

## **CRC1/CRC1+ BACnet<sup>®</sup> MS/TP Application Guide**

The BACnet MS/TP (Master Slave/Token Passing) driver implements a data link protocol that uses the services of the RS-485 physical layer on a shielded twisted pair cable. BACnet MS/TP is typically used for connecting field devices to controllers, routers and/or control applications (i.e. the LG MultiSITE VM3).

The BACnet MS/TP capability included with the CRC allows for the direct and seamless integration to third party building management system (BMS), where BACnet MS/TP is utilized.

For example, a data closet being served by an LG system with a CRC is being added to an existing building with a BMS: The most efficient way to integrate the LG System would be via the CRC over BACnet MS/TP directly to the BMS as shown below in *Figure 1*.



*Figure 1*

In addition to new construction projects, the CRC is ideal for small additions to existing buildings. The CRC is compatible with all LG Multi V, Multi V S and Multi F systems.

### **Communication Network Wiring Specifications:**

CRC BACnet MS/TP communication wiring requires AWG 18, two – core (18/2) stranded, twisted and shielded communication cable.

## Communication Network Design Considerations

A BACnet MS/TP network (including CRC and other BACnet MS/TP devices) has requirements on network design. Below are some guidelines to follow when designing the BACnet MS/TP network including the CRC as well as other BACnet MS/TP devices:

- Maximum length per MSTP Segment: 3900'
- 64 CRCs per MSTP Segment
- End-of-Line (EOL) Resistors: 120 ohm resistors must be installed at each end of the MSTP (or RS-485) trunk segment to reduce signal reflections and RF interference. Failure to install EOL resistors may result in intermittent communications errors.

## Communication Network Wiring

The BACnet MS/TP communication cable connects to terminals 13 and 14 on the terminal strip on the CRC. *Figure 2* shows the terminals on the backside of a CRC.

NOTE: Connect shields together and insulate to prevent accidental grounding.

Daisy chain the CRC onto BACnet MS/TP communication bus with other CRCs and/or other BACnet MS/TP devices as shown in *Figure 2*.



*Figure 2*

## Communication Network Installation Considerations

One of the most common causes of communication failures within a BACnet MS/TP Communication Network is related to network installation, i.e. improper wiring installation. The below list highlights some good practices to ensure correct installs:

- Polarity sensitive
- *Never* splice
- Avoid unwinding the twists of cable when not necessary. Twisting the insulated conductors around each other reduces outward noise and improves immunity to external noise pickup. Twist the two wires together before inserting them into the corresponding screw terminal of the controller.
- Avoid exposing too much bare wire so that adjacent wires do not short when connected to the controller.
- Avoid running network cables near DC signal switches, variable frequency drives and high voltage cabling to prevent introduction of noise.
- Secure the network cables to reduce vibration as much as possible.

Integrating the CRC's over BACnet MS/TP offers additional points allowing for remote screen configuration and ZigBee device configuration as shown below.

Name	Type	Read/Write	BACnet Object ID	Device Facets
ZB_Snsr_Wn_Interlock_M	Binary Value	Read	552	Window Interlock Deactivated, Window Interlock Activated
MsgShortScreenMsgTxt	characterStringValue	Write	1	N/A
MsgLongScreenMsgTxt	characterStringValue	Write	2	N/A
ZB_Zone1IEEEaddrs_M	Analog Input	Read	210	N/A
ConfigPassword	Analog Value	Write	56	N/A
BACnetComAddr	Analog Value	Write	10	N/A
BACnet Stack Poll Rate	Analog Value	Write	16	N/A
DisplayLowBacklight	Analog Value	Write	3	N/A
UserPassword	Analog Value	Write	57	N/A
ZB_NetworkStatus_M	Multi State Input	Read	2	Not Det = 1, Pwr On = 2, No NWK = 3, Joined = 4, Online = 5
ZB_Zone1Status_M	Multi State Input	Read	210	None = 1, Closed = 2, Opened = 3, No Motion = 4,

				Motion = 5
DisplayLanguage	Multi State Value	Write	4	English = 1, French = 2, Spanish = 3
BACnetNetworkUnits	Multi State Value	Write	6	SI = 1, Imperial = 2
DisplayTimeFormat	Multi State Value	Write	5	AM/PM = 1, 24Hours = 2
DisplayColor	Multi State Value	Write	2	White = 1, Green = 2, Blue = 3, Grey = 4, Dark Grey = 5
DisplayUseStandbyScreen	Multi State Value	Write	32	No = 1, Yes = 2, Occ Only = 3, Screen = 4
ZB_Zone1SnsrType	Multi State Value	Write	210	None = 1, Window = 2, Door = 3, Motion = 4, Status = 5, Remove = 6, N/A = 7
DisplayShowOnOff	Multi State Value	Write	500	Show = 1, Hide = 2
DisplayShowMode	Multi State Value	Write	501	Show = 1, Hide = 2
DisplayShowSchedule	Multi State Value	Write	502	Show = 1, Hide = 2
DisplayShowMore	Multi State Value	Write	503	Show = 1, Hide = 2
DisplayShowSetTemp	Multi State Value	Write	504	Show = 1, Hide = 2
DisplayShowSpaceTemp	Multi State Value	Write	505	Show = 1, Hide = 2
DisplayShowFanSpeed	Multi State Value	Write	506	Show = 1, Hide = 2
DisplayShowHumidity	Multi State Value	Write	507	Show = 1, Hide = 2
TempSenseLoc	Multi State Value	Write	516	Remote Controller = 1, IDU = 2, 2TH = 3

Additional documentation including a complete points list can be found at [www.lghvac.com](http://www.lghvac.com)

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