Thermonova

PROPANE R290 AIR TO WATER HEAT PUMPS

110 kW – 2.5 MW

We make it easy for you

The NOVA series is delivered directly from the factory, the crane in place, assembled and ready for operation.

We carefully plan every detail to achieve optimal comfort and operational reliability.

Thermonova

NOVA - the natural choice

NOVA 110-880 is an air/water heat pump series with propane gas as refrigerant (natural refrigerant R290).

The heat pump is built as a cascaded unit consisting of 1-8 units. independent compressors with associated frequency converter, condenser and evaporator. It is possible to optimize the system's supply temperature, heat output and COP with a hot gas exchanger and subcooler.

The cold side of the heat pump is designed with direct evaporation of refrigerant in the air-heat collector (DX).

The hot side of the heat pump can be supplied with series-connected condensers on the water side. This results in a higher COP.

Refrigerant

At Thermonova, we work hard to minimize the climate impact, but since leakage is always a small risk, the NOVA series cooling circuit is equipped with the natural refrigerant propane gas. The environmental impact of spills is negligible, and compared to a traditional synthetic refrigerant, it is as follows:

GWP factor (CO2 equivalent)

Natural refrigerant Propane gas (R290)

CO2 per kg refrigerant: 3 kg CO2

Synthetic refrigerant Fx R410A

CO2 per kg refrigerant: 2088 kg CO2

Propane has better thermodynamic properties than the synthetic alternatives R410A and R32, and with this a higher water temperature on the hot side and a higher COP can be achieved.

Compressor

The heat pump series is supplied with 1-8 pcs. 6-cylinder semi-hermetic suction gas-cooled compressors which are independently speed regulated as required.

Versatile compressor type with great advantages:

- Water temperature of 65 °C at -12 °C outside temperature
- Highest COP in its class
- Approved for propane gas

Evaporator

The heat pump is equipped with 2-16 pcs. evaporators with direct expansion of the refrigerant (DX) (two per compressor/refrigeration circuit). The evaporators have a total surface area facing the open air of 412 m2 per compressor, which helps ensure a min. temperature range between outside temperature and the refrigerant's evaporation temperature.

To reduce the risk of leakage, all copper pipes in the evaporator have been chosen with the greatest possible wall thickness, and to reduce the transition loss between outside air and coolant, the pipes are equipped with a unique internal groove, which provides the best possible heat contact between outside air and coolant.

Due to the Danish climate with high humidity during the heating season, great emphasis has been placed on reducing the energy requirement for the increased defrosting requirement.
The evaporator is therefore designed with an increased fin spacing (3 mm), which means that defrosting in critical situations must take place no more than once per operating hours.

The evaporator is designed as a light construction that, when defrosting, requires a minimum of energy for defrosting.

A unique control method between the evaporator's superheat on the refrigerant side and an interaction with the heat pump's subcooler means that the evaporator is partially overheated (low superheat). The method ensures that the surface area of the evaporator towards the outside is used in the best possible way for evaporating the refrigerant and thereby creates a higher COP.

Ventilators

The heat pump is equipped with 2-16 pcs. fans (2 per compressor/ refrigerant circuit)
The fan is regulated in terms of revolutions according to the cooling effect.
Total airflow max: 48,000 m3 /h per compressor
Awesome diameter: 1000 mm
Speed at max.; 570 rpm (at nom.)

Condenser

The condenser is a fully brazed hermetic plate heat exchanger with counter flow between refrigerant and water circuit.

The condenser is constructed with an asymmetric plate pattern with greater volume in the water circuit and reduced volume in the refrigerant circuit.
The asymmetric structure means that the pressure loss in the water circuit is greatly reduced and enables the system's condensers to be connected in series.

Hotgasvexes

The energy from the superheated coolant (80-100 °C) from the compressor's pressure line is separated via a hot gas exchanger and used to raise the heating system's supply temperature as the last link.

Overall, the energy from this will amount to 20-35 per cent. of the heat pump's total heating capacity.
Raising the supply temperature via the hot gas exchanger has no influence on the compressor's condensing temperature and therefore contributes to raising the heat pump's COP.

Subcooler

In order to increase the COP and ensure that the compressor's lubricant (oil) does not form a chemical connection with the refrigerant, a subcooler (heat exchanger) is mounted between the liquid line and the compressor's suction gas line.

The COP is raised partly by subcooling the liquid refrigerant before the evaporator's expansion valve - whereby an increased amount of energy can be absorbed in the evaporator - and partly by the subcooler being part of a unique regulation of the evaporator's overheating.

At the same time, the subcooler ensures sufficient overheating of the compressor's suction gas line, so that a chemical connection between coolant and lubricating oil does not occur.

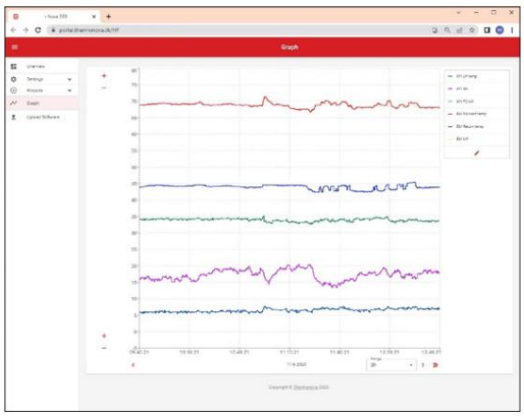
NOVA 440 on roof surface

Model		Nova 110	Nova 220	Nova 330	Nova 440
Performance					
Nominal COP (Ambient 7°C, Forward 45°C, Return 30°C)		3.73	3.93	4.01	4.04
Nominal heat capacity (Ambient 7°C, Forward 45°C, Return 30°C)	kW	98.0	193.6	289.8	384.9
Capacity range (min-max)	kW	45-110	45-220	45-330	45-440
ECO Design (per EN 14825:2018)					
Energy class		A++			
SCOP (low temperature application 35 °C)		4.19 (modules connected in parallel)			
SCOP (medium temperature application 55 °C)		3.68 (modules connected in parallel)			
Operating range					
Ambient temperature (air)	°C	-20 to 35[1]			
Forward temperature (heating circuit)	°C	35 to 70[2]			
1) at reduced compressor speed, 2) with sufficiently stable+low return temperature					
NOISE (at full capacity per EN 13487:2019)					
Sound power level (@ source)	dB(A)	81.6	84.6	86.4	87.6
Sound pressure level (@ 1m distance)	dB(A)	62.0	64.4	65.0	66.0
Sound pressure level (@ 3m distance)	dB(A)	52.5	55.5	57.2	58.5
Sound pressure level (@ 10m distance)	dB(A)	42.0	45.0	46.8	48
Dimensions and weight					
Length (not including electrical cabinet)	m	2.4	4.8	7.2	9.6
Width	m	1.54			
Height (without machine levelling shoes)	m	2.44			
Dry weight	kg	1,177	2,419	3,568	4,698
Refrigerant					
Type		R290 (propane)			
Global warming potential (GWP)		3			
CO2 equivalent	kg CO2e	24	48	72	96
Charge	kg	1x8	2x8	3x8	4x8
Electrical					
Supply	ph/V/Hz	3 / 400(+N+PE) / 50			
Supply connection (per pole max physical width)	mm	10 (cable pole)	30 M8 connector)	30 M8 connector)	30 M8 connector)
Fuse protection rating	A	63	150	200	250
Input power (max)	kW	38.4	76.8	115.3	153.7
Electric power meter (MID approved)		Included			
Heating circuit					
Forward and return connections 1) delivered with press crimp DN65 flange		1½" nipple	Ø76,1mm[1]	Ø76,1mm[1]	Ø76,1mm[1]
Nominal design flow	l/h	8,500	13,000	17,000	22,000
Largest allowed pressure drop	Bar	0,7	0,8	0,9	1,0
Minimum recommended buffer tank size	m³	1	2 (1x2)	3 (2x1.5)	4 (2x2)
Energy meter (MID approved)		Option			
Condensation drain					
Connection type		Polypropylene (PP)			
Connection size	mm	Ø40			
Flow volume (max), summer operation, full capacity	l/h	150	300	450	600
Flow volume (max), summer operation, full capacity	l/h	50	100	150	200
Communication					
Remote access		4G (SIM card included) or RJ45 option			
Modbus-RTU		RS485			
Main components and specs					
Compressors (semi-hermetic 6 cylinder)	pcs	1	2	3	4
Modulating frequency range	Hz	30-70			
Evaporator fin distance	mm	3.0			
Ventilators (EC technology)	pcs	2	4	6	8
Condenser plate heat exchangers	pcs	1	2	3	4
Hotgas plate heat exchangers	pcs	1	2	3	4
Subcooling plate heat exchangers	pcs	1	2	3	4
Ventilator - air volume	m³/h	48,000	96,000	144,000	192,000

Remote monitoring and data collection

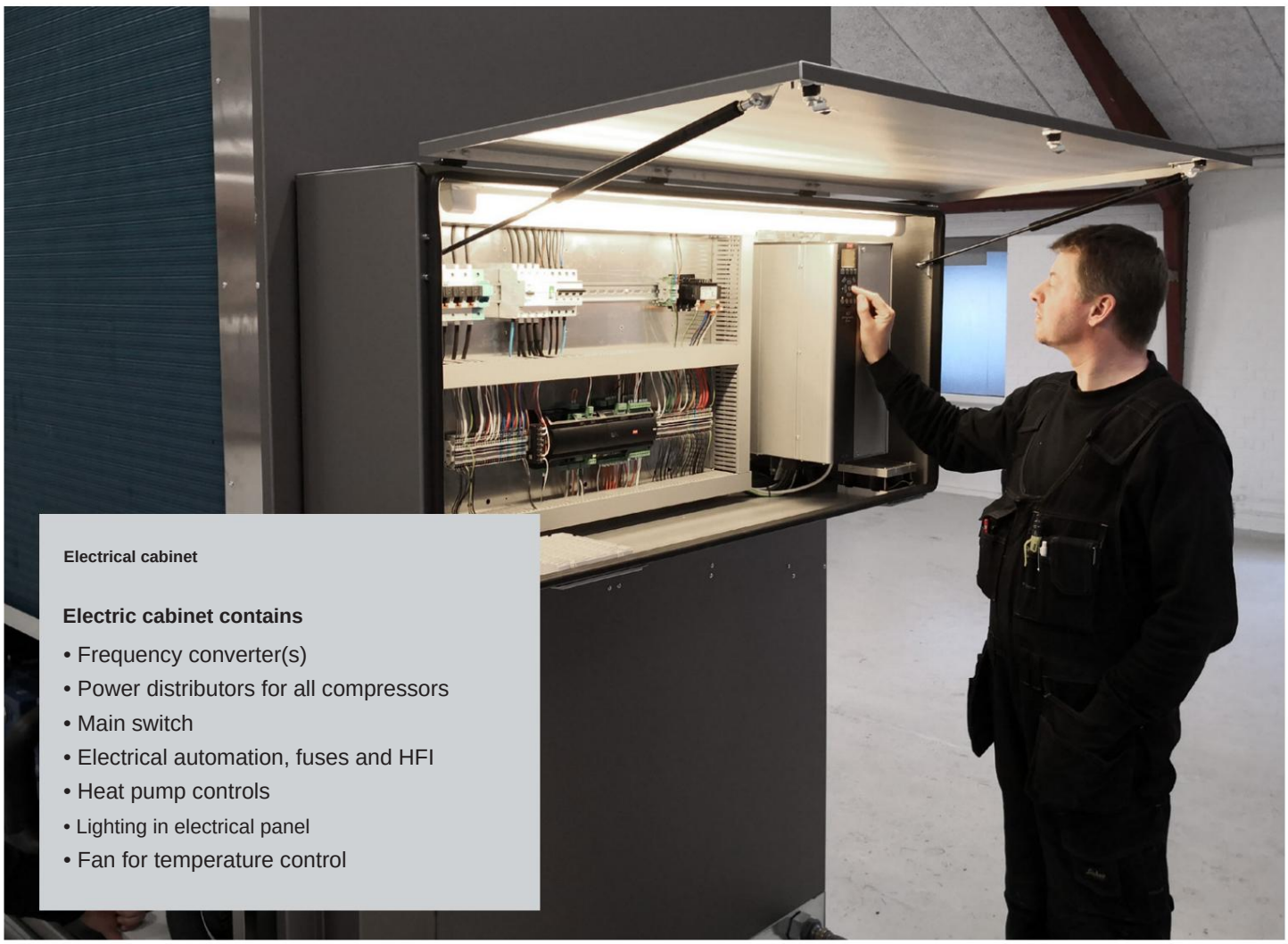
Platform for factory monitoring

- Monitoring from the factory
- Logging of a wide range of data
- Alarm and warning via e-mail and SMS
- Operating curves
- Remote control
- Remote software update



Data logging

The NOVA heat pump is equipped with a unique monitoring platform with data logging, which provides deep insight into how the heat pump works and performs. The platform provides additional security for competent and insightful support from the factory and local technicians.
The server and data service is performed with Amazon Web Services to achieve high reliability. The solution requires an Internet connection via built-in Gateway to Ethernet cable or 4G data connection.



Electrical cabinet

Electric cabinet contains

- Frequency converter(s)
- Power distributors for all compressors
- Main switch
- Electrical automation, fuses and HFI
- Heat pump controls
- Lighting in electrical panel
- Fan for temperature control

Thermonova

solar

Producer:

Thermonova A/S

Nordvestvej 4 | DK-9600 Aars | Denmark

info@thermonova.dk - thermonova.dk

Sales:

Solar Industrial Solution

Solar A/S

Industrivej Vest 43 | DK-6600 Vejen | Denmark

sis@solar.eu - solar.dk