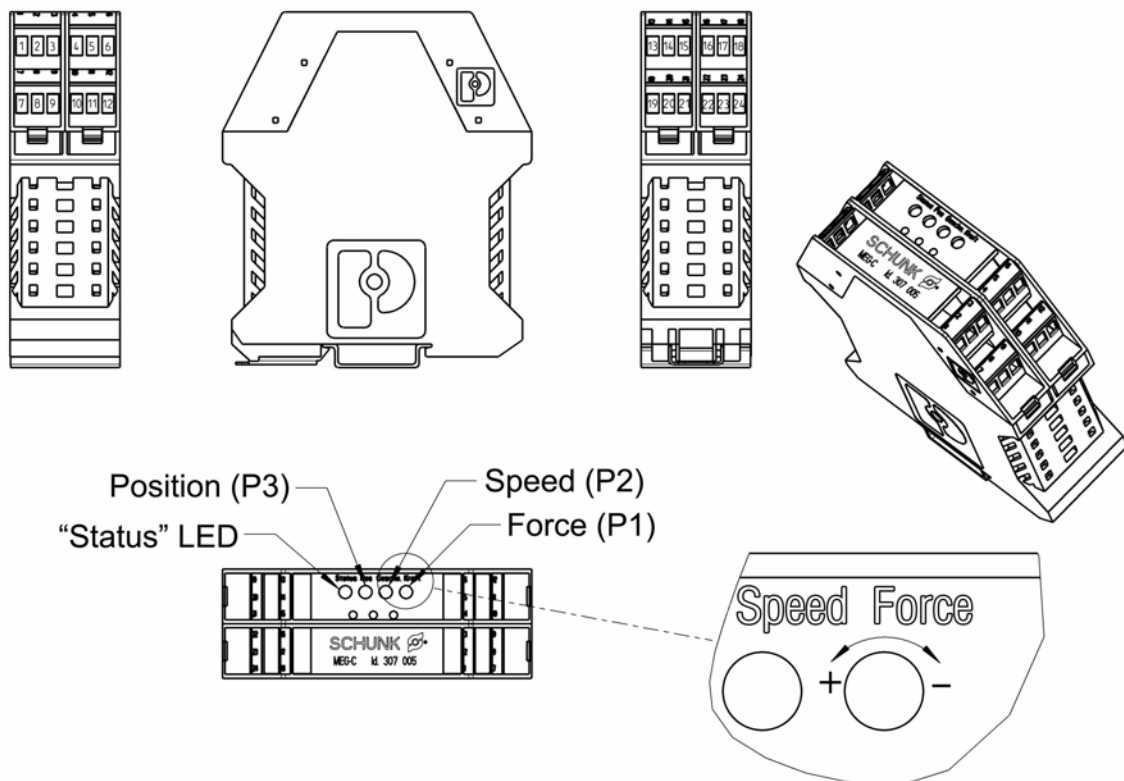


Fig. 6: MEG C

The external MEG C 40 controller for controlling the MEG 40 EC gripper has three potentiometers:

- P1: Adjusting the gripping force
- P2: Adjusting the gripping speed
- P3: Adjusting the movement distance/the position (incremental input of relative value)

Each potentiometer is assigned a measuring jack from which the set voltage can be used for measuring.

The “Status” LED provides information on possible controller operating statuses and helps with troubleshooting in the event of an error. The possible causes of errors which can be displayed by the LED are listed in the Troubleshooting chapter (see Table 9).

The MEG C 40 controller ([terminals 1, 3, 7, 9]) is connected to the MEG 40 EC gripper’s X2 connector via a 4-pole control cable. We can provide pre-assembled control cables for this purpose (see Accessories section in the catalog).

The allocation of the other inputs/ outputs and the power supply systems is shown in the terminal assignment (see Table 6).

The following terminals, as a minimum, must be connected in order to operate the MEG C 40 with the MEG 40 EC:

- Supply voltage [terminals 10 and 12]
- Supply voltage for the digital I/Os [terminals 16 and 17]
- MEG 40 EC gripper connection [terminals 1, 3, 7, 9]
- Digital inputs “Gripper open” [terminal 21] and “Gripper close” [terminal 20]

The other inputs and outputs are to be assigned depending on the application/ usage. After connecting the supply voltage the status LED flashes 6 times and then lights up permanently. The MEG C 40 controller is then operational. If the status LED flashes constantly after the MEG C 40 is switched on, this means that an error has occurred and the troubleshooting information must be followed (see Table 9).

A new command is always carried out with a rising edge on the digital inputs. The command is ended with a falling edge. Further details can be found in **Table 8:Function table for MEG C** (see page 24). When a command is being carried out please ensure that the input signal does not bounce.

The gripper opens when a rising edge is detected on the “Gripper open” input. In the event of a falling edge the command ends and the gripper is stopped. This works in exactly the same way for the “Gripper close” input. It is necessary to end the previous command with a falling edge before a new command is carried out. It is therefore imperative to ensure that the previous command has been ended by a falling edge.

6.4.3 Carrying out a Reference Movement

The reference movement is only necessary if the analog output “Analog position output” [terminal 15] is to be used in the application. A reference movement can be carried out inwards or outwards.

Procedure

- Apply a high signal at the digital input “Reference movement” [terminal 19]
- For an outwards reference movement, apply a high edge at the digital input “Gripper open” [terminal 21]
- For an inwards reference movement, apply a high edge at the digital input “Gripper close” [terminal 20]
- Wait until the digital output “Reference movement carried out” [terminal 14] is set to high
- After the reference movement has been carried out set the “Reference movement” and “Gripper open”/ “Gripper close” inputs to a low signal.

After the reference movement has been carried out a high signal will be emitted from the digital output "Reference movement carried out" [terminal 14]. The high level will remain at the output until the power supply is switched off, the external reset is actuated or a new reference movement is triggered.

6.4.4 Positioning Mode

We recommend that the claw jaws be pre-positioned in order to ensure an economical cycle time in an automation process. This means that the gripper is moved to a position which is slightly "larger" (for O.D. gripping) or "smaller" (for I.D. gripping) than the workpiece to be gripped. The "positioning mode", i.e. step mode is used for this. The distance to be covered by the gripper from its current position in an "open" or "close" direction is preset in this mode by means of an "Analog input, position" [terminal 23] or by the "Pos." potentiometer [potentiometer P3].

This means that the stroke traveled by the gripper is dependent upon the analog voltage at the input or on the potentiometer. This analog value must be applied before carrying out the "Gripper open" or "Gripper close" commands.

If the gripper hits a limit position or a workpiece in positioning mode, the current movement command will be reset and the gripper stops. In this case the digital signal "Gripper stopped" [terminal 13] is reported to the master control device whereas the "Target position reached" signal [terminal 18] is not. The MEG 40 EC achieves a relative positioning accuracy of 0.1 mm. This refers to the accuracy with which one stroke, preset by means of the potentiometer or analog input, is traveled from the current position provided no step losses occur as a result of the claw jaws colliding with a workpiece or a similar object.

Procedure

- The distance to be covered by the gripper is preset at the "Analog input, position" [terminal 23] or at the "Pos." potentiometer [potentiometer P3] → (preset distance applies from the current position)
- The analog values Speed ("Analog input, speed" [terminal 22] or potentiometer "Speed" [potentiometer P2]) and Force ("Analog input, force" [terminal 24] or potentiometer "Force" [potentiometer P1]) must also be applied before the command is carried out (the required values are shown in the "Analog inputs" section)
- A rising edge on one of the two digital inputs "Gripper open" [terminal 21] or "Gripper close" [terminal 20] is used to move toward the new gripping position by the specified value
- During this process the digital output "Gripper stopped" [terminal 13] is changed to low
- The gripper movement can be measured via the output "Analog position output"
- After the positioning movement has been successfully carried out a high signal is emitted from the output "Target position reached" [terminal 18] and the digital output "Gripper stopped" [terminal 13]

After a positioning movement has been carried out successfully a high signal will be emitted from the output "Target position reached" [terminal 18]. Successful completion of a positioning movement means that the gripper was able to complete the movement stroke which was preset by means of an analog value. When the next movement command is specified, a low signal is again emitted from the output.

The output "Analog position output" [terminal 15] always issues the current gripper position in the form of an analog value after the reference movement has been carried out.

Fig. 7 shows the relationship between the output voltage and the position of the gripper.

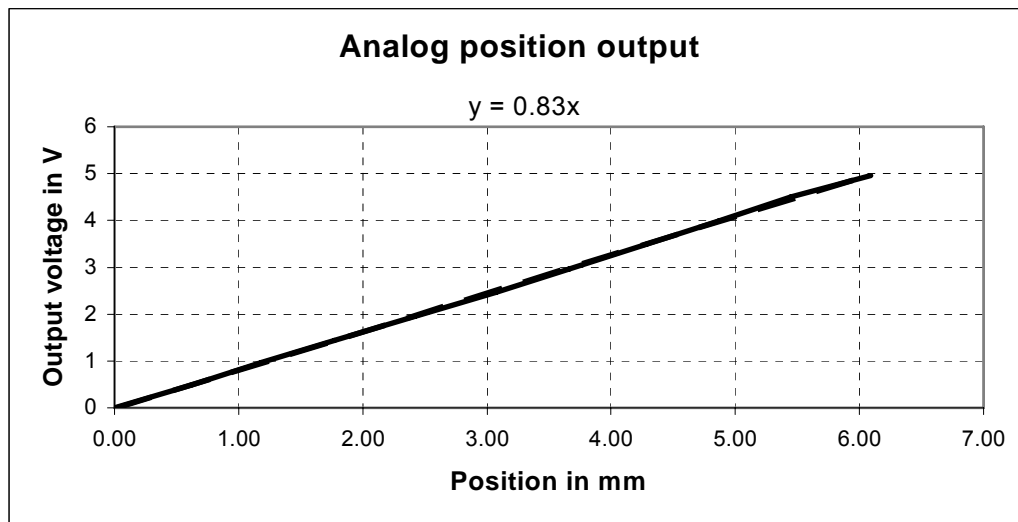


Fig. 7: Relationship between the analog position output [terminal 15] and the position of the gripper

Please note that the position could drift due to step losses. To counteract drifting, we recommend carrying out another reference movement before the deviation becomes too large for the application.



If more exact measurements are needed, we recommend that the analog output voltage be “adjusted” once (this cannot prevent a position output drift):

Procedure

- Carry out the reference procedure for gripper “inwards” or “outwards”
- Insert gauge blocks corresponding to the gripping positions adopted later
- Open or close gripper
- Measure the output voltage for each gauge block and use as the reference voltage for the particular position

During gripper operation in this facility, these reference voltages can then be compared with the analog output signal “Position output” [terminal 15] (e.g. to start further actions). Depending on the accuracy required, referencing must be repeated every x cycles because of the position output drift (high signal at “Reference movement” [terminal 19] + high edge at “Gripper open” [terminal 21] or “Gripper close” [terminal 20]). If a high level of accuracy of the output “Analog position output” is required, we recommend carrying out a reference movement prior to each gripping cycle.

(x must be determined experimentally in the application)

6.4.5 Power Mode

In order to grip a workpiece securely, we recommend that the gripping procedure be carried out in "Power movement" mode.

Procedure

- The voltage to the input "Analog input, steps" [terminal 23] and at the "Pos." potentiometer [potentiometer P3] must be set to 0 V
- The analog values for speed ("Analog input, speed" [terminal 22] or potentiometer "Speed" [potentiometer P2]) and for force ("Analog input, force" [terminal 24] or potentiometer "Force" [potentiometer P1]) must be set to the value specific to the application (the required values are shown in the "Analog inputs" section)
- A rising edge on the digital inputs "Gripper open" [terminal 21] or "Gripper close" [terminal 20] causes the gripper to open or close with the preset force. While the gripper fingers are moving, the digital output "Gripper stopped" [terminal 13] emits a low signal.
- If the gripper reaches the workpiece stop, the "Gripper stopped" output [terminal 13] emits a high signal. However, power is still supplied to the gripper.
- The workpiece continues to be gripped securely until the signal is reset by a falling edge on the inputs "Gripper open" [terminal 21] or "Gripper close" [terminal 20].

6.4.6 External Reset

When a rising edge, followed by a falling edge, is applied at the "Reset" input, a reset is carried out in the internal microprocessor. This means that the gripper shuts down immediately and all the outputs are reset. The next command received will then be carried out as normal.

6.4.7 Analog Preset Values

The analog values can either be preset by the SPC or they can be set directly using the gripper control system. Settings on the gripper control system are made via the potentiometers which can be accessed on the top side of the MEG C 40 controller housing. The analog voltages which are set via the potentiometers can be measured using the relevant measuring jacks.

The preset potentiometer values are ignored if analog voltages (level > 0.2 V) are applied at the relevant gripper control system inputs (terminal 22, 23, 24).

If the analog values are to be set via the gripper control system (potentiometers), then there must be no voltage at the external analog inputs (if possible, connect the inputs to GND).

If the analog voltages are specified by the SPC, we recommend that the internal analog voltages be set to 0 V at the potentiometers.

External (via SPC) and internal (via the potentiometers) presets can also be combined. For example, if the positioning movement is to be automated in a process and the force and the gripping speed remain unchanged, then these two values can be set in the electronics via potentiometers and the value for the position is preset separately by the control system (SPC).

With external voltage presetting it is possible that the presets for steps, force and speed also change in the event that the voltage values are slightly changed. It must be ensured that the voltage values do not change (unintentionally) to a degree that the gripping procedure could cause damage to the workpiece.

5.4.6.1 Gripping Speed - Presets

The illustrations below depict the relationship between the speed and the input voltage of the external input "Speed" [terminal 22] or of the potentiometer "Speed" [potentiometer P2].

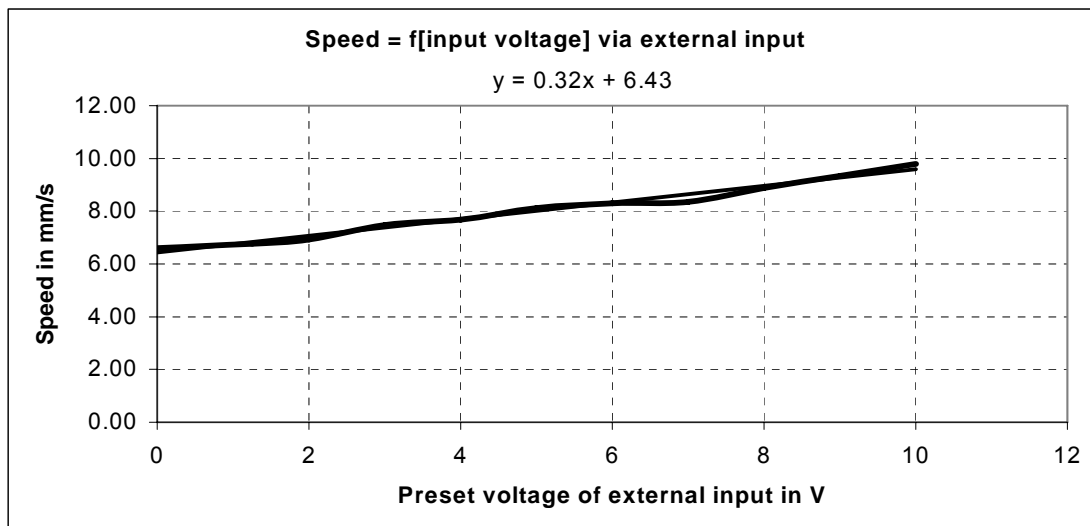


Fig. 8: Speed in relation to the external analog input "Speed" [terminal 22]

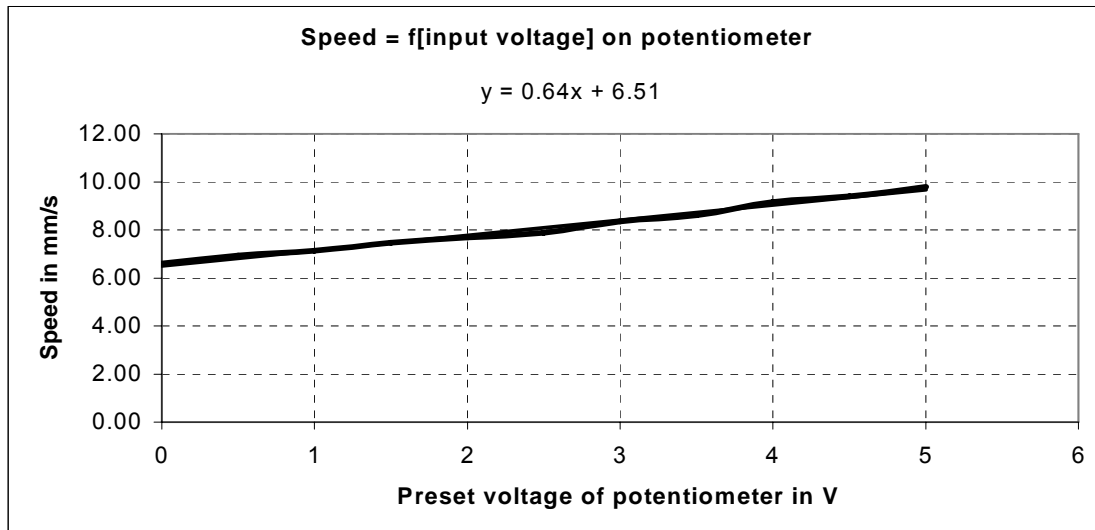


Fig. 9: Speed in relation to the input voltage at the “Speed” potentiometer [potentiometer P2]

5.4.6.1 Step - Presets

As explained in section 6.4.4 “Positioning Mode”, the distance to be covered by the gripper from its current position in an “open” or “close” direction is preset by means of an “Analog input, position” [terminal 23] or by the “Pos.” potentiometer [potentiometer P3]. This means that the stroke traveled by the gripper is dependent upon the analog voltage at the input or on the potentiometer. This analog value must be applied before carrying out the “Gripper open” or “Gripper close” commands.

Fig. 10 illustrates the relative movement distance when the input voltage is preset at the analog input “Steps” [terminal 23].

Fig. 11 illustrates the relative movement distance when the voltage is preset via the “Pos.” potentiometer [potentiometer P3] on the MEG C 40 controller.

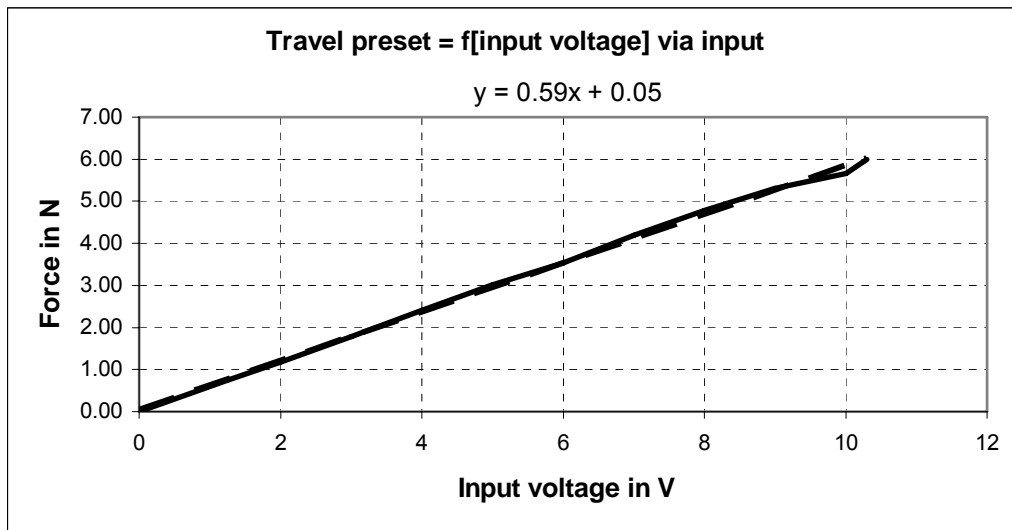


Fig. 10:Relative movement distance when analog voltage is preset on [terminal 23]

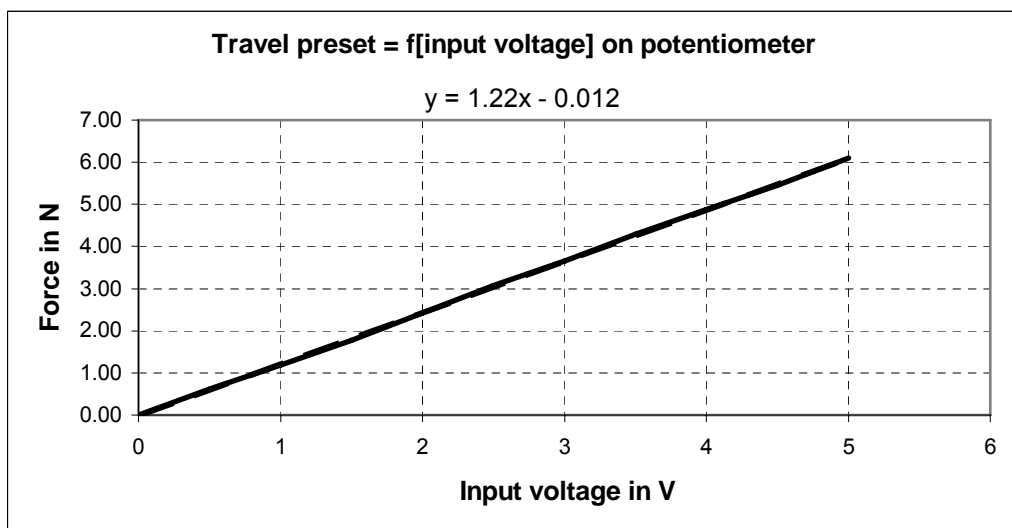


Fig. 11:Relative movement distance when analog voltage is preset via “Pos.” potentiometer [P3]

5.4.6.3 Gripping Force - Presets

Depending on the system (e.g. due to friction in the gripper and stepper motor torque fluctuations), fluctuations of +/- 15% are possible for force adjustment. To set the gripping force approximately, it is sufficient to set the gripping force via the “Force” potentiometer (P1) or the external input “Force” [terminal 24] on the basis of the equation of a straight line.

Fig. 12 and Fig. 13 depict the relationship between the gripping force and the input voltage of the external input “Force” [terminal 24] or of the potentiometer “Force” [potentiometer P1] at a finger length P = 20 mm.

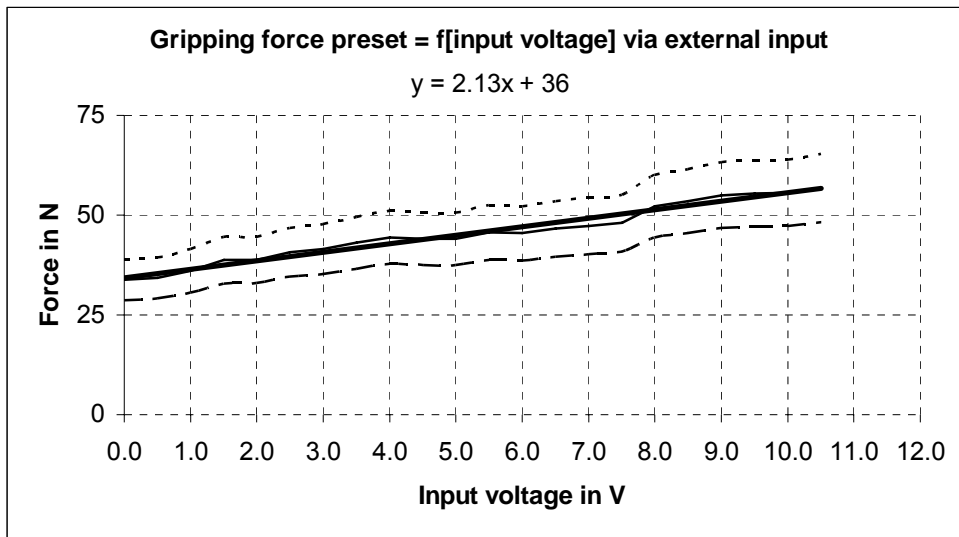


Fig. 12: Gripping force when analog voltage is preset on [terminal 24]
 (* gripping force is the arithmetic total of the individual forces occurring on the claw jaws at distance P = 20 mm)

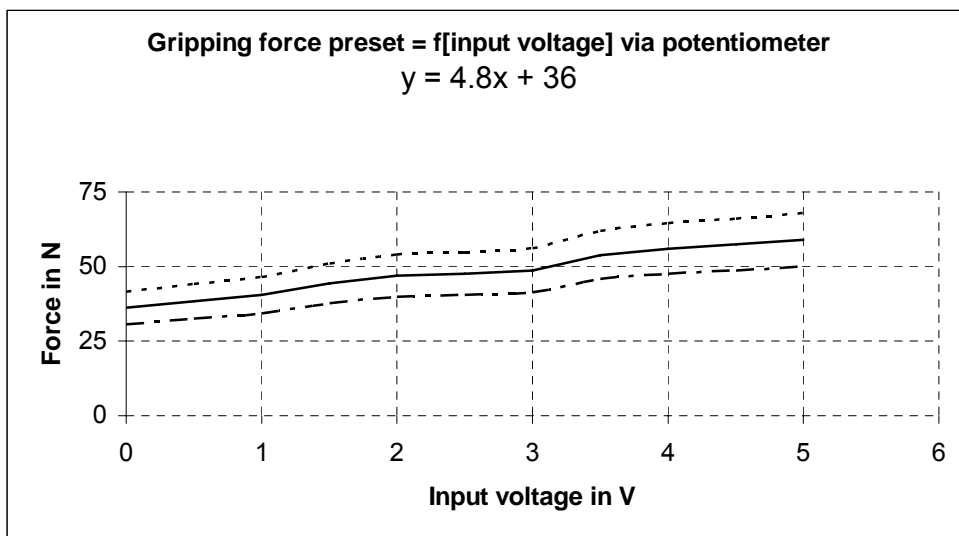


Fig. 13: Gripping force when analog voltage is preset via “Force” potentiometer [P1]
 (* gripping force is the arithmetic total of the individual forces occurring on the claw jaws at distance P = 20 mm)

6.4.8 Example of a Possible Gripping Cycle

We recommend that the claw jaws be pre-positioned and power mode be subsequently used for gripping in order to ensure an economical cycle time in an automation process. The control stages needed for a gripping cycle such as this will be explained by means of an example.

First, the claw jaws are moved to a position which is slightly “larger” (for O.D. gripping) or “smaller” (for I.D. gripping) than the workpiece to be gripped. The “positioning mode”, i.e. step mode is used for this.

The distance to be covered by the gripper from its current position in an “open” or “close” direction is preset in this mode by means of an “Analog input, position” [terminal 23] or by the “Pos.”

potentiometer [potentiometer P3]. This analog value, as well as the presets for force and speed, must be applied in positioning mode before carrying out the “Gripper open” or “Gripper close” commands.

After the positioning movement has been successfully carried out, a high signal will be emitted from the output “Target position reached” [terminal 18] and the digital output “Gripper stopped” [terminal 13]. The preset values for the stroke (“Analog input, position” [terminal 23] or at the “Pos.” potentiometer [potentiometer P3]) are now set to zero volts to switch from positioning mode to power mode.

The power movement is again initiated by carrying out the “Gripper open” or “Gripper close” commands. During power movement the preset value for the gripping force can be changed. The gripping force then changes concurrent with the set value. While the gripper fingers are moving, the digital output “Gripper stopped” [terminal 13] emits a low signal. If the gripper fingers reach the workpiece stop, the “Gripper stopped” output [terminal 13] emits a high signal.

However, power is still supplied to the gripper. The workpiece continues to be gripped securely until the signal is reset by a falling edge on the inputs “Gripper open” [terminal 21] or “Gripper close” [terminal 20]. When the workpiece has arrived at its unloading point, the input “Gripper open” [terminal 21] or “Gripper close” [terminal 20] (and therefore the power movement) is reset and the gripper is opened again in positioning mode by means of the preset at the “Analog input, position” [terminal 23] or at the “Pos.” potentiometer [potentiometer P3].

Procedure

- The distance to be covered by the gripper is preset at the “Analog input, position” [terminal 23] or at the “Pos.” potentiometer [potentiometer P3] → (preset distance applies from the current position)
- The analog values Speed (“Analog input, speed” [terminal 22] or potentiometer “Speed” [potentiometer P2]) and Force (“Analog input, force” [terminal 24] or potentiometer “Force” [potentiometer P1]) must also be applied before the command is carried out (the required values are shown in the “Analog inputs” section)
- A rising edge on one of the two digital inputs “Gripper open” [terminal 21] or “Gripper close” [terminal 20] is used to move toward the new gripping position by the specified value
- During this process the digital output “Gripper stopped” [terminal 13] is changed to low
- The gripper movement can be measured via the output “Analog position output”.
- After the positioning movement has been successfully carried out a high signal is emitted from the output “Target position reached” [terminal 18] and the digital output “Gripper stopped” [terminal 13]
- The voltage to the input “Analog input, steps” [terminal 23] and at the “Pos.” potentiometer [potentiometer P3] must be set to 0 V
- The analog values for speed (“Analog input, speed” [terminal 22] or potentiometer “Speed” [potentiometer P2]) and for Force (“Analog input, force” [terminal 24] or potentiometer “Force” [potentiometer P1]) must be set to the value specific to the application (the required values are shown in the “Analog inputs” section)
- A rising edge on the digital inputs “Gripper open” [terminal 21] or “Gripper close” [terminal 20] causes the gripper to open or close with the specified force. While the gripper fingers are moving, the digital output “Gripper stopped” [terminal 13] emits a low signal.
- If the gripper reaches the workpiece stop the “Gripper stopped” output [terminal 13] emits a high signal. However, power is still supplied to the gripper.

6.4.9 Function Overview Table

The functions of the terminals are described in Table 7:

Terminal	Function	Description
11	Reset	0 V → no function; 24 V → resetting the MEG C 40
13	Gripper stopped	0 V → gripper moving; 24 V → shutdown
14	Reference movement carried out	0 V → not carried out; 24 V → carried out
15	Analog position output	0 V – 5 V (approximate current position) ; (0 V inwards; 5 V outwards)
18	Target position reached	0 V → target position not reached; 24 V → target position reached
19	Reference movement	0 V → shutdown; 24 V → carry out command (with gripper open/close)
20	Gripper close	0 V → shutdown; 24 V → carry out command
21	Gripper open	0 V → shutdown; 24 V → carry out command
22	Speed pre-sel.	0.2 V – 10 V
23	Step pre-sel.	0.2 V – 10 V
24	Force pre-sel.	0.2 V – 10 V

Table 7: Control of MEG C 40 terminals

Input at control Gripper function	Reference movement (terminal 19)	Gripper open (terminal 21)	Gripper close (terminal 20)	Analog preset Speed [M]	Analog preset Steps [M]	Analog preset Force [M]	Reset (terminal 11)
Reference movement Open	H	┐	L	0*	0*	0*	L
Reference movement Close	H	L	┐	0*	0*	0*	L
Gripper open [number of steps]	L	┐	L	0V- 10V(external) 0V- 5V(potentiometer)	0V- 10V(external) 0V- 5V(potentiometer)	0V- 10V(external) 0V- 5V(potentiometer)	L
Gripper close [number of steps]	L	L	┐	0V- 10V(external) 0V- 5V(potentiometer)	0V- 10V(external) 0V- 5V(potentiometer)	0V- 10V(external) 0V- 5V(potentiometer)	L
Gripper open [power mode]	L	┐	L	0V- 10V(external) 0V- 5V(potentiometer)	0V**(external) 0V*(potentiometer)	0V- 10V(external) 0V- 5V(potentiometer)	L
Gripper close [power mode]	L	L	┐	0V- 10V(external) 0V- 5V(potentiometer)	0V**(external) 0V*(potentiometer)	0V- 10V(external) 0V- 5V(potentiometer)	L
Reset	L	L	L	0*	0*	0*	┐
Legend H=24VDC L=GND *=Not essential **=Essential							

Table 8: Function table for MEG C 40

6.5 Response to Malfunctions

Status LED	Cause	Remedy
LED on the MEG C 40 does not flash 6x when switched on	No power supply	Check power supply on MEG C 40 Switch the power supply on and off again
LED on the MEG C 40 is not lit up after the switching-on procedure is completed	No power supply	Check power supply on MEG C 40
LED on the MEG C 40 flashes continually (approx. 1x per sec)	Gripper not connected Open circuit	Check that the gripper is connected to the MEG C 40 and rectify if necessary Check the winding resistance between the motor leads: approx. 8.2 ohm
LED on the MEG C 40 flashes continually (approx. 1x per 2 sec)	Excess temperature on the controller	Reduce gripping force preset Cool MEG C 40 adequately
LED on the MEG C 40 flashes continually (approx. 1x per 4 sec)	Undervoltage or overvoltage	Check power supply on MEG C 40
LED on the MEG C 40 flashes continually (approx. 4x per 1 sec)	Over-current signal	Reduce gripping force preset
--	Defective spindle/ spindle nut (overload)	The gripper must be repaired at the factory!
--	The fingers are mechanically jammed	Check whether the adapter plate has been displaced (only if fixed at the side)

Table 9: Response to malfunctions

7 Manufacturer's Declaration

In accordance with the EC Machine Directive 98/37/EC, Appendix II B

Manufacturer / distributor

SCHUNK GmbH & CO:KG.
Spann- und Greiftechnik
Bahnhofstr. 106 - 134
D-74348 Lauffen/ Neckar

We hereby declare that the following

products in the MEG 40 series

Product type	Product no.
MEG 40 EC	306 008
MEG C 40	307 004

are designed to be incorporated into machinery and must not be put into service until it has been determined that the machinery, into which this product is to be incorporated, conforms with the provisions of the EC Machine Directive 98/37/EC.

Applied harmonized standards, in particular:
EN ISO 12100-1 and EN ISO 12100-2

Date / signature:

March 2007



Title of signatory

Head of Development



8 Index

A

adjusting 17
 Analog preset values 18
 Assembly 7, 12

B

Bending radius 8

C

Care 9
 Commissioning 13
 Notes 13
 Contents 2
 Control of MEG C 40 terminals 24

D

Data
 Technical 6
 Dimensions 12

E

EC Machine Directive 3, 4, 26
 Energy supply 4
 External reset 18

F

Function description 13
 Function overview table 24

Function table for MEG C 40 24

G

General information 13
 Gripper movement 23
 Gripping force 21, 22
 Gripping speed 19

H

Hazard zone 4

I

Initial starting torque 9

M

Machine directive
 EC Machine Directive 26
 Maintenance 9
 Malfunctions 25
 Gripper 9
 MEG 40 EC 14
 MEG C 40 14

P

Pin assignment 8
 Positioning mode 16, 22, 23
 Power mode 18

R

Reference movement 15

S

Safety 3
 Safety notes 3
 Scope of delivery 5
 Speed 20
 Symbol key 3

T

Technical data
 MEG 40 EC 6
 MEG C 40 11
 Terminal assignment 13
 Terms and conditions
 General 5
 Troubleshooting 25
 Troubleshooting on the gripper 9

U

Use
 Appropriate 3

W

Warranty 5

9 Contact



GERMANY – HEAD OFFICE

SCHUNK GmbH & Co. KG
Spann - und Greiftechnik
Bahnhofstrasse 106 – 134
D – Lauffen / Neckar
Tel. +49-7133-103-0
Fax +49-7133-103-2399
info@de.schunk.com
www.schunk.com



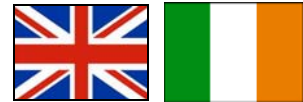
AUSTRIA

SCHUNK Intec GmbH
Holzbauernstr. 20
4050 Traun
Tel. +43-7229-65770-0
Fax +43-7229-65770-14
info@at.schunk.com
www.at.schunk.com



BELGIUM, LUXEMBOURG

SCHUNK Intec N.V./S.A.
Bedrijvencentrum Regio Aalst
Industrielaan 4, Zuid III
9320 Aalst-Erembodegem
Tel. +32-53-853504
Fax +32-53-836022
info@be.schunk.com
www.be.schunk.com



GREAT BRITAIN, IRELAND

SCHUNK Intec Ltd.
Cromwell Business Centre
10 Howard Way,
Interchange Park
Newport Pagnell MK16 9QS
Tel. +44-1908-611127
Fax +44-1908-615525
info@gb.schunk.com
www.gb.schunk.com



CHINA

SCHUNK Precision Machinery
(Hangzhou) Co.,Ltd.
6, 24th Street, HEDA
Hangzhou 310018
Tel. +86-571-8672-1000
Fax +86-571-8672-8800
info@cn.schunk.com
www.cn.schunk.com



DENMARK

SCHUNK Intec A/S
Storhaven 7
7100 Vejle
Tel. +45-43601339
Fax +45-43601492
info@dk.schunk.com
www.dk.schunk.com



FRANCE

SCHUNK Intec SARL
Parc d'Activités des Trois
Noyers 15, Avenue James de
Rothschild
Ferrières-en-Brie
77614 Marne-la-Vallée
Cedex 3
Tel. +33-1-64 66 38 24
Fax +33-1-64 66 38 23
info@fr.schunk.com
www.fr.schunk.com



NETHERLANDS

SCHUNK Intec B.V.
Speldenmakerstraat 3d
5232 BH 's-Hertogenbosch
Tel. +31-73-6441779
Fax +31-73-6448025
info@nl.schunk.com
www.nl.schunk.com

SCHUNK GmbH & Co.KG
Shanghai
Representative Office
777 Zhao Jia Bang Road
Pine City Hotel, Room 923
Xuhui District
Shanghai 200032
Tel. +86-21-64433177
Fax +86-21-64431922
info@cn.schunk.com
www.cn.schunk.com



INDIA

SCHUNK India Branch Office
80 B, Yeswanthpur
Industrial Suburbs,
Bangalore 560 022
Tel. +91-80-41277361
Fax +91-80-41277363
info@in.schunk.com
www.in.schunk.com



ITALY

SCHUNK Intec S.r.l.
Via Caio Plinio 5
22072 Cermenate (CO)
Tel. +39-031-770185
Fax +39-031-771388
info@it.schunk.com
www.it.schunk.com



HUNGARY

SCHUNK Intec Kft.
Széchenyi út. 70.
3530 Miskolc
Tel. +36-46-50900-7
Fax +36-46-50900-6
info@hu.schunk.com
www.hu.schunk.com



POLAND

SCHUNK Intec Sp.z o.o.
Stara Iwiczna,
ul. Słoneczna 116 A
05-500 Piaseczno
Tel. +48-22-7262500
Fax +48-22-7262525
info@pl.schunk.com
www.pl.schunk.com



PORTUGAL

Sales Representative
Victor Marques
Tel. +34-937-556 020
Fax +34-937-908 692
Mobil +351-963-786 445
info@pt.schunk.com
www.pt.schunk.com



SOUTH KOREA

SCHUNK Intec Korea Ltd.
907 Joongang
Induspia 2 Bldg.,
144-5 Sangdaewon-dong
Jungwon-gu, Seongnam-si
Kyunggi-do, 462-722
Tel. +82-31-7376141
Fax +82-31-7376142
info@kr.schunk.com
www.kr.schunk.com



SPAIN

SCHUNK Intec S.L.
Foneria, 27
08304 Mataró (Barcelona)
Tel. +34-937 556 020
Fax +34-937 908 692
info@es.schunk.com
www.es.schunk.com



SWEDEN

SCHUNK Intec AB
Morabergsvägen 28
152 42 Södertälje
Tel. +46-8 554 421 00
Fax +46-8 554 421 01
info@se.schunk.com
www.se.schunk.com



**SWITZERLAND,
LIECHTENSTEIN**

SCHUNK Intec AG
Soodring 19
8134 Adliswil 2
Tel. +41-44-7102171
Fax +41-44-7102279
info@ch.schunk.com
www.ch.schunk.com



CZECH REPUBLIC

SCHUNK Intec s.r.o.
Ernsta Macha 1
643 00 Brno
Tel. +420-545 229 095
Fax +420-545 220 508
info@cz.schunk.com
www.cz.schunk.com



MEXICO, VENEZUELA

SCHUNK Intec S.A. de C.V.
Av. Luis Vega y Monroy # 332
Fracc. Plazas de Sol
Santiago de Querétaro,
Qro. 76099
Tel. +52-442-223-6525
Fax +52-442-223-7665
info@mx.schunk.com
www.mx.schunk.com



USA

SCHUNK Intec Inc.
211 Kitty Hawk Drive
Morrisville, NC 27560
Tel. +1-919-572-2705
Fax +1-919-572-2818
info@us.schunk.com
www.us.schunk.com



CANADA

SCHUNK Intec Corp.
190 Britannia Road East,
Units 23-24
Mississauga, ON L4Z 1W6
Tel. +1-905-712-2200
Fax +1-905-712-2210
info@ca.schunk.com
www.ca.schunk.com



SLOVAKIA

SCHUNK Intec s.r.o.
Mostná 62
919 01 Nitra
Tel. +421-37-3260610
Fax +421-37-6421906
info@sk.schunk.com
www.sk.schunk.com



TURKEY

SCHUNK Intec
Bağlama Sistemleri ve
Otomasyon San. ve Tic. Ltd.
Şti.
Küçükyalı İş Merkezi
Girne Mahallesi
Irmak Sodak, A Blok, No: 9
34852 Maltepe, İstanbul
Tel. +90-216-366-2111
Fax +90-216-366-2277
info@tr.schunk.com
www.tr.schunk.com