APPLICATION NOTE

OJ DV BACnet MS/TP protocol



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Introduction

BACnet is a communication protocol for BAC networks (Building Automation and Control).
BACnet was developed to exchange information in a standardized way between sensors, actuators and controls. In this way, a BMS system can be created with devices from different manufacturers.
BACnet MS/TP is a BACnet protocol that uses an RS-485 interface for communication.

BACnet MS/TP is available in all DVs with AOC 2.50 and higher.

BACnet MS/TP connection

The OJ DV is equipped with three connectors for BACnet MS/TP communication:

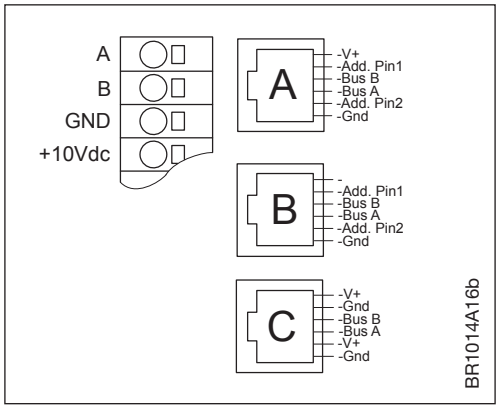
Two RJ12 connectors and one set of spring terminals.

On the strip of spring terminals for control signals (A/D I/O), the terminals for RS-485 interface connection are marked ”A”, ”B” and ”GND”. See figure 1.

The RS-485 spring terminals, marked “A” and “B” are internally connected in parallel to the RS-485 interface pins in the RJ12 connectors marked ”A”and ”B”.

The RJ12 connector marked ”C” is solely for the connection of external Modbus devices. (See OJ DV Manual)

Figure 1



Cable

The following can be used for RS-485 interface communication cable:

- Round communication cable, which should be connected to the OJ DV terminals marked ” A” and “B” and “GND”.
- Ribbon/telecom cable, 6-core, unshielded, 30 AWG, 0.066 mm^2 or similar ribbon cable.

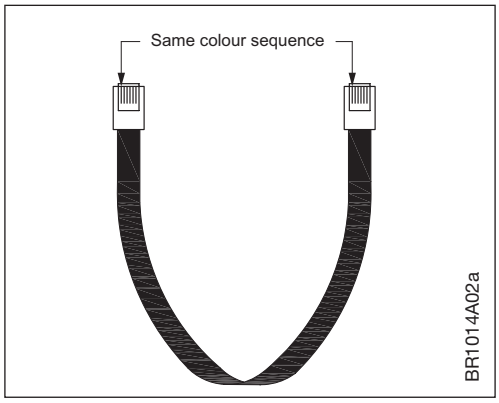
Note

If ribbon/telecom cable is used, RJ12 connectors must be attached to both ends of the cable using a special-purpose tool.

Note

IMPORTANT! The RJ12 connectors must be attached to both ends in such a way that the two connectors follow the same sequence of wire colours in the cable. See figure 2

Figure 2



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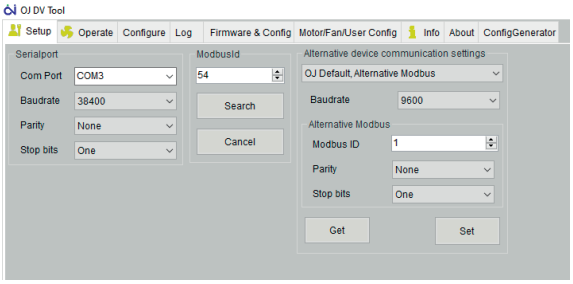
BACnet MS/TP Setup

Bacnet MS/TP needs to be configured via Modbus registers. The following section explaining how to configure BACnet MS/TP using the OJ-DV-PC-Tool and the lists the relevant Modbus registers

OJ-DV-PC-Tool

Connect to the OJ DV for the first time using the default Modbus address of:

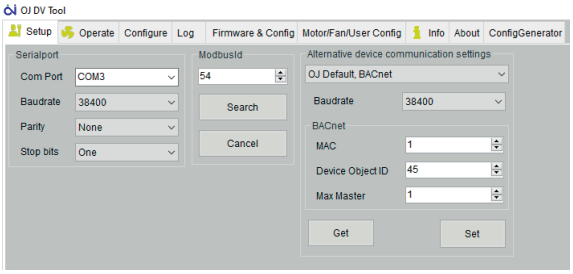
ID: 54
Baud rate: 38400
Parity: None
Stop bits: One



Click on Get. It will then be possible to use a drop-down menu under Alternative device communications

From the drop-down menu choose OJ Default, BACnet. Choose BACnet MS/TP settings:

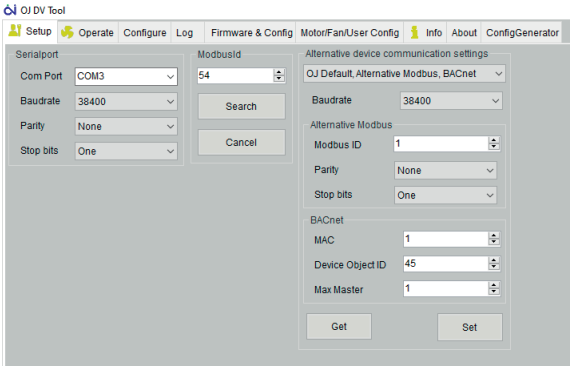
Baud rate: 9600, 19200, 38400, 57600, 115200 kbs
MAC: 0 – 127
Max Master: 1 - 127
Device object ID: 0 - 4194302



There is also the possibility of setting an alternative Modbus Address and BACnet MS/TP together.

Note

When using the Alternative device communication settings on the Setup page of the OJ-DV-PC-Tool, it will always be possible to communicate with the OJ DV using the default Modbus address.



Setup of BACnet MS/TP via Modbus registers

The table below shows how to enable/disable for communication protocols via coil bits via the Modbus interface.

Coil stats	Address	Function	OJ Default	OJ Default, BACnet MS/TP	OJ Default, Modbus Alt, BACnet MS/TP	BACnet MS/TP [1]
0x0009	8	Use Alternate Comm Settings	0	X	X	1
0x0010	9	Autodetect Communication	0	0	1	0
0x0036	35	BACnet Enable	X	X	X	1
0x0037	36	AutoDetect BACnet	0	1	1	0

[1] : If this option is selected Modbus interface will not be available. To deactivate BACnet MS/TP: Enter BACnetEnable (Binary_value:4) and change the present value from 1 to 0.

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BACnet MS/TP Communication Configuration

To configure the BACnet MS/TP communication use the following holding registers via the Modbus interface.

Register	Address	Function	Range	Resolution
4x0023	22	CommRate	1=9600, 2=19200, 3= 38400, 4= 57600, 5=115200	Bds
4x0057	56	BACnetMAC	0 -127	1
4x0058	57	BACnetMaxMaster	1 - 127	1
4x0059	58	BACnetDeviceObjectInstance Low	0 – 4194302	1
4x0060	59	BACnetDeviceObjectInstance Low		

BACnet Objects

The following sections lists the BACnet object instances. The EDE can be found on the OJ Electronics products homepage.

BACnet Binary Values

Object ID	Object Name	Read/Write (Present value)	Range	Active state	Remarks
BV:0	Motor ON/OFF	R/W	0 - 1	1 = ON	Will set to 0 if any error occurs
BV:1	Reset Alarms	R/W	0 - 1	1 = Reset	Will return to 0 after reset is performed
BV:2	Fire Mode	R/W	0 - 1	1 = Active	
BV:3	Motor Output OFF	R/W	0 - 1	1 = Keep motor output off	
BV:4	BACnet Enable	R/W	0 - 1	1= BACnet active	This will turn off the BACnet communication if set to 0. It can only recovered by using the Modbus interface or if protocol autodetect is enabled in the udf BACnet will be available after max. 10sec
BV:5	V LO Alarm	R	0 - 1	1= Alarm	
BV:6	V HI Alarm	R	0 - 1	1= Alarm	
BV:7	I HI Alarm	R	0 - 1	1= Alarm	
BV:8	Temperature High	R	0 - 1	1= Warning	
BV:9	Input Phase Error	R	0 - 1	1= Warning	
BV:10	Rotor Blocked	R	0 - 1	1= Alarm	
BV:11	Current Limit	R	0 - 1	1=Warning	
BV:12	Voltage Limit	R	0 - 1	1=Warning	
BV:13	Rotor Direction	R	0 - 1	1= Alarm	
BV:14	EEPROME error	R	0 - 1	1=Warning	
BV:15	Internal Stop	R	0 - 1	1= Alarm (Stop)	
BV:16	Earth Fault	R	0 - 1	1= Alarm	
BV:17	Motor Phase Error	R	0 - 1	1= Alarm	
BV:18	Communication Error MOC	R	0 - 1	1= Alarm	
BV:19	Ext 24 V Supply overload	R	0 - 1	1=Overload	
BV:20	MOC in Bootloader	R	0 - 1	1= Alarm	
BV:21	Communication Error IOM	R	0 - 1	1= Warning	
BV:22	Motor Overheat IOM	R	0 - 1	1= Alarm	

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BACnet Integer Values

Object ID	Object Name	Read/Write (Present value)	Range	Resolution	Unit	Remarks
IV:0	Prc Set	R/W	0 - 10000	0.01	%	When Analog control is active, it reflects the actual set point.
IV:1	min RPM	R/W	0 - 5000	1	RPM	
IV:2	max RPM	R/W	0 - 5000	1	RPM	
IV:3	Up Ramp Time	R/W	15 - 240	1	Sec.	
IV:4	Down Ramp Time	R/W	15 - 240	1	Sec.	
IV:5	AOC SW Version	R	0 - 65535	0.01	-	
IV:6	MOC SW Version	R	0 - 65535	0.01	-	
IV:7	Prc Out	R	0 -10000	0.01	%	
IV:8	RPM Out	R	0 - 3000	1	RPM	
IV:9	Intern Temp	R	-5000 - 15000	0.01	°C	
IV:10	V IN_RMS	R	0 - 500	1	V	
IV:11	I Out	R	0 - 65535	1	mA	
IV:12	Power In (Filtered)	R	0 - 20000	1	W	
IV:13	Operation Minutes	R	0 - 1439	1	Min	
IV:14	Operations Days	R	0 - 9999	1	Day	
IV:15	Extern Set	R	0 - 10000	1	V	
IV:16	V DC Bus (Peak)	R	0 - 800	1	V	
IV:17	V motor (Peak)	R	0 - 500	1	V	
IV:18	Power Consumption Wh	R	0 - 999	1	Wh	
IV:19	Power Consumption kWh	R	0 - 999	1	kWh	
IV:20	Power Consumption MWh	R	0 - 65535	1	MWh	

OJ Electronics A/S
Stenager 13B • DK-6400 Sønderborg
Tel. : +45 73 12 13 14 • Fax +45 73 12 13 13
oj@ojelectronics.com • www.ojelectronics.com

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