FROG ENGINEERING

Front & Side Cooler

Operating and Maintenance Instructions

28-30 kW

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Contents

Save these instructions

This manual contains important instructions that must be followed during the installation of this equipment.

Intended users

This manual is intended for authorized personnel. It provides component specifications and instructions for installing and commissioning the equipment.

Legal information concerning the operating instructions

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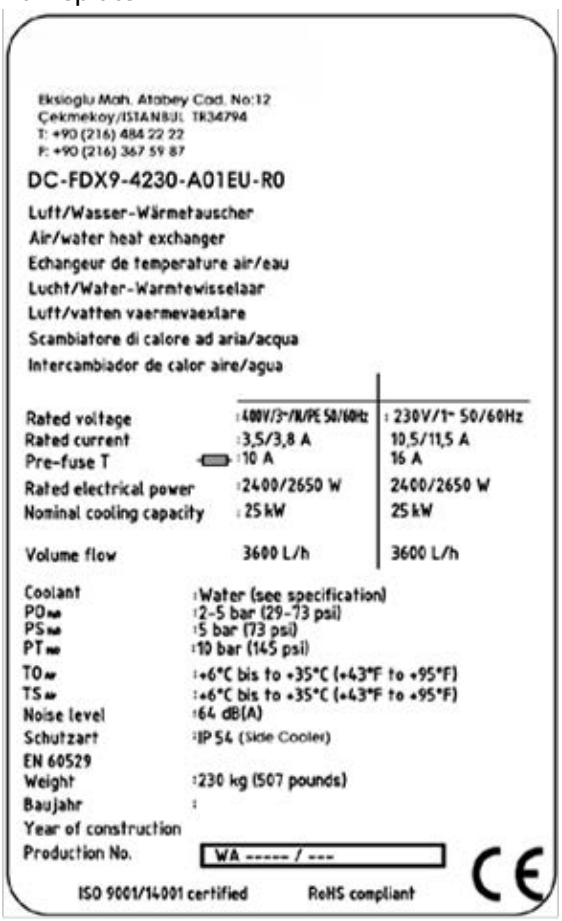
07.07.2017

Nameplate



Proper use

The Liquid Cooling Package Inline serves to dissipate high heat losses and for the effective cooling of devices built into a server enclosure. The unit is state of the art and built according to recognised safety regulations. Nevertheless, improper use can present a hazard to life and limb of the user or third parties, or result in possible impairment of the system and other property. The unit should thus only be used properly and in technically sound condition. Any malfunctions which impair safety should be rectified immediately! Follow the operating instructions! Intended use also includes following the operating instructions and fulfilling the inspection and maintenance conditions.

Precautionary measures

Inappropriate use may result in danger. Inappropriate use may include:

- Use of impermissible tools.
- Improper use.
- Improper rectification of malfunctions.
- Use of replacement parts which are not authorised by Frog Engineering

Safety Instructions

The Front Coolers produced by Frog Engineering are developed and produced with due regard to all safety precautions.

Nevertheless, the unit still causes a number of unavoidable dangers and risks. The safety instructions provide you with an overview of these dangers and the necessary safety precautions.

In the interest of your safety and the safety of others, please read these safety instructions carefully before assembly and commissioning of the Front Cooler.

Follow the user information found in these instructions and on the unit carefully.

Symbols in these operating instructions

Danger!

This warning symbol is used to indicate great dangers caused by the product which may result in injury and even death if the indicated preventative measures are not followed.

Caution!

This warning symbol is used to indicate procedures which may cause risk of equipment damage or personal injury.

Note:

This instruction symbol indicates information concerning individual procedures, explanations, or tips for simplified approaches.

Important safety instructions

Danger! Electric shock!
Contact with live electrical parts may be deadly. Before switching on, ensure that it is not possible to come into contact with live electrical parts.

Danger! Injury caused by fan impellors!
Keep persons and objects away from the fan impellors! Do not remove covers until the power supply is disconnected and impellors are not moving! Always use mechanical protection when working! Shut down the respective fan as much as possible during maintenance work! Tie long hair back! Do not wear loose clothing! Fans start up automatically following power disruptions!

Danger! Cut wounds, especially through sharp edges of the fan module and heat exchanger modules!
Put on protective gloves before beginning assembly or cleaning work!

Danger! Injury due to falling loads!
Do not stand under suspended loads when transporting the unit with a hoist trolley, a forklift, or a crane.

Caution! Risk of malfunction or damage!
Do not modify the unit! Use only original spare parts!

Caution! Risk of malfunction or damage!
Proper and flawless unit operation can only be ensured when it is operated under the intended ambient conditions. As far as possible, be sure that the ambient conditions for which the unit is designed are complied with, e.g. temperature, humidity, air purity.

Caution! Risk of malfunction or damage!
All media necessary for the control system, e.g. cooling water, must be available during the entire operating time.

Caution! Risk of malfunction or damage!
In order to avoid frost damage, the minimum permissible input water temperature of +6 °C must not be undercut at any point in the water cycle!
It is vital that the manufacturers' consent is obtained before adding anti-freeze!

Caution! Risk of malfunction or damage!
During storage and transportation below freezing point, the water cycle should be drained completely using compressed air!

Caution! Risk of malfunction or damage!
Only set the temperature control setpoint as low as is strictly necessary, since the danger of condensation through undercutting the dew point increases with a falling water inlet temperature!
Ensure that the enclosure is sealed on all sides, particularly at the cable
entry (condensation)!

Service and technical staff

The installation, commissioning, maintenance and repair of this unit may only be carried out by qualified mechanical and electro-technical trained personnel.
Only properly instructed personnel may carry out service on a unit while in operation.

RoHS compliance

Front Cooler fulfils the requirements of EU directive 2002/ 95/EC on the Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) of 13 February, 2014.

Transport and handling

Scope of delivery of Front Cooler

The scope of delivery of a Front Cooler includes:

Qty.	Parts
	Front Cooler, ready for connection
	Accessories:
1	Pipe fitting condensate pump
1	Condensate hose for condensate pump
1	Condensate hose emergency overflow
1	Sealing strip
1	Connection plug
1	Cable tie and spreading anchor
1	Jumper for connection plug (strain relief for connection cable)
4	Eyebolts
1	Assembly instructions

Transport

The Front Cooler is delivered shrink-wrapped on a pallet.

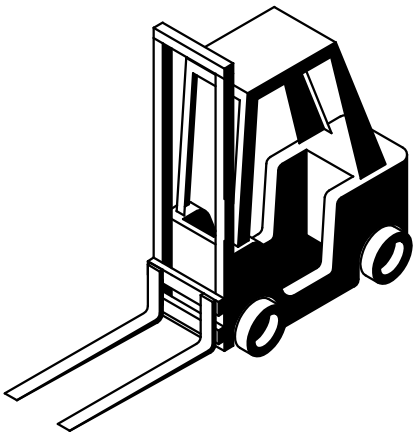
Caution!

Because of its height and small base, the Front Cooler is subject to tipping. Risk of toppling, especially after the unit is removed from the pallet!

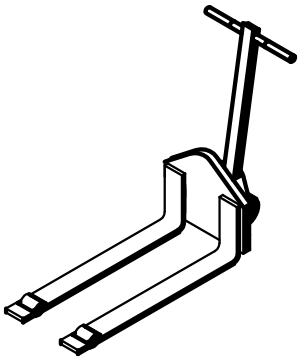
Caution!

Transport of the Front Cooler without a pallet:
- Use only suitable and technically sound lifting gear and load-bearing devices with sufficient load capacity.

Recommended module handling equipment



Forklift



Pallet Jack

Module Handling

If possible, transport the module using a forklift or pallet jack.

• If using a forklift or pallet jack, ensure that the fork tine length is suitable to safely move the packaged module.

• Frog Engineering recommends keeping the module in the protective packaging until it has been moved to the installation site.

• When handling and unpacking the module, exercise great care to prevent damage.
• Do not lift the module any higher than 6” (152mm) while moving it. If it must be lifted higher than 6” (152mm), exercise great care and keep all personnel who are not helping move the module at least 20’ (5m) away from the module.
• The Front Cooler ships with four outrigger-style wheels to permit rolling it into position. Frog Engineering recommends using a forklift or pallet jack to move the Front Cooler as near as practical to its installation site before removing it from the shipping pallet.

Unpacking

Upon arrival of the module and before unpacking, verify that the labeled equipment matches the bill of lading. Carefully inspect all items for either visible or concealed damage. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Frog Engineering or to your sales representative. If you later find any concealed damage, report it to both the shipping company and your local Frog Engineering representative.

Check to be sure all required assemblies and parts have been received.

The Front Cooler is shipped in protective packaging and secured to a pallet (see Figure 5). Do not remove these protective items from the Front Cooler before it is at the installation location. When unpacking and handling the Front Cooler, exercise extra care to prevent damage.

The heat exchanger of the inrow pre-charged with 6 bar nitrogen.To release nitrogen, loosen to blind caps slowly with using two torque wrenches.

Note: This procedure can be applied while piping connection.

Recyclable Packaging
All material used to package this module is recyclable. Please save for future use or dispose of the material appropriately.

WARNING : Risk of top-heavy module falling over. Can cause equipment damage, injury and death.
Read all of the following instructions before attempting to move, lift, remove packaging from the module, or preparing module for installation.
Use extreme caution and care when moving and installing this unit. Use lifting equipment that is rated for the weight of the unit by an OSHA-certified rating organization. Personnel should be properly trained and qualified to move and rig equipment

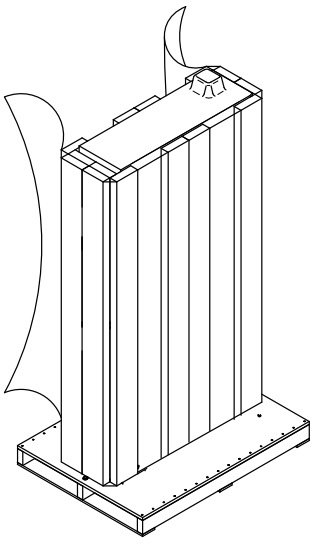
CAUTION: Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.
Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from, or prepare module for installation

NOTICE : Risk of overhead interference. Can cause module or structure damage.
The module may be too tall to fit through a doorway while on the skid. Measure the module and doorway heights and refer to the installation plans before moving the module to verify clearances.

NOTICE: Risk of improper storage. Can cause module damage.
Keep the module indoors and protected from dampness, freezing temperatures and contact
damage.

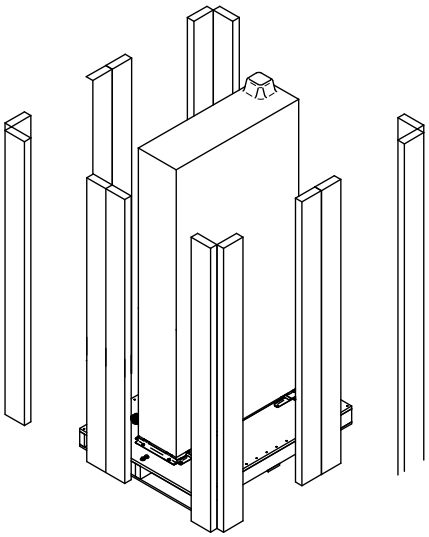
NOTICE : Risk of damage from forklift. Improper handling with the forklift can cause exterior and/or underside damage.
Keep tines of the forklift level and at a height suitable to fit below the pallet.

Internal Packaging
1. Remove the exterior stretch-wrap packaging from around the module, exposing the protective corner and side packaging planks.
2. Remove corner and side packaging planks from the module, exposing the bag over the module.
Remove the bag when ready to install the Front Cooler.

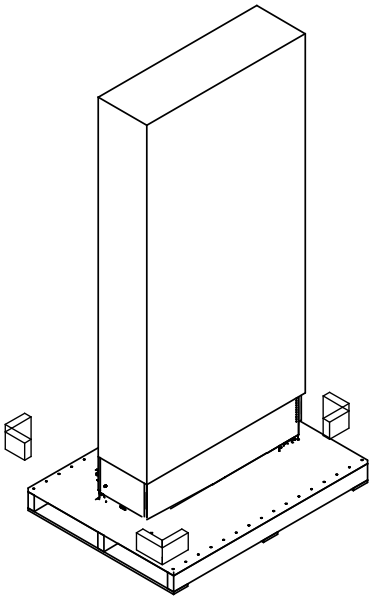


Planks at the corners and on the sides protect the Front Cooler during shipping

Exterior stretch wrapping surrounds other protective shipping features



Remove the Stabilizers at the corners



Room Preparation

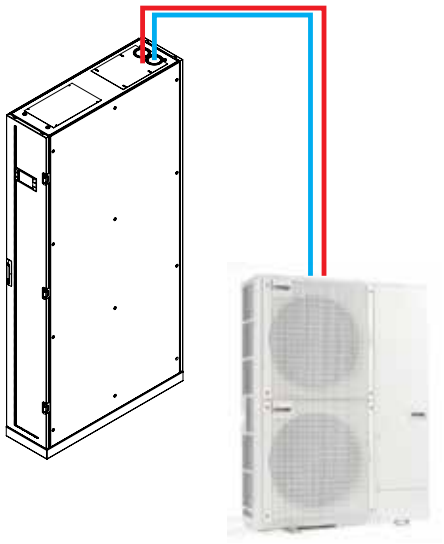
During the design of the data center, consider ease of entry for the equipment, floor loading factors, and accessibility to piping and wiring.

Seal the room with a vapor barrier to minimize moisture infiltration. (Polyethylene film is recommended for ceiling and wall applications.) Apply rubber- or plastic-based paints to concrete walls and floors.

Insulate the room to minimize the influence of exterior heat loads. Use the minimum required amount of fresh air for make up to comply with local and national codes and regulations. Fresh air imposes extreme load variation on the cooling equipment from summer to winter and causes increased operating costs.

The equipment is designed as a sensible cooling air conditioning unit for in-row use in data centers. The equipment does not have humidification or dehumidification control. Room humidity must be within acceptable operating conditions before starting equipment. **Note:** Top or bottom entry can be chosen individually for each type of connection, i.e. power, condensate drain, humidifier water supply, chilled water supply and chilled water return. Top piping configurations will have the same valves and strainers as bottom piping configurations.

Front Cooler DX (Direct Expansion)



These cooling products improve energy efficiency and cooling ability in a number of ways. First, the Refrigerant based Front Cooler draws air directly from the hot aisle, allowing the Front Cooler unit to take advantage of higher heat transfer efficiency due to higher temperature differences. It can then discharge room-temperature air directly in front of the servers it is cooling. Placing the cooling unit in the containments enables the unit to operate at higher return and supply air temperatures yielding 100% sensible capacity, which significantly reduces the need for humidification.

The predictable performance of the row-based architecture makes it well-suited for high density applications. The focus on heat removal instead of cold air delivery is the key to making this approach scalable. The design of the unit allows it to be easily added in the row of the data center containments as the demand for cooling increases.

The additional benefit of the row-based architecture is the ability to add hot air containment. Containing the hot air further reduces any chance of hot and cold air streams mixing. This provides ultimate predictability and allows the cooling capacity to be matched to the IT heat load.

Remarkable Features and Benefits:

1- Strong aluminium frame structure
2- Easy serviceable rail-mounted fan design (Hot-Swap module fans)
3- Fast and easy installation
4- High energy efficiency with variable speed EC fans and inverter Outdoor unit.
5- Reduces initial investment costs eliminating raised floor application
6- Easy controllable human interface and easy monitoring system
7- Scalable and compatible dimensions according to customer’s requirements
8- Modular design
9- Safe operation due to the sensors and sufficient insulation
10- Ability piping direction either from top or bottom through a raised floor or through a cooler’s plinth
11- Network interconnectivity and expandability
12- Internationally approved and high quality components
13- Flexible operation temperature ranges
14- Voltage options available for different countries (1~ 230V, 1~ 115V)
15- Available accessories (plinth, condensate pump,SMNP card etc.)

Note: The InRow is not intended to be used in an occupied o ice environment, due to potentially high noise levels during peak loads. Install the InRow in a computer room where people are normally present only for maintenance.

INDOOR	EU VERSION	US VERSION(CW only)
Voltage Ratings	230 VAC(Nominal)	115 VAC(Nominal)
Input Mains Power	1000W	1000W
Fuse	1x16A	1x20A
Power Supply Cable	3x2,5mm2	3x4mm2
Frequency	50~60 Hz	50~60 Hz

OUTDOOR	MITSUBISHI VR.	PANASONIC VR.
Voltage Ratings	380~415VAC	380~415VAC
Input Mains Power	max 8,34 KW	max 7,6 KW
Fuse	Three Phase 3P 25 A	Three Phase 3P 20 A
Power Supply Cable	5x4mm2	5x6mm2
Communication Cable to Indoor	3x2,5mm2	2x1mm2
Frequency	50 Hz only	50~60 Hz

Note: There is no need to connect communication cables for water-based.

Air/water heat exchanger

The air/water heat exchanger is installed in the front section of the Front Cooler between both of the front wall plates. The heat exchanger is covered with a spray eliminator on the air outlet side that catches any occurring condensate and directs it to the condensate collecting tray in the Front Cooler. 2 temperature sensors are mounted on the front side of the spray eliminator at the level of the fan modules. The sensors record the temperature of the cold air that is blown in (Cold aisle inlet temperature) and transfer it to the control.

Fan module

Front-Side cooler consists of three fan modules which is mounted in front of the heat exchanger.The fan module can be changed during operation with help by rail system. The fan modules are installed on rack-mounted shelves in the rear section of the Front Cooler with the control unit in between. Each shelf has slide rails on the longitudinal sides. The angle brackets with the fans are inserted into and held in the rails.
EC Radial fans are preferred for sensible cooling, these fans can be run variable speeds.

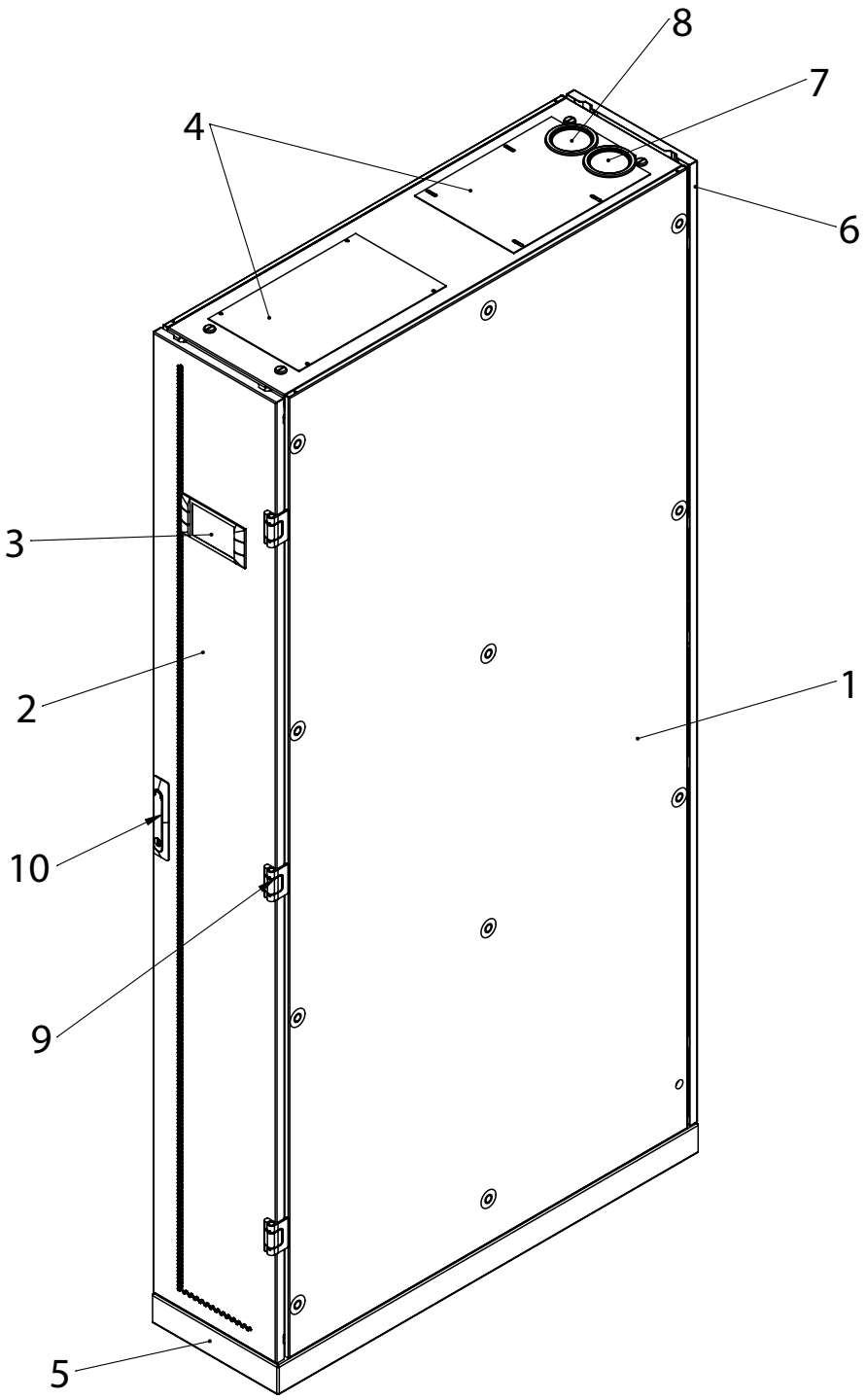
Phase	R3G250-RO40-A1
Motor	M3G084-DF

Phase		1 ~
Nominal voltage	VAC	230
Nominal voltage range	VAC	200...277
Frequency	Hz	50/60

Type of data definition	-1	ml
Speed	min	3700
Power input	W	490
Current draw Min. ambient temperature	A C	2.2 -25
MAX. ambient temperature	C	60

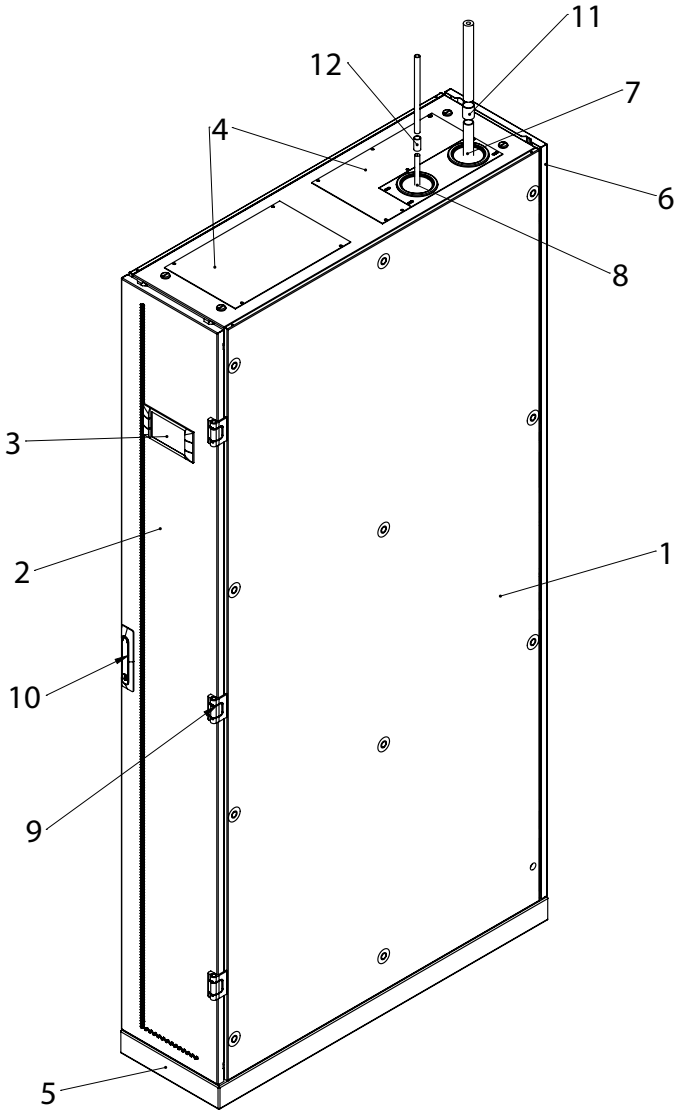
Note: Page 53 can be visited to get more information about replacement fan module.

Component Identification
Exterior Water Based



1- Removable side cover
2- Removable front cover
3- LCD Control Display
4- Maintenance Covers
5- Base
6- Removable Back Cover
7- Entrance
8- Exit
9- Door hinge
10- Door lock

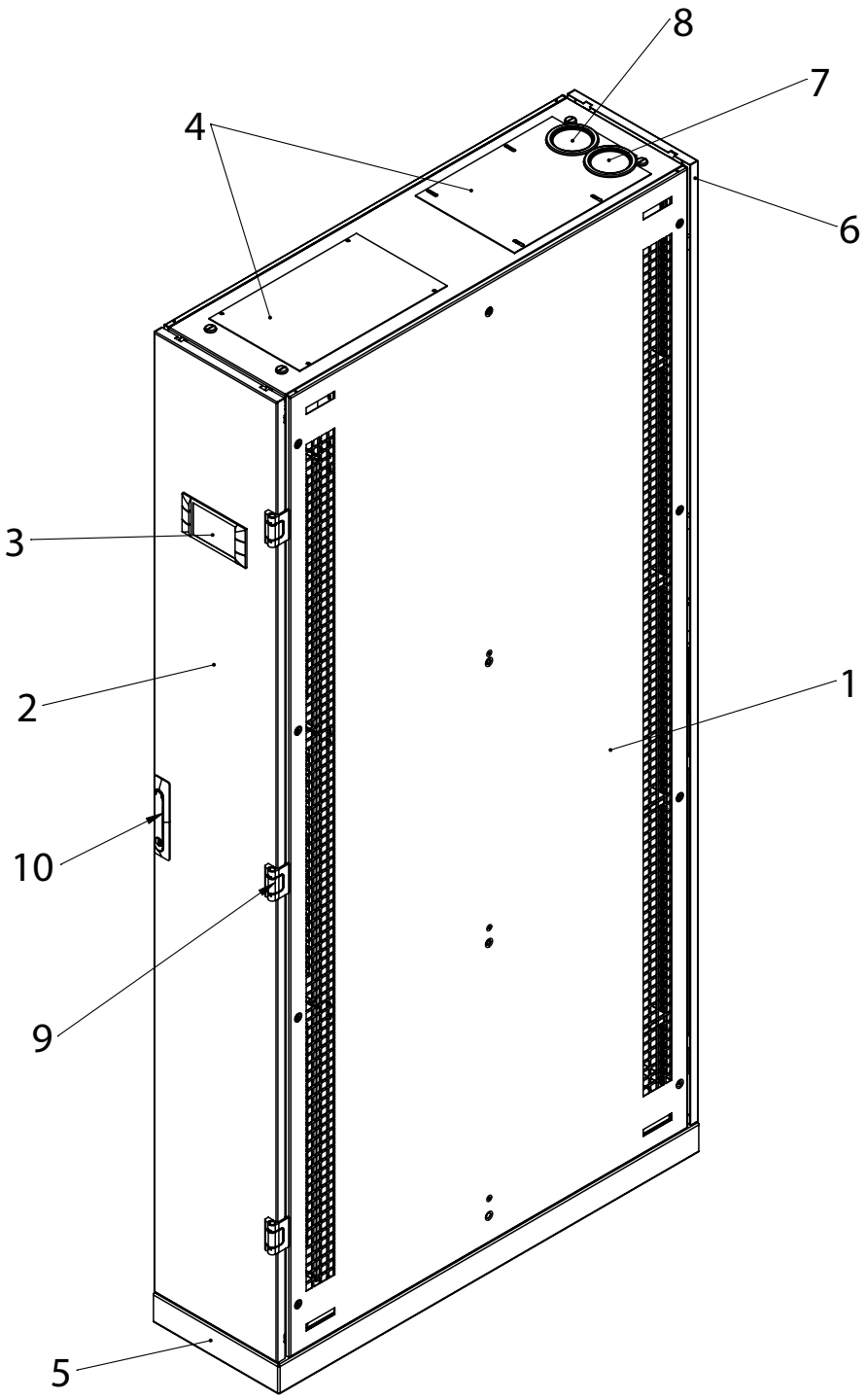
Component Identification
Exterior DX Based



This unit mainly has following main parts:
Chasis, mounting rails, top and bottom covers, side covers, front and rear access doors, three radial fans, evaporator, PLC unit and control panel, electrical parts and sensors, condensation tray (under heat exchanger).

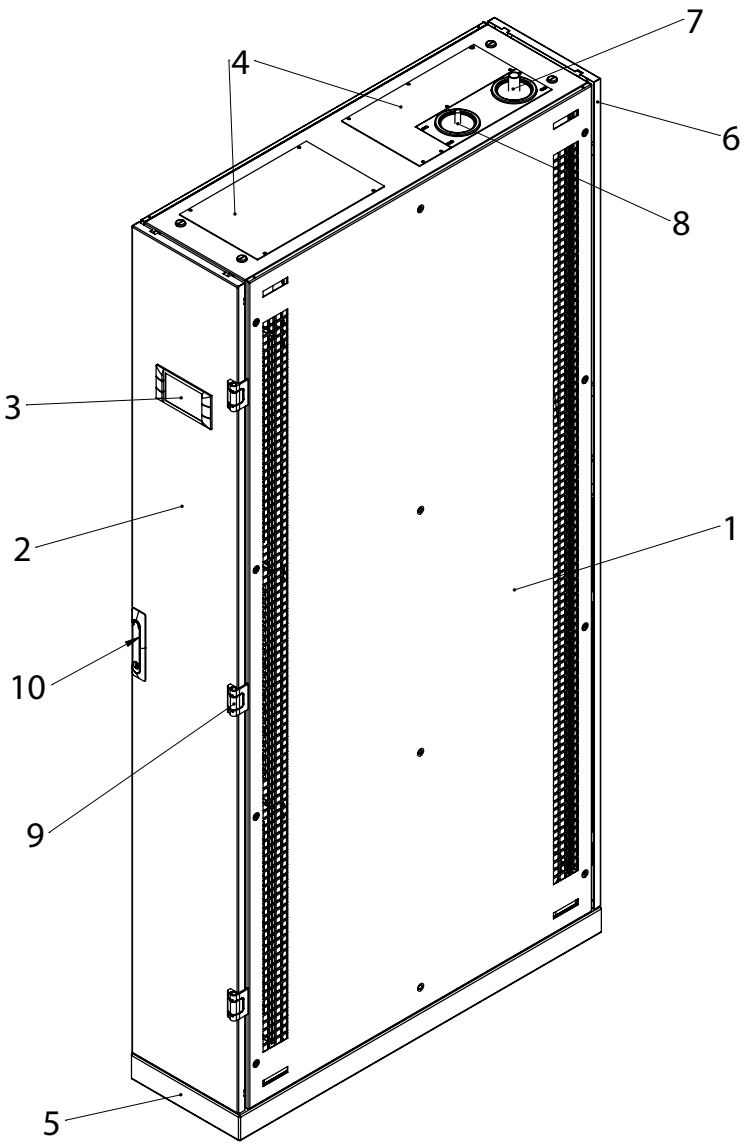
1- Removable side cover
2- Removable front cover
3- LCD Control Display
4- Maintenance Covers
5- Base
6- Removable Back Cover
7- Entrance
8- Exit
9- Door hinge
10- Door lock 11-Collar Entrance 12-Collar Exit

Component Identification
Exterior Water Based Side Cooler



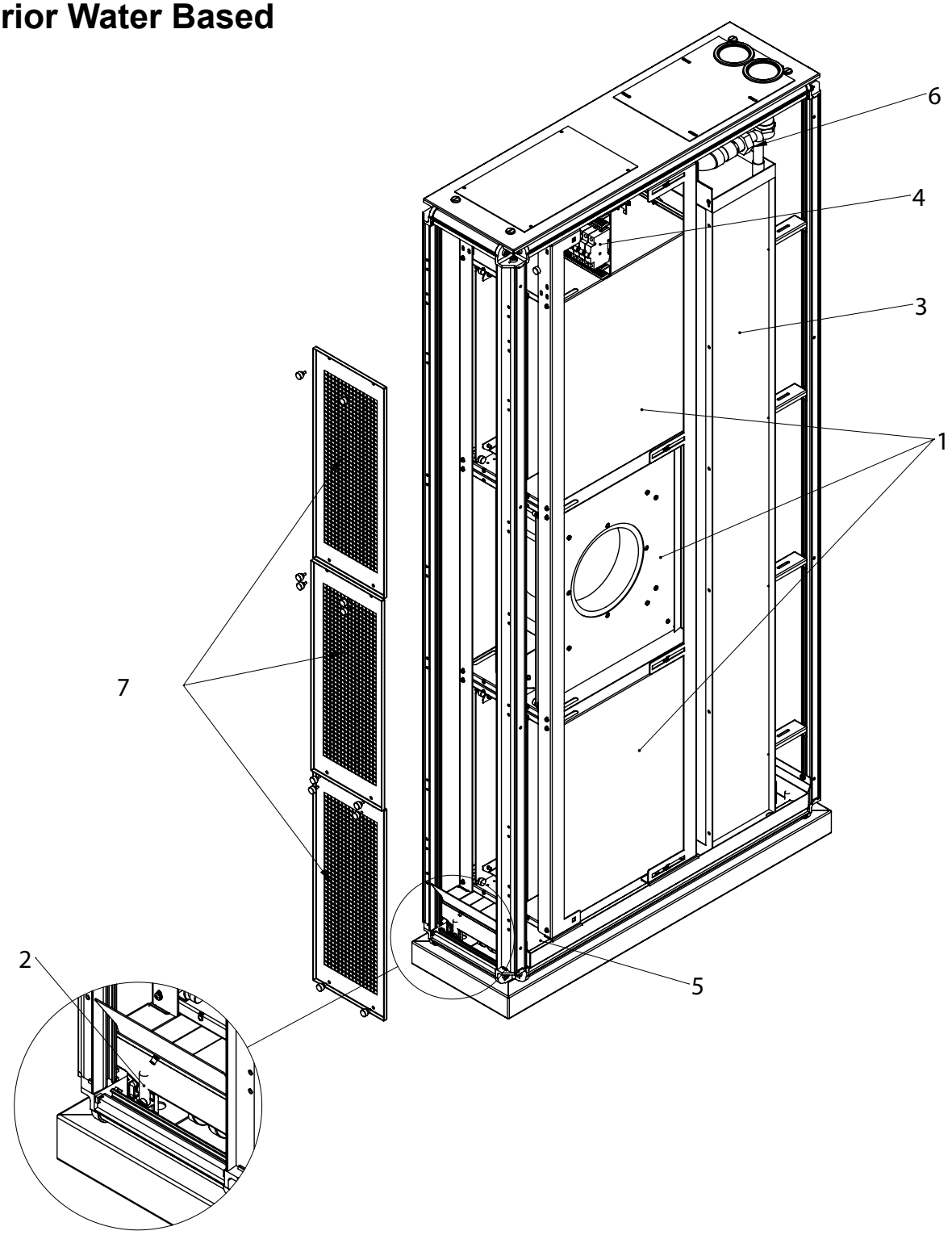
1- Removable Perforated Side Cover
2- Removable Front Door
3- LCD Control Display
4- Maintenance Covers
5- Base
6- Removable Back Door
7- Water Pipe Entrance
8- Water Pipe Exit
9- Door Hinge
10- Door Lock

Component Identification
Exterior DX Based Side Cooler



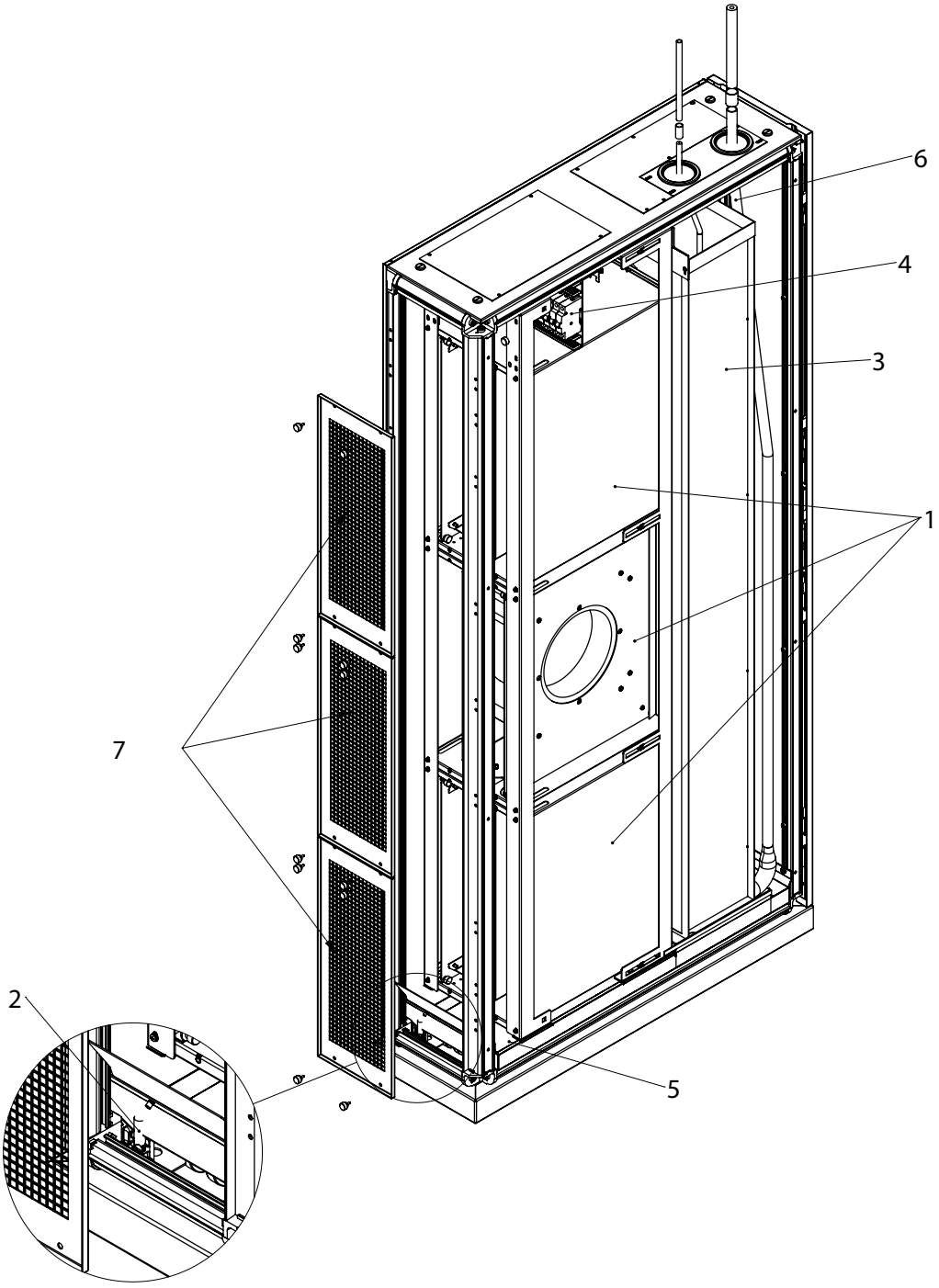
1- Removable side cover
2- Removable front door
3- LCD Control Display
4- Maintenance covers
5- Base
6- Removable Back Door
7- Liquid Pipe Extrance
8- Gas Pipe Exit
9- Door hinge
10- Door lock

Component Identification
Interior Water Based



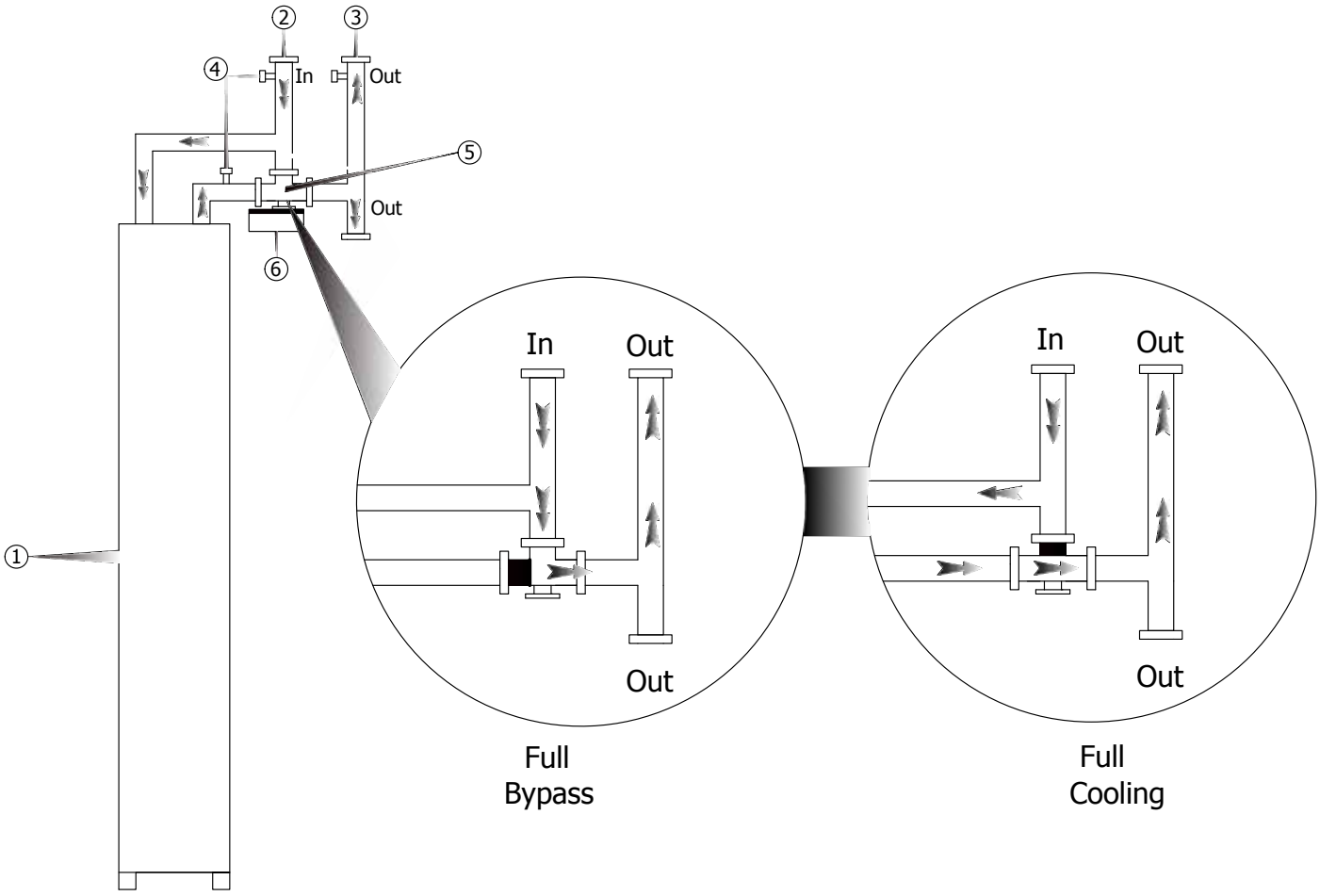
1- Fan Modules
2- Adjustable Feet
3- Heat Exchanger
4- Control Panel
5- Condensation Plate
6- Piping system
7- Fan Protection Sheets

Component Identification Interior
DX Based



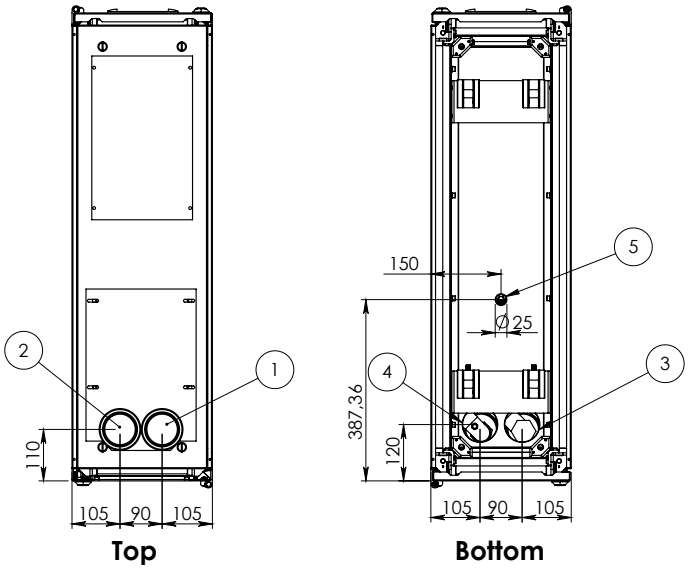
1- Fan Modules
2- Adjustable Foot
3- Heat Exchanger
4- Control Panel
5- Condensation Plate
6- Piping
7- Fan Protection Sheets

Internal Piping Diagram

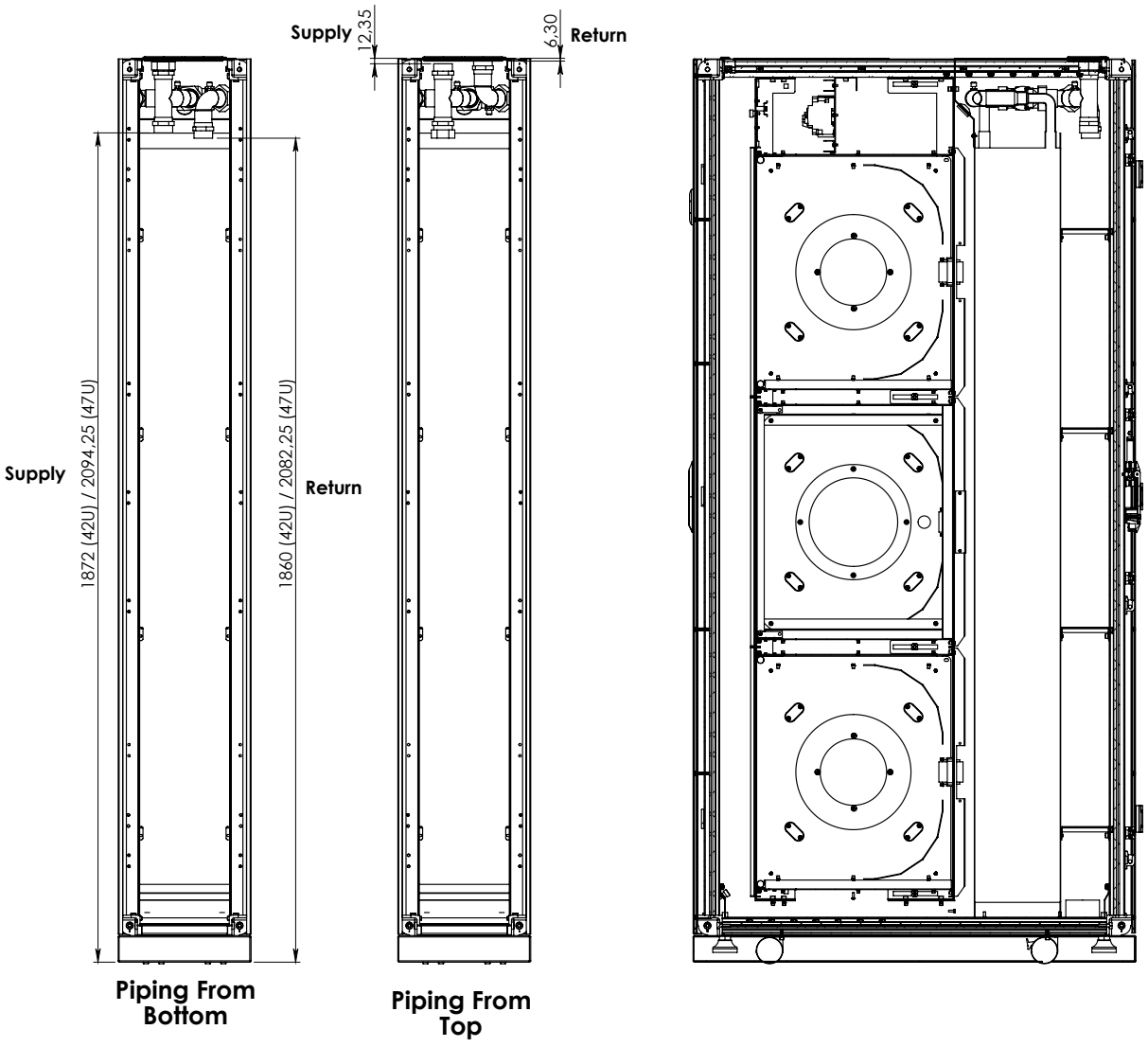


1. Heat Exchanger - Insulated(Water Coil)
2. Water Pipe Inlet 1.1/4" DN32 (Supply)
3. Water Pipe Outlet 1.1/4" DN32 (Return)
4. Air Evacuation Vent
5. 3-Way Valve
6. 3-Way Valve Step Motor

Piping and electrical access locations

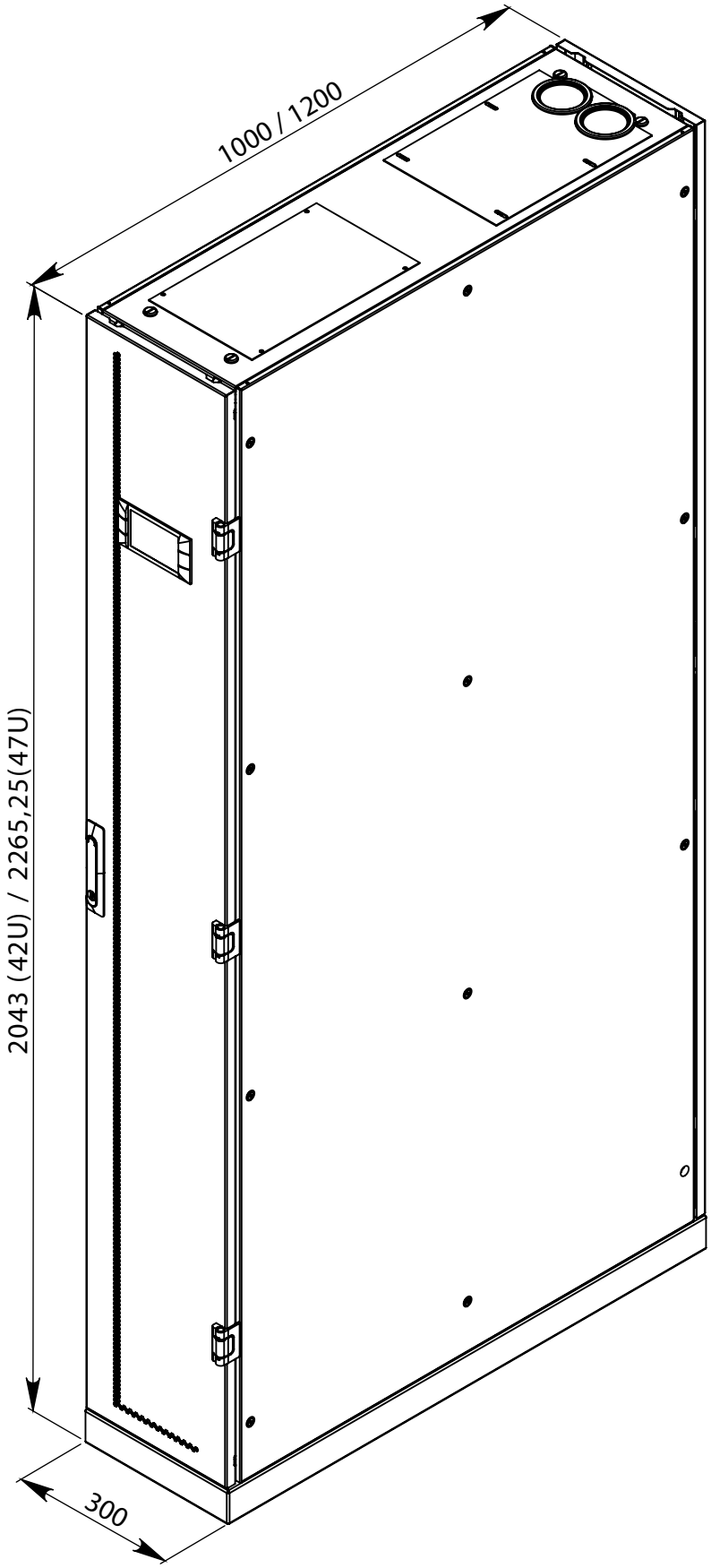


1. **1.1/4" Male Connection (Top Return)**
2. **1.1/4" Male Connection (Top Supply)**
3. **Ø76mm Pipe Entry (Bottom Return)**
4. **Ø76mm Pipe Entry (Bottom Supply)**
5. **Ø25mm Drainage Entry**

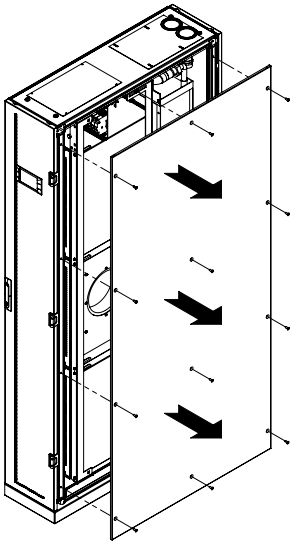


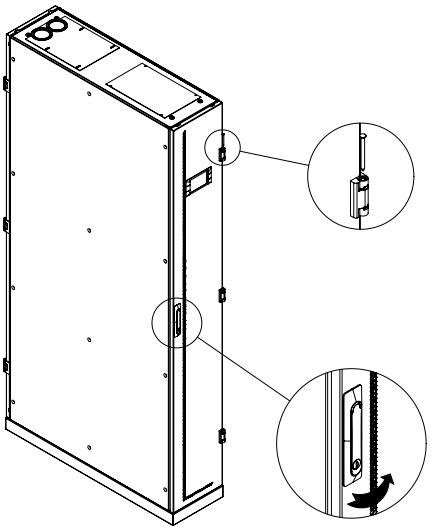
NOTE : Apply 6mm insulation to pipes.

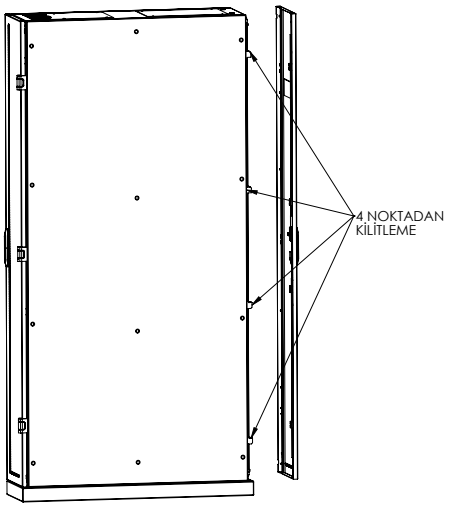
Dimensions



Removing Doors and Panels







Door removal

Warning: Do not open doors and panels if the equipment is operating.

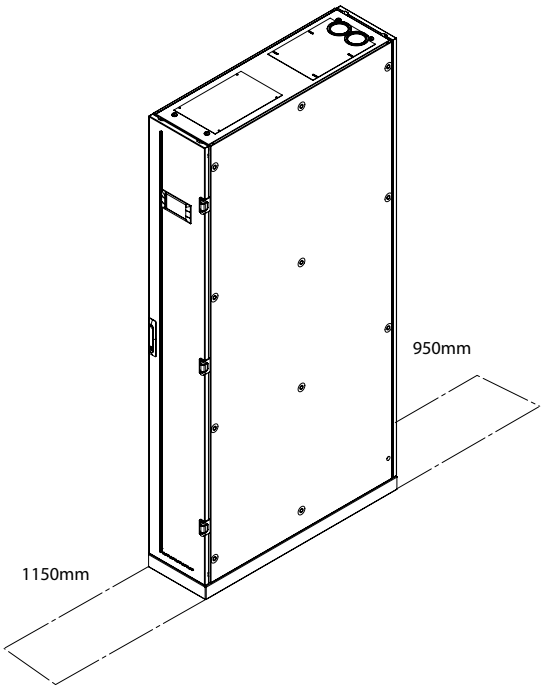
Caution: Spring latches can be damaged if the doors are placed against an object with the latches contacting the object.

Positioning the Equipment

Service access

An area of 1150 mm (45 in) of clear floor space in front and 950 mm (36 in) in back of the equipment is required for service.

All required maintenance can be performed from the front or back of the equipment.



Stabilizing the Equipment

Floor brackets

To prevent the equipment from moving from its final location (if it is not joined with an enclosure), use the included bolt-down kit. Follow the installation instructions included with the kit.

Joining to enclosures

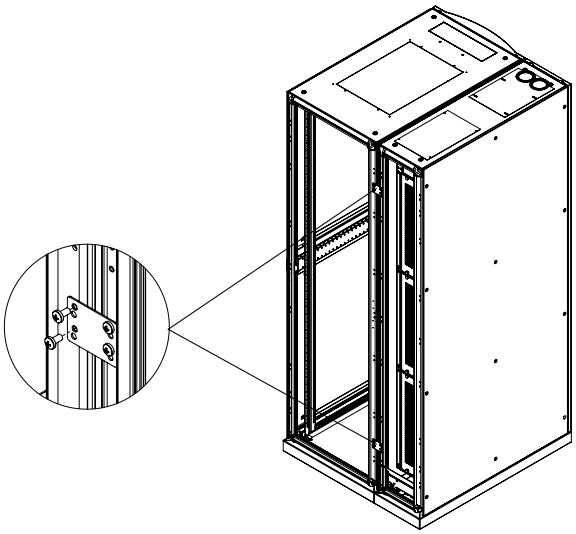
Rubber Sealing Tape

Smoothly stick “Rubber Sealing Tape” on all of 4 edge of cabinet which will be come together with the other cabinet.

Please be careful not to cover any opening or screws while applying this tape. Be careful at the end to cut the tape by the use of scissors.

1. Remove the front and two rear doors from the equipment.
2. Join the cabinet from 4 point by using Baying kit.

2 Pieces of baying kit have to be fixed on front side of cabinet (One has to be fixed on the holes at top, second one has to be fixed on the bottom holes. 2 Pieces of baying kit has to be fixed rear side of cabinet as well as front side.



Please be careful there is no Gap in between the two cabinets

Connect Piping For CW Cooling

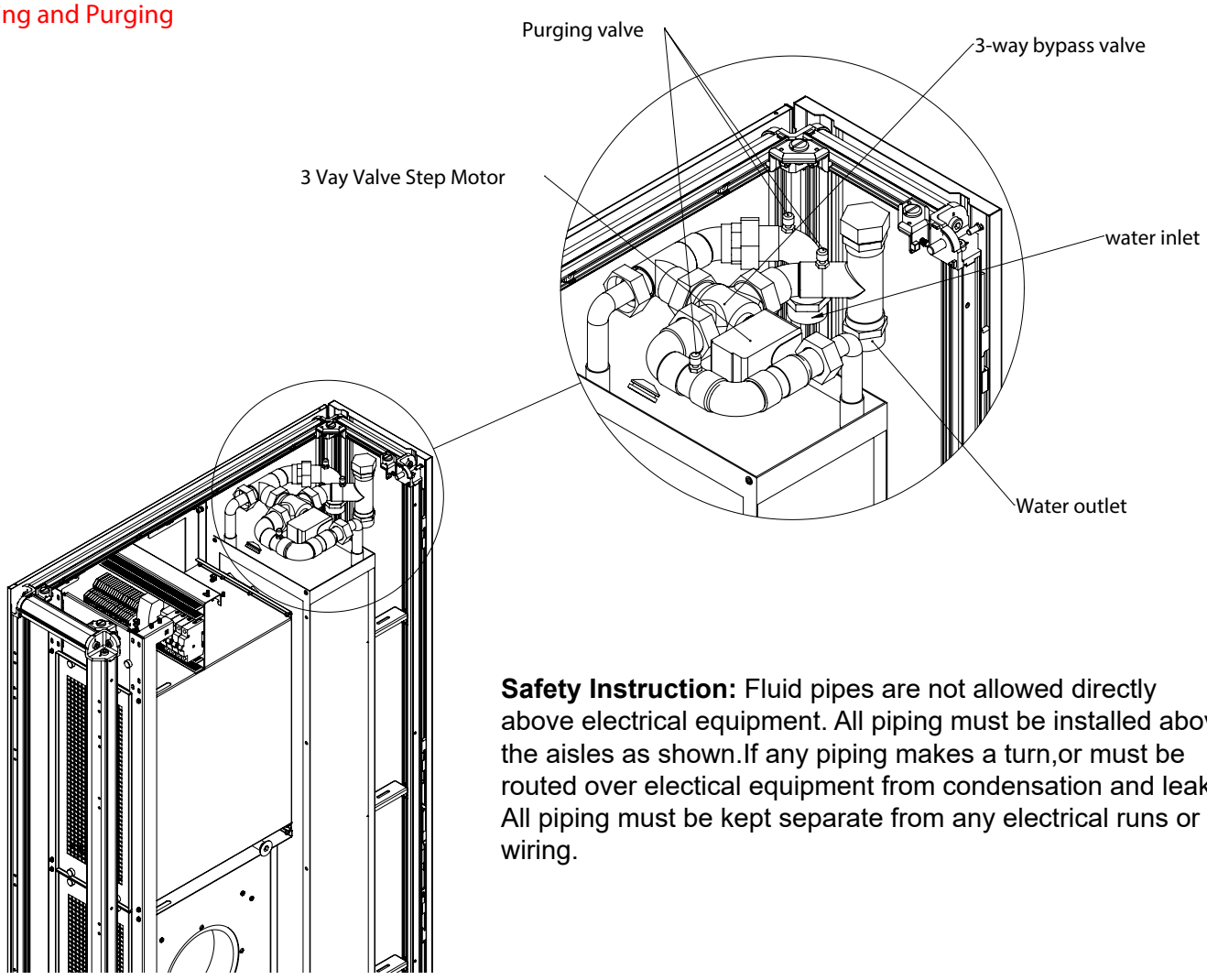
Connect supply and return pipes to heat exchanger inlet and outlet entries. Tighten the body onto the nut with using a wrench.(pipes diameter:1.1/4”-DN32) Insulate water pipes to save energy and minimize condensation. Using either tape or glue, completely seal the insulation boots covering the unused supply and return connections.

Note: When the equipment is properly piped, begin the filling and purging process.

When the equipment is properly piped, begin the filling process (top piping configuration shown).

Electrical Hazard: Ensure both electrical connections are disconnected before introducing water into the equipment.

Filling and Purging



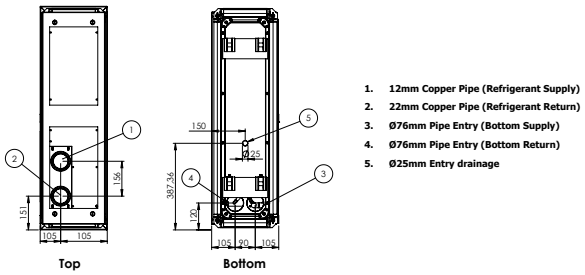
Safety Instruction: Fluid pipes are not allowed directly above electrical equipment. All piping must be installed above the aisles as shown.If any piping makes a turn,or must be routed over electical equipment from condensation and leaks. All piping must be kept separate from any electrical runs or wiring.

Connect piping

Accessories and spare parts

Accessories are available for the equipment, including lexible pipe adapters, data troughs, data partitions, and height adapters for use with other Frog Engineering equipment. For more information, contact Frog Engineering at a number on the back cover of this manual.

Many serviceable components are available as spare parts. For more information, contact Frog Engineering at a number on the back cover of this manual.



1. 12mm Copper Pipe (Refrigerant Supply)
2. 22mm Copper Pipe (Refrigerant Return)
3. Ø76mm Pipe Entry (Bottom Supply)
4. Ø76mm Pipe Entry (Bottom Return)
5. Ø25mm Entry drainage

Filling and Purging

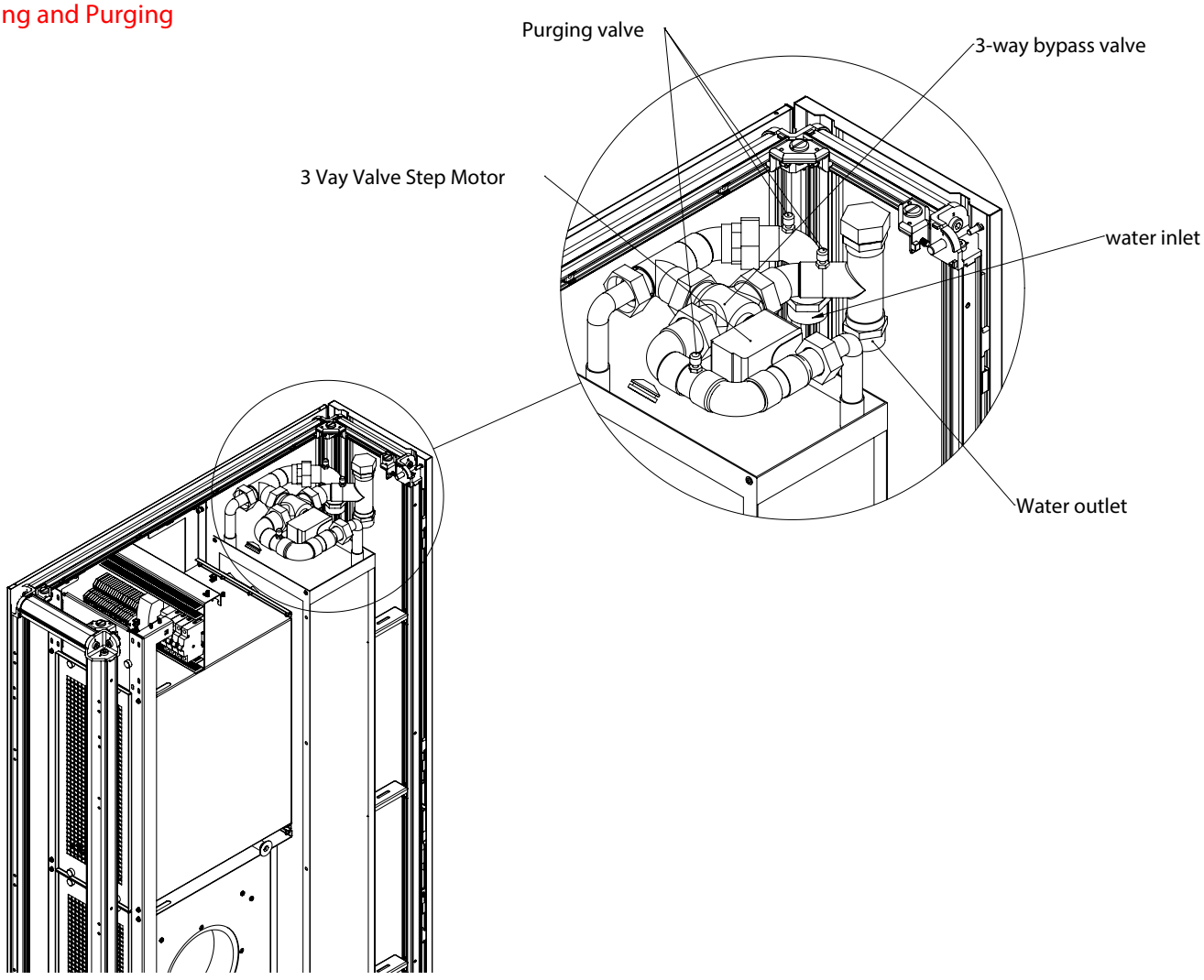
When the equipment is properly piped, begin the filling process (top piping configuration shown).

Electrical Hazard: Ensure both electrical connections are disconnected before introducing water into the equipment.

1. Open the 2-way supply valve and the 2-way bypass shutoff valve.

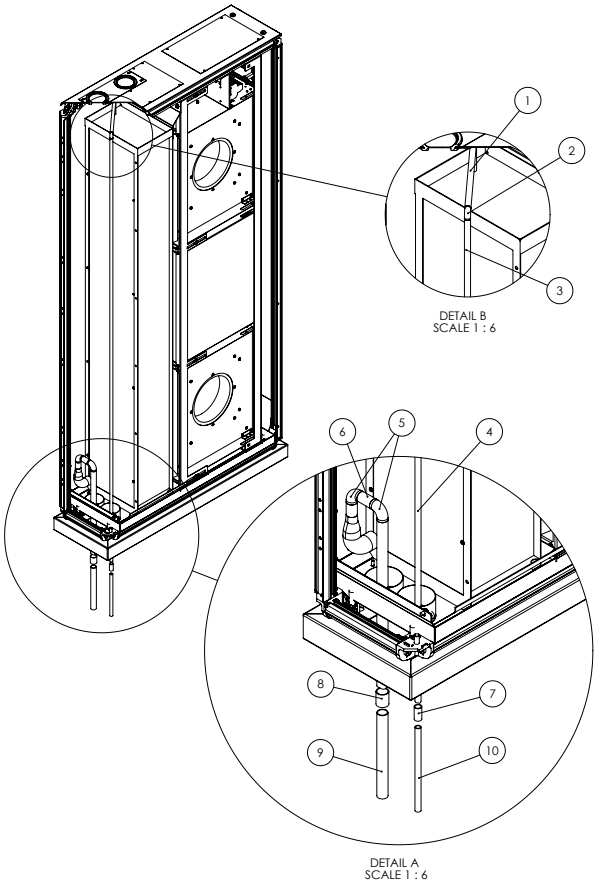
2. Using a 2.5-mm hex key, turn the flow control actuator to the fully open position.

Filling and Purging



Connect Piping for DX Cooling

Refrigerant pipes are not allowed directly above electrical equipment. All piping must be installed above the aisles. If any piping makes a turn, or must be routed over electrical equipment, there must be a drip tray under the pipe that will protect the equipment from condensation and leaks. All piping must be kept separate from any electrical runs or wiring.

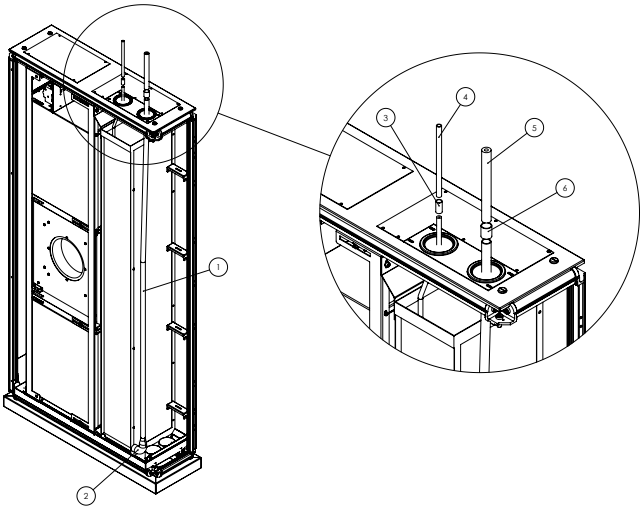


Insulation.
Insulate water lines to protect personnel and to minimize condensation.

Refrigerant Pipe Connections:
There are two refrigerant connection entrances on the top of the unit. One of them is refrigerant supply line and the other one is refrigerant return line.

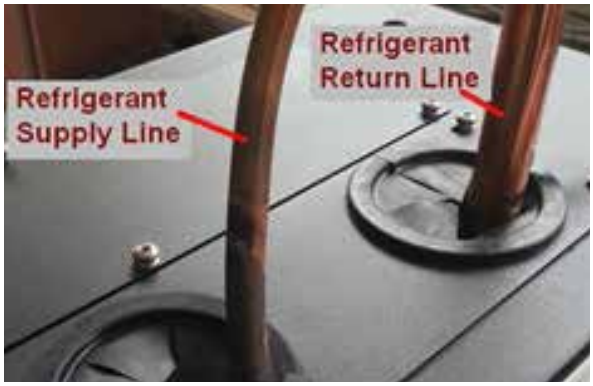
There are also two more entrances at the bottom of the unit.
Note: Piping installations can be performed from top or from bottom of the depending on customer requirements. In this manual only top piping considered.

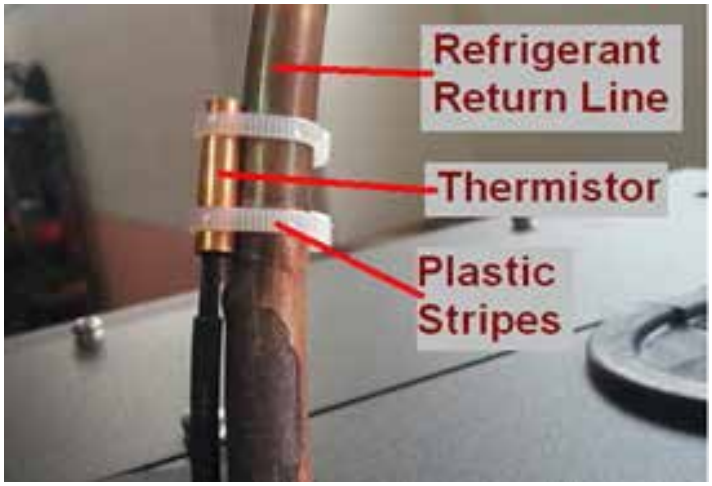
Piping Instructions:
• First, open the small top cover that has two grommets over the evaporator pipes.
• Prepare the evaporator inside the unit for welding. It has 8 Bar internal pressure. It was filled with Nitrogen in the factory. Evacuate the pressured air out from air valve.
• Cut off the ends of two copper pipes with suitable tool.
• Puncture two black grommets on the small cover.
• Insert the external pipes through the two grommets.
• Weld the supply and return pipes.
• Place the small cover.
• Put the Thermistor on the refrigerant supply line. Thermistor is present under the top cover (shown below) Pipe positions can be downwards different than that in the picture below when customer installs piping from floor due to customer requirements.



Fix the Thermistor on the pipe with two plastic stripes as shown in the picture below. It must be fixed very tightly due to sensitive operation.

Insulate both the thermistor and the pipe very well to prevent ambient temperature effects on the thermistor.





Note: Suitable copper pipes must be used for piping. All piping operations must be performed by qualified personnel only. All pipes must be insulated very well for effective and precision operation.

There are three grommets inside the back side of the cooler unit. They are shown in the Figure14. One of the grommets (No:1) is for exit of drain hose. Use a suitable flexible drain hose for condensation drain line. Puncture the grommet (Number1). Then, connect the hose to the pipe (No:2) passing throughout grommet (No:1). Use a bracelet around hose to tighten the connection to prevent any leakage. Other grommets (No:3 and No:4) are for inlet and return refrigerant pipe lines for bottom piping. Place the Water sensor (No:5) like in picture.

Notes on water quality

For safe operation, it is vital that the VBG guidelines on cooling water are observed (VGB R 455P). Cooling water must not contain any limescale deposits or loose debris, and it should have a low level of hardness, particularly a low level of carbonate hardness. For recooling within the plant, the carbonate hardness should not be too high. On the other hand, the water should not be so soft that it attacks the operating materials. When recooling the cooling water, the salt content should not rise too high as the result of evaporation of large quantities of water, since electrical conductivity increases as the concentration of dissolved substances rises, and the water thereby becomes more corrosive. For this reason, it is not only always necessary to add a corresponding quantity of fresh water, but also to remove part of the enriched water. Gypsiferous water is unsuitable for cooling purposes because it has a tendency to form boiler scale, which is particularly difficult to remove. Furthermore, cooling water should be free from iron and manganese, because deposits may occur which settle in the pipes and block them. At best, organic substances should only be present in small quantities, because otherwise sludge deposits and microbiological contamination may occur.

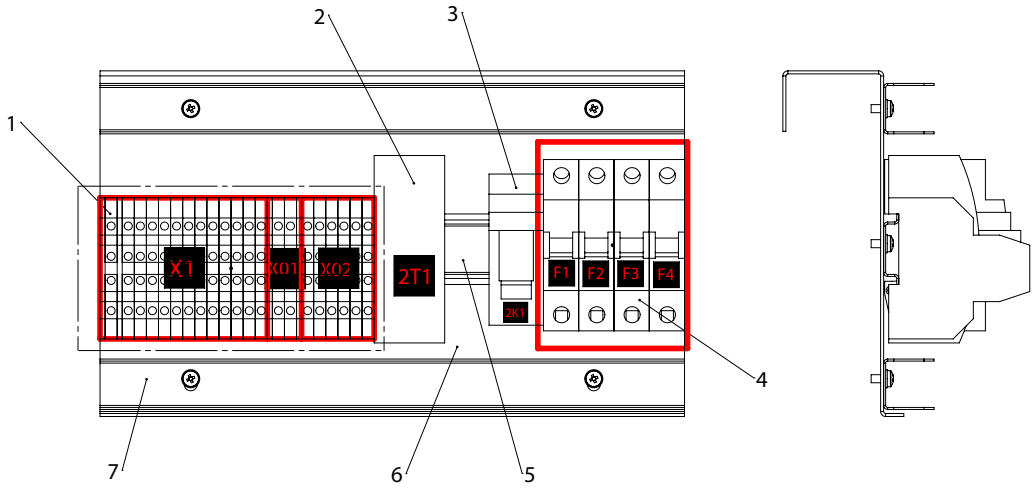
Note: To avoid frost and corrosion damage as well as biological contaminants, Frog Engineering recommends that a water/glycol mixture be used up to max. 30% glycol.

Note: Front Cooler is secured against excess pressure as regards a maximum permissible pressure (PS) of 8 bar if no cooling medium liquid is trapped. If shut-off valves that could cause cooling medium liquid getting trapped are installed on site, pressure relief vessels with safety valves (8 bar blowing-off pressure) must be built into the coolant circuit of the recooling system.

Note: Before operation with water is started, all supply lines must be adequately flushed. Frog Engineering also recommends the implementation of a magnetic filter in the cooling water flow for each Front Cooler or a central magnetic filter to avoid devices becoming contaminated with suspended matter and impurities containing ferrite.

Note: To avoid the loss of fluids due to diffusion (open and closed systems) or evaporation (open systems), it is recommended to employ automatic filling.

Electrical Panel and Components



1- Electrical Terminals

X1 - 0.2mm² - 4mm² , Double deck , DIN Rail 35mm
X01 - 0.2mm² - 4mm² , Double deck , DIN Rail 35mm
X02 - 0.2mm² - 4mm² , Double deck , DIN Rail 35mm

2- Power Supply (2T1)

İnput : 100-230V AC / Output : 24V DC 0.75A

3- Relay (2K1)

24V DC 250V AC 7A

4- Circuit Braker

(F1) D4A 230-400V AC
(F2) D4A 230-400V AC
(F3) D4A 230-400V AC
(F4) D4A 230-400V AC

5-Electrical Panel Board

6-Cable Duct

Electrical connection

Note: Please keep this electrical documentation readily available so that it is always on hand when needed. This is the only documentation which is authoritative for the unit.

Caution : Work on electrical systems or equipment may only be carried out by an electrician or by trained personnel guided and supervised by an electrician.
All work must be carried out in accordance with electrical engineering regulations.

The unit may only be connected after the above-named personnel have read this information.
Use insulated tools.

The connection regulations of the appropriate power company are to be followed.

The voltage values shown in the wiring plan or on the rating plate must match the mains voltage.

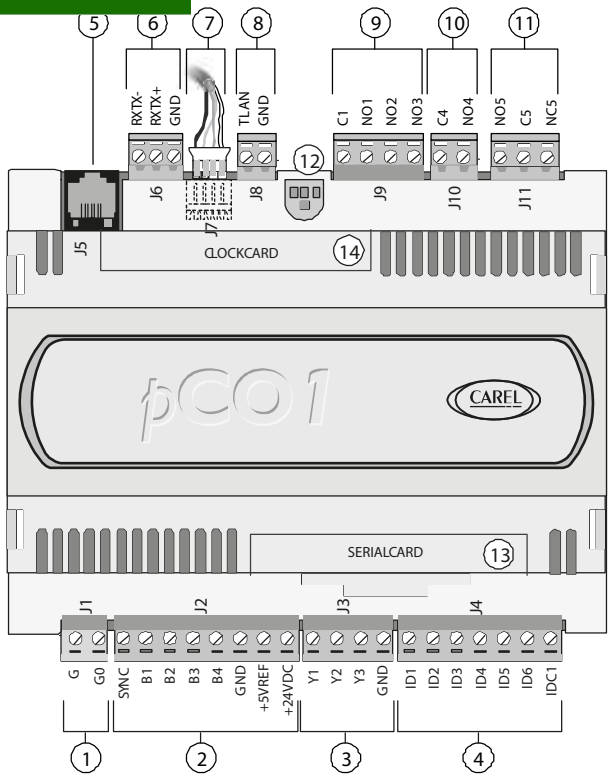
The pre-fuse specified in the wiring plan or on the rating plate should be provided as power protection.

The unit must be individually fused.

The unit must be connected to the mains via an isolating device which ensures at least 3 mm contact opening when switched off.

The mains connection may only be made using the connection cable which extends from the unit.

No additional control equipment may be connected upstream of the device at the supply end.



Key:

1	Power supply connector [G (+), G0 (-)], 24 Vac or 24 to 48 Vdc;
2	Input (24 Vac) for phase control and NTC, 0/1 V, 0/5 V, 0/20 mA, 4/20 mA analogue inputs, +5Vref for power supply to 5V ratiometric probe and
	+24 Vdc power to active probes;
3	0 to 10 V analogue outputs and PWM output;
4	Digital inputs with voltage-free contact;
5	Connector for all standard pCO* series terminals and for downloading the application program;
6	pLAN network connector;
7	tLAN terminal connector;
8	tLAN or MP-Bus network connector;
9	Relay digital outputs with one common;
10	Relay/SSR digital output;
11	Digital output for alarm relay with changeover contact/SSR;
12	Yellow power LED and 3 status LEDs (see paragraph 6.3)
13	Cover for inserting the supervisor and telemaintenance option
14	Cover for inserting the clock board;
15	Built-In terminal.

Fig. 2.f

2.5.1 Meaning of the pCO^{xs} board inputs/outputs

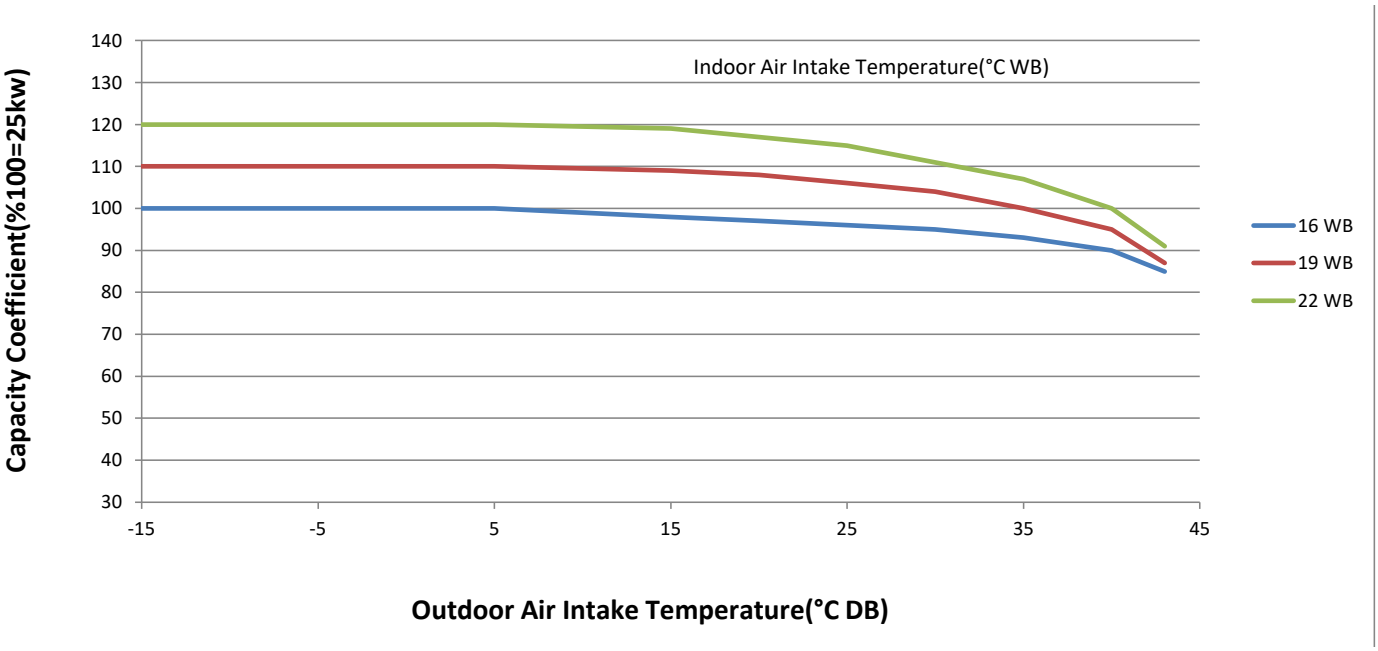
Connector	Signal	Description
J1-1	G	24 Vac or 24 to 48 Vdc power supply
J1-2	G0	power supply reference
J2-1	SYNC	synchronicity input for phase control (G0 is the reference)
J2-2	B1	universal analogue input 1 (NTC, 0/1V, 0/5 V, 0/20 mA, 4/20 mA)
J2-3	B2	universal analogue input 2 (NTC, 0/1V, 0/5 V, 0/20 mA, 4/20 mA)
J2-4	B3	universal analogue input 3 (NTC, 0/5 V)
J2-5	B4	universal analogue input 4 (NTC, 0/5 V)
J2-6	GND	reference for the analogue inputs
J2-7	+5VREF	power supply for 0/5 V ratiometric probes
J2-8	+24VDC	24 Vdc power supply for active probes
J3-1	Y1	analogue output no. 1, 0/10 V
J3-2	Y2	analogue output no. 2, 0/10 V
J3-3	Y3	analogue output no. 3, PWM (for phase cutting speed controllers)
J3-4	GND	reference for analogue output
J4-1	ID1	digital input no. 1
J4-2	ID2	digital input no. 2
J4-3	ID3	digital input no. 3
J4-4	ID4	digital input no. 4
J4-5	ID5	digital input no. 5
J4-6	ID6	digital input no. 6
J4-7	IDC1	common for digital inputs from 1 to 6
J5		6-pin telephone connector for connection to the standard user terminal
J6-1	RX-/TX-	RX-/TX- connector for RS485 connection to the pLAN network
J6-2	RX+/TX+	RX+/TX+ connector for RS485 connection to the pLAN network
J6-3	GND	reference for RS485 connection to the pLAN network
J7		tLAN terminal connector
J8-1	TLAN	connector to the tLAN network
J8-2	GND	reference for connection to the tLAN network
J9-1	C1	common for relays: 1, 2, 3
J9-2	NO1	normally open contact, relay no. 1
J9-3	NO2	normally open contact, relay no. 2
J9-4	NO3	normally open contact, relay no. 3
J10-1	C4	common for relays: 4
J10-2	NO4	normally open contact, relay no. 4
J11-1	NO5	normally open contact, relay no. 5
J11-2	C5	common for relays: 5
J11-3	NC5	normally closed contact, relay no. 5

Tab. 2.e

Sound Data

	FANS ROTATIONAL RATE							
Front Cooler	*30%*	*40%*	*50%*	*60%*	*70%*	*80%*	*90%*	*100%*
Front Noise/1 metre (dBA)	55,6	65,5	72,7	78	81,2	84,6	87,2	90,1
Side Noise/1 metre (dBA)	45,5	61,7	69,3	74	77,5	80,9	83,5	85,9
Rear Noise/1 metre (dBA)	49,5	63,1	69,9	74,1	78,1	81,2	84,1	87

Performance Graph of DX Type Front Cooler



Performance Data of Water Based Front Cooler

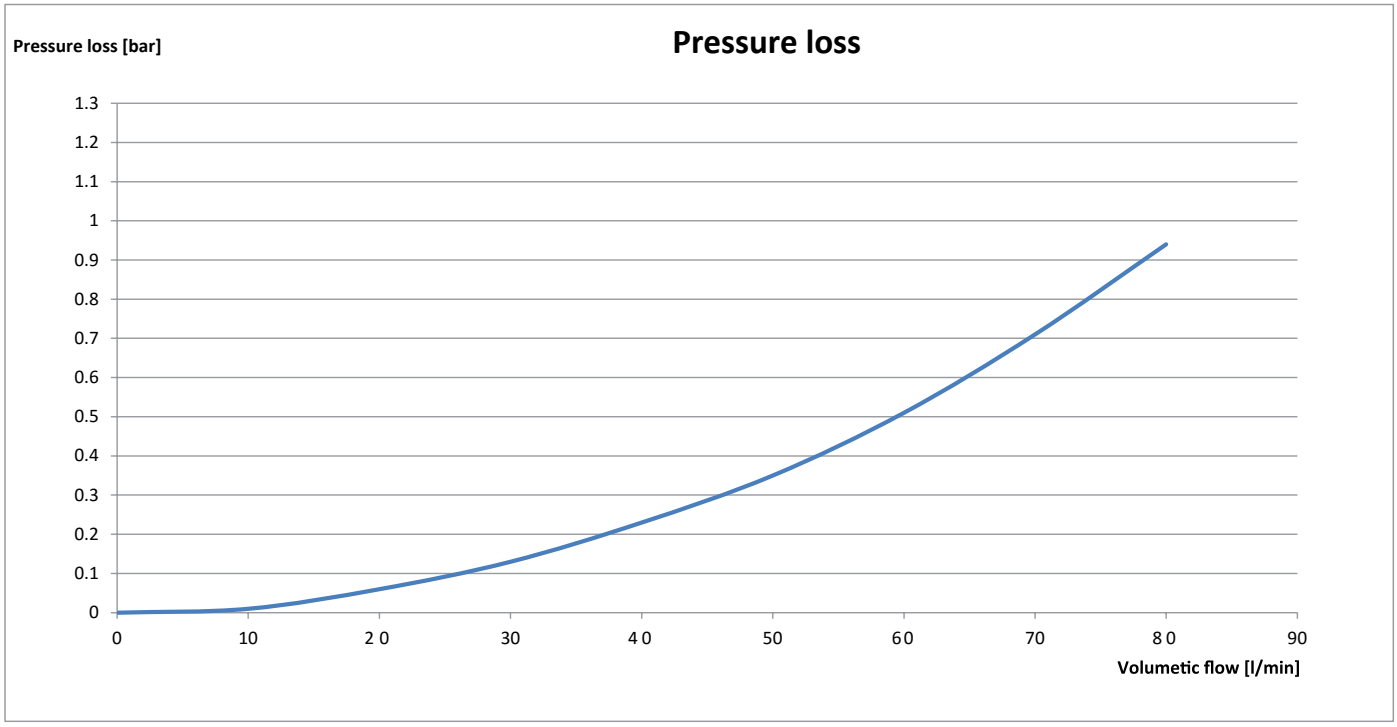
		Total Capacity		Sensible Capacity		Flow Rate LPM	Total System Pressure Drop ft. ^{2}O	Total System Pressure Drop mSS
		btu /h	kW	btu /h	kW			
37° C DB %20 Relati e Humidty Entering Air Values								
7 °C	Δ5° C	120.789,83	35,40	120.789,83	35,40	101,48	20,3	0,68
	Δ6° C	114.647,97	33,60	114.647,97	33,60	80,28	13,5	0,45
10 °C	Δ5° C	108.506,12	31,80	108.506,12	31,80	91,16	16,6	0,56
	Δ6° C	102.023,05	29,90	102.023,05	29,90	71,43	11,2	0,38
12 °C	Δ5° C	101.277,50	29,68	101.277,50	29,68	85,5	14,6	0,49
	Δ6° C	95.901,60	28,11	95.901,60	28,11	67	10,0	0,34
14 °C	Δ5° C	94.534,28	27,71	94.534,28	27,71	80,2	12,9	0,43
	Δ6° C	90.147,50	26,42	90.147,50	26,42	62,85	8,9	0,30
16 °C	Δ5° C	88.238,30	25,86	88.238,30	25,86	75,2	11,3	0,38
	Δ6° C	84.738,70	24,83	84.738,70	24,83	58,9	7,9	0,27
18 °C	Δ5° C	82.361,62	24,14	82.361,62	24,14	70,57	10,0	0,34
	Δ6° C	79.654,40	23,34	79.654,40	23,34	55,3	7,0	0,24
35° C DB %24 Relative Humidty Entering Air Values								
7 °C	Δ5° C	106.117,62	31,10	106.117,62	31,10	89,15	16,5	0,55
	Δ6° C	100.658,19	29,50	100.658,19	29,50	70,47	10,9	0,37
10 °C	Δ5° C	92.127,83	27,00	92.127,83	27,00	77,4	13,0	0,44
	Δ6° C	88.374,48	25,90	88.374,48	25,90	61,87	8,8	0,30
12 °C	Δ5° C	84.020,58	24,62	84.020,58	24,62	70,5	10,8	0,36
	Δ6° C	81.216,14	23,80	81.216,14	23,80	57,2	7,7	0,26
14 °C	Δ5° C	76.626,77	22,46	76.626,77	22,46	64,2	9,0	0,30
	Δ6° C	74.637,63	21,87	74.637,63	21,87	52,9	6,7	0,23
16 °C	Δ5° C	69.883,61	20,48	69.883,61	20,48	58,5	7,5	0,25
	Δ6° C	68.591,99	20,10	68.591,99	20,10	48,9	5,8	0,20
18 °C	Δ5° C	63.733,86	18,68	63.733,86	18,68	53,3	6,3	0,21
	Δ6° C	63.036,04	18,47	63.036,04	18,47	45,29	5,1	0,18
32° C DB %32 Relative Humidty Entering Air Values								
7 °C	Δ5° C	92.469,05	27,10	92.469,05	27	78	13,0	0,44
	Δ6° C	88.715,69	26,00	88.715,69	26	62	8,5	0,29
10 °C	Δ5° C	79.673,52	23,35	79.673,52	23	67	9,9	0,33
	Δ6° C	75.408,34	22,10	75.408,34	22	53	6,3	0,21
12 °C	Δ5° C	70.112,70	20,55	70.112,70	21	59	8,1	0,27
	Δ6° C	69.149,50	20,27	69.149,50	20	48	5,4	0,18
14 °C	Δ5° C	61.699,20	18,08	61.699,20	18	52	6,6	0,22
	Δ6° C	63.410,00	18,58	63.410,00	19	44	4,6	0,16
16 °C	Δ5° C	54.295,63	15,91	54.295,63	16	46	5,4	0,18
	Δ6° C	58.147,34	17,04	58.147,34	17	41	4,0	0,14
18 °C	Δ5° C	47.779,56	14,00	47.779,56	14	40	4,4	0,15
	Δ6° C	53.320,80	15,63	53.320,80	16	37	3,4	0,12

Performance Data of Water Based Front Cooler

30° C DB %33 Relative Humidty Entering Air Values								
7 °C	Δ5° C	79.161,69	23,20	79.161,69	23,20	66,51	9,9	0,33
	Δ6° C	75.067,12	22,00	75.067,12	22,00	52,56	6,2	0,21
10 °C	Δ5° C	67.219,20	19,70	67.219,20	19,70	56,47	7,1	0,24
	Δ6° C	62.783,41	18,40	62.783,41	18,40	43,96	4,4	0,15
12 °C	Δ5° C	60.034,55	17,59	60.034,55	17,59	49,24	5,8	0,20
	Δ6° C	56.756,20	16,63	56.756,20	16,63	39,74	3,7	0,13
14 °C	Δ5° C	54.447,55	15,96	54.447,55	15,96	42,94	4,8	0,16
	Δ6° C	51.307,60	15,04	51.307,60	15,04	35,92	3,0	0,10
16 °C	Δ5° C	48.029,30	14,08	48.029,30	14,08	37,44	3,9	0,13
	Δ6° C	46.382,10	13,59	46.382,10	13,59	32,47	2,5	0,09
18 °C	Δ5° C	42.938,18	12,58	42.938,18	12,58	32,65	3,2	0,11
	Δ6° C	41.929,40	12,29	41.929,40	12,29	29,35	2,1	0,07

Pressure loss

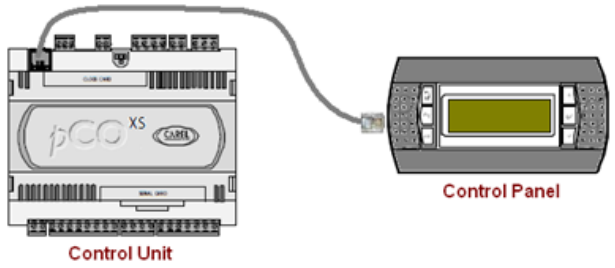
The following diagram shows the pressure loss of the Front Cooler in [bar], depending on the volumetric flow [l/min]. It is meant to assist the operator in the planning phase to determine the water pressure of the cold water supply system necessary for the system.



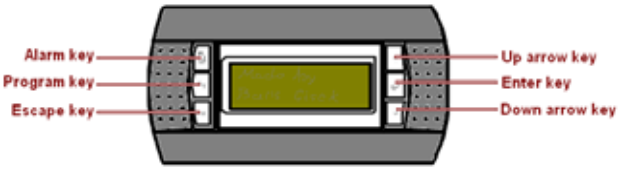
Operation

Control Interface

This cooling unit has a user interface which allows customer to control the unit and have informations about the running status. The user interface mainly has two parts, that one is control unit and the other one is digital control panel.



Control unit is an electronic device that has already loaded PLC program at the factory. It is placed at the electrical panel compartment inside the unit. The control panel is a digital panel mounted on the front perforated door of the unit. These both parts are connected via cable. Customer is able to define parameters and limits according to cooling system requirements.



Button	Description
	ALARM KEY: Alarm status can be shown by pressing this key. If the alarm existed, the led becomes on. Once the alarm is pressed, the alarm record will be seen. The led becomes off that means alarm is fixed and the alarm record is disappeared.
	PRG KEY: Views the main menu, regardless of which menu is open at the current time.
	ESC KEY: Steps back one level. If you are in the program menu, once you press button it returns previous screen or cancels current setup operation.
	UP KEY: Moves around the cursors and sets control parameter values.
	ENTER KEY: Confirms entered data and moves around set values.
	DOWN KEY: Moves around the cursors and sets control parameter values.

When the main power is supplied to the cooling unit, the display interface initializes. As soon as power is supplied to the cooling unit, Two fans start to run for about 60 seconds and “selftest please wait…” message is displayed in the control panel.

```
##################################
            selftest
          please wait...
##################################
```

The start-up inspection ensures that the equipment is operating properly after the initial start-up. This inspection verifies that all modes of operation are working correctly and that the cooling unit is ready for normal operation.

After the initial menu, main screen like the one below appears.

```
 FANS
SPEED:                  000 %
PERFORMANCE:            000 VA
```

Main Menus

This cooling unit has following main menus.

```
COOLER
  FACILITYREVIEW
  NETWORK
  LIMITS
  IN-OUTPUTS
  CONTROLLOOP
  SENSORCONFIG.
  FACILITYCONFIG.
```

Facility Review Menu:

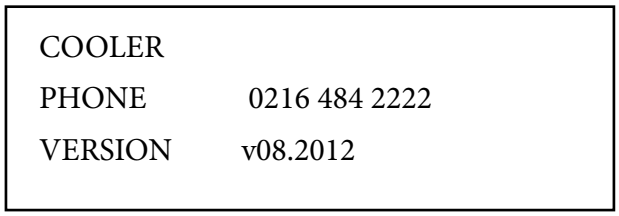
This menu displays the current setup datas such as; remote status, fan on/off status, 3-way valve position, actual return air temperature, actual supply air temperature, temperature set point.

FACILITY MENU DISPLAYS	FUNCTION	MODIFIABLE PARAMETERS
COOLING REMOTE off-Auto FANS off-on COOLING 0.0%	Operation can be started and stopped. Shows cooling rate.	To start operation, press enter key to access auto-off and switch parameter with down/up keys and press again enter key to confirm. If the auto is set, the unit will operate.
COOLER RETURN AIR ACTUAL 14.7 °C	Shows return air temperature.	This display is for information only.
COOLER SUPPLY AIR ACTUAL 14.6°C SETPOINT 22°C	Shows supply air temperature. Operation temperature can be defined if the unit operates according to supply air temperature.	Press enter key and adjust supply air temperature as recommended (20-28°C). Press enter to confirm.
COOLERS off RETURN AIR 14.7°C COOLVALVE 0.0%	Fans status can be seen. Return air temp. can be seen Shows outdoor unit operation rate(DX type) or three way valve opening rate(CW type).	This display is for information only.

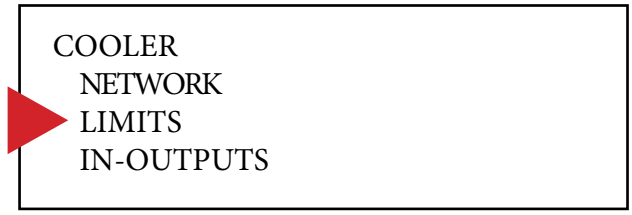
Note: When cursor blinks on the digits, parameter can be changed.

Note: In a data center room, maintaining ambient temperature range of 20 to 28°C is optimal for system reliability. Also this temp. range helps to maintain a safe humidity level.

Network Menu: Involves information about the network service number, operational program version and program date. To view Network Menu, press Prg key. Select Network by pressing Up and Down Arrow keys. Then press Enter key.



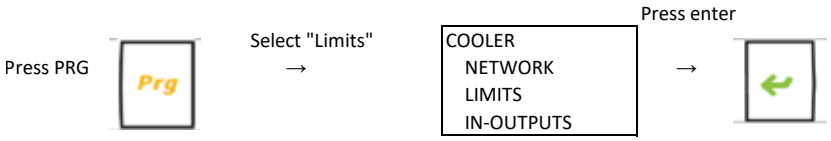
Limits Menu: This menu is for viewing and defining the limit parameters. Press Prg key, then select Limits by pressing Up and Down Arrow keys. Then press Enter key to view the sub menus.



Limit on/off status, delay time, maximum limit parameter of return air temperature, maximum limit parameter and dewpoint parameter of supply air temperature can be defined by operator.

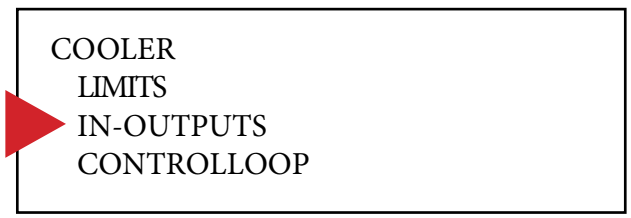
How to enter limits menu?

Limists Menu
This menu is used for viewing and defining the limit parameters.



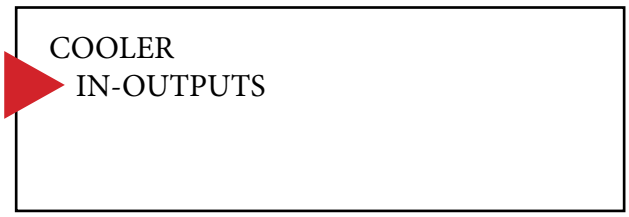
LIMITS MENU DISPLAYS			FUNCTION	MODIFIABLE PARAMETERS
COOLER LIMITS ON **COOLER LIMITS DELAY**		YES 005 min	Limit on/off status and delay time can be defined.	Press enter key to select limits status with up/down keys, press enter key to define delay time and press again to confirm data.
RETURN AIR MAXIMUM		40°C	Upper limit can be defined for return air temperature range.	Press enter key to define upper limit and confirm data.
SUPPLY AIR TEMPERATURE	MAX: DEW POINT:	29.0°C 14.0°C	Maximum and minumum supply air temperature can be defined.	Press enter key to define max and min temperature limit and confirm data with pressing enter key.

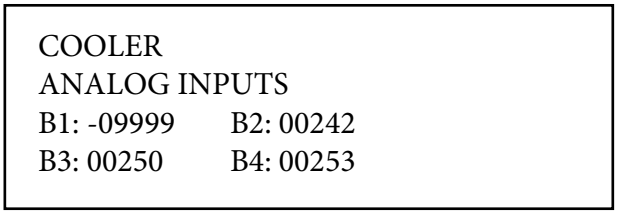
Inputs-Outputs Menu: This menu displays the digital inputs, digital outputs, analog inputs, analog outputs as “0” or “1”. “0” means “not connected”. “1” means “connected”.



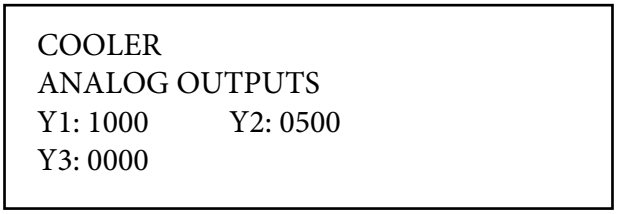
How to view Input and Output menu:

1. Press Prg Key,
2. Select In-Outputs with up/down arrow keys,
3. Press Enter Key to enter In-Output menu.
4. Press up/down arrow keys to view each submenus one after one like folowing page.



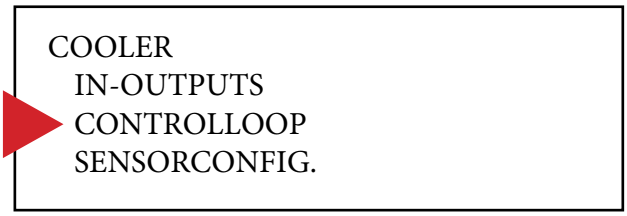


B1	Empty
B2	Return air temperature
B3	Supply air temperature
B4	Water leakage sensor



Y1	Controls outdoor unit operation rate
Y2	Controls fan speed
Y3	Empty

Control Loop Menu: This menu is to view and configure some important parameters about utilizing.



How to enter control loop menu?

Press PRG key

→

Select Control Loop

COOLER
IN-OUTPUTS
CONTROL LOOP
SENSOR CONFIG

Press enter key

COOLER
CONTROL LOOP
INSERT PASSWORD
ooooo TAKEN?

Press enter key to move the 00000 digits, insert “00500” password and enter key to skip digits. When “Taken?” digits blink, press up/down key to confirm password.

COOLER
CONTROL LOOP
CHECKED

The cooling unit has two temperature sensors. One is in the front side (supply air temperature) and the other is in the back (return air temperature). Cooling control sensor can be chosen with following menu by the customer regarding the preferences.

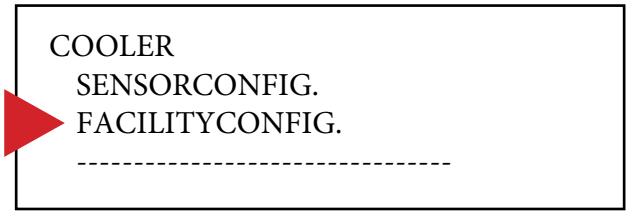
CONTROLLOOP DISPLAYS	FUNCTION
COOLER CONTROL BY: SUPPLYAIRTEMP.	The unit has two temp. sensors, one of them is placed front side as supply air temperature. The other sensor placed back side as return air temperature . In this display, cooling control sensor can be can be chosen by the supply or return air temperature reference.
COOLER REG. **SUPPLYAIRTEMP.** SETPOINT 22 °C PROP.BAND 3.0 K	The temperature can be defined and sensitive operation range can be adjusted. If the actual temperature 1 °C up to set value, cooling rate is 33 %. If it is 3 °C up to set value, cooling rate is 100 %. The cooling rate increases proportional.
FANS **CONTROL BY:** REQUIREMENT	Fan speed operation type can be selected by customer, according to the operation conditions. Fan speed is controlled by "requirement" as default. Fan speed rises proportional to temperature in this default. Also fan speed can be run "constant " and "sensor" adjustment.

Note: The EC fans operation is controlled by 0-10V DC power supply and the unit controls fan speed four stages in "requirement" setting.

COOLERS FAN OFF BY MAX: 35°C DELAY: 000min	Fans produce air circulation.if the fire existed inside of the cabinet, this air circulation will spread fire in a short time. To reduce the risk as much as possible, power of the fans should be shut down. If the temperature exceed 35°C, the fans will stop and make an alarm. Also time delay can be defined as desired to shut down power.
COOLERS FAN ON AFTER FAILURE MANUAL QUİTT-AUTO	After a fan failure, the fans will not start to operate in "manual quitt" setting.(default). To operate fans automatically after a fan failure(the failure must be fixed), select "auto" .

Fan rotational speed control can be selected by customer according to the operation conditions.
Fan rotational speed is controlled by “requirement” as default. But it can be changed to “constant” or “sensor” due to customer’s special conditions.

Facility Configuration Menu: This menu contains configurations of chiller, failure and alarm configurations, language selection, fan failure alarms and alarm control delay times, fan rotational speed limits, NC/NO contacts, 3-way valve mode.



How to enter Facility Configuration menu:
1- Press Prg Key,
2- Select Facilityconfig. with up/down arrow keys,
3- Press Enter Key to view password screen.
4- Press Enter key to move the cursor to the 00000 digits.
5- Type the password (00700). In order to type the password, Press Enter the key to skip the “0” digit. Press up/down arrow keys to define the digit.
6- Press Enter key to move the cursor to “Taken?” , then press Enter key.

7- A screen like the one below appears meaning password is accepted.

FACILITY CONFIGURATION MENU DISPLAYS

This menu, contains configurations of chiller, failure and alarm configurations,language selection, fan failure alarms and alarm control delay times, fan rotational speed limits, NC/NO contacts and 3 way valve mode.

DISPLAYS	FUNCTION
Y2 min 50 **Y2 max** 700	The EC fans are controlled by Y2 output. In that display, minumum and maximum operation rates of the fan can be modified as desired.
COOLER **INVERT Y** **COOLING:** Normal-Invert	For DX types, Y1 output is connected to interface card, so it controls outdoor unit operation rate by signalling 0-10. To enable outdoor unit operation, make it "normal" cooling. If the unit is water-based type, Y1 output is connected three way valve. To enable three way valve mode, make it "invert" cooling.
COOLER LANGUAGE English-German	English and German language can be selected in this display.
SELECT FANS FAN1: ON FAN4:OFF FAN2:ON FAN5:OFF FAN3:ON	If the fans do not operate for any reason the unit will show alarm, faulty fan or fans can be turned off to remove alarm in that display.

Removing a Fan Module

Semi-Annual Preventive Maintenance

• Check the cleanliness of the water coil. Clean if required.

This Cooling Unit has modular design. It is designed to allow easy installation, maintenance. Allows to replace parts easily.

Removing Fan Module: Right angular view of the unit (cover removed) is shown below. The unit has three radial fans. Fan modules can be removed when necessary. Each fan module has a perforated front cover for secure operation. To remove a fan module, follow the instructions below;

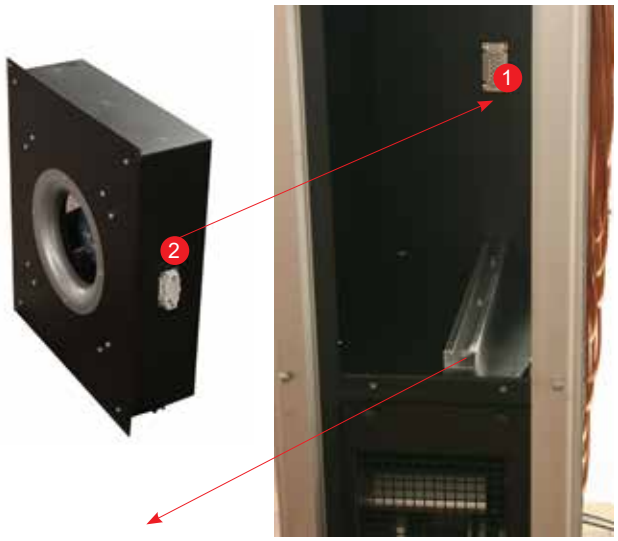
1. First remove the perforated fan cover. Unscrew manually the four plastic headed bolts at the cornens of the perforated front covers.

2. Unscrew manually two fan module fixing bolts (plastic headed) at the internal edge of the module. Then fan module will be free.

3. Grip the aluminium profil inside the fan module and pull it outward untill it gets out compeletely.

Fan modules and fan cases have male and female connectors. It allows fan module to be removed and placed back easily when required

While pulling the fan module out of the fan plug-in unit, support it from below. It cannot be held by the handle alone. Each fan unit is 4.1 kg

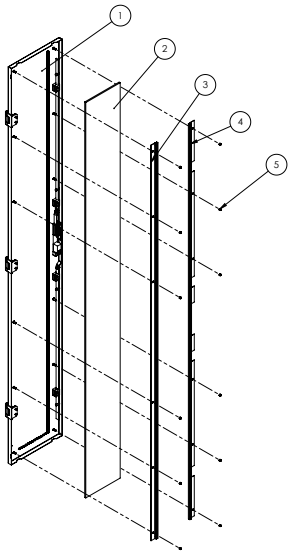


Rail System helps you drawing fan.

Replacing the Filter

Dust Filters

Angular view of the rear cover is shown below. Rear cover has a spongy filter. It can be removed and replaced with new one when necessary. It is fixed to the rear cover with four fixing laths. Follow the instructions below to replace the rear cover filter;



1-) Front Cooler Kapısı
2-) Sünger Filitre
3-) Menteşe Tarafı Filitre Cıtası
4-) Kilit Tarafı Filitre Çıtası
5-) M5 Fiberli Somun

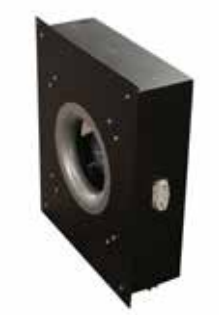
1. Remove the rear door (PartNo:1) from the unit.
2. Unscrew the nuts (PartNo:5) of the laths with suitable tool.
3. Remove four laths (PartNo:4)
4. Remove the old filter (PartNo:2)
5. Attach the new filter carefully. Don't damage it while doing this.
6. Attach the laths in their respective places.
7. Screw the nuts back.

Cleaning the Coil: Clean the coil as frequently as described above or whenever needs to be cleaned.

Clean debris between the coil fins with brush. After cleaning with brush, if necessary, clean dust particles with compressed air as shown below as well. This cleaning process is very important to keep the cooling performance well. Be very careful not to damage the delicate fins of the coil.

Accessories

Fan Module - 020925S02



Front Cooler Fan Module (020925S02) impeller with backward-curved blades is made of fibreglass-reinforced plastic, enabling an aerodynamically optimised shape that cuts the noise level in half and reduces power requirements significantly.

Miniature Circuit Breakers 025041H00

System pro M compact S200 miniature circuit breakers are current limiting. They have two different tripping mechanisms, the delayed thermal tripping mechanism for overload protection and the electromechanic tripping mechanism for short circuit protection. They are available in different characteristics (B,C,D,K,Z), configurations (1P,1P+N,2P,3P,3P+N,4P), breaking capacities (up to 6 kA at 230/400 V AC) and rated currents (up to 63A). All MCBs of the product range S200 comply with IEC/EN 60898-1, IEC/EN 60947-2, UL1077 and CSA 22.2 No. 235, allowing the use for residential, commercial and industrial applications. Bottom-fitting auxiliary contact can be mounted on S200 to save 50% space.

Relay Interface Module 24VDC 7A 4c 600R

Carel Control Unit - 025043H00

Carel Control Panel - 025045H00

The display recalls the shape and the dimensions of the already existing 4x20 display, yet features graphic representation on 120x32 pixels (version PGD0*). The “large” 132x64 pixel version is also available, with codes PGD1*. PGD0-1* can display graphic symbols of various sizes and the main international alphabets.

3-Way Mixing Valve - 025058H00

Rope water detector (AP9325). Up to four optional rope water detectors can be installed in series. The rope water detector connects to the RJ-45 leak detector port located at the top of the interface box.

Dust Filters - 025072H00

Dust filters on the door has to be 0,5*150*200 cm

Troubleshooting

Disturbance	Possible cause	Remedying
Cooler Sensor 2 Returnairtemp. Check Connections	Return air temperature (back side of the cooler) sensor connection failure exists.	"*Check the sensor cable connections. Make sure the temperature sensor is connected properly to the control unit B2-GND port. *Contact Frog Engineering if needed. - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."
Cooler Sensor 3 Supplyairtemp. Check Connections	Supply air temperature (front side of the cooler) sensor connection failure exists.	"*Check the sensor cable connections. Make sure the temperature sensor is connected properly to the control unit B3-GND port. *Contact Frog Engineering if needed. - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."
Cooler Sensor 4 Bilgewater Check Connections	Water leakage (in the back of the cooler) sensor connection failure exists.	"*Check the sensor cable connections. Make sure the temperature sensor is connected properly to the control unit B4-GND port. *Contact Frog Engineering if needed. - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."
Cooler Failure Bilge Water	Water leakage sensor detetcs water leak, or condensation water overflow the condensation line, or excessive condensation in the unit.	"*Check the piping and connections for leakage. *Check the insulations on the piping lines. *Check if the condensate pan drain line stuffed up. Clean the drainage if necessary. *Contact Frog Engineering if needed - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."
Alarm Fan 1	Fan1 doesn't run properly or may have connection problems.	"*Check if the Fan1 module plugged in tightly. *Remove the Fan1 module, clean the male-female connectors, and check the connector cables. *Contact Frog Engineering if needed. - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."
Alarm Fan 2	Fan2 doesn't run properly or may have connection problems.	"*Check if the Fan2 module plugged in tightly. *Remove the Fan2 module, clean the male-female connectors, and check the connector cables. *Contact Frog Engineering if needed. - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."

Alarm Fan 3	Fan3 doesn't run properly or may have connection problems.	"*Check if the Fan3 module plugged in tightly. *Remove the Fan3 module, clean the male-female connectors, and check the connector cables. *Contact Frog Engineering if needed. - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."
Cooler Fans Off Max Supply/ Returnair	Supply air temperature exceeds the maximum limit. Or cooling capacity is not sufficient.	"*Check if the cooling water flow is sufficient. *Check if the Chiller unit is operates properly. *Check the defined limits supply/return air temperature and define if necessary. *Check the air temperature setpoint. Set up if necessary. *Check the 3-way valve operates properly. - After fixing the problem, in order to clear alarm message, press the alarm key 3 seconds."
FrontCooler does not start	No voltage	Check voltage
	Fuse triggered	Fuse on switch
Fans run at full speed, control unit is off.	Defective control	Customer service call
Control lights on, system remains off	System is off	System in the main
Loud operation	Wear of the fan bearings	menu switch on
	Cladding plate vibrates	Checking if it is properly closed it
Leakage water “alarm”	Condensate formation in the FrontCooler	Clean the drain pan
	Leakage in the piping system	Customer service call
Fan “alarm”	Devective fan, Thermal protector tripped	Fan replace if necessary, call Customer Service
Over temperature “alarm”	Temperature exceeded exceeded in theler, control valve defective	Customer service call
	Heat load is too high	Reduce are the heat load

Disassembly and Disposal

Make sure that this unit will only be dismantled and remove by the expert.

Separate the device from the external water circuit by closing the shut-off valves and drain the system´s water circuit.
Dispose of the A/C device in accordance with locally applicable waste disposal and safety regulations. For this purpose, we recommend to employ a company specializing in recycling.
All parts are can be dismantled separately.