



Measuring - Controlling - Regulating
All from the same source

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Tank monitor

TW-31

Installation and operating instructions
for plant engineering companies,
installers and service engineers

Firmware V1.9



Programmable via
configuration software
WELBA „KONSOFT“

1. Introduction



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1. Introduction

1.1 Information about this operating instructions

These operating instructions are intended for the use by plant engineers, installers or service technicians of the TW-31 tank monitor. This manual contains all necessary suggestions, information, recommendations and advice for the safe and proper installation and commissioning of the tank monitor. It is only with the knowledge of this operating instruction that errors in the tank monitor system can be avoided and a trouble-free operation is guaranteed.

Read the assembly instructions carefully and adhere to the recommendations described in order to ensure proper operation. In addition, the local accident prevention regulations and general safety regulations are to be observed for the field of application of the tank monitor.



When delivered, the parameterization of the TW-31 does not necessarily correspond to the intended use. This must be adjusted accordingly during the installation.

The setting or changing of parameters may only be carried out by the system manufacturer or the service technician.

Basically, the installer of the system is responsible for the commissioning of the tank monitor.

Operation instruction for the operator

The plant engineers, the installer or the service technician must prepare operating instructions for the operator of the tank monitor (farmer).

When preparing the operating instructions for the operator the local regulations have to be observed - see chapter "Safety".

These operating instructions include important technical and safety information. It is vital to carefully study all these instructions before the installation of the tank monitor or in case of any other work with the tank monitor!

These instructions have been prepared with the utmost care. However, the information contained herein is not an assurance of product characteristics.

The manufacturer accepts no liability for errors and reserves the right to make technical changes at any time. All rights reserved.

NOTICE

NOTICE for storing the operating instructions

This instruction manual is part of the product and must always be readily available for the service technician.

1.2 Limitation of liability



The proper function of the TW-31 depends on many external factors on which the manufacturer has no influence. The manufacturer accepts no liability for any damages on the milk cooling tank, the connected components or the milk. The tank monitor supports only the control of the milk quality and does neither absolve the farmer (as operator of the milk tank) nor the driver of the milk collecting truck from the duty of care. Both parties have to ensure that the milk is transportable before it is removed from the tank.

All information and instructions in this manual have been compiled taking into account the applicable standards and regulations, the state of the art and our long-term experiences.

WELBA GmbH does not assume any liability for damages due to:

- Non-observance of the installation instruction
- Improper use
- Installation by unqualified staff
- incorrect or improper parameterization
- Non-professional installation by third parties
- Unauthorized modifications
- Technical modifications
- Use of unapproved spare parts (e.g. batteries)

Otherwise, our general terms and conditions as well as the terms of delivery of WELBA GmbH and the legal regulations valid at the time of conclusion of the contract are applicable.

We reserve the right to make technical changes in the context of improving the properties of use and further developments.

1.3 Warning notices in these operating instructions

Important safety information in these assembly instructions are identified by symbols. These instructions on occupational safety must be adhered to and followed. In these cases, behave particularly carefully in order to avoid accidents, personal injury and property damage.

In addition to the information in these assembly instructions, the general and local safety and accident prevention regulations must also be observed and instructed!



Nature and source of danger

This warning signs warns of an imminent danger to health and life of people. Failure to comply with this warning will result in extremely serious injuries, including death.



Nature and source of danger

This warning signs warns of possible property damage.

Failure to observe this warning signs can lead to further damage to the system, loss of data or damage to the milk.



Nature and source of danger

This warning signs warns of possible operating faults. Failure to observe these warning signs can lead to loss of data or damage to the milk.

NOTICE

Note

General notes contain application tips and particularly useful information, but no warnings about dangers.

1.4 Device description



The tank monitor TW-31 fully automatically monitors all processes (cooling, storage and cleaning processes) in milk cooling tanks. The objective here is to be able to remedy problems with the milk storage early enough by early alerting in order to prevent economic damage.

The TW-31 can be connected to all conventional tank brands and different system types such as VMS or common milking systems.

Automatic detection of the operating mode

The TW-31 detects independently the mode (cooling, cleaning or empty) of the connected milk cooling tank. Depending on the mode it stores the temperature of the tank at different intervals. If the temperatures are beyond the set limits, the farmer or the tank driver is alerted visually as well as acoustically. The exact error cause can be determined via the alarm code shown on the display.

Alarms

The TW-31 distinguishes between informative and critical alarms.

- The informative alarm (blinking green LED) signals to the farmer an improper operation -> action required
- The critical alarm "DO NOT LOAD" (blinking red LED) addresses the driver of the milk-collecting-truck. Together with the farmer the driver decides what to do next.

In addition to the two warning LEDs, an external warning light, an audible signal device or dialer can be connected.

You will find the description of the operation method in section 6.1.

Function monitoring

In addition to the temperatures the proper functioning of all agitators and the proper cleaning process of the milk tank are monitored. In case of errors the corresponding alarms are also generated.

Power failure

With the integrated power pack the temperatures are monitored and stored even in the case of a power failure. Thus the TW-31 can continue its work during a power failure and activate an alarm.

Data storage/-evaluation

The determined data of the last 300 days (max.) temperatures, alarms, operating mode changes, etc.) are stored in the CSV-format and can thus be opened in other programs.

The data can be read out by simply inserting a standard USB-stick into the USB socket - without further operation of the tank monitor.

EMAIL or SMS remote maintenance modems

By an optional Email or SMS remote maintenance modem error messages can be sent via Email or SMS to inform the farmer at an early stage.



NOTICE

WELBA „KONSORT“

For easier parameterization and updating of the TW-31 as well as for the evaluation of the data determined Welba provides its PC Software "Konsoft", which is free of charge. See section 5.2

NOTE: The KONSORT PC-Software has been thoroughly tested and has proven itself hundreds of times in customer use. Despite all care, we point out that the use of the free PC-Software is at your own risk. WELBA does not accept any liability for damages or loss of data resulting from the installation or use of the Software.

1.5 Type designation



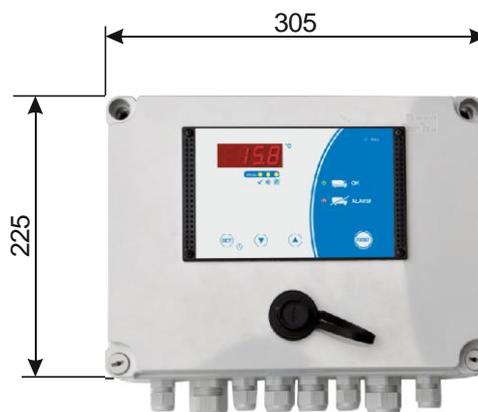
The type designation of your controller is attached to the holder frame.

1.6 Item supplied

- Tank monitor TW-31 ready for connection
- Sensor TF1A-2
- Accompanying device documentation
- Electro circuit diagram

Any optional accessories ordered.

1.7 Dimensions



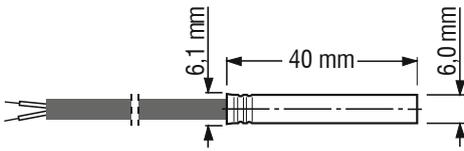
1. Introduction

1.8 Technical data of control unit

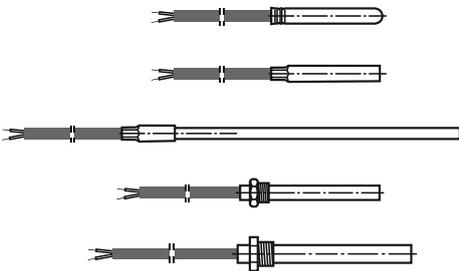
Operating voltage	230V AC +/-10%, 50 Hz
Relay contacts	3 performance relays
max. switching current	1 x each 6A AC1 bei 250V AC 2 x each 10A AC1 bei 250V AC
max. current per terminal	12A - 250V AC
max. switching voltage	250V AC - 50..60 Hz
Display	13 mm LED display, 4 digits
Display range	-999 .. 9999
Switching status displays	3 mm LED
Number of sensor	1 or 2
Measurement range	-5° .. +95°C
Temperature resolution	0,1°C
Sensor input	for KTY 81-210 (optionally PT-100)
Water detection	via independent level monitor
Digital inputs - for 230 V - for low voltage	6 (via optocoupler) 6 (via optocoupler)
Interface	2x RS-485 1xx USB master (for USB stick only)
Connection	Plug-in screw connections for cables up to 2.5 mm ²
Housing - Dimensions (LxBxH) - Material	305 mm x 225 mm x 120 mm Housing and cover ABS (UV-resistant) screws PA
Protection	IP 65 (DIN EN 60529)
Electrical safety	Protection class II, Overvoltage category III, pollution degree I
Environment specifications: - Operation temperature - Storage temperature - max. humidity 75% (no dew)	0° .. +50°C -20° .. +70°C 75% (no dew)

Technical data subject to change.

1.9 Sensor dimensions and technical data



Sensor element	KTY sensor
Bush material	1.4301 (V2A)
Bush length	40 mm
Bush diameter	6,0 mm +/- 0,1
Cable material	PVC
Measurement range	-10 .. 70° C
Cabel lenght	standard 2 metres



A Sensors other than our standard type are available on request (different bush form or cable length).

Some of the options are shown here.

2. Safety

2.1 General Information



These operating instructions contain important technical and safety information. Please read carefully before installation and before any work on or with the tank monitor.

It is the duty of the party commissioning the system to ensure compliance with the following guidelines.

Tank monitors must only be installed by an authorized electrician according to the electro-technical rules (for example EN 60204, DIN VDE 0100/0113/0160). The local safety regulations have to be observed!

Access to the environment when connected must be restricted to specialised personnel.

The tank monitor may only be opened by an authorized electrician!

The tank monitor is not suitable for use in explosive atmospheres. Danger of explosion. Use only outside areas subject to explosive atmospheres.

The tank monitor may not be exported to the USA without the manufacturer's express permission.



Do not simply confirm the alarms of the tank monitor.

It is essential to investigate and remedy the cause of the alarm in order to avoid harmful effects on the milk!!!!!!

Even without an alarm message, the operator of the equipment has to ensure the transportability of the milk!!!!



Important information on operation

The tank monitor must not be operated, when

- the housing is open or damaged***
- the front foil is damaged (leaking)***
- the time and date are not set correctly***

If four bars appear in the display after a longer power failure, the time setting is lost and must be set again! See section 5.4

No liquid may get inside the housing!



IMPORTANT NOTICE ABOUT THE ACCUMULATORS

See also section 8.11.

Charged (!) Batteries must be used at all times for the tank guard to function properly!

The life of the accumulators is limited. The built-in accumulators must be replaced by new ones every two years at the latest.

Only (!) charged accumulators of the following specification may be used: 1.2 V NiMh - size AA (min. 2.000 mAh):



Since the tank guard may not be opened by laypeople, the replacement of the batteries may only be carried out by a qualified electrician

DO NOT USE BATTERIES !!! EXPLOSIVE !!!!!

2. Safety

2.2 Intended use



These operating instructions contain important technical and safety information. Please read carefully before installation and before any work on or with the tank monitor.

The tank monitor TW-31 is used to monitor agitator motors, compressors and cleaning components in milk cooling tanks in the agricultural environment for the purpose of ensuring the milk quality. The device is designed for the installation in closed rooms and therefore may not be installed outdoors. Any other use beyond of this is not intended and thus forbidden.

The controller must not be modified or converted in any way.

The tank monitor is ready for use only when the parameters have been set appropriately. Its use before this has been done would have no benefits.

Responsibility for the faultless functions of the tank monitor is the responsibility of the plant engineer or the installer or the service technician who installed and commissioned the TW-31.

The device is fitted with a resistance temperature sensor.

The tank monitor is not suitable for use in explosive atmospheres. Danger of explosion. Use only outside areas subject to explosive atmospheres.



The TW-31 fulfils the EC requirements for electromagnetic compatibility (EMC) and the Low Voltage Directive (LVD).

The safety components meet the VDE regulations.

2.3 Safety during installation

Make sure that the mains voltage matches that on the nameplate of the control prior to the connection!

An incorrect electrical connection can cause damage to the control and to the connected systems!

When connecting the system components or the sensors, the control must be disconnected from the mains voltage.

It is not allowed to connect any devices to the relay contacts whose currents are above the maximum values specified in the technical data.

It is not allowed to connect any other devices to the power supply terminals of the control.



To avoid personal injuries or a damage of the milk the following sequence of connections must be strictly observed!

- Disconnect system from voltage and secure against unintentional restart.
- Open the housing.
- Connect all components and sensors to the terminal block according to the wiring diagram.
- Connect mains supply.
- Lock the switch box and switch on the mains voltage.
- Switch on and parameterize the control as described in section “Operation”. (Possibly with the optionally available configuration Software WELBA-KONSOFT).

2.4 Wiring, screening, earthing

When selecting wiring materials and installing and connecting the temperature controller to the electricity supply account must be taken of DIN VDE 0100 “Erection of power installations with rated voltages below 1000” or the relevant national regulations (e.g. based on IEC 60364).

- Wherever possible keep input, output and supply leads and sensor cable physically separate from each other and do not lay them parallel to each other.
- Mains voltage cables and low-voltage cables must not be laid in one cable.
- Use screened and twisted interface and sensor cables.
- Earth the screening of temperature sensors unilaterally in the switchbox.
- Ensure correctly wired potential equalisation.

2.5 Electrical safety

- The tank monitor itself and the associated control circuits and load circuits must be protected separately and in accordance with the local regulations.
- The separate protection of the control- and load circuit must be carried out according to local conditions!
- In order to prevent destruction of the relay or semiconductor relay outputs in the event of a short-circuit the load circuit should be fused to the maximum permissible output current.
- As well as incorrect installation wrong parameter settings can also adversely affect the correct functioning of the controller. For this reason safety devices that are independent of the controller should always be used, e.g. high and low pressure valves or temperature limiters. Account should be taken of the local safety regulations in this connection.
- The load circuit (relay outputs K1 to K3) must be fused in accordance with the connected components.
- The connection of external voltages to the digital inputs can lead to the destruction of the control.
- Caution: All cables to the digital inputs must be shielded and kept as short as possible. EMC.



NOTICE

Important note concerning the external fuse.

- The transformer, which is installed in the TW-31 has a two-chamber safety winding, is only conditionally short-circuit-proof due to the built-in thermal protection.

Protect control unit with an external fuse of 160 mA!!

2.6 Notes on wiring

Correct wiring in accordance with the information in the accompanying description and local regulations is essential. Take particular care to ensure that the AC supply is not connected to the sensor input or other low-voltage inputs or outputs.

Use copper wire (except for the sensor connection) and ensure that all supply leads and connection terminals are dimensioned to suit the relevant current rating.

When connecting the controller and selecting the wiring materials to be used, it is essential to comply with the provisions of DIN VDE 0100 "Erection of power installations with rated voltages below 1000" or the relevant national regulations.

Furthermore, all connections must comply with the relevant VDE regulations or corresponding national regulations.

Wiring of the digital inputs:

Only the output signal of the control at terminal 38 can be connected to the digital inputs (via potential-free switch contacts)!

Make the connection according to the wiring diagram on the next page.

- Use cable bushes
- Make sure that cables do not chafe!
- Observe relay current rating!
- Do not wire digital inputs with external voltage!
- Use potential-free switches.

3. Installation

3.1 Location and climatic conditions

The tank monitor is designed for the use in closed rooms. It must not be installed and operated outdoors.

It is essential not to install the device under the following conditions:

- severe jolting, vibration or magnetic fields
- permanent contact with water
- relative humidity of more than 75%
- sharply fluctuating temperatures (condensation)
- permanent and direct UV radiation
- dust, flammable gases, vapours, solvents,
- operation in an aggressive atmosphere (ammonia or sulphur fumes) - risk of oxidation
- operation in the immediate vicinity of radio transmitters with high levels of spurious radiation.

A physical separation between the device and inductive consumers is recommended.

3.2 Unpacking and storage

If the packaging is damaged or something is missing, do not fit the temperature controller. In this case please contact Welba.

If you keep the temperature controller for a period before using it, store it in a clean dry place at a temperature of between -20°C and +70°C.

3.3 Fitting the sensor



The sensor cable must not be chafed or kinked.

There must be no substantial mechanical pressure on the sensor tube.

Do not place the sensor and the high-voltage cable in the same cable conduit (not even within the switchbox).

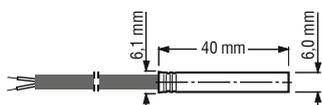
Temperature range sensor cable -10°C .. +70°C.



The TW-31 has been designed for connection to various types of sensor (see technical data). It can function properly only if one of those sensor types is installed and the parameters are correctly set.

When setting the tank monitor parameters (and whenever the sensor is replaced) the "actual value correction" [Parameter C91] must be adjusted so that the temperature measured corresponds to that shown on the display. A reference thermometer should be used for this purpose.

See the section 8.7.



Pay attention to the permitted temperature range for sensor cable exposure.

Changing the sensor cable length

If it is necessary to shorten or lengthen the sensor cable on installation (or if a sensor other than the one supplied is to be fitted), the "actual value correction" parameter must be adjusted accordingly. See section 8.7.

3.4 Cleaning instructions

The enclosure front (front foil) can be cleaned with usual detergents.



ATTENTION: The enclosure front is not resistant to aggressive acids and alkalis, abrasive cleaners and cleaning with high-pressure cleaners.

The use of these cleaners and cleaning methods may lead to damages!

4. Electrical connection

4.1 GUIDELINE for the electrical connection

During the entire cooling and cleaning process the tank monitor controls the correct operation of all components, in order to guarantee the perfect condition of the milk.

The objective is to detect problems with the milk storage as early as possible by a warning so that the immediate solving of these problems is possible and economic damage can be prevented.

In particular the following is monitored:

- Minimum and maximum milk temperature during the cooling process
- Power failure
- Agitator function
- Minimum and maximum temperatures during the cleaning process
- e.g.



Any errors are indicated by two LEDs and the corresponding error codes are blinking simultaneously on the display.

In case of errors which may jeopardize the milk quality the red LED flashes with the information “NO LOADING”!

A detailed description of the error codes can be found in section 6.5.

Installation

By evaluating “external signal transmitters” of your existing system the tank monitor can

- find out the operation mode of the cooling tank
- monitor other functions and conditions of the tank (agitator, detergent tank etc.).

“External transmitters” can be compressors, valves, level monitors or float switches but also signal transmitters of other system components such as milking robots or plate heat exchanger.

Proceed as follows:

- Familiarize yourself with the function of the “automatic detection of the operating mode” (section 4.3).
- Determine which of the “external signal transmitters” are to be connected for the different kind of functions of the tank monitor. See diagram in section 4.4.
- Connect the tank monitor together with the mains supply and the external signal transmitter according to the electrical wiring diagram which is in the switch box of the tank monitor or on the internet.



The tank guard is only ready for use after the correct date and time have been entered and the parameters have been adjusted accordingly. Commissioning without these settings is not permitted.

The guideline for the correct setting of the parameters can be found in section 7.1.

4. Electrical connection

4.3 Automatic detection of the operating mode

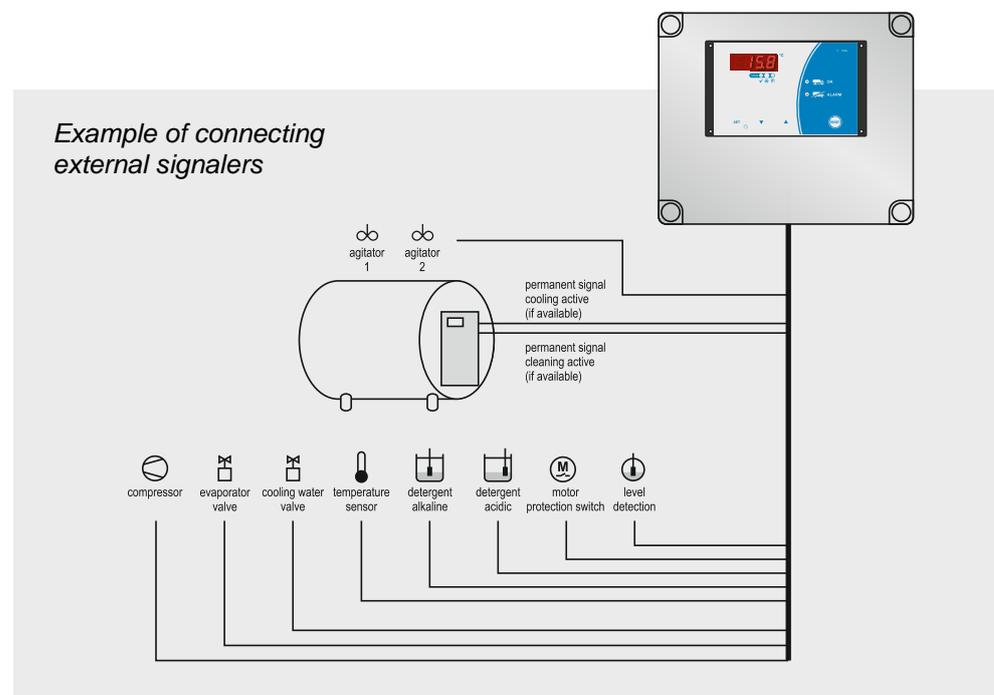
A proper operation of the tank monitor is only possible if it can detect reliably the operation modes of the milk cooling tank that has to be monitored! These are

- cooling
- cleaning
- empty (Off)

This detection is carried out - without additional operation - only by signals of the milk cooling tank or tank controls. The wiring of the tank monitor depends on the basic design of the milk cooling system.

If the control of the milk cooling tank provides continuous signals for "Cleaning active" or "Cooling active", these are to be used preferentially! This guarantees the highest detection reliability!

If this is not the case, external signal transmitters and sensors must be connected to determine the correct operation mode. These so-called "trigger signals" are signaling to the tank monitor when the corresponding mode starts or ends.



The correct connection of the external signal transmitters and sensors is described in section 4.5.

The mode of the control of the cooling tank must be known for the function of the TW-31. The modes are the following:



Cooling mode START

- either by a permanent signal of the external control (uncommon)
- or by the trigger signal -> see next page
- by “first milk into the tank” - detection - see parameter [h2]

Cooling mode END

- either by the omission of the permanent signal of the external control (uncommon)
- or by the detection “start of cleaning”
- or in case of a rise in temperature above 5°C in the tank, without the start of the compressor



Cleaning mode START

- either by a permanent signal of the external control
- or by the start signal “cold water valve ON” (trigger function)

Cleaning mode END

- either by omission of the permanent signal of the external control
- or after end of the settable “minimum period cleaning cycle” [h5] (example 0.5 hours – will be extended by 10 minutes [h6], if the agitator function is detected).



OFF (TANK EMPTY)

is displayed after cleaning mode has been finished.
The tank is empty and can be refilled.

4.4 Error detection (Example)

By means of different input signals or temperature measurement results predefined errors can be detected and displayed.

Example Error F1 -> **Milk temperature too high too long**

Error is displayed if the temperature sensor signals a higher temperature than the value that has been predefined in the limit value [H1].

Example Error F35 -> **Detergent “empty” alkaline**

Error is displayed, if the float switch reports “Container empty”.

A listing of the predefined errors and their causes can be found in section 6.5.

4.5 Connection of external signal transmitters and sensors

For the proper functioning of the automatic detection of the operating mode, the following wiring is necessary:

The corresponding list of the numbering is on the next page.

- 1** *for the detection of the cooling mode*
 - if possible by permanent signal of the external control "cooling active" (uncommon)
 - or by trigger signal -> (compressor ON, evaporator valve ON or ice water pump ON...) see graphic on the next page.

 - 1.1** *Safety function: Cooling was not switched on (see section 8.2)*
 - by signal milk feed pump - see parameter [h2]
 - the signal of the milk feed pump cannot be used due to a change in temperature "first milk in tank [h2]

 - 2** *for the detection of the cleaning mode*
 - if possible by permanent signal "cleaning active" of the external cooling tank control
 - or by start signal -> cold water valve ON
-

Optional: To be able to monitor other milk tank components, wire as follows:

- 3** *for the agitator detection 1*
 - by signal "agitator 1" of the external cooling tank control

- 4** *for the agitator detection 2*
 - by signal "agitator 2" of the external cooling tank control

- 5** *for the detection "container alkaline empty"*
 - by signal "float switch alkaline"

- 6** *for the detection "container acidic empty"*
 - by signal "float switch acidic"

- 7** *for the detection "motor protection switch compressor"*
 - by signal auxiliary contact motor protection switch

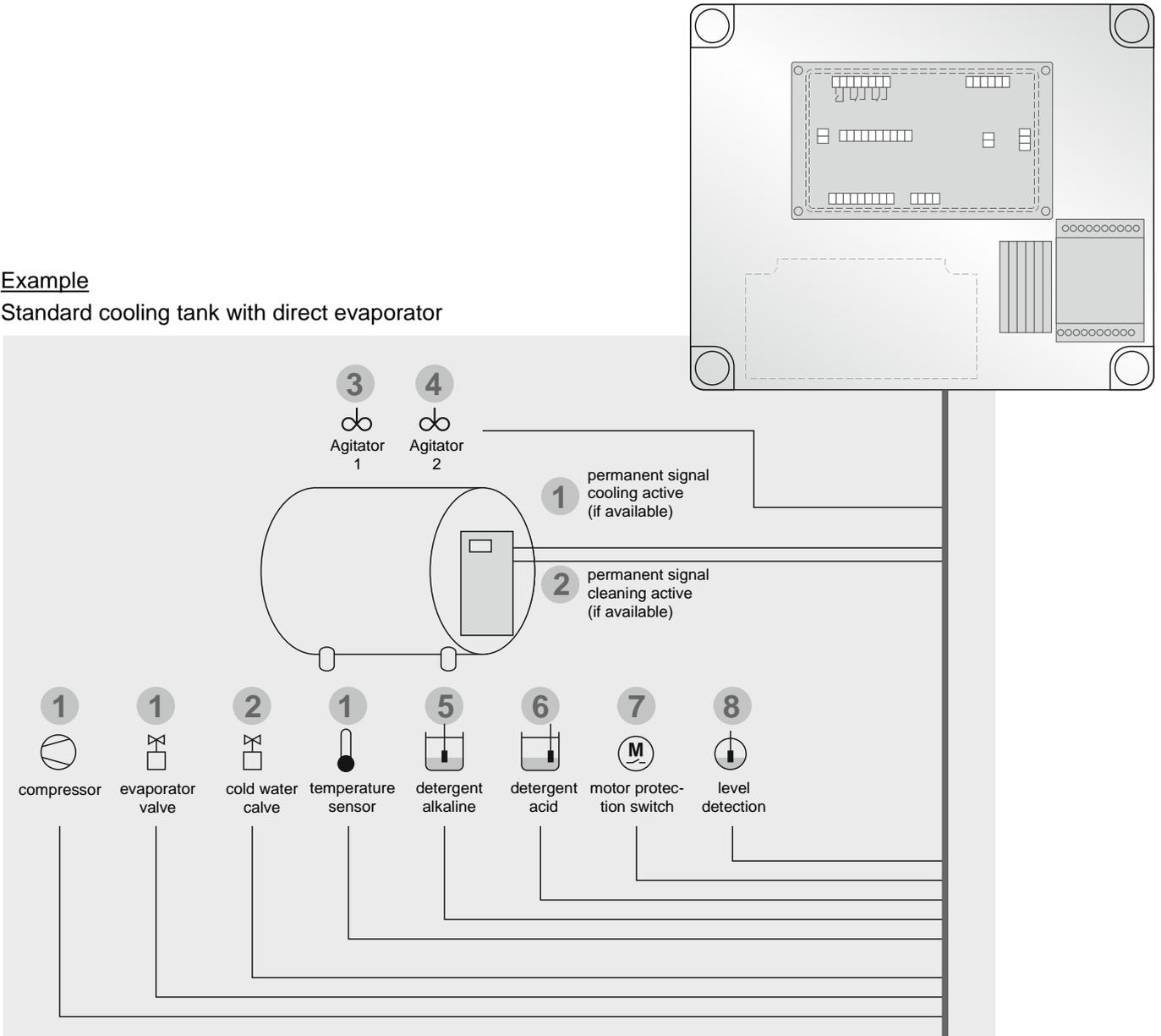
- 8** *for the detection "level detected after cleaning"*
 - by signal "level input"

**After the connection of the external signal transmitters and sensors:
Test the correct wiring.**

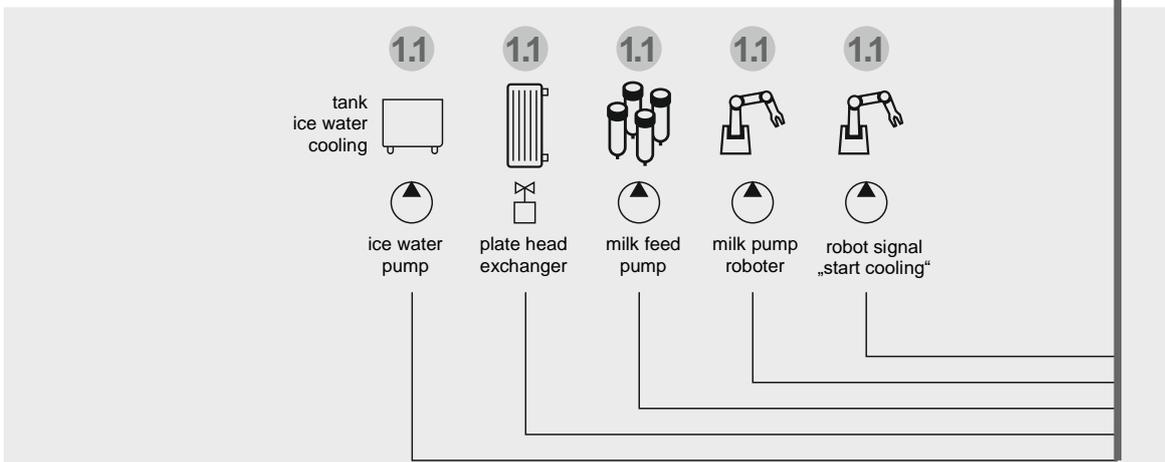
To test the correct wiring the functions of the corresponding inputs can be tested in parameters "o.21" to "o.42".

Example

Standard cooling tank with direct evaporator



Other possible signal transmitters



5. Operation

5.1 First commissioning

After applying the mains voltage the following can appear on the display

- 4 circulating bars, then briefly the firmware, then the time, or
- 4 blinking, horizontal bars

The time must be checked/set. See section 5.4.

For further operation the tank monitor must be parameterized according to the conditions of your system.

Incorrectly set parameters can cause malfunctions of the tank monitor!

The correct parameterization of the tank monitor is described in section 7. !

NOTICE

In order to be able to assign the file to the corresponding customer when the files are later evaluated by Welba-KONSOFT, it is important to enter the customer and tank number when installing the tank monitor.

See section 7.1.1

NOTICE

It is recommendable to record the setting values of the tank monitor after commissioning or to archive them as KONSOFT files. This allows us to deliver a pre-programmed tank monitors in case of a spare part delivery.

When exchanging the tank monitor at the end customer's site only the actual value correction has to be re-entered.

5.2 The configuration software KONSOFT



For software description see separate instructions

The user-friendly configuration software "KONSOFT" for the TW-31 can be used for

- configuration
- parameter setting
- visualisation
- storage
- updating

Configuration

All setting parameters can be entered and stored, with reference to levels, on your PC using a clearly designed template. A description is available for every parameter.

Once all parameters are entered the complete configuration can be transferred to the control unit via USB interface

Visualisation

Also by USB transfer, values and status or error reports can be obtained from the control unit, displayed on screen graphically or in tabular form, and stored. This allows rapid analysis in the event of a fault.

Bootloader function

This allows control units to be updated to any new software by pressing a button without changing parameter settings.

NOTICE

NOTE: The KONSOFT PC-Software has been thoroughly tested and has proven itself hundreds of times in customer use. Despite all care, we point out that the use of the free PC-Software is at your own risk. WELBA does not accept any liability for damages or loss of data resulting from the installation or use of the Software.

5.3 Reading out the tank guard LOG file



Proceed as follows:

- Insert a standard USB stick (FAT-32) into the USB socket of the tank monitor:
 - The blue "DATA" LED begins to look slowly after a short time => The tank monitor LOG file is transferred to the USB stick! Depending on the evaluation period [parameter h90], this transfer can take several minutes.
 - Has the data transfer been completed without faults: The blue "DATA" LED lights up permanently for approx. 5 seconds and then goes out.
 - If the data transfer is faulty: The blue "DATA" LED flashes quickly for approx. 5 seconds and then goes out.
Try again or use a different USB stick.
- If the LED has gone out: remove the USB stick and close the cover cap tightly.

5.4 Setting the date and time



In the event of a power cut the date and time are retained for up to 5 days. After that they must be re-entered.

When the power is connected...

... there are two possible displays:



1) Time is lost: 4 dashes are shown:

The date and time must be re-entered. Proceed as follows:

- Press one of the arrow keys: the year appears, flashing.
- Set the time as described below.

2.) Time is still preserved:

During initialisation, 4 rotating bars are shown, then the current firmware appears briefly, then the time is displayed. If it is not correct, adjust it as follows.



Setting the time during normal operation

- Press the SET button: a time is displayed.
If the correct time is displayed, no further steps are necessary.

If the wrong time is displayed

- Hold the SET button down until the year appears, flashing.
- (in between, the tank temperature is shown briefly)
- Use the arrow keys to set the correct year
- Press the SET button: the month appears, flashing.
- Use the arrow keys to set the correct month.
- Press the SET button: the day appears, flashing.
- Use the arrow keys to set the correct day.
- Then set the hour and minute displays in the same way.
- When finished press the SET button.

The setting is finished. Depending on the operation mode of the cooling tank the display shows the current temperature in the tank or the time.



NOTICE

Information: Switching to summer- / winter time

An automatic switching to summer-/winter time can be parameterized in parameter [A78].

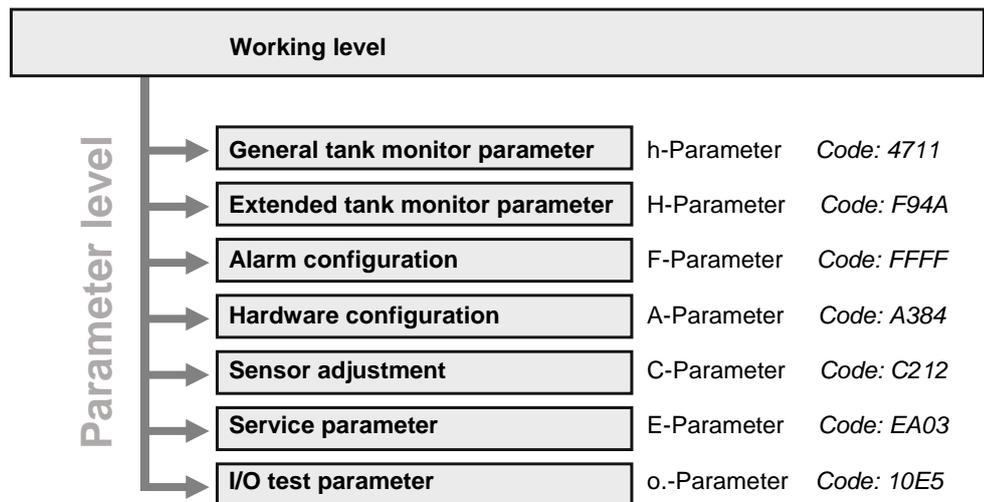
5.5 Operation in levels

All basic functions are operable and selectable in the working level. In addition the tank monitor can be adapted to a wide variety of system types and sizes. This is done via the thematically structured parameter levels.

The working level is used for control in everyday operation.

The TW-31 is parameterized in 7 different parameter levels.

The subordinate parameter levels are only entered after entering a code in order to avoid inadvertent adjustment of the parameters.



General tank monitor parameters – (h-parameters)

Determination of the criteria whether and when informative alarms are triggered

Extended tank monitor parameters – (H-parameters)

Determination of the criteria whether and when critical alarms are triggered

Alarm configuration – (F-parameters)

An individual “behavior” for each error can be assigned here.

Hardware configuration – (A-parameters)

Determination / parameterization of the Hardware-configuration

Sensor adjustment – (C-parameters)

Calibration of level- and temperature sensors

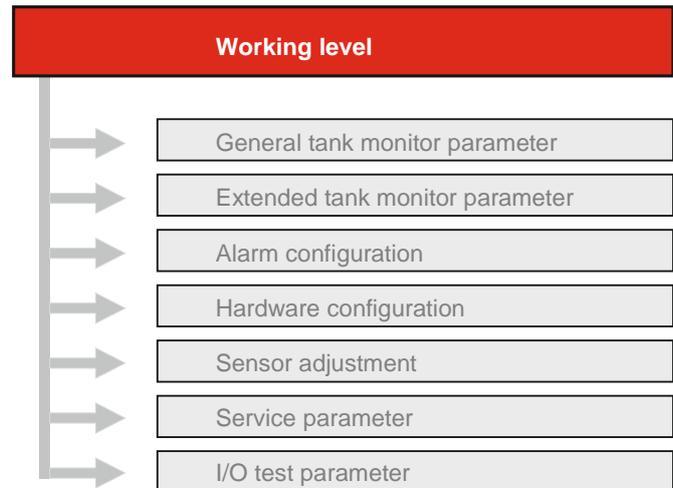
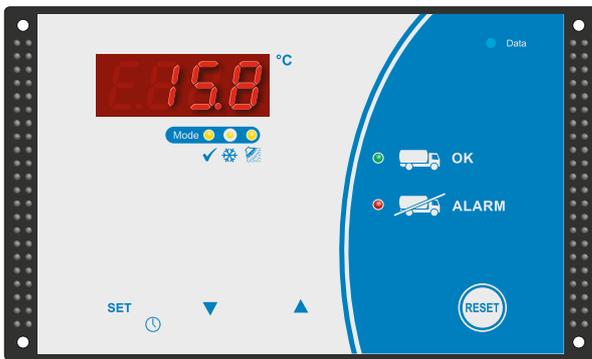
Service parameter – (E-parameters)

Display of the times when the temperature is too low or too high and the display of the power pack voltage

I/O-Test-parameter - /o-parameters)

Serves for the commissioning of the control.

5.6 Operating and display elements



5.6.1 Button functions

In case of a trouble-free working process the TW-31 does not require any handling with the following exception:

- in case of setting the clock (see section 5.4)
- in case of reading and confirming error codes (see section 6.4).



„SET“ button

in case of normal operation = brief pressing: Displays the current time, hold 3 seconds: Set date and time

If the red LED is flashing = display of the current fault codes
See section 6.4



„ARROW BUTTONS“

for setting the time or adjusting parameters

Operation by the driver of the milk-truck



„RESET“ button

- Confirmation of the message "Do not load". See section 6.2
- Function test "Do-Not-Load LED" and "external alarm light":
Press reset button for 5 seconds: the alarm will go off for 10 seconds.

5.6.2 Description of the LEDs

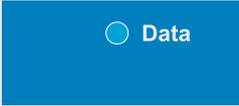
Display of the modes

	<p>“TANK EMPTY” detected After a successful cleaning the tank can be filled with milk.</p>
	<p>Operating mode “COOLING” detected Cooling operation is active</p>
	<p>Operating mode “CLEANING” detected The cleaning operation is active</p>
	<p>All LEDs off Check the tank content</p>

Tank monitor

	<p>LED (green) "MILK COLLECTION OK"</p> <table border="0"> <tr> <td style="padding-right: 20px;">permanent</td> <td>everything is ok – milk can be loaded</td> </tr> <tr> <td>blinking</td> <td>informative alarm</td> </tr> <tr> <td>off</td> <td>a) if red LED is flashing or blinking b) after the confirmation of an informative alarm</td> </tr> </table>	permanent	everything is ok – milk can be loaded	blinking	informative alarm	off	a) if red LED is flashing or blinking b) after the confirmation of an informative alarm
permanent	everything is ok – milk can be loaded						
blinking	informative alarm						
off	a) if red LED is flashing or blinking b) after the confirmation of an informative alarm						
	<p>LED (red) "DO NOT LOAD!"</p> <table border="0"> <tr> <td style="padding-right: 20px;">blinking</td> <td>critical alarm</td> </tr> <tr> <td>permanent</td> <td>critical alarm – has already been confirmed</td> </tr> </table>	blinking	critical alarm	permanent	critical alarm – has already been confirmed		
blinking	critical alarm						
permanent	critical alarm – has already been confirmed						

Data transfer

	<p>LED (blue) "Data"</p> <table border="0"> <tr> <td style="padding-right: 20px;">blinking</td> <td>USB-stick inserted: Data are transferred</td> </tr> <tr> <td>permanent flashing and goes off after 5 sec.</td> <td>USB-stick inserted: Data transfer successfully completed</td> </tr> <tr> <td>off</td> <td>No USB-stick inserted</td> </tr> </table> <p>For the procedure for reading out the LOG files, see section 5.3</p>	blinking	USB-stick inserted: Data are transferred	permanent flashing and goes off after 5 sec.	USB-stick inserted: Data transfer successfully completed	off	No USB-stick inserted
blinking	USB-stick inserted: Data are transferred						
permanent flashing and goes off after 5 sec.	USB-stick inserted: Data transfer successfully completed						
off	No USB-stick inserted						

6. Operation and fault handling

6.1 Description of tank monitor operation

During the entire cooling and cleaning process the tank monitor checks the operation of all processes to guarantee the perfect condition of the milk. Errors are displayed flashing on the display via corresponding error codes. Depending on the type of alarm two LEDs (red and green) flash or blink additionally.

In case of errors which may jeopardise the milk quality, the problem is indicated by the red LED as a “critical alarm”. In this case milk must not be filled into the tank unless a careful check has been carried out!

In the “F” parameters (see section 7.5) is defined if the error is a system alarm, an informative alarm or a critical alarm. In addition it is parameterized whether a relay function, an email or a SMS message should be carried out. Therefore the relay functions in the “A”- parameters (see section 7.6) must be assigned to a relay or the SMS function must be activated.

The tank monitor “knows” the following alarm types:



Critical tank monitor alarms (red LED + error code in the display)

- During cooling mode:
- minimum and maximum milk temperature
 - agitator function and stirring intervals
 - duration of power failure
 - milk temperature too high for a long period of time
- During cleaning:
- cleaning temperatures
 - cleaning time

A list of all critical alarms and their corresponding configuration can be found in section 7.5.



Informative tank monitor alarms (green LED + error code in the display)

- During cooling mode:
- milk temperature too high for a long period of time
 - milk temperature too low
 - malfunction agitator and agitator times
 - maximum time until next cleaning
 - duration of the power failure
- During cleaning:
- cleaning temperatures
 - detergent dosage and exposure time

A list of all informative alarms and their corresponding configuration can be found in section 7.5.

Additional system-alarms (only error code on display)

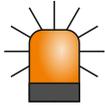
(Depending on parameterization they can be both, critical or informative).

- During cooling mode:
- cooling time first milking
 - broken sensor
 - short-circuit of sensor, etc.
- During cleaning:
- monitoring of butterfly valve, rinsing pump, cleaning pump etc.
 - times for water intake and outlet
 - heating times, etc.

A list of all system-alarms and their corresponding configuration can be found in section 7.5

to section 6.1: Description of tank monitor operation

Optical presentation of alarms



External alarm light:

In addition to the red LED, an external alarm light can optionally be connected to one of the relay outputs.

See also parameter [A47].



  No Alarm

F34

Each alarm has its own display code (see section 6.5). Informative and critical alarms are additionally displayed by LED as follows:

Informative alarm



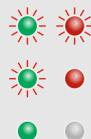
active informative alarm
(After RESET permanently green again)

Critical alarm



active critical alarm
critical alarm after RESET
(Turns off when cleaning cycle runs for at least 10 minutes)

Informative and critical alarm



active critical + informative alarm
critical + informative alarm – 1 x RESET
critical + informative alarm – multiple RESET
In case of several alarms, the RESET button has to be pressed several times. See section 6.3)
(Turns off when cleaning cycle runs for at least 10 minutes)

System alarms

F34

is displayed only as a blinking display code

6.2 Milk removal YES or NO

Examples for the use of the tank monitor.



ATTENTION:

Do not simply confirm the alarms of the tank monitor.

It is essential to investigate and remedy the cause of the alarm in order to avoid harmful effects on the milk!!!!

Even without an alarm message, the operator of the equipment has to ensure the transportability of the milk!!!!

No alarm – Milk may be drawn off.

 OK	Green = on	no alarm
 ALARM	Red = off	

- The driver goes to the TW-31 and checks the tank monitor. If the green LED is on, milk may be drawn off.
- Once the milk has been taken, the driver starts the cleaning process.

Informative alarm - Milk may be drawn off.

 OK	Green = flashing	Informative alarm	
 ALARM	Red = off	(Press RESET button)	
 OK	after RESET Green = on	Informative alarm	
 ALARM	Red = off		

- The driver checks the LEDs at the tank monitor
The green LED is blinking – alarm horn sounds - error code on display.
Milk can be removed -> farmer has to be informed.
- The farmer investigates ((and remedies) the cause of the error and presses the button “RESET” -> the alarm horn stops.
- The farmer presses button “RESET” once again -> the green LED flashes permanently.
(The informative alarm is confirmed and deleted by the push button).
- Once the milk has been removed, the driver starts the cleaning process.

Remark:
If the informative alarm is not reset, the green LED and the error code will continue to blink on the display -> even after the next cleaning cycle.

* if parametrized

to section 6.2: Milk removal YES or NO

Critical alarm - Milk must not be taken out.

 OK  ALARM	Green = an Red = flashing	critical alarm (press RESET button)	
after RESET			
 OK  ALARM	Green = off Red = on	critical alarm	

- The driver checks the LEDs at the tank monitor.
The red LED is blinking or flashing, an error code is displayed and an alarm horn sounds.
- The driver informs the farmer -> together they investigate the cause of the critical alarm. (The critical alarm codes are retrieved from the display and identified by means of the error table. See section 6.5).
- Farmer and driver determine together whether the milk can be fed into the tank, despite the alarm.
- With the RESET-button the farmer confirms the alarm -> the alarm horn stops – the red LED continuous to flash.
- The farmer presses the RESET-button again -> the red LED flashes permanently.
- After emptying the tank the cleaning process has to be started.

Only when the cleaning cycle has been active for at least 10 minutes, the tank monitor automatically resets all critical alarms.

6. Operation and fault handling

to section 6.2: Milk removal YES or NO

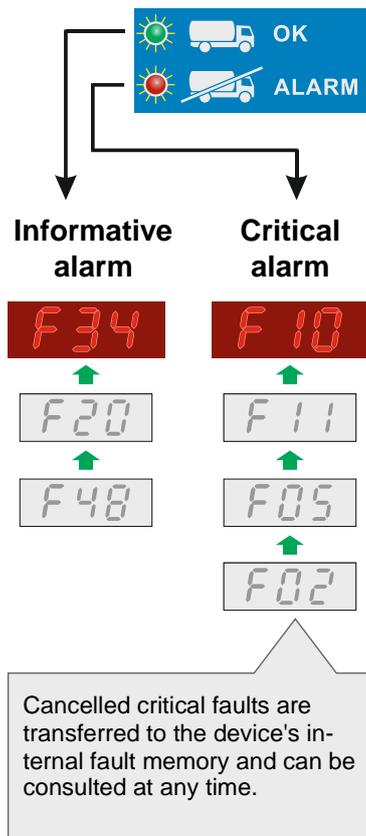
Critical + informative alarm - Milk must not be taken out.

 OK	Green = flashing	critical + informative alarm (press RESET button)	 ALARM
	Red = flashing		
after RESET			
 OK	Green = flashing	critical + informative alarm (press RESET button)	 ALARM
	Red = on		
after second RESET			
 OK	Green = off	critical + informative alarm	 ALARM
	Red = on		

- Der The driver checks the LEDs at the tank monitor. Green and red LEDs are blinking, an error is displayed and an alarm horn sounds.
- The driver informs the farmer -> together they investigate the cause of the critical and informative alarms. (The alarm codes are retrieved from the display and identified by means of the error table. See section 6.5).
- Farmer and driver determine together whether the milk can be fed into the tank, despite the alarm.
- With the RESET-button the farmer confirms the critical alarm at first -> the alarm horn stops.
- The farmer presses the RESET-button again -> the red LED flashes permanently.
- Afterwards the farmer confirms the informative alarm -> the green LED turns off.
- After emptying the tank the cleaning process has to be started.

Only when the cleaning cycle has been active for at least 10 minutes, the tank monitor resets automatically all critical alarms.

6.3 Handling multiple faults



For every alarm - whether informative (green) or critical (red) – an error code blinks in the display.

If several faults occur simultaneously, the code for the most recently occurring fault blinks in the display.

If both informative and critical faults occur, priority is always given to the critical error code (in the example this would be fault F10)

Exception in cooling mode: sensor faults flash alternately with critical or informative alarms.

labelling faults: (both LEDs flash alternately)

- The most recently occurring fault (example F10) blinks in the display. Press RESET button -> The horn switches off, the most recently occurring fault (example F10) continues to blink in the display.
- Identify the fault using the list of faults -> Press RESET button -> the red LED continues to flash in order to indicate that there are further critical faults.
- The next fault (in the example F11) blinks in the display: Identify the fault using the list of faults -> Press RESET button -> etc.:

When the last critical fault (example F02) has been reset: (red LED permanently lit)

- The first informative fault (example F34) blinks in the display: Identify the fault using the list of faults -> Press RESET button -> The green LED continues to flash in order to indicate that there are further informative faults.
- The next informative fault (example F20) flashes in the display...

When the last informative fault has been reset the green LED goes out while the red LED stays on permanently.

It is only when the cleaning cycle is active for at least 10 minutes that the tank monitor resets all critical alarms.

6.4 Display fault memory



NOTICE

If the red LED of the tank monitor flashes permanently it means that critical errors have already been confirmed, but still exist. These error codes are registered in the internal error memory of the unit. They can be read out as follows:

Display of the last 5 critical errors from the fault memory

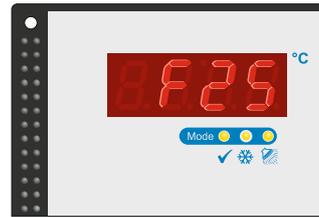
- Press SET-button: The display indicates the code of the first critical error (in the example above F02).
- Press SET-button again: the next error code (in example F05) is indicated..

If no button is pressed for 3 seconds the display switches back to temperature and time.

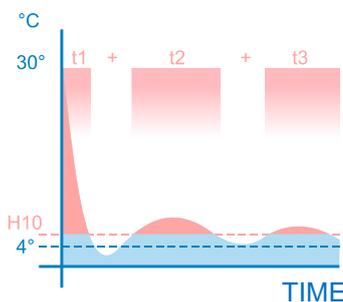
Only when the cleaning cycle has been active for at least 10 minutes, the tank monitor resets automatically all critical alarms.

6.5 Listing fault memory and description

The display blinks to indicate faults.



6.5.1 Critical tank monitor alarms (red)



F1 Milk temperature too high for too long 1

If during cooling mode the milk temperature exceeds the temperature limit value entered in [H10] for longer than the time entered in [H11], fault report F1 appears.

H11 here is the limit value for the sum of all time overshoots (t1, t2, t3 etc.)

F2 Milk temperature too high for too long 2

as F1, but relating to [H12 and H13]

F3 Milk temperature too high for too long 3

as F1, but relating to [H14 und H15]

F6 Power failure alarm

Alarm is only possible, if all power packs are charged!

Alarm is activated if power failure time lasts longer than parameterized in [H20] and the milk temperature is higher than parameterized in [H19].

F11 Minimum washing temperature not reached

Alarm is triggered if in the main washing stages the minimum water temperature selected in [H30] is not reached.

F12 Minimum acting time not reached

Alarm is triggered if in the main washing stages the minimum water temperature selected in [H30] has not had enough time to act.

Minimum acting time = [H31]

F13 Cleaning time too short

Alarm is activated if the cleaning stops earlier than the time [H32] that has been set.

F15 Agitator fault in cooling mode (milk not stirred)

Alarm functions only if optional "Welba agitator monitor" is installed and parameters set [A71].

Alarm occurs after the cooling mode is started, if a backpressure by the milk has not been detected on the stirrer within the time [H40].

F16 "No stirring" time exceeded

Alarm can only occur if the „agitator monitor“ is parameterized according to [A71]!

Alarm is triggered if more minutes have passed than set in [H41] or the minimum term [H42] was not achieved without a restart of the agitator.

to section 6.5: Listing fault memory and description



6.5.2 Informative tank monitor alarms (green)

- F17 Cooling not activated after “first milk comes into the tank” time 1**
After detection “first milk comes into the tank” the compressor start was not detected after expiration of the time [h17]. See also section 8.2.
- F18 Cooling not activated after “first milk comes into the tank” time 2**
Same as F17, however, after expiration of time [h18]. See section 8.2.
- F19 Cooling not activated after “first milk comes into the tank” time 3**
Same as F17, however, after expiration of time [h19]. See section 8.2.
- F20 Cooling time exceeded for first milking**
Alarm is triggered if the temperature set in parameter [h20] is not reached within the time set in parameter [h21].
The time starts when cooling of the first milking starts.
- F21 Cooling time exceeded**
Alarm is activated if after detection “first milk comes into the tank” the temperature [H21] has not been achieved within the corresponding time [H22].
- F22 Forgotten to switch on the cooling**
At the milking time [h41-h43] entered, the cooling was not switched on.
- F23 Milk temperature too high for too long**
Same as for faults F1 - F3.
Here a shorter time interval can be entered to warn the farmer ahead of time.
Setting in parameter [h23 / h24]
- F25 Excess temperature directly**
When cooling starts, this alarm remains inactive until the milk temperature falls below the temperature set in [h20] for the first time. It is at this point that milk temperature monitoring starts. If the milk temperature subsequently exceeds the temperature set in [h25], the alarm is triggered.
- F27 Milk temperature too low for too long**
The alarm is triggered if the milk temperature is too low [h27] for too long [h28]. The timer starts when the temperature falls below [h27] and stops again when the temperature exceeds [h27]. The timer restarts each time the temperature is exceeded.
- F29 Low temperature directly**
The alarm is triggered as soon as the milk temperature falls below the temperature set in [h29]. (Ice protection)
- F30 Power cut directly**
The alarm can function only if the optional power pack is installed. Regardless of the operating mode the alarm is triggered in the event of a power cut.

6. Operation and fault handling

to section 6.5: Listing fault memory and description

F31 Max. time without cleaning

Safety function! (This is to prevent that after manual interruption of the cooling mode is forgotten, to reactivate it or to start the cleaning after the milk removal.)

Alarm is activated if after exceeding a temperature set by the TW31 a new cooling or cleaning mode is not detected within the time [h31].

F32 Max. time without cooling (starts when washing ends)

Safety function! (designed to ensure that the operator does not forget to start cooling mode after washing.)

Timer starts as soon as washing mode ends. The alarm is triggered if a new cooling period or washing cycle is not started within time [h32].

F33 min. cleaning interval

Timer starts after detection of "cleaning finished". Alarm is activated if within the time [h33] a new cleaning start is not detected.

F34 Time / date not set

The alarm is triggered if the date and time are lost.

F35 Detergent "empty" alkaline [h35]

Alarm is activated only during the cleaning if the float switch detects "detergent alkaline empty".

F36 Detergent "empty" acidic [h36]

Alarm is activated only during the cleaning if the float switch detects "detergent acidic empty".

F38 Exceeding of temperature difference, monitoring sensor

The alarm can function only if the optional monitoring sensor is installed and parameters set.

The alarm is triggered as soon as the temperatures differ by value [h38].

F39 Battery voltage too low

The alarm is triggered if the battery charge is no longer sufficient.

See also section 8.12.

6.5.3 System alarms

F45 Water in the tank after cleaning end

- washing completed
- level electrode reports water in the cleaning line
- the red LED "FAULT" flashes

At the end of the draining phase there is still water in the tank.

Possible cause of fault:

- Water valve has not closed / is faulty
- Draining phase set too short

Function is activated in parameter [h10].

to section 6.5: Listing fault memory and description

F53 Thermal protection compressor

The motor protection switch for the compressor contactor of the tank and the ice water preparer is activated.

Function is activated in parameter [h11].

F56 Broken sensor

The control unit is not receiving any signals from the sensor.

Possible cause of fault:

- Temperature sensor faulty
- Sensor cable damaged

F57 Sensor short circuit

as F56, but fault code F57 is displayed.

F58 Sensor range exceeded

Sensor reports upward or downward exceeding of measuring range

as F56, but fault code F58 is displayed.

F59 Signal error mode detection

If the tank monitor receives different signals for the mode detection (trigger signal for cooling and cleaning at the same time), error F59 is displayed.

6.5.4 System alarms external sensors

F60 Erroneous communication with agitator monitoring module

and phase error (only for ESVAW-003). See parameter [A85].

F61 Erroneous communication with email or sms modem

See parameter [A73].

F85 Phase error

Error is displayed when the power module ESVAW-003 (if available) detects a phase error.

6.5.5 Test alarm

F99 Test alarm (see section 8.13)

7. Setting of parameters

7.1 GUIDELINE for the correct parameterization

Basically the following has to be specified prior to parameterization:

- Which signals are available for the detection of the operation mode? See section 4.5 - Connection of external signal transmitters and sensors
- How to perform the agitator monitoring. See section 8.12.
- Which other system components are to be monitored.
 - Float switch detergent container
 - Level monitoring in rinsing line
 - Thermo protection compressor
- Is a detection for the milk feed required? See section 8.2.
- If available: Parameterization of the optional Email or SMS module.

- | | |
|---------------|--|
| Step 1 | Connect all hardware components according to wiring diagram.
Optional: Connect EMAIL or SMS modem. |
| Step 2 | Check if all components are wired correctly. See section 7.9 |
| Step 3 | Parameterize detection of operation mode: Parameter [h1-h6] |
| Step 4 | Configure A-parameters -> Hardware
Configure H-parameters -> extended tank monitor parameters
Configure h-parameters -> general parameters |
| Step 5 | If necessary assign messages to the various alarms in the F-parameters (alarm horn, LED-display, EMAIL or SMS-messages etc.) |

7.1.1 Enter customer and tank number

When reading out the tank monitor data on a USB stick, the tank monitor automatically defines the file name of the data file:

DATA-000.CSV

If this file name is already on the stick, the next higher number is used:

DATA-001.CSV

In order to be able to assign the file to the corresponding customer when the files are later evaluated by Welba-KONSOFT, it is important to enter the customer and tank number when installing the tank monitor. This is done using the parameters [h93 + h94] and [h96 + h97].

In this way, the corresponding customer or tank can be assigned to each file.

NOTICE

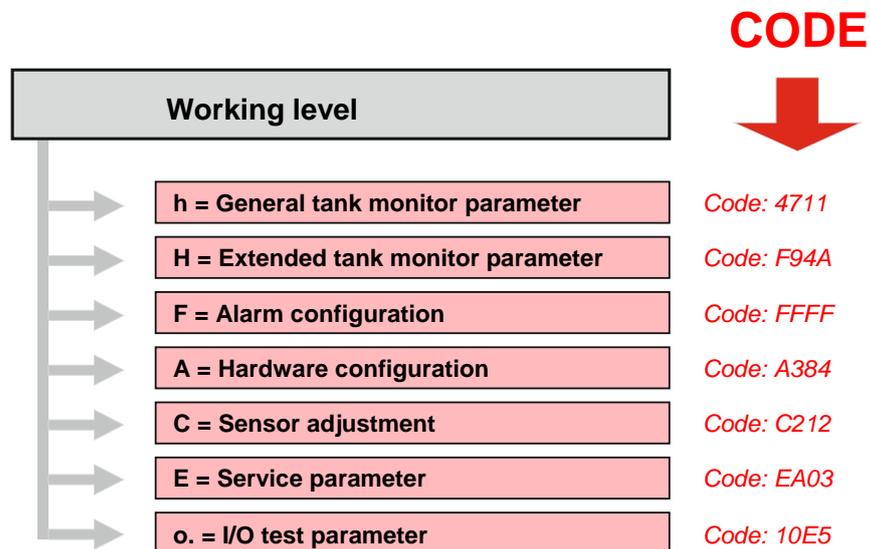
Also note the 'readout period' specified in parameter [h90]!

Store the parameterization of the TW-31 with the KONSOFT. In this case, you can reload the correct parameterization to the new device in the case of a spare parts delivery. Only the actual value correction has to be entered newly.

7.2 Change and save parameter values

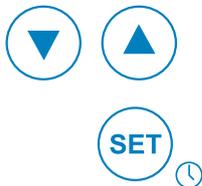
The TW-31 is configured in 7 different parameter levels.

To change parameters in one of the lower levels, enter the corresponding 'level code'.



Enter the level code

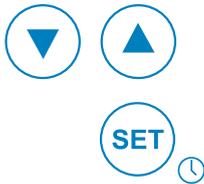
Proceed as follows:



- Press the "SET" button for 5 seconds:
The display shows '0000' - the first '0' flashes.
- Use the arrow keys to set the first digit or letter of the desired code.
- Confirm the correct digit with "SET".
The set digit has been accepted - the second '0' flashes.
- Use arrow keys to set the second digit.
- Set third and fourth digits as well:
The first parameter of the selected level now appears.

If an incorrect code is entered, the control switches back to the operation mode.

to section 7.2: Change and save parameter values



Display parameter value:

- Use the arrow keys to select the desired parameter.
- Press the "SET" button: The parameter value is displayed.

Change parameter value:

- Use the arrow keys to select the desired parameter.
- Hold down the "SET" button and use the arrow buttons to set the desired value. (If the arrow buttons are held, the value starts to run)

NOTICE

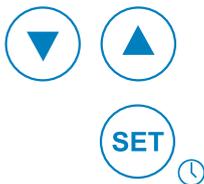


Note:

In order to store the value in the memory, first release the arrow button and then the "SET" button.

Return to working level:

(possible from any parameter)



Standard with saving the values:

- Press both arrow buttons simultaneously. The display shows "Stor" for a short time - changes are accepted.
The control switches to the operation mode - the display shows the current time..

Return without saving the values:

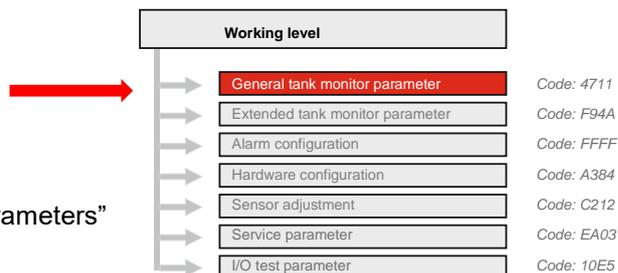
- If the OFF key is pressed - or
- If no button is pressed for 60 seconds:
The controller automatically returns to the operation mode.
All changes are lost.

7.3 Level “General tank monitor parameters” (h parameters)

H parameters

Code: 4711

Switch to level
“General tank monitor parameters”
see section 7.2



Detection of the operation mode (see section 4.3)

Range Def.

h1: Trigger signal
„cooling activated“
can take place by:
- Compressor ON
- Ice water pump ON
- Evaporator valve ON

Parameter	Range	Def.
h1 Mode detection “cooling” 0 = permanent signal from the cooling tank control (cooling active) 1 = Activation by trigger signal “cooling activated” (see box), end by starting the cleaning cycle 2 = same as 1 + end-detection in case of a temperature increase and trigger signal “cooling activated” is longer detected (see section 8.1)	0 .. 2	1
h2 Additional detection “cooling” by “first milk comes into the tank” (see section 8.2) If the cooling was not started at the tank, the start of mode detection „cooling” takes place by the first milk feeding. 0 = deactivated 1 = activated (triggered) only in case of a change in temperature 2 = activated (triggered) directly on the input signal (milk pump, plate cooling signal etc.) 3 = 1 and 2 in combination	0 .. 3	0
h4 Mode detection “cleaning” (see section 8.3) 0 = permanent signal from the tank control (cleaning active) 1 = Activation by signal “open cold water valve” end by time [h5] 2 = same as 1 + with extension of time when detecting agitator [h5+h6]	0 .. 2	2
h5 Minimum period cleaning cycle after signal “open cold water valve”	1..999 min.	30
h6 Extension of time cleaning cycle after [h5] Setting of time for the extension of the cleaning cycle if during time [h5] a new “open cold water valve” or an agitator start is detected.	1..30 min.	15

to section 7.3: Level “General tank monitor parameters” (h parameters)

Additional information on the errors see section 6.5.2



	<i>Fault</i>	<i>Range</i>	<i>Def.</i>
h10 Water detection in cleaning pipe after end of cleaning 0 = deactivated 1 = activated Level electrode in cleaning pipe has to be connected to “level 1”	F45	0 .. 1	0
H11 Monitoring motor protection cooling 0 = deactivated 1 = high active (error, if no signal at the input) 2 = low active (error, if no signal at the input)	F53	0 .. 2	0
<i>Error messages during cooling</i>			
No cooling start after milk feed... (see section 8.2)			
h17 ... first warning after time [h17]	F17	0..120 min.	30
h18 ... second warning after time [h18]	F18	0..120 min.	45
h19 ... third warning after time [h19]	F19	0..120 min.	60
h20 Target temperature first milking (see 8.5) Alarm is activated if this temperature has not been achieved within time [h21] after the start of the cooling mode.	F20	0..30°C	6,0
h21 Max. time to achieve target temperature Alarm is activated if this temperature has not been achieved within time [h20] after the start of the cooling mode. 0: deactivated 1...999: Time limit in minutes		0..999 min.	180
h23 Milk temperature too high for too long <i>Function see section 8.4.</i>	F23	0..30,0 °C	10,0
h24 Time limit for [h23] 0: deactivated 1...999: Time limit in minutes		0..999 min.	180
h25 Maximum overtemperature with direct activation of alarm Monitoring start when target temp. has been achieved [h20]	F25	0..30,0 °C	25,0
h27 Milk temperature too low for too long	F27	0..30,0 °C	2,0
h28 Time limit for [h27] 0: deactivated 1...999: Time limit in minutes		0..999 min	120
h29 Alarm in case of exceeding the temperature with direct alarm activation	F29	0..30,0 °C	0,5

In [h23] an overtemperature alarm can be defined, that activates an informative (pre-)-alarm contrary to the critical faults F1 - F3.

7. Setting of parameters

to section 7.3: Level “General tank monitor parameters” (h parameters)

Additional information on the errors see section 6.5.2



<u>Setting system times</u>		<i>Fault</i>	<i>Range</i>	<i>Def.</i>
h31	Max. interruption of cooling	F31	0..999 min.	60
h32	Max. time without cooling after finishing of cleaning	F32	0..5000 min	600
h33	Min. cleaning interval	F33	0 .. 250 h	78

<u>Monitoring of detergent</u> see section 8.10		<i>Fault</i>	<i>Range</i>	<i>Def.</i>
h35	Monitoring of detergent “alkaline” by float switch 0 = deactivated 1 = wiring “high active” 2 = wiring “low active”	F35	0 .. 2	0
h36	Monitoring of detergent “acidic” by float switch 0 = deactivated 1 = wiring “high active” 2 = wiring “low active”	F36	0 .. 2	0

<u>Settings monitoring sensor</u>		<i>Fault</i>	<i>Range</i>	<i>Def.</i>
h38	Max. temperature difference monitoring sensor to control sensor cooling For this function the monitoring sensor in parameter [A50] has to be activated.	F38	1,0 .. 5,0	2,0

<u>Setting milk times to monitor „cooling activated”</u>			<i>Range</i>	<i>Def.</i>
This function triggers an alarm if cooling has not been activated at the entered milk times. This is to prevent to forget the activation of the cooling in case of the first milking after the cleaning.				
h41	milk time 1	F22	00:00..23:59	--:--
h42	milk time 2	F22	00:00..23:59	--:--
h43	milk time 3	F22	00:00..23:59	--:--

to section 7.3: Level "General tank monitor parameters" (h parameters)

<u>Settings tank monitor LOG-data</u>	Range	Def.
h90 Read-out period (in days) of the recorded data	1 .. 365	90
h91 Recoding intervals cleaning in minutes	1 .. 10 min.	1
h92 Recording intervals OFF and cooling in minutes	1 .. 30 min.	15

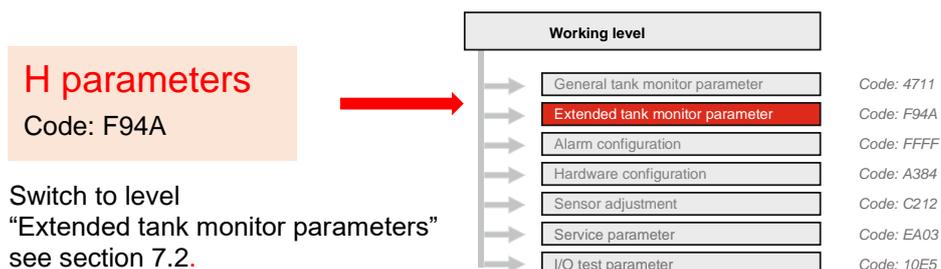
<u>Identification of tank</u>	Range	Def.
-------------------------------	-------	------

Tank and customer numbers are 8-digit. Since the LED-display can indicate 4 digits only, enter the first and then the last digits of the number.

Example: $\frac{1\ 2\ 3\ 4}{\text{Part 1}} + \frac{5\ 6\ 7\ 8}{\text{Part 2}}$ gives the number 12345678

h93 Customer number part 1	0 .. 9999	0
h94 Customer number part 2	0 .. 9999	0
h96 Tank number part 1	0 .. 9999	0
h97 Tank number part 2	0 .. 9999	0

7.4 Level “Extended tank monitor parameters” (H parameters)



Additional information on the errors see 6.5.1

<u>No-load – temperature conditions</u> see section 8.4		Fault	Range	Def.
H10	Milk temperature too high for too long 1 Enter “Overtemperature 1” in °C	F1	0..50,0 °C	13,0
H11	Zeitlimit für [H10] 0: deactivated 1..999: time limit overtemperature 1 in minutes		0..999 min.	600
H12	Milk temperature too high for too long 2 Enter “Overtemperature 2” in °C	F2	0..50,0 °C	16,0
H13	Zeitlimit für [H12] 0: deactivated 1..999: time limit overtemperature 2 in minutes		0..999 min.	360
H14	Milk temperature too high for too long 3 Enter “Overtemperature 3” in °C	F3	0..50,0 °C	28,0
H15	Zeitlimit für [H14] 0: deactivated 1..999: time limit overtemperature 3 in minutes		0..999 min.	300
<u>Downtimes</u> Power pack necessary!				
H19	Max. temperature in case of power failure Alarm activation F6 only, when the milk temperature exceeds this temperature in case of a power failure	F6	0..30 °C	7,0
H20	Max. power failure time in cooling mode 0: deactivated 1..999: time limit until alarm in minutes	F6	0..999 min.	300
<u>Cooling time</u> see section 8.5				
H21	Minimum cooling temperature Enter “target-cooling temperature” in °C	F21	0..50,0 °C	8,0
H22	Maximum time until cooling temperature has been achieved [H21] 0: deactivated 1..999: time limit until target-cooling temperature has been achieved		0..999 min.	210

to section 7.4: Level "Extended tank monitor parameters" (H parameters)

Additional information on the errors see 6.5.1



<u>Monitoring of cleaning temperature</u>		Fault	Range	Def.
H30	Minimum cleaning temperature	F11	0..50,0 °C	40,0
H31	Minimum exposure time detergent Exposure time at cleaning temperature [H30] 0: deactivated 1...999: Minimum exposure time in minutes	F12	0..999 min.	2
H32	Minimum cleaning time (detection of stop) Alarm is activated, when cleaning stops before the set time [H32].	F13	0..300 min.	35

<u>Monitoring of agitator</u>		Fault	Range	Def.
H40	Agitator error in cooling mode No milk detection by agitator detection module after X minutes	F15	0..999 min.	450
H41	Timeout "No agitator" No stirring of the milk in cooling mode X minutes after the last agitator stop	F16	0..999 min.	60
H42	Minimum running time of agitator Alarm is activated when agitator has run less than X seconds.	F16	0..500 min.	60
H43	Delay monitoring of agitator 1. milking Time of the set cooling start delay has to be entered here, to avoid a false alarm by an agitator that does not start.		0..120 min.	30

<u>Delay of tank monitor activation</u> see section 8.6		Range	Def.
H90	Delay period	0..300 min.	180

<u>Parameter level locking</u>		Range	Def.
h98	Password protection	0 .. FFFF	0
h99	Password protection	0 .. FFFF	0

Information o password protection:

Since with the parameterization of the H-parameters the important critical alarms are set, this level can be protected by a password.

In the delivery status of the tank monitor, the password protection is parameterized with "0" - this means: Password protection deactivated.

For the activation of the password protection the following steps are necessary in parameters [H98 and H99]

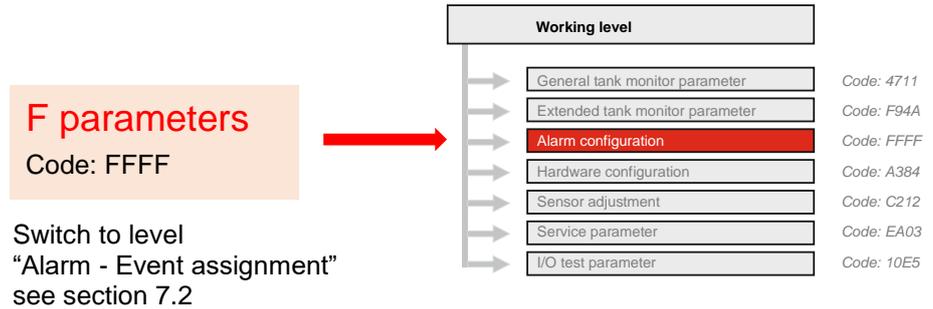
- enter the identical password
- quit the H-parameter level

The password request is made when re-entering the level-code "F94A".

ATTENTION: Please write down the password!!

7. Setting of parameters

7.5 Level “Alarm - Event assignment” (F parameters)



In this level each fault message F1 to F61 is assigned the effect of this alarm. See the table below.

Alarm effect

Setting	display code (flashes)	„green“-LED	„red“-LED	Stores in Konsoft	alarm relay in general	alarm relay tank monitor	SMS
---------	------------------------	-------------	-----------	-------------------	------------------------	--------------------------	-----

TW-31 system alarms (only display)



1:	•	-	-	-	-	-	-
2:	•	-	-	•	-	-	-
3:	•	-	-	•	•	-	-
4:	•	-	-	•	-	•	-
5:	•	-	-	•	•	-	•
6:	•	-	-	•	-	•	•



Informative tank monitor alarms (green LED)

7:	•	•	-	•	-	-	-
8:	•	•	-	•	•	-	-
9:	•	•	-	•	-	•	-
10:	•	•	-	•	•	-	•
11:	•	•	-	•	-	•	•



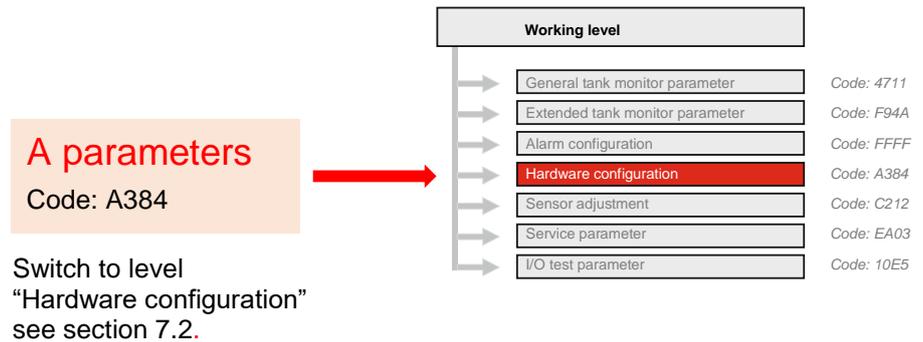
Critical tank monitor alarms (red LED)

12:	•	-	•	•	-	•	-
13:	•	-	•	•	-	•	•

to section 7.5: Level "Alarm - Event assignment" (F parameters)

	Fault configuration...	Setting	Def.
<p><i>Critical tank monitor alarms</i></p> <p>(F1-F6 always red LED) (F11-F16 = green or red LED)</p>	F1 ... milk temperature too high for too long high 1	12 .. 13	13
	F2 ... milk temperature too high for too long high 2	12 .. 13	13
	F3 ... milk temperature too high for too long high 3	12 .. 13	13
	F6 ... power failure alarm	12 .. 13	13
	F11 ... minimum cleaning temperature not reached	7 .. 13	11
	F12 ... minimum cleaning time at temp. not reached	7 .. 13	11
	F13 ... Termination of cleaning (cleaning too short)	7 .. 13	11
	F15 ... agitator fault in cooling mode	7 .. 13	11
	F16 ... timeout "No agitator action"	7 .. 13	11
	<p><i>Informative tank monitor alarms (green or red LED)</i></p>	F17 ... cooling not activated at milk intake - Time 1	7 .. 13
F18 ... cooling not activated at milk intake - Time 2		7 .. 13	11
F19 ... cooling not activated at milk intake - Time 3		7 .. 13	11
F20 ... cooling time exceeded for first milking		7 .. 13	11
F21 ... cooling time exceeded		7 .. 13	11
F22 ... cooling is not switched on		7 .. 13	11
F23 ... milk temperature too high for too long		7 .. 13	11
F25 ... over-temperature directly		7 .. 13	11
F27 ... milk temperature too long too low		7 .. 13	11
F29 ... under-temperature directly		7 .. 13	11
F30 ... power failure (direct)		7 .. 13	11
F31 ... max. time without cleaning (after end cool. mode)		7 .. 13	11
F32 ... max. time without cooling (after cleaning mode)		7 .. 13	11
F33 ... min. cleaning interval		7 .. 13	11
F34 ... time / date not set		7 .. 13	11
F35 ... Detergent dispenser empty ,alkaline'		7 .. 13	11
F36 ... Detergent dispenser empty ,acid'		7 .. 13	11
F38 ... temp. difference exceeded monitoring sensor		7 .. 13	11
F39 ... battery voltage too low		7 .. 13	11
<p><i>Depending on the setting it is an informative or a critical tank monitor alarm or a system alarm (Green or red LED or display only)</i></p>		F45 ... water in the tank after draining	1 .. 13
	F53 ... thermal protection compressor	1 .. 13	6
	F56 ... broken sensor	1 .. 13	6
	F57 ... sensor short circuit	1 .. 13	6
	F58 ... sensor range exceeded	1 .. 13	6
	F59 ... signal error mode detection	1 .. 13	6
	F60 Communication external sensors	1 .. 13	6
	F61 Communication GSM-Modul	1 .. 13	4
	F85 Phase error	1 .. 13	6
	F99 Test alarms (see section 8.13)	1 .. 13	11

7.6 Level “Hardware configuration” (A- parameters)



The assignment of the input and output functions to the relays or digital inputs is defined in the A-parameters [A1 to A32].

The parameterization of this configuration is set by the factory, i.e. no changes are normally necessary.

If required an adjustment can be made in individual cases.

Assignment of the output relays:

In [A1 to A3] the necessary functions to the output relays K1 to K3 are assigned.

Assignment of the digital inputs:

In [A21 to A32] the input functions to the digital inputs DE1 to DE12 are assigned.

to section 7.6: Level "Hardware configuration" (A- parameters)

* The relay functions for assignment 1 and 2 are configured in parameters A45 and A46.

Assignment of output functions to relays K1 to K3

- 0: deactivated
- 1: Alarm tank monitor
- 2: Alarm in general
- 3: Texternal alarm light

		<i>Setting</i>	<i>Def.</i>
A1	assignment relay K1	0 .. 3	1
A2	assignment relay K2	0 .. 3	2
A3	assignment relay K3	0 .. 3	3

Assignment of input functions to digital inputs DE1 to DE12

- 0: deactivated
- 1: Cooling mode detection
- 2: Cleaning mode detection
- 3: milk intake detection
- 4: without function
- 5: without function
- 6: without function
- 7: Float switch ,alkaline'
- 8: Float switch ,acidic'
- 9: without function
- 10: without function
- 11: thermal protection compressor
- 12: without function
- 13: Agitator detection 1
- 14: Agitator detection 2

		<i>Setting</i>	<i>Def.</i>
<i>230V AC wiring only with L1</i>	A21 assignment digital input DE1	0 .. 14	1
	A22 assignment digital input DE2	0 .. 14	2
	A23 assignment digital input DE3	0 .. 14	3
	A24 assignment digital input DE4	0 .. 14	4
	A25 assignment digital input DE5	0 .. 14	5
	A26 assignment digital input DE6	0 .. 14	6
<i>Connect potential-free contacts to terminal 38</i>	A27 assignment digital input DE7	0 .. 14	7
	A28 assignment digital input DE8	0 .. 14	8
	A29 assignment digital input DE9	0 .. 14	9
	A30 assignment digital input DE10	0 .. 14	10
	A31 assignment digital input DE11	0 .. 14	11
	A32 assignment digital input DE12	0 .. 14	12

7. Setting of parameters

to section 7.6: Level "Hardware configuration" (A- parameters)

<u>Output signal configuration alarm</u>	Range	Def.
A45 Configuration alarm output in general 0: closing contact, alarm if closed 1: closing contact, alarm if open (power failsafe) 2: opening contact, alarm if closed (power failsafe) 3: opening contact, alarm if opened	0 .. 3	0
A46 Configuration alarm output tank monitor 0: closing contact, alarm if closed 1: closing contact, alarm if open (power failsafe) 2: opening contact, alarm if closed (power failsafe) 3: opening contact, alarm if opened	0 .. 3	0
A47 Configuration ,Reset external alarm light' 0: Reset after cleaning 1: Reset via reset button	0 .. 1	0
<u>Configuration temperature sensor</u>	Range	Def.
A50 Activation of second sensor 0: deactivated 1: Safety temperature sensor	0 .. 1	0
A51 Sensor type (Sensor 1 / sensor 2) 0: KTY81/210 1: PT100 three-wire 2: PT1000 3: KTY81/110	0 .. 3	0
<u>Configuration of external modules</u>	Range	Def.
A71 Activation agitator monitoring <i>see section 8.12.</i> 0: deactivated 1: one agitator at ESVAW-001-A or ESVAW-004-A 2: two agitators at ESVAW-001-A or ESVAW-004-A 3: without function 4: without function 5: Deleting the range (the number of agitators has to be reset after range deleting) 6: without function 7: without function 8: One agitator over inductive proximity sensor at the agitator shaft at digital input 3 9: Two agitators over 2 inductive proximity sensors at the agitator shaft at digital input 3+4 10: Monitoring switch contact agitator at digital input 3 11: Monitoring switch contacts of 2 agitators at digital inputs 3 + 4 12: one 3-phase 400V agitator at ESVAW-003-A 13: two 3-phase 400V agitator at two ESVAW-003-A 14: one 2-phase 400V agitator at ESVAW-003-A 15: two 2-phase 400V agitator at two ESVAW-003-A	0 .. 15	0

to section 7.6: Level "Hardware configuration" (A- parameters)

	<i>Range</i>	<i>Def.</i>
A72 Activation detergent monitoring by conductometry currently without function 0: deactivated 1: activated	0 .. 1	0
A73 Activation fault message ,no email or sms modem' Monitors the error request through the email or sms modem'. If no more errors are requested, the error F61 is displayed. 0: deactivated 1: activated	0 .. 1	0
A75 Activation fault message ,battery voltage' <i>see section 8.11</i> 0: deactivated 1: activated	0 .. 1	1
A78 Automatic change of daylight saving time 0: deactivated 1: Western European time zone (change at 1:00) 2: Central European time zone (change at 2:00) 3: Eastern European time zone (change at 3:00)	0 .. 3	2

Sensitivity adjustment for agitator evaluation

	<i>Range</i>	<i>Def.</i>
A80 Rating limit agitator <i>see section 8.12</i> -1: more sensitive 0: normal 1: less sensitive	-1 .. 1	0
A85 Phase monitor ESVAW-003 <i>see section 8.12</i> 0: deactivated 1: activated	0 .. 1	1

Other settings

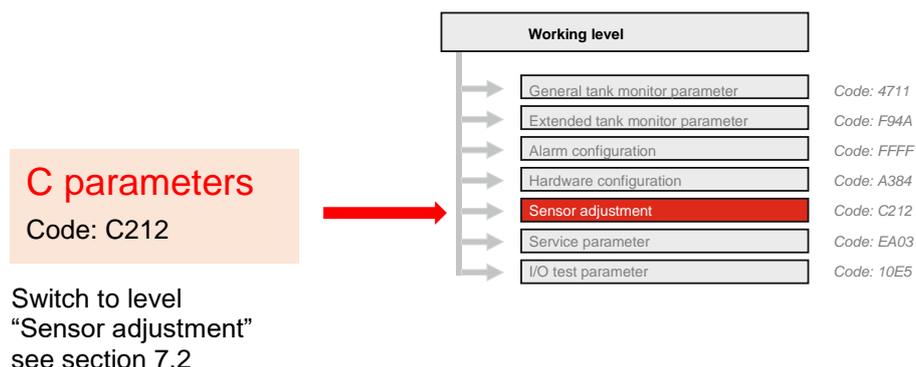
	<i>Range</i>	<i>Def.</i>
A96 Device adress Has to be set only, when two or three tank monitors are connected to <u>one</u> email- or sms modem.	1 .. 3	1
A98 Setting of language 0: German 1: English 2: English (presentation with decimal points in the csv.file of the USB port)	0 .. 2	0

Factory reset

	<i>Range</i>	<i>Def.</i>
A99 Factory reset Reset all values to factory setting. ATTENTION: All settings are lost.	0 .. 999	000

7. Setting of parameters

7.7 Level "Sensor adjustment" (C- parameters)



Settings level detection (see section 8.9)

	Range	Def.
C30 Sensitivity level input 1 -10: insensitive + 10: highly sensitive	-10 .. 10	0
C31 Sensitivity level input 2 -10: insensitive + 10: highly sensitive	-10 .. 10	0

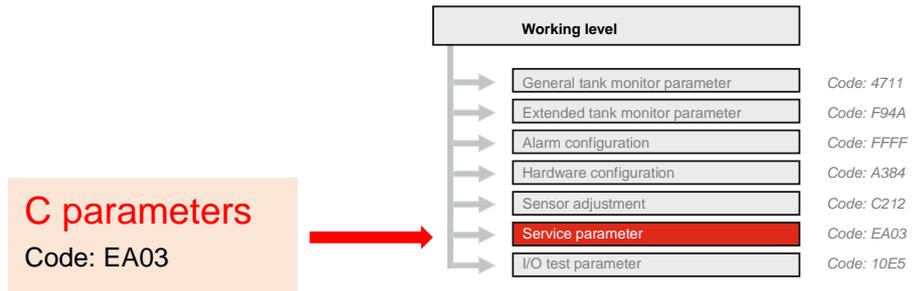
Sensor correction adjustment (see section 8.7)

C90 Display actual temperature sensor 1		
C91 Sensor correction sensor 1 A correction can be applied to the value measured by the sensor 1. It is then applied cumulatively throughout the entire measurement range.	-10 .. 10	
C92 Display actual temperature sensor 2 (hidden if A50 = 0)		
C93 Sensor correction sensor 2 (hidden if A50 = 0) A correction can be applied to the value measured by the sensor 2. It is then applied cumulatively throughout the entire measurement range.	-10 .. 10	

Software version

C98 Installed software version The software version installed is shown to help service technicians.

7.8 Level “Service parameters” (E- parameters)



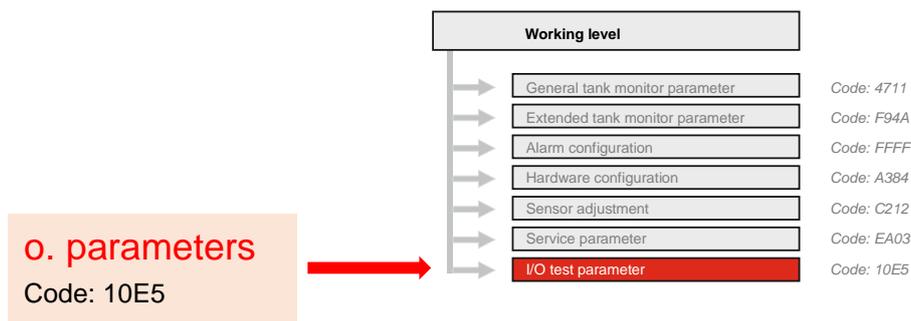
Switch to level
“Service parameters” see section 7.2.

These parameters are only used to query ACTUAL states.

<u>Display tank monitoring time counter and values</u>	<u>Range</u>	<u>Def.</u>
Display of...		
E1 ... over- / under time temperature / time 1	0...900 min.	---
E2 ... over- / under time temperature / time 2	0...900 min.	---
E3 ... over- / under time temperature / time 3	0...900 min.	---
Based on the error messages F1 - F3, it can be read here how long the milk temperature has already been above the respectively set limit value.		
E6 ... the last cleaning temperature reached	0...99,9 °C	---
Displays the maximum temperature during the last cleaning cycle.		
E15 ... accu voltage	0,0V.. 12,0V	---
Display the current accu voltage (Only if optional accu pack is installed)		
<hr/>		
E50 SIM PIN entry for optional ESGSM	-1..9999	---
for optional remote maintenance module		
-1 = no PIN deposited		
0000 ... 9999 = SIM PIN		

7. Setting of parameters

7.9 Ebene "I / O test parameters" (o- parameters)



Switch to level
"I / O test parameter" see section 7.2.

Meaning of the parameters

All inputs and outputs of the individual components can be tested in this parameter level. For this purpose the corresponding relays are set to 'I' or 'O'.

This operating level is NOT reset automatically!

Test of relay outputs

Switched on relays remain switched on until they are reset manually.

	Range	Def.
o.1 Test relay 1	0 .. 1	0
o.2 Test relay 2	0 .. 1	0
o.3 Test relay 3	0 .. 1	0

0: On
1: Off

to section 7.9: Ebene "I / O test parameters" (o- parameters)

Test digital inputs

All inputs [o.21 to o.28] can be selected via the arrow keys and tested as follows:

- Select the desired parameters with the arrow keys.
- Press the SET key briefly: '0' or '1' appears in the display (depending on the current switching state of the respective component).
- Change switch state (e.g., safety switch).
The display toggles between '0' and '1'.
- Press the SET key again: The display shows the current parameter name again.

	<i>Range</i>	<i>Def.</i>
o.21 Test digital input DE1	0.. 1	---
o.22 Test digital input DE2	0.. 1	---
o.23 Test digital input DE3	0.. 1	---
o.24 Test digital input DE4	0.. 1	---
o.25 Test digital input DE5	0.. 1	---
o.26 Test digital input DE6	0.. 1	---
o.27 Test digital input DE7	0.. 1	---
o.28 Test digital input DE8	0.. 1	---
o.29 Test digital input DE9	0.. 1	---
o.30 Test digital input DE10	0.. 1	---
o.31 Test digital input DE11	0.. 1	---
o.32 Test digital input DE12	0.. 1	---

0: input signal low

1: input signal high

Test and setting level inputs

	<i>Range</i>	<i>Def.</i>
o.41 Level 1	-10.. 10	0
o.42 Level 2	-10.. 10	0

-10: less sensitive

0: normal

10: more sensitive

Adjust sensitivity: Green LED "OK" lights up if the respective o.41 / o.42 level is detected



Display agitator capacity

(Procedure as for testing the digital inputs)

o.71 Agitator 1 in watt

o.72 Agitator 2 in watt

Others

o.98 Software version supply board

Display of the software version of the power supply.

Uses for communication with the service technician.

8. Other informations

8.1 Detection of mode “cooling” - parameter [h1]

This parameter determines how the tank monitor can detect the beginning and end of the cooling mode.

Setting parameter [h1] = 0

Permanent signal from the cooling tank control (cooling active).

Select setting, when tank control detects an active cooling mode via permanent signal.

Setting parameter [h1] = 1

Activated by trigger signal “cooling activated”, end by starting the cleaning cycle.

In this setting the mode “cooling” will be kept until mode “cleaning” is detected. Tank monitor cannot detect the switching off of the cooling.

Setting parameter [h1] = 2

Same as setting 1, however, with end-detection.

This setting is an additional safety option.

The tank monitor finds the target value based on the switch-on points and shut-off points of the cooling. If the temperature exceeds the found out target value without an active cooling, this will be interpreted as switched off cooling - change into mode “OFF”.

NOTICE

NOTE: For an effective use of this function the signal should come from the “compressor”, and the target value should not be changed during a cooling cycle.

Thus a deactivation of the cooling mode can be detected.

8.2 Safety function: “First milk in the tank” [h2]

A cooling mode can only be detected if the cooling of the tanks has actually been started.

If warm milk is fed into the tank and an active cooling mode has not been detected, there must be an alarm.

The additional safety function “first milk comes into the tank” can be set and parameterized. Independent on parameter [h1] the cooling mode detection can also be detected with “first milk comes into the tank” [h2].

(Makes no sense in case of robot operation).

to section 8.2: Safety function: "First milk in the tank" [h2]

Functionality:

The detection of the feeding of warm milk is based on the assumption that the temperature in an empty tank changes or remains stable after the cleaning has been finished. If there is a sudden change in temperature, this can only have been caused by the feeding of warm milk.

If this is detected, the tank monitor changes into the mode "cooling".

Alternatively this detection can be derived from the signal of the milk pump or the magnetic valve of the plate heat exchanger of the pre-cooling (if available) - or it is a combination of both.

Warning messages:

If the milk feeding was detected without an activation of the cooling, the farmer can be warned by errors F17, F18 and F19.

With the detection of the milk feeding and a temperature of more than 8°C the three timers [h17, h18, h19] are started.

8.3 Detection of mode "Cleaning" - parameter [h4].

In this parameter is determined how the tank monitor can detect the start and the end of the cleaning mode.

Setting parameter [h4] = 0

Permanent signal from the tank control (cleaning active)

Select the setting, if the tank control detects an active cleaning mode by a permanent signal.

Setting parameter [h4] = 1

Activation by signal "open cold water valve", end by time [h5]

- Start cleaning mode by trigger signal "open cold water valve"
- Start timer [h5] (= minimum activation time cleaning mode)
- In case of a another signal of cold water valve prior to end [h5] - timer [h6] starts (can be done several times).

After end of [h6] = End of cleaning mode

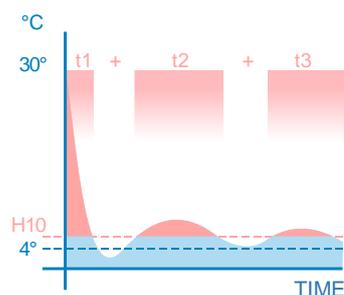
Setting parameter [h4] = 2

Same as setting 1, but with extension of time for detection agitator [h5+h6]

Same procedure as setting 1, however, the signal of the agitator is additionally used as trigger signal to start the timer [h6].

8. Other informations

8.4 Definition of term “milk temperature too high for too long”



Detection of how long the milk temperature exceeds a defined limit value in [H10]. In the case of a repeated temperature increase the new time is added. See diagram: $t1+t2+t3$.

If the recorded total time achieves the value set in [H11], alarm F1 is activated.

4 different kinds of temperature alarms can be defined:

F1 = setting in [H10 + H11] = required by the dairies

F2 = setting in [H12 + H13] = required by the dairies

F3 = setting in [H14 + H15] = required by the dairies

F23 = setting in [h23 + h24] = alarm for the farmer = pre-alarm

The monitoring is activated by the cool start and ends with the start of the next cleaning.

NOTICE

NOTE: Even a temporary switching off of the cooling does not interrupt the temperature monitoring. Only the next cleaning stops the monitoring.

8.5 Definition of term “cooling time” + target temperature first milking”

Parameters "Cooling time" and "target temperature first milking" are functionally exactly the same - however, different alarms (for example red or green alarm) can be assigned depending on the kind of requirement.

F21 = cooling time [H21 + H22] = required by the dairies

F20 = target temp. first milking [h20 + h21] = alarm for the farmer
= pre-alarm

Function

A time is set in which the milk must have reached a pre-set temperature - after the start of the cooling. If the temperature has not been reached within this time, the alarm will be activated.

8.6 Activation delay tank monitor [H90]

The activation delay of the tank monitor is required to test the operation modes during the commissioning without activating false alarms.

Activation

Delay is activated by the start of the tank monitor and suppresses all errors from F1 to F38 for a pre-set time (with the exception of F30).

After expiration of the set time the tank monitor is set to the basic condition and then activated.

Premature stop of the activation delay

The activation delay can be finished by pressing the reset button twice quickly.

8.7 Sensor correction procedure

Sensor correction means:

A correction is applied to the value measured by the sensor. This is then cumulatively effective over the whole measurement range.

An adjustment to the sensor correction is only necessary:

- in conjunction with first installation,
- if the sensor cable length is altered,
- when replacing a faulty sensor.

In order to adjust the sensor correction a reference thermometer is needed.

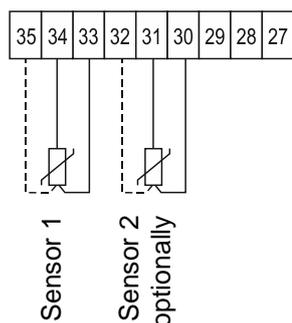
Proceed as follows:

- Switch off power supply
- Install / change sensor
- Use the reference thermometer to establish the milk temperature.
- Switch on control unit and set [c90] to the measured number of degrees.
- The control unit calculates the difference between the reference thermometer reading and temperature sensor 1 and automatically sets this in parameter [c91].
- Parameter [c91] can be displayed and adjusted at any time.
- Hold down the up and down arrow buttons simultaneously:
The settings are stored.

Proceed with the setting for sensor 2 (if present) in the same way. In this case parameters [c92 and c93] must be set.

8. Other informations

8.8 Function second temperature sensor



The second temperature sensor serves as monitoring sensor (redundancy) for the first one. An alarm is activated in case of an adjustable deviation of both measured values.

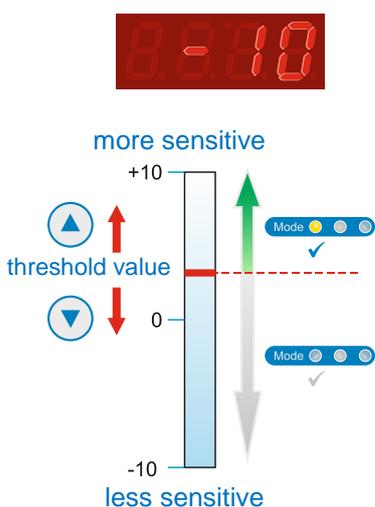
The second sensor input must be activated by an appropriate parameter setting [A50].

The maximum temperature difference for the monitoring sensor in comparison to the regulating sensor (FÜ1) is set in [h38]. If the set temperature difference is exceeded for longer than 5 minutes, fault code [F38] is displayed.

Error code [H38] indicates that one of the two sensors is defective. Thus, a slow dying of a sensor can be detected.

8.9 Setting of the level control

The level control is factory pre-set to medium water quality. Depending on the degree of hardness in the local water network, the sensitivity can be set as follows:



Setting in the I/O test parameters:

- Feed water with the consisting tank cleaning control until level has been achieved (optical control of the electrode)
- Select parameter [o.41] - in TW-31 in level "I/O test parameter" (see section 7.9) Setting level 1.
- Keep SET pressed - set simultaneously the displayed value to "-10" with the button ARROW DOWN.
- Keep SET pressed - increase slowly the value with button ARROW UP until the left yellow LED flashes (increase additionally by 1)
- With the release of the SET-button the last set value is stored
- Setting of level 2: Select parameter [o.42] -> then see level 1

Re-adjustment in C-parameters

By readjusting parameters [C30] for level 1 and [C31] for level 2 the sensitivity can be readjusted.

8.10 Monitoring of detergent dispenser

If the detergent dispensers for the alkaline and the acidic detergent are monitored by float switch, these can be parameterized in the parameters [h35] „alkaline” and “acidic” [h36] as follows:

- Setting = 0
In deactivated condition no detergent dispenser-monitoring takes place.
- Setting = 1 (high aktiv)
Fault messages F35 and F 36 are activated, when the corresponding digital input is switched on.
- Setting = 2 (low aktiv)
Fault messages F35 and F 36 are activated, when the corresponding digital input is switched off..

8.11 Function power pack + regular exchange

Charged (!) Batteries must be used at all times for the tank guard to function properly!

The batteries are used to maintain the tank guard function in the event of a power failure. During the power failure, the error code (F30) flashes in the display.



Maximum power failure time during the cooling process is exceeded.

If the time of the power failure is longer than set in [H20] during the cooling mode and the milk temperature is higher than the pre-adjusted value [H19], the error code F6 blinks. Alarm "DO NOT FEED" is activated.

In this case the power packs have to be removed and charged or exchanged.

Fault message (F39)

If the fault message (F39) appears, the battery voltage is too low. The batteries can be removed and recharged by a qualified electrician. Are the batteries older than two years => replace!

IMPORTANT NOTICE ABOUT THE ACCUMULATORS

The life of the accumulators is limited. The built-in accumulators must be replaced by new ones every two years at the latest.

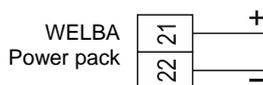
Only (!) charged accumulators of the following specification may be used: 1.2 V NiMh - size AA (min. 2.000 mAh)

Be sure to use the supplied battery holder!



Since the tank guard may not be opened by laypeople, the replacement of the batteries may only be carried out by a qualified electrician

DO NOT USE BATTERIES !!! EXPLOSIVE !!!!!



Installation:

- Connect the power pack to terminals 21 + 22 (observe polarity)
- activate power pack in parameter [A75]:

8. Other informations

8.12 Monitoring of detergent dispenser



Agitator-monitoring modules determine independently the power input of each motor connected to find out, if the motor is rotating and whether it is running with or without load. For example: a defective agitator wing can be detected.

The module has to be configured in parameter [H71].

For different applications 4 different agitator monitoring modules are available:

ESVAW-001-A

The ESVAW-001-A monitoring module is designed for monitoring up to 4 agitator motors. In the standard version only the motors A and B are supported motors C and D are optional usable.

ESVAW-003-A

The agitator monitoring module ESVAW-003-A is designed to monitor a three-phase AC motor with 400V AC.

ESVAW-004-A

Das ESVAW-004-A

The ESVAW-004-A monitoring module is designed for monitoring up to 4 agitator motors. In conjunction with the TW-31 only the motors A and B are supported motors C and D are optional usable.

For proper installation and LED behaviour, refer to the enclosed documentation of the respective module.

8.12.1 Cancellation of the recorded temperatures in the diagram

The agitator-monitoring modules memorize the data recorded by the agitator motors and evaluate if the milk creates a counter pressure for the agitator.

If the cancellation of this data is required (e.g. exchange of an agitator motor) proceed as follows:

- Select parameter [H71]
- Set value 5 -> store
- Select parameter [H71] again
- Set the original value (depending on configuration) -> store

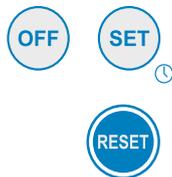
The tank monitor requires about 4 days for the assimilation of the new motor data.

8.13 Test functions

8.13.1 Test alarm F99

The function "test alarm" is required to test the impacts of an error on the parameterized outputs in the F-parameters (relays, SMS etc.).

Method:



- Set and store the configuration to be tested in parameter [F99]
- Trigger test errors by pressing buttons SET and ARROW UP simultaneously for four seconds
- Check if the required reaction has taken place
- Reset the error triggered with the reset button



8.13.2 Function test "Do-Not-Load LED" and "external alarm light"

Used to test the function of the red "Do-Not-Load LED" and the associated relay contact "external alarm light".

Method:



- Hold the "Reset button" for approx. 4 seconds:
For approx. 10 seconds, the red "Do-Not-Load LED" is switched on and the relay "external alarm light" is energized.

8.14 General measures when using electronic control systems

So that even complicated regulatory tasks can be presented to the user in a manner which is clear and simple and ensures high measurement accuracy, today's electronic control systems make increasing use of microprocessors. However, the benefits of these systems are countered by the disadvantage that increased measurement accuracy is accompanied by sensitivity to interference. In order to minimise the effect which interference may have on the regulator the user also must take account of a number of points when installing a new regulator.

Assistance here is provided by standard DIN VDE 0843 on the electromagnetic compatibility (EMC) of measurement, control and regulatory devices in industrial process technology. The following table shows, for example, the maximum interference levels to which (according to the standard), an appliance may be exposed.

Degree of severity	Environment class	Test voltage Power supply	Test voltage Signal/control line
1	well-protected environment	0.5 kV	0.25 kV
2	protected environment	1.0 kV	0.5 kV
3	typical industrial environment	2.0 kV	1.0 kV
4	industrial environment with very high interference level	4.0 kV	2.0 kV

As the values given in the table are maximum values, operational values should remain well below them. However, in practice this is possible only with difficulty, as even a normal contactor without interference suppression produces interference pulses of up to 3.0 kV. For this reason we recommend that the following principles be taken into account during installation:

- a. Try to eliminate all sources of interference by carrying out interference suppression and minimising the interference level. Radio interference suppression is required under VDE 0875 and confirmed by VDE 0874. In principle the interference must be eliminated at source. The nearer the interference suppresser is to the source of interference the greater its effect.

Interference spreads through wires or by electromagnetic radiation. It is usually the former which interferes most seriously with regulation systems.

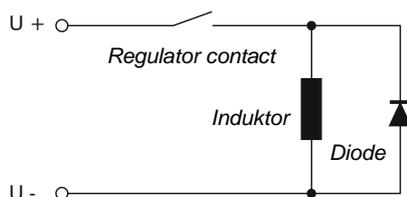
Possible interference sources (to name a few) include:

- bouncing contacts when switching loads
- switching off inductive loads (contactors, motors, solenoid valves, etc.)
- unsatisfactory routing of wires, too small cross-sections
- loose contacts
- rhythmically changing power stages (power converters)
- power breakers
- high-frequency generators

to section 8.14: General measures when using electronic control systems

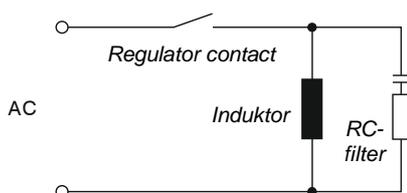
- b. If specific interference sources cannot be avoided they should at least be kept at a distance from the regulator system.
- c. Capacitive and inductive couplings can cause crosstalk between high-voltage lines and parallel low-voltage and sensor lines. This distorts measured values and signals and can disrupt the entire regulatory process. It is therefore recommended that all sensors and signal lines be placed separately from the control and mains voltage lines.
- d. If possible a separate main line should be provided to feed the regulator system. This helps reduce any interference penetrating the regulator via the mains supply line. Voltage surges resulting from switching substantial loads will also then be less of a problem.
- e. In the case of contactors, solenoid valves and other inductive consumers the induction voltage occurring during switching has to be reduced by appropriate protection methods. The choice of methods depends on whether the consumer runs on DC or AC voltage.

Right !



DC voltage

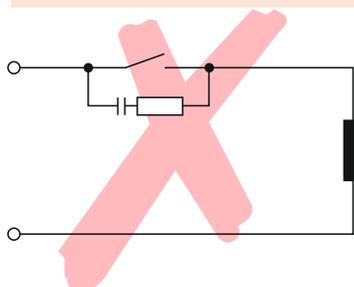
In the case of d/c voltage systems the induction voltage occurring can, for example, be limited by using self-induction diodes, varistors or suppresser diodes. The diagram on the left shows one possibility using a self-induction diode.



AC voltage

In the case of a/c voltage interference suppression as described above is not possible. Instead an RC combination must be used. An RC filter must be connected as directly as possible to the inductance in order to ensure a short line. In addition the component ratings of the RC combination must be geared to the inductance. Too low ratings lead to excessive voltage and too high ratings cause significant losses in the interference suppresser component. Another point to note here is that only capacitors which meet VDE 0656 may be used. They must be suited to the mains voltage and designed for very high switching voltages. The diagram on the left shows inductance interference suppression using an RC filter.

Wrong !



An RC filter should not be fitted directly to the regulator's switching contact (as shown on the left), as an idle current will flow through the RC combination even when the switching contact is open. This current may be enough to mean that a downstream contactor is not de-energised and a closed protective contact does not reopen.

8. Other informations

to section 8.14: General measures when using electronic control systems

- f. Semiconductor switches such as thyristors or triacs also produce interference voltages. They occur as a result of non-linear characteristics and finite ignition voltages. These components must be protected against excessive voltages, for which mainly varistors, RC combinations or choke coils are used. The use of zero-voltage switches is also recommended.

The suggestions made represent only a few of the possible ways of protecting a microprocessor-controlled regulator system from interference. The suggested measures have the advantage that they will increase the lifetime of the devices as lower induction voltages (reduced spark formation) will also reduce contact burn.