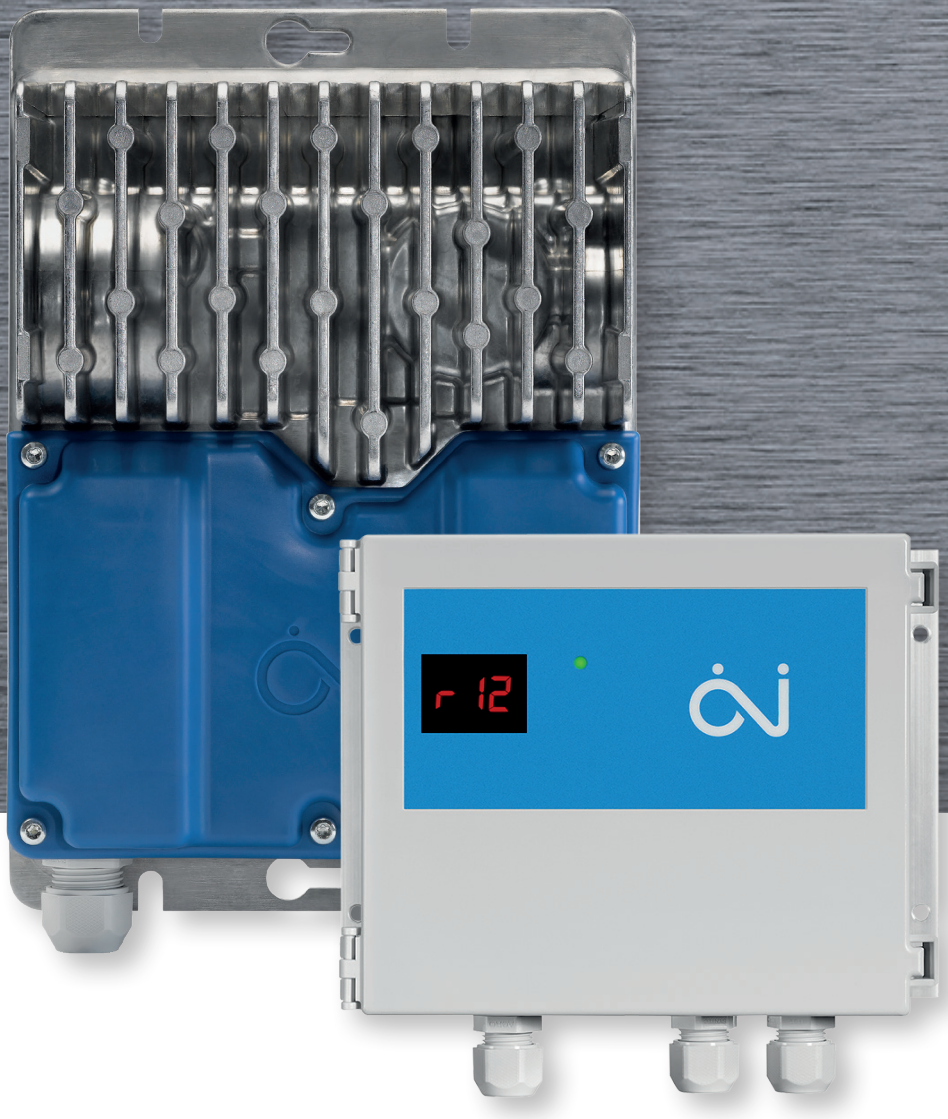
APPLICATION NOTE

OJ DRHX BACnet MS/TP protocol



OJ DRHX

A DRIVES PROGRAMME DEDICATED TO VENTILATION SOLUTIONS

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OJ ELECTRONICS

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 on OJ DRHX with AOC 2.50 and higher.

This protocol applies to the following product variants:

- **OJ-DRHX-1055-MAD5**
- **OJ-DRHX-1220-MAD5**
- **OJ-DRHX-1690-MAN5**
- **OJ-DRHX-1790-MAN5**

BACnet MSTP connection

The OJ DRHX is provided with connections for BACnet MSTP communication.

The product variants:

- **OJ-DRHX-1055-MAD5**
- **OJ-DRHX-1220-MAD5**

- Have two RS-485 RJ12-plug connectors for BACnet MS/TP, marked ”A” & ”B” (see fig. 1)

- 1 set of spring terminals marked ”A” & ”B” + “GND” (see fig. 2)
The RS-485 terminals (terminal no. 3/D+ & terminal no. 4/D-) on the spring terminal block are internally connected in parallel to the RS485 pins in the RJ12 connectors marked ”A” and ”B” (pin no. 3/D+ & pin no. 4/D-).

Product variants:

- **OJ-DRHX-1690-MAN5**
- **OJ-DRHX-1790-MAN5**

- Do have 1 pcs. of RJ12-plug marked with ”B” (see fig. 3)

Note

RJ 12 Plug connector marked with “A” supplies 24V to some pins, only use compatible products.
RJ 12 Plug connector marked with ”C” cannot not be used.

- 1 set of spring terminals (see fig. 4)
The RS-485 terminals (terminal A & terminal B) on the strip of spring terminals are internally connected in parallel to the RS-485 pins in the RJ12 connectors marked ”A” and ”B” (pin no. 3/D+ & pin no. 4/D-).

Figure 1

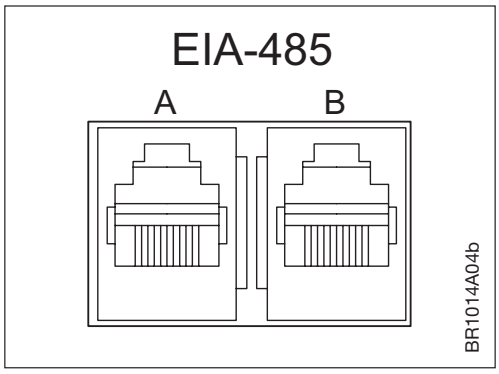


Figure 2

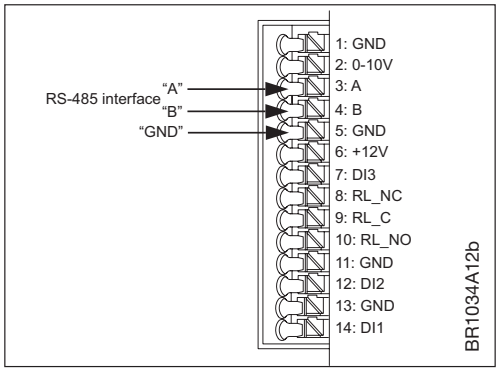


Figure 3

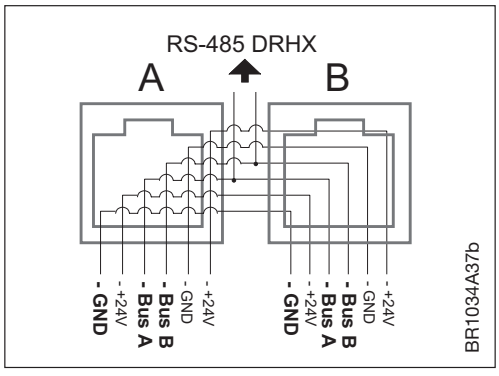
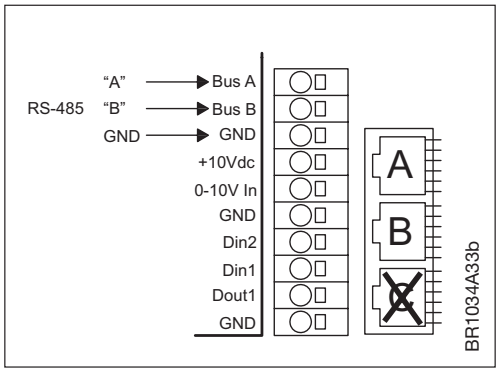


Figure 4



Cable

Types of RS-485 cables which can be used:

- Round communications cable (like twisted pair cables) can be used and connected in the spring terminals marked ”A” & ”B” + “GND”.
- Flat cable/tele cable, 6-wire, not shielded, 30 AWG, 0,066 mm^2 or equal types of flat cable.

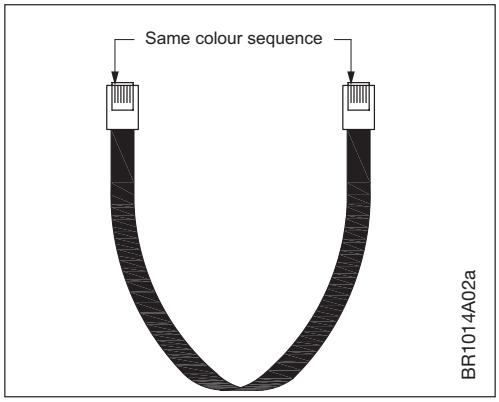
Note

If flat cable/tele cable is used, RJ12 connectors must be attached to both ends of the cable, using a special crimp tool.

Note

IMPORTANT! If flat cable/tele cable is used, the RJ12 connectors in both ends must be attached in such a way that the two connectors follow the same sequence of wire colours. (See fig. 5)

Figure 5



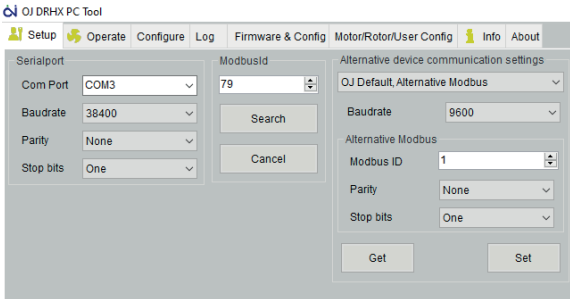
BACnet MS/TP setup

Bacnet MS/TP needs to be configured via Modbus, using OJ-DRHX-PC-Tool or another Modbus interface.

OJ-DRHX-PC-Tool

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

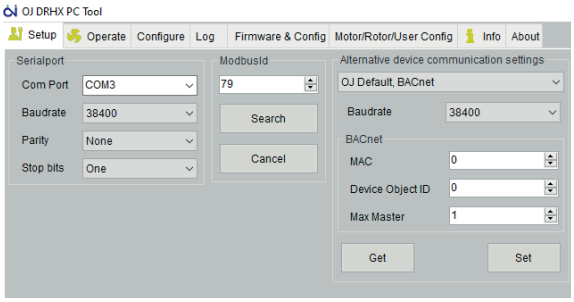
ID: 79
Baud rate: 38400
Parity: None
Stop bits: One



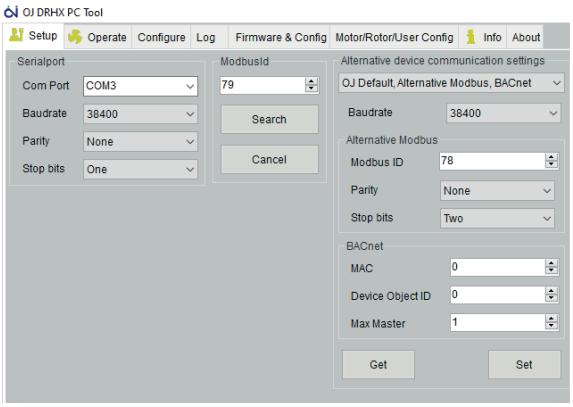
Click on Get. It will then be possible to use a drop-down menu under Alternative device communications.

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-DRHX-PC-Tool, it will always be possible to communicate with the OJ DRHX using the default Modbus address

Set up 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 Communica-tion	0	0	1	0
0x0019	18	BACnet Enable	X	X	X	1
0x0020	19	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:22) and change the present value from 1 to 0.

BACnet Communications Register

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

Register	Address	Function	Range	Resolution
4x0015	14	CommRate	1=9600, 2=19200, 3= 38400, 4= 57600, 5=115200	Bds
4x0042	41	BACnet MAC	0 – 127	1
4x0043	42	BACnet MaxMaster	1 - 127	1
4x0044	43	BACnet DeviceObjectInstance Low	0 - 4194302	1
4x0045	44	BACnet DeviceObjectInstance High		

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 occur
BV:1	Reset Alarms	R/W	0 - 1	1 = Reset	Will return to 0 after reset is performed
BV:2	BACnet Enable	R/W	0 - 1	1 = Enabled	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:3	Rotorguard Alarm	R	0 - 1	1 = Alarm	
BV:4	V LO Alarm	R	0 - 1	1 = Alarm	
BV:5	V HI Alarm	R	0 - 1	1 = Alarm	
BV:6	I HI Alarm (Motor out short)	R	0 - 1	1 = Alarm	
BV:7	Temperature High	R	0 - 1	1 = Warning	
BV:8	Rotorguard signal	R	0 - 1	1 = Pulse	
BV:9	Overload / Rotor Blocked	R	0 - 1	1 = Alarm	
BV:10	Internal Stop	R	0 - 1	1 = Alarm (Stop)	
BV:11	I Limit	R	0 - 1	1 = Warning	
BV:12	EEPROM error	R	0 - 1	1 = Warning	
BV:13	Communication error MOC	R	0 - 1	1 = Alarm	
BV:14	Motor Phase Error	R	0 - 1	1 = Alarm	
BV:15	MOC in bootloader	R	0 - 1	1 = Alarm	
BV:16	Communication error IOM[1]	R	0 - 1	1 = Warning	
BV:17	Rotation OK	R	0 - 1	1 = OK	
BV:18	Test function active	R	0 - 1	1 = Active	

[1]: Only supported on OJ- DRHX-1690-MAN5 and OJ-DRHX-1790-MAN5

BACnet Integer Values

Object ID	Function	Read/Write (Present value)	Range	Resolution	Unit
IV:0	Setpoint / PrcSet	R/W	0 - 10000	0.01	%
IV:1	Min. Motor Speed	R/W	100 - Max.	0.01	RPM
IV:2	Max. Motor Speed	R/W	Min. - 40000	0.01	RPM
IV:3	DRHX Type	R	1 - 2 - 4 - 8 - 14	1	Nm
IV:4	MOC SW Version	R	0 - ?	0.01	
IV:5	PrcOut	R	0 - 10000	0.01	%
IV:6	Intern Temp	R	0 - 12000	0.01	°C
IV:7	Motor Speed Out	R	0 - 40000	0.01	RPM
IV:8	V In	R	0 - 300	1	V
IV:9	I Out (RMS)	R	0 - 10000	1	mA
IV:10	Power In	R	0 - 1000	1	W
IV:11	ExterSet	R	0 - 10000	1	mW
IV:12	Operation Day	R	0 - 9999	1	Day
IV:13	Operation Minutes	R	0 - 1439	1	Minutes
IV:14	AOC SW Version	R	0 - ?	0.01	
IV:15	Rotor Speed Out	R	0 - 40000	0.01	RPM
IV:16	Torque	R	0 - 1500	0.01	Nm
IV:17	V DC Bus (Peak)	R	0 - 400	1	V
IV:18	V Motor (Peak)	R	0 - 400	1	V
IV:19	ExternSet (IOM)[1]	R	0 - 10000	1	mV

[1]: Only supported on OJ-DRHX-1690-MAN5 and OJ-DRHX-1790-MAN5

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