

OLC – OIL LEVEL CONTROLLER

INSTALLATION INSTRUCTION



OLC 
MOTORTECH OIL LEVEL CONTROLLER

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1 GENERAL INFORMATION

Prior to use, read this Installation Instruction carefully and familiarize yourself with the product. Installation and start-up should not be carried out before reading and understanding this document. Keep this Installation Instruction readily available so that you can reference it as needed.

1.1 What Is the Purpose of this Installation Instruction?

This Installation Instruction serves as an aid for the installation and operation of the product and supports the technical staff with all operating and maintenance tasks to be performed. Furthermore, this manual is aimed at preventing dangers to life and health of the user and third parties.

1.2 Who Is this Installation Instruction Targeted to?

This Installation Instruction provides a code of conduct for personnel tasked with the set-up, operation, maintenance, and repair of stationary engines. A certain level of technical knowledge with respect to the operation of stationary engines and basic knowledge of the electronic components used are necessary. Persons who are merely authorized to operate the stationary engine are to be trained by the operating company and explicitly informed of the potential hazards.

1.3 What Symbols Are Used in the Installation Instruction?

The following symbols are used in this manual and must be observed:



Example

This symbol indicates examples, which point out necessary handling steps and techniques. In addition, you receive additional information from the examples, which will increase your knowledge.



Notice

This symbol indicates important notices for the user. Follow these. In addition, this symbol is used for overviews that give you a summary of the necessary work steps.



Warning

This symbol indicates warnings for possible risks of property damage or risks to health. Read these warning notices carefully and take the mentioned precautionary measures.



Danger

This symbol indicates warnings for danger to life, especially due to high voltage. Read these warning notices carefully and take the mentioned precautionary measures.

1.4 What Abbreviations/Acronyms Are Used in the Installation Instruction?

The following abbreviations/acronyms are used in the Installation Instruction.

Abb.	Term	Description	Explanation
AC	Alternating Current	Alternating Current	
CE	Conformité Européenne	Conformity with EU directives	Mark based on EU legislation for certain products in conjunction with product safety
CSA	Canadian Standards Association		Organization that defines standards, inspects products for safety compliance, and issues pertinent certifications.
DC	Direct Current	Direct Current	
OLC	Oil Level Controller	Oil Level Controller	

2 SAFETY INSTRUCTIONS

The device is operated on a stationary engine. Please follow therefore all safety instructions of the equipment manufacturer, especially with regards to sections under high voltage. All work must be performed by trained and authorized personnel only.



Risk of injury!

Turn off the engine prior to assembly and secure it from re-starting in order to avoid damage or injury.



Risk of burning!

The surfaces of the system may heat up to high temperatures.

2.1 Proper Disposal

After the expiration of its service life, MOTORTECH equipment can be disposed of with other commercial waste, or it may be returned to MOTORTECH. We will ensure its environmentally friendly disposal.

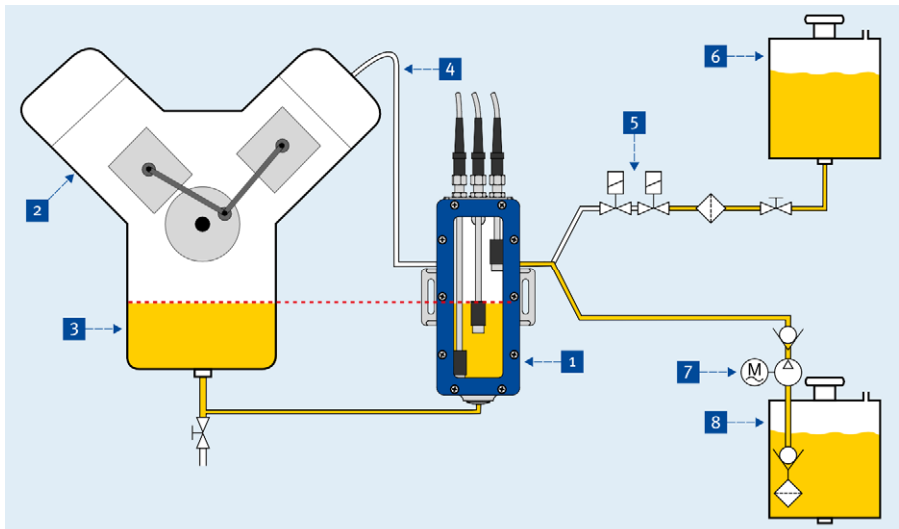
The local regulations for disposal must be observed, in particular for oil and pipes and fittings contaminated with oil.

3 INTENDED USE

3.1 Functional Description

The oil level controller helps you to ensure the supply of lubricating oil for your engines, compressors, turbines, etc. Depending on the number and type of switches used, different oil levels can be signaled. These signals can be transmitted to a master control, which regulates the oil refill via pumps or valves. This ensures optimum lubrication of the engine during operation and prevents damage to the engine and downtimes.

Principle of the Oil Level Control and Oil Refill



Pos.	Description
1	OLC Oil Level Controller
2	Engine
3	Engine sump
4	Compensation line

Pos.	Description
5	Double solenoid valve
6	Overhead oil tank
7	Oil pump
8	Bottom-mounted oil tank

Basically two scenarios are possible:

- **Oil reservoir above the oil level in the engine**
The oil flows as a result of gravity. A solenoid valve is required. For reasons of redundancy, a double solenoid valve is recommended.
- **Oil reservoir below the oil level in the engine**
The oil is pumped by an electrical pump from the reservoir into the engine.

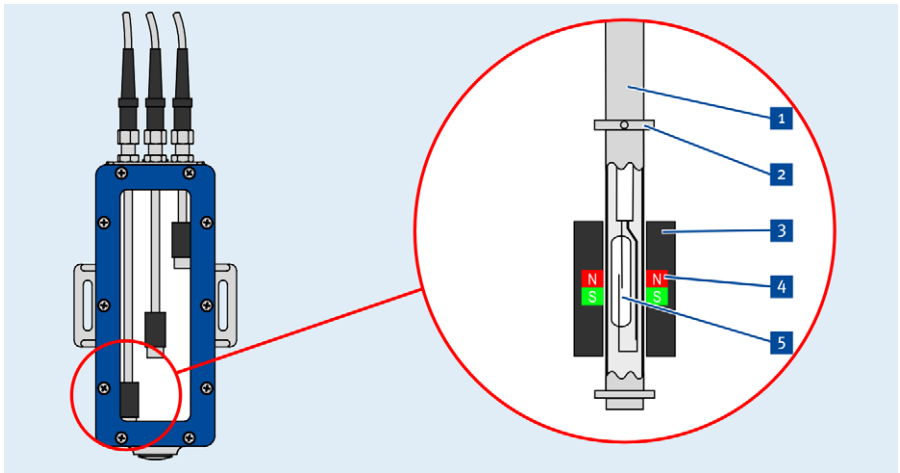
3 INTENDED USE

Float switches are used as sensors. Depending on the model, up to four switches can be used. In addition, it is possible to use an analog level sensor. This can be combined with one or two float switches. With these combination options it is possible to meet a wide range of needs.

Design of the Float Switch

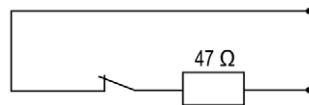
Reed contacts are used as float switches. These consist of two metal tongues sealed in a small air-tight glass tube. The ends of metal tongues protrude from the glass tube. If a change in oil level causes the annular magnet integrated in the float to pass over the metal tongues, the magnetic forces will act on the metal tongues. Depending on the type of float switch, the electric circuit is closed by the metal tongues and is opened by the magnetic forces or vice versa. This results either in a normally-open relay or in a normally-closed relay.

Example MIN switch



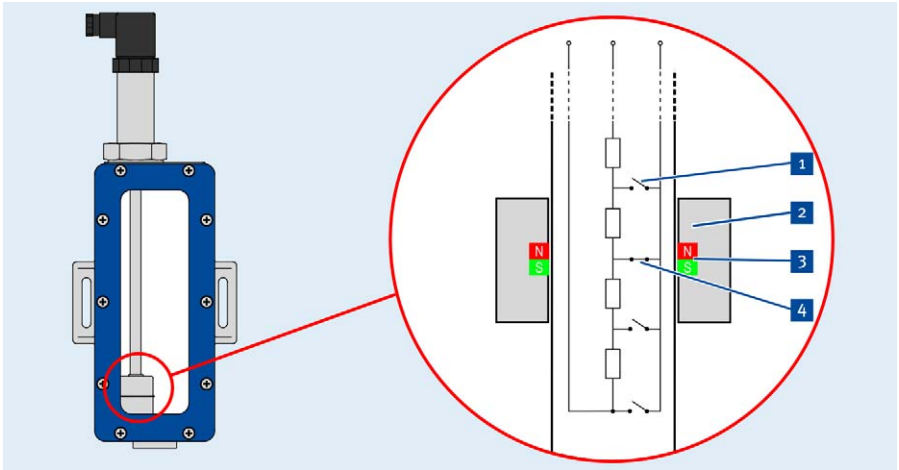
Pos.	Description
1	Guide tube
2	Limit stop for floats
3	Float
4	Annular magnet
5	Reed contact, opens in the case of falling oil level

Float Switch Circuit Diagram (Normally Closed Contact)



Design of the Analog Level Sensors

The analog level sensor has 25 reed contacts in the guide tube in the measuring range of 125 mm (5"). Each contact is followed by a resistor. If a change in oil level causes the float to rise or fall, the reed contact, which is located at the height of the annular magnet in the float, is closed by the annular magnet. The different number of resistors in the closed circuit creates a varying current whenever the float moves. This is converted into a 4-20 mA signal by a transducer.



Pos.	Description
1	Open reed contact
2	Float
3	Annular magnet
4	Closed reed contact

3.2 Applications

The oil level controller controls the oil level in combustion engines, compressors, gearboxes, turbines, pumps, etc. The materials used, especially the seals are resistant to mineral oils and synthetic oils based on polyalphaolefins. Polyglycol/PAG-based oils, coolants, water and water glycol mixtures must not be used with the standard version of the OLC. Specially equipped devices can be provided for these applications by request. This also applies for use in potentially explosive environments.

Any use other than the one described in the Installation Instruction shall be considered improper use and will result in the voiding of all warranties.

4 PRODUCT DESCRIPTION

4.1 Certifications

The oil level controller is certified in accordance with the following:

CE

- EMC Directive
- RoHS Directive
- Machinery Directive
- Low Voltage Directive

EC DECLARATION OF CONFORMITY

The company: **MOTORTECH GmbH**
Hogrevestrasse 21-23
29223 Celle

declares that the products: **OLC Oil Level Controller**

intended purpose: **Application on engines**

complies with the provisions of the following EC Directives:

EMC Directive 2004/108/EC
RoHS Directive 2002/95/EC
Machinery Directive 2006/95/EC
Low Voltage Directive 2006/95/EC

under consideration of the following standards:

DIN EN 55011:2011
DIN EN 61000-6-2:2005
DIN EN 61000-6-4:2007
DIN EN 60947-5-2:2004
DIN EN 50581:2012
DIN EN 12100:2010
DIN EN 1127-1:1997
DIN EN 60529:1991

The marking of the product is: **P/N 80.01.xxx**

This declaration is submitted by:

Name: Florian Virchow

Position in company: Managing Director

Celle, dated 09.10.2014

Place, date



Legally binding signature

4 PRODUCT DESCRIPTION

4.2 Technical Data

The device has the following technical characteristics.

Feature	Value
Dimensions	212 mm x 120 mm x 73 mm (8.35" x 4.72" x 2.87") (length x width x height)
Weight	1.6 kg (3.53 lbs) (for three switches and 1 m (3.3') cable length)
Shape of device	See chapter <i>Overview Drawings</i> on page 14
Oil line connections	1/2"
Compensating line connections	3/8"
Maximum inner pressure	2.5 bar (36.3 psi)
Maximum oil temperature	90 °C (194 °F)
Protection class	IP 65
Ambient temperature	max. 80 °C (176 °F) with PVC cables max. 120 °C (248 °F) for silicone cables

Technical Data of the Float Switch

Feature	Value
Type	MIN/MAX contact: normally closed refill contact: normally open
Maximum switching voltage	60 V AC/DC
Maximum switching current	50 mA
Maximum switching capacity	1,2 W
Series resistor (in series with the reed contact)	47 Ω
Switching hysteresis	3 mm to 4 mm (0.12" to 0.16")

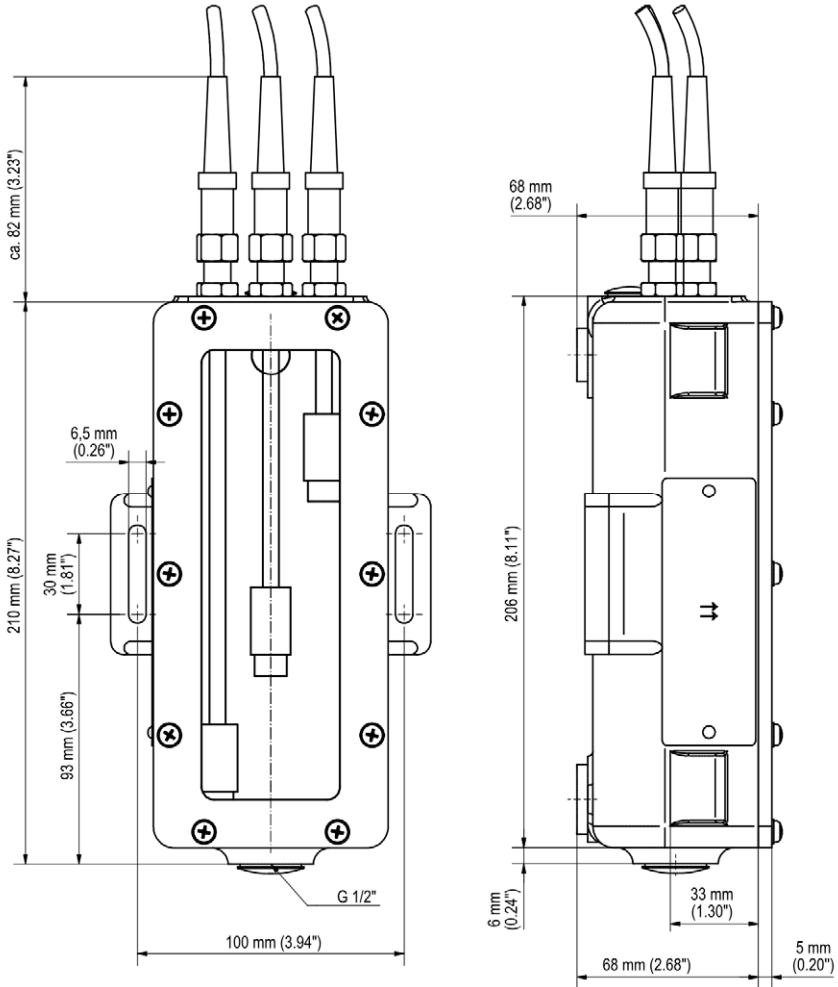
Technical Data of the Analog Sensor

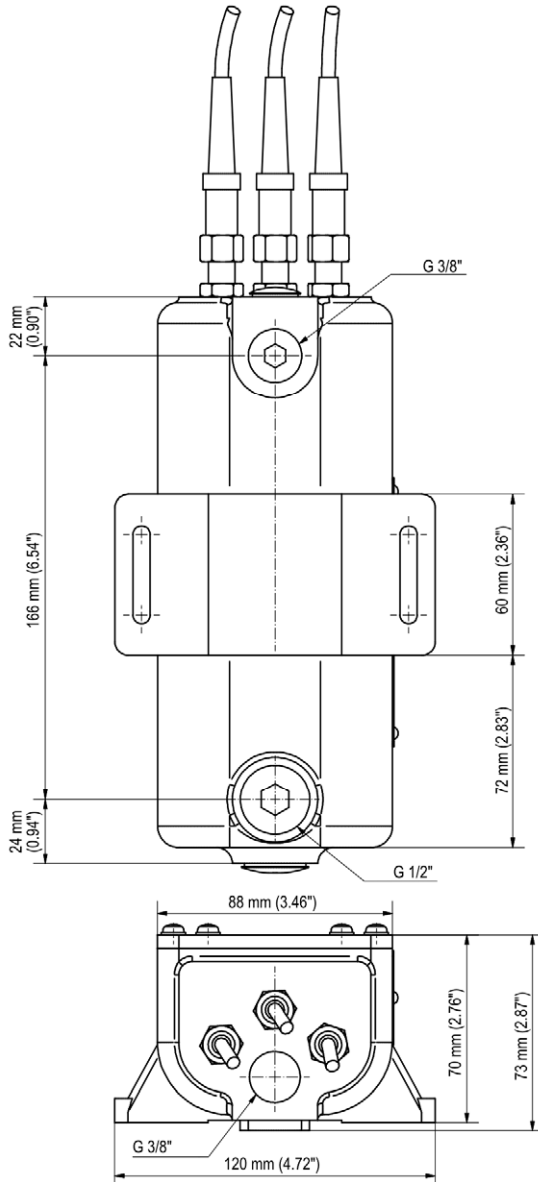
Feature	Value
Type	Sensor with variable resistor incl. 4-20 mA transducer
Supply voltage	12 V DC to 32 V DC
Resistance range	625 Ω to 8.5 k Ω
Length of the adjustment range	125 mm (4.92")

4 PRODUCT DESCRIPTION

4.3 Overview Drawings

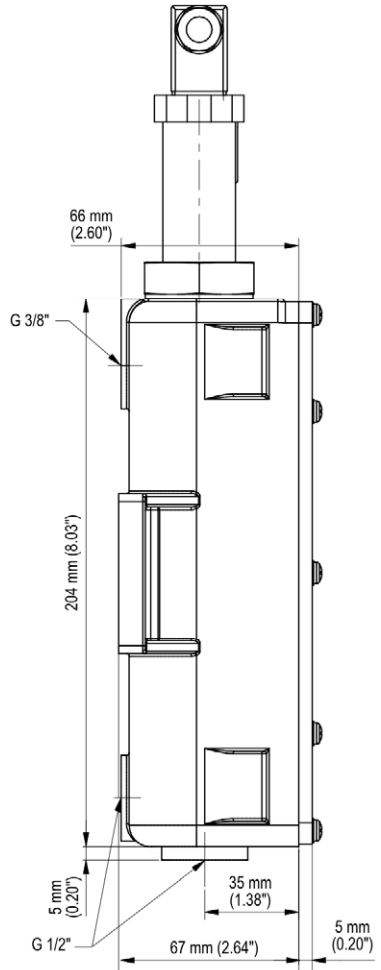
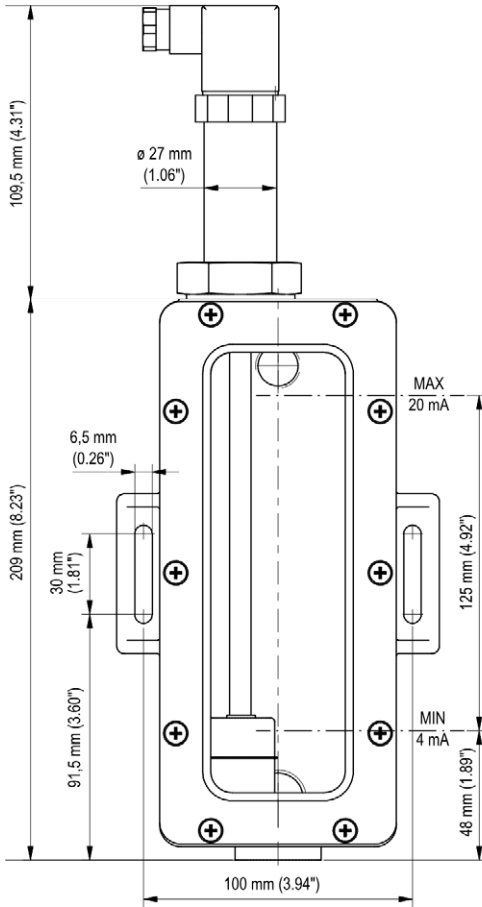
Variant with Three Float Switches (Example)

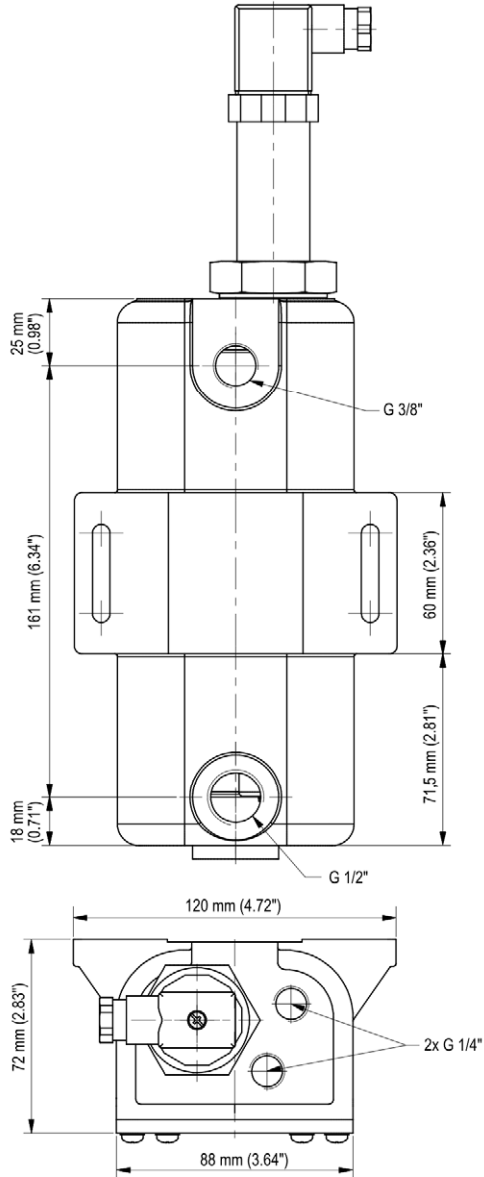




4 PRODUCT DESCRIPTION

Variant with an Analog Sensor and Transducer





5 INSTALLATION INSTRUCTION

5.1 Unpacking

Unpack the device taking care not to damage it, and ensure that the installation instructions are always stored with the device and are easily accessible. Check the contents for completeness and verify that the device type meets your application requirements.

Scope of Supply

The supply scope of the device consists of the following components:

- OLC Oil Level Controller including float switches and/or analog level sensor and connecting cable
- Installation Instruction

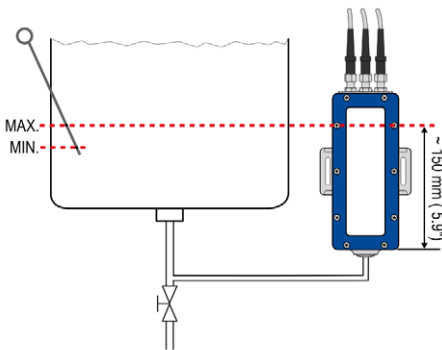
5.2 Determining the Mounting Location

When selecting the mounting location, please note the following information:

- No installation directly on the engine
- Avoid installation in areas exposed to heavy vibration
- Install as close as possible to the oil pan
- Recommendation: Installation on the engine frame

5.3 Mounting the Device

1. Hold the dipstick in the inclined position in front of the engine oil pan and transfer the MIN and MAX marks onto the outside of the oil pan. Please also refer to the note at the end of the section.
2. Screw the housing of the oil level controller onto a bracket so that the MAX mark on the dipstick is approx. 150 mm (5.9") above the bottom edge of the controller (see illustration).



3. Position the housing so that the fastening screws are located as centrally as possible in the slotted holes. This allows subsequent readjustment.



Transfer of the MAX mark

If it is difficult to transfer the MAX mark due to the mounting position of the oil level controller, proceed as follows:

1. Connect a transparent hose to the valve on the oil outlet (connection to the oil level controller).
2. Leave the other end of the hose open and make sure that it is always positioned above the maximum oil level.
3. Fill the engine with oil up to the MAX mark.
 - ▶ The maximum oil level is now shown in the transparent hose.
4. Now align the oil level controller with the indicated oil level as described.

5.4 Connecting the Device

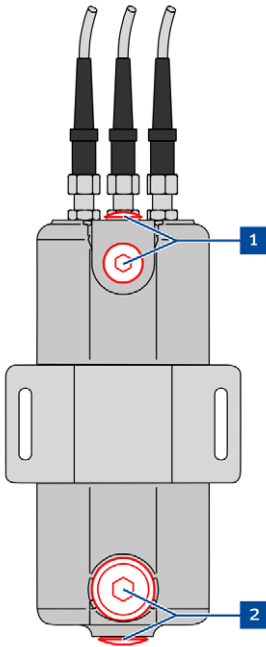


Operational safety!

The oil flow and level compensation between the engine and oil level controller must take place unhindered. Therefore, please ensure in particular that no air or oil pockets can form and there are no kinks.

5 INSTALLATION INSTRUCTION

Overview of Ports/Connections



Pos.	Description
1	Connections for the compensating line and oil refill
2	Connections for the oil feed from the engine



Pipe dimensioning

Please note that the inner diameters specified below are recommendations. Depending on the type of oil, oil temperature and location of refill tank, other cable cross-sections may be required.

Connecting the Oil Feed from the Engine

Drain the oil from the oil pan before you start to install the connections. The installation of the oil feed takes place using one of the two lower connections (1/2") on the oil level controller and must meet the following criteria:

- Heat-resistant, oil-resistant hose with an inner diameter of at least 15 mm (0.6")
- Connection to oil pan drain plug (if necessary use a T-piece)
- 10% (6°) laid ascending

- Short hose lengths
- No elbow screw joints
- No reducing sockets

Connecting the Compensating Line and Oil Refill (Optional)

The installation of the compensating line, and if necessary the oil refill, takes place using one of the two upper connections (3/8") on the oil level controller and must meet the following criteria:

- Inner diameter of the hose of at least 10 mm (0.4")
- Connecting the compensating line on the engine above the maximum oil level (preferably on the valve cover)



Connecting the compensating line

When connecting the compensating line, the flow conditions in the engine should be observed. There is generally pressure in the engine block and the flows are turbulent. This makes pressure equalization between the engine and oil level controller difficult. Connection to a valve cover is therefore preferable.



Oil refill via the OLC

Ideally, the oil should be refilled directly via the oil level controller. This means there is a connection between the oil tank and the OLC and the oil is not refilled directly into the engine sump.

In this way, the oil level controller can react immediately to changes in level. This reduces the risk of overfilling, as the oil level compensation while refilling takes time.

5.5 Setting up and Connecting the Switch

To set the switches correctly, proceed as follows:

- Mark the relevant oil levels on the housing of the oil level controller
- Setting the refill switch
- Setting the MAX switch
- Setting the MIN switch
- Connecting the switch to the master control

5 INSTALLATION INSTRUCTION

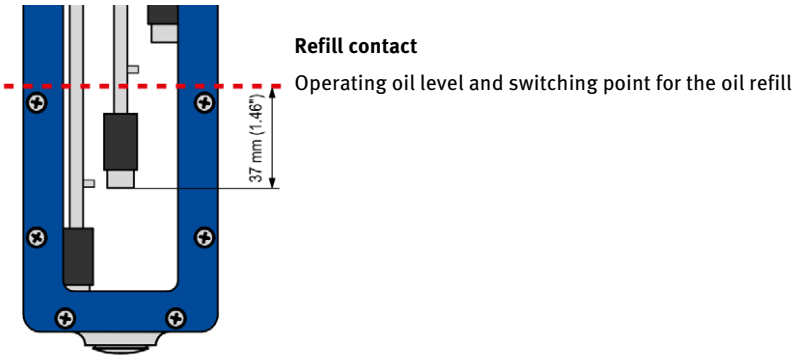
Marking the Oil Levels on the Housing

1. Fill the oil pan with engine oil of the correct SAE class up to just below the MAX mark on the dipstick.
2. Start the engine briefly and then shut it off again.
 - ▶ The lube oil filter and the oil channels are filled with oil.
3. Allow the engine to cool off.
4. Restart the cooled engine.
 - ▶ The oil level drops sharply.
5. Mark this lowest permissible operating oil level on the housing of the oil level controller.
6. As the engine temperature increases, the oil level will increase to the operating oil level. Mark this on the housing of the oil level controller, too.

Setting the Refill Switch

The middle sensor is used as a refill switch and is installed at the level of the operating oil level.

1. Release the union nut on the guide tube of the middle switch.
2. Move the guide tube until lower end of the switch is 37 mm (1.46") below the mark for the operating oil level.



- ▶ The switching point of the switch is now at the level of the marked operating oil level.
3. Tighten the union nut again until the guide tube is no longer able to shift on its own.



Risk of damage!

When tightening the union nut, make sure that the maximum tightening torque of 6 Nm (4.4 lb-ft) is not exceeded, otherwise the clamping ring will be deformed. A readjustment of the switch position is then no longer possible.



Equalization of the oil level following a cold start

After a cold start, the oil level may initially drop sharply. To avoid overfilling in this situation, the refill contact should be deactivated until the oil has reached operating temperature.



Variant with four float switches

If you use the OLC version with four float switches, two contacts are available to execute the refill function. The lower contact starts the refilling (e. g. via a pump) and the upper contact stops the refilling.

Setting the MAX Switch

The shortest switch is used as the MAX switch.

1. Proceed similarly to the procedure for the refill switch, with the lower end of the switch located 37 mm (1.46") below the MAX mark on the dipstick.
 - ▶ The switching point of the switch is now at the level of the marked maximum oil level.

Setting the MIN Switch

The longest switch is used as the MIN switch. The switching point of the MIN switch should not be set too far below the operating oil level to ensure the best possible oil filling.

1. Proceed similarly with the procedure for the refill switch, with the lower end of the switch located 37 mm (1.46") below the required switching point.

5 INSTALLATION INSTRUCTION

Connecting the Float Switch to the Master Control

A two-core cable is securely attached to the float switch and cannot be disconnected. A $47\ \Omega$ series resistor that reduces the high inrush current is connected in series with the switches in each case.

1. Connect the switches to the digital inputs of your master control. Please observe the following behavior of the switch:
 - The MIN switch opens when the oil level falls below the switching point.
 - The MAX switch opens when the oil level rises and reaches the switching point.
 - The refill switch closes when the oil level falls and reaches the switching point.
2. Please ensure that sufficient clearance is maintained to exhaust pipes and other hot machine components when laying the cable. If necessary, use polyamide corrugated hoses (nominal diameter 10).
3. After setting up and connecting the switches, test them under field conditions, by testing the behavior in all conceivable operating conditions, for example:
 - Test with a warm and cold engine
 - At full capacity
 - Sudden load reduction
 - Simulate oil overfilling
 - Simulate an oil shortage



Risk of damage!

Exceeding the specified values for the switching current and voltage may result in the destruction of the reed contacts in the float switches. Depending on the integration into an electrical control circuit, inductive or capacitive loads may overload the reed contacts temporarily or permanently. This load must be reduced by appropriate measures.

Depending on the voltage source inductive loads can be reduced by means of:

- Diodes
- RC elements
- Varistors

Capacitive loads can be reduced using a series resistor. In the case of the float switches used, a series resistor of $47\ \Omega$ is used in series with the reed contact.



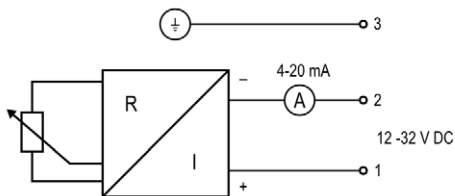
Examples of switching states

Depending on the desired reaction, the different switching states can be used for various functions, e. g.:

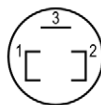
- A warning lamp is turned on when the minimum level is reached.
- A valve is closed when the maximum level is reached.
- A pump is activated when the refilling level is reached.

Connecting the Analog Sensor to the Master Control

As a rule, the oil level controller is aligned as described above for the variation with the float switches. Furthermore, the respective current must be determined for the corresponding switching states and programmed in the master control (e. g.). The connection to the master control is via the plug on the 4-20 mA transducer.



Transducer circuit diagram



Transducer connector plug

6 DISTURBANCES

In the event of a malfunction, generally check the complete installation and adjustment of all components. Most malfunctions are caused by incorrectly installed pipes or hoses or when too-small inner diameters of the lines used.

6.1 Overfilling

When in operation and/or at rest, the oil level in the gage glass is above the indicated operating oil level.

In the following sections you will find possible causes of overfilling and the recommended corrective measures:

There is coolant in the lube oil; the oil in the gage glass is milky-white.

- Check the cooling circuit.
- Clean the seals of the oil gage glass on the level controller.
- Please note: Tighten hollow bolts to a maximum of 8 Nm (5.9 lb-ft)!

The solenoid valves do not close.

- Check the valve function.
- Check the cables/connectors.
- Check the electrical valve control.
- Check the refill switch functioning.
- All tips also apply in the case of oil refilling by electric pump.

The oil level controller is not properly adjusted.

- Readjust it according to the instructions.
- Check slotted hole attachment on the controller.
- Secure the controller against slipping.
- Check the screw connection.

The oil and/or compensating line is blocked.

- Check the lines.
- Check the hoses for kinks.
- Check the lines for air and/or oil pockets.

6.2 Underfilling

When in operation and/or at rest, the oil level in the gage glass is below the indicated operating oil level.

In the following list you will find possible causes of underfilling and the recommended corrective measures:

The reservoir is empty.

- Top up the tank.

The tank bleeding vent is blocked.

- Clean the bleeding vent.

The pipe and/or the fittings are blocked or closed.

- Check that all pipes, hoses and fittings are unobstructed.

The hoses are kinked; an oil pocket has formed in the compensating line or an air pocket has formed in the oil line.

- Check that all hoses and pipes are properly installed.

The solenoid valves do not open.

- Check the valve function.
- Check the cables/connectors.
- Check the electrical valve control.
- Check the refill switch functioning.
- All tips also apply in the case of oil refilling by electric pump.

The oil level controller and/or refill switch are not correctly adjusted or have shifted.

- Check the settings.
- Readjust it according to the instructions.
- Check slotted hole attachment on the controller.
- Secure the controller against slipping.
- Check the screw connection.

The oil in the reservoir and in the supply line is cold and does not flow.

- Heat the oil.
- Install pipe heating.
- Select larger pipe diameters.
- Select longer cooling periods.

The crankcase pressure is too high due to engine wear. The back pressure prevents the inflow of fresh oil.

- Overhaul the engine.
- Position to reservoir higher.

7 MAINTENANCE

The oil level controller is generally maintenance-free. Nevertheless, the following inspections should be carried out regularly:

- Check the fastenings and fixing of the switch.
- Check cables and hoses for damage and possible chafing.

Furthermore, a function test should be included in the maintenance plan.

Maintenance of the Gage Glass

If the gage glass is replaced, the seals on both sides of the glass will need to be replaced. The torque of the cover bolt is 4.0 Nm (2.95 lb-ft).



Risk of damage!

Cleaning the polycarbonate gage glass using solvent-based cleaners will result in it clouding over. Therefore, use only water and household detergent for cleaning.

7.1 Customer Service Information

You can reach our customer service during business hours at the following phone and fax number, or by e-mail:

Phone: +49 5141 93 99 0

Fax: +49 5141 93 99 99

Email: service@motortech.de

7.2 Returning Equipment for Repair / Inspection

To return the device for repair and inspection, obtain a return form and return number from MOTORTECH.

Fill out the return form completely. The completely filled out return form guarantees fast, uncomplicated processing of your repair order.

Send the device and the return form to one of the two addresses below or to the nearest MOTORTECH representative:

MOTORTECH GmbH

Hogrevestr. 21-23
D-29223 Celle

Germany

Phone: +49 5141 93 99 0
Fax: +49 5141 93 99 98

www.motortech.de
motortech@motortech.de

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New Orleans, LA 70123

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Phone: +1 504 355 4212
Fax: +1 504 355 4217

www.motortechamericas.com
info@motortechamericas.com

7.3 Instructions for Packaging the Equipment

For return shipment, equipment should be packaged as follows:

- Package the device separately in foil.
- Use packaging material that does not damage the equipment surfaces.
- Wrap the equipment with sturdy materials and stabilize it inside the packaging.
- Use sturdy adhesive film to seal the packaging.

7.4 Spare Parts and Accessories

For spare parts and accessories, please refer to our current Product Guide, which is available for you to download on the Internet at www.motortech.de.

WE UPGRADE GAS ENGINES

Original MOTORTECH Accessories for Stationary Gas Engines

As a supplier, MOTORTECH develops, produces and distributes accessories as well as spare and wearing parts for nearly all kinds of stationary gas engines worldwide: Ignition control and monitoring, industrial spark plugs and high tension leads, wiring systems and gas regulation– from detonation to speed control and complete gas engine management. On-site support and special training courses complete our service.



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