

# EXact control system VEX200

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## 1. GeneralAdd to print

### EXact Control System

Behind the simple operating controls, the advanced EXact control system secures optimum operating economy. The control system is easily matched to the daily rhythms of the user location, e.g. school, office or home.

#### EXact control system features

- Simple operation
- 3 user levels, 2 of which are with password (engineer and specialist )
- Several indoor climate levels which can adapt ventilation to current needs via a built in week-timer
- See more select features in the list of functions

## 2. HMI control panelAdd to print

### EXact

The control panel is designed so that it can be operated in two modes, locked or open. In locked mode, there is access to the standard daily interface, and the user can therefore not inadvertently access more advanced menus and parameters.

In open mode, the panel gives access to additional controls and thereby to more advanced functions for engineering or specialist use. The control panel requires a code to be operated in open mode.



The user menu is for the daily interface which provides information via visual symbols regarding the status of the unit, while allowing the user to temporarily change the temperature and ventilation levels.

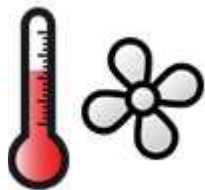
## Specialist menu



The very useful help texts displayed in the yellow area minimise the need for manuals and instructions. Help texts exist at engineering and specialist levels.

## Icons in the menu display

Via graphic elements we have made it easier to comprehend the information shown in the display.



### Temperature-/ ventilation levels

Temporary changes to temperature and ventilation levels can be performed easily and quickly. Set points are shown together with visual symbols in the display.



### Alarm/warning

The EXact control system warns of operational disruptions by displaying the warning symbol. The display will show an alarm bell if more serious disturbances have been detected.



### External stop

If the ventilation system has been stopped via the external start/stop facility, this symbol will be shown in the display.



### Manual operation

It is possible for the EXact control system to run on manual, which is shown in the display via the "hand symbol".



#### Weekly schedule

The "clock symbol" will be shown in the display if the control system has been set to operate with the weekly schedule activated.



#### Override

When temperature and ventilation level set points are changed, the override symbol will appear in the display until the settings are overridden by the next change in the weekly plan.



#### Daylight Savings Time/winter time

The EXact control system switches automatically between daylight savings time and winter time. The display indicates the current setting.

### 3. External communicationAdd to print

#### Web server

The EXact control system is supplied with web server as standard. This provides the following possibilities:

1. 1. The unit can be monitored and configured using a local PC
2. 2. The unit can be connected to a local area network (LAN) and accessed from a PC connected to the LAN
3. 3. The unit can be connected to the internet and accessed from external PCs

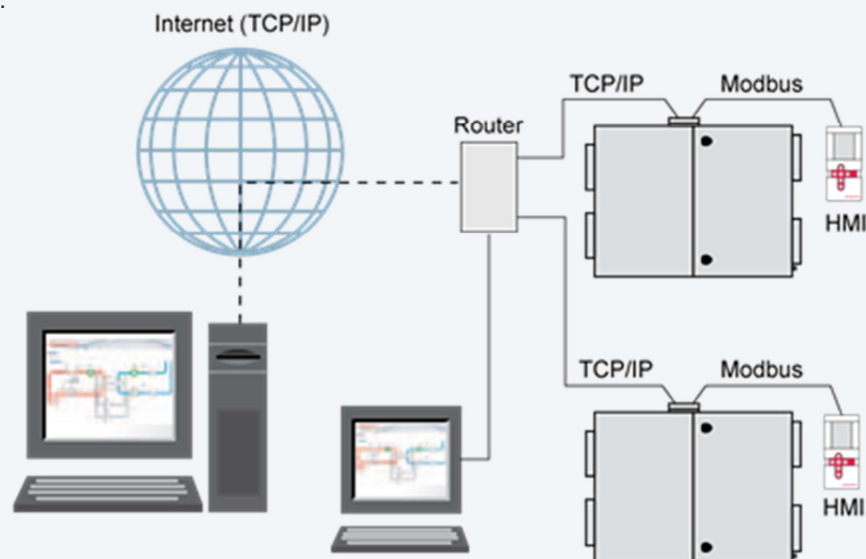
Common to all possibilities is that there is no other requirement than that the PC has a browser The Web server is password protected.

The Web server user interface is designed in the same logical fashion as the menus in the control panel. This uniformity makes the system easy to use. The overview display is configured and ready to monitor the air handling unit. The Web server can send an email in the event of an alarm, log data, etc.

#### Connection to a BMS system

By default, the Web Server can communicate via Modbus RTU, RS485, BACnet MSTP, BACnet IP.

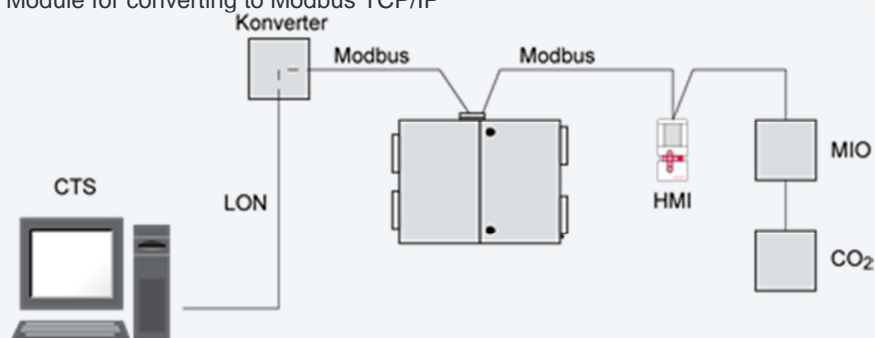
Therefore, a BMS system which uses these communication protocols can easily be connected to the air handling unit.



## Conversion to other protocols

Via the web server it is possible to connect the units to a CTS system with other protocols via a converter (gate-way). The converter is optional and the following possibilities are available:

1. MLON - Module for converting to LON
2. MTCP - Module for converting to Modbus TCP/IP



## Try the EXact control system online

The Exact control system can be tested online on a VEX340 unit which located at EXHAUSTO in Langeskov.

This unit is free-standing and without connections to duct systems.

The control system can be accessed via this address: <http://exact.exhausto.dk>

For engineering access to the unit, the following must be used:

Username: VEX340

Password: 1111 (4 times numeral one)

NOTE! Only one user can be logged on at any one time.

### 4. Functional overview of air handling unitsAdd to print

## VEX200

Function / component	Description	+Standard - Accessory
<b>Filter monitor</b>	Pressure sensors for monitoring pressure drops over filters - alarm at pressure drops higher than set value and "Early Warnings"	+
<b>Bypass</b>	When modulating bypass of the extract air, heat recovery will be reduced so that the desired air temperature can be maintained spring, summer and autumn	+
<b>Temperature sensors</b>	1) In the extract air spigot for measuring/control of room temperature	+
	2) In the exhaust air spigot for measuring exhaust temperature	+
	3) In the outdoor air spigot for outdoor	+

	temperature compensation and night time cooling	
	4) In the supply air spigot for measurement/control of the supply air temperature	+
	5) Duct temperature sensor	-
	6) Room temperature sensor	-
<b>Overheating fuse</b>	When there is danger of overheating motors and motor controls the system will be shut down and reset manually	+
<b>Fire alarm</b>	Fire thermostats (40/50/70 °C), smoke detectors and other fire alarm switches can be connected. The function of the air handling unit is adjustable when a fire alarm is activated	-
<b>Closing damper- outdoor air (required with a water heating coil)</b>	Damper mounted in outdoor air duct - closes at system shut-down - can be supplied with a spring-return motor	- (+)
<b>Closing damper - exhaust air</b>	Damper mounted in exhaust air duct - closes at system shut-down - can be supplied with a spring-return motor	-
<b>Temperature adjustment</b>	Adjustment of supply air temperature	+
	Adjustment of room temperature	+

Function / component	Description	+Standard - accessory
<b>Compensating functions</b>	Outdoor temperature compensation	+
	Airflow reduction	+
	Outdoor compensation of airflow	+
	Summer compensation	+
	CO <sub>2</sub> -compensation	+
	Moisture compensation	+
<b>Night cooling</b>	The installation can be set to start at night to cool the building	+
<b>Control panel</b>	Panel for operating at user,	+

	engineer and specialist levels	
<b>Weekly schedule</b>	For setting the desired times for changes between indoor climate levels	+
<b>Webserver</b>	Webserver with the possibility for control and monitoring	+
	Modbus RTU RS485, BACnet MSTP, BACnet IP	
<b>Bus communication (requires webserver)</b>	Modbus TCP/IP	-
	LONWORKS	-
<b>Cooling recovery</b>	Cooling recovery when needed	+
<b>Constant pressure adjustment</b>	Possible from both the extract air side and supply air side	-
<b>Motion sensor (PIR)</b>	For automatic adjustment of indoor climate levels	-
<b>Airflow measurement</b>	Airflow level is shown on control panel	+
<b>Indoor climate levels</b>	Timer controlled (comfort, standby, economy, off)	+
	Manual	+
<b>Trim damper for purging</b>	Manual trim damper (TB240/250/260/270/280)	-
<b>Alarm log</b>	Shows the latest 100 alarms	+
<b>Hour counters</b>	Supply air motor and extract air motor	+
<b>Alarm relay</b>	Relay for external alarm (potential free)	+

## 5. Functional overview of heating coils [Add to print](#)

### EXact automation system

#### HCW - External water heating coil

Function / component	Description
<b>Temperature sensors</b>	1) In the supply air duct for measurement/control of the supply air temperature
	2) On the return duct from the water heating coil to keep the heating coil warm and frost-proof
	3) For frost-proofing external pipes for the heating coil (optional)
	4) Temperature sensor for supply pipes for the water heating coil
<b>Modulating motor valve</b>	Valve which continuously regulates water flow to the heating coil, depending on the heat required
<b>Circulation pump control</b>	1) Control of the circulation pump for the water heating coil
	2) Heat retention function (keeps the heating coil frost free)
	3) Built-in control for working the circulation pump during periods when heating is not necessary

## HCE - External heating coil

Function / component	Description
Temperature sensors	In the supply air duct for measurement/control of supply air temperature
Overheating fuse	1) TSA60 is in the print card, triggers at 60 °C and must be manually reset in HMI 2) TSA70 is located in the airflow, triggers at 70 °C and features automatic reset 3) TSA120 is located in the airflow, triggers at 120 °C and features manual reset in the heating coil and HMI

## 6. Function overview coolingAdd to print

### EXact

## CCW - External cooling coil

Function / component	Description
Temperature sensors	1) In the supply air duct for measurement/control of supply air temperature 2) In the supply pipe for the cooling coil
Modulating motor valve	Valve which continuously regulates water flow to the cooling coil, depending on the cooling required
Circulation pump control	1) Control of the circulation pump for the cooling coil 2) Built-in control for working the circulation pump during periods when cooling is not necessary

## MXCU - External cooling control

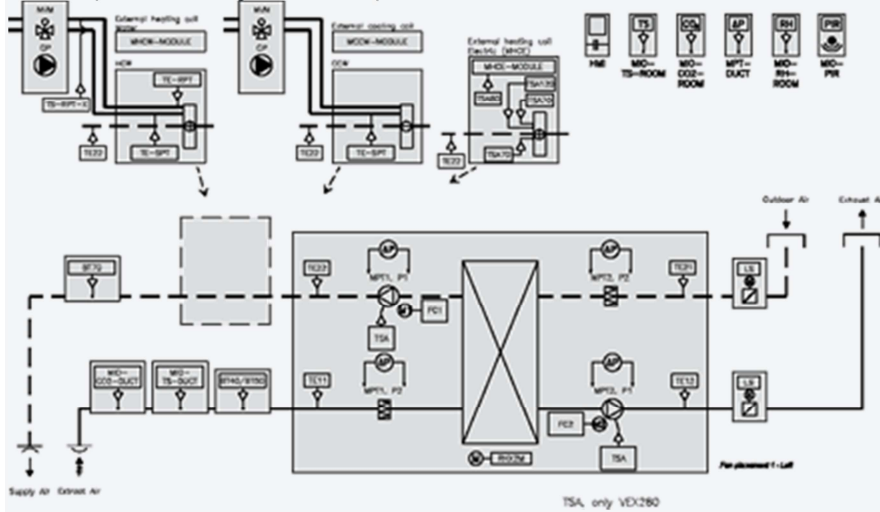
Function /component	Description
Temperature sensors	In the supply air duct for measurement of supply air temperature Control of external cooling facility via start/stop-signal and on-demand regulation 0-10 V (10-0 V)

## 7. Simplified diagramAdd to print VEX200

### VEX200 med EXact control system

- with after heating coil (HCW/HCE). cooling coil (CCW) and without heating coil

The simplified drawings show components that can be included in a VEX200 air handling unit.



### Standard and accessory components

The VEX340H is supplied with a number of components fitted to the unit or for fitting in the duct system and the premises. In the following table, the standard and accessory components for the VEX200 are specified. Accessories must be ordered separately.

Abbreviation	Description	+ = Standard - = accessory
BP1	Damper, bypass	+
BP2	Damper, bypass	+
BT40/50/70	Fire thermostat, 40, 50 and 70 respectively °C	-
FC1	Motor control 1 (extract air)	+
FC2	Motor control 2 (supply air)	+
HMI	Control panel	+
LS	Closing damper, exhaust air	-
LS	Closing damper, outdoor air (required and a part of the delivery with water heating coils)	- (+)
LSR	Closing damper, exhaust/outdoor air (spring-return)	-
M1	Fan motor 1	+
M2	Fan motor 2	+
MCCW	Cooling Coil Water control system	-
MHCE	Electrical heating coil control system	-
MHCW	Heating Coil Water control system	-
MIO-CO2-DUCT	CO2-sensor, duct	-
MIO-CO2-ROOM	CO2-sensor, room	-
MIO-PIR	PIR-sensor	-
MIO-RH-ROOM	Moisture sensor (RH)	-



<b>MIO-TS-DUCT</b>	Temperature sensor, extract air duct (external)	-
<b>MIO-TS-ROOM</b>	Temperature sensor, room	-
<b>MPT-DUCT</b>	Pressure sensor for constant pressure adjustment	-
<b>MPT1, P1</b>	Airflow control, extract air	+
<b>MPT1, P2</b>	Filter monitor extract air	+
<b>MPT2, P1</b>	Airflow control, supply air	+
<b>MPT2, P2</b>	Filter monitor outside air	+
<b>MVM</b>	Motor valve, water heating coil (HCW)	-
<b>MXCU</b>	Cooling module for controlling external cooling systems	-
<b>RHX2M</b>	Rotor control	+
<b>BUZZ ALARM</b>	Alarm relay	+
<b>TE1,1</b>	Temperature sensor, extract air - spigot 1,1	+
<b>TE1,2</b>	Temperature sensor, exhaust - spigot 1,2	+
<b>TE2,1</b>	Temperature sensor, outside air - spigot 2,1	+
<b>TE2,2</b>	Temperature sensor, supply air - spigot 2,2	+
<b>TE-RPT</b>	Temperature sensor, return pipe from water heating coil (HCW)	-
<b>TE-SPT</b>	Temperature sensor supply	-
<b>TS-RPT-X</b>	Temperature sensor, return, external pipes (HCW)	-
<b>TSA</b>	Overheating, motor	+
<b>TSA 60/70/120</b>	Overheating thermostat, 60, 70 and 120 respectively °C	-

## 8. Cable dimensioning [Add to print](#)

### VEX200

The electrician installing the unit is responsible for ensuring that all sizes used are compatible with current legislation and regulations. The VEX200 series heat recovery units have a built-in isolation switch and automatic fuses which safeguard the air handling units internally against overload and short-circuit. The HCE after heating coil has a built-in isolation switch and the control system has short-circuit protection. In the HCE, internal cables and heating elements have short-circuit protection via a fuse in the distribution board (not supplied by EXHAUSTO).

Maximum short circuit current ( $I_{cu}$ ), in accordance with EN60947.2 is 10 kA.

Maximum fuse rating is 63 A and G/gI.

Accessory types HCW, CCW and XCU do not require separate supply cables and can be connected directly to the control system box of the VEX200. Only clips (U1, N) may be used for the above accessories and can receive a maximum load of 1.4 A on the VEX240, and a load of 2 A on the other sizes. A maximum of 1 (HCW (after-heating) and 1 CCW/XCU (cool) may be connected. The EXact control ensures that after heat and cooling can not operate at the same time. HCE-type accessories must have a separate power supply.

Maximum phase current is the dimensioned current for choice of cable. Cable should be dimensioned according to maximum neutral current if this is greater than the maximum phase current.

#### Equalising connections

Equalising connections must be established between the VEX and HCE types of accessories (or after heat).

### Fitting of fault current breakers

If fault current breakers are fitted to the i installation, these must be of a type which comply with the following requirements:

- VEX240 / VEX250 / VEX260 / VEX270-1:  
PFI-breaker **type A** in compliance with EN61008, which disconnects when fault currents are detected with DC content (pulsating DC)
- VEX270-2 / vex280-1 / vex280-2:  
PFI **type B** breaker in compliance with EN 61008, which breaks the circuit when a fault current with DC content (pulsating DC) or smooth fault current is detected
- maximum break time must be 0,3 sec.

The current leakage can be up to 300 mA.

### Automatic cut-out built into the VEX200

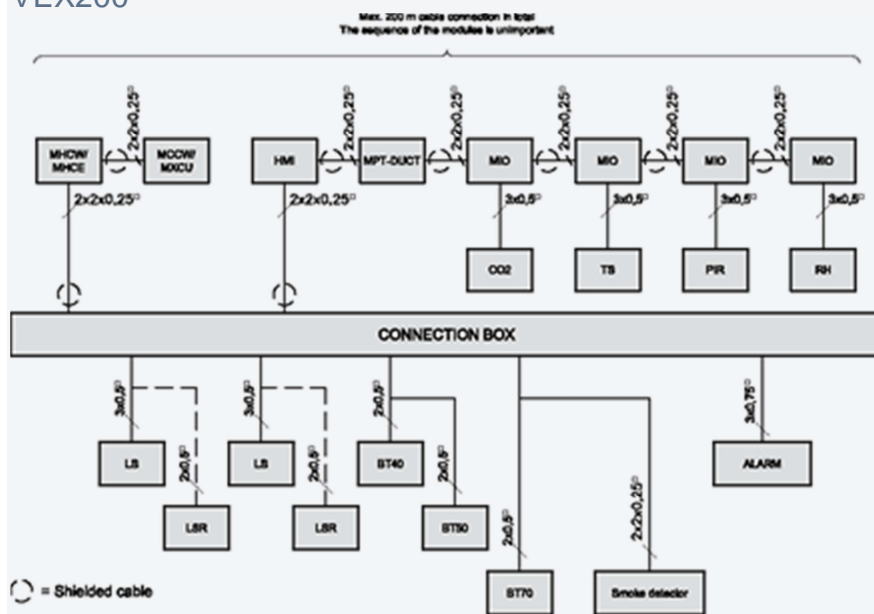
VEX...	240FC	250FC	260FC	270-1FC	270-2FC	280-1FC	280-2FC
<b>Voltage (V)</b>	1 x 230 V + N + PE	3 x 400 V + N + PE					
<b>Fuse for control system (1 x 230 V) 2 pol</b>	C-10 A	C-10 A	C-10 A	C-10 A	C-10 A	C-10 A	C-10 A
<b>Fuse for FC1 (1 x 230 V) 2 pol</b>	C-10 A	C-10 A	C-16 A	C-20 A			
<b>Fuse for FC2 (1 x 230V) 2 pol</b>	C-10 A	C-10 A	C-16 A	C-20 A			
<b>Common fuse for FC1 og FC2 (3 x 400 V) 3 pol</b>					C-20 A	C-32	
<b>Total number of fuses</b>	3	3	3	3	2	2	2

FC1 = Frequency converter 1

FC2 = Frequency converter 2

## 9. Cable plan - accessories

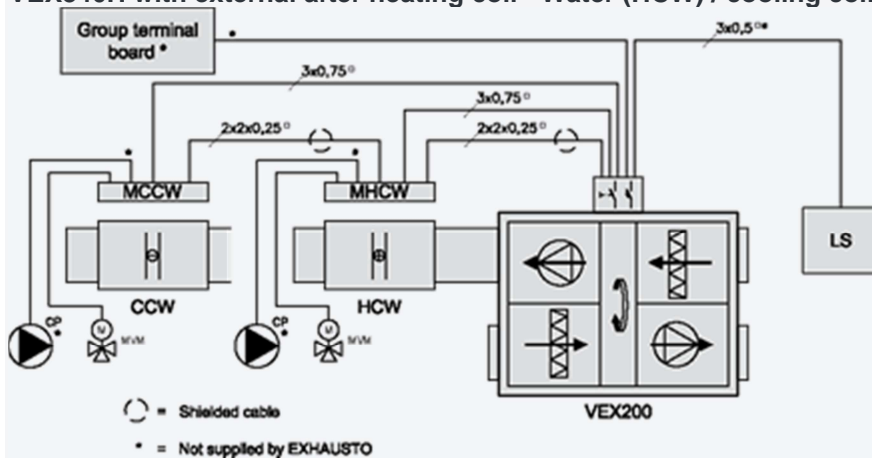
### VEX200



Abbreviation	Designation
ALARM	Alarm relay
BT40	Fire thermostat 40°C
BT50	Fire thermostat 50°C
BT70	Fire thermostat 70°C
HMI	Control panel
LS	Closing damper, exhaust air
LS	Closing damper, outside air (required and supplied with water heating coil)
LSR	Closing damper, exhaust air/outside air (spring-return)
MCCW	Cooling Coil Water, control system
MHCE	Heating Coil Electric, control system
MHCW	Heating Coil Water, control system
MIO-CO2	CO2-sensor
MIO-PIR	PIR-sensor
MIO-RH	Moisture sensor (RH)
MIO-TS	Temperature sensor
MPT-DUCT	Pressure sensor for constant pressure adjustment
MXCU	External cooling control, control system
Smoke detector	Smoke detector

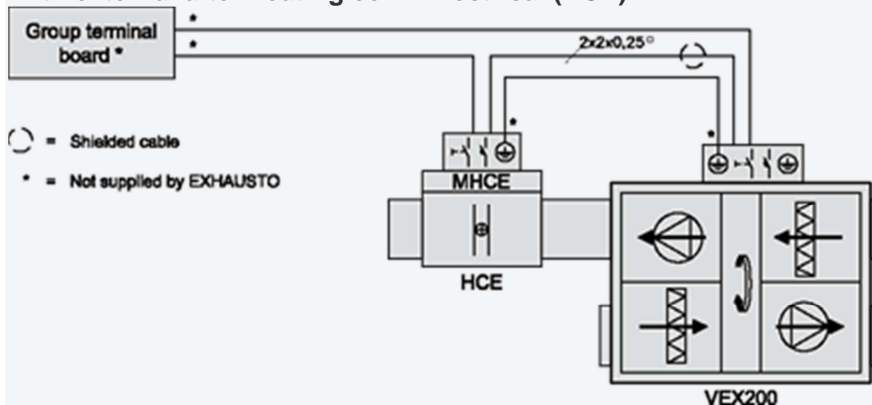
## VEX200

## VEX340H with external after heating coil - Water (HCW) / cooling coil (CCW)



Size	Voltage (V)	Power consumption (A) (max. phase current)	Dimensioning power consumption (A) (max. neutral current)
VEX240FC	1 x 230 V + N + PE	13	
VEX250FC	3 x 400 V + N + PE	10,5	16
VEX260FC	3 x 400 V + N + PE	18	26,8
VEX270-1FC	3 x 400 V + N + PE	21	28
VEX270-2FC	3 x 400 V + N + PE	21,3	
VEX280-1FC	3 x 400 V + N + PE	28,3	
VEX280-2FC	3 x 400 V + N + PE	36,5	

## With external after heating coil – Electrical (HCE)



Size	Type designation after heating coil electric HCE	Voltage to heating coil HCE (V)	Dimensioning power consumption (A) (max. phase current)
VEX240FC	HCE240	3 x 400 V + N + PE	8,7
VEX250FC	HCE250	3 x 400 V + N + PE	17,3
VEX260FC	HCE260	3 x 400 V + N + PE	20,2
VEX270-1FC	HCE270	3 x 400 V + N + PE	30,3
VEX270-2FC	HCE270	3 x 400 V + N + PE	30,3
VEX280-1FC	HCE280	3 x 400 V + N + PE	66,3
VEX280-2FC	HCE280	3 x 400 V + N + PE	66,3

#### 11. Technical data [Add to print](#)

EXact

CONNECTION BOARD	
2 x LS (Closing damper, exhaust/outside air)	Power supply 24 V DC
	ON/OFF 24 V DC
	Max. power consumption 0,3 A
BT/Fire (fire thermostat/smoke detector)	Max. 4 A breaking current
START/STOP	Digital input
ALARM	Changeover relay, max 8 A @ 30 V DC or 250 V AC ohmic load

MHCW (Control system for after heating coil, water)	
MCCW (Control system for cooling coil)	
MXCU (Control system for external cooling unit)	
Communication	Modbus RTU RS-485
MVM (motor valve) supply	24 V AC
MVM (motor valve) control signal	0-10 V DC (or 10 - 0 V)
Relay switch for circulation pump	250 V, max. 5 A cos φ 0,97

MHCE (Control system for after heating coil, electric)	
Communication	Modbus RTU RS-485
Number of power levels	Up to 4
Modulating power level	1 level
Supply voltage	3 x 400 V + N + PE

## VEX200 for third-party control system

### **Freedom to choose your solution!**

VEX200 is also offered with third-party control systems. This means the unit can be integrated to a control system from another supplier. Designed for quick and easy integration on location.

### **A VEX200 solution without a control system is characterized by:**

- Air handling unit with rotating heat exchanger
- Horizontal construction
- Free-blowing B-wheel - EXstream
- Filter class M5 or F7
- Low energy motors suitable for frequency modulation
- Possibility of choosing whether the VEX is supplied with or without a frequency converter (on the VEX270 and VEX280 only motor size 1 is available with frequency converters)
- Rotor pinion and rotor control are always supplied
- Cables for frequency converters or motors (if frequency converters are not supplied) have been connected to the connector box
- Air hoses for filter monitoring and flow measurement are not part of the delivery

### **Accessories**

- HCW water heating coil
- HCE electrical heating coil
- CCW cooling coil
- DX cooling/heating coil