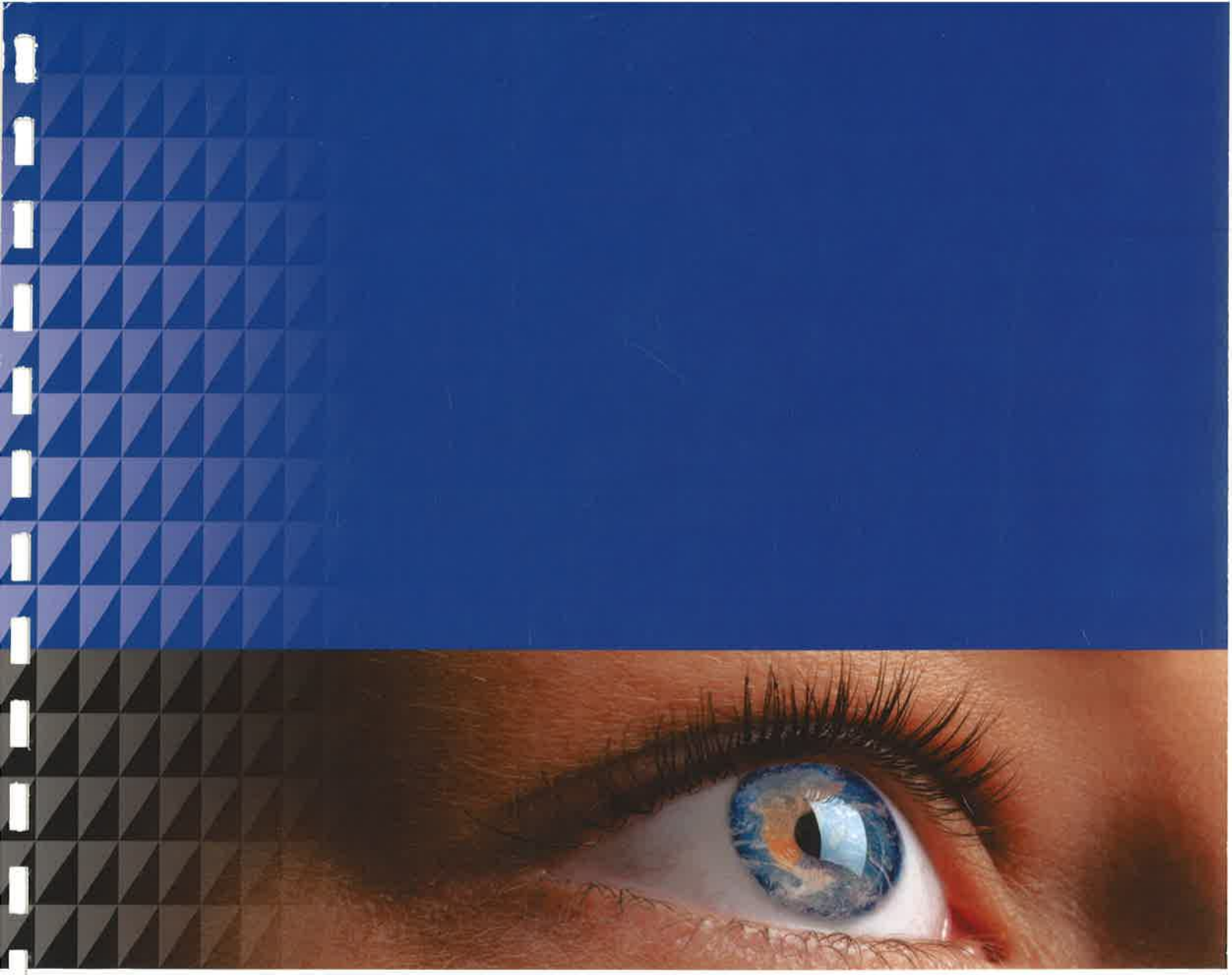

Belimed

Infection Control

This manual is valid for:

Product	Steam sterilizer MST 5-5-9
Product version	TOP 5000
Local regulations	American Society of Mechanical Engineers (ASME)

Editor	Belimed Sauter AG, CH-8583 Sulgen
Date of issue	July 2013

CE

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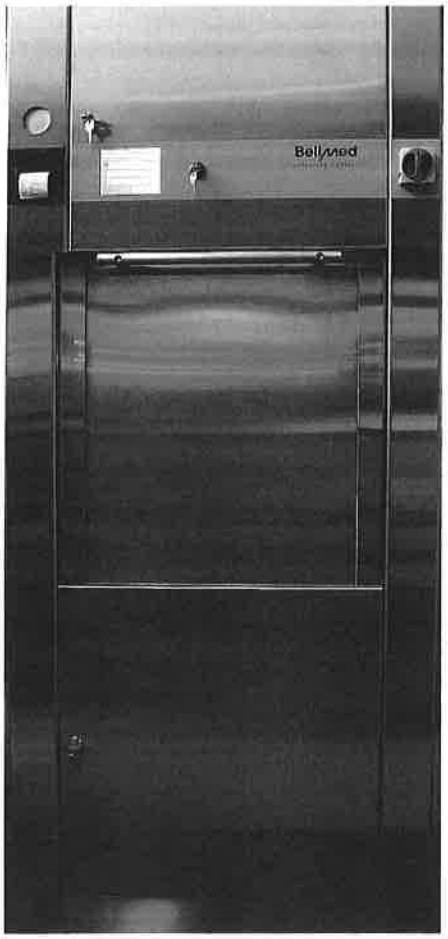
Belimed
Infection Control

Belimed Steam Sterilizer TOP 5000

USER MANUAL



Model 5-5-9

535x535x965 mm

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IMPORTANT: A SUMMARY OF THE SAFETY PRECAUTIONS TO BE OBSERVED WHEN OPERATING THIS EQUIPMENT CAN BE FOUND ON PAGE 14 OF THIS MANUAL AND BEHIND THE SERVICE DOOR OF THE UNIT. DO NOT OPERATE THE STERILIZER UNTIL YOU HAVE BECOME FAMILIAR WITH THIS INFORMATION.

Manufacturer
Belimed Sauter AG
Zelgstrasse 8
CH- 8583 Sulgen Switzerland
Phone 011 41 71 644 85 00
Fax 011 41 71 644 86 01

1 Introduction

1.1 Become familiar with the system

This manual contains important information on proper use and maintenance of this sterilizer. All operators and departments heads are urged to carefully review and become familiar with the warnings, cautions and instructions contained herein. This sterilizer is specifically designed to process goods using only the cycles as specified in this manual. If there is any doubt about a specific material or product, contact the manufacturer of the product for the recommended sterilization technique.

1.2 Intended use

The Belimed Steam Sterilizer TOP 5000 is designed to be used for the terminal sterilization of porous and non porous, heat and moisture stable materials in the healthcare facilities.
The sterilizer is factory equipped with standard cycles: their applicability is insured only under the specified conditions. Depending of the chosen cycle, materials as different as textiles, glassware, unwrapped or wrapped instrument trays with single or multiple instruments can be sterilized.
The Belimed Steam Sterilizer TOP 5000 is factory equipped with cycles which has been tested in accordance with AAMI/ANSI ST-8 as well as EN285 standards under defined load conditions. The cycles parameters can be easily modified to perform the sterilization under optimized conditions. A modification of the parameters of the standard cycles is under the responsibility of the user. BELIMED can offer assistance or quote complete validation procedures to the relevant standards.

WARNING
This sterilizer is not designed to process flammable liquids nor liquids in containers that are not designed for sterilization.

CAUTION
Any alteration of the sterilizer which affects its operation will void the warranty and could violate state and local regulations and jeopardize insurance coverage.

CAUTION
Use only original BELIMED replacement parts for maintenance purposes: in all other cases the manufacturer can no more guaranty the specified performances of the equipment nor apply the warranty conditions.

CAUTION
In order to ensure the proper function of the sterilizer, we recommend to perform the leak-rate-test at least once per week, at normal working temperature.

CAUTION
The Bowie-Dick Test Cycle has to be performed daily.

1.3 Summary of safety precautions

The following is a summary of safety precautions to be observed when operating or servicing this unit. WARNINGS indicate the potential for danger to personnel and CAUTIONS indicate the potential for damage to equipment. The precautions may be repeated where applicable throughout the manual. The following is a list of all safety precautions to be taken. Carefully read them before proceeding to use or service the unit.

WARNINGS

- **RESTRICTION: It is inappropriate for a health care facility to sterilize liquids for direct patient contact.**
- **Before entering the chamber (e.g. for cleaning), turn the key switch off (position '0') and keep the key in your pocket as long as you work in the chamber.**
- **Danger of Squeeze Hand: Hands off from chamber door area while closing the door.**
- **When closing the door, no person is to be inside the chamber. The operator is responsible for the observation of this safety precaution.**
- **BURN HAZARD: The chamber door surface can be hot (>70°C/158°F), if the ambient temperature is above 30°C/86°F.**
- **BURN AND SHOCK HAZARD: Repairs and adjustments should be attempted only by authorized persons fully acquainted with this equipment. Use of inexperienced, unqualified persons to work on the equipment or the installation of unauthorized parts could cause personal injury or result in costly damage!**
- **Observe the label "Dangerous voltage": turn off main switch before opening**
- **BURN HAZARD: Allow sterilizer, generator (if applicable) and accessories to cool to room temperature before performing any cleaning or maintenance procedures.**
- **BURN HAZARD: Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.**
- **FALL HAZARD: To prevent falls keep floors dry by immediately wiping up any liquids or condensation in sterilizer loading or unloading area.**
- **EXPLOSION HAZARD: This sterilizer is not designed to process flammable liquids.**
- **BURN HAZARD: When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, you must observe the following procedure:**

- Use LIQUIDS cycle only. No other cycle is safe for processing liquids.
- Use only vented closures- do not use screw caps or rubber stoppers with crimped seal.
- Use only Type I borosilicate glass bottles- do not use ordinary bottles or any container not designed for sterilization.
- Avoid sudden opening of door at end of cycle. Wait at least 10 minutes before door opening and unloading the sterilizer.
- Do not allow hot bottles to be jolted. This can cause hot-bottle explosions! Do not move bottles if any boiling or bubbling is present.
- Allow bottles to cool to touch before attempting to move them from sterilizer shelf to storage area.

- BURN HAZARD: A steam supply malfunction may cause the sterilizer chamber to fill with scalding water. Do not open chamber door if the unit fails to complete an automatic cycle or if water leaks past the door gasket upon unlocking the door.

- STERILITY ASSURANCE HAZARD: Load sterility may be compromised if the chemical or biological indicator or the Bowie-Dick Test (or DART) indicate a potential problem. If these indicators show a potential problem, refer the situation to a qualified maintenance technician before using the sterilizer further.

- STERILITY ASSURANCE HAZARD: According to AAMI ST-8 a measured leak rate greater 1,3 mbar/minute indicates a problem with the sterilizer. Refer the situation to a qualified maintenance technician before using the sterilizer further.

CAUTIONS

CAUTION: Never use sharp tools to push gasket into groove.

CAUTION: Never use wire brush or steel wool on door and chamber assembly.

CAUTION: Observe the Electrostatic Precautions outlined in the maintenance manual. Always wear a grounding wrist strap when removing or replacing PC boards or ICs.

CAUTION: Solenoid valves are equipped with a special material which can be attacked by oils and grease. When replacing entire valve, wipe threads clean of cuttings oils and use Teflon tape to seal pipe joints.

CAUTION: Handle siphon and bellows assembly gently to avoid damage.

CAUTION: Keep the movement area of the door unobstructed during door opening and closing.

CAUTION: Any alteration of the sterilizer which affects its operation will void the warranty and could violate state and local regulations and jeopardize insurance coverage.

CAUTION: Use only original BELIMED replacement parts for maintenance purposes: in all other cases the manufacturer can no more guaranty the specified performances of the equipment nor apply the warranty conditions.

CAUTION: In order to ensure the proper function of the sterilizer, we recommend to perform the leak-rate-test at least once per week, at normal working temperature.

CAUTION: The Bowie-Dick Test Cycle has to be performed daily.

CAUTION: Sterilize only goods which are declared to be steam- sterilizable by their manufacturer and compatible with the chosen cycle parameters (maximum temperature)

CAUTION: Respect the maximum number of sterilization's given by the manufacturer of the goods to be sterilized. Check their proper function according to the manufacturer's information of the goods (e.g. instruments)

2 Installation

2.1 Sterilizer sizes

The Belimed steam sterilizers are available in the following sizes (Table 2-1):

Model	Configuration	Chamber volume (liters)	Chamber size (H x W x D) (mm)	Overall Dimensions (H x W x D) (mm)	Weights (kg) [1] Transport / Operation / Inspection
5-5-9 VS1	1- door	275	535x535x965	1900x855x1174	800 650 900
5-5-9 VS2	2- door	275	535x535x915	1900x855x1174	820 670 920

Table 2-1: Sterilizer sizes

Tolerances: Overall Dimensions ±3mm

1 Weight without internal steam generator

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2.2 Required building system utilities

Unless otherwise specified in the contract the utilities (refer to Table 2-2 and Table 2-3) must be provided by the customer to the connection points (refer to Figure 2-1 to Figure 2-2)

2.2.1 Utility connections

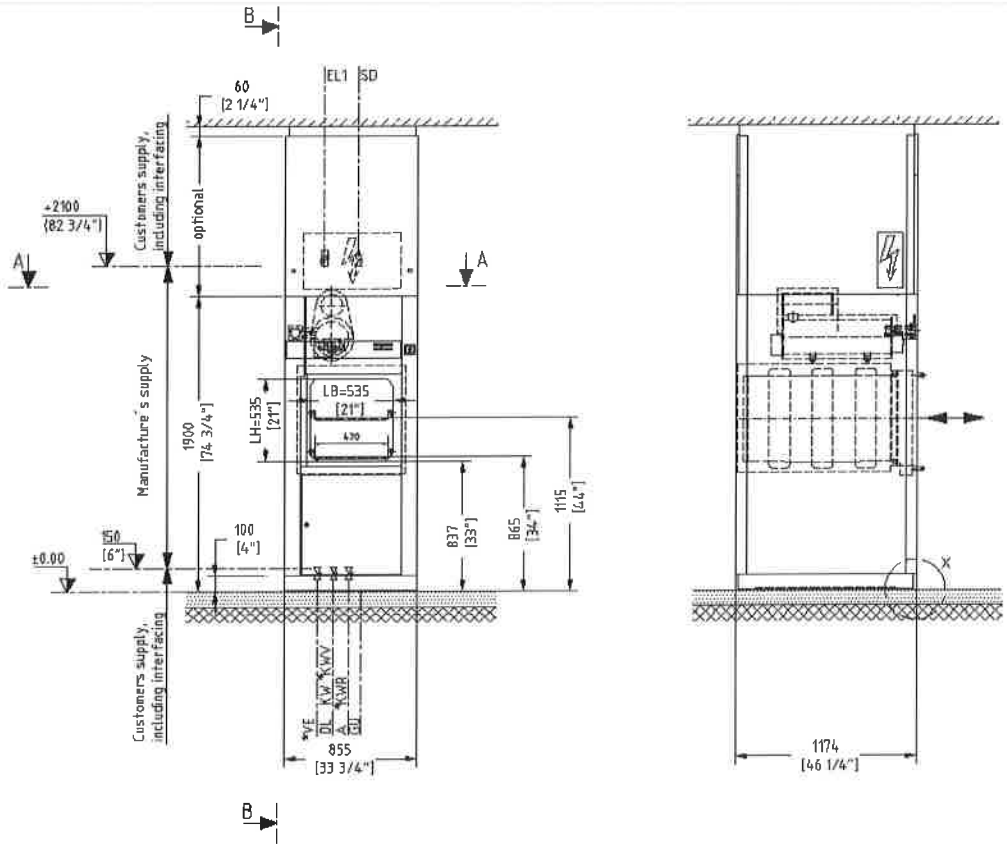
Symbol	Medium	Pressure in bar g	Customers supply	Peak	Consumption per batch with normal load
Standard-Supply lines					
SD	Sterilizing Steam, safeguarding 60 psi g	2.5- 4	¾" NPT-f	40 kg/h	9 kg
KW	Tap water for vacuum pump, 15 °C (60°F)	2 - 5	½" NPT-f	1 m³/h	150 l 10 l
VE	Deionized water 15-80°C for internal steam generator only	2 - 5	¼" NPT-f	0.1 m³/h	9.5 l
DL	Compressed air, oil-free	5 - 7	¼" NPT-f	5 Nm³/h	0.25 Nm³
EL1	Electric supply: external steam 3~ 208V 60 Hz (branch circuit breaker)		6 A (10A)	1.6 kW	0.5 kWh
EL2	Electric supply: Option internal steam generator 3~ 480V 60 Hz (branch circuit breaker)		37 A (50A)	30 kW	8 kWh
ZL	Air inflow to service room coming through customer's ventilation duct or from operating room.				
Standard-Waste line					
ALP	Free air exhaust of vacuum pump				
A	Floor drain (waste water open)		1 ¼" NPT-f	max. 15 l/min	
GU	Floor drain				
AL1	Air outflow from service room: heat flow of 1 kW to be dissipated, temperature in service room ~30°C			1.5 kW	
Option waste steam line upwards					
AD1	Waste steam, chamber	≤ 2.75	1" NPT-m	100 kg/h	
AD2	Waste steam, jacket	≤ 2.75	1" NPT-m	100 kg/h	
Option Cooling water circuit					
KWV	Cooling water forward: T1 10 °C, ΔT 15K Cooling energy required	2 - 5	¾ " NPT-f	2 m³/h 8kW	400l 26000kJ
KWR	Cooling water backward		¾ " NPT-f		

Table 2-2: Utilities for chamber size 5-5-9

2.2.2 Utility connection positioning and dimensions

view loading/ unloading side

section B - B



connections from above

view of stainless steel tub & connections from below

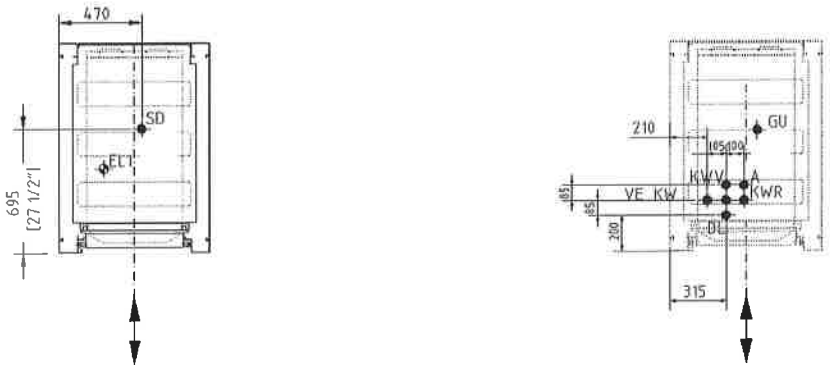


Figure 2-1: Utility connection positions and dimensions

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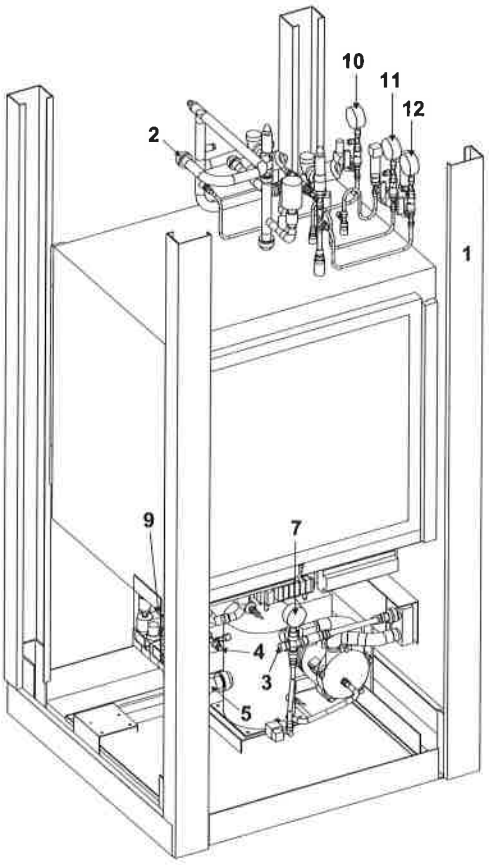
2.2.3 Utility connections

The customer shall provide all supply connection lines with a built in manual stop-cock. All connection assemblies between the sterilizer and supply / exhaust lines (customer's supply) are designed wtih flexible, pressure-resistant tubes made of 316L material: in that way, mechanical tolerances of ±25 mm in any direction can be easily compensated which results in short assembly times. Only exception is the steam supply <SD> which is realized in a rigid manner.

When the exhaust line will be neither connected nor led outside the tubing ends in a bend oriented upwards.



1 EL1	Electric supply, Terminal box, main power switch
2 SD	Steam connection
3 KW	Tap water supply
4 DL	Compressed air supply
5 A	Drain
7-12	gauges, refer to chapter 4.2

Figure 2-2: Utility connections

2.3 Installation instructions

2.3.1 Introduction

The installation of the sterilizer will generally be performed by Belimed technicians. They received a detailed training on all aspects of the installation, running and maintenance of the Belimed Sterilizers. Those details of the installation are part of their specific know how and will not be written down here. If the customer requires to perform the installation himself, Belimed will provide the necessary information and at least insure the supervision of the installation. This is required in order to be able to insure the warranty of the system for the accepted duration.

Each installation drawing pertains to the sterilizing equipment as specified or purchased by the customer. The general notes and recommendations are intended to complete the installation drawings.

2.3.2 Space considerations

Clearance in front of sterilizer, for comfortable loading and unloading operations, should be about twice the length of the transfer carriage unless otherwise specified on installation drawing.

2.3.3 Mounting details

2.3.3.1 Service power

One convenience outlet (120V) is required for power tools next to the sterilizer.

2.3.4 Utility service requirements

2.3.4.1 Terminal Fittings

Unless otherwise specified in the contract piping, shutoff valves and other appurtenances between terminal fittings on the equipment and wall or floor outlets are not furnished by Belimed.

Note: "Supply lines are to be safeguarded and separable in accordance with connection ratings"

2.3.4.2 Pipe sizes

Pipe sizes listed in paragraph 3.2 indicate the equipment termination sizes only. Size of supply piping is dependent on length of pipe run from pressure regulation station for steam line and main water headers to ensure adequate supply service pressure and demand flow at equipment terminals. Effect of coincident draw of multiple unit installations must also be considered.

2.3.4.3 Backflow preventer

If local codes require a reduced pressure principle device on water supply line it shall be provided by the customer.

2.3.4.4 Pressure relief valves

Belimed recommends piping all chamber relief valves to a vented manifold outside the equipment service area .

Caution:
Do not reduce the discharge capacity of the safety relief valve.

Recommended piping practices for relief valve piping can be found in Pressure equipment directive 97/23/EG.

2.3.4.5 Blow down piping

Blow down building steam, water and compressed air supply lines before final connection to equipment.

2.3.4.6 Steam and water pressure

Sterilizer is equipped to operate on pressures listed in Table 2-2 and Table 2-3. If supply pressure exceeds those shown, provide reducing valves. Unless otherwise specified in the contract reducing valves are not furnished by Belimed.

2.3.4.7 Steam quality

Steam should be condensate free and 100% saturated vapor (dry, not superheated) to ensure proper goods drying. It has to fulfill the requirements of AAMI ST 46.

2.3.4.8 Water quality

Water is used for vacuum pump and heat exchangers. Refer to Table 2-3 for recommended water quality.

Condition	Nominal conditions	Maximum conditions
Temperature	4-16°C (40-60°F)	21°C (70°F)
PH	6.5-8	6-8.5
Total hardness as Ca^{2+}	0.2-1.8 mmol/l	2 mmol/l
Total dissolved solids	50-200 mg/l	400 mg/l
Chloride	10-70 mg/l	80 mg/l

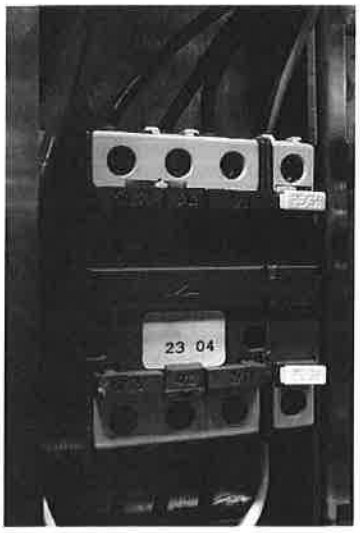
Table 2-3: Recommended feed water q uality for sterilizers

2.3.4.9 Wiring Terminals

It is the responsibility of the customer to provide proper electrical disconnect device and branch circuit protection in accordance with applicable codes and regulations .

Wiring to the disconnect device is not furnished by Belimed.

Connect the supply line on the main disconnect switch terminals (refer to Figure 2-3)



Wire (cable)	connector no
Phase L1	to 1/L1
Phase L2	to 3/L2
Phase L3	to 5/L3
Protective Conductor to PE	

Figure 2-3: Disconnect switch

The electrical installation must be carried out by an installer in the fields.

2.3.5 Preparation

2.3.5.1 Standard sterilizers

- Check the sterilizer placement according to installation drawing.
- Measure overall height on the wall opening.
- Mark the center lines of the sterilizer chamber on the floor with a color marker
- For correct positioning refer to installation drawing
- Check the position and carrying out of the floor drains (A and GU)
- Put the stainless steel tub on place (if required).
- Remove transportation screws from all door-counter weights.
- Place the chamber on the stainless steel tub.
- If the sterilizer is installed on a flammable floor, a steel bottom plate, 800mm wide and 2mm thick, must be placed on the floor below the service area, covering the whole service area.

- Adjust the chamber high using the adjusting screws. Refer to the installation drawing.
- Open chamber door
- Remove door locking bolts (below chamber) an insert the bolt 90° turned again.
- Adjust the chamber high with a spirit level along x and y axis by using the 4 adjustment screws on the feeds. The chamber floor must be leveled to 837mm above ground.
- Close chamber door.
- Tighten the gap between steel tub and sterilizer ground frame with silicone compound.
- Install the 4 pressure sensors.
- Fill 5 liters of water into the vacuum pump circulation tank.

3 Labeling

3.1 Type and Model Designation

The Belimed Steam Sterilizer TOP 5000 model 5-5-9 is available in the standard configuration.

Table 3-1 hereafter resumes size and designation.

Model	Configuration	Chamber volume (liters)	Chamber size (H x W x D) (mm)	Overall Dimensions (H x W x D) (mm)	Weights (kg)[2] Transport / Operation / Inspection
5-5-9 VS1	1- door	275	535x535x965	1900x855x1174	650
5-5-9 VS2	2- door	275	535x535x915	1900x855x1174	650

Table 3-1: Size and Designation

3.2 Marking

The sterilizer can be identified through following two metal marking plates

- Chamber/jacket ratings (fig. 4-1) are located just above the chamber door on the operating end.

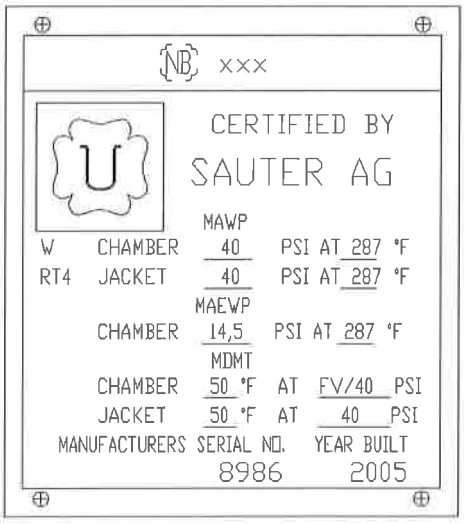


Figure 3-1: Chamber labeling (according to ASME pressure and fire vessels, example)

[2] Weight without internal steam generator

- Electrical ratings (Figure 3-2) are given on the label located in the upper part inside the servicing door on the operating end.

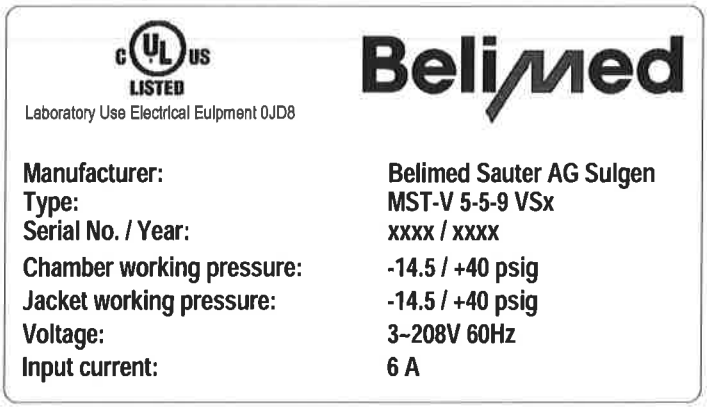


Figure 3-2: Labeling Electrical Ratings

Remark to Figure 3-2:

Working pressure: 1 bar (gauge) =14.5psi / 2.75 bar g = 40 psi g

Voltage: 3~ = 3 phase

3.3 Warning labels

Those labels are placed close to the respective parts which represent a potential hazard:

- DANGER OF SCALDING !

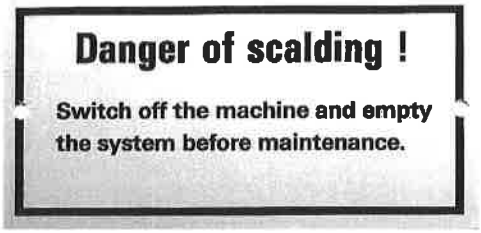


Figure 3-3: Label "DANGER OF SCALDING !"

- DANGER: OVERPRESSURE !

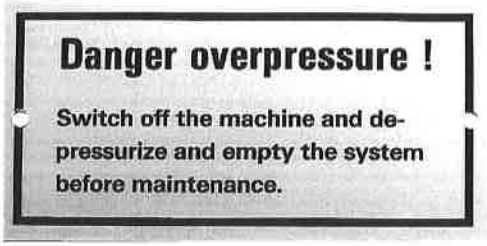


Figure 3-4: Label "Danger overpressure !"

- DANGEROUS VOLTAGE !

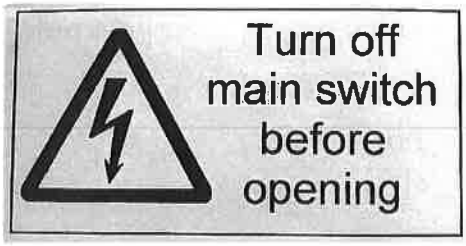


Figure 3-5: Label „DANGEROUS VOLTAGE !"

- DANGER OF GET ONE'S HAND CRUSEHD

Figure 3-6: Label „Danger of get one's hand crushed" while closing chamber door

- BURN HAZARD

Figure 3-7: Label „Burn Hazard"

- CAUTION refer to accompanying documents

Figure 3-8: Label „CAUTION - REFER TO MANUAL"

4 General description of the components and functions

4.1 General view

Figure 4-1 shows the main components or control elements which are accessible to the user from the operating end. The number of control elements of the sterilizer is reduced to the absolute minimum in order to maximize the simplicity and security of use.

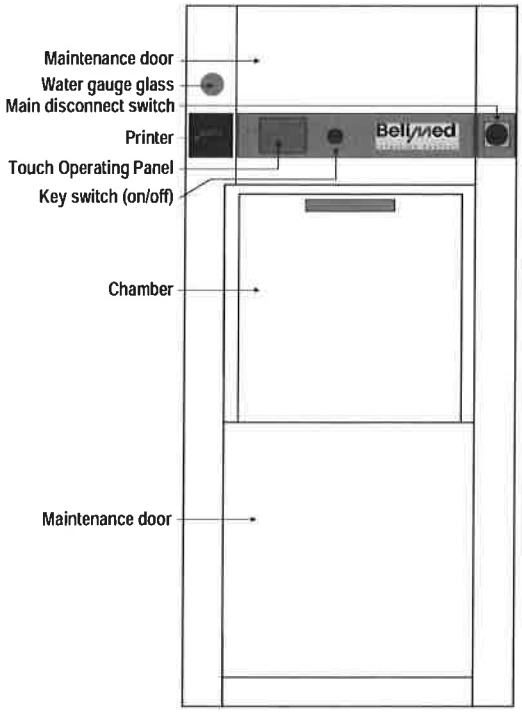


Figure 4-1: Control elements operating end

Figure 4-2 shows the main components or control elements which are accessible to the user from the non operating end.

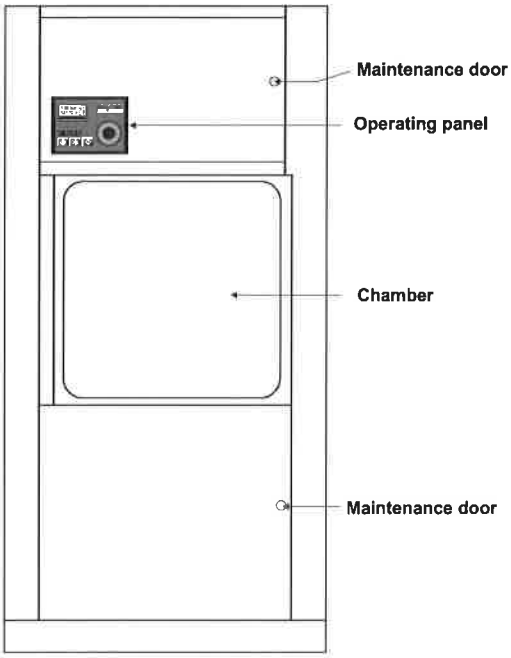


Figure 4-2: Control elements non operating end

4.2 Indicators and gauges

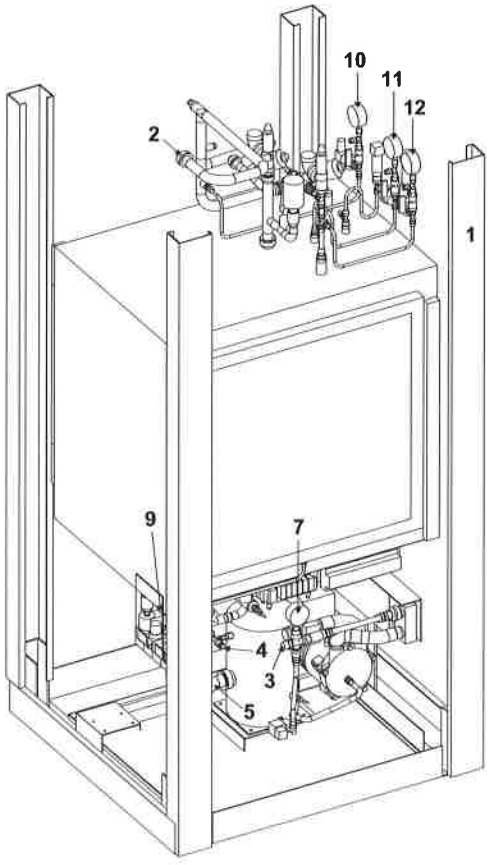
The system offers two types of indicators and gauges:

- The process indicators are all located on the display of the operating end control panel and of the non operating end control panel (see section 5.3 and 5.4)
- The service indicators and gauges are all located within the service area (see service and maintenance manual). The pressure gauges in the service area scaled in bar gauge:

The gauges shall show :

Pressure indication	Nominal conditions bar	Maximum conditions bar
Steam supply	2.5-3	2.5-3.5
Chamber	-0.96-2.3	-1..+2.7
Jacket	-0.96-2.3	-1..+2.7
Door seal (door locked)	2.9-3.2	2.8-3.5
Compressed air	5-7	5-7
Tap water	2-5	2-5
Deionized water	2-5	1.5-5

Table 4-1: Pressure indicators in service area



1-6 utility connections refer to chapter 2.2.2
7 Tap water pressure gauge
9 Compressed air gauge
10 Steam supply gauge
11 Chamber pressure gauge
12 Jacket pressure gauge

Figure 4-3: Instrumentation

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4.3 Operating End Control Panel

Figure 4-4 shows the arrangement of the control elements on the operating end.

The user's control panel with the interactive touch-screen display is described with more details in Figure 4-5 and Figure 4-6 and hereafter.

The chamber temperature indicator can be configured in °F or °C.

The chamber pressure indicator can be configured in mbara, barg, kPaa, psia, psig/in.Hg

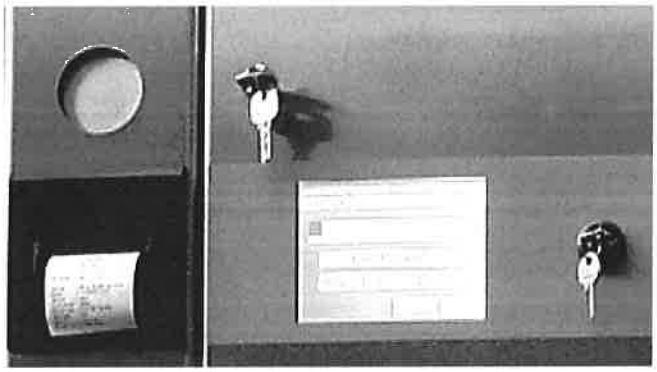

Figure 4-4: Operating end control panel

Figure 4-5: Out-of-cycle display

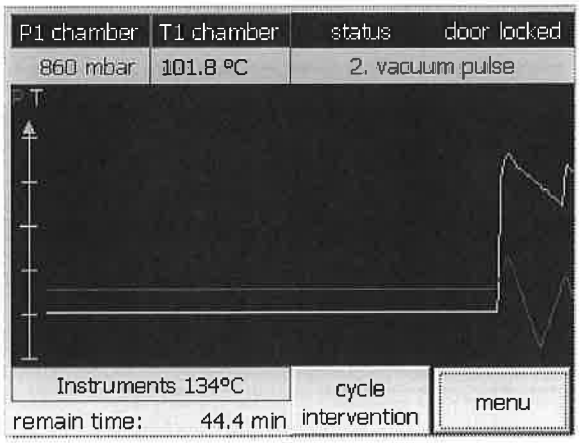

Figure 4-6: In-cycle display

4.4 Non-Operating End Control Panel (option)

Sterilizers with 2 doors are equipped with the non-operating end control panel.

Figure 4-7 shows the panel on the non operating end.

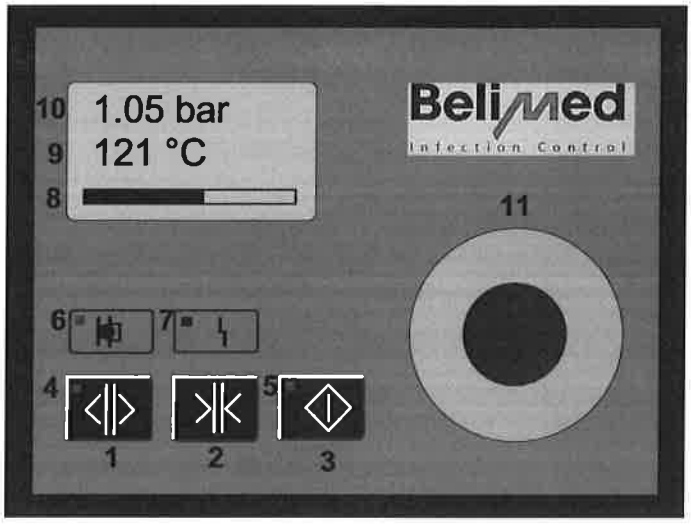

Figure 4-7: Non operating end control panel

No.	Item	Name	Function
1	Push button	Open door	Open chamber door at end of cycle
2	Push button	Close door	Close chamber
3	Push button		n/a
4	LED	Open door	Lights up, when the door on the non operating end can be opened
5	LED	In cycle	Lights up while a cycle is running
6	LED	Door locked	Lights up, when doors are locked
7	LED	Alarm	Lights up while an alarm is active
8	Bar Graph	Cycle progress	Shows the progress of a cycle (0...100%)
9	Display	Temperature	Chamber temperature Indicator or remain process time
10	Display	Pressure	Chamber pressure Indicator
11	Push button	Emergency stop	Emergency stop button

4.5 Printer

The cycle documentation printer is a panel mount printer (refer to Figure 4-8).

General Specifications:

Technology:	impact dot matrix
Columns:	42 columns
Paper with:	57.5mm
Paper roll diameter	38mm

For replacing paper roll or ribbon refer to chapter 11

Figure 4-8: Panel mount printer

4.6 Printouts (example)

```
BELIMED CYCLE DOCUMENTATION
Hospital       : Charity
Department     : CSSD
Machine-Type   : 12-6-12HS2     No:  045556
Run number     : 345679
Operator       : Brown
Cycle          : 4: Leak Test
Version        : PR: 13.03.2001  SW:   2.2
Cycle start    : 24.03.2001 / 13:35

Set-Values     : Leak rate   <1.3 mbar/min
                 Test time        15.0 min

Time  Phase                  Press. Temp.
  m:s                         mbara     °C
-----------------------------------------
  0:00 Vacuum                   995   28.5
  2:20 Stabilize                 70   25.5
  7:20 Air Leak Test             72   27.9
 22:20 Air Break                 79   28.3
 24:03 Complete                 980   29.1

Leak rate                    0.5 mbar/min

CYCLE PASSED
Cycle approved: Y / N      Date:

Signature:
```

Figure 4-9: Printout of a Leak Test cycle

4.7 Door operation

4.7.1 Manual doors

The door can be opened by pressing the control button "open door". The door will be unlocked by sucking back the door seal. Five seconds after pressing the "open door" button the door can be opened.
Close the door manually. When the door is closed the door will be locked automatically.

4.7.2 Motorized doors

If the doors of the Belimed Steam Sterilizer TOP 5000 are motorized: they can be activated by pressing the control buttons "open door" and "close door" on the control panel of the operating or non-operating end: the corresponding door will be activated when the sterilizer status allows the opening or closing procedure. The door motor is equipped with a safety clutch, which stops the door if the closing force is >150N.

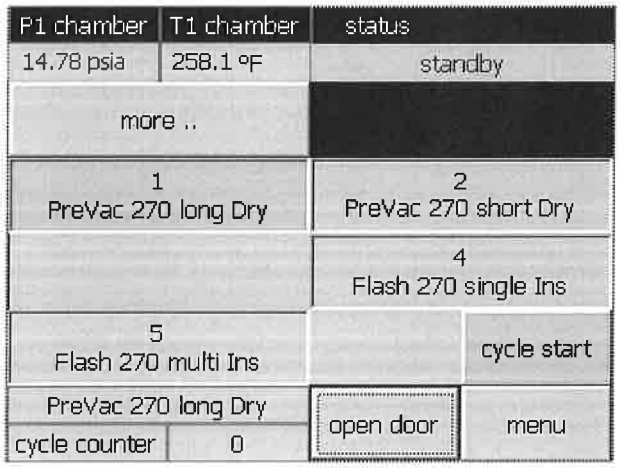

Figure 4-10: Door operation buttons operating end (manual door)

Figure 4-11: Door operation buttons non operation end

4.8 General precautions for the sterilization procedure

The sterilization performances in terms of cycle duration, level of dryness and water/steam consumption can only be achieved when the loading prescriptions are respected. Following aspects are to be followed:

- The goods to be sterilized must be placed on the loading racks especially designed therefore: avoid placing the goods directly onto the chamber floor.
- Each shelf of the loading rack must be loaded individually: do not stack trays.
- When wire baskets are stacked , pay attention that the goods of the underlying basket shall not be compressed. The package must be able to expand during the sterilization process.
- Heavy sterilization items shall always be placed in the lower part of the unit.
- Overfilled baskets and trays can cause problems. Loading of baskets has to be achieved in such a way that a hand can easily fit between the packs without compressing them.
- Foil/ paper packaging has to be stacked in an oblique way to each other, the paper side located downwards.
- Textiles have to be placed vertically whenever possible.
- Instruments shall be equally distributed among the tray
- Loading has to be performed with similar instruments or goods to be processed.
- Goods to be sterilized shall be packaged in a loose way. Sufficient room shall remain free in order that the steam can reach the surface of the goods to be sterilized without hindrance.
- Keep at least 5 cm (2") distance - horizontally and vertically - between the goods to be sterilized and the chamber walls.

5 Operating the sterilizer

5.1 Turn on the sterilizer

The **Sterilizer main power disconnect switch** is located on the right side above the sterilizer. This switch disconnects power to the control. Under normal operation, this switch is left in the **On** position at all times.

The **Steam shut-off valve** (refer to Figure 5-1) is located behind the access door on the top . Ensure this valve is in the open position before trying to operate the sterilizer.

The **Tap water shut-off valve** is located behind the lower maintenance door. Ensure this valve is open.

The **Deionized water shut-off valve** (option internal steam generator) is located behind the lower maintenance door on the left side. Ensure this valve is in the open position before trying to operate the sterilizer.

The **Key Switch** (refer to Figure 5-1) is located on the Operating End Control Panel. Turn the key in the **I** position (on)

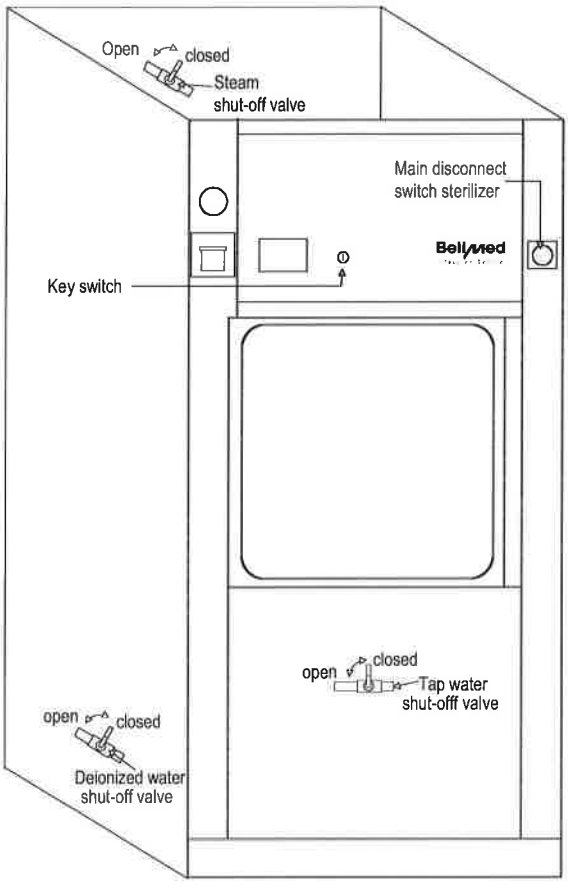

Figure 5-1: Utility locations

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5.2 Log on

To operate the sterilizer a user must be logged on. The operator has to enter his username and password (refer to Figure 5-2 to Figure 5-5).

Note:

The Belimed service personnel can configure the system that a 'common' user is automatically logged on. The 'common' user can select and start a cycle and can operate the door. User 'System' is entered in the batch log. In this configuration, it is not possible to trace back to the user who started the program

Press the 'menu' button in the out-of-cycle display (refer to Figure 5-2)

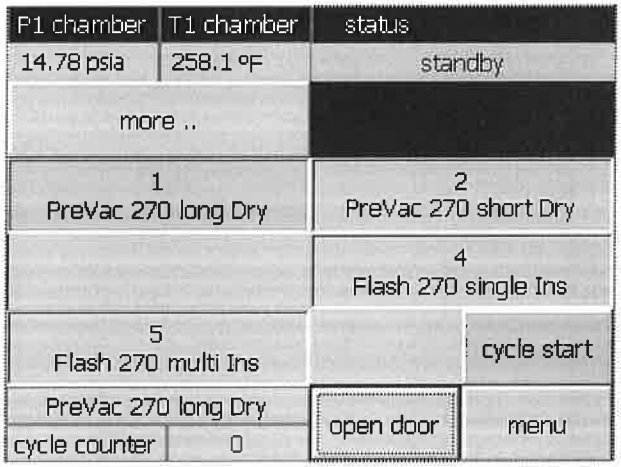

Figure 5-2: Out-of-cycle display

Then press the 'log on' button in the 'menu' display (refer to Figure 5-3)

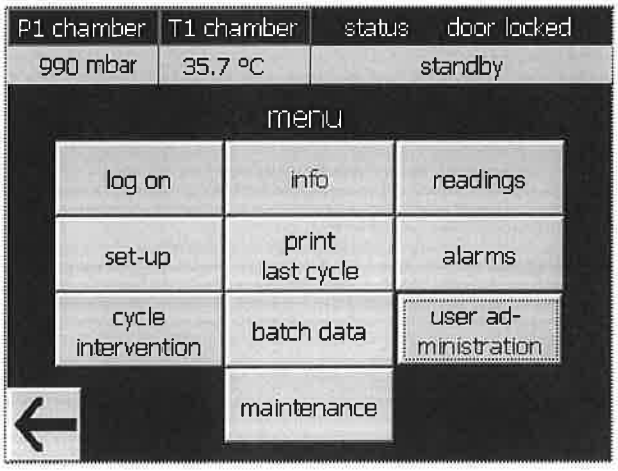

Figure 5-3: Menu display

The log on display shows the entry-field for the password (refer to Figure 5-4).

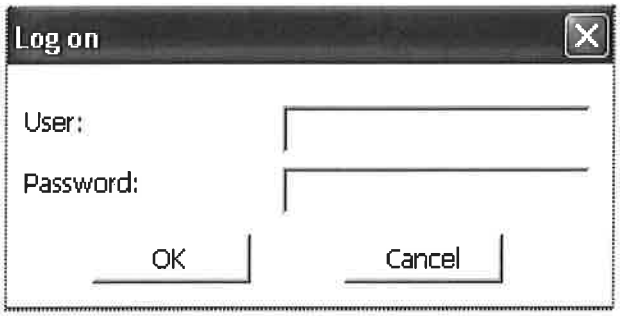

Figure 5-4: Log on display

To enter a password, press the field below 'password'.

The alphanumeric keyboard is shown (refer to Figure 5-5):

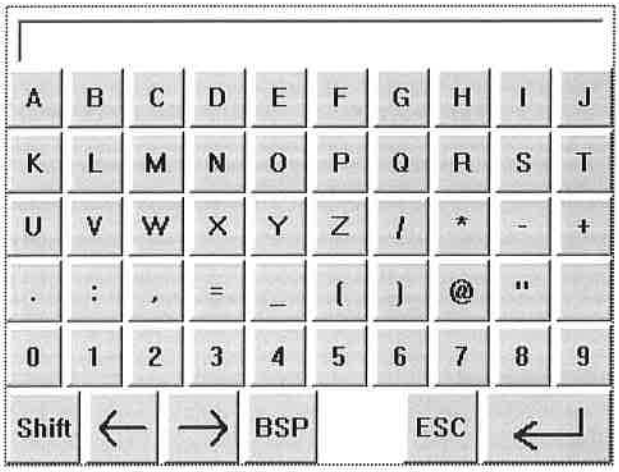

Figure 5-5: Alphanumeric keyboard

Enter the password and press the ↵ button. After entering the Password, press the **'Login'** button (Figure 5-4)

You will see message 'Invalid Password' if you have entered an incorrect Password.

If the Password is correct, the display switches to the Menu display.

5.3 Loading the sterilizer

WARNING - BURN HAZARD

Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

WARNING - FALL HAZARD

To prevent falls keep floors dry by immediately wiping up any liquids or condensation in sterilizer loading or unloading area.

Prepare the load as described in chapter 8 Techniques of sterilization.

CAUTION

Keep the movement area of the door unobstructed during door opening and closing.

5.3.1 Loading sterilizer

If you want to enter batch data manually select the 'Batch data' menu (refer to chapter 8.8.1).

If the optional documentation system 8535-BC is installed, enter batch data with the barcode scanner first before loading the sterilizer (refer to chapter 8.8.2).

- Open the chamber door
  option motorized doors: by pressing the 'open door' button or actuating the foot pedal.
- Pull-out a shelf (refer to Figure 5-6)
- Put the load on the shelf
- Slowly push-in the shelf
- Close the chamber door
  option motorized doors: by pressing the 'close door' button, until door is closed.

Figure 5-6: Pull-out shelf

5.3.1.1 Remove the upper shelf

If an item is higher than 300mm, you can remove the upper shelf.

To remove a shelf:

- Pull-out the shelf to the stop
- Lift-on the latch on the right side (refer to Figure 5-7)
- Pull-out and remove the shelf, use both hands (refer to Figure 5-8)

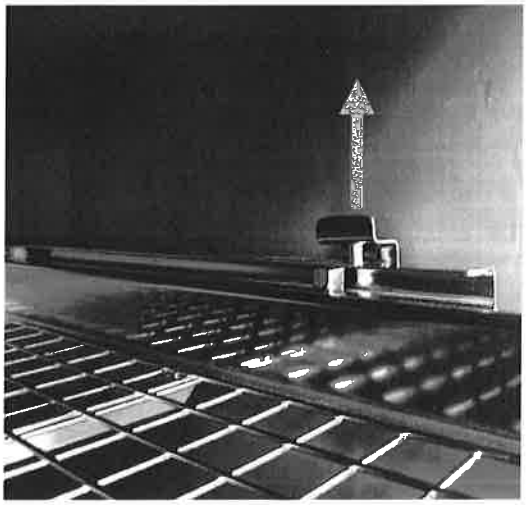

Figure 5-7: Pull-out shelf

Figure 5-8: Pull-out shelf

5.3.1.2 Remove the lower shelf

For cleaning the chamber and the strainer remove the lower shelf in the same way.

5.4 Select a cycle

5.4.1 Factory-set cycles and cycle values

The predefined programs of the Belimed steam sterilizers TOP5000 are described in Chapter 6.

5.4.2 Select a cycle

Ensure that the load is suitable for the intended sterilization temperature (temperature resistant) before selecting a cycle.

Five cycle selection buttons (P1..P5) are shown on the screen (refer to Figure 5-9). These buttons display the cycle number, the cycle name and the sterilization exposure temperature.

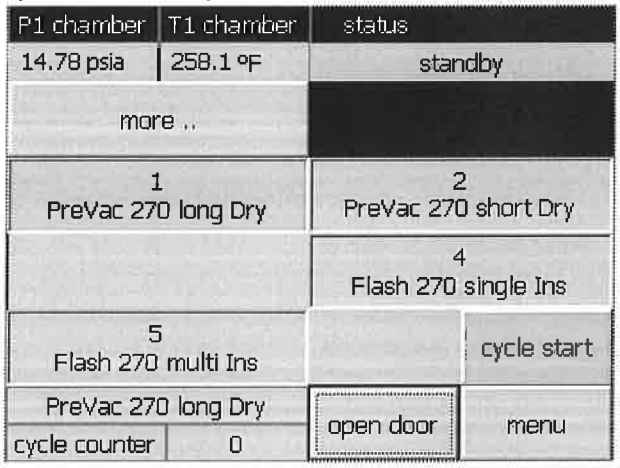

Figure 5-9: Cycle selection buttons with cycle start button

5.5 Start a cycle

The selected program is started after you press the Start button if:

- a cycle is selected
- chamber doors are closed
- no alarms are pending
- the minimum steam pressure is exceeded

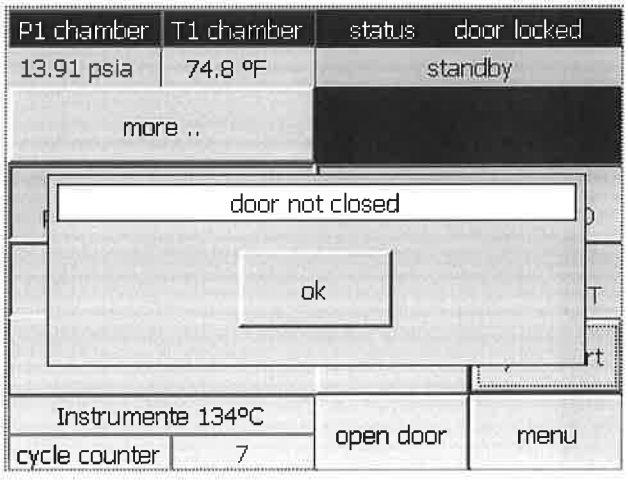

Figure 5-10: Cycle selection with "dialog box"

If the sterilizer is not at start standby, the cause is displayed with a dialog box (Figure 5-10) when you press the Start button.

5.6 In-cycle

During a cycle the following information is displayed:

- Chamber pressure P1
- Chamber temperature T1
- Cycle status (phase)
- Door status
- Cycle graph
- Cycle intervention button
- Menu button

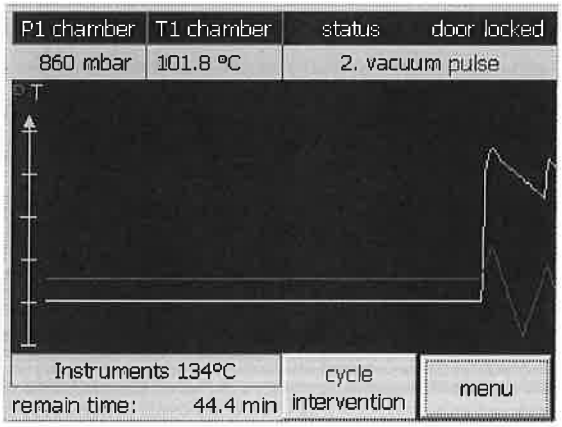

Figure 5-11: In-cycle display

5.7 Cycle failed

If there was an injurious alarm during a cycle, the door on the non operating end is locked.

On the operating end panel the message 'cycle failed' is displayed (refer to Figure 5-12).

If the user must press the 'ok' button. Only the door on the operating end can be opened. Unload the sterilizer.

The load must be wrapped again with dry material before sterilizing.

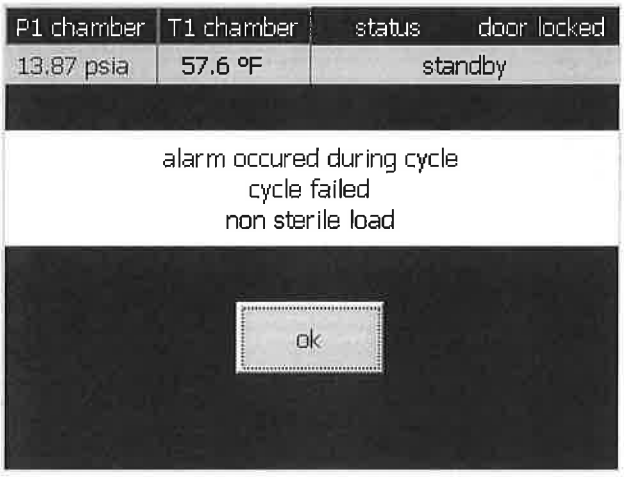

Figure 5-12: Cycle failed display

5.8 Unloading the sterilizer

WARNING - BURN HAZARD

Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

WARNING - FALL HAZARD

To prevent falls keep floors dry by immediately wiping up any liquids or condensation in sterilizer loading or unloading area.

The door on the non operating end (double-door sterilizers) can be opened if:

- The sterilization cycle is completed (Test cycles: door can be opened on the operating end only)
- The cycle passed (no injurious alarms during cycle)
- The difference between chamber pressure and atmospheric pressure does not exceed ±80mbar.

CAUTION:

Keep the movement area of the door unobstructed during door opening and closing.

5.8.1 Unloading sterilizer

- Open the chamber door by pressing the 'open door' button.
- Pull-out the shelf
- Remove the load
- Push-in the shelf
- Close the chamber door by pressing the 'close door' button

5.9 Cycle documentation

At cycle end the cycle documentation is printed on the built-in printer (refer to Figure 5-13).

The Panel Mount printer uses impact dot matrix technology.

For a detailed description of the printer see instructions in chapter 4.5.

For printout examples see in chapter 4.6.

Figure 5-13: Built-in printer

5.10 Log off

After using the sterilizer the user should log off to prevent that unauthorized persons can handle the sterilizer. Press first the 'menu' button on touch screen and then press the 'log off' button in the 'menu' display (refer to Figure 5-14).

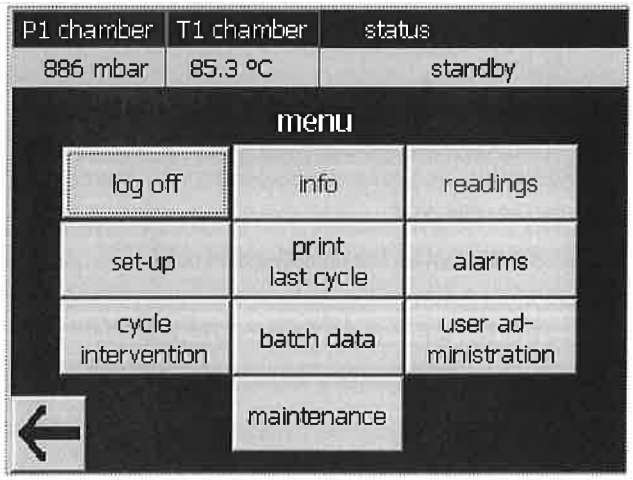

Figure 5-14: Menu display

5.11 Turn off the sterilizer

After unloading the last cycle of a day turn off the sterilizer with the key switch (refer to Figure 5-1).

6 Sterilizer Factory Cycles Settings

Belimed steam sterilizers TOP5000 are shipped with the factory-set cycles and cycle values listed in Table 6-1:

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
1	PreVac 270F 4S / 30Dry	270°F	4 minutes	30 minutes	Double-wrapped instrument trays, maximum weight of 17 lbs each. Fabric Packs.
2	PreVac 270F 4S / 5Dry	270°F	4 minutes	6 minutes	Double-wrapped instrument trays, maximum weight of 17 lbs each. Fabric Packs. Instruments for immediate use only.
3	Flash 270F - Single Ins	270°F	3 minutes	1 minute	Unwrapped instrument tray with a single instrument
4	Flash 270F - Multi Ins	270°F	10 minutes	1 minute	Unwrapped instrument tray with non porous multiple instruments (maximum weight of 17lbs)
5	Express 270F	270°F	4 minutes	3 minutes	Single wrapped instrument tray with non porous single instrument
6	Bowie-Dick Test	273°F	3.5 minutes	1 minute	One DART or Bowie-Dick-Test-Pack
7	Leak Test	-	-	-	Empty chamber
8	Warm up & Leak Test	270°F	4 minutes	3 minutes	Empty chamber
9	-	-	-	-	-
10	Liquid 250F	250°F	45 minutes	-	Max 1000 ml of Liquid per bottle. Use only vented bottles, type I, borosilicate glass. Cycle disabled

Table 6-1 Factory set cycles

6.1 270°F Pre-vacuum Cycles

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
1	PreVac 270 long Dry	270°F	4 minutes	30 minutes	Double-wrapped instrument trays, maximum weight of 17 lbs each. Fabric Packs.
2	PreVac 270 short Dry	270°F	4 minutes	6 minutes	Fabric Packs.

Table 6-2: 270°F Pre-vacuum Cycles

The cycle graph provides a visual representation of the Belimed Steam Sterilizer TOP 5000 Pre-vacuum cycles (refer to Figure 6-1):

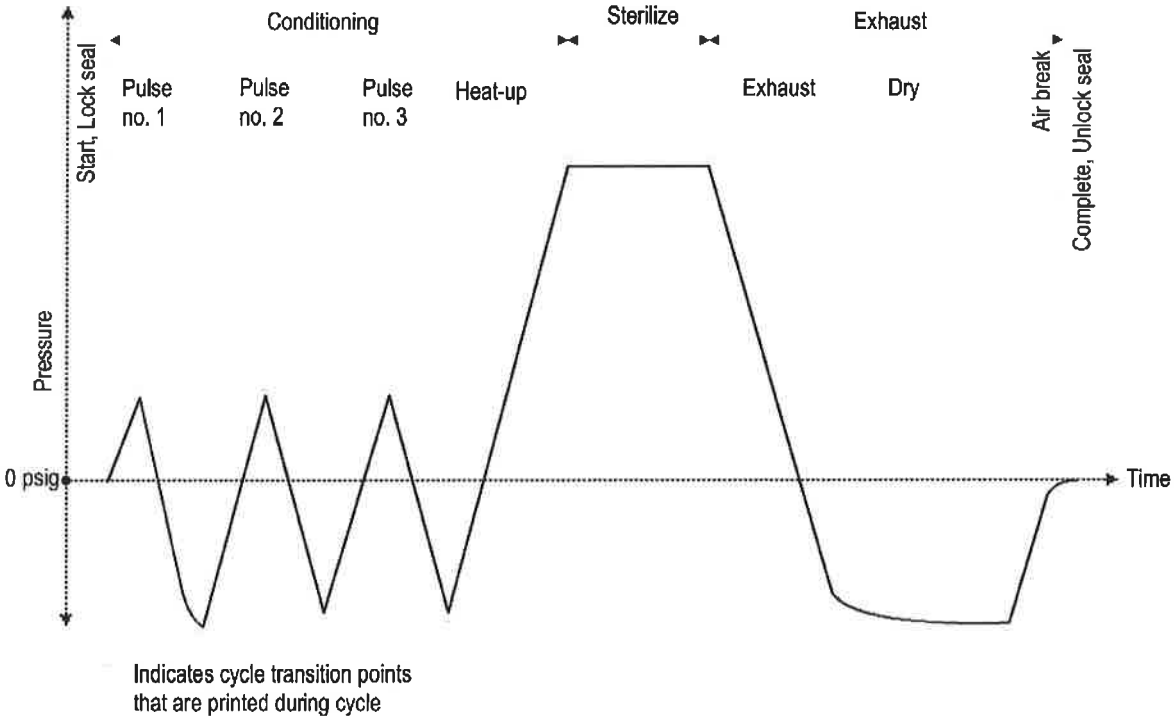

Figure 6-1: Cycle Graph - 270°F Pre-vacuum cycles

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6.2 250°F Liquid Cycle

RESTRICTION:

It is inappropriate for a health care facility to sterilize liquids for contact.

WARNING - EXPLOSION HAZARD:

This sterilizer is not designed to process flammable compounds

WARNING - BURN HAZARD:

When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, you must observe the following procedures:

Use Liquid cycle only; no other cycle is safe for processing liquids

Use only vented closures; do not use screw caps or rubber stoppers with crimped seal.

Use only Type I borosilicate glass bottles, do not use ordinary glass bottles or any container not designed for sterilization.

Do not allow hot bottles to be jolted; this can cause hot-bottle explosions. Do not move bottles if any boiling or bubbling is present.

This sterilizer is not designed to process flammable liquids nor liquids in containers that are not designed for sterilization.

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
10	LIQUID 250°F	250°F	45 minutes	--	Max 1000ml of Liquid per bottle. Use only vented Type I borosilicate glass bottles.

Table 6-3: 250°F Liquid Cycle

The cycle graph provides a visual representation of the Belimed Steam Sterilizer TOP 5000 LIQUID cycles (refer to Figure 6-2):

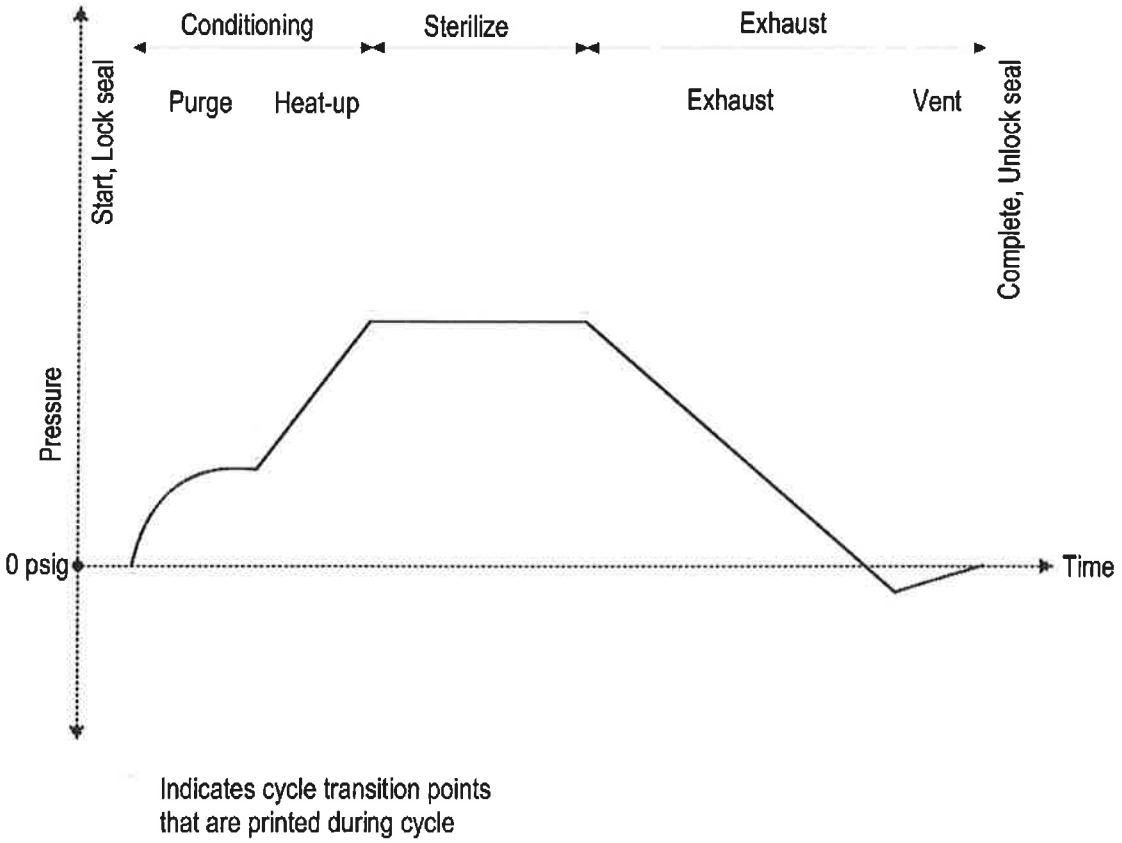

Figure 6-2: Cycle Graph - Liquid cycle

6.3 270°F Express Cycle

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
5	Express 270	270°F	4 minutes	3 minutes	Single Wrapped Instrument Tray with non porous single instrument

Table 6-4: 270°F Express Cycle

The cycle graph provides a visual representation of the Belimed Steam Sterilizer TOP 5000 Express cycles (refer to Figure 6-3):

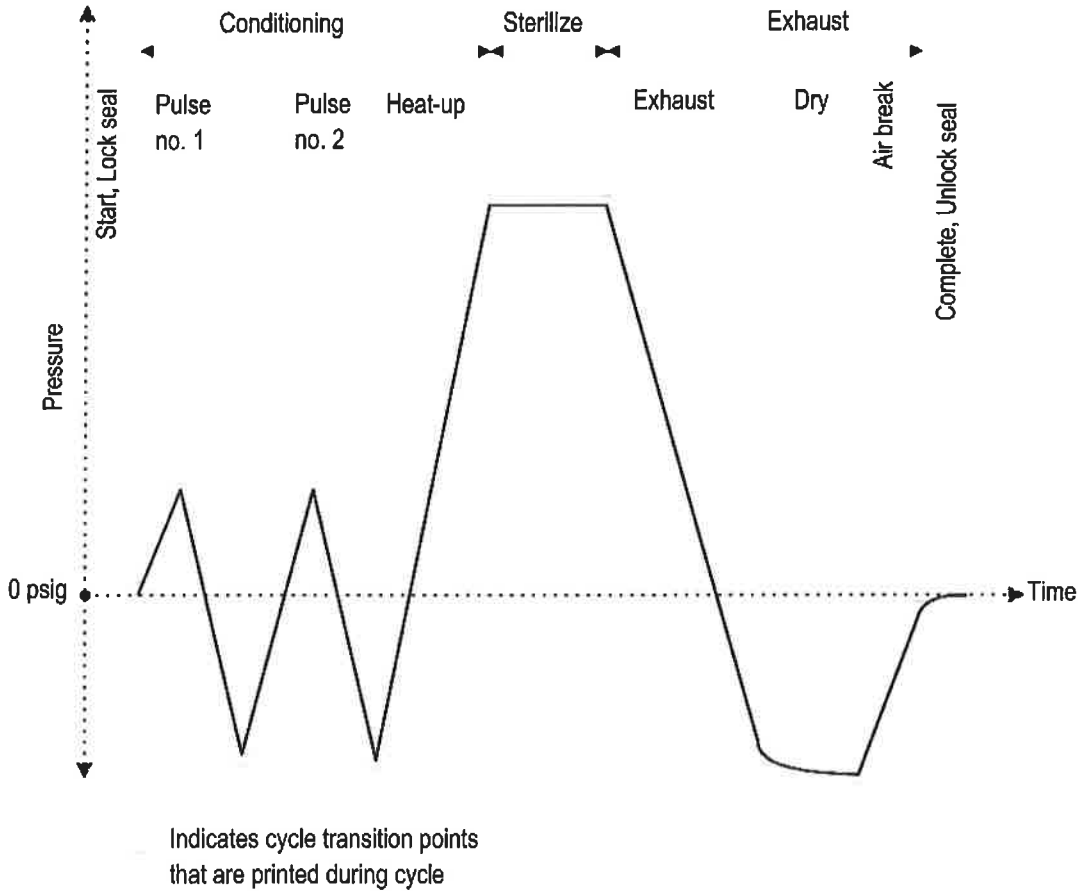

Figure 6-3: Cycle Graph - Express cycle

6.4 270°F Flash Cycles

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
3	Flash 270 single Ins	270°F	3 minutes	1 minute	Unwrapped instrument tray with a single instrument
4	Flash 270 multi ins	270°F	10 minutes	1 minute	Unwrapped instrument tray with non porous multiple instruments (maximum weight of 17lbs)

Table 6-5: 270°F Flash Cycles

The cycle graph provides a visual representation of the Belimed Steam Sterilizer TOP 5000 Flash cycles (refer to Figure 6-4):

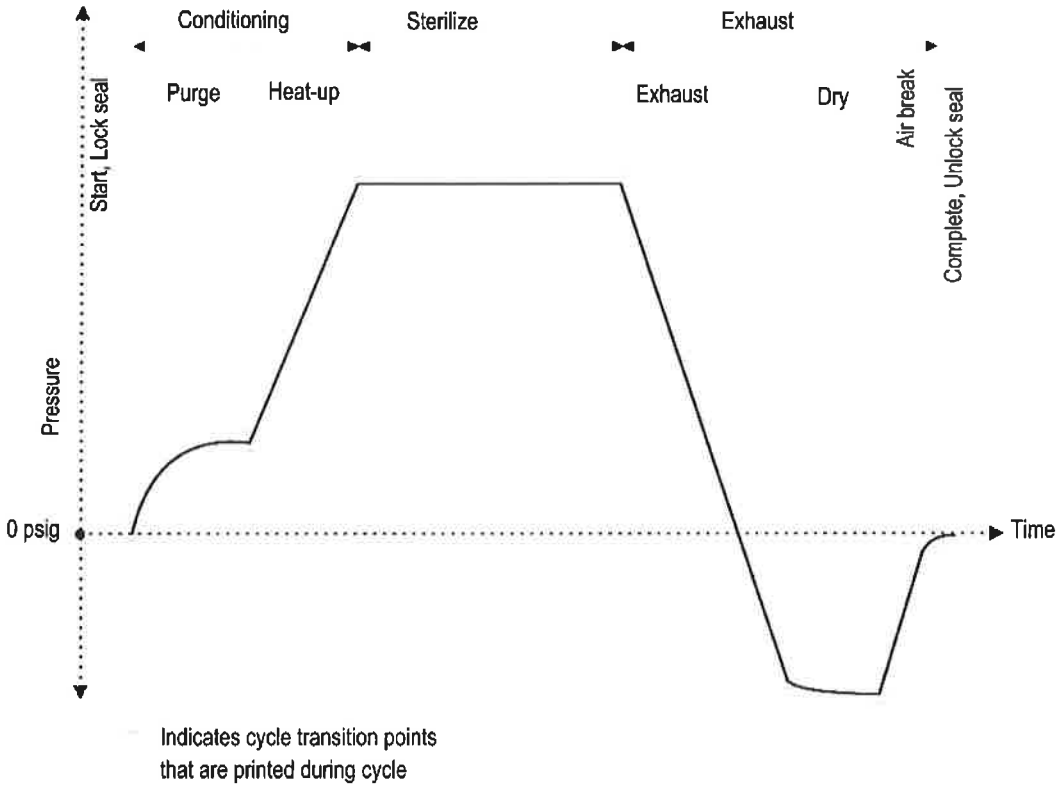

Figure 6-4: Cycle Graph - Flash cycles

6.5 DART / Bowie-Dick Test cycle

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
6	DART / Bowie -Dick Test	273°F	3.5 minutes	1 minute	One DART or Bowie-Dick Test Pack

Table 6-6: DART / Bowie-Dick Test cycle

The cycle graph provides a visual representation of the Belimed Steam Sterilizer TOP 5000 DART / Bowie-Dick Test cycle (refer to Figure 6-5):

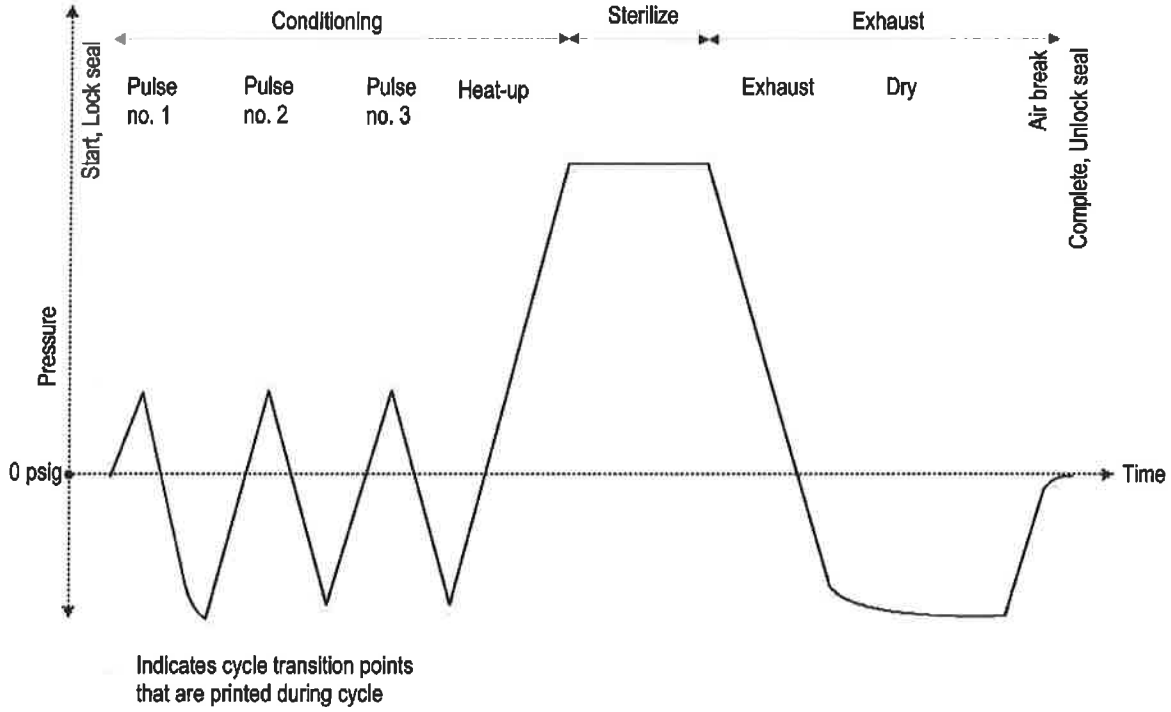

Figure 6-5: Cycle Graph - DART / Bowie-Dick Test cycle

CAUTION

The Bowie-Dick/ DART Test Cycle has to be performed daily.

6.6 Warm-up & Leak Test cycle

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
8	Warm up & Leak test	270°F	3 minutes	3 minutes	EMPTY CHAMBER

Table 6-7: Warm-up & Leak Test cycle

The cycle graph provides a visual representation of the Belimed Steam Sterilizer TOP 5000 Warm-up & Leak Test cycle (refer to Figure 6-6):

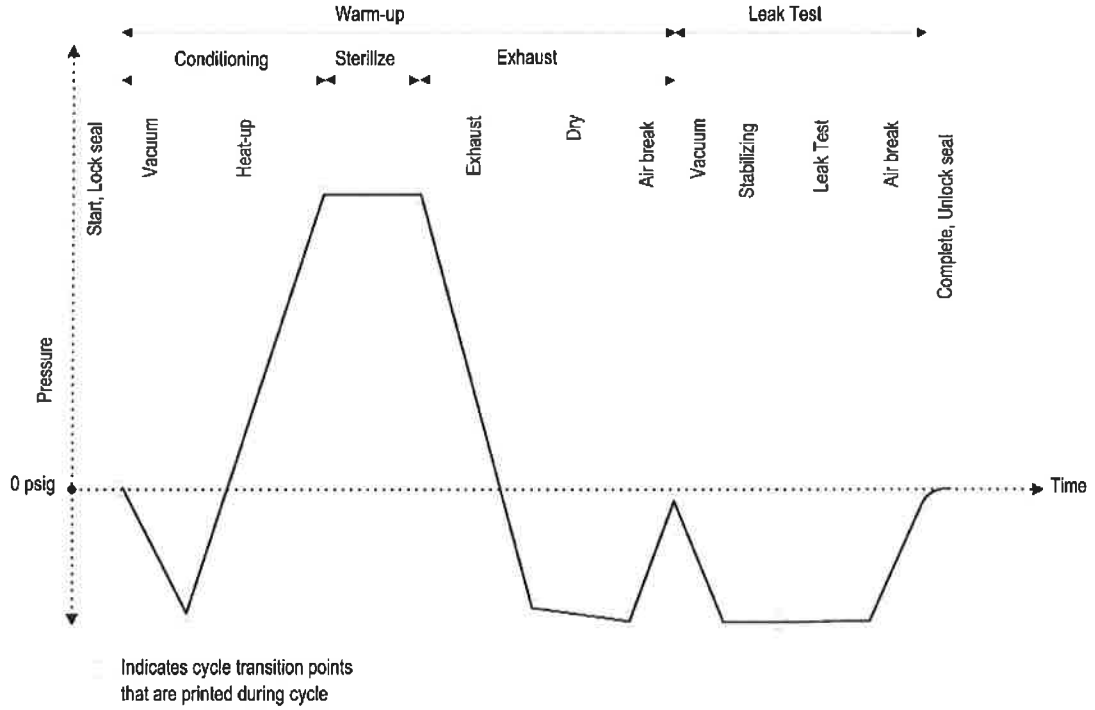

Figure 6-6: Cycle Graph - Warm-up & Leak Test cycle

CAUTION

In order to ensure the proper function of the sterilizer, we recommend to perform the leak-rate-test at least once per week, at normal working temperature.

7 Techniques of sterilization

7.1 Guidelines for preparing and sterilizing wrapped packs

WARNING - BURN HAZARD

BURN HAZARD: Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation

7.1.1 Preparing load:

- Before sterilization, materials must be thoroughly cleaned.
- Wrappers may be made of 100% cotton, 140 thread count, two-ply fabric, and freshly laundered.
- Reusable wrappers should be laundered between sterilization cycles
- Before wrapping, packaging materials must be dry and should be under room temperature (15°C-25°C) and at a relative humidity ranging from 30%-60% for at least 2 hours.

7.1.2 Wrapped fabric packs

- Place two wrappers on work surface
- Place contents on wrappers. Fabrics should be folded flat, with each succeeding layer placed crosswise to the one below to promote free steam circulation.
- Place internal chemical indicator in the center of the pack
- Wrap contents sequentially in two wrappers (refer to Figure 7-1).
- Secure with sterilizer tape and identify
- The maximum weight must not exceed 8 kg , density factor: not in excess of 0.47kg/dm3, and the size must be limited to 250x500x250mm.
- Single Fabric Test Pack (for validation) should weigh approximately 7 kg and the size must be limited to 220x300x250mm.

Notes:

- Wrapper size should be adequate for the desired method of wrapping. Excessive size wrappers may cause drying problems
- Do not wrap too tightly

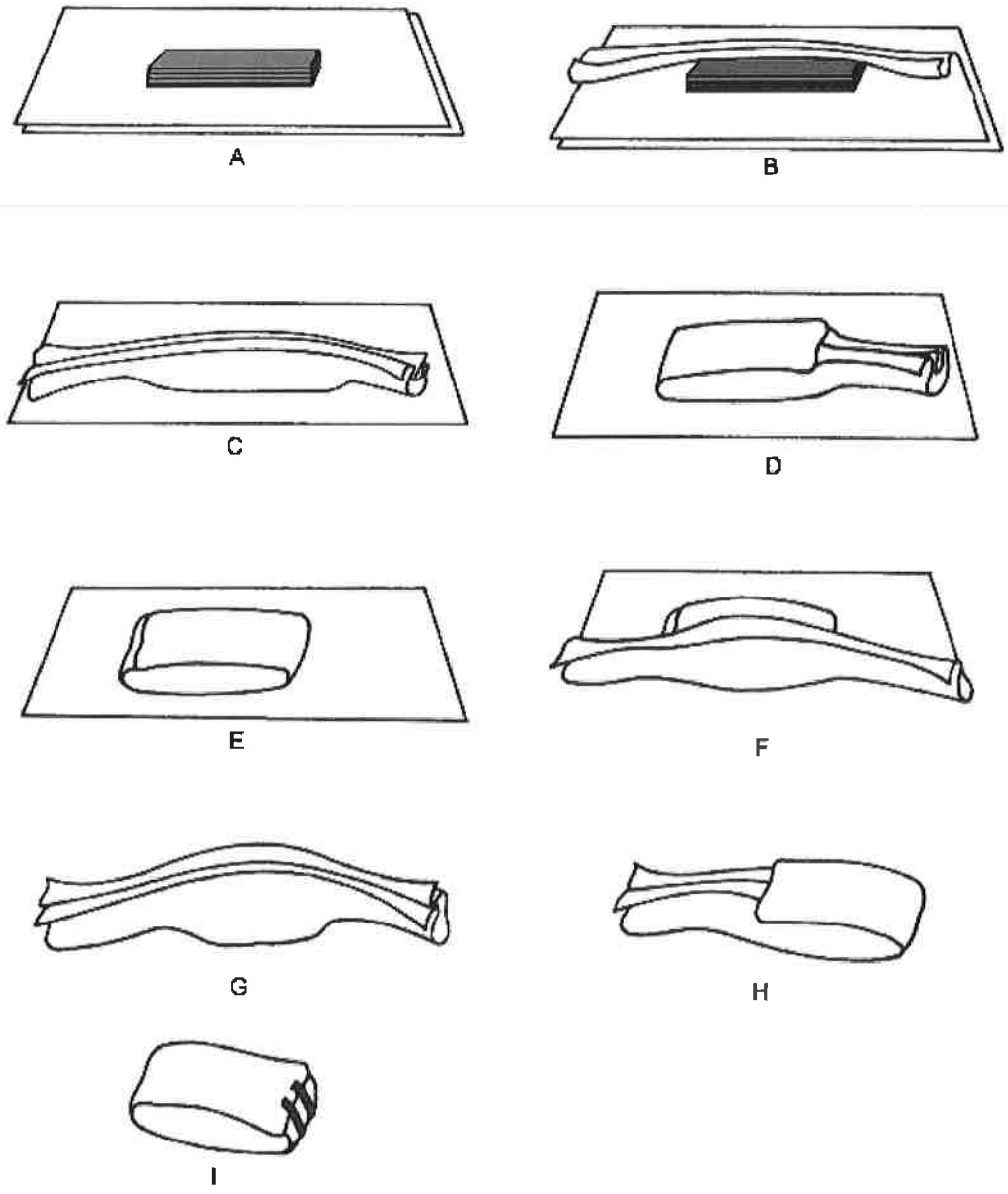

Figure 7-1: Double-wrapping: Square fold

7.1.3 Wrapped instrument sets

- Inspect instruments to make sure they are functioning properly, they are clean and dry.
- Open, disassemble or unlock instruments to permit steam contact to all surfaces.
- Use mesh-bottom tray or wire-mesh or equivalent trays.
- Place a fully opened huck towel in the bottom of the tray. This will assist drying.
- Place instruments on towel, distributing them as much as possible. Using an adequate size tray will allow optimal distribution of the instruments.
- Fold the towel excess over the instruments
- Place internal chemical indicator on instruments. Ink side should not come in contact with metal surface.
- Wrap instrument tray sequentially in two wrappers (refer to Figure 7-1).
- Secure with sterilizer tape and identify.

- Recommended weight of each wrapped instrument set is 5-8 kg for minimizing moisture retention. The maximum weight must not exceed 10kg.

Notes:

- Instrument trays must be designed for effective sterilization and drying
- Use a towel which covers the tray with minimum excess overhang.
- Wrapper size should be adequate for the desired method of wrapping. Excessive size wrappers may cause drying problems.

7.1.4 Wrapped utensils

- When placing utensils in a set, separate each clean, dry basin from the one beneath it by a huck towel.
- Open towel to fully cover the metal surface.
- Arrange utensils so that the bottom of each is parallel to the one beneath it. This allows air to escape from the utensils and helps drying.
- Place internal chemical indicator in an area of the package where steam penetration is worst. Ink side should not come in contact with metal surface.
- Wrap utensils sequentially in two wrappers (refer to Figure 7-2).
- Secure with sterilizer tape and identify
- Recommended weight of each wrapped utensil set is 6-8 kg for minimizing moisture retention.

Note:

- Wrapper size should be adequate for the desired method of wrapping. Excessive size wrappers may cause drying problems.

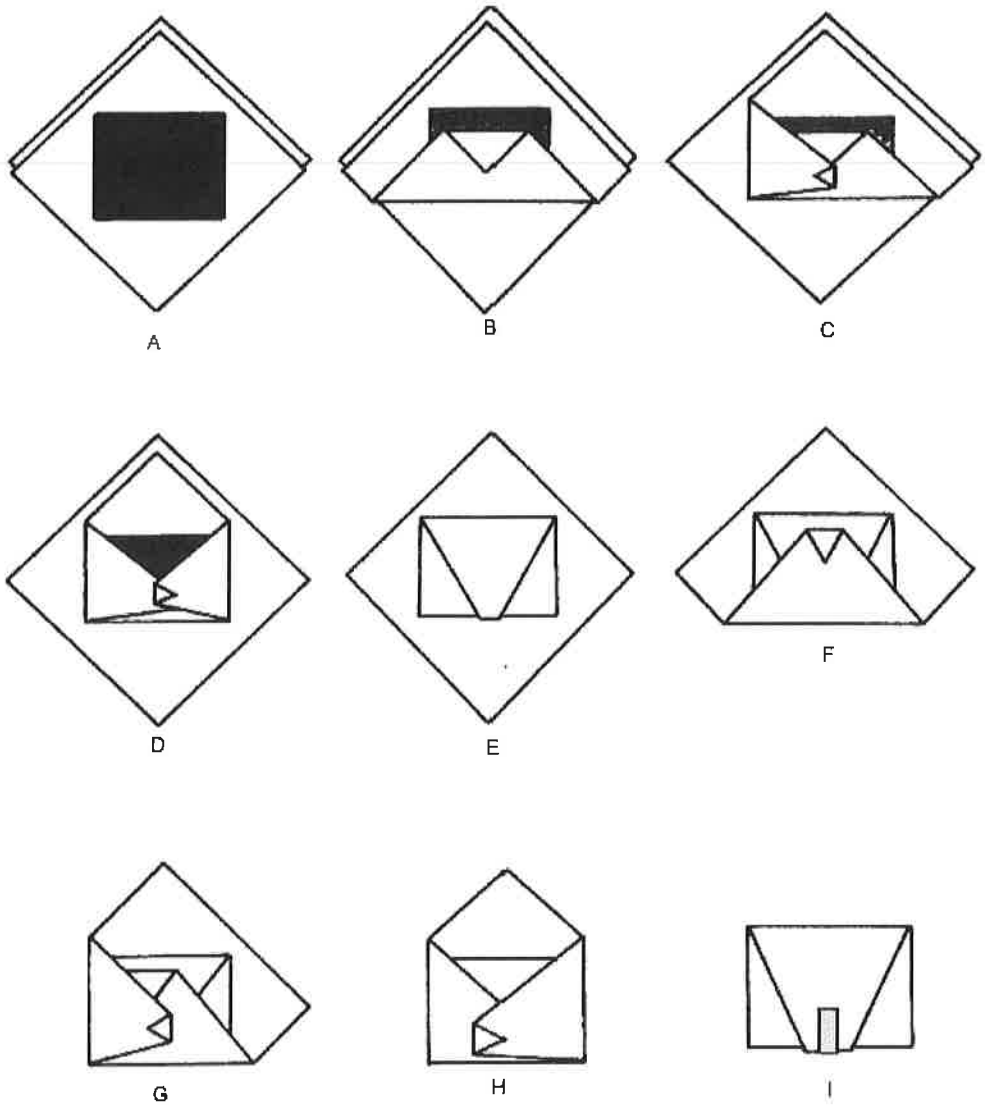

Figure 7-2: Double-wrapping: Envelope fold

7.1.5 Loading the shelves:

- Do not combine fabrics and hard goods (instruments) in one load
- Place fabric packs on edge to promote passage of steam through the pack
- Do not overload shelves
- Do not compress packages
- Provide at least 2 inches between the chamber walls and the packages
- Place packages on sterilizer shelves, do not staple packages

7.1.6 Steam sterilization cycles

Cycle no. 1 and 2 is recommended for full load fabric packs, instrument trays, utensils.

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
1	PreVac 270 long Dry	270°F	4 minutes	30 minutes	Double-Wrapped Instrument Trays or Fabric Packs, For amount refer to *Table 7-2*
2	PreVac 270 short Dry	270°F	4 minutes	6 minutes	Fabric Packs, For amount refer to *Table 7-2*

Table 7-1: Recommended solid cycles

Do not sterilize a mix load of instrument trays and fabric packs.

Model	Sterilizer Chamber Size	Wrapped Instrument Trays 20"x10" max. 17lb each	Wrapped Instrument Trays 17"x12" max. 17lb each	Fabric Packs 11"x11"x9" max. 6.6lb each	Fabric Packs 9"x9"x6" max. 3.3lb each
5-5-9 VS1 5-5-9 VS2	21"x 21" x 38" (535 x 535 x 965) mm	2	4	6	12

Table 7-2: Recommended solid load

Ensure that the load is suitable for the intended sterilization temperature (temperature resistant) before selecting a cycle.

7.1.7 Material qualification

Fabrics:

Use only fabrics designed for steam sterilization with 134°C.

Life time of fabrics depend mainly on washing and ironing the fabrics.

Please note the manufacturer's declaration.

Instruments:

Use only instruments designed for steam sterilization with 134°C.

Instrument life time depends mainly on use and cleaning with chemicals.

100% ASTM 316 Stainless steel instruments can generally be used for steam sterilization.

For other materials note the manufacturer's declaration.

Other materials:

Before sterilizing other materials refer to the manufacturer's recommendations and restrictions (steam, temperature, max. sterilization time).

7.2 Guidelines for preparing and sterilizing liquids

WARNING - EXPLOSION HAZARD:
This sterilizer is not designed to process flammable compounds

WARNING - BURN HAZARD:
When sterilizing liquids, to prevent personal injury or property damage resulting from bursting bottles and hot fluid, you must observe the following procedures:
Use Liquid cycle only; no other cycle is safe for processing liquids.
Use only vented closures; do not use screw caps or rubber stoppers with crimped seal.
Use only Type I borosilicate glass bottles, do not use ordinary glass bottles or any container not designed for sterilization.
Do not allow hot bottles to be jolted; this can cause hot-bottle explosions. Do not move bottles if any boiling or bubbling is present.
Avoid sudden opening of door at end of cycle. Wait at least 10 minutes before door opening and unloading the sterilizer.
Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves, apron and face shield when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.

WARNING - Restrictions
It is inappropriate for a health care facility to sterilize liquids for direct patient contact.

7.2.1 Preparing load

- Use only Type I borosilicate glass bottles, do not use ordinary glass bottles or any container not designed for steam sterilization
- The maximum allowed bottle size is 1000ml
- Do not use flammable liquids
- Use only vented closures; do not use screw caps or rubber stoppers with crimped seal.
- Place the bottles into baskets to prevent falling down during transportation
- Place chemical indicator in a hermetically sealed vial in the center of a bottle.

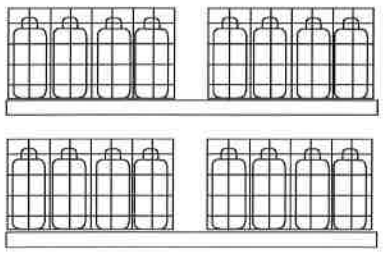

Figure 7-3: Loading shelves with liquid load

7.2.2 Liquid cycle

Only use cycle no. 6 liquid cycle

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
10	Liquid 250	250°F	45 minutes	--	Max 1000ml of Liquid per bottle. Use only vented Type I borosilicate glass bottles. For amount refer to *Table 7-4*

Table 7-3: 250°F Liquid Cycle

Model	Chamber Size (mm)	Volume of Liquid in one bottle	Number of bottles
5-5-9 VS1 5-5-9 VS2	21"x 21" x 38" (535 x 535 x 965) mm	1000 ml	36

Table 7-4: Recommended liquid loads

This sterilizer is not designed to process flammable liquids nor liquids in containers that are not designed for sterilization.

7.3 Appropriated use of Flash cycle

The express cycle is used to sterilize a single unwrapped instrument tray **for immediate** use (e.g. a dropped instrument). There is **no storage or shelf life** of Flash sterilized items.

This cycle may only be uses if the sterilizers non operating end is within the surgery theatre.

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
3	Flash 270 single Ins	270°F	3 minutes	1 minute	Unwrapped Instrument Tray with a single instrument
4	Flash 270 multi Ins	270°F	10 minutes	1 minute	Unwrapped Instrument Tray with non porous multiple instruments (maximum weight of 17lbs)

Table 7-5: 270°F Flash Cycles

Note: The Belimed Steam Sterilizer TOP 5000 is usually installed in the Central Sterilization Supply Department CSSD.

7.4 Appropriated use of Express cycle

The express cycle is used to sterilize a **single wrapped** instrument tray with a non porous single instrument **for immediate** use. The Express cycle is useful in providing quick turnaround of an instrument using the wrapped technique for transport from sterilizer to the point of use. A single wrapped item sterilized with the express cycle does not have a shelf life.

No.	Cycle	Sterilize temp	Sterilize time	Dry time	Recommended load
5	Express 270	270°F	4 minutes	3 minutes	Single Wrapped Instrument Tray with non porous single instrument

Table 7-6: 270°F Express Cycle

7.5 Guideline for determining wet packs

7.5.1 Introduction

Aseptic techniques for surgical procedures require that all supplies coming in contact with the surgical field have to be sterile.

An inherent, inseparable quality for sterility of supplies is a 'state of dryness'. Wet materials transmit bacteria; therefore, a 'state of wetness' would compromise the sterility of process packs and instruments presented to sterile field.

7.5.2 Evaluation of wet packs

A load must be examined for wet packs for three conditions:

- Water droplets on the exterior of a pack
- Water droplets within a pack
- Absorbed moisture in a pack

7.5.3 Moisture retention acceptance criteria

The AAMI ST8: 2001 sets the following acceptance criteria:

7.5.3.1 Fabric packs

Moisture retained by the fabric test pack must cause no more than 3% increase in pre-sterilization test pack weight, and the pack must not exhibit wet spots.

Wrapped instruments

Upon completion of the recommended cycle, the wrapped instrument pack must have no wet spots on the outer wrappers. Moisture retained in the load must cause no more than a 20% increase in pre-sterilization weight of the towel.

7.5.3.2 Summary

- External droplets or visible moisture on the exterior pack, or on the tape, are unacceptable unless the wrap is completely impermeable to water.

Note: This should be inspected while unloading the sterilizer

- Water droplets on the interior of a wrap, or on the items within the pack, are unacceptable
- A pack is unacceptable if the pack is damp or wet when opened for use.
- A general guideline is that the pack be completely dry after cooling to room temperature (i.e. 21°C and 50% relative humidity) for a minimum of one hour following unloading from the sterilizer.

7.5.4 Solving wet pack problems

If moisture is detected on the interior of the wrap, in the huck towel or on the item the causes can be:

- Insufficient drying time
- Chamber overloaded; size , density or weight of specific packs
- Excessively large hard goods items being sterilized
- No absorbent huck towel used
- Materials not being permitted to cool and equilibrate to room temperature
- Wet steam supply
- Defective vacuum drying system
- Air leak

7.6 Sterility maintenance

7.6.1 Cooling

All items removed from the sterilizer should remain on transfer carriage until adequately cooled.

- They should not be touched within cooling process
- A cooling time of 30-90 minutes is recommended
- During cooling the load should be placed in a low-traffic area where there are no air-conditioning or other cold-air vents in close proximity

7.6.2 Inspection

As items are removed from the sterilizer, they should be visually inspected. Do not use:

- Any items with torn packaging
- Packaging that appears to be wet

7.6.3 Sterile storage

Sterile materials should be stored:

- at least 8-10 Inches above floor
- at least 18 inches below ceiling
- at least 2 inches from outside walls

Items should positioned so that packaging:

- is not crushed
- is not bent
- is not compressed
- can't become wet

Closed or covered cabinets are recommended for the storage of seldom-used supplies.

7.6.4 Expiration dating

Each item should be labeled with a control date for stock rotation and the following statement:
'Contents sterile unless package is open or damaged. Please check before using'.
If the product contains material that degrades over time, the product package should be labeled with a clearly identifiable expiration date that takes this degradation into account and/or that is based on the device manufacturer's instructions.

8 Operating device TOP5000

8.1 User administration

Each user is defined by a:

- user name (alphanumeric, max. 20 characters)
- user access level (numeric 1..4, for user rights see chapter 9.2)
- Password (alphanumeric, max.10 characters)

8.1.1 User's rights

Users with four different access levels can be defined on the TOP5000:

Level 1: Operator

Level 2: Group Leader

Level 3: Service

Level 4: User Admin

The Administrator only can define new users or delete users.

Additionally one user (level 5) is reserved for Belimed Service and one user (level 9) is reserved for the Belimed Administrator.

Important

In some cases, only buttons for which the operator has read or write access are displayed.

Table 8-1 shows the TOP5000 menus with the corresponding user rights.

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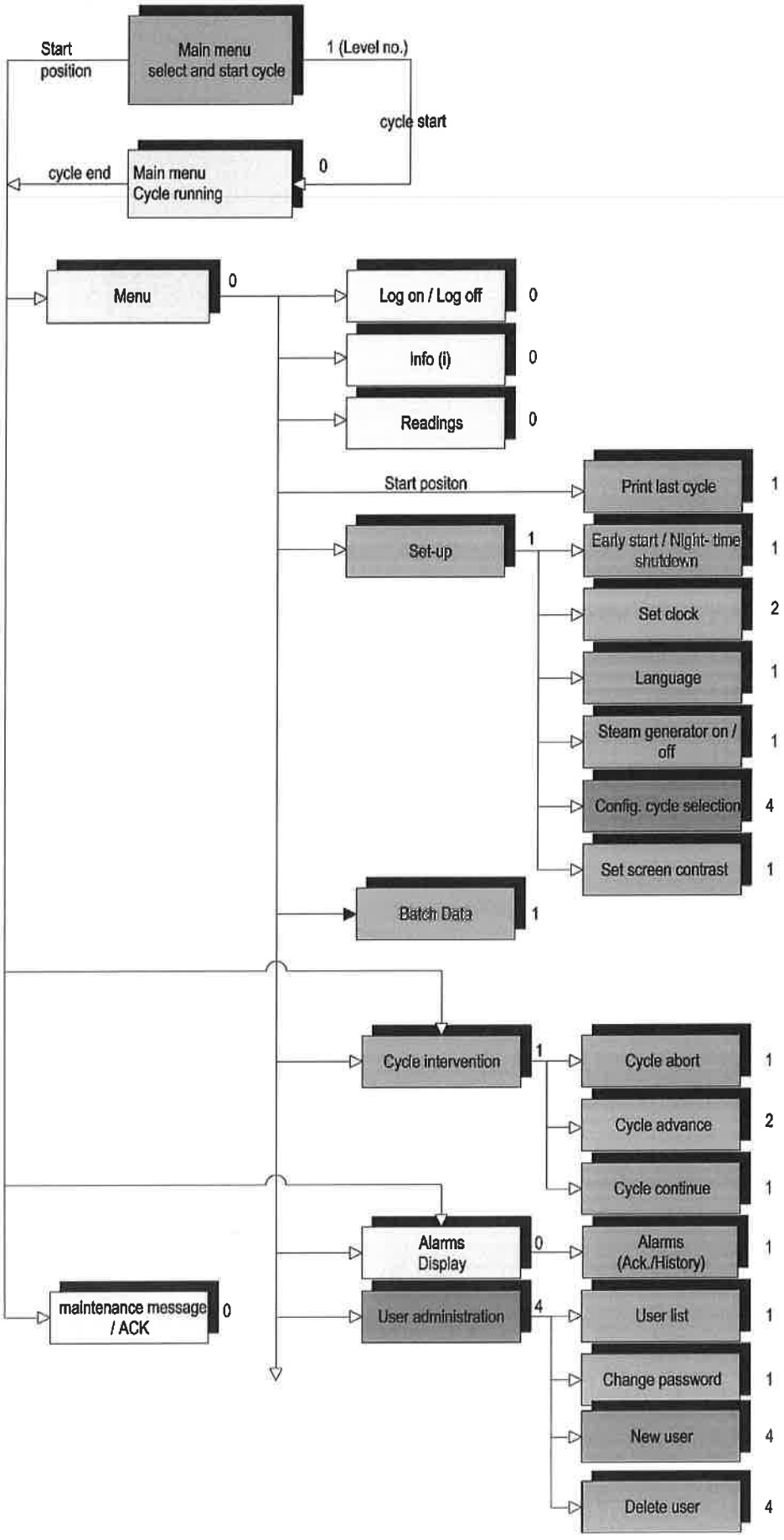

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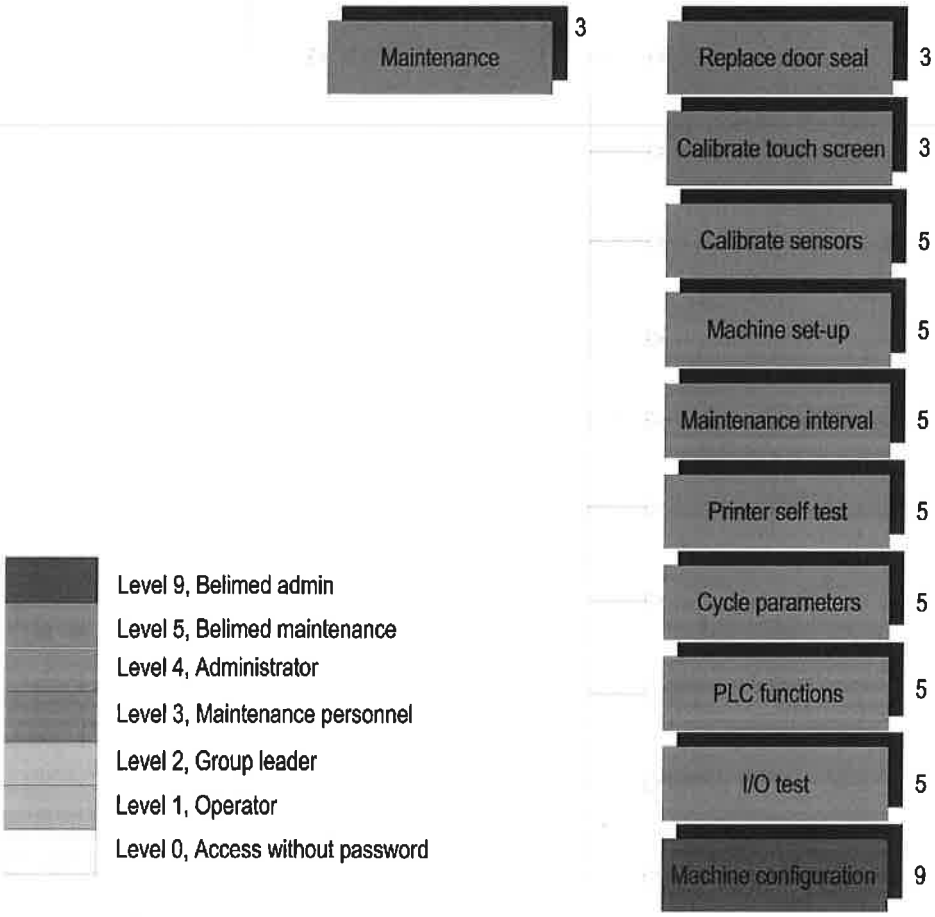


Table 8-1: User menus and rights

8.1.2 Direct login

In the case of visible buttons for which the user has no authorization, the user is prompted directly to enter the user name and the Password. The user can log in with his or her Password and then receives access authorization.

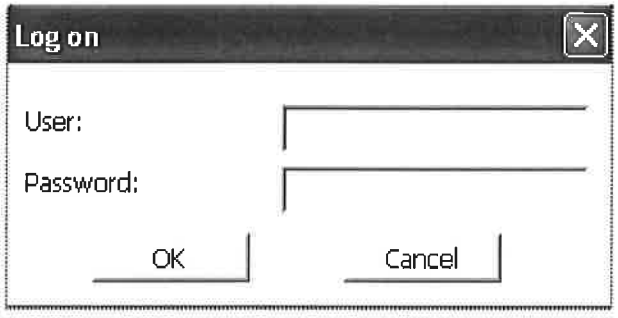


Figure 8-1: Password entry

8.1.3 Administrate user

The Administrator (Level 4) has permission to create new users, delete users or change Passwords.

Press the **'Menu'** button. The Mask menu is then displayed (refer to Figure 8-2).

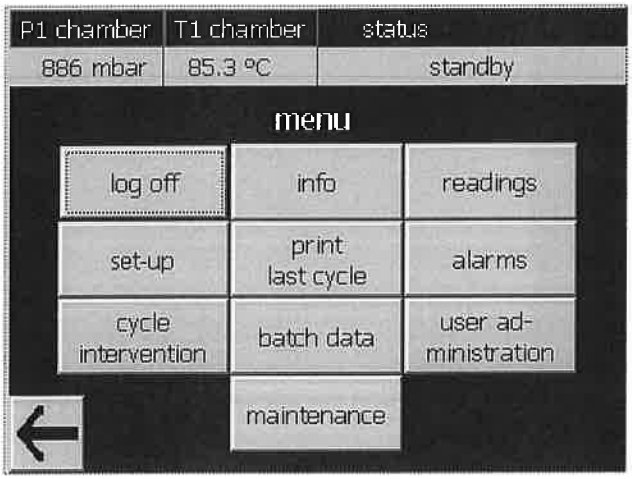


Figure 8-2: Menu display

Press the **'User Administration'** button (Figure 8-3). A list of all users with Password, Group and Level is then displayed. Only users with Level (Group) equal to or lower than the user logged in are displayed.

Additionally a automatic logoff time (in minutes) can be defined, where 0 means no automatic logoff.

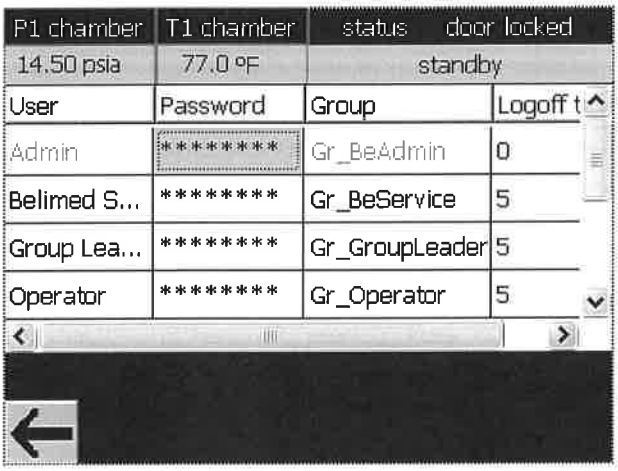


Figure 8-3: User administration

8.1.3.1 Create New User

A new user can be defined by making entries in fields "User", "Password" and "Group". The user name may contain maximum 20 characters and the Password may contain maximum 10 characters. User names and Passwords may never be the same. Enter the automatic logoff time in minutes, if required.

8.1.3.2 Delete User

Fields "User" and "Password" must be deleted in order to delete a user from the list. Button "BSP" can be used for this.

8.1.3.3 Change Password

The Password can be changed easily in field "Password".

8.2 Info

Each user can open the information display.

Press '**menu**' button. The menu functions are displayed (refer to Figure 8-4):

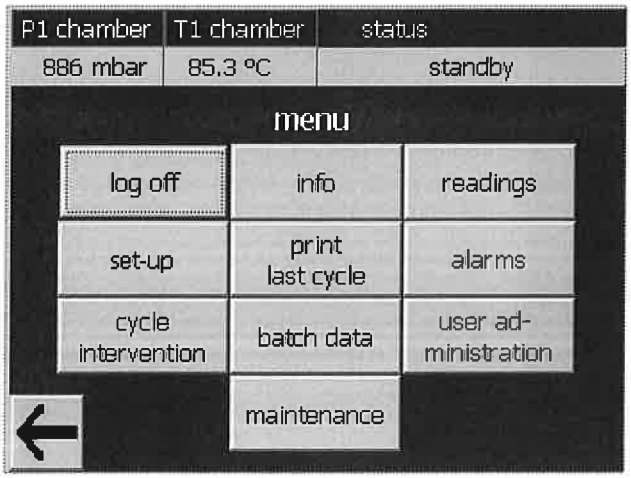


Figure 8-4: Menu display

Press '**info**' button

The display shows the following information (refer to Figure 8-5):

- actual time and date
- User name
- Time since cycle start
- Remaining time in the actual phase
- Date of last Leak Test and last Bowie Dick Test
- Cycle counter
- Status of doors and steam generator (if configured)

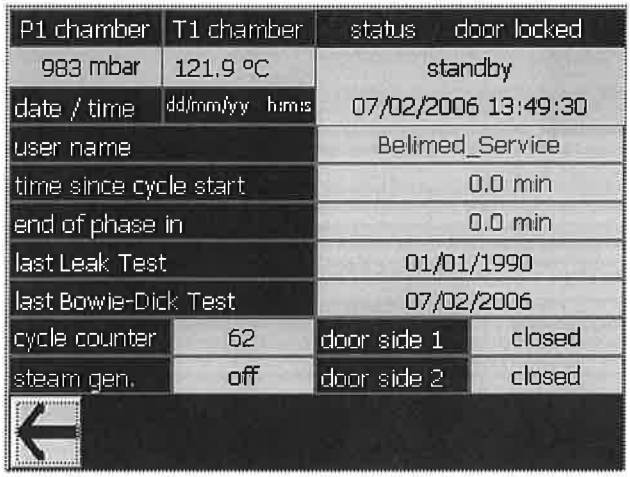


Figure 8-5: Info display

8.3 Readings

Each user can open the Readings display.

Press '**menu**' button. The menu functions are displayed (refer to Figure 8-6):

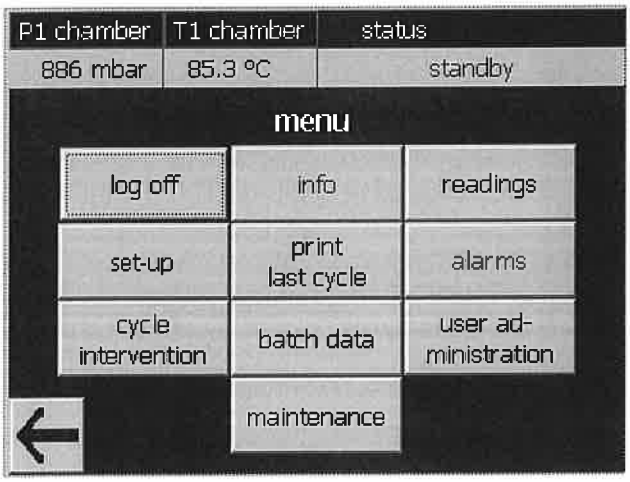


Figure 8-6: Menu display

Press '**readings**' button.

The display shows the actual readings of all temperature- and pressure sensors, used in the sterilizer (refer to Figure 8-7):

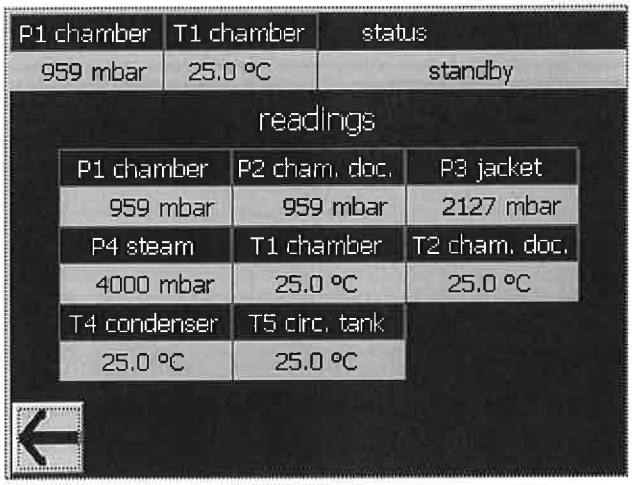


Figure 8-7: Readings display

P1 Chamber pressure - control

P2 Chamber pressure - documentation

P3 Jacket pressure

P4 Steam supply pressure

T1 Chamber temperature - control

T2 Chamber temperature - documentation

T4 Condenser temperature - chamber outlet cooling

T5 Circulation tank temperature - vacuum pump cooling

8.4 Set-up

Press '**menu**' button. The menu functions are displayed (refer to Figure 8-8):

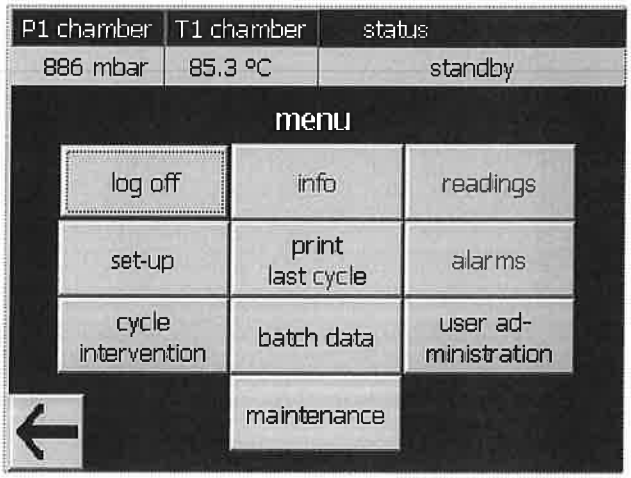


Figure 8-8: Menu display

Press '**set-up**' button.

The display shows the 'set-up' functions (refer to Figure 8-9):

- Early start and night-time shutdown (access level 1)
- Set clock (access level 2)
- Select Language (access level 1)
- Steam generator on/off (access level 1 / if steam generator connected)
- Drain steam generator (access level 2 / option: internal steam generator)
- Configure cycle selection (access level 2)
- Set screen contrast (access level 1)
- Activate on-line documentation

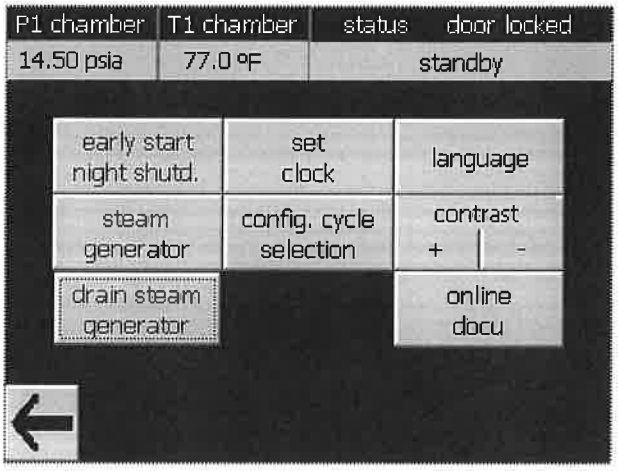


Figure 8-9: Set-up display

8.4.1 Early start / night-time shutdown

Press **'early start / night shutd.'** button. The display shows the input-mask (refer to Figure 8-10):

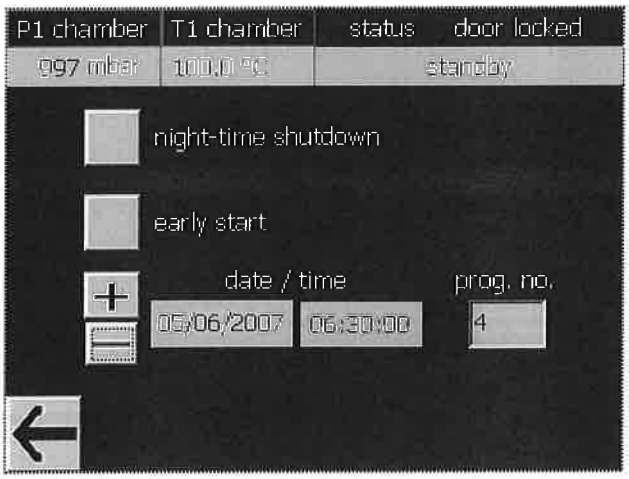


Figure 8-10: Early start / night-time shutdown display

8.4.1.1 Night-time shutdown

If you press **'night-time shutdown'** button, the sterilizer goes into a sleep mode at the end of the next cycle. All valves are closed, an optional connected steam generator is turned off.

To restart the sterilizer turn key switch off and on again.

8.4.1.2 Early start

Conditions for early start:

The Sterilizer must be in the initial position and the chamber doors must be closed.

If you want to start a cycle early in the morning (usually the warm-up and leak test cycle),

set **'early start'** date and time, enter **'prog. no.'** and activate **'early start'** button (left side). With the keys + and - the starting date can be selected gradually.

The sterilizer goes into a sleep mode (the display is turned off). At the pre-set early start time the sterilizer goes into an active mode, the operating panel display is turned on and the pre-selected cycle starts. The system suggests the date of the next day and the last pre-set time.

If the sterilizer is in sleep mode (early start or night-time shutdown) and you want to operate, turn the key-switch off and on again. The early start and night-time shutdown are turned off.

8.4.2 Set clock

Usually twice a year (change of winter- to summertime and summer- to wintertime) the time has to be adjusted.

Press **'Set clock'** button (refer to Figure 8-9).

Press the date/time button and enter the time and date in the format: MM/DD/YY hh:mm:ss

Legend:

MM:	Month (1..12)	DD:	Day of the month (1..31)	YY:	Year (00..99)		
hh:	hour 1..12	mm:	minute (0..59)	ss:	second (0..59)	xx:	AM or PM

Press **'save date/time'** button (refer to Figure 8-11) to set the new date/time

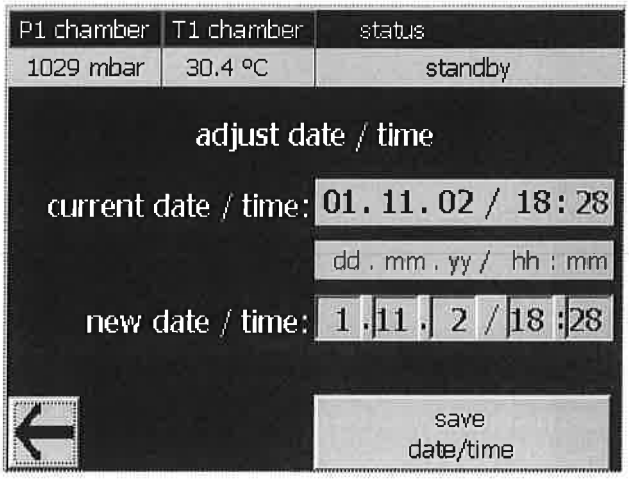


Figure 8-11: Set clock display

8.4.3 Language and units

Each operator (access level 1) can select the language he wants to have displayed.

Press **'language'** button in the set-up menu and then press the operation language select button '⩛' (refer to Figure 8-12). All predefined languages are displayed. Press the language you need in the display field. The display changes to the selected language.

The administrator (access level 4) has the right to change the units:

Temperature:

- Degree Celsius (°C)
- Degree Fahrenheit (°F)

Press the temp. unit select button '⩛' and choose the temperature unit.

Pressure:

- Millibar absolute (mbara)
- Bar gauge (bar)
- Kilopascal absolute (kPa)
- Pounds/square inch absolute (psia)
- Pounds/square inch gauge for pressure (psig) and inches of Mercury for vacuum (in.Hg)

Press the pressure unit select button '⩛' and choose the pressure unit.

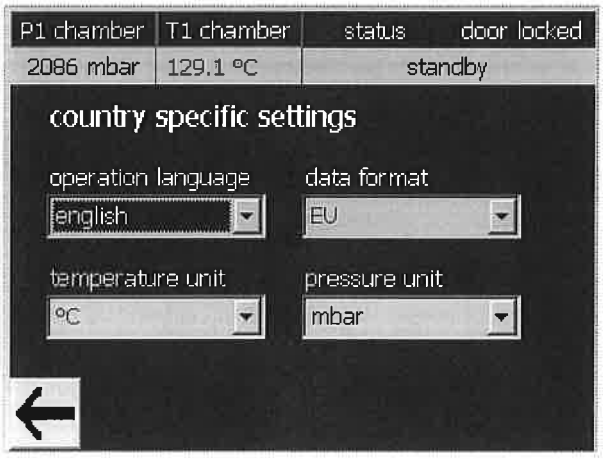


Figure 8-12: Language and units display

8.4.4 Steam generator

If the steam generator can be activated form the sterilizer (option) you can turn on and off the steam generator by pressing the **'steam generator'** button (refer to Figure 8-14).

8.4.5 Drain steam generator

If an internal steam generator (option) is installed, it can be emptied by pressing the **'drain steam generator'** button (refer to Figure 8-14).

8.4.6 Configure cycle selection

The administrator (level 4) can define:

- The selectable cycles by a user can be activated or locked.
- Cycle start only after entering a password by the operator (set: yes)
- Automatic logon with user name 'common' using level 1 (set: yes).

To activate a cycle or a function or press corresponding button (refer to Figure 8-13).

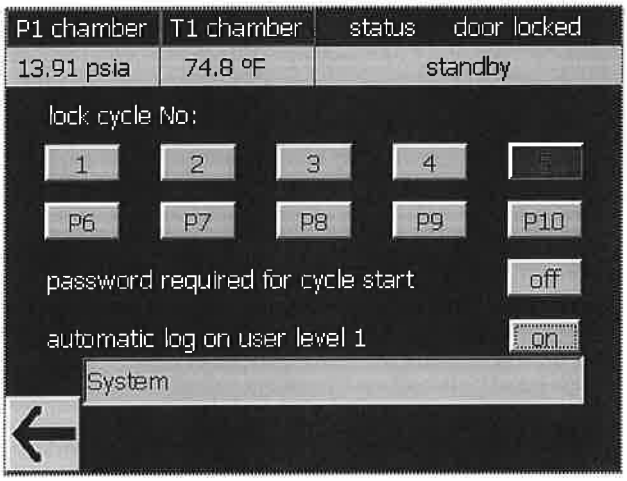


Figure 8-13: Configure cycle selection

8.4.7 Display contrast

All logged on users can adjust the display contrast (Refer to Figure 8-14).

To increase the contrast of the display, press **'contrast +'** button.

To decrease the contrast of the display, press **'contrast -'** button.

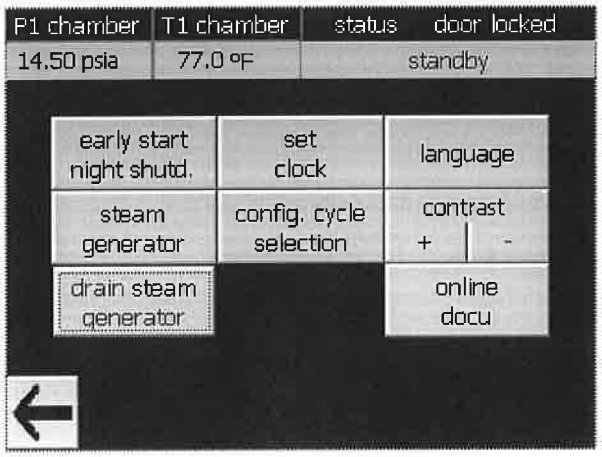


Figure 8-14: Set-up display

8.4.8 Online docu

If there is an external PC- based documentation system 8535 installed, the built-in printer can be turned off (refer to Figure 8-14). In case of a breakdown of the system 8535, the built in printer can be activated by the group leader.

8.5 Print last cycle

The cycle documentation is printed at the end of the cycle.

It is possible to print a copy of the cycle documentation until the next cycle is started.

Press **'menu'** button. The menu functions are displayed (refer to Figure 8-15):

Press **'print last cycle'** button and a cycle documentation copy is printed.

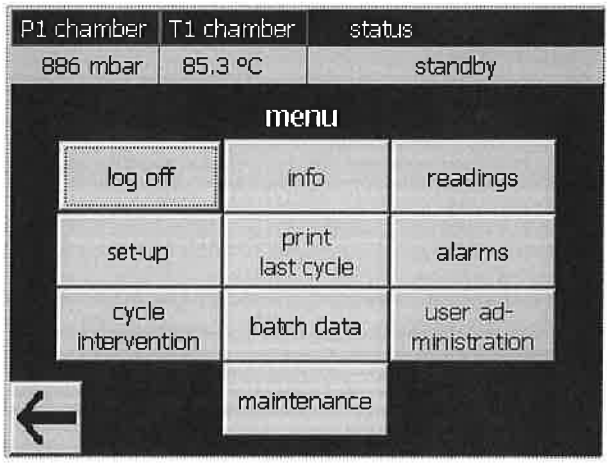


Figure 8-15: Menu print last cycle display

8.6 Alarm messages

All important process parameters are continuously monitored. If there is a deviation, an alarm button is displayed in the main mask.(refer to Figure 8-17).

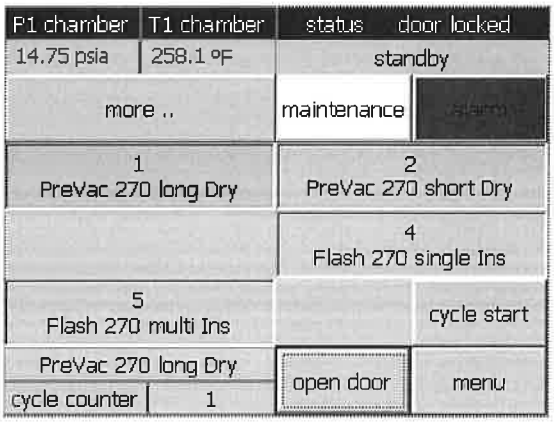


Figure 8-16: Out-of-cycle display with active alarm

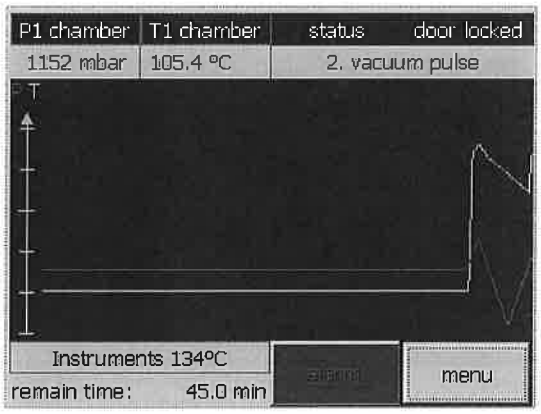


Figure 8-17: In-cycle display with active alarm

Press **'alarm'** button. All active alarms are displayed (refer to Figure 8-18).

The alarm mask has 3 buttons:

- Help (❐)
- ACK
- history

The alarm is displayed with number/time/date and the alarm message.

Each alarm must be acknowledged by an operator (access level 1)

- To acknowledge an alarm press the **'ACK'** button.
- To display the history of the last 250 alarms press **'history'** button
- To get more information about the active alarm press Help button '❐'

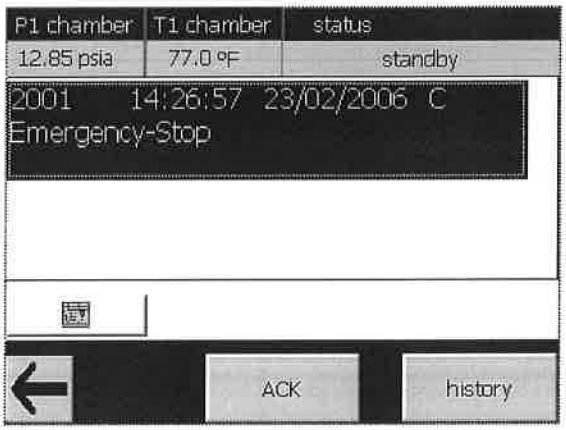


Figure 8-18: Alarm display

The operator should follow the Help instructions on the alarm Display. If these instructions fail to clear the alarm, consult your department supervisor or a trained service technician before using the sterilizer further.

8.6.1 Critical alarms

Only the critical alarms are printed out in the batch report. If a critical alarm has occurred during a cycle, the door can only be released on the operating end. A message 'cycle failed' is displayed on the operating panel and printed on the batch documentation. The start of a new cycle is not possible if a critical alarm is pending.

8.6.2 Alarm list

Table 8-2 shows the list of alarms and the possible causes.

No.	1st line: Alarm message text 2nd line: Cause	Critical alarm
1	Emergency-Stop	X
	Emergency-Stop button on the sterilizer has been pressed.	
2	Vacuum pump	X
	Motor protection switch vacuum pump has tripped.	
3	Door motor	
	Motor protection switch of the door motors has tripped.	
4	Cycle aborted	X
	Function 'cycle abort' has been activated by an operator or by the system itself.	
5	Power failure	X
	Loss of electric power	
6	Manual advance	X
	The 'manual advance' button has been pressed by on operator	
7	Fault of PLC battery	
	PLC battery empty (do not switch-off electric power switch); change battery	

No.	1st line: Alarm message text 2nd line: Cause	Critical alarm
8	On-Off Key switch off	X
	The key switch was turned off during cycle running	
9	Too long in step	X
	The monitoring time of a cycle phase has been exceeded.	
11	Sensor T1 failed	X
	Temperature sensor T1 signal is out of range (0..150°C)	
12	Sensor T2 failed	X
	Temperature sensor T2 signal is out of range (0..150°C)	
14	Sensor T4 failed	X
	Temperature sensor T4 signal is out of range (0..150°C)	
15	Sensor T5 failed	X
	Temperature sensor T5 signal is out of range (0..150°C)	
18	Sensor P1 failed	X
	Pressure sensor P1 signal is out of range (4..20mA)	
19	Sensor P2 failed	X
	Pressure sensor P2 signal is out of range (4..20mA)	
20	Sensor P3 failed	X
	Pressure sensor P3 signal is out of range (4..20mA)	
21	Sensor P4 failed	
	Pressure sensor P4 signal is out of range (4..20mA)	
22	Undertemperature T1	X
	Chamber temperature T1 is below alarm set-point during sterilization phase	
25	Overtemperature T1	X
	Chamber temperature T1 is above max. alarm set-point during sterilization phase	
27	Overtemperature T5	X
	Temperature in circulation tank is >50°C	
28	Divergence T1-T2	X
	During sterilization phase the difference T1-T2 is >±1°C	
30	Max. chamber pressure	X
	Maximum chamber pressure exceeded, steam to chamber valve not closed / leaky	
31	Max. jacket pressure	X
	Maximum jacket pressure exceeded, steam to jacket valve not closed / leaky	
32	Low jacket pressure	X
	Jacket set pressure not reached within pre-set time, steam to jacket valve not open or low steam supply pressure	

No.	1st line: Alarm message text 2nd line: Cause	Critical alarm
33	Steam pressure low	
	Steam supply pressure is below set-point	
34	Correlation low temp.	X
	Temp. T1 is lower than the saturated steam temperature calculated from P1	
35	Correlation high temp.	X
	Temp. T1 is higher than the saturated steam temperature calculated from P1	
36	Leak rate test failed	X
	The chamber is leak or wet	
37	Divergence P1-P2	X
	During sterilization phase the difference P1-P2 is > ±100mbar	
38	Door 1 time overrun	
	Door on the operating end hasn't reached the end position within 20 seconds	
39	Door 2 time overrun	
	Door on non operating end hasn't reached the end position within 20 seconds	
42	Door 1 not closed	X
	Limit switch door closed on operating end is not actuated during a cycle	
43	Door 2 not closed	X
	Limit switch door closed on non operating end is not actuated during a cycle	
48	Door not unlocked	
	Door seal didn't unlock during door- unlock step	
49	Door not locked	X
	Minimum door seal pressure not reached	
50	Ext. steam generator	
	Alarm signal from external steam generator	
58	Atmospheric pressure monitoring	
	Atmospheric pressure switch difference to sensor P1	
59	Deviation from time base	X
	The real time clock deviates from the PLC time-base	
61	Overtemperature T4	X
	Temperature in condenser is >80°C	
62	Lack of compressed air	X
	Compressed air pressure is <4 bar g	
76	Connection to printer	
	The PLC doesn't receive telegrams form printer interface	
78	No connection to system 8535	
	The PLC doesn't receive telegrams form documentation system 8535	

Table 8-2: Alarm list

8.7 Cycle intervention

The cycle intervention touch screen button is used to

- Abort a cycle before it is finished normally (by operator, access level 1)
- Advance the cycle into the next phase (for maintenance and qualification, access level 2) or
- Continue an interrupted cycle (by emergency stop or motor starter failure, access level 1)

Press **'menu'** button. The menu functions are displayed (refer to Figure 8-19):

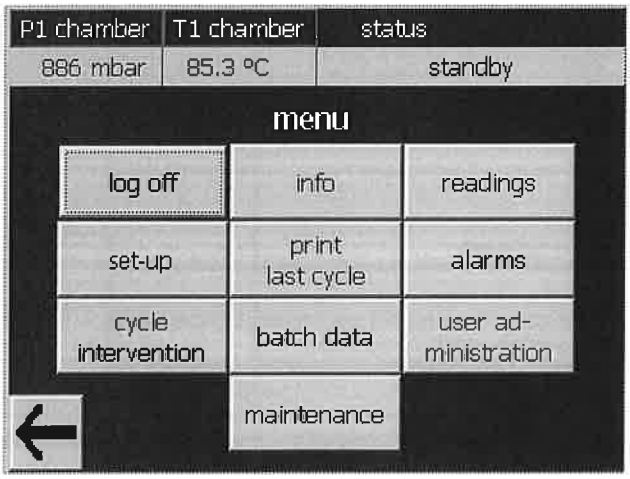


Figure 8-19: Menu display

Press **'cycle intervention'** button (refer to Figure 8-20).

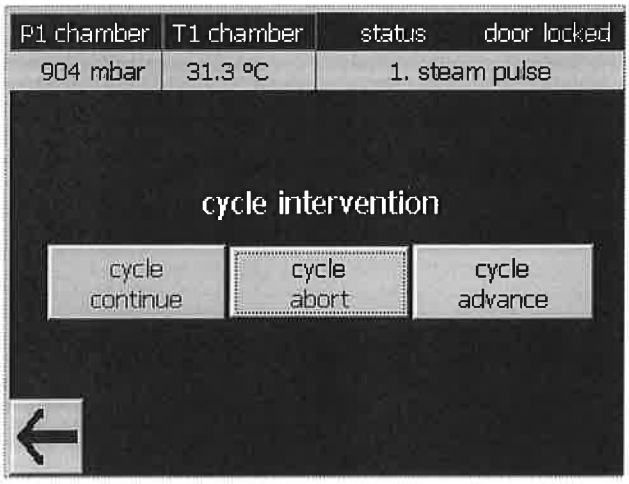


Figure 8-20: Cycle intervention display

8.7.1 Cycle advance

Press **'cycle advance'** button to advance the cycle into the next phase. An alarm message 'manual advance' is generated.

8.7.2 Cycle abort

Press **'cycle abort'** button. This causes the sterilizer-chamber to depressurise (if pressurised), evacuate the chamber (to dry) and to air break. The door opening deactivates, the control prompts the operator to acknowledge the 'cycle aborted' message and to Log on.

If a cycle has been aborted, the door on the non operating is locked. The door on the operating end can be opened. The material is not sterile. Unload the sterilizer. The load must be wrapped again with dry material before sterilizing.

8.7.3 Cycle continue

Press **'cycle continue'** to continue an interrupted cycle. This function only works if the alarm has already gone.

8.8 Batch data

8.8.1 Manual data entry

Batch data entry must be activated in the set-up menu.

Press **'menu'** button and then **'batch data'** button (refer to Figure 8-19):

The following batch data can be entered (refer to Figure 8-21):

Load details (alphanumeric 12 characters).

batch No. (12 digits).

Batch data is printed on the cycle documentation printer.

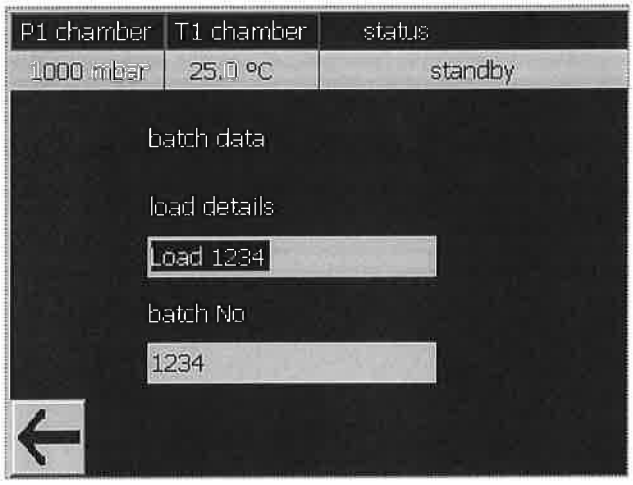


Figure 8-21: Manual batch data entry

8.8.2 Batch data entry with Documentation system 8535-BC

An optional PC- based cycle documentation system 8535-BC can be supplied for electronic batch data acquisition.

Before loading the sterilizer, the load ID- numbers are to be read with a barcode scanner.

A maximum of 18 items can be entered. The ID's are displayed on the display (refer to Figure 8-22).

The bar code type EAN13 is used, whereby 12 characters are displayed. The 13th character is the check sum an is not displayed. If necessary, the last or all entries can be deleted. At cycle start the data is transferred to the system 8535 and the table on the sterilizer is deleted afterwards.

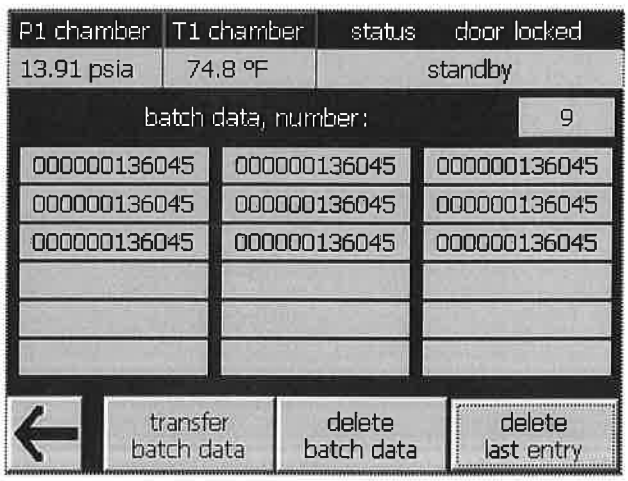


Figure 8-22: Scanner based batch data entry

At cycle start the data is transferred to the system 8535 and the table on the sterilizer is deleted afterwards. The data can also be transferred several times to system 8535 with the **"transfer batch data"** button even before program start

8.8.3 Batch data input via scanner with ICS 8665 Documentation System

The data is **not** transferred automatically to system 8565 on program start. The data must be transferred to system 8565 before program start with the **"transfer batch data"** button. The program is then selected automatically by system 8565. This is indicated in a dialog box. After this, no other program may be selected.

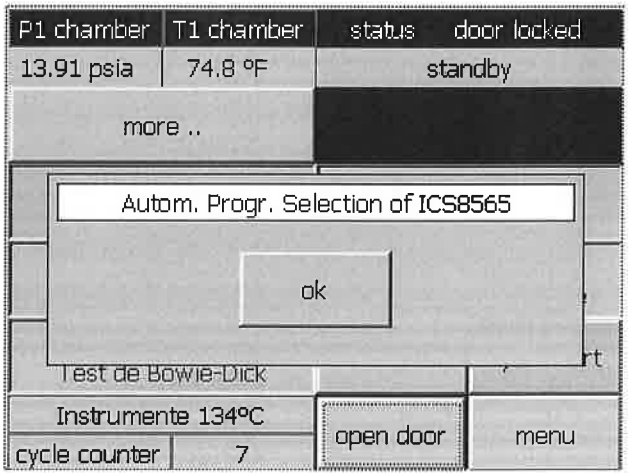


Figure 8-23: Automatic program selection by ICS 8565

8.9 Maintenance messages

After a predefined number of cycles a maintenance message is displayed in the Out-of-cycle display.

Figure 8-24: Out-of-cycle display with maintenance message.

The maintenance message can be acknowledged by maintenance personnel (access level 3).

Press **'maintenance'** button in the out-of cycle mask. If the maintenance has been done press **'ACK'** button in the maintenance mask (refer to Figure 8-25).

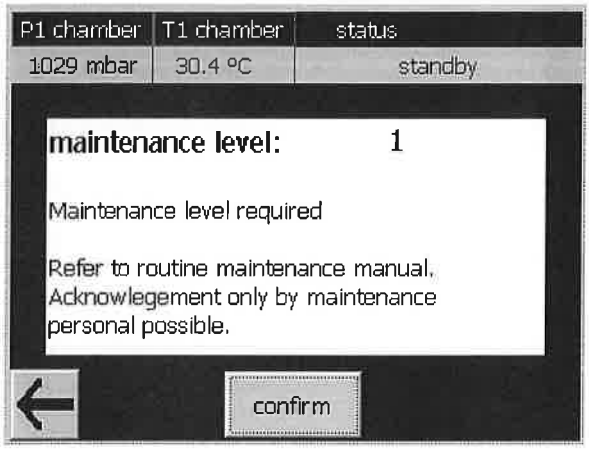


Figure 8-25: Maintenance message display.

8.10 Maintenance functions

Press **'menu'** button. The menu functions are displayed (refer to Figure 8-26):

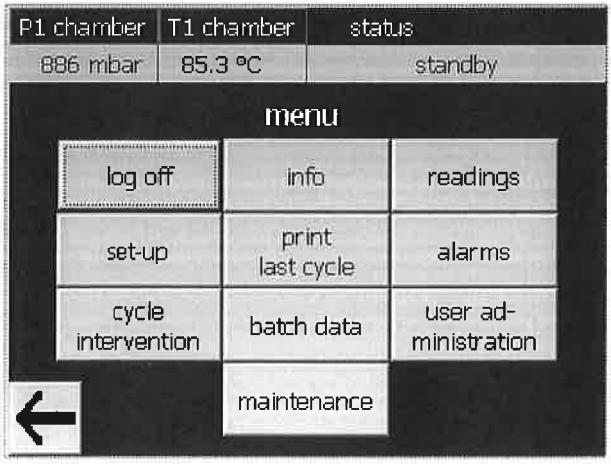


Figure 8-26: Menu display

Press **'maintenance'** button. The following functions can be selected (refer to Figure 8-27):

- Replace door seal at operating end (access level 3)
- Calibrate touch screen (access level 3)
- Calibrate sensors (access level 5)
- Machine set-up (access level 5)
- Maintenance intervals (access level 5)
- Printer self test (access level 5)
- Cycle parameters (access level 5)
- PLC functions (access level 5)
- I/O Test (Level 5)
- Air Detector (option, access level 5)

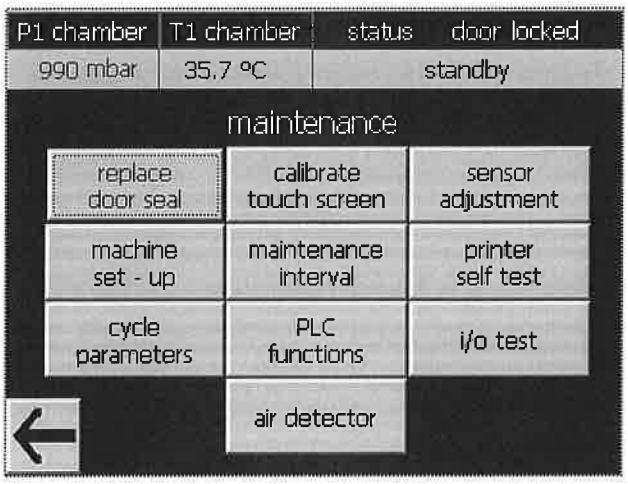


Figure 8-27: Maintenance menu display

8.10.1 Replace door seal

The maintenance personnel can replace the door seal. on the operating end by pressing **'replace door seal'** button while the chamber door is open (refer to Figure 8-28).

Press 'blow out door seal' button to remove door seal on the operating end.

Press 'pull back door seal' button and the vacuum pump sucks a vacuum behind the door seal.

Press 'standby' button to set the sterilizer to initial (load) position

Press 'complete' button to set the sterilizer to 'complete' (unload) position to replace the door seal on the non operation end.

For replacing the door seal refer to 'maintenance manual' chapter 1.7

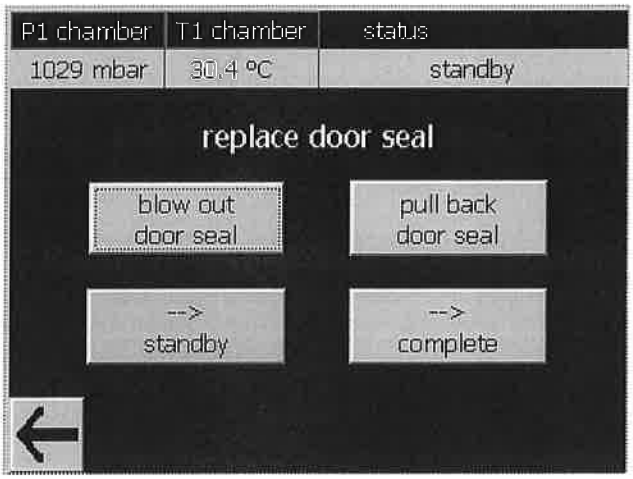


Figure 8-28: Replace door seal display

8.10.2 Calibrate touch screen

If the touch screen adjustment is inaccurate, adjust the touch screen.

Press **'calibrate touch screen'** button and follow the instructions (refer to Figure 8-27).

8.10.3 Sensors adjustment

See Maintenance guidelines

8.10.4 Machine set-up

The Belimed maintenance personnel must set the machine set-up before running the first cycle.

The first display (refer to Figure 8-29) must be adjusted:

- Enter hospital name into the **'hospital name'** field .
- Enter department name into the **'department'** field.
- Enter the machine number (serial number) into the **'machine No.'** field.
- Enter the ambient pressure (in mbar absolute) into the **'norm ambient pressure'** field.

The ambient (atmospheric) pressure depends on the altitude of the sterilizer. Enter the following values:

Altitude (m)	ambient pressure (mbar)	Altitude (m)	ambient pressure (mbar)
0	1013	1200	877
200	989	1400	856
400	966	1600	835
600	943	1800	815
800	921	2000	795
1000	898	2200	775

Table 9-3: Ambient pressure for altitudes up to 2200m.

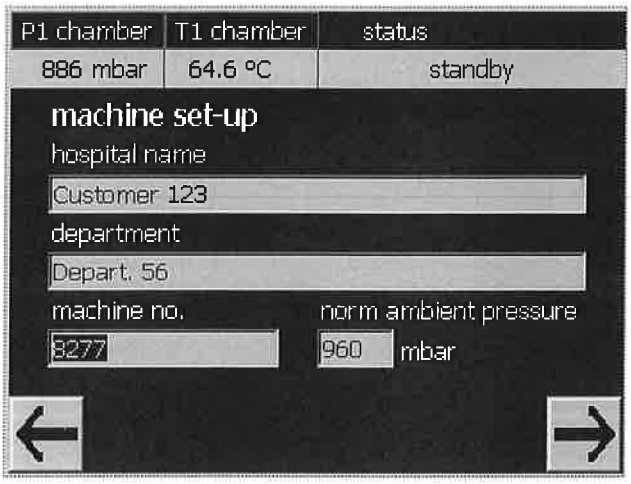


Figure 8-29: Machine set-up display 1

The second display (refer to Figure 8-30) functions are:

- The low steam pressure alarm delay time can be set (default: 300s)
- Pressure difference between set steam pressure and alarm pressure (default: 500mbar)
- Steam set pressure in out-of cycle position (default: 3900mbar)
- Steam set pressure in- cycle (default: 700mbar above chamber pressure during sterilize phase)

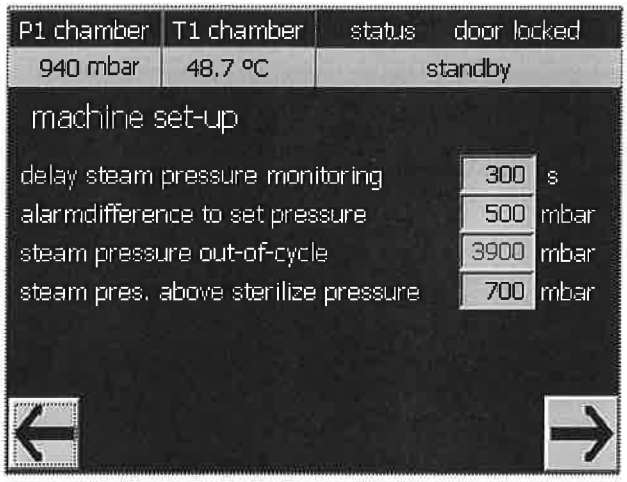


Figure 8-30: Machine set-up display 2

The third display (refer to Figure 8-31) functions are:

- The compensation time before the sterilization is started can be set (default: 4 seconds).
- The control temperature of the circulation tank (default: 40/40°C*)
- the control temperature of the circulation tank during vacuum steps (prevac, dry, default:21/30°C*)
- The control temperature of the condenser if the chamber pressure is >500mbar (default: 50/30°C*)
- The control temperature of the condenser if the chamber pressure is <500mbar (default: 35/15°C*)

*) without / with cooling water loop.

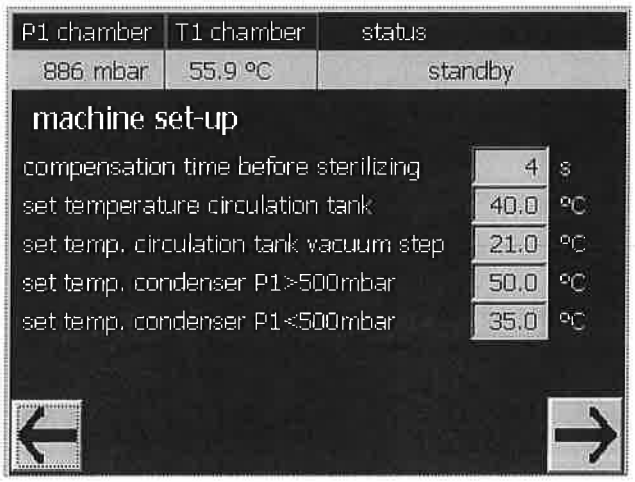


Figure 8-31: Machine set-up display 3

The fourth display (refer to Figure 8-32) functions are:

- The system can request batch data before a cycle is started
- A buzzer can be activated at an incoming alarm (until alarm is acknowledged)
- A buzzer can be activated at cycle end (until a chamber door is opened
- Display mode: The remain process time or the chamber temperature on side 2 will be displayed.
- The door opening / closing function can be set to an inching mode (door moves only as long as the door open or door close button is pressed)

  1o: open door on operating end

  1c: close door on operating end

  2o: open door on non operating end

  2c: close door on non operating end

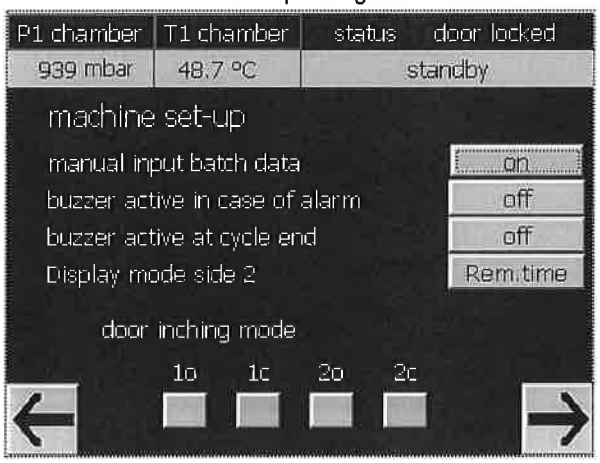


Figure 8-32: Machine set-up display 4

The fifth display (refer to Figure 8-33) functions are (only with internal steam generator):

- Blow-down interval (default 1800s)
- Blow down pulse (default 2s)
- degassing time (default 2 sec); depending on water quality.
- to reduce peak current, the second heater can be delayed.
  - during heat-up phase (default =2 sec)
  - during standby phase (default=20 sec)

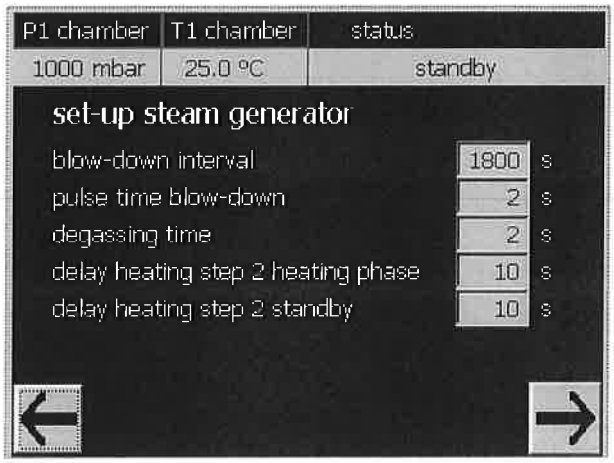


Figure 8-33: Machine set-up display 5

The sixth display (refer to Figure 8-34) functions are:

- Start point of the reduced steam pressure increase rate below sterilize pressure (default: 200mbar)
- Pressure increase rate before sterilization (reduced ramp, default: 200mbar/min) to prevent an over-temperature on the top of the chamber
- Open time steam valve gravitation: the steam inlet and, thus, also the steam outlet can be reduced by reducing the open time in the range between 10 and 100 %.
- Maximum chamber pressure during gravity: the chamber steam valve is closed when the maximum chamber pressure is exceeded.
- Print interval and data store during sterilize phase on built-in printer (default: 60 s)
- The software version of the panel is displayed

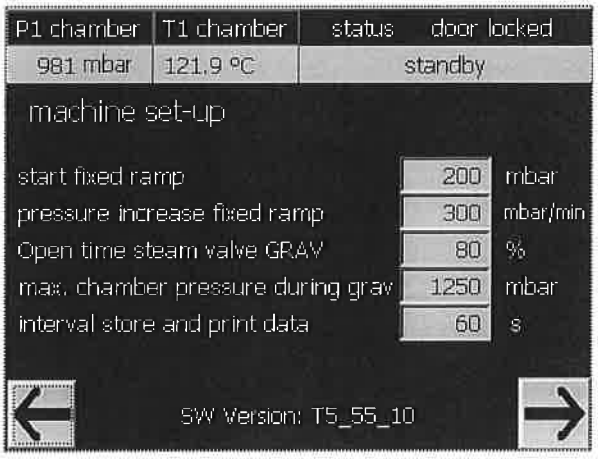


Figure 8-34: Machine set-up display 6

The seventh display (refer to Figure 8-35) functions are:

- Define the external documentation system (none / 8535 / 8535 BC/8565)
  (BC: Barcode reader for recording the load)

- If an external documentation system type 8535 is connected via serial interface (RS485), enter the sterilizer system address communication port address, range 3..20)

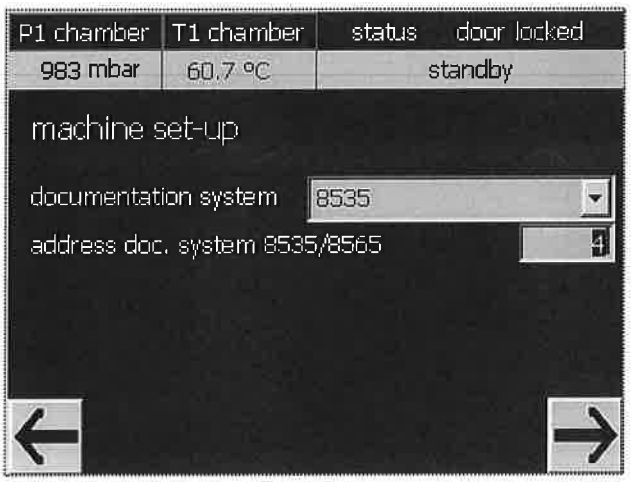


Figure 8-35: Machine set-up ICS 8535

- IP address, documentation system 8535, with Ethernet connection: if the sterilizer is connected to an 8535 documentation system, each unit must have a TCP/IP address. Click on the "Set IP address" button to accept this address after it has been set.

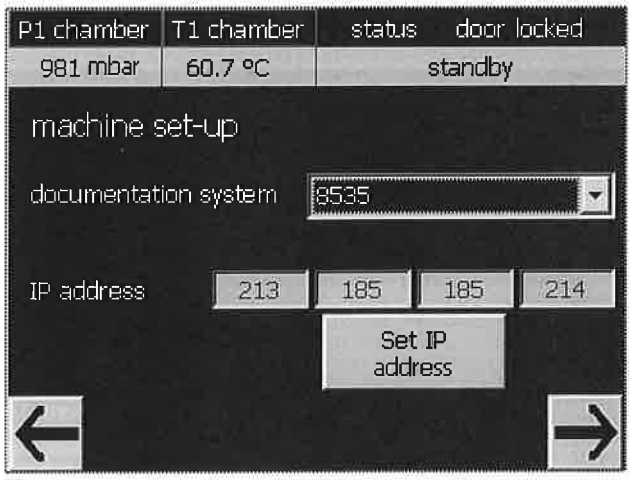


Figure 8-36: Machine set-up ICS 8535 TCP/IP

8.10.5 Maintenance interval

The factory-set maintenance intervals can be changed by Belimed maintenance personnel when special circumstances require shorter intervals (e.g. quality of utilities do not fulfill our specifications).
The standard settings are defined in the 'Maintenance Manual' (Refer to Figure 8-37). The current values are displayed at the right. You can reset the maintenance counters at any time by pressing the "reset" buttons.

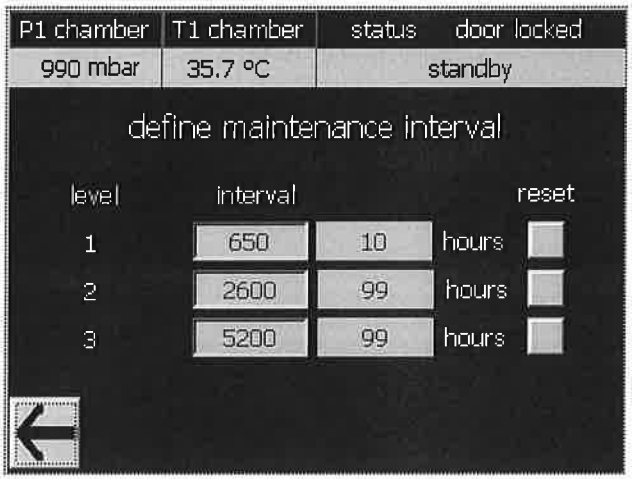


Figure 8-37: Maintenance interval display

8.10.6 Printer self-test

The printer system-test forces a printout (refer to Figure 8-38). Thereby the following are tested:

- Serial communication between PLC and Printer interface
- Serial communication between Printer interface and printer
- Printer interface
- Accuracy of Sensor inputs on printer interface (T2, P2), if a reference RTD (T2=134°C) and a reference input current (P2= 12mA) are connected to the sensor inputs.
- Printer function

A record is printed out with machine type and no., date, time, set values , actual values, allowed tolerance and result.

Additionally to the system- test, a printout of the alarm texts and the cycle phase texts can be forced.

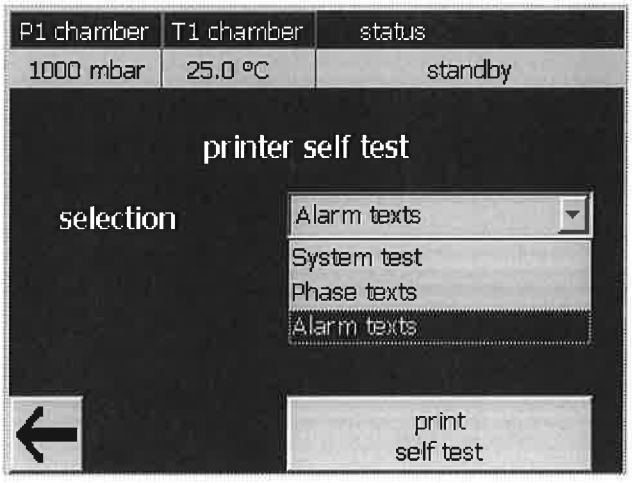


Figure 8-38: Printer self test

8.10.7 Modify Cycle Parameters and copy program

The Belimed maintenance personnel can modify the following cycle parameters (refer to Figure 8-39):

- Cycle name
- Sterilize time
- Dry time

IMPORTANT:

The cycles listed in Table 6-1 have been validated using the techniques documented in AAMI ST-8 and ST-37. If different cycle parameters (sterilize time or dry time) are required, it is the responsibility of the health care facility to validate the cycle. Reference appropriate AAMI guidelines for validating sterilization cycles to assure the proper Sterility Assurance Level (SAL) as well as moisture retention acceptance criteria.

After modifying parameters press '**save parameters**' button. A new version is generated on the basis of the date if the parameters are changed.

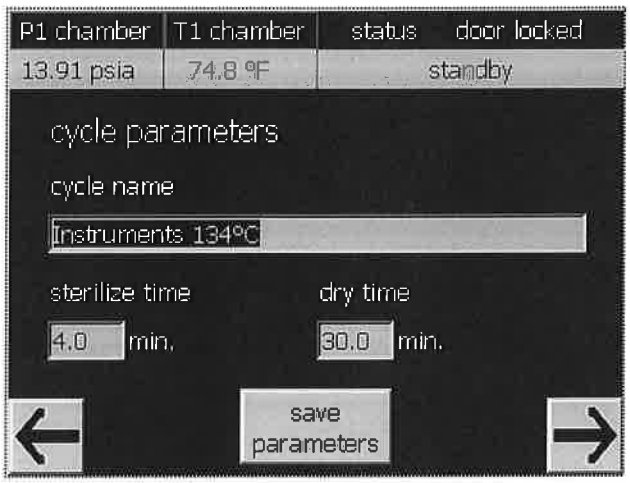


Figure 8-39: Modify cycle parameters display 1

All parameters can be displayed and modified in a further mask.

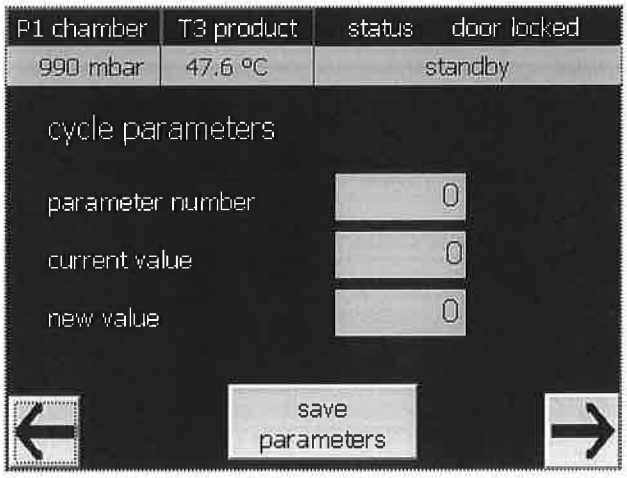


Figure 8-40: Modify cycle parameters display 2

Procedure for displaying or changing program parameters:

- Enter the parameter number in the **"parameter number"** field. Belimed Service or the technician will be able to provide you with information on the corresponding number.
- The current parameter is displayed without unit in the **"current value"** field
- In the case of modification: enter the new value in the **"new value"** field.
- In the case of modification: press the **'save parameters'** button. If the parameters are changed, a new version is generated on the basis of the date.
- The new value is displayed immediately in the **"current value"** field.

None of the parameter values have a unit. This means:

- Temperatures are displayed in tenths of 1 °C
- Pressure is displayed in mbar absolute
- Times are displayed in tenths of a minute.

In a third screen a complete program can be copied under a new number

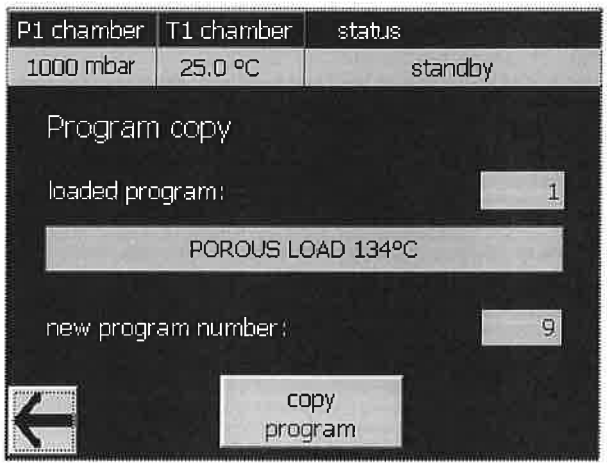


Figure 8-41: Copy program display

Guidance to copy a program:

- Select the program to be copied. (See chapter.5.4.2 Select a cycle)
- Enter the number of the new program in field **'new program number'**

Warning: Any existing program under that number will be overwritten !

- Press **'copy program'** button to copy the program.
- To modify the program name and parameters, the new program needs to be selected.

8.10.8 PLC functions

The PLC functions allow the Belimed maintenance personnel to read any data from the PLC.

Warning:

Write entries are allowed only to Belimed maintenance personnel, who are authorized by the sterilizer manufacturer. The functions, and addresses must be announced by the manufacturer before.

The Belimed maintenance personnel has access to the PLC data memory (refer to Figure 8-42).

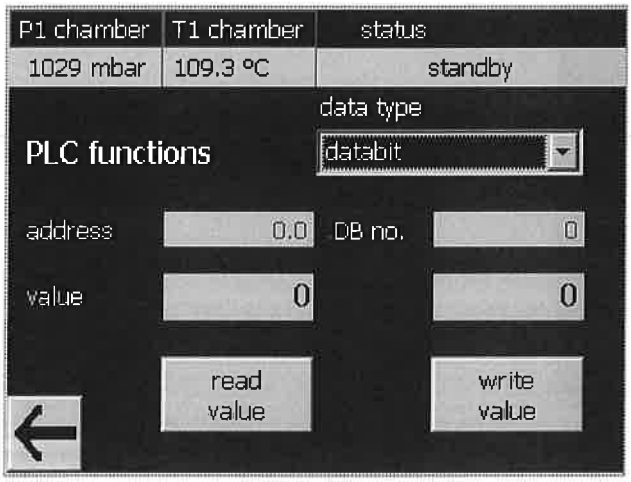


Figure 8-42: PLC functions

Reading a value from PLC:

- Select the data type
- Enter the PLC memory address and DB- No.
- Push button 'read value'

Change a value in the PLC:

- Read the value, you want to change as described above
- enter the new value in the field 'value'
- Press button 'write value'

The new value is displayed on the left side.

8.10.9 I/O- Test

The Belimed maintenance personnel can read the digital PLC inputs for diagnostics and wiring tests.

He also can temporary set an digital output (refer to Figure 8-43).

Leaving the Mask resets the (manual set) outputs

Reading a digital input from PLC:

- Enter the Input byte address in the field 'input byte'

Values with 24V are displayed 'High'

Writing a digital output:

- Enter the output byte address in the field 'output byte'
- Select the desired bit in the lower row. The button changes to 'high'
- Push the 'write outputs' button. The corresponding output is set.

Warning:

Digital outputs are set without any conditions (not limit switches are checked). The outputs stay set until a reset command is set or the mask is closed. Only the emergency stop button stays in action.

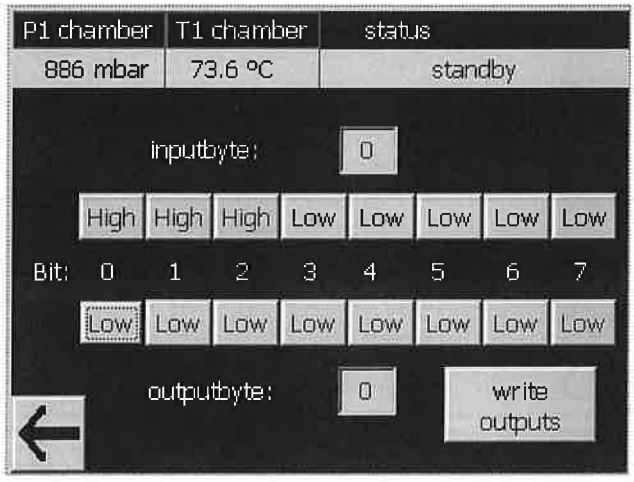


Figure 8-43: I-O Test

9 Routine Monitoring

9.1 Biological monitoring

As part of the operator's verification of the sterilization process, biological indicators may be used to demonstrate that sterilization conditions have been met.

A live spore test utilizing Geobazillus stearothermophilus is the most reliable form of biological monitoring.

To verify the process insert the biological indicator in a test pack (refer to AAMI ST-8 guidelines) and place pack on the lower shelf. Run test pack through a typical Pre-vacuum cycle

(Cycle no. 1 or 2).

On completion, forward test pack and monitor to appropriate personnel for evaluation.

9.2 Testing for pre-vacuum efficiency

9.2.1 Leak Test

The leak-rate-test measures the integrity of the sealed pressure vessel and associated piping to assure air is not being admitted to the sterilizer during vacuum steps.

After running a Leak Test, the leak rate is printed on the cycle documentation.

If the leak rate is out of range, additionally an alarm message is printed.

The malfunction must be reported to the supervisor, who will take appropriate action to determine the cause of the problem. Sterilizer should not be used during this time.

The leak rate value will help define a trend over a period of time if the integrity of the system begins to deteriorate.

9.2.2 Bowie-Dick Test

Daily run a Bowie-Dick Test cycle before processing any loads. This cycle should be used to test the adequacy of air removal from chamber an load, so that steam can penetrate the load. It is not a test for adequate exposure to heat in terms of time-at-temperature.

Tests such as Bowie-Dick are designed to document the removal of residual air from a sample challenge load.

In case of these tests, following exposure in a Bowie-Dick Test cycle, the pack is opened, the indicator examined and conclusions are drawn as to the pattern of residual air, if any, that remained in the pack during the sterilization cycle. Any indication of a malfunction must be reported to the supervisor, who will take appropriate action to determine the cause of the problem. Sterilizer should not be used during this time.

10 Routine Maintenance

CAUTION

Use only original BELIMED replacement parts for maintenance purposes: in all other cases the manufacturer can no more guaranty the specified performances of the equipment nor apply the warranty conditions.

10.1 Replacement of ribbon or paper roll

The printer is built in a strong plastic housing with removable cover. For replacing the ribbon or the paper roll, the cover must be removed from the housing.

Step 1: Remove the cover

Shift the cover while placing the two thumbs on the grooved rail and pressing into the opposite direction (Fig. 10-1).

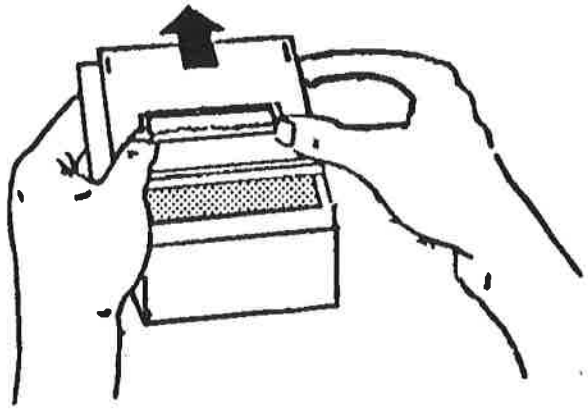


Figure 10-1: Remove Cover

Step 2: replace the ribbon cassette

For replacing the printing ribbon press onto the edge of the ribbon cassette, where the words „PUSH" and „EJECT" appear (figure 11-2). After that the ribbon cassette is unlocked on the right hand side and it can be removed. Tighten the ribbon of the new cassette by turning the small wheel on the right hand side in the arrow-indicated direction (figure 11-3). Place the ribbon cassette over the paper. The paper must be between the textile ribbon and the plastic rail. Place the cassette in its definitive location until it engages clearly (figure 11-4)

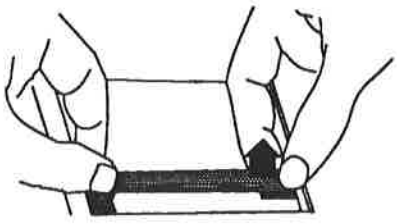


Figure 10-2: Replace ribbon 1

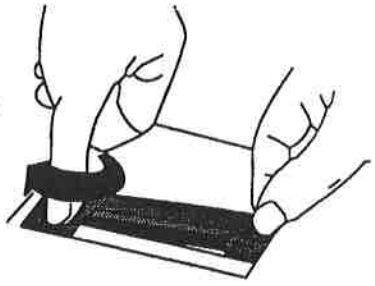


Figure 10-3: Replace ribbon 2

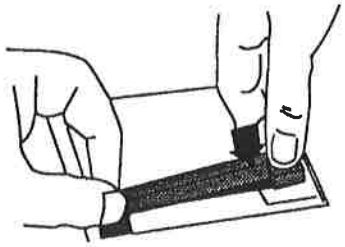


Figure 10-4: Replace ribbon 3

Step 3: replace the paper roll

Paper rolls with a diameter of 38mm (1.5") are compatible with the printer housing.

Remove the ribbon cassette according to step 2. Remove the spindle with the core of the empty paper roll and place it into the core of the new roll. Place the roll in this way that the paper will be carried down and forwards

(figure 11-5). If necessary cut off the paper end straightly. Introduce the end of the paper from underneath into the corresponding slot at the printer until there is a resistance. In order to get the paper in front of the textile ribbon press the paper advance button until about 5 cm come out of the printer.
Introduce the ribbon cassette in its location as explained in step 2 (figure 11-6 to 11-8).

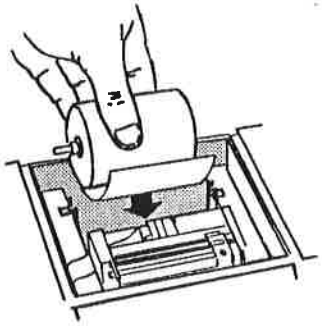


Figure 10-5: Replace paper 1

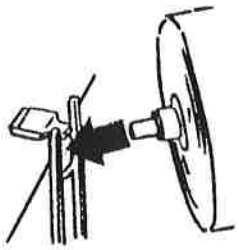


Figure 10-6: Replace paper 2

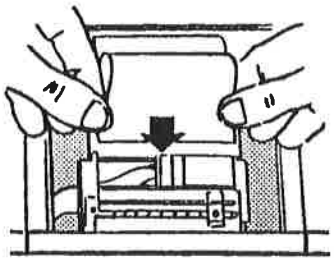


Figure 10-7: Replace paper 3

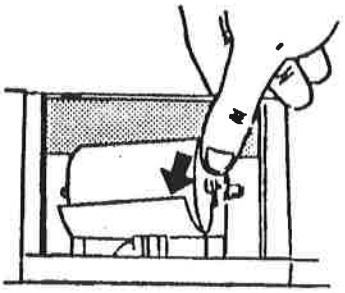


Figure 10-8: Replace paper 4

Step 4: Place the cover back in its position

Introduce the paper from the back side through the cover. Place the cover on the housing with a distance of about 1 cm from the edge and shift it as far as it goes (Fig. 11-9).

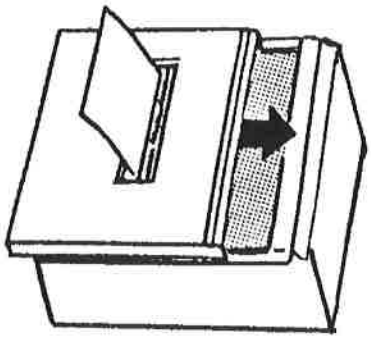


Figure 10-9: Place back printer cover

10.2 Cleaning of Chamber and Front panels

Clean chamber and front panels if dirty but at least once per week.

WARNING

Before entering the chamber (e.g. for cleaning) turn the key switch off (position '0') and keep the key in your pocket as long as you work in the chamber.

CAUTION

Clean the chamber in cold condition only.

Chamber

Clean with cotton towel or sponge. Use water or washing-up liquid. See to it that no residues are left.

Front panels

Clean with soft towel. Clean dry or use washing-up liquid or stainless steel cleaner EAB TOP (Belimed part no. 3-175).

Belimed
Infection Control

Belimed Steam Sterilizer MST-V TOP 5000

TECHNICAL MANUAL

Model 5-5-9

535x535x965 mm

© Belimed 2013

11 General Safety Precautions

It is essential that the following safety regulations be followed:

- This manual contains important information on proper maintenance of this sterilizer.
- Maintenance and servicing may be carried out only by BELIMED-trained staff authorized to do so. Follow the instructions in this the manual when carrying out maintenance and servicing work.
- The system may be placed into operation only in perfect working order and in compliance with the Operating Manual.
- Do not remove or bypass safety facilities.
- The pressure equipment must be inspected regularly pursuant to the applicable legal regulations.
- Please inform your superior in the event of faults or damage. Proceed on the basis of the troubleshooting chart for fault clearance.
- Since the system is operated with saturated or superheated steam, the chamber body, material being sterilized and loading equipment must be considered as hot. Use appropriate protective equipment.
- Take great care, particularly when opening the sterilizer door. The edges of the door and inside walls of the chamber are hot. The chamber interior and any batch trolleys used are also hot (>50°C).
- In the service compartment, all valves, pipes and chamber components must be considered hot until the operator has established otherwise.
- Keep the door's movement zone unobstructed when opening and closing the door.
- The owner must fit all pipes with shut-off valves.
- The owner must ensure that the media have the required operating pressures.
- Always switch off the master switch before carrying out maintenance or servicing work. Depressurize all tanks, containers and pipes before opening screw unions.
- Use only original spare parts. Make no modifications to the system. This would otherwise render warranty null and void.
- Only BELIMED's own staff or others under the supervision of BELIMED staff may move (i.e. load, unload or relocate) the system.
- The system must be disposed of professionally and in line with national regulations.
- Block the chamber door on the closed position by turning the door safety device 90 degrees, so that the door cannot open before you make any changes on the door drive (chain, clutch, motor).

11.1 Summary of warnings and cautions

The following is a summary of safety precautions to be observed when operating or servicing this unit. WARNINGS indicate the potential for danger to personnel and CAUTIONS indicate the potential for damage to equipment. The precautions may be repeated where applicable throughout the manual. The following is a list of all safety precautions to be taken. Carefully read them before proceeding to use or service the unit.

WARNINGS

- BURN AND SHOCK HAZARD: Repairs and adjustments should be attempted only by authorized persons fully acquainted with this equipment. Use of inexperienced, unqualified persons to work on the equipment or the installation of unauthorized parts could cause personal injury or result in costly damage!
- Observe the label "Dangerous voltage": turn off main switch before opening
- BURN HAZARD: Allow sterilizer, generator (if applicable) and accessories to cool to room temperature before performing any cleaning or maintenance procedures.
- This sterilizer is not designed to process any liquids.
- BURN HAZARD: Sterilizer and rack/shelves will be HOT after cycle is run. Always wear protective gloves and apron (also face shield if processing liquids) when removing a processed load. Protective gloves and apron should also be worn when reloading sterilizer following previous operation.
- FALL HAZARD: To prevent falls keep floors dry by immediately wiping up any liquids or condensation in sterilizer loading or unloading area.
- EXPLOSION HAZARD: This sterilizer is not designed to process flammable liquids.
- BURN HAZARD: A steam supply malfunction may cause the sterilizer chamber to fill with scalding water. Do not open chamber door if the unit fails to complete an automatic cycle or if water leaks past the door gasket upon unlocking the door.
- STERILITY ASSURANCE HAZARD: According to EN285 standards, a measured leak rate greater 1.3 mbar/minute indicates a problem with the sterilizer. Refer the situation to a qualified maintenance technician before using the sterilizer further.
- Before entering the chamber (e.g. for cleaning), turn the key switch off (position '0') and keep the key in your pocket as long as you work in the chamber.
- Block the chamber door on the closed position by turning the door safety device 90 degrees, so that the door cannot open before you make any changes on the door drive (chain, clutch, motor).

CAUTIONS

- **CAUTION: Avoid letting moisture get into chamber insulation, as it will cause rusting of the outer jacket.**
- **CAUTION: Never use sharp tools to push gasket into groove.**
- **CAUTION: Never use wire brush or steel wool on door and chamber assembly.**
- **CAUTION: Observe the Electrostatic Precautions outlined in the maintenance manual. Always wear a grounding wrist strap when removing or replacing PC boards or ICs.**
- **CAUTION: Solenoid valves are equipped with a special material which can be attacked by oils and grease. When replacing entire valve, wipe threads clean of cuttings oils and use Teflon tape to seal pipe joints.**
- **CAUTION: Handle siphon and bellows assembly gently to avoid damage.**
- **CAUTION: Keep the movement area of the door unobstructed during door opening and closing.**
- **CAUTION: Any alteration of the sterilizer which affects its operation will void the warranty and could violate state and local regulations and jeopardize insurance coverage.**
- **CAUTION: Use only original Belimed replacement parts for maintenance purposes: in all other cases the manufacturer can no more guaranty the specified performances of the equipment nor apply the warranty conditions.**
- **CAUTION: In order to ensure the proper function of the sterilizer, run a leak test cycle daily.**
- **CAUTION: The Bowie-Dick Test Cycle has to be performed daily.**
- **CAUTION: Sterilize only goods which are declared to be steam- sterilizable by their manufacturer and compatible with the chosen cycle parameters (maximum temperature)**
- **CAUTION: Respect the maximum number of sterilization's given by the manufacturer of the goods to be sterilized. Check their proper function according to the manufacturer's information of the goods (e.g. instruments)**
- **CAUTION: STERILITY ASSURANCE HAZARD: Load sterility may be compromised if the chemical or biological indicator or the Bowie-Dick Test indicate a potential problem. If these indicators show a potential problem, refer the situation to a qualified maintenance technician before using the sterilizer further.**

12 Maintenance / periodic tests

12.1 Safety information

You must always do the following before starting maintenance:

- Switch off the key-operated switch on the operating panel and remove the key.
- Switch off the master switch on the switch cabinet and lock it with a padlock.
- Shut off all energy supplies (water, steam and compressed air) at the shut-off valve.

Before entering the chamber (e.g. for cleaning), turn the key switch off (position '0') and keep the key in your pocket as long as you work in the chamber. Enter the chamber from load side (operating end) only.

12.2 Maintenance intervals

The maintenance intervals are defined in the TOP5000 maintenance menu. 3 maintenance levels can be set. A maintenance interval can be defined on the basis of the operating hours. If a number of operating hours (operating hours of the PLC) are elapsed, the maintenance prompt is displayed on the screen when the first event has occurred. If a maintenance level is reset, the operating hours of all lower levels are also reset. The higher levels must always be defined as a multiple of the next layer down.

Maintenance messages not displayed on the TOP 5000 screen:

- Daily
- Weekly 50h (10 hours/day, 5 days a week)

Maintenance messages displayed on the TOP 5000 screen:

- Level 1: Quarterly 650h
- Level 2: Yearly 2600h
- Level 3: 2-Years 5200h

12.3 Maintenance personnel

The **test person** must be authorized and trained by the sterilizer manufacturer.

12.4 Maintenance plan

12.4.1 Daily Maintenance (before start sterilizing)

No maintenance message is displayed for daily tests.

Item to be serviced	Work to be performed	Performed by
Cleaning	Clean: • Sterilizer surface, if dirty	user
Printer	Printer paper: If red paper marking is visible on printout, replace the paper roll. If the printout is poor, replace printer ribbon	user
Leak Test	Run a Warm- Up & Leak Test cycle. Any indication of a malfunction, (leak rate > 1.3mbar/Min) must be reported to the supervisor, who will take appropriate action to determine the cause of the problem. Sterilizer should not be used during this time.	user
Steam penetration test	Run a Bowie- Dick Test. If the sterilizer was turned off before (cold chamber), run a Warm-up cycle first. Any indication of a malfunction must be reported to the supervisor, who will take appropriate action to determine the cause of the problem. Sterilizer should not be used during this time.	user

12.4.2 Weekly Maintenance

No maintenance message is displayed for weekly tests.

Item to be serviced	Work to be performed	Performed by
Cleaning	Clean: Chamber Chamber drain strainer Sterilizer surface	user
Door seals	Examine the door seal: • Door seal must be completely sucked back in the frame • Door seal must not be mechanically damaged. Any indication of a malfunction must be reported to the supervisor, who will take appropriate action to determine the cause of the problem. Sterilizer should not be used during this time. Door seal must be completely sucked back in the frame. If not, clean dirty door seal and grease.	user test person
Option motorized door: Door closing force	While closing the door you must be able to stop the movement by pressing down the door Alternatively: Place a test weight of 15 kg (at Belimed available) on the open door. The door must not close, when the button 'close door' is pressed.	user
Piping system	Open service doors and check for leaks In case of a leak: • Reseal leaking points and replace seals or exchange parts if necessary	user test person

12.4.3 Maintenance level 1

Maintenance interval 650 hours (Quarterly)

Item to be serviced	Work to be performed	Performed by
Cleaning	Clean: • Chamber • Chamber drain strainer • Sterilizer surface	user
Door seals	• Examine the door seal. • Clean door seal and grease. • Replace door seal, if mechanically damaged.	test person
Option motorized door: Door closing force	• Place a test weight of 15 kg (at Belimed available) on the open door. • The door must not close, when the button 'close door' is pressed.	test person
EMERGENCY-STOP	• Check for proper operation. • 2- door sterilizers: check function on operating and non-operating end	test person
Piping system	• Check for leaks. • Reseal leaking points and replace seals or exchange parts if necessary	test person
Compressed air filter	• Drain off the condensate in the filter casing using the drain plug	test person
Sterile filter	• Unscrew sterile filter and sterilize filter with 134°C Fabric Packs cycle.	test person
Control panel fan	• Check the air inlet fan for proper operation	test person
Leak Test	• Run a Warm- Up & Leak Test. Any indication of a malfunction, (leak rate > 1.3mbar/Min) must be reported to the supervisor, who will take appropriate action to determine the cause of the problem. Sterilizer should not be used during this time.	user
Steam penetration test	• Run a Bowie- Dick Test. If the sterilizer was turned off before (cold chamber), run a Warm-up cycle first. Any indication of a malfunction must be reported to the supervisor, who will take appropriate action to determine the cause of the problem. Sterilizer should not be used during this time.	user

12.4.4 Maintenance level 2

Maintenance interval 2600 hours (Yearly)

Item to be serviced	Work to be performed	Performed by
Cleaning	Clean: • Chamber • Chamber drain strainer • Sterilizer surface	user
Door seal	• Replace door seal	test person
Door drive	• Grease chain, as required	test person
Option motorized door: Door drive	• As required, clean chain and grease • Check chain tension, as required	test person
EMERGENCY-STOP	• Check for proper operation • 2- door sterilizer: check on operating end and non operating end	test person
Condensate steam piping jacket	• Replace steam trap capsule elements	test person
Piping system	• Check for leaks: • Reseal leaking points, replace seals or exchange parts if necessary	test person
Strainer in the pipes, dirt trap	• Clean strainer inserts: • Remove and clean the strainer on the marked pipe screw unions or on the dirt trap	test person
Orifices, nozzles	• Clean orifice plates and nozzles • Remove and clean orifices on the pipe	test person
Sterile filter	• Replace sterile filter	test person
Compressed air filter	• Drain filter • Drain off the condensate in the filter casing using the drain plug	test person
Control panel fan	• Check the air inlet fan for proper operation • Exchange the fan inlet- and outlet filters	test person
Solenoid valves	• Check for proper operation	test person
Angle-seat valves	• Check for leak • Replace piston actuator or valve in case of a leak or malfunction	test person
Vacuum pump	• Check suction capacity with dry and empty chamber: Evacuation time from atmosphere to 70mbar must not exceed: Model 6-6-6: 3 min.; model 6-6-9: 4 min.; model 6-6-12: 5min.	test person
Gauges	• Check for proper operation	test person
One-way restrictor on V623 and V624	• Check adjustment: opening time: ~1-2 seconds	test person
pressure vessel steam generator (option)	• Take and analyze Steam condensate (external laboratory). • Examine if necessary feed water quality and clean pressure vessel	test person

12.4.5 Maintenance level 3

Maintenance interval 5200 hours (2-year interval)

Item to be serviced	Work to be performed	Performed by
All level 2 items	All level 2 work as described above	
PLC Battery	The batteries must be replaced on the PLC • use Lithium battery, Type CR2032 **Warning: Do not switch off electrical power while changing the battery**	test person

12.4.6 Yearly safety check

The Safety check is to log in a maintenance record.

No.	Item to be tested	Work to be performed	refer to chapter	Performed by
1	Door seal	• Examine the door seal	16.2	test person
2	Atmospheric pressure switch	• Check switch point	17.3.1	test person
3	Door lock pressure switch	• Check switch point g	17.3.2	test person
4	Door Limit switches	• Check switch points • Check for firm attachment (they may have come loose)	17.3.4	test person
5	Temperature sensors in Chamber drain	• Calibration verification • Calibrate or replace if required	14.1, 15.1	test person
6	Verification of calibration Pressure sensors	• Calibration verification • Calibrate or replace pressure sensors, if required	14.2, 14.3, 15.2	test person
7	Pressure regulator door seal	• Check setting	18.1	test person
8	Safety valve chamber	• Check safety valve	17.2	test person
9	Safety valve jacket	• Check safety valve	17.2	test person
11	EMERGENCY-STOP	• Check for proper operation	17.1	test person
12	Option motorized door: Door closing force	• Place a test weight of 15 kg (at Belimed available) on the open door. • The door must not close, when the button 'close door' is pressed.	16.3	test person
16	Chamber steam valve	• Function test	17.3.3	test person
17	Compressed air pressure switch	• Function test (pressure set-point)	18.1	test person

12.4.7 Periodic pressure vessel check

The pressure vessel must be checked according to the national or local regulations.

13 Cleaning

Warning

Before entering the chamber (e.g. for cleaning), turn the key switch on the operating panel off (position '0') and keep the key with you as long as you are in the chamber.

Caution

Clean the chamber in cold condition only.

Caution

Do not use any cleaning agent containing salt or chloride or any other cleaning agent which is not suitable for stainless steel.

Chamber

Clean with cotton towel or sponge. Use water or washing-up liquid only. Make sure that no residues remain on the surface.

Front panels

Clean with soft towel. Clean dry or use washing-up liquid or suitable stainless steel cleaner.

We recommend EAB-TOP, Belimed part no.: 350 07473.

Touch panel

Before cleaning the touch screen make sure the sterilizer is turned of with the key switch. Clean the touch screen with a damp towel. Apply only water or washing-up liquid or a suitable screen cleaning foam to moisturize cleaning towel. Do not spray any cleaning agents directly on the screen. Never use aggressive or abrasive detergents.

14 Calibration verification

Calibration involves recording and documenting the difference between indicated value and correct value of the process-related parameters on the measuring facility .

The temperature and pressure measuring chain must be calibrated at least once per year.

The user is responsible for calibration. The user may amend the adjustment points suggested below by own instructions. It is important that calibration be performed at the sterilization temperature(s) used.

For calibration use official calibrated and certified temperature and pressure references. Calibration certificate must not be expired.

14.1 Temperature calibration verification

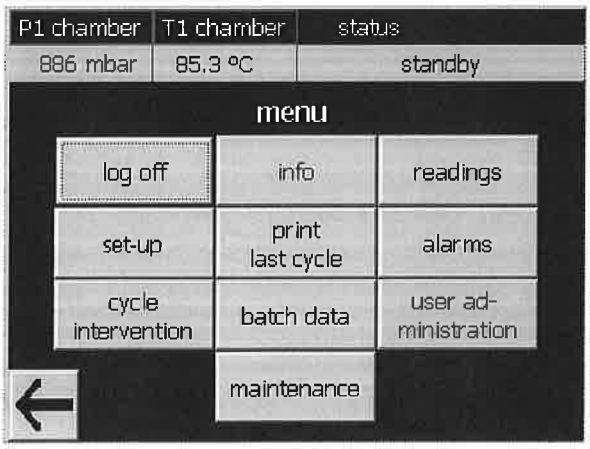


Figure 14-1: Menu

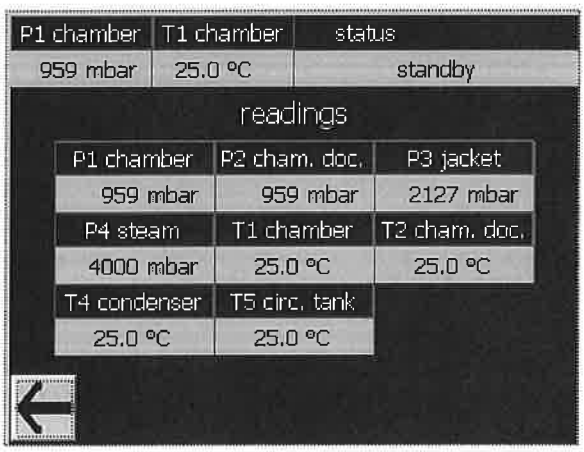


Figure 14-2: Readings

Calibrate offset

- Select on the operating panel the menu 'readings' (refer to Figure 14-1 and Figure 14-2).
- Insert all sensors in a temperature calibration unit (or bucket). Sensors must be immersed at least 95% (minimum 3 ½") into the temperature reference.
- Set the reference temperature to approx. 20°C (room temperature).
- Wait until the temperature reading is stable for at least 5 minutes.
- If the temperature T1 or T2 shown on the display differs by more than ±0.2 degrees from the actual value (certified temperature reference), the offset point is to be calibrated.
- If the temperature T4,T5 shown on the display differs by more than ±2 degrees from the actual value (certified temperature reference), the sensor is to be replaced.

Calibrate gain

- Set the reference temperature to approx. 134°C.
- Insert all sensors in a temperature calibration unit (e.g. oil bath). Sensors must be immersed at least 95% (minimum 3 ½") into the temperature reference.
- Wait until the temperature reading is stable for at least 5 minutes.
- If the temperature T1 or T2 indicated on the display differs by more than ±0.2 degrees from the actual value, the gain is to be calibrated.
- If the temperature T4,T5 shown on the display differs by more than ±2 degrees from the actual value (certified temperature reference), the sensor is to be replaced.

14.2 Chamber pressure transducer calibration verification

- Connect a calibrated absolute-value vacuum-gauge to the chamber.
- Select the Leak test program and start it. Wait until the program enters stabilize phase.
- Compare the pressure readings on the display with the pressure reading of the pressure gauge.
- If the chamber vacuum of P1 or P2 differs by more than ± 15 mbar from the effective value, the pressure transducer must be calibrated.
- Abort the cycle

14.3 Jacket and steam pressure transducer calibration verification

Warning

Before disconnecting the pressure transducers ensure that the steam supply valve is turned off and that there is no overpressure in the jacket and the steam supply pipe.

Offset calibration

- Disconnect jacket pressure transducer P3 and steam pressure transducer P4.
- Use a calibrated pressure transducer (Range 0..4000mbara, accuracy ±0.15% or better) as a pressure reference.
- Compare the pressure readings of P3 and P4 on the display with the pressure reference (ambient pressure).
- If the pressure P3 or P4 differs by more than ± 100 mbar from the reference value, the faulty pressure transducer should be replaced.

Remark

A vacuum calibration is not required because there is always an overpressure in steam supply and jacket during normal operation.

Gain calibration:

- Install the transducers P3 and P4 and the pressure reference to a pressure test tank.
- Set the pressure in the test box (at least 1 gallon) to 3000mbar absolute by compressed air. Close the compressed air inlet valve.
- Wait one minute for pressure stabilization.
- If the pressure P3 or P4 differs by more than ± 100 mbar from the reference value, the faulty pressure transducer should be replaced.
- Release pressure in test tank to ambient pressure.
- Reinstall the pressure transducers P3 and P4.

15 Sensors adjustment

Calibration involves setting or adjusting the measuring facility with the aim of maintaining the difference between indicated and correct value of the process-related parameters as small as possible (DIN 58950-1).
The chamber temperature or pressure measuring chain has to be re-calibrated if deviations of more than ±0.2°C in the case of temperature or more than ±20 mbar in the case of pressure are determined during calibration.

15.1 Temperature sensors adjustment

The temperature calibration must be done in degree Celsius (°C) (refer to Figure)

15.1.1 Offset calibration:

- Put the temperature sensor T1, T2 into a temperature reference (accuracy ± 0.1°C).
- Set the reference temperature to 0°C or to ambient temperature (20-25°C).
- Wait until the temperature T1 and T2 are stable (at least 5 minutes).
- Enter the actual value in **'reference temperature'** field.
- Choose the corresponding temperature sensor T1, T2 or, optionally, T3 (the selected temperature sensor lights green). The uncorrected value of the selected temperature sensor is displayed
- Press **'offset'** button
- Press **'confirm values'** button

15.1.2 Gain calibration:

- The gain calibration must be done after the offset calibration.
- Set the reference temperature to 134°C.
- Wait until the temperature T1 and T2 are stable.
- Enter the actual (reference) value in **'reference temperature'** field.
- Choose the corresponding temperature sensor T1, T2 or, optionally, T3 (the selected temperature sensor lights green). The uncorrected value of the selected temperature sensor is displayed
- Press **'gain'** button
- Press **'confirm values'** button

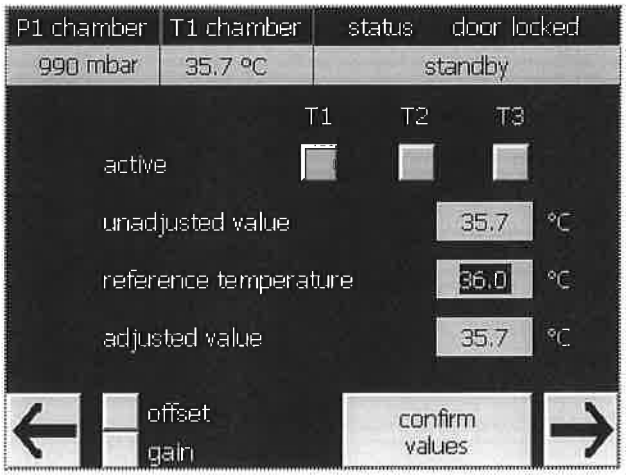


Figure15-1: Calibrate temperature sensors display

15.2 Pressure sensors adjustment

The pressure calibration must be done in mbar absolute (mbar) (refer to Figure)

15.2.1 Offset calibration:

- Install a calibrated vacuum transducer (range 0..1000mbara, accuracy 0.2%) on the chamber validation flange..
- Start a leak test cycle
- Wait until the leak test starts .
- Enter the actual pressure value (from reference transducer) in **'reference pressure'** field. The pressure should be between 50mbar and 80mbar.
- Choose the corresponding pressure sensor P1 or P2 (the selected pressure sensor lights green). The uncorrected value of the selected pressure sensor is displayed
- Press **'offset'** button
- Press **'confirm values'** button
- Abort the cycle

15.2.2 Gain calibration:

- Install a calibrated pressure transducer (Range 0..4000mbara, accuracy 0.2%) and a shut-off valve V1 on the chamber validation flange. Install compressed air (> 30psi) to the other side of the shut-off valve V1)
- Start a leak test cycle
- Disconnect the connector X43 on the print 2005-07 (all valves are closed, door seals are locked)
- Open shut-off valve V1. When the chamber pressure reaches 3200mbar, close V1.
- Wait until the pressure is stable
- Enter the actual pressure value (from reference transducer) in **'reference pressure'** field.
- Choose the corresponding pressure sensor P1 or P2 (the selected pressure sensor lights green). The uncorrected value of the selected pressure sensor is displayed
- Press **'gain'** button
- Press **'confirm value'** button
- Connect the connector X43
- Abort the cycle

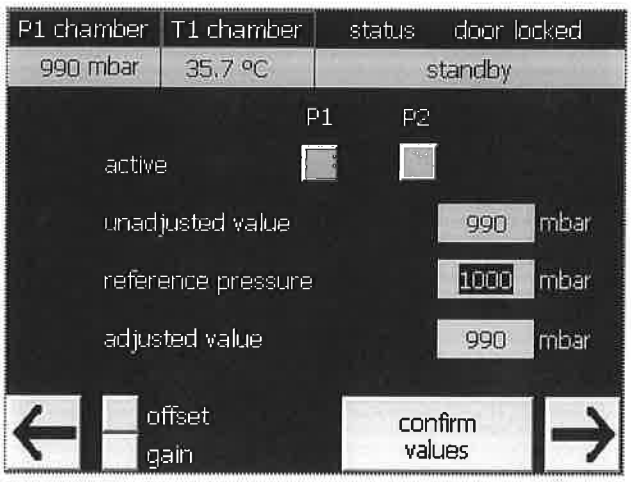


Figure 15-2:Calibrate pressure sensors display

16 Servicing instructions

16.1 Opening control panel

The pullout control panel is placed below the chamber. Open the lower maintenance door. Then push the handle on the left side of the panel (Figure 16-1) and pull out the control panel. Lock the panel in the open position with the 2 handles on the lower left and lower right side of the panel (Figure16-2).

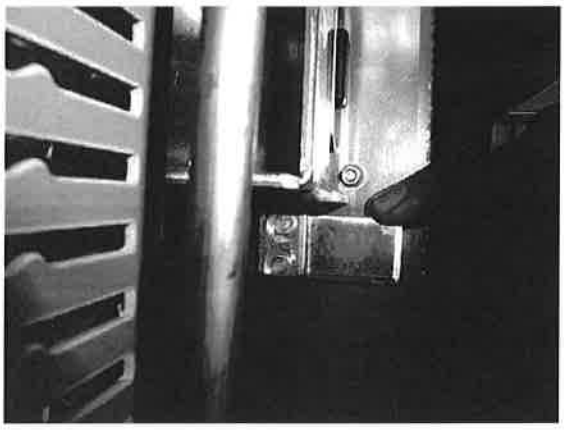


Figure 16-1 : unlock control panel

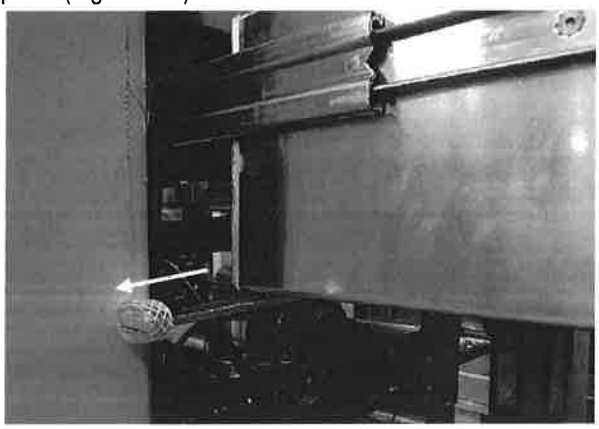


Figure16-2: Lock panel in open position

16.2 Cleaning and replacement of door seal

16.2.1 Door seal on operating end

To replace the door seal, press button 'replace door seal' in the 'maintenance' menu:

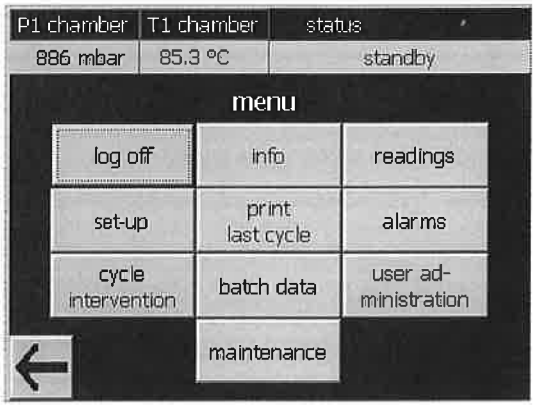


Figure 16-3 : Menu functions

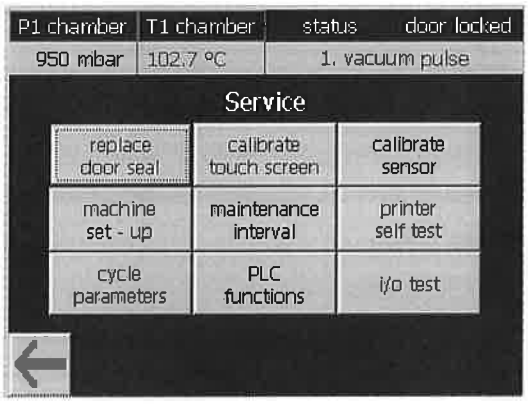


Figure 16-4: Maintenance functions

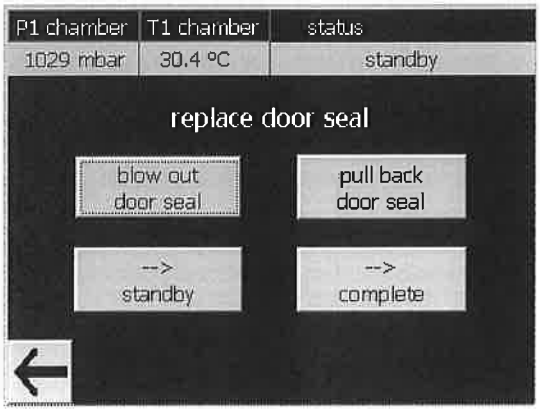


Figure 16-5: replace door seal

- Fully open the door, the sterilizer must be in standby position.
- The door seal can be removed with the 'replace door seal' function in the operating panel maintenance menu (refer to Figure 16-5):
- Press **'menu'** button.
- Press **'maintenance'** button.
- Press **'replace door seal'** button.
- Press **'blow out door seal'** button.
- The door seal is then pushed out a little.
- Remove the seal.
- Clean the seal and grease it with grease Belimed part no. 350 07118.
- Insert a seal as follows (refer to Figure16-6)
- Insert the seal in all 4 corners
- Insert the seal in the center at the top and bottom
- Then insert it half way up at the left and right side
- Then insert the seal between two sections
- Then press the rest of the seal into the groove. (It is always best to do this at the center, between two sections already in the groove).
- When the seal has been fitted completely, press **'pull back door seal'** button.
- The seal is sucked into the groove by vacuum for approx. 15 seconds.
- If the seal is not yet neatly fitted in the groove, you can press **'pull back door seal'** button again.
- Close the door

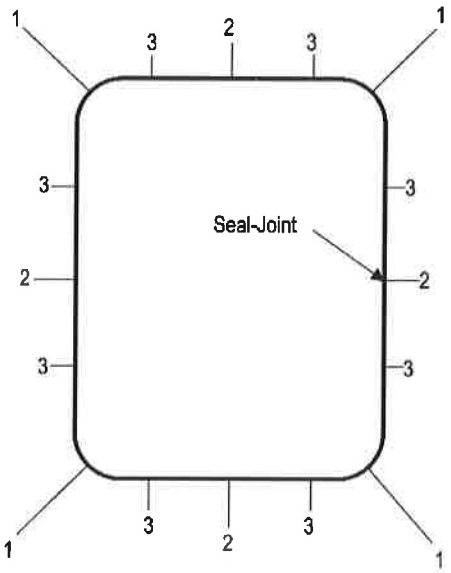


Figure16-6: replace door seal

16.2.2 Door seal on non operating end

- Fully open the door on the non operating end (the sterilizer must be in 'cycle complete' position)
- If the cycle is in the standby position, you can set the sterilizer to 'complete' position by pressing **'complete'** button.

- The door seal can be removed by pressing the **'open door'** and the **'close door'** buttons together on the non operating end.
- The door seal is then pushed out a little.
- Remove the seal.
- Clean the seal and grease it with grease Belimed part no. 350 07118
- Insert a seal as described in chapter 16.2.1.
- When the seal has been fitted completely, press **'close door'** button.
- The seal is sucked into the groove by vacuum for approx. 15 seconds.
- Close the door, press button **'close door'**.
- Press **'complete'** button to go back to standby.

16.3 Adjust door sliding clutch (option motorized doors)

The clutch must be adjusted, so that the door closing-force is between 75N and 100N.

The force must not exceed 150N.

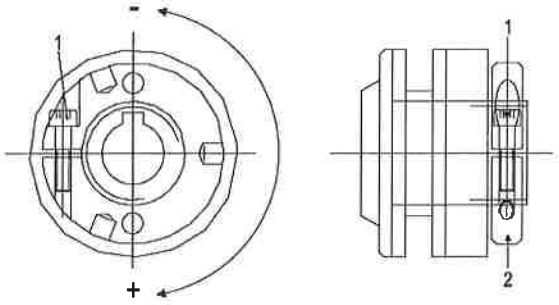


Figure 16-7: sliding clutch on door motor

For door sliding clutch adjustment proceed as follows:

16.3.1 Check the closing force

- With the door open, place a total test weight of **15** Kgs (2 x 7.5 Kgs, available at Belimed) on the top of the door frame. Press the button „close door". The door must not close.
- Place a test weight of **7.5** Kgs over the door. Press the button 'close door'. The door must close.

If one of this two conditions is not fulfilled, you have to adjust the sliding clutch.

16.3.2 Door sliding clutch adjustment

16.3.2.1 Preparation

- Close the door.
- Switch off the sterilizer and pull out the key of the switch. Carry the switch with you in your pocket during the whole maintenance work.
- Open the maintenance service door below the chamber.
- Block the chamber door at the closed position by turning the door safety device 90 degrees, so that the door cannot open when the sliding clutch is released.
- Open the Hexagon screw 1 (Figure 16-7).

16.3.2.2 Increase of the closing pressure:

Rotate the tension screw 2 (Figure 16-7) on the sliding clutch by approx. 1/8 turn clockwise.

Tighten the Hexagon screw 1 (Figure 16-7).

16.3.2.3 Decrease of the closing pressure:

Rotate the tension screw 2 (Figure 16-7) on the by approx. 1/8 turn counterclockwise.

Tighten the Hexagon screw 1 (Figure 16-7) .

16.3.2.4 Door release

- Turn back the door safety device parallel to the chamber door.
- Close the maintenance service door below the chamber.
- Switch the sterilizer on again.
- Open the chamber door.
- Check the closing pressure according chapter 16.3.1

16.4 Replacing the batteries (accumulators)

- The PLC controller must be switched on to prevent data loss.
- Remove MPI- plug (to operating panel)
- Remove the controller cover (PLC).
- You can now exchange the batteries.
  Use only the lithium battery 3V. type CR2032.
- Clip the controller cover back on.
- Put the MPI- plug in and fasten with 2 connector- screws

16.5 Arrangements to be taken before and after an operation interruption

Arrangements before and after a longer interruption of the sterilizer.

All utilities shut-off valves have to be closed.

The electric main switch must be switched off.

Prior to a unit interruption of more than 1 month, the vacuum pump has to be preserved with a water soluble anti-corrosion preservation agent. Depending on the size of the vacuum pump, a quantity of 1-2 lt. preservation fluid has to be filled in to the pump.

- After an interruption of more than 1 month, the rotation capability of the vacuum pump must be checked before starting the operation. (In case of the pump sticking, the grip shall be loosen by rotating the pump shaft).

In case of frost (ice) danger :

- the pressure sensors and the pressure switches are to be removed.
- all the pipes are to be drained.
- all components (pumps, heat exchangers, valves) are to be drained.

17 Tests and inspections

Safety-related monitoring functions are also implemented independently of the PLC in order to enhance operating and system safety.

17.1 Emergency-Stop (double door sterilizers only)

The Emergency-Stop switch A925 on non operating end disconnects the supply voltage of the digital outputs.

The following components are disconnected from the electrical power supply:

- Door motors (Option motorized doors)
- Vacuum pump
- All angle seat valves

The following components remain connected to the electrical power supply:

- PLC control
- Operating panels
- Solenoid valves for cooling down the condensate (to prevent hot water can get to drain)
- Pressure and temperature sensors
- All limit switches, pressure switches and pushbuttons
- On the operating end the main disconnect switch disconnects the whole power (208V/60Hz and 24VDC.

17.2 Safety valves

Caution!

Safety valves may be inspected only by trained servicing personnel. Such inspections involve manual interventions which require a precise knowledge of the system!

17.2.1 General:

Safety valves are set and lead-sealed by approved and authorized agencies resp. companies. The official acceptance testing authority conducts an initial and periodic inspection of the safety valves. An interim inspection should be conducted only when absolutely necessary. After an inspection of the safety valve, there is a risk that the valve seat may leak as the result of fouling, deformation or damage, thus no longer guaranteeing perfect sterilization. Consequently, after each inspection, check the safety valve for leaks by removing the blow-off line and inspecting the safety valve at the outlet connector. Leaking safety valves must be replaced! The permitted operating gauge pressures can be read off on the rating plate.

17.2.2 Inspection in fitted condition

17.2.2.1 Safety valve, jacket Y 702

BURN HAZARD

Waste steam streams out through the safety valve. Safety valve drain must be connected to a pipework leading outside maintenance area. Use safety goggles.

- Select the warm-up cycle so that the jacket is heated.
- Monitor the jacket pressure on the pressure gauge PI 804. Under no circumstances may the pressure in the jacket increase by more than 15% above the permitted operating gauge pressure.

- The safety valve must open at the specified response pressure +/- 10%. Activate the jacket steam valve manually via the related pilot valve V622.1 (refer to Figure 20-3) until the safety valve blows off or the pressure is max. 15% above the permitted operating gauge pressure.
- The steam pressure in the steam supply line may need to be increased.
- If this is not possible, inspect the safety valve after removing it.
- If the safety valve does not blow off within the specified limits, it must be replaced or readjusted and lead-sealed by an approved agency.

17.2.2.2 Safety valve, chamber Y 700

- Start the heating program and wait until the program switches to the sterilization phase.
- Monitor the chamber pressure on the pressure gauge PI 800. Under no circumstances may the pressure in the chamber increase by more than 15% above the permitted operating gauge pressure.
- The safety valve must open at the specified response pressure +/- 10%.
- Activate the chamber steam valve manually via the related pilot valve V623.1 (refer to Figure 20-3) until the safety valve blows off or the pressure is max. 15 % above the permitted operating gauge pressure.
- The steam pressure in the steam supply line may need to be increased.
- If this is not possible, the safety valve must be inspected after removing it.
- If the safety valve does not blow off within the specified limits, it must be replaced or readjusted and lead-sealed by an approved agency.

17.2.3 Inspection in removed condition

If the required test pressure is not available, the safety valve must be removed and inspected by an external test agency. Ensure that the vessels (chamber, jacket) are depressurized before removing the safety valves.

17.3 Safety equipment, door lock

17.3.1 Chamber atmospheric pressure, safety switch

17.3.1.1 Checking the switch point, chamber atmospheric pressure

- Start a Warm-up & Leak Test cycle (P4).
- Wait until the program is in the heat-up phase and the chamber pressure is at least +0.5 bar g (1500mbar a).
- LED D6 on the I/O- print (in control panel) must not lit, as long as the chamber pressure is above 0.12 bar g.
- Abort the cycle.
- The LED D6 must lit green, as soon as the chamber pressure drops below 0.1 bar g (refer to Figure).

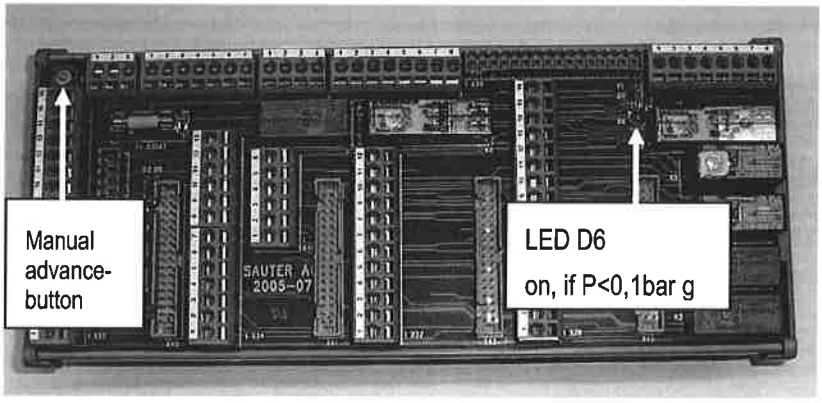


Figure 17-1: Ambient pressure display

17.3.1.2 Atmospheric pressure switch function test

- Start a Warm-up & Leak Test cycle.
- Wait until the program is in the steam phase and the chamber pressure is at least +0.5 bar g (1500mbara).
- The LED D6 on the I/O- print must not lit (refer to Figure).
- Disconnect the plug (pin 1) from pressure switch S335.
- The alarm message 'Atmospheric pressure monitoring' must be displayed on operating panel.
- Abort the cycle.

17.3.2 Door seal pressure

- Start a Leak Test cycle.
- Safety pilot valve Y334 must open and release compressed air to pilot valve Y623 (V623.1).

Remark

The position indicator juts out approx. 2mm, if a pilot valve is actuated (refer to Figure 20-3).

- Reduce door seal air pressure on reducing valve V300 to 2 bar g (refer to Figure 20-3).
- The door seal pressure slowly drops.
- When the door seal pressure drops below 2.2 bar (pressure switch S331), an alarm message 'Door not locked 'must be displayed on the operating panel and the cycle aborts.
- The pilot valve Y334 must close and interrupt compressed air to steam to chamber pilot valve Y623 (V623.1).

Remark

The position indicator juts out approx. 2mm, if a pilot valve is actuated

- Acknowledge the alarms.
- Start a Leak Test cycle again and wait 10 seconds.
- Increase door seal pressure on reducing valve V300 to 3 bar g.
- Acknowledge the alarms and press 'open door' button.

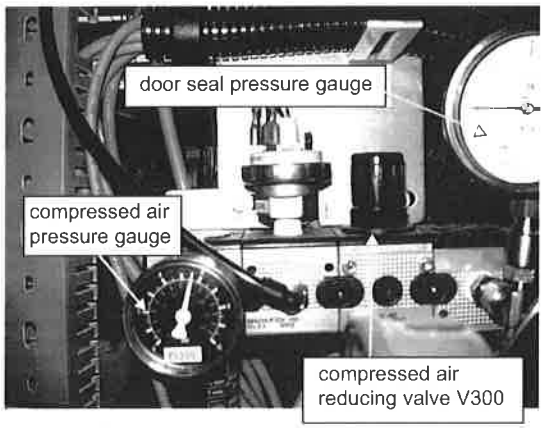


Figure 17-2: compressed air pressure reducing valve V300

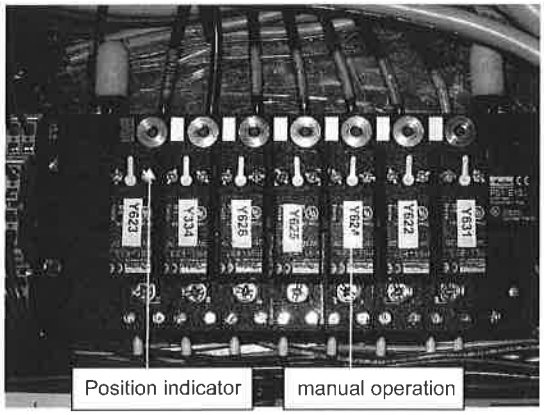


Figure 17-3 pilot valve battery

17.3.3 Door limit switches and steam supply to chamber monitoring

Steam to chamber must be locked until the chamber doors are closed and locked.

- Start a Leak Test cycle
- Safety pilot valve Y334 must open and release compressed air to pilot valve Y623 (V623.1).

Remark

The position indicator juts out approx. 2mm, if a pilot valve is actuated (refer to Figure 20-3).

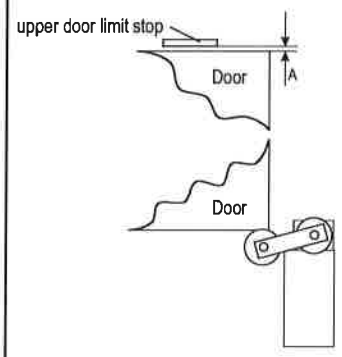
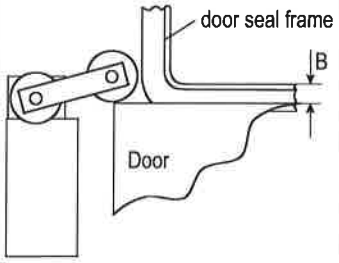
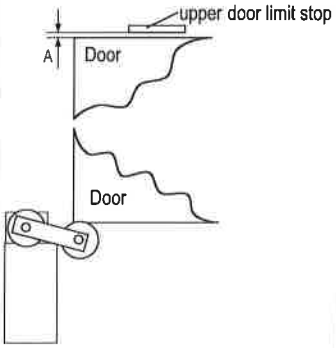
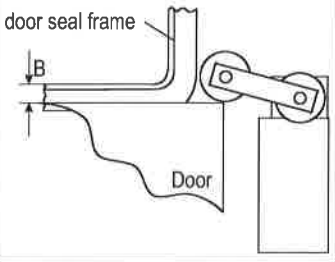
- Actuate door limit switch S332 on operating end (on the right side below chamber door)

- An alarm message 'Door 1 not closed 'must be displayed on the operating panel and the cycle aborts.
- The pilot valve Y334 must close and interrupt compressed air to steam to chamber pilot valve Y623 (V623.1).

17.3.3.1 Two door sterilizers:

- Start a Leak Test cycle
- Actuate door limit switch S333 on non operating (on the left side below chamber door)
- An alarm message 'Door 1 not closed 'must be displayed on the operating panel and the cycle aborts.
- The pilot valve Y334 must close and interrupt compressed air to steam to chamber pilot valve Y623 (V623.1).
- Open the chamber door and ensure, that no steam enters into the chamber (V623 must not be leaky).

17.3.4 Door limit switch adjustment

Test feature	Procedure/Measuring equipment	Set-point
Limit switch S332 „Door 1 closed" on operating end	• Open door 10 cm on operating end. • Close door manually. Limit switch S332 shall switch off (metering point: terminal X33.12), when distance A between door and limit stop is between 1-3mm. • Slowly open door. Limit switch S332 shall switch on (metering point: terminal X33.12), when distance A between door and limit stop is ≤ 10mm.	
Limit switch S342„Door 1 open" on operating end (Option motorized door)	• Open door. • Limit switch S342 shall switch on (metering point: terminal X33.16 =24V), when distance B between lower chamber border and upper door border is 20-30 mm.	
Limit switch S333 „Door 2 closed" on non operating end (option 2-door sterilizer)	• Manually open door 10 cm. • Close door manually. Limit switch S333 shall switch off (metering point: terminal X34.5), when distance A between door and limit stop is between 1-3mm. • Slowly open door. Limit switch S333 shall switch on (metering point: terminal X34.5), when the distance A between door and limit stop is ≤ 10mm.	
Limit switch S343„Door 2 open" on non operating end (option 2-door sterilizer with motorized doors)	• Open door. • Limit switch S343 shall switch on (metering point: terminal X33.9 =24V), when distance B between lower chamber border and upper door border is between 20-30 mm.	

18 Settings

18.1 Pressure switches, pressure regulators and safety valves

The settings must be checked in accordance with the table below. In the case of deviations, the corresponding elements must be readjusted, adjusted or replaced.

Designation:	Description:	Setting:
S 331	Pressure switch, door seal	with increasing pressure 2.6 ± 0.2 bar gauge pressure with decreasing pressure 2.2 ± 0.2 bar gauge
S 335	Pressure switch chamber atmospheric pressure	with increasing pressure 0.12 ± 0.01 bar gauge with decreasing pressure 0.10 ± 0.01 bar gauge
S 346	Pressure switch Compressed air	with increasing pressure 4.5 ± 0.3 bar gauge with decreasing pressure 4.0± 0.3 bar gauge
V 300	Pressure regulator, compressed air door seal	with increasing pressure on PI301 3.0 ± 0.15 bar gauge
Y 700	Safety valve, chamber	40 ± 0.4 psi gauge
Y 702	Safety valve, jacket	40 ± 0.4 psi gauge

19 Tests after electrical repair

An insulation test and a PE wire test must be conducted after exchanging low-voltage components (motors, contactors and heaters).

The following minimum requirements must be complied with:

- Insulation resistance: >1Mohm
- Continuity of the PE wire system connection:

• Continuity of the PE wire system connection: Minimum cross-section of the PE wire [mm²]	Max. measured voltage drop [V] (at 10 A test current)
1.0	3.3
1.5	2.6
2.5	1.9
4	1.4
≥6	1.0

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CIRCUIT DIAGRAM

Belimed
Infection Control

Standard:	UL 61010A-1
Project manager:	P. Herde

Connection data:

Rated voltage:	3x208V, 60Hz
Rated current/achievement:	6.0A / 1.6kW
Extra low voltage:	24V/DC
Back-up fuse:	20A
Rated insulation voltage:	1000V
Short circuit capacity:	10kA
Mains system:	TT

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Series circuit diagram
MST-V 5-5-9

Belimed Infection Control

Title sheet

MST-V 5-5-9_V1.2

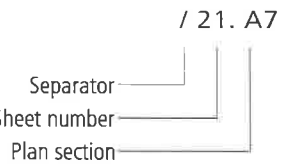
No. 33
Sheet 1
following Inith_1

Terminal strips

Control panel
- -XT1 Supply lead
- -XT2 Three-phase motor
- -XT3 Consumer 208V
- -XT9 Measuring terminals
- -XT11 Power supply 24V DC, emergency-off

On the plant
- -XT23 Valves
- -XT24 Sensors
- -XT29 Measuring terminals

Structure of the destination device



Legend of operating material indentification

Assembly place

- +B1 Operating Panel side 1
- +KA Chamber
- +KR Installation rack chamber
- +SS Control panel
- +EXT External

Line colors by IEC 204-1

Main wiring system 3x208V	black
Protection- potential equalization wire	green-yellow
Control circuit 208 V without transformer	black
Control circuit with transformer < 48V	green
	brown
Control circuit with transformer > 48V	red
	pink
Continous current +	blue
-	blue-white

Line cross section

Cross section of all no-designated lines: AWG19

Modification administration

	Description	Date	Signature

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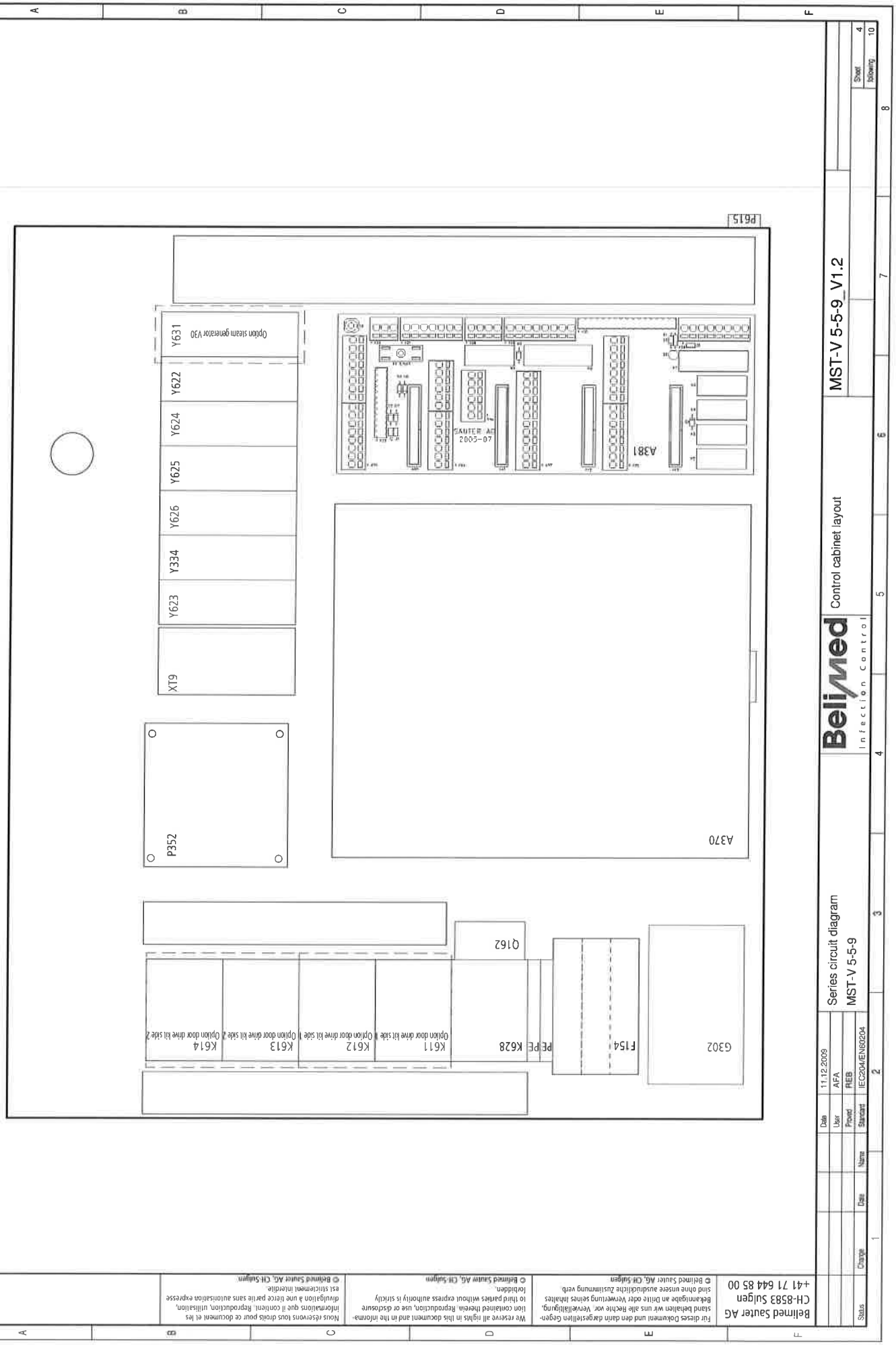
Series circuit diagram
MST-V 5-5-9

Belimed Infection Control

Legend

MST-V 5-5-9_V1.2

Sheet 3
following 4


P615
Option steam generator Y30
Y631
Y622
Y624
Y625
Y626
Y334
Y623
XT9
SAUTER AG
2005-07
A381
A370
P352
Q162
G302
F154
PE
PE
K628
K611
K612
K613
K614
Option door drive kit side 1
Option door drive kit side 1
Option door drive kit side 2
Option door drive kit side 2
Belimed
Infection Control
Control cabinet layout
MST-V 5-5-9_V1.2
Series circuit diagram
MST-V 5-5-9
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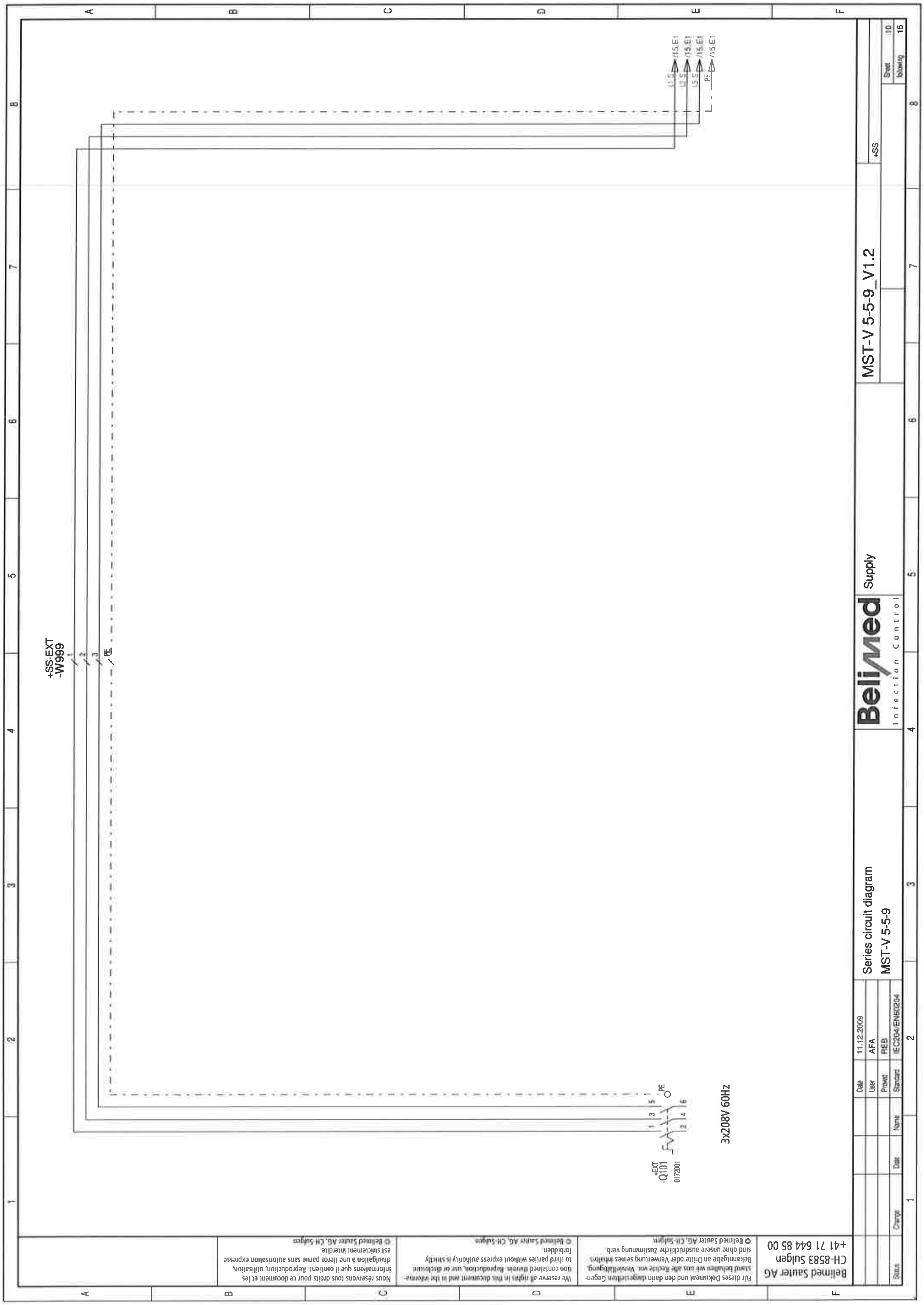
Standard IEC204/EN60204
Sheet 4
Drawing 10
Status
Change
Date
Name


+SS-EXT
-W999
PE
/15.E1
+EXT
-Q101
3x208V 60Hz
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Series circuit diagram
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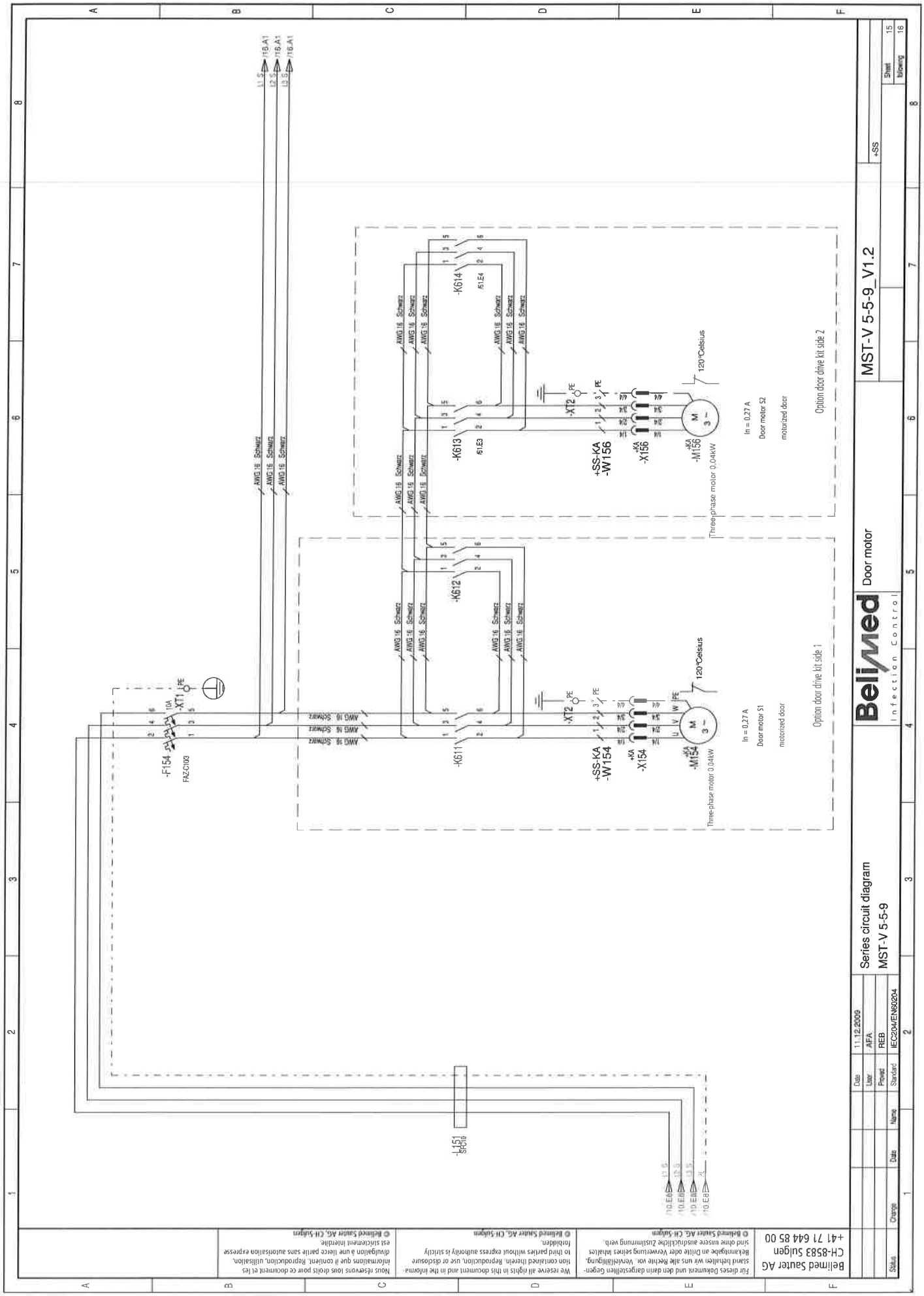
Infection Control
Supply
MST-V 5-5-9_V1.2
+SS
Sheet 10
following 15


Belimed
Infection Control
Door motor
MST-V 5-5-9_V1.2
+SS
Series circuit diagram
MST-V 5-5-9
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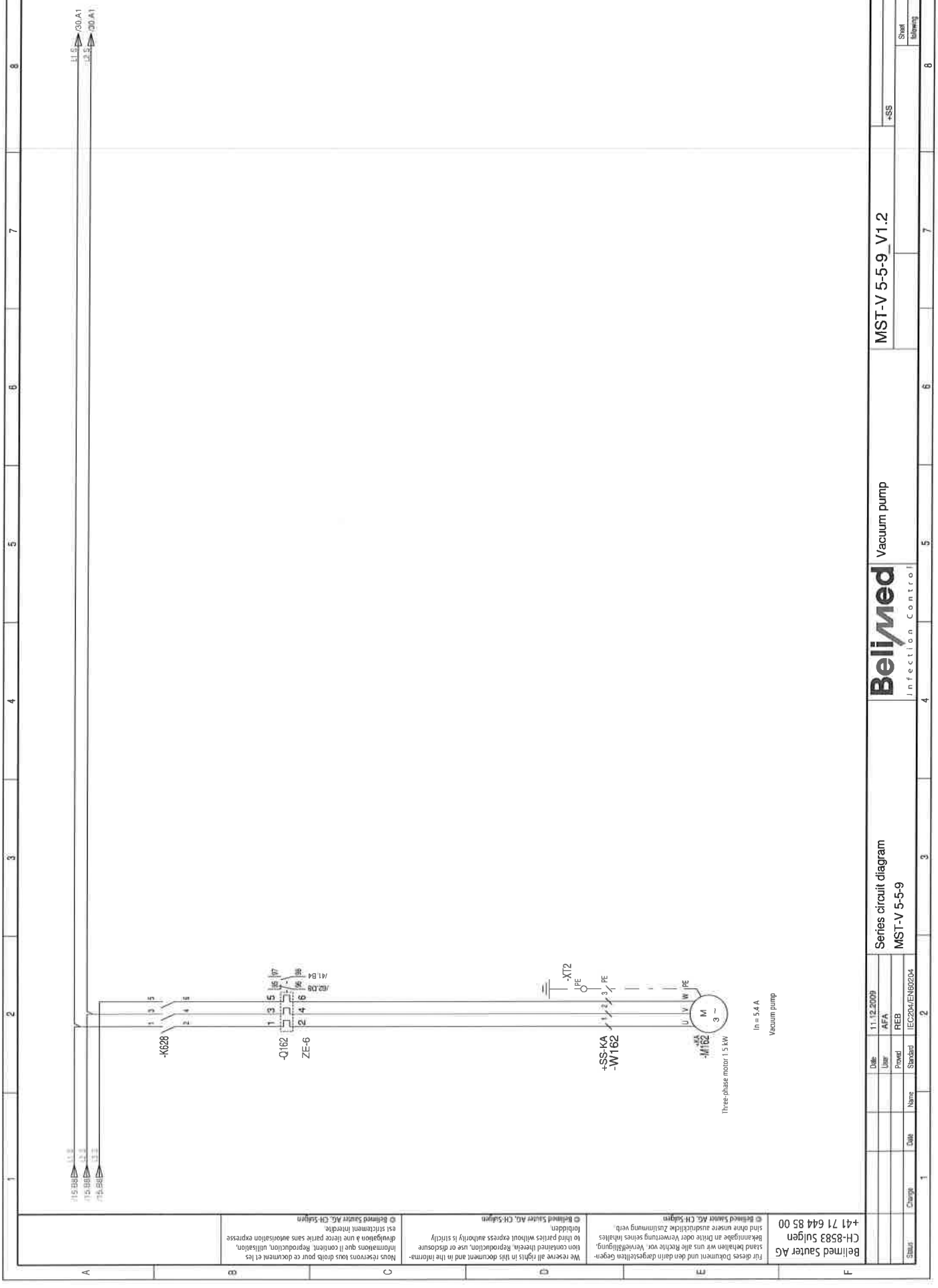
Option door drive kit side 1
Option door drive kit side 2
Three-phase motor 0.04kW
In = 0.27 A
Door motor S1
motorized door
Door motor S2
120°Celsius
-F154
-XT1
-K611
-K612
-K613
-K614
-W154
-W156
-X154
-X156
-M154
-M156
-L151
IEC204/EN60204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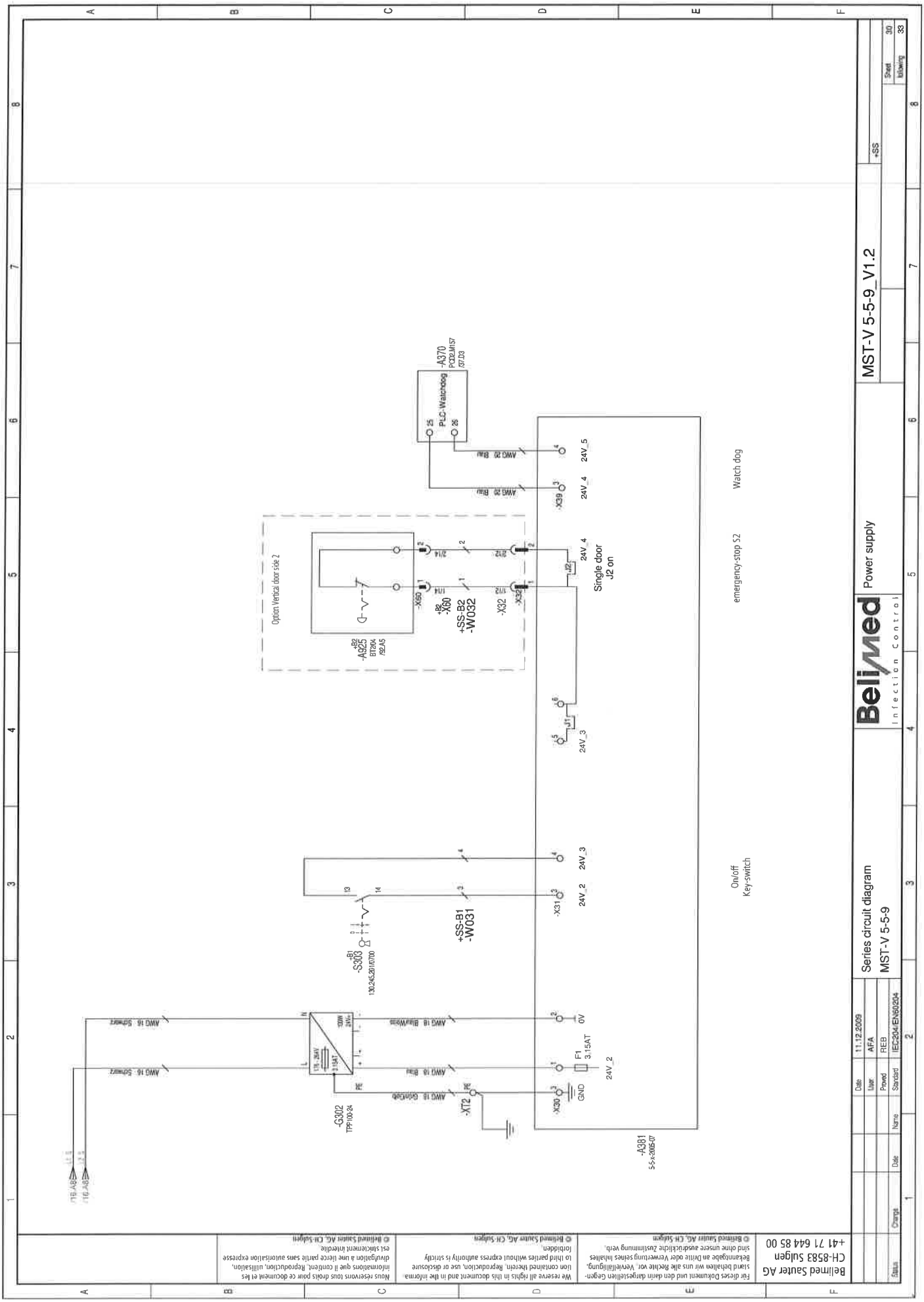
Series circuit diagram
MST-V 5-5-9
Belimed
Infection Control
Vacuum pump
MST-V 5-5-9_V1.2
+SS
Sheet
16
Anhang
30
-K628
-Q162
ZE-6
+SS-KA
-W162
-M162
-XT2
Three-phase motor 1.5 kW
In = 5.4 A
Vacuum pump



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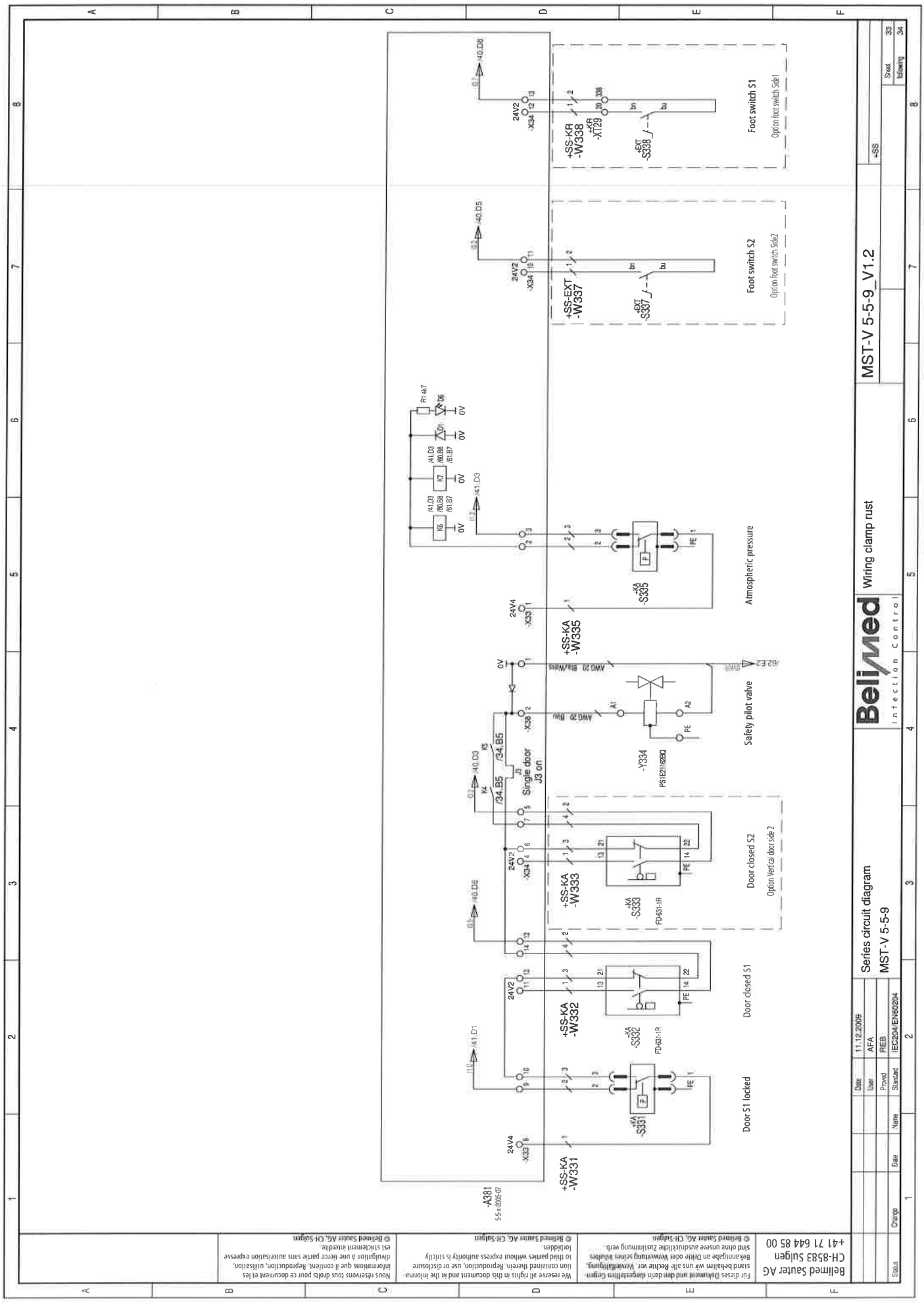

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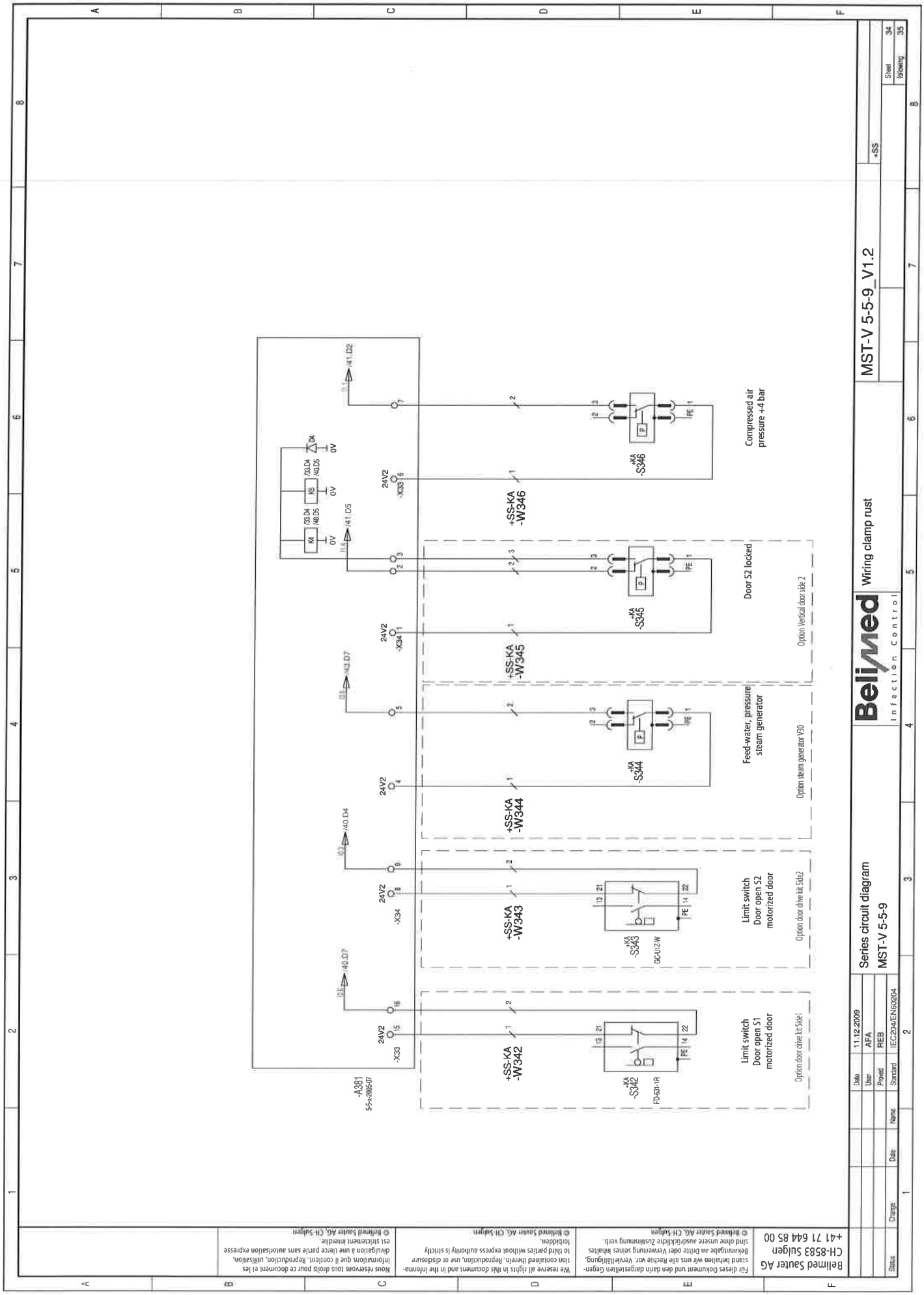

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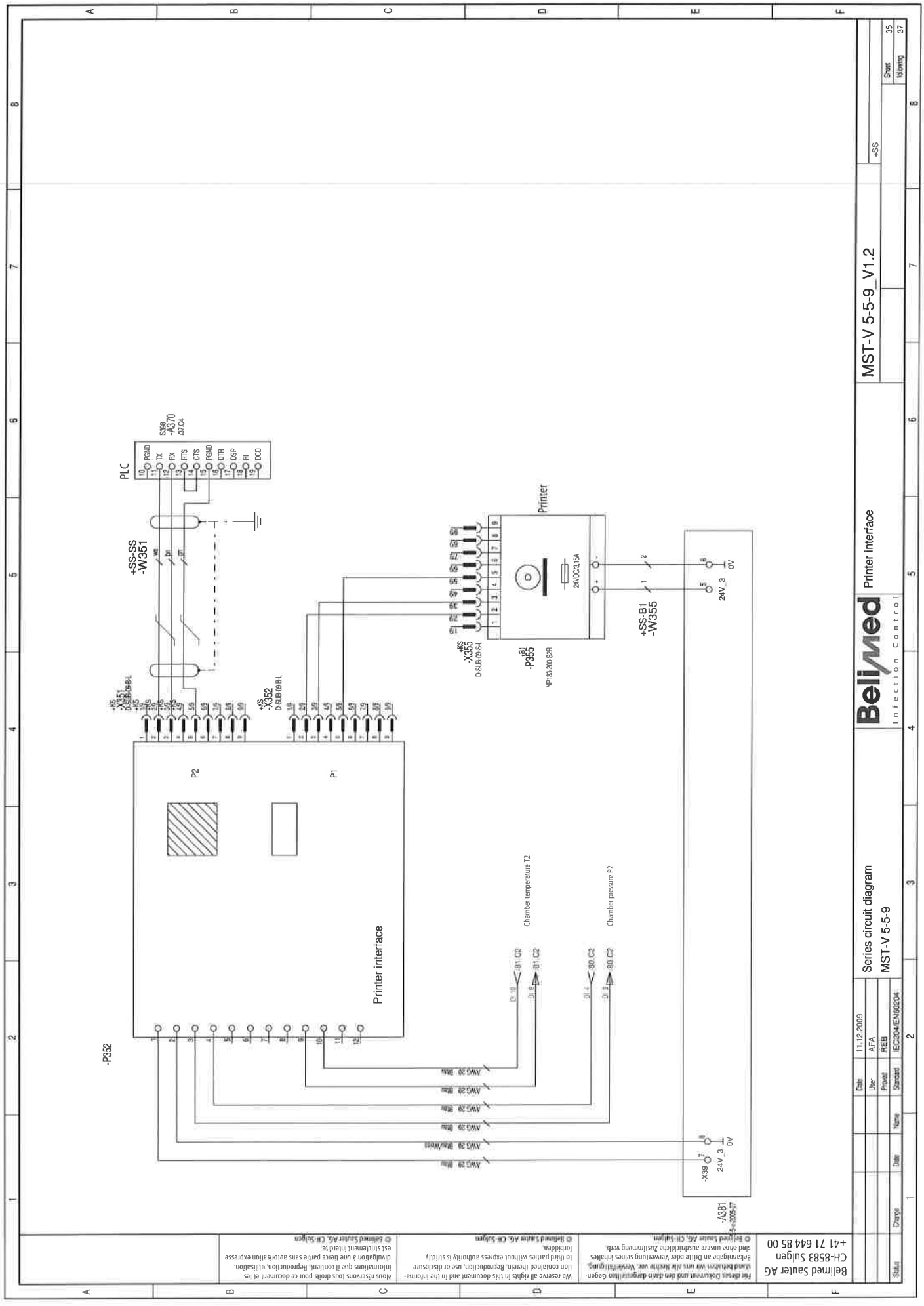

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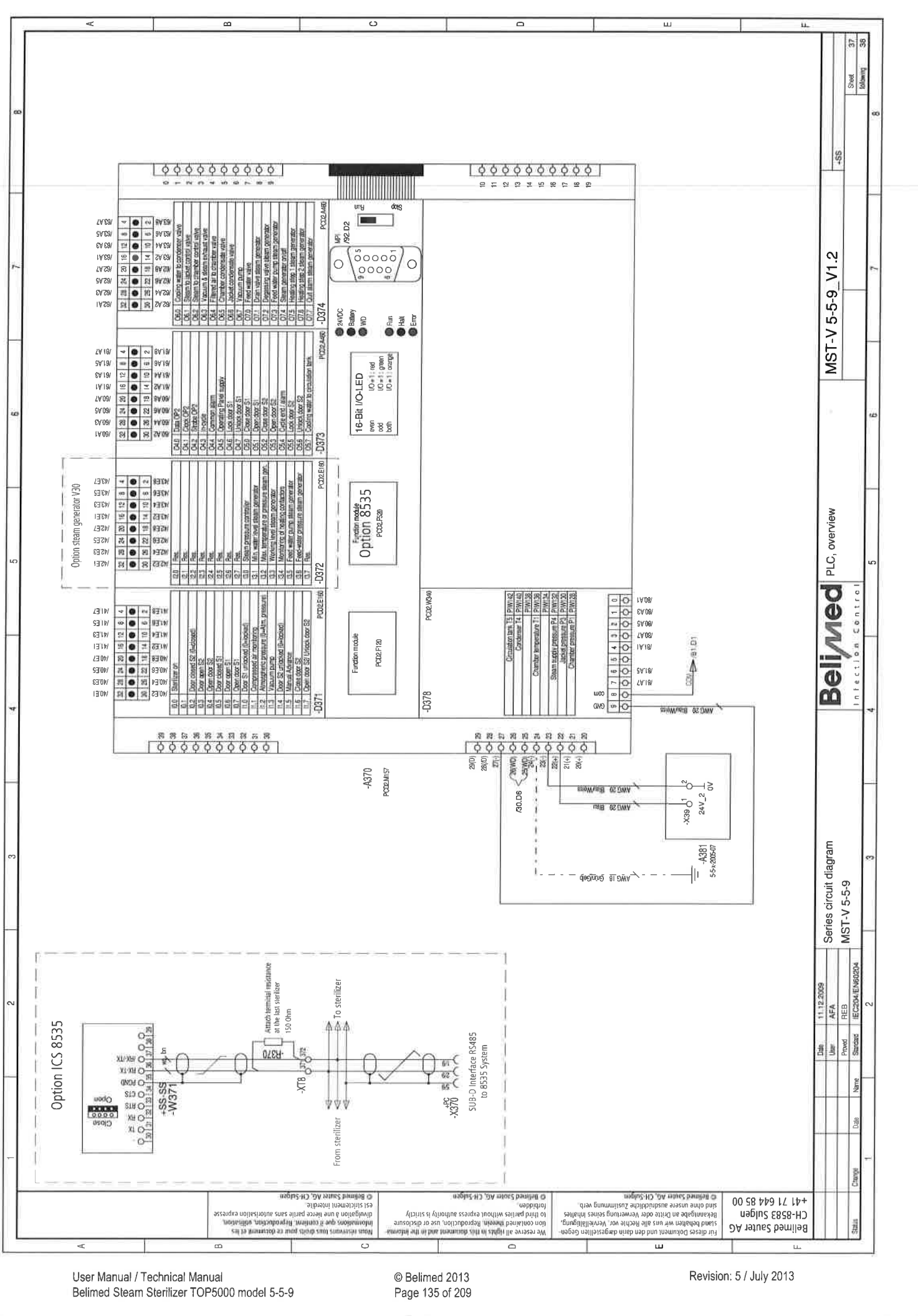

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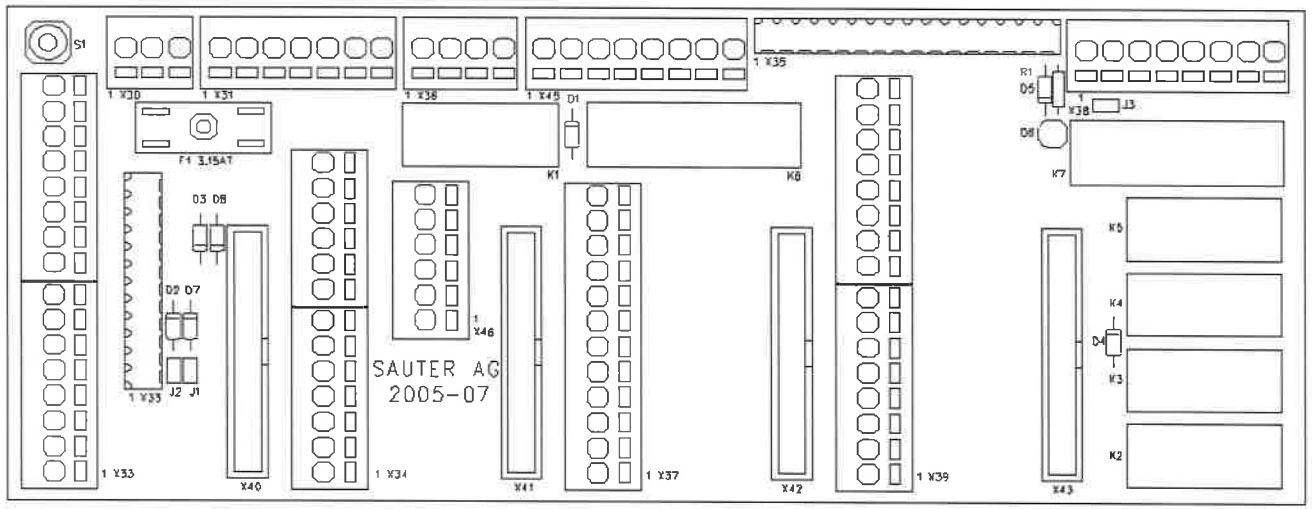

K1 = Operating panel on
K2 = Common alarm
K3 = In-cycle
K4 = Door unlocking
K5 = Door unlocking
K6 = Atmospheric pressure chamber
K7 = Atmospheric pressure chamber
D6 = Atmospheric pressure chamber
S1 = Manual advance

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Series circuit diagram
MST-V 5-5-9

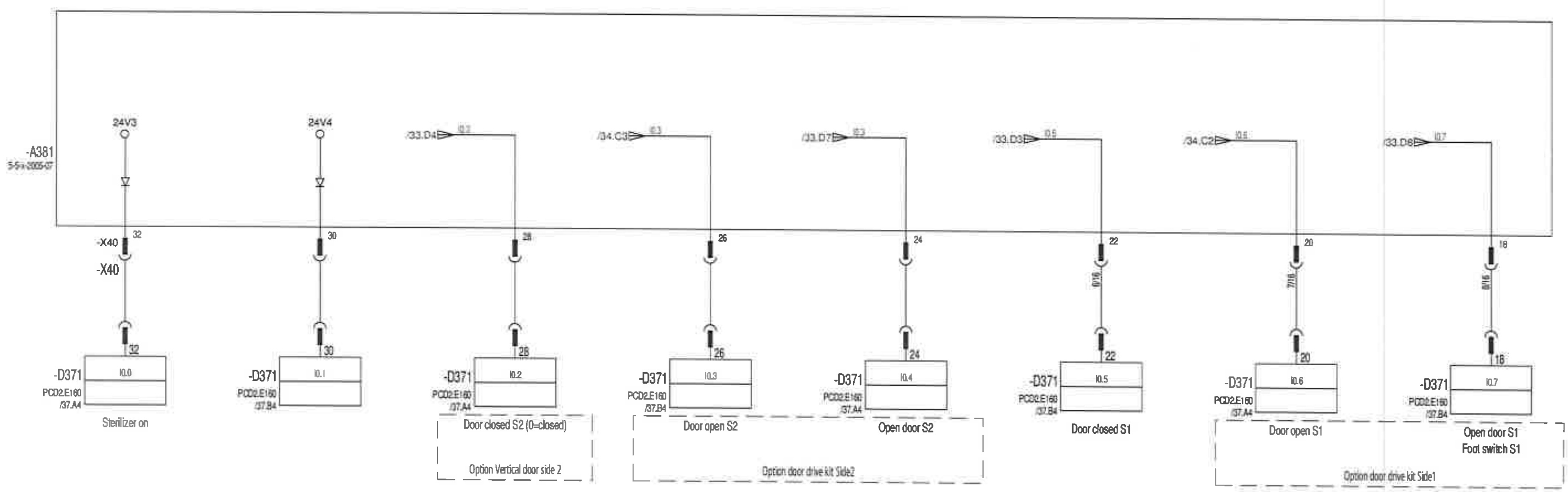
Belimed Infection Control

In-/ output print

MST-V 5-5-9_V1.2

+SS

Sheet 38
following 40



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Series circuit diagram
MST-V 5-5-9

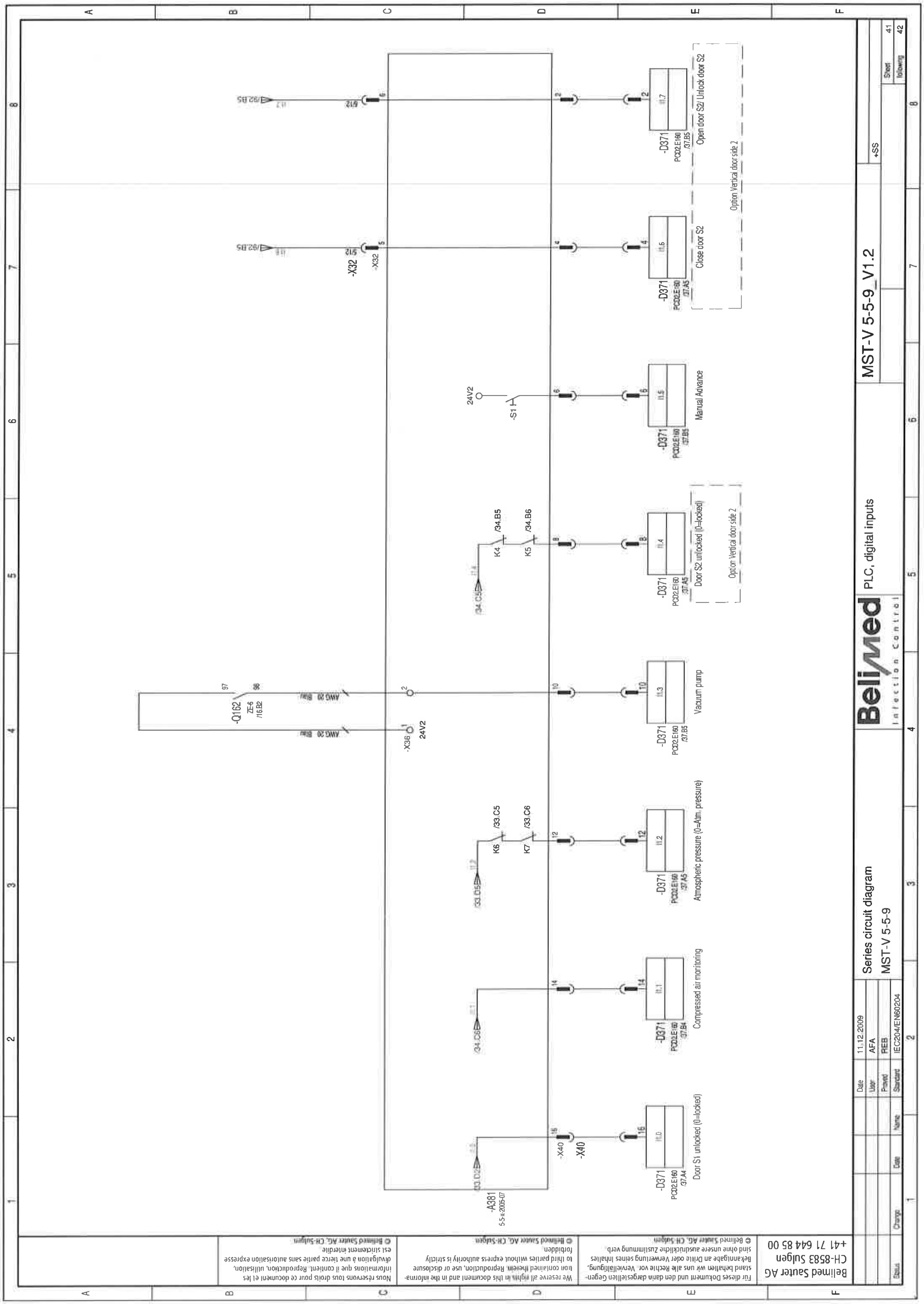
Belimed
Infection Control

PLC, digital inputs

MST-V 5-5-9_V1.2

+SS

Sheet 40
following 41


Series circuit diagram
MST-V 5-5-9
PLC, digital inputs
MST-V 5-5-9_V1.2
Belimed
Infection Control
Door S1 unlocked (0=locked)
Compressed air monitoring
Atmospheric pressure (0=Atm. pressure)
Vacuum pump
Door S2 unlocked (0=locked)
Option Vertical door side 2
Manual Advance
Close door S2
Open door S2/ Unlock door S2
-D371
-Q162
24V2
-X32
-X36
-X40
-A381
-S1
K4
K5
K6
K7
Date 11.12.2009
User AFA
Proved REB
Standard IEC204/EN60204
+SS
Sheet 41
following 42
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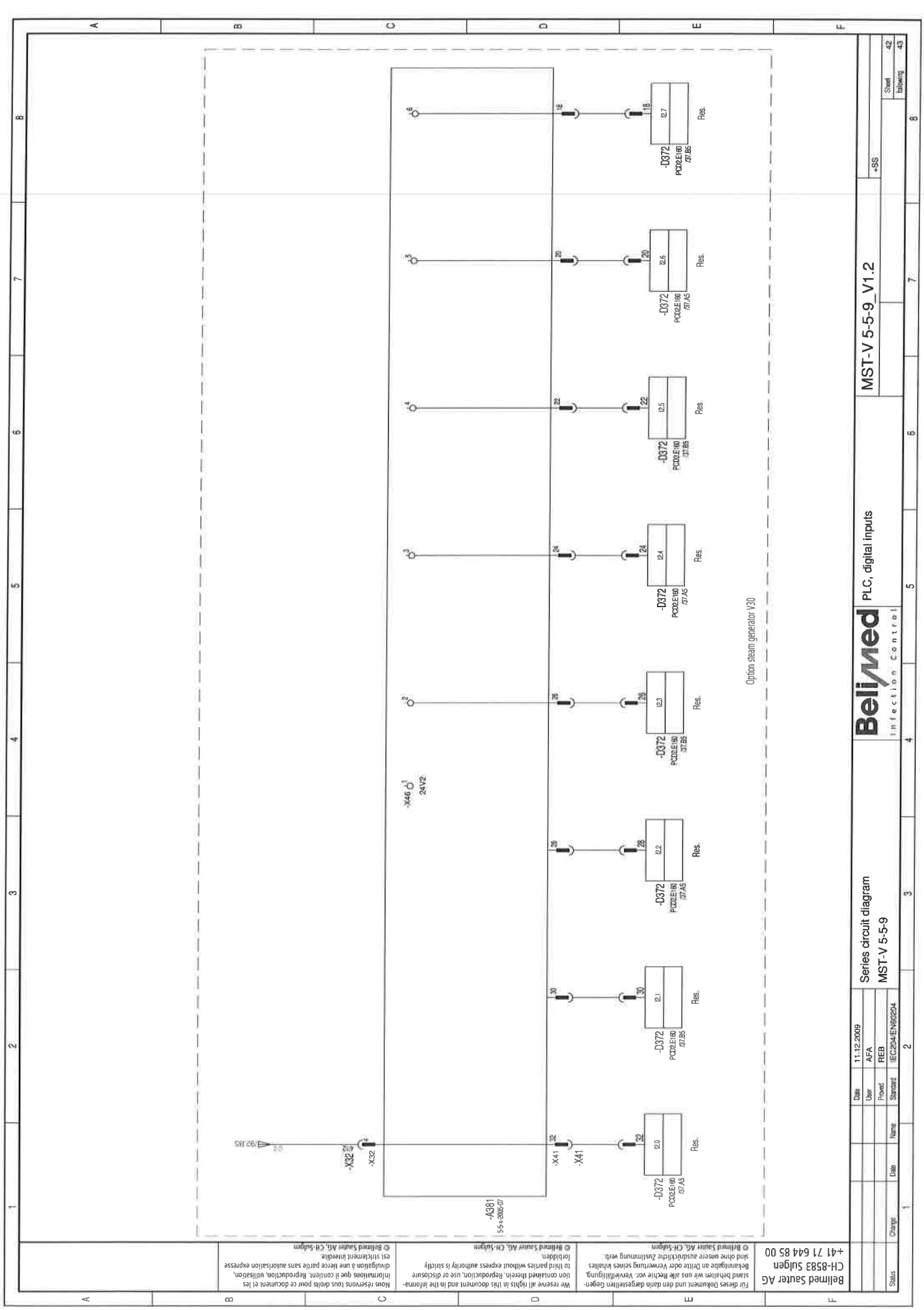
Option steam generator V30
-A381
5-5-x-2005-07
-X32
-X41
-X46
24V2
-D372
PCD2.E160
Res.
MST-V 5-5-9_V1.2
PLC, digital inputs
Series circuit diagram
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Infection Control
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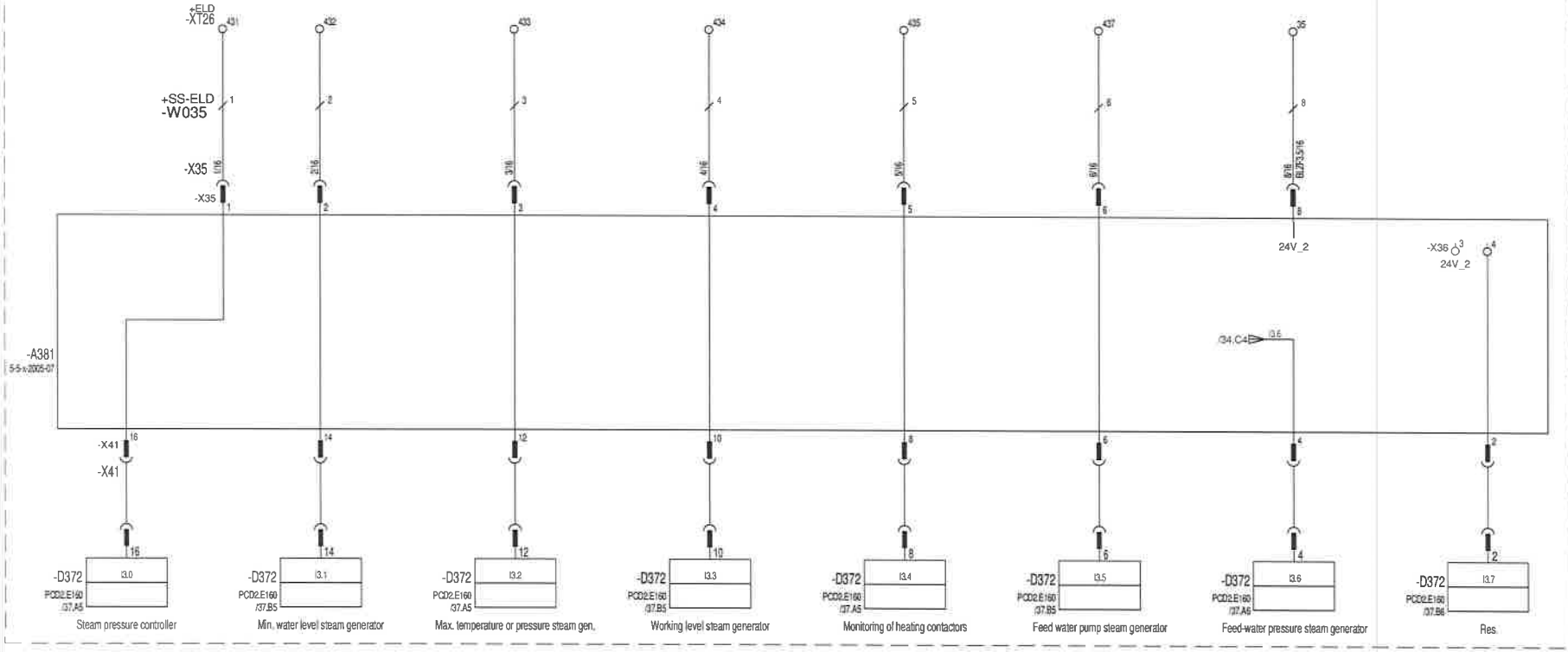
Option steam generator V30

refer to schematic steam generator page 43



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Series circuit diagram
MST-V 5-5-9

Belimed Infection Control

PLC, digital inputs

MST-V 5-5-9_V1.2

+SS

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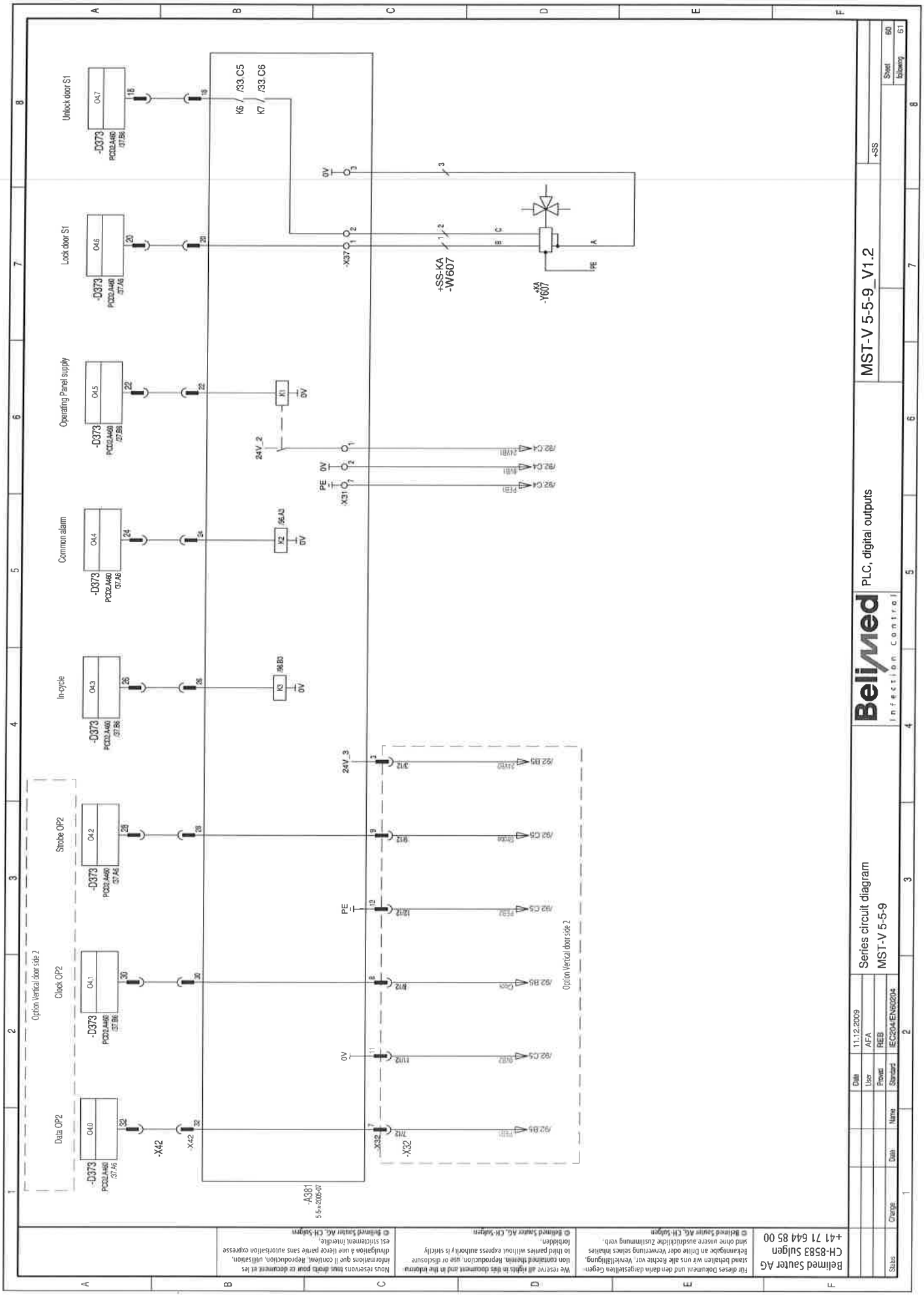

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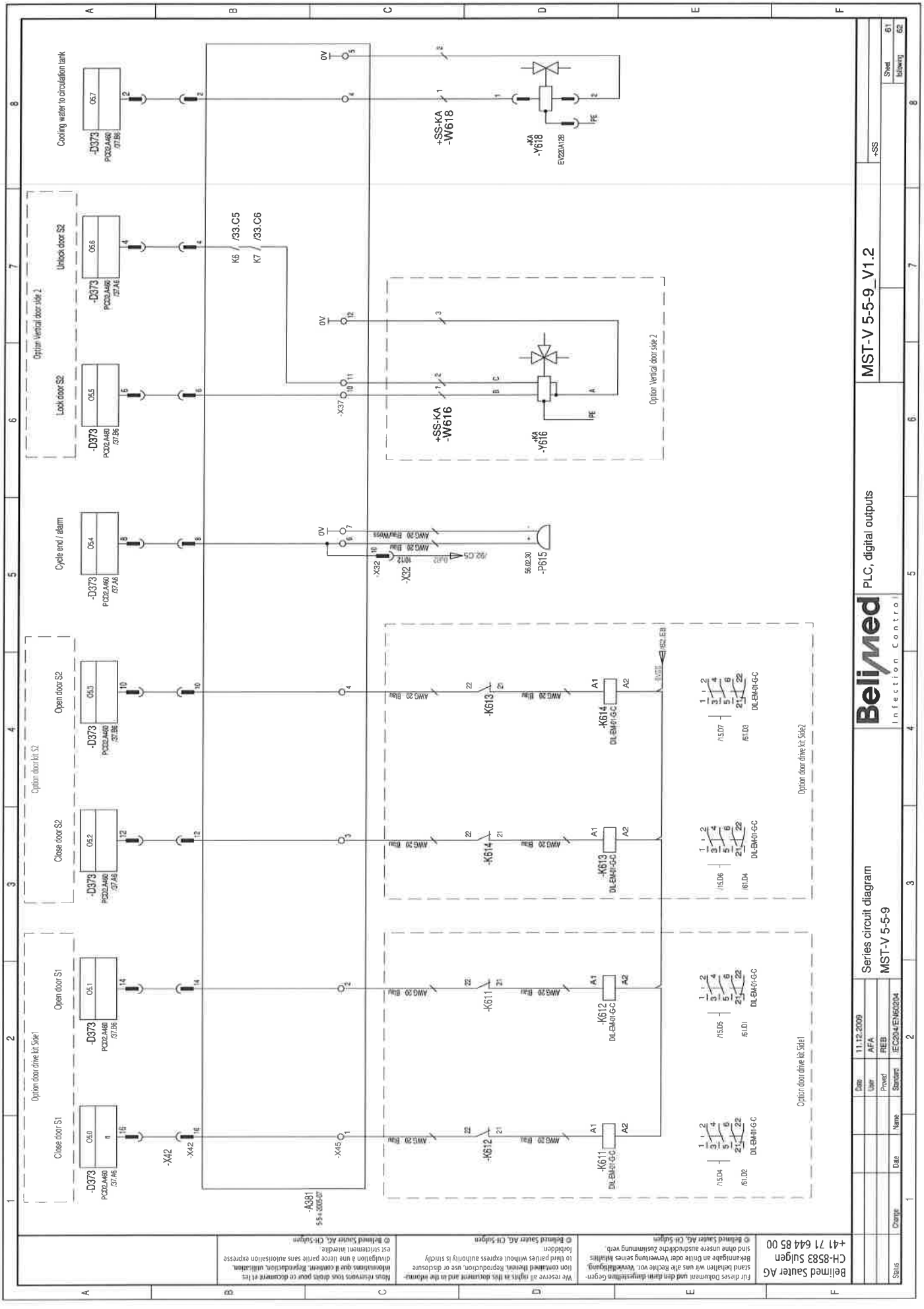
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Standard IEC2004 EN60204
Name
Date
Change
Status
Series circuit diagram
MST-V 5-5-9
Belimed Infection Control
PLC, digital outputs
MST-V 5-5-9_V1.2
+SS
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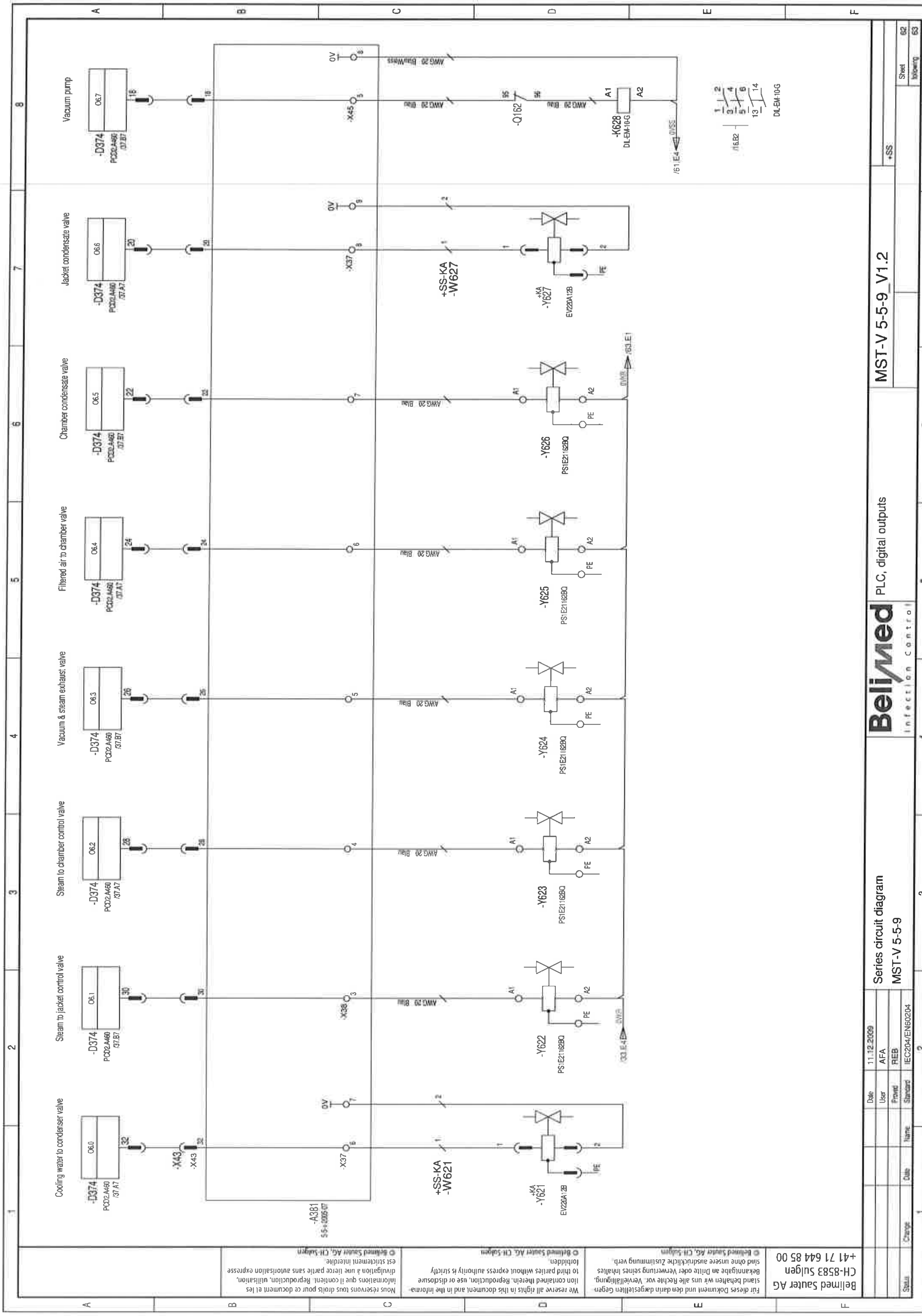
Cooling water to circulation tank
Option Vertical door side 2
Unlock door S2
Lock door S2
Cycle end / alarm
Open door S2
Close door S2
Open door S1
Close door S1
Option door kit S2
Option door drive kit Side1
Option door drive kit Side2
-D373
PCD2.A460
-A381
-X42
-X45
-X37
-X32
-P615
-K611
-K612
-K613
-K614
DIL EM01-G-C
+SS-KA
-W618
-W616
-KA
-Y618
-Y616
K6 /33.C5
K7 /33.C6
0V
AWG 20 Blau
AWG 20 Blau/Weiss
56.02.30


Vacuum pump
Jacket condensate valve
Chamber condensate valve
Filtered air to chamber valve
Vacuum & steam exhaust valve
Steam to chamber control valve
Steam to jacket control valve
Cooling water to condenser valve
-D374
-A381
-Y621
-Y622
-Y623
-Y624
-Y625
-Y626
-Y627
-K628
-Q162
+SS-KA
-W621
-W627
Series circuit diagram
MST-V 5-5-9
PLC, digital outputs
MST-V 5-5-9_V1.2
Belimed
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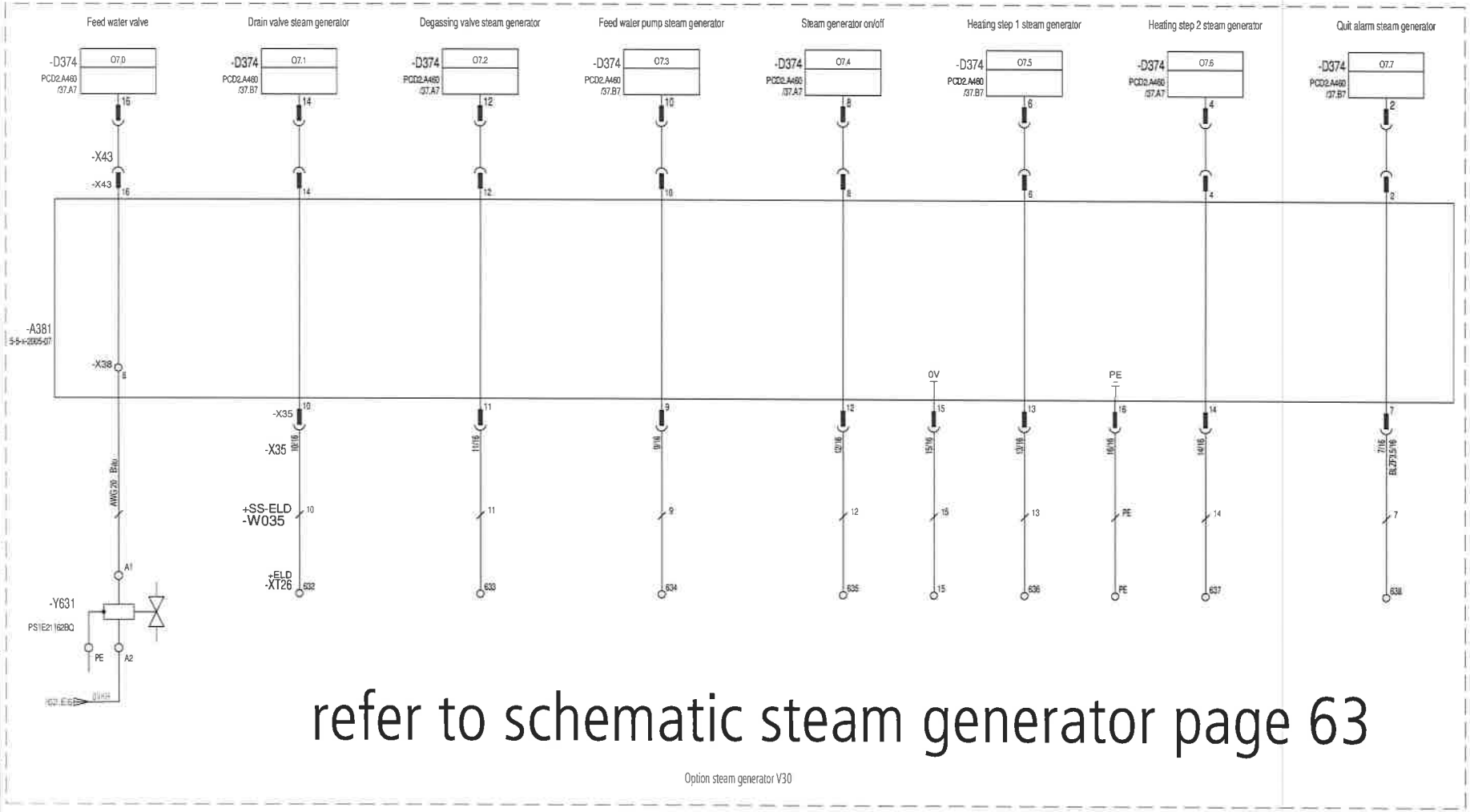

Option steam generator V30

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Series circuit diagram
MST-V 5-5-9

Belimed Infection Control

PLC, digital outputs

MST-V 5-5-9_V1.2

+SS

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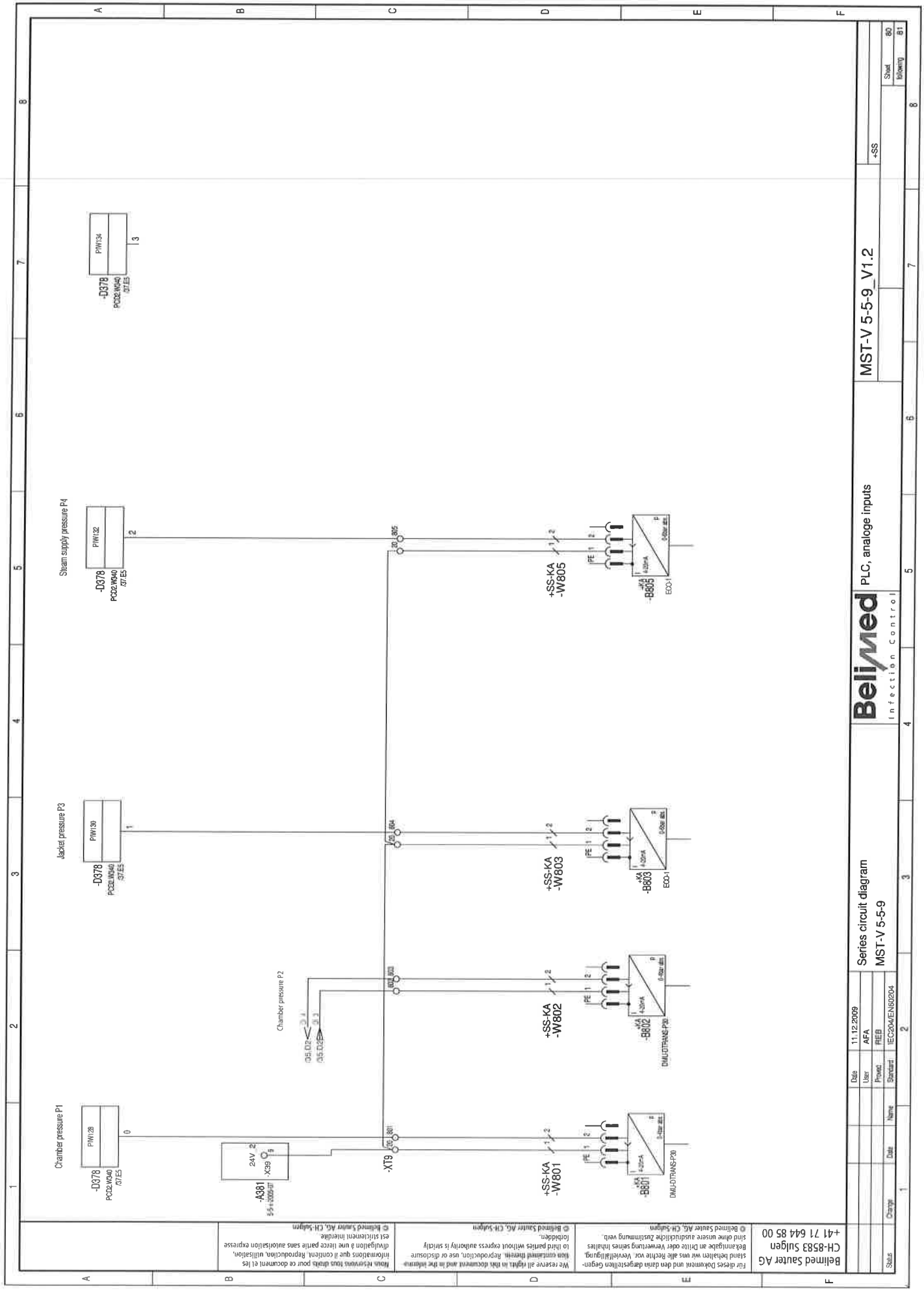

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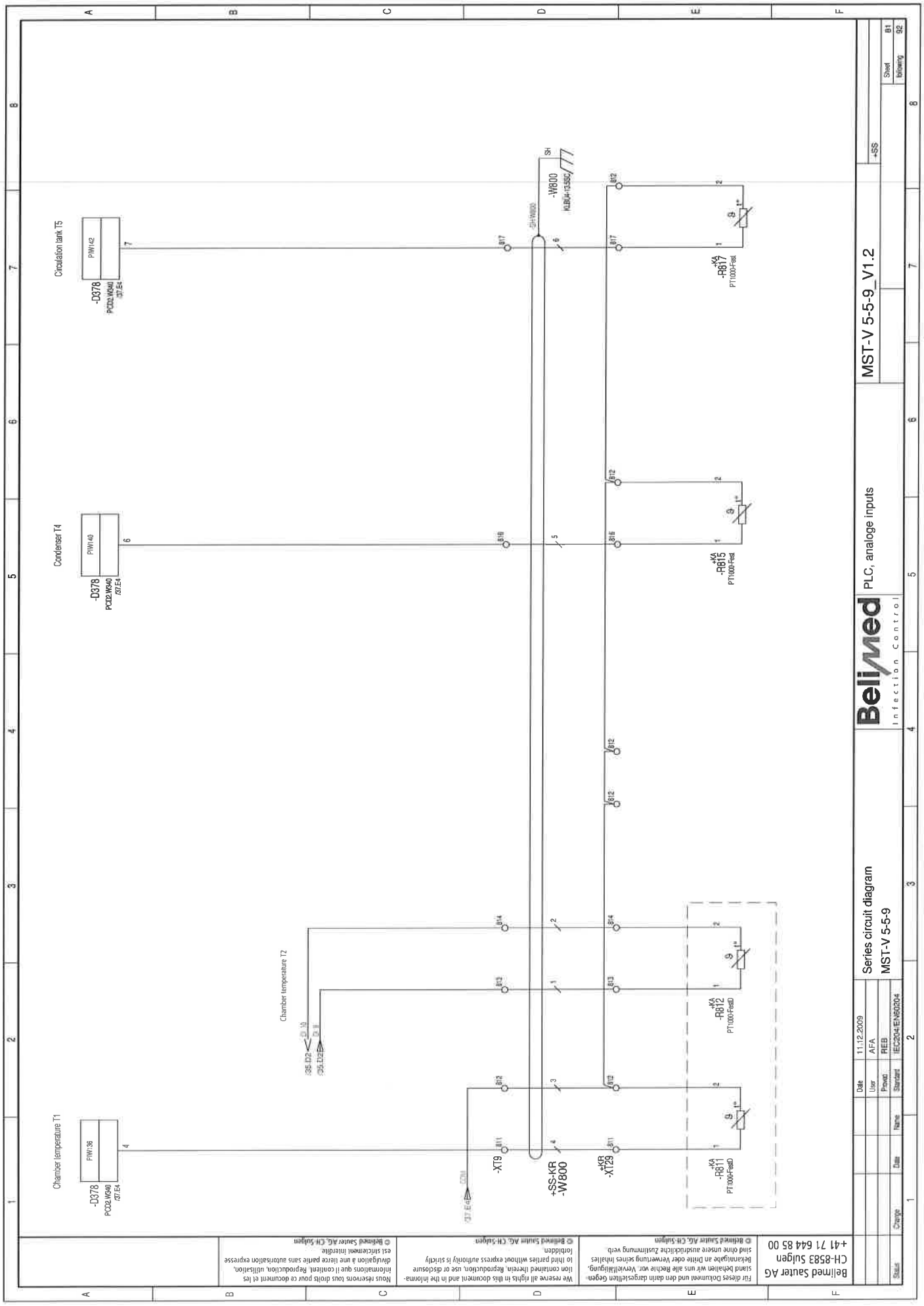

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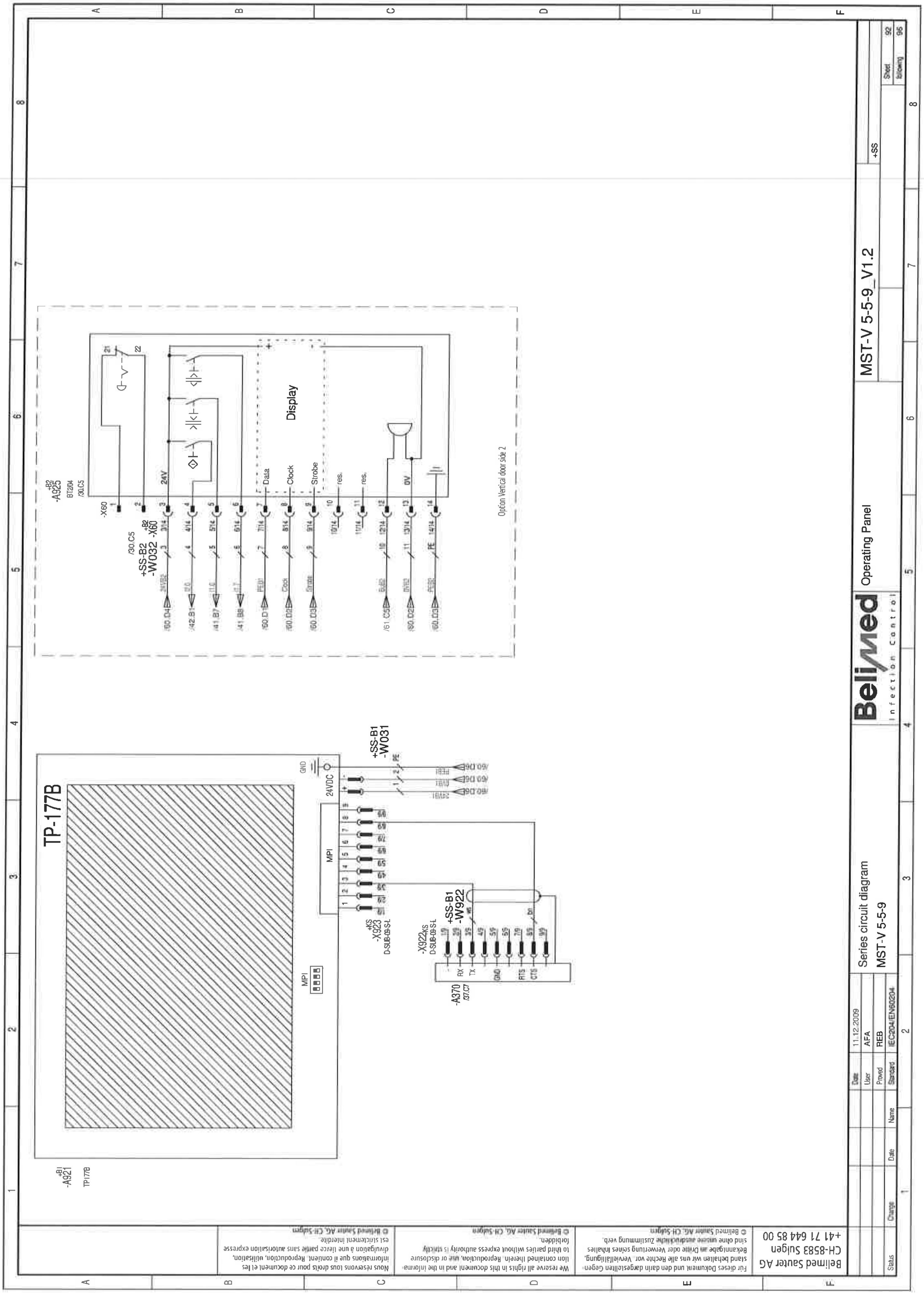
TP-177B
+B1
-A921
TP177B
MPI
24VDC
GND
+SS-B1
-W031
+KS
-X923
D-SUB-09-S-L
-X922KS
D-SUB-09-S-L
+SS-B1
-W922
-A370
/37.C7
RX
TX
GND
RTS
CTS
+B2
-A925
BT204
/30.C5
-X60
+SS-B2
-W032
-X60
24V
Data
Clock
Strobe
res.
0V
Display
Option Vertical door side 2
Series circuit diagram
MST-V 5-5-9
Operating Panel
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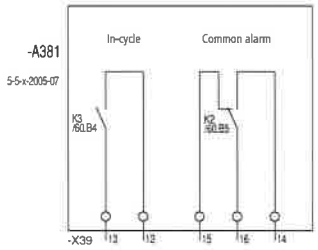

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Series circuit diagram
MST-V 5-5-9

Belimed Infection Control

Potential-free contacts

MST-V 5-5-9_V1.2

+SS

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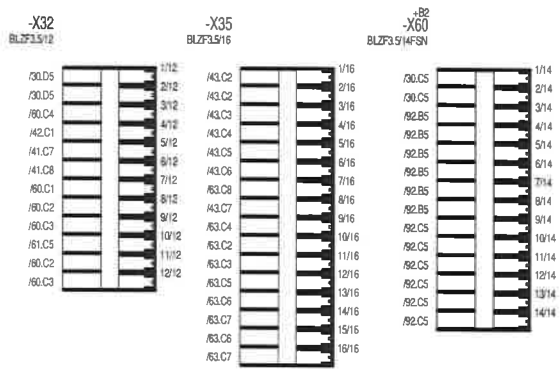

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Series circuit diagram
MST-V 5-5-9

Belimed
Infection Control

Plug overview

MST-V 5-5-9_V1.2

+SS

Sheet 103
following 105

terminal strip

-XT1

Multinorm-AWM2587-3LPE1.0-

+SS-EXT -W999

cable designations	target external		potential	terminal number	jumpers	target internal	Placement in Schematics	cable designations
			#1611	PE			/15.B4	
PE	+EXT -Q101	PE	PE	"			/15.B4	

Terminal type

terminal ZPE6 [PE - PE]

terminal

terminal

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Series circuit diagram
MST-V 5-5-9

Belimed Infection Control

Contents

MST-V 5-5-9_V1.2

+SS

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following 106

terminal strip

-XT2

cable type	cable designations	target external	potential	terminal number	jumpers	target internal	Placement in Schematics	cable designations	cable type
Multinorm-AWM2587-3LPE2.5+	+SS-KA -W162								
Multinorm-AWM2587-3LPE2.5+	+SS-KA -W156								
Multinorm-AWM2587-3LPE2.5+	+SS-KA -W154								
cable type	cable designations	target external	potential	terminal number	jumpers	target internal	Placement in Schematics	cable designations	cable type
		+KA -X154 :4	PE	PE			/15.D4		
			PE	"			/15.D4		
	PE	+KA -X156 :4	#1613	PE			/15.D6		
			#1533	"			/15.D6		
		+KA -M162 :PE	PE	PE			/16.D2		
			PE	"			/16.D2		
			#1614	PE		+SS -A381 -X30:3	/30.D2		
			#1454	"		+SS -G302 :PE	/30.D2		

Terminal type

terminal ZPE2.5/4AN [PE - PE]

terminal

terminal

+SS

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MST-V 5-5-9_V1.2

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Belimed Infection Control

Series circuit diagram
MST-V 5-5-9

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terminal strip

-XT8

cable designations	target external	potential	terminal number	jumpers	target internal	Placement in Schematics	cable designations	Profibusadresse
		#1264	371			/37.C2		
		#1262	"		+SS -A370 :36	/37.C2		ws
		#1262			+SS -R370 :	/37.C2		
			371					
		#1265	372			/37.C2		
		#1263	"		+SS -A370 :37	/37.C2		bn
		#1263			+SS -R370 :	/37.C2		
			372					

Terminal type

terminal ZDU2.5/4AN [371 - 372]

terminal

terminal

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+SS

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Series circuit diagram MST-V 5-5-9

	Date	Name	Date
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terminal strip

-XT9

cable designations	target external		potential	terminal number	jumpers	target internal		Placement on Schematics	cable designations
+SS-KR -W800	+KA -B801	:1	24V1	20				/80.C1	
			24V1	"		+SS -A381	-X39:9	/80.C1	
+SS-KA -W802	+KA -B803	:1	24V1	20				/80.C3	
			24V1	"				/80.C3	
+SS-KA -W805	+KA -B805	:1	24V1	20				/80.C5	
			24V1	"				/80.C5	
+SS-KA -W803	+KA -B801	:2	#751	801				/80.C1	
			#784	"		+SS -D378	:0	/80.C1	
+SS-KA -W801	+KA -B802	:1	DI_3	802				/80.C2	
			DI_3	"		+SS -P352	:3	/80.C2	
	+KA -B802	:2	DI_4	803				/80.C2	
			DI_4	"		+SS -P352	:4	/80.C2	
	+KA -B803	:2	#789	804				/80.C3	
			#797	"		+SS -D378	:1	/80.C3	
	+KA -B805	:2	#791	805				/80.C5	
			#798	"		+SS -D378	:2	/80.C5	
Multinorm-AWM2464-7L0.5AW	+KR -XT29	:811	#922	811				/81.D1	
			#805	"		+SS -D378	:4	/81.D1	
Multinorm-AWM2587-2L0.5AW	+KR -XT29	:812	COM	812				/81.D2	
			COM	"		+SS -D378	:8	/81.D2	
Multinorm-AWM2587-2L0.5AW	+KR -XT29	:813	DI_9	813				/81.D2	
			DI_9	"		+SS -P352	:9	/81.D2	
Multinorm-AWM2587-2L0.5AW	+KR -XT29	:814	DI_10	814				/81.D3	
			DI_10	"		+SS -P352	:10	/81.D3	
Multinorm-AWM2587-2L0.5AW	+KR -XT29	:816	#924	816				/81.D5	
			#811	"		+SS -D378	:6	/81.D5	
Multinorm-AWM2587-2L0.5AW	+KR -XT29	:817	#925	817				/81.D7	
			#814	"		+SS -D378	:7	/81.D7	

Terminal type

terminal ZDU2.5 [20 - 817]

terminal

terminal

MST-V 5-5-9_V1.2

+SS

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Belimed Infection control

Series circuit diagram

MST-V 5-5-9

	Date	Name	Standard
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terminal strip

-XT26

cable designations	target external	potential	terminal number	jumpers	target internal	Placement in Schematics	cable designations
cable type: Multinorm-AWM2587-15LPE0.5							cable type:
+SS-ELD -W035							
8	+SS -X35 :8	#1593	35			+SS/43.B7	
1	+SS -X35 :1	#1596	431			+SS/43.B2	
2	+SS -X35 :2	#1597	432			+SS/43.B2	
3	+SS -X35 :3	#1598	433			+SS/43.B3	
4	+SS -X35 :4	#1599	434			+SS/43.B4	
5	+SS -X35 :5	#1595	435			+SS/43.B5	
6	+SS -X35 :6	#1594	437			+SS/43.B6	
10	+SS -X35 :10	#1605	632			+SS/63.D2	
11	+SS -X35 :11	#1606	633			+SS/63.D3	
9	+SS -X35 :9	#1607	634			+SS/63.D4	
12	+SS -X35 :12	#1604	635			+SS/63.D5	
15	+SS -X35 :15	#1603	15			+SS/63.D6	
13	+SS -X35 :13	#1602	636			+SS/63.D6	
14	+SS -X35 :14	#1600	637			+SS/63.D7	
7	+SS -X35 :7	#1608	638			+SS/63.D8	
PE	+SS -X35 :16	#1601	PE			+SS/63.D7	

Terminal type

terminal 1608510000 [15 - PE]

terminal

terminal

+ELD

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Series circuit diagram

MST-V 5-5-9

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terminal strip

-XT29

+SS-KR -W338	+SS-KR -W800	target external	potential	terminal number	jumpers	target internal	Placement in Schematics
		+KA -R811 :1	#1580	811			+SS/81.E1
	4	+SS -XT9 :811	#922	"			+SS/81.E1
		+KA -R811 :2	#1581	812			+SS/81.E2
	3	+SS -XT9 :812	COM	"			+SS/81.E2
		+KA -R812 :1	#1579	813			+SS/81.E2
	1	+SS -XT9 :813	DI_9	"			+SS/81.E2
			COM	812			+SS/81.E4
		+KA -R812 :2	#1582	814			+SS/81.E3
	2	+SS -XT9 :814	DI_10	"			+SS/81.E3
			COM	812			+SS/81.E4
		+KA -R815 :1	#1583	816			+SS/81.E5
	5	+SS -XT9 :816	#924	"			+SS/81.E5
		+KA -R815 :2	#1584	812			+SS/81.E6
			COM	"			+SS/81.E6
		+KA -R817 :1	#1585	817			+SS/81.E7
	6	+SS -XT9 :817	#925	"			+SS/81.E7
		+KA -R817 :2	#1586	812			+SS/81.E8
			COM	"			+SS/81.E8
		+EXT -S338 :bn	#1617	20			+SS/33.D8
1		+SS -A381 -X34:12	#1491	"			+SS/33.D8
		+EXT -S338 :bu	#1537	338			+SS/33.D8
2		+SS -A381 -X34:13	#1618	"			+SS/33.D8

Terminal type

terminal ZDK-1.5 [20 - 817]

terminal

terminal

MST-V 5-5-9_V1.2

+KR

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following

Contents

Belimed Infection Control

Series circuit diagram

MST-V 5-5-9

Date	11.12.2009	
User	AFA	
Proved	REB	
Standard	IEC204/EN60204	

Name	Date	Change	Status

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Belimed Sauter AG
CH-8583 Sulgen
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Cable List: MST-V 5-5-9_V1.2

			Cable	Type			Length (mm)
		+SS-B1	-W031	Multinorm-AWM2587-6LPE0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-A921	+		1	-A381	-X30.1		
-A921	-		2	-A381	-X30.2		
-S303	14		3	-A381	-X31.3		
-S303	13		4	-A381	-X31.4		
			5				
			6				
-A921	GND		PE	-A381	-X31.7		
			Cable	Type			Length (mm)
		+SS-B2	-W032	Multinorm-AWM2587-11LPE0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-X32	1		1	-X60	1		
-X32	2		2	-X60	2		
-X32	3		3	-X60	3		
-X32	4		4	-X60	4		
-X32	5		5	-X60	5		
-X32	6		6	-X60	6		
-X32	7		7	-X60	7		
-X32	8		8	-X60	8		
-X32	9		9	-X60	9		
-X32	10		10	-X60	12		
-X32	11		11	-X60	13		
-X32	12		PE	-X60	14		
			Cable	Type			Length (mm)
		+SS-ELD	-W035	Multinorm-AWM2587-15LPE0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-X35	1		1	-XT26	431		
-X35	2		2	-XT26	432		
-X35	3		3	-XT26	433		
-X35	4		4	-XT26	434		
-X35	5		5	-XT26	435		
-X35	6		6	-XT26	437		
-X35	7		7	-XT26	638		
-X35	8		8	-XT26	35		
-X35	9		9	-XT26	634		
-X35	10		10	-XT26	632		
-X35	11		11	-XT26	633		
-X35	12		12	-XT26	635		
-X35	13		13	-XT26	636		
-X35	14		14	-XT26	637		
-X35	15		15	-XT26	15		
-X35	16		PE	-XT26	PE		

Cable List: MST-V 5-5-9_V1.2

			Cable	Type			Length (mm)
		+SS-KA	-W154	Multinorm-AWM2587-3LPE2.5-AWG16			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-K611	2		1	-X154	1		
-K611	4		2	-X154	2		
-K611	6		3	-X154	3		
-XT2	PE		PE	-X154	4		
			Cable	Type			Length (mm)
		+SS-KA	-W156	Multinorm-AWM2587-3LPE2.5-AWG16			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-K613	2		1	-X156	1		
-K613	4		2	-X156	2		
-K613	6		3	-X156	3		
-XT2	PE		PE	-X156	4		
			Cable	Type			Length (mm)
		+SS-KA	-W162	Multinorm-AWM2587-3LPE2.5-AWG16			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-Q162	2		1	-M162	U		
-Q162	4		2	-M162	V		
-Q162	6		3	-M162	W		
-XT2	PE		PE	-M162	PE		
			Cable	Type			Length (mm)
		+SS-KA	-W331	Multinorm-AWM2587-3L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X33.8		1	-S331	1		
-A381	-X33.9		2	-S331	2		
-A381	-X33.10		3	-S331	3		
			Cable	Type			Length (mm)
		+SS-KA	-W332	Multinorm-AWM2587-4L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X33.11		1	-S332	13		
-A381	-X33.12		2	-S332	14		
-A381	-X33.13		3	-S332	21		
-A381	-X33.14		4	-S332	22		
			Cable	Type			Length (mm)
		+SS-KA	-W333	Multinorm-AWM2587-4L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X34.4		1	-S333	13		
-A381	-X34.5		2	-S333	14		
-A381	-X34.6		3	-S333	21		
-A381	-X34.7		4	-S333	22		
			Cable	Type			Length (mm)
		+SS-KA	-W335	Multinorm-AWM2587-3L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X33.1		1	-S335	1		
-A381	-X33.2		2	-S335	2		
-A381	-X33.3		3	-S335	3		

Cable List: MST-V 5-5-9_V1.2

			Cable	Type			Length (mm)
		+SS-EXT	-W337	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X34.10		1	-S337	bn		
-A381	-X34.11		2	-S337	bu		
			Cable	Type			Length (mm)
		+SS-KR	-W338	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X34.12		1	-XT29	20		
-A381	-X34.13		2	-XT29	338		
			Cable	Type			Length (mm)
		+SS-KA	-W342	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X33.15		1	-S342	21		
-A381	-X33.16		2	-S342	22		
			Cable	Type			Length (mm)
		+SS-KA	-W343	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X34.8		1	-S343	21		
-A381	-X34.9		2	-S343	22		
			Cable	Type			Length (mm)
		+SS-KA	-W344	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X33.4		1	-S344	1		
-A381	-X33.5		2	-S344	3		
			Cable	Type			Length (mm)
		+SS-KA	-W345	Multinorm-AWM2587-3L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X34.1		1	-S345	1		
-A381	-X34.2		2	-S345	2		
-A381	-X34.3		3	-S345	3		
			Cable	Type			Length (mm)
		+SS-KA	-W346	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A381	-X33.6		1	-S346	1		
-A381	-X33.7		2	-S346	3		
			Cable	Type			Length (mm)
		+SS-SS	-W351	Volltron-Twist-CY-2*2*0.34			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-A370	11		ws	-X351	2		
-A370	12		bn	-X351	3		
-A370	15		gn	-X351	5		
			gb				

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Cable List: MST-V 5-5-9_V1.2

			Cable	Type			Length (mm)
		+SS-B1	-W355	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-A381	-X39.5		1	-P355	+		
-A381	-X39.6		2	-P355	-		
			Cable	Type			Length (mm)
		+SS-SS	-W371	Profibuskabel			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-XT8	371		ws	-A370	36		
-XT8	372		bn	-A370	37		
			Cable	Type			Length (mm)
		+SS-KA	-W607	Multinorm-AWM2587-3L0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-A381	-X37.1		1	-Y607	B		
-A381	-X37.2		2	-Y607	C		
-A381	-x30.3		3	-Y607	A		
			Cable	Type			Length (mm)
		+SS-KA	-W616	Multinorm-AWM2587-3L0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-A381	-X37.10		1	-Y616	B		
-A381	-X37.11		2	-Y616	C		
-A381	-X37.12		3	-Y616	A		
			Cable	Type			Length (mm)
		+SS-KA	-W618	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-A381	-X37.4		1	-Y618	1		
-A381	-X37.5		2	-Y618	2		
			Cable	Type			Length (mm)
		+SS-KA	-W621	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-A381	-X37.6		1	-Y621	1		
-A381	-X37.7		2	-Y621	2		
			Cable	Type			Length (mm)
		+SS-KA	-W627	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-A381	-X37.8		1	-Y627	1		
-A381	-X37.9		2	-Y627	2		

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Cable List: MST-V 5-5-9_V1.2

			Cable	Type			Length (mm)
		+SS-KR	-W800	Multinorm-AWM2464-7L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT9	813		1	-XT29	813		
-XT9	814		2	-XT29	814		
-XT9	812		3	-XT29	812		
-XT9	811		4	-XT29	811		
-XT9	816		5	-XT29	816		
-XT9	817		6	-XT29	817		
			7				
-W800	SH		SH1				
			Cable	Type			Length (mm)
		+SS-KA	-W801	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT9	20		1	-B801	1		
-XT9	801		2	-B801	2		
			Cable	Type			Length (mm)
		+SS-KA	-W802	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT9	802		1	-B802	1		
-XT9	803		2	-B802	2		
			Cable	Type			Length (mm)
		+SS-KA	-W803	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT9	20		1	-B803	1		
-XT9	804		2	-B803	2		
			Cable	Type			Length (mm)
		+SS-KA	-W805	Multinorm-AWM2587-2L0.5-AWG20			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT9	20		1	-B805	1		
-XT9	805		2	-B805	2		
			Cable	Type			Length (mm)
		+SS-B1	-W922	Volltron-Twist-CY-2*2*0.34			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-X922	3		ws	-X923	3		
-X922	8		bn	-X923	8		
			gn				
			gb				
			SH1				
			Cable	Type			Length (mm)
		+SS-EXT	-W999	Multinorm-AWM2587-3LPE4.0-AWG12			
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-F154	1		1	-Q101	1		
-F154	3		2	-Q101	3		
-F154	5		3	-Q101	5		
-XT1	PE		PE	-Q101	PE		

Bill of Material MST-V 5-5-9_V1.2_SS

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
1	4-502-7224-0	Flash-EPROM 512 kBytes /4MBit	SAIA	-A370	5601SOD-134
1	PCD2.F120	Functionmodul; PCD2.F120	SAIA	-A370	5601SOD-108
1	PCD2.F520	Functionmodul; PCD2.F520	SAIA	-A370	5601SOD-93
1	PCD2.M157	CPU enclosure; PCD2.M157; CPU	SAIA	-A370	5600SOD-12
1	5-5-x-2005-07	I/OPrint-Input	Sauter AG	-A381	850 22135
2	PCD2.E160	Digital Input; PCD2.E160; 16 Inputs	SAIA	-D371,-D372	5601SOD-138
2	PCD2.A460	Digital Output; PCD2.A460; 16 Outputs	SAIA	-D373,-D374	5601SOD-139
1	PCD2.W340	Analog Input; PCD2.W340; 8 Inputs	SAIA	-D378	5601SOD-150
1	FAZ-C10/3	Circuitbreaker 3/10A; Characteristic C	Möller AG	-F154	5230KLM-82
1	TPP100-24	Power supply 24V; 100W	Lambda	-G302	5320-26
4	DIL-EM-01-G-C	CONTACTOR, AC-3 4 KW/400 V, 1 NC, DC 24 V, 3-POLE, SIZE S00, SCREW CONNECTION	Möller AG	-K611,-K612,-K613,-K614	5250KLM-117
1	DIL-EM-10-G	CONTACTOR, AC-3 4 KW/400 V, 1 NO, DC 24 V, 3-POLE, SIZE S00, SCREW CONNECTION	Möller AG	-K628	5250KLM-81
1	SFC10	Ferrite core;SFC10	Sibalco	-L151	5900-258
1	20906	Printerinterface; 4 Languages	Sauter AG	-P352	5731-274
1	56.02.30	Buzzer Piezo 24V	Piezo	-P615	5214-10
1	ZE-6	Thermic overload relay: adjustable range of current is 4A-6A, auxiliary contactors 1NO +1NC	Moeller	-Q162	5240KLM-65
1	150 Ohm/1%/0.6W	Precision resistor 150 Ohm; 1%; 0.6 W	Dätwyler	-R370	5810-165
1	FM4/TS35	Mounting plate for shield terminal	Weidmüller	-W800	5971WDM-253
1	KLBÜ4-13.5SC	Shield terminal	Weidmüller	-W800	5971WDM253
1	BLZF3.5/12	Connector 12 contacts; female contacts 3.5	Weidmüller	-X32	5971WDM-328
1	BLZF3.5/16	Connector 16 contacts; female contacts 3.5	Weidmüller	-X35	5971WDM-305
1	ZPE6	2-CONDUCTOR EARTH TERMINAL BLOCK; CENTRE MARKING (ASYMMETRIC LEFT); FRONT-ENTRY; green-yellow	Weidmüller	-XT1	5970WDM-79
2	ZPE2.5/4AN	4-CONDUCTOR THROUGH TERMINAL BLOCK; CENTRE MARKING (ASYMMETRIC LEFT); FRONT-ENTRY; green-yellow	Weidmüller	-XT2(2)	5970WDM-109
2	ZDU2.5/4AN	4-CONDUCTOR THROUGH TERMINAL BLOCK; CENTRE MARKING (ASYMMETRIC LEFT); FRONT-ENTRY; grey	Weidmüller	-XT8(2)	5970WDM-72

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Bill of Material MST-V 5-5-9_V1.2_SS

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
14	ZDU2.5	2-CONDUCTOR THROUGH TERMINAL BLOCK; CENTRE MARKING (ASYMMETRIC LEFT); FRONT-ENTRY; grey	Weidmüller	-XT9(14)	5970WDM-67
7	PS1E21162BQ	Pilot valve	Parker	-Y334,-Y622,-Y623,-Y624,-Y625, -Y626,-Y631	121000-04

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Bill of Material MST-V 5-5-9_V1.2_KR

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
6	ZDK-1.5	DOUBLE DECK TERMINAL BLOCK; THROUGH/THROUGH; FRONT-ENTRY	Weidmüller	-XT29	5970WDM-85

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Bill of Material MST-V 5-5-9_V1.2_EXT

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
1	0172001	Main switch; 25 A/3p; 3NO; Compact construction; Rotary drive	Baco	-Q101	5212-03
1	0172185	Logic element	Baco	-Q101	5211-143
2	0172167	Clamp cover	Baco	-Q101(2)	5211-144
2	PML 6A7230VCA	Foot switch;1NO	EHS	-S337,-S338	5218-53

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Bill of Material MST-V 5-5-9_V1.2_ELD

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
16	1608510000	Terminal Z-series _ ZDU 2.5; Feed-through terminal; 2.50 mm²; dark beige; tension spring connection	Weidmüller	-XT26	5970WDM-67

Bill of Material MST-V 5-5-9_V1.1_B1

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
1	TP177B	Panel;TOP5000	Sauter AG	-A921	5601SIE-77
1	FB-58-S	Ribbon to matrixprinter	Gfm	-P355	5731-260
1	NP-58	Paper to matrixprinter	Gfm	-P355	5731-261
1	NP183-200-S2R	Matrixprinter;NP183-200-S2 R	Gfm	-P355	5730-101
1	130.245.201/0700	Key switch 0-1; 1NO	RAFI	-S303	5218-59
1	500.100.145	Logic element, 1NO	RAFI	-S303	5211-137
1	505.510.935	Coupler	RAFI	-S303	5211-136

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Bill of Material MST-V 5-5-9_V1.1_B2

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
1	BT2/04	Panel S2	Sauter AG	-A925	350 06157
1	BLZF3.5/14FSN	Connector 14 contacts; female contacts 3.5	Weidmüller	-X60	5971WDM-331

CIRCUIT DIAGRAM

Standard:	UL508A
Project manager:	

Connection data:

Rated voltage:	3~480V, 60Hz
Rated current/power:	37A / 31kW
Extra low voltage:	120V/AC+24V/DC
Largest motor FLA:	0.35A / 0.16kW
Branch circuit protection:	70A
Rated insulation voltage:	600V
Short circuit capacity:	5kA

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				Date	12.07.2011	Steam generator V30	Belimed Infection Control	Title page	ELDV30UL_V1.4	No. 14
				User	AGL					Sheet 1
				Proved	REB					following Inh_1
Status	Change	Date	Name	Standard	IEC204/EN60204					

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5	Control cabinet layout	12.07.2011	AGL	03-Circuit diagram
6	Elements heating	12.07.2011	AGL	03-Circuit diagram
10	Supply	12.07.2011	AGL	03-Circuit diagram
11	Control 120V/AC steam generator	12.07.2011	AGL	03-Circuit diagram
12	Control 120V/AC steam generator	12.07.2011	AGL	03-Circuit diagram
43	Power supply 24V	12.07.2011	AGL	03-Circuit diagram
63	Power supply 24V	12.07.2011	AGL	03-Circuit diagram
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106	Terminal diagram (-XT26)	12.07.2011	AGL	04-Terminal diagram
107	Terminal diagram (-XT91)	12.07.2011	AGL	04-Terminal diagram

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Status	Change	Date	Name		
				Date	12.07.2011
				User	AGL
				Proved	REB
				Standard	IEC204/EN60204

Steam generator V30

Belimed Infection Control

Contents

ELDV30UL_V1.4

Sheet Inh_1
following 3

Terminal strips

In the steam generator cabinet

-XT00 Supply
-XT26 Power supply 24V
-XT91 Power supply 120V

On the plant

-XT113 Temperture limiter

Structure of the destination device

/ 21. A7

Separator
Sheet number
Plan section

Legend of operating material indentification

+SS -K119

Assembly place
Class of operating material
Counting number of a sheet
Sheet number

Assembly place

+ED Steam generator
+ELD In the steam generator cabinet
+KD Terminal box

Line colors by EN 60204-1

Main wiring system 3x208/480V		black
Protection- potential equalization wire		green-yellow
Control circuit 208 V without transformer		black
Control circuit with transformer < 48V		green
		brown
Control circuit with transformer > 48V		red
		white
Direct current	+	blue
	-	blue-white

Line cross section

Cross section of all no-designated lines: 0.75mm2, AWG19

Change management

	Description	Date	Signature

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Status	Change	Date	Name		
				Date	12.07.2011
				User	AGL
				Proved	REB
				Standard	IEC204/EN60204

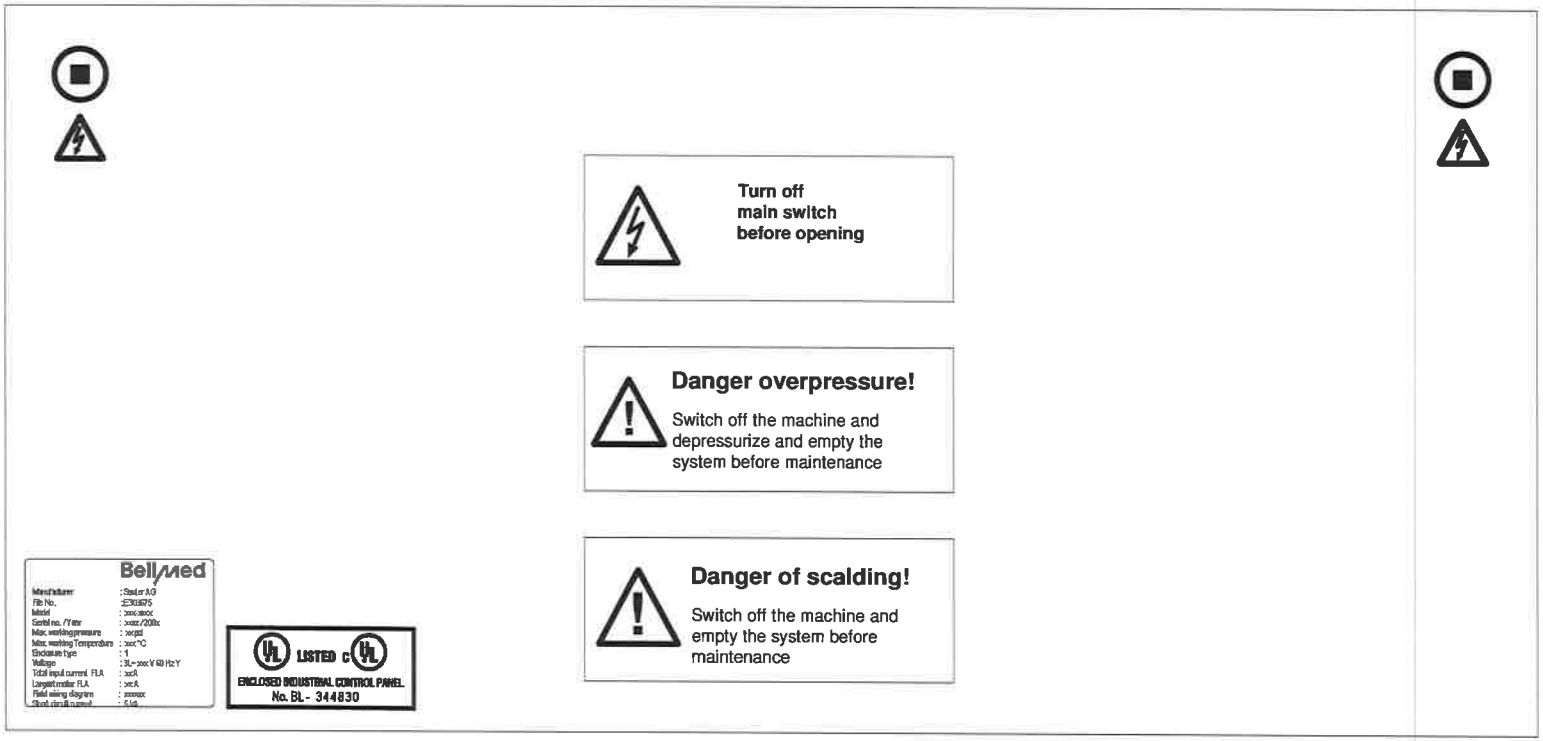
Steam generator V30

Belimed Infection Control

Legend

ELDV30UL_V1.4

Sheet 3
following 4



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				Date	12.07.2011
				User	AGL
				Proved	REB
				Standard	IEC204/EN60204

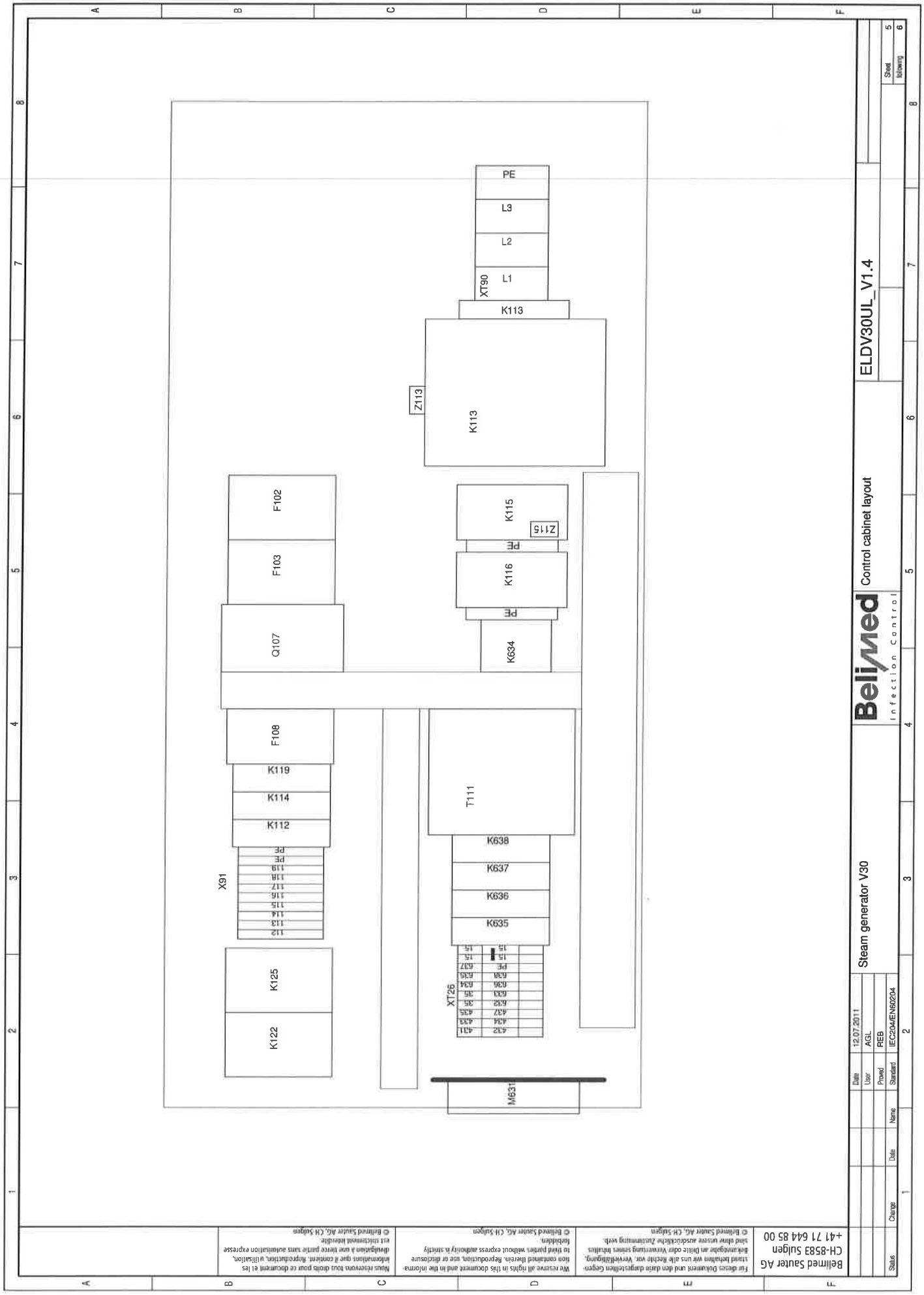
Steam generator V30

Belimed Infection Control

Control cabinet layout

ELDV30UL_V1.4

Sheet 4
following 5



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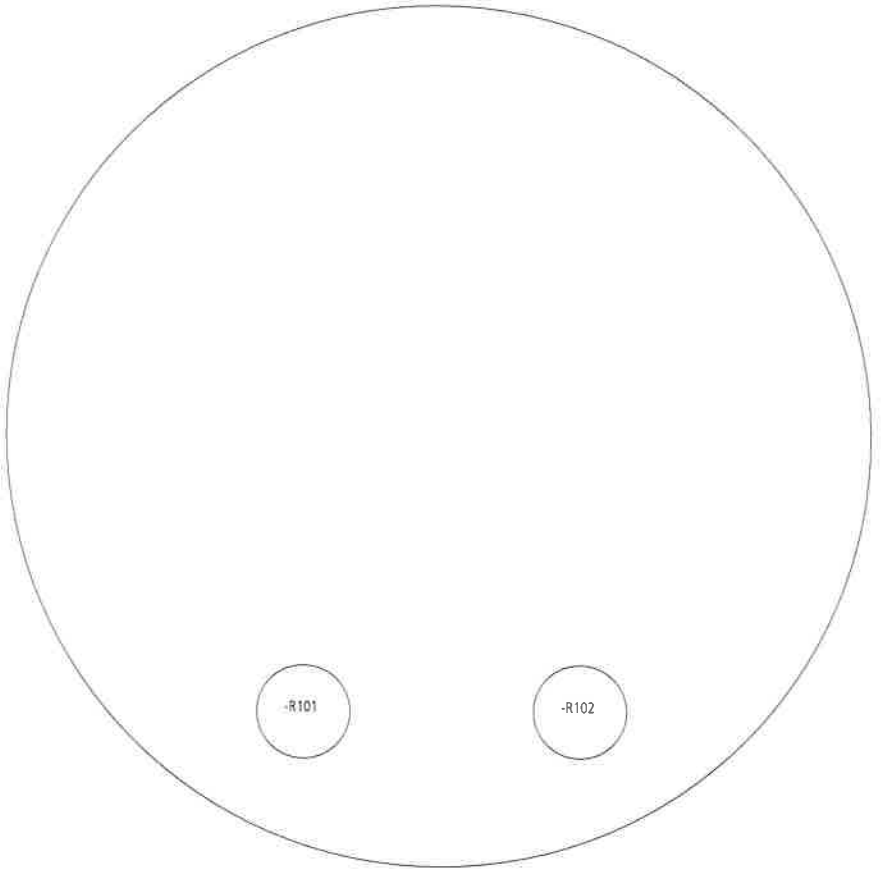
Steam generator

30KW



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Status	Change	Date	Name		
				Date	12.07.2011
				User	AGL
				Proved	REB
				Standard	IEC204/EN60204

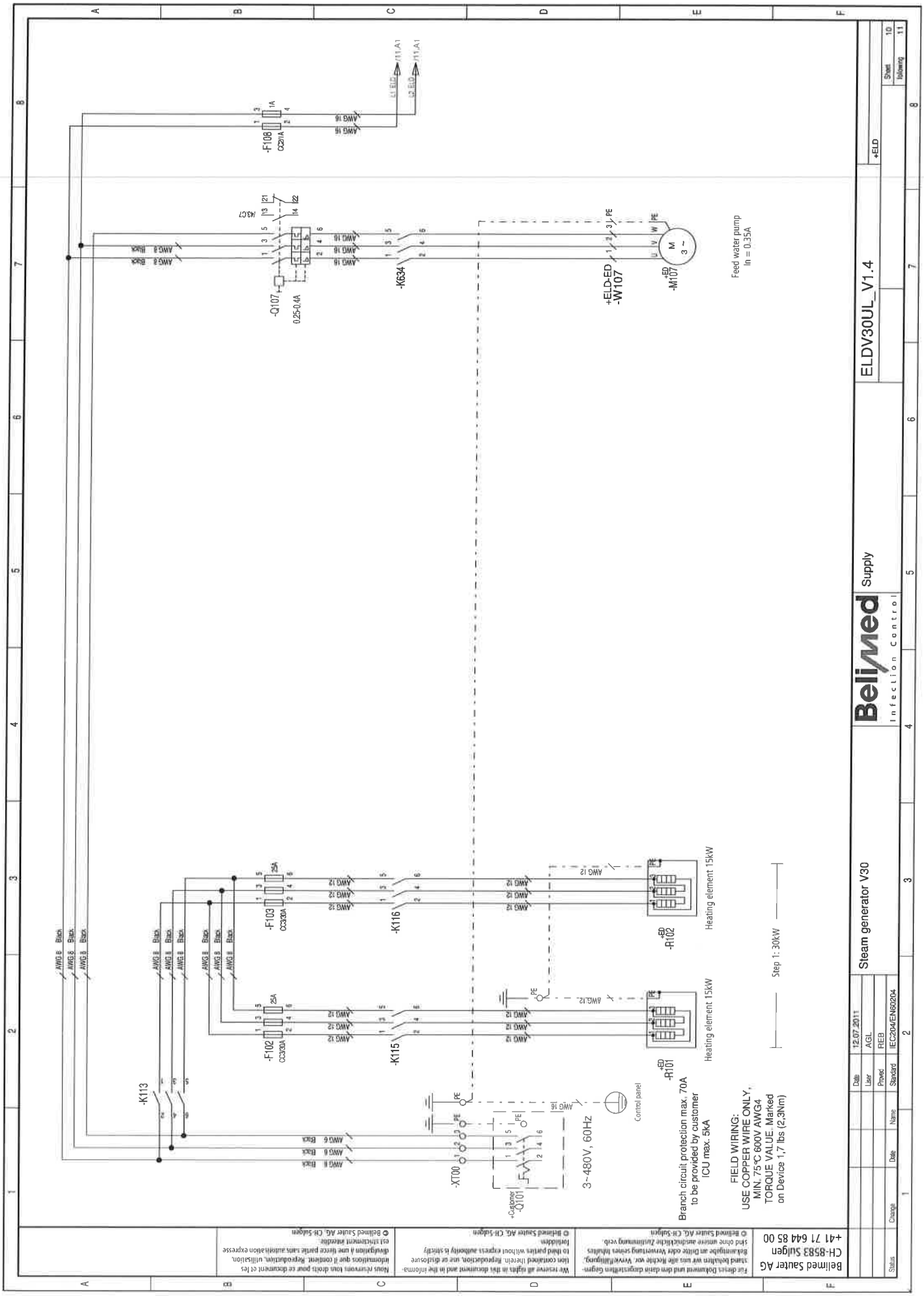
Steam generator V30

Belimed Infection Control

Elements heating

ELDV30UL_V1.4

Sheet 6
following 10



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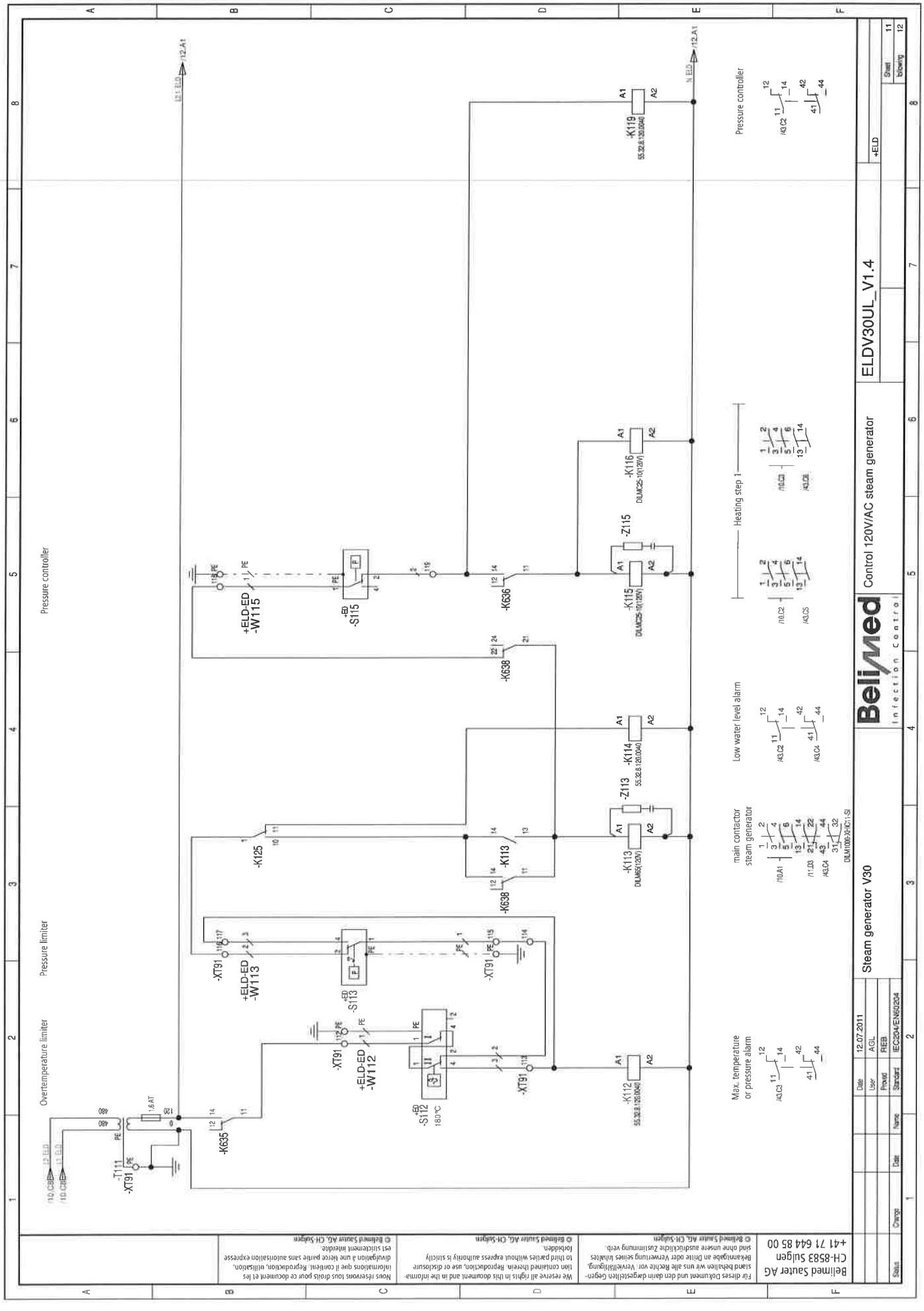
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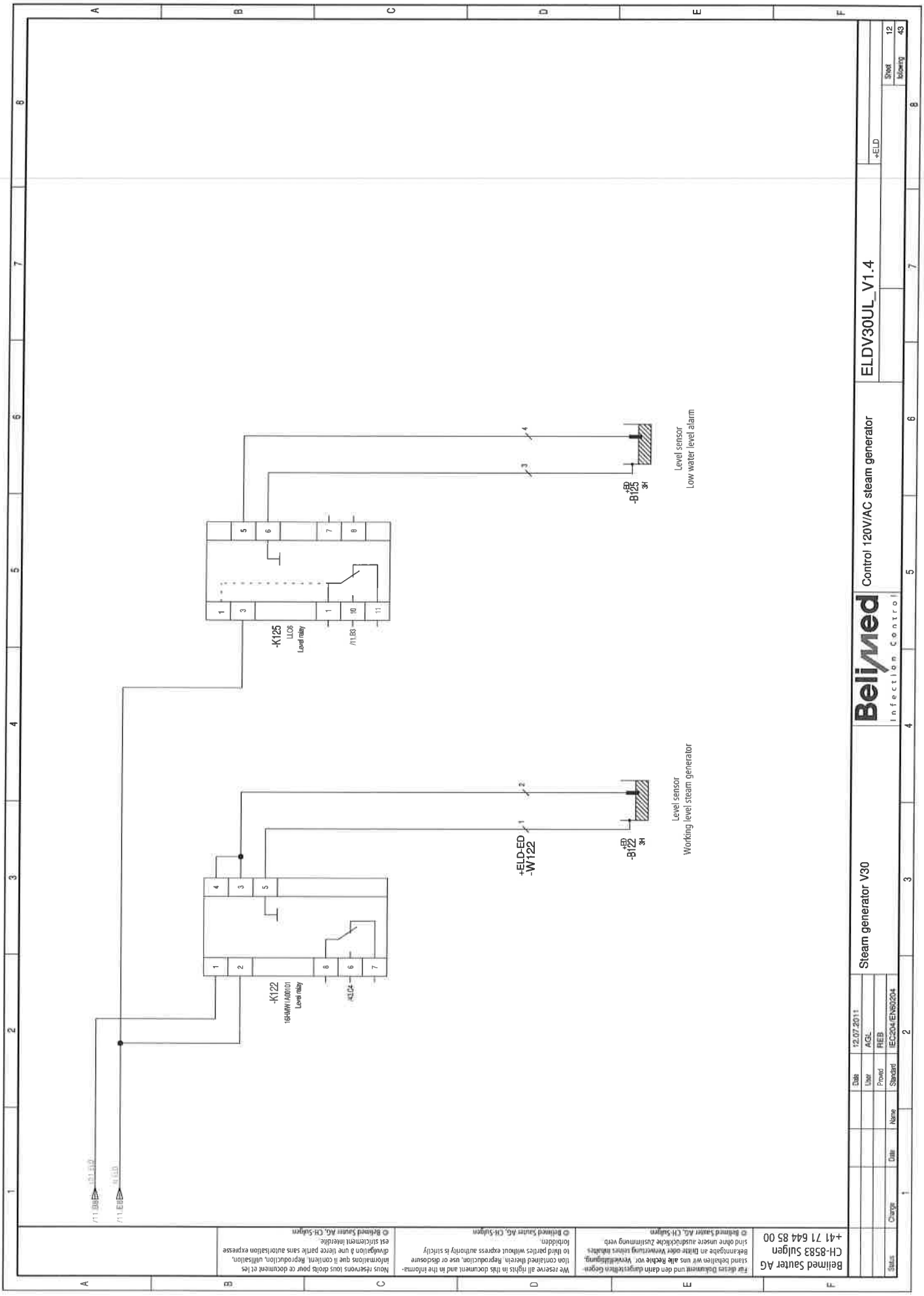
Steam generator V30
Control 120V/AC steam generator
ELDV30UL_V1.4
Belimed
Infection Control
Pressure controller
Pressure limiter
Overtemperature limiter
Heating step 1
Low water level alarm
main contactor steam generator
Max. temperature or pressure alarm
-K119
-K116
-K115
-K114
-K113
-K112
-K125
-K635
-K636
-K638
-Z115
-Z113
-S115
-S113
-S112
-T111
-XT91
+ELD-ED -W115
+ELD-ED -W113
+ELD-ED -W112



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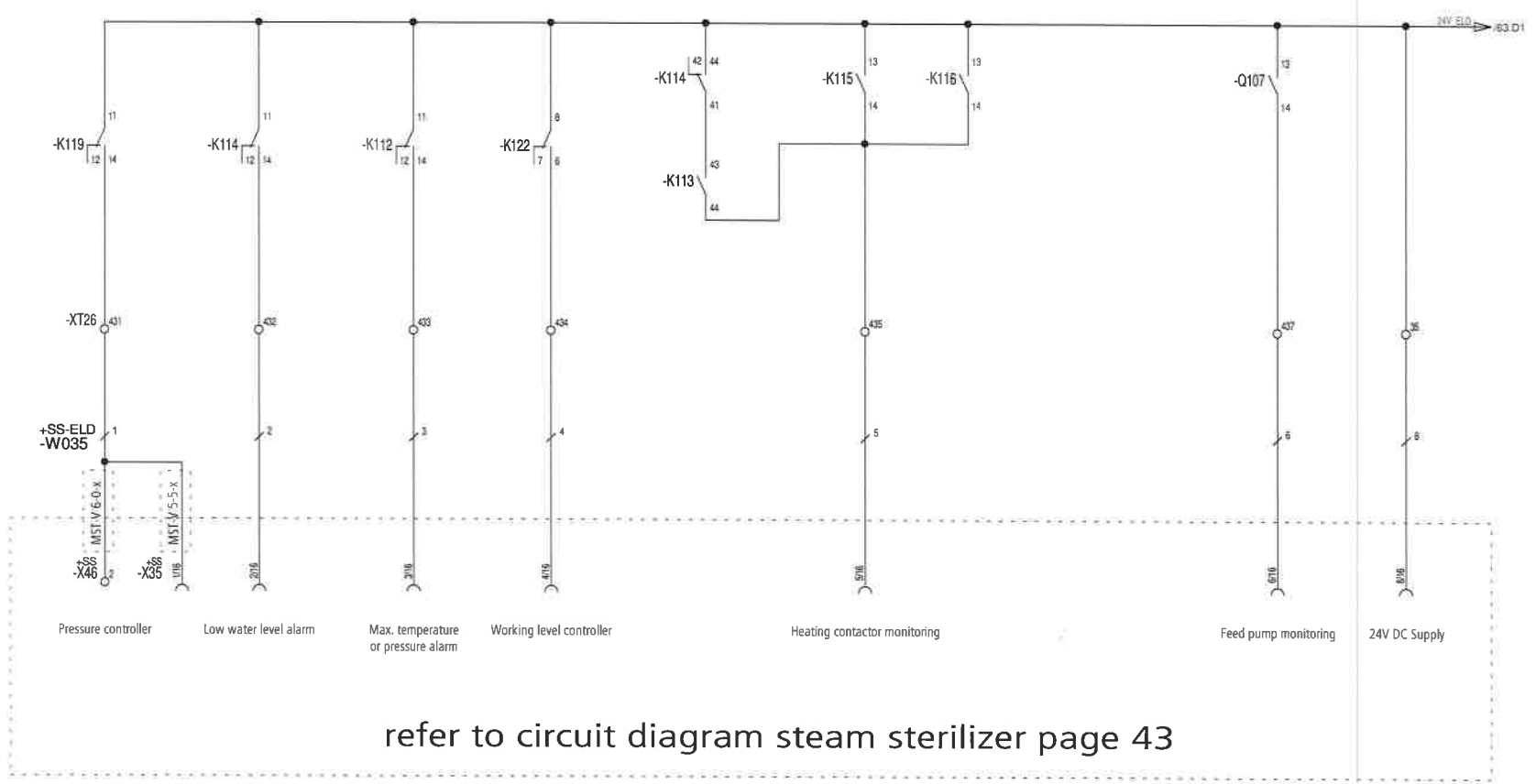

				Date	12.07.2011
				User	AGL
				Proved	REB
Status	Change	Date	Name	Standard	IEC204/EN60204

Steam generator V30 | Belimed Infection Control | Power supply 24V | ELDV30UL_V1.4 | +ELD | Sheet 43 | following 63

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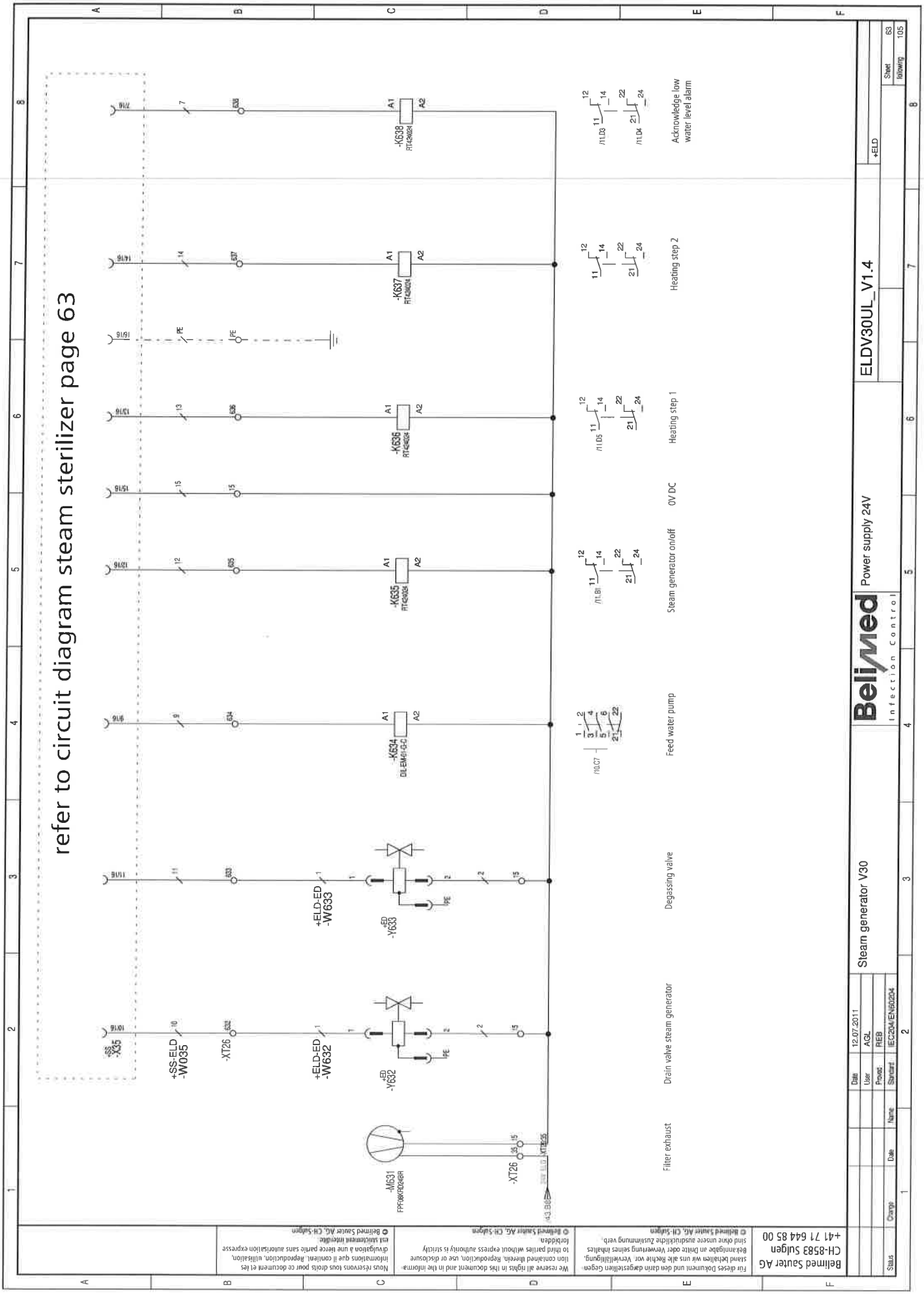

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terminal strip

-XT00

+ELD-ED -W107 cable designations	Multinorm-AWM2587-3L-PE O+ cable type	target external	potential	terminal number	jumpers	target internal	Placement in Schematics	cable designations	cable type
		+Customer -Q101 :1	#1975	1		+ELD -K113 :2	/10.D1		
		+Customer -Q101 :3	#1976	2		+ELD -K113 :4	/10.D1		
		+Customer -Q101 :5	#1977	3		+ELD -K113 :6	/10.D1		
			#1847	$			/10.D1		
			#1847	PE			/10.D1		
		+Customer -Q101 :PE	#1847	$			/10.D1		
			#1847	PE			/10.D1		
		+ED -R101 :PE	#1524	PE			/10.D2		
		+ED -R102 :PE	#1524				/10.D2		
				$					
	PE	+ED -M107 :PE	#1529	PE			/10.D2		

Terminal type

terminal 1020500000 [1 - 3]

terminal 0661460000 [$, $, PE , PE]

terminal 7907400000 [$, PE]

+ELD

Sheet 105
following 106

ELDV30UL_V1.4

Terminal diagram

Belimed Infection Control

Steam generator V30

	Name	Date
Data		12.07.2011
User		AGL
Proved		REB
Standard		IEC204/EN60204
Status		
Change		

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terminal strip

-XT26

cable type	cable designations	target external		potential	terminal number	jumpers	target internal		Placement in Schematics	cable designations	cable type
Multinorm-AWM2587-2L0.5AW	+ELD-ED -W633										
Multinorm-AWM2587-2L0.5AW	+ELD-ED -W632										
Multinorm-AWM2587-17L0.75	+SS-ELD -W035										
	1	+SS -X46	:2	#2021	431		+ELD -K119	:14	/43.D2		
		Verbindung ist nicht eindeutig.		#2021					/43.D2		
	2	+SS -X35	:2	#2026	432		+ELD -K114	:14	/43.D2		
	3	+SS -X35	:3	#2022	433		+ELD -K112	:14	/43.D3		
	4	+SS -X35	:4	#2023	434		+ELD -K122	:6	/43.D4		
	5	+SS -X35	:5	#2019	435		+ELD -K116	:14	/43.D5		
				#2019			Verbindung ist nicht eindeutig.		/43.D5		
	6	+SS -X35	:6	#2024	437		+ELD -Q107	:14	/43.D7		
	8	+SS -X35	:8	24V_ELD	35	●	+ELD -Q107	:13	/43.D8		
				24V_ELD			Verbindung ist nicht eindeutig.		/43.D8		
	10	+SS -X35	:10	#2039	632				/63.B2		
1		+ED -Y632	:1	#2039					/63.B2		
				24V_ELD	35	●	+ELD -M631	:	/63.D1		
				24V_ELD			Verbindung ist nicht eindeutig.		/63.D1		
	11	+SS -X35	:11	#2040	633				/63.B3		
		+ED -Y633	:1	#2040					/63.B3		
	9	+SS -X35	:9	#2029	634		+ELD -K634	:A1	/63.B4		
	13	+SS -X35	:13	#2031	636		+ELD -K636	:A1	/63.B6		
	12	+SS -X35	:12	#2030	635		+ELD -K635	:A1	/63.B5		
	7	+SS -X35	:7	#2033	638		+ELD -K638	:A1	/63.B8		
	14	+SS -X35	:14	#2032	637		+ELD -K637	:A1	/63.B7		
	PE	+SS -X35	:16	#2038	PE				/63.B6		
	15	+SS -X35	:15	0V_ELD	15	●	Verbindung ist nicht eindeutig.		/63.B5		
2		+ED -Y632	:2	0V_ELD	15	●	Verbindung ist nicht eindeutig.		/63.D2		
		+ED -Y633	:2	0V_ELD	15	●	Verbindung ist nicht eindeutig.		/63.D3		
				0V_ELD	15	●	+ELD -M631	:	/63.D1		
				0V_ELD			Verbindung ist nicht eindeutig.		/63.D1		

Terminal type

terminal 1791100000 [15 - PE]

terminal

terminal

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Steam generator V30

Terminal diagram

ELDV30UL_V1.4

+ELD

Sheet 106 / following 107

	Date	Name
Change	12.07.2011	
User	AGL	
Proved	RIEB	
Standard	IEC204+EN60204	
Status		

terminal strip

-XT91

cable type	cable designations	target external	potential	terminal number	jumpers	target internal	Placement in Schematics	cable designations	cable type
Multinorm-AWM2587-3LPE-AA	+ELD-ED -W115							+ELD	
Multinorm-AWM2587-3LPE-D-	+ELD-ED -W113								
Multinorm-AWM2587-3LPE-D-	+ELD-ED -W112								
	1	+ED -S112 II:1	#2004	112		+ELD -K635 :11	/11.C2		
	3	+ED -S112 II:4	#4293	113		+ELD -K112 :A1	/11.D2		
	2	+ED -S112 II:2	#2099	114			/11.D3		
1		+ED -S113 :1	#2099	115			/11.D3		
2		+ED -S113 :2	#4292	116		+ELD -K125 :1	/11.B3		
3		+ED -S113 :4	#4293	117			/11.B3		
1		+ED -S115 :1	#2013	118		+ELD -K638 :22	/11.B5		
2		+ED -S115 :2	#2100	119		+ELD -K636 :14	/11.C5		
			#2100			+ELD -K119 :A1	/11.C5		
			N_ELD	PE		+ELD -T111 :PE	/11.A1		
			N_ELD			+ELD -T111 :0	/11.A1		
			N_ELD			Verbindung ist nicht eindeutig.	/11.A1		
	PE	+ED -S112 :PE	#1999	PE			/11.C2		
PE		+ED -S113 :PE	#2098	PE			/11.D3		
		+ED -S115 :PE	#2011	PE			/11.B5		

Terminal type

terminal 1608570000 [112 - 119]

terminal 1608660000 [PE - PE]

terminal

ELDV30UL_V1.4

Sheet 107 following

Belimed Infection Control

Terminal diagram

Steam generator V30

	Name	Date
Drawn	AGL	12.07.2011
Proved	REB	
Standard	IEC204-EN60204	

Change | Data | Name | Date | User | Proved | Standard | Status

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Cable List: ELDV30UL_V1.4

			Cable	Type			Length (mm)
		+SS-ELD	-W035	Multinorm-AWM2587-17LPE0.75-AWG19			3800
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT26	431		1	-X46	2		
-XT26	432		2	-X35	2		
-XT26	433		3	-X35	3		
-XT26	434		4	-X35	4		
-XT26	435		5	-X35	5		
-XT26	437		6	-X35	6		
-XT26	638		7	-X35	7		
-XT26	35		8	-X35	8		
-XT26	634		9	-X35	9		
-XT26	632		10	-X35	10		
-XT26	633		11	-X35	11		
-XT26	635		12	-X35	12		
-XT26	636		13	-X35	13		
-XT26	637		14	-X35	14		
-XT26	15		15	-X35	15		
			16				
			17				
-XT26	PE		PE	-X35	16		
			Cable	Type			Length (mm)
		+ELD-ED	-W107	Multinorm-AWM2587-3LPE1.0-AWG18			4500
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-K634	2		1	-M107	U		
-K634	4		2	-M107	V		
-K634	6		3	-M107	W		
-XT00	PE		PE	-M107	PE		
			Cable	Type			Length (mm)
		+ELD-ED	-W112	Multinorm-AWM2587-3LPE1.0-AWG18			2250
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT91	112		1	-S112	I.1		
-XT91	114		2	-S112	II.2		
-XT91	113		3	-S112	II.4		
-XT91	PE		PE	-S112	PE		
			Cable	Type			Length (mm)
		+ELD-ED	-W113	Multinorm-AWM2587-3LPE1.0-AWG18			2450
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT91	115		1	-S113	1		
-XT91	116		2	-S113	2		
-XT91	117		3	-S113	4		
-XT91	PE		PE	-S113	PE		
			Cable	Type			Length (mm)
		+ELD-ED	-W115	Multinorm-AWM2587-2LPE1-AWG18			2050
Device Name	Pin	Fitting Part	Core	Device Name	Pin	Fitting Part	Length (mm)
-XT91	118		1	-S115	1		
-XT91	119		2	-S115	2		
-XT91	PE		PE	-S115	PE		

Cable List: ELDV30UL_V1.4

		Cable	Type			Length (mm)
	+ELD-ED	-W122	Multinorm-AWM2587-4L0.5-AWG20			2300
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-K122	5		1	-B122			
-K122	3		2	-B122			
-K125	11		3	-B125			
-K125	1		4	-B125			
		Cable	Type			Length (mm)
	+ELD-ED	-W632	Multinorm-AWM2587-2L0.5-AWG20			2850
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-XT26	632		1	-Y632	1		
-XT26	15		2	-Y632	2		
		Cable	Type			Length (mm)
	+ELD-ED	-W633	Multinorm-AWM2587-2L0.5-AWG20			1750
Device Name	**Pin**	**Fitting Part**	**Core**	**Device Name**	**Pin**	**Fitting Part**	**Length (mm)**
-XT26	633		1	-Y633	1		
-XT26	15		2	-Y633	2		

Bill of Material ELDV30UL_V1.4_ELD

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
2	CC3/30A	Fuse holder 3/max. 30A	AMBUS	-F102,-F103	5221-04
2	HCLR25	Fuse class CC 25A	Edison	-F102,-F103	5220-24
1	CC2/1A	Circuitbreaker 2/1A	AMBUS	-F108	5221-05
1	HCTR1	Fuse class CC 1A	Edison	-F108	5220-25
3	55.32.8.120.0040	Relay; 120VAC; 2NC, 2NO	Finder	-K112,-K114,-K119	5264-15
3	94.82	Realay socket 8 pole	Finder	-K112,-K114,-K119	5261-10
1	DILM65(120V)	CONTACTOR; Ith 80A; AC120V60HZ	Möller AG	-K113	5250KLM-137
2	DILM1000-XHIC11-SI	Auxiliary contact, 1NC, 1NO	Möller AG	-K113(2)	5251KLM-27
2	DILMC25-10(120V)	CONTACTOR; Ith 35A; 1S; AC120V60HZ	Möller AG	-K115,-K116	5250KLM-133
1	16HMW1A00101	Level relay	Warrick	-K122	5263-03
1	EC-8	Realay socket 8 pole; EC-8	Comat	-K122	5261WIS-01
1	EC-11	Realay socket 11 pole; EC-11	Comat	-K125	5261-11
1	LLC6	Level relay	ABB	-K125	5217-30
1	DIL-EM-01-G-C	CONTACTOR, AC-3 4 KW/400 V, 1 NC, DC 24 V, 3-POLE, SIZE S00, SCREW CONNECTION	Möller AG	-K634	5250KLM-117
4	Haltebügel	Retainer to relays RT424024; 3-1393161-3	Schrack	-K635,-K636,-K637,-K638	5261-05
4	RT424024	Relay; 24VDC; 2NC, 2NO	Schrack	-K635,-K636,-K637,-K638	5264-03
4	Sockel2Pol	Realay socket 2 pole; 2-1419108-2	Schrack	-K635,-K636,-K637,-K638	5261-04
1	FPF08KRD24BR	Fan; 24V; 105x105mm	Simpex	-M631	5160-13
1	FPF08KRG	Fan kit 105x105mm	Simpex	-M631	5161-08
1	BK25-E	Terminalblock	Möller AG	-Q107	5241KLM-14
1	PKZMO-0.4-C+NHI-11	CIRCUIT-BREAKER FOR MOTOR PROTECTION; 0.25-0.4A; 0.06kW400V	Möller AG	-Q107	5240KLM-52
1	EEJ175/EJ96/C59.75-380-3	Transformer 460V/480V -120V;175VA	Wagner&Grimm	-T111	5310-28
1	0661460000	Terminal EK _ EK 35/35; PE terminal; 35.00 mm²; green/yellow; screw connection	Weidmüller	-XT00	5970WDM-24
2	7907400000	Terminal Z-series _ ZPE 6/3AN; PE terminal; 6.00 mm²; green/yellow; tension spring connection	Weidmüller	-XT00(2)	5970WDM-99
3	1020500000	Terminal WDU _ WDU 35; Feed-through terminal; 35.00 mm²; dark beige; screw connection	Weidmüller	-XT00(3)	5970WDM-86
5	1608660000	Terminal Z-series _ ZPE 2.5/4AN; PE terminal; 2.50 mm²; green/yellow; tension spring connection	Weidmüller	-XT00,-XT91(4)	5970WDM-109

Bill of Material ELDV30UL_V1.4_ELD

Quant.	Ident-No.	Description	Supplier	Device Names	Article number
10	1791100000	Terminal Z-series _ ZDK 1.5; Double terminal; 1.50 mm²; dark beige; tension spring connection	Weidmüller	-XT26(10)	5970WDM-85
8	1608570000	Terminal Z-series _ ZDU 2.5/4AN; Feed-through terminal; 2.50 mm²; dark beige; tension spring connection	Weidmüller	-XT91(8)	5970WDM-72
1	26183	RC element; A0	Murr	-Z113	5810-75
1	DILM32-XSPR240	RC element	Möller AG	-Z115	5251KLM-25

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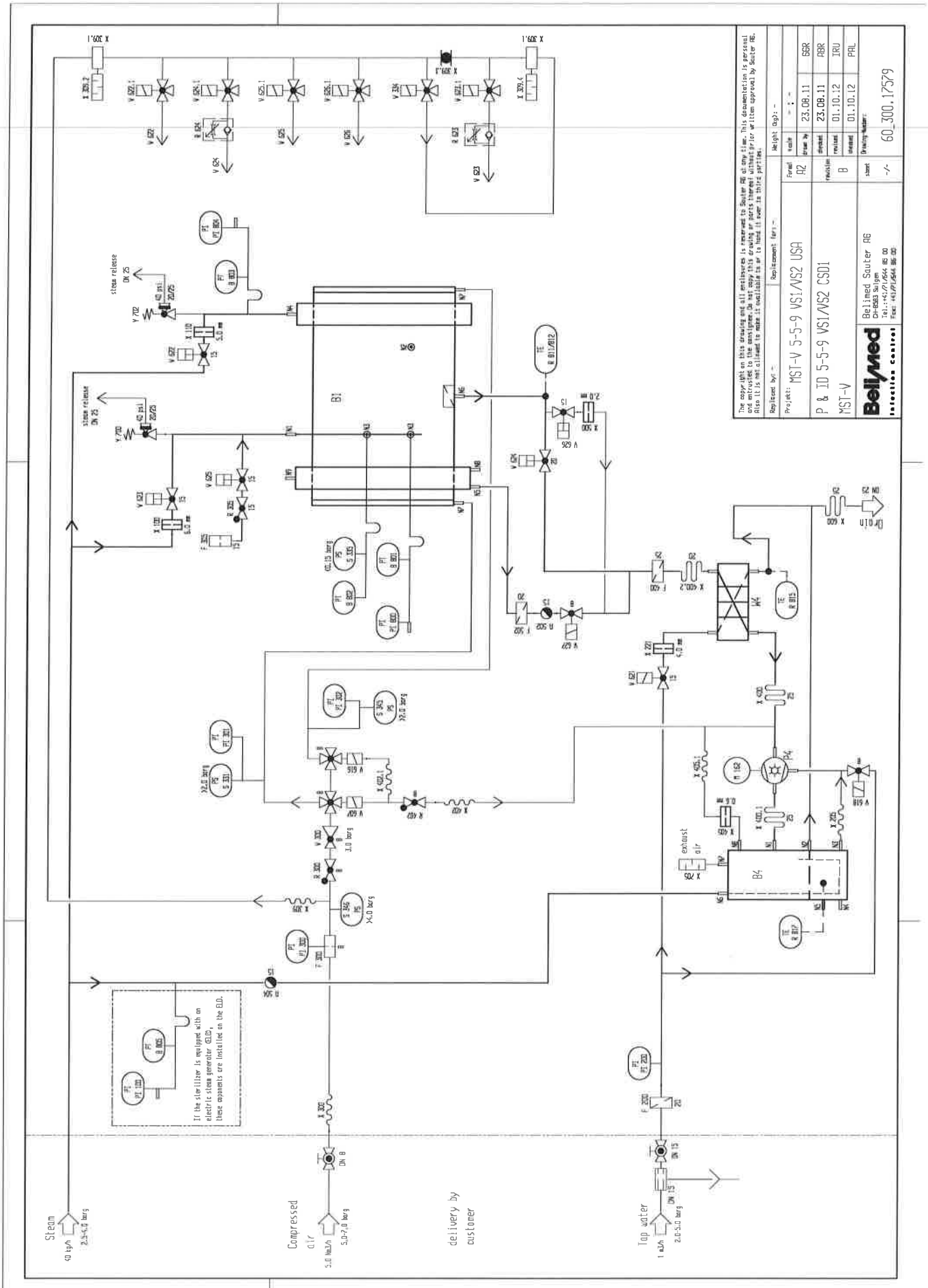
27 P & I Diagram Sterilizer without cooling circuit



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LIST OF SPARE PARTS / PROCESS TECHNOLOGY

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DRAW NO.	: 60_300.17579	ORIGINATOR	: GGR	REVISED	: IRU
PROJECT	: MST-V 5-5-9 VS1 CSD1 o. KK USA	DATE	: 23.08.11	DATE	: 01.10.12
DESIGNATION 1	: P & ID 5-5-9 VS1/VS2 CSD1	CHECKED	: ABR	CHECKED	: PAL
DESIGNATION 2	: MST-V	DATE	: 23.08.11	DATE	: 01.10.12

INDEX : B

FILE : MSTV_009_A

LIST TYPE: EFMTXA

DESIGN.	EACH	TERM	DIMENSION	MATERIAL	TYPE	PART NO.	MANUFACTURER/SUPPLIER
A 502	1	Steam trap	1/2"	MS	BPT 13S SUB (F=24K	102000-48	Spirax Sarco
A 504	1	Steam trap	1/2"	MS	BPT 13S SUB (F=24K	102000-48	Spirax Sarco
B 801	1	Pressure transducer	1/2"	316L	MIDAS S05/0-4bar/4	5510JUM-17	Jumo
B 802	1	Pressure transducer	1/2"	316L	MIDAS S05/0-4bar/4	5510JUM-17	Jumo
B 803	1	Pressure transducer	1/4"	1.4571	MIDAS S05/0-6bar/4	5510JUM-19	Jumo
B 805	1	Pressure transducer	1/4"	1.4571	MIDAS S05/0-6bar/4	5510JUM-19	Jumo
F 200	1	Strainer	3/4" zu ø 1/2"	1.4404	03-000.5691	03-000.5691	Sauter Sul. /Künzli AG
F 300	1	Filter	1/4"	AL/ZN	Multi-Fix F.11	136001MF-07	Bachofen / Knocks
F 305	1	Filter	1/2"	KS	ZGPB.01V-E8	103001-82	Crustag/d.hunter
F 400	1	Strainer	1" zu ø 3/4"	1.4404	03-000.5690	03-000.5690	Sauter Sul. /Künzli AG
F 502	1	Strainer	3/4" zu ø 1/2"	1.4404	03-000.5691	03-000.5691	Sauter Sul. /Künzli AG
P4	1	Vacuum pump		GG-25	VZ 30	5130SPK-78	Speck /E.W. Müller
PI 100	1	Mano-vacuummeter	1/4"	1.4301	MGS18.1/A-63 -1..+	111000D063-57	Moesch K. AG
PI 200	1	Manometer	1/4"	MS 58	MGS10.3/A-63/0..+1	111000D063-32	Nuova Fima
PI 300	1	Manometer	1/4"	MS	Multi-Fix G.50-10	136001MF-06	Bachofen / Knocks
PI 301	1	Mano-vacuummeter	1/4"	MS	MGS10.3/A-63SEC/-1	111000D063-31	Nuova Fima
PI 302	1	Mano-vacuummeter	1/4"	MS	MGS10.3/A-63SEC/-1	111000D063-31	Nuova Fima
PI 800	1	Mano-vacuummeter	1/4"	1.4301	MGS18,A-63,-1.+5ba	111000D063-58	Nuova Fima
PI 804	1	Mano-vacuummeter	1/4"	MS	MGS10.3/A63SEC/-1.	111000D063-33	Nuova Fima
R 300	1	Spring-loaded check valve	1/4"	AL/ZN	Multi-Fix V.11	136001MF-10	Bachofen / Knocks
R 305	1	Spring-loaded check valve	1/2"	1.4301	Small 0,02-0,03 ba	142A20015-02	Hamberger / Cromax
R 402	1	Spring-loaded check valve	1/4"	1.4301	Small 0,02-0,03 ba	142A20008	Hamberger / Cromax
R 623	1	Butterfly flap valve	1/8"x4.0mm	MS verni.	A327927	121001-26	Bachofen AG
R 624	1	Butterfly flap valve	1/8"x4.0mm	MS verni.	A327927	121001-26	Bachofen AG
R 811/812	1	Resistance thermometers	5.0mm	1.4571	2xPT1000 5.0/120/3	5550JUM-108	Jumo
R 815	1	Resistance thermometers	4.5mm	1.4571	1xPT1000/1L-4.5-20	5550JUM-19	Jumo
R 817	1	Resistance thermometers	4.5mm	1.4571	1xPT1000/1L-4.5-20	5550JUM-19	Jumo
S 331	1	Manometric switch	1/4"	MS	901.51 111L1 +2.6b	5215-25	Pewatron
S 335	1	Manometric switch	1/4"	MS verni.	901.11.122X1 +0.12	5215-30	Pewatron
S 345	1	Manometric switch	1/4"	MS	901.51 111L1 +2.6b	5215-25	Pewatron

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LIST OF SPARE PARTS / PROCESS TECHNOLOGY

DRAW NO.	: 60_300.17579	ORIGINATOR	: GGR	REVISED	: IRU	INDEX : B
PROJECT	: MST-V 5-5-9 VS1 CSD1 o. KK USA	DATE	: 23.08.11	DATE	: 01.10.12	
DESIGNATION 1	: P & ID 5-5-9 VS1/VS2 CSD1	CHECKED	: ABR	CHECKED	: PAL	FILE : MSTV_009_A
DESIGNATION 2	: MST-V	DATE	: 23.08.11	DATE	: 01.10.12	LIST TYPE: EFMTXA

DESIGN.	EACH	TERM	DIMENSION	MATERIAL	TYPE	PART NO.	MANUFACTURER/SUPPLIER
S 346	1	Manometric switch	1/4"	MS	901.51 111L1 +4.5b	5215-28	Pewatron / Beck GmbH
V 300	1	Pressure controller	1/4"	AL	R.11 / Serie 1 / M	136001MF-09	Bachofen / Knocks
V 334	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 607	1	Solenoid valve 4-way	1/4"	AL	135MF0/24VDC/13W	121000LU002-01	Bachofen / Lucifer
V 616	1	Solenoid valve 4-way	1/4"	AL	135MF0/24VDC/13W	121000LU002-01	Bachofen / Lucifer
V 618	1	Solenoid valve 2-way	1/4"	MS	EV210A 3.5B/24V DC	121MS0DA008-01	Danfoss
V 621	1	Solenoid valve 2-way	1/2"	MS	EV220B 15B/24V DC/	121MS0DA015-02	Danfoss
V 622	1	Slanted seat valve	1/2"	1.4408	2000-A-013,0-E-VAG	122A40BU015-01	Bürkert
V 622.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 623	1	Slanted seat valve	1/2"	1.4581	2000-A-015,0-E-VAS	122A40BU015	Bürkert
V 623.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 624	1	Slanted seat valve	3/4"	RG	2000-A-020,0-E-RGG	122RG0BU020-01	Bürkert
V 624.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 625	1	Slanted seat valve	1/2"	1.4408	2000-A-013,0-E-VAG	122A40BU015-01	Bürkert
V 625.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 626	1	Slanted seat valve	1/2"	RG	2000-A-013,0-E-RGG	122RG0BU015	Bürkert
V 626.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 627	1	Solenoid valve 2-way	1/4"	1.4401	21L2K1T30-2/2Weg-1	121A0SA008	ODE
W4	1	Heat exchanger	1"	1.4401	SL 34-TL-BB-14 / A	04-002.7451	ETS
X 100	1	Orifice	G 3/4" zu ø 1/2"	1.4435	zum Aufbohren	750 05362	Marton / Zweifel
X 110	1	Orifice	zu ø 12.0mm	1.4435	D=14.5 d=5.0 s=1.5	750 05133	Marton / Zweifel
X 205	1	Tube	8.0mmx13.5mm	PVC-Ny.gefl.	8x14 mm PVC-transp	350 00727	Maagtechnic
X 221	1	Orifice	zu ø 15.0mm	1.4435	D=18.5 d=4.0 s=1.5	750 00052	Marton / Zweifel
X 300	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 309	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 309.1	1	End plate	6.0mm	KS	PS1-E102	121001-04	Girmatic / Parker
X 309.2	1	Sound absorber	6.0mm	KS	0671 06 00CH	121001-05	Parker
X 309.3	1	Ball	3.0mm	ST chem.verni.	HY219 488	121001-07	Girmatic / Parker
X 309.4	1	Sound absorber	6.0mm	KS	0671 06 00CH	121001-05	Parker
X 400	1	Compensator	1"	1.4404	Assiwell DN 25	106A40-61	Angst+Pfister

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LIST OF SPARE PARTS / PROCESS TECHNOLOGY

DRAW NO.	: 60_300.17579	ORIGINATOR	: GGR	REVISED	: IRU	INDEX	: B
PROJECT	: MST-V 5-5-9 VS1 CSD1 o. KK USA	DATE	: 23.08.11	DATE	: 01.10.12		
DESIGNATION 1	: P & ID 5-5-9 VS1/VS2 CSD1	CHECKED	: ABR	CHECKED	: PAL	FILE	: MSTV_009_A
DESIGNATION 2	: MST-V	DATE	: 23.08.11	DATE	: 01.10.12	LIST TYPE	: EFMTXA

DESIGN.	EACH	TERM	DIMENSION	MATERIAL	TYPE	PART NO.	MANUFACTURER/SUPPLIER
X 400.1	1	Compensator	1"	1.4404	Assiwell DN 25	106A40-61	Angst+Pfister
X 400.2	1	Expansion joint	3/4"	1.4404	FMH840.020.25	300 02805	Torgen GmbH
X 402	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 402.1	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 405	1	Orifice	zu ø 8.0mm	1.4435	D=10.0 d=0.6 s=1.5	350 07094	Marton / Zweifel
X 405.1	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 500	1	Orifice	zu ø 15.0mm	1.4435	D=18.5 d=2.0 s=1.5	750 00049	Marton / Zweifel
X 600	1	Compensator	1"	1.4404	Assiwell DN 25	106A40-61	Angst+Pfister
X 705	1	Sound absorber	1"	Sinterbronze	06700034-1"	121001-25	Legris
Y 700	1	Safety valve	3/4"-1"	RG	0041EDA-40 / Stamp	133RG000020-32	Spence/USA
Y 702	1	Safety valve	3/4"-1"	RG	0041EDA-40 / Stamp	133RG000020-32	Spence/USA

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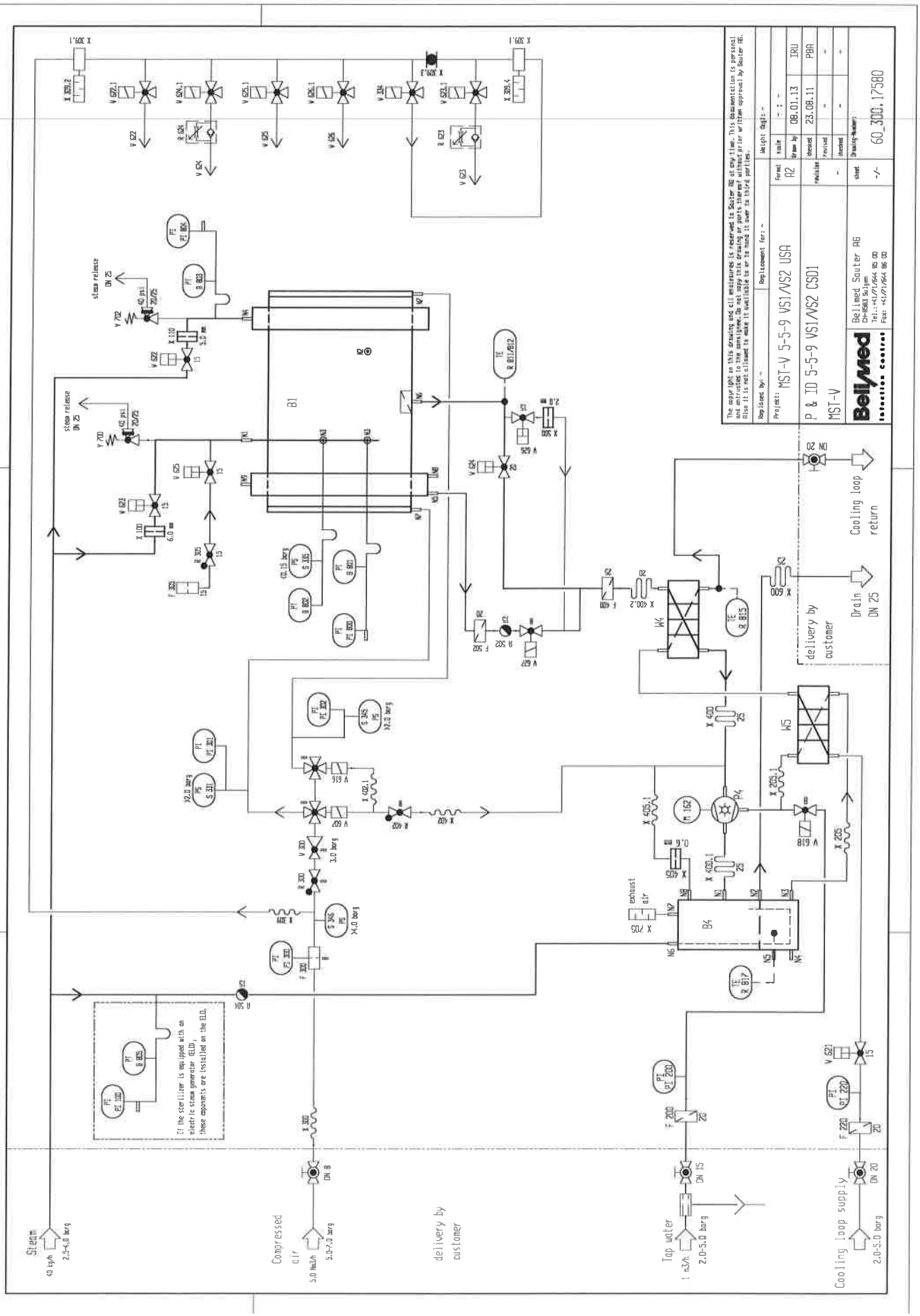
29 P & I Diagram Sterilizer with cooling circuit



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DRAW NO. : 60_300.17580	ORIGINATOR : IRU	REVISED : -	INDEX : _		
PROJECT : Standard MST-V 5-5-9 VS1 CSD1 m. KK USA	DATE : 08.01.13	DATE : -			
DESIGNATION 1 : P & ID 5-5-9 VS1/VS2 CSD1	CHECKED : PBA	CHECKED : -	FILE : MSTV_010_A		
DESIGNATION 2 : MST-V	DATE : 23.08.11	DATE : -	LIST TYPE: EFMTXA		

DESIGN.	EACH	TERM	DIMENSION	MATERIAL	TYPE	PART NO.	MANUFACTURER/SUPPLIER
A 502	1	Steam trap	1/2"	MS	BPT 13S SUB (F=24K	102000-48	Spirax Sarco
A 504	1	Steam trap	1/2"	MS	BPT 13S SUB (F=24K	102000-48	Spirax Sarco
B 801	1	Pressure transducer	1/2"	316L	MIDAS S05/0-4bar/4	5510JUM-17	Jumo
B 802	1	Pressure transducer	1/2"	316L	MIDAS S05/0-4bar/4	5510JUM-17	Jumo
B 803	1	Pressure transducer	1/4"	1.4571	MIDAS S05/0-6bar/4	5510JUM-19	Jumo
B 805	1	Pressure transducer	1/4"	1.4571	MIDAS S05/0-6bar/4	5510JUM-19	Jumo
F 200	1	Strainer	3/4" zu ø 1/2"	1.4404	03-000.5691	03-000.5691	Sauter Sul. /Künzli AG
F 220	1	Strainer	3/4"	Bronze	SF12.1	101RG0-04	Spirax Sarco
F 300	1	Filter	1/4"	AL/ZN	Multi-Fix F.11	136001MF-07	Bachofen / Knocks
F 305	1	Filter	1/2"	KS	ZGPB.01V-E8	103001-82	Crustag/d.hunter
F 400	1	Strainer	1" zu ø 3/4"	1.4404	03-000.5690	03-000.5690	Sauter Sul. /Künzli AG
F 502	1	Strainer	3/4" zu ø 1/2"	1.4404	03-000.5691	03-000.5691	Sauter Sul. /Künzli AG
P4	1	Vacuum pump		GG-25	VZ 30	5130SPK-78	Speck /E.W. Müller
PI 100	1	Mano-vacuummeter	1/4"	1.4301	MGS18.1/A-63 -1..+	111000D063-57	Moesch K. AG
PI 200	1	Manometer	1/4"	MS 58	MGS10.3/A-63/0..+1	111000D063-32	Nuova Fima
PI 220	1	Manometer	1/4"	MS 58	MGS10.3/A-63/0..+1	111000D063-32	Nuova Fima
PI 300	1	Manometer	1/4"	MS	Multi-Fix G.50-10	136001MF-06	Bachofen / Knocks
PI 301	1	Mano-vacuummeter	1/4"	MS	MGS10.3/A-63SEC/-1	111000D063-31	Nuova Fima
PI 302	1	Mano-vacuummeter	1/4"	MS	MGS10.3/A-63SEC/-1	111000D063-31	Nuova Fima
PI 800	1	Mano-vacuummeter	1/4"	1.4301	MGS18,A-63,-1.+5ba	111000D063-58	Nuova Fima
PI 804	1	Mano-vacuummeter	1/4"	MS	MGS10.3/A63SEC/-1.	111000D063-33	Nuova Fima
R 300	1	Spring-loaded check valve	1/4"	AL/ZN	Multi-Fix V.11	136001MF-10	Bachofen / Knocks
R 305	1	Spring-loaded check valve	1/2"	1.4301	Small 0,02-0,03 ba	142A20015-02	Hamberger / Cromax
R 402	1	Spring-loaded check valve	1/4"	1.4301	Small 0,02-0,03 ba	142A20008	Hamberger / Cromax
R 623	1	Butterfly flap valve	1/8"x4.0mm	MS verni.	A327927	121001-26	Bachofen AG
R 624	1	Butterfly flap valve	1/8"x4.0mm	MS verni.	A327927	121001-26	Bachofen AG
R 811/812	1	Resistance thermometers	5.0mm	1.4571	2xPT1000 5.0/120/3	5550JUM-108	Jumo
R 815	1	Resistance thermometers	4.5mm	1.4571	1xPT1000/1L-4.5-20	5550JUM-19	Jumo
R 817	1	Resistance thermometers	4.5mm	1.4571	1xPT1000/1L-4.5-20	5550JUM-19	Jumo
S 331	1	Manometric switch	1/4"	MS	901.51 111L1 +2.6b	5215-25	Pewatron

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LIST OF SPARE PARTS / PROCESS TECHNOLOGY — page: 2 / 3

DRAW NO.	: 60_300.17580	ORIGINATOR	: IRU	REVISED	: -	INDEX : _
PROJECT	: Standard MST-V 5-5-9 VS1 CSD1 m. KK USA	DATE	: 08.01.13	DATE	: -	
DESIGNATION 1	: P & ID 5-5-9 VS1/VS2 CSD1	CHECKED	: PBA	CHECKED	: -	FILE : MSTV_010_A
DESIGNATION 2	: MST-V	DATE	: 23.08.11	DATE	: -	LIST TYPE: EFMTXA

DESIGN.	EACH	TERM	DIMENSION	MATERIAL	TYPE	PART NO.	MANUFACTURER/SUPPLIER
S 335	1	Manometric switch	1/4"	MS verni.	901.11.122X1 +0.12	5215-30	Pewatron
S 345	1	Manometric switch	1/4"	MS	901.51 111L1 +2.6b	5215-25	Pewatron
S 346	1	Manometric switch	1/4"	MS	901.51 111L1 +4.5b	5215-28	Pewatron / Beck GmbH
V 300	1	Pressure controller	1/4"	AL	R.11 / Serie 1 / M	136001MF-09	Bachofen / Knocks
V 334	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 607	1	Solenoid valve 4-way	1/4"	AL	135MF0/24VDC/13W	121000LU002-01	Bachofen / Lucifer
V 616	1	Solenoid valve 4-way	1/4"	AL	135MF0/24VDC/13W	121000LU002-01	Bachofen / Lucifer
V 618	1	Solenoid valve 2-way	1/4"	MS	EV210A 3.5B/24V DC	121MS0DA008-01	Danfoss
V 621	1	Slanted seat valve	1/2"	RG	2000-A-013,0-E-RGG	122RG0BU015	Bürkert
V 622	1	Slanted seat valve	1/2"	1.4408	2000-A-013,0-E-VAG	122A40BU015-01	Bürkert
V 622.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 623	1	Slanted seat valve	1/2"	1.4581	2000-A-015,0-E-VAS	122A40BU015	Bürkert
V 623.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 624	1	Slanted seat valve	3/4"	RG	2000-A-020,0-E-RGG	122RG0BU020-01	Bürkert
V 624.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 625	1	Slanted seat valve	1/2"	1.4408	2000-A-013,0-E-VAG	122A40BU015-01	Bürkert
V 625.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 626	1	Slanted seat valve	1/2"	RG	2000-A-013,0-E-RGG	122RG0BU015	Bürkert
V 626.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 627	1	Solenoid valve 2-way	1/4"	1.4401	21L2K1T30-2/2Weg-1	121A0SA008	ODE
W4	1	Heat exchanger	1"	1.4401	SL 34-TL-BB-14 / A	04-002.7451	ETS
W5	1	Heat exchanger	3/4"	1.4401	WP-2-20 m. Bolzen	05-300.13842	Javorka Thermotechnik
X 100	1	Orifice	G 3/4" zu ø 1/2"	1.4435	zum Aufbohren	750 05362	Marton / Zweifel
X 110	1	Orifice	zu ø 12.0mm	1.4435	D=14.5 d=5.0 s=1.5	750 05133	Marton / Zweifel
X 205	1	Tube	8.0mmx13.5mm	PVC-Ny.gefl.	8x14 mm PVC-transp	350 00727	Maagtechnic
X 205.1	1	Tube	8.0mmx13.5mm	PVC-Ny.gefl.	8x14 mm PVC-transp	350 00727	Maagtechnic
X 300	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 309	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 309.1	1	End plate	6.0mm	KS	PS1-E102	121001-04	Girmatic / Parker
X 309.2	1	Sound absorber	6.0mm	KS	0671 06 00CH	121001-05	Parker

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LIST OF SPARE PARTS / PROCESS TECHNOLOGY

DRAW NO.	: 60_300.17580	ORIGINATOR	: IRU	REVISED	: -	INDEX : _
PROJECT	: Standard MST-V 5-5-9 VS1 CSD1 m. KK USA	DATE	: 08.01.13	DATE	: -	
DESIGNATION 1	: P & ID 5-5-9 VS1/VS2 CSD1	CHECKED	: PBA	CHECKED	: -	FILE : MSTV_010_A
DESIGNATION 2	: MST-V	DATE	: 23.08.11	DATE	: -	LIST TYPE: EFMTXA

DESIGN.	EACH	TERM	DIMENSION	MATERIAL	TYPE	PART NO.	MANUFACTURER/SUPPLIER
X 309.3	1	Ball	3.0mm	ST chem.verni.	HY219 488	121001-07	Girmatic / Parker
X 309.4	1	Sound absorber	6.0mm	KS	0671 06 00CH	121001-05	Parker
X 400	1	Compensator	1"	1.4404	Assiwell DN 25	106A40-61	Angst+Pfister
X 400.1	1	Compensator	1"	1.4404	Assiwell DN 25	106A40-61	Angst+Pfister
X 400.2	1	Expansion joint	3/4"	1.4404	FMH840.020.25	300 02805	Torgen GmbH
X 402	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 402.1	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 405	1	Orifice	zu ø 8.0mm	1.4435	D=10.0 d=0.6 s=1.5	350 07094	Marton / Zweifel
X 405.1	1	Pipe	ø 6.0x4.0mm	Polyamid	1100P0601 - Schwar	121001-09	Legris AG
X 500	1	Orifice	zu ø 15.0mm	1.4435	D=18.5 d=2.0 s=1.5	750 00049	Marton / Zweifel
X 600	1	Compensator	1"	1.4404	Assiwell DN 25	106A40-61	Angst+Pfister
X 705	1	Sound absorber	1"	Sinterbronze	06700034-1"	121001-25	Legris
Y 700	1	Safety valve	3/4"-1"	RG	0041EDA-40 / Stamp	133RG000020-32	Spence/USA
Y 702	1	Safety valve	3/4"-1"	RG	0041EDA-40 / Stamp	133RG000020-32	Spence/USA

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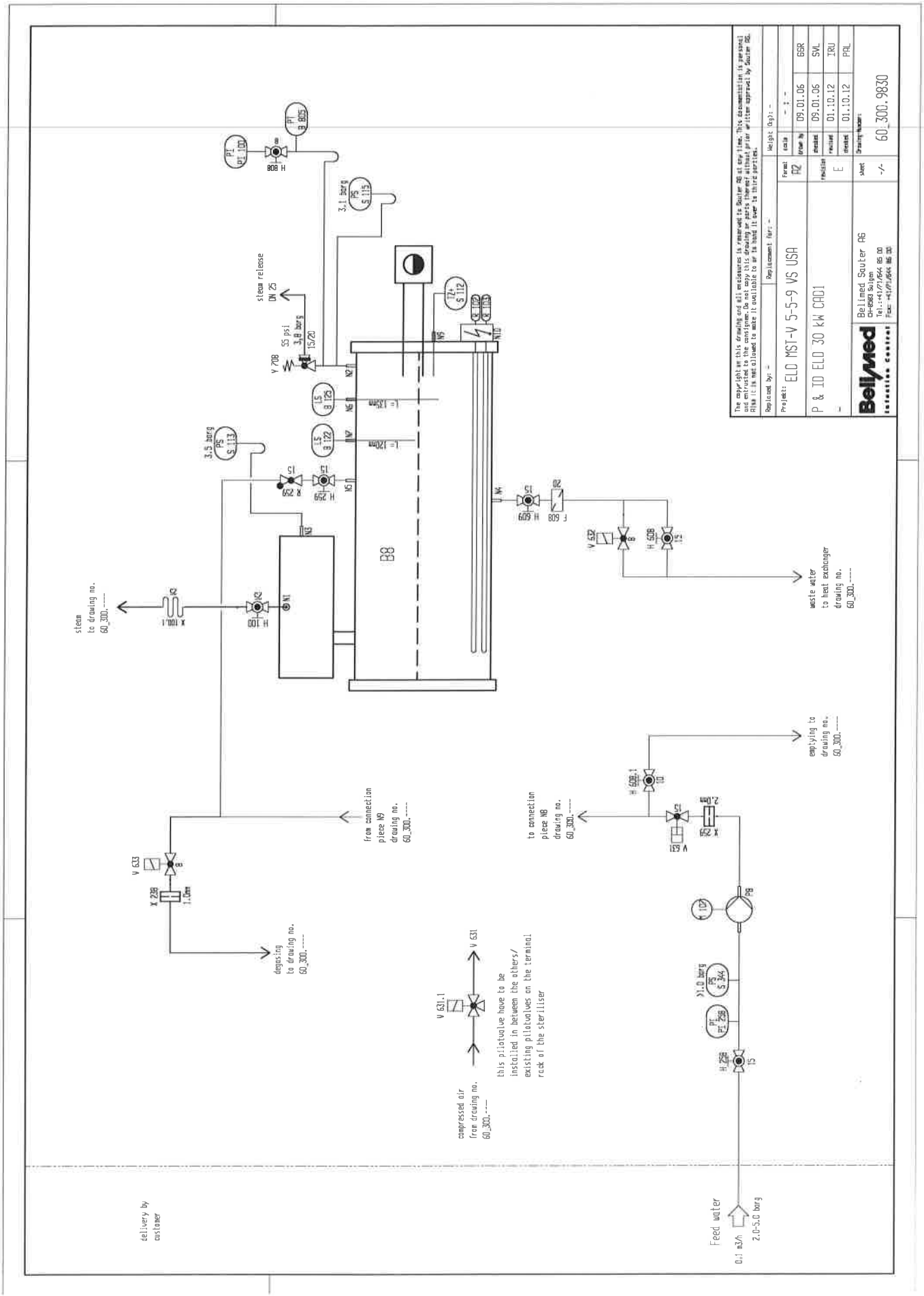
31 P & I Diagram Electric Steam Generator (optional)



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LIST OF SPARE PARTS / PROCESS TECHNOLOGY

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DRAW NO.	: 60_300.9830	ORIGINATOR	: GGR	REVISED	: IRU	INDEX : E
PROJECT	: ELD-V 30kW CSD1 USA zu 5-5-	DATE	: 09.01.06	DATE	: 01.10.12	
DESIGNATION 1	: P & ID ELD 30 kW CAD1	CHECKED	: SVL	CHECKED	: PAL	FILE : SELD_110_A
DESIGNATION 2	: -	DATE	: 09.01.06	DATE	: 01.10.12	LIST TYPE: EFMTXA

DESIGN.	EACH	TERM	DIMENSION	MATERIAL	TYPE	PART NO.	MANUFACTURER/SUPPLIER
B 122	1	Level switch	3/8"	1.4435	L=120mm	60-300.15856	GEMS/Warrick
B 125	1	Level switch	3/8"	1.4435	L=135mm	60-300.15857	GEMS/Warrick
B 805	1	Pressure transducer	1/4"	1.4571	MIDAS S05/0-6bar/4	5510JUM-19	Jumo
F 608	1	Strainer	3/4" zu ø 1/2"	1.4404	03-000.5691	03-000.5691	Sauter Sul. /Künzli AG
H 100	1	Manual flow balancing valve	1"	316SS	054-44-6-6-TT-BW4-	123VA0W0025	Avintos AG
H 258	1	Manual flow balancing valve	1/2"	1.4401	RB-7310-015	131A4000015-02	Trigress
H 259	1	Manual flow balancing valve	1/2"	316SS	05-44-6-6-TT-BW4-B	123VA0W0015-01	Avintos AG
H 608	1	Manual flow balancing valve	1/2"	MS verni.	B-RB-1700-015	131MS000015-05	Trigress/Economic
H 608.1	1	Manual flow balancing valve	3/8"	MS verni.	B-RB-1700-010	131MS000010-03	Trigress/Economic
H 609	1	Manual flow balancing valve	1/2"	316SS	05-44-6-6-TT-BW4-B	123VA0W0015-01	Avintos AG
H 808	1	Manual flow balancing valve	1/4"	MS verni.	B-RB-1720-008	131MS000008	Trigress/Economic
P8	1	Pump		1.4408/1.4581	Y-2951 UL 0.12 kW	5140-53	Speck
PI 100	1	Mano-vacuummeter	1/4"	1.4301	MGS18.1/A-63 -1..+	111000D063-57	Moesch K. AG
PI 258	1	Manometer	1/4"	1.4304	MGS18.3/A / 0..+16	111000D063-40	Nuova Fima
R 102	1	Screwed heating unit	2"	1.4404	L=690mm/3x480V/60H	5350-32	Electrolux Professional
R 103	1	Screwed heating unit	2"	1.4404	L=690mm/3x480V/60H	5350-32	Electrolux Professional
R 259	1	Spring-loaded check valve	1/2"	1.4401	Small 0,02-0,03 ba	142A40015-01	Hamberger
S 112	1	Temperature limiter	1/2"	CU	EMF-50/U +160-200°	5410JUM-09	JUMO
S 113	1	Manometric switch	1/4" NPT	VA	K35 manual reset 6	5215-36	Danfoss
S 115	1	Manometric switch	1/4" NPT	VA	K35 auto. reset 6-	5215-37	Danfoss
S 344	1	Manometric switch	1/4"	1.4401	901.51.117R1	5215-26	Pewatron
V 631	1	Slanted seat valve	1/2"	1.4408	2000-A-013,0-E-VAG	122A40BU015-01	Bürkert
V 631.1	1	Solenoid valve 3-way	-	KS	PS1-E21162BQ	121000-04	Girmatic / Parker
V 632	1	Solenoid valve 2-way	1/4"	1.4401	21L2K1T30-2/2Weg-1	121A0SA008	ODE
V 633	1	Solenoid valve 2-way	1/4"	1.4401	21L2K1T30-2/2Weg-1	121A0SA008	ODE
X 100.1	1	Tubing piece	1"-1"	PTFE/VA-Umfle.	FT800006.8519	350 07090	Angst + Pfister
X 238	1	Orifice	zu ø 8.0mm	1.4435	D=10.0 d=1.0 s=1.5	350 00682	Marton / Zweifel
X 259	1	Orifice	zu ø 12.0mm	1.4435	D=14.5 d=2.0 s=1.5	750 05293	Marton / Zweifel
Y 708	1	Safety valve	1/2"-3/4"	Bronze	0041DCA-55	133RG000015-24	Spence/USA

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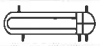
Graphic Symbols for Fittings

Symbol / Character		Term
	V	Bellows valve piston operated
	V	Bellows valve hand operated
	V	Bellows valve piston operated (angle type)
	V	Bellows valve piston operated (angle type)

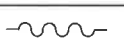
Graphic Symbols for Fittings acc. to DIN 2429 part 2

Symbol / Character		Term
	A	Steam Trap
	F	Strainer
	F	Gas filter / Air filter
	G	Inspection glass
	H	Ball valve hand operated
	H	Ball valve motor driven
	H	Ball valve pneumatic driven
	K	Swing type check valve
	K	Shutting clack hand operated
	K	Shutting clack piston operated
	K	Shutting clack pneumatic driven
	R	Spring-loaded check valve
	V	Ventilation
	V	Shut-off valve hand operated
	V	Diaphragm valve hand operated
	V	Shut-off valve with float cock
	V	Pressure reducing valve
	V	Shut-off valve diaphragm driven
	V	Diaphragm valve diaphragm driven
	V	Shut-off valve piston operated
	V	Diaphragm valve piston operated
	V	Control valve with linear actuator
	V	Control valve piston operated
	V	3/2 way valve hand operated
	V	3/2 way valve piston operated
	V	Solenoid valve 2-way
	V	Solenoid valve 3/2-way
	X	Spraying nozzle
	X	Orifice, flow reducer
	X	Sound absorber
	X	Pipe disconnector
	X	T-distribution
	Y	Safety valve
	X	Ball

Graphic symbols for equipment acc. to DIN 28004 part 3

Symbol / Character		Term
	B	Sterilizer / Disinfection Equipment
	B	Tank / Container
	D	Steam Generator
	F	Filter
	P	Pump
	P	Vacuum pump
	V	Ventilator
	W	Plate heat exchanger
	W	Gilled radiator heat exchanger
	W	Tubular heat exchanger
	X	Gas radiator

Graphic symbols for pipes acc. to DIN 2429 part 2

Symbol / Character		Term
	X	Tube
	X	Expansion joint
		Flexible connection
		U-tube
		Pipe
		Control line
		Crossing with connection
		Crossing without connection
		Crossing without connection
		Branch-off

Graphic symbols for pneumatic acc. to DIN ISO 1219

Symbol / Character		Term
	R	Flow control
	V	Solenoid 5/2-way
	X	Lubrication unit
	Z	Pneumatic cylinder

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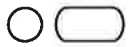
Graphical symbols an identifying letters for measurement, open-loop control and closed-loop control in process engineering to DIN 19227 1

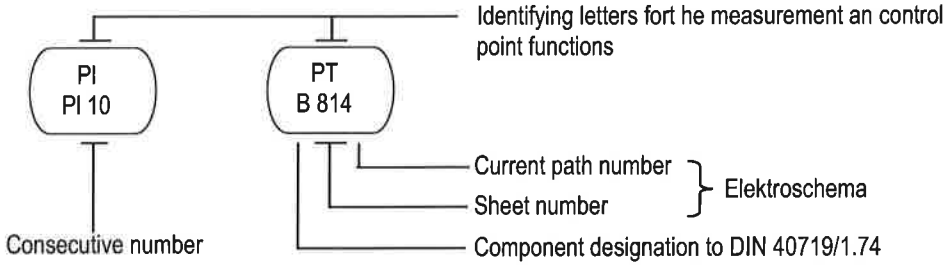


measuring location symbol (Measurement/open-loop control/closed-loop control

Process calculator symbol (Process computer)

The function of a measurement and control point is entered in the top half of the measurement and control point circuit using identifying letters shown in the table below. The measurement and control point number is entered in the bottom half of the measurement and control point circuit.
The measurement and control point number is formed from the identifying letters of the measurement and control functions and a consecutive number in the case of mechanical components and from the electrical-engineering designation to DIN 40719/1.74 and the sheet number and current path number in the case of electrical devices.

Example:



In the process computer point circuit, the process computer functions are entered in the top half of the process computer point circuit in accordance with the identifying letters shown in the table below.

Table for recognition character

Character	Group 1 Measured variable or other input variable		Group 2 Processing
	as first character	as second character	as additional character
A			State display, alarm
B			
C			Controlling
D	Density	Difference	
E	All electrical variables		Sensing element
F	Flow rate	Ratio	
G	Gauging, position or length		
H	Hand, manually initiated		
I			Indicating
J			
K	Time or time program		
L	Level		
M	Moisture or humidity		
N	User's choice		User's Choice
O	User's choice		Test point connection
P	Pressure or vacuum		
Q	Quality, e. g. analysis, concentration, conductivity	Integrate or totalise	
R	Nuclear radiation		Recording
S	Speed or frequency		Switching
T	Temperature		Transmitting, multifunction unit
U	Multi-variable		
V	Viscosity		Valve, damper, louver, actuating element
W	Weight or force		
X	Unclassified variables		Unclassified functions, e. g. TV camera, cathode ray tube, radioactive source
Y	User's choice		Computing relay, relay
Z			Emergency or safety acting
+			Upper limit value
/			Intermediate value
-			Lower limit value

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