

# Description of CERTO controller Standard

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# 1. Functions of the controller

The following control units are available depending on the pumping capacity:

**CERTO FU 750 = 750 Watt**

**CERTO FU 1500 = 1500 Watt**

## Special features:

- the control units can be used worldwide
- we have followed all the guidelines available to us in the design of the control unit
- it is therefore the most up-to-date generation of control units
- the control unit is operated via only three keys. Results and queries are displayed on the illuminated single-line display
- Once the mains power has been switched on, the control unit is ready for immediate operation if it is connected
- Faults are shown on the display



- most modern processor technology
- CE approved
- housing IP 54
- short-circuit-proof output
- EN 55011 tested
- EN 61000-3 tested
- EN 61000-4-2 tested
- EN 61000-4-3 (burst) tested
- EN 61000-4-4 (surge) tested
- EN 61800-3 tested
- each individual module is tested
- detailed error messages

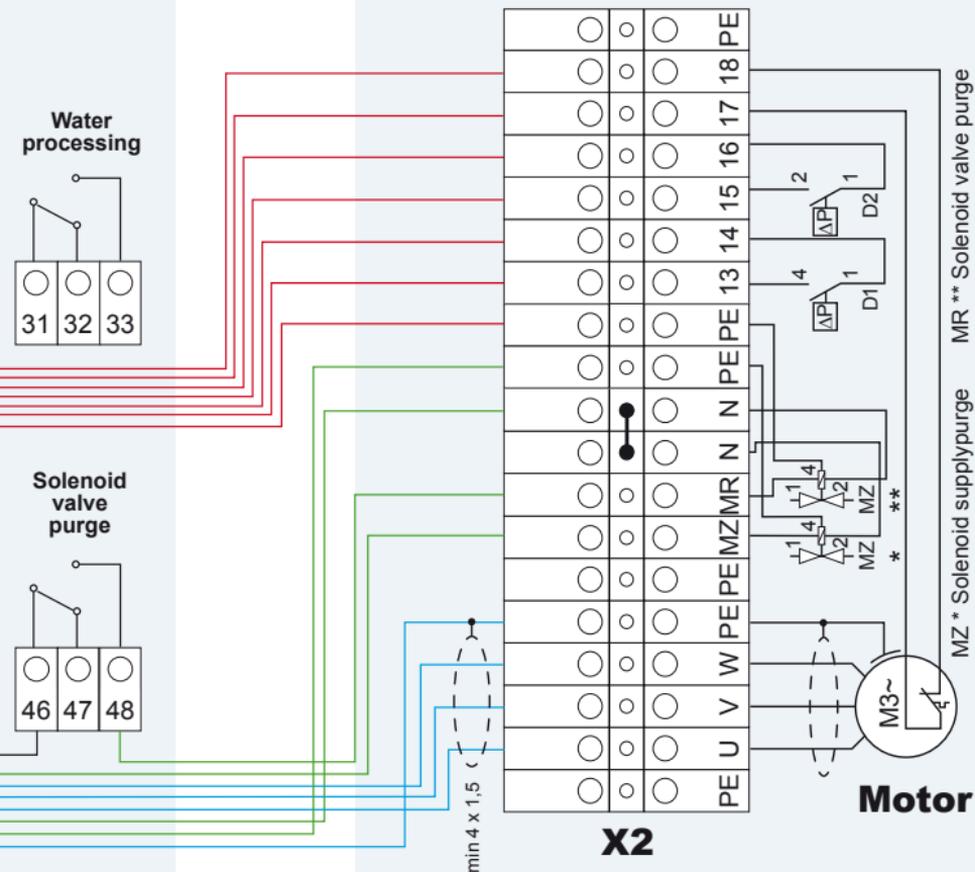
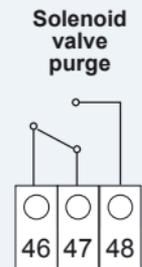
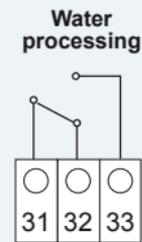


- thermal contact monitoring including function display
- Status message
- Service indicator
- Start-up and run-out circuit
- Menu-guided programming
- Plain text display via LCD display
- Three-button operation
- Third party control signal processing
- Humidity sensor input
- Hygiene circuit
- Operating hours counter

## Optional accessories:

- Control range extension
- Humidity sensor
- Menu language extension





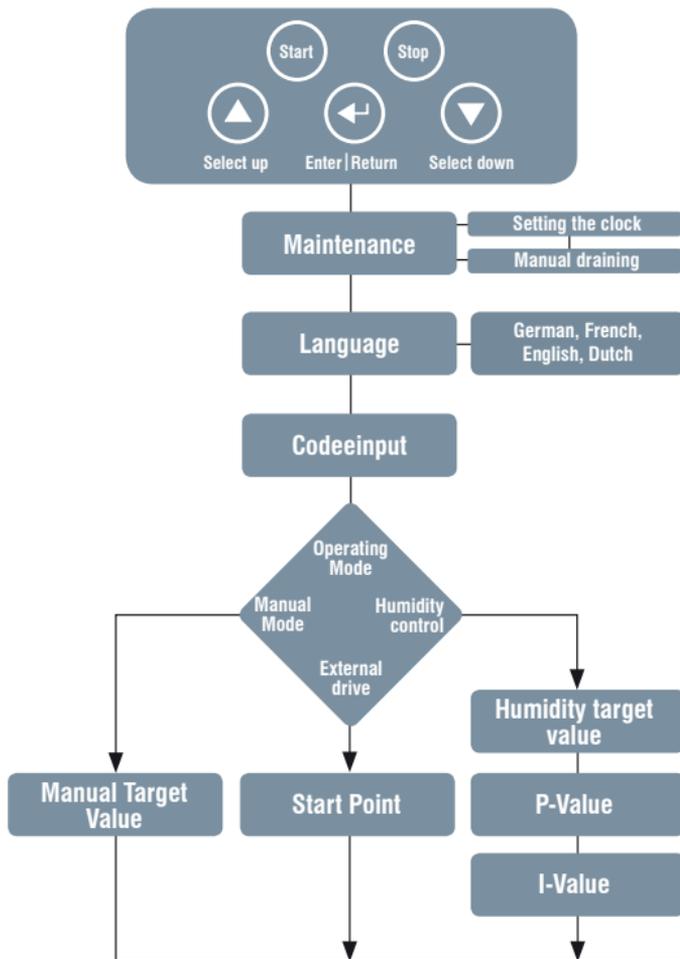
## Terminal connections Control unit:

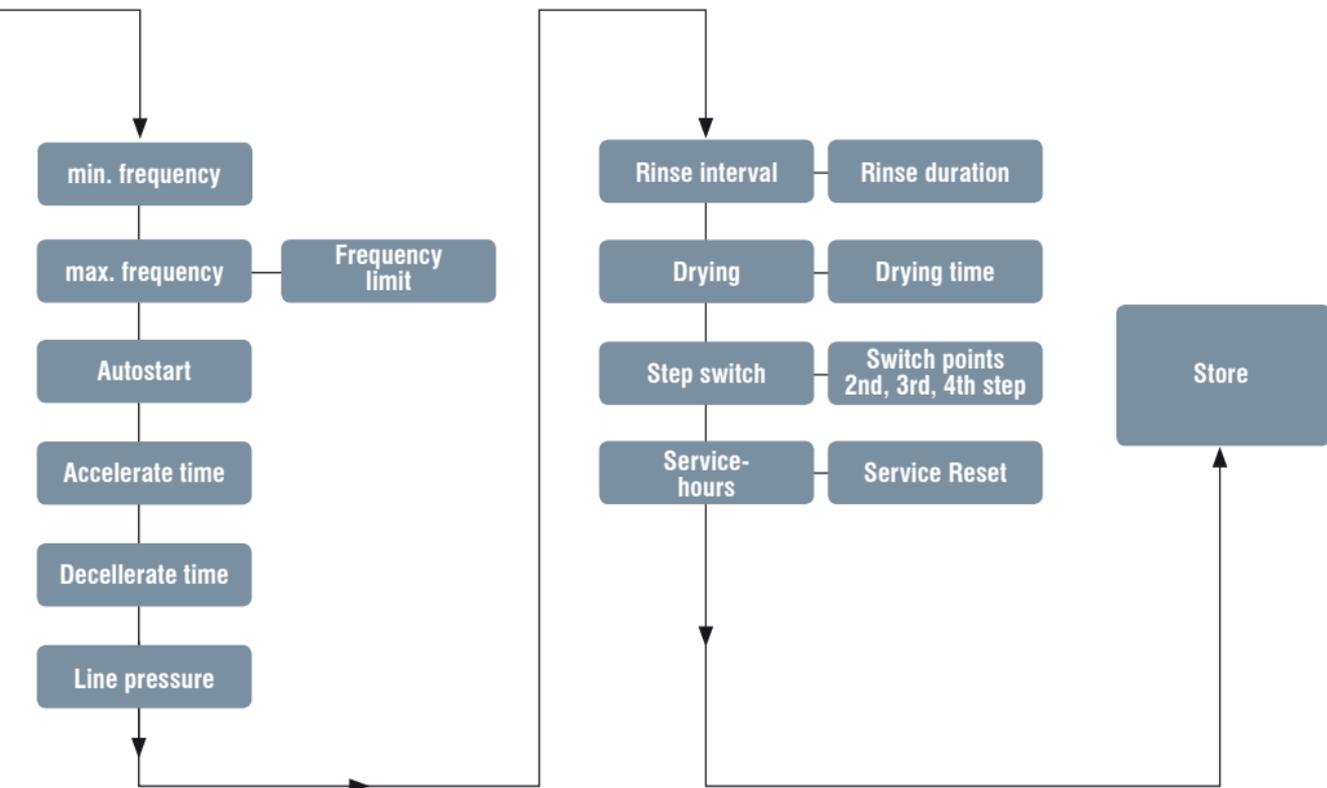
- 5: Water treatment (+)
- 6: Water treatment (-)
- 7: +10 V
- 8: Controller signal input (+)
- 9: Controller signal earth (-)
- 10: Earth
- 11: Controller enable (+)
- 12: Controller enable (-)
- 13: Low pressure switch D1 (+)
- 14: Low pressure switch D1 (-)
- 15: High pressure switch D2 (+)
- 16: High pressure switch D2 (-)
- 17: Thermal contact motor (+)
- 18: Thermal contact motor (-)

## Terminal connections Pump station:

- 13: Low pressure switch D1 (+)
- 14: Low pressure switch D1 (-)
- 15: High pressure switch D2 (+)
- 16: High pressure switch D2 (-)
- 17: Thermal contact motor (+)
- 18: Thermal contact motor (-)

### 3. Menu structure overview





## 4. Menu structure

The control unit has a double-line, multi-colour illuminated display and is operated via 5 keys.



Only for “on-site” operation – priority



Select up



Enter/Return



Select down

The menu is accessed by pressing the keys simultaneously. (Control unit reset):

**Attention:** Error acknowledgement is also carried out via this key combination:

**Navigation:** The left () key: selects the menu item above. The right () key: selects the menu item below. The middle () key: input or acknowledgement. This takes you to the menu item settings that are set with the selection keys and confirmed with the () key. Once the settings are made, move to the next menu item by pressing the Enter key () again.

Once the wiring is completed, the device version will appear on the display when the voltage is switched on:

```
  Befeuchter
V: KB5.00 DEFNL
```

If the autostart function is enabled, the following message appears:

```
  Achtung!!!
  Autostart!!!
```

If you access the menu during operation, the following message appears:

```
  Motor Stop!
R Istfreq.: xxHz
```

## 5. Menu navigation

Pressing the three keys (▲ ▼ ◀) will take you to:

			S	e	r	v	i	c	e				



S	t	d		M	i		T	T	.	M	M	.	J	J	
		1	2		3	9		1	7	.	0	6	.	1	1

This sets the clock that controls the error log. Pressing (◀), again will open the menu item “Manual draining”.

M	a	n	u	a	l		d	r	a	i	n	i	n	g	
+	:		S	t	a	r	t		d	r	a	i	n	i	n

Prior to long downtimes, the pump station can be drained via “Manual draining”. Pressing the left selection key (▲) will open the solenoid valve underneath the water filter. Pressing the Enter key (◀), will stop the process, the following menu item appears:

			S	p	r	a	c	h	e				



			D	e	u	t	s	c	h				



			F	r	a	n	c	a	i	s				



			E	n	g	l	i	s	h				



			N	e	d	e	r	l	a	n	d	s		

Confirm the selection by pressing the Enter key (◀). Next appears:

		C	o	d	e		i	n	p	u	t	:				
									0	0	0	0	0			

To access the main menu, the code 00111 must be entered. This code request protects against unauthorised access. It is therefore advisable to keep these operating instructions in a safe place.

### Main menu:

Confirming with (←) takes you to the menu item “Operating mode” for selecting the control option.

		O	p	e	r	a	t	i	n	g		m	o	d	e	



		O	p	e	r	a	t	i	n	g		m	o	d	e	
		E	x	t	e	r	n	a	l		d	r	i	v	e	



		O	p	e	r	a	t	i	n	g		m	o	d	e		
		M	a	n	u	a	l		O	p	e	r	a	t	i	o	n



		O	p	e	r	a	t	i	n	g		m	o	d	e		
		M	o	i	s	t	u	r	e		c	o	n	t	r	o	l



Depending on the on-site conditions, you can choose between external control via a control signal, manual operation and humidity control (with optional humidity sensor). The operating mode can be changed by pressing the left (▲) and right selection key (▼).

After selecting the control option, the entry must be confirmed with the Enter key (↵).

## 6. Manual operation / external control / humidity control

### Manual operation

If “Manual operation” has been selected, a manual target value between 3 Hz and the factory-set maximum frequency can be specified. The manual target value is set by pressing the selection keys.

M	a	n	u	a	l		t	a	r	g	.	v	a	l	u
0	-	8	7	H	z							2	0	H	z

└── Limits ───┬──────────────────────────────────┘ Set value

This value is confirmed by pressing the Enter key (↵).

### External control.

If “External control” has been selected, the following display appears:

			S	t	a	r	t		p	o	i	n	t			
0	-	4	0	%										1	0	%

The start point can be set from 0-40% and relates to the control signal. Example: If set at 10%, the control unit will only react to a control signal of 1 Volt. As a result, interfering voltages, which can lead to inadvertent operation of the control unit, are suppressed.

## Humidity control

If "Humidity control" has been selected, the following display appears:

	D	e	s	i	r	e	d		h	u	m	i	t	y		
1	0	-	9	5	%									6	0	%

Here, the relative humidity the humidifier can achieve is set between 10 % and 95 %.

The PI-controller is activated during humidity control. This ensures that the set target value remains constant. The Klingenburg humidity sensor is required for this purpose. The gain factor is set here.

	P	-	g	a	i	n										
0	,	2	-	5	,	0					0	0	1	,	0	

### Attention:

**The value must not be set >1.0, since this could lead to strong sub-harmonics and harmonics.**

	I	n	t	e	g	r	a	t	o	r		t	i	m	e	
0	,	1	-	1	5	0	s				0	0	1	,	0	

This controls the reaction time of the control. The greater the time, the slower the control.

## 7. Factory-set default settings on the control unit

All factory-set default settings are now displayed, and each setting must be confirmed by pressing ENTER. No changes should be made.

Minimal	freq.								
3-20	Hz							10	Hz

Frequenzbegrenz.									
22-Fmax								50	Hz

Acceler. time									
1-30	sec							15	s

Water pressure									
Störmeld. n.								30	s

Wash. time									
1-1800	s							180	s

Drying time									
15-120	min							30	min

Step switch									
Steps on									

Maximal	freq.								
22-87	Hz							60	Hz

Autostartfunkt.									
Autostart on									

Deceler. time									
1-30	sec							10	s

Wash interval									
1-96	h							48	h

Trocknungsfunkt									
Drying on									

Step switch									
Steps off									

Service interval									
								1000	Std

## Minimum frequency

	M	i	n	i	m	a	l	f	r	e	q	.		
3	-	2	0	H	z					1	0	H	z	

The minimum frequency is factory set. The nozzle pressure should be set at a minimum of 5 bar in any humidification situation. Changing this frequency means that humidification is not guaranteed but the humidifier is operating all the same. Controllability is also compromised. This setting value is calculated at the factory and preset and checked during a trial run. Frequency range: 3-20 Hz. Changes can cause damage to the humidifier.

## Maximum frequency

	M	a	x	i	m	a	l	f	r	e	q	.		
2	2	-	8	7	H	z				6	0	H	z	



F	r	e	q	u	e	n	z	b	e	g	r	e	n	z	.
2	2	-	F	m	a	x				5	0	H	z		

The maximum frequency is factory set. The humidifier is designed for a specific humidification capacity. To achieve this value, the complete humidification system is synchronised. This setting value is calculated at the factory and preset and checked during a trial run. Frequency range: 22-80 Hz. Changes can cause damage to the humidifier.

Pressing the Enter key (↵) in the setting values of “Maximum frequency” will take you to the menu item Frequency limit. If excessive humidity occurs or the water consumption is too high, the frequency can be adjusted here. It is important to note that the maximum frequency remains unchanged.

## Autostart function

A	u	t	o	s	t	a	r	t	f	u	n	k	t	.
A	u	t	o	s	t	a	r	t	o	n				

The Start and Stop button under the display screen has priority. The “Autostart on” function puts the control unit in Run mode, when menu navigation is completed and after a control unit reset, i.e. if approval is given and a control signal is present, the control unit starts the humidifier up again.

If “Autostart off” is programmed, the control unit must be activated via the Start button (Ⓢ). This setting is useful for maintenance or during longer downtimes.

## Power-up time

A	c	c	e	l	e	r	.	t	i	m	e			
1	-	3	0	s	e	c						1	5	s

The power-up time is factory set. This is the time required to reach the designed maximum speed. This is to ensure that the components of the drive system are not put under unnecessary strain.

This value is preset at 15 seconds. Years of experience have shown that this can extend the service life. Adjustment range: 1-30 s. Changes can cause damage to the humidifier.

## Power-down time

	D	e	c	e	l	e	r	.	t	i	m	e			
1	-	3	0	s	e	c							1	0	s

The power-down time is factory set. In contrast to the power-up time, this is the time required for the motor to get from maximum speed to zero. Again, the aim is to protect the mechanical components. This value is preset at 10 seconds. Adjustment range: 1-30 s. Changes can cause damage to the humidifier.

## Line pressure fault message

	W	a	t	e	r		p	r	e	s	s	u	r	e	
S	t	ö	r	m	e	l	.		n	.		3	0	s	

If several appliances are using the osmosis system and are running simultaneously, the line pressure can drop below 1.6 bar. This causes the humidifier to stop or switch off. In this menu item, the tripping time of the line pressure fault message can be extended (up to 30 minutes) or the fault message can even be switched off (Fault message off). This means that the humidifier is on standby for longer or all the time, when the line pressure is above 2 bar.

## Rinse interval

	W	a	s	h	.	i	n	t	e	r	v	a	l			
1	-	9	6	h										4	8	h

To ensure hygienic operation of the humidifier, the control unit has an automatic rinsing cycle as standard. The rinse interval is preset at the factory for 48 hours. The value is adjustable between 1 hour and 96 hours. This is the period between two rinsing cycles. Rinsing is activated if the humidifier is enabled via terminals 11 and 12, but no humidification is provided via the control signal or the humidity sensor. Changes lead to increased water consumption and should only be made if bacterial growth due to stagnant water is found during the hygiene inspection.

## Purge duration

	W	a	s	h	.	t	i	m	e								
1	-	1	8	0	0	s								1	8	0	s

The time of the actual purge process is adjustable between 10 and 1800 seconds. The factory default setting is 180 seconds. The nozzle assemblies are rinsed for half the set time. Afterwards the solenoid valve under the filter opens and the filter is flushed.

## Drying run

T	r	o	c	k	n	u	n	g	s	f	u	n	k	t
D	r	y	i	n	g	o	n							

D	r	y	i	n	g	t	i	m	e					
1	5	-	1	2	0	m	i	n		3	0	m	i	n

The control unit is equipped with a delayed shut-off control for drying the humidifier. This function allows an enforced shut-off delay of the ventilation system. During operation and after the pump has been switched off, the floating output is switched on for the set time. Adjustment range: 15 - 120 min. or off.

## Step switch

For large humidifiers that use a lot of water, it may be useful to switch the nozzle assemblies in groups. In transitional periods when less humidification is required, this can be achieved with fewer nozzles and higher pressure. Depending on the frequency, the nozzle assemblies can be switched on in succession via high pressure solenoid valves.

S	t	e	p		s	w	i	t	c	h				
S	t	e	p	s		o	f							

S	t	e	p		s	w	i	t	c	h				
S	t	e	p	s		o	n							

S	t	e	p		s	w	i	t	c	h				
S	t	e	p	s		o	n							

Up to 3 levels can be switched.

2	n	d		S	t	a	g	e		o	n				
0	-	8	7	H	z							3	0	H	z

2	n	d		S	t	a	g	e		o	f				
0	-	8	7	H	z							2	7	H	z

... etc. ...

## Reset service message

r	u	.	h	o	u	r	s	:		0	0	x	x	x	h

This menu item is only available, if the “Service” message appears during operation and the recommended oil change intervals have been exceeded. Once the oil change has been carried out, the message can be reset by pressing the left selection key (⬅) and confirming with the Enter key (↵), thus initiating a new interval cycle. Proof that the oil change has been carried out must be provided.

**Attention!** Resetting the service message without an oil change will damage the pump and void the warranty.

## Saving the settings

S	t	o	r	e		d	a	t	a	?				

The changes made must now be saved. This is necessary in order to start the control unit in the selected mode.

			S	t	o	r	e	d	!					

Pressing the Enter key () saves the values.

		N	o	t		s	t	o	r	e	d	!		

If the changes should not be saved, the action can be cancelled by pressing the selection keys ( .

## Messages displayed for different control options during operation

### For external control:

The display (Control signal is present, release enabled) is shown in the event of external control.

S	o	l	l	f	r	e	q	.	:		6	0	H	z	
R		I	s	t	f	r	e	q	.	:		6	0	H	z

↑  
„R“ for Run

S	o	l	l	f	r	e	q	.	:		0	0	H	z	
S		I	s	t	f	r	e	q	.	:		0	0	H	z

↑  
„S“ means stopped via Stop button ()  
Press the Start key () , to activate auto-start.

## In manual operation

M	a	n		f	r	e	q	.	:		2	0	H	z	
R		I	s	t	f	r	e	q	.	:		2	0	H	z

Started up via the Start button (Start) in manual mode.

## Humidity control via humidity sensor

F	S	:		6	0	%		F	I	:		5	8	%	
R		I	s	t	f	r	e	q	.	:		4	0	H	z

Humidity control is enabled.

## Water treatment

The CERTO control unit has a relay contact for water treatment. Closing (potential-free) the control terminals 5 and 6, shuts down the water treatment contact and allows a short time in which to dispense an additive into the water of the humidifier. If you open the contact (terminal 5 and 6) the relay drops out.

## 8. Fault and error messages

### 8.1 Controller disabled

```
Contr. blocked!  
R Istfreq.: 00Hz
```

When this message appears in the display, the control unit is externally disabled via terminals 11 and 12. That is to say, the DDC has not enabled the control unit or the connection is faulty e.g. due to loose terminals etc. Generally, the message “Controller disabled” is not a fault, the controller has merely not been enabled because, for example, the fan was switched off.

### 8.2 Line pressure

```
Water pressure?  
R Istfreq.: 00Hz
```

Message appears when the line pressure drops below 1.6 bar.

When this message appears on the display, the primary pressure (flow pressure) of the feedwater pipe has dropped below 1.6 bar. The pressure switch sends an enabling signal to the control unit when the pressure reaches 2 bar. If the pressure drops below the minimum limit for a maximum of 30 seconds, the message “Line pressure?” is displayed.

If the pressure rises above 2 bar again during this time, the humidifier starts automatically. If the pressure drops below the minimum limit for more than 30 seconds, a fault message is displayed. This fault can be caused by several factors. The water supply may be switched off or restricted. The water supply pressure drops below 2 bar. The water filter is heavily contaminated. The supply pressure can also drop due to increased flow rate.

```
Leitungsdrk stör!  
R Istfreq.: 00Hz
```

Fault message after the set tripping time.

Pressing the three buttons (▲ ◀ ▼) below the display simultaneously, acknowledges the fault message.

### 8.3 Overpressure

```
Sollfrequ.: 56Hz  
R Istfreq.: 56Hz
```

Overpressure message is displayed!

When this message appears on the display, the pressure downstream from the high pressure pump is too high. The high pressure pressure switch is triggered at a pressure of 150 bar, and reduces the speed of the motor. If the pump speed has dropped enough for the pressure switch to turn on again at 135 bar, the control unit saves this frequency and the humidifier returns to operating mode. This saved frequency is stored as the maximum frequency until the fault has been rectified or the control unit has been reset. Since the Klingenburg humidifier continues to operate and the nominal frequency is thus also shown in the display, an overpressure fault is displayed.

#### **An overpressure fault can be caused by several factors:**

- the maximum frequency is set too high.
- the atomiser nozzles may be dirty, which leads to increased flow resistance. This leads to higher pressure for the same amount of water.

## 8.4 Motor overheating

	M	o	t	o	r		t	e	m	p	!				
S		I	s	t	f	r	e	q	.	:		0	0	H	z

The motor in the pump station is protected against damage from overheating. A thermal contact inside the motor sends a signal to the control unit, causing the motor to switch off and triggering a fault message.

## 8.5 Service indicator

				S	e	r	v	i	c	e					

The Service message appears if the recommended oil change intervals have been exceeded. The first message appears after the first 50 operating hours and then every 1000 operating hours after that. Pressing the Enter key (↵) can suppress the message in order to return to the frequency display. The Service message can be reset in programming mode once the oil change has been carried out. If the Service message is not reset, it will reappear in the display.

## 8.3 Error codes

	H	a	r	d	w	a	r	e		e	r	r			
				E	:	x	x	!							

The seven possible faults are displayed by the two-digit error code in the second line of the display.

01	Excessive voltage (motor / rotor blocked; short circuit between U, V, W)
05	Overload (control unit / motor overloaded)
09	Undervoltage
14	Earth fault
15	Overvoltage
21	Overheating in the final stage, ambient temperature too high; control unit overloaded
99	Software error

When the control unit registers a fault, the fault message is displayed in clear text or as hardware error EXX code. In some cases, the humidifier will automatically start up again and continue to run under restricted conditions. The control unit is ready for operation again, when the fault is acknowledged either by switching off the supply voltage or by simultaneously pressing the three buttons.

**If the humidifier does not start, you should check the following:**

- Line pressure
- Control signal
- Controller enable
- Power supply

When all the conditions are met and the humidifier is still not working, please contact the customer service of Klingenburg GmbH.

## 8.7 Communication error

```
Communications
error!
```

Communication between the display circuit board and the frequency converter is via a monitored connection. If the connection is faulty, the message appears. The fault is automatically detected and another connection attempt is made. Normally, after a successful attempt at reconnection, the fault is rectified within a few seconds. If the message remains on the display for some time, you should ensure that the connectors on the display's circuit board and the frequency converter are a tight fit, while the control unit is disconnected from the mains. If the message still remains, please contact the customer service of Klingenburg GmbH.

## 8.8 Software update

The special design of the control unit allows the software to be updated at any time.

# 9. Status messages

By pressing the left selection key (⬆), the following operating status messages can be displayed successively:

1x ⬆:

```
I-Mot: 003,4A
R 13:58 06.06.11
```

**Motor current, time and date**

2x ⬆:

```
ru.hours: xxxxxh
Serv.hou: xxxxxh
```

**Operating hours and service hours**

3x ▲:

+ B	- O	- S	- T	+ A		
+ H	+ 2	- 3	- 4	- R		

## Status display of the 10 relays

A “+” in front of the letter equals: “Relay output connected”

A “-” in front of the letter equals: “Relay output open”

B	Status message
O	Overpressure message
S	Maintenance message
T	Follow-up drying run
A	Water treatment

H	Main valve intake
2	2nd level
3	3rd level
4	4th level
R	Backflushing

4x ▲:

		O	v	e	r	p	r	e	s	s	u	r	e		
1		1	3	:	5	8		0	6	.	0	6	.	1	1

## Most recent fault message

5x ▲:

## Second most recent fault message

6x ▲:

## Third most recent fault message

The three most recent faults are saved.

To return to the normal display, press the right selection key (▼) repeatedly.

Control unit type	CERTO-FU 750	CERTO-FU 1500
<b>Output</b>	0,75 kW	1,5 kW
<b>Protection</b>	10 A delayed fuse (5 x 20 mm) internal	16 A delayed fuse required (external)
<b>Mains voltage</b>	220-240 Volt / 50-60 Hz 1~	
<b>Weight</b>	3500 g	8000 g
<b>Ambient temperature</b>	from -10°C to +40°C (For temperatures below 0°C it is necessary to switch on the unit's mains voltage without running the motor, so that the control unit can warm up)	
<b>Humidity adjustment range (only for humidity control)</b>	10% to 95% rel. humidity	
<b>Protection class</b>	IP 54	
<b>Output frequency</b>	0-80 Hz (factory set as per data sheet)	
<b>Frequency resolution</b>	0,1 Hz	
<b>Control signals</b>	0-10 V, 0-20 mA, 4-20 mA	
<b>Fault alarm relay</b>	Potential free changeover contact, load capacity 250 V AC, 1 A	
<b>Motor connection cable</b>	The connecting cable must always be shielded, for cable lengths over 50 m current limiters should be provided. Please enquire.	
<b>Dimensions</b>	L=256 mm B=232 mm H=128 mm	L=355 mm B=262 mm H=168 mm

## You can enter your settings here:

Manual target value						
Start point						
Humidity target value						
Min. frequency						
Max. frequency						
Power-up time						
Braking time						
Purge interval						
Purge duration						
Control factor						
Drying						
Level 2 on						
Level 2 off						

## 7. Safety and precautions

Before installation and initial operation of the frequency converter, please read through the product handbook carefully and observe all warnings and safety precautions. Make sure that the product manual is easily reachable in the area of the frequency converter.

### Definition of tips:

**Warning!** Failure to comply with this information could cause death, severe bodily injury or significant physical damage.

**Caution!** Failure to comply with this information could cause minor bodily injury or physical damage.

**General:** During operation it must be ensured that the mains voltage is constantly on.

### Warning!

- This frequency converter creates dangerous electrical voltage and controls dangerous rotating parts. Failure to comply with the information in this manual could cause death, severe bodily injury or significant physical damage.
- The installation, initial operation and maintenance of this drive may only be performed by expert staff that are well versed in the functionality and equipment as well as the machine.
- The device contains intermediate circuit capacitors that also carry out switchover of dangerously high voltages on the grid side. After switching off the voltage, wait at least 15 minutes before opening the device and working on it. Please be sure that no live parts are touched.
- The ground fault safety serves only as protection for the frequency converter and not as personal protection. In accordance with VDE 0160 (German abbreviation for the Association for Electrical, Electronic & Information Technologies), the three-phase frequency converter must not be operated on a leakage current circuit breaker, because a possible direct current component will reduce the sensitivity of the leakage current circuit breaker in the event of a fault.
- The provisions of VDE 0160 should be observed as protective measures.
- Ground the frequency converter to the connection provided for it.
- To avoid injury and damage, do not touch any parts within the housing – not with hands or any kind of object – when mains voltage is present or the intermediate circuit capacitor is not loaded. Do not work on wiring or test signals when mains voltage is present.

- Pay special attention when the automatic restart is activated. To avoid injury from possible uncontrolled restart of the frequency converter after a power outage, install a switch element on the grid side that de-energises in a power outage and can only be turned on after return of voltage by manual confirmation (e.g., contactor, etc.).
- Ensure that the input voltage corresponds with the voltage listed on the label. Environmental influences such as high temperature and high humidity are to be avoided as well as dust, dirt and aggressive gases.
- The install location should be a well-ventilated location away from direct sunlight. Install the device on a non-flammable, vertical wall that does not transmit vibrations. Do not connect mains voltage to the output terminals U/T1, V/T2, W/T3.
- Please contact the motor or machine manufacturer if standard motors with a frequency of  $> 60$  Hz will be operated.
- All frequency converters are tested for dielectric strength and insulation resistance measurements. Insulation resistance measurements, for example, in the course of inspection, must not be conducted between the power terminals and earth. Do not carry out insulation resistance measurements on the control terminals.
- During operation it must be ensured that the mains voltage is constantly on. Control commands and operating signals (such as start/stop) must only be implemented via the control terminals or the control panel and not by switching the mains supply or a motor contactor.
- Do not install capacitors or overvoltage arrestors in the motor lead.

### **Caution!**

- In order to guarantee that your Klingenburg frequency converter operates securely and reliably, all respective safety regulations, such as accident prevention regulations, VDE regulations, etc., must be observed.
- As these regulations could contain different details within the German speaking areas, the user must observe the requirements that are valid for their area.
- Klingenburg GmbH cannot exonerate the user from the obligation to follow the most current safety regulations. The technical data and descriptions in these operating instructions are compiled according to the best of our knowledge and belief. Product improvements are constantly performed. For this reason, Klingenburg GmbH reserves the right to make such changes without prior notice.
- Despite the careful creation of these instructions, Klingenburg GmbH cannot be held liable for errors or damage which arise from use of this manual.

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