

## Outline principle

The SMO 40 with multiple air/water heat pumps, additional heat and accessory (liquid condensation)

### Application

Buildings with water-borne heating systems.

### Alternative

Start by selecting the number of heat pumps.

NOTE! When selecting a different number of heat pumps, click "start again" and "reset" at the bottom of this page.

Number of slaves:

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

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## Operating modes

### Heat production

The heating control system on the SMO 40 is controlled by the outdoor temperature. This means that the supply of heat to the house is regulated in accordance with the setting chosen for the regulating curve (curve slope and offset). After adjustment, the correct amount of heat for the outdoor temperature is supplied. The SMO 40's supply temperature will hover around the 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. The internal immersion heater is connected automatically when the energy requirement exceeds the heat pumps' capacity.

### Hot water production

During hot water demand, the SMO 40 prioritises the heat pumps that are selected for hot water production. 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.

### Cooling production

If a heat pump with cooling function is connected to the SMO 40, active cooling can be produced at two different levels.

Without an accessory, high temperature cooling down to a minimum temperature of +18 °C can be produced.

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

## Functions/accessories

### Heat pumps

Heat pumps with on/off compressors.

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

Heat pumps with inverter compressor. The compressor output is adjusted according to the demand and routed to heating, hot water or pool heating or cooling, where applicable. Compressors step in if needed. If the output of all available compressors is not sufficient, additional heat engages automatically.

### MASTER/SLAVE

Up to 8 heat pumps can be connected together. In systems with several heat pumps, each pump must have a unique number. Heat pumps with on/off compressors cannot be combined with heat pumps with inverter compressors in the same system. The heat pump with the lowest max supply and return line temperature sets the level for the whole installation.

### AUX inputs

The SMO 40 has 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 six 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:

- Blocking of additional heat and/or compressor
- Tariff blocking
- Activating temporary lux (extra hot water)
- External adjustment of the supply temperature
- Switch for "SG ready"

All control signals must be made 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 (preset at the factory).
- Control of circulation pump for hot water circulation.
- External circulation pump (for heating medium).
- External alarm (NO/NC).
- Blocking heating.
- Cooling mode indication.
- Active cooling (4-pipe)

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.

### Accessories

The SMO 40 is equipped with an accessory board, that can be used for any accessory, for example POOL 40 or AXC 30.

### Room control

The SMO 40 can be supplemented with a room sensor (BT50).

The room sensor has up to three functions:

- Show current room temperature in the heat pump's display.
- Provides the option of changing the room temperature in °C.
- 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 you want to read the accommodation's indoor temperature off the SMO 40 display, the sensor must be installed.

### Extra climate system

This function requires the accessory ECS 40/ECS 41. 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 7 extra climate systems can be connected to SMO 40.

### Pool

This function requires the accessory POOL 40. A reversing valve can be connected to control all of the charge flow from the heat pump(s) to a pool exchanger.

The SMO 40 can control 2 pools; 2 x POOL 40 accessories are then required.

The Pool 40 has a max charge power of 15kW

### External additional heat

Step controlled additional heat

With the AXC 30 accessory (one AXC 30 for each accessory function that is to be used) a further three potential-free relays can be used for additional control.

Shunt controlled additional heat

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 the AXC 30.

### Hot water comfort

This function requires accessory AXC 30, which allows temporary lux, mixer valve and hot water circulation.

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 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.

### Solar

This function requires the accessory Solar 40/42 as well as a pump station. The solar panel can be used to heat the hot water.

# List of Components

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Pos	Name	Product name	Supplier	RSK no.	Remarks
AA25	Control module	SMO 40	NIBE	625 10 07	
BT1	Outdoor temperature sensor		NIBE		Included in the SMO 40
BT6	Temperature sensor, hot water charging		NIBE		Included in the SMO 40
BT7	Temperature sensor, hot water top		NIBE		Included in the SMO 40
BT25	Temperature sensor, external supply		NIBE		Included in the SMO 40
BT50	Room sensor		NIBE		Included in the SMO 40
BT63	Temperature sensor, external supply line after "additional heating before QN10"		NIBE		Included in the SMO 40
BT71	Temperature sensor, external return line		NIBE		Included in the SMO 40
GP10	Circulation pump, heating medium				
QN10	Reversing valve, hot water/heating medium	VST 11/VST 20	NIBE	624 65 63 / 624 65 23	
CL11	Pool system 1		-		Charge power max 15 kW
AA25	Unit box	POOL 40	NIBE	624 66 78	
BT51	Temperature sensor, pool	POOL 40	NIBE	624 66 78	
EP5	Heat exchanger, pool		Pahléns fabriker		Tel: +46 (0) 8 - 59 41 10 50
GP9	Circulation pump, pool		Pahléns fabriker		Tel: +46 (0) 8 - 59 41 10 50
HQ4	Particle filter		Pahléns fabriker		Tel: +46 (0) 8 - 59 41 10 50
QN19	Reversing valve, pool	POOL 40	NIBE	624 66 78	
RN10	Trim valve		-		
EB1	Additional heat				
EB1	Electric heater	ELK 15/ELK 26/ELK 42	NIBE	624 07 87/ 624 07 88/ 624 07 89	
KA1	Auxiliary relay/Contactor	HR 10	NIBE	624 67 79	
EB20	Immersion heater				
EB20	Immersion heater	IU (immersion heater) + K11 (terminal block)	NIBE	IU 3kW: 695 20 30 IU 6kW: 695 20 71 IU 9kW: 695 20 97 K11: 695 22 38 624 67 79	
KA1	Auxiliary relay/Contactor	HR 10	NIBE		
EB101	Heat pump system				
BT3	Temperature sensor, return line		NIBE		Included in F2025/F2026//F2030/F2040/F2300
BT12	Temperature sensor, condenser supply line		NIBE		Included in F2025/F2026//F2030/F2040/F2300
EB101	Heat pump	F2025/F2026//F2030/F2040/F2300	NIBE		F2025/F2026/F2300: The software must be 55 or later.
GP12	Charge pump	CPD 11	NIBE	(CPD 11-25/65: 624 72 48 CPD 11-25/75: 624 72 49	
HQ1	Particle filter		NIBE		Included in F2025/F2026//F2030/F2040/F2300
QM1	Drain valve, heating medium				
QM31 to 32, QM43	Shut-off valve				
RN10	Trim valve				
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	624 71 25	
BT52	Temperature sensor, boiler	AXC 30	NIBE	624 71 25	
CM1	Expansion vessel, closed				
EM1	Oil, gas, pellets or wood boiler				
FL2	Safety valve				
KA1	Auxiliary relay/Contactor	HR 10	NIBE	624 67 79	
QN11	Shunt valve				
EP21	Extra climate system				
AA25	Unit box	ECS 40/ECS 41	NIBE	624 74 93/624 74 94	
BT2	Temperature sensor, heating medium supply	ECS 40/ECS 41	NIBE	624 74 93/624 74 94	
BT3	Temperature sensor, heating medium return	ECS 40/ECS 41	NIBE	624 74 93/624 74 94	
GP20	Circulation pump	ECS 40/ECS 41	NIBE	624 74 93/624 74 94	

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Pos	Name	Product name	Supplier	RSK no.	Remarks
QN25	Shunt valve	ECS 40/ECS 41	NIBE	624 74 93/624 74 94	
QZ1	Hot water circulation				
GP11	Circulation pump				
EQ1	Active cooling module AXC 30 (4 pipe)				
AA25	Unit box	Included in AXC 30	NIBE	624 71 25	
BT64	Temperature sensor, cooling, supply line	Included in AXC 30	NIBE		
CP21	Single jacket accumulator tank, cooling	UKV 200	NIBE	686 19 41	Cooling accumulator
		UKV 300	NIBE	686 19 42	Cooling accumulator
GP13	Circulation pump, cooling				
QN12	Reversing valve cooling/heating	VCC05/VCC11		VCC05: 624 71 03 VCC11: 624 71 04	
Other					
CM1	Expansion vessel, closed				
CP5	Buffer vessel, UKV	UKV 100		686 19 36	
		UKV 200		686 19 41	
		UKV 300		686 19 42	
		UKV 500		686 19 39	
CP10	Accumulator tank with hot water heating	VPA 300/200	NIBE	686 16 19	Note that the tank must be able to accept the heat pump charge output. See below for a table of possible combinations of the NIBE range.
		VPA 450/300	NIBE	686 16 21	
		VPAS 300/450	NIBE	686 16 22	
		VPB 500	NIBE	686 12 04	
		VPB 750-2	NIBE	686 12 14	
		VPB 1000	NIBE	686 12 06	
EB10	Additional water heater				
FL2	Safety valve, Heating medium				

Control module	Air/water heat pump	Accumulator with hot water heater	Circ. pump	Water heater	HW Control	Reversing valve cooling	Addition	Volume vessel
SMO 40	F2030 – 7 kW	VPA 300/200 VPA 450/300 VPAS 300/450	CPD 11-25/65	VPB 200 VPB 300 VPBS 300 VPB 500 VPB 750-2	VST 11	VCC 05	ELK 15 ELK 26 ELK 42	UKV 100 UKV 200 UKV 300 UKV 500
	F2030 – 9 kW							
	F2040 – 8 kW							
	F2040 – 12 kW							
	F2040 – 16 kW	VPA 450/300 VPAS 300/450	CPD 11-25/75	VPB 500 VPB 750-2 VPB 1000	VST 11 VST 20	VCC 11		
	F2300 – 14 kW							
	F2300 – 20 kW						VPB 750-2 VPB 1000	VST 20