

MB20

Protocol description

2019-12-03
Modbus protocol version: 1.3

Modbus communication

Interface: RTU, RS-485
Baud rates: 9600, 19200, 38400, 57600
Data bits: 8 bits
Stop bits: 1 or 2 (2 stop bits with no parity)
Parity: None, Even, Odd

Slave address, baud rate and parity are changed in LabVent SAR Id 15

Modbus function codes

Code	Description
03	Read Holding Registers
06	Write Single Holding Register

Modbus exception codes

Code	Description
01	Illegal Function (for example if you try and write to a read-only register)
02	Illegal Address (if you try and read/write to an unmapped register)
06	Slave Device Busy (if you request external (FHR, ACU) registers too often)

Modbus register mapping

SAR is mapped to holding registers 40001 - 40199.

FHR gets mapped to 40200 upto 42999 depending on the number of FHRs in the system.

ACU gets mapped to 43000 upto 44999 depending on the number of ACUs in the system.

Product	Reg Start	Reg End	Product	Reg Start	Reg End	Product	Reg Start	Reg End
SAR	40001	40199	FHR 22	42300	42399	ACU 1	43000	43099
FHR 1	40200	40299	FHR 23	42400	42499	ACU 2	43100	43199
FHR 2	40300	40399	FHR 24	42500	42599	ACU 3	43200	43299
FHR 3	40400	40499	FHR 25	42600	42699	ACU 4	43300	43399
FHR 4	40500	40599	FHR 26	42700	42799	ACU 5	43400	43499
FHR 5	40600	40699	FHR 27	42800	42899	ACU 6	43500	43599
FHR 6	40700	40799	FHR 28	42900	42999	ACU 7	43600	43699
FHR 7	40800	40899				ACU 8	43700	43799
FHR 8	40900	40999				ACU 9	43800	43899
FHR 9	41000	41099				ACU 10	43900	43999
FHR 10	41100	41199				ACU 11	44000	44099
FHR 11	41200	41299				ACU 12	44100	44199
FHR 12	41300	41399				ACU 13	44200	44299
FHR 13	41400	41499				ACU 14	44300	44399
FHR 14	41500	41599				ACU 15	44400	44499
FHR 15	41600	41699				ACU 16	44500	44599
FHR 16	41700	41799				ACU 17	44600	44699
FHR 17	41800	41899				ACU 18	44700	44799
FHR 18	41900	41999				ACU 19	44800	44899
FHR 19	42000	42099				ACU 20	44900	44999
FHR 20	42100	42199						
FHR 21	42200	42299						

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Compatability

New versions of MB20 (program version) and the Modbus Protocol (this document and register list) can introduce new registers or updated communication code. This lists which version of SAR, MB20 and the Protocol version are compatible with each other.

SAR Version	MB20 Version	Protcol version
1.28	1.1	1.1
1.29	1.4	1.3

SAR Holding Registers
40001-40164

SAR	HEADER	REG	DESCRIPTION	CMD	FORMAT	UNIT	FORMAT NOTE	MIN	MAX	DEF	STEP
1	Serial number	1	Serial number	03	u16			0	32000	500	0
2	Program version	2	Program version	03	u16		Ex: 123 = 1.23	0	65535	100	0
3	Analog input 1	3	Options	03, 06	u16	bitfield	xxxx xx00 = Off xxxx xx01 = Exhaust xxxx xx10 = Inlet xxxx x0xx = Normal xxxx x1xx = Not in control loop Examples: 1 = Exhaust 2 = Inlet 5 = Exhaust AND not in control loop 6 = Inlet AND Not in control loop	0	255	0	1
		4	Range	03, 06	u16	l/s or m3/h	Unit is set in SAR register 64	0	4000	0	20
		5	Current value	03	u16	%		0	100		0
4	Analog input 2	6	Options	03, 06	u16	bitfield	xxxx xx00 = Off xxxx xx01 = Exhaust xxxx xx10 = Inlet xxxx x0xx = Normal xxxx x1xx = Not in control loop Examples: 1 = Exhaust 2 = Inlet 5 = Exhaust AND not in control loop 6 = Inlet AND Not in control loop	0	255	0	1
		7	Range	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	4000	0	20
		8	Current value	03	u16	%		0	100		0
5	Analog input 3	9	Options	03, 06	u16	bitfield	xxxx xx00 = Off xxxx xx01 = Exhaust xxxx xx10 = Inlet xxxx xx11 = Room pressure control xxxx x0xx = Low alarm not activated xxxx x1xx = Low alarm activated xxxx 0xxx = High alarm not activated xxxx 1xxx = High alarm activated Examples: 1 = Exhaust 2 = Inlet 3 = Room pressure control 7 = Room pressure AND Low alarm activated 11 = Room pressure AND High alarm activated 15 = Room pressure AND both alarms activated	0	255	0	1
		10	Range	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	4000	0	20
		11	Current value	03	u16	%		0	100		0
		12	Sensor type	03, 06	u16	0-2	0 = SPS505 (-50 to +50 Pa) 1 = SPS101 (-100 to +100 Pa) 2 = SPS10 (0 to +100 Pa)	0	2	0	1
		13	Setpoint	03, 06	s16	Pa	Min and max depends on sensor type setting	-80	80	0	1
		14	Max control output	03, 06	u16	%		0	20	5	1
		15	Alarm level low	03, 06	s16	Pa	Min and max depends on sensor type setting	-100	100	-10	1
		16	Alarm level high	03, 06	s16	Pa	Min and max depends on sensor type setting	-100	100	10	1
17	Alarm delay	03, 06	u16	seconds		10	240	20	1		
6	Analog input 4	18	Options	03, 06	u16	bitfield	xxxx xx00 = Off xxxx xx01 = Exhaust xxxx xx10 = Inlet xxxx xx11 = Room temperature control Examples: 1 = Exhaust 2 = Inlet 3 = Room temperature control	0	255	0	1
		19	Range	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	4000	0	20
		20	Current value	03	u16	%		0	100		0
		21	Setpoint	03, 06	u16	Celsius		15	30	24	4
		22	Max control output	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	8000	0	40
		23	Overtemperature	03, 06	u16	Celsius * 10	Celcius with 1 decimal point Ex 10 = 1.0 Ex 29 = 2.9	10	50	30	1

SAR Holding Registers
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7	Analog input 5	24	Options	03, 06	u16	bitfield	xxxx xx00 = Off xxxx xx01 = Exhaust xxxx xx10 = Inlet xxxx xx11 = Zone pressure control xxxx x0xx = Alarm not activated xxxx x1xx = Alarm activated xxxx 0xxx = Auto control xxxx 1xxx = Manual control xxx0 xxxx = Bypass not activated xxx1 xxxx = Bypass activated Examples: 1 = Exhaust 2 = Inlet 3 = Zone pressure control 5 = Zone pressure AND alarm activated 11 = Zone pressure AND manual control 19 = Zone pressure AND bypass activated ...	0	255	0	1	
		25	Range	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	4000	0	20	
		26	Current value	03	u16	%		0	100			0
		27	Setpoint	03, 06	u16	Pa		100	400	200		2
		28	Manual control	03, 06	u16	%		0	100	50		1
		29	Alarm level	03, 06	u16	Pa		50	400	150		2
		30	Alarm delay	03, 06	u16	seconds		10	240	20	1	
8	Constant air	31	Constant air 1 options	03,06	u16	bitfield	00 (0) = OFF 01 (1) = Exhaust 10 (2) = Inlet	0	3	0	1	
		32	Constant air 2 options	03, 06	u16	bitfield	00 (0) = OFF 01 (1) = Exhaust 10 (2) = Inlet	0	3	0	1	
		33	Constant air 3 options	03, 06	u16	bitfield	0000 (0) = OFF 0001 (1) = Exhaust 0010 (2) = Inlet 0100 (4) = Door contact normally open 1000 (8) = Door contact normally closed	0	15	0	1	
		34	Constant air 1 vol.	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	1000	0		5
		35	Constant air 2 vol.	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	1000	0		5
		36	Constant air 3 vol.	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	1000	0		5
9	Extra constant air	37	Extra exhaust	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	8000	0	32	
		38	Extra inlet	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	8000	0	32	
10	Min. exhaust	39	Min. exhaust	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	8000	0	32	
		40	Min. external exhaust	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	8000	0	32	
		41	Options	03, 06	u16	0-2	0 = OFF 1 = Close fume hood 2 = Economy setpoint to fume hood	0	2	2	1	
11	Max. exhaust	42	Max. exhaust	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	32000	0	128	
		43	Options	03, 06	u16	bitfield	Bit0: Used Bit1: Limit Bit2: Sound alarm in all fume hoods	0	7	0	1	
12	Output: exhaust	44	Volume range	03, 06	u16	0-3	0 = 0-8000 m3/h 1 = 0-16000 m3/h 3 = 0-4000 m3/h 2 = 0-32000 m3/h	0	3	0	1	
		45	Output range	03, 06	u16	0-1	0 = 0 - 20mA 1 = 4-20mA	0	1	0	1	
		46	Output adjust	03, 06	u16	%		50	200	100		1
13	Output: inlet	47	Volume range	03, 06	u16	0-3	0 = 0-4000 m3/h 1 = 0-8000 m3/h 2 = 0-16000 m3/h 3 = 0-32000 m3/h	0	3	0	1	
		48	Output range	03, 06	u16	0-1	0 = 0 - 20mA 1 = 4-20mA	0	1	0	1	
		49	Output adjust	03, 06	u16	%		50	200	100		1
14	Alarm: relay	50	Options	03, 06	u16	bitfield	Bit0 = Low exhaust air flow (FHR, ACU) Bit1 = Low inlet air flow (ACU) Bit2 = Low zone pressure Bit3 = Low room pressure Bit4 = High room pressure Bit5 = Communication error Bit6: Service (FHL, FHD, ACU pot.) Bit7: High air volume (room)	0	255	0	1	
		51	Delay	03, 06	u16	seconds		0	240	20		1
15	Expansion module	52	Lonwork	03, 06	u16	0-1	0 = Not used 1 = Used	0	1	0	1	
		53	Modbus address	03, 06	u16	1-247		1	247	1	1	
		54	Modbus baud rate	03, 06	u16	0-3	0 = 9600 1 = 19200 2 = 38400 3 = 57600	0	3	0	1	
		55	Modbus parity	03, 06	u16	0-2	0 = No parity 1 = Even parity 2 = Odd parity	0	2	0	1	

SAR Holding Registers
40001-40164

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16	Air balance	56	Adjust low	03, 06	s16		-100	100	0	1	
		57	Adjust high	03, 06	u16	%	50	200	100	1	
		58	Air balance	03, 06	s16	l/s or m3/h	Unit is set in SAR register 67	-3000	3000	0	25
		59	Adjust at	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	16000	0	1
		60	Current air volume	03, 06	u16	l/s or m3/h	Unit is set in SAR register 67	0	32000	0	1
17	Total exhaust	61	Total exhaust	03	u16	l/s or m3/h	Unit is set in SAR register 67				0
18	Total inlet	62	Total inlet	03	u16	l/s or m3/h	Unit is set in SAR register 67				0
19	Zone pressure	63	Zone pressure	03	u16	Pa					0
20	Zone damper ang.	64	Zone damper ang.	03	u16	deg					0
21	Room pressure	65	Room pressure	03	u16	Pa					0
22	Temperature	66	Temperature	03	u16	Celsius					0
		67	Global unit	03, 06	u16	0-1	0 = m3/h 1 = l/s	0	1	0	1
	Total nodes	68	Connected nodes	03	u16		Total number of nodes (FHR, ACU)				0
	Status	69	Comm. service	03	u16	0-1	0 = No service 1 = Service (Node connection lost)	0	1	-	-
MB20 Inputs / Outputs		70	Analog input 1	03	u16	%	Terminal block 2 on MB20	0	100		0
		71	Analog input 2	03	u16	%	Terminal block 3 on MB20	0	100		
		72	Analog output 1	03, 06	u16	%	Terminal block 10 on MB20	0	100	0	1
		73	Digital input 1	03	u16		Terminal block 7 & 8 on MB20				
		74	Digital output 1	03, 06	u16	%	Terminal block 11 & 12 on MB20	0	1	0	1

FHR Holding Registers
4xx00-4xx50

2019-12-03
Modbus protocol version: 1.3

FHR	HEADER	REG	DESCRIPTION	CMD	FORMAT	UNIT	FORMAT NOTE	MIN	MAX	DEF	STEP
		0	Connection status	03	u16	0-1	0 = OFFLINE 1 = ONLINE	0	1	0	0
1	Serial number	1	Serial number	03	u16						0
2	Program version	2	Program version	03	u16		Ex: 123 = 1.23				0
3	Setpoint	3	NORMAL	03, 06	u16	cm/s		30	150	50	1
		4	ECONOMY	03, 06	u16	cm/s		20	100	30	1
4	Anemometer (HPS 50)	5	Count	03, 06	u16			1	2	1	1
		6	Not for airvolume	03, 06	u16	0-1		0	1	0	1
		7	Mode	03, 06	u16	0-3	0 = Normal 1 = Normal Slow 2 = Analog 3 = Analog Slow	0	3	0	1
5	Alarm	8	Alarm level	03, 06	u16	%	Alarm level LED/Buzzer	20	90	80	1
		9	Delay LED	03, 06	u16	s		10	60	20	1
		10	Delay buzzer	03, 06	u16	s		10	60	20	1
		11	Buzzer reset	03, 06	u16	minutes OFF	0 = OFF	0	60	0	1
		12	Alarm relay	03, 03	u16	0-2	0 = Service 1 = ON/OFF 2 = Flow	0	2	0	1
		13	Flow alarm level	03, 06	u16	%	Only valid if Alarm relay = Flow	20	90	80	1
6	Sash pot. (FHL 95)	14	Flow alarm delay	03, 06	u16	seconds		10	60	20	1
		15	Count	03, 06	u16			0	2	1	1
		16	Ratio	03, 06	u16	0-1	0 = 1:1 1 = 1:2	0	1	0	1
		17	Sash 1 width	03, 06	u16	cm		40	250	120	1
7	ECONOMY sensor	18	Sash 2 width	03, 06	u16	cm		40	250	120	1
		19	Count	03, 06	u16		Economy sensor, PD 30, IR 50, IR 60	0	2	1	1
		22	Onset delay	03, 06	u16	seconds		5	240	20	1
		23	Alarm sash high	03, 06	u16	cm or OFF	0 = OFF	0 10	50	0	1
		24	Motor sash	03, 06	u16	0-1	0 = Not used 1 = Used	0	1	0	1
8	Sash motor	25	Lower on economy	03, 06	u16	0-1		0	1	0	1
		26	Options	03, 06	u16	0-3	1 = 1 damper (FHD) 2 = 2 damper (FHD) 3 = Fan	1	3	1	1
		27	Damper 2 inverted	03, 06	u16	0-1	0 = Not inverted 1 = Inverted	0	1	0	1
9	Dampers	28	Damper 2 input	03, 06	u16	0-1	1 = Use damper 2 as analog input for air volume	0	1	0	1
		29	Min. air limit	03, 06	u16	(l/s or m ³ /h) OFF	0 = OFF Unit set in SAR register 67	0 100	1000	0	20
		30	Max. air limit	03, 06	u16	(l/s or m ³ /h) OFF	0 = OFF Unit set in SAR register 67	0 200	4000	0	20
		31	Buzzer options	03, 06	u16	bitfield	00 = Both OFF 01 = Max. air limit buzzer ON 10 = Max. sash opening buzzer ON 11 = Both ON	0	3	0	1
		32	Max. sash opening	03, 06	u16	cm OFF	0 = OFF	0 10	100	0	1
		33	Min. damper angle	03, 06	u16	deg		0	90	0	1
10	Air limits	34	Max. damper angle	03, 06	u16	deg		0	90	90	1
		35	Button options	03, 06	u16	bitfield	Bit 0: Off on external input (SAR) Bit 1: Force on Bit 2: Rig/Off on	0	7	0	1
		36	Forced damper angle	03, 06	u16	deg		0	90	90	1
		37	Forced recall	03, 06	u16	min or OFF	0 = OFF	0	60	0	1
11	Misc. settings	38	Rig/Off damper angle	03, 06	u16	deg		0	90	0	1
		39	Rig/Off recall	03, 06	u16	min or OFF	0 = OFF	0	60	0	1
12	Expansion module	40	Expansion connected	03, 06	u16	0-1	0 = No 1 = Yes	0	1	0	1
13	Sash pot. adjust	41	Sash pot. 1 adjust	03, 06	s16	cm	Signed integer	-10	10	0	1
		42	Sash pot. 2 adjust	03, 06	s16	cm	Signed integer	-10	10	0	1
14	Damper relation	43	FHD relation	03, 06	u16	%	FHD1 - FHD2 relation	50	200	100	1
15	Air flow adjust	44	Adjust low	03, 06	u16	%		50	200	100	1
		45	Adjust high	03, 06	u16	%		50	200	100	1
16	Damper 1	46	Damper 1 angle	03	u16	deg					0
17	Damper 2	47	Damper 1 angle	03	u16	deg					0
18	Air volume	48	Air volume	03	u16	l/s or m ³ /h	Unit set in SAR register 67				0
19	Sash 1	49	Sash 1 height	03	u16	cm					0
20	Sash 2	50	Sash 2 height	03	u16	cm					0
	Fume hood status	51	Alarm status	03	u16	0-1	0 = No alarm 1 = Alarm	0	1		
		52	Service status	03	u16	0-1	0 = No service 1 = Service	0	1		

ACU Holding Registers
4xx00-4xx11

ACU.X	HEADER	REG	DESCRIPTION	CMD	FORMAT	UNIT	FORMAT NOTE	MIN	MAX	DEF	STEP
		0	Connection status	03	u16	0-1	0 = OFFLINE 1 = ONLINE	0	1	0	1
1	Serial number	1	Serial number	03	u16			0	32000	500	1
2	Program version	2	Program version	03	u16		Ex: 123 = 1.23	0	65535	100	1
3	Diameter	3	Diameter	03	u16	0-4	0 = 160 mm 1 = 200 mm 2 = 250 mm 3 = 315 mm 4 = 400 mm	0	4		1
4	Group	4	Group	03, 06	u16	0-2	0 = Min. exhaust 1 = Group 1 2 = Group 2	0	2	1	1
		5	Controller mode	03, 06	u16	0-3	0 = Normal 1 = Normal Slow 2 = Analog 3 = Analog Slow	0	3	0	1
5	Alarm	6	Alarm level	03, 06	u16	%		20	90	80	1
		7	Alarm delay	03, 06	u16	s		10	60	20	1
6	Damper angle	8	Damper angle	03	u16	deg					
7	Air volume	9	Air volume	03	u16	l/s or m3/h	Unit is set in SAR register 67				
8	Air velocity	10	Air velocity	03	u16	cm/s					
9	Setpoint	11	Setpoint	03	u16	cm/s					
	Status	12	Alarm status	03	u16	0-1	0 = No alarm 1 = Alarm	0	1		
		13	Service status	03	u16	0-1	0 = No service 1 = Service	0	1		