🕮 User's Guide

A4910 – Lubri

Applications:

- Monitoring and control of lubrication process
- Measurement of rolling bearing condition

Ref. No.: 12112009

Contents:

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Introduction

There is an increasing demand for an instrument which is able to simply check lubrication of rolling bearings and also the condition of these bearings.

Every machine does have in its specifications how much lubricant every one of its bearings uses in a specific amount of operational hours. A task of each technician or engineer is to regularly check all the lubricated points and maintain lubricant at sufficient levels. Either state, lack or excess of lubricant, are harmful for a rolling element bearing. The result is always excessive stress on the bearing and consequently excessive wear. Every lubricating point has a lubrication time interval (in hours of service) and also an amount of lubricant that needs to be replenished. This manner of lubrication control has a significant disadvantage.

The amount of lubricant that any bearing actually needs for proper operation changes during its lifetime. Longer lubricating intervals in the case of a new machine are usually not sufficient for a machine after several years of operation.

It is clear that it would be useful to be able to determine a state of a bearing somehow and replenish only as much lubricant as is actually needed. Controlled lubrication increases bearing service life and lowers costs for lubrication and repairs.

We have collected a large amount of knowledge by researching machine long-term operation and lubrication here at ADASH and we have applied it in developing the instrument A4910 - Lubri. It is simple to operate, and user's training takes less than one hour. The main use of this instrument is in the lubrication replenishment process. During this process the instrument measures the actual lubrication condition of a bearing and tells the operator when the amount of lubricant is ideal. This way it is ensured that we do not under or over lubricate.

When we use this instrument we can shorten recommended lubrication intervals, since the instrument always exactly determines the ideal amount of lubricant needed.

As a result of using the A4910-Lubri instrument, your machines will be maintained in their best lubrication condition. The instrument enables you to make the whole lubricating process simpler and it normally reduces the consumption of very expensive lubricants.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

What Will You Get with Your Instrument?

Instrument and Accessories

The instrument case contains:
- instrument A4910 - Lubri
- lubrication and bearing condition sensor
- magnetic base for sensor
- coiled cable to connect sensor
- headphones
- 1.5V alkaline battery

The complete lubrication set

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Application example

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Before You Start

Ignoring any recommendations mentioned below may cause failure of the instrument.

Operating with power higher then 24 V can cause an accident.

1. Never connect any other type of sensor than ICP into the socket marked ICP!
If unsure, contact your supplier.

2. Never plug the A4910 into 110 - 230 V voltage!

3. To power the A4910, use batteries (rechargeable batteries) with max. nominal voltage of 1.5 V!

4. To power the A4910 use only alkaline or rechargeable (NiCd, NiMH) batteries.
Regular carbon-zinc batteries are not suitable.

WARNING!
Use correct battery polarity.
Incorrect polarity will cause destruction of the instrument!

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Quick Start

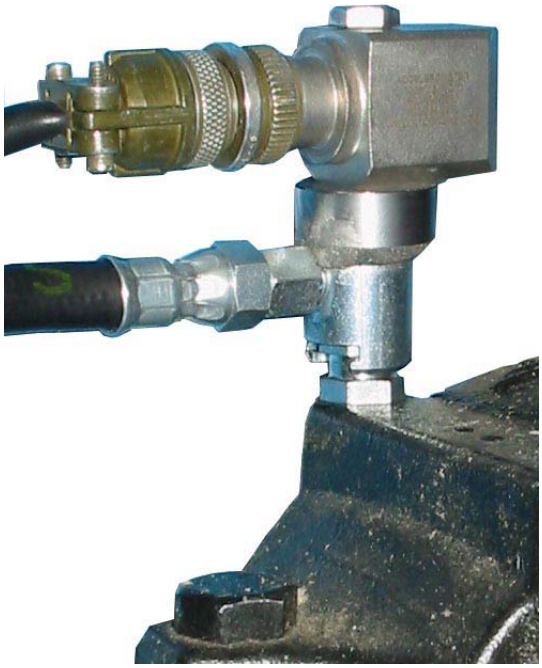
The aim of this chapter is to introduce you to A4910-Lubri, and, without reading a complete User's Guide, try this instrument in practice.

Two Possible Ways to Measure

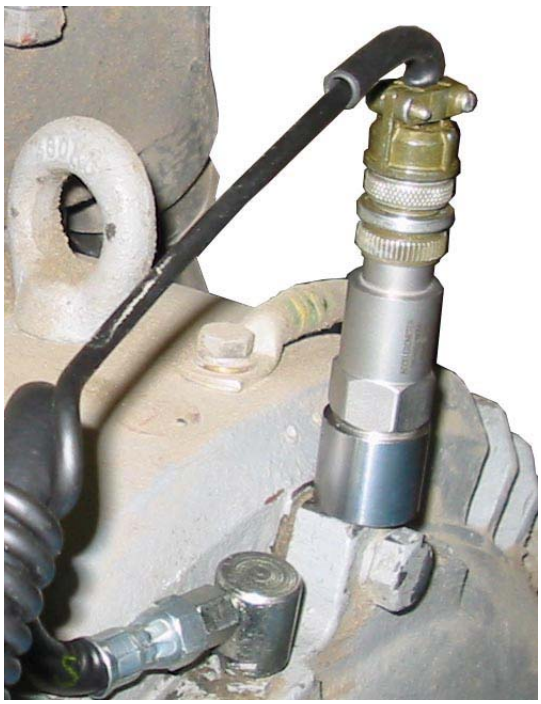
A sensor (a standard accelerometer with sensitivity of 100mV/g and ICP power), which needs to be mounted on a bearing housing, is used to measure lubrication.

We have two possibilities how to do this:

1 The sensor is mounted on a lubrication head.
This option enables a quick service since the lubrication head is transferred together with the sensor. The disadvantage is a partial loss of sensitivity, since the lubrication head attenuates the measured signal.
2 The sensor is mounted next to lubrication point on a bearing housing (measurement pad recommended).
This option enables a perfect measurement. The disadvantage is a longer preparation, since the lubrication head and sensor must be mounted separately.



1. Sensor is on the lubrication head



2. Sensor is mounted next to lubrication point

If vibration diagnostic measurements are performed on a machine, then a measurement pad is already mounted. This pad can be used also for lubrication measurements.

A procedure for mounting of a measuring base is shown at the end of this Guide.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

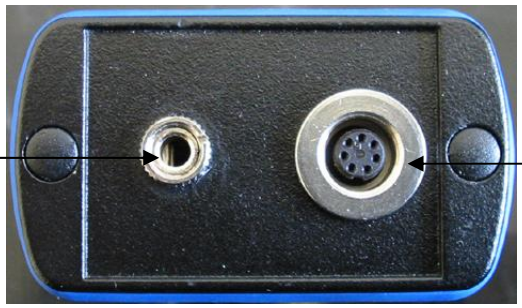
Instrument Preparation

The preparation of this instrument for measurement is easy. All you need to do is to put in batteries and plug in the lubrication sensor and screw it on a magnetic base.

Remark: The battery (rechargeable battery) space is behind a door in the base of the instrument. Open the door by pressing its lower edge (the edge with hinge) then you can easily replace the batteries – see chapter: **Instrument Description – Battery Change.**

Plugging in the Lubrication Sensor

Lubrication measurements require plugging in a lubrication sensor with ***ICP*** power. The sensor must be a standard ***accelerometer with 100 mV/g sensitivity***. The instrument is equipped with its own source of ICP power for connected sensor.
The sensor needs to be connected at the right side plug using the supplied cable. Then a magnetic base needs to be screwed on to the sensor.



Top view of the connectors

Lubrication and Measurement

If the instrument is ready, we need to attach a lubrication head. If a sensor is not a part of lubrication head, we attach it, by using a magnetic base, to a formerly prepared and glued measuring base. Do not forget to remove the cover of magnetic base, which protects the magnet from weakening in storage.
Switch on the instrument by pressing ***Mode***. Provided that the batteries are OK, the instrument display will show running bands and greasers (red and green). Then the instrument will automatically measure an actual lubrication state. If your headphones are connected, you will be able to clearly hear the bearing noise. Using ⮝ and ⮟ arrows you can increase/decrease its volume. On the left side of the display is a column, whose height indicates a bearing lubrication state. After the instrument is switched on, it always reaches a maximum level. We need to slowly start adding lubricant, while monitoring the height of the column on the display and the noise in the headphones. Usually there is not much going on in the beginning, which means that the lubricant is pushed toward the bearing, however it is not there yet. At the moment when the lubricant reaches the bearing, the column decreases (usually its upper red part disappears and only the green lower part remains) and noise in the headphones decreases also. We need to add a little more lubricant, and if there is no further decrease, we end the lubrication process.

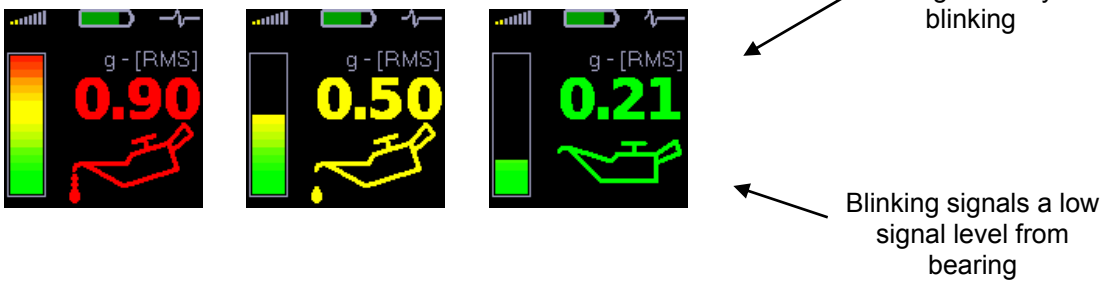
If, at the beginning of measurement, the greaser in the lower right hand corner starts to blink, then the signal from a bearing is very low. We have either new or a very well greased bearing. In this case we suggest using headphones to finish lubrication.

Before we start lubricating another bearing we need to reset after the previous measurement. It is

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

necessary, since, during bearing operation, values showing bearing status are different for every bearing. The values are different even for bearings of the same type used on different machines or under different loads. Reset is done by a short push of the ***Mode*** button. A lubrication value in the upper right display corner will start blinking during reset.

Complete switch-off is done by a long push of the ***Mode*** button.



Picture on the left shows greasers signalling proper instrument start. Middle picture shows measurement before lubrication and right shows measurement after lubrication

Warning!!! If the display stays off after switching on the instrument, the batteries are weak – change them!

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Determining of Lubrication Interval and Amount of Lubricant

Goal of Maintenance in Lubrication Process

The goal of maintenance is a long lifetime of rolling bearings. We need to optimise lubrication to achieve this. To achieve the best possible state of lubricated bearings and save lubricant at the same time, we need to determine regular intervals, when we are going to perform lubrication. Another question is the amount of lubricant for each of the lubrication points.
Starting points are intervals and amounts determined by a manufacturer. We had performed a large amount of testing on bearings directly in manufacturing. We have found that the intervals, which are determined by manufacturers, are always too long, and that at the end of these intervals the bearings are not working under optimum condition.

Procedure for Lubrication Optimisation

The A4910 Lubri instrument enables you to measure an actual working condition of a bearing (a numerical value up on the display). We can utilise this measurement for optimisation of lubrication, using the following steps:

1 We need to lubricate a machine thoroughly.
2. Then we measure and record a (reference) value of the bearing condition.
3. We need to repeat this measurement regularly in 1/10th lubrication intervals recommended by a manufacturer.
4. If the condition value of the bearing increases to double of its reference value, then further lubrication is needed, and time from reference measurement to this new lubrication is our new optimum lubrication interval.

Remark: In case that we overlubricate a bearing at the initial reference lubrication, the bearing condition value can initially decrease, until the amount of lubricant in the bearing reaches an optimum (minimum) value. Than we use this time and value as our initial reference.

Example:
The manufacturer recommended lubrication interval is 600 service hours. The reference value is 0.25g. The control measurements are performed every 60 service hours (see Table):

REF	0.25
60	0.26
120	0.29
180	0.35
240	0.51

The measured value reached double of the reference value in 240 service hours. Optimum lubrication interval is then 240 service hours.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

How Much Lubricant Needs to Be Added

The result of lubrication interval optimisation procedure is also the lowest value of a bearing condition. Our goal is to reach this value by regular lubrication. We add lubricant long enough to reach this reference value.
We need to realise, however, that a bearing is being worn out, and so its working condition worsens. That is why it is not possible to constantly reach, during its lifetime, its original reference value during lubrication.

The lubrication rule is then as follows:

Lubricate while the bearing condition value decreases, then stop.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Instrument Description

Adash 4910 – Lubri.

Note: The A4910-Lubri instrument has the LB/TRUE RMS measurement method preset, this method is capable of numerical evaluation of a bearing state.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Instrument Operation

Mode button

Mode button is used to switch the instrument on/off and for measurement reset. The button needs to be pushed for a longer time to switch off.

Buttons ▲ and ▼

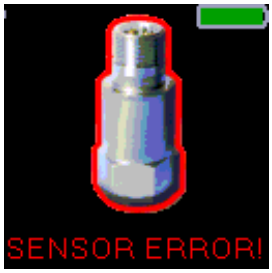
These buttons are use to control volume in headphones. Arrow ▲ increases volume, arrow ▼ decreases it.

Error Indications

Errors are indicated on an instrument display.
If there is a problem with cable or sensor, the display will show “ICP ERR“ (see picture). If we get an **ICP ERR**, we need to check:

- connecting cable (broken or short circuit)
- sensor

If there is another internal fault, the display will show “CPU ERR“ (see picture). If the error constantly repeats itself, contact your supplier or manufacturer.



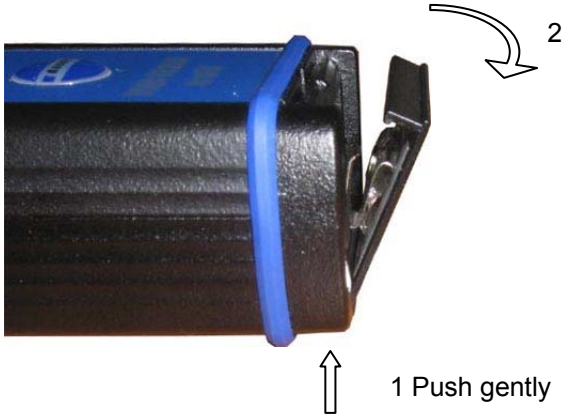
Sensor and instrument power supply errors

Changing Batteries

To power the instrument, use **AA-size alkaline batteries or NiMH rechargeable batteries with nominal voltage of max. 1.5 V**. Use of regular carbon-zinc batteries is not recommended.
The batteries are accessible after you open a small lid on a bottom of the instrument. You can open the lid by pushing on its bottom side (hinge side), the upper side then opens easily – see the picture. DO NOT APPLY FORCE!!! Correct polarity is shown in the picture.

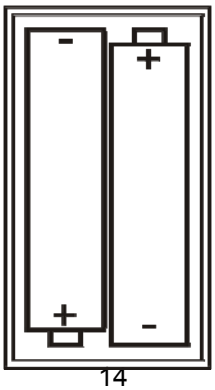
Do not forget to switch the instrument off before you open the battery compartment lid! Never handle the batteries when the instrument is switched on!

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz



Battery compartment opening

Battery placement



ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Correct polarity

Connecting of Headphones

The instrument is equipped by a 0.5 W amplifier for listening to a bearing noise. We can connect the headphones by a stereo 3.5 mm jack marked ***PHONES*** on the top of the instrument (see picture in the sensor connecting chapter). Suitable volume can be set by arrows ⮝ or ⮟.

When the instrument is switched on or off, range is changed, or the sensor is connected or disconnected, a short, unpleasant crack can be heard due to a transitional effect. This is not a defect.

Be careful not to overload the headphone amplifier by excessive volume. This will distort a signal in the headphones!

You can use any headphones with nominal impedance higher than ***8 Ω*****.**

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Measurement pad instalation

Selection of Measurement Point

Two conditions are important for exact measurement of lubrication state.
Firstly, to pick a suitable attachment place for the lubrication sensor, i.e. place as close as possible to the bearing. The bearing housing is ideal for this. If this is not possible, we should choose a part of a machine, which is in as firm as possible contact with the bearing. Covers etc. are not suitable as measurement points – the points have to be as rigid as possible.
The other condition is preparation of the measurement place – gluing on a measurement base.

Note: If your company performs vibration diagnostics on its machines, you can utilize measurement points that have been created for this purpose for bearing lubrication measurements also.

Preparation of Measurement Point

In order to obtain a quality measurement, we need to properly prepare these places. It is necessary, in regularly performed lubrications, to always attach a sensor the same way at the same place. In order to perform bearing lubrication measurements, we need to attach a sensor through magnetic base or, even better, screw it on. For practical reasons most users use the magnetic base, since screwing takes more time. The magnetic base is a very strong magnet firmly screwed on to the sensor, which is then magnetically attached to a surface of a machine. The quality of the attachment significantly influences the measurement results. If the sensor rocks or jumps etc. the measurement is useless. Also a thick layer of paint or corrosion lowers the usefulness of a measurement. The surface of the magnetic base is carefully ground and the same type of surface is needed on the machine. This is, of course, practically impossible, since we are only capable to create an evenly ground surface of 3x3 cm in a workshop. Even if we were able to create such a surface, it would not last since a quality of bearing housing steel (for example) is not high, and it quickly succumbs to corrosion. This renders the place unusable.

The solution is to use measuring pads. They are small cylinders with diameter of approx. 26 mm and 10 mm tall with ground surface. They are made from magnetic stainless steel. They are glued to appropriate places on a machine with a special glue, which ensures perfect transfer of high frequency vibration. The pad is covered by a plastic cover, which is only removed at the time of measurement. Another advantage of the cover is that in case of a machine being painted your measurement point is preserved. Painting over the measuring pad destroys it!

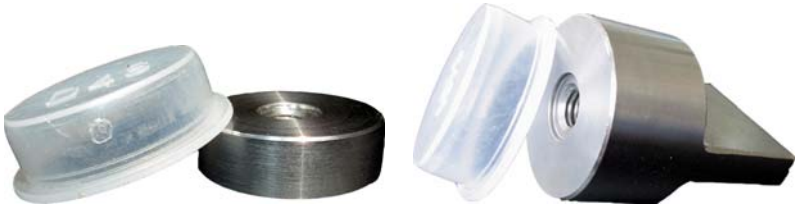
All you need to do before gluing one of the pads is to degrease and roughly grind a machine surface in an appropriate spot. The pads last indefinitely, or until they are forcibly removed.

Types of Measurement Pads

We supply two basic types of the measurement pads for measuring location preparation. They are: a simple measuring pad for easily accessible places on a machine and special T-pad for electric motors

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

(for attachment at cooling ribs). Both pads have an M6 threads for screwing on the sensor.



Pad Installation

You will need the following: angle grinder, files, sand paper, degreaser (spirits, thinner), measurement pads, and glue.
The surface where you need to attach the pad needs to be prepared as follows:
- remove paint, corrosion and eventual unevenness by grinding
- degrease

Both types of pads are being attached to a measuring location by METAL TECH SG glue.
See ***www.thortex.com - product***
You can use other glues with similar properties.

It is dual component epoxy glue with characteristics suitable for this purpose.
The two components react chemically when handled and after proper mixing and drying create a hard material, which is resistant to pressure, temperature and humid environment.

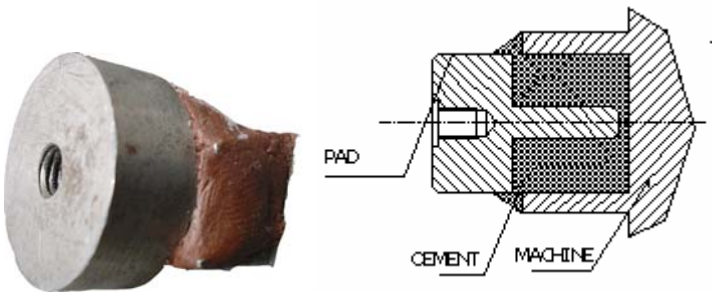
In case of the simple pad proceed as follows: With a sharp knife cut about 3 mm thick slice and by wet fingers work into homogeneous matter. From this make about 2 – 3 mm thick cylinder and put it on a rough side of the pad.

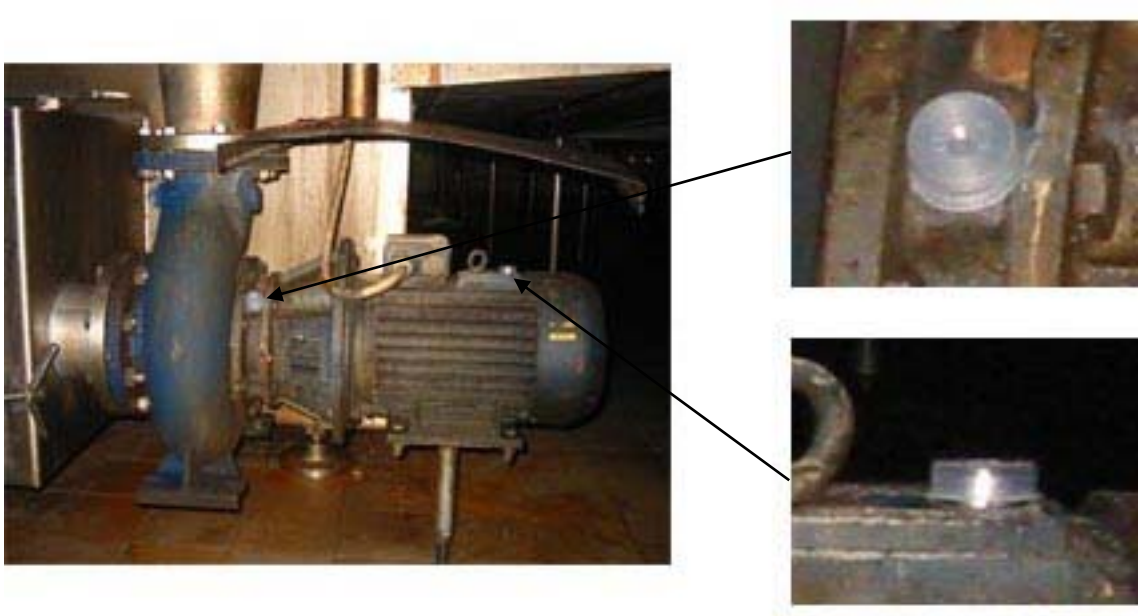
Then press the pad onto the previously prepared, cleaned spot and turn back and forth under steady pressure to glue it onto the machine. Make sure the glue is being pushed out evenly around the circumference of the pad. The purpose is to create as thin a layer of glue as possible at the attachment location.

! WARNING: DO NOT PUSH OUT ALL THE GLUE !

Extra glue can be removed or smoothed around the pad. Cover the pad by its cover.
When using T-pad the amount of glue depends on the distance between cooling ribs, so it is not possible to exactly determine this amount. Just as with the simple pad you have to clean and degrease the space between ribs where the T-pad is going to be attached. This space needs to be filled by sufficient amount of glue so after inserting of the T-pad only the cylindrical part of the pad would stay exposed. Pack the glue around the pad then cover the pad with a cover.

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz





Placement of measurement pads on a machine

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Bearing Condition Measurement for Diagnostic Purposes

This instrument also takes measurements of rolling bearing conditions in addition to lubrication measurements. For this purpose an actual value of bearing condition is displayed at the upper right side of the display. It is possible to follow a time trend, if these values are recorded or entered into a computer. If you want to successfully diagnose rolling bearing conditions use the following suggestions:

1. Make a list of machines and bearings you want to measure. Mark each measuring place.
2. Measure every bearing at the same place under the same operational conditions.
3. Mark the values only after proper bearing lubrication.
4. Determine a reference value for each bearing. Measure the reference value at a time when the bearing is in a good operational condition (the best is after a successful installation of a new bearing).
5. Record all measurements into a notebook or computer.
6. We are capable to determine conditions of rolling bearings based on increasing values:
- if there is an increase of ***100%*** against a reference value, we need to understand it as a ***warning*** and the bearing should be investigated in detail at the earliest opportunity,
- if there is an increase of ***more than 400%,*** a critical change in operational conditions of the bearing took place. ***This bearing should be replaced as soon as possible.***

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz

Technical Specifications Adash 4910 – Lubri

🗁 **Technical Specifications:**

Input:	- 1x ***ICP*** powered accelerometer with 100 mV/g sensitivity for measurement and recording of lubrication
Output:	- 1x monoaural AC signal 8 Ω / 0,5 W for external headphones (listening to measured signal)
Power:	- 2x1,5V (AA alkaline batteries) or 2x1,2V (NiMH AA rechargeable batteries)
Consumption:	**-** max. 400 mA using headphones
Dimensions:	- 150 x 60 x 35 mm
Weight:	- approx. 250 g

ADASH Ltd., Czech republic, tel.: +420 596 232 670, fax: +420 596 232 671, email: info@adash.cz
For more technical and contact information visit www.adash.net, www.adash.cz