Instruction manual

for

Portable TF-Detector

(Trace of Ferrous Detector)

High sensitive magnetic particle detector
Portable Type

MEIYO ELECTRIC Co.,Ltd.

TF200324IM-E

Description

- Power supply : Single phase AC100V（60Hz）
  （Other electric source specification can be prepared.）
- Measurement range : Lubricant Oil 0ppm ～ 500ppm
  Grease 0.000%～ 2.000%
- Operating temperature : 0℃ ～ 50℃
- Accuracy : Lubricant Oil ±5ppm
  Grease ±0.02%
- Power consumption : about 20W
- Dimension : 150x220x150 mm
- Weight : about 4.3Kg
- Accessories : Glass tube 15sets
  Grease measurement stick
  Lubricant Oil Calibration kit 1set
  Standard tool of 0 adjustment and Span adjustment
  Grease Calibration kit (Sold Separately)
  Grease sample for Calibration
  SD-card 1set
  Fuse 2set
  Power Cable 1set
  Instruction Manual 1set

Lubricant Oil Calibration kit

0ppm adjustment for SPAN

Grease measurement stick

General description about TF-Detector

The device can measure magnetic particle content in liquid with high resolution.

The device is suitable and easy operation to measure friction powder content of worn particles in lubricating oil or grease for mechanical devices.

Portable TF-Detector is developed under collaboration with MEIYO ELECTRIC Co., Ltd. and IHI Power Systems Co., Ltd.

MEIYO ELECTRIC IHI Power Systems

Application of technical standards and directives

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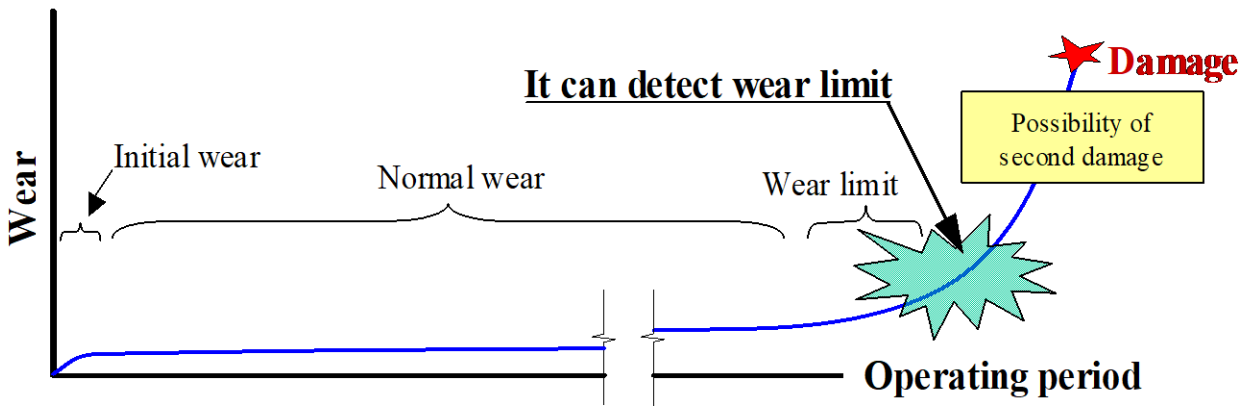
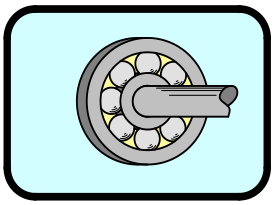
1. Feature of Portable TF-Detector

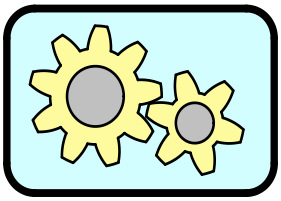
- The “TF-Detector” can measure minute magnetic particles in liquid with high resolution of less than 20ppm by unique and advanced measuring method.
- So, measurements of worn particle content by Portable TF-Detector contribute detection of wear limit before damage.



- Portable TF-Detector is precise device, but auto zero point compensate feature is integrated. Therefore it is no need to calibrate in normal use with long period.
- Calibration of Portable TF-Detector is very easy by using calibration kit. Please refer to another chapter. （See Operation）

2. Application example of Portable TF-Detector

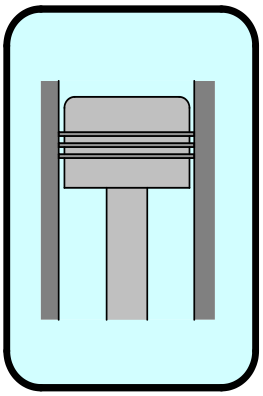




Condition monitoring for ball and roller bearing and gear made by steel or steel alloy

In generally, lifetime of roller bearings is limited. If wear reach to limit by normal wear, wear speed drastically increase suddenly. Then the bearing might be damaged with bigger vibration in short time. In addition, the damage distributes many fragments and larger particles in lubricating oil or grease, and such particles damage other devices that installed on same lubricating line or grease line.

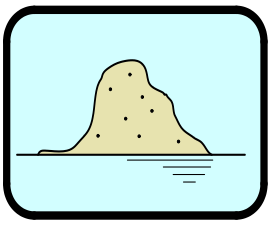
Periodically measurements of friction powder density by Portable TF-Detector contribute detection of wear limit before damage.



Condition monitor for running behavior of piston ring for reciprocating combustion engines

The reciprocating engine operated by heavy fuel oil, running condition of piston ring is affected by fuel oil property very much. In worst case, heavy wear is appeared.

Periodically measurements of cylinder drain oil by Portable TF-Detector, operator can confirm running condition of piston ring without engine stopping. It leads to less lubricating oil consumption and safer operation by optimized lubricating feed rate.



Measurement for powder material

In some case, iron particles in powder material affects quality of sintered products. It is easy to measure density of magnetic particles in powder material by Portable TF-Detector. It leads to improvement of product quality and yield rate.

3. Operation

3-1. Method of measurement

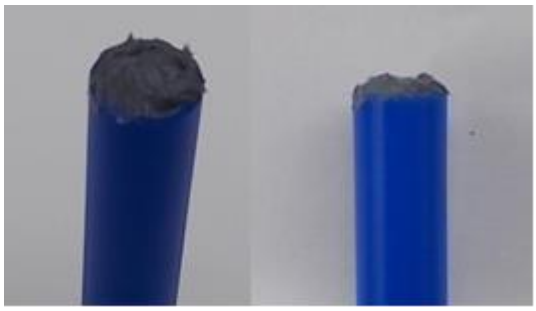
- Put in electric plug to socket.
- Turn on electric source switch of Portable TF-Detector.
- The device needs 90 second to stable condition after turned on the power switch to achieve high-resolution measurement.
- In case of lubricating oil

  Put in more than 5cc of subjects to glass tube, it will fill about 3cm from bottom.

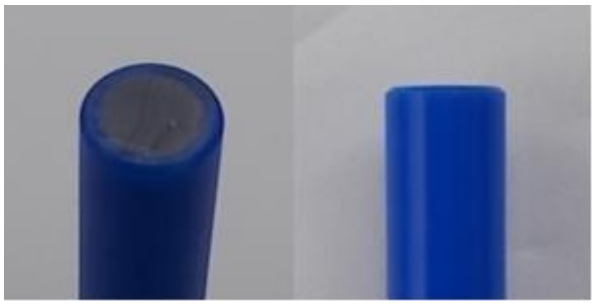
  In case of grease

  Scratch the surface of the grease to be measured in the recess of the attached measurement stick. (See the figure below) Then put the stick in a glass tube.

  Slightly flood the grease



  Remove the overflowing part



  Attention: Clean the grease measuring stick and the glass tube before using.
- Set glass tube to measuring hole of Portable TF-Detector.

  Attention: Please set after cleaning of outside and bottom of glass tube.
- Measurement starts. (Please refer to the detailed of operation at the end of a volume.)

  Please operate it according to instructions of LCD screen.

  Attention：Don't operate buttons rapidly or push too strong. It leads to damage of TF-Detector. It causes the breakdown.
- Glass tube continuously moves up and down 10 times, so do not touch the glass tube.
- Measurement will finish about 20 second.
- 480data (24 units ×20 data) can be stored. Measurement value is stored with measurement date and time. Each unit cannot store lubricant oil data and grease data together.

  Each unit can store the type of data entered first.
- Saved data can be copied in a SD card or SD-HC card also.

  File is saved in SD card as tab-format data, and then "Excel" on PC opens the file.

3-2. Method of calibration

- Please refer to chapter of the detailed operation of the end of book.
- Case of lubricating oil calibration

  The zero point adjustment is performed by measuring the attached 0 ppm calibration kit.

  The SPAN point adjustment is performed by measuring the attached SPAN calibration kit.

  Calculate the coefficients of ZERO and SPAN from the above two measurement data and the values for SPAN adjustment.
- Case of grease calibration

  Zero point adjustment is performed by 0ppm calibration kit for lubricating oil. At this time, clean the grease measurement stick and the glass tube cleanly. The SPAN adjustment is performed by measuring the grease sample (Sold Separately) for calibration. Calculate the coefficients of ZERO and SPAN from the above two measurement data and the values for grease sample for calibration.
- Calibration coefficients of lubricant and grease are stored independently, it is not necessary to perform calibration every time you change the object to be measured.
- If calibration cannot be done correctly. It is necessary to repair

  *1 The calibration is not needed frequently under usual usage. If it is necessary to adjust frequently, it is necessary to repair.

  *2 Calibration should be performed if the measurement results show an error of 10 ppm or more for lubricating oil and 0.04% or more for grease, as confirmed by the calibration kit.

3-3. Notes

- Please use this device without vibration.
- Please keep certain distance magnetic field etc. as much as possible.
- Other things never insert than glass tube to measuring whole (especially water). Inserting other things might damage the TF-Detector.
- If there is something on glass tube outside, it leads to measurement error. So, please keep clean outside and bottom of glass tube before measurement.
- If temperature of the subject is high, please cool down less than 50 degree C before measurement.
- In generally, magnetic particles quickly settle on bottom of glass tube due to bigger mass density. When there are some period between sampling and measurement, please stir the subject before measurement for accurate measurement.
- Never shock the device during measurement.
- Glass tube breaks easily and the braked fragment is dangerous, so please take care about usage of glass tube, and never use damaged glass tube.

4. Faults, Causes and Remedies

Power does not switch on

- Confirm power supply.

Measurement data is abnormal

- Confirm measuring object and measuring mode are matched.

Displayed value does not steady

- Possibiy, sensor electric circuit is not steady after turning on the power supply. Please measure it again after a few minutes.
- Possibiy, temperature of sample is high. Please measure it again after cooling.
- Possibly, magnetic particles settle on bottom of glass tube, or bigger particles contain in subject. Please stir the subject, again.
- Possibiy, outside of glass tube is dirty. Please clean up outside and bottom of glass tube.
- Possibiy, inside of sensor hole is dirty. Please lightly wipe and clean the inside.
- Possibly, amount of subject is not enough. Please confirm amount of subject, and please follow operation manual.
- Confirm a glass tube move after start measurement.

If Portable TF-Detector is still malfunction it is necessary to repair.

Stop movement of glass tube, otherwise.

- It might be failure of Portable TF-Detector by the damage of the drive parts. It is necessary to repair.

5. Others

- Portable TF-Detector is measurement device of magnetic density in subject. It is not guarantee the condition monitoring of devices.
- There should be no liability for pecuniary damages or other consequential damages resulting from damage of Portable TF-Detector.
- Never dismantle and modify. If there are sign of such work. We can abandon liability of warranty and guarantee.
- Warranty period is 12 months after delivery.
- The device can measure density of magnetic particles with high resolution. Maintenance about once every two years is recommended.
- This device has a clock. Measurement is possible even when the backup battery is run out, but measure after correcting the date and time.
- Replace the backup batteries of "CR2032 button battery" in about 2 year.

Please contact service station, if you want to repair or maintenance of Portable TF-Detector.

6. Service

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