DAIKIN APPLIED EUROPE S.p.A.

BAS integration guide

Modbus protocol

Doc. Name:

D-EIGOC00204-25_01EN

Product Name:

ADT

Control software name:

Airstream

Table of contents

1 Introduction

This document contains information to incorporate a Microtech 4 Unit Controller into a building automation system (BAS) via Modbus communication protocols.

Microtech 4 is suitable for network integration. Data points accessible from a Modbus network are made available to a BAS provided that the proper communication module is installed / 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:

Microtech III	Controller
Microtech 4	Controller
POL902.00/STD	Modbus MSTP module

Users

Users of this document are intended to be:

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

Conventions

Microtech III e Microtech 4 further in this document and when proper will be referred to as “Microtech”.

Abbreviations

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

Reference

- Siemens Building Technologies - CB1J3960en - Modbus communication, slave mode
- Siemens Building Technologies - CB1Q3934en - Climatix™ Modbus communication modules POL902.00
- 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 extralow 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

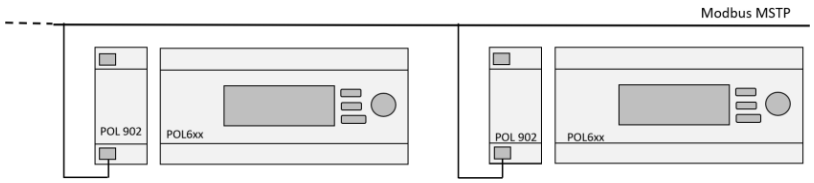
4.1 General information

Microtech 4 controller can be integrated in a Modbus network provided one of the followings:

a) it is equipped with the proper communication module
b) the onboard communication has been made available (software option).

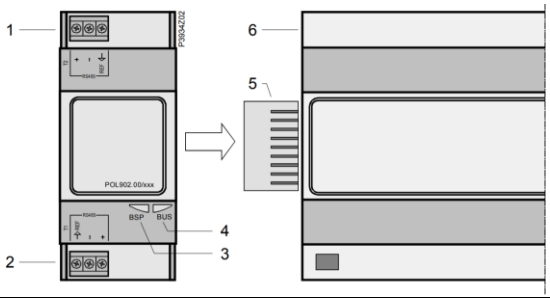
Modbus MSTP (POL902)

Communication module to configure Microtech controllers in Modbus network is the POL902:



4.2 Modbus module

Module description



Part	Description
1	Modbus RS485 interface T1 (slave, channel 0).
2	Modbus RS485 interface T2 (slave, channel 1).
3	Status display "BSP" (Board Support Package).
4	Status display "BUS" (bus connections o.k. / bus traffic).
5	Plug connection "Communication extension bus".
6	Microtech III controller.

BSP Led

Color	Flashing frequency	Meaning
Green	Steady on	BSP operating and communication with controllerworking.
Yellow	Steady on	BSP operating, but no communication with controller.
Red	Steady on	Hardware fault.
Red/Yellow	Flashing at 1 Hz (1 second on/ 1 second off)	Upgrade mode running.
Red	Flashing at 2 Hz (0,5 second on/ 0,5 second off)	BSP error (software error).

BUS Led

Color	Flashing frequency	Meaning
Green	Steady on	Communication active.
Yellow	Steady on	Initializing
Red	Steady on	Communication interrupted.

Module connection

Step	Action
1	Power off the controller
2	Connect POL902 module to the controller via plug connection (part 5).
4	Power on the controller

Configuration procedure

Step	Action
1	Check that BUS led status is steady on green coloured.
2	Navigate the unit's keypad/display to the main menu page and set the "service" password
3	Navigate the unit's keypad/display following the path below: **Main menu→Commissioning→Modbus**
4	Set parameters in the table below as needed according to the local network

Configuration parameters

Parameter	Default value
Address T1	1
Parity T1	None
2 Stop bits T1	Yes
Baud rate T1	19200
Rspnce Dly T1	5 ms
Port T2	Passive
Address T2	1
Parity T2	None
2 Stop bits T2	Yes
Baud rate T2	19200
Rspnce Dly T2	5 ms

5 Airstream integration list

5.1 Coil Status

Address	Description	Values/Units	Remarks
0x0001	Alarm acknowledge input	0-1	Off*On

5.2 Input States

Address	Description	Values/Units	Remarks
1x0001	Alarm class Danger alarm (A) status	0-1	Normal*Alarm
1x0002	Alarm class Critical alarm (A) status	0-1	Normal*Alarm
1x0003	Alarm class Low alarm (B) status	0-1	Normal*Alarm
1x0004	Alarm class Warning alarm (C) status	0-1	Normal*Alarm
1x0011	Emergency stop status	0-1	Alarm*OK
1x0012	Standby mode status	0-1	On*Off
1x0027	Supply fan alarm	0-1	OK*Alarm
1x0030	Return fan alarm	0-1	OK*Alarm
1x0038	Cooling pump alarm	0-1	OK*Alarm
1x0040	Recovery alarm	0-1	OK*Alarm
1x0045	Heating pump alarm	0-1	OK*Alarm
1x0047	Frost switch alarm	0-1	OK*Alarm
1x0048	Electrical heating alarm	0-1	OK*Alarm
1x0063	Humidifier pump alarm	0-1	OK*Alarm
1x0073	Fire alarm	0-1	OK*Alarm
1x0074	Supply temperature fire alarm	0-1	OK*Alarm
1x0075	Return temperature fire alarm	0-1	OK*Alarm
1x0080	Outside air temperature	0-1	OK*Alarm
1x0081	Supply air temperature	0-1	OK*Alarm
1x0085	Return air temperature	0-1	OK*Alarm
1x0086	Exhaust air temperature	0-1	OK*Alarm
1x0087	Pre-Heating temperature	0-1	OK*Alarm
1x0094	Room humidity	0-1	OK*Alarm
1x0097	Supply air pressure	0-1	OK*Alarm
1x0098	Return air pressure	0-1	OK*Alarm
1x0100	Air quality	0-1	OK*Alarm
1x0102	Room unit 1	0-1	OK*Alarm
1x0106	ERQ 1 leakage	0-1	OK*Alarm
1x0107	ERQ 2 leakage	0-1	OK*Alarm
1x0108	Low flow alarm	0-1	OK*Alarm
1x0109	Supply optional transducer	0-1	OK*Alarm
1x0110	Return optional transducer	0-1	OK*Alarm
1x0111	ERQ 1 alarm	0-1	OK*Alarm
1x0112	ERQ 2 alarm	0-1	OK*Alarm

5.3 Input Register

Address	Description	Values/Units	Remarks
	Unsigned Word		
3x0001	**General status (Word 1)**		
Bit0	- Alarm class danger (A)		
Bit1	- Alarm class critical (A)		
Bit2	- Alarm class low (B)		
Bit3	- Alarm class warning (C)		
Bit4			
Bit5			
Bit6	- Winter/Summer state		
Bit7		0-65535	0-1 for each bit or counted binaryto a decimal number
Bit8			
Bit9			
Bit10			
Bit11	- Actual control mode temp, room		
Bit12	- Actual control mode temp, return		
Bit13	- Actual control mode temp, supply		
Bit14	- Actual control mode humidity, room		
Bit15			
3x0005	**Digital inputs (Word 1)**		
Bit0	- Emergency stop		
Bit1			
Bit2			
Bit3			
Bit4			
Bit5			
Bit6			
Bit7		0-65535	0-1 for each bit or counted binaryto a decimal number
Bit8			
Bit9			
Bit10			
Bit11			
Bit12			
Bit13			
Bit14			
Bit15			
3x0009	**Digital outputs (Word 1)**		
Bit0	- Supply damper		
Bit1			
Bit2			
Bit3			
Bit4	- Supply fan, running		
Bit5			
Bit6		0-65535	0-1 for each bit or counted binaryto a decimal number
Bit7			
Bit8			
Bit9	- Return fan, running		
Bit10			
Bit11			
Bit12			
Bit13			

Bit14 Bit15			
3x0010 Bit0 Bit1 Bit2 Bit3 Bit4 Bit5 Bit6 Bit7 Bit8 Bit9 Bit10 Bit11 Bit12 Bit13 Bit14 Bit15	**Digital outputs (Word 2)** - Cooling pump - Heating pump	0-65535	0-1 for each bit or counted binaryto a decimal number
3x0012 Bit0 Bit1 Bit2 Bit3 Bit4 Bit5 Bit6 Bit7 Bit8 Bit9 Bit10 Bit11 Bit12 Bit13 Bit14 Bit15	**Digital outputs (Word 4)** - AHU Alarm (output high and low)	0-65535	0-1 for each bit or counted binaryto a decimal number
3x0013 Bit0 Bit1 Bit2 Bit3 Bit4 Bit5 Bit6 Bit7 Bit8	**Alarms (Word 1)** - Supply fan - Return fan	0-65535	0-1 for each bit or counted binaryto a decimal number
Bit9 Bit10 Bit11 Bit12 Bit13 Bit14 Bit15			
Present value, Unsigned Word			

3x0017	Actual operating mode	0-4	0 = Off 1 = On 2 = Ventilation 3 = Economy 4 = Standby
3x0021	Actual time scheduler state	0-3	Off*On*Ventilation*Economy
3x0025	Fresh air damper command	0-1	Close*Open
3x0027	Fire damper command	0-1	Close*Open
3x0028	Supply fan command	1-2	Off*On
3x0029	Supply fan output signal	0 - 100%	
3x0030	Return fan command	1-2	Off*On
3x0031	Return fan output signal	0 - 100%	
3x0032	Fresh air damper output signal	0 - 100%	
3x0033	Cooling coil output signal	0 - 100%	
3x0034	Cooling pump command	0-1	Off*On
3x0036	Recovery output signal	0 - 100%	
3x0037	Recovery command	0-1	Off*On
3x0038	Mixing damper output signal	0 - 100%	
3x0040	Heating coil output signal	0 - 100%	
3x0041	Heating pump command	0-1	Off*On
3x0042	Electrical heating output signal / Post heating	0 - 100%	
3x0043	Electrical heating command	0-2	Off*Step1*Step2
3x0044	Pre-heating electrical command	0-2	Off*Step1*Step2
3x0047	ERQ 1 state	0-2	Off*On*Defrost
3x0048	ERQ 2 state	0-2	Off*On*Defrost
3x0051	ERQ global load output signal	0 - 100%	
3x0052	Humidifier output signal	0 - 100%	
3x0053	Humidifier command	0-1	Off*On
3x0054	ERQ 1 actual load	0 - 100%	
3x0055	ERQ 2 actual load	0 - 100%	
3x0060	Alarm output	0-1	Normal*Alarm
3x0067	Actual temperature compensation fan	0 - 100%	
3x0071	Present unit status	0-16	0 = NA 1 = Fire 2 = Emergency 3 = Replace Fan 4 = Fault 5 = Alarm 6 = Manual 7 = Panel switch 8 = Local switch 9 = NA 10 = BMS 11 = Schedular 12 = Occupancy 13 = NA 14 = NA 15 = NA 16 =Ready
	Present value, Signed Word		
3x0072	Outside air temperature	°C	(factor 10)
3x0073	Supply air temperature	°C	(factor 10)
3x0075	Room temperature	°C	(factor 10)
3x0076	Return air temperature	°C	(factor 10)
3x0077	Exhaust Temperature	°C	(factor 10)
3x0078	Pre-Heating sensor temperature	°C	(factor 10)
3x0090	Room humidity relative	%r.H	
3x0091	Room humidity absolute	g/kg	(factor 10)
3x0092	Room enthalpy	kJ/kg	(factor 10)

3x0095	Supply air flow	m^3/h	
3x0096	Return air flow	m^3/h	
3x0097	Supply air pressure	Pa	
3x0098	Return air pressure	Pa	
3x0125	Supply optional transducer	Pa	
3x0126	Return optional transducer	Pa	
3x0101	Air quality	ppm	
3x0104	Actual heating setpoint, Main (depending on actual control mode)	°C	(factor 10)
3x0105	Actual cooling setpoint, Main (depending on actual control mode)	°C	(factor 10)
3x0108	Actual humidity setpoint, Main (depending on actual control mode)	%r.H.	(factor 10)
3x0109	Actual dehumidity setpoint, Main (depending on actual control mode)	%r.H	(factor 10)
3x0112	Actual Supply fan setpoint	%, Pa, m3/h	Units depends on configuration
3x0113	Actual Return fan setpoint	%, Pa, m3/h	Units depends on configuration

5.4 Holding register

Address	Description	Values/Range	Remarks
Present value, Unsigned Word			
4x0010	Summer/Winter mode changeover	0-1	0 = Winter 1 = Summer
4x002	Network Source	0-1	0 = Off 1 = On
4x312	Network Source (BMS)	0-4	0 = Auto 1 = Off 2 = On 3 = Ventilation 4 = Economy
Present value, Signed Word			
4x0020	Central temperature setpoint *	10 - 30	°C, (factor 10)
4x0021	Band temperature setpoint *	0 - 20	°C, (factor 10)
4x0022	Heating temperature setpoint *	10 - 30	°C, (factor 10)
4x0023	Cooling temperature setpoint *	10 - 30	°C, (factor 10)
4x0024	Economy central temperature setpoint *	10 - 30	°C, (factor 10)
4x0025	Economy band temperature setpoint *	0 - 20	°C, (factor 10)
4x0026	Economy heating temperature setpoint *	10 - *"Heating setpoint"*	°C, (factor 10)
4x0027	Economy cooling temperature setpoint *	*"Cooling setpoint"* - 30	°C, (factor 10)
4x0034	Min Supply Temperature Summer	0 - 30	°C, (factor 10)
4x0035	Max Supply Temperature Summer	20 - 80	°C, (factor 10)
4x0281	Min Supply Temperature Winter	0 - 30	°C, (factor 10)
4x0282	Max Supply Temperature Winter	20 - 80	°C, (factor 10)
4x0283	Pursuit band	10 - 30	°C, (factor 10)
4x0284	Pursuit setpoint	10 - 30	°C, (factor 10)
4x0285	Pursuit eco setpoint	10 - 30	°C, (factor 10)
4x0041	Humidification setpoint	0 - 100 (0 - "*Dehum. Setpoint*")	%r.H. *(Hum. High Limit = "Dehum. Setpoint" if Dehumidification control is enabled)*
4x0042	Dehumidification setpoint	0 - 100 (*"Hum. Setpoint"* - 100)	%r.H. *(Dehum. Low Limit = "Hum. Setpoint" if Humidification control is enabled)*
Present value, Unsigned Word			

4x0050	Supply fan setpoint	0 - *"High Limit"* (High Limit = 100% = 10000 Pa = 140000 m^3/h)	%, Pa, m^3/h
4x0051	Supply fan economy setpoint	0 - *"Supply fan setpoint"*	%, Pa, m^3/h
4x0053	Supply fan max force setpoint	0 - (*"High Limit – Supply fan setpoint")*	%, Pa, m^3/h.
4x0054	Return fan setpoint	0 - *"High Limit"* (High Limit = 100% = 10000 Pa = 140000 m^3/h)	%, Pa, m^3/h
4x0055 4x0057	Return fan economy setpoint / Room Pressure Return fan max force setpoint	0 - *"Return fan setpoint"* 0 - (*"High Limit – Return fan setpoint")*	%, Pa, m^3/h %, Pa, m^3/h
4x0120	COP K factor		%
Present value, Signed Word			
4x0059	Air quality setpoint	0 - 3000	ppm
4x0091	Min fresh air	0 - 100	%
Present value, Unsigned Word			
4x0277	Supply fan running hours	0 – 999999 h	It represents the overall amount of running hours of the supply fan**
4x0279	Return fan running hours	0 – 999999 h	It represents the overall amount of running hours of the return fan**

* Different setpoint combinations are considered depending on configuration. Please refer to operating manual for more details.

** Attention! This variable contains a 32-bit value, obtained concatenating the MSB at specified address+1 and LSB at specified address, i.e. [MSB, LSB]. For example [0x278, 0x277] represents the correct value of the Supply Fan Running Hours.

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