Взрывозащищенные камеры Safety X

Руководство по эксплуатации

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1 Preface

1.1 Notes to the Document

This operating manual is a behaviour guide of the manufacturer for the operator of the unit and all persons being engaged in installation, operation, maintenance and repair.

The photographs in this manual might deviate from the conditions at your unit.

1.1.1 Symbols in the Text

The unit is designed according to the state of the art ensuring operating safety. Nevertheless, dangers might arise due the construction, which cannot be excluded.

The following expressions, which are used in this operating manual, shall indicate dangers when handling the unit or they shall give information for unit handling.

DANGER

Warning of injuries with fatal consequences.
Non-observance of the warning might result in severe health damages including death.
➔ The arrow indicates a protective measure you should take to avert the danger.

WARNING

Warning of severe injury.
Non-observance of the warning might result in severe health damages.
➔ The arrow indicates a protective measure you should take to avert the danger.

CAUTION

Warning of injury.
Non-observance of the warning might result in minor and moderate health damages.
➔ The arrow indicates a protective measure you should take to avert the danger.

NOTE

Warning of property damage.
Non-observance of the warning might result in considerable damage of the unit or of its environment.
➔ The arrow indicates a protective measure you should take to avert the danger.

HINT
Further useful information.

Furthermore, this operating manual contains safety signs according to DIN 4844 and BGV A8 (Implementation of the EC Regulation 2006/42/EC).

1.2 Obligations of the Operator

The unit is designed according to the state of the art ensuring operating safety. Nevertheless, dangers might arise from the unit, or it might be damaged.

Therefore, the operator shall ensure the following:

- Installation of the unit only in explosive areas of zone 1.
- Ensure, that only an explosive area of zone 1 within the usual atmospheric conditions can be expected for the test room of the unit due to the stored media (air pressure between 88 and 110 kPA, oxygen content approx. 21 %).
- Only use cables for electrical connection, which can withstand the mechanical, chemical and thermal strains to be expected.
- Ensure, that the condensate drain valves are installed prior to initial start-up.
- Ensure, that the tubular port for the measuring lines is sealed gas-tightly.
- If an exhaust pipe is existing, it must be connected to an explosion-proof exhaust system (zone 1), or the exhaust air must be released to the atmosphere. The opening for the exhaust pipe to the atmosphere is surrounded by a spherical ex zone with a diameter of 1 m. The explosive area must be marked correspondingly by the operator.
- Any person, who is engaged in operation, maintenance or repair of the unit, must be informed concerning potential hazardous characteristics of the tested materials and must be instructed concerning preventive measures for danger prevention.
- Any person, who is engaged in installation, operation, maintenance or repair of the unit, must be familiar with the safety devices of the unit and must be informed of the behaviour in case of hazardous incidents.
- Any person, who is engaged in installation, operation, maintenance or repair of the unit, must wear personal protective equipment (safety glasses, tight-fitting protective clothing, safety shoes, safety gloves, respirator mask etc.).
- Any person, who is engaged in installation, operation, maintenance or repair of the unit, must have read and understood the relevant parts of the operating manual.
- The operating manual must always be readily available.

- Only persons shall be allowed to operate the unit, who are familiar with the basic regulations for work safety and accident prevention, who are instructed in handling the unit and who are authorized for the corresponding task.
- All processes, competences and responsibilities in the area of the unit must be unambiguously determined.
- Security-conscious working of the personal must be checked regularly.
- The unit must always be fully functionally.
- All safety devices must be fully functionally.
- The unit and the entire work area must always be clean and tidy.
- Units, which are used for microbiological or bacterial tests etc., shall not be used for storage of food.
- Batches, which have been tested in the unit, must be disposed professionally.
- All maintenance/inspection tasks must be executed according to the scheduled time intervals.
- Modifications, addition or conversion of the unit are not allowed without prior approval of the manufacturer and of the named authority. This applies particularly to temperature limiters, flow controllers, protective motor switches and other safety devices. This applies also to modifications of the software of the programmable control systems.
- Only use original RUMED ® spare parts for repair.
- All national laws and regulations, the national safety regulations and laws and the company safety regulations and laws, the Ordinance on Industrial Safety and Health (BetrSichV) etc., which are applicable for the unit, including those, which are not expressly mentioned herein, must be observed.
- Observation of the following standards:
  - ATEX 99/92/EC
  - EN 60079-14
  - EN 60079-17
  - EN 60079-19

In case of doubt or further questions, please address to "Rubarth Apparate GmbH".

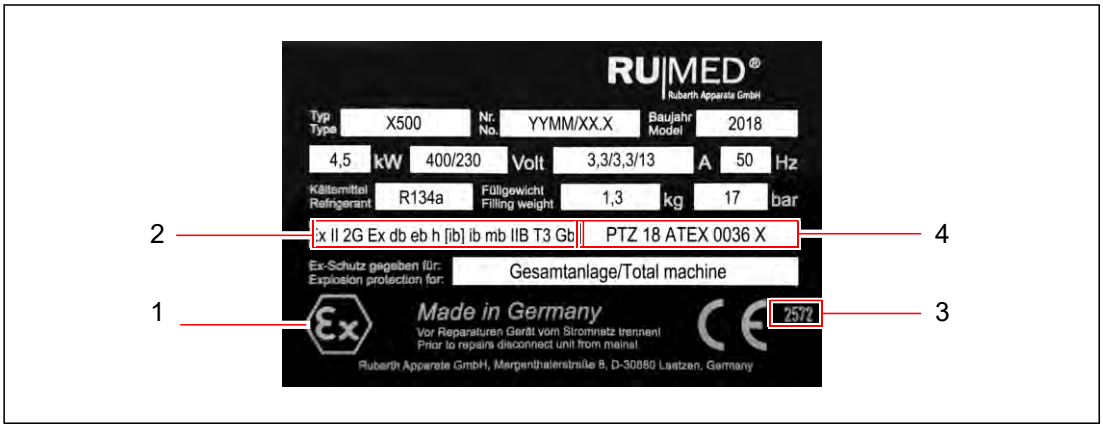
3 Information Concerning the Unit

NOTE

Property Damage!
Metal objects, which are placed on or in the unit and which do not consist of stainless steel, might damage the stainless-steel surfaces of the unit due to formation of extraneous rust.
➔ Never place metal objects, which do not consist of stainless steel, on or in the unit.

3.1 Nameplate

Ex Marking on the Nameplate



No.	Marking	Explanation
1	Ex	Specific safety sign for protection against danger of explosion
2	II	Electrical equipment for all explosive areas, except of potentially explosive atmospheres in underground mines.
	2G	Zone 1: Application gases, fogs, vapours
	db	Pressure-proof housing: Application in zone 1 and zone 2
	eb	Increased safety: Application in zone 1 and zone 2
	h	Type of protection of non-electrical appliances
	[ib]	Intrinsic safety: associated electrical equipment - Installation in safe area
	ib	Intrinsic safety: Application in zone 1 and zone 2
	mb	Encapsulation: Application in zone 1 and zone 2
	IIB	Suitable for gases of group IIA and IIB
	T3	Temperature class of the unit
	Gb	Unit protection level EPL according to IEC 60079-0: Zone 1
3	2572	Number of the named authority for manufacturer certificates
4	*** yy ATEX zzzzX	***: Code of the named authority for ATEX certification yy: Year of issue of the certificate zzzz: Approval number X: Special conditions

3.2 Description

The test and simulation equipment allows rapid temperature-conditioning, storage of material or tests with material, which occasionally or temporarily might develop an explosive atmosphere. The material is stored in the test room of the test and simulation equipment.

The appliances of the X-Line are approved for installation in zone 1 and zone 2.

The supply of the temperature sensors in the test room is executed intrinsically safe. The optimum temperature distribution in space is achieved by installation of the fan wheel and drive motor in the test room. Both have an ex certificate.

In case of a temperature extension to +80 °C, the drive of the test room air circulation is located outside the cabinet, but it has also an ex certificate.

Standard heating is effected with hot gas of the refrigerating system. In case of the option +80 °C, heating is effected by an additional heater with ex certificate in the test room with the type of protection "increased safety".

For separation, the test room is sealed all around to largely avoid a carryover of the explosive atmosphere.

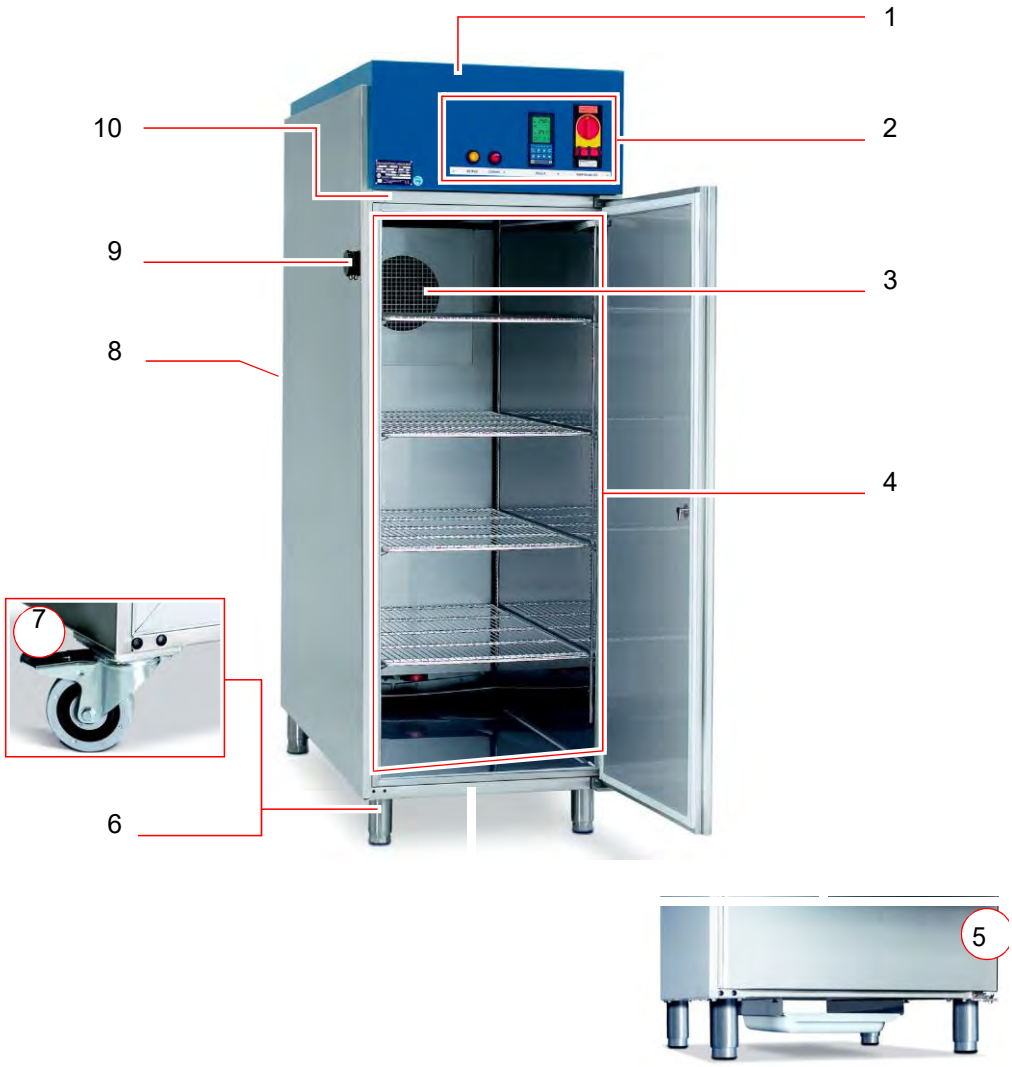
The switch cabinet is located in a pressure-proof housing. When the door is opened, a safety shut-down will be effected by a contact-free door limit switch, which is executed in the type of protection "pressure-proof housing". In succession, the electrical circuits of ventilation, heating and cooling will be interrupted. A permanent disconnection is effected, if the adjusted limit temperature of the unit of max. 40 °C or 90 °C is exceeded with an extension of the temperature range to +80 °C.

The control and the refrigerating machine are located in a separate volume in the upper part of the test and simulation equipment, and they are executed explosion-proof. During the disconnection due to the opened door, the control continues working. The explosion protection is here ensured by the explosion-proof execution of the temperature controller.

The maximum admissible ambient temperature of the test and simulation equipment is +30 °C. Minimum and maximum test room temperatures are 0 °C/+35 °C (standard execution) or +80 °C (upper temperature extension) and -20 °C (lower temperature extension).

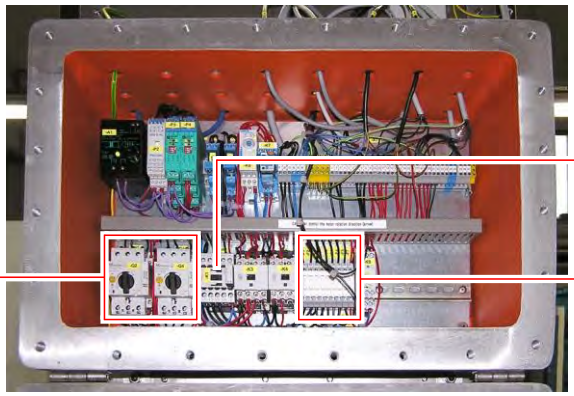
3.3 Overview

Single Door Units (such as X 820)

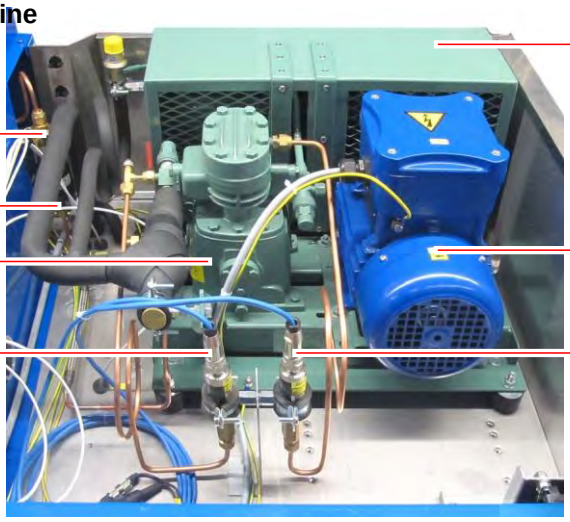


Item	Designation
1	Refrigerating machine
2	Control and display elements
3	Recirculating air cycle (motor at rear side in case of optional extension of the temperature range to +80 °C)
4	Test room
5	Condensate collecting pan (option)
6	Feet, adjustable in height
7	Steering rollers (option)
8	Switch cabinet (rear)
9	Tubular port
10	Door contact switch

Switch Cabinet (Rear)

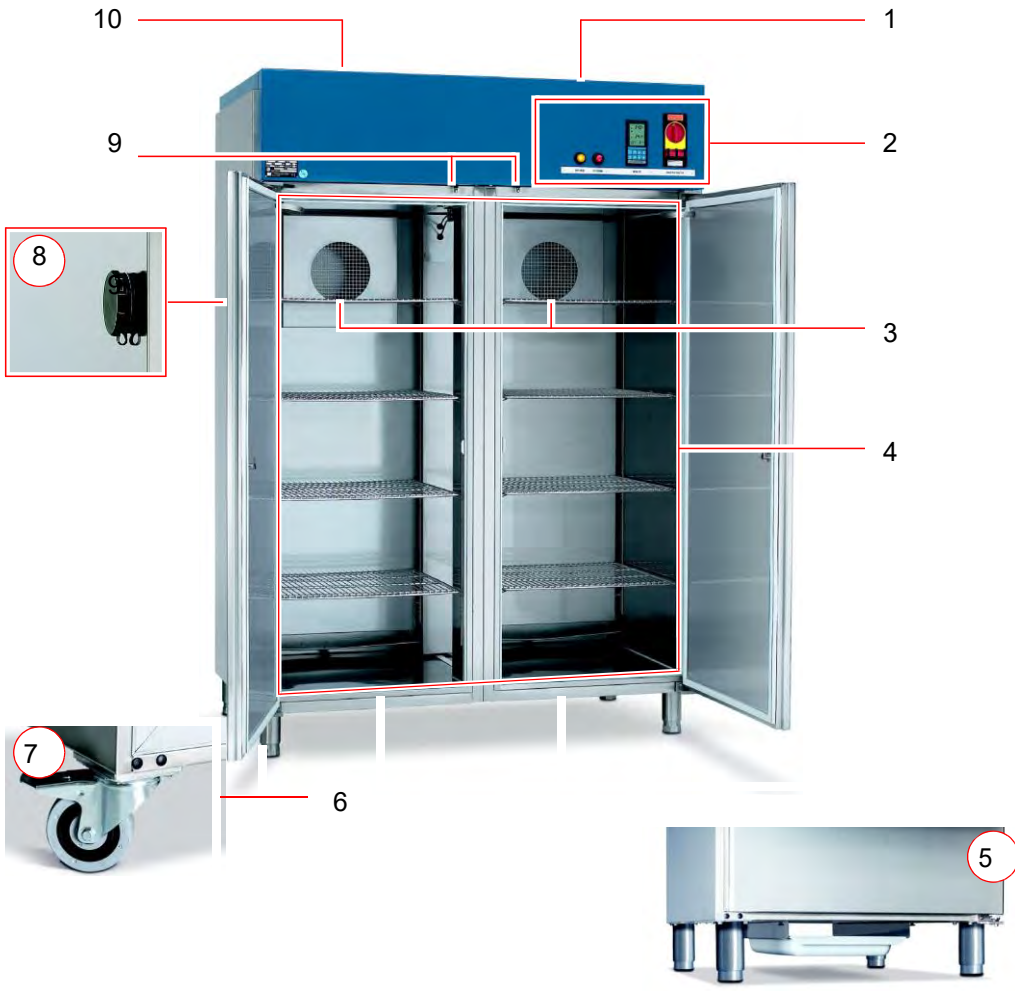


Refrigerating Machine



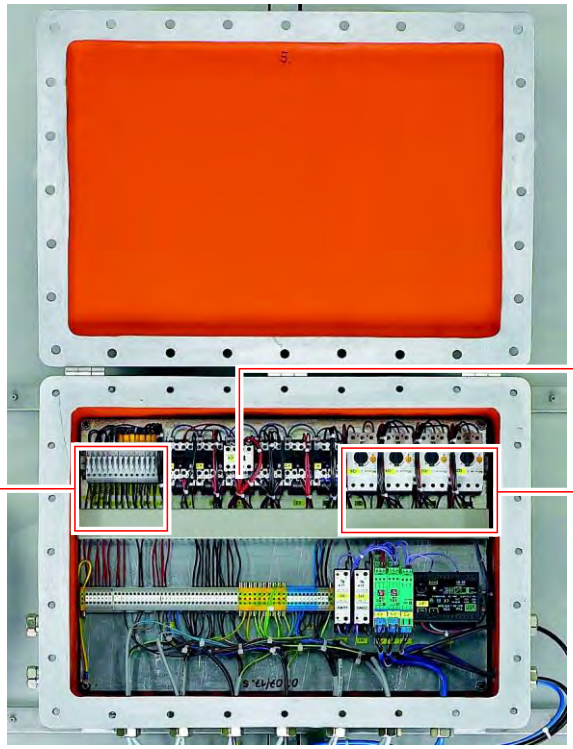
Item	Designation
1	Protective motor switch (refrigerating machine and recirculating air fan)
2	Residual current circuit breaker (in case of optional extension of the temperature range to +80 °C)
3	Fuses
4	Belt protective cover
5	Drive motor refrigerating machine
6	Pressure transmitter high pressure
7	Pressure transmitter low pressure
8	Chiller
9	Inspection glass oil
10	Inspection glass refrigerant

Double Door Units (such as X 1000)

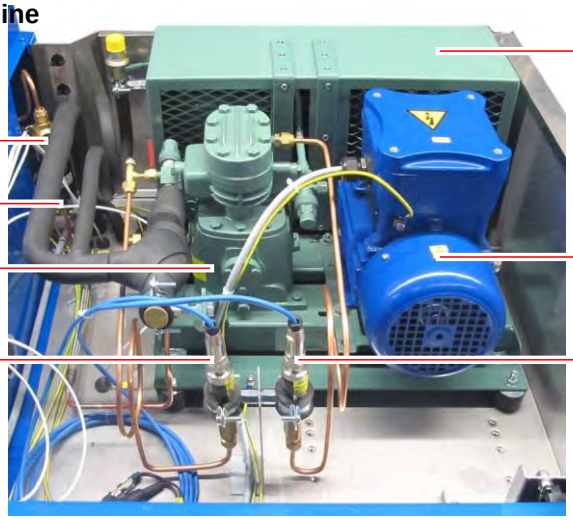


Item	Designation
1	Refrigerating machine
2	Control and display elements
3	Recirculating air cycle (motor at rear side in case of optional extension of the temperature range to +80 °C)
4	Test room
5	Condensate collecting pan (option)
6	Feet, adjustable in height
7	Steering rollers (option)
8	Tubular port
9	Door contact switch
10	Switch cabinet

Switch Cabinet



Refrigerating Machine



Item	Designation
1	Fuses
2	Residual current circuit breaker (in case of optional extension of the temperature range to +80 °C)
3	Protective motor switch (refrigerating machine and recirculating air fan)
4	Belt protective cover
5	Drive motor refrigerating machine
6	Pressure transmitter high pressure
7	Pressure transmitter low pressure
8	Chiller
9	Inspection glass oil
10	Inspection glass refrigerant

4 Safety

The operator is responsible for the safe use of the unit. The following must be observed:

- Observation of the general, national safety regulations and the company safety regulations.
- Inside the unit only an explosive area of zone 1 within the usual atmospheric conditions is allowed due to the stored media (air pressure between 88 and 110 kPA, oxygen content approx. 21 %).
- Equipment with exhaust pipe: The exhaust pipe must be connected to an explosion-proof exhaust system (zone 1), or the exhaust air must be released to the atmosphere. The opening for the exhaust pipe to the atmosphere is surrounded by a spherical ex zone with a diameter of 1 m. The explosive area must be marked correspondingly.
- Ensure, that the condensate drain valves are installed.
- Ensure, that the tubular port for the measuring lines is sealed gas-tightly.
- Installation of the unit is only allowed in explosive areas of zone 1.
- Application is only allowed, if the unit is in faultless condition.
- All warnings and safety instructions at the unit must be observed.
- All safety measures, which possibly might result from the specimen, must be observed.
- Potential danger resulting from the specimen must be observed.

4.3 Zone Classification

The unit is approved for zone 1 and zone 2. The test room is approved for zone 1 (marking 2G).

Explosion Zone, Gases, Vapours and Fogs (EN 60 079-10)	Unit Category	A dangerous, potentially explosive atmosphere is produced ...	No effective ignition source ...
✗ **Zone 0**	1G	Permanently or long-term (>1000 hours/year)	During trouble-free operation, just as in case of rare or frequent malfunctions
✓ **Zone 1**	2G	occasionally (10-1000 hours/year)	During trouble-free operation and in case of frequent malfunctions
✓ **Zone 2**	3G	only rarely and only short-term (<10 hours/year)	During trouble-free operation

4.4 Explosion Groups

The appliance is approved for explosion group II.

Explosion Group I	Explosion Group II
✗ Electrical equipment for potentially explosive atmospheres in underground mines, such as mining: pulverised coal, methane gas	✓ Electrical equipment for all explosive areas, except of potentially explosive atmospheres in underground mines, such as the chemical industry: dyestuffs

4.5 Temperature Classes in Explosion Group II

The appliance is approved for the temperature classes T1, T2 and T3 of the explosion groups IIA and IIB.

Temperature Class	Maximum Admissible Surface Temp. of the Equipment	Ignition Temperature of the Combustible Substances
✓ **T 1**	450 °C	>450 °C
✓ **T 2**	300 °C	>300 °C ≤ 450 °C
✓ **T 3**	200 °C	>200 °C ≤ 300 °C
✗ **T 4**	135 °C	>135 °C ≤ 200 °C
✗ **T 5**	100 °C	>100 °C ≤ 135 °C
✗ **T 6**	85 °C	>85 °C ≤ 100 °C

4.6 Exemplary Classification of Combustible Gases and Vapours to Explosion Groups and Temperature Classes

The appliance is approved for the temperature classes T1, T2 and T3 of the explosion groups IIA and IIB.

Explosion Group	Temperature Class					
	T1 (450 °C)	T2 (300 °C)	T3 (200 °C)	T4 (135 °C)	T5 (100 °C)	T6 (85 °C)
	✓	✓	✓	X	X	X
✓ IIA	Acetone (540 °C) Ethane (515 °C) Propane (470 °C) Toluene (535 °C)	Cyclohexanone (430 °C) i-Amyl Acetate (380 °C) n-Butane (365 °C) n-Butyl Alcohol (340 °C)	Petrol (220 °C-300 °C) Diesel (220 °C-300 °C) Fuel Oil (220 °C-300 °C) n-Hexane (240 °C)	Acetaldehyde (140 °C)		
✓ IIB	City Gas (560 °C)	Ethyl Alcohol (425°C) Ethylene (425 °C) Ethylene Oxide (440 °C)	Hydrogen Sulphide (270 °C)		Ethyl Ether (180 °C)	
X IIC	Hydrogen H2 (560 °C)	Acetylene (305 °C)				Carbon Disulphide (95 °C)

4.7 Warning Signs and Mandatory Signs

Dangerous areas at the unit are marked with warning signs according to DIN 4844 and BGV A8.

Mandatory signs at the unit indicate necessary actions to be taken.

Warning signs, mandatory signs and other information signs at the unit must always be clearly legible. Illegible or damaged warning signs must be replaced immediately.

The following warning signs, mandatory signs and information signs are attached to the unit.

Symbol	Meaning	Example
	Warning of dangerous electrical voltage	• Cover Switch Cabinet
	Warning of hot surfaces	• Switchboard above the test room door (with optional extension of the temperature range to +80 °C)
	Warning of low temperature/cold	• Switchboard above the test room door (with optional extension of the temperature range to -20 °C)
	Do not drive underneath with lift truck	• Switchboard above the test room door For option "Condensate Collecting Pan"
	Withdraw mains plug	• Cover of switch cabinet
	Wear eye protection	• Test room door (with UV lighting)
	Maximum load of the shelves	• Test room shelf single frame
	Maximum load of the shelves	• Test room shelf double frame (option)

Symbol	Meaning	Example
	Warning of electrostatic charge	• Cable ducts rear

5 Storage

NOTE

Property Damage!
Metal objects, which are placed on or in the unit and which do not consist of stainless steel, might damage the stainless-steel surfaces of the unit due to formation of extraneous rust.
➔ Never place metal objects, which do not consist of stainless steel, on or in the unit.

Observe the following for storage of the unit:

- Always store the unit in a closed building.
- Protect the unit from humidity.
- Storage temperature from +10 °C to +30 °C
- No direct sun radiation.
- No condensation.
- Low-dust environment.

6 Technical Data

The technical data of your unit can be drawn from the nameplate. *See page 9*.

Entire unit explosion-proof  II 2G Ex db eb h [ib] ib mb IIB T3 Gb

Type	X 320	X 500	X 820
Test room			
Volume	320 l	500 l	820 l
Standard min. temperature	0 °C	0 °C	0 °C
Standard max. temperature	+35 °C	+35 °C	+35 °C
Temperature deviation in time	±0,5 °C	±0,5 °C	±0,5 °C
Height	990 mm	1500 mm	1500 mm
Width	610 mm	610 mm	610 mm
Depth	585 mm	585 mm	935 mm
Number of shelves (standard delivery scope)	3	4	4
Maximum load per shelf	25 kg	25 kg	25 kg
Unit			
Height	1600 mm	2105 mm	2105 mm
Width	760 mm	760 mm	760 mm
Depth	900 mm	900 mm	1250 mm
Electrical connection	400 V/230 V/ 50 Hz	400 V/230 V/ 50 Hz	400 V/230 V/ 50 Hz

Options

Type	X 320	X 500	X 820
Additional shelf (max. 25 kg)	X0320-01	X0500-01	X0820-01
Additional shelf, reinforced (max. 50 kg per shelf)	X0320-02	X0500-02	X0820-02
Glazed door, unheated	X0320-03	X0500-03	X0820-03
Extension of the temperature range to -20 °C	X0320-04	X0500-04	X0820-04
Extension of the temperature range to +80 °C	-	X0500-05	X0820-05
Speed of temperature change 1 °C/min (0 °C to +35 °C)	X0320-06	X0500-06	X0820-06
Speed of temperature change 1 °C/min (-20 °C to +80 °C)	X0320-07	X0500-07	X0820-07
Evaporation humidification + dehumidification	X0320-20	X0500-20	X0820-20

Type	X 1000	X 1640
Test room		
Volume	1000 l	1640 l
Standard min. temperature	0 °C	0 °C
Standard max. temperature	+35 °C	+35 °C
Temperature deviation in time	±0,5 °C	±0,5 °C
Height	1500 mm	1500 mm
Width	2 × 610 mm	2 × 610 mm
Depth	585 mm	935 mm
Number of shelves (standard delivery scope)	8	8
Maximum load per shelf	25 kg	25 kg
Unit		
Height	2105 mm	2105 mm
Width	1520 mm	1520 mm
Depth	900 mm	1250 mm
Electrical connection	400 V/230 V/ 50 Hz	400 V/230 V/ 50 Hz

Options

Type	X 1000	X 1640
Additional shelf (max. 25 kg)	X1000-01	X1640-01
Additional shelf, reinforced (max. 50 kg per shelf)	X1000-02	X1640-02
Glazed door, unheated	X1000-03	X1640-03
Extension of the temperature range to -20 °C	X1000-04	X1640-04
Extension of the temperature range to +80 °C	X1000-05	X1640-05
Speed of temperature change 1 °C/min (0 °C to +35 °C)	X1000-06	X1640-06
Speed of temperature change 1 °C/min (-20 °C to +80 °C)	X1000-07	X1640-07
Evaporation humidification + dehumidification	X1000-20	X1640-20

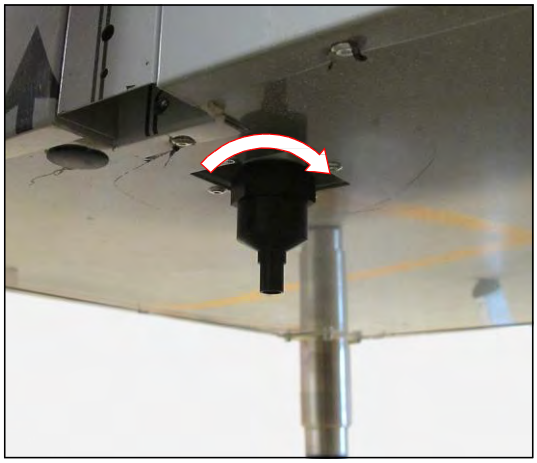
Dimensions sheets of the units are included in the chapter "Technical Annex":

- Single door units, *see page 68*.
- Double door units, *see page 69*.

7.2 Set-up

7.2.1 Installation of the Condensate Drain Valves

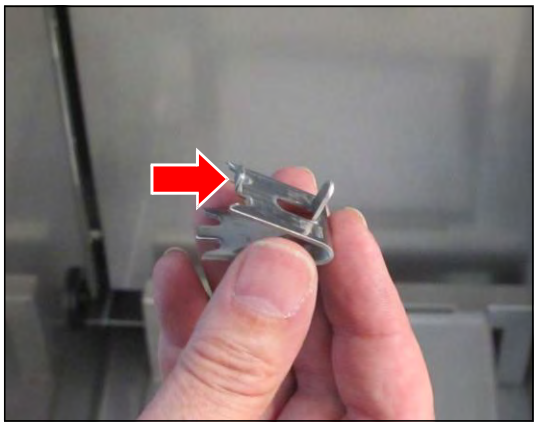
1. Screw the condensate drain valves from the unit rear to the condensate drain sockets below the unit.
   1 Piece at X 320, X 500, X 820
   2 Pieces at X 1000, X 1640

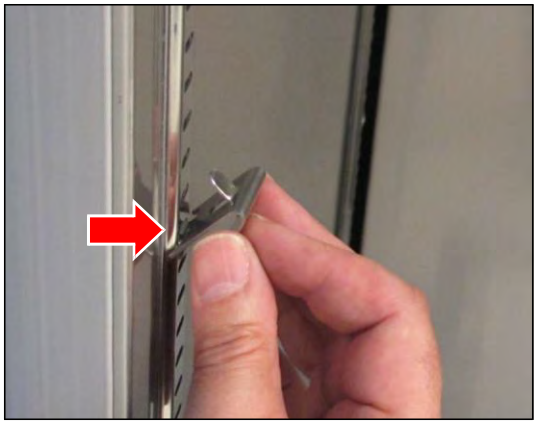


7.2.2 Installation of the Shelves

How to install the shelves:

1. Withdraw shelves and mounting clips from the test room.
2. Determine the position of the shelves.
3. Insert the upper hook of the mounting clip into the fastening rail.

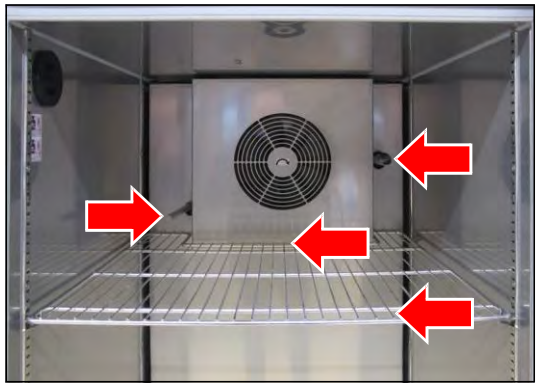




4. Press the mounting clip together from below and insert also the lower part into the fastening rail.

5. Fasten the fastening clips in the fastening rails in the same height. Numbers facilitate the positioning of the fastening clips in the same height.

6. Remove the protective cushions from the shelves.



7. Insert the shelves into the fastening clips.
   Double wire ahead.
   Insert the shelf with recesses in front of the fan. Do not damage the humidity sensor and the humidity blow-in pipe.

   Pegs at the fastening clips prevent the shelves from dropping when withdrawing them.

   For removal, the shelf must be lifted.

   The carrying capacity of the shelves (single frame) is a maximum of 25 kg surface load.

   The carrying capacity of the reinforced shelves (double frame) is a maximum of 50 kg surface load.

7.2.3 Tubular Port

The tubular port can be used to lead cables, measuring lines, hoses, tubes etc. into the test room.

The opening must permanently be sealed gas-tightly to prevent, that explosive gases might escape from the test room.

Use the closing plug.
See page 29.

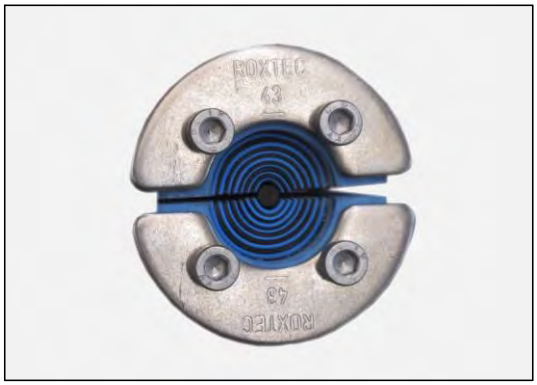
7.2.4 Adaptation of the Closing Plug to the Tubular Port

For gas-tight leading of the cables, tubes etc. in different sizes through the tubular port into the test room, the closing plug must be adapted.

Adaptation of the closing plug is possible in the range of 4 mm to 23 mm.

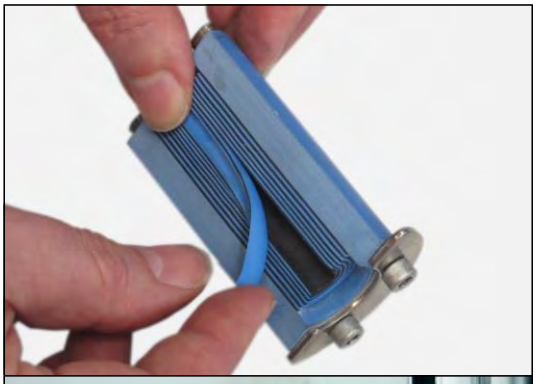
How to adapt the closing plug:

1. Loosen the four Allen screws from the closing plug.
2. Withdraw the closing plug from the tubular port.

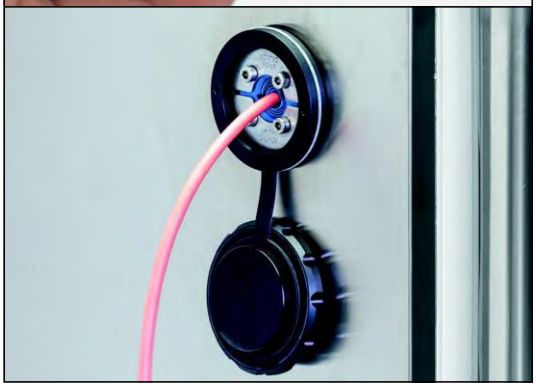


3. Open the closing plug.

4. Remove the rubber pads from both sides of the closing plug according to the required aperture diameter.



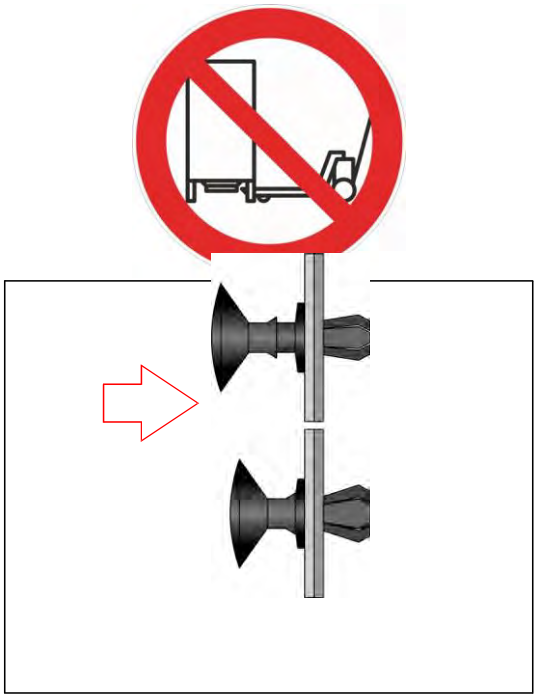
5. Insert the cable between the two sides of the closing plug.
6. Insert the closing plug into the tubular port.
7. Tighten the four Allen screws.
   The closing plug will be compressed, and the tubular port is sealed.



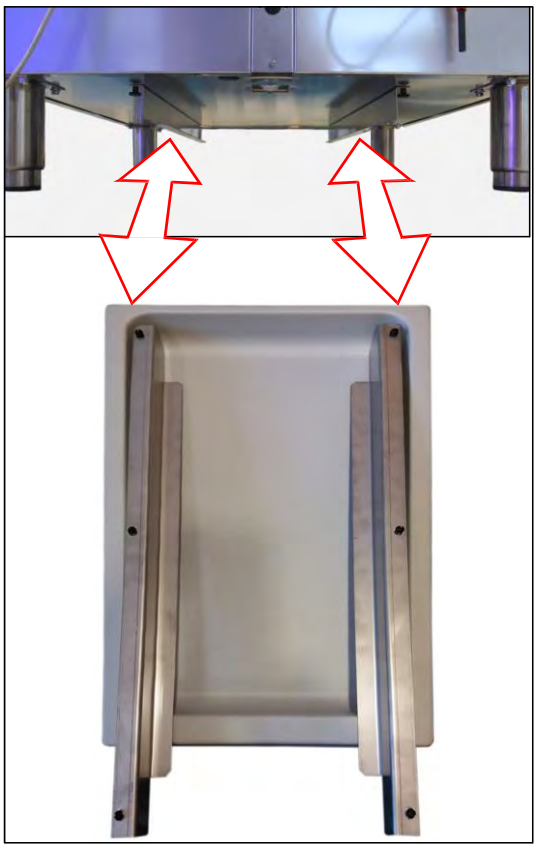
7.2.5 Installation of the Condensate Collecting Pan (Option)

How to install a condensate collecting pan:

HINT
Install the condensate collecting pan at the final installation place and after levelling of the unit. After the installation, the unit cannot be lifted anymore with a lift truck. Otherwise, the rails for the condensate collecting pan would be damaged.



1. Fasten the rails by pressing the six clips below the test and simulation cabinet.



2. Move the condensate collecting pan with the moulded recess to the front on the rails underneath the unit to the limit stop.

7.3 Connection

DANGER

Danger to life due to electrical current!
The unit is operated with three-phase current.

➔ Installation of the electrical system is only allowed to be performed by skilled and authorized expert electricians for explosion protection.

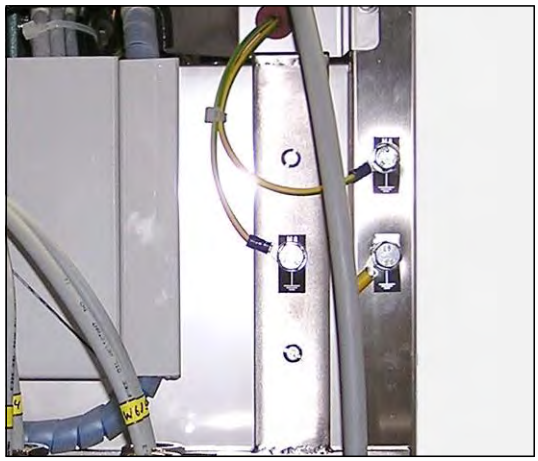
➔ The unit must be de-energized and must be protected from unintentional restart, *see page 35*.

The following must be observed for electrical connection:

- Only use cables, which can withstand the mechanical, chemical and thermal strains to be expected.
- Use appropriate cable platforms/cable ducts to produce safe cable connections between the unit and the connection point.
- Observe the minimum bending radius of the cables for laying.
- Kind of current (three-phase current) and voltage at the place of installation must coincide with the data on the nameplate of the appliance. *See page 9.*

1. Establish the equipotential bonding (ground connection on the rear, top right).

Cross-section of the Mains Cable	Cross-section of the Earth Conductor
Less than or equal to 16 mm^2	Cross-section identical
Between16 mm^2 and 35 mm^2	16 mm^2



The choice of the terminals and of the cable must be based on the maximum operating temperature, which is determined for the cable and which is indicated on an eventually existing label (if the maximum operating temperature exceeds 70 °C).
Only use seals, which have been delivered by the manufacturer.
Cable inputs, which are left unused, must be closed with marked cable closures.

The connections must be executed with cable inputs, which correspond to the standard 60079-14 (glands or conduits).

The cable input must be executed in such a way, that the specific characteristics of the protection class will not be changed and that the instructions in the standards are observed:

- EN 60079-1 for components with pressure-proof housing "d" (as explosion protection).
- EN 60079-7 for explosion-proof components with increased safety "e".

3. After connection, check the correct direction of rotation of the motors by means of the arrows. If required, exchange the two phases.

HINT
The direction of rotation can be seen best when the motor runs down, immediately after switching off.

8 Control and Display Elements

8.1 Temperature Controller

All entries and programming are effected at the temperature controller.
Information concerning operation can be found in the chapter Control. *See page 40*.

8.2 Main Switch

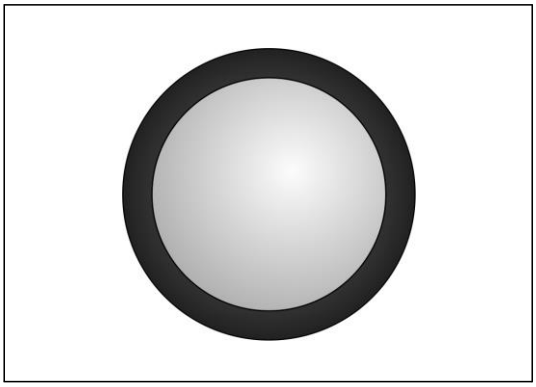
The supply voltage of the unit is switched on and switched off by means of the main switch.

- Position O (OFF) - Supply voltage is switched off.
- Position I (ON) - Supply voltage is switched on.

HINT
In switched-off position, the lock can be pushed upwards and the main switch can be protected against unintentional restart by means of up to three padlocks.

8.3 Pilot Lamp Operation

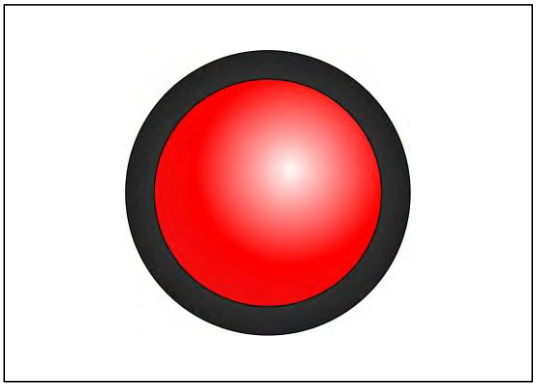
Lights up when the unit is connected to the energy supply and when it is switched-on.



8.4 Pilot Lamp Failure

Lights up

- shortly, when the unit is switched on and while the safety chain is checked.
- permanently, in case of a failure.



9.1 Switching on

NOTE

Property Damage!
When tilting the test and simulation equipment during transport, oil might flow from the refrigerating machine into the evaporator, which results in damage of the latter during operation.
➔ After transport, the equipment should be switched-on only after four hours in upright position.

1. Ensure, that the condensate drain valves have been installed. *See page 27*.
2. Ensure, that the tubular port is sealed gas-tightly.
   If the tubular port is used, the opening must be closed with a gas-tight closing plug. *See page 29*.

3. If required, remove the padlock from the main switch and push the lock downwards.
4. Use the main switch to switch the unit on.

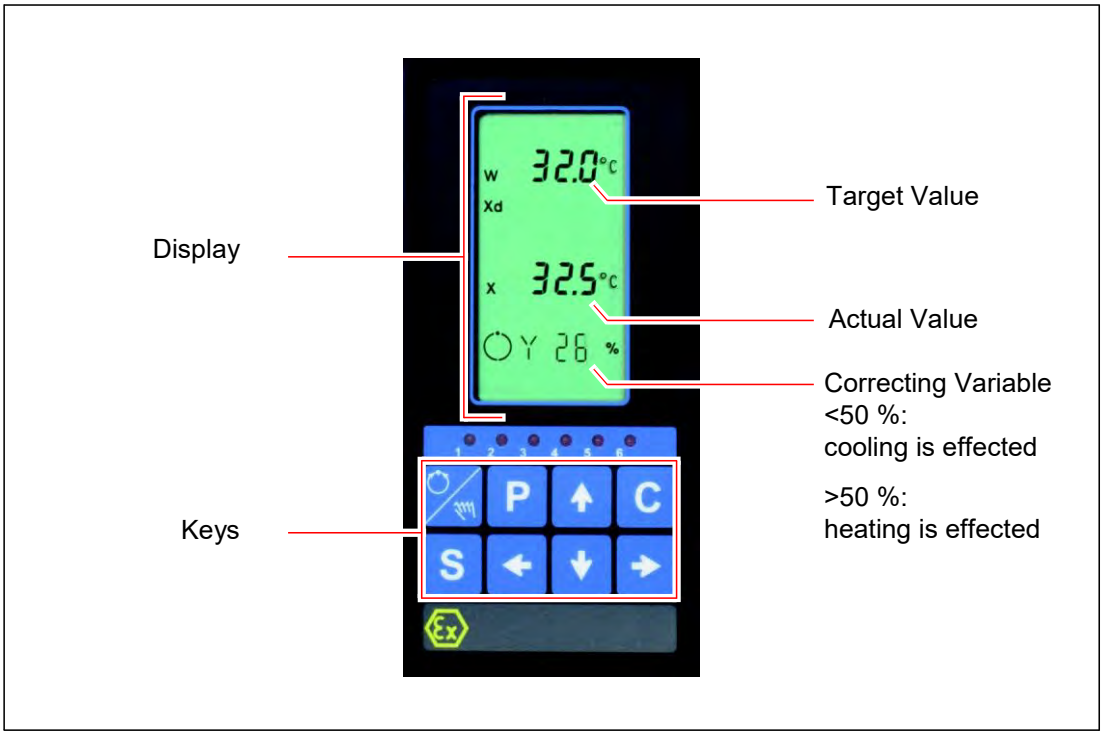
   The safety chain will be checked, The pilot lamp *Failure* will be lighting.

   If there is no failure, the pilot lamp *Failure* extinguishes after a few seconds and the pilot lamp *Operation* will be lighting.

   The temperature controller boots up.
5. Information concerning operation can be found in the chapter Control. *See page 40*.

10 Control

The unit is controlled by an explosion-proof temperature controller. All required settings can be made at the temperature controller.



10.1 Keys and Their Functions

Key Manual/Automatic

- Switches between manual and automatic operation.
  The factory-adjustment of the unit is automatic operation. This setting cannot be changed.

Programming key

- Switches to the programming mode.
- The key must be pressed for approx. 1 second.
- The display shows the device number in the upper area and the software version in the middle area for a short moment.

Arrow keys UP and DOWN

- During automatic mode, direct setting of the target value
- During manual mode, direct setting of the correcting variable
- During programming mode, selection of the programming level

Arrow key RIGHT

- During programming mode, selection of the programming level or parameter.
- Selection of the digit of parameter values to be changed.

Arrow key LEFT

- Selection of the digit to be changed.

Key DELETE

- Quit the programming level without any saving.

Key SAVE

- Saves the sub-item.

HINT

The modification will not be considered by the controller, yet. For this, final saving is required (see below).

Final Saving

- Programming key and key SAVE must be pressed simultaneously to finally save all settings.
- Press the keys simultaneously for approx. 1 second.
- The display disappears for approx. 2 seconds. After that, the new settings are considered.

10.2 Single Setpoint Control

Set the desired target value using the keys UP and DOWN. During automatic operation, the controller will go to the adjusted target value.

10.3 Program Control (Option)

If the controller is equipped with the option "Program Control", selection of a temperature profile is possible.

10.3.1 Program Selection

Press the arrow key RIGHT 1×
- Display: "user" / "P1" / "Sta"

Press the arrow key RIGHT 1×
- Display: "P1" is flashing

Use the arrow keys UP and DOWN to select the desired program (P1 to P3)

Press the key SAVE 1×
- The selected program is saved
- Display: Base Menu (Target/Actual Value)

Final Saving

10.3.2 Program Start

Press the arrow key RIGHT 1×
- Display: "user" / "P1" / "Sta"

Press the arrow key UP 1×
- Display: "user" / "P1" / "init"

Press the arrow key RIGHT 1×
- Display: "no" is flashing

Press the arrow key UP 1×
- Display: "YES" is flashing

Press the key SAVE 1×
- Saves the parameter value
- Display: Base Menu (Target/Actual Value)
- "W" on the left of the target value will be flashing

10.3.3 Program Stop (Pause)

Press the arrow key RIGHT 1×
- Display: "user" / "no" / "Stp"

Press the arrow key RIGHT 1×
- Display: "no" is flashing

Press the arrow key UP 1×
- Display: "YES" is flashing

Press the key SAVE 1×
- Saves the parameter value
- Display: Base Menu (Target/Actual Value)
- "W" on the left of the target value is not flashing

Final Saving

10.3.4 Program Reset (Program restart at program begin)

Press the arrow key RIGHT 1×
- Display: "user" / "no" / "Sta"

Press the arrow key UP 1×
- Display: "user" / "no" / "RST"

Press the arrow key RIGHT 1×
- Display: "no" is flashing

Press the arrow key UP 1×
- Display: "YES" is flashing

Press the key SAVE 1×
- Saves the parameter value
- Display: Base Menu (Target/Actual Value)
- "W" on the left of the target value is not flashing

Final Saving

10.3.5 Program Input or Modification

Press the programming key for at least 1 second
- Display: "PArA"

Press the arrow key DOWN 1x
- Display: "ProG"

Press the arrow key RIGHT 1×
- Display: "P1" / "init"

Press the arrow key UP 6×
- Display: "Pr-1"

Press the arrow key RIGHT 1×
- Display: "S - O" / "init"

Press the arrow key UP to the next parameter to be modified
- Display: "W - 0" ... "W - 17" ...

Press the arrow key RIGHT 1×
- Display: "Parameter Value" is flashing

Move to the digit to be changed using the arrow keys LEFT / RIGHT
- Display: The digit to be changed is flashing

Set the desired value using the keys UP / DOWN and press the key

SAVE 1 x
- Saves the parameter value

Press the arrow key UP until the next parameter to be modified is reached
Display: "W - 0" ... "W - 17" ...

Press the arrow key RIGHT 1×
- Display: "Parameter Value" is flashing

Move to the digit to be changed using the arrow keys LEFT / RIGHT

- Display: The digit to be changed is flashing

Set the desired value using the keys UP / DOWN and press the

key SAVE 1 x

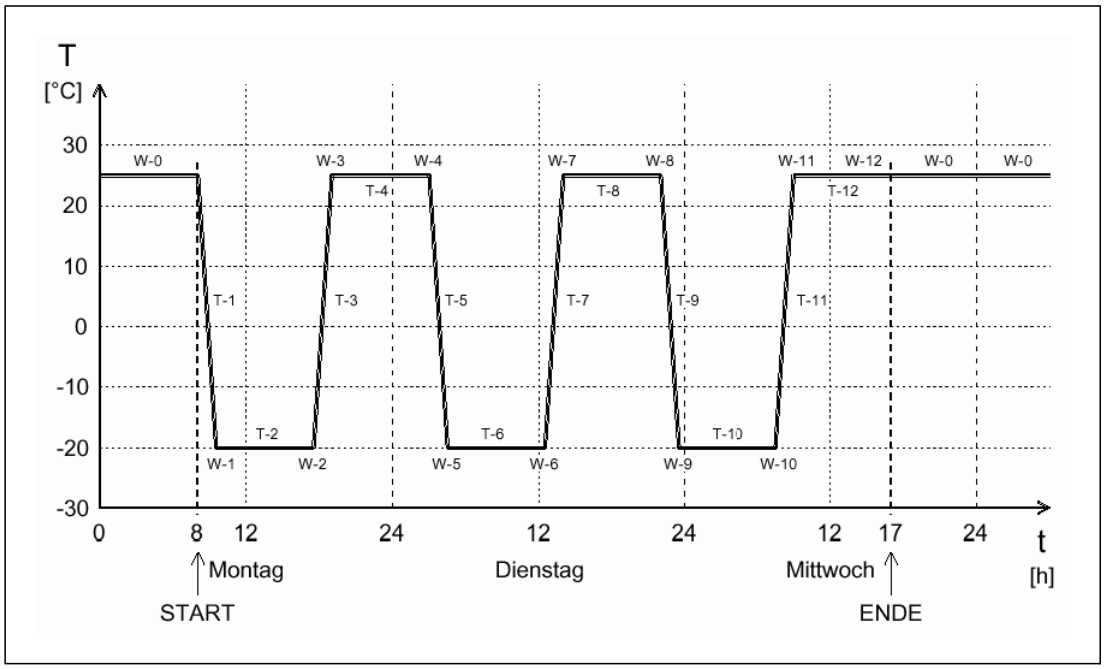
- Saves the parameter value

Continue the procedure until all desired parameters are set

Press the programming key and the key SAVE simultaneously

- Saves all the settings
- Press the keys simultaneously for approx. 1 second
- The display disappears for approx. 2 seconds. After that, the new settings are considered.
- Display: Base Menu (Target/Actual Value)

10.3.6 Sample Program



Start Target Value: 25 °C

Start: Monday, 8 o'clock

Program Profile:

- Cooling to -20 °C in 90 minutes
- Keep -20 °C for 480 minutes
- Heating to +25 °C in 90 minutes
- Keep +25 °C for 480 minutes
- The cycle is executed 3 times
- Program end

Pressing the key SAVE 1x saves the parameter value
Display: Base Menu (Target/Actual Value) "W" on the left of the target value is not flashing

10.3.7 Parameter Table for Sample Program

Parameters	Parameter Value	Parameters	Parameter Value
W - 0	+25 °C	**W - 7**	+25 °C
D - 1	0000	**D - 8**	0000
T - 1	90 min	**T - 8**	480 min
W - 1	-20 °C	**W - 8**	+25 °C
D - 2	0000	**D - 9**	0000
T - 2	480 min	**T - 9**	90 min
W - 2	-20 °C	**W - 9**	-20 °C
D - 3	0000	**D - 10**	0000
T - 3	90 min	**T - 10**	480 min
W - 3	+25 °C	**W - 10**	-20 °C
D - 4	0000	**D - 11**	0000
T - 4	480 min	**T - 11**	90 min
W - 4	+25 °C	**W - 11**	+25 °C
D - 5	0000	**D - 12**	0000
T - 5	90 min	**T - 12**	480 min
W - 5	-20 °C	**W - 12**	+25 °C
D - 6	0000	**D - 13**	0000
T - 6	480 min	**T - 13**	End
W - 6	-20 °C		
D - 7	0000		
T - 7	90 min		

Parameter Explanation:

- W: Target value of a segment
- D: Digital outputs 1-4 (the digital outputs are not assigned)
- T: Duration of a segment

11 Maintenance

DANGER

Danger to life due to electrical current!
The unit is operated with three-phase current.

➔ De-energize the unit completely and protect it from unintentional restart prior to any work at electrical components. *See page 35*.

➔ If the power supply is required for the work, the atmosphere at the unit must be checked and supervised permanently for explosion proofness by authorized specialists prior and during the work.

NOTE

Property Damage!
Metal objects, which are placed on or in the unit and which do not consist of stainless steel, might damage the stainless-steel surfaces of the unit due to formation of extraneous rust.

➔ Never place metal objects, which do not consist of stainless steel, on or in the unit.

11.1 Maintenance Table

No.	Maintenance Task	Interval	Remark
1	Defrosting the unit	As required	Never use sharp objects for removal of ice. *See page 51*.
2	Cleaning the unit	As required	*See page 51*
3	Empty and clean the condensate collecting pan.	As required, at least once a week.	
4	Aspiration of the fan grill	As required, at least every 6 months.	*See page 49*
5	Checking the door gasket	Once a year.	Door gasket must be undamaged and sit perfectly.
6	Checking the oil level	Once a year	Check the oil level in the inspection glass on the rear side. *See page 53*.
7	Checking the belt tension	Once a year	*See page 56*
8	Checking the high pressure switch	Once a year	*See page 55*
9	Dismantling and cleaning the condensate drain valves	Once a year	*See page 63*
10	Checking the ground straps and the	Once a year	*See page 65*
11	Changing the Oil	Every three years or 10,000 operating hours	*See page 53*.

11.2 Maintenance Tasks

11.2.1 Aspiration of the fan grill

⚠ CAUTION

Risk of injury at the fan grill!
When cleaning the fan grill take care to avoid cutting your hands at the sharp-edged lamellae.

➔ Wear safety gloves when cleaning the lamellae with the hands.

NOTE

Property damage of the fan grill!
When aspirating the fan grill, the lamellae might be damaged.

➔ Never press the vacuum cleaner nozzle against the lamellae.

1. Aspirate the fan grill using a vacuum cleaner or clean it by hand using a smooth brush.

11.2.2 Working at the Switch Cabinet

DANGER

Warning of danger of explosion!
The electrical components in the switch cabinet are not explosion-proof.
➔ De-energize the unit completely and protect it from unintentional restart prior to any work at the switch cabinet. *See page 35*.

DANGER

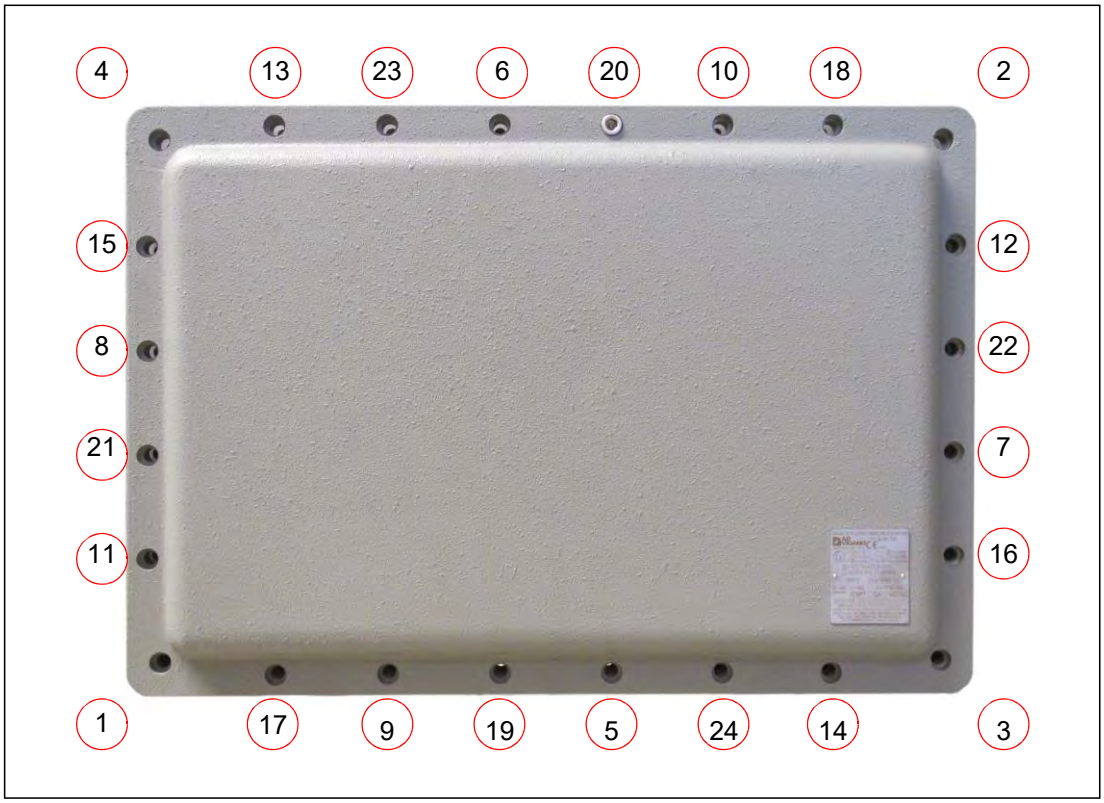
Danger to life due to electrical current!
The unit is operated with three-phase current.
➔ De-energize the unit completely and protect it from unintentional restart prior to any work at the switch cabinet. *See page 35*.

WARNING

Crushing Hazard!
Units with the switch cabinet installed at the top: risk of crushing when closing the lid.
➔ Lower the lid carefully on wooden wedges on the sealing surface. Carefully remove the wooden wedges.

Observe the following when working at the switch cabinet:

- Protect the lid from moving prior to opening the switch cabinet!
- Take care to not damaging the sealing surfaces of the switch cabinet when lifting the lid. Use appropriate tools, such as wooden wedges (no metallic, sharp-edged tools).
- Observe that the sealing surfaces of the switch cabinet must be undamaged and free from corrosion.
- Observe that the sealing surfaces of the switch cabinet must be free from grease and lubricants.
- Lower the lid carefully on wooden wedges on the sealing surface. Carefully remove the wooden wedges.
- Fasten the lid using all the screws.
  Insert the screws and hand-tighten them firstly.
  After that, tighten them in the shown order using a torque wrench. Torque: 14 Nm



11.2.3 Defrosting the Unit

NOTE

Damage of the Unit!
If sharp objects are used for removal of ice, the unit might be damaged.
➔ Never use sharp objects for removal of ice.

1. Remove the specimen.
2. Switch the humidity off.
3. Heat the unit up to maximum temperature.
4. Keep the temperature for one hour.
   If required, remove the ice from the condensate collecting pan in the rear lower area of the test room from time to time to accelerate the drying.
5. Open the door for approx. 2 min.
6. Check the test room for humidity, particularly the condensate collecting pan.
7. If required, heat again up and open the door until the test room is dry.
8. Clean the unit after defrosting. *See page 51*.
9. Set the temperature controller to the desired temperature.

11.2.4 Cleaning the Unit

DANGER

Warning of Danger of Explosion!
When cleaning the unit in explosive atmospheres, there is the risk of explosion by electrostatic charge.
➔ Clean the unit only with damp antistatic clothes.

WARNING

Warning of hot surfaces!
Risk of burning when cleaning the test room of units with extension of the temperature range to +80 °C.
➔ Ensure that the test room temperature is below 30 °C prior to cleaning.

NOTE

Damage of the Unit!
Never use steel wool to clean the unit. Otherwise the stainless-steel surface is damaged, which results in corrosion.
➔ Never use steel wool to clean the unit.
➔ Stubborn soiling can be removed with a cleaning fleece. Carefully check the suitability of the cleaning fleece.

HINT
Use demineralized water for cleaning to avoid dry stains.

HINT
Polished stainless-steel surfaces must always be cleaned in direction of the polishing.

1. Remove the specimen and the shelves.
2. Clean the shelves and the surfaces in the test room and the outer surfaces of the unit using a damp antistatic cloth.

Removal of Extraneous Rust

- Insignificant, surficial stains:
  Remove them with commercial mild cleansing milk or polishing agent (containing calcium carbonate with additional surface-active substances).
  Household cleaning agents for stainless steel on basis of citric acid are also suitable.

WARNING

Risk of injury by etching material!
Risk of injury when using etching material!
➔ Observe the manufacturers specifications and the regulations for industrial safety and environmental protection.
➔ Wear protective clothing.

- Moderate rust-like soiling:
  Use phosphoric acid cleaners for removal. Proceed carefully to avoid undesirable changes of the surface.
  If small tramp iron particles have already penetrated the surface, they can also be removed by means of diluted nitric acid.

11.2.5 Checking the Oil Level

NOTE

Damage at the refrigerating machine or the valves!
Depending on the operating state, oil might be contained temporarily in the cooling circuit. This might result in machine damages, if oil is improperly refilled.
➔ Only refrigeration engineers are allowed to refill oil.

NOTE

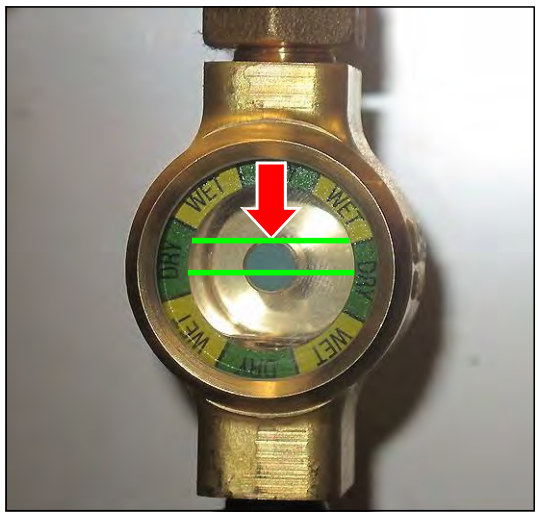
Damage at the refrigerating machine!
Oil being not approved or mixed oil might result in damages of the refrigerating machine.
➔ Only use oil, which is approved by the manufacturer.
➔ Never mix oil.
➔ Only refrigeration engineers are allowed to refill oil.

HINT
It is advisable to check the oil level together with the high pressure switch (*see page 55*), since the two maintenance measures effect first heating and then cooling of the unit.

1. Set the target value at the temperature controller to maximum temperature.
2. Wait, until the maximum temperature is reached.
3. Set the target value to minimum temperature.
   (Refrigerating machine is running continuously and is not switched off.)
4. Wait, until the minimum temperature is reached.

5. Use a torch to look through the inspection glass on the unit's rear.
The inspection glass is marked with the shown label.

6. Check the oil level.
The oil level should be within the upper 2/3 of the indicator point.
If the oil level is below it, a refrigeration engineer must refill oil.



11.2.6 Checking the High Pressure Switch

HINT
It is advisable to check the oil level together with the high pressure switch (*see page 53*), since the two maintenance measures effect first heating and then cooling of the unit.

1. Set the target value at the temperature controller to maximum temperature.
2. Wait, until the maximum temperature is reached.
3. Set the target value at the temperature controller to minimum temperature.
4. Cover the fan grill with a fitting piece of paperboard.
   The size of the paperboard must fit to the fan grill. It is not sufficient to place the paperboard on the unit's outer panel, since extraneous air might be sucked in through the lateral gap.

- The unit is switched off by the high pressure switch after approx. 5 minutes.
- The pilot lamp *Failure* will be lighting.

5. After the safety shut-down, remove the paperboard.
6. Use the main switch to switch the unit off.

Approx. 5 minutes after the safety shut-down the unit can be restarted

In the event of low ambient temperatures, the high pressure switch might not be switching.

If the safety shut-down has not been effected after 10 minutes, the unit must be shut down, and it must be checked by a technician of the refrigerating service.

11.2.7 Changing the Oil

NOTE

Damage at the refrigerating machine!
Oil being not approved or mixed oil might result in damages of the refrigerating machine.
➔ Only use oil, which is approved by the manufacturer.
➔ Never mix oil.
➔ Only refrigeration engineers are allowed to refill oil.

Replace the oil according to the manufacturer's instructions. At the same time, also clean the oil filters and magnet plugs.

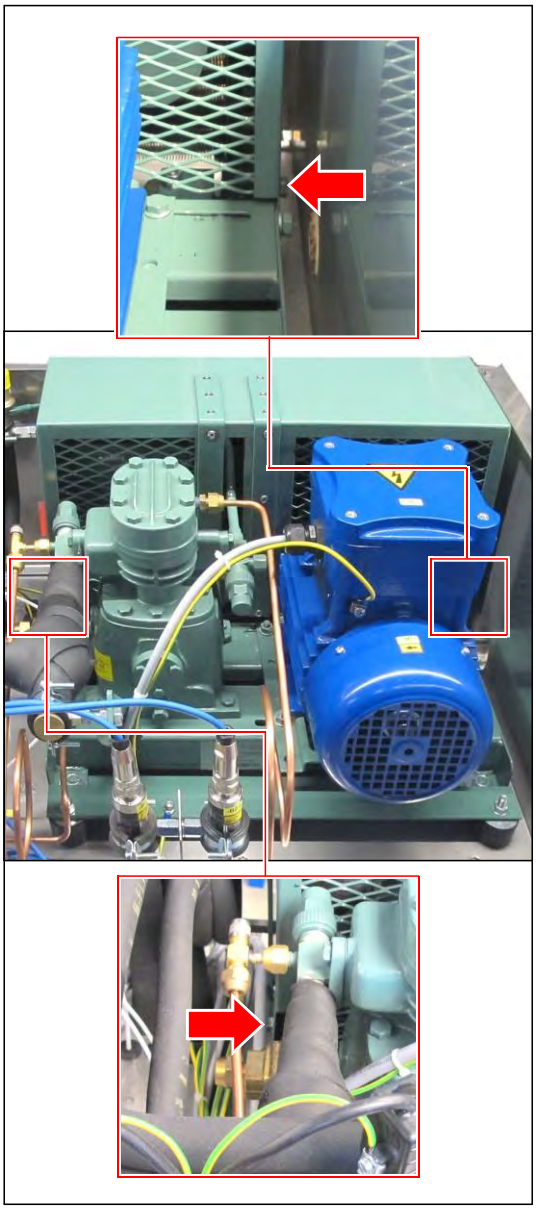
11.2.8 Checking the Belt Tension

NOTE

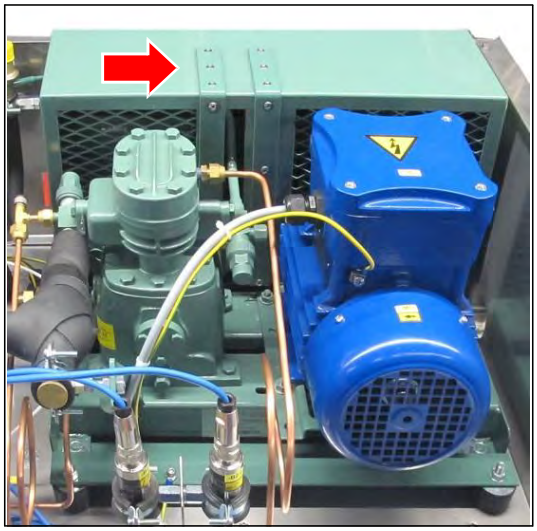
Bearing damage!
Excessive belt tension might cause damage of the bearings.
➔ The recommended setting values for belt tension should never be exceeded.

HINT
Use a long open-ended spanner to loosen the belt protective cover (Length: 450 mm). SW: 13).

1. Switch the unit off and protect the main switch from unintentional restarting by means of a padlock.
2. Remove the unit cover.
3. Loosen the screw on the left and on the right side of the belt protective cover.

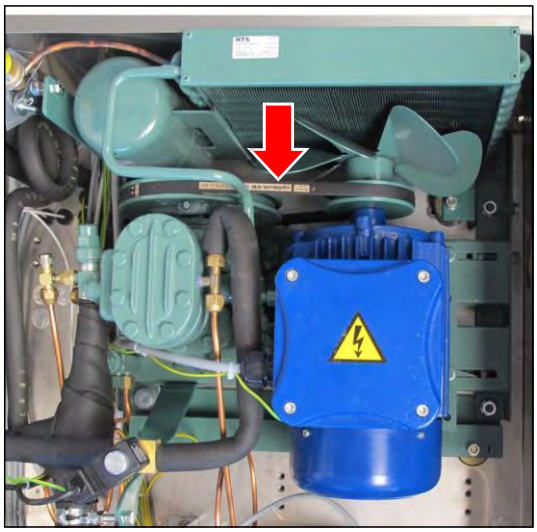


4. Remove the belt protective cover.



5. Check the belt for wear. If the running surface of the belt shows cracks or if it is porous, the belt must be replaced. *See page 59*.

6. Press on the middle of the free length of the belt.
It should be possible to press the belt by approx. 1 cm downwards.

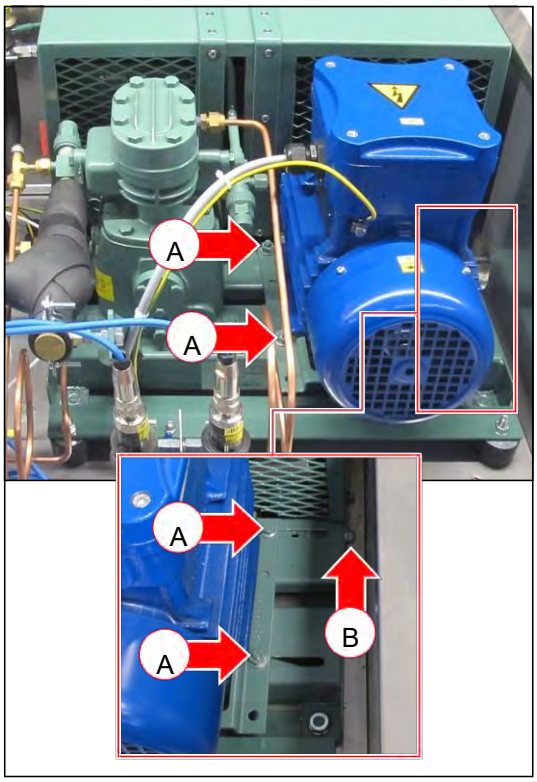


7. Retighten or relieve the tension of the belt by loosening the four screws (A) at the motor carriage.

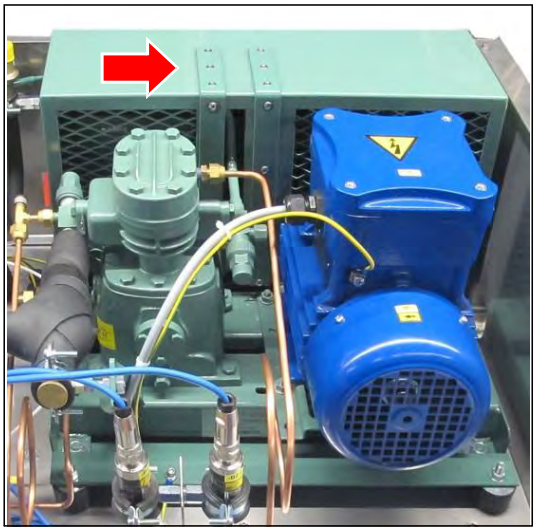
8. Tighten the spindle screw (B), to tighten the belt.
Loosen the spindle screw (B) to relieve the belt tension.

9. Tighten the four screws (A) at the motor carriage.

10. Check the belt tension again and retighten, if required.

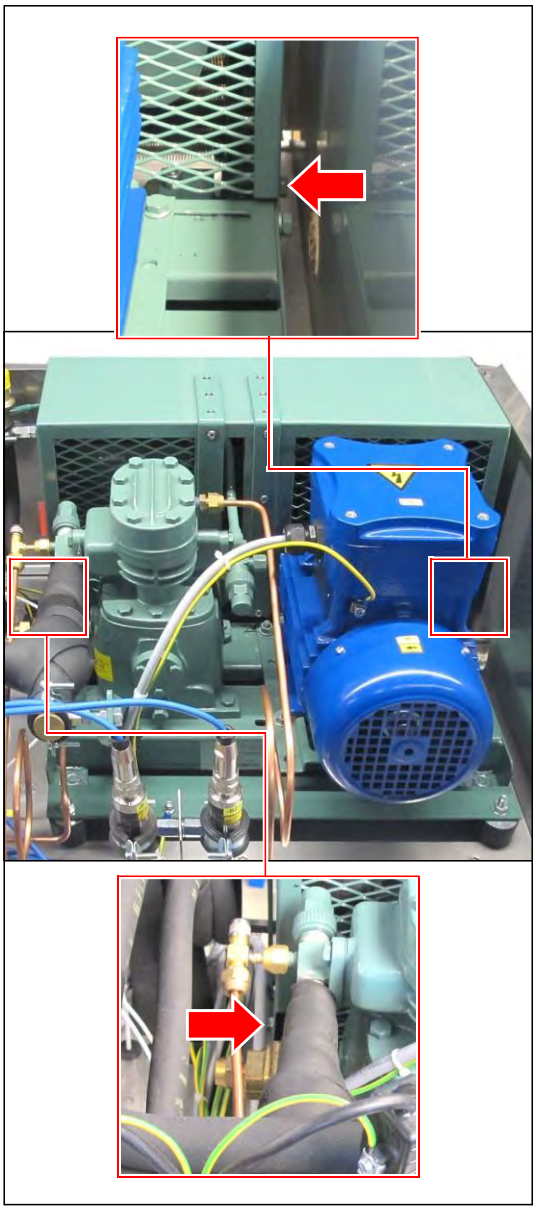


11. When the belt tension is correct: Apply the belt protective cover.



12. Tighten the screw on the left and on the right side of the belt protective cover.

13. Install the unit cover.



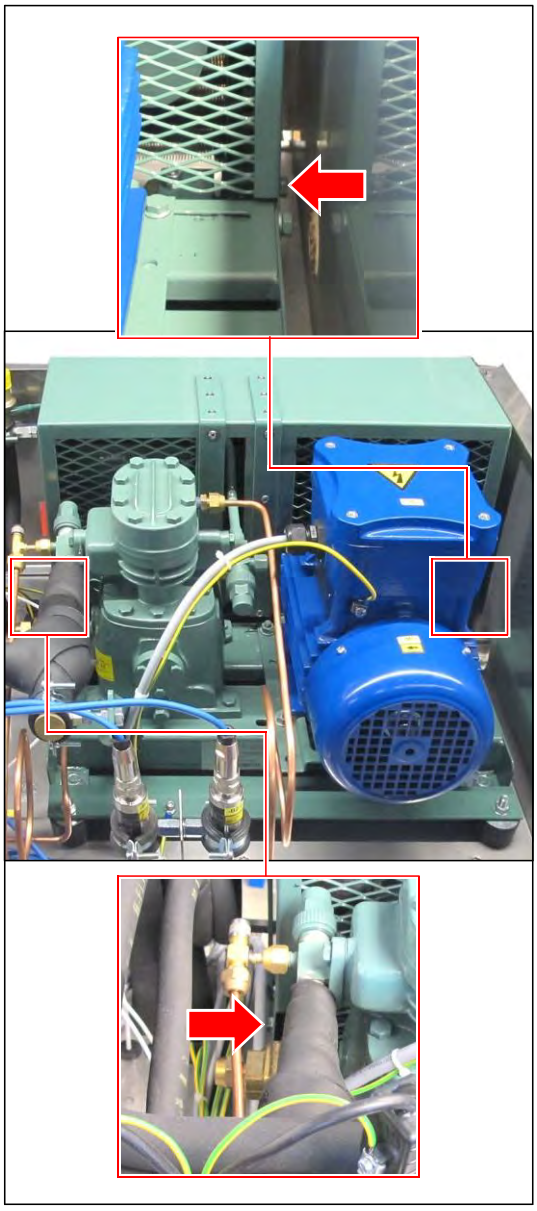
11.2.9 Changing the Belt

NOTE

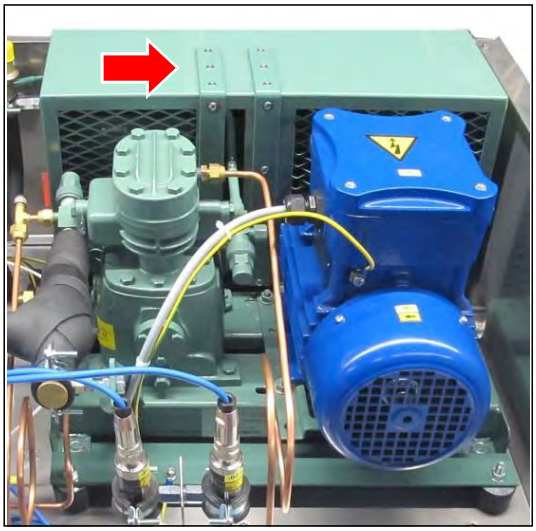
Bearing damage!
Excessive belt tension might cause damage of the bearings.
➔ The recommended setting values for belt tension should never be exceeded.

HINT
Use a long open-ended spanner to loosen the belt protective cover (Length: 450 mm). SW: 13).

1. Switch the unit off and protect the main switch from unintentional restarting by means of a padlock.
2. Remove the unit cover.
3. Loosen the screw on the left and on the right side of the belt protective cover.



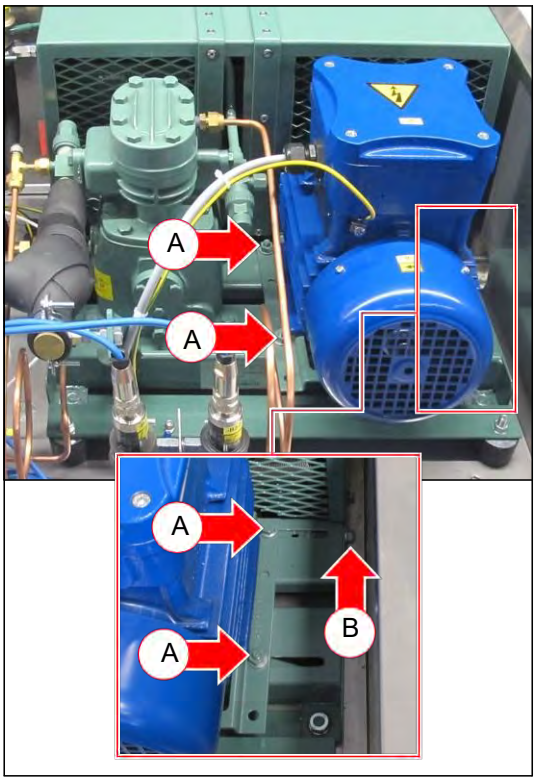
4. Remove the belt protective cover.



5. Loosen the four screws (A) at the motor carriage.
6. Loosen spindle screw (B) and push the motor completely to the left.

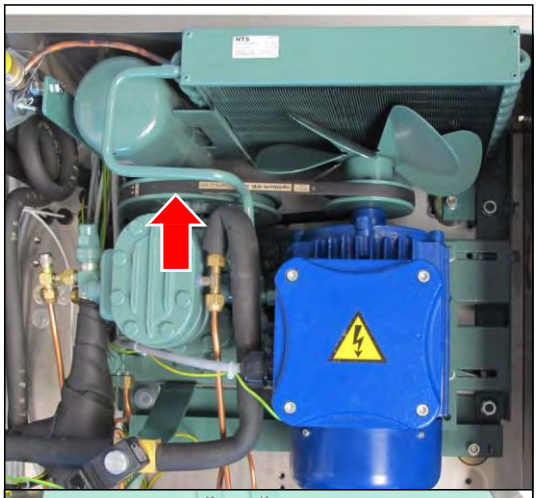
NOTE

Never loosen further screws to enlarge the gap between the fan wheel and the cooling fins

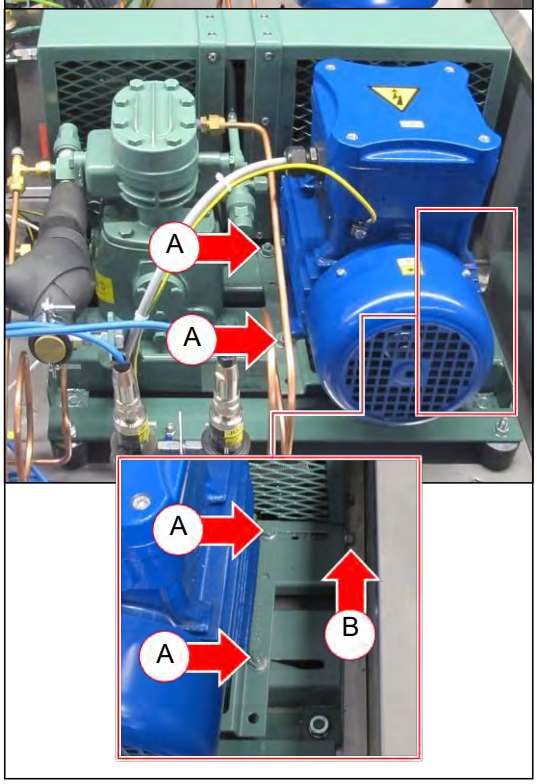


7. Push the belt from the large disk.
8. Push the belt through the gap between the fan wheel and the cooling fins end remove it.

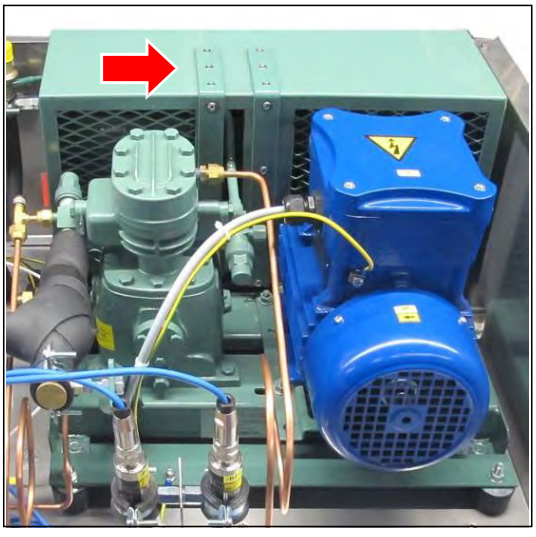
9. Push the new belt over the fan wheel and place it on the small disk.
10. Push the belt on the large disk.



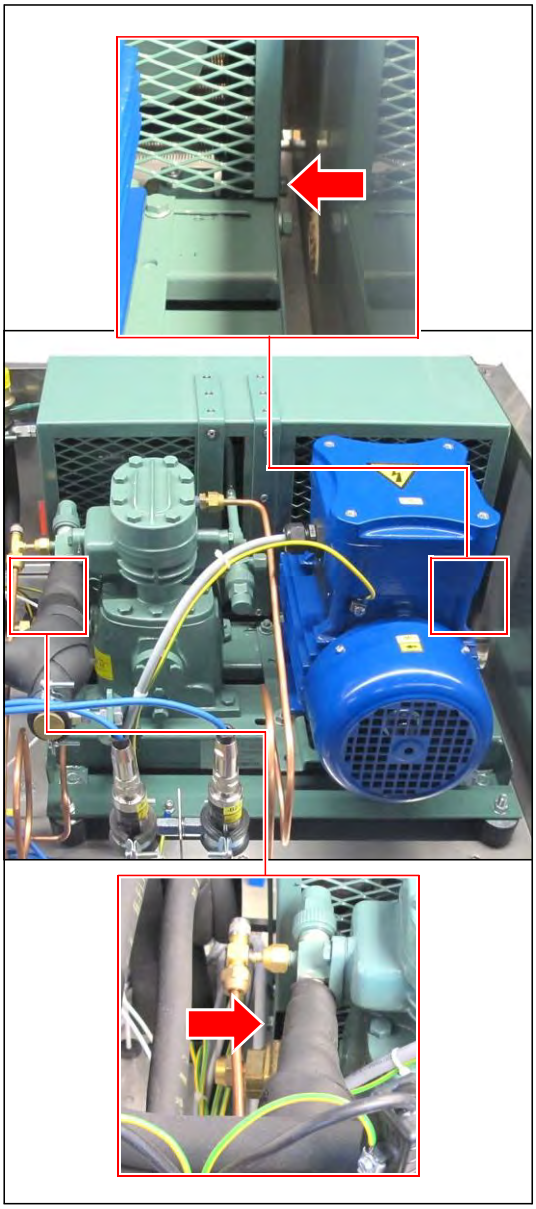
11. Push the motor to the right and tighten the belt by means of the spindle screw (B).
12. Check the belt tension. *See page 56*.
13. Tighten the four screws (A) at the motor carriage.



14. Apply the belt protective cover.



15. Tighten the screw on the left and on the right side of the belt protective cover.
16. Install the unit cover.

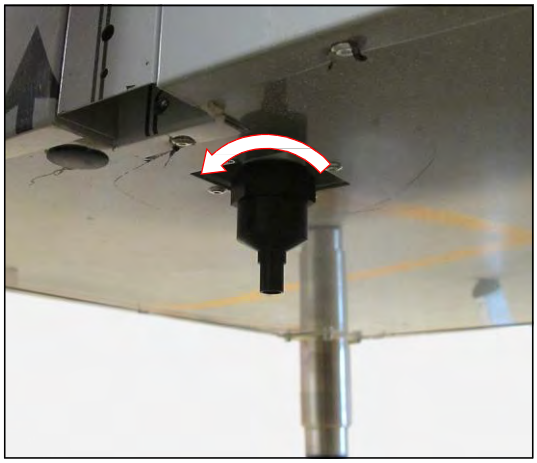


11.2.10 Dismantling and Cleaning the Condensate Drain Valves

Condensate drain valves must be dismantled and cleaned once a year. If required, replace the floating ball.

Observe the correct seat of the O-ring when assembling the condensate drain valve.

1. Unscrew the condensate drain valve below the unit.

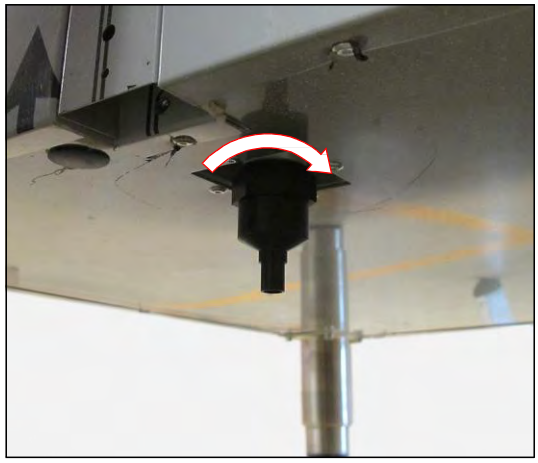


2. Unscrew the condensate drain valve.

3. Clean the ball of the condensate drain valve or replace it, if required.
4. Insert the cleaned or new ball.

5. Screw the condensate drain valve together.
6. Check the function of the condensate drain valve:
   - Fill water into the condensate drain valve.
   - The ball must float.
   - The water is drained until the ball drops and closes the drain.

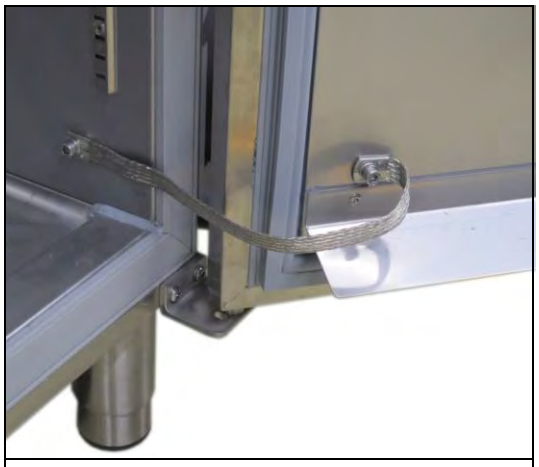
7. Insert the condensate drain valve below the unit and tighten the screws.

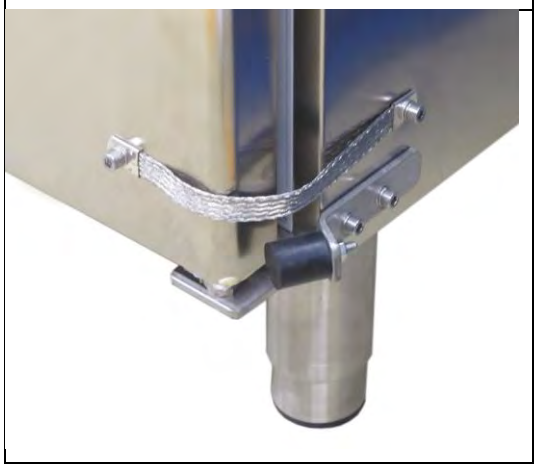


The maintenance of the condensate drain valve is finished.

11.2.11 Checking the Ground Straps and the Stopper

1. Check the ground straps on the inside and outside of the door for correct seat and soundness.
2. Check the stopper on the outside of the door for correct seat and soundness.

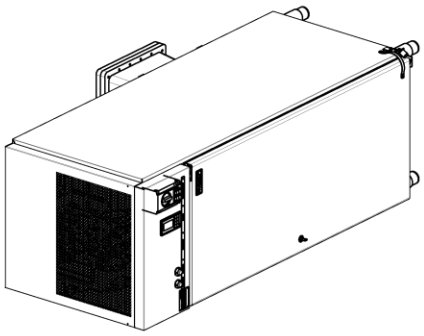


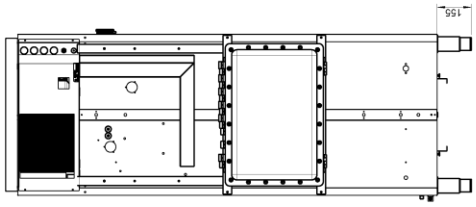


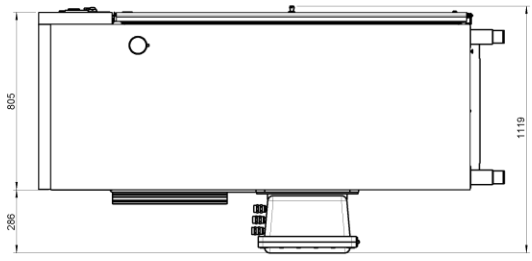
14 Technical Annex

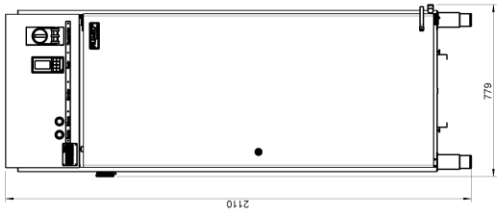
14.1 Technical Plans

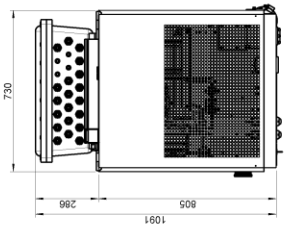
14.1.1 X 500



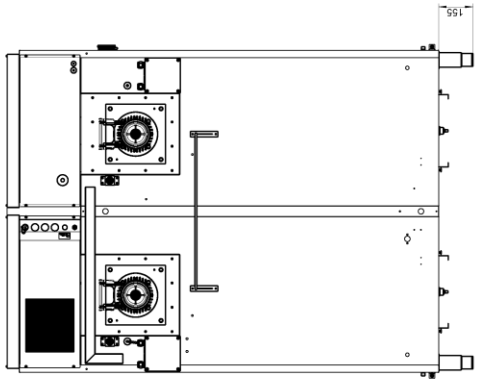


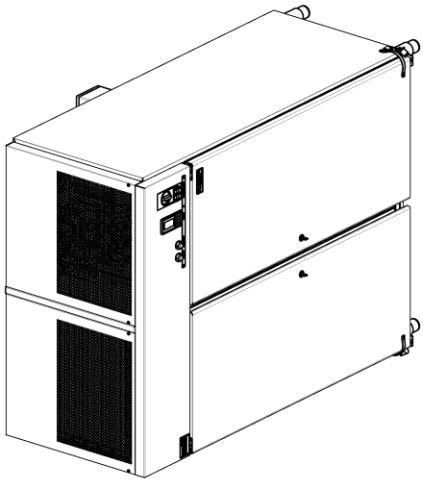


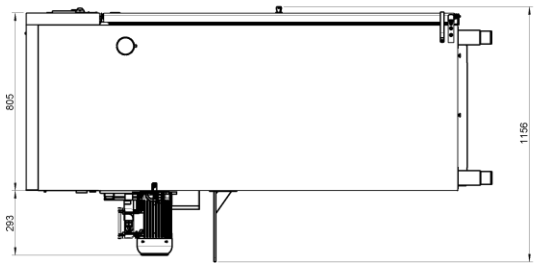


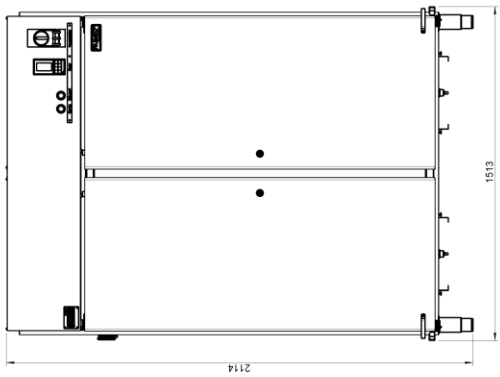


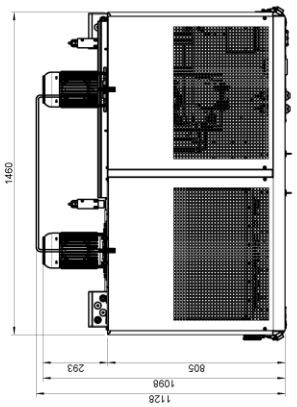
14.1.2 X 1000











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