PRODUCT-INFO

Measuring - Controlling - Regulating
All from the same source

UNIVERSAL TANK CONTROL UNIT

with integrated tank monitoring system and extended milking robot interface, intuitive operation via a graphical display

WTS-500





Programmable via configuration software WELBA „KONSOFT"

www.welba.de

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Advantages
of using the WTS-500
at a glance



- Intuitive operation / installation via a large information display
- Configurable via device buttons or PC
- Modification / improvement of the existing technique
- Replacement of the existing switch boxes
- Integrated tank monitor
- Useable for all tanks
- Easy operation and assembly
- Can be parameterized via PC
- Automation
- Remote maintenance



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One control system for EVERYTHING!

Combined cleaning and milk cooling control
for all common milk cooling tanks

for conventional milking or with robot,
with extended milking-robot-remote-control
and PC-interface



Includes

Milk cooling control

Tank monitor

Milking robot interface

Cleaning control

The WTS-500 universal tank control includes a milk cooling control system with an integrated tank monitor, a robot interface and a freely programmable cleaning control system

- The integrated milk cooling control with automatic after-stirring control controls the cooling compressors or ice water pumps and agitator motors in milk cooling tanks.
- The integrated tank monitor meets the regulations and requirements of leading dairies.
- Via the integrated milking robot-interface a connected robot (if available) can be directly controlled, without any additional external components.

The control is of course suitable also for conventional milking - without robots.

- The integrated cleaning control offers extensive possibilities for your tank for an optimum cleaning. When exchanged it replaces completely the old mechanical wash timers.

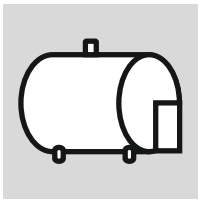
The tank control is basically ready for use in parameterized condition. It will just have to be adapted to the respective situation on site.

With the free PC-Software WELBA KONSOFT the parameterization and the subsequent data analysis becomes “a piece of cake”.

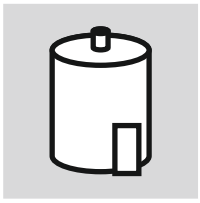
Application area and function overview

The WTS-500 is suitable for



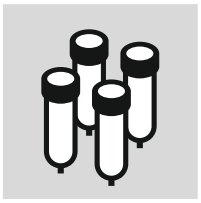


horizontal milk cooling tanks

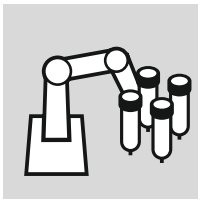


vertical milk cooling tanks (silos)

for direct evaporators + ice water cooling



conventional milking systems



Milking systems with robots

Functions at a glance

cooling

(after) agitating automatic

cleaning

heating

monitoring / alarm

roboter start/stop

actuate valve

PC parameterized

Data logger (RTC)

optional USB

USB interface

remote maintenance

optional EMAIL

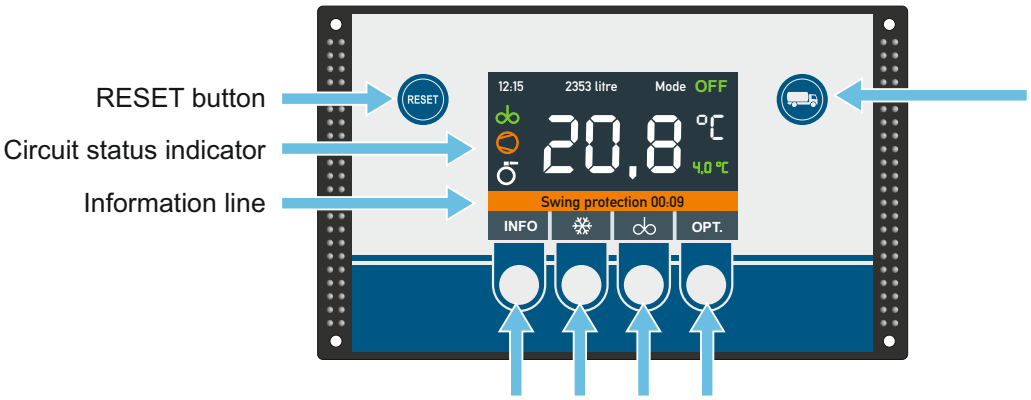
EMAIL alarm

optional SMS

SMS alarm

Operating concept

The simple operating concept
Always well informed



Softkeys with variable functions for operation and configuration.

Only the required functions are displayed.

for the collection of the milk:

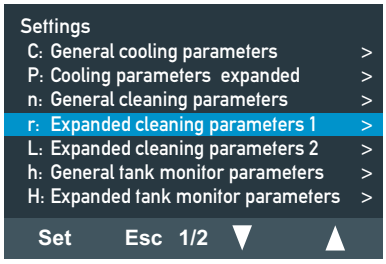
A separate login button for the milk truck driver:

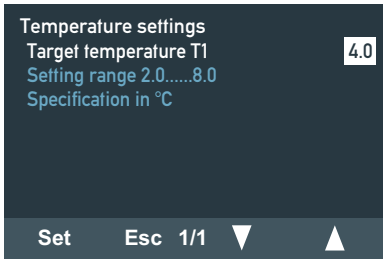
Simple and safe operation via the graphic display.

Operating functions (excerpt)

Installation and Configuration

This can be done at any time by using the Softkeys or the KONSOFT PC Software. All parameters are displayed in plain text and can be edited immediately - no manual is required.





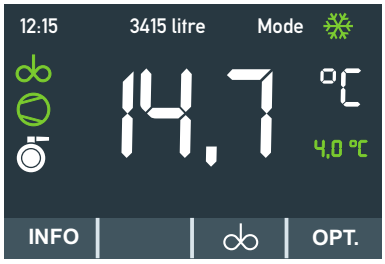
Cooling

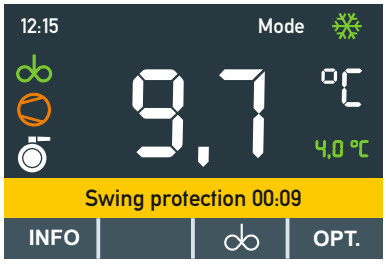
The cooling process can either be initiated manually, by robots or automatically.

The display shows all functions relevant to the cooling system, such as target and actual temperature, the operating status of the agitator, compressor and butterfly valve, as well as the tank capacity in litres (optional).

An “intermediate stirring” can be initiated by using the softkey.

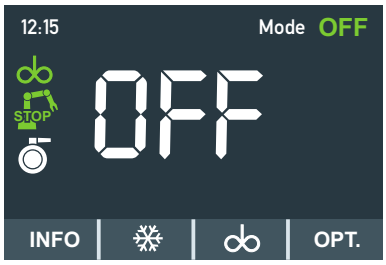
Any faults or messages will be displayed in the status bar.



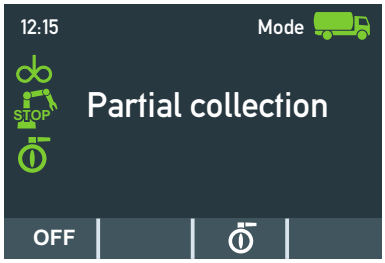


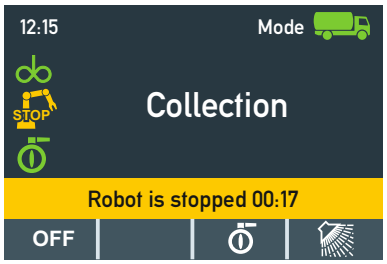
Operating concept

Permanent stirring
to stir the milk before collection

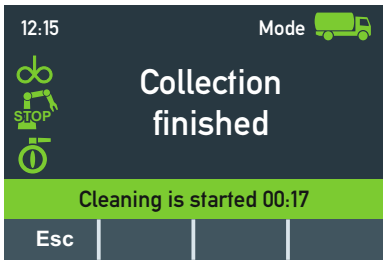


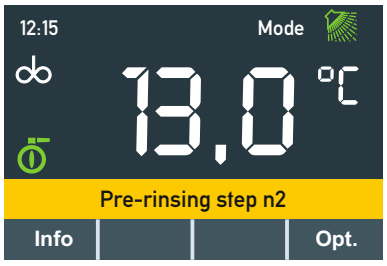
Collection (for the milk truck driver)
By pressing the start button the cooling mode will be finished and robots (if available) are stopped. Both complete and partial collection are possible. Only the necessary Softkeys are displayed to prevent incorrect operation.





Cleaning
The cleaning process is initiated by the milk truck driver. If the driver forgets, an alarm will sound after a configurable amount of time.
All information relevant to the cleaning process, as well as the progress of the cleaning cycle is continuously indicated on the display.







Parameterizing
Retrieving of data
Evaluation of data
Remote-maintenance
Updating

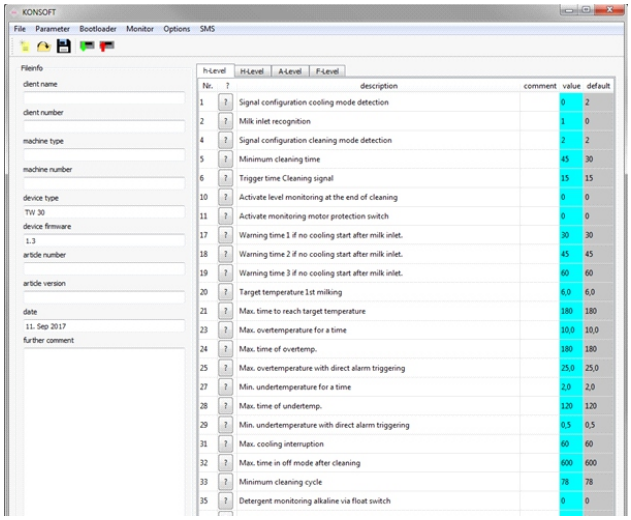


Receipt fault messages
Checking of tank status

Configuration Software WELBA KONSOFT



Configuration
Parameterization
Visualization
Storing
Updating
Remote maintenance

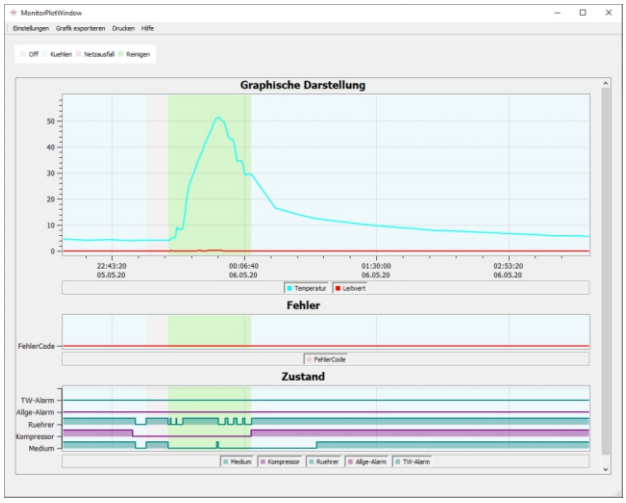


With the WELBA Configuration Software "KONSOFT", the WTS-500 can be conveniently configured and the measuring- and control-values can be clearly visualized.

Parameterizing

All setting parameters can be entered and stored on a level-related basis on your PC in a clear operation mask. For each parameter a “description text” is there.

Once all parameters have been entered, the complete configuration can be transferred to the WTS-500 via USB interface.



Visualization

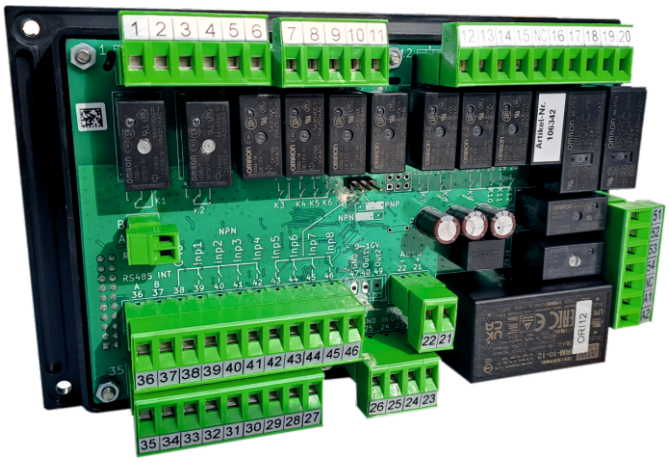
Measured values and status- or fault messages from the WTS-500 can also be read out via USB-transmission and displayed and stored graphically or in tabular form on the screen. Thus a fast fault analysis is possible.

Bootloading function

This allows you to update the WTS-500 to the latest operating software with the push of a button.

That way, you’re always up to date.

Connection diagram



The WTS-500 is universally usable for all types of systems. Relays and digital inputs can be parameterized for versatile functions.

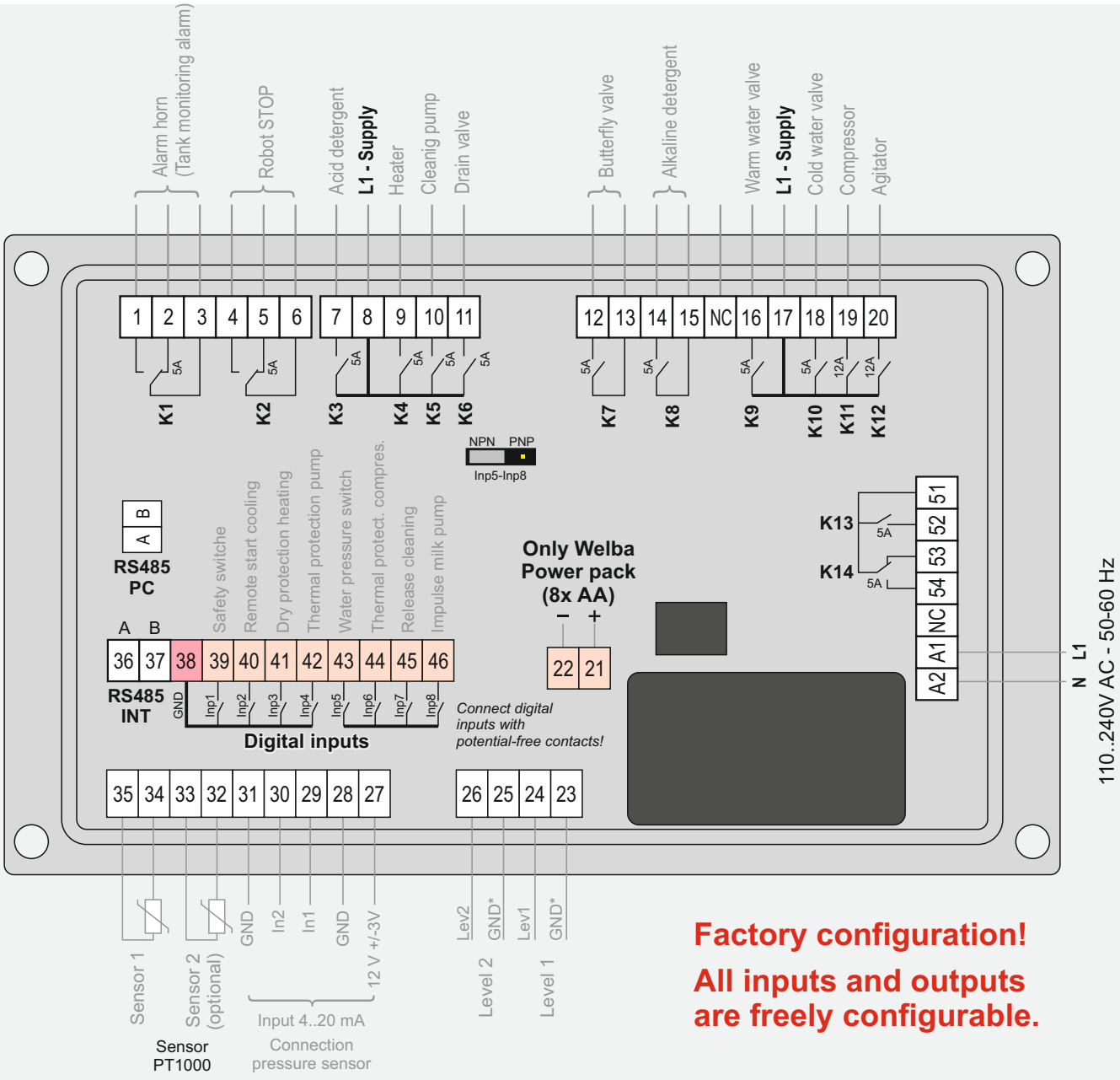
The connection diagram below represents the basic configuration of the inputs and outputs. The configuration has to be adapted to the corresponding systems when installed.



<u>If the inputs/outputs of the WTS-500 are not sufficient:</u>

The optional I/O extension module ESIO-001 expands the WTS-500

- 5 digital inputs
- 6 additional output relays
- 2 current inputs 4..20 mA



Factory configuration!

All inputs and outputs are freely configurable.

Funcitonal description COOLING



The milk cooling function of the WTS-500 includes all features that a modern cooling tank control should offer.

The control can be used for all common tank models.

It supports systems with compressors (direct evaporators) as well as with ice water cooling. In the case of silo tanks, the control of up to three separate evaporator bases.

The activation of the cooling process can be done in different ways:

- manually via button „START COOLING“
- via digital input „Remote start cooling“ (from the robot or external button)
- automatically after successful cleaning (only useful in case of robots)

The cooling starts now according to pre-set starting modes: Direct or with cooling start delay (anti-icing protecting), with interval-cooling phases, etc.

EXCERPT

Milk cooling functions

- Complete milk cooling control with (after) -stirring automatic
- Start of cooling:
  - manually | via robot | automatically
- Different kinds of cooling start delay to avoid ice build-up
  - time delayed
  - reduced power (interval cooling)
  - event-controlled (pump pulses)
  - milk quantity dependent cooling capacity
- Anti-icing protection via optional low-pressure sensor
- Separate control of up to three compressors or evaporators
- Manual or time-controlled setpoint switching
- Pre-stirring when filling from below by a robot (minimizes compressor switching cycles)
- Automatic pre-stirring before the next milk collection
- Oscillation protection for compressor
- Level indicator via opt. pressure sensor
- Safety temperature sensor (optional)
- Alarm for rising water in the circulation line during cooling
- A separate log-in button for the driver of the milk collection lorry
- Continuous agitating function and automatic start of continuous agitating after cooling is complete
- Extensive monitoring functions such as cooling time monitoring, cooling not started, etc.
- Emergency cooling function in case of sensor failure
- Energy saving function 'Photovoltaic Ready’

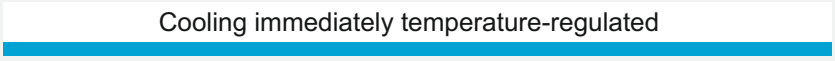
Different types of cooling start delays (anti-icing protection)

In addition to many other special features of the WTS-500, the versatile "cooling start delay" should be emphasized. The control can be parameterized so that after the cooling mode is triggered, the start of the compressor is delayed in order to prevent freezing of small quantities of milk in the tank. This delay takes place at the first milking only - after the cleaning.

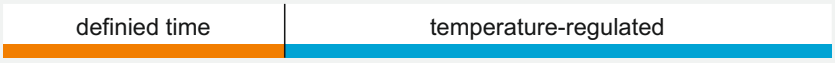
The WTS-500 offers different types of cooling start delays for a wide range of system configurations.

In silo tanks, the bottom and side evaporators are controlled separately. The activation of the lateral evaporator takes place delayed in time or optionally via the filling level.

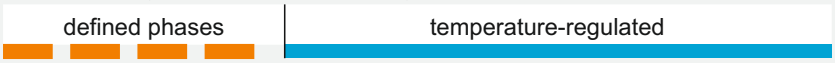
0. no cooling start delay
Cooling starts immediately



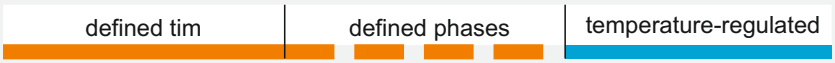
1. simple cooling start delay
Cooling starts after a set time.



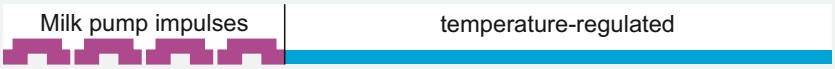
2. periodic cooling phases
Cooling starts in the form of periodic cooling phases at set intervals before then switching over to temperature regulation.



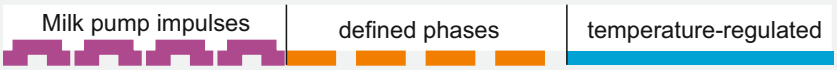
3. periodic cooling phases after switch-on delay
Cooling starts after a set time, in the form of pre-set periodic cooling phases at set intervals before then switching over to temperature regulation.



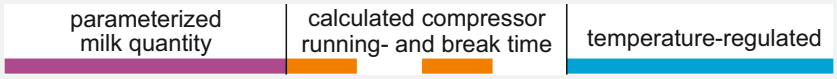
4. according to number of milk pump impulses
Cooling starts after the set number of milk pump impulses.



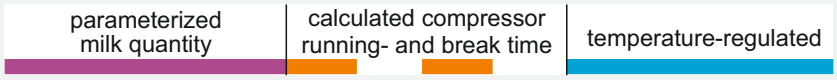
5. periodic cooling phases after a number of milk pump impulses
Cooling starts after the set number of milk pump impulses in the form of pre-set periodic cooling phases at set intervals before then switching over to temperature regulation.



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

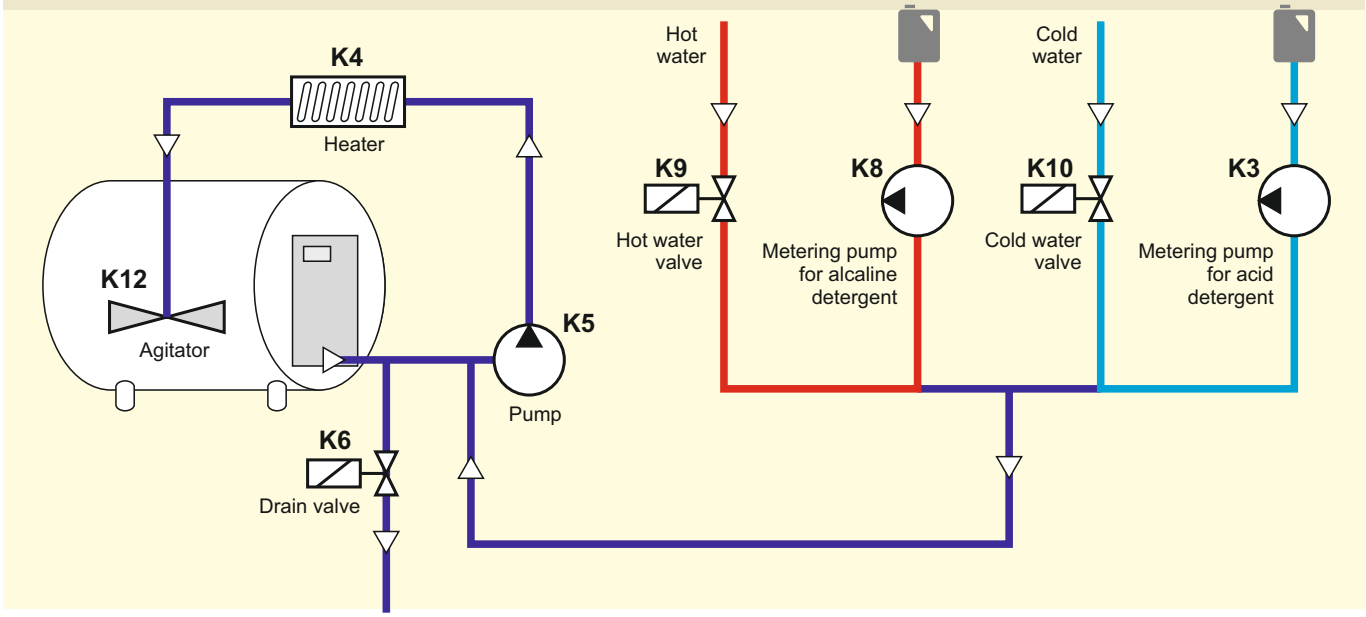


7. Milk-volume-dependent cooling start delay from start cleaning [P50 - P 55]
Compressor starts according to the parameterized milk quantity in the tank for the calculated running time, before switching to temperature control.



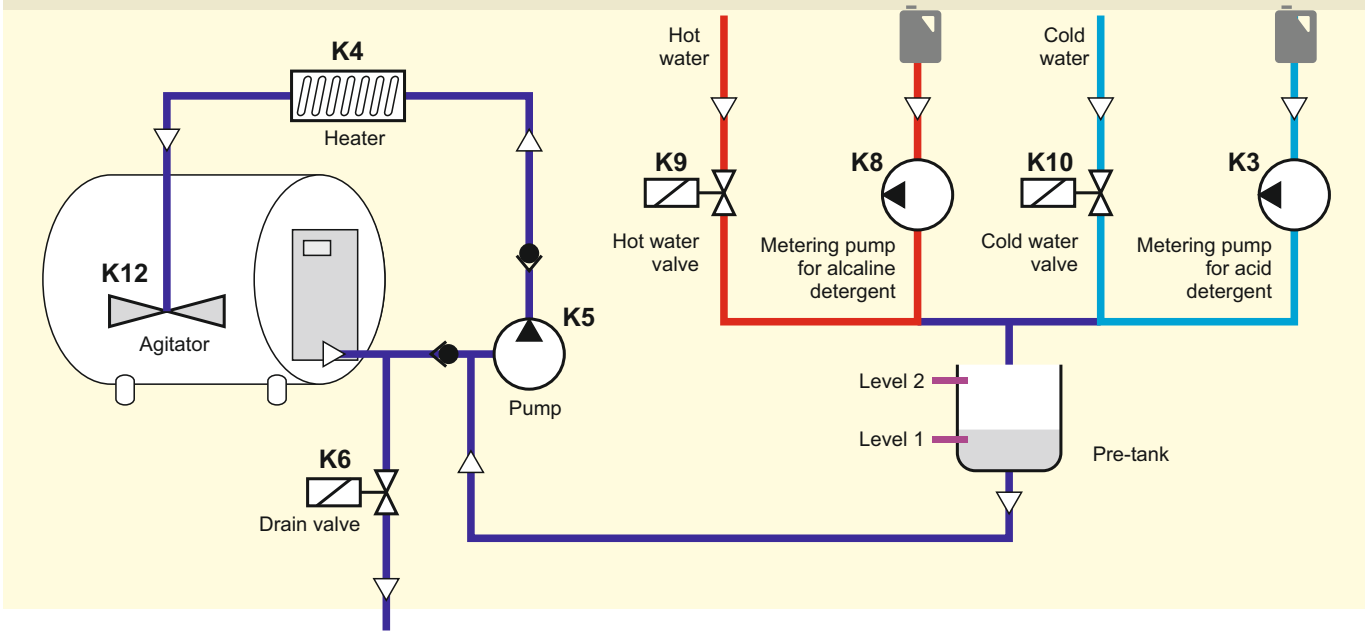
Examples of possible plant configurations

Circulation cleaning with two dosing pumps



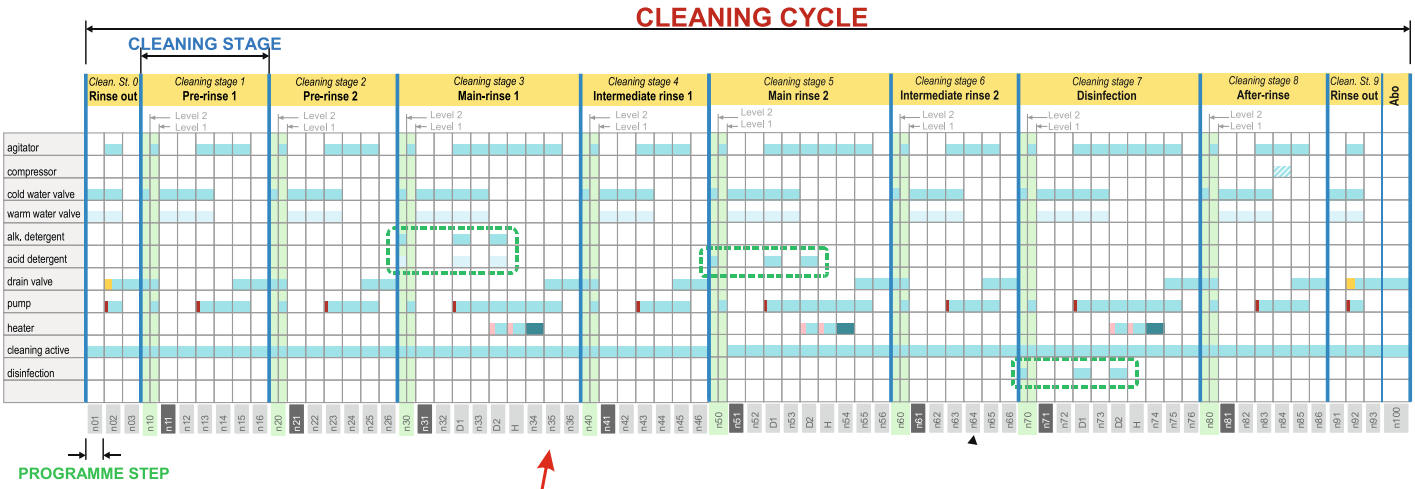
Cleaning method for milk cooling tanks, where alkaline and acidic detergents are supplied by separate dosing pumps.

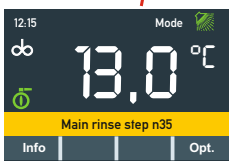
Displacement cleaning with pre-tank and dosing pumps



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

Functional description CLEANING





All the important information at a glance, anytime.

The cleaning of the milk cooling tank takes place according to a preset program that can be adapted to the local conditions.

As a procedure the circulation cleaning, the displacement cleaning and the cleaning via pre-tank are supported. The detergent can be added via cups, Venturi-valves or metering pumps.

Define how many alkaline or acid rinses should be performed per cleaning cycle and whether a subsequent disinfection should take place.

The parameterization is described in detail on the basis of the documentation and can be carried out easily with the included free Software KONSOFT

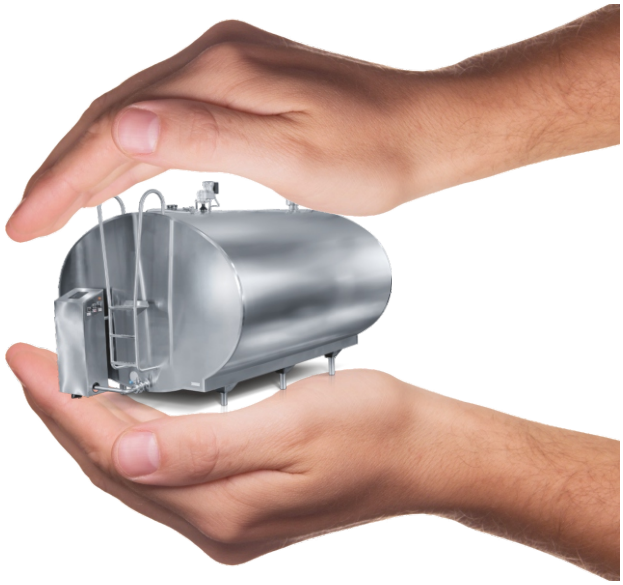
EXCERPT

Cleaning functions

- Freely configurable cleaning cycle
- Water dosing either by time, level, a feed container or quantity-depending
- All running times (heating, pump, detergent etc.) are adjustable separately
- Heating temperatures freely adjustable
- Different heating phases during the main cleaning
- Post-heating function during the circulation phase
- Dosing of detergent via dosing pump, cup / drawer or quantity-dependent
- Detergent switchover 'acidic/alkaline' adjustable
- Separate rinse cycle for disinfecting
- Active cooling during rinsing
- Short rinse program
- Drain valves configurable: 'currentless open / currentless closed'
- Two separately controllable drain valves
- „Rinse out“ function
- Venting of cleaning lines via rinsing pump impulses
- Protection of the cleaning pump by an optionally connectable pressure switch
- Robot signal 'Cleaning active'
- Release of cleaning via robot
- Various commissioning functions

Functional description TANK MONITOR

The tank monitor retrofitting is "non-destructive" without drilling the milk tank"



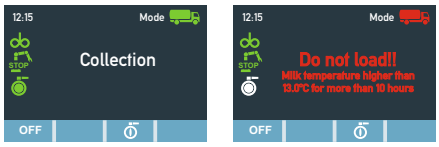


The integrated tank monitor meets all the requirements of the leading dairies and replaces a separate device. The collected data and fault messages of the last 365 days are recorded internally and can be read out at any time. If you use the optional USB module, the simply plugging in of a standard USB stick is sufficient to store your data on the stick.

For the tank monitor functionality, an additional agitator monitoring module as well as a battery pack for bridging a power failure is required.

The installation is non-destructive. A drilling of the tank walls for the installation of additional sensors is not necessary. Even a complex assembly of rotary sensors, etc. is not necessary. Parameterization can be carried out conveniently via the KONSOFT Software.

The tank monitor distinguishes between informative and critical (do not load) alarms. Each of the more than 30 different alarms can be assigned its own function: e.g. horn, lamp, SMS etc.



The display indicates the driver of the milk lorry whether the milk is properly cooled and ready for collection.



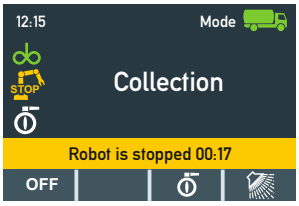
Tank monitor functions

- Non-destructive installation (just connect it)
- Real-time clock with date
- Data storage for the temperatures of the last 12 months
- Monitoring of the temperature profiles during cooling and cleaning
- Complete agitator monitoring (interval detection, agitator blades available)
- Comprehensive fault management - password protected
- Generation of "do not load" message
- "Tank empty" - monitoring after cleaning
- Additional message about configurable alarm relay
- Water in the rinsing system during the cooling
- Water in the rinsing system after draining
- Alarm in case of power failure (battery buffered)
- Optional alarm message via EMAIL or SMS

Functional description ROBOT







The WTS-500 has a robotic-Interface, to which all robot models can be connected.

The robot is operated during the registration process by the milk truck driver. When selecting either partial or complete collection, the robot is stopped. This can take place immediately or with a time delay. An additional relay sends a signal to the robot indicating whether the buffer tank should be activated. The driver of the milk truck can open the buttterfly valve manually by using the Softkeys. The button cleaning or cooling is only displayed when relevant, to prevent accidental operation.

Furthermore, different **"comfort functions"** can be parameterized" such as:

- Interruption of cooling without Robot Stop
- Robot start when the cooling system starts automatically
- Separate buffer tank control
- Compressor control via robot
- Premature ending of a cooling start delay by the robot
- Butterfly valve closed in case of cooling start

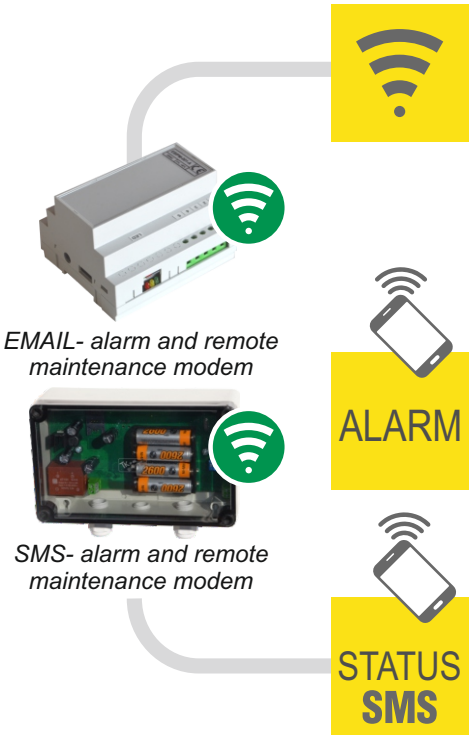
Robot functions

- Various types of cold start delay to prevent the milk from freezing during robot operation
  - time-delayed
  - power-reduced (intermittent cooling)
  - event-controlled (pump impulses)
  - cooling capacity depending on milk quantities
  - Compressor shutdown via evaporator pressure
- Robot operation integrated into the collection process
- Start-up delay of compressor / pre-stirring. When filling with warm milk, the contents of the tank is previously stirred without activating the compressor. The distribution of temperature within the tank minimises the the switching cycles of the compressor.
- Cleaning approval by robot
- Cooling start via robot
- automatic cooling start after successful cleaning
- Switch status indicator for robot and butterfly valve on the display

Functional description REMOTE MAINTENANCE + ALARMS

CONFIGURATION | PARAMETERIZATION
VISUALIZATION | READING OUT DATA





EMAIL- alarm and remote maintenance modem

SMS- alarm and remote maintenance modem

The **remote maintenance** of the WTS-500 is basically possible with three options:

- A possibly existing PC with installed Teamviewer-Software (e.g. from the robot control) is permanently connected to the WTS-500 via a USB data cable.
- Remote maintenance is carried out via the Welba EMAIL- alarm and remote maintenance modem ESGSM-001 via internet transmission.
- Remote maintenance is carried out via the Welba SMS- alarm and remote maintenance modem ESGSM-001 via wireless transmission. For the use a standard mobile phone card (SIM-card) with data volume is required.

For the **EMAIL- or SMS-alarm** the Welba SMS- alarm and remote maintenance modem ESGSM-001 is required. In the event of a fault, alarms can be automatically sent to different phone numbers or email addresses.

With the SMS modem, an SMS status query is also possible, with which the current status of the tank can be queried at any time and from any location. (With the EMAIL modem, this would be possible via remote maintenance.)

System configuration Accessories

Necessary accessories **for parameterization and remote maintenance**



- to parameterize the control and to evaluate the data via the free Software Welba-Konsoft Software
- for remote maintenance of the control via permanent connection to a robot-PC (if available).



USB-RS485 adapter cable

connects the WTS-500 to a PC



Adapter LAN-RS485

connects the WTS-500 to a PC via a network or an existing router via a LAN cable to the Internet.

Optional accessories for parameterization, alarming and remote maintenance



EMAIL- alarm and remote maintenance modem ESIPM-001

is required for the

- Remote-maintenance via ESIPM-001-modem
- Alarm-message by EMAIL





SMS- alarm and remote maintenance modem ESGSM-001

is required for the

- Remote-maintenance via ESGSM-001-modem
- Alarm-message by SMS
- Status-request by SMS

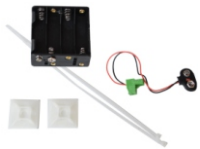
For the use a standard mobile phone card (SIM-card) with data volume is necessary.

Necessary accessories **for the use of the tank monitor**



Agitator monitoring module

is installed into the control wire to the agitator motor and monitors the proper stirring function via the power consumption of the stirring motor.
Different modules for 1- or 3-phase motors are available.



Battery holder

required for the power supply of the control to maintain all tank monitor functions in case of a power failure.



USB-module external - optional

is used to read out the recorded tank monitor data and fault messages by simply plugging in a standard USB stick. A PC to retrieve the data is not required.

Optional **hardware expansion module**



I/O Expansion module ESIO-001

Expands the WTS-500 by:

- 5 digital inputs
- 6 additional output relays
- 2 current inputs 4..20 mA

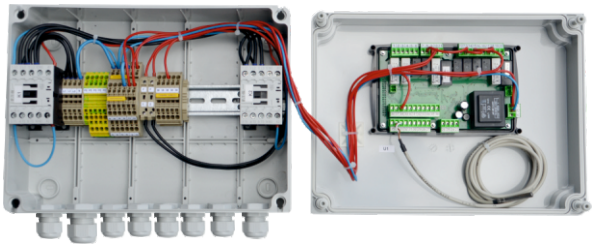
WTS-300 pre-assembled in the switch box



The WTS-500 is also available pre-assembled in a solid switch box (IP65) for a wall mounting.

The customers can directly connect the device on terminals.

Required contactors for the rinsing pump and the heating are already integrated and completely wired. Depending on the design, the required additional modules for the tank monitor function are already integrated.

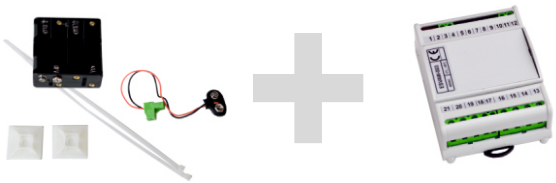


WTS-500-G1-000

- incl. contactors for rinsing pump and heating

without agitator monitoring!

optional:

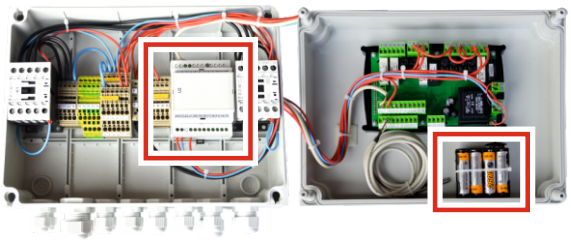


Expansion kit '-001' for monitoring 4 230 V agitators

includes
- battery holder (without batteries)
- Agitator monitoring module ESVAW-001

Expansion kit "-002" for monitoring 2 230 V agitators (integr. relays)

includes
- battery holder (without batteries)
- Agitator monitoring module ESVAW-002



Expansion kit "-003" for monitoring 1 400 V agitator

includes
- battery holder (without batteries)
- Agitator monitoring module ESVAW-003

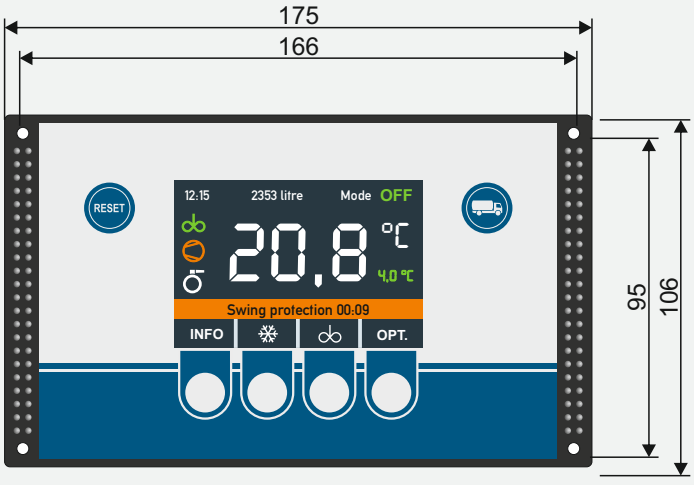
Technical data

Operating voltage	230V AC +/-10%, 50/60 Hz
Relay contact	14 performance relays
max. switching current	12 x each 5A 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	3,5" colour graphic display
Number of sensor inputs	2x for PT-1000
Measurement range	-5° ... +95°C
Temperature resolution	0.1°C
Control mode	two-step controller
Water detection	via 2 independent level monitors
Digital inputs	via optocoupler
- standard	4 inputs (e.g. for switch-state monitoring)
- High-speed inputs	4 inputs (e.g. for litre measurement)
Analogue inputs	2 inputs 4..20 mA for external pressure sensors
Interface	2x RS-485
Connection	Plug-in screw connections for cables up to 2.5 mm²
Housing	
- Front dimension	177 x 106 mm
- Front panel cut out	157 x 97 mm
- Insertion depth	45 mm
Protection	The control is open on the rear, as it is designed for installation in a closed housing
- Housing front	IP 64
- Rear	IP 20
Electrical safety	Protection class II, Overvoltage category III, pollution degree I
Environment specifications:	
- Operation temperature	0° .. +50°C
- Storage temperature	-20° .. +70°C
- max. humidity	75% (no dew)

Technical data subject to change

Dimensions





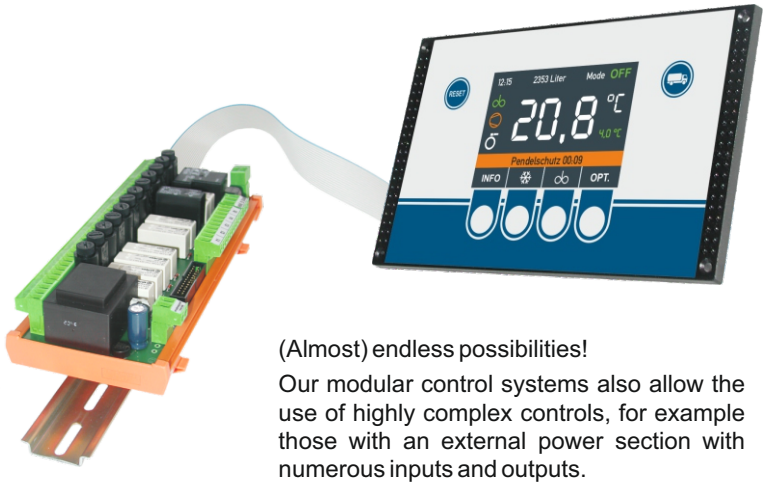


Adaptions to individual requirements

WELBA is specialized in modifying standard products to the requirements of the customers or to newly develop complete system solutions at reasonable prices.

Thanks to our many years of expertise and short reporting lines, we offer maximum flexibility – even for smaller order quantities.

In general, you also have the option of customising your own front film.

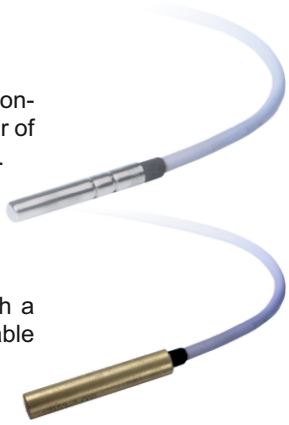


(Almost) endless possibilities!

Our modular control systems also allow the use of highly complex controls, for example those with an external power section with numerous inputs and outputs.

Sensor

Our standard sensors - which are used in all Welba controllers - have a stainless steel sleeve with a diameter of 6.0 mm (4.0 mm on request) and a cable length of 2 m.



Depending on the operating condition, sensors with a brass sleeve and a diameter of 9.5 mm and a cable length of 7 m are available as an option.

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