

PROTON[®]

OPERATIONS MANUAL FOR AIR HEATER **PROTON FROST**

05012221



**COOLING AND
HEATING**

- SAFETY PRECAUTIONS
- TECHNICAL PARAMETERS
- INSTALLATION
- EQUIPMENT CONNECTION

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Operations manual for air heater **PROTON FROST**

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Attention!

Having received the equipment, check the package on damages and opening, package contents, and documentation availability.



The company **PROTON GROUP LLC** thanks you for choosing air heaters **PROTON FROST**.



To provide proper wiring and application of the unit, please, study this manual thoroughly before installation.



We recommend keeping the manual safe in order to address it during operation.



The user should strictly follow safety instructions while installing, using and servicing the unit.



The manufacturer disclaims any responsibility for damages caused by wrong installation and misuse of the unit.



The manufacturer disclaims any responsibility for damages done by people who didn't study the manual.



The manufacturer preserves the right to introduce any amendments to the manual without prior notification.



The manufacturer preserves the right to alter the construction which doesn't impact its functioning and basic technical parameters.



The air heater is intended only and exclusively to be installed and used for purposes which it has been designed. Any misuse or noncompliance with the manufacturer's instructions may lead to property damages, personnel injuries or death. The user has to take measures to eliminate possibilities of misuse of the unit.



Before any actions connected with the air heater, please, study this manual to provide safety.



Installation and connection of the equipment to pipelines and networks must be performed by qualified personnel only, having appropriate access.



During installation, start-up, repair and maintenance of the air heater follow the safety rules.



Install the unit on a firm base or surface, which can stand its weight filled with water.



Use screws appropriate for the material which the base is made of.



Check correctness of connections of the system, accordance of the heat medium parameters to the parameters indicated on the rating plate as well as leak proof of joints before filling in the heat medium.



Avoid substances and impurities in the heat medium causing



Check compliance of parameters of the electrical supply network to the ones indicated on the unit's rating plate before connecting to the power supply.



Check grounding. Prohibit the use of the unit without grounding as it may cause property damages, personnel injuries and death.



Power grid which feeds the unit's motor and controls must be additionally protected by a fuse to prevent consequences of shunt fault.



Motor fan thermal protection is in-build and operating automatically.



While the air heater is operating under low temperatures, the user must provide protection of the water heat exchanger or use heat medium with special additives preventing copper corrosion.



To prevent defrosting of the air heater's heat exchanger when circulation of the heat medium is stopped during a heating period under outdoor temperatures lower than 0°C, you need to drain the heat medium from the heat exchanger and blow it off by compressed air.

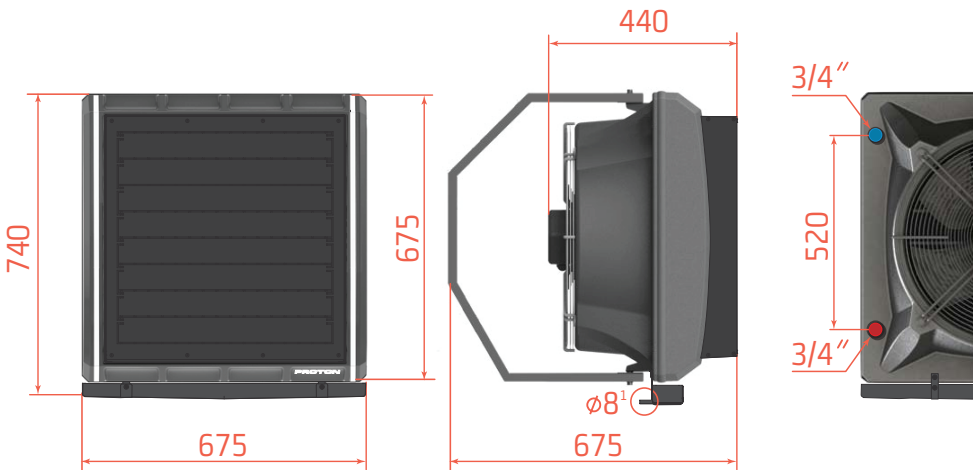


PROTON FROST

The air heater/cooler PROTON FROST is used for cooling or heating middle- and large-size buildings such as manufacturing facilities, warehouses, supermarkets, sports facilities etc.

Water droplet catcher with directing louvers and condensate tray provide reliability and effectiveness of using PROTON FROST for maintaining necessary temperatures in winter or in spring.

4. DIMENSIONS



¹ Pipe for draining condensate (outer diameter)

AXIAL FAN



The axial fan is fixed in a special diffuser on the back of the unit, due to which air flow is evenly distributed on the heat exchanger surface. This provides its most effective application. This solution decreases noise level created by the flowing air.

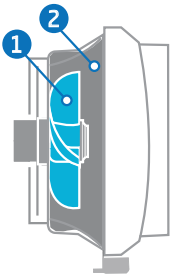
The axial fan is equipped with a special grill which protects the heater from falling in foreign objects as well as prevents possible personnel injuries caused by fan blades.

Rated power supply of fans in PROTON FROST is 230 V/50 Hz. Motor protection grade is IP54. Working temperature range is up to +55 °C.

DIFFUSER



Diffuser creates a cover around axial fan grill. Due to this air flow is evenly distributed on the heat exchanger surface which provides its most effective application.



Blades of the fan **1** are recessed into the diffuser **2** that provides effective air supply and its distribution to the heat exchanger. The heat exchanger is fixed to the diffuser by a flat surface which allows to use maximum air which passes through the heat exchanger plates.

HEAT EXCHANGER



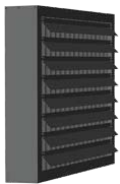
The heat exchanger consists of copper pipes and aluminum lamellas pressed on them. It is equipped with pipes with threading connection (outer thread 3/4"). The copper-and-aluminum heat exchanger is distinguished by high efficiency, is not exposed to corrosion if you don't use substances and impurities in the heat medium causing copper corrosion. Maximal parameters of heat medium supply are 105°C /1.6 MPa.

FRONT PANEL



The front panel protects heat exchanger against damages assuring long service life of the air heater. Using plastic provides durability of the construction and increases service life of the unit.

WATER DROPLET CATCHER WITH DIRECTING LOUVERS



Water droplet catcher is designed to remove condensed droplets from the air after cooling and direct them to the condensate tray. Directing louvers provide minimum air resistance on the outlet from the unit and direct the air directly to the necessary zone.

CONDENSATE TRAY



The tray gathers condensate and has a pipe for draining (outer diameter of the pipe is 8 mm).

6. TECHNICAL CHARACTERISTICS

MODEL	F65			
Number of heat exchanger rows	R	3		
Speed	-	3	2	1
Airflow	m ³ /h	3100	2400	2000
Heating power ¹	kW	58.7	47.8	41.8
Air temperature at the outlet of the unit (heating) ¹	°C	56.3	59.1	62.0
Cooling power ²	kW	12.3	10.0	8.7
Air temperature at the outlet of the unit (cooling) ²	°C	18.0	17.4	16.9
Condensate release ²	l/h	5.1	4.0	3.6
Max. temperature of heat medium	°C	105		
Max. working pressure	MPa	1.6		
Max warm air throw	m	17		
Volume of water in heat exchanger	dm ³	3.2		
Diameter of connection pipes	inch	3/4		
Motor supply voltage	V/Hz	230/50		
Motor power	W	240		
Rated current	A	1.2		
Noise level ³	dB	54		
Protection rating	IP	54		
Net weight	kg	24.6		
Gross weight	kg	28.9		
Net dimensions (WxHxL)	mm	675x740x440		
Gross dimensions (WxHxL)	mm	700x800x450		

¹ Data under water temperature 90/70°C and inlet air of 0 °C.

² Data under water temperature 7/12°C, inlet air of 26°C and humidity 50%

³ Measurements made at distance of 5 m from the unit.

PROTON F65 (COOLING)

Parameters T_{W1} / T_{W2} (°C)			Water 7/12°C / Humidity 50%				
T_{a1} (°C)	1 2 3	Q_a (m ³ /h)	P_g (kW)	T_{a2} (°C)	Q_w (m ³ /h)	Δp_{pw} (kPa)	CONDENSATE RELEASE (l/h)
15	3	3 100	1,8	13,5	0,3	0,4	< 1,0
	2	2 400	1,4	13,2	0,2	0,3	< 1,0
	1	2 000	1,3	13,0	0,2	0,3	< 1,0
20	3	3 100	3,7	16,5	0,6	1,5	< 1,0
	2	2 400	3,4	15,9	0,6	1,2	< 1,0
	1	2 000	3,1	15,4	0,5	1,1	< 1,0
22	3	3 100	6,3	16,1	1,1	3,7	< 1,0
	2	2 400	4,9	16,1	0,8	2,3	< 1,0
	1	2 000	3,9	16,3	0,6	1,5	< 1,0
25	3	3 100	9,7	17,0	1,7	8,1	1,8
	2	2 400	8,1	16,5	1,4	5,8	1,5
	1	2 000	7,0	16,1	1,2	4,4	1,3
30	3	3 100	16,7	19,9	2,8	21,6	8,4
	2	2 400	14,1	19,0	2,4	15,9	7,2
	1	2 000	12,4	18,4	2,1	12,6	6,3
35	3	3 100	24,3	23,2	4,2	43,0	16,4
	2	2 400	20,6	22,1	3,5	31,9	14,0
	1	2 000	18,3	21,2	3,1	25,6	12,4

T_{W1} – water temperature at the inlet of the unit

T_{W2} – water temperature at the outlet of the unit

Q_w – water consumption

T_{a1} – air temperature at the inlet of the unit

T_{a2} – air temperature at the outlet of the unit

Δp_{pw} – water pressure drop in the heat exchanger

P_g – heating power of the unit

Q_a – airflow

6. TECHNICAL CHARACTERISTICS

PROTON F65 (HEATING)

Parameters T_{W1}/T_{W2} (°C)			Water 90/70				Water 80/60				Water 70/50				Water 60/40			
T_{a1} (°C)	$\overset{1}{\circ} \overset{2}{\circ} \overset{3}{\circ}$	Q_a (m ³ /h)	P_g (kW)	T_{a2} (°C)	Q_w (m ³ /h)	Δ_{pw} (kPa)	P_g (kW)	T_{a2} (°C)	Q_w (m ³ /h)	Δ_{pw} (kPa)	P_g (kW)	T_{a2} (°C)	Q_w (m ³ /h)	Δ_{pw} (kPa)	P_g (kW)	T_{a2} (°C)	Q_w (m ³ /h)	Δ_{pw} (kPa)
0	3	3 100	58,7	56,3	2,6	14,7	50,6	48,5	2,2	11,3	42,4	40,6	1,8	8,3	34,0	32,5	1,5	5,7
	2	2 400	47,8	59,1	2,1	9,8	41,2	50,9	1,8	7,5	34,4	42,6	1,5	5,5	27,5	34,1	1,2	3,8
	1	2 000	41,8	62,0	1,8	7,6	36,0	53,5	1,6	5,9	30,2	44,8	1,3	4,3	24,1	35,8	1,0	3,0
5	3	3 100	55,0	57,6	2,4	13,0	46,8	49,8	2,1	9,8	38,6	41,9	1,7	7,0	30,1	33,8	1,3	4,6
	2	2 400	44,8	60,3	2,0	8,7	38,1	52,1	1,7	6,5	31,4	43,7	1,4	4,7	24,4	35,1	1,1	3,0
	1	2 000	39,2	63,0	1,7	6,7	33,4	54,4	1,5	5,1	27,5	45,1	1,2	3,6	21,4	36,7	0,9	2,4
10	3	3 100	51,3	58,9	2,3	1,5	43,1	51,1	1,9	8,4	34,8	43,2	1,5	5,8	26,2	35,0	1,2	3,5
	2	2 400	41,8	61,5	1,8	7,6	35,1	53,2	1,5	5,6	28,2	44,8	1,2	3,8	21,2	36,1	0,9	2,3
	1	2 000	36,5	64,0	1,6	5,9	30,7	55,4	1,3	4,4	24,8	46,6	1,1	3,0	18,5	37,4	0,8	1,8
15	3	3 100	47,6	60,2	2,1	10,0	39,1	52,4	1,7	7,1	30,9	44,4	1,4	4,7	22,2	36,1	1,0	2,6
	2	2 400	38,7	62,6	1,7	6,6	32,0	54,3	1,4	4,7	25,1	45,9	1,1	3,1	17,9	37,0	0,8	1,7
	1	2 000	33,9	64,9	1,5	5,2	28,0	56,3	1,2	3,7	22,0	47,5	1,0	2,4	15,6	38,1	0,7	1,3
20	3	3 100	43,8	61,5	1,9	8,6	35,5	53,7	1,5	5,9	27,0	45,6	1,2	3,7	18,1	37,1	0,8	1,8
	2	2 400	35,7	63,7	1,6	5,7	28,9	55,4	1,3	3,9	21,9	46,9	1,0	2,4	14,4	37,7	0,6	1,2
	1	2 000	31,2	65,9	1,4	4,4	25,3	57,2	1,1	3,1	19,2	48,3	0,8	1,9	12,5	38,4	0,5	0,9
25	3	3 100	40,1	62,8	1,8	7,3	31,7	54,9	1,4	4,8	23,1	46,8	1,0	2,7	13,7	37,9	0,6	1,1
	2	2 400	32,6	64,7	1,4	4,8	25,8	56,4	1,1	3,2	18,7	47,8	0,8	1,8	10,5	37,8	0,5	0,7
	1	2 000	28,6	66,8	1,3	3,8	22,6	58,0	1,0	2,5	16,4	49,0	0,7	1,4	8,9	38,0	0,4	0,5

T_{W1} - water temperature at the inlet of the unit

T_{W2} - water temperature at the outlet of the unit

Q_w - water consumption

T_{a1} - air temperature at the inlet of the unit

T_{a2} - air temperature at the outlet of the unit

Δ_{pw} - water pressure drop in the heat exchanger

P_g - heating power of the unit

Q_a - airflow

Attention!

Data on operating characteristics of air heater PROTON, when using heat medium with differing temperatures, is to be provided on demand.

Attention!

There is danger of heat exchanger defrosting (breakage) if room temperature falls lower than 0 °C.

Attention!

As maximal pressure of the heat medium is 1.6 MPa, the water circuit system must have protection from pressure rise higher than accepted value.

7. ACCESSORIES

PROFLEX FLEXIBLE HOSES

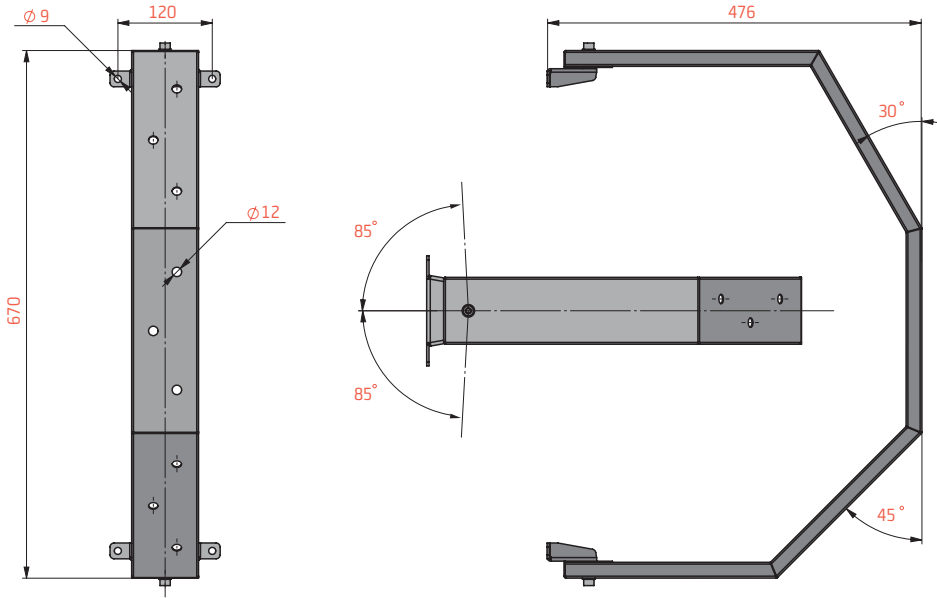


Corrosion-proof flexible hoses are used to connect water-consuming equipment.

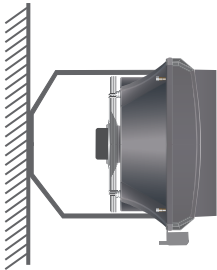
LENGTH	90 cm
CORRUGATED HOSE	AISI 304
SIZE OF CONNECTING FITTINGS	3/4"
MAX. WORKING PRESSURE	10 atm
WORKING TEMPERATURE	-10/+95 °C
STORAGE TEMPERATURE	-10/+50 °C
HOSE BENDING RADIUS (MIN)	0.02 m
CONNECTION TYPE	NUT-NUT
WEIGHT	0.11 kg

7. ACCESSORIES

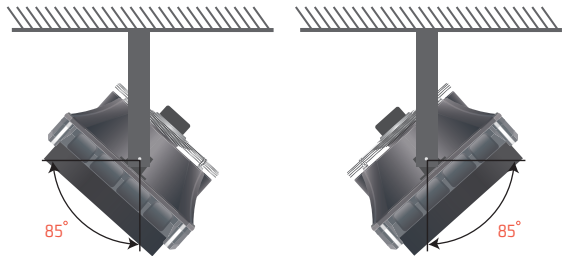
CM3D MOUNTING CONSOLE



The air heater PROTON FROST to be installed only vertically (wall mounting).



On a wall vertically.



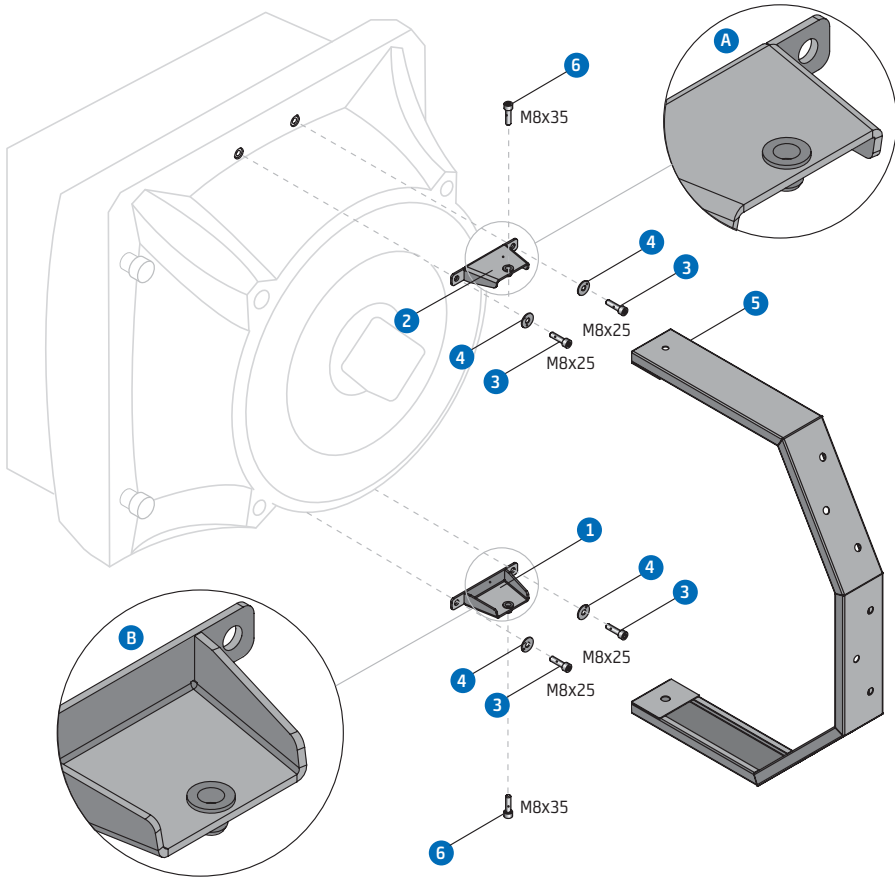
On a wall with bend to the right or left under angle 0° to 85°.



Noncompliance with the minimal distance (0.25 m) from a wall will lead to wrong operation of the air heater which, in turn, will influence the useful life of the equipment.

7. ACCESSORIES

CM3D MOUNTING CONSOLE



1. Fasten brackets ① and ② on the air heater's body using screws ③ and rings ④ .
Follow the brackets position - A , B .
2. Fasten the console under necessary angle (position ⑤) using anchoring screws (are to be bought separately).
3. Install the air heater on the console in the position ① into the hole on the console (position ⑤).
Then putting together holes on the bracket ② and upper hole on the console ⑤ , fix everything by screws ⑥ .
4. Mount the air heater under necessary angle and fix by screws ⑥ .



Use fasteners designed for the material which the base is made of.

8. INSTALLATION

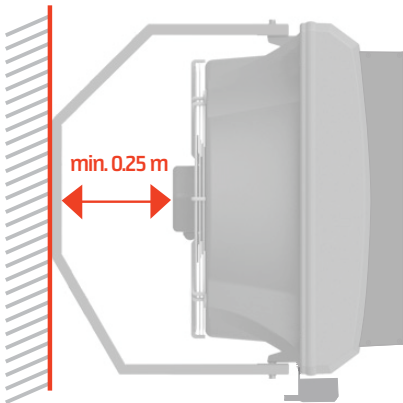
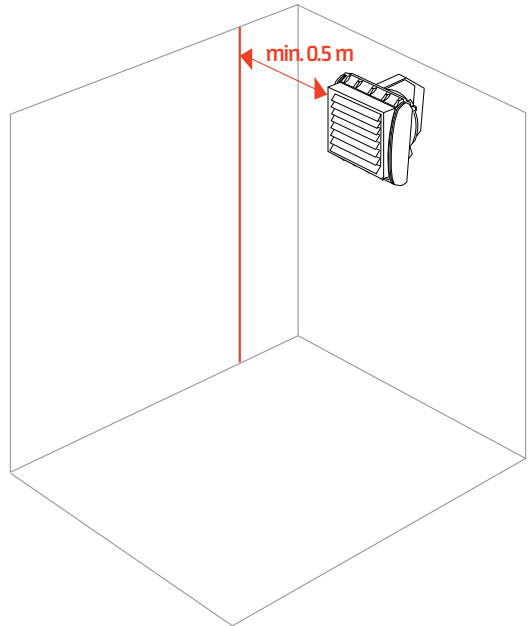
RECOMMENDATIONS FOR PLACEMENT

Wall mounting	
Distance from a wall, min.	0.25 m
Mounting height	2.5-8 m
Distance of air stream	up to 18 m

* directing louvers are installed under angle of 45°

Attention!

The air heater PROTON FROST to be installed only vertically (wall mounting).

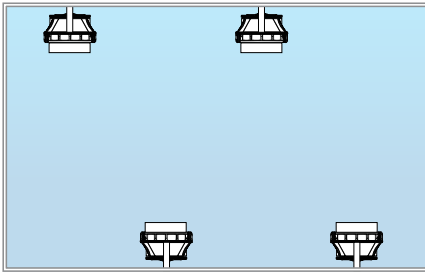


Attention!

Noncompliance with the minimal distance (0.25 m from a wall) will lead to wrong operation of the air heater which, in turn, will influence the useful life of the equipment.

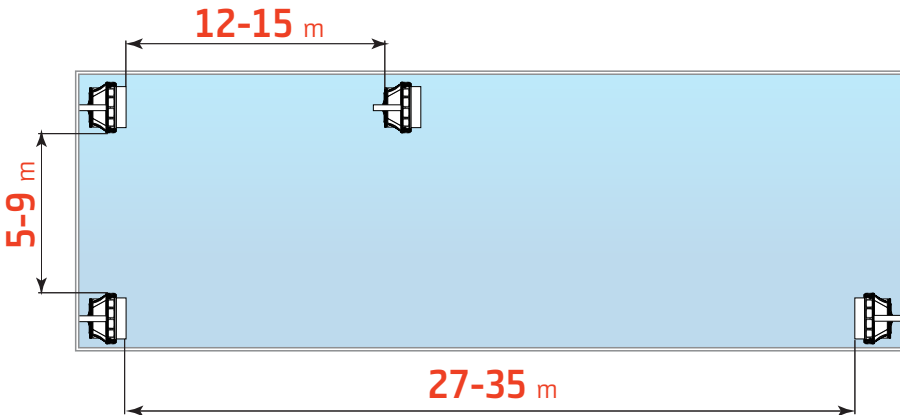
8. INSTALLATION

RECOMMENDATIONS FOR PLACEMENT



! Attention!

Examples of placing the equipment which provide even distribution of heat in a building are presented on the illustrations.



! Attention!

When mounting a few air heaters PROTON it is recommended to stick to the following distances between units: installation in one line - **5-9 m**, installation opposite to each other - **27-35 m**, installation one by one - **12-15 m**. These distances are just recommendations. The installer should also take into account dimensions and shape of a building, its encumbering, and recommendations of specialists on a project.

8. INSTALLATION

CONNECTION OF HEAT MEDIUM

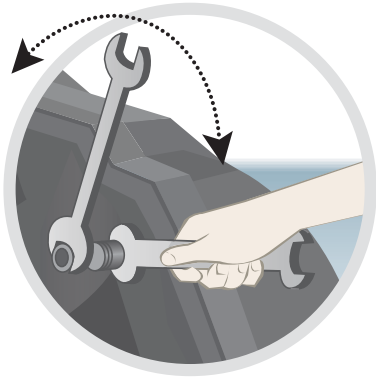


When connecting to the heating main pipes it is necessary to provide the following conditions:

1. Installation of the air heater should be carried out referring to the minimal distances from walls, ceiling and floor.
2. The air heater has to be completed with intercepting cocks on the inlet and outlet pipes.
3. It is recommended to install a coarse filter on the inlet pipe.
4. Provide at least one cock for heat medium drainage on the bottom point on the piping scheme of the air heater.
5. Provide at least one air outtake on the upper point on the piping scheme of the air heater.
6. The diameter of pipes should be selected in accordance with hydraulic calculations of the heat supply system.
7. Heating tubes from the heating system pipe to the air heater must be installed with the pitch of 3° to the pipes the heat supply system.
8. All cable trays for wiring a fan should be installed higher than pipes of the heating system.
9. Installation must be done by technician/company who has appropriate permissions for performing such a type of work.

8. INSTALLATION

CONNECTION OF HEAT MEDIUM



! Attention!

When connecting the heat medium pay your attention that manifolds of the air heater must be fixed. For this use two keys: one – for fixing heat exchanger manifolds, the second – for connecting it to the system.

! Attention!

Air heating units can be installed in closed heating systems with forced circulation with maximal temperature of the heat medium 105 °C and maximal pressure 1.6 MPa.

! Attention!

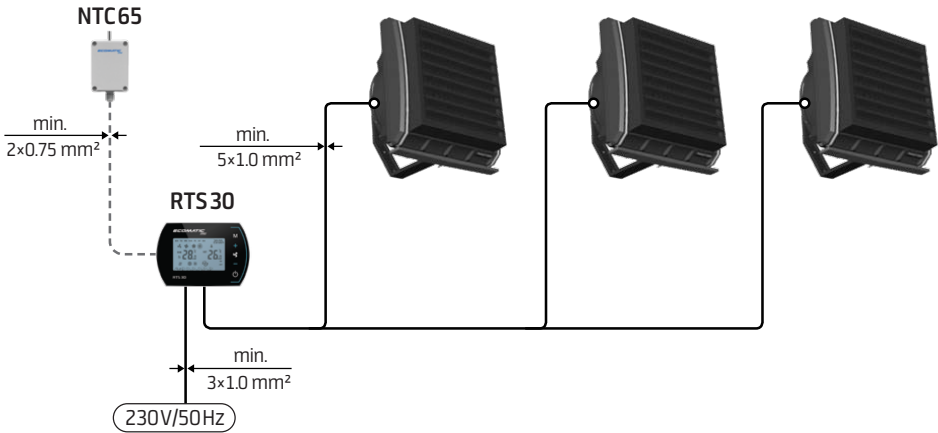
The section of heat exchanger's pipes should be chosen at the stage of project initiation from client's side. The manufacturer of the AH presents only data on hydraulic characteristics of the equipment.

! Attention!

It is recommended to use filters in a hydraulic system. Also it is recommended to clean the system by draining a few liters of water before connecting pipes (especially supply pipes) to the equipment.

9. CONTROL SOLUTIONS

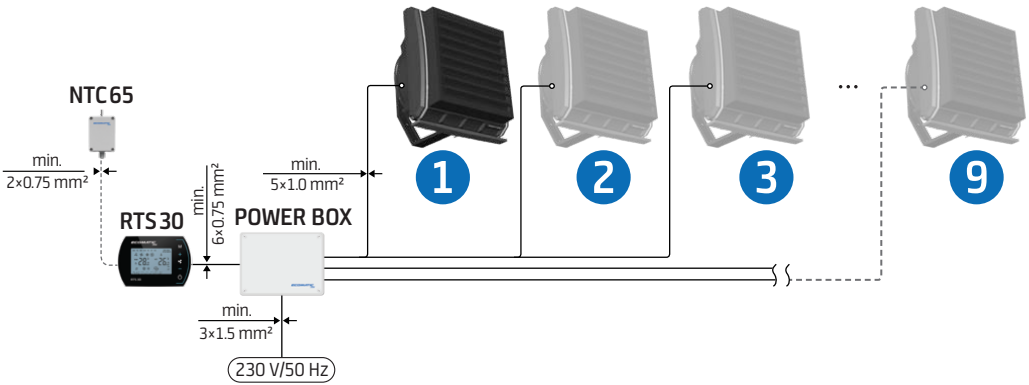
Wiring of PROTON FROST to RTS30



AIR HEATER	NUMBER OF CONNECTIONS	SKU
PROTON F65	max. 3 pcs.	102 008
ECOMATIC PRO		SKU
RTS30		211 006
NTC65		211 010

9. CONTROL SOLUTIONS

Wiring of PROTON FROST to POWER BOX



AIR HEATER	NUMBER OF CONNECTIONS ²	SKU
PROTON F65	from 3 to 9 pcs.	102 008
ECOMATIC PRO		SKU
POWER BOX		211 008
RTS 30		211 006
NTC65		211 010

² That is possible to connect up to three units to one terminal of the control board POWER BOX.
That is possible to connect up to nine units to the control board POWER BOX.
That is possible to connect up to three control boards POWER BOX to the controller RTS30 (max. 27 units).



RTS 30

RTS 30 – is a programmable controller of temperature and AC-fan rotation speed.

- Programmability of temperature mode with accuracy up to 0.5°C
- Temperature control range +5°C ... +70°C
- Automatic and manual modes of control of rotation speed of three-speed AC-fan
- Week programmability 5+1+1
- Can be used with RC 30 remote controller
- Possibility of operation with door switch DC230
- Possibility to connect thermal sensor NTC65
- High level of energy savings
- Protection against indoor temperature drop lower than critical level
- Operation at heating and cooling modes
- MODBUS protocol
- Possibility of operation with valve with actuator SRV2
- Protection class IP20
- Weight (net/gross) – 0.21/0.30 kg
- Net dimensions (WxHxL) – 138x94x36 mm
- Gross dimension (WxHxL) – 156x120x46 mm



NTC 65

NTC 65 – is a external thermal sensor. Checks indoor temperature and sends data to a controller **RTS 30**.

- High accuracy
- Possibility to connect a number of sensors for large buildings
- Possibility to use in explosive buildings
- Protection class IP65
- Weight (net/gross) – 0.09/0.10 kg
- Net dimensions (WxHxL) – 65x128x42 mm
- Gross dimension (WxHxL) – 70x150x50 mm



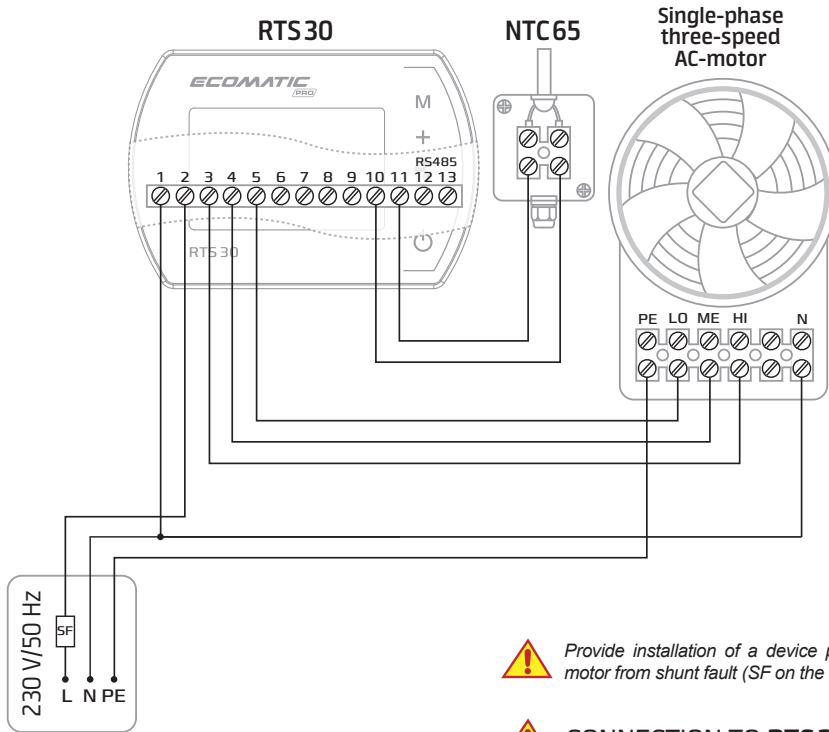
POWER BOX

POWER BOX – is a board to regulate fan motors. It is controlled by signals from **RTS 30**.

- Ease of adjustment and accurate control
- Can provide control of up to 9 air heaters (AC)
- High efficiency
- Protection class IP65
- Weight (net/gross) – 1.35/1.40 kg
- Net dimensions (WxHxL) – 240x190x100 mm
- Gross dimension (WxHxL) – 240x190x100 mm

11. WIRING CONTROL ELEMENTS

Wiring of PROTON FROST to RTS30



Provide installation of a device protecting the motor from shunt fault (SF on the scheme).

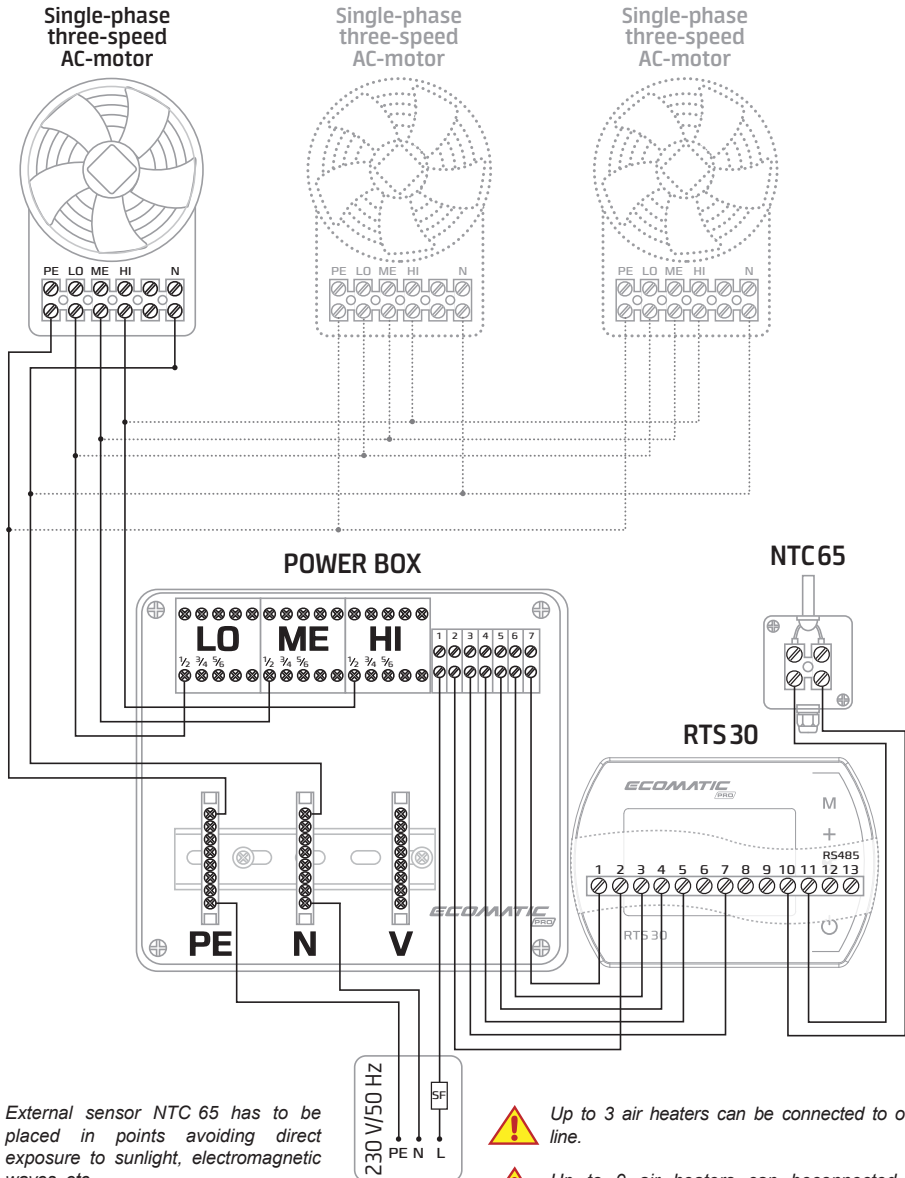
CONNECTION TO RTS30:
max. 3 x PROTON F65

SPEED

On the diagrams		
3	HI	3 speed
2	ME	2 speed
1	LO	1 speed

11. WIRING CONTROL ELEMENTS

Wiring of **PROTON FROST** to **POWER BOX**
(connection of a few fans to one wire)



! External sensor NTC 65 has to be placed in points avoiding direct exposure to sunlight, electromagnetic waves, etc.

! Up to 3 air heaters can be connected to one line.

! Up to 9 air heaters can be connected to POWER BOX.

! Provide installation of a device protecting the motor from shunt fault (SF on the scheme).

11. WIRING CONTROL ELEMENTS

Wiring of PROTON FROST to POWER BOX (connection fans to different wires)

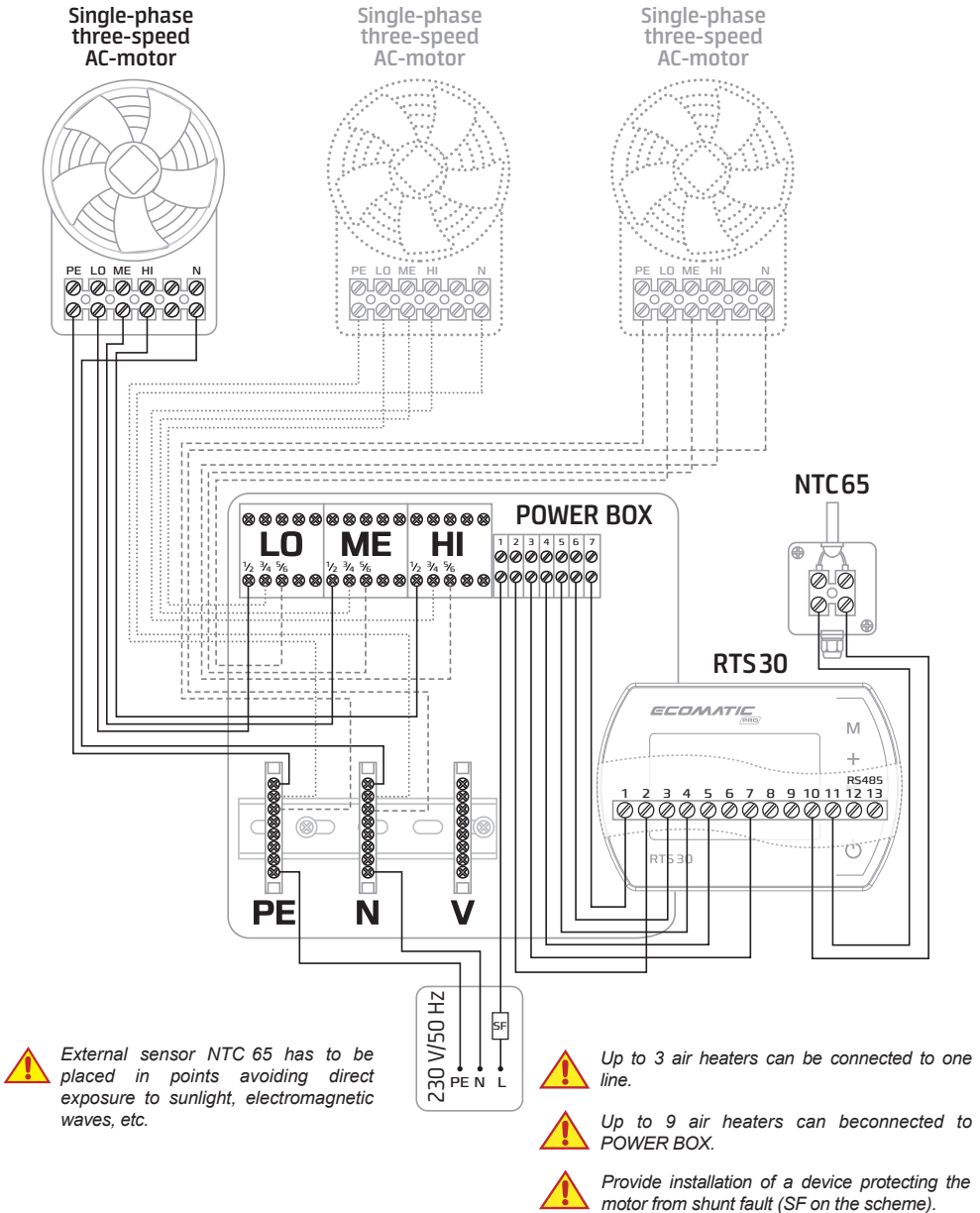


TABLE. DIAMETERS OF MAIN HEATING PIPES

Number of air heaters which are connected to the water pipes.	PROTON F65	
	Max. water consumption (m ³ /h)	Pipes diameter (inch)
1	2.9	1
2	5.8	1 ½
3	8.7	1 ¾
4	11.6	2
5	14.5	2 ¼
6	17.4	2 ½
7	20.3	2 ½
8	23.2	2 ¾
9	26.1	3
10	29.0	3

 **Attention!**

The length of the pipeline is not more than 40 meters.

 **Attention!**

This data is presented as reference.

SERVICE DEPARTMENT

In case of any failures in operation of equipment address the authorized support centers of the Manufacturer.

For information about support centers and procedure of claim submission contact Manufacturer's service department:



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