

Technical Manual

Milk Module II

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Certified Quality Tests:



Emissions :

EN 55014-1
EN 55014-2
EN 61000-3-2
EN 61000-3-3
CISPR 14-1
CISPR 14-2
IEC 61000-3-2
IEC 61000-3-3

Security :

EN 60335-1
EN 60335-2-15
IEC 60335-1
IEC 60335-2-15
IEC 60335-2-75

Associations:



Vending Association
Switzerland



German Vending
Association



European Vending
Association



Speciality Coffee
Association
of Europe

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Table of contents

1	Introduction	4
1.1	Safety Instructions.....	4
2	Measures Milk module.....	5
3	Handling	6
3.1	Installation.....	6
3.1.1	Unpacking the Machine	6
3.1.2	Water Connection	6
3.1.1	Water Filter / Water Softener	6
3.1.1	Electricity	6
3.2	Boiler Safety	7
3.2.1	Safety regulation for pressure systems.....	7
3.2.2	Regular function of the pressure system.....	7
3.2.3	Safety function of the pressure system.....	7
3.2.4	Safety test.....	7
4	Electronics	8
4.1	Schematics	8
4.2	Electronics Description.....	9
4.3	I2C AVR MILK UNIT BOARD	10
5	Waterflow	11
5.1	Diagram.....	11
5.2	Legend Water flow diagram.....	12

1 Introduction

Welcome to our service team. Reading this manual you will find out how easy it is to take care of this modern coffee machine. The installation, service and repairing work must be done from an Aequator authorised technician.

Operating, programming, servicing and maintenance are explained in this manual. You will learn about safe and correct handling of the machine.

We do not assume any liability for damages caused by non-observance of the instructions or by improper handling of the machine.

It is impossible to treat all problems in this technical manual. If you need additional information or do not find your problem in the manual, do not hesitate to contact us at support@aequator.ch or via fax.



Generic warning



Hazard symbol High Voltage

1.1 Safety Instructions



For safety purposes, unplug the power connector for any operation inside the unit, e.g. cleaning!

The machine is constructed for safe operation, meeting advanced engineering standards.
The machine is produced in accordance with the valid CE regulations and ISO 9001.

However, the use of the machine may be dangerous if

- you do not follow the present instructions of operation carefully
- unauthorised staff installs, maintains or repairs the machine
- there is improper use of the machine, not according to the original purpose thereof.

The above may cause

- danger to correct, efficient, and reliable working of the machine
- danger to the payment system and to further assets of the operator or the user
- danger to life and limb

Concerning transport, installation, maintenance and repair please consult the latest edition of the following regulations and guidelines of your country:

- Regulations of the federation of electro-technology
- EU – guidelines (in EU - countries)
- Regulations concerning the prevention of accidents
- Guidelines of the professional union
- Trade regulations

The following points are to be considered:

- The prepared drinks are hot.
- Some parts of the machine are hot.
- Some parts of the machine are under high pressure. (Hot water)
- The water flowing out during the cleaning process is hot.
- Any change or modification of the machine is prohibited.
AEQUATOR AG does not assume any liability in such a case.
- Store the machine in dry rooms and never in frosty environment.
- Transport it only in the original packing.

2 Measures Milk module

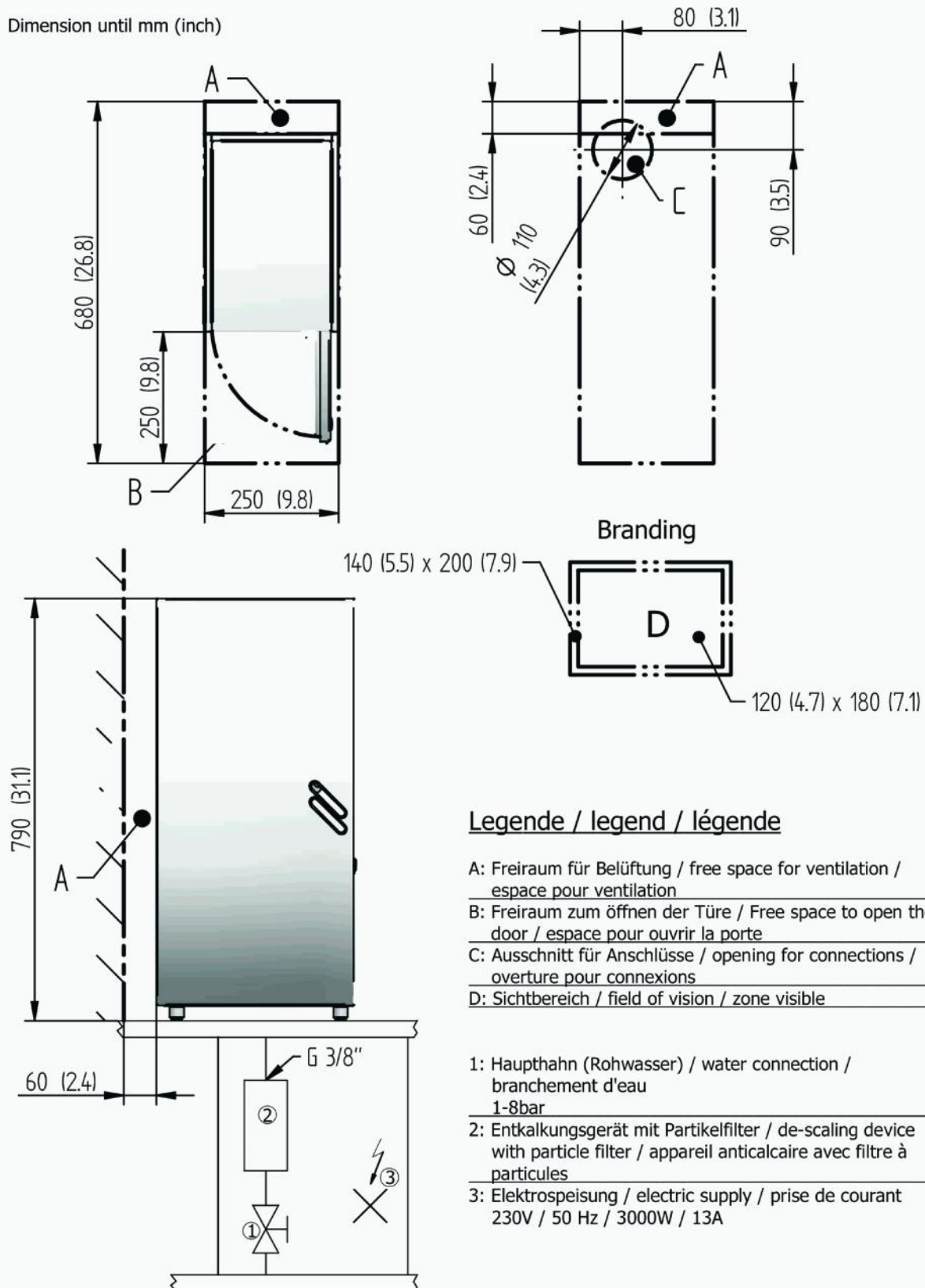
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Massblatt / Dimension / Mesures

AQUATOR
Swiss made coffee machines 

Milk-Unit

Dimension until mm (inch)



Legende / legend / légende

- A: Freiraum für Belüftung / free space for ventilation / espace pour ventilation
- B: Freiraum zum öffnen der Türe / Free space to open the door / espace pour ouvrir la porte
- C: Ausschnitt für Anschlüsse / opening for connections / ouverture pour connexions
- D: Sichtbereich / field of vision / zone visible

- 1: Haupthahn (Rohwasser) / water connection / branchement d'eau 1-8bar
- 2: Entkalkungsgerät mit Partikelfilter / de-scaling device with particle filter / appareil anticalcaire avec filtre à particules
- 3: Elektrospeisung / electric supply / prise de courant 230V / 50 Hz / 3000W / 13A

3 Handling



The manufacturer does not assume any liability for damages caused by non-observance of the instructions below.

3.1 Installation

Please check before installing the machine:

- water connection
- electricity
- degree of hardness of the water

3.1.1 Unpacking the Machine

Check whether the machine is undamaged. If you have any doubts, do not operate the machine.

Recycle the packaging material.

The machine complies with IP20 and must be operated in dry rooms only!



This table top machine must not be operated on the floor!

The machine must be placed on a horizontal surface, not exceeding 2 degrees inclination. Adjust the position with the adjustable feet.

3.1.2 Water Connection

Connect the machine to your drink water system, observing the legal regulations of your country.

The water pressure must be 0.1 to 0.8 MPa (1 to 8 bars).

Rinse the water tubes before connecting the machine, until the water is clean and clear, without dirt. Connect the machine using the hose delivered with the machine. Outside the machine there must be an easily accessible water tap to turn the water on and off.

3.1.1 Water Filter / Water Softener

The standard machine is delivered without filter no softener.

Phosphate filters may be used in case of hard water, or ion exchangers in case of very hard water.

A suitable water filter must be placed between the water connection and the machine.

The manufacturer does not assume any liability for damages caused due to missing or improper use of water filters or softeners respectively.

A volume counter is integrated in the machine to facilitate the handling of exchangers.

3.1.1 Electricity

The machine is constructed for a one phase voltage of 230V AC. Before operating the machine, make sure the specifications indicated on the label correspond to your electricity network:

- Is the voltage range within the legal limits?
- Can the fuses take the required maximum load, and is the disconnection from the net between phase and neutral conductor guaranteed with a distance of a minimum of 3 mm between the wires?

The main plug must be easily accessible.

The power cord is firmly connected to the machine and must only be removed and replaced by electrical engineers. The exclusive use of cables of type HO5 RR-F, HO5 RN-F, HO5 VV-F, HO7 RN-F, with wire size of 3 x 1.5 mm² is a must.

The electric safety of the machine is only guaranteed if duly connected to a network with proper earth connection.



This safety measure must be guaranteed. If you have any doubts, have your connection checked by an electrical engineer.

It is strictly forbidden to use adapters, multiple plugs or extension power cords.

Before operating the machine make sure that the water connection is properly installed and that the water tap is open.

3.2 Boiler Safety

3.2.1 Safety regulation for pressure systems

It is advisable to recommend that owners have to inspect Milk Unit machines on an annual basis. In UK the owner of equipment is governed by the PSSR (Pressure Systems Safety Regulations) act. This means, that they must be maintained by a competent engineer and examined on an annual basis and the safety and expansion valve checked for operating.

3.2.2 Regular function of the pressure system

The Milk Unit has a pressurised steam system. Temperature in the steam boiler is controlled by a pressure switch set to 1.7bar.

The temperature is directly related to pressure. As the temperature in the steam boiler rises, so does the pressure. When the pressure reaches 1.7bar (about 118°C) the pressure switch operates and cuts the supply to the solid state relay.

When the solid state relay is in its open state, it cuts the supply to the heating element, and so the "boiler" stops heating.

When the boiler temperature drops, the pressure descends also, which closes the pressure switch again. The supply to the solid state relay will now start the heating cycle again.

3.2.3 Safety function of the pressure system

Should a fault condition occur and the pressure switch fails to switch off the supply to the solid state relay, the steam boiler would continue to heat until the first safety device cuts in.

1. This is a thermal trip (thermo fuse) on the steam boiler set at 140°C.
Then this operates it cuts the supply to the solid state relay and heating element.
2. The second level of safety is the over pressure valve. This valve opens mechanically.
It releases the pressure from the steam boiler safely.
3. Should these two levels of safety fail, the third safety level sets in.
The PTFE-tubes within the machine will lose their strength, related of over temperature.
The tubes will rupture and release the pressure safely within the machine

3.2.4 Safety test

The Overpressure valve (2. Safety level) needs to be tested yearly.

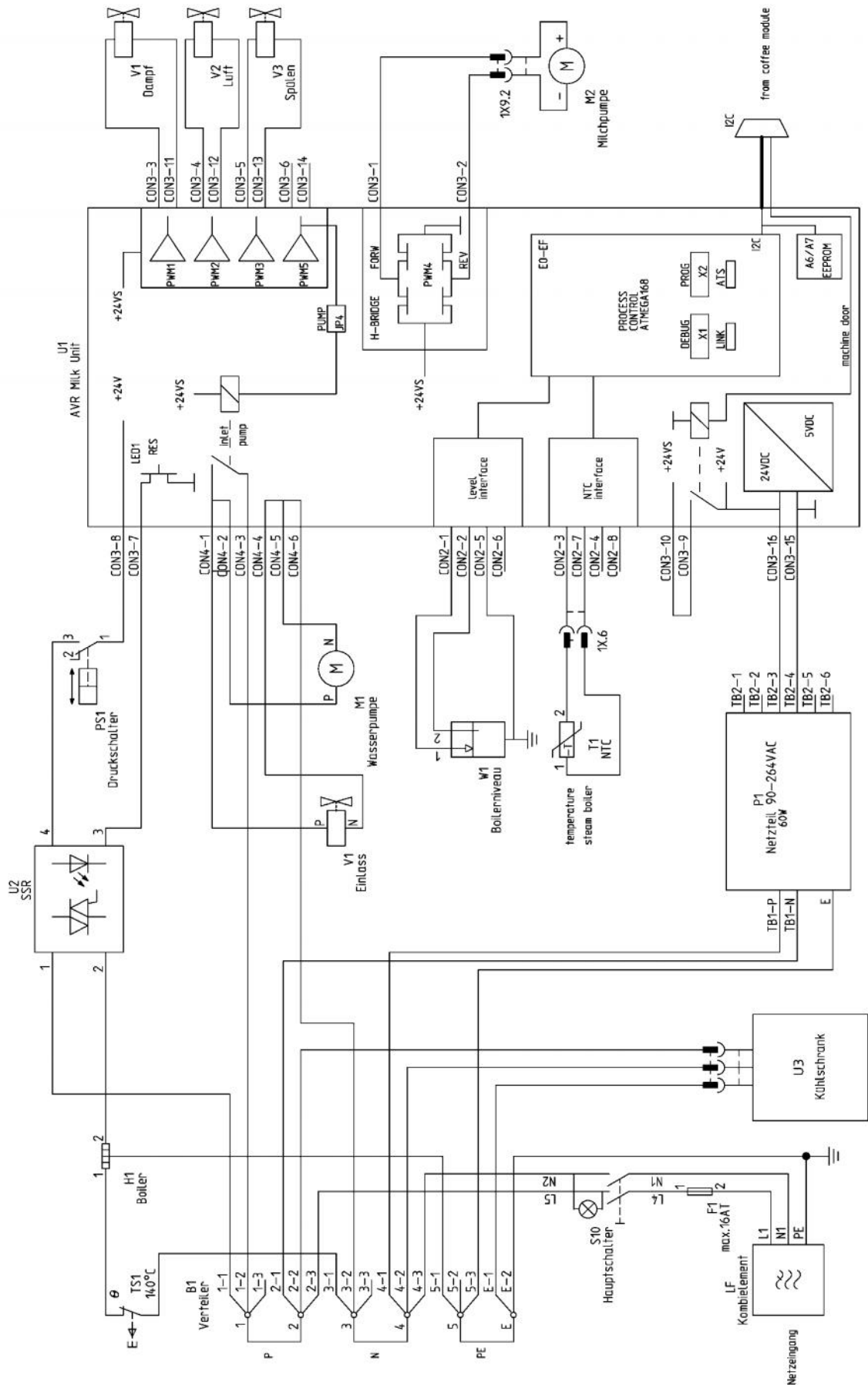
We test the over pressure valve by starting in the technician menu the over pressure test routine:

- Switch on the machine and wait, until "Select Drink" is shown at the display
- Enter the technician menu, and start the pressure test routine.
- The pump in the milk unit starts now and generates an over pressure in the boiler.
The over pressure valve should open before reaching 3bar.

In case, the over pressure valve opens not before 3bar, exchange it and test again.

4 Electronics

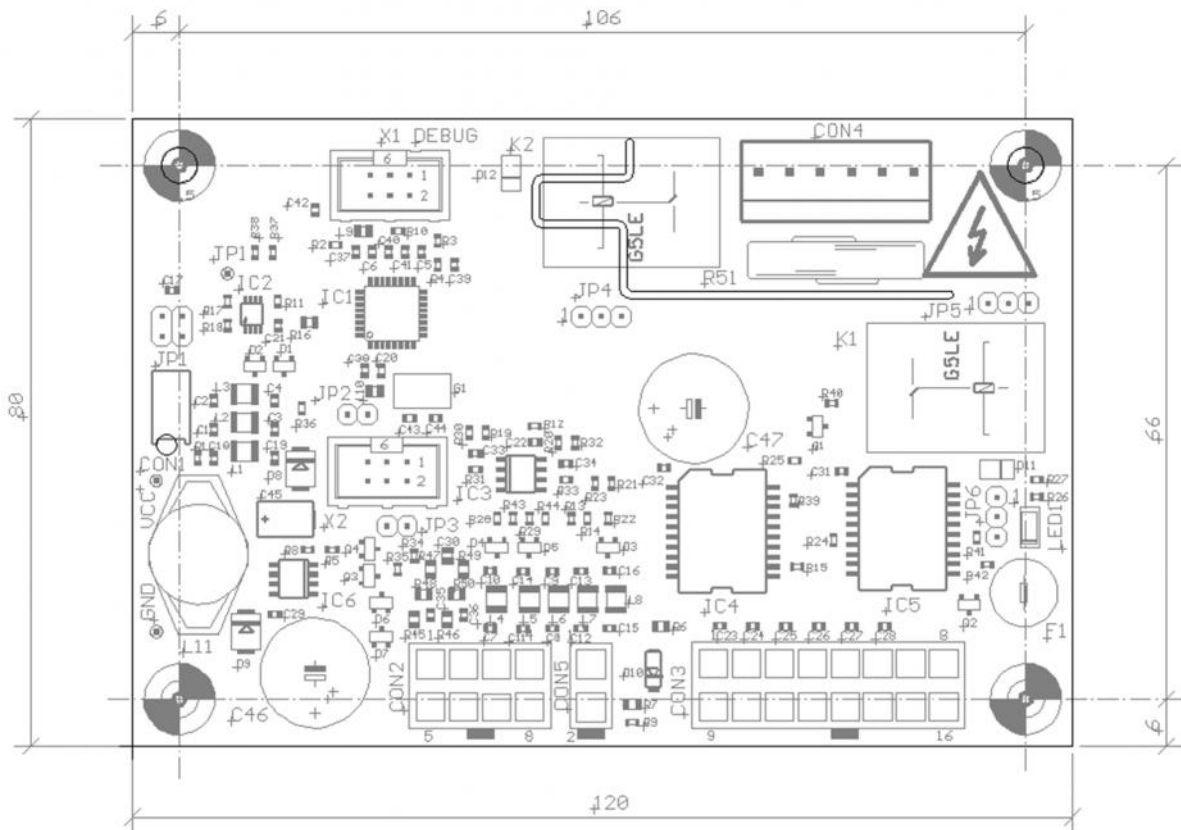
4.1 Schematics



4.2 Electronics Description

Pos.	Description	Bemerkung
H1	Heating boiler	
I2C	Connection to machine	I2C Protocol
LF	Mains filter	
M1	Water pump	
M2	Milk pump	
P1	Power Supply Board	
S10	Main Switch	
T1	Temperature sensor	NTC
U1	Electronic board Milk module	
U2	Solid State Relay	SSR
U3	Fridge	
W1	Level Sensors	Min. / Max. Level
V1	Inlet Valve	
V1	Steam Valve	
V2	Air Valve	
V3	Flush Valve	Water

4.3 I2C AVR MILK UNIT BOARD



LED'S

Pos.	Function	Description	Color
LED1	Heating	Control Heater 1 ON	yellow

Testpoints

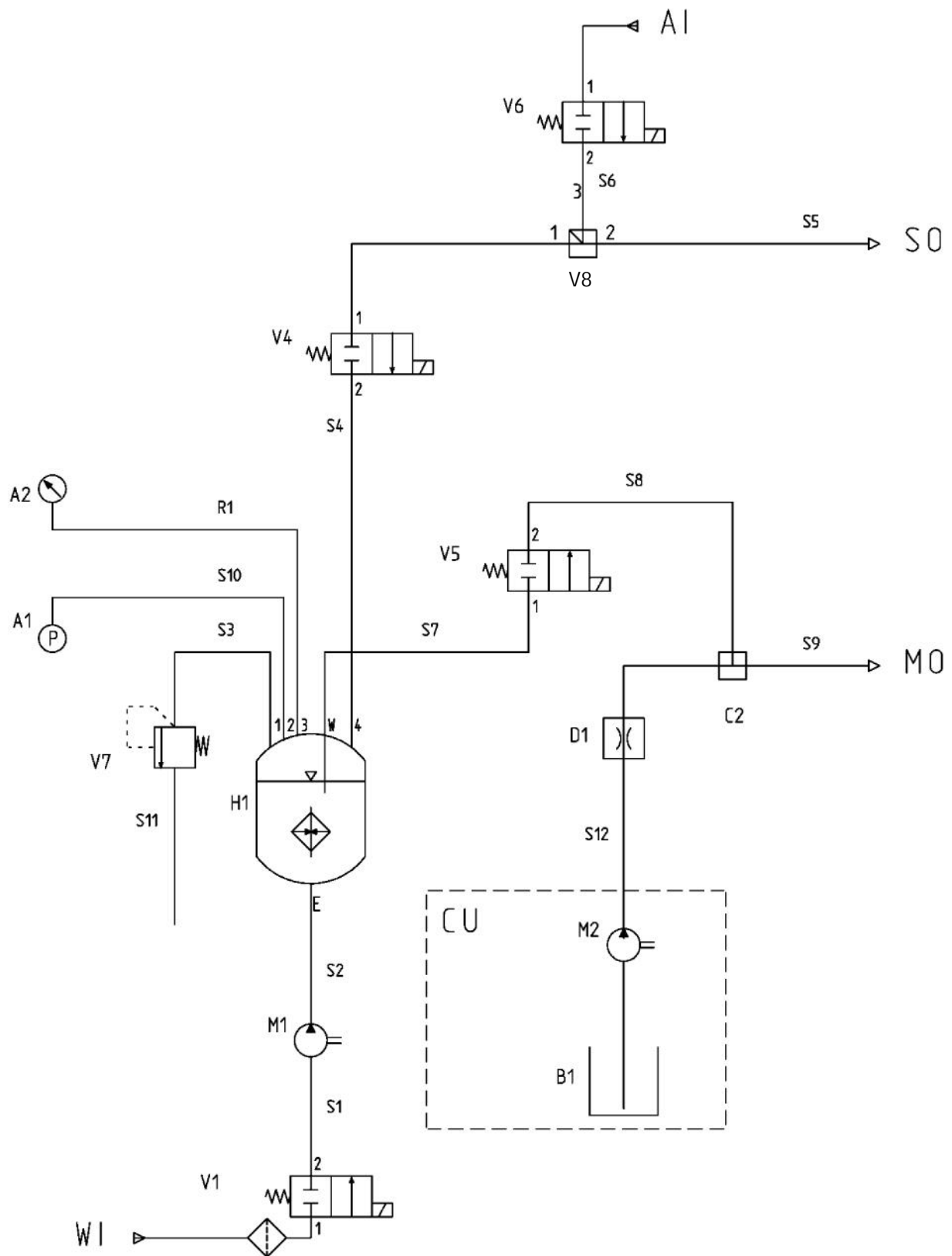
Pos.	Description	Level
GND	GND	0V
VCC	Supply logic	+5V DC

Jumper

Pos.	Function	Description	1-2	3-4
JP1	24VDC Door Switch	24VDC Door Switch/Power from I2C Connector	GNDIO	24VDC
JP2	ATS Link	Test Software ATS via RESET (optional)	option	
JP3	+5V Link	Programming serial TTL activation	active	
			1-2	2-3
JP4	Relais Control	Relais for 230VAC Inlet valve & Pump	OFF	active
JP5	24VDC Link	24VDC Versorgung Türschalter überbrücken	OFF	active
JP6	Heating	Heizung activated/deactivated (prog.)	active	prog.

5 Waterflow

5.1 Diagram



5.2 Legend Water flow diagram

Pos.	Bezeichnung	Bemerkung
WI	Water IN	
AI	Air IN	
SO	Steam OUT	
MO	Milk OUT	
CU	Cooling Unit	
A1	Manometer	
A2	Pressure regulator	
B1	Milk container	
C2	T-piece adapter	Milk, Water
H1	Boiler	
M1	Water pump	
M2	Milk pump	
R1	Copper pipe	Pressure regulator
S1	Silikon pipe red	
S2	PTFE pipe 4x6mm	Transparent/white
S3	PTFE pipe 4x6mm	Transparent/white
S4	PTFE pipe 4x6mm	Transparent/white
S5	Silicon rubber pipe	Steam, black
S6	PTFE pipe	Transparent/white
S7	PTFE pipe	Transparent/white
S8	Silicon rubber pipe	Water, black
S9	Silicon rubber pipe	Milk, black
S10	PTFE pipe	Manometer
S11	Silicon rubber pipe	Overpressure, black
S12	Special rubber pipe	white
T1	T-piece adapter	
V1	Inlet valve	
V4	Steam valve	
V5	Water valve (Rinse)	
V6	Air valve	
V7	Overpressure valve	
V8	Venturi – Mixing chamber	Steam & Air