DAIKIN APPLIED EUROPE S.p.A.

BAS integration guide

Modbus protocol

Doc. Name:
D-EIGOC00201-25_01EN-SIC_454C

Product Name:
EWYE-CZ

Control software name:
OPTEON

Table of contents

1. Introduction

This document contains information to incorporate EWYE-CZ Unit Controller into a building automation system (BAS) via Modbus communication protocols.

EWYE-CZ data points are always accessible to a BAS via Modbus network by mean of on board RS485 connection or when option for Ethernet connection is activated.

Modbus terms are not defined. Refer to the standard Modbus specifications for definitions and details about the protocol.

2. About this document

2.1 Notice

2.2 Before starting

Application range

This document refers to the following components:

POL486.85	Controller

Users

Users of this document are intended to be:

- Modbus systems integrators
- Service Technicians
- Plant Engineers
- Sales staff

Conventions

POL486.85 further in this document and when proper shall be referred to as "Controller"

Abbreviation

BSP	**B**oard **S**upport **P**ackage (operating system)

References

- Siemens Building Technologies - CB1J3960en - **Modbus** communication, slave mode
- The Modbus Organization - www.modbus.org

3. Safety information

Only personnel qualified in accordance with IEC (International Electrotechnical Commission) recommendations may be permitted access to electrical components. It is particularly recommended that all sources of electricity to the unit be shut off before any work is begun. Shut off main power supply at the main circuit breaker or isolator.

IMPORTANT: This equipment uses and emits electromagnetic signals. Tests have shown that the equipment conforms to all applicable codes with respect to electromagnetic compatibility.

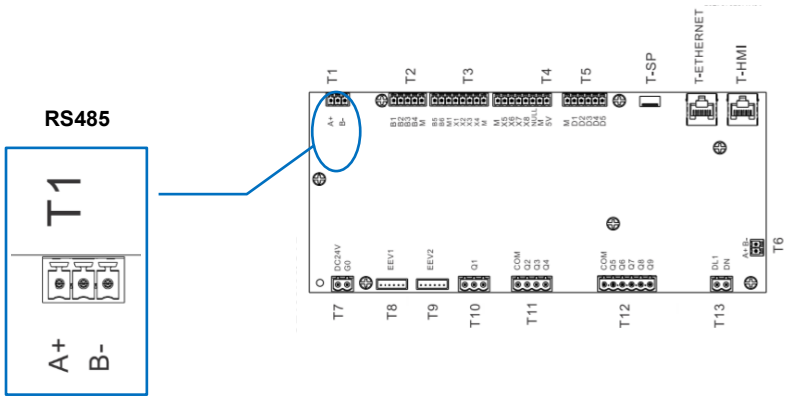
	RISK OF ELECTROCUTION: Even when the main circuit breaker or isolator is switched off, certain circuits may still be energized, since they may be connected to a separate power source.
	RISK OF BURNS: Electrical currents cause components to get hot either temporarily or permanently. Handle power cable, electrical cables and conduits, terminal box covers and motor frames with great care.

Field of application	Use Modbus communication module only for control and monitoring functions in ventilation, air conditioning and refrigeration plants.
Intended use	Trouble-free and safe product operation of the above products presupposes transport, storage, mounting, installation, and commissioning as intended as well as careful operation.
Electrical installation	Fuses, switches, wiring and grounding must comply with local safety regulations for electrical installations.
Wiring	When wiring, strictly separate AC 230 V mains voltage from AC 24 V safety extra low voltage (SELV) to protect against electrical shock!
Commissioning and maintenance	Only qualified staff trained accordingly may prepare for use, commission, and maintain Modbus communication modules. Maintenance of Modbus communication modules generally only means regular cleaning. We recommend removing dust and dirt from system components installed in the control panels during standard service.
Faults	Only authorized staff may diagnose and correct faults and recommission the plant. This applies to working within the panel as well (e.g. testing or changing fuses).
Storage and transport	Refer to the environmental conditions specified in the respective data sheets for storage and transport. If in doubt, contact your supplier.
Disposal	Devices contain electrical and electronic components; do not dispose of them in household garbage. Observe all local and applicable laws.

4. Commission this unit in a Modbus network

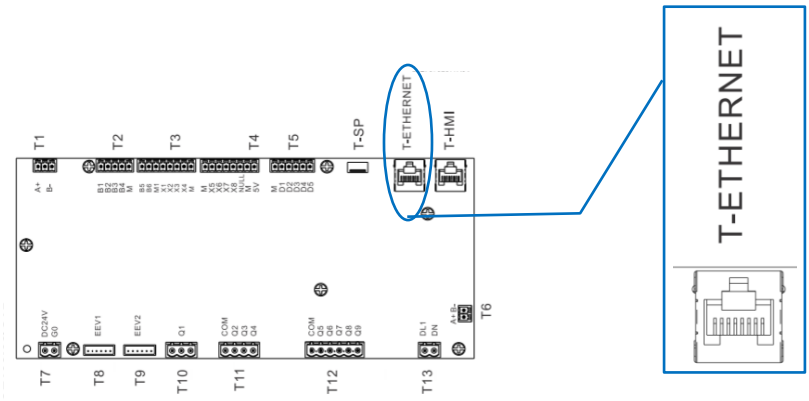
Unit controller

EWYE-CZ controller is the POL468.85 and can be always integrated in a Modbus network by mean of the onboard integrated RS485 connection.



Communication software option

Modbus TCP/IP communication is also ready onborad the controller via Ethernet port as a software option available with connectivity kit SAP code EKRSCBMS.



5. Modbus integration list

Note

All the variables can be accessed through Holding Registers. The address is 4xxxx.

Always verify “Clear Alarms – Network” writing configuration before starting normal operations: a continuous clear command can lead to potential hazard and unit damaging

Description	Type	Address	Offset	R/W	Range
Local/Network Source	UNSIGNED WORD	1	1	R	0 Local 1 Remote
Enabled State	UNSIGNED WORD	2	1	R	0 Disabled 1 Enabled
Capacity Limited	UNSIGNED WORD	4	1	R	0 No 1 Yes
Unit general alarm	UNSIGNED WORD	5	1	R	0 No 1 Yes
Thermoregulation State	UNSIGNED WORD	8	1	R	0 Off 1 On
Unit Enable Setpoint - Network	UNSIGNED WORD	9	1	W	0 Disable 1 Enable
Clear Alarms – Network	UNSIGNED WORD	10	1	W	0 Normal 1 Clear
Operation Mode	UNSIGNED WORD	11	1	R	1 Not Used 2 Cool 3 Heat 4 No tUsed 5 Not Used
Active Setpoint	SIGNED WORD	12	0,1	R	-15…70°C
Actual Capacity	SIGNED WORD	13	0,1	R	0…100%
Active Capacity Limit Output	SIGNED WORD	14	0,1	R	0…100%

Description	Type	Address	Offset	R/W	Range
Status	UNSIGNED WORD	15	1	R	1 Off 2 Start 3 Run 4 Preshutdown 5 Service
Evaporator Entering Water Temp	SIGNED WORD	16	0,1	R	°C
Evaporator Leaving Water Temp Unit	SIGNED WORD	17	0,1	R	°C
Outdoor Air Temperature	SIGNED WORD	24	0,1	R	°C
Warning CODE	SIGNED WORD	31	1	R	0 No Alarm 1 External event
Problem CODE	SIGNED WORD	32	1	R	0 No Alarm 1 Circuit Alarm
Fault CODE	SIGNED WORD	33	1	R	0 No Alarm 1 Unit Alarm or both circuits in alarm
Operation Mode Setpoint – Network	UNSIGNED WORD	34	1	W	0 NULL 1 NotUsed 2 Cool 3 Heat 4 Not Used
Cool Setpoint – Network	SIGNED WORD	35	0,1	W	-15/4°C…28°C
Heat Setpoint – Network	SIGNED WORD	37	0,1	W	20…70°C
Capacity Limit Setpoint - Network	SIGNED WORD	38	0,1	W	0…100%
Current Limit Setpoint - Network	SIGNED WORD	39	0,1	W	0…2000A
Unit of Measure	UNSIGNED WORD	47	1	W	0 Metric 1 Imperial
Noise Reduction Enable Setpoint	UNSIGNED WORD	48	1	W	0 Off 1 On
Defrost - Operating State	UNSIGNED WORD	62	1	R	0 Off 1 On
Bivalent Operation - Enable Setpoint	UNSIGNED WORD	70	1	W	0 Off 1 On

Description	Type	Address	Offset	R/W	Range
Bivalent Operation - Temperature Cut-Off	SIGNED WORD	71	0,1	W	-7…7 °C
Bivalent Operation - Temperature Bivalent Mode	SIGNED WORD	72	0,1	W	0…20 °C
Bivalent Operation - Boiler Start Delay	SIGNED WORD	73	0,1	W	0…60 min
Collective Housing - Enable Setpoint	UNSIGNED WORD	80	1	W	0 Off 1 On
Collective Housing - Tank Temperature	SIGNED WORD	81	0,1	R	°C
Collective Housing - Changeover Upper Limit	SIGNED WORD	82	0,1	W	CngovrLowerLim…60°C
Collective Housing - Changeover Lower Limit	SIGNED WORD	83	0,1	W	-15°C/4°C…60°C
Collective Housing - Tank Temperature Stp	SIGNED WORD	84	0,1	W	CngovrLowerLim…CngovrUpperrLim
DHW Enable Setpoint	UNSIGNED WORD	90	1	W	0 Off 1 On
DHW Temperature Setpoint	SIGNED WORD	91	0,1	W	0…60˚C
DHW Temperature	SIGNED WORD	92	0,1	R	˚C
DHW Switching Valve State	UNSIGNED WORD	93	1	R	0 DHW Off 1 Switching 2 DHW Run 3 Error
DHW Anti Legionella Cycle	UNSIGNED WORD	94	1	R	0 Off 1 On
DHW Standby Mode	MV_red	95	DHWStandbyMode	W	0 Off 1 On

Description	Type	Address	Offset	R/W	Range
Evaporator Pump #1 Status	UNSIGNED WORD	101	1	R	0 Pump Off Request 1 Pump On Request
Evaporator Pump #1 Run Hours -High	UNSIGNED DOUBLE WORD	102	1	W	hours
Evaporator VFD Pump - Fixed Speed 1	SIGNED WORD	150	1	W	%
Evaporator VFD Pump - Fixed Speed 2	SIGNED WORD	151	1	W	%
Evaporator VFD Pump - Standby Speed	SIGNED WORD	152	1	W	%
Evaporator VFD Pump - Actual Speed	SIGNED WORD	153	1	R	%
Evaporator VFD Pump - Building Differential Pressure Setpoint	SIGNED WORD	154	1	W	kPa
Evaporator VFD Pump - Unit Differential Pressure Setpoint	SIGNED WORD	155	1	W	kPa
Evaporator VFD Pump - Building Differential Pressure	SIGNED WORD	156	1	R	kPa
Evaporator VFD Pump - Unit Differential Pressure	SIGNED WORD	157	1	R	kPa
Evaporator VFD Pump - Bypass Valve State	UNSIGNED WORD	158	1	R	0 Closed 1 Opened
Evaporator VFD Pump - DeltaTemperature Setpoint	SIGNED WORD	159	0,1	W	°Dc
Evaporator VFD Pump - DeltaTemperature	SIGNED WORD	160	0,1	R	°Dc
Siemens Controller type	UNSIGNED WORD	201	1	R	0 N/A 1 POL687 2 POL638 3 POL687.00 4 POL687.70 5 POL688.80 6 POL688.80UPS 7 POL468
Application Save	UNSIGNED WORD	202	1	W	0 Off 1 On
Reserved	Reserved	279	1	W	Reserved
External Alarm	UNSIGNED WORD	288	1	R	0 No Alarm 1 InAlarm
External Event	UNSIGNED WORD	289	1	R	0 No Event 1 Event

Description	Type	Address	Offset	R/W	Range
Reserved	Reserved	290	1	R	Reserved
Reserved	Reserved	291	1	W	Reserved
Unit Alarm Word #4	SIGNED WORD	296	1	R	0...4294967295 – See Annex A
Unit Alarm Word #3	SIGNED WORD	297	1	R	0...4294967295 – See Annex A
Unit Alarm Word #2	SIGNED WORD	298	1	R	0...4294967295 – See Annex A
Unit Alarm Word #1	SIGNED WORD	299	1	R	0...4294967295 – See Annex A
Circuit #1 State	UNSIGNED WORD	300	1	R	0 Off 1 Preopen 2 Run 3 Pumpdown
Circuit #1 Comp #1 – Status	UNSIGNED WORD	321	1	R	0 Off 1 On
Circuit #1 Comp #1 – Starts	UNSIGNED WORD	322	1	W	0…9999999
Circuit #1 Comp #1 - Run Hours	UNSIGNED DOUBLE WORD	323	1	W	0…9999999
Circuit #1 Comp #1 - Actual Capacity	SIGNED WORD	325	0,1	R	0…100%
Circuit #1 Comp #1 - Percent RLA	SIGNED WORD	326	0,1	R	0…110%
Circuit #1 or Cir1Comp1 Alarm Word #4	SIGNED WORD	396	1	R	0...4294967295 – See Annex A
Circuit #1 or Cir1Comp1 Alarm Word #3	SIGNED WORD	397	1	R	0...4294967295 – See Annex A
Circuit #1 or Cir1Comp1 Alarm Word #2	SIGNED WORD	398	1	R	0...4294967295 – See Annex A
Circuit #1 or Cir1Comp1 Alarm Word #1	SIGNED WORD	399	1	R	0...4294967295 – See Annex A
Circuit #2 State	UNSIGNED WORD	400	1	R	0 Off 1 Preopen 2 Run 3 Pumpdown
Circuit #2 Comp #1 – Status	UNSIGNED WORD	421	1	R	0 Off 1 On
Circuit #2 Comp #1 – Starts	UNSIGNED WORD	422	1	W	0…9999999

Description	Type	Address	Offset	R/W	Range
Circuit #2 Comp #1 - Run Hours - High	UNSIGNED DOUBLE WORD	423	1	W	0…9999999
Circuit #2 Comp #1 - Actual Capacity	SIGNED WORD	425	0,1	R	0…100%
Circuit #2 Comp #1 - Percent RLA	SIGNED WORD	426	0,1	R	0…110%
Circuit #2 or Cir2Comp1 Alarm Word #4	SIGNED WORD	496	1	R	0...4294967295 – See Annex A
Circuit #2 or Cir2Comp1 Alarm Word #3	SIGNED WORD	497	1	R	0...4294967295 – See Annex A
Circuit #2 or Cir2Comp1 Alarm Word #2	SIGNED WORD	498	1	R	0...4294967295 – See Annex A
Circuit #2 or Cir2Comp1 Alarm Word #1	SIGNED WORD	499	1	R	0...4294967295 – See Annex A
M/S Leaving Water Temperature	SIGNED WORD	21	0,1	R	°C
M/S Disconnect Setpoint	UNSIGNED WORD	330	1	W	0 No 1 Yes
M/S LWT Sensor Fault	UNSIGNED WORD	595	1	R	0 No Alarm 1 In Alarm
Master Comm Error	UNSIGNED WORD	890	1	R	0 No Alarm 1 In Alarm
Slave 1 Comm Error	UNSIGNED WORD	891	1	R	0 No Alarm 1 In Alarm
Slave 2 Comm Error	UNSIGNED WORD	892	1	R	0 No Alarm 1 In Alarm
Slave 3 Comm Error	UNSIGNED WORD	893	1	R	0 No Alarm 1 In Alarm
Slave Load #1	SIGNED WORD	1150	0,1	R	0….100%
Slave State #1	UNSIGNED WORD	1154	1	R	0 Stop 1 Run 2 Alarm 3 ComErr
Slave Load #2	SIGNED WORD	1168	0,1	R	0….100%
Slave State #2	UNSIGNED WORD	1172	1	R	as Slave State #1
Slave Load #3	SIGNED WORD	1186	0,1	R	0….100%
Slave State #3	UNSIGNED WORD	1190	1	R	as Slave State #1

6. Annex A – Alarming

Unit and circuits alarms are coded inside “Alarm Words”. Each bit represents an alarm that is active when the correspondent bit has 1 value. It follows examples:

Unit Alarm Word #1		**Encoding**		
Value (dec)	**Value (bin)**	**bit**	**value**	**Meaning**
17.408	0**1**00 0**1**00 0000 0000	0	0	*Not Used*
		1	0	*Not Used*
		2	0	*Not Used*
		3	0	*Not Used*
		4	0	*Not Used*
		5	0	*Not Used*
		6	0	*Not Used*
		7	0	Demand Limit Fault
		8	0	*Not Used*
		9	0	*Not Used*
		10	**1**	**ACTIVE: Evaporator Entering water temperature sensor fault**
		11	0	Evaporator flow loss
		12	0	Evaporator freeze unit
		13	0	*Not Used*
		14	**1**	**ACTIVE: Evaporator leaving water temperature sensor fault**
		15	0	Evaporator pump 1 fault

Circuit #2 Alarm Word #2		**Encoding**		
Value (dec)	**Value (bin)**	**bit**	**value**	**Meaning**
1.089	0000 0**1**00 0**1**00 000**1**	**0**	**1**	**ACTIVE: High motor temperature**
		1	0	*Not Used*
		2	0	High Vfd Amperes
		3	0	*Not Used*
		4	0	*Not Used*
		5	0	*Not Used*
		6	**1**	**ACTIVE: Low discharge superheat**
		7	0	Low evaporating pressure
		8	0	Low pressure ratio
		9	0	*Not Used*
		10	**1**	**ACTIVE: Mechanical high pressure switch**
		11	0	No pressure at start
		12	0	No pressure change at start
		13	0	*Not Used*
		14	0	*Not Used*
		15	0	Pumpdown fail

6.1 Annex A – Unit Alarm Words

Unit	bit #	Alarm	SIC	SPLIT	R454C
Alarm Word #1	0	*Not Used*			
	1	*Not Used*			
	2	*Not Used*			
	3	*Not Used*			
	4	*Not Used*			
	5	*Not Used*			
	6	*Not Used*			
	7	Demand Limit Fault	X	X	X
	8	*Not Used*			
	9	*Not Used*			
	10	Evaporator Entering water temperature sensor fault	X	X	X
	11	Evaporator flow loss	X	X	X
	12	Evaporator freeze unit	X	X	X
	13	*Not Used*			
	14	Evaporator leaving water temperature sensor fault	X	X	
	15	Evaporator pump 1 fault	X	X	
Alarm Word #2	0	*Not Used*			
	1	External alarm	X	X	X
	2	*External Event*	-	*X*	-
	3	*Not Used*			
	4	*Not Used*			
	5	*Not Used*			
	6	*Not Used*			
	7	*Not Used*			
	8	*Not Used*			
	9	*Not Used*			
	10	*Not Used*			
	11	*Not Used*			
	12	*Not Used*			
	13	*Not Used*			
	14	Low outside ambient temperature lock out	X	X	-
	15	Leaving water temperature reset fault	X	X	X

Unit	bit #	Alarm	SIC	SPLIT	R454C
Alarm Word #3	0	Outside ambient temperature sensor fault	X	X	X
	1	Option extension fault	X	-	X
	2	*Not Used*			
	3	*Not Used*			
	4	*Not Used*			
	5	*Not Used*			
	6	*Not Used*			
	7	*Not Used*			
	8	*Not Used*			
	9	*Not Used*			
	10	*Not Used*			
	11	*Not Used*			
	12	*Not Used*			
	13	*Not Used*			
	14	*Not Used*			
	15	Unit power restore	-	-	-
Alarm Word #4	0	ACS communication fail	X	X	X
	1	Pump communication fail	X	X	X
	2	Domestic Hot Water Alarm	X	X	X
	3	Controller Time Not Valid	X	X	X
	4	*Outdoor Commutication Error*	-	*X*	-
	5	*Out Mismatch Alarm*	-	*X*	-
	6	*Software Mismatch Alarm*	-	*X*	-
	7	*Gas Leakage Alarm*	-	*X*	-
	8	*Gas Sensor Fault*	-	*X*	-
	9	*TankWtSenf*	*X*	-	*X*
	10	*WaterOverHeatAlm*	*X*	-	*X*
	11	*DHW_AntiLeg_AlmEv*	-	-	*X*
	12	*pCOe Modbus Communication Error*	-	-	*X*
	13	*Not Used*			
	14	*Not Used*			
	15	*Not Used*			

6.2 Annex A – Circuit Alarm Words

Circuit 1	bit#	Alarm	bit#	Circuit 2	SIC	SPLIT	R454C
Alarm Word#1	0	Condensing pressure sensor fault	0	**Alarm Word#1**	X	X	X
	1	Discharge temperature sensor fault	1		X	X	X
	2	*Not Used*	2				
	3	*Not Used*	3				
	4	*Economizer pressure sensor fault*	4		-	-	X
	5	*Economizer temperature sensor fault*	5		-	-	X
	6	Evaporating pressure sensor fault	6		X	X	X
	7	*Not Used*	7				
	8	*Not Used*	8				
	9	*Not Used*	9				
	10	Fan fault	10		X	X	X
	11	Gas leakage	11		X	-	-
	12	*Not Used*	12				
	13	High condensing pressure	13		X	X	X
	14	High discharge temperature	14		X	X	X
	15	*Not Used*	15				
Alarm Word #2	0	High motor temperature	0	**Alarm Word #2**	**X**	**X**	**X**
	1	*Not Used*	1				
	2	High Vfd Amperes	2		X	X	X
	3	*Not Used*	3				
	4	*Not Used*	4				
	5	*Not Used*	5				
	6	Low discharge superheat	6		X	X	X
	7	Low evaporating pressure	7		X	X	X
	8	Low pressure ratio	8		X	X	X
	9	*Not Used*	9				
	10	Mechanical high pressure switch	10		X	X	X
	11	No pressure at start	11		X	X	X
	12	No pressure change at start	12		X	-	X
	13	*Not Used*	13				
	14	*Not Used*	14				
	15	Pumpdown fail	15		X	X	X

Circuit 1	bit #	Alarm	bit #	Circuit 2	SIC	SPLIT	R454C
Alarm Word #3	0	*Not Used*	0	**Alarm Word #3**			
	1	*Not Used*	1				
	2	*Not Used*	2				
	3	*Not Used*	3				
	4	*Not Used*	4				
	5	Suction temperature sensor fault	5		X	X	X
	6	*Not Used*	6				
	7	Vfd communication fail	7		X	X	X
	8	Vfd fault	8		X	X	X
	9	*Not Used*	9				
	10	*Not Used*	10				
	11	*Not Used*	11				
	12	*Not Used*	12				
	13	*Not Used*	13				
	14	*Not Used*	14				
	15	*Not Used*	15				
Alarm Word #4	0	*Not Used*	0	**Alarm Word #4**			
	1	*Not Used*	1				
	2	Fan communication alarm	2		X	X	X
	3	*Not Used*	3				
	4	*Not Used*	4				
	5	*Not Used*	5				
	6	*Not Used*	6				
	7	*Not Used*	7				
	8	*Not Used*	8				
	9	*Not Used*	9				
	10	*Not Used*	10				
	11	*Not Used*	11				
	12	*Not Used*	12				
	13	*Not Used*	13				
	14	*Not Used*	14				
	15	*Not Used*	15				

DAIKIN APPLIED EUROPE S.p.A.
Via Piani di Santa Maria, 72 - 00072 Ariccia (Roma) - Italia
Tel: (+39) 06 93 73 11 - Fax: (+39) 06 93 74 014
http://www.daikinapplied.eu