

Versatronik® 505 OT
Communication Gateway
for LON or BACnet or Modbus RTU/RS485



Document Applicable to:
Wall Mount BACnetIP 704051
Wall Mount LON 704052
Wall Mount Modbus 704054
DIN Rail Mount LON 704072
DIN Rail Mount BACnetIP 704073
DIN Rail Mount Modbus 704077

Applicable Controls
Vitodens 100, WB1A
Vitodens 100, WB1B

Technical, Installation and Configuration Information

Cautionary Statement

The information presented in this document is only to be used by those familiar with its application and use.






C US LR 102874

IMPORTANT


Read and save these instructions for future reference

About these instructions


 Take note of all symbols and notations intended to draw attention to potential hazards or important product information. These include "WARNING", "CAUTION" and "IMPORTANT". See below.

 WARNING
Indicates an imminently hazardous situation which, if not avoided, could result in death, serious injury or substantial product/property damage.

→ Warnings draw your attention to the presence of potential hazards or important product information.

 CAUTION
Indicates an imminently hazardous situation which, if not avoided, may result in minor injury or product/property damage.

→ Cautions draw your attention to the presence of potential hazards or important product information

 CAUTION
Static sensitive components may be damaged by improper handling or work within the control. Ensure all possible measures are taken to eliminate build-up of static electricity.

IMPORTANT

→ Helpful hints for installation, operation or maintenance which pertains to the product.

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Important Regulatory and Installation Requirements

Codes

The installation of this unit must be in accordance with local codes.

→ Please carefully read this manual prior to attempting installation. Any warranty is null and void if these instructions are not followed.


All electrical wiring is to be done in accordance with the latest edition of CSA C22,1 Part 1 and/ or local codes. In the U.S. use the National Electrical Code ANSI/NFPA 70.

→ The completeness and functionality of field supplied electrical controls and components must be verified by those installing the device

The installing contractor must comply with the Standard of Controls and Safety Devices for Automatically fired Boilers, ANSI/ ASME CSD-1 where required by the authority having jurisdiction.

Working on the equipment

The installation, adjustment, service and maintenance of this unit must be done by a licensed professional heating contractor or persons who are qualified and experienced in the installation, service, and maintenance of similar products. There are no user serviceable parts on this control.

	WARNING
More than one live circuit. See wiring diagram in this manual. Turn off power supply to control and damper/blower before servicing. Contact with live electrical components can result in serious injury or death	

Power supply

Install power supply in accordance with the regulation of the authorities having jurisdiction or in absence of such requirements, in accordance with National Codes.

Purpose of Device and Operation

The Versatronik 505 OT gateway provides a communication translation between OT enabled boilers, room thermostat controls, LON or BACnet or Modbus enabled BMS systems.

The Versatronik gateway may be either part of a control panel or stand-alone control device.

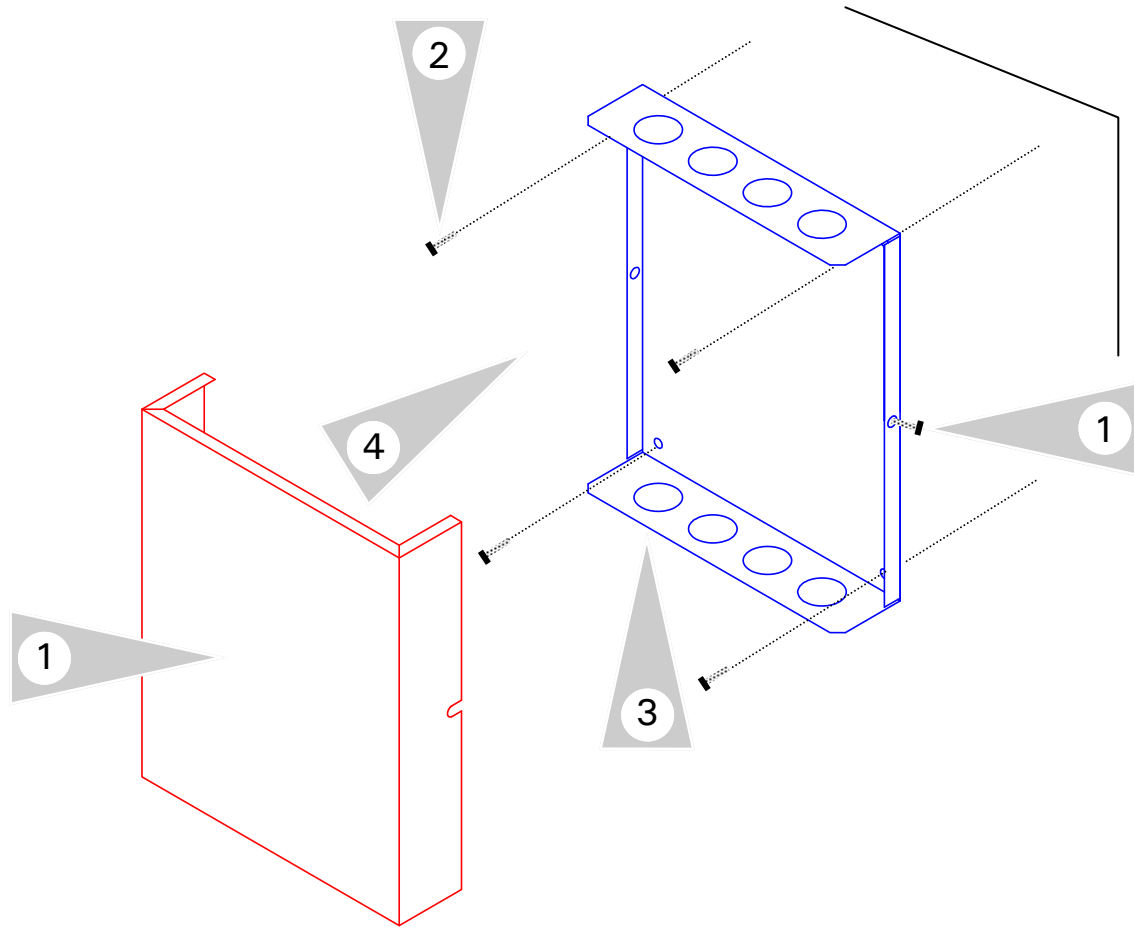
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Section 2.0

Information	Page
Mounting Information 120VAC	6
Mounting Information 24VAC	7
Connection Overview 120VAC	8
Connection Overview 24VAC	9
Connection Overview—RJ45 Adapters LON and Modbus	10

Installation

Mounting Versatronik Gateway—120VAC Unit



Mounting Steps

1. Mount Versatronik 505 Gateway in a convenient location near the connected boiler control. Remove cover by loosening the two screws on either side of base to release the cover.
2. Fasten base to wall using field-supplied screws/fasteners.
3. Remove knockout and installed wire strain relief or box connector. Removal of remaining knockouts is required to make further connections.
4. Once all of the 120VAC and low voltage connections are complete and verified, reinstall the cover from Step 1.



WARNING

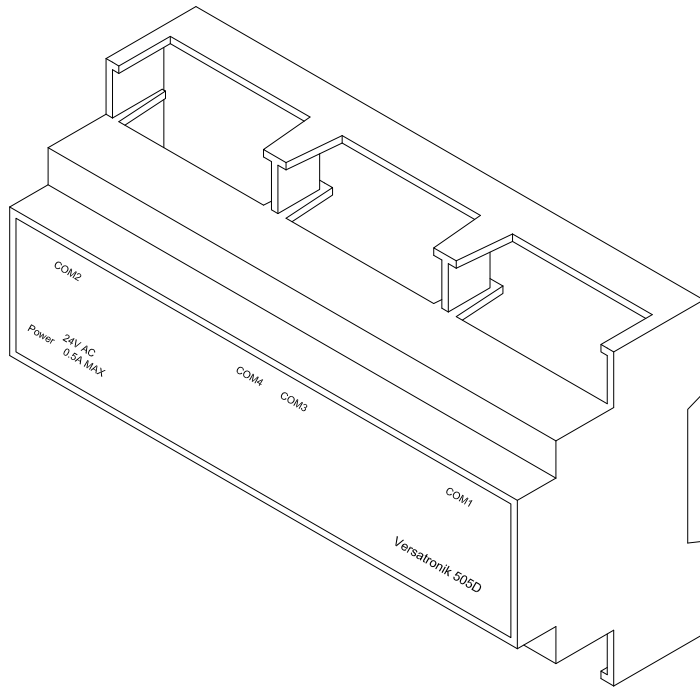
When extending wire there is the possibility of exposure to electromagnetic interference. Avoid running wires beside or near high voltage 120/240 VAC conductors. If proximity to high voltage conductors cannot be avoided, use stranded, twisted pair of shield design wire. Ensure that only one end of the shielding is grounded.

Installation

Mounting Versatronik Gateway—24VAC DIN Rail Unit

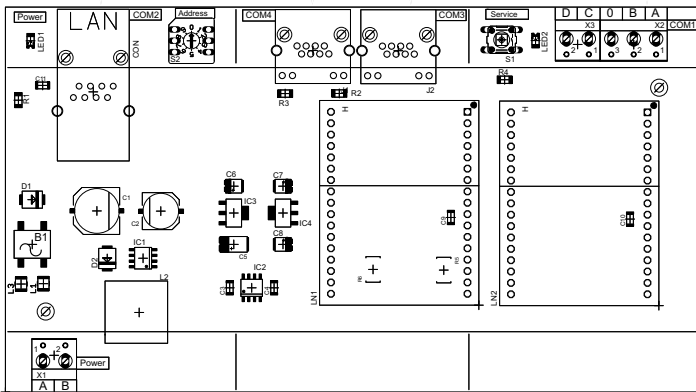
Mounting Steps

1. Mount Versatronik 505D Gateway onto DIN rail within an enclosure in a convenient location near the boiler controls.
2. Make all the necessary connections including the field supplied 24VAC power connection.



Connection Overview

1. BACnet IP RJ45 connection (model specific)
2. LON RJ45 connection (model specific)
3. Parallel LON BUS connection
4. OT connections terminals A and B to boiler
5. 24VAC Power Connection

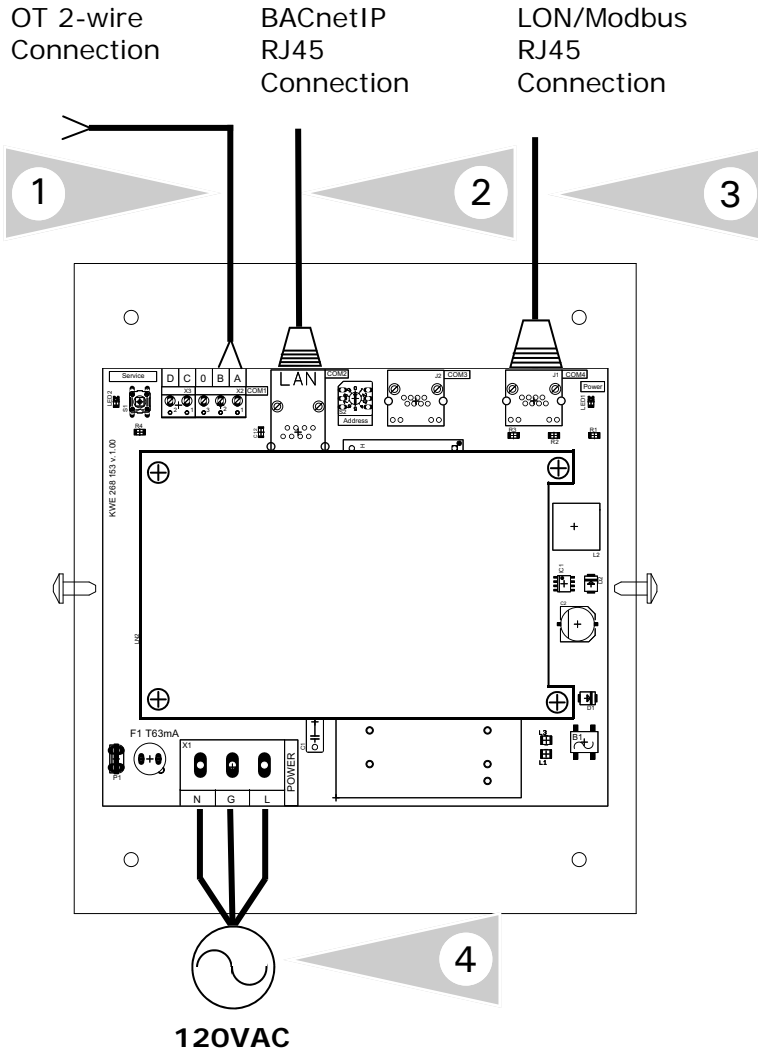


WARNING

When extending wire there is the possibility of exposure to electromagnetic interference. Avoid running wires beside or near high voltage 120/240 VAC conductors. If proximity to high voltage conductors cannot be avoided, use stranded, twisted pair of shield design wire. Ensure that only one end of the shielding is grounded.

Connection Overview—120VAC

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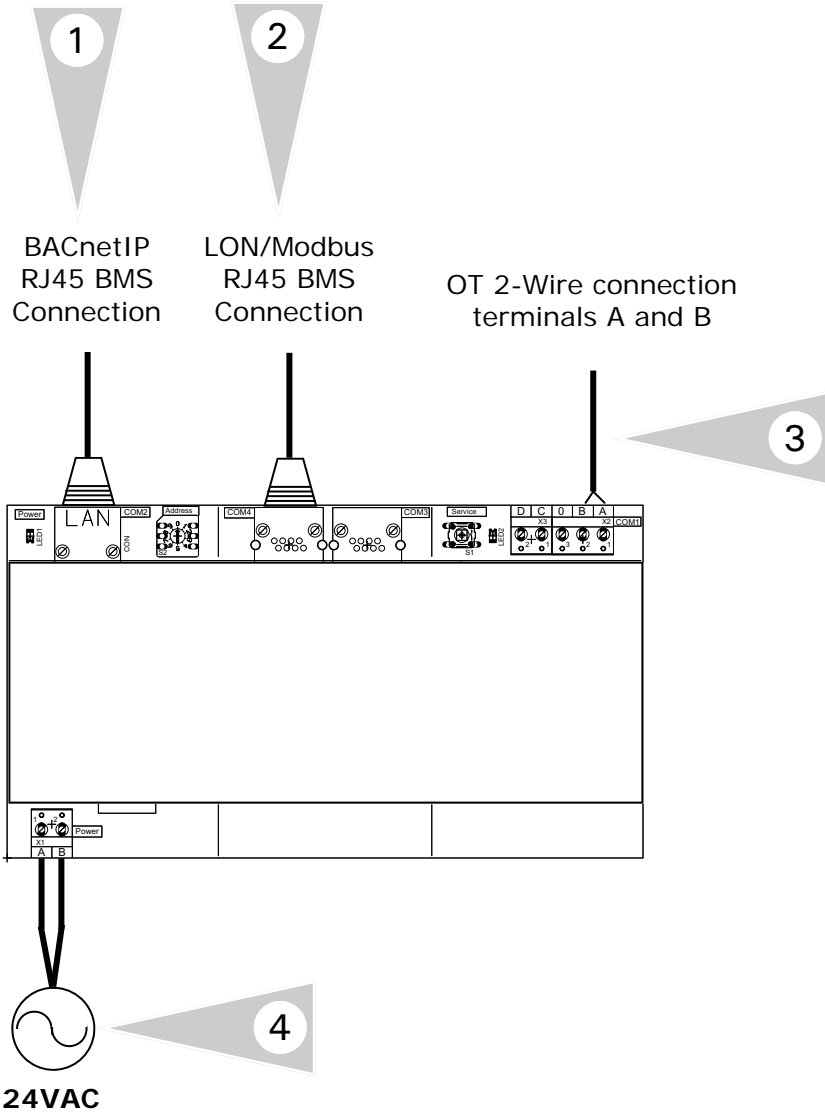


Connection Overview

- 1 OpenTherm 2 wire connection to OT enabled boiler. Refer to boiler manual for proper connection location.
- 2 BACnetIP RJ45 connection.
- 3 LON RJ45 connection.
- 4 Plug-in power cord for 120VAC Versatronik 505 gateways.

Connection Overview—24VAC

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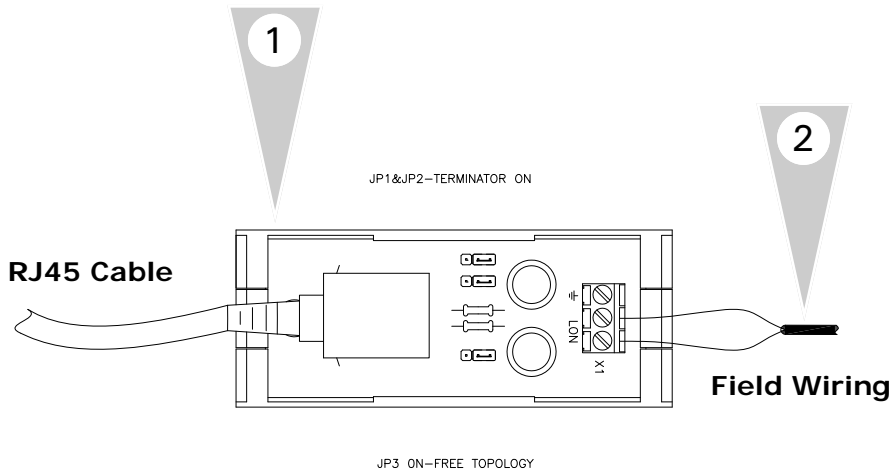


Connection Overview

- 1 BACnetIP RJ45 connection.
- 2 LON RJ45 connection.
- 3 Field wiring for OpenTherm connection to terminals A and B.
- 4 Field supplied 24VAC power supply for gateway.

Connection Overview—RJ45 Adapters LON and Modbus

RJ45LON Adapter



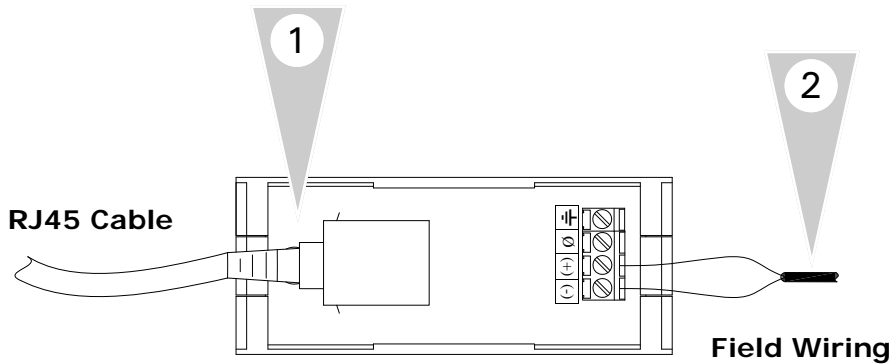
Note: Verify the RJ45 Adaptor jumpers have been set to correspond with the system. Jumpers JP1 and JP2 must be set to ON and JP3 has to be set to position ON. This configuration allows for a Free BUS Topology with the adaptor acting as the termination resistor. Refer to adaptor manual for detailed information.

Overview

1. A RJ45LON Adapter is supplied with the LON version of Versatronik 505 Gateway. Utilize the supplied adapter and connection cable to interconnect the gateway and adapter.
2. Connect the field wiring to terminal X1 for the LON communication.
3. Ensure that the jumpers are correctly positioned.

3

RJ45 Adapter Modbus



Overview

1. A RJ45 Adapter is supplied with the Modbus version of Versatronik 505 Gateway. Utilize the supplied adapter and connection cable to interconnect the gateway and adapter.
2. Connect the field wiring to terminal X1 for the Modbus communication.

Configuration of Gateway Overview

Configuration & Technical Information

Section 3.0

Information	Page
Configuration of BACnet/IP Settings	11
Configuration of BACnet Device Settings	12
BACnet Objects	13
Configuration of LON network variables	14
Configuration of Gateway Modbus	15
Technical Information Troubleshooting	17
Technical Information 120VAC	18
Technical Information 24VAC	19

Configuration of Gateway

Configuring BACnet/IP Settings

Connect your computer DIRECTLY to the BACnet interface of the gateway device. With no other devices attached (an isolated network). Either set your computer's network connection to automatic IP Address (DHCP), or set your computer's IP address to 192.168.88.90 (subnet mask 255.255.255.0)

Restart the Gateway by cycling the power off and then on again.

Open a browser window and insert the following

URL: <http://192.168.88.89/admin>

The default user name / password is "admin" and "admin" (without the quotes). This can be renamed in the Change Password screen. At this point you will see the Configuration pages.

Versatronik 505 OT/BACIP

<ul style="list-style-type: none">HomeBACnet/IP SettingsBACnet Device SettingsAdvanced SettingsRestore DefaultsChange PasswordActivate Configuration	<h4>BACnet/IP Settings</h4> <p>This page allows you to view current BACnet/IP settings, to change them or to restore them to factory defaults.</p> <table border="1"><thead><tr><th>Parameter</th><th>Value</th><th>Description</th></tr></thead><tbody><tr><td>IP</td><td><input type="text" value="192.168.0.22"/></td><td>IP address of the BACnet device.</td></tr><tr><td>Network Mask</td><td><input type="text" value="255.255.255.0"/></td><td>IP subnet mask.</td></tr><tr><td>Default Gateway</td><td><input type="text" value="192.168.0.1"/></td><td>IP address of the default gateway.</td></tr><tr><td>UDP Port</td><td><input type="text" value="47808"/></td><td>BACnet/IP UDP port number.</td></tr></tbody></table> <p><input type="button" value="Save"/> <input type="button" value="Reset"/> <input type="button" value="Defaults"/></p>	Parameter	Value	Description	IP	<input type="text" value="192.168.0.22"/>	IP address of the BACnet device.	Network Mask	<input type="text" value="255.255.255.0"/>	IP subnet mask.	Default Gateway	<input type="text" value="192.168.0.1"/>	IP address of the default gateway.	UDP Port	<input type="text" value="47808"/>	BACnet/IP UDP port number.
Parameter	Value	Description														
IP	<input type="text" value="192.168.0.22"/>	IP address of the BACnet device.														
Network Mask	<input type="text" value="255.255.255.0"/>	IP subnet mask.														
Default Gateway	<input type="text" value="192.168.0.1"/>	IP address of the default gateway.														
UDP Port	<input type="text" value="47808"/>	BACnet/IP UDP port number.														
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IMPORTANT: Make sure that you remember any changes made here.

Configuration of Gateway Continued

BACnet Device Settings

You can now reconfigure these settings according to your network requirements. Make sure that you press SAVE on every screen where you make changes. The new setting will not take effect until the Activate Configuration screen has been confirmed. These configuration pages can now be accessed through both the 192.168.88.89 Address, as well as the one you have selected.

The BACnet Device Settings screen looks like this:

Versatronik 505 OT/BACIP

- Home
- BACnet IP Settings
- BACnet Device Settings**
- Advanced Settings
- Restore Defaults
- Change Password
- Activate Configuration

BACnet Device Settings

This page allows you to view current BACnet Device settings, to change them or to restore them to factory defaults.

Parameter	Value	Description
Device ID:	<input type="text" value="1"/>	BACnet Device Instance Number.
Object Name:	<input type="text"/>	Value of the Device's Object_Name property.
Description:	<input type="text"/>	Value of the Device's Device_Description property.
Location:	<input type="text"/>	Value of the Device's Device_Location property.

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NOTE: The **Device ID** must be unique on the entire BACnet internetwork.

The Restore Defaults and Change Password screens are very simplistic. When you select Activate Configuration, it will ask you if you want to SAVE your settings. This will then store your new settings and reboot automatically.

You can now join the Gateway to the rest of your network, provided you have not specified a duplicate IP Address. Any Computer on the network should now be able to access these configuration screens.

BACnet control mode (Manual) (*Refer to table on following page)

This feature is enabled when AO-1 is set to 1 (BACnet control), the gateway will ignore the thermostat (if connected) and communicate directly with the boiler. The Control Set-point will now determine the boiler target temperature.

Temperature Units (*Refer to table on following page)

You have the ability to control whether temperatures are displayed in Celsius or Fahrenheit by setting AO-2 (Analog Output 2). This will also determine whether the Control Set-point (AO-3) is provided in °C or °F.

Analogue Input Overview—BACnet Objects

BACnet Object	Description	Units	Source
Analog Input 1	Boiler Set-point	°C / °F	T / M
Analog Input 2	Boiler water temperature	°C / °F	B
Analog Input 3	Maximum Modulation level	%	T
Analog Input 4	Current Modulation level (boiler modulation)	%	B
Analog Input 5	Room Temperature	°C / °F	T
Analog Input 6	Room Set-point temperature	°C / °F	T
Analog Input 7	Outside Temperature	°C / °F	T
Analog Input 8	Return Water Temperature	°C / °F	B
Analog Input 9	Flue Gas Temperature	°C / °F	B
Analog Input 10	Boiler Heat Exchanger Temperature	°C / °F	B
Analog Input 11	Boiler Fan Speed	Hertz	B
Analog Input 12	Water Pressure	Bar / PSI	B
Analog Input 13³	OEM Fault Code	0-255	B
Analog Input 14³	OEM Diagnostic Code	0 - 65535	B
Analog Input 15	DHW Set-point upper bound	°C / °F	B
Analog Input 16	DHW Set-point lower bound	°C / °F	B
Binary Input 1	Boiler Fault (no fault / fault)	0/1	B
Binary Input 2	Flame Status (no flame / flame)	0/1	B
Binary Input 3	Fault - Service Required (not req'd / req'd)	0/1	B
Binary Input 4	Fault - Lockout Reset	0/1	B
Binary Input 5	Fault - Low Water Pressure	0/1	B
Binary Input 6	Fault - Gas / Flame	0/1	B
Binary Input 7	Fault - Air Pressure	0/1	B
Binary Input 8	Fault - Water Over-Temperature	0/1	B
Binary Input 9	DHW Set-point control allowed by boiler	0/1	B
Analog Output 1	Control source (Setpoint from Thermostat or Manual) *See previous page	0/1	
Analog Output 2	Temperature Units (°C / °F) *See previous page	0/1	
Analog Output 3¹	Control Set-point (only if control source is Manual)	°C / °F or %	
Analog Output 4	Control Method (Setpoint / Modulation Controlled)	0/1	
Analog Output 5²	DHW Set-point	°C / °F	
Analog Output 6⁴	Boiler Enable (Boiler enable directly controls OpenTherm ID0 CH Enable)	0/1	
T=Thermostat B=boiler M=Manual (BACnet) Temperature units displayed / Set-point units, is determined by Analog Output 2			

Note: Availability of these Variables depends on the boiler and/or thermostat used. Unavailable variables will be displayed as -99 in most cases.

¹ All boilers will allow for Set-point control, i.e., you provide the boiler set point temperature. Not all boilers support modulation control (ID14). Under modulation control, boiler temperature set point will be set to ID57 (Max CH Water Set-point). If not provided, it will be set to 90C. Modulation is then controlled by providing the boiler with a maximum modulation level (ID14).

² Not all boilers support DHW set-point (ID6, 48, 56). Gateway

will automatically adjust DHW set-point to fall between the upper and lower DHW set-point bounds provided by the boiler (ID48).

³ Reference your boiler documentation for the meaning of these codes. They will likely be in Hexidecimal format, eg. 10=0A, 15=0F, 16=10, 17=11, 255=FF

⁴ Boiler Enable directly controls OpenTherm ID0 bit 0 (CH Enable). The behavior of this bit may vary depending on the control manufacturer. Generally speaking, when this bit is disabled, the boiler pump will not run and boiler will not fire.

Configuration of Gateway—LON

LON Network Variable	Description	SNVT Type
nviBoilerEnable	Value 100 - Lon controls OT communications State - must be 1 Value 0 - Thermostat controls OT communications (gateway in passive mode)	Switch
nviCMode	Value 100 - Setpoint = Boiler Modulation Level State - must be 1 Value 0 - Setpoint = Boiler Temperature Setpoint	Switch
nviSetpoint	Setpoint (temp or modulation see nviCMode)	Temp
nviDHWSetpoint²	DHW Set-point	Temp
nvoAlarm	Alarm Type - Alarm Condition or No Condition Alarm limit[0] - OEM Diagnostic Code (byte 1) ¹ Alarm limit[1] - OEM Diagnostic Code (byte 2) ¹ Alarm limit[2] - OEM Fault Code ¹ Alarm limit[3] - Convert to binary ² 0. Service Request 1. Lockout Reset 2. Low Water Pressure 3. Gas/Flame Fault 4. Air Pressure Fault 5. Water Over Temp	Alarm
nvoBFanSpeed	Boiler Fan Speed in Hertz	Freq Hz
nvoBHETemp	Boiler Heat Exchanger Temperature	Temp
nvoBoilerState	Value - Boiler Modulation Level State - Boiler active / not active	Switch
nvoDHWLowerBound	DHW Lower Bound set-point temperature	Temp
nvoDHWUpperBound	DHW Upper Bound set-point temperature	Temp
nvoDHWSupported	100-1=DHW set-point supported, 0=not supported	Switch
nvoEffectSetpt	Setpoint (*temp or modulation see nviCMode)	Temp
nvoFlueGasTemp	Flue gas (exhaust) Temperature	Temp
nvoLocalOATemp	Outdoor Air Temperature	Temp
nvoMaxModLevel	Maximum Modulation Level (only from thermostat)	Lev Percent
nvoRetTemp	Return Water Temperature	Temp
nvoRoomSetP	Room Setpoint Temperature (only from thermostat)	Temp
nvoRoomTemp	Room Temperature (only from thermostat)	Temp
nvoSupplyTemp	Boiler Water Temperature	Temp
nvoWPressure	Boiler Water Pressure	Press

Note: Availability of these Variables depends on the boiler and/or thermostat used. Unavailable variables will be displayed as -99 in most cases.

¹ All boilers will allow for Set-point control, i.e., you provide the boiler set point temperature. Not all boilers support modulation control (ID14). Under modulation control, boiler temperature set point will be set to ID57 (Max CH Water Set-point). If not provided, it will be set to 90C. Modulation is then controlled by providing the boiler with a maximum modulation level (ID14).

² Not all boilers support DHW set-point (ID6, 48, 56). Gateway will automatically adjust DHW set-point to fall between the upper and lower DHW se-point bounds provided by the boiler (ID48).

³ Reference your boiler documentation for meaning of these codes. They will likely be in Hexadecimal format. E.g. 10=0A, 15=0F, 16=10, 17=11, 255=FF

⁴ Convert this value to binary. Bit 0 is the least significant bit.

5	4	3	2	1	0
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Modbus Information

Connection Settings

Use standard straight-through network cable to connect COM4 to Adapter. From adapter, use screw terminals (+ and -) to connect to RS485 Network.

- (+) non-inverting
- (-) inverting

Baud Rate: 9600bps

Data bits: 8

Parity: none

Stop bits: 1

Address: Controlled by rotary Address knob (0 = address 88, 1-9 = addresses 1 - 9.)

LED indicators

COM4 has two LED indicators. An orange blip means a packet is received, a green blip means a response has been sent by the gateway.

Modbus Communication

Configuration Settings

The gateway is a Modbus slave and all communication has to be initiated by a master. To set up successful communication with the gateway all connection parameters have to be set correctly to the following: 9600 8-N-1 RTU.

Mode	RTU
Baud Rate	9600bps
Data Bits/Length	8
Parity	None
Stop bits	1
Address/Device ID	88, 1-9

Trouble-Shooting

Problem: Not getting a response from the gateway device

- Ensure the connection is set to 9600 8-N-1
- Check the rotary dial switch for the device addressing and it not in between dial settings
- Ensure the communication cables match their polarity

Configuration of Gateway—Modbus RTU/RS485

Coil / Discrete Inputs (01/02)			
Address	Value	Read/Write	Units
00001	Control Method (0 = Temp. Set-point control, 1 = Modulation Controlled)	W	°C / °F
00002	Temperature Units (0 = °C, 1 = °F)	W	°C / °F
00003	Reserved		
00004	Reserved		
00005	Reserved		
00006	Reserved		
00007	Reserved		
00008	Reserved		
00009	Boiler - Fault Indication	R	0/1
00010	Boiler - CH Mode active	R	0/1
00011	Boiler - DHW Mode active	R	0/1
00012	Boiler - Flame Status	R	0/1
00013	Boiler - Cooling Status	R	0/1
00014	Boiler - CH3 Mode	R	0/1
00015	Boiler - Diagnostic indication	R	0/1
00016	Reserved	R	0/1
00017	Fault - Service Request	R	0/1
00018	Fault - Lockout - Reset	R	0/1
00019	Fault - Low water pressure	R	0/1
00020	Fault - Gas / Flame fault	R	0/1
00021	Fault - Air Pressure fault	R	0/1
00022	Fault - Water Over Temp	R	0/1
00023	Reserved	R	0/1
00024	Reserved	R	0/1

Holding / Input Registers (03/04)			
Address	Value	Read/Write	Units
40001	Set-point ¹	W	°C / °F
40002	DHW Set-point ²	W	°C / °F
40003	Boiler Water Temperature	R	°C / °F
40004	Modulation Level	R	%
40005	Return Water Temperature	R	°C / °F
40006	Flue Gas Temperature	R	°C / °F
40007	Boiler Heat Exchanger Temperature	R	°C / °F
40008	Outdoor Temperature	R	°C / °F
40009	Boiler Fan Speed	R	Hertz
40010	Water Pressure	R	mBar / PSI
40011	OEM Fault Code ³	R	
40012	OEM Diagnostic Code ³	R	
40013	DHW Set-point Upper Bound	R	°C / °F
40014	DHW Set-Point Lower Bound	R	°C / °F

Note: Availability of these Variables depends on the boiler and/or thermostat used. Unavailable variables will be displayed as -99 in most cases.

¹ All boilers will allow for Set-point control, i.e., you provide the boiler set point temperature. Not all boilers support modulation control (ID14). Under modulation control, boiler temperature set point will be set to ID57 (Max CH Water Set-point). If not provided, it will be set to 90C. Modulation is then controlled by providing the boiler with a maximum modulation level (ID14).

² Not all boilers support DHW set-point (ID6, 48, 56). Gateway will automatically adjust DHW set-point to fall between the upper and lower DHW set-point bounds provided by the boiler (ID48).

³ Reference your boiler documentation for meaning of these codes. They will likely be in Hexadecimal format. E.g. 10=0A, 15=0F, 16=10, 17=11, 255=FF

Technical Information

Trouble-Shooting

Problem: LED2 is flashing

Control/BMS Mode

LED 1 flash per second—OK

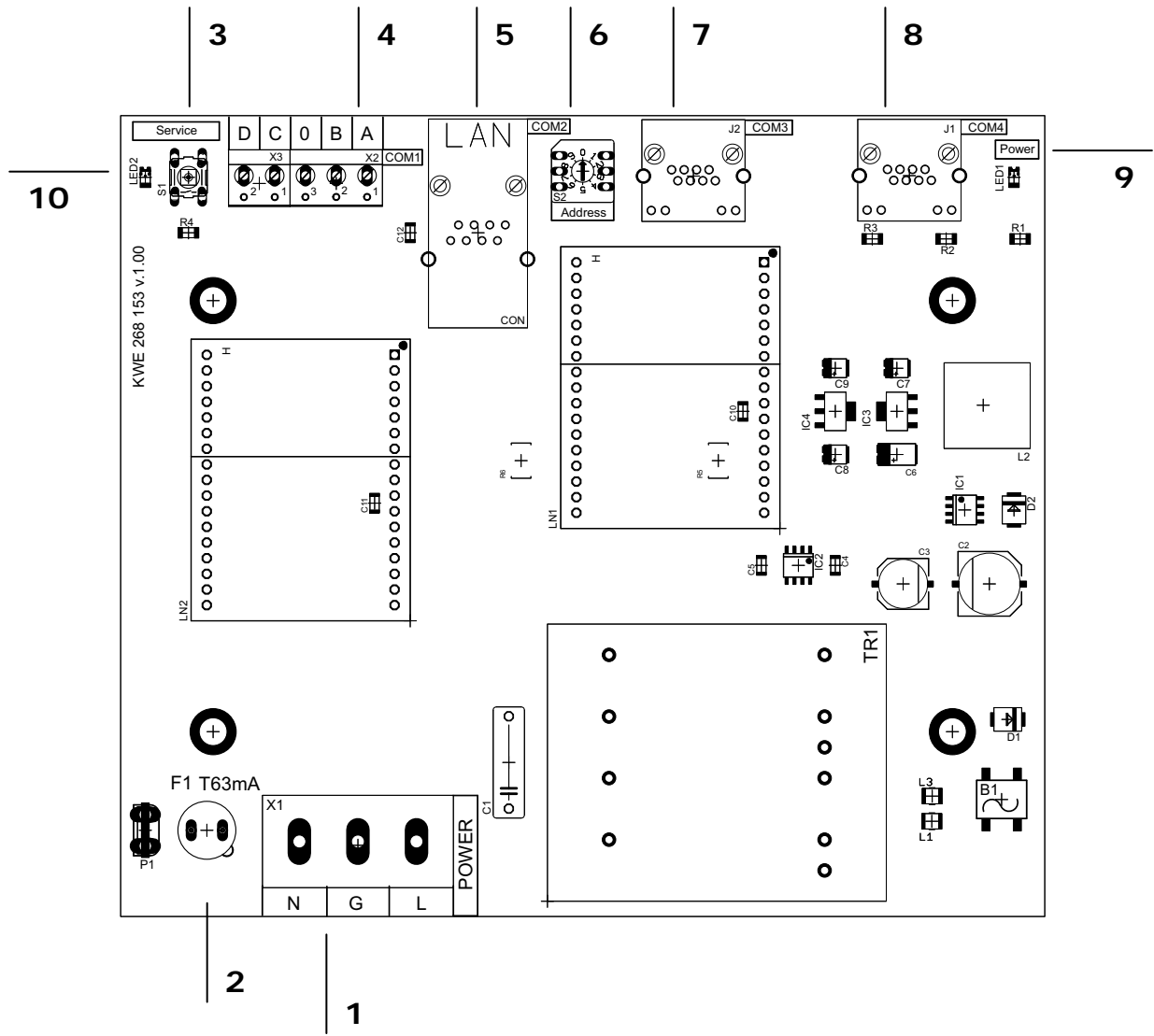
LED 4 flash per second—No Communication

Modbus Gateway

LED indicators

COM4 has two LED indicators. An orange blip means a packet is received, a green blip means a response has been sent by the gateway.

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PCB Identifiers

1	120VAC Power Supply Connections
2	Fuse
3	Service Button
4	OT Connections to boiler (terminals A and B)
5	RJ45 Connection to BMS BACnet
6	Rotary Dial not used
7	Parallel connection for LON Communication
8	RJ45 Connection to LON/Modbus via adapter
9	Power LED indicator
10	OT Indicator LED

Specifications

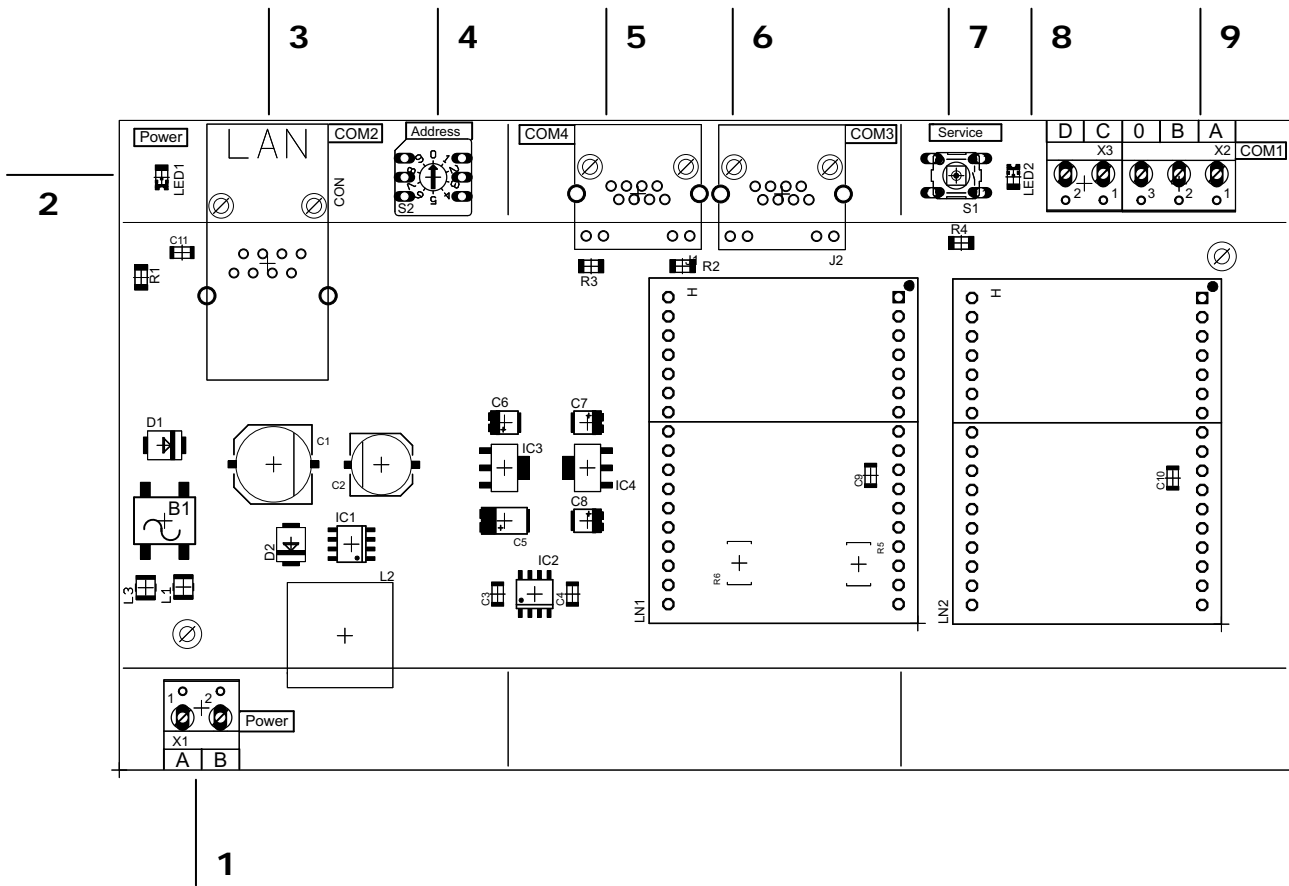
Voltage Requirements	120VAC
Fuse Rating	63mA Time Delay
Power	4VA
Communication Connections	Supplied cable between devices

CAUTION

Static sensitive components may be damaged by improper handling or work within the control. Ensure all possible measures are taken to eliminate build-up of static electricity.

Technical Information

KWE P/N 394-005 Versatronik 505 and 505D OT LON/BACIP/Modbus Gateway V3.1 02/2012 Technical information subject to change without notice




PCB Identifiers

1	24VAC Power Supply Connections
2	Power LED indicator
3	BACnet RJ45 BMS Connection
4	N/A
5	RJ45 LON/Modbus via RJ45 adapter to BMS
6	Parallel LON connection
7	Service button
8	OT Indicator LED
9	OT connection to boiler (terminals A and B)

Specifications

Voltage Requirements	24VAC
Fuse Rating	N/A
Power	4VA
Communication Connections	Supplied cable between devices



CAUTION

Static sensitive components may be damaged by improper handling or work within the control. Ensure all possible measures are taken to eliminate build-up of static electricity.

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Notes:

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Notes:

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