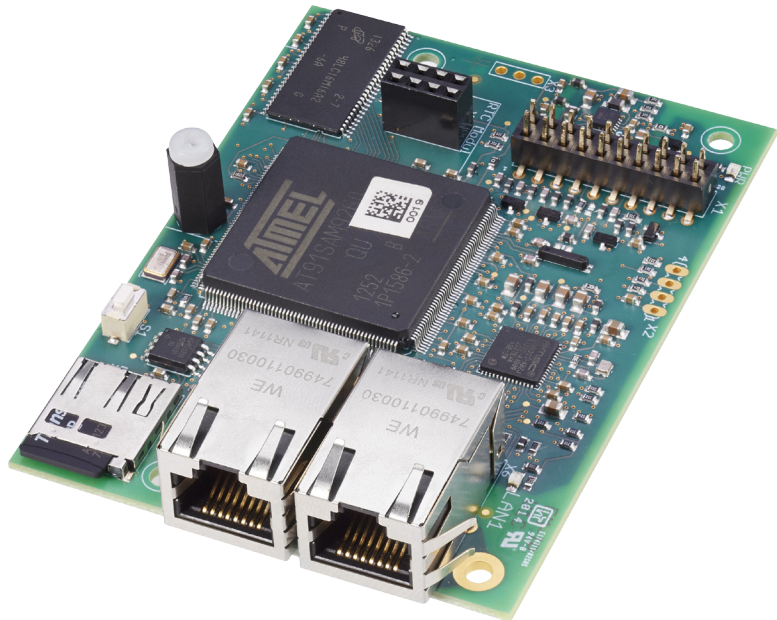


Expansion modules

Type EM-IP



BACnet/IP interface, Modbus/IP interface, and webserver for EASYLAB controllers and TAM adapter modules

Expansion module for EASYLAB fume cupboard controllers, room controllers and TAM adapter modules, for the integration of rooms or individual volume flow controllers with the central BMS, and for accessing the above mentioned devices using the integral webserver.

- Change between BACnet/IP and Modbus/IP using the integral webserver
- BACnet Application Specific Controller (B-ASC) according to Annex L
- Trend logging, alarming and scheduling for selected data points
- BACnet/IP (Annex J based on IPv4)
- BACnet/IP interface by integrating the expansion module with EASYLAB components
- Modbus interface with individual data registers
- Modbus/IP (according to IEC 61158)
- Easy retrofitting
- Two RJ45 10/100 Mbit Ethernet connections (daisy chain is possible)
- Multi functional Reset push button
- Power and status indicator lights
- MicroSD card as persistent data store for firmware, trend logging, alarming, scheduling and help files
- Real time clock expansion module (RTC) (optional)

Modbus®

Modbus-IP-Schnittstelle

BACnet™

BACnet-IP-Schnittstelle

Type		Page
EM-IP	General information	IP – 2
	Function	IP – 3
	Technical data	IP – 4
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Application

Application

- Expansion module Type EM-IP for the EASYLAB system
- BACnet/IP or Modbus/IP interface to the central BMS
- Integral webserver for configuring EM-IP
- Display of the principal device data on the web UI
- BACnet trend logging, alarming and scheduling for selected data points
- 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, volume flow rates and alarms for all EASYLAB controllers in a room
- 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 IP-based networks BACnet/IP and Modbus/IP
- BACnet Application Specific Controller (B-ASC) according to Annex L
- Connection for access to BACnet/IP network, Modbus/IP network or integral webserver
- BACnet/IP Protocol Revision 7.0
- 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
- Multi functional Reset push button
- All settings for alarming, trend logging, event logging, notifications and scheduling can be accessed and changed using the integral webserver (no configuration software required)
- 2 GB microSD card for firmware, trend logging, event logging and alarming
- With BACnet Broadcast Management Device (BBMD) function
- Foreign devices are supported
- Firmware is updated using the webserver

Description

Parts and characteristics

- Microprocessor with setup program stored in nonvolatile memory
- Two RJ45 10/100 Mbit Ethernet connections for accessing the BACnet/IP networks, the Modbus/IP network or the integral webserver (up to five EM-IP modules can be linked by a daisy chain)
- Daisy chain function can be switched off
- Reset push button for resetting EM-IP using the web UI, for activating two IP configurations and

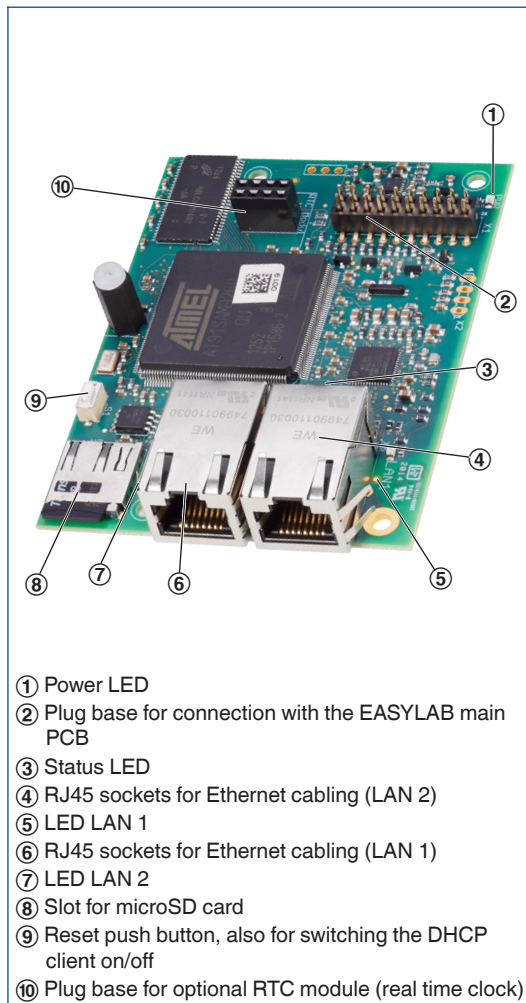
for restarting the module

- One LED each for power and status

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-IP



- ① Power LED
- ② Plug base for connection with the EASYLAB main PCB
- ③ Status LED
- ④ RJ45 sockets for Ethernet cabling (LAN 2)
- ⑤ LED LAN 1
- ⑥ RJ45 sockets for Ethernet cabling (LAN 1)
- ⑦ LED LAN 2
- ⑧ Slot for microSD card
- ⑨ Reset push button, also for switching the DHCP client on/off
- ⑩ Plug base for optional RTC module (real time clock)

Functional description

Expansion module EM-IP is used to integrate EASYLAB controllers Type TCU3 or EASYLAB adapter modules Type TAM into an IP-based network and connect them to the central BMS using the BACnet/IP or Modbus/IP protocol. 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.

BACnet/IP mode and the webserver allow for trend logging, alarming and scheduling for selected data points. The integral microSD card is used for trend logging. The integral webserver is used to configure EM-IP, to access trend logs and event logs, and to enter controller data using the web UI.

The optional real time clock (RTC) expansion module can be used for trend logging or event logging if, for example, EM-IP is not integrated with a network or if no time server is available in the network.

Dimensions (B × H × T)	65 × 15 × 90 mm
Supply voltage (from the controller TCU3 or adapter module TAM)	5 V DC
Acceptable temperature range for storage	-10 to 70 °C
Acceptable temperature range for operation	10 – 50 °C
Maximum humidity, non-condensing, for storage and operation	<90 %
Protection level	IP 20
Persistent data store for firmware, logging objects and help files	2 GB microSD card

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

Expansion module includes an interface for IP-based networks; switching between BACnet/IP and Modbus/IP is possible. All settings for alarming, trend logging, event logging, notifications and scheduling can be accessed and changed using the integral webserver.

Special characteristics

- Ready for installation, can be easily connected to the main PCB
- Interface for IP-based networks BACnet/IP and Modbus/IP
- BACnet Application Specific Controller (B-ASC) according to Annex L
- Connection for access to BACnet/IP network, Modbus/IP network or integral webserver
- BACnet/IP Protocol Revision 7.0
- 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
- Multi functional Reset push button
- All settings for alarming, trend logging, event logging, notifications and scheduling can be accessed and changed using the integral webserver (no configuration software required)
- 2 GB microSD card for firmware, trend logging, event logging and alarming
- With BACnet Broadcast Management Device (BBMD) function
- Foreign devices are supported
- Firmware is updated using the webserver

Technical data

- Dimensions (B × H × T): 65 × 15 × 90 mm
- Supply voltage (from the controller TCU3 or adapter module TAM): 5 V DC
- Acceptable temperature range for storage: -10 to 70 °C
- Acceptable temperature range for operation: 10 to 50 °C
- Maximum humidity, non-condensing, for storage and operation: <90 %
- Protection level: IP 20
- Persistent data store for firmware, logging objects and help files: 2 GB

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), and all individual volume flow rate values
- 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), and all individual volume flow rate values
- 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)

BACnet Interoperability Building Blocks Supported

- Data Sharing-ReadProperty-B: DS-RP-B
- Data Sharing-ReadProperty-Multiple-B: DS-RPM-B
- Data Sharing-WriteProperty-B: DS-WP-B
- Data Sharing-WritePropertyMultiple-B: DS-WPM-B
- Data Sharing-COV-B: DS-COV-B
- Alarm and Event-Notification-Internal-B: AE-N-I-B
- Alarm and Event-Acknowledge-B: AE-ACK-B
- Alarm and Event-Alarm-Summary-B: AE-ASUM-B
- Alarm and Event-Enrollment-Summary-B: AE-ESUM-B
- Alarm and Event-Event-Information-B: AE-INFO-B
- Alarm and Event-Event-Log-Internal-B: AE-EL-I-B
- Scheduling-Weekly-Schedule-Internal-B: SCHED-WS-I-B
- Trending-Viewing-and-Modifying-Trends-Internal-B: T-VMT-I-B

- Trending-Automatic-Trend-Retrieval-B: T-ATR-B
- Device Management-Dynamic Device Binding-A: DM-DDB-A
- Device Management-Dynamic Device Binding-B: DM-DDB-B
- Device Management-Dynamic Object Binding-B: DM-DOB-B
- Device Management-DeviceCommunicationControl-B: DM-DCC-B
- Device Management-TimeSynchronization-B: DM-TS-B
- Device Management-UTCTimeSynchronization-B: DM-UTC-B
- Device Management-ReinitializeDevice-B: DM-RD-B
- Device Management-List Manipulation-B: DM-LM-B
- Device Management-Restart-B: DM-R-B

- 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 / ...I... / ...

ELAB / ...R... / ...

Erweiterungsmodule

- I** EM-IP: EM-IP für BACnet- / Modbus-IP sowie Webserver
- R** EM-IP + RTC: EM-IP für BACnet- / Modbus-IP sowie Webserver und aufgebauter Echtzeituhr (RTC)

Expansion module EM-IP for retrofit

EM – IP
EM – RTC

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

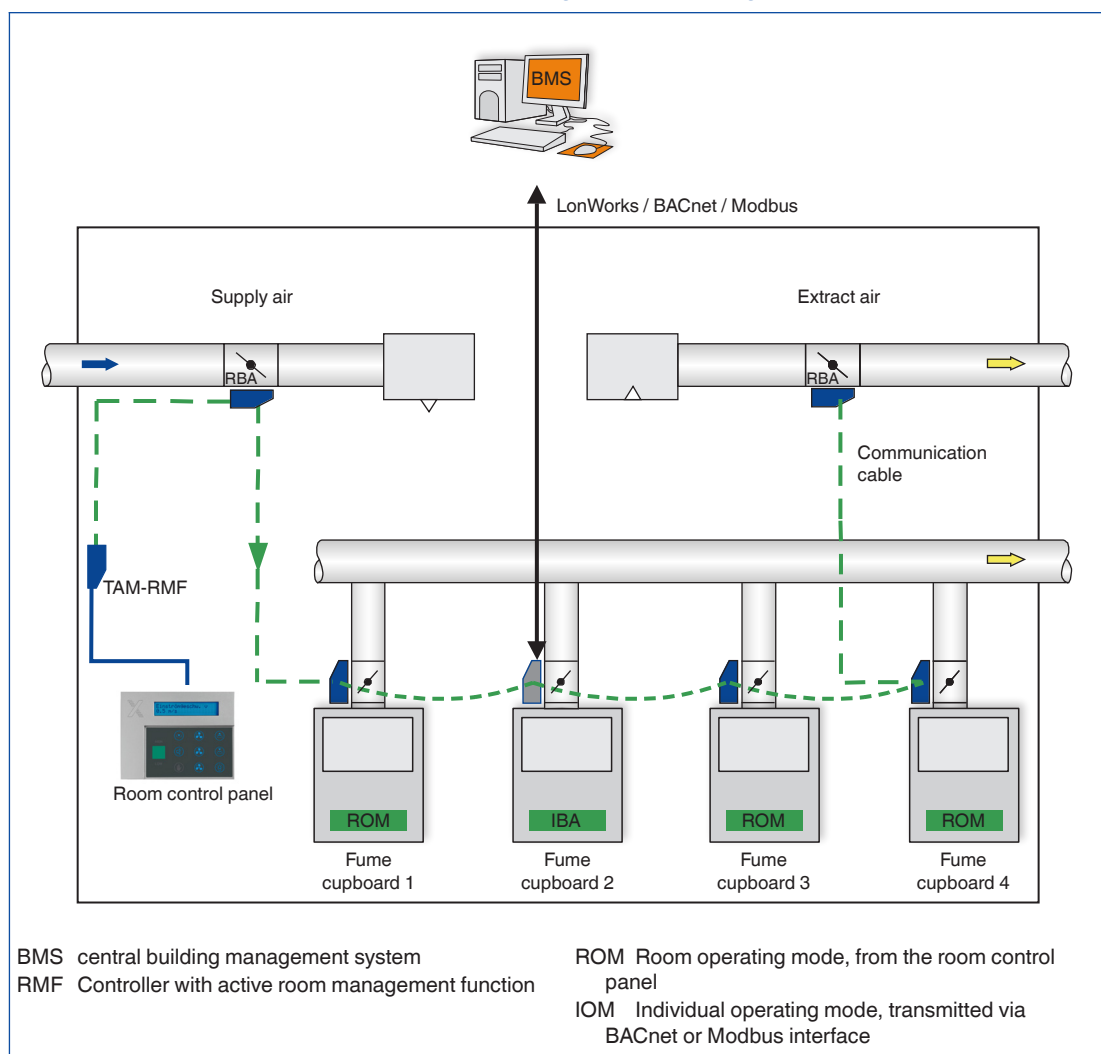
- Volume flow rate actual and setpoint values
- Damper blade position
- Operating mode
- Alarm/status messages
- Total supply air and total extract air actual values (room)
- Evaluated damper blade positions for all controllers in a room

- 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



EASYPAB room

Interface for one EASYPAB room

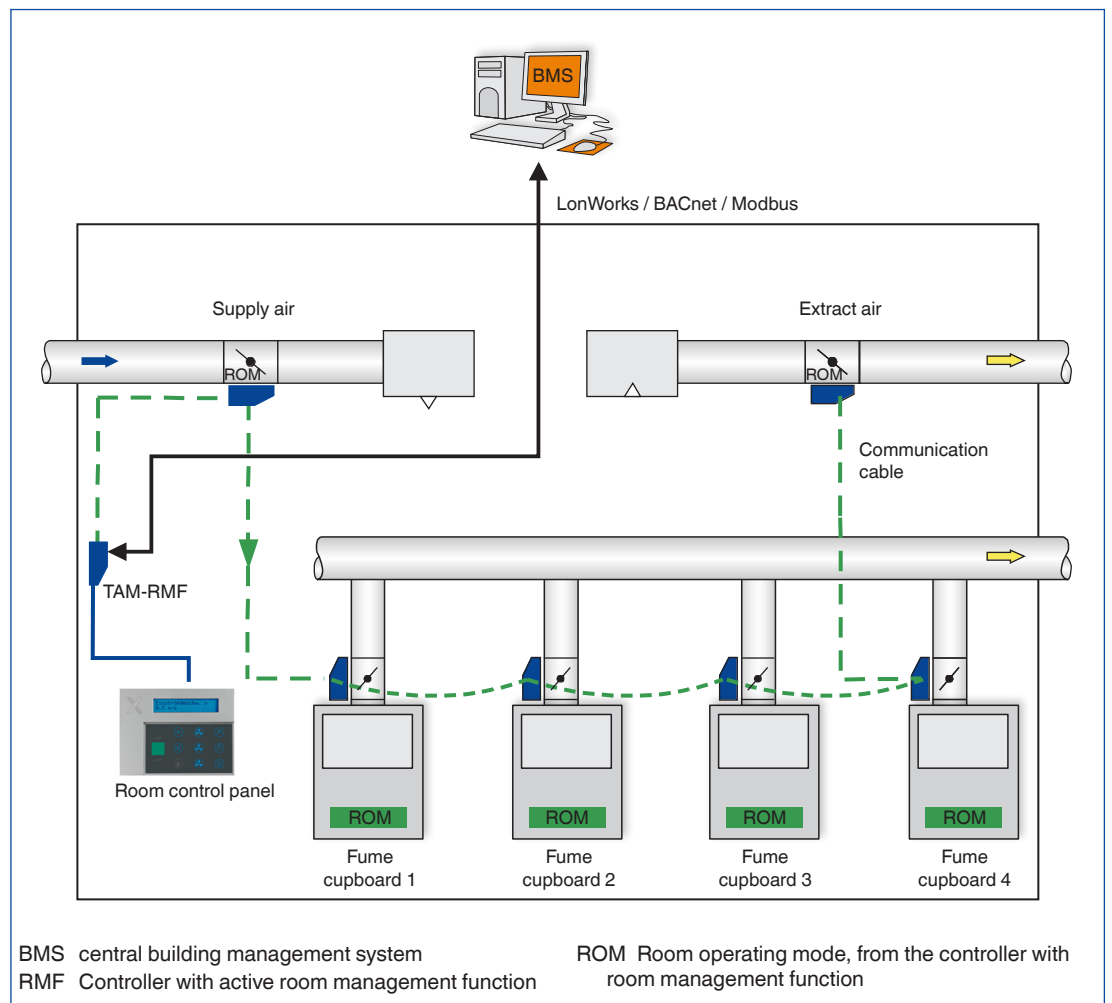
- Local data interface for a TCU3 room controller (supply air or extract air) or TAM adapter module with active room management function
- Room management function reduces the required number of network data points and hence the commissioning costs
- Transmission of local data for the single controller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

Data points for an EASYPAB 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 EASYPAB 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 EASYPAB room, e.g. on a room controller with active room management function



BACnet interface

Application

EM-IP 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

BACnet PICS (extract)

Category	Data
Date	2011-07-20
Vendor name/Vendor identifier	TROX GmbH/329
Product name/Model no.	EM-IP/EM-IP
Application/Firmware Revision	1.0/1.0
BACnet Protocol Revision	7
Standardized Device Profile	BACnet Application Specific Controller (B-ASC)
Interoperability Building Blocks Supported	DS-RP-B, DS-WP-B, DS-RPM-B, DS-WPM-B, DS-COVU-B, AE-NI-B, AE-ACK-B, AE-ASUM-B, AE-ESUM-B, AE-INFO-B, AE-EL-I-B, SCHEDWS-I-B, T-VMT-I-B, T-ATR-B, DM-DDB-A, DM-DDB-B, DM-DOB_B, DM-DCC-B, DM-TS-B, DMUTC-B, DM-RD-B, DM-LM-B, DM-R-B
Segmentation Capability	No
Data Link Layer Options	TCP-IP 10/100 Mbit
Device Address Binding	No
Network Security Options	No
Character Sets Supported	ISO 10646 (UTF-8)

DeviceObject

Property	Value	Access
Object identifier	Device instance; default = 17493	WR, RD; E
Device name	Default = "Device17493"; 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-IP	RD
Description	Default = "TROX EM-IP"; description can be entered, 126 characters max.	WR, RD; E
Location	Default = ""; description can be entered, 62 characters max.	WR, RD; E
Firmware_Revision	2.0	RD
Application_Software_Version	V2	RD
Protocol_Version	1	RD
Protocol_Revision	7	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...31, binary-value 1...30, multistate-value 1...8	RD
Max_ADPU_Length_Accepted	1024	RD
Segmentation_Supported	NO_SEGMENTATION (3)	RD
APDU_Timeout	5000	RD
Number_Of_APDU_Retries	3	RD
Device_Address_Binding	-	RD
Database_Revision	0	RD

Multistate Value Objects

Instance	Designation	Unit						Access
		TCU3				TAM		
		Available with equipment function						
		FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
MV-2	Mode	x ¹		x			x	WR, RD
MV-3	ModeAct	x	x	x	x			RD
MV-4	RoomModeAct	x		x			x	RD
MV-5	SwitchPos	x						RD
MV-6	Sunblind	x		x			x	WR, RD
MV-7	SC_SetLockHighPrio							WR, RD
MV-8	SC_GetLockHighPrio							RD
MV-9	SC_SetPos							RD
MV-10	SC_GetPos							RD
MV-11	DampPosMaxState_FH	x	x	x	x	x	x	RD
MV-12	DampPosMinState_FH	x	x	x	x	x	x	RD
MV-13	DampPosMaxState_RE	x	x	x	x	x	x	RD
MV-14	DampPosMinState_RE	x	x	x	x	x	x	RD
MV-15	DampPosMaxState_TE	x	x	x	x	x	x	RD
MV-16	DampPosMinState_TE	x	x	x	x	x	x	RD
MV-17	DampPosMaxState_RS	x	x	x	x	x	x	RD
MV-18	DampPosMinState_RS	x	x	x	x	x	x	RD
MV-26	DampPosMaxState_EC	x	x	x	x	x	x	RD
MV-27	DampPosMinState_EC	x	x	x	x	x	x	RD
MV-28	DampPosMaxState_SC	x	x	x	x	x	x	RD
MV-29	DampPosMinState_SC	x	x	x	x	x	x	RD
MV-30	DampPosMaxState_TS	x	x	x	x	x	x	RD
MV-31	DampPosMinState_TS	x	x	x	x	x	x	RD
MV-32	DampPosMaxState_VE							RD
MV-33	DampPosMinState_VE							RD
MV-34	DampPosMaxState_VS							RD
MV-35	DampPosMinState_VS							RD
MV-36	DampPosMaxState_PKE							RD
MV-37	DampPosMinState_PKE							RD
MV-38	DampPosMaxState_PKS							RD
MV-39	DampPosMinState_PKS							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		
AV-1	VolflowSet	l/s (87)	x	x	x	x			RD	
AV-2	VolflowAct	l/s (87)	x	x	x	x			RD	
AV-3	VolTotalExh	l/s (87)	x	x	x	x	x	x	RD	
AV-4	VolTotalSup	l/s (87)	x	x	x	x	x	x	RD	
AV-5	PressSet	Pa (53)				x			x	RD
AV-6	PressAct	Pa (53)				x			x	RD
AV-7	VelocitySet	m/s (74)	x							RD
AV-8	VelocityAct	m/s (74)	x							RD
AV-9	WireSensorPos	percent (98)	x							RD
AV-10	DampPos	percent (98)	x	x	x	x				RD
AV-11	DampPosMax_FH	percent (98)	x	x	x	x	x	x	x	RD
AV-12	DampPosMin_FH	percent (98)	x	x	x	x	x	x	x	RD
AV-13	DampPosMax_RE	percent (98)	x	x	x	x	x	x	x	RD
AV-14	DampPosMin_RE	percent (98)	x	x	x	x	x	x	x	RD
AV-15	DampPosMax_TE	percent (98)	x	x	x	x	x	x	x	RD
AV-16	DampPosMin_TE	percent (98)	x	x	x	x	x	x	x	RD
AV-17	DampPosMax_RS	percent (98)	x	x	x	x	x	x	x	RD
AV-18	DampPosMin_RS	percent (98)	x	x	x	x	x	x	x	RD
AV-19	VolOffset_T	percent (98)				x			x	WR, RD
AV-20	VolOffset_P	percent (98)				x			x	WR, RD
AV-21	SystemDevices	no units (95)	x	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	
AV-22	VolflowExh	l/s (87)	x	x	x		x	x	WR, RD
AV-23	VolflowSup	l/s (87)	x	x	x		x	x	WR, RD
AV-24	SC_SetPos	percent (98)							WR, RD
AV-25	SC_GetPos	percent (98)							RD
AV-26	DampPosMax_EC	percent (98)	x	x	x	x	x	x	RD
AV-27	DampPosMin_EC	percent (98)	x	x	x	x	x	x	RD
AV-28	DampPosMax_SC	percent (98)	x	x	x	x	x	x	RD
AV-29	DampPosMin_SC	percent (98)	x	x	x	x	x	x	RD
AV-30	DampPosMax_TS	percent (98)	x	x	x	x	x	x	RD
AV-31	DampPosMin_TS	percent (98)	x	x	x	x	x	x	RD
AV-32	Device_ID_0	no units (95)	x	x	x	x	x	x	RD
AV-33	Device_ID_1	no units (95)	x	x	x	x	x	x	RD
AV-34	Device_ID_2	no units (95)	x	x	x	x	x	x	RD
AV-35	Device_ID_3	no units (95)	x	x	x	x	x	x	RD
AV-36	Device_ID_4	no units (95)	x	x	x	x	x	x	RD
AV-37	Device_ID_5	no units (95)	x	x	x	x	x	x	RD
AV-38	Device_ID_6	no units (95)	x	x	x	x	x	x	RD
AV-39	Device_ID_7	no units (95)	x	x	x	x	x	x	RD
AV-40	Device_ID_8	no units (95)	x	x	x	x	x	x	RD
AV-41	Device_ID_9	no units (95)	x	x	x	x	x	x	RD
AV-42	Device_ID_10	no units (95)	x	x	x	x	x	x	RD
AV-43	Device_ID_11	no units (95)	x	x	x	x	x	x	RD
AV-44	Device_ID_12	no units (95)	x	x	x	x	x	x	RD
AV-45	Device_ID_13	no units (95)	x	x	x	x	x	x	RD
AV-46	Device_ID_14	no units (95)	x	x	x	x	x	x	RD
AV-47	Device_ID_15	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	
AV-48	Device_ID_16	no units (95)	x	x	x	x	x	x	RD
AV-49	Device_ID_17	no units (95)	x	x	x	x	x	x	RD
AV-50	Device_ID_18	no units (95)	x	x	x	x	x	x	RD
AV-51	Device_ID_19	no units (95)	x	x	x	x	x	x	RD
AV-52	Device_ID_20	no units (95)	x	x	x	x	x	x	RD
AV-53	Device_ID_21	no units (95)	x	x	x	x	x	x	RD
AV-54	Device_ID_22	no units (95)	x	x	x	x	x	x	RD
AV-55	Device_ID_23	no units (95)	x	x	x	x	x	x	RD
AV-56	VolflowAct_0	l/s (87)	x	x	x	x	x	x	RD
AV-57	VolflowAct_1	l/s (87)	x	x	x	x	x	x	RD
AV-58	VolflowAct_2	l/s (87)	x	x	x	x	x	x	RD
AV-59	VolflowAct_3	l/s (87)	x	x	x	x	x	x	RD
AV-60	VolflowAct_4	l/s (87)	x	x	x	x	x	x	RD
AV-61	VolflowAct_5	l/s (87)	x	x	x	x	x	x	RD
AV-62	VolflowAct_6	l/s (87)	x	x	x	x	x	x	RD
AV-63	VolflowAct_7	l/s (87)	x	x	x	x	x	x	RD
AV-64	VolflowAct_8	l/s (87)	x	x	x	x	x	x	RD
AV-65	VolflowAct_9	l/s (87)	x	x	x	x	x	x	RD
AV-66	VolflowAct_10	l/s (87)	x	x	x	x	x	x	RD
AV-67	VolflowAct_11	l/s (87)	x	x	x	x	x	x	RD
AV-68	VolflowAct_12	l/s (87)	x	x	x	x	x	x	RD
AV-69	VolflowAct_13	l/s (87)	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	
AV-70	VolflowAct_14	l/s (87)	x	x	x	x	x	x	RD
AV-71	VolflowAct_15	l/s (87)	x	x	x	x	x	x	RD
AV-72	VolflowAct_16	l/s (87)	x	x	x	x	x	x	RD
AV-73	VolflowAct_17	l/s (87)	x	x	x	x	x	x	RD
AV-74	VolflowAct_18	l/s (87)	x	x	x	x	x	x	RD
AV-75	VolflowAct_19	l/s (87)	x	x	x	x	x	x	RD
AV-76	VolflowAct_20	l/s (87)	x	x	x	x	x	x	RD
AV-77	VolflowAct_21	l/s (87)	x	x	x	x	x	x	RD
AV-78	VolflowAct_22	l/s (87)	x	x	x	x	x	x	RD
AV-79	VolflowAct_23	l/s (87)	x	x	x	x	x	x	RD
AV-80	VolflowSet_R	l/s (87)							WR, RD
AV-81	PressSet	Pa (53)							WR, RD
AV-82	Volt_AI2	volt (5)	x	x	x	x	x	x	RD
AV-83	Volt_AI3	volt (5)	x	x	x	x	x	x	RD
AV-84	Volt_AO2	volt (5)	x	x	x	x	x	x	WR, RD

Analogue Value Objects

Instance	Designation	Unit	Unit						Access
			TCU3				TAM		
			Available with equipment function						
			FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
AV-85	DampPosMaxValue_VE	per-cent (98)							RD
AV-86	DampPosMinValue_VE	per-cent (98)							RD
AV-87	DampPosMaxValue_VS	per-cent (98)							RD
AV-88	DampPosMinValue_VS	per-cent (98)							RD
AV-89	DampPosMaxValue_PKE	per-cent (98)							RD
AV-90	DampPosMinValue_PKE	per-cent (98)							RD
AV-91	DampPosMaxValue_PKS	per-cent (98)							RD
AV-92	DampPosMinValue_PKS	per-cent (98)							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	
BV-1	LocalAlarm (COVU)	x	x	x	x	x	x	RD
BV-2	SummaryAlarm (COVU)			x			x	RD
BV-3	PressAlarm (COVU)			x			x	RD
BV-4	ManOP_Disable	x ¹		x			x	WR, RD
BV-5	PressSetSel			x			x	WR, RD
BV-6	DI1	x	x	x	x	x	x	RD
BV-7	DI2	x	x	x	x	x	x	RD
BV-8	DI3	x	x	x	x	x	x	RD
BV-9	DI4	x	x	x	x	x	x	RD
BV-10	DI5	x	x	x	x	x	x	RD
BV-11	DI6	x	x	x	x	x	x	RD
BV-12	DO1	x	x	x	x	x	x	RD
BV-13	DO2	x	x	x	x	x	x	RD
BV-14	DO3	x	x	x	x	x	x	RD
BV-15	DO4	x	x	x	x	x	x	RD
BV-16	DO5	x	x	x	x	x	x	RD
BV-17	DO6	x	x	x	x	x	x	RD
BV-18	SC_Alarm							RD
BV-19	DO1_Set	x	x	x	x	x	x	WR, RD
BV-20	DO2_Set	x	x	x	x	x	x	WR, RD
BV-21	DO3_Set	x	x	x	x	x	x	WR, RD
BV-22	DO4_Set	x	x	x	x	x	x	WR, RD
BV-23	DO5_Set	x	x	x	x	x	x	WR, RD
BV-24	DO6_Set	x	x	x	x	x	x	WR, RD
BV-25	DO1_SetByLocal	x	x	x	x	x	x	RD
BV-26	DO2_SetByLocal	x	x	x	x	x	x	RD
BV-27	DO3_SetByLocal	x	x	x	x	x	x	RD
BV-28	DO4_SetByLocal	x	x	x	x	x	x	RD
BV-29	DO5_SetByLocal	x	x	x	x	x	x	RD
BV-30	DO6_SetByLocal	x	x	x	x	x	x	RD

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

Binary Value Objects

Instance	Designation	Unit						Access
		TCU3				TAM		
		Available with equipment function						
		FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
BV-31	LocalAlarm_0	x	x	x	x	x	x	RD
BV-32	LocalAlarm_1	x	x	x	x	x	x	RD
BV-33	LocalAlarm_2	x	x	x	x	x	x	RD
BV-34	LocalAlarm_3	x	x	x	x	x	x	RD
BV-35	LocalAlarm_4	x	x	x	x	x	x	RD
BV-36	LocalAlarm_5	x	x	x	x	x	x	RD
BV-37	LocalAlarm_6	x	x	x	x	x	x	RD
BV-38	LocalAlarm_7	x	x	x	x	x	x	RD
BV-39	LocalAlarm_8	x	x	x	x	x	x	RD
BV-40	LocalAlarm_9	x	x	x	x	x	x	RD
BV-41	LocalAlarm_10	x	x	x	x	x	x	RD
BV-42	LocalAlarm_11	x	x	x	x	x	x	RD
BV-43	LocalAlarm_12	x	x	x	x	x	x	RD
BV-44	LocalAlarm_13	x	x	x	x	x	x	RD
BV-45	LocalAlarm_14	x	x	x	x	x	x	RD
BV-46	LocalAlarm_15	x	x	x	x	x	x	RD
BV-47	LocalAlarm_16	x	x	x	x	x	x	RD
BV-48	LocalAlarm_17	x	x	x	x	x	x	RD
BV-49	LocalAlarm_18	x	x	x	x	x	x	RD
BV-50	LocalAlarm_19	x	x	x	x	x	x	RD
BV-51	LocalAlarm_20	x	x	x	x	x	x	RD
BV-52	LocalAlarm_21	x	x	x	x	x	x	RD
BV-53	LocalAlarm_22	x	x	x	x	x	x	RD
BV-54	LocalAlarm_23	x	x	x	x	x	x	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

Modbus interface

Application

EM-IP 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

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 No.	Bit Designation	Unit						Access
		TCU3				TAM		
		Available with equipment function						
		FH	RR	RR RMF	EC, SC	TAM	TAM RMF	
0	ManOP_Disable	x ¹		x			x	WR, RD
1	PressSetSel			x			x	WR, RD
2	LocalAlarm	x	x	x	x	x	x	RD
3	SummaryAlarm			x			x	RD
4	PressAlarm			x			x	RD
5	SC_SetlockHighPrio							WR, RD
6	SC_GetLockHighPrio							RD
7	SC_Alarm							RD
8	LocalAlarm_0	x	x	x	x	x	x	RD
9	LocalAlarm_1	x	x	x	x	x	x	RD
10	LocalAlarm_2	x	x	x	x	x	x	RD
11	LocalAlarm_3	x	x	x	x	x	x	RD
12	LocalAlarm_4	x	x	x	x	x	x	RD
13	LocalAlarm_5	x	x	x	x	x	x	RD
14	LocalAlarm_6	x	x	x	x	x	x	RD
15	LocalAlarm_7	x	x	x	x	x	x	RD
16	LocalAlarm_8	x	x	x	x	x	x	RD
17	LocalAlarm_9	x	x	x	x	x	x	RD
18	LocalAlarm_10	x	x	x	x	x	x	RD
19	LocalAlarm_11	x	x	x	x	x	x	RD
20	LocalAlarm_12	x	x	x	x	x	x	RD
21	LocalAlarm_13	x	x	x	x	x	x	RD
22	LocalAlarm_14	x	x	x	x	x	x	RD
23	LocalAlarm_15	x	x	x	x	x	x	RD
24	LocalAlarm_16	x	x	x	x	x	x	RD
25	LocalAlarm_17	x	x	x	x	x	x	RD
26	LocalAlarm_18	x	x	x	x	x	x	RD
27	LocalAlarm_19	x	x	x	x	x	x	RD
28	LocalAlarm_20	x	x	x	x	x	x	RD
29	LocalAlarm_21	x	x	x	x	x	x	RD
30	LocalAlarm_22	x	x	x	x	x	x	RD
31	LocalAlarm_23	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

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, RD
1	ManOP_Disable	x ¹		x			x	WR, RD
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, RD
10	VolOffset_P			x			x	WR, RD
11	PressAct			x			x	RD
12	PressSet			x			x	RD
13	PressSetSel			x			x	WR, RD
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, RD
39	StateDI	x	x	x	x	x	x	RD
40	StateDO	x	x	x	x	x	x	RD
41	VolflowExh	x	x	x		x	x	WR, RD
42	VolflowSup	x	x	x		x	x	WR, RD

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, RD
44	SC_GetLockHighPrio							RD
45	SC_SetPos - Value							WR, RD
46	SC_SetPos - Status							WR, RD
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, RD
62	DO_SetByLocal	x	x	x	x	x	x	RD
63	LocalAlarm_ * (0 - 7)	x	x	x	x	x	x	RD
64	LocalAlarm_ * (8 - 15)	x	x	x	x	x	x	RD
65	LocalAlarm_ * (16 - 23)	x	x	x	x	x	x	RD
66	Device_ID_0	x	x	x	x	x	x	RD
67	Device_ID_1	x	x	x	x	x	x	RD
68	Device_ID_2	x	x	x	x	x	x	RD
69	Device_ID_3	x	x	x	x	x	x	RD
70	Device_ID_4	x	x	x	x	x	x	RD
71	Device_ID_5	x	x	x	x	x	x	RD
72	Device_ID_6	x	x	x	x	x	x	RD
73	Device_ID_7	x	x	x	x	x	x	RD
74	Device_ID_8	x	x	x	x	x	x	RD
75	Device_ID_9	x	x	x	x	x	x	RD
76	Device_ID_10	x	x	x	x	x	x	RD
77	Device_ID_11	x	x	x	x	x	x	RD
78	Device_ID_12	x	x	x	x	x	x	RD
79	Device_ID_13	x	x	x	x	x	x	RD
80	Device_ID_14	x	x	x	x	x	x	RD
81	Device_ID_15	x	x	x	x	x	x	RD
82	Device_ID_16	x	x	x	x	x	x	RD
83	Device_ID_17	x	x	x	x	x	x	RD
84	Device_ID_18	x	x	x	x	x	x	RD
85	Device_ID_19	x	x	x	x	x	x	RD
86	Device_ID_20	x	x	x	x	x	x	RD
87	Device_ID_21	x	x	x	x	x	x	RD
88	Device_ID_22	x	x	x	x	x	x	RD
89	Device_ID_23	x	x	x	x	x	x	RD

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	
90	VolflowAct_0	x	x	x	x	x	x	RD
91	VolflowAct_1	x	x	x	x	x	x	RD
92	VolflowAct_2	x	x	x	x	x	x	RD
93	VolflowAct_3	x	x	x	x	x	x	RD
94	VolflowAct_4	x	x	x	x	x	x	RD
95	VolflowAct_5	x	x	x	x	x	x	RD
96	VolflowAct_6	x	x	x	x	x	x	RD
97	VolflowAct_7	x	x	x	x	x	x	RD
98	VolflowAct_8	x	x	x	x	x	x	RD
99	VolflowAct_9	x	x	x	x	x	x	RD
100	VolflowAct_10	x	x	x	x	x	x	RD
101	VolflowAct_11	x	x	x	x	x	x	RD
102	VolflowAct_12	x	x	x	x	x	x	RD
103	VolflowAct_13	x	x	x	x	x	x	RD
104	VolflowAct_14	x	x	x	x	x	x	RD
105	VolflowAct_15	x	x	x	x	x	x	RD
106	VolflowAct_16	x	x	x	x	x	x	RD
107	VolflowAct_17	x	x	x	x	x	x	RD
108	VolflowAct_18	x	x	x	x	x	x	RD
109	VolflowAct_19	x	x	x	x	x	x	RD
110	VolflowAct_20	x	x	x	x	x	x	RD
111	VolflowAct_21	x	x	x	x	x	x	RD
112	VolflowAct_22	x	x	x	x	x	x	RD
113	VolflowAct_23	x	x	x	x	x	x	RD
114	VolflowSet_R							WR, RD
115	PressSet							WR, RD
116	Volt_AI2	x	x	x	x	x	x	RD
117	Volt_AI3	x	x	x	x	x	x	RD
118	Volt_AO2	x	x	x	x	x	x	WR, RD
119	DampPosMax_VE - Value							RD
120	DampPosMax_VE - Status							RD
121	DampPosMin_VE - Value							RD
122	DampPosMin_VE - Status							RD
123	DampPosMax_VS - Value							RD
124	DampPosMax_VS - Status							RD
125	DampPosMin_VS - Value							RD
126	DampPosMin_VS - Status							RD

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	
127	DampPosMax_PKE - Value							RD
128	DampPosMax_PKE - Status							RD
129	DampPosMin_PKE - Value							RD
130	DampPosMin_PKE - Status							RD
131	DampPosMax_PKS - Value							RD
132	DampPosMax_PKS - Status							RD
133	DampPosMin_PKS - Value							RD
134	DampPosMin_PKS - Status							RD

FH: Fume cupboard controller

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RR RMF: Room controller with active room management function

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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

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 MV-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 MV-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 MV-

- 7
- Modbus: Bit list - bit 5 or register 43

VoOffset_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 AV-19
 - Modbus: Register 9

VoOffset_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 AV-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 AV-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 AV-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 AV-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 AV-80
- Modbus: Register 114

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 AV-81
 - Modbus: Register 115

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 AV-84
 - Modbus: Register 118

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 BV-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 BV-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 BV-19 (DO1_Set) – Instance BV-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 MV-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

- 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 MV-4
- Modbus: Register 36

Functional values (BACnet / Modbus)

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 MV-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 MV-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 AV-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 AV-2
 - Modbus: Register 3

VolTotalExh

BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: l/s

- 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.

Function

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

Data point

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

VolTotalSup

BMS access: RD
Equipment function: FH, RR, RR with RMF, EC, SC, TAM, TAM with RMF
Unit: l/s

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)

Function

- Output of the total supply air flow rate of an

Data point

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

PressAct

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

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 AV-6
- Modbus: Register 11

Function

- Output of the differential pressure actual value

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 AV-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 AV-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 AV-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 AV-21
 - Modbus Register 37

SC_GetPos

BMS access: RD

Function

- Signals the sash position

- Data point
- BACnet: Analogue Value Object - Instance AV-25
 - Modbus: Register 47

Device_ID_*

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

Function

- Output of the Device ID of the device being addressed (0 – 23)
- The Device_ID_* data points (0 – 23) of the EM-IP expansion module contain the Device ID of each controller (1 – 24)
- Controllers are automatically assigned a Device ID as part of the configuration procedure
- Controllers are automatically assigned to the data points
- If any variables, e.g. VolfowAct_* and

LocalAlarm_* or others, have the same slot (*), they are associated with the same controller, which is being addressed

- Example
- A controller has Device ID 5
 - When you switch on the supply voltage, the expansion module assigns a free slot to that device, let's say slot 8
 - As a consequence, Device_ID_8 will receive value 5, and the VolfowAct_8 and LocalAlarm_8 variables will receive the current values for controller 5
- Data point
- BACnet: Analogue Value Object – Instance AV-32 (Device_ID_0) – Instance AV-55 (Device_ID_23)
- Modbus: Register 66 – 89

VolFlowAct_*

BMS access: RD
Equipment function: FH, RR, RR with RMF, EC,
SC, TAM, TAM with RMF
Unit: l/s

Function

- Output of the volume flow rate actual value for the controller being addressed (0 – 23)
- Data point
BACnet: Analogue Value Object – Instance AV-56 (VolFlowAct_0) – Instance AV-79 (VolFlowAct_23)
Modbus: Register 90 (VolFlowAct_0) – 113 (VolFlowAct_23)

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 AV-82
– Modbus: Register 116

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 AV-83
– Modbus: Register 117

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 BV-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 BV-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 BV-6 (DI1) – Instance BV-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 BV-12 (DO1) – Instance BV-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 BV-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 BV-25 (DO1_SetbyLocal) – Instance BV-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

LocalAlarm_*

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

Function

- Output of alarms for the controller being addressed (0 – 23)

Data point

BACnet: Binary Value Object – Instance BV-31 (LocalAlarm_0) – Instance BV-54 (LocalAlarm_23)

- 0 = No alarm
- 1 = Alarm

Modbus: Register 63 - bit 0 (LocalAlarm_0) – bit 7 (LocalAlarm_7), register 64 - bit 0 (LocalAlarm_8) – bit 7 (LocalAlarm_15), register 65 - bit 0 (LocalAlarm_16) – bit 7 (LocalAlarm_23)

- Bit not set = no alarm
- Bit set = alarm

DampPosMaxState_FH

BMS access: RD

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

Function	(2 fans), i.e. fume cupboard extract air and room extract air
– Output of the status of the fume cupboard controller with the widest open damper blade ⁴	Data point
– For the evaluation of the damper blade positions in separate extract air systems	– BACnet: Multistate Value Object – Instance MV-11
	– Modbus: Register 16

DampPosMinState_FH

BMS access: RD

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

Function

- Output of the status of the fume cupboard controller with the least wide open damper blade 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: Multistate Value Object – Instance MV-12
 - Modbus: Register 18
-

DampPosMaxState_RE

BMS access: RD

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

Function

- Output of the status of the room extract air controller with the widest open damper blade 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: Multistate Value Object – Instance MV-13
 - Modbus: Register 20
-

DampPosMinState_RE

BMS access: RD

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

Function

- Output of the status of the room extract air controller with the least wide open damper blade 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: Multistate Value Object – Instance MV-14
 - Modbus: Register 22
-

DampPosMaxState_TE

BMS access: RD

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

Function

- Output of the status of the fume cupboard, extract air or room extract air controller with the widest open damper blade 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: Multistate Value Object – Instance MV-15
 - Modbus: Register 24
-

DampPosMinState_TE

BMS access: RD

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

Function

- Output of the status of the fume cupboard, extract air or room extract air controller with the least wide open damper blade 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: Multistate Value Object – Instance MV-16
- Modbus: Register 26

DampPosMaxState_RS

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

Function

- Output of the status of the room supply air controller with the widest open damper blade ⁴
- Data point
- BACnet: Multistate Value Object – Instance MV-17
- Modbus: Register 28

DampPosMinState_RS

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

- Function
- Output of the status of the room supply air

- controller with the least wide open damper blade ⁵
- Data point
- BACnet: Multistate Value Object – Instance MV-18
- Modbus: Register 30

DampPosMaxState_EC

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

Function

- Output of the status of the extract air controller with the widest open damper blade ⁴
- Data point
- BACnet: Multistate Value Object – Instance MV-26
- Modbus: Register 50

DampPosMinState_EC

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

Function

- Output of the status of the extract air controller with the least wide open damper blade ⁵
- Data point
- BACnet: Multistate Value Object – Instance MV-27
- Modbus: Register 52

DampPosMaxState_SC

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

Function

- Output of the status of the supply air controller with the widest open damper blade ⁴
- Data point
- BACnet: Multistate Value Object – Instance MV-28
- Modbus: Register 54

DampPosMinState_SC

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

Function

- Output of the status of the supply air controller with the least wide open damper blade ⁵
- Data point
- BACnet: Multistate Value Object – Instance MV-29
- Modbus: Register 56

DampPosMaxState_TS

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

- Function
- Output of the status of the supply air or room

- supply air controller with the widest open damper blade ⁴
- Data point
- BACnet: Multistate Value Object – Instance MV-30
- Modbus: Register 58

DampPosMinState_TS

BMS access: RD

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

Function

- Output of the status of the supply air or room

supply air controller with the least wide open damper blade ⁵

Data point

- BACnet: Multistate Value Object – Instance MV-31
- Modbus: Register 60

DampPosMaxState_VE

BMS access: RD

Function

- Output of the status of the Universal extract air

controller with the widest open damper blade ⁴

Data point

- BACnet: Multistate Value Object – Instance MV-32
- Modbus: Register 120

DampPosMinState_VE

BMS access: RD

Function

- Output of the status of the Universal extract air controller with the least wide open damper blade 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: Multistate Value Object – Instance MV-33
- Modbus: Register 122

DampPosMaxState_VS

BMS access: RD

Function

- Output of the status of the Universal supply air

controller with the widest open damper blade ⁴

Data point

- BACnet: Multistate Value Object – Instance MV-34
- Modbus: Register 124

DampPosMinState_VS

BMS access: RD

Function

- Output of the status of the Universal supply air controller with the least wide open damper blade 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: Multistate Value Object – Instance MV-35
- Modbus: Register 126

DampPosMaxState_PKE

BMS access: RD

Function

- Output of the status of the Universal differential pressure controller – extract air – with the

widest open damper blade ⁴

Data point

- BACnet: Multistate Value Object – Instance MV-36
- Modbus: Register 128

DampPosMinState_PKE

BMS access: RD

Function

- Output of the status of the Universal differential pressure controller – extract air – with the least

wide open damper blade ⁵

Data point

- BACnet: Multistate Value Object – Instance MV-37
- Modbus: Register 130

DampPosMaxState_PKS

BMS access: RD

Function

- Output of the status of the Universal differential pressure controller – supply air – with the

widest open damper blade ⁴

Data point

- BACnet: Multistate Value Object – Instance MV-38
- Modbus: Register 132

DampPosMinState_PKS

BMS access: RD

Function

- Output of the status of the Universal differential pressure controller – supply air – with the least

wide open damper blade ⁵

Data point

- BACnet: Multistate Value Object – Instance MV-39
- Modbus: Register 134

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 AV-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 %)

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 AV-11 – value and event state
- Modbus: Register 15 (value) and register 16 (event state)

Function

- Output of the damper blade position of the

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 %)

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 AV-12 – value and event state
- Modbus: Register 17 (value) and register 18 (event state)

Function

- Output of the damper blade position of the

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 %)

- 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 AV-13 – value and event state

Function

- 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 AV-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 AV-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 AV-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 AV-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 AV-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 AV-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 AV-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 AV-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 AV-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 AV-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 AV-31 – value and event state
- Modbus: Register 59 (value) and register 60 (event state)

DamPosMaxValue_VE

Data point
– BACnet: Analog Value Object – Instance AV-85

- value and event state
- Modbus: Register 119 (value) and register 120 (event state)

DamPosMinValue_VE

Data point
– BACnet: Analog Value Object – Instance AV-86

- value and event state
- Modbus: Register 121 (value) and register 122 (event state)

DamPosMaxValue_VS

Data point
– BACnet: Analog Value Object – Instance AV-87

- value and event state
- Modbus: Register 123 (value) and register 124 (event state)

DamPosMinValue_VS

Data point
– BACnet: Analog Value Object – Instance AV-88

- value and event state
- Modbus: Register 125 (value) and register 126 (event state)

DamPosMaxValue_PKE

Data point
– BACnet: Analog Value Object – Instance AV-89

- value and event state
- Modbus: Register 127 (value) and register 128 (event state)

DamPosMinValue_PKE

Data point
– BACnet: Analog Value Object – Instance AV-90

- value and event state
- Modbus: Register 129 (value) and register 130 (event state)

DamPosMaxValue_PKS

Data point
– BACnet: Analog Value Object – Instance AV-91

- value and event state
- Modbus: Register 131 (value) and register 132 (event state)

DamPosMinValue_PKS

Data point
– BACnet: Analog Value Object – Instance AV-92

- value and event state
- Modbus: Register 133 (value) and register 134 (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

Commissioning

- The EASYLAB controller identifies the expansion module automatically
- Use the Ethernet patch cable to connect the configuration computer with an active DHCP client or adapted IP address to the EM-IP module
- Complete and save the configuration using the personal computer and the web UI
- Restart EM-IP using the Reset push button or web UI and connect it to the target network (BACnet/IP, Modbus/IP or Ethernet network)