

# Outline principle

F1345 docked with additional heat, accessories and hot water heater (floating condensing)

## Application

Buildings with water-borne heating systems.

## Alternative

### Heat pump

Quantity      Size (kw)

- 1 x
- 2 x
- 3 x
- 4 x

Select number of compressors that are permitted to charge hot water:(selecting compressor resets selecting pool)

Extra climate system

Ventilation recovery

Cooling

Collector

NOTE! This is an outline diagram. Actual installation must be designed according to applicable norms.  
See the appropriate "Installer manual" for more information.  
Designations according to standard IEC 81346-1 and 81346-2.

# Function

## Basic functions

### Heat production

F1345 is equipped with an outdoor temperature controlled heating control system. This means that the supply of heat to the house is regulated in accordance with the chosen setting of the regulating curve (curve slope and offset). After adjustment, the correct amount of heat for the outdoor temperature is supplied. The supply temperature of the heat pump will hover around the theoretically required value. For subnormal temperatures, the control system calculates a heating deficit in the form of "degree minutes", which means that heating production is accelerated. The larger the subnormal temperature, the greater the heat production.

Heat production can take place with one or several compressors.

### Hot water production

This function requires the VST 20 accessory.

If the water heater is docked to F1345 when there is a demand for hot water, the heat pump gives this priority and devotes half its output to hot water heating. Heating is produced by the second compressor in this mode. The maximum time for hot water charging can be adjusted in the menu system. After this, heating is produced by both compressors for the remaining period of time, before further hot water heating can take place.

With two or more compressors connected for hot water charging, these are connected and disconnected automatically by the control system as required. A reversing valve is required for each F1345 that is to charge hot water.

Hot water charging starts when the hot water sensor has fallen to the set start temperature. Hot water charging stops when the hot water temperature on the hot water sensor (BT6) has been reached.

For occasional higher demand for hot water, the "temporary lux" function can be used to raise the temperature for 3 – 12 hours (selected in the menu system).

### Brine pump

The brine pumps (40 or 60 kW have 1 brine pump) normally follow the operation of the heat pump. There is a special operating mode for continuous operation for 10 days, followed by return to normal mode (this may be used before stable circulation has been established).

### Room control

F1345 can be supplemented with a room sensor (BT50). The room sensor has up to three functions:

1. Show current room temperature in the heat pump's display.
2. Provides the option of changing the room temperature in °C.
3. Makes it possible to change/stabilise the room temperature.

Install the sensor in a neutral position where the set temperature is required. A suitable place is on a free inner wall in a hall approx. 1.5 m above the floor. It is important that the sensor is not prevented from measuring the correct room temperature by being located, for example, in a recess, between shelves, behind a curtain, above or

close to a heat source, in a draft from an external door or in direct sunlight. Closed radiator thermostats may also cause problems.

The heat pump operates without the sensor, but if one wishes to read off the accommodation's indoor temperature in F1345's display the sensor must be installed.

### External control (AUX input)

F1345 can to some degree be controlled using signals from external systems (for example DUC), connected to the three software controlled inputs (AUX inputs). However, the alarm and time conditions in F1345 override the external control.

The following functions can be controlled:

- Blocking of compressors -EP14 and -EP15
- Blocking additional heat
- Blocking heating
- Tariff blocking
- Activating temporary lux (extra hot water)
- External adjustment of supply temperature
- Forced control of the brine pump(s)
- Activating fan speed (requires accessory NIBE FLM)

All control signals must occur with potential-free relays.

### Step controlled additional heat

Heat pumps are not usually dimensioned to provide the entire heat output requirement, which is why additional output is necessary during cold days. The externally controlled additional heat (if connected) is automatically switched on (in different steps) if the output is not sufficient to reach the temperature levels requested by the control computer.

F1345 sends 230 V control signals for the additional heating, that is signals to control external relays, contactors etc, but not to supply them with power.

External step controlled additional heat can be controlled by up to three potential-free relays in the heat pump (3 step linear or 7 step binary). With the AXC 50 accessory, a further three potential-free relays are used for additional heat control, which then gives max 3+3 linear or 7+7 binary steps.

Step in occurs with at least 1 minute intervals and step outs with at least 3 second intervals.

### Master/Slave

Several heat pumps (F1345) can be interconnected by selecting one heat pump as master and the others as slaves.

The heat pump is always delivered as master and up to 8 slaves can be connected to it and supply up to 540 kW (with 9 x F1345 60 kW) in the same system. In systems with several heat pumps, each pump must have a unique name, only one heat pump can be "Master" and only one can be, for example, "Slave 5".

External temperature sensors and control signals must only be connected to the master, except for external control of the compressor module and reversing valve(s) (QN10), which can be connected to each heat pump.

### Software controlled output (AUX output)

It is possible to have an external connection through the relay function via a potential-free variable relay (max 2 A) on the X5 terminal block.

Optional functions for external connection:

- Indication of common alarm (preset at the factory).
- Controlling ground water pump.
- Cooling mode indication (only applies if cooling accessories are available).
- Control of circulation pump for hot water circulation.
- External circulation pump (for heating medium).

If any of the above is installed to terminal block X5, it must be selected in the control system.

The accessory board is required if two or more of the above functions are to be connected to terminal block X5 at the same time.

## Extended functions

### Pool

This function requires accessory POOL 40.

A reversing valve can be connected to control part, or all, of the heating medium supply to a pool exchanger. The reversing valve, or, if required – the reversing valves (however, with the same control signal), is/are installed on the heating medium circuit that normally goes to the radiator system. You determine in the control system how many compressors are permitted to work with pool heating. An external circulation pump (GP10) must be installed for pool operation.

During pool heating, the heating medium is circulated between the heat pump and the pool exchanger using the heat pump's internal circulation pumps.

The external circulation pump circulates the heating medium water in the climate system and the additional heat can be engaged as necessary, at the same time as the external supply temperature sensor continually meters the heating demand of the house.

Up to two different pool systems can be connected to F1345 and controlled individually, however, this requires two POOL 40-accessories.

### Extra climate system

This function requires the ECS 40/ECS 41 or AXC 50 accessory, if larger separate shunt valves are needed.

A shunt valve, flow and return line sensor and a circulation pump are connected to a second heating circuit with a lower temperature demand (e.g. under floor heating system). The temperature in the extra climate system is controlled by the heat pump and the shunt valve by offsetting the heating curve (each climate system has its own heating curve), room sensor or room unit.

Up to 3 extra climate systems can be connected to the heat pump.

### Hot water comfort

This function requires the AXC 50 accessory which allows temporary lux, mixer valve and hot water circulation (an AXC 50 for each accessory function that is to be used).

### Temporary lux (extra hot water)

If an immersion heater is installed in the tank, it can be used to raise the temperature of the hot water to a temperature that exceeds the working range of the heat pump. In addition, it can be permitted to produce

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hot water, at the same time as the heat pump prioritises heating.

### Mixer valve

A temperature sensor reads the temperature of the outgoing hot water to the domestic hot water and adjusts the mixer valve from the water heater until the set temperature has been reached.**Hot water circulation (VVC)**

One pump can be controlled for circulating the hot water during selectable periods.

### Cooling

For distribution of cooling to the climate system, the accessory AXC 50 is required.

### Passive cooling (4-pipe)

This function requires the AXC 50 accessory (an AXC 50 for each accessory function that is to be used).

The cooling system is connected to the heat pump brine circuit, through which cooling is supplied from the collector via the circulation pump and the shunt valve.

When cooling is required (activated from the outdoor temperature sensor and any room sensor), the reversing valve and the circulation pump are activated. The shunt valve regulates so that the cooling sensor reaches the current set point value corresponding to the outdoor temperature and the set min. value for the cooling temperature (to prevent condensation).

### Passive/active cooling (4-pipe)

This function requires a reversing valve for cooling, circulation pump, shunt valve and the ACS 45 accessory.

This function makes both heat and cooling production independently of each other possible.

The cooling system supplies cooling from the brine circuit using a circulation pump via a shunt valve.

Passive cooling occurs without the compressor running, while active cooling occurs when the compressor is running.

For the installation to work the heating medium must flow freely, for example using UKV.

Operating mode cooling is activated by the temperature of the outdoor temperature sensor and any room sensors or room units.

When cooling is required, the cooling reversing valve and the circulation pump are activated. The shunt regulates according to the cooling sensor and a cooling set point value that is determined by the selected cooling curve and offset. Degree minutes are calculated in response to the value on the brine out external temperature sensor and the cooling set point value. The degree minute value determines which cooling mode the installation is in, according to the menu settings.

### Groundwater pump

With the AXC 50 (one AXC 50 for each accessory function that is to be used), a ground water pump can be connected to the heat pump, if the software controlled output (AUX output) is used for something else.

This connection enables the use of ground water as heat source. The ground water is pumped up to an intermediate heat exchanger. An intermediate heat exchanger is used to protect the heat pump's exchanger from dirt and

freezing. The water is released into a buried filtration unit or a drilled well.

The ground water pump runs at the same time as the brine pump.

### Step controlled additional heat

With the AXC 50 accessory (one AXC 50 for each accessory function that is to be used), a further three potential-free relays are used for additional heat control, which then gives max 3+3 linear or 7+7 binary steps.

### Shunt controlled additional heat

With the AXC 50 accessory (one AXC 50 for each accessory function that is to be used), the shunt controlled additional heat can be connected to the heat pump.

This connection enables an external additional heater, e.g. an oil boiler, to aid with heating.

The heat pump controls a shunt valve and a circulation pump via AXC 50. If the heat pump does not manage to keep the correct supply temperature, the additional heat starts. When the boiler temperature has been increased to about 55 °C, the heat pump sends a signal to the shunt to open from the addition. The shunt adjusts so the true supply temperature corresponds with the control system's theoretical calculated set point value. When the heating requirement drops sufficiently so the additional heat is no longer required, the shunt closes completely. The boiler will be kept warm for a further 12 hours to be prepared for any increase in the heating requirement.

### Solar heating

With the Solar 42 accessory F1345 together with:

1. VPAS can be connected to obtain solar heating for hot water charging and heating of buildings.
2. VPB/heater for hot water charging via heat exchanger.

The heat pump prioritises charging from the solar panel.

### External circulation pump

With the AXC 50 accessory (one AXC 50 for each accessory function that is to be used), an external circulation pump (for the climate system) can be connected to the heat pump if the alarm relay (AUX output) is activated for another function.

The function is already included in the following accessory functions:

- Step controlled additional heat
- Shunt controlled additional heat
- Pool

### Exhaust air recovery

The NIBE FLM accessory is required for this function.

The integrated fan in NIBE FLM extracts the air from the wet areas of the house to the recovery unit. Here, the energy is transferred to the heat pump's brine, whereby the temperature increases and raises the heat pump's coefficient of performance. Energy is stored in the ground or rock collector even if the heat pump is not in operation, which fully utilises the exhaust air energy.

The heat pump capacity is not bound by the amount of air, but the output can be optimally adapted to suit the size of the house.

# List of Components

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Pos	Name	Specification	Manufacturer	Art no.	Remarks
<b>AZ1</b>	<b>Exhaust air system</b>				
AZ1	Exhaust air module	NIBE FLM	NIBE	067011	
RN40	Trim valve				
<b>AZ2</b>	<b>Exhaust air system</b>				
AZ1	Exhaust air module	NIBE FLM	NIBE	067011	
RN40	Trim valve				
<b>AZ3</b>	<b>Exhaust air system</b>				
AZ1	Exhaust air module	NIBE FLM	NIBE	067011	
RN40	Trim valve				
<b>CL11</b>	<b>Pool system</b>				
AA5	Accessory board		NIBE		Included in POOL 40 (RSK no. 624 66 78)
BT51	Temperature sensor		NIBE		Included in POOL 40 (RSK no. 624 66 78)
EP5	Exchanger				
GP9	Circulation pump				
HQ4	Particle filter				
QN19	Reversing valve		NIBE		Included in POOL 40 (RSK no. 624 66 78)
RN42	Trim valve				
<b>EB1</b>	<b>Electric heater system</b>				
AA5	Accessory board				
EB1	Electric heater				
FL10	Safety valve				
QM42-43	Shut-off valve				
RN11	Trim valve				Bypass valve when the electric heater cannot accept the whole flow.
<b>EB100</b>	<b>Heat pump system</b>	Master			
BT1	Temperature sensor, outdoor		NIBE		Included in F1345
BT6	Temperature sensor, hot water charging		NIBE		Included in F1345
BT25	Temperature sensor, heating medium supply, External		NIBE		Included in F1345
BT71	Temperature sensor, heating medium return, External		NIBE		Included in F1345
EB100	Heat pump	F1345	NIBE		
EP14	Cooling module A		NIBE		Included in F1345
EP15	Cooling module B		NIBE		Included in F1345
FL10-FL11	Safety valve, brine side				
FL12-FL13	Safety valve, heating medium side				
HQ12-HQ15	Particle filter		NIBE		Included in F1345
QM50- QM53	Shut-off valve, brine side				
QM54- QM57	Shut-off valve, heating medium side				
QN10	Reversing valve, heating/hot water	VST 20	NIBE	089388	Max recommended power, 40 kW
RM10- RM13	Non-return valve				
<b>EB101</b>	<b>Heat pump system</b>	Slave 1			
EB101	Heat pump	F1345	NIBE		
EP14	Cooling module A		NIBE		Included in F1345
EP15	Cooling module B		NIBE		Included in F1345

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Pos	Name	Specification	Manufacturer	Art no.	Remarks
FL10-FL11	Safety valve, brine side				
FL12-FL13	Safety valve, heating medium side				
GP16	Brine pump		NIBE		Included in F1345
HQ12-HQ15	Particle filter		NIBE		Included in F1345
QM50- QM53	Shut-off valve, brine side				
QM54- QM57	Shut-off valve, heating medium side				
RM10- RM13	Non-return valve				
<b>EB102</b>	<b>Heat pump system</b>	Slave 2			
EB102	Heat pump	F1345	NIBE		
EP14	Cooling module A		NIBE		Included in F1345
EP15	Cooling module B		NIBE		Included in F1345
FL10-FL11	Safety valve, brine side				
FL12-FL13	Safety valve, heating medium side				
GP16	Brine pump		NIBE		Included in F1345
HQ12-HQ15	Particle filter		NIBE		Included in F1345
QM50- QM53	Shut-off valve, brine side				
QM54- QM57	Shut-off valve, heating medium side				
RM10- RM13	Non-return valve				
<b>EB103</b>	<b>Heat pump system</b>	Slave 3			
EB103	Heat pump	F1345	NIBE		
EP14	Cooling module A		NIBE		Included in F1345
EP15	Cooling module B		NIBE		Included in F1345
FL10-FL11	Safety valve, brine side				
FL12-FL13	Safety valve, heating medium side				
GP16	Brine pump		NIBE		Included in F1345
HQ12-HQ15	Particle filter		NIBE		Included in F1345
QM50- QM53	Shut-off valve, brine side				
QM54- QM57	Shut-off valve, heating medium side				
RM10- RM13	Non-return valve				
<b>EM1</b>	<b>External addition</b>				
AA5	Accessory board	AXC 50	NIBE	067193	
BT52	Temp.sensor, Boiler				
EM1	Gas boiler				
FL10	Safety valve				
GP10	Circulation pump, heating medium external				
KA1	Auxiliary relay	HR10	NIBE	089423	
QN11	Shunt valve, addition				
RM42	Non-return valve				

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Pos	Name	Specification	Manufacturer	Art no.	Remarks
<b>EP1</b>	<b>Remote heating system</b>				
AA5	Accessory board				
BT52	Temperature sensor, boiler				
EP7	Exchanger, district heating				
QN11	Shunt valve, addition				
<b>EP12</b>	<b>Collector system, brine</b>				
AA5	Accessory board				
EP4	Heat exchanger, groundwater				
EP12	Collector, brine				
GP3	Circulation pump, groundwater				
HQ40	Particle filter				
<b>EP21</b>	<b>Climate system 2</b>				
AA5	Accessory board		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
BT2	Temperature sensor, heating medium supply		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
BT3	Temperature sensor, heating medium return		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
GP20	Circulation pump		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
QN25	Shunt valve		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
<b>EP22</b>	<b>Climate system 3</b>				
AA5	Accessory board		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
BT2	Temperature sensor, heating medium supply		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
BT3	Temperature sensor, heating medium return		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
GP20	Circulation pump		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
QN25	Shunt valve		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
<b>EP23</b>	<b>Climate system 4</b>				
AA5	Accessory board		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
BT2	Temperature sensor, heating medium supply		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
BT3	Temperature sensor, heating medium return		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
GP20	Circulation pump		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
QN25	Shunt valve		NIBE		Included in ECS 40/41 (RSK no. 624 66 77)
<b>EP25</b>	<b>Cooling system</b>				
BT2	Temperature sensor, heating medium supply		NIBE		
EP25	Fan coils		NIBE		
GP20	Circulation pump		NIBE		
QN25	Shunt valve		NIBE		
<b>EP30</b>	<b>Solar kit</b>				
AA5	Accessory board		NIBE		Included in SOLAR 42 (RSK no. 624 66 91)
BT53	Temperature sensor, solar panel		NIBE		Included in SOLAR 42 (RSK no. 624 66 91)
BT54	Temperature sensor, solar coil		NIBE		Included in SOLAR 42 (RSK no. 624 66 91)
EP8	Solar panel				
GP30	Pump station, solar				
CM5	Expansion vessel, solar				
FL4	Safety valve, solar				
GP4	Circulation pump				
QM43-45	Shut-off valve				

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Pos	Name	Specification	Manufacturer	Art no.	Remarks
RM3-4	Non-return valve				
<b>EQ1</b>	<b>Passive/active cooling 4-pipe</b>				
AA5	Accessory board	AXC 50	NIBE	067193	
BT57	Temperature sensor, collector				
BT64	Temperature sensor, supply line cooling				
BT75	Temperature sensor, supply line after heating dump				
CP21	Volume vessel	NIBE UKV	NIBE		UKV vessel must be condensation insulated.
EP24	Exchanger				
GP20	Circulation pump				
QN12	Reversing valve, cooling/heating				Rec runtime 30-120 secs.
QN18	Shunt valve, cooling				Rec runtime 60-120 secs.
QN36	Shunt valve, heating dump				Rec runtime 60-120 secs.
RM22	Non-return valve				
<b>EQ1</b>	<b>Passive cooling 4-pipe</b>				
AA5	Accessory board	ACS 45	NIBE	067195	
BT64	Temperature sensor, cooling supply line				
BT65	Temperature sensor, cooling return line				
EP13	Supply air battery				
GP13	Circulation pump, cooling				
QM40-41	Shut-off valve				
QN18	Shunt valve, cooling				
RM40	Non-return valve				
<b>QZ1</b>	<b>Hot water circulation</b>				
AA5	Accessory board	AXC 50	NIBE	067193	
BT70	Temperature sensor, hot water flow				
EB2	Immersion heater	IU	NIBE	3kW: 218009 6kW: 218011 9kW: 218003	
FQ1	Mixer valve, hot water				
GP11	Circulation pump, domestic hot water circulation				
KA1	Auxiliary relay	HR10	NIBE	089423	
RM23-24	Non-return valve				
RN20-21	Trim valve				
XD1	Connection box	K11	NIBE	18893	
	<b>Other</b>				
BP6	Manometer, brine side				
CP10-CP13	Accumulator tank	VPA/VPB/VPAS	NIBE		Note that the tank must be able to receive the heat pump charge effect. See the last page for a table of possible combinations of the NIBE range.
CP20	Volume vessel	UKV	NIBE		
CM1	Expansion vessel, heating medium side				
CM3	Expansion vessel, brine side				
EB10	Additional water heater				
EP12	Collector, brine side				
FL2	Safety valve, heating medium side				
FL3	Safety valve, brine		NIBE		Included in F1345

Pos	Name	Specification	Manufacturer	Art no.	Remarks
GP10	Circulation pump				
QM21	Vent valve, brine side				
QM33	Shut off valve, brine flow				
QM34	Shut off valve, brine return				
RM21	Non-return valve				
RN60-RN67	Trim valve				For Tichelman connection, RN64 to RN67 are withdrawn.
XL27-XL28	Connection, filling brine				

**Possible combinations of NIBE F1345 and NIBE’s range of accumulator tanks/heaters.**

- The heat transfer must be sufficient to obtain 53 °C hot water at 10 °C brine with one charging (65 °C heating medium max).
- Pressure drop over the charge coil (s) must not be greater than the brine pump has capacity for.
- Outputs of less than approx 5 kW / 500 l hot water volume are considered to give recharging times of > approx 5 hrs.

Size of heat pump	Quantity compressors	VPB 200	VPB 300	VPB 500	VPB 750-2	VPB 1000 <sup>1</sup>	VPB 1000 <sup>2</sup>	VPA 200/70	VPA 300/200	VPA 450/300	VPAS 300/450
24	1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
24	2	-	-	at least 2 pcs	at least 2 pcs	OK	at least 2 pcs	-	-	-	-
30	1	at least 2 pcs	at least 2 pcs	OK	OK	OK	OK	at least 2 pcs	OK	OK	OK
30	2	-	-	at least 2 pcs	at least 2 pcs	OK	at least 2 pcs	-	-	-	-
40	1	-	-	at least 2 pcs	OK	OK	-	at least 2 pcs	at least 2 pcs	OK	OK
40	2	-	-	-	-	at least 2 pcs	at least 3 pcs	-	-	at least 2 pcs	at least 2 pcs
60	1	-	-	at least 2 pcs	at least 2 pcs	OK	-	-	at least 2 pcs	at least 2 pcs	at least 2 pcs
60	2	-	-	-	-	at least 2 pcs	at least 4 pcs	-	-	at least 3 pcs	-

1) Parallel connected charge coils

2) Serially connected charge coils