Metal Detector

METARIDDER MHD Series

User's Manual

MHD-E (04) E/ 201809



Saika Technological Institute Foundation

Introduction

Thank you for purchasing METARIDDER MHD Series (hereinafter referred to as the machine). Read this manual before and during the operation to use the machine properly.

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Symbols used in this manual

Following symbols are used in this manual. Please understand the meaning of each symbol in using the machine.

Indication	Significance			
	Neglect of warnings may result in the death or serious injury of the operator.			
	Neglect of cautions may result in a minor injury of the operator or a property damage.			
Important	Things to be observed and precautions in handling the machine.			
	Supplementary information and hints.			
1	Part number and other memos.			

Safety Precautions </br><Warnings>

MARNING	 Do not disassemble or modify the machine. May result in an injury or a machine failure. Stop the use if a smoke, abnormal smell or noise is detected. Continued use may cause a fire. Turn OFF the main circuit breaker immediately and then turn OFF the primary power supply as well. If a power plug is provided, pull out the plug from the outlet. Contact SAIKA or the place of purchase for assistance. Always use the machine at the rated voltage. Using the machine at an improper voltage may cause a fire or the operator to suffer an electrical shock.
	• Be careful in handling the power cable. Do not pull the cable, put heavy objects on the cable or place heat source near the cable. Doing so may damage the cable, causing a fire or electric shock to the operator.
	 In servicing and/or inspecting the machine, always turn OFF the Operation Switch and the main circuit breaker. If a plug is provided, pull out the plug from the power outlet. Unexpected operation of the machine may cause an injury or electric shock. Do not touch the power plug with a wet hand. (For a machine with a plug) The operator is susceptible to an electric shock due to the moisture on the hand. Do not open the damper door and reach inside with the power ON. Unexpected operation of the machine may lead to an injury

<Cautions>

 The machine is assembled with precision. Do not expose it to excessive vibrations and/or mechanical impacts. Install the machine on a level floor without a vibration. Avoid using the machine under a high temperature and humidity. The operating temperature for the machine is 5°C to 45°C. * Dew formation must be avoided.
be avoided.
 If the machine is not going to be used for a prolonged period, always turn OFF the main circuit breaker and the power supply.
If a plug is provided, pull out the plug from the power outlet.

Notes on the Operation

- [1] The machine has been adjusted to detect and remove metal pieces contained in virgin plastic pellets and pulverized plastic pellets. Consult SAIKA if the machine is to be used for materials other than pellets or other purposes.
- [2] Install the machine on a level so that the materials subject to inspection will fall freely through the metal detector unit.
- [3] Although sufficient care is taken to make the machine resists vibrations and environmental conditions, the user may be requested to adjust the sensitivity to a weaker level depending on the environment to avoid malfunctions due to vibrations and/or noise. If such an adjustment is required, note that metal detection as described in the specifications may not be possible.
- [4] Always clean the machine before changing the materials to be loaded. Materials remaining in the machine may contaminate the material to be loaded next. (Flushing the machine with water is strictly prohibited.)
- [5] The ceramic materials used for the section coming in contact with pellets within the sensor may break due to an impact. In cleaning the machine, be extra careful not to apply impacts to the ceramic material by poking or rubbing it with a metal rod.
- [6] Do not disassemble the metal detector since it is enclosed in a metallic housing and assembled with precision to eliminate effects of noises. Disassembling the metal detector will void the product warranty and SAIKA may refuse to perform maintenance services thereafter.
- [7] Use the machine at the rated voltage. Using it at a voltage other than the rated voltage may result in a machine failure, damage on the machine or electric shock to the operator.
- [8] Supply the power to the machine from a dedicated power supply. Supplying the power from other devices (such as a molding machine) may cause a malfunction due to the introduction of noises.
- [9] The operating temperature of the machine is 5°C to 45°C and the material temperature is 5°C to 70°C. (*Dew formation must be avoided.)
- [10] In installing the machine, ensure to provide a grounding (Class D grounding). Otherwise, malfunctions may occur.

Note that SAIKA will not be held responsible for secondary accidents and/or troubles other than those caused directly by the machine.

Warning Labels

<1ch model>

Maintenance door, support plate



Rear side of the frame, transformer housing



<2ch model>



Maintenance door, support plate

Rear side of the frame, transformer housing



Metal Detector

<4ch model>

Maintenance door



Rear side of the frame, transformer housing



<Common for all models>

Inside the control panel



Fan guard



7 (also on the opposite side)

<example of a 2ch model>

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No.	WARNING				
1.2	Pinching fingers	ISO	Pay attention to open and close the control panel door and the maintenance doors.		
3.5	Electric shock	ISO	Be extra careful not to suffer an electric shock.		
4	Support plate	クポートプレート ・取用の私用和ビグレートです。 ・作時和州を兼望します。	A plate to prevent the machine to roll over. (Not provided for the 4ch model.)		
6	Electric shock	ELECTRIC HAZARD Do Not Touch.	Be extra careful not to suffer an electric shock.		
7	Pinching electric cables	Do not electrication	Pay attention not to pinch cables in installing the fan guard.		

[Table 1: List of warning labels]



Before Using the Machine

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1.1 Detection Principle and Features

1.1.1 Detection Principle

The machine is designed to make a highly accurate metal detection by the adoption of Dielectric Loss Isolated High Frequency Oscillation method, which was developed by SAIKA.

If a metal piece approaches the magnetic field A generated by the sensor, an eddy current runs on the metal surface and the magnetic field B will be generated to cancel the magnetic field A. The machine detects the disturbance caused by the generation of magnetic field B and determines if it is caused by a metal from the level of response.



Sensing area

1.1.2 Features

The machine is capable of detecting and removing metal pieces mixed in the material using a highly sensitive metal detector.

- The calibers offered for the user can select one depending on the sensitivity or the volume to be treated.
 - * For the detection capability according to the caliber, refer to: Machine Specifications in Section 6-1.
- Three different models with a single channel, two channels and four channels are offered to accommodate different levels of treatment.
- The machine comes with a standard feature to save a history data file (.CSV) to an SD memory card.
 By retrieving various history information, such as those on the detections made, machine status and errors, the data can be utilized for the management of the machine operation.
- The display is made of a 5.7 inch TFT color LCD touch panel to provide an enhanced display and operability.
 If the user has selected an optional handy type touch panel, the panel can be separated from the door, enabling operations at locations where it is difficult to operate the machine under normal circumstances.
- An anti-static-electricity sensor (standard) reduces malfunctions due to the static electricity on the material.
- All types of metals, including stainless steel, aluminum, brass and copper that cannot be eliminated by the magnetic detection, can be detected and removed.
 - * However, iron oxide, of which the property has changed, is excluded.

1.2 Names and Functions of Parts

1.2.1 Names and Functions of Various Sections of the Machine

<1ch model>





<2ch model>



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<4ch model>



Internal view



No.	Name	Function	
1	Touch panel	Allows various settings, status display and saving logging data.	
2	Control panel door	The touch panel is installed.	
3	Circuit protector	Provides a protection against an overcurrent on the solenoid for operating the discharge damper. * Provided individually for each channels.	
4	Upper hopper	The hopper to load the material.	
5	Buzzer	The buzzer sounds if there is an error.	
6	Louver / cooling fan	A louver for ventilation. * Exchangeable with No. 10	
7	Transformer (optional)	Converts the voltage of primary power supply. (For the use of primary power supplies other than 100 VAC.)	
8	Discharge chute	Discharge port for metal pieces.	
9	Light tower (optional)	Indicates the status of the machine. Green: normal operation, Yellow: metal detected, Red: error	
10	Cooling fan / louver	For cooling inside the sensor housing. * Exchangeable with No. 6	
11	Main circuit breaker	Turns ON/OFF the power supply to the machine. <u>* For user operation</u>	
12	Power switch	Turns ON/OFF the power supply to the controller (for operation).	
13	Discharge damper	Transfers detected metal pieces and the material (pellets) to the discharge chute.	
14	PLC unit	Performs the control other than the metal detection.	
15	Control board	Control the metal detector.	
16	Adjustment volume and coaxial connector	A volume for adjusting the sensor output and a connector for an oscilloscope. * Provided individually for each channels.	
17	Support plate	A plate for preventing the machine to roll over * Not provided for the 4ch model.	

[Table 2: Names of parts]

1.2.2 Screen Display

This section explains the Metal Detection (main) and Menu screens.

Upon turning ON the Power Switch with the main circuit breaker turned ON, the main screen will be displayed after the startup screen.

 $(\Rightarrow$ For the operational procedures, see Section 2.1.1 Operation.)

■ Screen configuration



Names and functions of display fields [Main screen]

No.	Display	Name	Function
1	Safe	Status display * Fault screen indication y	 Displays the status of the device. * Switch to abnormal screen possible
2	Count Reset	Count reset button	 Reset detection number. The screen will shift to "Reset number of emissions" screen. * See Section 2.2 " Count Reset".
3	CH1 CH1	Channel display	 All channels for the relevant model are displayed. Display of CH1 for the 1ch model. Display of CH1 and CH2 for the 2ch model. Display of CH1 to CH4 for the 4ch model.
4	123456	Detection count	 The number of times a metal piece has been detected and discharged. * The display is made for each channel.
5	Menu	Menu button	 Brings up the Menu screen. * For further information on the Menu screen, see Section 3.1 Various Settings.
6		Information display button	 Open the option related information screen. Detection mode indication Carbon Gain Mode * Carbon gain mode "option" Material information display * Management System "option" Auto threshold adjustment * Auto adjustment "option" Auto adjustment "option" Auto matic calculation Automatic calculation Automatic calculation
7	Threshold : 10000	Threshold display	 Displays the threshold for the metal detection. * See Section 3.1.1 Threshold Setting to set the threshold.
8	10000	Sensor voltage display	 Displays the sensor output voltage during the operation. * The display is made for each channel.
9	28.5	Sensor temperature display	 Displays the temperature near the sensor board during the operation. * The display is made for each channel.

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10	Detect Vol. 10000	Detection voltage display	 Displays the peak value when a metal piece has been detected. * The display is made for each channel.
11	Mainte_Door Close	Damper door status indication * Option	 Door safety switch "ON" detects "door closed" and "OFF" detects "toilet bowl" When the safety switch is "OFF (door open)", turn off the drive power of the damper. ※ Optional function
12	PC Connecting	Communication status with management system * Option	Display communication status with PC for management system. Other connected to management PC Other connection (normal) Other connection (no
13	Threshold	Automatic threshold adjustment Screen button * Option	 Display the "Automatic threshold adjustment" screen. How to set See Section 3.1.1 "Threshold auto adjustment". ※ Optional function
14	Operate	Vibration Feeder operation screen button * Option	Image: sector screen Image: sector screen Operation screen Image: sector screen Amplitude (speed) Configuration

[Table 3: Main screen display fields]

[Menu screen]

No.	Display	Name	Function
1	Threshold Setting	Threshold setting	 Brings up the Threshold Setting screen. Allows the setting of sensor sensitivity (threshold). * See Section 3.1.1 Threshold Setting to set the threshold.
2	Standard Setting	Standard setting	 Brings up the Standard Setting screen. Allows the settings for the standard menus. * See Section 3.1.2 Standard Setting to make settings.
3	Function Setting	Function setting	 Brings up the Function Setting screen. Allows the settings for the functional menus. * See Section 3.1.3 Function Setting to make settings.
4	Detection Record	Detection record	 Brings up the Detection Record screen. * See Section 3.1.4 Detection & State Records for more information.
5	Color History	Error history	 Brings up the Error History screen. * See Section 3.1.5 Error History for more information.
6	State & Wave Plot	State & wave plot	 Brings up the State & Wave Plot screen. * See Section 3.1.6 State & Wave Plot for more information.

[Table 4: Menu screen, menu items]

1.2.3 Detection Sensitivity

In using the machine, note that there is a difference in the sensor signal depending on the path of the detected metal inside the sensor even if the same metal piece is used.



Important

The detection sensitivity of the machine is set by assuming the metal pieces to pass the center of the sensor.

1.2.4 External Output 《standard Output》

This section describes the external outputs of the machine. Use an external output connector to output signals.

Output signals





Rear view of the machine [shown is the 1ch model]

External output connector

Terminal	Signal	Description
1-2	Metal Detection Signal	 Output period: 250 msec * The output of the signal starts as soon as the discharge damper starts its discharge operation. Note) If multiple number of discharge dampers operate simultaneously, multiple signals will be output in order with a one second interval.
1-3	Detector Ready Signal	Output period: during the normal operation * The signal will be turned OFF if an error occurs.
1-4	Discharge Frequency Warning (*1) Signal	Output period: 250msec * Only for 2 and 4ch models (*1) See < <discharge frequency="" setting="">> on page 3-7.</discharge>
1-5	Error integration signal	Output until error returns

[Table 5: Output signal descriptions]

[Circuit diagram]



[Output terminal specifications (1a relay)]

Type of output	Relay contact	
Max. load current	6 A per contact	
Min. switching load	10mA, 6 VDC (for reference only)	
Initial contact resistance	100 m Ω or less	
Load voltage	240 VAC 1.5A or less, 30 VDC 0.11A or less	
Output circuit insulation	Mechanical insulation	
Response time	$OFF \rightarrow ON$ Approx. 15 msec $ON \rightarrow OFF$ Approx. 20 msec	

[Table 6: Contact specification]



Use a dedicated connector (male) for the connection with the external output connector.

Supplier: DDK LTD.

Model: JMSP1305M-D (straight plug) * 1ch model, 4ch model JMLP1305M-D (L-shaped plug) * 2ch model JMPC13 (plug cap) * common for all models

1.2.5 External Output 《Option Output》

As an optional function (* 1), metal detection signals of each CH can be outputted separately from the external interface.

* 1: This function is effective when the Carbon Gain function (Option) (refer to 3.1.1 Threshold setting) is disabled.

Terminal	Signal name	Output specification
CH1	1CH Detection signal	Output time : Min 300msec
CH2	2CH Detection signal	* It varies with the size of the metal.
CH3	3CH Detection signal	ease apply the control voltage from the receiving side.
CH4	4CH Detection signal	(See Table 8)
		Common to 4 points of CH 1-4
	common	※ Connect to 0V(GND)

[Table 7: External output signal Description]

[circuit diagram]



Type of output	Transistor / sink output (4 Point common)	
Max. load current	DC load :0.5A / 1Point (Common: 0.8A or less)	
Load voltage	DC5-30V	
Output circuit insulation	Photo coupler insulation	
Response time	OFF \rightarrow ON 0.2msec or less / 200 mA Above	

[Table 8: External output specification]

2

Basic Operations

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2.1 Running & Stopping

2.1.1 Running

- Turn ON the Main circuit breaker. (See Table 2, No. 11 in Section 1.2.1 Names and Functions of Various Sections of the Machine.)
- Press the Power Switch on the left side of the door. (See Table 2, No. 12 in Section 1.2.1 Names and Functions of Various Sections of the Machine.)
- 3. The Power Switch lights up in green.
- 4. The Startup screen appears.
 - * If the light tower is included in the option, the green indicator blinks.



- 5. When the startup process completes, the main screen will be displayed. If the mode display under the model number is Normal Mode, the machine is ready to start an inspection.
 - * If the light tower is included in the option, the green light stops blinking and becomes ON.

PC Disconnected 2018/08/22 17:33 Menu				
Safe	CountReset	Operate	Thresh	old
	Count	W/N Volt	Detect Volt	Temp
CH1	8	101	1854	28.5
CH2	5	100	1352	28.5
CH3	8	98	985	28.5
CH4	6	101	1623	28.5
Maint	e_Door Close	Threshold :	600	Info

<4ch model>

[Main screen]

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When the sensor detects a metal piece in the material and performs normal discharge operation, it behaves as follows.

- The discharge damper of relevant channel starts its discharge operation.
- When a detection is made, the yellow light on the light tower turns ON. (Only for the machine with this option.)
- The detection count for relevant channel will be incremented.



2.1.2 Stopping

- Press the Power Switch while the machine is in operation. (See Table 2, No. 12 in Section 1.2.1 Names and Functions of Various Sections of the Machine.)
- 2. The Power Switch illumination and the touch panel screen go OFF and the machine stops.

2.2 Count Reset

2.2.1 Count Reset

- 1. Press the **Count Reset** button on the main screen.
- 2. The Count Reset screen appears.



[Count Reset screen]



The counts will not be reset by turning OFF the power supply.

No.	Display	Name	Function
1	CH1 8 CH2 5 CH3 8 CH4 6	Cumulative numbers of discharge operations	 The count is displayed for each channel.
2	All Reset	All Reset button	 Resets the counts for all channels by a single operation. Keep the button pressed for about one second.
3	CH1 Reset CH2 Reset CH3 Reset CH4 Reset	Reset button for each channel	 Resets the count for each channel. * Keep the button pressed for about one second.

[Table 6: Count Reset screen description]

2.3 Saving Records (.CSV) and Handling SD Memory Cards

2.3.1 Types of Records and Destination Folders in the SD Memory Card

	Record Name	Description	Destination Folder in SD Memory Card
1	Detection record	 Records of detections made (.CSV data) Date & time, mode (*1), code (*2), threshold, CH No., temperature, sensor voltage (peak detection value) [File name] DETECTION_OOO_yyyymmddhhmmss.CSV (*3) 	Destination folder: DETECTION (See Section 3.1.4 Detection & State Records)
2	State history	 History of state monitoring (.CSV data) Date & time, mode (*1), code (*2), threshold, CH No., temperature, sensor voltage (average of peak values in the white noise) [File name] STATE_OOO_yyyymmddhhmmss.CSV (*3) 	Destination folder: STATE (See Section 3.1.4 Detection & State Records)
3	Error history	History of errors encountered (.CSV data) • Time of error, error description, restoration time [File name] ARARM_OOO_yyyymmddhhmmss.CSV (*3)	Destination folder: ARARM (See Section 3.1.5 Error History.)

[Table 7: Description and destination folders of records]

* (*1): Mode: Normal mode (0) or carbon gain mode (1)

* (*2): Code: Sensor output voltage (white noise), metal detection (1) or state monitoring (2)

* (*3): "OOO" in the file name is the machine number (three characters), which has been set in the machine number setting operation on the touch panel (see Section 3.1.2 Standard Setting).

2.3.2 Storage Methods for Records

	Storage Method	Description	Setting
1	Manual saving	Save all records in Table 7 as CSV files by manual operation of a button on the Save screen.	This operation is allowed regardless of the selection of storage method made in Standard Setting. (See Section 3.1.2 Standard Setting.)
2	Automatic saving	Save all records in Table 7 as CSV files at the end of the day (23:59:00).	This operation is enabled by selecting "Auto Save" option for the storage method in the Standard Setting. (See Section 3.1.2 Standard Setting.)
3	Forced saving * When the max. number of records was reached	 Forced saving will be made only for a particular record file shown in Table 7 when the number of records in that file reaches the preset numbers shown below. Detection record/State history: 6,000 records/file Error history: 1,000 records/file 	Forced saving will be made regardless of the selection of storage method made in Standard Setting. (See Section 3.1.2 Standard Setting.)

[Table 8: Storage methods]

2.3.3 Manual Saving of Records

Save

1. Press the

button on the Detection Record, State History or Error History screen to

open the Save screen.

2. Description of the Save screen (manual saving operation)

SD	Same 20000	tiy te 🔒	SDLSpace UK
	Brite CK	1.1	Explanation
Detection			
History			
To sa	ve the histor	y to S	D card?
		Ba	ck

[Save screen: in transition]

SU_Space 2000	10 Kby teSpace ox
Write OK	Explanation
Defection Intellegeneration	
STATEROID	1916 14126456 (087
History	1 40 10
to save the hist	tory to SU card?
Yes	Back

[Save screen: ready to save]

S0_Searce 20000	DivbyteSpuseace ox
Unite OK	Explanation
Detection Residentition	uniqui mineschen son
STATE_801_10	x0814123456.CSV
History	
To save the histo	ory to SD card?
Saving	Back

[Save screen: saving]

• After moving to the Save screen, the characters to be used for the CSV file name will be extracted automatically.

While the file name is being extracted, the Yes button will be disabled. (Extraction time: approx. 5 seconds) * It is OK to move to other screens during the extraction process.

• Upon completion of character extraction, the file name will be displayed in the fields and the Yes button will be enabled.



- Pressing the button in this condition will save the three history files in respective destination folders in the SD memory card as CSV files.
 - * Refer to Table 7: Description and destination folders of records.
 - * History files without any record will not be saved.
- While the save button is displayed as Savinger, data

are being written to the SD memory card. Do not perform following operations since doing so may damage the SD memory card or lead to a loss of data.

- * Turning OFF the Power Switch of the machine
- * Turning OFF the access switch of the SD memory card
- * Removing the SD memory card
- Upon completion of the saving operation, the Menu screen will reappear.

<<Caution>>

When the empty space on the SD memory card becomes <u>1Mbyte</u> or less, the capacity display on the top-right corner changes to <u>Out Of SD_Space</u>.

Ensure that there is sufficient space available on the SD memory card before saving data.

Use this display for determining the time for erasing data or replacing the SD memory card.

Use the **Explanation** button to open the Data Save

Function Description screen and refer to instructions.

2.3.4 Automatic (Forced) Saving of Records

1. Auto Save

When the Auto Save option was selected from the Save menu on the Standard Setting screen, records are saved automatically at the following time (*1) during the machine operation (*2). (See Table 10_2 in Section 3.1.2 Standard Setting.)

* (*1): Automatic saving will be done daily at 23:59, the time displayed on the touch panel.

* (*2): If the time for automatic saving comes while the machine is stopped, the records will be accumulated in an internal data area of the touch panel since the saving operation cannot be performed.

2. Forced saving

Forced saving will be performed when the number of records in a file reaches the maximum number of records (*1) set for each file.

* (*1): See Table 8_3 in Section 2.3.2 Storage Methods for Records.

3. Saving process

When an automatic or forced saving starts, the following processes will take place automatically.

[1] The Save screen appears.



[2] The character extraction process for the file name is performed upon moving to the Save screen.



[3] Upon completion of the character extraction process, CSV files are saved.



[4] When all files are saved, the Menu screen reappears.

2.3.5 SD Memory Card Specifications and Handling

1. SD memory card specifications

Specifications of the SD memory card that comes with the machine are listed below.

SanDisk: SDSDB-004G-J01		
Item	Specification	
Card type	SDHC	
Capacity	4GB (*1)	
Speed	Class4	

* (*1): Recommended maximum capacity of an SDHC_SD memory card: 32GB * Format: FAT32

2. Mounting and removing the SD memory card

To mount or remove the SD memory card while the machine is turned OFF or during the operation, turn OFF the SD memory card access switch (*1) on the back of the touch panel and ensure that the access indicator on the left side of the switch has gone OFF before the operation.

* (*1): Positions of the SD memory card access switch and SD memory card slot



[Rear of the touch panel]



■ Mounting the SD memory card

- [1] Hold the SD memory card with its front face (labeled) facing outward, insert it into the SD memory card interface and close the slot cover.
- [2] Turn ON the machine. If the SD memory card access switch is turned OFF, turn it ON. The SD memory card becomes available for data storage when the SD memory card access switch is turned ON.

Removing the SD memory cards

- [1] Turn OFF the Power Switch of the machine. If the SD memory card access switch needs to be turned OFF during the machine operation, ensure that the SD memory card access indicator has gone OFF before removing the data card.
- [2] Open the slot cover for the SD memory card interface, push in the memory card temporarily and pull out the SD memory card after releasing the finger.



Various Settings and Other Operations

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3.1 Various Settings

3.1.1 Threshold Setting

This section describes registration and selection of the Threshold, as well as switching the Sensor Sensitivity Mode.



(*1): Customers who wish to user function limit, you will need a password in order to move to the screen of the "threshold setting".

This brings up the Threshold Value Setting screen.



Threshold Value Setting screen

Metal Detector

[Explanation of each part]

No.	Display	Name	Function			
1	Standard mode Carbon gain mode * For applications with a high level of response to the material	Sensitivity mode select *Option	Switches the sensitivity between the Standard and Carbon Gain modes. The carbon gain mode is optional. The selection is not available unless this option has been selected for the machine. For others, the Standard mode is simply displayed.			
2	Basis No.1 No.2 No.3 No.4 PC * "PC" enabled by management system option	Threshold select	 Selects the threshold value. Settings No.1 through No.4 are available for the user. * The setting of Basis shall be made to the recommended value before the shipment. (The Basis setting cannot be modified.) The selected setting will be displayed as . * E.g. The setting No.2 is selected. * "PC" is applied when management system is active 			
3	10000 11111 22222 33338 44444	Display of registered thresholds	 Displays threshold values registered. * The setting value from the host PC is displayed in the "PC" frame. 			
4	Resistration	Threshold registration	 Registers various setting values. Pressing this button brings up a screen to register values to be assigned for the settings No.1 through No.4. * Note that the value for the Basis cannot be modified. The Threshold registration screen corresponding to the sensitivity mode selected in 1 will be brought up. * The Carbon Gain Mode is optional. 			
5	Lot No, Material 4204967295 65535	Management system Information display *Option	 Displayed only when "Management system" option is active. From the management system PC, the following values set for transmission are displayed. 			





The threshold value registration is explained below. * Note that the screen shots used are those for the Standard Mode.

On the Threshold Value Setting screen, ensure that the field marked by [_____] is displayed as "Mode: Standard".

1.	Press the	Besistration	button.					
		Thres	hold Val Mode Selec	ue Sett t	ing [Main	Back	
			Standard		Registration -			1
		ز Ad	Adjusting threshold		Lot No, 4294967295		Material 65535	
			Level select					
		Set	No,1	No.2	No.3	No.4	PC	
		1		Setting	value			
		19566	0 ((111))	29222	39333	44444	958,55	

2. Press the display field for the threshold to be set (modified). (Setting No.1 - No.4)



3. When a software keyboard pops up, enter the desired value (*1) to be set. (*1): The range of values allowed is displayed under the field for entering the value.




Metal Detector

- 4. Press the Enter key. (The entered value will be registered.)
- * Registration of Carbon Gain mode threshold will be possible when the sensitivity mode is switched to
- * The Carbon Gain mode is optional. The display does not appear on the sensitivity mode select button unless the option was selected for the machine.

Carbon gain mode (*optional) Conductive materials containing carbon may trigger the sensor without the presence of a metal piece. This is referred to as "response to the material". It is possible to reduce false detections due to response to the material by reducing the sensitivity. * Note that the detection performance will drop.

3.1.2 Standard Setting

This section describes the Standard Setting.

Press the Menu button on the main screen. This brings up the Menu screen.
 Press the Standard Setting button.

The Standard Setting screen will be displayed.





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No.	Display	Name	Function
1	Language	Language select	Brings up the Language Setting screen. Select either Japanese or English.
2	Save	Data storage method select	 Brings up the Save screen. Select how the data are saved on the SD memory card. * For more information on the storage method, see Section 2.3 Saving Records (.CSV) and Handling SD Memory Cards.
3	Calendar	Date & time setting	 Brings up the Calendar screen. Set (modify) the date and time here. Is/12/31 23:23:23 Is/23 23:23 Is/23 23:23
4	Unit No,	Machine number registration	 Brings up the Unit Number screen. Set the machine number (*1) here. Registered machine number will be displayed at the top-right corner (*2) of the Menu screen.

[Table 10: Standard Setting screen description]

- (*1): The machine number will be used as a part of file name to be used for saving data on the SD memory card. See Section 2.3.1 Types of Records and Destination Folders in the SD Memory Card.
- (*2): See Section 1.2.2 Screen Display.

<<Date & time setting (modification)>>

- 1. The current time on the machine is displayed.
- 2. Touch the frame for date and time to be modified and enter a number. (A software keyboard pops up.)
- 3. Press the **renewed** button.
- 4. When a prompt "Do you want to update the calendar?" appears, keep the pressed for about one second.
 - * Pressing the **button** will cancel the operation.
- 5. Upon completion of the modification operation, the value entered for the date and time in 2. will appear on the window shown in 1.



3.1.3 Function Setting

This section describes functional setting for the machine.

Press the Menu button on the main screen. The Menu screen appears.

Press the Function Setting button. (*1)

(*1): Customers who wish to user function limit, you will need a password in order to move to the screen of the "Function setting".



Function Setting screen

No.	Display	Name	Function	
1	Record Setting	Record setting	 Brings up the Record screen for performing following settings. 1) Set the interval (minutes) for saving the State History. (*1) See Section 3.1.4 Detection & State Records. 2) Set the interval (seconds) for updating the W/N Wave Monitor Plot. (*2) See Section 3.1.6 State & Wave Plot. 	
2	Discharge Frequency	Discharge frequency warning setting	 Brings up the Discharge Frequency Warning screen for making settings. Further explanations are provided in page 3.7 <<discharge frequency setting>> and onward in this section.</discharge 	
3	TP Mode	Test piece (TP) measurement setting * Management system optional function	It can be used only when the management system is selected. We accumulate the detected value at the test piece in the management system PC. * For details, see page 3.9 of this section	
4	Operation MODE	Operation mode select	 Brings up the Operation Mode Change screen (*3) for switching the Standard and Maintenance modes. * A password is required for selecting the Maintenance mode. 	

[Table 11: Function Setting screen description]

(*1): Setting range 1 to 99 (minutes)

(*2): Setting range 5 to 3600 (seconds)

(*3): The button will be enabled by pressing it for two seconds.

<<Discharge frequency setting>>

- If "I/F (interface) Effective" is selected, the Discharge Frequency Warning screen (*2) will be displayed and an external I/F signal will be sent whenever there are preset number (*1) of discharge operations within a preset time frame.
- * The external I/F signal (*3) is available only on 2ch and 4ch models.
- (*1): For a machine with multiple channels, the sum of discharge operations on different channels is the number of discharge operations.
- (*2): See <<Discharge frequency warning screen>> on page 3-8.
- (*3): See Section 1.2.4 External Output.

<<How to set the discharge frequency>>

- 1. Pressing the Discharge Frequency Warning screen. * E.g. If "I/F Effective" is selected.
- 2. Select the I/F setting. Pressing **IFErrective** will bring up a prompt "Warning to Effective?"



- 3. Press the button to complete the setting.
- 4. The discharge frequency setting can be done by pressing the **Pischarge** button.

Discharge Frequency Warning	Discharge Frequency Marning	
I/F Invalid I/F Effective St klt: 5 Times./ Marning to Effective ? 3	I/F Invalid I/F Effective Mile: Stiest Twinste Presence	4

5. Press the display fields for "Times" and "minute" will bring up a software keyboard, on which a new number can be entered.





[Software keyboard]

6. After entering a value to be set, press the **Set** button to complete the registration. To cancel the setting, press the **Cancell** button.



<<Discharge frequency warning screen>>

- * If discharge operations exceeding the number set for the discharge frequency were detected, the Discharge Frequency Warning screen will be displayed showing a warning message and the time of detection.
- * An external I/F signal (*1) will be sent. (*1): See Section 1.2.4 External Output.

Pressing the **continuum** button will revert the screen to the previous one.



Discharge frequency warning screen

<<When a discharge frequency warning was happend >>

* The Discharge Frequency Warning is not an error. The metal detection operation continues normally even if the warning is issued and the above message is displayed on the screen.

《About TP measurement mode》

It can be used if the management system function is enabled.

In this mode, the detection value of the test piece is recorded on the management system side and managed.

1. Press to display the sub screen for selecting the material of the test piece.

Please select the material of the test piece to be measured. After that, measurement becomes possible. % Please use the test piece specified by us.



2. Select the material and measure with the test piece dropped on each CH of the sensor. After measuring with all CH press



Four latest detection data and their average value are displayed respectively

3. You will return to "Function setting screen".

The measured detection value is sent to the management system PC.

% The detected value is also recorded in the "detection history" of the touch panel with the following code.

Code 3: TP mode Fe detection Code 4: TP mode SUS detection Code 5: TP mode W / N detection (* 1)

* 1: For "TP mode", "W / N value" is recorded in "detection history".

* For details on using accumulated data, please refer to "Management System 10. Chart".

3.1.4 Detection & State Records

This section explains the records of detection and state for the machine.

Press the button on the main screen. This brings up the Menu screen. Menu Press the button. The Detection History screen will appear. Detection Record Detection History Suncess Main D 4/12 12:10:00 5 · **T_Set** Search Date Mode Code T_Val CHS_temp NN_Val H M 5
 H
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No.	Display	Name	Function
1	* Detection history screen	Detection history	 Displays the past seven detection (state) records. Newer records are shown on top. * The history forms (items) for the detection and state are the same. * The "Code" in the table changes to "1" for the detection history and "2" for the state history.
2	Save	Data save	 Brings up the Data Save screen. For more information on the data save function, see Section 2.3 Saving Records (.CSV) and Handling SD Memory Cards. Data to be saved are explained in <<csv data="" output="">> on page 3-10 and onward.</csv>
3	Code ex.	Code explanation	 Brings up a screen explaining the codes used in the Detection and State History screens. * For more information on the codes, see Table 7 "Description and destination folders of records".
4	P.▲ P.▼	Page scroll	 Scrolls the pages (with seven records) of accumulated history data.
5	4/12 12:10:00 [Date & Time Display Setting]	Search method	 Press the T_Set button to load the current date and time. Pressing respective fields in the Date & Time Display Setting will bring up a software keyboard. Modify the year, month, day, hour or minute as desired. Press the Search button to jump to a detection record nearest to the set date and time.

6	Data Renewal	Renewal button	 After scrolling pages and/or performing a search, use this button to update the screen with the latest history data.
7	SD_Access SD_Error	SD memory card state	 Displays the state of SD memory card. If the SD memory card is not working properly (*1), "SD_Error" will be displayed.
8	State State tion	Switch history	 Detection history: Records of the detection voltage on the relevant CH and other data at the time of detecting metal pieces State history: White noise voltage and other data recorded every ten minutes * Switch on each screen (On the Detection History screen) (On the Detection History screen) (On the State History screen) (On the State History screen)

[Table 12: Detection & State History screen description]

(*1): When the SD memory card is full or the card slot is empty.

<<CSV output data>>

The Detection (State) History and Error History are saved in the csv format. The csv format data can be loaded on a spreadsheet or database software. The explanation given in this section uses an example of loading the data onto a spreadsheet of Microsoft Excel.

Microsoft Excel is a registered trademark of Microsoft Corporation.

<<Destination folders in the SD memory card and file names>>



<<File name construction>>



<Detection & state history data on the CSV file>



No.	Data Item	Description
1	RECORD_NUM	Total number of history data in the file
2	DEV_COMENT (date & time)	The date and time (year minute) of occurrence * Actual date and time record contains the "second" field as well.
3-8	Year, Month, Day, Hour, Minute, Second (date & time)	The date and time (year second) of occurrence.
9	Mode	0: Standard mode 1: Carbon Gain mode * Optional
10	Code	 Measured peak voltage at the time of metal detection Normal white noise measured with a set interval Detected value of test piece "Fe" (TP mode) Detection value of test piece "SUS" (TP mode) Detection value of "W / N" (TP mode)
11	T_Val (mv)	Threshold voltage
12	CH_No	1 - 4: Relevant channel number
13	S_Temp (°C)	Sensor temperature of the relevant channel
14	W/N_Val (mV)	 Detection history: Peak voltage at the time of detection State history: The value obtained by averaging (* 3) the maximum value (* 2) of the white noise voltage within a fixed period (* 1)

[Table 13: Detection & State History CSV output data]

(* 1): Depends on PLC scan time 1000 scan period / 4ch sampling time is 250 scans / ch (PLC scan: average 2 msec)

(* 2): Peak hold value of PLC analog input section is adopted

(* 3): Average number of times 20 $\,$ $\,$ Default factory setting value

3.1.5 Error History

This section explains the Error History of the machine.



Error History screen

No.	Display	Name	Function
1	Outrose Two Drur Centerts Reset WM/11 11.12.52 Note Detection Drur 11:07 Schult 11:17.52 Dr. Journal 11:07 Schult 11:17.52 Dr. Journal 11:07 Schult 11:17.52 Dr. Journal 11:07	Error history display	 Displays the past three errors. Newer records appears on top. * Errors are displayed in red. Once restored, the display color changes to blue.
2	Save	Data save	 Brings up the Data Save screen. * For more information on the data save function, see Section 2.3. * Output data are explained on the page 3-10 and onward.
3		Scroll buttons	Scrolls the accumulated error data by one record at a time.
4	Bz Stop	Buzzer stop	 Stops beeping of the buzzer notifying an error.
5	Reset	Error outbreak (reset)	 When an error was detected, the icon Error will be displayed and the error state display is maintained. After restoring the error, press the Error button to reset the error. The button changes to Reset.

Metal Detector

6	An error was detected in the state of the voltage level of the control board. If you do not want to return the power reset, please contact the manufacturer.	Error description	 Displays a description of the relevant error. * For the types of errors, see Section 5.1 Errors.
7	5/12 11:20:00 [Date & Time Display Setting]	Search	 Press the T_Set button to load the current date and time. Pressing respective fields in the Date & Time Display Setting will bring up a software keyboard. Modify the year, month, day, hour or minute as desired. Press the Search button to jump to a detection record nearest to the set date and time.
8	SD_Access SD_Error	SD memory card state	 Displays the state of SD memory card. If the SD memory card is not working properly (*1), "SD_Error" will be displayed.

[Table 14: Error history screen description]

(*1): When the SD memory card is full or the card slot is empty.

<Error history data in the CSV file>

1 ALARN LOG H 2 3 4 MH07'5A 5 DOMIENT GR 6 MUNEER OF A 7 NUNEER OF A 8 MINEER OF A 9 UPPER NO 10 11 12	HIETORY 129 1 ROLF NAME ALARM HISTORY NOT RESUMED UNCONFIRMED	123	— 1						
2 3 4 MH075-A 1 COMMENT GR 6 NUMBER OF J 7 NUMBER OF J 8 NUMBER OF J 8 UPPER NO 10 11 12 13	123 1 ROLF NAME ALARM HISTORY NOT RESUMED UNCONFIRMED	123	— 1						
3 4 MHOPTH-A 5 COMMENT GR 6 NUMBER OF J 7 NUMBER OF J 9 UPPER NO 10 11 12	1 ROLP NAVE ALARM HISTORY NOT RESUMED UNCONFIRMED	1	—1						
4 MHOP5-A 1 DOMMENT GR 6 NUMBER OF A 1 NUMBER OF N 8 NUMBER OF U 9 UPPER NO 10 11 12 13	ROUP, NAME ALARM, HISTORY NOT, RESUMED UNCONFIRMED	123	—1						
1 DOMMENT GR 6 NUMBER OF A 7 NUMBER OF N 8 NUMBER OF U 9 UPPER NO 10 11 12	ROLF, NAME ALARM, HISTORY NOT, RESUMED UNCONFERMED	123	<u> </u>						
6 (NUMBER OF A 7 NUMBER OF JU 8 NUMBER OF JU 9 UPPER NO 10 11	ALARM HISTORY NOT RESUMED UNCONFIRMED	125	<u> </u>						
7 NUMBER OF N 8 NUMBER OF U 9 UPPER NO 10 11 12	NOT RESUMED UNCONFIRMED	0							
8 W.MEET.OF.U 9 UPPER.ND 10 11 12	UNCONFEMED	646							
9 UPPER,ND 10 11 12		1220		_					
10 11 12	N	EDDLE NO ODWM	ENTING COMMENT	STATUS	OCIC URRED	RES TORIEL	CHECKED	LEVE.	GROUP
12	ó	0	26 1ch.戻」男常	A	2015/12/24 9:13	2015/12/24 8:22	1007/10/01303000	20424	2
12	0	0	28 3ch民) 異常	R	2015/12/24 9:22	2015/12/24 922	1000.000/00.00750.00		2
18	0	G	If Sch展。具常	H	2015/12/24 9:29	2015/12/24 923	8088/88/88 80,00,00	10	2
140	0	0	261ch展,男常	H.	2015/12/24 925	2015/12/24 8:23	1111/11/111220	1	2
14	Ő.	0	18 Ich民) 목官	A	2015/12/24 9:29	2015/12/24 5:24	1000/100/00 30/00/00		2
15	0	0	fi 2ch 排出具常	R	2015/12/24 9:24	2015/12/24 9:24	1000/100/00 30,000 (0)		2
16	0	0	ft 2ch)排出异常	A	2015/12/24 925	2015/12/24 9:25	MM/M/M 3930.00	2.0	2
17		0	H Con 翻出鼻宮) A	2015/12/24 925	2015/12/24 8:25	4444/64/66.88386.68	1.13	2

No.	Data Item	Description
1	NUMBER_OF_ALARM_HISTORY	Total number of records in the file
2	COMMENT	Type of the error encountered
3	OCCURRED (date & time)	Date & time of the error (year minute) * Actual date and time record contains the "second" field as well.
4	RESTORED (date & time)	Date & time of restoration (year minute) * Actual date and time record contains the "second" field as well.

[Table 15: Error History CSV output data]

3.1.6 State & Wave Form Plot

This section explains settings for various features of the machine.

Press the Menu button on the main screen. This brings up the Menu screen.
 Press the State & Wave Plot button.

The State & Wave Plot screen will be displayed.



State & Wave Plot screen

No.	Display	Name	Function
1	Unite Noise Monitoring	W/N (white noise) wave form monitoring	 Pressing a button for desired channel will bring up the W/N Wave Form Monitoring screen for monitoring the W/N (white noise) on the relevant channel. * See <<w form="" monitoring="" n="" screen="" wave="">> on the page 3-15 in this section.</w>
2	Detected savefors Dirt-4 detection time	High speed plot	 When you press the button, the display shifts to the screen that draws the sensor detection voltage waveform of the corresponding channel. * See <<high plot="" screen="" speed="">> on the page 3-17 in this section.</high>

[Table 16: State & Wave Plot screen description]

<<W/N wave form monitoring screen>>



<The screenshot is for a CH4 model>

W/N (white noise) wave form monitoring screen

No.	Display	Name	Function
1	165- 153- 135- 120- 90- 90- 85- 85- 85- 80- 15- 0-	Wave form display area	 Plots average values of peak white noise with the monitoring frequency (*1) The number of plots displayed is 199.
2	<mark>91 93 (XC) 111 (XC) 93 (XH)</mark> 121	Waveform display W / N indication	 Waveform display "valid" - "invalid" button Press the CH button, it becomes valid when it is lit, and it becomes invalid when it is off. valid va
3		Channel select	 For a machine with multiple channels, use the (next) and (previous) buttons to switch the screen.
4	Oscillo_M	Waveform continuous drawing	Press the Oscillon button to display the W / N voltage value in continuous (* 5).
5	800mv 850mv 150mv	Drawing range switching	 Press any display maximum voltage button to switch the range.
6	Plot_Cycle <u>3600</u> sec	Drawing cycle Configuration	• When button is pressed, keyboard (sub) screen opens and drawing cycle (sec) is arbitrary You can set to.

[Table 17: W/N wave form monitoring screen description]

(* 1): Monitoring period: Time (seconds) set in "History setting" of Section 3.1.3 "Function setting"

(* 2): Depends on PLC scan time 1000 scan period / 4ch sampling time 250 scans / ch (PLC scan: average 2 msec)

(* 3): Peak hold value of PLC analog input section is adopted

(* 4): Average number of times 20 $\,$ $\,$ Standard factory setting value

(* 5): Drawing update scan: average 50 msec

<<About "Detected Waveform Drawing" Screen>>

1. Press the **DENDERCONNER** button on the "State / Waveform Drawing" screen to switch to the "Detected Waveform Drawing" screen.



"Waveform drawing" screen

No.	Display	Name	Function
1		Wave form plot area	 Plot threshold voltage with purple line. Plot voltage waveform at metal detection with each CH color (* 1). The number of plotting points is 150
2	Range 10 V	Change chart range Range value display (Selected range)	 When prese button is pressed, the following "Graph scale setting" sub screen opens. You can select and press the voltage range button on the setting frame on the left.
3	Threshold 0.00 m	Threshold display	 The set threshold voltage value (mV) is displayed.
4	111 112 112 112 112 113	Metal detection value display	 Metal detection value (mV) is displayed. (A value exceeding the threshold value)
5		Channel select	 For a machine with multiple channels, use the (next) and (previous) buttons to switch the screen.

[Table 18: High Speed Plot screen description]

(* 1): From small CH to red \rightarrow yellow \rightarrow green \rightarrow blue for each screen (see Table 18-4)



Maintenance

4.1	Routine Inspection 4-	-2
4.2	Routine Cleaning 4- 4.2.1 Routine Cleaning	-4 4
	4.2.2 Points of Cleaning 4	-5
4.3	Replacing Parts4-4.3.1Replacing Batteries for the Control Devices4-4.3.2Replacing the Cooling Fan4-	-6 -6

4.1 Routine Inspection

In order to use the machine in the optimum condition, it is recommended to perform routine inspections before loading and changing the material.

Read this section for determining the points and types of inspection.

- Checking the operation of discharge damper Move the discharge damper and ensure that it works properly.
 - * The illustrations shown below are those of a 1ch model. Check two dampers for the 2ch model and four dampers for the 4ch model.

If the damper does not work properly, contact SAIKA.



• Checking operation with a test piece (*1)

To check the detection sensitivity, confirm that a test piece will be discharged to the discharge chute properly.

If the test piece cannot be discharged properly, contact SAIKA.

(*1): Test pieces are optional.

Important In order to prevent the test piece being lost in the line or mixed with the material, provide a protection to the discharge port.

<<Notes in opening the Maintenance Door and checking the damper operation>>

With the Maintenance Door open (*1), it is possible to check the damper operation at the time of detecting a metal piece.

(*1): If an optional Maintenance Door safety switch is enabled, follow the procedure described in the page 4-3 in this section.

If an optional Maintenance Door safety switch is enabled

1. By opening the Maintenance Door during the operation, the Maintenance Door OPEN screen pops up and the buzzer beeps. In this condition, the power supply to the damper is shut down.



- 2. Pressing the **Release** button will bring up a message to confirm the release of the damper lock.
- 3. Pressing the Yes button will restore the power supply to the damper and the damper function will be unlocked.
- 4. While the display "Damper Unlocked" is present, the damper functions even if the Maintenance Door is open.



- * The locking function will start working again once the Maintenance Door is closed.
- * If the display is switched to other screens using the Buck but

button before unlocking, press

the **contraction** on the main screen to return to the Maintenance Door OPEN confirmation screen.

 Checking the cooling fan operation Ensure that air flows out from the cooling fan.
 If the cooling fan needs to be replaced, see Section 4.3.2 Replacing the Cooling Fan.



The cooling fan turns ON if the ambient temperature rises above 30°C and turns OFF if the temperature drops to 15°C.

It may not be running depending on the ambient temperature.

4.2 Routine Cleaning

4.2.1 Routine Cleaning

Pay attention to the followings in cleaning the machine.

WARNING Before cleaning, ensure that the Power Switch and the Main Circuit Breaker are turned OFF.

CAUTION Do not wash with water.



CAUTION The machine is assembled with precision. Do not remove parts that need not be removed.

Items to be prepared:

Prepare following items before cleaning.

- Vacuum cleaner
- Dry rag
- Air blowing device



CAUTION In order to prevent foreign matter and dusts on the machine from contaminating the production line at the time of cleaning, take necessary measures such as providing a protection.

4.2.2 Points of Cleaning

Clean the area on which the material may be adhered (the area in the yellow dotted line) with a vacuum cleaner or an air blowing device.

For other cleaning methods, see Table 19: Points and methods of cleaning on the page 4-6.

* The illustrations shown below are those of the 1ch model.



Metal Detector

No.	Name	Cleaning Method
1	Touch panel	Wipe it with a rag to remove finger prints and stains.
2	Cooling fan	Clean it with a vacuum cleaner and an air blowing device.
3	Maintenance door	Clean the door and areas around it with a vacuum cleaner and a rag. * Check the packing as well.
4	Discharge damper	Clean the inside and outside of the damper with a vacuum cleaner and a rag.
5	Inside the frame	Clean the inside of the frame (ceiling and walls) with a vacuum cleaner and a rag.
6	Around the discharge chute (inside)	Clean the discharge chute and areas around it with a vacuum cleaner and a rag.
7	Air filter	Clean the air filter inside the louver with a vacuum cleaner.
8	Discharge chute (outside)	Clean it with a vacuum cleaner and a rag.

[Table 19: Points and methods of cleaning]

4.3 Replacing Parts

4.3.1 Replacing Batteries for the Control Devices

If the power of batteries inside the touch panel and/or PLC drops, a warning (*1) will be issued. Replace them accordingly.

(*1): See the list of errors in Section 5.1.1 Errors and Notification.

[Replacing the touch panel battery]

- 1. Save the detection, state and error histories on the SD memory card. (There is a possibility that unsaved data will be lost.)
- 2. Turn OFF the Power Switch.
- 3. Open the control panel door and turn OFF the main circuit breaker.
- 4. Open the battery cover on the back of the touch panel.
- 5. Disconnect the battery at the connector and connect a new battery (*1).
- 6. Replace the battery cover and turn ON the main circuit breaker.
- 7. Close the control panel door and turn ON the Power Switch.
- 8. Check the date and time displayed and, if necessary, set the correct date and time (*2).

(*1): See <<Table 25: Troubleshooting low battery errors>> in Section 5.2.1 Troubleshooting.

(*2): See << Date & time setting (modification)>> in Section 3.1.2 Standard Setting.

* The touch panel battery is used to hold history data on the machine before saving them to the SD memory card. Continued use of the battery with low power for about a month may cause the history data on the machine becoming inconsistent. It is recommended to replace the battery as soon as possible. <<Touch panel battery replacement procedure>>



[Replacing the PLC battery]

- 1. Turn OFF the Power Switch.
- 2. Open the control panel door and turn OFF the main circuit breaker.
- 3. Open the battery cover on the face of the PLC unit.
- 4. Disconnect the battery at the connector and connect a new battery (*1).
- 5. Replace the battery cover and turn ON the main circuit breaker.
- 6. Close the control panel door.
- 7. Turn ON the Power Switch.
- 8. Check the date and time displayed and, if necessary, set the correct date and time (*2).
- (*1): See <<Table 25: Troubleshooting low battery errors>> in Section 5.2.1 Troubleshooting.
- (*2): See <<Date & time setting (modification)>> in Section 3.1.2 Standard Setting.
- * The PLC battery is used to hold the clock data (shared with the touch panel). Continued use of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the clock data becomes a state of the battery with low power for about a month may cause the battery with low power for about a month may cause the battery with low power for about a month may cause the battery with low power for about a month may cause the battery with low power for abou

Continued use of the battery with low power for about a month may cause the clock data becoming inconsistent. It is recommended to replace the battery as soon as possible.

<<PLC battery replacement procedure>>



Face of the PLC unit

4.3.2 Replacing the Cooling Fan

Replace the cooling fan whenever an abnormal noise is heard, it stops working or its service life has expired.





(*1): The service life in the ambient temperature of 25°C. * The life will be reduced to half (approx. 20,000 hours) at 35°C.

- 1. Remove the fan guard. (Loosen the four thumb screws.) * Be careful not to drop the guard.
- 2. Remove the power cable for the fan.
- 3. Remove the cooling fan mounting screws (at four locations).
- 4. Remove the connector on the cooling fan side and the grounding wire (one screw).
- 5. Put a new fan and secure it with four screws. (Pay attention to the air flow direction.)
- 6. Plug in the connector and secure the grounding wire with a screw.
- 7. Secure the fan guard. (Fasten the four thumb screws.)
- 8. Turn ON the main circuit breaker and Power Switch.
- 9. Ensure that the fan turns and the air is discharged.



The cooling fan turns ON if the ambient temperature rises above 30°C and turns OFF if the temperature drops to 15°C.

It may not be running depending on the ambient temperature.

<<Cooling fan replacement procedure>>



Fan guard



Fan mounting screws



Connector



Grounding wire fastening screw

Important

nt Install the cooling fan so that the air flows out of the machine.





The stamp on the cooling fan. Pay attention to the AIR FLOW direction.



Errors and Troubleshooting

5.1	Errors	;	5-2
	5.1.1	Errors and Notification	5-2
	5.1.2	"Warning Display" screen	5-2
	5.1.3	List of Error items	5-3
5.2	Troub	leshooting	5-4
	5.2.1	Troubleshooting	5-4
	5.2.2	Troubleshooting Other Problems	5-7

5.1 Errors

5.1.1 Errors and Notification

This section explains types of errors and error notification on the screen.

If the machine in normal condition detects an error, the buzzer beeps and the Error History screen (*1) appears. At the same time, the light tower lights up in red.

- (*1): See Section 3.1.5 Error History.
- (*2): The light tower is optional.

M

Important The error screen will be displayed automatically only if an error is detected on the machine working normally (without any error). To display the error screen in other instances, press the Error History button on the Menu screen.

For further information on the external I/F signal for errors, see Section 1.2.4 External Output.

5.1.2 "Warning Display" screen

Item on which warning screen is displayed.

Item		Contents	
Discharge Frequency Warning Screen	 When the number of discharges exceeding the setting condition of the discharge frequency is detected Display the announcement screen * Refer to Section 3.1.3 <<discharge frequency="" setting="">><<how discharge="" frequency="" set="" the="" to="">><<discharge frequency="" screen="" warning="">>.</discharge></how></discharge> 		
	An announcement screen is displayed when any sensor temperature reaches 65 ° C or more		
Sensor Temperature	The summer compositions reached the number of white (D) * (). • Please check the operation of the cooling fam 1 • Please check material temperature 1	The time when the warning occurrence was detected is displayed.	
Warning Screen	Confirmation	Confirmation Press "A" to move to the screen	
	Detection Clock 23 23 23	before occurrence.	
	※ Sensor temperature abnormality	$^{\circ}$ occurs at 70 $^{\circ}$ C or higher.	

[Table 20: Warning item list]

5.1.3 List of Error items

Following information will be displayed in the error display fields on the Error History screen. By selecting a particular error, more detailed information will appear under the history data item.

No.	Error Name	Description (in the description display area)	
1	CH1-4 Metal detection error	An error was detected in the state of the voltage	
2	Each CH metal detection error	If you do not want to return the power reset, please contact the manufacturer.	
3	CH1-4 DP_Overload	It has detected an overload of the driving power of the damper. Please check the circuit protector of the corresponding CH.	
4	(Each CH) temperature error	It has detected a value above the temperature upper limit of the sensor unit. Please check the sensor of the corresponding CH.	
5	(Each CH) discharge error	Until the discharge position at the time of the damper behavior was detected that did not reach. Please make sure the damper of the appropriate CH.	
6	(Each CH) return error	It did not return to origin in the operation of the damper. Please make sure the damper of the appropriate CH.	
7	CH1-4 PLC battery low	Battery of the PLC and the Touch_Panel has detected that you are reduced.	
8	TP battery low	Please refer to the battery replacement.	
9	SD card full	An error was detected in the SD card.	
10	SD card access error	remaining amount of the memory of the SD card.	
11	CH1-4 Metal detection T_value error	Threshold voltage is defective. If you do not want to return the power reset, please contact the manufacturer.	

[Table 21: List of Errors]

Procedures for stopping the buzzer and resetting errors

Once an error is reported, the error condition is maintained until it is reset. Upon restoring the error, reset the error condition as follows.

- 1. Press the Buzzer Stop button to stop the buzzer.
- 2. Address the error in accordance with instructions in Section 5.2 Troubleshooting.
- 3. Once the error is restored, the display changes from red to blue. Then press the Error Reset button to reset the error condition.

ImportantThe error condition cannot be reset unless the machine has been restored.ImportantAddress the error and press the Error Reset button after the machine is restored.

On the Error History screen, the Error History can be viewed and saved on the SD memory card in the CSV format.

5.2 Troubleshooting

Important This section explains how to address errors. If the troubleshooting method described in this section does not work, contact SAIKA.

5.2.1 Troubleshooting

This section explains how to address errors listed in Table 21. For troubleshooting other types of problems, see Section 5.2.2 Troubleshooting Other Problems.

1. Errors relevant to the metal detection board (sensor unit)

* Error item No.1 to No.2	See Table 21: List of Errors in Section 5.1.3 Errors and Notification.
Assumed Cause	Troubleshooting
Too many metal pieces are being fed continuously.	Stop loading the material temporarily and press the Error Reset button. If the error item is cleared, the sensor is working properly.
The sensor signal is erroneous.	Stop loading the material temporarily. Check the sensor voltage on the Main screen. If the sensor signal level is unusually high, contact SAIKA.
The sensor is in an abnormal state.	The sensor needs to be replaced. Contact SAIKA.

[Table 22: Troubleshooting errors relevant to the metal detection board (sensor unit)]

2. DP Overload

* Error item No.3

See Table 21: List of Errors in Section 5.1.3 Errors and Notification.

Assumed Cause	Troubleshooting
The path of the material is clogged with the material.	Check the path of the material to see if it is clogged with the material.
Abnormal power supply voltage	Check the voltage if it satisfies the specification.
Faulty solenoid	Contact SAIKA.
* If no particular cause is found	The circuit protector has tripped. Push the switch (*1) on the circuit protector to reset it. Upon resetting the CP, perform a discharge operation test using a test piece and ensure that it is discharged properly.

[Table 23: Troubleshooting the DP (damper) overload error]

(*1): See No.3 in Table 2: Names of parts, Section 1-2 Names and Function of Parts.

3. Sensor Temperature Error

* Error item No.4

See Table 21: List of	Errors in Section	on 5.1.3 Errors	and Notification

Assumed Cause	Troubleshooting
Improper ambient temperature	Take actions to make the ambient temperature to fall within the specified range (5 to 45° C).
The cooling fan has stopped.	Check the cooling fan to see if it is running.
The temperature of the loaded material is out of range.	Take actions to make the material temperature to fall within the specified range (5 to 70°C, *standard model).
The temperature sensor is not working properly.	If the ambient temperature and the material temperature are both normal, the temperature sensor may be faulty. Contact SAIKA.
The sensor unit is defective.	Contact SAIKA.

[Table 24: Troubleshooting the sensor temperature error]

4. Damper Movement Error

* Error item No.5 and No.6 See Table 21: List of Errors in Section 5.1.3 Errors and Notification. **Assumed Cause** Troubleshooting Clogging of the material inside the Remove the sensor unit and check the discharge damper and the area around it in the discharge mechanism discharge mechanism. If the material has clogged, remove it. Improper power supply voltage Check the voltage to see if it satisfies the specification. · Failure of the solenoid Contact SAIKA. · Failure of the damper position sensor Perform a discharge operation test using a test piece and ensure that the test piece is * If no particular cause is found discharged properly.

[Table 25: Troubleshooting the damper movement error]

5. PLC Battery Low/TP Battery Low Errors

* Error item No.7 and No.8	See Table 21: List of Errors in Section 5.1.3 Errors and Notification.
Assumed Cause	Troubleshooting
The battery life has expired.	The battery needs to be replaced. Replace the battery with a new one. [Battery models and recommended replacement period] PLC: FX3U-32BL (lithium battery) 5 years (ambient temperature 25°C) (*1) TP: GT11-50BAT (manganese dioxide lithium primary battery) 5 years (ambient temperature 25°C) (*1)

[Table 26: Troubleshooting low battery errors]

(*1): The service life depends on the ambient temperature. With the temperature of 50°C, the life is about 2.5 years.

6. SD Card Access Error/SD Card Full Error

* Error item No.9 and No.10	See Table 21: List of Errors in Section 5.1.3 Errors and Notification.
Assumed Cause	Troubleshooting
The SD memory card is not inserted. The SD memory card has little free space.	Check the presence of the SD memory card in the slot. If the SD card is present, check the memory space from the Save screen on the touch panel. (*1) If the lack of free space (*2) was confirmed, replace the SD memory card (*3) or free some memory space.

[Table 27: Troubleshooting the SD memory card errors]

- (*1): See Paragraph 2 Description of the Save screen in Section 2.3.3 Manual Saving of Records.
- (*2): The SD Card Full error is issued when the free space drops to about 1 Mb.
- (*3): See Section 2.3.5 SD Memory Card Specifications and Handling.

7. T_Value Error

	* Error item No.11	See Table 21: List of Errors in Section 5.1.3 Errors and Notification.		
	Assumed Cause	Troubleshooting		
•	The threshold voltage is not supplied properly to the control board from the PLC.	Ensure that the PLC unit is working properly with the LED indicator (*1) on the unit. POWER: Green light ON RUN: Green light ON		
•	The feedback of threshold voltage on the control board is not input properly to the PLC.	→ If the light is OFF, switch the PLC RUN-STOP switch to RUN (*2). BATT,ERROR: Both OFF If normal operation cannot be made after confirming these conditions, reset the power of		
*	Defective PLC	the machine.		
*	Broken signal line or bad contact	If this still does not work, contact SAIKA.		

[Table 28: Troubleshooting the threshold error]

(*1),(*2): For the indicators and switch on the PLC unit, refer to followings.



5.2.2 Troubleshooting Other Problems

This section explains other types of problems and how to address them.

List of other problems

- A) The power cannot be turned ON.
- B) The discharge damper does not operate even if a metal piece has been detected.
- C) Metal pieces cannot be detected.
- D) The discharge damper is activated frequently or there is too much material discharged improperly.

Troubleshooting

A) The power cannot be turned ON even if the main circuit breaker and the Power Switch are both switched ON

Assumed Cause	Troubleshooting
The power cable is unplugged.	Plug in the power cable.
The machine is used with a power supply outside the specification.	Check the power supply specifications for the machine. Use the machine with the power supply corresponding to the voltage (AC***V) inscribed on the label.

[Table 29: Troubleshooting the problem of turning ON the power]

B) The discharge damper does not operate even if a metal piece has been detected

Assumed Cause	Troubleshooting		
The solenoid is defective.	Contact SAIKA.		

[Table 30: Troubleshooting the problem of failure to perform the discharge operation]

C) Metal pieces cannot be detected

Assumed Cause	Troubleshooting				
The sensor sensitivity has dropped.	If the sensor sensitivity drops due to a drop in the ambient temperature (*1), the detection level becomes low necessitating an adjustment of the sensor signal sensitivity. Contact SAIKA.				
The size of metal pieces is smaller than the detection capability of the machine.	Let a test piece drop through and check if it can be discharged. (Repeat the test a few times.) If the type of metal piece desired to be detected (the target) cannot be detected, it is possible the target is smaller than the detection capability of the machine. Ensure that the target matches the detection capability of the machine. * If larger metal pieces cannot be detected, contact SAIKA.				
The sensor has failed.	If above actions do not solve the problem, the sensor may have failed. Contact SAIKA.				

[Table 31: Troubleshooting the problem of failure to detect metal pieces]

(*1): For more information on the operating conditions, see Section 6.1 Specifications.

D) The discharge damper is activated frequently or there is too much material discharged improperly

Assumed Cause	Troubleshooting		
Metal pieces have attached inside the sensor unit.	Clean the inside (the path of the material) of the sensor unit. (*1)		
Too many metal pieces are mixed in the material.	If there are too many metal pieces mixed in the material, it is possible that most of the material are discharged as NG material because the discharge damper always turns to the discharge chute due to frequent detection response of the sensor. If that was the case, take following actions.		
	If there are too many metal pieces mixed in the material, performing a pre-processing of reducing metal pieces with a magnet will help increasing the effectiveness of the machine.		
	• Reduce the amount of material fed to the machine In using the machine with the specified sensitivity, reduce the amount of material fed to the machine to reduce the number of detection responses. The optimum amount to be loaded depends on the level of metal pieces in the material. Try reducing the amount of the material little by little to find the optimum amount.		
	Material Metal piece		
	Reduce the amount of material being fed to reduce the number of metal pieces passing through the sensor.		
	 Set a higher threshold (the sensitivity will drop) Make the threshold higher than the current setting. (*2) 		
	CAUTION Setting a threshold higher than the recommended value may lead to a detection performance lower than those described in the specifications.		
The threshold is not set properly. The machine allows the customer to set four arbitrary thresholds. (*2) Before the shipment, the recommended threshold for the machine is set as BASIS. Although a selection among five different thresholds, BASIS plus four user settings, a made for daily operation, note that using user settings (No.1 - No.4) significantly low the recommended value (*3) may lead to frequent operations of the discharge damp resulting in improper discharge of the material.			

The metal detection response is caused by a constituent of the material.	If frequent detection responses are observed without the presence of metal pieces, it is possible that the machine is responding to some component contained in the material. If this was the case, take following actions.			
	• Reduce the amount of material fed to the machine In using the machine with the specified sensitivity, reduce the amount of material fed to the machine to reduce the number of detection responses to the component contained in the material. The optimum amount to be fed depends on the component of the material. Try reducing the amount of the material little by little to find the optimum amount.			
	Material			
	Adjust the amount of material so that the material passes closer to the center of the sensor. * Because the sensitivity is the lowest at the center of the sensor.			
	 Set a higher threshold (the sensitivity will drop) Make the threshold higher than the current setting. (*2) 			
	Setting a threshold higher than the recommended value may lead to a detection performance lower than those described in the specifications.			
The sensor has failed.	If above actions do not solve the problem, contact SAIKA.			

[Table 32: Troubleshooting the problem of frequent discharge damper operation]

- (*1): See Section 4.2.2 Points of Cleaning.
- (*2): See Section 3.1.1 Threshold Setting.
- (*3): Values close to the sensor voltage (white noise).



Specifications

This chapter describes the specifications for the machine.

6.1	Specifications	 6-2
6.2	Dimensions	 6-3

6.1 Specifications

Model		MHD1-15	MHD1-20	MHD1-24	MHD1-30	MHD1-40	
		MHD2-15	MHD2-20	MHD2-24	MHD2-30	MHD2-40	
		MHD4-15	MHD4-20	MHD4-24	MHD4-30	MHD4-40	
Detection	Fe	sǫ0.16 equivalent (*1)	sø0.2	sφ0.3	s¢0.4	sφ0.5	
capacity	sus	sø0.24 equivalent (*2)	sø0.3	sφ0.3	s¢0.5	sø0.6	
Sensor caliber		φ15 mm	φ20 mm	φ24 mm	φ30mm	φ42mm	
Discharge port diameter		Outer diameter	φ60.5mm				
Metal piece elimination mechanism		Solenoid-driven damper					
Operating conditions		5°C to 45°C * Without dew formation					
Power supply		100 VAC (50/60 Hz) * The voltage may be modified by request					
Materia temperat	al ture	5°C to 70°C * Without dew formation					

[Table 33: Machine specifications]

(*1): Detection capacity is valid for the ambient temperature of 15°C to 45°C.

(*2): The detection sensitivity is determined by using a test piece of the size t0.15 $\times \phi$ 0.25 (mm) and converting the result to a sphere having the same volume.

* The design and specifications of the machine may be modified without notice for the purpose of improving the product.

Metal Detector

6.2 Dimensions

▼ 1ch





Metal Detector

▼ 2ch


▼ 4ch







7

Warranty and Customer Support

7.1	Warranty Information	7-2
	•	

7.2 Inquiries & Consultations on the Product 7-2

7.1 Warranty Information

SAIKA warrants that the product will be repaired with no cost to the customer is it fails due to manufacturing defects within the period of one year from the date of acceptance (or, if there is no explicit acceptance date, the delivery date).

For repairs after the expiration of the warranty period, consult the place of purchase or SAIKA. Repairs shall be made on the customer's request for a fee provided that the product can be repaired and the proper function is deemed to be restored by the repair.

The warranty will be void and the product will not be repaired free of charge if any of the followings apply.

- Failures caused by erroneous wiring and/or erroneous operation.
- A repair and/or a modification has been done by a third party.
- The product used under improper conditions.
- Failures caused by an accident or act of God.
- Damage caused by the customer's willful negligence such as dropping the product.
- When a detection accuracy, specifications, etc. exceeding those agreed upon by the parties prior to placing the order is requested.
- If any of the repair parts is unavailable due to discontinuation of production.
- Excessive damages beyond repair.

Note that the warranty is valid only for the original purchaser and does not apply to the product transferred after the delivery.

SAIKA shall not be held liable for any damage caused by a defect in the product resulting from special circumstances, which cannot be foreseen at the time of manufacture, as well as any loss in the customer's business.

7.2 Inquiries & Consultations on the Product

Saika Technological Institute Foundation 2-1-20 Kuroda, Wakayama 640-8341 TEL 073-474-0860 FAX 073-474-0862 URL: http://www.saika.or.jp



Addendum:special specifications Such as

External output(A001)

This text is equivalent to <<External output> on page 1-11. This section describes 'Special specification(A001)'.

Use 'an Output-I/F terminal' to output signals.

■Output signals



Special specification(A001) (Side View of PLN-Frame)



Terminal	Signal	Description					
1-2	CH1 Metal Detection	Output period: 250 msec					
1-3	CH2 Metal Detection	damper starts its discharge operation.					
1-4	CH3 Metal Detection						
1-5	CH4 Metal Detection						
6	Not used						
7-8	Metal Detection (TOTAL)	 Output period: 250 msec * The output of the signal starts as soon as the discharge damper starts its discharge operation. Note) If multiple number of discharge dampers operate simultaneously, multiple signals will be output in order with a one second interval. 					
7-9	Sensor Error Detection	Output period: during the normal operation * The signal will be turned OFF if an error occurs.					
7-10	Discharge Frequency Warning (*1)	Output period: 250msec * Only for 2 and 4ch models (*1) See < <discharge frequency="" setting="">> on page 3-7.</discharge>					

[Circuit diagram]



[Output terminal specifications (1a relay)]

Type of output	Relay contact					
Max. load current	2 A per contact					
Min. switching load	2 mA, 5 VDC (for reference only)					
Initial contact resistance	100 mΩ or less					
Load voltage	250 VAC or less, 30 VDC or less					
Output circuit insulation	Mechanical insulation					
Response time	$OFF \rightarrow ON$ Approx. 10 msec $ON \rightarrow OFF$ Approx. 10 msec					

Safety Switch Option (A003)

■ It describes the Safety Switch Option.

1. Function

As a safety measure function,

While the maintenance door is open, automatically stops the operation of discharge dampers.

2 . Names and Functions

On the lower side of each maintenance door safety switch is equipped with.



[Fig. A003-1 : Safety switch installation position]

3 . Basic action

While the maintenance door is open, stops the operation of discharge dampers.

At the same time, "Warning" screen is displayed, the buzzer sounds,

and the light tower will turn on yellow light .

When a door is closed, warning is released, and all operation about this warning is cleared.



4 .Method of operation

When the ' the maintenance door Opened' warning has occurred, It is possible the following operations.



- Buzzer stops
- Back from ' warning 'screen to the control screen.
- To unlock discharge damper operation (in lock)

Please see at the Section <u>4.1 Routine Inspection</u> <u>If an optional Maintenance Door safety switch is enabled</u> the details of how to operate.

Bridge Prevention Unit (Option)

S001e

Description for Bridge Prevention Unit

1. Overview

A Option-Unit for MC/MHD that prevents and eliminates clogging due to material bridges in the Upper Hopper

2. Specifications

The Motor is driven to swing the Stirring Plate through the Link.

(The swing width changes with the sensor aperture.)

3. Equipment Outline



4. Basic action

The rocking of the stirring plate starts at the same time with the power ON. It is always moving while driving.

Recommended set value

Motor rotation speed : 300rpm (As Shipped)

% Refer to Operation Manuals of Motor (7. Appendix), for how to change the set value.

5. Maintenance

Check and clean it regularly.

•For basic method, check the following.

User's Manual / MC series : **3. Maintenance** User's Manual / MHD series : **4. Maintenance**

User's Mariuar / MITD series : 4. Mariteria

About this Unit,

Check ... Check visually whether the stirring plate is moving.

Clean ... (When the Power is off)

With a vacuum cleaner or an air blow, remove materials adhering to the stirring plate and other parts (in the vicinity of the plate).



Caution

Do not insert your finger or a stick on the moving part while driving. It may cause injury.

6. Dimensions

*See the Page3-5.

7. Appendix

 Speed Control Motor and Controller Package US2Series (Oriental Motor) Operation Manuals / Quick start guide ▼1ch



*1:Holes for setting protector unit *2: Dimensions in () are for Sensor ID= φ 30,42 type of MHD.



▼2ch



Note1: The Unit type to be attached differs depending on the sensor





*2: Dimensions in () are for Sensor ID= φ 40 type.

|--|

Management system

This document explains the management system.

1	Overview of management system	1
2	Starting/exiting the system	2
3	State display screen	3
4	Material master maintenance	4
5	Changing materials	6
6	Detection record	7
7	Error record	9
8	Clearing detection count	10
9	Machine unit information	11
10	Chart (graph)	12
11	System specifications	19
12	Folder structure	20

Notice:

The screens used in this document are under development, and therefore they may be partially different from ones used in the actual products.

Note that the contents herein are subject to change without notice for some purposes such as upgrading.

1 Overview of management system

1.1 Overview

The management system is used for managing and operating METARIDDERMHD/MEDseriesof products via network.

The management system allows you to check the operating status of METARIDDER,

manage/configure materials (detection threshold), view the detection records, cleardetection count (set to zero), and display various charts (graphs).

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2 Starting/exiting the system

2.1 Starting the system

1. Double click the [管理システム][Management system] icon on the desktop.



2. The system launches.

2.2 Exiting the system

1. Click the [終了] [Exit] button on the state display screen of the management system.

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2. The dialog box appears prompting you to confirm the operation. Click the [OK] button.

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<<Note>>

Clicking X mark at the upper-right corner of the window does notexit the system.

3 State display screen

3.1 State display

In this screen the state of connected METARIDDER is displayed. The displayed information is updated periodically.

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[Remarks]

The displays for sensor voltage and sensor temperature arerenewed each time the information is updated on theMETARIDDERunit.

<u>検出能力</u>-Detection capacity

The "detection capacity" is an estimated value for the size of detectable metal particles which is calculated from the sensor caliber and detection threshold.

This value may be different from one actually detected because it is only an estimated value. This value should therefore be considered as a rough indicator for setting the threshold.

Metal Detector METARIDDER

4 Material master maintenance

4.1 Material master maintenance

To maintainthe material master:

1. Click the [材料マスター][Material master] button on the state display screen.

A STATE								
1781738-	thotage	4±20	21-00	94807/P	NONE	29-1	1.6	Ť.

2. The material master screen appears.

1995年世界システム おおこフターメンチナッフ					- o x
		18.30	100	ange	C HENR
title 4 U a 2	##E 3			₹-F 4 #	T.IE.F (5 .3. 1811
1 @ PC				1.5-5	0 50

- Material number ① The management number for materials. Any number from 1 to 32767 can be specified.
- Enabled ② Indicates whether this material can be selected or not in the material change screen. (Only "Enabled" material can be selected.)
- Material name ③ The name of material
- Mode ④ Sensor mode (The carbon gain mode function can be selected, if available.)
- Display order 5 The display order for showing the material list In the list the materials are displayed in ascending order of the numeric values.
- Threshold x 6 The detection threshold for the material Set this value for each machine.

4.2 Addinga material

To add a material, enter the number and name for the material to be added and then enter the threshold for each machine.

- 1. Click the <u>[追加]</u> [Add] button.
- 2. Enter the material number, material name, and sensor mode, and then click the [OK] button.



3. The material is added to the list. At this point the threshold value for each machine is set to 1000.

材料算者	有劲	HELE.	モード 表示網络	£	LOWELMOL
1	ie.	PC	1-76	0	500
2	98	105	1-76	0	1000

4. Double click the cell at theintersection point of the threshold column and the material row to make it editable andenter a threshold value. After that, press the [Enter] key to exit edit mode.



5. Click the [編集確定] [Confirm edit] button to confirm the edited value.Return to the state display screen.

				追加	400		18.912	14	系统里
材料番号	有油		初料者			E-F	表示顺序	1.8	IOM CRIVE
1	E.	PC				-74		0	500
2	-141	PPS			1	-72		ū.	555

4.3 Changing material information

To change the material information:

- 1. Click the [材料マスター] [Material master] on the state display screen to go to the material master maintenance screen.
- 2. Edit the item(s) you want to change in the list. The material number cannot be changed.

材料番号	有助	titie	E.F	表示频率 心色以進下M01
ï	141	ポリカーボネート	1-71-	0 500
2		PPS .	1-74	0 555

- Toggle between "Enabled" and "Disabled" by clicking the checkbox.
- To enter data in the material name column, first double-click the cell to make it available for data entry.
- To select a mode, first click the cell to display the combo box.
- To enter data in the display order or threshold columns, first double-click the corresponding cell to make it available for data entry.
- 3. To confirm an entry in the cell, press the [Enter] key.
- 4. After you have entered all the necessary information, click the [編集確定] [Confirm edit] button. The editsare confirmed andyou return to the state display screen.
- 5. To cancel the change, click the [編集破棄] [Cancel edit] button to return to the state display screen.

Note

When a cell is in entry mode, you cannot click the [編集確定] [Confirm edit] button. First exit entry mode of the cell.

Clicking the [編集確定] [Confirm edit] button confirms edits for all the materials.

Metal Detector METARIDDER

5 Changing materials

5.1 Changing materials

To change materials for the METARIDDER:

1. In the state display screen, click the [材料切り替え] [Change material] button to display the material change screen.

(1) 4905-10年5254.							-		-26
RM1338-	THE PAR	9228	25-258	\$±8.7077	NONE	21-1		87	

2. Enter the information to be used "after the change."

														10.00
****	***	-		2+# \$	 E-1	ERSE Lave	9587	0124	1946	0+124	State .	±-)	5.992 1.11-2	9487
i.	see:	8	1.95	180905	3-16	500 B	e 64 505 64	14	ins -	100310		1-93;	555	0434504

- Select the checkbox for the machine whose material will be changed, and enter the information to be used "after the change."
- Enter the material number or select the material name.
- Enter the lot number (numeric value) to be applied "after the change." The current lot number is used by default.
- When using the automatic threshold adjustmentfunction, select the 「自動」「Auto」 checkbox (depending on the machine options).
- Enter a threshold value. When the material number or name was changed, the corresponding threshold value is retrieved from the material master. This value can be retained or changed.
- 3. After entering the target machine and "after-the-change" value(s), click the [切り替え] [Change] button.

A material change request is sent to the METARIDDER and the material is changed. After a while the information on the state display screen will be updated.

6 Detection record

6.1 Detection record

To view the detection record that meets the conditions you set:

1. Click the [検出記録] [Detection record] button on the state display screen to display the detection record screen.

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ET 11 1 1.1.1 -	1011010	water	21-258	94387917	NONE	24-1	87	

2. Enter the display conditions.

	2018/03/04	+ 0.0000 2 76	2018/03/05	+ 13:59:59	#0.	
2	- #5		1.50.50.000	404-505-56		
			3		9895	
4	1	#6		J		

- Specify the display date/time① range. You can viewdata for up to 400 days. These fields are required (must not be blank).
- You can specify a machine range②. The default value is either the lowest machine number (1) or the highest machine number.
- You can specify the material③.Enter the material number or select the material name.
- You can enter a lot number range④.
- Clicking the [リセット] [Reset] button resets the conditions to the initial values.
- 3. Click the [表示] [Display] button,to display the list of the detection records that meet the conditions you have just set.

〒- ク約 6									7	7 印出办
846	根体奏号	相体者	CH	相相義王	材料街	미카호문	-F-F	Laure	電圧	112サー港東
2018/03/05 1034:00	1	MOT	1	1.8	E-1	18030501	1-711	1000	1121	23.0
2018/03/05 10:34:30		M01	. 4	1.0	6	18030501	1-714	1000	1203	23.0
2010/03/05 10:25:00	1	MOL	1	1.9	£1.	18080501	1-74	1000	1100	22.0

<<Note>>

It may take some time before the data is displayed depending on the total amount of data and/or conditions you set.

6.2 File output

To save the displayed result as a tab-delimited text file:

- 1. Display a detection result list as described in the previous section.
- 2. Click the [ファイル出力] [File output] button.

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2018/03/05 10 34:00	1	MOT	1	1 PC		18030501	1-711	1000	1121	23.0
2018/03/05 10:34:30		M01	. 1	1.90		18030501	1-716	1000	1203	23.1
2010/03/05 10:25:00	1	MIL	1	1 PC		10000501	1-714	1000	1109	22.0

3. The 「<u>名前を付けて保存</u>」「Save as」 dialogue box appears. Specify the file/folder name to which you save the result, and click the 「<u>保存</u>」「Save」 button.

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a rc *	65	8828	6.0	913	
10 +75 +0% 10 +75 +0% 10 +75 +07 10 +75 +77 10 +75 +77 10 +75 +77 10 +75 +77 10 +75 +75 10 +75 +75 +75 10 +75 +75 +75	SQ, Sahar Manapersent Shulle Yound Sactor 2015	2018/02/02 1971 2018/02/09 19 10	1142.348- 1143.3489-		
79154.00	STATISTICS				
Second States	NORCE CHIN				
- 245F-6885			823	401	4

7 Error record

7.1 Error record

To view the error record(s) that meets the conditions you set:

1. Click the [エラー記録] [Error record] button on the state display screen to display the error record screen.

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TRITAT- UNUIGN MADE 25-28 MARCHIF MONE 51-1	817	21-1	NONE	948.777	21-218	14±230	REAL PROPERTY	THITSI-

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1	2018/03/04	10.00.00	* #6 2018/03/05	* 23.59.50		
2	±	-			10 mil	
3	11 I I I I I I I I I I I I I I I I I I		+ #6			

- Specify the display date/time① range. You can view data for up to 400 days.These fieldsare required (must not be blank).
- You can specify a machine range②. The default value is either the lowest machine number (1) or the highest machine number.
- You can specify an error number range③.
- Clicking the [リセット] [Reset] button resets the conditions to the initial values.
- 3. Click the [表示] [Display] button,to display the list of the detection records that meet the conditions you have just set.

チータロー					
84	级体袋号	编件名	10-#4	12-内容	
2018/05/05 17:00:00	1	MD1	15 SDカード アクセスエラー		

<<Note>>

2.

It may take some time before the data is displayed depending on the total amount of data and/or conditions you set.

[Remarks]

Error cannot be cleared in the management system. To clear the error, use the METARIDDERunit.

8 Clearing detection count

8.1 Clearing detection count

To clear(set to 0 (zero)) the detection count:

1. Click the <u>[検出数]</u> [Detection count] button in the state display screen to display the detection countclear screen.

(1) 約15年世界225年。 秋期素示	an						-	П	×
1761331-	10000ge	4228	21-258	9:387917	NOW	24-1		йт:	

2. Select the machine unit and CH whose detection count you want to clear.

検出載クリア			
			Re
対象		our	
1014	dived		
CH	11 11	0 trok	

- In the machine body field, select a machine unit whose detection count you want to clear. If you select 「すべて」「All」, the detection count for all the machine units will be cleared.
- When selecting a machine unit, you can select a CH (or all the CHs). If you select the all CHs, the detection count for all the CHs will be cleared.
 If you specify no machine unit, you cannot select CH.
- Clicking the [リセット] [Reset] button resets the conditions to the initial value.
- 3. Click the [クリア] [Clear] button. The detection count clear request is sent to the METARIDDER unit and the detection count is cleared. After a while the detection count becomes zero (0) on the state display screen.

9 Machine unit information

9.1 Machine unit information

To view the information for the METARIDDER unit:

1. Click the [機体情報] [Machine information] button on the state display screen to display the machine information screen.

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174137.8-	1000191	9220	25-858	9:38:977	NONE	29-1		87	

2. In this screen you can view the machine information.

缝件情報												
											陳音	
											AP-01-00	
被体备号	瞬停.6	19415	OH	日在	9976番号	PLC/-5/57	タッチャパージョン	ANAXAN	オーボンゲインモード	THUX	PLCIHA	#1-1×
1	MDL	MHD	1	24	20180305	20180305	20180905	φL.	4L	192,168,1,250	¥85	8500

9.2 Clock setting

To set the clock on the METARIDDER unit:

- 1. Click the [機体情報] [Machine information] button on the state display screen to display the machine information screen.
- 2. Select a machine unit whose clock you want to set.
- 3. Click the [時計設定] [Clock setting] button.The time setting information is sent to the METARRINDER unit and the clock will be updated.



10 Chart (graph)

10.1 Chart menu

2.

To display various chart screens, use the chart menu.

1. Click the $[\underline{\mathcal{F} \mathbf{v} - \mathbf{b}}]$ [Chart] button on the state display screen.

「「「「「「「「「」」」」							- u .x
EN121-	1001091	WE20	19-29	948.977	NOWE	59-1	M.7
he chart r	menu appe	ars.					
			検出	状況チャート			
			センサ	状態チャート			
				115			
		1		altite L			
			JA (90.983 V-1-			
		10					
			検出	車圧チャート			
		- 13		- E A			

10.2 Detection state chart

This chart shows the metal particle detection state per a unit time.

- 1. Click the [検出状況チャート] [Detection state chart] button from the chart menu to display the detection state chart screen.
- 2. Enter the display conditions.

開始日時	\mathbb{O}	2018/03	205		- 7	0:00:00	1
100	2	30.0	- 1				
R15	3	\$150	Ť				
H.	4		Ψ.	#6		+	

Γ	表示	٦
	URVE	

- Start date/time① The detection count is displayed for each interval after this date/time.
- Interval② Specify the time interval. The number of detections will be counted in this interval.
- Machine body③ Select a machine unit (or all machine units) whose data you want to view.
- CH④ Select a CH (or CHs) whose data you want to view. If you select all the machine units, CH is not selectable.
- Clicking the [リセット] [Reset] button resets the display conditions to the default values.
- 3. Click the [表示] [Display] button to display the chart.

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22.22	30 🕀 👘				
酸体	7%T +				リセット
сн.	⇒ ±6				10.25833//
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60 - 50 - 40 - 30 - 20 -		1四時間名2.9018日間 2018/03/05 00000 69 24	0 - 2018/03/06 053000 8	乾減 30分	

<<Note>>

It may take a long time before the chart is displayed depending on the total amount of data and/or conditions you set.

10.3 Sensor state chart

This chart presents a time-series sensor state data.

- 1. Click the [検出状況チャート] [Detection state chart] button from the chart menu to display the detection state chart screen.
- 2. Enter the display conditions.



- Date/time ① Specify the date/time range for which data is displayed. You can display data for up to 70 days.
- Machine body ② Specify the machine unit whose data you want to view. This field is required (must not be blank).
- CH Specify the CH whose data you want to view. This field is required (must not be blank).
- Clicking the [リセット] [Reset] button resets the display conditions to the default values.
- 3. Click the [表示] [Display] button, to display the chart.

•	2018/03/05	- 0.00.00 +	#5 2018/03/05	+ 23.59.59	A X	1100	
	1 M01 +					Ver	63 Ü
	CH 1	A			11.07.00	-	
4000		- アメリー式感 強臣 13	NO 5-10 1 240 A/10/102	umucoso - 2010/03/03	2.1039-024		[⁹⁰
3500							-45
5000							35
2500							30
2000-							25 -1.30
1500							-20 · 株出
1000							15 - 221
300			1.1.1.1.1				s
G da/05 10-2	5 03,05 19-40	03/05 10:45	03/05 10:50	03/05 10:55	00/05 11:00	03/08 11:05	-0
1911	the second second	Concernance and the	Contraction of the	And all the second second	- 0.00000000000		

 Hovering the mouse cursor over a detection voltage marker (green filled circle) displays the detailed information.



<<Note>>

It may take some time before the chart is displayed depending on the total amount of data and/or conditions you set.

When a large amount of data should be displayed, the scroll bars for X and Y axes are not displayed.

10.4 Test record chart

To display the test result completed on the METARIDDERunit:

(For details on the tests, refer to the operating manual for the METARIDDERunit)

- 1. Click the [テスト記録チャート] [Test record chart] button from the chart menu to display the test record chart screen.
- 2. Enter the display conditions.

表示条件		
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сн	CHI1	+

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9	tv⊁		

- Time period ① Specify a time period for which the record is displayed.
- Machine body² Specify the machine unit whose data you want to view. This field isrequired (must not be blank).
- CH Specify the CH whose data you want to view. This field isrequired (must not be blank).
- Clicking the [リセット] [Reset] button resets the display conditions to the default values.
- 3. Click the [表示] [Display] button, to display the chart.



• Hovering the mouse cursor over each bar in the chart displays the detailed information.



<<Note>>

It may take some time before the chart is displayed depending on the total amount of data and/or conditions you set.

10.5 Detection voltage chart

This chart shows the frequency for each detection voltage within the specified period. To display the test result completed on the METARIDDERunit:

(For details on the test operation, refer to the operating manual for the METARIDDERunit.)

- 1. Click the [検出電圧チャート] [Detection voltage chart] button from the chart menu to display the detection voltage chart screen.
- 2. Enter the display conditions.



- Date/time ① Specify the date/time range for which the data will be displayed. You can display data for up to 400 days.
- Start voltage ② Specify the start value (lower limit) for the voltage to be displayed.
- Interval ③ Specify a voltage interval. The detected frequencies are displayed in this interval, with the Start voltage set as the lower limit.
- Machine body Specify the machine unit whose data you want to view. This field is required (must not be blank).
- CH Specify the CH whose data you want to view. This field is required (must not be blank).



• Hovering the mouse cursor over each bar in the chart displays the detailed information.



<<Note>>

It may take some time before the chart is displayed depending on the total amount of data and/or conditions you set.

11 System specifications

11.1 System specifications

The following table shows the system specifications.

Operating system (OS)	Microsoft Windows 10 Pro 64-bit
Database system	Microsoft SQL Server 2017 Express
Database max. size	10GB (due to the limitation of Express edition)
Display resolution	1366 × 768

11.2 Cautions/limitations

- Once the database size exceeds 10 GB, <u>the system stops</u>.
 (Significantly depending on the total number of CHs and data storage frequency, we assume that data for more than 10 years can be recorded when normally operating a 4CH machine.)
- If you save a large volume of data, it may take some time to complete an operation such as displaying a new screen.

Even if this is the case, the process continues, although the system seems to be hung up (frozen up). Wait for a while.

The start time of the processing appears in the status display area at the bottom-left corner of the screen.

Also the current date/time display at the bottom-right corner of the screen is not updated during the processing.

Note that once the display processing starts it cannot be stopped.

データ意味中間始:11:3153

パージョン 0.84.0(0) 現在日時 2018/03/06 1131:52

• When continuously operating for a long time, such as more than one week, the entire system may become unstable.

Restart your PC periodically.

• The management system directly or indirectly depends on Windows OS, database system and its related software, and various component package software.

The specifications, malfunction, or others of these software items may cause the malfunction of the management system functions.

Please understand these scenarios beforehand.

12 Folder structure

This section provides the folder structure related to the management system.

C:¥Meta2018	
¥Database	Meta.mdf,Meta_log.ldf database file is placed here.
¥Log	
¥2018	
	¥03 The log for March in 2018 is stored here.
	¥04 The log for April in 2018is stored here (and so on).
¥MetaManage	The program and related files for the management system are placed here.
¥MataTools	Variousmaintenance tools are placed here.