

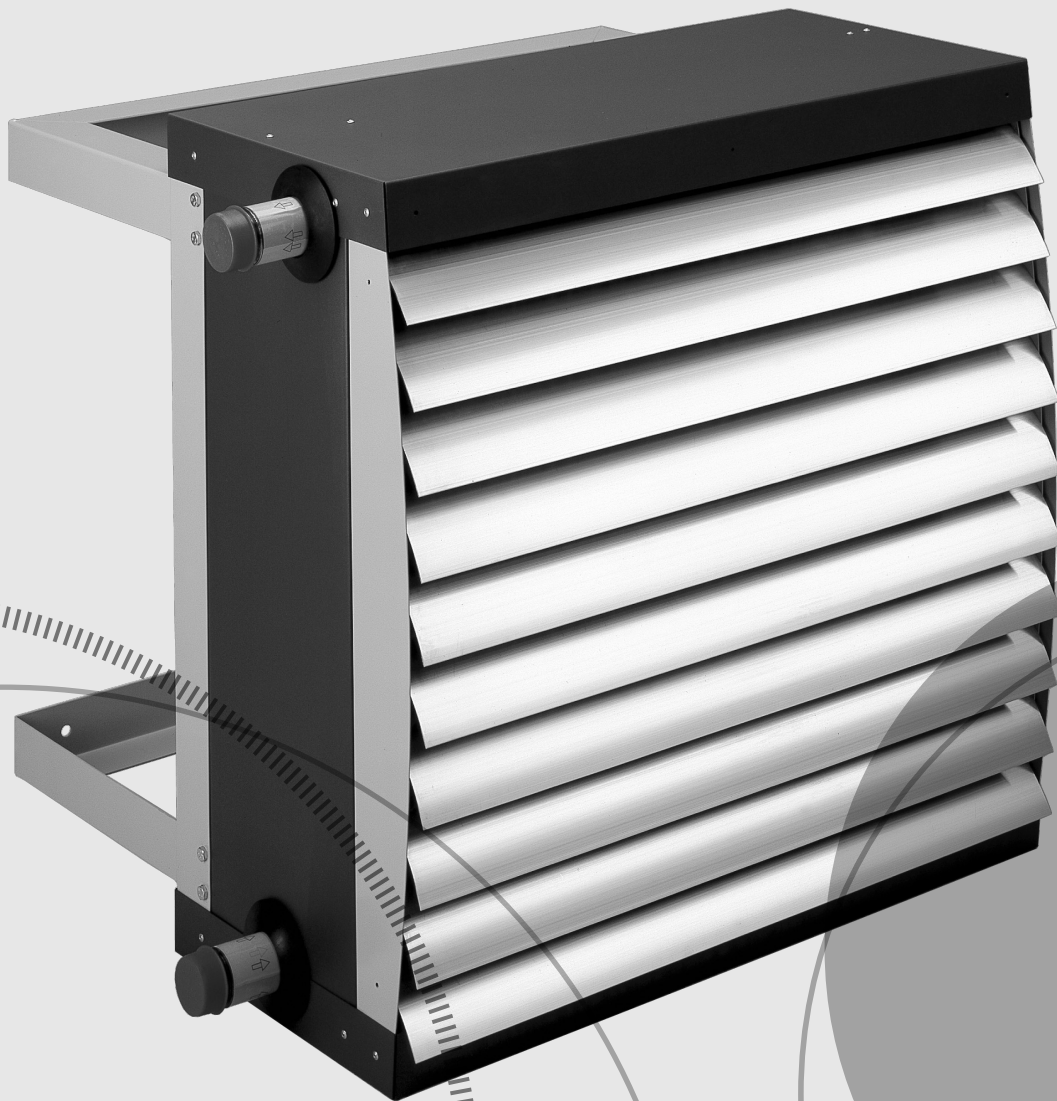
Pure competence in air.

VMA / VMB INSTALLATION AND MAINTENANCE

Building & Industry

NOVENCO 

SCHAKO Group



ENGLISH

918027-0

NoVa air heaters type VMA and VMB

Installation and maintenance

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1. General

The air heater consists of a basic unit, which can be fitted with various accessories for air distribution on the outlet side.

1. Fan suspension and wire mesh
2. Motor and fan
3. Heating coil
4. Cabinet
5. Mounting brackets

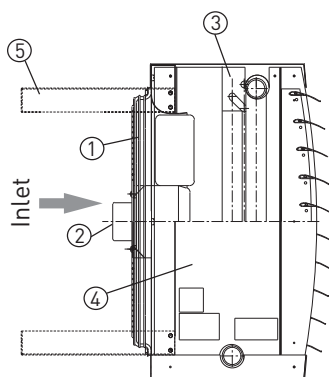


Figure 1. Basic unit

Figure 2. and 3.

1. Basic unit with fan and heating coil
2. Front grille J1 - with individually adjustable-louvres.
3. Front grille J2 - with individually adjustable louvres in two directions.
4. Mixing housing in three designs
 - B3, without damper, only for connection of return air.
 - B13, with inter-connected dampers on top and bottom for fresh and return air.
 - B23, with inter-connected dampers on the reverse side and bottom for fresh and return air.
5. Return air duct (3rd party delivery)
6. Filter section F

7. Fresh air duct - for intake of fresh air through roof.
8. Fresh air hood H
9. Wall grille M - for intake of fresh air directly into the mixing housing (3rd party delivery).
10. Air diffuser J4 - for horizontal air distribution in four directions with vertical supply
11. Air cone K - for jet-shaped air distribution in high-ceiling rooms.

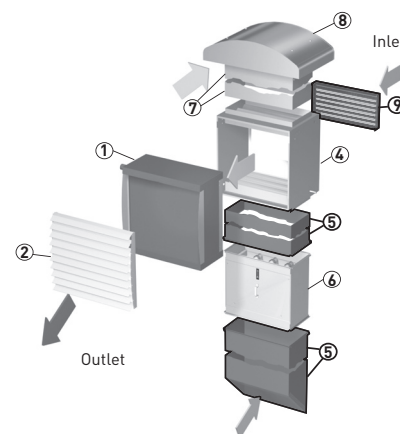


Figure 2. Horizontal position

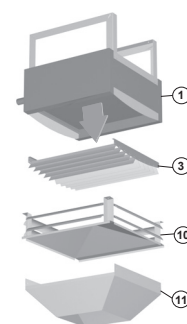


Figure 3. Vertical position

Accessories for recirculation and mixing of fresh and return air are mounted on the inlet side. The basic unit consists of a cabinet with heating coil and axial flow fan. The fan motor is mounted on the inlet side. Pipe connections for the heating medium are extended through the side of the cabinet.

The fan motor is fitted with 1.5 m cable.

The VMA is for water from boilers or heat pumps with temperature drops of 10 to 20 °C.

The VMB is for water from district-heating systems with temperature drops of 40 °C.

Refer also to the technical calculation.

1.1 Scope of delivery

The basic unit and accessories are delivered in cartons. Ducting is outside the scope of delivery.

Included with the basic unit

- 2 mounting brackets for installations without accessories on the inlet side
- A drilling template for mounting brackets
- Self-tapping screws for mounting of accessories on the outlet side

A mixing housing includes two mounting angles. The mounting angles are screwed onto the open ends of the housing during transport.

The fresh air hood H includes four supporting fixtures with clamping bolts for hood and duct.

Types	Weights [kg]
VMA/B 42-43	20
VMA/B 52-53	30
VMA/B 62-63	40
VMA/B 72-73	50
VMA/B 82-84	67

Table 1. Maximum weights

1.2 Mounting positions

The units are for wall mounting (horizontal inlet) or roof mounting (vertical inlet) with optional location of the pipe connections for water on the vertical sides of the fan.

2. Installation

2.1 Assembly and mounting

Before mounting, screw the air distribution accessories onto the outlet of the basic unit using the supplied screws.

The natural frequency of the surface

the fans are mounted onto must be 20% higher than the fan speed.

Types	Frequency [Hz]	RPMs
VMA/B 42-43	50 / 60	1350 / 1490
VMA/B 52-53	50 / -	1300 / -
VMA/B 62-63		1320 / 1450
VMA/B 72-73	50 / 60	910 / 980
VMA/B 82-84		920 / 1080

Table 2. Fan RPMs

No accessories on inlet side – wall or ceiling mounting

1. Screw the mounting brackets onto the basic unit.

Eight screws for mounting in the corners of the unit on the inlet side are included. The position of the brackets is identical for mounting onto walls and ceilings.

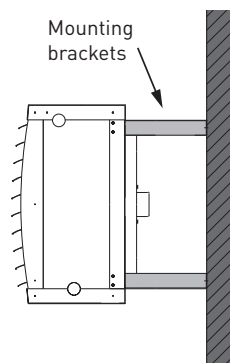


Figure 4. Wall mounting

2. Mark holes for mounting on the wall or ceiling surfaces using the included template sheet.

Note: Wall-mounted fans must be at least 2.2 m above the floor measured from the underside.

3. Drill holes for M8 size bolts.

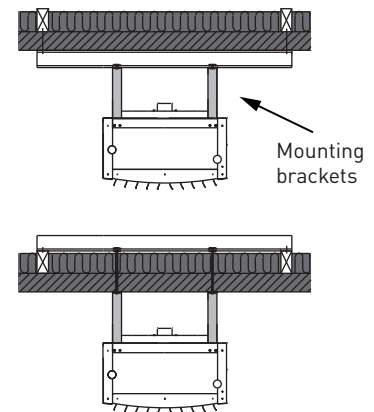


Figure 5. Ceiling mounting

4. Lift the unit into position and support it.
5. Tighten the fastening bolts and screws carefully.

For non-supporting ceilings M8 threaded rods with discs and nuts can be used for suspension in sectional frames attached to supporting parts.

Mixing housing and accessories on inlet side - wall mounting

1. Mark holes for mounting on the wall surfaces using the included template sheet.

Note: Wall-mounted fans must be at least 2.2 m above the floor measured from the underside.

2. Drill holes for M8 size bolts.
3. Mount one of the two mounting angles on the wall to support the second bracket.

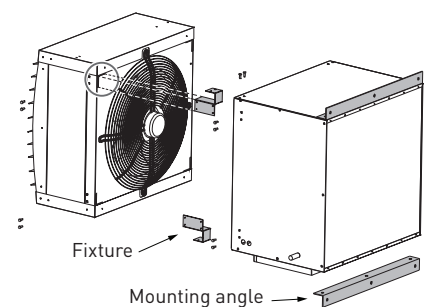


Figure 6. Mounting brackets for wall

4. Secure the other mounting angle to the top plate of the mixing housing with the three screws.
5. Remove the screws at the bottom of the mixing housing.
6. Mark the three upper mounting holes on the wall using the mixing housing.
7. Mount the mixing housing by means of the four supplied fixtures.
8. Assemble the basic unit with the mixing housing using the supplied screws.
9. Pull the motor cable through one of the cable inlets on the access side. See figure 6.
10. Mount the entire unit on the wall in the upper mounting angle
11. Re-insert the screws in the bottom plate of the mixing housing through the lower mounting angle.
12. Push the connected ducts across the duct connections of the mixing housing.
13. Attach the ducts by means of self-tapping screws.
The return air duct should be supported against the wall.
14. Mount regulators on the damper shafts of the mixing housings.

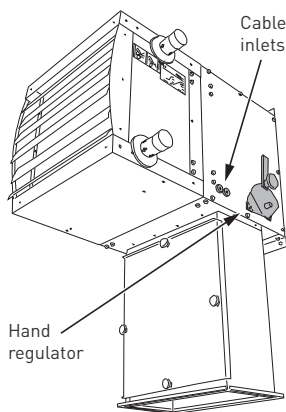


Figure 7. Wall-mounted unit

Manually operated hand regulators are mounted directly onto the shafts.

Motor-driven regulators for automatic operation are mounted onto the shafts

according to the motor supplier's instructions.

A slot at the end of the damper shaft marks the position of the dampers plate. See figure 6.

15. Mount the filter section in the return or fresh air duct by means of U-cleats.

Note: The arrow at the filter front indicates the air direction.

Mixing housing and accessories on inlet side - ceiling mounting

1. Assemble fan, mixing housing and mounting angles on the floor.
2. Hoist the entire assembly into position.
M8 lifting eyes can be placed in the mounting brackets.

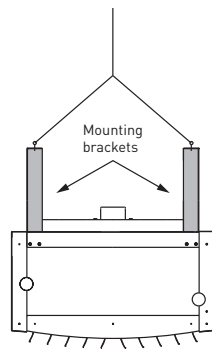


Figure 8. Hoisting air heater

3. Attach the unit to the ceiling.

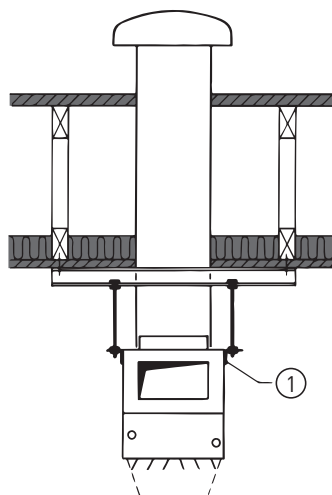


Figure 9. Ceiling mounting

4. Mount the fresh air hood on top of the fresh air duct by means of the supplied supporting fixtures and stainless screws.

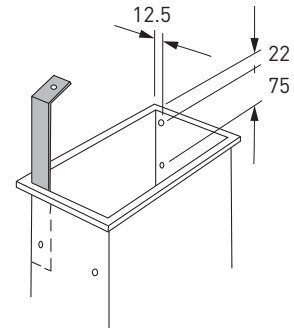


Figure 10. Mounting fresh air hood

The hood has mounting holes. Drill holes in the ducts when mounting.

2.2 Pipe circuit construction

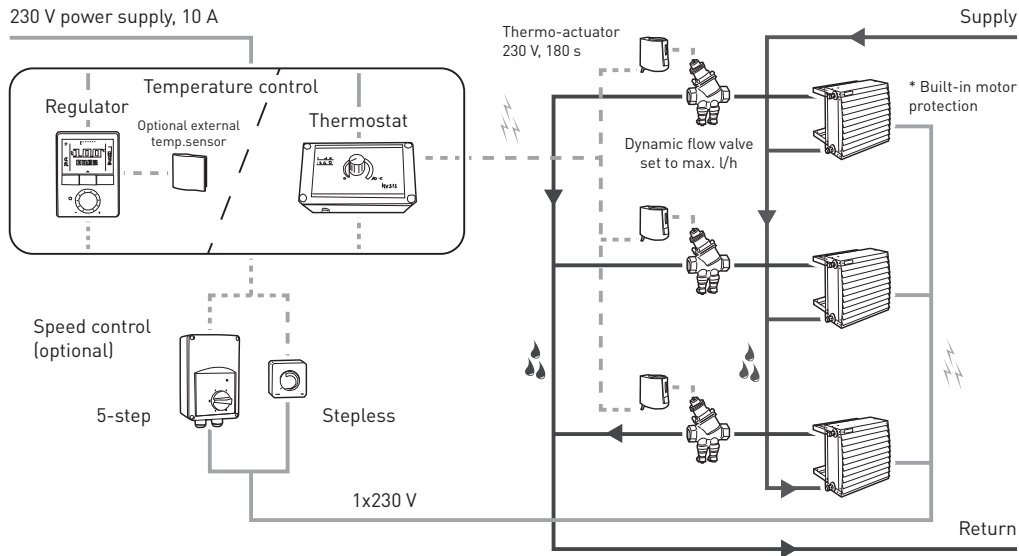


Figure 11. Basic system layout – pipe circuit and electric wiring

Review the basic system layout in figure 11. It shows the principle, which the implemented system should follow.

It is recommended to make a plan of both the pipe and the electrical circuits.

Construction stages

1. Connect the air heaters and flow valves to the heating medium as described in section "2.3 Connection of heating medium".
2. Connect the regulation and frost protection. See section "2.4 Regulation and frost protection".
3. Connect the electrical as described in section "2.5 Electrical connection".
4. Test the system.

2.3 Connection of heating medium

The air heaters are designed for hot water as heating medium.

Heating media sources

- Boilers – type VMA
- Heat pumps – type VMA
- District heating – type VMB

Pipe connections are 5/4" pipe thread. The water flow direction is indicated on the pipe connections.

Check the orientation of the flow valves and set the maximum water flow rate. The flow rate can be calculated with the following formula.

$$Q_{\text{water}} = \frac{P}{\frac{\Delta_{\text{loss}}}{10^{\circ\text{C}}} \times 42} \times 3600$$

Example

Heat need: 50 kW
Heat loss: 20 °C
No. of heaters: 3

$$Q_{\text{water}} = \frac{\frac{50}{3}}{\frac{20}{10}} \times 3600$$

$$Q_{\text{water}} = 714 \text{ l/h}$$

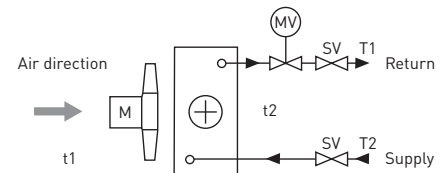
Refer to the documentation included with the valves for how to set the flow rate.

Important: The pipe circuit must be made according to current regulations and by authorised personnel.

2.4 Regulation and frost protection

Regulation of the heating capacity is

done by changing the fan speed. See section "2.5 Electrical connection". In addition, the water flow in the heating coil should be constant to allow for regulation of the heat supply through changing of the water temperature.



- M = Motor
- MV = Dynamic flow valve
- SV = Shut-off valve
- t1 = Inlet air temperature
- t2 = Outlet air temperature
- T1 = Return water temperature
- T2 = Supply water temperature

Figure 12. Constant flow in coil

Fans with fresh air supply must be protected against frost. When using water as heating medium an automatic control system with a frost indicator should be installed. The preferred method is with a stem bulb sensor in the return water. At low temperatures this stops the fan, closes the damper against the outside air and ensures full flow in the automatic regulator valve.

2.5 Electrical connection

Important: The electrical connections must be made according to current regulations and by authorised personnel.

Connect the motors to the electrical supply.

The fans can be connected to different types of speed regulators. See the wiring diagrams on pages 8 to 11.

After connecting the motor, check the direction of rotation from the fan inlet side.

Directions of rotation

- VM-4 and -5: Counter-clockwise
- VM-6, -7 and -8: Clockwise

Access to the fan motor on units with mixing housings is done by removing the side plate opposite the damper shaft.

The damper motor has a terminal box for direct cable connection.

3. Maintenance

The air heaters are designed to give long and reliable operation and to require little service.

Important: The electric system must be switched off and locked to avoid unintentionally starts when the air heaters are undergoing maintenance.

The air heaters must be kept clean at all times for optimum performance and best level of comfort. Inspect and clean the units as needed. Units installed in dust-filled environments require more frequent maintenance.

Refer to figure 1. Basic unit in the following sections.

3.1 Inspection

Air heaters without accessories on the inlet side can be checked directly.

Inspection of the inlet on units with mixing housings is done by removing the vertical side plate of the mixing housing opposite to the damper shaft.

3.2 Cleaning

Dust builds up inside the unit cabinets and reduce the performance if not removed.

Build-ups on fan suspensions, wire guards, heating coils and dampers can usually be removed by vacuum cleaning. Cleaning the inlet of the heating coil can be done after removing the fan unit with suspension. See section "3.4 Motor".

On the outlet side it is possible to remove the front grille.

Wall grilles for fresh air and wire guards for return air ducts must also be kept free from dust and foreign particles.

3.3 Impeller

Prior to delivery, the fan unit has been carefully balanced. If vibrations occur during operation, it is normally due to dust on the fan blades. If vibrations persist after cleaning; stop the unit and call for skilled assistance. Continued operation may damage the motor bearings.

3.4 Motor

The motor and impeller is a one piece assembly. The motor bearings are greased for life, i.e. approx. 30.000 working hours and cannot be greased anew. When the service life of the bearings has run out, they should be replaced. Replacement of the bearings should be carried out by a specialist. During replacement, remove the entire unit comprising fan suspension and fan. Afterwards, remove the suspension from the fan. When re-mounting, the fan must be centred carefully with equal blade clearance around the circumference.

3.5 Heating coil

The heating coil has copper tubes with aluminium fins and is sensitive to frost. If there is a risk of hard frost, it might be necessary – besides the established frost protection at the fresh air inlet – to empty the heating coil of water. In exposed installations it is recommended to supply the plant with antifreeze.

3.6 Damper

The damper function should be checked on occasion.

3.7 Filter

The filter is made of synthetic material and must be cleaned occasionally to maintain fan performance. Cleaning is done either by vacuum cleaning the dirty side of the filter mat, rinsing from the clean side or by washing in lukewarm soap water at max. 40 °C. The filter mat can be washed four times, before it must be replaced.

During cleaning or replacement of the filter, draw out the filter cassette and insert a new filter after cleaning the mat retainers. The filter cassette is fitted with a handle. The retainers are of Velcro and reusable.

When ordering a new filter mat, please state the type and size of fan, e.g. VMA-62.

The filter condition must be checked 2 weeks after start-up of the fan and then once every month.

Recommended rise in differential pressure above the filter mat is 100 Pa.

3.8 Other components

Components for regulation, ventilation, water outlet and other accessories essential for the correct operation of the fan, need regular inspection and maintenance according to the manufacturer's instructions.

4. Electrical data

4.1 Motors

All motors are 1x230 V.

Sizes	Frequency [Hz]	RPMs	Power [W]	Current [A]
4-	50 / 60	1350 / 1490	110 / 148	0.52 / 0.66
5-	50 / -	1300 / -	190 / -	0.66 / -
6-		1320 / 1450	410 / 570	1.90 / 2.50
7-	50 / 60	910 / 980	390 / 580	1.80 / 2.60
8-		920 / 1080	470 / 730	2.30 / 3.20

Sizes	Starting current [A]	Ambient temp. ranges [°C]	Weight [kg]	Encapsulation
4-	1.20 / 1.18	-20 to 45	3.5	IP44
5-	-	-	-	
6-	4.40 / -	-15 to 60	9.2	IP54
7-	-	-	-	
8-	5.50 / -	-15 to 45	12.8	

Table 3. Motor specifications ¹

¹The motors comply with EU's ErP 2015 directive.

4.2 Regulators

Types	Regulation type	Voltage [V]	Max. current [A]	Encapsulation
RDG100T	Thermostat	1x230	4	IP30
NV515			6	IP34
5-step	Speed	1x230	1.5	IP54
			3.5	
			5	
			10	
			2.5	
Stepless			5	

Types	Max. current [A]	h [mm]	w [mm]	d [mm]	Weight [kg]
RDG100T	4	128	93	30.8	0.3
NV515	6	-	-	-	-
	1.5	205	115	100	2.1
	3.5	255	170	140	5.0
5-step	5	255	170	140	5.4
	10	325	300	185	13.2
	2.5	82	82	65	0.24
Stepless	5	160	83	81	0.59

Table 4. Regulator specifications

	Types				
	Ampere [A]	RDG100T [max. 4 A]	NV515 [max. 5 A]	5-step 1.5 A	5-step 3.5 A
4-	0.52 / 0.66	7 / 5	9 / 7	2 / 2	4 / 3
5-	0.66 / -	6 / -	7 / -	2 / -	3 / -
6-	1.90 / 2.50	2 / 1	2 / 2	- / -	1 / 1
7-	1.80 / 2.60	2 / 1	2 / 1	- / -	1 / -
8-	2.30 / 3.20	1 / 1	2 / 1	- / -	1 / -

	Types				
	Ampere [A]	5-step 5 A	5-step 10 A ¹	Stepless 2.5 A	Stepless 5 A
4-	0.52 / 0.66	9 / 7	15 / 13	4 / 3	9 / 7
5-	0.66 / -	7 / -	15 / -	3 / -	7 / -
6-	1.90 / 2.50	2 / 2	4 / 3	1 / 1	2 / 2
7-	1.80 / 2.60	2 / 1	4 / 3	1 / -	2 / 1
8-	2.30 / 3.20	2 / 1	4 / 3	1 / -	2 / 1

Table 5. Max. number of motors per regulator at 50 / 60 Hz

¹The regulator cannot be used with the RDG100T.

4.3 Wiring diagrams

The fan motors are connected through a voltage regulator. See the appendices for wiring diagrams of how to connect each of the thermostats and how to connect each of the thermostats with the different regulators.

Several fan motors can be connected in parallel to the same regulator. See table 5. "Max. number of motors per regulator at 50 / 60 Hz".

5. Sound

Sizes	RPMs	Sound power Level total [dB]	Sound pressure level [dB(A)] ¹
4-	1350	59	45
5-	1300	-	-
6-	1400	74	60
7-	910	71	57
8-	950	76	62

Table 6. Sound data, VMA and VMB without accessories

¹Sound pressure level at a distance of 5 m, room of 1.500 m³, normal reflection, direction factor Q = 2

6. Troubleshooting

In case of breakdowns, the following checklists should be completed, before calling for service.

Lacking performance

- Damper closed
- Ducts clogged
- Supply fan stopped
- Motor defective
- Motor disconnected
- Wrong direction of rotation

Noise and vibrations

- Motor bearings defective
- Impeller out of balance
- Impeller worn or damaged
- Bolts or components loose

Fans operating in the stalling area, may result in breakdowns.

7. Inspection and test

It is recommended to test and inspect the air heaters and installation at regular intervals with regard to operability and operating conditions.

Extent of inspection

- Measure power consumption
- Check torques for fixing bolts and correct if necessary
- Cleaning
- Visual inspection of cabinet, pipe and electric connections

Enter all values and observations in a log.

8. Safety

The air heaters must be installed according to Novenco Building & Industry A/S', the current and the local safety regulations. At a minimum these include EN 13850. It is recommended to review and revise safety procedures regularly.

Safety check

- Test if safety procedures and the installation work correctly.
- Check if safety regulations have been changed and if the installation needs revising.
- Consider taking additional measures to improve the safety of the installation.

9. Spare parts

Contact Novenco Building & Industry A/S for information about and ordering of spare parts.

10. Patents and trademarks

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11. Quality management

Novenco Building & Industry A/S is ISO 9001 certified. This means that all air heaters are inspected and tested, before leaving the production.

12. Warranty

Novenco Building & Industry A/S provides according to law a standard 12 months warranty from the product is sent from the factory. The warranty covers materials and manufacturing defects. Wear parts are not covered.

Extended warranty can be agreed upon.

13. Declaration of conformity

The Machinery Directive 2006/42/EU, part 2, A.

Novenco Building & Industry A/S
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Denmark

hereby declares that the air heaters type VMA and VMB have been manufactured in accordance to and comply with the European Council's directives 2006/42/EU regarding mutual approximation of the machinery laws (the Machinery Directive) of the member states.

EU directives

- Machinery Directive 2006/42/EU
- ECO design 2009/125/EU
- ECO energy labelling 2010/30/EU
- EMC directive 2014/30/EU
- LVD 2014/35/EU

Applied standards and regulations

EU 327/2011:

Fans driven by motors with electric power between 125 W and 500 kW

EN ISO 12100:2011

Safety of machinery

- General principles for design
- Risk assessment and risk reduction

EN ISO 13857:

Safety of machinery - Safety distances

EN 60204-1:

Safety of machinery - Electrical equipment of machines Part 1: General Requirements

EN 61000-6-2:

EMC - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-3:

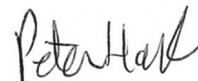
EMC - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

EN 61800-3, class C2:

Adjustable speed electrical power drive systems, EMC requirements and specific test methods

It is conditioned for the validity of the warranty that Novenco Building & Industry A/S' instructions for installation and maintenance have been followed.

Naestved, 01.01.2019



Peter Holt
Technical director
Novenco Building & Industry A/S

Appendices – wiring diagrams

A. Thermostats RDG100T and NV515

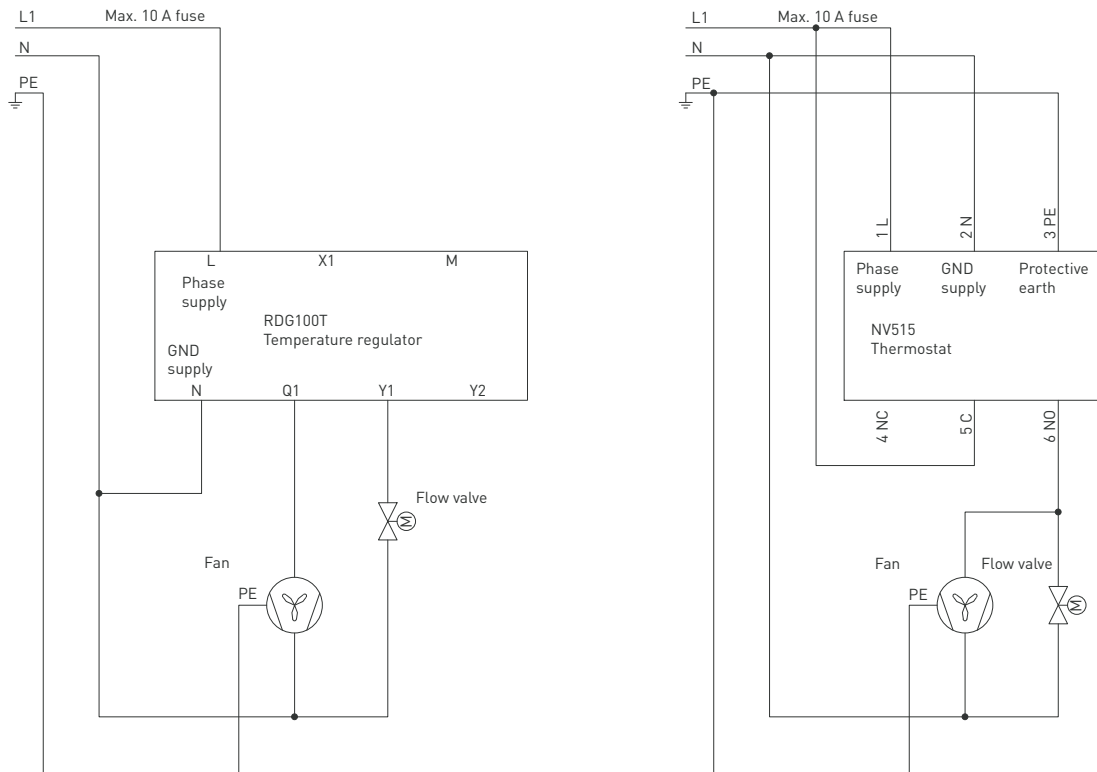


Figure 13. Wiring diagrams for RDG100T and NV515 thermostats

B. RDG100T – 5-step regulators

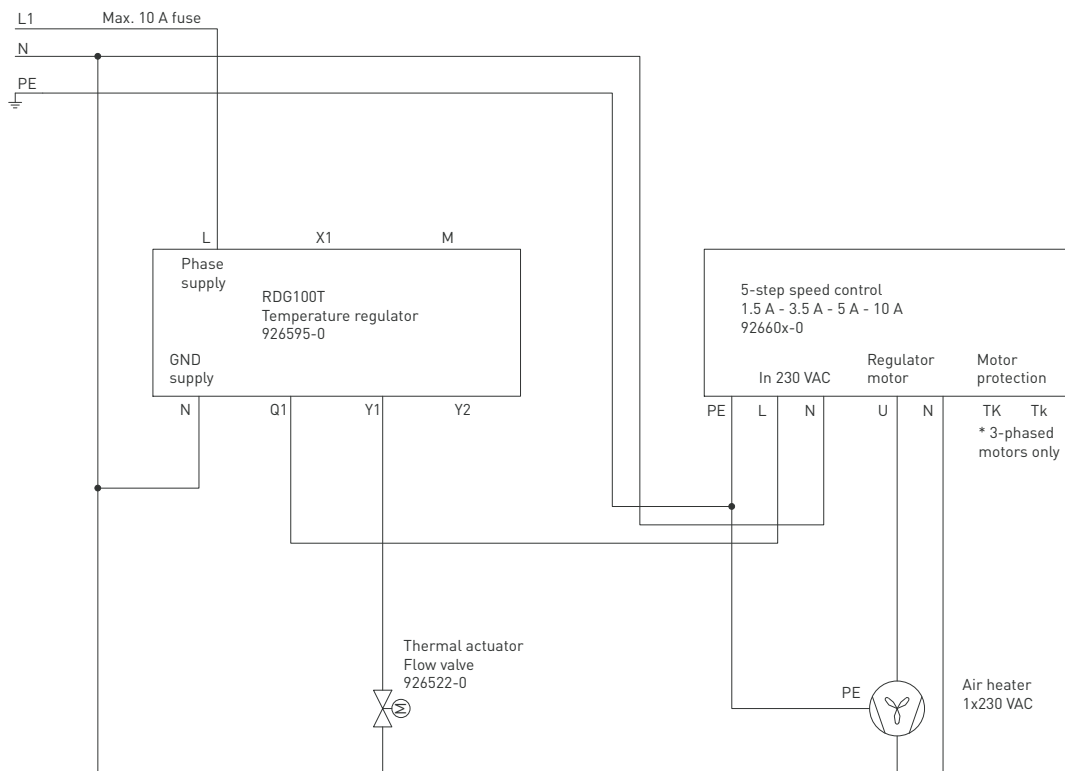


Figure 14. Wiring diagram for RDG100T and 5-step regulators 1.5 A, 3.5 A, 5 A and 10 A

C. RDG100T – stepless regulator 2.5 A

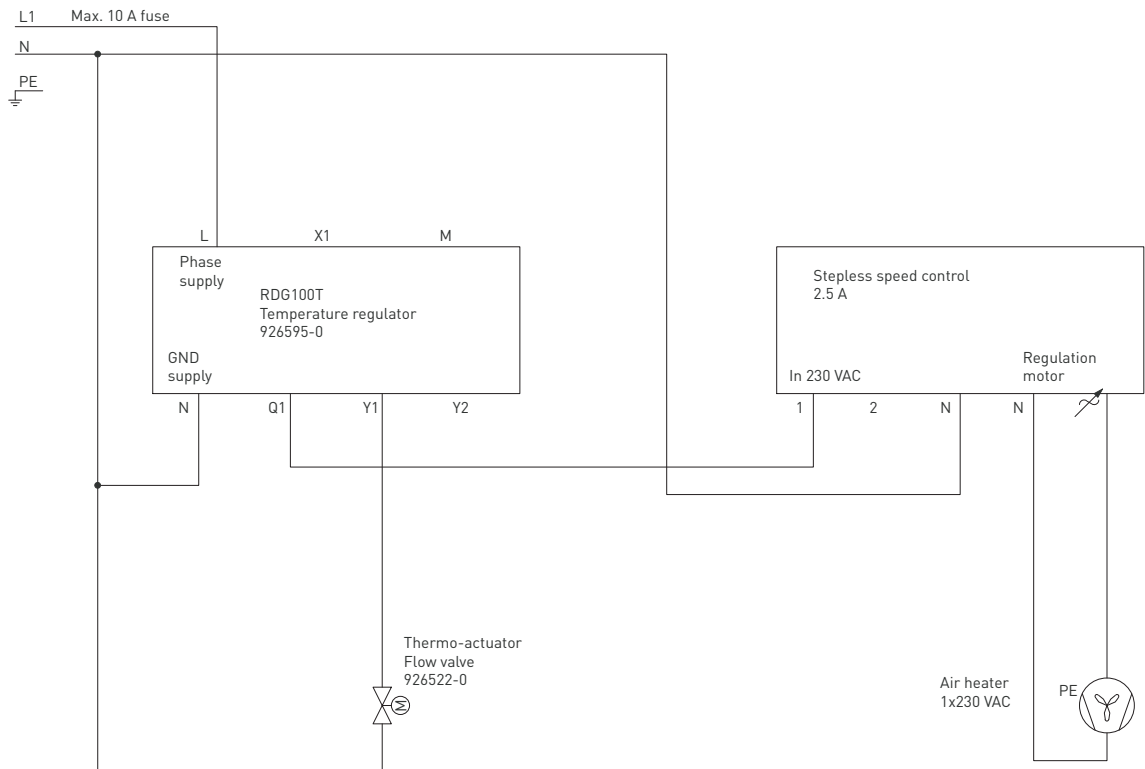


Figure 15. Wiring diagram for RDG100T and stepless regulator 2.5 A

D. RDG100T – stepless regulator 5 A

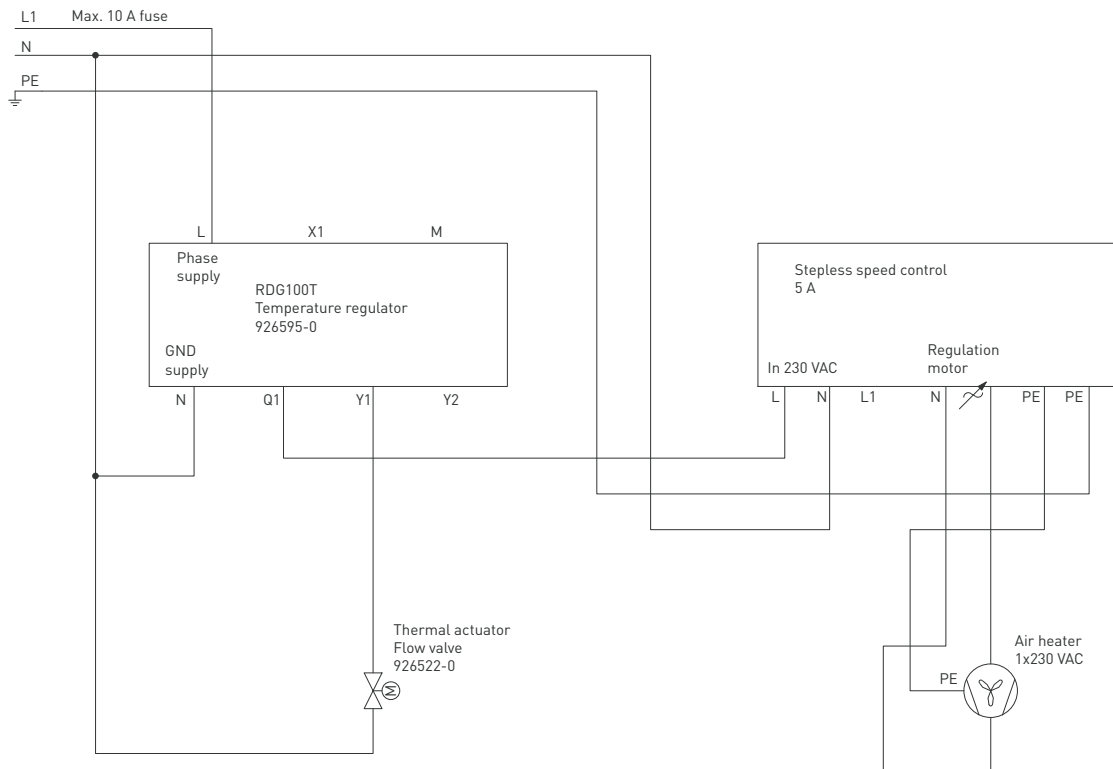


Figure 16. Wiring diagram for RDG100T and stepless regulator 5 A

E. NV515 – 5-step regulators

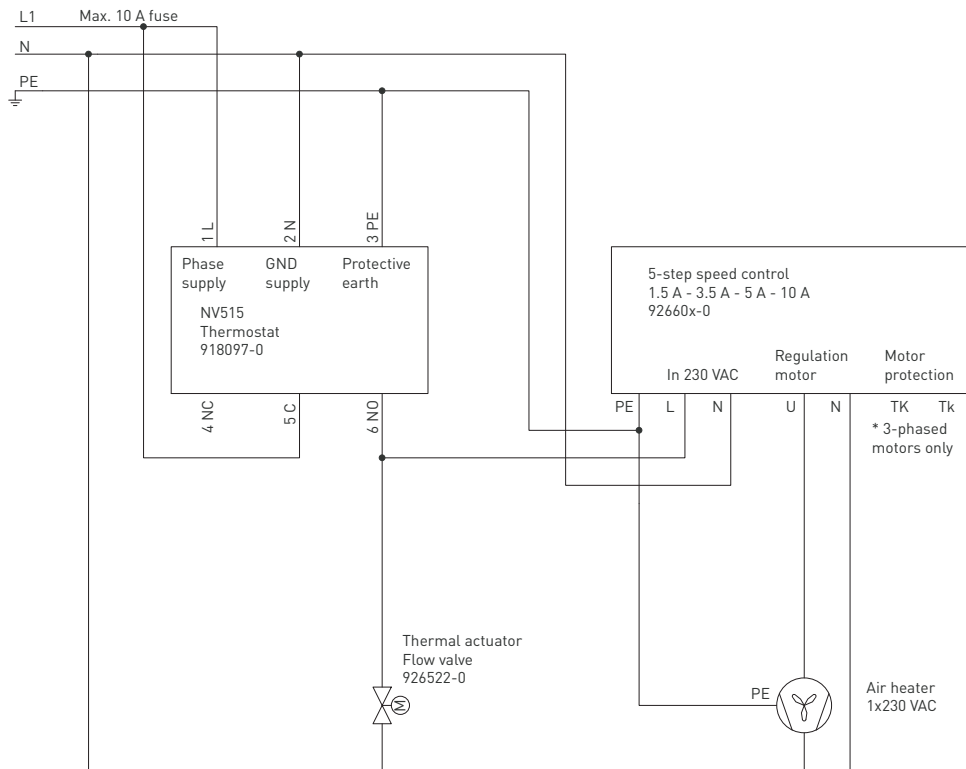


Figure 17. Wiring diagram for NV515 and 5-step regulators 1.5 A, 3.5 A, 5 A and 10 A

F. NV515 – stepless regulator 2.5 A

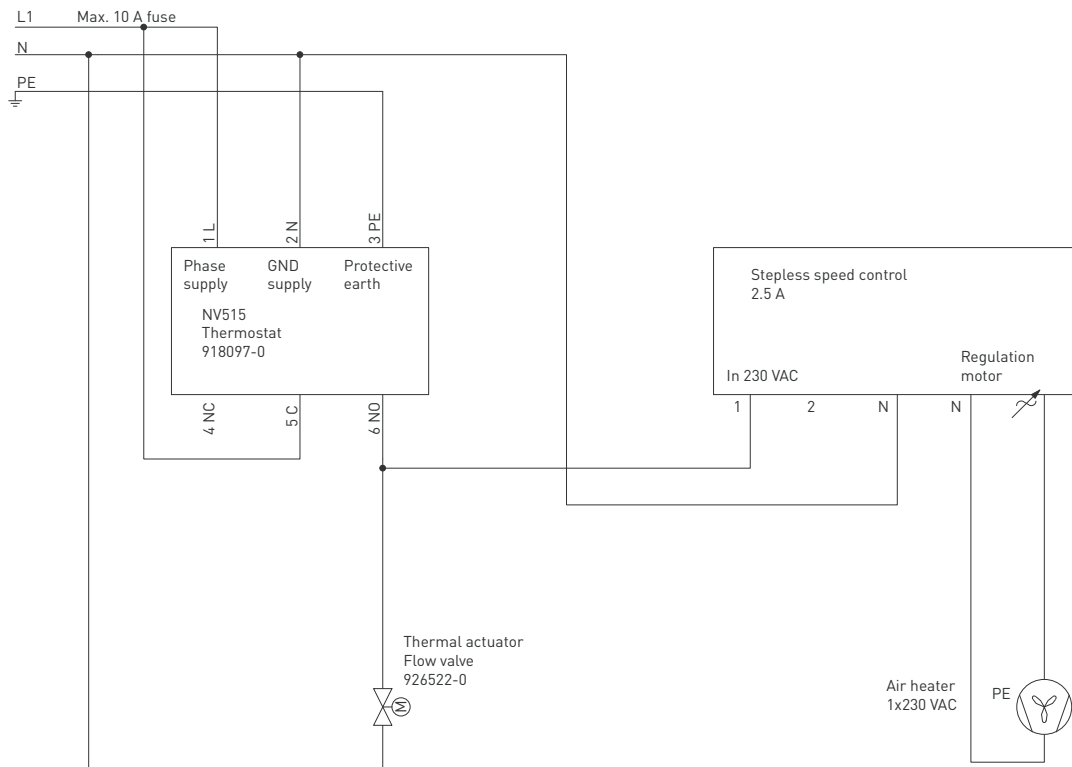


Figure 18. Wiring diagram for NV515 and stepless regulator 2.5 A

G. NV515 – stepless regulator 5 A

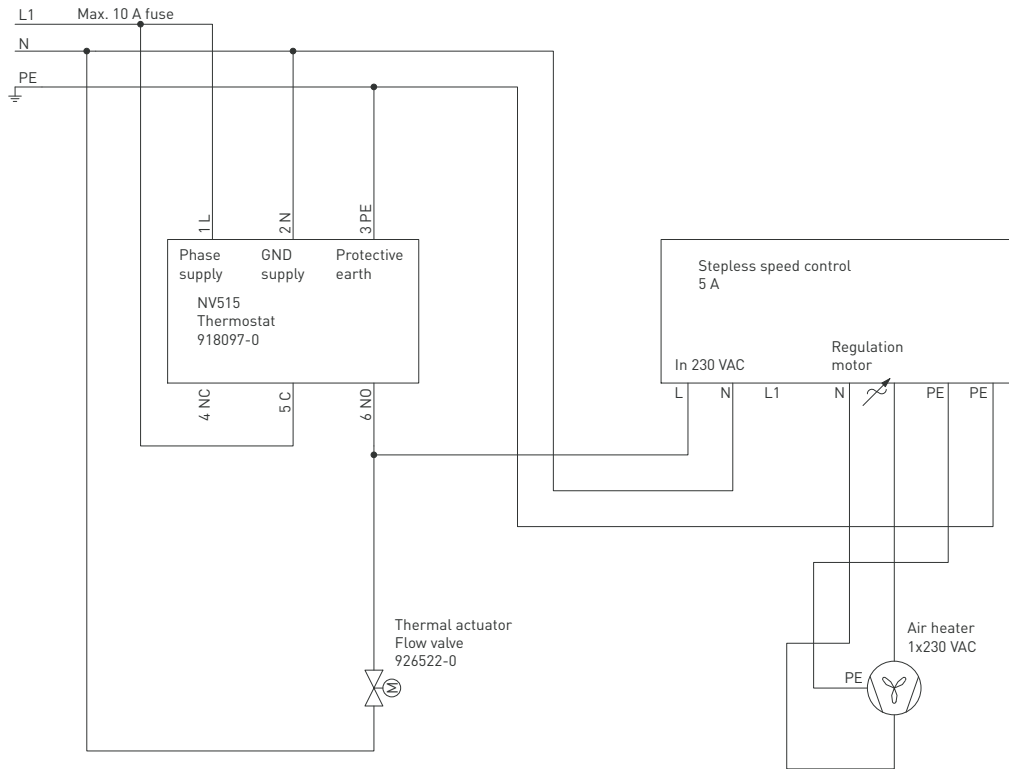


Figure 19. Wiring diagram for NV515 and stepless regulator 5 A

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