

Outline principle

SMO 40 with heat pump, hot water, additional heat and accessory (liquid condensation).

Application

Buildings with water-borne heating systems.

Alternatives

Additional heating before QN10

Accessories

NOTE! This is an outline diagram. Actual installation must be engineered according to current standards.

NOTE! NIBE does not supply all components in this outline diagram.

See the appropriate "Installer manual"/"Installation and Maintenance Instructions" for more information.

Designations according to standard IEC 81346-1 and 81346-2.

Function

SMO 40 with heat pump, hot water, additional heat and accessory (liquid condensation).

Basic functions

Heat production

SMO 40 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 is supplied to meet the house demand at the present outside temperature. For heat production, the control system calculates a heating deficit in the form of "degree-minutes" which means that the engagement of heating production is accelerated the larger the subnormal temperature in question. To obtain a system that compensates faster the supplied room sensor should be installed.

Hot water production

During hot water production SMO 40 goes to hot water mode. No room heat is produced in this mode. Maximum time for hot water charging can be adjusted in the menu system. After this, heating is produced for the remaining period of time before further water heating can take place.

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 to 12 hours (selected in the menu system).

Cooling production

If a heat pump with cooling functionality is connected to SMO 40, cooling can be produced to two different levels.

Without accessories, high-temperature cooling to a minimum temperature of +18 °C can be produced.

By connecting the accessory AXC 30, flow temperatures down to +7 °C can be obtained. A cooling system is connected to the heat pump's flow line via a reversing valve.

Heat pump

F2025/F2026/F2030/F2040/F2120/F2300 can be connected to SMO 40.

The heat pump supplies the house with heating. When the heating demand exceeds the heat pump capacity the additional heat is engaged as additional heating (connected to SMO 40).

Room control

SMO 40 is supplied with a room sensor (BT50).

The room temperature sensor has up to three functions:

1. Show current room temperature in the control module display.
2. 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 can also cause problems.

The installation operates without the sensor, but if one wishes to read off the accommodation's indoor temperature in the SMO 40 display, the sensor must be installed.

Step controlled additional heat

Heat pump installations that are not dimensioned to provide the entire heat output requirement re-

quire additional output during cold days. The step 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.

SMO 40 can provide up to 230 V control signals for the additional heating, i.e. signals to control external relays, contactors etc, but not to supply them with power.

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).

Step in occurs with at least 1 minute interval and step outs with at least 3 seconds interval.

Shunt controlled additional heat

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

SMO 40 controls a shunt valve and a circulation pump. If the heat pump does not manage to maintain the correct supply temperature, the addition starts. When the boiler temperature has been increased to about 55°C, the control module sends a signal to the shunt valve to open from the addition. The shunt adjusts so the true flow 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.

External control (AUX-input)

SMO 40 can to some degree control the installation using signals from external systems (for example DUC) connected to the three software controlled inputs (AUX inputs). However, the alarm and time conditions in SMO 40 override the external control.

The following functions can be controlled:

- Blocking the compressor in heat pump
- Blocking additional heat
- Blocking heating
- Tariff blocking
- Activating temporary lux (extra hot water)
- External adjustment of flow temperature

All control signals should occur with potential-free relays.

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 terminal block AA2-X4.

Optional functions for external connection:

- Indication of buzzer alarm signal (preselected at the factory).
- Control of external circulation pump.
- Control of circulation pump for hot water circulation.

If any of the above is installed to terminal block AA2:X4 it must be selected in the control system.

Function

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Extended functions

SMO 40 contains an accessory board, which can be used for the following extended functions. If more than one of the functions is used, either the relevant accessory or accessory AXC 30 (an AXC 30 for each accessory function that is to be used) is required.

Hot water circulation (VVC)

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

Step controlled additional heat

With the AXC 30 accessory a further three potential free relays are used for addition control, which then gives max 3+3 linear or 7+7 binary steps.

Shunt controlled additional heating

Shunt controlled addition can also be connected to the control module via accessory AXC 30.

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

Pool

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

A three-way valve can be connected to control part, or all, of the heating medium flow to a pool exchanger. The three way valve, or, if required – the three way valves (however, with the same control signal), is/are installed on the heating medium circuit that goes to the radiator system as normal. You determine in the control system how many compressors are permitted to work with pool heating. 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 heat-

ing medium water in the climate systems and the additional heat can be engaged as necessary at the same time as the external flow sensor continually meters the heating demand of the house.

Up to two different pool systems can be connected to SMO 40 and controlled individually, it does however require two POOL 40 accessories.

Extra climate system

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

A shunt valve, flow and return 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 heat curve (each climate system has its own heat curve), room sensor or room unit.

Up to 3 extra climate systems can be connected to the control module.

List of Components

SMO 40 with heat pump, hot water, additional heat and accessory (liquid condensation).

| Pos | Name | Product name | Supplier | Art no. | Remarks |
|--------------|---|--|----------|--|--|
| AA25 | Control module | SMO 40 | NIBE | 067 225 | |
| BT1 | Outdoor sensor | | NIBE | | Included in SMO 40 |
| BT6 | Temperature sensor, hot water charging | | NIBE | | Included in SMO 40 |
| BT7 | Temperature sensor, hot water top | | NIBE | | Included in SMO 40 |
| BT25 | Temperature sensor, external supply | | NIBE | | Included in SMO 40 |
| BT50 | Room sensor | | NIBE | | Included in SMO 40 |
| BT63 | Temperature sensor, external supply line after "additional heating before QN10" | | NIBE | | Included in SMO 40 |
| BT71 | Temperature sensor, external return line | | NIBE | | Included in SMO 40 |
| GP10 | Circulation pump, heating medium | | | | |
| QN10 | Reversing valve, hot water/heating medium | VST 05/ VST 11/VST 20 | NIBE | 089 982 /089 152 / 089 388 | |
| CL11 | Pool system 1 | | - | | |
| AA25 | Unit box | POOL 40 | NIBE | 067 062 | |
| BT51 | Temperature sensor, pool | POOL 40 | NIBE | 067 062 | |
| EP5 | Heat exchanger, pool | | | | |
| GP9 | Circulation pump, pool | | | | |
| HQ4 | Particle filter | | | | |
| QN19 | Reversing valve, pool | POOL 40 | NIBE | 067 062 | |
| RN10 | Trim valve | | - | | |
| EB1 | Additional heat | | | | |
| EB1 | Electric heater | ELK 15/ELK 26/ELK 42 | NIBE | 069 022/ 067 074/ 067 075 | |
| KA1 | Auxiliary relay/Contactor | HR 10 | NIBE | 067 309 | |
| EB20 | Immersion heater | | | | |
| EB20 | Immersion heater | IU (immersion heater) + K11 (terminal block) | NIBE | IU 3kW: 218 009 IU 6kW: 218 011 IU 9kW: 218 003 K11: 188 93 | |
| KA1 | Auxiliary relay/Contactor | HR 10 | NIBE | 067 309 | |
| EB101 | Heat pump system | | | | |
| BT3 | Temperature sensor, return line | | NIBE | | Included in F2025/F2026/F2030/F2040/F2120/F2300 |
| BT12 | Temperature sensor, condenser supply line | | NIBE | | Included in F2025/F2026/F2030/F2040/F2120/F2300 |
| EB101 | Heat pump | F2025/F2026/F2030/F2040/F2120/F2300 | NIBE | | F2025/F2026/F2300: The software must be 55 or later. |
| GP12 | Charge pump | CPD 11 | NIBE | (CPD 11-25/65: 067 321 CPD 11-25/75: 067 320 | |
| HQ1 | Particle filter | | NIBE | | Included in F2025/F2026/F2030/F2040/F2120/F2300 |
| QM1 | Drain valve, heating medium | | | | |
| QM31 to 32, | Shut-off valve | | | | |
| QM43 | | | | | |
| RN10 | Trim valve | | | | |

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| Pos | Name | Product name | Supplier | Art no. | Remarks |
|--------------------------|--|---------------------|-----------------|------------------------------------|---|
| EM1 | External addition | | | | Certain boilers have their own circulation pumps, if not they must be equipped with a flow guard. |
| AA25 | Unit box | AXC 30 | NIBE | 067 304 | |
| BT52 | Temperature sensor, boiler | AXC 30 | NIBE | 067 304 | |
| CM1 | Expansion vessel, closed | | | | |
| EM1 | Oil, gas, pellets or wood boiler | | | | |
| FL2 | Safety valve | | | | |
| KA1 | Auxiliary relay/Contactor | HR 10 | NIBE | 067 309 | |
| QN11 | Shunt valve | | | | |
| EP21 | Extra climate system | | | | |
| AA25 | Unit box | ECS 40/ECS 41 | NIBE | 067 287/067 288 | |
| BT2 | Temperature sensor, heating medium supply | ECS 40/ECS 41 | NIBE | 067 287/067 288 | |
| BT3 | Temperature sensor, heating medium return | ECS 40/ECS 41 | NIBE | 067 287/067 288 | |
| GP20 | Circulation pump | ECS 40/ECS 41 | NIBE | 067 287/067 288 | |
| QN25 | Shunt valve | ECS 40/ECS 41 | NIBE | 067 287/067 288 | |
| QZ1 | Hot water circulation | | | | |
| GP11 | Circulation pump | | | | |
| EQ1 | Active cooling module AXC 30 (4-pipe) | | | | |
| AA25 | Unit box | Included in AXC 30 | NIBE | 067 304 | |
| BT64 | Temperature sensor, cooling, flow line | Included in AXC 30 | NIBE | | |
| CP21 | Single jacket accumulator tank, cooling | | | | |
| GP13 | Circulation pump, cooling | | | | |
| QN12 | Reversing valve cooling/heating | VCC05/VCC11 | | VCC 05: 067 311 VCC 11: 067 312 | |
| Other information | | | | | |
| CM1 | Expansion vessel, closed | | | | |
| CP5 | Buffer vessel, UKV | | | | |
| CP10 | Accumulator tank with hot water heating | 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 NIBE's range. |
| EB10 | Additional water heater | | | | |
| FL2 | Safety valve, Heating medium | | | | |

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System solutions

The following combinations of products are recommended for control with SMO 40.

| Control module | Air/water heat pump | Accumulator with hot water heater | Circ. pump | Water heater | HW Control | Addition | Volume vessel |
|----------------|---------------------|--|------------------------------|--|----------------------------|------------------|--|
| SMO 40 | F2030 – 7 kW | VPA 300/200 VPA 450/300 VPAS 300/450 | CPD 11-25/65 CPD 11-25/75 | VPB 200 VPB 300 VPBS 300 VPB 500 VPB 750-2 | VST 11 | ELK 15 ELK 26 | UKV 100 UKV 200 UKV 300 UKV 500 |
| | F2030 – 9 kW | | | | | | |
| | F2040/F2120 – 8 kW | | | | | | |
| | F2040/F2120 – 12 kW | | | | | | |
| | F2040/F2120 – 16 kW | | | | | | |
| | F2300 – 14 kW | VPA 450/300 VPAS 300/450 | | VPB 500 VPB 750-2 VPB 1000 | VST 20 VST 11 VST 20 | | |
| | F2300 – 20 kW | | | VPB 750-2 VPB 1000 | VST 20 | | |