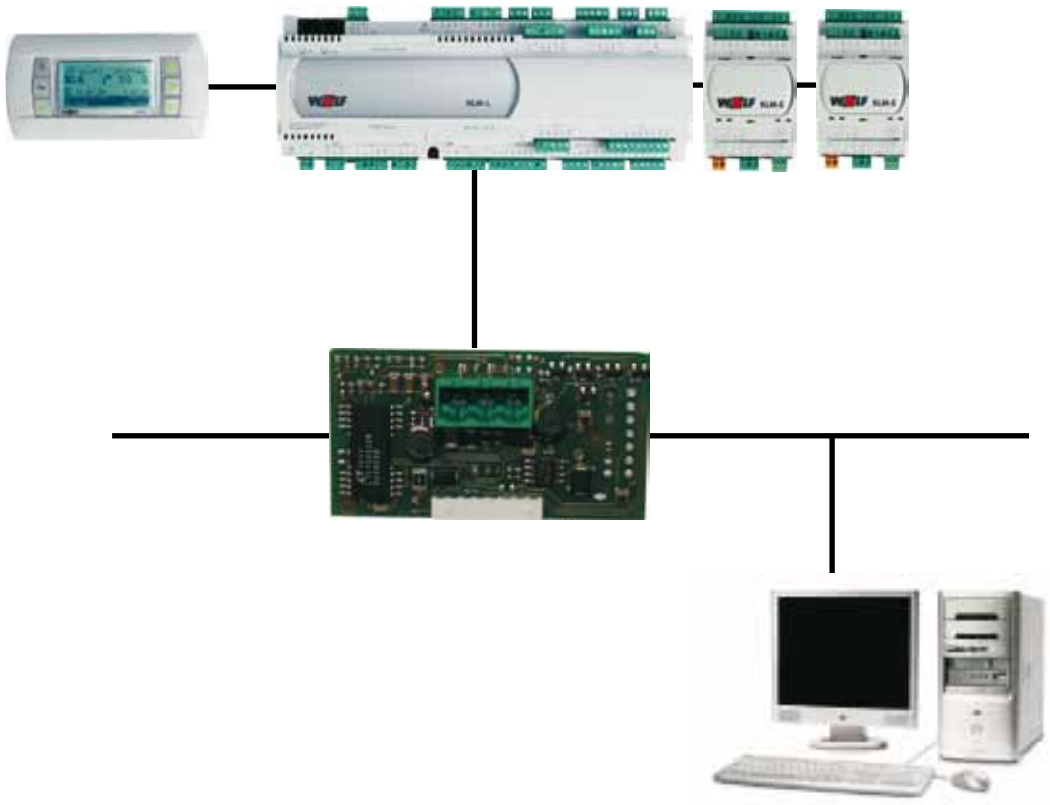
Installation and operating instructions

ModBus interface for WRS-K
(Translation of the original)



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Part no.: 3062947_201211 Subject to technical modifications.

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Index

2. Documentation information

2.1 Other applicable documents

WRS-K installation and operating instructions.

The instructions for all accessory modules and further accessories may also apply.

2.2 Safekeeping of these documents

The system operator or user should ensure the safekeeping of all instruction manuals.

→ Pass on these operating instructions as well as all other applicable manuals.

2.3 Symbols and warnings used

The following symbols are used in conjunction with these important instructions concerning personal safety, as well as operational reliability.

"Safety instructions" are instructions with which you must comply exactly, to prevent risks and injuries to individuals and material losses.

Danger through 'live' electrical components!
Please note: Switch OFF the ON/OFF switch before removing the casing.

Never touch electrical components or contacts when the ON/OFF switch is in the ON position! This results in a risk of electrocution that may lead to injury or death.

Please note

"Please note" indicates technical instructions that you must observe to prevent material losses and equipment malfunctions.

Warning structure

You will recognise warnings in this manual by a pictogram with a line above and below respectively. These warnings are structured according to the following principle:

Signal word
Type and source of the risk.
Explanation of the risk.
→ Action to prevent the risk.

2.4 Applicability of these instructions

These operating instructions are valid for the ModBus interface for WRS-K.

3. Standards and directives

The components of the Wolf WRS-K control system comply with the following regulations:

EC Directives
- 2006/95/EC Low Voltage Directive
- 2004/108/EC EMC Directive

EN Standards
- EN 55014-1 Emission
- EN 55014-2 Immunity
- EN 55022 Radio disturbance characteristics
- EN 55024 Immunity characteristics
- EN 60730-1 Automatic electrical controls for household and similar use
- EN 60730-2-9 Particular requirements for temperature sensing controls
- EN 61000-6-1 Immunity for residential, commercial and light-industrial environments
- EN 61000-6-2 EMC Immunity for industrial environments
- EN 61000-6-3 EMC Emission standard for residential, commercial and light-industrial environments
- EN 61000-6-4 Emission standard for industrial environments
- EN 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use

3.1 Installation / commissioning

- In accordance with DIN EN 50110-1, installation and commissioning may only be performed by qualified electricians
- Observe all regulations stipulated by your local power supply utility and all VDE or local regulations
- DIN VDE 0100 Regulations regarding the installation of high voltage systems up to 1000 V
- DIN VDE 0105-100 Operation of electrical installations.

3.2 Warnings

Only operate the system in perfect technical condition. Immediately remove / remedy any faults and damage that may impact on safety.

3.3 Service / repair

Please note

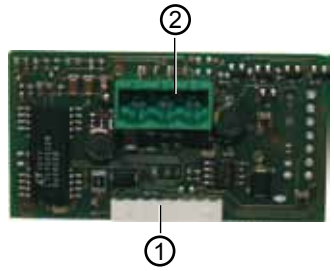
- Regularly check the perfect function of all electrical equipment.
- Only qualified personnel may remove faults or repair damage.
- Only replace faulty components or equipment with original Wolf spare parts.
  We accept no liability for any damage or loss resulting from technical modifications to Wolf control units.

3.4 Disposal

Observe the following information regarding the disposal of faulty system components or the system at the end of its service life: Dispose of all components in accordance with applicable regulations, i.e. separate material groups correctly. The aim should be the maximum possible recycling of basic materials with the least environmental impact. Never throw electrical or electronic scrap into the household waste, but recycle it appropriately.

Generally, dispose of materials in the most environmentally responsible manner according to environmental, recycling and disposal standards.

4.1 View



① Connection block to the KLM-M or KLM-L controller

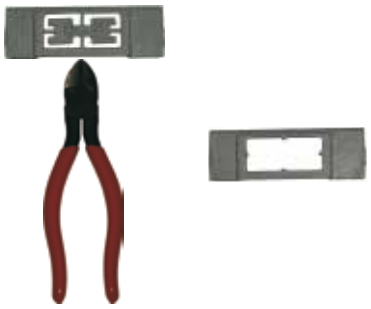
② Terminal block for the ModBus network

4.2 Installation

The ModBus interface is usually supplied fully assembled with the control unit. If it is retrofitted, please observe the following points:

The ModBus interface is inserted into the "serial card" slot on the KLM-M controller (part no. 2744747) or KLM-L controller (part no. 2744746). To do this, proceed as follows:

1. Isolate the KLM-M or KLM-L air conditioning and ventilation module from the power supply.
2. Remove the cover of the "serial card" slot using a screwdriver.



3. Remove the inner part of the cover with wire cutters.

4. Insert the ModBus interface into the free slot such that a plug-in connection is made between the connection block of the ModBus interface and the pins of the air conditioning and ventilation module (connection block clicks into place).

5. Refit the slot cover.

6. Reconnect the power supply.

4.3. Interface configuration

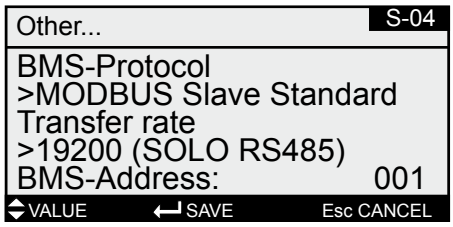
Note

If the ModBus interface was supplied fully assembled with the control unit, it is also already configured. No further settings are required.
If the interface is retrofitted, it can be configured as follows:

1. Navigate to the main menu with the Esc key on the BMK programming module.
2. Select menu item **Heating contractor** with Enter.
3. Enter password "**1234**" and confirm with Enter.
4. Select menu item **Other...** with Enter.
5. Navigate to menu item BMS-Protocol with the up/down arrows.
6. Use Enter to highlight the BMS-Protocol and the up/down arrows to select protocol type ModBus Slave Standard.
   The transfer rate is then automatically set to 19200 and the BMS address to 001.
7. Confirm these entries with Enter.
8. Use Esc to complete the entry and exit the menu item.

Note

The precise procedure for operating the BMK programming module can be found in the WRS-K installation and operating instructions.



5.1 Connection

Connection to the ModBus network is made via the pluggable terminal block:

1: GND
2: RX+/TX+
3: RX-/TX-

1 2 3

6. Data

Via the ModBus interface, it is possible to gain read and write access to the air conditioning control unit.

6.1 Read access

With read access, actual and set values can be checked, subject to operating mode, via a ModBus network.
Digital values can be scanned with function code 1 (read coils).
Analogue values can be scanned with function code 3 (read holding register).

6.1.1 Operating data read access

The following data is available for read access:

Description	Unit	Factor	Type	Index
Central fault	-	-	Digital	1
External system enable	-	-	Digital	2
Hygrostat humidity	-	-	Digital	3
Humidifier enable	-	-	Digital	4
System status	-	-	Digital	5
Operating status 1)	-	-	Digital	117
Pump, hot water	-	-	Digital	60
Pump, cold water	-	-	Digital	18
Heat source demand	-	-	Digital	61
Enable or pump HR	-	-	Digital	62
Outside/supply air damper	-	-	Digital	63
Exhaust/extract air damper	-	-	Digital	64
Enable gas valve	-	-	Digital	65
Enable or pump, adiabatic cooling	-	-	Digital	87
Enable convector heater (WO)	-	-	Digital	89
Thermostat, convector heater (WO)	-	-	Digital	90
Water supply line drain valve, adiabatic cooling, open	-	-	Digital	91
Pan drain valve, adiabatic cooling, open	-	-	Digital	92
Inlet valve, adiabatic cooling, open	-	-	Digital	94
Supply air temperature	°C	0.1	Analog	1
Outside temperature	°C	0.1	Analog	2
Room temperature	°C	0.1	Analog	3
Extract air temperature	°C	0.1	Analog	4
Air quality (mixed gas)	V	0.1	Analog	5
Set room transducer	°C	0.1	Analog	6
Room air humidity	%r.h.	0.1	Analog	7
Relative humidity, extract air	%r.h.	0.1	Analog	8
Relative humidity, supply air	%r.h.	0.1	Analog	9
Current set value, supply air temperature	°C	0.1	Analog	10
Current set temperature	°C	0.1	Analog	11
Current set value, fresh air proportion	%	1	Analog	12
Current set speed, supply air fan	%	0.1	Analog	13
Current set speed, extract air fan	%	0.1	Analog	14
Current set value, relative humidity	%r.h.	0.1	Analog	23
Current set value, absolute humidity	g/kg	0.1	Analog	24
Icing-up sensor	°C	0.1	Analog	27
Actuating signal, heating	%	0.1	Analog	28
Actuating signal, cooling	%	0.1	Analog	29
Actuating signal, HR	%	0.1	Analog	30
Actuating signal, humidifier	%	0.1	Analog	31
Extract air temperature after humidifier for adiabatic cooling	°C	0,1	Analog	32
Actuation signal reheating 1)	%	0,1	Analog	33

Description	Unit	Factor	Type	Index
Air quality (CO_2)	ppm	0.1	Analog	209
Supply air pressure	Pa	1	Analog	210
Extract air pressure	Pa	1	Analog	211
Flow rate, supply air	m³/h	10	Analog	212
Flow rate, extract air	m³/h	10	Analog	213
Operating mode	-	-	Analog	214
Current set value, fan stage	-	-	Analog	215
Current set pressure, supply air	Pa	1	Analog	216
Current set pressure, extract air	Pa	1	Analog	217
Current set flow rate, supply air	m³/h	10	Analog	218
Current set flow rate, extract air	m³/h	10	Analog	219
Cooling source demand, stage 1/2	-	-	Analog	220
Electric heater bank stage	-	-	Analog	232
Direct evaporator stage	-	-	Analog	233
Operating mode, heat pump 1)	-	-	Analog	255

1) Available WRS-K software version 3.0.000 or higher

Values with a factor = 0.1 have a decimal place. Multiply the transferred value by the factor 0.1.
Example: Transferred value for supply air temperature = 243 -> actual value = 24.3 °C.

For values with a factor = 1, the transferred value equals the actual value (no decimal place).
Example: Transferred value for fresh air proportion = 45 -> actual value = 45%.

For values with a factor = 10, the transferred value needs to be multiplied by 10.
Example: Transferred value for supply air flow rate = 125 -> actual value = 1250 m³/h

Note: Subject to the implementation of the MODBUS connection, it may be necessary to add the value of 1 to the index.

Codierung

Description	Value	Explanation
Current set value, fan stage	0	Fans Off
	1	Fans On (single stage and variable fans) Fans stage 1 On (multi stage fans)
	2	Fans stage 2 On
	3	Fans stage 3 On
Operating mode	0	Manual mode
	1	7-day program
	2	BMS mode
System status	0	Standby
	1	Ready for operation
Operating status	0	System not in use
	1	System in use
Operating mode, heat pump	0	Not enabled
	1	Enable heating
	2	Enable cooling

6.1.2 Special operating modes

Any special operating modes which are enabled will be transferred as described below. Function descriptions of the special operating modes can be found in the WRS-K installation and operating instructions.

Description	Type	Index
Holiday program	Digital	6
Filter test	Digital	7
Preheat program	Digital	8
Night ventilation	Digital	9
Backup mode	Digital	10
Extension of utilisation time	Digital	11
Peak ventilation	Digital	12
Natural cooling	Digital	13
Hygrostat function	Digital	14
Air quality control	Digital	15
External demand	Digital	16
Run-on	Digital	17
HR-Ice guard	Digital	92
HR-Ice guard	Digital	101
Speed reduction	Digital	102
Setback mode 1)	Digital	112
Winter start HR 1)	Digital	113

1) Available WRS-K software version 3.0.000 or higher

Explanation

Value	Explanation
0	Special operating mode not enabled
1	Special operating mode enabled

Note: Several special operating modes can be enabled at the same time.

6.1.3 Alarms

Any enabled alarms will be transferred as described below. Descriptions of the causes and possible solutions can be found in the WRS-K installation and operating instructions.

Description	Type	Index
Fault, inverter, supply air fan	Digital	19
Motor temperature too high, supply air fan	Digital	20
Repair switch, supply air fan	Digital	21
Air flow monitor, supply air	Digital	22
Fault, inverter, extract air fan	Digital	23
Motor temperature too high, extract air fan	Digital	24
Repair switch, extract air fan	Digital	25
Air flow monitor, extract air	Digital	26
Outside air filter contaminated	Digital	27
Supply air filter contaminated	Digital	28
Extract air filter contaminated	Digital	29
Pump fault, DHW bank	Digital	30
Frost stat has responded	Digital	31
Frost protection temperature, supply air not reached	Digital	32
Temperature limiter, electric heater bank	Digital	33
High limit safety cut-out, electric heater bank	Digital	34
Fault, pump, cold water bank	Digital	35
Central fault, external refrigeration unit	Digital	36
Alarm, fire alarm system	Digital	37
Supply air temperature sensor faulty or not connected	Digital	38
Supply air humidity sensor faulty or not connected	Digital	39
Room temperature sensor faulty or not connected	Digital	40

Description	Type	Index
Room air humidity sensor faulty or not connected	Digital	41
Extract air temperature sensor faulty or not connected	Digital	42
Extract air humidity sensor faulty or not connected	Digital	43
Outside temperature sensor faulty or not connected	Digital	44
Outside humidity sensor faulty or not connected	Digital	45
Icing-up sensor HR faulty or not connected	Digital	46
Fire damper responded	Digital	47
Fault, EC motor, supply air fan	Digital	48
Fault, EC motor, extract air fan	Digital	49
Databus fault, extension modules	Digital	50
Remote control not connected or databus fault	Digital	51
Service required	Digital	52
Icing-up temperature HR below set value 2)	Digital	53
Fault, heat recovery	Digital	54
Service message, humidifier	Digital	55
Fault, humidifier	Digital	56
External fault	Digital	57
Smoke detector responded	Digital	58
Set value transducer not or incorrectly connected	Digital	59
Fire damper 1 responded	Digital	66
Fire damper 2 responded	Digital	67
Fire damper 3 responded	Digital	68
Fire damper 4 responded	Digital	69
Fire damper 5 responded	Digital	70
Fire damper 6 responded	Digital	71
Fire damper 7 responded	Digital	72
Fire damper 8 responded	Digital	73
Fire damper 9 responded	Digital	74
Fire damper 10 responded	Digital	75
Fire damper 11 responded	Digital	76
Fire damper 12 responded	Digital	77
Fire damper 13 responded	Digital	78
Fire damper 14 responded	Digital	79
Fire damper 15 responded	Digital	80
Fire damper 16 responded	Digital	81
Fire damper 17 responded	Digital	82
Fire damper 18 responded	Digital	83
Fire damper 19 responded	Digital	84
Fire damper 20 responded	Digital	85
Fire damper 21 responded	Digital	86
Scaling, freshwater contact humidifier, adiabatic cooling	Digital	88
Fault, convector heater (WO) burner	Digital	95
Fault, humidifier for adiabatic cooling	Digital	96
No adiabatic cooling	Digital	97
Humidifier for adiabatic cooling at risk of icing up	Digital	98
Extract air temperature sensor downstream of humidifier for adiabatic cooling faulty or not connected	Digital	99
Service message, humidifier for adiabatic cooling	Digital	100
Fault, heat pump 1)	Digital	114
Pump fault, reheater bank1)	Digital	115
Frost thermostat responded, reheater bank 1)	Digital	116

1) Available WRS-K software version 3.0.000 or higher
2) Available up to WRS-K software version 2.1.031

Explanation

Value	Explanation
0	Alarm disabled
1	Alarm enabled

Note: Several alarms can be enabled at the same time.
An alarm remains enabled until it is acknowledged at the BMK programming module.

6.2 Write access

With write access, set values can be specified or adjusted, subject to operating mode, via a ModBus network. In addition, the system can be switched on or off and the operating mode specified.
These values can be written with function code 6 (write single register) or function code 16 (write multiple register).

6.2.1 Operating data write access

The following data is available for write access:

Description	Unit	Factor	Type	Index
Set temperature from BMS	°C	0.1	Analog	15
Set speed, supply air fan from BMS	%	0.1	Analog	16
Set speed, extract air fan from BMS	%	0.1	Analog	17
Set value, fresh air proportion from BMS	%	1	Analog	221
Set pressure, supply air from BMS	Pa	1	Analog	223
Set pressure, extract air from BMS	Pa	1	Analog	224
Set flow rate, supply air from BMS	m³/h	10	Analog	225
Set flow rate, extract air from BMS	m³/h	10	Analog	226
Set value, fan mode (stage or ON/ OFF) from BMS	-	-	Analog	222
Set value, relative humidity from BMS	%r.h.	0.1	Analog	25
Set value, absolute humidity from BMS	g/kg	0.1	Analog	26
Offset set temperature	K	0.1	Analog	18
Offset set speed, supply air fan	%	0.1	Analog	19
Offset set speed, extract air fan	%	0.1	Analog	20
Offset set value, fresh air proportion	%	1	Analog	227
Offset set pressure, supply air	Pa	1	Analog	228
Offset set pressure, extract air	Pa	1	Analog	229
Offset set value, relative humidity	%r.h.	0.1	Analog	21
Offset set value, absolute humidity	g/kg	0.1	Analog	22
Offset set flow rate, supply air	m³/h	10	Analog	230
Offset set flow rate, extract air	m³/h	10	Analog	231
Operating mode	-	-	Analog	214

Values with a factor = 0.1 are transferred with a decimal place. The required value equals the specified value times 0.1.
Example: Required value for set temperature = 24.3 °C -> value to be specified = 243.

For values with a factor = 1, the value to be specified equals the required value (no decimal place).
Example: Required value for set fresh air proportion = 45% -> value to be specified = 45.

For values with a factor = 10, the required value equals the value to be specified multiplied by 10.
Example:
Required value for set flow rate, supply air = 1300 m³/h -> value to be specified = 130.

Note: Subject to the implementation of the MODBUS connection, it may be necessary to add the value of 1 to the index..

6.2.2 Operating mode selection

If a ModBus interface is installed, the system can be operated in 3 different operating modes:

- Manual mode
- 7-day program
- BMS mode

Manual mode
The system runs with the set values specified for manual mode via the BMK programming module. The set values can be adjusted via offsets using the ModBus interface.

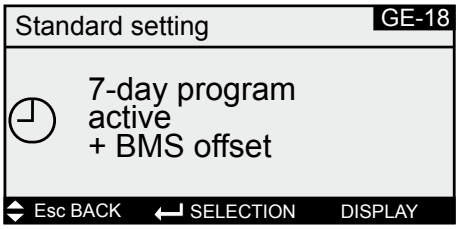
7-day program
The system runs with the times and set values specified in the 7-day program. The set values can be adjusted via offsets using the ModBus interface.

BMS mode
The system runs with the set values specified via the ModBus interface. The system is switched on and off via the ModBus interface.

The operating mode can be changed via the BMK programming module or the ModBus interface.

- Selecting the operating mode via the BMK programming module:

1. Navigate to the main menu with the Esc key on the BMK programming module.
2. Select menu item **Standard settings** with Enter.
3. Navigate to the operating mode with the up/down arrows.
4. Highlight the operating mode with Enter.
5. Select the required operating mode with the up/down arrows and confirm with Enter.



6. Use Esc to complete the entry and exit the menu item.

- Selecting the operating mode via ModBus interface:

The system operating mode can be specified via ModBus:

Value	Explanation
0	Manual mode
1	7-day program
2	BMS mode

6.2.3 Manual mode / 7-day program

In manual mode or with a 7-day program enabled, the set values can be adjusted via the offset variables. The system runs as specified by manual mode or the 7-day program.

The following variables are effective:

- Offset set temperature (adjusting the set temperature)
- Offset set speed, supply air fan (adjusting the set speed for the supply air fan)
- Offset set speed, extract air fan (adjusting the set speed for the extract air fan)
- Offset set value, fresh air proportion (adjusting the fresh air proportion)
- Offset set pressure, supply air (adjusting the set pressure for the supply air fan)
- Offset set pressure, extract air (adjusting the set pressure for the extract air fan)
- Offset set flow rate, supply air
  (adjusting the set flow rate for the supply air)
- Offset set flow rate, extract air
  (adjusting the set flow rate for the extract air)
- Offset set value, relative humidity (adjusting the set value for relative humidity)
- Offset set value, absolute humidity (adjusting the set value for absolute humidity)
- Operating mode

Please note

Any adjustment of the set values is always relative to the set values selected for manual mode or the 7-day program.

Systems with BMK-F remote control:

Adjusting the set temperature:
If the set value is adjusted via the ModBus interface, after the set value has been altered via the remote control, a changeover is made to the set value for manual mode or the 7-day program, plus offset, via the ModBus interface.

Example:
Set value for manual mode = **21 °C**; set value adjusted via BMK-F to **23 °C**.
If an offset = **-1 K** is then specified, a new set value of **20 °C** (21 °C – 1 K) is enabled.

Adjustment of set speed / pressure / flow rate:
The set values for speed or pressure can be adjusted via the remote control in 3 stages (see WRS-K installation and operating instructions). Here, the set value is altered according to the values specified in the standard settings for supply air and extract air.
If, after altering a set value via the remote control, a set value is adjusted via the ModBus interface for supply air **or** extract air, a changeover is made to the set values for manual mode or the 7-day program, plus offset, via the ModBus interface for supply air **and** extract air.

Example:
Set speed for supply air in manual mode = **50%**; set speed for extract air in manual mode = **45%**; set speeds changed via BMK-F to **60%** (supply air) and **55%** (extract air).
If an offset for the supply air speed of **30%** is then specified, but no offset for the extract air fan is set, new set values of **80%** (50%+30%) for the supply air fan and **45%** (= set value for manual mode) for the extract air fan are enabled.

Adjusting the set value for fresh air proportion:
If the set value is adjusted via the ModBus interface, after the set value has been altered via the remote control, a changeover is made to the set value for manual mode or the 7-day program, plus offset, via the ModBus interface.

Example:
Set value for manual mode = **40%**; set value adjusted via BMK-F to **50%**.
If an offset = **-10%** is then specified, a new set value of **30%** (40%-10%) is enabled.

6.2.4 BMS mode

In BMS mode, all set values are specified via the ModBus interface. The system is also switched on and off via the ModBus interface.

The following variables are effective:

- Set temperature from BMS
- Set speed, supply air fan from BMS
- Set speed, extract air fan from BMS
- Set value, fresh air proportion from BMS
- Set pressure, supply air from BMS
- Set pressure, extract air from BMS
- Set flow rate, supply air from BMS
- Set flow rate, extract air from BMS
- Set value, fan mode from BMS
- Set value, relative humidity from BMS
- Set value, absolute humidity from BMS
- Operating mode

Via set value, fan mode from BMS, the fans are switched on and the system is enabled with the set values specified via the ModBus interface:

For single stage and variable speed fans:

Value	Explanation
0	System OFF
1	System ON

For multi stage fans (2- or 3-stage):

Value	Explanation
0	System OFF
1	System ON with fan stage 1
2	System ON with fan stage 2
3	System ON with fan stage 3

Systems with BMK-F remote control:

Set temperature:
If the set value has been altered via the remote control, a new set value specification is accepted via the ModBus interface when the value of set temperature from BMS is **changed**.

Set speed / pressure:
If the set value has been altered via the remote control, a new set value specification is accepted via the ModBus interface when the value of set speed, supply air fan from BMS or set speed, extract air fan from BMS (or set pressure, supply air from BMS, or set pressure, extract air from BMS) is **changed**. As soon as a new set value for supply air **or** extract air is specified, the set values specified via the ModBus interface for supply air **and** extract air are enabled.
If the set value for the supply air speed or supply air pressure is set to 0, the set value for the extract air speed is also set to 0.

Set value for fresh air proportion:
If the set value has been altered via the remote control, a new set value specification is accepted via the ModBus interface when the value of the set value, fresh air proportion from BMS is **changed**.

7. Specification

Operating conditions	-10-60 °C, 20-80% r.H. not condensing
Storage conditions	-20-70 °C, 20-80% r.H. not condensing
Protocol	ModBus Slave RTU, 8 databits, 2 stopbits, no parity
Maximum baud rate	19200
Power supply	Via KLM controller
Cable	AWG 20/22 screened
Maximum cable length	1000m

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