FRIDURIT fume scrubbers C54 and C90

Operating mode with time-controlled scrubbing liquid change and optional conductivity measurement

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1 CONSTRUCTION

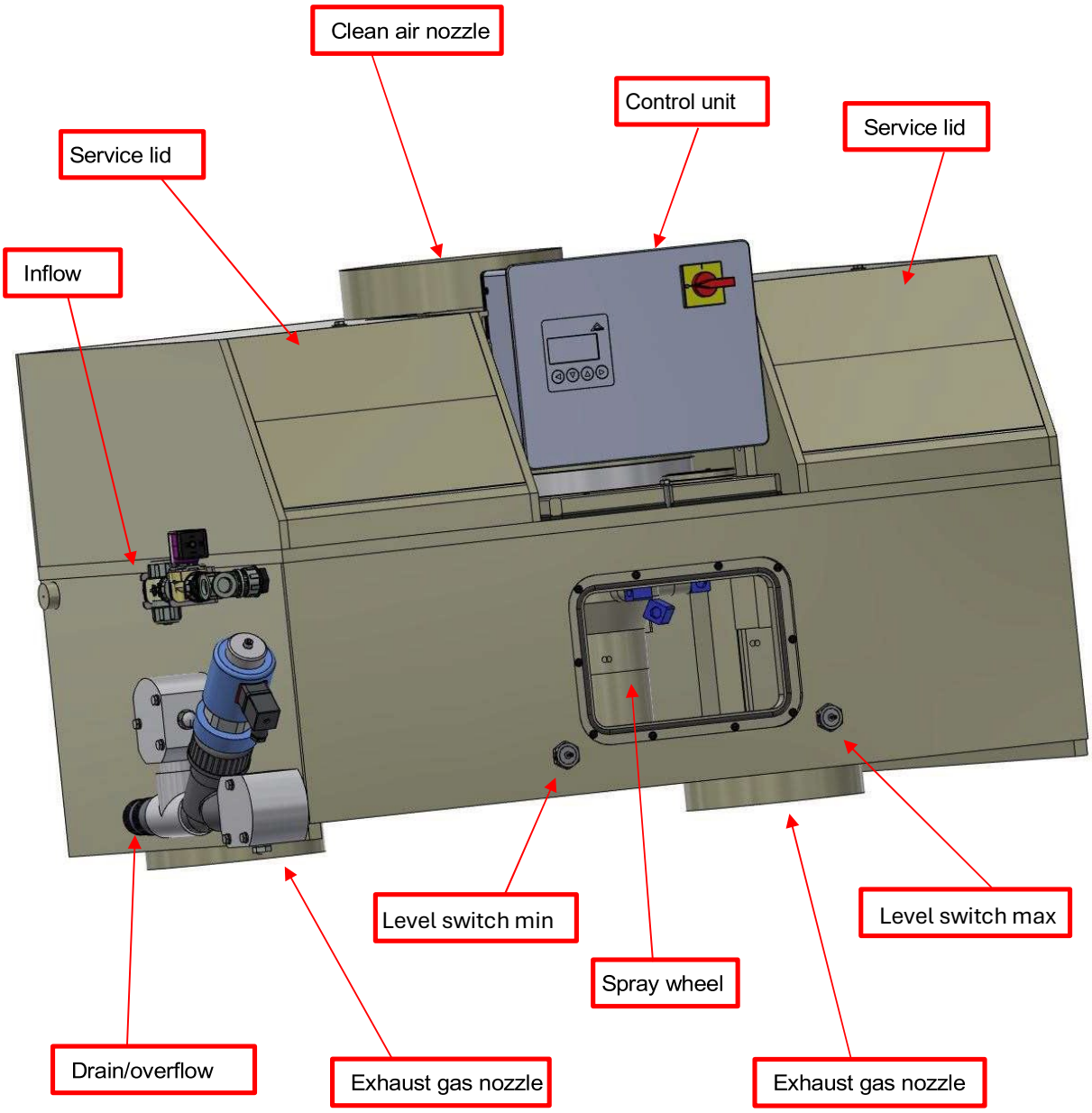

Figure 1: Structure of fume scrubber

2 PREFACE

With the FRIDURIT fume scrubber, you make an active contribution to operational environmental protection. Cleaning waste air contaminated with chemicals preserves both your laboratory and building structure. The device achieves highest absorption efficiencies with minimum noise levels and very economical operation.

The FRIDURIT fume scrubber allows for compliance with the following legal requirements:

- Observance of emission limit values for vaporous and gaseous inorganic compounds (Regulation by TA Luft, German Technical Instructions on Air Quality)
- Minimisation of harmful effects on the environment in accordance with German BImSchG (Federal Immission Control Act)
- Exhaust air cleaning directly at the fume cupboard (in accordance with EN 14175 part 7)
- Minimisation of emissions from laboratory fume cupboards (see DGUV German Social Accident Insurance, Information 213-850 “Working Safely in Laboratories “)
- Preventing the formation of toxic gases in the event of fire

The FRIDURIT fume scrubber is characterised by sophisticated technology, high-quality components from leading manufacturers and a simple and reliable design allowing easy maintenance. It is constructed in accordance with DVGW guidelines (German Technical and Scientific Association for Gas and Water) making it suitable for connection to the service water system. Certificates of inspection in accordance with TÜV (Technical Inspection Association) are available for absorption efficiencies.

3 NOTES ON THE USE OF THE OPERATING INSTRUCTIONS

3.1 User groups

User group	Task	Qualification
Skilled personnel	Installation	Skilled worker for assembly, electrician
Skilled personnel	Commissioning	service technicians
Skilled personnel	Operation	Laboratory technicians
Skilled personnel	Maintenance	Service technician
Skilled personnel	Repair and maintenance	Service technician
Skilled personnel	Decommissioning / dismantling	Service technician
Skilled personnel	Disposal	Disposal specialist
Trainees	Operation	Only after instruction by laboratory specialists
Laymen	----	Operation by laypersons is not intended

Table 1: User groups

3.2 About this instruction manual

This manual contains instructions for both operation and assembly. The operating instructions have been listed first, as they are likely to be used more frequently. As a user of the FRIDURIT fume scrubber be sure to

- read the instruction manual carefully before use

- keep the instruction manual throughout the entire service life of the device
- make it available to personnel at all times.

If you have any further questions, please do not hesitate to contact the Kyocera environmental equipment department (see cover page for contact details)

3.3 Symbols and markings

The instructions are divided into four different text elements: pure information text, procedural instructions, indications and safety instructions. Each text element can be identified as follows:

Information text: running text without markup

Indications: blue information symbol and text description

Safety instructions: yellow danger symbol with text description highlighted in grey

Symbol	Signal word	Meaning
	**Warning!**	Indicates a potentially hazardous situation caused by electrical voltage. There could be considerable damage to health or material if this warning is ignored.
	**Warning!**	Indicates a potentially hazardous situation caused by aggressive chemicals. There could be considerable damage to health or material if this warning is ignored.
	**Caution!**	Indicates a potentially hazardous situation. This could result in minor injuries and material damage if this situation is not avoided.
	**Attention!**	Indicates a potentially harmful situation. The device or objects in the vicinity could be damaged if this is not avoided.

Table 2: Safety instructions

4 INTENDED USE

The FRIDURIT fume scrubber absorbs in chemical laboratories and laboratory-like environments, usually in combination with a fume cupboard for thermal loads, the aggressive and toxic gases extracted therein and thus contributes to air pollution control and the preservation of the building fabric. The FRIDURIT fume scrubber is available in four types.

Types C54 and C 90 were developed for installation in the fume cupboard.

Types C75 and C180 are designed as free-standing units for installation next to the fume cupboard but can also be installed at other workplaces where pollutants are emitted.

These operating instructions refer to installation types C54 and C90.

4.1 Operating data / Limit values

Limit values:

Gas temperatures at scrubber inlet: +10°C to +40°C

Ambient temperature: +10°C to +35°C

Absorbable gases:

The FRIDURIT fume scrubber absorbs aggressive and toxic gases produced from substances commonly used in chemical laboratories, in particular hydrochloric acid, sulphuric acid, nitric acid, perchloric acid, hydrofluoric acid and mixtures thereof as well as water-soluble or mixable hydrocarbons such as acetone.

Mass flows up to 500 grams per hour allow absorption efficiencies exceeding 90%, depending on the pollutant. Higher concentrations can reduce absorption efficiencies.

Improper use:

The following is considered improper use of the device:

- Gases at high or low temperatures which are not permitted
- Gases containing hazardous concentrations of substances that could attack or destroy the construction or materials of the fume scrubber
- Sticky or fibrous components in the waste air
- Elements that are particularly dusty or contain solid particles in the waste air

Contact the staff at Kyocera technical department environmental equipment to discuss your specific requirements. See the front page for contact details.

4.2 Relevant documentation

- Technical description of the FRIDURIT fume scrubber
- Circuit diagrams of the FRIDURIT fume scrubber
- Technical data and pressure loss diagram
- Spare parts list
- Service information

4.3 Maintenance instructions

Proper use requires regular maintenance of the fume scrubber. Please observe the information on maintenance and servicing of the FRIDURIT fume scrubber in the following section of these operating instructions.

4.4 Product safety

Kyocera Fineceramics Europe GmbH guarantees a high-quality standard of the manufactured products through a certified quality management system (ISO 9001). All devices are subjected to a final inspection before leaving the factory.

The FRIDURIT fume scrubber may only be used if it is in perfect technical condition and in accordance with its intended use, with due regard for safety and hazards and in compliance with the operating instructions.

Faults that could impair safety must be rectified immediately. Only original spare parts from KYOCERA Fineceramics Europe GmbH may be used for repairs.

The applicable national, regional and company regulations must be observed, in particular with regard to

explosion protection, safety and accident prevention.

5 GENERAL SAFETY INSTRUCTIONS

This section specifies the general safety instructions. Please read them carefully. They are intended to prevent injury and material damage. You will also find these and more safety instructions at the respective positions in the text.

5.1 Operation

Warning! Corrosive aerosols!

Risk of chemical burns from acid fog leakage!

Do not take the cover off the device during operation!

Warning! Corrosive aerosols!

Risk of chemical burns due to contact with contaminated exhaust air!

The exhaust air after the fume scrubber contains a low residual pollutant content. Therefore, no maintenance work may be conducted on or near the fan outlet during work in the fume cupboard.

5.2 Assembly and installation

Attention!

Make sure that the assembly and any other work on the FRIDURIT fume scrubber are carried out by specialised personnel only. Always comply with this instruction manual and the standards applicable.

Warning! Electrical voltage!

Risk of electric shock due to improper connection!

The electrical connection of the FRIDURIT fume scrubber must only be carried out by a qualified electrician. Always consider and comply with the standards applicable.

Warning! Corrosive chemicals!

Risk of chemical burns and material damage due to leaking scrubbing liquid!

Do not reduce the cross-section of the drain and overflow pipes and do not fit with a shut-off device (e.g. a ball valve)! Do not damage seal rings during assembly!

Warning! Corrosive chemicals!

Risk of chemical burns from acid fog leaking from the fume cupboard when exceeding the maximum fan air-flow capacity!

Ensure correct fan dimensioning!

5.3 Maintenance

Warning! Electrical voltage!

Risk of electric shock and material damage when working on the electrical parts of the fume scrubber!

First set the main switch to position “0” or disconnect from the main power supply!

Warning! Corrosive chemicals!

Risk of chemical burns from accidents with chemicals!

Wear protective goggles, gloves and clothing when carrying out any work (especially cleaning) on the FRIDURIT fume scrubber! Consider local safety guidelines! Avoid skin contact with the scrubbing liquid!

6 PERFORMANCE DESCRIPTION

6.1 System properties

Materials:

All construction parts of the FRIDURIT fume scrubber in contact with media are made of chemically stable plastics. The fume scrubber’s housing and parts of the spray wheel in contact with media are made of polypropylene (PP). Other construction materials are acrylic glass (PMMA), fluoropolymer (FPM) and ethylene / propylene rubber (EPDM).

Control system:

The control and monitoring elements necessary for use are accommodated in a compact plastic switch box that has been fully integrated in the fume scrubber housing. The use of a modern, electronic control systems guarantees safe operation of the FRIDURIT fume scrubber. Numerous interfaces allow the control system to be linked simply and flexibly to other components and customer equipment.

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Corrosion protection:

The FRIDURIT fume scrubber can be used to prevent corrosion damage to exhaust air pipes, fire protection and control flaps, silencers as well as the roofing and other parts of a building. It contributes considerably to enhancing the service life of parts.

Fire behaviour:

When the spray wheel rotates, the FRIDURIT fume scrubber virtually acts as a flame arrester. Polypropylene is the material that is mainly used. It does not release toxic gases in case of fire.

6.2 Scope of supply

The FRIDURIT fume scrubber comprising an integrated control system is supplied complete and ready for use. The scope of supply comprises:

- FRIDURIT fume scrubbers C54 and C90 with integrated spray wheel and built-in, pre-installed separators ready for use.
- Kyocera switch box comprising the electronic control system and a pre-assembled supply cable (partly pre-assembled with plug-in connector).
- Accessories included (mating connector for plug-in connector, fixing devices).
- Technical documentation comprising instruction and assembly manual, fume scrubber and accessories, circuit diagrams etc.

7 DESCRIPTION OF EQUIPMENT

7.1 Operation of the equipment

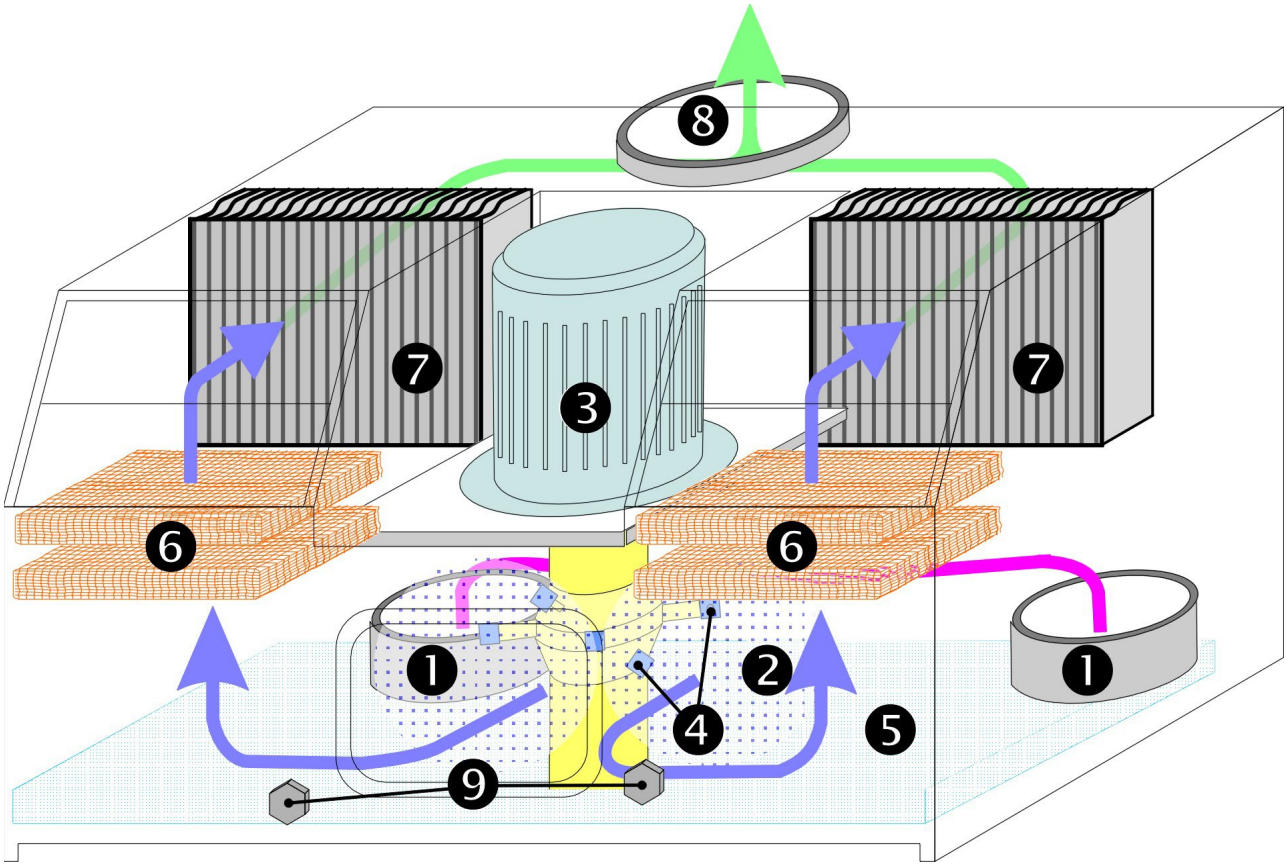


Figure 2: Description of operation

Equipment components:

❶ Noxious gas socket
❷ Absorption chamber
❸ Spray wheel
❹ Spray nozzles
❺ Scrubbing liquid reservoir
❻ Agglomerators
❼ Droplet separators
❽ Clean air socket
❾ Level switches

Airstreams in the device are illustrated with arrows.

Negative pressure generated by the fan absorbs the noxious gases produced during the process via two noxious gas sockets ❶ and releases them into the absorption chamber ❷ of the FRIDURIT fume scrubber. The patented spray wheel ❸, which has been developed especially for this purpose, performs two functions at the same time:

1. It absorbs the scrubbing liquid from the reservoir tank ❺.
2. Spray nozzles ❹ nebulise the scrubbing liquid distributing it evenly into the absorption

This ensures that the noxious gases are optimally mixed with the scrubbing liquid leading to a highly effective degree of absorption. The intense swirling and mixing of waste air, noxious gases and liquid fog allows absorption efficiencies in excess of 90% for acids most commonly used in laboratories.

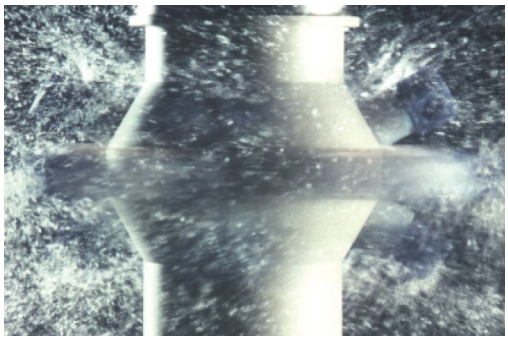


Figure 3: The atomised spray system

Separators i.e. agglomerators ❻ and droplet separators ❼ separate the atomised spray from the waste air. The scrubbed waste air is dried at the separators before leaving the fume scrubber through a clean air socket ❽.

The fine droplets of scrubbing liquid spray enriched with chemicals condense on the plastic netting of the agglomerators ❻becoming larger drops of water that are fed back through the droplet separators ❼ into the scrubbing liquid reservoir.

Two level switches ❾ regulate the level of scrubbing liquid. Reaching a preset filling level, the controlled solenoid valve stops the water supply automatically. In order to prevent unlimited overfill in the event of a fault in the operation of the level switches or the solenoid valve, the water supply automatically cuts off after a preset period of time. The scrubbing liquid is changed automatically after the preset conductance (lower limit value) has been reached. The FRIDURIT fume scrubber remains fully effective when the scrubbing liquid is being changed.

A fan is required for operation. It is not integrated in the scrubber and must be installed by the customer on the clean air side of the building wall.

7.2 Electronic control system

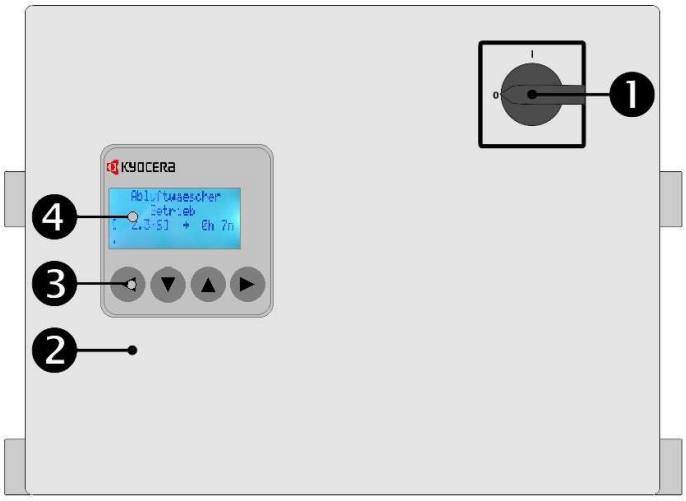


Figure 4: Switch box

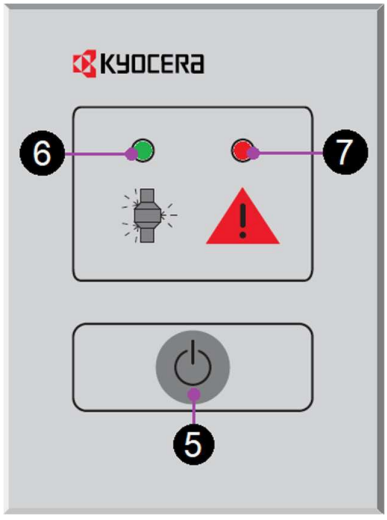


Figure 5 Operating module

The main switch (1) is used to turn the entire control system on or off.

The integrated transmitter (2) shows the current measured value of the scrubbing liquid and monitors the preset limit values via the electronic control system inside the switch box. The face membrane keyboard (3) is required for service functions, such as setting of limit values. The alphanumeric text display (4) shows measured values, unit status and failure modes.

The operating module button (5) allows the user to switch off the fume scrubber when requested by ventilation. This function may be deactivated due to requirements from the laboratory operators. The operating light (6) and fault light (7) on the operating module allow the unit status to be monitored. In the event of a failure, the cause is shown in the bottom line of the text display. Please refer to the error table in chapter 8.8 to identify faults and the measures to be taken to correct them.

8 OPERATING INSTRUCTIONS

8.1 Before starting

Please note the following requirements and instructions before using the device for the first time:

Attention! Risk of damage to equipment due to improper putting into service!

First putting into service should be carried out by a qualified technician from Kyocera service organisation. See the front page for more information.

Attention! Risk of scaling!

Water quality should have a maximum total hardness of 10°dH (German degree of hardness) i.e. 12.522°eH (English degree of hardness/UK) or 10.426 gr/gal (US). If this value is exceeded, we recommend feeding the fume scrubber with purified water such as deionised water!

8.2 Operation

Warning! Corrosive scrubbing liquid!

Risk of chemical burns due to scrubbing liquid escaping when covers are removed! Do not open or remove any covers during operation!

Caution! Danger if the appliance malfunctions!

In the event of a fault, the instructions in section 8.8 must be observed!

When operating the FRIDURIT fume scrubber, the following procedure is recommended:

1. Switch on the control system of the FRIDURIT fume scrubber by turning the main switch to position “1”. Make sure that the main switch is always in position “1” and only set to position “0”, i.e. switch off, when carrying out work on the electrical control system.
2. Generally, the fume scrubber and ventilation system switch on automatically. The scrubbing liquid is changed automatically after a preset time. If conductivity measuring is installed, this can start the liquid change before the set time.
3. Open the stop valve of the fume scrubber to ensure water supply.

8.3 Text display and keypad

The text display and keypad on the front of the control unit can be used to display values and make settings. Each press of one of the 4 buttons switches on the display backlighting. A short press on the button ▶ takes you to the main menu. The user has the following options there:

- Settings
- Maintenance / Service
- Display actual values

The cursor can select the individual menu items by pressing the ▼ and ▲ buttons. Pressing the ▶ button takes you to the selected menu. Press the ◀ button to exit the main menu.

8.4 Set target values

The setpoint settings can be adjusted using the keypad on the front of the control unit. Optional settings depend on additional components. The devices are generally preset at the factory, so that not all settings may be displayed.

Nr.	Settings	Functions	Area
1	Time value for scrubbing liquid change	Depending on the operating time, part of the scrubbing liquid is drained and replaced with fresh water. This reduces the concentration of pollutants in the liquid. Note: If 0 h is set, the time-controlled scrubbing liquid change is deactivated.	Min: 0 h Max: 999 h Step: 1 h Pre-set: 16 h
2	Switching point conductance	With the optional conductivity measurement in the scrubbing liquid, the scrubbing liquid change is initiated when the set switching point is reached. Note: If 0 h is set, the switching point is deactivated and the measured value indication in the display is suppressed.	Min: 0,0 mS Max: 50,0 mS Step: 1,0 mS Pre-set: 0,0 mS
3	Reminder for regular maintenance	Even little-used systems will only function reliably in the long term if they are cleaned and maintained regularly. The maintenance indicator reminds the user to have the necessary work conducted.	Min: 60 days Max: 720 days Step: 30 days Pre-set: 360 days
4	Monitoring of the downstream wastewater system	The scrubbing lieuid change is blocked if, for example an optional neutralisation system is not ready for filling. If the monitoring time is exceeded, a fault in the neutralisation system could be the cause. **Note:** For further information on potential causes of faults, please refer to the documentation for the neutralisation system. **Note:** If 0 h is set, monitoring is deactivated	Min: 0 min Max: 1440 min Step: 60 min Pre-set: 600 min
5	Dosing quantity for algaecide adjust	The dosing pump for algaecide dosing is activated once a day (every 24 h). The switch-on time of the dosing pump determines the quantity dosed.	Min: 1 sek Max: 600 sek Step: 1 sek Pre-set: 10 sek
6	Setting the time for monitoring the inlet solenoid valve when filling the exhaust air scrubber	The opening time of the inlet solenoid valve after switching on or after changing the scrubbing liquid is monitored. If the set time has elapsed, the water inlet is blocked and an error message is issued. The system must be switched off and on again to clear the error message.	Min: 150 sek Max: 900 sek Step: 30 sek Pre-set: 300 sek
7	Set the time for monitoring the inlet solenoid valve when refilling the scrubbing liquid	The opening time of the inlet solenoid valve for refilling the scrubbing liquid in normal operation is monitored. If the set time has elapsed, the water supply is blocked and an error message is issued. The system must be switched off and on again to delete the error message.	Min: 30 sek Max: 300 sek Step: 30 sek Pre-set: 120 sek
8	Set the time for monitoring the drain solenoid valve	The opening time of the drain solenoid valve during the scrubbing liquid change is monitored. If the set time has elapsed, the scrubbing liquid change is stopped and a message is issued. The message is automatically deleted before the next scrubbing liquid change.	Min: 150 sek Max: 900 sek Step: 30 sek Pre-set: 300 sek

Nr.	Settings	Functions	Area
9	Setting the filter time for the motor protection alarm message	The motor protection relay permanently monitors the operating current of the spray wheel motor. Triggering of the relay is reported to the control unit and causes the fume scrubber to switch off. The filter time prevents brief interference pulses on the lines from switching off the fume scrubber. If possible, this setting should only be changed after consulting the manufacturer.	Min: 5 sek Max: 250 sek Step: 5 sek Pre-set: 10 sek
10	Setting the filter time for the phase monitoring alarm message	The phase monitoring relay permanently monitors the symmetry of the electrical supply line. Triggering of the relay is reported to the control unit and causes the fume scrubber to switch off. The filter time prevents brief interference pulses on the lines from switching off the fume scrubber. If possible, this setting should only be changed after consulting the manufacturer.	Min: 5 sek Max: 250 sek Step: 5 sek Pre-set: 10 sek
11	Setting the filter time for the option input	The optional input is used for different tasks depending on the function of the fume scrubber. The filter time prevents brief interference pulses on the ducts from switching off the fume scrubber. If possible, this setting should only be changed after consulting the manufacturer.	Min: 1 sek Max: 15 sek Step: 1 sek Pre-set: 2 sek
12	Changing the operating language	The operating language in the display can be set here. The adjacent languages are stored in the software. **Note:** The control unit is restarted after changing the language	German English French Spanish
13	Set Modbus address	With an optional interface adapter, several fume scrubbers can be networked in order to query the data at a central point. To do this, the individual fume scrubbers must be assigned different addresses. The address is set here.	Min: #1 Max: #127 Step: #1 Pre-set: #1

Table 3: Setting setpoints

8.5 Automatic scrubbing liquid change

Appropriate device settings allow the scrubbing liquid to be changed automatically. This requires an effective downstream neutralisation unit that is usually monitored by the fume scrubber control system. The scrubbing liquid change function will not start if there is any failure.

By law, the scrubbing liquid must be discharged into a neutralisation unit, as the liquid can have an acid content of up to 2%.

The automatic scrubbing liquid change of FRIDURIT fume scrubbers starts in accordance with the limit value set in the device control system.

8.6 Menu item Maintenance / Service Show Current Actual Values on the Display

Operating the Maintenance / Service menu requires knowledge of the effects of selecting the items. Manual-complete draining should only be carried out by service personnel for maintenance and repair purposes. Please observe the following safety instructions:

Caution! Corrosive chemicals!

Risk of chemical burns and material damage due to leaking scrubbing liquid!

Check that the neutralisation unit is fully effective before manually starting the scrubbing liquid change!

Please note that when changing the scrubbing liquid manually using the keypad, the downstream unit will not be monitored by the fume scrubber control unit. Check that the neutralisation unit is fully functional before starting to change the scrubbing liquid and prevent possible leakage of scrubbing liquid.

8.7 Show current actual values on the Display

Operating values that have been saved in the electronic control of the fume scrubber can be checked on the display in the menu under "Show actual values". The values have the following meaning:

Description
Display value "Total operating hours" The operating time of the fume scrubber is recorded to the minute and the operating hours performed to date are displayed.
Display value "value drain cycles" This value is increased by 1 after each scrubbing liquid change. The scrubbing liquid change cycle includes emptying the exhaust air scrubber and refilling it.
Display value "value fault motor >" If the thermal protection relay of the spray wheel motor is activated, the display value increases by 1. The motor is probably overloaded. The value is permanently stored in the non-volatile memory of the fume scrubber and is used to inform the Kyocera service technician and as an aid for troubleshooting.
Display value "value filltime >" If the solenoid valve in the freshwater inlet of the fume scrubber is activated for filling after the fume scrubber has been switched on or after the emptying process when changing the scrubbing liquid, the set time for the filling process is set (see Making settings) and reduced by 1 to the second. If the value 0 is reached without the upper float switch having signaled the maximum fill level, the display value increases by 1. There is probably a fault in the fresh water supply. The value is permanently stored in the non-volatile memory of the fume scrubber and is used to inform the Kyocera service technician and as an aid for troubleshooting.
Display value "value refilltime >" If the solenoid valve in the freshwater inlet of the fume scrubber is activated for filling during operation, the set time for the refilling process is set (see Making settings) and reduced by 1 to the second. If the value 0 is reached without the upper float switch having reported the maximum fill level, the display value increases by 1. There is probably a fault in the fresh water supply. The value is permanently stored in the non-volatile memory of the fume scrubber and is used to inform the Kyocera service technician and as an aid for troubleshooting.
Display value "neutra interlock >" Input I4 of the fume scrubber control must either be linked to a downstream wastewater system (e.g. neutralisation system) or permanently activated by a short-circuit bridge. If the contact for this input is not closed, the value for monitoring is reduced by 1 to the minute. If the counter value reaches 0, the display value increases by 1. There is probably a fault in the downstream system. The value is permanently stored in the non-volatile memory of the fume scrubber and is used to inform the Kyocera service technician and as an aid for troubleshooting.
Display value "value draintime >" If the solenoid valve in the drain of the fume scrubber is activated when the scrubbing liquid is changed, the set time for the emptying process is set (see Making settings) and reduced by 1 to the second. If the value 0 is reached without the lower float switch having reported the minimum fill level, the display value increases by 1. There is probably a fault in the drain valve or a blockage in the drainpipe. The value is permanently stored in the non-volatile memory of the fume scrubber and is used to inform the Kyocera service technician and as an aid for troubleshooting.
Display value "Last/next maintenance" Left value: Days since last maintenance, right value: Days until next maintenance. A counter in the electronic control unit is incremented by the value 1 once a day. After reaching the setting value (see Making settings) for the maintenance message, the fume scrubber signals that the annual maintenance is due. The symbol flashes in the scrubber symbol on the basic screen: Kyocea Service cleans and checks the fume scrubber and resets the counter to the value "0" after maintenance has been completed.

Table 4: Display actual values.

8.8 Troubleshooting

If the FRIDURIT fume scrubber does not function as described in the manual, please check common fault sources and remedies in this overview of faults and errors.

To request the Kyocera service, please use the contact options described on the cover sheet.

Failure	Cause	Remedy
The device does not switch on.	The main plug is not connected to the power supply.	Connect the mains plug to the mains supply by plugging it into the mating connector.
	Control system switches are not in the correct position.	Turn the main switch to position “1”. (Attention! Scrubber may start immediately)
	The supply cable to the fume cupboard is not energised. Have it checked by an electrician.	Switch on the operating voltage.
	The ventilation-side release is missing.	Check ventilation interface.
No scrubbing liquid is fed.	The water supply to the fume scrubber is shut off	Open the shut-off valve slowly.
	The water supply to the fume scrubber is faulty (on-site water treatment).	If a water treatment system is installed on site (e.g. demineralized water system), this can also impair the function of the fume scrubber in the event of a fault.
	The connection plug is not screwed onto the solenoid valve correctly.	Screw the connection plug on tightly.
	No water feed after successful recovery of fault sources 1 and 2.	Contact Kyocera service.
The red fault light on the operating module flashes.	The text display shows the cause of the failure. The causes can be:	
	Motor protection tripped.	Contact Kyocera service.
	“Fresh water filling".	See point "No scrubbing liquid is fed". Please contact Kyocera Service if this error occurs frequently.
	“Fresh water re-filling".	See point "No scrubbing liquid is fed". Please contact Kyocera Service if this error occurs frequently
	“Locking time >>>"	Inspection of the wastewater treatment plant (Neutralisation system).
	Phase error supply line.	Check the supply line (possible phase failure or incorrect phase sequence). Please contact the Kyocera Service if this error occurs frequently.
The green operating light on the operating module flashes.	The text display indicates the message. The messages can be:	

Failure	Cause	Remedy
	„Drain time limit “	It has taken too long to empty the scrubber. If this message occurs several times, the device should be inspected by service staff.
	“Maintenance necessary.”	The preset time interval for maintenance has been reached. Contact Kyocera service to carry out maintenance work.

Table 5: Troubleshooting

8.9 Serial Modbus interface

The values described above can also be called up and partially changed via the serial interface.

Commercially available devices that support the MODBUS RTU master protocol can be used for this purpose. The registers for reading in and out the data are described in the table in the appendix.

9 MAINTENANCE AND SERVICING

9.1 Maintenance

The FRIDURIT fume scrubber requires very little maintenance due to its design and high-quality components. Nevertheless, it is necessary to have maintenance carried out at least every 12 months - even for appliances that are not used very often - as otherwise considerable material damage may occur due to material fatigue.

Servicing operations may only be carried out by specialised personnel i.e., members of Kyocera service organisation. Further regular inspections of the device can be carried out by the operator.

Please comply with the following safety instructions. KYOCERA Fineceramics Solutions GmbH does not assume any liability or warranty for damage or consequential damage arising from non-compliance with these instructions!

Warning! Electrical voltage!

Risk of electric shock and material damage when working on the electrical parts of the fume scrubber!

Turn the main switch to position “0” to disconnect the control system from the main power supply!

Warning! Corrosive chemicals!

Risk of chemical burns from accidents with chemicals!

Wear protective goggles, gloves and clothing when carrying out any work (especially cleaning) on the FRIDURIT fume scrubber! Consider local safety guidelines! Avoid skin contact with the scrubbing liquid!

Attention! Risk of water damage caused by leakage!

Check the feed hose regularly for brittleness caused by ageing and replace it in suitable time (see Chapter 10.3).

9.2 Maintenance plan

The maintenance and inspection plan gives an overview of maintenance and inspection operations that should be carried out regularly. You can find the spare parts list in the Appendix.

Maintenance and inspection work	Performed by	Maintenance interval*
Visual check for leaks in the valves, housing and connection hoses.	Operator	Monthly
Check that plug-in connections on the fume scrubber and the valves are seated firmly.	Kyocera service personnel	Annually
Check the functionality of conductance measuring and cleaning. Calibrate if necessary.	Kyocera service personnel	Annually
Make a visual check of the absorption chamber for deposits (sludge) on the floor.	Kyocera service personnel	Annually
If deposits are found, drain off scrubbing liquid as fully as possible and thoroughly hose out the interior.	Kyocera service personnel	Annually*
Complete inspection of the unit i.e. cleaning the interior, absorption systems and spray wheel. Check the entire control system.	Kyocera service personnel	Annually*

Table 6: Maintenance schedule

Intensively used units (e.g., 24-hour operation) require shorter maintenance intervals.

Reduce the maintenance intervals if the unit is exposed to severe chemical contamination by concentrated acids and alkalis or if extremely dirty.

9.3 Cleaning

The interior, spray wheel and absorption systems will be cleaned when the KYOCERA service personnel carry out servicing operations (see *Maintenance and inspection plan*).

Attention! The surface of the equipment is scratch-sensitive!

The housing can be scratched if aggressive and abrasive detergents are used! Use only mild detergents when cleaning the housing.

10 ASSEMBLY AND INSTALLATION (ASSEMBLY INSTRUCTIONS)

10.1 Before mounting

Quality control

Each FRIDURIT fume scrubber leaves the factory in perfect condition and has been subjected to strict quality control. Make sure that the device you have received is complete and undamaged and make a

1. visual inspection of the packaging for signs of external damage
2. visual inspection of the equipment for external defects after unpacking

Checking delivery

Should any defects be found, please submit a written complaint to Kyocera within five working days after delivery, stating the order number and reason for the complaint. Our service personnel will either repair the equipment on your premises or, if necessary, replace it.

Unpacking

When transporting and unpacking the equipment, please consider the following safety instructions and precautions to prevent damage to the device and injury to personnel.

Caution during transport! The equipment is heavy!

Risk of injury and damage to the equipment!

Secure the equipment during transport against collisions to prevent it from falling!

Caution when loosening the transport straps! The straps have sharp edges!

Risk of hand and eye injuries when loosening the transport straps!

Please wear protective gloves and goggles!

Caution! The surface of the device is sensitive!

The housing can be damaged by handling pointed and sharp objects! Be careful when removing the packaging!

Caution! Securely fasten the appliance and fixtures!

Only use suitable tools and fastening materials when fastening and connecting the appliance and built-in components! Be careful when tightening fastenings and connections, risk of chipping with the tool.

Environmental protection and packing

Our Kyocera environmental devices have been used for several years to protect the environment and building fabric. In order to continue to take environmental protection into account, the packaging required for safe packaging required for safe transportation has been reduced to a minimum. We therefore ask you to observe the following recommendations when disposing of packaging materials:

- please dispose of packaging cardboard as recyclable material at the waste recycling facility provided in your district.
- the packaging film is made of polyethylene (PE) and can be recycled. Please also dispose of it as recyclable material for waste recycling.
- the conveyor belts are made of glass fiber reinforced plastic to ensure the required stability. They must be disposed of as residual waste.
- the disposal of the wooden pallets is taken over by the municipal waste disposal companies. Please

contact your city or municipal administration.

10.2 Mounting

FRIDURIT fume scrubbers are kept as compact as possible for mounting in fume cupboards. Types C54 and C90 are usually installed directly into the cupboard ceiling, types C75 and C180 next to the fume cupboard. They can be easily incorporated into existing units.

This manual refers to built-in types C54 and C90. Please note the following to ensure fault-free operation of these scrubber types:

- The base for the FRIDURIT fume scrubber must allow level installation of the equipment.
- When designing the base and fixtures, the filled weight of the fume scrubber must be taken into account (see Technical Data in the Technical description).
- Due to the design, both side walls of the fume scrubber protrude approx. 18 mm over the lower edge. Thus, the equipment cannot be placed directly on the base and should be placed on vibration dampers (see figure 6).

Provide space for servicing and maintenance operations:

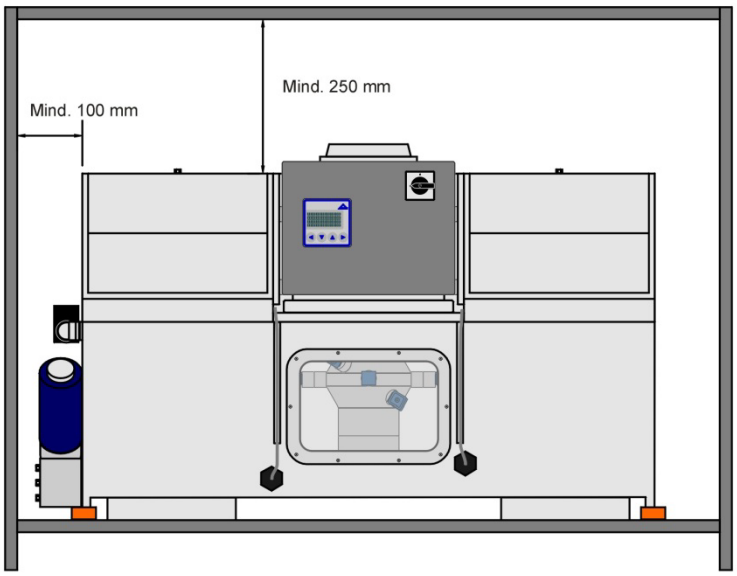
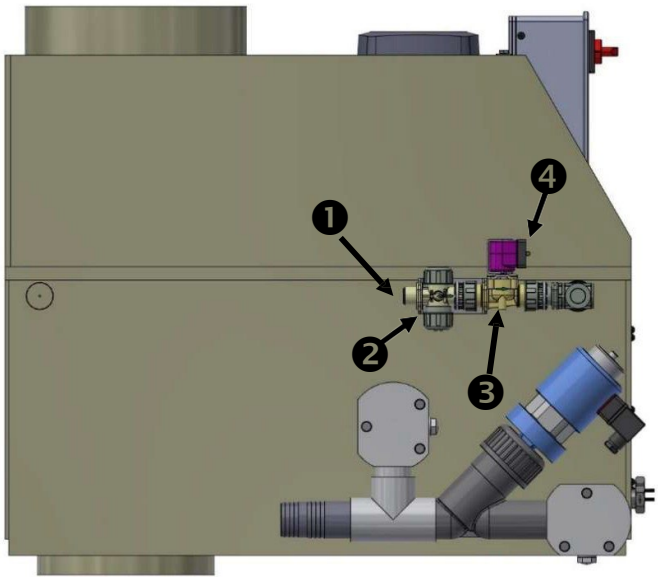


Figure 6: Mounting

- 250 mm between the upper edge of the fume scrubber and the upper edge of the top of the fume cupboard or the ceiling.
- 100 mm between the left-hand side of the fume scrubber and the cupboard wall.

10.3 Sanitary connections

Inlet



❶ Water inlet ½ inch external thread

❷ Strainer with shut-off function

❸ Inlet solenoid valve

❹ Connecting plug

Figure7: Sanitary connections – feed fittings

The feed fittings consist of a water inlet comprising a manual ball valve ❶, a soil trap ❷ and the solenoid ball valve ❸. It is located on the left side of the fume scrubber. A hose or pipe connection links the water inlet with the freshwater pipe. A plug ❹ connects the solenoid valve with the control system.

If the water supply is suppressed during operation, a message appears after a parameterizable time to draw attention to the malfunction.

Water pressure should be at least 2.5 bar in the inlet. It is recommended that the scrubbing water inlet is connected to the drinking water supply. Hard water with total hardness >10°dH (German degree of hardness) i.e. 12.522°eH (English degree of hardness/UK) or 10.426 gr/gal (US) risks calcification of the system, treated water should be fed in as an alternative.

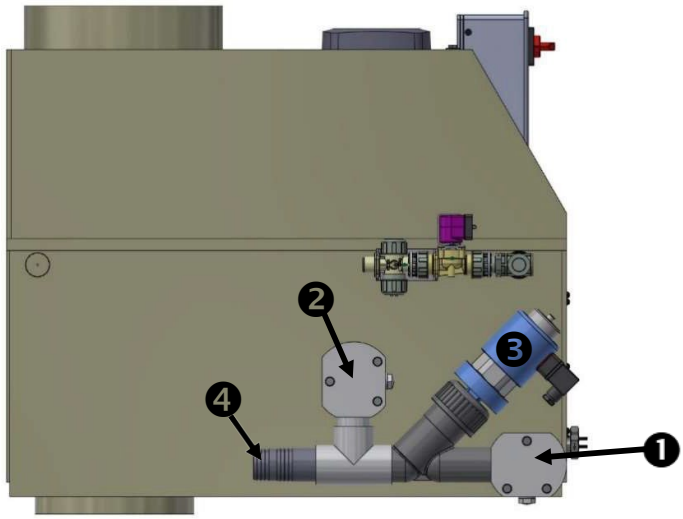
A connecting hose for the freshwater inlet is part of the optional hose set and is available as an accessory together with the drain hose. The inlet hose consists of a metal-reinforced polyethylene hose with nickel-plated brass connections.

The inlet hose is under pressure and is subject to age-related embrittlement. It is therefore recommended to replace the hose with a new one after 10 years at the latest.

Attention! Risk of contamination when feeding with polluted water!

Only use purified or drinking water. Feed with purified water such as deionised water if total hardness exceeds 10°dH (German degree of hardness) i.e. 12.522°eH (English degree of hardness/UK) or 10.426 gr/gal (US)!

Outlet



❶ Drain connection

❷ Overflow connection

❸ Solenoid drain valve

❹ Hose nozzle (interior ∅ 30 mm, external ∅ 40mm)

Figure 8: Sanitary connections - drain/overflow

The FRIDURIT fume scrubber's outlet is used to empty the device when automatically changing the scrubbing liquid and as a safety overflow. When connecting to the downstream neutralisation unit, we recommend using a PVC fabric tube with internal Ø 38 mm, i.e. a drain hose. This hose is resistant enough to the chemicals contained in the scrubbing liquid. A matching inlet and outlet hose set with stainless steel hose clamps can be ordered as an accessory from KYOCERA.

The drain fittings (Figure 8) are located on the left side of the fume scrubber. They comprise a connection piece for the outlet ❶, a solenoid drain valve ❸ and a connection piece for the overflow ❷. The drain fittings can be detached allowing the overflow hose to be connected even if space is restricted.

Please note the safety instructions before assembly:

Warning! Corrosive chemicals!

Risk of chemical burns and material damage due to leaking scrubbing liquid!

Do not reduce the cross-section of the drain and overflow pipes and do not fit a shut-off device!

Do not damage seal rings during assembly!

Please assemble the equipment as follows (see Figure 8):

1. First unscrew the drain fittings.
2. Attach the drain hose ❶ to the hose nozzle ❹ and fix the hose using a hose clip.
3. Run the drain hose past the rear wall of the fume cupboard.
4. Screw the drain fittings back on to the fume scrubber.

10.4 Electrical connections

Connecting the FRIDURIT fume scrubber

Warning! Electrical voltage!

Risk of electric shock due to improper connection!

Have a qualified electrician carry out the electrical connection of the FRIDURIT fume scrubber. Please note and apply the applicable DIN-VDE specifications and standards (DIN German Institute for Standardization / VDE Association for electrical, electronic & information technologies).

The FRIDURIT fume scrubber is connected to the mains supply using a GST 18i5 or CEE 16 amps plug connector. The plug connection allows reliable disconnection of the control system from the power supply when it is serviced. The neutral wire must be used in all cases. Otherwise faults in the operation could occur or the individual components can be destroyed.

Warning! Electrical voltage!

Risk of electric shock due to improper work!

This work requires the control system housing to be open. Its connections L1, L2 and L3 are energised, even when disconnected from power!

Disconnect the fume scrubber and its plug-in connection from the main power supply to achieve best possible safety from electric shock!

Quick connection terminals process the inputs and outputs of the electronic control system. Permissible terminal cross section is between 0.25mm² and 1.5mm². Use wire end sleeves with insulating flanges to avoid short circuits.

The switching voltage of inputs is 24V DC and the current is approx. 10 mA.

Voltage-free contacts may not exceed 30V DC. The permissible current of relay contacts is 5 amps.

Wiring inputs

Figure 9 shows the terminal strips of inputs. The wired terminals shown are already connected at the

connected at the factory.

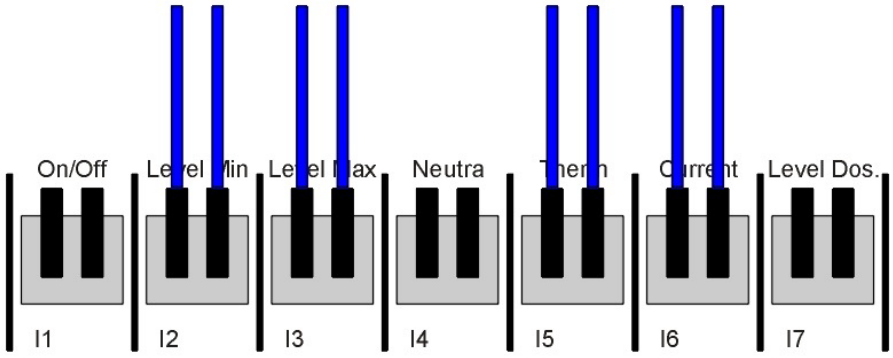


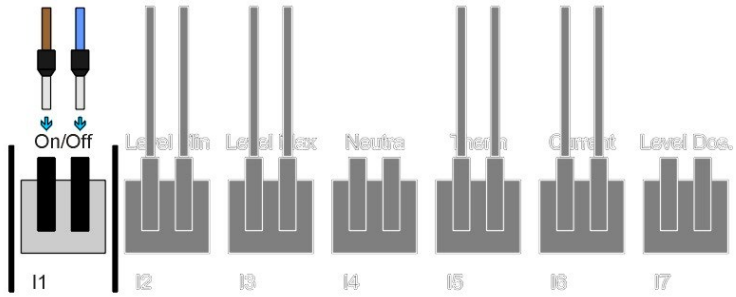
Figure 9: Wiring inputs

The functions of electronic control system inputs are:

Termi-nal	Description	Function
I1	On/Off	If the input is activated while a contact is closed, the fume scrubber will switch on.
I2	Level Min	The float switch is connected with the terminal and will stop the automatic scrubbing liquid change.
I3	Level Max	The float switch is connected with the terminal and regulates the scrubbing liquid level.
I4	Neutra	Please note the following section.
I5	Therm	The contact of the thermal over-current circuit breaker is connected with the terminal. It reports switching off of the spray wheel motor if the power consumption is exceeded.
I6	Current	The contact of the phase monitoring relays is connected with the terminal. It reports any failure in the fume scrubber's connection to the power supply. The reason could be a wrong phase sequence, for example.
I7	Level Dos.	This input is connected with the reservoir level switch if an optional chemical dosing unit is connected. If the contact opens if the filling level inside the tank is too low.

Table 7: Inputs

Connecting the ventilation release contact



If the input is activated by a closed contact is, the device will switch on. Otherwise the device switches off. The contact can be connected with the ventilation unit installed by the customer or with the frequency converter controlling the fan.

Figure 10: Connecting the ventilation enable contact.

Note: Sometimes this contact is wired by the manufacturer.

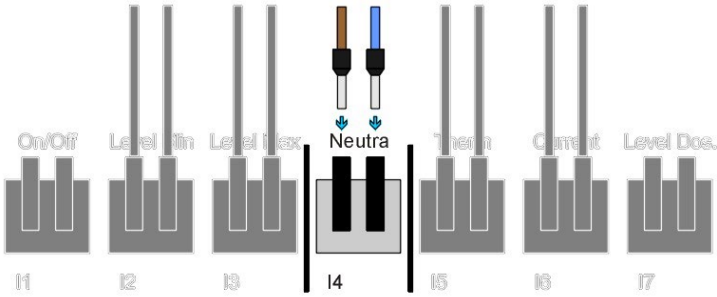
Connection of the neutralisation unit C100 interlock

Caution! Corrosive chemicals!

Risk of chemical burns and material damage due to overflowing neutralisation unit! Connect the neutralisation unit with the fume scrubber!

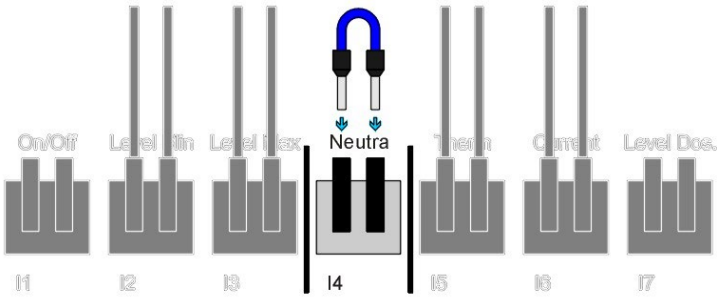
Attention! Risk of faults in the operation!

If the device is not connected as in *figure 12*, the automatic change of the scrubbing liquid will not be started. This will reduce the absorption capacity of the scrubbing liquid! As a result, it might not reach its absorption efficiency as described.



If the input is activated while a contact is closed, the automatic scrubbing liquid change is released. Otherwise the fume scrubber recognises that the neutralisation unit cannot absorb liquid and will not release the scrubbing liquid.

Figure 11: Connecting the neutralisation system interlock



If the neutralisation unit is not connected, a wire bridge must be inserted.

Figure 12: Insert wire bridge

Wiring outputs

Figure 13 shows the output terminal strips. Terminals marked as wired have been connected by the manufacturer.

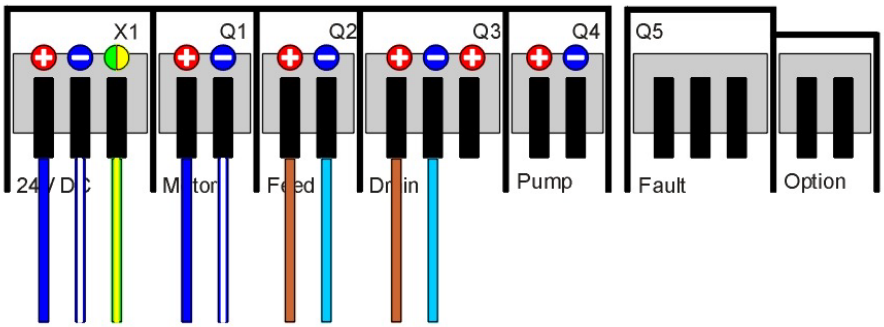


Figure 13: Wiring the outputs

The functions of electronic control system outputs are:

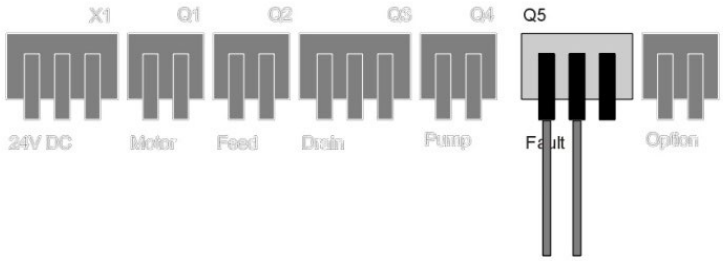
Terminal	Description	Function
X1	24V DC	All electrical components are connected to the power supply using these terminals.
Q1	Motor	The coil motor contactor is connected to these terminals.
Q2	Feed	The coil solenoid feed valve is connected to these terminals.
Q3	Drain	The coil solenoid feed valve, a motor ball valve or a drain pump are connected to these terminals. The voltage at terminal “0” switches when the scrubbing liquid needs to be changed. Otherwise voltage is released at terminal “C”.

Termi-nal	Description	Function
Q4	Pump	Voltage for controlling the dosing pump is switched on if an optional chemical dosing unit has been connected.
Q5	Fault	The voltage-free changeover contact switches in the event of faults.
Q6	Option	The potential-free switch-on contact is activated as soon as the fume scrubber is switched on. The contact is open in the off state. This contact can also be used for other user-specific tasks.

Table 8: Outputs

Connect potential-free option output

Contact closed when fault-free, open in the event of faults



Contact open when fault-free, closed in the event of faults

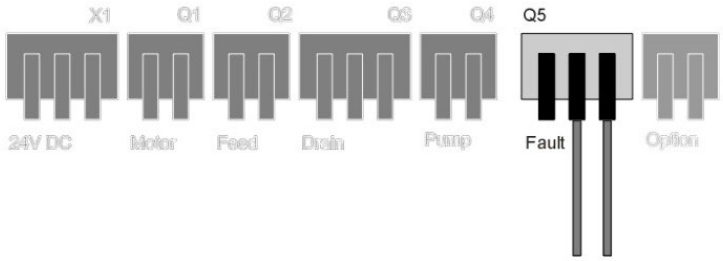
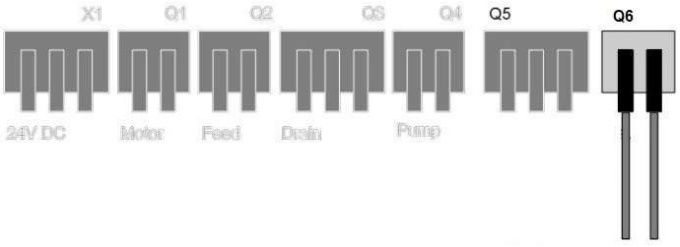


Figure 14: Connecting potential-free fault signal

Connecting the potential-free option output



Contact is open as long as the

scrubber is off and is switched on when the fume scrubber is in operation.

is in operation.

Figure 15: Connecting potential-free option output

Connecting the serial interface

Termi-nal	Description	Function
RTS	Request Send	This function is currently not supported.
CTS	Enable Send	This function is currently not supported.
TXD	Send Data	Sends data to another device.
RXD	Receive Data	Receives data from another device.
GND	Mass	Reference mass for above mentioned signals.

Table 9: Connecting the serial interface

10.5 Activating or deactivating the operating module button

Warning! Electrical voltage!

Risk of electric shock due to improper work!

This work requires the control system housing to be open. Its connections L1, L2 and L3 are energised, even when disconnected from power!

Disconnect the fume scrubber and its plug-in connection from the main power supply to achieve best possible safety from electric shock!

The switch activating the operating module function is on the conductor board. The plug connector used for the operating module protrudes over the back of the controller.

Pull the switch toward the connection plug to deactivate the operating module button. Push the switch towards the outside of the conductor board to activate the operating module button.

10.6 Ventilation connections

Building requirements

Warning! Corrosive aerosols!

Risk of chemical burns from acid fog leaking from the fume cupboard when the maximum fan airflow capacity is exceeded!

Ensure correct fan dimensioning!

With regard to the size of the fan, its performance should be dimensioned in such a way that perfect operation is guaranteed even if there is an increase of up to 30% in the pressure loss caused by contamination in the separators. The pressure loss values given in the technical data (see technical description) refer to fume scrubbers as supplied to the customer.

If necessary for safety reasons, it may be necessary to use a fan or fume scrubber with larger dimensions. Please contact Kyocera technical department environmental equipment for specific questions. See the front page for contact details.

Connecting the ventilation and exhaust air unit

Air enters the FRIDURIT fume scrubber through two sockets at the back. Air exits the fume scrubber through a central socket on the top of the device. The fitting and installation company must connect the fume scrubber to the laboratory ventilation unit.

Attention! Risk of operation impairment due to contamination of separators!

Check the agglomerators and droplet separators for contamination after connecting the FRIDURIT fume scrubber and test running it with water. If necessary, have it cleaned by service personnel.

Servicing due to excessive pressure loss in soiled separators is not covered by the warranty.

Only an experienced ventilation technician may plan the laboratory ventilation unit. This guarantees reliable and fault-free operation of the exhaust air unit. The exhaust air unit and scrubber require specific processes. In addition to basic rules on planning and designing a ventilation unit, the following should be considered:

All materials coming into contact with exhaust air must be resistant to the chemicals used. The same applies to fume scrubber piping, fans, butterfly valves, and fire protection flaps, etc. as the scrubbed fumes contain chemical residues which can condense to form a corrosive layer on downstream unit components.

Depending on the process, the scrubbed fumes may contain residual moisture that very quickly clogs up the downstream filter elements such as particle filters or similar increasing significantly pressure loss. Filter elements are therefore not recommended.

Highly contaminated exhaust air, e.g. caused by sticky substances, leads to clogging of the absorption systems and hence to an increase in pressure loss above the fume scrubber. If contamination cannot be avoided, make sure that the absorption systems are cleaned regularly by a member of Kyocera service organisation.

11 PUTTING INTO SERVICE

Putting into service should be carried out by a qualified technician from Kyocera service organisation. See the front page for more information. This can only be carried out when the FRIDURIT fume scrubber and its components have been fully assembled. The place of installation must be freely accessible, and any materials needed, such as a ladder, tools, etc. should be available. Consider the instructions on the order confirmation. Before putting into service, a Kyocera service technicians will check that all the necessary prerequisites are given.
Putting into service includes:

- Checking the installation and operational test of the spray wheel
- Briefing of the Service personnel
- Test run in the presence of the operator and the operating personnel
- Answering any other questions

Kyocera servicing personnel will only put the FRIDURIT fume scrubber and parts supplied by Kyocera into service. Please understand that our service does not include putting the fume cupboard or the ventilation unit into service.

We recommend that the components used with the fume scrubber are set up on the same day. This allows the interaction of the individual parts to be tested. Kyocera will always do its best to fit in with your time schedules.

12 DECOMMISSIONING

12.1 Dismantling

Caution! Corrosive chemicals!

The scrubbing liquid contains corrosive chemicals. It is necessary to discharge the wastewater into a neutralisation system.

Warning! Corrosive scrubbing liquid!

Drain the scrubbing liquid completely before dismantling!

To do this, the manual ball valve underneath the scrubber is opened so that the scrubbing liquid is completely drained. Any remaining liquid can be removed with a vacuum cleaner.

After emptying the system, completely disconnect the power supply before starting to remove electrical components and cables.
Please observe the following safety instructions and precautionary measures during removal to avoid damage to the equipment and injury to personnel:

Take care during transportation! The appliance is heavy!

There is a risk of injury and damage to property! Secure the appliance against bumping and falling during transportation!

12.2 Disposal

The guidelines of the local disposal companies must be observed. Please contact the responsible local authority.

The main components of the storage tank are:

- Housing, construction parts in contact with the medium are made of unmixed plastic (usually polypropylene).
- Electrical components such as float switches are usually electronic waste
- Sealing materials consist mainly of industrial rubber
- Metal connecting elements such as screws etc. are made of stainless steel

Please also note the following information:

Electrical and electronic devices contain valuable recyclable materials and components that can pose a potential risk to human health and the environment if handled or disposed of incorrectly. This also applies in particular to all parts that come into contact with chemicals. Therefore Kyocera products must not be disposed of with household waste.

12.3 Return of the fume scrubber by the manufacturer

In accordance with the German Electrical and Electronic Equipment Act (ElektroG), Kyocera is obliged to take back the fume scrubber for disposal.

KYOCERA Fineceramics Europe GmbH is registered under WEEE-Reg. No. DE 40217002

If you would like to make use of this, please contact us. Please note that for safety of our employees, we will only take back machines that have been completely emptied and and cleaned. This must be certified by a signed form (clearance certificate). The relevant form can be downloaded from the homepage or requested from Kyocera

13 APPENDIX

13.1 Modbus register table

Input Register (Read: Modbus function 3)

Label	Register	Byte (H/L)	Definition	Read/Write	Description
Actual values word register					
MB_val_ms_ph	**1**	16 / 17	($val_{/10}$)	Actual (R)	Current conductance / pH value
MB_val_tchange_h	**2**	18 / 19	(h)	Actual (R)	Time since last water change (h)
MB_val_tchange_min	**3**	20 / 21	(min)	Actual (R)	Time since last water change (min)
MB_val_top_h	**4**	22 / 23	(h)	Actual (R)	Total operating hours of the system
MB_val_top_min	**5**	24 / 25	(min)	Actual (R)	Operating hours Minute counter
MB_val_tfill	**6**	26 / 27	(sec)	Actual (R)	Current filling time / last filling
MB_val_trefill	**7**	28 / 29	(sec)	Actual (R)	Current refill time
MB_val_tdrain	**8**	30 / 31	(sec)	Actual (R)	Current emptying time / last emptying
MB_val_tclean	**9**	32 / 33	(sec)	Actual (R)	Current flushing time
MB_val_tcheck	**10**	34 / 35	(min)	Actual (R)	Current release monitoring
MB_val_pump	**11**	36 / 37	(sec)	Actual (R)	Current pumping time
MB_val_cycles	**12**	38 / 39	(x)	Actual (R)	Total emptying cycles
MB_val_maint	**13**	40 / 41	(d)	Actual (R)	Days since last maintenance
Actual values word register					
MB_val_ftherm	**14**	42 / 43		Actual (R)	Fault z. Motor protection
MB_val_ffill	**15**	44 / 45		Actual (R)	Failure count. Filling timeout
MB_val_frefill	**16**	46 / 47		Actual (R)	Failure count. Refill timeout
MB_val_fcheck	**17**	48 / 49		Actual (R)	Failure cert. Neutra locking
MB_val_mdrain	**18**	50 / 51		Actual (R)	Fault timer Empty timeout
Bitregister					
f_therm	**19 Bit 0**	53		Actual (R)	Motor protection fault bit
f_phase	**19 Bit 1**			Actual (R)	Fault bit Phase monitoring
f_overflow	**19 Bit 2**			Actual (R)	Fault bit overflow monitoring
f_fill	**19 Bit 3**			Actual (R)	Fault bit filling time monitoring
f_refill	**19 Bit 4**			Actual (R)	Fault bit refill time monitoring

f_neutra	**19 Bit 5**			Actual (R)	Fault bit enable neutralisation
f_protect	**19 Bit 6**			Actual (R)	Fault bit Dry-running protection
m_param (1)	**20 Bit 0**	55		Actual (R)	Parameter error message bit
m_range (1)	**20 Bit 1**			Actual (R)	Neutral range message bit
m_pH	**20 Bit 2**			Actual (R)	Message bit pH measurement
m_low	**20 Bit 3**			Actual (R)	Dosing container empty (chemical dosing)
m_maint	**20 Bit 4**			Actual (R)	Message bit Maintenance due
Label	**Register**	**Byte (H/L)**	**Definition**	**Read/Write**	**Description**
m_drain	**20 Bit 5**			Actual (R)	Empty time monitoring message bit
m_time	**20 Bit 6**			Actual (R)	Empty message bit necessary
S_Off	**21**	57	0	Actual (R)	Step chain Off
S_Clean	**21**		3	Actual (R)	Rinse step
S_Fill	**21**		5	Actual (R)	Fill step
S_Operate	**21**		7	Actual (R)	Step Operation
S_Drain	**21**		9	Actual (R)	Empty step
onoff	**22 Bit 0**	59		Actual (R)	Enable external
ls_min	**22 Bit 1**			Actual (R)	Lower float switch
ls_max	**22 Bit 2**			Actual (R)	Float switch top
neutra	**22 Bit 3**			Actual (R)	Interlock Neutra system
therm	**22 Bit 4**			Actual (R)	Bimetal motor protection switch
phase	**22 Bit 5**			Actual (R)	Phase monitoring relay
option	**22 Bit 6**			Actual (R)	Optional input (e.g. dosing level)
button	**22 Bit 7**			Actual (R)	Control module button
motor	**23 Bit 0**	61		Actual (R)	Operation Motor
feed	**23 Bit 1**			Actual (R)	Filling solenoid valve
drain	**23 Bit 2**			Actual (R)	Empty solenoid valve
pump	**23 Bit 3**			Actual (R)	Pump output
fault_rly	**23 Bit 4**			Actual (R)	Relay Fault
option_rly	**23 Bit 5**			Actual (R)	Relay option
led_green	**23 Bit 6**			Actual (R)	LED green Operating module
led_red	**23 Bit 7**			Actual (R)	LED red Operating module
MB_screen_id	**24**	63 / 64		Actual (R)	Screen ID for external panel
MB_UF (2)	**25**	65 / 66		Actual (R)	Raw value UF converter
MB_val_buf1 (2)	**26**	67 / 68		Actual (R)	UF value pH buffer 1
MB_val_buf2 (2)	**27**	69 / 70		Actual (R)	UF value pH buffer 1
MB_val_basic (2)	**28**	71 / 72		Actual (R)	Function register mirrored

Table 10: Modbus Input Register

(1) Currently not used

(2) Registers are used internally by the software and are for testing purposes only

Data Register (Read: Modbus function 4 / Write: Modbus function 6)

Label	Register	Byte (H/L)	Definition	Read/Write	Description
Target values					
MB_special	**1**	0 / 1	0	Soll (R/W)	Multifunction special register
MB_def_tchange	**2**	2 / 3	+16 (h)	Soll (R/W)	Scrubbing liquid time Setpoint

MB_def_ms	**3**	4 / 5	+200 ($mS_{/10}$)	Soll (R/W)	Limit value Conductance measurement
MB_def_check	**4**	6 / 7	+600 (min)	Soll (R/W)	Release monitoring setpoint
MB_def_maint	**5**	8 / 9	+365 (d)	Soll (R/W)	Maintenance interval for message
MB_def_pump	**6**	10 / 11	+0 (sec)	Soll (R/W)	Pump switch-on time (0 = deactivated)
MB_def_pH_lo	**7**	12 / 13	+65 ($pH_{/10}$)	Soll (R/W)	Limit value pH (lower value) Dosing
MB_def_pH_hi	**8**	14 / 15	+90 ($pH_{/10}$)	Soll (R/W)	Limit value pH (upper value) Dosing
MB_def_clean	**9**	16 / 17	+0 (sec)	Soll (R/W)	Flush time (only for packed scrubber)
MB_def_tfill	**10**	18 / 19	+0 (sec)	Soll (R/W)	Filling time exceeded limit value
MB_def_trefill	**11**	20 / 21	+0 (sec)	Soll (R/W)	Limit value refill time exceeded
MB_def_tdrain	**12**	22 / 23	+0 (sec)	Soll (R/W)	Empty time exceeded limit value
MB_def_therm	**13**	24 / 25	+0 (sec)	Soll (R/W)	Delay time motor protection relay
MB_def_phase	**14**	26 / 27	+0 (sec)	Soll (R/W)	Delay time phase monitoring relay
MB_def_option	**15**	28 / 29	+0 (sec)	Soll (R/W)	Delay time option input
MB_def_modbus_adr	**16**	30 / 31	1	Soll (R/W)	Modbus address (for bus connection)
MB_def_language	**17**	32 / 33	Deutsch	Soll (R/W)	Operating language
MB_def_con_zero (1)	**18**	34 / 35	-----	Soll (R/W)	UF value Conductance measurement
MB_def_pH_zero (1)	**19**	36 / 37	-----	Soll (R/W)	Zero-point pH measurement after calib.
MB_def_pH_slope (1)	**20**	38 / 39	-----	Soll (R/W)	Slope pH measurement after calib.
MB_def_pH_basic (1)	**21**	40 / 41	-----	Soll (R/W)	UF value Zero-point pH measurement
MB_def_function	**22**	42 / 43	0x0001	Soll (R/W)	Application-specific function
MB_def_protect	**23**	44 / 45	+15 (sec)	Soll (R/W)	Delay time for dry-running sch.

(1) : Registers are used internally by the software and should not be changed externally.

13.2 Spare parts list

Article no:	Designation:	C54*	C90*
L-386759	Agglomerator 250x250x50 coarse (wire thickness 0.4mm)	**4**	
L-386760	Agglomerator 340x250x50 coarse (wire thickness 0.4mm)		**4**
L-319027	Float switch (red) with G ½" thread and plug connector	**2**	**2**
L-384712	Tangential full cone nozzle	**8**	**8**
L-385795	Intermediate piece PP	**10**	**10**
L-386333	Spray wheel flange seal EPDM	**1**	**1**
L- Spray wheel	Delivery and spray wheel complete with nozzles	**1**	**1**
L- ACCESS UNI 08/18	Inlet set with solenoid valve 24V DC, strainer and shut-off valve	**1**	**1**
L-319065	Solenoid for solenoid valve DN32 (without lower part) 24V DC	**1**	**1**
L-AWLZ	Conductance measuring cell c=1.0 with protection tube	**1**	**1**

Table 12: Spare parts list

* Number of parts installed in the appliance

** Please state the appliance number or order number when ordering

If you require spare parts that are not listed in the spare parts list, please request the current spare parts price list.

13.3 Compliance with the 42nd BImSchV (only valid in Germany)

The regulation on evaporative cooling systems, cooling towers and wet separators (42nd BImSchV) came into force on 20 August 2017 came into force. It sets out comprehensive legal requirements for the construction, operation and monitoring of wet separators for the first time. The FRIDURIT fume scrubber is one of these wet separators.

The operation of a fume scrubber with a chemical dosing system that regulates the pH value in the scrubbing liquid may, under certain circumstances, allow an exception within the meaning of § 1 area of application (2) 5 of the Ordinance.

Quote:

"Wet scrubbers are exempted: in which the process water permanently has a pH value of 4 or less or 10 or more; in which the exhaust gas is heated to at least 72 degrees Celsius for at least 10 seconds or which are operated exclusively with fresh water in continuous operation"

The obligation to report the device to the authorities remains in force even if it is used as described above.

Completion aid for plant registers according to VDI 3679 Sheet 1-4	
Designation of the system	FRIDURIT fume scrubber C54 or FRIDURIT fume scrubber C90 (See type plate on the front of the appliance).
Operating principal Separator	Spray scrubber.
Scrubbing liquid	Mixture of water and acid with max. 0.5% concentration.
Year of construction / performance	The year of manufacture can be found on the rating plate on the front of the appliance. The capacity depends on the air volume of the fume cupboard, the circulated volume of scrubbing liquid is approx. 2000 liters per hour.
The wet separator emits its exhaust air to the outside world (environment)	Yes

Table 13: Completion aid for asset register

For further information on this topic, please refer to the information sheets of the chambers of industry and commerce of your local district.

13.4 Declaration of conformity

War/We/Nous: **KYOCERA Fineceramics Europe GmbH**
Environmental equipment
Steinzeugstraße 92
D - 68229 Mannheim

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the product
déclarons sous notre seulé responsibilité que le produit

FRIDURIT® Abluftwäscher C54, C90, C75 und C180
FRIDURIT® fume scrubber C54, C90, C75 and C180
FRIDURIT® laveur de gaz C54, C90, C75 et C180

auf das sich diese Erklärung bezieht, mit den Anforderungen der folgenden Richtlinien und Normen übereinstimmt.
is in conformity with the requirements of the following directives and standards.
est conforme aux exigences des directives et des normes suivantes.

Richtlinie(n) / Directive(s) / Directive(s)		Norm(en) / Standard(s) / Norme(s)
2006/42/EG 2006/42/EG 2006/42/EG	Maschinen-Richtlinie Machine-Directive Directive Machine	EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
2014/30/EU 2014/30/EU 2014/30/UE	EMV-Richtlinie EMC-Directive Directive CEM	EN 61000-6-2:2005/AC:2005 EN 61000-6-3:2007/A1:2011/AC:2012
2011/65/EU 2011/65/EU 2011/65/UE	RoHS-Richtlinie RoHS-Directive Directive RoHS	EN IEC 63000:2018

Der oben beschriebene Gegenstand der Erklärung erfüllt die Vorschriften der Richtlinie 2011/65/EU des Eurpäischen Parlaments und des Rates vom 8.Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektrogeräten.
The object of the declaration described above is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment
L'objet de la déclaration décrit ci-dessus est conforme à la directive 2011/65/UE du Parlement européen et du Conseil du 8 juin 2011 relative à la limitation de l'utilisation de certaines substances dangereuses dans les équipements électriques et électroniques

Mannheim, im August 2023

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