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Universal tank control

WTS-300

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

Firmware V4.6



**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.



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



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!



Nature and source of danger

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



Nature and source of danger

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



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



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 „KONSOF“

The free of charge configuration Software KONSOF 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 KONSOF 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



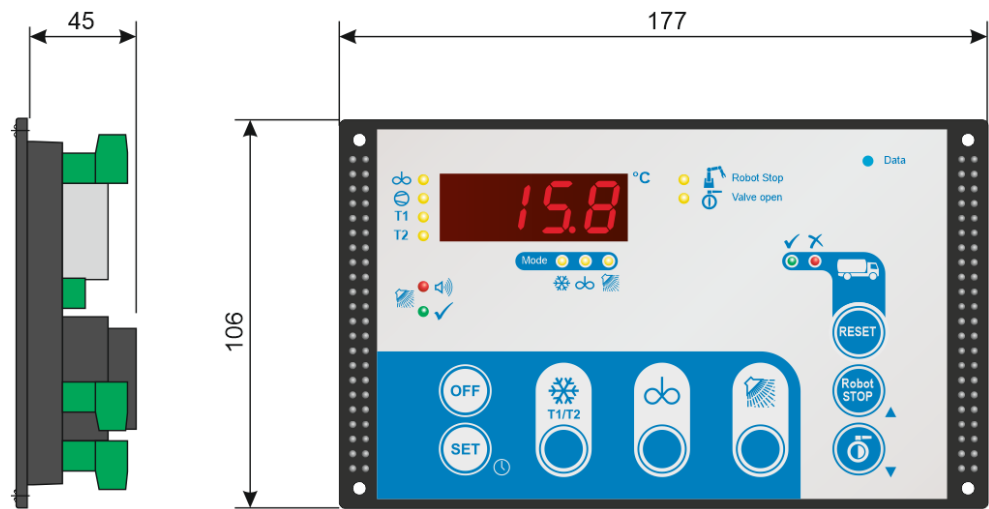
The type designation of your controller is attached to the holder frame.

1. Introduction

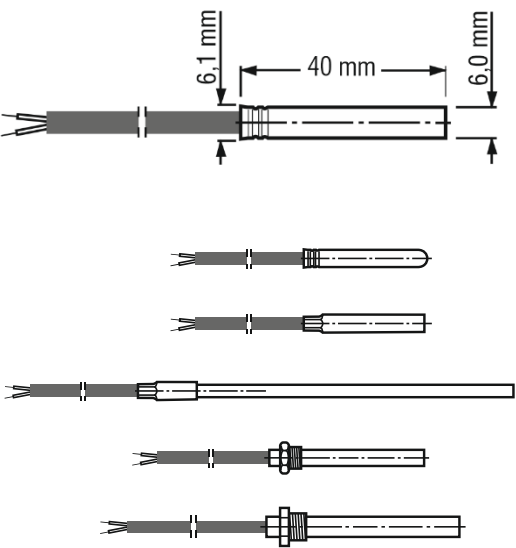
1.6 Item supplied

- Controller WTS-300
- Holder
- Rubber seal
- Sensor TF1A-2
- Fixing screws
- Any optional accessories ordered.

1.7 Dimensions



1.8 Sensor dimensions and technical data



Sensor element	KTY 81-210
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
Number of sensor inputs	1 or 2
Measurement range	-5° .. +95°C
Temperature resolution	0,1°C
Sensor input	for KTY 81-210 (optionally PT-100)
Control mode	two-step controller
Hysteresis*	0,1 K .. 99,9 K ((standard adjusting 0.7 K)
Water detection	via 2 independent level monitors
Target temperature T1* Target temperature T2*	standard adjusting 8°C standard adjusting 4°C
Digital inputs	8 (via optocoupler) expandable by 5 digital inputs*
Interface	2x RS-485
Supply ext. pressure sensor	12V +/-3V max. 40 mA
Connection	Plug-in screw connections for cables up to 2.5 mm ²
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



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)***DO NOT USE BATTERIES !!! EXPLOSIVE !!!!!****DANGER!****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.



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

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

Protect control unit with an external fuse of 160mA!

3. Installation

3.1 Location and climatic conditions

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

- severe jolting, vibration or magnetic fields
- permanent contact with water
- relative humidity of more than 90%
- sharply fluctuating temperatures (condensation)
- dust, flammable gases, vapours, solvents,
- operation in an aggressive atmosphere (ammonia or sulphur fumes) - risk of oxidation
- operation in the immediate vicinity of radio transmitters with high levels of spurious radiation.

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

3.2 Unpacking and storage

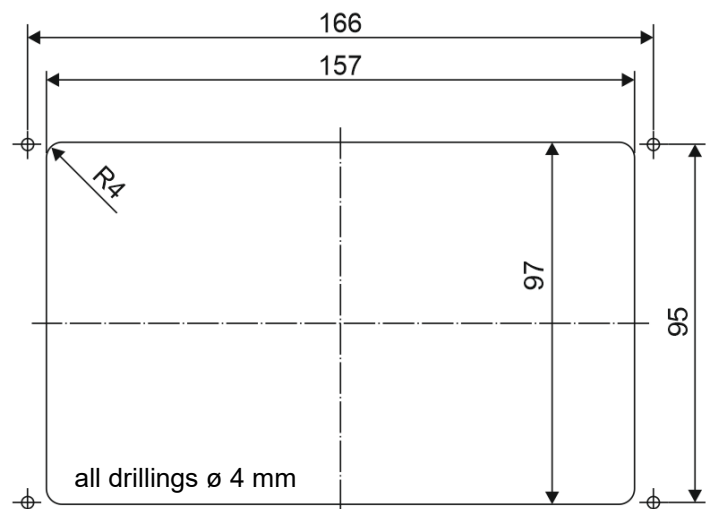
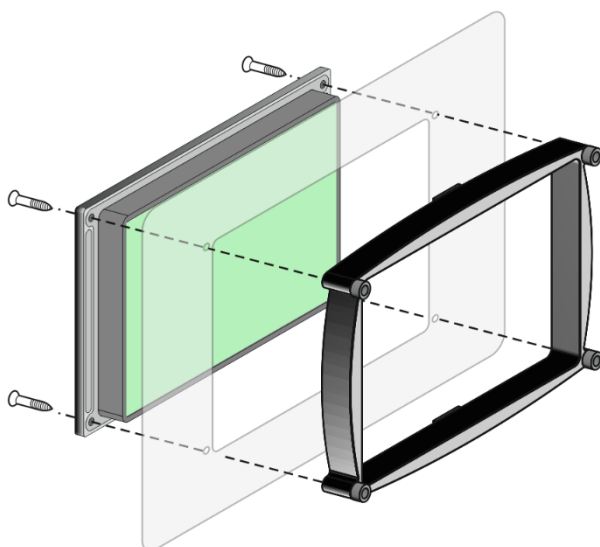
If the packaging is damaged or something is missing, do not fit the temperature controller. In this case please contact Welba.

If you keep the temperature controller for a period before using it, store it in a clean dry place at a 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



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).

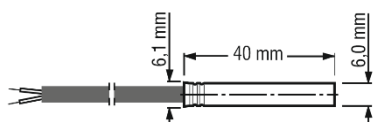
Temperature range sensor cable -10°C .. +70°C



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!

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

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

4.3 Wiring

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

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

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

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

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

- Within the two relay groups (K3 to K6) and (K9 to K12), the respective relays are connected with each other on one side. They connect the respective voltage which has been connected at the feed point (terminals 8 and 17) to the load.
- Compressor, cleaning pump and heater must not be connected directly to the relays on the control unit. These must be switched by additional contactors. In individual cases, it must be checked whether additional motor protection switches or other safety devices are to be installed.
- Contactors are to be fitted with an RC protective circuit.
- Connection of the digital inputs:
- Only the output signal of the control provided at terminal 38 must be connected to the digital inputs (via potential-free switching contacts)!

4. Electrical connection

4.4 Connection diagram (Delivery configuration)

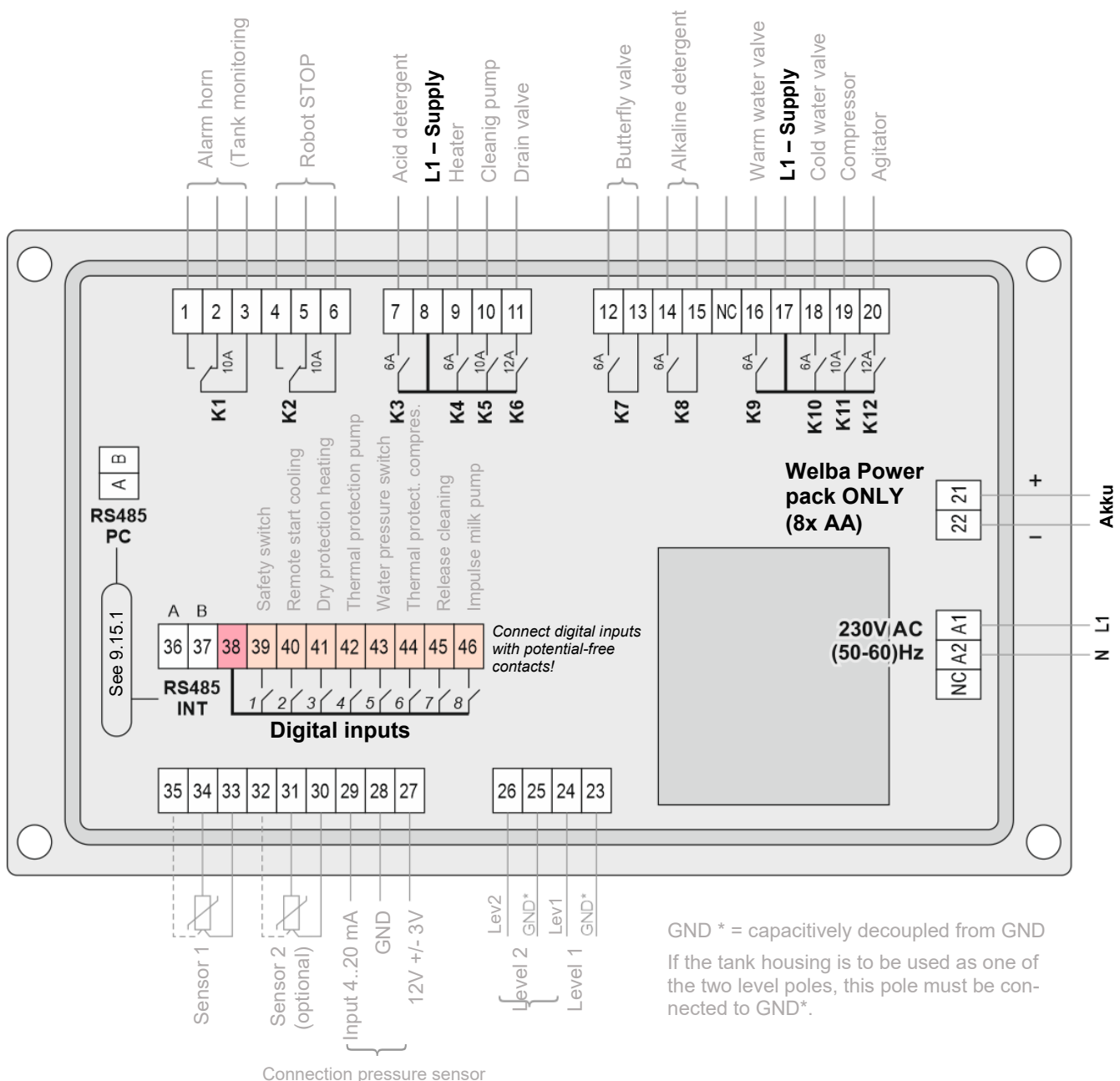


- Electrical connections must be as shown in the diagram below.
- Use cable bushes.
- Make sure that cables cannot chafe.
- Observe relay current rating.
- In all cases use contactors for pump, compressor and heater.
- Do not feed digital inputs with external voltage! Use potential-free switches.

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

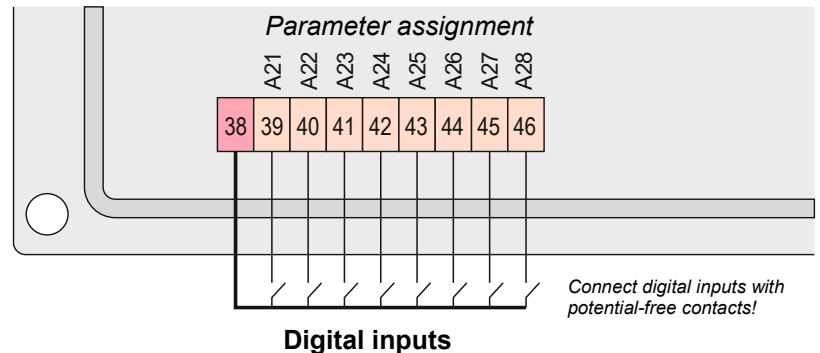


GND * = capacitively decoupled from GND

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

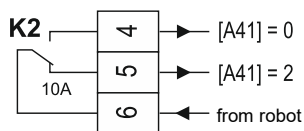
4.5 Wiring the digital inputs

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



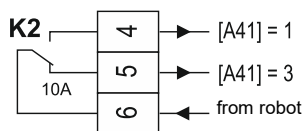
4.6 Connection robot

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



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

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



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

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

4.7 Connection of external pressure sensor (optional)

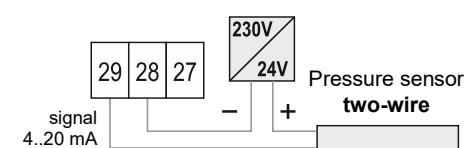
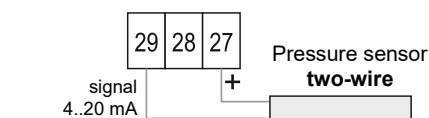
Terminals 27 | 28 | 29 must be used only for the connection of an external pressure sensor. See section 10.6

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

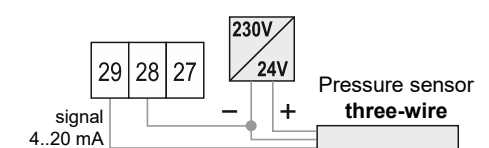
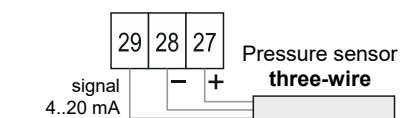
NOTICE

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

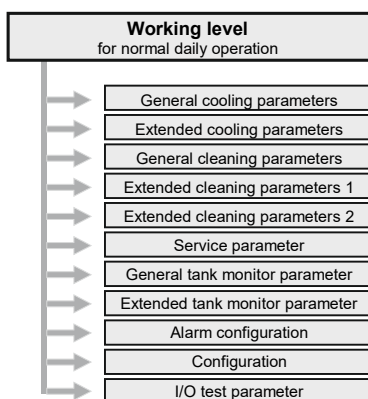
5.1 Function overview



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)

Shows the current time.

All LEDs are out

(Exceptions: robot, outlet valve and tank monitor LEDs may be lit)

All output relays are deactivated

(Exceptions: robot, outlet valve and tank monitor alarms may be active)

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

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.

Cooling can be triggered in different ways:

- manually using the "START COOLING" button
- via digital input "Remote start to cooling" (by robot or external button)
- automatically following cleaning (only in conjunction with robot)

Cooling now starts in accordance with the pre-set starting mode:

Immediately or after a cooling start delay, with periodic cooling boosts, etc.

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.

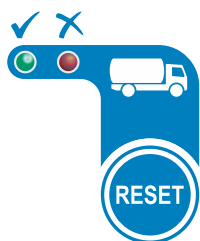
Following a power failure the control unit will restart in the mode it was in before. See also section 9.6

Robot interface

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

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

These functions are controlled via the keypad.



Tank monitor function

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

In particular, the following are monitored:

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

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

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

5.2 The configuration software KONSOF



*For software
description see
separate instructions*

The user-friendly configuration software “KONSOF” can be used for

- configuration
- parameter setting
- visualisation
- storage
- updating

Configuration

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

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

Visualisation

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

Bootloader function

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

NOTICE

NOTE: The KONSOF 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 6.6

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 KONSOF".

Advantages:

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

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

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

Information:

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

NOTICE

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: 4 dashes are shown:



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

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

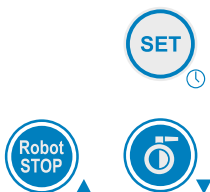
NOTICE

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 **2017**
Date **23.08**
Time **19:25**

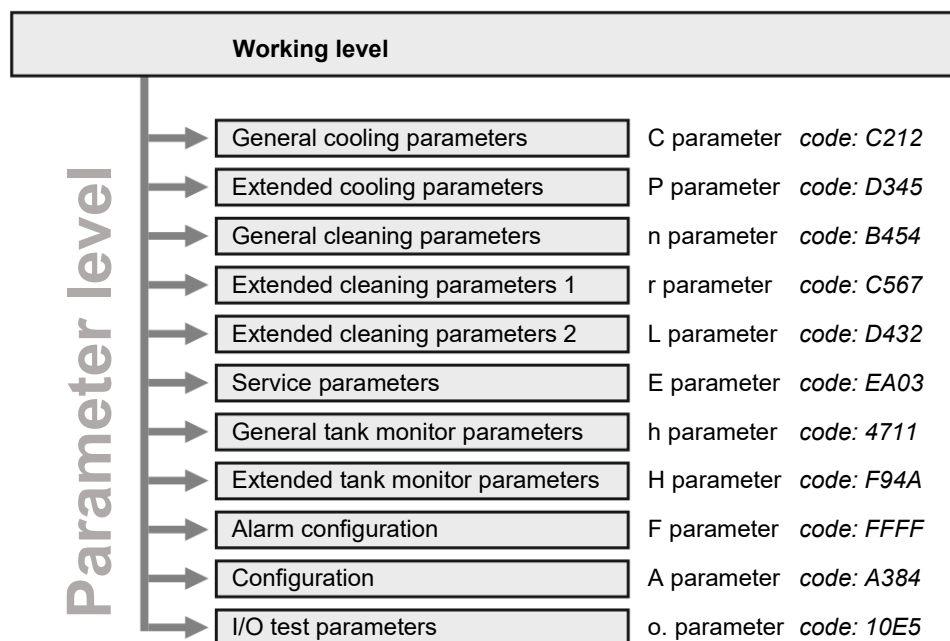


5.5 Operation in levels

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.

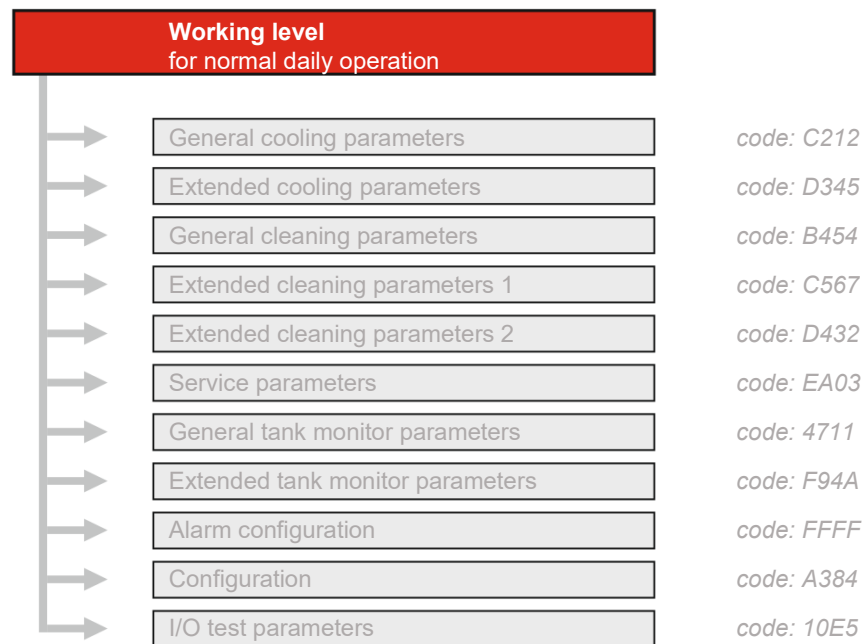
Configuration - (A parameter)

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**

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

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

**„SET“ button**

in OFF mode = press briefly: Display of critical faults (if available)
Hold down for 3 seconds: set date and time

in cleaning mode = “Cleaning stage” or “Tank temperature” is displayed
(see Parameter [r97]) and current error

Parameter setting = the current value entered is displayed

in cooling mode = Display of various information such as time, fault,
litre display, pressure (see section 10.6 + 10.10)

**„COOL“ button**

in OFF mode = Start cooling

press 2x = bypass the cooling start delay (if set)

press long = new start of the cooling-start-delay (see section 9.15.2)

in cooling mode = change target temperature T1 / T2

**„AGITATOR“ button**

in OFF mode = start continuous stirring mode

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

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

**“WASHING” button**

in OFF mode = start cleaning

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

**“ARROW KEYS”**

To select and adjust parameters.

Operation by the driver of the milk truck**„RESET“ button**

press briefly = Confirmation of the message “do not load”. See 7.2

hold 5 seconds = Test of the red alarm-LED

**„ROBOT STOP“ button** (if parameterized)

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

**„PNEUMATIC OUTLET VALVE“ button** (if parameterized)

Opens / closes the pneumatic outlet valve.

5.6.2 Meaning of the LED's



LEDs in cooling mode

		LED "AGITATOR"	
			during cooling mode
T1			Agitator is switched on
T2			
		LED "COMPRESSOR"	
			permanently on
T1			Compressor contactor is switched on
T2			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
			- Fault thermal protection / fault contact
			in case of a fault
			- Phase fault (opt. in connection with ESVAW 003)
		LED "T1" or „T2"	
			T1 on
T1			Set target temperature for "T1" is active
T2			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 9.15.1)

Robot / Drain valve

  Roboter Stop	LED "ROBOTER STOP"	permanent Roboter is stopped flashing - "CLEANING" button was pressed before the robot was stopped or - Robot release delay active. See [A42]
  Valve open	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..
 Data	LED (blue) "Data"	Flashing Tank monitor data are stored on the USB stick. 5 sec. permanent, then off Saving finished, stick can be removed.

5.6.3 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!

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

This delay applies only for the first milking after cleaning.

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 9.15.2



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 5.6.2.
 - 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 5 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.

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

- 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 9.15.1)

Displays during main wash

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

Robot operation *only if the robot is configured*



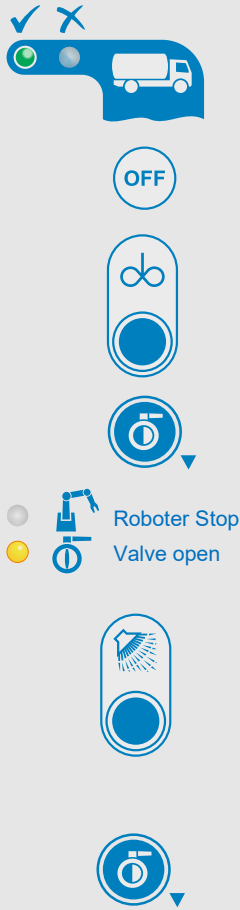
Using the ROBOT STOP button, the operation of a connected robot is either stopped or enabled.

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

- Hold down the ROBOT STOP button for approx. 3 seconds: robot operation is either enabled or stopped (Toggle function)
The current switching status is indicated by LED.

to section 5.6.3 Operation modes

Milk collection



Complete emptying of tank into collection tanker

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

If the tank has a pneumatic butterfly valve:

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

When the tank is empty

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

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

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

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

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

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.

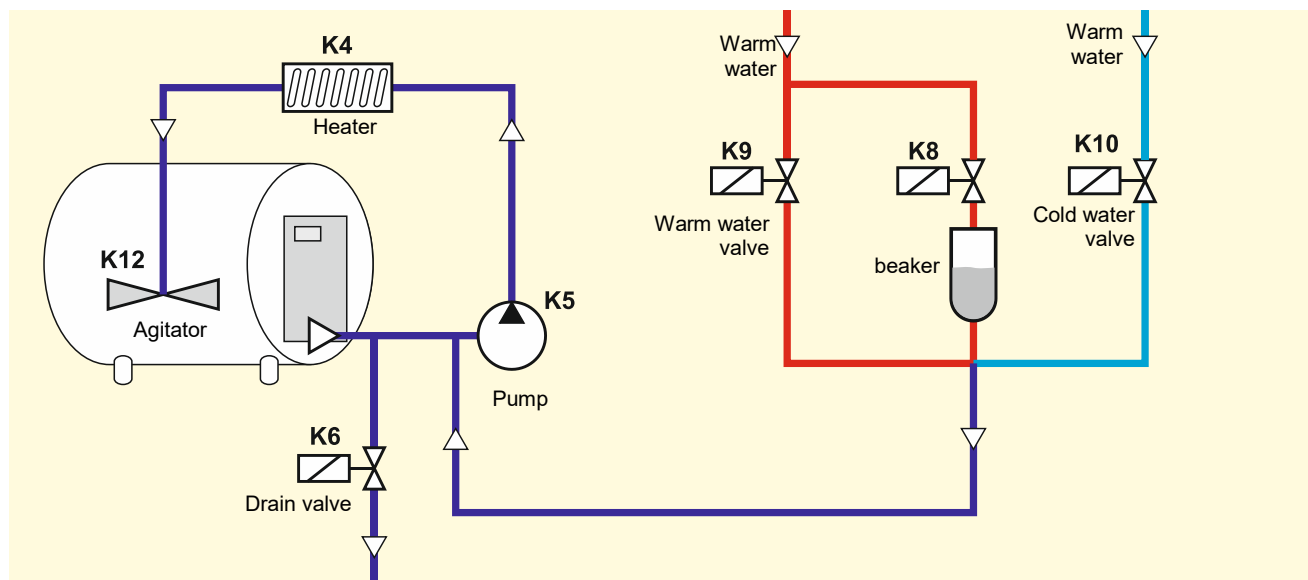
- LED shows green: milk can be taken out.
- LED shows red: DO NOT LOAD MILK!
The fault is indicated in the display.

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

6. Cleaning

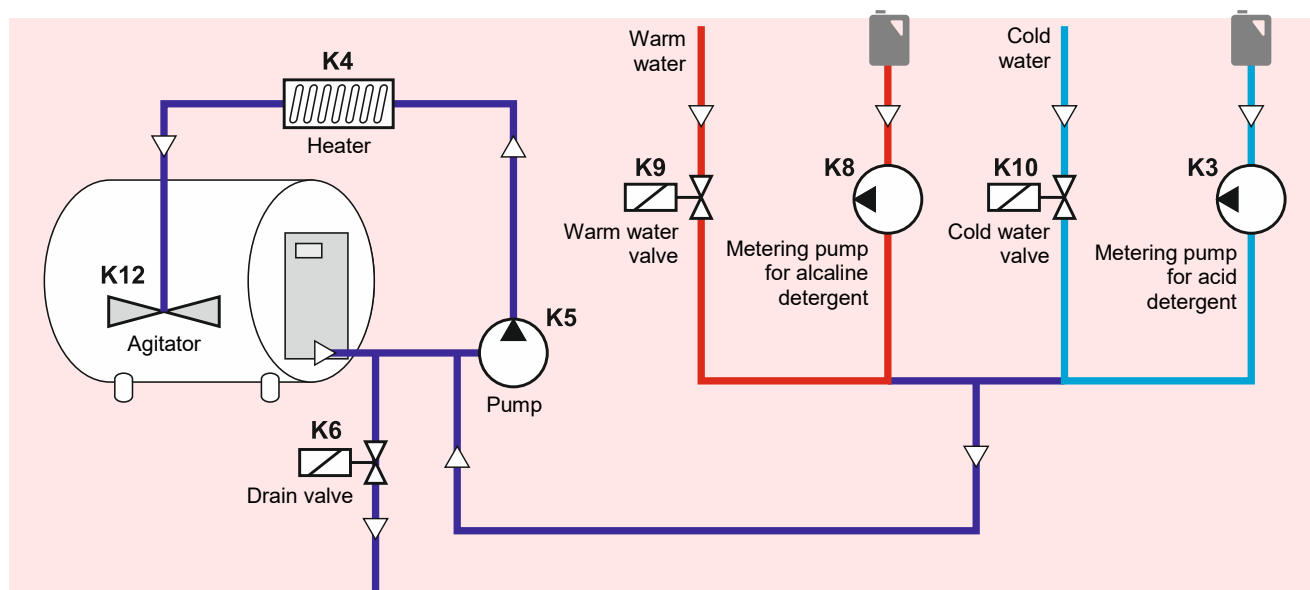
6.1 Cleaning methods (cooling tank-configurations)

6.1.1 Circulation cleaning with a beaker



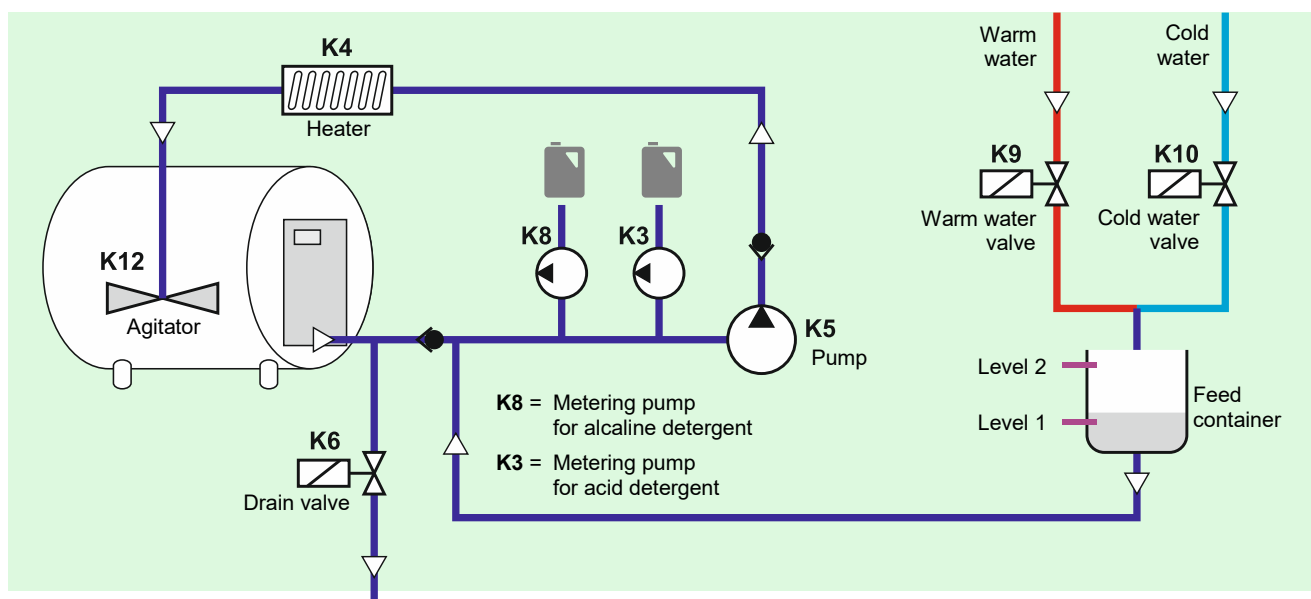
Cleaning method for milk cooling tanks, where alkaline and acidic detergents are supplied either by a drawer or a fixed beaker. See also section 11.1

6.1.2 Circulation cleaning with two dosing pumps



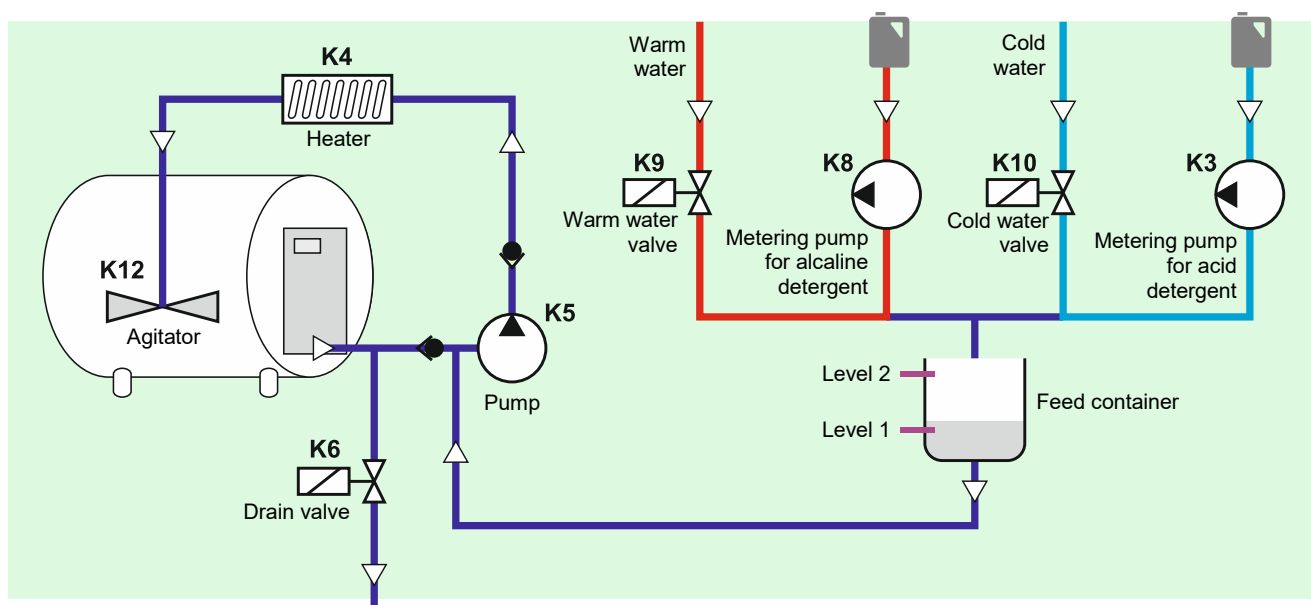
Cleaning method for milk cooling tanks, where alkaline and acidic detergents are supplied by separate dosing pumps.

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.

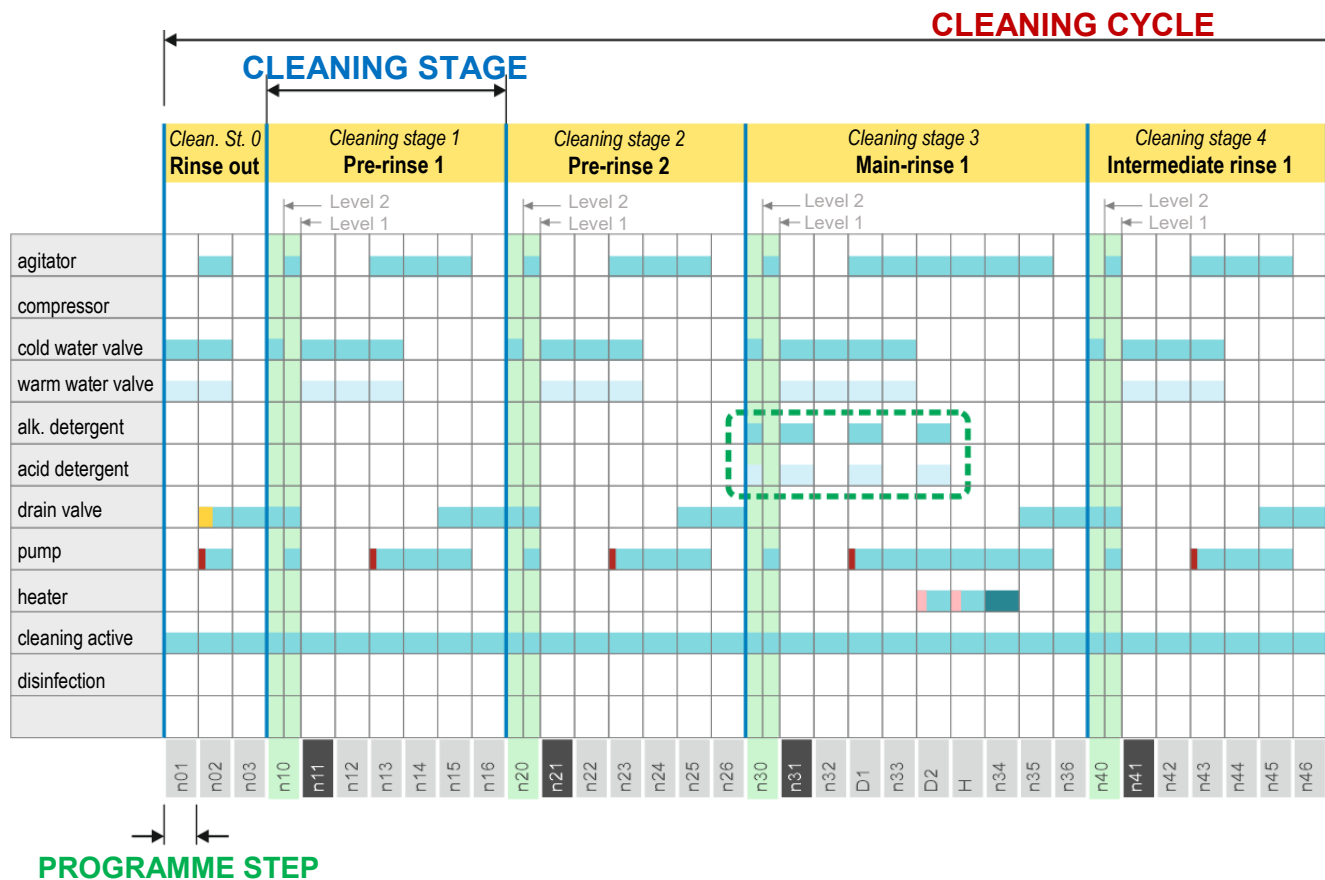
6.1.4 Displacement cleaning with feed container and dosing pumps



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. 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

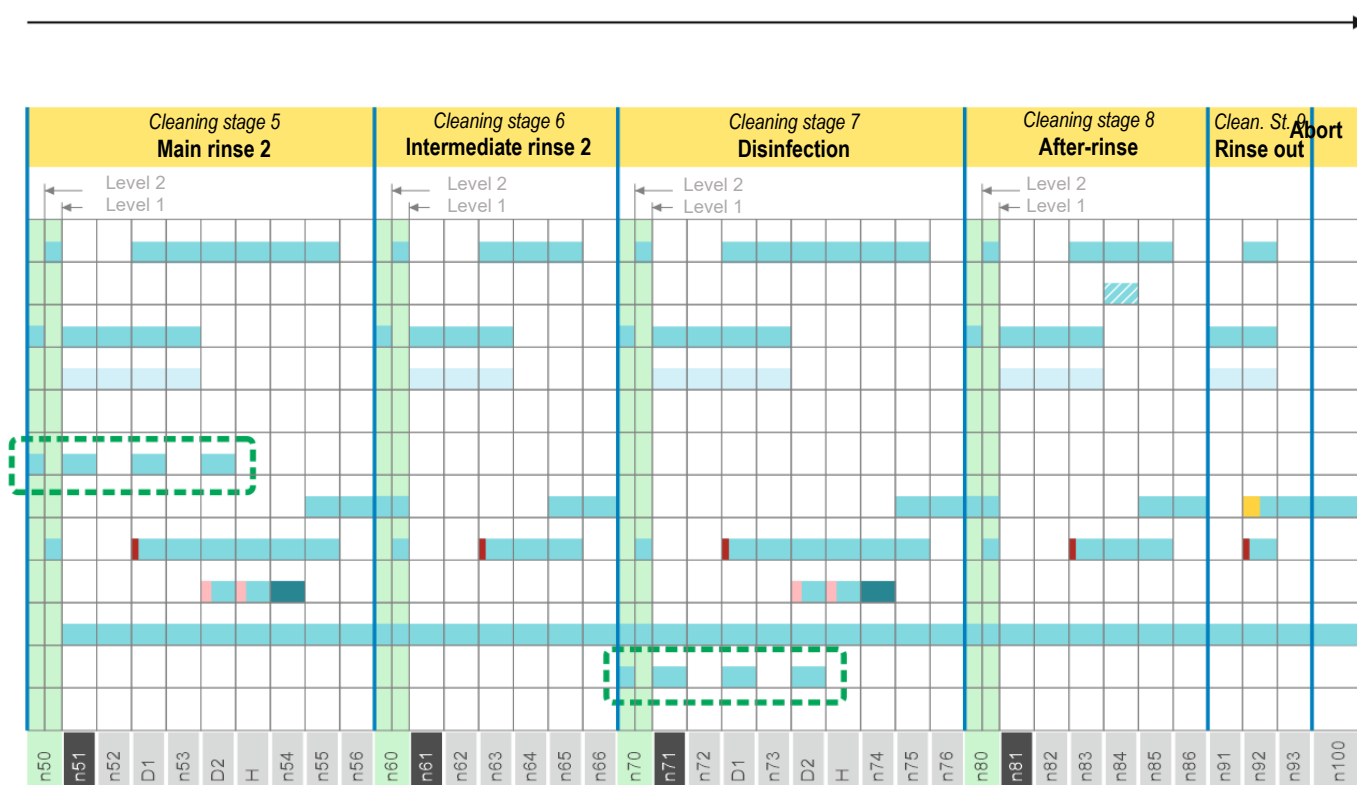
Each CLEANING STAGE consists of several 'PROGRAMME STEPS'.

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 section 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

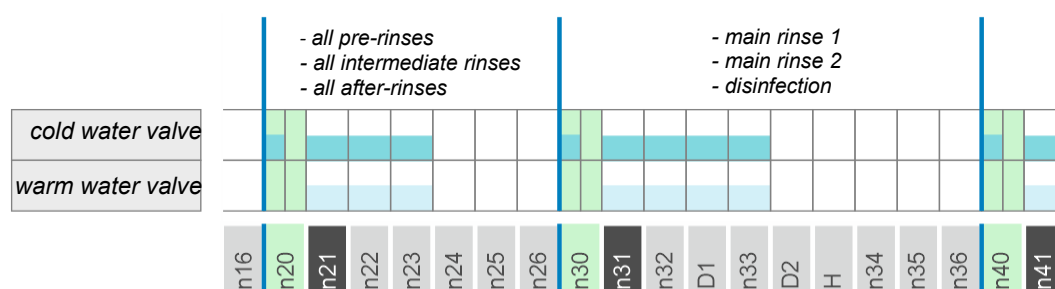
By setting the cleaning parameters, the sequence of the cleaning cycles can be adapted to all system types.

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 TEMPORAL 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, ...] Here you can set in the programme steps [n10, n20, n30... n80] how often the pre-hopper is filled with water up to level 2 and then pumped out up to level 1.
	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

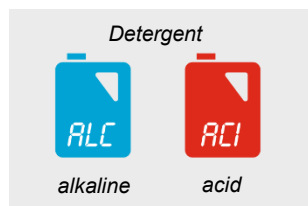
- dosing of cleaning agent or disinfectant' is time-controlled and / or
- water intake optionally are time- or level-controlled.

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. Cleaning

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

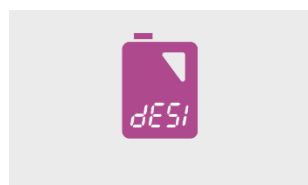
6.3.5 Disinfection

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].

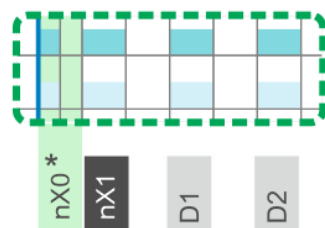
The display shows "dESI" during the dosing process.



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.

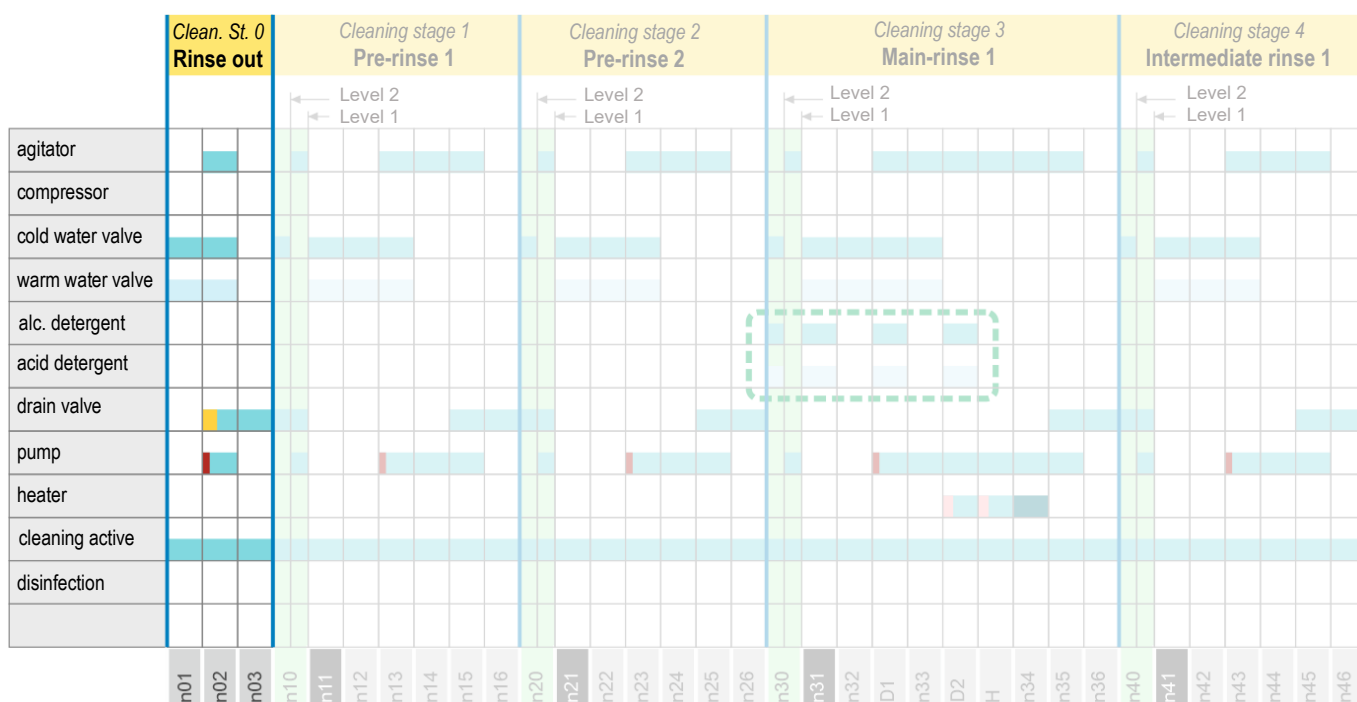
ATTENTION: The corresponding level step must be activated in the associated n parameter - otherwise NO cleaning agent will be added!

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



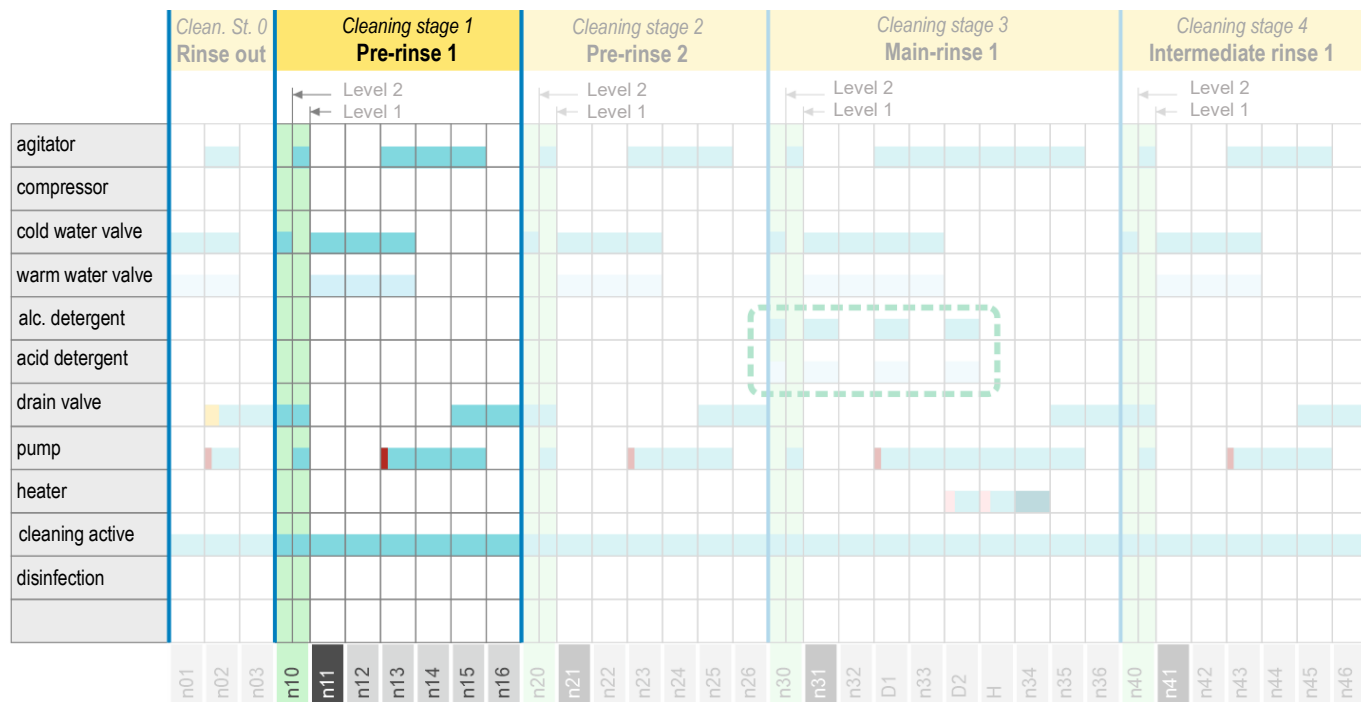
Cleaning stage 0: RINSE OUT

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.

6. Cleaning

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.

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

- Water is taken in.

The parameter [n11] is used to stipulate whether water will be taken by level or time.

If time-controlled, the water intake time is defined in parameter [n12].

If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44

The cleaning parameter [r51] is used to stipulate whether cold, hot or mixed water is to be taken in.

In case of green
 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“

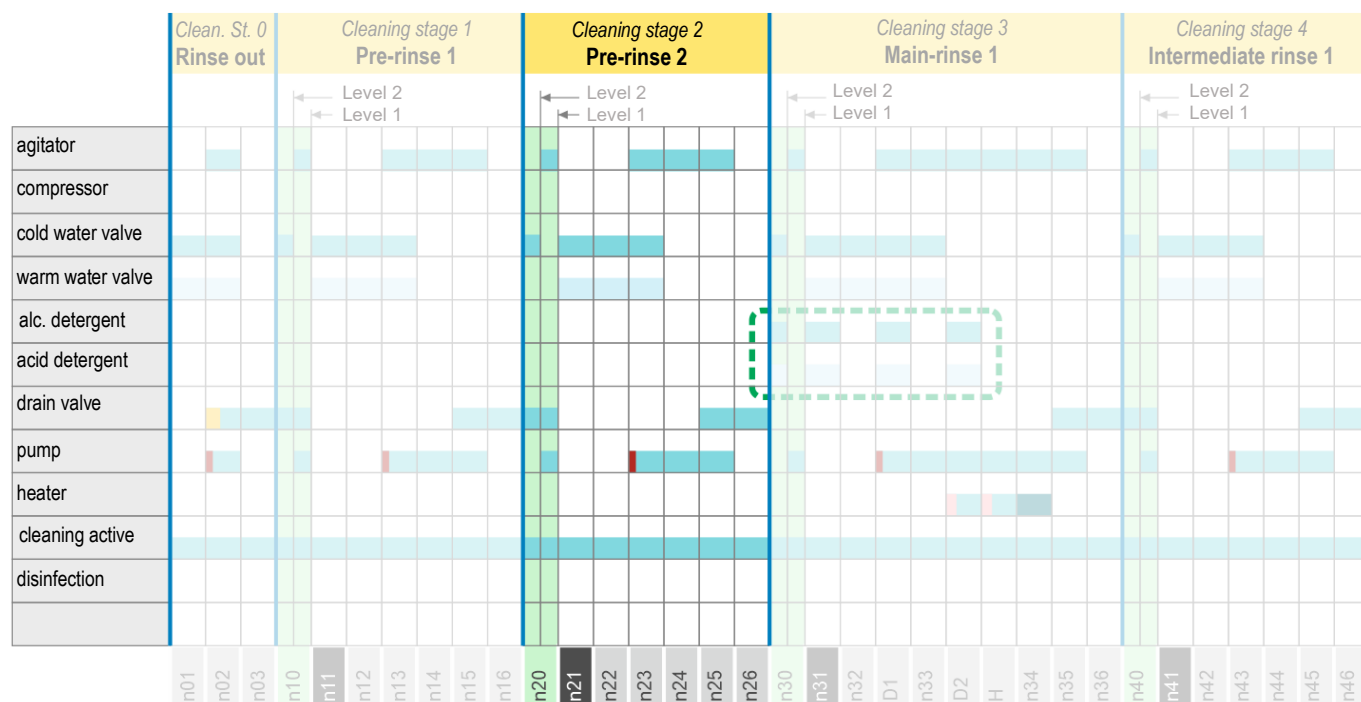
- The water circulates for the pre-set time [n14].

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

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

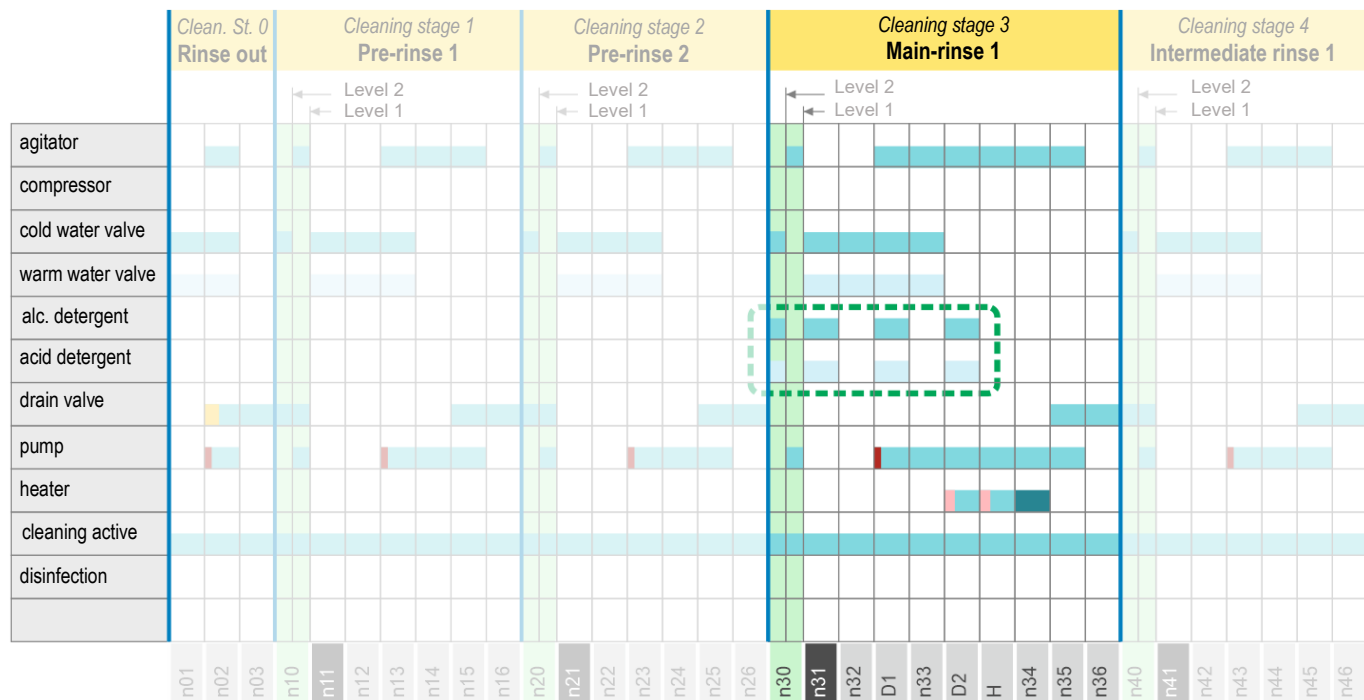


In case of green
 n23 and n24 have to be
 parameterized on „0“



6. Cleaning

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.
- 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 n31 and n32 have to be parameterized on „0“



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“



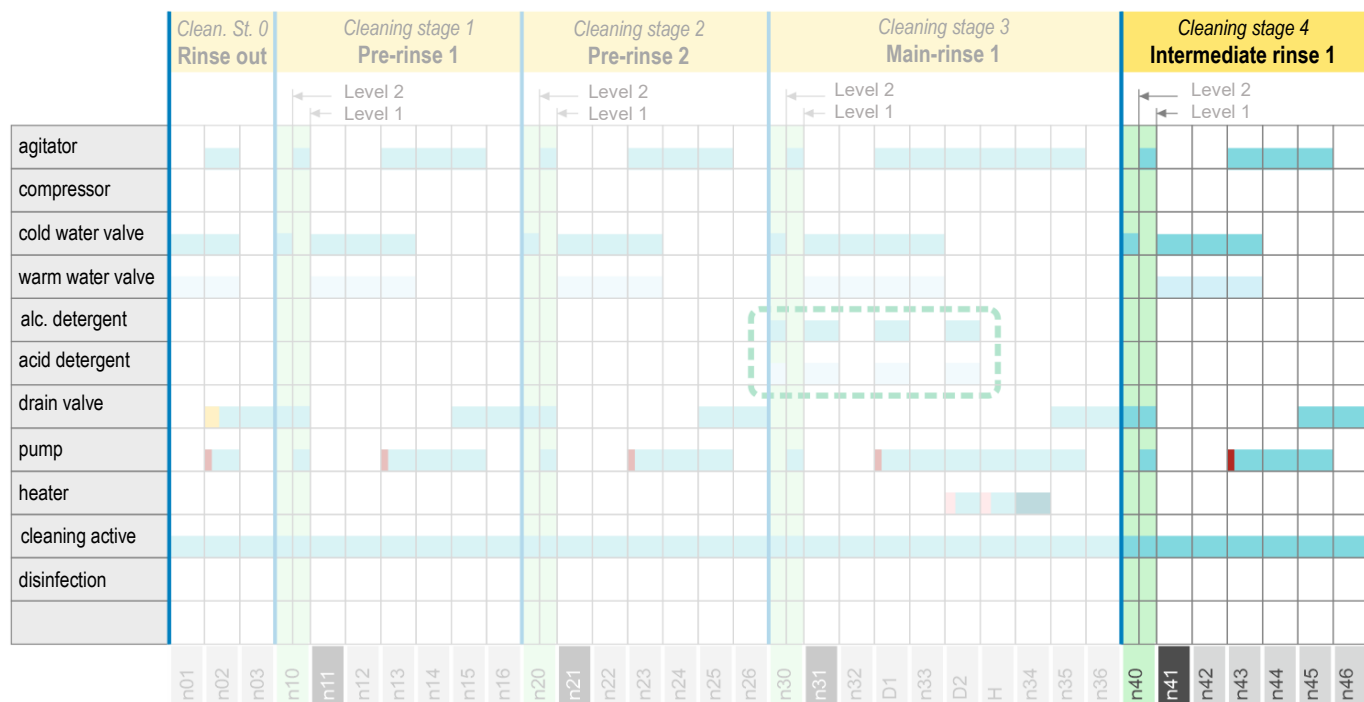
Cleaning agent dosing: (see also section 6.3.6)

- 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 - F44

If a switch-on delay [r36] has been parameterized for heating, heating starts only after this time has elapsed. (This is to ensure that water is in the heater.)
- Main circulation time: The water circulates for the pre-set time [n34]. During the main circulating time, a post-heating temperature [n109] can be defined.
- An additional time can be defined in parameter [n35], in which the drain valve opens (agitator and cleaning pump continue to run)
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n36]. See also [n35].

6. Cleaning

to section 6.4: Parameterization of the cleaning stages



Cleaning stage 4: ZWISCHENSÜLEN 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.

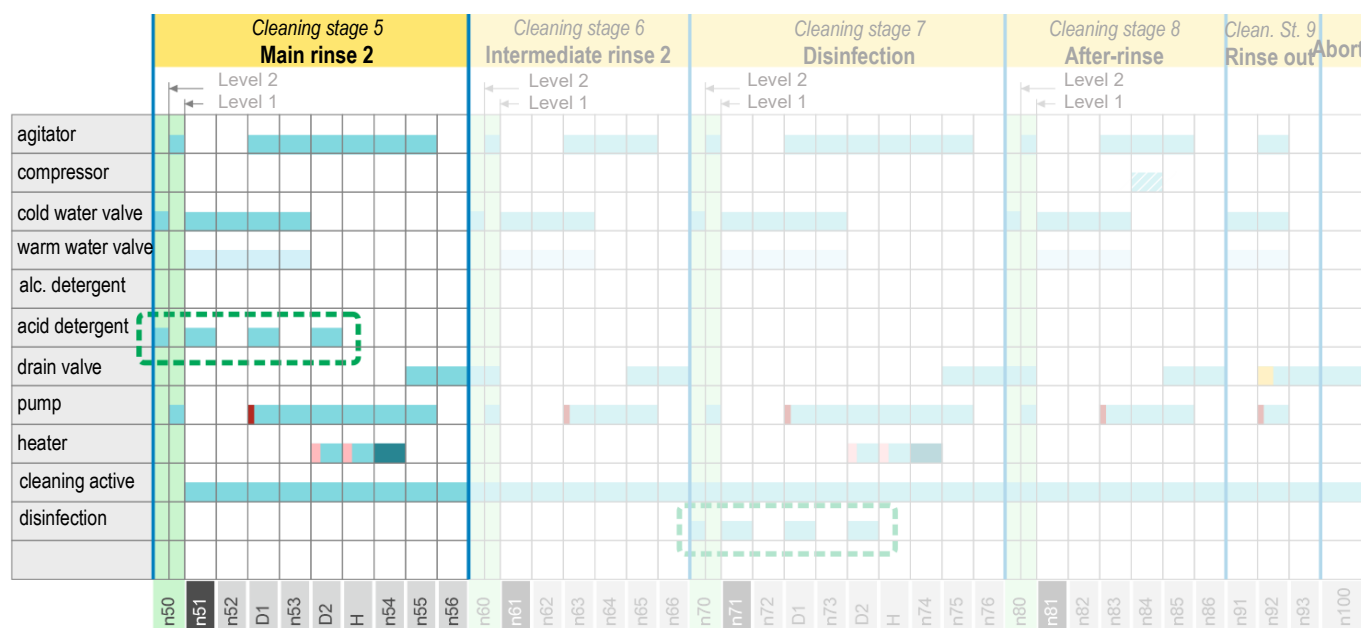
Another option is to select an 'additional water intake time' using [n43].

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.

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



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



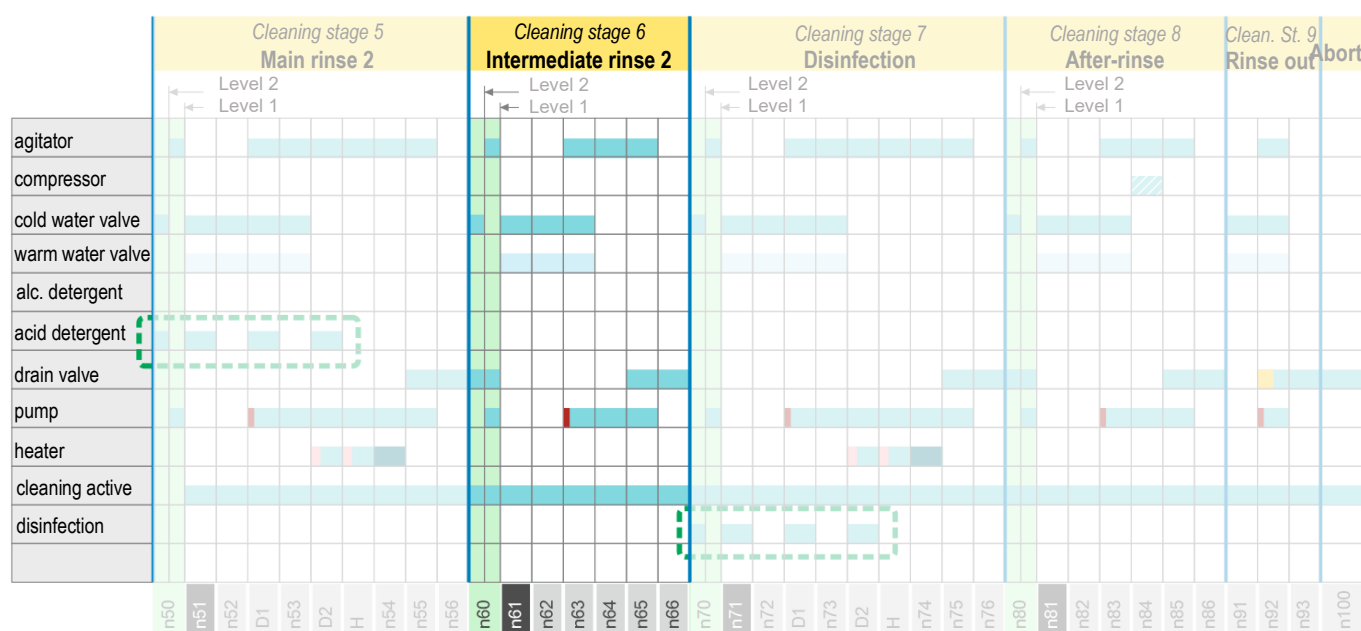
- Water is taken in.
 Parameter [n51] is used to stipulate whether water will be taken by level or time.
 If time-controlled, the water intake time is defined in parameter [n52].
If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44
 The cleaning parameter [r54] is used to stipulate whether cold, hot or mixed water is to be taken in.
- Agitator and pump start to run. Water circulates in the tank.
- Another option is to select an 'additional water intake time' using [n53].
- Depending on the setting of the parameter [r20], acidic detergent is injected at the end of the water intake time [n52] or the subsequent water intake time [n53]. The duration of the detergent dosing is set in parameter [n102].
- If a heater is present [r35], this is switched on. When the heating temperature [n107] is reached, the heater is switched off again.
If the temperature is not reached within the pre-set time [r37], the control unit continues with the program, but a fault report is displayed at the end. See section 7.5.3 - F44
 If a switch-on delay [r36] has been parameterized for heating, heating starts only after this time has elapsed. (This is to ensure that water is in the heater.)

6. Cleaning

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 [r55] is used to stipulate whether cold, hot or mixed water is to be taken in.

If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. See section 7.5.3 - F44

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].

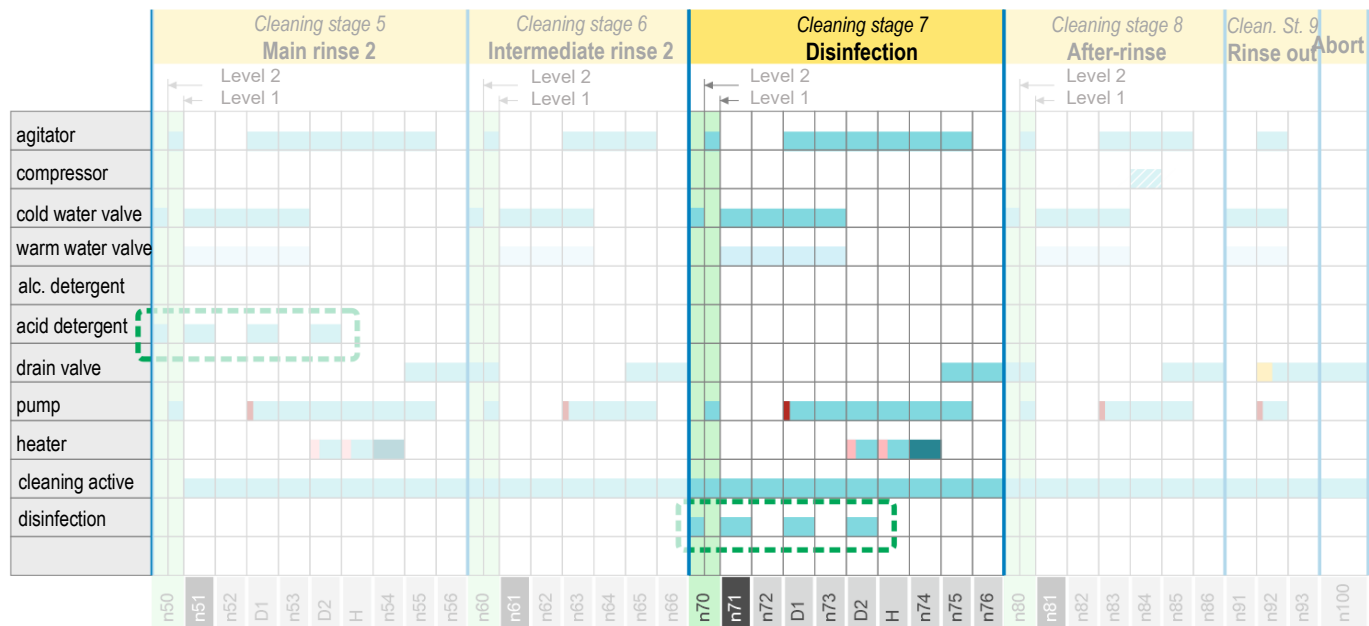
The water circulates for the pre-set time [n64].

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].

6. Cleaning

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“



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



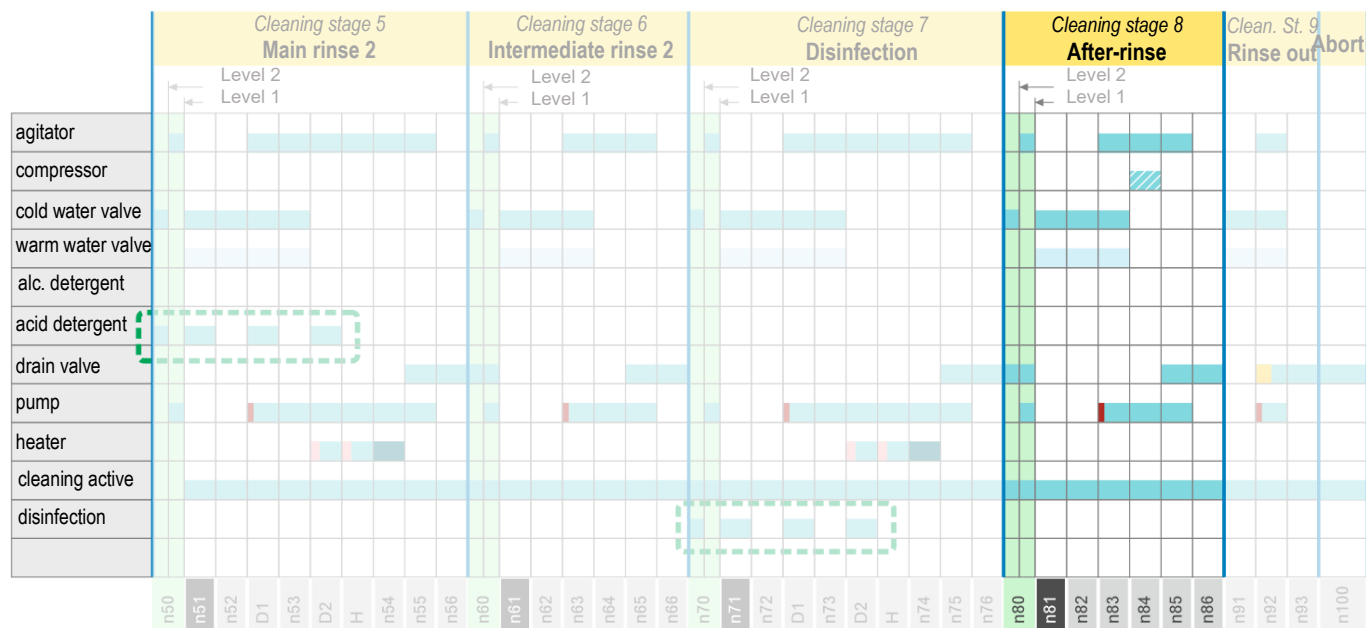
- Water is taken in.
 Parameter [n71] is used to stipulate whether water will be taken by level or time.
 If time-controlled, the water intake time is defined in parameter [n72].
If, in the event of intake by level, the level is not reached after a pre-set time [r32], the cleaning cycle is interrupted. 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.
- Agitator and pump start to run. Water circulates in the tank.
 Another option is to select an 'additional water intake time' using [n73].
- Depending on the setting of the parameter [r20], acidic detergent is injected at the end of the water intake time [n72] or the subsequent water intake time [n73]. The duration of the detergent dosing is set in parameter [n103].
- If a heater is present [r35], this is switched on. When the heating temperature [n108] is reached, the heater is switched off again.
If the temperature is not reached within the pre-set time [r37], the control unit continues with the program, but a fault report is displayed at the end. See section 7.5.3 - F44
 If a switch-on delay [r36] has been parameterized for heating, heating starts only after this time has elapsed. (This is to ensure that water is in the heater.)

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].

6. Cleaning

to section 6.4: Parameterization of the cleaning stages



Cleaning stage 8: NACHSPÜLEN

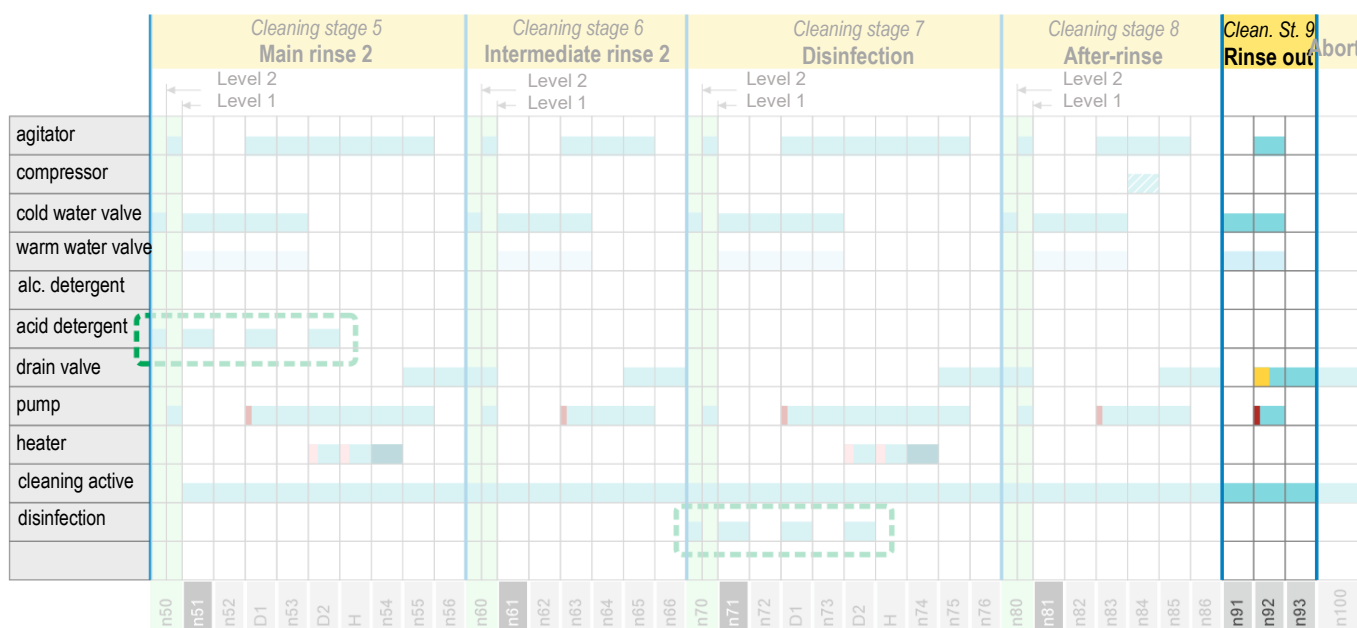
Parameter [r48] = 0 'Cleaning stage 8' disabled
 Parameter [r48] = 1..5 'Cleaning stage 8' execute x-times

- 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.
- 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
- 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].

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

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

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

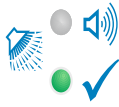
Parameter [r49] = 1..5

'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 [n01].
- Agitator and pump start to run, the outlet valve will open.
- The water circulates for the pre-set time [n02].
- Agitator and pump switch off.
- Drain valve opens for the pre-set time [n03]. The drain valve is assigned to the respective cleaning stage via the parameters [r60 to r69].
- Parameter [r24 / r25] determines whether the drain valve is normally open or normally closed. Applies to all cleaning stages.

6.5 Abort of the cleaning

6.5.1 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.

6.5.2 Manual abort of the cleaning



In the first 10 seconds after starting, cleaning can be cancelled by pressing the OFF button without an error message!

Thereafter:

- Cleaning is aborted manually by pressing the OFF key:
 - *cleaning stops,*
 - *the display alternately shows 'AbL' and the fault message 'F43',*
 - *the drain valve is opened for the time [n100] fault (can be stopped by pressing the OFF key again).*
 - *The cleaning switches to "fault mode" and must be acknowledged.*



6.5.3 Abort of the cleaning due to faults

Fault messages are displayed:

- flashing on the display
- via SMS or email (optional)

The following faults cause the abort of the cleaning:

- **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
 - *cleaning stops,*
 - *the display alternates between 'AbL' and the fault number,*
 - *the drain valve is opened for the time [n100],*
 - *the control unit remains in cleaning mode.*
 - *Fault code is displayed and must be acknowledged.*

NOTICE: The drain time [n100] can be stopped by pressing the OFF button.
See also section 7.5.3



The cooling can only be started again once the faults have been acknowledged!

Reset / acknowledge the fault messages:

- Press the RESET button for approx. 4 seconds.

6.5.4 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!

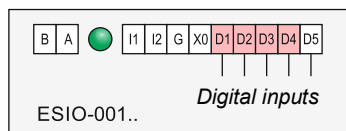
** e.g. strongly fluctuating water pressure or for the monitoring of the detergent quantity*

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.

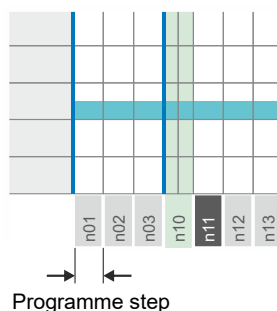
6.6.2 Dosing of the quantity-controlled detergent and disinfectant

Settings for rinsing cycles (3 + 5 + 7)**NOTICE**

- 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].
- 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

Settings separately for each rinse cycle (0 - 9)

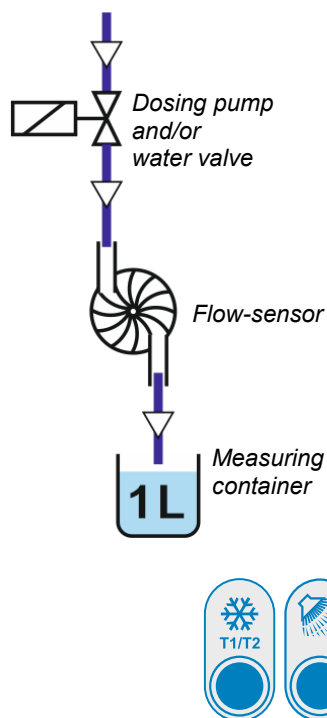
- Activate the function "quantity-controlled water intake" in parameter [L105] for all rinse cycles.
- In the corresponding L-parameters [L1, L2, L12, L13... etc.], determine the desired amount of water for the associated 'programme steps' n01, n02, n12, n13... etc.
Water is then added in each rinse 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 <u>abort of cleaning*</u> .	F46
1:	Same timeout [L107] for all programme steps after timeout <u>the cleaning is continued</u>	F46
2:	Individual timeout for each programme steps (adds up from the corresponding n- parameter [n01, n02, n12, n13...] + [L107]) after timeout the <u>cleaning is continued</u>	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 after one or two cooling cycles (learning of the tank processes).*

Trouble-free operations during this time are important!

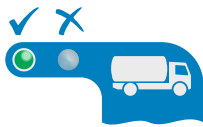
Der During the entire cooling and cleaning process, the built-in tank monitor keeps check on the correct operation of all processes, in order to guarantee the perfect state of the milk. Faults are displayed flashing in the display via corresponding fault codes. Depending on the type of alarm, two LEDs (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 “critical alarm”. In this case milk must not be added to the tank before a careful check has been carried out.

In the "F" parameters (see section 8.10), 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 long
During cleaning:	- cleaning temperatures - wash duration

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



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

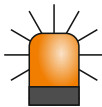
Additional WTS-300 system alarms (only fault code in the display) (depending on parameter settings, may be both critical and informative)

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

A list of all alarms and a description of how they are configured can be found in section 8.10 “Alarm -> Event assignment”.

7. Tank monitor and general fault handling

Optical presentation of alarms



External alarm light:
In addition to the red LED, an external alarm light can optionally be connected to one of the relay outputs.
See also parameter [A47].





No alarm

F34

Each alarm has its own display code (see section 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 <i>If several alarms are present, the reset button must be pressed several times. See section 7.3</i> (Turns off when cleaning cycle runs for at least 10 minutes ...)
System alarm	F34	Is displayed as a blinking display code only.

7.2 Tank monitor: Milk removal YES or NO

Examples of use of tank monitor.

CAUTION:

Do not simply cancel a tank monitor alarm.

It is essential to investigate and remedy the cause, in order to avoid a harmful effect on the milk.

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



No alarm – Milk may be drawn off.

	Green = on Red = off	No alarm
- The driver goes to the WTS-300 and checks the tank monitor. If the green LED is on, milk may be drawn off. - Once the milk has been taken, the driver starts the cleaning process.		

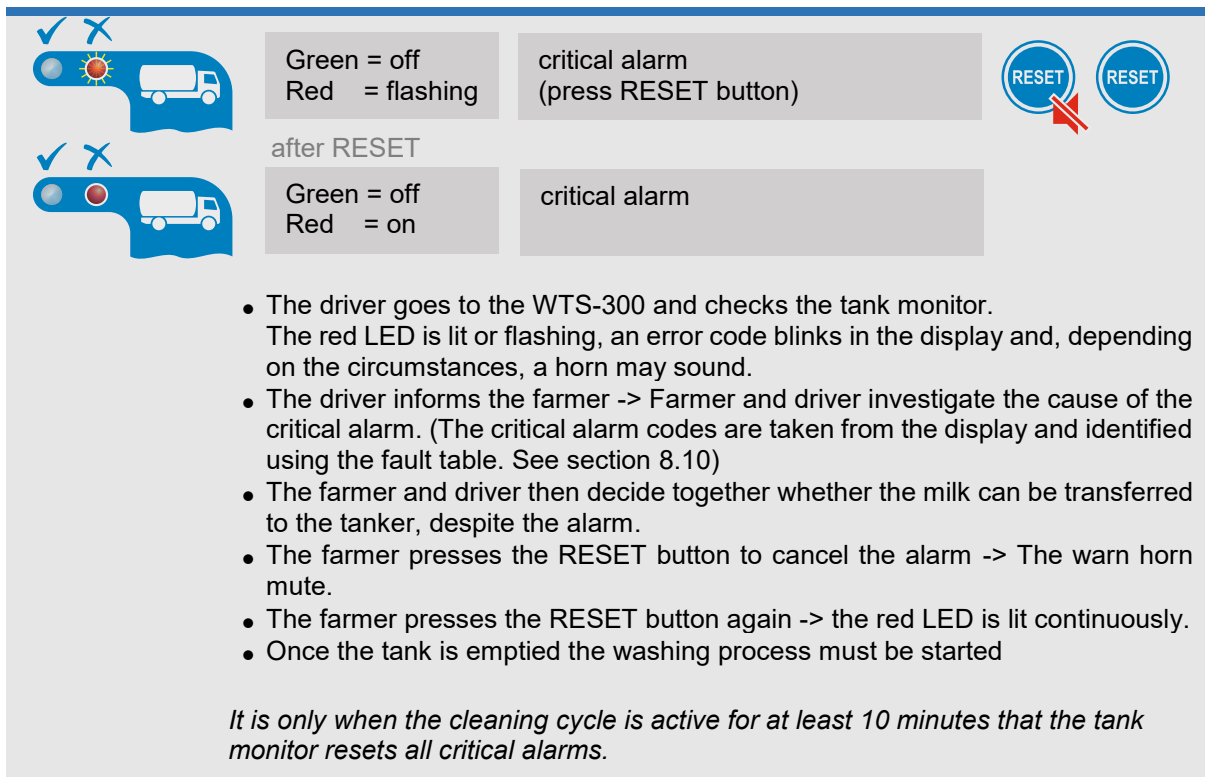
Informative alarm – Milk may be drawn off.

	Green = flashing Red = off	Informative alarm (Press RESET button)	
after RESET			
	Green = on Red = off	Informative Alarm	
- The driver goes to the WTS-300 and checks the tank monitor. The green LED is flashing - the warn horn sounds - an error code is displayed. Milk can be drawn off -> The farmer must be informed. - The farmer investigates (and remedies) the cause of the fault and presses the "RESET" button -> the warn horn mute. - The farmer presses the "RESET" button again -> the green LED is now on continuously. (The informative alarm is accepted and deleted with the pushbutton.) - Once the milk has been taken, the driver starts the cleaning process.			
NB: If the informative alarm is not reset, the green LED flashes and the error code continues to be displayed -> even after the next cleaning cycle.			

7. Tank monitor and general fault handling

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

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



The diagram illustrates the critical alarm state of the tank monitor. It shows two states: the initial alarm state and the state after a RESET button is pressed. In the initial state, the green LED is off and the red LED is flashing, indicating a critical alarm. In the state after RESET, the green LED remains off, but the red LED is now on (solid), indicating the alarm has been reset. The diagram also shows two RESET buttons, one of which is highlighted with a red arrow. Below the diagram, a list of steps describes the procedure for handling the critical alarm, and a note states that the tank monitor resets all critical alarms only when the cleaning cycle is active for at least 10 minutes.

State	Green LED	Red LED	Action
Initial Alarm	off	flashing	critical alarm (press RESET button)
after RESET	off	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.**

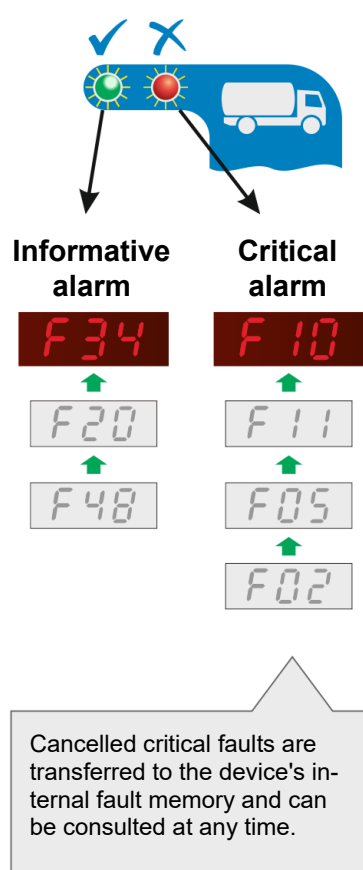
	Green = flashing Red = flashing	critical + informative alarm (press RESET button)	 
	after RESET Green = flashing Red = on	critical + informative alarm (press RESET button)	
	after second RESET Green = off Red = on	critical + informative alarm	

- 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. Tank monitor and general fault handling

7.3 Tank monitor: Handling multiple faults



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

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

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

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

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.

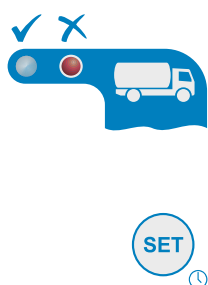
When the last critical fault (example F02) has been reset: (red LED permanently lit)

- 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

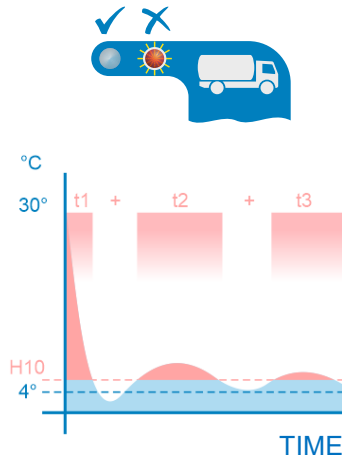
- SET button in OFF mode: the code for the first critical fault is displayed (in the above example F02).
- SET button again: the next error code is displayed (in the example F05).

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 each time the temperature is exceeded.
- F29 Low temperature directly**
The alarm is triggered as soon as the milk temperature falls below the temperature set in [h29].
- F30 Power cut directly**
The alarm can function only if the optional power pack is installed. Regardless of the operating mode, the alarm is triggered in the event of a power cut.
- F31 Max. time without cooling (starts when cooling manually ends)**
Safety function! (This is to prevent that after manual interruption of the cooling mode is forgotten, to reactivate it or to start the cleaning after the milk removal.)
Timer starts as soon as cooling mode is switched off manually. The alarm is triggered if a new cooling period or washing cycle is not started within time [h31].
- F32 Max. time without cooling (starts when washing ends)**
Safety function! (designed to ensure that the operator does not forget to start cooling mode after washing.)
Timer starts as soon as washing mode ends. The alarm is triggered if a new cooling period or washing cycle is not started within time [h32].
- F33 min. cleaning interval**
Alarm is triggered, if a new cleaning does not take place within the time [h33]
- F34 Time / date not set**
The alarm is triggered if the date and time are lost.

F35 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

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

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

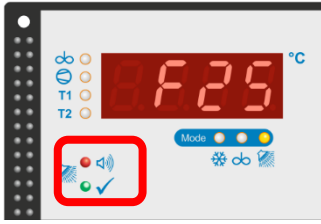
F39 Battery voltage too low

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

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

7. Tank monitor and general fault handling

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. Tank monitor and general fault handling



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 10.9

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

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].

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

F56 Broken sensor

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

Possible cause of fault:

- Temperature sensor faulty
- Sensor cable damaged

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

Consequence:

- 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

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

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

F85 Phase error

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

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

7.5.7 Test alarm

F99 Test alarm (see section 9.5)

8. Setting of parameters

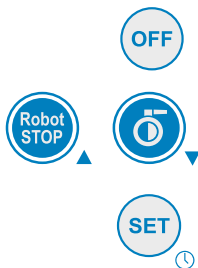
8.1 Change and save parameter values

The WTS-300 is configured in 11 different parameter levels.
To change parameters in one of the lower levels, enter the corresponding 'level code'

Working level for normal daily operation		CODE
		
→	General cooling parameters	code: C212
→	Extended cooling parameters	code: D345
→	General cleaning parameters	code: B454
→	Extended cleaning parameters 1	code: C567
→	Extended cleaning parameters 2	code: D432
→	Service parameters	code: EA03
→	General tank monitor parameters	code: 4711
→	Extended tank monitor parameters	code: F94A
→	Alarm configuration	code: FFFF
→	Configuration	code: A384
→	I/O test parameters	code: 10E5

Enter the level code

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



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

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

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)

NOTICE



Note:

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

Return to working level:

(possible from any parameter)



Standard with saving the values:

- Press both arrow buttons simultaneously. The display shows "STOR" for a short time - changes are accepted.

The control switches to the OFF mode - the display shows the current time.

Return without saving the values:

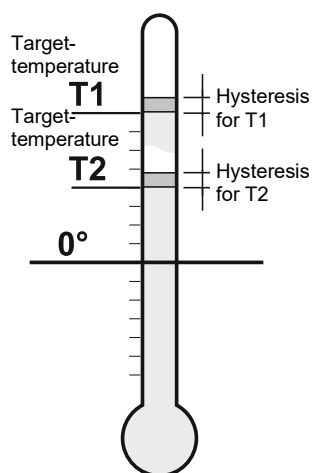
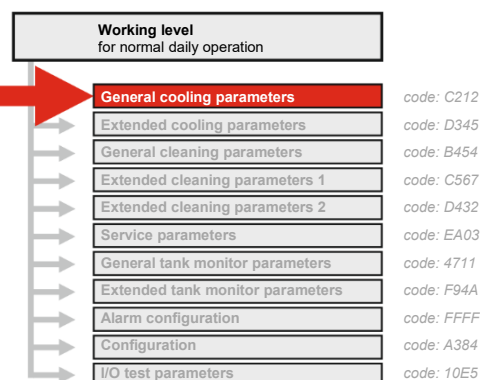
- Press the OFF button – or
- If no button is pressed for 60 seconds:
The controller automatically returns to the OFF mode. All changes are lost.

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		
	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		
	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	0 .. 999 sec.	120
	Period in seconds for which the agitator continues to operate after compressor is switched off.		
c21	Pause duration	0 .. 999 min.	20
	Period in minutes between agitator switching off and switching on again (for the duration of the after-stirring period selected).		
c23	Duration of 'intermediate stirring SHORT'	0 .. 999 min.	2
	Period in minutes during which the agitator operates if the UP arrow button is pressed for approx. 1 second during a cooling pause.		
c24	Duration of 'intermediate stirring LONG'	0 .. 999 min.	10
	Period in minutes during which the agitator operates if the UP arrow button is pressed for approx. 3 seconds during a cooling pause.		
c25	Maximum continuous stirring period in mode ,continuous stirring'	0 .. 999 min.	30
	Setting of maximum continuous stirring period.		
	0: indefinite stirring (to end, the OFF button must be pressed)		
	1..999: max. stirring period in minutes		

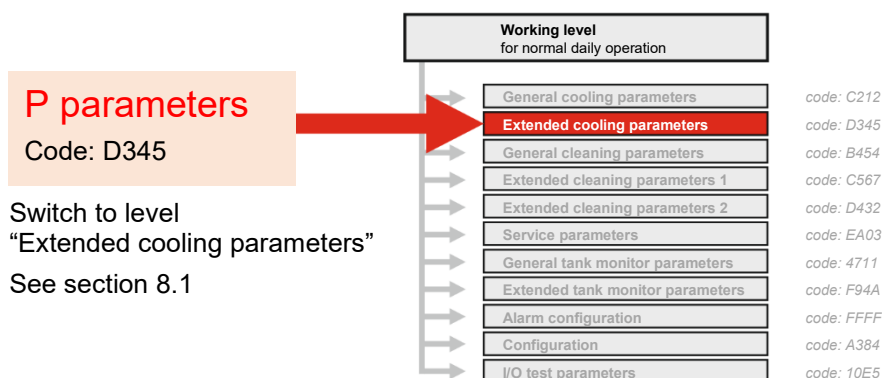
to section 8.2: Level “General cooling parameters” (c parameters)

<u>Sensor correction adjustment</u> (see section 9.3)		Range	Default
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 10.4	0 .. 60 min.	0
-----------	---	--------------	---

Compressor protection when filling from below Range Default

P6	Compressor switch-on delay / pre-agitating <i>Function see section 9.15.2</i> 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 <i>see section 5.6.3</i> 0: deactivated 1: short / long 2: toggling by button	0 .. 2	1
P23	Automatic start to continuous stirring when cooling mode ends <i>see section 10.1.1</i> 0: deactivated 1: activated	0 .. 1	0

to section 8.3: Level "Extended cooling parameters" (P parameters)

		Range	Default
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!).	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) <i>Precondition:</i> - Input function 35 must be assigned to one of the digital inputs [A21..A33]. 0: deactivated Evaluation permanent <u>Fault message only</u> 1: High-active (fault, when contact is closed) 2: Low-active (fault, when contact is opened) <u>Fault message and compressor shutdown from 50% failure of the agitators</u> 3: High-active (fault, when contact is closed) 4: Low-active (fault, when contact is opened) Evaluation only if agitator is switched on <u>Fault message only</u> 5: High-active (fault, when contact is closed) 6: Low-active (fault, when contact is opened) <u>Fault message and compressor shutdown from 50% failure of the agitators</u> 7: High-active (fault, when contact is closed) 8: Low-active (fault, when contact is opened)	0 .. 8	0
<u>Automatic agitating before next pickup</u>		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

8. Setting of parameters

to section 8.3: Level "Extended cooling parameters" (P parameters)

	<u>Drawing off milk through pneum. butterfly valve in cooling mode</u>	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 2 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	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)

<u>"Milk decanting function" for buffer tanks</u>		Range	Default
<i>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 <u>can only be started in OFF mode</u> using an external button on the digital input.</i> 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
<u>with premature stop option</u>			
0:* - premature stop possible by repeated pressing of the external button - <u>no</u> 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)			
<u>without premature stop option</u>			
2: - <u>no</u> premature stop possible - <u>no</u> Autostart of the cleaning after successful decanting 3: - <u>no</u> premature stop possible - Autostart of the cleaning (after successful decanting)			

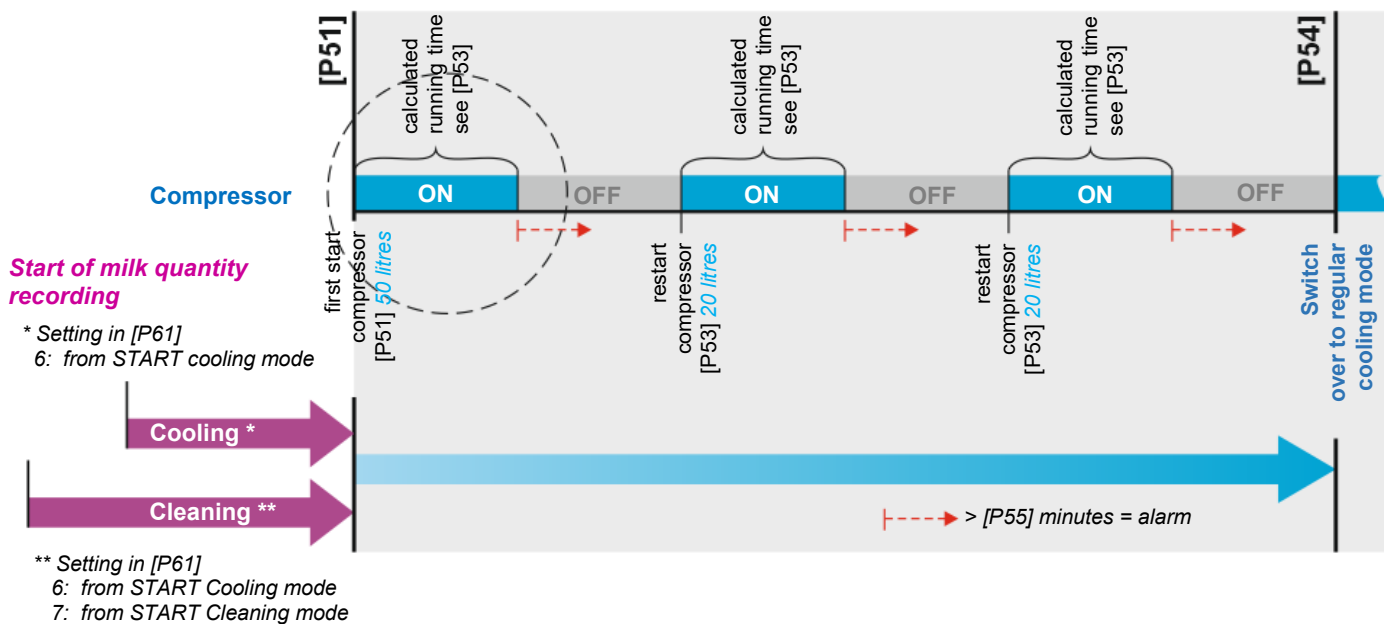
* Parameter [A21..A33] must be parameterized to 22
(decanting function start button).

8. Setting of parameters

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

<u>Alarm “Water detection in cleaning pipe”</u>	Range	Default
Alarm / prevention of water intake into tank during cooling mode (see also section 10.5)		
P40 Alarm activation 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		
 <u>Alarm „tank overflow protection“</u>	Range	Default
Explanation see section 10.9		
P42 Activation tank overflow protection	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)		

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



<u>Milk-volume-dependent cooling start delay / (Cooling power reduction in case of robot operation)</u>		Range	De- fault
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 Example based on the default values: per 20 liters of milk the compressor runs 60 seconds = 70 litres of milk = 210 seconds compressor running time	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

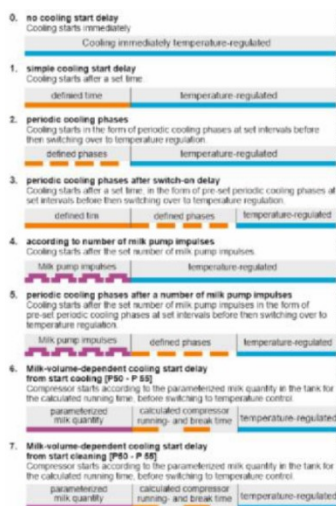
The milk quantity-dependent cooling start delay is only active with parameter [P61 = 6, 7, 8].
See also section 10.2

Regular cooling =
temperature-dependent
cooling operation

8. Setting of parameters

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

See section 10.2 for the setting of cooling start parameters



Cooling start settings

		Range	Def.
P60	Auto start cooling mode after successful cleaning <i>see also section 10.1.2.</i>	0 .. 1	0
	0: Auto start deactivated 1: Auto start activated (in case of successful cleaning)		
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 Only if [P61] = 1 or 3	1..999 min.	30
P63	„ON“ time cooling boost [P61] = 2, 3, 5	1 .. 30 min.	5
P64	„OFF“ time cooling boost [P61] = 2, 3, 5	5 .. 60 min.	20
P65	Number of cooling boosts [P61] = 2, 3, 5	1 .. 50	5
P66	Number of impulses milk pump [P61] = 4 or 5	1 .. 100	10
P67	Timeout delay via milk pump only if [P61] = 4 or 5 Safety function: In the absence of milk pump impulses (for example, wire breakage), cooling is started after [P67] has elapsed.	1..999 min.	60

Compressor settings

		Range	Def.
P69	Compressor mode continuous pulse operation Here can be activated that the compressor works in continuous pulse operation (reduction of the cooling performance) (after delay of cooling start it uses the times of P63, P64) 0: deactivated 1: activated	0 .. 1	0
P70	Compressor stop via digital input Possible control of the cooling start by robot. See section 9.15.3 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”	0 .. 4	0

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

to section 8.3: Level "Extended cooling parameters" (P parameters)

		Range	Def.
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 10.8		
	The fault monitoring is used to indicate problems during the operation of the compressor.		
	0: deactivated		
	<u>Evaluation via motor protection relay or motor protection switch</u>		
	1: Thermal protection contact "high-active" (fault message when open)		
	2: Thermal protection contact "low-active" (fault message when closed)		
	<u>Evaluation via auxiliary contact compressor contactor</u>		
	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).		
	* <i>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.</i>		
	Assign a digital input [A21..A33] with function 6 to each compressor.		
	* <i>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.</i>		
P73	Method of activation of the 2nd and / or 3rd cooling stage	0 .. 12	0
	Only applies to tanks or silos with more than one compressor or evaporator!		
	<i>Explanations see also section 10.7</i>		
	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.		

8. Setting of parameters

to section 8.3: Level "Extended cooling parameters" (P parameters)

* Parameter [P74 + P75]:

- are used in method 1
as a time delay

- are used as timeout
times in method 5

		Range	Def.
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 3rd cooling level on	1..5000 ltr.	4000
P78	Mutual switch-on delay of the compressor stages	2..25 sec.	3

Settings for target temperature switchover T1 / T2

	Range	Def.
P80	Settings for target temperature switchover	0 .. 5

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 auto-
matic 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 or 3	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

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

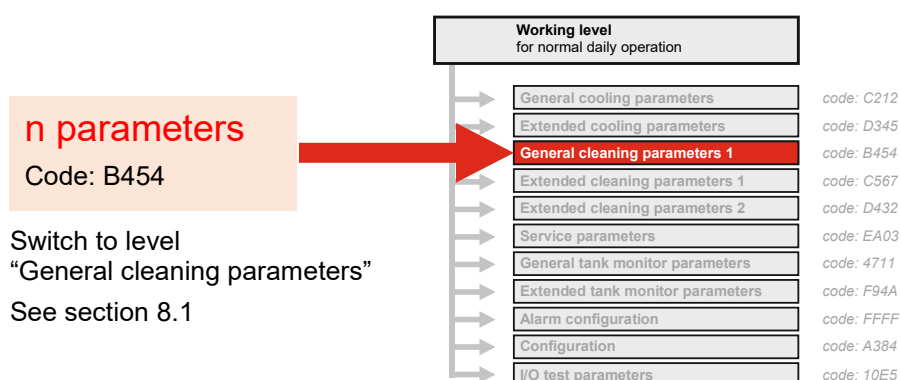
to section 8.3: Level “Extended cooling parameters” (P parameters)

NOTICE

<u>Freezing protection by low pressure monitoring</u>		Range	Def.
<i>Explanations see also section 10.10</i>			
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.			
<i>NOTE: For freeze protection via low pressure switch, function assignment [A21..A33] => 20 (low pressure switch input)</i>			
<i>P85 has no function when using a low pressure switch!</i>			
P85	Pressure trigger limit (freeze protection)	1 .. 99,9 %	20
P86	Pressure trigger limit (Low pressure fault F80)	1 .. 99,9 %	20
P87	Monitoring delay after start compressor	10 .. 999 sec.	120
P88	Switch off time compressor in case of too low pressure	1 .. 15 min.	10
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.			
<u>Fault message compressor</u>		Range	Def.
<i>Explanations see also section 10.11 and 10.12</i>			
P90	Fault message low pressure (F80)	0 .. 2	0
0: deactivated			
<u>Independent of freeze protection</u>			
1*: High-active => Signal on digital input triggers alarm			
2*: Low-active => NO signal at digital input triggers alarm			
<u>In connection with low pressure monitoring (freeze protection)</u>			
3..30 min.: 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			
<i>NOTE: Observe function assignment [A21 - A28]!</i>			
<u>Display settings</u> (see section 10.3)		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)



	Range	Default
<u>Running times cleaning stage 0</u> (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

* **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

<u>Running times cleaning stage 1</u> (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

<u>Running times cleaning stage 2</u> (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

<u>Running times cleaning stage 3</u> (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)

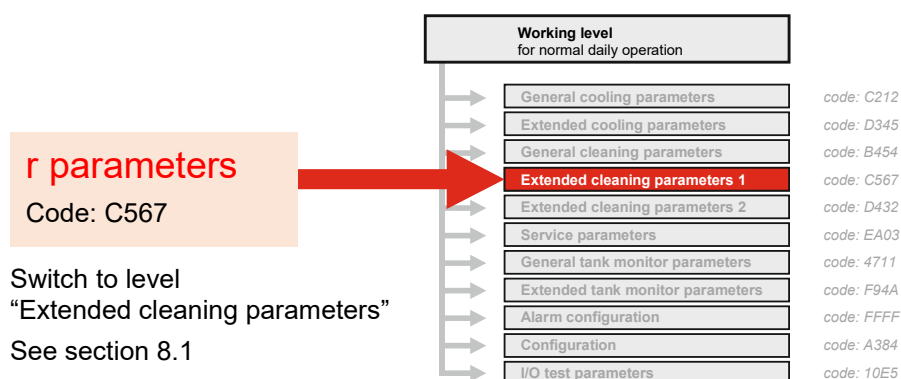
	Range	Def.
<i>Running times cleaning stage 4 (intermediate rinse) - hidden, if [r44] = 0</i>		
n40 Water intake by feed container *	0 .. 10	0
n41 Water intake by level 1 **	0 .. 1	0
n42 Water intake by time	0 .. 999 sec.	90
n43 Additional water intake time + circulation	0 .. 999 sec.	0
n44 Main circulation time	0 .. 999 sec.	30
n45 Rinse out time	0 .. 999 sec.	0
n46 Drain time	0 .. 999 sec.	60
<i>Running times cleaning stage 5 (main rinse 2) - hidden, if [r45] = 0</i>		
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
<i>Running times cleaning stage 6 (intermediate rinse 2) - hidden, if [r46] = 0</i>		
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
<i>Running times cleaning stage 7 (disinfection) - hidden, if [r47] = 0</i>		
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
<i>Running times cleaning stage 8 (after-rinse) - hidden, if [r48] = 0</i>		
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

8. Setting of parameters

to section 8.4: Level "General cleaning parameters" (n parameters)

	Range	Def.
<u>Running times cleaning stage 9 (rinse out) - hidden, if [r49] = 0</u>		
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
 <u>Runtime abort for all cleaning stages</u>		
n100 Drain time after cleaning has been aborted	0 .. 999 sec.	150
 <u>Dosing time settings</u>		
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
 <u>Temperature settings (see also section 11.3)</u>		
n106 Pre-heat. temp. main cleaning stage 1 (alkal./acid) (hidden if r35 = 0)	0 .. 99,9 °C	45,0
n107 Pre-heat. temp. main cleaning stage 2 (acid) (hidden if r35 = 0 or 1)	0 .. 99,9 °C	45,0
n108 Pre-heat. temp. main cleaning stage disinfection (hidden if r35 = 1 or 2)	0 .. 99,9 °C	45,0
n109 Post-heating temp. during circulation in main cleaning stage 1 [n34] (hidden if r35 = 0)	0 .. 99,9 °C	40,0
n110 Post-heating temp. during circulation in main cleaning stage 2 [n54] (hidden if r35 = 0 / 1)	0 .. 99,9 °C	40,0
n111 Post-heating temp. during circulation in cleaning stage disinfection [n74] (hidden if r35 = 0 / 1 / 2)	0 .. 99,9 °C	40,0

8.5 Level “Extended cleaning parameters 1” (r parameters)



Adjustment to safety elements

	Def.
r10 Safety switch butterfly valve (F40) see section 9.2	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 (Fault F41)	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 (Fault F42)	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
If this function is activated, the compressor is switched on in the circulation step n84, provided that the tank temperature is between 4 ° and 40 °.	
0: deactivated	
1: activated with compressor lock - see [P70]	
2: activated without compressor lock - see [P70]	

Detergent options

	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)		

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

Drain valve settings

	Def.
r23 State of drain valve in program steps n20 and n80 (Pre-rinse 2 and post-rinse via preliminary tank)	1
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 (see section 9.15.1)	0
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



8. Setting of parameters

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

<u>Settings for level detection</u> (see also section 11.6)		Def.
r29 Inertia level input	1: fast 2: medium 3: sluggish	3
r30 Sensitivity level input 1	-10: less sensitive +10: more sensitive	0
r31 Sensitivity level input 2	-10: less sensitive +10: more sensitive	0
r32 Timeout water intake by level (Fault F44)	Maximum time to cleaning abort: 1 .. 60 min.	5
r33 Level monitoring at the end of the rinsing cycle (Fault F45)	0: deactivated <u>Termination of cleaning in the event of a fault</u> 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 <u>No termination of cleaning in the event of a fault</u> (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	0
r34 Monitoring of water intake time during intake (Fault F46)	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.	0
<u>Setting of heater</u>		Def.
r35 Heater activation	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	1
r36 Start delay heater	Range: 0 .. 120 sec.	10
r37 Max. running time heater (Timeout programme step "H")	Range: 10 .. 999 min. (Fault F48)	60
r38 Heater protection via pressure switch	0: deactivated 1.. 8 sec.: Switch off the heater after x seconds without pressure	0
r39 Over temperature protection heater (Fault F49)	To protect the heater (open in the event of a fault) 0: No protective contact 1: Protective contact active	0

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

<u>Number of passes of separate cleaning stages</u>		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

<u>Selection of water valve (cold / hot water)</u>		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

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

- 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

<u>Selection of drain valve</u>		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

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

- 1: Drain valve 1
- 2: Drain valve 2

8. Setting of 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.

<u>Settings cleaning breaks</u>		Range	Def.
r70	Activation of break in cleaning programme (see section 11.2)		0
	0: deactivated		
	1: activated, finish of break only with button or digital input		
	2: activated, finish of break after time [r72] or button or digital input		
	3: activated, finish of break at a certain time [r73] or button or digital input		
r71	Position break	0 .. 8	1
	After which cleaning stage is the break integrated		
	Setting range: after cleaning stage 0....8		
r72	Break time	0...999 min.	120
r73	Finish of the break at time	00:00..23:59	00:00

<u>Settings of cleaning pump</u> (see section 11.9)		Range	Def.
r80	Cleaning pump venting	0 .. 4	0
	0: deactivated		
	1: On-/off-impulses with a fixed quantity for all cleaning stages		
	2: as 1, however, premature termination if pressure via pressure switch		
	3: as 1, however, unlimited impulses when rinsing (cleaning stages 0+9)		
	4: as 2, however, unlimited impulses when rinsing (cleaning stages 0+9)		
r81	Number of on / off impulses cleaning pump	0 .. 10	
r82	ON impulse length cleaning pump	0 .. 10 sec.	5
r83	OFF impulse length cleaning pump	0 .. 10 sec.	5
r85	Deactivate rinsing pump during rinsing	0 .. 1	0
	(Rinse 0 and 9)		
	0: Rinsing pump is not deactivated		
	1: Rinsing pump is deactivated		

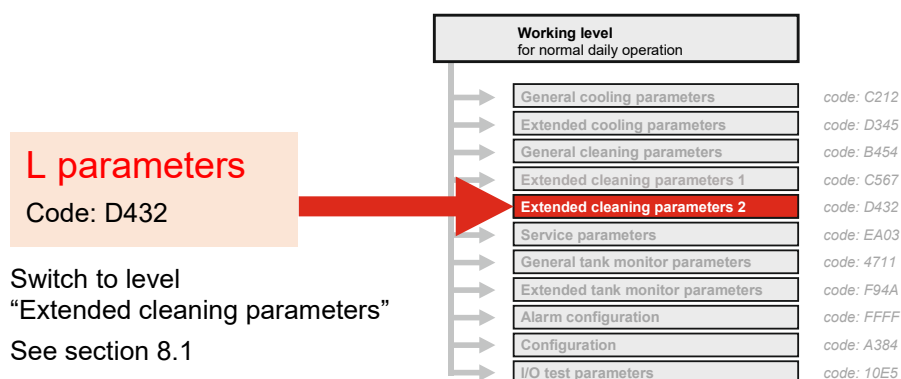
<u>Settings for rinsing cycle-optimisation</u>		Range	Def.
r86	Water pressure-controlled rinse-out step.	0..6 sec.	0
	If the water pressure in the rinse-out step (n15, n25...n85) drops out for x seconds, the rinse sequence is continued with the drain step (n16, n26...n86).		
	0: deactivated		
	1..6: activated, seconds without pressure.		
r87	Avoidance of rinsing shadows on the agitator blade	0..1	0
	0: deactivated		
	1: in the circulation phase (n14, n24, n34...n84) the agitator stops every 25 seconds for 5 sec.		

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

<u>Service settings and commissioning</u> (see also section 6.6)		Range	Def.
r92	Start cleaning at the beginning of cleaning stages 0..8	0 .. 8	0
r93	Number of cleaning cycles with step function	0 .. 5	0
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			
r97	Display during cleaning	0 .. 4	0
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			
r98	Display of the maximum cleaning temperature achieved in OFF after cleaning	0 .. 1	0
0: deactivated			
1: alternating with the time			

* only for the installer

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



For information on quantity-controlled dosing, see also section 6.5

<u>Rinse cycle quantity setting 0 (Rinse out)</u>		Range	Def.
L1	Amount of water in step n1	0...500 l	5
L2	Amount of water in step n2	0...500 l	50
<u>Rinse cycle quantity setting 1 (Pre-rinse 1)</u>			
L12	Amount of water in step n12	0...500 l	35
L13	Amount of water in step n13	0...500 l	0
<u>Rinse cycle quantity setting 2 (Pre-rinse 2)</u>			
L22	Amount of water in step n22	0...500 l	35
L23	Amount of water in step n23	0...500 l	0
<u>Rinse cycle quantity setting 3 (Main-rinse 1)</u>			
L32	Amount of water in step n32	0...500 l	50
L33	Amount of water in step n33	0...500 l	0
<u>Rinse cycle quantity setting 4 (Intermediate-rinse 1)</u>			
L42	Amount of water in step n42	0...500 l	35
L43	Amount of water in step n43	0...500 l	0
<u>Rinse cycle quantity setting 5 (Main-rinse 2)</u>			
L52	Amount of water in step n52	0...500 l	50
L53	Amount of water in step n53	0...500 l	0
<u>Rinse cycle quantity setting 6 (Intermediate-rinse 2)</u>			
L62	Amount of water in step n62	0...500 l	35
L63	Amount of water in step n63	0...500 l	0
<u>Rinse cycle quantity setting 7 (Disinfection)</u>			
L72	Amount of water in step n72	0...500 l	50
L73	Amount of water in step n73	0...500 l	0
<u>Rinse cycle quantity setting 8 (After-rinse)</u>			
L82	Amount of water in step n82	0...500 l	50
L83	Amount of water in step n83	0...500 l	0
<u>Rinse cycle quantity setting 9 (Rinse out)</u>			
L92	Amount of water in step n92	0...500 l	5
L93	Amount of water in step n93	0...500 l	50
<u>Detergent / disinfectant quantity setting</u>			
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 <u>Same timeout (L107) for all programme steps</u> 0: After timeout stop of the cleaning with fault message 1: Continue cleaning after timeout with fault message <u>Individual timeout for each programme step (L107 plus step time from the corresponding n-parameter)</u> 2: Continue cleaning after timeout and report fault	0...2	1
L107	Timeout time for water intake	1,0..25,0 min.	5,0

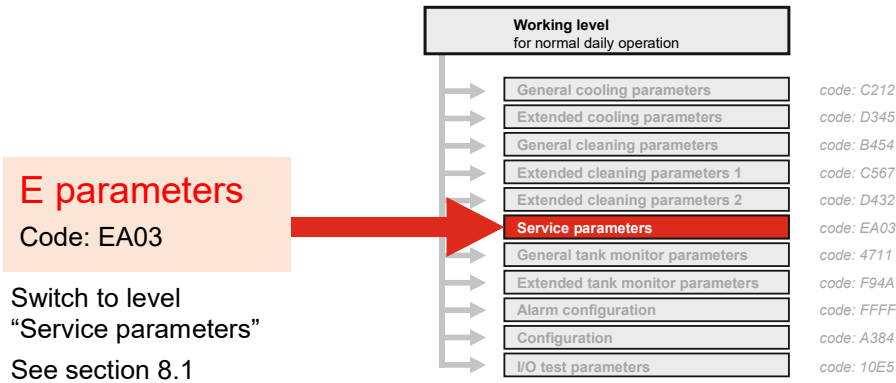
Settings for quantity-controlled detergent and disinfectant dosing

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 "acidic"	1...9999	2000
L122	Impulse counter "alkaline"	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.

<u>Display tank monitoring time counter and values</u>		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	0...900 min.	- - -
Based on the error messages F1 - F3, it can be read here how long the milk temperature has already been above the respectively set limit value.			
E6	... the last cleaning temperature reached	0...99,9 °C	- - -
Displays the maximum temperature during the last cleaning cycle.			
E15	... battery voltage	0,0V..12,0V	- - -
Display the current battery voltage (Only if optional power pack is installed)			

<u>Display of the presently measured current of the analogue 4..20 mA inputs</u>		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)

	<i>Display area.</i>	<i>Def.</i>
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.	<i>x ltr.</i>	- - -
E40 Display Start-DATE * automatic stirring prior to collection	<i>DD : MM</i>	- - -
E41 Display Start-TIME * automatic stirring prior to collection	<i>hh : mm</i>	- - -
E50 SIM PIN entry for optional ESGSM for optional remote maintenance module -1 = no PIN deposited 0000 ... 9999 = SIM PIN	<i>-1..9999</i>	<i>-1</i>

* 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).

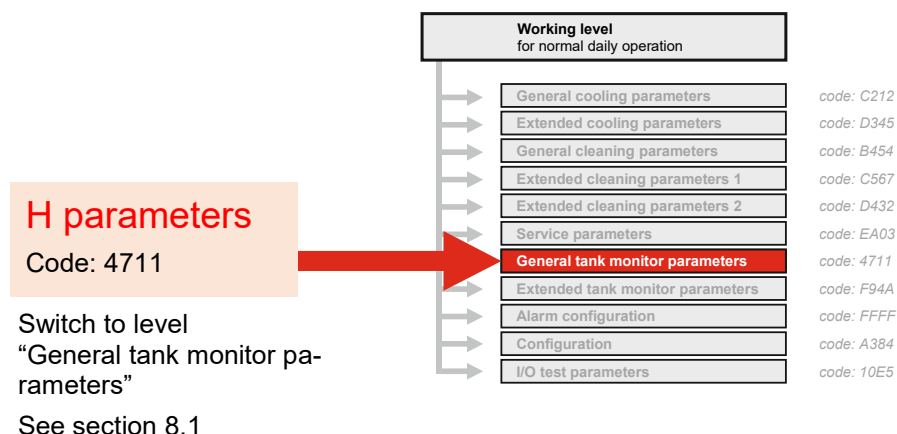
The display shows:

- [E61..E63] Compressor running times in the current cooling cycle
- [E65..E67] Compressor running times in the previous cooling cycle

Display of...

E61 ... current cycle time of compressor 1	<i>0 .. 99,9h</i>
E62 ... current cycle time of compressor 2	<i>0 .. 99,9h</i>
E63 ... current cycle time of compressor 3	<i>0 .. 99,9h</i>
E65 ... last cycle time of compressor 1	<i>0 .. 99,9h</i>
E66 ... last cycle time of compressor 2	<i>0 .. 99,9h</i>
E67 ... last cycle time of compressor 3	<i>0 .. 99,9h</i>

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



Fault messages tank monitor during cooling mode

	<i>Fault</i>	<i>Range</i>	<i>Def.</i>
h20 Target temperature 1st milking * (Starting from this point the monitoring of the over / under temperature begins [h25] + [h29])	F20	0 .. 30,0 °C	5,0
h21 Max. time to reach target temperature [h20] *		0..999 min.	120
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. undertemperature 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 undertemperature (from cooling start) *		0..999 min	120
h29 Min. undertemperature with direct alarm triggering * (from 1st milking) Start the counter from cooling start	F29	0..30,0 °C	0,5
h31 Max. cooling interruption *	F31	0..999 min.	60
h32 Max. time in off mode after cleaning *	F32	0..5000 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 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.	F36	0 .. 5	0
h38 Max. temperature difference monitoring sensor during cooling mode	F38	1,0 .. 5,0	2,0

* 0: deactivated

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

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.

	<i>Fault</i>	<i>Range</i>	<i>Def.</i>
h41 milk time 1	F22	00:00..23:59	--:--
h42 milk time 2	F22	00:00..23:59	--:--
h43 milk time 3	F22	00:00..23:59	--:--

Settings fault indicator

h82 Fault indicator for external faults	F82	0 .. 2	0
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			

Settings tank monitor LOG files

h87 Activation of fast recording via digital input		0 .. 13	0
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]			
h89 Saving of additional information in LOG-memory		0 .. 4	4
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]			
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

8. Setting of parameters

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 KONSOF

	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		

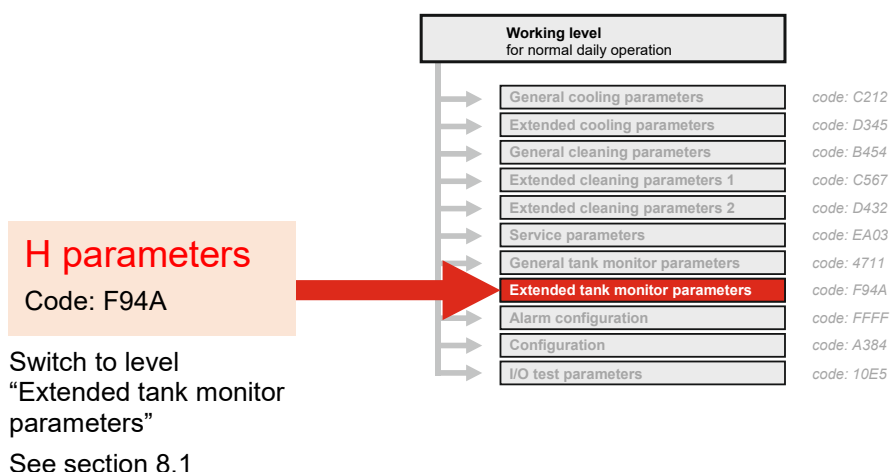
Selection of the inputs and outputs to be saved

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..31: 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)

Don't add milk - temperature conditions

	Fault	Range	Def.
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

8. Setting of parameters

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

<u>Tank monitor activation</u>	Range	Def.
H90 Activation delay (see section 12.1) 0 = deactivated	0 .. 300 min.	180

Parameter level lock

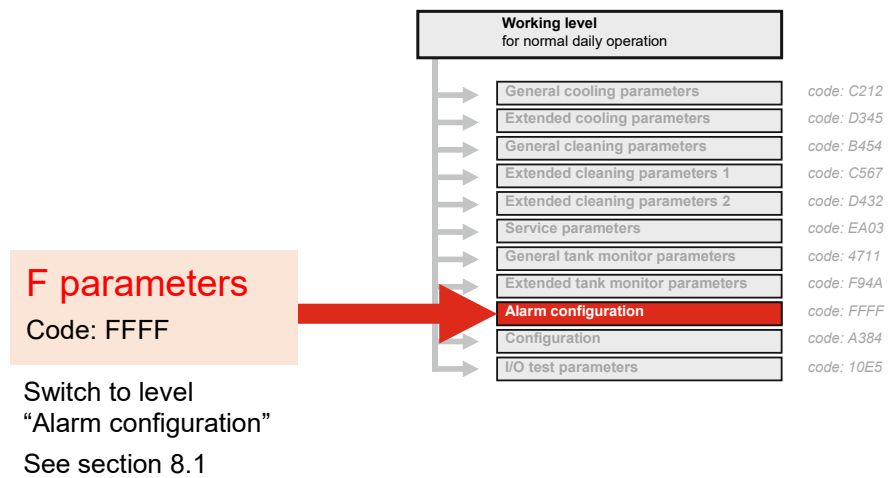
H98 Password protection	0 .. FFFF	0
H99 Password protection	0 .. FFFF	0

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 F61 is assigned the effect of this alarm.

See the table below.

Alarm effect

Setting	display code (flashes)	„green“ LED	„red“ LED	stores in „Konsoft“	alarm relay in general	alarm relay tank monitor	SMS / Email
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WTS-300 system alarms(only display)

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

Informative tank monitor alarms(green LED)

7:	•	•	—	•	—	—	—
8:	•	•	—	•	•	—	—
9:	•	•	—	•	—	•	—
10:	•	•	—	•	•	—	•
11:	•	•	—	•	—	•	•

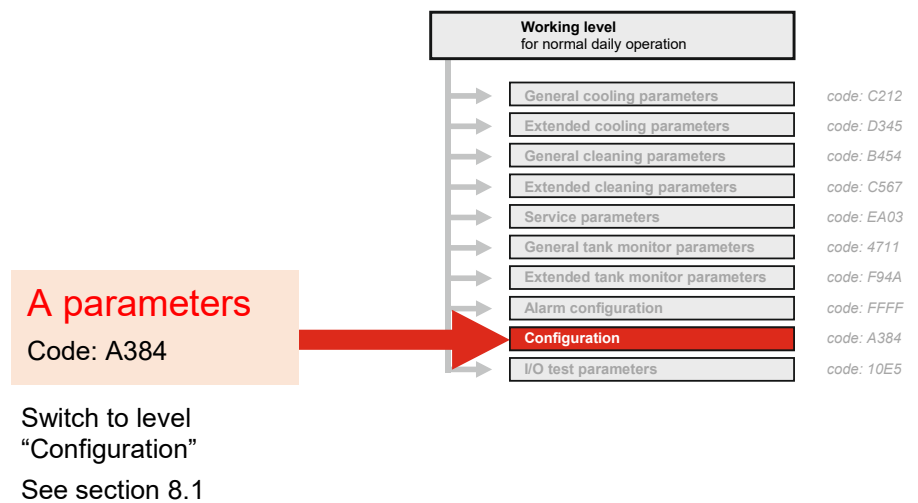
Critical tank monitor alarms(red LED)

12:	•	—	•	•	—	•	—
13:	•	—	•	•	—	•	•

8. Setting of parameters

	Fault configuration...	Setting	Def.
<i>Critical tank monitor alarm (always red LED)</i>	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
<i>Depending on the setting, it is an informative or a critical tank monitor alarm (green or red LED)</i>	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
<i>je nach Einstellung informativer oder kritischer Tankwächteralarm oder auch Systemalarm (grüne oder rote LED oder nur Displayanzeige)</i>	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	1 .. 13	6
	F61 ... Error ESGSM or ESIPM module	1 .. 13	4
	F62 ... I/O expansion module	1 .. 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)



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:

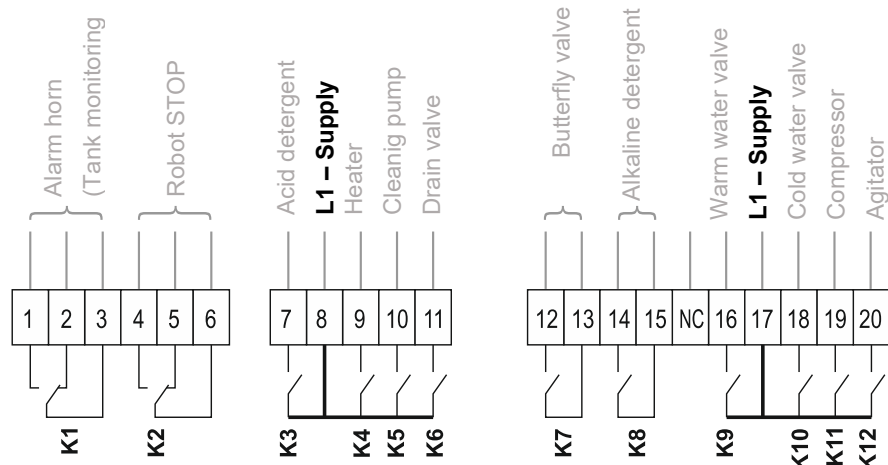
In [A21 .. A33] input functions are assigned to the digital inputs.



WARNING

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

8. Setting of parameters



Assignment of output functions to relays

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

- 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

		Range	Def.
A1	assignment relay K1	0 .. 26	1
A2	assignment relay K2	0 .. 26	2
A3	assignment relay K3	0 .. 26	3
A4	assignment relay K4	0 .. 26	4
A5	assignment relay K5	0 .. 26	5
A6	assignment relay K6	0 .. 26	6
A7	assignment relay K7	0 .. 26	7
A8	assignment relay K8	0 .. 26	8
A9	assignment relay K9	0 .. 26	9
A10	assignment relay K10	0 .. 26	10
A11	assignment relay K11	0 .. 26	11
		0 .. 26	12
A15	assignment relay K1 – I/O module (optionally)	0 .. 26	0
A16	assignment relay K2 – I/O module (optionally)	0 .. 26	0
A17	assignment relay K3 – I/O module (optionally)	0 .. 26	0
A18	assignment relay K4 – I/O module (optionally)	0 .. 26	0
A19	assignment relay K5 – I/O module (optionally)	0 .. 26	0
A20	assignment relay K6 – I/O module (optionally)	0 .. 26	0

to section 8.11: Level "Configuration" (A parameters)

Assignment of output functions to digital inputs 1 to 8

0:	deactivated	
1:	safety switch (manual butterfly valve)	
2:	remote start cooling	
3:	dry protection heating (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:	Low pressure switch input	
20:	Error input low pressure	
21:	Error input high pressure	
22:	Start button milk-decanting function	
23:	Level sensor milk-decanting function	
24:	Signal input multi-function relay	
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 message converter agitator	
36:	Release remote start	
37:	Fault indicator	
38:	Pulse counter "acidic"	
39:	Pulse counter "alkaline"	
40:	Pulse counter "disinfect" (without function)	
41:	Pulse counter "cold water"	
42:	Pulse counter "warm water"	

		Range	Def.
A21	assignment digital input 1	0 .. 42	1
A22	assignment digital input 2	0 .. 42	2
A23	assignment digital input 3	0 .. 42	3
A24	assignment digital input 4	0 .. 42	4
A25	assignment digital input 5	0 .. 42	5
A26	assignment digital input 6	0 .. 42	6
A27	assignment digital input 7	0 .. 42	7
A28	assignment digital input 8	0 .. 42	8
A29	assignment digital input 1 – I/O module (optionally)	0 .. 42	0
A30	assignment digital input 2 – I/O module (optionally)	0 .. 42	0
A31	assignment digital input 3 – I/O module (optionally)	0 .. 42	0
A32	assignment digital input 4 – I/O module (optionally)	0 .. 42	0
A33	assignment digital input 5 – I/O module (optionally)	0 .. 42	0

8. Setting of parameters

to section 8.11: Level "Configuration" (A parameters)

<u>Safety chain function "remote start"</u>	<i>Range</i>	<i>Def.</i>
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

<u>Output signal configuration robot</u>	<i>Range</i>	<i>Def.</i>
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

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

<u>Alarm relay configuration</u>	<i>Range</i>	<i>Def.</i>
A45 Relay configuration "alarm in general" 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	0..3	0
A46 Configuration "alarm tank monitor" 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	0..3	0
A47 Configuration „red warning light“ Parameter [A1..A20] => 19 0: is reset during the cleaning (same as red LED) 1: is reset with pressure	0..1	0

to section 8.11: Level "Configuration" (A parameters)

<u>Configuration temperature sensor</u>		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			
A51 Sensor type (Sensor 1 / sensor 2)		0 .. 3	0
0: KTY81/210 1: PT100 three-wire 2: PT1000 3: KTY81/110			
<u>Configuration analogue input</u>		Range	Def.
A54* Function analogue input 4 .. 20 mA		0 .. 2	0
0: deactivated 1: Determination of litres via filling pressure (see section 10.6) 2: Low pressure monitoring (antifreeze function) (see section 10.10)			
A55 Error monitoring 4-20mA input (F83)		0 .. 2	0
0: deactivated 1: Alarm is activated when < 3.5 mA and > 21 mA 2: Alarm is activated when < 3.5 mA			
<u>Configuration of analog inputs (I/O extension module)</u>		Range	Def.
A56* Function analogue input I1 (4..20 mA) (optional via I/O extension module)		0 .. 2	0
0: deactivated 1: litre determination via filling pressure 2: Low pressure monitoring (see section 10.10)			
A57* Function analogue input I2 (4..20 mA) (optional via I/O extension module)		0 .. 2	0
0: deactivated 1: litre determination via filling pressure 2: Low pressure monitoring (see section 10.10)			
A58 Fault monitoring 4..20 mA input (F83) Alarm at less than 3.5 mA		0 .. 3	0
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			

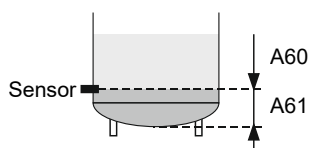
* Prioritisation of analogue inputs (parameter [A54 => A56 => A57]).

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

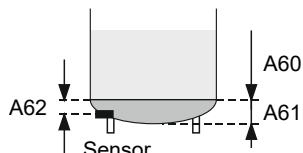
8. Setting of parameters

to section 8.11: Level "Configuration" (A parameters)

Sensor **within** linear area



Sensor **below** linear area



Scaling determination of litres via pressure sensor

See section 10.6

		Range	Def.
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

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
- (if not used with [A14] other functions are selectable)

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 .. 1	0
	0: deactivated			
	1: activated			
A73	activation alarm module monitoring ESGSM modem / ESIPM modem	F61	0 .. 4	0
	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			
A74	Activation of the I/O extension module	F62	0 .. 2	0
	0: deactivated			
	1: activated, no current monitoring			
	2: activated, fault monitoring 1st channel (cable break <3.5 mA) active			
A75	Operating mode 12V input <i>See section 9.7</i>		0 .. 2	0
	0: Input not used			
	1: Battery operation with power failure monitoring			
	2: Operation via external power pack, Power failure monitoring is deactivated			
A76	Activation of additional module 'liter display'		0 .. 1	0
	0: deactivated			
	1: activated			

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

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

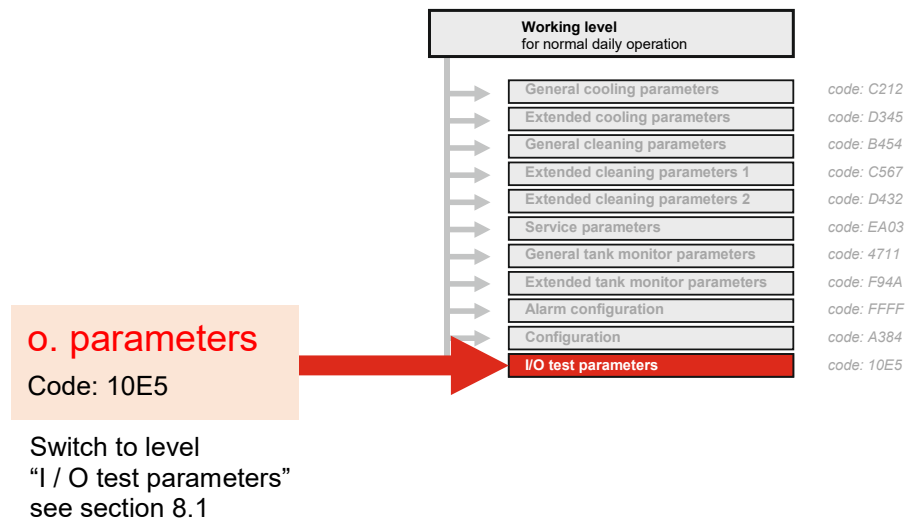
			Range	Def.
	<u>Activate phase monitoring relay ESVAW-003</u>			
A85	Activate phase monitoring relay ESVAW-003 (F85)		0 .. 4	1
	0: deactivated			
	1: activated, the relay on the module drops off in case of an error			
	2: Additional compressor protection. In case of an error the compressor is switched off			
	3: Additional cleaning pump protection. In case of an error the cleaning is interrupted			
	4: Additional compressor protection and cleaning pump protection.			

8. Setting of parameters

to section 8.11: Level "Configuration" (A parameters)

<u>Multifunction time relay</u> (see also section 9.11)		<i>Range</i>	<i>Def.</i>
A86 Multifunction time relay function selection		0 .. 8	1
0: deactivated 1: On-delay T1 2: Off-delay T2 3: On- and off-delay T1 and T2 4: On-impulse T1 5: Off-impulse T2 6: Clock T1 on, T2 off 7: Switch-on pulse T2 delayed by T1 8: Switch-off pulse T2 delayed by T1			
A87 Assignment of multi-function timing relay input		0 .. 26	0
0: digital input (multifunction time relay) 1...26: freely selectable output function see parameter [A1..A20]			
A88 T1 (time 1)		1..5000 sec.	30
A89 T2 (time 2)		1..5000 sec.	30
<u>PC-Interface configuration</u>		<i>Range</i>	<i>Def.</i>
A95 Baud setting		1 .. 4	4
1: 9600 2: 19200 3: 38400 4: 76800			
A96 Device address		1 .. 8	1
<u>Language setting</u>		<i>Range</i>	<i>Def.</i>
A98 Language setting for Konsoft monitor		0 .. 2	0
0: german 1: english 2: french			
<u>Factory reset</u>		<i>Range</i>	<i>Def.</i>
A99 Factory reset		0 .. 999	000
<u>Acknowledgment of fault messages (reset) via Konsoft</u>			
A100 Activation of fault reset via Konsoft		0 .. 1	0
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.			

8.12 Level "I/O test parameters" (o. parameters)

**Meaning of the parameters**

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

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!

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

NOTICE**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 re-stored.

Test relay outputs

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

- 0: Off
- 1: On

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

8. Setting of parameters

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.

		Range	Def.
	0: switched		
	1: unswitched		
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

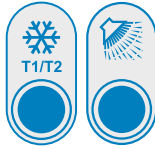
o.72* Agitator 2 in watt

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 "acidic"**
- o.82* Pulse counter 2 "alkaline"**
- 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.

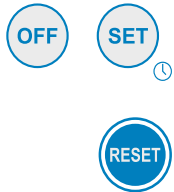
If FÜ2 develops a fault (break or short-circuit), fault code [F38] will also be displayed after 5 minutes.

9.5 Test functions

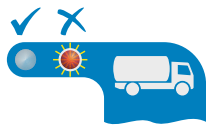
9.5.1 Test alarm F99

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.

Date and time...

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

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

Is the control unit was in cleaning mode ...

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

The tank monitor functions ...

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

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.

NOTICE

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.

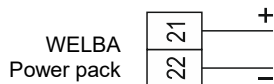
Thus, the tank monitor function is guaranteed in the event of a power failure. During the power failure, the fault code [F30] flashes in the display.

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

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!

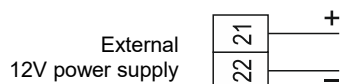


***DO NOT USE ORDINARY BATTERIES !!!
EXPLOSIVE !!!!!***

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.

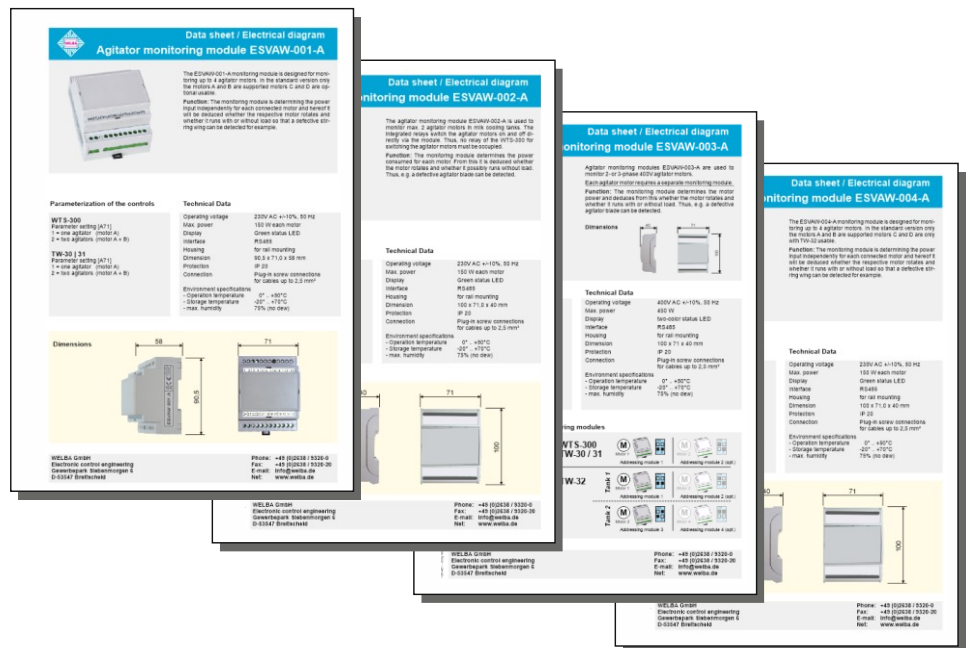
ESVAW-004-A [Operating instructions](#)

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 configured 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 KONSOFIT 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.



9. Other information – General

to section 9.11: Integrated multifunction-time relay

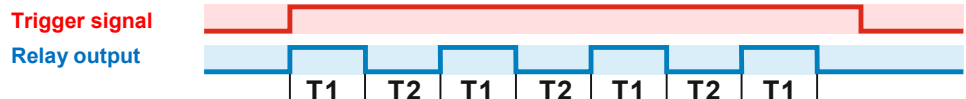
Selection 5: Switch-off pulse T2

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.



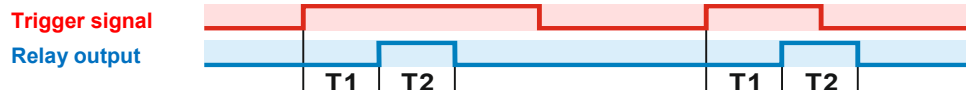
Selection 6: Impulse generator T1 on, T2 off

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.



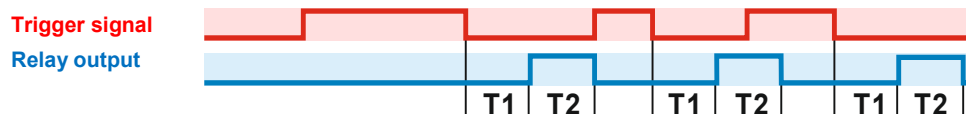
Selection 7: Delayed pulse, ON-switched-triggered (Event-controlled -> cannot be stopped!)

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.

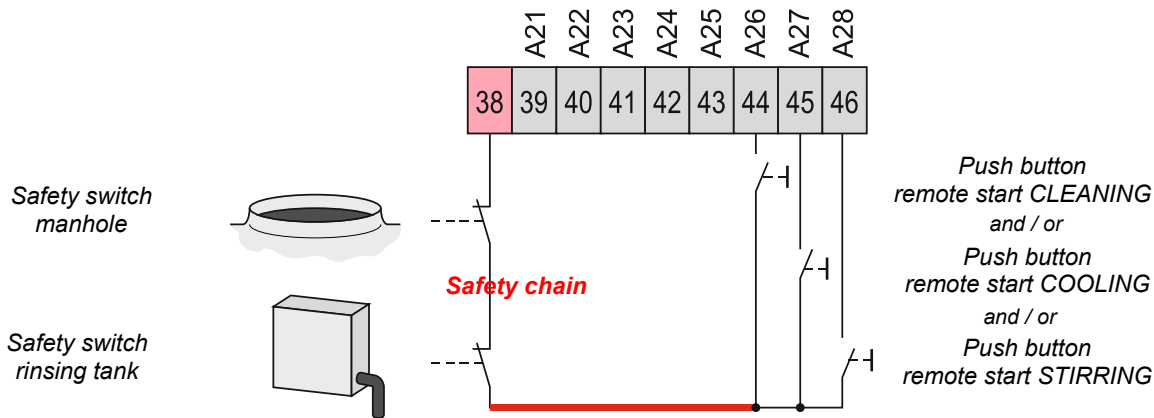


9.12 Safety chain for 'remote start' functions



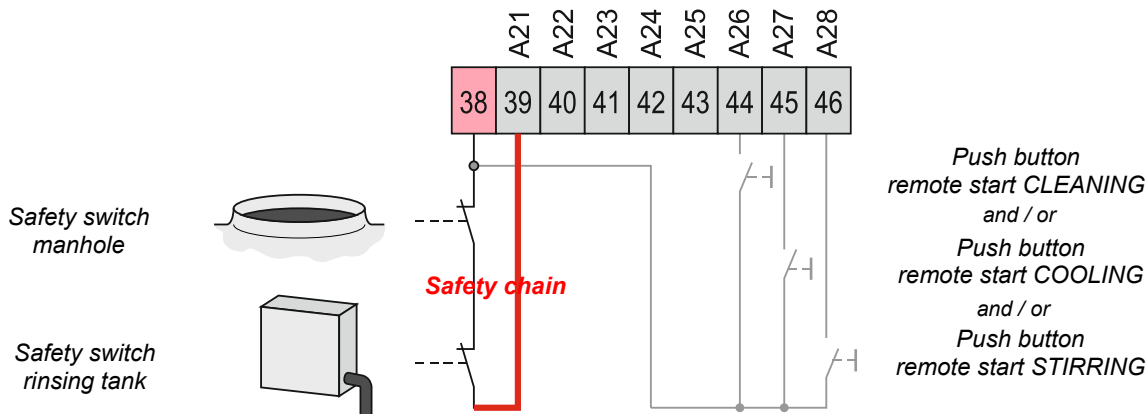
If the functions *CLEANING*, *COOLING* and/or *STIRRING* are triggered by remote start (push button), the system operator must ensure that the manhole and the rinsing tank are monitored by a safety chain.

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].



9.13 RS485 interface

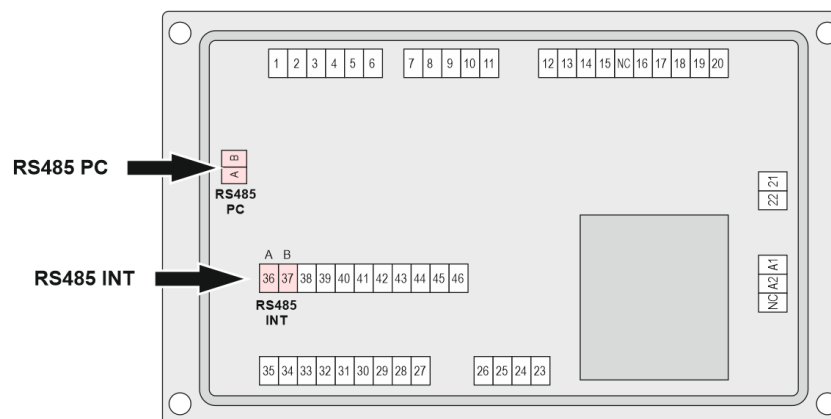
The WTS-300 has two RS485 interfaces as connection options for:

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.



9.14 General measures when using electronic control systems

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

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

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

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

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

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

Possible interference sources (to name a few) include:

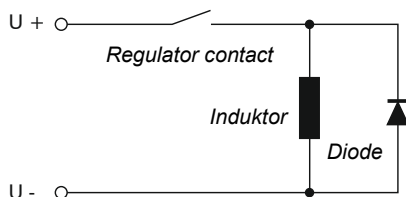
- bouncing contacts when switching loads
- switching off inductive loads (contactors, motors, solenoid valves, etc.)
- unsatisfactory routing of wires, too small cross-sections
- loose contacts
- rhythmically changing power stages (power converters)
- power breakers
- high-frequency generators

9. Other information – General

to section 9.14: General measures when using electronic control systems

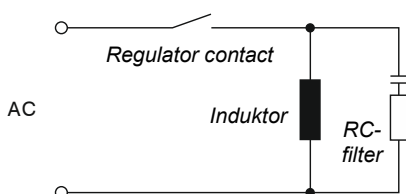
- b. If specific interference sources cannot be avoided they should at least be kept at a distance from the regulator system.
- c. Capacitive and inductive couplings can cause crosstalk between high-voltage lines and parallel low-voltage and sensor lines. This distorts measured values and signals and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

Right !



DC voltage

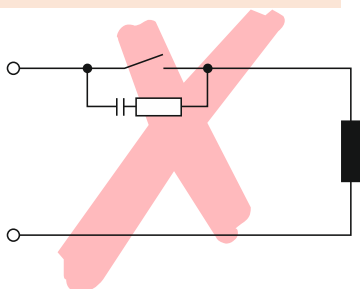
In the case of d/c voltage systems the induction voltage occurring can, for example, be limited by using self-induction diodes, varistors or suppresser diodes. The diagram on the left shows one possibility using a self-induction diode.



AC voltage

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

Wrong !



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

to section 9.14: General measures when using electronic control systems

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

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

9.15 Robot control

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

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

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

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

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

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

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



In OFF mode

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

In cooling mode

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

In cleaning mode

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

When washing is successfully completed:

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

or

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

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

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

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

When washing is successfully completed the robot can start cooling via a digital input. (Digital input [A22..A33] => must be set to 2).

9.15.1 Cleaning release by robot

r27 Cleaning release via digital input

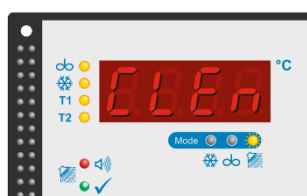
- 0: deactivated
1: activated

Explanation

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

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

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

**Procedure**

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

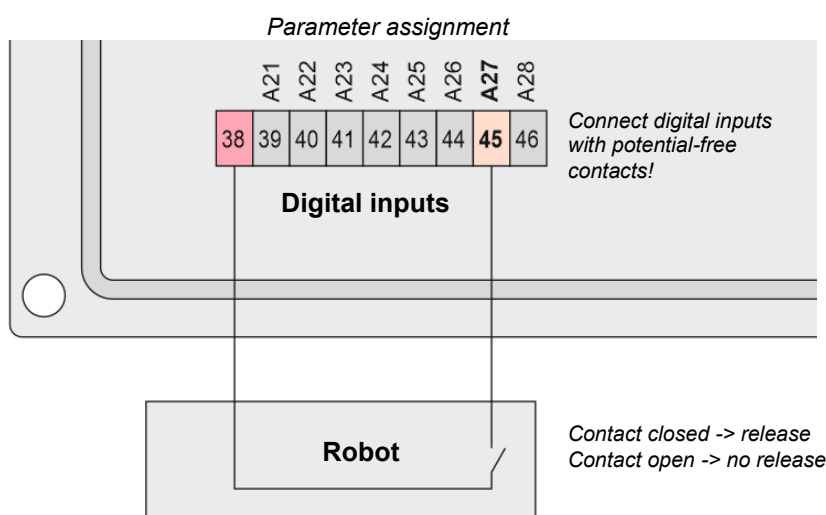
- the display shows 'CLEn'
- the "washing" mode LED flashes

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

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

Parameter setting - IMPORTANT

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



9.15.2 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.

9.15.3 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 Automatic start continuous agitating or cooling mode

10.1.1 Automatic start to continuous agitating mode after exiting cooling mode

Setting in parameter [P23].

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

10.1.2 Automatic start to cooling mode after successful cleaning

Setting in parameter [P60].

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

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

10.2 Different variants for cooling start delay

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

NOTICE

With the WTS-300, a cooling start delay can be parameterized so that after the cooling mode is triggered, the compressor starts with a delay in order to prevent small quantities of milk from freezing in the tank. This delay takes place only in case of first milking after the cleaning.

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

Cooling immediately temperature-regulated

1 Simple cooling start delay

Cooling starts after a set time.

defined time

temperature-regulated

2 Periodic cooling spurts

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

defined spurts

temperature-regulated

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.

defined time

defined spurts

Temper.-regulated

4 According to number of milk pump impulses

Cooling starts after the set number of milk pump impulses.

Milk pump impulses

temperature-regulated

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.

Milk pump impulses

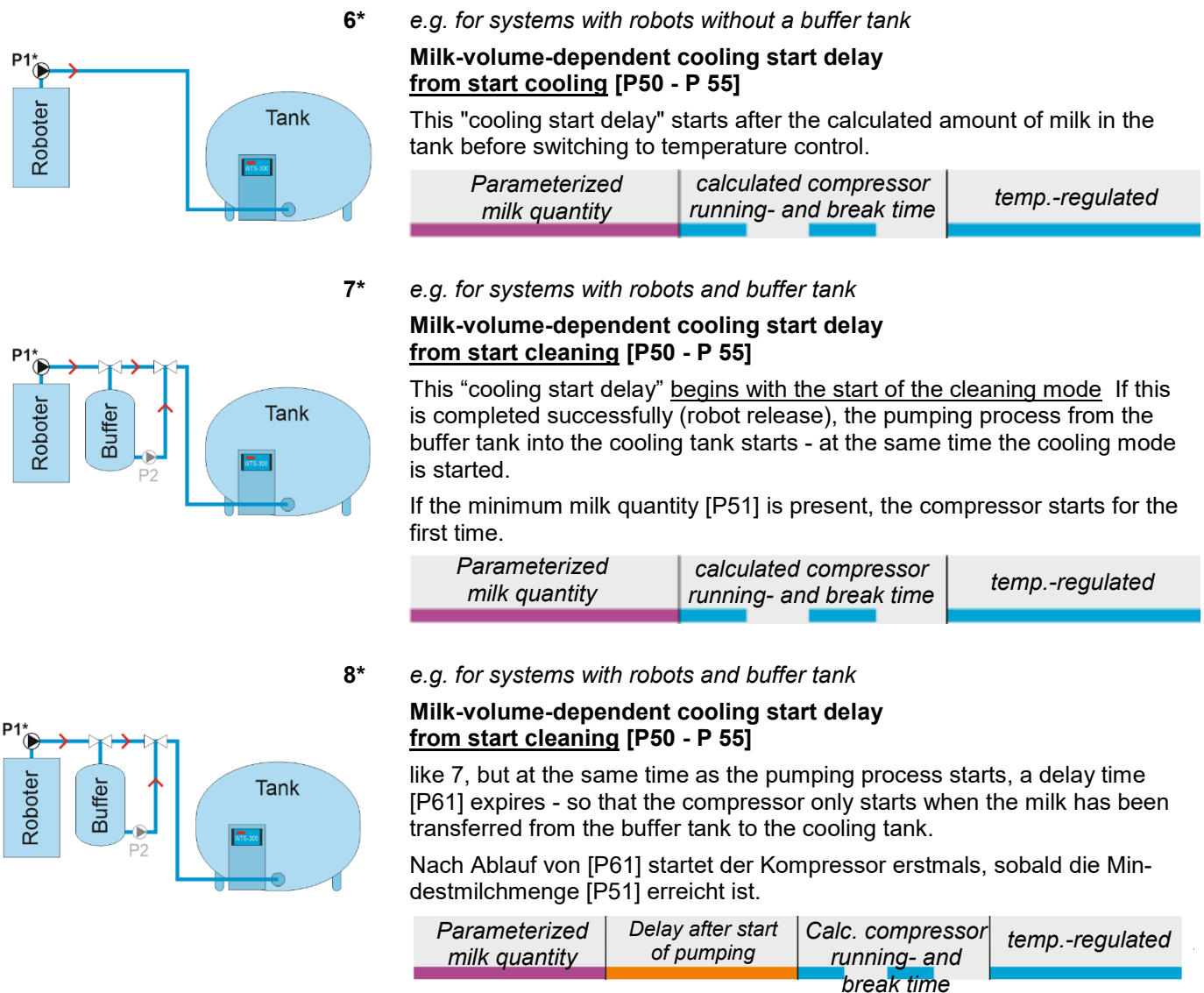
defined spurts

Temper.-regulated

to section 10.2: Different variants for cooling start delay

Variants milk-volume-dependent cooling start delay

For further explanations see next page..

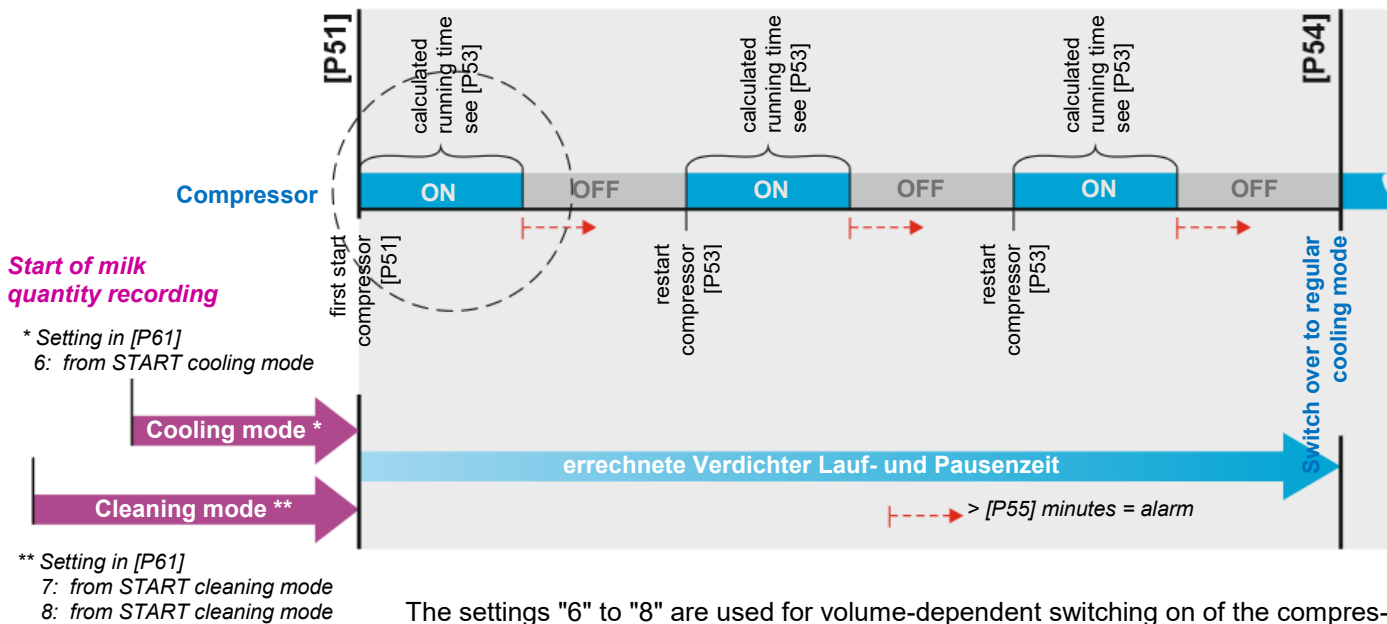


* P1 = Milk feed pump

10. Other information - Cooling

to section 10.2: Different variants for cooling start delay

Information on cooling start versions 6 + 7 + 8



The settings "6" to "8" are used for volume-dependent switching on of the compressor in order to prevent the milk from freezing during robot operation when the cooling mode starts. Depending on the quantity of milk *, the compressor is switched on either sooner or later and then longer or shorter.

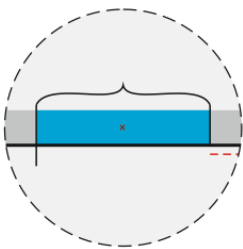
* The control calculates the current milk quantity in the tank from the entered capacity of the feed pump [P50] and the measured duty cycle of the feed pump.

Measured milk quantity = $P50 \times \text{measured running time milk feed pump}$ **

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

Depending on the setting, the calculation of the **milk quantity** already begins

- Setting „6“ = only with the beginning of the cooling mode
- Setting „7“ = bereits zu Beginn des Reinigungsmodus
- Setting „8“ = like “7”, but with an additional delay time [P61] after the start of the pumping process.



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

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

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

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

10.3 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 [P97] [P61]		Display
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

10.4 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.

10.5 Level alarm during cooling (Fault code F52)

Safety function:

The level input will be monitored during cooling.

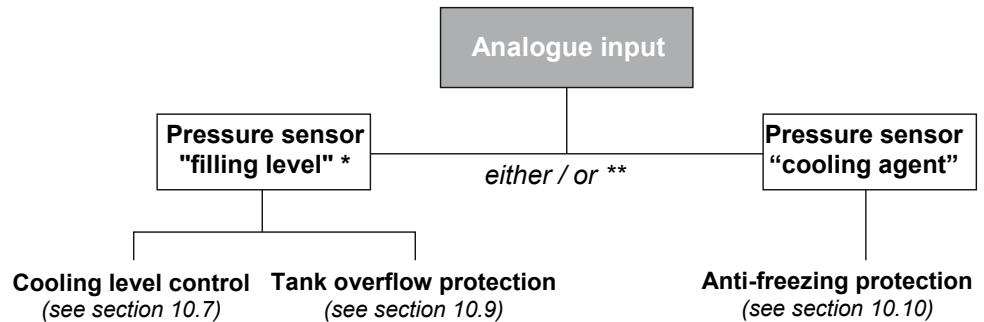
In the case of systems with robot operation, depending on the layout of the system, the washing line may be connected permanently. If, for example, a water valve jams and the water level rises, water could be forced into the tank via the washing line. In this case, once the electrode is reached, an alarm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

All relevant settings are found in [P40].

10.6 Connection /Parameterization external analogue pressure sensor

* The pressure sensor „filling level“ must have a measuring range of 0..1000 mbar.

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

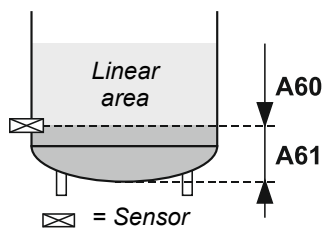


Either a pressure sensor for the filling level or the cooling agent can be connected to the analogue input of the WTS-300. See graphic.

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

Installation case "A"

Mounting sensor within the linear area

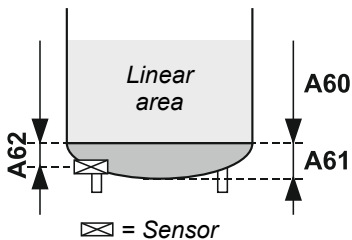


Installation case "A"

- Set parameter [A54] to 1
- Set parameter [A60] (litres per cm filling height) to your tank.
Example: tank-inside diameter "D" = 250 cm
Formula: $D^2 \times 3.14 \div 4 \div 1000 = \text{litres}$
Corresponds in the example: $250 \times 250 \times 3.14 \div 4 \div 1000 = 49$ 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.

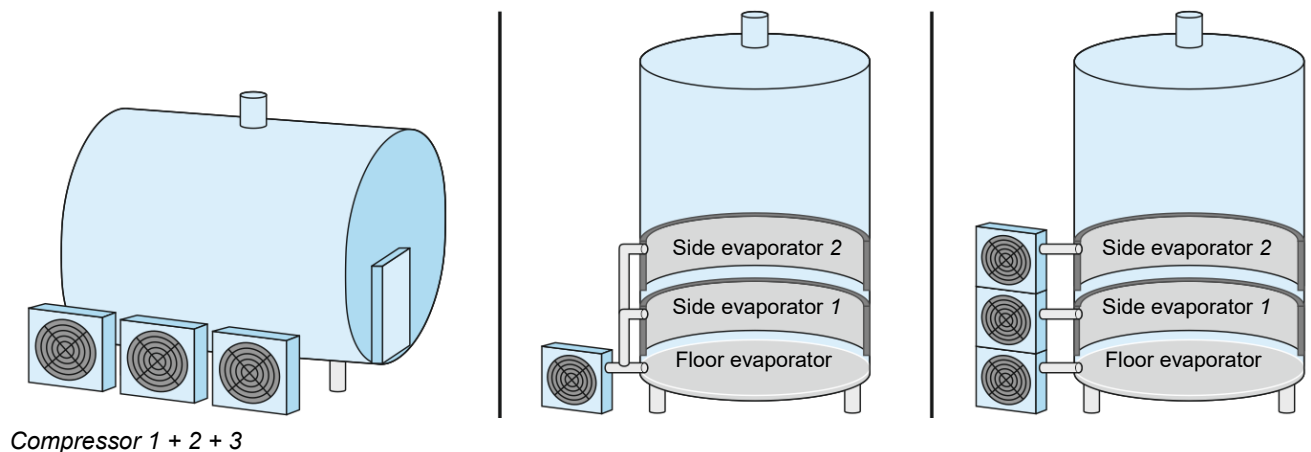
Level indicator on the display (in litres)

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.

10.7 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 10.8

[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.)

[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.)

10. Other information - Cooling

to section 10.7: 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 level switch as described in section 10.6.
- 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

- 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 1 in parameter [P74].
- Set the desired timeout time* for cooling step 2 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).

Timeouts:

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

to section 10.7: 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].

10. Other information - Cooling

to section 10.7: 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].

**** 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 10.8 **Fehler! Verweisquelle konnte nicht gefunden werden.**

10.8 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),

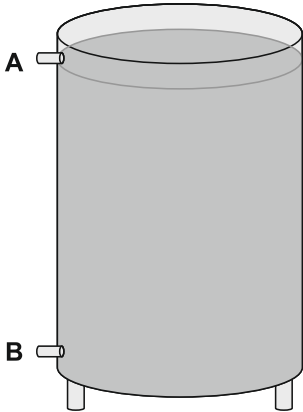
The following settings for fault monitoring are possible:

- **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.
-
- **Parameter [P72] is at 3***
Fault monitoring via switch-on feedback from the compressor contactor auxiliary contact (N/O contact).
 - **Parameter [P72] is at 4***
As selection 3, but switch-on feedback from the compressor contactor auxiliary contact (N/C contact).

* Settings 3 and 4:

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, a fault message is displayed.

10.9 Tank overflow protection



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 level switch as described in section 10.6

Fault display:

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

10.10 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 10.11)

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

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

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

NOTICE



19.7P

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 10.11 **Fehler! Verweisquelle konnte nicht gefunden werden..***

10.11 Fault messages low pressure (F80)

Based on the setting for low pressure monitoring (section 10.10), 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..30

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

Parameter [P90] - Setting 3..30

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)

10.12 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

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].

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.

NOTICE

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].

11.2 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]

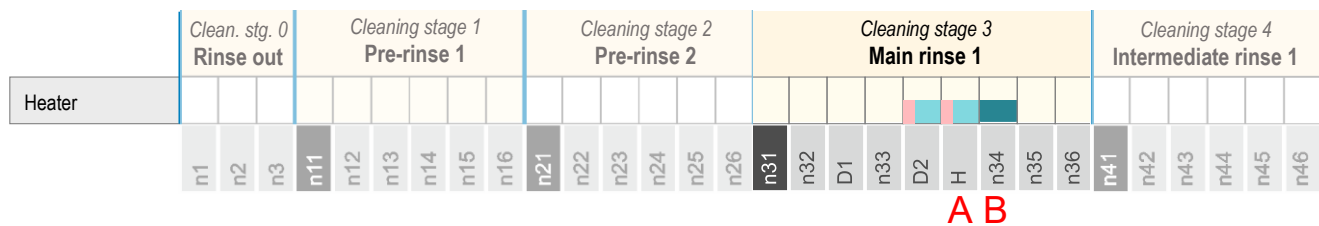
Options:

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".

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)

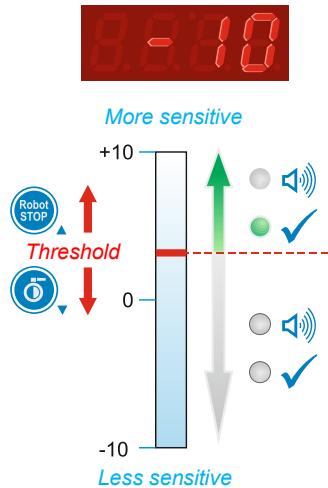
With the function "Boost-Pump", a booster pump can be controlled in water supply networks with low water pressure.

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.

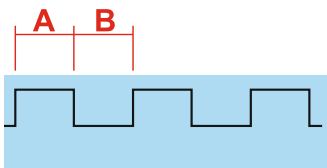
Protection of heater

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.

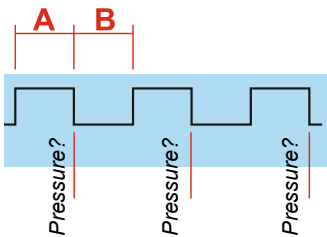
- r81 - Number of switch-on and switch-off impulses
- r82 - Duration of switch-on impulses **A**
- r83 - Duration of switch-on impulses **B**

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.

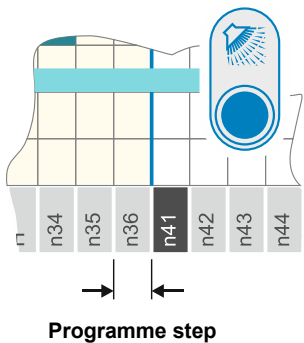
NB:

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.

NOTICE

11.10 Service functions for testing the cleaning cycle



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!!

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. <i>NOTE: The single-step function can be activated immediately when cleaning is started!</i>
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.



StEP



ABL

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.

11. Other information - Cleaning

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.



Break function:

- 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 'CLEAN-ING 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.

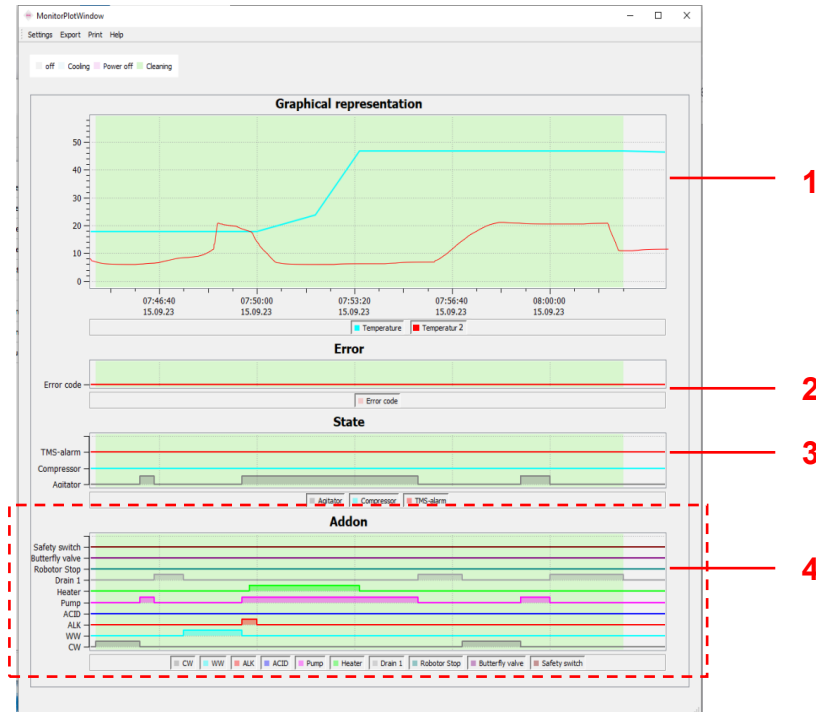
For proper installation, please pay attention to the [documentation](#) supplied.

Configuration:

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

12.4 Settings tank monitor LOG-data for KONSOF

The data stored in the WTS-300 can be displayed graphically in KONSOF. 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.