

### BACNET, MODBUS AND YORKTALK 2 COMMUNICATIONS

Data can be read and in some cases modified using a serial communication BACnet, Modbus or YorkTalk 2 network connection. This information allows communications of chiller operating parameters and external control changes to setpoint, load limiting, and start/stop commands.

BACnet and YorkTalk 2 RS485 networks are wired to the + and - terminals of TB1 for port 1 communications. Modbus network connection has the option of RS232 or RS485 connection for port 2 communications. Modbus network is wired to either TB2 or TB3 as follows:

- RS-485: connect to TB2 - Network (-) to TB2 (-); Network (+) to TB2 (+)

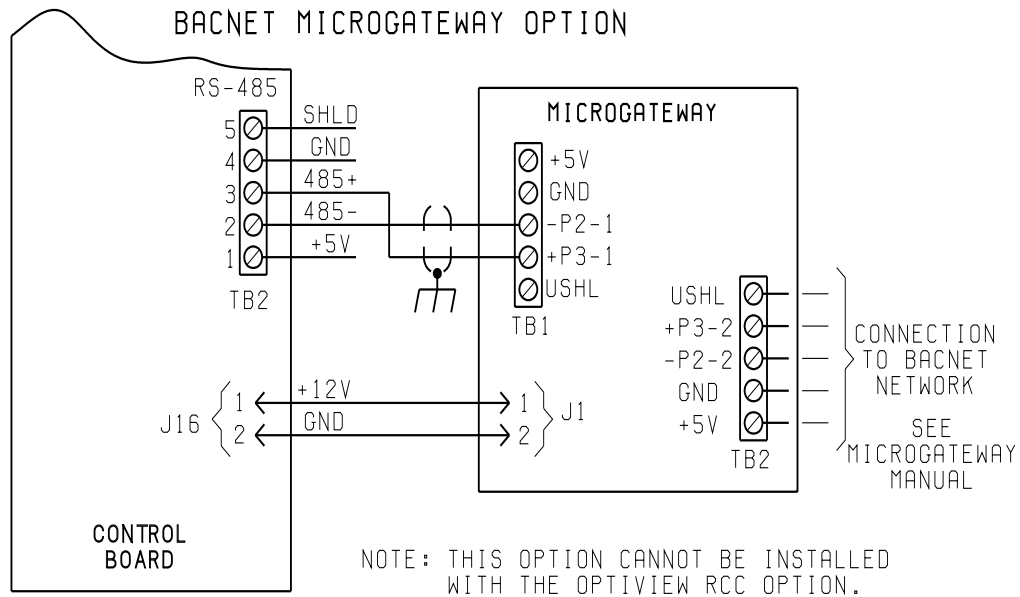
- RS-232: connect to TB3 - Network (RX) to TB3 (TXD); Network (TX) to TB3 (RXD); Network (GND) to TB3 (GND)

Refer to *Figure 60 on page 301* “Control Board Connections” for TB1, and TB2 locations.

In most cases, communication parameters will need to be modified. *Table 26 on page 302* “Values Required for BAS Communication” lists setup parameters for the available protocols. Modification is accomplished by pressing the PROGRAM, DOWN ARROW, DOWN ARROW, DOWN ARROW, DOWN ARROW, and ENTER keys in sequence. The list below shows the displays for the values that may be modified:

DE MODIFIER ADDRESS XXXXX	P2 PROTOCOL XXXXXXXXXX
DE MODIFIER OFFSET XX	P2 MANUAL MAC ADDRESS      XXX
P1 PROTOCOL XXXXXX	P2 BAUD RATE XXXXXX
P1 MANUAL MAC ADDRESS      XXX	P2 PARITY XXXXXX
P1 BAUD RATE XXXXXX	P2 STOP BITS X
P1 PARITY XXXXX	P2 HW SELECT BIT XXXXXX
P1 STOP BITS X	REAL TIME ERROR   ## RESET 1 = YES, 0 = NO  0

Note: See TABLE 27 for error descriptions



**FIGURE 60 - CONTROL BOARD CONNECTIONS**

LD10637

The Chiller Control Board contains a dual UART for RS-485 and RS-232 communications. UART1 is dedicated to RCC and ISN communications over an RS-485 link. UART2 is dedicated to internal communications within the chiller. The RS-485 port is configured

for 4800 baud, 1 start bit, 8 data bits, odd parity, and 1 stop bit. Connections for ISN communications are on the Chiller Control Board on TB1/TB2. TB2 on the Microgateway is utilized for ISN comms connection. P3 is RS485+, P2 is RS485-, and USHL is the shield.

The table below shows the minimum, maximum, and default values.

**TABLE 25 - MINIMUM, MAXIMUM AND DEFAULT VALUES**

DESCRIPTION	MINIMUM	MAXIMUM	DEFAULT
DE MODIFIER ADDRESS	-1	41943	-1
DE MODIFIER OFFSET	-1	99	-1
P1 BAUD RATE	1200	76800	4800
	1200, 4800, 9600, 19200, 38400, 76800, AUTO SELECTABLE		
P2 BAUD RATE	1200	57600	1200
	1200, 4800, 9600, 19200, 38400, 57600 SELECTABLE		
P1, P2 MANUAL Mac ADDRESS	-1	127	-1
P1, P2 PARITY	NONE	IGNORE	NONE
	NONE, EVEN, ODD, IGNORE SELECTABLE		
P1 PROTOCOL	BACNET	API	BACNET
	BACNET, API SELECTABLE		
P2 PROTOCOL	TERMINAL	MODBUS CLIENT	API
	TERMINAL, MODBUS IO, MODBUS SERVER, API, MODBUS CLIENT SELECTABLE		
P1, P2 STOP BITS	1	2	1
RESET REAL TIME ERROR	NO	YES	NO

The table below shows set-up requirements for each communication protocol.

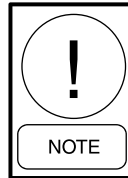
**TABLE 26 - VALUES REQUIRED FOR BAS COMMUNICATION**

SETTING DESCRIPTION	Protocol		
	BACnet MS/TP	Modbus RTU <sup>5</sup>	YorkTalk 2
DE MODIFIER ADDRESS	0 to 41943 <sup>(3)</sup>	1	-1
DE MODIFIER OFFSET	0 to 99 <sup>(4)</sup>	0	N/A
P1 PROTOCOL	BACNET	N/A	N/A
P1 MANUAL MAC ADDRESS	0-127 <sup>(1)</sup>	N/A	N/A
P1 BAUD RATE	9600 To 76800 or Auto Selectable <sup>(1)</sup>	N/A	N/A
P1 PARITY	NONE	N/A	N/A
P1 STOP BITS	1	N/A	N/A
P2 PROTOCOL	N/A	MODBUS SVR	N/A
P2 MANUAL MAC ADDRESS	N/A	0-127 <sup>(1)</sup>	N/A
P2 BAUD RATE	N/A	19,200 <sup>(2)</sup>	N/A
P2 PARITY	N/A	NONE <sup>(2)</sup>	N/A
P2 STOP BITS	N/A	1	N/A
P2 HW SELECT BIT	N/A	RS-485 or RS-232 <sup>(1)</sup>	N/A
RESET REAL TIME ERROR	N/A	N/A	N/A
P1 HW SELECT BIT	N/A	N/A	N/A
CHILLER ID	N/A	N/A	0

<sup>1</sup> as Required By Network  
<sup>2</sup> or Other As Required By Network  
<sup>3</sup> number Is Multiplied By 100, Set As Required By Network  
<sup>4</sup> number Is Added To De Modifier Address, Set As Required By Network  
<sup>5</sup> unit Operating Software Version C.Mmc.13.03 Or Later Required For Modbus Protocol

**TABLE 27 - REAL TIME ERROR NUMBERS**

ERROR NUMBER (##)	DESCRIPTION
0	ALL OK
1	DATUM TYPE OK TEST FAILED
2	ENGLISH TEXT TOO LONG
3	FLOATING POINT EXCEPTION
4	GET PACKET FAILED
5	GET TYPE FAILED
6	INVALID UNIT CONVERSION
7	INVALID HARDWARE SELECTION
8	REAL TIME FAULT
9	SPANISH TEXT TOO LONG
10	THREAD EXITED
11	THREAD FAILED
12	THREAD STALLED
13	IO BOARD RESET
14	BRAM INVALID
15	BACNET SETUP FAILED



***Reboot required (cycle power) after settings are changed.***

*Table 27 on page 302 shows the real time error numbers that may be encountered during communication setup and a description of each.*

## BACnet and Modbus Communications

Chiller data that can be read and modified using specific BACnet or Modbus Register Addresses; and the data associated with the addresses, is outlined in the following description:

### ANALOG WRITE POINTS

This data can be read and modified using a BACnet or Modbus network connection. The Modbus Register Address for these points is 1025 plus AV #.

### BINARY WRITE POINTS

This data can be read and modified using a BACnet or Modbus network connection. The Modbus Register Address for these points is 1537 plus BV #.

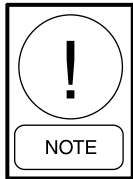
### ANALOG READ ONLY POINTS

This data can be read using a BACnet or Modbus network connection and can NOT be modified using this connection. The Modbus Register Address for these points is 513 plus AI #.

### BINARY MONITOR ONLY POINTS

This data can be read using a BACnet or Modbus network connection and can NOT be modified using this connection. The Modbus Register Address for these points is 1281 plus BI #.

Refer to *Table 28 on page 304* for complete list of BACnet and Modbus registers.



*The latest data map information is listed on the Johnson Controls Equipment Integration website.*

## Communications Data Map Notes

(See *Table 28 on page 304*)

1. IPU II based units are configured for Native BACnet MS/TP and Modbus RTU communications. Microgateway or E-Link not required for these two communication protocols.
2. BACnet Object Types: 0= Analog In, 1 = Analog Out, 2= Analog Value, 3= Binary In, 4 = Binary Output, 5= Binary Value, 8= Device, 15 = Alarm Notification (0 through 127 are reserved ASHRAE Objects).
3. WC= Inches of water column; CFM = Cubic Feet per Minute; FPM = Feet per Minute; PSI = Lbs per square inch; Pa = Pascals; kPa = Kilopascals; PPM = Part per Million; kJ/kg = Kilojoules per Kilogram.
4. Water Cooled Scroll units use the same firmware as Air-Cooled Scroll units, ignoring Fan Control.









TABLE 28 - BACNET AND MODBUS COMMUNICATIONS DATA MAP (CONT'D)

8/25/2014

ENG PAGE	Operational Code	ENG PAGE	Fault/Inhibit Code	ENG PAGE	Fault/Inhibit Code (cont)
P56,58	C_OPER_CODE	P57,59	C_FAULT_CODE	P57,59	C_FAULT_CODE
63	Manual Override	1	Low Ambient Temperature	52	Reserved 52
64	Daily Schedule Shutdown	2	High Ambient Temperature	53	Reserved 53
65	Unit Switch OFF	3	Low Chilled Liquid Temperature	54	Reserved 54
66	Remote Controlled Shutdown	4	SPARE0	55	Reserved 55
67	Loss of External Communications	5	Low RTC Battery Voltage	56	Reserved 56
68	Flow Switch Shutdown	6	Invalid Number of Comp ressors Selected	57	Reserved 57
69	VSD Cooling Shutdown	7	VSD Communications Failure	58	Reserved 58
70	Serial Number Shutdown	8	Pre-charge Low DC Bus Voltage	59	Reserved 59
71	SPARE	9	Pre-charge DC Bus Voltage Imbalance	60	Reserved 60
72	SPARE	10	Bus Voltage High DC	61	Reserved 61
73	SPARE	11	Bus Voltage Low DC	62	Reserved 62
74	No Run Permissive	12	Voltage Imbalance DC Bus		
75	Anti-Recycle Timer Active	13	High VSD Ambient Temperature		
76	System Switch OFF	14	Single Phase Input		
77	System Not Running	15	VSD Power Supply Fault		
78	System Running	16	VSD Logic Board Fault		
79	Discharge Pressure Limiting	17	Motor Current Overload (Hardware)		
80	Suction Pressure Limiting	18	CT Plug Fault		
81	Motor Current Limiting	19	Reserved 19		
82	Motor Temperature Limiting	20	Reserved 20		
83	ISN Motor Current Limiting	21	Reserved 21		
84	Remote Motor Current Limiting	22	Reserved 22		
85	System Pumping Down	23	Reserved 23		
86	VSD PreCharging	24	Reserved 24		
87	VSD Baseplate Temp Limiting	25	Reserved 25		
88	VSD Internal Ambient Temp Limiting	26	Reserved 26		
89	Sound Limiting	27	High Discharge Pressure (Software)		
90	ISN Sound Limiting	28	High Differential Oil Pressure		
91	Remote Sound Limiting	29	Low Differential Oil Pressure		
92	Pulldown Motor Current Limiting	30	Low Suction Pressure		
93	Cooling Demand Shutdown	31	High Discharge Temperature		
94	Reserved 94	32	High Oil Temperature		
95	Reserved 95	33	Low Suction Superheat		
96	Reserved 96	34	Sensor Failure		
		35	Low Motor Current		
		36	High Motor Temperature		
		37	Pre-charge Low DC Bus Voltage		
		38	Pre-charge DC Bus Voltage Imbalance		
		39	High DC Bus Voltage		
		40	Low DC Bus Voltage		
		41	DC Bus Voltage Imbalance		
		42	High Motor Current		
		43	Motor Current Overload (Software)		
		44	IGBT Gate Driver Fault		
		45	High Baseplate Temperature		
		46	Single Phase Input		
		47	VSD Run Signal Fault		
		48	High Discharge Press (Hardware – HPCO)		
		49	High Flash Tank Level		
		50	Control Voltage Fault		
		51	Low Discharge Superheat		

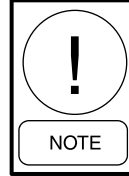
## Yorktalk 2 Communications

### **Received Data (Control Data)**

The unit receives eight data values from the MicroGateway or E-Link. The first four are analog values and the last four are digital values. These eight data values are used as control parameters when in REMOTE mode. When the unit is in LOCAL mode, these eight values are ignored. If the unit receives no valid YorkTalk 2 transmission for 5 minutes it will revert back to all local control values. *Table 29 on page 310* “Yorktalk 2 Communications Data Map” lists the control parameters. These values are found under feature 54 in the MicroGateway or E-Link.

### **Transmitted Data**

After receiving a valid transmission from the MicroGateway or E-Link, the unit will transmit either operational data or history buffer data depending on the “History Buffer Request” on ENG PAGE 10. Data must be transmitted for every page under feature 54. If there is no value to be sent to a particular page, a zero will be sent. *Table 29 on page 310* “Yorktalk 2 Communications Data Map” shows the data values and page listings for this unit.



***The latest point map information is listed on the Johnson Controls Equipment Integration website.***



TABLE 29 - YORKTALK 2 COMMUNICATIONS DATA MAP (CONT'D)

12/10/2008

ENG PAGE REF	ASCII PAGE REF	GPC Object Type	York Talk Point Type	ISN LINC Descriptive Text	York Talk Character Position	N2 Address	POINT LIST CODE: S = STANDARD O = OPTIONAL POINT LIST DESCRIPTION	N = NOT AVAILABLE										ENG PAGE REF			
								1	2	3	4	5	6	7	8	9	10				
P43	P41		D. Monitor		115	BD 12	Sys 2 Economizer Solenoid Valve Status	S	S	S	S										P43
P44	P42		D. Monitor		116	BD 13															P44
P45	P43		D. Monitor		117	BD 14															P45
P46	P44		D. Monitor		118	BD 15															P46
P47	P45		D. Monitor		119	BD 16															P47
P48	P46		D. Monitor		120	BD 17															P48
P49	P47		D. Monitor		121	BD 18															P49
P50	P48		D. Monitor		122	BD 19	S1-1 Cooling Type: 0=Water, 1=Glycol	S	S	S	S										P50
P51	P49		D. Monitor		123	BD 20	Local/Remote Control Mode: 0 = Local, 1 = Remote	S	S	S	S										P51
P52	P50		D. Monitor		124	BD 21	Display Units Mode: 0 = Imperial, 1 = SI	S	S	S	S										P52
P53	P51		D. Monitor		125	BD 22															P53
P54	P52		D. Monitor		126	BD 23															P54
P55	P53		D. Monitor		127	BD 24															P55
P56	P54		Code Monitor		128	ADI 1	*Sys 1 Operational Code	S	S	S	S										P56
P57	P55		Code Monitor		129	ADI 2	*Sys 1 Fault Code	S	S	S	S										P57
P58	P56		Code Monitor		130	ADI 3	*Sys 2 Operational Code	S	S	S	S										P58
P59	P57		Code Monitor		131	ADI 4	*Sys 2 Fault Code	S	S	S	S										P59
P60	P58		Code Monitor		132	ADI 5	Sys 1 Flash Tank Level (%)	S	S	S	S										P60
P61	P59		Code Monitor		133	ADI 6	Sys 1 Condenser Fan Stages Running (0-6)	S	S	S	S										P61
P62	P60		Code Monitor		134	ADI 7	Sys 2 Flash Tank Level (%)	S	S	S	S										P62
P63	P61		Code Monitor		135	ADI 8	Sys 2 Condenser Fan Stages Running (0-6)	S	S	S	S										P63
P64	P62		Code Monitor		136	ADI 9	Lead System Number	S	S	S	S										P64
P65	P63		Code Monitor		137	ADI 10	Sys 1 & 2 Debug Code	S	S	S	S										P65
P66	P64		A. Monitor		138 - 141	ADF 30	Local Leaving Chilled Liquid Setpoint	S	S	S	S										P66
P67	P65		A. Monitor		142 - 145	ADF 31	Low Leaving Chilled Liquid Temp Cutout	S	S	S	S										P67
P68	P66		A. Monitor		146 - 149	ADF 32	Sys 1 Flash Tank Drain Valve % Open	S	S	S	S										P68
P69	P67		A. Monitor		150 - 153	ADF 33	Sys 2 Flash Tank Drain Valve % Open	S	S	S	S										P69
P70	P68		A. Monitor		154 - 157	ADF 34	Low Suction Pressure Cutout	S	S	S	S										P70
P71	P69		A. Monitor		158 - 161	ADF 35	VSD DC Bus Voltage	S	S	S	S										P71
P72	P70		A. Monitor		162 - 165	ADF 36	Remote Leaving Chilled Liquid Setpoint	S	S	S	S										P72
P73	P71		A. Monitor		166 - 169	ADF 37	Sys 1 Suction Superheat	S	S	S	S										P73
P74	P72		A. Monitor		170 - 173	ADF 38	Cooling Range	S	S	S	S										P74
P75	P73		A. Monitor		174 - 177	ADF 39	Sys 1 Discharge Superheat	S	S	S	S										P75
P76	P74		A. Monitor		178 - 181	ADF 40	Sys 2 Suction Temperature	S	S	S	S										P76
P77	P75		A. Monitor		182 - 185	ADF 41	Sys 2 Discharge Temperature	S	S	S	S										P77
P78	P76		A. Monitor		186 - 189	ADF 42	Sys 2 Suction Superheat	S	S	S	S										P78
P79	P77		A. Monitor		190 - 193	ADF 43	Sys 2 Discharge Superheat	S	S	S	S										P79
P80	P78		D. Monitor		194	BD 25	Sys 1 Lockout	N	N	S	S										P80
P81	P79		D. Monitor		195	BD 26	Sys 2 Lockout	N	N	S	S										P81
P82	P80		D. Monitor		196	BD 27															P82
P83	P81		D. Monitor		197	BD 28															P83
P84	P82		D. Monitor		198	BD 29															P84

NOTE: The Appropriate Product Code Listing Summary Should Accompany Document

TABLE 29 - YORKTALK 2 COMMUNICATIONS DATA MAP (CONT'D)

12/10/2008

ENG PAGE	ASCII PAGE	Operational Code	ENG PAGE	ASCII PAGE	Fault Code	ENG PAGE	ASCII PAGE	Fault Code (cont.)
P56.58	P54.56	C. OPER.CODE	P57.59	P55.57	C. FAULT.CODE	P57.59	P55.57	C. FAULT.CODE
63	63	Manual Override	1	1	Low Ambient Temperature	52	53	SPARE
64	64	Daily Schedule Shutdown	2	2	High Ambient Temperature	53	54	SPARE
65	65	Unit Switch OFF	3	3	Low Chilled Liquid Temperature	54	55	SPARE
66	66	Remote Controlled Shutdown	4	4	SPARE0	55	56	SPARE
67	67	Loss of External Communications	5	5	Low RTC Battery Voltage	56	57	SPARE
68	68	Flow Switch Shutdown	6	6	Invalid Number of Compressors Selected	57	58	SPARE
69	69	VSD Cooling Shutdown	7	7	VSD Communications Failure	58	59	SPARE
70	70	SPARE	8	8	Pre-charge Low DC Bus Voltage	59	60	SPARE
71	71	SPARE	9	9	Pre-charge DC Bus Voltage Imbalance	60	61	SPARE
72	72	SPARE	10	10	Bus Voltage High DC	61	62	SPARE
73	73	SPARE	11	11	Bus Voltage Low DC	62	62	SPARE
74	74	No Run Permissive	12	12	Voltage Imbalance DC Bus			
75	75	Anti-Recycle Timer Active	13	13	High VSD Ambient Temperature			
76	76	System Switch OFF	14	14	Phase Input Single			
77	77	System Not Running	15	15	VSD Power Supply Fault			
78	78	System Running	16	16	VSD Logic Board Fault			
79	79	Discharge Pressure Limiting	17	17	Motor Current Overload (Hardware)			
80	80	Suction Pressure Limiting	18	18	CT Plug Fault			
81	81	Motor Current Limiting	19	19	SPARE			
82	82	Motor Temperature Limiting	20	20	SPARE			
83	83	ISN Motor Current Limiting	21	21	SPARE			
84	84	Remote Motor Current Limiting	22	22	SPARE			
85	85	System Pumping Down	23	23	SPARE			
86	86	VSD PreCharging	24	24	SPARE			
87	87	VSD Baseplate Temp Limiting	25	25	SPARE			
88	88	VSD Internal Ambient Temp Limiting	26	26	SPARE			
89	89	Sound Limiting	27	27	High Discharge Pressure (Software)			
90	90	ISN Sound Limiting	28	28	High Differential Oil Pressure			
91	91	Remote Sound Limiting	29	29	Low Differential Oil Pressure			
92	92	Pulldown Motor Current Limiting	30	30	Low Suction Pressure			
93	93	SPARE	31	31	High Discharge Temperature			
94	94	SPARE	32	32	High Oil Temperature			
95	95	SPARE	33	33	Low Suction Superheat			
96	96	SPARE	34	34	Sensor Failure			
			35	35	Low Motor Current			
			36	36	High Motor Temperature			
			37	37	Pre-charge Low DC Bus Voltage			
			38	38	Pre-charge DC Bus Voltage Imbalance			
			39	39	High DC Bus Voltage			
			40	40	Low DC Bus Voltage			
			41	41	DC Bus Voltage Imbalance			
			42	42	High Motor Current			
			43	43	Motor Current Overload (Software)			
			44	44	IGBT Gate Driver Fault			
			45	45	High Baseplate Temperature			
			46	46	Single Phase Input			
			47	47	VSD Run Signal Fault			
			48	48	High Discharge Press (Hardware - HPCO)			
			49	49	High Flash Tank Level			
			50	50	Control Voltage Fault			
			51	51	Low Discharge Superheat			