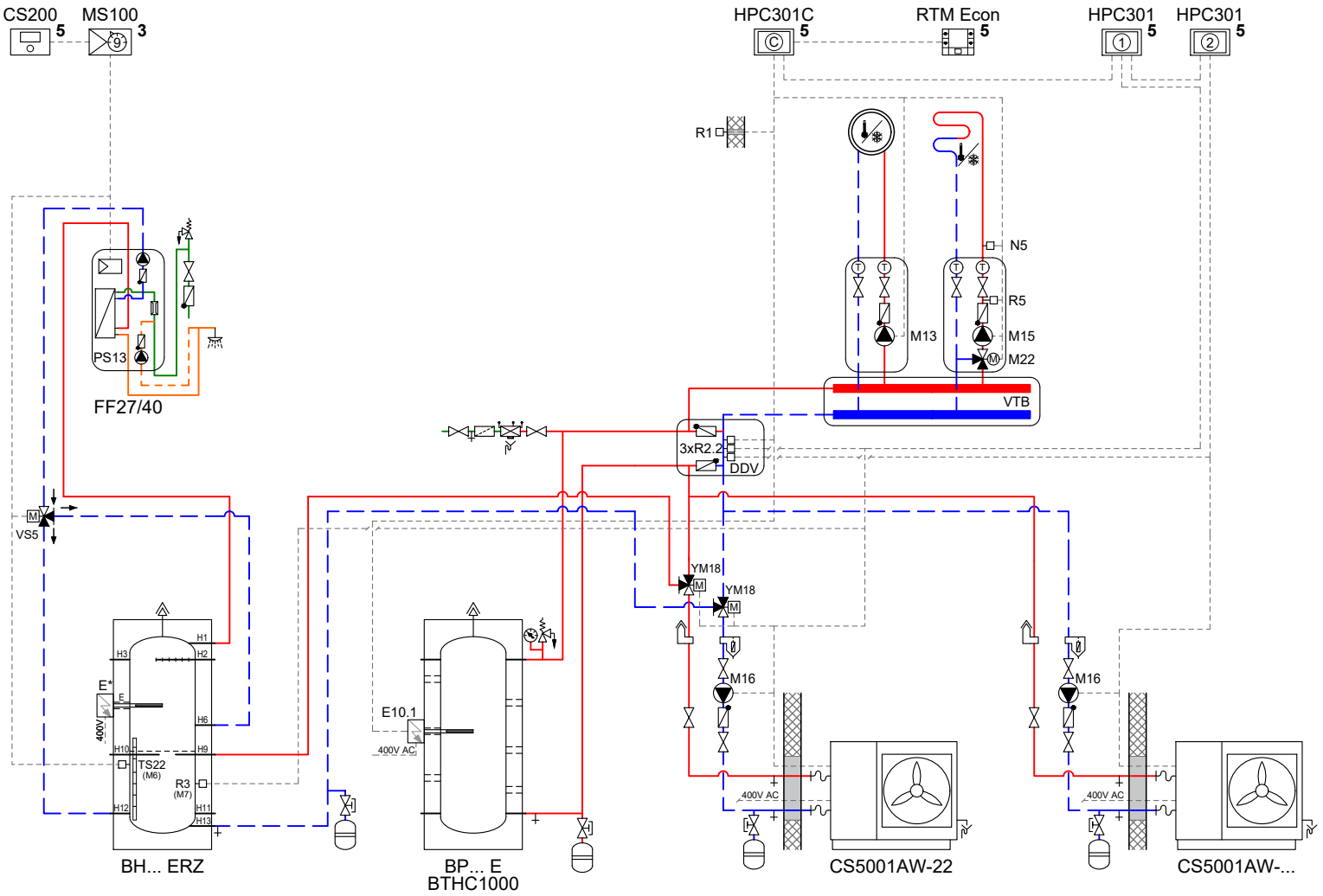
System schematic

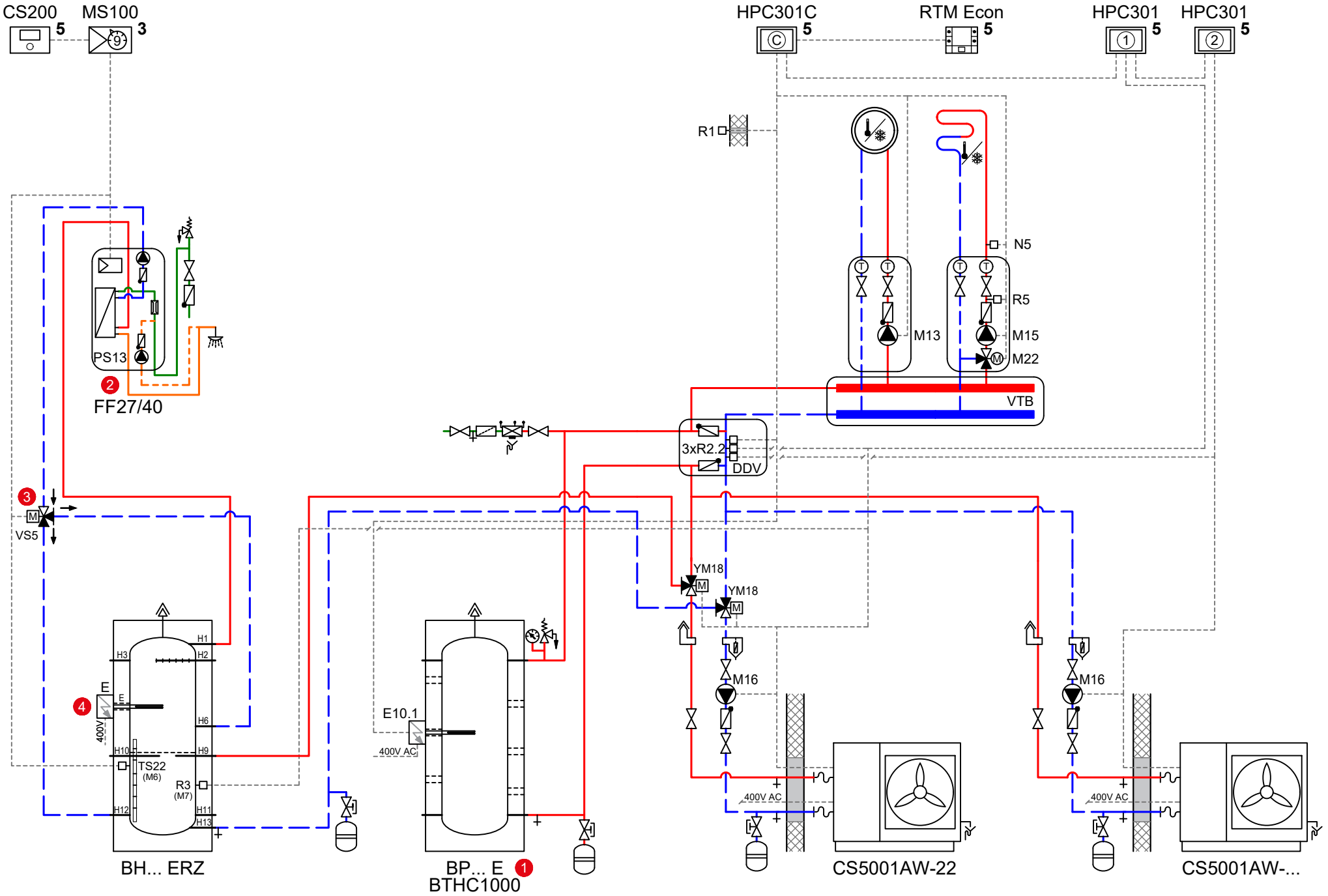
2x Compress CS5001 AW- ... (Cascade)

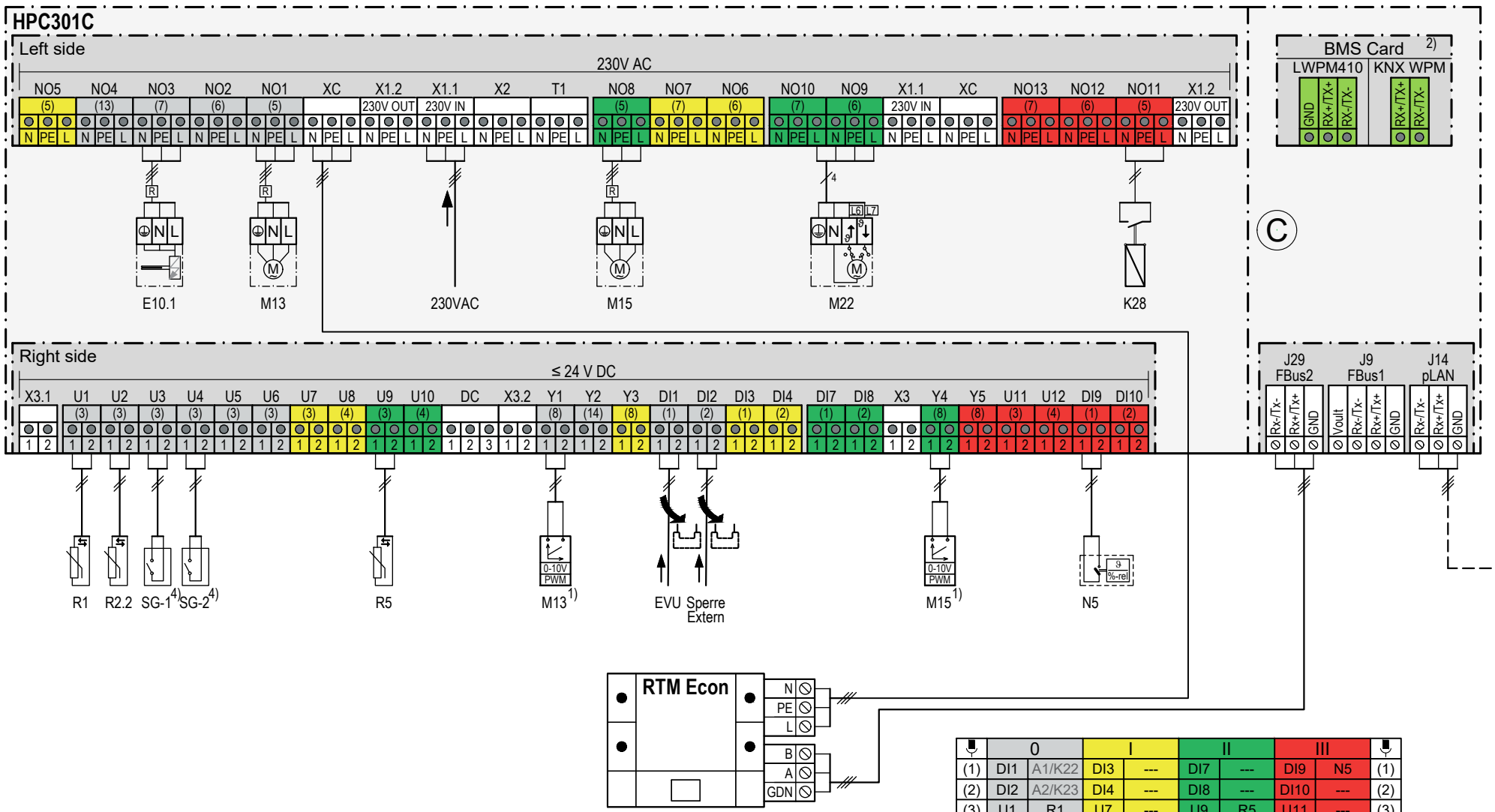
System example for qualified contractors



Hydraulic components:

- Air-to-water heat pump (Cascade)
- Buffer tank
- Fresh water station
- Heating/cooling circuits

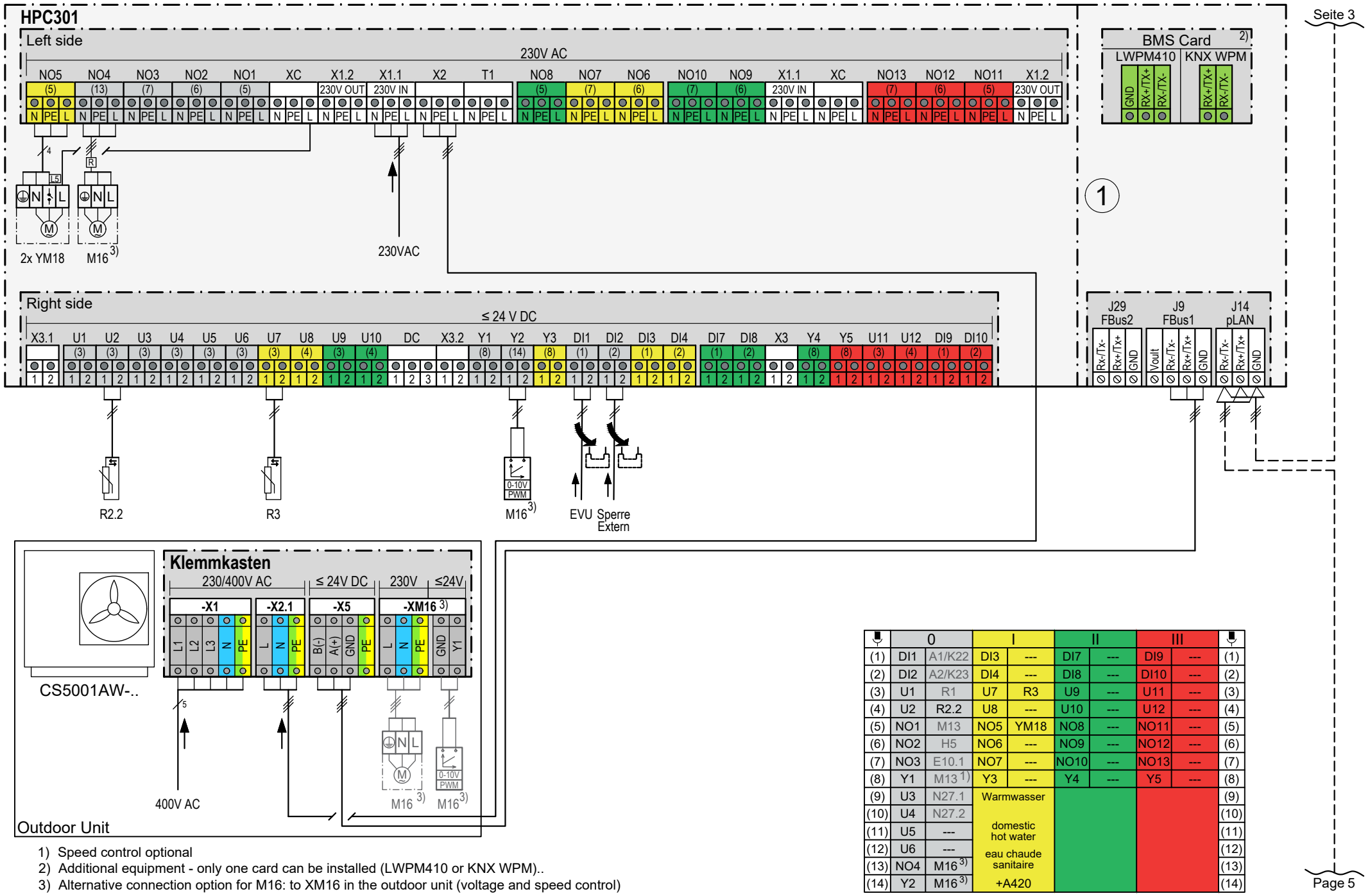

CS200
MS100
HPC301C
RTM Econ
HPC301
HPC301
R1
N5
R5
M13
M15
M22
VTB
PS13
FF27/40
3xR2.2
DDV
VS5
YM18
YM18
M16
M16
E
E10.1
400V AC
TS22
(M6)
R3
(M7)
BH... ERZ
BP... E
BTHC1000
CS5001AW-22
CS5001AW-...



	0		I		II		III		
(1)	DI1	A1/K22	DI3	---	DI7	---	DI9	N5	(1)
(2)	DI2	A2/K23	DI4	---	DI8	---	DI10	---	(2)
(3)	U1	R1	U7	---	U9	R5	U11	---	(3)
(4)	U2	R2.2	U8	---	U10	---	U12	---	(4)
(5)	NO1	M13	NO5	---	NO8	M15	NO11	K28	(5)
(6)	NO2	H5	NO6	---	NO9	M22↑	NO12	---	(6)
(7)	NO3	E10.1	NO7	---	NO10	M22↓	NO13	---	(7)
(8)	Y1	M13 1)	Y3	---	Y4	M15 1)	Y5	---	(8)
(9)	U3	N27.1			2. Kreis: gemischt		Kühlen aktiv		(9)
(10)	U4	N27.2			2. circuit: mixed		cooling activ		(10)
(11)	U5	---			2. circuit: mélangé		réfrigérer actif		(11)
(12)	U6	---							(12)
(13)	NO4	M16 3)							(13)
(14)	Y2	M16 3)			+A411		+A451		(14)

1) Speed control optional
2) Additional equipment - only one card can be installed (LWPM410 or KNX WPM).
3) Alternative connection option for M16: to XM16 in the outdoor unit (voltage and speed control)
4) Optional

Page 4

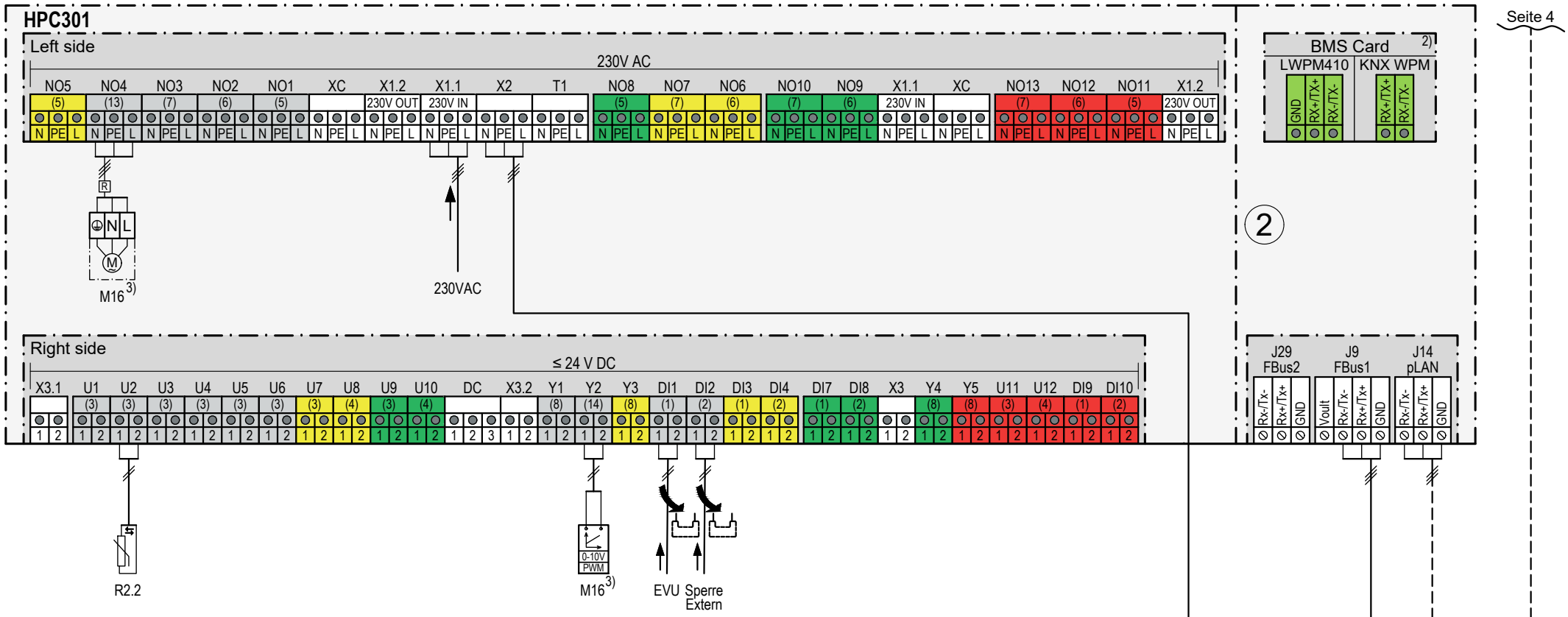


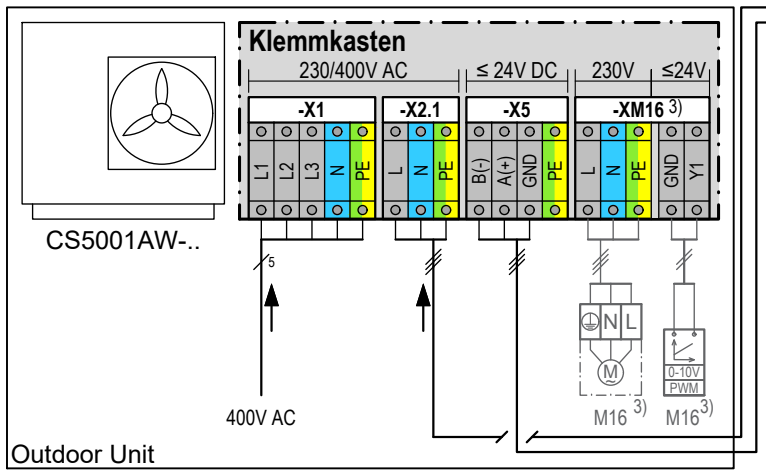
	0		I		II		III		
(1)	DI1	A1/K22	DI3	---	DI7	---	DI9	---	(1)
(2)	DI2	A2/K23	DI4	---	DI8	---	DI10	---	(2)
(3)	U1	R1	U7	R3	U9	---	U11	---	(3)
(4)	U2	R2.2	U8	---	U10	---	U12	---	(4)
(5)	NO1	M13	NO5	YM18	NO8	---	NO11	---	(5)
(6)	NO2	H5	NO6	---	NO9	---	NO12	---	(6)
(7)	NO3	E10.1	NO7	---	NO10	---	NO13	---	(7)
(8)	Y1	M13 1)	Y3	---	Y4	---	Y5	---	(8)
(9)	U3	N27.1	Warmwasser						(9)
(10)	U4	N27.2							(10)
(11)	U5	---	domestic hot water						(11)
(12)	U6	---	eau chaude sanitaire						(12)
(13)	NO4	M16 3)							(13)
(14)	Y2	M16 3)	+A420						(14)

1) Speed control optional
2) Additional equipment - only one card can be installed (LWPM410 or KNX WPM)..
3) Alternative connection option for M16: to XM16 in the outdoor unit (voltage and speed control)

Page 5

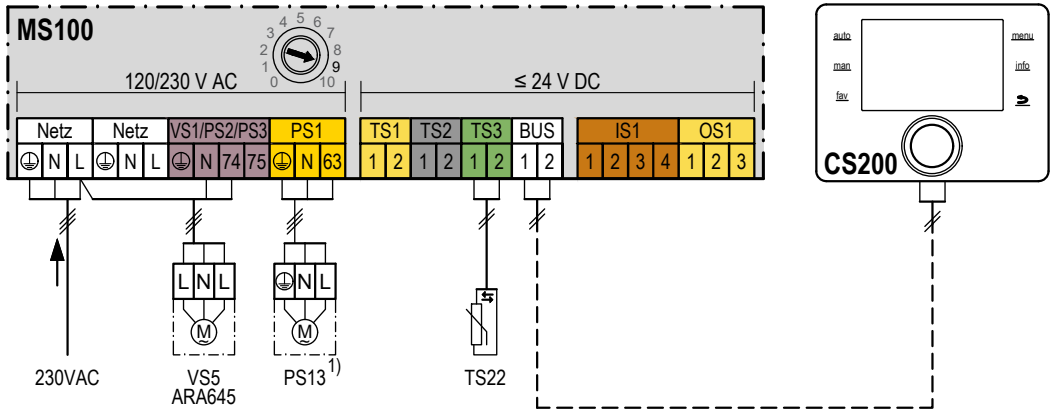
BOSCH





1) Speed control optional
2) Additional equipment - only one card can be installed (LWPM410 or KNX WPM)..
3) Alternative connection option for M16: to XM16 in the outdoor unit (voltage and speed control)

	0		I		II		III		
(1)	DI1	A1/K22	DI3	---	DI7	---	DI9	---	(1)
(2)	DI2	A2/K23	DI4	---	DI8	---	DI10	---	(2)
(3)	U1	R1	U7	---	U9	---	U11	---	(3)
(4)	U2	R2.2	U8	---	U10	---	U12	---	(4)
(5)	NO1	M13	NO5	---	NO8	---	NO11	---	(5)
(6)	NO2	H5	NO6	---	NO9	---	NO12	---	(6)
(7)	NO3	E10.1	NO7	---	NO10	---	NO13	---	(7)
(8)	Y1	M13 1)	Y3	---	Y4	---	Y5	---	(8)
(9)	U3	N27.1							(9)
(10)	U4	N27.2							(10)
(11)	U5	---							(11)
(12)	U6	---							(12)
(13)	NO4	M16 3)							(13)
(14)	Y2	M16 3)							(14)



1) Zirkulationspumpe PS13 optional (Zubehör)

General information

- To cover larger heat demands, two heat pumps are cascaded.
- This configuration is suitable for applications with heating and cooling requirements.
- In monoenergetic operation, the heat pump covers the heating and hot water demand.
- A general connection of pumps by means of a coupling relay is recommended.
- The components of the hydraulic system, such as DDV, PW...E, MMH and the pipelines, must be dimensioned according to the required outputs/volume flows.
- The correct size and connection of the buffer tank must be ensured. If necessary, a four-way connection or several buffer tanks connected in parallel should be provided.
- An additional heat source must be provided in the hydraulics to ensure the frost protection of the heat pump in all operating conditions.

Hot water preparation

- In order to keep the share of the electric auxiliary heater as low as possible, the heat pump operates with priority.
- For buildings, For buildings in which a permanent hot water temperature of ≥ 60°C must be ensured, a switch-on value for the electric auxiliary heater of > 60°C must be selected.
- The electric auxiliary heater in the head of the hot water tank BH... ERZ is set to a fixed temperature value.
- Due to the limited volume of the hot water tank BH... ERZ, a heat pump for hot water preparation can only be selected with a power of ≤ 22 kW in this configuration.
- (4) The electric auxiliary heater is operated independently and must be set according to the hot water requirement.

Control

- The cascade control unit HPC301C as the higher-level master ensures that the operating times of the heat pumps are evenly distributed..
- With a heat pump cascade, only 1 outdoor temperature sensor R1 is required (installation on the master control unit HPC301C).
- In a heat pump cascade, 1 request temperature sensor R2.2 is required for each control unit (installation on the master control unit HPC301C and on the slave control units HPC301).

Cooling

- The relay K28 can be used externally as a signal for switching between heating and cooling.
- With silent cooling, the water temperature must always be kept above the dew point temperature. For this purpose, at least one room controller (RTM Econ) must be installed in a reference room in order to regulate the min. permissible flow temperature depending on the measured room temperature and humidity. To avoid condensation at critical points in the cooling system, up to 5 dew point sensors (TPF341) in conjunction with a dew point monitor (TPW WPM) can interrupt the cooling operation if necessary.
- With dynamic cooling, all pipes and the buffer tank must be provided with vapor diffusion-proof insulation. The heat pump is switched on and off via the set return temperature. The room temperature control must be taken over by the temperature controllers of the fan convectors.
- (1) If cooling below the dew point is desired, a storage tank with vapor diffusion-proof insulation should also be selected (e.g. BTHC1000). Otherwise, only cooling above the dew point is possible and the system must be monitored by using dew point sensors (TPF314 - N5).

Fresh water station Flow Fresh FF27/FF40

- The FF.. fresh water stations with stainless steel brazed plate heat exchangers are characterized by their particularly hygienic instantaneous domestic hot water production.
- The FF.. fresh water stations are available with a tapping capacity of 27...160 l/min.
- The temperature-sensitive return feed function is carried out via the 3-way changeover valve VS5 (Catalog accessory: ESBE VRG with ARA645 actuator).
- (2) The circulation pump PS13 is an optional accessory.

(3) Electrical connection of the 3-way changeover valve at the MS100 function module

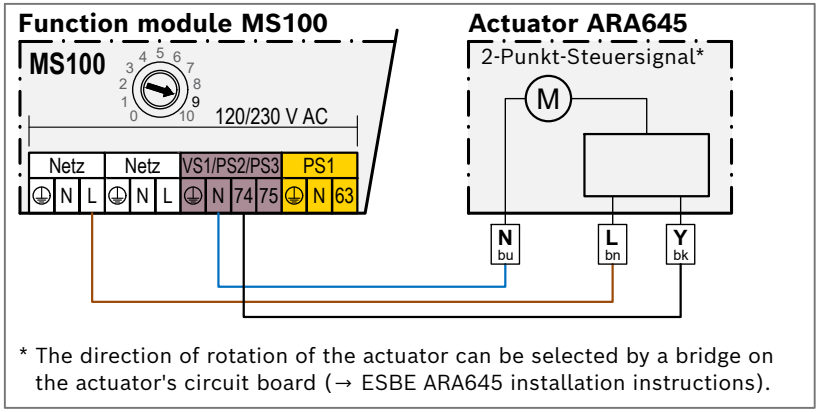


Figure 1: Electrical connection of the ARA645 actuator to the MS100

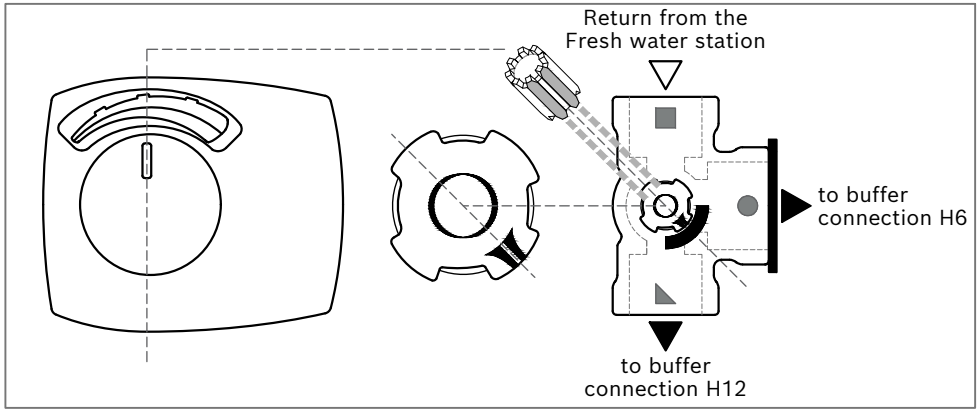
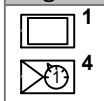


Figure 2: Installation position of the 3-way changeover valve VRG.../ARA645

- Terminal L = permanent live supply to the MS100 function module and ESBE ARA645 actuator
- Terminal 74 de-energized = return to the BH... ERZ buffer tank bottom (H12)
- Terminal 74 energized = return to the BH... ERZ buffer tank middle (H6)
- Terminal 75 is not assigned and can be used as a fault message output (230V).

This schematic diagram is a non-binding representation of a possible hydraulic circuit.
The dimensions and the location of the connections can be found in the respective installation instructions.
The electrical wiring is shown in detail in the wiring diagrams.
Safety devices must be installed in accordance with currently applicable standards and local regulations.

Symbol	Description
Regulators and modules position	
	1 at the heat/cooling generator 2 at the heat/cooling generator or on the wall 3 in the station 4 in the station or on the wall 5 on the wall 6 in the control unit

Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description
Piping/Electrical wiring									
	Flow - Heating/Solar		Flow Brine		Domestic hot water		Domestic cold water		Electrical wiring
	Return - Heating/Solar		Return Brine		Domestic hot water circulation		Refrigeration system		Electrical wiring with a break
Actuators/Valves/Temperature Sensors/Pumps									
	Ventil		Revisionsbypass		Balancing valve		Overflow valve		Shout-off valve with dirt trap (with or without magnet)
	Kappenventil		Shut-off valve with actuator		Shut-off valve with therm. thermostatic actuator or anti-freeze valve		Absperrventil, magnetically controlled		Differential pressure regulator
	3-way valve with actuator (mixing)		3-way valve with actuator (distributing)		3-way valve with thermostatic actuator		Pumpe		Check valve
	3-way valve with actuator (switching)		3-way valve with actuator (switching, adjustable)		4-way valve with actuator		Safety valve		Safety group
	Temperature sensor		Safety temperature limiter		Flue gas temperature sensor		Flue gas temperature limiter		Outdoor temperature sensor
Miscellaneous									
	Radio (e.g., Controller, Sensor)		Thermometer		Manometer		Drain funnel with odor trap		Filling/draining valve
	Relay		Automatic/manual air vent		Air separator		Dirt trap		Magnetite/Sludge separator
	Compensator		Domestic hot water outlet		Heat meter		Volumetric flow meter		Collection tank
	Low loss header with sensor		Heat exchanger		System separation according to EN1717		Expansion vessel with cape valve		Immersion heater
	Heating circuit		Underfloor heating circuit		Ventilation heating circuit		Swimming pool heating circuit		Circuit function (Heating/Cooling)