



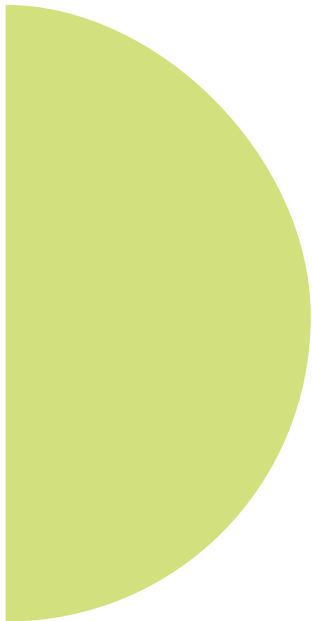
**REGASENSE®**

Regasense is a part of Regal Components | *Regal*

# Installation Manual

**PS6500**

**Potentiometric cylinder sensor**






## Introduction

### Intended use

Regasense PS6500 sensors are designed to be installed in hydraulic cylinders with the purpose of absolute linear positioning.

 PS6500 shall not be used in, or exposed to, fluids with conductive properties. This will cause malfunction of the sensor.

This manual shall be read together with the data-sheet.

### 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.

### Used symbols

 General attention

### Storage instructions

The sensor must be stored in a dry environment within the temperature range specified in the data-sheet. 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. Note that the performance of the sensor may change during its lifetime, this is a natural attribute of potentiometers.

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

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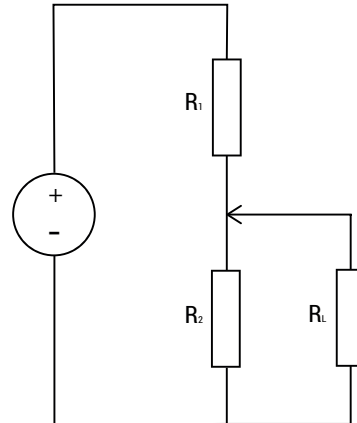


## Product description

### Potentiometer technology

Regasense PS6500 is a potentiometric absolute linear sensor. Potentiometers are voltage dividers and the output signal is proportional to the wiper position.

- R1: Resistance before the wiper.
- R2: Resistance after the wiper.
- R<sub>L</sub>: Input impedance



### Configuration options

**Stroke length:** PS6500-series are available with active electrical range between 50-1000 mm in 50 mm intervals.

**Single or dual output:** All lengths are available as single output or dual output. The dual output option is redundant with separate supply voltage, GND and output signals.

**Electrical connections:** Single output sensors are available with two electrical connection options, 3 wires (SW) and minibridge connector (SC). Dual output sensors are available with 6 wire (DW) connection.

**NOTE** Custom design options is available. Contact Regal Components for more information.

### Scope of delivery

Sensor, wiper and installation accessories are included in the standard scope of delivery.

Installation accessories:

- 1 pcs O-ring: 17,17x1,78 NBR70
- 1 pcs Back-up ring
- 2 pcs Retaining ring
- 2 pcs Wave spring washer
- 3 pcs Flat washer



## Accessories

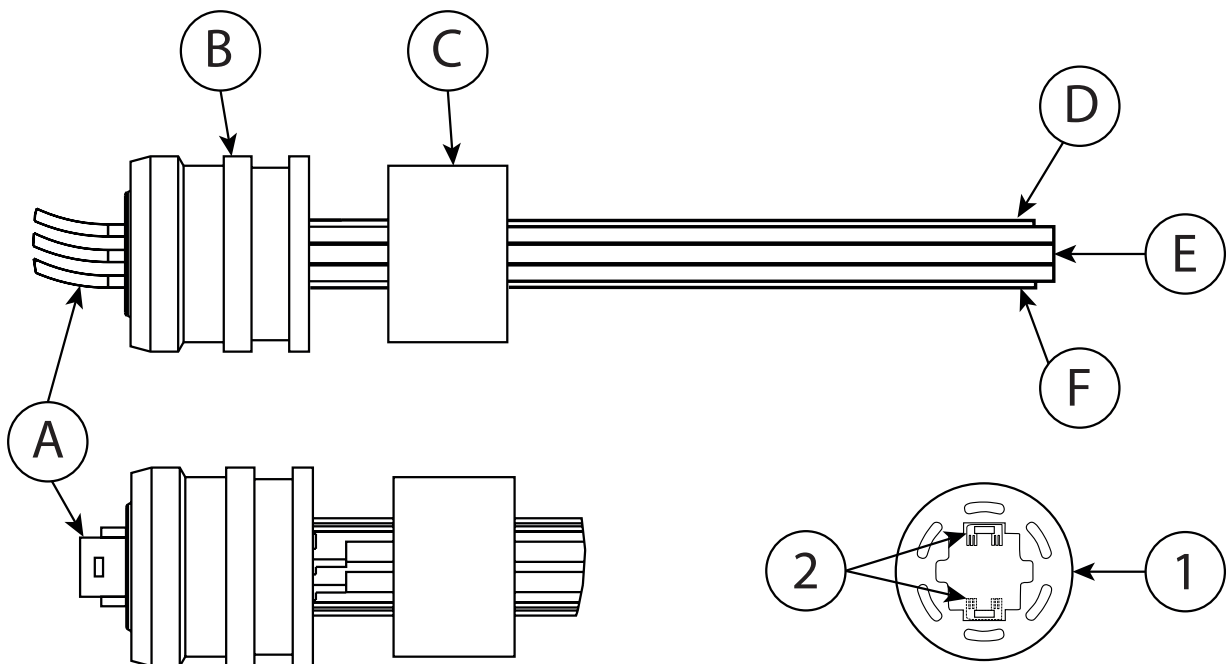
Additional accessories, not included in the standard scope of delivery are connectors and cables.

Connectors 6140 and 6145 are pressure sealed M12 connectors suitable when the installation is not pressure sealed at the sensor header or/and when the hydraulic cylinder is exposed to extremely harsh environment requiring a hermetically sealed connector. 6140 suits wire sensors (SW and DW) and require soldering. 6145 suits sensors with minibridge connector (SC) and require no soldering, minibridge cables for SC-sensors and 6145 connectors are available in different lengths.

Connector 6160 is an M12 connector with IP67 protection suitable for applications with pressure seal at the sensor header. 6160 require no soldering and can be used with sensors with wire connection (SW and DW).

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

## Part design



### Sensor body

- A. Electrical connection; wires or minibridge connector
- B. Sensor header
- C. Wiper
- D. Sensor element
- E. Sensor rod
- F. (Sensor element dual output)

### Wiper


- 1. Wiper body
- 2. Wiper fingers  
(Dual wiper fingers only on dual output sensor)



# Installation

## Pre-installation checklist

- Make sure that there is no damage to the sensor.
  - The sensor rod shall be straight.
  - The sensor element shall be free from scratches, dents, contamination etc.
  - The sensor header shall be intact. Cracks, dents etc. can affect the pressure seal.
  - Make sure that the electrical connection is in good condition.  
Wires (SW/DW) shall be firmly attached to the backside of the header and the cable jacket shall be intact.  
Or the minibridge connector (SC) shall be firmly attached, free from damage and clean from contamination.
  - Installation accessories shall be in good condition.

 The drilling dimensions in the cylinder must be within specified tolerances. Otherwise there is risk of malfunction of the pressure seal and/or the sensor may vibrate in it's mount causing wear.

## Outline installation options

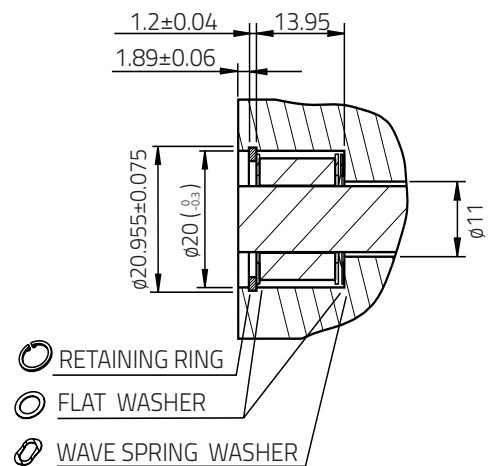
PS6500 can be installed with the pressure seal at the header, or when used with 6140/6145 connector with the pressure seal at the connector.

PS6500-DW, dual output sensor require two 6140 or 6160 connectors.

Preferred method depends on the design of the cylinder. Consult Regal Components AB for recommendations.

## Wiper installation

1. Place the wave spring washer followed by a flat washer in the piston.
2. Install the wiper with the green marked side outwards and make sure that the wiper fingers are on the same side as the sensor element.
3. Place a flat washer on the wiper.
4. Install the retaining ring.





### Installation of sensor with pressure seal at the sensor header

1. Mount the back-up ring and o-ring on the header. Lubricate the o-ring with hydraulic oil to ease the installation.
2. When installing PS65XX-SC (minibridge connector) attach the minibridge cable to the connector.
3. Feed the minibridge cable or wires thru the canal to the location where the connector shall be mounted. This step may vary depending on the design of the cylinder.
4. Mount the sensor firmly in place.
5. Fix the sensor in position:
  - a. Use the retaining ring: Place the wave spring washer on the header, followed by the flat washer and then install the retaining ring.
  - b. Or use a flat pointed set-screw. Recommended tightening torque 0.5 Nm. Seal the set screw with suitable sealing compound.



Make sure that the minibridge cable or wires are free from mechanical stress.



Do not push the sensor in place by pushing the sensor rod or by pulling the wires or minibridge cable.



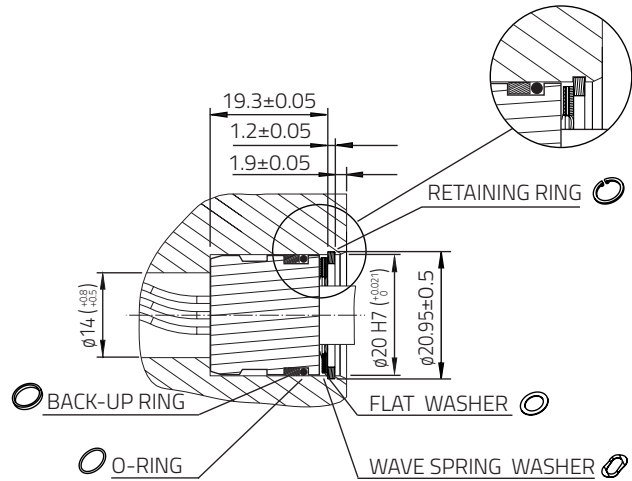
The force from the hydraulic pressure shall apply on the backside of the sensor head against the cylinder body, the set-screw shall not hold this force.



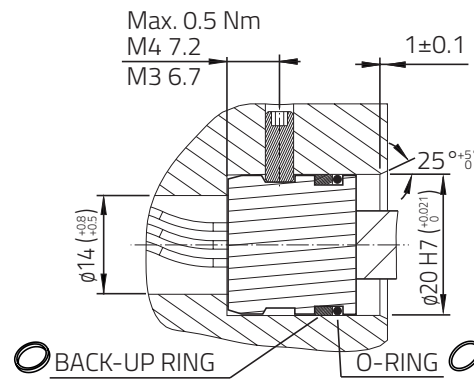
Over tightening of the set-screw may cause damage to the sensor head and compromise the pressure seal.



During assembly of the cylinder make sure that the wiper fingers are on the same side as the sensor element.



Installation using retaining ring



Installation using set screw



### Installation of sensor with pressure sealed connector 6140 or 6145

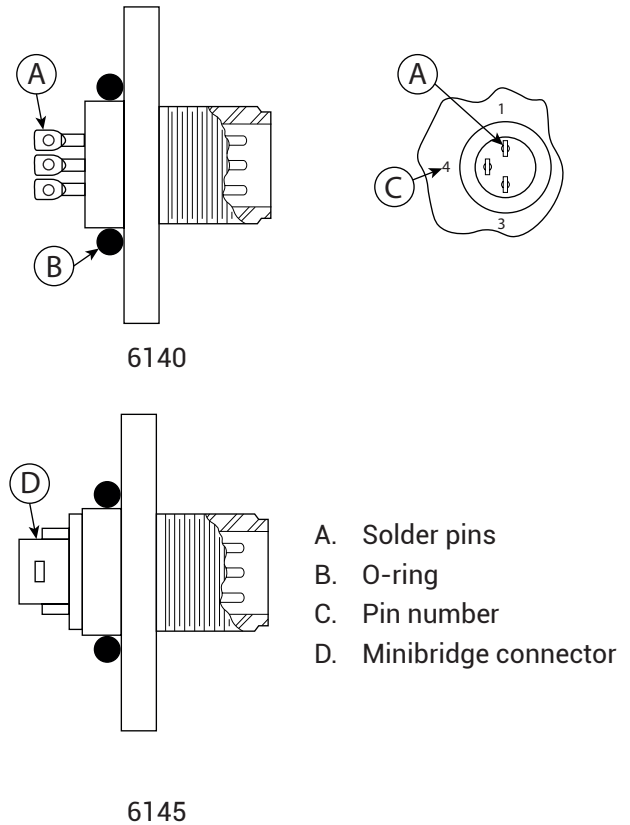
1. Feed the mini cable or wires thru the canal to the location where the connector shall be mounted. This step may vary depending on the design of the cylinder.
  - ⚠ Make sure that the minibridge cable or wires are free from mechanical stress.
  2. Mount the sensor in place.
  - ⚠ Note that the o-ring and back-up ring are not needed.
  3. Fix the sensor in place by using a set screw.
  4. Seal the set screw with suitable sealing compound.
  5. Mount the 6140/6145 connector according to instructions below.
- ⚠ During assembly of the cylinder make sure that the wiper fingers are on the same side as the sensor element.

### Installation of connector 6140 and 6145

1. Place o-ring on connector. Recommended o-ring: 14 x 1,78 mm NBR70. Not included in scope of delivery.
  2. For 6145: Attach the minibridge cable from the sensor to the connector.
  3. For 6140:
    - a. Cut the sensor wires to suitable length.
    - b. Place heat shrink tube on the wires.
    - c. Strip 10 mm of the wires and twist them in place in the pins of the connector. See connection in table below.
    - d. Solder the joints.

⚠ Soldering shall be done by personnel with proper training.

    - e. Heat the heat shrink wires in place over the solder joints.
    - f. Dual output sensor; repeat step a-e for the second connector.
  4. Mount the connector in place.
- ⚠ Make sure that the minibridge cable or wires are free from mechanical stress.



#### Electrical connection 6140

Solder pin	Sensor wire Single output	Sensor wire Dual output	Connection
1	Red	Orange	+
3	Black	Blue	GND
4	Yellow	White	Output



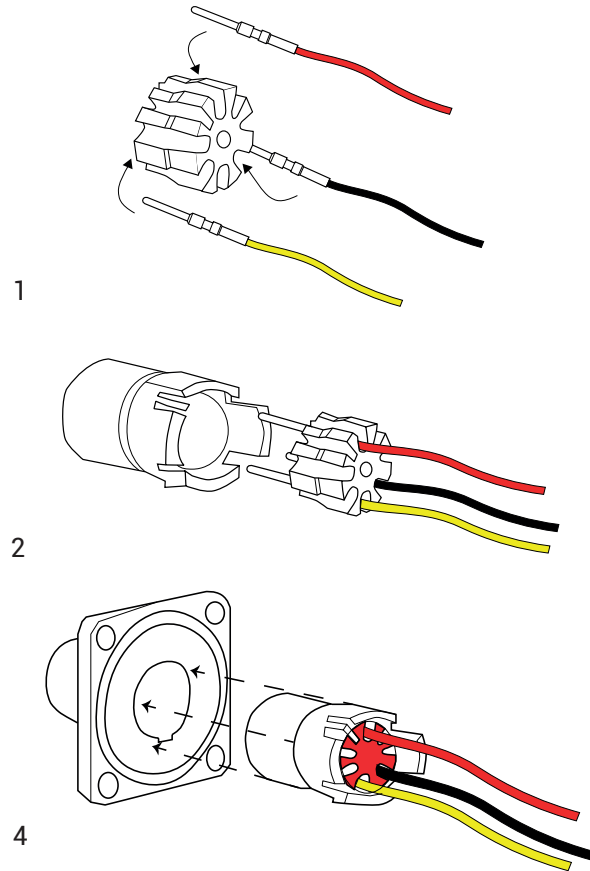
### Installation of connector 6160

**⚠** 6160 connectors can only be used when the sensor is pressure sealed at the header.

6160 consists of crimp contacts, splice ring, contact carrier and flange housing. When a PS6500 sensor is supplied with 6160 connector the crimp contacts are crimped to the sensor wires from factory.

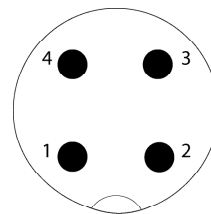
1. Assemble the crimp contacts with sensor wire to the splice ring. Standard A-coded M12 connection shown in table below.
2. Attach the contact carrier.
3. Insert the o-ring into the groove on the housing.
4. Slide the contact carrier in the housing until they snap together.
5. Mount the assembled contact to the cylinder. Recommended tightening torque 0.3-0.5 Nm.

Dual output sensors, repeat step 1-5 for the second connector.



#### Electrical connection 6160

Contact pin	Sensor wire Single output	Sensor wire Dual output	Connection
1	Red	Orange	+
3	Black	Blue	GND
4	Yellow	White	Output



Pin connection, view plug side





## Comissioning

⚠ PS6500 shall be operated as a voltage divider for proper performance. The sensor is not designed to be used as variable resistor, this may decrease the performance and lifetime.

Install connecting sensor cables with regards to electromagnetic combability (EMC), environmental conditions (temperatures, chemical exposure etc.) and mechanical stress, this is necessary to ensure proper function of the sensor. Use of shielded PUR cable, with overmolded M12 connector is recommended.

Recommended input impedance is min. 100 x sensor resistance, the sensor resistance is specified for each stroke length in the datasheet.

⚠ Low input impedance causes linearity errors that vary with the wiper position.

## Function test

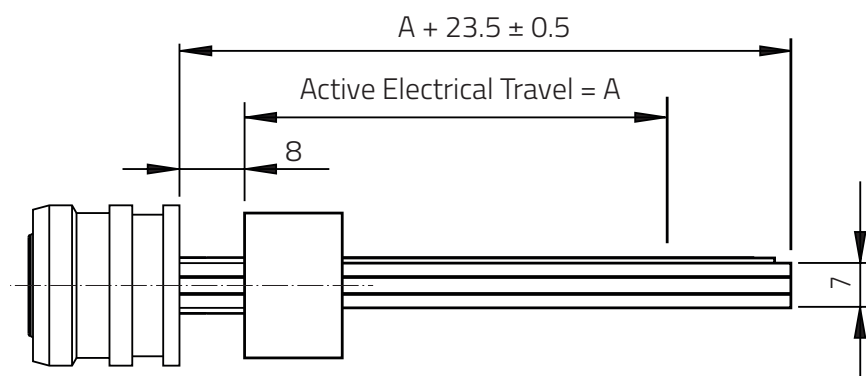
Function test when the sensor is installed in the cylinder and before commissioning of the cylinder is recommended.

If the full electrical stroke is used:

1. Connect the sensor to applicable power source and measuring equipment.
2. Set the sensor in home position, 8 mm from the header. The output signal shall be approx. 0 % of the supply voltage. Small variations is possible depending on how close to the header the cylinder stroke ends.
3. Set the sensor in mid position. The output signal shall be 50 % of the supply voltage.
4. Set the sensor in end position, 8 mm + A from the header (A is specified in the datasheet). The output signal shall be approx. 100 % of the supply voltage. Small variations is possible depending on how close to the end of the sensor the cylinder stroke ends.

If the full electrical stroke is not used, then the correct output at a given position can be calculated as the output is proportional to the wiper position.

It is also possible to measure continuous output over a full stroke and check that the signal is within tolerance.





<b>Error</b>	<b>Causes</b>
No output signal	Broken cables between the sensor and connector. Damage to wiper or sensor element. The wiper fingers is not on the same side as the sensor element i.e the wiper is upside down.
Uneven output signal or noise	Damage to cables between the sensor and connector. Damage to wiper or sensor element. The wiper mounted with the green side toward the piston not the sensor header i.e the wiper is mounted backwards. Low input impedance. Electromagnetic disturbances. Contamination in the cylinder.
The output is reversed	Supply and zero connection are switched. (This is not a technical issue for potentiometers, it can be used both ways)
The mid-position is not 50 % of the supply voltage (very high or very low)	The sensor is not connected with correct pin configuration.