Liscarroll ENGINEERING

EST. 1973

Universal Tank Controller:
LE-200

Installation and Operating Instructions for Installers and Service Engineers

Simply Better . . . *by Design*

Notes

Contents

Appliance Description

The LE-200 is a universal tank control unit combining a modern milk cooling regulator and a complete cleaning program control system in one.

This combined with the backup cooling function provided by the Carel Thermostat makes the LE200 controller the most robust system in the market.

The control unit has various operating modes:

OFF mode
(with continuous stirring function)

The control unit is on stand-by. The display shows 'OFF' and all output replays are deactivated. In the OFF mode the agitator can be switched on and off by pressing a button. In parameter [C25] a time can be set after which the agitator switches off automatically. The following operating modes can only be selected from the OFF mode. It is not possible to switch directly from one of them to another.

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

COOLING mode

The LE-200 has 2 adjustable target Temperatures.

(1) T1 is the STANDARD selection (Default 4 °C)

(2) T2 is the DEEP COOL selection (Default 2 °C)

The current milk temperature, as measured, is permanently displayed. If the milk temperature exceeds the selected target temperature (T1 or T2) by the differential value, the compressor relay and agitator are automatically activated. Once the target temperature is reached, the compressor switches off, while the agitator continues to operate for the pre-set 'after-stirring' time.

The DEEP COOL function also has an adjustable time setting (Default 30 minutes) and the LE-200 will automatically switch back to T1 when this time is reached. During non-cooling periods the agitator switches on at pre-set intervals in order to ensure an even temperature throughout the milk. Independently of this a short or long 'intermediate stirring' period can be selected during cooling by pressing a button.

If the delayed start is activated (parameter [P62]), cooling starts for the first milking after a delay. If the cooling button is pressed twice, cooling starts immediately.

CLEANING mode

The cleaning timer controls water intake by time.
The LE-200 has the following built-in programs to cater for all tank sizes and to allow for varying on-farm conditions.

(1) MAIN WASH ALKALINE: 3 Programs: 30 Minute, 50 Minute, 75 Minute

(2) DESCALE WASH (Alk + Acid): 3 Programs: 33 Minute, 50 Minute, 75 Minute

(3) Quick WASH: 2 Cycles : 3 Programs: 8 Minute, 12 Minute, 18 Minute

All running times (pump and detergent injection) can be set separately. Detergent switchover from alkaline to descale can also be set. The LE-200 controls the various processes and times needed for a thorough wash fully automatically.

Following a power failure, the control unit restarts in the mode in which it was operating before the outage.

Safety

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

The universal tank control must be installed by an authorised specialist observing local safety regulations.

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

The universal tank control contains live components and must not be opened up.

It 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.

CE

Intended use

The universal tank control is ready for use once the parameters have been set. It should not be used before this has been done as this might result in damage to the plant and the item to be cooled or heated.

The device is fitted with a resistance temperature sensor.

The device must not be installed in potentially explosive atmospheres.

The universal tank control type LE-200 fulfills the EC requirements for electromagnetic compatibility (EMC) and the Low Voltage Directive (LVD).

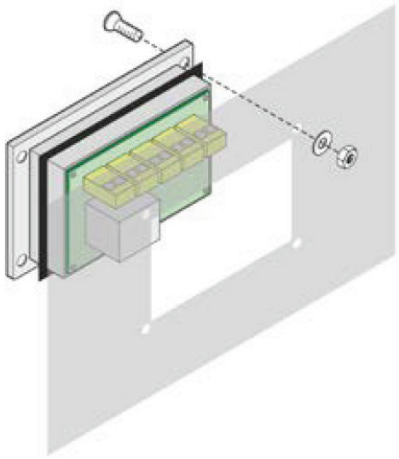
The safety components meet the VDE regulations.

Installation

Installation of Housing

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

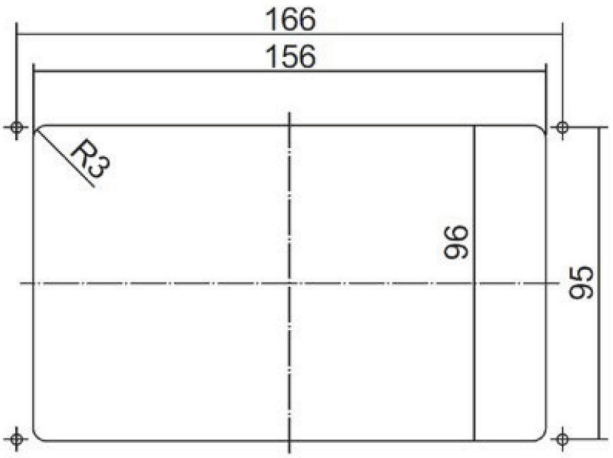
- severe jolting or vibration
- permanent contact with water
- relative humidity of more than 90%
- sharply fluctuating temperatures (condensation)
- operation in an aggressive atmosphere (ammonia or sulphur fumes) - risk of oxidation
- operation in the immediate vicinity of radio transmitters with high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



Intended use

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 and fasten using the screws provided.
- Carry out the electrical wiring and sensor connection in accordance with the following description.



Drilling diagram

Installation

Fitting the sensor

The sensor cable must not be chafed or kinked.

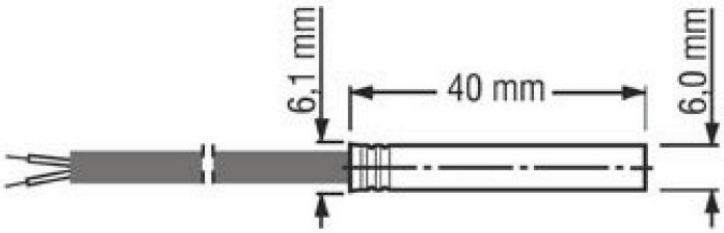
There must be no substantial mechanical pressure on the sensor tube.

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

Changing the sensor cable length

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



Electrical connection

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 tank control and to the equipment.

The mains voltage should not be switched on until all components including the sensor are connected.

No appliances with current levels in excess of the maximum values indicated on the relays should be connected to the relay contacts Use contactors.

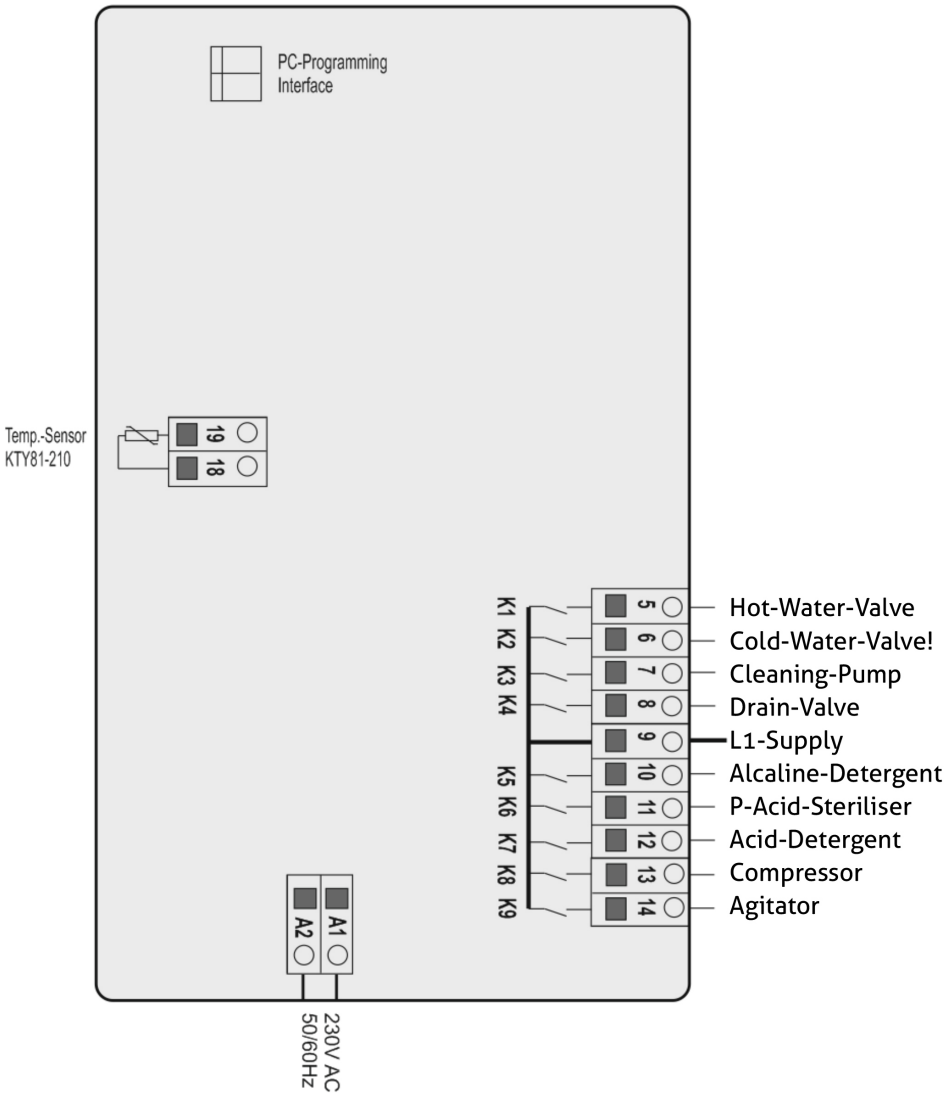
Downstream contactors must be fitted with an RC protection circuit.

Installation

Connection diagram

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

Note: see wiring diagram in Appendix 1

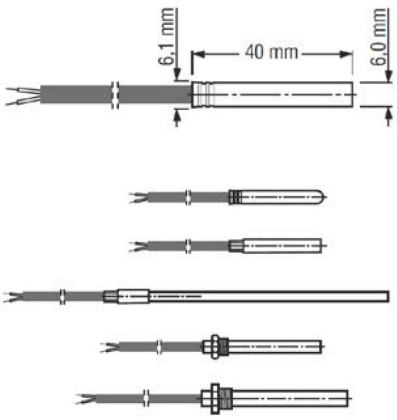


Technical Data

Control

Operating voltage	230V AC +/-10%, 50 Hz
Relay contacts max. switching current max. switching voltage	10 performance relays each 5A AC1 - 250V AC 250V AC - 50 Hz
Display	13 mm LED - Display, 3 digits
LED switching status displays	3 mm
Display range	-99 .. 999
Number of Sensors	1
Sensor type	KTY 81-210
Sensor cable length	2 metres (or as required)
Measurement range	-5° .. +70°C
Temperature resolution	0,1°C
Control mode	two-step-controller
Hysteresis*	0,1 K .. 10,0 K (standard adjusting 0,7 K)
Water detection	via level monitor (optionally)
Target temperature T1*	standard adjusting 4°C
Target temperature T2*	standard adjusting 4°C
Digital inputs	3 (via optocoupler)
Connection	Push-in screw connections for cables up to 2.5 mm²
Housing - front dimension - front panel cut out - insertion depth	FEG 106/175 M 106 x 175 mm 156 x 96 mm 45 mm
Protection (housing front)	IP 65
Environment specifications: - Operation temperature - Storage temperature - max. humidity	 0° .. +50°C -20° .. +70°C 75% (no dew)

Sensor



Sensor element	KTY sensor
Bush material Bush length Bush diameter	1.4301(V2A) 40 mm 6.0 mm +/- 0.1
Cable material	PVC
Measurement range	-10 .. 70° C
Cable length	Standard 2 metres
Protection type	IP 65

Sensors other than our standard type are available on request
Some of the options are shown here.

Operating Levels

Working level
for normal daily operation

CODE

General cooling parameters	**Code: 212**
Extended cooling parameters	**Code: 345**
Extended cleaning parameters	**Code: 567**
I/O test parameters	**Code: 0E5**

Operation of the LE-200 takes place at various levels:

Working level:

… for normal daily operation.
- OFF mode = control unit switched off.
- Start cooling mode.
- Start cleaning mode.

The subsidiary parameters are accessed by entering a code in order to avoid their accidental alteration.

General cooling parameters
Parameters such as target values, hysteresis etc. are set here.

Extended cooling parameters
For programming the control unit's individual tank-specific cooling functions.

Extended cleaning parameters
For programming the control unit's individual tank-specific cleaning functions.

I/O test parameters
Used to test the relay output relays.

Operating of Working Levels

Working level
for normal daily operation

CODE

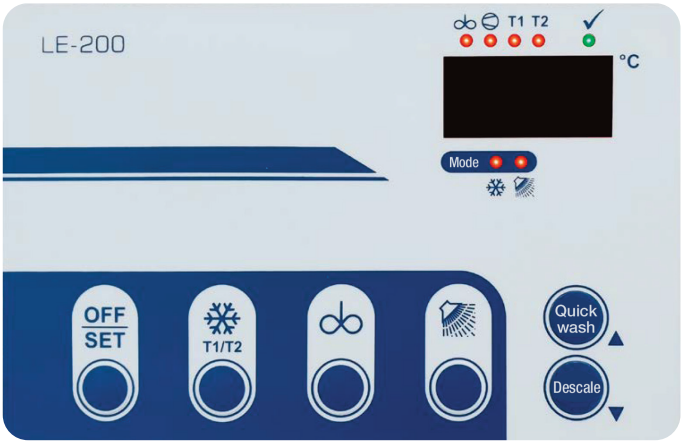
General cooling parameters	Code: 212
Extended cooling parameters	Code: 345
Extended cleaning parameters	Code: 567
I/O test parameters	Code: 0E5

Operation

The working level is for normal daily milk-cooling operation. In cooling mode, the current milk temperature as measured is permanently displayed.

Button functions

To change to a different mode always press the 'OFF/SET' button first. Active modes are closed down by pressing the 'OFF' button.



OFF / Set button

- Switch regulator to STANDBY
- Switch off continuous stirring
- Acknowledge error
- Switch to programming mode (press button for 3 seconds)

COOLING button

Press once = T1 Start Cooling
Press twice = T2 Deep Cool

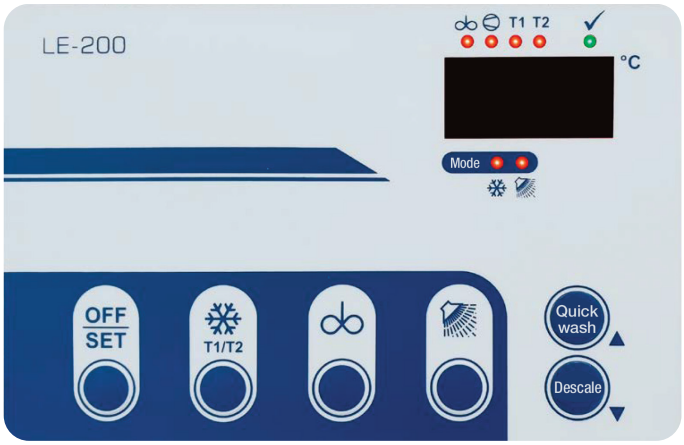
AGITATOR button

in OFF mode = Continuous stirring
in COOLING mode (press 1 sec.) = Intermediate stirring SHORT
in COOLING mode (press 3 sec.) = Intermediate stirring LONG
See also section: 'Intermediate stirring options' .

WASHING button

in OFF mode = Start cleaning
During the cleaning process = Special function when Commissioning/Service
(See page 16)

Operating of Working Levels



Meaning of LEDs

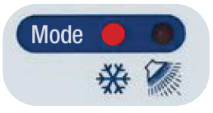
LED "AGITATOR"
in all mode - Agitator is switched on

LED "COMPRESSOR"
Continuous: Compressor contactor is switched on
Blinking: Minimum switch-off time (swing protection) is still active

LED "T1"
Target temperature 'T1' active

LED "T2"
Target temperature 'T2' active

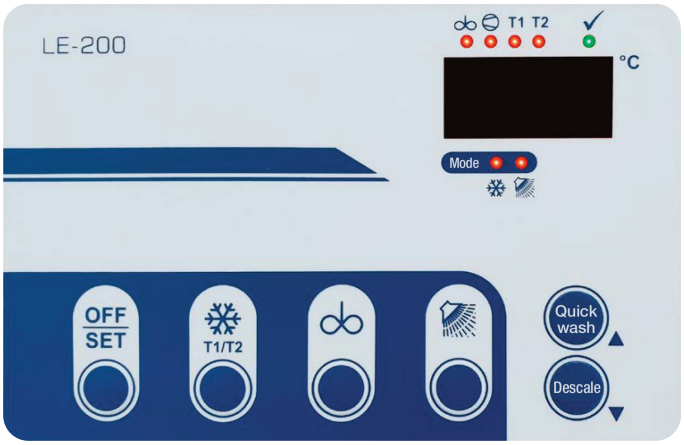
LED "WASH END"
Continuous cleaning is completed



LED "COOLING MODE"
Blinking: Cooling start delay is active
Continuous: "Cooling mode" is active

LED "CLEANING MODE"
Continuous: "Cleaning mode" is active

Operating of Working Levels



Operating modes

OFF mode

(with continuous stirring function)
If the display shows "OFF" the control is in standby-mode.

Permanent stirring function:

In the OFF mode the agitator can be switched on with the button "agitator" and switched off with the button "OFF". During the stirring cycle, a rotating bar appears on the display.

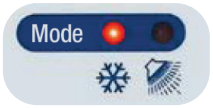
If the agitator is not switched off manually or switched to another mode, an automatic switching off takes place according to the time set in [C25]. (If the parameter is set to '0' there is no automatic switch off).

The cooling and the cleaning mode can only be selected from OFF mode and it is not possible to switch directly between them.

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

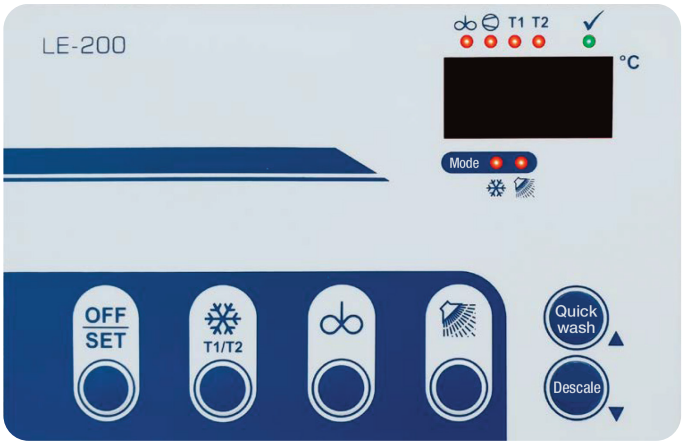
COOLING mode

Press "COOLING" button on foil keyboard in OFF-mode:



- Either LED 'T1' or 'T2' flashes (for target temperature 1 or 2).
- T1 is the normal target temperature (4°C)
- T2 is the deep cool function (2°C)
- At the same time the display briefly shows the current target temperature before the current medium temperature appears.
- If the other target temperature is desired: Press the "COOLING" button again (The switching from T1 to T2 can be blocked via parameter [P80]).
- If 'Cooling start delay' [P62] for the 1st milking is programmed cooling will not start immediately. During the delay the cooling mode LED blinks. Press the 'COOLING' button twice in succession to start cooling without a delay.
- The milk will now be cooled to the set target temperature. The agitator motor runs continuously. If the milk temperature is already lower than the target temperature only the agitator operates.
- When the target temperature is reached the compressor switches off.
- The agitator switches off at the end of the 'after-stirring' time [C20].
- During cooling pauses, the agitator switches on periodically: in accordance with the 'pause time' set [C21], for the duration of the 'after-stirring' time [C20], in order to ensure an even temperature throughout the milk.
- If the milk temperature exceeds the selected target temperature by the set 'differentials' value [C10 or C11] the compressor and agitator automatically start again.

Operating of Working Levels



Deep cool

Press the 'COOLING' button twice activates the T2,
(Deep cool, function: default 2°C)

Stirring in cooling mode = INTERMEDIATE STIRRING

Briefly press 'AGITATOR' in cooling mode:
A short intermediate stirring period [duration = C23] is triggered.
Press 'AGITATOR' in cooling mode for around 5 seconds:
A long intermediate stirring period [duration = C24] is triggered.
See also the section: 'Intermediate stirring options'.

Cleaning mode

Press 'WASHING' button: (out of OFF mode)
The cleaning program will be carried out automatically according to your default settings. Depending on the setting in [r97], the display indicates the current cleaning stage or the temperature.

Quick wash

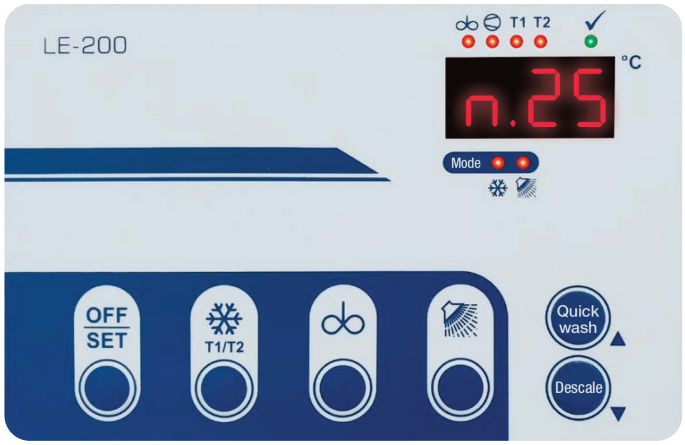
- Press the 'QUICK WASH' button for 3 seconds
  The "Quick Wash" cleaning program will be carried out automatically according to preset default settings.

Descale

- Press the 'DESCALE' button for 3 seconds Automated descale can be activated using r7

Special function for commissioning / Service
For commissioning- and Service purposes all rinsing steps can be manually switched.

Cleaning Program Description



Cleaning cycle

A cleaning cycle consists of five different preset cleaning stages.

Main, ECO, Descale and Quick Wash parameters and times are all pre set with the programs. Selecting the wash time will activate the pre set program steps and times

The ECO wash is activated by selecting peracetic acid in the main wash's final rinse (r5 = 1)

Automatic descale can be activated by turning on r7.
You can select the descale to be automatically turned on after 1-5 washes by changing the r7 value to the wash that you want automated.

During the cleaning process the following can be is displayed.
(Setable in parameter [r97]: default '4').

0: Display of program step
1: Display of temperature
2: Display change between step and temperature
3: Display of remaining wash program time
4: Display changes between temperature and remaining wash program time

Start quick wash or descale wash

To start the wash program "quick wash" or "descale wash", press the respective button for about 3 seconds. The program "main wash" starts directly when pressing the button Cleaning

Manual stop of the cleaning

Cleaning is manually stopped by the OFF-button:

- cleaning stops,
- the display alternately shows 'AbL' and the current temperature,
- for the time [n70] drain valve is opened (can be stopped by repeated pressing of the Off-button).
- control switches into the OFF-mode.

Cleaning Program Description

Power failure during the cleaning process

After return of voltage in case of a power failure:

- display shows the current temperature
- drain valve is opened for the time [n70]
- control continues the cleaning at the start of the cleaning stage in which the interruption happened
- control switches into the OFF-mode .

Service functions for testing the cleaning cycle

Start cleaning with the desired cleaning stage

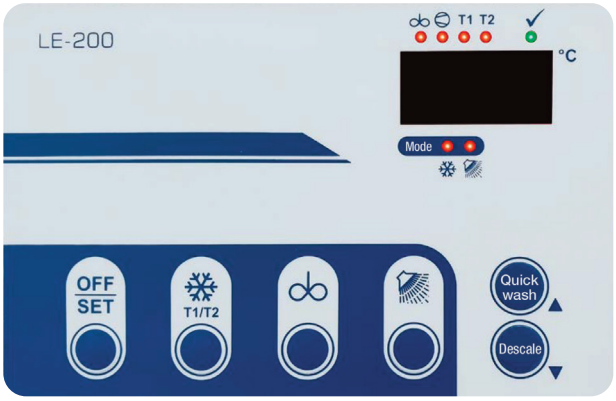
- Press CLEANING button: A cleaning cycle starts with the selected cleaning stage and then runs through to the end.
- The next cleaning cycle starts again with the first cleaning stage.

Switch on the cleaning cycle with single step function

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

- First, set the 'Display during Cleaning parameter 'r97' to '0'.
- By repeatedly pressing the CLEANING button, the cycle can now be progressed step by step.
- Can be terminated via OFF button at any time, with drain phase.
- When finished set 'r97' back to '4'.

Adjusting of Parameters in General



The controller has different parameter levels:

To get into the parameter levels, the OFF button must be pressed for approx. 5 seconds in OFF-mode!

The parameter levels have different codes:

Level 1: Cooling parameter 1 C parameter code: 212
Level 2: Cooling Parameter 2 P-Parameter Code: 345
Level 3: Cleaning Parameters 2 r-Parameter Code: 567
Level 4: Step times ECO main wash n-Parameter Code: 111
Level 5: Step times Descale wash d-Parameter Code: 222
Level 6: Step times Quick wash u-Parameter Code: 333
Level 7: Service parameter E-Parameter Code A03
Level 8: I / O Test Parameter o. Parameter Code: 0E5

Exit the parameter levels by simultaneously pressing the two buttons UP and DOWN for about 3 seconds.

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

- Press 'OFF' button for 3 seconds: '000' appears in the display - the first '0' blinks.
- Use the arrows buttons to select the first digit of the required code.
- Confirm the correct digit by pressing 'SET'. The digit is accepted and the second '0' blinks.
- Use the arrow buttons to set the second digit.
- Confirm the correct digit by pressing 'SET'. The third '0' blinks.
- Use the arrow buttons to set the third digit.
- Confirm the correct digit by pressing 'SET'. The first parameter of the selected level now appears.

  If an incorrect code is entered the control unit switches back into OFF mode.

  If no buttons are pressed for 60 seconds the control automatically switches back to the working level.

  Attention: Any changes will not be accepted!

Display parameter value:

- Use the arrow buttons to select the desired parameter.
- Press the 'SET' button: the parameter value is displayed.

Change parameter value:
Saving the changed parameters and switching back to the working level: (possible from any parameter)

- Press UP and DOWN buttons simultaneously for approx. 5 seconds. The device switches to the OFF mode.

Adjustment of Cleaning Step Times

Step Times

	CODE
Main Wash: 'n' parameters	**Code: 111**
Descale Wash: 'd' parameters	**Code: 222**
Quick Wash: 'u' parameters	**Code: 333**

The step times as set in Parameters r1, r2 and r3 are fixed and cannot be altered.

USER DEFINED PROGRAM TIMES

But should it be necessary to make adjustments this can be done selecting Parameter 'r4'

How to proceed

- Parameter 'r4' is used to make a copy of the wash programs 'r1', 'r2' and 'r3'
- Set 'r4' to position '2'
- This makes a copy of the programs under 'r1', 'r2' and 'r3'
- Hold the UP and DOWN buttons simultaneosly for 3 secs to save
- Proceed to change the required step times by entering the relevant ACCESS CODE
- Now you can proceeed to change the step times in 'n', 'd' and 'u' parameters
- After every change, hold the UP and DOWN buttons simultaneosly for 3 secs to save
- After all changes are complete Set 'r4' to position '1'
- 'r4' position '1' now contains the active cleaning programs
- To revert to the original default programs set 'r4' back to '0'

Cooling Parameters

Code 212: GENERAL COOLING PARAMETERS C

Parameter	Description	Range	LE-200 Default
Temperature Settings			
C1	Target temperature T1	2,0 – 12,0 °C	4,0
C2	Target temperature T2 (Deep cool)	2,0 – 12,0 °C	2,0
C10	Differential for T1	0,1 – 2,0 °C	0,5
C11	Differential for T2 (Deep cool)	0,1 – 2,0 °C	0,2
Agitator Settings			
C20	Duration of after-stirring	0-999 sec	60
C21	Pause duration	0-999 min	15
C23	Duration of 'intermediate stirring SHORT'	1-60 min	2
C24	Duration of 'intermediate stirring LONG'	1-60 min	5
C25	Maximum continuous stirring period in OFF mode	1 - 60 min	7
Cooling Time Monitoring			
C81	Maximum cooling time for first milking	0 - 999 min	0
Sensor Setting			
C90	Display actual temperature		
C91	Sensor correction	-10 to +10k	
Software Version			
C98	Software version The software version installed is shown to help service technicians.		

Code 345 EXTENDED COOLING PARAMETERS P

Parameter	Description	Range	LE-200 Default
Setting Range Limit			
P10	Lower limit for target temperature T1	0 – 50.0 °C	2
P11	Upper limit for target temperature T1	0 – 50.0 °C	8
P12	Lower limit for target temperature T2 (Deep cool)	0 50.0 °C	2
P13	Upper limit for target temperature T2 (Deep cool)	0 – 50.0 °C	8
P15	Lower limit for differential T1	0.1 – 30.0 °C	0.1
P16	Upper limit for differential T1	0.1 – 30.0 °C	2
P17	Lower limit for differential T2 (Deep cool)	0.1 – 30.0 °C	0.1
P18	Upper limit for differential T2 (Deep cool)	0.1 – 30.0 °C	2
Setting Agitator			
P22	Function intermediate stirring 0: deactivated 1: short / long	0 or 1	1
Setting Cooling Start			
P62	Duration of cooling start delay	0…999 min	30
Setting Compressor			
P71	Minimum pause time compressor	0…999 sec	120
Setting Deep Cool			
P81	Duration of T2 deep cool	0…100 min	30

Cleaning Parameters

Code 567 CLEANING PARAMETERS / configuration (r-level)

Parameter	Description	Range	LE-200 Default
Setting Wash Program Times			
r1	**Time selection main wash** 1: 75 min 2: 50 min 3: 30 min	1...3	3
r2	**Time selection descale wash** 1: 75 min 2: 50 min 3: 33 min	1...3	3
r3	**Time selection quick wash** 1: 18 min 2: 12 min 3: 8 min	1...3	3
r4	**User defined program times** 0: Deactivated 1: Activated (program times from n, d and u parameters are used) 2: Activated by changing the fixed times as set in r1, r2 and r3 in the user defined times (n, d and u parameters) This setting is automatically set to 1 (activated) after the parameters have been changed	0...2	0
Detergent Settings			
r5	***Main and quick wash with Peracetic ACID*** 0: Deactivated 1: Activated	0...1	1
r6	***Separate output relay for Descaling ACID*** 0: Acid and Peracetic Acid on the same relay K6 (Must be switched by the farmer before the wash cycle) 1: Descaling ACID on a separate relay K7	0...1	0
r7	***Automatic descaling*** 0: Deactivated 1 ... 5 = x times main wash, then once descale wash. Is started by button "cleaning". (Attention, this function is only active if either the descaling pump has its own output (r6 = 1) or the Peristaltic Pump is deactivated in the main and quick wash (r5 = 0). **NB: If automatic descaling is activated, the descaling button has no function.**	0...5	0
Display During Cleaning			
r97	0: Display of program step 1: Display of temperature 2: Display changes between step and temperature 3: Display of remaining wash program time 4: Display changes between remaining wash program time and temperature	0...4	4

Cleaning Parameters

Code 111: CLEANING PARAMETERS MAIN WASH (n-level) LE-200 ECO Main Wash

Step	Programs Stage/Step	Stage	K1 H.SV	K2 C.SV	K3 PUMP	K9 AGIT	K4 D.V	K5 ALK	K6 P-ACID	K6 or 7 ACID	30 Mins Sec	30 Mins Min	Min	50 Mins Sec	50 Mins Min	Min	75 Mins Sec	75 Mins Min	Min
1	n12	1st Pre-Rinse		●							120	2,00	5,50	200	3,34	9,19	300	5,00	13,75
2	n13			●	●	●					75	1,25		125	2,09		188	3,13	
3	n15				●	●	●				90	1,50		150	2,51		225	3,75	
4	n16						●				45	0,75		75	1,25		113	1,88	
5	n22	2nd Pre-Rinse	●								120	2,00	5,50	200	3,34	9,19	300	5,00	13,75
6	n23		●		●	●					75	1,25		125	2,09		188	3,13	
7	n25				●	●	●				90	1,50		150	2,51		225	3,75	
8	n26						●				45	0,75		75	1,25		113	1,88	
9	n32	Main Wash	●					●			120	2,00	8,00	200	3,34	13,36	300	5,00	20,00
10	n33		●		●	●		●			155	2,58		259	4,31		388	6,46	
11	n34				●	●					50	0,83		84	1,39		125	2,08	
12	n35				●	●	●				105	1,75		175	2,92		263	4,38	
13	n36						●				50	0,83		84	1,39		125	2,08	
14	n42	Post Rinse 1		●							120	2,00	5,50	200	3,34	9,19	300	5,00	13,75
15	n43			●	●	●					75	1,25		125	2,09		188	3,13	
16	n45				●	●	●				90	1,50		150	2,51		225	3,75	
17	n46						●				45	0,75		75	1,25		113	1,88	
18	n62	Final Rinse		●							90	1,50	5,50	150	2,51	9,19	225	3,75	13,75
19	n63			●	●	●			●		60	1,00		100	1,67		150	2,50	
20	n64			●	●	●					45	0,75		75	1,25		113	1,88	
21	n65				●	●	●				75	1,25		125	2,09		188	3,13	
22	n66						●				60	1,00		100	1,67		150	2,50	

Code 222: CLEANING PARAMETERS DESCALE (d-level) LE-200 Descale Wash (Alkaline & Acid)

Step	Programs Stage/Step	Stage	K1 H.SV	K2 C.SV	K3 PUMP	K9 AGIT	K4 D.V	K5 ALK	K6 P-ACID	K6 or 7 ACID	33 Mins Sec	33 Mins Min	Min	50 Mins Sec	50 Mins Min	Min	75 Mins Sec	75 Mins Min	Min
1	d12	Pre-Rinse	●								120	2,00	5,50	185	3,08	8,47	277	4,62	12,71
2	d13		●		●	●					75	1,25		116	1,93		173	2,89	
3	d15				●	●	●				90	1,50		139	2,31		208	3,47	
4	d16						●				45	0,75		69	1,16		104	1,73	
5	d32	Main Wash 1	●					●			120	2,00	8,00	185	3,08	12,32	277	4,62	18,48
6	d33		●		●	●		●			155	2,58		239	3,98		358	5,97	
7	d34				●	●					50	0,83		77	1,28		116	1,93	
8	d35				●	●	●				105	1,75		162	2,70		243	4,04	
9	d36						●				50	0,83		77	1,28		116	1,93	
10	d42	Rinse		●							120	2,00	5,50	185	3,08	8,47	277	4,62	12,71
11	d43			●	●	●					75	1,25		116	1,93		173	2,89	
12	d45				●	●	●				90	1,50		139	2,31		208	3,47	
13	d46						●				45	0,75		69	1,16		104	1,73	
14	d52	Main Wash 2	●							●	120	2,00	8,00	185	3,08	12,32	277	4,62	18,48
15	d53		●		●	●				●	155	2,58		239	3,98		358	5,97	
16	d54				●	●					50	0,83		77	1,28		116	1,93	
17	d55				●	●	●				105	1,75		162	2,70		243	4,04	
18	d56						●				50	0,83		77	1,28		116	1,93	
19	d62	Final Rinse		●							120	2,00	5,50	185	3,08	8,47	277	4,62	12,71
20	d63			●	●	●					75	1,25		116	1,93		173	2,89	
21	d65				●	●	●				90	1,50		139	2,31		208	3,47	
22	d66						●				45	0,75		69	1,16		104	1,73	

Cleaning and Test Parameters

Code 333: CLEANING PARAMETERS QUICK WASH (u-level) LE-200 Quick Wash

Step	Programs Stage/Step	Stage	K1 H.SV	K2 C.SV	K3 PUMP	K9 AGIT	K4 D.V	K5 ALK	K6 P-ACID	K6 or 7 ACID	8 Mins Sec	8 Mins Min	8 Mins Min	12 Mins Sec	12 Mins Min	12 Mins Min	18 Mins Sec	18 Mins Min	18 Mins Min
1	u12	Pre-Rinse		●							90	1,50	4,00	135	2,25	6,00	203	3,38	9,00
2	u13			●	●	●					60	1,00		90	1,50		135	2,25	
3	u15				●	●	●				45	0,75		68	1,13		101	1,69	
4	u16						●				45	0,75		68	1,13		101	1,69	
5	u62	Final Rinse		●							90	1,50	4,33	135	2,25	6,50	203	3,38	9,75
6	u63			●	●	●			●		50	0,83		75	1,25		113	1,88	
7	u64			●	●	●					5	0,08		8	0,13		11	0,19	
8	u65				●	●	●				70	1,17		105	1,75		158	2,63	
9	u66						●				45	0,75		68	1,13		101	1,69	

Code OE5: INPUT/OUTPUT TEST PARAMETERS Switch to 'I / O test parameters' level

All inputs and outputs of the individual components can be tested in this parameter level. For this purpose the corresponding relays are set to 'I' or '0'. NB: However, the two relays for the supply of acid and alkaline detergents are locked against each other since never acid and alkaline detergents may never enter the tank together!

Parameter	Description	Range	Default
o.1	Test relay K1 Hot water	0…1	0
o.2	Test relay K2 Cold water	0…1	0
o.3	Test relay K3 Cleaning pump	0…1	0
o.4	Test relay K4 Drain valve	0…1	0
o.5	Test relay K5 Alkaline detergent	0…1	0
o.6	Test relay K6 P-Acid detergent	0…1	0
o.7	Test relay K7 Acid detergent	0…1	0
o.8	Test relay K8 Compressor	0…1	0
o.9	Test relay K9 Agitator	0…1	0

Test of the digital inputs

o.21 **Test digital input 1** = Safety switch
o.22
o.23 **Test digital input 2** = Remote start cooling
o.24 **Test digital input 3** = free

The SET button can be used to check the switching status of the digital inputs.
No values can be entered here.
0 = input not connected 1 = input connected

Test level input

o.41 **Level 1**

The SET button can be used to check the switching status of the level input.
No values can be entered here.
0 = input not connected
1 = input connected

Fault Indication on the Display

Faults in the regulator are indicated by a flashing display as follows:

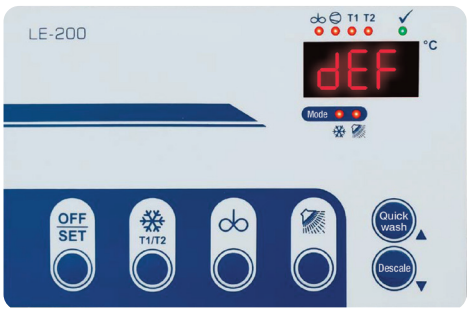
Cooling time exceeded
The active set point temperature must be achieved within the set time, otherwise fault message [F20] appears on the display.

Broken sensor
The sensor or sensor cable is faulty and must be replaced or repaired. Parameter [C91] 'Actual value correction' must then be adjusted at programming level.

Sensor short circuit
The sensor or sensor cable is faulty and must be replaced or repaired. Parameter [C91] 'Actual value correction' must then be adjusted at Programming level.

Software fault
Please contact the manufacturer.

Memory fault



Automatic factory reset after update
The controller was reset to factory settings after a software update.

WATER AND DETERGENT USAGE Eco Wash 5 Cycle: 30 Minutes

1st Pre-Rinse

Water Intake – Time 3.08

Flow l/min	Litres	Gallons
7	21.6	4.8
8	24.7	5.4
9	27.8	6.1
10	30.8	6.8
11	33.9	7.5

2nd Pre-Rinse

Water Intake – Time 3.08

Flow l/min	Litres	Gallons
7	21.6	4.8
8	24.7	5.4
9	27.8	6.1
10	30.8	6.8
11	33.9	7.5

Main Wash

Water Intake – Time 4.58

Flow l/min	Litres	Gallons
7	32.1	7.1
8	36.7	8.1
9	41.3	9.1
10	45.8	10.1
11	50.4	11.1

PP Time (mins) 4.58

Detergent Required			Actual Vol of Detergent (Etatron Pump)					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
160	257	321	4	165	6	257	7	312
183	293	367	5	211	7	312	8	403
206	330	413	5	211	7	312	8	403
229	367	458	6	257	8	403	8.5	495
252	403	504	6	257	8	403	8.5	495

1st Post Rinse

Water Intake – Time 3.08

Flow l/min	Litres	Gallons
7	21.6	4.8
8	24.7	5.4
9	27.8	6.1
10	30.8	6.8
11	33.9	7.5

2nd Post Rinse

Water Intake – Time 3.08

Flow l/min	Litres	Gallons
7	21.6	4.8
8	24.7	5.4
9	27.8	6.1
10	30.8	6.8
11	33.9	7.5

PP Time (mins) 1

Peracetic Acid Required			Actual Vol of Detergent (Etatron Pump)					
0.15%	0.30%	0.40%	0.15%		0.30%		0.40%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
32	65	86	5	47	8	88	8.5	110
37	74	99	5	47	8	90	8.5	110
42	83	111	6	57	9	110	9.0	139
46	93	123	6	57	9	110	9.5	171
51	102	136	7	69	9	139	9.5	171

Etatron BV-3

		Time (Mins)	
SET	l/min	4.58	1
4	36	165	37
5	46	211	47
6	56	257	57
7	68	312	69
8	88	403	90
8.5	108	495	110
9	136	623	139
9.5	168	770	171
10	220	1008	224
11	232	1063	236
Default Setting			
Alkaline Pump			5
Acid Pump			8

Total Water Consumption

Water	Flow 1/min				
	7	8	9	10	11
HOT	54	61	69	77	84
COLD	65	74	83	93	102

WATER AND DETERGENT USAGE Eco Wash 5 Cycle: 50 Minutes

1st Pre-Rinse

Water Intake – Time 5.14

Flow l/min	Litres	Gallons
7	36	7.92
8	41	9.06
9	46	10.19
10	51	11.32
11	57	12.45

2nd Pre-Rinse

Water Intake – Time 5.14

Flow l/min	Litres	Gallons
7	36	7.92
8	41	9.06
9	46	10.19
10	51	11.32
11	57	12.45

Main Wash

Water Intake – Time 7.64

Flow l/min	Litres	Gallons
7	53	11.78
8	61	13.46
9	69	15.14
10	76	16.83
11	84	18.51

PP Time (mins) 7.64

Detergent Required			Actual Vol of Detergent (Etatron Pump)					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
267	428	535	4	275	6	428	7	519
306	489	611	5	351	7	519	8	672
344	550	687	5	351	7	519	8	672
382	611	764	6	428	8	672	8.5	825
420	672	840	6	428	8	672	8.5	825

1st Post Rinse

Water Intake – Time 5.14

Flow l/min	Litres	Gallons
7	36	7.92
8	41	9.06
9	46	10.19
10	51	11.32
11	57	12.45

2nd Post Rinse

Water Intake – Time 5.14

Flow l/min	Litres	Gallons
7	36	7.92
8	41	9.06
9	46	10.19
10	51	11.32
11	57	12.45

PP Time (mins) 1.67

Peracetic Acid Required			Actual Vol of Detergent (Etatron Pump)					
0.15%	0.30%	0.40%	0.15%		0.30%		0.40%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
54	108	144	5	88	7	130	8	168
62	123	164	5	88	8	168	8.5	206
69	139	185	6	107	8	168	8.5	206
77	154	206	6	107	8.5	206	9	260
85	170	226	7	130	8.5	206	9	260

Etatron BV-3

		Time (Mins)	
SET	l/min	7.64	1.67
4	36	275	69
5	46	351	88
6	56	428	107
7	68	519	130
8	88	672	168
8.5	108	825	206
9	136	1039	260
9.5	168	1283	321
10	220	1681	420
11	232	1772	443

Default Setting

Alkaline Pump	5
Acid Pump	8

Total Water Consumption

Water	Flow 1/min				
	7	8	9	10	11
HOT	89	102	115	128	141
COLD	108	123	139	154	170

WATER AND DETERGENT USAGE Eco Wash 5 Cycle: 75 Minutes

Water Intake – Time 7.7

1st Pre-Rinse

Flow l/min	Litres	Gallons
7	54	11.9
8	62	13.6
9	69	15.3
10	77	17.0
11	85	18.7

Water Intake – Time 7.71

2nd Pre-Rinse

Flow l/min	Litres	Gallons
7	54	11.9
8	62	13.6
9	69	15.3
	10	77
17.0		
11	85	18.7

Water Intake – Time 11.46

Main Wash

Flow l/min	Litres	Gallons
7	80	17.7
8	92	20.2
9	103	22.7
10	115	25.2
11	126	27.8

Water Intake – Time 7.71

1st Post Rinse

Flow l/min	Litres	Gallons
7	54	11.9
8	92	20.2
9	103	22.7
10	115	25.2
11	126	27.8

Water Intake – Time 7.71

2nd Post Rinse

Flow l/min	Litres	Gallons
7	54	11.9
8	62	13.6
9	69	15.3
10	77	17.0
11	85	18.7

Etatron BV-3

		Time (Mins)	
SET	l/min	11.46	2.50
4	36	412	90
5	46	527	115
6	56	642	140
7	68	642	140
8	88	1008	220
8.5	108	1237	270
9	136	1558	340
9.5	168	1925	420
10	220	2521	550
11	232	2658	580

Default Setting

Alkaline Pump	5
Acid Pump	8

PP Time (mins) 11.46

Detergent Required			Actual Vol of Detergent (Etatron Pump)					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
401	642	802	4	412	6	642	7	779
458	733	917	5	527	7	779	8	1008
516	825	1031	5	527	7	779	8	1008
573	917	1146	6	642	8	1008	8.5	1237
630	1008	1260	6	642	8	1008	8.5	1237

PP Time (mins) 2.50

Peracetic Acid Required			Actual Vol of Detergent (Etatron Pump)					
0.15%	0.30%	0.40%	0.15%		0.30%		0.40%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
81	162	216	4	90	7	170	8.5	270
92	185	247	5	115	8	220	8.5	270
104	208	277	5	115	8.5	270	9	340
116	231	308	6	140	8.5	270	9	340
127	254	339	7	170	9	340	9.5	420

Total Water Consumption

Water	Flow 1/min				
	7	8	9	10	11
HOT	134	153	172	192	211
COLD	162	185	208	231	254

WATER AND DETERGENT USAGE DESCALE (Alkaline & Acid) Wash 5 Cycle: 33 Minutes

Water Intake – Time 4

1st Pre-Rinse

Flow l/min	Litres	Gallons
7	28	6.17
8	32	7.05
9	36	7.93
10	40	8.81
11	44	9.69

Water Intake – Time 4.58

ALK

Flow l/min	Litres	Gallons
7	32	7.07
8	37	8.08
9	41	9.09
10	46	10.10
11	50	11.10

PP Time (mins) 4.58

Detergent Required			Actual Vol of Detergent (Etatron Pump)					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
160	257	321	4	165	6	257	7	312
183	293	367	5	211	7	312	8	403
206	330	413	5	211	7	312	8	403
229	367	458	6	257	8	403	8.5	495
252	403	504	6	257	8	403	8.5	495

Water Intake – Time 4

Rinse

Flow l/min	Litres	Gallons
7	28	6.17
8	32	7.05
9	36	7.93
10	40	8.81
11	44	9.69

Water Intake – Time 4.58

Acid

Flow l/min	Litres	Gallons
7	32	7.07
8	37	8.08
9	41	9.09
10	46	10.10
11	50	11.10

PP Time (mins) 4.58

Acid Required			Actual Vol of Detergent Etatron Pump					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
160	257	321	4	162	6	252	7	306
183	293	367	5	207	7	306	8	396
206	330	413	5	207	7	306	8	396
229	367	458	6	252	8	396	8.5	486
252	403	504	6	252	8	396	8.5	486

Water Intake – Time 4

Rinse

Flow l/min	Litres	Gallons
7	28	6.17
8	32	7.05
9	36	7.93
10	40	8.81
11	44	9.69

Etatron BV-3

SET	l/min	Time (Mins) 4.58
4	36	165
5	46	211
6	56	257
7	68	312
8	88	403
8.5	108	495
9	136	623
9.5	168	770
10	220	1008
11	232	1063

Default Setting

Alkaline Pump	5
Acid Pump	8

Total Water Consumption

Water	Flow 1/min				
	7	8	9	10	11
HOT	92	105	119	132	138
COLD	56	64	72	80	88

WATER AND DETERGENT USAGE DESCALE (Alkaline & Acid) Wash 5 Cycle: 50 Minutes

Water Intake – Time 4.7

1st Pre-Rinse

Flow l/min	Litres	Gallons
7	33	7.2
8	37	8.2
9	42	9.3
10	47	10.3
11	51	11.3

Water Intake – Time 6.9

ALK

Flow l/min	Litres	Gallons
7	49	10.7
8	56	12.2
9	62	13.8
10	69	15.3
11	76	16.8

PP Time (mins) 6.9

Detergent Required			Actual Vol of Detergent (Etatron Pump)					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
243	389	486	4	250	6	389	7	472
278	444	556	5	319	7	472	8	611
312	500	625	5	319	7	472	8	611
347	556	694	6	389	8	611	9	750
382	611	764	6	389	8	611	9	750

Water Intake – Time 6

Rinse

Flow l/min	Litres	Gallons
7	42	9.3
8	48	10.6
9	54	11.9
10	60	13.2
11	60	13.2

Water Intake – Time 6.9

Acid

Flow l/min	Litres	Gallons
7	49	10.7
8	56	12.2
9	62	13.8
10	69	15.3
11	76	16.8

PP Time (mins) 6.9

Acid Required			Actual Vol of Detergent Etatron Pump					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
243	389	486	4	270	6	420	7	510
278	444	556	5	345	7	510	8	660
312	500	625	5	345	7	510	8	660
347	556	694	6	420	8	660	9	810
382	611	764	6	420	8	660	9	810

Water Intake – Time 6

Rinse

Flow l/min	Litres	Gallons
7	42	9.3
8	48	10.6
9	54	11.9
10	60	13.2
11	66	14.5

Etatron BV-3

SET	l/min	Time (Mins) 6.9
4	36	250
5	46	319
6	56	389
7	68	472
8	88	611
8.5	108	750
9	136	944
9.5	168	1167
10	220	1528
11	232	1611

Default Setting

Alkaline Pump	5
Acid Pump	8

Total Water Consumption

Water	Flow 1/min				
	7	8	9	10	11
HOT	130	148	167	186	194
COLD	84	96	108	120	132

WATER AND DETERGENT USAGE DESCALE (Alkaline & Acid) Wash 5 Cycle: 75 Minutes

Water Intake – Time 7

1st Pre-Rinse

Flow l/min	Litres	Gallons
7	49	10.8
8	56	12.3
9	63	13.9
10	70	15.4
11	77	17.0

Water Intake – Time 10.4

ALK

Flow l/min	Litres	Gallons
7	73	16.1
8	83	18.4
9	94	20.6
10	104	22.9
11	115	25.2

Water Intake – Time 7

Rinse

Flow l/min	Litres	Gallons
7	49	10.8
8	56	12.3
9	63	13.9
10	70	15.4
11	77	17.0

Water Intake – Time 10.4

Acid

Flow l/min	Litres	Gallons
7	73	16.1
8	83	18.4
9	94	20.6
10	104	22.9
11	115	25.2

Water Intake – Time 7

2nd Post Rinse

Flow l/min	Litres	Gallons
7	49	10.8
8	56	12.3
9	63	13.9
10	70	15.4
11	77	17.0

Etatron BV-3

SET	l/min	Time (Mins) 10.42
4	36	375
5	46	479
6	56	583
7	68	708
8	88	917
8.5	108	1125
9	136	1417
9.5	168	1750
10	220	2292
11	232	2417

Default Setting

Alkaline Pump	5
Acid Pump	8

PP Time (mins) 10.42

Detergent Required			Actual Vol of Detergent Etatron Pump					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
365	583	729	4	375	6	583	7	708
417	667	833	5	479	7	708	8	917
469	750	937	5	479	7	708	8	937
521	833	1042	6	583	8	917	9	1125
573	917	1146	6	583	8	917	9	1125

PP Time (mins) 10.42

Acid Required			Actual Vol of Detergent Etatron Pump					
0.50%	0.80%	1.00%	0.50%		0.80%		1.00%	
ml	ml	ml	SET	Vol	SET	Vol	SET	Vol
365	583	729	4	405	6	630	7	765
417	667	833	5	517	7	765	8	990
469	750	937	5	517	7	765	8	1012
521	833	1042	6	630	8	990	8.5	1215
573	917	1146	6	630	8	990	8.5	1215

Total Water Consumption

Water	Flow 1/min				
	7	8	9	10	11
HOT	195	223	251	278	269
COLD	98	112	126	140	154

Other Information

Function "Intermediate stirring"

The universal tank control LE-200 has a function allowing the agitator to be switched on manually in cooling mode. This can be done is different ways. Regardless of the chosen option the corresponding LED always indicates when the agitator is operating.

The function is set at configuration level using parameter [P22].

Parameter [P22] is set to 0:

"Intermediate stirring" is not possible.

Parameter [P22] is set to 1 (standard) :

"Intermediate stirring SHORT or LONG" can be switched on via the regulator's foil keyboard. In this case:

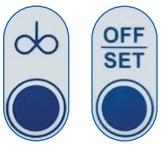
- Intermediate stirring SHORT = Press agitator button for approx. 1 sec. until "Sho" appears in the display. Release the button immediately - otherwise "Intermediate stirring LONG" will be activated.
- Intermediate stirring LONG = Press agitator button for approx. 3 secs. until "Lon" appears in the display. The duration of the stirring run SHORT or LONG is defined in 'General cooling parameters' via parameters [C23] and [C24].

Parameter [P22] is set to 2:

Function: Continuous stirring ON / OFF
By pressing the button the agitator is switched on and can be switched off by pressing the OFF-button.

"Continuous stirring" Function

In the OFF-mode the agitator can be switched on by button "agitator" and switched off by button "OFF".



if Parameter [C25] = '0'
The agitator continues to run until the OFF-button is pressed. There is NO automatic switching off.

if parameter [C25] > '1 .. 999'
The agitator stops automatically after the set time.

A rotating bar appears in the display during continuous stirring.

Setting the actual value correction

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.

Other Information

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.

If the control unit was in cleaning mode ...

...as soon as power is restored, a draining period is run for the time in [n70] 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.

Incorrect parameter configuration when switching on:

Factory configuration is restored automatically

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

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

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

Displayed when invalid storage areas are detected.

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

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

Procedure:

- Press and hold the OFF / SET / UP / DOWN buttons simultaneously until "dEF" 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 "EEP" appears again on the display after the factory reset and after another OFF and ON-switching, the control is irreparably defective.

Memory fault

Automatic factory reset after update
The controller was reset to factory settings after a software update.

Other Information

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	Typica Industrial Environment	2.0 kV	1.25 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

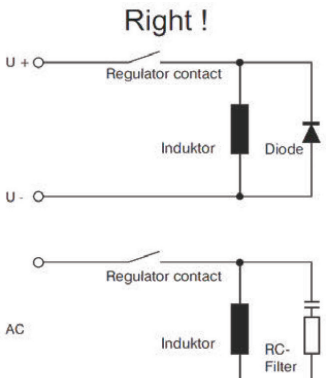
Other Information

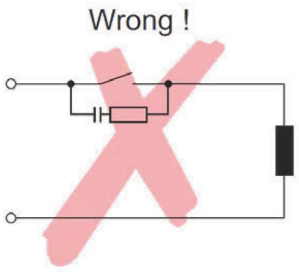
b. If specific interference sources cannot be avoided they should at least be kept at a distance from the regulator system.

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.





- 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.

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.

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.

Backup Cooling Functions

LE-200 Universal Tank Controller Backup Cooling Function

The LE-200 Universal Tank Controller has the added feature of a thermostatically controlled backup cooling function.

To activate this function simply turn the switch located on the right-hand side of the control panel from "Normal" to "Backup".

The LED on the Carel thermostat will turn on and display the current temperature of the milk in the tank

The Carel Thermostat has pre-set default settings built into the thermostat.

LEDs and associated functions

icon	function	normal operation			start up
		ON	OFF	Blink	
	Compressor	on	off	request	ON
	Stirrer	on	off	request	ON
AUX	aux	output on	output off	–	ON
	allarme	all	no alarm	–	ON

Table of functions activated by the buttons

Button	Normal Operation		Start Up	
	Pressing the Button Alone	Pressed Together		
T1/T2	More than 3 s: change set point between setpoint 1 and setpoint 2 (the display shows '1t2' or '2t1', depending on whether the setpoint is being switched from 1 to 2 vice-versa).	Pressed together start/stop continuous cycle		
	If the manual stirring cycle is not active: • Selects the short manual cycle if released in less than 3s (P3). • Selects the long manual cycle if released after more than 3s (P4). If the manual stirring cycle is active: pressed for more than 3s stops the manual stirring cycle.		Pressed together start parameter RESET procedure	For 1s display firmware version code
set	• 1s: display/set the active set point (setpoint 1 or setpoint 2 selected with T1/T2 button). • more than 3 s: access parameter setting menu (enter password '22'). • mute audible alarm (buzzer)			For 1s RESET current EZY set

CAREL Easy Milk Chiller

Setting the Setpoint (desired temperature)

STEP	ACTION
1	Press T1/T2 Button for more than 3 secs
	Select T1
2	Press SET for 1s: current value will display
3	Press UP or DOWN to change the value
4	Press SET to confirm the new value

Accessing and Setting the Parameters Types F and C

1	Press SET for 3 s; "PS" will display (Password is requested)
2	- to access type F & C parameters enter the password "22" using UP/DOWN - to access type F only, press SET (without entering the password)
3	Scroll inside the menu by using UP/DOWN
4	to display/set the values of the parameter displayed press SET, then UP/DOWN and finally press SET to confirm the changes
5	to save all the new values and exit the parameter menu, press SET for 3 s: to exit without saving the changed values do not press any button for at least 60 s;

Parameter Folders

/ PROBE
r CONTROL
c COMPRESSOR
A ALARM
P AGITATOR
H OTHER SETTINGS

Parameter Types

F Frequent
C Configuration

CAREL Easy Milk Chiller

Default Parameters CAREL (for back-up cooling)
TABLE OF PARAMETERS

	PARAMETER	TYPE	MIN.	MAX.	DEF.	U.M.	LE
PS	PASSWORD	F	0	200	22	-	Default
/	**PROBE PARAMETERS**						
/2	Measurement stability	C	1	15	4	-	
/4	Select probe/input displayed (1= probe 1, 2= probe 2, 3= probe 3)	F	1	3	1	-	1
/5	Select °C / °F (0 = °C; 1 = °F)	C	0	1	0	-	
/6	Disable decimal point	C	0	1	0	-	
/C1	Probe 1 calibration	F	-12.7	12.7	0	°C/°F	°C
/C2	Probe 2 calibration	F	-12.7	12.7	0	°C/°F	
/C3	Probe 3 calibration	F	-12.7	12.7	0	°C/°F	
r	**CONTROL PARAMETERS**						
St1	Set point 1	F	r1L	r1H	4	°C/°F	4
rd1	Control differential 1 (referred to setpoint 1)	F	0	19	2	°C/°F	0.5
St2	Set point 2	F	r2L	r2H	4	°C/°F	
rd2	Control differential 2 (referred to setpoint 2)	F	0	19	2	°C/°F	
r1L	Minimum user set point allowed (setpoint 1)	C	-50	r1H	-50	°C/°F	4
r1H	Maximum user set point allowed (setpoint 1)	C	r1L	150	90	°C/°F	4
r2L	Minimum user set point allowed (setpoint 2)	C	-50	r2H	-50	°C/°F	
r2H	Maximum user set point allowed (setpoint 2)	C	r2L	150	90	°C/°F	
r3	Operating mode 1= direct; 2= reverse	C	1	2	0	-	
r4	Automatic night-time set point variation	C	-50	50	3	°C/°F	
c	**COMPRESSOR PARAMETERS**						
c0	Compressor and fan start delay after start-up	C	0	100	0	min	
c1	Minimum time between successive compressor starts	C	0	100	0	min	
c2	Minimum compressor OFF time	C	0	100	0	min	
c3	Minimum compressor ON time	C	0	100	0	min	
c4	Compressor safety (duty setting)	C	0	100	0	min	
cc	Continuous cycle duration	C	0	15	4	h	
c6	Alarm bypass time after continuous cycle	C	0	15	2	h	
A	**ALARM PARAMETERS**						
A0	Alarm and fan differential	C	-20	20	2,0	°C/°F	
AL	Low temperature alarm threshold/deviation (AL= 0 alarm disabled)	F	-50	150	0	°C/°F	
AH	High temperature alarm threshold/deviation (AH= 0 alarm disabled)	F	-50	150	0	°C/°F	
Ad	Low and high temperature alarm delay	C	0	199	0	min	
A4	Digital input configuration	C	0	11	0	-	
A7	External alarm detection delay	C	0	199	0	min	
Ac	High condenser temperature alarm	C	-50	150	70	°C/°F	
AE	High condenser temperature alarm differential	C	0.1	20	5	°C/°F	
Acd	High condenser temperature alarm delay	C	0	250	0	min	
P	**STIRRER PARAMETERS**						
P1	Stirrer actuator duration after chill cycle	F	0	999	0	sec	60
P2	Interval between two activations of the stirrer	F	0	999	0	min	15
P3	Manual short stirring cycle duration	F	0	999	0	min	5
P4	Manual long stirring cycle duration	F	0	999	0	min	
P5	Stirrer in automatic mode	C	0	2	0	min	

CAREL Easy Milk Chiller

Default Parameters CAREL (for back-up cooling)
TABLE OF PARAMETERS

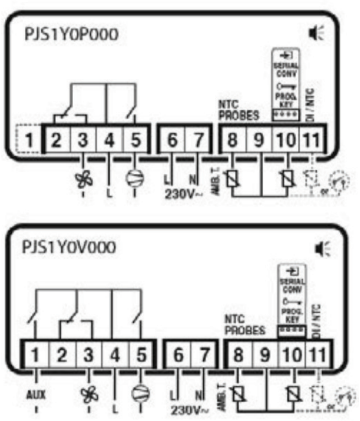
	PARAMETER	TYPE	MIN.	MAX.	DEF.	U.M.	LE
PS	PASSWORD	F	0	200	22	-	Default
H	**OTHER SETTINGS**						
H0	Serial address	C	0	207	1	-	
H1	AUX output configuration	C	0	3	0	-	
	0= no function associated with the output						0
	1= alarm output usually energised						
	2= alarm output usually de-energised						
	3= auxiliary output driven by digital input [A4=6/7/8]						
	DI open = AUX de-energised						
	DI closed= AUX energised						
H2	Enable keypad	C	0	2	1	-	1
	0= keypad disabled						
	- F parameters, read-only						
	- C parameters, modifiable (PS)						
	- NO change set point with SET button						
	- NO manual stirring						
	- NO continuous cycle						
	- NO change setpoint 1/setpoint 2						
	1= keypad enabled						
	2= keypad enabled except for change setpoint1/setpoint 2 with SET						
H4	Disable buzzer 0= buzzer enabled (ON); 1= buzzer disabled (OFF)	C	0	1	0	-	1
H5	Key ID code from supervisor	F	0	199	1	-	
EZY	Select Easy Set according to the model, see manual (see note)	C	0	4	0	-	

CAREL Easy Milk Chiller

Technical Specifications

Power Supply (*)	230 Vac +10/-15% 50/60 Hz; 115 Vac +10/-15% 50/60 Hz 12 Vac +10/15% 50/60 Hz class 2; 12 Vdc +10/-20% class 2;	
Rated Power	3.5 VA	
Inputs (*)	NTC or PTC probes 1 or 3 inputs Digital input as alternative to third probe	
Relay outputs (*)	2 HP relay	UL: 12 A Res. 12 FLA 72 LRA - 240 Vac (***) EN60730-1: 10(10) A 250 Vac (**)
	16 A relay	UL: 12 A Res. 5 FLA 30 LRA - 240 Vac C300, EN60730-1: 12(2) A NO/NC, 10(4) A up to 60 °C NO, 2(2) A CO - 250 Vac
	8 A relay	UL: 8 A Res. 2 FLA 12 LRA - 240 Vac C300, EN60730-1: 8(4) A NO, 6(4) A NC, 2(2) A CO - 250 Vac
Type of Probe (*)	Std CAREL NTC 10K Ω at 25 °C, Std CAREL PTC 985 Ω at 25 °C	
Connections (*)	Screw terminals for cables with cross-sect. from 0.5 mm² to 1.5 mm². Plug-in terminals for screw blocks or with crimped contact (cable cross-sect. up to 2.5 mm²). Rated maximum current per terminal 12A.	
Assembly (*)	Terminal: using screws from the front panel or with rear brackets. Interface: wall mounting, 4 screws, spacing 101 x 151mm	
Display	3 digit LED display with sign (-199 to 999) and decimal point; six status LEDs	
Operating conditions	-10T50 °C - humidity ,<90% rH non-condensing	
Storage conditions	-20T70 °C - humidity ,<90% rH non-condensing	
Range of measurement	-50T90 °C (-58T194 °F) - resolution 0.1 °C/ °F	
Front panel index of protection	Panel installation with IP65 type 1 gasket	
Case	Plastic terminal, 81 x 36 x 65 mm	
Classification according to protection against electric shock	Class II when suitably integrated	
Environmental pollution	Normal	
PTI of the insulating material	250 V	
Period of stress across the insulating parts	Long	
Category of resistance to heat and fire	Category D (UL94-VO)	
Immunity against voltage surges	Category 1	
Type of action and disconnection	1C relay contacts	
No. of relay automatic operating cycles (*)	EN60730-1:	100,000 operations
	UL:	30,00 operations (250 Vac)
Software class and structure	Class A	
Cleaning the instrument	Only use neutral detergents and water.	
Cable max. length	Serial: 1 km Probes: 30 m Relay: 10 m	

Wiring Diagram



Code	Description
PJS1Y0P000	Easy milk chiller 2 relays 16 A compressor relay 8 A stirrer relay
PJS1Y0V000	Easy milk chiller 3 relays 16 A compressor relay 8 A stirrer relay 8 A AUX relay

CAREL Easy Milk Chiller

How to use the Programming Key

Programming keys PSOPZKEY00/A0

The programming keys are used to copy the complete set of parameters relating to the LE-200 back-up cooling solution parameters.

The keys must be connected to the connector (4 pin AMP) fitted on the compatible controllers, and work even without switching the controller on.

Three functions are available, and are selected by using the two supplied dipswitches; these can be accessed by removing the battery cover:

- load the parameters for a controller onto the key (UPLOAD figure)
- copy from the key to a controller (DOWNLOAD figure)
- extended copy from the key to a controller (EXTENDED DOWNLOAD - Fig. 5.e).

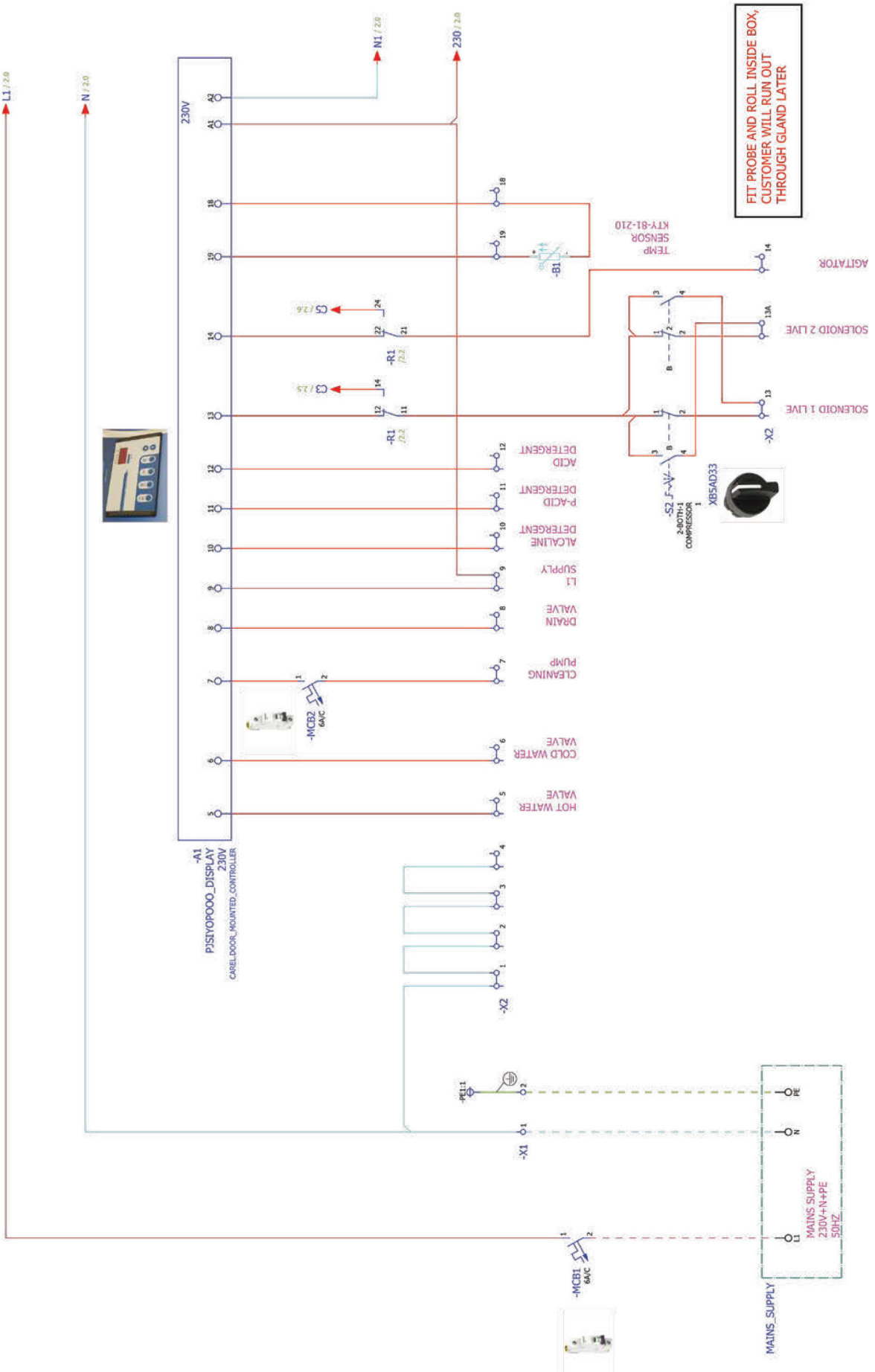
Warning: the parameters can only be copied between instruments with the same code. The UPLOAD operation can, however, always be performed.

Copying and downloading the parameters

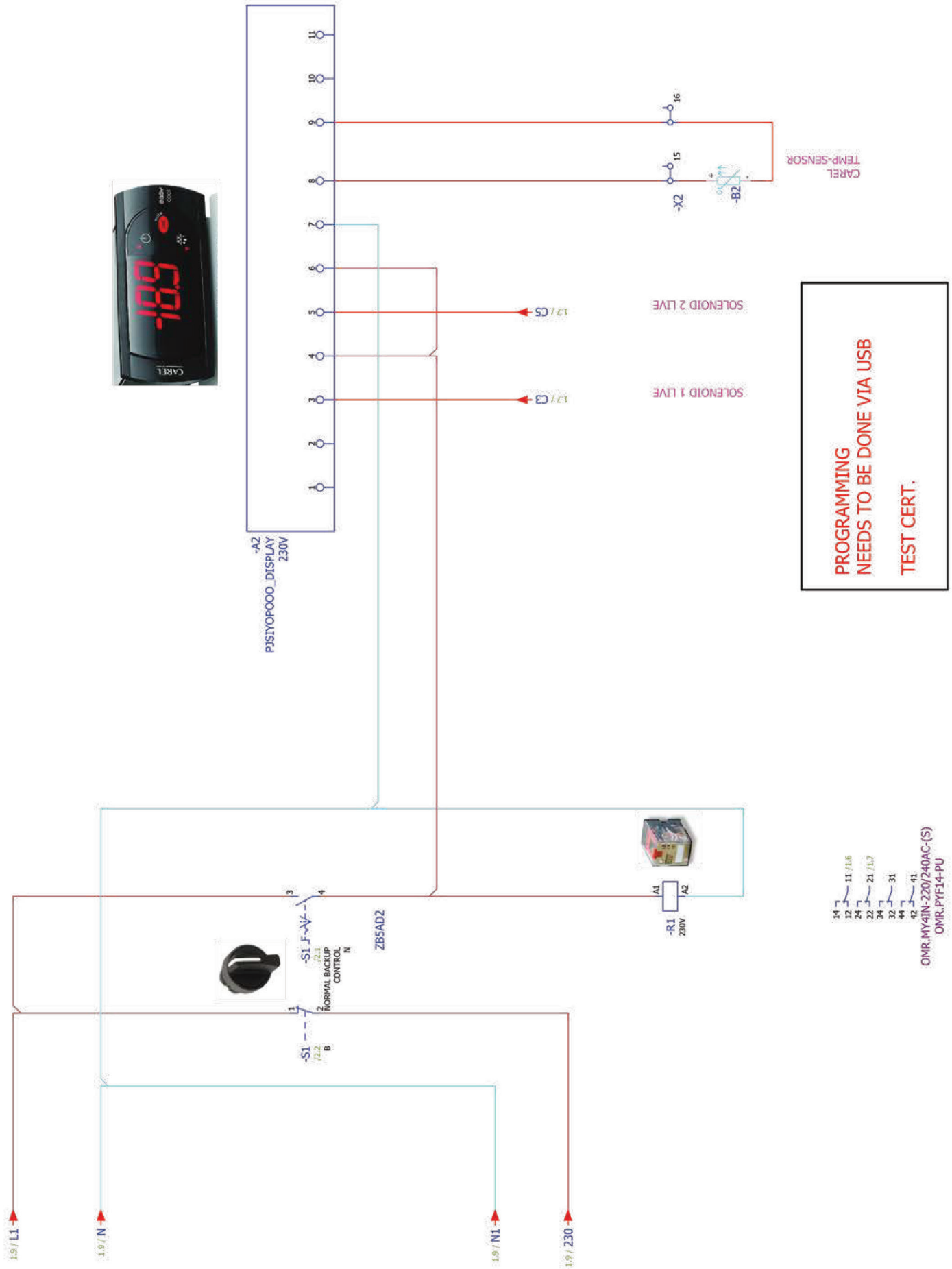
The following operations are used for the UPLOAD and/or DOWNLOAD or EXTENDED DOWNLOAD functions, simply by changing the settings of the dipswitches to change the function:

1. open the rear cover on the key and position the 2 dipswitches according to the desired operation
2. close the rear cover on the key and insert the key in the connector on the controller
3. press the button and check the LED: red for a few seconds, then green, indicates that the operation was completed correctly.
4. at the end of the operation, release the button, after a few seconds the LED goes OFF
5. remove the key from the controller.

Appendix 1 Main Wiring Diagram



Appendix 2 Card Wiring Diagram



Appendix 3 Wash Program -v- Tank Size

Tank Model	FALL 1:50 Size Litres	Depth mm	Vol litres	Surface M2	Min H.W 0.5%*Vol	Min H.W l/M² *	Flow l/m	H.W Actual	Program	Req Drain 40l/m	D.T SV+P	D.T S.V	D.T total
EDX1000	**4,500**	46	24	15.92	22.5	32		41.2					
EDX1100	**5,000**	51	31	17.21	25.0	34		41.2					
EDX1300	**5,800**	58	43	19.07	29.0	38	9	41.2	30	1.03	2.17	1.08	3.25
EDX1600	**7,200**	58	45	22.06	36.0	44		41.2					
EDX1800	**8,000**	58	46	23.04	40.0	46		41.2					
2200LONG	**9,750**	72	80	26.54	48.8	53		69.7					
EDX2200	**9,750**	58	48	27.10	48.8	54		69.7					
EDX2500	**11,500**	58	55	30.00	57.5	60	9	69.7	50	1.74	3.61	1.81	5.42
EDX2700	**12,000**	88	121	32.04	60.0	64		69.7					
EDX3400	**15,000**	88	136	36.65	75.0	73		69.7					
EDX4500	**20,000**	118	282	46.76	100.0	94		103.1					
EDX5500	**25,000**	118	293	52.97	125.0	106	9	103.1	75	2.58	5.42	2.71	8.13
EDX6600	**31,000**	118	295	59.89	155.0	120		103.1					

* Estimated @ 2 litres per M² of Surface area

Program	Time Mins	Flow Rate L/min 7	8	9	10	11
30	4.58	32.1	36.6	41.2	45.8	50.4
50	7.74	54.2	61.9	69.7	77.4	85.1
75	11.46	80.2	91.7	103.1	114.6	126.1

DRAINAGE TEST:

"With the Tank in it's reference position and with 40Litres in tank, at least 39.8L should drain out in 1 minute by gravity".

(Ref: EN13732 5.9.7)

Notes

Liscarroll ENGINEERING

EST. 1973

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