

User instructions E-Gripper

Bi-stable Electro-Permanent Magnetic Gripper

Product key: HGE-SQ-xxx-FR-EP-P-I

Thank you for purchasing a Goudsmit HGE-SQ series E-Gripper.
Read this manual carefully before operating the product and make sure you understand its capabilities and limitations. Keep this manual handy for future reference.



Intended use

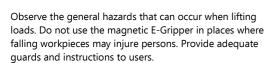
HGE-SQ family E-Grippers are designed as so-called "End Of Arm Tool" for robots and manipulators to grab ferromagnetic products and workpieces by means of magnetism to manipulate them, for example by placing those workpieces in a processing machine or taking them out of a machine.

Safety, standards and guidelines

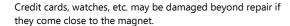
Take into account steel parts being attracted to the magnetic field as a projectile if they come within 10 cm of the magnetic E-Gripper.



There is a risk of interference with the functioning of active implanted devices, e.g. pacemakers. Maintain a safety distance of at least 25 cm.



The CE mark confirms that the device complies with all EU regulations (ISO/IEC) applicable for this marking, including the EMC & RoHS directive.





Ensure that all electrical connections are carried out by qualified personnel in accordance with all applicable laws and directives.

Technical specifications

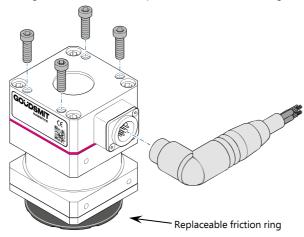
For detailed specifications such as drawings, working load and tear off force, see website:

www.goudsmitmagnetics.com

- Magnetic on-off control: electrically switched with integrated electronic control.
- Inductive sensors for product presence detection and sensors for temperature monitoring.
- Min./max. ambient temperature: min. 5°C / max. 40°C.
- Dust/water protection class: IP40.
- Coil insulation class B
- Rated supply voltage: 24V DC (protected <21,6V / >29V).
- Peak current consumption during switching time: max 6A for 350ms.
- Duty cycle: 12x "on" & 12x "off" / min.
- Material of replaceable friction ring: NBR 70 shore A.
- Maximum permitted acceleration forces with friction ring installed: 20m/s² in all directions and positions provided there are no limiting factors that reduce magnetic force.

Installation and commissioning

Mount the E-Gripper to your robot arm or manipulator with 4 threaded bolts. The E-Gripper is equipped with an integrated microprocessor, electronics and sensors and is connected with only one "power & logic" cable to the power supply and PLC line control. Make sure the cable is securely connected and the locking mechanism is closed to prevent the cable from coming loose.



The connection cable is not part of the delivery and must be ordered separately. Cables are available with straight and angled plugs in various lengths. See website: www.goudsmitmagnetics.com.

The black NBR friction ring can be replaced when worn out, for spare parts see website: www.goudsmitmagnetics.com.

Wiring

Caution: Only qualified personnel should carry out electrical connections in compliance with European standards and directives. Ensure that the power supply is switched off before connecting the connection cable. It is essential to ground the copper braiding sleeve.

Wire	Size	Туре	Function / Signal	Note	
Red	2.5mm²	Power +	Power supply +24VDC/6A	Switching max 6A / 350ms Nominal 30mA	
Black	2.5mm²	Power -	Power supply 0VDC		
White	0.25mm ²	Digital input 1 DI1	Magnet ON 24V/1mA	24V 10ms pulse	
Green	0.25mm ²	Digital input 2 DI2	Magnet OFF 24V/1mA	24V 10ms pulse	
Yellow	0.25mm ²	Analog input 1 AI1	Optional Force setting 1 – 10V / 1mA	Unused = 100% 1V to 10V 10% to 100%	
Grey	0.25mm ²	Digital output 1 DO1	Feedback magnet state 24V / 4mA	24V = OFF 0V = ON	
Pink	0.25mm ²	Digital output 2 DO2	Feedback product presence 24V / 4mA	24V = undetected 0V = detected	
Purple	0.25mm ²	Digital output 3 DO3	Feedback malfunction 24V / 4mA	24V = no error 0V = error	
Blue	0.25mm ²	Digital input 3 DI3	Reserve	Reserve	
Brown	0.25mm ²	Digital output 4 DO4	Reserve	Reserve	
Braiding sleeve	2.5mm²	Shielding	Grounding		

Operating cycle

The E-Gripper is equipped with all-round LED lighting that indicates the E-Gripper's status through various colours and or flashing signals. Later in this manual you will find a flow chart of the operation with additional explanations.

Description of the successive stages the E-Gripper goes through during normal operation:

Stage	Switching state description	Light signal		
0	Power off, magnet off, no product detected.	off		
Α	Action: Switch on power			
	Power on, magnet off, no product detected.	continuous		
В	Action : Move the E-Gripper to the workpiece location to detect the product.			
	Power on, magnet off, product presence is detected.	continuous		
С	Action: Switch E-Gripper on. (DI1)			
	Power on, magnet on, product detected.	continuous		
D	Action: Move the workpiece to the location for the next operation.			
E	Action: Switch off the E-Gripper (DI2) (the light signal changes from green to light blue as long as the product is detected).			
	Power on, magnet off, product still detected.	continuous		
В	Action: Move the E-Gripper away from the workpiece to the next location.			
	Power on, magnet off, no product detected.	continuous		
	Repeat cycle			
M/bon the	E Grinnar is placed on a product and the light signal d	and not turn		

When the E-Gripper is placed on a product and the light signal does not turn light blue, this may be due to too large air gap or excessive perforations in the workpiece. To resolve this issue, improve the E-Gripper's touch.

Trouble shooting

Description of the stages the E-Gripper may encounter during a fault.

If a grabbed product is lost during the operating cycle, the feedback signal "product presence" drops and the E-Gripper goes into failure.

Fault	Fault description	Light signal
Product lost	Product has released while magnet is on.	blinking
	Action: Remove the lost product and reset	the E-Gripper
	by switching off the magnet. (DI2)	

Check if the product was lost due to a blockage or if there were other factors that led to insufficient magnetic force. Read the manual to examine possible causes.

In exceptional cases, the internal temperature of the E-Gripper may become too high due to excessive ambient temperature and/or exceptionally frequent switching. Wait for the E-Gripper to cool down. Once cooled down, the E-Gripper will revert to its previous stage.

Temperature	erature Internal temperature too high.		
	Action: Wait for the E-Gripper to cool down down, the E-Gripper will return to its previous		

Tip: at ambient temperatures above 30°C do not switch on and off the E-Gripper more often than 12 times per minute.

Power	Voltage is too low or too high	blinking	
	Action : If there is a voltage drop during switching, we recommend to raise the supply voltage or using a higher current rated power supply.		
	After power is restored, the E-Gripper return previous stage.	ns to the	

Attainable magnetic force

The E-Gripper can handle various ferromagnetic products and workpieces. The holding force achieved depends on the magnetic properties and composition of the material. Compared to the holding force on low-carbon steels, a force reduction of over 30% may occur with certain materials.

Reduction of magnetic force by material	Efficiency
Non-alloy low carbon steel (<0,3% C) like Fe 360, Fe 510	100%
Non-alloy carbon steel (0,3 – 0,5% C) like C15, C45	80 – 90%
High carbon (0.5 – 1,8% C) alloyed tool steel	70 – 80%
Magnetic stainless steel (ferritic, martensitic) like AISI430	60 - 75%
Cast-iron (>1,8% C)	45 – 50%
Nickel	30 – 50%
Stainless steel AISI304	1 - 3%
Austenitic stainless steel like AISI316	0%
Brass, aluminium, copper	0%

Advised working loads

Workpieces with the weights listed here can be lifted under ideal conditions. In accordance with EN13155, a safety factor of 3 was taken into account..

no	friction	ring mou	nted	with	frictio	n ring mo	ounted
6. 1	HGE-SQ-052 Airgap [mm]			Steel	HGE-SQ-052		
Steel thickness				thickness	Airgap [mm]		
[mm]	Airgap < 0.1	Airgap 0.1 - 0.25	Airgap 0.25 - 0.5	[mm]	Airgap < 0.1	Airgap 0.1 - 0.25	Airgap 0.25 - 0.
>= 1	3kg	2kg	2kg	>= 1	2.5kg	2kg	2kg
>= 3	10kg	6kg	4kg	>= 3	9kg	5kg	3kg
>= 5	15kg	7kg	4kg	>= 5	14kg	6kg	3.5kg
Steel	HGE-SQ-070		Steel	HGE-SQ-070			
thickness [mm]	Airgap < 0.1	Airgap 0.1 - 0.25	Airgap 0.25 - 0.5	thickness [mm]	Airgap < 0.1	Airgap 0.1 - 0.25	Airgap 0.25 - 0.
>= 3	12kg	9kg	6kg	>= 3	11kg	8kg	5kg
>= 5	24kg	15kg	7.5kg	>= 5	22kg	13kg	6kg
>= 8	33kg	17kg	8kg	>= 8	30kg	14kg	7kg
Steel	Н	HGE-SQ-090		Steel	Н	GE-SQ-09	90
thickness [mm]	Airgap < 0.1	Airgap 0.1 - 0.25	Airgap 0.25 - 0.5	thickness [mm]	Airgap < 0.1	Airgap 0.1 - 0.25	Airgap 0.25 - 0.
>= 5	30kg	25kg	18kg	>= 5	30kg	24kg	17kg
>= 8	53kg	36kg	19kg	>= 8	52kg	34kg	18kg
>= 12	75kg	41kg	20kg	>= 12	72kg	39kg	19kg

Factors influencing magnetic force

Apart from the magnetic properties of the workpiece material, there are other factors that can reduce the holding force.

Air gap between workpiece and E-Gripper:

Non-magnetic surface layers such as coatings, foils, as well as rough surfaces, rust and dirt lead to an air gap and reduce the holding force.

Workpiece dimensions in contact with E-Gripper

When the workpiece is fully in contact with the magnetic poles, the maximum holding force is achieved. With partial coverage or contact, e.g. because the workpiece is perforated or difficult to cover completely, the holding force will decrease.

• Thickness of the workpiece:

Thin sheet material becomes magnetically saturated, so the magnetic field cannot be fully utilised and the holding force decreases, see table.

• High temperatures reduces magnetic force: Both higher ambient temperature (>30°C) and higher product temperature (40 - 80°C) reduce magnetic force. Frequent switching (>4 cycles / min) also leads to heating of the internal magnetic system and a reduced magnetic

Acceleration forces:

When the workpiece is moved quickly, acceleration forces can occur that adversely affect the holding force. Always ensure that the acceleration forces on the workpiece are significantly lower than the holding force.

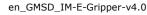
Rigidity or ductility of the load:

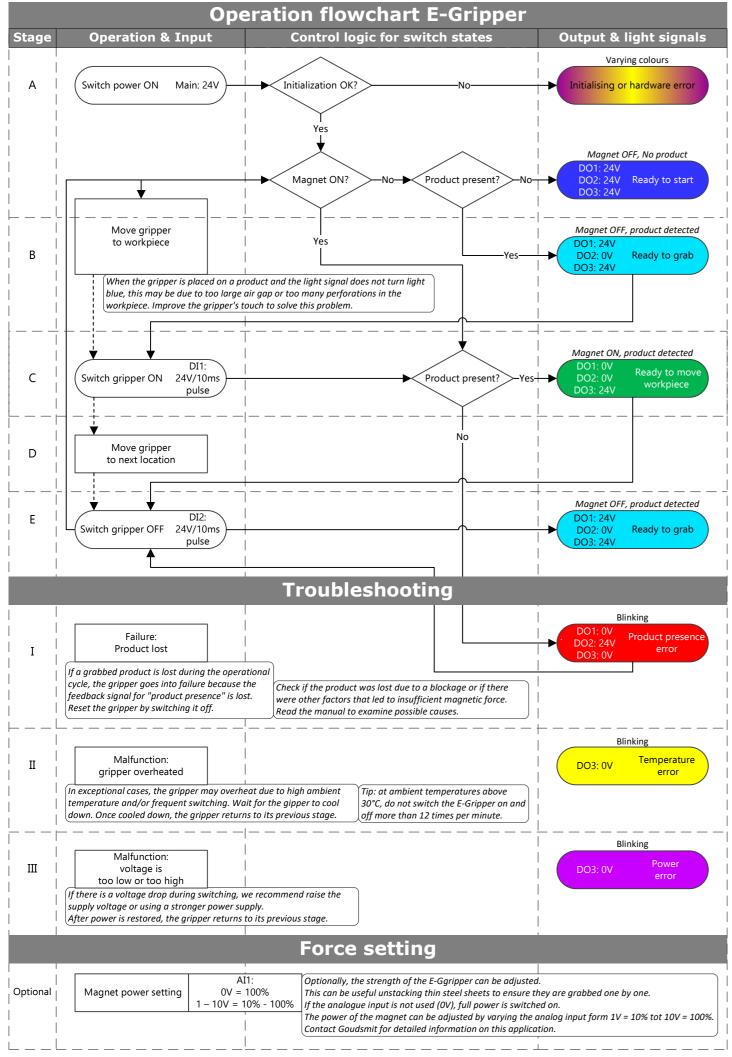
Protruding parts of flexible loads may sag, resulting in a peeling effect that causes the load to come loose. Ensure an adequate number of E-Grippers at multiple engagement points to prevent sagging. Also provide a flexible attachment of the E-Grippers to compensate for sagging, preventing peeling.

Doubts about magnetic strength and limiting factors:

rever unsure about the conditions and whether they limit

Are you unsure about the conditions and whether they limit the magnetic force and holding power? Then conduct additional tests or consult Goudsmit's application specialists.







EU Declaration of Conformity

Manufacturer:

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Goudsmit Magnetic Systems B.V. Petunialaan 19 5582 HA Waalre The Netherlands

Herewith we declare, on our own responsibility, that the device:

Article description: E-Gripper / bistable electro-permanent magnet E-Gripper

Product key(s): HGE(Z)-SQ-XXX-XX-XX-X

Meets the requirements of the following European Directives:

EMC Directive 2014/30/EU
 Applied harmonized standard(s):

- IEC EN 61000-6-4(2007)

- RoHS-2 Directive 2011/65/EU + RoHS-3 (EU) 2015/863

UK Declaration of Conformity

Manufacturer:

UK

Goudsmit Magnetic Systems B.V. Petunialaan 19 5582 HA Waalre The Netherlands

Authorized representative:

Goudsmit Magnetics (UK) Ltd 1st Floor, Riverview The Green Tullynacross Road Lisburn, BT27 5SR UK

Herewith we declare, on our own responsibility, that the device:

Article description: E-Gripper / bistable electro-permanent magnet E-Gripper

Product key(s): HGE(Z)-SQ-xxx-xx-xx-x

Meets the requirements of the following Regulations:

Electromagnetic Compatibility Regulations 2016

Applied designated standard(s):

- EN 61000-6-4(2007)

 Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (as amended) (RoHS)

Waalre, The Netherlands, 25-6-2025

on behalf of Goudsmit:

Signature manufacturer:



Alwin de Bruine, Compliance Engineer

Warranty

The warranty on your magnetic E-Gripper is void if it has been improperly refurbished, modifications have been made, the nameplate has been removed or if the magnetic E-Gripper is used improperly, incorrectly or other than for magnetic handling of ferromagnetic products. If in doubt about maintenance or use, please contact Goudsmit Magnetics.