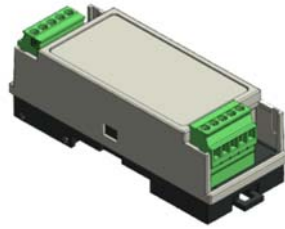# SCC Inc.

LMV5 Series

OCI415.30
for use with LMV5... Linkageless Burner Management Systems

OCI415.30

Description

The OCI415.30 provides the LMV5... family of flame controllers with a Modbus RTU or BACnet MS/TP interface. This allows the interconnection of one or more LMV5... to a PLC or building management system (BMS).

Table of Contents

Compatible Controls

Linkageless Burner Management Systems
- LMV51...
- LMV52...

Physical Connections

Power

Power to the OCI415.30 must be either 9-24VDC or 9-24VAC (nominal). Power consumption is 2.5W or less. **SCC part number AGA15-24** is available as a suitable power supply.

Terminal designations:

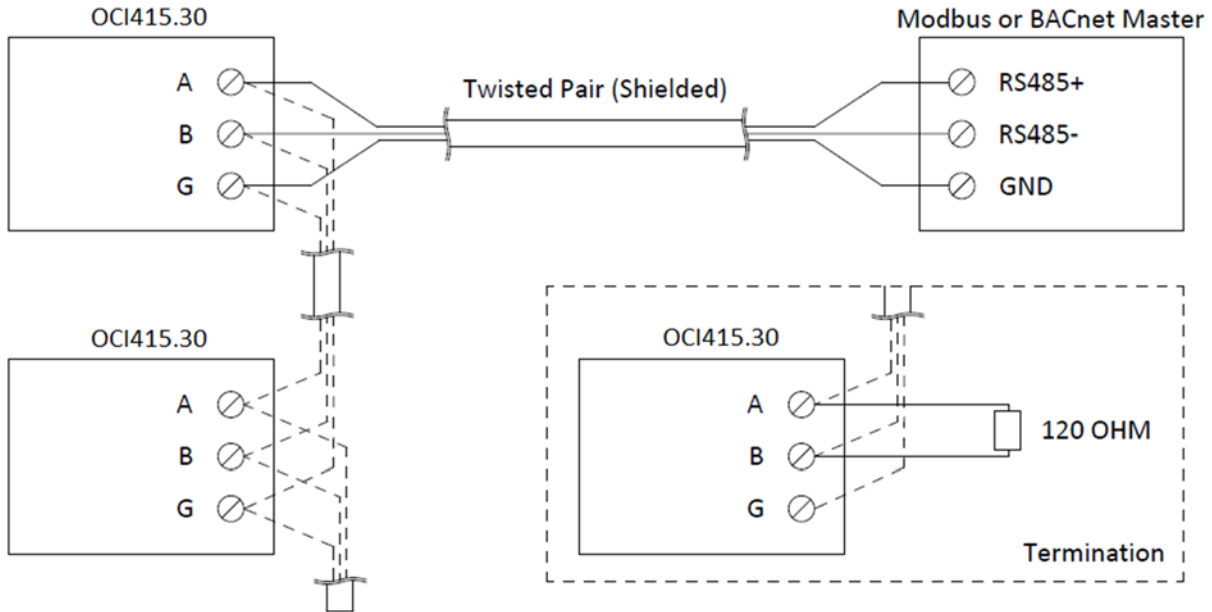| Label	Function
L+	DC + / AC ~
N-	DC - / AC ~

Connection to LMV5...

The connection from the OCI415.30 to the LMV5... should be made with the supplied cable. The connection at the LMV5... is to the AZL X72 (COM2) port. **Maximum allowed cable length is 5 meters.**

Physical Connections (continued)

Connection to BMS

The connection from the BMS to the OCI415.30 is via terminal block. The physical medium is RS-485. Multiple RS-485 nodes may be connected in a daisy-chain. For long runs (typically greater than 1000 feet) or noisy environments, termination may be required on the end node.

Terminal designations:

Label	Function
A	RS-485 Data (+)
B	RS-485 Data (-)
G	RS-485 Common Ground

Status LED

The status LED annunciates the status of the OCI415.30 and the connection to the LMV5…

Color	Status
Green Flashing	No Connection to LMV5…
Green / Red Alternating	Communicating with LMV5…
Red Flashing	Internal Error OCI415.30

Tx/Rx LED

The LED will flash red to indicate incoming communication on the RS-485 connection. The LED will flash green to indicate outgoing communication. With normal communication, the LED will rapidly alternate between green and red. NOTE: If the poll rate is fast the flashes may be very brief and hard to notice.

Required LMV5 Configuration

Use the **Select <** and **Select >** buttons to navigate up and down the screen and the **Enter** button when the desired option is selected with the cursor. Use **Esc** to go back to the previous menu. When a parameter needs to be changed, the **Select <** and **Select >** buttons allow the value to be changed and **Enter** confirms the change. Press the **Esc** button to return after the change is made.

First, activate the Modbus port on the AZL (no password required):
1. Operation > OptgModeSelect > Type of Gateway = **Modbus**
2. Operation > OptgModeSelect > **GatewayBASon**
   Note: Older AZL units may read 'GatewayDDCon' instead.
3. The AZL should now read 'Gateway Mode active'.

Next, set up the required parameters through the AZL (no password required):
1. Params & Display > Access w-out PW > AZL > Modbus > Address = **1**
2. Params & Display > Access w-out PW > AZL > Modbus > Baudrate = **19200 bit/s**
3. Params & Display > Access w-out PW > AZL > Modbus > Parity = **no**
4. Params & Display > Access w-out PW > AZL > Modbus > Timeout = **30s**

If remote operation is desired the load controller operating mode must be changed to "IntLC Bus" using the following procedure (no password required):
1. Params & Display > Access w-out PW > LoadController > Configuration > LC_OptgMode = **IntLC Bus**

The changes take effect immediately (no reboot required).

Modbus RTU Connection Details

Modbus RTU protocol selection and addressing is done using the PC tool **OCI Configuration Utility** (see next section).

Supported addresses: 1-247
Supported baud rates: 2400, 4800, 9600, 19200, 38400, 57600, and 115200
Supported data bits: 8
Supported parity and stop bits: none (1 or 2 stop bits), odd (1 stop bit), and even (1 stop bit)
Supported function codes: 3 (read holding registers), 4 (read input registers), 6 (write single holding register), and 16 (write multiple holding registers)
Maximum read length: 125 (if beginning and ending registers are valid addresses)

BACnet MS/TP Connection Details

BACnet MS/TP protocol selection and addressing is done using the PC tool **OCI Configuration Utility** (see next section).

Supported addresses: 0-127
Supported baud rates: 9600, 19200, 38400, 57600, 76800, and 115200
Supported data bits: 8
Supported parity and stop bits: none (1 stop bit)
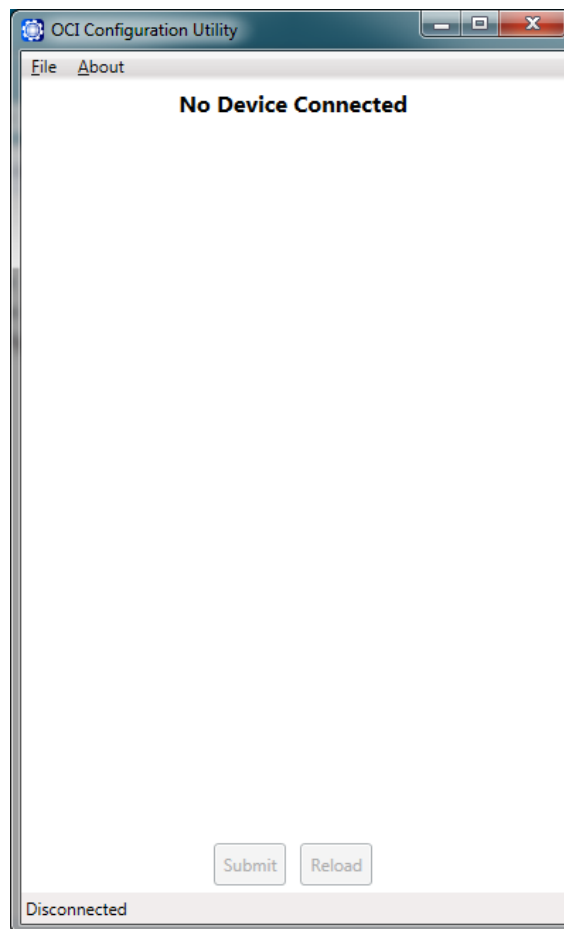Supported device instances: 0-4194302

Configuration Utility

Using the Configuration Utility

1. Double-click the icon to open the configuration utility.

2. The utility will open and show the connection status of the OCI415.30.

Configuration Utility (continued)

3. Use a mini-USB cable to connect the OCI415.30 to the computer, such as **SCC part number AGA5-05M**. A driver may self-install the first time a connection is made. The connected device will then be indicated on the screen.
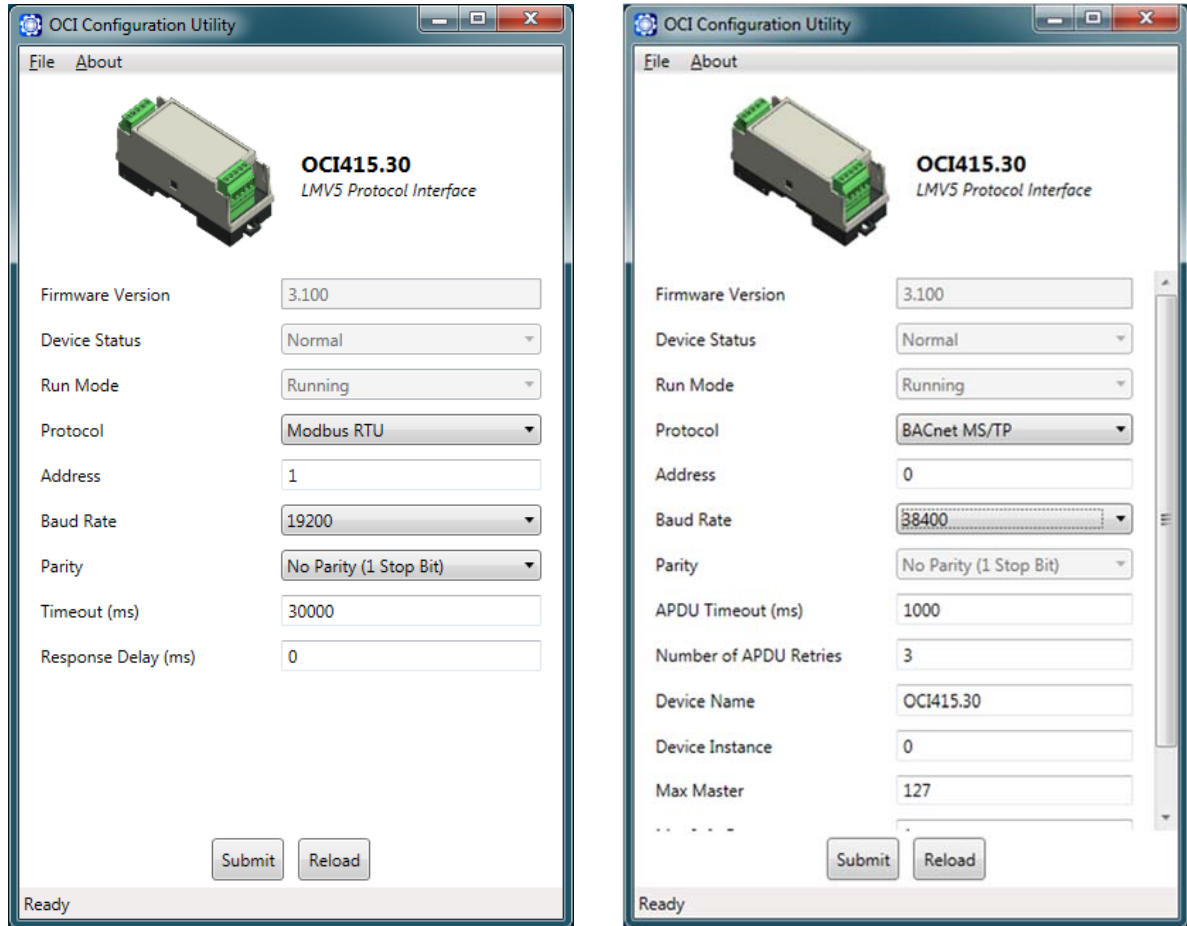
4. The protocol can be changed between Modbus RTU and BACnet MS/TP from this screen. See the previous sections for further details on the protocol-specific settings that can be changed. Once the desired settings have been entered, click **Submit** to apply. Click **Reload** to refresh the displayed settings.

Configuration Utility (continued)

<u>Updating Firmware</u>

1. From the OCI415.30 Configuration Utility, click **File -> Update Device…**

2. Locate the supplied update file with a **.duf** extension and click **Open**.
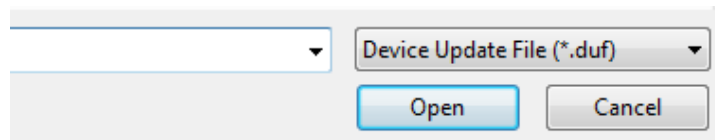
3. The device will automatically reboot and reconnect with the OCI415.30 Configuration Utility once the firmware update is complete. When a device is connected, the firmware version is shown as one of the read-only parameters.

Modbus RTU Mapping (continued)

Refer to Document No. LV5-1000 (LMV5 Technical Instructions) for complete Modbus mapping information.

BACnet MS/TP Mapping

Point Name	Type	Instance	Units	Active Text	Inactive Text
PHASE	ANALOG INPUT	1	NO UNITS	-	-
FUEL ACTUATOR	ANALOG INPUT	2	ANG DEG	-	-
GAS ACTUATOR	ANALOG INPUT	3	ANG DEG	-	-
OIL ACTUATOR	ANALOG INPUT	4	ANG DEG	-	-
AIR ACTUATOR	ANALOG INPUT	5	ANG DEG	-	-
AUX1 ACTUATOR	ANALOG INPUT	6	ANG DEG	-	-
AUX2 ACTUATOR	ANALOG INPUT	7	ANG DEG	-	-
AUX3 ACTUATOR	ANALOG INPUT	8	ANG DEG	-	-
VSD	ANALOG INPUT	9	PERCENT	-	-
CURRENT OUTPUT	ANALOG INPUT	10	PERCENT	-	-
CURRENT SETPOINT	ANALOG INPUT	11	NO UNITS	-	-
ACTUAL VALUE	ANALOG INPUT	12	PERCENT	-	-
FLAME SIGNAL	ANALOG INPUT	13	PERCENT	-	-
FUEL FLOW	ANALOG INPUT	14	NO UNITS	-	-
CURRENT O2 VALUE	ANALOG INPUT	15	PERCENT	-	-
SENSOR TYPE **(SEE NOTE 1)**	ANALOG INPUT	16	NO UNITS	-	-
START COUNTER	ANALOG INPUT	17	NO UNITS	-	-
HOUR COUNTER	ANALOG INPUT	18	NO UNITS	-	-
ERROR CODE	ANALOG INPUT	19	NO UNITS	-	-
DIAGNOSTIC CODE	ANALOG INPUT	20	NO UNITS	-	-
ERROR CLASS	ANALOG INPUT	21	NO UNITS	-	-
ERROR PHASE	ANALOG INPUT	22	NO UNITS	-	-
SUPPLY AIR TEMPERATURE	ANALOG INPUT	23	NO UNITS	-	-
FLUE GAS TEMPERATURE	ANALOG INPUT	24	NO UNITS	-	-
COMBUSTION EFFICIENCY	ANALOG INPUT	25	PERCENT	-	-
PROGRAM STOP **(SEE NOTE 2)**	ANALOG VALUE	26	NO UNITS	-	-
LC OPER MODE **(SEE NOTE 3)**	ANALOG VALUE	27	NO UNITS	-	-
AZL OPER MODE **(SEE NOTE 4)**	ANALOG VALUE	28	NO UNITS	-	-
LOCAL REMOTE **(SEE NOTE 5)**	ANALOG VALUE	29	NO UNITS	-	-
TIMEOUT	ANALOG VALUE	30	SECONDS	-	-
REMOTE MODE **(SEE NOTE 5)**	ANALOG VALUE	31	NO UNITS	-	-
REMOTE SP W3 **(SEE NOTE 5)**	ANALOG VALUE	32	NO UNITS	-	-
REMOTE FIRE RATE **(SEE NOTE 4)**	ANALOG VALUE	33	PERCENT	-	-
SETPOINT W1	ANALOG INPUT	34	NO UNITS	-	-
SETPOINT W2	ANALOG INPUT	35	NO UNITS	-	-
DAY OF WEEK (0=SUNDAY)	ANALOG INPUT	36	NO UNITS	-	-
YEAR 2-DIGIT	ANALOG INPUT	37	NO UNITS	-	-
MONTH	ANALOG INPUT	38	NO UNITS	-	-
DAY	ANALOG INPUT	39	NO UNITS	-	-
HOUR	ANALOG INPUT	40	NO UNITS	-	-
MINUTE	ANALOG INPUT	41	NO UNITS	-	-
SECOND	ANALOG INPUT	42	NO UNITS	-	-
HOURS GAS RESET **(SEE NOTE 6)**	ANALOG VALUE	43	HOURS	-	-
HRS OIL S1 RESET **(SEE NOTE 6)**	ANALOG VALUE	44	HOURS	-	-
HRS OIL S2 RESET **(SEE NOTE 6)**	ANALOG VALUE	45	HOURS	-	-

BACnet MS/TP Mapping (continued)

Point Name	Type	Instance	Units	Active Text	Inactive Text
HRS OIL S3 RESET **(SEE NOTE 6)**	ANALOG VALUE	46	HOURS	-	-
HOURS RUN RESET **(SEE NOTE 6)**	ANALOG VALUE	47	HOURS	-	-
HOURS RUN TOTAL	ANALOG INPUT	48	HOURS	-	-
HOURS POWERED	ANALOG INPUT	49	HOURS	-	-
STARTS GAS RESET **(SEE NOTE 6)**	ANALOG VALUE	50	NO UNITS	-	-
STARTS OIL RESET **(SEE NOTE 6)**	ANALOG VALUE	51	NO UNITS	-	-
STARTS RESET **(SEE NOTE 6)**	ANALOG VALUE	52	NO UNITS	-	-
STARTS TOTAL	ANALOG INPUT	53	NO UNITS	-	-
FUEL VOLUME F0 **(SEE NOTE 6)**	ANALOG VALUE	54	PERCENT	-	-
FUEL VOLUME F1 **(SEE NOTE 6)**	ANALOG VALUE	55	NO UNITS	-	-
NUMBER OF FAULTS	ANALOG INPUT	56	NO UNITS	-	-
EXTRA TEMP SENSOR	ANALOG INPUT	57	NO UNITS	-	-
MINIMUM FIRE RATE GAS	ANALOG INPUT	58	PERCENT	-	-
MAXIMUM FIRE RATE GAS	ANALOG INPUT	59	PERCENT	-	-
MINIMUM FIRE RATE OIL	ANALOG INPUT	60	PERCENT	-	-
MAXIMUM FIRE RATE OIL	ANALOG INPUT	61	PERCENT	-	-
LOAD LIMIT MODULATING	ANALOG VALUE	62	PERCENT	-	-
LOAD LIMIT STAGING	ANALOG VALUE	63	PERCENT	-	-
P-VALUE	ANALOG VALUE	64	PERCENT	-	-
I-VALUE	ANALOG VALUE	65	NO UNITS	-	-
D-VALUE	ANALOG VALUE	66	NO UNITS	-	-
LOCKOUT CODE **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 100	PERCENT	-	-
LOCKOUT DIAG **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 101	NO UNITS	-	-
LOCKOUT CLASS **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 102	NO UNITS	-	-
LOCKOUT PHASE **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 103	NO UNITS	-	-
LOCKOUT OUTPUT **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 104	PERCENT	-	-
LOCKOUT YEAR **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 105	NO UNITS	-	-
LOCKOUT MONTH **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 106	NO UNITS	-	-
LOCKOUT DAY **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 107	NO UNITS	-	-
LOCKOUT HOUR **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 108	NO UNITS	-	-
LOCKOUT MINUTE **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 109	NO UNITS	-	-
LOCKOUT SECOND **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 110	NO UNITS	-	-
LOCKOUT START **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 111	NO UNITS	-	-
LOCKOUT HOUR **(SEE NOTE 7)**	ANALOG INPUT	(20 * x) + 112	NO UNITS	-	-
ERROR CODE **(SEE NOTE 7)**	ANALOG INPUT	(10 * x) + 280	NO UNITS	-	-
ERROR DIAG **(SEE NOTE 7)**	ANALOG INPUT	(10 * x) + 281	NO UNITS	-	-
ERROR CLASS **(SEE NOTE 7)**	ANALOG INPUT	(10 * x) + 282	NO UNITS	-	-
ERROR PHASE **(SEE NOTE 7)**	ANALOG INPUT	(10 * x) + 283	NO UNITS	-	-
ERROR OUTPUT **(SEE NOTE 7)**	ANALOG INPUT	(10 * x) + 284	PERCENT	-	-
ERROR START **(SEE NOTE 7)**	ANALOG INPUT	(10 * x) + 285	NO UNITS	-	-
CURRENT FUEL	BINARY INPUT	1	-	OIL	GAS
UNIT TYPE	BINARY INPUT	2	-	STANDARD	METRIC
CONTROL SWITCH	BINARY INPUT	3	-	ON	OFF
FAN CONTACTOR	BINARY INPUT	4	-	ON	OFF
OIL SELECTED	BINARY INPUT	5	-	ON	OFF
GAS SELECTED	BINARY INPUT	6	-	ON	OFF

BACnet MS/TP Mapping (continued)

Point Name	Type	Instance	Units	Active Text	Inactive Text
HIGH OIL SWITCH	BINARY INPUT	7	-	ON	OFF
LOW OIL SWITCH	BINARY INPUT	8	-	ON	OFF
VALVE PROVING	BINARY INPUT	9	-	ON	OFF
SAFETY LOOP	BINARY INPUT	10	-	ON	OFF
LOW GAS SWITCH	BINARY INPUT	11	-	ON	OFF
HIGH GAS SWITCH	BINARY INPUT	12	-	ON	OFF
AIR SWITCH	BINARY INPUT	13	-	ON	OFF
OIL RELEASE	BINARY INPUT	14	-	ON	OFF
HEAVY OIL START	BINARY INPUT	15	-	ON	OFF
ALARM	BINARY INPUT	16	-	ON	OFF
IGNITION	BINARY INPUT	17	-	ON	OFF
START SIGNAL	BINARY INPUT	18	-	ON	OFF
FAN OUTPUT	BINARY INPUT	19	-	ON	OFF
OIL PUMP	BINARY INPUT	20	-	ON	OFF
OIL VALVE SV	BINARY INPUT	21	-	ON	OFF
OIL VALVE V1	BINARY INPUT	22	-	ON	OFF
OIL VALVE V2	BINARY INPUT	23	-	ON	OFF
OIL VALVE V3	BINARY INPUT	24	-	ON	OFF
GAS VALVE SV	BINARY INPUT	25	-	ON	OFF
GAS VALVE V1	BINARY INPUT	26	-	ON	OFF
GAS VALVE V2	BINARY INPUT	27	-	ON	OFF
GAS VALVE PV	BINARY INPUT	28	-	ON	OFF
FUEL SELECT	BINARY VALUE	29	-	OIL	GAS
LOCKOUT FUEL **(SEE NOTE 7)**	BINARY INPUT	30 + x	-	OIL	GAS
ERROR FUEL **(SEE NOTE 7)**	BINARY INPUT	39 + x	-	OIL	GAS

Note 1 – Sensor type.
- **0:** Pt100
- **1:** Pt1000
- **2:** Ni1000
- **3:** Temperature (4-20mA, 0-10V)
- **4:** Pressure (4-20mA, 0-10V)
- **5:** Pt100Pt1000
- **6:** Pt100Ni1000
- **7:** No sensor

Note 2 – LMV program stop.
- **0:** deactivated
- **1:** prepurge phase 24
- **2:** ignition position phase 36
- **3:** interval 1 phase 44
- **4:** interval 2 phase 52

BACnet MS/TP Mapping (continued)

Note 3 – Load control operating mode.
- **0:** ExtLC X5-03
- **1:** IntLC
- **2:** IntLC Bus
- **3:** IntLC X62
- **4:** ExtLC X62
- **5:** ExtLC Bus

Note 4 – AZL operating mode.
- **0:** Automatic
- **1:** Burner on
- **2:** Burner off

Note 5 – Set local/remote (AV29) to 1 for remote. Once in remote the desired mode can be set using AV31 (0 = local/automatic, 1 = burner on, 2 = burner off). If AV31 is set to automatic, write the desired setpoint using AV32. If AV31 is set to burner on, write the desired firing rate using AV33. The firing rate must be between 0% and 100% to remain valid. AV29 must be actively written at least once during the timeout period to reset the timeout counter. Once the timeout counter reaches the timeout value local/remote will revert to local (failsafe operation).

Note 6 – Counter values can only be reset to zero.

Note 7 – There are 9 lockouts in memory (current plus 8 history). There are 21 errors in memory (current plus 20 history). The addresses for the historical data are all in the same format as shown in the mapping. Use the formula to find the correct instance. For example, the analog input instance for the ERROR CODE history index 4 would be (10 x 4) + 280 = 320, or AI320. The analog input instance for the LOCKOUT OUTPUT history index 7 would be (20 x 7) + 104 = 244, or AI244.