

# MIYAWAKI

Steam Trap Survey and Management System

# Dr. Trap PM500

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## USER'S MANUAL

- Read this User's Manual carefully before using the product and use the product properly and safely.
- **Be sure to read the "Safety precautions" (page 4) before using the product.**
- Keep the Manual readily available after reading it so that you can use it at any time as needed.

# Introduction

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This User's Manual explains matters such as the method for handling the steam trap management system (hereinafter called "Dr. Trap"), the procedures for operating it and the safety precautions.

In order to fully utilize the performance of Dr. Trap, be sure to read this manual before using it.

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# Safety precautions

Strict observance

The following explains the items that must be observed strictly in order to prevent human injury and property damage.

## ■ The explanation classifies the items based on the extent of the injury or damage that may occur if the product is not handled correctly.

 <b>Warning</b>	Failure to observe this type of precaution may lead to serious injury or death.
 <b>Caution</b>	Failure to follow this type of precaution can lead to injury or damage to equipment and property.

## ■ Batteries

 <b>Caution</b>	Only use the batteries specified.
 <b>Caution</b>	Remove the batteries from the checker if they will not be used for some time and store them separately.

## ■ Temperature sensor

 <b>Caution</b>	The tip of the sensor is extremely thin, so do not touch it directly.
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# Safety precautions

Strict observance

## ■ Checker

 <b>Warning</b>	The checker is not an intrinsically safe device. Do not use it within any explosive atmosphere.
 <b>Warning</b>	Do not operate the product while walking, driving a car or riding a bicycle.
 <b>Caution</b>	Use the product only for the steam trap survey.
 <b>Caution</b>	The detection part is at an extremely high temperature immediately after the survey work. Do not touch it with hands or fingers.
 <b>Caution</b>	Do not put water on the product or submerge it in water during use. Also, use a dry cloth to cleanly wipe off any water droplets.
 <b>Caution</b>	Avoid bodily contact with the detector tip during and after operation as it can reach extremely high temperatures. Do not expose it to any strong impact. Also, when the product is not being used, store it in the dedicated soft case.
 <b>Caution</b>	Do not place the product in unstable locations as there is a risk of dropping.
 <b>Caution</b>	Do not place the product in a location where static electricity is easily generated (such as a location with a carpet) or close to devices that generate magnetism such as televisions and radios.
 <b>Caution</b>	Do not leave the product in locations exposed to direct sunlight for long periods of time or in locations that reach high (or low) temperatures.

# Requests regarding use

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Observe the followings in order to use Dr. Trap correctly.

## ■ Checker

- Do not open the case of the checker or modify it.

## ■ Batteries

- The batteries are consumable items. The battery capacity level is shown on the upper right of the display on the checker. Replace the batteries when the indication becomes red with one bar shown.

Indication	Indication color	Battery capacity
	Green	High
	Green	↓
	Green	↓
	Red	Low: Replace the batteries.

- Always use the type of battery specified (AA size nickel-hydrogen batteries).
- Always ensure that the power is turned off before replacing the batteries.
- Remove the batteries from the checker if it will not be used for some time and store them separately.
- Dispose of the used batteries in accordance with the legal regulations of each country.

# Requests regarding use

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## ■ **Operating environment and usage location**

- Do not leave the product in locations where the humidity is high or where is a lot of dust.
- Condensation may occur if the product is moved from a cold location to a warm location. If condensation does occur, do not use the checker until the water droplets attached evaporate.
- Do not allow the checker to come in contact with water including rain.

## ■ **Dropping impacts and damage**

- The checker is a precision device and must be handled carefully. Do not apply any strong impact to the checker. Do not drop it and do not place heavy objects on it.

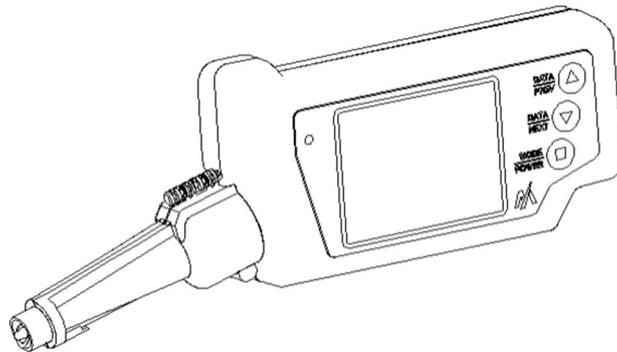
# Devices and accessories

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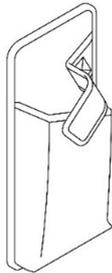
Confirm that all devices and accessories shown below have been included in the package.

- If any accessory is missing, please contact MIYAWAKI, our local authorized agent, or the place where you purchased.

## ■ Checker



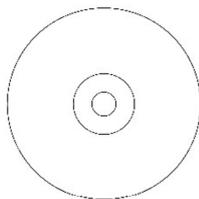
## ■ Soft case for checker



## ■ Hexagonal wrench



## ■ Installation disk



## ■ Attache case



## ■ Installation manual (2 copies)

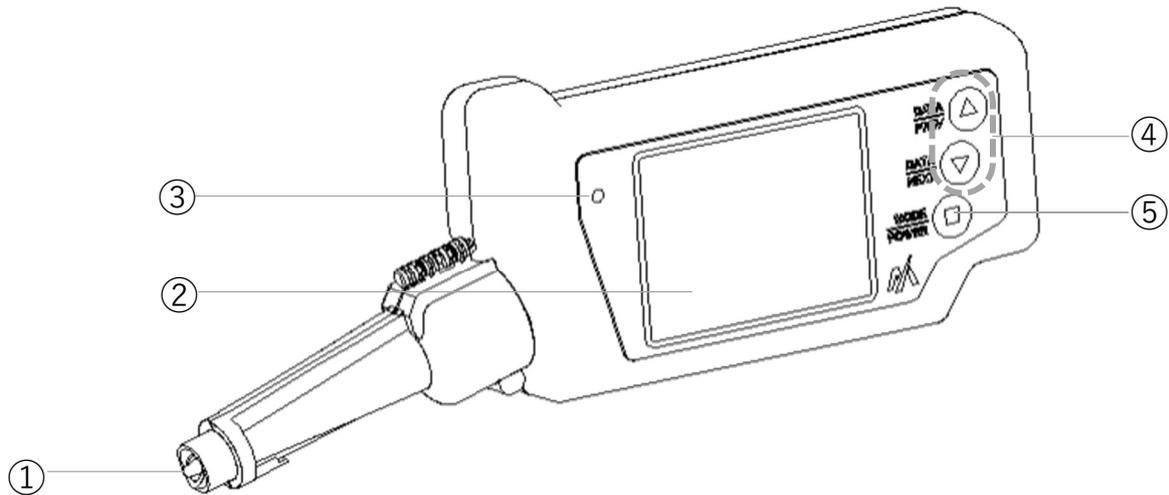
## ■ USER'S MANUAL (This document)

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## MEMO

# Names and functions of each part

## ■ Checker (Front face)

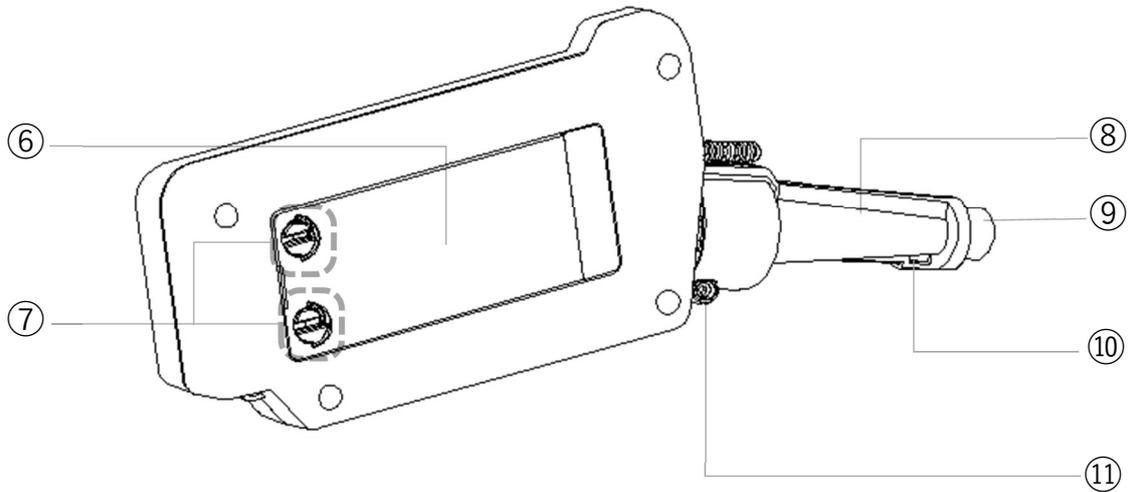


No.	Name	Function
①	Detection part	To detect the steam trap vibration and surface temperature.
②	Display	To display matters such as the results of the steam trap survey.
③	Brightness sensor	Automatically adjusts the backlight of the display.
④	Data button	To be used when receiving the information necessary for the steam trap survey (hereinafter called the "trap information") from the survey list in the Trap Survey App.
⑤	Mode/Power button	To be used for functions such as turning the power on/off (with long press).

## ■ Automatic power-off function

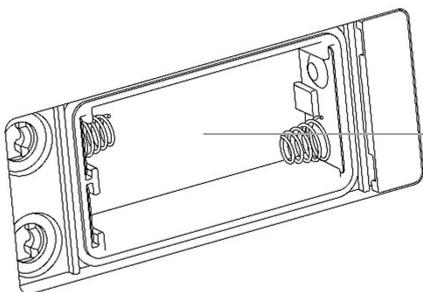
The power will be turned off automatically if the checker is left for a certain time with no button operation.

## ■ Checker (Back face)



No.	Name	Function
⑥	Battery panel	Storage of the batteries.
⑦	Battery panel locks	To be used for opening and closing the battery panel.
⑧	Sensor cover	Storage of the temperature sensor.
⑨	Sensor head	Protection for temperature sensor.
⑩	Snap-fit	To be used for opening and closing the sensor cover.
⑪	Sensor cover bolt	Bolt for opening and closing the sensor cover.

## ■ Battery storage part (Back face)



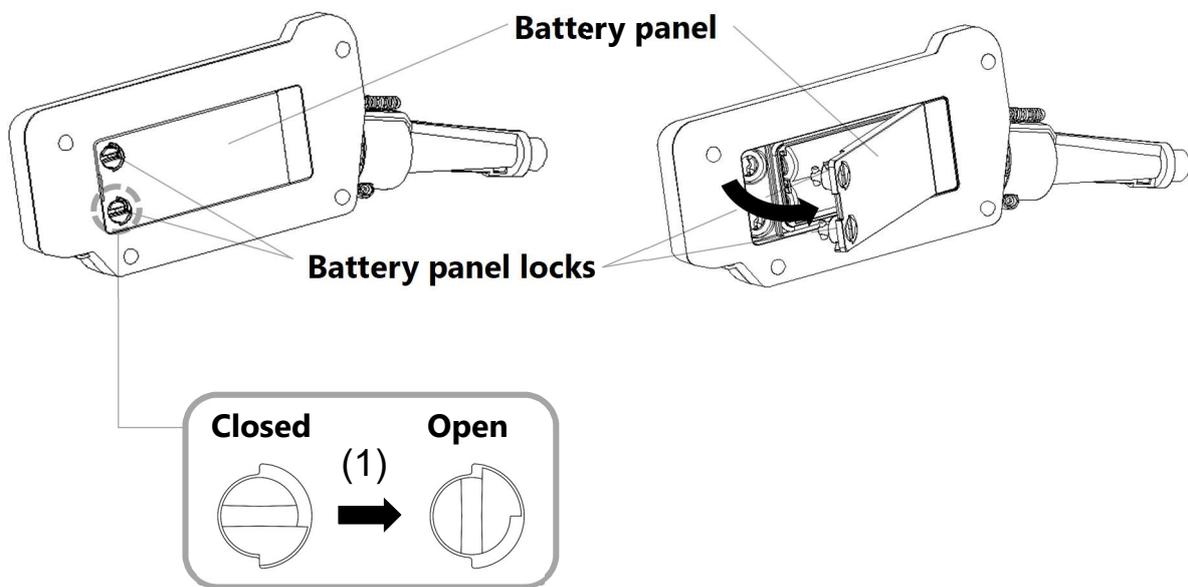
**Product name plate**  
(The Serial No. is shown.)

# Battery replacement

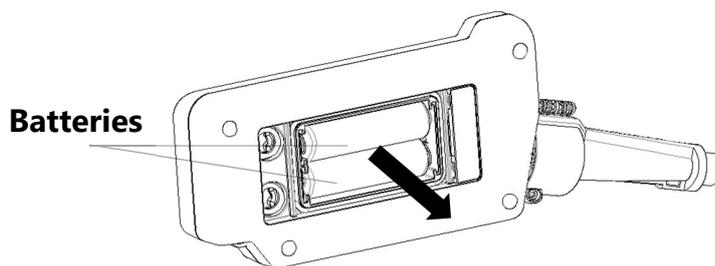
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## ■ How to replace batteries

1. Turn off the power of the checker after finishing the work in progress.
2. Turn the battery panel locks on the back face of the checker 90 degrees to the left (1) and then open the battery panel.
  - If there are water droplets on the checker, wipe them off with a soft dry cloth before opening the battery panel.



3. Pull the batteries out.



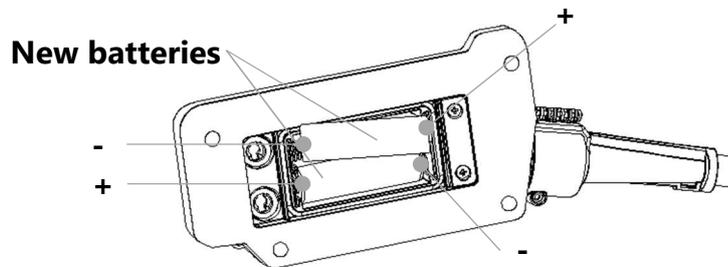
# Battery replacement

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## 4. Insert the new batteries.

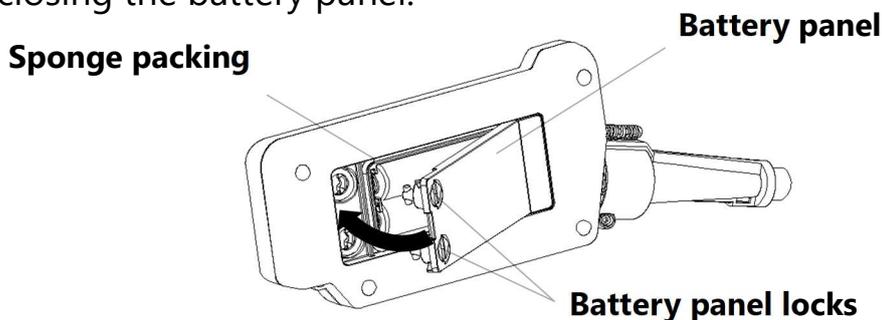
Pay attention to the direction of the terminals and insert the batteries in the checker.

- If there are any water droplets or dirt particles inside the battery storage part, wipe them off with a soft dry cloth.



## 5. Close the battery panel and lock it securely.

- Lock the battery panel lock securely to ensure that no water droplets get inside the battery storage part.
- If the sponge packing on the storage part comes off by opening and closing the battery panel, place the sponge packing again before closing the battery panel.



### ◆ Requests

- Always ensure that the power of the checker is turned off before replacing the batteries.
- Check the direction of the batteries before installing them.
- Replace the batteries when the insufficient battery capacity message is displayed.
- When closing the battery panel, place the sponge packing correctly and be careful not to get fingers caught in.
- The checker is not an intrinsically safe device. Always replace the batteries within a nonexplosive area.

# System outline

Dr. Trap is composed of the following products.

Product name	Model No.	Main functions and features
Trap Survey App	PM510	This performs the survey of steam trap based on the data detected by the checker and then records and displays the results per steam trap.
Checker	PM520	This detects the vibration and surface temperature that are necessary for the steam trap survey.
Data analyzing software SurveyPro	PM530	This analyzes necessary data for steam trap management such as the failure rate and steam loss, from the survey results recorded in the Trap Survey App.

Dr. Trap is used in accordance with the procedures shown below.

Procedure	Operation name	Products used		
		Trap Survey App	Checker	SurveyPro
1	Installation	○		○
2	Creation of management files			○
3	Creation of survey list	(○)		○
4	Steam trap survey	○	○	
5	Automatic tabulation and analysis processing			○

- Refer to each of the manuals supplied for the detailed operation methods for the Trap Survey App and SurveyPro (Procedures 1 to 3 and 5).

# Steam trap survey procedure

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The steam trap survey is performed with the following procedure.

**1. Operate the checker to retrieve the trap information from the Trap Survey App.**

- Details are in "Trap information retrieval" (page 16).

**2. Operate the checker to perform the automatic steam trap survey.**

- Details are in "Steam trap survey" (page 18).

Even if the steam trap is operating normally, if there is steam leaking from a component close to the steam trap such as a bypass valve, then there is a risk that the steam trap survey may be adversely affected. If there is any doubt about the results of the survey, then follow the procedure below to check whether there is an effect from the surrounding piping.

**3. Operate the checker to perform an automatic survey of a bypass valve.**

- Details are in "Bypass valve survey" (page 20).

**4. Operate the checker to check if there is an effect from the surrounding piping.**

- Details are in "Measurement mode" (page 22).

# Trap information retrieval

## ■ How to retrieve trap information

### 1. Connect the checker to the Trap Survey App.

- For details of the operation method, refer to the "Trap Survey App User Manual".

### 2. Press the Data button on the checker.

- The trap information is automatically received from the survey list in the Trap Survey App.
- The information received is displayed on the checker with the screen layout shown below.

Auto-Diagnosis			
Area	①		Trap
Trap No	②		Bypass
Trap Info	③		④
	⑤		⑥
	⑦	⑧, ⑨	
Result			
⑩			

No.	Display item	No.	Display item
①	Area name	⑥	Size
②	Trap No.	⑦	Set temperature
③	Trap name	⑧	Results of final judgment in previous survey
④	Type	⑨	Type of final judgment in previous survey
⑤	Operating pressure	⑩	(Various messages)

- For details of each term, refer to the "SurveyPro Terminology" supplied.
- ⑨: If the type of the final judgment in the previous survey is other than "Automatic survey," a "\*" is displayed at the end of the result.

## ■ The trap information retrieval update function

The checker automatically identifies the trap information to be retrieved based on the order of surveys defined in the survey list in the Trap Survey App.

Status before retrieval	Operation button	Function
The trap information in the checker is identical to the trap information in the Trap Survey App.	Data ▾ button	Displays the next trap information in the survey order in the survey list.
	Data ▴ button	Displays the previous trap information in the survey order in the survey list.
The trap information in the checker is not identical to the trap information in the Trap Survey App.	Data ▾ or ▴ button	Displays the trap information currently selected in the survey list.

### ◆ Requests

- Do not operate the Trap Survey App whilst the operation of trap information retrieval is in progress, as there is a risk that the data may be damaged.
- Do not repeatedly press the Data button on the checker whilst the operation of trap information retrieval is in progress, as there is a risk that the data may be damaged.

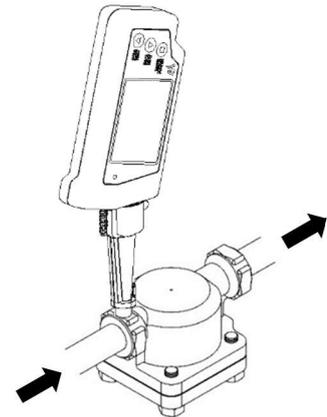
# Steam trap survey

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## ■ How to survey a steam trap

### 1. Press the detection part of the checker onto the steam trap.

- Operate the checker so that the detection part contacts a surface as flat as possible on the inlet side of the steam trap.



### 2. The steam trap survey starts automatically when an appropriate pressing force is detected.

- It is possible to confirm that the survey has started from the message on the display and the change in the background color of the screen.

### 3. After a certain time has elapsed, the survey result is displayed.

- If the judgment is "Plugged" or "Discharge problem ("T-Low" is displayed)", the survey ends within about 2 to 4 seconds.
- If the judgment is "Good" or "leak", the survey ends within about 4 to 10 seconds.

## ◆ Requests

- Do not operate the Trap Survey App whilst the steam trap survey is in progress, as there is a risk that the data may be damaged.
- If it is difficult to put the detection part of the checker to a flat surface in the area close to the inlet side of the steam trap, put it to a position as close as possible.  
The survey may be influenced by the position where the checker detection part is pressed.
- The detection part of the checker must be oriented perpendicular to the flat surface. Failure to properly place and orient the detection part can adversely affect the survey results.

## ■ How to check the survey results

- The survey results are displayed on the checker with the screen layout shown below.

Auto-Diagnosis				
Area				Trap
Trap No				Bypass
Trap Info				
Result	①	②	③	④
⑤				

No.	Display item	No.	Display item
①	Operation judgment	④	Detected temperature
②	Degree of deterioration	⑤	(Various messages)
③	Leak Level		

- For details of each term, refer to the "SurveyPro Terminology" supplied.
- ②: The degree of deterioration is displayed as "S" in case of "Small", "M" in case of "Medium", "L" in case of "Large" or "B" in case of "Blow".
- It is also possible to check the survey results in the Trap Survey App. For details, refer to the "Trap Survey App User's Manual" supplied.

# Bypass valve survey

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## ■ How to survey bypass valve

### 1. Press the Mode button on the checker.

- "Bypass" is displayed highlighted with a blue background and the survey target is switched over.

Auto-Diagnosis			
Area		Trap	Survey target
Trap No		Bypass	
Trap Info			
Result			

### 2. Press the detection part of the checker onto the bypass valve.

- Operate the checker so that the detection part contacts a surface as flat as possible on the inlet side of the bypass valve.
- In the same way as the steam trap survey, the bypass valve survey starts automatically when an appropriate pressing force is detected and then the survey result is displayed after a certain time has elapsed.
- The survey ends within about 4 to 10 seconds.
- The detected temperature is not displayed in a bypass valve survey.

#### ◆ Requests

- Do not operate the Trap Survey App whilst the bypass valve survey is in progress, as there is a risk that the data may be damaged.
- The detection part of the checker must be oriented perpendicular to the flat surface. Failure to properly place and orient the detection part can adversely affect the survey results.

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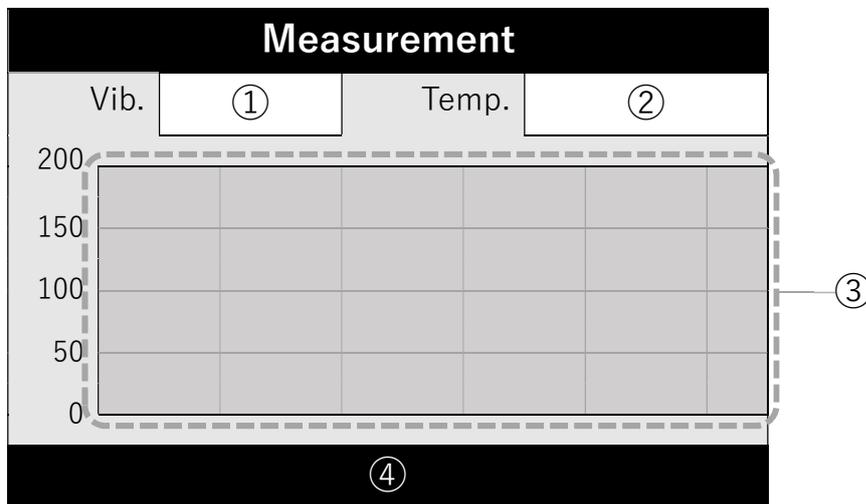
## MEMO

# Measurement mode

## ■ How to operate measurement mode

### 1. Press the Mode button on the checker.

- Press the Mode button up to a maximum 2 times until the screen below is displayed.
- In the measurement mode, the detected vibration value and detected temperature are displayed on the checker with the screen layout shown below.
- When only the measurement mode is used, it is possible to start it up by pressing the Mode button whilst the MIYAWAKI logo screen is displayed.



No.	Display item	No.	Display item
①	Detected vibration value	③	Vibration value graph
②	Detected temperature	④	(Various messages)

- ①: The vibration value detected by the vibration sensor is displayed as an integer value from "0" to "400" with MIYAWAKI original detection criteria.
- ③: The horizontal axis on the vibration value graph shows the elapsed time and the vertical axis shows the detected vibration value. Continuing vibration value changes are displayed at intervals of around 55 seconds.
- The vibration values and temperatures detected in the measurement mode are not recorded.

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## ■ How to operate measurement mode

### 2. Press the detection part of the checker onto the surrounding piping.

- Put the detection part of the checker to a surface as flat as possible on the surrounding piping.
- The display of the vibration value graph starts automatically when an appropriate pressing force is detected.
- In cases where background piping system vibration is present at a steam trap being checked, a comparative assessment with the vibration value on the steam trap must be performed.

#### ◆ Requests

- If there is continuing detection of a strong vibration value of "400," stop the measurement immediately as there is a risk that the equipment may be damaged.
- The detected vibration values and detected temperatures are only displayed during the measurement. If necessary, record the results by taking notes or other methods.
- The vibration value graph is reset every time the detection part is pressed with an appropriate pressing force. If necessary, record the results by taking notes or other methods.

# Connection to peripheral devices

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If the method for communication with the peripheral devices is unclear, contact MIYAWAKI, our local authorized agent, or the place where you purchased.

## ■ Requests regarding communications with peripheral devices via wireless communications (Bluetooth)

- Communications may not be possible where there are electromagnetic waves being generated, such as close to other wireless devices, OA equipment or power transmission lines.
- If wireless communication is not successful, bring the checker closer to the peripheral device and try the communication again.

# Caring for the equipment

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**Always ensure that the power is switched off before caring for the equipment.**

## ■ **Body (Checker)**

- If the checker becomes dirty, wipe it with a soft dry cloth.
- If the dirt is particularly bad, then rub it lightly with a cloth that has been soaked in water and then wrung well. And then finish it off with a soft dry cloth.
- Do not use items such as thinner, benzine, wax, petroleum thinner, soap, polishing powder, hot water or chemical cloths.

## ■ **Detection part (Checker)**

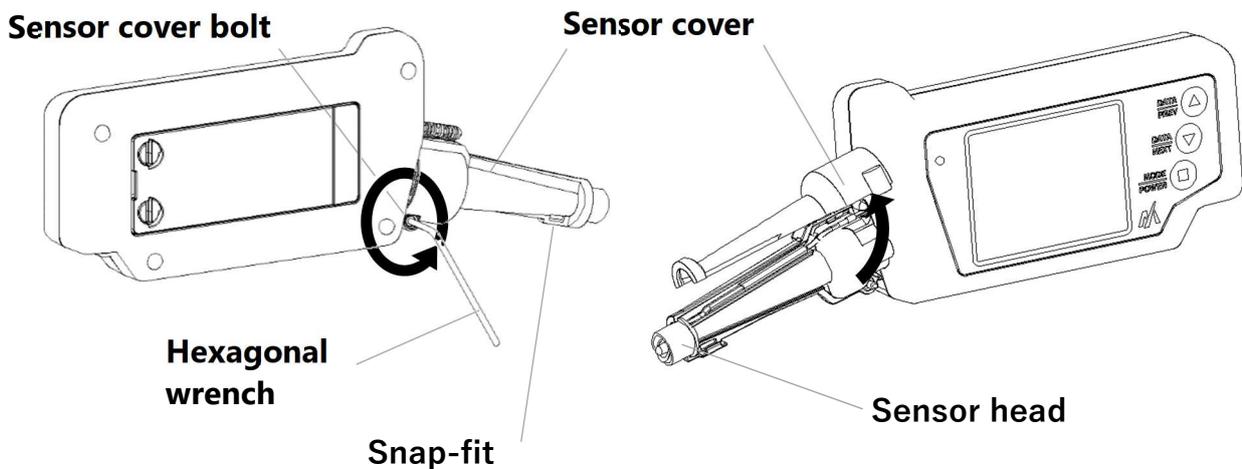
- The detection part is the part that performs the detection of the vibration and temperature, which is necessary for the steam trap survey. There is the risk that the detection part may become deformed due to dropping or impacts. The detection sensitivity may also change as a result of wear. We recommend that it is calibrated periodically (once in 2 years). If a calibration is required, please contact our local authorized agent, or the place where you purchased.
- The tip of the temperature sensor is extremely thin, so please consider it as a consumable item.  
Contact our local authorized agent, or the place where you purchased for the replacement.  
For details how to replace the temperature sensor, refer to "Temperature sensor replacement" (page 26).

# Temperature sensor replacement

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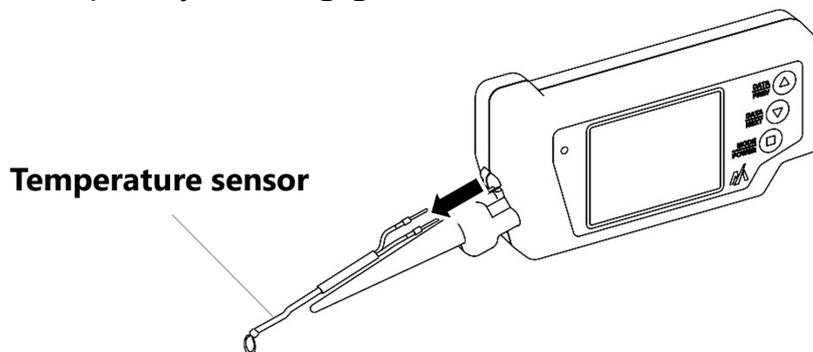
## ■ How to replace the temperature sensor

1. Turn off the power of the checker after finishing the work in progress
2. Loosen the sensor cover bolt on the back of the checker, while turning it to the left with the accessory hexagonal wrench. Remove the Snap-fit and open the sensor cover.



### 3. Pull the temperature sensor out.

- The tip of the temperature sensor is extremely thin, so there is a risk of cuts if you touch it directly. Be sufficiently careful of safety, for example, by wearing gloves.

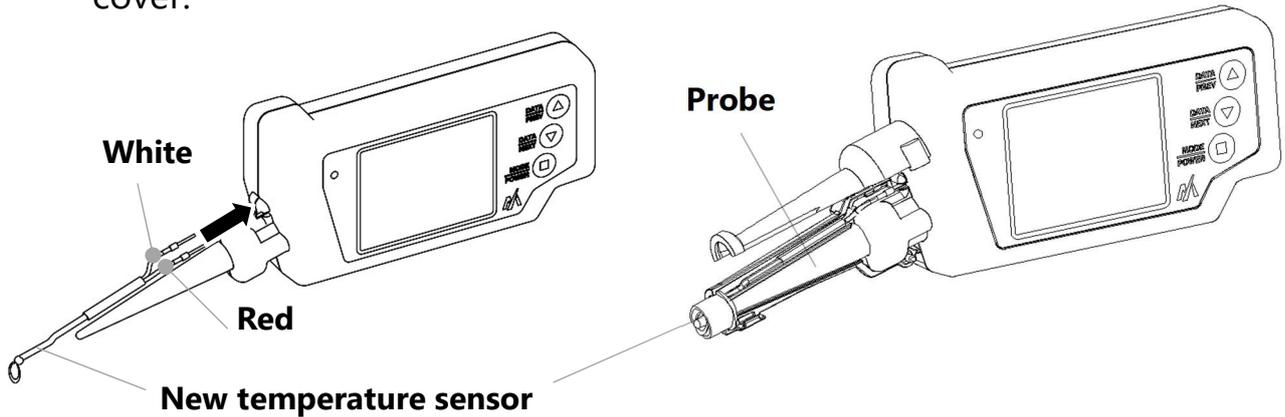


# Temperature sensor replacement

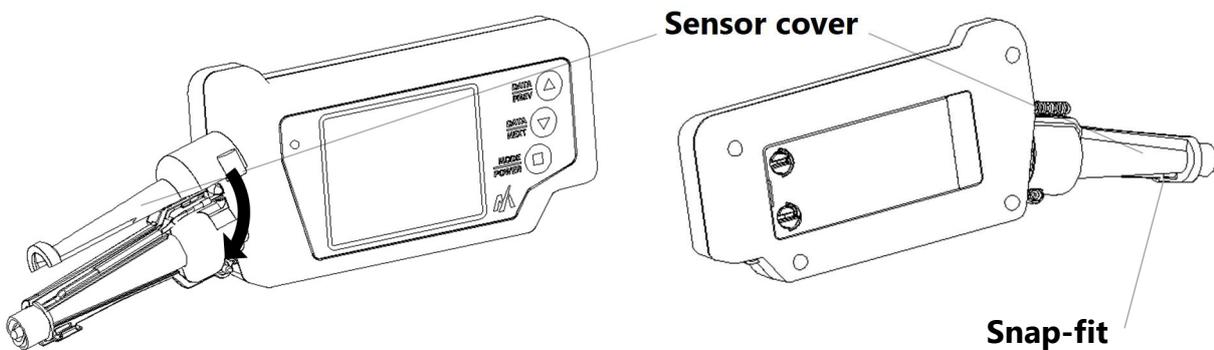
## 4. Install the new temperature sensor.

Pay attention to the orientation of the wiring and place the temperature sensor in the checker.

- If there are any water droplets or dirt particles inside the temperature sensor storage, wipe them off with a soft dry cloth.
- Do not put the temperature sensor between the probe and the sensor cover.



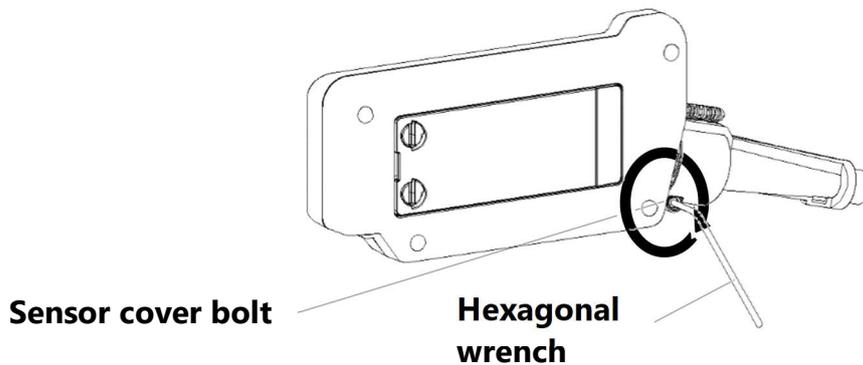
## 5. Close the sensor cover and lock the Snap-fit.



# Temperature sensor replacement

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6. Close the sensor cover and surely lock the sensor cover bolt.



## ◆ Requests

- Always ensure that the power of the checker is turned off before replacing the temperature sensor.
- Do not touch the tip of the temperature sensor directly. There is a risk that the sensor may be damaged and that injuries such as cuts may be suffered.
- Check the orientation of the wiring before inserting the sensor.
- If the message "Temperature Sensor Burn-out!" is displayed, replace the temperature sensor.

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## MEMO

# Troubleshooting

Phenomenon	Items to check and response methods
The screen is not displayed when the power is turned on.	<ul style="list-style-type: none"> <li>● Is there sufficient battery capacity remaining? → Replace the batteries with new ones.</li> </ul>
The power is turned on but the screen disappears.	<ul style="list-style-type: none"> <li>● The automatic power-off has operated. → Switch the power on.</li> </ul>
The screen is displayed but soon disappears.	<ul style="list-style-type: none"> <li>● Is there sufficient battery capacity remaining? → Replace the batteries with new ones.</li> </ul>
It is not possible to retrieve the trap information.	<ul style="list-style-type: none"> <li>● Is the Trap Survey App being operated? → Do not operate the Trap Survey App during the trap information retrieval operation.</li> </ul>
It is not possible to survey steam traps.	<ul style="list-style-type: none"> <li>● Did you perform the trap information retrieval operation? → Refer to "Trap information retrieval" on page 16.</li> <li>● Is the detection part of the checker being pressed with appropriate pressing force? → Refer to "Steam trap survey operation" on page 18.</li> <li>● Is the trap information displayed on the checker identical with the trap information displayed in the Trap Survey App? → The survey will not be performed if it is not identical.</li> </ul>

# Troubleshooting

Phenomenon	Items to check and response methods
It is not possible to survey bypass valves.	<ul style="list-style-type: none"> <li>● Is the survey target set to "Bypass"? → Refer to "Bypass valve survey" on page 20.</li> <li>● Is the detection part of the checker being pressed with appropriate pressing force? → Refer to "Bypass valve survey" on page 20.</li> </ul>
It is not possible to detect the temperature.	<ul style="list-style-type: none"> <li>● The temperature sensor may be damaged. → Replace the temperature sensor with a new one.</li> </ul>
It is not possible to communicate with the peripheral devices.	<ul style="list-style-type: none"> <li>● Has the pairing of the checker been performed? → Refer to the "Trap Survey App Installation Manual" supplied.</li> <li>● Has the checker to be communicated with been selected correctly? → Refer to the "Trap Survey App User's Manual" supplied.</li> <li>● Refer to "Requests regarding communications with peripheral devices via wireless communications (Bluetooth)" on page 24.</li> </ul>
"Temperature Sensor Burn-Out!" is displayed.	<ul style="list-style-type: none"> <li>● The temperature sensor may be damaged. → Replace the temperature sensor with a new one.</li> </ul>

# Specifications

## ■ Checker

Item		Specification
CPU		32 bit MCU
Memory	ROM	512 KB
Display	Display system	Transmission type TFT color liquid crystal
	Screen dimensions	57.6 mm × 43.2 mm (2.8 inch)
	Display capacity	320 dots × 240 dots
	Backlight	LED type backlight (White)
Entry	Keys	3 keys
Communications function	Bluetooth	Specification: Ver. 2.1 + EDR (Class 2)
		Communication distance: Approx. 5 m (Line of sight distance)
Vibration detection part	Sensor	Piezoelectric ceramic sensor
	Input frequency	10 kHz to 40 kHz
	Detection range	0 to 400
Temperature detection part	Sensor	Type K thermocouple (Tolerance JIS C 1602 Class 2)
	Detection range	0 °C to 400 °C
Power supply	Type	AA size nickel-hydrogen secondary batteries (×2)
	Rated voltage	2.4 V
	Consumption current	240 mA or less
External diameter	Dimensions	Approx. 218 mm × Approx. 74 mm × Approx. 30 mm
	Weight	Approx. 220 g (excluding batteries)
Environment	Operating temperature	-5 °C to +50 °C
	Operating humidity	5 % RH to 95 % RH (However, there must be no condensation.)
	Protective structure	IP34 (conforming to IEC 60529)
	Dropping strength	Height 1 m (conforming to IEC 60068-2-31)

- Bluetooth is a registered trademark of The Bluetooth SIG, Inc.
- Refer to the separate manuals supplied for the detailed specifications of the Trap Survey App and SurveyPro.

# Compliance with regulations

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## ■ Europe

We hereby declare that this product is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.



## ■ North America

This product contains the following wireless module built in.

Contains Transmitter Module FCC ID: T9J-RN42

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that are deemed to comply without testing of specific absorption ratio (SAR).

# Warranty

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## ■ Warranty regulations

The regulations of this warranty grant explicit and limited warranty rights to the user (hereinafter called "the customer") of the Dr. Trap product manufactured by MIYAWAKI INC. (hereinafter called "the company"). With the premise that this product will operate well when used as prescribed, if any problem or item causing hindrance occurs in the operation of the product during use by the customer, then the company will implement repairs and servicing in accordance with these warranty regulations. The company provides no warranty for items not written in these warranty regulations or for any other warranty or conditions.

The period for which the customer can receive warranty service for this product shall be one year from the purchase and hand-over of this product (hereinafter called the "warranty period").

If during the warranty period a good operating status in accordance with the specifications cannot be achieved, the company or a third party specified by the company will repair the product free of charge.

However, there is a case that a fee may be charged for consumable parts (such as the sponge packing, temperature sensor, sensor cover and sensor cover lock).

## ■ Disclaimer

The company will bear no liability for the damage of the product, resulting from the misuse of the product by the customer or other phenomena.

- 1) Items related to damage or loss restoration of any program, data or memory medium
- 2) Data loss resulting from system error or interruption in the operation of this product  
Elimination or loss of customer data due to the network connected devices that this product is connected to, the software used with this product or circuit failure in the equipment or electrical communications
- 3) Failure or damage due to errors in the use of the product or improper repairs or modifications
- 4) Failure or damage due to inappropriate use by methods not written in this user manual
- 5) Failure, damage or customer data elimination or loss when a third party not authorized by the company has performed repairs, maintenance inspections or similar acts
- 6) Failure or damage due to fires, earthquakes, water damage, lightning or other natural disasters or due to pollution, salt damage or the use of a power supply other than that specified
- 7) Failures caused by products for which the company has no warranty responsibility

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- For any questions about the product that you purchased or about the details in this user's manual, please contact the following.
  - © 2017 MIYAWAKI INC.  
This user's manual may not be reproduced or copied in whole or in part, without the written consent of MIYAWAKI INC.
  - Some special specifications of the product you have, may found to be different from the ones in the user's manual. If you have any question, please contact MIYAWAKI, our local authorized agent, or the place where you purchased.
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