Outline principle

F1145/1245/1345 Master/Slave with additional heat, accessories and hot water heater (floating condensing).

Application

Buildings with water-borne heating systems.

Alternative

Heat pump

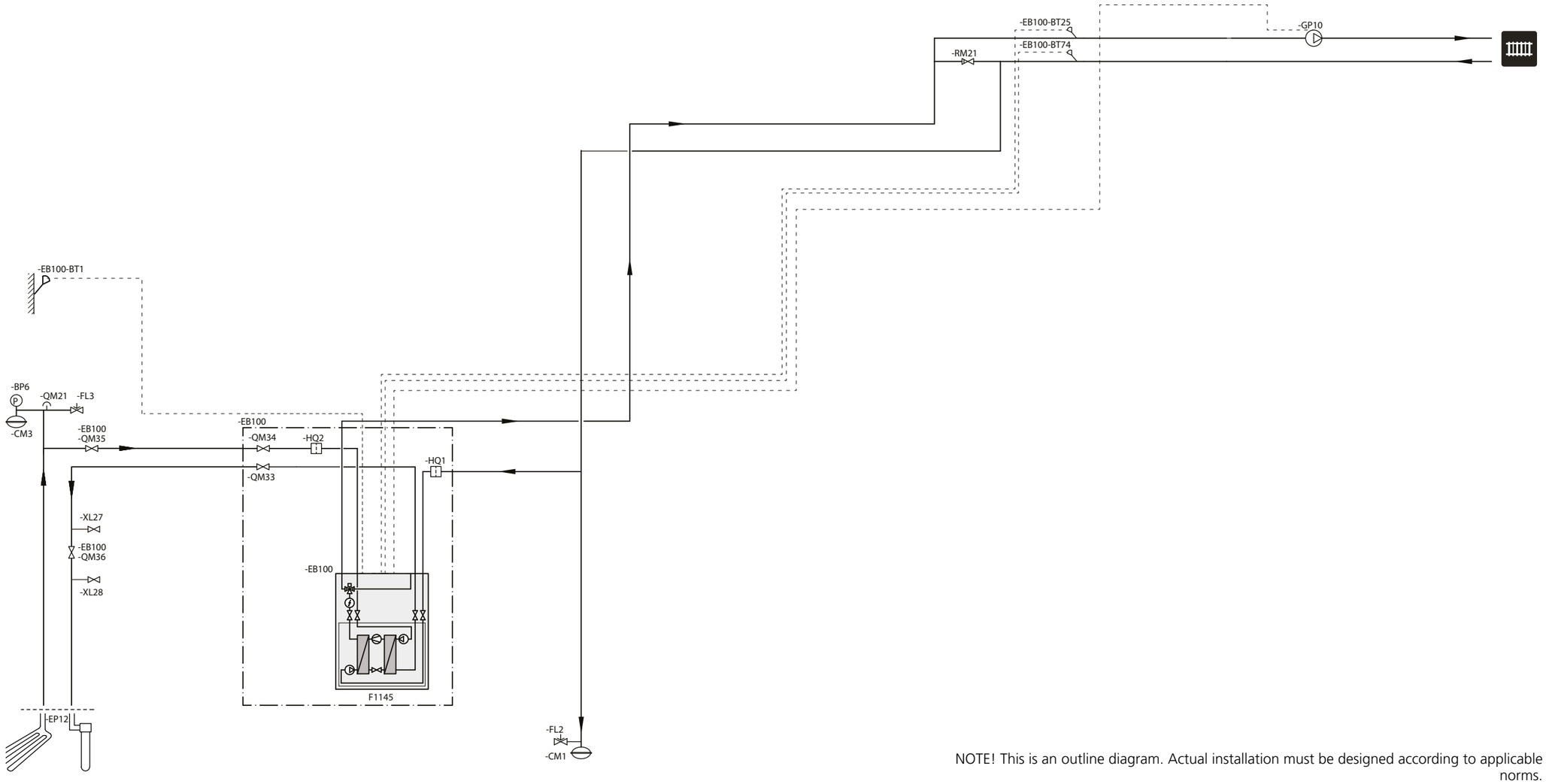
3 ☐ F1145 ☐ F1345 24/30 ☐ F1345 40/60
2 ☐ F1145 ☐ F1345 24/30 ☐ F1345 40/60
1 ☑ F1145 ☐ F1245

☐ **Hot water charging**
- 1 x ☐ VPB
- 2 x ☐ VPB
- ☐ Additional water heater
- ☐ Hot water comfort with additional water heater

☐ **Extra additional heat**
- ☐ Electric boiler (step controlled)
- ☐ Combustion boiler (shunt controlled)
- ☐ District heating (shunt controlled)

☐ **Extra climate system**

☐ **UKV - Buffer vessel**
- ☐ 2 pipe, Low tempered unbalanced low flow
- ☐ 2 pipe, High tempered low flow
- ☐ 3-pipe, High tempered



NOTE! This is an outline diagram. Actual installation must be designed according to applicable norms.

See the relevant "Installer manual" for more information.
Designations according to standard IEC 81346-1 and 81346-2.

Start again

Operating modes

Heat production

Master/Slave

Several heat pumps (F1145, F1245 and F1345) can be connected 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 3".

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) that can be connected to each heat pump.

F1145/F1245/F1345

F1145/F1245/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 hunt 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

F1145

If the water heater is docked to F1145 when there is a demand for hot water, the heat pump gives this priority and devotes its entire output to hot water heating. No room heat is produced in this mode. Maximum time for hot water charging can be adjusted in the menu system. 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). Periodic hot water increase is factory set to every 14 days.

F1245

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). Periodic hot water increase is factory set to every 14 days.

Functions/accessories

Heat pump

The entire compressor output is routed to heating or hot water. Compressors step in if needed. If the output of all available compressors is not sufficient, additional heat engages automatically.

AUX inputs

F1145 and F1245 have software controlled inputs for connecting the switch function or sensor. This means that when an external switch function or sensor is connected to one of five AUX connections, the correct function must be selected for the correct connection. For further information see the Installer manual.

The following functions can be controlled:

- Temperature sensor, hot water top
- Temperature sensor, cooling/heating
- Blocking of additional heat and/or compressor
- Blocking heat
- Tariff blocking
- Switch for "SG ready"
- Forced control of brine pump
- Activating temporary lux (extra hot water)
- External adjustment of supply temperature
- Activating fan speed (requires accessory NIBE FLM)
- NV 10, pressure/level/flow monitor brine

All control signals should occur with potential-free relays.

AUX outputs

It is possible to have an external connection through the relay function

via a potential-free variable relay (max 2

A) on the input board (AA3), terminal block X7.

Optional functions for external connection:

• Indication of common alarm (preselected 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).

•External reversing valve for hot water.

If any of the above is installed to terminal block X7 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.

External electric additional heat heating

With the AXC 40 accessory (an AXC 40 for each accessory function that is to be used) a further three potential-free relays are used for addition control, which then gives max 3+3 linear or 7+7 binary steps. The externally controlled additional heat is automatically switched on (in different steps) if the output is not sufficient to reach the temperature levels requested by the control computer. F1145 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. Step in occurs with at least 1 minute interval and step outs with at least 3 seconds interval.

Oil addition

With the AXC 40 accessory (an AXC 40 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 assist with heating. The heat pump controls a shunt valve and a circulation pump

via AXC 40. 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 that 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.

District heating addition

With the AXC 40 accessory (an AXC 40 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. district heating, to assist with heating. The heat pump controls a shunt valve and a circulation pump via AXC 40. If the heat pump does not manage to keep the correct supply temperature, the additional heat starts. 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 that additional heat is no longer required, the shunt closes completely.

Hot water circulation (HWC)

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

Extra climate system

This function requires the ECS 40/ECS 41 or AXC 30 or AXC 40 accessory if larger separate shunt valves are needed.

A shunt valve, supply 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 control module.

List of Components

F1145/1245/1345 Master/Slave with additional heat, accessories and hot water heater (floating condensing).

Pos	Name	Specification	Manufacturer	Art no.	Remarks
EB100	**Heat pump system 1**	Master			
BT1	Temp.sensor, Outdoor		NIBE		Included in F1145/F1245.
BT6	Temp.sensor, hot water charging		NIBE		Included in F1145/F1245.
BT7	Temp.sensor, hot water charging		NIBE		Included in F1145/F1245.
BT25	Temp.sensor				
BT74	Temp.sensor				
EB100	Heat pump	F1145/F1245	NIBE		
HQ1-HQ2	Particle filter HM		NIBE		Included in F1145/F1245.
QM33	Shut off valve, HM-r				
QM34	Shut off valve, HTF-f				
QM35	Shut off valve, HTF-f				
QM36	Shut off valve, HTF-r				
EB101	**Heat pump system 2**	Slave 1			
EB101	Heat pump	F1145/F1345	NIBE		
EP14	Cooling module A		NIBE		Included in F1345
EP15	Cooling module B		NIBE		Included in F1345
FL10	Safety valve, brine side				
FL12	Safety valve, heating medium side				
GP16	Brine pump		NIBE		Included in F1345
HQ12-HQ15	Particle filter		NIBE		Included in F1345
QM50-QM51	Shut-off valve, brine side				
QM52-QM53	Shut-off valve, heating medium side				
RM10-RM13	Non-return valve				
EB102	**Heat pump system 3**	Slave 2			
EB102	Heat pump	F1145/F1345	NIBE		
EP14	Cooling module A		NIBE		Included in F1345
EP15	Cooling module B		NIBE		Included in F1345
FL10	Safety valve, brine side				
FL12	Safety valve, heating medium side				
GP16	Brine pump		NIBE		Included in F1345
HQ12-HQ15	Particle filter		NIBE		Included in F1345
QM50-QM51	Shut-off valve, brine side				
QM52-QM53	Shut-off valve, heating medium side				
RM10-RM13	Non-return valve				
EB1	**Electric heater system**				
AA25	Unit box with accessory board	AXC 50	NIBE	067193	
EB1	Electric heater				
FL10	Safety valve				
QM42-43	Shut-off valve				
RN11	Trim valve				

Pos	Name	Specification	Manufacturer	Art no.	Remarks
EM1	**External addition**				
AA25	Unit box with accessory board	AXC 50	NIBE	067193	
BT52	Temp.sensor, Boiler				
EM1	Gas boiler/Oil boiler				
FL10	Safety valve				
GP10	Circulation pump, heating medium external				
KA1	Auxiliary relay	HR10	NIBE	089423	
QN11	Shunt valve, addition				
RM42	Non-return valve				
EP1	**Remote heating system**				
AA25	Unit box with accessory board				
BT52	Temperature sensor, boiler				
EP7	Exchanger, district heating				
QN11	Shunt valve, addition				
EP21	**Climate system 2**				
AA25	Unit box with 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)
QZ1	**Hot water circulation**				
AA25	Unit box with 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, hot water circulation				
KA1	Auxiliary relay	HR10	NIBE	089423	
RM23-24	Non-return valve				
RN20-21	Trim valve				
XD1	Connection box	K11	NIBE	018893	
	Other				
BP6	Manometer, HTF				
CM1	Expansion vessel, closed, HM				
CM2	Level vessel HTF		NIBE		Level vessel at open system. Level vessel included in F1145/F1245.
CM3	Expansion vessel HTF				Expansion vessel at closed system.
CP10-CP11	Accumulator tank	VPB	NIBE		Note that the tank must be able to accept the heat pump charge output. See the last page for a table of possible combinations of the NIBE range.
CP20	Volume vessel	UKV	NIBE		
EB10	Additional water heater				
EP12	Collector, HTF				
FL2	Safety valve, HM				
FL3	Valve, Safety, HTF		NIBE		Included in F1145/F1245.
GP10	Circulation pump, heating medium after UKV				

Pos	Name	Specification	Manufacturer	Art no.	Remarks
QM12	Filling valve, HTF				
QM21	Vent valve, HTF				
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 the NIBE 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[1]	VPB 1000[2]	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