# Electrical variable gripper
# EVG 55

## Assembly and Operating Manual

# Imprint

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# Table of Contents

# 1 General

## 1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

Illustrations in this manual are provided for basic understanding and may differ from the actual product design.

In addition to these instructions, the documents listed under (☞ 1.1.2, Page 7) are applicable.

### 1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

| | |
|---|---|
|  | **⚠ DANGER**<br>**Danger for persons!**<br>Non-observance will inevitably cause irreversible injury or death. |
|  | **⚠ WARNING**<br>**Dangers for persons!**<br>Non-observance can lead to irreversible injury and even death. |
|  | **⚠ CAUTION**<br>**Dangers for persons!**<br>Non-observance can cause minor injuries. |
|  | ***NOTICE***<br>**Material damage!**<br>Information about avoiding material damage. |

### 1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and Operating manuals of the accessories *
- Software Manual – Motion Control *

The documents marked with an asterisk (*) can be downloaded on our homepage **www.schunk.com**.

### 1.1.3 Sizes

This operating manual applies to the following sizes:

- EVG - 40
- EVG - 100

## 1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the ambient conditions and operating conditions (☞ 2.6, Page 9)
- Observe the specified maintenance and lubrication intervals (☞ 7, Page 57)

Parts touching the workpiece and wearing parts are not included in the warranty.

## 1.3 Scope of delivery

The scope of delivery includes

- 2-Finger ParallelgreiferEVG
  in the ordered model
- USB to RS232 converter inclusive driver CD
- Accessory pack
- EVG - cable length 3m 4mm x 1mm

## 1.4 Accessory

The following accessories, which must be ordered separately, are required for the product:

- Controller (e.g. SCHUNK MCS-06)

A wide range of accessories are available for this product

For information about which accessories can be used with the appropriate product version see catalog.

# 2 Basic safety notes

## 2.1 Intended use

The product is designed exclusively for gripping and temporarily holding workpieces or objects.

- The product may only be used within the scope of its technical data, (☞ 3, Page 22).
- The product is intended for installation in a machine/system. The applicable guidelines must be observed and complied with.
- The product is intended for industrial use.
- Appropriate use of the product includes compliance with all instructions in this manual.

## 2.2 Not intended use

It is not intended use if the product is used, for example, as a pressing tool, stamping tool, lifting gear, guide for tools, cutting tool, clamping device or a drilling tool.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

## 2.3 Constructional changes

### Making constructional changes

Attachments and modifications, constructional changes and subsequent work, e.g. additional threads, drill holes and safety devices may impair the operation and safety or damage the product.

- Constructional changes may only be done with SCHUNK's permission.

## 2.4 Spare parts

### Use of unauthorised spare parts

Using unauthorised spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorised by Schunk.

## 2.5 Gripper fingers

### Requirements for the gripper fingers

Stored energy within the product creates the risk of serious injuries and significant property damage.

- Arrange the gripper fingers in a way that the product reaches either the position "open" or "closed" in a de-energized state.
- Only exchange the gripper fingers when no residual energy remains in the product.

## 2.6 Ambient conditions and operating conditions

### Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, (☞ 3, Page 22).
- Ensure that the product is protected against sprayed water, vapors, contamination, and EMC influences during operation. Exceptions are products that are designed especially for contaminated environments.

### 2.6.1 Electromagnetic compatibility

The product meets the requirements of the EMC act of the inner-European market, among other requirements. The product has passed the EMC test as per the following standards:

| Standard | Title |
|---|---|
| EN 61000-6-2 (2006) | EMC: Generic standard – Interference immunity in industrial environments |
| EN 61000-6-3 (2011) | EMC: Generic standards - emitted interference for living area, business and commercial areas and small businesses |

The product must be installed using interference-free cables and in a way that meets EMC requirements in order to ensure interference-free operation.

**Interference variables**

The electromagnetic compability with pulse-shaped inference variables has been verified and confirmed according to the following standards:

| Standard | Title |
|---|---|
| EN 61000-4-2 (2008) | Test and measurement procedures - Testing the interference immunity to discharging of static electricity |
| EN 61000-4-4 (2008) | Test and measurements procedures - Testing the interference immunity to fast transient electric interference variables/burst |
| EN 61000-4-5 (2014) | Test and measurement procedures - Testing the interference immunity to surge voltages |

**Sinusoidal interference variables:**

The electromagnetic compability with sinusoidal interference variables has been verified and confirmed according to the following standards:

| Standard | Title |
|---|---|
| EN 61000-4-3 (2011) | Test and measurement procedures - Testing the interference immunity to electromagnetic high frequency fields |
| EN 61000-4-6 (2014) | Test and measurement procedures - interference immunity to conducted interference variables induced by high frequency fields |

**Emission of radio interference**

The emission of radio interference has been verified and confirmed according to the following standards:

| Standard | Title |
|---|---|
| EN 61000-6-3 (2011) | EMC: Generic standards - emitted interference for living area, business and commercial areas and small businesses |

The emitted interference of electromagnetic fields (limit class A, group 1, measured with 10 m distance) has been tested according to the following standards:

| Standard | Title |
|---|---|
| EN 55011 (2009) | Industrial, scientifical and medical devices - radio interference - limits and measurement procedures |

### 2.6.2 Environmental conditions

**Requirements for transport and storage**

The following information applies if the product is transported and stored in the original package.

**Mechanical Environmental Conditions** Standard: IEC 60721-3-2 (1997-02) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2M3 applies.

**Climatic Environmental Conditions** Standard: IEC 60721-3-2 (version 1997-02) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2K4 applies.

The aforementioned standards result in the following parameters for the essential environmental conditions:

| Standard | Title |
|---|---|
| EN 60068-2-1 | Test procedure - test A: cold |
| EN 60068-2-2 | Test procedure - test B: dry heat |
| EN 60068-2-13 | Tests - test group M: low air pressure |
| EN 60068-2-14 | Test procedure - test N: temperature change |
| IEC 60068-2-32 | Tests - Test ed: Free fal |

**Requirements during operation**

The following overview shows the permissible environmental conditions for the product.

**Mechanical Environmental Conditions** Standard: IEC 60721-3-3 (1995-09) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weather-protected locations. Class 3M7 applies.

**Climatic Environmental Conditions** Standard: IEC 60721-3-3 (1995-09) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weather-protected locations. Class 3K3 applies

The product has been tested for the essential environmental conditions according to the following standards:

| Standard | Title |
|---|---|
| EN 60068-2-1 | Test procedure - test A: cold |
| EN 60068-2-2 | Test procedure - test B: dry heat |
| EN 60068-2-30 | Test procedure - test Db: humid heat, cyclical (12 + 12 hours) |

The product may only be used in the following locations if additional measures are taken:

- In locations with a high level of ionizing radiation
- In locations with difficult operating conditions, e.g., due to caustic fumes, gases, oils or chemicals
- In facilities requiring special monitoring, e.g., in particularly at-risk areas

The product must also not be used in potentially explosive zones. If the product is subjected to unacceptably large impacts or vibrations, suitable measures must be taken to reduce the amplitude or acceleration of such disturbances. Vibration-damping or vibration-absorbing systems are to be used in such cases.

**Testing environmental conditions**

**Tests regarding mechanical environmental conditions**

The product has been tested with respect to mechanical environmental conditions according to the following standards:

| Standard | Title |
|---|---|
| EN 60068-2-6 (2008-10) | Test procedure - test Fc: swinging (sinusoidal) |
| EN 60068-2-27 (2010-02) | Test procedure - test Ea and guideline: shocking |

## 2.7 Personnel qualification

**Inadequate qualifications of the personnel**

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

| | |
|---|---|
| **Trained electrician** | Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations. |
| **Pneumatics specialist** | Pneumatics specialists have been trained for this particular area of responsibility and know the relevant standards and regulations. |
| **Hydraulic specialist** | Hydraulic specialists have been trained for this particular area of responsibility and knows the relevant standards and regulations. |
| **Qualified personnel** | Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations. |
| **Instructed person** | Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour. |
| **Service personnel of the manufacturer** | Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers. |

## 2.8 Personal protective equipment

### Using personal protective equipment

Not wearing personal protective equipment while working with the product, may result in dangers that impact the personnel's safety and health.

- While working with the product, obeserve the health and safety regulations and wear the required personal safety equipment.
- Observe the valid safety and accident prevention regulations.
- In case of sharp edges and corners and rough surfaces, wear protection gloves.
- In case of hot surfaces, wear heat-resistant protection gloves.
- When dealing with hazardous substances, wear protection gloves and goggles.
- In case of moving parts, wear tight protection clothes.

## 2.9 Notes on safe operation

### Incorrect manner of working by personnel

Working in an incorrect manner may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media.
- Rectify malfunctions as soon as they occur.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

## 2.10 Transport

### Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

## 2.11 Malfunctions

### Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

## 2.12 Disposal

### Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

## 2.13 Fundamental dangers

**General**

- Observe safety distances.
- Never deactivate safety installations.
- Install the provided protective product in the danger zone before switching on the product.
- Remove energy supplies before the installation, modification, maintenance or adjustment work. Make sure that no residual energy is remaining in the system.
- Do not move parts by hand while the energy supply is connected.
- Do not reach into the open mechanism or movement area of the product during operation.

### 2.13.1 Protection during handling and assembly

**Incorrect handling and assembly**

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

**Incorrect lifting of loads**

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

### 2.13.2 Protection during commissioning and operation

**Falling or violently ejected components**

Falling and violently ejected components can cause serious injuries and even death.

- The danger zone must be cordoned off by a protective barrier.
- Never step into the danger zone during operation.

### 2.13.3 Protection against dangerous movements

**Unexpected movements**

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply and ensure that no residual energy remains.
- The faulty actuation of conected drives may cause dangerous movements.
- Operating mistakes, faulty parameterization during commissioning or software errors may trigger dangerous movements.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Restrict unintentional access by persons to this range e.g. via a protective cover, protective fence or photoelectric barrier. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Check the function of the EMREGENCY STOP before starting up the machine or system. If this protective equipment is not working properly, prevent the operation of the machine.

### 2.13.4 Protection against electric shock

**Work on electric equipment**

Touching live parts may cause death.

- Work on electrical installations must be performed only by electricians in accordance with the electrical regulations.
- Observe the general installation and safety regulations concerning work on high-voltage systems.
- Lay electrical cables correctly, e.g. in a cable duct or cable protector. Observe standards.
- Before connecting or disconnecting electric cables, switch off power supply and make sure the lines are dead. Secure power supply against reactivation.
- Before working on the product, disconnect it from the line power and wait for at least 15 minutes to allow dangerous voltage charges to dissipate (capacitor charge). Check that the device is deenergized before you start working.
- Before switching on the product, check if the protective conductor on all electrical components has been installed correctly according to the connection diagram.
- Check if covers and safety equipment preventing contact with live components have been installed.
- Do not touch the product's connecting elements while the energy supply is switched on.

**Possible electrostatic energy**

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local equipotential bonding in accordance with the applicable regulations.
- While paying particulary attention to the actual conditions of the working environment, the equipotential bonding must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the equipotential bonding must be verified by executing regular safety measurements.

### 2.13.5 Protection against magnetic and electromagnetic fields

**Work in areas with magnetic and electromagnetic fields**

Magnetic and electromagnetic fields can lead to serious injuries.

- Persons with pace-makers, metal implants, metal shards or hearing aids require the consent of a physician before entering areas in which components of the electric drive and control systems are mounted, started up and operated.
- Persons with pace-makers, metal implants, metal shards or hearing aids required the consent of a physician before entering areas in which motor parts with permanent magnets are stored, repaired or assembled.
- Do not operate high-frequency or radio products in the proximity of electric components of the drive system and their feed lines.

  If the use of such devices is necessary:

  When starting up the electric drive and control system, check the machine or system for possible failures when such systems are used at different intervals and in different states of the control system. A special additional EMC test may be necessary if the system has a high risk potential.

## 2.14 Notes on particular risks

**⚠ DANGER**

**Danger from electric voltage!**
Touching live parts may result in death.

- Switch off the power supply before any assembly, adjustment or maintenance work and secure against being switched on again.
- Only qualified electricians should perform electrical installations.
- Check if de-energized, ground it and hot-wire.
- Cover live parts.

**⚠ DANGER**

**Risk of fatal injury from suspended loads!**
Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.
- Wear suitable protective equipment.

**⚠ WARNING**

**Risk of injury from objects falling and being ejected!**
Falling and ejected objects during operation can lead to serious injury or death.

- The danger zone must be cordoned off by a protective barrier.

**⚠ WARNING**

**Risk of injury from uncontrolled movements!**
If the energy supply is switched on or residual energy remains in the system, parts may move unexpectedly and cause serious injuries.

- Switch off energy supply.
- Make sure there is no residual energy in the system

**⚠ WARNING**

**Risk of injury due to squeezing and bumping!**
Moving the base jaws and breaking or loosening the gripper fingers may cause serious injuries.

- Do not reach into the product's open mechanical system or movement range.

**⚠ WARNING**

**Risk of injury from sharp edges and corners!**
Sharp edges and corners can cause cuts.

- Use suitable protective equipment.

**⚠ WARNING**

**Risk of injury from objects falling during energy supply failure!**
Electronic devices are not fail-safe. In case of an energy supply failure, the gripping force decreases. As a consequence, it cannot be guaranteed that the workpiece is held safely.

- In case of an energy supply failure, it is the user's responsibility to revert the drive into a safe state.

# 3 Technical data

## 3.1 Basic data

| Size | EVG | |
|---|---|---|
| | 55<br>stroke 40 | 55<br>stroke 100 |
| **Mechanical operating data** | | |
| Weight [kg] | 0.79 | 1.1 |
| Noise emission [dB(A)] | ≤ 70 | |
| IP Code | 20 | |
| Ambient temperature [°C]<br>Min.<br>Max. | <br>+5<br>+55 | |
| Stroke per jaw [mm] | 20 | 50 |
| Min. gripping force [N] | 5 | |
| Max. gripping force [N] at max. current | 24 | 57 |
| Max. speed [mm/s] | 300 | 400 |
| Max. acceleration [mm/s²] | 10000 | |
| Repeatability [mm] *** | ±0.05 | |
| Max. permissible finger length [mm] | 125 | |
| **Electrical operating data** | | |
| Nominal voltage [VDC] MCS-06 | 24 | |
| Nominal power current [A] | 4 | 5 |
| Max. current [A] | 8 | |
| **Control electronics** | | |
| Interface<br>RS232<br>CAN bus<br>Profibus DP | <br>X<br>X<br>X | <br>X<br>X<br>X |
| Power supply [VDC] (Logic) | 24 | |
| Nominal power current [A] (Logic) | 0.5 | |
| Sensor system | Encoder | |

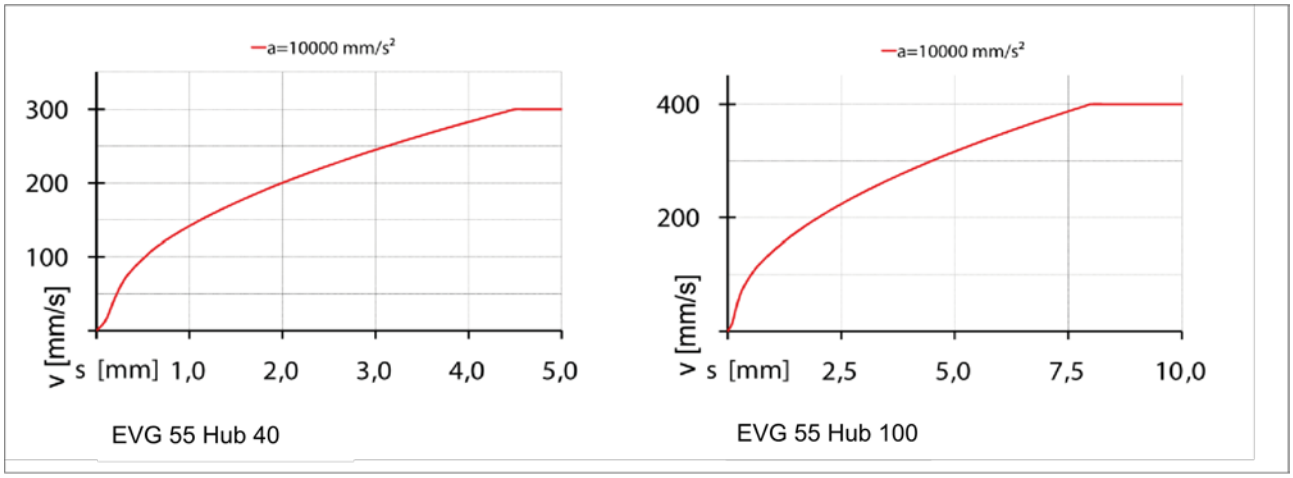
* Gripping force is the arithmetical sum of the single forces arising at the gripper jaws in a distance of P=50 mm for I=8 Aeff, of 6 mm pre-positioning and the max. velocity. Observe the temperature behavior in relation to the time of the applied current (☞ 3.3, Page 24).

** Values for friction coefficient μ = 0.1 and safety factor v = 2. In case of form-fit gripping, the values can be increased.

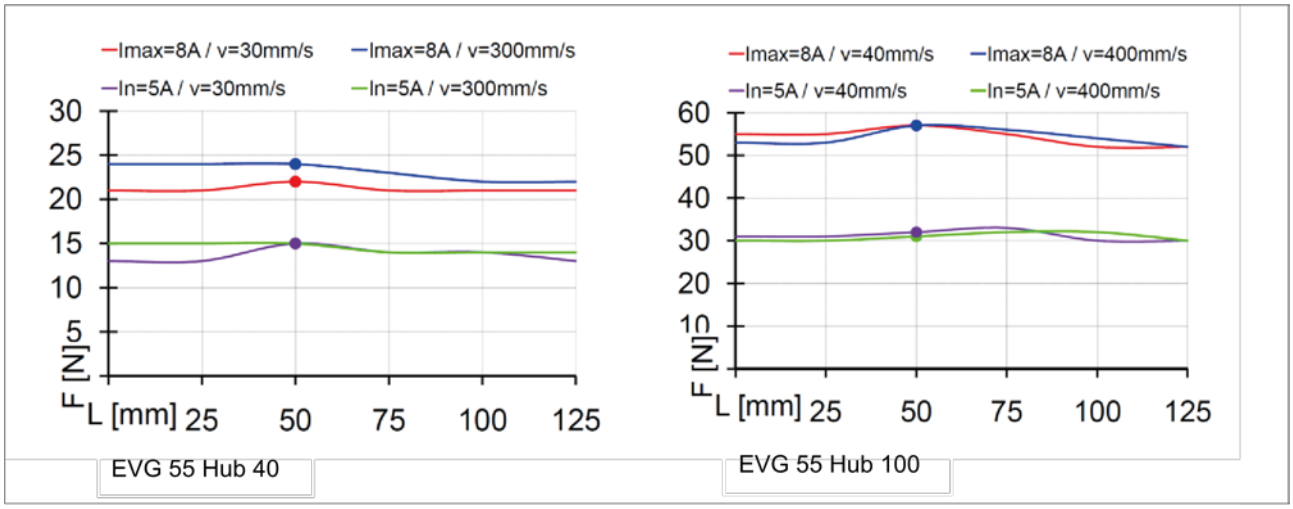
*** Scattering of end positions for 100 consecutive strokes.

More technical data are included in the catalog data sheet. Whichever is the latest version.

## 3.2 Diagrams




Stroke diagrams




Gripping force diagrams

## 3.3 Motor data

| Reference value | EVG 55 Stroke 40 | EVG 55 Hub 100 |
|---|---|---|
| Terminal voltage $U_{kl}$ [V] | 24 | |
| | | |
| Torque constant $K_t$ [Ncm/A] | 1.3 | 3.8 |
| Ambient temperature $\theta_u$ [°C] | 40 | |
| Maximal winding temperature $\theta_{max}$ [°C] | 140 | |
| Thermal transfer resistance $R_{th}$ [K/W] | 4.5 | 3.25 |
| | | |
| Maximal torque $M_{max}$ [Ncm] | 23.5 | 72.4 |
| Maximal current $I_{max}$ [Aeff] | 16.0 | |
| | | |
| Permanent standstill torque $M_o$ [Ncm] | 5.9 | 18.0 |
| Permanent standstill current $_o$ [Aeff] | 4.0 | 3.9 |
| Idle speed $n_o$ [min-1] | 19100 | 6200 |
| | | |
| Nominal torque $M_n$ [Ncm] | 5.0 | 16.3 |
| Nominal current $I_n$ [Aeff] | 3.6 | 3.7 |
| Nominal torque $n_n$ [min-1] | 15900 | 5100 |
| | | |
| Terminal inductance $R_{tt}$ [Ω] | 0.5 ±7% | 0.6 ±7% |
| Terminal inductance $L_{tt}$ [mH] | | 0.4 ±20% |
| Electrical time constant $\tau_e$ [ms] | 0.4 ±27% | 0.7 ±27% |

The tolerances of M, I, n may be around 10%. All temperatures correspond to isolation class F.

Mmax is limited by the maximal current.

# 4 Design and description

## 4.1 Configuration

The gripper base jaws are designed in such a way that different types of fingers for parallel grippers can be attached to them. A controller supplies the gripper with voltage.

- For an optimal operation, the SCHUNK MCS-06 controller is recommended.

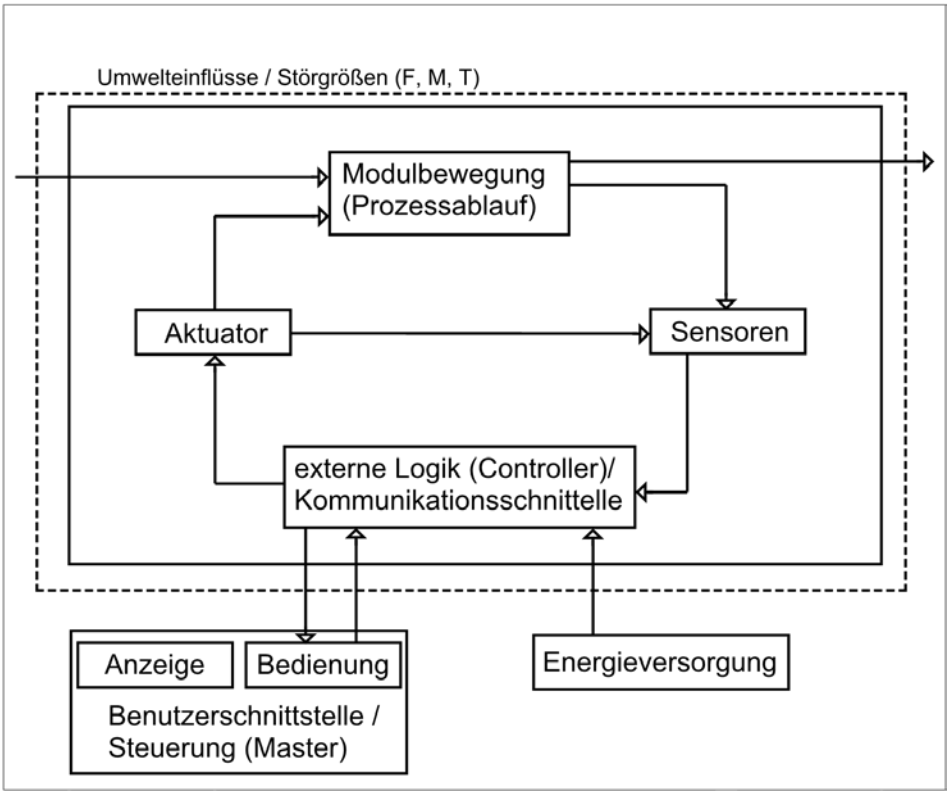
The module is equipped with a brushless direct current servo motor with bevel gear and toothed belt.

The unit is intended for gripping, holding and loosening workpieces.

The module has functions for monitoring end positions, voltage, current and temperature. The module shuts itself down if the permitted values are exceeded.

All parameters like velocity, stroke, position or motor current are transmitted to an external controller via the corresponding interface (RS232, CAN Bus, Profibus).

## 4.2 Operation principle




Operation principle external logic

The actuator (in this case DC motor) is controlled by the external logic (controller). The superior control (master) transfers the required parameters to the external logic (controller).

The module performs a movement. Its position is constantly monitored. Sensors transfer the required parameters back to the external logic.

The following parameters can be transferred from the controller (master) to the internal logic:

- Current I
- Velocity v
- Acceleration a
- Position (distance between base jaws)

# 5 Assembly and installation

## 5.1 Mechanical connection

**⚠ WARNING**

**Risk of injury from uncontrolled movements!**
If the energy supply is switched on or residual energy remains in the system, parts may move unexpectedly and cause serious injuries.

- Switch off energy supply.
- Make sure there is no residual energy in the system

**Levelness of the mounting surface**

The values apply to the whole mounting surface to which the product is mounted .

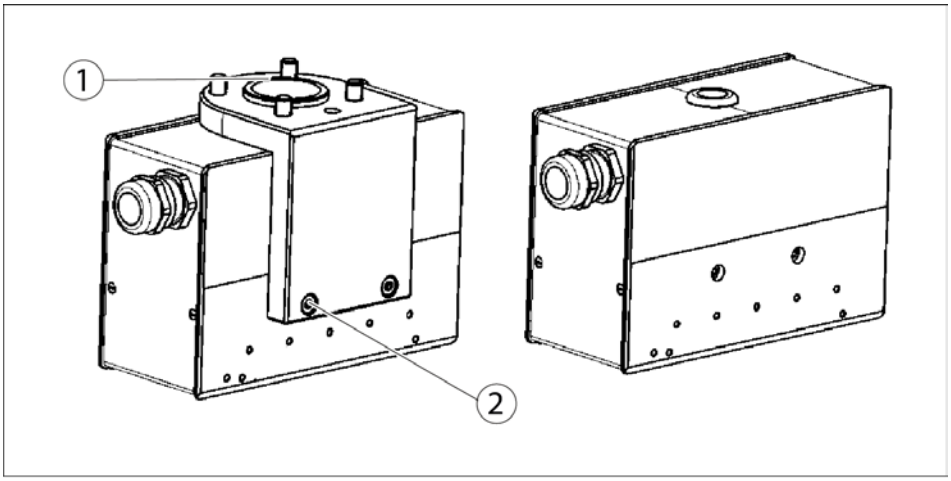
Requirements for levelness of the mounting surface (Dimensions in mm)

| Diameter | Permissible unevenness |
|---|---|
| < 100 | < 0.02 |
| > 100 | < 0.05 |

- Use suitable connecting elements (adapter plate) to connect the module to the machine/system.
- Observe the permissible screw-in depth.

**Mounting**

The gripper can be fastened and fixed via the lateral threads with centering. Another possibility is the adaption via a L-shaped adapter plate with ISO 9409-1-A50 flange:

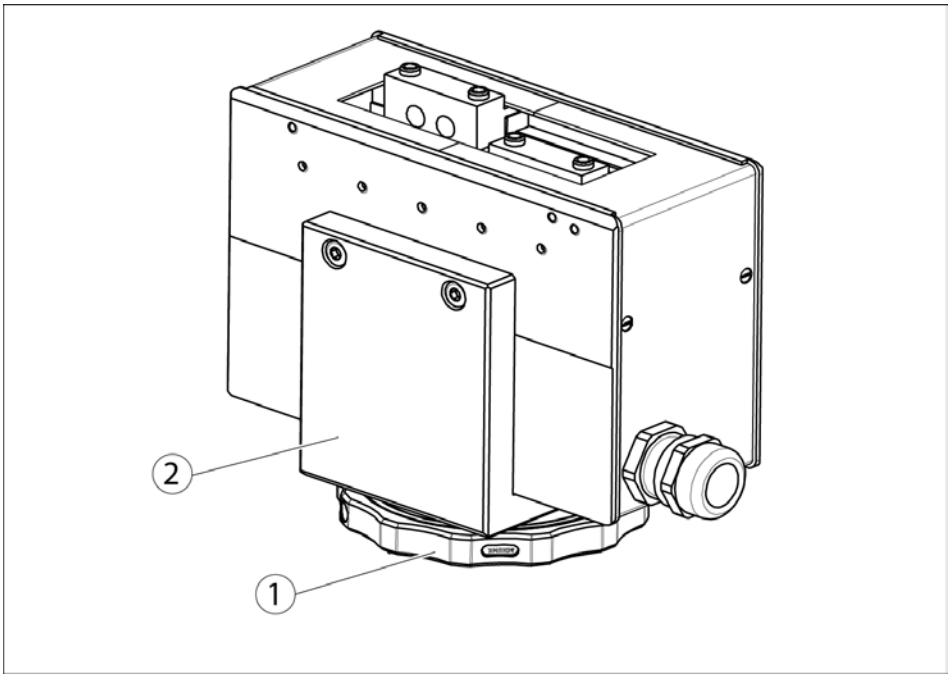



Assembly possibilities

| | |
|---|---|
| 1 | L-shaped adapter plate with flange according to ISO 9409-1-A50 |
| 2 | Moutning screws DIN EN ISO 4762 and centering sleeve 6x5.35 |

**NOTE**

Optionally the module can be mounted to the flat change head (FWK) with flat change system (FWS):

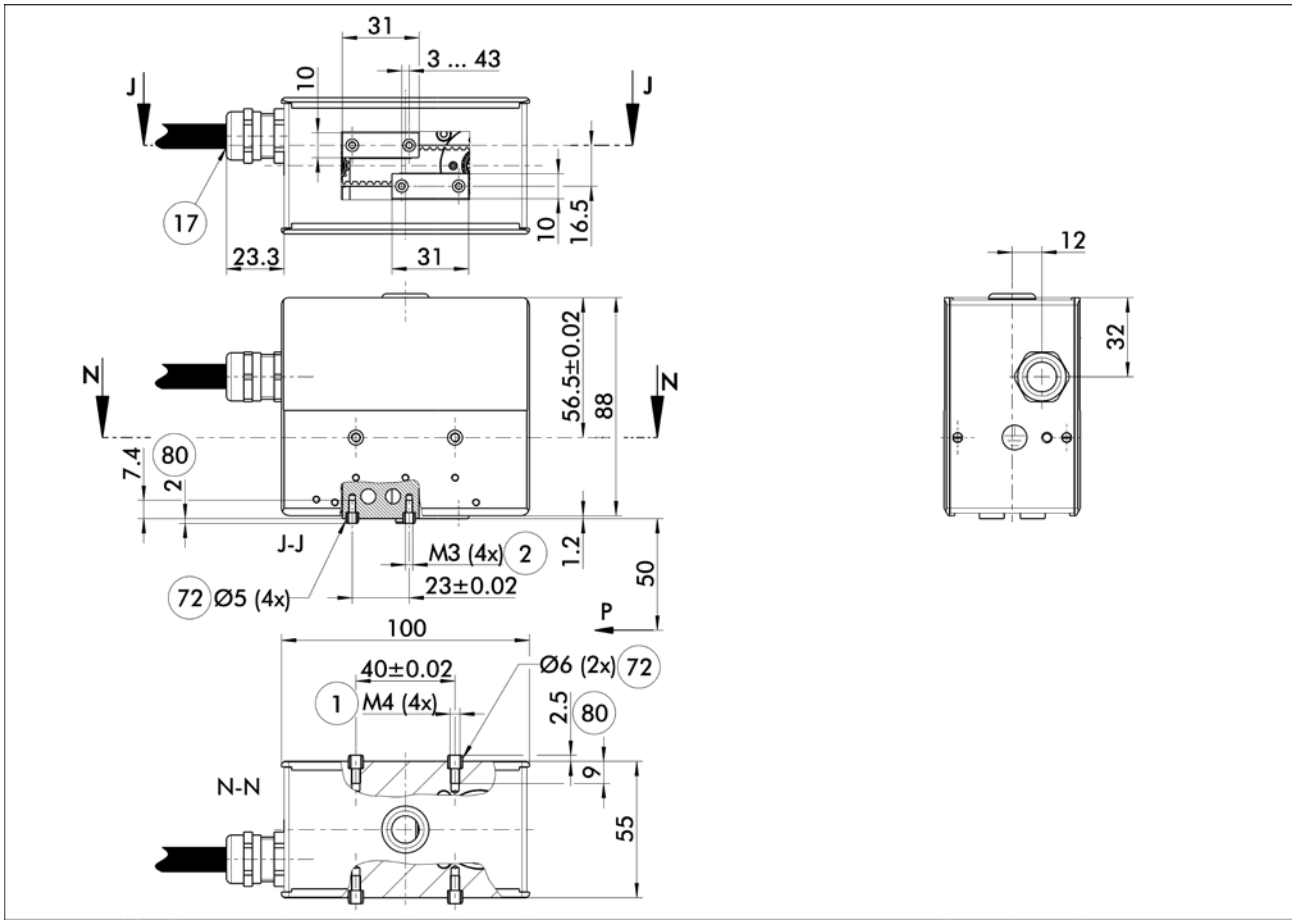



Mounting at the FWS

| | | | |
|---|---|---|---|
| 1 | Flat change head with adapter | 2 | adapter plate |

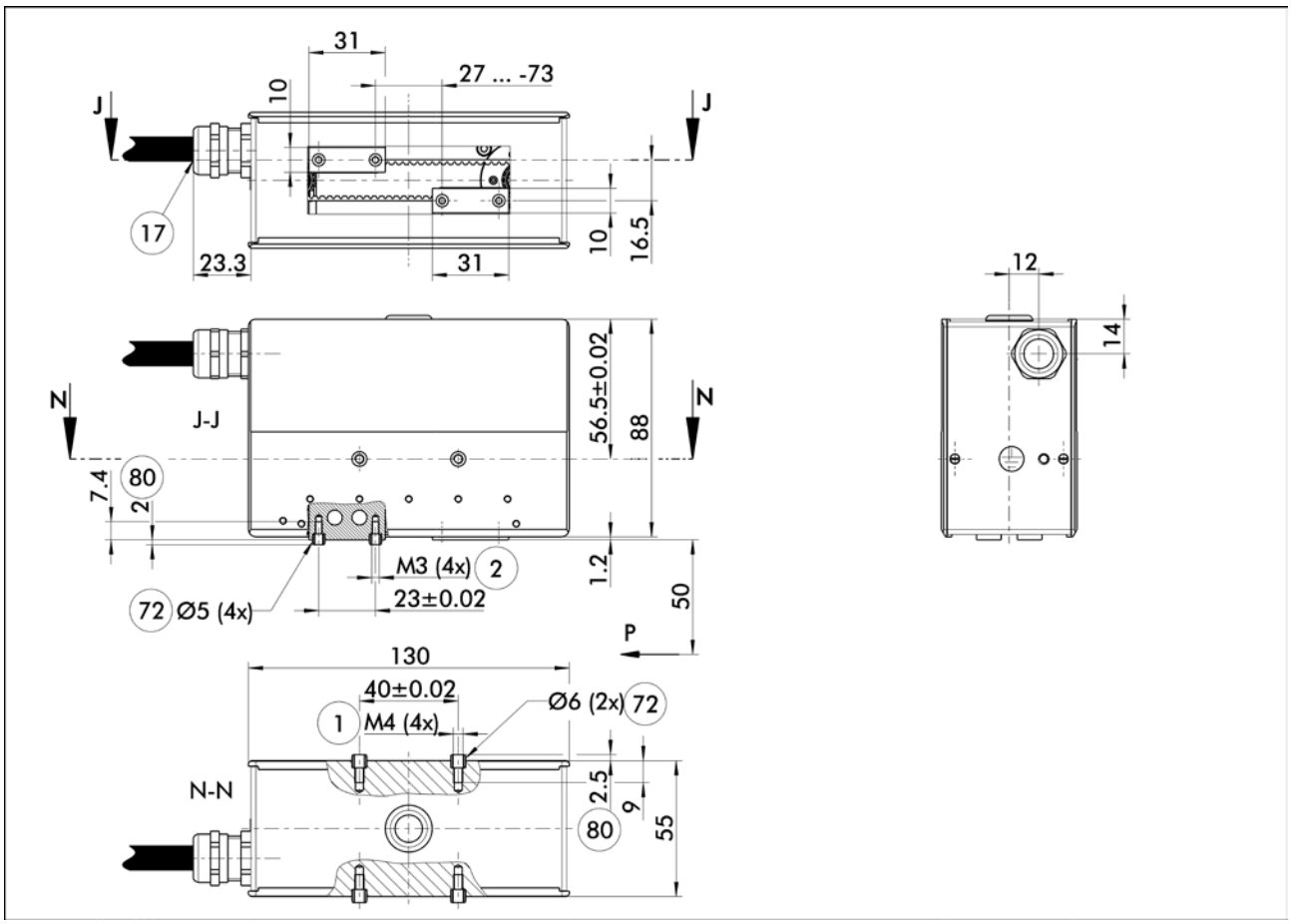
## 5.2 Special connection dimensions

The gripper EVG can be screwed to the lateral M4 mounting threads. For fastening the top jaws, there are respectively two M3 mounting threads at the base jaws:




Connection dimensions EVG55 stroke 40

| | | | |
|---|---|---|---|
| 1 | Gripper connection | 72 | Fit for centering sleeves |
| 2 | Finger connection | 80 | Depth of the centering bore in the counterpart |
| 17 | M16x1,5 for cable connection | | |




Connection dimensions EVG55 stroke 100

| | | | |
|---|---|---|---|
| 1 | Gripper connection | 72 | Fit for centering sleeves |
| 2 | Finger connection | 80 | Depth of the centering bore in the counterpart |
| 17 | M16x1,5 for cable connection | | |

## 5.3 Electrical connection

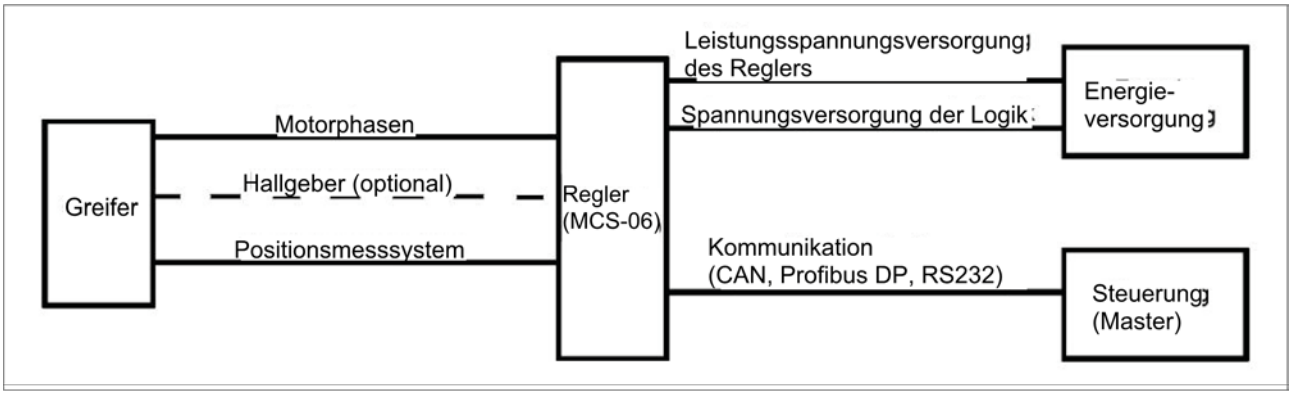
**NOTE**
The cable color throughout this chapter refers to the use of a SCHUNK connection cable.

| | |
|---|---|
|  | ***NOTICE*** |
| | **Danger of short circuit!**<br>Damage of circuit board possible!<br>• Observe configuration of the terminals.<br>• Electrical connection may only be performed by qualified personnel. |

### 5.3.1 Connection principle

The controller supplied the gripper with voltage.

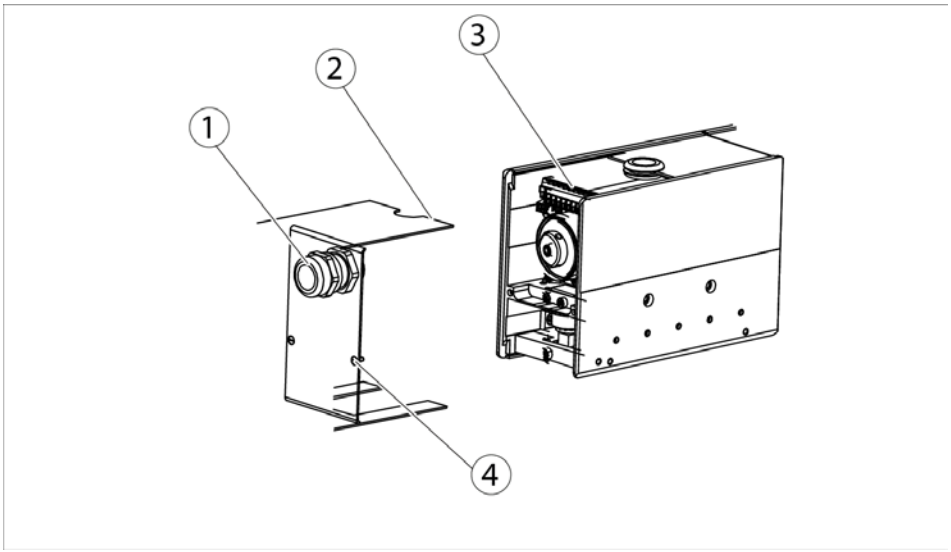
- The gripper must be connected to the controller.




Connection principle

### 5.3.2 EMV fitting of connection cable to the gripper

Signal and power lines of the controller (MCS-06) are connected to the gripper's connection board.



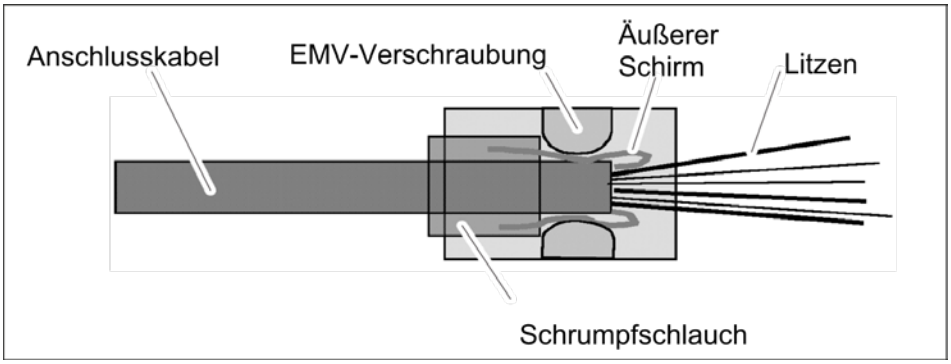

1 Loosen countersunk screws (4) and remove the cover (2).

2 Pull the connection cable through the EMV-fitting (1).

3 Isolate the connection cable and the single conductors (ca. 90 mm from the outer sheath of the MCS-06 connection cable and the single conductors ca. 5 mm, corresponding to the spring terminals).

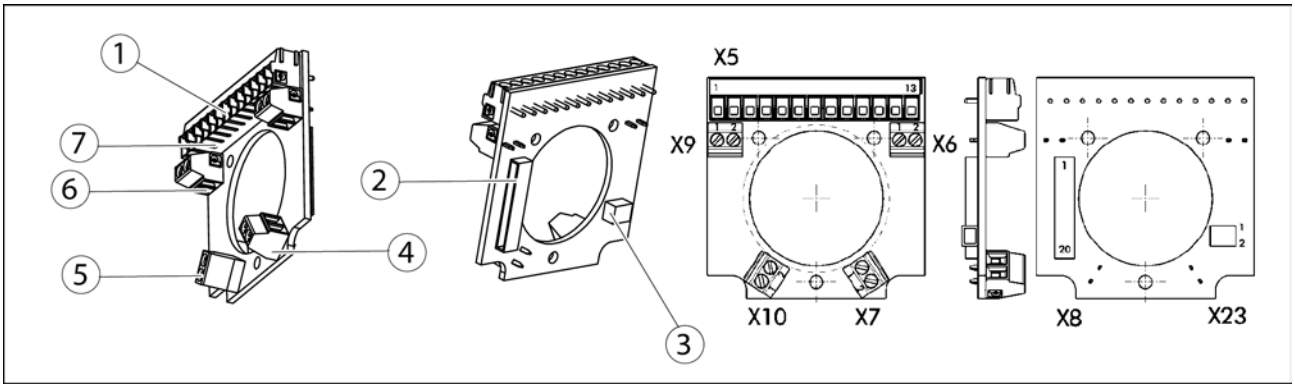
4 Fold the outer shielding over the sheath of the connection cable and fix the shrink hose (☞ figure below). The shielding remains visible at the end of the sheath.

5 Connect the connection cable directly to the connection board (3). Extending the connection board is not necessary. (☞ Fig. and tab. connection board with terminals and configuration of terminals).




EMC-fitting

| | |
|---|---|
| | **NOTICE**<br>**Damage of circuit board possible!**<br>• Electrical connection may only be performed by qualified personnel.<br>• Never remove the adapter plate from the gripper. |




Connection board with terminals and configuration of terminals

| Item | Connection board EVG55 | Pin | Function | SCHUNK cable color |
|---|---|---|---|---|
| 1 | Terminal strip X5 | 1 | Brake - | Brown (0,34mm²) |
| | | 2 | Brake + | White (0,34mm²) |
| | | 3 | Hall sensor 1 | Yellow |
| | | 4 | Hall sensor 2 | Pink |
| | | 5 | Hall sensor 3 | Grey |
| | | 6 | Encoder track A | Black |
| | | 7 | Encoder track B | White |
| | | 8 | Encoder track C | Copper |
| | | 9 | Encoder track A\ | Violet |
| | | 10 | Encoder track B\ | Brown |
| | | 11 | Encoder track C\ | Orange |
| | | 12 | GND | Blue |
| | | 13 | +5V | Red |
| 2 | Bushing X8 | 1 | - | |
| | | 2 | - | |
| | | 3 | Encoder track C\ | |
| | | 4 | Encoder track B\ | |
| | | 5 | Encoder track A\ | |
| | | 6 | Encodert track C | |
| | | 7 | Encoder track B | |

| Item | Connection board EVG55 | Pin | Function | SCHUNK cable color | |
|---|---|---|---|---|---|
| | | 8 | Encoder track A | | |
| | | 9 | GND | | |
| | | 10 | +5V | | |
| | | 11 | Hall sensor 3 | | |
| | | 12 | Hall sensor 2 | | |
| | | 13 | Hall sensor 1 | | |
| | | 14 | GND | | |
| | | 15 | +5V | | |
| | | 16 | - | | |
| | | 17 | - | | |
| | | 18 | - | | |
| | | 19 | - | | |
| | | 20 | - | | |
| 3 | Bushing X23 | 1 | Brake + | | |
| | | 2 | Brake - | | |
| 4 | Terminal strip X7 | 1 | Shielding | Grey | Lines of the |
| | | 2 | Motor phase W | Black | external controller |
| 5 | Terminal strip X9 | 1 | Motor phase U | Red | Lines of the |
| | | 2 | Motor phase V | White | motor in the grip-per |
| 6 | Terminal strip X10 | 1 | Motor phase U | Red | Lines of the |
| | | 2 | Motor phase V | White | external controller |
| 7 | Terminal strip X6 | 1 | Shielding | Grey | Lines of the |
| | | 2 | Motor phase W | Black | motor in the grip-per |

## 5.4 Electrical connection of the module to the MCS-06 controller

**NOTE**
The cable color throughout this chapter refers to the use of a SCHUNK connection cable.

### 5.4.1 Scope of delivery of MCS-06 controller

The MCS-06 is an accessory and can be ordered separately.

The scope of delivery includes

- MCS-06 controller
- DVD

Content of DVD:

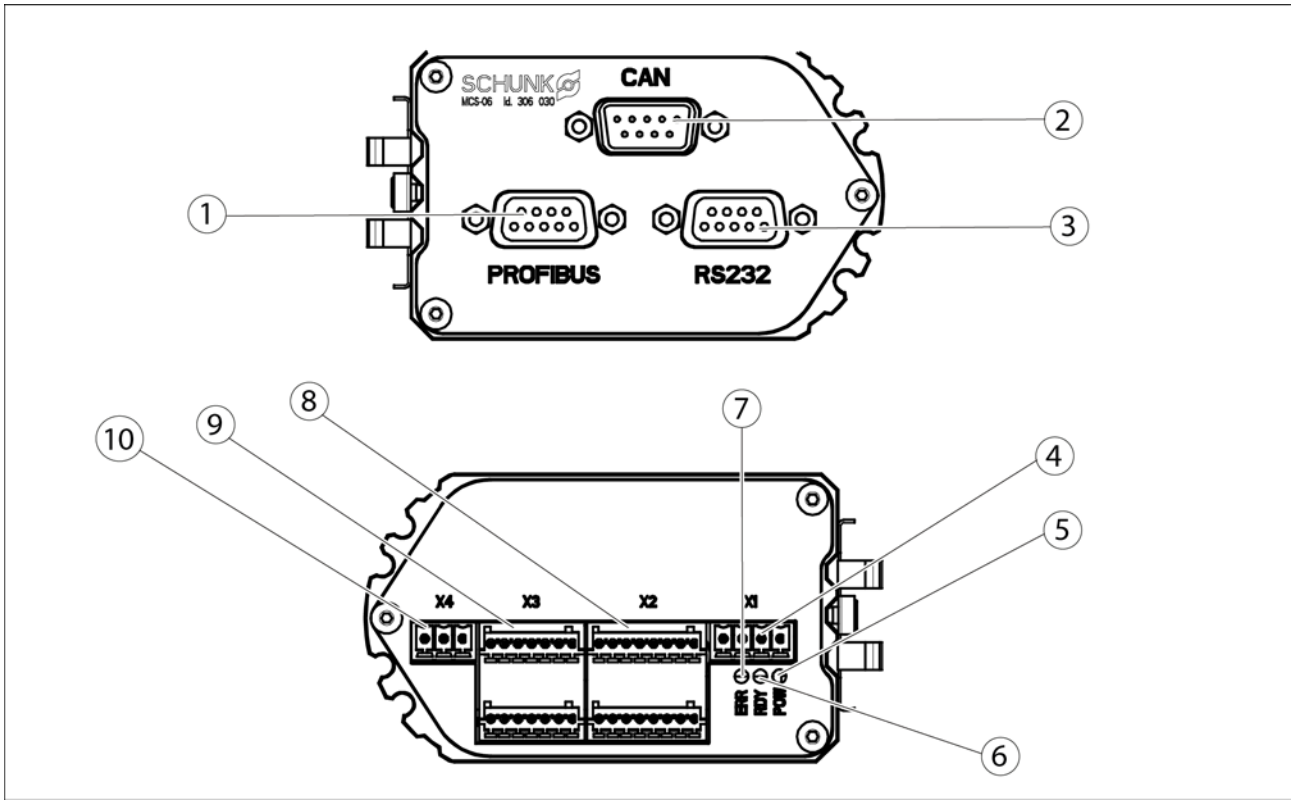
- Motion Tool SCHUNK (MTS) (configuration and commissioning tool)
- Operating manual in PDF format
- Software manual Motion Tool SCHUNK in PDF format
- Software module for Siemens S7300/400

### 5.4.2 Technical data of the MCS-06 controller

| **Type** | **MCS-06** |
|---|---|
| Logic voltage supply at controller [VDC] | 24 |
| Current consumption of logic [A] | 0.5 |
| Nominal current for controller [A] | 6 |
| Power supply [VDC] | 24 |
| Weight [kg] | 0.45 |
| Interfaces = communication type (data rate) | RS232 (9600 baud)<br>Profibus DP (auto-detect)<br>CAN |
| Control types | Current control<br>Velocity control<br>Positioning control |
| **Technical data of outputs** | |
| Type of output | Opto-isolator |
| $U_{out}$ [V] | >12 |
| Ground potential | GND |
| Max. power output [mA] | >3 |
| Short-circuit-proof | yes |
| Protected against polarity reversal | yes |
| Galvanically isolated | yes |
| **Technical data of inputs** | |

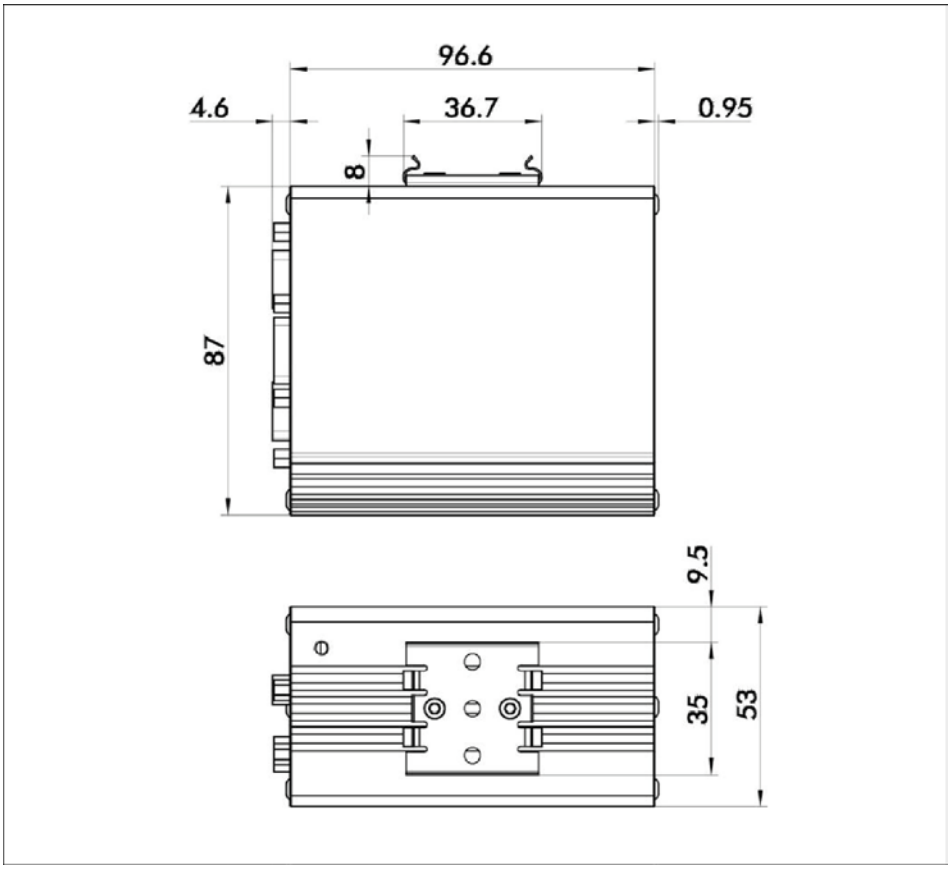
| Type | MCS-06 |
|---|---|
| Switching threshold ‚High' [V] | >3 |
| Switching threshold ‚Low' [V] | <0,5 |
| Current consumption of logic [A] | <5 |
| Protected against polarity reversal | yes |
| Galvanically isolated | yes |

### 5.4.3 Configuration and description of the MCS-06 controller




Configuration of the MCS-06 controller

| | | | |
|---|---|---|---|
| 1 | Connection Profibus | 2 | Connection CAN |
| 3 | Connection RS232 | 4 | Terminal strip X1 (☞ 5.4.5, Page 39) |
| 5 | Display - LED for POW (indicates if power supply is available) | 6 | Display - LED for RDY (indicates communication readiness) |
| 7 | Display - LED for ERR (indicates occurring errors) | 8 | Terminal strip X2 (☞ 5.4.6, Page 40) |
| 9 | Terminal strip X3 (☞ 5.4.7, Page 41) | 10 | Terminal strip X4 (☞ 5.4.8, Page 43) |




Dimensions of the controller

The controller is fastened with a metal base latch to a support rail (according to EN 50022).

**DEFAULT function**

Reset the module via the SCHUNK controller.

**NOTE**
For more information on the DEFAULT values, see the Motion-ToolSchunk.pdf on the controller's DVD.

Perform the following steps:

1 Switch off the logic voltage supply at the controller.
2 Set a jumper between pin 9 (GND) and pin 14 (default) on terminal strip X3.
3 Turn on the logic voltage supply at the controller.
4 Wait approximately 10 seconds.
5 Switch off the logic voltage supply.
6 Remove the jumper.

**DEFAULT values**

Now the unit is reset:

- Module address = 12
- Communication = RS232
- Data rate = 9,600 baud

**Loading new firmware on the module**

The new firmware can be loaded on the module via the Motion Tool Schunk software (MTS) (on the supplied DVD) under "Module" - "Update firmware".

**NOTE**
For further information ☞ MotionToolSchunk.pdf document on the DVD.

### 5.4.4 Procedure and requirements

**⚠ DANGER**

**Danger due to faulty connection.**

- Observe the pin assignment of the connecting terminals.
- Make sure that all components are grounded correctly.

**Voltage supply requirements**

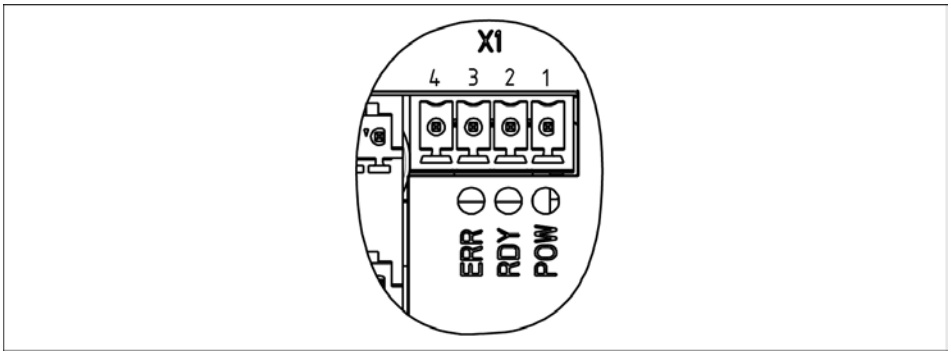
| | |
|---|---|
| Power supply (MCS-06) | 24 V DC |
| Voltage supply of motor (gripper) | 24 V DC (+ 10% / - 4%) |
| Voltage supply of logic | 24 V DC (up to 36 V DC) ripple smaller than 150 mVSS; switching peak smaller than 240 mVSS |
| Connection value | Number of modules x nominal module current x 1.2 |

### 5.4.5 Configuration of terminal strip X1 of the MCS-06 controller

The strands with 1.0 mm² cross-section are required.

**Terminal strip X1**

Terminal strip X1 serves for connecting the controller's motor phases:




Terminal strip X1

Position of terminal strip (☞ 5.4.3, Page 36)

Configuration of the pins of terminal strip X1

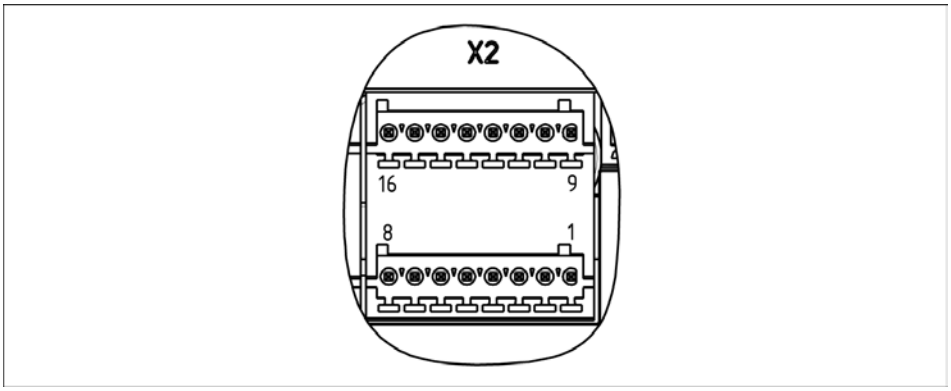
| Pin | Function | Cable color |
|---|---|---|
| 1 | Motor phase U | Red |
| 2 | Motor phase V | White |
| 3 | Motor phase W | Black |
| 4 | Shielding | Grey |

### 5.4.6 Configuration of terminal strip X2 of the MCS-06 controller

The strands with 0.15 mm² cross-section are required.

**Terminal strip X2**

The terminal strip X2 serves for connecting the encoder, Hall sensors and resolver:




Terminal strip X2

Position of terminal strips (☞ 5.4.3, Page 36)

Configuration of the pins of terminal strip X2

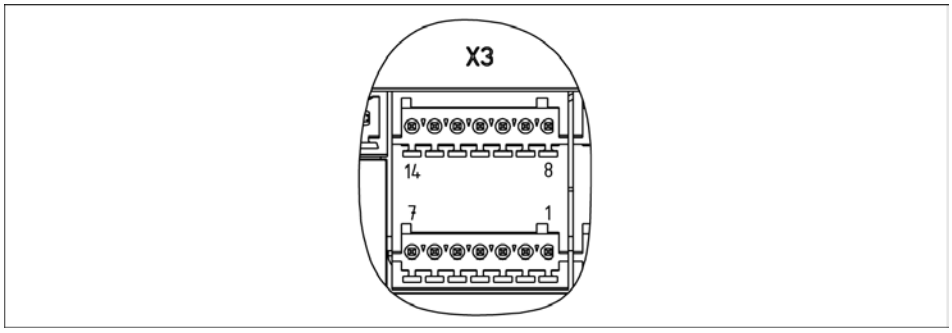
| Pin | Function | Cable color (diff. encoder) |
|---|---|---|
| 1 | Resolver signal reference + | - |
| 2 | Resolver signal COSINUS + | - |
| 3 | Resolver signal COSINUS - | - |
| 4 | Resolver signal SINUS + | - |
| 5 | Resolver signal SINUS - | - |
| 6 | Encoder track A (or Adiff) | Black |
| 7 | Encoder track B (or Bdiff) | White |
| 8 | Encoder track C (or Adiff\) | Violet |
| 9 | +5V for encoder and Hall sensor | Red |
| 10 | GND for encoder and Hall sensor | Blue |
| 11 | Hall sensor 1 | Yellow |
| 12 | Hall sensor 2 | Pink |
| 13 | Hall sensor 3 | Grey |
| 14 | Brake - | Brown (0,34mm²) |
| 15 | Brake + | White (0,34mm²) |
| 16 | Resolver signal reference - | - |

### 5.4.7 Configuration of terminal strip X3 of the MCS-06 controller

The strands with 0.15 mm² cross-section are required.

**Terminal strip X3**

Terminal strip X3 serves for connecting digital inputs and outputs, the encoder and the voltage supply +24 V DC of the logic:




Terminal strip X3

Position of terminal strips (☞ 5.4.3, Page 36)

Configuration of the pins of terminal strip X3

| Pin | Function | Cable color (diff. encoder) |
|---|---|---|
| 1 | Encoder track Bdiff\ | Brown |
| 2 | Encoder track Cdiff | Copper |
| 3 | Encoder track Cdiff\ | Orange |
| 4 | Digital output 1 | - |
| 5 | Digital output 2 | - |
| 6 | Digital output 3 | - |
| 7 | Digital output 4 | - |
| 8 | +24V logic supply | - |
| 9 | GND logic supply | - |
| 10 | Digital input 4 | - |
| 11 | Digital input 3 | - |
| 12 | Digital input 2 | - |
| 13 | Digital input 1 | - |
| 14 | Default | - |

## Configuration of in- and outputs

Inputs and outputs of terminal strip X3

| Pin | Designation | Application: Program | Application: Normal |
|---|---|---|---|
| 13 | DI1 | Release / External reference switch (as of Firmware 1.20) | Digital input (IN0) |
| 12 | DI2 | Sentence selection | Digital input (IN1) |
| 11 | DI3 | Sentence selection | Digital input (IN2) |
| 10 | DI4 | Sentence selection | Digital input (IN3) |
| 4 | DO1 | Reference (low active) | Digital output (OUT0) |
| 5 | DO2 | Error message (low active) | Digital output (OUT1) |
| 6 | DO3 | Depending on configuration (low active) ☞ See table below | Digital output (OUT2) |
| 7 | DO4 | Movement finished (low active) | Digital output (OUT3) |

Switching possibilities of the output DO3 via Motion Tool Schunk (as of Firmware V1.22)

| Setting | Description |
|---|---|
| Normal | Digital output via CMD_DIO switchable |
| Status + movement | OUT2 reports, if the module is moving. |
| Status + position achieved | OUT2 reports, if the module achieved a position. |
| Status + brake | OUT2 reports the condition of the brake. |
| Status + warning | OUT2 reports, if a warning is pending. |
| Status + program run | OUT2 indicates, if the module is situated in a program run. |

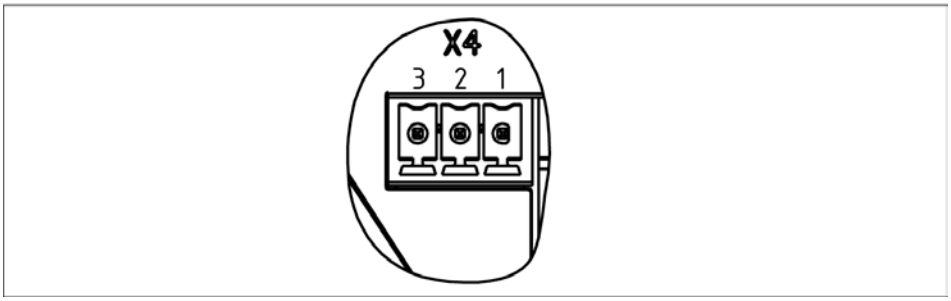
**NOTE**

Further information and usage options of terminal stip X3 are contained in the configuration tool "Motion Tool Schin (MTS)" (☞ DVD, document: MotionToolSchunk.pdf). The digital input IN0 cannot be used as external reference switch as long as the gripper is in program mode. The digital input IN0 can only be used with the setting "normal" if the referencing is adjusted on "external switch IN0".

### 5.4.8 Configuration of terminal strip X4 of the MCS-06 controller

**Terminal strip X4**

Terminal strip X4 serves for connecting the voltage supply +24 VDC of the power:




Terminal strip X4

Position of terminal strips (☞ 5.4.3, Page 36)

Configuration of the pins of terminal strip X4

| Pin | Function |
|---|---|
| 1 | +24 V power supply |
| 2 | GND power supply |
| 3 | PE protective conductor |

### 5.4.9 Pin assignment of communication interfaces

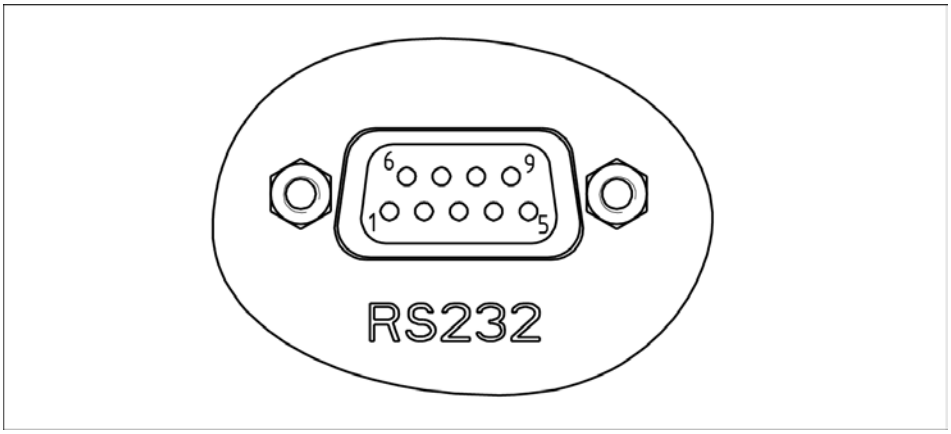
The MCS-06 has curently three communication interfaces (RS232, CAN, Profibus DP). The controller can be actuated with the SCHUNK Motion Protocol (SMP) via these interfaces.

- Information on the SMP (☞ 5.4.3, Page 36)

All communication interfaces can be connected at the same time, however, only one of them may be active.

**Connection RS232**

The RS232 is connected via a 9-pin SUB-D plug from the control (PC / SPS) to the controller (MCS-06):




RS232 interface

- Position of the plugs (☞ 5.4.3, Page 36)

Due to its properties the communication interface RS232 is not suitable as fieldbus.

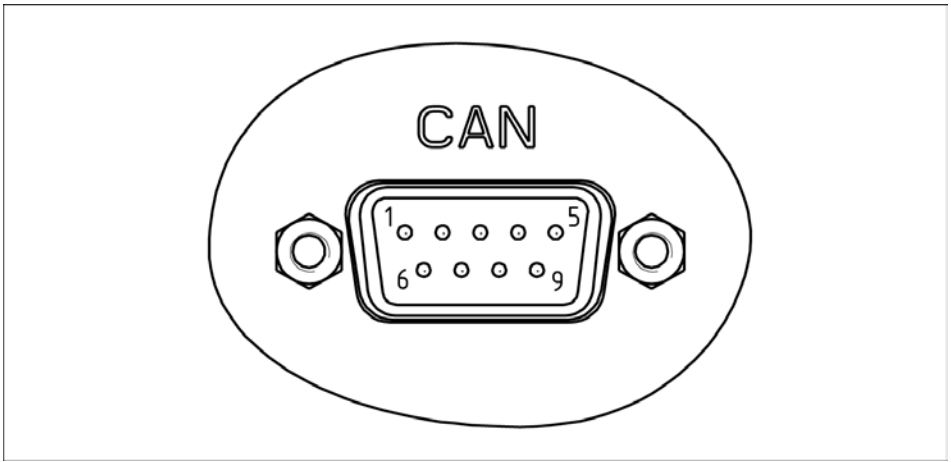
- The RS232 interface should only be used as a parameterization interface.

Configuration of the pins for RS232 interface

| Pin | Function | Description |
|---|---|---|
| 1 | - | - |
| 2 | TxD | Transmit data |
| 3 | RxD | Receive data |
| 4 | - | - |
| 5 | GND | Reference potential for data lines |
| 6 | - | - |
| 7 | - | - |
| 8 | - | - |
| 9 | - | - |

**Connection CAN**

The CAN is connected via a 9-pin SUB-D bushing from the control (master) to the controller (MCS-06):




CAN interface

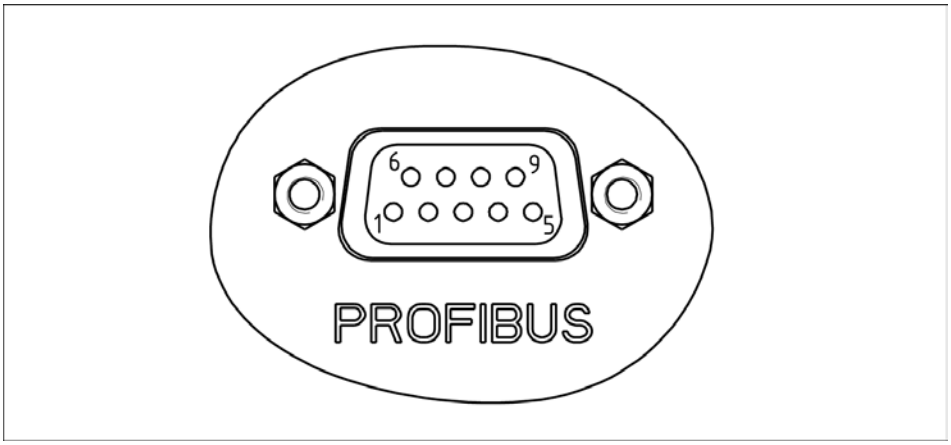
Position of the plugs (☞ 5.4.3, Page 36)

Configuration of the Pins for CAN interface

| Pin | Function | Description |
|---|---|---|
| 1 | - | - |
| 2 | CAN-L | CAN BUS signal (dominant low) |
| 3 | - | - |
| 4 | - | - |
| 5 | CAN_SHLD | Optional shielding |
| 6 | - | - |
| 7 | CAN-H | CAN BUS signal (dominant high) |
| 8 | - | - |
| 9 | - | - |

**Connection Profibus DP**

The Profibus DP is connected via a 9-pin Profibus plug from the control (master) to the controller (MCS-06):



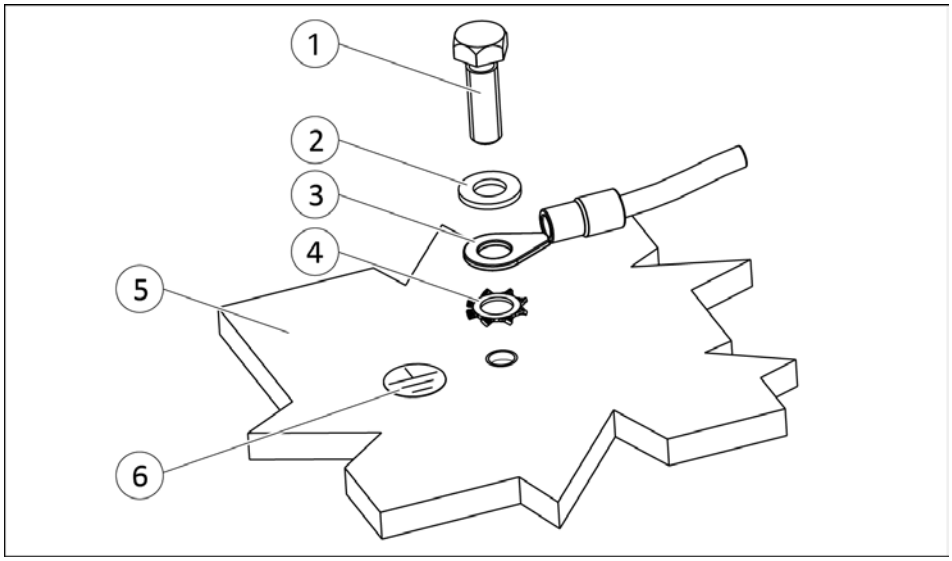

Profibus DP interface

Position of plugs (☞ 5.4.3, Page 36)

Configuration of the pins for the Profibus DP interface

| Pin | Function | Description |
|---|---|---|
| 1 | - | - |
| 2 | - | - |
| 3 | RxD/TxD-P | Receive / transmit data plus line (B line) |
| 4 | - | - |
| 5 | GND | Reference potential for 5V supply voltage |
| 6 | +5 V | Supply voltage +5 V DC |
| 7 | - | - |
| 8 | RxD/TxD-N | Receive / transmit data N line (A line) |
| 9 | - | - |

## 5.5 Connecting ground cable




Ground connection

| | | | |
|---|---|---|---|
| 1 | Screw | 4 | Toothed lock washer |
| 2 | Plain washer | 5 | Product |
| 3 | Cable lug | 6 | Ground marking |

A ground connection must be established between the product and the machine on the customer's premises.
The ground cable must be mounted to the threaded hole marked by the ground marking. If there is no such threaded hole, mount the ground cable to another free threaded hole of the product.

**NOTE**

Do not mount the ground cable to a threaded hole that is already mechanically used for something else, e.g. for screwing on accessory. Always mount the ground cable individually.

Always use all components of the screw connection and install them in this order: plain washer, cable lug, and toothed lock washer. See "Ground connection" diagram.

## 5.6 Function and handling

**NOTICE**

**Possible damage of the gripper, due to insufficient lubrication (dry running) at permanent short strokes.**
**Residues on the toothed belt may lead to blocking of the gripper base jaws.**

- Observe maintenance intervals. (☞ 7, Page 57)
- Travel through the entire stroke after every 1,000 cycles or at least once a day.

**NOTICE**

**Danger of collision after recommissioning the controller.**

- When automatically adjusting the commuting offset, the gripper must be able to perform its full stroke.

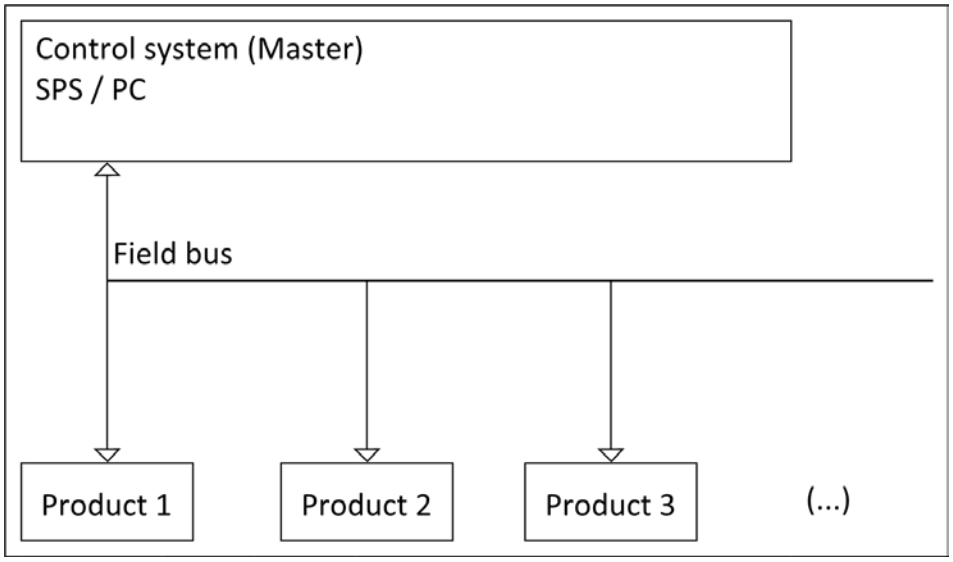
**NOTE**
With the start of the gripping process, the gripping force is acting on the gripper fingers. This force proportionally depends on the current value, meaning: The bigger the current, the bigger the gripping force.

The gripper's servo axis normally moves like on a mechanical stop. When handling the module, the following must be observed:

- The max. gripping force refers to the loads of the guides. For this reason, it may only be gripped with the maximal admissible current (☞ 3.2, Page 23). It is recommended to position into the workpiece in the positioning mode with speed default and current limitation ("gripping force default"). Due to the cascaded control, the gripper adjusts the current to the set value after the gripper fingers touched the workpiece.

## 5.7 Commissioning and system integration via the SCHUNK MCS-06 controller

### 5.7.1 System structure




System structure

**Data format** The data is transferred in INTEL Format (Little Endian For-mat).

**NOTE**

The number of connected products depends on the used bus system. A maximum of 255 IDs can be assigned. For more information, see *Motion Control* document.

### 5.7.2 SCHUNK Motion protocol


SCHUNK Motion protocol

The data frame of the Motion protocol always includes the following elements:

- D-Len (1 Byte)
- Kommando Code (1 Byte)

D-Len (Data Length) specifies the number of subsequent items of user data including the command byte. The data frame consists of one byte, therefore a Motion protocol message can transfer a maximum of 255 data bytes.
The D-Len byte is always followed by the command code, consisting of one byte. If necessary, the command code is followed by the relevant parameters required. If required, a "master command" can be extended with a "sub-command".
All commands sent are immediately confirmed by the module with a response (acknowledge). This response also uses the data frame described above (D-Len, command code, any parameters). If the request has been successfully processed, D-Len always has a value that is not equal to "0x02". If the request failed, D-Len has the value "0x02".

**NOTE**
To get to know the special features of the different bus systems, see *Motion Tool* document.

### 5.7.3 Important commands

**DANGER**

**Risk of injury by unexpected movements of the machine/system!**
When settings and parameter entries are faulty, components can move in an uncontrolled manner and cause serious injuries.

- Only specialists or specially trained personnel should carry out settings and enter parameters.

**NOTE**
In all examples only the required parameters are listed, not the optional ones. In the examples "M" stands for Master and "S" for Slave (= product).

**NOTE**
For further information on the commands, see *Motion Control* document.

**Reference run**

**Command code:** 0x92

**Description**: A reference drive is executed.

**Parameter:** (Master -> Slave): none.

**Response** (Slave -> Master): "OK" (0x4F4B) if successful. Product is executing the command.

**Other:** Spontaneous response is possible

Example for REFERENCE

| | D-Len | Cmd | Param | Meaning |
|---|---|---|---|---|
| M -> S | 0x01 | 0x92 | | |
| S -> M | 0x03 | 0x92 | 0x4F0x4B | Successfully referenced |

**Positioning run**

**Command code:** 0xB0

**Description:** Moves the product to a specified position.

**Parameter** (Master -> Slave):

- Position in configured unit system (must be specified)
- Velocity (optional)
- Acceleration (optional)
- Current (optional)
- Jerk (optional)

**Response** (Slave -> Master): If possible, the time that the module needs for the movement is returned.

**Other:** Spontaneous response occurs when position is reached or if positioning run is terminated earlier

Example for MOVE POS

| | D-Len | Cmd | Param | Meaning |
|---|---|---|---|---|
| M -> S | 0x05 | 0xB0 | 0x00 0x00 0x20 0x41 | Move to position 10.0 [mm] |
| S -> M | 0x05 | 0xB0 | 0xCD 0xCC 0x04 0x41 | Will reach position in 8.3 [sec] |

**Velocity run**

**Command code:** 0xB5

**Desciption:** A velocity run is executed.

**Parameter** (Master -> Slave)**:**

- Velocity in the configured unit system (must be specified)
- Current (optional)

**Response** (Slave -> Master)**:**"OK" (0x4F4B) if successful. Product executes the command.

**Other:** Spontaneous message is possible if the product is no longer moving.

Example for MOVE VEL

| | D-Len | Cmd | Param | Meaning |
|---|---|---|---|---|
| M -> S | 0x05 | 0xB5 | 0x9A 0x99 0x31 0x41 | Execute velocity run with 11.1 [mm/s] |
| S -> M | 0x05 | 0xB5 | 0x4F 0x4B | |

**Stop the product**

**Command code:** 0x91

**Description:** Produkt braked and stopped in the current position.

**Parameter**(Master -> Slave)**:** None.

**Response**(Slave -> Master)**:** "OK" (0x4F4B) if successful.

**Other:** Spontaneous message is possible.

Example for CMD STOP

| | D-Len | Cmd | Param | Meaning |
|---|---|---|---|---|
| M -> S | 0x01 | 0x91 | | |
| S -> M | 0x03 | 0xB5 | 0x4F 0x4B | OK |

**Stop the product immedately**

**Command code:** 0x90

**Description:** Product is stopped as quickly as possible. If a brake is fitted and configured appropriately, it is activated immediately. The motor phases are short-circuited.

**Parameters**(Master -> Slave)**:** None.

**Response** (Slave -> Master)**:** Error message "ERROR EMERGENCY STOP" is triggered.

**Other:** Can only be reset by "CMD ACK."

Example for CMD EMERGENCY STOP

| | D-Len | Cmd | Param | Meaning |
|---|---|---|---|---|
| M -> S | 0x01 | 0x90 | | |
| S -> M | 0x03 | 0x88 | 0xD9 | Emergency stop executed |

**Achknowledge error**

**Command code:** 0x8B

**Description:** Acknowledgment of an error message.

**Parameter**(Master -> Slave)**:** None.

**Response** (Slave -> Master)**:** „OK“ (0x4F4B)

**Others:** If all errors have been successfully acknowledged, an "INFO NO ERROR“ info message is sent after sending "OK“ (0x4F4B).

Example for CMD ACK

| | D-Len | Cmd | Param | Meaning |
|---|---|---|---|---|
| M -> S | 0x01 | 0x8B | | |
| S -> M | 0x03 | 0x8B | 0x4F 0x4B | OK |

# 6 Troubleshooting

## 6.1 Behavior in case of product malfunctions

### 6.1.1 Gripper does not move

| Possible cause | Corrective action |
|---|---|
| Motor connected incorrectly | Check the connection between motor and controller |
| Communication not possible | Check bus connection |

### 6.1.2 Gripping force decreases / gripper opens and closes abruptly

| Possible cause | Corrective action |
|---|---|
| Dirt deposits | Clean and, if necessary, lubricate |
| Dry running of the guide | Lubricate the product, (☞ 7, Page 57) |

### 6.1.3 Gripper does not travel through the entire stroke

| Possible cause | Corrective action |
|---|---|
| Dirt deposits between base jaws and guide | Clean and, if necessary, re-lubricate. |
| Dirt deposits between cover plate and chuck piston | Clean and, if necessary, re-lubricate |

## 6.2 Motor does not turn

| Possible cause | Corrective action |
|---|---|
| Motor lines are defective | Check winding resistances: Motor lines towards each other: R = 0.4...2.0 Ω (depending on cable length) |

## 6.3 Behavior in case of malfunctions of the MCS-06 SCHUNK controller

### 6.3.1 LEDs on Controller Do Not Light Up

| Possible cause | Corrective action |
|---|---|
| No voltage connected | Check the power and logic voltage supplies on the controller |
| Master (control unit) on the field bus is not active | Check the master; reactivate fieldbus communication if necessary |

### 6.3.2 POW LED (Green) Does Not Light Up

| Possible cause | Corrective action |
|---|---|
| No voltage connected | Check power supply on the controller |

### 6.3.3 RDY LED (Green) Does Not Light Up

| Possible cause | Corrective action |
|---|---|
| Incorrect air connections | Check connection |
| Logic voltage supply missing | Check the logic voltage supply on the controller |

### 6.3.4 ERR LED (Red) Flashing

**NOTE**
Troubleshooting; see the *Motion Control* document.

### 6.3.5 Product stops abruptly

If the delivered GSD file has been integrated, the product can report this by means of the **ERROR_CABLE_BREAK (0x76)** parameter.

| Possible cause | Corrective action |
|---|---|
| Bus cable fault (connection interrupted). | Check bus cable for damage and, if necessary, replace it. |
| | For more troubleshooting, see *Motion Control*. |

### 6.3.6 Module Does Not Move/Respond

| Possible cause | Corrective action |
|---|---|
| Encoder/Resolver falsch angeschlossen. | Check connection. |
| Motor connected incorrectly. | Check motor, change if necessary. |

# 7 Maintenance

## 7.1 Maintenance intervals

| Size | EVG 55 |
|---|---|
| Interval [Mio. cycles] | 2 |
| Travelling through the entire stroke [cycles] | 1,000 |

Check after every production day or at least once a day if the profiled rail guides of the gripper base jaws are sufficiently lubricated.

## 7.2 Measures for preserving the gripper's function

The maintenance and lubrication intervals must be adapted to the ambient and operating conditions.

Observe the following factors:

- Extreme operating temperatures
- The effects of condensation
- High vibration loading
- Use in a vacuum
- Very dynamic operation
- Permanent small stroke movements
- Influence of foreign substances (e.g. vapors or acids)

Preserving the gripper's function:

- Do not expose the gripper to drilling emulsion.
- Operate the gripper in an ambient temperature between +5°C and +55°C.
- Observe the bending radii when laying the cable. No torsional movements must occur.
- Since it is a servo system motor, it can generate the indicated forces only for a short term. These forces may overload the gripper and mechanically destroy it. Every overload leads to a decrease of the system's service life.

  Do only operate the gripper within the scope of its technical data.
- Gripping force:

  The repeat accuracy of the gripping force is ±15%. The breakaway torque can vary significantly from gripper to gripper.

  If an automatic gripper change shall be enabled, the breakaway torque must be determined during an initialization of the superior control.

  For more information on the programming, see control manual.

## 7.3 Cleaning

### 7.3.1 Gripper

The module corresponds to IP code 20.

- Clean the module dry, remove all coarse dirt and chips from the cavities of the module.
- Check for damage and, if necessary, replace the module.

Any repair work on the module may only be carried out by SCHUNK.

### 7.3.2 Controller

The module corresponds to IP code 20.

- Clean the module dry, remove all coarse dirt and chips from the cavities of the module.
- Check for damage and, if necessary, replace the module.

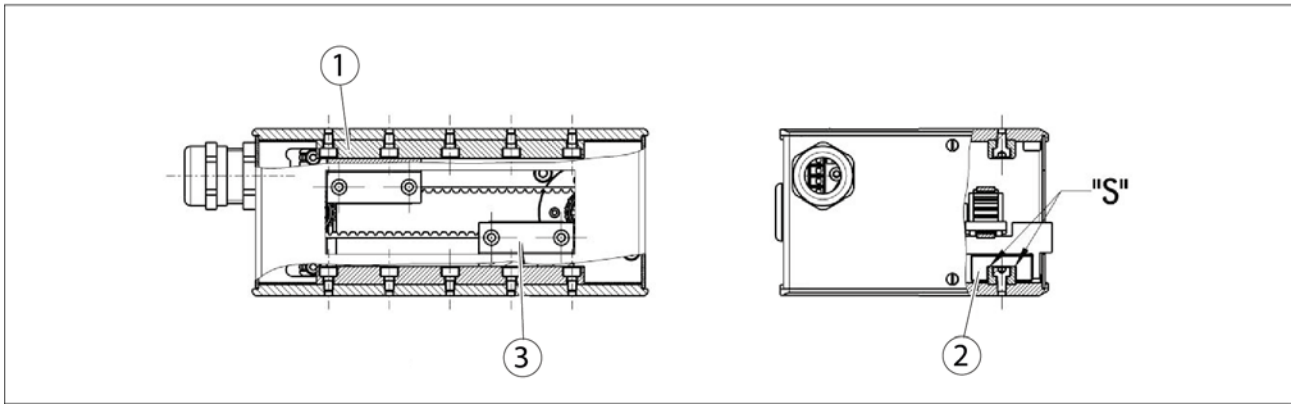
## 7.4 Lubricants/lubrication points

SCHUNK recommends the lubricants listed.

During maintenance, treat all greased areas with lubricant. Thinly apply lubricant with a lint-free cloth.

| Lubrication point | Lubricant |
|---|---|
| Metallic sliding surfaces | THK AFC-Grease |

The lubricant quantity depends on the stroke lengths and stroke cycles.




Lubrication point „S“

| | | | |
|---|---|---|---|
| 1 | Profile rail | 2 | Profile carriage |
| 3 | Gripper base jaw | | |

1 Move gripper in „open“ position.

2 Apply lubricant at lubrication point „S“ with a brush.

3 Distribute the lubricant:
Travel two or three times through the entire stroke.

## 7.5 Disassembly and assembly

***NOTICE***

**Risk of damage to the product!**
Faulty disassembly of the product can cause damage to the mechanics and internal electronics.

- Allow only SCHUNK to disassemble the product.

# 8 Translation of original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1.B of the European Parliament and of the Council on machinery.

| | |
|---|---|
| Manufacturer/ Distributor | SCHUNK GmbH & Co. KG Spann- und Greiftechnik<br>Bahnhofstr. 106 – 134<br>D-74348 Lauffen/Neckar |

We hereby declare that on the date of the declaration the following incomplete machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

| | |
|---|---|
| Product designation: | 2-Finger Parallelgreifer / EVG 55 / elektric |
| ID number | 0306020 ... 0306025, 0306030 ... 0306031 |

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

| | |
|---|---|
| DIN EN ISO 12100:2011-03 | Safety of machinery - General principles for design - Risk assessment and risk reduction |

The manufacturer agrees to forward on demand the relevant technical documentation for the partly completed machinery in electronic form to national authorities.

The relevant technical documentation according to Annex VII, Part B, belonging to the partly completed machinery, has been created.

Person authorized to compile the technical documentation:
Robert Leuthner, Address: see manufacturer's address

*Signature: see original declaration*

Lauffen/Neckar, July 2016

p.p. Ralf Winkler,
Head of Gripping Systems
Development