

ACVATIX™

Intelligent Valve

Modbus Registers



EVG4U10E.. / EVF4U20E.. / EXG4U10E.. / EXF4U20E..

Valid for the following product versions:

- Model info: ASE4E10E; HW=2.1.0
- Firmware revision: 09.54.12.07; APP=1.18.6462; SVS300.6SBC=15.00; ISC1.00
- Application software version: AAS-20:SU=SiUn; APT=HvacFnct34; APTV=2.111; APS=1

Revision history

Version	Date	Changes	Sections	Pages
A	28.09.2021			New document

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Communication

Technical Data

Modbus RTU communication		
Modbus RTU	RS-485, galvanically isolated	
Address range	1...247 / 255 (= "unassigned")	
	Default	10
Transmission formats	1-8-N-2; 1-8-N-1; 1-8-E-1; 1-8-O-1	
	Default	1-8-N-1
Baud rates	9600; 19200; 38400; 57600; 76800; 115200	
	Default	19200
Bus termination	120 Ω Selectable via ABT Go / Modbus RTU	
	Default	OFF
Parity	None; Even; Odd	
StopBit	[1]; [2]	
Master Alive Timeout	60 s (fixed)	
Supported function codes	03 (0x03)	Read Holding Register
	04 (0x04)	Read Input Register
	06 (0x06)	Write Single Register
	16 (0x10)	Write Multiple Registers

Cable types	
Modbus	Modbus 2- or 3-wire, twisted, shielded, if > 3 m

Cable length	
Modbus	Max. 1000 m (3300 ft)
NOTICE	The baud rate must be adapted to match the cable length.

Register implementation

All data is arranged in a table and addressed by 0..n-1 (Address). No distinction is made between data types (Discrete Inputs, Coils, Input Registers and Holding Registers). As a consequence, all data can be accessed with the 2 commands for Holding Registers. The commands for Discrete Inputs and Input Registers can be used as an alternative.

Values in all registers are unsigned integer datatypes representing one value.

Example: Address 11 – Primary flow temperature

- Read value = 10
- Actual value = (Value x Scaling factor) + Offset x Unit
 $\Rightarrow = (483 \times 0.01) + -10 \times \text{°C} = (4.83 - 10) \text{°C} = -5.17 \text{°C}$

Exceptions are registers for cooling volume (Addr. 190/191) and heating volume (Addr. 192/193), as well as for cooling energy (Addr. 194/195) and heating energy (196/197). The values exceed 65'535 and are stored in 2 consecutive registers; they have to be interpreted as last significant word first. These register pairs have to be written at once with the function "Write Multiple Registers". They cannot be written together with other registers.

Configuration Workflows

Configuration over bus

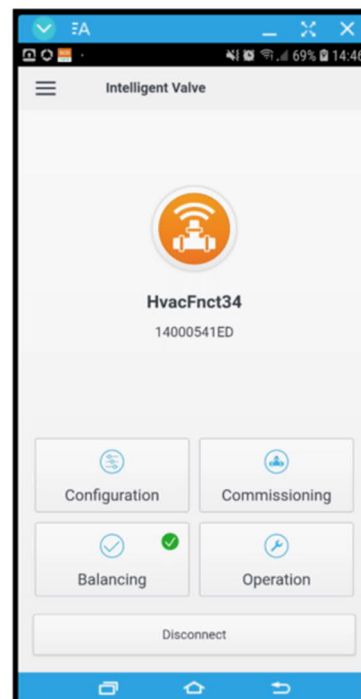
The devices can be configured over bus if the pre-commissioning settings allow for a connection between the Modbus master / programming tool and peripheral devices (i.e. non-conflicting addresses and matching baud rate / transmission format).

- Full configuration over bus: If the address is unique per segment when powered up, the device can be accessed by the Modbus master (or programming tool) and the address and other parameters can then be set to the definitive values.
- Partial configuration over bus: If the address is not unique per segment when powered up, each device must get a non-conflicting address before connecting it to the bus. After addressing all devices, the remaining configuration can be done over the bus using the default settings for baud rate (19200) and transmission mode for the Modbus master.
- Overwriting the bus configuration over bus uses a timeout. If "1 = Load" is not written into Reg. "Command" (address 2) within 30 seconds, all values are discarded.

Configuration with ABT Go

The devices can be configured with ABT Go Version 4.1 or higher.

- Full configuration with ABT Go: If the address is invalid (255) or not unique, the full configuration with ABT Go is recommended. For access, either the USB connection or the Device Access Point can be used. The address and other parameters can then be set to the definitive values at runtime without restart. To configure, go to "Commissioning > Modbus settings".
- Overwriting the bus configuration with ABT Go uses a timeout. If "1 = Load" is not written into Reg. "Command" (address 2) within 30 seconds, all values are discarded.



Example

The table below shows bus configuration registers before and after changing them over bus. Please note register 2.

Reg.	Name	Pre-commissioning	New value (ex.)
100	Termination	[0] = Off	[0] = Off
101	Address	46	12
102	Baud rate	[2] = 19200	[1] = 9600
104	StopBit	1 = 1 → 1-8-E-1	2 = 2 → 1-8-N-2
105	Parity	[2] = Even → 1-8-E-1	[1] = None → 1-8-N-2
2	Command	[0] = None	[6] = Apply Modbus Configuration

Modbus Register Description

Operation

Address	Register	R/W	Scaling / Unit	Options		Notes	BACnet Object
0	Relative setpoint Modbus	R/W	0.01 %	Min.	0	0...100.00 %	SpRelMdbS
				Max.	10'000		
1	Valve override mode	R/W	-	[1] None [2] Fully Open [3] Fully Close [4] Minimum Volume Flow [5] Nominal Volume Flow [6] Maximum Volume Flow [7] Design Power [8] Maximum Power [9] Keep Position		-	VovrMod
2	Command	W	-	[1] None [2] Adaption - not used [3] Self-Test (Application) [4] Re-init [5] Reset - not used [6] Apply Modbus Configuration [7] Discard Modbus Configuration [8] Fail-safe run		[6]: The Modbus stack is re-initialized with values from registers 101, 102, 103. [7]: Registers 101, 102, 103 are reset to current configuration.	-
3	Actuator type	R	-	[1] Not connected [2] DAC/VAC [3] VAV / ePICV [4] Fire/Smoke Damper Actuator [5] Intelligent Valve [6] 6-port ePICV [7] 6-port Valve		-	Fixed value – no object needed
4	Valve position feedback	R	0.01 %	Min.	0	0...100.00 %	VlvPosFb
				Max.	10'000		
5	Relative setpoint	R	0.01 %	Min.	0	-	SpRel
				Max.	10'000		
6	Present volume flow	R	0.01 m³/h	Min.	0	0...500 m³/h	PrVfl
				Max.	50'000		
7	Present setpoint volume flow	R/W	0.01 m³/h	Min.	0	0...288 m³/h	PrSpVfl
				Max.	28'800		
8	Present power	R	0.1 kW	Min.	0	0...6553.5 kW	PrPwr
				Max.	65'536		
9	Present setpoint power	R/W	0.1 kW	Min.	0	0...6553.5 kW	PrSpPwr
				Max.	65'536		
10	Present differential pressure of valve	R	0.1 kPa	Min.	0	0...700 kPa needed	PrDiffPVlv
				Max.	7000		
11	Primary flow temperature	R	0.01 °C	Min.	0	Offset 10 °C -10...150 °C	TFIPrim
				Max.	16'000		

Address	Register	R/W	Scaling / Unit	Options			Notes	BACnet Object
12	Primary return temperature	R	0.01 °C	Min.	0	Offset 10 °C	-10... 150 °C	TRtPrim
				Max.	16'000			
13	Flow temperature setpoint Modbus	R/W	0.01 °C	Min.	0	No offset	0... 120 °C	SpTFIMdb
				Max.	12'000			
14	Flow temperature setpoint	R	0.01 °C	Min.	0	No offset	0... 120 °C	SpTFI
				Max.	12'000			
15	Flow temperature	R	0.01 °C	Min.	0	Offset 10 °C	-10... 150 °C	TFI
				Max.	16'000			
16	Present setpoint source	R	-	[1] Relative setpoint terminal [2] Relative setpoint Modbus [3] Relative setpoint remote [4] Heat circuit outside temp. comp. [5] Flow temp. setpoint terminal [6] Flow temp. setpoint Modbus [7] Flow temp. setpoint remote [8] Diff. pressure setpoint remote			-	PrSpSrc
17	Control state	R	-	[1] Position [2] Volume flow [3] Power [4] Maximum power limit [5] Minimum volume flow limit [6] Maximum volume flow limit [7] Min. return temp. limitation [8] Max .return temp. limitation [9] Flow/return temp. diff. limitation [10] Valve override			-	CtlSta
18	Heating/cooling state	R	-	[1] Neither [2] Heating [3] Cooling			-	HCSta
19	Main fault	R	-	[1] No fault [2] Prim. flow temp., sensor fault [3] Prim. return temp., sensor fault [4] Flow temp., sensor fault [5] Return temp., sensor fault [6] Vol. flow, sensor fault [7] Valve actuator fault [8] Valve actuator, pos. feedb. fault [9] Valve actuator, no pos. feedb. [10] Relative setpoint, fault [11] Flow temp., setpoint fault [12] Diff. press. primary, sensor fault [13] Vol. flow, wrong flow direction [14] Vol. flow, air bubbles [15] Vol. flow, cannot reach max. value [16] Valve diff. press. above max. value [17] Vol. flow sensor, comm. error [18] Outside air temp., sensor fault [19] Vol. flow, cannot reach setpoint			-	MnFit

Configuration - Network settings

Address	Register	R/W	Options		Notes	BACnet Object
				Default		
100	Bus termination	R/W	[0] Inactive [1] Active	[0] Inactive	To apply the configuration after a change, Address 2 must be set to [5] "Apply Modbus Configuration". To reset the register to the current setting, Address 2 must be set to [6] "Discard Modbus Configuration".	-
101	Modbus address	R/W	1...247 / 255	[10]		
102	Baud rate	R/W	[5] 9600 [6] 19200 [7] 38400 [8] 57600 [9] 76800 [10] 115200	[6] 19200		
104	StopBit	R/W	[1] 1 [2] 2	[1] 1		
105	Parity	R/W	[1] None [2] Even [3] Odd	[2] Even		

Configuration - Valve settings

Address	Register	R/W	Scaling / Unit	Options		BACnet Object	
					Default		
110	Valve mounting position	R/W	-	[0] Flow [1] Return	[1] Return	VlvMountPos	
111	Valve design	R/W	-	[1] 2-Port [2] 3-Port	[1] 2-Port	VlvDsgn	
112	Nominal pipe size	R	1 mm	-	-	NomPipeSize	
113	Control mode	R/W	-	[1] Position [2] Volume Flow [3] Output	[2] Volume Flow	CtlMod	
114	Compensation mode	R/W	-	[1] Linear [2] Equal Percentage [3] Heat Exchanger Characteristic	[1] Linear	CmpMod	
115	Compensation volume flow coefficient	R/W	0.1	Min.	10	-	CmpVflCoef
				Max.	40		
116	Compensation heat exchanger coefficient	R/W	0.1	Min.	1	-	CmpHxCoef
				Max.	10		

Configuration - Hydronic balancing settings

Address	Register	R/W	Scaling / Unit	Options		Notes	BACnet Object
120	Nominal volume flow for valve	R	0.01 m ³ /h	Min.	0	-	VflNomVlv
				Max.	28'800		
121	Relative maximum volume flow	R/W	0.01 %	Min.	3000	-	VflMaxRel
				Max.	10'000		
122	Maximum volume flow	R	0.01 m ³ /h	Min.	0	Values depending on line size!	VflMax
				Max.	28'800		
123	Enable minimum volume flow	R/W	-	[0] Disabled [1] Enabled		-	EnVflMin
124	Relative minimum volume flow	R/W	0.01 %	Min.	250	-	VflMinRel
				Max.	2000		
125	Minimum volume flow	R	0.01 m ³ /h	Min.	0	Values depending on line size!	VflMin
				Max.	28'800		
133	Enable adapted maximum volume flow	R/W	-	[0] Disabled [1] Enabled		-	EnAdaVflMax
135	Present adapted maximum volume flow	R	0.01 m ³ /h	Min.	0	-	PrAdaVflMax
				Max.	28'800		

Configuration - Design power and power limitation

Address	Register	R/W	Scaling / Unit	Options			Notes	BACnet Object
140	Design primary flow temperature	R/W	0.01 °C	Min.	0	Offset 10 °C	-10... 120 °C	TFIPrimDsgn
				Max.	13'000			
141	Design primary return temperature	R/W	0.01 °C	Min.	0	Offset 10 °C	-10... 120 °C	TRtPrimDsgn
				Max.	13'000			
142	Design power	R	0.1 kW	Min.	0	-	PwrDsgn	
				Max.	65'535			
143	Relative maximum power	R/W	0.01 %	Min.	0	-	PwrMaxRel	
				Max.	10'000			
144	Maximum power	R	0.1 kW	Min.	0	-	PwrMax	
				Max.	65'535			

Configuration - Valve settings (Flow temperature control)

Address	Register	R/W	Scaling / Unit	Options		Notes	BACnet Object
150	Enable kick	R/W	-	[0] Disabled [1] Enabled		-	EnKick
151	Gain flow temp. control valve pos. for heating circuit	R/W	0.01 K	Min.	0	-	GainHcrTFIVlvc
				Max.	5000		
152	Tn (reset time) flow temp. control valve pos. for heating circuit	R/W	1 s	Min.	1	-	TnHcrTFIVlvc
				Max.	600		

Configuration - Valve settings (Limitations)

Address	Register	R/W	Scaling / Unit	Options		Notes	BACnet Object
160	Enable return temperature limitation	R/W	-	[0] Disabled [1] Enabled		-	EnTRtLm
161	Return temperature setpoint for heating	R/W	0.01 °C	Min.	0	-	SpHTRt
				Max.	10'000		
162	Return temperature setpoint for cooling	R/W	0.01 °C	Min.	0	-	SpCTRt
				Max.	10'000		
163	Return temperature limitation gain	R/W	0.01 %/°C	Min.	0	-	GainTRtCtr
				Max.	1000		
164	Return temperature limitation reset time	R/W	1 s	Min.	1	-	TnTRtCtr
				Max.	600		
165	Enable flow/return temperature difference limitation	R/W	-	[0] Disabled [1] Enabled		-	EnTDiffFIRtLm
166	Setpoint flow/return temperature difference limitation	R/W	0.01 K	Min.	0	-	SpTDiffFIRtLm
				Max.	4000		
168	Flow/return temperature difference control – Gain	R/W	0.01 %/K	Min.	0	-	GainTDiffFIRtCtr
				Max.	1000		
169	Flow/return temperature difference – Reset time (Tn)	R/W	1 s	Min.	1	-	TnTDiffFIRtCtr
				Max.	600		

Configuration - Backup mode

Address	Register	R/W	Scaling / Unit	Options		Default	BACnet Object
170	Backup mode	R/W	-	[1] None [2] Last Setpoint [3] Predefined Setpoint		-	BckpMod
171	Backup mode activation delay	R/W	1 s	Min.	0	900	BckpModDly
				Max.	36'000		
172	Backup mode value for position	R/W	0.01 %	Min.	0	-	BckpModValPos
				Max.	10'000		
173	Backup mode value for volume flow	R/W	0.01 %	Min.	0	-	BckpModValVfl
				Max.	10'000		
174	Backup mode value for power	R/W	0.01 %	Min.	0	-	BckpModValPwr
				Max.	10'000		
175	Backup mode value for flow temperature	R/W	0.01 °C	Min.	0	-	BckpModValTFl
				Max.	12'000		

Configuration - Flow/Energy counters

Address	Register	R/W	Scaling	Options		Notes	BACnet Object
180	Operating hours device	R	2 h	Min.	0	65'535 * 2 hours = 5461 days = 15 years	OphDev
				Max.	65535		
190	Total heating volume flow • Low data	R	0.01 m³	Min.	0	Shows volume between 0.01 m³ = 10 l ... 655.35 m³	TotHVfl
				Max.	65535		
191	Total heating volume flow • High data	R	6.55360E+02 m³	Min.	0	Shows volume between 655.35 m³ ... 42'949'017 m³	TotHVfl
				Max.	65535		
192	Total cooling volume flow • Low data	R	0.01 m³	Min.	0	Shows volume between 0.01 m³ = 10 l ... 655.35 m³	TotCVfl
				Max.	65535		
193	Total cooling volume flow • High data	R	6.55360E+02 m³	Min.	0	Shows volume between 655.35 m³ ... 42'949'017 m³	TotCVfl
				Max.	65535		
194	Total heating energy • Low data	R	0.1 kWh	Min.	0	Shows energy between 0.1 kWh = 100 Wh ... 6553.5 kWh	TotHEngy
				Max.	65535		
195	Total heating energy • High data	R	6.55360E+03 kWh	Min.	0	Shows volume between 6553.5 kWh ... 429'949'017 kWh	TotHEngy
				Max.	65535		
196	Total cooling energy • Low data	R	0.1 kWh	Min.	0	Shows energy between 0.1 kWh = 100 Wh ... 6553.5 kWh	TotCEngy
				Max.	65535		
197	Total cooling energy • High data	R	6.55360E+03 kWh	Min.	0	Shows volume between 6553.5 kWh ... 429'949'017 kWh	TotCEngy
				Max.	65535		

Configuration - Device information

Address	Register	R/W	Scaling	Options		Notes / Example	
200	Index	R	-	Value returned as string		e.g. "A" → 00 41	
201	Production date • Lower value (DDMM)	R	-	Value returned as hex string (4 digits per register, DDMM)		e.g. "15.12." → 0F 0C	
202	Production date • Higher value (YYYY)	R	-	Value returned as hex string (4 digits per register YYYY) – leading 20!		e.g. "2019" → 14 13	
203	Series number • Hword	R	-	Value returned as hex string (4 digits per register, upper word = Hword)		1234 → 20015998343680	
204	Series number • Lword	R	-	Value returned as hex string (4 digits per register, lower word = Lword)			
205	Series number • Lword	R	-	Value returned as hex string (4 digits per register, lower word = Lword)			
206	ASN • char 1+2	R	-	Value returned as string (2 letters per register)		"AS" → ASE4U10E	
207	ASN • char 3+4	R		Value returned as string (2 letters per register)		"E4"	
208	ASN • char 5+6	R		Value returned as string (2 letters per register)		"U1"	
209	ASN • char 7+8	R		Value returned as string (2 letters per register)		"0E"	
210	ASN • char 9+10	R		Unused		-	
211	ASN • char 11+12	R		Unused		-	
212	ASN • char 13+14	R		Unused		-	
213	HW Version	R	0.01	Min.	0	Value returned as Int without "." Actual value: JJNN	"2.1" → 0201
				Max.	65'535		
214	FW Version Major, Minor	R	0.01	Min.	0	Value returned as Int without "." Actual value: JJNN	"12.18" → 1218
				Max.	65'535		
215	FW Version Build	R	1	Min.	0	Value returned as Int without "." Actual value: BBBB	"12345" (max. value = 999'999!)
				Max.	65'535		
216	Application Version	R	0.001	Min.	0	Value returned as Int without "." Actual value: JNNN	"2.024" → 2024
				Max.	65'535		