



Lennox Refac S.A.

Modbus for Climatic40

INTRODUCTION

BMS

BMS (Building Management Systems) are systems for the integrated management of all the technological functions of a building, including access control, safety, fire detection, lighting, intelligent elevators, Air-Conditioning.

The resulting advantages of such solutions as simpler and more efficient management of the building from a single control station, reduction in running costs, possibility of statistical analysis of all data, immediate identification of and response to faults and alarms, amply justify the little extra cost of the Air-Conditioning unit BMS connectable.

Today not only the quality and the reliability of the instruments are important, but also the degree of external connectivity they can offer.



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MODBUS

Modbus is a serial communications protocol published by Modicon in 1979, that has become an standard communications protocol in industry, and is now the most commonly available method of connecting industrial electronic devices.

Controllers communicate using a master-slave technique, in which only one device (the master) can initiate transactions (called 'queries'). The other devices (the slaves) answer by supplying the requested data to the master, or by taking the action requested in the query.

LENNOX units implement Modbus slave protocol with the following settings:

Serial Line	RS485 (EIA/ TIA -485 Standard)
Transmission Mode	RTU (Remote Terminal Unit)
Baudrate	9600 Bauds
Data bits	8 bits
Parity	None
Stop bits	2 bit

The following Modbus commands are implemented in LENNOX CLIMATIC controls:

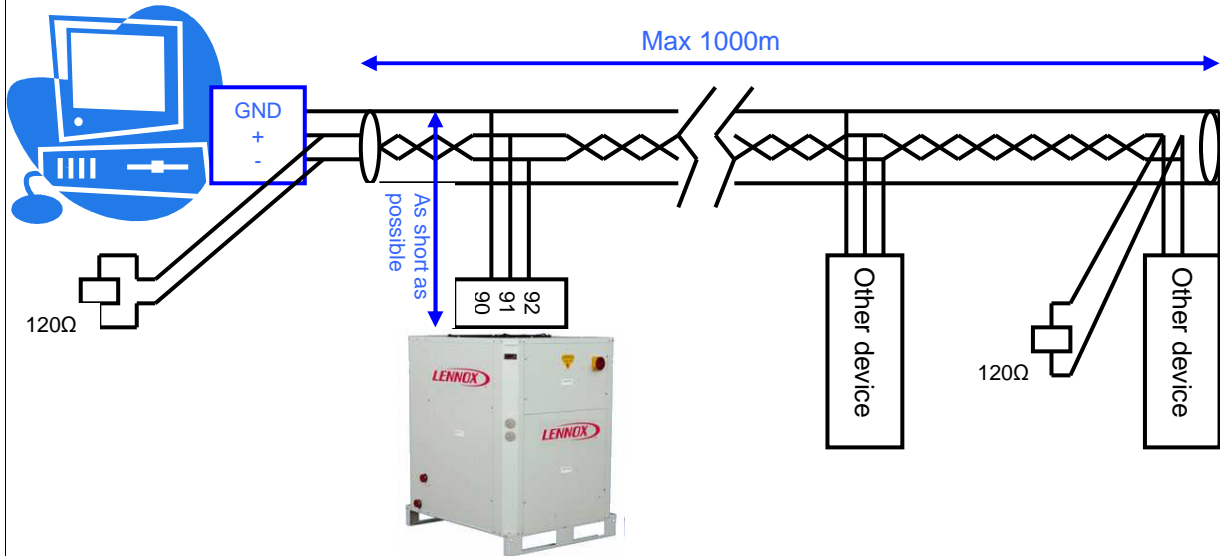
MODBUS COMMANDS	MEANING	NOTES
01: read coil status	read digital variable(s)	obtain the current status of a group of digital variables
02: read input status	read digital variable(s)	obtain the current status of a group of digital variables
03: read holding register	read analog variable(s)	obtain the current status of a group of analog variables
04: read input register	read analog variable(s)	obtain the current status of a group of analog variables
05: force single coil	Write individual digital variable	force the individual digital variable to ON or OFF
06: force single register	Write individual analog variable	force the individual analog variable to a specific value
15: force multiple coil	Write multiple digital variables	force a consecutive series of digital variables to a defined status, ON or OFF
16: force multiple register	Write multiple analog variables	force a consecutive series of analog variables to specific values

Note that due to the wide range of machines available, LENNOX control does not distinguish between input variables (read only) and output variables (read/write), so that the knowledge and management of the database is managed by the supervisor (see the Climatic 40 manual for further informations)

CLIMATIC 40 SETTINGS (without Supernode)

Climatic 40¹ needs just 3 easy steps to link to the Modbus serial line:

1. Enable Modbus protocol on Climatic 40 setting parameter **H23=1**;
2. Set Modbus device direction on parameter **H10**
3. Connect RS485 line to the LENNOX unit as shown below.



Respect the right order in the LENNOX unit electrical board connection:

90=GND;
91=+; 92=-.

In compliance with standards on electromagnetic compatibility, **shielded twisted pair** cables are used suitable for the RS485 data transmission

¹ In case DC40 or DC41 remote terminal were installed, the supernode is required for Modbus connectivity

SUPERNODE SETTINGS

Modbus communications for Climatic 40 are allowed by the Supernode.

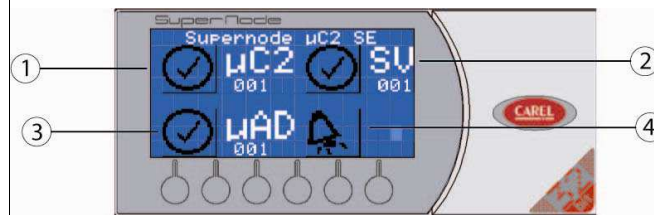
A few settings are needed before using the Supernode:

At start-up:

m_language

<pre> +-----+ Current language: A0 First screen displayed. ENGLISH The application delays the display of the first press ENTER to screen to allow the application time to change language initialise all the procedures and allow the user to change language. This is displayed for 30 seconds +-----+ </pre>

The main screen indicates the communication status (online/offline) between the Supernode and the various devices enabled.



- 1) CL40 online/offline; CL40 query address
- 2) Supervisor online/offline; serial supervisor address
- 3) DC40 online/offline; DC40 query address (must coincide with the CL40 address)
- 4) Indicates alarms that are active and/or not reset.

Pressing the PRG button enters the main menu.

m_menu

<pre> +-----+ k-CLOCK ~ÿ This screen provides access to all the branches (Manufacturer, Maintenance, q-history Alarm log, Clock) +-----+ </pre>
--

Go to manufacturer menu

m_manuf_c0

<pre> +-----+ Insert C0 manufacturer password : 0000 +-----+ </pre>	<p>enter the password 77 to access the branch</p>
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Scroll up till the following menu

m_Config_com1

<pre> +-----+ Serial SV C2 Type protocol MODBUS SLAVE Baud rate 4800 Ident 001 Supervisor +-----+ </pre>	<p>Communication protocol configuration for serial port 1 (Supervisor)</p> <p>Communication speed</p> <p>Supernode Modbus Address</p>
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PARAMETERS TABLE

U.O.M.= Unit of measure

Resol. = Resolution

R/W = Read / Write

Parameter and description	min.	max.	U.O.M.	resol.	R/W	Modbus address	variable type
Alarms							
Circuit 1 alarm	0	1	Flag	1	R	41	Digital
Circuit 2 alarm	0	1	Flag	1	R	42	Digital
Indoor fan / Water pump alarm	0	1	Flag	1	R	45	Digital
Probe alarm	0	1	Flag	1	R	46	Digital
Alarm reset	0	1	Flag	1	R/W	78	Digital
Input/Output							
Digital input 1	0	1	Flag	1	R	53	Digital
Digital input 2	0	1	Flag	1	R	54	Digital
Digital input 3	0	1	Flag	1	R	55	Digital
Digital input 4	0	1	Flag	1	R	56	Digital
Digital input 5	0	1	Flag	1	R	57	Digital
Digital output 1	0	1	Flag	1	R	59	Digital
Digital output 2	0	1	Flag	1	R	60	Digital
Digital output 3	0	1	Flag	1	R	61	Digital
Digital output 4	0	1	Flag	1	R	62	Digital
Digital output 5	0	1	Flag	1	R	63	Digital
Digital input 6	0	1	Flag	1	R	66	Digital
Digital input 7	0	1	Flag	1	R	67	Digital
Digital input 8	0	1	Flag	1	R	68	Digital
Digital input 9	0	1	Flag	1	R	69	Digital
Digital input 10	0	1	Flag	1	R	70	Digital
Digital output 6	0	1	Flag	1	R	72	Digital
Digital output 7	0	1	Flag	1	R	73	Digital
Digital output 8	0	1	Flag	1	R	74	Digital
Digital output 9	0	1	Flag	1	R	75	Digital
Digital output 10	0	1	Flag	1	R	76	Digital
Probes							
Value read by probe B1	-400	800	°C	0.1	R	102	Analog
Value read by probe B2	-400	800	°C	0.1	R	103	Analog
Value read by probe B3	-400	800	°C/Dbar	0.1	R	104	Analog
Value read by probe B4	-400	800	°C	0.1	R	105	Analog
Value read by probe B5	-400	800	°C	0.1	R	106	Analog
Value read by probe B6	-400	800	°C	0.1	R	107	Analog
Value read by probe B7	-400	800	°C	0.1	R	108	Analog
Value read by probe B8	-400	800	°C/Dbar	0.1	R	109	Analog
Value read by probe DC40	-400	800	°C	0.1	R	128	Analog
Unit management							
Unit status (1=ON or 0=standby)	0	1	Flag	1	R/W	64	Digital
Cooling/Heating status (1=Cooling or 0=Heating)	0	1	Flag	1	R/W	65	Digital
CL40 Cooling Setpoint	*	*	°C	0.1	R/W	41	Analog
CL40 Heating Setpoint	*	*	°C	0.1	R/W	43	Analog
CL40 2 nd Cooling Setpoint	*	*	°C	0.1	R/W	55	Analog
CL40 2 nd Heating Setpoint	*	*	°C	0.1	R/W	56	Analog
Indoor fan operating mode 1 = always ON 2 = Auto 3= anti-stratification	0	5	Flag	1	R/W	263	Analog



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ATTENTION Do not set this parameter to 0 otherwise the fan would be deactivated!							
Defrost status 0= no Defrost 1= Def. circuit 1 2= Def. circuit 2 3= Def. circuit 1 and 2 5= Fan Def. circuit 1 10= Fan Def. circuit 2 15= Fan Def. circuit 1 and 2	0	255	Flag	1	R	341	Analog
Low noise enable 0= disabled 1= enabled in cooling 2= enabled in heating 3= enabled in cooling&heating	0	3	Flag	1	R/W	292	Analog
Minimum fresh air configuration 0= disabled 1= when freecooling enabled 6= when freecooling disabled 7= always 8= in cooling mode 9= in heating mode	0	9	Flag	1	R/W	326	Analog
Minimum fresh air %	0	100	%	1	R/W	327	Analog
Real Time Clock settings							
RTC hour	0	23	h	1	R/W	336	Analog
RTC minutes	0	59	Min	1	R/W	337	Analog
RTC day	1	31	Day	1	R/W	338	Analog
RTC month	1	12	Month	1	R/W	339	Analog
RTC year	0	99	Year	1	R/W	340	Analog
2 nd Cooling Setpoint starting hour	0	23	h	1	R/W	299	Analog
2 nd Cooling Setpoint starting minutes	0	59	min	1	R/W	300	Analog
2 nd Cooling Setpoint ending hour	0	23	h	1	R/W	301	Analog
2 nd Cooling Setpoint ending minutes	0	59	min	1	R/W	302	Analog
2 nd Heating Setpoint starting hour	0	23	h	1	R/W	303	Analog
2 nd Heating Setpoint starting minutes	0	59	min	1	R/W	304	Analog
2 nd Heating Setpoint ending hour	0	23	h	1	R/W	305	Analog
2 nd Heating Setpoint ending minutes	0	59	min	1	R/W	306	Analog
Cooling Low-Noise starting hour	0	23	h	1	R/W	307	Analog
Cooling Low-Noise starting minutes	0	59	min	1	R/W	308	Analog
Cooling Low-Noise ending hour	0	23	h	1	R/W	309	Analog
Cooling Low-Noise ending minutes	0	59	min	1	R/W	310	Analog
Heating Low-Noise starting hour	0	23	h	1	R/W	311	Analog
Heating Low-Noise starting minutes	0	59	min	1	R/W	312	Analog
Heating Low-Noise ending hour	0	23	h	1	R/W	313	Analog
Heating Low-Noise ending minutes	0	59	min	1	R/W	314	Analog