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Installation Manual
GY-mini

Magnetostrictive cylinder sensor with control box

Regal

Table of content

Introduction

Intended use

Regasense GY-mini sensors are designed to be installed in hydraulic cylinders with the purpose of absolute linear positioning. The controller is designed to be installed on DIN-rail in an dry and dust free enviroment.

This manual shall be read together with the datasheet.

Used symbols

General attention

Risk of electric shock

Safety instructions

Installation and commissioning shall be performed by technical personnel with appropriate training and expertise. Whom are trained in the field of applicable automation technology and installation, commissioning and/or service operations of the hydraulic cylinder in use.

If sensor failure or malfunction can cause injury to person or damage to property, design the system with additional safety measures to prevent injury or damage.

Storage instructions

The sensor and controller must be stored in a dry environment within the temperature range specified in the datasheet. The sensor shall not be under mechanical stress that can cause damage to the sensor rod.

Correct storage prior too installation is necessary to ensure proper function.

Warranty

Regal Components AB grants warranty according to Nordiska leveransbestämmelser (NL09) in applicable areas or Orgalime S2012. Warranty is not provided for defects due to improper use, storage or excessive stress on the product.

Warranty is not provided if the product has been modified. No repairs are allowed, in event of sensor malfunction contact Regal Components AB.

Referred documents

- GY-mini datasheet
- 6140 connector datasheet
- 6160 connector datasheet

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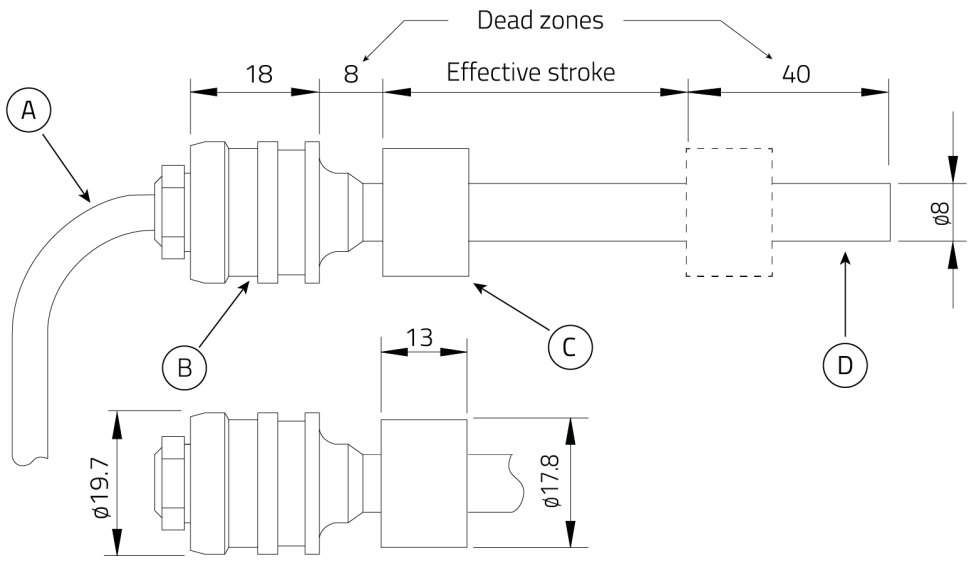
Product description

Part design

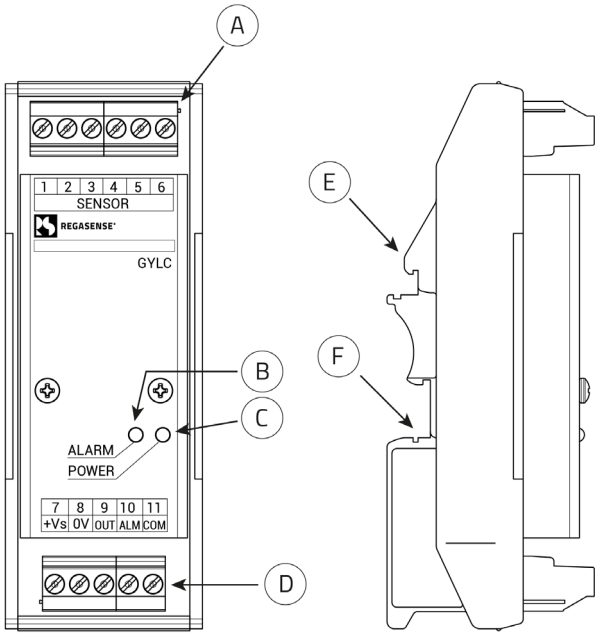


Sensor body

A. Sensor cable
B. Sensor header
C. Magnet
D. Sensor rod

Controller

A. Sensor terminals
B. Alarm LED
C. Power LED
D. Power and output terminals
E. DIN Rail lock
F. DIN 35mm mount



Magnetostrictive technology

Regasense GY-mini are magnetostrictive linear sensors, and contain electronics, sensor rod and a permanent magnet. A waveguide runs inside the sensor rod, this waveguide is a magnetostrictive wire. Magnetostriction is a property of magnetic materials that causes them to change size or shape during magnetization. The permanent magnet travels along the sensor rod affecting the wave guide.

The electronics applies a current pulse to the waveguide, the current and permanent magnet causes the waveguide to twist, this is called the Wiedemann effect and it travels along the waveguide as a pulse. The pulse is detected by the sensor electronics and the position is calculated.

Scope of delivery

GY-mini sensor with installation accessories:
- 1 pcs support ring
- 1 pcs o-ring
- 1 pcs wave spring washer
- 1 pcs retaining ring

GYLC controller

Sensor and control box are sold separate.

Accessories

Additional accessories, not included in the standard scope of delivery are connectors and cables.

Connector 6140 is a pressure sealed M12 connector suitable when the hydraulic cylinder is exposed to extremely harsh environment requiring a hermetically sealed connector.

Connector 6160 is an M12 connector with IP67 protection suitable for applications with pressure seal at the sensor header. 6160 require no soldering. When GY-mini is used with 6160 connector, the sensor and connector must be ordered together as the crimp contacts for the connector are mounted from factory.

Shielded PUR sensor cables with overmolded M12-connector are available in different lengths.
More information on the different connectors and cables are availible in the datasheets.

Installation of sensor rod

Pre-installation checklist

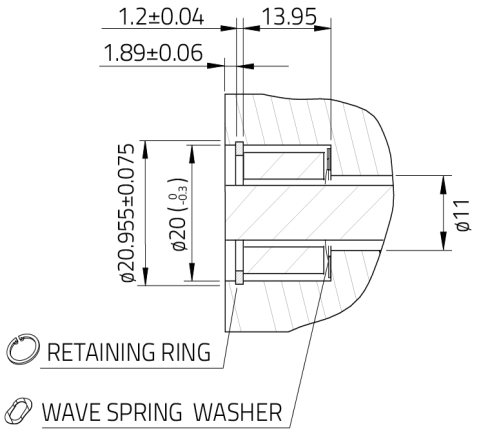
Make sure that there is no damage to the sensor.

- The sensor rod shall be straight and intact without dents and scratches.
- The sensor header shall be intact.
- Make sure that the electrical connection is in good condition. Cable shall be firmly attached to the back-side of the header and the cable jacket shall be intact.
- Installation accessories shall be in good condition.

⚠ The drilling dimensions in the cylinder must be within specified tolerances. Otherwise there is risk of malfunction and/or vibration can cause increased wear and pressure seal failure.

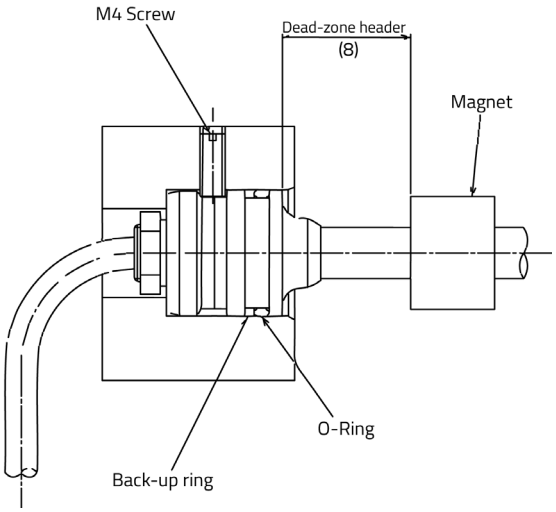
Installation of magnet

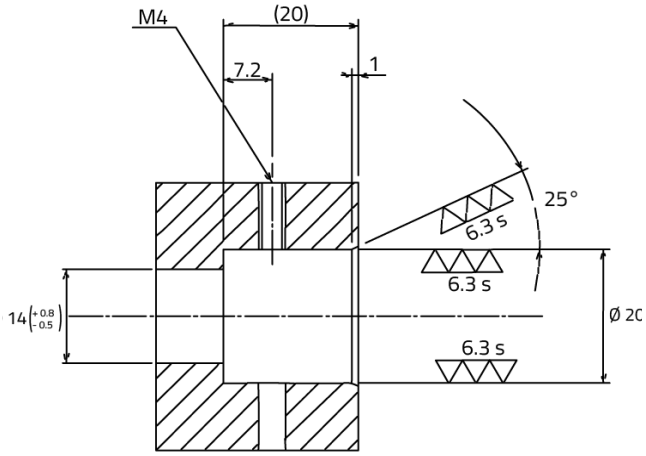
1. Place the wave spring washer in the mounting hole in the piston.
2. Mount the magnet in the piston, the groove on the magnet facing the sensor header i.e away from the piston.
3. Fix the magnet with the retaining ring.

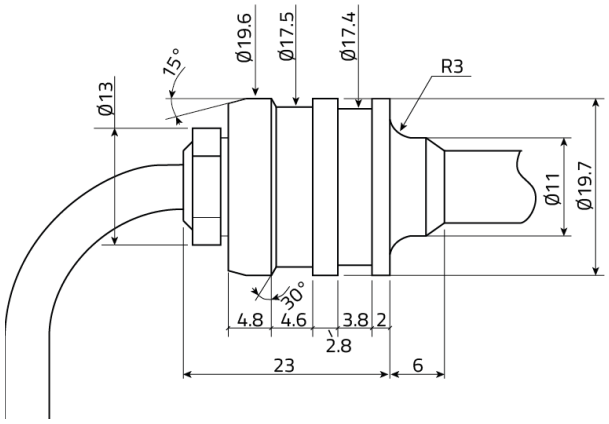


Installation of sensor rod

1. Mount the o-ring and and back-up ring on the sensor header according to drawing below.
⚠ Do not install the senor rod without o-ring and back-up ring. The sensor is not designed for hydraulic pressure on the backside of the sensor header.
2. Feed the sensor cable thru the drill hole in the cylinder body to the location where the connector or cable gland shall be mounted. This step may vary depending on the design of the cylinder.
⚠ Make sure that the cable is free from mechanical stress. Do not pull on the cable to pull the sensor in place.
3. Mount the sensor firmly in place.
4. Fix the sensor in position with M4 flat pointed set-screw. Recommended tightening torgue < 0.5 Nm. Seal the set screw with suitable sealing compound. ⚠ The force from the hydraulic pressure shall apply on the back side of the sensor head against the cylinder body, the set-screw shall not hold this force.
5. Install the electric connection either with a cable gland or connector:
   a. Cable gland: Use the sensor cable to connect the controller, use a cable gland on the cylinder for strain relief of the cable.
   b. Connector: Connect the wires to a suitible connector. Recommended options are 6140 or 6160, follow the instructions under "Connections" in this manual. When GY-mini is used with a 6160 connector, the sensor and connector must be ordered together as the crimp contacts for the connector are mounted from factory.







Installation of control box

General information

Inspect the controller prior to installation so the casing, electronic connections etc. is in good condition, free from damage and contamination such as liquids or dirt.

⚠ Do not supply power to the controller until all wires and cables are connected properly. Connect the wires from the sensor, power supply, 0V and output before the power is switched on.

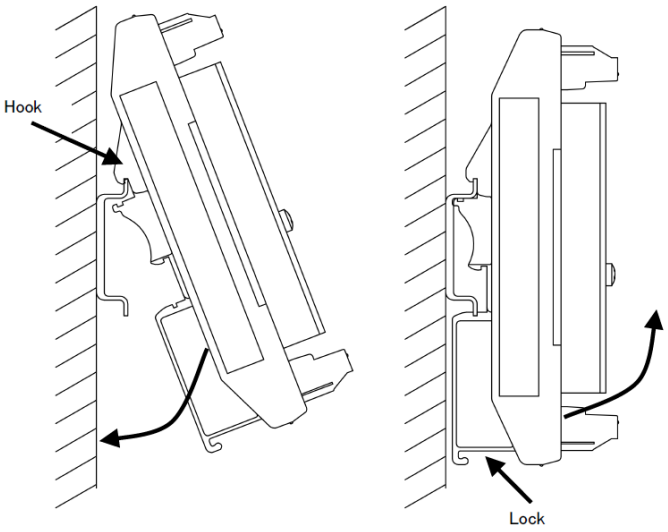
⚠ Always use shielded cables to connect the sensor probe and keep in mind that the cable shield on GY-mini is connected to the header of the sensor. Be aware of the risk of malfunction if there is a potential difference between the location of the sensor and the grounding point of the cable shield.

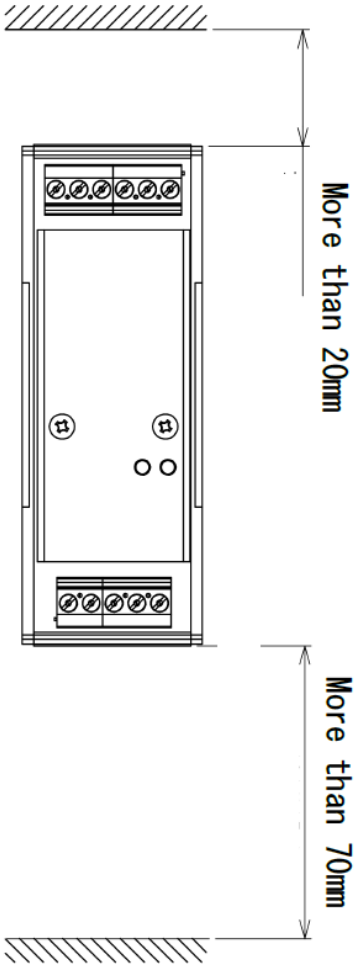
To ensure proper EMC-performance:
- The shield of the sensor should be connected to the correct terminal on the controller.
- The sensor cable should be kept as short as possible.
- If the cabinet contains EMC-noisy equipment there may be need to EMC-protect the wires and the control box.
- Don't place the sensor cable near power cables.

⚠ Do not touch the termials directly. It causes electric shock and malfunction.

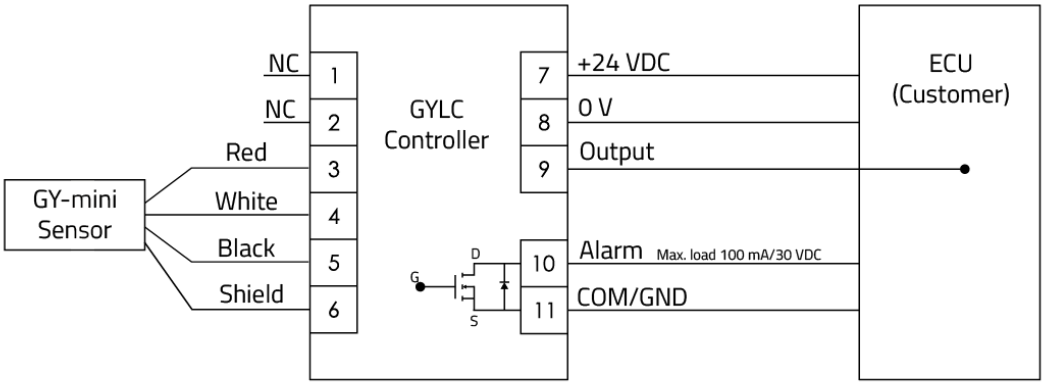
Mounting

The controller has a 35 mm DIN rail mount and shall be installed as following:
- Install the controller with 20 mm air space above the controller and 70 mm below.
- Do not put anything on the controller.
- Shall be installed in a space free from causticity gas, combustion gas, firedamp and oil mist.
- Shall be installed protected from water and moisture.
- Shall be protected from dust.





Connection



Recommended wire area for the power supply and alarm is 0.2-2.5 mm^2 / AWG24-12.

Terminal screw tightening torque: 0.5 Nm (max 1.0 Nm)

Connect the sensor and controller as per the schematic above, if the installation is done with a M12 connector on the cylinder follow the instructions for each connector in this manual.

Load resistance voltage output: min. 2 kΩ

Load resistance current output: max. 500 Ω

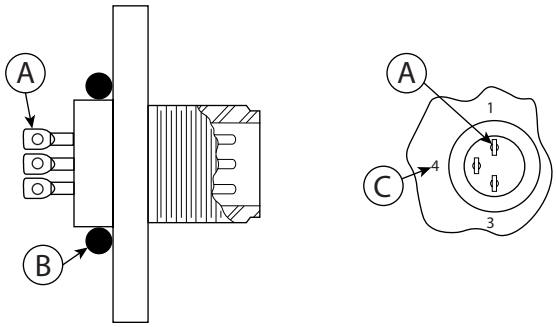
Installation of connector 6140

1. Place o-ring on connector. Recommended o-ring: 14 x 1,78 mm NBR70. Not included in scope of delivery.
2. Cut the sensor cable to suitable length.
3. Place heat shrink tube on the wires.
4. Strip 10 mm of the wires and twist them in place in the pins of the connector. See connection in table below.
5. Solder the joints.

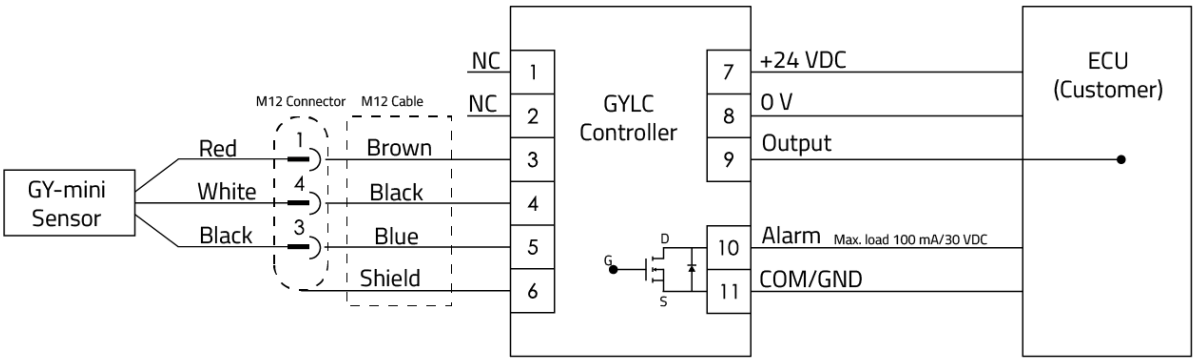
⚠ Soldering shall be done by personnel with proper training.

6. Heat the heat shrink tube in place over the solder joints.
7. Mount the connector in place, refer the 6140 connector datasheet for further information.

⚠ Make sure that the wires are free from mechanical stress.



A. Solder pins
B. O-ring
C. Pin number

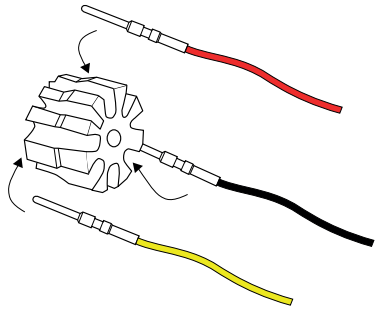


Installation of connector 6160

⚠ Note that 6160 connectors are not pressure proof.

6160 consists of crimp contacts, splice ring, contact carrier and flange housing. When a GY-mini sensor is supplied with 6160 connector the crimp contacts is crimped to the sensor wires from factory. Refer 6160 datasheet for further information.

1. Assemble the crimp contacts with sensor wire to the splice ring.
2. Attach the contact carrier.
3. Insert the o-ring into the groove on the housing.
4. Slide the contact carrier in the housing until they snap together.
5. Mount the assembled contact to the cylinder. Recommended tightening torgue 0.3-0.5 Nm.



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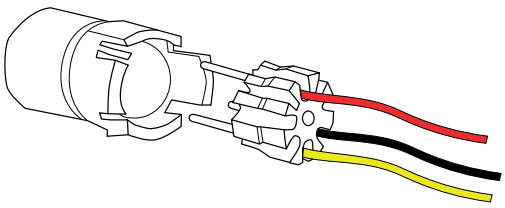

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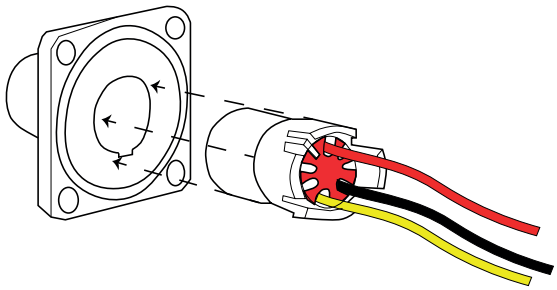

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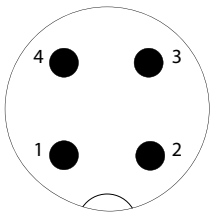
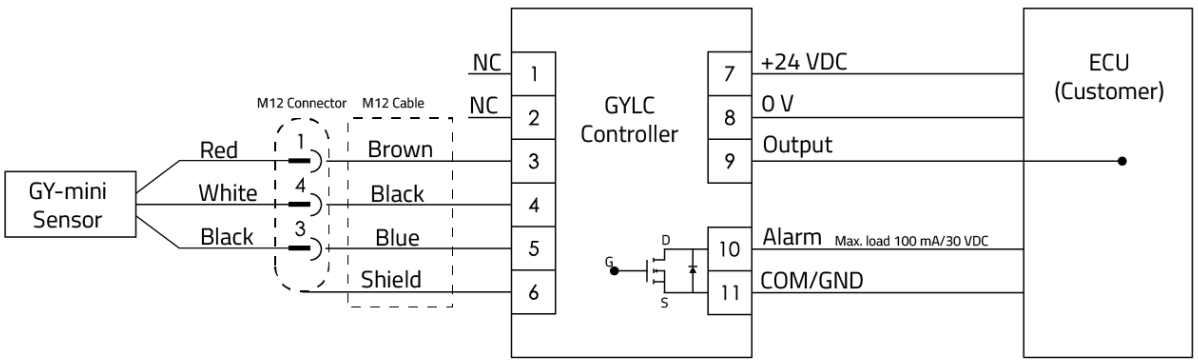
* Note wires is not colour coded in above drawings. Follow connection in table.



Pin connection, view plug side



Comissioning

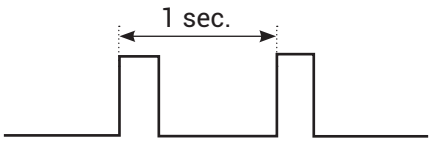
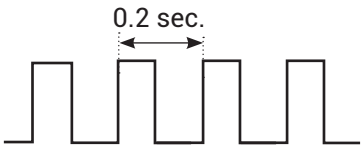
Check that the controller and sensor are connected properly. ⚠ Do not supply power to the controller until all wires or cables are connected properly.

NOTE Immediatly after power-on, the alarm LED lights up for about 0.5 seconds. This is normal and not an error.

Error detection

The controller outputs a warning signal and warning LED light when an abnormality is detected as follows:
- Dropout or damage of magnet.
- Disconnected/cable break or faulty wiring of sensor cable.
- System error (internal)

Lightning sequence of warning LED depends on the error. When two or more errors are detected at the same time, the error with higher priority is shown. In case of error is the alarm output signal always ON/ high regardless of error state.

Priority	LED warning sequence	Error and troubleshooting
Low	Light ON in intervals of one second. 	Error of sensor magnet. - Check if the magnet is in range of stroke. - Check if the magnet is damaged.
Medium	Light ON every 0.2 seconds. 	Error of sensor cable. - Check for faulty wiring of the sensor cable. - Check for disconnected of broken sensor cable.
High	Continous ON	System error - Return all parameters to factory default.