VACUUM SOLUTIONS

GABA

High Performance Heat & Wet Type
Gas Abatement System
ATW 100 A

Instruction Manual

CE

0870732292 | A0001_en-US | Original instructions

7/17/2024

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1 About this manual

This document contains the company’s technology and intellectual data. unauthorized use such as copying and transfer without permission from the company is strictly prohibited.

GABA ATW 100 A User Manual	
Amendment Date	March 10, 2023
Standard Model Item Name	GABA ATW 100 A
Standard Model Item Code	1208-A001-02
Manufacturer	MAT Plus Co., Ltd.
Address	31-22, Mansudong-gil, Gongdo-eup, Anseong-si, Gyeonggi-do, Republic of Korea
Telephone	+82 (031) 659-0600
Homepage	www.buschvacuum.com

2 Before Use

2.1 Product

- The product GABA ATW 100 A is an abatement technology by MAT PLUS Co., Ltd. The original designation of this product is MAT1208BWA.
- The product is applied with the latest technology to achieve users' safety, high process efficiency, and energy efficiency.
- This product. as a product for industrial use, is an air pollution controlling device for reducing harmful gases and particles from industrial exhausts.
- The front part of this product is designed to be connected to the exhaust pipe of the source of harmful gases.
- The rear end of this product is connected to the vacuum system and it is designed for the internal product to be operated with negative pressure.
- Users must be fully acquainted with operation and management before using the product.
- This product must be operated only by trained personnel.
- A password must be set on the product system so that only designated personnel can access the system.
- If the product is not operating normally, refer to this user manual and solve the problem. When the problem cannot be resolved, please contact the manufacturer or the seller.
- If abnormal situations or problems occur during product operation, immediately stop operation and contact the manufacturer or the seller.

2.2 User Manual

- Read this user manual before use and use the product safely and appropriately.
- Users must be well acquainted with and observe the risk factors and safety matters entered in this user manual.
- This user manual explains the safety, installation, operation, problem solving, maintenance methods, option items, and technical data of the product in detail.
- This user manual includes advanced operation procedures authorized only to trained personnel.
- This user manual explains based on the basic set values of the product.
- This user manual may not correspond to the users' product environment.
- Some items, device, and software from the content of this user manual may not be provided or may be changed by derivative products according to the manufacture's policy.
- The contents of this user manual may be partially changed without notice to the user. For the latest version of the use manual, contact the manufacturer or the seller.
- Do not operate the product in any way other than the method specified in this user manual.
- MAT PLUS Co., Ltd. or the seller is not responsible for the accidents or malfunctions occurred resulting from not observing the instructions in this user manual.

2.3 Copyright

2.4 Authentication

- This product is a product that corresponds to the following standards, guidelines, and regulations.

Items	Report NO.	Issued Date	Authentication Test Institution
CE	50090544 001	2017. 7. 20	TÜV Rheinland
EMC	50090015 001		

Table 1.1 Authentication Status

2.5 Terms

The terms used in this user manual include “Warning”, “Caution”, and “Notice”.

WARNING

It is used when indicating warning matters that can cause severe damages if not paid attention to.

CAUTION

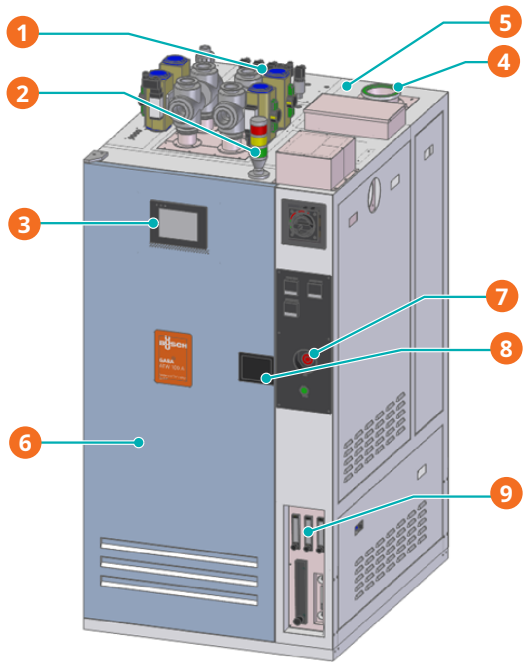
It is used when indicating matters to be attended to use properly.

NOTICE

It is used when providing additional information such as reference matters that are good to know and useful functions.

2.6 Product Description

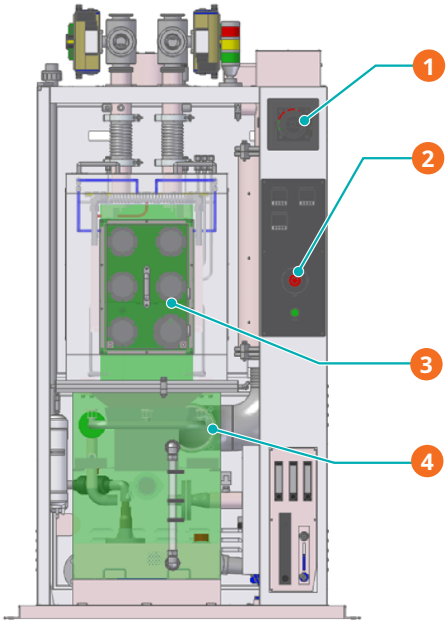
Product Front



Description			
1	Cabinet Exhaust	2	Tower Lamp
3	Touch Screen	4	Utility Inlets
5	Gas Outlets	6	Label Right
7	Emergency Switch	8	Cabinet Door Handle
9	Flowmeter		

Fig 1.1 Name of Product Front

Internal Product



Description			
1	Main Power Breaker	2	Emergency Machine Off
3	Heat Chamber	4	Circulation Tank

Fig 1.2 Name of the Internal Product

3 Related to Safety

3.1 Safety Equipment

WARNING

Wearing inappropriate safety equipment or not wearing any may cause fatal damages to the body.

Symbol	Meaning of the Symbol
 Safety Gloves	You must wear safety gloves in areas indicated with this symbol. Wear safety gloves appropriate to the work.
 Safety Helmet	You must wear a safety helmet in areas indicated with this symbol. A safety helmet must be able to protect the whole head. Wear a safety helmet appropriate to the work.
 Facial Protection	You must wear a facial protection in areas indicated with this symbol. It must be compatible with other protection equipment worn. Wear a facial protection appropriate to the work.
 Safety Glasses	You must wear safety glasses in areas indicated with this symbol. Safety glasses must be able to protect the side of the eyes. Wear safety glasses appropriate to the work.
 Gas Mask	You must wear a gas mask in areas indicated with this symbol. Wear a certified gas mask to protect the respiratory system. Wear a gas mask appropriate to the work.
 Safety Clothing	You must wear a safety clothing in areas indicated with this symbol. It must be able to protect the entire skin. Wear a safety clothing appropriate to the work.
 Safety Shoes	You must wear safety shoes in areas indicated with this symbol. The ankles must not be exposed when wearing together with the safety clothing. Wear safety shoes appropriate to the work.

Table 2.1 Safety Equipment

3.2 Risk Factors

WARNING

Be sure to work after wearing appropriate protective equipment when implementing any work attached with a hazard label. If it is not observed, it may cause fatal damages to the body.

<table>
<tr><th>Risk Label</th><th colspan="2">Meaning of the Symbol</th></tr>
<tr><td rowspan="2"> 
High Temperature Warning</td><td colspan="2">- You may get burned when contacted.</td></tr>
<tr><td>Protective Equipment</td><td> 
Wear safety glasses, heat-resistant gloves, safety shoes, and a facial mask.</td></tr>
<tr><td rowspan="2"> 
Danger Electric Shock</td><td colspan="2">- You may be electrocuted when contacted or approached.
- There may be fire and additional damages due to electric leakage, short circuit, etc.</td></tr>
<tr><td>Protective Equipment</td><td> 
Wear safety glasses, insulating gloves, and safety shoes.</td></tr>
<tr><td rowspan="2"> 
Warning Hazardous Substance</td><td colspan="2">- Fire may occur due to combustible substances.
- It is used when there is combustible substance or spontaneous combustion substance inside.
- There may be additional damages such as burn and generation of noxious gases due to fire.</td></tr>
<tr><td>Protective Equipment</td><td> 
Wear safety glasses, heat-resistant gloves, safety shoes, facial protection, gas mask, and heat resistant clothing.</td></tr>
</table>

Risk Label	Meaning of the Symbol	
 Warning Corrosive Substance	- There is danger of corrosion due to corrosive substances. - Even a low level of corrosive substance may irritate the eyes and the respiratory system. - In case of high level of concentration, there is risk of injury or death.	
	Protective Equipment	 Wear safety glasses, chemical-resistant gloves, safety shoes, facial protection, gas mask, and chemical resistant clothing.
 Noxious Gas Exposure	- Substances such as harmful dust, vapor, and gas may occur and damage the respiratory system.	
	Protective Equipment	 Wear safety glasses, safety gloves, safety shoes, and gas mask.

Table 2.2 Risk Label and Protective Equipment

3.3 Safety Label

- Safety labels are attached as follows.
- Additional labels or other labels may be attached according to the area.

Internal Cabinet

Heating Chamber Surface

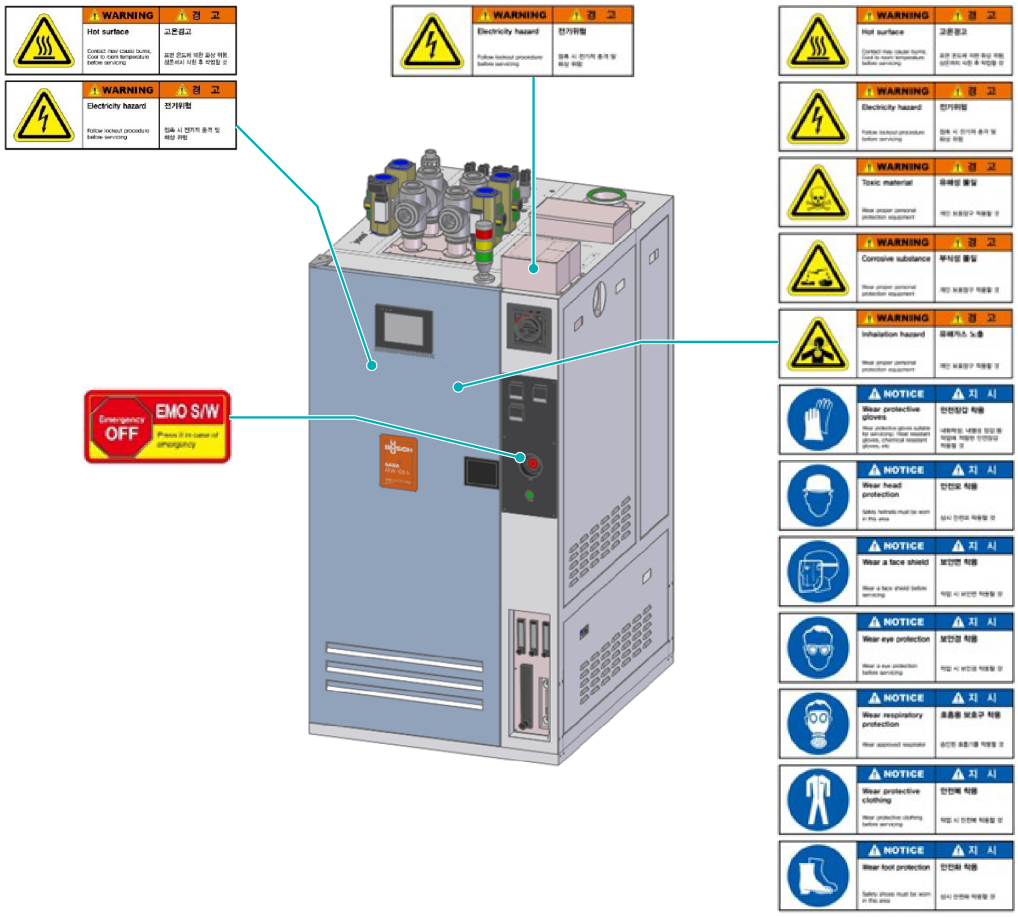


Fig 2.1 Safety Label Location

3.4 Precautions

Temperature - during Normal Operation

WARNING

This product retains high temperature during normal operation. It may cause burn to the body of the users when contacted.

- Heating Chamber Module which is the heated part is located inside the cabinet and the cabinet is made to be opened only by the personnel possessing the cabinet key.
- This product retains high temperature for a certain period of time even after the operation is stopped.
- Do not touch the cartridge module, the surrounding parts of the cartridge module, and gas pipes during normal operation or immediately after the operation is stopped.

Temperature – during Maintenance

CAUTION

If inspection, maintenance, and repair work are necessary, please observe the following directions to prevent danger.

- Please wait until the cartridge temperature cools down to room temperature by converting to cooling mode.
- Shutdown the power after confirming that the temperature has fully dropped through the product system.
- Implement work after the heated part and the surroundings are fully cooled.
- Implement work after wearing appropriate protective equipment.

Pressure - during normal operation

WARNING

This product uses the utilities such as water, nitrogen gas, and compressed dry air with high pressure. When inappropriate operation method is used, the user's body may be exposed to high pressured gas.

- The utilities used in this product are flown with high pressure at the supply part, exhaust part, pipes, and component connection part.
- Do not arbitrarily disassemble the parts flowing with utilities during normal operation.
- This product must be used in negative pressure condition.

Pressure – during Maintenance

CAUTION

If inspection, maintenance, and repair work are necessary, please observe the following directions to prevent danger.

- The utility lines may retain remnant pressure even after the valve is closed or after the suspension of operation.
- When disassembling the utility pipes and parts, open the connection part very slowly before complete disassembly and gradually remove the remnant pressure.
- Disassemble completely after the remnant pressure is all relieved.
- Work after wearing appropriate protective equipment.

Electricity – during Normal Operation

WARNING

This product uses 200-240VAC power according to the facility equipment. It may cause electric shock and burn to the user's body.

- Do not touch the power part when the product is in normal operation.
- Do not arbitrarily disassembly the power part when the product is in normal operation.

Electricity – during Maintenance

CAUTION

If inspection, maintenance, and repair work are necessary, please observe the following directions to prevent danger.

- Do not implement inspection, maintenance, and repair without shutting down the power.
- Work after wearing appropriate protective equipment.

Gas – during Normal Operation

WARNING

This product may flow harmful gases according to the installed environment. Users may be exposed to harmful gases.

- Before suspending the operation, inform the person interested such as product users and facility managers of operation suspension and the reasons for operation suspension.
- Do not arbitrarily disassemble the pipes flowing with gases during normal operation.
- Do not disassemble parts in the area existing with gases during normal operation.

Gas – during Maintenance

CAUTION

If inspection, maintenance, and repair work are necessary, please observe the following directions to prevent danger.

- Before suspending operation, stop the process facility connected to the front end of this product.
- Before suspending operation, shutdown the supply of harmful gases.
- Do not operate the front-end process facility or supply harmful gases during inspection, maintenance, and repair work.
- Work after wearing appropriate protective equipment.

NOTICE

When the product is in normal operation, users are not exposed to harmful gases.

- This product is designed so that the internal product is operated under negative pressure as it is connected together to a vacuum system.
- It is not exposed to harmful gases during normal operation.
- During abnormal situation, interlock is operated and it protects the users from risk factors.

Contaminant – during Normal Operation

WARNING

This product is designed so that the internal product is operated under negative pressure as it is connected together to a vacuum system.

It is not exposed to harmful gases during normal operation.

During abnormal situation, interlock is operated and it protects the users from risk factors.

- Do not arbitrarily disassemble the parts during normal operation.
- Leakage of gases and waste water may cause fatal damages to the body.

Contaminant – during Maintenance

CAUTION

If inspection, maintenance, and repair work are necessary, please observe the following directions to prevent danger.

- The facility manager of the facility installed with this product must process and discharge contaminants produced by this product in accordance with laws and regulations.
- Discharge of contaminants generated during inspection, maintenance, and repair work must be handles in accordance with the regulations of the installed facility.
- Work after wearing appropriate protective equipment.

Noise, Vibration

NOTICE

This product does not generate noise over 70dB. This product is designed to satisfy the vibration standards of each device.

3.5 Interlock

NOTICE

This product operates the interlock if abnormal operation is detected. It protects the user's safety through operation of interlock.

- It explains only EMO, Water Leak related to Emergency.
  - EMO
    If you press the Emergency Off button, the Main MC connected to the Safety relay unit is opened and all the power is shut off.

- Water leak
  If a leak is detected, an alarm will set off.

- If the product detects abnormal status during normal operation, the following interlocks are operated.

Fig 2.2 Interlock Operation Method

Interlock no: 1		
Interlock Name / Alarm	[Alarm] Heater temp low	
Alarm	600 – 800°C	
Delay time	None	
Alarm point	Low	n/a
	High	800°C
PNID Tag Number	Heater	n/a
	Supply Water	Close
	Burning air	Close
	Sleeve air	Close
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 2		
Interlock Name / Alarm	[Alarm] Heater Temp High	
Alarm	600 – 800°C	
Delay time	None	
Alarm point	Low	600°C
	High	n/a
PNID Tag Number	Heater	OFF
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 3		
Interlock Name / Alarm	[Alarm] Chamber Temp High	
Alarm	800°C	
Delay time	None	
Alarm point	Low	n/a
	High	800°C

Interlock no: 3		
PNID Tag Number	Heater	OFF
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 6		
Interlock Name / Alarm	[Alarm] Exhaust Temp High	
Alarm	50°C ↑	
Delay time	None	
Alarm point	Low	n/a
	High	50°C
PNID Tag Number	Heater	OFF
	Supply Water	n/a
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	CLOSE
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 7		
Interlock Name / Alarm	[Alarm] Exhaust Temp High	
Alarm	50 mBar	
Delay time	5 s	
Alarm point	Low	50 mBar
	High	n/a
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 8		
Interlock Name / Alarm	[Alarm] Supply Water Flow Error	
Alarm	50 mBar	
Delay time	20 s	
Alarm point	Low	50 mBar
	High	n/a

Interlock no: 8		
PNID Tag Number	Heater	OFF
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 9		
Interlock Name / Alarm	[Alarm] Circulation Water Flow Error	
Alarm	20 KpA	
Delay time	20 s	
Alarm point	Low	20 KpA
	High	n/a
PNID Tag Number	Heater	OFF
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 10		
Interlock Name / Alarm	[Alarm] Wet Chamber Level Low Error	
Alarm	Water level variation	
Delay time	30 s	
Alarm point	Low	200 mm
	High	n/a
PNID Tag Number	Heater	OFF
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	CLOSE
	Cleaning air	n/a
	Circulation pump	OFF
	Drain pump	n/a
Signal tower	RED	

Interlock no: 11		
Interlock Name / Alarm	[Alarm] Wet Chamber Level High Error	
Alarm	Water level variation	
Delay time	30 s	
Alarm point	Low	360 mm
	High	n/a

Interlock no: 11		
PNID Tag Number	Heater	OFF
	Supply Water	CLOSE
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	CLOSE
	Circulation pump	OFF
	Drain pump	n/a
Signal tower	RED	

Interlock no: 12		
Interlock Name / Alarm	[Alarm] Wet Chamber Level H-high Error	
Alarm	Water level variation	
Delay time	1 s	
Alarm point	Low	400 mm
	High	n/a
PNID Tag Number	Heater	OFF
	Supply Water	CLOSE
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	n/a
	Circulation pump	OFF
	Drain pump	n/a
Signal tower	RED	

Interlock no: 13		
Interlock Name / Alarm	[Alarm] Water Leak	
Alarm	Detection	
Delay time	1 s	
Alarm point	Low	n/a
	High	n/a
PNID Tag Number	Heater	OFF
	Supply Water	CLOSE
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	OFF
	Drain pump	n/a
Signal tower	RED	

Interlock no: 23		
Interlock Name / Alarm	[Alarm] Inlet#1 Pressure Error	
Alarm	1 mm H2O ↑	
Delay time	10 s	
Alarm point	Low	n/a
	High	1 mm H2O

Interlock no: 23		
PNID Tag Number	Heater	OFF
	Supply Water	CLOSE
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	CLOSE
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 24		
Interlock Name / Alarm	[Alarm] Inlet#2 Pressure Error	
Alarm	1 mm H2O ↑	
Delay time	10 s	
Alarm point	Low	n/a
	High	1 mm H2O
PNID Tag Number	Heater	OFF
	Supply Water	CLOSE
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	CLOSE
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 25		
Interlock Name / Alarm	[Alarm] Inlet#3 Pressure Error	
Alarm	1 mm H2O ↑	
Delay time	10 s	
Alarm point	Low	n/a
	High	1 mm H2O
PNID Tag Number	Heater	OFF
	Supply Water	CLOSE
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	CLOSE
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 26		
Interlock Name / Alarm	[Alarm] Inlet#4 Pressure Error	
Alarm	1 mm H2O ↑	
Delay time	10 s	
Alarm point	Low	n/a
	High	1 mm H2O

Interlock no: 26		
PNID Tag Number	Heater	OFF
	Supply Water	CLOSE
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	CLOSE
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 27		
Interlock Name / Alarm	[Alarm] Exhaust Pressure Error	
Alarm	1 mm H2O ↑	
Delay time	10 s	
Alarm point	Low	n/a
	High	1 mm H2O
PNID Tag Number	Heater	OFF
	Supply Water	n/a
	Burning air	CLOSE
	Sleeve air	CLOSE
	Cleaning air	CLOSE
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	RED	

Interlock no: 38		
Interlock Name / Alarm	[Warning] Water Leak Sensor Open Error	
Alarm	Electrical disconnection	
Delay time	5 s	
Alarm point	Low	Electrical disconnection
	High	n/a
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	WARNING	

Interlock no: 42		
Interlock Name / Alarm	[Warning] Pump#1 Error	
Alarm	n/a	
Delay time	10 s	
Alarm point	Low	n/a
	High	n/a

Interlock no: 42		
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	WARNING	

Interlock no: 43		
Interlock Name / Alarm	[Warning] Wet Chamber Sensor Error	
Alarm	n/a	
Delay time	5 s	
Alarm point	Low	n/a
	High	n/a
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	WARNING	

Interlock no: 44		
Interlock Name / Alarm	[Warning] By-pass Open Error	
Alarm	n/a	
Delay time	5 s	
Alarm point	Low	n/a
	High	n/a
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	WARNING	

Interlock no: 45		
Interlock Name / Alarm	[Warning] By-pass Close Error	
Alarm	n/a	
Delay time	5 s	
Alarm point	Low	n/a
	High	n/a

Interlock no: 45		
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	WARNING	

Interlock no: 46		
Interlock Name / Alarm	[Warning] Select the By-pass Switch	
Alarm	n/a	
Delay time	10 m	
Alarm point	Low	n/a
	High	n/a
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	WARNING	

Interlock no: 47		
Interlock Name / Alarm	[Warning] SSR 60°C Warning	
Alarm	60°C ↑	
Delay time	10 s	
Alarm point	Low	n/a
	High	60°C
PNID Tag Number	Heater	n/a
	Supply Water	n/a
	Burning air	n/a
	Sleeve air	n/a
	Cleaning air	n/a
	Circulation pump	n/a
	Drain pump	n/a
Signal tower	WARNING	

3.6 Emergency Stop

- This product includes an emergency stop mode.
- When abnormal operation status is detected when all the parts are normal, interlock and alarm are generated.
- Although it is in abnormal operation status, if interlock and alarm are not generated, activate the emergency stop mode.
- If variables occur at the installed environment of the product such as fire, flooding, and gas leakage, activate the emergency stop mode.
- If the emergency stop mode is activated, it immediately stops the product.

System during Emergency Stop

WARNING

This product is retained at high temperature for a certain time after the abnormal stop. It may cause burn to the user's body.

- If emergency stop mode is activated, power provision to all circuits is cut off.
- The power of the main circuit breaker, main electromagnetic contactor, and emergency stop circuit is cut off after power is supplied for a certain period of time.
- Do not touch until the high temperature heated part is cooled.

System Recovery

WARNING

Do not insert process gases to the product until the product or the surrounding environment of the product become a normal status. Gas leakage may cause fatal damages to the user's body.

- If recovering to a normal state from emergency stop state, follow the following procedure.

1. Check whether there isn't any problem in the environment where the product is installed.
2. Check whether the product is in normal state.
3. Turn the emergency stop button clockwise and check the button protrude toward the user's body.
4. Press the START switch of the front part of the product for more than 1 seconds.
5. If there are additional requirements or inspection matters, start manual mode operation.
6. If there aren't additional requirements or inspection matters, or if confirmation is completed, start operation with automatic operation mode.

4 Facility Requirements

4.1 Installation Environment

CAUTION

This product is designed to be installed indoors where there is no risk of explosion. Install at an appropriate installation environment for normal operation and maintenance.

Table 3.1 Required Environment for Installation

Classification	Required Environment
Temperature	5°C ~ 40°C
Relative Humidity	30% ~ 75%
Elevation	1,000 m (3,280 ft) below the sea level (Consult with MAT PLUS Co., Ltd. if it exceeds)

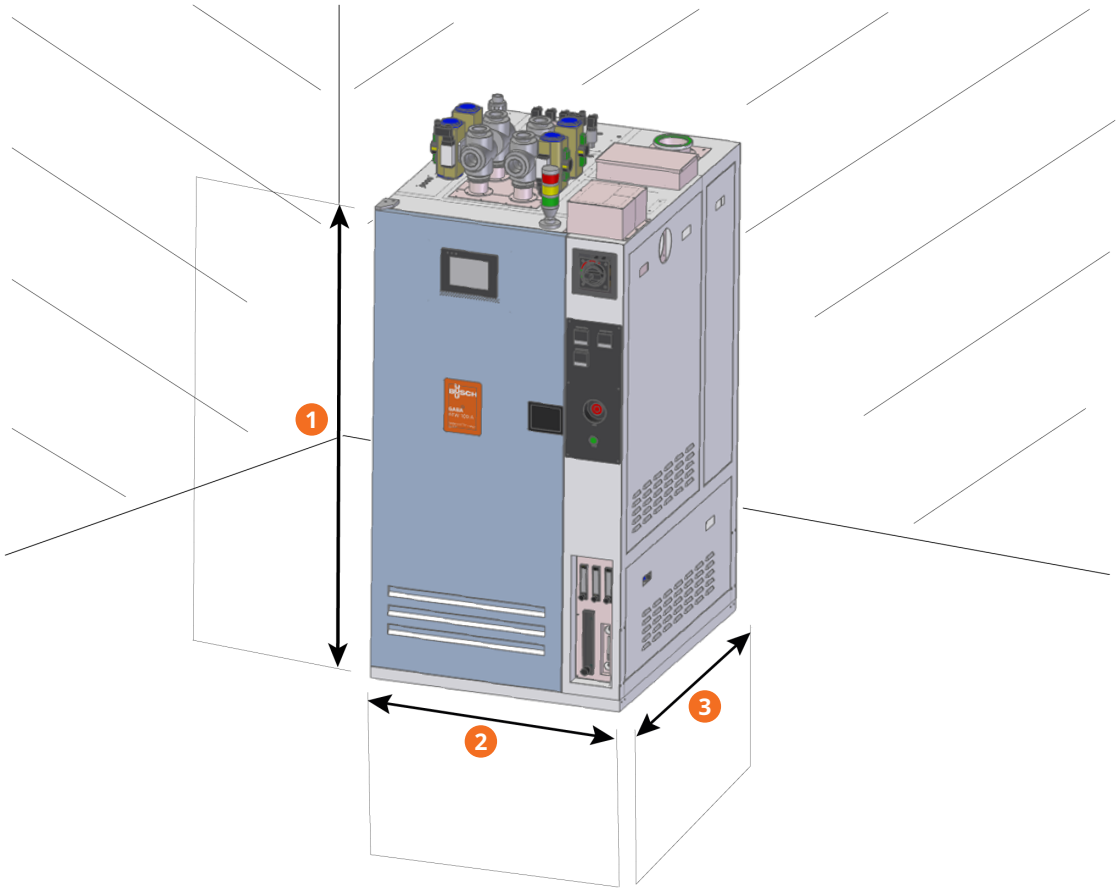
- When installing the product, the temperature for the installed area is recommended to be 5℃ ~ 40℃.
  - If temperature of the installed area is not appropriate, dew condensation at the internal and external exhaust pipe may occur.
- Do not put any objects within the radius of opening and closing the cabinet door.
  - There may be restrictions on the maintenance work of the product.
- When installing the product, install at a flat floor.
  - If it is not a flat floor, parts may fall off due to vibration.

4.2 Installation Space

Table 3.2 Required Spaces for Installation

Classification	Size
External Size	900mm (W) × 1,100mm (D) × 1,850mm (H)
Weight	600kg (Dry), 650kg (Wet)
Inspection and Maintenance Space	690mm (Front), 500mm (Sides), 550mm (Rear)
Utility Connection Space	Top 100mm

Fig 3.1 Required Spaces for Installation



Description			
1	1,850 mm	2	900 mm
3	1,100 mm		

4.3 Utility

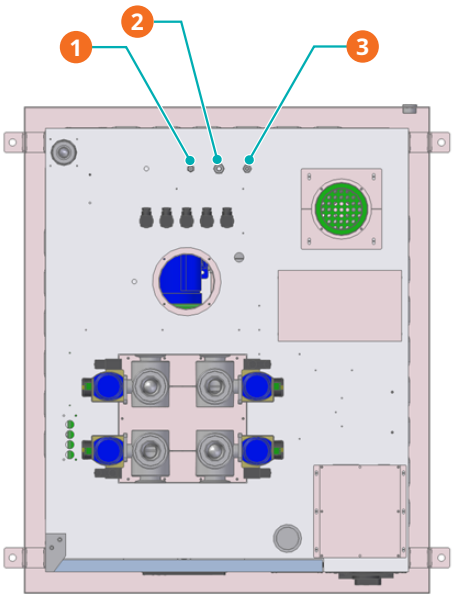
Table 3.3 Utility

Classification		Specifications
Power	Main Power	3Ph. 208VAC 60A Power Consumption 18KW MAX @PF 0.95 SCCR: 2.5KA
	Cir. Pump	370W
	Drain Pump	260W
CDA (Compressed Dry Air)		4 ~ 7 kg • f/cm^2 (Max 800 SLM), 1/2" Tube
N2 Gas		4 ~ 7 kg • f/cm^2 (Max 200 SLM), 3/8" Tube
CW (City Water)		3 ~ 5 kg • f/cm^2 (Max 18 LPM), 1/2" Tube
Gas inlet		NW50 Flange, Maximum of 4 Ports
By-pass inlet		NW50 Flange, Maximum of 4 Ports
Gas exhaust		-100 ~ -50 mm H_2O, 2.5 m^3/min, NW100 flange
Cabinet exhaust		-50 ~ -30 mm H_2O, 5.8 m^3/min, ø139.8

Classification	Specifications
Drain	20A PVC Union, Acid drain

4.4 LOTO Location and Measures Time

Fig 3.2 LOTO Location

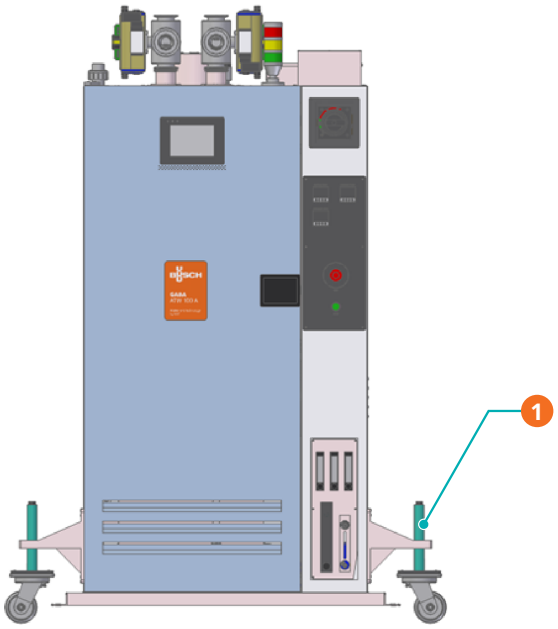


Description			
1	N2 IN	2	Air IN
3	Water IN		

- LOTO is applied to this facility so that it can be used in the following cases.
  - During PM, improvement work, facility relocation, emergency situations (Leak etc.).

5 Installation

5.1 Product Transport

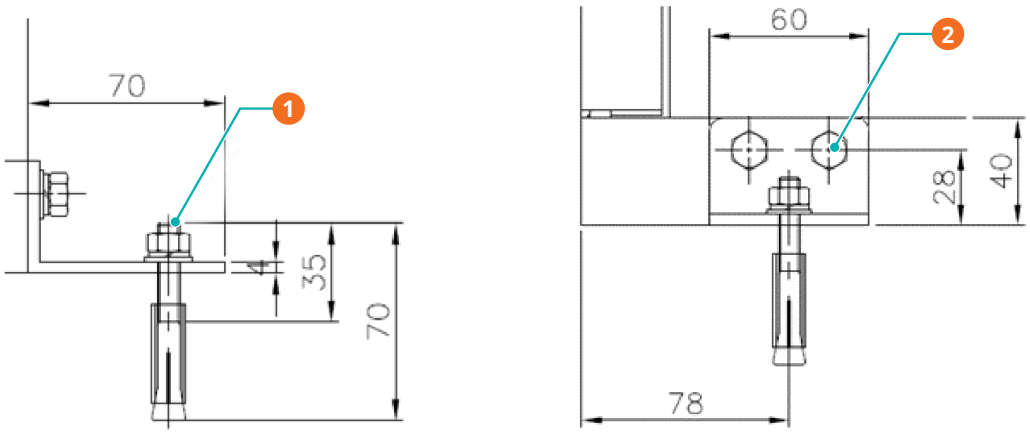


Description			
1	Facility Wheel		

- For facility transport, turn the wheels attached to the facility to float it from the ground and move it to the right position.
- When transporting, it should be floated less than 1cm to prevent damage of the top part of the facility.
- Since this equipment is a heavy object, more than 3 people are necessary when transporting.

5.2 Product Fixation

- Fix the product at the installation place of the product.
  - Brackets with M8 bolt size are installed at the four corner points of the lower part of the cabinet.
  - This product is fixed with brackets.
  - The parts where they are not fixed must be fixed to the floor of the product being installed.



Description			
1	M8 Anchor Bolt	2	2-M8 Bolt

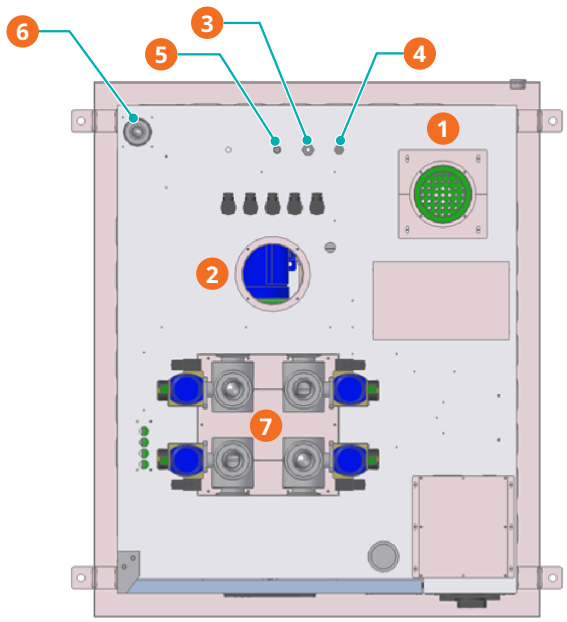
Fig 4.1 Product Fixation Bracket

CAUTION

When fixing the product, please check the location of each pipe connected to the product.

5.3 Utility Installation

Fig 4.2 Connection Parts of the Product Utility



Description			
1	Gas Exhaust: Final Gas Exhaust	2	Cabinet Exhaust: Prevent Cabinet temperature Increase
3	Air Supply Pipe: Supply Air within the Product	4	Water Supply Pipe: Supply Water within the Product
5	N2 Supply Pipe: Supply N2 within the Product	6	Drain Pipe: Waste Water Exhaust within the Product
7	Gas Inlet Pipe: Gas Inlet		

Table 4.1 Product Connection Pipe Type

Gas exhaust pipe, Cabinet exhaust pipe connection

- Connect the exhaust pipe to the product.
- Connect using the NW100, ø139.8 size pipe.
- Connect using an appropriate gasket and clamp.

Air supply pipe, Water supply pipe, N2 supply pipe connection

- Connect the air supply pipe, water supply pipe, and N2 supply pipe to the product.
- Connect using 1/2″, 3/8″ Pipe respectively.

Drain pipe connection

- Connect the Drain pipe to the product.
- Connect using a 20A Size pipe.

Bypass pipe connection (when adding Bypass option)

- Connect the Bypass pipe to the product.
- Connect suing a NW50 Size pipe.
- Connect using an appropriate Gasket and Clamp.

Gas inlet pipe connection

- Connect the bypass pipe to the product.
- Connect using a NW50 Size pipe.
- Connect using an appropriate gasket and clamp.

WARNING

When inappropriate Union, Gasket and Clamp are used, it may be the cause of gas and liquid leak. If leak occurs, it may cause fatal damages to the user's body.

5.4 Installation Inspection

Product Fixation Inspection

- Check the installation location and fixation of the product.
- Check whether the product shakes or not.
- Inspect whether there is problem opening the front, sides, and rear door of the product.

I-marking Inspection

- Check the union, bolt type I-marking of the connection part of the internal product pipe.
  There may be connection parts without an I-marking.
  [It may vary according to the role of the parts. ex.) parts with no connection direction]
- There may be connection parts without an I-marking.

Utility Inspection

WARNING

When checking the utility, make sure to proceed according to the manual. Work after wearing appropriate protective equipment. There may be exposure of electric shock and harmful chemicals to the body.

Pipe Connection Inspection

Pipe Type	Size	Pressure	Flow Rate
Gas exhaust	NW100	-100 ~ -50 mm H_2O	
Cabinet exhaust	Ø139.8	-50 ~ -30 mm H_2O	
Air	1/2 inch	4 ~ 7 kg •f/cm^2	Max 800 SLM
Water (CW)	1/2 inch	3 ~ 5 kg •f/cm^2	Max 18 LPM
N_2	3/8 inch	4 ~ 7 kg •f/cm^2	Max 200 SLM
Drain	20A		
Bypass	NW50		
Gas Inlet	NW50		

Table 4.2 Inspection Items for the Product Connection Pipe

- Check the connection state of each pipe.
- Check the pressure and flow rate supplied to each pipe.
  - Pressure may vary according to the subject of supply (installation environment). Flow rate may be checked by adjusting the Flowmeter.

Power Line Inspection

WARNING

Be sure to work after turning OFF the main power. There may be risk of electric shock.

- The main power of this product is 200～240VAC, and it is based on three-phase, interrupting capacity of 60A.
- Connect the power line to the connection part so that it is not loose.
- Check whether the connection part of the grounding line is not loose. If it is loose, reconnect.

6 Operation

6.1 Start

WARNING

Inappropriate system operation during normal operation my cause fatal damages not only to this product but also to other connected products. If it is not appropriate to normal operation, do not operate until it becomes an appropriate environment. Make sure to work after checking the manual when operating.

- Make sure to operate after being well acquainted with the operation method of the corresponding system.
- Check whether all the utilities are in normal operation before operating the product. (Refer to the installation)
- Press the power (start) button for more than 1 second.
- The initial screen is as follows.

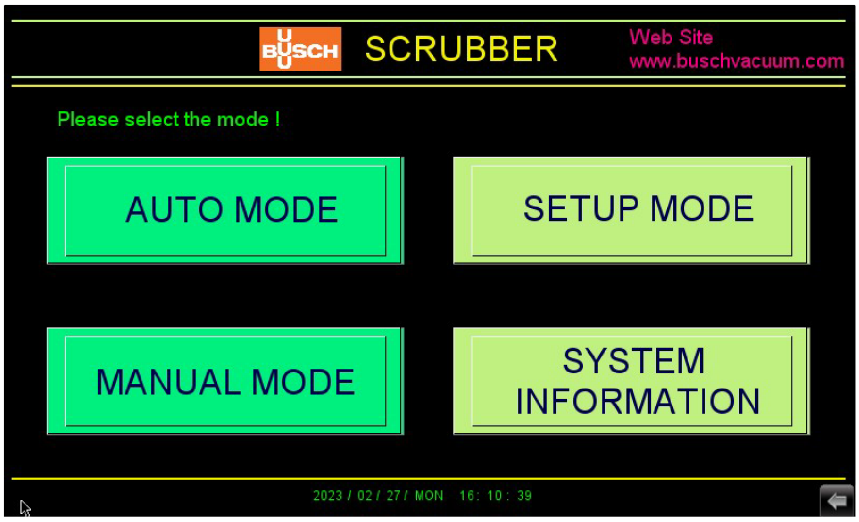


Fig 5.1 PLC Initial Screen

6.2 Set Up Mode

- If you intend to change the parameter inside the control program, press the SETUP MODE switch on the initial screen or operation screen.
- Password screen will appear. If you enter the password on this screen, it will convert to the Set-up Menu.

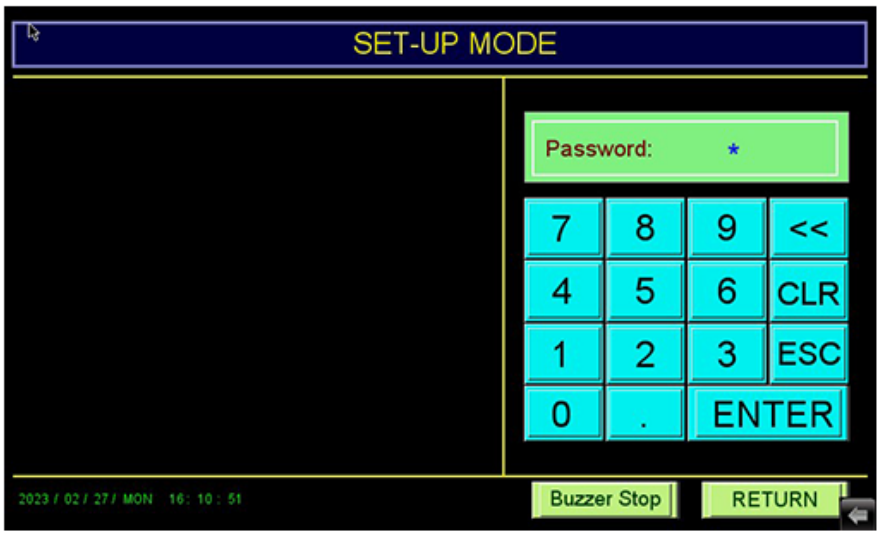


Fig 5.2 Set Up Mode Screen 1

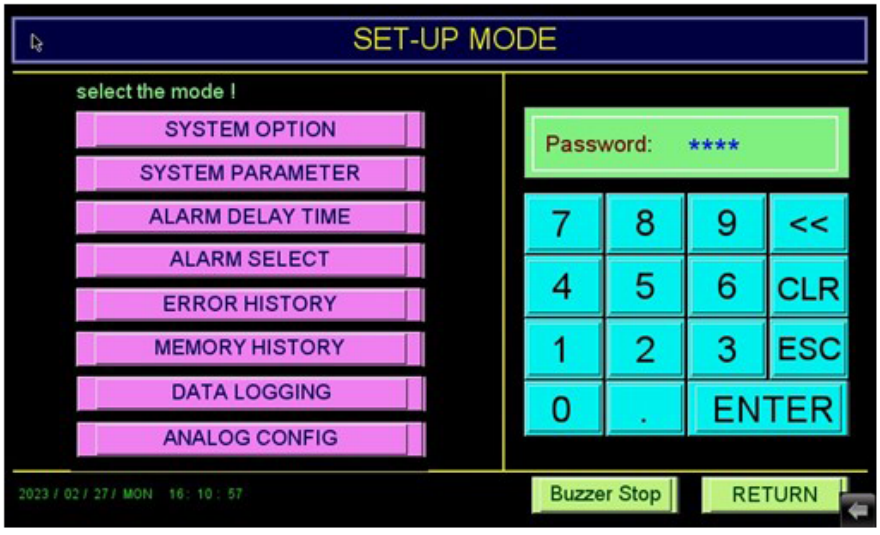


Fig 5.3 Set Up Mode Screen 2

- If you press the PARAMETER switch on the Set-up Menu screen, System Parameter screen will appear.
- After pressing the button of the parameter intended to change, enter the set values.

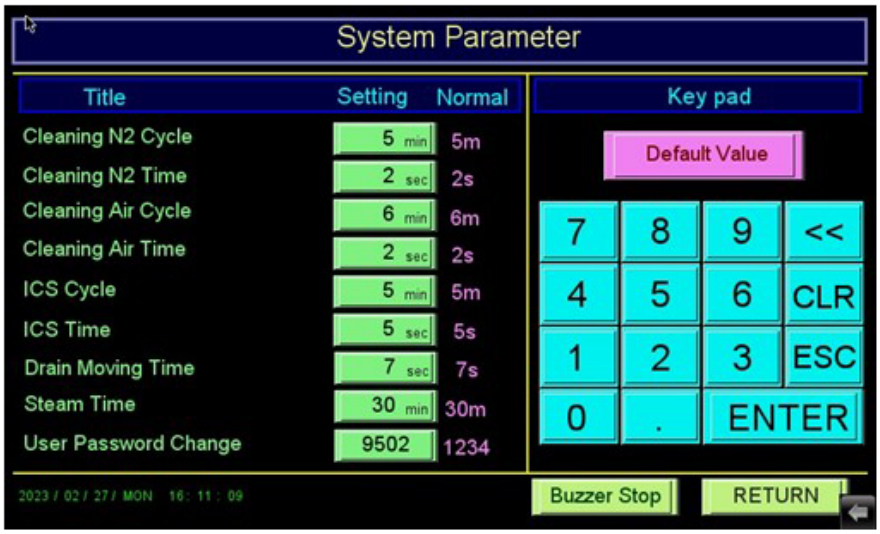


Fig 5.4 System Parameter

- If you press the Default Value, it will automatically set as Normal value.
- After setting the parameter, press the RETURN switch and convert to the SETUP menu, and then if you press OPTION, model and option selection screen will be displayed.

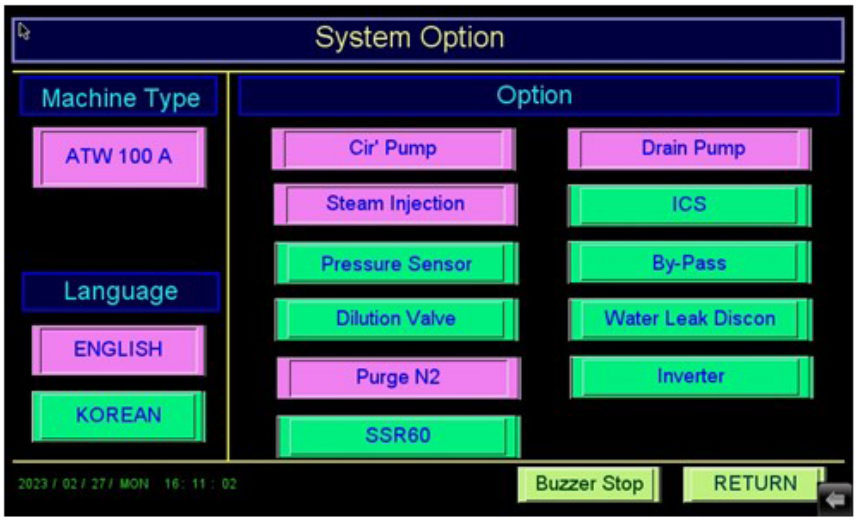


Fig 5.5 System Option

ERROR HISTORY

- Errors that occurred during operation of this facility are saved on the touch screen. If you select the Error History screen, you can confirm the types and time of the generated errors.
- Error History will all be deleted if you press the Clear switch.

Fig 5.6 Error History Screen

6.3 Manual Mode

MANUAL MODE

- You can enter manual mode if you select MANUAL MODE from the menu on the main screen.
- If you enter manual mode, items possible of manual operation will be listed in the lower left corner.
- All operations are possible in manual mode if there is no alarm.
- The purpose of manual mode is to confirm whether the operation status of all values, pumps, and pressure, flow, etc. are displayed.
- If it is left in manual for a long time when the temperature of the heating chamber is high, it may be the cause of product break down due to wrong operation or may cause serious property damage of the process, so caution is required.

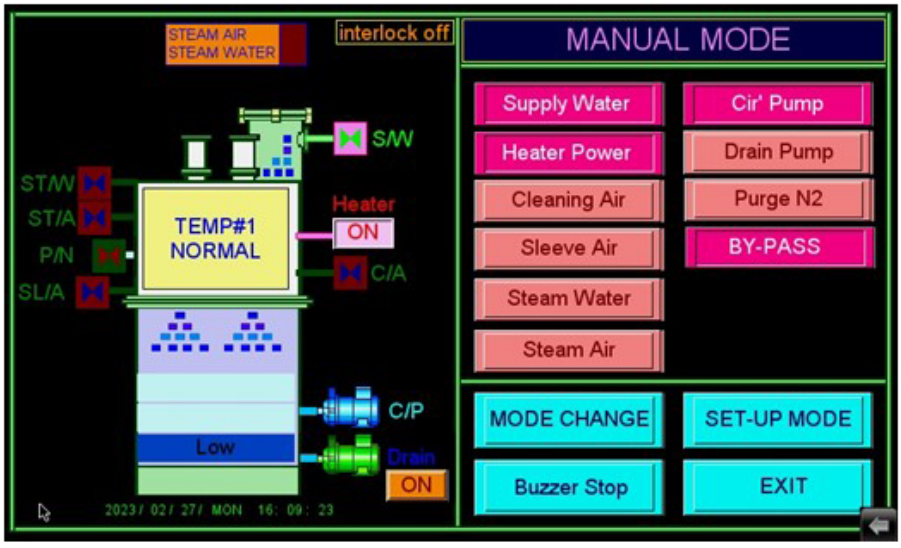


Fig 5.7 Manual Mode Screen

6.4 Auto Mode

AUTO MODE

- Automatic operation starts when AUTO MODE is selected from the menu on the main screen.
- If Supply Water, Circulation Pump, Heater Power, and Burning Air are supplied in sequence and it becomes normal operation, it is finally operated in Auto Mode screen.

AUTO MODE Step 1

- Supply water ON

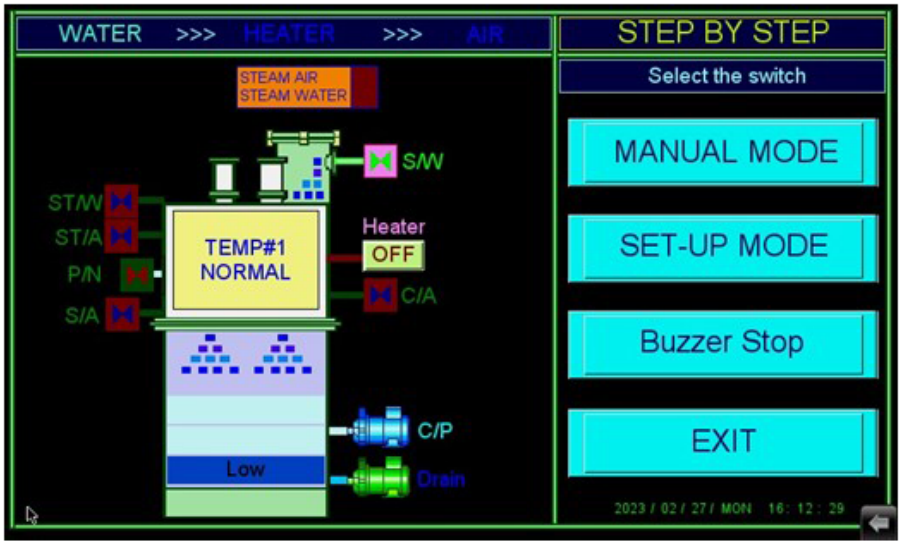


Fig 5.8 Step by Step Screen

AUTO MODE Step 2

- Heater power ON

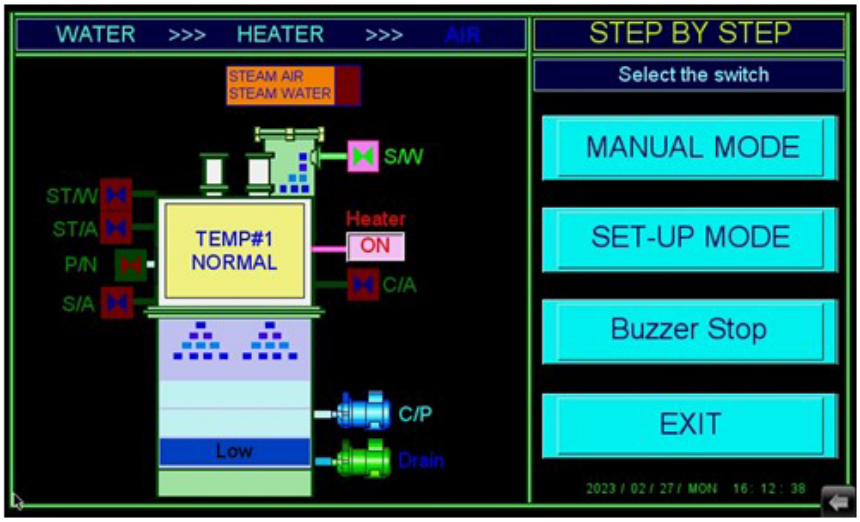


Fig 5.9 Step by Step Screen 2

AUTO MODE Step 3

- Burning air supply start
- If the heater temperature is above Low alarm value, Burning air is supplied.

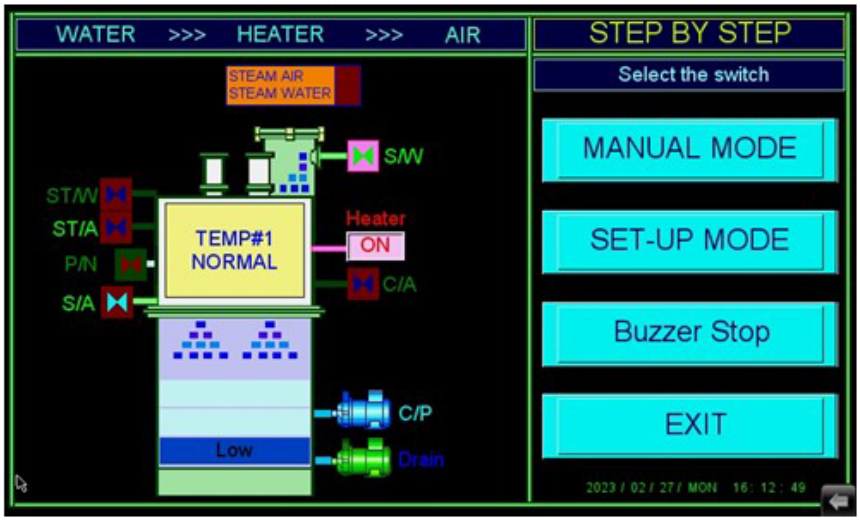


Fig 5.10 Step by Step Screen 3

AUTO MODR Step 4

- If you press the START button after the heater temperature rises above the low value, it will convert to Auto mode screen.

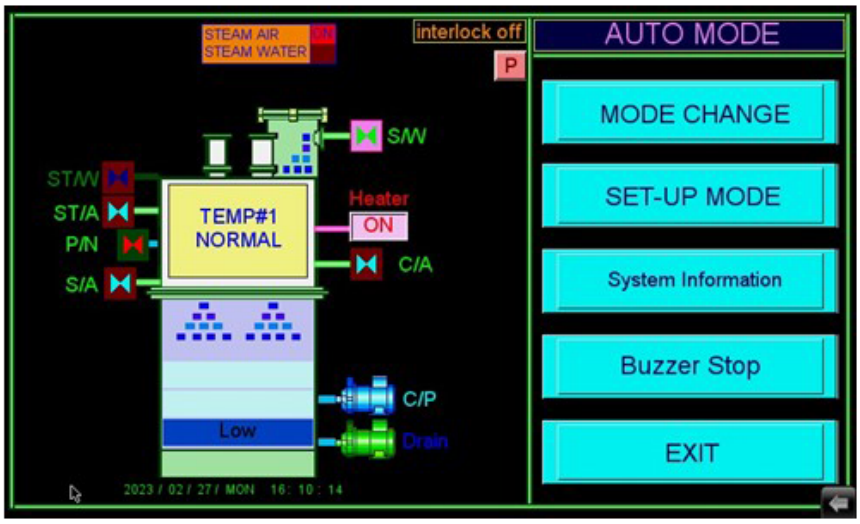


Fig 5.11 Auto Mode Screen

6.5 Other Modes

COOLING MODE

- If you select 'COOLING MODE' from the meu, cooling is initiated.
- If the Cooling mode is initiated, cleaning air is blocked and only Burning air is supplied.
- After cooling for 60 minutes, it is automatically converted to Main mode and all operations stop in Main mode.

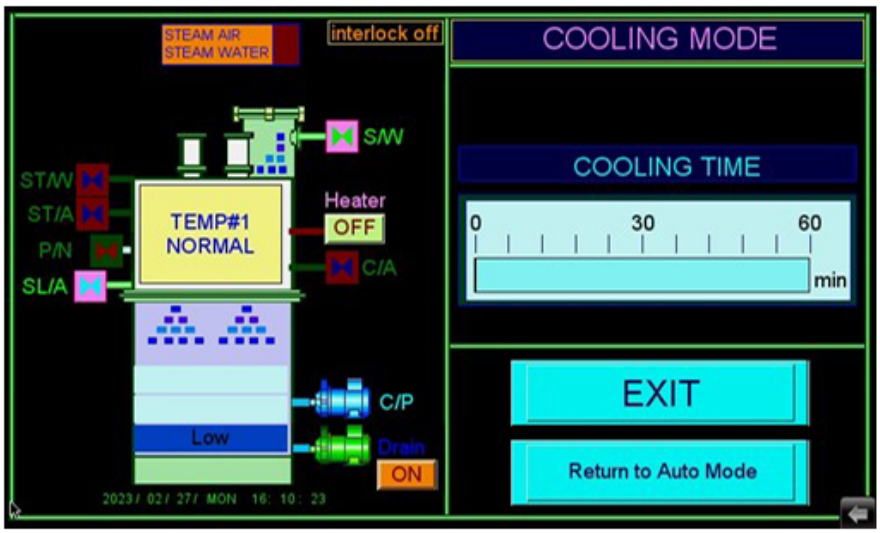


Fig 5.12 Cooling Mode Screen

POWER SAVING MODE

- If there is no touch entry for 10 minutes, the backlight power of the touchscreen is shut off.
- If the backlight power is shut off, the screen turns on if you touch the screen.

DATA LOG

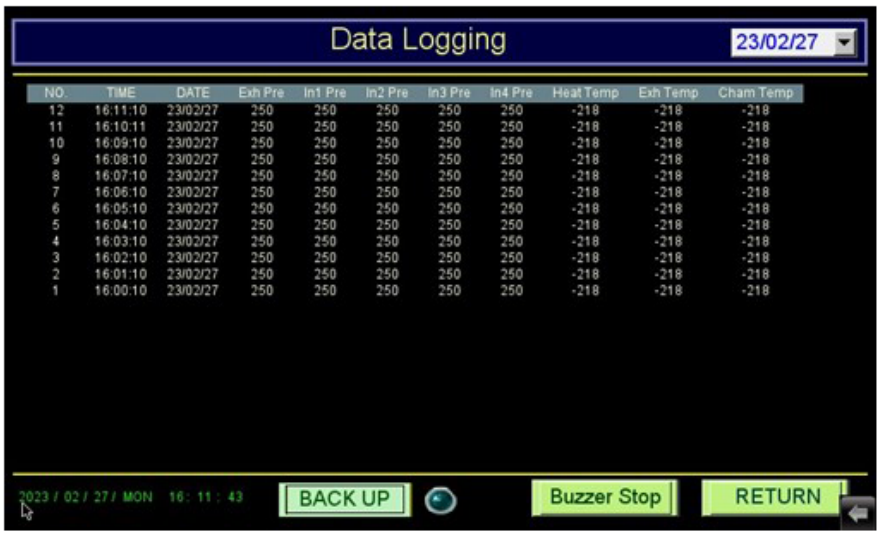


Fig 5.13 Data Log Screen

- It collects and stores data displayed on the product.

6.6 Setting mode (other than PLC)

Heater Temperature Controller

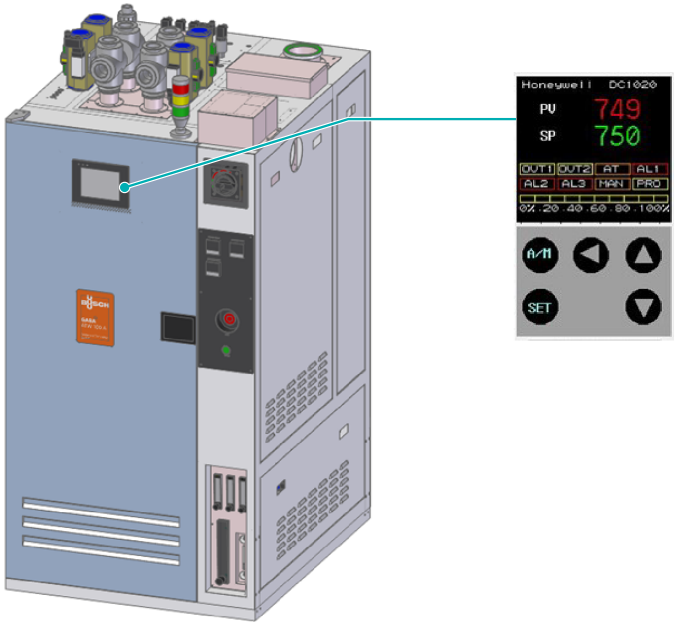


Fig 5.14 Temp Controller

WARNING

Operation temperature (SP) must be set to the temperature discussed with MAR PLUS Co., Ltd. Operation on arbitrary temperature may lead to non-processing of discharge gas, reduction in parts life, and safety accidents.

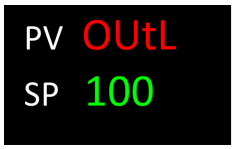
Setting Target Operation Temperature

- It refers to the target set temperature. It is displayed as SP (Set Point) on the temperature controller, and the temperature is retained after reaching the corresponding set value.

- At the initial state, press the ◂ Key and move to each digit of the SP value.
- After entering the set values by changing the values with ▲,▼ Key, press the SEL Key and and exit.

Setting Output Values

- It calibrates the output value (%) delivered to the heater.



- At the initial screen, press the SET key 1 time and OUtL will be displayed.

From the output maximum limit setting screen after entering the digit with ◂ Key and the set values using the ▲,▼ Key, press the SEL Key and exit.

Alarm Setting

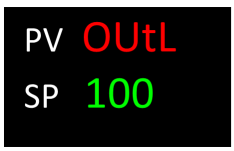
- If it reaches the set temperature, alarm will set off and relevant interlock may operate.

- At the AL1 screen, press the SET Key 3 times for AL1, 4 times for AL2 setting screen display. [AL1 is the upper limit temperature, AL2 is the lower limit temperature.]

- At the AL1 screen, after entering the set value with ▲,▼Key by moving pressing the ◂ Key, move to AL2 screen by pressing the SET key.
- After entering the ▲,▼ Key by pressing the ◂ Key one more time, press the SET key and exit.

Proceeding Auto-tuning

- To implement PID parameter setting automatically, proceed Auto-tuning.



- After moving to At screen by pressing SET 2 times at the initial screen, change No to Yes by pressing the ▲,▼ Key.
- If you move to the initial screen by pressing the SET Key 3 times at the AT setting screen, auto-tuning setting is completed.

Digital Pressure Gauge (PSQ)

- May be set according to the fluid pressure of Water and Air.

Alarm Value Setting

1. **PV Indicator (Green, Red, Orange Color)**:
   Operation Mode: PV (Current Value).
2. **SV Indicator (Green):**
   Operation Mode: SV (Set Value), unit, etc. indication.

3. **[M] Key**:
   Parameter group entry, item selection and operation automatic return.
4. [▼], [▲] **Key:**
   Preset setting of output operation mode, mode execution and parameter change.

Fig 5.15 Pressure Controller

Description			
1	PV Indicator (Green, Red, Orange Color)	2	SV Indicator (Green)
3	[M] Key	4	[▼], [▲] Key
5	OUT1 or OUT2		

- If you press the [▲] button one time, "P-1" will be displayed on the SV indication part and the alarm setting screen will flicker.
- After entering the alarm value by pressing the [▲,▼] button, if you press the [M] button for a long time, alarm values will be set.
- If an alarm occurs, words on the PV indication part will change to red color and "OUT1" will be indicated on the output lighting.

Zero Point Adjustment

- If you press the [▲,▼] button simultaneously for more than 1 second, automatic zero point adjustment will be implemented.

7 Trouble Shooting

7.1 Tower Lamp

- It flashes in different colors so that it is easy for users to understand according to the operation state of the product.

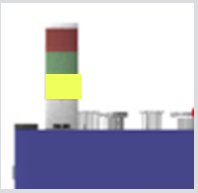
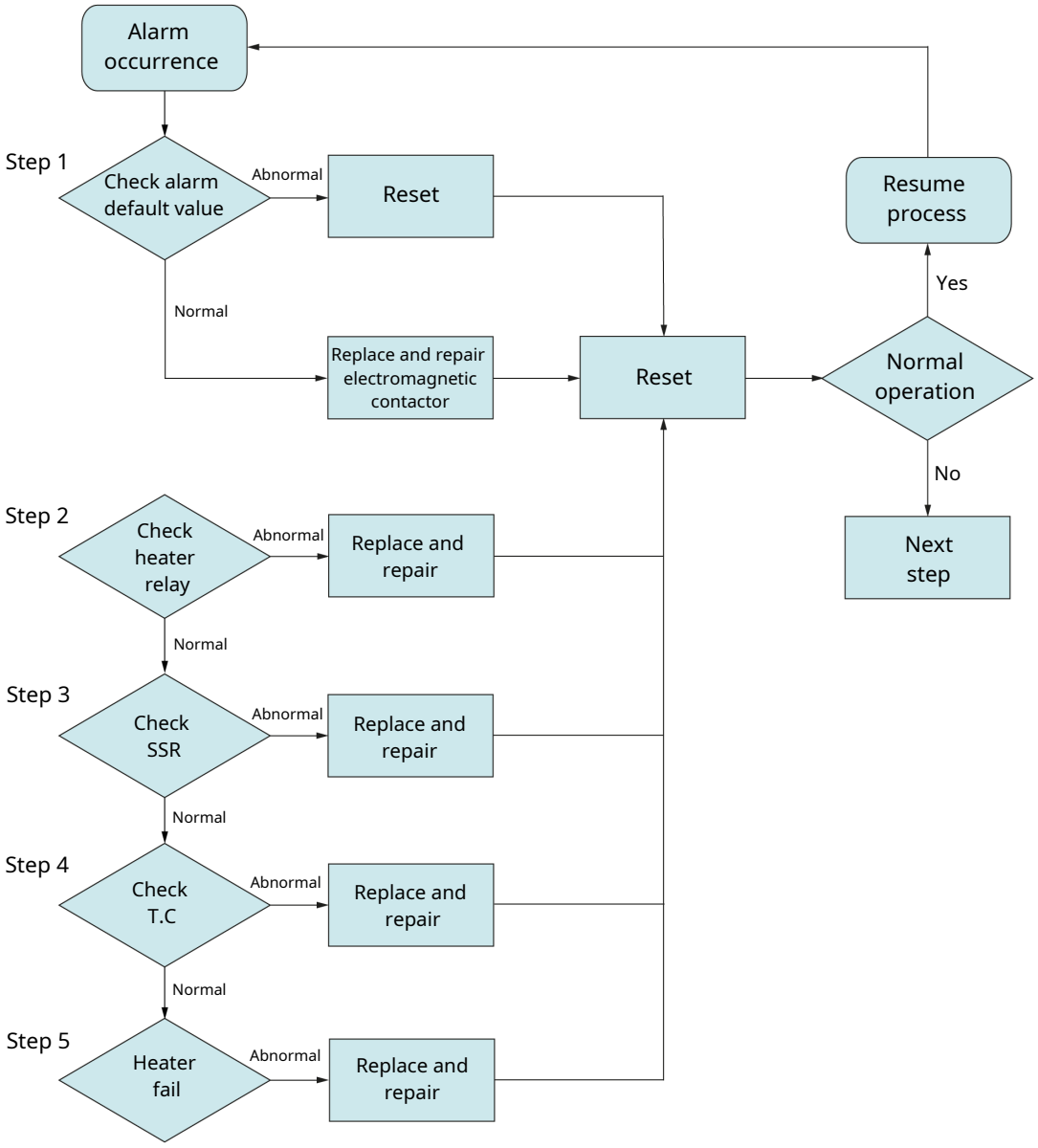
Lamp	System Condition
Green Steady 	When the system is normal in the automatic & manual mode.
Yellow Steady 	When the system is in the initial screen. When the system is in normal operation bypass state in automatic & manual mode state. When system is in Warning state.
Red Steady 	When an alarm occurs.

Table 6.1 Tower Lamp Flash State Items

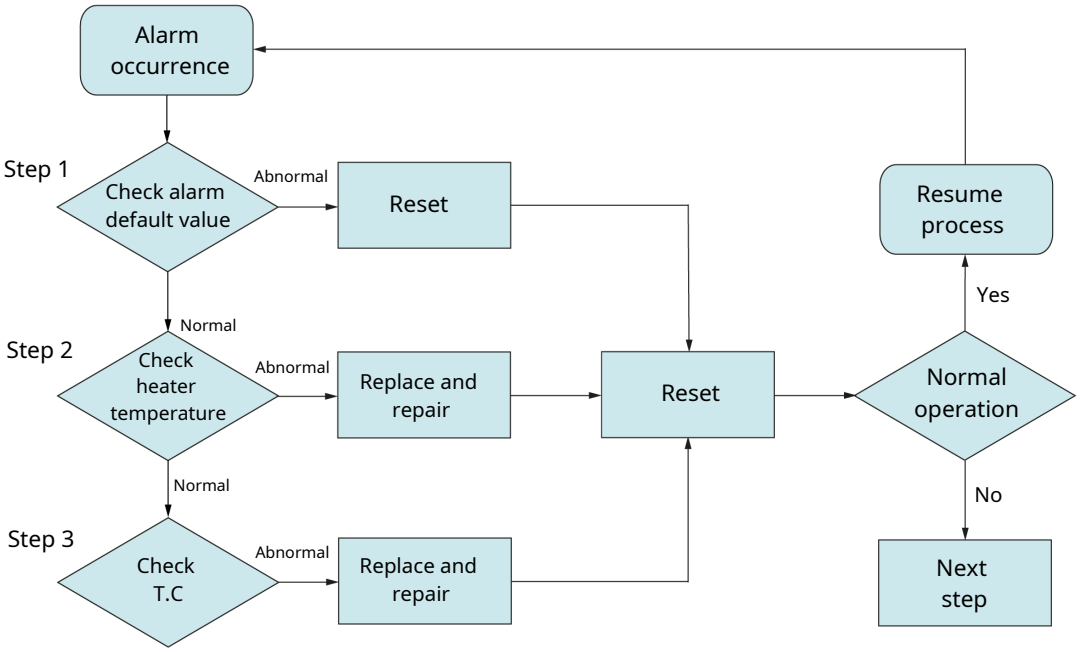
7.2 Trouble Solving Method

- If normal operation is not possible even after implementing all the steps presented in each problem-solving method, contact the manufacturer or the seller.
- Reset work is a work that presses the START button for more than 1 second.

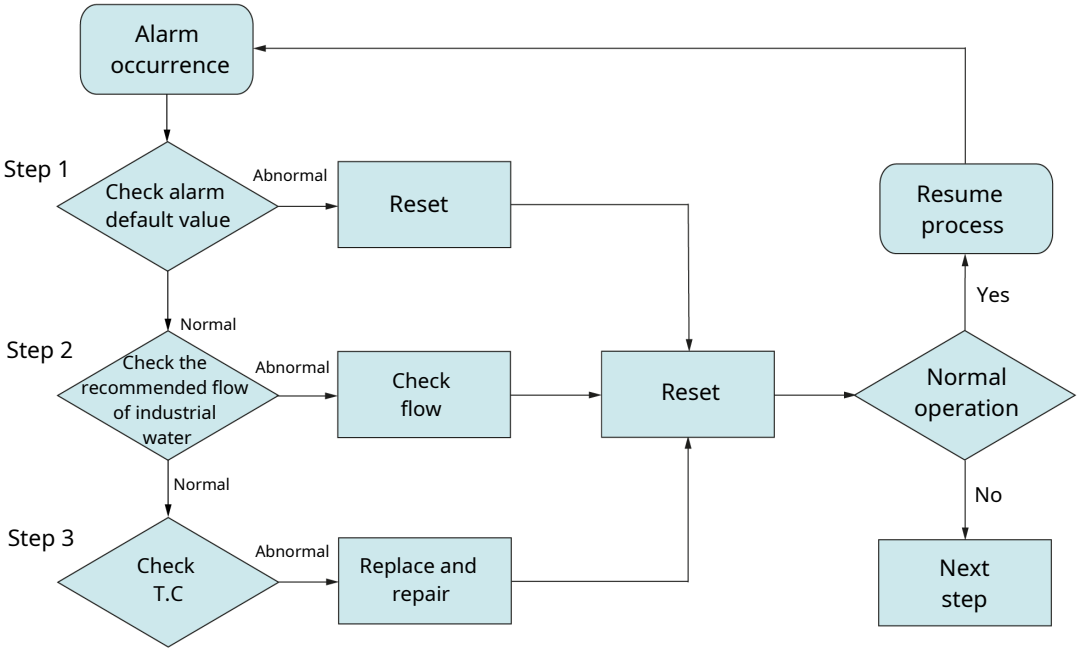
Heater Temp Error (High, Low)



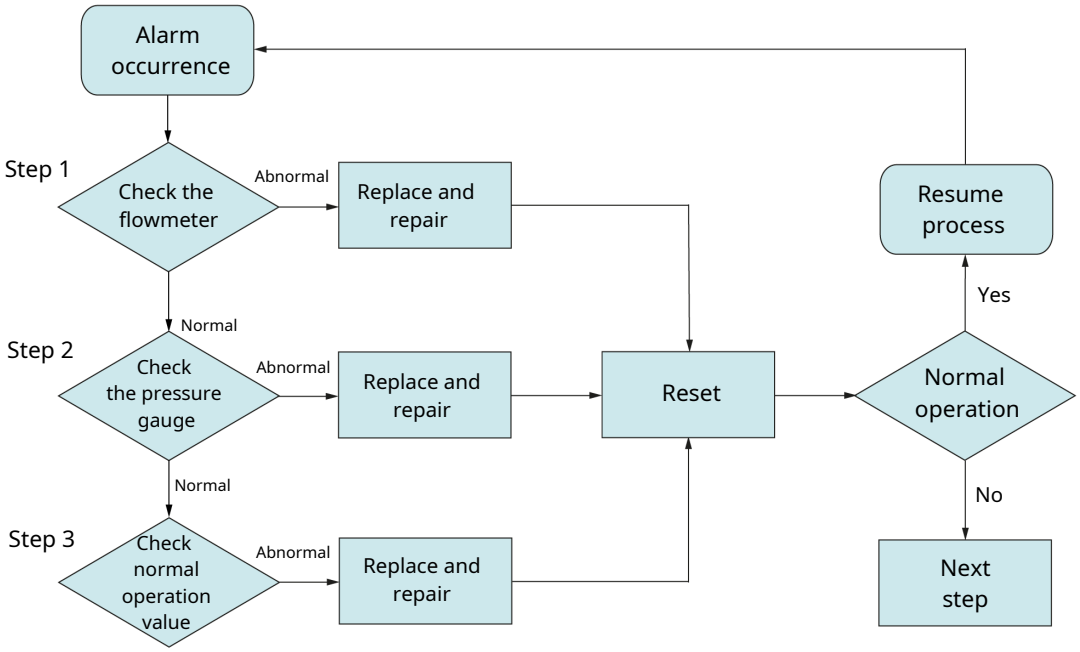
Chamber Temp High Error



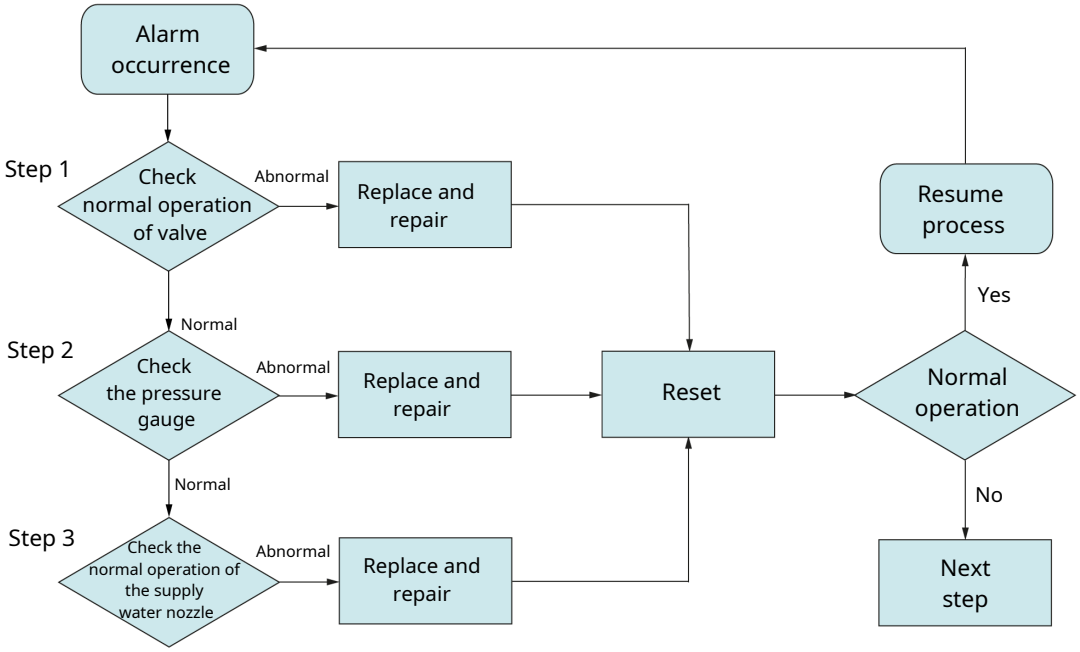
Exhaust Temp High Error



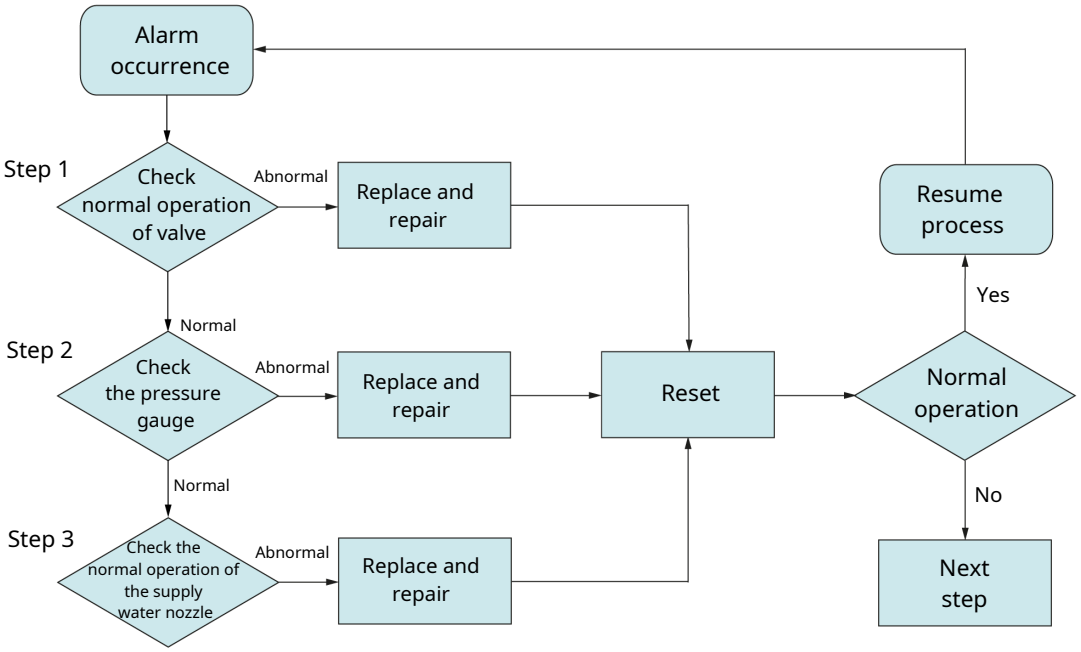
Air Flow Error



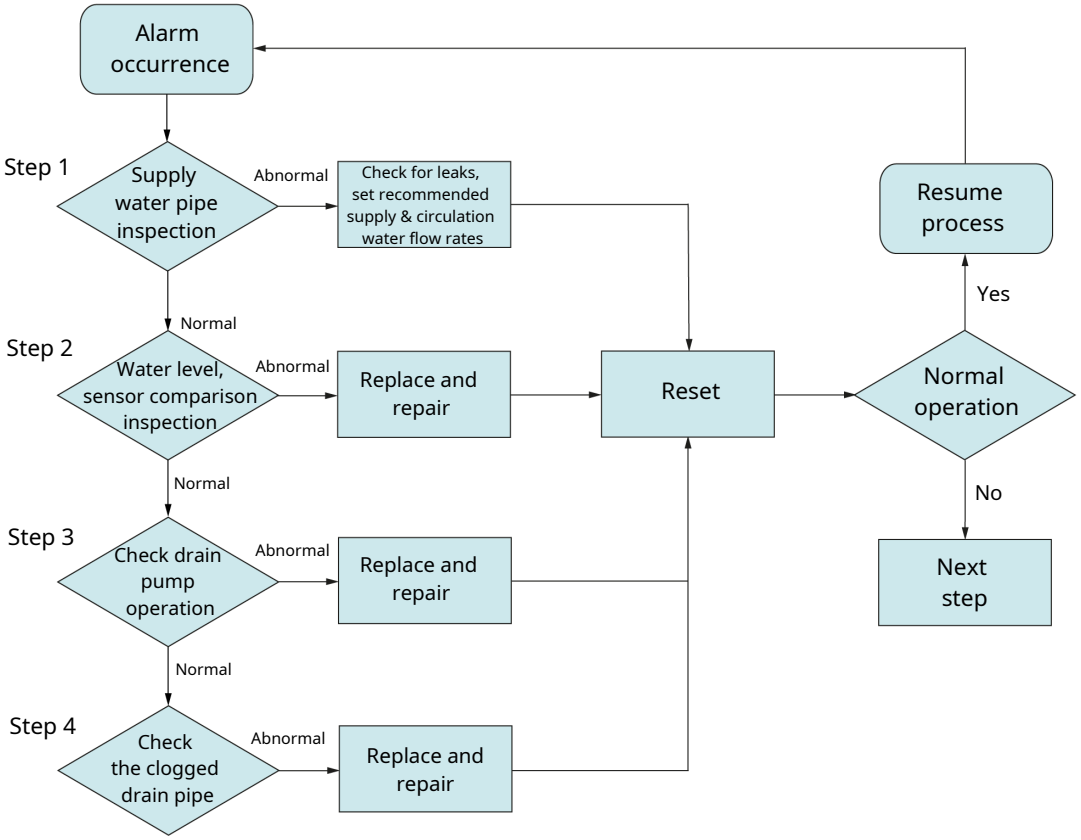
Supply Water Flow Error



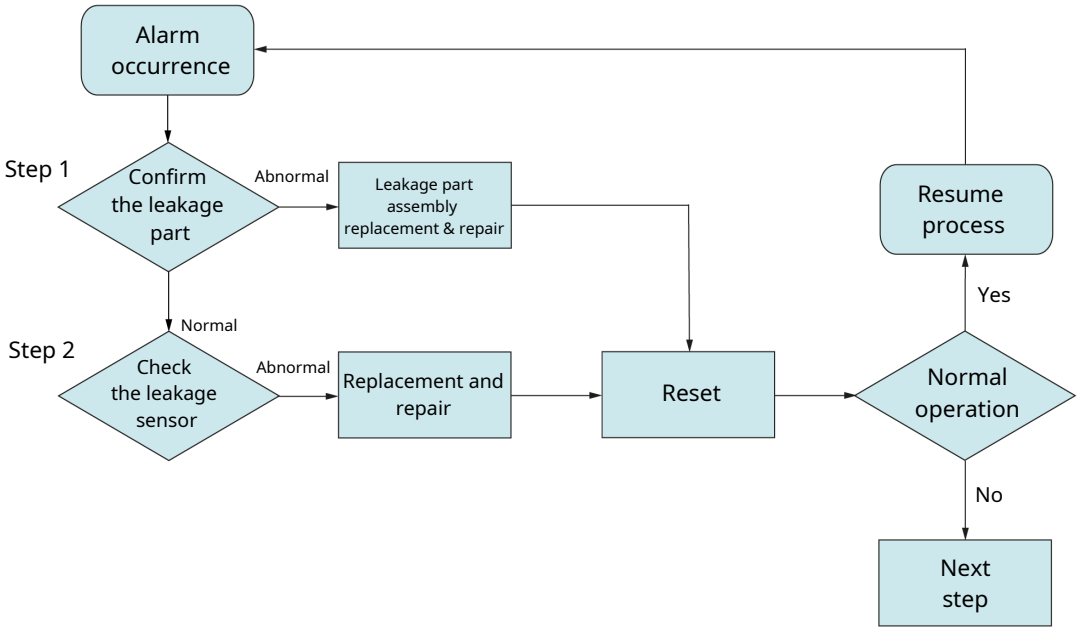
Circulation Water Flow Error (High, Low)



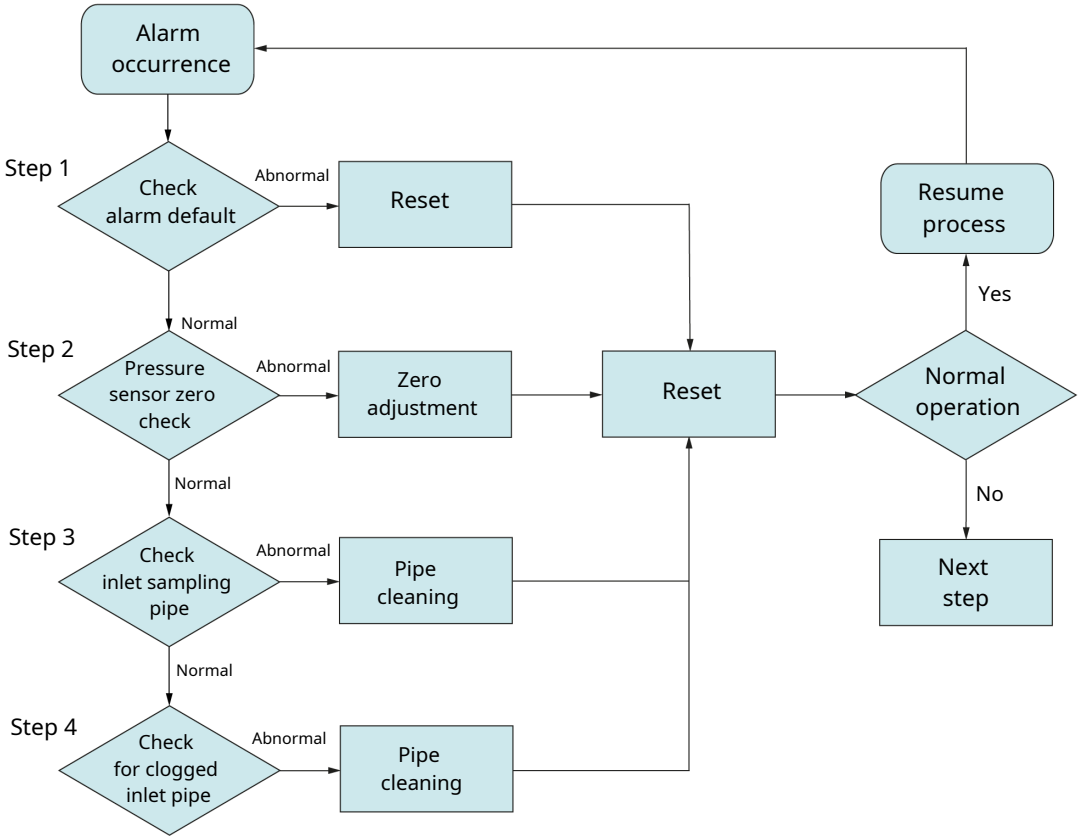
Wet Chamber Level Error (Low, High, H-High)



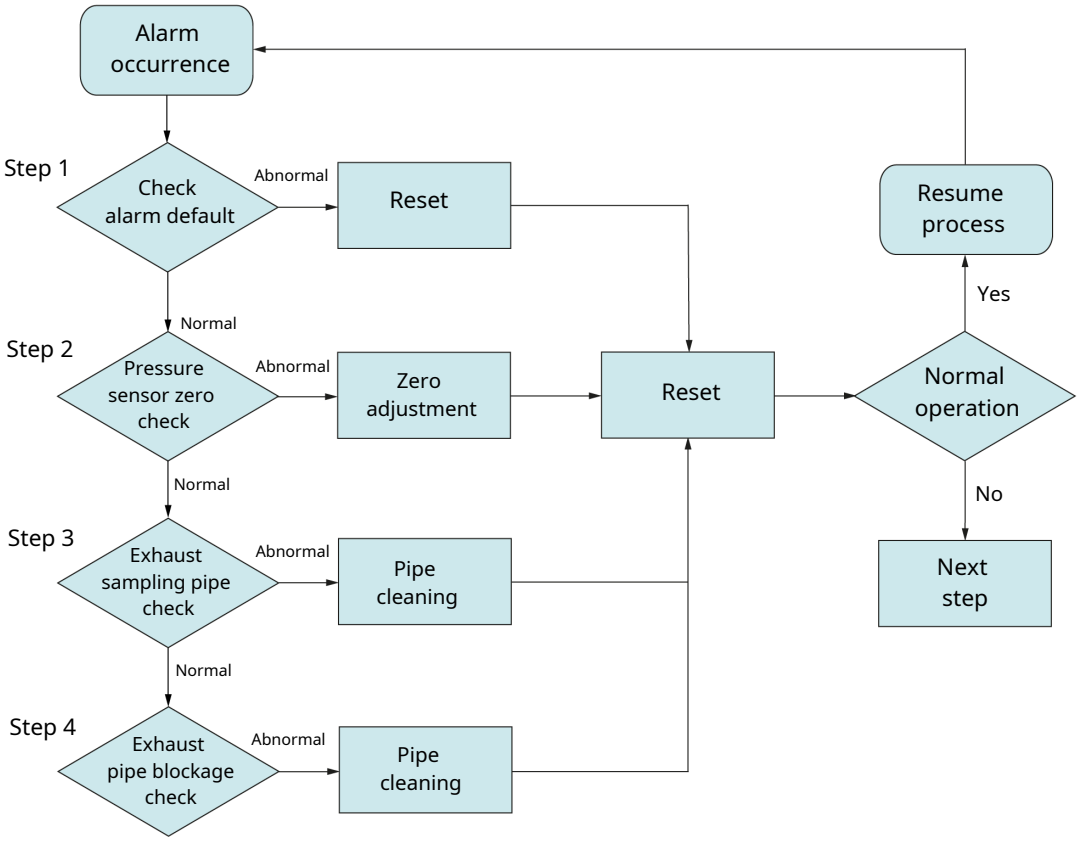
Water Leak Error



Inlet Pressure High Error



Exhaust Pressure High Error



8 Maintenance

8.1 Preparation Materials

Protective Equipment

- Refer to Chapter 2.1 Protective Equipment

Working Tools

Name	Role
 Spanner	• Tighten and loosen bolt. • Required Size: 1/4″, 17 mm. • Required Quantity: each more than 2.
 Digital Multi-meter	• Check electric current and resistance.
 Industrial Wiper	• Remove contamination sources generated during work.
 Dry, Wet Vacuum Cleaner	• Remove contamination sources generated during work.
 Plug	• Block pipes and valves that are open during work. • Required Size: 1/4″, NW50. • Note: Certain size plugs are not ready-made goods.
 Litmus Paper	• For measuring acidity of wastewater generated during work.

Table 7.1 Working Tools

Replacement Parts

- Provided separately.

8.2 Equipement Stop

WARNING

Before stopping the equipment, shut off the flow of process gases. If not shutoff, process gases may be leaked and they may cause fatal injuries to the users.

8.3 Module Cleaning

Burn Chamber

- To clean the Burn Chamber, more than 2 workers are required.
- To clean the Burn Chamber, prepare safety equipment specified in chapter 2.1 and wear appropriate protective equipment.
- Prepare the working tools specified in chapter 7.1.
- The cleaning sequence of the Burn Chamber is as follows.
- After checking whether Air, N2 supplied to the Burn chamber are shut off, disconnect the T.C connected to the rear part of the Burn chamber.
- Disconnect the Heracron jacket installed at the inlet part and after removing the NW50 and suction bellows, block the end of the inlet with a plug.
- Separate the M16 bolt that fixed the burn chamber and the Wet Chamber.
- After wearing heat-resistance gloves, open the Burn chamber backwards. At this time, be cautious as the O-ring installed between the Burn Chamber and the Middle Flange may be adhered to the Burn Chamber due to heat.
- Remove the powder accumulated inside the Burn chamber.
- After replacing the O-ring in the Middle Flange and re-assemble in the reverse order of the disassemble procedure.

Wet Chamber

- To clean the Wet Chamber, more than 2 workers are required.
- To clean the Wet Chamber, prepare safety equipment specified in chapter 2.1 and wear appropriate protective equipment.
- Prepare the working tools specified in chapter 7.1.
- The cleaning sequence of the Wet Chamber is as follows.
- Check whether the power of ELCB for circulation pump and drainage pump is shut down at the control panel.
- After checking whether Air, N2 supplied to the Burn chamber are shut off, disconnect the T.C connected to the rear part of the Burn chamber.
- Disconnect the Heracron jacket installed at the inlet part and after removing the NW50 and suction bellows, block the end of the inlet with a plug.
- After removing the Sleeve air line connected to the Middle flange, disassemble the double clamp fixing the Burn chamber and the Wet chamber.
- After wearing heat-resistance gloves, open the Burn chamber backwards. At this time, be cautious as the O-ring installed between the Burn Chamber and the Middle Flange may be adhered to the Burn Chamber due to heat.
- Close the PVC manual value of the inlet and outlet of the circulation water and drainage in order and disconnect the Middle flange.

- After disconnecting the Absorber Kit installed inside the Wet Chamber, remove the powders accumulated in the Chamber and implement cleaning.
- After assembling the Absorber Kit, supplement and replace the corroded Absorber.
- After replacing the O-ring in the Wet Chamber, re-assemble in the reverse order of the disassemble procedure.

Inlet Pipe

- To replace the intel module, more than 2 workers are required.
- To replace the module, prepare safety equipment specified in chapter 2.1 and wear appropriate protective equipment.
- Prepare the working tools specified in chapter 7.1.
- The sequence of replacing the inlet module is as follows.
- After removing the NW50 clamp, pull the suction bellows and block the inlet with a plug.
- Disconnect the pressure sampling port and purge the N2 port at the inlet pipe.
- Loosen all the M5 bolts for the inlet fixation bracket located at the top part of the cabinet.
- Carefully pull the inlet assembly modules one by one.
- Dry the inlet bellows, 3-way valves, O-ring and re-install the clean inlet assembly modules and tighten the clamps.
- Re-assemble in the reverse order of the disassemble procedure.

8.4 Preventive Maintenance

- For the safety and maintenance of this product, periodic item inspection is required.

Inspection Items	Cycle	Inspection Method
Check the gas inlet/outlet pressure	Daily	Visual check.
Check temperature control device in the product	Daily	Visual check whether appropriate range of temperature is retained.
Check the use amount of the utility	Daily	Visual check whether appropriate range of flow is retained.
Check water leak	Daily	Visual check inside and outside of the equipment.
Check water line pressure	Daily	Visual check whether appropriate range of pressure is retained.
Organize equipment	Weekly	Work manual.
Inspect and replace electric parts	At the time of PM	Work manual.
Check the connection parts and implement leak test	At the time of PM	Visual check.
Pressure gauge calibration	At the time of AM	Work manual.

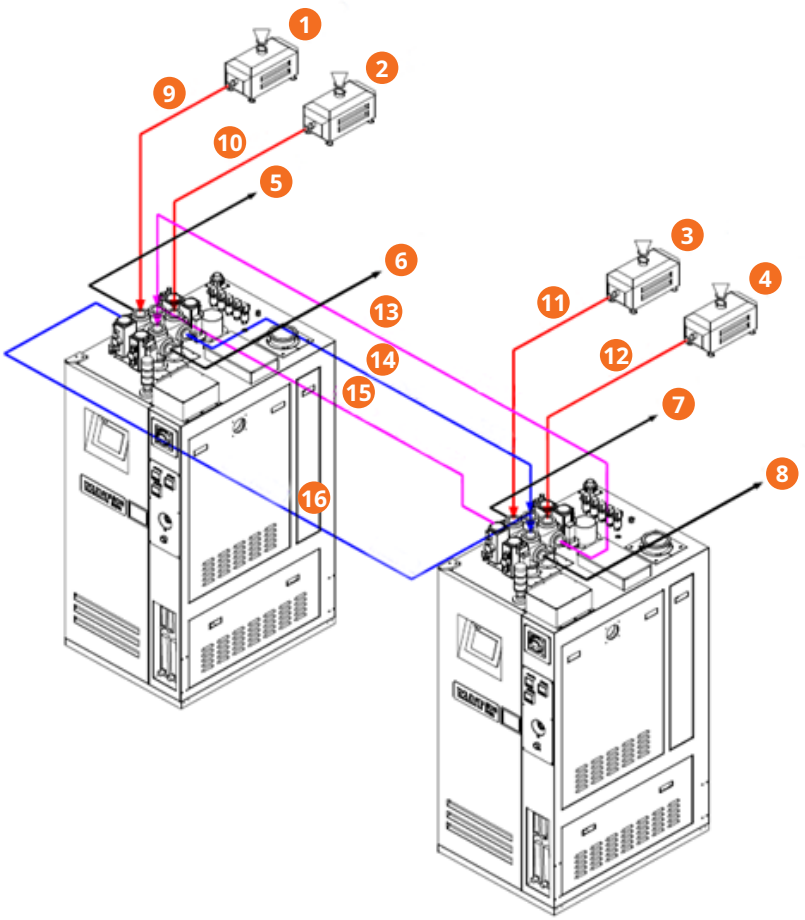
Table 7.2 Preventive Maintenance

9 Optional Specifications

9.1 By-pass System

- This is a system to minimize the outage time of the process equipment connected to the front part of this product.
- There are 2 types of valves according to the flow direction of the fluid: C.W., C.C.W.
- Select an appropriate valve according to the installed environment.

Fig 8.1 By-pass System Schematic Diagram



Description			
1	Pump	2	Pump
3	Pump	4	Pump
5	PFC#4	6	PFC#2
7	PFC#4	8	PFC#2
9	Inlet # 1	10	Inlet # 3
11	Inlet # 1	12	Inlet # 3
13	Inlet # 4 = > By-pass # 3	14	By-pass # 3 = > Inlet # 4
15	Inlet # 2 = > By-pass # 1	16	By-pass # 1 = > Inlet # 2

9.2 3-way Valve

3-way Valve Composition

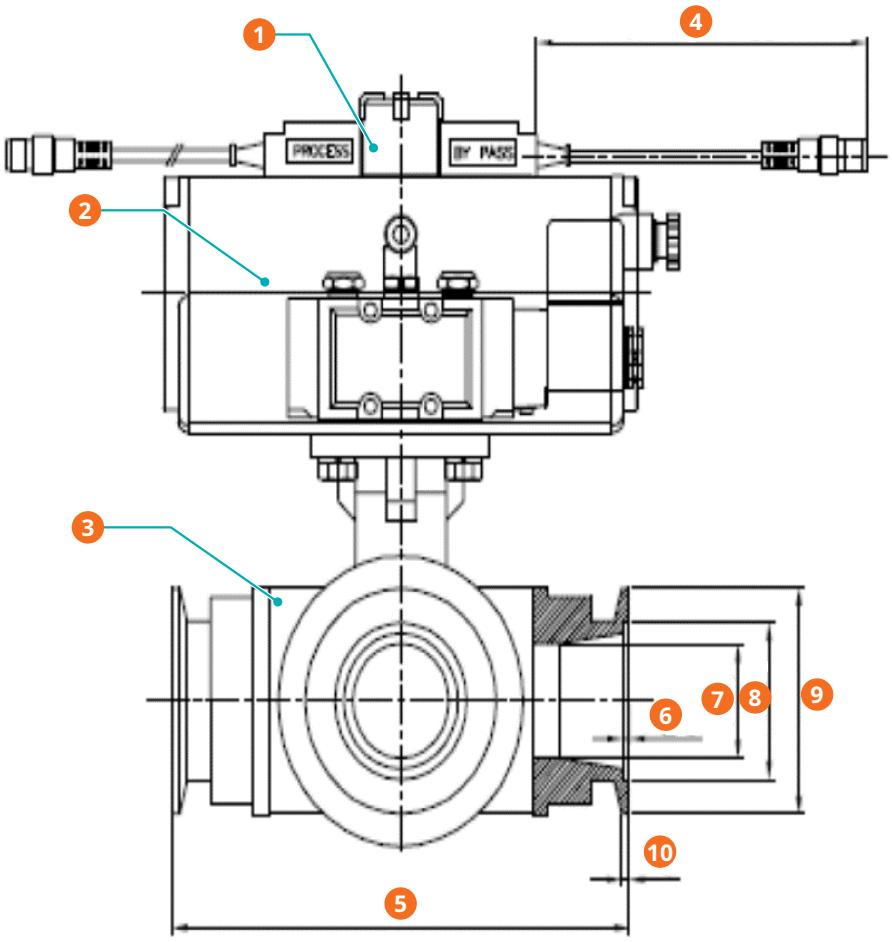
- Cylinder Unit
  - Receive the signal of the system and determines the valve location.
  - It is operated through air and the required air pressure is over 4 kg/cm2.
  - It is operated with DC 24V power. (Additional power installation not required)

Sensor Unit

- It is composed of process sensors and by-pass sensors, and they operate according to the system

Ball Valve Unit

- It is rotated by the cylinder unit and it changes the flow direction of gases.



Description			
1	Sensor Unit	2	Cylinder Unit
3	Ball Valve Unit	4	Approx. 130
5	180	6	2.5
7	Diameter 38	8	Diameter 52.2
9	Diameter 75	10	3

Fig 8.2 3-way Valve Schematic Diagram

Utility Requirements

Power: DC 24V

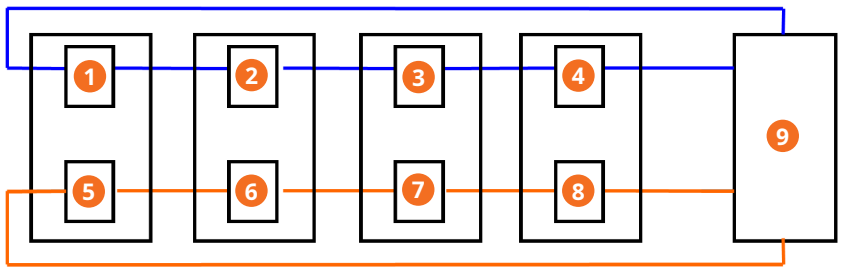
Air Pressure: 4 ~ 7kg/cm2

Installation

WARNING

After installation, implement visual inspection. If you install the valve in the opposite direction, it may cause severe damage to the process and the product.

- Installation Location: top part of the gas inlet
- Power: Connect using the DC 24V power. Additional power installation is not required.
- Signal Connection
  - It is connected as the electric part schematic diagram as follows.
  - Valve open/close error occurs if the sensors do not detect the electrical signals.
- Air Connection: It uses air connected to the existing utility.



Description			
1	Process Sensor	2	Process Sensor
3	Process Sensor	4	Process Sensor
5	By-pass Sensor	6	By-pass Sensor
7	By-pass Sensor	8	By-pass Sensor
9	PLC		

Fig 8.3 Signal Connection Electric Part Schematic Diagram

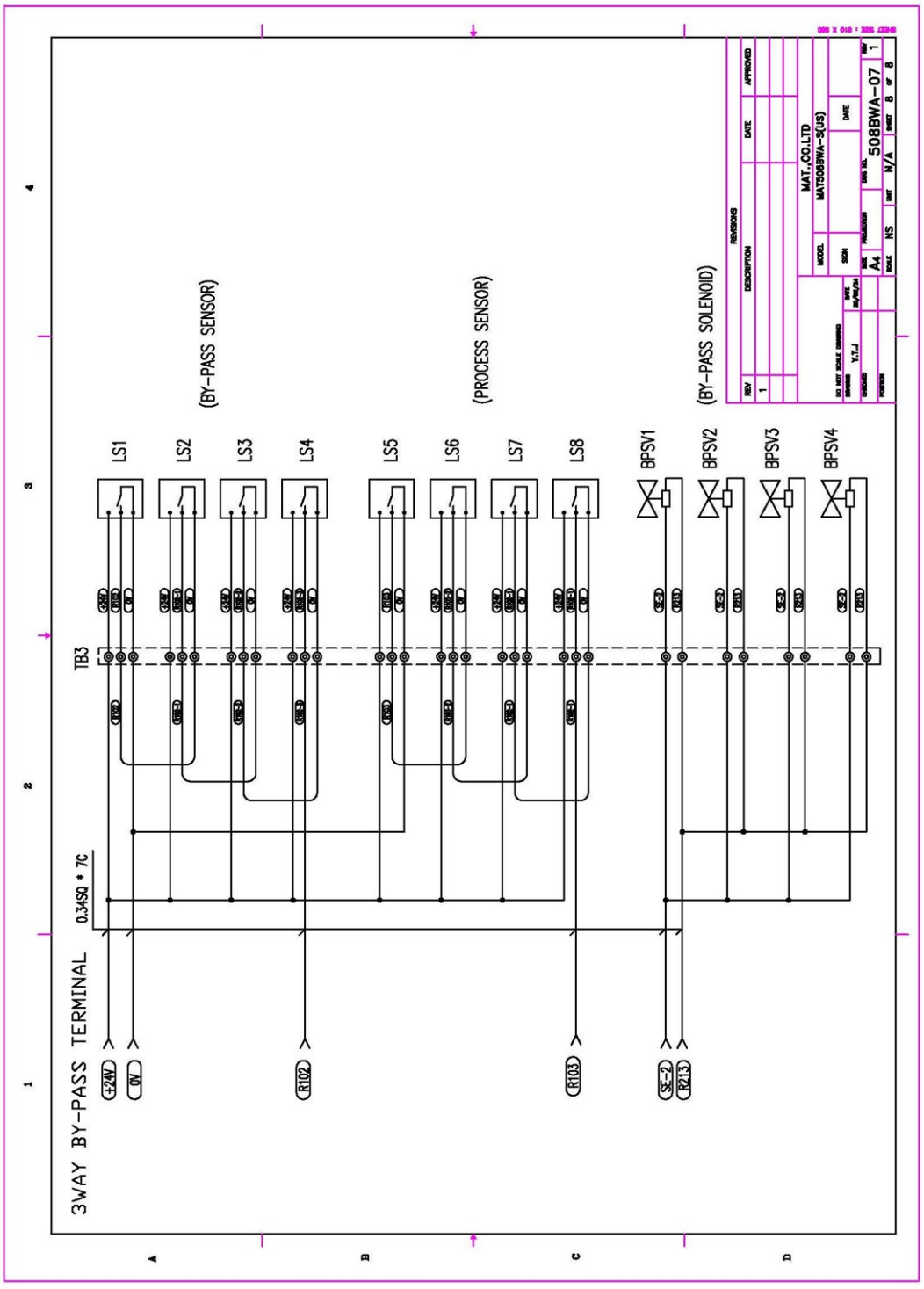


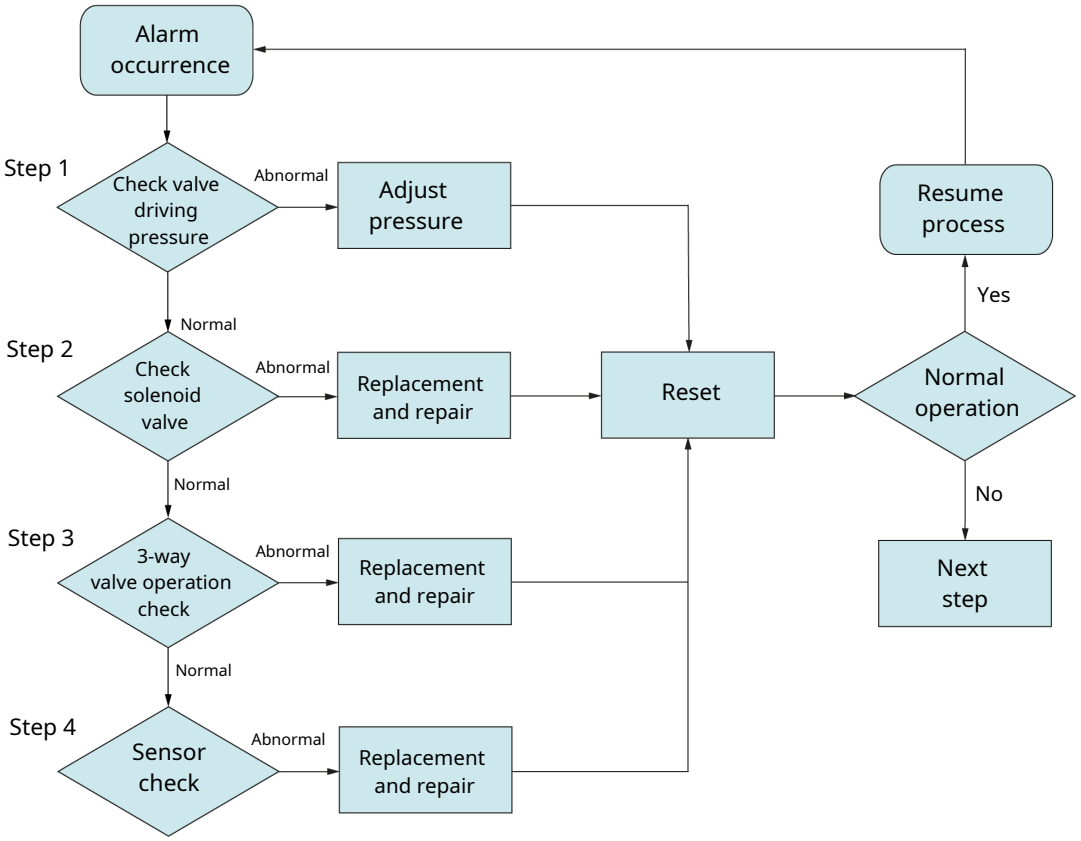
Fig 8.4 By-pass System Electric Part Schematic Diagram

Operation

- Activate the by-pass option in the option selection from the setting method.
- Although the by-pass location is fixed during normal operation status, if the by-pass system is activated, it controls the flow direction of gases according to the program signal.
- After the problems are resolved and it becomes normal operation state, the 3-way valve location is restored so that it can be processed manually in the auto mode within the alarm set time.

Trouble Shooting

- If normal operation is not possible even after implementing all the steps provided in the troubleshooting methods, contact the seller or manufacturer.
- Reset work is a work that presses the START button more than 1 second.



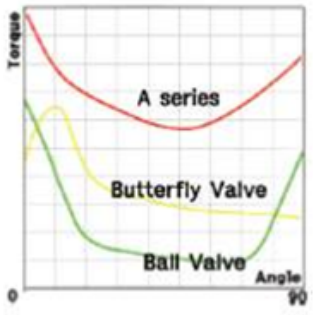
Pneumatic Pressure Torque Values

Angle		According to the pressure TORQUE(N-m)			
		4 kg/cm²	5 kg/cm²	6 kg/cm²	7 kg/cm²
0°C	CLOSE	108.3	138.7	169.1	199.5
	OPEN	69.4	84.6	99.8	115.0
45°C	CLOSE	45.6	57.0	68.4	80.8
	OPEN	43.7	55.1	65.6	76.0
90°C	CLOSE	69.4	85.2	102.6	119.7
	OPEN	88.4	111.2	134.0	156.8

Table 8.1 By-pass System Torque Values

Torque Curves

- Torque in this by-pass system as the following features.



Cylinder Volume

Cylinder volume (L)		Air Consumption
A (Close)	B (Open)	(Air Consumption, L) 4 kg/cm², 1 s
0.3	0.3	Cylinder Volume

Table 8.2 By-pass System Cylinder Volume

10 EU Declaration of Conformity

This Declaration of Conformity and the CE-markings affixed to the nameplate are valid for the machine within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

When this machine is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process for the superordinate machine or plant, issue the Declaration of Conformity for it and affix the CE-marking.

The manufacturer

MAT PLUS Co., Ltd.
31-22 Mansudong-Gil, Gongdo-Eup,
Ansung-Si, Gyeonggi-Do, 456-823
Republic of Korea

declares that the machine: P.O.U GAS ABATEMENT SYSTEM, Type designation(s): MAT1208BWA

fulfill(s) all the relevant provisions from EU directives:

- 'Machinery' 2006/42/EC
- 'Electromagnetic Compatibility' (EMC) 2014/30/EU
- 'RoHS' 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)

and comply(-ies) with the following harmonized standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN ISO 12100 : 2010	Safety of machinery - Basic concepts, general principles of design
EN 60204-1 : 2018	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN ISO 4414 : 2010	Pneumatic fluid power – General rules and safety requirements for systems and their components.
EN IEC 61000-6-2 : 2005	Electromagnetic compatibility (EMC) Part 6-2 : Generic standards. Immunity for industrial environments
EN IEC 61000-6-4 : 2007 / A1 : 2011	Electromagnetic compatibility (EMC) Part 6-4 : Generic standards. Immunity for industrial environments + A1 : 2011

Legal person authorized to compile the technical file and authorized representative in the EU (if the manufacturer is not located in the EU):

Busch Dienste GmbH
Schauinslandstr. 1
DE-79689 Maulburg

Notified Body: **SZU KOREA**

Manufacturer:

CH Kim / VP

Gyeonggi-Do, Korea / 07.2023

Notes

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Vacuum Solutions

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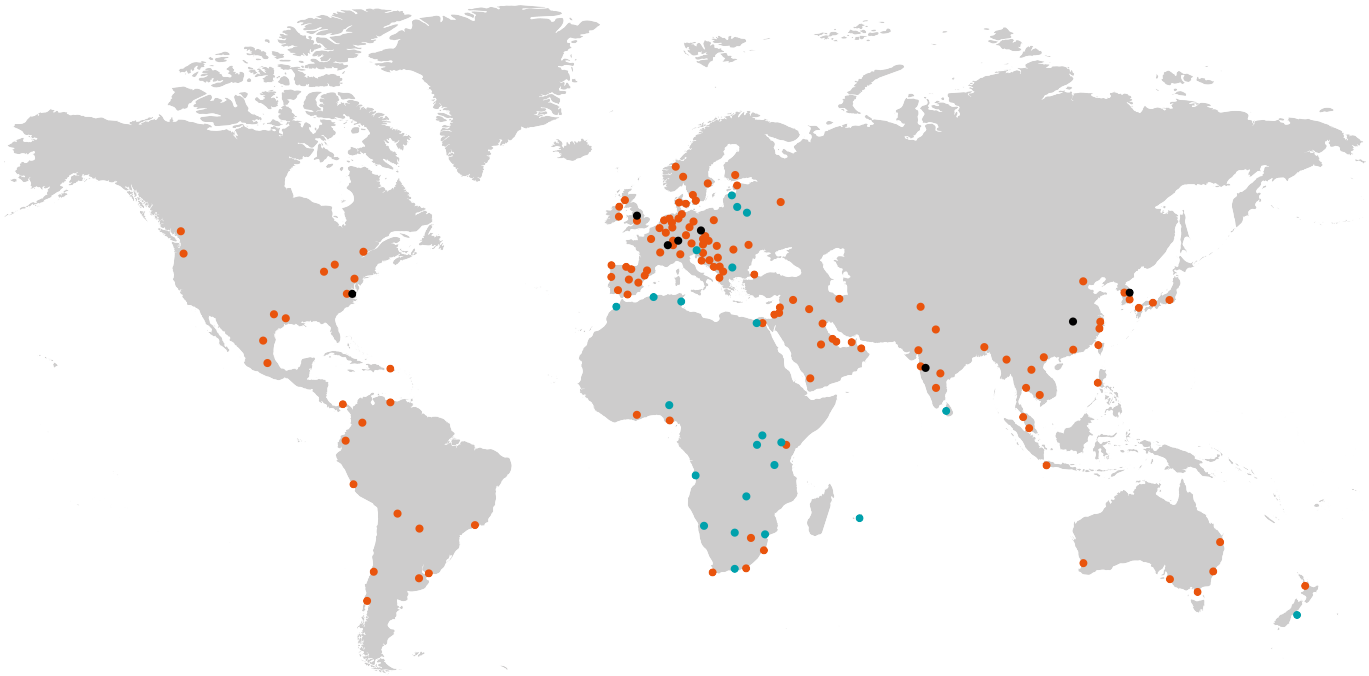

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