Hospital Technician

Technical Manual WD230 and WD250

CE 0044

Rev. 1.8 E

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Belimed
Infection Control

TABLE OF CONTENT

Edition

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! Important Note !

Please, carefully study this operation manual BEFORE starting the automat.

The manufacturer waives all responsibility for damages resulting from improper handling or failure to follow instructions offered in this manual. Any changes made on the automat, especially technical modifications performed without the written consent by the manufacturer by non-authorized personnel will result in loss of product liability rights.

The user has to check each time the cleanness of the instruments and is responsible for it

1. Machine Dimensions

Type	Door	Machine Dimensions	Max. Load
WD 230	Manual	900 / 800 / 1840	**10 – 12** DIN sieves
WD 250	Automatic	900 / 800 / 1840	**10 – 12** DIN sieves

Dimensions	WD 230 / 250
Basket dimension height	670 mm
Basket dimension width	610 mm
Basket dimension depth	610 mm
Door opening height net / gross	670 / 690 mm
Door opening width net / gross	610 / 630 mm
Chamber opening depth	660 mm
Outside dimension height	1840 mm
Outside dimension width	900 mm
Outside dimension depth	800 mm
Lad height	870 mm
Base height	100 mm

1.1 Performance Data

Performance Characteristics / Components	WD 230 / 250
Heat radiation free standing	900 (+/- 200) W
Weight of side covers	270 Kg
Noise emission with side covers installed	62 dB(A)
WD 250: door opens from top to bottom	Automatic
WD 250: with safety shut-off	Tape switch
Material: Frame, Panels, Covers CNS	1.4301, AISI = 304*
Material: Wash camber, Door CNS	1.4404, AISI 316L **
Material: Stainless steel (CNS)	1.4301
Wash pump capacity nominal	900 l / min
Wash pump capacity operating level	750 l / min
Wash pump electric power rating	1100 W
Material impeller wheel	CNS
Tank heater power rating	15 kW
Tank heater power steam heat (2.5 bar)	30 kW
Wash arm length	580 mm

Drain valve made of CNS 17 W	DN 50
Dosing pump (Sair brand) voltage	24 V AC
No. of dosing pumps basic model	2 units, (max. 5)
Flow meter	Optional (max. 5 units)
El. dryer connected load	10.5 kW
Steam drying, power steam and pure steam	16 kW at 3 bar
Dryer blower el. power (2 brush-less DC turbines)	2.4 kW
Exhaust air throughput dryer	320 m^3 / h
Air filter: Filter class H13 EN 1822, retaining efficiency with particle size from 0.1 to 0.2 µm	99.95%
Powered separator flap water / air	24 V DC

Processor

Mitsubishi M16C M306NOFG - Processor with 256 K Byte EEPROM (Program and parameter memory) and 10 K Byte RAM (Data memory)

2. Connections

2.1 Plumbing

Cold Water	Connection	3/4	“
CW and WW	Water pressure	200 - 600	kPa
	Volume rating	40*	l/min
	*at water pressure of	2.2	bar
DI Water	Connection	3/4	“
DI	Water pressure	200 - 600	kPa
	Volume rating*	40	l/min
	Minimal volume rating	**8**	**l/min**
	Recommended conductivity	< 30	µS/cm
Drain	Connection stud DO	56 mm	
AB	Temperature, max.	90	°C
	PH value	5 - 12	pH

2.2 Steam

Steam Connection	Machine side	R ½“	
	Pressure range	200 - 600	kPa
	Steam temperature	133 - 165	°C
Water heating	Saturated steam consumption	0.8	kg / min.
	Consumption / batch at 3 bar	12-16	kg
Dryer heating	Saturated steam consumption	0.45	kg / min.
	Consumption / batch for 10 min.	4.5	Kg at 3 bar

2.3 Exhaust Air

Exhaust Air Conn.	Machine side duct DO	115	mm
Without condenser	Exhaust air volume, drying	300 - 500	m^3/h
	Exhaust air temperature	60 - 90	°C
With condenser	Exhaust air volume, drying	150 - 260	m^3/h
	Exhaust air temperature	30 - 60	°C

2.4 El. Connected Load

	EU, AU, PRC, NZ	**USA, CA**	**JP**	**JP**
Voltage Frequency	400V 3N AC 50 Hz	208V 3 A C 60 Hz	200-220V 3 AC 50 Hz	200-220V 3 AC 60 Hz
Electrical water heating				
Connected load total	16 kW	13 kW	16 kW	16 kW
Fusing	25 A	30 A	40 A	40 A
Water heating steam				
Connected load total	13 kW	13 kW	13 kW	13 kW
Fusing	20 A	30 A	30 A	30 A
Water heating steam and stem dryer				
Connected load total	3.5 kW	3.5 kW	3.5 kW	3.5 kW
Fusing (without DI Tank)	16 A	16 A	16 A	16 A

2.5 Connecting Conditions

Building side requirements	Machine side delivery
CW, WW, DI water connections	
Shut-off valve 3/4"	2.1 m armored hose
	Fine filter 3/4" Mesh gauge 250µ
	Free flow area
AB Drain	
Floor drain 90 °C heat resistant Drain stub DO 56 mm	T-piece for condensate drain KD = DO 28 mm
	Siphoned drain hose DI 56 mm
AL Exhaust Air	
Exhaust duct DO 115 mm	Exhaust duct DO 114 mm DI 109 mm
Exhaust hood not required	Condensate water collector with drain
	Exhaust air flap with ambient air opening
EL Electro Connection	All pole main switch **52A**
50 Hz 400 V 25 Amp 3P+N model	cable L = 3 m, 5 x 2.5 mm ^{2,} H o5 RN - F
60 Hz 208 V 30 Amp 3P model	protective hose G16 L = 1.3 m, cable 3,5 m 4 x 4 mm ^{2}
60 / 50 Hz 200 V 40 Amp 3P model	cabeL = 3,5 m, 4 x 6 mm ^{2}
DO Steam Connection	
2 T-piece ½“	1 2/2 way magn. valve ½“ (24 VAC)
2 Condensate separators ½“	2 welding sleeve ½“
2 Shut-off valves ½“	
1 Dirt separator ½“	
(Protection device) Relief vent flap 7 bar	

There is no need for compressed air supply.

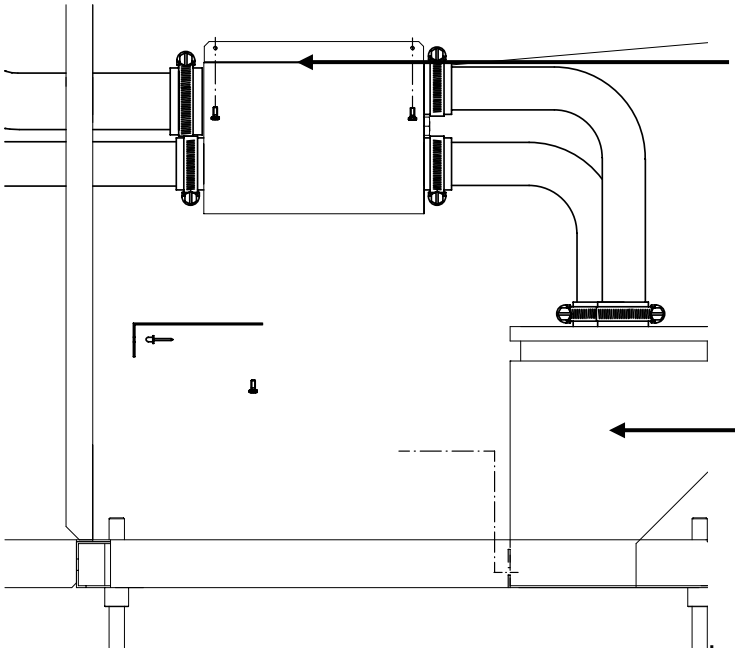
3. Maintenance Items

Clamp Connections

Check hose clamps for leaks and clamping torque, retighten if needed, replace clamps if defective. EPDM hose clamps must be replaced if brittle.

Drying System

Dryer system components must be checked for performance and leaks. The entire system needs to be thoroughly cleaned periodically. Check air hoses for cracks and other errors. This switch serves to shut down the heater power (K18) in case of insufficient blower efficiency.

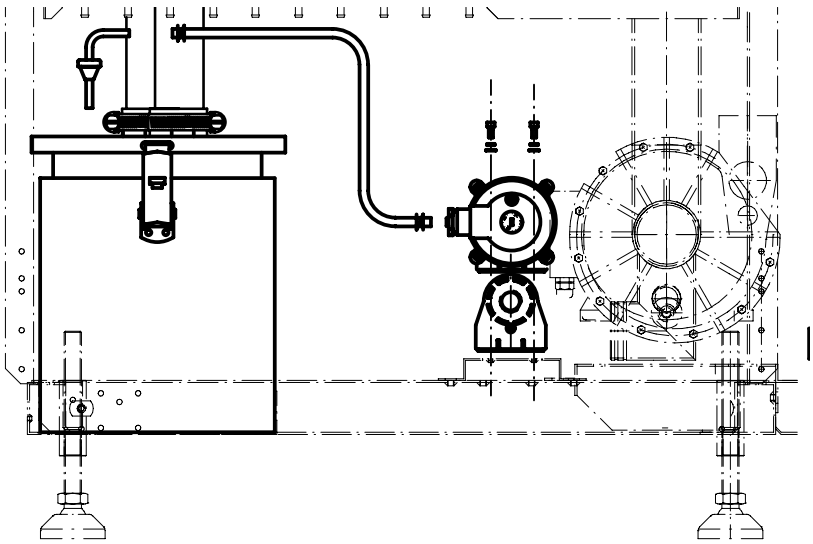


Over time, the sealing system on the heat box is getting pushed out and need to be returned to the original position. Caution, there is a pressure switch inside the heater box (P18).

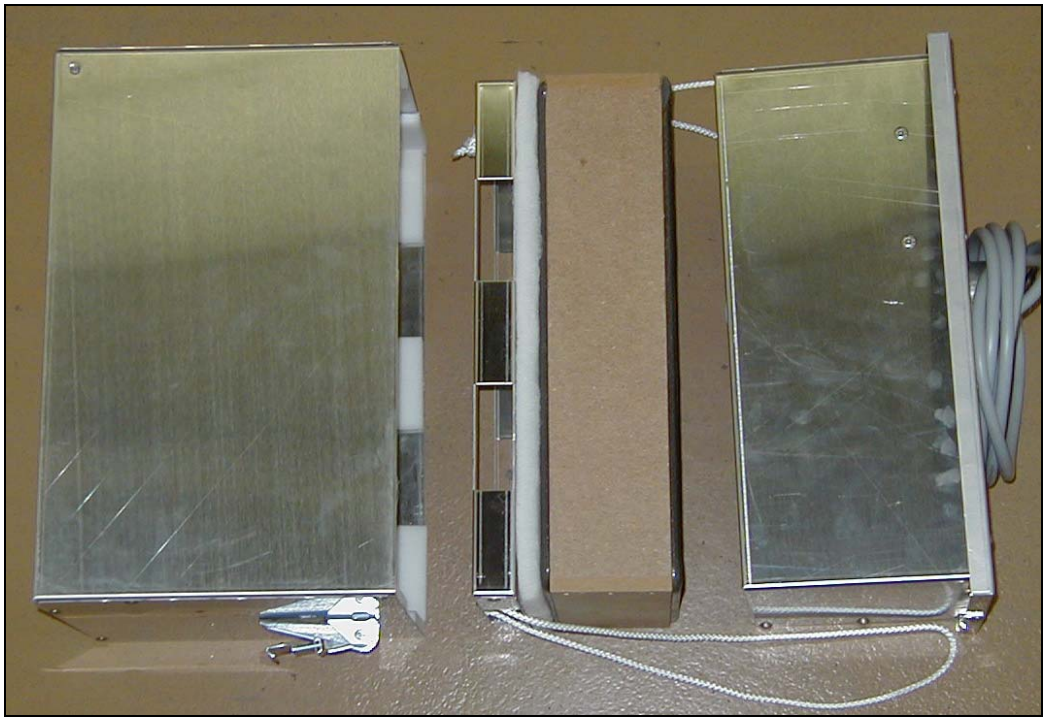
Replace **main filter** (77317) after **about 500 h of service**, **pre-filter** (74422) **after about 300 h** of service.

Option pressure differential for blower unit

When reaching a pressure differential of 1.7 k Pa (17 m bar), air filters have arrived at the end of their usefulness and “filter replace” will be displayed.



Assembly of the blower box



Dosing System

Check dosing system for leaks and accuracy. *The dosing hoses should be replaced at each service cycle*. Check connection elbows of wash chamber for leaks and hose connections for clamping torque of clamps. At each maintenance cycle or replacement of a safety related component, system needs to be recalibrated.

Frequency: min. once per year!

The dosage system must be newly calibrated after every maintenance service or every change of detergents!

Flow Meter (Option)

The flow meters must be regularly checked for their proper function. The number of pulses of water is approximately 4000 beats per liter.

Water Intake Valves

The water intake valves must be checked for connection safety and throughput capacity. In case of improper tightness, valves must be replaced. The valve pre-filters must be cleaned or replaced if damaged.

Recoil Cap at Entry of Water

Due to hygienic reasons, the silicone barrier should be checked regularly at the entry of water. In case of discoloration, the silicon barrier ought to be changed (Item No 74146).

Wash System

Check wash system for impurities, remove foreign objects and clean. Check and clean water jets of wash arms and docking ports.

Function check of sleeves and retaining springs of water docking ports.

Make sure that bearing rings of wash arms are in good condition, replace if needed.

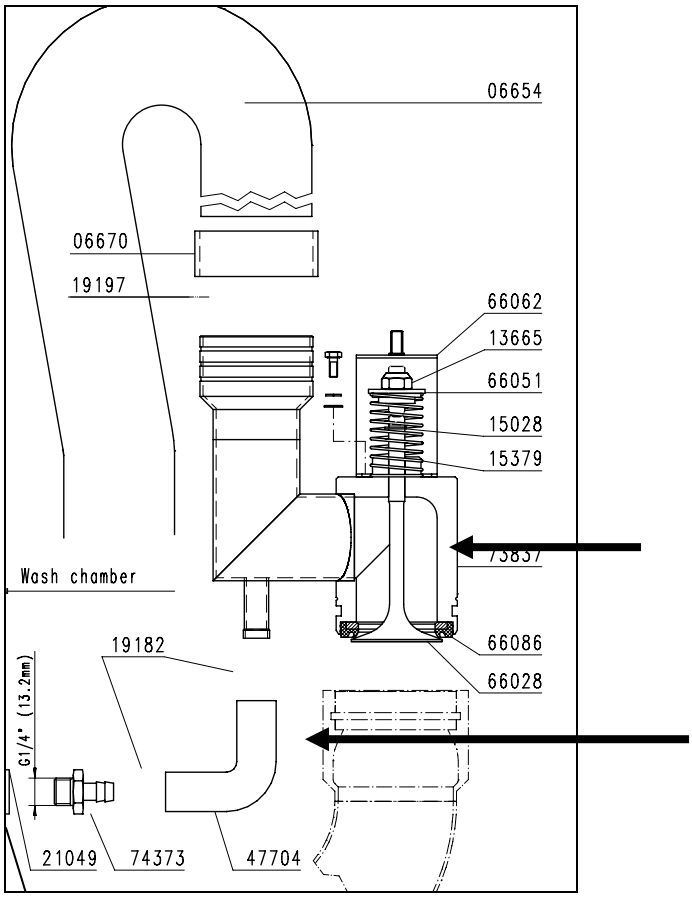
Check drain valve and re-circulation pump for proper function and leaks.

Cleaning of Wash Arms

The wash arms must be cleaned and bone rests removed after every maintenance service. Possibly, the wash arm bearing must be removed in order to facilitate the procedure and to have better access. The plastic bearing can be opened, as shown below, counterclockwise to the wash arm.

Check valve

Does the check valve Opens?



Remove housing and check seal. Remove orange color air hose and check for leaks following several water cy-

Check leak water return hose for brittleness .

Door

Check gear belt of door, adjust by means of door spanner if needed.

Functional check of entire door system.

Use mild detergent to clean door seal, coat with Silicon grease.

Door pressure: check linear motor for proper function.

Periodic maintenance is highly recommended for reasons of operational safety. Professional disassembly is required (Customer Service Belimed). *The collection trough of inner door must be given special attention. Hoses of door drainage must periodically be replaced.*

Electric Installation

Check entire electric installation (burn and melt traces). Replace damaged components. Make sure that all plug and clamp connections are in good shape, replace suspicious connections.

Temperature Monitoring System

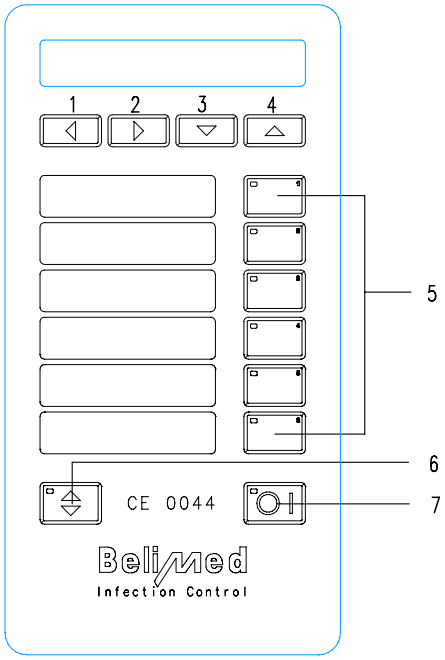
The sensors and limiters of the temperature monitoring system must be checked for proper function. Damaged or visibly altered components must be replaced.

Find itemized maintenance. Thus, efficient and comprehensive maintenance service is assured.

4. Service Programs

4.1 Input Modules for Servicing

4.1.1 General Key Functions Service Module



Legend

1- 4 <Arrow keys>

1. **Print operational data** such as program recipe and setup data.
   Activate **self-disinfection** ON / OFF
   Activate **Process verification** IPD = ON / OFF
   (If Option IPD is connected, verification may be activated).
2. **Beeper** ON / OFF, at program end or in case of error acoustic signal occurs.
3. **Printer** ON / OFF
4. **Shift** key programs P7 - 12

Program keys <PT> 1, 2, 3, 4, 5, 6

5. **Selecting programs** P 1-6, with shift P 7-12
6. **Door button**, door open / close.
   With CS door open, beeper is activated with door button
7. **Reset and ON / OFF** <IO> button respectively.
   By pressing for 4 seconds, then releasing, batch number and machine No. is shown.

Access to Service Module:

- 5 push seconds <IO> 7 key then Query key sequence for 3-digit password (1 - 6)

Operations within the Input Modules:

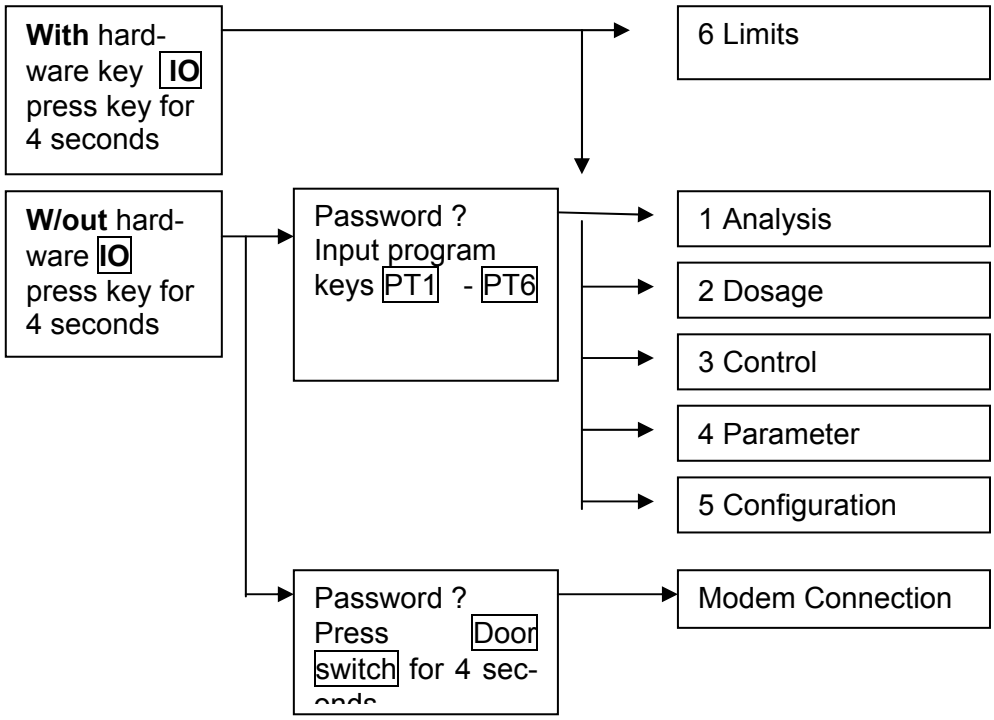
- <Arrow keys> 1 and 2 ◄ ► for cursor functions within the display window ◄►
- <Arrow keys> 3 and 4 ▼ ▲ for scrolling within the respective input window ▼▲, at time of exit, value is saved by means of cursor.
- With Door switch 6 to subsequent display No. or display window.
- Exit or move up to next level with IO 7.

4.1.2 Access Authorization

User	Input Module	Access
Dosing manufacturer	1 and 2	Password A
Hospital technician hospital	1, 2, 3, 4, 5.1	Password B
Service technician manufacturer	All modules	Hardware Key

4.1.3 Access to Service Module

Press <IO> 7 key for 5 seconds, followed by query key sequence for 3-digit password (1-6)



Function	**Display / Input**
Press **IO** key for 4 seconds, enter password Keys 0-9, 3 digits	Password ? *XXX*
Menu surface, over program key 1 - 6 access to respective service module. With Door key to next window	1. Analysis 2. Dosing 3. Access 4. Parameter 5. Configuration

4.1.4 Service assignments: Opening of both doors

Both doors may be opened by means of code input or by hardware key.

- Press <door switch> 6 of unclean side for 5 seconds in mode „Program ready “.
- unclean side door opens
- Password is queried.
- Enter password while keeping door switch depressed
- Clean side door opens.

(Keep <door switch> depressed, even during password input)

When using hardware key, there is no password requirement.

4.1.5 Overview Service Module

1. Analysis Module (1 Analysis)

The operating conditions can be analyzed with this mode.

- Query of a variety of current values (sensors, probes, inputs..), query only, no input possible.
- Query last 10 error codes with respective date and program step.
- Interrogation no. of batches of programs 1-12.
- Operating hours air filter.
- Analysis possibility and water sample with step override.
- Testing rack recognition

2. Dosing Module (2 Dosage) for Dosing Unit

This mode is for the manufacturer of detergents.

- Display of recipes assigned to individual programs
- Input of dosing agent parameters in recipe
- Calibration Dosing pump and Impulse counter; query pulse values

3. Control Module (3 Control)

- Manual control of individual outputs.

4. Parameter Module (4 Parameter)

With this mode you can change or adjust the process parameter (program)

- Modification of recipe assisted by guiding mask (self-explanatory). The program sequence cannot be altered.
- Assignment of program name.
- Input of stored programs from program library.
- Modification of recipe: Program sequence may be chosen freely, i.e. any and all combinations are possible. (not self-explanatory).

5.1 Configuration Modules 1 (5 Configuration)

With this mode you can change the Set Up attitudes of the machine.

- Self Disinfection

- Service interval
- Operating hours air filter / resetting hour counter following replacement of air filter
- Modification of temperature unit (F or C)
- Time and date, unit
- Display and message in case of error such as „Tel No. Tech Service 154“
- Languages, German, French, Italian
- Signal K28 ON or OFF
- Pressing force of automatic door (only applicable with WD 250 and 290)
- DI boiler: input pre-heating and dwell time (option)
- 1 or 2 door model (in case of wall installation)
- No draining in case of program interruption
- Automatic basket recognition ON or OFF (option)
- CS door opens automatic at program end on or off
- Door interlock for DS on or off
- User ID on or off
- Bach content Identification on or off
- Automatic rack ID by means of keypad on or off)
- CS door opens at program end

5.2 Configuration Module (only for service technicians manufacturer)

- Operating level wash pump
- Input empty level
- Duration drain pumping / draining following level 0.5 V until net step
- Definition door positioning (potentiometer values) only applicable with automatic door
- Assigning potential-free output K28, K58, K59 (end of program, run, error, exhaust flap)
- Assigning Bus No to ICS 8535 (communication to outside)
- Display type
- Post-cooling dryer
- Locking DI boiler ON / OFF (option)
- Dryer in case of steam / steam
- Drain water cooling ON / OFF (option)
- Altering password
- Input machine number
- Production date
- Last print exchange
- Input telephone number for modem connection

6. Limit Values Error Codes (only for service technicians manufacturer)

- Alteration of limit values

4.2 Analysis Module (1 Analysis)

Function	Display / *Input*
LED PT 1 illuminated Software index, the automat may be started in this mode. With door key, it is possible to continue selections in the current program. Using IO, the program is cut off, remaining in analysis module.	**Analysis** Software index V 1.0
4.2.1 Actual values temperature sensor NTC NTC1 = Wash chamber NTC2 = Dryer NTC3 = Empty (--- = empty) NTC4 = DI boiler (option)	T1= 45 °C T2= 25°C T3= --- °C T4=---°C
According to Eur. Norm EN ISO 15883-1 (5.10.3), temperature indication must be independent of control system. NTC 5 = water wash chamber is a monitoring sensor.	T5= 45 °C T6=---°C
Actual value temperature sensor 7- 10 PT 100 sensor (only with WD 270 / 290)	T7= 45 °C T8 =32 ° C T9= 45 °C T10=32 ° C
4.2.2 Level sensor L1, L2 actual values level sensors in V. Working level approx. 1.7V, empty level 0.5V PL, PR actual values in V	L1= 1.20V L2= 1.02V PL= 0.00V PR= 0.00V
Actual values flow meter (optional) Pulses	IMP1= 1234 IMP3= 1234 IMP2= 1234 IMP4= 1234
Display Input switch status (see chapter Inputs) S 101 to S106 0 = open, 1 = closed	S1 01 02 03 04 05 06 1 0 0 1 0 1
Display Input switch status (see chapter Inputs) S 107 to S112	S1 07 08 09 10 11 12 1 0 0 1 0 1
Display Input switch status (see chapter Inputs) S 201 bis S206	S2 01 02 03 04 05 06 1 0 0 1 0 1
Display Input switch status (see chapter Inputs) SA to SF	SA SB SC SD SE SF 1 0 0 1 0 1
Call-up last 10 error codes with respective error code, program, program step, date and time.	1: Error **111** **P3** **S2.1** 13.12.2000 16:44

Error code

Error in program No.

In program step

Batch Counter: display **Batch number** of programs 1-12 with scroll keys ▲ ▼. For example: with program 1, 5 batches were processed.	Batch count Prog. *P1* 5
Operating Hours: Display operating hours of air filter. Air filter should be replaced after about every 500 operating hours (accumulated drying time).	Op. Time Air Filter **15 h**

Step Jump: Program selection with program keys PT1 - PT6 Selection of desired program step S1.1 to 4.2 with, scroll keys ▲ ▼, then start with ▲.	Step over Program P1-P6 ? Step over S2.1 Start
4.2.3 Validating mode! This module is suitable for validating the dosage. In this step the actual dosing quantity is indicated in ml, which is to be tested while validating. Individual steps may be bypassed form the beginning. By means of ↕door switch, draining action my be stopped, the door opened to remove a water sample. Again using door key ↕, process may be resumed. The programmed dosage, the effectively proportioned amount additive in ml, the respective medium, target temperature and program duration for respective step will be displayed.	P1 I ▌▌▌▌____I 13 min Cleaning 36 °C Step over **D1 = 124 ml** S2.1 M4 085°C 10min

Program step

Medium

Target temperature

Program duration

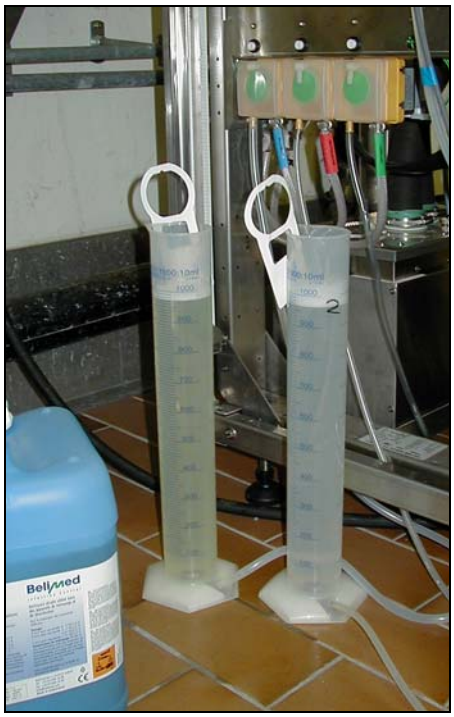
4.3 Dosing Module (2 Dosage) for Dosing Agent Manufacturers

Function	**Display / *Input***
Dosing Module LED PT 2 illuminated Last change in dosing module	Dosage Last mod. 13.06.2001
Display / Adjusting. Program selection P1-6 (7-12 with shift), then dosing data input, otherwise jump dosing input by means of door key. Jumps to display of calibration flow meter.	Display / Modify Program Nr. P1-P6 ?
Display Program No. and Program Name	Program No. 4 Instruments normal
Display of cleaning step 1.1, assignment dosing pump 1-5 and input dosing agent volume in ml.	1.1 Pre-rinse 36 °C 00 min HT0 D**1 5.0**ml
Display of cleaning step 1.2, assignment dosing pump 1-5 and input of dosing agent volume in ml.	1.2 Pre-rinse 36 °C 00 min HT0 D**1 0.0**ml
Display of cleaning step 2.1, assignment of dosing pump 1-5 and input of dosing agent volume in ml.	2.1 Pre-rinse 00 °C 02 min HT0 D**2 0.0**ml
Display of cleaning step 2.2, assignment of dosing pump 1-5 and input of dosing agent volume in ml.	2.2 Rinsing 60 °C 05 min HT0 D**2 2.0**ml

Calibration Dosing Pump 1. If **no** flow meters are connected, **Time** must be set. Calibration procedure see chapter 4.4 Calibration Dosing Pump Start dosing pump for calibration with PT 1, dosing Pump runs 6 Minutes, Input measured amount of Liter. Remaining time in seconds from 6 Minutes.	Doser *1* ***Time*** ***1.10*** L/6Min 360
Calibration of Flow Meter 1. If flow meters are connected, Impulse must be set. Calibration procedure see chapter 4.5 Calibration Flow Meters Start dosing pump for calibration with PT 1, if you reach 1 liter stop with PT 1, push PT2 for transfer measured Impulses to control	Doser 1 ***Impulse*** ***3700*** Imp / L 2353
Actual values flow meters Pulses saved	IMP1 1234 IMP3 1234 IMP2 1234 IMP4 1234
Testing automatic Rack Recognition Option: This indication is active only in case of additional print. In this mode, automatic rack recognition may be tested. Door opening is enabled by button P1. The display changes to „Rack No. –„ With door open, baskets may be inserted. With „IO“ button, door may be closed again, operation reverts back to the analytical mode.	Test Rack Ident Syst Open Door with P1 Test Rack Ident Syst Rack No. 12

4.3.1 Simultaneous dosing from several dosing units: Mix dosing Programming the programs: Without Mix Dosing / Doser 1 = 2.6 ml/L P1S2_035°00M-060°05M F2M3_D1=2.6L-D1=0.0L With Mix Dosing A = D1=5.0 ml D2=3.0 ml P1S2_035°00M-060°05M F2M3_DA=0.0L-D1=0.0L Using Mix Dosing, per phase maximum 4 detergents may be dosed with appropriate concentration. If in doing unit D, instead of a number a letter from A – F is entered, mix doing is activated. To each letter, a maximum of 4 concentrations may be assigned. The software activates a maximum of 2 dosing units simultaneously (otherwise, max. safety is exceeded).	MIX D1:=5,0ml D2=3,0ml A D3= 0,0ml D4= 0,0ml

4.3.2 Calibration of Dosing Pump (Time)



1. Remove hose from respective agent container elbow and place in measuring container (more then 1 liter).
2. Using **PT key 1**, calibration program is started. The dosing pump propels the respective medium into the measuring container. After 6 Minutes the dosing pump stops it self. .
3. The measured value of agents enter in second line liter per 6 minutes.
4. Example: 1.2 liter per 6 minutes corresponds to 12 liter / hour.
5. Return dosing hose back to the machine intake and secure it by means of the hose clamp.

Return calibration liquid to the respective agent container.

4.3.3 Calibration of Flow Meters (Impulse)

Remove hose from respective agent container elbow and place in calibration container (1 liter).

Flow Meter has to be mounted upright.

Using **PT key 1**, calibration program is started. The dosing pump propels the respective medium into the calibration container. On second display line, pulses are summed up.

Once the 1 liter mark has been reached in the calibration container, the calibration program must be stopped by means of **PT key 1**.

The counted number of pulses found on display line two corresponds with the pulse value per liter. This number must now be taken over by means of **PT key 2**.

Return dosing hose back to the machine intake and secure it by means of the hose clamp.

Return calibration liquid to the respective agent container.

4000 Impuls is approx equivalent to one Liter of water

4.4 Direct Control Module (3 Control) for Service Technicians Hospital

Function	Display / *Input*
Direct control of actuators 1 – 6: Individual control by pressing PT1 – PT6, If a relay is active, the respective LED of PT 1-6 is illuminated K1-K34: On first push, user is turned **on**, on second push, user is turned **off**. Activate user for max. 10 seconds. Reset all activities with IO button. Door drive K35-K38 and linear motor M41, M42 : Motors are active only as long as respective buttons are pushed.	P1 P2 P3 P4 P5 P6 11 12 13 14 15 16
Direct control of actuators 17-24: Individual control through pushing PT 1 - 6 etc.	P1 P2 P3 P4 P5 P6 17 18 21 22 23 24
Direct control of linear drive UR M41. O = open, C = close. 255 = potentiometer value	P1 P2 255 41O 41C
Direct control linear drive RS M42. O = open, C = close. 255 = potentiometer value	P1 P2 255 42O 42C

4.5 Parameter Module (4 Parameter)

Parameter Module LED PT 4 illuminated Last modification in parameter module	Parameter Last modif. 13.06.00
Display / Modify: enter selected program P1-6 (with shift + p1-6), then enter recipe. Otherwise, recipe input may be jumped by means of door key. Jumps to display recipe library.	Display / Modify Program Nr. P1 – P6?
Assignment Program Name Program name may be assigned to program with scroll key ▲ ▼. New names may only be defined by application of PC software. The program name is displayed with printout or batch document.	Program P1 *Instruments Normal* *AN Material Normal* *MIC Instruments* *OP Shoes etc.*
Temperature and time input step 1 / I: The media and step assignments cannot be changed. HT0/1 Dwell time ON or OFF **Dwell Time** 1 = Dwell time, program run time is counted only if value is above target. In case of thermal and chemical disinfecting (F6 and F7), always select dwell time = 1, for drying and condensing (M5 and M6), dwell time not possible, i.e. always = 0.	1.1 Pre-rinse **00** °C **00** min HT**0** D**1 5.0**ml

Temperature and time input step 1 / II	1.2 Pre-rinse **30** °C **02** min HT **0** D**1 0.0** ml

Temperature in step 1.2

Wash cycle time at selected temperature in minutes

Dwell time ON 1 or OFF 0

Dosing unit 1-5 and doing in ml / liter

Assignment of program library Example Assign program No. 3 to program key 1. With cursor to **Do**, then execute with ▲ key. 0 = Reset.	Instruments Normal From **03** to **P1** **Do**

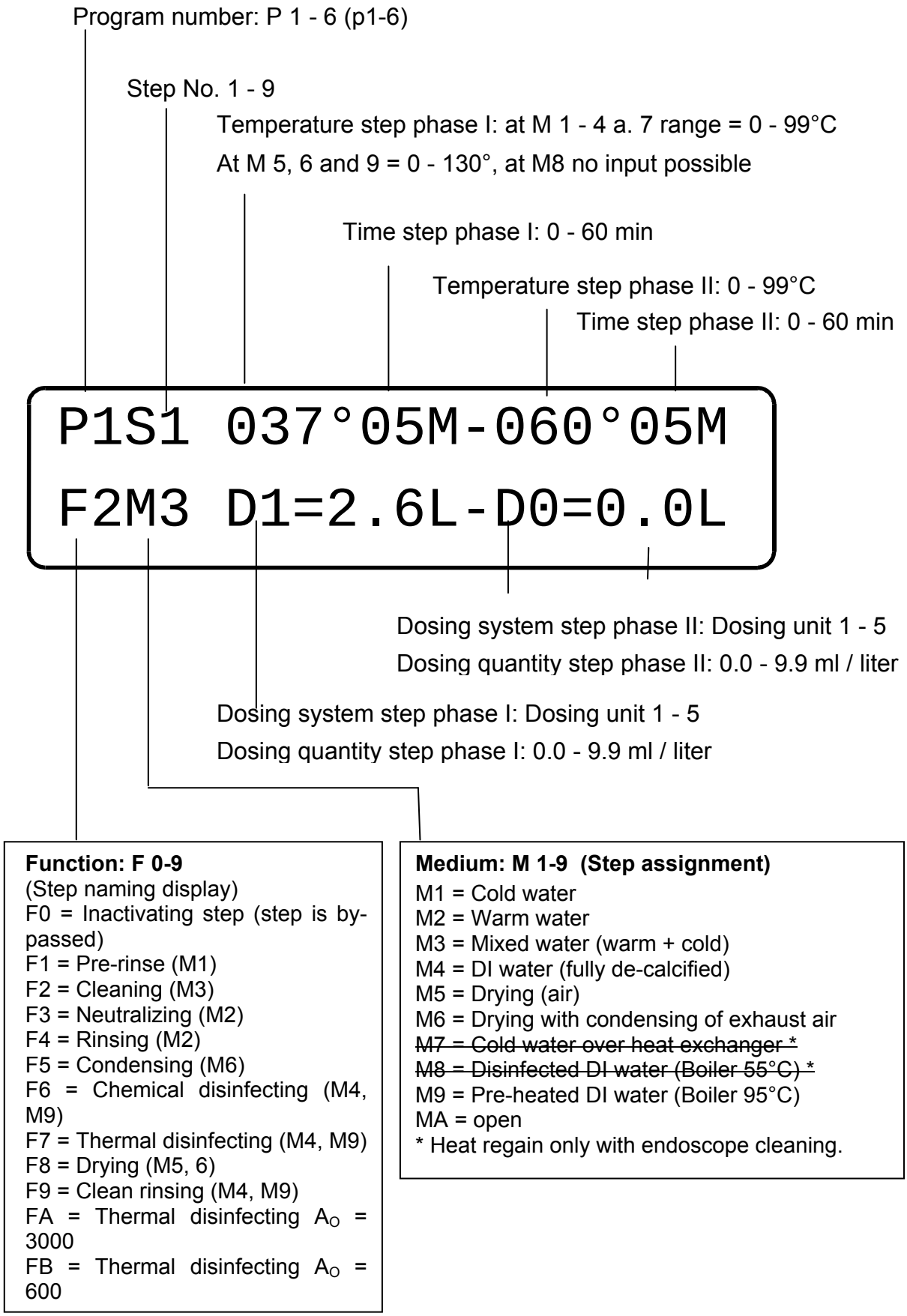
Program No. 0-99

Assigned program key

Execute with ▲

Recipe input see chapter Parameter Input. Media 1-9, functions 1-9 and A, temperature and time input, temperature limitation with media 1-4, 7-9 max 99°, media 5 and 6 max. 130 °C. Time limit max. 60 min. **!WARNING!** **Drying: A to long drying time with high temperature speed up the age of the EPDM tubing. The tubing get brittle and do not last long.** **Recommendation:** Due to Evaporations energy it is recommended to dry in the beginning with the max Temp., after 5 Min. it must reduced to lower heat. Instruments 130 C°, 5 Min., after reduce to 100°C and 7 Min.. AN Material: 130°C, 3 Min., after reduce to 75°C and 15 Min.	P1S1_085°05M-025°05M F1M3_D1=2.6L-D1=2.6L (in C°, M = min, L = ml) ⚠

4.5.1 Overview Parameter Input



4.5.2 M1 medium CW for cold water cycle

Intake process (dynamic)

With the “dynamic fill procedure”, water consumption may be kept to a minimum. The control allows water intake only until an optimal operation of the water pump is assured. Depending on wash goods carrier and wash goods, only the required quantity of water is replenished. This methods warrants optimal decontamination results while keeping water and chemicals consumption to a minimum.

During the cold water cycle, CW is injected to the calibration point of approx. 2.1 V. During the calibration step, the intake rate (liter / second) of the intake valve is determined. From this reading, the control system calculates the water consumption for the entire opening time of the water valve during the respective water cycle. If the wash pump is now started, the level will drop whereupon the dynamic water intake procedure is started. The intake will be stopped as soon as the working level is attained. 7 seconds later, a check is made to insure that the predetermined level has been reached. In case the required level is underachieved, water will be replenished accordingly. This procedure is repeated until the target value is attained. Should this procedure exceed the preset limit of 5 minutes, the filling cycle will be interrupted under display of “no CW”. The limit value may be adjusted under „Limit 6“.

Temperature control ISO EN 15883 –1 chapter 5.9.1 a

If water temperature deviates by more than 8 °C in water steps M 1, 2, 3, 4, 9, error code 163 „Water too warm “ will be flashed while process is interrupted.

In case no temperature is entered (00 Default), query is inactive and no error is indicated.

In case of function cold pre-rinse F1, the max. allowed temperature is 45 C°. When exceeding a water temperature of 45 °C, error 163 „Water too warm “ is indicated and the process is interrupted.

In case the selected temperature is not attained, the SW interrupts the process under indication of error 161 „No heat“. Monitoring is started when heater is turned on.

The temperature limit of the temperature control during water steps (M1-4, M9) is therefore –0 / +5 °C, thus meeting requirements of norm ISO EN 15883 –1, chapter 5.9.1 a.

Dosing procedure:

The dosing quantity is determined by the calibrating step. Dosing is possible either from the beginning or, if desired, only after reaching the target temperature (certain detergents have a tendency for foaming at low temperatures).

Dosing may be controlled either by on-time of the dosing pump or by flow meter results (pulse counting). Calibration procedure is described in chapter 2.8 Dosing Module. **The maximum dosing is limited to 500 ml.**

Important note:

If dosing is added during the first program phase, dosing will take place only after reaching the target temperature.

Example:

	Phase1-	Phase2	
P1S1_	035°00M-	060°05M	Phase 1: filling at 35°, dosing 2.6 ml
F1M3_	D1=**2.6L**-	D1=**0.0L**	Phase 2: heating to 60°C

	Phase1-	Phase2	
P1S1_	035°00M-	060°05M	Phase 1: filling w/out dosing
F1M3_	D1**=0.0L**-	D1=**5.0L**	Phase 2: heating to 60°C, then dosing 5 ml.

By means of level sensor P1 the drain cycle is monitored.

Errors 140 to 162 monitor the filling, dosing , wash, heating and draining cycles.

4.5.3 M2 medium WW for warm water cycle

Same function as M1 but with WW.

0° = Unless a certain temperature is programmed, the program will start with whatever the temperature of the warm water happens to be.

Example:

Phase1- Phase2
P1S2_000°00M- 090°05M Phase 1: filling at given temperature, dosing 2.6 ml
F2M2_ D1**=2.6L**- D1=**0.0L** Phase 2: heating to 90°C

4.5.4 M3 medium CW + WW mix water cycle

During the dynamic water intake process, cold and warm water are injected according to the preset temperature. First, warm water is injected, as soon as the preset temperature is reached, cold water is added. Should the preset temperature be underachieved, filling continues again with WW.

4.5.5 M4 medium DI water cycle

Same function as M1 but with DI water, i.e. with Y13.

4.5.6 M5 medium hot air (dry)

In this medium, blower (output K 17) and the air heater (K 18) are controlled by means of intake (air temperature sensor NTC 2) according to the selected target temperature and over time. Temperature indication on the display and at the printer corresponds with the readings of the air temperature sensor at the wash chamber intake NTC 2.

A fixed shut-off delay of the blower according to chapter 5.27 Dryer delay is always present.

4.5.7 M6 condenser functions

To activate the condenser, medium **M6** – condensing must be programmed instead of medium **M5** – drying. In this medium, in addition to drying, the CW valve (Y27) is opened. After 8 min. drying time, the CW valve remains closed, because usually the exhaust humidity drops below 20 %.

4.5.8 M9 pre-heated DI water (final rinse)

Instead of **M4, M9** is entered for the final rinse. Preferably, the temperature for the thermal disinfection of the DI tank is **95°C**, **dwell time 0 min**. is entered. This eliminates preheating of rinsing water in the wash chamber. (See input configuration module)

Content may be kept no longer than for 24 h at the selected preheating temperature. In case no program is selected, the temperature will drop at the expiration of the preset number of hours (econo mode).

Set Up see input configuration module 1 5.10 Pre-heat

The filling procedure, dosing and temperature control are as with M1.

Important note for option condenser with DI water pre-heating.

During programming, both media **M6 and M9 must always appear in the same program.** Should M9 not appear in the same program, the DI water will be sent by way of the overflow into the drain.

4.5.9 F0 function step inactive

A step may be added or removed. E.g. 2 rinsing steps may be programmed, customer may elect to deactivate one rinsing step. The second step will subsequently be shifted from F4 to F0. The SW will jump this step, in spite of the fact that these parameters are set.

4.5.10 F1 – F5, F8 and F 9, FD, FE function display

These are pure indicator functions. The dwell time is et to 0.

M8 should always be applied together with FD and M4/9 together with F9. As a rule, final rinse is used instead of clean rinse.

4.5.11 F6 and F 7 thermal disinfection or chemical disinfection

In these functions, the dwell time is set to 1 in addition to the display function.

4.5.12 FA Thermal disinfecting A_o = 3000

Selection of Ao values in practical application

The norm EN ISO 15883-1 defines disinfection as follows: «Reduction of living micro organisms on a product to a predetermined level that is appropriate for the subsequent application of the product». Reduction factors of 5 or sometimes 4 log magnitudes are required of chemical disinfecting additives, depending on types of germs (Virus, prEN14476). Which titer reduction is appropriate for a thermal disinfecting process?

EN ISO 15883 defines two different applications with one associated Ao value for each. According to this, containers for human excrements (part 3 of the norm) must be disinfected with a minimum Ao=3D 60, surgical instruments etc. (part 2) with minimum Ao=3D 600.

In addition, according to the norm, an RDT must be in a position to carry out a disinfection with Ao=3D 3000, however, an appropriate application is not defined.

The Robert Koch Institute in Germany recommends an Ao value of 3000 for all critical medical products. Medical products that are contaminated by heat resistant viruses such as Hepatitis B – Viruses, must be disinfected with an Ao value of 3000.

All semi-critical instruments, i.e. those that are thermally disinfected but will not go through a subsequent sterilization process should be disinfected with A_O = 3000.

According to definition CEN/TC102 WG8 N305 EN ISO 15883-1 Annex A

A_O concept; comparative lethality of mister heat processes

A reduction of the exposure time for decontamination process can be achieved by using the function FA. The control continually measure and add the prevailing heat quantities according to the Equation $A_0 = \Sigma\ 10\ (T\text{-}80)\ /Z\ \Delta t$ (Z = 10, Δt = 10 Seconds above 65°C) already during the heat up phase and finish the phase thermal disinfections immediately on reaching the requisite A_O = 3000 / 600 value.

Example 1

P1S4_093°00M-093°01M
FAM4_D1=0.0L-D3=2.6L

After reaching in the first phase the value A_O = 3000 at 93°C, the second phase of dosing 3 for 1 Min 93°C will be processed.

Example 2

P1S4_093°05M-000°00M
FAM4_D1=0.0L-D0=0.0L

After reaching in the first phase the value A_O = 3000 at 93°C, an additional disinfecting of 5 Min. will be processed.

Value A_O = 3000 means 2 min. at 93 °C..

The display shows the actual A_O value.

P2 < ■■■_> 13
Min
DESINF.Ao 2389 89
°C

4.5.13 FB Thermal disinfecting A_o = 600

Same function as FA but with reduced Ao value of 600.

All instruments that will be sterilized in RDG following their disinfection may be disinfected with A_O = 600.

Wert A_O = 600 means 60 sec. at 90 °C or 10 min. at 80°C.

Example

P1S4_090°00M-000°00M
FBM4_D1=0.0L-D1=0.0L

4.5.14 FF and FE, empty

These functions may be individually named by means of the „Language File“. Text line T318 and 319.

Example: instead of „FUNCTION F „ it is „Demi rinsing “

4.6 Configuration Module 1 (5 Configuration)

Configuration Module 1 LED PT 5 illuminated Last change in configuration module.	Configuration Last modif. 13.06.00
4.6.1 Timer for self-disinfection / DI tank drainage In case system disinfection is activated, automatically, program self-disinfection is suggested on display once the preset time (e.g. 24 h following last wash cycle) has elapsed. Default 24h, setting range is 1-99 h, 0 = inactive Caution! For self-disinfection, input by keys or mode „Basket Coding“ must be ON! See Automatic Program Recognition.	Timer self-disinf. 24 h
4.6.2 Maintenance Warning Batch number service interval; when reaching the selected number of processed batches, the display does not show the usual “Program ready” but rather „Periodic Service“. However, the automat continues to be operational. Increase in steps of 100. 00 = Maintenance display turned off. After maintenance, it is necessary to increase the batch number, e.g. to 2000.	!Periodic Service! *10000*
Display Operating Hours Air Filter. The drying time is summed up. If air filter is exchanged, use right hand scroll key ▲ to reset the operating hours to 0 h. The lifetime of the main filter is about 500 h.	Op. Time Air Filter Reset Timer 200 h
Languages Default = German	Language German
Temperature Unit F or C° Date and time indication in European (e.g. 16:24) or in USA (e.g. 4:24 PM) version	Unit of Temp. F/C° Date / Time Europ. / USA
Date / Time Indication. Setting date and time units 01/13/2001 = USA = Month/Day/ 13.01.2001 = Europe = Day.Month.	Date / Time 01/13/2001 01.15 PM
Signal ON / OFF (potential-free output K28), Caution: no beeper	Signal ON / OFF
4.6.3 Naming Automat for batch printer or PC documentation	Name Washer SUBSTERI DEKONT1
4.6.4 Input Door Pressure (only for WD 250) Default = 0.5 A Values for the door pressure 0 - 1.6 A for DS = unclean side, CS = clean side.	Door Press Force US = 0.5 A CS = 0.5 A
DI Boiler Pre-Heating: This mode permits setting of pre-heat target temperature with respective dwell time. Input temperature and pre-heating time. The tank is pre-heated to 85 °C and held for max. 24 h. The pre-heating temperature is active only when O-I key is ON and if no program is active. Only with option DI boiler, i.e. switch SC is closed, otherwise no	Pre-heat 85°C 24 hours

indication.*	
Thermal Disinfecting of DI Boiler: Input of temperature and dwell time. Example: At 0 min. DI tank is drained even if the target temperature of 95°C has not been attained. Heating to 95°C takes place only after program start.	Thermal Disinfecting 95°C 0 min
Number of Doors: 1 door / 2 doors, default 2. In case of 1 door model, RS is not queried. Front loading operation.	Number of Doors 2/1
4.6.5 Suppressing liquid drainage acc. ∫ 18 ISSG Infection protection law (BGA / RKI) No draining in case of program interruption such as error through „I/O“ switch. On / Off. According to the German infection protection law, paragraph 18, a special program is required in case of an epidemic. The disinfection phase must occur at the beginning of a program. The first wash liquid draining must occur only after conclusion of the disinfection phase. In case of program interruption, the program may not be continued by discarding the wash liquid ahead of completion of the disinfection phase. This requirement shall prevent contaminated wash liquid from reaching the drain system. In case of an epidemic the door interlock must be “On” (Drain interlock on) and rain pumping action in case of interrupt must be set to “Off” (Drain at interrupt off). In addition, a BGA program must be assigned to a program key. On: In case of program interrupt, always draining (normal condition) Off: In case of program interrupt, no drain pump action. If a new program is started, wash pump is restarted without prior draining. Exception: Should the first program step happen to be M5 or M 6, input is ignored. Caution: In case of program step bypass, it is prohibited to set on “Off”!	Drain at Interrupt ON / OFF **Default „on“** **If epidemic „off“**

4.6.6 Automatic Program Recognition

ON / OFF / Only, Default ON

If Reed sensor basket recognition S105 is closed, basket coding S 106 – 108 is read into memory. Depending on magnet combination, some 7 different programs may be activated. Upon activating door key, the automat will start the selected program after door closing.

S105	S106	S107	S108	Program
X			X	**P1**
X		X		**P2**
X		X	X	**P3**
X	X			**P4**
X	X		X	**P5**
X	X	X		**P6**
X	X	X	X	**P7**

S105 = Basket positioning

Basket Coding
On / Off / Only

ON

Program selection with basket coding is active. The entered programs may be **overwritten by means of the program keys**.

OFF

Basket coding is not active, programs may activated by **keyboard** only.

Only

Program selection **only** by means of **basket coding**. When pressing program key, display shows „only by basket coding “.

4.6.7 Display and Message in case of error.

e.g. „Tel No Tech Service 105“

Error Message
Tech. Service 105

Assignment of Printer.
Tabletop printer / Panel printer

Printer
Desk (Star SP200)

4.6.8 At Program end, CS door opens automatic (2 doors = CS; 1 door = UC) Default = OFF, with conveyor always ON.	Door open at progr. end ON / *OFF*
4.6.9 Door Interlock Unclean Side: If a program got interrupted with the I/O button, during a program cycle, the UC door stays interlocked. On the display instead of “Program ready” “Door Interlock” is shown. The Door can be opened only if a program is run successfully till to the end. Default = On	Door Interlock *On / off*
4.6.10 User Identification Input of name No. by means of keyboard or input name by means of barcode reader for batch documentation. IN case of activated user ID, name or number of user will be interrogated on display as follows: “User Name or No.?.." The machine either enters a two-digit number of the 6 program buttons from 11 – 66 or reads a text by means of the barcode scanner. The respective number (e.g. 36) or name is fed to the printer RS232 X 31 or interface RS 485 X32. A program can be initiated only if this input is completed. If program start is attempted, the machine will remain in the interrogation mode. In case of automatic basket loading, program cannot be started until this information is provided. Upon entering a 66, text "No ID" will be passed on. Barcode reader is connected identical to printer to the printer interface X32. Default = Off	User Identification *on / off*

4.6.11 Automatic Rack Identification Input of rack ID No. by means of keypad or by means of barcode reader for batch documentation. In case of activated rack ID, after program start, interrogation of rack No. is shown on display: “Rack Name No?" - - “. Upon input of e.g. 36, No. 36 is passed on to the printer or to batch ID system 8535. The machine either reads a 2-digit number from the 6 program buttons from 11 – 66 or it reads a text (12 characters) by means of the barcode reader. The respective number (e.g. 36) or the name is passed on to the printer RS232 X 31 or to the interface RS 485 X32. A program can be started only if the input has been accomplished. 66 means "no ID". If the program is started without input of name or number, the SW will remain in interrogation mode. In case of automatic basket loading, program cannot be started prior to input. Printer shows a line with "batch rack / No. xxx" only in case of active batch ID. The barcode reader is also connected to the printer interface X32. In case of de-activated basket ID, automatic rack recognition can be accomplished by means of Reed sensors S 301 – 306 (auxiliary print). Default = OFF	Rack Identification *on / off*
4.6.12 Input batch content on or off In case of active batch content ID and open door, instead of “door open”, display shows query of batch content (sieve tray No.): Inputting of batch content, e.g. sieve tray with barcode or keyboard. Printer shows line „Batch content„ only in case of active batch content identification. The barcode reader is also connected to printer interface X32. On the unit, the barcode 0 for identification must be concluded or no identification must be attached. Default = off	Content Ident. *on / off*

5. Printouts

Following printouts are available:

- Current program operation (batch documentation)
- Operational status in case of error
- Setup settings and program parameter

In case of program operation (batch documentation)

Printer must be in stand-by mode and activated by cursor key ▼ „ON / OFF“.

```
Substeri West 1
Belimed WD 250
Machine No.      99996.9632
Batch No.              1565
Program No.P1
User name / No.: Chr. Wicky
Rack name / No.   1250
Instruments Normal
Pre Wash                  12:01
 S1.1 20°C                 2Min
Wash                      12:03
 S2.1 35°C 5.0mL/L 1550ml 0Min
 S2.2 60°C                10Min
..
Total program time 45Min.
A0 = 3045, Disinfecting OK

……..
```

The concentration and the actual proportioned quantity of the dosage get printed.

„Disinfecting OK is shown only in case of function FA or FB.

In case of error or program interrupt (operational status in case of error)

If stand-by printer has been activated by cursor key ▼ „ON / OFF“, all inputs, outputs, sensor values and error codes at time of program interrupt will be logged.

Printing of setup settings and program parameter

Since all parameters and configurations will be lost on the occasion of a processor print exchange, it is mandatory to keep a parameter printout near the automat following start-up.

By pressing the left cursor key ◄ the display will show „Print Operating„. With the right cursor key ▲ the printer will be activated.

Program parameter

```
P1 Instruments Normal
S1_F1M1_035° D1=2.6L 05M0_055°D1=0.0L005M0
S2_F2M3_060° D2=3.7L 08M1_000°D1=0.0L000M0
```

Definitions:

F1 = Function, **M1** = Medium, **F0** = Step bypassed

M = min, **L** = ml / liter, **°** = C°

0 = without dwell time, **1** = with dwell time

6. Hardware Configuration

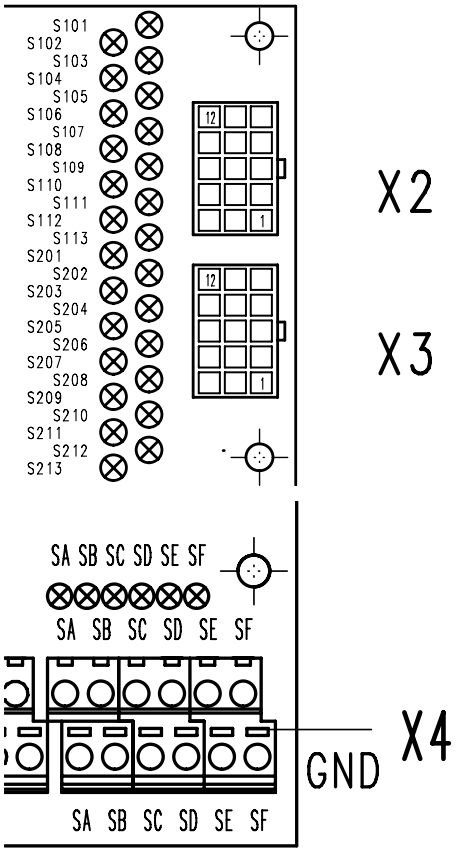
6.1 Outputs

Code	WD 230	Code	WD 250
Y11	CW valve	Y11	CW valve
Y12	WW valve	Y12	WW valve
Y13	DI valve	Y13	DI valve
K14	Pump DI tank /tank	K14	Pump DI tank/tank
K15	Re-circulation pump	K15	Re-circulation pump
K16	Tank heater	K16	Tank heater
K17	Dryer blower, flap	K17	Dryer blower, flap
K18	Dryer heater (NTC2)	K18	Dryer heater (NTC2)
M21	Dosing pump 1	M21	Dosing pump 1
M22	Dosing pump 2	M22	Dosing pump 2
M23	Dosing pump 3	M23	Dosing pump 3
M24	Dosing pump 4	M24	Dosing pump 4
Y25	CW valve drain cooling 60°C	Y25	CW valve drain cooling 60°C
K26	Boiler heater DI tank	K26	Boiler heater DI tank
Y27	CW(DI) valve condenser	Y27	CW(DI) valve condenser
K28	Signal end of progr. run, Error exhaust flap	K28	Signal end of progr. run, Error exhaust flap, Pre-check valve
	240 V		
Y/M31	Drain valve / pump	Y/M31	Drain valve / pump
K32	Dosing pump 5 (option)	K32	Dosing pump 5 / **Basket drive US***
K33	-	K33	**Basket drive in unit ***
M34	-	M34	**Basket drive CS***
L35	Door lock US	K35	Lift motor US open
L36	Door lock CS	K36	Lift motor US close
K37	-	K37	Lift motor CS open
K38	Illumination chamber	K38	Lift motor CS close
	-	M41	Linear motor US
	-	M42	Linear motor CS

6.2 Inputs

Code	WD 230	Code	WD 250
S101	Machine code -	**S101**	Machine code 250
S102	Machine code -	**S102**	Machine code 250
S103	Machine code 230	**S103**	Machine code 250
S104	Empty	**S104**	Reset External / close CS door
S105	-	**S105**	Basket positioning
S106	Basket coding	**S106**	Basket positioning
S107	Basket coding	**S107**	Basket positioning
S108	Basket coding	**S108**	Basket positioning
S109	Pressure switch sieve clogged (opener)	**S109**	Pressure switch sieve clogged (opener)
S110	Door switch US closed	**S110**	Aux. Relay door US closed
S111	Door switch CS closed	**S111**	Aux. Relay door CS closed
S112	Empty	**S112**	Door switch US open
S113	Empty	**S113**	Door switch CS open
S201	Empty Indicator 1	**S201**	Empty indicator 1
S202	Empty indicator 2	**S202**	Empty indicator 2
S203	Empty indicator 3	**S203**	Empty indicator 3
S204	Empty indicator 4	**S204**	Empty indicator 4
S205	Empty indicator 5	**S205**	Empty indicator 5
S206	Empty	**S206**	Feed in and out conveyor
S207	Empty	**S207**	External Conveyer Manual (code)
S208	Empty	**S208**	External Conveyer automated
S209	Empty	**S209**	Tape switch US
S210	Empty	**S210**	Tape switch CS
S211	Pressure switch 50 mbar	**S211**	Pressure switch 50 mbar
S212	Differential switch filter option	**S212**	Differential pressure switch filter option
S213	Error exhaust system (external)	**S213**	Error exhaust system (external)
SA	Load cut-off (external)	**SA**	Load cut-off (external)
SB	Leakage floor pan	**SB**	Leakage floor pan
SC	DI boiler code	**SC**	DI boiler code
SD	Float switch DI boiler	**SD**	Float switch DI boiler
SE	Empty	**SE**	Door US open
SF	Empty	**SF**	Door CS close

Inputs X2 and X3



The LEDs are arranged with offset.

Following digital inputs (closing contacts) may be connected at screw clamps (X4).

6.2.1 SA Load cut-off (external)

If input SA is closed, the current program will not be interrupted but completed in normal fashion. However, a new program cannot be activated. Instead of „Program ready“, display will show „Peak Load Cut-Off “.

6.2.2 SB Leakage Floor Pan

If input SB is closed, the current program will be interrupted. Display will show „Machine leaks / Error code 112“.

6.2.3 SC DI Boiler Code

If input SC is closed, the SW knows that a DI boiler is connected. The temperature sensor NTC4 is queried, the functions for DI operation (float switch SD, K26, NTC4, K34) are activated.

6.2.4 SD Float Switch DI Boiler

Float switch for DI boiler, active only if SC is closed.

6.2.5 SE Door US open

If input SE is closed, US door is opened (conveyer).

6.2.6 SF Door CS close

If input SF is closed, door CS is closed (conveyer).

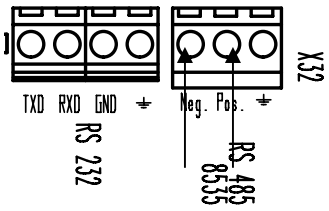
6.3 Temperature Sensor

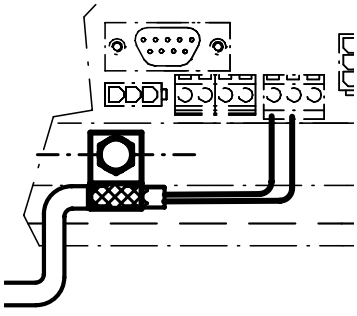
The control sensor is NTC 1, the display sensor is NTC 5. Printer always shows values of NTC 5.

NTC	**1**	Temperature sensor tank (K16) for process control
NTC	**2**	Temperature sensor dryer (K18)
NTC	**3**	Empty
NTC	**4**	Temperature sensor DI boiler (K26) option
NTC	**5**	Temperature sensor tank monitoring is applied for display during water cycles M 1, 2, 3, 4 or 9, batch documentation printer and PC documentation 8535
NTC	**6**	Empty
PT100	**7**	Temperature sensor tank (K16)
PT100	**8**	Temperature sensor dryer (K18)
PT100	**9**	Temperature sensor tank monitoring
PT100	**10**	Temperature sensor DI boiler (K26) option

6.4 Interfaces

6.4.1 Bach documentation system Sauter ICS 8535 / 8565





Interface RS 485

The connection for the Bach documentation system 8535 are as by arrows marked on the terminal X 32 on the Control print.

Assigning of the address

In configuration module (5 Configuration), the address for the interface RS 485 may be assigned only using the HW key under

Address RS 485
Nr. 0

For washers, No. 4 - 9 are reserved, for sterilizers address 1-3.

0 = interface inactive. Default

Unit No. 1 address 4
Unit No. 2 address 5

Unit No. 3 address 6
Unit No. 4 address 7

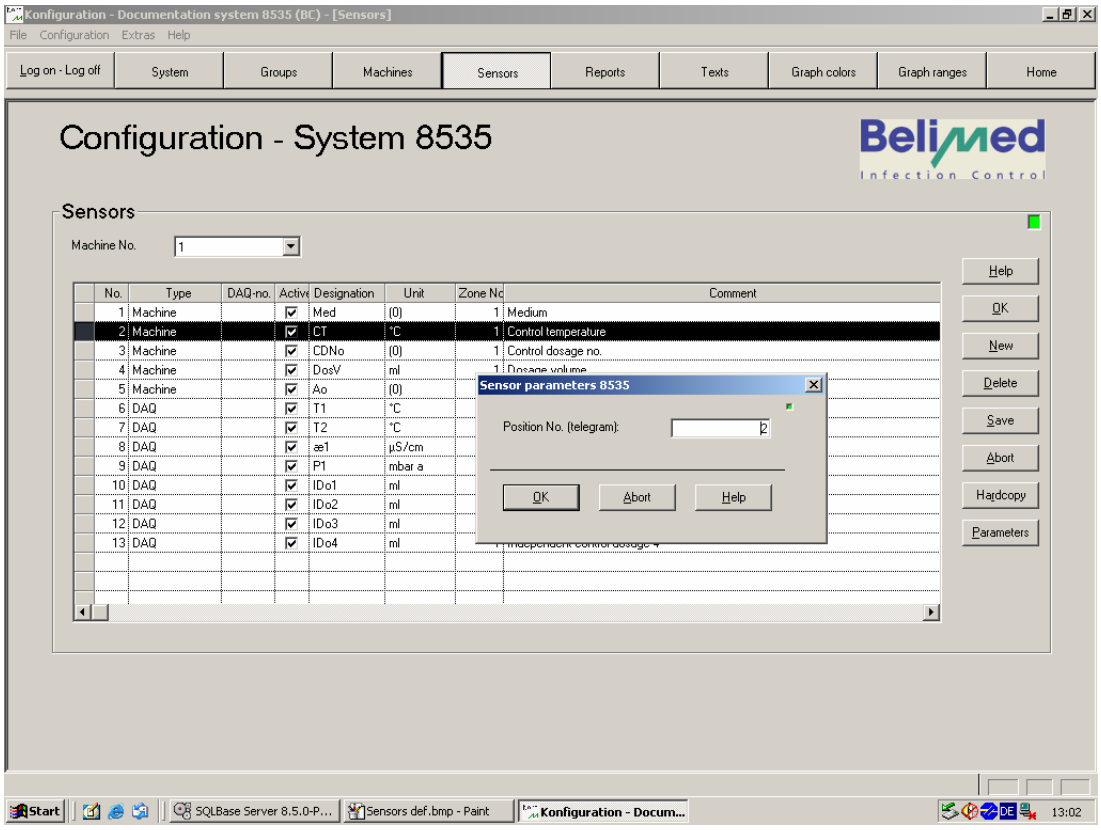
Configuration PC

If no DAQ is to be connected, on PC under configuration interface parameters of COM Por 4 for the washer must be configured as follows:

COM Por	4
Baud rate:	38400
Data bit:	8

Parity:	even
Stop bits	1
Flow control	none

6.4.2 Telegram assignment to Bach documentation system Sauter



Telegram assignment (**position number send by machine controller**)

No.	Type	Designation	Comment	Position No. (telegram)
1	Machine	Med	Medium	1
2	Machine	CT	Control temperature NTC 5 NTC 2	2
3	Machine	CDNo	Control dosage no.	4
4	Machine	DosV	Dosage volume	8
5	Machine	Ao	Ao value	7
14	Machine	t	Remaining Time	9

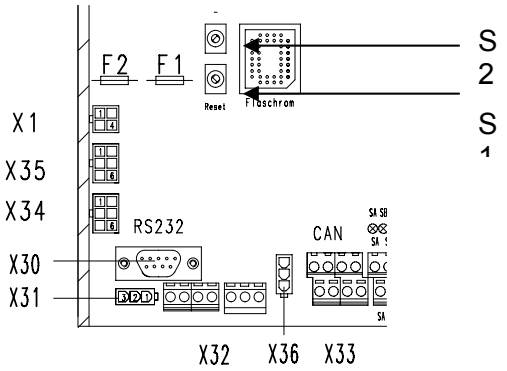
Telegram assignment (**Independent DAQ channel assignment option**)

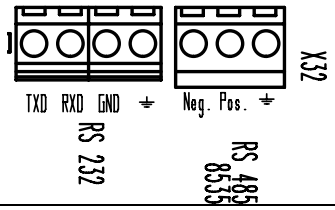
No.	Type	Designation	Comment	DAQ Channel No.
6	DAQ	T1	Air temperature	0
7	DAQ	T2	Water temperature	0
8	DAQ	ae1	Water conductivity	0
9	DAQ	P1	Water pressure	0

10	DAQ	IDo1	Independent dosage 1	1
11	DAQ	IDo2	Independent dosage 2	1
12	DAQ	IDo3	Independent dosage 3	2
13	DAQ	IDo4	Independent dosage 4	2

6.4.3 Overview for Interface as Modem, Printer and Scanner

- 3 pcs. RS232 of which one parallel with RS232/485 driver (all potential segregated)
- 1 pcs. CAN bus connection



	Connector	Function / Interface
X1	Mini Mate n, lock AMP	24 V supply DC or AC
X30	Sub - D	Interface RS 232 (**PC, Modem**)
X31	Mini Mate n, lock AMP	Interface RS 232 **(Printer , Scanner**)
X32	Phoenix screw terminal 	Interface RS 232 TXD, RXD, GND, ground **Interface RS 485** **Bach documentations system 8535** **From left Data -, Data +,** Earth
X33	Phoenix screw terminal	Interface CAN
X34	Mini Mate n, lock AMP	SPI external Panel (up to 20 m with 24 V)
X35	Mini Mate n, lock AMP	SPI Bus Interface print 24 V
X36	Mini Mate n, lock AMP	**Hardware Key**
S1	Reset key	Reset key
S2	Mode key	Downloading EPROM

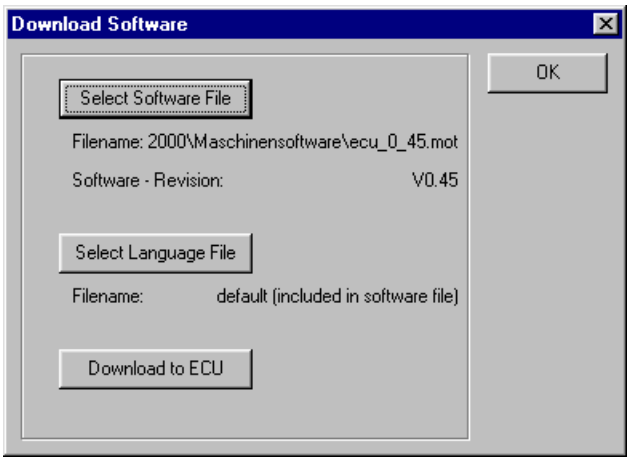
7. Loading of new SW in Control Unit

!Important Message!

!This procedure is targeted for the exclusive use by licensed service technicians!

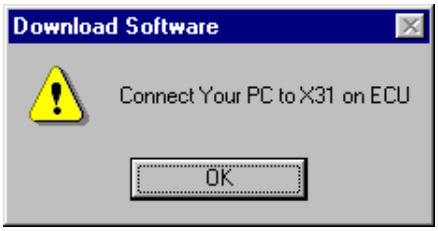
Be sure to make a note of the machine serial number, the manufacturing date, operating hours of clean filter, date of last print replacement and batch count (see chapter 1.1 Configuration Module 2 [Configuration 5] in Service Manual). All these data will be lost during downloading. It is recommended to use 'Save Setup Settings'.

Selecting Washer / Download Software.

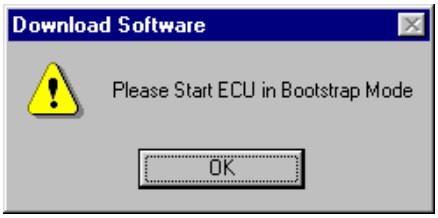


Path **`/WD290_X_xx.mot`** then confirm with **`Download to ECU`**.

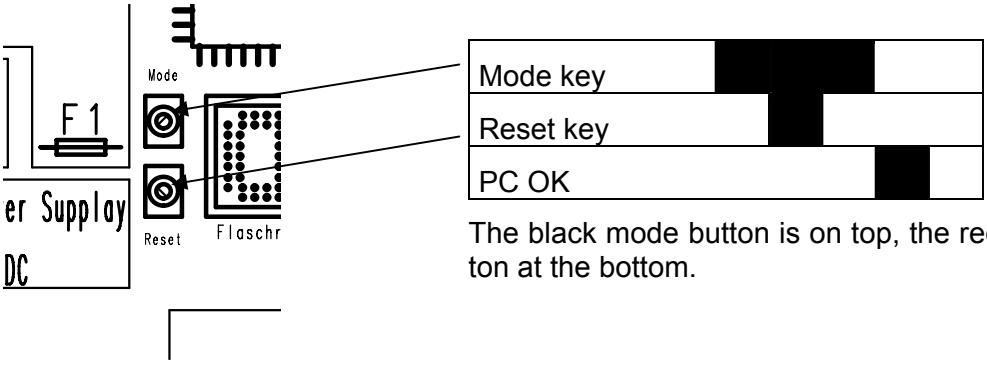
Use data communications cable B to connect control unit.



Is proper cable connected with correct connector ? See chapter 2.3 Application Data Communications Cable B.



Press black key on control surface while simultaneously briefly pressing the red reset key, keep pressing mode button, then confirm with OK button.



The black mode button is on top, the red reset button at the bottom.

Software is being loaded.

Pressing reset button, control system is restarted.

Caution: The door end positions must be re-calibrated, load Set up and program data.

Reenter machine ser. no., mfg. date, date of print replacement and batch count (see chapter 1.1 Configuration Module 2 [Configuration 5] in **Service** Manual)

8. Errors with Process Interrupt and their Remedy

8.1 Procedure in case of malfunction

In case of malfunction, the first item is to find the cause and that requires systematic procedure. Never exchange any components unless the cause of the malfunction has first been clearly defined and localized.

By means of aids such as analytical software, inputs and sensors may be monitored visually and recorded by data logger.

In case of intermittent malfunction, the batch printer printout records status of inputs and outputs at the time the error occurs.

The individual wires are imprinted at the end of the cable in very fine print:

Sometimes, poor crimps or bad plug connections are the source for malfunction and error indication. Therefore, check connections (i.e. by shaking cables while observing the input).

8.2 Color Code of Low Voltage Circuits

Cable for low voltage circuits (secondary side of transformer 24 V AC) are color coded.

Syntax of markings e.g. X2 / 5 X 2 is the connector with pin 5, see schematic Digital Inputs

Term	Voltage	Color
Valves		
Secondary voltage 24V	24 Volt AC	Purple
Secondary voltage COM (common)	24 Volt AC	Green
Switch		
Switch signals S101.....	24 Volt DC	orange
Switch signals GND	0 Volt DC	Gray
Temperature sensor		
Signal cable for NTC sensor	+ 5 Volt DC	yellow
Level and pressure sensors		
Signal cable for level and pressure sensors	24 Volt DC	orange
Signal cables for level and pressure sensors GND	0 Volt DC	gryu
Signal cable for level and pressure sensors	0,5 - 4,5 Volt	pink

8.3 Error code / Error chart / Remedy

	Error / Cause		Display
100	On door US, Reed sensor S 1 or auxiliary relays K1 is not closed or the potentiometer value is not within the proper range or has changed during the current program. Query input S110/111 and R1/2 only during current program.		**Door is open** **Error code 100**
	Cause:	**Remedy:**	
	Door switch S1 is closed S110	defect, cable break, adjust	
	Signal cable linear drive interrupted	interrupt of cable of connector	
	Linear drive	replace	
	Relay K1	replace	
	Actual value pot meters not in target range	readjust doors	
	Chack all plug connections		
101	(Only for WD 250/) The opening sequence of **US** door takes more than 20 seconds or the linear drive is defective. Control system will interrupt the opening sequence and display error if either the opening process for door with lifting motor US (M 35) takes more than 16 seconds until the lower Reed S 112) or the potentiometer value remains within the 'closed' range. Query input S 112, R1 only during opening procedure.		**Door does not open** **Error code 101**
	Cause:	**Remedy:**	
	Manual linear drive on door panel print (buttons)		
	Open	re-calibrate door, exchange	
		Linear motor	
	Activate door drive motor M 35 with control K35	replace door motor or capacitor	
	Reed sensor S 112 does not open	replace S 112	
	Check all plug connections	re-crimp S 112 to print	
	Safety relay ESR 1		
	Relay ESR 1 LED green	no action required	
	LED yellow = resistance incorrect	replace safety strip	
	LED red = cable break	replace safety strip or find	
		Cable break	
102	The closing process of the **US** door takes more than 20 seconds or linear drive is defective. The control system will interrupt closing sequence and displays error if either the closing procedure of door with lifting motor US (M 35) takes in excess of 16 seconds until the upper Reed sensor (S 1/K1) closes or until the potentiometer value R1 comes within 'closed' range. Query of input S 110, R1 only during closing process.		**Door does not close** **Error code 102**

103	The safety strip of door **US** has triggered. The control system will interrupt closing sequence and displays error if the closing procedure of door with lifting motor US (M 35) the safety strip (S 209) opens the relay ESR1 and reopens the door (M 35). Query input S109 only during closing procedure.	**Object in door** **Error code 103**
105	On door **US,** the Reed sensor or the auxiliary relay S 2 is not closed or the UCvalue is not within the 'closed' range or has opened or has gone outside of range during the current program. Program will shut down under error display. Query input S111, R2 only during current program. In case of single door model (Pos. 5.11), there will be no query.	**Door is open** **Error code 105**
106	The opening process of door **CS** takes more than 20 seconds. If opening process of door with lifting motor US (M 37) takes mo0re than 16 seconds until the lower Reed sensor (S 113) opens, or if potentiometer R2 value does not go out of 'closed' range, the control system will interrupt the opening process under display of error. Query input S113, R2 only during opening process. In case of single door version (Pos. 5.11), there is no query.	**Door does not open** **Error code 106**
107	The closing process of door **CS** takes more than 20 seconds. If closing process of door with lifting motor CS (M 37) takes more than 16 seconds until the upper Reed sensor (S2/K2) opens, or if potentiometer R2 does not come into 'closed' range, the control system interrupts the closing process and displays error. Query input S111 only during closing process.	**Door does not close** **Error code 107**
108	The safety strip of door **RS** has triggered. If during the closing process of door CS (M 37), the safety strip (S 210) opens the relay ESR2, the control system will interrupt the closing process and display error and reopens the door (M 37). Query input S110 only during closing process. **Cause:** — **Remedy:** Relay ESR 1 green — no action required LED yellow = resistance incorrect — replace safety strip LED red = cable break — replace safety strip or find cable break Safety relay ESR 1 is defective — replace ESR 1	**Object in door** **Error code 108**
109	A communications error between processor and door press prints has occurred or the door press print has a defect. **Cause:** — **Remedy:** Door press print of aux. Print — plug conn. or cable break Print defect — replace print No supply voltage — check power supply	**No communication** **Error code 109**
110	The minimal pressure in the wash system has been undercut.	

	If the pressure switch 150 m bar (S 211) designed to monitor pump pressure, remains open for 90 seconds past start of fill phase, the control system will interrupt the current program and display error. Query input S211 only active with media M1-4, M7-9 for 90 seconds after program time and under 85 °C wash liquid temperature. Over 85°C, query is inactive. **Cause:** — **Remedy:** Rotation direction of wash pump by — Reverse rotation direction exch. Phase 1 and 2 Foam: water — flush chamber with warm Incorrect conn. of wash additive tion — correct container connec- Pump pressure switch S 211 does not close — replace	
112	Floor pan has collected water. If input SB (optional float switch) is longer then 2 seconds closed, the control system will interrupt the current program and display error. Query input SB also in “Program ready” mode. **Cause:** — **Remedy:** Coarse or fine mesh sieve clogged — clean sieves Circuit over switch S B is open — locate interruption Leakage in system — fix leakage, dry basin	**Machine leaks** **Error code 112**
113	If input S 109 (opener) pressure switch opens - at 35 mm water column – within 2 seconds, display shows malfunction “Sieve clogged”, current program is interrupted Query input S 109 during entire program cycle with water M1-M4 and M9, also with “Program ready” modus active. **Cause:** — **Remedy:** Coarse or fine mesh sieve clogged — clean sieves Circuit over switch S 109 is open — locate interruption	**Screen cogged** **Error code 113**
121	The level sensor is defective or not connected. If level sensor (P 1) is defective or not connected for more than 2 seconds (the value must be between 0.2 and 4.5 V), the control system interrupts the current program and displays error. Query limit values input P1 during program cycle.	**No water** **Error code 121**
130	The temperature sensor on bottom of wash chamber is defective or not connected. If the temperature sensor NTC 1 For the wash chamber is defective or not connected (the value must be between 0 and 150 °C), the control system interrupts the current program and displays error.	**NTC 1 defective** **Error code 130**

	Query of limit value input NTC 1 during program cycle. **Cause:** **Remedy:** If analysis T 1 = sensor defective fix wire break, replace sensor Resistance readings: 20°C = 12.490 K Ohm, 25°C = 10.000 K Ohm, 30°C = 8.060 K Ohm, 35°C = 6.356 K Ohm 40°C = 5.331 k Ohm, 45°C = 4.373 K Ohm, 50°C = 3,606 K Ohm, 55°C = 2.989 K Ohm 60°C = 2.949 K Ohm, 65.°C = 2.085 K Ohm, 70°C = 1.753 K Ohm, 75°C = 1.481 K Ohm	
131	The temperature sensor in the dryer is defective or not connected. See malfunction 130	**NTC 2 defective** **Error code 131**
132	The temperature sensor NTC 3 is defective or not connected. See malfunction 130	**NTC 3 defective** **Error code 132**
133	The temperature sensor in the DI boiler is defective or not connected. See malfunction 130	**NTC 4 defective** **Error code 133**
134	The Temperature sensor on bottom of wash chamber is defective or not connected. See malfunction 130	**NTC 5 defective** **Error code 134**
135	The temperature sensor in the DI boiler is defective or not connected. See malfunction 130	**NTC 6 defective** **Error code 135**
136	The temperature sensor on bottom of wash chamber is defective or not connected. If temperature sensor PT100 1 is defective or not connected (value must be between 0 and 150 °C), the control system will interrupt the current program and display error. Monitoring limit value input PT100 during program cycle.	**PT100 1 defective** **Error code 136**
137	Temperature sensor in dryer is defective or not connected.	**PT100 2 defective** **Error code 137**
138	Temperature sensor PT100 is defective or not connected.	**PT100 3 defective** **Error code 138**
139	Temperature sensor PT100 3 is defective or not connected.	**PT100 4 defective** **Error code 139**
140	Float switch SD in DI boiler remains open even 30 minutes following start of filling process. No DI water intake to boiler.	**No DI water** **Error code 140**

	Query input S SD only during intake process. **Cause:** **Remedy:** DI water valve closed — open DI water valve DI valve defective — clean or replace Float switch SD is defective — replace SD (de-install heater)	
140	**Adjustment of limit value** for query input S SD during intake process. 10 – 45 min., default = 15 min.	**DI boiler SD** ***15* Minutes**
141	Working level with CW during intake process has not been attained. No cold water intake into wash chamber or door contact of door (S1 or S2) is open. If during filling of wash chamber with CW (valve Y 11) the operating level 2 of level sensor P1 is not attained within a predetermined period of time tcw (5 min.), the control system will interrupt the current program and display error. Monitoring limit value: only during intake process until operating level 2 is attained. **Cause:** **Remedy:** Activate with Y 11 CW valve closed — open CW valve CW valve defective — clean replace valve Level monitoring system P1 leaks — check hoses S 110 / S 111 door switch remains open position — check door switch and	**No CW water** **Error code 141**
141	**Adjustment of limit value** for cold water intake. 1 - 15 min., default = 5 min.	**CW water P1** ***5* Minutes**
142	During WW intake process, the operating level is not attained. No warm water intake into wash chamber or door contact of door (S1 or S2) is open. If during WW intake into wash chamber (valve Y 12), working level 2 of level sensor P1 is not attained within a predetermined period of time tww (5 min.), the control system will interrupt the current program and display error. Monitoring limit value: As under 141 See 141	**No WW water** **Error code 142**
142	**Adjustment of limit value** for warm water intake tww. 1 - 15 min., Default = 5 min.	**WW water P1** ***5* Minutes**
143	During intake process with DI water, working level is not attained. If during intake process with DI water (valve Y 13), operating level 2 is not attained within a predetermined period of time tvek (7 min.) the control system will interrupt the current process and display error. Monitoring limit value: As under 141 See 141	**No Di water** **Error code 143**
143	**Adjustment of limit value** fo DI water intake tvek.	**DI water P1**

	1 - 20 Min., Default = 7 Min.	***7*** **Minutes**
146	Working level with preheated DI water (M9) from boiler is not attained during fill process. If during intake process of preheated DI water (drain pump M32), the operating level 2 is not attained within a predetermined period of time tvew (3 min.), the control system will interrupt the current process and display error. Monitoring of limit value: as under 141 **Cause:** — **Remedy:** Using control (key 3), activate K 41 Relay K 14 is defective — replace Feed pump M 14 is defective — repair / exchange Level system leaks — check hoses	**No DI water** **Error code 146**
146	**Adjustment of limit value** for preheated DI water intake tvew. 1 - 15 min., Default = 3 min.	**DI water boiler** ***3*** **Minutes**
147	**The max overflow level has been reached.** If for more than seconds, the overflow level of level sensor (P1) has been exceeded, the control system will interrupt the current process and display error. (See chapter 6 Wash Chamber Level). Limit value $P_{u\ static}$ = 3.2 V (without wash pump M 15) Limit value $P_{u\ dynamic} = P_{u\ static} - 1.3$ V (with running wash pump) **Cause:** — **Remedy:** Wash pump M 16 is deductive — Check Contact K16 or wiring connection Pressure switch S211 stays always open — Check plugs and wiring Water valve doe not close properly — replace valves	**Overflow level** **Error code 147**
148	**Fill level monitoring recognizes no level change during drainage of wash chamber.** If during the wash chamber drain process with drain valve Y31 or drain pump, the level has not dropped to 0.7 V (empty level + 0.2 V) within a predetermined period of time, the control system will interrupt the current process and display error. Monitoring of limit value: only during drain process until empty level is attained. Cause: The drain is plugged or drain pump is broken. **The wash pump contact K 15 stays stuck closed** If during the draining process (Y31 is activated) the pressure switch S211 is still closed, the control will interrupt the current process and display error. Monitoring of limit value: 5 sec. after and during drain process (5. Sec after Y31 is activated). **Cause:** — **Remedy:** Pressure switch S211 stays always closed — replace Pressure switch S211 Activate Y 31 (key 3) Wire break from CPU to valve	**No drainage** **Error code 148**

	Relay Y 31 does not react — replace control system Drain valve defective — replace Drain clogged (building side) — clean Relay for wash pump K 15 remains stuck	
148	**Adjustment of limit value** for drainage ta. 3 - 15 min., default = 3 min.	**Drainage P1** ***3*** **Minutes**
149	The minimal operating level (water heater no longer immersed) has been undercut during wash phase. Loss of water during wash phase. If during wash cycle, the minimum level of 1 V is undercut for 15 seconds, the control system will interrupt the current process and display error. Monitoring limit value: only during heating phase. **Cause:** — **Remedy:** Drain valve leaks — clean membrane or replace Exhaust has excessive suction power Wtare vapor is being removed — reduce negative pressure Exhaust flap remains open at all times — repair Exhaust flap remains closed at all times Liquid is drained by means of pressure switch S31 — repair Exhaust system is closed, expanding air cannot escape — check exhaust system Air presses back by way of exhaust system — install motorized flap That opens overflow level Too much air is aspirated during fill process	**Level too low** **Error code 149**
150	The maximum level (water is over door threshold) has been exceeded. Undesirable water intake into wash chamber. If level of 3.2 V is exceeded for 3 seconds, the control system will interrupt the current process and display error. As long as the level is over 3.2 V, the door remains locked. Monitoring limit values: as long as machine is under power. **Cause:** — **Remedy:** Water valves are not tight — replace water valves	**Level too high** **Error code 150**
151	**Flow meter 1 does not recognize the required number of pulses or to high dosing.** If in a program step phase dosing with D1 and flow meter 1 is programmed, during dosing with pump M 21, within **1 minute** a minimum of 10 pulses (in the beginning it is possible that only air will come through), and after each further **6 sec. at least 50 impulses** take place. The flow meter impulse is supervised during the entire dosing phase on minimum throughput: 8 Imp. per sec. of flow meter 1 must be counted. Otherwise, the control system will interrupt the current process and display error.	**false dosing** **D1**

	The limit value for interrupt criteria X pulses in 6 seconds is calculated as follows: The pulse value / liter found in SW module for configuration dosage 2 used for calibrating is divided by a constant K = 77. Example: Pulse value / liter divided by K = limit value X Pulse value / liter = 3610 X = limit value = 3610 / 77 = 47 Error 151 is flashed if less than 47 pulses are registered within 6 seconds. **Overdosing** On flow meter , 6 impulses within 6 seconds must not be exceeded. **Die maximum dosing is limited to 500 ml.** Monitoring: Over full program cycle and when no dosing takes place, i.e. no output K21 – K 24 is active (Program run). **Cause:** **Remedy:** Dosing module (key 2) Check flow meter 1 replace flow meter 1 Hose of dosing pump defective replace Dosing pump defective replace Dosing lines clogged clean IF DOSING PUMP KEY IS PRESSED, MACHINE GOES INTO ERROR MODE	
152	Flow meter 2 does not recognize the required number of pulses during dosing. As per 151	**false dosing D2**
153	Flow meter 3 does not recognize the required number of pulses during dosing. As per 151	**false dosing D3**
154	Flow meter 4 does not recognize the required number of pulses during dosing. As per 151	**false dosing D4**
161	The temperature sensor in the wash chamber does not recognize any change in temperature during heating phase. If during the heating phase in the wash chamber (NTC 1), no minimal temperature change of 1°C is detected over a predetermined period of time th (3 min.) or during the dwell phase the temperature is no longer attained for more than th (3 min.), the control system will interrupt the current process and display error. Monitoring limit values: during heating phase with water. **Cause:** **Remedy:** Activate heater contactor K 16 with control (key 3), only to be done if there is water in tank Heater contactor is defective replace Heater is defective replace Cable connections are burnt replace connector Drain valve leaks clean / replace membrane Exhaust system has excessive suction power reduce negative pressure	**No heat Error code 161**

	Exhaust flap remains always open repair	
161	**Adjustment of limit value** minimal water heating th. 1 - 6 min., default = 3 min.	**Delta Temp. NTC 1** ***3* Minutes**
162	The temperature sensor in DI boiler does not recognize any change in temperature during heating phase. If during the heating phase in the DI boiler (NTC 4), no minimal change in temperature of 1°C over a predetermined period of time thve (5 min.) is recognized, the control system will interrupt the current process and display error. Monitoring limit values: during heating and dwell phase.	**No heat** **Error code 162**
162	**Adjustment of limit value,** minimal water heating in DI boiler thve. 1 - 6 min., default = 5 min.	**Delta Temp. NTC 4** ***5* Minutes**
163	**Temperature overrun** In case water temperature overshoots target value by 8°C during water steps M 1, 2, 3, 4, 7, 9, active process is interrupted. Cut-off criteria: If water temperature of NTC 1 is exceeded by 8°C for 1 minute after the fill process during a water step M 1, 2, 3, 4 or 9, the SW cuts off the current process. If no water temperature is entered (00 default), monitoring is inactive and no error is indicated. In function cold pre-rinse F1, max. permitted temperature is 45°C. If water temperature exceeds that value, process is also interrupted. Interrupt criteria: If under function F1 a temperature of 00°C is entered and water temperature of 45°C of NTC 1 is exceeded for 1 minute, the SW shuts current process down. **Cause:** **Remedy:** Water media are interchanged properly connect water Programming error of media assignments check programs Heater contactor K 16 remains stuck replace	**Water too warm** Error code 163

9. Cycle value and process variables of Factory Settings

9.1 Process Time

The process data refer to a WD 230 and 250 that is electrically heated without DI water preheating. Using Di water preheating, the disinfecting process may be shortened by approximately 14 minutes. Steam heated water preheating are usually significantly faster, depending on steam pressure.

9.2 Water consumption and Electrical Energy

Among other reasons, water consumption is dependent on the applied wash goods rack but also from its load characteristics. Mixing cold and warm water, the ration is dependent on the feed temperatures of each medium. In case of low feed temperatures, the proportion of warm water is higher.

The electric energy used applies for the electrically heated version only. It comprises pump and ventilation energy as well as the energy used to bring the process liquid from its original temperature to the target temperature, also the air heating energy. Not included in the energy equation is the energy content of water drawn from the building side supply. In case of steam heated machines, the energy used to heat the water is not to be counted.

9.3 Validated Process Parameters P1 – P7

The 6 different programs with specific program parameters such as rinse cycles, concentration of additives, cleaning temperature and cleaning duration, depending on the suitability pertaining to additives and load carried (instruments, OP shoes etc.). These programs were subsequently tested and validated as specific machine software in order to be distributed by the machine manufacturer as Factory Settings.

! IMPORTANT NOTE !

Any and all modifications of these programs are carried out at the full risk born by the user!

All factory programs contain a thermal disinfection step. That is why reconditioning of thermally unstable wash goods is not provided.

! CAUTION !

The last process P6 „additional drying “ must be applied with caution. It is imperative that no wash goods whatsoever are subjected to this cycle without prior cleaning and disinfection and are thus passed into the „clean“ zone. Assignment of respective Media

9.4 Assignment of respective media

! IMPORTANT NOTE !

With condenser:

In order to activate the condenser, it is required to replace Drying M5 by Medium M6 – Condensing - in the program. In this medium, additional to drying, the DI water valve (Y27) is opened.

DI water preheating:

Instead of M4, M9 is entered for the final rinse. Preferably, the temperature for thermal disinfection of the DI tank is set at 95°C, dwell time set at 0 Min. Thus, heating of rinsing water in the wash chamber is omitted.

In the program, both media, M6 and M9 must be present in the same program (M9 = final rinse with pre-heated DI water, M6 = condensing).

Deactivation of Program Steps

If so desired, F0 permits deactivation of the second rinsing step.

9.5 Overview Factory Settings

The factory settings programs have been optimized for the following chemical additives. In case any foreign products are used, the full responsibility is passed on to the user of the installation.

! IMPORTANT NOTE !

Be very careful in assignments of dosing pumps and chemical additives! Each program must be validated prior to commissioning.

Progr. No. / Program Name	Type of Cleaner	Cleaning Chemicals	Dosing
P1 Alkalische cleaning of instruments	Alkaline cleaner	Beliclean 128	
P2 Alkalische Intensivreinigung of instruments	Alkaline cleaner	Beliclean 128	
P3 Alkaline cleaning of anesthetic material	Alkaline cleaner	Beliclean 128	
P4 Neutral cleaning of containers	Enzymatic cleaner	Belizym 203	
P5 Alkaline cleaning of MIC instruments	Alkaline cleaner	Beliclean 128	
P6 Additional drying			
P7 Alkaline cleaning of OP shoes	Alkaline cleaner	Beliclean 128	
P8			
P9			

P10			
P11			
P12			

9.6 P1 Alkaline Cleaning of Instruments

Indication / rinsing goods:	OP instruments and investigative tools, lightly soiled,
Load carrier:	Instrument basket 4 levels, 8 DIN sieve bowls 100 mm high
Process description:	Alkaline cleaning using thermal disinfection A0 = 3000
Cleaner:	Beliclean 128
Dosing unit 1	Consumption = 140 ml / batch
Neutralizer:	none
Dosing unit 2	none
Drying accelerator:	Belidry 604
Dosing unit 3	Consumption = 28 ml / batch
El. energy consumption:	4.5 kWh

Process description

Program No. 1: „Instruments alkaline“								
Program steps	Type me-dium	**Phase 1**			**Phase 2**			Duration of steps [min]
		Temp. 1 [°C]	Product / Dosing	Dura-tion 1 [min]	Temp. 2 [°C]	Product / Dosing	Duration 2 [min]	
Pre-rinse	CW	**-**	**-**	**3**	**-**	**-**	**-**	5
Cleaning	CW + WW	**35**	**128 / 5 ml**	**0**	**70**	**-**	**5**	18
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Therm. Dis.	DI	**93**	**604 / 1 ml**	**-**	**-**	**-**	**-**	17
Drying	Air	**120**	**-**	**10**	**-**	**-**	**-**	11
Total average program time in minutes:								57

Water consumption

	Cold water [l]	Warm water [l]	DI Warm water [l]
Pre-rinse	28	0	0
Cleaning	15	13	0
Rinsing	0	28	0
Rinsing	0	28	0
Therm. Dis.	0	0	28
Total	43	69	28

9.7 P2 Alkaline intensive Cleaning of Instruments

Indication / rinsing goods: OP instruments and investigative tools, heavily soiled

Load carrier: Instrument basket 4 levels, 8 DIN sieve bowls 100 mm high

Process description: Alkaline cleaning at 90°, with thermal disinfection at 80°

Cleaner: Beliclean 128

Dosing unit 1 Consumption = 140 ml / batch

Neutralizer: none

Dosing unit 2 none

Drying accelerator: Belidry 604

Dosing unit 3 Consumption = 28 ml / batch

El. energy consumption: 5.3 kWh

Process description

Program No. 2: „Instr. intensive alkal.“								
Program steps	Type me-dium	**Phase 1**			**Phase 2**			Duration of steps [min]
		Temp. 1 [°C]	Product / Dosing	Dura-tion 1 [min]	Temp. 2 [°C]	Product / Dosing	Duration 2 [min]	
Pre-rinse	CW	**-**	**-**	**3**	**-**	**-**	**-**	5
Cleaning	CW + WW	**35**	**128 / 5 ml**	**-**	**90**	**-**	**4**	16
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Therm. Dis.	DI	**80**	**604 / 1 ml**	**-**	**-**	**-**	**-**	12
Drying	Air	**120**	**-**	**10**	**-**	**-**	**-**	11
Total average program time in minutes:								50

Water consumption

	Cold water [l]	Warm water [l]	DI Warm water [l]
Pre-rinse	28	0	0
Cleaning	15	13	0
Rinsing	0	28	0
Rinsing	0	28	0
Therm. Dis.	0	0	28
Total	43	69	28

9.8 P3 Alkaline Cleaning of anesthetic Material

Indication / rinsing goods: Anesthetic material (hoses, respiration pouches etc.)

Load carriers: Anesthetic racks

Process description: Alkaline cleaning with thermal disinfection A_0 = 3000

Cleaner: **Beliclean 128**

Dosing unit 1 Consumption = 155 ml / batch

Neutralizer: none

Drying accelerator: **Belidry 604**

Dosing unit 3 Consumption = 31 ml / batch

El. Energy consumption: 4.9 kWh

Process description

Program No. 3: „Anesthetic alkaline“

Program steps	Type me-dium	Phase 1			Phase 2			Duration of steps [min]
		Temp. 1 [°C]	Product / Dosing	Dura-tion 1 [min]	Temp. 2 [°C]	Product / Dosing	Duration 2 [min]	
Pre-rinse	CW	**-**	**-**	**3**	**-**	**-**	**-**	5
Cleaning	CW + WW	**35**	**128 / 5 ml**	**0**	**70**	**-**	**5**	17
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Therm. Dis.	DI	**93**		**-**	**-**	**604 / 1 ml**	**1**	19
Drying	Air	**120**	**-**	**4**	**80**	**-**	**16**	21
Total average program time in minutes:								68

Water consumption

	Cold water [l]	Warm water [l]	DI Warm water [l]
Pre-rinse	31	0	0
Cleaning	16	15	0
Rinsing	0	31	0
Rinsing	0	31	0
Therm. Dis.	0	0	31
Total	47	77	31

9.9 P4 Neutral Cleaning of Containers

Indication / rinsing goods: 4 containers with 2 covers each

Load carrier: Container rack

Process description: Neutral cleaning using thermal disinfection $A_0 = 600$

Cleaner: **Beliclean 203**

Dosing unit 4 Consumption = 140 ml / batch

Neutralizer: none

Dosing unit 2 none

Drying accelerator: **Belidry 604**

Dosing unit 3 Consumption = 28 ml / batch

El. energy consumption: 3.7 kWh

Process description

Program No. 4: „Container neutral“								
Program steps	Type me-dium	**Phase 1**			**Phase 2**			Duration of steps [min]
		Temp. 1 [°C]	Product / Dosing	Dura-tion 1 [min]	Temp. 2 [°C]	Product / Dosing	Duration 2 [min]	
Pre-rinse	CW	**-**	**-**	**2**	**-**	**-**	**-**	4
Cleaning	CW + WW	**40**	**203 / 5 ml**	**3**	**60**	**-**	**5**	11
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Therm. Dis.	DI	**80**	**604 / 1 ml**	**-**	**-**	**-**	**-**	10
Drying	Air	**120**	**-**	**5**	**-**	**-**	**-**	6
Total average program time in minutes:								37

Water consumption

	Cold water [l]	Warm water [l]	DI Warm water [l]
Pre-rinse	28	0	0
Cleaning	15	13	0
Rinsing	0	28	0
Rinsing	0	28	0
Therm. Dis.	0	0	28
Total	43	69	28

9.10 P5 Alkaline Cleaning of MIC Instruments

Indication / rinsing goods: MIC instruments and accessories

Load carrier: MIC rack

Process description: Alkaline cleaning, rinsing with DI water, therm. disinfection A_0= 3000

Cleaner: **Beliclean 128**

Dosing unit 1 Consumption = 150 ml / batch

Neutralizer: none

Dosing unit 2 none

Drying accelerator: **Belidry 604**

Dosing unit 3 Consumption = 30 ml / batch

El. energy consumption: 4.7 kWh

Process description

Program No. 5: „MIC Instr. alkaline“								
Program steps	Type me-dium	**Phase 1**			**Phase 2**			Duration of steps [min]
		Temp. 1 [°C]	Product / Dosing	Dura-tion 1 [min]	Temp. 2 [°C]	Product / Dosing	Duration 2 [min]	
Pre-rinse	CW	**-**	**-**	**3**	**-**	**-**	**-**	5
Cleaning	CW + WW	**35°**	**128 / 5 ml**	**0**	**70°**	**-**	**5**	16
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Rinsing	DI	**-**	**-**	**1**	**-**	**-**	**-**	4
Therm. Dis.	DI	**93°**	**604 / 1 ml**	**-**	**-**		**-**	17
Drying	Air	**120°**	**-**	**10**	**-**	**-**	**-**	11
Total average program time in minutes:								56

Water consumption

	Cold water [l]	Warm water [l]	DI Warm water [l]
Pre-rinse	30	0	0
Cleaning	15	15	0
Rinsing	0	30	0
Rinsing	0	0	30
Therm. Dis.	0	0	30
Total	45	45	60

9.11 P 6 Additional Drying

Indication / rinsing goods:

Load carrier:

Process description: Additional drying at 120 °C and 5 min.

! Caution !

Process P12 „Additional Drying “ must be applied with great caution.

It is imperative to ensure that no wash goods can reach the „clean“ work zone after it has passed through this process only and without cleaning.

Process description

Program No. 12: „Additional Drying“								
Program steps	Type me-dium	**Phase 1**			**Phase 2**			Duration of steps [min]
		Temp. 1 [°C]	Product / Dosing	Dura-tion 1 [min]	Temp. 2 [°C]	Product / Dosing	Duration 2 [min]	
Drying	Air	**120**	**-**	**5**	**-**	**-**	**-**	6
Total average program time in minutes:								6

9.12 P7 Alkaline Cleaning of OP Shoes

Indication / rinsing goods: OP shoes

Load carrier: Basket for OP shoes on two shelves basic rack

Process description: High alkaline cleaning using thermal disinfection A_0 = 600

Cleaner: **Beliclean 128**

Dosing unit 1 Consumption = 130 ml / batch

Neutralizer: none

Dosing unit 2

Drying accelerator: **Belidry 604**

Dosing unit 3 Consumption = 26 ml / batch

El. energy consumption: 3,7 kWh

Process description

Program No. 7: „OR shoes alkaline“								
Program steps	Type me-dium	**Phase 1**			**Phase 2**			Duration of steps [min]
		Temp. 1 [°C]	Product / Dosing	Dura-tion 1 [min]	Temp. 2 [°C]	Product / Dosing	Duration 2 [min]	
Pre-rinse	CW	**-**	**-**	**2**	**-**	**-**	**-**	4
Cleaning	CW + WW	**35**	**128 / 5 ml**	**0**	**70**	**-**	**3**	15
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Rinsing	WW	**-**	**-**	**1**	**-**	**-**	**-**	3
Therm. Dis.	DI	**80**	**604 / 1 ml**	**-**	**-**	**-**	**-**	18
Drying	Air	**120**	**-**	**4**	**80**		**10**	15
Total average program time in minutes:								58

Water consumption

	Cold water [l]	Warm water [l]	DI Warm water [l]
Pre-rinse	26	0	0
Cleaning	12	14	0
Rinsing	0	26	0
Rinsing	0	26	0
Therm. Dis.	0	0	26
Total	38	66	26

10. Functional and Electro Schematics

Abb. 73870-01 with electrical dryer

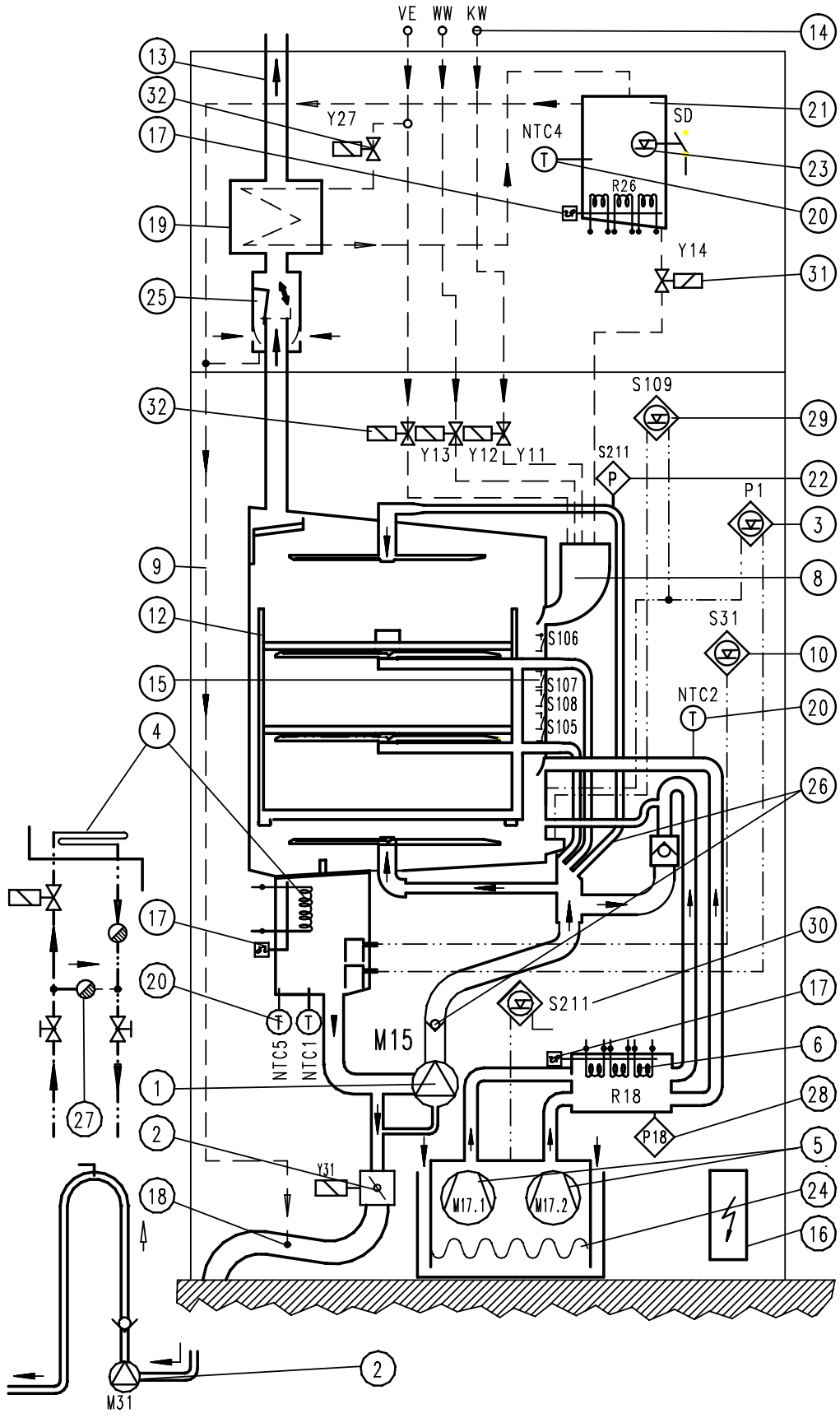
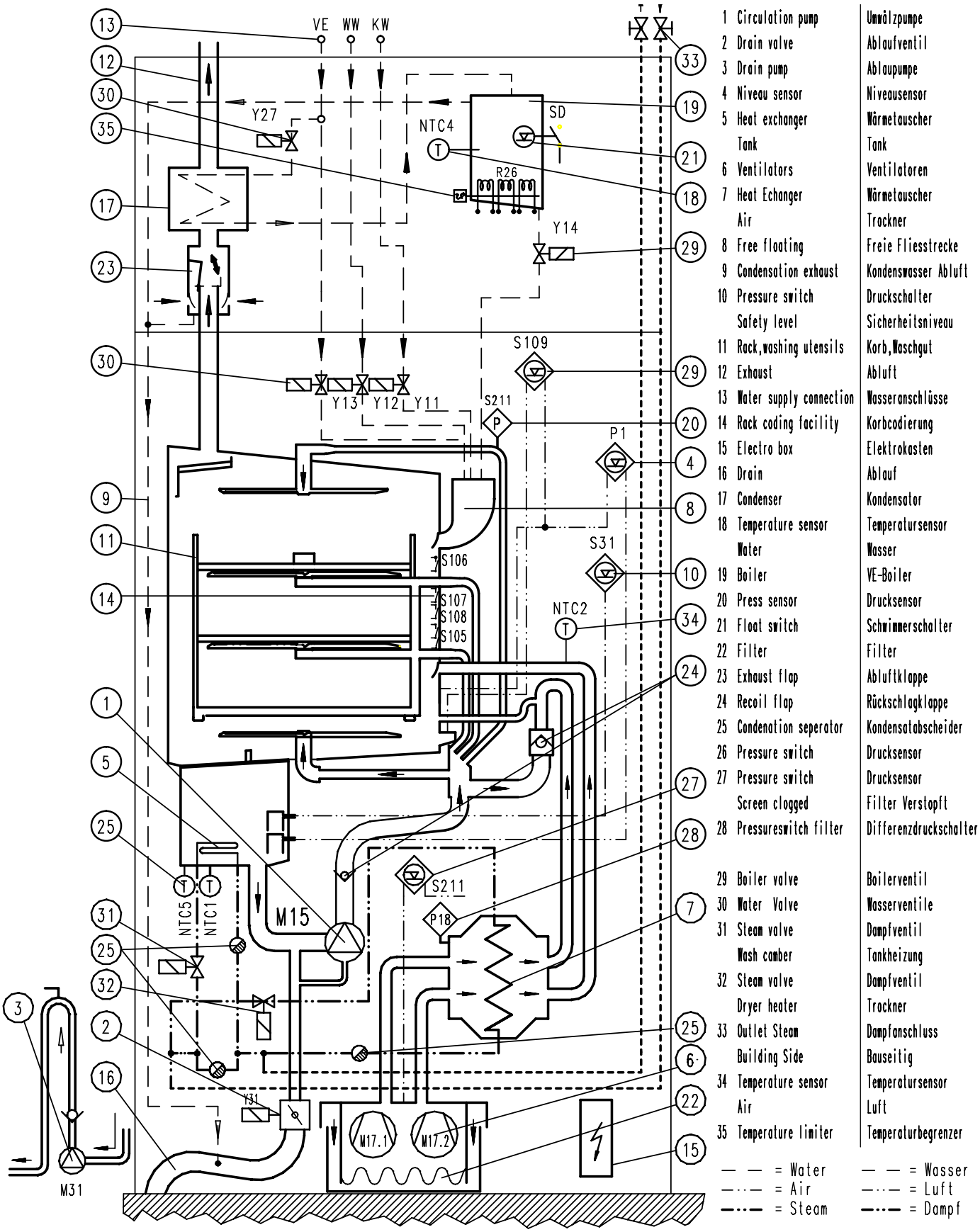
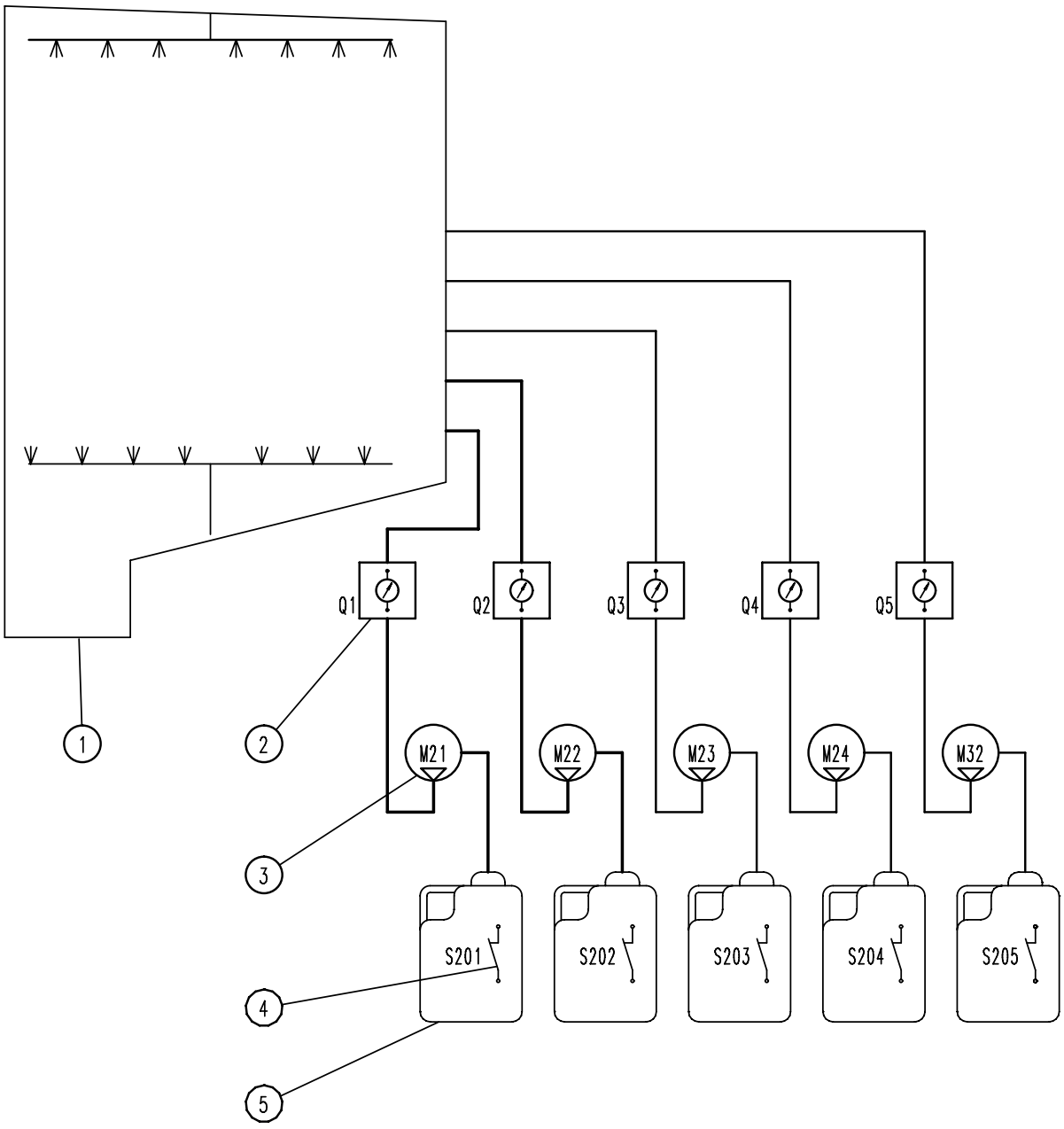


Abb. 73018-91 **Steam dryer**



10.1 Function Diagram Dosing

Abb. 73018-58



1 Utensil washing chamber
2 Flow-meter
3 Dosing pump
4 Empty fluid level display
5 Detergent countainers