

USER'S MANUAL



AIR DUCT HEATER WITH INTEGRATED TEMPERATURE CONTROL UNIT OR A CONTROL UNIT

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SAFETY REQUIREMENTS

- Read the user's manual carefully prior to the operation and installation of the air duct heater with an integrated temperature control unit, hereinafter the heater.
- Installation and operation of the heater shall be performed in accordance with the present user's manual as well as the provisions of all the applicable local and national construction, electrical and technical codes and standards.
- The warnings contained in the present user's manual must be considered most seriously since they contain vital personal safety information.
- Failure to follow the safety regulations and rules may result in an injury or heater damage.
- Read the manual carefully and keep it as long as you use the heater.
- While transferring the heater control the user's manual must be turned over to the receiving operator.



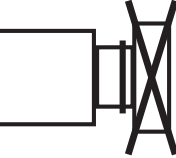
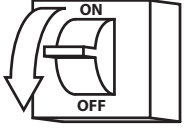
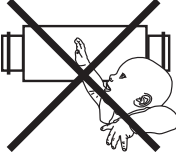

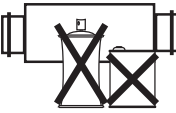
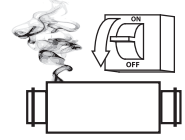
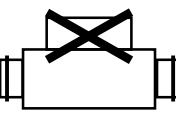

Symbol legend used in the manual:

	WARNING!
	DO NOT!

HEATER MOUNTING SAFETY PRECAUTIONS

	The heater must be disconnected from the power supply prior to installation, servicing or repair operations.		Do not operate the heater beyond the temperature range stated in the user's manual or in aggressive or explosive environments.
	Do not position any heating devices or other equipment in close proximity to the heater power cord.		Do not use damaged equipment or conductors to connect the heater to power mains.
	While installing the heater follow the safety regulations specific to the use of electric tools.		Unpack the heater with care.
	Do not change the power cord length at your own discretion. Do not bend the power cord. Avoid damaging the power cord.		Use the heater only as intended by the manufacturer.

HEATER OPERATING SAFETY PRECAUTIONS

	<p>Do not touch the controls with wet hands. Do not perform the heater maintenance with wet hands.</p>		<p>Do not wash the heater with water. Protect the heater electric parts from water ingress.</p>
	<p>Do not block the air duct when the heater is on.</p>		<p>Disconnect the heater from power supply prior to maintenance.</p>
	<p>Do not let children operate the heater.</p>		<p>Do not damage the power cable while operating the heater. Do not put any objects on the power cable.</p>
	<p>Keep combustible and inflammable substances away of the heater.</p>		<p>In case of unusual sounds, smoke disconnect the heater from power supply and contact the service centre.</p>
	<p>Do not cover the electric heater with any materials. Do not place any appliances on top of the heater.</p>		<p>Do not put any water containers (e.g. vases etc.) on top of the heater.</p>

INTRODUCTION

The present operation manual consisting of technical details, operating instructions and technical specification contains the information specific to the installation and mounting of the following duct heater models:

- NKU heater with a built-in temperature control unit for round ducts (from 0.6 kW to 2.4 kW);
- NKU heater with a control unit for round ducts (from 3.0 kW to 9.0 kW);
- NKU heater with a control unit for rectangular ducts (from 4.5 kW to 54 kW).

PURPOSE

The heater is intended to heat up the supply air entering the ventilation system. The built-in temperature control module or the integral control unit ensure that air duct temperature is automatically maintained at the pre-set level.

The heater is designed for extended periods of continuous operation without disconnection from the power mains.

Being a component unit, the heater may not be commissioned for standalone operation.

Transported air must not contain any flammable or explosive mixtures, evaporation of chemicals, coarse dust, soot and oil particles, sticky substances, fibrous materials, pathogens or any other harmful substances.



**THE HEATER IS NOT INTENDED TO BE USED BY CHILDREN, PHYSICALLY OR MENTALLY DISABLED PERSONS, PERSONS WITH SENSORY DISORDER, PERSONS WITH NO APPROPRIATE QUALIFICATION.
ANY OPERATIONS WITH THE HEATER MUST BE PERFORMED ONLY BY PROPERLY QUALIFIED PERSONNEL AFTER THE APPROPRIATE SAFETY BRIEFING.
THE HEATER INSTALLATION SITES MUST PREVENT ACCESS BY UNATTENDED CHILDREN.**

DELIVERY SET

Heater	1 item
User's manual	1 item
Packing box	1 item

DESIGNATION KEY
NKU FOR ROUND DUCTS
NK X-X-X U
Product type

NK — duct heater

Connected air duct diameter [mm]
Heater power [kW]
Phase

1 - single-phase

3 - three-phase

Integrated temperature control unit
NKU FOR RECTANGULAR DUCTS
NK X_xX- X-X U
Product type

NK - duct heater

Connected air duct width [mm]

400, 500, 600, 700, 800, 900, 1000

Connected air duct height [mm]

200, 250, 300, 350, 400, 500

Heater power [kW]
Phase

3 - three-phase

Integrated temperature control unit

MAIN TECHNICAL PARAMETERS

The heater is intended for operation in closed spaces under ambient air temperatures from +40 °C to +80 °C and relative humidity up to 80%. The unit is capable of maintaining the duct temperature in the following range:

- From -10°C to +40°C (NKU units rated from 0.6 kW to 2.4 kW);
- From -0°C to +40°C (NKU units rated from 3.0 kW to 54 kW).

The heater must be grounded.

Hazardous parts access and water ingress protection standard is IP 40.

Allowable deviation from the rated voltage is $\pm 10\%$.

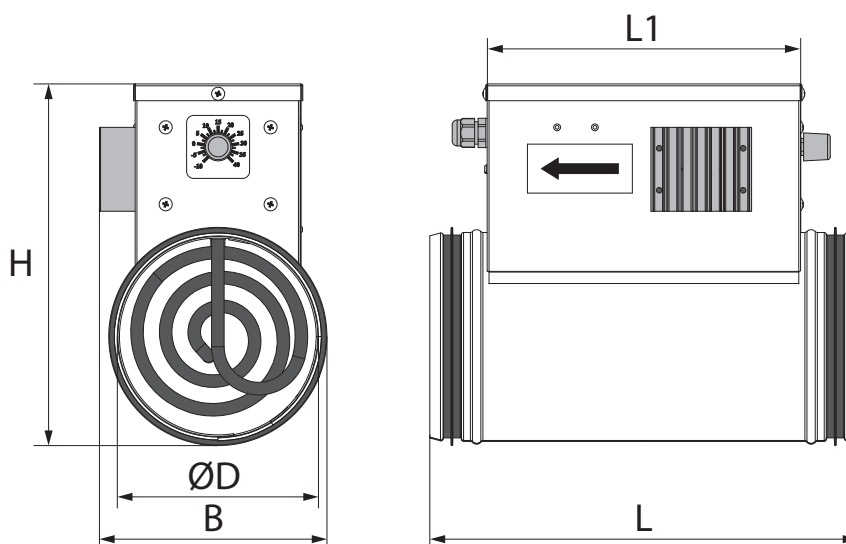
The heater design is regularly improved, so some models may slightly differ from those ones described in this manual.

NKU with integrated temperature control unit for round air ducts from 0.6 kW up to 2.4 kW	Technical data			
	Min. air flow [m ³ /h]	Current consumption [A]	Supply Voltage [V]	Number of electric heating elements x power [kW]
NK 100-0,6-1U	60	2,6	230	1 item x 0,6
NK 100-0,8-1U	80	3,5	230	1 item x 0,8
NK 100-1,2-1U	90	5,2	230	2 item x 0,6
NK 100-1,6-1U	120	7,0	230	2 item x 0,8
NK 100-1,8-1U	130	7,8	230	3 item x 0,6
NK 125-0,6-1U	60	2,6	230	1 item x 0,6
NK 125-0,8-1U	80	3,5	230	1 item x 0,8
NK 125-1,2-1U	90	5,2	230	2 item x 0,6
NK 125-1,6-1U	120	7,0	230	2 item x 0,8
NK 125-2,4-1U	150	7,8	230	3 item x 0,8
NK 150-1,2-1U	120	5,2	230	1 item x 1,2
NK 150-1,7-1U	130	7,4	230	1 item x 1,7
NK 150-2,0-1U	140	8,7	230	1 item x 2,0
NK 150-2,4-1U	150	10,4	230	2 item x 1,2
NK 160-1,2-1U	150	5,2	230	1 item x 1,2
NK 160-1,7-1U	160	7,4	230	1 item x 1,7
NK 160-2,0-1U	170	8,7	230	1 item x 2,0
NK 160-2,4-1U	180	10,4	230	2 item x 1,2
NK 200-1,2-1U	150	5,2	230	1 item x 1,2
NK 200-1,7-1U	160	7,4	230	1 item x 1,7
NK 200-2,0-1U	170	8,7	230	1 item x 2,0
NK 200-2,4-1U	180	10,4	230	2 item x 1,2
NK 250-1,2-1U	180	5,2	230	1 item x 1,2
NK 250-2,0-1U	200	8,7	230	1 item x 2,0
NK 250-2,4-1U	265	10,4	230	2 item x 1,2
NK 315-1,2-1U	180	5,2	230	1 item x 1,2
NK 315-2,0-1U	200	8,7	230	1 item x 2,0
NK 315-2,4-1U	265	10,4	230	2 item x 1,2

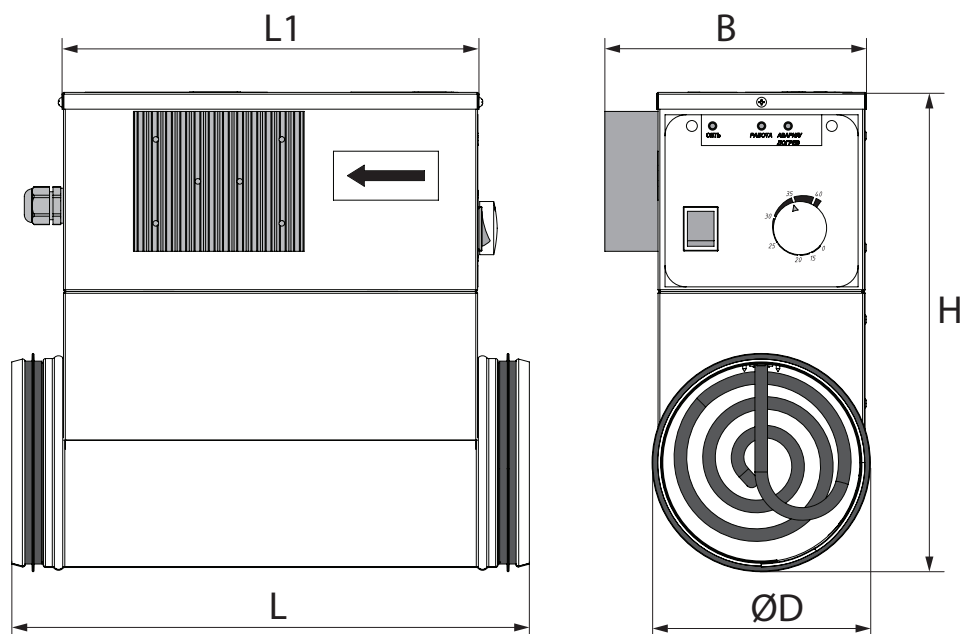
NKU with integrated control unit for round air ducts from 3.0 kW up to 9.0 kW	Technical data			
	Min. air flow [m ³ /h]	Current consumption [A]	Supply Voltage [V]	Number of electric heating elements x power [kW]
NK 150-3,4-1U	220	14,7	230	2 item x 1,7
NK 150-3,6-3U	265	5,2	400	3 item x 1,2
NK 150-5,1-3U	320	7,4	400	3 item x 1,7
NK 150-6,0-3U	360	8,7	400	3 item x 2,0
NK 160-3,4-1U	250	14,8	230	2 item x 1,7
NK 160-3,6-3U	265	5,2	400	3 item x 1,2
NK 160-5,1-3U	375	7,4	400	3 item x 1,7
NK 160-6,0-3U	440	8,7	400	3 item x 2,0
NK 200-3,4-1U	250	14,8	230	2 item x 1,7
NK 200-3,6-3U	265	5,2	400	3 item x 1,2
NK 200-5,1-3U	375	7,4	400	3 item x 1,7
NK 200-6,0-3U	440	8,7	400	3 item x 2,0
NK 250-3,0-1U	375	13,0	230	1 item x 3,0
NK 250-3,6-3U	375	5,2	400	3 item x 1,2
NK 250-6,0-3U	440	8,7	400	3 item x 2,0
NK 250-9,0-3U	660	13,0	400	3 item x 3,0
NK 315-3,6-3U	375	5,2	400	3 item x 1,2
NK 315-6,0-3U	440	8,7	400	3 item x 2,0
NK 315-9,0-3U	660	13,0	400	3 item x 3,0



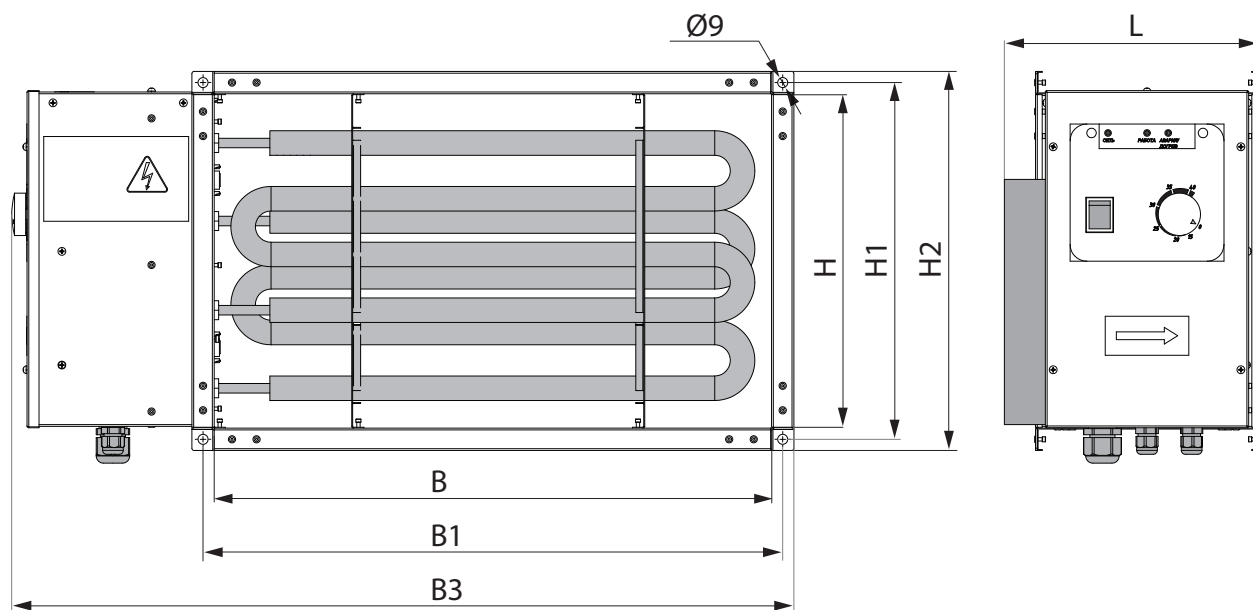
NKU with integrated control unit for rectangular air ducts from 4.5 kW up to 54 kW	Technical data				
	Min. air flow [m ³ /h]	Current consumption [A]	Supply Voltage [V]	Power, kW	Number of electric heating elements x power [kW]
NK 400x200-4,5-3U	330	6,5	400	4,5	3 item x1,5
NK 400x200-6,0-3U	440	8,7	400	6,0	3 item x2,0
NK 400x200-7,5-3U	550	10,9	400	7,5	3 item x2,5
NK 400x200-9,0-3U	660	13,0	400	9,0	3 item x3,0
NK 400x200-10,5-3U	770	15,2	400	10,5	3 item x3,5
NK 400x200-12,0-3U	880	17,4	400	12,0	3 item x4,0
NK 400x200-15,0-3U	1100	21,7	400	15,0	3 item x5,0
NK 500x250-6,0-3U	440	8,7	400	6,0	3 item x2,0
NK 500x250-7,5-3U	550	10,9	400	7,5	3 item x2,5
NK 500x250-9,0-3U	660	13,0	400	9,0	3 item x3,0
NK 500x250-10,5-3U	770	15,2	400	10,5	3 item x3,5
NK 500x250-12,0-3U	880	17,4	400	12,0	3 item x4,0
NK 500x250-15,0-3U	1100	21,7	400	15,0	3 item x5,0
NK 500x250-18,0-3U	1320	26,0	400	18,0	3 item x6,0
NK 500x250-21,0-3U	1540	30,0	400	21,0	3 item x7,0
NK 500x300-6,0-3U	440	8,7	400	6,0	3 item x2,5
NK 500x300-7,5-3U	550	10,9	400	7,5	3 item x3,0
NK 500x300-9,0-3U	660	13,0	400	9,0	3 item x3,5
NK 500x300-10,5-3U	770	15,2	400	10,5	3 item x4,0
NK 500x300-12,0-3U	880	17,4	400	12,0	3 item x5,0
NK 500x300-15,0-3U	1100	21,7	400	15,0	3 item x6,0
NK 500x300-18,0-3U	1320	26,0	400	18,0	3 item x7,0
NK 500x300-21,0-3U	1540	30,0	400	21,0	3 item x2,5
NK 600x300-9,0-3U	660	13,0	400	9,0	3 item x3,0
NK 600x300-12,0-3U	880	17,4	400	12,0	3 item x4,0
NK 600x300-15,0-3U	1100	21,7	400	15,0	3 item x5,0
NK 600x300-18,0-3U	1320	26,0	400	18,0	3 item x6,0
NK 600x300-21,0-3U	1540	30,0	400	21,0	3 item x7,0
NK 600x300-24,0-3U	1760	34,7	400	24,0	3 item x8,0
NK 600x350-9,0-3U	660	13,0	400	9,0	3 item x3,0
NK 600x350-12,0-3U	880	17,4	400	12,0	3 item x4,0
NK 600x350-15,0-3U	1100	21,7	400	15,0	3 item x5,0
NK 600x350-18,0-3U	1320	26,0	400	18,0	3 item x6,0
NK 600x350-21,0-3U	1540	30,0	400	21,0	3 item x7,0
NK 600x350-24,0-3U	1760	34,7	400	24,0	3 item x8,0
NK 700x400-18,0-3U	1320	26,0	400	18,0	6 item x3,0
NK 700x400-27,0-3U	1980	39,0	400	27,0	9 item x3,0
NK 700x400-36,0-3U	2640	52,0	400	36,0	12 item x3,0
NK 800x500-27,0-3U	1980	39,0	400	27,0	9 item x3,0
NK 800x500-36,0-3U	2640	52,0	400	36,0	12 item x3,0
NK 800x500-54,0-3U	3960	78,0	400	54,0	18 item x3,0
NK 900x500-45,0-3U	3300	65,0	400	45,0	15 item x3,0
NK 900x500-54,0-3U	3960	78,0	400	54,0	18 item x3,0
NK 1000x500-45,0-3U	3300	65,0	400	45,0	15 item x3,0
NK 1000x500-54,0-3U	3960	78,0	400	54,0	18 item x3,0

NKU OVERALL DIMENSTIONS FOR ROUND DUCTS FROM 0.6 KW UP TO 2.4 KW


NKU with integrated temperature control unit for round air ducts from 0.6 kW up to 2.4 kW	D [mm]	B [mm]	H [mm]	L [mm]	L1 [mm]	Weight [kg]
NK 100-0,6-1U	99	94	204	306	227	1,5
NK 100-0,8-1U	99	94	204	306	227	1,5
NK 100-1,2-1U	99	120	204	370	290	1,6
NK 100-1,6-1U	99	120	204	370	290	1,6
NK 100-1,8-1U	99	120	204	454	374	1,8
NK 125-0,6-1U	124	103	230	306	227	1,6
NK 125-0,8-1U	124	103	230	306	227	1,6
NK 125-1,2-1U	124	126	230	370	290	1,8
NK 125-1,6-1U	124	126	230	370	290	1,8
NK 125-2,4-1U	124	126	230	454	374	2
NK 150-1,2-1U	149	144	255	306	226	2,1
NK 150-1,7-1U	149	144	255	306	226	2,1
NK 150-2,0-1U	149	144	255	306	226	2,1
NK 150-2,4-1U	149	144	255	370	290	2,6
NK 160-1,2-1U	159	154	267	306	226	2,2
NK 160-1,7-1U	159	154	267	306	226	2,2
NK 160-2,0-1U	159	154	267	306	226	2,2
NK 160-2,4-1U	159	154	267	370	290	2,8
NK 200-1,2-1U	199	174	302	306	228	2,6
NK 200-1,7-1U	199	174	302	306	228	2,6
NK 200-2,0-1U	199	174	302	306	228	2,6
NK 200-2,4-1U	199	174	302	376	298	3,2
NK 250-1,2-1U	249	174	356	306	228	3,3
NK 250-2,0-1U	249	174	356	306	228	3,3
NK 250-2,4-1U	249	174	356	376	298	3,9
NK 315-1,2-1U	313	174	425	306	228	4,1
NK 315-2,0-1U	313	174	425	306	228	4,1
NK 315-2,4-1U	313	174	425	376	298	5

NKU OVERALL DIMENSTIONS FOR ROUND DUCTS FROM 3.0 KW UP TO 9.0 KW


NKU with integrated control unit for round air ducts from 3.0 kW up to 9.0 kW	D [mm]	B [mm]	H [mm]	L [mm]	L1 [mm]	Weight [kg]
NK 150-3,4-1U	149	187	340	370	298	4,3
NK 150-3,6-3U	149	187	340	370	298	4,9
NK 150-5,1-3U	149	187	340	370	298	4,9
NK 150-6,0-3U	149	187	340	370	298	4,9
NK 160-3,4-1U	159	187	350	370	298	4,6
NK 160-3,6-3U	159	187	350	370	298	5,2
NK 160-5,1-3U	159	187	350	370	298	5,2
NK 160-6,0-3U	159	187	350	370	298	5,2
NK 200-3,4-1U	199	237	389	376	298	5,2
NK 200-3,6-3U	199	237	389	376	298	5,9
NK 200-5,1-3U	199	237	389	376	298	5,9
NK 200-6,0-3U	199	237	389	376	298	5,9
NK 250-3,0-1U	249	237	446	376	298	5,1
NK 250-3,6-3U	249	237	446	376	298	6,6
NK 250-6,0-3U	249	237	446	376	298	6,6
NK 250-9,0-3U	249	237	446	376	298	6,6
NK 315-3,6-3U	313	237	514	376	298	5,6
NK 315-6,0-3U	313	237	514	376	298	7,4
NK 315-9,0-3U	313	237	514	376	298	7,4

OVERALL DIMENSIONS OF NKU HEATERS FOR RECTANGULAR DUCTS FROM 4.5 KW TO 54 KW


NKU Heater with a Control Unit for Rectangular Ducts from 4.5 kW to 54 kW	B [mm]	B1 [mm]	B3 [mm]	H [mm]	H1 [mm]	H2 [mm]	L [mm]	Weight [kg]
NK 400x200-4,5-3U	400	420	611	200	220	240	228	18,24
NK 400x200-6,0-3U	400	420	611	200	220	240	228	18,24
NK 400x200-7,5-3U	400	420	611	200	220	240	228	18,24
NK 400x200-9,0-3U	400	420	665	200	220	240	228	18,52
NK 400x200-10,5-3U	400	420	665	200	220	240	228	18,52
NK 400x200-12,0-3U	400	420	665	200	220	240	228	18,52
NK 400x200-15,0-3U	400	420	665	200	220	240	228	18,52
NK 500x250-6,0-3U	500	520	702	250	270	290	228	22,4
NK 500x250-7,5-3U	500	520	702	250	270	290	228	22,4
NK 500x250-9,0-3U	500	520	702	250	270	290	228	23,0
NK 500x250-10,5-3U	500	520	702	250	270	290	228	23,0
NK 500x250-12,0-3U	500	520	702	250	270	290	228	23,0
NK 500x250-15,0-3U	500	520	702	250	270	290	228	23,1
NK 500x250-18,0-3U	500	520	702	250	270	290	228	23,1
NK 500x250-21,0-3U	500	520	702	250	270	290	228	23,1
NK 500x300-6,0-3U	500	520	702	300	320	340	228	22,9
NK 500x300-7,5-3U	500	520	702	300	320	340	228	22,9
NK 500x300-9,0-3U	500	520	702	300	320	340	228	23,5
NK 500x300-10,5-3U	500	520	702	300	320	340	228	23,5
NK 500x300-12,0-3U	500	520	702	300	320	340	228	23,5
NK 500x300-15,0-3U	500	520	702	300	320	340	228	24,0
NK 500x300-18,0-3U	500	520	702	300	320	340	228	24,0
NK 500x300-21,0-3U	500	520	702	300	320	340	228	24,0
NK 600x300-9,0-3U	600	620	802	300	320	340	228	27,0
NK 600x300-12,0-3U	600	620	802	300	320	340	228	27,0
NK 600x300-15,0-3U	600	620	802	300	320	340	228	27,0
NK 600x300-18,0-3U	600	620	802	300	320	340	228	27,5
NK 600x300-21,0-3U	600	620	802	300	320	340	228	27,5
NK 600x300-24,0-3U	600	620	802	300	320	340	228	27,5

NKU Heater with a Control Unit for Rectangular Ducts from 4.5 kW to 54 kW	B [mm]	B1 [mm]	B3 [mm]	H [mm]	H1 [mm]	H2 [mm]	L [mm]	Weight [kg]
NK 600x350-9,0-3U	600	620	802	350	370	390	228	28,2
NK 600x350-12,0-3U	600	620	802	350	370	390	228	28,2
NK 600x350-15,0-3U	600	620	802	350	370	390	228	28,5
NK 600x350-18,0-3U	600	620	802	350	370	390	228	28,5
NK 600x350-21,0-3U	600	620	802	350	370	390	228	28,5
NK 600x350-24,0-3U	600	620	802	350	370	390	228	28,5
NK 700x400-18,0-3U	700	720	924	400	420	440	410	16,8
NK 700x400-27,0-3U	700	720	924	400	420	440	530	21,0
NK 700x400-36,0-3U	700	720	924	400	420	440	750	28,0
NK 800x500-27,0-3U	800	820	1024	500	520	540	410	20,6
NK 800x500-36,0-3U	800	820	1024	500	520	540	530	25,9
NK 800x500-54,0-3U	800	820	1024	500	520	540	750	36,1
NK 900x500-45,0-3U	900	920	1130	500	520	540	750	33,4
NK 900x500-54,0-3U	900	920	1130	500	520	540	750	35,0
NK 1000x500-45,0-3U	1000	1020	1230	500	520	540	750	35,5
NK 1000x500-54,0-3U	1000	1020	1230	500	520	540	750	41,2

DESIGN AND OPERATING LOGIC

NKU HEATER WITH A BUILT-IN TEMPERATURE CONTROL UNIT FOR ROUND DUCTS

The heater casing has a rigidly mounted junction box protected with a removable lid.

The front panel of the junction box has the electronic thermostat control knob with a temperature scale. The heater is equipped with a temperature sensor built into the air duct. The sensing element is encapsulated in an aluminium tube protecting it against mechanical damage. The rear panel of the junction box has a sealed lead-in for the heater feed lines and the grounding conductor. The heater casing encloses electric heating elements.

The heater casing, junction box and protective lid are made of galvanized steel.

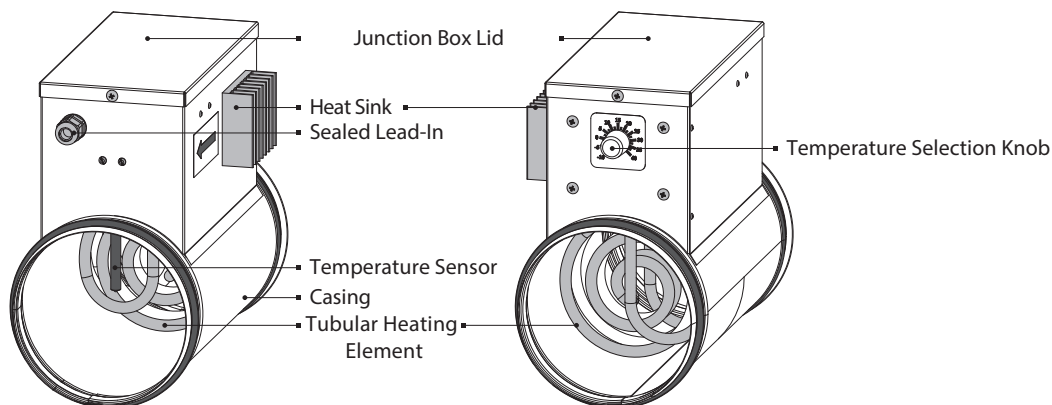
The junction box contains the following components:

- Fasteners for the heating elements;
- Electrical components for the power mains connection;
- The terminal block for connecting the external feed lines of the heater;
- Grounding screw clamp;
- Manual reset thermoswitch;
- Electronic thermostat controller circuit board.

In the NK100, 125 - 0.6 .. 0.8 -1U models the TRIAC is installed on a heat sink inside the junction box. All other models feature external heat sinks to dissipate extra heat.

The heater is also equipped with a manual reset thermoswitch rated to trip at +60 °C. The thermoswitch actuation may be caused by an abnormal temperature increase in the event of the thermostat electronic unit failure.

The electrical connections diagram is given on the inside of the junction box lid.



NKU HEATER WITH A CONTROL UNIT FOR ROUND AND RECTANGULAR DUCTS

The duct heater is equipped with a three-phase TRIAC power controller to regulate the output of the tubular electric heating elements. The units benefit from proportional-integral control used for adjusting the supply air temperature with automatic control function adaptation.

The control unit can use the temperature sensor feedback to maintain the pre-set duct temperature or the heating output proportionally to the 0-10 V external control signal value in the range from 0 to 100%.

While switching the duct temperature sensor mode select one of the temperature sensors below:

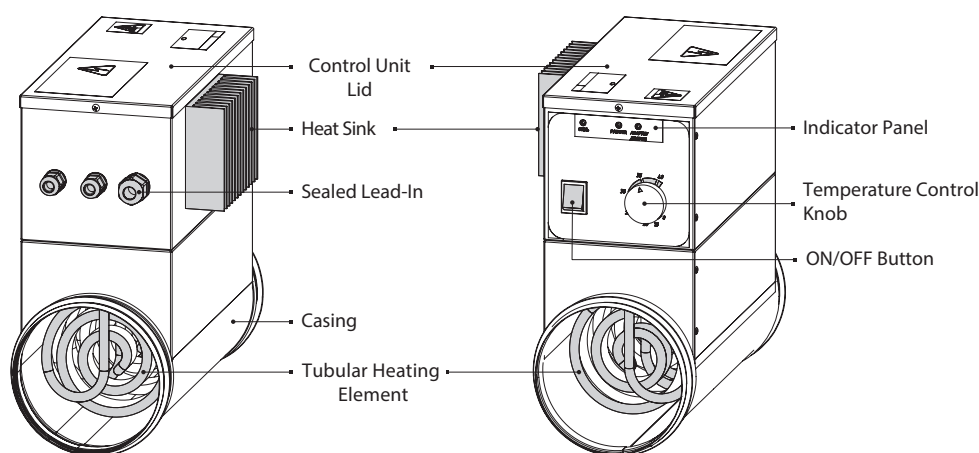
- Duct temperature sensor with a sealed end KDT2-M1 (100...400 mm);
- Duct sensor with a mounting flange encased in a rolled tube KDT2-M (100...400 mm);
- Duct sensor with a mounting flange encased in a rolled tube equipped with a terminal box KDT2-M (100...400 mm).

The temperature is controlled by means of connecting and disconnecting the full load. The TRIAC power controller of the NKU heaters effects proportional time control by changing the relation between the load on-time and off-time depending on the pre-programmed heating requirements. For example, if the full load is intermittently on and off in 5 second periods the heater runs at 50% of its maximum power output. The cycle time (i.e. the total of the load on-time and off-time) is programmed at the factory in the range from 1 to 6 seconds by using the appropriately rated resistance 3 (see Fig. 14). The load is commutated by means of a TRIAC controller.

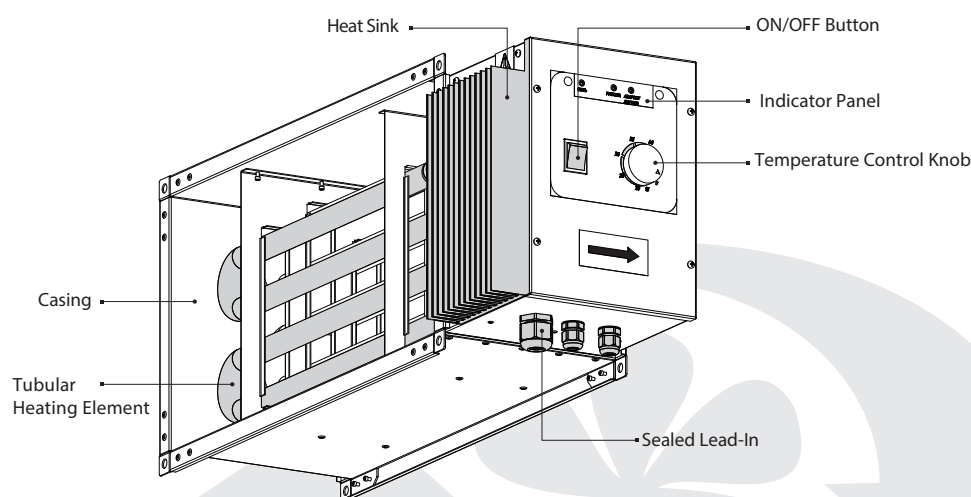
The NKU has two built-in thermal contacts for overheating protection: the automatic reset TK50 with intervention temperature of +50 °C and the manual reset TK90 with intervention temperature of +90 °C. The thermal contacts are connected to the control unit terminals.

The air temperature is set by means of the integral pot resistor or an external control device generating a 0-10 V control input signal to increase the duct temperature proportionally in the range from 0 to +40 °C.

The NKU heaters with integral control units for round ducts consist of a casing with a rigidly mounted junction box which has a removable top lid.



The NKU heaters with integral control units for rectangular ducts consist of a casing with a rigidly mounted junction box. The junction box has a removable front panel featuring the temperature control knob, the ON/OFF button and the indicator panel.



Functional Switches and Indicators



There are three lights on the indicator panel:

- Power – AC Mains (Green Light);
- Status lights – Operation (Yellow);
- Alarm/Booster Heating (Red).

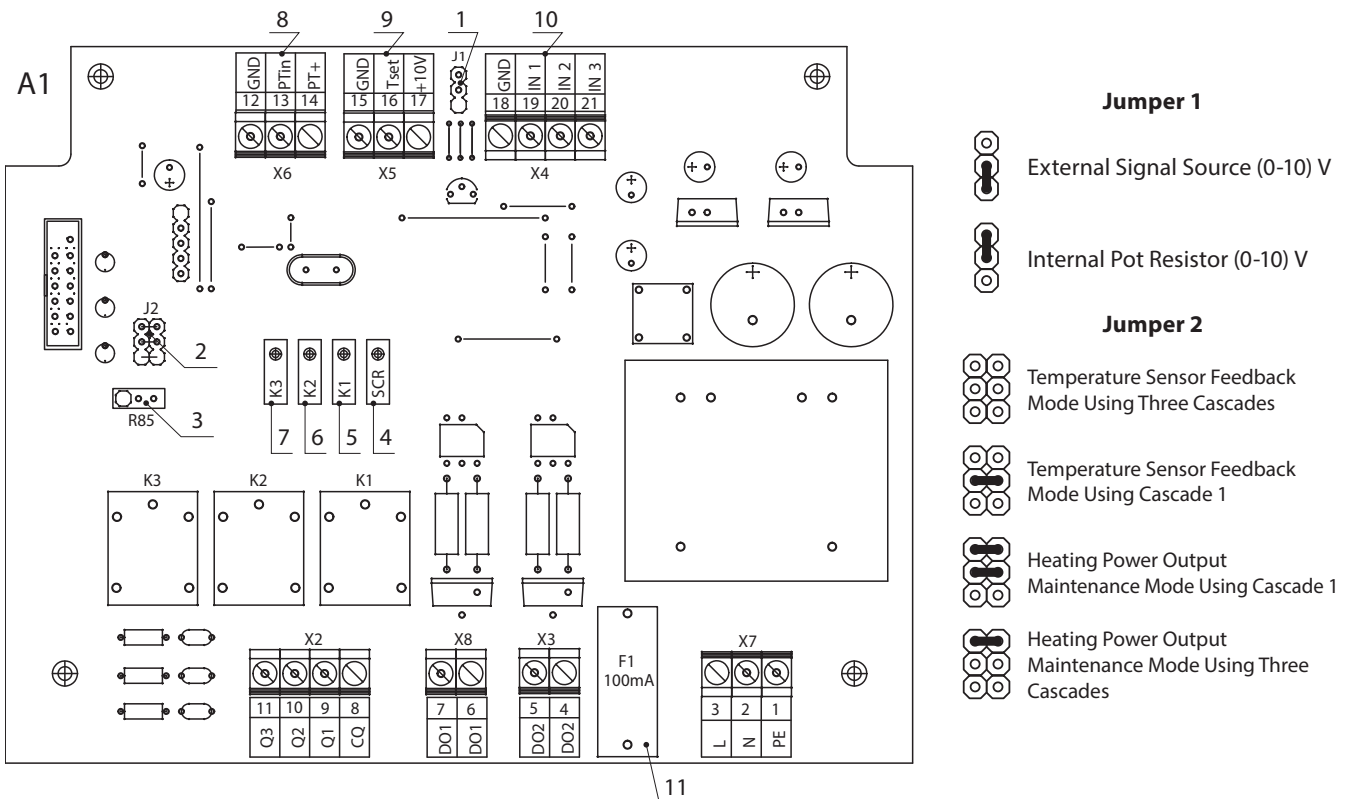
Current State and Malfunction Indication

AC Mains Green Light	Operation Yellow	Alarm/Booster Heating Red Light	EVENT
OFF	OFF	OFF	AC Mains Disconnected
ON	ON	BLINKS IN 5 s INTERVALS	Temperature Boosting T set >T flow
ON	ON	ON	Switching to Mode T set = T flow
ON	OFF	ON	Overheating T set < T flow
ON	ON	BLINKS IN 1 s INTERVALS	Duct Pressure Switch Signal Lost
ON	BLINKS IN 1 s INTERVALS	ON	TK50 thermal contact actuation
ON	ALTERNATE BLINKING		Heating Power Output Maintenance Irrespective of Sensor Feedback
ON	SIMULTANEOUS BLINKING		Alarm

Controller Circuit Board Functional Outputs:

- 1 - Internal or External 0-10 V Control Input Selection;
- 2 - Control Mode Selection;
- 3 - Cycle Length Adjustment Resistor (factory-set);
- 4 - Indication of TRIAC Operation and Heating Cascade Activation;
- 5 - Heating Cascade 1 Indicator;
- 6 - Second Heating Cascade Indicator ;
- 7 - Heating Cascade 3 Indicator;
- 8 - Terminal Block for Temperature Sensor Connection;
- 9 - Terminal Block for External 0-10 V Control Input;
- 10 - Terminal Block for Protection and Enabling Contacts;
- 11 - Control Circuit Board Fuse.

To facilitate connection by the user Outputs 8, 9 and 10 are factory-commutated on the X2 terminal block (see Page 20 «Heater Control»).





READ THIS USER'S MANUAL CAREFULLY PRIOR TO THE HEATER INSTALLATION.



AFTER TRANSPORTATION OR STORAGE UNDER BELOW ZERO TEMPERATURES KEEP THE UNIT IN THE SPECIFIED OPERATION CONDITIONS FOR AT LEAST 4 HOURS BEFORE POWERING UP.

Prior to the heater installation check the heater for the integrity and reliability of the heating element fixation.

The working position of the heater must ensure unimpeded access to the junction box (control unit) and the RESET thermoswitch manual reset button mounted inside the control unit.

The heater must be securely fastened in place. The mounting location must enable quick access to the heater and provide ample space for technical maintenance operations.

The heater must be installed into the ventilation system so that the arrow on the heater casing matches the air flow direction.

The minimum clearance between the heater and other ventilation system components should double the connection size.

No inflammable, explosive or fire-hazardous materials are allowed within 150 mm of the heater casing and within 500 mm of the heater air inlet and outlet. Air ducts and fans must be equipped with a grille or similar protective device preventing free access to the tubular heating elements.

Pre-commissioning precautions:

- The unit must be safely earthed in compliance with the «Electrical Installations Regulations» (i.e. the clamp must be connected to the protective ground wire);
- The minimum air flow through the heater must comply with the value stated in the technical specification (see pages 6, 7, 8).

The fan must be installed in the air duct upstream of the heater along the air flow direction to eliminate the possibility of extra heat load on the electric motor. Wherever possible a supply filter should be installed upstream of the heater to reduce contamination.

To ensure proper and safe operation the heater should be equipped with an automatic control system capable of comprehensive control and protection - in particular:

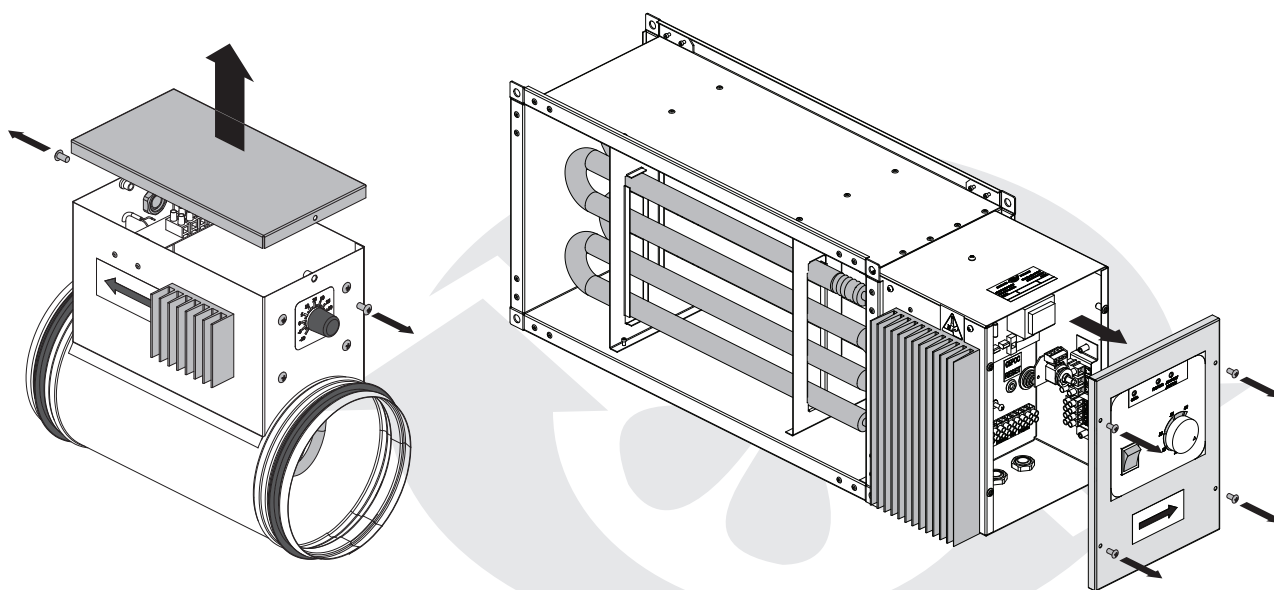
- Monitoring the filter condition using the pressure differential sensor feedback;
- Powering off the heater in the event of the supply fan shutdown or air flow velocity drop as well as upon actuation of the built-in overheating protection thermostat;
- Ventilation system shutdown after a 30-second blowing cycle required to cool down the electric heating elements.

The supply voltage must be fed via an automatic circuit breaker with a minimum gap of 3 mm between the open contacts on all poles.

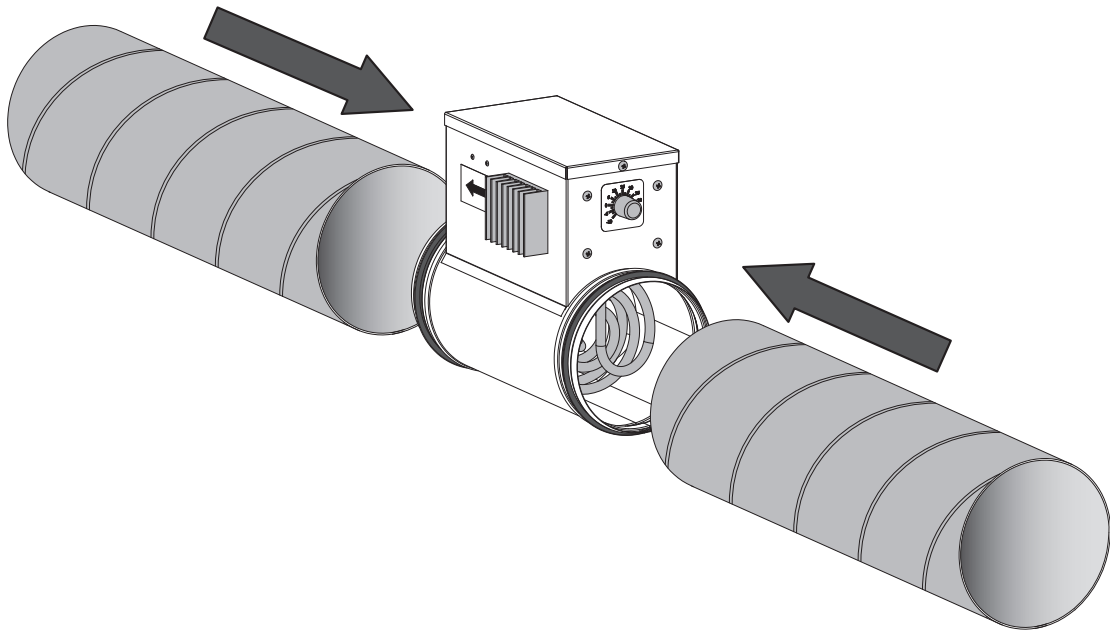
The circuit breaker must be integrated into the stationary wiring in accordance with the applicable electrical wiring regulations.

To access the terminal block remove the junction box (control unit) lid.

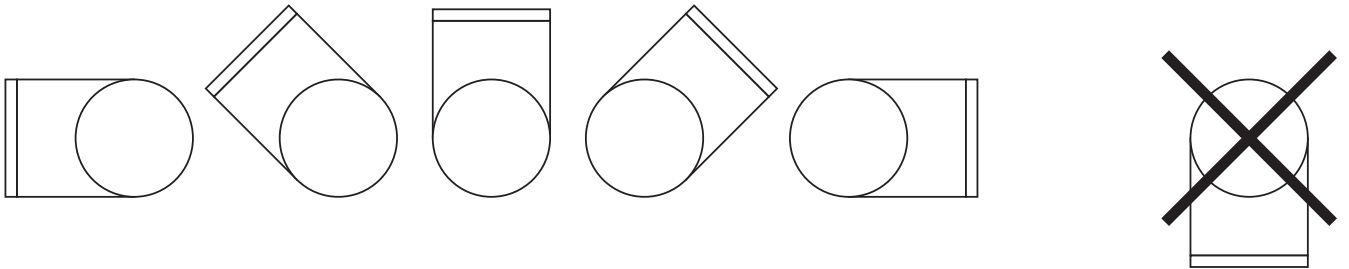
NKU TERMINAL BLOCK ACCESS



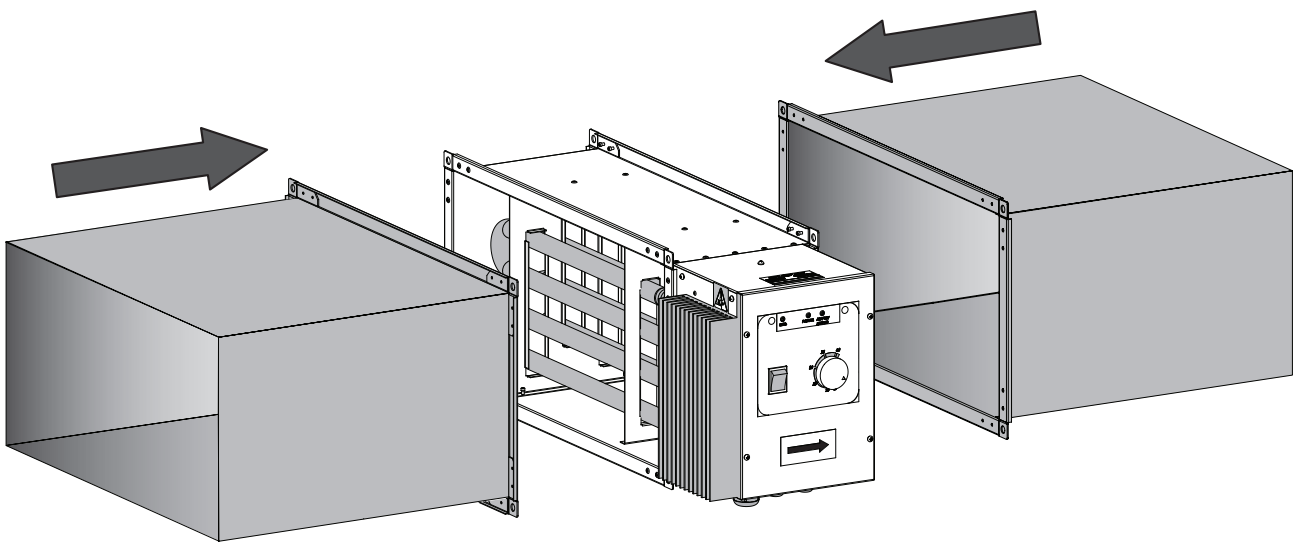
Connecting Round Air Ducts to the Heater



The heater is designed for internal installation into air ducts in the horizontal or vertical position. Horizontal Position Installation. In a horizontal position the junction box must face upwards. The horizontal deviation may be up to 90°. The heater junction box may not face downwards.



Connecting Rectangular Air Ducts to the Heater





DISCONNECT THE HEATER FROM THE POWER SUPPLY PRIOR TO ANY WORK ON THE UNIT. THE POWER MAINS CONNECTION SHALL ONLY BE PERFORMED BY A PROFESSIONAL ELECTRICIAN. THE NOMINAL ELECTRICAL PARAMETERS OF THE HEATER ARE GIVEN ON THE MANUFACTURER'S LABEL. ANY TAMPERING WITH THE INTERNAL CONNECTIONS IS PROHIBITED AND WILL VOID THE WARRANTY.

The heater is powered with 230 V / 50 Hz single-phase alternating current or 400 V / 50 Hz three-phase current depending on the particular NKU model. The heater connection must be made on the terminal block mounted on a plank inside the junction box or the control unit in accordance with the electrical connections diagram and terminal designations as shown on the respective schematic.

Route the cables into the unit through sealed lead-ins in the casing sidewall as per the electric hazard class specifications. The external lead-in (230 V / 50 Hz or 400 V / 50Hz) must be equipped with an automatic circuit breaker built into the stationary wiring to interrupt all the network phases. The location of the QF external switch must ensure free access for quick shutdown of the heater. The protection trip current must be consistent with the current consumption of the unit. The recommended nominal trip current of the circuit breaker, the cross-section and the number of cores are given in the respective tables.

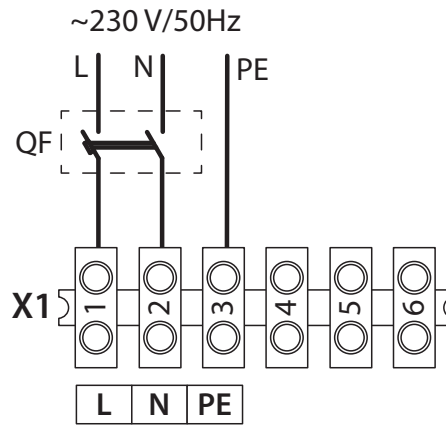
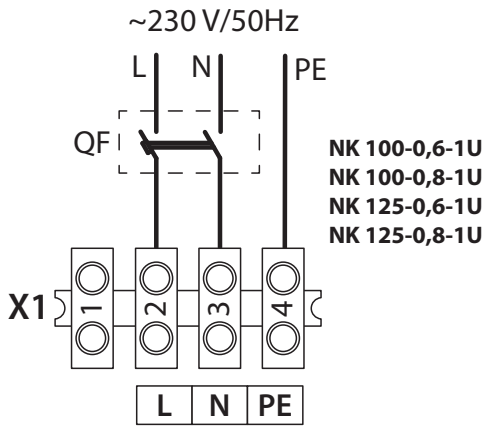
The heater connections (cables and wires) must be durable, insulated and heat-resistant. The given wire sections are for reference only. The conductor section selection must account for the maximum permissible wire heating which depends on the wire type, its insulation, length and installation method (i.e. overhead, in pipes or inside walls).

CONNECTION OF NKU WITH INTEGRATED TEMPERATURE CONTROL UNIT FOR ROUND AIR DUCTS

Automatic Circuit Breaker Trip Current Selection for NKU Heaters with an Integrated Temperature Control Unit for Round Ducts from 0.6 kW to 2.4 kW

NKU heater with a built-in temperature control unit for round ducts from 0.6 Kw to 2.4 Kw	Supply Voltage [V]	Circuit Breaker Trip Current [A]	Number and Cross-Section of Cores [mm ²]
NK 100-0,6-1U	230	3,15	3x0,75
NK 100-0,8-1U	230	4,0	3x0,75
NK 100-1,2-1U	230	6,3	3x2,5
NK 100-1,6-1U	230	8,0	3x2,5
NK 100-1,8-1U	230	10,0	3x2,5
NK 125-0,6-1U	230	3,15	3x0,75
NK 125-0,8-1U	230	4,0	3x0,75
NK 125-1,2-1U	230	6,3	3x2,5
NK 125-1,6-1U	230	8,0	3x2,5
NK 125-2,4-1U	230	10,0	3x2,5
NK 150-1,2-1U	230	6,3	3x2,5
NK 150-1,7-1U	230	8,0	3x2,5
NK 150-2,0-1U	230	10,0	3x2,5
NK 150-2,4-1U	230	12,5	3x2,5
NK 160-1,2-1U	230	6,3	3x2,5
NK 160-1,7-1U	230	8,0	3x2,5
NK 160-2,0-1U	230	10,0	3x2,5
NK 160-2,4-1U	230	12,5	3x2,5
NK 200-1,2-1U	230	6,3	3x2,5
NK 200-1,7-1U	230	8,0	3x2,5
NK 200-2,0-1U	230	10,0	3x2,5
NK 200-2,4-1U	230	12,5	3x2,5
NK 250-1,2-1U	230	6,3	3x2,5
NK 250-2,0-1U	230	10,0	3x2,5
NK 250-2,4-1U	230	12,5	3x2,5
NK 315-1,2-1U	230	6,3	3x2,5
NK 315-2,0-1U	230	10,0	3x2,5
NK 315-2,4-1U	230	12,5	3x2,5

Wiring Diagrams for NKU Heaters from 0.6 kW to 2.4 kW



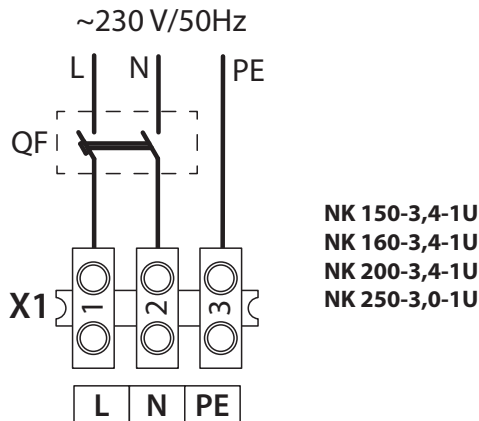
- NK 100-1,2-1U
- NK 100-1,6-1U
- NK 100-1,8-1U
- NK 125-1,2-1U
- NK 125-1,6-1U
- NK 125-2,4-1U
- NK 150-1,2-1U
- NK 150-1,7-1U
- NK 150-2,0-1U
- NK 150-2,4-1U
- NK 150-2,4-1U
- NK 160-1,2-1U
- NK 160-1,7-1U
- NK 160-2,0-1U
- NK 160-2,4-1U
- NK 200-1,2-1U
- NK 200-1,7-1U
- NK 200-2,0-1U
- NK 200-2,4-1U
- NK 250-1,2-1U
- NK 250-2,0-1U
- NK 250-2,4-1U
- NK 315-1,2-1U
- NK 315-2,0-1U
- NK 315-2,4-1U

CONNECTION OF NKU WITH CONTROL UNIT FOR ROUND AND RECTANGULAR DUCTS

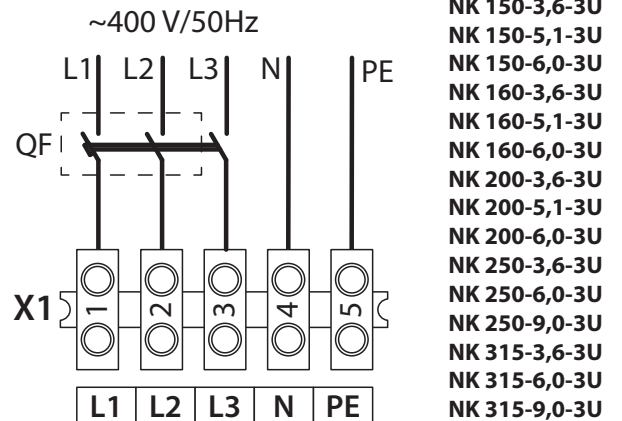
Automatic Circuit Breaker Trip Current Selection for NKU Heaters with a Control Unit for Round Ducts from 3.0 kW to 9.0 kW

NKU Heaters with a Control Unit for Round Ducts from 3.0 kW to 9.0 kW	Supply Voltage [V]	Circuit Breaker Trip Current [A]	Number and Cross-Section of Cores [mm ²]
NK 150-3,4-1U	230	20	3x2,5
NK 160-3,4-1U	230	20	3x2,5
NK 200-3,4-1U	230	20	3x2,5
NK 250-3,0-1U	230	20	3x2,5
NK 150-3,6-3U	400	8	5x2,5
NK 160-3,6-3U	400	8	5x2,5
NK 200-3,6-3U	400	8	5x2,5
NK 250-3,6-3U	400	8	5x2,5
NK 315-3,6-3U	400	8	5x2,5
NK 150-5,1-3U	400	10	5x2,5
NK 160-5,1-3U	400	10	5x2,5
NK 200-5,1-3U	400	10	5x2,5
NK 250-6,0-3U	400	10	5x2,5
NK 315-6,0-3U	400	10	5x2,5
NK 250-9,0-3U	400	16	5x2,5
NK 315-9,0-3U	400	16	5x2,5

Wiring Diagram for NKU Heaters with a Control Unit for Round Ducts from 3.0 kW to 9.0 kW



Wiring Diagram for NKU Heaters with a Control Unit for Round Ducts (from 3.0 kW to 9.0 kW) and for the entire model range of Rectangular Ducts (from 4.5 kW to 54 kW)



Automatic Circuit Breaker Trip Current Selection for NKU Heaters with a Control Unit for Rectangular Ducts from 4.5 kW to 54 kW

NKU Heaters with a Control Unit for Rectangular Ducts from 4.5 kW to 54 kW	Supply Voltage [V]	Circuit Breaker Trip Current [A]	Number and Cross-Section of Cores [mm ²]
NK 400x200-4,5-3U	400	10	5x2,5
NK 400x200-6,0-3U	400	50	5x2,5
NK 400x200-7,5-3U	400	16	5x2,5
NK 400x200-9,0-3U	400	16	5x2,5
NK 400x200-10,5-3U	400	20	5x2,5
NK 400x200-12,0-3U	400	20	5x2,5
NK 400x200-15,0-3U	400	25	5x2,5
NK 500x250-6,0-3U	400	10	5x2,5
NK 500x250-7,5-3U	400	16	5x2,5
NK 500x250-9,0-3U	400	16	5x2,5
NK 500x250-10,5-3U	400	20	5x2,5
NK 500x250-12,0-3U	400	20	5x2,5
NK 500x250-15,0-3U	400	25	5x2,5
NK 500x250-18,0-3U	400	31,5	5x4
NK 500x250-21,0-3U	400	40,0	5x4
NK 500x300-6,0-3U	400	10	5x2,5
NK 500x300-7,5-3U	400	16	5x2,5
NK 500x300-9,0-3U	400	16	5x2,5
NK 500x300-10,5-3U	400	20	5x2,5
NK 500x300-12,0-3U	400	20	5x2,5
NK 500x300-15,0-3U	400	25	5x2,5
NK 500x300-18,0-3U	400	31,5	5x4
NK 500x300-21,0-3U	400	40	5x4
NK 600x300-9,0-3U	400	16	5x2,5
NK 600x300-12,0-3U	400	20	5x2,5
NK 600x300-15,0-3U	400	25	5x2,5
NK 600x300-18,0-3U	400	31,5	5x4
NK 600x300-21,0-3U	400	40	5x4
NK 600x300-24,0-3U	400	40	5x4
NK 600x350-9,0-3U	400	16	5x2,5
NK 600x350-12,0-3U	400	20	5x2,5
NK 600x350-15,0-3U	400	25	5x2,5
NK 600x350-18,0-3U	400	30	5x4
NK 600x350-21,0-3U	400	40	5x4
NK 600x350-24,0-3U	400	40	5x4
NK 700x400-18,0-3U	400	31,5	5x4
NK 700x400-27,0-3U	400	50	5x6
NK 700x400-36,0-3U	400	63	5x10
NK 800x500-27,0-3U	400	50	5x6
NK 800x500-36,0-3U	400	63	5x10
NK 800x500-54,0-3U	400	100	5x16
NK 900x500-45,0-3U	400	80	5x10
NK 900x500-54,0-3U	400	100	5x16
NK 1000x500-45,0-3U	400	80	5x10
NK 1000x500-54,0-3U	400	100	5x16

HEATER CONTROL

NKU HEATER WITH A BUILT-IN TEMPERATURE CONTROL UNIT FOR ROUND DUCTS

Use the temperature control knob to set the desired temperature in the air duct (thermostat operation threshold). The temperature can be set in the range from -10°C to +40°C. The heater switches on automatically upon the air temperature dropping below the pre-set thermostat operation threshold. When the air warms up to the pre-set level the heater switches off automatically.

NKU HEATERS WITH CONTROL UNIT FOR ROUND AND RECTANGULAR DUCTS

Complete the electrical connections according to the respective diagram, see Page 18.

To use the temperature sensor feedback connect the sensor to the X2 terminal block:

TE1 [Gnd, PTin, PT+].

PT+ - Sensor Power - «Brown»;

Gnd - Analogue Ground Contact - «Shield»;

PTin - Sensor Signal Input - «White».

Jumper 1 (see Page 14) toggles the heater control method (the 0-10 V control signal or the feedback from the built-in temperature controller pot resistor).

To use the feedback from an external control device connect it to the X2 terminal block.

Control [GND, 0-10 V].

Gnd - Analogue Ground Contact

0-10V - External Signal Input.

Protective Contact Circuit Connection.

The «Start» signal (the activation signal source device) must be connected to the X2 terminal: Enable [nc and s]

The flow sensing element (the supply filter pressure switch) must be connected to the X2 terminal: PD1 [nc and s];

TK50 (the heater overheating protection thermoswitch set to actuate at +50 °C) is connected to the A1 controller terminal at the factory:

- **[Gnd and In2]** (see Page 14);

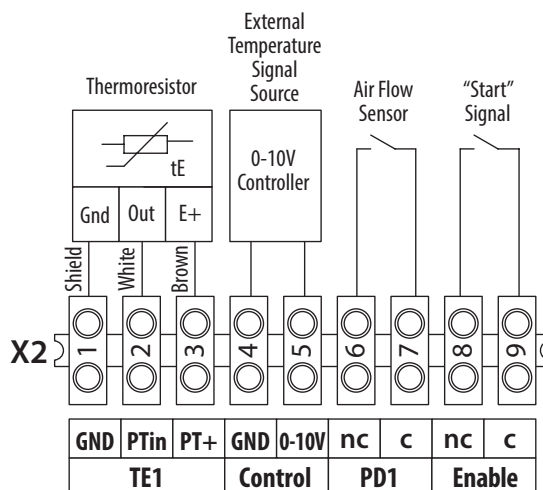
TK90 (the heater overheating protection thermoswitch set to actuate at +90 °C) is connected to the A1 controller terminal at the factory:

- **CQ** (see Page 14) and to the circuit of the master switch (see Page 14).

Supply the power voltage to the unit and activate the heater by pressing the ON/OFF button. Then use the controller knob connected to the pot resistor to set the desired temperature in the range from 0°C to +40°C.

The NKU heaters equipped with a control unit have one or several power relays depending on the number of the controlled cascades in use. The relays are connected to the controller circuit board via the TK 90 protective thermal contact at the factory.

EXTERNAL CONNECTIONS DIAGRAM



MAINTENANCE



THE HEATER TECHNICAL MAINTENANCE MUST BE PERFORMED BY ADEQUATELY QUALIFIED AND TRAINED PERSONNEL UPON HEATER DISCONNECTION FROM THE POWER MAINS.

Heater maintenance includes:

- inspection of screw, rivet and welded connections;
- inspection of screw ground clamp tightening and electric connections;
- inspection of wire terminal connections;
- cleaning of the heating elements of dust and dirt. Cleaning with solvents or flammable substances is not allowed.

STORAGE AND TRANSPORTATION RULES

Store the heater in the manufacturer's original packing box in a dry ventilated premise at the temperatures from +5 °C up to +40 °C. Storage environment must not contain aggressive vapours and chemical mixtures provoking corrosion, insulation and sealing deformation.

Use hoist machinery for handling and storage operations to prevent the heater damage.

Fulfil the handling requirements applicable for the applicable freight type.

Transportation with any vehicle type is allowed provided that the heater is protected against mechanical and weather damage.

Avoid any mechanical shocks and strokes during handling operations.

MANUFACTURER'S WARRANTY

The manufacturer hereby warrants normal operation of the heater over the period of 24 months from the retail sale date provided the user's observance of the transportation, storage, installation and operation regulations.

Should any malfunctions occur during the heater operation through the manufacturer's fault during the warranty period the user is entitled to elimination of faults by means of warranty repair performed by the manufacturer.

The warranty repair includes work specific to elimination of faults in the heater operation to ensure its intended use by the user within the warranty period. The faults are eliminated by means of replacement or repair of the complete heater or the faulty part thereof.

The warranty repair does not include:

- Routine maintenance;
- Heater installation / dismantling;
- Heater setup.

To benefit from warranty repair the user must provide the heater, the user's manual with stamped sale date and the payment document certifying the purchase.

The heater model must comply with the one stated in the user's manual.

Contact your Seller for warranty service.

The manufacturer's warranty does not apply to the following cases:

- User's failure to provide the heater with the entire delivery package as stated in the user's manual or with missing component parts previously dismantled by the user;
- Mismatch of the heater model and make with the respective details stated on the heater packing and in the user's manual;
- User's failure to ensure timely technical maintenance of the heater;
- External damage to the casing (excluding external modifications of the heater as required for its installation) and the internal components of the heater;
- Alteration of the heater design or engineering changes of the heater;
- Replacement and use of the heater assemblies, parts and components not approved by the manufacturer;
- heater misuse;
- User's violation of the heater installation regulations;
- User's violation of the heater control regulations;
- heater connection to the power mains with a voltage different from the one stated in the user's manual;
- heater breakdown due to voltage surges in the power mains;
- User's discretionary repair of the heater;
- heater repair performed by any non-authorized by the manufacturer persons;
- Expiry of the heater warranty period;
- User's violation of the established regulations specific to the heater transportation;
- User's violation of the heater storage regulations;
- Wrongful acts against the heater committed by third persons;
- heater breakdown due to circumstances of insuperable force (fire, flood, earthquake, war, hostilities of any kind, or blockade);
- Missing seals if provided by the user's manual;
- Failure to provide the user's manual with the sale date stamp;
- Missing payment document certifying the heater purchase.



FOLLOWING THE REGULATIONS STIPULATED HEREIN WILL ENSURE A LONG AND TROUBLE-FREE OPERATION OF THE HEATER.



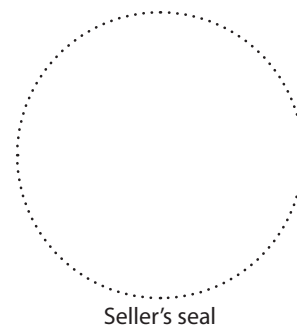
USERS' CLAIMS SHALL BE SUBJECT TO REVIEW ONLY UPON PRESENTATION OF THE HEATER, THE PAYMENT DOCUMENT AND THE USER'S MANUAL WITH THE SALE DATE STAMP.

ACCEPTANCE CERTIFICATE

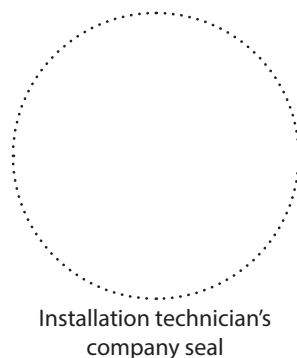
Product Type	The air duct heater with integrated temperature control unit or control unit
Model	NK _____ U
Serial number	
Manufacturing date	
<p>Is recognized as serviceable.</p> <p>The product complies with the requirements according to the EU norms and directives, to the relevant EU-Low Voltage Equipment Directives, EU-Directives on Electromagnetic Compatibility. We hereby declare that the following product complies with the essential protection requirements of Electromagnetic Council Directive 2004/108/EC, 89/336/EEC and Low Voltage Directive 2006/95/EC, 73/23/EEC and CE-marking Directive 93/68/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. This certificate is issued following test carried out on samples of the product referred to above. Assessment of compliance of the product with the requirements relating to electromagnetic compatibility was based on the following standards.</p>	
Quality Inspector's Stamp	

SELLER'S INFORMATION

Shop name	
Address	
Telephone	
E-mail	
Sales date	
<p>This is to certify delivery of the complete heater with the user's manual. The warranty terms are acknowledged and accepted.</p>	
Customer's signature	


MOUNTING CERTIFICATE

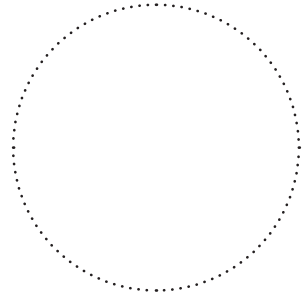
<p>The air duct heater with integrated temperature control unit or control unit NK _____ U has been connected to power mains pursuant to the requirements stated in the present user's manual.</p>	
Company name	
Address	
Telephone	
Installation technician's full name	
Installation date:	Signature:



<p>This is to certify that the works specific to the heater installation have been performed in accordance with all the applicable provisions of local and national construction, electrical and technical codes and standards. The heater operates normally as intended by the manufacturer.</p>
Signature:

WARRANTY CARD

Product type	Air duct heater with integrated temperature control unit
Model	NK _____ U
Serial number	
Manufacturing date	
Sales date	
Warranty period	
Sales company	



Seller's seal

