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Universal tank control

WTS-300

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

Firmware V4.8



Programmable via configuration software WELBA „KONSOFT"

WTS-300 G1

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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.

⚠ WARNING

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!

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

NOTICE

NOTICE for storing the operating instructions

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

1.2 Limitation of liability

WARNING

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.

1.3 Warning notices in these operating instructions

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

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

DANGER!

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

WARNING

Nature and source of danger
This warning signs warns of a possibly dangerous situation for the health of people. Failure to observe these warning notices can result in serious injuries, including death.

ATTENTION

Nature and source of danger
This warning sign warns of a possibly dangerous situation for the health of people. Failure to observe these warnings can lead to minor or moderate injuries.

NOTICE

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

NOTICE

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.

1.4 Device description



Die 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

NOTICE

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.

1.5 Type designation

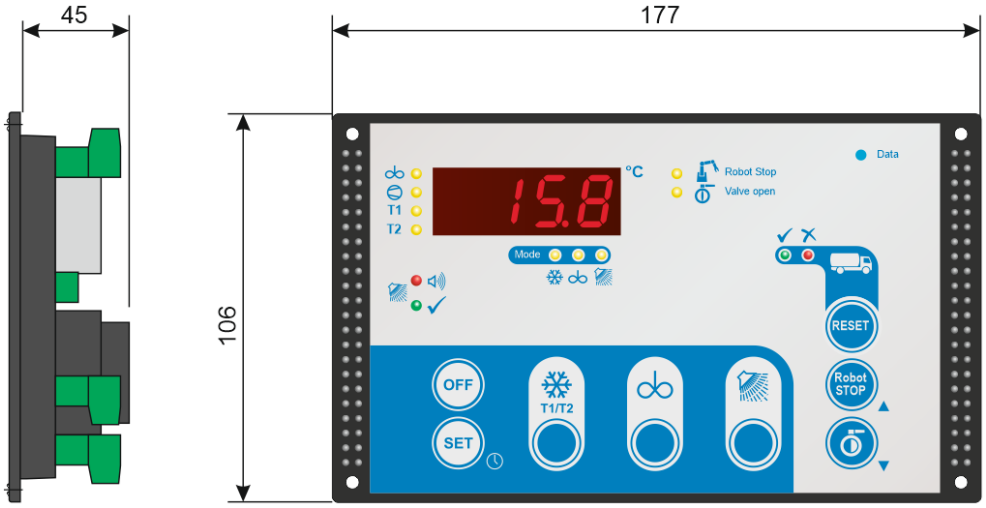


The type designation of your controller is attached to the holder frame.

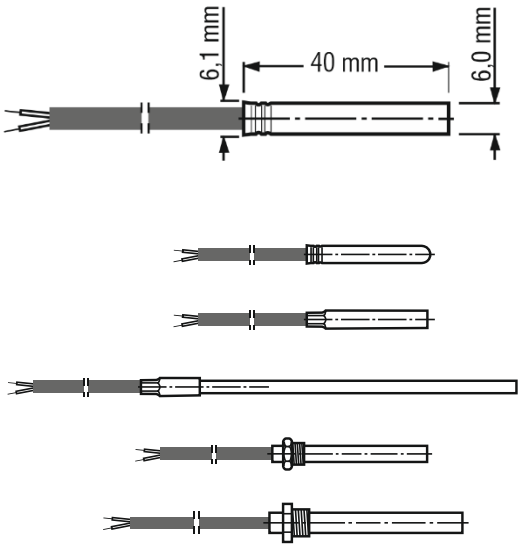
1.6 Item supplied

- Controller WTS-300
- Holder
- Rubber seal
- Sensor TF4A-2
- Fixing screws
- Any optional accessories ordered.

1.7 Dimensions



1.8 Sensor dimensions and technical data



Sensor element	PT-1000
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

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

Some of the options are shown here.

1.9 Technical data of control unit

Operating voltage	230V AC +/-10%, 50/60 Hz
Relay contact	12 performance relays expandable by 6 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 LED
Sensor input	PT-1000, PT-100, KTY 81-210, KTY 81-110
Number of sensor inputs	1 or 2
Measurement range	-5° .. +95°C
Temperature resolution	0,1°C
Control mode	two-step controller
Hysteresis	0,1 K .. 30 K (standard adjusting 0.7 K)
Water detection	via 2 independent level monitors
Target temperature T1 Target temperature T2	standard adjusting 4°C standard adjusting 4°C
Digital inputs	8 (via optocoupler) expandable by 5 digital inputs*
Interface	2x RS-485
Supply ext. pressure sensor	12V - max. 40 mA
Connection	Plug-in screw connections for cables up to 2.5 mm²
Housing - Front dimension - Front panel cut out - Insertion depth	 177 x 106 mm 157 x 97 mm 45 mm
Protection - Housing front - Rear	The control is open on the rear, as it is designed for installation in a closed housing IP 64 IP 00 IP 20
Electrical safety	Protection class II, Overvoltage category III, pollution degree I
Environment specifications: - Operation temperature - Storage temperature - max. humidity 75% (no dew)	 0° .. +50°C -20° .. +70°C 75% (no dew)

Technical data subject to change.
** via I/O expansion module ESIO-001*

2. Safety

2.1 General Information

⚠ WARNING

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.

NOTICE

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.

⚠ WARNING

IMPORTANT NOTICE ABOUT THE ACCUMULATORS

See section 9.7

(required when using the tank monitor)

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)

⚠ DANGER!

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

⚠ WARNING

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

NOTICE

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.

NOTICE

Important note concerning the external fuse

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 75 %
- 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

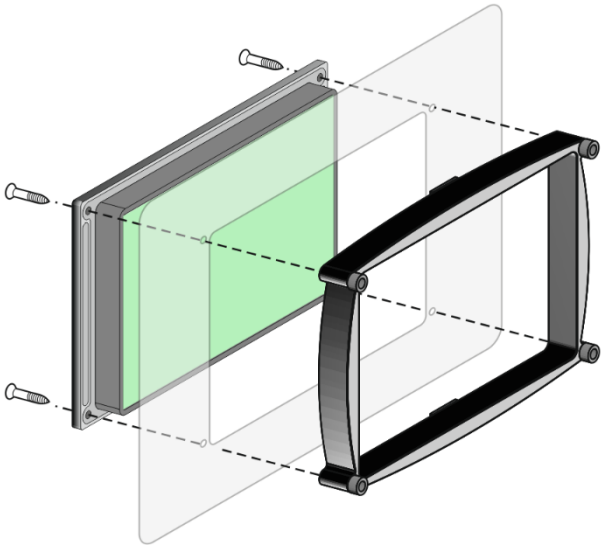
If the packaging is damaged or something is missing, do not fit the temperature controller. In this case please contact Welba.

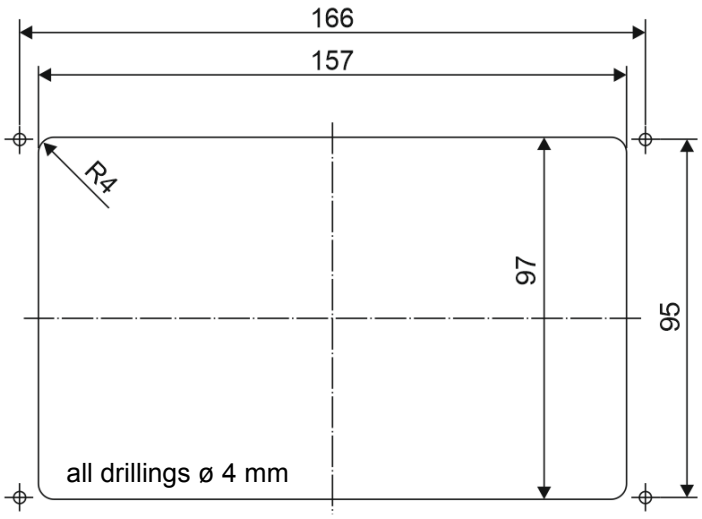
If you keep the temperature controller for a period before using it, store it in a clean dry place at a temperature of between -20°C and +70°C.

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

WARNING

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).

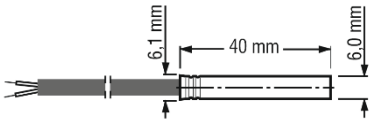
Temperature range sensor cable -10°C .. +70°C



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 section 9.3



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

Changing the sensor cable length

If it is necessary to shorten or lengthen the sensor cable on installation (or if a sensor other than the one supplied is to be fitted), the "actual value correction" parameter must be adjusted accordingly. See section 9.3

4. Electrical connection

4.1 Safety during installation

WARNING

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

WARNING

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

- Ensure there is no tension.
- 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)!

4.4 Connection diagram (Delivery configuration)

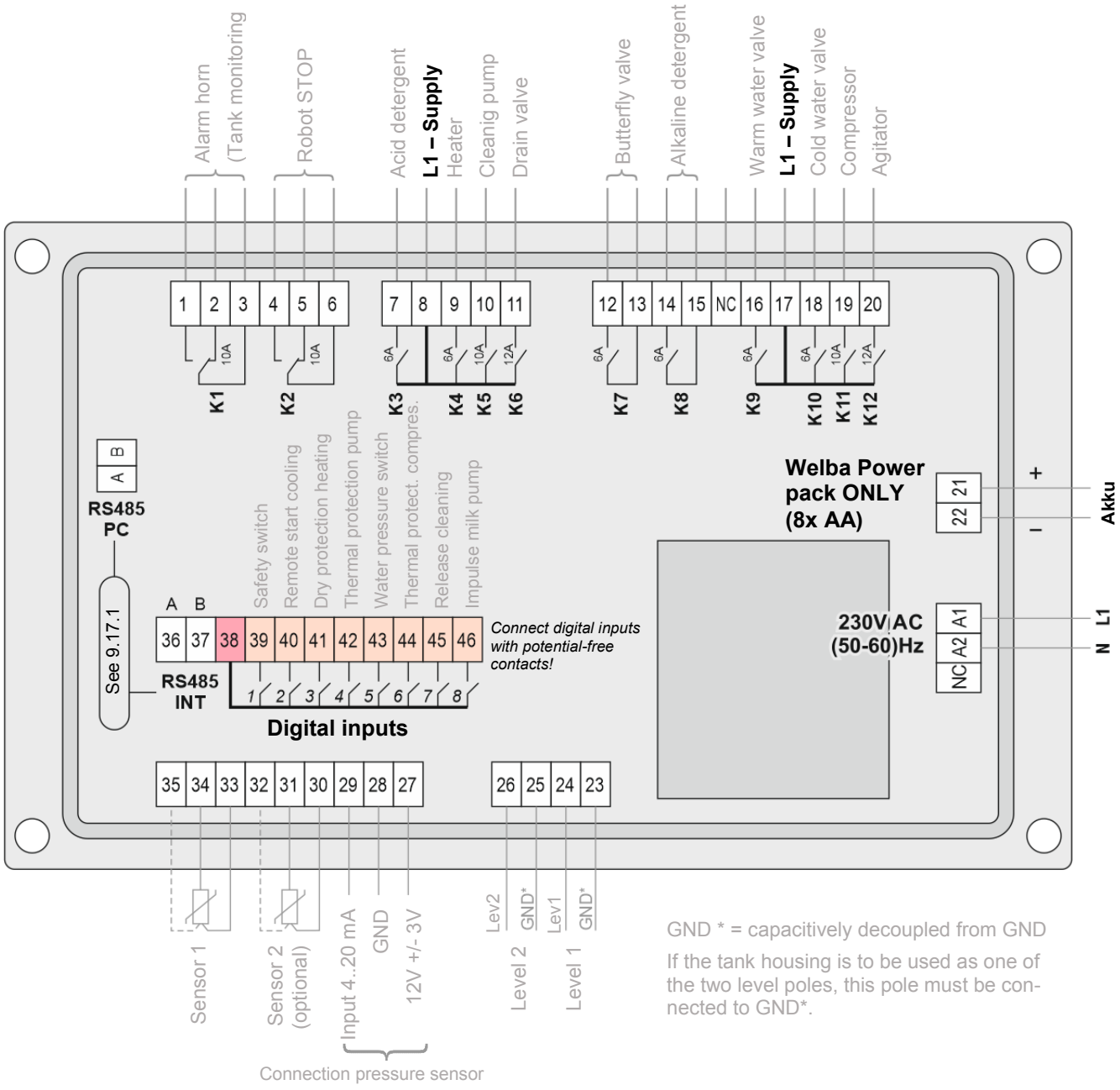


- Electrical connections must be as shown in the diagram below.
- Use cable bushes.
- Make sure that cables cannot chafe.
- Observe relay current rating.
- In all cases use contactors for pump, compressor and heater.
- Do not feed digital inputs with external voltage! Use potential-free switches.

ATTENTION => Delivery configuration

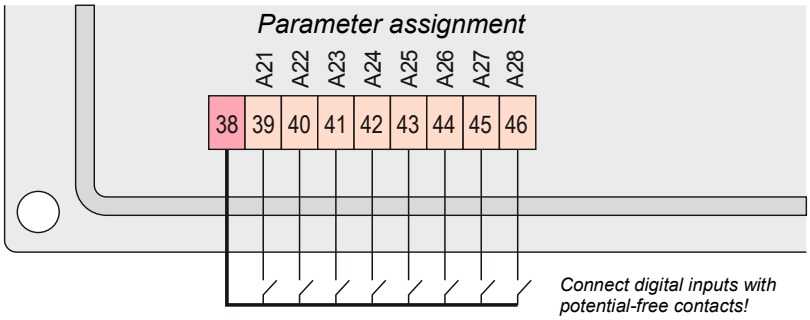
The final assignment of components to the relay outputs is set in the A parameters (A1 to A20). See section 8.11

The assignment of components to the digital inputs is set in the A parameters (A21 to A33). See section 8.11



4.5 Wiring the digital inputs

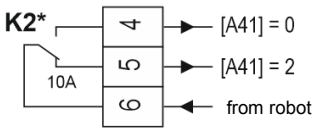
Terminals 39 to 46 are digital optocoupler inputs. These are used to monitor and process external switching contacts. These switching contacts must be potential-free! The signal provided by the controller at terminal 38 must be fed separately to each individual switching contact.



Digital inputs

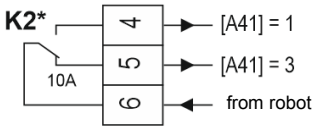
4.6 Connection robot

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.



If the 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)



If the robot needs the signal to be interrupted in order 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)

** Illustration when de-energised*

4.7 Connection of external pressure sensor (optional)

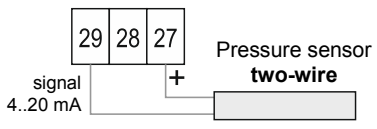
Terminals 27 | 28 | 29 must be used only for the connection of an external pressure sensor. At terminal 27, the control unit supplies a voltage to power external sensors. See section 10.8

Power supply for external sensors via terminal 27
12 V - max. 40 mA

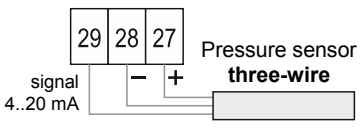
NOTICE

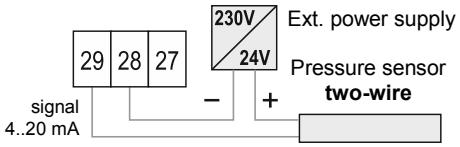
If the sensor cannot be powered by internal power supply:
Use external power supply.

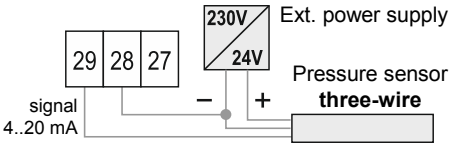
Connection pressure sensor two-wire



Connection pressure sensor three-wire







5. Operation

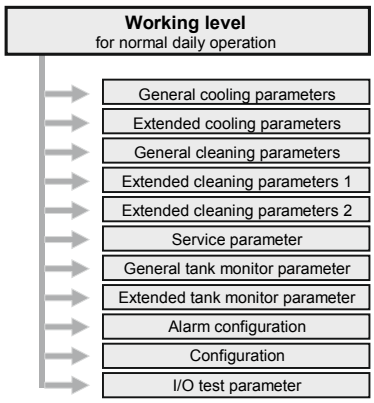
5.1 Function overview



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:

5.1.1 OFF mode (stand-by)

The current time is shown on the display. *

** (or depending on the parameterization, the temperature of sensor 1 or 2 or the last cleaning temperature. See section 5.6.4).*

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!

5.1.2 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.

There are various ways to start cooling mode:

- 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.

To stop cooling mode, see the section **Fehler! Verweisquelle konnte**

5.1.3 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.

5.1.4 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.

NOTICE

Following a power failure the control unit will restart in the mode it was in before. See also section 9.6

Robot interface (see also section 9.17)

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. See parameter [A40]



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.

5.1.5 Full or partial collection of milk

In practice, it happens that the tanker driver only collects part of the milk and then - out of habit - starts the cleaning after collection (which of course should not happen, as the milk remaining in the tank is now contaminated with water and cleaning agent).



For systems without a robot

Full extraction

- Press the 'OFF' button – cooling stops.
- Open the disc valve – extract the milk,
- Press the 'Cleaning' button – the cleaning cycle starts.

Partial extraction

(only if an external 'Partial collection' pushbutton is installed and a digital input is configured with input function 44 'Start partial collection')

- Press the 'Partial collection' pushbutton – cooling stops.
- Open the disc valve – extract the milk – close the disc valve,
- Press the 'Cooling' button.
  Cooling starts.
  Cleaning is disabled and cannot be started accidentally!



For systems with a robot

Full extraction

- Press the 'ROBOT STOP' button
  - cooling stops
  - the robot receives a stop signal (for behaviour, see parameter [A44])
- Open the disc valve – pump out the milk,
- Press the 'Clean' button.
  The cleaning cycle starts.

Partial extraction

(only if an external 'Partial collection' button is installed and a digital input is configured with input function 44 'Start partial collection')

- Press the 'Partial collection' button:
  - cooling is stopped
  - the robot is stopped
- Open the disc valve – pump out the milk – close the disc valve,
- Press the 'Cooling' button.
  Cooling is restarted.
  Cleaning is disabled and cannot be started accidentally!

Optional: Separate outlet for a buffer tank (output function 30)

To prevent milking into the buffer tank during a partial collection

- Normal collection: buffer is activated.
- Partial collection: buffer is not activated.

5.2 The configuration software KONSOFT



For software description see separate instructions

The user-friendly configuration software “KONSOFT" 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.

NOTICE

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

5.3 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 A20). See section 8.11

Step 3 Assign external signal transmitters to the digital inputs (A21 to A33). See section 8.11

Step 4 Check the wiring of all connected components. See section 8.12

Step 5 Adjust cooling and cleaning parameter. See sections 8.2 to 8.5

Step 6 Test cleaning sequence on proper function. See section 11.10

IF ROBOTS IS SHALL BE USED:

Step 7 Adjust parameter A40 and A41.

IF TANK MONITORS SHALL BE USED:

Step 8 A-parameter, h-parameter, adapt H-parameter according to conditions.

Step 9 Assign occurrences to the various alarms in the F-parameters (alarm horn, LED-display, SMS-message, etc.)

TIPP

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

NOTICE

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

NOTICE

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.

WARNING

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.

NOTICE

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.

5.4 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: “dAtE” and “SEt” are displayed alternately:

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. The date and time must be re-entered.

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.

NOTICE

If there is a device error or parameter loss when the voltage is applied, an error message appears on the display. See section 9.6

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.

Year 

Date 

Time 



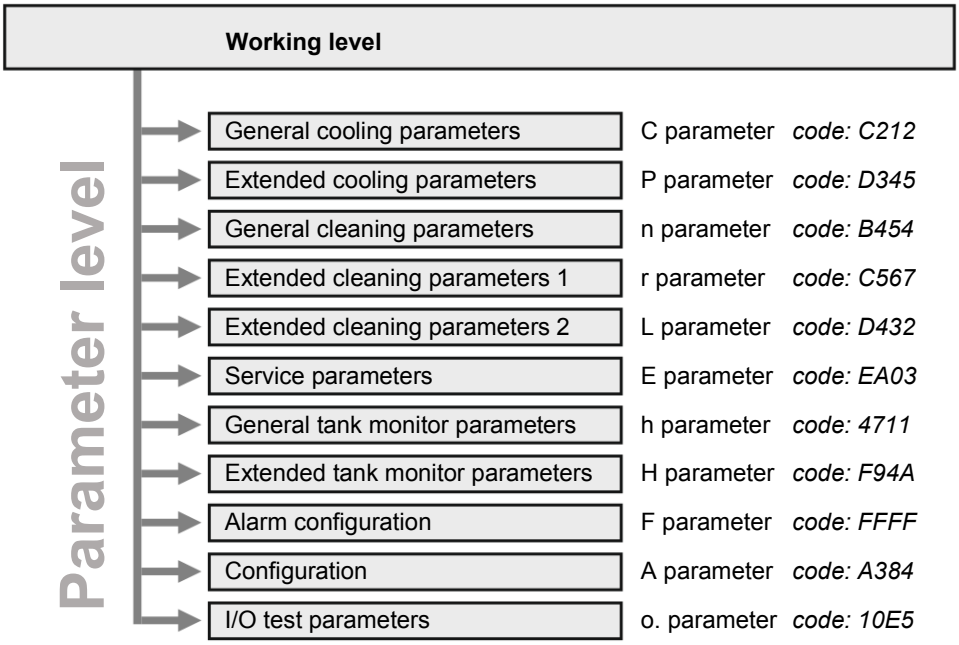


5.5 Operation in levels

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

The WTS-300 is parameterized in 11 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 1 - (r parameter)
Setting of plant-specific functions such as configuration of safety elements, level detection, number of passes of individual cleaning stages etc.

Extended cleaning parameters 2 - (L parameter)
Setting of all parameters in terms of 'quantity-controlled water fetching and dosing' with the optional expansion module ESIO-001.

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

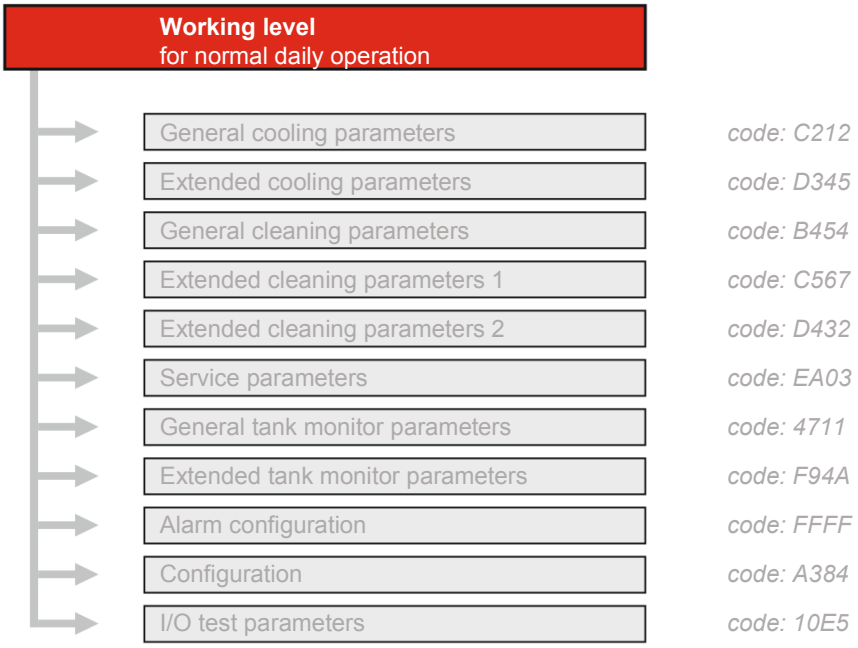
Extended tank monitor parameters - (H parameter)
Determine whether and when critical alarms are triggered

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.

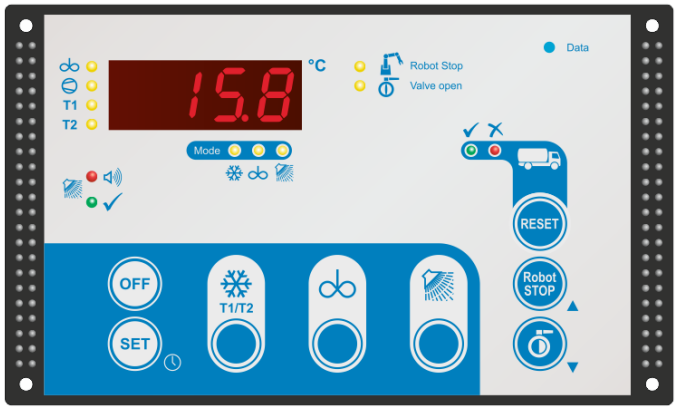
5.6 Operation of working level



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

Switch the control unit to OFF mode without stopping the robot.

- Switch the control unit to OFF mode without stopping the robot,
- end the cleaning mode or continuous stirring mode early,
- switch to parameterisation mode (press and hold the button for 3 seconds)
- switch from parameterisation mode to OFF mode without saving any changes.



„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 10.8 + 10.13)



„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 10.4)
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 „5.6.4 Cooling mode“



“WASHING” button

in OFF mode = start cleaning

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



“ARROW KEYS”

To select and adjust parameters.

5.6.2 Button functions for the driver of the milk truck





OFF button

- Press the ‘OFF’ button – cooling is stopped.



‘RESET’ button

Press briefly = Acknowledge the ‘No load’ message. See 7.2

Hold for 5 seconds = Test the red alarm LED



‘ROBOT STOP’ button (if configured)
Starts or stops the robot and, at the same time, the cooling mode.



‘DISK VALVE’ button (if configured)
Opens / closes the disk valve.



‘CLEANING’ button

in OFF mode = Starts the cleaning cycle

NOTE: To set up the ‘Quick Rinse Programme’, see parameter [r28]

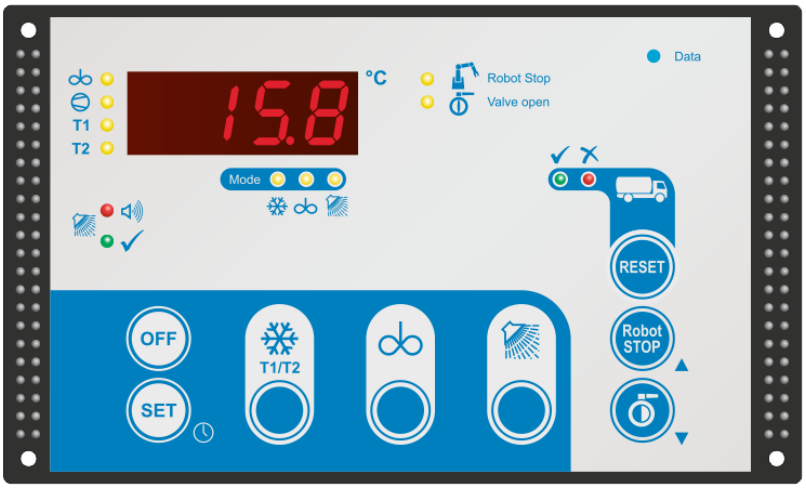


Press the “Part Retrieval” button

(only if an external “Part Retrieval” pushbutton is installed and a digital input is configured with input function 44 “Start Part Retrieval”)

- Press the “Part Retrieval” button:
  - cooling is stopped
  - the robot is stopped

5.6.3 Meaning of the LED‘s



LEDs in cooling mode

LED "AGITATOR”

during cooling mode	Agitator is switched on

LED "COMPRESSOR“

permanently on	Compressor contactor is switched on
off	Compressor contactor is switched off
flashing slowly	- Pause time compressor (pendulum protection) - Compressor delay / pre-stirring active - Anti-freezing protection active - Compressor blocked via digital input
flashes fast in case of a fault	- Fault thermal protection / fault contact - Phase fault (opt. in connection with ESVAW 003)

LED "T1” or „T2"

T1 on	Set target temperature for "T1" is active
T2 on	Set target temperature for "T2" is active
T2 flashing	automatic switching back to T1 active, see [P80]]

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 "AGITATION "

permanent	„continuous stirring“ is active



LED operating mode "CLEANING"

Permanent	„cleaning mode“ is active
flashing	no cleaning release from the robot (see section 9.17.1)

Robot / Drain valve



LED "ROBOTER STOP"

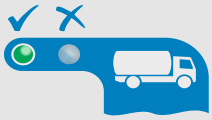
permanent	Roboter is stopped
flashing	- "CLEANING" button was pressed before the robot was stopped or - Robot release delay active. See [A42]



LED "PNEUMATIC OUTLET VALVE" opened

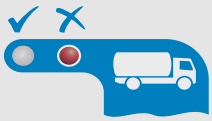
permanent	pneumatic outlet valve is open
flashing	flashing cleaning button has been pressed before the pneumatic outlet valve has been opened.

Tank monitoring



LED (green) "MILK COLLECTION OK"

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



LED (red) "DON'T ADD MILK !"

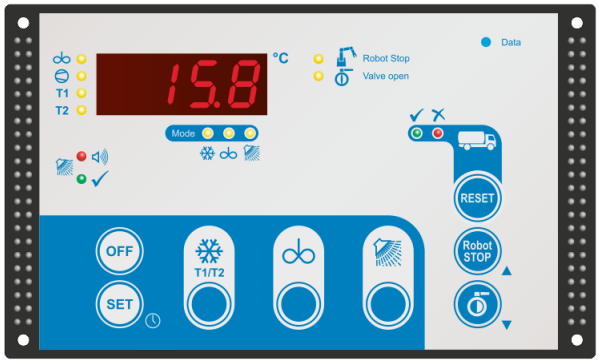
flashing	critical alarm is on.
permanent	critical alarm is on - has already been acknowledged
off	everything ok - milk can be loaded..



LED (blue) "Data"

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

5.6.4 Operation modes



OFF mode



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!

* *Depending on the parameterization, different temperatures can also be displayed in OFF mode - alternating with the time:*

Last cleaning temperature reached [r98=1]

Temperature of the 2nd sensor [A50=4]

Temperature of the 1st sensor [A52=1]

Cooling mode



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” [P61] 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.



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 9.17.2



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).



- The “agitator” LED lights up
- LED „compressor“ displays the current condition of the compressor.
- Further description of the LED display see section 5.6.3.
- 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.



Agitating 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 3 seconds:
  A “long intermediate agitating” 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.

to section 5.6.4: Operation modes

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.

Run a short rinsing cycle (if in [r28] parameterized)



- Hold SET-button and then press button CLEANING immediately.

To stop cleaning manually (see also section 6.5)

- 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 9.17.1)

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 ‘Robot’ is configured in parameter [A40]. See also 9.17





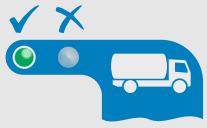
Using the ROBOT STOP button, the operation of a connected robot is either stopped or enabled.

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.

to section 5.6.4 Operation modes

Milk collection















Complete emptying of tank into collection tanker

(For partial emptying, see section 5.1.5)

- 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].

Function is also operable via external button.

(see parameters A21..A33 - setting 26)

Observe the tank monitor



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

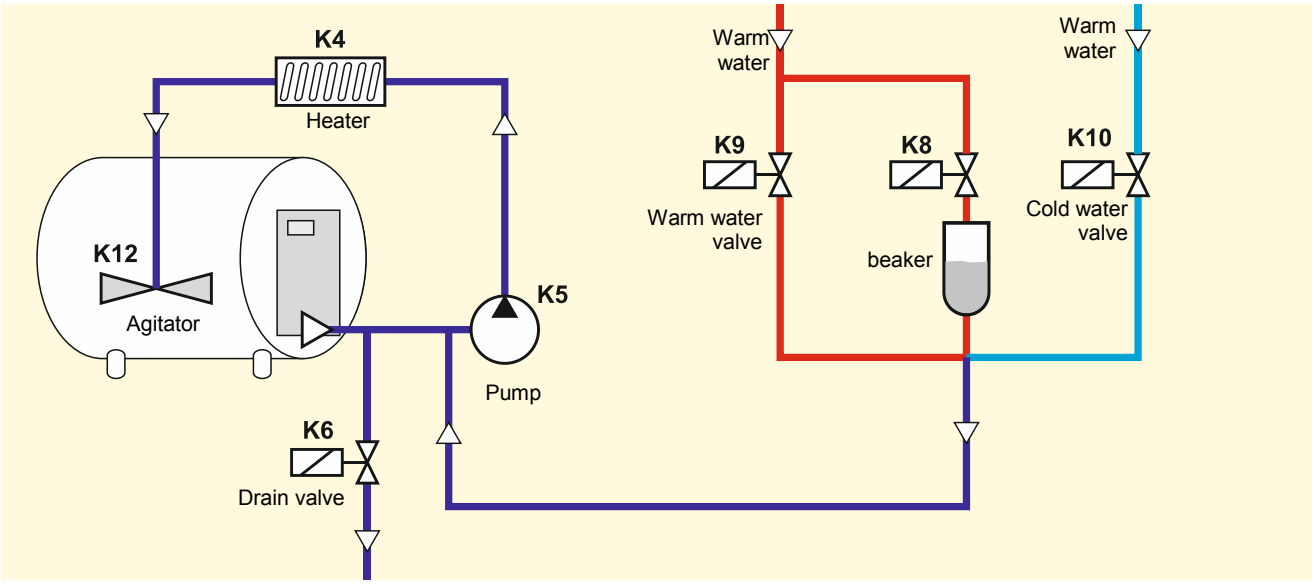
- LED shows green: milk can be taken out.
- LED shows red: DO NOT LOAD MILK!
  The fault is indicated in the display.

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

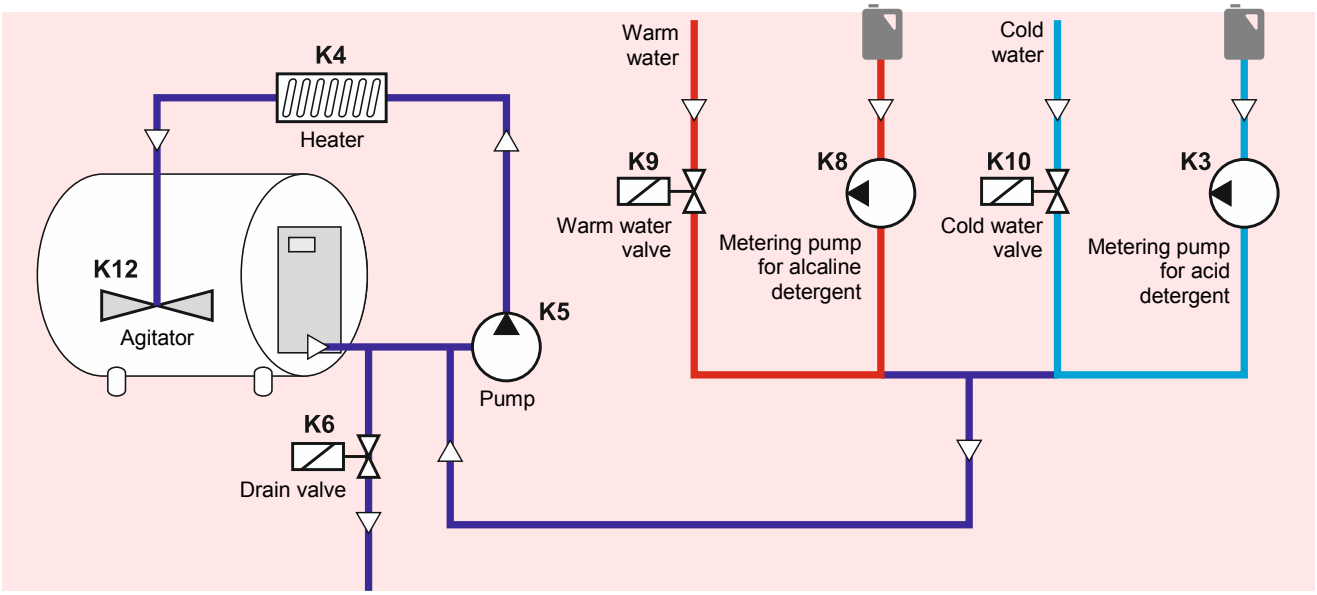


Cleaning method for milk cooling tanks, where alkaline and acidic detergents are supplied either by a drawer or a fixed beaker.

It is also possible to control a pinch/ball valve directly.

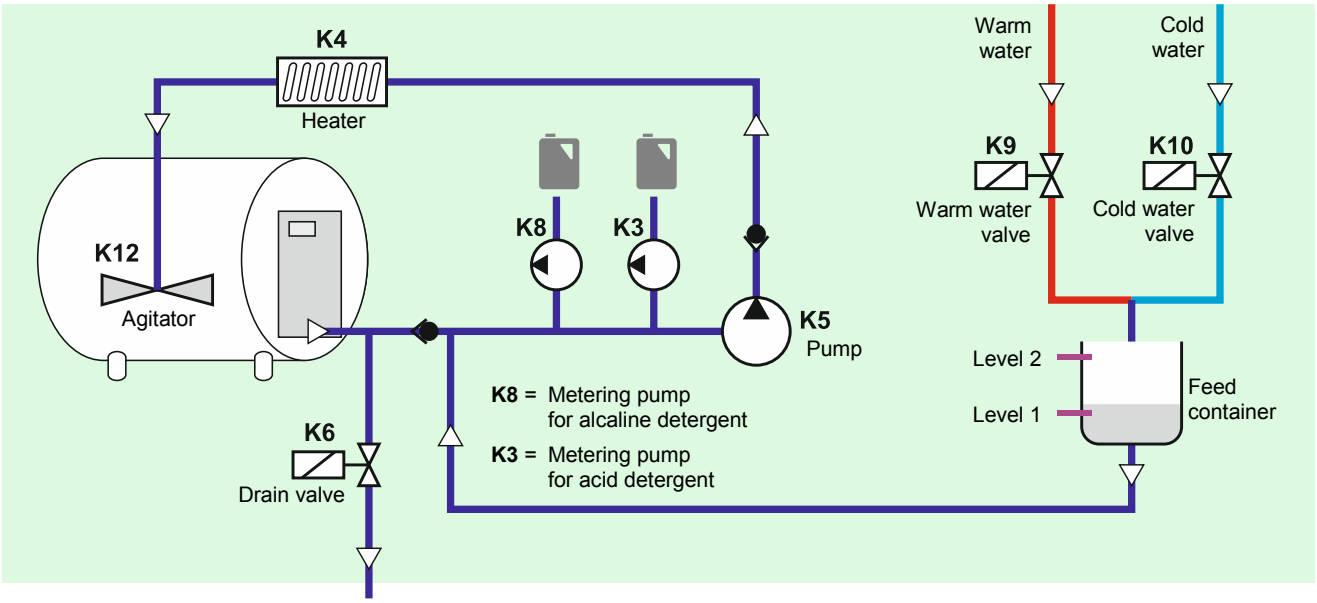
See also section 11.1.1

6.1.2 Circulation cleaning with two dosing pumps



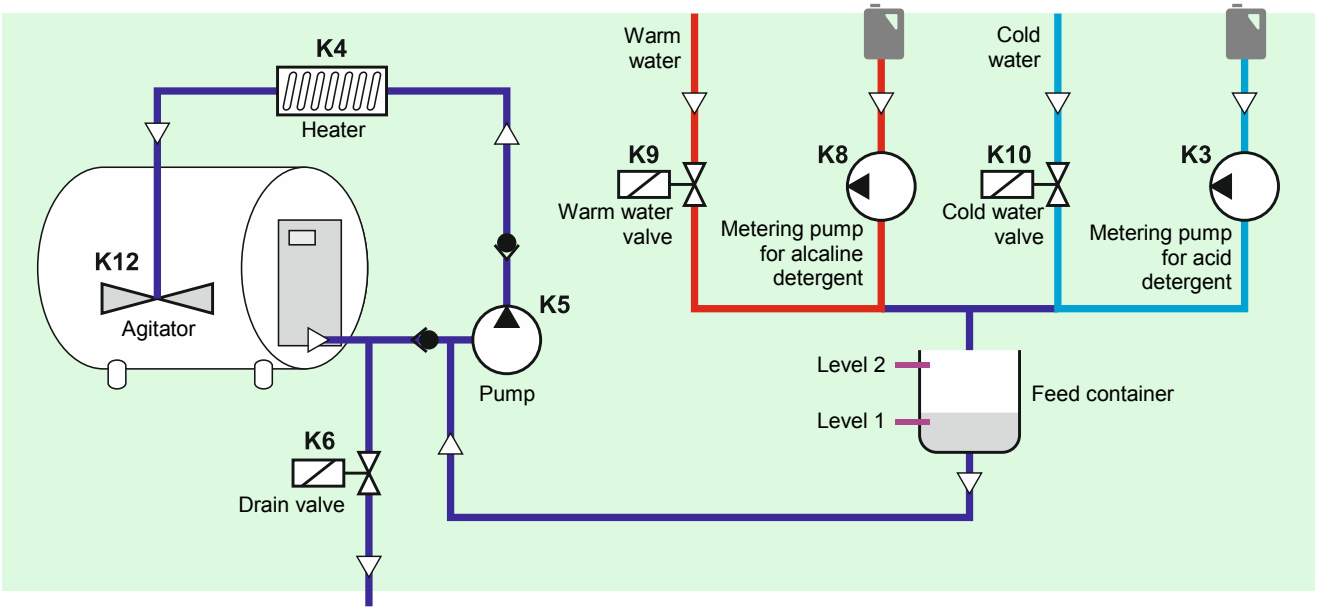
Cleaning method for milk cooling tanks, where alkaline and acidic detergents are supplied by separate dosing pumps.

6.1.3 Displacement cleaning with feed container, dosing pumps in circulation pipe



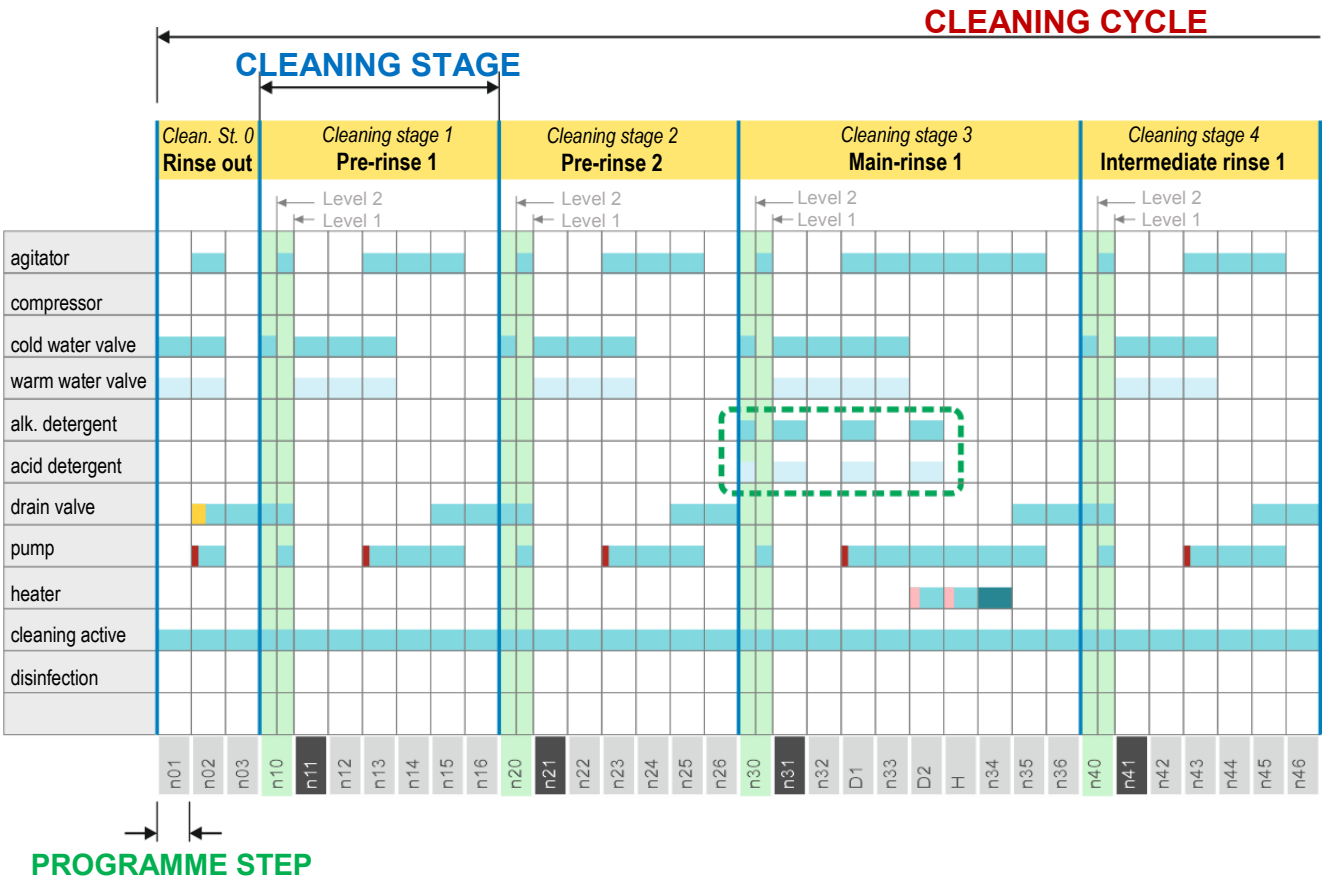
Cleaning method for milk cooling tanks, where hot and cold water are dosed level-controlled in a feed container, before pumped out for tank cleaning. The detergent is filled into circulation line.

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 (Maximum configuration)



CLEANING CYCLE

A CLEANING CYCLE consists of different CLEANING STAGES. Whether and how often each individual cleaning cycle is carried out is parameterized in parameters [r40 to r49].

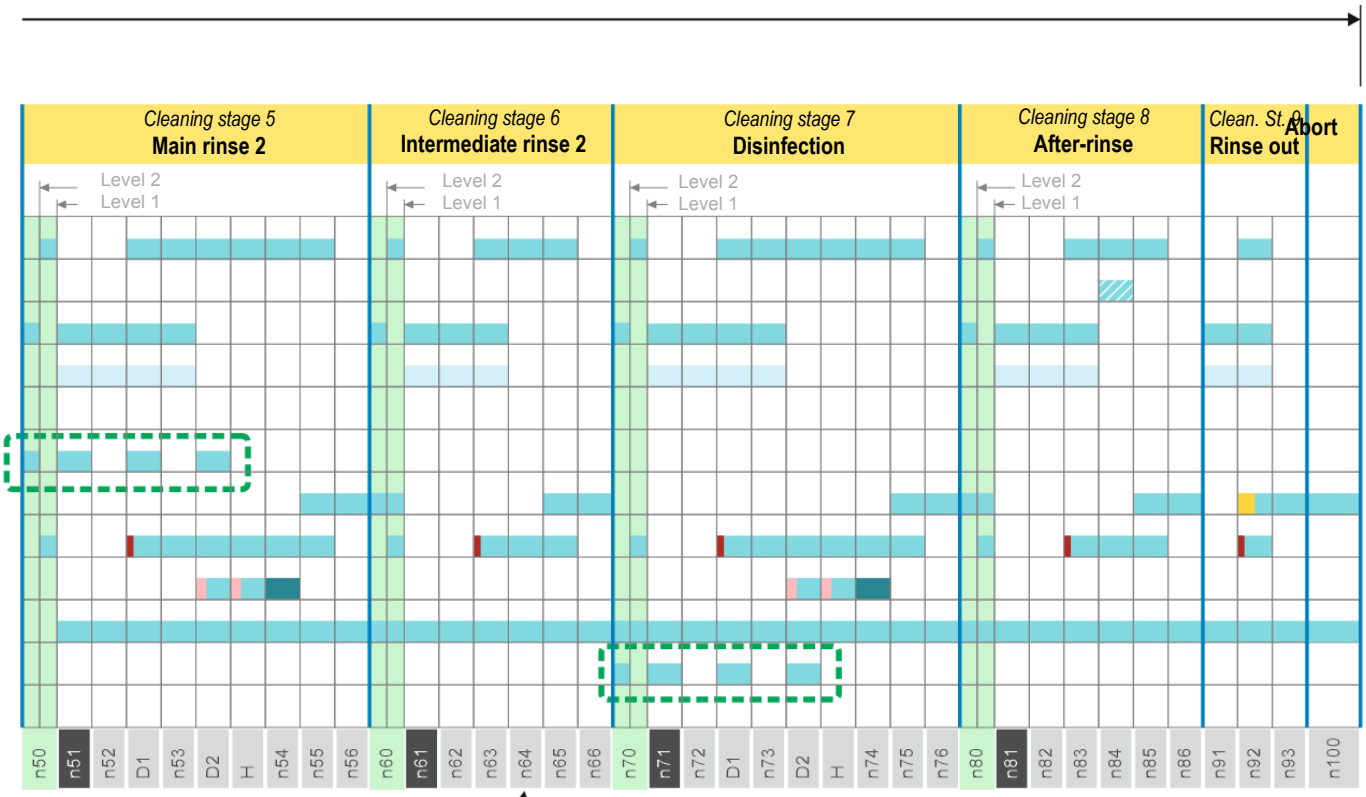
CLEANING STAGE

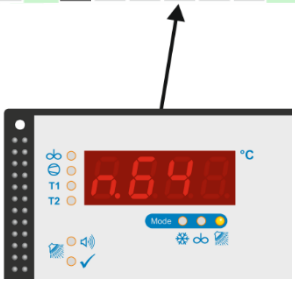
Each CLEANING STAGE consists of several 'PROGRAMME STEPS'.
The sequence of a rinsing cycle is determined by the parameterisation of the programme steps

PROGRAMME STEP

Each individual PROGRAMME STEP can be set via n-parameters (section 8.4). Entering '0' deactivates a programme step.

- 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])
- Switch-on delay drain valve [r26]





During the cleaning process the current programme step is displayed (factory setting)

The flashing point indicates activity.

PROGRAMME STEPS

n	Designation of the **n-parameters**, with which the corresponding times are set
n	n-parameter, only required in case **of cleaning method with feed container** ‚green' (see section 6.1.3 and 6.1.4)
n	n-parameter, only required for **water intake by level**
D	Adjustment of dosing times for detergents (see sectio**Fehler! Verweisquelle konnte nicht gefunden werden.**n 6.3.6)
H	Heat-up time (variable - until the set temperature is reached)

6.3 Explanation and programming of the cleaning process

6.3.1 Factory setting

In the factory setting, the WTS-300 is set as follows:

- Only 1 main rinse cycle per cleaning cycle
- 3 cleaning cycles are carried out with alkaline detergent, before 1x acidic cleaning takes place
- Water intake via time (the first two programme steps of each rinse cycle are deactivated)
- Dosing of detergent via time and dosing pumps

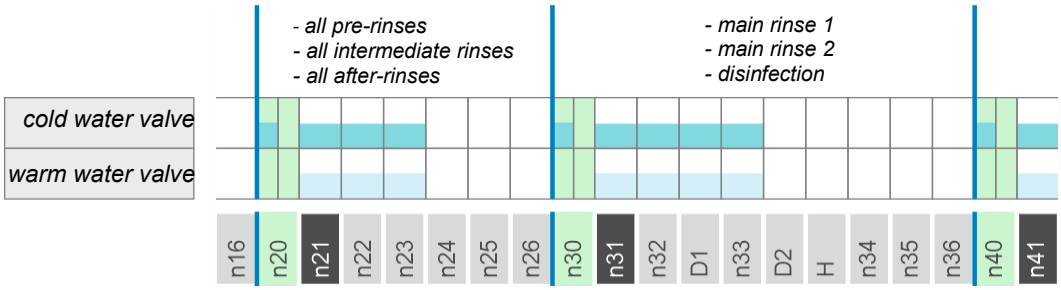
By setting the cleaning parameters, the sequence of the cleaning cycles can be adapted to all system types.

6.3.2 Determination of the number of individual rinsing cycles

Parameters [r40 to r49] are used to set whether and how often each individual rinsing cycle is carried out. The parameters of the deactivated rinsing cycles are hidden.

During the cleaning cycle, the display shows the programme step currently being carried out.

6.3.3 Different methods of water intake



The WTS-300 offers various methods of water intake to suit the different types of system. The setting for this is made in the first parameters of each rinsing cycle. See section 6.4

	TIME [n22, n32, …] (factory setting) Here the water intake is opened TEMPIRAL ONLY.
	LEVEL [n21, n31, …] Here the water valve is opened until the LEVEL ELECTRODE is achieved.
	LEVEL and **TIME** [n23, n33, …] As LEVEL, but an additional 'water intake time' can be determined.
	PRE-HOPPER [n20, n30, …] In programme steps [n10, n20, n30 … n80], you set how often the pre-tank is filled with water up to level 2 and then drained. Draining continues either until level 1 is clear or for the time set in [r88].
	QUANTITY-CONTROLLED (special application – see below) Here, the water intake is quantity-controlled via a FLOW SENSOR.

NOTICE

Special application
"Dosing detergent and / or water intake QUANTITY CONTROLLED"

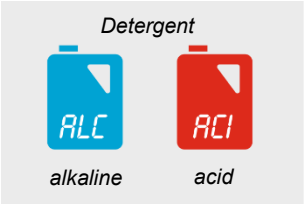
As a rule, the functions

- dosing of cleaning agent or disinfectant' is time-controlled and / or
- water intake optionally are time- or level-controlled.

In certain applications, however, it may be advantageous to control these functions 'quantity-controlled'. For setting instructions on this topic, see section 6.6

Quantity-based dosing into the feed container is not supported!

6.3.4 Cleaning with alkaline or acidic detergents



In parameter [r45] it is parameterized whether the cleaning cycle is generally carried **out with one or two main rinses.**

Cleaning cycle with one main rinse cycle *(factory setting)*

If a cleaning cycle with acidic detergent shall take place only after x cleaning cycles with alkaline detergent, main rinse 2 must be deactivated [r45 = 0]. In parameter [r21] is set after how many alkaline cleaning cycles a cycle with acidic detergent shall take place.

Cleaning cycle with main rinse 1 + 2

- If main rinse 1 + 2 is activated [r45 = 1], both alkaline and acidic detergent is used in each cleaning cycle.

See also section 6.2

6.3.5 Disinfection



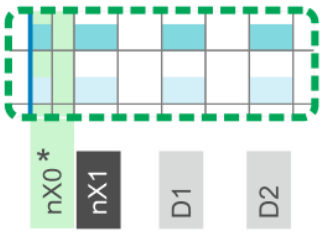
In rinsing cycle 7, a 'disinfection' can optionally be parameterised.

Settings:

- Activate rinsing cycle 7 in parameter [r47],
- Enter the desired dosing time in parameter [n103],
- Assign output function '17' to a free relay [A1..A12].

The display shows "dESI" during the dosing process.

6.3.6 Time of detergent dosing



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

0: Programme step nX0 => dosing in feed container (displacement cleaning)
1: Programme step D1 => add detergent AND water at the same time
2: Programme step D2 => add detergent ONLY
3: in program step 'Fetching water above level'

* only required for cleaning methods with a pre hopper ‚green'
(nX0 = n30, n50, n70)

The detergent is always added time-controlled [n101.. n103] in the factory setting. During dosing, the following appears in the display

- ALC = alkaline detergent is dosed
- ACI = acid detergent is dosed

NOTICE

Dosing into the pre-hopper

When dosing into the pre-hopper, the detergent is added with the second water intake only. See also section 6.2 - Cleaning flow chart.

NOTICE

Detergent is added by beaker

When adding detergent by a beaker, see section 11.1 – Possibility 2.

NOTICE

Get cleaning agents in the program step: 'Get water above level'

Fetching water and adding the cleaning agent start at the same time. Jumping to the next program step only occurs when both processes have been completed.

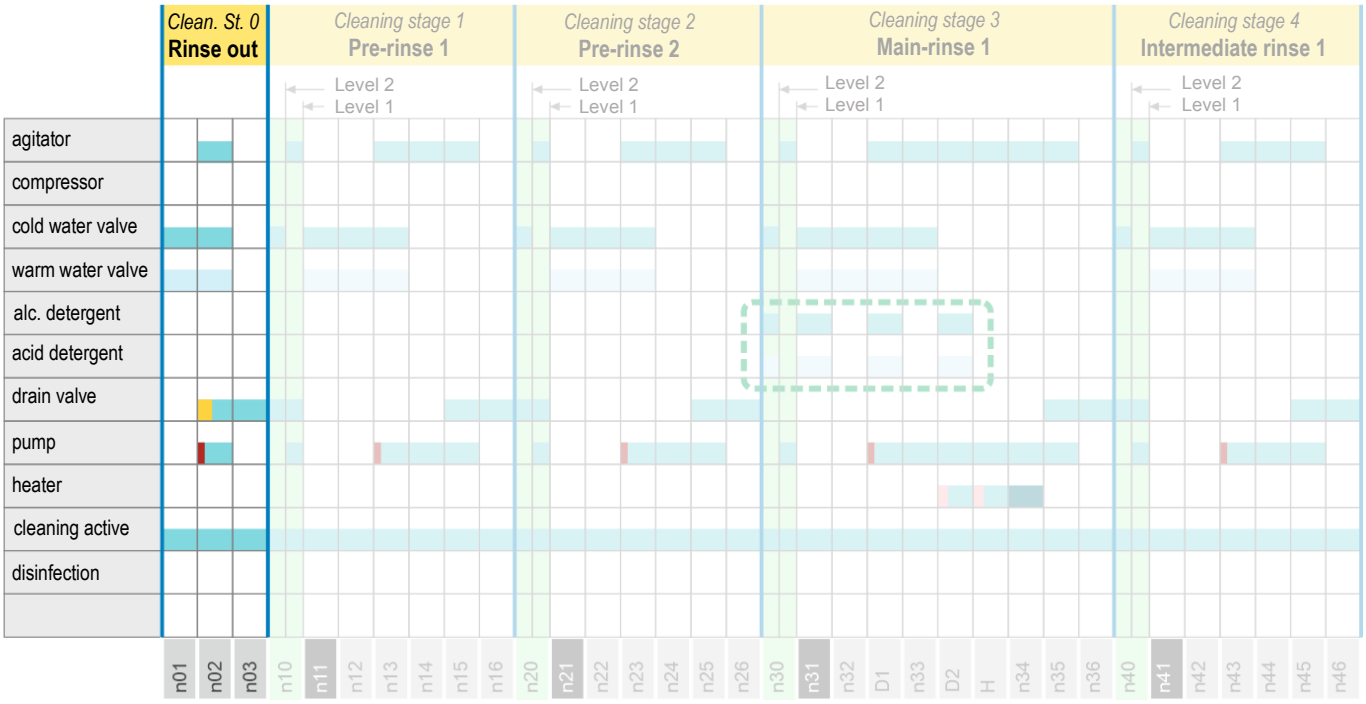
ATTENTION: The corresponding level step must be activated in the associated n parameter - otherwise NO cleaning agent will be added!

6.4 Parameterization of the cleaning stages

6.4.1 Cleaning methods

Section 6.1 explains 4 cleaning methods for different cooling tank configurations. The parameterization of all 4 methods is described below, 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



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.

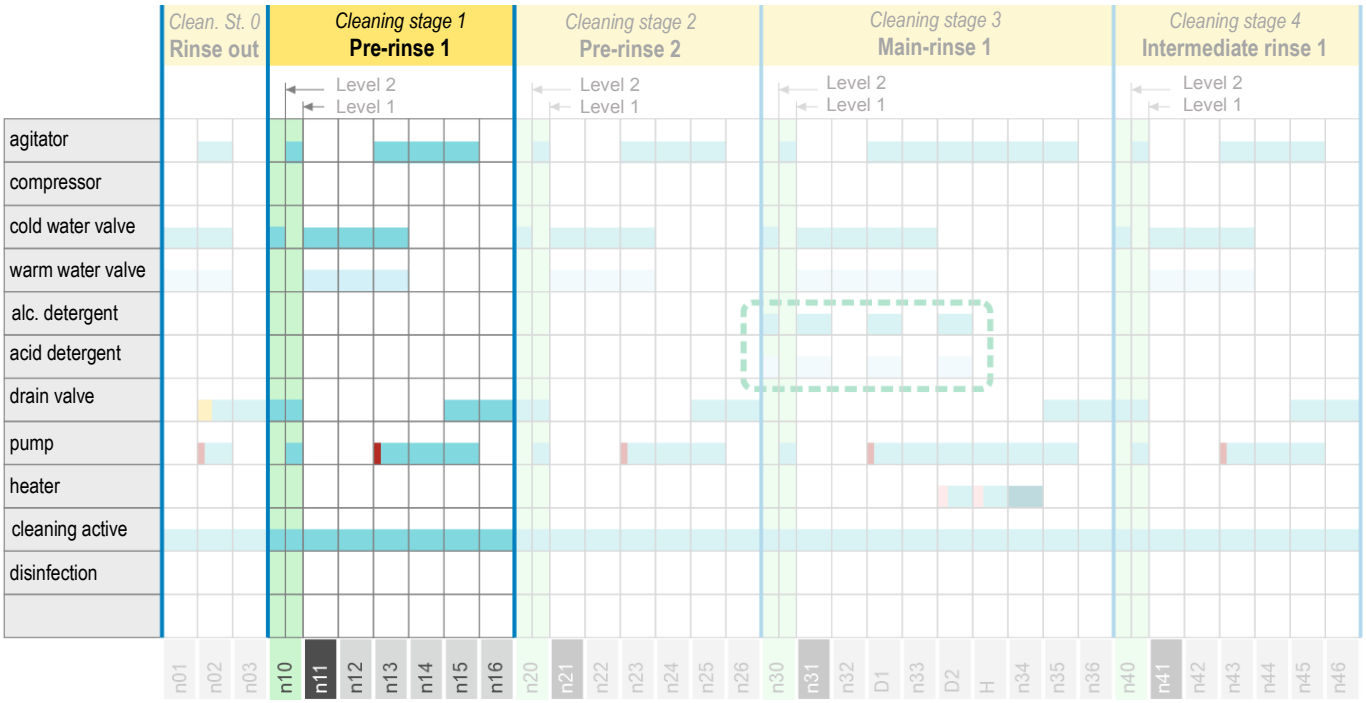
  The parameter [r50] is used to stipulate whether cold, hot or mixed water is to be taken in.

  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.

to section 6.4: Parameterization of the 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.

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

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 n13 have to be parameterized on „0“

- Agitator and pump start to run.

Another option is to select an 'additional water intake time' using [n13].

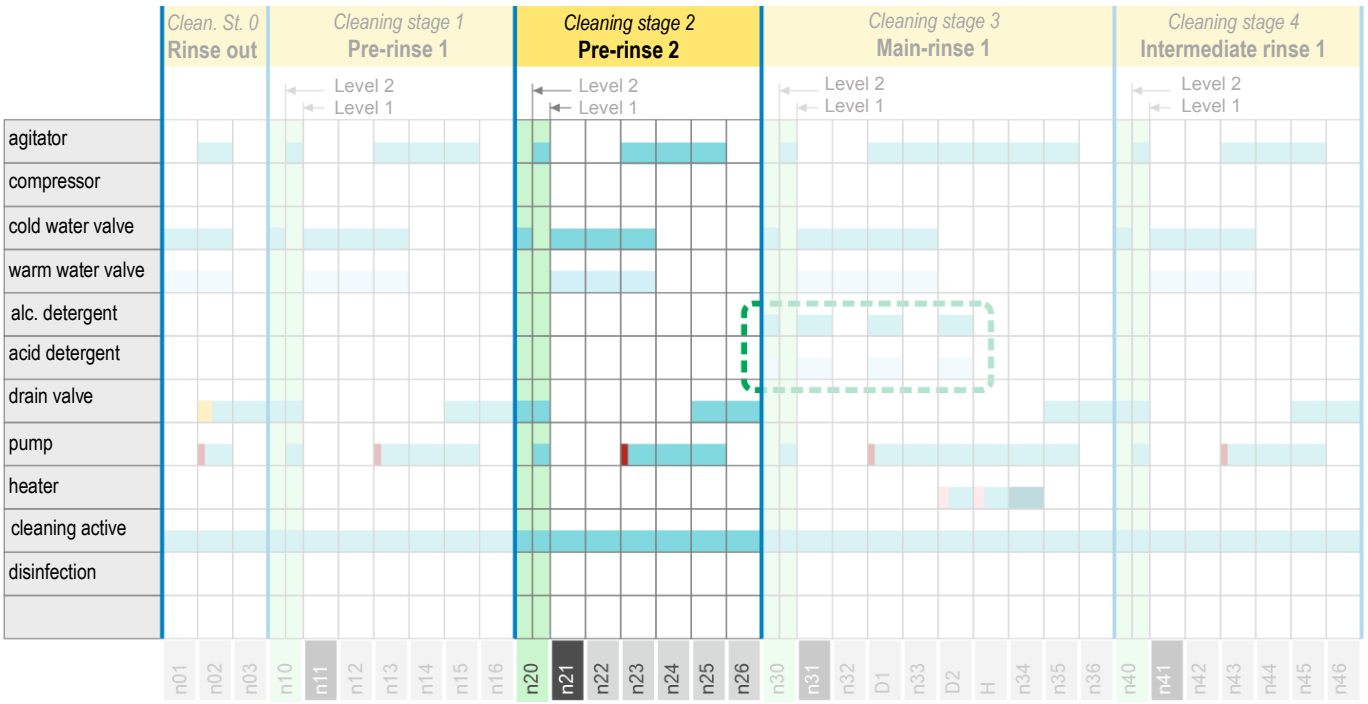
In case of green n14 have to be parameterized on „0“

- 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].

to section 6.4: Parameterization of the cleaning stages



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.
- Water is taken in.

  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 n21 and n22 have to be parameterized on „0“

- Agitator and pump start to run.

  Another option is to select an 'additional water intake time' using [n23].

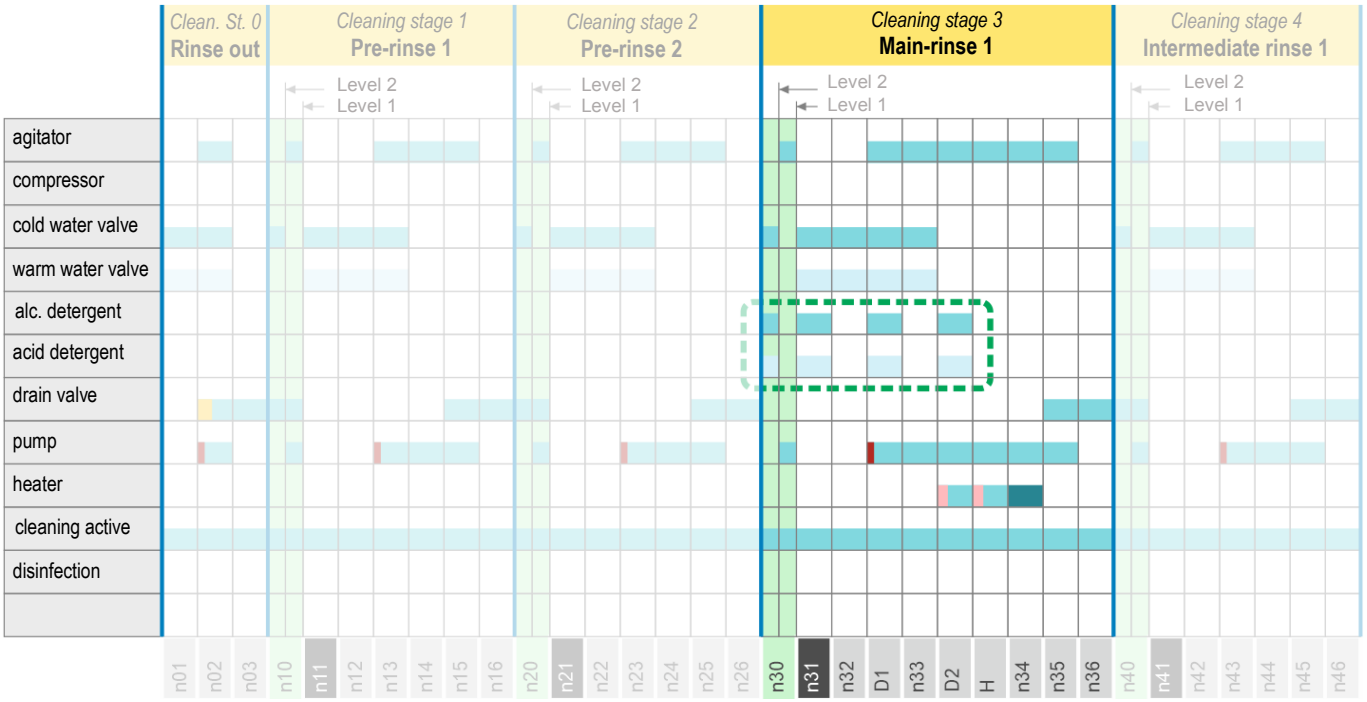
  The water circulates for the pre-set time [n24].

  An additional time can be defined in parameter [n25], in which the drain valve opens (agitator and cleaning pump continue to run)

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

- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n26]. See also [n25].

to section 6.4: Parameterization of the cleaning stages



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].

  Settings for version 6.1.4 (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.

- Water is taken in.

  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 n31 and n32 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].

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

** (D1 or D2 in cleaning programme diagram)*

to section 6.4: Parameterization of the cleaning stages

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



Cleaning agent dosing: *(see also section 6.3.6)*

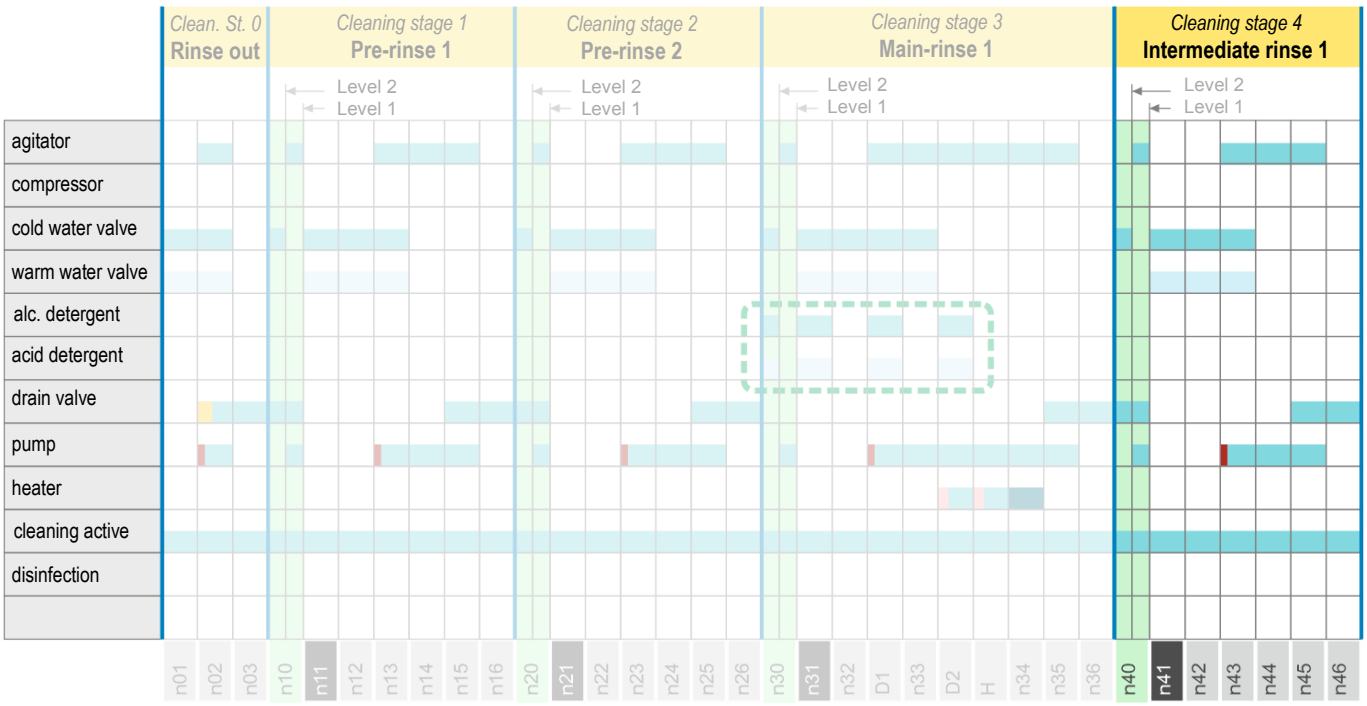
- Depending on the setting of the parameter [r20], detergent is injected at the end of the water intake time [n32] or the subsequent water intake time [n33] as follows:
  - *If ‚cleaning stage 5' is activated [r45=1] only alkaline detergent is injected here for duration [n101*].*
  - *If 'cleaning stage 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 - F48

  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].

to section 6.4: Parameterization of the cleaning stages



Cleaning stage 4: ZWISCHENSPÜLEN 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.

  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.

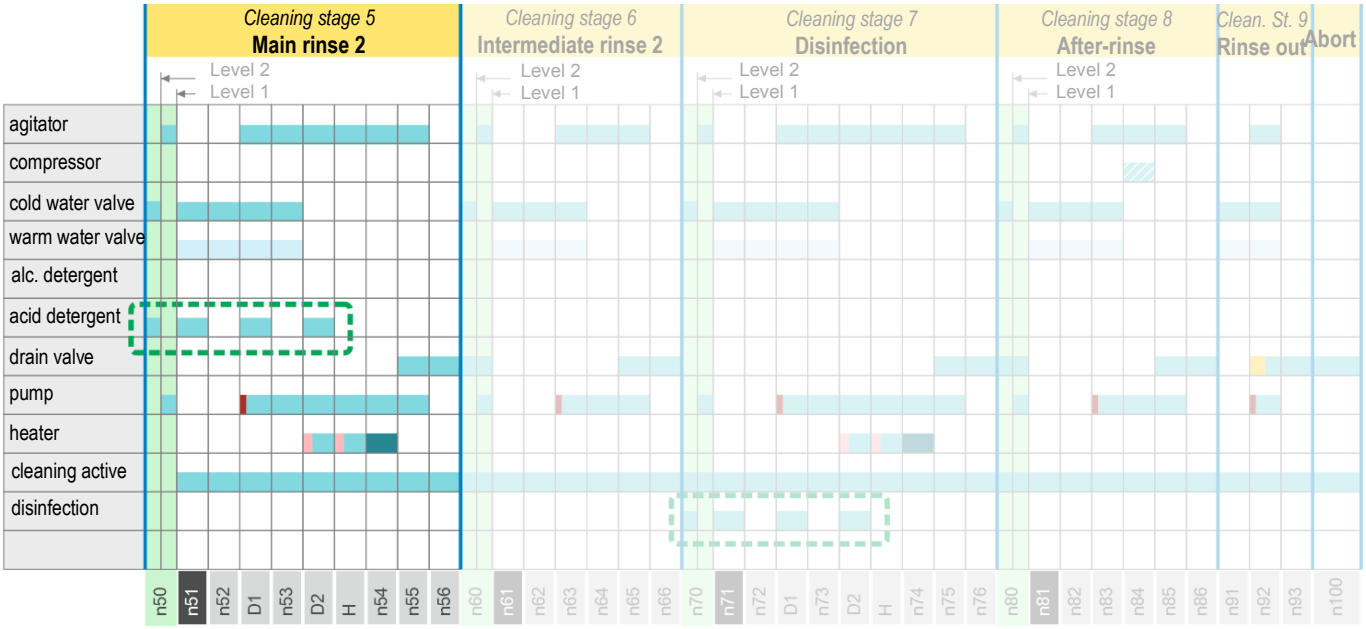
  Another option is to select an 'additional water intake time' using [n43].

  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].

to section 6.4: Parameterization of the cleaning stages



Cleaning stage 5: MAIN WASH 2

Parameter [r45] = 0 'Cleaning stage 5' disabled
Parameter [r45] = 1..5 '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.

- Water is taken in.

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

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 [r55] 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.

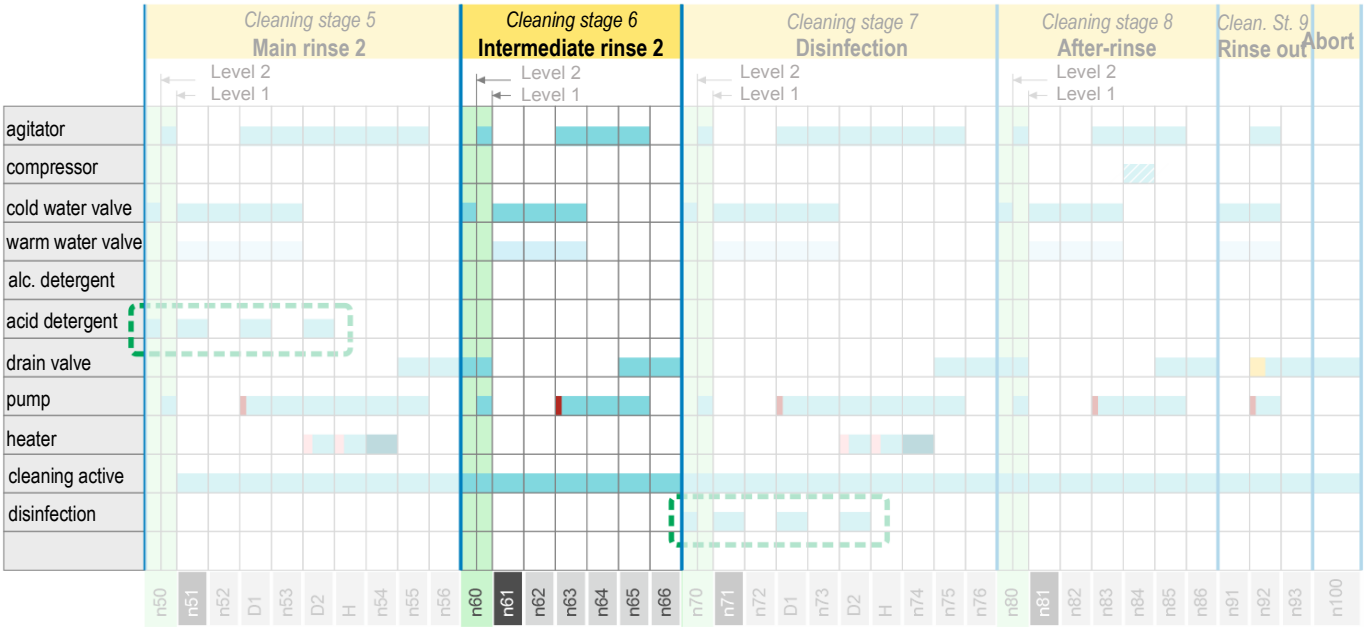
  If the temperature is not reached within the pre-set time [r37], the control unit continues with the program, but a fault report is displayed at the end. See section 7.5.3 - F48

  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.)

to section 6.4: Parameterization of the cleaning stages

- 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].

to section 6.4: Parameterization of the cleaning stages



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.

  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 [r56] 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 n63 and n64 have to be parameterized on „0“

- Agitator and pump start to run.

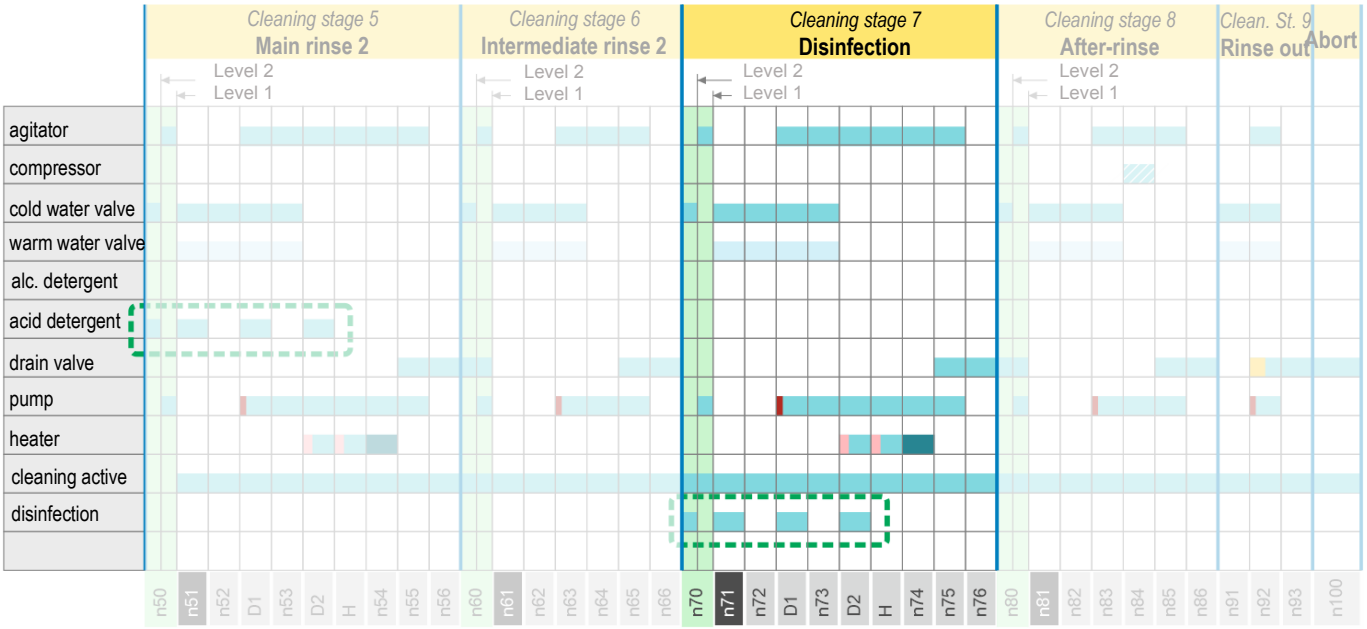
  Another option is to select an 'additional water intake time' using [n63].

  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].

to section 6.4: Parameterization of the cleaning stages



Cleaning stage 7: DISINFEKTION

Parameter [r47] = 0	‘Cleaning stage 7’ disabled
Parameter [r47] = 1..5	‘Cleaning stage 7’ 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 [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.

  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 7.5.3 - 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.

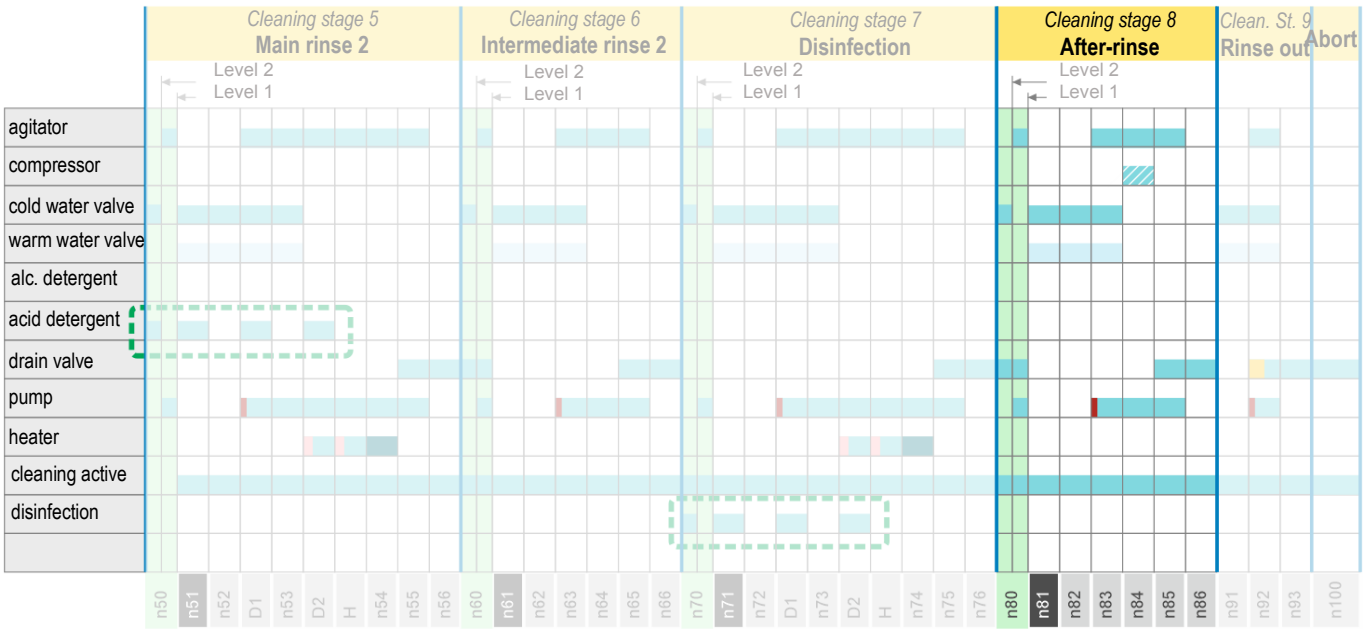
  If the temperature is not reached within the pre-set time [r37], the control unit continues with the program, but a fault report is displayed at the end. See section 7.5.3 - F48

  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.)

to section 6.4: Parameterization of the cleaning stages

- 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].

to section 6.4: Parameterization of the cleaning stages



Cleaning stage 8: NACHSPÜLEN

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.

  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].

  The cleaning parameter [r58] 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 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].

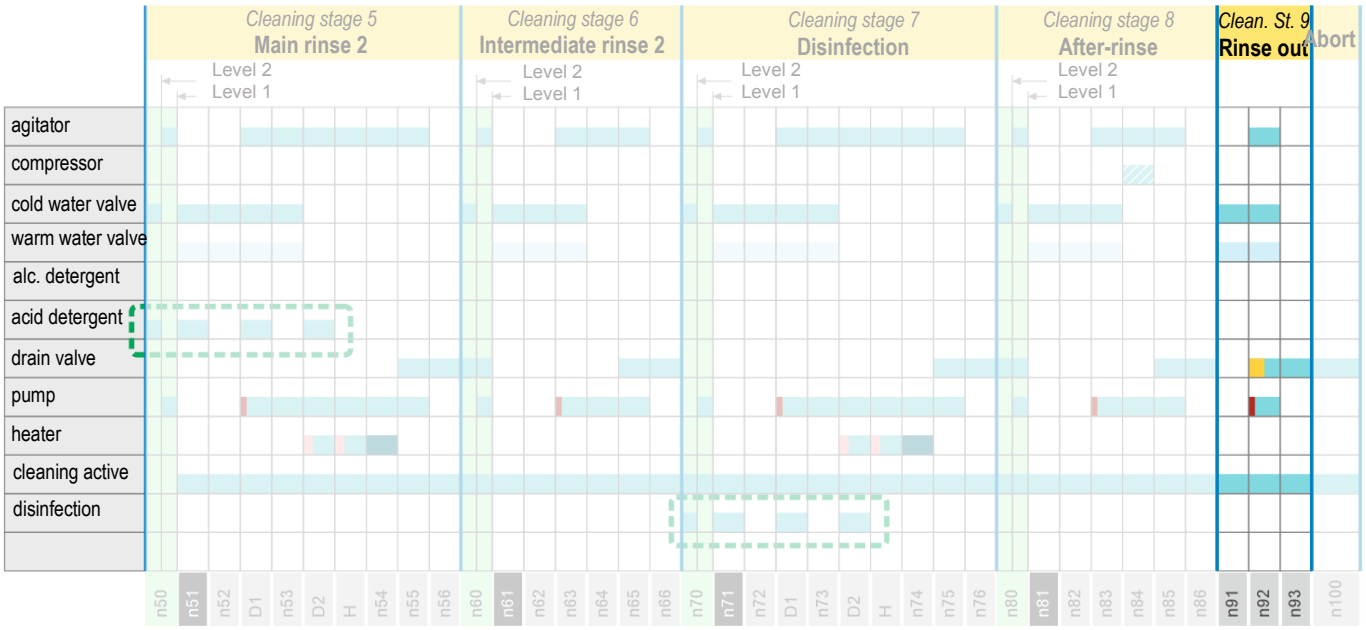
  The water circulates for the pre-set time [n84].

  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].].

to section 6.4: Parameterization of the cleaning stages



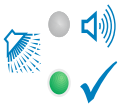
Only reasonable for yellow and pink

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 [n91].
- Agitator and pump start to run, the outlet valve will open.
- The water circulates for the pre-set time [n92].
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n93]. 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.

6.5 Abort of the cleaning



Cleaning cycle completely finished

If all rinsing cycles have been completed, this is signalled by the "green LED". Depending on the parameterisation [P60], cleaning changes to "OFF mode" or to "cooling mode".

NOTICE: Any errors that occurred during cleaning that did not lead to cleaning being interrupted are shown on the display.

Abort of the cleaning



MANUAL

- Cancel the cleaning cycle by pressing and holding the OFF button.
  - In the first 10 seconds after start-up:
    No fault message appears - the control unit switches to OFF mode.
  - Afterwards (after the first 10 seconds)
    - cleaning stops,
    - 'AbL' and the fault message 'F43' are displayed alternately



For further details, see section 6.5.1

DUE TO FAULTS

If any of the faults listed below occur during cleaning, the cleaning process is stopped and the display alternates between 'AbL' and the corresponding fault message.



The following faults cause the cleaning process to be aborted:

- **F40** - Tank outlet safety switch activated
- **F41** - Pressure switch for cleaning line
- **F42** - Thermal contact for washing pump
- **F43** - Manual cancellation of cleaning
- **F44** - TIMEOUT water intake above level
- **F45** - Water in tank after emptying
- **F46** - TIMEOUT water intake quantity controlled

For further details, see section 6.5.1

6.5.1 Abort of the cleaning due to faults

If the cleaning process was aborted manually or due to a fault, the control unit switches to the fault state of cleaning mode! (The yellow LED for cleaning indicates that the control unit remains in cleaning mode.)

This means:

- the robot remains stopped
- the disc valve and drain valve are open.
- the fault relay is energised (if configured).



- the drain valve remains open for a duration of [n100] (it can be closed early by pressing the OFF button again).
- After a time of [n100], the drain valve closes and the red fault LED flashes alternately with the fault message on the display.



- The robot remains stopped and the disc valve remains open.
- The fault relay can be deactivated by briefly pressing the RESET button.



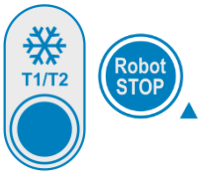
Clearing the fault condition in cleaning mode

- Press and hold the OFF button: The fault condition in cleaning mode is cleared.
  - The control unit switches to OFF mode,
  - the yellow ‘Cleaning’ LED and the flashing red fault LED go out.
  - The fault message continues to flash on the display.
  - Press the RESET button briefly: The fault message is reset
  - The robot remains stopped (if fitted) and the disc valve remains open.
  - The drain valve is closed



The fault must be rectified!

The cleaning or cooling mode can be started!



<u>Reset / acknowledge the fault messages:</u>

- Restart cooling manually:
  - either using the COOLING button
  - or (if a robot is installed) using the ROBOT STOP button.

6.5.2 Power failure during cleaning



- After the power returns after a power failure:
  - *the display shows the current temperature alternating with 'ABL',*
  - *the drain valve is opened for the time [n100],*
  - *the control continues the cleaning at the start of the rinse cycle in which the interruption occurred.*
  - *Fault 'F30' appears in the display until it is acknowledged.*
  - *Depending on the parameterisation [P60], the cleaning changes to "OFF mode" or to "cooling mode"*

6.6 Dosing of detergent and / or water intake by flow metering

6.6.1 General information and first steps

As a rule, the functions

- dosing of cleaning agent or disinfectant' is time-controlled and / or
- water intake are optionally time- or level-controlled.

In certain applications*, however, it may be advantageous to control these functions 'quantity-controlled'. Detergent or water are flowing until the entered litre quantity is achieved.

Quantity-based dosing into the feed container is not supported!

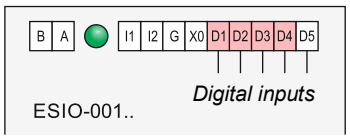
** e.g. strongly fluctuating water pressure or for the monitoring of the detergent quantity*

For the quantity-controlled detergent addition the following is required:

- WELBA I/O extension module ESIO-001
- for detergent dosing:
  2 pieces of flow sensors (pulse counter) for alkaline and acid detergent
  and / or
- for water intake:
  2 pieces of flow sensors (pulse counters) each for cold and warm water,
  or only 1 flow sensor when cold and warm water are combined in front of the sensor.

Proceed as follows:

- Connect the flow sensors to the first four digital inputs (D1 to D4) of the I/O expansion module. For connection, see the documentation of the I/O expansion module.



As only 4 flow sensors can be connected, only a maximum of 4 of the following functions can be dosed in a quantity-controlled manner.

- alkaline detergent
- acidic detergent
- disinfectant
- cold water
- warm water

- Activate the I/O expansion module in parameter [A74].
- Assign the connected flow sensors to the corresponding digital inputs using parameters [A29..A32]. (Selection 38 to 42)
- Enter the number of pulses per litre in each of the parameters [L121..L125]. This is usually given in the documentation of the flow sensors.

  L121 <=> alkaline detergent
  L122 <=> acidic detergent
  L123 <=> disinfectant
  L124 <=> cold water
  L125 <=> warm water
- If the pulse numbers are unknown, they must be determined - as described in section 6.6.4.

6.6.2 Dosing of the quantity-controlled detergent and disinfectant

Settings for rinsing cycles (3 + 5 + 7)

- Activate the function *"Volume-controlled detergent and disinfectant dosing"* in parameter [L110] for both main rinses and disinfection.
- Select the desired detergent and disinfectant dosing quantities in parameters [L101 to L103].

  If the value '0' is entered in a parameter [L101 to L103], the corresponding detergent or disinfectant is dosed via time [n101 to n103].

NOTICE

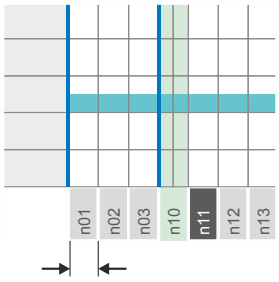
- Set a timeout-time for dosing in parameter [L112].

  If the desired detergent quantity is not achieved within the time [L112]:

  - the dosing is stopped,
  - the cleaning is carried out to the end,
  - the fault message (F35, F36 or F37) is given.
- Select 'Programme step' D1 or D2 in parameter [r20] for the dosing of the cleaning agent.
  - Programme step D1 => Add detergent AND water at the same time
  - Programme step D2 => Add detergent ONLY

Detergent and disinfectant are now added in each rinse cycle according to the number of litres entered. The other programme steps remain unchanged.

6.6.3 Quantity-controlled water intake



Programme step

Settings separately for each rinse cycle (0 - 9)

- Activate the function *"quantity-controlled water intake"* in parameter [L105] for all rinse cycles.
- In the corresponding L-parameters [L1, L2, L12, L13... etc.], determine the desired amount of water for the associated 'programme steps' n01, n02, n12, n13... etc.

  Water is then added in each rinse cycle according to the number of litres entered. The other programme steps remain unchanged.

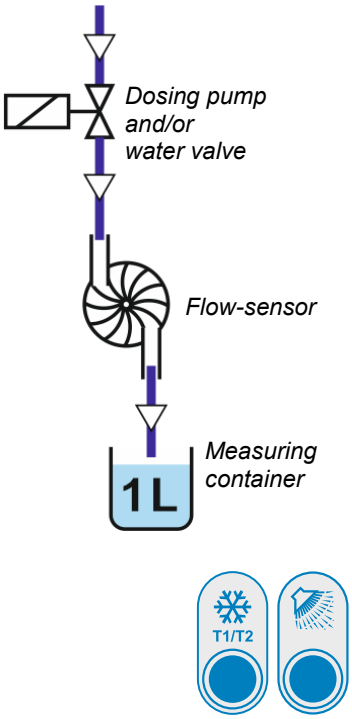
  NOTICE: If no water quantity is entered in one of the L-parameters, the programme step is skipped.
- if program step D1 is selected in parameter [r20]:

  Define in parameter [L104] the amount of water entering at the same time as the detergent or disinfectant.
- Set a timeout-time for water intake in parameter [L107].

  If the desired litre-indication is not achieved within the time [L107], parameter [L106] is performed as set:

0:	Same timeout [L107] for all programme steps after timeout abort of cleaning*.	F46
1:	Same timeout [L107] for all programme steps after timeout the cleaning is continued	F46
2:	Individual timeout for each programme steps (adds up from the corresponding n- parameter [n01, n02, n12, n13...] + [L107]) after timeout the cleaning is continued	F46

** Control stops at the end of cleaning. Robot remains stopped*



6.6.4 Testing / determining the number of pulses of the flow sensors per litre

To determine the number of pulses of each flow sensor, proceed as follows:

- Connect a hose to the first flow sensor and insert the other end into a measuring container.
- Go to the o.-parameter level by entering code '10E5'.
- Select the appropriate flow sensor [o.81 to o.85] with the arrow keys.
  - o.81 => Detergent alkaline
  - o.82 => Detergent acidic
  - o.83 => Disinfectant
  - o.84 => Cold water
  - o.85 => Warm water
- Activate the selected parameter with the SET button
- Reset the displayed number of pulses by pressing the 'Cool' key.
- By pressing the 'cleaning' key, the corresponding dosing pump can now be activated or the water valve opened. Keep the 'cleaning' key pressed until the measuring container is filled up to the 1-litre mark - and then release the key.

  The display now shows the number of pulses per litre.
- Record the number of pulses displayed and enter them in the corresponding L-parameter [L121...L125].
- Now repeat the procedure described above for each additional flow sensor.

TIP: If you do not have a 1-litre measuring container available, you can also use a bucket with a defined filling quantity, for example. The number of pulses displayed must be converted to pulses per litre.

7. Tank monitor and general fault handling

7.1 Description of tank monitor operation

IMPORTANT: ***After the initial installation the tank monitor works reliably only <u>after one or two cooling cycles</u> (learning of the tank processes).***

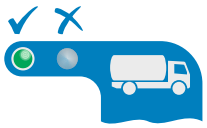
Trouble-free operations during this time are important!

Der 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 "<u>critical alarm</u>". In this case milk must not be added to the tank before a careful check has been carried out.

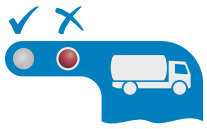
In the "F" parameters (see section 8.10), a system alarm, an informative alarm or a critical alarm is defined for each fault. It is also parameterized, whether a relay function or an SMS message should be carried out. For this to take effect, the relay functions in the "A" parameters (see section 8.11) 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 lon
During cleaning:	- cleaning temperatures - wash duration



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

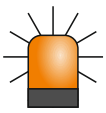
During cooling:	- milk temperature too high for too long - milk temperature too low - agitator failure and stirring times - max. time till next wash - duration of power failure
During cleaning:	- cleaning temperatures - detergent injection and acting time

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 8.10 "Alarm -> Event assignment".

Optical presentation of alarms

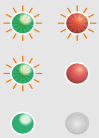


External alarm light:

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.

WARNING

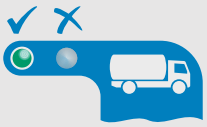
CAUTION:

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!!

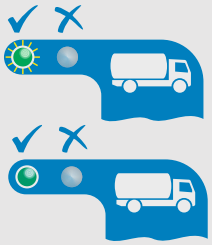
No alarm – **Milk may be drawn off.**



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	Informativer Alarm

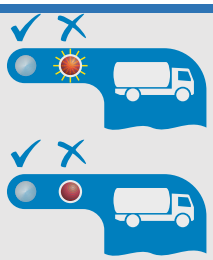
- The driver goes to the WTS-300 and checks the tank monitor.
  The green LED is flashing - the warn horn sounds - an error code is displayed.
  Milk can be drawn off -> The farmer must be informed.
- The farmer investigates (and remedies) the cause of the fault and presses the "RESET" button -> the 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.

to section 7.2: Tank monitor: Milk removal YES or NO

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



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



after RESET

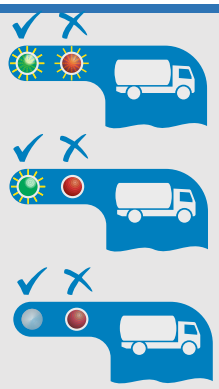
Green = off Red = on	critical alarm

- 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 8.10)
- 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.

to section 7.2: Tank monitor: Milk removal YES or NO

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

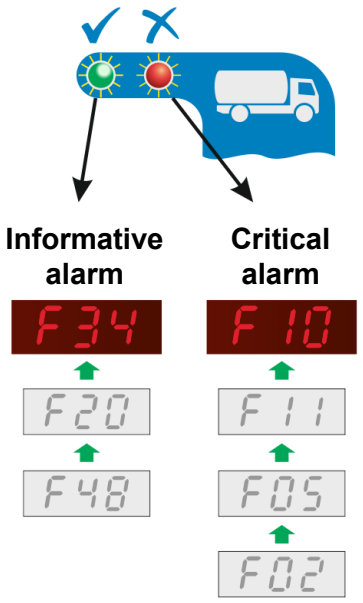


Green = flashing Red = flashing	critical + informative alarm (press RESET button)	
after RESET		
Green = flashing Red = on	critical + informative alarm (press RESET button)	
after second RESET		
Green = off Red = on	critical + informative alarm	

- 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 8.10)
- 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)

- Der 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.

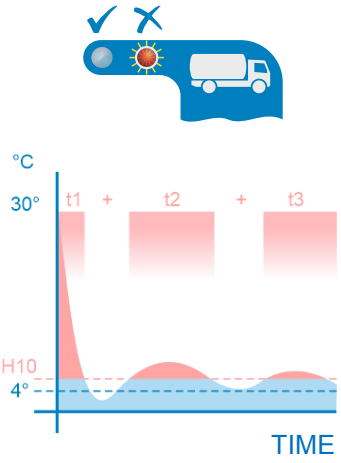
It is only when the cleaning cycle is active for at least 10 minutes that the tank monitor resets all critical alarms.

7.5 Listing fault codes and their description

Faults are shown flashing on the display.

Here mean:





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)**

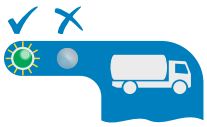
Alarm functions only if optional “Welba agitator monitor” is installed and parameters set [A71].

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.

F26 **Maximum compressor running time exceeded**
Alarm occurs when the total running time of all compressors during a cooling cycle exceeds the time entered in [h26].

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 every time the level falls below the set point!

F29 **Low temperature directly**
An alarm is triggered as soon as the milk temperature falls below the temperature set in [h29], but only once the compressor starts up for the first time after cleaning.

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. duration of cooling interruption (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 after cleaning** (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 **Fault detergent "alkaline”**

When the optional float switch is installed and configured [h35]:
- reports empty detergent tank

When the optional pulse counter is installed and configured [L112]:
- reports when no detergent is flowing in

F36 Fault detergent "acidic“

When the optional float switch is installed and configured [h36]:
- reports empty detergent tank

When the optional pulse counter is installed and configured [L112]:
- reports when no cleaning agent is flowing in

F37 Fault disinfectant supply

Only if the optional pulse counter is installed and configured [L112]**:**
- reports when no disinfectant is flowing in

F38 Exceeding of temperature difference, monitoring sensor
See section 10.16.

F39 Battery voltage too low

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

Check batteries – exchange or charge them, if necessary. See also section 9.7.

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.



3 sec.

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.

to section 7.5.3: System alarms - cleaning

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

F44 **Timeout for water intake by level / pulse counter**

- 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**

- 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].

F46 **Water intake monitoring**

- washing completed
- fault is shown in the display

Before the expiration of the minimum water intake time, the level electrode reports the water level.

Possible cause of fault:
- Level electrode defective or incorrectly connected.

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]).



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 10.11

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 or fault monitoring compressor

The compressor's motor protection has triggered.

Possible cause of fault:
- Compressor overheated / faulty

F54 Monitoring agitating unit (directly)

The alarm can only be triggered if an agitator monitoring is parameterised in parameter [P24 or P25].

Alarm is triggered when one of the following agitator faults is detected:

- no agitating unit activity, although agitator was switched on.
- agitating unit activity, although agitator was not switched on.
- Fault contact of the frequency converter triggered

WARNING

ATTENTION: Depending on the setting in parameters [P24 or P25], ONLY fault message F54 is displayed - or the compressor is also switched off. If this is the case, it must be ensured that an alarm is noticed!!!!

*Tip: **use** optional ESIPM-001 or ESGSM-001!*

F55 Timeout quantity-dependent cooling start

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

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:
- Defective temperature sensor
- Sensor cable damaged

The "EMERGENCY cooling" function is possible if parameterized 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 9.8

F61 **Error ESGSM modem / ESIPM modem**

- no communication with the ESGSM or ESIPM modem

F62 **Error I/O expansion module**

- no communication with the I/O extension module

7.5.6 System alarms in general

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).

F82 **Fault "external fault”**

Fault is displayed if a corresponding signal is present at the digital input [A21..A33] defined as a fault indicator. Thus, external system components can be monitored.

F83 **Malfunction 4-20 mA**

An error is displayed if an under- or over-current is detected at the active current input.

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.

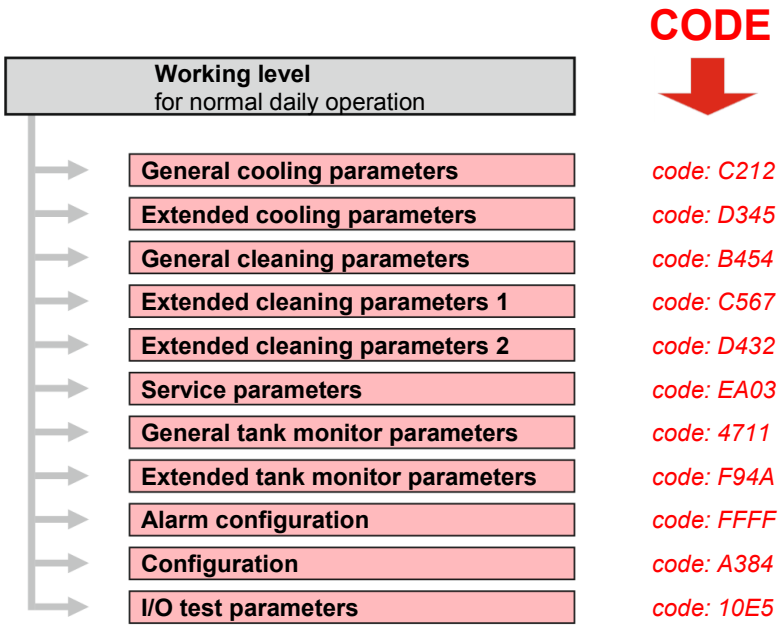
7.5.7 Test alarm

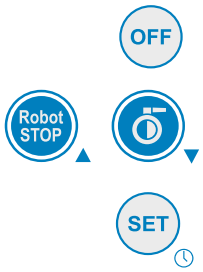
F99 **Test alarm** (see section 9.5)

8. Setting of parameters

8.1 Change and save parameter values

The WTS-300 is configured in 11 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 3 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.

to section 8.1: Change and save parameter values

Display parameter value:

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



Change parameter value:

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



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.

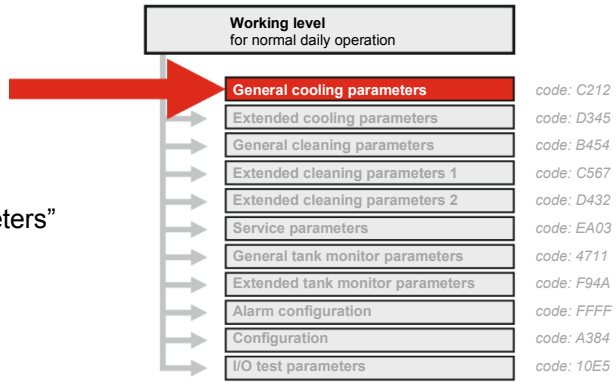
Return without saving the values:

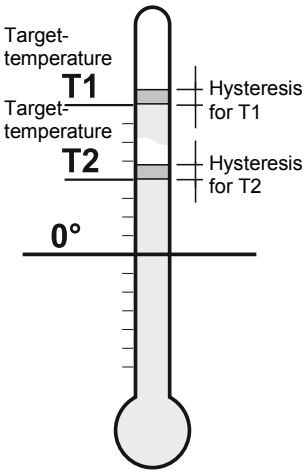
- Press the OFF button – or
- If no button is pressed for 60 seconds:
  The controller automatically returns to the OFF mode. All changes are lost.

8.2 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**	*Setting range defined in parameters [P10..P13]*	*4,0*
c2	**Target temperature for T2**		*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**	*Setting range defined in parameters [P15..P18]*	*0,7*
c11	**Hysteresis for target temperature 2**		*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 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*
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*

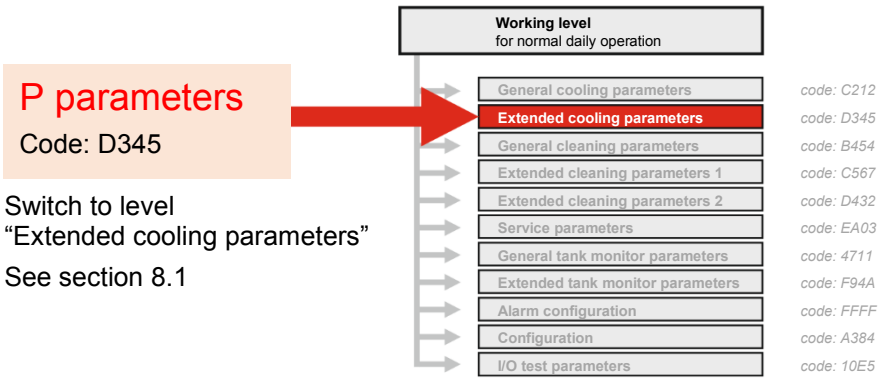
to section 8.2: Level “General cooling parameters” (c parameters)

		Range	Default
Sensor correction adjustment			
(see section 9.3)			
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.

8.3 Level “Extended cooling parameters” (P parameters)



EMERGENCY COOLING, behaviour on sensor failure		*Range*	*Default*
P4	**Manual start of compressor for x min. in case of sensor failure.** *Function see 10.6*	*0 .. 60 min.*	*0*

Compressor protection when filling from below		*Range*	*Default*
P6	**Compressor switch-on delay / pre-agitating** *Function see section 9.17.2* 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 5.6.4* 0: deactivated 1: short / long 2: toggling by button	*0 .. 2*	*1*
P23	**Automatic start to continuous stirring when cooling mode ends** *see section 10.2* 0: deactivated 1: activated	*0 .. 1*	*0*

to section 8.3: Level “Extended cooling parameters” (P parameters)

ATTENTION with P24

If selection "2" is activated for P24, it must be ensured that an alarm is noticed!!!!!!

(Use the optional ESIPM or ESGSM!).

ATTENTION with P25

If the option ‘3, 4, 7 or 8’ is selected for P25, you must ensure that an alarm is not ignored!!!

(Use optional ESIPM or ESGSM!)

		Range	*Default*
P24	**Status monitoring agitator (direct)** (F54) **via monitoring module, agitator sensor or switching contact** related to setting in [A71] *(see also section 7.5.4)* 0: deactivated 1: ONLY fault message when ONE of the agitators fails 2: Fault message + shutdown compressor in case of a shutdown of at least 50% of all agitators	*0 .. 2*	*0*
P25	**Fault monitoring agitator (direct)** (F54) **via fault contact of motor protection switch for example, Klixon etc.** *(see also section 7.5.4)* *Precondition:* *- Input function 35 must be assigned to one of the digital inputs [A21..A33].* 0: deactivated **Evaluation permanent** Fault message only 1: High-active (fault, when contact is closed) 2: Low-active (fault, when contact is opened) Fault message and compressor shutdown from 50% failure of the agitators 3: High-active (fault, when contact is closed) 4: Low-active (fault, when contact is opened) **Evaluation only if agitator is switched on** Fault message only 5: High-active (fault, when contact is closed) 6: Low-active (fault, when contact is opened) Fault message and compressor shutdown from 50% failure of the agitators 7: High-active (fault, when contact is closed) 8: Low-active (fault, when contact is opened)	*0 .. 8*	*0*

Automatic agitating before next pickup		*Range*	*Default*
P28	**Automatic pre-stirring prior to next collection** *see also section [E40 + E41]* 0: deactivated 1..72: x-hours after start of last cleaning an automatic stirring is activated	*0 .. 72 h*	*0*
P29	**Limitation of running time.** Pre-stirring stops after the set time if there is no milk collection with a subsequent cleaning.	*0,1..10,0 h*	*4,0*

to section 8.3: Level “Extended cooling parameters” (P parameters)

Drawing off milk through pneum. butterfly valve in cooling mode

		Range	Default
P32	**Milk removal options** (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 3 seconds: Valve opens until button is pressed again (briefly). The maximum open time can be limited in [P33].	*0 .. 2*	*0*
P33	**Max. open time for butterfly valve For drawing off milk manually** (hidden if A40 = 0 or 1) 0: no time limit on valve being open 1 to 60: seconds	*0 .. 60 sec.*	*5*
P34	**Lock the butterfly valve in OFF mode, if robots have not stopped yet** 0: Butterfly valve can always be opened 1: can only be opened when robot stopped 2: activated, requires an additional RobotStop feedback via digital input (function 34)	*0 .. 2*	*0*

Function is also operable via external button.

(see parameters A21 – A33- setting 26)

Note on [P34] - Selection 2:

Function 34 must be assigned to one of the digital inputs [A21..A33].

to section 8.3: Level “Extended cooling parameters” (P parameters)

“Milk decanting function” for buffer tanks *Range* *Default*

With the decanting function, it is possible to use the rinsing pump (at the same time the milk pump) or via a switching valve to fill milk into another tank. Decanting can only be started in OFF mode using an external button on the digital input.

Settings:

Start decanting function => via dig. input signal of approx. 5 seconds
parameter [A21-A33] = 22

End decanting function =>
- via external float switch parameter [A21-A33] = 23
  parameter [P36] = 1 or 2
- or time-controlled parameter [P36] = 3
- or via internal level input parameter [P36] = 4

P36 Setting milk decanting function *0 .. 4* *0*

0: Deactivated

1*: End level-controlled "high-active" via external float switch at digital input (if there is a signal, pumping is stopped))

2*: End level-controlled "low-active" via external float switch at digital input (if there is no signal, pumping is stopped)

3: End time-controlled (pumping time = [P37])

4*: End level input 2
(if electrode no longer detects milk, pumping is stopped.)

** with Timeout [P37]*

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

P38 possibilities premature stop decanting function and AUTOSTART cleaning *0 .. 3* *0*

with premature stop option

0:* - premature stop possible by repeated pressing of the external button
- no Autostart of the cleaning after successful decanting

1:* - premature stop possible by repeated pressing of the external button
- Autostart of the cleaning (after successful decanting)

without premature stop option

2: - no premature stop possible
- no Autostart of the cleaning after successful decanting

3: - no premature stop possible
- Autostart of the cleaning (after successful decanting)

** Parameter [A21..A33] must be parameterized to 22 (decanting function start button).*

to section 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 10.7)*

P40 **Alarm activation [F52] level monitoring 1 / 2 in cooling mode** — *0 .. 4* — *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 10.11

P42 **Activation tank overflow protection [F51]** — *0 .. 4* — *0*

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

P43 **Maximum filling quantity in litre** — *0 .. 500* — *100*

input in hectolitres (=100 l)
0...500 (is equivalent to 0 to 50.000 litres)

Tank full signal with optional self-holding — *Range* — *Default*

For explanation see also section 10.12
This function can be used for automatic tank switching.

P44 **Activation of the full tank message** — *0 .. 4* — *0*

0: deactivated
1: when level switch 3 is triggered. Signal at the digital input triggers function.
2: when level switch 3 is triggered. No signal at the digital input triggers function.
3: activates liter detection. Reaching the entered liters triggers function.
4: activates level input 2. Detection at level input 2 triggers function

P45 Filling quantity in liters (hectoliters = 100 liters) — *0 .. 500* — *100*

P46 Activation delay time in seconds — *0 .. 100* — *15*

to section 8.3: Level “Extended cooling parameters” (P parameters)

The milk quantity-dependent cooling start delay is only active with parameter [P61 = 6, 7, 8].

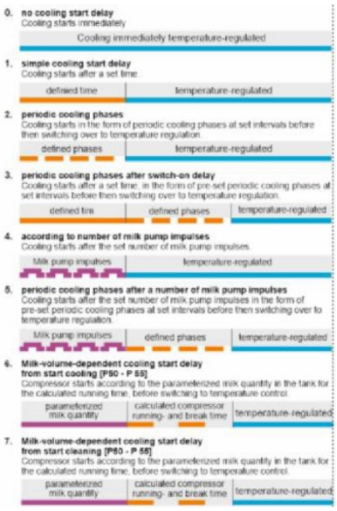
See also section 10.4

Regular cooling = temperature-dependent cooling operation

	Milk-volume-dependent cooling start delay / (Cooling power reduction in case of robot operation) See also section 10.4.2	*Range*	*Default*
P50	**Capacity of the milk pump in litres / minute** Is needed to calculate the milk quantity in the tank from the measured pump running time.	*1,0 .. 99,9*	*30,0*
P51	**Minimum milk quantity in the tank before compressor starts for the first time** Prevents the freezing of small amounts of milk in the tank. The compressor running time from this point is calculated from [P52 and P53]	*10 .. 300 ltr.*	*50*
P52	**Compr. running time per X litres milk quantity** in connection with parameter [P53]	*10 .. 500 sec.*	*60*
P53	**Milk quantity in connection to compressor running time** in connection with parameter [P52]	*10 .. 99 ltr.*	*20*
P54	**Minimum milk quantity in the tank until switching to regular cooling operation**	*10 .. 999 ltr.*	*200*
P55	**Error message if no milk feed is detected for X minutes from the last stop of the compressor** (a switchover to the regular cooling mode does not take place)	*0. 999 min.*	*60*
P56	**Behaviour in case of fault** (P55) **"no milk intake”** 0: ONLY fault message 1: Fault message and change to regular cooling 2: ONLY change into regular cooling	*0 .. 2*	*0*
P57	**Post-cooling** if no milk intake is detected for the time entered, the compressor is switched on for the time set in parameter [P58].	*0 .. 999 min.*	*0*
P58	**Running time for post-cooling** The specified cooling time is indicated together with the time accumulated up to that point.	*0,5 .. 15,0 min.*	*2,0*

to section 8.3: Level “Extended cooling parameters” (P parameters)

See section 10.4 for the setting of cooling start parameters



Cooling start settings — *Range* — *Def.*

P60 **Cooling start options** — *0 .. 3* — *0*

In addition to manual start via keyboard, other start options can be set. See also section 10.3

0: Remote start "cooling" via digital input

1: Autostart "cooling" after successful cleaning
2: Autostart "cooling" with cancellation of a cooling start delay via digital input.
3: Start and stop cooling via digital input.

NOTE: Options 0, 2 and 3 require the input function “Start or stop cooling (2)”! See section 8.11

P61 **Variations of the cooling start delay** — *0 .. 8* — *0*

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-dep. cooling start delay (from start cleaning) [P50-55]
8: Milk quantity-controlled cooling start (from the start of cleaning) with additional cooling start delay [P62] to only start cooling when milk has been transferred from the buffer tank.

P62 **Duration of cooling start delay** — *1..999 min.* — *30*
Only if [P61] = 1, 3 or 8

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*

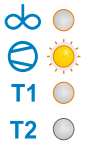
P65 **Number of cooling boosts** [P61] = 2, 3, 5 — *1 .. 50* — *5*

P66 **Number of impulses milk pump** [P61] = 4 or 5 — *1 .. 100* — *10*

P67 **Timeout delay via milk pump** — *1..999 min.* — *60*
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.

to section 8.3: Level “Extended cooling parameters” (P parameters)



Compressor settings — *Range* — *Def.*

P69 **Compressor mode continuous pulse operation** *0 .. 1* *0*

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

P70 **Compressor stop via digital input** *0 .. 4* *0*

Possible control of the cooling start by robot.
See section 9.17.3

0: deactivated
1: Signal at the digital input blocks the compressor
2: no signal at digital input blocks the compressor
3: as 1, however, the compressor lock can be stopped up to the next cooling start with button “cooling”
4: as 2, however, the compressor lock can be stopped up to the next cooling start with button “cooling”

INFORMATION: Assign function 19 to one of the digital inputs [A21..A33]!

P71 **Minimum pause time compressor** *0..999 sec.* *120*

Definition of the minimum pause time for the refrigeration compressor. Serves to reduce the switching frequency (oscillation protection) of the compressor. Should also prevent the compressor from starting against pressure. During the pause the compressor LED flashes

P72 **Thermo protection and fault monitoring compressor** - Fault F53 / F71 / F72 / F73 *0 .. 4* *0*

See also section 0

The fault monitoring is used to indicate problems during the operation of the compressor.

0: deactivated

Evaluation via motor protection relay or motor protection switch
1: Thermal protection contact "high-active" (fault message when open)
2: Thermal protection contact "low-active" (fault message when closed)

Evaluation via auxiliary contact compressor contactor
3:* Fault monitoring via switch-on feedback from the compressor contactor auxiliary contact (N/O contact).
4:* As selection 3, but switch-on feedback from the compressor contactor auxiliary contact (N/C contact).

* *When the compressor is switched on, feedback is expected at the digital input of the controller after 60 seconds at the latest. If this feedback is not received, fault "F53" is triggered.*

Assign a digital input [A21..A33] with function 6 to each compressor.

* *When a compressor is switched on, feedback is expected at the digital input after 60 seconds at the latest. If this feedback information is not received, an fault message is triggered.*

to section 8.3: Level “Extended cooling parameters” (P parameters)

		Range	Def.
P73	**Method of activation of the 2nd and / or 3rd cooling stage** Only applies to tanks or silos with more than one compressor or evaporator! *Explanations see also section 10.9* 0: Disabled (compressor 1 only) 1: Compressors 2 + 3 or cooling stages 2 + 3 switch on with a time delay after the cooling start delay by the time [P74 / P75]. 2: Cooling levels 2 + 3 are switched on using a fill level switch. (Assign a digital input [A21..A33] with function 16 or 17 to each level switch.) 3: Cooling levels 2 + 3 are switched on depending on the filling quantity. (Litre detection via pressure sensor) 4: Compressors are switched on at the same time (parallel operation) (already active in the cooling start delay) 5: As selection 2 - with additional timeout [P74 + P75] 6: Compressors 1 + 2 run alternately - with running time comparison 7: Compressors 1 + 2 + 3 run alternately - with running time comparison 8: Only compressor 1 without switching. Fault message after three start attempts. 9: Only compressor 2 without switching. Fault message after three start attempts. 10: Only compressor 3 without switching. Fault message after three start attempts. 11: Compressor 1 with switchover to compressor 2 in the event of an fault. 12: Compressor 2 with switchover to compressor 1 in the event of an fault. 13: Compressor 2 switches on when the difference to the setpoint is 2° (after the cooling start delay and additional time delay [P74])	*0 .. 13*	*0*
P74	**Time delay 2nd cooling level** Start at the end of the cooling start delay	*1..999 min*	*60*
P75	**Time delay 3rd cooling level** Start with activation of the 2nd cooling stage	*1..999 min*	*60*
P76	**Min. fill.-quantity to switch the 2nd cooling level on**	*1..5000 ltr.*	*2000*
P77	**Min. fill.-quantity to switch the 3nd cooling level on**	*1..5000 ltr.*	*4000*
P78	**Mutual switch-on delay of the compressor stages**	*2..25 sec.*	*3*

** Parameter [P74 + P75]:*

- are used in method P73=1 as a time delay

- are used as timeout times in method P73=5

to section 8.3: Level “Extended cooling parameters” (P parameters)

With settings 2, 3 and 5 you can switch back to the target temperature T1 at any time by pressing the cooling button.

Settings for target temperature switchover T1 / T2		*Range*	*Def.*
P80	**Settings for target temperature switchover**	*0 .. 5*	*0*

Definition of the "Switch target temperature" function:

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 temperature.
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*: Automatic switchover to T2 to programmed times [P82, P83]. Reset to T1 after duration [P81].
If only one time shall be used, [P82] and [P83] have to be set to same time).)

4: Switchover T1 / T2 externally (via digital input)
NOTE: Observe assignment of functions [A21..A33]!

5*: Automatic switchover to T2 when cooling starts with automatic switchback after time [P81].

- -

* *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.

P81	**Duration until switch-back to T1** [P80] = 2, 3 or 5	*1 .. 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*

to section 8.3: Level “Extended cooling parameters” (P parameters)

NOTICE

* The measuring range of the pressure sensor must be specified in [A102 - A104].

Freezing protection by low pressure monitoring — *Range* — *Def.*
Explanations see also section 10.13

P84 **Selection of sensor type** — 0 .. 2 — 0

0: Pressure detection via analogue input.
Is only active when one of the analogue inputs [A54, A56 or A57] => 2 (low pressure monitoring) is parameterized.

1: Pressure detection via low pressure switch.
“High-active” – signal at input switches the compressor off.

2: Pressure detection via low pressure switch.
“Low-active” – no signal at input switches the compressor off.

NOTE: For freeze protection via low pressure switch, function assignment [A21..A33] => 20 (low pressure switch input)

P85 has no function when using a low pressure switch!

P85 **Pressure trigger limit *** (freeze protection) — *0,1..99,9 bar* — *2,00*

P86 **Pressure trigger limit *** (Low press. fault F80) — *0,1..99,9 bar* — *2,00*

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

P89 **Time limit freeze protect. after cooling start** — *0 .. 999 min.* — *0*

0: no limitation

1..999: x minutes after start of the cooling, the low-pressure monitoring switches off until the next cooling activation takes place.

Fault message compressor — *Range* — *Def.*
Explanations see also section 10.14 and 10.15

P90 **Fault message low pressure** (F80) — *0 .. 999 sec.* — 0

0: deactivated

Independent of freeze protection

1:* High-active => Signal on digital input triggers alarm
2:* Low-active => NO signal at digital input triggers alarm

In connecction with low pressure monitoring (freeze protection)

3..999sec.: If a low pressure message is detected for longer than the time set here after the freeze protection [P89] has ended with the compressor switched on, the fault (F80) will be displayed.

P91 **Fault 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]!

Display settings (see section 10.5) — *Range* — *Def.*

P97 **Display remaining term of cooling start delay** — *0 .. 2* — *0*

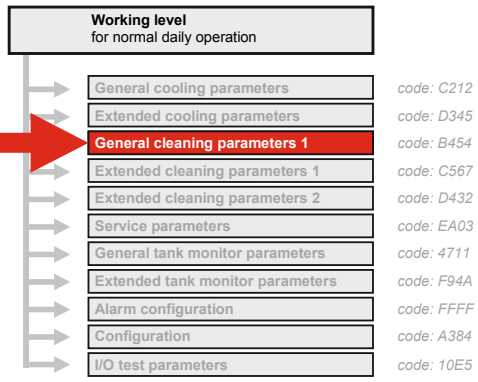
0: deactivated
1: Display of the remaining running time [P62] or determined breast pump pulses
2: also display the time for cooling bursts

** Note function assignment [A21..A33]!*

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..10 = Number of repetition

** ***Applies to all* "water in take 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 ***	*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 ***	*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)*			
n30	**Water intake by feed container ***	*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*

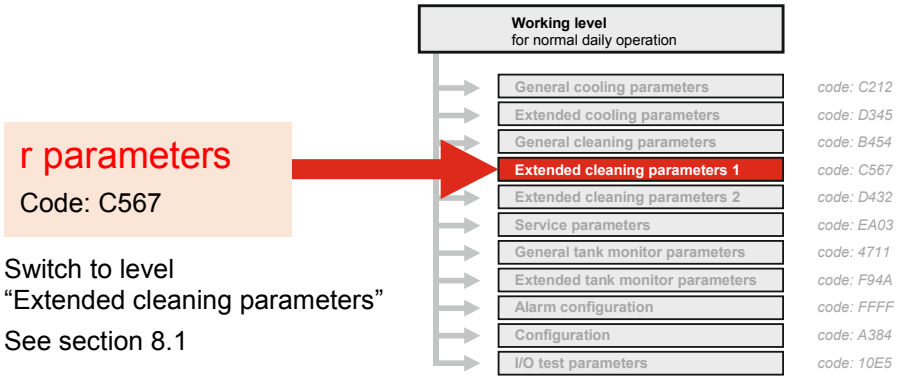
to section 8.4: Level “General cleaning parameters” (n parameters)

		Range	Def.
Running times cleaning stage 4 (intermediate rinse) - hidden, if [r44] = 0			
n40	**Water intake by feed container** *	*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** *	*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** *	*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** *	*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** *	*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*

to section 8.4: Level “General cleaning parameters” (n parameters)

		Range	Def.
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 11.3)			
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 = 0, 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 1” (r parameters)



Adjustment to safety elements *Range* *Def.*

r10 Safety switch butterfly valve (F40) see section 9.2 0..2 *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 (F41) 0..20 sek. *0*

For dry running protection of 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 (F42) 0..2 *0*

To protect the cleaning pump (open in case of fault)
0: no thermo contact switch
1: activated, contact open in case of fault
2: activated, contact colosed in case of fault

r18 Active cooling in after-rinsing 0..3 *0*

If this function is enabled, the compressor is switched on during circulation step n84, provided that the tank temperature is between the temperature set in [r19] and 40°.
0: deactivated
1: activated with compressor lock - see [P70]
2: activated without compressor lock - see [P70]
3: enabled, automatic. This includes:
- Repeating the entire final rinse cycle up to three times if the temperature exceeds 40°C.
- The process remains in programme step n84 until the temperature set in r19 is reached. (max. 15 minutes)
- Circulation continues for a further 15 seconds without the compressor once the temperature has been reached.

r19 Leave to cool until the temperature reaches *4,0..30,0°C* *8,0*

to section 8.5: Level “Extended cleaning parameters 1” (r parameters)

Adjustment to safety elements — *Range* — *Def.*

r20 **Dosing position** (see section 6.2 and 6.3.6) — *0..3* — *3*
0: dosing in feed container (displacement cleaning)
1: position D1 in cleaning diagram
2: position D2 in cleaning diagram
3: in the program step 'Fetching water above level'

r21 **Detergent sequence in case of 3-cycles** — *0..10* — *3*
see section 6.3.4
(if second main cleaning stage is deactivated)
0: only alkaline
1..10: x times alkaline, before one time acid

r22 **Premature switching off of the rinsing pump when adding detergent via beaker** — *0..120 sec.* — *0*
in dosing step D1/D2 (see section 11.1)

Drain valve settings — *Def.*

r23 **State of drain valve in program steps n20 and n80** — *1*
(Pre-rinse 2 and post-rinse via preliminary tank)
0: Drain valve: in n20 close - in n80 open
1: Drain valve: in n20 open - in n80 open
2: Drain valve: in n20 close - in n80 close

r24 **Switching mode drain valve 1** — *0*
0: normally closed
1: current less open

r25 **Switching mode drain valve 2** — *0*
0: normally closed
1: current less open

r26 **Switch-on delay drain valve** (rinsing cycle 0 and 9) — *0*
Time delay with which the drain valve opens after the agitator and flushing pump have started.
0: deactivated
1..60 sec.: Delay time of the activation of the drain valve

Settings to start cleaning — *Def.*

r27 **Cleaning enable via digital input** — *0*
(see section 9.17.1)
0: deactivated
1: activated

r28 **Activation quick cleaning programme via button** — *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)

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



to section 8.5: Level “Extended cleaning parameters 1” (r parameters)

Settings for level detection (see also section 11.6) *Def.*

r29 **Inertia level input** *3*
1: fast
2: medium
3: sluggish

r30 **Sensitivity level input 1** *0*
-10: less sensitive | +10: more sensitive

r31 **Sensitivity level input 2** *0*
-10: less sensitive | +10: more sensitive

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

r33 **Level monitoring at the end of the rinsing cycle** (Fault F45) *0*

0: deactivated

Termination of cleaning in the event of a fault

1: Monitoring of level 1 after last rinsing stage only
2: Monitoring of level 1 after each rinsing stage
3: Monitoring of level 2 after last rinsing stage only
4: Monitoring of level 2 after each rinsing stage

No termination of cleaning in the event of a fault (only fault message)

1: Monitoring of level 1 after last rinsing stage only
2: Monitoring of level 1 after each rinsing stage
3: Monitoring of level 2 after last rinsing stage only
4: Monitoring of level 2 after each rinsing stage

r34 **Monitoring of water intake time during intake** (Fault F46) *0*
above level (not in case of “water intake via pre-hopper”)

0: deactivated
1..300: A minimum-water intake time (in seconds) is set.
If water is detected at the level electrode before this time has elapsed, the water still continues to run until the time has elapsed - fault F46 is reported.

Setting of heater *Def.*

r35 **Heater activation** *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** *10*
Range: 0 .. 120 sec.

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

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

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

to section 8.5: Level “Extended cleaning parameters 1” (r parameters)

Number of passes of seperate cleaning stages — *Range.* — *Def.*
See also section 6.3

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.* — *Def.*

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

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

From option 4 onwards, the function A 16 (hot water valve) must additionally be assigned to one of the relays in the A parameters. See also section 11.1

Selection of drain valve — *Range.* — *Def.*

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

1: Drain valve 1
2: Drain valve 2

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

to section 8.5: Level “Extended cleaning parameters 1” (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		*Range*	*Def.*
r70	**Activation of break in cleaning programme** *(see section 11.2)* 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		*0*
r71	**Position break** After which cleaning stage is the break integrated Setting range: after cleaning stage 0….8	*0 .. 8*	*1*
r72	**Break time**	*0...999 min.*	*120*
r73	**Finish of the break at time**	*00:00..23:59*	*00:00*

Settings of cleaning pump (see section 11.9)		*Range*	*Def.*
r80	**Cleaning pump venting** 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)	*0 .. 4*	*0*
r81	**Number of on / off impulses cleaning pump**	*0 .. 10*	*3*
r82	**ON impulse length cleaning pump**	*0 .. 10 sec.*	*3*
r83	**OFF impulse length cleaning pump**	*0 .. 10 sec.*	*3*
r85	**Deactivate rinsing pump during rinsing** (Rinse 0 and 9) 0: Rinsing pump is not deactivated 1: Rinsing pump is deactivated	*0 .. 1*	*0*

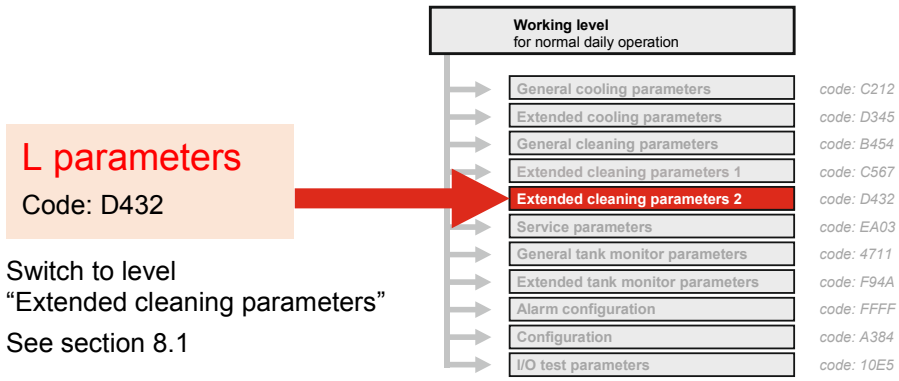
Settings for rinsing cycle-optimisation		*Range*	*Def.*
r86	**Water pressure-controlled rinse-out step.** If the water pressure in the rinse-out step (n15, n25...n85) drops out for x seconds, the rinse sequence is continued with the drain step (n16, n26...n86). 0: deactivated 1..6: activated, seconds without pressure.	*0..6 sec.*	*0*
r87	**Avoidance of rinsing shadows on the agitator blade** 0: deactivated 1: in the circulation phase (n14, n24, n34...n84) the agitator stops every 25 seconds for 5 sec.	*0..1*	*0*
r88	**Water collection via a pre-tank with a single level electrode** (see section 6.3.3) 0: abled. Water collection is carried out using two electrodes. (Fill until level 2 is reached, then drain until level 1 is clear) 1…30: Drainage time in seconds. Water collection is carried out using only one electrode. (Fill until level 2 is reached, then drain for the set time.).	*0..30 sec.*	*0*

to section 8.5: Level “Extended cleaning parameters 1” (r parameters)

Service settings and commissioning (see also section 11.10)		*Range*	*Def.*
r92	**Start cleaning at the beginning of cleaning stages 0..8**	*0 .. 8*	*0*
r93	**Number of cleaning cycles with step function** See section 11.10.2 This function is used to manually advance all programme steps of the cleaning sequence. The setting 1..3 is mainly used by the service technician during commissioning if a permanent activation is not desired. 0: deactivated 1..3:* active in the next 1..3 rinsing cycles 4: seconds in cleaning mode. “StEP" is shown in the display. By pressing the CLEANING key repeatedly, the cycle can now be advanced step by step 5: like 4: with additional 'pause' function via the OFF button	*0 .. 5*	*0*
r97	**Display during cleaning** 0: Display of programme step 1: Display of temperature 2: Display changes between step and temperature 3: Display of remaining term 4: Display of remaining term / temperature alternately	*0 .. 4*	*0*
r98	**Display of the maximum cleaning temperature achieved in OFF after cleaning** 0: deactivated 1: alternating with the time	*0 .. 1*	0

** only for the installer*

8.6 Level “Extended cleaning parameters 2” (L parameters)



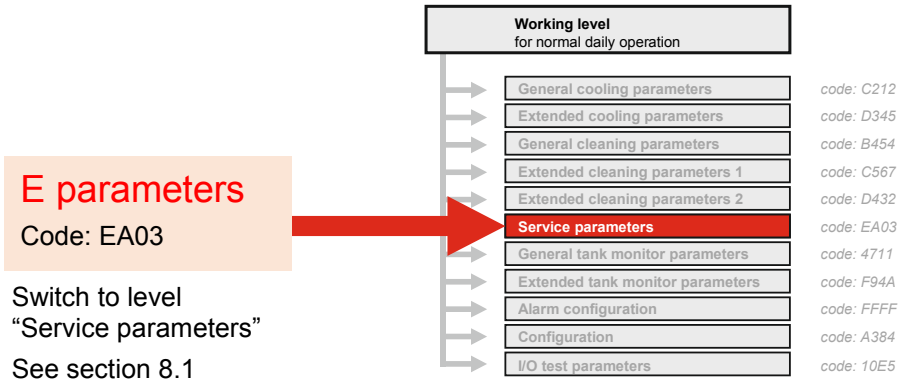
For information on quantity-controlled dosing, see also section 6.6

		Range	Def.
Rinse cycle quantity setting 0 (Rinse out)			
L1	**Amount of water in step n1**	*0…500 l*	*5*
L2	**Amount of water in step n2**	*0…500 l*	*50*
Rinse cycle quantity setting 1 (Pre-rinse 1)			
L12	**Amount of water in step n12**	*0…500 l*	*35*
L13	**Amount of water in step n13**	*0…500 l*	*0*
Rinse cycle quantity setting 2 (Pre-rinse 2)			
L22	**Amount of water in step n22**	*0…500 l*	*35*
L23	**Amount of water in step n23**	*0…500 l*	*0*
Rinse cycle quantity setting 3 (Main-rinse 1)			
L32	**Amount of water in step n32**	*0…500 l*	*50*
L33	**Amount of water in step n33**	*0…500 l*	*0*
Rinse cycle quantity setting 4 (Intermediate-rinse 1)			
L42	**Amount of water in step n42**	*0…500 l*	*35*
L43	**Amount of water in step n43**	*0…500 l*	*0*
Rinse cycle quantity setting 5 (Main-rinse 2)			
L52	**Amount of water in step n52**	*0…500 l*	*50*
L53	**Amount of water in step n53**	*0…500 l*	*0*
Rinse cycle quantity setting 6 (Intermediate-rinse 2)			
L62	**Amount of water in step n62**	*0…500 l*	*35*
L63	**Amount of water in step n63**	*0…500 l*	*0*
Rinse cycle quantity setting 7 (Disinfection)			
L72	**Amount of water in step n72**	*0…500 l*	*50*
L73	**Amount of water in step n73**	*0…500 l*	*0*
Rinse cycle quantity setting 8 (After-rinse)			
L82	**Amount of water in step n82**	*0…500 l*	*50*
L83	**Amount of water in step n83**	*0…500 l*	*0*
Rinse cycle quantity setting 9 (Rinse out)			
L92	**Amount of water in step n92**	*0…500 l*	*5*
L93	**Amount of water in step n93**	*0…500 l*	*50*
Detergent / disinfectant quantity setting			
L101	**Amount of detergent alkaline**	*0…10,00 l*	*0,30*
L102	**Amount of detergent acid**	*0…10,00 l*	*0,30*
L103	**Amount of disinfectant**	*0…10,00 l*	*0,30*

to section 8.6: Level “Extended cleaning parameters 2” (L parameters)

Settings for quantity-controlled water intake			
L104	**Water quantity in dosing position 1** only active if quantity-controlled water intake is activated	*0…50 l*	*5*
L105	**Activation of quantity-controlled water intake** 0: deactivated 1: activated	*0…1*	*0*
L106	**Timeout settings for water intake** Same timeout (L107) for all programme steps 0: After timeout stop of the cleaning with fault message 1: Continue cleaning after timeout with fault message Individual timeout for each programme step (L107 plus step time from the corresponding n-parameter) 2: Continue cleaning after timeout and report fault	*0…2*	*1*
L107	**Timeout time for water intake**	*1,0..25,0 min.*	*5,0*
Settings for quantity-controlled detergent and disinfectant dosing			
L110	**Activation of dosing of quantity-controlled detergent and disinfectant** 0: deactivated 1: activated	*0…1*	*0*
L112	**Dosing of timeout-time**	*0,1..10,0 min.*	*1,0*
Setting of the pulse counters: Pulses per litre			
L121	**Impulse counter “alkaline “**	*1…9999*	*2000*
L122	**Impulse counter “acidic“**	*1…9999*	*2000*
L123	**Impulse counter “disinfectant“**	*1…9999*	*2000*
L124	**Impulse counter “cold water“**	*1…9999*	*2000*
L125	**Impulse counter “warm water“**	*1…9999*	*2000*

8.7 Level “Service parameters” (E parameters)



NOTICE

The “Service parameters” (E-parameter) level is only used to query actual states. The layer cannot be displayed in the Konsoft software. The parameters can only be displayed on the WTS-300 display.

Display tank monitoring time counter and values		*Range*	*Def.*
Display off...			
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** 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.	*0…900 min.*	*- - -*
E6	**... the last cleaning temperature reached** Displays the maximum temperature during the last cleaning cycle.	*0…99,9 °C*	*- - -*
E15	**... battery voltage** Display the current battery voltage (Only if optional power pack is installed)	*0,0V..12,0V*	*- - -*

Display of the presently measured current of the analogue 4..20 mA inputs		*Display area*
E16	**Display of the analogue input 4..20 mA** Display of the presently measured current*.	*0,0..20,0 mA*
E17	**Display of the analogue input 4..20 mA** as [E16] but on IO expansion module I1*.	*0,0..20,0 mA*
E18	**Display of the analogue input 4..20 mA** as [E16] but on IO expansion module I2*.	*0,0..20,0 mA*

** If the respective input is deactivated, "- -" is displayed*

to section 8.7: Level “Service parameters” (E parameters)

		Display area.	*Def.*
E31	**Display of the last dosed detergent quantity** only with quantity-controlled detergent dosing. The amount of detergent dosed in the last rinsing cycle can be read here.	*x ltr.*	*- - -*
E40	**Display Start-DATE** * automatic stirring prior to collection	*DD : MM*	*- - -*
E41	**Display Start-TIME** * automatic stirring prior to collection	*hh : mm*	*- - -*
E50	**SIM PIN entry for optional ESGSM** for optional remote maintenance module -1 = no PIN deposited 0000 … 9999 = SIM PIN	*-1..9999*	*-1*

** With [E40 / E41] you can check at which date or time the next automatic stirring is activated, which was set under [P28]. The control unit calculates the time displayed on the basis of the last cleaning.*

Display of cycle times compressor — *Display area*

Used in robot applications to detect faults in the cooling system (e.g. loss of refrigerant).

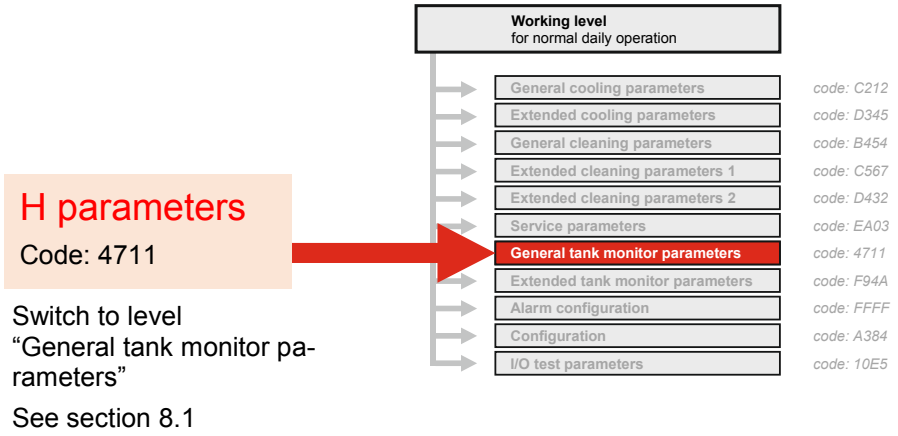
The display shows:

- [E61..E63] Compressor running times in the current cooling cycle
- [E71..E73] Compressor running times in the previous cooling cycle

Display of…

E61	**… current cycle time of compressor 1**	*0 .. 99,9h*
E62	**… current cycle time of compressor 2**	*0 .. 99,9h*
E63	**… current cycle time of compressor 3**	*0 .. 99,9h*
E71	**… last cycle time of compressor 1**	*0 .. 99,9h*
E72	**… last cycle time of compressor 2**	*0 .. 99,9h*
E73	**… last cycle time of compressor 3**	*0 .. 99,9h*

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



	Fault messages tank monitor during cooling mode	*Fault*	*Range*	*Def.*
h20	**Target temperature 1st milking *** (Starting from this point the monitoring of the over / under temperature begins [h25]	**F20**	*0 .. 30,0 °C*	*5,0*
h21	**Max. time to reach target temperature [h20] ***		*0..999 min.*	*180*
h23	**Max. overtemperature for a time** (from cooling start) * Start of monitoring from the start of cooling	**F23**	*0 .. 30,0 °C*	*10,0*
h24	**Max. time of overtemperature** (from cooling start) *****		*0..999 min.*	*180*
h25	**Max. overtemperature with direct alarm triggering *** Start of the counter from the 1st milking	**F25**	*0..99,9 °C*	*25,0*
h26	**Max. running time compressor cycle *** Max. total running time of all compressors from the start of cooling to the collection of the milk. If the time entered is exceeded, the alarm is triggered. Serves the service technician to determine problems with the cooling cycles.	**F26**	*0..99,9 h*	*0,0*
h27	**Min. under temperature for a time *** Start of monitoring from cooling start. An alarm is triggered if the temperature falls below the value set for longer than the time set [h28].	**F27**	*0..30,0 °C*	*2,0*
h28	**Max. time of under temperature** (from cooling start) *		*0..999 min*	*120*
h29	**Min. under temperature with direct alarm triggering *** from the first compressor start-up following a clean	**F29**	*0..30,0 °C*	*0,5*
h31	**Max. cooli ng interruption ***	**F31**	*0..999 min.*	*60*
h32	**Max. time in off mode after cleaning** *	**F32**	*0..8000 min*	*600*
h33	**Min. cleaning cycle ***	**F33**	*0 .. 250 h*	*78*
h35	**Detergent monitoring alkaline by float switch**	**F35**	*0 .. 5*	*0*
h36	**Detergent monitoring acid by float switch**	**F36**	*0 .. 5*	*0*

0: deactivated
1: high-active only in cleaning
2: low-active only in cleaning
3: high-active, permanently
4: low-active, permanently
5: Flow switch. Feedback via the flow switch is expected when the respective pump is activated.

** 0: deactivated*

h38	**Max. temperature difference monitoring sensor during cooling mode** (see section 10.16)	**F38**	*1,0 .. 5,0*	*2,0*
h39	**Activation delay for temperature differential monitoring** Temperature differential monitoring is delayed by the set number of hours from the start of cooling. (see section 10.16)		*0..10h*	*0*

Setting milk times to monitor „cooling activated”

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.

		Fault	*Range*	*Def.*
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*	*--:--*
h44	**Cooling activation monitoring delay** The delay begins after cleaning. For tanks that are not filled immediately after cleaning, the monitoring function can be delayed by the set number of hours. (e.g. systems with two tanks that are used in rotation)		*0..72h*	*0*

Settings fault indicator

h82	**Fault indicator for external faults** Input function digital input [A21..A33] => 37 (fault indicator) 0: deactivated 1: „High-active“ * Fault when contact opened 2: „Low-active“ * Fault when contact closed ** The signal must be permanently ready for use*	**F82**	*0 .. 2*	*0*

Settings tank monitor LOG files

h87	**Activation of fast recording via digital input** 0: disabled 1: refers to digital input [A21] 2: refers to digital input [A22] 3: refers to digital input [A23] … 13: refers to digital input [A33]		*0 .. 13*	*0*
h89	**Saving of additional information in LOG-memory** 0: deactivated 1: Temperature 2 2: Performance of stirring unit first stirring unit 3: Measuring size analogue input (4..20 mA) 4: freely defined inputs and outputs. See parameter [h100..h110]		*0 .. 4*	*4*
h90	**Selection period (in days) of the recording data (Konsoft)**		*1 .. 365*	*90*
h91	**Logging intervals cleaning mode in minutes**		*1 .. 10*	*1*
h92	**Logging intervals OFF and cooling mode in minutes**		*1 .. 30*	*15*

Tank identification

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** (the first 4 digits...)	*0 .. 9999*	*0*
h97	**Tank number part 2** (the last 4 digits...)	*0 .. 9999*	*0*

to section 8.8: Level “General tank monitor parameters” (h parameters)

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.

Freely definable storage data for the KONSOFT		*Range*	*Def.*
h100	**Storage frequency**	*0 .. 2*	*0*

0: in all modes when a state changes
1: only in cleaning when a condition changes
2: only in cooling when a state changes

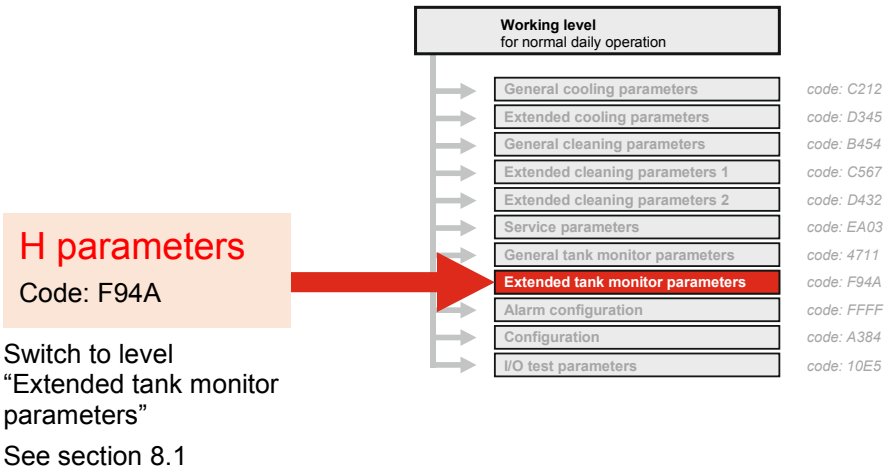
Selection of the inputs and outputs to be saved

for output in the Konsoft

0: deactivated
1..12: Relay 1..12
15..20: Relay 1..6 (from expansion module ESIO-001)
21..28: Digital input 1..8
29..33: Digital input 1..5 (from expansion module ESIO-001)
41: Level 1
42: Level 2

h101	**Assignment 1 info**	*0 .. 42*	*10*
h102	**Assignment 2 info**	*0 .. 42*	*9*
h103	**Assignment 3 info**	*0 .. 42*	*8*
h104	**Assignment 4 info**	*0 .. 42*	*3*
h105	**Assignment 5 info**	*0 .. 42*	*5*
h106	**Assignment 6 info**	*0 .. 42*	*4*
h107	**Assignment 7 info**	*0 .. 42*	*6*
h108	**Assignment 8 info**	*0 .. 42*	*2*
h109	**Assignment 9 info**	*0 .. 42*	*7*
h110	**Assignment 10 info**	*0 .. 42*	*21*

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



		Fault	Range	Def.
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 .. 999 min.*	*600*
H12	**Milk temperature too high for too long**	**F2**	*0 .. 50,0 °C*	*16,0*
H13	**Time limit for [H12] ***		*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 .. 999 min.*	*300*
Power failure times				
H19	**Temperature limit for fault F6** 0 = temperature-independent	**F6**	*0 .. 50 °C*	*7,0*
H20	**Max. power failure time in cooling mode ***	**F6**	*0 .. 999 min.*	*300*
Cleaning temperature monitoring				
H30	**Minimum cleaning temperature ***	**F11**	*0 .. 50,0 °C*	*40,0*
H31	**For min. time ***	**F12**	*0 .. 999 min.*	*2*
Agitator monitoring				
H40	**Agitator fault in cooling mode - no stirring of milk ***	**F15**	*0 .. 999 min.*	*450*
H41	**Timeout "No agitator" ***	**F16**	*0 .. 999 min.*	*60*
H42	**Min. run time agitator** [zu H41]	**F16**	*0 .. 500 sec.*	*60*

** 0 = deactivated*

to section 8.9: Level “Extended tank monitor parameters” (H parameters)

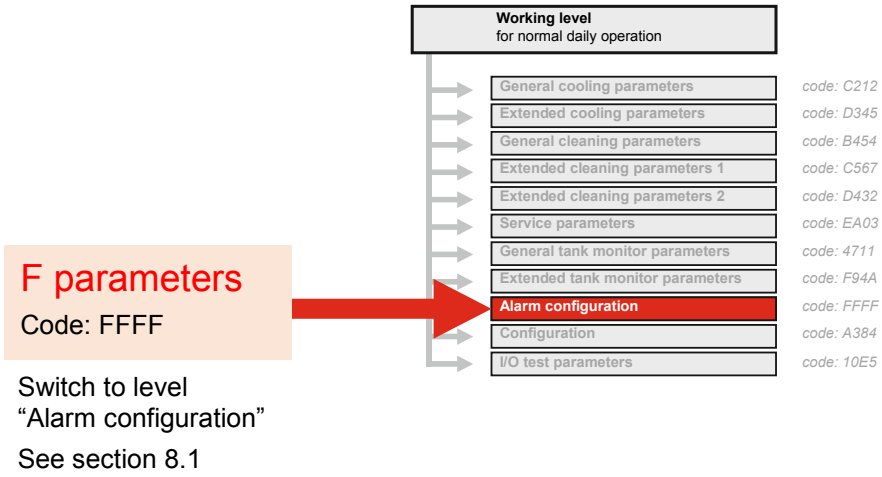
		Range	Def.
Tank monitor activation			
H90	**Activation delay** *(see section 12.1)* 0 = deactivated	*0 .. 300 min.*	*180*
Parameter level lock			
H98	**Password protection**	*0 .. FFFF*	*0*
H99	**Password protection**	*0 .. FFFF*	*0*

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.

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



In this level, each fault message F1 to F99 is assigned the effect of this alarm.

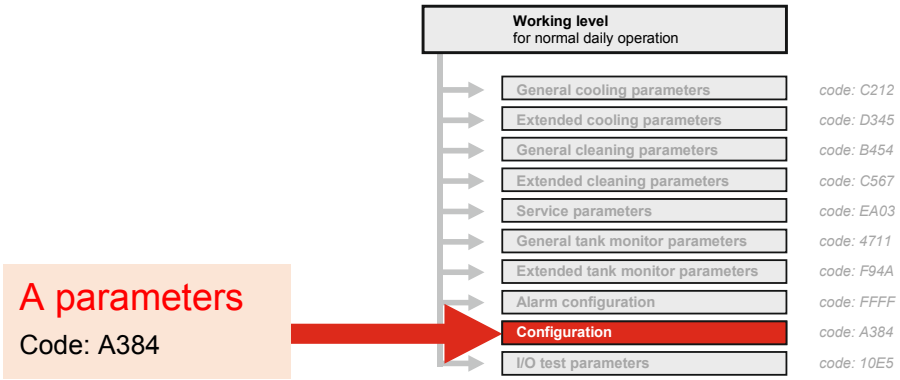
See the table below.



Setting	display code (flashes)	„green“ LED	„red“ LED	stores in ‚Konsoft	alarm relay in general	alarm relay tank monitor	SMS / Email
			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:	•	–	•	•	–	•	•

	Fault configuration...	Setting	Def.
Critical tank monitor alarm (always red LED)	**F1 ... milk temperature too high for too long high1**	*12 .. 13*	*13*
	F2 ... milk temperature too high for too long high2	*12 .. 13*	*13*
	F3 ... milk temperature too high for too long high3	*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*
	F26 … max. running time of compressor cycle exceeded	*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*
	F37 … Disinfectants	*7 .. 13*	*11*
	F38 ... temp. difference exceeded monitoring sensor	*7 .. 13*	*11*
	F39 ... battery voltage too low	*7 .. 13*	*11*
je nach Einstellung informativer oder kritischer Tankwächteralarm oder auch Systemalarm (grüne oder rote LED oder nur Displayanzeige)	**F40 ... safety switch butterfly valve**	*1 .. 13*	*6*
	F41 ... pressure switch cleaning pipe	*1 .. 13*	*6*
	F42 ... thermos contact 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*
	F46 ... Fault water intake	*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 protec. - / fault monitoring 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	*0 .. 13*	*6*
	F61 ... Error ESGSM or ESIPM module	*0 .. 13*	*4*
	F62 ... I/O expansion module	*0 .. 13*	*6*
	F71 ... Compressor fault monitoring 1	*0 .. 13*	*6*
	F72 ... Compressor fault monitoring 2	*0 .. 13*	*6*
	F73 ... Compressor fault monitoring 3	*0 .. 13*	*6*
	F80 ... Message low pressure	*1 .. 13*	*6*
	F81 ... Message high pressure	*1 .. 13*	*6*
	F82 … external fault	*1 .. 13*	*6*
	F83 ... Malfunction analog input 4..20 mA	*1 .. 13*	*6*
	F85 ... Phase error		
	F99 ... Test alarms *(see section 9.5)*	*1 .. 13*	*11*

8.11 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 .. A20] the functions needed are assigned to the output relays.

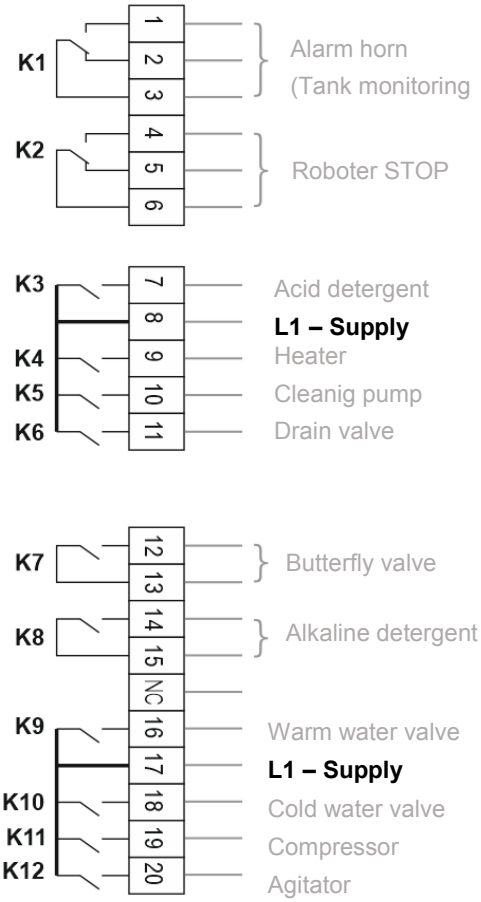
Allocation of digital inputs:

In [A21 .. A33] input functions are assigned to the digital inputs.

WARNING

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

to section 8.11: Level “Configuration” (A parameters)



** The alarm relay configuration for output functions 1 and 14 is done in parameters A45 and A46.*

Assignment of output functions to relays

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 / Beaker cleaning
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 (see section 11.7)
24: Off mode active
25: Cooling active
26: Milk transfer valve
28: Clamp valve
29: Flush valve
30: Buffer tank activation
31: Input direct 1
32: Input direct 2
33: AND1
34: AND2
35: OR1
36: OR2
37: NOT1
38: NOT2

		Range	*Def.*
A1	**assignment relay K1**	*0 ..*	*1*
A2	**assignment relay K2**	*0 ..*	*2*
A3	**assignment relay K3**	*0 ..*	*3*
A4	**assignment relay K4**	*0 ..*	*4*
A5	**assignment relay K5**	*0 ..*	*5*
A6	**assignment relay K6**	*0 ..*	*6*
A7	**assignment relay K7**	*0 ..*	*7*
A8	**assignment relay K8**	*0 ..*	*8*
A9	**assignment relay K9**	*0 ..*	*9*
A10	**assignment relay K10**	*0 ..*	*10*
A11	**assignment relay K11**	*0 ..*	*11*
		0 ..	*12*
A15	**assignment relay K1 – I/O module (optionally)**	*0 ..*	*0*
A16	**assignment relay K2 – I/O module (optionally)**	*0 ..*	*0*
A17	**assignment relay K3 – I/O module (optionally)**	*0 ..*	*0*
A18	**assignment relay K4 – I/O module (optionally)**	*0 ..*	*0*
A19	**assignment relay K5 – I/O module (optionally)**	*0 ..*	*0*
A20	**assignment relay K6 – I/O module (optionally)**	*0 ..*	*0*

to section 8.11: Level “Configuration” (A parameters)

Assignment of output functions to digital inputs

0: deactivated
1: safety switch (manual butterfly valve)
2: Starting and stopping the cooling system
3: dry protection heating (can be assigned 2x)
4: thermal protection / fault contact pump
5: water pressure switch
6: thermal protection compressor (can be assigned 3x)
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 / flow switch ‚alkaline’
14: Float switch / flow switch ‚acidic’
15: Start from rinse stop
16: Level switch 1 (release 2nd cooling level)
17: Level switch 2 (release 3rd cooling level)
18: Level switch 3 (tank full)
19: Compressor lock / release
20: Input low pressure switch
21: Fault input high pressure
22: Start button milk-decanting function
23: Level sensor milk-decanting function
24: Signal input multi-function relay
25: external switchover of temperature
26: Milk removal button
27: Remote start => OFF-Mode
28: Remote start => CLEANING - see also parameter [A38]
29: Remote start => COOLING - see also parameter [A38]
30: Remote start => STIRRING - see also parameter [A38]
31: Remote triggering => RobotStop
32: Remote triggering => Disc valve OPEN
33: Remote triggering => Tank monitor reset
34: Feedback RobotStop
35: Fault: Agitator (e.g. due to a motor circuit breaker, inverter, etc.)
36: Release remote start
37: Fault indicator
38: Pulse counter "alkaline "
39: Pulse counter "acidic"
40: Pulse counter "disinfect" (without function)
41: Pulse counter "cold water"
42: Pulse counter "warm water"
43: Reset tank full report
44: Start partial pickup

		Range	*Def.*
A21	**assignment digital input 1**	*0 ..*	*1*
A22	**assignment digital input 2**	*0 ..*	*2*
A23	**assignment digital input 3**	*0 ..*	*3*
A24	**assignment digital input 4**	*0 ..*	*4*
A25	**assignment digital input 5**	*0 ..*	*5*
A26	**assignment digital input 6**	*0 ..*	*6*
A27	**assignment digital input 7**	*0 ..*	*7*
A28	**assignment digital input 8**	*0 ..*	*8*
A29	**assignment digital input 1 – I/O module (optionally)**	*0 ..*	*0*
A30	**assignment digital input 2 – I/O module (optionally)**	*0 ..*	*0*
A31	**assignment digital input 3 – I/O module (optionally)**	*0 ..*	*0*
A32	**assignment digital input 4 – I/O module (optionally)**	*0 ..*	*0*
A33	**assignment digital input 5 – I/O module (optionally)**	*0 ..*	*0*

to section 8.11: Level “Configuration” (A parameters)

Safety chain function “remote start”	*Range*	*Def.*
A38 **Safety chain for function ‚remote start‘** Monitoring of manhole and rinsing tank. See parameter [A21..A33] selection 28: 29: 30: Connection see section 9.12 0: Safety chain in control line of remote push-buttons 1: Safety chain via digital input	*0..1*	*0*

Output signal configuration robot	*Range*	*Def.*
A40 **Robot operation / control pneum. butterfly valve** 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	*0..3*	*0*
A41 **Robot stop signal configuration** *(see section 4.6)* 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	*0..3*	0
A42 **Robot release delay** Delays the robot release by the set time. During this time, the "Robot STOP" LED flashes.	0..60 sec.	0
A43 **Robot release and closing disc valve after cleaning** 0: Scheibenventil schließen und Roboterfreigabe, erfolgen direkt nach erfolgreicher Reinigung 1: The disc valve closes immediately after successful cleaning; the robot is only authorised once cooling has started 2: Scheibenventil schließen und Roboterfreigabe, erfolgen erst mit Start der Kühlung	0..2	0
A44 **Robot stop output when the bin is full** See also section 5.1.5 0: The robot is stopped 1: The robot is stopped until cleaning begins, but is not stopped during cleaning 2: The robot is not stopped In conjunction with the buffer tank outlet, which is always activated during a full collection, the robot can be set to continue operating and milk into the buffer tank. In the case of partial collection, the robot is always stopped and the buffer tank outlet is not activated.	0..2	0

to section 8.11: 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 A20:
A45 = 14
A46 = 1
A47 = 19

Alarm relay configuration — *Range* — *Def.*

A45 **Relay configuration “alarm in general“** — *0..3* — *0*
Parameter [A1..A20] => 14
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..3* — *0*
Parameter [A1..A20] => 1
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..1* — *0*
Parameter [A1..A20] => 19
0: is reset during the cleaning (same as red LED)
1: is reset with pressure

Configuration temperature sensor — *Range* — *Def.*

A50 **Function of second sensor** — *0 .. 4* — *0*
0: deactivated
1: Safety temperature sensor
2: Heating temperature sensor
3: Sensor activation
(only for recording, no control function)
4: as 3: - but temperature is shown on the display in OFF mode. (Only active if the cleaning temperature (r98=1) has not been activated as an alternative temperature display.)

A51 **Sensor type** (Sensor 1 / sensor 2) — *0 .. 3* — *2*
0: KTY81/210 *
1: PT100 three-wire
2: PT1000 *
3: KTY81/110
** When selecting 0 and 2, the control automatically detects which sensor (KTY81/210 or PT-1000) is connected.*

A52 **Temperature display of sensor 1 in OFF** — *0 .. 1* — *0*
0: deactivated
1: activated, (only active if no other alternative temperature display has already been activated. Cleaning temperature (r98=1) or sensor 2 (A50=4)

to section 8.11: Level “Configuration” (A parameters)

Configuration analogue input	*Range*	*Def.*
A54* Function analogue input 4 .. 20 mA 0: deactivated 1: Determination of litres via filling pressure (see section 10.8) 2: Low pressure monitoring (antifreeze function) (see section 10.13)	*0 .. 2*	*0*
A55 Error monitoring 4-20mA input (F83) 0: deactivated 1: Alarm is activated when < 3.5 mA or > 21 mA 2: Alarm is activated when < 3.5 mA	*0 .. 2*	*0*

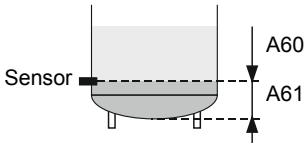
Configuration of analog inputs (I/O extension module)	*Range*	*Def.*
A56* Function analogue input I1 (4..20 mA) (optional via I/O extension module) 0: deactivated 1: litre determination via filling pressure 2: Low pressure monitoring (see section 10.13)	*0 .. 2*	*0*
A57* Function analogue input I2 (4..20 mA) (optional via I/O extension module) 0: deactivated 1: litre determination via filling pressure 2: Low pressure monitoring (see section 10.13)	*0 .. 2*	*0*
A58 Fault monitoring 4..20 mA input (F83) Alarm at less than 3.5 mA 0: deactivated 1: activated, alarm when I1 is less than 3.5mA 2: activated, alarm when I2 is less than 3.5mA 3: activated, alarm if I1 or I2 is less than 3.5 mA	*0 .. 3*	*0*

* *Prioritisation of analogue inputs (parameter [A54 => A56 => A57]).*

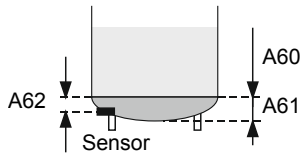
Example: If low pressure monitoring was parameterised in parameter [A54], the same setting in parameters [A56 + A57] would be ignored.

to section 8.11: Level “Configuration” (A parameters)

Sensor **within** linear area



Sensor **below** linear area



Scaling determination of litres via pressure sensor		*Range*	*Def.*
See section 10.8			
A60	**Litre per cm filling height (linear area)**	*0..100,0 l*	*50,0*
A61	**Offset in litre**	*0..1000 l*	*500*
A62	**Distance sensor to the beginning of linear area**	*0..300 cm*	*0*
A69	**Start of pressure sensor measuring range** (in mBar)	*-50..0*	*0*
A70	**End of pressure sensor measuring range** (in mBar)	*100..1000*	*1000*

Configuration external modules — *Range* — *Def.*

A71 **Configuration stirring unit monitoring** — *0 .. 15* — *0*

look also section 9.8

0: deactivated
5: Clear bands
(after deleting of the bands, the number of agitators must be readjusted)

Agitator monitoring module ESVAW-001-A
Switching on of the agitator by a WTS-300 relay

1: one agitator
2: two agitators
3: three agitators
4: four agitators

Agitator monitoring module ESVAW-002-A
with two agitator switch-on-relays that are integrated in the module

6: one agitator
7: two agitators

Agitator monitoring without a separate module

If agitator monitoring is made via inductive agitator sensor (max. 2 channels)

8:* one agitator
9: * two agitators

Agitator monitoring without a separate module
If agitator monitoring is made via switch contact of the WTS-300

10:* one agitator
11:* two agitators

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)

** Precondition: Input function 11 or 12 must be assigned to one of the digital inputs [A21..A33].*

to section 8.11: Level “Configuration” (A parameters)

			Range	Def.
A72	**activation detergent monitoring by conductometry** 0: deactivated 1: activated		*0 .. 1*	*0*
A73	**activation alarm module monitoring ESGSM modem / ESIPM modem** 0: deactivated 1: activated, do not forward alarm messages 2: activated, forward tank guard alarms 3: activated, forward general alarms 4: activated, forward all alarms	**F61**	*0 .. 4*	*0*
A74	**Activation of the I/O extension module** 0: deactivated 1: activated, no current monitoring 2: activated, fault monitoring 1st channel (cable break <3.5 mA) active	**F62**	*0 .. 2*	*0*
A75	**Operating mode 12V input** *See section 9.7* 0: Input not used 1: Battery operation with power failure monitoring 2: Operation via external power pack, Power failure monitoring is deactivated		*0 .. 2*	*0*
A76	**Activation of additional module 'liter display'** 0: deactivated 1: activated		0 .. 1	0

Automatic change of daylight saving time		Range	Def.
A78	**Automatic change of daylight saving time** 0: deactivated 1: Western European time zone (change at 1:00) 2: Central European time zone (change at 2:00) 3: Eastern European time zone (change at 3:00)	*0 .. 3*	*2*

Test parameter for the agitator rating		Range	Def.
A80	**Rating limit agitator** -1: more sensitive 0: normal 1: less sensitive	*-1 .. 1*	*0*

Activate phase monitoring relay ESVAW-003		Range	Def.
A85	**Activate phase monitoring relay ESVAW-003** (F85) 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.		0 .. 4	1

to section 8.11: Level “Configuration” (A parameters)

Multifunction time relay (see also section 9.11)		*Range*	*Def.*
A86	**Multifunction time relay function selection** 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 7: Switch-on pulse T2 delayed by T1 8: Switch-off pulse T2 delayed by T1	*0 .. 8*	*1*
A87	**Assignment of multi-function timing relay input** 0: digital input input function 24 (multifunction time relay) 1..: freely selectable output function see parameter [A1..A20]	*0 ..*	*0*
A88	**T1 (time 1)**	*1..5000 sec.*	*30*
A89	**T2 (time 2)**	*1..5000 sec.*	*30*

PC-Interface configuration (see also section 9.15)		*Range*	*Def.*
A91	**Modbus RTU Data Interface Activation** 0: disabled 1: enabled, 8N1 (communication with Konsoft is also possible) 2: enabled, 8E1 (communication with Konsoft is no longer possible)	0 .. 2	*0*
A92	**Modbus RTU permissions** 0: no authorisation 1: remote start of cooling	0..1	0
A95	**Baud setting** 1: 9600 2: 19200 3: 38400 4: 76800	1 .. 4	4
A96	**Device adress**	1 .. 8	1

Language setting		*Range*	*Def.*
A98	**Language setting for Konsoft monitor** 0: german 1: english 2: french	0 .. 2	0

Factory reset		*Range*	*Def.*
A99	**Factory reset** Here you have the option of resetting the control to the factory settings. • Enter the value‘124‘ in parameter [A99] • Save the parameter. - the display ‚dEFA‘ flashes - after a short time the control restarts. - the data memory is deleted, all setting values are reset to the factory settings..	*0 .. 999*	*000*

to section 8.11: Level “Configuration” (A parameters)

Acknowledgment of fault messages (reset) via Konsoft	*Range*	*Def.*
A100 **Activation of fault reset via Konsoft** 0: deactivated 1: activated If activated, an additional “RESET” button will be displayed on the Konsoft online monitor at the bottom of the screen. Here, errors can be acknowledged directly via Konsoft without pressing the key on the membrane keyboard.	0 .. 1	0

pressure sensor specification for low pressure measurement	*Range*	*Def.*
A102 Start of the measuring range in bar	*-1,0..1,0*	*0*
A103 End of the measuring range in bar	*1,0 ..100,0*	*100,0*
A104 Measured value correction in bar	*-3,00..3,00*	*0*

Input direct	*Range*	*Def.*
This function allows an input to be output directly to an output function (function 31, 32) or to be linked using logic blocks. See section 9.12.1. 0: deactivated 1…8: Digital input direct 9…13: Digital input ESIO-001 14: Level 1 15: Level 2		
A110 Input direct 1	*0 .. 15*	*0*
A111 Input direct 2	*0 .. 15*	*0*

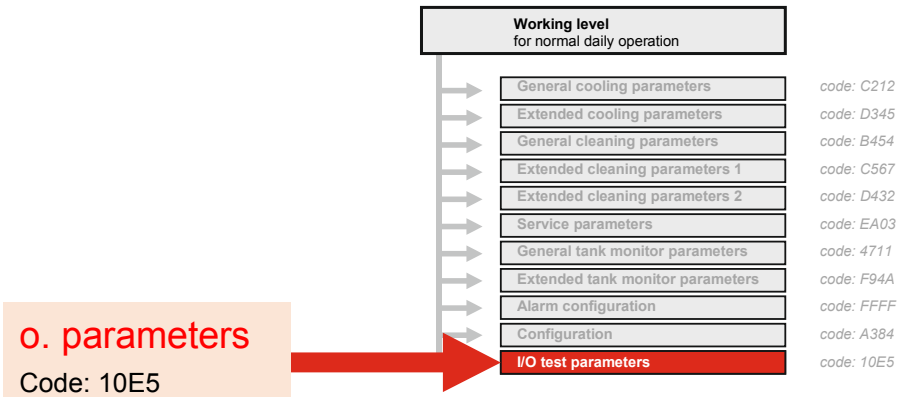
Logic module AND function	*Range*	*Def.*
This function can be used to AND any output function and output it on the AND output function (function 33, 34). See section 9.12.2 0: deactivated 1…: freely selectable output function. See A1…		
A112 AND1 Assignment Input A	*0..*	*0*
A113 AND1 Assignment Input B	*0..*	*0*
A114 AND1 Assignment Input C	*0..*	*0*
A115 AND2 Assignment Input A	*0..*	*0*
A116 AND2 Assignment Input B	*0..*	*0*
A117 AND2 Assignment Input C	*0..*	*0*

to section 8.11: Level “Configuration” (A parameters)

Logic module OR function	*Range*	*Def.*
This function can be used to OR any output function and output it on the OR output function (function 35, 36). See section 9.12.3 0: deactivated 1…: freely selectable output function. See A1…		
A118 OR1 Assignment Input A	*0..*	*0*
A119 OR1 Assignment Input B	*0..*	*0*
A120 OR1 Assignment Input C	*0..*	*0*
A121 OR2 Assignment Input A	*0..*	*0*
A122 OR2 Assignment Input B	*0..*	*0*
A123 OR2 Assignment Input C	*0..*	*0*

Logic module NOT function	*Range*	*Def.*
This function can be used to link any output function NOT/NOT and output it inverted on the NOT output function (function 37, 38). See section 9.12.4 0: deactivated 1…: freely selectable output function. See A1…		
A124 NOT1 Assignment Input	*0..*	*0*
A125 NOT2 Assignment Input	*0..*	*0*

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



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

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'.

Depending on the parameterization, individual o.-parameters can be hidden.

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!

NOTICE

The operating level does NOT automatically jump back to the working level!
(must be exited by simultaneously pressing the two arrow keys.)

NOTE:

The 4 functions

- Tank monitor alarm
- system alarm
- OFF mode active
- Robot stop

maintain their state when the I/O test parameter level is accessed.

However, during testing, the state of these 4 functions can be changed with

- 0: Relay de-energised
- 1: Relay energised

When leaving the level, the original state is restored.

Test relay outputs		*Range*	*Def.*
Switched-on relays remain switched on until they are reset manually. 0: Off 1: On			
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*
o.15*	**Test Relay 1 – ext. I/O module** (optionally)	*0 .. 1*	*0*
o.16*	**Test Relay 2 – ext. I/O module** (optionally)	*0 .. 1*	*0*
o.17*	**Test Relay 3 – ext. I/O module** (optionally)	*0 .. 1*	*0*
o.18*	**Test Relay 4 – ext. I/O module** (optionally)	*0 .. 1*	*0*
o.19*	**Test Relay 5 – ext. I/O module** (optionally)	*0 .. 1*	*0*
o.20*	**Test Relay 6 – ext. I/O module** (optionally)	*0 .. 1*	*0*

** is only displayed if ext. I / O extension module is activated and parameterized.*

to section 8.12: Level “I / O test parameters” (o. parameters)

Test digital inputs

All inputs [o.21 to o.33] 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.

0: switched
1: unswitched

		Range	Def.
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*	*- - -*
o.29*	**Test digital input 1 external I/O module** (optionally)	*0 .. 1*	*- - -*
o.30*	**Test digital input 2 external I/O module** (optionally)	*0 .. 1*	*- - -*
o.31*	**Test digital input 3 external I/O module** (optionally)	*0 .. 1*	*- - -*
o.32*	**Test digital input 4 external I/O module** (optionally)	*0 .. 1*	*- - -*
o.33*	**Test digital input 5 external I/O module** (optionally)	*0 .. 1*	*- - -*

** is only displayed if ext. I / O extension module is activated and parameterized*

Set and test level inputs		Range	Def.
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

Test ESVAW (agitator monitoring module)

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

o.71* **Agitator 1** in watt

o.72* **Agitator 2** in watt

o.73* **Agitator 3** in watt

o.74* **Agitator 4** in watt

** is only displayed if the agitator monitoring module is activated and parameterized*

to section 8.12: Level “I/O test parameters” (o. parameters)



Test flow sensors (pulse counters)

Display as impulses

Select the desired parameter with the SET button:
- *Button cooling* => *the displayed value is reset*
- *Button cleaning* => switches on the assigned valve or pump

See also section 6.6.4

o.81* **Pulse counter 1** ***“alkaline”***

o.82* **Pulse counter 2** ***“acidic”***

o.83* **Pulse counter 3** ***“Disinfectants”***

o.84* **Pulse counter 4** ***“Cold water”***

o.85* **Pulse counter 5** ***“Warm water”***

** is only displayed if flow sensors are activated and configured*

Display of the Software version adaptor

o.98 **Display of the Software version adaptor**

9. Other information – General

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.

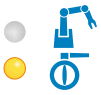
9.2 Safety switch for manual butterfly valve



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 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.

9.4 Function second temperature sensor

The second temperature sensor can take over different tasks or functions. The sensor input FÜ2 must be activated via a corresponding parameterisation [A50] as follows:

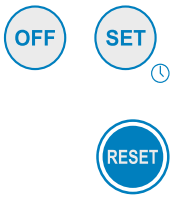
0. **Deactivated**
1. **Safety temperature sensor**
   used as monitoring sensor (redundancy) for the first sensor. In [h38], the maximum temperature difference of the monitoring sensor FÜ2 to the control sensor FÜ1 is set. If the set temperature difference is exceeded for more than 5 min., fault code F38 occurs.
2. **Heating temperature sensor**
   used to control the heating or holding temperature during cleaning.
3. **Sensor activation**
   the measured temperature is stored in the saved data for later checking. There is no control function.
4. **Sensor activation**
   as 3: - but the temperature is shown on the display in OFF-mode.

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

9.5 Test functions

9.5.1 Test alarm F99

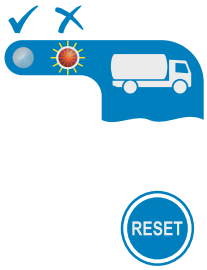
The function “test alarm” is required to test the impacts of an error on the parameterized outputs in the F-parameters (relays, SMS etc.).



Method:

- Set and store the configuration to be tested in parameter [F99].
- Trigger test errors 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.

9.5.2 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.

9.6 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.

The ‘Buffer Tank’ and ‘Robot Stop’ relays return to the state they were in before the power cut.

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. See also section 6.5.2

The tank monitor functions ...

...are maintained during a power failure, provided the optional power pack is installed. 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:

- Hold down the SET button for 5 seconds 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.

NOTICE

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.

9.7 Power pack or operation via external power supply

NOTICE

The optional battery pack is essential for full function of the tank monitor of the WTS-300.

Thus, the tank monitor function is guaranteed in the event of a power failure. During the power failure, the fault code [F30] flashes in the display.

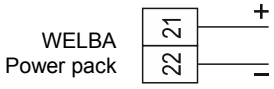
The use of the battery pack must be specified in parameter [A75] = 1. The charge status of the batteries is monitored (fault F39).

In the event of a power cut, the following relays will continue to be powered by the battery pack and will retain their current status:

- 'Robot Stop Signal' relay
- 'Buffer Tank Signal' relay
- 'Alarm' relay
- 'Tank Monitor Alarm' relay

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]

NOTICE

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)

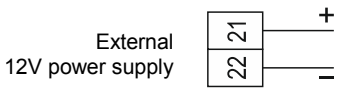
The new batteries must always be charged!

DANGER!

DO NOT USE ORDINARY BATTERIES !!!

EXPLOSIVE !!!!!!

Operation via external power supply



In the event of extreme voltage fluctuations in the power supply (or if no 230V power supply is available), the WTS-300 can also be operated via an external 12 V power supply. The connection must be made via terminals 21 + 22.

The use of the external power supply must be specified in parameter [A75 = 2].

9.8 Agitator monitoring module (optionally)



For different applications 4 different agitator monitoring modules are available:

ESVAW-001-A Operating instructions

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 Operating instructions

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 Operating instructions

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

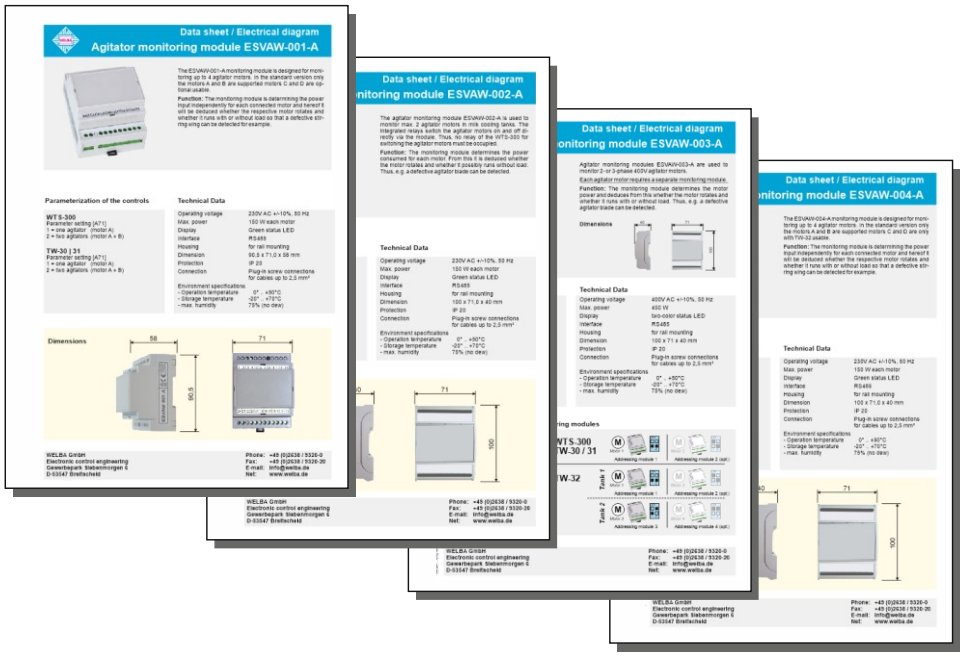
ESVAW-004-A Operating instructions

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.



9.9 I/O Expansion module ESIO



With I/O extension modules, WELBA controllers can be extended with additional digital and analogue inputs or outputs.

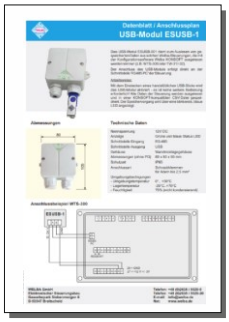
- The 6 output relays can be operated either all with 24V DC or all with 230V AC.
- The 5 digital inputs (24V DC) can be configured via jumper as NPN or PNP inputs. The inputs 1..4 can additionally measure a frequency up to 10 kHz.
- The 2 current inputs 4..20mA with supply voltage connection can be used for the connection of corresponding sensors

For proper installation, please pay attention to the documentation supplied.

Configuration:

- Assignment of relays 1 to 6 => Parameters [A15..A20]
- Assignment of digital inputs 1 to 5 => Parameters [A29..A33]
- Activation I/O extension module => Parameters [A74]

9.10 USB module ESUSB



The USB module ESUSB-001 is used to read out stored data from Welba controllers that can be read out with the Welba KONSOFT configuration software (e.g. WTS-300 or TW-31/-32).

The USB module is connected directly to the 'RS485 PC' interface of the control unit.

For proper installation, please pay attention to the documentation supplied.

9.11 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:

- Select time relay function via parameter [A86] (selection 1..8).
- Assign output function '22' to a free relay [A1..A20].
- Determine the trigger signal:
  - [A87] = 0: Function '24' must be assigned to a free digital input [A21..A33].
  - [A87] = 1..x: 1..x: the trigger signal is provided by the corresponding output function. '1..26' of the control - see [A1..A20]
- Set the desired switching times in parameters T1 [A88] and T2 [A89].

Selection 1: Delayed switch-on T1

When the trigger signal is given, a delay time T1 starts. After T1 has elapsed, the relay output is switched on (but only as long as the trigger signal is present). If the trigger signal is shorter than T1, the relay is not switched on.



Selection 2: Switch-off delay T2

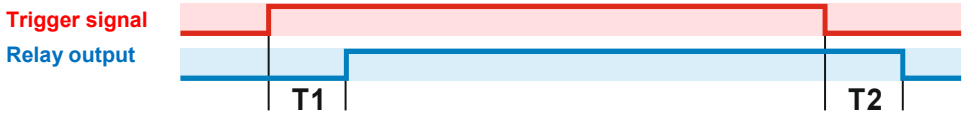
When the trigger signal is given, the relay output is switched on at the same time. If the trigger signal drops off, a time T2 starts. The relay is only switched off after T2 has elapsed.



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

If the trigger signal is given, a delay time T1 starts. After T1 has elapsed, the relay output is switched on (but only as long as the trigger signal is present). If the trigger signal is shorter than T1, the relay is not switched on.

If the trigger signal drops off, a time T2 starts. The relay is only switched off after T2 has elapsed.



Selection 4: Switch-on pulse T2

If the trigger signal is given, a pulse of length T2 is given at the relay output (but only as long as the trigger signal is present). If the trigger signal drops off within the time T2, the relay also drops off, too.



to section 9.11: Integrated multifunction-time relay

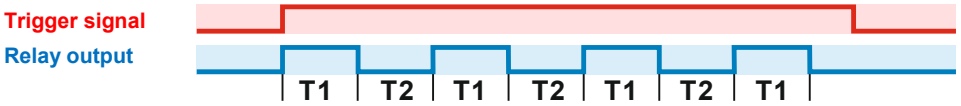
Selection 5: **Switch-off pulse T2**

If the trigger signal drops off, a pulse of length T2 is given at the relay output (but only as long as the trigger signal remains dropped off). If the trigger signal returns within T2, the relay also drops off, too.



Selection 6: **Impulse generator T1 on, T2 off**

As long as the trigger signal is present, the relay output is alternately switched ON for time T1 and OFF for time T2. If the trigger signal disappears, the relay switches off again.



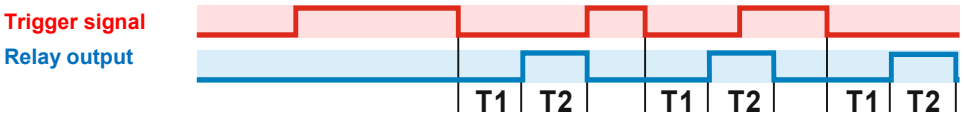
Selection 7: **Delayed pulse, ON-switched-triggered (Event-controlled -> cannot be stopped!)**

If the trigger signal is given, the relay output is switched on for the time T2 after a delay time T1. The relay output also remains switched on, if the trigger signal should drop off again before the time T2 has elapsed.



Selection 8: **Delayed pulse, OFF-switch triggered (Event-controlled -> cannot be stopped!)**

After the omission of trigger signal, a delay time T1 starts. The relay output is switched on for time T2.



9.12 The logic function

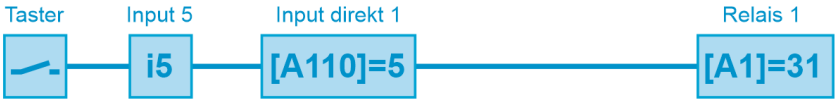
The WTS-300 has a toolbox with logic functions. This makes it possible to link input and output signals in order to generate new signals that are required for tank control. Each module has one to three inputs to which an output signal can be coupled.

9.12.1 „Input direct“ module

With this module it is possible to output an input signal (can also be a level) directly to an output, or to link it to other signals via other logic modules.

Example:

A valve connected to relay 1 is to be switched via a button (on input 5).



Parameterization:

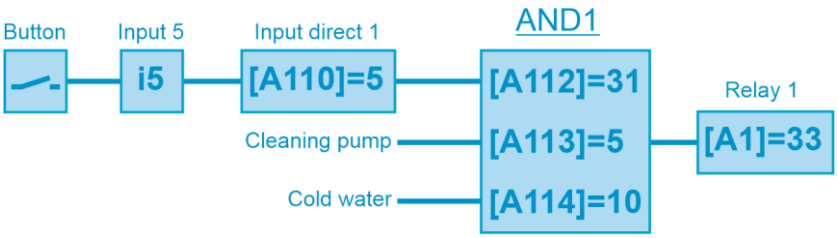
- Parameter [A110] = 5 - Assign input 5 to the function “Input direct 1”
- Parameter [A1] = 31 - Output function “Input direct 1” to relay 1.

9.12.2 „AND“ module

This module has three inputs, each of which can be linked to an "output function". If all inputs are active, the output of this module is also active. If only two inputs are required, the third can remain deactivated and is then not taken into account.

Example:

We are expanding the previous example. The valve on Relay1 should only switch on when the button is pressed, the cleaning pump is running and the cold water valve is open.



Parameterization:

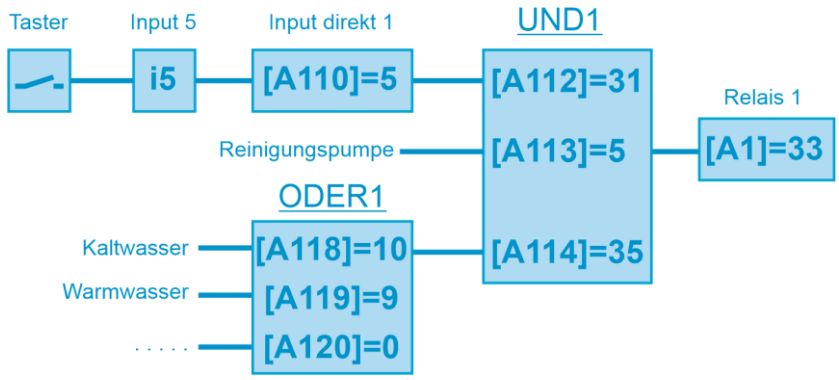
- Parameter [A110] = 5 - Assign input 5 to function “Input direct 1”
- Parameter [A112] = 31 - Input direct 1 (button) on the 1st input AND1
- Parameter [A113] = 5 - Cleaning pump on the 2nd input AND1
- Parameter [A114] = 10 - Cold water valve on the 3rd input AND1
- Parameter [A1] = 33 - Output of the AND1 to relay 1.

9.12.3 „OR“ module

This block has three inputs to which an "output function" can be connected. If at least one input is active, the output of this block is also active. If only two inputs are required, the third can remain deactivated and is then ignored.

Example:

We expand on the previous example. The valve on relay 1 should only switch on when the button is pressed and the cleaning pump is running and the cold water valve or the hot water valve is open.



Parameterization:

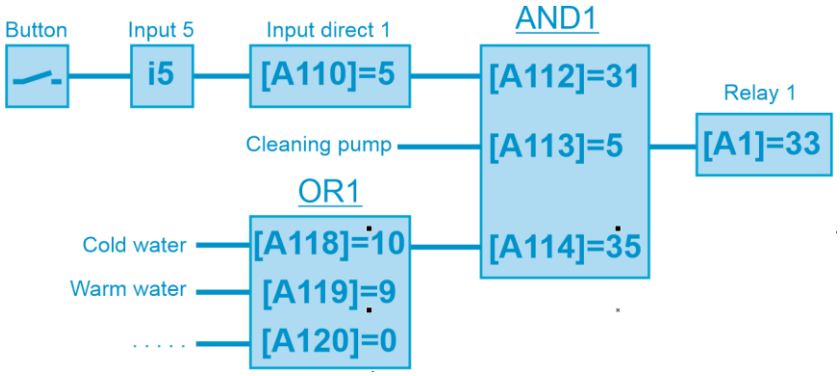
- Parameter [A110] = 5 - Assign input 5 to the function “Input direct 1”
- Parameter [A112] = 31 - Input direct 1 (button) on the 1st input AND1
- Parameter [A113] = 5 - Cleaning pump on the 2nd input AND1
- Parameter [A114] = 35 - to the output of OR1
- Parameter [A118] = 10 - Cold water valve on the 1st input OR1
- Parameter [A119] = 9 - Hot water valve on the 2nd input OR1
- Parameter [A1] = 33 - Output the output of AND1 to relay 1.

9.12.4 „NOT“ module

This module has an input and inverts it at the output. It is needed to reverse a signal direction.

Example:

We change the example from the beginning. The valve on the relay 1 should only switch on when the button is pressed and the cleaning pump is running and the cold water valve is not open.



Parameterization:

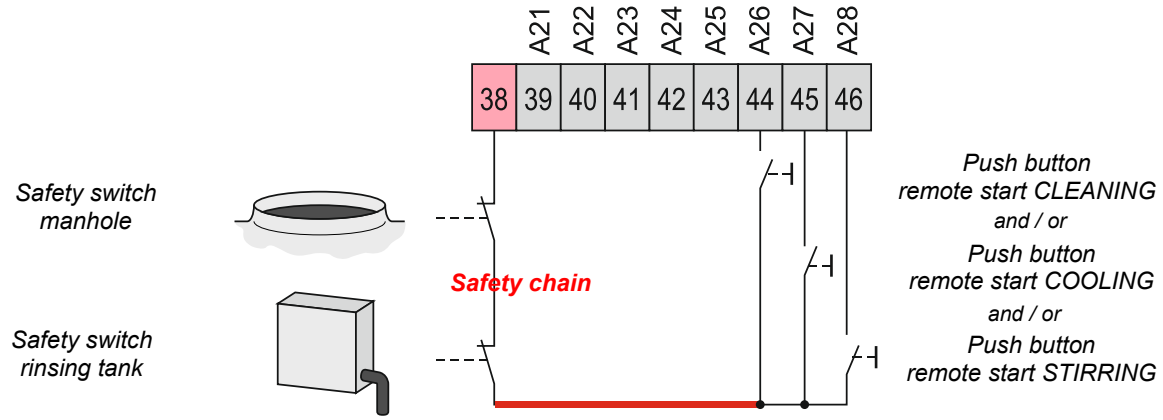
- Parameter [A110] = 5 - Assign input 5 to function “Input direct 1”
- Parameter [A112] = 31 - Input direct 1 (button) on the 1st input AND1
- Parameter [A113] = 5 - Cleaning pump on the 2nd input AND1
- Parameter [A114] = 37 - NOT1 on the 3rd input AND1
- Parameter [A124] = 10 - Cold water on NOT1
- Parameter [A1] = 33 - Output the output of the AND1 to relay 1.

9.13 Safety chain for 'remote start' functions

DANGER!

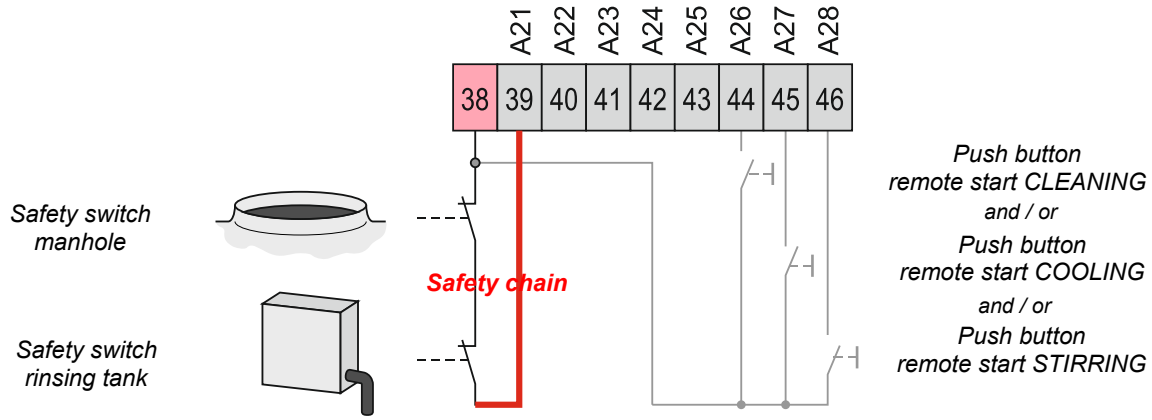
If the functions CLEANING, COOLINGL and/or STIRRING are triggered by remote start (push button), the system operator must ensure that the manhole and the rinsing tank are monitored by a safety chain.

Parameter [A38] => Selection '0'
safety chain in the control line of the remote push buttons



Parameter [A38] => Selection ‚1‘
Safety chain via digital input

- Assign function '36' (release remote start) to one of the digital inputs [A21..A33].



9.14 RS485 interface

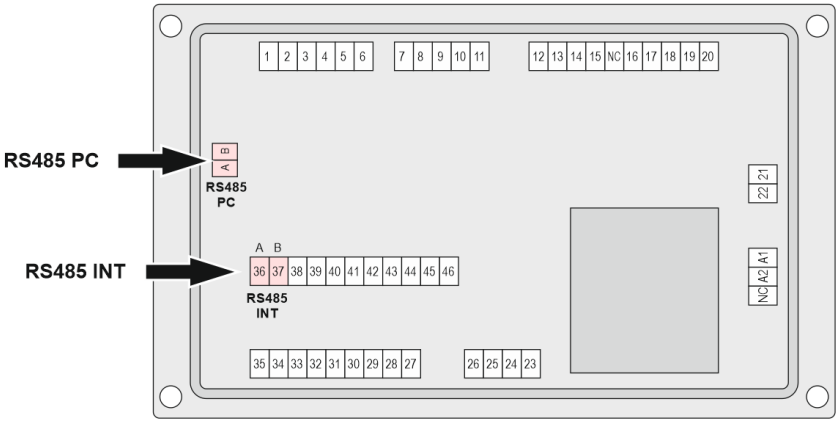
The WTS-300 has two RS485 interfaces as connection options for:

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.



9.15 Data access via Modbus RTU

Via Modbus RTU, higher-level systems can read out the WTS-300's operating data, acknowledge faults and, subject to the appropriate authorisation, start the cooling process.

The WTS-300 supports function code FC03 (read holding register) for reading out operating data. A maximum of 10 registers may be read in a single access.

The following data is provided:

Meaning of the operating mode (adress 0):
0 = OFF
1 = Cooling
2 = Power failure
3 = Cleaning

Byte / Bit	Name	Data type	Unit
Adress 0	Operating mode	UI16	
Adress 1	Fault code for the current fault	UI16	
Adress 2	Actual value, temperature sensor 1 (one decimal place)	SI16	°C
Adress 3	Actual value, temperature sensor 2 (one decimal place)	SI16	°C
Adress 4	Current setpoint for cooling (one decimal place)	SI16	°C
Adress 5	Relay status: Fault relay	UI16	
Adress 6	Relay status WTS-300	UI16	
Adress 7	Input status: WTS-300	UI16	
Adress 8	Relay status: ESIO-001 expansion module	UI16	
Adress 9	Input status: ESIO-001 expansion module	UI16	
Adress 10	Current fill level (in 10-litre units)	UI16	

Function code FC06 (write holding register) can be used to trigger functions on the WTS-300 via Modbus. Some function accesses must be enabled in parameter A92.

The following register accesses are provided:

Byte / Bit	Name	Data type	Unit
Adress 64	Fault Reset If this register is written to with the code 0xCEFE, this is equivalent to pressing the reset button. The fault relay is deactivated, or any active errors are acknowledged. (UINT16=52990 or INT16 = -12546)	UI16	
Adress 65	External cooling start If this register is written to with the code 0x5AA5, this triggers a cooling start from OFF mode. The function must be enabled in A92 and the conditions specified in parameter A38 must be met. (UINT16 = 23205 or INT16 = 23205)	UI16	

9.16 General measures when using electronic control systems

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

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

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

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

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

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

Possible interference sources (to name a few) include:

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

to section 9.15: General measures when using electronic control systems

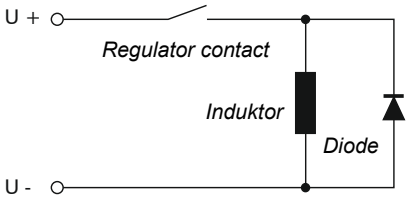
b. If specific interference sources cannot be avoided they should at least be kept at a distance from the regulator system.

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

d. If possible a separate main line should be provided to feed the regulator system. This helps reduce any interference penetrating the regulator via the mains supply line. Voltage surges resulting from switching substantial loads will also then be less of a problem.

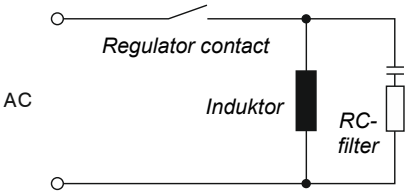
e. In the case of contactors, solenoid valves and other inductive consumers the induction voltage occurring during switching has to be reduced by appropriate protection methods. The choice of methods depends on whether the consumer runs on DC or AC voltage.

Right !



DC voltage

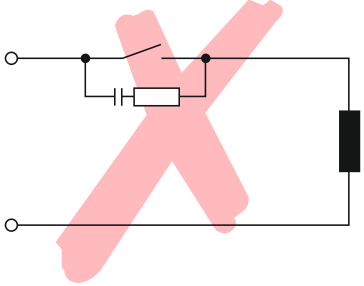
In the case of d/c voltage systems the induction voltage occurring can, for example, be limited by using self-induction diodes, varistors or suppresser diodes. The diagram on the left shows one possibility using a self-induction diode.



AC voltage

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

Wrong !



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

to section 9.15: 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.

9.17 Robot control

The WTS-300 offers two ways of stopping a connected robot via a relay:

a.) using the '**Robot Stop'** button

b.) using the '**Cleaning active'** signal

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

---

*a.) Button „**Robot Stop**“*





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 rapidly.
- If cooling mode is activated while the robot is switched off, the robot will start automatically.

In cooling mode

- If the OFF button is pressed to switch to OFF mode, the robot remains active.
- If the 'Robot Stop' button is pressed for 3 seconds, the robot will stop and cooling mode will be deactivated at the same time.

In cleaning mode

The 'Robot Stop' button has no function.

In the event of a cleaning fault:

- See section 6.5

After successful cleaning:

- The robot is released or the disc valve is closed, depending on the settings in [A43].
- Cooling starts either via a signal or automatically, depending on the setting in parameter [P60].

---

*b.) „**Cleaning active**“ **signal*** *(Robot button not functioning)*

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 A20].

- *If cleaning is unsuccessful*: See section 6.5
- *If cleaning is successful*, the robot can start the cooling process via a digital input (digital input [A22..A33] => must be set to 2) or the cooling process starts automatically. See parameter [P60].

9.17.1 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

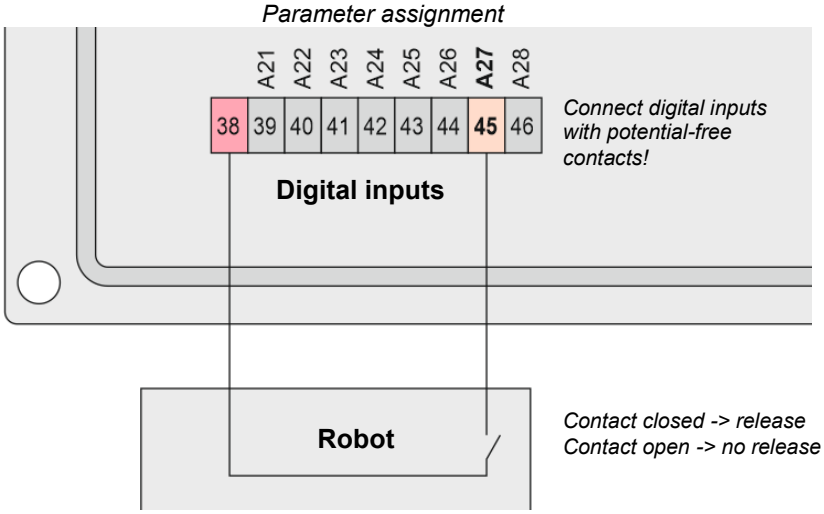
As soon as the robot is released, the cleaning process is started - the mode LED remains lit permanently and the programme step for the cleaning process appears in the display

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].

Parameter assignment



9.17.2 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.

9.17.3 Compressor lock via digital input (by robot)

With this function it can be set that a robot influences the cooling performance. If the robot sends a signal to the correspondingly configured digital input, the compressor is switched off as long as the signal is present.

NOTICE

Note: With settings 3 and 4 in parameter [P70], the compressor lock can be deactivated via button “Cooling” until the next cooling start.

Cancel compressor lock:

- Press the OFF button,
- Start cooling mode immediately (without cooling start delay) by double-clicking the “COOLING” button.

  The compressor lock is deactivated once (until the next cooling start).

10. Other information - Cooling

10.1 Exiting cooling mode

There are two ways to exit cooling mode:

- Press the **OFF button**:
  Cooling mode ends – the robot (if fitted) continues to run
- Press the **ROBOT STOP button** (only during robot operation)
  Cooling mode ends – the robot is stopped.

10.2 Automatic start to continuous agitating mode after exiting cooling mode

Setting in parameter [P23].

When you exit cooling mode by pressing the OFF or ROBOT STOP button, a continuous stirring mode can be activated automatically to ensure the milk in the tank is mixed more thoroughly.

10.3 Automatic start to cooling mode after successful cleaning

In addition to manually starting the cooling via keyboard, other starting options can be set.

Setting in parameter [P60].

Setting 0 *	**Remote start via digital input "Remote start cooling"** The cooling can be started from OFF mode via digital input.
Setting 1	**Autostart cooling** When using a robot, you can set the cooling mode to start automatically after a successful cleaning.
Setting 2 *	**Autostart cooling with cancellation of a cooling start delay via digital input** Like option 1, but in addition a still active cooling start delay (see setting in [P61]) can be cancelled and switched to thermostatic cooling.
Setting 3 *	**Start and stop cooling via digital input** The cooling can be started and stopped from OFF mode via digital input.

** For settings 0, 2 and 3, a digital input [A21..A28] must be assigned the input function "Start and stop cooling (2)".*

NOTICE

If cleaning is not successful, the control remains in cleaning mode and must be manually acknowledged before cooling can be started. See section 6.5

10.4 Different variants for cooling start delay

10.4.1 Variant overview

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

On the WTS-300, a cooling start delay can be set so that, once cooling mode has been activated, the compressor starts with a time delay to prevent small quantities of milk in the tank from freezing. This delay takes place only in case of first milking after the cleaning.

NOTICE

If the COOLING button is pressed twice, the cooling start delay is bypassed.

If the cooling mode is interrupted during a cooling start delay and is restarted, the cooling start delay begins again.

If the cooling mode is interrupted after the cooling start delay has been completed and then started again, the cooling start delay will no longer be carried out!

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 spurts

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



3 Periodic cooling spurts after switch-on delay

Cooling starts after a set time, in the form of pre-set periodic cooling spurts at set intervals before then switching over to temp. regulation.



4 According to number of milk pump impulses

Cooling starts after the set number of milk pump impulses.



5 Periodic cooling spurts after a number of milk pump impulses

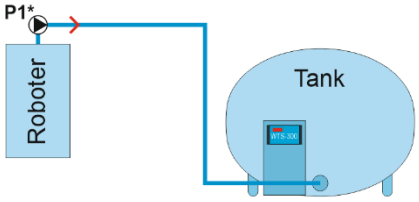
Cooling starts after the set number of milk pump impulses in the form of pre-set periodic cooling spurts at set intervals before then switching over to temperature regulation.



to section10.4.1: Different variants for cooling start delay

Variants milk-volume-dependent cooling start delay

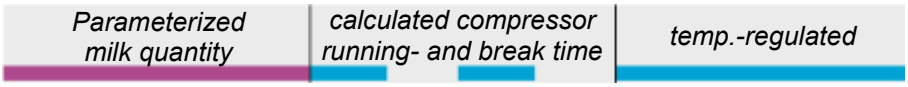
For further explanations see next page..

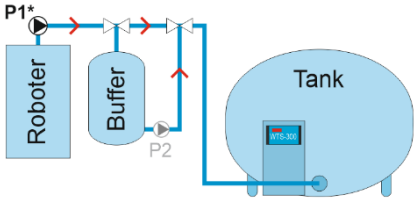


6* *e.g. for systems with robots without a buffer tank*

Milk-volume-dependent cooling start delay
from start cooling [P50 - P 55]

This "cooling start delay" starts after the calculated amount of milk in the tank before switching to temperature control.



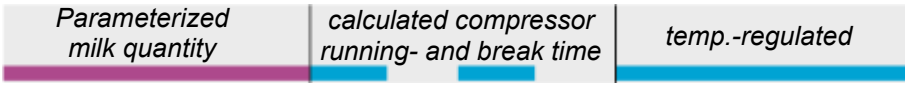


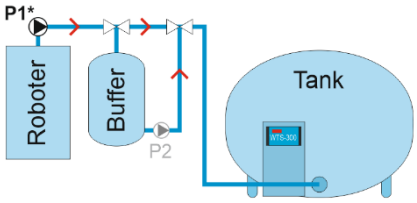
7* *e.g. for systems with robots and buffer tank*

Milk-volume-dependent cooling start delay
from start cooling [P50 - P 55]

This “cooling start delay” begins with the start of the cleaning mode If this is completed successfully (robot release), the pumping process from the buffer tank into the cooling tank starts - at the same time the cooling mode is started.

If the minimum milk quantity [P51] is present, the compressor starts for the first time.





8* *e.g. for systems with robots and buffer tank*

Milk-volume-dependent cooling start delay
from start cooling [P50 - P 55]

like 7, but at the same time as the pumping process starts, a delay time [P61] expires - so that the compressor only starts when the milk has been transferred from the buffer tank to the cooling tank.

Nach Ablauf von [P61] startet der Kompressor erstmals, sobald die Mindestmilchmenge [P51] erreicht ist.



** P1 = Milk feed pump*

10.4.2 Explanations of the milk volume-dependent cooling start variants 6 + 7 + 8

Introduction:

The WTS-300 uses the milk pump's on time to determine the amount of milk delivered to the tank. The signal used for the evaluation can also be an "equivalent" signal from another element (e.g. milk valve). It only matters that the signal is present for as long as milk is delivered to the tank with the specified delivery rate [P50].

Depending on which signal is used, it may be necessary to ensure that it is interrupted during rinsing times or during discharge. (e.g. pump is running, but no milk is delivered to the tank)

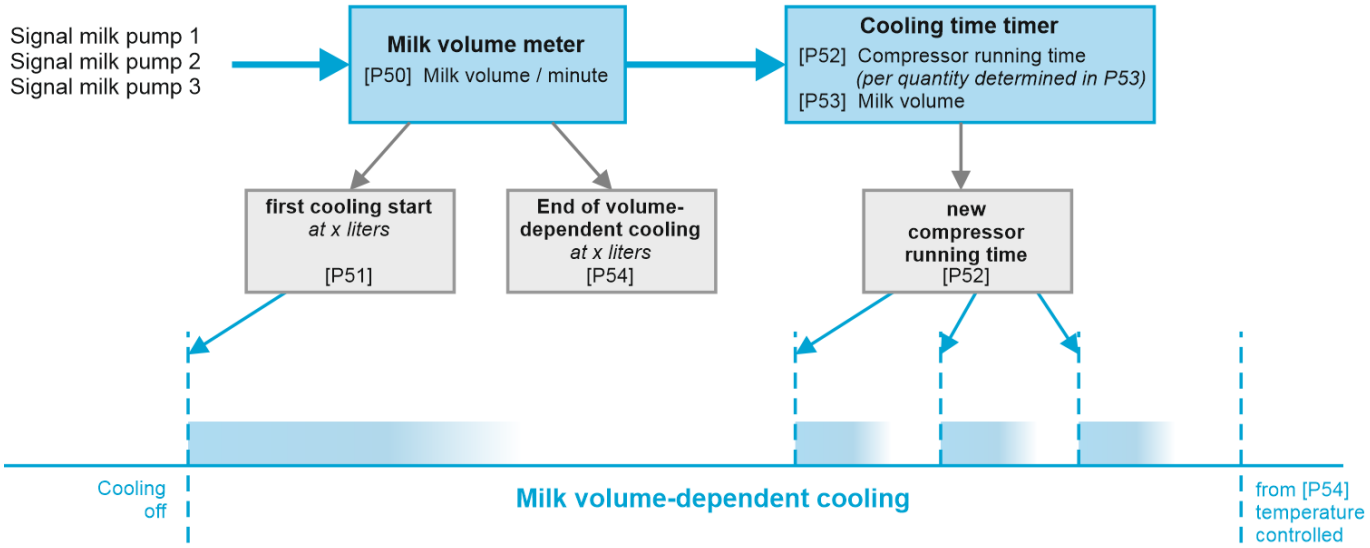
Up to three independent input signals can be connected. The digital inputs must be parameterized accordingly. (Input function 8, 9, 10)

Start of volume recording:

Variant 6*	The milk volume is recorded when cooling starts
Variant 7* + 8*	The milk volume is recorded when cleaning starts if the milk is temporarily stored in a buffer. This volume is then taken into account after cleaning when the cooling mode starts and the milk is pumped around.

Every litre of milk that is added generates a compressor running time in a cooling timer.

To section 10.4.2: Explanations of the milk volume-dependent cooling start variants 6 + 7 + 8



The compressor switches on...

- … for the first time when there is a set amount of milk [P51] in the tank.
- … then again when the set compressor running time [P52] is reached in the cooling time timer. This corresponds to a new amount of milk that has been added, which is set in [P53].

In both cases, the compressor runs until the cooling time timer has been processed. Milk that is added (while the compressor is running) is added to the cooling time timer and thus extends the compressor running time.

Switching to regular (temperature-controlled) cooling

If the amount of milk entered in [P54] is reached, the control switches to regular cooling mode. The "milk volume-dependent cooling start" is ended and is only activated again after the next cleaning of the tank.

Compressor running time per liter added

The parameters [P52] and [P53] determine when the compressor starts again.

Example:
"The cooling system switches on for 180 seconds when another 15 liters of milk flow into the tank"

The two parameters result in the running time per liter, which is used to calculate the running time in the cooling time timer. (P52/P53) = running time in seconds per liter of milk.

10.4.3 Practical example “Milk volume-dependent cooling start”

Given facts:
- 6000 liter tank.
- Cooling unit with 10 kW **(=10,000 W)** cooling capacity.
- Cooling can be started from a milk quantity of 50 liters.
- Thermostatic cooling can be switched on from 350 liters.
- The compressor should be switched on for at least 180 seconds.
- The milk pumps each deliver 25 liters/minute
- The incoming milk should be cooled by **32 Kelvin**.

Calculation of the required compressor running time
(per liter of milk based on the cooling capacity)

$$\frac{\textbf{32 Kelvin} \; x \; 4.000 \; Ws}{\textbf{10.000 W}} = 12{,}8 \text{ seconds}$$

The factor 4,000 Ws results from the heat capacity of the milk.

Parameterization (according to the example)

[A28] = 8	The 8th digital input receives the function “Impulse milk pump 1”. If there are several robots on separate lines, additional free digital inputs can be parameterized. These then receive function 9 or 10.
[P61] = 6,7,8	„Set “milk volume dependent cooling start”.
[P50] = 25	Delivery rate of the milk pump
[P51] = 50	Switch on the compressor for the first time from 50 liters of milk. (approx. 10 minutes running time)
[P52] = 180	The compressor switches on from this running time
[P53] = 14	Calculated from [P52] / 12.8 seconds
[P54] = 350	Regular cooling begins from this amount of milk.

In this example, the compressor running time is 12.8 seconds/liter of milk. The values are calculated and are only intended as a guideline. In practice, the values must be adapted to the respective tank.

Generally: Short compressor running times are more useful than long running times (to reduce the risk of freezing). However, this is counteracted by frequent switching on of the compressor. The correct value must be found depending on the tank.

Fine adjustment can be made using parameters [P52 or P53]:
- More cooling capacity = increase [P52] or decrease [P53]
- Less cooling capacity = increase [P53] or decrease [P52]

10.5 Display of the remaining time of cooling start delay

The display of the remaining running time can be set in parameter [P97] depending on the set cooling start delay variant [P61].

Parameter		*Display*
[P97]	*[P61]*	
1	*1*	The remaining running time (delay time from [P62]) is displayed alternating with the current temperature. Example: Display 0:09 = 9 minutes left
	3	Same as setting 1, only the remaining running time is displayed. The remaining running time of the cooling spurts is not visible.
	4	The number of breast pump pulses that have occurred so far is displayed alternating with the temperature. Example: Display P. 5 = 5 pulses.
	5	Same as setting 4, only until breast pump pulses are reached. The remaining running time of the cooling spurts is not visible
2	*1,2,3*	The total remaining running time including cooling spurts, which results from the respective setting 1,2,3, until the cooling switches to normal cooling.
	4	The number of breast pump pulses that have occurred so far is displayed alternating with the temperature. Example: Display P. 5 = 5 pulses.
	5	Same as setting 4, only until breast pump pulses are reached. The remaining running time of the cooling spurts is displayed. Example: Display 0:09 = 9 minutes left

10.6 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.

10.7 Level alarm during cooling (Fault code F52)

Safety function:

The level input will be monitored during cooling.

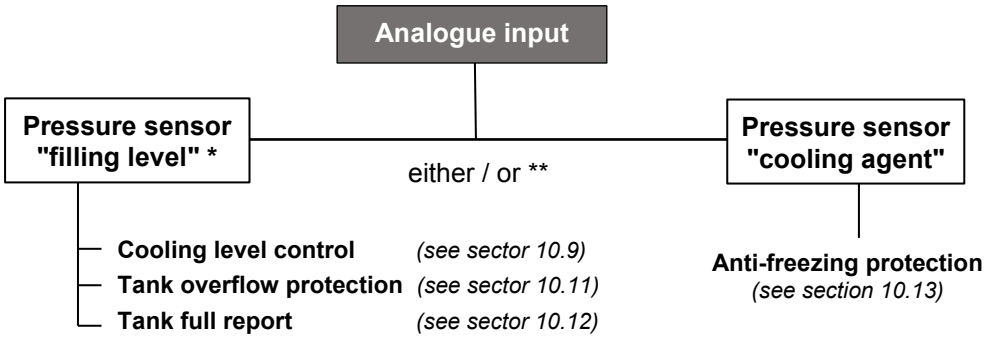
In the case of systems with robot operation, depending on the layout of the system, the washing line may be connected permanently. If, for example, a water valve jams and the water level rises, water could be forced into the tank via the washing line. In this case, once the electrode is reached, an alarm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

All relevant settings are found in [P40].

10.8 Connection /Parameterization external analogue pressure sensor

** The measuring range of the pressure sensor used must be entered in parameters [A69 + A70].*

*** in connection with the optional IO extension-module, both functions can be used simultaneously.*

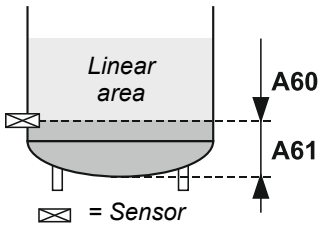


A pressure sensor for the filling level or the refrigerant can be connected to the analog input of the WTS-300. See graphic.

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

Installation case "A"

Mounting sensor **within** the linear area

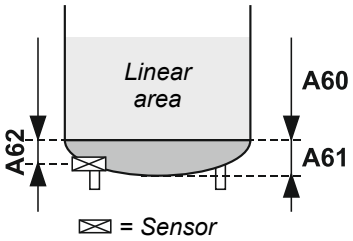


Installation case "A"

- 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.

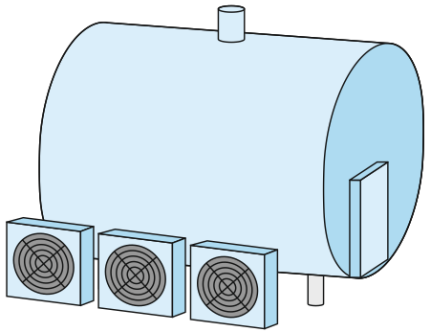
Level indicator on the display (in litres)

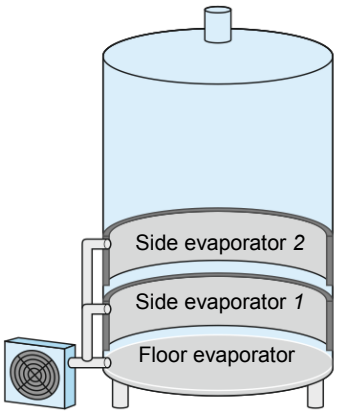
With a pressure sensor “filling level” the filling level in the tank can be displayed in the cooling mode by pressing the SET-button (in hectolitres).

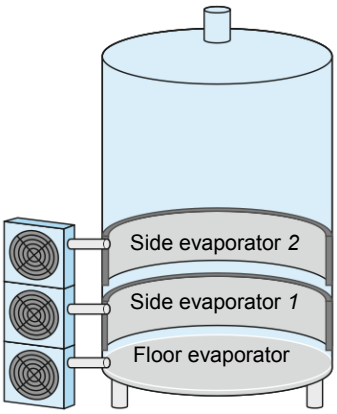
Display L.125 = 12,500 litres

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

10.9 Tanks or silos with multiple compressors / evaporators [P73]







Compressor 1 + 2 + 3

The WTS-300 supports tanks and silos with up to three compressors or evaporators. Various settings are possible in parameter [P73] to control compressors 2 + 3 or evaporators 2 + 3.

The following applies to all of these settings:

The connected compressors or evaporators must be assigned to the corresponding output relays in the parameters [A1..A20].

Compressors / evaporators are referred to below as COOLING STAGES!

NOTICE

If the individual compressors/evaporators should also be monitored, see section 0

[P73 = 0] *only for operation with ONE compressor*

Compressor is switched on or off depending on requirements

- Set parameter [P73] to method 0.

[P73 = 1]

Cooling stages are switched on with a time delay after the cooling start delay

- Set parameter [P73] to method 1.
- Set parameter [P74] (time delay cooling stage 2 => from end of cooling start delay) to the desired delay time.
- Set parameter [P75] (time delay for cooling level 3 => from activation of cooling level 2) to the desired delay time.
- Set the desired time delay between the cooling stages relative to each other in parameter [P78] (effective after the cooling stages are switched off for the first time.)

If the 1st level switch is not assigned to an input, it is treated as 'set'.

Result: The 2nd compressor runs at the same time as the 1st compressor after the cooling start delay has expired.

[P73 = 2]

Cooling levels 2 + 3 are switched on using a fill level switch

Requirement: installed level switch for each cooling level.

- Set parameter [P73] to method 2.
- Assign the fill level switches to one of the digital inputs [A21.. A33]. (Setting 16 or 17 for "fill level switch 1 or 2")
- Set the desired time delay between the cooling stages relative to each other in parameter [P78] (effective after the cooling stages are switched off for the first time.)

to section 10.9: Tanks or silos with multiple compressors / evaporators [P73]

[P73 = 3]

Cooling steps are switched on depending on the filling quantity
Precondition: installed analogue pressure sensor "filling level"

- Set the pressure sensor as described in section 10.8.
- Set parameter [P73] to method 3.
- Set the filling quantity in [P76] in litres to switch on cooling level 2.
- Set the filling quantity in [P77] in litres to switch on cooling level 3.
- Set the desired time delay of the cooling steps to each other in parameter [P78] (effective after the first switching off of the cooling steps).

[P73 = 4]

Cooling steps are switched on simultaneously (parallel operation)

All cooling steps are simultaneously switched on to each other with a short time delay [P78]. Parallel operation is already active during the cooling start delay.

- Set parameter [P73] to method 4.
- Set the desired time delay of the cooling steps to each other in parameter [P78]. (Immediately effective)

[P73 = 5]

As method 2 - with additional timeout*.

Precondition: installed level switch per cooling step

Timeouts:

If the set levels are not achieved within the timeouts, the relevant cooling steps are still switched on

- Set parameter [P73] to method 5.
- Assign the fill level switches to one of the digital inputs [A21... A33]. (Setting 16 or 17 for "Fill level switch 1 or 2").
- Set the desired timeout time* for cooling step 2 in parameter [P74].
- Set the desired timeout time* for cooling step 3 in parameter [P75].
- Set the desired time delay of the cooling steps to each other in parameter [P78]. (Effective after the first switching off of the cooling steps).

to section 10.9: Tanks or silos with multiple compressors / evaporators [P73]

[P73 = 6] *only for compressors* **

Compressors 1 + 2 run alternately (with running time comparison) with a switchover to the other compressor in case of a fault.

This selection is suitable for tanks with 2 compressors.

Each cooling cycle is started with the compressor with the fewest operating hours. Only one compressor is in operation at a time.

In case of a fault, the other compressor is switched on and the fault message 'F71 or F72' is indicated.

- Set parameter [P73] to setting 6.
- Select the type of fault monitoring in parameter [P72].
- Assign setting 6 for "thermal protection / fault contact compressor" to two of the digital inputs [A21... A33].

[P73 = 7] *only for compressors* **

Compressors 1 + 2 run alternately (with running time comparison) with a switchover to the other compressor in case of a fault.

As setting 6, but for tanks with 3 compressors.

Exception:

- Set parameter [P73] to setting 7.
- Select the type of fault monitoring in parameter [P72].
- Assign setting 6 for "thermal protection / fault contact compressor" to three of the digital inputs [A21... A33].

[P73 = 8] *only for compressors* **

Only compressor 1 is activated - without switching to other compressors. Fault message after three starting attempts.

This selection is suitable for tanks with more than one compressor. However, ONLY compressor 1 should be used!

- Set parameter [P73] to setting 8.
- Select the type of fault monitoring in parameter [P72].
- Assign setting 6 for "thermal protection / fault contact compressor" to two or three of the digital inputs [A21... A33].

[P73 = 9] *only for compressors* **

Only compressor 2 is activated - without switching to other compressors. Fault message after three starting attempts.

This selection is suitable for tanks with more than one compressor. However, ONLY compressor 2 should be used!

- Set parameter [P73] to setting 9.
- Select the type of fault monitoring in parameter [P72].
- Assign setting 6 for "thermal protection / fault contact compressor" to two or three of the digital inputs [A21... A33].

to section 10.9: Tanks or silos with multiple compressors / evaporators [P73]

[P73 = 10] *only for compressors* **

Only compressor 3 is activated - without switching to other compressors. Fault message after three starting attempts.

This selection is suitable for tanks with more than one compressor. However, ONLY compressor 3 should be used!

- Set parameter [P73] to setting 10.
- Select the type of fault monitoring in parameter [P72].
- Assign setting 6 for "thermal protection / fault contact compressor" to three of the digital inputs [A21... A33].

[P73 = 11] *only for compressors* **

Compressor 1 with switchover to compressor 2 in case of a fault.

This selection is suitable for tanks with two compressors.

ONLY compressor 1 is used, but in case of a fault, the system switches to compressor 2.

- Set parameter [P73] to setting 11.
- Select the type of fault monitoring in parameter [P72].
- Assign setting 6 for "thermal protection / fault contact compressor" to two of the digital inputs [A21... A33].

[P73 = 12] *only for compressors* **

Compressor 2 with switchover to compressor 1 in case of a fault.

This selection is suitable for tanks with two compressors.

ONLY compressor 2 is used, but in case of a fault, compressor 1 is used.

- Set parameter [P73] to setting 12.
- Select the type of fault monitoring in parameter [P72].
- Assign setting 6 for "thermal protection / fault contact compressor" to two of the digital inputs [A21... A33].

[P73 = 13] *nur für Verdichter* **

Compressor 1 with compressor 2 switched on from 2° temperature difference to the setpoint.

Generally, compressor 1 is used, but if the temperature difference is more than 2°C from the setpoint, compressor 2 is switched on in addition.

- Set parameter [P73] to setting 13.
- Select the type of fault monitoring in parameter [P72]..
- Assign setting 6 for "Thermal protection / compressor fault contact" to two of the digital inputs [A21.. A33].

- -

** **For the setting [P73 = 6, 7, 8, 9, 10, 11, 12], the following is general applicable:**

In case of a fault message of the active compressor

- it is switched off after one minute and
- switched on again after a break of 6 minutes.

This procedure will be repeated until the fault is eliminated.

For the establishing of fault messages, see section 10.10

10.10 Thermal protection - / Fault monitoring compressor [P72]

Fault monitoring is used to indicate problems when running up to three separate compressors.

Assignment of digital inputs

Fault monitoring is only possible if function 6 (thermal protection / compressor error contact) is assigned to at least one digital input [A21..A33].

NOTICE

*If fault monitoring is parameterized when using only ONE compressor [A21..A33 = 6], fault message **F53** appears in the event of an fault.*

*If function '6' is assigned to more than one digital input [A21..A33] when using SEVERAL compressors, the corresponding fault message **F71, F72 or F73** appears if a compressor fails.*

The fault message occurs depending on the parameterisation

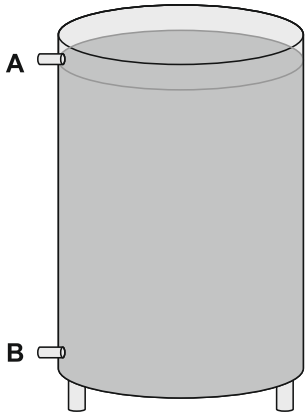
- by evaluation of the potential-free auxiliary contact of the motor protection switch (setting 1, 2), or
- by evaluation of the potential-free auxiliary contact of the compressor contactor (setting 3, 4),

The following settings for fault monitoring are possible:

- **Parameter [P72] is at 0**
  Fault monitoring is deactivated
- **Parameter [P72] is at 1**
  The auxiliary contact of the motor protection relay or of the motor protection switch is queried.
  Is this auxiliary contact opened = A fault message is displayed.
- **Parameter [P72] is at 2**
  The auxiliary contact of the motor protection relay or of the motor protection switch is queried.
  Is this auxiliary contact closed = A fault message is displayed.

- - - -

10.11 Tank overflow protection – Fault F51



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

1. Via level switch **A** “tank full”

Precondition: installed “level switch tank full”

- Set parameter [P42] to 1 or 2, depending on the switch used
- Assign to one of the digital inputs [A21..A33] the function 18 “level sensor tank full”

2. Via level electrode **A** (connected to level 2 of the control)

Precondition: installed level electrode

- Set parameter [P42] to 4.

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

Precondition: installed analogue pressure sensor “filling level”

- Set parameter [P42] to 3
- Enter the maximum filling quantity of the silo-tank in hectolitres ((= 100 litres) in parameter [P43]
- Set the pressure sensor as described in section 10.8

Fault display:

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

This fault is reported only once per cooling cycle.

10.12 Tank full message with optional self-holding

This function can be used for automatic tank switching.

Depending on the parameterization in [P44], a full tank is detected and reported at the “Tank full message” output (output function 27) after the delay time [P46].

Optional self-holding

Optionally, self-holding can be activated by setting an input to “Reset tank full message” (input function 43).

The tank full message is then reset via this input.

10.13 Anti-freezing protection by means of low pressure monitoring

With the WTS-300 "freeze protection" can be set up via the low pressure monitoring of the refrigeration circuit. This prevents small quantities of milk from freezing in the tank or silo.

NOTICE

If there are several compressors, the low-pressure monitor acts on ALL the compressors at the same time.

Two variants are possible:

A) Via an analogue pressure sensor at the analogue 4..20 mA -input

If the pressure falls below a set pressure release limit [P85], the compressor is switched off for an adjustable time [P88].

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

Time limit of the "anti-freezing protection":

After cooling has started, the "low pressure monitoring" can be limited in time via parameter [P89].

If a low-pressure fault is to be reported after this limit [P89] has expired, a corresponding fault pressure must be entered in [P86]. If this pressure is undercut, fault F80 occurs (if parameterised in parameter [P90]. See section 10.14)

NOTICE

Other settings: [A54 or A56 or A57] => 2
[P84] => 0

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

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

B) Via a pressure switch on one of the digital inputs

If the pressure switch signals (pressure too low) the compressor is switched off for a time which can be set [P88].

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

Time limit of the "anti-freezing protection":

After cooling has started, the "low pressure monitoring" can be limited in time via parameter [P89].

Other settings:
- P84 = 1 or 2
- The assignment of function 20 (low pressure switch input)

NOTICE

If, in addition to 'anti-freezing protection', a 'low pressure' fault message (F80) is to be set up,too, a value >= 3 must be entered in parameter [P90]. See section 10.14.

10.14 Fault messages low pressure (F80)

Based on the setting for low pressure monitoring (section 10.13), a fault message can also be generated as follows:

Parameter [P90] - Setting 1 + 2

- When using a digital pressure switch
- Independent of the low pressure monitoring for freeze protection
- Simultaneous use of freeze protection via low pressure switch see setting 3..999

Function assignment digital input [A21..A33] => 20 (low pressure switch input)

Parameter [P90] - Setting 3..999 sec.

If a low-pressure message stands longer than the time set after the finishing of the low pressure monitoring [P89] for freeze protection, fault (F80) is displayed.

- When using a digital pressure switch or an analogue pressure sensor
- Depending on the low pressure monitoring for the freeze protection (only possible if [P89] > 0)

10.15 Fault Messages High Pressure (F81)

Via parameter [P91], the signal of an external high-pressure switch can be generated as fault message.

Function assignment digital input [A21..A33] => 21 (fault high-pressure)

Parameter [P91] - Setting 1 + 2

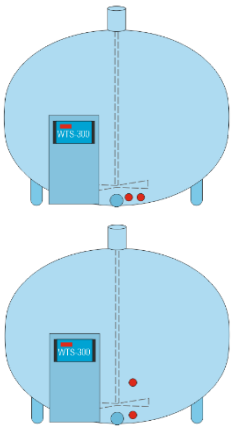
- independent of the low-pressure monitoring

10.16 Temperature difference monitoring using a second sensor

Temperature difference monitoring is designed to use a second 'safety temperature sensor' to monitor the correct operation of the first sensor or the agitator.

In both cases, setting 1 (safety temperature sensor) must be selected in parameter [A50].

Monitoring can be carried out in two different ways:



- <u>Monitoring the correct operation of sensor 1</u>
  Sensor 1 and the monitoring sensor are positioned side by side.
  If the temperature difference between the two sensors exceeds the value entered in parameter [h38], **alarm F38** is triggered.

- <u>Monitoring the correct operation of the agitator</u>
  Sensor 1 and the monitoring sensor are positioned one above the other at a certain distance.
  If the temperature difference between the two sensors exceeds the value entered in parameter [h38], **alarm F38** is triggered.
  An activation delay (adjustable in parameter [h38]) ensures that no alarm is triggered until the milk has reached the second sensor.

11. Other information - Cleaning

11.1 Detergent supply via beaker

Option 1: Usage of the 'alkaline detergent' function‘

If parameter [r21 = 0] is set, only the relay for alkaline detergent is activated. The selection of the cleaning agent (alkaline / acidic) is up to the farmer.

Option 2: Usage of the 'Hot water valve' function‘

- Assign function 16 'Hot water valve / beaker cleaning' to one of the relays A1..A20.
- Select the hot water valve for the main cleaning in parameter [r53].

NOTICE

NOTE: By activation of parameter [n30] (water intake via level) the hot water valve to flood the beaker when the level is achieved would be switched off again.

With the beaker dosing a premature switching off of the rinsing pump may be necessary, i.e. prior to the finishing of the dosing process. This can be set in parameter [r22].

11.1.1 Direct control of a pinch/clamp valve

If the cleaning agent is added to the tank via cup and an additional pinch / clamp valve is installed, the WTS-300 must be parameterized as follows:

Change the assignment of the relays as follows:

- In the 'A' parameters, assign the function '28' (= clamp valve) to a relay.
- In the 'A' parameters, assign the function '29' (= flushing valve) to a relay.
- Wire the valve to the corresponding outputs.
- Parameterize parameter [r21 = 0]

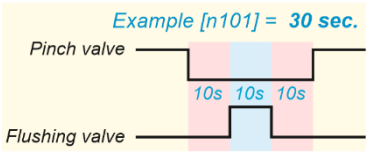
NOTE:
Pinch- / clamb valve
- normally OPEN
- energized CLOSED

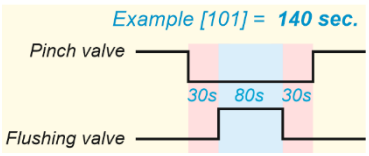
The pinch/clamp valve and the flushing valve are then controlled instead of the alkaline dosage.

The time setting for controlling the pinch/clamp valve and the flush valve is now parameterized in parameter [n101].

When cleaning starts, the pinch/clamp valve is closed and only opened for the entered time [n101]. The valve is also open in standby or cooling mode.

Time input for opening or closing the valves





The opening time for the pinch/clamp valve is entered using parameter [n101]. The control system calculates the opening time for the flush valve automatically.

- Set in parameter [n101] how long the pinch valve should be open.

  Time setting [n101] <= 90 sec.

  After a third of the entered time, the flushing valve opens automatically - after another third, the flush valve closes again.

  Time setting [n101] > 90 sec.

  The opening time of the flushing valve corresponds to the entered time minus 60 seconds.

11.2 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]

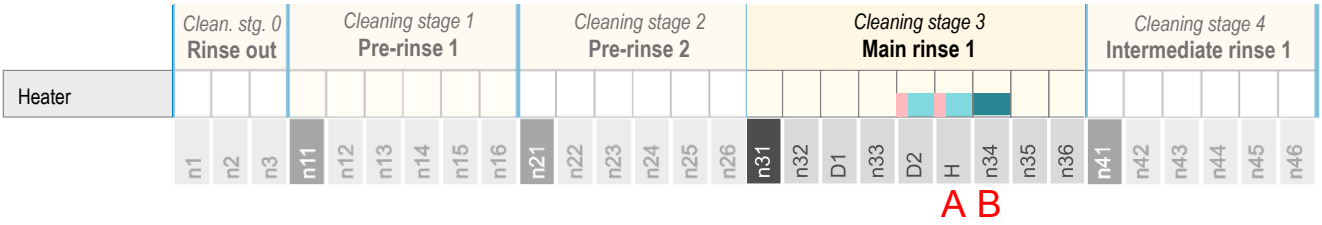
Options:

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”.

11.3 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:

NOTICE

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 9.4".

to section 11.3: Heating control

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”).

11.4 Influence on the temperature of the tank wall

By repeating warm pre-rinsing cycles, it is possible to warm up a cold tank or to cool it down again at the end of cleaning with cold after-rinsing cycles.

In addition, it is possible to switch on the cooling compressor in parameter [r18] during the after-rinsing in order to cool down the tank quickly with the cooled water before the milk enters the tank.

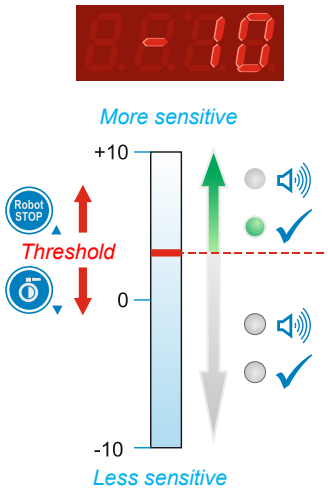
11.5 Boost pump function (booster pump)

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.

11.6 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 8.12), 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.

11.7 Relay function 'set level 2 to relay'

If this function '23' is assigned to a relay [A1..A20], the relay is always energized when water is detected at the level 2 input.

11.8 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.

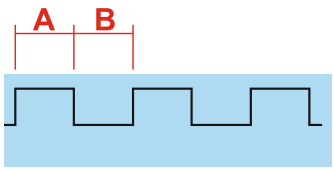
Protection of heater

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.

11.9 Air in the cleaning pump -> automatic venting

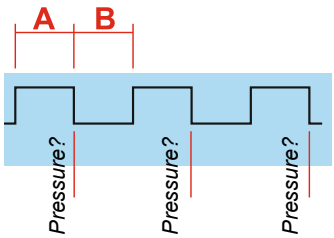
If there is air in the washing line when the washing pump starts, it is impossible for the pump to circulate the washing water. The remedy: short switch-on and switch-off impulses when the pump starts can remove air bubbles.

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.

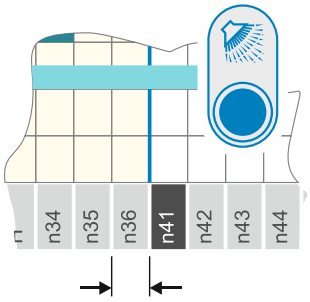
NOTICE

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.

11.10 Service functions for testing the cleaning cycle



Programme step

11.10.1 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.

11.10.2 Single step function during cleaning

Advancing the cleaning cycle by individual steps

For a faster testing of the cleaning cycle, it is possible to manually switch the cycle from one programme step to the next one with the single-step function, you do not have to wait until it has been completely processed.

NOTE: Even a stopped cleaning cycle is considered completed!!

WARNING

ATTENTION: The use of this single step function is at your own risk! Advancing important processes poses a danger to both the tank and the milk!

Possibilities of the single step function: [r93]

[r93]	
1..3	<u>for 1 to 3 cleaning cycles.</u> Set in parameter [r93] how many cleaning cycles (1..3) are to be carried out in succession with the single-step function. NOTE: The single-step function can be activated immediately when cleaning is started!
4	<u>Permanent</u> Set selection '4' in parameter [r93]. The single step function can be activated until [r93] is reset to '0'.
5	<u>Permanent</u> As selection 4: but with an additional 'break' function.



Implementation of single step function for selection 1..4:

- Press and hold the CLEAN button for 4 seconds during the cleaning process:
  - The display shows "StEP" - the single step function is started.
  - Then the latest cleaning step is displayed.
- A repeated pressing of the CLEAN button allows a step-by-step switching of the cycle.



A stop of the cleaning is possible at any time by pressing the OFF button. A drain phase is automatically carried out, but it cannot be stopped. The display shows "ABL" alternating with the temperature.

to section 11.10.2: Single step function during cleaning



Implementation of single step function for selection 5 (with break function):

- Press and hold the CLEAN button for 4 seconds during the cleaning process:
  - The display shows "StEP" - the single step function is started.
  - Then the latest cleaning step is displayed.
- A repeated pressing of the CLEAN button allows a step-by-step switching of the cycle.





<u>Break function:</u>

- Press button OFF:
  The current cleaning step is stopped, the display shows "StOP", all relays are switched off except of
  - Roboter STOP
  - Cleaning active
  - butterfly valve

either:



- Press the OFF button again: The current cleaning step is continued and the relays are switched on again according to the cleaning step.

or:



- Press the CLEAN button until the desired programme step is achieved by single step function.
- Press the OFF button to continue cleaning. The relays are switched on again according to the cleaning step.



Notes:

The last rinsing step (n86) 'drain phase' cannot be skipped..

If cleaning has been continued via the single step function, the green LED 'CLEANING END' does not flash.

12. Other information - Tank monitor

12.1 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.

The delay is activated when the WTS-300 is switched on.

- All time-dependent alarms are temporarily deactivated
- Only after the set time [H90] has elapsed the tank monitor is set to the basic condition and activated.
- After one day, parameter [H90] is also reset to 0 to prevent a repeated delay.

12.2 EMAIL-, alarm + remote maintenance module ESIPM



The email alarm and remote maintenance modem ESIPM-001 is used

- to send fault messages by email
- for remote configuration
- for remote diagnosis
- for configuration and diagnosis via the own LAN / WLAN network

of the connected controllers.

For proper installation, please pay attention to the documentation supplied.

Configuration:

- Activation of alarm module monitoring => Parameter [A73]

12.3 SMS, alarm + remote maintenance module ESGSM



The SMS alarm and remote maintenance modem ESGSM-001 is used

- to send fault messages by SMS
- for remote configuration
- for remote diagnosis

of the connected controllers.

For proper installation, please pay attention to the documentation supplied.

Configuration:

- Activation of alarm module monitoring => Parameter [A73]

12.4 Settings tank monitor LOG-data for KONSOFT

The data stored in the WTS-300 can be displayed graphically in KONSOFT. The following settings are required in the WTS-300:



Example graphical monitor window

1. Blue line: (Standard)
   graphical presentation of the temperature curve
   Red line: corresponds to [h89] setting 1..3
2. Display of fault messages and manual reset by pressing the RESET button
3. Display of the conditions (events) depending on your individual settings
4. Display of additional conditions depending on settings in [h89] = setting 4.

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