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Universal tank control WTS-300 *Firmware V2.2*

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

Programmable via configuration software WELBA „KONSOFT"

WTS-300 G1

105204 WTS-300 V2.2 - 01.05.2019

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Circuit diagram
is stored in the control box

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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 WTS-300 universal tank control. This manual contains all necessary suggestions, Information, recommendations and advice for the safe and proper installation and commissioning of the tank control. It is only with the knowledge of this operating instruction that errors in the tank control 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 control.

When delivered, the parameterization of the WTS-300 does not necessarily correspond to the intended use. This must be adjusted accordingly during the installation.

Basically, the installer of the system is responsible for the commissioning of the control.

Operation instruction for the operator

The plant engineers, the installer or the service technician must prepare operating instructions for the operator of the tank control (farmer). In this case the parameterization of the delivery state must be clearly documented.

We recommend to only document those parameters which the operator of the tank control needs.

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 control or in case of any other work with the control!

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 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 WTS-300 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 integrated 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
- 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. Introduction

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

These instructions have been compiled with maximum care and attention. However, their content does not constitute an assurance of product features.

The manufacturer cannot be held liable for errors and may at any time make changes serving technical progress. All rights reserved.

1.3 Device description

The WTS-300 is an universal tank control unit that combines various basic functions in one unit

- a milk cooling thermostat
- an extensive cleaning control
- an extended robot interface
- an extended tank monitoring system

All functions can be parameterised separately and universally.

The control unit has various operating modes:

- OFF mode (tank is empty)
- Cooling mode
- Continuous stirring mode
- Cleaning mode

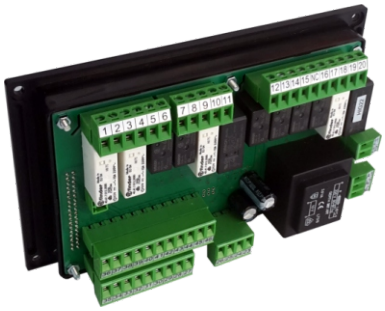
WELBA KONSOFT

The free of charge configuration Software KONSOFT provides a simple parameterization and updating of the WTS-300 as well as a comfortable evaluation of the determined data.

See section 5.2

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.

1.4 Type designation

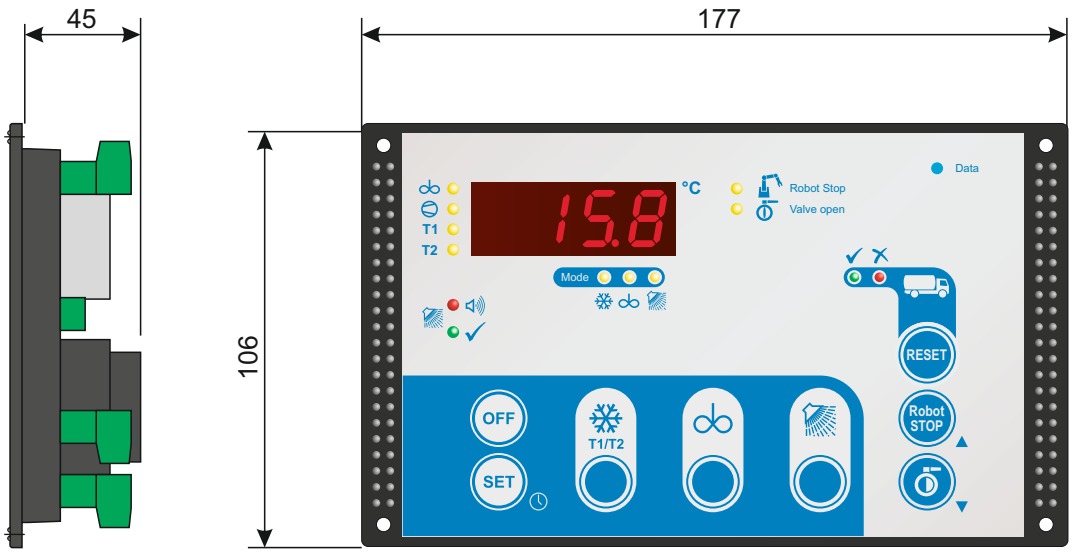


The type designation of your controller is attached to the holder frame.

1.5 Items supplied

- Controller WTS-300
- Holder
- Rubber seal
- Sensor
- Fixing screws

1.6 Dimensions

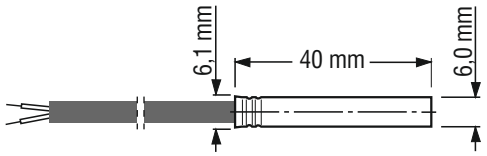


1.7 Technical data of control unit

Operating voltage	230V AC +/-10%, 50/60 Hz
Relay contact	12 performance relays
max. switching current	6 x each 6A AC1 - 250V AC 4 x each 10A AC1 - 250V AC 2 x each 12A AC1 - 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
LED switching status displays	3 mm
Number of sensor inputs	1 or 2
Measurement range	-5° ... +95°C
Temperature resolution	0.1°C
Sensor input	KTY 81-210 (optionally PT-100)
Control mode	two-step controller
Hysteresis*	0.1 K .. 99,9 K (standard adjusting 0.7 K)
Water detection	via 2 independent level monitors
Target temperature T1*	standard adjusting 8°C
Target temperature T2*	standard adjusting 4°C
Digital inputs	8 (via optocoupler)
Interface	2x RS 485
Supply ext. pressure sensor	12V +/- 3V max. 40 mA
Connection	Plug-in screw connections for cables up to 2.5 mm²
Housing	
- Front dimension	177 x 106 mm
- Front panel cut out	157 x 97 mm
- Insertion depth	45 mm
Protection	The control is open on the rear, as it is designed for installation in a closed housing
- Housing front	IP 64
- Rear	IP 20
Electrical safety	Protection class II, Overvoltage category III, pollution degree I
Environment specifications:	
- Operation temperature	0° .. +50°C
- Storage temperature	-20° .. +70°C
- max. humidity	75% (no dew)

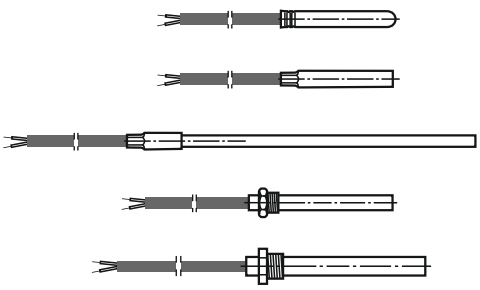
Technical data subject to change

1.8 Sensor dimensions and technical data



Order no. TF1A-2

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
Cable length	standard 2 metres
Protection type	IP 65



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

The plant engineering company, the installer or the service engineer must prepare operating instructions for the operator, taking account of the controller's parameters as supplied.

We recommend referring only to the parameters which the end user needs for safe operation.

In preparing the operating instructions for the end user, especially the chapter on "Safety", account must be taken of local regulations.

The parameter settings of the WTS-300 as supplied do not correspond to the intended use. This can lead to undefined behaviour by individual components when the system is commissioned.

For this reason, no actuators should be connected when starting operation. Load circuits should be separated.

The general principle is that the plant constructor is responsible for putting the controller into operation.

IMPORTANT NOTICE ON LIABILITY

The faultless function of the WTS-300 depends on many external factors, which the manufacturer has no influence on. The manufacturer assumes no liability for damage to the milk cooling tank, the connected components or the milk. The integrated tank monitor thus only supports the milk quality and does not release the farmer (as operator of the milk cooling tank) or the driver of the milk collecting truck from the duty of care. These must ensure, before withdrawing from the tank, that the milk is transportable.

IMPORTANT NOTICE ABOUT THE ACCUMULATORS (only if installed)

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)

DO NOT USE BATTERIES !!! EXPLOSIVE !!!

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

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

The universal tank controller may only be installed by an authorised specialist, observing all local safety requirements.

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

Universal tank controllers contain live components. They must be built into the plant in such a way that contact with such live components is impossible.

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

The device must not be used if the housing or connection terminals are damaged.

No fluids must penetrate the housing.

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

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 regulator.

Universal tank controllers WTS-300 are designed to control heating systems, condensing units, alarms, fans, etc. in milk cooling tanks as well as to monitor milk quality. Furthermore, connected milking robots can be controlled. Any other use of the device is permitted only with prior written permission from the manufacturer.

The controller is intended only for incorporating into machinery, display panels or switchboxes etc. and when fitted corresponding to protection class 2 (double or reinforced insulation). It is only allowed to be put into operation in installed state. The use of the control is permitted in devices of protection class 1 and 2. The controller must not be modified or converted in any way.

The universal tank controller is ready for use only when the parameters have been set appropriately. Its use before this has been done would have no benefits and could also damage the equipment or adversely affect the milk to be temperature-controlled.

Responsibility for the faultless functioning of the connected devices lies with the plant engineer or the installer or the service engineer who has installed and commissioned the WTS-300.

CE

The device is fitted with a resistance temperature sensor.

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

The WTS-300 fulfils the EC requirements for electromagnetic compatibility (EMC) and the Low Voltage Directive (LVD).

The safety components meet the VDE regulations.

2.3 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.

2.4 Electrical safety

- The controller 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 K12) 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.

Important note concerning the external fuse

- The transformer, which is installed in the WTS-300, has a two-chamber safety winding, which is only short-circuit-proof due to the built-in thermal protection. If the temperature exceeds 145 ° C, there is a risk of damage!

  Protect control unit with an external fuse of 160mA!

3. Installation

3.1 Location and climatic conditions

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 90%
- sharply fluctuating temperatures (condensation)
- 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

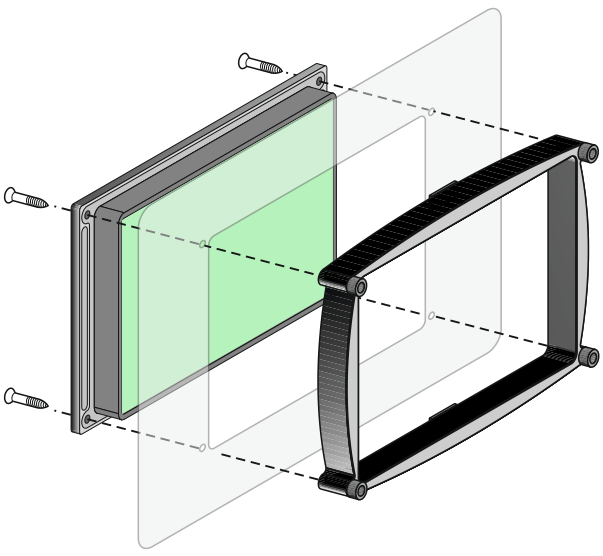
If the packaging is damaged or something is missing, do not fit the temperature controller. In this case please contact Welba.

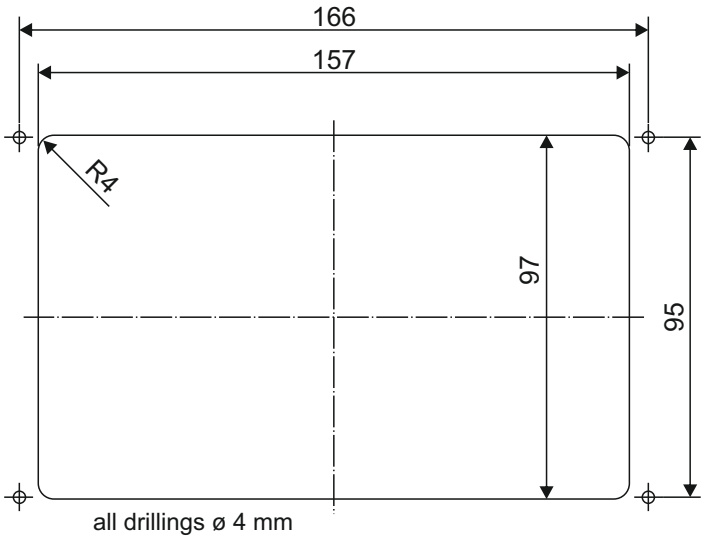
If you keep the temperature controller for a period before using it, store it in a clean dry place at a temperure of between -20°C and +70°C.

3.3 Installation of housing

For fixing the housing please follow the instructions:

- Place the seal carefully in the groove. Ensure it is not twisted.
- Insert the housing from the front through the switchboard cut-out.
- Attach the holding frame in the rear position as shown by the picture.
- Fasten the housing by using the screws provided.





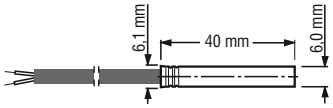
3.4 Fitting the sensor

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 WTS-300 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 temperature controller 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 9.7

Pay attention to the permitted temperture 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 the section 9.7

4. Electrical connection

4.1 Safety during installation

Before connecting ensure that the mains voltage is the same as indicated on the device's type plate.

Incorrect electrical connection can cause damage to the regulator and to the equipment.

The temperature controller should be disconnected from the mains voltage while connecting plant components or the sensor.

No appliances with current levels in excess of the maximum values indicated in the technical data should be connected to the relay contacts.

No other consumers may be connected to the controller's mains terminals.

4.2 Procedure

In order to avoid injury to persons or damage to connected components, connections must in all cases be undertaken in the following order.

- Pull out all the controller's plug-in terminals.
- Put the controller in position in the housing or switchboard.
- Connect all components and sensors in accordance with section 4.4 (Circuit diagram) to the plug-in terminals.
  (Do not yet plug the terminals into the controller!)
- Connect the mains cable to plug-in terminal A1 / A2.
- Plug terminal A1/ A2 into the controller.
- Close the switchbox and turn on the mains voltage.

- Switch on the controller and set the parameters
  (possibly using the optional WELBA-KONSOFT configuration software).
- Plug the pre-cabled plug-in terminals of the components into the controller.
- Close the switchbox.

4.3 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.

The various relay contacts may only be connected with uniform tension.

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.

- Within the two relay groups (K3 to K6) and (K9 to K12), the respective relays are connected with each other on one side. They connect the respective voltage which has been connected at the feed point (terminals 8 and 17) to the load.
- Compressor, cleaning pump and heater must not be connected directly to the relays on the control unit. These must be switched by additional contactors. In individual cases, it must be checked whether additional motor protection switches or other safety devices are to be installed.
- Contactors are to be fitted with an RC protective circuit.
- Connection of the digital inputs:

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

4. Electrical connection

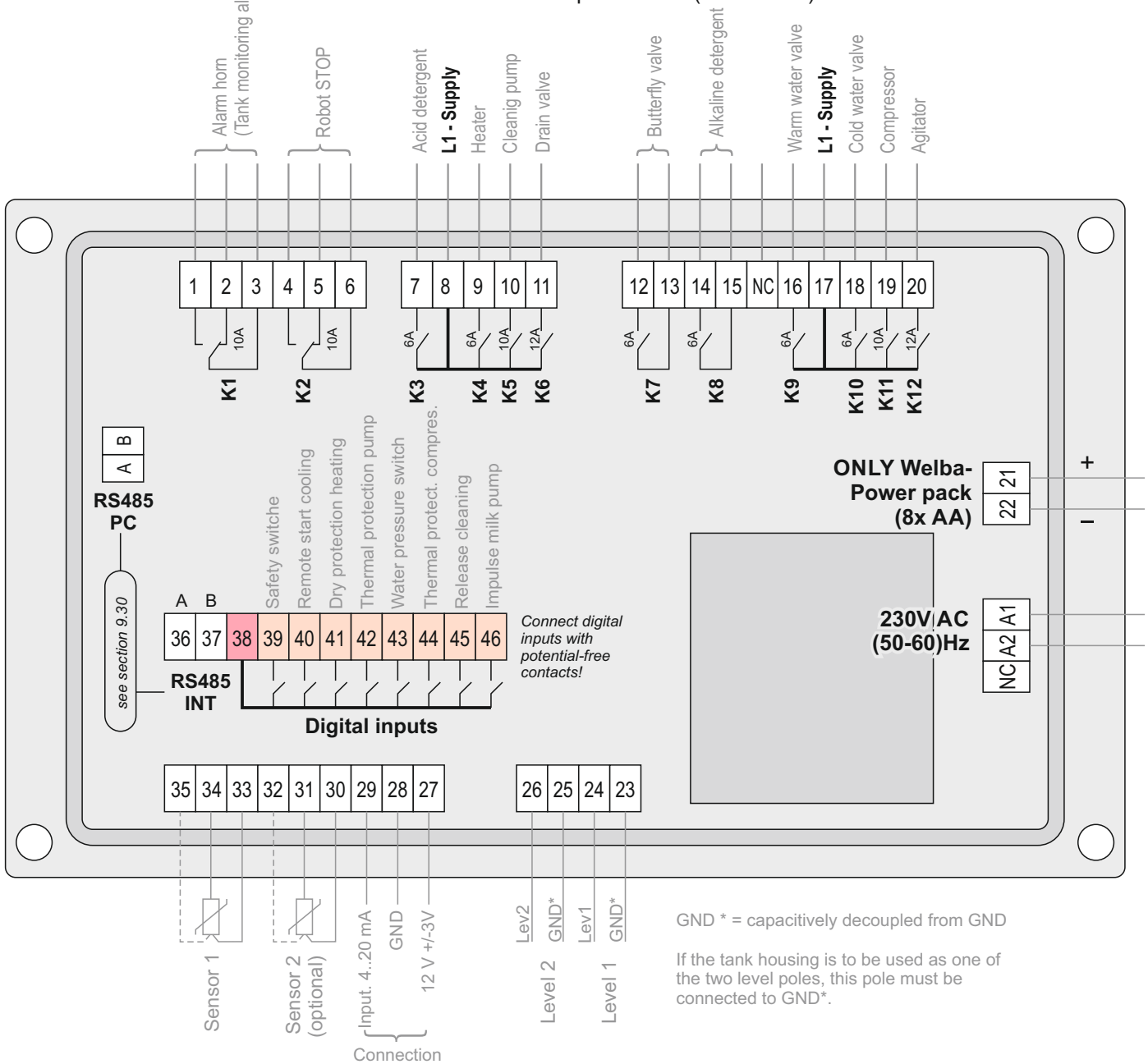
4.4 Connection diagram

- Electrical connections must be as shown in the diagram below.
- Use cable bushes.
- Make sure that cables cannot chafe.
- Observe relay current rating.
- In all cases use contactors for pump, compressor and heater.
- Do not feed digital inputs with external voltage! Use potential-free switches.

Default configuration

The assignment of components to the relay outputs is set in the A parameters (A1 to A12). See section 8.10

The assignment of components to the digital inputs is set in the A parameters (A21 to A28). Section 8.10

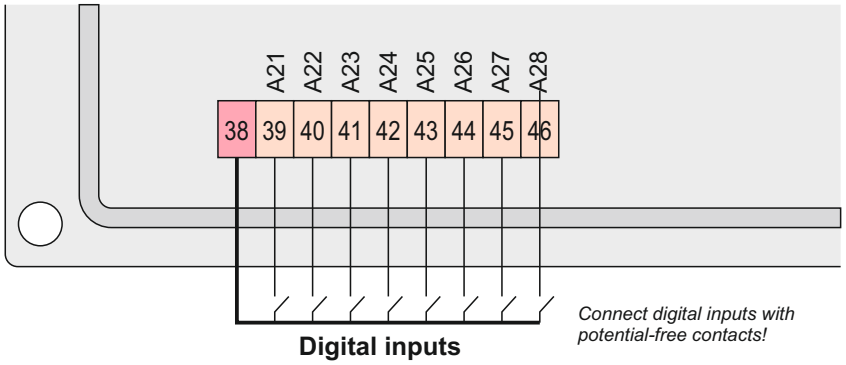


GND * = capacitively decoupled from GND

If the tank housing is to be used as one of the two level poles, this pole must be connected to GND*.

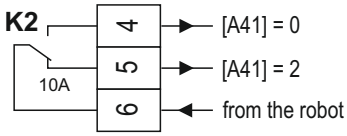
4.5 Wiring the digital inputs

Terminals 39 to 46 are digital optocoupler inputs. These are used to monitor and process external switching contacts. These switching contacts must be potential-free! The signal provided by the controller at terminal 38 must be fed separately to each individual switching contact.



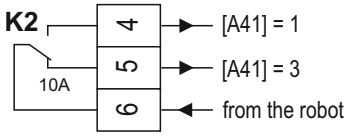
4.6 Connection robot

If the WTS-300 and the robot have a separate power supply, the robot can still be stopped (by corresponding connection) in the event of power failure.



Robot requires an active signal to stop (high-active)

- [A41] = 0: In the event of a power failure, the robot is not stopped (Connection to terminal 6 / 4)
- [A41] = 2: In the event of a power failure, the robot is stopped (Connection to terminal 6 / 5)



Robot needs to lose the signal to stop (low active)

- [A41] = 1: In the event of a power failure, the robot is stopped (Connection to terminal 6 / 4)
- [A41] = 3: In the event of a power failure, the robot is not stopped (Connection to terminal 6 / 5)

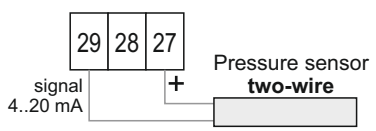
4.7 Connection of external pressure sensor (optional)

Terminals 27 to 29 must be used only for the connection of an external pressure sensor. See section 9.23

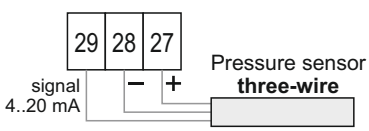
Internal power supply
via terminal 27
12 V +/- 3 V - max. 40 mA

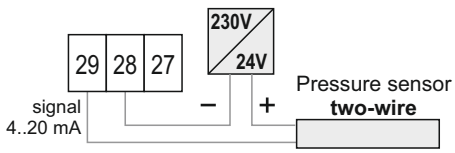
If the sensor can not be powered by internal power supply:
Use external power supply.

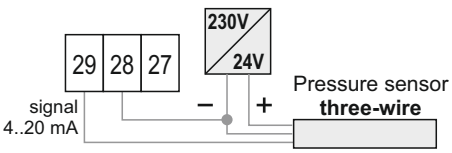
Connection pressure sensor two-wire



Connection pressure sensor three-wire







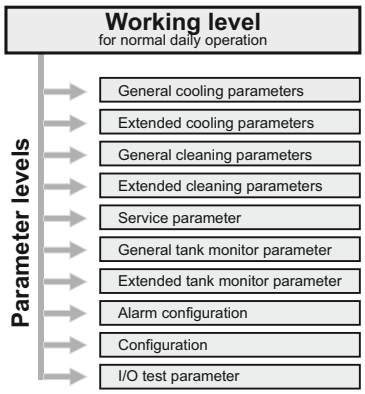
5. Operation

5.1 Function overview

The WTS-300 is a universal tank control unit which combines all the basic functions in one device:

- milk cooling control
- comprehensive cleaning control
- an extended robot interface
- an extended tank monitor

All basic functions can be selected and operated from the working level. The control unit can also be adapted to a wide range of different system types and sizes. This takes place through the thematically organised parameter levels.



Within the working level the control unit differentiates between various operating modes:

- **OFF mode (stand-by)**

  Shows the current time

  . All LEDs are out
  (Exceptions: robot, outlet valve and tank monitor LEDs may be lit)

  . All output relays are deactivated
  (Exceptions: robot, outlet valve and tank monitor alarms may be active)

  CAUTION: The control unit is live even when switched off.

- **Cooling mode**

  (can NOT be started from cleaning mode)

  Two freely definable target temperatures can be selected by pressing a button.

  If the milk temperature exceeds the selected target temperature (T1 or T2) by the hysteresis value, the compressor contactor and agitator are switched on automatically. Once the target temperature is attained, the compressor contactor switches off, while the agitator continues to run for the set “after-stirring“ period.

  During cooling breaks the agitator switches on periodically, in accordance with the set 'pause time', in order to ensure an even temperature throughout the milk.

  Independently of this, during cooling, short or long “intermediate stirring” can be switched on by pressing a button.

  Cooling can be triggered in different ways:

  . manually using the “START COOLING“ button

  . via digital input “Remote start to cooling“
  (by robot or external button)

  . automatically following cleaning (only in conjunction with robot)

  Cooling now starts in accordance with the pre-set starting mode:
  Immediately or after a cooling start delay, with periodic cooling boosts, etc.

- **Continuous stirring mode**

  From OFF mode, the agitator can be switched on by pressing a button and then switched off again by pressing the OFF button.

  Parameter [C25] can be used to set the time after which the agitator is to switch off automatically.

  The countdown can be interrupted at any time using the OFF button.

  If [C25] is set to '0', the agitator will run continuously, but can be switched off at any time using the OFF button.

  From the continuous stirring mode, it is possible to switch directly to the cooling or cleaning mode by pressing a button.

- **Cleaning mode**

  (can NOT be started from cooling mode)

  The cleaning timer controls the water intake by time or level, as desired. All running times (heater, pump, detergent injection) can be set separately. The automatic switchover from acidic to alkaline detergent is also adjustable.

  The WTS-300 controls the different processes and times fully automatically.

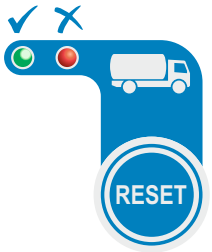
Following a power failure the control unit will restart in the mode it was in before.

Robot interface

Depending on the parameter settings, the control unit includes a built-in robot interface with the following functions:

- „Robot start / stop“ and
- “Butterfly valve open / closed“

These functions are controlled via the keypad.



Tank monitor function

During the entire cooling and cleaning process, the built-in tank monitor keeps check on the correct operation of all components, in order to guarantee the perfect state of the milk.

In particular, the following are monitored:

- minimum and maximum milk temperatures during cooling
- power failure (optionally power pack required!)
- agitator function (optionally agitator monitoring module required
- minimum and maximum temperatures during cleaning
- etc.

Any faults are indicated by two LEDs, and associated fault codes flash in the display.

In the case of errors which may jeopardise the milk quality, the red LED “Don't add milk” lights up.

5. Operation

5.2 The configuration software KONSOFT

For software description see separate instructions

The user-friendly configuration software “KONSOFT" for the WTS-300 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.

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 Guideline for the initial installation / parameterization

Before setting parameters you should decide the following:

- Which components (pump, compressor, heater, robot, butterfly valve, alarm, etc.) do you wish to control or regulate with the control unit?
- Which external signal transmitters (sensors, safety switches, pressure switches, robot signals etc.) are decisive for the control of the connected devices?
- Are alarm functions to be defined?
- Which occurrences (temperature, time) shall affect the control processes?
- Which cleaning processes are appropriate to the system?

Step 1 Connect all hardware components acc. to connecting diagram. See section 4.4
When using the tank monitor, connect optionally extra modules such as USB module and / or stirring unit monitoring module.

Step 2 Assign hardware components to the corresponding relay outputs (A1 to A12). See section 8.10

Step 3 Assign external signal transmitters to the digital inputs (A21 to A28). See section 8.10.

Step 4 Check the wiring of all connected components. See section 8.11

IF ROBOTS IS SHALL BE USED:

Step 5 Adjust parameter A40 and A41

IF TANK MONITORS SHALL BE USED:

Step 6 A-parameter, H-parameter, adapt H-parameter according to conditions.

Step 7 Assign occurrences to the various alarms in the F-parameters (alarm horn, LED-display, SMS-message, etc.)

Step 8 Adjust cooling and cleaning parameter. See sections 8.2 to 8.5

Step 9 Test cleaning sequence on proper function. See section 6.3.1.

TIP

For the parameterization and the commissioning of the WTS-300 use the free Software “Welba KONSOFT”.

Advantages:

- Fast and comfortable parameterization of the WTS-300.
- Clear presentation of the parameter-settings of your tank.
- Fast transfer of an existing configuration onto identical or similar tanks.
- Use the „monitoring function“ of the Software when commissioning the WTS-300.
- Here all occurrences can be graphically displayed and recorded.
- Store your configurations so that in case of a spare parts delivery the parameterization can be loaded onto the new device. Only the actual value correction has to be entered newly

In case of the initial installation the display shows after the application of the mains voltage

- 4 circulating bars,
- then briefly the Firmware-version
- then the time

Information:
If only 4 blinking horizontal bars are displayed after the application of the mains voltage, the time has to be reset. See section 5.4.

Note:

For data evaluation, the Software Konsoft uses the entered date of the WTS-300. If date and time are not entered correctly, the evaluation is also incorrect!

Now the control unit's parameters must be properly set in line with the features of your system.

Incorrectly set parameters can lead to serious malfunctions and damage to the milk-cooling tank.

When setting the control unit parameters, please bear in mind the consequences of malfunctions. For example, a continuously operating compressor can result in damage to the system. Protect yourself and your system by additional safeguards.

NB: The control unit offers more application functions than the number of relays and digital inputs available on the printed circuit board. When starting configuration please give careful consideration to how you want to allocate all the various components to the relays and digital inputs.

5. Operation

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.

Note:
If there is a device error or parameter loss when the voltage is applied, an error message appears on the display. See section 9.20

Setting the time during normal operation

- Press the OFF button: a 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.
  Setting is completed, and the actual time is displayed.

Jahr

Datum

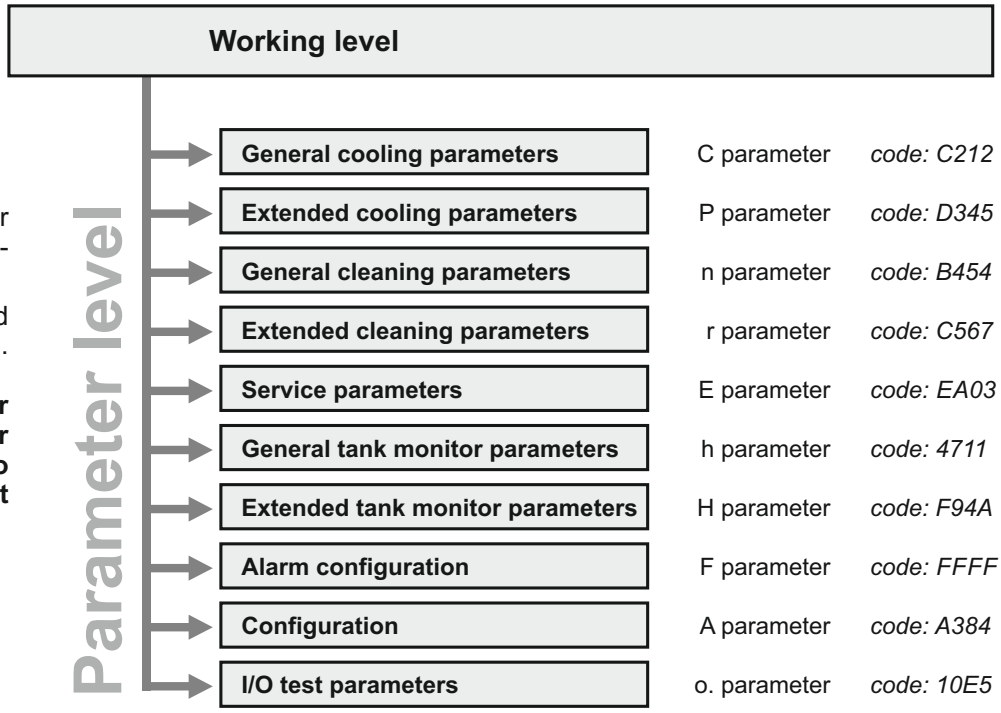
Uhrzeit

5.5 Operation in levels

The working level is used for operation and control in everyday operation.

The WTS-300 is parameterized in 10 different parameter levels.

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



General cooling parameters - (c parameter)
Parameters such as setpoints, hysteresis etc. can be set here.

Extended cooling parameters - (P parameter)
Setting of plant-specific functions such as agitator function, cooling start variant, milk removal option, etc.

General cleaning parameters - (n parameter)
Parameters such as the run times of the rinses etc. can be set here.

Extended cleaning parameters - (r parameter)
Setting of plant-specific functions such as configuration of safety elements, level detection, number of passes of individual cleaning stages etc.

Service parameters - (E parameter)
Displays the tank monitor parameters and counters

General tank monitor parameters - (h-parameter)
Determine whether and when informative alarms are triggered

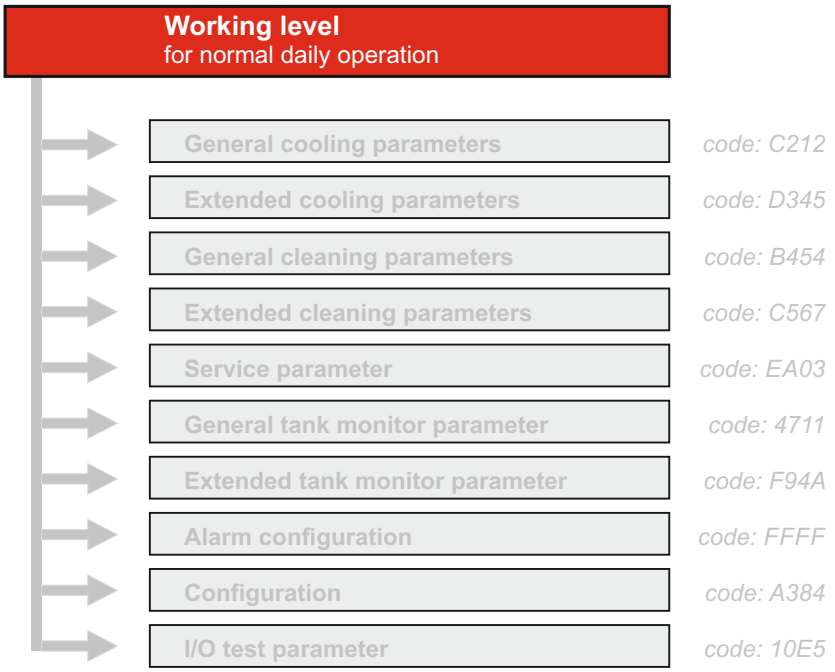
Extended tank monitor parameters - (H parameter)
Determine whether and when critical alarms are triggered

Alarm configuration - (F parameter)
Here an individual behaviour can be assigned for each fault.

Configuration - (A parameter)
Determination / Parameterisation of the hardware configuration

I / O test parameters - (o parameter)
Is intended for commissioning the control system.

5.6 Operation of working level



The working level is used for operation and control in everyday operation:

- OFF mode = switch off the control (Stand-by)
- Start cooling mode
- Start continuous stirring
- Start cleaning mode
- Robot operation
- Milk removal via the butterfly valve
- Observe tank monitor

5.6.1 Button functions

„OFF“ button

Active modes are closed down when the OFF button is pressed.

- Switch control unit to STAND-BY
- Close down cleaning mode or continuous stirring mode prematurely
- Acknowledge error
- Change to programming mode (hold down button for 3 seconds)

„SET“ button

in OFF mode =	press briefly: Display of critical faults (if available) Hold down for 3 seconds: set date and time
in cleaning mode =	“Cleaning stage” or “Tank temperature” is displayed (see Parameter [r97]) and current error
Parameter setting =	the current value entered is displayed
in cooling mode =	Display of various information such as time, fault, litre display, pressure (see section 9.23 + 9.26)

“COOL” button

in OFF mode =	start cooling
press 2x =	bypass the cooling start delay (if set)
press long =	new start of the cooling-start-delay (see section 9.4)
in cooling mode =	change target temperature T1 / T2

„AGITATOR” button

in OFF mode =	start continuous stirring mode
in cooling mode =	press for 1 second: "Intermediate stirring SHORT" press for 3 seconds: "Intermediate stirring LONG”

See also at the end of section “5.6.3 Cooling mode”

“WASHING” button

in OFF mode =	start cleaning

NOTE: Installation “Quick cleaning programme“ see parameter [r28]

“ARROW KEYS”

To select and adjust parameters.

Operation by the driver of the milk truck

„RESET“ button

press briefly =	Confirmation of the message “do not load”. See section 7.2
hold 5 seconds =	Test of the red alarm-LED

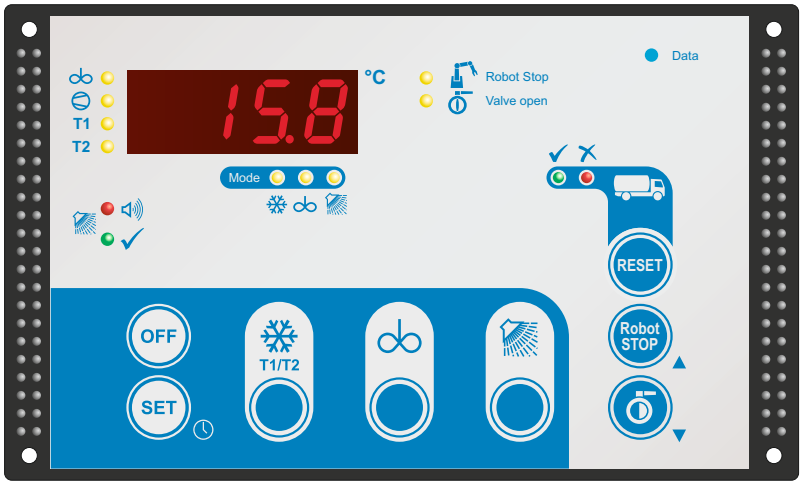
„ROBOT STOP“ button (if parameterized)

Starts or stops both the robot and the cooling mode as well.

„PNEUMATIC OUTLET VALVE“ button (if parameterized)

Opens / closes the pneumatic outlet valve.

5.6.2 Meaning of the LED‘s



LEDs in cooling mode

LED "AGITATOR”

during cooling mode	Agitator is switched on

LED "COMPRESSOR“

on	Compressor contactor is switched on
off	Compressor contactor is switched off
flashing	Pause time compressor (pendulum protection)

LED "T1” or „T2"

T1 on	Set target temperature for "T1" is active
T2 on	Set target temperature for "T2" is active

LEDs in cleaning mode

LED “ERROR”

flashing	The control is in error mode and must be acknowledged with the "OFF" button.

LED “END OF CLEANING / TANK EMPTY”

permanent	Cleaning successfully finished - tank is ready for further filling.

Display of operation mode

LED operating mode "COOLING”

flashing	„cooling start delay“ is active
permanent	„cooling mode“ is active

LED operating mode "AGITATING”

permanent	„continuous stirring“ is active

LED operating mode "CLEANING”

permanent	„cleaning mode“ is active
flashing	no cleaning release from the robot (see section 9.3.1)

Robot / Drain valve

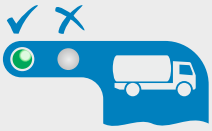
LED "ROBOTER STOP”

permanent	Roboter is stopped
flashing	"CLEANING" button was pressed before the robot was stopped

LED "PNEUMATIC OUTLET VALVE” opened

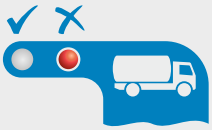
permanent	pneumatic outlet valve is open
flashing	Cleaning button has been pressed before the pneumatic outlet valve has been opened.

Tank monitoring



LED (green) "MILK COLLECTION OK”

permanent	everything ok - milk can be loaded.
flashing	informative alarm is on



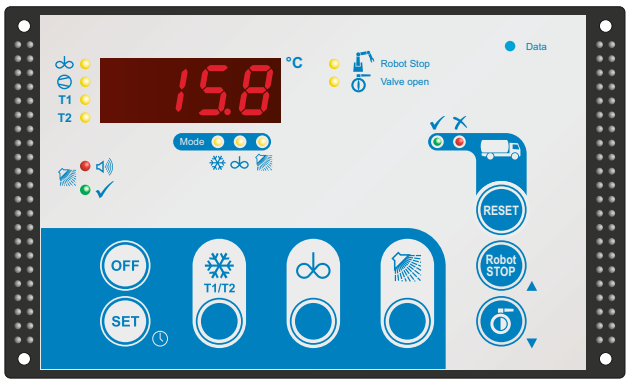
LED (red) "DON‘T ADD MILK !”

flashing	critical alarm is on.
permanent	critical alarm is on - has already been acknowledged
off	everything ok - milk can be loaded.

LED (blue) "Data”

flashing	Tank monitor data are stored on the USB stick.
5s permanent, then off	Saving finished, stick can be removed.

5.6.3 Operation modes



OFF mode

OFF

The current time is displayed. (see also section 5.4)
The control unit is on stand-by

- All mode LEDs are out.
- All output relays are deactivated
  (Exceptions: robot, butterfly valve and tank monitor alarms may be active)

CAUTION: The control unit is live even when switched off.

Cooling mode

T1/T2

Cooling mode is started from the OFF or from the continuous stirring mode.

- MANUALLY by pressing the COOL button
- DIGITALLY via digital input “Remote start to cooling “ (by robot or external button)
- AUTOMATICALLY following cleaning (if programmed)

Subject: Cooling start delay.

If “Cooling start delay” [P60] is programmed, the compressor starts after a delay, in order to prevent a small amount of milk in the tank from freezing. During the cooling-start-delay LED “operation mode “COOLING” is blinking.

This delay applies only for the first milking after cleaning.

Mode

Note: If you push the button “COOLING” twice (double click), cooling will start immediately without a delay - the LED will be lit continuously.

There are various cooling start delay options. See section 9.4

After the start of the cooling mode

- The COOLING mode LED is lit
- The robot is enabled (LED off).
- The butterfly valve is closed (LED off).

Robot Stop
Valve open

- The “Agitator” LED lights up
- The “Compressor” LED lights up only when the compressor is actually running.
  - it is not lit if the milk temperature is lower than the target value
  - it flashes for the duration of the min. pause time for the compressor [P71]
- The “T1” or “T2” LED (for target temperature 1 or 2) lights up.
- The pre-set target temperature T1 or T2 flashes three times in the display, then the current temperature of the milk is shown.
  If you wish to change to the other target temperature: press the COOL button again. (Switching over from T1 to T2 may be blocked via parameter [P80]).

The milk is now cooled down to the set target temperature, and the agitator runs continuously during cooling. If the milk temperature is already below the target, just the agitator runs for the time being.

- When the target temperature is reached, the compressor switches off.
- At the end of the set “after-stirring” period [c20], the agitator also switches off.
- During cooling breaks the agitator switches on periodically, in line with the set “pause time” [c21] for the “after-stirring” period [c20], in order to ensure an even temperature throughout the milk.
- If the milk temperature rises again, and exceeds the selected target temperature by the hysteresis value [c10 or c11], the compressor and agitator are switched on again automatically.

Stirring in cooling mode = **INTERMEDIATE STIRRING**
(only if released in parameter [P22])

- In cooling mode, briefly press the AGITATOR button:
  A “short intermediate stirring” is triggered [duration = c23].
  The indication “Sho” is displayed.
- In cooling mode, press the AGITATOR button for 5 seconds:
  A “long intermediate stirring” is triggered [duration = c24].
  The indication “Lon” is displayed.

Continuous stirring mode

if parameter [c25] = '0'

- Press the “AGITATOR” button: (from OFF mode)
  Switches on continuous stirring mode (revolving bar in the display).
- Press “OFF” button:
  Switches off continuous stirring mode.

if parameter [c25] > '0'

- Press the “AGITATOR” button: (from OFF mode)
  If parameter [c25] is set higher than '0', when the button is pressed the agitator runs for the set number of minutes.
- Press “OFF” button:
  Switches off continuous stirring mode prematurely.

5.6 3 Operation of working level

Cleaning mode

- Press the “WASH” button: *(NOT possible from cooling mode*)

  Cleaning proceeds automatically in line with your settings.
  Depending on the setting in [r97], the display indicates the current cleaning stage or the temperature.
  Exception: During the heating stages the current water temperature is displayed.

To stop cleaning manually

- Press OFF button for 3 seconds: The cleaning programme switches to the stop phase. “ABL” and “F43” flash alternately in the display, indicating “outlet valve open”.
  - All currently active relays are de-energised (apart from “Cleaning active” and “Robot stop”)
  - The outlet valve opens for a pre-set time and then closes again.
  - The red “WASHING” LED blinks - code F43 flashes in the display.
  - The control unit switches to OFF mode only when the OFF button is pressed again.

Cleaning does not start

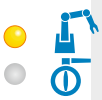
There are various possible causes – depending on parameter settings:

- The robot has not been stopped -> Stop.
- The butterfly valve is still closed -> Open.
- The safety switch is in the wrong position.
- No cleaning release from the robot (see section 9.3.1)

Displays during main wash

- during intake of alkaline detergent: "ALC“
- during intake of acidic detergent: "ACI“
- during disinfecting: “dESI“
- during heating the temperature alternates with "HEAt“

Robot operation *only if the robot is configured*



Using the ROBOT STOP button, the operation of a connected robot is either stopped or enabled.

With the start / stop of the robot, the cooling mode of the milk tank is simultaneously started / stopped.

- Hold down the ROBOT STOP button for approx. 3 seconds: robot operation is either enabled or stopped (Toggle function)

  The current switching status is indicated by LED.

5.6 3 Operation of working level

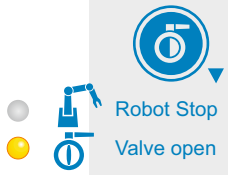
Milk collection

Complete emptying of tank into collection tanker

- Ensure that the green LED of the tank monitor indicator is lit

- Press the OFF button

- To stir the milk for a short period: briefly press the AGITATOR button. After the desired stirring time, stop the agitator by pressing the OFF button.
- Connect the milk pipe from the tanker.
- Open the tank outlet. (depending on the system, either manually or by means of the BUTTERFLY VALVE button)



If the tank has a pneumatic butterfly valve:

- Press the “BUTTERFLY VALVE” button for approx. 3 seconds:
  The butterfly valve opens – the milk is transferred to the tanker.
  The “Valve open“ LED is lit.

When the tank is empty

- Disconnect the tanker's milk pipe .
- Connected the cleaning hose to the tank outlet.
- Press the WASH button.

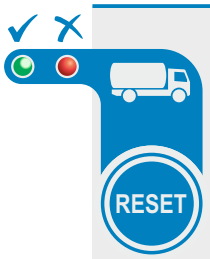
To draw off a small quantity of milk *(tanks with pneumatic butterfly valve)*

If milk is to be taken from the tank while cooling mode is running, proceed as follows

- Parameter [P32] Setting 1 -> Button function
  The butterfly valve opens immediately and remains open for as long as the button is held down.
  When the button is released, the valve closes immediately.
- Parameter [P32] Setting 2 -> Toggle function
  Press the BUTTERFLY VALVE button for 3 seconds - Outlet opens.
  Briefly press the button again - Outlet immediately closes.

For both settings a time limit can be programmed via parameter [P33].

Observe the tank monitor



The “Tank monitor” function indicates whether the milk quality is guaranteed or whether a fault has occurred during cleaning.

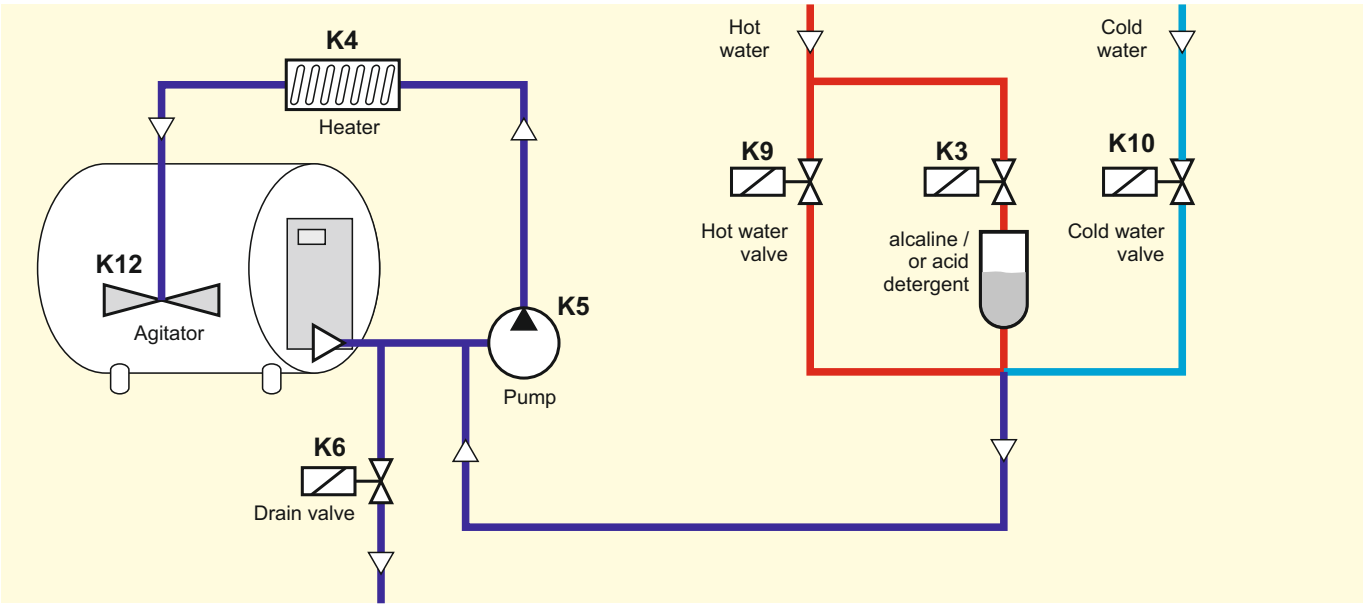
- LED shows green: milk can be taken out.
- LED shows red: DO NOT LOAD MILK!
  The fault is indicated in the display.

A detailed description of the tank monitor function may be found in section 7.1 of these operating instructions.

6. Cleaning

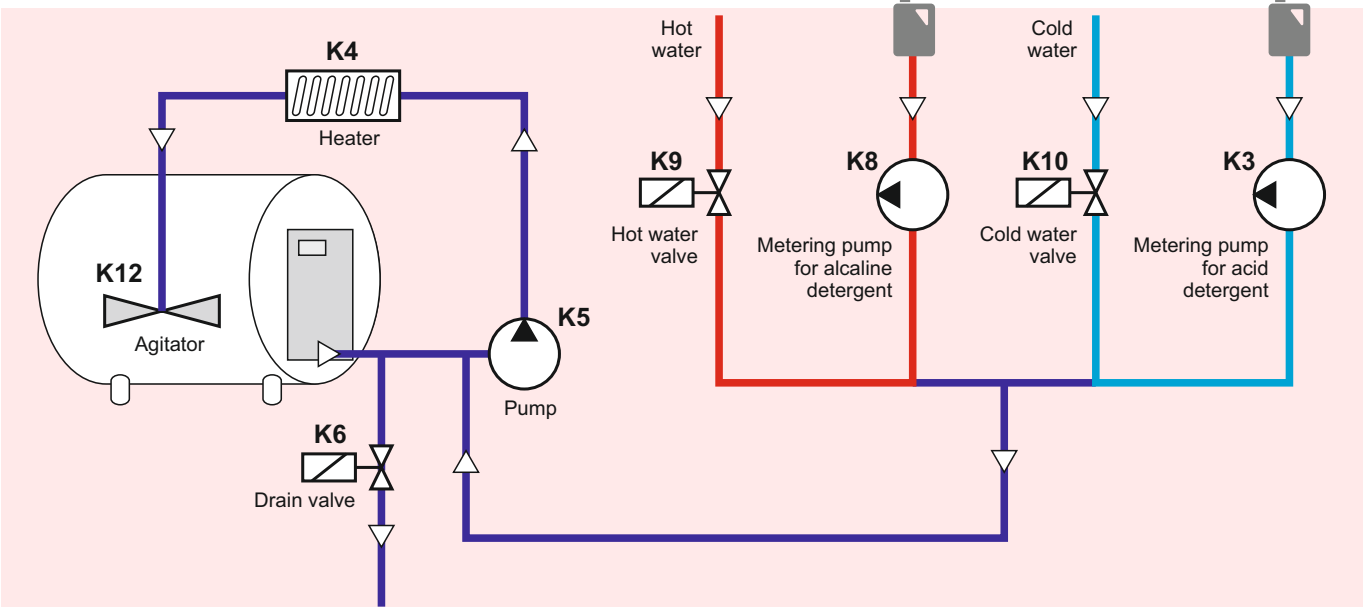
6.1 Cleaning methods (cooling tank-configurations)

6.1.1 Circulation cleaning with a beaker



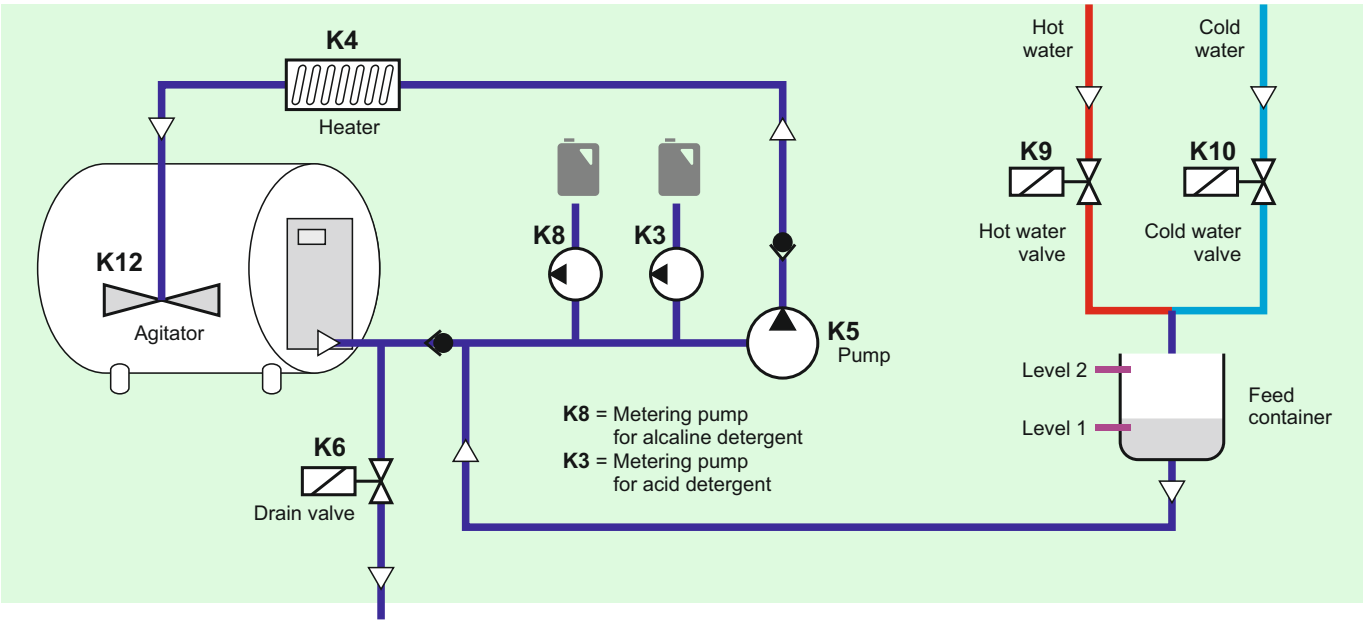
Cleaning method for milk cooling tanks, where alkaline and acidic detergents are supplied either by a drawer or a fixed beaker.

6.1.2 Circulation cleaning with two dosing pumps



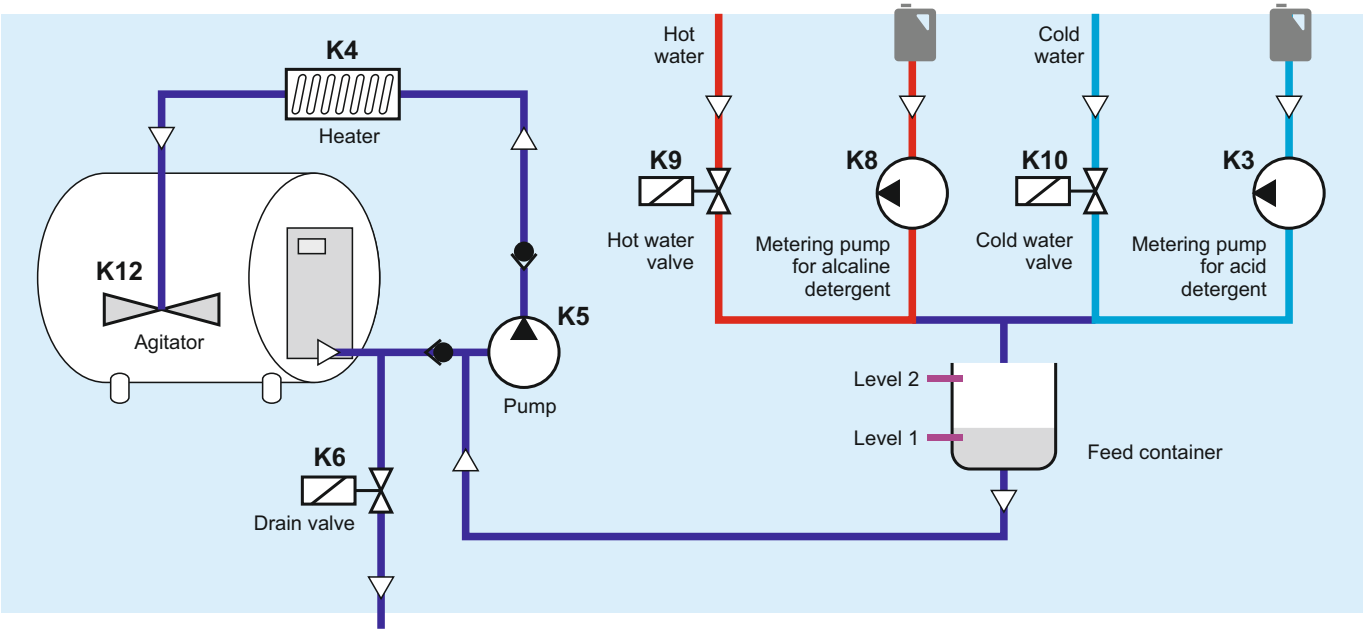
Cleaning method for milk cooling tanks, where alkaline and acidic detergents are supplied by separate dosing pumps.

6.1.3 Displacement cleaning with feed container, dosing pumps in circulation line.



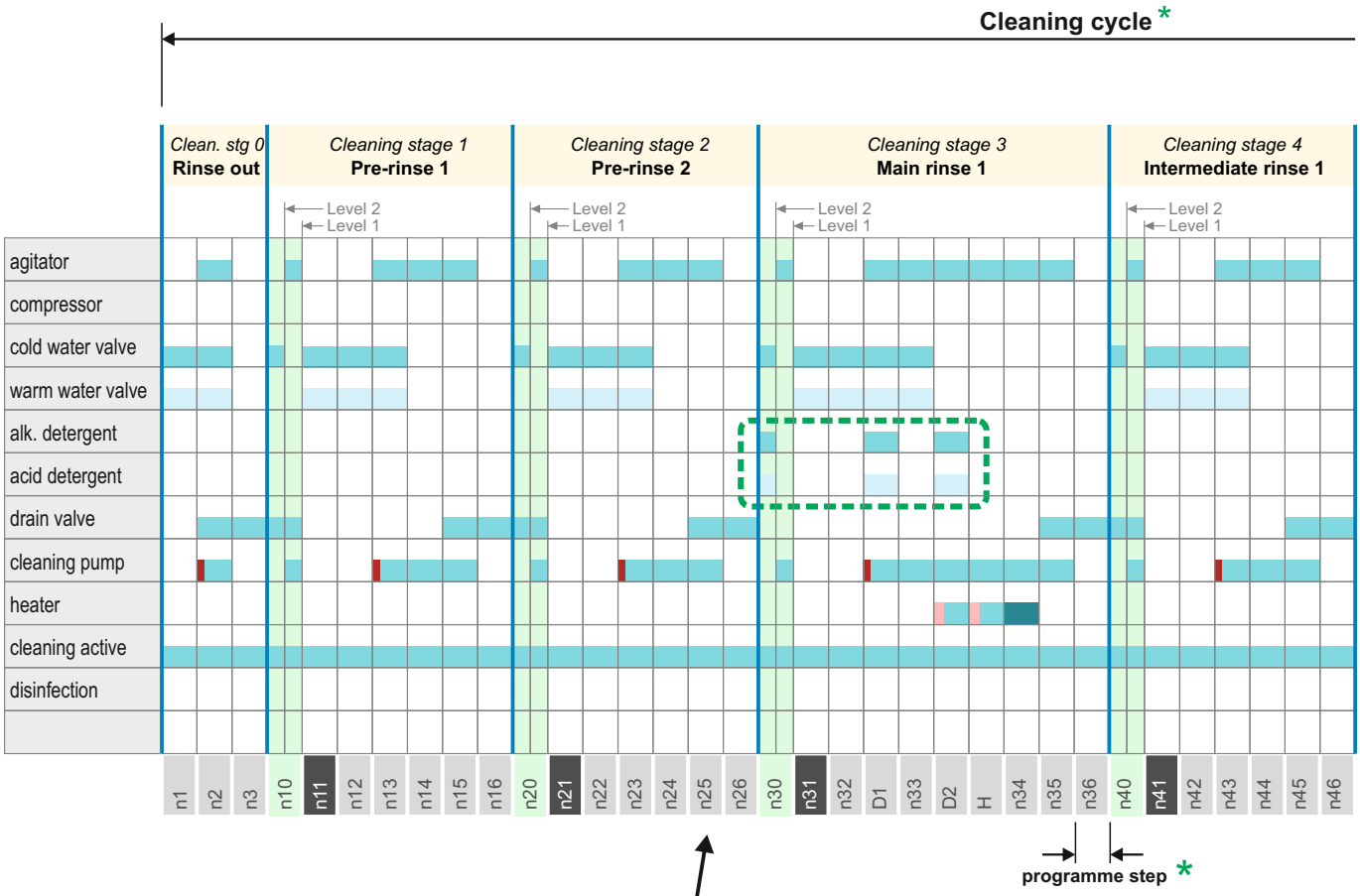
Cleaning method for milk cooling tanks, where hot and cold water are dosed level-controlled in a feed container, before pumped out for tank cleaning. The detergent is filled into circulation line.

6.1.4 Displacement cleaning with feed container and dosing pumps

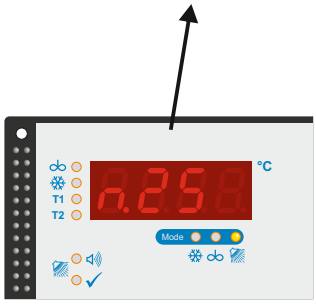


Cleaning method for milk cooling tanks, where water and detergent are dosed level-controlled in a feed container, before pumped out for tank cleaning.

6.2 Cleaning programme diagram



During the cleaning process the current programme step is displayed.
The flashing point indicates activity.



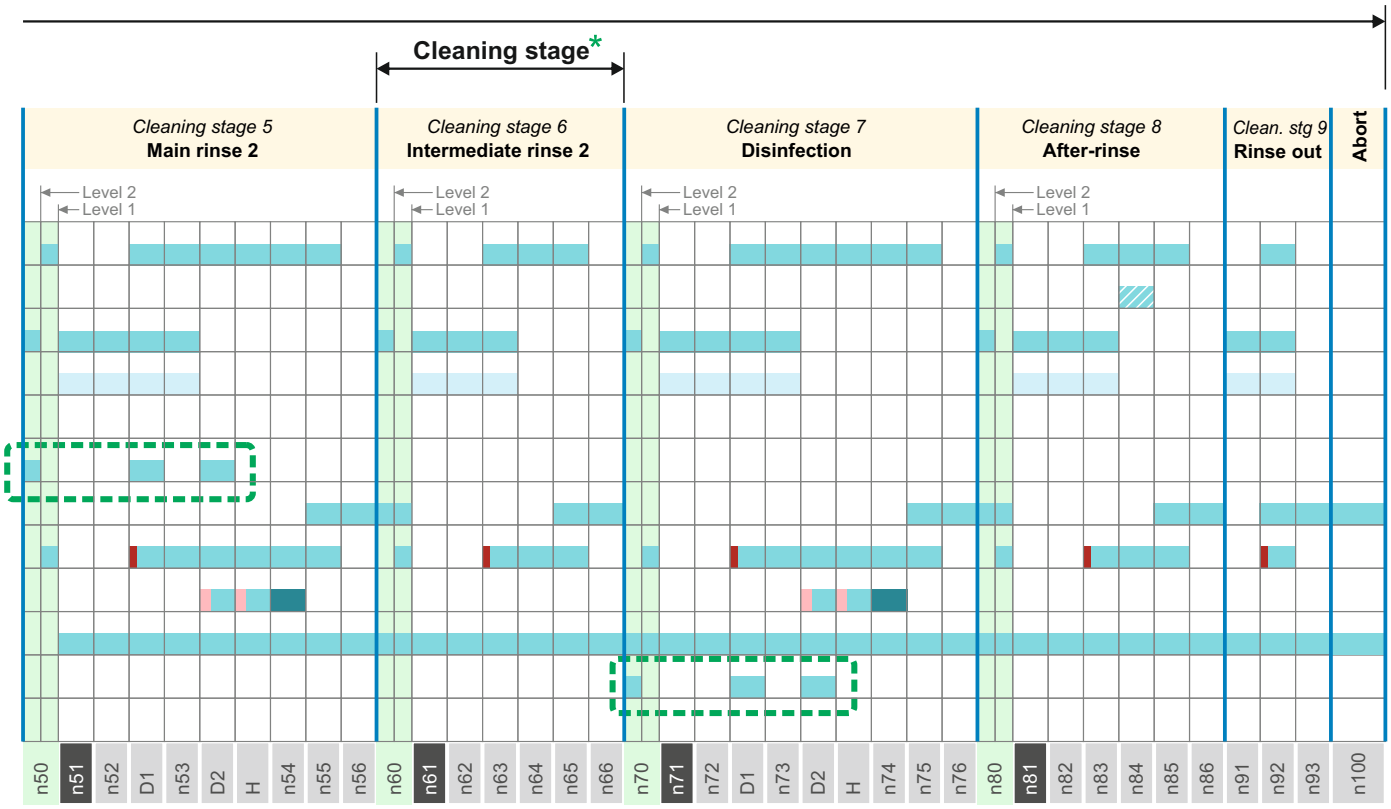
*** Cleaning cycles, cleaning stages and programme steps:**

A cleaning cycle consists of different "cleaning stages".

Each cleaning stage consists of several 'programme steps'.

- Only available when activated in parameters
- Switch-on delay for heater
- Post-heating temperature during main circulation
- Cleaning pump venting (if set in parameter [r80])
- Only required in case of cleaning method ‚green' (see section 6.1.3 and 6.1.4).

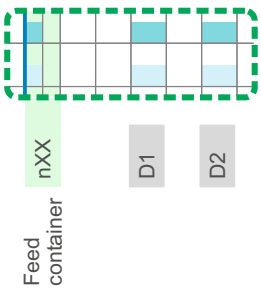
n	Designation of the **n-parameters**, with which the corresponding times are set
n11	For the first parameter of each cleaning stage the following can be parameterised: Water intake by level
D	Adjustment of dosing times for detergents
H	Heat-up time (variable - until the set temperature is reached)



Explanation of the setting of alkaline / acid cleaning:

- If main cleaning stages 1 + 2 are activated, both alkaline and acid detergents are used for each cleaning cycle.
- If a cycle with acidic detergent is to be carried out after x cleaning cycles with alkaline detergent only, the main cleaning stage 2 must be deactivated. Parameter [r21] is used to set the number of alkaline cycles, after which one cycle with acid detergent will be carried out.

- The intake of the detergent is always time-controlled.
  During dosing the display shows:
  - ALC - alkaline detergent is dosed
  - ACI - acid detergent is dosed



- Here you can select whether the detergent is to be dosed in programme step D1 or D2 or in the feed container. Parameter [r20]

6.3 Explanation and programming of the cleaning process

Cleaning methods

In section 6.1, 4 cleaning methods for different cooling tank configurations are described. In the following all 4 methods are described, whereby the specific differences are marked in colour.

Circulation cleaning with beaker	Circulation cleaning with dosing pumps	Displacement cleaning with dosing pumps and feed container
6.1.1	*6.1.2*	*6.1.3 + 6.1.4*

A cleaning cycle consists of up to nine different cleaning stages. The frequency of each stage during a cycle can be set by the user. See parameter [r40 to r48].

During the cleaning cycle the current programme step is displayed.

Only reasonable for yellow and pink

Cleaning stage 0: RINSE OUT

Parameter [r40] = 0 'Cleaning stage 0' disabled
Parameter [r40] = 1..5 'Cleaning stage 0' execute x-times

- Water is taken in.
  The parameter [r50] is used to stipulate whether cold, hot or mixed water is to be taken in.
  Furthermore, for "Cleaning stage 0", the water intake time was set [n01].
- Agitator and pump start to run, the outlet valve will open.
  The water circulates for the pre-set time [n02].
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n03]. The drain valve is assigned to the respective cleaning stage via the parameters [r60 to r68].
  Parameter [r24 / r25] determines whether the drain valve is normally open or normally closed. Applies to all cleaning stages.

Cleaning stage 1: PRE-RINSE 1

Parameter [r41] = 0 'Cleaning stage 1' disabled
Parameter [r41] = 1..5 'Cleaning stage 1' execute x-times

- In case of cleaning method 'green' – it is set in programme step [n10] how often the feed container is filled with water up to level 2 and water is pumped back up to level 1. As long as the rinsing pump is running, the drain valve is open.
- Water is taken in.
  The parameter [n11] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n12].
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44
  The cleaning parameter [r51] is used to stipulate whether cold, hot or mixed water is to be taken in.

In case of green n11 and n12 have to be parameterized on „0“

- Agitator and pump start to run.
  Another option is to select an 'additional water intake time' using [n13].

In case of green n13 have to be parameterized on „0“

6.3 Explanation and programming of the cleaning process

In case of green n14 have to be parameterized on „0“

- The water circulates for the pre-set time [n14].
  An additional time can be defined in parameter [n15], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Outlet valve opens for the pre-set time [n16]. See also [n15].

Cleaning stage 2: PRE-RINSE 2

Parameter [r42] = 0 ‘Cleaning stage 2’ disabled
Parameter [r42] = 1..5 ‘Cleaning stage 2’ execute x-times

- In case of cleaning method 'green' – it is set in programme step [n20] how often the feed container is filled with water up to level 2 and water is pumped back up to level 1. As long as the rinsing pump is running, the drain valve is open.

In case of green n21 and n22 have to be parameterized on „0“

- Water is taken in.
  The parameter [n21] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n22].
  The cleaning parameter [r52] is used to stipulate whether cold, hot or mixed water is to be taken in.
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44

In case of green n23 and n24 have to be parameterized on „0“

- Agitator and pump start to run.
  Another option is to select an 'additional water intake time' using [n23].
  The water circulates for the pre-set time [n24].
  An additional time can be defined in parameter [n25], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n26]. See also [n25].

Cleaning stage 3: MAIN WASH 1

Parameter [r43] = 1 not changeable

- In case of cleaning method 'green' – it is set in programme step [n30] how often the feed container is filled with water up to level 2 and water is pumped backup to level 1. The drain valve remains closed up to cleaning step [n35/n36].
  <u>Settings for version 6.1.4</u> (dosing in pre-hopper)
  Parameter [r20 = 0] and parameter [n30 = min. 2] since the detergent is added when water is taken from the pre-hopper for the second time.

In case of green n31 and n32 have to be parameterized on „0“

- Water is taken in.
  The parameter [n31] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n32].
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44
  The cleaning parameter [r53] is used to stipulate whether cold, hot or mixed water is to be taken in.

In case of green n33 have to be parameterized on „0“

- Agitator and pump start to run. Water circulates in the tank.
  Another option is to select an 'additional water intake time' using [n33].

* (D1 or D2 in cleaning programme diagram)

6.3 Explanation and programming of the cleaning process

In case of green n32 and n33 have to be parameterized on „0“

Cleaning agent dosing: (see also explanation two pages before)

- Depending on the setting of the parameter [r20], detergent is injected at the end of the water intake time [n32] or the subsequent water intake time [n33] as follows:
  - *If ‚cleaning stage 5' is activated [r45=1] only alkaline detergent is injected here for duration [n101*].*
  - *If 'cleaning stage 5' is deactivated [r45=0] alkaline detergent is injected x times for duration [n101*] before acidic detergent is injected once for duration [n102*].*
  - *The number of alkaline cleaning cycles is set in [r21].*
- If a heater is present [r35], this is switched on. When the heating temperature [n106] is reached, the heater is switched off again.
  If the temperature is not reached within the pre-set time [r37], the control unit continues with the program, but a fault report is displayed at the end. See section 7.5.3 - F44
  If a switch-on delay [r36] has been parameterized for heating, heating starts only after this time has elapsed. (This is to ensure that water is in the heater.)
- Main circulation time: The water circulates for the pre-set time [n34]. During the main circulating time, a post-heating temperature [n109] can be defined.
- An additional time can be defined in parameter [n35], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n36]. See also [n35].

Cleaning stage 4: INTERMEDIATE RINSE 1

Parameter [r44] = 0 ‘Cleaning stage 4’ disabled
Parameter [r44] = 1..5 ‘Cleaning stage 4’ execute x-times

- In case of cleaning method 'green' – it is set in programme step [n50] how often the feed container is filled with water up to level 2 and water is pumped back up to level 1. As long as the rinsing pump is running, the drain valve is open.

In case of green n41 and n42 have to be parameterized on „0“

- Water is taken in.
  The parameter [n41] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n42].
  The cleaning parameter [r54] is used to stipulate whether cold, hot or mixed water is to be taken in.
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44

In case of green n43 and n44 have to be parameterized on „0“

- Agitator and pump start to run.
  Another option is to select an 'additional water intake time' using [n43].
  The water circulates for the pre-set time [n44].
  An additional time can be defined in parameter [n45], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n46]. See also [n45].

6.3 Explanation and programming of the cleaning process

Cleaning stage 5: MAIN WASH 2

Parameter [r45] = 0 'Cleaning stage 5' disabled
Parameter [r45] = 1 'Cleaning stage 5' execute one time

- In case of cleaning method 'green' – it is set in programme step [n30] how often the feed container is filled with water up to level 2 and water is pumped backup to level 1. The drain valve remains closed up to cleaning step [n55/n56].

  Settings for version 6.1.4 (dosing in pre-hopper)
  Parameter [r20 = 0] and parameter [n50 = min. 2] since the detergent is added when water is taken from the pre-hopper for the second time.

In case of green n51 and n52 have to be parameterized on „0“

- Water is taken in.
  The parameter [n51] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n52].
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44
  The cleaning parameter [r54] is used to stipulate whether cold, hot or mixed water is to be taken in.

In case of green n53 have to be parameterized on „0“

- Agitator and pump start to run. Water circulates in the tank.
- Another option is to select an 'additional water intake time' using [n53].
- Depending on the setting of the parameter [r20], acidic detergent is injected at the end of the water intake time [n52] or the subsequent water intake time [n53]. The duration of the detergent dosing is set in parameter [n102].
- If a heater is present [r35], this is switched on. When the heating temperature [n107] is reached, the heater is switched off again.
  If the temperature is not reached within the pre-set time [r37], the control unit continues with the program, but a fault report is displayed at the end. See section 7.5.3 - F44
  If a switch-on delay [r36] has been parameterized for heating, heating starts only after this time has elapsed. (This is to ensure that water is in the heater.)
- Main circulation time: The water circulates for the pre-set time [n54]. During the main circulating time, a post-heating temperature [n110] can be defined.
- An additional time can be defined in parameter [n55], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n56]. See also [n55].

Cleaning stage 6: INTERMEDIATE RINSE 2

Parameter [r46] = 0 'Cleaning stage 6' disabled
Parameter [r46] = 1..5 'Cleaning stage 6' execute x-times

- In case of cleaning method 'green' – it is set in programme step [n60] how often the feed container is filled with water up to level 2 and water is pumped back up to level 1. As long as the rinsing pump is running, the drain valve is open.

In case of green n61 and n62 have to be parameterized on „0“

- Water is taken in.
  The parameter [n61] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n62].
  The cleaning parameter [r55] is used to stipulate whether cold, hot or mixed water is to be taken in.
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44

6.3 Explanation and programming of the cleaning process

In case of green n63 and n64 have to be parameterized on „0“

- Agitator and pump start to run.
  Another option is to select an 'additonal water intake time' using [n63].
  The water circulates for the pre-set time [n64].
  An additional time can be defined in parameter [n65], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n66]. See also [n65].

Cleaning stage 7: disinfection

Parameter [r47] = 0 ‘Cleaning stage 7’ disabled
Parameter [r47] = 1 ‘Cleaning stage 7’ execute x-times

- In case of cleaning method 'green' – it is set in programme step [n30] how often the feed container is filled with water up to level 2 and water is pumped backup to level 1. The drain valve remains closed up to cleaning step [n75/n76].

Settings for version 6.1.4 (dosing in pre-hopper)
Parameter [r20 = 0] and parameter [n70 = min. 2] since the detergent is added when water is taken from the pre-hopper for the second time.

In case of green n71 and n72 have to be parameterized on „0“

- Water is taken in.
  The parameter [n71] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n72].
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 6.5.3 - F44
  The cleaning parameter [r57] is used to stipulate whether cold, hot or mixed water is to be taken in.

In case of green n73 have to be parameterized on „0“

- Agitator and pump start to run. Water circulates in the tank.
  Another option is to select an 'additional water intake time' using [n73].
- Depending on the setting of the parameter [r20], acidic detergent is injected at the end of the water intake time [n72] or the subsequent water intake time [n73]. The duration of the detergent dosing is set in parameter [n103].
- If a heater is present [r35], this is switched on. When the heating temperature [n108] is reached, the heater is switched off again.
  If the temperature is not reached within the pre-set time [r37], the control unit continues with the program, but a fault report is displayed at the end. See section 7.5.3 - F44
  If a switch-on delay [r36] has been parameterized for heating, heating starts only after this time has elapsed. (This is to ensure that water is in the heater.)
- Main circulation time: The water circulates for the pre-set time [n74]. During the main circulating time, a post-heating temperature [n111] can be defined.
- An additional time can be defined in parameter [n75], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n76]. See also [n75].

6.3 Explanation and programming of the cleaning process

Cleaning stage 8: AFTER RINSE

Parameter [r48] = 0 'Cleaning stage 8' disabled
Parameter [r48] = 1..5 'Cleaning stage 8' execute x-times

- In case of cleaning method 'green' – it is set in programme step [n80] how often the feed container is filled with water up to level 2 and water is pumped back up to level 1. As long as the rinsing pump is running, the drain valve is open.

In case of green n81 and n82 have to be parameterized on „0“

- Water is taken in.
  The parameter [n81] is used to stipulate whether water will be taken by level or time.
  If time-controlled, the water intake time is defined in parameter [n82].
  If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44
  The cleaning parameter [r58] is used to stipulate whether cold, hot or mixed water is to be taken in.

In case of green n83 and n84 have to be parameterized on „0“

- Agitator and pump start to run.
  Another option is to select an 'additional water intake time' using [n83].
  The water circulates for the pre-set time [n84].
  Optionally, during the time [n84] an 'active cooling' can be parameterized [r18].
  An additional time can be defined in parameter [n85], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n86]. See also [n85].

Only reasonable for yellow and pink

Cleaning stage 9: RINSE OUT

Parameter [r49] = 0 'Cleaning stage 9' disabled
Parameter [r49] = 1..5 'Cleaning stage 9' execute x-times

- Water is taken in.
- The parameter [r50] is used to stipulate whether cold, hot or mixed water is to be taken in.
- Furthermore, for "Cleaning stage 0", the water intake time was set [n01].
- Agitator and pump start to run, the outlet valve will open.
- The water circulates for the pre-set time [n02].
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n03]. The drain valve is assigned to the respective cleaning stage via the parameters [r60 to r69].
- Parameter [r24 / r25] determines whether the drain valve is normally open or normally closed. Applies to all cleaning stages.

Abort of cleaning cycle

Aborting can occur:

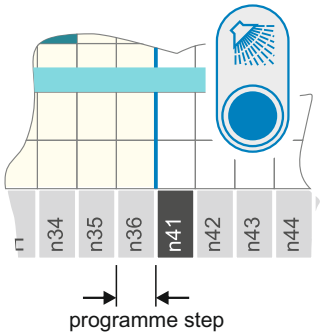
- Manually (by pressing the OFF button)
- Due to mains failure
- An abort criterion was met
  (e.g. predetermined time for reaching the level exceeded)

If cleaning has been completed without errors, the control unit switches to "OFF mode" or "cooling mode" depending on the parameter setting.

6.7.1 Service functions for testing the cleaning cycle

Start cleaning with the desired cleaning stage (0 to 8)

- Set the desired cleaning stage (0 to 8) in parameter [r92].
- Press CLEANING button: A cleaning cycle starts with the selected cleaning stage and then runs through to the end.
  The next cleaning cycle starts again with the first cleaning stage.



Switch on the cleaning cycle with single step function (up to 3 times)

In order to be able to test a cleaning cycle more quickly, it is possible to switch the cycle manually from one programme step to the next without having to wait until it has been completely processed.

- In parameter [r93], set the number of cleaning cycles to be executed consecutively with the single step function.
  NB: An aborted cleaning counts here as a completed cleaning.
- By repeatedly pressing the CLEANING button, the cycle can now be progressed step by step.

Can be terminated via OFF button at any time, with drain phase.

Tank monitoring function and alarms are deactivated !!!!!

7. Tank monitor and general fault handling

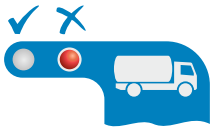
7.1 Description of tank monitor operation

During the entire cooling and cleaning process, the built-in tank monitor keeps check on the correct operation of all processes, in order to guarantee the perfect state of the milk. Faults are displayed flashing in the display via corresponding fault codes. Depending on the type of alarm, two LEDs (red and green) are flashing or lit.

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

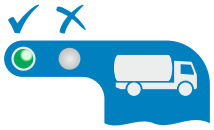
In the "F" parameters (see section 8.9), a system alarm, an informative alarm or a critical alarm is defined for each fault. It is also parameterized, whether a relay function or an SMS message should be carried out. For this to take effect, the relay functions in the "A" parameters (see section 8.10) must be assigned to a relay or the SMS function must be activated.

The tank monitor of the WTS-300 has the following alarm types:



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

During cooling:	- min. and max. milk temperature - agitator function and stirring intervals - duration of power failure - milk temperature too high for too long
During cleaning:	- cleaning temperatures - wash duration



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

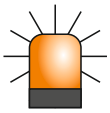
During cooling:	- milk temperature too high for too long - milk temperature too low - agitator failure and stirring times - max. time till next wash - duration of power failure
During cleaning:	- cleaning temperatures - detergent injection and acting time

Additional WTS-300 system alarms (only fault code in the display)
(depending on parameter settings, may be both critical and informative)

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

A list of all alarms and a description of how they are configured can be found in section 8.9 “Alarm -> Event assignment”.

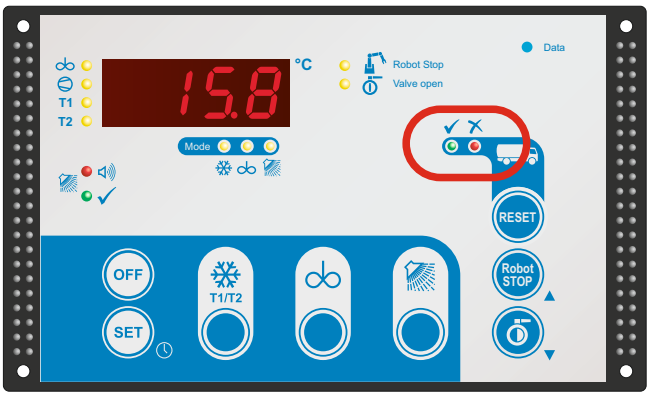
Optical presentation of alarms



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

Each alarm has its own display code (see section 7.5 for listing)
Informative and critical alarms are also indicated by LED as follows:

Informative alarm		active informative alarm (Green permanently again after RESET)
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 - 1x RESET
		critical + informative alarm - multiple RESET *If several alarms are present, the reset button must be pressed several times. See section 7.3* (Turns off when cleaning cycle runs for at least 10 minutes ...)
System alarm		Is displayed as a blinking display code only.

7.2 Tank monitor: Milk removal YES or NO

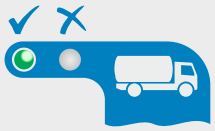
Examples of use of tank monitor.

CAUTION:

Do not simply cancel a tank monitor alarm.
It is essential to investigate and remedy the cause, in order to avoid a harmful effect on the milk.

Even without an alarm message, the plant operator has to convince himself of the transportability of the milk before picking up!

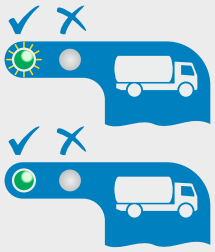
No alarm – **Milk may be drawn off.**



Green = on Red = off	No alarm

- The driver goes to the WTS-300 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.**



Green = flashing Red = off	Informative alarm (Press RESET button)

after RESET

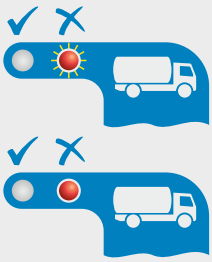
Green = on Red = off	Informative alarm

- The driver goes to the WTS-300 and checks the tank monitor.
  The green LED is flashing – the warn horn sounds - an error code is displayed.
  Milk can be drawn off -> The farmer must be informed.
- The farmer investigates (and remedies) the cause of the fault and presses the "RESET" button -> the warn horn mute.
- The farmer presses the “RESET“ button again -> the green LED is now on continuously.
  (The informative alarm is accepted and deleted with the pushbutton.)
- Once the milk has been taken, the driver starts the cleaning process.

NB:

If the informative alarm is not reset, the green LED flashes and the error code continues to be displayed -> even after the next cleaning cycle.

Critical alarm - **Milk must not be taken out.**



Green = off Red = flashing	critical alarm (press RESET button)

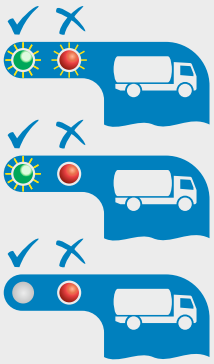
after RESET

Green = off Red = on	critical alarm

- The driver goes to the WTS-300 and checks the tank monitor.
  The red LED is lit or flashing, an error code blinks in the display and, depending on the circumstances, a horn may sound.
- The driver informs the farmer -> Farmer and driver investigate the cause of the critical alarm. (The critical alarm codes are taken from the display and identified using the fault table. See section 8.9)
- The farmer and driver then decide together whether the milk can be transferred to the tanker, despite the alarm.
- The farmer presses the RESET button to cancel the alarm -> The warn horn mute.
- The farmer presses the RESET button again -> the red LED is lit continuously.
- Once the tank is emptied the washing process must be started

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

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



Green = flashing Red = flashing	critical + informative alarm (press RESET button)

after RESET

Green = flashing Red = on	critical + informative alarm (press RESET button)

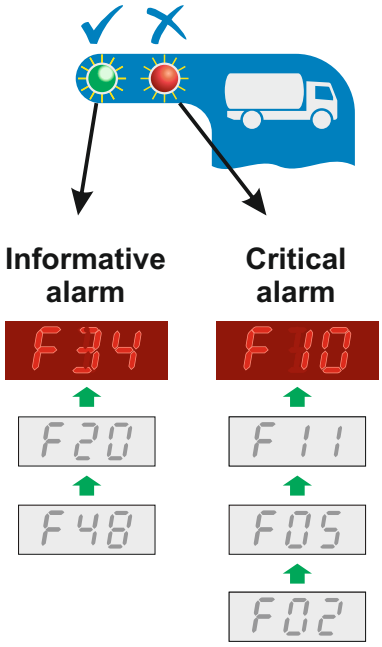
after second RESET

Green = off Red = on	critical + informative alarm

- The driver goes to the WTS-300 and checks the tank monitor.
  Green and red LEDs are flashing, an error code blinks in the display and, depending on the circumstances, a horn may sound
- The driver informs the farmer -> Farmer and driver investigate the cause of the critical and informative alarms. (The critical alarm codes are taken from the display and identified using the fault table. See section 8.9)
- The farmer and driver then decide together whether the milk can be transferred to the tanker, despite the alarm.
- The farmer first presses the RESET button to cancel the critical alarm -> the horn switches of.
- The farmer presses the RESET button again -> the red LED is lit continuously.
- The farmer then cancels the informative alarm -> the green LED turns off.
- Once the tank is emptied the washing process must be started.

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

7.3 Tank monitor: Handling multiple faults



Cancelled critical faults are transferred to the device's internal fault memory and can be consulted at any time.

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.

Cancelling 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.

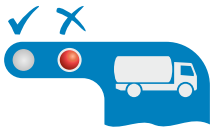
When the last critical fault (example F02) has been reset: (red LED permanently lit)

- 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.

7.4 Tank monitor: Display fault memory



If the tank monitor's red LED is permanently lit, it means that critical faults have already been acknowledged, but still exist. These error codes are registered in the device's internal fault memory and can be consulted as follows:

Show the last 5 critical faults from the fault memory

- SET button in OFF mode: the code for the first critical fault is displayed (in the above example F02).
- SET button again: the next error code is displayed (in the example F05).

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

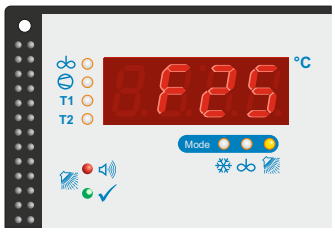
It is only when the cleaning cycle is active for at least 10 minutes that the tank monitor resets all critical alarms.

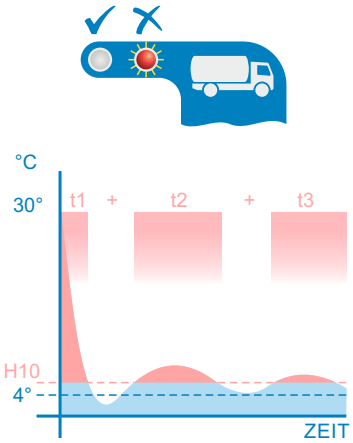
7. Tank monitor and general fault handling

7.5 Listing fault codes and their description

The display blinks to indicate faults.

Meanings as follows:





7.5.1 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 and H15]

F6 Power cut alarm

Alarm functions only if optional power pack is installed.

Alarm is triggered if power cut lasts longer than the time entered in parameter [H20].

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]

F15 Agitator fault in cooling mode (milk not stirred)

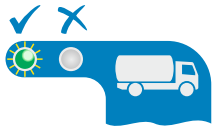
Alarm functions only if optional “Welba agitator monitor” is installed and parameters set [A71].

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

Alarm is triggered if, after the previous stirring, more than the number of minutes set in [H41] have passed without the agitator restarting.



7.5.2 Informative tank monitor alarms (green)

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.

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.
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].

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.

F31 Max. time without cooling (starts when cooling manually ends)
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.)
Timer starts as soon as cooling mode is switched off manually. The alarm is triggered if a new cooling period or washing cycle is not started within 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
Alarm is triggered, if a new cleaning does not take place within the time [h33]

F34 Time / date not set
The alarm is triggered if the date and time are lost.

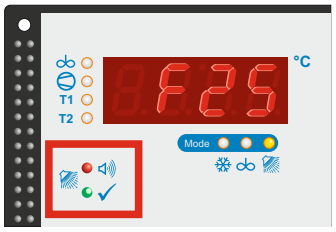
F35 Detergent "Empty" alkaline - Alerts empty detergent container
(only if optional float switch is installed and configured [h35])

F36 Detergent "Empty" acid - Alerts empty detergent container.
(only if optional float switch is installed and configured [h36])

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 can function only if the optional power pack is installed. The alarm is triggered if the battery charge is no longer sufficient.
See also section 9.21

7. Tank monitor and general fault handling



3 sec.

7.5.3 System alarms - cleaning

When a washing cycle has been completed successfully, this is indicated by the green LED “OK”. A new mode can then be started.

If a **system-critical** fault occurs during a washing cycle:

. the cycle is interrupted, the red LED “Fault” flashes, the yellow mode indication “Wash” remains permanently lit. A code in the display indicates the type of fault. Press down OFF button for 3 seconds and acknowledge the fault message. NB: If “Automatic start to cooling” has been set, this will not happen. Cooling mode must be started manually in this special case.

or

If a **system-noncritical** fault occurs during a washing cycle:

. the cleaning cycle continues to the end, the yellow "Cleaning" mode indicator remains lit until then.
After the cycle has ended, the controller switches to the OFF mode or, with the "Autostart cooling" parameterized, to the cooling mode.
A code in the display indicates which error has occurred. This must be acknowledged with the reset button.

F40 Safety switch for butterfly valve (only if [r10] = 2)

- washing stops
- outlet valve is opened for time [n100]
  (during the emptying phase the display alternates between F40 and AbL)
- the red LED “FAULT” then flashes, with error code F40

During washing the digital input for the tank outlet safety switch [r10] was triggered.

Possible cause of fault:
- manual butterfly valve on tank outlet was closed.

F41 Pressure switch for cleaning line

- washing stops
- outlet valve is opened for time [n100]
  (during the emptying phase the display alternates between F41 and AbL)
- the red LED “FAULT” then flashes, with error code F41

During cleaning the pressure switch has not recognised pressure for a period longer than that set in [r11].

Possible cause of fault:
- leak in washing line
- pressure switch faulty
- air in washing line
- washing pump faulty

F42 Thermal contact for washing pump

- washing stops
- outlet valve is opened for time [n100]
  (during the emptying phase the display alternates between F42 and AbL)
- the red LED “FAULT” then flashes, with error code F42

During washing the thermal contact of the washing pump has triggered (if parameter set in [r12].

Possible cause of fault:
- Cleaning pump overheated.

F43 Washing aborted manually

- washing stops
- outlet valve is opened for time [n100]
  (during the emptying phase the display alternates between F43 and AbL)
- the red LED “FAULT” then flashes, with error code F43

Washing was stopped manually using the OFF button.

Note: press the OFF button again to stop the draining phase ahead of time.

F44 Timeout for water intake by level

- washing stops
- outlet valve is opened for time [n100]
  (during the emptying phase the display alternates between F44 and AbL)
- the red LED “FAULT” then flashes, with error code F44

Possible cause of fault:
- Water valve faulty
- No pressure in water pipe
- Water circuit damaged / interrupted

F45 Water in tank after emptying

- washing completed
- level electrode reports water
- 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 [r33].

F48 Timeout for heating for washing

- washing completed
- fault is shown on the display

During the heating phase the pre-set temperature [n106 / n107 / n108] was not reached within the pre-set time [r37].

Possible cause of fault:
- Heater faulty
- Pressure switch has triggered
- Water circuit damaged / interrupted

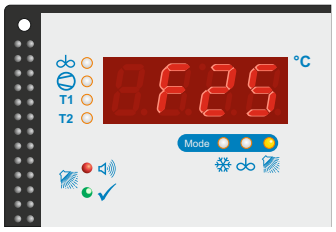
F49 Excess temperature monitor for heater

- washing completed
- fault is shown on the display

During washing the heater's dry-running protection has triggered (if set in [r39]).

F85 Phase error

Depending on the parameterization of the parameter [A85], the cleaning is aborted in the event of a phase error.



7.5.4 System alarms - cooling

F51 Tank overflow protection

Fault is displayed, when the maximum filling quantity of the tank has been achieved. See section 9.24.

F52 Water in tank during cooling

In cooling mode, water has been detected in the washing line through one of the level inputs.

Possible cause of fault:
- one of the water valves open

Parameters set in [P40] to determine whether only a fault report blinks in the display or whether the outlet valve of the washing line is also opened.

F53 Thermal protection for compressor

The compressor's motor protection has triggered.

Possible cause of fault:
- Compressor overheated / faulty

F54 Monitoring stirring unit (directly)

Alarm is only possible, if the "WELBA stirring unit monitoring" is installed and parameterized [A71] and activated in parameter [P24]!

Alarm occurs if the stirring unit monitoring detects one of the following stirring unit errors:

- no stirring unit activity, although stirrer was switched on.
- stirring unit activity, although stirrer was not switched on.

F55 Timeout quantity-dependent cooling start

Timeout compressor downtimel (in case of "milk-volume-dependent cooling start delay"). See also parameter [P55].

Alarm is only active if parameter [P61] is parameterized to 6 or 7.

F56 Broken sensor

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

Possible cause of fault:
- Temperature sensor faulty
- Sensor cable damaged

Function “EMERGENCY cooling” is possible, if parameters set in [P4].

Consequence:

- in OFF mode: - fault code F56 is indicated
- in cooling mode - fault code F56 is indicated ,
  - compressor is switched off,
  - alarm is indicated and stored
- in cleaning mode: - fault code F56 is indicated,
  - heating is stopped ,
  - cleaning continues, cleaning fault

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.

7.5.5 System alarms - external sensors

F60 Error agitator monitoring
- no communication with the agitator monitoring module

See also section 9.22

F61 Error GSM-SMS-Modul
- no communication with GSM-SMS-Modul

F80 Low pressure error

Error is displayed if a low pressure malfunction is detected at the low pressure input (optionally programmed).

F81 High pressure error

Error is displayed if a high pressure malfunction is detected at the high pressure input (optionally programmed).

F83 Malfunction 4-20 mA

Error is displayed if an input current < 4 or > 20 mA is detected at the activated current input 4-20 mA.

An activated antifreeze function [A54 = 2] is temporarily deactivated in the event of an error.

F85 Phase error

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

Depending on the parameterization of the parameter [A85], the cleaning is aborted in the event of a phase error.

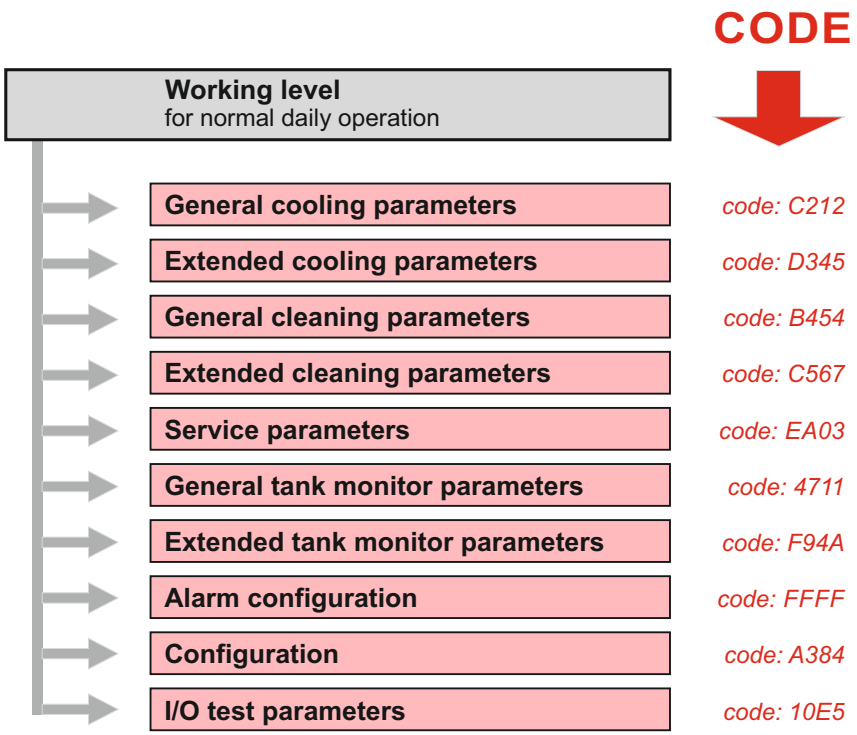
7.5.6 Test alarm

F99 Test alarm *(see section 9.18)*

8. Setting of parameters

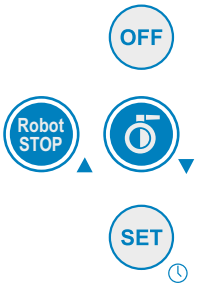
8.1 Change and save parameter values

The WTS-300 is configured in 10 different parameter levels.
To change parameters in one of the lower levels, enter the corresponding 'level code'



Enter the level code

Proceed as follows (control must be in OFF mode):



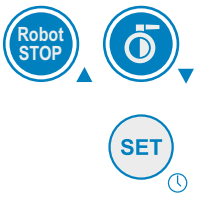
- Press the "OFF" button for 5 seconds:
  The display shows '0000' - the first '0' flashes.
- Use the arrow keys to set the first digit or letter of the desired code
- Confirm the correct digit with "SET".
  The set digit has been accepted - the second '0' flashes.
- Use arrow keys to set the second 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 OFF mode.

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)

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 OFF mode - the display shows the current time.

Return without saving the values:

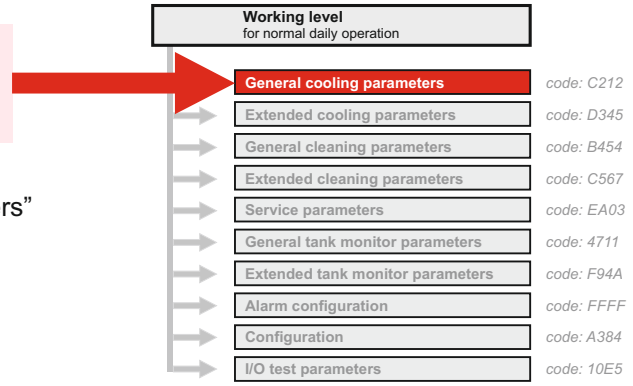
- Press the OFF button - or
- If no button is pressed for 60 seconds:
  The controller automatically returns to the OFF mode.
  All changes are lost.

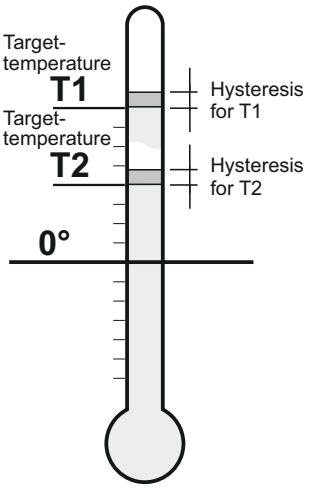
8. Setting of parameters

8.2 Level “General cooling parameters” (c parameters)

c parameters
Code: C212

Switch to level
“General cooling parameters”
See section 8.1.





Temperature settings		*Range*	*Default*
c1	**Target temperature for T1**	-2,0 .. 12,0°C	4,0
c2	**Target temperature for T2**	-2,0 .. 12,0°C	4,0
	The target temperature is the temperature to which the milk is to be cooled down. When the target temperature is reached the compressor switches off. See diagram.		
c10	**Hysteresis for target temperature 1**	0,1 .. 2,0 K	0,7
c11	**Hysteresis for target temperature 2**	0,1 .. 2,0 K	0,7
	The hysteresis determines the amount by which the milk temperature is allowed to differ from target temperature T1 or T2 before the cooling compressor is switched on again. See diagram.		

Agitator running time settings		*Range*	*Default*
c20	**Duration of after-stirring** Period in seconds for which the agitator continues to operate after the compressor is switched off.	0 .. 999 sec.	120
c21	**Pause duration** Period in minutes between agitator switching off and switching on again (for the duration of the after-stirring period selected).	0 .. 999 min.	20
c23	**Duration of 'intermediate stirring SHORT'** Period in minutes during which the agitator operates if the UP arrow button is pressed for approx. 1 second during a cooling pause.	0 .. 999 min.	2
c24	**Duration of 'intermediate stirring LONG'** Period in minutes during which the agitator operates if the UP arrow button is pressed for approx. 3 seconds during a cooling pause.	0 .. 999 min.	10

		Range	*Default*
c25	**Maximum continuous stirring period in mode ‚continuous stirring‘** Setting of maximum continuous stirring period. 0: indefinite stirring (to end, the OFF button must be pressed) 1..999: max. stirring period in minutes	0 .. 999 min.	30

Sensor correction adjustment		*Range*	*Default*
	(see section 9.7)		
c90	**Display actual temperature sensor 1**		
c91	**Sensor correction sensor 1** A correction can be applied to the value measured by the sensor. Then applies it cumulatively throughout the entire measurement range.	10 .. 10 K	
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. Then applies it cumulatively throughout the entire measurement range.	-10 .. 10 K	

Software version

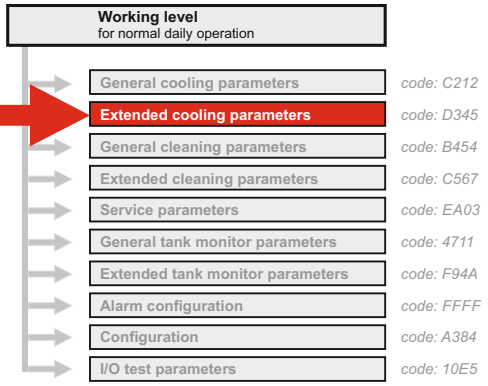
c98 **Installed software version**
The software version installed is shown to help service technicians.

8. Setting of parameters

8.3 Level “Extended cooling parameters” (P parameters)

P parameters
Code: D345

Switch to level
“Extended cooling parameters”
See section 8.1.



EMERGENCY COOLING, behaviour on sensor failure		*Range*	*Default*
P4	**Manual start of compressor for x min. in case of sensor failure** *Function see section 9.6*	0 .. 60 min.	0

Compressor protection when filling from below		*Range*	*Default*
P6	**Compressor switch-on delay / pre-agitating** *Function see section 9.5* 0: Function deactivated 1 to 180: Time delay compressor in sec.	0 .. 180 sec.	0

Limit setting for set temperatures and hysteresis		*Range*	*Default*
Setting of limitations for target temperatures and hysteresis in C parameter level.			
P10	**Lower limit for target temperature T1** - for C1	0 .. 50,0 °C	2,0
P11	**Upper limit for target temperature T1** - for C1	0 .. 50,0 °C	8,0
P12	**Lower limit for target temperature T2** - for C2	0 .. 50,0 °C	2,0
P13	**Upper limit for target temperature T2** - for C2	0 .. 50,0 °C	8,0
P15	**Lower limit for hysteresis T1** - for C10	0,1 .. 30,0 K	0,1
P16	**Upper limit for hysteresis T1** - for C10	0,1 .. 30,0 K	2,0
P17	**Lower limit for hysteresis T2** - for C11	0,1 .. 30,0 K	0,1
P18	**Upper limit for hysteresis T2** - for C11	0,1 .. 30,0 K	2,0

Agitator settings		*Range*	*Default*
P22	**Function intermediate stirring** *see section 5.6.3* 0: deactivated 1: short / long 2: toggling by button	0 .. 2	1
P23	**Automatic start to continuous stirring when cooling mode ends** *see section 9.10.1* 0: deactivated 1: activated	0 .. 1	0
P24	**Monitoring agitator directly** [F54] *see section 7.5.4* 0: deactivated 1: activated	0 .. 1	1

8.3 Level “Extended cooling parameters” (P parameters)

Drawing off milk through pneum. butterfly valve in cooling mode — *Range* — *Default*

P32 Milk removal options — 0 .. 2 — 0

(hidden if A40 = 0 or 1)

0: deactivated – not possible to open manually

1: Button function
Opens the butterfly valve directly, for as long as the button is held down.
The maximum open time can be limited in [P33].

2: Toggle function
Press butterfly valve button for 2 seconds:
Valve opens until button is pressed again (briefly).
The maximum open time can be limited in [P33].

P33 Max. open time for butterfly valve For drawing off milk manually — 0 .. 60 sec. — 5

(hidden if A40 = 0 or 1)

0: no time limit on valve being open
1 to 60: seconds

P34 Lock the butterfly valve in OFF mode, if robots have not stopped yet — 0 .. 1 — 0

0: Butterfly valve can always be opened
1: can only be opened when robot stopped

"Milk decanting function“ for buffer tanks — *Range* — *Default*

With the decanting function, it is possible to fill milk into another tank by means of a rinsing pump (simultaneously milk pump).

The decanting can only be started in the OFF mode via a button at the digital input

P36 Setting milk decanting function — *0 .. 3* — *0*

0: Deactivated

1: Level-controlled high-active - with timeout
(if there is a signal at the input the transfer pumping is finished)

2: Level-controlled low-active - with timeout
(if there is no signal at the input the transfer pumping is finished)

3: only time-controlled

NOTE: Observe function assignment [A21 - A28]!

P37 Maximum pumping time — *1,0 .. 50,0 min.* — *10,0*

8.3 Level “Extended cooling parameters” (P parameters)

Alarm “Water detection in cleaning pipe” — *Range* — *Default*

Alarm / prevention of water intake into tank during cooling mode (see also section 9.9)

P40 Alarm activation level monitoring 1 / 2 in cooling mode — *0*

If the level electrode detects water in the cleaning pipe during cooling mode:

0: deactivated = no consequence
1: activates fault indication [F52] when level 1 is reached
2: as 1, plus outlet valve 1 opens
3: activates fault indication [F52] when level 2 is reached
4: as 3, plus outlet valve 1 opens

Alarm „tank overflow protection“ — *Range* — *Default*

Explanation see section 9.24

P42 Activation tank overflow protection — *0 .. 3* — *0*

0: deactivated
1: Level sensor “tank full” – signal applied = alarm
2: Level sensor “tank full” – no signal = alarm
3: In case of activated litre recording [A54]:
Achievement of litres [P43] entered, triggers alarm.

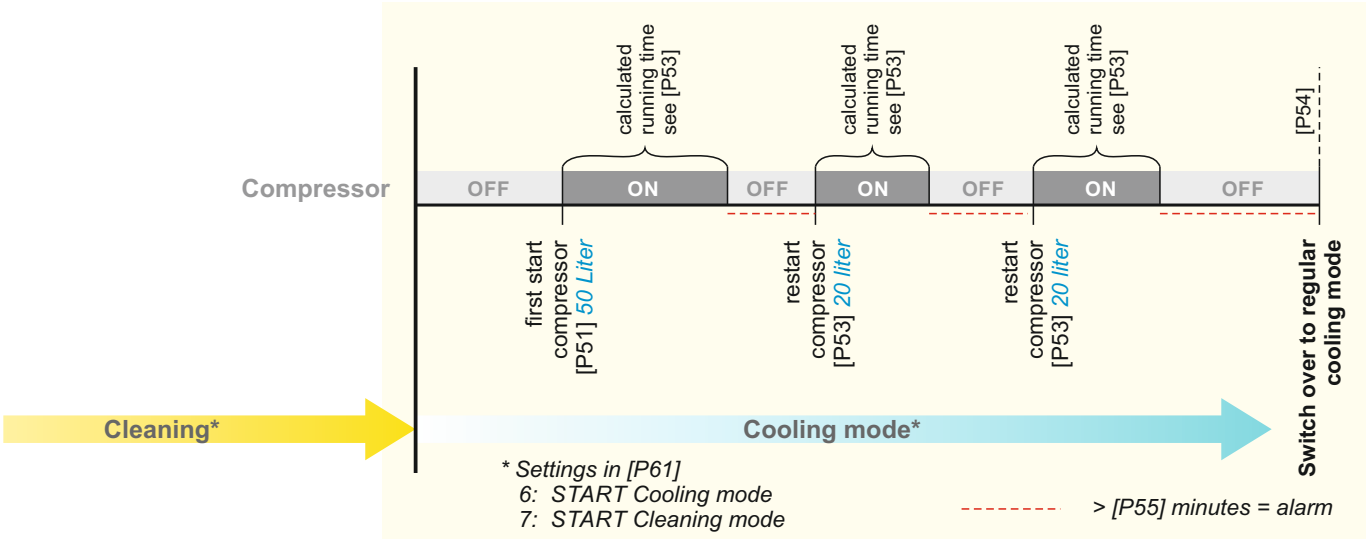
P43 Maximum filling quantity in litre input in hectolitres (=100 l) — *100*

0...500 (is equivalent to 0 to 50.000 litres)

8.3 Level “Extended cooling parameters” (P parameters)

Milk-volume-dependent cooling start delay
(Cooling power reduction in case of robot operation)

Range *Default*



For the parameterization of the „milk-volume-dependent cooling start delay“, please see parameter [P61] and section 9.4. as well.

P50 **Capacity of the milk pump in litres / minute** 1,0 .. 99,9 30,0
Is needed to calculate the milk quantity in the tank from the measured pump running time.

P51 **Minimum milk quantity in the tank before compressor starts for the first time** 10 .. 99 litres 50
Prevents the freezing of small amounts of milk in the tank. The compressor running time from this point is calculated from [P52 and P53]

P52 **Compr. running time per X litres milk quantity** 10 .. 500 sec. **60**
in connection with parameter [P53]

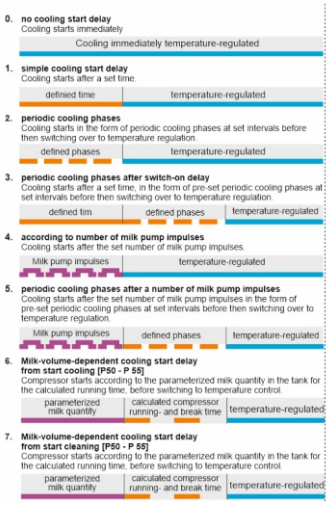
P53 **Milk quantity in connection to compr. running time** 10 .. 99 litres **20**
Example based on the default values:
per **20** liters of milk the compressor runs **60** seconds =
70 litres of milk = 210 seconds compressor running time

P54 **Minimum milk quantity in the tank until switching to regular cooling operation** 10 .. 500 litres 200

P55 **Error message if no milk feed is detected for X minutes from the last stop of the compressor** 0 .. 300 min. 60
(a switchover to the regular cooling mode does not take place)

8.3 Level “Extended cooling parameters” (P parameters)

See section 9.4 for the setting of cooling start parameters



Cooling start options		*Range*	*Default*
P60	**Auto start cooling mode after successful cleaning** *see also section 9.10.2* 0: Auto start deactivated 1: Auto start activated (in case of successful cleaning)	0 .. 1	0
P61	**Variations of the cooling start delay** 0: deactivated (without cooling start delay) 1: simple cooling start delay 2: Interval cooling boosts (power reduction by cycles) 3: Interval cooling boosts after switch-on delay 4: Start cooling according to number of boosts of milk pump 5: Interval cooling boosts according to number of impulses milk pump 6: Milk-volume-dependent cooling start delay (from start cooling) [P50-55] 7: Milk-volume-dependent cooling start delay (from start cleaning) [P50-55]	0 .. 7	0
P62	**Duration of cooling start delay** [P61] = 1 or 3	1 .. 999 min.	30
P63	**„ON“ time cooling boost** [P61] = 2, 3, 5	1 .. 30 min.	5
P64	**„OFF“ time cooling boost** [P61] = 2, 3, 5	5 .. 60 min.	20
P65	**Number of cooling boosts** [P61] = 2, 3, 5	1 .. 10	5
P66	**Number of impulses milk pump** [P61] = 4 or 5	1 .. 10	10
P67	**Timeout delay via milk pump** only if [P61] = 4 or 5 Safety function: In the absence of milk pump impulses (for example, wire breakage), cooling is started after [P67] has elapsed.	1 .. 999 min.	60

Compressor settings		*Range*	*Default*
P69	**Compressor mode continuous pulse operation** Here can be activated that the compressor works in continuous pulse operation (reduction of the cooling performance) (after delay of cooling start it uses the times of P63, P64) 0: deactivated 1: activated	1 .. 999 min.	60
P70	**Compressor stop via digital input** Possible control of the cooling start by robot. 0: deactivated 1: Signal at the digital input blocks the compressor 2: no signal at digital input blocks the compressor INFORMATION: Pay attention to the function assignment [A21 - A28]	0 .. 2	0
P71	**Minimum pause time compressor** Prevents the compressor from running against pressure. The LED compressor is flashing during the pause time.	0 .. 999 sec.	120

8.3 Level “Extended cooling parameters” (P parameters)

P72 **Thermal protection monitoring compressor** 0 .. 2 0

0: deactivated
1: high-activated (error "F53" when open)
2: low-active (error „F53" when closed)

INFORMATION: Pay attention to the function assignment [A21 - A28]

P73 **Function 2nd and/or 3rd cooling level compressor** 0 .. 3 0

Explanations see also section 9.25

0: deactivated
1: Delayed after cooling start delay by the time [P74 / P75]
2: Controlled via level sensor
INFORMATION: Pay attention to the function assignment [A21 - A28]!
3: Filling quantities controlled (litre registration via pressure sensor)

P74 **Time delay 2nd cooling level** 1..999 min 60

From the end of cooling start delay

P75 **Time delay 3rd cooling level** 1..999 min 60

From activation of 2nd cooling level

P76 **Min. filling-quantity to switch the 2nd cooling level on** 0..5000 ltr 2000

P77 **Min. filling-quantity to switch the 3rd cooling level on** 0..5000 ltr 4000

8.3 Level “Extended cooling parameters” (P parameters)

Settings for target temperature switchover T1 / T2		*Range*	*Default*
P80	**Settings for target temperature switchover T1 / T2** 0: deactivated (always T1 active) 1: only manual switchover T1 / T2 via button. *Press “Cooling” button in cooling mode to change to the other target tempepature.* *The corresponding LED lights up.* 2*: manual switchover to T2 with switch-back after a period. *Press “Cooling” button in cooling mode: control unit switches to T2 for period [P81] and then back to T1.* 3*: manual and automatic switchover to T2 at a set time, with switch-back after a period. *- Automatic switchover to T2 at time [P82] and [P83] with switch-back after period [P81]. (if only one time is to be used, [P82] and P83 must be set to the same time.)* *- Manual switchover to T2 for period [P81] by pressing the “Cooling” button.* * *In the case of 2 and 3:* *- If T1 is active, the LED for T1 is permanently on.* *- If T2 is active, the LED for T2 flashes and shows that switch-back to T2 will happen automatically.*	0 .. 3	0
P81	**Duration until switch-back to T1** [P80] = 2 or 3	0 .. 999 min.	60
P82	**Time 1 for automatic switchover to T2** see also [P80]	00:00 .. 23:59	4:00
P83	**Time 2 for automatic switchover to T2** see also [P80]	00:00 .. 23:59	16:00

Freezing protection by low pressure monitoring		*Range*	*Default*
Explanations see also section 9.26			
P85	**Pressure trigger limit (pressure too low)**	1 .. 99,9 %	20
P87	**Monitoring delay after start compressor**	10 .. 999 sec.	120
P88	**Switch off time compressor in case of too low pressure**	1 .. 15 min.	10

Error message compressor			*Range*	*Default*
P90	Error message low pressure	(F80)	0 .. 2	0
P91	Error message high pressure	(F81)	0 .. 2	0

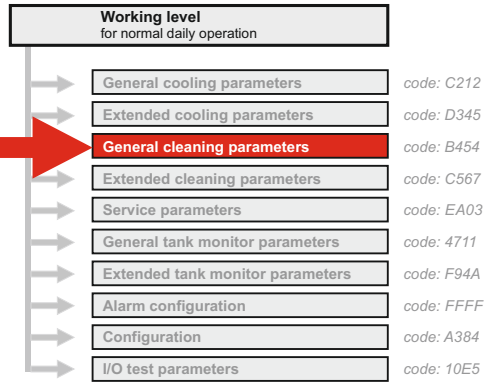
0: deactivated
1: high-active, signal at input triggers alarm
2: low-active, no signal at the input triggers an alarm

NOTE: Observe function assignment [A21 - A28]!

8.4 Level “General cleaning parameters” (n parameters)

n parameters
Code: B454

Switch to level
“General cleaning parameters”
See section 8.1.



For all „water intake by feed container“ the following applies:
0 = deactivated
1..6 = Number of repetitions

Applies to all “Water intake by level 1" situations:'
0 = deactivated
1 = activated

		Range	Default
	Running times cleaning stage 0 (rinse out) - *hidden, if [r40] = 0*		
n01	**Water intake time**	0 .. 999 sec.	10
n02	**Rinse out time with water intake**	0 .. 999 sec.	120
n03	**Drain time**	0 .. 999 sec.	30
	Running times cleaning stage 1 (pre-rinse 1) - *hidden, if [r41] = 0*		
n10	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n11	**Water intake by level 1**	0 .. 1	0
n12	**Water intake by time**	0 .. 999 sec.	90
n13	**Additional water intake time + circulation**	0 .. 999 sec.	0
n14	**Main circulation time**	0 .. 999 sec.	30
n15	**Rinse out time**	0 .. 999 sec.	0
n16	**Drain time**	0 .. 999 sec.	60
	Running times cleaning stage 2 (pre-rinse 2) - *hidden, if [r42] = 0*		
n20	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n21	**Water intake by level 1**	0 .. 1	0
n22	**Water intake by time**	0 .. 999 sec.	90
n23	**Additional water intake time + circulation**	0 .. 999 sec.	0
n24	**Main circulation time**	0 .. 999 sec.	30
n25	**Rinse out time**	0 .. 999 sec.	0
n26	**Drain time**	0 .. 999 sec.	60
	Running times cleaning stage 3 (main rinse 1) - *hidden, if [r43] = 0*		
n30	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n31	**Water intake by level 1**	0 .. 1	0
n32	**Water intake by time**	0 .. 999 sec.	120
n33	**Additional water intake time + circulation**	0 .. 999 sec.	0
n34	**Main circulation time**	0 .. 999 sec.	120
n35	**Rinse out time**	0 .. 999 sec.	0
n36	**Drain time**	0 .. 999 sec.	90

Running times cleaning stage 4 (intermediate rinse) - hidden, if [r44] = 0

n40	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n41	**Water intake by level 1**	0 .. 1	0
n42	**Water intake by time**	0 .. 999 sec.	90
n43	**Additional water intake time + circulation**	0 .. 999 sec.	0
n44	**Main circulation time**	0 .. 999 sec.	30
n45	**Rinse out time**	0 .. 999 sec.	0
n46	**Drain time**	0 .. 999 sec.	60

Running times cleaning stage 5 (main rinse 2) - hidden, if [r45] = 0

n50	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n51	**Water intake by level 1**	0 .. 1	0
n52	**Water intake by time**	0 .. 999 sec.	120
n53	**Additional water intake time + circulation**	0 .. 999 sec.	0
n54	**Main circulation time**	0 .. 999 sec.	120
n55	**Rinse out time**	0 .. 999 sec.	0
n56	**Drain time**	0 .. 999 sec.	90

Running times cleaning stage 6 (intermediate rinse 2) - hidden, if [r46] = 0

n60	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n61	**Water intake by level 1**	0 .. 1	0
n62	**Water intake by time**	0 .. 999 sec.	90
n63	**Additional water intake time + circulation**	0 .. 999 sec.	0
n64	**Main circulation time**	0 .. 999 sec.	30
n65	**Rinse out time**	0 .. 999 sec.	0
n66	**Drain time**	0 .. 999 sec.	60

Running times cleaning stage 7 (disinfection) - hidden, if [r47] = 0

n70	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n71	**Water intake by level 1**	0 .. 1	0
n72	**Water intake by time**	0 .. 999 sec.	120
n73	**Additional water intake time + circulation**	0 .. 999 sec.	0
n74	**Main circulation time**	0 .. 999 sec.	120
n75	**Rinse out time**	0 .. 999 sec.	0
n76	**Drain time**	0 .. 999 sec.	90

Running times cleaning stage 8 (after-rinse) - hidden, if [r48] = 0

n80	**Water intake by feed container** (displacement cleaning)	0 .. 10	0
n81	**Water intake by level 1**	0 .. 1	0
n82	**Water intake by time**	0 .. 999 sec.	120
n83	**Additional water intake time + circulation**	0 .. 999 sec.	0
n84	**Main circulation time**	0 .. 999 sec.	60
n85	**Rinse out time**	0 .. 999 sec.	0
n86	**Drain time**	0 .. 999 sec.	150

Running times cleaning stage 9 (*rinse out) - hidden, if [r49] = 0*

n91	**Water intake time**	0 .. 999 sec.	10
n92	**Rinse out time with water intake**	0 .. 999 sec.	120
n93	**Drain time**	0 .. 999 sec.	30

Runtime abort for all cleaning stages

n100	**Drain time after cleaning has been aborted**	0 .. 999 sec.	150

Dosing time settings

n101	**Dosing time alkaline detergent**	0 .. 999 sec.	30
n102	**Dosing time acid detergent**	0 .. 999 sec.	30
n103	**Dosing time disinfection** (hidden if r47 = 0)	0 .. 999 sec.	30

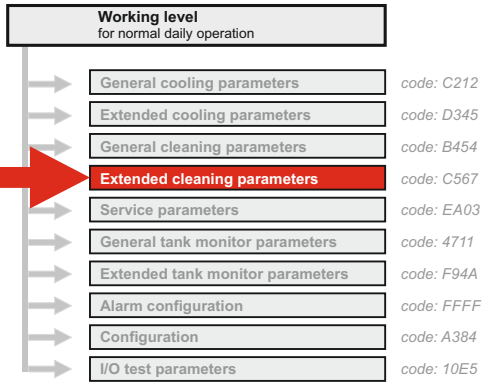
Temperature settings (see also section 9.11)

n106	**Pre-heat. temp. main cleaning stage 1** (alkal./acid) (hidden if r35 = 0)	0 .. 99,9 °C	45,0
n107	**Pre-heat. temp. main cleaning stage 2** (acid) (hidden if r35 = 0 or 1)	0 .. 99,9 °C	45,0
n108	**Pre-heat. temp. main cleaning stage disinfection** (hidden if r35 = 1 or 2)	0 .. 99,9 °C	45,0
n109	**Post-heating temp. during circulation** in main cleaning stage 1 [n34] (hidden if r35 = 0)	0 .. 99,9 °C	40,0
n110	**Post-heating temp. during circulation** in main cleaning stage 2 [n54] (hidden if r35 = 0 / 1)	0 .. 99,9 °C	40,0
n111	**Post-heating temp. during circulation** in cleaning stage disinfection [n74] (hidden if r35 = 0 / 1 / 2)	0 .. 99,9 °C	40,0

8.5 Level “Extended cleaning parameters” (r parameters)

r parameters
Code: C567

Switch to level
“Extended cleaning parameters”
See section 8.1.



Adjustment to safety elements

r10 **Safety switch butterfly valve** (F40) see section 9.2 *(Default 0)*
Parameter is hidden, if parameter [A40] = 2 or 3
0: no safety switch
1: prevents the start of cooling / cleaning, when switch is not in proper position
2: as 1 + abort of cleaning when switch in the wrong position

r11 **Cleaning pump monitoring via pressure switch** (Fault F41) *(Default 0)*
For dry running protection of the cleaning pump (open in case of fault)
0: deactivated
1 .. 20: Stop cleaning after x seconds without pressure

r12 **Cleaning pump fault thermo contact switch** (Fault F42) *(Default 0)*
To protect the cleaning pump (open in case of fault)
0: no thermo contact switch
1: thermo contact switch active

r18 **Active cooling in after-rinsing** *(Default 0)*
If this function is activated, the compressor is switched on in the circulation step n84, provided that the tank temperature is between 4 ° and 40 °.
0: deactivated
1: activated

Detergent options

r20 **Dosing position** (see section 6.2 and 9.15) *(Default 2)*
0: dosing in feed container (displacement cleaning)
1: position D1 in cleaning diagram
2: position D2 in cleaning diagram

r21 **Detergent sequence in case of 3-cycles** *(Default 3)*
(if second main cleaning stage is deactivated)
0: only alkaline
1..10: x times alkaline, before one time acid

Drain valve settings

r24 **Switching mode drain valve 1** *(Default 0)*
0: normally closed 1: currentless open

r25 **Switching mode drain valve 2** *(Default 0)*
0: normally closed 1: currentless open

If a quick cleaning programme (1..8) is parameterized here, it can be started as follows:

- *Hold down SET-button,*
- *right after that press button CLEANING*

Settings to start cleaning (see section 9.3.1)

r27 **Cleaning enable via digital input** *(Default 0)*
0: deactivated
1: activated

r28 **Activation quick cleaning programme via button** *(Default 0)*
0: deactivated
1: 1x pre-rinse 1 (cleaning stage 1)
2: 1x pre-rinse 2 (cleaning stage 2)
3: 1x after-rinse (cleaning stage 8)
4: 1x rinse-out (cleaning stage 9)
5: 2x pre-rinse 1 (cleaning stage 1)
6: 2x pre-rinse 2 (cleaning stage 2)
7: 2x after-rinse (cleaning stage 8)
8: 2x rinse-out (cleaning stage 9)

Settings for level detection (see also section 9.14)

r30 **Sensitivity level input 1** *(Default 0)*
-10: less sensitive
+10: more sensitive

r31 **Sensitivity level input 2** *(Default 0)*
-10: less sensitive
+10: more sensitive

r32 **Timeout water intake by level** (Fault F44) *(Default 5)*
Maximum time to cleaning abort: 1 .. 60 min.

r33 **Level monitoring at the end of the cleaning stages** (Fault F45) *(Def. 0)*
0: deactivated
1: Level 1 monitoring only after the last cleaning stage.
activate alarm message F45 and alarm relays.
2: Level 1 monitoring after each cleaning stage.
activate alarm message F45 and alarm relays.
3: Level 2 monitoring only after the last cleaning stage.
activate alarm message F45 and alarm relays.
4: Level 2 monitoring after each cleaning stage.
activate alarm message F45 and alarm relays.

Setting of heater

r35 **Heater activation** *(Default 1)*
0: no heater
1: only in main cleaning stage 1
2: in both main cleaning stages 1+2
3: in both main cleaning stages 1+2 and disinfection

r36 **Start delay heater** *(Default 10)*
Range: 0 .. 120 sec.

r37 **Max. running time heater** (Timeout programme step “H”) *(Default 60)*
Range: 10 .. 999 min. (Fault F48)

r38 **Heater protection via pressure switch** *(Default 0)*
0: deactivated
1.. 8 sec.: Switch off the heater after x seconds without pressure

r39 **Over temperature protection heater** (Fault F49) *(Default 0)*
To protect the heater (open in the event of a fault)
0: No protective contact
1: Protective contact active

8.5 Level “Extended cleaning parameters” (r parameters)

Number of passes of seperate cleaning stages — *Range* — *Default*

See also section 9.16

		Range	Default
r40	**Number of passes clean. stage 0: Rinse out**	0 .. 5	0
r41	**Number of passes clean. stage 1: Pre-rinse 1**	0 .. 5	1
r42	**Number of passes clean. stage 2: Pre-rinse 2**	0 .. 5	0
r43	**Number of passes clean. stage 3: Main rinse 1** (not changeable)	1	1
r44	**Number of passes clean. stage 4: Intermed. rinse 1**	0 .. 5	0
r45	**Number of passes clean. stage 5: Main rinse 2**	0 .. 1	0
r46	**Number of passes clean. stage 6: Intermed. rinse 2**	0 .. 5	0
r47	**Number of passes clean. stage 7: Disinfection**	0 .. 1	0
r48	**Number of passes clean. stage 8: After-rinse**	0 .. 5	1
r49	**Number of passes clean. stage 9: Rinse out**	0 .. 5	0

Selection of water valve (cold / hot water) — *Range* — *Default*

		Range	Default
r50	**Valve selection clean. stage 0: Rinse out**	1 .. 4	1
r51	**Valve selection clean. stage 1: Pre-rinse 1**	1 .. 4	1
r52	**Valve selection clean. stage 2: Pre-rinse 2**	1 .. 4	2
r53	**Valve selection clean. stage 3: Main rinse 1**	1 .. 4	2
r54	**Valve selection clean. stage 4: Intermitt. rinse 1**	1 .. 4	1
r55	**Valve selection clean. stage 5: Main rinse 2**	1 .. 4	1
r56	**Valve selection clean. stage 6: Intermed. rinse 2**	1 .. 4	1
r57	**Valve selection clean. stage 7: Disinfection**	1 .. 4	1
r58	**Valve selection clean. stage 8: After-rinse**	1 .. 4	1
r59	**Valve selection clean. stage 9: Rinse out**	1 .. 4	1

From option 4 onwards, the function A 16 (hot water valve) must additionally be assigned to one of the relays in the A parameters.

1: Cold water
2: Warm water
3: Cold and warm water (mixed)
4: Hot water
5: Hot water and cold water
6: Hot water and warm water
7: Hot water and warm water and cold water

Selection of drain valve — *Range* — *Default*

		Range	Default
r60	**Drain valve select. clean. stage 0: Rinse out**	1 .. 2	1
r61	**Drain valve select. clean. stage 1: Pre-rinse 1**	1 .. 2	1
r62	**Drain valve select. clean. stage 2: Pre-rinse 2**	1 .. 2	1
r63	**Drain valve select. clean. stage 3: Main rinse 1**	1 .. 2	1
r64	**Drain valve select. clean. stage 4: Intermed. rinse 1**	1 .. 2	1
r65	**Drain valve select. clean. stage 5: Main rinse 2**	1 .. 2	1
r66	**Drain valve select. clean. stage 6: Intermed. rinse 2**	1 .. 2	1
r67	**Drain valve select. clean. stage 7: Disinfection**	1 .. 2	1
r68	**Drain valve select. clean. stage 8: After-rinse**	1 .. 2	1
r69	**Drain valve select. clean. stage 9: Rinse out**	1 .. 2	1

In case of selection 2, the function A 15 (drain valve) must additionally be assigned to one of the relays in the A parameters.

1: Drain valve 1
2: Drain valve 2

8.5 Level “Extended cleaning parameters” (r parameters)

Selection 1, 2, 3:
If the digital input is to be used to terminate the pause, the function 15 must additionally be assigned to one of the digital inputs A21-A28 in the A-parameters.

Settings cleaning breaks

r70 **Activation of break in cleaning programme** (see section 9.17) *(Default 0)*
0: deactivated
1: activated, finish of break only with button or digital input
2: activated, finish of break after time [r72] or button or digital input
3: activated, finish of break at a certain time [r73] or button or digital input

r71 **Position break:** *(Default 1)*
After which cleaning stage is the break integrated
Setting range: after cleaning stage 0….8

r72 **Break time** 0...999 min. *(Default 120)*

r73 **Finish of the break at time** 00:00 … 23:59 *00:00*

Settings of cleaning pump (see section 9.13)

r80 **Cleaning pump venting** *(Default 0)*
0: deactivated
1: On-/off-impulses with a fixed quantity for all cleaning stages
2: as 1, however, premature termination if pressure via pressure switch
3: as 1, however, unlimited impulses when rinsing (cleaning stages 0+9)
4: as 2, however, unlimited impulses when rinsing (cleaning stages 0+9)

r81 **Number of on / off impulses cleaning pump**
Range: 0 .. 10

r82 **ON impulse length cleaning pump** *(Default 5)*
Range: 0 .. 10 sec.

r83 **OFF impulse length cleaning pump** *(Default 5)*
Range: 0 .. 10 sec.

Service settings and commissioning (see also section 6.3.1)

r92 **Start cleaning at the beginning of cleaning stages 0..8** *(Default 0)*
Range: 0 .. 8

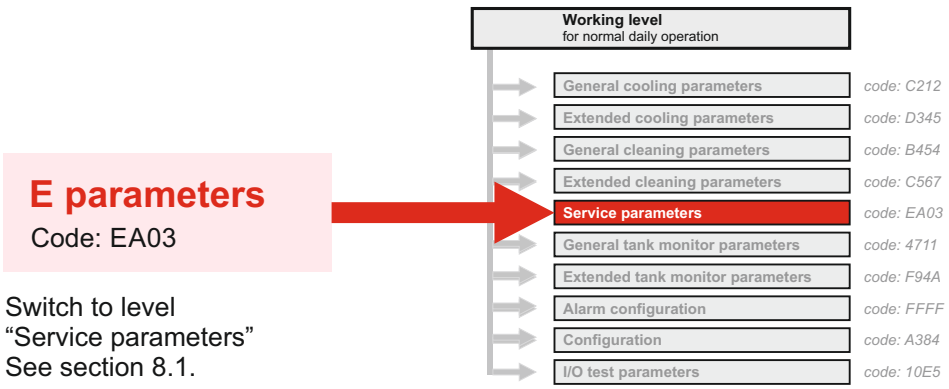
r93 **Number of cleaning cycles with step function** *(Default 0)*
Range: 0 .. 3

r97 **Display during cleaning** *(Default 0)*
0: Display of programme step
1: Display of temperature
2: Display changes between step and temperature

r98 **Display of the maximum cleaning temperature achieved in OFF after cleaning** *(Default 0)*
0: deactivated
1: alternating with the time

8. Setting of parameters

8.6 Level “Service parameters” (E parameters)



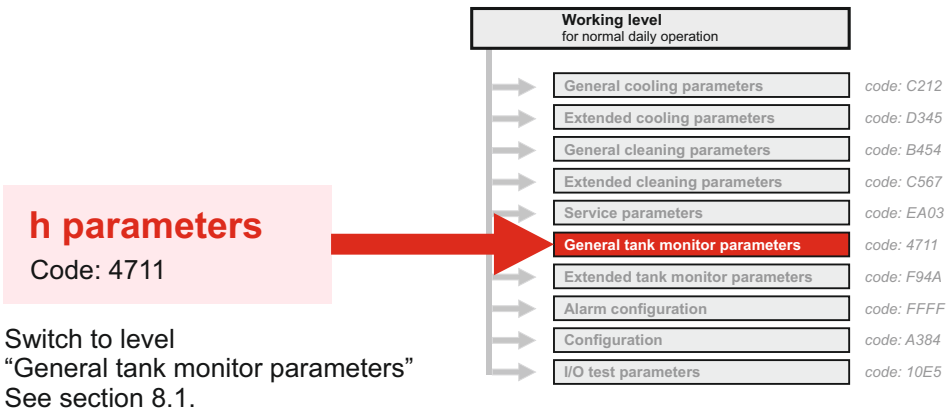
These parameters are only used to query ACTUAL states.

Display tank monitoring time counter and values	*Range*	*Default*
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 ... battery voltage	0,0V ... 12,0V	- - -
Display the current battery voltage (Only if optional power pack is installed)		
E16 ... of the analog input 4-20mA	0,0 ... 20,0mA	- - -
Display of the currently measured current		

E50 SIM PIN entry for optional ESGSM	-1…9999	- - -
for optional remote maintenance module -1 = no PIN deposited 0000 … 9999 = SIM PIN		

8. Setting of parameters

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



Fault messages tank monitor during cooling mode		*Fault*	*Range*	*Default*
h20	**Target temperature 1st milking** (Starting from this point the monitoring of the over / under temperature begins [h25] + [h29])	F20	0 .. 30,0 °C	5,0
h21	**Max. time to reach target temperature** [h20] 0 = deactivated		0 .. 999 min.	120
h23	**Max. overtemperature for a time (from cooling start)**	F23	0 .. 30,0 °C	10,0
h24	**Max. time of overtemperature (from cooling start)** 0 = deactivated		0 .. 999 min.	120
h25	**Max. overtemperature with direct alarm triggering (from 1st milking)**	F25	0 .. 99,9 °C	25,0
h27	**Min. undertemperature for a time (from cooling start)**	F27	0 .. 30,0 °C	2,0
h28	**Max. time of undertemperature (from cooling start)** 0 = deactivated		0 .. 999 min.	120
h29	**Min. undertemperature with direct alarm triggering (from 1st milking)** Start the counter from cooling start	F29	0 .. 30,0 °C	0,5
h31	**Max. cooling interruption** 0 = deactivated	F31	0 .. 999 min.	60
h32	**Max. time in off mode after cleaning** 0 = deactivated	F32	0 .. 5000 min.	60
h33	**Min. cleaning cycle** 0 = deactivated	F33	0 .. 250 h	78
h35	**Detergent monitoring alkaline by float switch** 0 = deactivated, 1 = high aktiv 2 = low aktiv	F35	0 .. 2	0
h36	**Detergent monitoring acid by float switch** 0 = deactivated 1 = high aktiv 2 = low aktiv	F36	0 .. 2	0
h38	**Max. temperature difference monitoring sensor during cooling mode**	F38	1,0 .. 5,0	2,0

Setting milk times to monitor „cooling activated”		*Fault*	*Range*	*Default*
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	--:--

Settings tank monitor LOG files		*Range*	*Default*
h90	**Selection period (in days) of the recording data (Konsoft)**	1 .. 365	90
h91	**Logging intervals cleaning mode in minute**s	1 .. 10	1
h92	**Logging intervals OFF and cooling mode in minutes**	1 .. 30	15
h93	**Customer number part 1** (the first 4 digits...)	0 .. 9999	0
h94	**Customer number part 2** (...the last 4 digits)	0 .. 9999	0
h96	**Tank number part 1**	0 .. 9999	0
h97	**Tank number part 2**	0 .. 9999	0

Parameter level-locking			
h98	**Password protection**	0 .. FFFF	0
h99	**Password protection**	0 .. FFFF	0

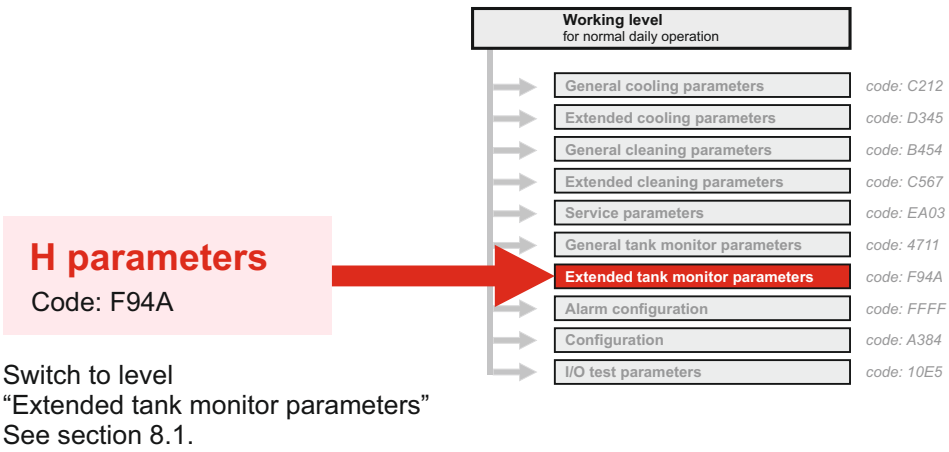
Explanations to the password protection:

In addition to the level code the level “General tank monitor parameter” can be protected by another password. A 4-digit password (not 0000) has to be entered in parameter [h98]. For the activation of the password protection the password in parameter [h99] has to be repeated exactly.

After the level code is re-entered the password query takes place.

8. Setting of parameters

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



Switch to level
“Extended tank monitor parameters”
See section 8.1.

			Fault	*Range*	*Default*
Don‘t add milk - temperature conditions					
H10	**Milk temperature too high for too long**		F1	0 .. 50,0 °C	13,0
H11	**Time limit for [H10]**	0 = deactivated		0 .. 999 min.	600
H12	**Milk temperature too high for too long**		F2	0 .. 50,0 °C	16,0
H13	**Time limit for [H12]**	0 = deactivated		0 .. 999 min.	360
H14	**Milk temperature too high for too long**		F3	0 .. 50,0 °C	28,0
H15	**Time limit for [H14]**	0 = deactivated		0 .. 999 min.	300
Power failure times					
H19	**Temperature limit for fault F6**	0 = temperature-independent	F6	0 .. 50 °C	6,0
H20	**Max. power failure time in cooling mode**	0 = deactivated	F6	0 .. 999 min.	60
Cleaning temperature monitoring					
H30	**Minimum cleaning temperature**	0 = deactivated	F11	0 .. 50,0 °C	40,0
H31	**For min. time**	0 = deactivated	F12	0 .. 999 min.	2
Agitator monitoring					
H40	**Agitator fault in cooling mode - no stirring of milk**	0 = deac.	F15	0 .. 999 min.	450
H41	**Timeout "No agitator"**	0 = deactivated	F16	0 .. 999 min.	60
H42	**Min. run time agitator**	[to H41]	F16	0 .. 500 sec.	60

Tank monitor activation

H90	**Activation delay** *(see section 9.19)* 0 = deactivated	0 .. 300 min.	180

Parameter level lock

H98	**Password protection**	0 .. FFFF	0
H99	**Password protection**	0 .. FFFF	0

Information on password protection:

The level "extended tank monitor parameters" can additionally be protected with another password. For this purpose, a 4-digit password (not 0000) must be entered in parameter [H98]. In order to activate the password protection, the password in parameter [H99] must be repeated exactly.

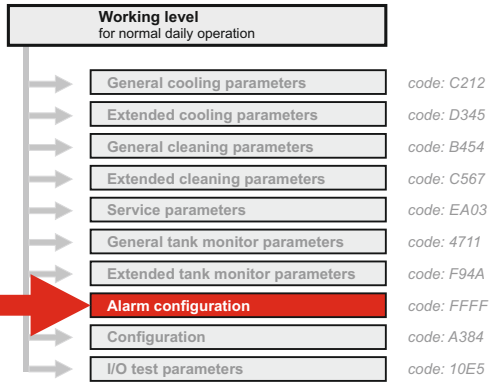
If the level code is entered again, the password is requested afterwards.

8. Setting of parameters

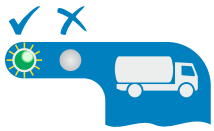
8.9 Level “Alarm - Event assignment” (F parameters)

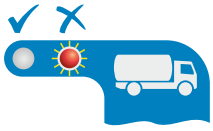
Switch to level
“Alarm configuration”
See section 8.1.

F parameters
Code: FFFF



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

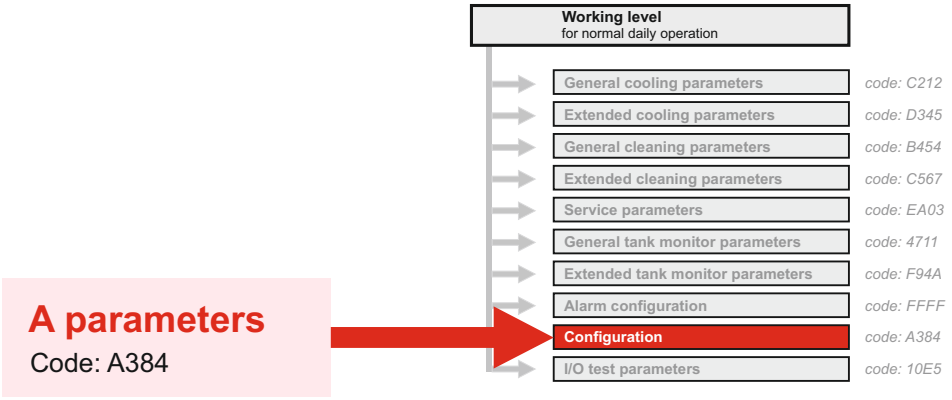




Setting	display code (flashes)	„green“ LED	„red“ LED	stores in „Konsoft“	alarm relay in general	alarm relay tank monitor	sms
Alarm effect							
WTS-300 system alarms (only display)							
1:	●	–	–	–	–	–	–
2:	●	–	–	●	–	–	–
3:	●	–	–	●	●	–	–
4:	●	–	–	●	–	●	–
5:	●	–	–	●	●	–	●
6:	●	–	–	●	–	●	●
Informativ tank monitor alarms (green LED)							
7:	●	●	–	●	–	–	–
8:	●	●	–	●	●	–	–
9:	●	●	–	●	–	●	–
10:	●	●	–	●	●	–	●
11:	●	●	–	●	–	●	●
Critical tank monitor alarms (red LED)							
12:	●	–	●	●	–	●	–
13:	●	–	●	●	–	●	●

			Setting	*Default*
	Fault configuration...			
Critical tank monitor alarm (always red LED)	**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
Depending on the setting, it is an informative or a critical tank monitor alarm (green or red LED)	**F11**	**... minimum cleaning temperature not reached**	7 .. 13	11
	F12	**... minimum cleaning time at temp. not reached**	7 .. 13	11
	F15	**... agitator fault in cooling mode**	7 .. 13	11
	F16	**... timeout "No agitator action"**	7 .. 13	11
	F20	**... cooling time exceeded for first milking**	7 .. 13	11
	F22	**... Cooling 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	**... temperature difference exceeded monitoring sensor**	7 .. 13	11
	F39	**... battery voltage too low**	7 .. 13	11
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)	**F40**	**... safety switch butterfly valve**	1 .. 13	6
	F41	**... pressure switch cleaning pipe**	1 .. 13	6
	F42	**... thermocontact cleaning pump**	1 .. 13	6
	F43	**... manual interruption of cleaning**	1 .. 13	6
	F44	**... timeout water intake by level**	1 .. 13	6
	F45	**... water in the tank after draining**	1 .. 13	6
	F48	**... timeout heating time cleaning**	1 .. 13	6
	F49	**... over-temperature monitor heater**	1 .. 13	6
	F51	**... Tank-overflow protection**	1 .. 13	6
	F52	**... water in tank cooling mode**	1 .. 13	6
	F53	**... thermal protection compressor**	1 .. 13	6
	F54	**... agitator-condition monitoring direct**	1 .. 13	6
	F55	**... Timeout quantity-dependent cooling start**	1 .. 13	6
	F56	**... broken sensor**	1 .. 13	6
	F57	**... sensor short circuit**	1 .. 13	6
	F58	**... sensor range exceeded**	1 .. 13	6
	F60	**... Error external sensors**	1 .. 13	6
	F61	**... Error GSM-Modul**	1 .. 13	4
	F80	**... Message low pressure**	1 .. 13	6
	F81	**... Message high pressure**	1 .. 13	6
	F83	**... Malfunction analog input 4-20mA**	1 .. 13	6
	F85	**... Phase error**	1 .. 13	6
	F99	**... Test alarms** *(see section 9.18)*	1 .. 13	11

8.10 Level “Configuration” (A parameters)



Switch to level
“Configuration”
See section 8.1.

This configuration is very important and should be the first step when setting the parameters for a system.

The WTS-300 supports a large number of different system configurations (with or without robot operation), milk tanks with more than one compressor, different outlet valves etc.). In total, the control unit supports more output functions than there are relays and digital inputs on the printed circuit board.

Normally, however, not all functions are used at the same time. When starting configuration please give careful consideration to how you want to allocate all the various components to the relays and digital inputs.

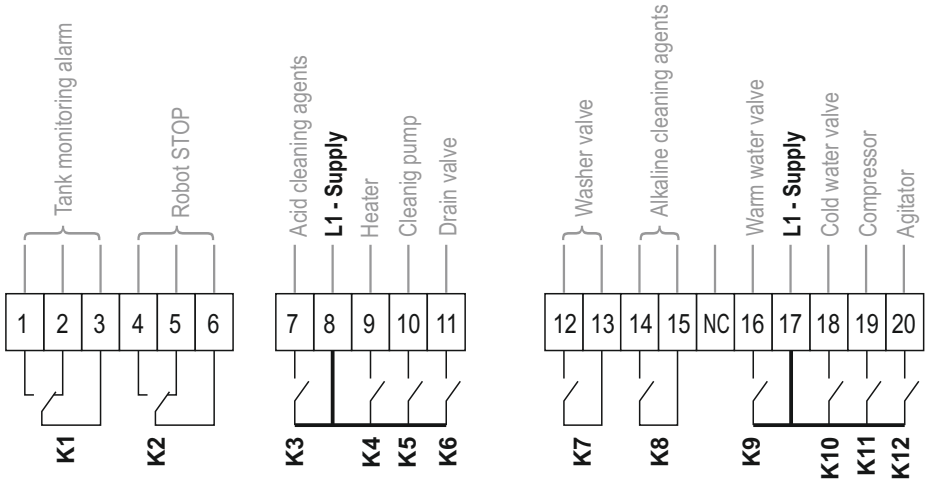
Allocation of output relays:

In [A1 to A12] the functions needed are assigned to the output relays.

Allocation of digital inputs:

In [A21 to A28] input functions are assigned to the digital inputs.

Incorrectly set parameters can lead to serious malfunctions and damage to the milk-cooling tank.



Assignment of output functions to relays K1 to K14

0: deactivated
1: alarm tank monitor *
2: robot stop
3: detergent „acid“
4: heater
5: cleaning pump
6: drain valve 1
7: pneumatic butterfly valve
8: detergent „alkaline“
9: warm water
10: cold water
11: compressor 1 / 1. cooling level
12: agitator
13: cleaning active
14: alarm in general *
15: drain valve 2
16: hot water valve
17: disinfection
18: compressor 2 / 2. cooling level
19: external alarm light
20: compressor 3 / 3. cooling level
21: Boost pump
22: Output multifunction relay
23: Set level 2 on the relay

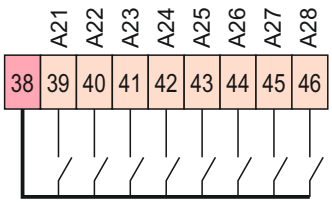
** The relay functions for assignment 1 and 14 are configured in parameters A45 and A46.*

		Range	*Default*
A1	**assignment relay K1**	0 .. 23	1
A2	**assignment relay K2**	0 .. 23	2
A3	**assignment relay K3**	0 .. 23	3
A4	**assignment relay K4**	0 .. 23	4
A5	**assignment relay K5**	0 .. 23	5
A6	**assignment relay K6**	0 .. 23	6
A7	**assignment relay K7**	0 .. 23	7
A8	**assignment relay K8**	0 .. 23	8
A9	**assignment relay K9**	0 .. 23	9
A10	**assignment relay K10**	0 .. 23	10
A11	**assignment relay K11**	0 .. 23	11
A12	**assignment relay K12**	0 .. 23	12

8.10 Level “Configuration” (A parameters)

Assignment of output functions to digital inputs 1 to 8

0: deactivated
1: safety switch (manual butterfly valve)
2: remote start cooling
3: dry protection heating
4: thermal protection pump
5: water pressure switch
6: thermal protection compressor
7: cleaning release robot
8: milk pump impulse 1
9: milk pump impulse 2
10: milk pump impulse 3
11: Inductive stirring unit sensor / switch 1
12: Inductive stirring unit sensor / switch 2
13: Float switch ‚alkaline’
14: Float switch ‚acidic’
15: Start from rinse stop
16: Level sensor 1 (release 2nd cooling level)
17: Level sensor 2 (release 3rd cooling level)
18: Level sensor 3 (tank full)
19: Compressor lock /release
20: Error input low pressure
21: Error input high pressure
22: Start button milk-decanting function
23: Level sensor milk-decanting function
24: Signal input multi function relay



		Range	*Default*
A21	**assignment digital input 1**	0 .. 24	1
A22	**assignment digital input 2**	0 .. 24	2
A23	**assignment digital input 3**	0 .. 24	3
A24	**assignment digital input 4**	0 .. 24	4
A25	**assignment digital input 5**	0 .. 24	5
A26	**assignment digital input 6**	0 .. 24	6
A27	**assignment digital input 7**	0 .. 24	7
A28	**assignment digital input 8**	0 .. 24	8

Output signal configuration robot *Default*

A40 **Robot operation / control pneum. butterfly valve** 0

0: without robot and without pneumatic butterfly valve
1: only with robot
2: only butterfly valve control (pneumatic)
3: robots and pneum. butterfly valve control active

A41 **Robot stop signal configuration** (see section 4.6) 0

0: closing contact, robot stopped when closed
1: closing contact, robot stopped when open
2: opening contact, robot stopped when closed
3: opening contact, robot stopped when open

8.10 Level “Configuration” (A parameters)

The settings in A45 to A47 are only active if the corresponding output function is assigned to a relay in the parameters A1 to A12: A45 = 14
A46 = 1
A47 = 19

Alarm relay configuration — *Default*

A45 Relay configuration “alarm in general“ — 0
(see output function 14 previous page)
0: closing contact, alarm if closed
1: closing contact, alarm if open (non-volatile)
2: opening contact, alarm if closed (non-volatile)
3: opening contact, alarm if opened

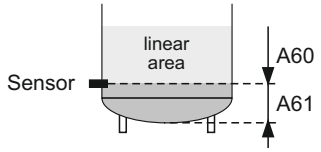
A46 Configuration “alarm tank monitor“ — 0
(see output function 1 previous page)
0: closing contact, alarm if closed
1: closing contact, alarm if open (non-volatile)
2: opening contact, alarm if closed (non-volatile)
3: opening contact, alarm if opened

A47 Configuration „red warning light“ — 0
0: is reset during the cleaning (same as red LED)
1: is reset with pressure

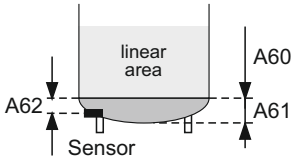
Configuration temperature sensor	*Range*	*Default*
A50 activation of second sensor 0: deactivated 1: Safety temperature sensor 2: Heating temperature sensor	0 .. 2	0
A51 Sensor type (Sensor 1 / sensor 2) 0: KTY81/210 1: PT100 three-wire 2: PT1000 3: KTY81/110	0 .. 3	0

Configuration analogue input	*Range*	*Default*
A54 Function analogue input 4 .. 20 mA 0: deactivated 1: Determination of litres via filling pressure (see section 9.23) 2: Low pressure monitoring (antifreeze function) (see section 9.26)	0 .. 2	0
A55 Error monitoring 4-20mA input (F83) 0: deactivated 1: activated	0 .. 1	0

Sensor **within** linear area



Sensor **below** linear area



Scaling determination of litres via pressure sensor *See section 9.23*	*Range*	*Default*
A60 ☐ **Litre per cm filling height**	0…100,0 ltr.	50,0
A61 ▒ **Offset in litre**	0…1000 ltr.	500
A62 Distance sensor to the beginning of linear area	0…300 cm	0

8.10 Level “Configuration” (A parameters)

Configuration external modules	*Range*	*Default*
A71 Configuration stirring unit monitoring *look also section 9.22* 0: deactivated 5: Clear bands (after deleting of the bands, the number of agitators must be readjusted)	0 .. 15	0

Agitator monitoring module ESVAW-001-A
Switching on of the agitator by a WTS-300 relay
1: one agitator
2: two agitators
3: without function
4: without function

Agitator monitoring module ESVAW-002-A
with two agitator switch-on-relays that are integrated in the module
6: one agitator
7: two agitators (if not used with [A14] other functions are selectable)

Agitator monitoring module ESVAW-003-A
with one agitator switch-on-relay that is integrated in the module
12: One agitator 3-phases 400 V
13: Two agitators 3-phases 400V (over second module. Note addressing)
14: One agitator 2-phases 400V
15: Two agitators 2- phases 400V (over second module. Note addressing)

Agitator monitoring module ESVAW-004-A
(same as ESVAW-001-A)

- -

Agitator monitoring without a separate module

If agitator monitoring is made via inductive agitator sensor (max. 2 channels)
8: one agitator
9: two agitators

If agitator monitoring is made via switch contact of the WTS-300
10: one agitator
11: two agitators

	Range	*Default*
A72 activation detergent monitoring by conductometry 0: deactivated | 1: activated	0 .. 1	0
A73 activation GSM alarm module monitoring 0: deactivated | 1: activated	0 .. 1	0
A75 activation power pack *see section 9.21* 0: deactivated | 1: activated	0 .. 1	0

8.10 Level “Configuration” (A parameters)

Automatic change of daylight saving time — *Range* — *Default*

A78 Automatic change of daylight saving time — 0 .. 3 — 2

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)

Test parameter for the agitator rating — *Range* — *Default*

A80 Rating limit agitator — -1 .. 1 — 0

-1: more sensitive
0: normal
1: less sensitive

Activate phase monitoring relay ESVAW-003 — *Range* — *Default*

A85 Activate phase monitoring relay ESVAW-003 — 0 .. 4 — 1

0: deactivated
1: activated, the relay on the module drops off in case of an error
2: Additional compressor protection, in case of an error the compressor is switched off
3: Additional cleaning pump protection, in case of an error the cleaning is interrupted
4: Additional compressor protection and cleaning pump protection

Multifunction time relay — *Range* — *Default*

A86 Multifunction time relay function selection — 0 .. 6 — 1

0: deactivated
1: On-delay T1
2: Off-delay T2
3: On- and off-delay T1 and T2
4: On-impulse T1
5: Off-impulse T2
6: Clock T1 on, T2 off

A88 T1 (time 1) — 1 .. 5000 sec. — 30

A89 T2 (time 2) — 1 .. 5000 sec. — 30

PC-Interface configuration — *Range* — *Default*

A95 Baud setting — 1 .. 4 — 4

1: 9600
2: 19200
3: 38400
4: 76800

A96 Device address — 1 .. 8 — 1

Language setting — *Range* — *Default*

A98 Language setting for Konsoft monitor — 0 .. 1 — 0

0: german
1: english

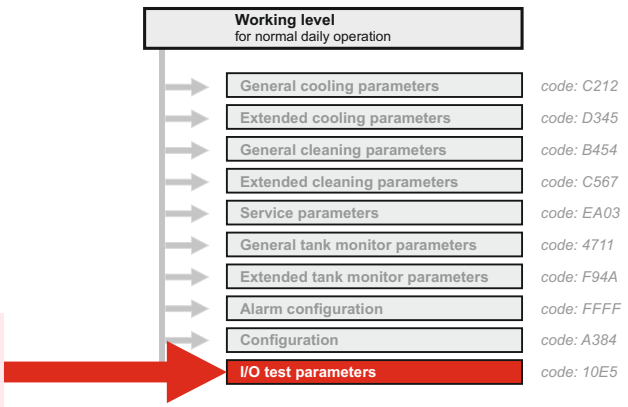
Factory reset — *Range* — *Default*

A99 Factory reset — 0 .. 999 — 000

8.11 Level “I / O test parameters” (o. parameters)

Switch to level
“I / O test parameters”
See section 8.1.

o parameters
Code: 10E5



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 '0'.

NB: However, the two relays for the supply of acid and alkaline detergents are locked against each other since never acid and alkaline detergents may never enter the tank together!

This operating level is NOT reset automatically!

Test relay outputs		*Range*	*Default*
Switched-on relays remain switched on until they are reset manually.			
o.1	**Test relay 1**	0 .. 1	0
o.2	**Test relay 2**	0 .. 1	0
o.3	**Test relay 3**	0 .. 1	0
o.4	**Test relay 4**	0 .. 1	0
o.5	**Test relay 5**	0 .. 1	0
o.6	**Test relay 6**	0 .. 1	0
o.7	**Test relay 7**	0 .. 1	0
o.8	**Test relay 8**	0 .. 1	0
o.9	**Test relay 9**	0 .. 1	0
o.10	**Test relay 10**	0 .. 1	0
o.11	**Test relay 11**	0 .. 1	0
o.12	**Test relay 12**	0 .. 1	0

0: Off
1: On

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.

		Range	*Default*
o.21	**Test digital input 1**	0 .. 1	- - -
o.22	**Test digital input 2**	0 .. 1	- - -
o.23	**Test digital input 3**	0 .. 1	- - -
o.24	**Test digital input 4**	0 .. 1	- - -
o.25	**Test digital input 5**	0 .. 1	- - -
o.26	**Test digital input 6**	0 .. 1	- - -
o.27	**Test digital input 7**	0 .. 1	- - -
o.28	**Test digital input 8**	0 .. 1	- - -

0: switched
1: unswitched

Test level inputs		*Range*	*Default*
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 o.41 / o.42 detects level

Display agitator capacity

o.70 test of relay on optional ESVAW 002 or 003

o.71 agitator 1 in watt

o.72 agitator 2 in watt

Display of the Software version adaptor

o.98 Display of the Software version adaptor

9. Other Information

9.1 Butterfly valve (manual or pneumatic)

manual

In the case of a manual butterfly valve, the position of the lever (open / closed) can be monitored via an optional safety switch. See also section 9.2

pneumatic

In the case of a pneumatic butterfly valve, this must be set in parameter [A40]. The corresponding function must then be assigned to a relay in one of parameters [A1 to A12]. Only then can the valve be opened or closed manually via the "Butterfly valve" button.

Convenience function (only with pneumatic butterfly valve)

Significance: if the COOLING button is pressed in OFF mode, the pneumatic butterfly valve is automatically closed.

9.2 Safety switch for manual butterfly valve

The safety switch monitors the correct position of the lever on the tank outlet.

The function of the safety switch is configured in parameter [r10].

Parameter [r10] is not available if a pneumatic butterfly valve is configured in [A40]

Fault indication

The “butterfly valve” LED flashes if, in OFF mode:

- the COOLING button is pressed while the valve is open.
- the WASHING button is pressed while the valve is closed.

If the butterfly valve is closed in washing mode, the cycle is interrupted, provided [r10=2] is configured.

9.3 Robot control

The WTS-300 offers two possibilities of controlling a connected robot:

- via the button **“Robot Stop”**
- via the signal **“Cleaning active”**

For both functions, the appropriate parameter settings must be done beforehand.

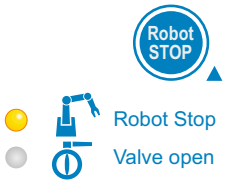
---

*Signal **“Robot-Stop”** (Robot stop via button)*

If the cleaning button is pressed before the robot is stopped, the ROBOT LED flashes rapidly.

In [A40] robot operation must be configured and assigned to an output relay [default = A2 = 2].

Also pay attention to the setting in [A41], so that in the event of a power failure the robot is correctly controlled. See section 4.6



In OFF mode

- Press “ROBOT STOP” button: The robot is started or stopped again (toggle function). The LED indicates the present status.
- If the robot is active (LED “Robot Stop” off) washing will not start. If the washing button is pressed, the LED will flash.
- If cooling mode is activated while the robot is switched off, the robot will start automatically.

In cooling mode

- switching to OFF mode, the robot remains active.
- If the button “Robot Stop” is pressed for 3 seconds, the robot is stopped and cooling mode ends.

In cleaning mode

- The button “Robot Stop” does not have a function.
- If a fault occurs during washing: the robot is stopped.

When washing is successfully completed:

- the robot is automatically released, and
- the control unit switches to OFF mode
  (cooling must then be started manually or by the robot)

or

- if “Automatic start to cooling” is set: cooling mode is activated automatically.

---

*Signal **“cleaning active”** (robot button has no function)*

is given only during washing or in the event of a fault (washing stopped), if the control unit has not yet switched back to OFF mode.

Parameter setting: setting “13" must be assigned to one of the relays [A1 to A12].

When washing is successfully completed the robot can start cooling via a digital input (must be set in [A22]).

9.3.1 Cleaning release by robot

r27 Cleaning release via digital input

0: deactivated
1: activated

Explanation

Setting the parameter [r27] to 'active' is only useful for robot operation.

If the cleaning button is pressed after the tank has been emptied by the truck driver, it may be that the robot is not ready for the cleaning process, depending on the configuration of the connected robot.

The WTS-300 can be configured in such a way that washing is not started directly by pushing the button, but in addition a robot release signal is needed.

Procedure

If the cleaning release in parameter [r27] is set to 'active' and the CLEANING button is pressed,

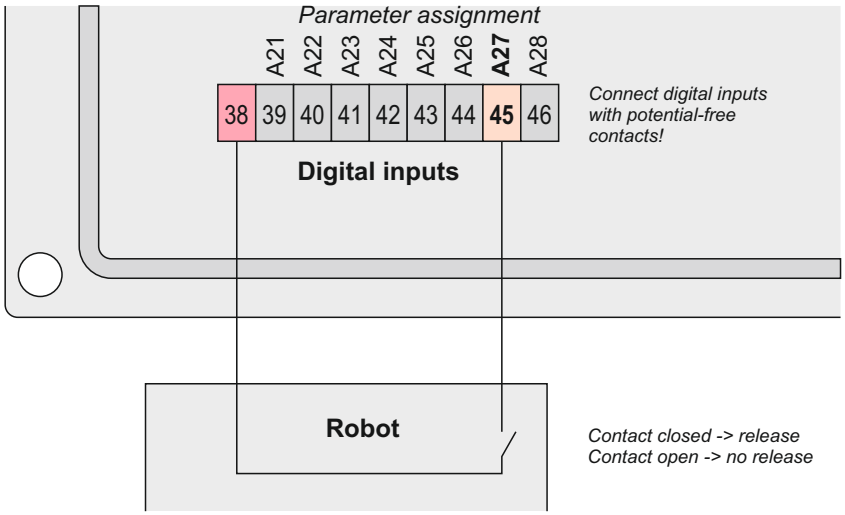
- the display shows 'CLEn'
- the “washing“ mode LED flashes

As soon as the robot is released, the cleaning process is started - the mode LED remains lit permanently and the programme step for the cleaning process appears in the display

Note: The function can be deactivated by pressing the OFF key during the waiting period until the cleaning release 'CLEn' is activated.

Parameter setting - IMPORTANT

In order for the cleaning release to take place, the robot release signal must be assigned to one of the digital inputs. It is preferable to use terminal 45, since this is already configured at the factory via parameter [A27].



9.4 Different variants for cooling start delay

Cooling start delay is set using parameters [P61 - P67].

The control can be programmed to delay the start of the compressor after the cooling mode has been triggered, to prevent a slight freezing of milk in the tank. This delay takes place only in case of first milking after the cleaning.

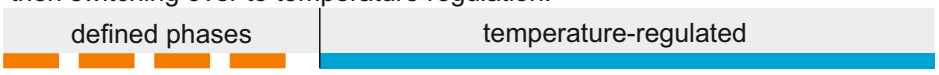
A new manual activation of the cooling start delay can be triggered only by a long pressing of the button “COOLING”.

To cover all the different system configurations possible, the WTS-300 offers a range of variants for cooling start delay.

0. no cooling start delay
Cooling starts immediately

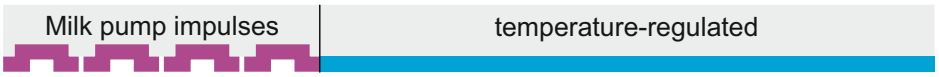
1. simple cooling start delay
Cooling starts after a set time.

2. periodic cooling phases
Cooling starts in the form of periodic cooling phases at set intervals before then switching over to temperature regulation.

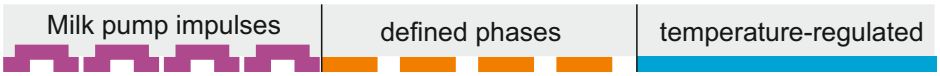


3. periodic cooling phases after switch-on delay
Cooling starts after a set time, in the form of pre-set periodic cooling phases at set intervals before then switching over to temperature regulation.

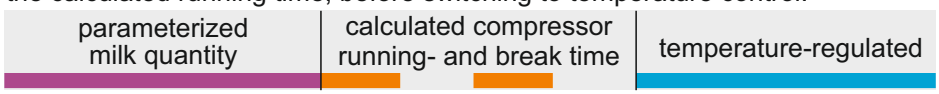
4. according to number of milk pump impulses
Cooling starts after the set number of milk pump impulses.



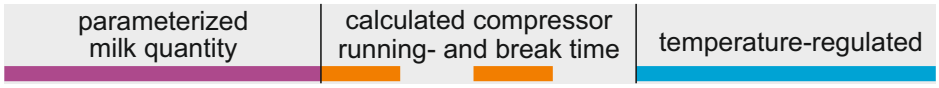
5. periodic cooling phases after a number of milk pump impulses
Cooling starts after the set number of milk pump impulses in the form of pre-set periodic cooling phases at set intervals before then switching over to temperature regulation.



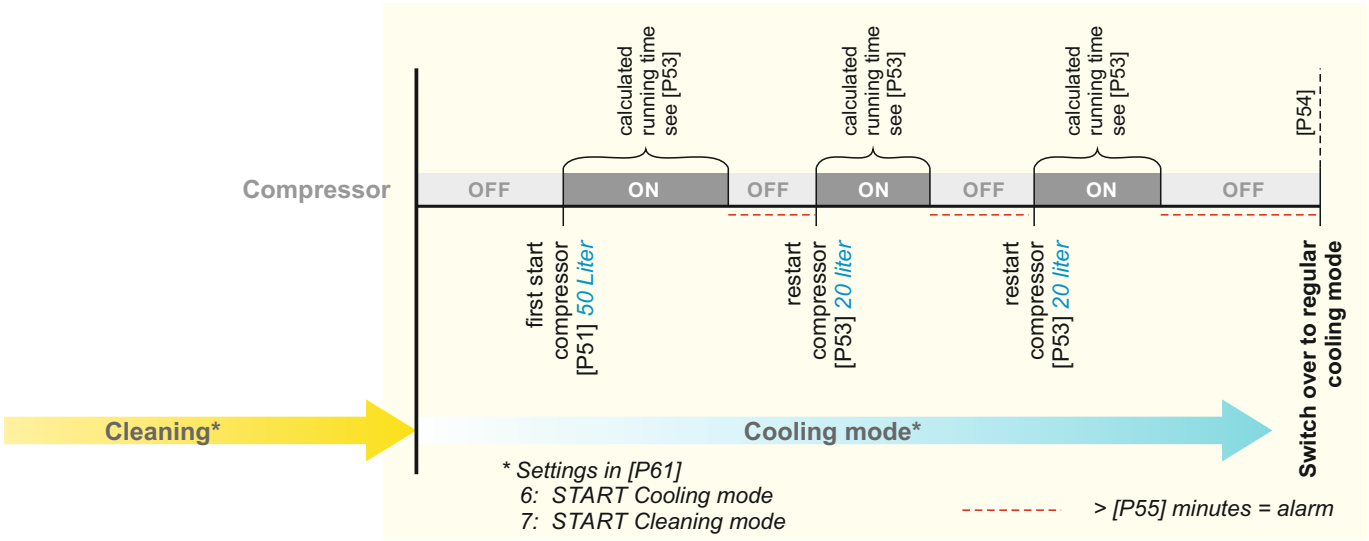
6. Milk-volume-dependent cooling start delay from start cooling [P50 - P 55]
Compressor starts according to the parameterized milk quantity in the tank for the calculated running time, before switching to temperature control.



7. Milk-volume-dependent cooling start delay from start cleaning [P50 - P 55]
Compressor starts according to the parameterized milk quantity in the tank for the calculated running time, before switching to temperature control.



Information on cooling start versions 6 and 7



Both settings "6" and "7" are used for volume-dependent switching on of the compressor in order to prevent the milk from freezing during robot operation when the cooling mode starts. Depending on the quantity of milk *, the compressor is switched on either sooner or later and then longer or shorter.

* *The control calculates the current milk quantity in the tank from the entered capacity of the feed pump [P50] and the measured duty cycle of the feed pump.*

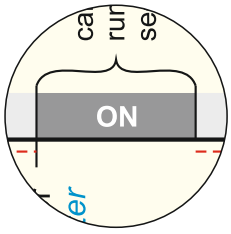
Measured milk quantity = P50 x measured running time milk feed pump **

** *The running time of the milk feed pump(s) is determined via digital inputs. I.e. the digital inputs in the parameters [A21 - A28] need the assignment of the settings 8, 9 or 10 (depending on the number of milk pumps). For several milk pumps, the total pump running capacity is added -> and from this it is the total quantity of milk.*

Depending on setting „6“ or „7“ the calculation of the milk quantity starts already

- Setting „6" = only with the beginning of the cooling mode
- Setting „7“ = or in the cleaning mode

Setting "7" is selected if during the cleaning of the main tank milk has already been milked into a buffer tank and this milk is pumped into the main tank after the end of cleaning to start the cooling mode. This amount of milk is added to the amount of milk from the start of cooling mode.



The running time of the compressor is calculated from the formula:

$$\text{Running time compressor} = \frac{\text{measured quantity of milk}}{P53} \times P52$$

If milk is transported from the feed pump into the tank while the compressor is running, the running time of the compressor will be extended accordingly.

If the compressor is switched off, it cannot start again until at least the quantity of milk set in parameter [P53] has been added.

9. Other Information

9.5 Compressor switch-on delay / pre-agitating

(Only useful when using a robot)

If the milk cooling tank is filled by a robot, filling from below takes place via the tank outlet. For some tank types, the temperature sensor is positioned very close to the tank outlet. For this reason, an increase in the milk temperature is measured during filling, although the actual milk temperature has not yet risen (due to a heat bubble at the outlet by the type of filling). This leads unnecessarily to the frequent switching on of the compressor and thus to an increased wear of the cooling system.

The parameter P6 can be used to parameterize a 'pre-agitating time' in which the agitator starts before the compressor is switched on. This is intended to ensure that the warm milk at the outlet is mixed with the remaining cold milk in the tank and the compressor is switched on only after the pre-agitating time has elapsed if the total milk quantity is above the target temperature.

9.6 Emergency cooling / Sensor fault

In the event of a faulty temperature sensor, a fault code is displayed:

- F56 fault configuration broken sensor
- F57 fault configuration sensor short circuit
- F58 fault configuration sensor range exceeded

Emergency programme

- A timer can be set in parameter [P4].
- On pressing the COOL button, the compressor and agitator will run continuously until the time set on the timer expires.

The timer can be switched off manually at any time using the OFF button.

9.7 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 then necessary only:

- 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.

9.8 Function second temperature sensor

The second temperature sensor (FÜ2) may have two different tasks or functions.

- To act as a monitoring sensor (redundancy) for the first sensor. An adjustable difference between the two measured values gives rise to an alarm.
- To regulate the heating temperature / holding temperature during washing.

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.

If FÜ2 develops a fault (break or short-circuit), fault code [F38] will also be displayed after 5 minutes.

9.9 Level alarm during cooling (Fault code F52)

Safety function:
The level input will be monitored during cooling.

In the case of systems with robot operation, depending on the layout of the system, the washing line may be connected permanently. If, for example, a water valve jams and the water level rises, water could be forced into the tank via the washing line. In this case, once the electrode is reached, an alarm is given and the outlet valve is opened.

All relevant settings are found in [P40].

9.10 Automatic / convenience functions

9.10.1 Automatic start to continuous agitating mode after exiting cooling mode

Setting in parameter [P23].

When the cooling operation is stopped by the milk truck driver, a continuous agitating mode can be initiated automatically in order to achieve better mixing of the milk in the tank.

9.10.2 Automatic start to cooling mode after successful cleaning

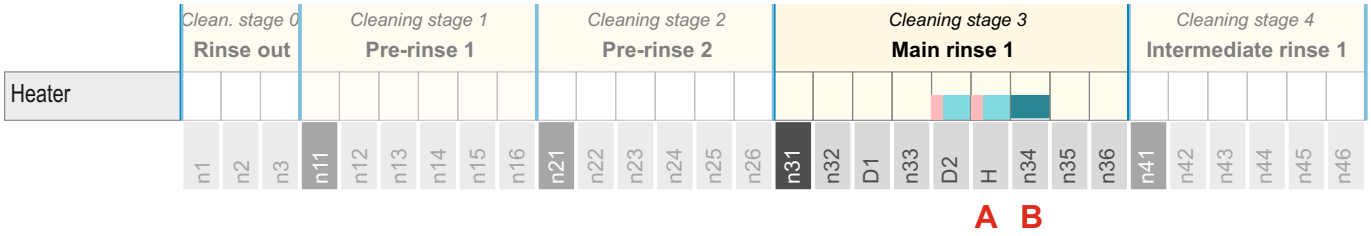
Setting in parameter [P60].

When using a robot, it is possible to start the cooling mode automatically after a successful cleaning.

If cleaning is not successful, the control remains in cleaning mode and manual acknowledgement is necessary.

9. Other Information

9.11 Heating control



The WTS-300 distinguishes between two heating phases:

A - **Heating-up phase** - programme step "H“

B - **Further heating phase** - during the main circulation (n34 or n54 and n74).

During the heating-up phase, the water is heated to the temperature set (the display shows the temperature measured by sensor 1 instead of the programme stage). The next programme stage then follows. The heating-up time is, however, limited by an adjustable timeout. Once the time has expired the control unit switches to the next programme stage. The completion of washing is followed by a corresponding fault report.

During the following further heating phase, the circulating washing solution is maintained at the further heating temperature that has been set.

NB:
If a second sensor has been configured as a washing sensor, temperature regulation and the display switch over to the second sensor. See also the section “Function of second temperature sensor 8.8".

Heater start delay

Depending on the system layout, a start delay for the heater can be set. This applies only at the beginning of the heating-up phase (depending on whether this starts in programme stage “D2" or “H”).

This delay can be used to prevent the system switching on to the next programme stage too soon ...

- ... if pre-heated water- e.g. from a boiler - is cooled down by the cold walls of the tank and needs to be reheated, or
- ... if, as a result of pre-set pump venting, the pressure switch triggers and the heater is switched off (see also the sections “Pressure switch” and “Pump venting”).

9.12 Function of pressure switch – Effect on pump and heater

A pressure switch fitted to the washing circuit can protect the pump and heater from damage.

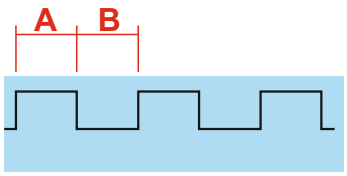
Protection of the cleaning pump
Parameter [r11] can be used to set the length of time during which there may be no pressure in the washing line before washing is stopped. This prevents the washing pump being damaged by running dry.

Protection of heater
Parameter [r38] can be used to set the length of time during which there may be no pressure in the washing line before the heater is switched off. Washing continues nevertheless.
This prevents heater burn-out.

9.13 Air in the cleaning pump -> automatic venting

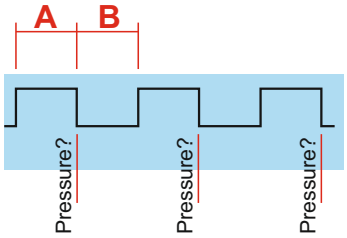
If there is air in the washing line when the washing pump starts, it is impossible for the pump to circulate the washing water. The remedy: short switch-on and switch-off impulses when the pump starts can remove air bubbles.

The number of impulses and the time interval between them must be set.



Parameter [r80] - Setting 1 =
On/off impulse with fixed quantity for all cleaning stages.

r81 - Number of switch-on and switch-off impulses
r82 - Duration of switch-on impulses **A**
r83 - Duration of switch-on impulses **B**



Parameter [r80] - Setting 2 =
as 1 - however, premature termination when pressure via pressure switch

After each switch-on impulse, the pressure switch is contacted. If no pressure has been built up, a further impulse interval follows. If there is pressure in the line the washing pump switches on and runs continuously. Parameter [r81] is used to limit the maximum number of impulses.

r81 - Max. number of switch-on and switch-off impulses
r82 - Duration of switch-on impulses **A**
r83 - Duration of switch-on impulses **B**

Parameter [r80] - Setting 3 or 4

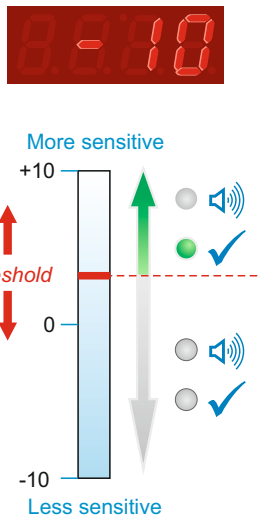
If permanent impulses of the cleaning pump are requested (improved rinsing effect) in the rinsing steps (rinsing cycles 0 and 9) select settings 3 and 4.

NB:

During automatic venting with pressure switch evaluation, parameters [r11] and [r38] do not come into play.

The digital input in parameter [A25] (5=Pressure switch water "Default setting") is used directly for evaluation.

9.14 Level control setting



The level control is pre-set in the factory to “average” water quality. Depending on the hardness of the local water supply, sensitivity can be adjusted as follows:

Setting under the I / O test parameters::

- In the level “I/O test parameters” (see section 8.11), open the water intake relay until the level is reached. (Visual check of electrode)
- Setting level 1: Select parameter [o.41].
- Press and hold down SET - simultaneously set the displayed value to "-10" using the DOWN ARROW button.
- Keep the SET key pressed - simultaneously increase the value slowly with the UP ARROW button until the green LED is lit (and then increase by 1). Releasing the SET button saves the last set value.
- Setting level 2: Select parameter [o.42] -> then see level 1

Fine adjustment during cleaning (only for the service technician)

This method works only when sensitivity has been set too low!

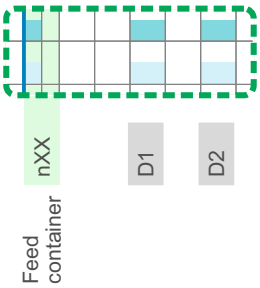
If at the start of the first washing stage (water intake until level is reached) no water is detected despite the level electrode having been reached, water continues to enter. The service technician can now adjust the sensitivity setting:

- Hold down the SET button for 4 seconds: The water valve is switched off. The value indicated changes from the programme stage display to level sensitivity display. The value last set appears.
- Use the DOWN ARROW to adjust the value shown to “-10".
- Use the UP ARROW button to increase the value slowly until the green LED lit up. (And then increase by 1).
- Pressing CLEANING button. The value set is stored, and washing continues from the appropriate stage.

Fine adjustment in the extended washing parameters
(Only for the service technician)

The level input sensitivity can be further adjusted manually using parameters [r30] for level 1 and [r31] for level 2.

9.15 Detergent injection position



Parameter [r20] is used to determine whether the detergent is added in programme stage D1 or D2 or in the feed container.

Note: When filling the pre-hopper [r20 =0] the detergent is added when water is taken for the second time.

See section 6.2 - Cleaning programme diagram

In position D2 there is a risk that a pressure peak (caused by the simultaneous start of detergent injection) may cause a highly concentrated water-detergent mixture to pass through the manhole onto the outside of the tank.

9.16 Configuration of the different cleaning stages

Setting the number of individual cleaning stages

Parameters [r40 to r49] are used to determine whether and how often each individual cleaning stage is run. The parameters for the deactivated cleaning stages are hidden.

Acting on the temperature of the tank walls

It is possible to repeat the hot cleaning stages in order to warm up a cold tank. At the end of cleaning, additional cold rinses can be used to cool down the tank again.

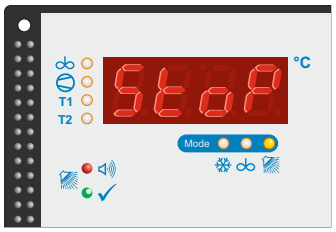
Setting the cleaning cycle so as automatically to have a certain number of alkaline washes to one acidic wash

Parameter [r45] is used to determine whether the cleaning cycle generally includes one or two main rinses.

- [r45 = 1] - per cleaning cycle 1 alkaline wash / 1 acidic wash
- [r45 = 0] - an acidic clean follows after x alkaline cleaning cycles.
  Set “x” in [r21].

Look also section 6.2

9.17 Setting of a break in the cleaning programme



During the automatic cleaning programme it is possible to add a break after a cleaning cycle.

Example: Setting a break after the pre-cleaning until sufficient quantities of warm water from the heat recovery for the main cleaning cycle is available.

The following settings are necessary

- After which cleaning cycle the break shall take place [r71]
- How the break shall be finished [r70]

Options:

When the break should be finished ...

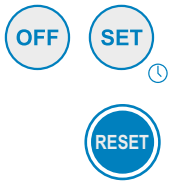
- ... via a signal at the digital input
  assign the function 15 "Start from rinse stop" to a digital input A21 to A28.
- ... after a certain amount of time
  enter this time in parameter [r72].
- ... at a certain time
  enter them in parameter [r73].

A parameterized elapsed time of the break or the countdown-timer is displayed alternately with “STOP”

9.18 Test functions

9.18.1 Testalarm F99

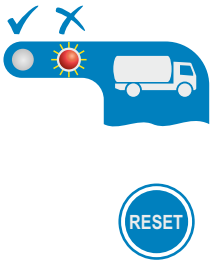
The function “test alarm” is required to test the impacts of an error on the parameterized outputs in the F-parameters (relays, SMS etc.).



Method:

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

9.18.2 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.

9.19 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 WTS-300 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.

9.20 Procedure following power failure

After any interruption to the electricity supply, the control unit automatically switches back to the mode it was in before the outage.

Date and time...

...are retained for at least 3 days. If the interruption is longer they may have to be reset. When the power is restored the control unit will automatically ask for this to be done.

Exception: If the control unit was in cleaning mode, cooling starts again immediately and only fault code (F34) is displayed.

Is the control unit was in cleaning mode ...

...as soon as power is restored, a draining period is run for the time in [n100] in order to empty the tank. Cleaning then continues from the start of the cleaning stage the system was in at the time of the power failure.

The tank monitor functions ...

...are maintained during a power failure, provided the optional power pack is installed (see 8.15). Depending on the parameter settings, the fault code is also displayed

Incorrect parameter configuration when switching on:

Factory configuration is restored automatically

If "dEFA" occurs in the display after switching on, the standard configuration (factory setting) has been restored automatically. The control will not be ready for use until confirmed with the SET-button.

This behavior occurs after a firmware-update or a factory reset.

Procedure:

- Press button SET to confirm the factory reset
- Set and store original parameterization for the tank.

Displayed when invalid storage areas are detected.

When the control is switched on, it checks whether the parameter values in the EEprom-storage have been changed inappropriately. (This is possible in rare cases due to EMC-effect or lightning, for example).

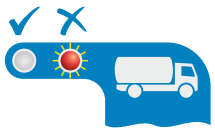
If an impermissible change is detected, "F.EEP" is displayed, the control is not ready for operation.

Procedure:

- Press and hold the OFF / SET / UP / DOWN buttons simultaneously until "dEFA" appears in the display: The default configuration (factory setting) has been restored.
- Press button SET to confirm the factory reset.
- Set and store original parameterization for the tank.

NOTE:
If "F.EEP" appears again on the display after the factory reset and after another OFF and ON-switching, the control is irreparably defective.

9.21 Power pack (optional)

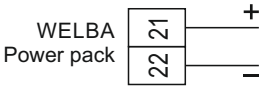


The optional power pack offers enormous advantages for the WST-300.

The control unit's tank monitoring function is maintained in the event of a power cut. During the outage fault code [F30] is displayed.

Maximum outage time during cooling exceeded

If in cooling mode a power outage lasts longer than the time set in [H20], fault code (F6) flashes, followed by an alarm “DO NOT LOAD”.



Installation:

Only the suitable original WELBA-power pack may be connected.

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

IMPORTANT NOTE

The life of the rechargeable batteries is limited. Those fitted must be replaced by new ones every two years at the latest.

Only (!) rechargeable batteries of the following specification may be used:

1.2 V NiMh - size AA (min. 2.000 mAh)

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

9. Other Information

9.22 Agitator monitoring module (optionally)

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-002-A

The agitator monitoring module ESVAW-002-A is used to monitor max. 2 agitator motors in milk cooling tanks. The agitator motors can be switched on or off directly via the module via the integrated relays. Thus, e.g. on a cooling tank control no relay for switching the agitator motors are occupied.

ESVAW-003-A

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

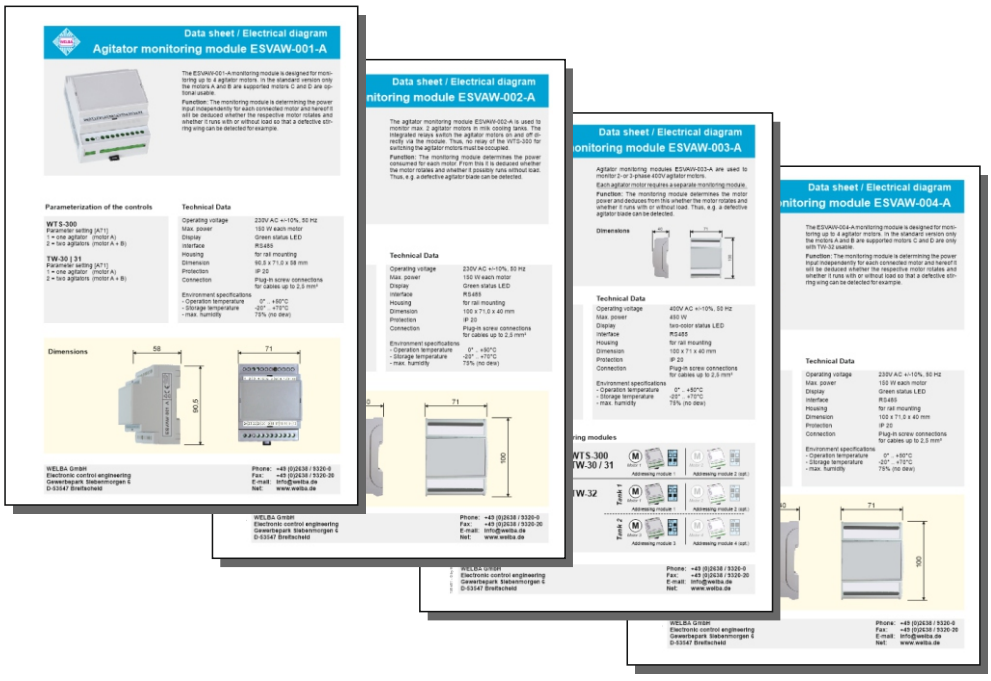
ESVAW-004-A

The ESVAW-004-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.

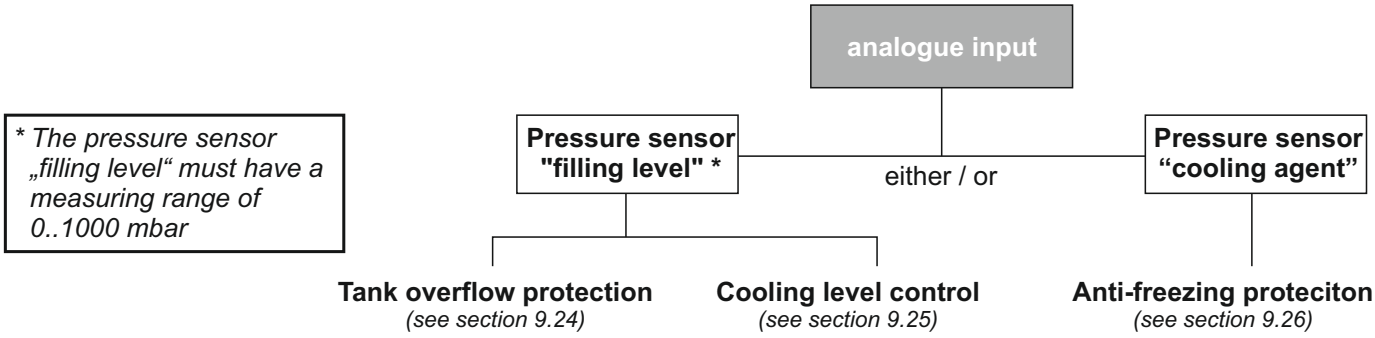
The monitoring module is determining the power input independently for each connected motor and hereof it will be deduced whether the respective motor rotates and whether it runs with or without load so that a defective stirring wing can be detected for example.

The module has to be configurated in parameter [A71]

For the correct installation please pay attention to the supplied documentation of the respective module.



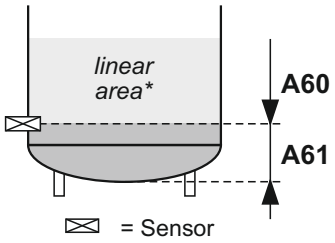
9.23 Connection /Parameterization external analogue pressure sensor



Either a pressure sensor for the filling level or the cooling agent can be connected to the analogue input of the WTS-300. See graphic.

When using the pressure sensor „filling level“, it has to be set as follows:

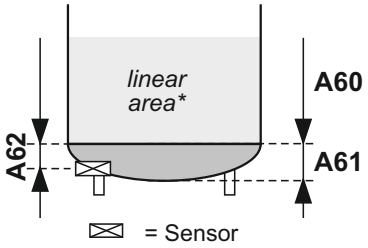
Installation case "A"
Mounting sensor **within** the linear area



Installation case "A"

- Set parameter [A54] to 1
- Set parameter [A60] (litres per cm filling height) to your tank
  Example: tank-inside diameter “D” = 250 cm
  Formula: D² x 3.14 ÷ 4 ÷ 1000 = litres
  Corresponds in the example: 250 x 250 x 3.14 ÷ 4 ÷ 1000 = 49 litre per cm filling height
- Set parameter [A61] (offset in litres) to your tank.
  Quantity of milk in the tank below the pressure sensor that is not determined
- Set Parameter [A62] to "0"

Installation case "B"
Mounting sensor **below** the linear area



Installation case "B"

- Set parameter [A54] to 1
- Set parameter [A60] (litres per cm filling height) to your tank
  Example: as before
- Set parameter [A61] (offset in litres) to your tank.
  Quantity of milk in the tank below the linear area*.
- In parameter [A62] enter the distance 'Center sensor' to 'Start linear area' in cm.

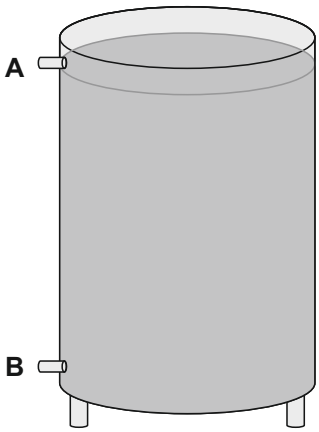
Level indicator on the display (in litres)

With a pressure sensor “filling level” the filling level in the tank can be displayed in the cooling mode by pressing the SET-button (in hectolitres).

Display L.125 = 12,500 litres

* *Linear area = Start of the cylindrical shape of the tank.*
From here the incoming milk quantity is linear to the pressure on the sensor.

9.24 Tank overflow protection



Especially for silo-tanks a „tank overflow protection“ can be set in two different ways:

Via level sensor **A** “tank full”

Precondition: installed “level sensor tank full”

- Set parameter [A42] to 1 or 2, depending on the sensor used
- Assign to one of the digital inputs [A21 - A28] the function 18 “level sensor tank full”

Via litre-recording by pressure sensor **B**

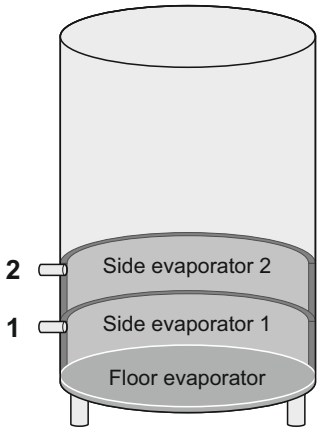
Precondition: installed analogue pressure sensor “filling level”

- Set parameter [A42] to 3
- Enter the maximum filling quantity of the silo-tank in hectolitres ((= 100 litres) in parameter [A43]
- Set level sensor as described in section 9.23

Fault display:

When the upper filling level is achieved fault [F51] “tank overflow protection” is triggered

9.25 Tanks with various cooling levels



The WTS-300 supports tanks with up to three cooling levels. There are three different methods available to switch on the cooling levels during the first milking.

Applicable for all methods:

In the parameters [A1 .. A12] the connected cooling levels and compressors have to be assigned to the corresponding output relays.

Cooling levels are switched on with a time delay

- Set parameter [P73] to 1
- Set parameters [P74 und P75] to the desired delay times

Cooling levels are switched on via level sensors

Precondition: installed level sensors

- Set parameter [P73] to 2
- Assign the two level sensors to one of the digital inputs [A21 - A28]. (Setting 16 and 17 for “level sensor 1 and 2”)

Cooling levels are switched on depending on the filling quantity (recording via pressure sensor)

Precondition: installed analogue pressure sensor “filling level”

- Set parameter [P73] to 3
- Set the min. filling quantity in litres in parameter [P76] - to switch on cooling level 2
- Set the min. filling quantity in litres in parameter [P77] - to switch on cooling level 3
- Set level sensor as described in section 9.23

9.26 Anti-freezing protection by means of low pressure monitoring

It is possible to set up a “freeze protection” with the WTS-300. For this purpose a pressure sensor for the low pressure monitoring of the compressor is connected at the analogue input and the control is appropriately parameterized.

Function:

If the monitoring pressure [P85] is below the pressure that has been set, the compressor is switched off for a settable time [P88].

When restarting the compressor the monitoring is delayed by the set time [P87].

NOTE:

If the fault monitoring of the analogue input [A55] is activated and there is an error, the anti-freeze protection is temporarily deactivated.

Example

NOTE:

If this function is activated, the current pressure (in%) can be displayed in the cooling mode by pressing the SET-button

9.27 Integrated multifunction-time relay

The WTS-300 has an integrated time relay function by which external components can be switched. There is no need of an additional time relay.

Setting as follows:

- Assign input function '24' to a free digital input [A21 - A28].
- Assign output function '22' to a free relay [A1 - A12].
- Use parameter [A86] to select the time relay function.
- Set the desired switching times in parameters T1 [A88] and T2 [A89].

Selection 1: on-delay T1

Selection 2: off-delay T2

Selection 3: on- and off-delay T1 and T2

Selection 4: on-impulse T1

Selection 5: off-impulse T2

Selection 6: Clock T1 on, T2 off

9.28 Boost pump function (booster pump)

With the function "Boost-Pump", a booster pump can be controlled in water supply networks with low water pressure.

For this, the function '21' "Boost Pump has to be assigned to a free output relay.

The booster pump is now always controlled when a water valve is opened.

9.29 Set level 2 on the relay

If this function '23' is assigned to a relay [A1 - A12], the relay is always energized when water is detected at the level 2 input.

9.30 RS485 Interface

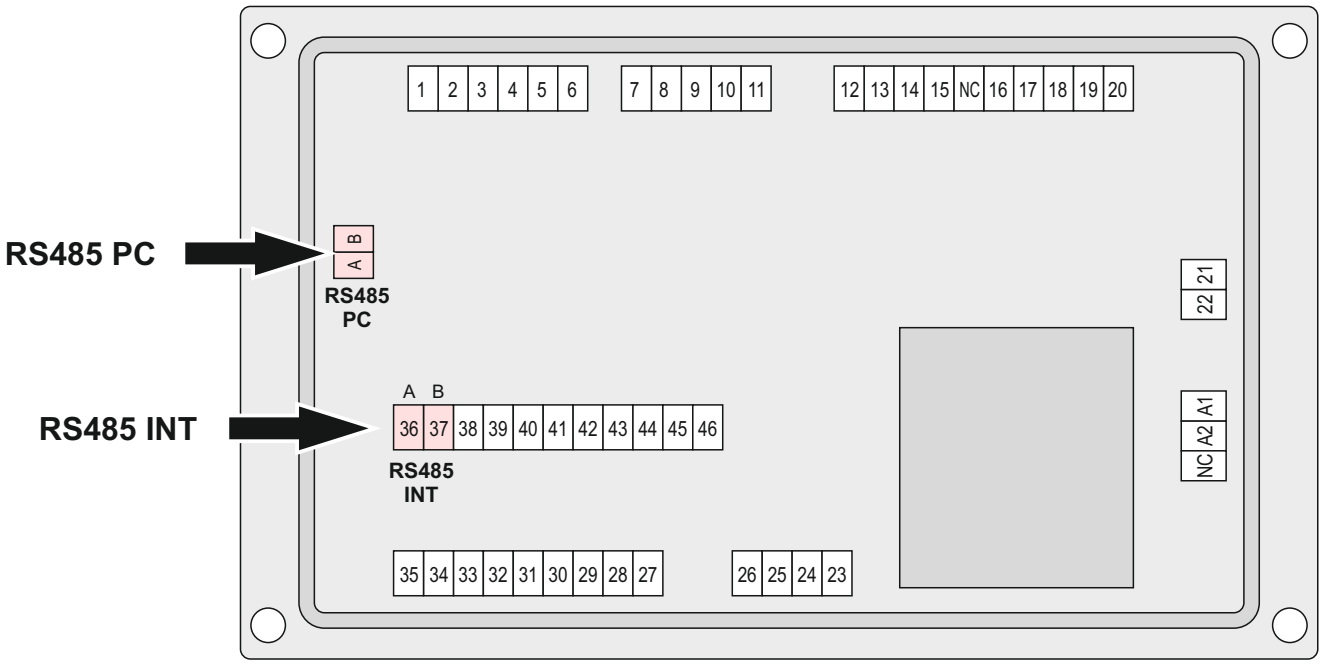
The WTS-300 has two RS485 interfaces as connection options for:

RS485 PC

- A PC with the Welba Konsoft
  for parameterizing, updating and reading the data
- Remote maintenance module ESGSM
  for a remote configuration and sending SMS-error messages
- USB module ESUSB
  for reading the stored tank monitor data onto a USB stick

RS485 INT

- Agitator monitoring module ESVAW
  for monitoring the agitator motors.



9.31 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

9.30 General measures when using electronic control systems

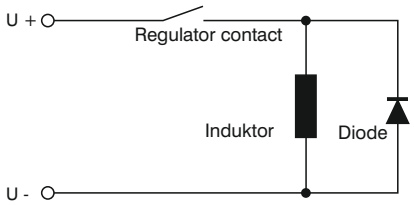
b. If specific interference sources cannot be avoided they should at least be kept at a distance from the regulator system.

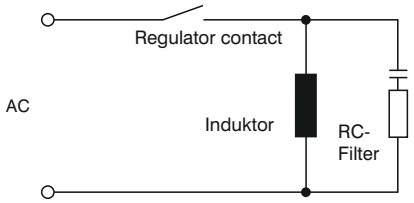
c. Capacitive and inductive couplings can cause crosstalk between high-voltage lines and parallel low-voltage and sensor lines. This distorts measured values and signals and can disrupt the entire regulatory process. It is therefore recommended that all sensors and signal lines be placed separately from 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.

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 !

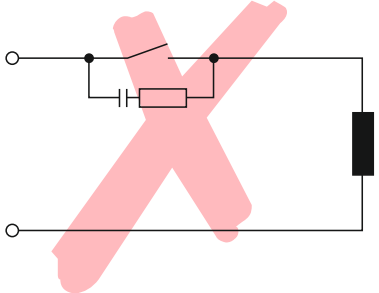




- *DC voltage*
  In the case of d/c voltage systems the induction voltage occurring can, for example, be limited by using self-induction diodes, varistors or suppresser diodes. The diagram on the left shows one possibility using a self-induction diode.

- *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.

9.30 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.