

Assembly and operating instructions

Electric Smart Rotary Module SREH-50-IOL



Translation of the Original Assembly Instructions EN

■ SREH-50-IOL ⇒ Order no.: 50503985

Dear Customer

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

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

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

We wish you every success with our products!

With kind regards

Your Afag team

© Subject to modifications

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

Updates of our documentations



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

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

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1 General

1.1 Contents and purpose of these assembly instructions

These assembly instructions contain important information on assembly, commissioning, functioning and maintenance of the smart rotary module SREH-50-IOL to ensure safe and efficient handling and operation.

Consistent compliance with these assembly instructions will ensure:

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

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

1.2 Explanation of symbols

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

DANGER



Danger!

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

WARNING



Warning!

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

CAUTION



Caution!

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

NOTICE

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



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

Further warning signs:

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

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

1.3 Additional symbols

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

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

1.4 Applicable documents



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

1.5 Warranty

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

- 24 months from initial operation and up to a maximum of 27 months from delivery.
- Wear parts are excluded from the warranty (The customer is entitled to a product free of defects. *This does also apply to defective accessories and wear parts. Normal wear and tear are excluded from the warranty.*)

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

The warranty shall expire in the following cases:

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

1.6 Liability

No changes shall be made to the smart rotary module unless described in this instructions manual or approved in writing by Afag Automation AG.

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

1.7 Support tools

The following support tools are available on the homepage www.afag.com for the design and commissioning of the smart rotary module for your specific applications:

- PerfectCycle ⇒ Designing the travel time for your application
- CAD ⇒ For your construction
- EPLAN ⇒ For your electrical planning
- Function modules ⇒ For your commissioning

2 Safety instructions

2.1 General

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

Safe handling and trouble-free operation of the module requires knowledge of the basic safety regulations.

Every person carrying out installation, commissioning, maintenance work or operating the module must have read and understood the complete user manual, especially the chapter on safety instructions.

Beyond this, there are rules and regulations regarding accident prevention that are applicable to the place of installation which must be observed.

Improper use may result in danger to life and limb of the user or third parties or in damage to the automation system or other material assets.



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

2.2 Intended use

The smart rotary module is intended for the shock-free rotary movement of loads in **non-hazardous** and in the ambient and operating conditions defined for this module (→ Chapter 3 Technical data).

The rotary modules are designed exclusively for rotating payloads that do not pose any danger to persons, property or the environment during manipulation. In combination with other modules the modules can be used as a pick & place station.

Any use beyond the described purpose is not in accordance with the intended use.



The intended use of the module also includes:

- Observance of all instructions given in this instructions manual.
 - Compliance with the inspection and maintenance work and the specifications in the data sheets.
 - Using only original spare parts.
-

2.3 Foreseeable misuse

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

Especially the following use is considered a misuse:

- Use in potentially explosive atmospheres

WARNING



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

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

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



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

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

2.4 Obligations of the operator and the personnel

2.4.1 Observe the assembly instructions

A basic prerequisite for safe and proper handling of the SREH-50-IOL module is a good knowledge of the basic safety instructions.



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

2.4.2 Obligations of the operating company

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

The operating company is required to use only personnel who:

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

The operating company is also required to:

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

2.4.3 Obligations of the personnel

All personnel working with the modules are required to:

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



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

2.5 Personnel requirements

2.5.1 Personnel qualification

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

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

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

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

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

Qualified personnel:

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

Qualified electrician:

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

Operator (trained personnel):

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





2.6 Personal protective equipment (PPE)

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

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

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

Personal protective equipment and the respective mandatory signs:

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

2.7 Changes and modifications

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

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



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

2.8 General hazards / residual risks

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

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

2.8.1 General hazards at the workplace

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

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



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

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

WARNING



Danger - Do not use in unsuitable environment!

The smart rotary module is designed for use in **non**-explosive atmospheres.

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

CAUTION



Risk of injury from being caught!

Rotative movements of the module can catch pieces of clothing, hair or materials and injure people.

- Maintenance and care should only be carried out by qualified personnel.
- Wear personal protective equipment!

CAUTION



Risk of injuries due to uncontrolled parts movements!

When connecting and operating the module, unexpected movements can cause personal injury or damage to property.

- Only qualified personnel may work with or on the module.

2.8.2 Danger due to electricity

DANGER



Danger! Risk of electric shock!

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

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

2.8.3 Dangers due to magnetic fields (effects on medical implants)

DANGER



Danger due to strong magnetic fields.

The built-in permanent magnet creates strong magnetic fields around the module, which can influence medical implants such as pacemakers or defibrillators or impair their function.

- Persons with a pacemaker must keep a safety distance of at least 10 [cm].
-

2.8.4 Danger due to high temperatures

CAUTION



Danger of burns due to heated housing!

The housing of the module can reach a temperature of approx. 60°C at a room temperature of 20-25°C during operation. This temperature continues to rise the higher the ambient temperature is.

- Do not touch the housing or wear protective gloves.
 - No temperature-sensitive parts must be in contact or fastened.
 - Allow the housing to cool down to ambient temperature before touching it without protective gloves.
-

2.8.5 Mechanical hazards

CAUTION



Danger of injury by moving components!

Limbs can be crushed by moving components!

- Work on and with the module may only be carried out by qualified personnel.
 - Never reach into the system during normal operation!
-

3 Technical data

3.1 Dimensional drawing SREH-50-IOL

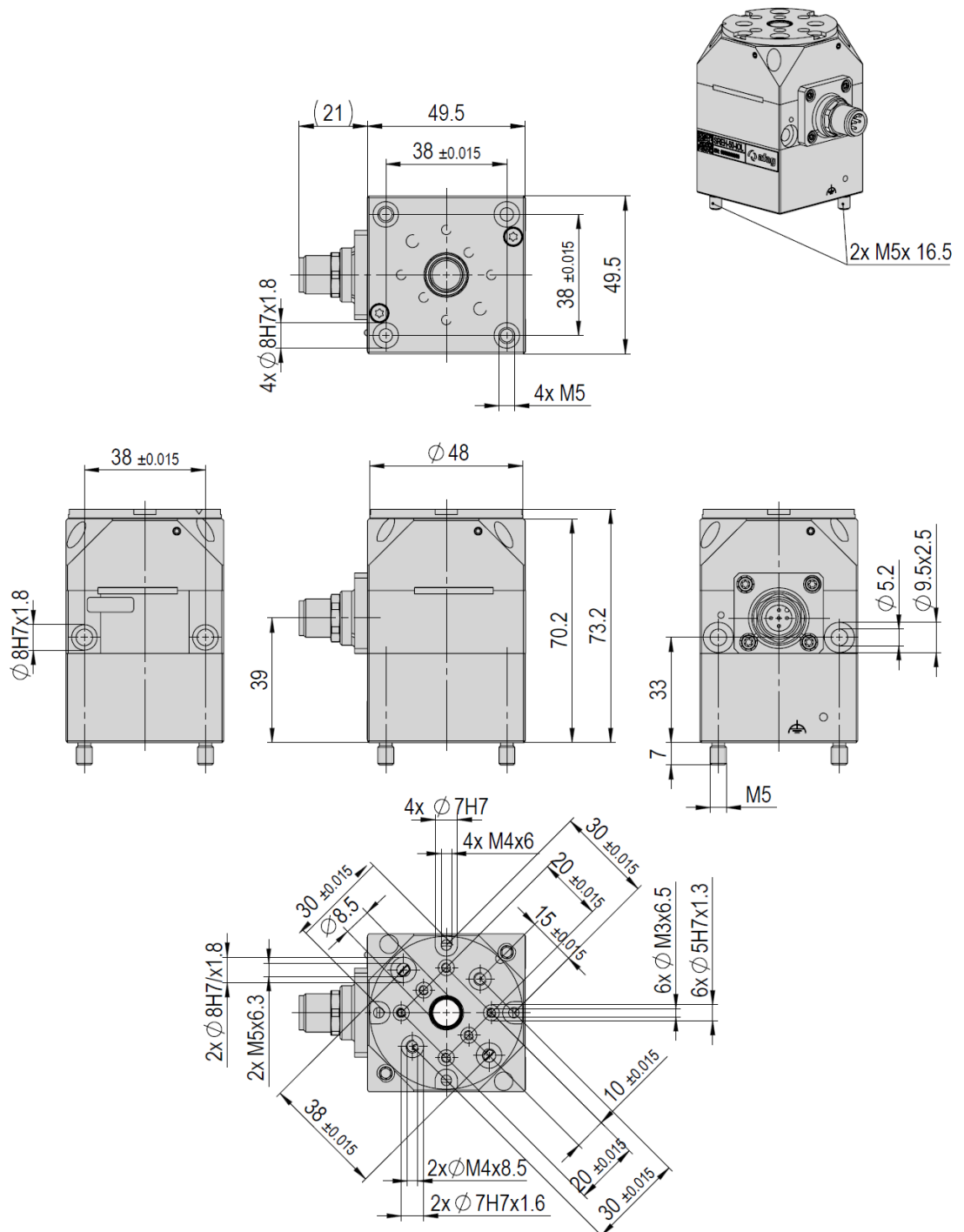


Fig. 1 Dimensional drawing smart rotary module SREH-50-IOL

Technical data

3.2 Technical data SREH-50-IOL

SREH-50-IOL	
Attachment grid (rear)	38 x 38 mm
Attachment grid (flange)	20 x 20, 30 x 30 and 38 mm
Attachment grid (lateral)	38 mm
Operating temperature	10 - 35 °C
Ambient temperature (min./max.)	0 - 50 °C
Storage temperature	5 - 50 °C
Humidity	< 90 %

Type	SREH-50-IOL
Order number	50503985
Net weight	0.6 kg
Maximum axial payload**	1350 N
Maximum radial payload**	790 N
Idling speed (continuous - maximum)	640 min ⁻¹ / 716 min ⁻¹
Torque (continuous - maximum)	0.45 Nm / 0.90 Nm
Nominal speed***	480 min ⁻¹
Rated torque***	0.17 Nm
Max. mass moment of inertia	15 x 10 ⁻⁴ kgm ²
Max. dynamic tilting moment	9 Nm
Repeatability*	± 0,015°
Radial concentricity	0.009 mm
Axial concentricity	0.023 mm
Rotation angle	∞
Hollow shaft	Ø 8.5 mm
Currentless multiturn	fourfold
Rated current	3 A
Max. current input	5 A
Supply voltage	24 VDC
Status display	LED-Ring
Communication interface	IO Link, Portkl. B, COM 3
Noise level	< 65 dB(A)
Protection class IP	IP 50
Clean room class ISO 14644-1	Class ISO 6
Mounting position	✚

* Achieved with centric load after appropriate settling time.

** The above maximum values depend on the application and must not be combined. In case of doubt, contact your Afag partner.

*** Nominal values apply at nominal voltage, at 22°C ambient temperature and without reduction of thermal resistance

The technical data refer to Afag standard test conditions.

Product conformity: RoHS-Directive 2011/65/EU and REACH Regulation (EG) 1907/2006.

Included in the delivery (Catalogue HT accessories)

- 2x Mounting screw M5x55
- 2x Centering sleeve Ø8x3.5
- 2x Countersunk screw M4x5
- 2x Rotation limitation SREH-50
- 2 x Set screw M5x16

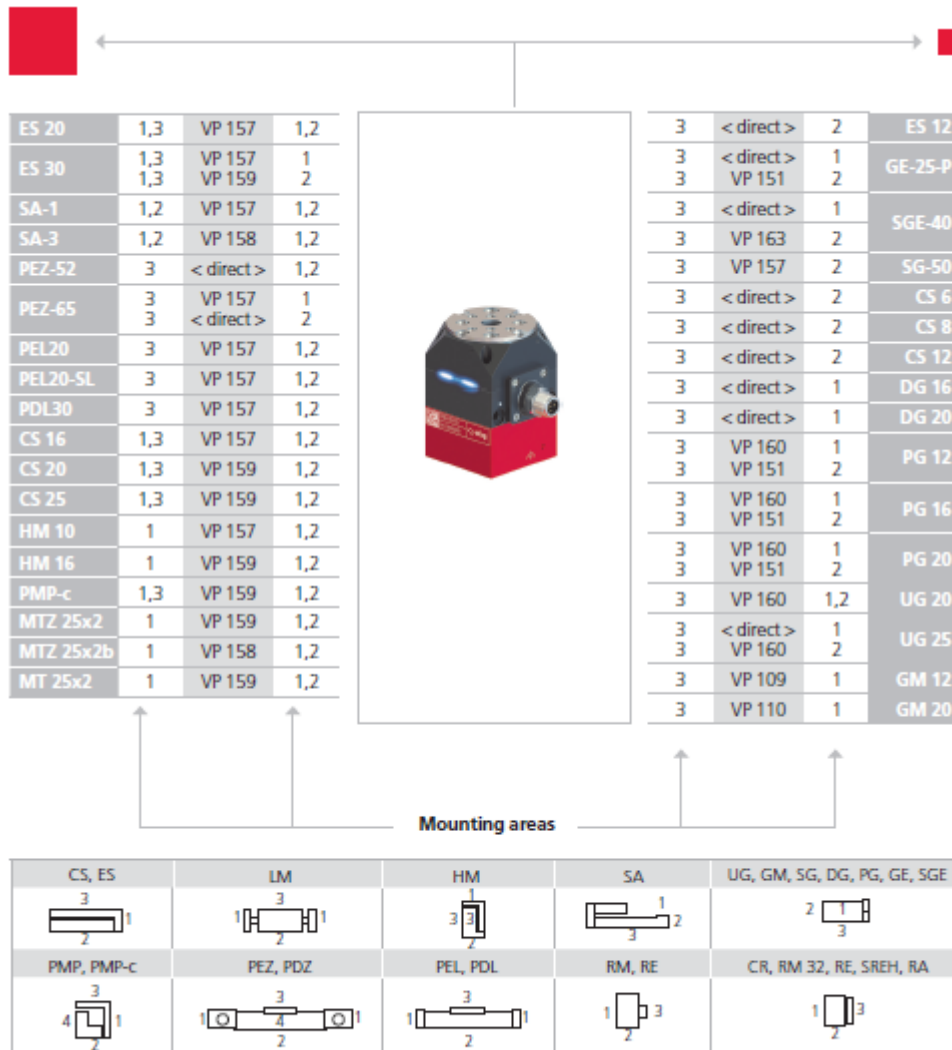
Accessories

- (Catalogue HT accessories)
- Sensor actuator cable



Equipped with H1 lubricant → food grade lubricant.

3.3 Preferred combinations SREH-50-IOL

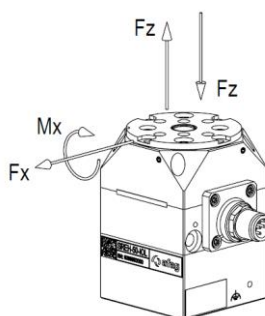


Note that there might be different mounting positions from one module to another one.

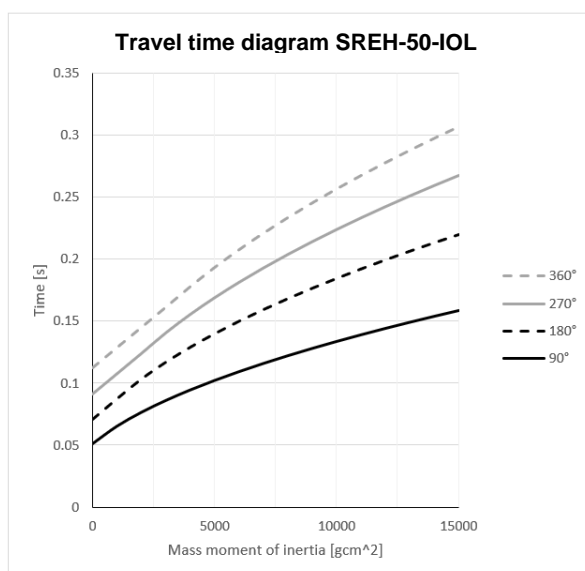
The required connection elements and the range of support columns are depicted in the catalogue HT accessories.

3.4 Module loads

Type	SREH-50-IOL
Max. axial traction force (Fz dynamic)	1350 N
Max. axial press-in force (Fz dynamic)	1350 N
Max. radial force (Fx dynamic)	790 N
Max. tilting moment (Mx dynamic)	9 Nm



3.5 Positioning time



Inertia [gcm ²]	Settling time* ±0.1° [ms]	Settling time ±0.015° [ms]
0	30	100
1000	30	100
2000	35	100
5000	40	100
7500	40	100
8500	40	115
10000	45	125
12500	45	140
15000	50	150

The travel time diagram refers to centric loads. Depending on the required position tolerance, the settling time must be added to the travel time shown in the diagram.

The table next to the diagram shows the load-dependent maximum settling time* for a position tolerance of $\pm 0.1^\circ$ and $\pm 0.015^\circ$. The values given apply to a waiting time of 25ms. In the delivery state, the settling timeout is configured to 100ms. This means that it may have to be adjusted depending on the position tolerance and load.

With a required position tolerance of $\pm 0.4^\circ$, the drive is already stable within the tolerance window at the end of the travel time, independent of the load. I.e. the waiting time can be set to 0ms and the positioning time thus corresponds to the travel time.



The precise swivel time calculation can be determined via the online engineering tool **Afag PerfectCycle** www.perfectcycle.afag.com.

4 Transport, packaging and storage

4.1 Safety instructions for transport



CAUTION

Risk of injury when unpacking the smart rotary module!

The servo grippers are packed in the original packaging (cardboard box). If handled incorrectly, the module may fall out of the box when unpacked and cause limb injuries.

- Carefully unpack the smart rotary module.



Also observe the safety instructions in [Chapter 2](#) “Safety instructions” in this manual.

4.2 Scope of supply



In addition to the assembly and operating instructions, a safety information sheet is enclosed with module.

This information sheet must be read by every person who carries out work with and on the module!



Fig. 2 Scope of delivery smart rotary module

[Unt]	SREH-50-IOL
1 x	Smart rotary module (weight 0.6 kg)
2 x	Centring sleeve Ø8x3.5
2 x	Fastening screws M5x55 mm
2 x	Rotation limitation SREH-50
2 x	Set screw M5x16 mm
2 x	Countersunk screw M4x5 mm
1 x	Assembly & operating instructions

4.3 Transport



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



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

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

4.4 Packaging

The smart rotary module is transported in the Afag Automation AG transport packaging. If no Afag packaging is used, the smart rotary module must be packed in such a way that it is protected against shocks and dust.

NOTICE

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

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

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

4.5 Storage

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

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

5 Design and description

5.1 Design smart rotary module



Fig. 3 Design of the smart rotary module

- | | |
|--|---------------------------------------|
| 1. LED band | 5. Status LED IO-Link |
| 2. Electronics housing with controller | 6. IO-Link connector M12 Port Class B |
| 3. Motor housing | 7. Gearbox case |
| 4. FE connection thread M3x6 mm | 8. Output flange |

5.2 Product description

The SREH-50-IOL module is a highly compact electric smart rotary module for rotating payloads.

The controller integrated in the rotary module is controlled via a 5-pole IO-Link and is equipped with two separate, galvanically isolated supplies - one supply each for the logic and one for the motor.

The SREH-50-IOL can rotate endlessly and is equipped with an absolute encoder with 4-fold multiturn.

As no external controller is required, the smart rotary module is simply connected via a connecting cable from the SREH-50-IOL to the IO-Link master provided by the customer. This connecting cable is used for both power supply and signal exchange.

Further technical information can be found in the chapter 3 “Technical data” in these installation instructions.

5.3 Accessories

Cr.	Designation	Order Number
1	Connecting plate VP 157	50572976
2	Connecting plate VP 158	50572977
3	Connecting plate VP 159	50572982
4	Connecting plate VP 160	50573133
5	Connecting plate VP 161	50547871
6	Connecting plate VP 162	50547872
7	Sensor actuator cable-S4-1.5m-0-0-2	50573863
8	Sensor actuator cable-S4-1.5m-90-0-2	50573864
9	Sensor actuator cable-S4-3m-0-0-2	50573865
10	Sensor actuator cable-S4-3m-90-0-2	50573866
11	Sensor actuator cable-S4-5m-0-open-2	50573867
12	Sensor actuator cable-S4-5m-90-open-2	50573868
13	Sensor actuator cable-S4-10m-0-open-2	50573870
14	Sensor actuator cable-S4-10m-90-open-2	50573871

6 Installation, assembly and setting

The SREH-50-IOL module is an incomplete machine. For safe operation, the module must be integrated into the safety concept of the system in which it is installed.

During normal operation, it must be ensured that the user cannot interfere with the working area of the smart rotary module. This can be achieved through suitable protective measures (e.g., enclosure, light grid).

When the system is running in special operating modes, it must be ensured that there is no danger to the operator.



The system operator is responsible for the installation of the SREH-50-IOL in a system!

6.1 Safety instructions for installation and assembly

CAUTION



Personal injury caused by hot surfaces!

High surface temperatures of more than 60 °C can occur on the modules. There is a risk of injury and damage to property.

- Do not touch the housing or wear protective gloves!
- No temperature-sensitive parts must be in contact or fastened!
- Before touching hot surfaces without protective gloves, make sure they have cooled down to ambient temperature.

CAUTION



Risk of injuries due to uncontrolled parts movements!

When connecting to the control system and during operation of the smart rotary modules, unpredictable movements may occur and cause injury/property damage.

- Before working on the module SREH-50-IOL, make sure that the motor supply is switched off and secured against unintentional restarting
 ➔ Chapter 6.3.1

CAUTION



Danger due to inadequate fastening!

The use of unsuitable fasteners and incorrect torques will result in the module not being held in position by the fastener and may result injury and/or property damage.

- Only use the screws and centring sleeves intended for the SREH-50-IOL with the appropriate torques!
- The module may only be attached by trained personnel.



No warranty will be granted for damage caused by improper installation on the part of the operating company.



Also observe the safety instructions in ➔Chapter 2 “Safety instructions” in this manual.

6.2 Assembly and attachment

The SREH-50-IOL can be installed vertically or horizontally. The module can be screwed through or screwed onto the side or the lower surface of the motor housing.

NOTICE

Risk of material damage due to manipulation of the modules!

Unauthorised manipulation of the smart rotary module can cause damage to property. In such cases, any warranty will be voided!

- Basically, no manipulations may be made to the module or to the screws and nuts.
- The rubber covers (Fig. 4) must not be removed!
- The only exception: the two integrated module fastening screws, which are screwed back from below for mounting the module (➔Chapter 6.2).

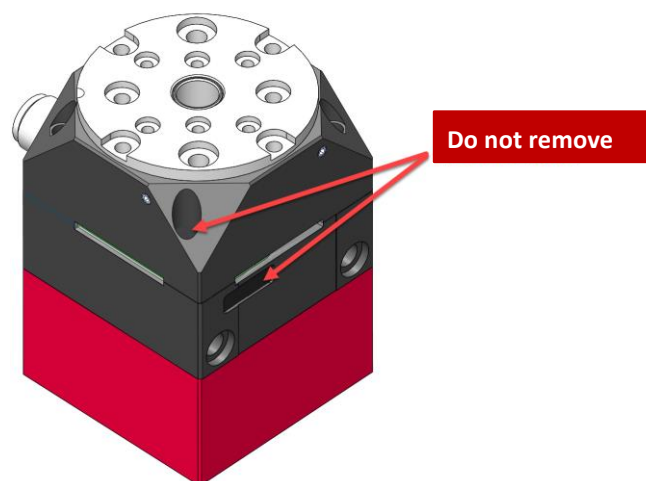


Fig. 4 Rubber covers on the SREH-50

6.2.1 Fastening the module



Suitable connecting plates must be used for mounting on Afag modules.

Lateral attachment

The M5x55 cap screws and the $\varnothing 8$ centring sleeves supplied in the accessory kit can be used for lateral fastening.

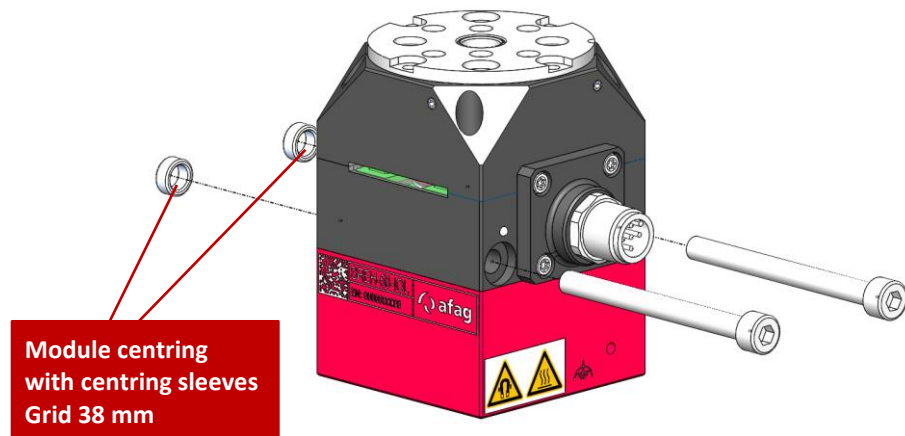


Fig. 5 Lateral attachment of the module (grid 38 mm)

Fastening from below

To fasten the module from below, the 4xM5 threads with centring sleeve hole can be used (screws not included).

In addition, the smart rotary module can be screwed through from above with the integrated M5 screws (Fig. 7). Use a hexagonal spanner size 3 mm.

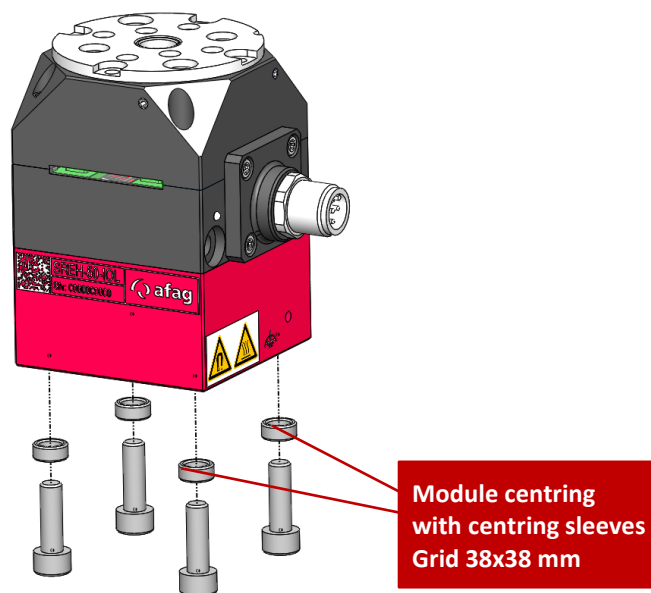


Fig. 6 Fastening the module from below (grid 38x38 mm)

As standard, the screws are screwed back into the upper area of the motor housing so that the full thread length is available for fastening from below.

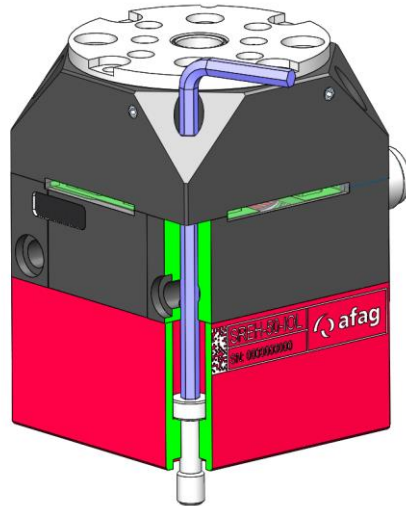


Fig. 7 Screwing the screws back into the upper area



For positioning use the centring sleeves included in the supply. Insert the centering sleeves into two diagonally opposite holes of the attachment grid.

6.2.2 Tightening torques

For assembling use screws with the following minimum specifications:

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

Thread	Tightening torque
M2	0.3 ... 0.35 Nm
M2.5	0.5 ... 0.73 Nm
M3	1.1 ... 1.4 Nm
M4	2.6 ... 3.3 Nm
M5	5.2 ... 6.5 Nm
M6	9.0 ... 11.3 Nm
M8	21.6 ... 27.3 Nm

6.2.3 Hollow shaft

The smart rotary module has a hollow shaft (Fig. 8 marked yellow) that can be used for a user-specific task (e.g. passing cables or shafts).

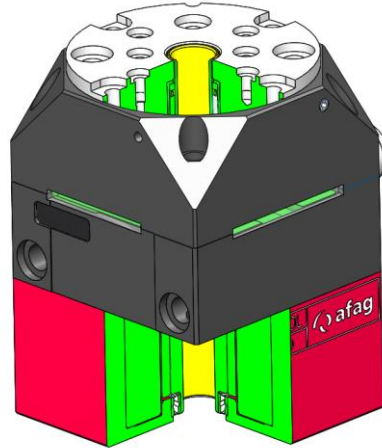


Fig. 8 Exemplary representation of the hollow shaft

CAUTION

Danger from rotating parts!

When an object is inserted into the hollow shaft of the module, the kinematic energy can be transferred to the object and accelerate it. This may result in injury or damage to property.

- Ensure that the module is de-energised when inserting objects into the rotor.
- Ensure that the objects do not touch the rotor.
- This activity may only be performed by trained personnel.



NOTICE

Risk of material damage due to mechanical load on the hollow shaft!

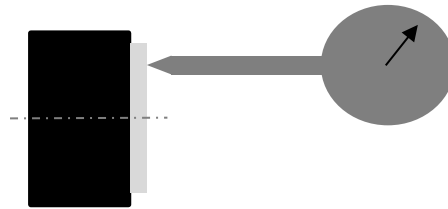
When using the hollow shaft, please note that it rotates at different speeds to the flange and that mechanical stress may cause damage to property.

- The hollow shaft must not be subjected to any mechanical load!

6.2.4 Concentricity

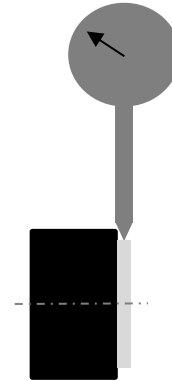
Concentricity was determined both axially and radially. The value reflects the difference of the extreme values at one rotation.

Axial runout



The maximum axial runout is 0.023 mm

Radial runout



The maximum radial runout is 0.009 mm

6.2.5 Rotation limitation

The rotation limitation (Fig. 9, 1) is used to prevent unintentional over-rotation of the output flange.

This is particularly advantageous in setup mode when external lines are routed to attachments of the output flange or external interference contours are present. In set-up mode, the rotation limitation prevents external cables from displacement and thus possible collisions.

This only works with a load of max. 10'000 gcm² and a maximum speed of 2000°/sec. The tracking error limitation must also be switched on.

Alternatively, the rotation limitation can also be set via the IO-Link configuration data. This option is deactivated in the delivery state (⇒ software manual).

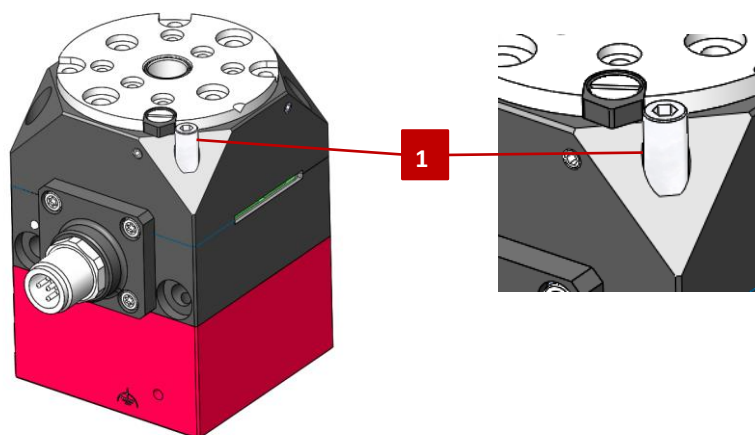


Fig. 9 Rotation limitation SREH-50-IOL

Scope of delivery rotation limitation

The rotation limitation is supplied as standard in the accessory pack and consists of the following components:

Units	Article no.	Designation	Fig.
2 x	50560145	Rotation limitation	
2 x	11001447	Set screw M5x16 mm	
2 x	50560381	Countersunk screw M4x5 mm	

Installation options and mounting of the rotation limitation

The rotation limitation can be mounted in the following ways:

Rotation limitation 4 x 90°

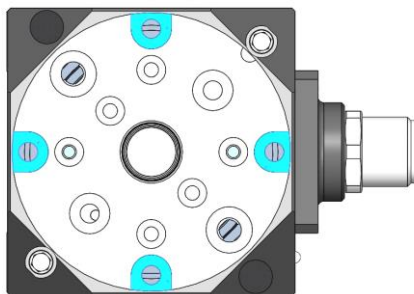


Fig. 10 Mounting option 1: Rotation limitation: 4 x 90°

Rotation limitation 2 x 180°

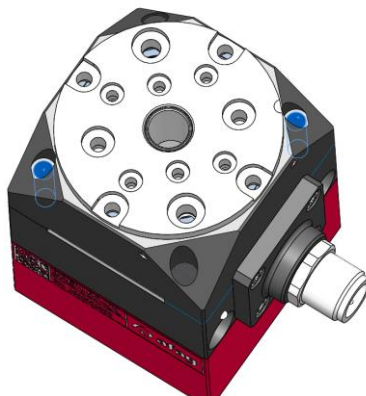


Fig. 11 Mounting option 2: Stop rotation limitation (M5 set screw): 2x180°

Mounting the rotation limitation

To prepare for commissioning proceed as follows:

Rotation limitation 4 x 90°:

1. Insert the rotation limitation into one of the four recesses on the flange.
2. Tighten with the countersunk screw and threadlocker to a torque of approx. 1.5 to 2.5 Nm.

⇒ The rotation limitation is mounted.

Rotation limitation 2 x 180°:

1. Screw the threaded pin with threadlocker into the M5 thread as far as it will go with a torque of approx. 5.2 to 6.5 Nm.
2. Ensure that the set screw does not protrude beyond the output flange.

⇒ The rotation limitation is mounted.



After each collision of the rotation limitation with the set screw, the rotation limitation must be replaced!

Gripper on output flange

CAUTION



Danger due to inadequate fastening!

Fastening semi-finished products with unsuitable fastening material and incorrect torques will result in the semi-finished product not being held in position by the fastener.

- Only use the screws and centring sleeves provided and fasten with the appropriate torques!
 - The fastening of semi-finished products may only be carried out by trained personnel.
-

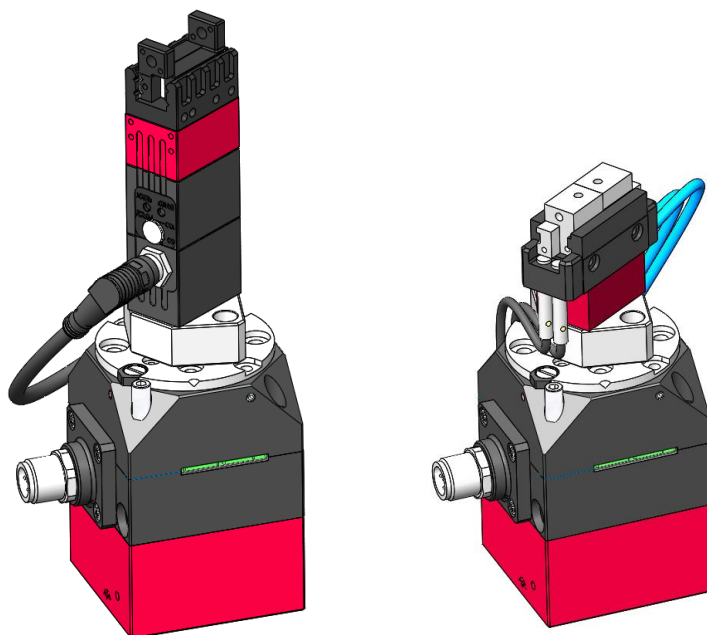


Fig. 12 Gripper on output flange with connection cable or sensor system

External interfering contour (contact with rotating open ends)

CAUTION



Risk of injury due to mounted components!

The output flange is driven and can move rotationally. Attachments to the smart rotary module can pose a hazard together with the moving output flange.

- Take appropriate measures to ensure safe operation!
- Only use trained personnel.

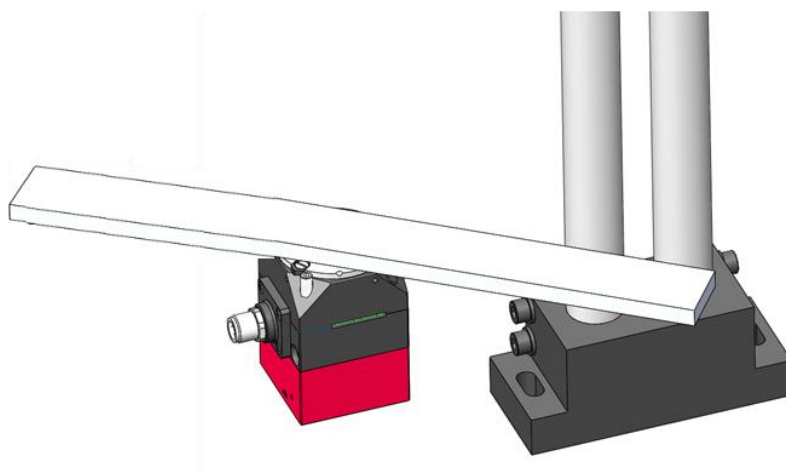


Fig. 13 External interfering contour

6.3 Electrical interfaces



Please refer to the software manual accompanying the SREH-50-IOL. This contains further information on the **IO-Link** interface.

DANGER

Danger of electric shock when connecting the module connector!

There is a risk of electric shock if the module connector is not connected properly.



- The electrical connection of the module must be made via an **M12 connector** (➔Chapter 6.3.1) which can provide the electrical specifications of the module according to the manufacturer's specifications.
- Before loosening the plug connection, make sure that the connecting cable is de-energised and secured against being switched on again.

WARNING

Danger of collisions!

By controlling the decentralised controller in the module via the IO-Link interface, there is a risk that movements are specified that can lead to collisions.



- When working on the module, the motor supply must be switched off and only switched on again after the work has been completed.
- If it cannot otherwise be ruled out that persons move within 2 [m] of the module, visual contact from the person to be controlled to the module must be ensured.
- When lines are laid from the installation to the flange, over-turning of the flange by 360° must be prevented. This can be done with the help of the rotation limitation.

WARNING

Danger due to premature or faulty control!

Premature or incorrect control of the module can cause the output flange to rotate.



- Do not connect the plug/motor supply to the output flange until the module and components have been fully assembled.
- Before carrying out any work in the area of the module, disconnect the motor supply and secure it against being switched on again!

WARNING



Danger due to uncontrolled movements!

Due to the IO-Link interface, the control unit can specify commands (possibly incorrect) due to external influences that do not correspond to the intended application.

- Ensure that the influencing adjacent processes responsible for the movement of the flange function faultlessly.
- If this cannot be ensured, further protective measures shall be taken for this purpose.

6.3.1 IO-Link connector M12

Power supply and communication are realized via a 5-pin, A-coded M12 connector.

The unit has a connection according to IO-Link port class B, i.e. two separate, galvanically isolated supply units. One supply unit is used for the logic, the other for the motor.

Pin	Function
1	+24V DC logic
2	+24V DC motor
3	GND Logic
4	IO-Link communication
5	GND Motor



6.3.2 Functional earth

The functional earth of the unit is connected as standard via an M3 screw on the housing.

Use a toothed lock washer or contact washer to screw on the connection in order to break through the anodised layer. This ensures the electrical conductivity of the connection.

Alternatively, at the customer's request, a shielded IO-Link cable can be used instead of the standard unshielded cable to connect the functional earth.

6.3.3 Topology IO-Link

The SREH-50-IOL is a port class B IO-Link device. This means it needs 2 separate power supplies: One for the logic and one for the motor.

The use of an IO-Link master of port class B is recommended. Such masters have two galvanically separated voltage inputs.

The connection between the PLC and IO-Link is made via a field bus.

The following figure shows an example with an 8-port master, where 2 ports are used for SREH-50 IOL modules.

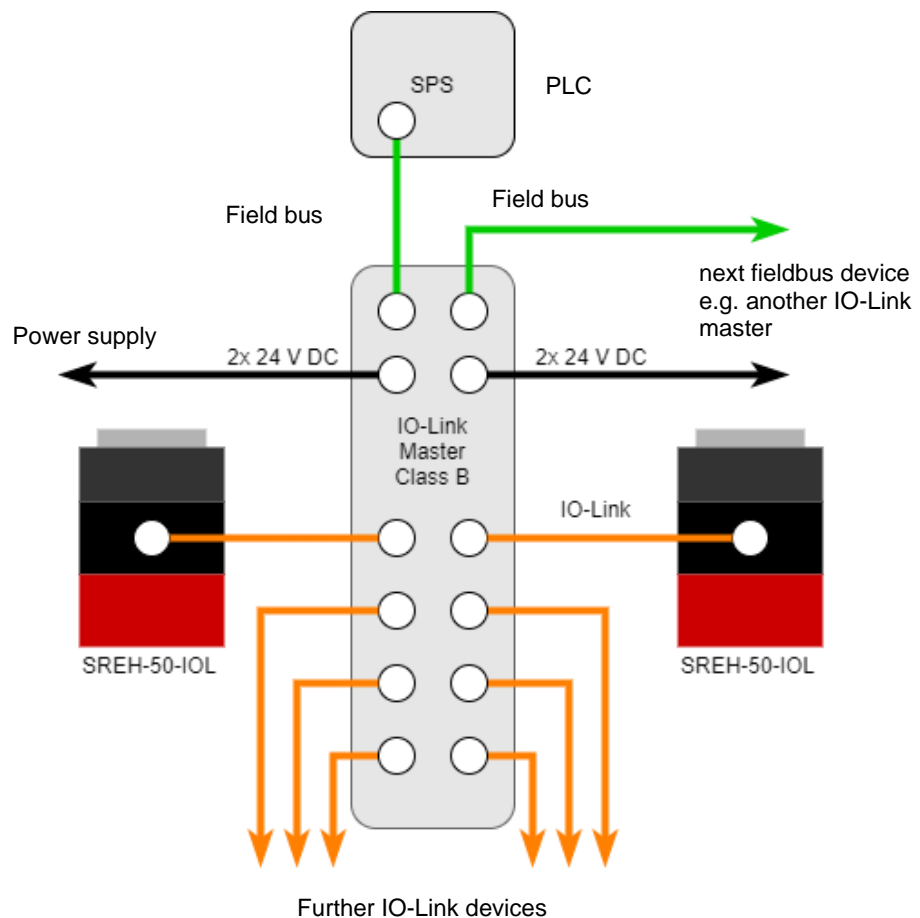


Fig. 14 Topology IO-Link on the SREH-50-IOL - Example 8-port master

Alternatively, a master of port class A can also be used. With port class A, only one supply is available. Therefore, in this case, the motor voltage must be fed in via a Y-cable.

With port class A, pin 2 is sometimes used as an additional digital I/O. Therefore, when using a Class A master, make sure that pin 2 on the master is not connected.

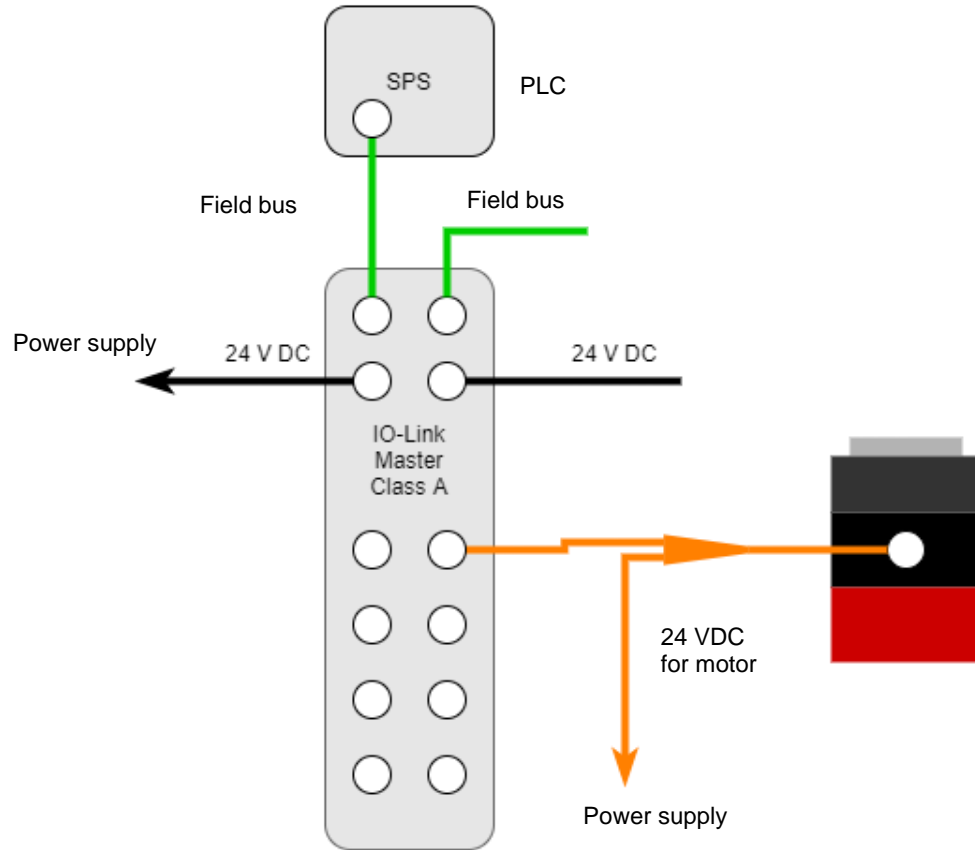


Fig. 15 Topology IO-Link on the SREH-50-IOL - Port class A

Y-Cable

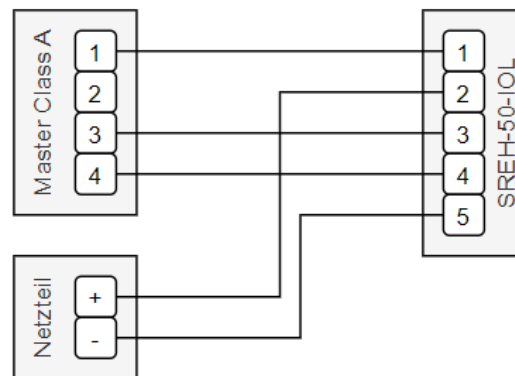


Fig. 16 Y-cable

6.4 Energy supply

The basic power supply for IO-Link devices is defined in the IO-Link specification (https://io-link.com/share/Downloads/Package-2020/IO-Link-Interface-Spec_10002_V113_Jun19.pdf).

Based on this, the following figure shows the principle of topology for the power supply of the SREH-50-IOL smart rotary module.

Unlike shown in the simplified illustration, the connection between power supplies and the SREH-50-IOL is usually made via an IO-Link master. This topology is described in the section 6.3.3.

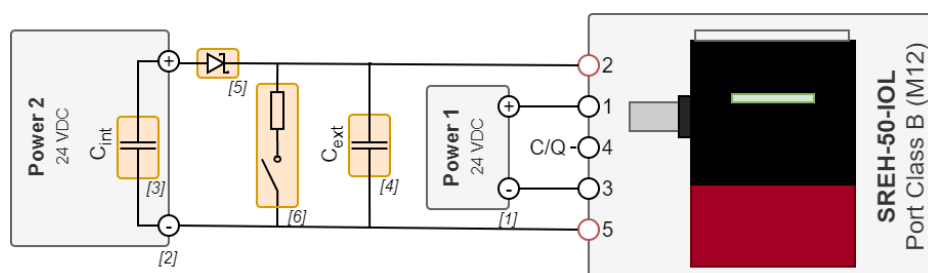


Fig. 17 Power supply of the SREH-50-IOL

- [1] Power supply unit for the logic power supply
- [2] Power supply unit for the drive's energy supply
- [3] Power supply unit-internal output capacity of the drive supply
- [4] Optional additional bus capacity of the drive supply
- [5] Optional diode for protection of the drive power supply unit
- [6] Optional brake chopper

6.4.1 Energy supply logic

A regulated power supply unit is required for the logic supply.

	MIN.	TYPE	MAX.	
Voltage	18	24	30	VDC
Current	-	125	180	mA

6.4.2 Energy supply Drive

A regulated power supply unit is required to power the drive. The power supply unit must provide the power required at the output of the rotary module. The design of the power supply unit is highly dependent on the application - e.g., the moving load - and the required acceleration.

	MIN.	TYPE	MAX.	
Voltage	16	24	32	VDC
Current:	-	-	4.5	A peak

Tab. 1 Energy supply



Voltages below 24V reduce the maximum speed of the drive. A reduced current limits the maximum acceleration.

6.4.3 Generative operation

In applications with large loads and trajectories with maximum acceleration and/or speed, energy is fed back into the drive supply circuit. This may increase the voltage in the power supply circuit by up to 20 VDC, which may damage/shut down the power supply, shut down the SREH-50-IOL and possibly damage other equipment connected to the same power supply circuit.

The SREH-50-IOL smart rotary module has internal monitoring of the drive supply voltage. If the measured voltage leaves the range, the output stage is switched off. The range can be set between 16V and 32V via IO-Link (➔Chapter 6.4.2).

If the power supply unit is not regenerative, damage can be prevented with a diode at the output of the power supply unit (see [5], Fig. 17). The diode must be dimensioned according to the expected voltage and currents.

Industrial power supplies are usually regenerative, i.e. the voltage at their output may rise to a certain limit without the power supply switching off or being damaged. This data can be found in the data sheet of the power supply unit.

To prevent an excessive increase in voltage, it may therefore be necessary to provide one or more external measures (Fig. 17).

The most energy-efficient method (Fig. 17) is to buffer the entire energy in capacitors - either in the power supply unit's internal output capacitance C_{int} (see [3], Fig. 17) or in an additional bus capacitance C_{ext} (see [4], Fig. 17). The power supply unit's internal output capacity can be found in the power supply unit's data sheet.

Table 1 gives a recommendation for the required capacity $C_{int} + C_{ext}$ depending on the load. The basis for this recommendation is the assumption of a pivoting movement with maximum speed and deceleration and a regeneration of 50% of the mechanical energy.

For applications with lower dynamics, a lower bus capacity can be provided.

The following formulas form the basis for the calculation:

$$E_{mech} = \frac{1}{2} \cdot (J_{Load} + 0.000115 \text{ kgm}^2) \cdot \omega_{max}^2$$

$$C = S \cdot \frac{E_{mech}}{U_{max}^2 - (24 \text{ V})^2}$$

With: E_{mech} : mechanical energy in J

J_{Load} : inertia load in kgm^2

ω_{max} : maximum speed in rad/s

S : factor of safety

U_{max} : maximum voltage in V

Load / gcm ²	C_28V / uF	C_30V / uF	C_32V / uF
0	1900	1200	900
500	2700	1800	1300
1000	3500	2300	1700
1500	4300	2800	2000
2000	5200	3300	2400
2250	5600	3600	2600
2500	6000	3900	2800
3000	6800	4400	3200
3500	7600	4900	3600
4000	8400	5400	3900
4500	9200	5900	4300
5000	10000	6500	4700
5500	10800	7000	5100
6000	11700	7500	5400
6500	12500	8000	5800
7000	13300	8500	6200
7500	14100	9100	6600
8000	14900	9600	6900
8500	15700	10100	7300
9000	16500	10600	7700
9500	17300	11100	8100
10000	18100	11700	8400
10500	19000	12200	8800
11000	19800	12700	9200
11500	20600	13200	9600
12000	21400	13700	10000
12500	22200	14300	10300
13000	23000	14800	10700
13500	23800	15300	11100
14000	24600	15800	11500
14500	25400	16400	11800
15000	26300	16900	12200

Tab. 2 Minimum bus capacity depending on load and maximum voltage

6.5 Attachment of third-party modules

The smart rotary module is designed for the attachment of Afag modules.

When using third-party modules, the Afag mounting grid can be used.

In general, the following must be observed when using the smart rotary module:

- The smart rotary module is designed for pure pivoting tasks of inertias without additional external forces or torques.
 - In vertical installation position, symmetrical as well as asymmetrical loads can be swivelled. With asymmetrical loads, it must be ensured that the bearing forces listed in the chapter 3.2 are not exceeded.

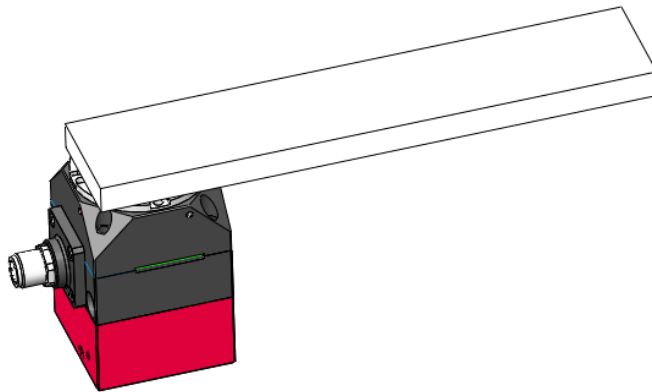


Fig. 18 Asymmetrical load (vertical mounting position)

- In the horizontal mounting position, the applications are limited to the pivoting of symmetrical loads. The gravitational forces that occur when pivoting asymmetrical loads in a horizontal installation position are not permissible.

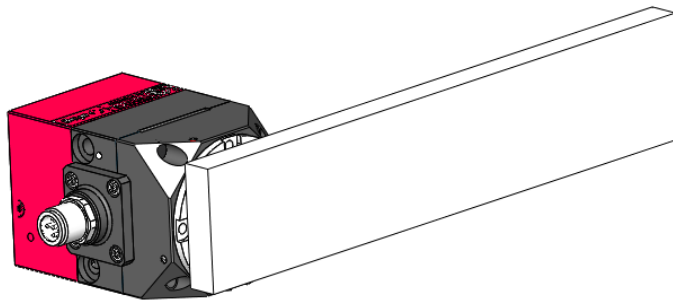


Fig. 19 Non-admissible asymmetrical load in horizontal mounting position

- The SREH-50-IOL module is **not suitable** for applications where work is carried out against external forces or torques. This applies, for example, to screw-in tasks, swivelling against external spring forces or in the case of large and/or varying external friction (e.g. in connection with a friction clutch). In these applications, the correct function of the SREH-50-IOL cannot be guaranteed.

Such applications may be possible under certain conditions. However, this requires careful examination in advance.



Observe the permissible payloads of the module (⇒Chapter 3 “Technical data”)!

Afag accepts no liability for attachments to the modules!

7 Commissioning

After connection, the smart rotation modules are put into operation for the first time via the plant control system.



Commissioning must only be carried out in setup/jog mode!

7.1 Safety instructions for commissioning



DANGER

Risk of injury due to electric shock!

Unauthorized removal of the plug cover causes a risk of electric shock!

- Do **NOT** dismount the plug cover!
- Avoid any action on the module which could endanger safety!



CAUTION

Danger of injury in the working area of the smart rotary module!

During operation, persons who are in the working area can be injured.

- During operation, ensure a good overview of the working area.
- Unauthorised persons are not allowed in the work area.



CAUTION

Risk of injuries due to uncontrolled parts movements!

When the motor power supply is switched on, signals from the control can lead to unintentional movements of the module and cause serious injuries or damage to property.

- Before working on the smart rotary module, make sure that the motor power supply unit is switched off and secured against being switched on again.
- Only connect or disconnect the cables when the control is switched off!



CAUTION

Risk of injury due to mounted components!

Attachments on the smart rotary module can be a risk in conjunction with moving parts.

- Take appropriate measures to ensure safe operation!



Also observe the safety instructions in ➔Chapter 2 “Safety instructions” in this manual.

Please also observe the installation instructions for the control unit used!

7.2 Preparatory activities for commissioning

Perform a test run in preparation for commissioning. For this proceed as follows:

1. Connect the smart rotary module with the 5-pin M12 connection cable and the master. According to chapter 6.3.1.
2. Ensure communication from the PLC to the master.
3. Ensure power supply. According to chapter 6.4.
 - ⇒ The test operation can now be carried out.

7.3 Commissioning of the modules

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

1. Observe the admissible technical data (➔Chapter 3.2).
 - Payload
 - Positioning time
 - Torque load
2. First, make sure that there are no persons or tools in the working area.
3. Configure module according to software manual.
 - Configure the mass moment of inertia at least in all parameters sets used.
4. Perform test run:
 - Start with slow movements (In the delivery state, parameter set 0 is configured accordingly to slow).
 - Then continue under normal operating conditions.
 - ⇒ Commissioning is completed.

7.4 Setting up and retrofitting

Improperly carried out activities can result in considerable material damage and serious injury. Only use trained specialist personnel to carry out the activities.



During adjustment work on the module, the motor voltage must be deactivated and switched on again only after the work has been completed!

8 Fault elimination

8.1 Safety instructions for troubleshooting



DANGER

Risk of injury due to electric shock!

Unauthorized removal of the plug cover causes a risk of electric shock!

- Do NOT dismount the plug cover!
- Avoid any action on the module which could endanger safety!



WARNING

Danger of injury due to faulty troubleshooting!

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

- Only use trained specialist personnel for troubleshooting.
- All work on the modules must be carried out with the power supply cut off!



WARNING

Risk of injuries due to uncontrolled parts movements!

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

- Before starting work on the modules, switch off the motor voltage and secure it against being switched on again.
- Observe the operating instructions of the controller used!



Also observe the safety instructions in [Chapter 2](#) “Safety instructions” in this manual.

8.2 Fault causes and remedy



The software manual that comes with the SREH-50-IOL contains more detailed information on the causes of faults and their remedies.

Furthermore, in the event of a malfunction, our service technicians offer competent support on possible faults.

9 Maintenance and repair

9.1 General notes

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

9.2 Safety instructions for maintenance and repair

DANGER



Risk of injury due to electric shock!

Unauthorized removal of the plug cover causes a risk of electric shock!

- Do NOT dismount the plug cover!
- Avoid any action on the module which could endanger safety!

WARNING



Danger of injury due to improper maintenance!

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

- Only use trained specialist personnel to carry out the activities.
- Always wear personal protective equipment when carrying out maintenance and repair work!

WARNING



Risk of injuries due to uncontrolled parts movements!

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

- Before starting work on the modules, switch off the motor voltage and secure it against being switched on again.
- Observe the operating instructions of the controller used!



Also observe the safety instructions in [Chapter 2](#) “Safety instructions” in this manual.




- The maintenance intervals must be strictly observed. The intervals refer to a normal operating environment.

9.2.1 Overview of maintenance points



Fig. 20 Maintenance smart rotary module SREH-50-IOL

No.	Maintenance point	Maintenance work	Interval	System [On/Off]	Remarks
1	Smart rotary module	Cleaning and checking 	As required	[Off]	- <ul style="list-style-type: none"> ▪ Clean the servo gripper with a dry, lint-free cloth. - Do not spray the module with water, do not use aggressive cleaning agents. - Perform a visual inspection of the smart rotary module.

9.2.2 Further maintenance

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

- Clean working area
- No use of splash water
- No abrasion or process dusts
- Environmental conditions as specified in the technical data (→Chapter 3).

9.3 Spare parts and repair work

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



Damaged modules may only be replaced or repaired by Afag Automation Afag! Spare parts are not available.

10 Decommissioning, disassembly, disposal

The smart rotary module must be properly dismantled after use and disposed of in an environmentally friendly manner.

10.1 Safety instructions for decommissioning and disposal

WARNING



Risk of injury due to improper decommissioning and disposal!

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

- Only use trained specialist personnel to carry out the activities.
 - Disconnect the media supply before dismantling the module!
 - Only dismantle the module when the control unit is switched off and secured!
-

10.2 Decommissioning

If the smart rotary modules are not used for a longer period of time, they must be properly commissioned and stored as described in chapter 4.5.

10.3 Disposal

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

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

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

NOTICE

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

Environmental damage can be caused by improper disposal of the smart rotary module.

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

11 Declaration of incorporation

Declaration of incorporation

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

The manufacturer hereby declares:

Afag Automation AG, Luzernstrasse 32, CH-6144 Zell

that the partly completed machine:

Product description	Smart rotary module SREH-50
Type:	SREH-50-IOL

complies with the following essential health and safety requirements of the Machinery Directive 2006/42/EC at the time of declaration: 1.1; 1.1.1; 1.1.2; 1.2; 1.2.1; 1.2.3; 1.2.4.4; 1.2.5; 1.3; 1.3.3; 1.3.5; 1.3.6; 1.3.7; 1.3.8.1; 1.3.8.2; 1.3.9; 1.4; 1.4.1; 1.5; 1.5.1; 1.6; 1.6.1; 1.6.3; 1.6.4; 1.7; 1.7.1; 1.7.4.; 1.7.4.1; 1.7.4.2; 1.7.4.3; 3.3.5; 3.4.1

Harmonised standards applied, in particular:	
2014/30/EU	Electromagnetic Compatibility Directive (EMC)
2014/35/EU	Low Voltage Directive (LVD)
EN ISO 12100:2010	Safety of machinery - General design principles - Risk assessment and risk reduction.
DIN EN 60204-1:2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements

Note: The partly completed machinery must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC.

The manufacturer undertakes to transmit, in response to a reasoned request by the national authorities, relevant technical documentation for the partly completed machinery. The relevant technical documentation was created according to Annex VII, Part B of the above-mentioned Directive.

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