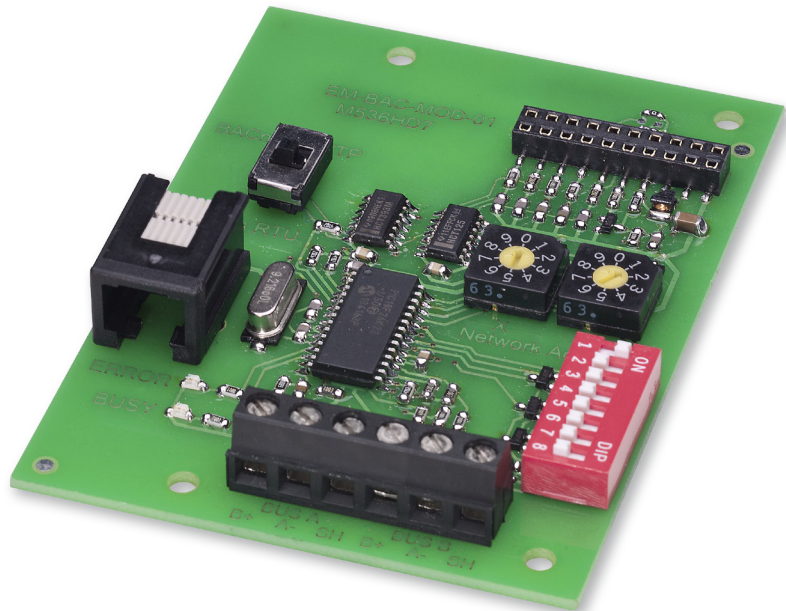


Expansion modules

Type EM-BAC-MOD



BACnet and Modbus interface for EASYLAB controllers and adapter modules

Expansion module for EASYLAB fume cupboard controllers, room controllers, extract air controllers, supply air controllers, and adapter modules, for the integration of rooms or individual volume flow controllers with the central BMS

- Switching between BACnet MS/TP and Modbus RTU
- BACnet Standardised Device Profile (Annex L)
- Modbus interface with individual data registers
- Native BACnet interface by integrating the expansion module with EASYLAB components
- Easy retrofitting
- Double-stack terminal blocks for the EIA-485 bus
- Equipment address and data transfer parameters can be defined

Interface to central BMS

- When used on a controller with active room management function (RMF) the module provides also data points for the entire room, e.g. for total volume flows or consolidated alarms
- When used on a single controller: data points for volume flow rate, alarm, damper blade position, or others
- Centralised operating mode default setting, e.g. night-time operation

Modbus®

Modbus-Schnittstelle

BACnet™

BACnet-MS/TP-Schnittstelle

Type		Page
EM-BAC-MOD	General information	BM – 2
	Function	BM – 3
	Technical data	BM – 4
	Specification text	BM – 5
	Order code	BM – 6
	Single controller	BM – 7
	EASYLAB room	BM – 8
	BACnet interface	BM – 9
	Modbus interface	BM – 14
	Product details	BM – 17
	Installation details	BM – 28

Application

Application

- Expansion module Type EM-BAC-MOD for the EASYLAB system
- BACnet-MS/TP or Modbus RTU interface to the central BMS
- Data points for individual controllers or for the room
- Room interface: Default setting of room operating modes within the EASYLAB system, increase or reduction of the air change rate, readout of the actual room operating values or evaluated damper blade positions, consolidated alarms
- Controller interface: Operating mode default setting for a single fume cupboard controller, readout of individual operating values such as volume flow rates for single controllers, or individual alarms
- Can be used with fume cupboard, supply air, extract air or differential pressure controller EASYLAB TCU3 and with adapter module TAM
- For use in laboratories, clean rooms in the

pharmaceutical and semiconductor industries, operating theatres, intensive care units, and offices with very demanding control requirements

- Factory mounted or for retrofitting into the EASYLAB base component casing

Special characteristics

- Ready for installation, can be easily connected to the main PCB
- Interface for EIA-485 networks BACnet MS/TP and Modbus RTU
- BACnet Protocol Revision 12.0
- Only standard BACnet objects or Modbus registers are used for communication
- Data interface for an EASYLAB controller or for an EASYLAB room with different functional profiles
- Hardware switch to enter network addresses and communication parameters (no communication software required)

Description

Parts and characteristics

- Microprocessor with setup programme stored in nonvolatile memory
- EIA-485 communication interface
- Slide switch to switch between BACnet and Modbus communication protocols
- Two address switches, X and Y, to set equipment addresses 1-99
- 8-way DIP switches to adjust the communication parameter
- Double-stack terminal blocks for the EIA-485 network (simple wiring)
- Two indicator lights indicate communication

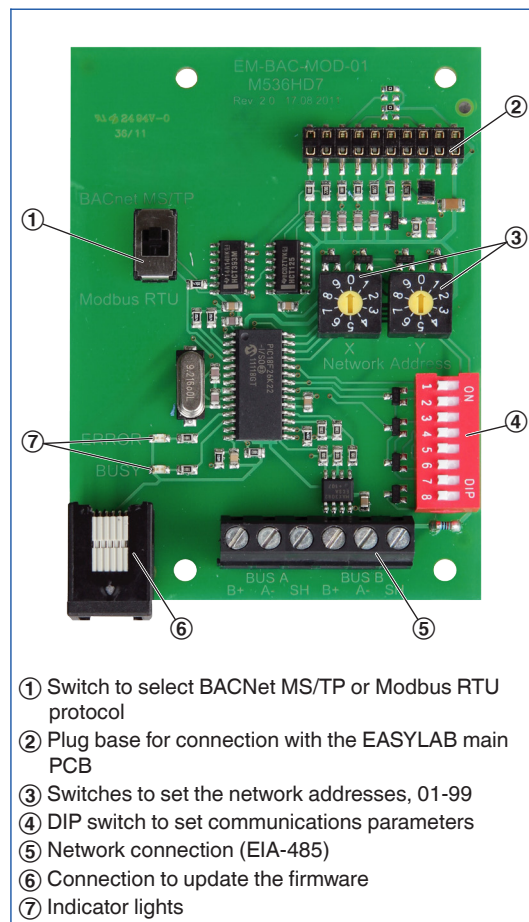
and errors, respectively

- Connection to update the firmware
- EIA-485 terminal resistor that can be activated

Construction features

- PCB dimensions and fixing points correspond to the EASYLAB main PCB and the casing
- Fixing with screws
- Pin header to connect the module to the main PCB of the TCU3 or TAM

EM-BAC-MOD



Functional description

The expansion module EM-BAC-MOD is used to integrate EASYLAB controllers Type TCU3 or EASYLAB adapter modules Type TAM into a BACnet (MS/TP) network and in this way connect them to the central BMS.

The BACnet or Modbus interface supports the EASYLAB room operating mode concept. It is possible to set operating mode defaults in order to control different volume flow rates for daytime and night-time operation; it is also possible to increase

or reduce the air change rate (volume flow rate setpoint change), e.g. to influence the room temperature.

Using the BACnet or Modbus interface, an individual alarm management system can be set up by consolidating configurable EASYLAB alarms. The interface also enables the transfer of actual operating values such as volume flow rates and damper blade position for a controller or for all controllers in a room.

Supply voltage	5 V DC from controller or adapter module
Communication interface	EIA-485 standard
Protocol	BACnet MS/TP standard rev. 12 or Modbus RTU
Data transmission speeds	BACnet: 9600, 19200, 38400, 76800 Bd, Modbus: 9600, 19200, 38400, 57600 Bd
Parity checks for data transmission security	None, odd, even
Configurable network addresses	01 ... 99
Operating temperature	0 – 50 °C
IEC protection class	III (protective extra-low voltage)
Protection level	IP 20
EC conformity	EMC according to 2004/108/EC
Dimensions (B × H × T)	78 × 65 × 100 mm

Expansion module to supplement an EASYLAB base component (controller TCU3 or adapter module TAM) with a BACnet or Modbus interface to link rooms or individual volume flow controllers to the central BMS.

The expansion module includes an interface for EIA-485 networks that can be used for BACnet MS/TP or Modbus RTU (switching), a switch to enter communication parameters, a connection to update the firmware, and indicator lights.

Special characteristics

- Ready for installation, can be easily connected to the main PCB
- Interface for EIA-485 networks BACnet MS/TP and Modbus RTU
- BACnet Protocol Revision 12.0
- Only standard BACnet objects or Modbus registers are used for communication
- Data interface for an EASYLAB controller or for an EASYLAB room with different functional profiles
- Hardware switch to enter network addresses and communication parameters (no communication software required)

Technical data

- Communication interface: EIA-485 standard
- Protokoll: BACnet MS/TP standard rev. 12 or Modbus RTU
- Data transmission speeds: BACnet: 9600, 19200, 38400, 76800 baud, Modbus: 9600, 19200, 38400, 57600 baud
- Parity checks for data security: none, odd, even
- Configurable network addresses: 01 ... 99
- Operating temperature: 0 to 50 °C
- IEC protection class: III (protective extra-low voltage)
- Protection level: IP 20
- EC conformity: EMC to 2004/108/EC

Data points for a single controller

- Volume flow rate actual and setpoint values
- Damper blade position
- Operating mode
- Alarm/status messages

- Total supply air and total extract air actual values (room)
- Evaluated damper blade positions for all controllers in a room
- Number of controllers
- Integration of volume flows

Additional data points for a fume cupboard controller

- Operating mode default setting for the fume cupboard controller equipped with the expansion module
- Selection of priority for operating mode default setting
- Face velocity actual value and setpoint value (only for fume cupboard controllers with face velocity transducer, equipment function FH-VS)

Data points for an EASYLAB room

- Operating mode default setting for the room: Just one data point is required to set the default operating mode for all controllers in a room
- Selection of priority for operating mode default setting (central BMS or room)
- Room operating mode
- Volume flow rate setpoint change (by the central BMS, for example) for an external temperature or differential pressure control
- Setpoint value switching for differential pressure control: Switching between two differential pressure setpoint values
- Total supply air and total extract air actual values (room)
- Evaluated damper blade positions for all controllers in a room
- Room differential pressure actual and setpoint values
- Room pressure alarm
- Number of controllers within the EASYLAB system
- Integration of volume flows
- Status of the digital inputs and outputs
- Configurable consolidated alarm (operating statuses, hardware faults)

- Any attachments are to be defined with the order code of the VAV terminal unit.
- Retrofit possible

Bestellschlüsseldetail für Anbaugruppe ELAB EASYLAB Regler TCU3 oder TAM

ELAB / ...B... / ...

ELAB / ...M... / ...

Erweiterungsmodule

B EM-BAC-MOD für BACnet MS/TP

M EM-BAC-MOD für Modbus RTU

Expansion module EM-BAC-MOD for retrofit

EM – BAC – MOD

Single controller

Interface for one EASYLAB controller

- Local data interface for a fume cupboard controller, supply air controller, extract air controller, or adapter module TAM

Data points for a single controller

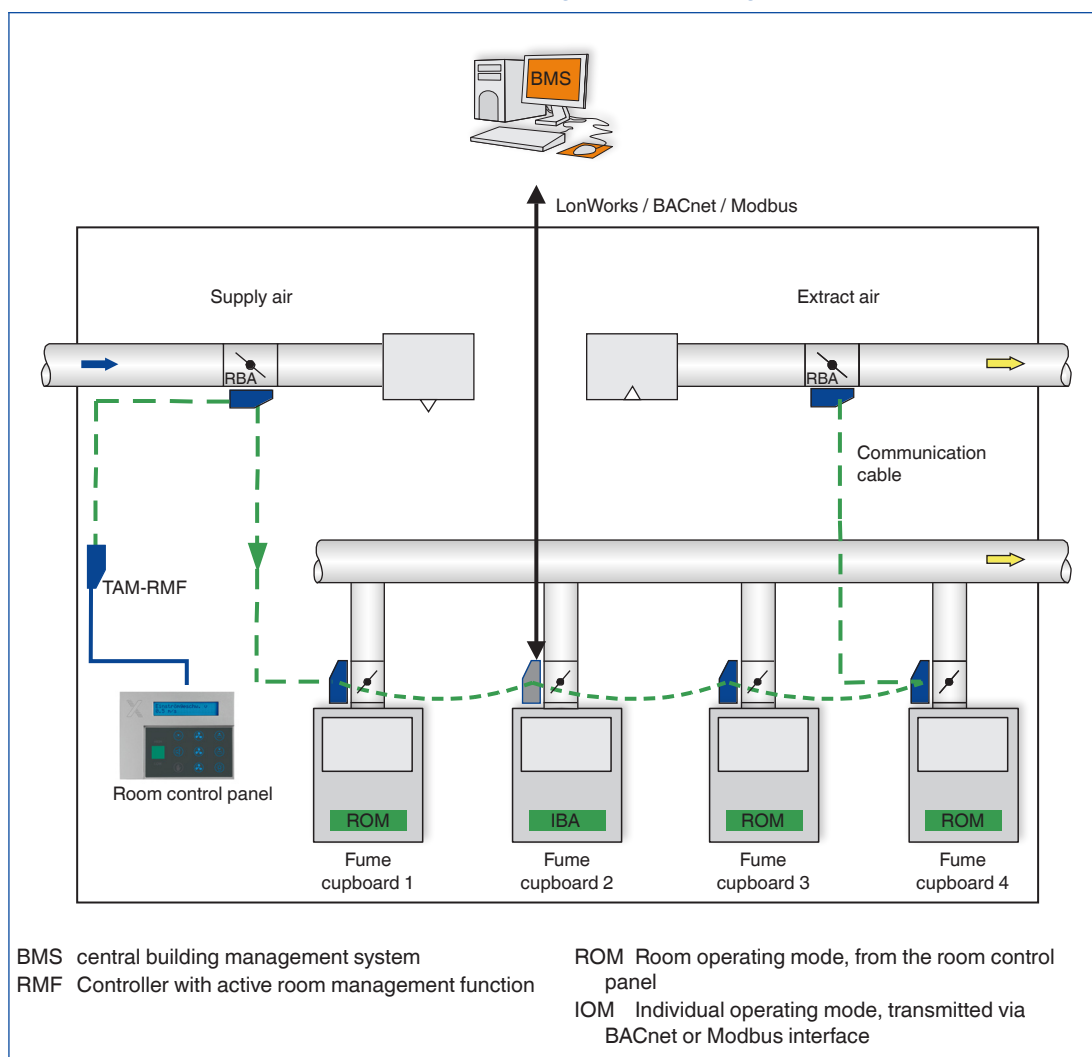
- Volume flow rate actual and setpoint values
- Damper blade position
- Operating mode
- Alarm/status messages
- Total supply air and total extract air actual values (room)
- Evaluated damper blade positions for all controllers in a room

- Number of controllers within the EASYLAB system
- Integration of volume flows
- Status of the digital inputs and outputs

Additional data points for a fume cupboard controller

- Operating mode default setting for the fume cupboard controller equipped with the expansion module
- Selection of priority for operating mode default setting
- Face velocity actual value and setpoint value (only for fume cupboard controllers with face velocity transducer, equipment function FH-VS)

LonWorks, BACnet or Modbus interface on a single controller, e.g. fume cupboard controller



EASYLAB room

Interface for one EASYLAB room

- Local data interface for a TCU3 room controller (supply air or extract air) or TAM adapter module with active room management function
- Room management function reduces the required number of network data points and hence the commissioning costs
- Transmission of local data for the single controller and for the room

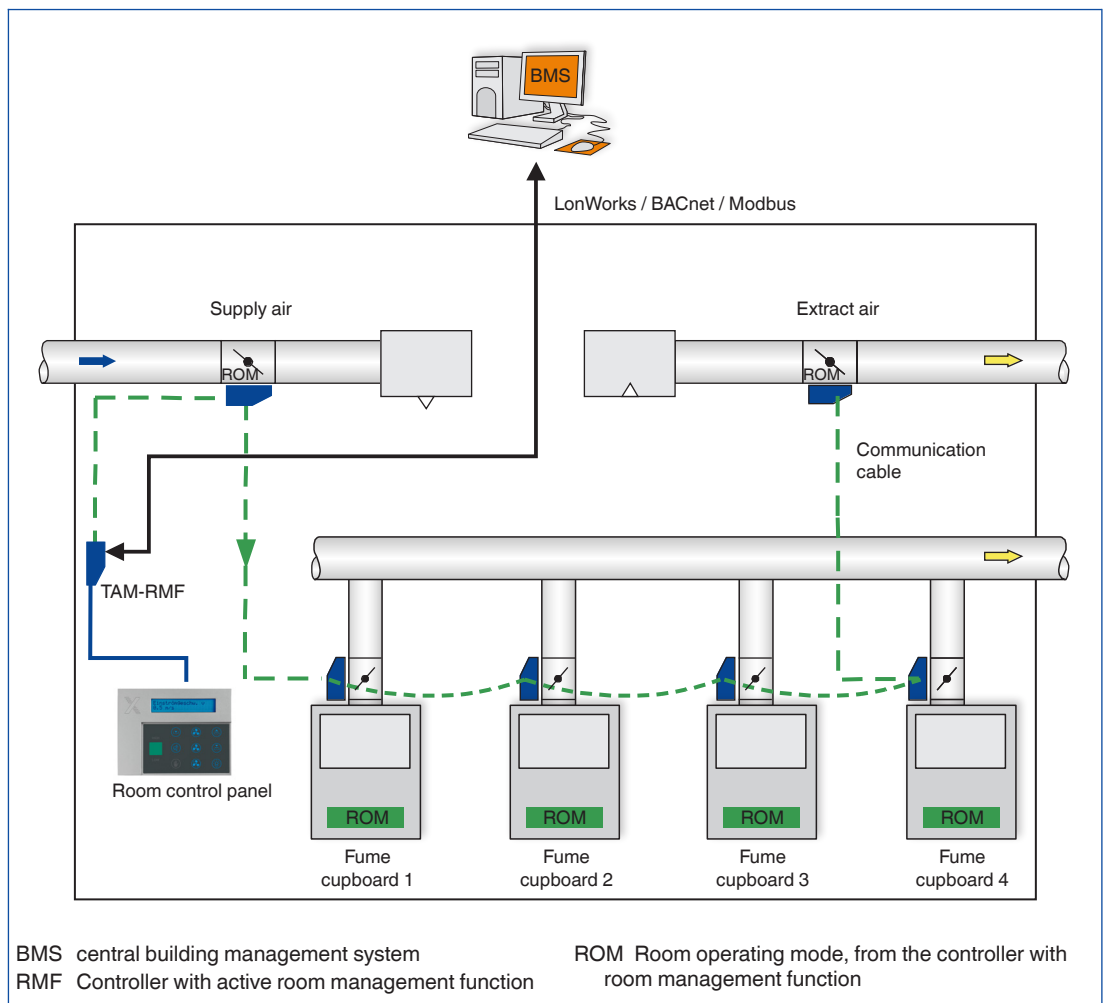
Data points for an EASYLAB room controller

- Operating mode default setting for the room: Just one data point is required to set the default operating mode for all controllers in a room
- Selection of priority for operating mode default setting (central BMS or room)
- Room operating mode
- Volume flow rate setpoint change (by the central BMS, for example) for an external

temperature or differential pressure control

- Setpoint value switching for differential pressure control: Switching between two differential pressure setpoint values
- Total supply air and total extract air actual values (room)
- Evaluated damper blade positions for all controllers in a room
- Room differential pressure actual and setpoint values
- Room pressure alarm
- Number of controllers within the EASYLAB system
- Integration of volume flows
- Status of the digital inputs and outputs
- Configurable consolidated alarm (operating statuses, hardware faults)
- Control input signal for sun protection/blinds (to be provided by others)

LonWorks, BACnet or Modbus interface for an EASYLAB room, e.g. on a room controller with active room management function



BACnet interface

Application

The expansion module EM-BAC-MOD supports the following interface functions on an EASYLAB controller TCU3 or an adapter module TAM if the BACnet protocol has been selected:

- Native BACnet, i.e. the BACnet interface is implemented on the field module (EASYLAB volume flow controller)
- External hardware components such as

- physical gateways are not required
- BACnet interface documentation includes the following documents: Protocol Implementation Conformance Statement (PICS), BACnet Interoperability Building Blocks Supported (BIBBS), as well as a description of the device object and the supported objects
- For more information on each data point see the Details section

BACnet PICS (Protocol Implementation Conformance Statement) – Overview

Principal categories	Values
Date	2014-01-21
Vendor name	TROX GmbH
Vendor identifier	329
Product name	EM-BAC-MOD
Model no.	M536HD7
Application	4.0
Firmware Revision	4.0
BACnet Protocol Revision	12
Standardised Device Profile	BACnet Application Specific Controller (B-ASC)
Segmentation Capability	No
Data Link Layer Options	MS/TP master (Clause 9), Baudrates 9600, 19200, 38400, 76800
Device Address Binding	No
Network Security Options	Non-secure Device - is capable of operating without BACnet Network Security
Character Sets Supported	ISO 10646 (UTF-8)

Configuration switches

Hexadecimal Switches X, Y	Network address			
DIP Switch 1	OFF	ON		
Controller	EASYLAB TCU3	Other		
DIP Switch 2	OFF	ON	OFF	ON
DIP Switch 3	OFF	OFF	ON	ON
Baud rate	9600	19200	38400	76800

BIBBS - BACnet Interoperability Building Blocks Supported

Data Sharing-ReadProperty-B	DS-RP-B
Data Sharing-WriteProperty-B	DS-WP-B
Data Sharing-COV-Unsolicited-B	DS-COVU-B
Device Management-Dynamic Device Binding-B	DM-DDB-B
Device Management-Dynamic Object Binding-B	DM-DOB-B
Device Management-Device Communication Control-B	DM-DCC-B
Device Management-ReinitialiseDevice-B	DM-RD-B

DeviceObject

Property	Value	Access
Object identifier	Device instance; default instance = 32900 + set network address	WR, RD; E
Object name	Default="EM-BACnet"; project-specific description can be entered, 62 characters max.	WR, RD; E
Object type	Device (8)	RD
System_Status	OPERATIONAL (0)	RD
Vendor_Name	"TROX GmbH"	RD
Vendor_Identifier	329	RD
Model_Name	"EM-BAC-MOD"	RD
Description	Default = "EASYLAB"; description can be entered, 126 characters max.	WR, RD; E
Location	Default = ""; description can be entered, 62 characters max.	WR, RD; E
Firmware_Revision	"4.0" (EASYLAB)	RD
Application_Software_Version	"4.0" (EASYLAB)	RD
Protocol_Version	1	RD
Protocol_Revision	12	RD
Protocol Services Supported	Who-is, Who-has, Read-Property, Write-Property, Device-communication-control, Reinitialize-device	RD
Protocol_Object_Types_Supported	DEVICE, ANALOG_VALUE, BINARY_VALUE, MULTISTATE_VALUE	RD
Object_List	EASYLAB: device, analog-value 1...36, binary-value 1...30, multistate-value 1...8	RD
Max_ADPU_Length_Accepted	480	RD
Segmentation_Supported	NO_SEGMENTATION (3)	RD
APDU_Timeout	10000	RD
Number_Of_APDU_Retries	3	RD
Device_Address_Binding	-	RD
Database_Revision	0	RD
Description	Controller Type "EASYLAB"	RD
Max_Master	Default 127	WR, RD; E
Max_Info_Frames	Default 1	WR, RD; E

Multistate Value Objects

Instance	Designation	Unit						Access
		TCU3			TAM			
		Available with equipment function						
		FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
1	COVU mode	x	x	x	x	x	x	WR, RD
2	Mode	x ¹		x			x	WR, RD
3	ModeAct	x	x	x	x			RD
4	RoomModeAct			x			x	RD
5	SwitchPos	x						RD
6	Sunblind			x			x	WR, RD
7	SC_SetLockHighPrio							WR, RD
8	SC_GetLockHighPrio							RD

¹ only for individually selected operating mode (stand-alone operation)

FH: Fume cupboard controller

RR: Room controller for supply air or extract air (RS, RE, PC)

RR RMF: Room controller with active room management function

EC, SC: Single controller for supply air or extract air (EC, SC)

TAM: Adapter module

TAM RMF: Adapter module with active room management function

Analogue Value Objects

Instance	Designation	Unit	Unit						Access
			TCU3			TAM			
			Available with equipment function						
			FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
1	VolflowSet	l/s (87)	x	x	x	x		x	RD
2	VolflowAct	l/s (87)	x	x	x	x		x	RD
3	VolTotalExh	l/s (87)	x	x	x	x	x	x	RD
4	VolTotalSup	l/s (87)	x	x	x	x	x	x	RD
5	PressSet	Pa (53)				x		x	RD
6	PressAct	Pa (53)				x		x	RD
7	VelocitySet	m/s (74)	x						RD
8	VelocityAct	m/s (74)	x						RD
9	WireSensorPos	percent (98)	x						RD
10	DampPos	percent (98)	x	x	x	x			RD
11	DampPosMax_FH	percent (98)	x	x	x	x	x	x	RD
12	DampPosMin_FH	percent (98)	x	x	x	x	x	x	RD
13	DampPosMax_RE	percent (98)	x	x	x	x	x	x	RD
14	DampPosMin_RE	percent (98)	x	x	x	x	x	x	RD
15	DampPosMax_TE	percent (98)	x	x	x	x	x	x	RD
16	DampPosMin_TE	percent (98)	x	x	x	x	x	x	RD
17	DampPosMax_RS	percent (98)	x	x	x	x	x	x	RD
18	DampPosMin_RS	percent (98)	x	x	x	x	x	x	RD
19	VolOffset_T	percent (98)				x		x	WR, RD
20	VolOffset_P	percent (98)				x		x	WR, RD
21	SystemDevices	no units (95)	x	x	x	x	x	x	RD

Analogue Value Objects

Instance	Designation	Unit	Unit						Access
			TCU3			TAM			
			Available with equipment function						
			FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
22	VolflowExh	l/s (87)	x	x	x		x	x	WR, RD
23	VolflowSup	l/s (87)	x	x	x		x	x	WR, RD
24	SC_SetPos	percent (98)							WR, RD
25	SC_GetPos	percent (98)							RD
26	DampPosMax_EC	percent (98)	x	x	x	x	x	x	RD
27	DampPosMin_EC	percent (98)	x	x	x	x	x	x	RD
28	DampPosMax_SC	percent (98)	x	x	x	x	x	x	RD
29	DampPosMin_SC	percent (98)	x	x	x	x	x	x	RD
30	DampPosMax_TS	percent (98)	x	x	x	x	x	x	RD
31	DampPosMin_TS	percent (98)	x	x	x	x	x	x	RD
32	VolflowSet_R	l/s (87)							WR, RD
33	PressSet	pascal (57)							WR, RD
34	Volt_AI2	volt (5)	x	x	x	x	x	x	RD
35	Volt_AI3	volt (5)	x	x	x	x	x	x	RD
36	Volt_AO2	volt (5)	x	x	x	x	x	x	WR, RD

FH: Fume cupboard controller

RR: Room controller for supply air or extract air (RS, RE, PC)

RR RMF: Room controller with active room management function

EC, SC: Single controller for supply air or extract air (EC, SC)

TAM: Adapter module

TAM RMF: Adapter module with active room management function

Binary Value Objects

Instance	Designation	Unit						Access
		TCU3			TAM			
		Available with equipment function						
		FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
1	LocalAlarm (COVU)	x	x	x	x	x	x	RD
2	SummaryAlarm (COVU)			x			x	RD
3	PressAlarm (COVU)			x			x	RD
4	ManOP_Disable	x ¹		x			x	WR, RD
5	PressSetSel			x			x	WR, RD
6	DI1	x	x	x	x	x	x	RD
7	DI2	x	x	x	x	x	x	RD
8	DI3	x	x	x	x	x	x	RD
9	DI4	x	x	x	x	x	x	RD
10	DI5	x	x	x	x	x	x	RD
11	DI6	x	x	x	x	x	x	RD
12	DO1	x	x	x	x	x	x	RD
13	DO2	x	x	x	x	x	x	RD
14	DO3	x	x	x	x	x	x	RD
15	DO4	x	x	x	x	x	x	RD
16	DO5	x	x	x	x	x	x	RD
17	DO6	x	x	x	x	x	x	RD
18	SC_Alarm							RD
19	DO1_Set	x	x	x	x	x	x	WR, RD
20	DO2_Set	x	x	x	x	x	x	WR, RD
21	DO3_Set	x	x	x	x	x	x	WR, RD
22	DO4_Set	x	x	x	x	x	x	WR, RD
23	DO5_Set	x	x	x	x	x	x	WR, RD
24	DO6_Set	x	x	x	x	x	x	WR, RD
25	DO1_SetByLocal	x	x	x	x	x	x	RD
26	DO2_SetByLocal	x	x	x	x	x	x	RD
27	DO3_SetByLocal	x	x	x	x	x	x	RD
28	DO4_SetByLocal	x	x	x	x	x	x	RD
29	DO5_SetByLocal	x	x	x	x	x	x	RD
30	DO6_SetByLocal	x	x	x	x	x	x	RD

¹ only for individually selected operating mode (stand-alone operation)

FH: Fume cupboard controller

RR: Room controller for supply air or extract air (RS, RE, PC)

RR RMF: Room controller with active room management function

EC, SC: Single controller for supply air or extract air (EC, SC)

TAM: Adapter module

TAM RMF: Adapter module with active room management function

Modbus interface

Application

The expansion module EM-BAC-MOD supports the following interface functions on an EASYLAB controller TCU3 or an adapter module TAM if the Modbus protocol has been selected:

- Modbus is an open serial master-slave communication protocol which has become a de facto standard for the industry
- The master (e.g. central BMS) can address a number of slaves (EASYLAB volume flow controllers) and use Modbus functions to request information from individual data points

- Data access is based on numbered data registers which the master has to define in order to request data using Modbus functions
- The slave responds by either returning the requested information or an exception code (error)
- Example: The Read Holding Registers function (register no. 3) returns the volume flow rate actual value of the addressed controller
- General information for a Modbus device can be read out using the Read Device Identification function

Modbus functions

Function no.	Designation	Meaning
1 (0x01)	Read Coils	Read states of 1 to 8 bits according to bit list
3 (0x03)	Read Holding Registers	Read several consecutive registers
4 (0x04)	Read Input Registers	Read several consecutive registers
5 (0x05)	Write Single Coil	Write state of a single bit
6 (0x06)	Write Single Register	Write single register
8 (0x08)	Diagnostics	Check Modbus communication
16 (0x10)	Write Multiple Registers	Write several consecutive registers
43 (0x2B)	Read Device Identification	Read identification data for the device
14 (0x0E)	Read Device Identification	Read identification data for the device

Exception codes

Codes	Designation	Meaning
1	Illegal Function Code	Unknown function or subfunction code
2	Illegal Data Address	Invalid register address
3	Illegal Data Value	Inconsistent coding for number of registers/bytes, data value

Exception codes (error codes) are returned in case of invalid function or register access.

Bit list for ReadCoil/WriteSingleCoil functions

Bit	Bit	Unit						Access
		TCU3			TAM			
		Available with equipment function						
No.	Designation	FH	RR	RR-RMF	EC, SC	TAM	TAM-RMF	
0	ManOP_Disable	x ¹		x			x	WR
1	PressSetSel			x			x	WR
2	Local Alarm	x	x	x	x	x	x	RD
3	SummaryAlarm			x			x	RD
4	PressAlarm			x			x	RD
5	SC_SetlockHighPrio							WR
6	SC_GetLockHighPrio							RD
7	SC_Alarm							RD

¹ only for individually selected operating mode (stand-alone operation)

Bits are read with function 1 (RD) or written with function 5 (WR).

FH: Fume cupboard controller

RR: Room controller for supply air or extract air (RS, RE, PC)

RR RMF: Room controller with active room management function

EC, SC: Single controller for supply air or extract air (EC, SC)

TAM: Adapter module

TAM RMF: Adapter module with active room management function

Register list for Read***Registers and Write***Registers functions

Register No.	Register Designation	Unit						Access
		TCU3				TAM		
		Available with equipment function						
		FH	RR	RR- RMF	EC, SC	TAM	TAM- RMF	
0	Mode	x ¹		x			x	WR
1	ManOP_Disable	x ¹		x			x	WR
2	ModeAct	x	x	x	x			RD
3	VolflowAct	x	x	x	x			RD
4	VolflowSet	x	x	x	x			RD
5	VelocityAct	x						RD
6	VelocitySet	x						RD
7	VolTotalExh	x	x	x	x	x	x	RD
8	VolTotalSup	x	x	x	x	x	x	RD
9	VolOffset_T			x			x	WR
10	VolOffset_P			x			x	WR
11	PressAct			x			x	RD
12	PressSet			x			x	RD
13	PressSetSel			x			x	WR
14	DampPos	x	x	x	x			RD
15	DampPosMax_FH - Value	x	x	x	x	x	x	RD
16	DampPosMax_FH - Status	x	x	x	x	x	x	RD
17	DampPosMin_FH - Value	x	x	x	x	x	x	RD
18	DampPosMin_FH - Status	x	x	x	x	x	x	RD
19	DampPosMax_RE - Value	x	x	x	x	x	x	RD
20	DampPosMax_RE - Status	x	x	x	x	x	x	RD
21	DampPosMin_RE - Value	x	x	x	x	x	x	RD
22	DampPosMin_RE - Status	x	x	x	x	x	x	RD
23	DampPosMax_TE - Value	x	x	x	x	x	x	RD
24	DampPosMax_TE - Status	x	x	x	x	x	x	RD
25	DampPosMin_TE - Value	x	x	x	x	x	x	RD
26	DampPosMin_TE - Status	x	x	x	x	x	x	RD
27	DampPosMax_RS - Value	x	x	x	x	x	x	RD
28	DampPosMax_RS - Status	x	x	x	x	x	x	RD
29	DampPosMin_RS - Value	x	x	x	x	x	x	RD
30	DampPosMin_RS - Status	x	x	x	x	x	x	RD
31	LocalAlarm	x	x	x	x	x	x	RD
32	SummaryAlarm			x			x	RD
33	PressAlarm			x			x	RD
34	WireSensorPos	x						RD
35	SwitchPos	x						RD
36	RoomModeAct			x			x	RD
37	SystemDevices	x	x	x	x	x	x	RD
38	SunBlind			x			x	WR
39	StateDI	x	x	x	x	x	x	RD
40	StateDO	x	x	x	x	x	x	RD
41	VolflowExh	x	x	x			x	WR
42	VolflowSup	x	x	x			x	WR

¹ only for individually selected operating mode (stand-alone operation)

Register list for Read***Registers and Write***Registers functions

Register No.	Register Designation	Unit						Access
		TCU3			TAM			
		Available with equipment function						
		FH	RR	RR- RMF	EC, SC	TAM	TAM- RMF	
43	SC_SetLockHighPrio							WR
44	SC_GetLockHighPrio							RD
45	SC_SetPos - Value							WR
46	SC_SetPos - Status							WR
47	SC_GetPos							RD
48	SC_Alarm							RD
49	DampPosMax_EC - Value	x	x	x	x	x	x	RD
50	DampPosMax_EC - Status	x	x	x	x	x	x	RD
51	DampPosMin_EC - Value	x	x	x	x	x	x	RD
52	DampPosMin_EC - Status	x	x	x	x	x	x	RD
53	DampPosMax_SC - Value	x	x	x	x	x	x	RD
54	DampPosMax_SC - Status	x	x	x	x	x	x	RD
55	DampPosMin_SC - Value	x	x	x	x	x	x	RD
56	DampPosMin_SC - Status	x	x	x	x	x	x	RD
57	DampPosMax_TS - Value	x	x	x	x	x	x	RD
58	DampPosMax_TS - Status	x	x	x	x	x	x	RD
59	DampPosMin_TS - Value	x	x	x	x	x	x	RD
60	DampPosMin_TS - Status	x	x	x	x	x	x	RD
61	DO_Set	x	x	x	x	x	x	WR
62	DO_SetByLocal	x	x	x	x	x	x	RD
63	VolflowSet_R							WR, RD
64	PressSet							WR, RD
65	Volt_AI2	x	x	x	x	x	x	RD
66	Volt_AI3	x	x	x	x	x	x	RD
67	Volt_AO2	x	x	x	x	x	x	WR, RD

FH: Fume cupboard controller

RR: Room controller for supply air or extract air (RS, RE, PC)

RR RMF: Room controller with active room management function

EC, SC: Single controller for supply air or extract air (EC, SC)

TAM: Adapter module

TAM RMF: Adapter module with active room management function

Data points – detailed description

The following is a detailed description of the information that each data point provides; input variables and output variables are described separately:

- Name of data point
- Access as viewed from the central BMS
- WR – Defaults for the volume flow controller or room, from the central BMS
- RD – Data provided by the volume flow controller or room
- List of volume flow controller equipment functions for which the variable is available
- Unit of measure (applies only to BACnet objects of type Analogue Value Object)
- Function and special functional values with their meaning
- Access to the data point using a BACnet object or Modbus register

Input variables

COVU mode

BACnet only

BMS access: WR RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Function

- BACnet control function used to indicate how unsolicited Change of Value notifications

(COVU), that are used to mark some Binary Value Objects, should be sent

Data point

BACnet: Multistate Value Object – Instance 1

- 1 = no broadcast
- 2 = local broadcast (only local in the MS/TP network of EM-BAC-MOD)
- 3 = global broadcast (in all networks)

Mode

BMS access: WR RD

Equipment functions: FH, RR with RMF, TAM with RMF

Function

- FH: Operating mode default setting for a single fume cupboard controller, only with individual operating mode default setting (stand-alone operation)
- RMF: Operating mode default setting for the entire EASYLAB room
- The valid binding of the input variable results in a valid operating mode default setting via BACnet or Modbus
- The invalid binding of an input variable or failure to set an operating mode default results in no operating mode default being set for the EASYLAB controller or room
- Which operating mode is then used depends on the default options available on the controller

Functional values (BACnet / Modbus)

- 1/0 = No default: The central BMS does not

default an operating mode for the controller or room. The operating mode is set locally, e.g. on the room control panel, on the fume cupboard control panel, or using switch contacts. If the operating mode is not set locally, the controller activates standard mode.

- 2/1 = Standard mode: Normal operation in the daytime (in Germany: usually according to DIN 1946, part 7, 25 m³/h extract air per m² main useful floor area)
- 3/2 = Reduced operation: Low mode in comparison to standard mode, e.g. as a night-time setback
- 4/3 = Increased operation: High mode in comparison to standard mode, e.g. in an emergency
- 5/4 = Shut-off: Shut-off of the volume flow controller, e.g. to save energy at night or to shut down the system
- 6/5 = OPEN position: Open position of the volume flow controller

Data point

- BACnet: Multistate Value Object – Instance 2
- Modbus: Register 0

Sunblind

BMS access: WR RD

Equipment functions: RR with RMF, TAM with RMF

from firmware version EM-BAC-MOD 2.0 and TCU3, TAM 3.0

Function

- Control input signal for sun protection/blinds, connected to the controller or adapter module
 - Switch outputs DO5 and DO6 will be used
 - This BACnet or Modbus default overrides any other defaults from the local room control panel
- Data point
BACnet: Multistate Value Object – Instance 6
- 1 = No default
 - 2 = Close blinds (activate switch output DO6)
 - 3 = Open blinds (activate switch output DO5)
- Modbus: Register 38
- 0 = Close blinds
 - 1 = Open blinds
 - 0xFF = No default
-

SC_SetLockHighPrio

BMS access: WR RD

Function

- Close and lock sash, high priority
- Data point
- BACnet: Multistate Value Object - Instance 7
 - Modbus: Bit list - bit 5 or register 43
-

VolOffset_T

BMS access: WR RD

Equipment functions: RR with RMF, TAM with RMF

Unit/value range: BACnet: percentage value in 0.5 % increments; Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Signalling of an external volume flow rate setpoint change, e.g. for adjusting the room air change rate or for external temperature control
 - The change signal is transferred as a percentage value of a volume flow rate change range that has been configured in the controller
- Data point
- BACnet: Analog Value Object – Instance 19
 - Modbus: Register 9
-

VolOffset_P

BMS access: WR RD

Equipment functions: RR with RMF, TAM with RMF

Unit/value range: BACnet: percentage value in 0.5 % increments; Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Signalling of a flow rate setpoint change for external differential pressure control
 - The change signal is transferred as a percentage value of a volume flow rate change range that has been configured in the controller
- Data point
- BACnet: Analog Value Object – Instance 20
 - Modbus: Register 10
-

VolflowExh

BMS access: WR RD

Equipment functions: FH, RR, RR with RMF, TAM, TAM with RMF

Unit: l/s

from firmware version EM-BAC-MOD 2.0 and TCU3, TAM 3.0

Function

- Integration of an extract air flow into the room balance of the EASYLAB system
 - This default volume flow is considered for all volume flow calculations (balance and setpoint values)
- Data point
- BACnet: Analog Value Object – Instance 22
 - Modbus: Register 41
-

VolflowSup

BMS access: WR RD

Equipment functions: FH, RR, RR with RMF, TAM, TAM with RMF

Unit: l/s

from firmware version EM-BAC-MOD 2.0 and TCU3, TAM 3.0

Function

- Integration of a supply air flow into the room balance of the EASYLAB system
 - This default volume flow is considered for all volume flow calculations (balance and setpoint values)
- Data point
- BACnet: Analog Value Object – Instance 23
 - Modbus: Register 42
-

SC_SetPos

BMS access: WR RD

Function
– Default setting from central BMS: Close sash
Data point

- BACnet: Analogue Value Object - Instance 24
- Modbus: Register 45 (value) and register 46 (event state)

VolflowSet_R
BMS access: WR RD
Unit: l/s
from firmware version EM-BAC-MOD 4.0, EM-IP 2.0

- Function
- Default setting of volume flow rate setpoint (room), only for standard mode
- Data point
- BACnet: Analog Value Object – Instance 32
 - Modbus: Register 63

PressSet
BMS access: WR RD
Unit: Pa
from firmware version EM-BAC-MOD 4.0, EM-IP 2.0

- Function
- Local default setting of room pressure or duct pressure setpoint value
- Data point
- BACnet: Analog Value Object – Instance 33
 - Modbus: Register 64

Volt_AO2
BMS access: WR RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: V DC
from firmware version EM-BAC-MOD 4.0, EM-IP 2.0 and TCU3, TAM 7.0

- Function
- Default setting of voltage for analogue output AO2
 - 0 – 10 V DC, in increments of 0.1 V
- Data point
- BACnet: Analog Value Object – Instance 36
 - Modbus: Register 67

ManOp_Disable
BMS access: WR RD
Equipment functions: FH, RR with RMF, TAM with RMF

- Function
- Enabling/disabling manual control
 - Upon enabling manual control the corresponding symbol appears on the control panel
 - For further information on manual control please refer to the EASYLAB design manual.
 - FH: Operating mode default setting for a fume cupboard controller, only with individual operating mode default setting (stand-alone

- operation)
- RMF: Operating mode default setting for the entire EASYLAB room
- Functional values
- 0: Manual control has been enabled on the control panel; operating mode defaults set on DI override BACnet or Modbus defaults.
 - 1: Manual control has been disabled on the control panel; operating mode default settings from BACnet or Modbus have the highest priority
- Data point
- BACnet: Binary Value Object – Instance 4
 - Modbus: Bit list – bit 0 or register 1

PressSetSel
BMS access: WR RD
Equipment functions: RR with RMF, TAM with RMF

- Function
- If room pressure control of the EASYLAB system is active, this is the input for switching between two differential pressure setpoint

- values that are stored in the room management function
- Functional values
- 0: Use differential pressure setpoint 1
 - 1: Use differential pressure setpoint 2
- Data point
- BACnet: Binary Value Object – Instance 5
 - Modbus: Bit list – bit 1 or register 13

DO*_Set (BACnet), DO_Set (Modbus)

BMS access: WR RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Ansteuerung der nicht benutzten Schaltausgänge DO1 – DO6 des Reglers oder

Adaptermodules

Data point

BACnet: Binary Value Object – Instance 19 (DO1_Set) – Instance 24 (DO6_Set)

- 0 = output inactive
- 1 = output active

Modbus: Register 61 – bit 0 (DO1_Set) – bit 5 (DO6_Set)

- Bit not set = output inactive
- Bit set = output active

Output variables

ReadDeviceIdentification

Modbus only
BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Function

- Provides status information for the Modbus device

Data point

BACnet : see Device Object description

- Modbus: Device response
- Byte 0: Slave Address 1-99
- Byte 1: Function Code 0x2B
- Byte 2: MEI-Type 0x0E

- Byte 3: Read Device ID Code 0x01
- Byte 4: Conformity Level 0x01
- Byte 5: More Follows 0x00
- Byte 6: Next Object ID 0x00
- Byte 7: Number of Objects 0x03
- Byte 8: ID: VendorName 0x00
- Byte 9: Obj-Length 9
- Byte 10-18: Obj-Value "TROX GmbH"
- Byte 19 ID: ProductCode 0x01
- Byte 20: Obj-Length 23
- Byte 21-43: Obj-Value "EM-BAC-MOD - EASYLAB"
- Byte 44 ID: MajMinRevision 0x02
- Byte 45: Obj-Length 4
- Byte 46-49: Obj-Value "V3.0"

ModeAct

BMS access: RD
Equipment functions: FH, RR, RR with RMF, EC, SC

Function

- Output of the operating mode for the volume flow controller
- For more information on each operating mode see the description of the 'Mode' input variable

Functional values (BACnet / Modbus)

- 1/0 = No default
- 2/1 = Standard mode
- 3/2 = Reduced operation
- 4/3 = Increased operation
- 5/4 = Shut-off
- 6/5 = OPEN position

Data point

- BACnet: Multistate Value Object – Instance 3
- Modbus: Register 2

RoomModeAct

BMS access: RD
Equipment functions: RR with RMF, TAM with RMF

Function

- Output of the room operating mode
- For more information on each operating mode see the description of the 'Mode' input variable

Functional values (BACnet / Modbus)

- 1/0 = No default
- 2/1 = Standard mode
- 3/2 = Reduced operation
- 4/3 = Increased operation
- 5/4 = Shut-off
- 6/5 = OPEN position

Data point

- BACnet: Multistate Value Object – Instance 4
- Modbus: Register 36

SwitchPos

BMS access: RD
Equipment function: FH

Function

- Output of the current switching step of the fume

cupboard as a numeric value if the fume cupboard controller is equipped with switch contacts for 2-point or 3-point control (FH2P, FH-3P)

Data point

- BACnet: Multistate Value Object – Instance 5

- 1 = invalid state
 - 2 = switching step 1
 - 3 = switching step 2
 - 4 = switching step 3
- Modbus: Register 35

- 0 = invalid state
- 1 = switching step 1
- 2 = switching step 2
- 3 = switching step 3

SC_GetLockHighPrio

BMS access: RD

Function

- Signal that sash has been locked, high priority
- Data point
- BACnet: Multistate Value Object - Instance 8
 - Modbus: Bit list - bit 6 or register 44

VolflowSet

BMS access: RD

Equipment functions: FH, RR, RR with RMF, EC, SC

Unit: l/s

Function

- Output of the volume flow rate setpoint value for the volume flow controller

Data point

- BACnet: Analog Value Object – Instance 1
- Modbus: Register 4

VolflowAct

BMS access: RD

Equipment functions: FH, RR, RR with RMF, EC, SC

Unit: l/s

Function

- Output of the volume flow rate actual value of the volume flow controller

Data point

- BACnet: Analog Value Object – Instance 2
- Modbus: Register 3

VolTotalExh

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: l/s

Function

- Output of the total extract air volume flow rate of an EASYLAB room

- This includes the extract air volume flow rates of all fume cupboards and extract air controllers as well as any additional extract air volume flow rates (constant and variable) from other controllers.

Data point

- BACnet: Analog Value Object – Instance 3
- Modbus: Register 7

VolTotalSup

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: l/s

Function

- Output of the total supply air flow rate of an

EASYLAB room

- This includes the supply air volume flow rates of all supply air controllers as well as the additional supply air volume flow rates (constant and variable)

Data point

- BACnet: Analog Value Object – Instance 4
- Modbus: Register 8

PressSet

BMS access: RD

Equipment functions: RR with RMF, TAM with RMF

Unit: Pa

Function

- Output of the differential pressure setpoint value within the EASYLAB system

Data point

- BACnet: Analog Value Object – Instance 5
- Modbus: Register 12

PressAct

BMS access: RD

Equipment functions: RR with RMF, TAM with RMF

Unit: Pa

Function

- Output of the differential pressure actual value within the EASYLAB system

- The actual value is recorded by a differential pressure transducer connected to the RR with RMF or to the TAM with RMF

Data point

- BACnet: Analog Value Object – Instance 6
- Modbus: Register 11

VelocitySet

BMS access: RD

Equipment function: FH

Unit: m/s

Function

- Output of the face velocity setpoint value if the fume cupboard controller is equipped with a face velocity transducer (FH-VS)

Data point

- BACnet: Analog Value Object – Instance 7
- Modbus: Register 6

VelocityAct

BMS access: RD

Equipment function: FH

Unit: m/s

Function

- Output of the face velocity actual value if the fume cupboard controller is equipped with a face velocity transducer (FH-VS)

Data point

- BACnet: Analog Value Object – Instance 8
- Modbus: Register 5

WireSensorPos

BMS access: RD

Equipment function: FH

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of sash position of the fume cupboard as a percentage value between closed position (0 %) and open position (100 %) if the fume cupboard controller is equipped with a sash distance sensor (FH-DS, FH-DV)

Data point

- BACnet: Analog Value Object – Instance 9
- Modbus: Register 34

SystemDevices

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Function

- Number of identified EASYLAB system components

Data point

- BACnet: Analog Value Object – Instance 21
- Modbus Register 37

SC_GetPos

BMS access: RD

Function

- Signals the sash position

Data point

- BACnet: Analogue Value Object - Instance 25
- Modbus: Register 47

Volt_AI2

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: V DC

from firmware version EM-BAC-MOD 4.0, EM-IP 2.0 and TCU3, TAM 7.0

Function

- Output of the voltage at analogue input AI2
- 0 – 10 V DC, in increments of 0.1 V

Data point

- BACnet: Analog Value Object – Instance 34
- Modbus: Register 65

Volt_AI3

BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: V DC
from firmware version EM-BAC-MOD 4.0, EM-IP 2.0 and TCU3, TAM 7.0

Function
– Output of the voltage at analogue input AI3
– 0 – 10 V DC, in increments of 0.1 V
Data point
– BACnet: Analog Value Object – Instance 35
– Modbus: Register 66

LocalAlarm

BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Function
– Output of a local alarm for a fume cupboard controller, extract air controller, supply air controller, room controller or TAM
– Alarm conditions can be defined using the

EasyConnect configuration software

Functional values
– 0 = No local alarm
– 1 = Local alarm
Data point
– BACnet: Binary Value Object – Instance 1 (BIBBS-DS-COVU-B Change of value reporting)
– Modbus: Bit list - bit 2 or register 31

SummaryAlarm

BMS access: RD
Equipment functions: RR with RMF, TAM with RMF

Function
– Output of a consolidated alarm
– An alarm signal is generated when a controller emits an alarm or fault message.
– Alarm conditions can be defined using the EasyConnect configuration software

– Standard configuration: volume flow rate alarm
Functional values
– 0 = No consolidated alarm
– 1 = Consolidated alarm
Data point
– BACnet: Binary Value Object – Instance 2 (BIBBS-DS-COVU-B Change of value reporting)
– Modbus: Bit list - bit 3 or register 32

PressAlarm

BMS access: RD
Equipment functions: RR with RMF, TAM with RMF

Function
– Output of a room pressure alarm when room pressure control is active
– Alarm conditions can be defined using the EasyConnect configuration software

Functional values
– 0 = No differential pressure alarm
– 1 = Differential pressure alarm
Data point
– BACnet: Binary Value Object – Instance 3 (BIBBS-DS-COVU-B Change of value reporting)
– Modbus: Bit list - bit 4 or register 33

DI* (BACnet), StateDI (Modbus)

BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
from firmware version EM-BAC-MOD 2.0 and TCU3, TAM 3.0

Function
– Status of digital inputs DI1 – DI6 of the

controller or adapter module
Data point
BACnet: Binary Value Object – Instance 6 (DI1) – Instance 11 (DI6)
– 0 = inactive
– 1 = active
Modbus: Register 39 – bit 0 (DI1) – bit 5 (DI6)
– Bit not set = inactive
– Bit set = active

DO* (BACnet), StateDO (Modbus)

BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

from firmware version EM-BAC-MOD 2.0 and TCU3, TAM 3.0

Function

- Status of digital outputs DO1 – DO6 of the controller or adapter module
- Data point
BACnet: Binary Value Object – Instance 12 (DO1)
– Instance 17 (DO6)

- 0 = output inactive
 - 1 = output active
- Modbus: Register 40 – bit 0 (DO1) – bit 5 (DO6)
- Bit not set = output inactive
 - Bit set = output active

SC_Alarm

BMS access: RD

Function

- Output for automatic sash device signal

Data point

- BACnet: Binary Value Object – Instance 18
- Modbus: Bit list – bit 7 or register 48

DO*_SetByLocal (BACnet), DO_SetByLocal (Modbus)

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Feedback from the controller about switch outputs DO1 – DO6 used by the controller or

adapter module

Data point

BACnet: Binary Value Object – Instance 25 (DO1_SetbyLocal) – Instance 30 (DO6_SetbyLocal)

- 0 = output inactive
- 1 = output active

Modbus: Register 62 - bit 0 (DO1_Set) – bit 5 (DO6_Set)

- Bit not set = output inactive
- Bit set = output active

DampPos

BMS access: RD

Equipment functions: FH, RR, RR with RMF, EC, SC

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments

- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position¹

Data point

- BACnet: Analog Value Object – Instance 10
- Modbus: Register 14

DampPosMaxFH

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the

fume cupboard controller with the widest open damper blade^{1,2,4}

- For the evaluation of the damper blade positions in separate extract air systems (2 fans), i.e. fume cupboard extract air and room extract air

Data point

- BACnet: Analog Value Object – Instance 11 – value and event state
- Modbus: Register 15 (value) and register 16 (event state)

DampPosMin_FH

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the

fume cupboard controller with the least wide open damper blade^{1,2,5}

- For the evaluation of the damper blade positions in separate extract air systems (2 fans), i.e. fume cupboard extract air and room extract air

Data point

- BACnet: Analog Value Object – Instance 12 – value and event state
- Modbus: Register 17 (value) and register 18 (event state)

DampPosMax_RE

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the

room extract air controller with the widest open damper blade ^{1, 2, 4}

- For the evaluation of the damper blade positions in separate extract air systems (2 fans), i.e. fume cupboard extract air and room extract air

Data point

- BACnet: Analog Value Object – Instance 13 – value and event state
- Modbus: Register 19 (value) and register 20 (event state)

DampPosMin_RE

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the

room extract air controller with the least wide open damper blade ^{1, 2, 5}

- For the evaluation of the damper blade positions in separate extract air systems (2 fans), i.e. fume cupboard extract air and room extract air

Data point

- BACnet: Analog Value Object – Instance 14 – value and event state
- Modbus: Register 21 (value) and register 22 (event state)

DampPosMax_TE

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the

fume cupboard, extract air or room extract air controller with the widest open damper blade ^{1, 3, 4}

- For the evaluation of the damper blade positions in the extract air system (1 fan) for fume cupboard and room extract air

Data point

- BACnet: Analog Value Object – Instance 15 – value and event state
- Modbus: Register 23 (value) and register 24 (event state)

DampPosMin_TE

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the

fume cupboard, extract air or room extract air controller with the least wide open damper blade ^{1, 3, 5}

- For the evaluation of the damper blade positions in the extract air system (1 fan) for fume cupboard and room extract air

Data point

- BACnet: Analog Value Object – Instance 16 – value and event state
- Modbus: Register 25 (value) and register 26 (event state)

DampPosMax_RS

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the room supply air controller with the widest open damper blade ^{1, 4}

Data point

- BACnet: Analog Value Object – Instance 17 – value and event state

- Modbus: Register 27 (value) and register 28 (event state)

DampPosMin_RS

- BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: %
Value range:
- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)

Function

- Output of the damper blade position of the room supply air controller with the least wide open damper blade ^{1,5}

Data point

- BACnet: Analog Value Object – Instance 18 – value and event state
- Modbus: Register 29 (value) and register 30 (event state)

DampPosMax_EC

- BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: %
Value range:
- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)
from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Output of the damper blade position of the room extract air controller with the widest open damper blade ^{1,4}

Data point

- BACnet: Analog Value Object – Instance 26 – value and event state
- Modbus: Register 49 (value) and register 50 (event state)

DampPosMin_EC

- BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: %
Value range:
- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)
from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Output of the damper blade position of the room extract air controller with the least wide open damper blade ^{1,5}

Data point

- BACnet: Analog Value Object – Instance 27 – value and event state
- Modbus: Register 51 (value) and register 52 (event state)

DampPosMax_SC

- BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: %
Value range:
- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)
from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Output of the damper blade position of the supply air controller with the widest open damper blade ^{1,4}

Data point

- BACnet: Analog Value Object – Instance 28 – value and event state
- Modbus: Register 53 (value) and register 54 (event state)

DampPosMinSC

- BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: %
Value range:
- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %)
from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Output of the damper blade position of the supply air controller with the least wide open damper blade ^{1,5}

Data point

- BACnet: Analog Value Object – Instance 29 – value and event state
- Modbus: Register 55 (value) and register 56 (event state)

DampPosMax_TS

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %) from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Output of the damper blade position of the supply air or room supply air controller with the widest open damper blade ^{1,4}

Data point

- BACnet: Analog Value Object – Instance 30 – value and event state
- Modbus: Register 57 (value) and register 58 (event state)

DampPosMin_TS

BMS access: RD

Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF

Unit: %

Value range:

- BACnet: percentage value in 0.5 % increments
- Modbus: 0 – 200 (200 corresponds to 100 %) from firmware version EM-BAC-MOD 3.0 and TCU3, TAM 5.0

Function

- Output of the damper blade position of the supply air or room supply air controller with the least wide open damper blade ^{1,5}

Data point

- BACnet: Analog Value Object – Instance 31 – value and event state
- Modbus: Register 59 (value) and register 60 (event state)

¹ Damper blade positions DampPos**_** are transmitted as a percentage value between 0% (closed) and 100% (open).

² The output variables DampPosMax_FH, DampPosMin_FH, DampPosMax_EC, and DampPosMin_EC, as well as DampPosMax_RE and DampPosMin_RE are provided for the evaluation of the damper blade positions in separate extract air systems (3 fans) for fume cupboards, extract air and room extract air.

³ The output variables DampPosMax_TE and DampPosMin_TE are provided for the evaluation of the damper blade positions in the extract air system (1 fan) for fume cupboard, extract air and room extract air.

⁴ Status information for damper blade positions DampPosMax_**

BACnet

- Functional value = -1 (FF): All damper blades in OPEN position (special operating mode, value = 100%). Override not possible
- Functional value = 2: All damper blades in standard operating mode. Override possible
- Functional value = 3: At least one damper blade in OPEN mode (special operating mode)

Modbus

- Event state = 0: All damper blades in standard operating mode. Override possible
- Event state = -1 (FF): All damper blades in OPEN position (special operating mode, value = 100 %). Override not possible
- Event state = 1: At least one damper blade in OPEN position (special operating mode)

⁵ Status information for damper blade positions DampPosMin_**

BACnet

- Functional value = -1: All damper blades in shut-off mode (special operating mode, value = 0%). Override not possible
- Functional value = 2: All damper blades in standard operating mode. Override possible
- Functional value = 3: At least one damper blade in shut-off mode (special operating mode)

Modbus

- Event state = 0: All damper blades in standard operating mode. Override possible
- Event state = -1 (FF): All damper blades in shut-off mode (special operating mode, value = 0 %). Override not possible
- Event state = 1: At least one damper blade in shut-off mode (special operating mode)

Installation and commissioning

Installation

- As attachment for the EASYLAB base component: factory mounted
- For retrofitting: Mount the expansion module into the base casing
- Make connection to the BACnet/Modbus EIA-485 network

Commissioning

- The EASYLAB controller identifies the expansion module automatically
- Select BACnet or Modbus protocol using slide switch
- Set network address and communication parameters using the coding switches
- If necessary, activate terminal resistor of the network segment
- Integrate data interface with the central BMS (system integration)