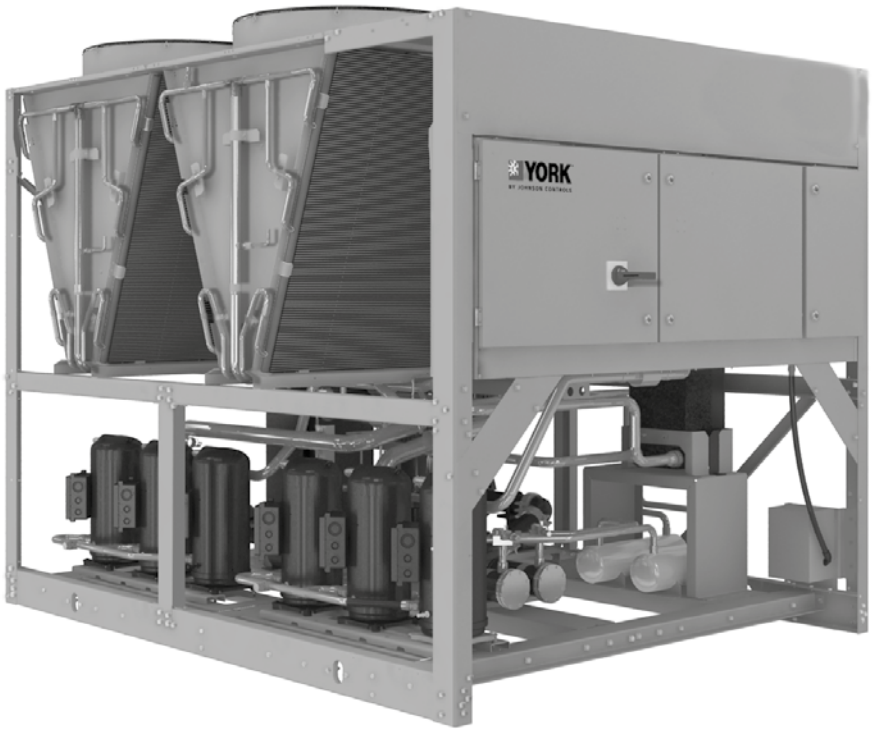
YORK®	Air-Cooled Scroll Chiller	
Installation, Operation, Maintenance	Supersedes: 150.72-ICOM6 (1223)	Form 150.72-ICOM6 (724)

035-23572-100

YLAA0041 – YLAA0230
Air-Cooled Scroll Chillers
with Brazed Plate Heat Exchanger
Style B (60 Hz) 4 to 12 Fan
40 ton to 230 ton
140 kW to 800 kW



R-410A,
R-454B

AHRI CERTIFIED www.ahridirectory.org Air-Cooled Chillers AHRI Standard 550/590

ISO 9001 Registered
Products are produced at a facility whose quality-management systems are ISO9001 certified.

Issue Date:
July 03, 2024

BACnet, Modbus, N2, 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 (-1) to TB2 (-1); Network (+1) to TB2 (+1)
- RS-232: connect to TB3 - Network (RX) to TB3 (TXD); Network (TX) to TB3 (RXD); Network (GND) to TB3 (GND)

See Figure 47 on page 171 for TB1, TB2 and TB3 locations.

In most cases, communication parameters will need to be modified. *Table 30 on page 172* 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 XXXXX
P1 MANUAL MAC ADDRESS XXX	P2 PARITY XXXXX
P1 BAUD RATE XXXXX	P2 STOP BITS X
P1 PARITY XXXXX	P2 HW SELECT BIT XXXXX
P1 STOP BITS X	REAL TIME ERROR ## RESET 1 = YES, 0 = NO 0

Note: *See Table 22 on page 173 for error descriptions*

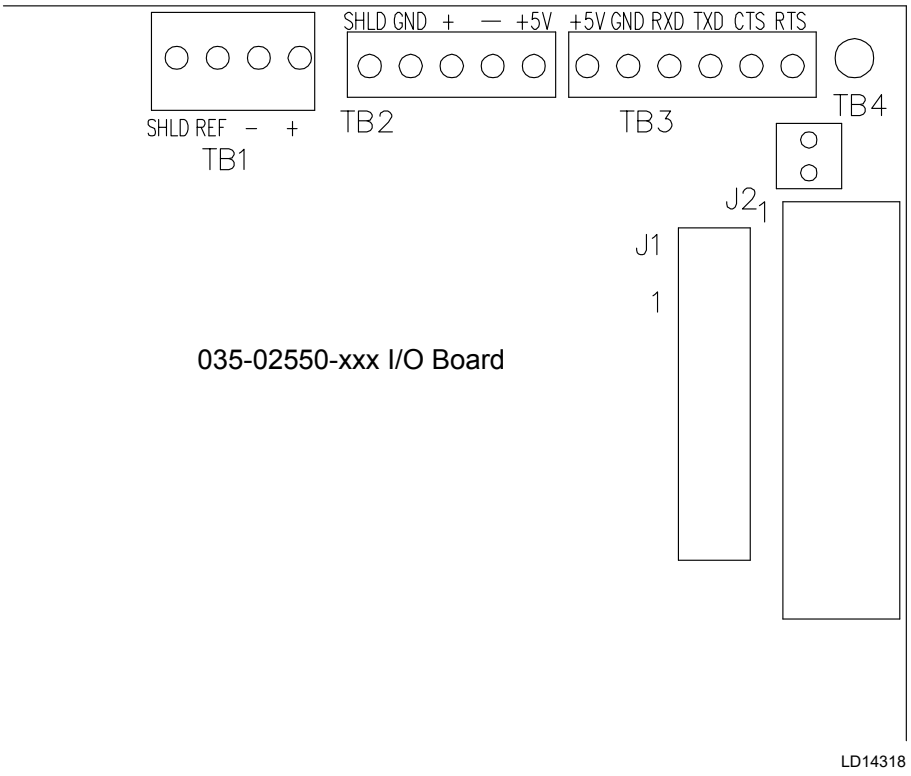


Figure 47: Micro Panel Connections

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

Table 20: 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 21: Values Required for BAS Communication

Setting description	Protocol			
	BACnet MS/TP	Modbus RTU[5]	YorkTalk 2	N2[6]
De modifier address	0 to 41943[3]	1	-1	0 to 41943[3]
De modifier offset	0 to 99[4]	0	N/A	0 to 99[4]
P1 protocol	BACNET	N/A	N/A	9n2
P1 manual MAC address	0-127[1]	N/A	N/A	0-127[1]
P1 baud rate	9600 To 76800 or Auto Selectable[1]	N/A	N/A	9600
P1 parity	NONE	N/A	N/A	NONE
P1 stop bits	1	N/A	N/A	1
P2 protocol	N/A	MODBUS SVR	N/A	N/A
P2 manual MAC address	N/A	0-127[1]	N/A	N/A
P2 baud rate	N/A	19,200[2]	N/A	N/A
P2 parity	N/A	NONE[2]	N/A	N/A
P2 stop bits	N/A	1	N/A	N/A
P2 HW select bit	N/A	RS-485 or RS-232[1]	N/A	N/A
Reset real time error	N/A	N/A	N/A	N/A
P1 hw select bit	N/A	N/A	N/A	N/A
Chiller ID	N/A	N/A	0	N/A

1. As required by network. 2. Or other as required by network. 3. Number is multiplied by 100, set as required by network.
4. Number is added to de modifier address, set as required by network.
5. Unit operating software version C.Mmc.13.03 or later required for Modbus Protocol.
6. Unit operating software version 04 (C.MMC.13.04, C.MMC.14.04, or C.MMC.16.04) or higher required for N2 protocol functionality.

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 + 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 + BV #.

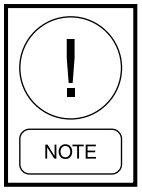
Analog read only points

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 + 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 + BI #.

See Table 22 on page 173 for complete list of BACnet and Modbus registers.



Go to the Johnson Controls Chillers Knowledge Exchange website for the most up-to-date SC-EQ BAS point maps: https://docs.johnsoncontrols.com/chillers/. You can also contact your local Johnson Controls office for a copy of the data map.

Communications data map notes

See Table 22 on page 173.

1. IPU II based units are configured for Native BACnet MS/TP and Modbus RTU communications. E-Link Gateway 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.

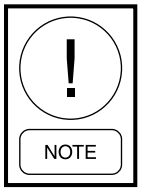
   WC= Inches of water column
   CFM = Cubic Feet per Minute
   FPM = Feet per Minute
   PSI = Lb per square inch
   Pa = Pascals
   kPa = Kilopascals
   PPM = Part per Million
   kJ/kg = Kilojoules per Kilogram.

4. Water Cooled Scroll units use the same firmware as Air Cooled Scroll units, ignoring Fan Control.

The following table shows the real time error numbers that may be encountered during communication setup and a description of each.

Table 22: 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.

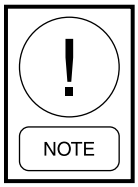
YorkTalk 2 communications

Received data, control data

The unit receives eight data values from the E-Link Gateway. 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. These values are found under feature 54 in the E-Link Gateway.

Transmitted data

After receiving a valid transmission from the E-Link Gateway, 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.



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Section 8: Unit operation

Unit operating sequence

The operating sequence described below relates to operation on a hot water start after power has been applied, such as start-up commissioning. When a compressor starts, internal timers limit the minimum time before another compressor can start to 1 minute.

1. For the chiller system to run, the Flow Switch must be closed, any remote cycling contacts must be closed, the Daily Schedule must not be scheduling the chiller OFF, and temperature demand must be present.
2. When power is applied to the system, the microprocessor will start a 2 minute timer. This is the same timer that prevents an instantaneous start after a power failure.
3. At the end of the 2 minute timer, the microprocessor will check for cooling demand. If all conditions allow for start, a compressor on the lead system will start and the liquid line solenoid will open. Coincident with the start, the anti-coincident timer will be set and begin counting downward from “60” seconds to “0” seconds.

   If the unit is programmed for Auto Lead/Lag, the system with the shortest average run-time of the compressors will be assigned as the “lead” system. A new lead/lag assignment is made whenever all systems shut down.
4. Several seconds after the compressor starts, that systems first condenser fan will be cycled ON (outdoor air temperature more than 25°F (-4°C) or discharge pressure). See *Standard condenser fan control on page 179* for details concerning condenser fan cycling.
5. After 1 minute of compressor run time, the next compressor in sequence will start when a system has to load. Additional compressors will be started at 60 second intervals as needed to satisfy temperature setpoint.
6. If demand requires, the lag system will cycle ON with the same timing sequences as the lead system after the lead system has run for five minutes. See the section on Capacity Control for a detailed explanation of system and compressor staging.
7. As the load decreases below setpoint, the compressors will be shut down in sequence. This will occur at intervals of either 60, 30, or 20 seconds based on water temperature as compared to setpoint, and control mode. See *Leaving chilled liquid control on page 176* for a detailed explanation.
8. When the last compressor in a “system” (two or three compressors per system), is to be cycled OFF, the system will initiate a pump-down. Each “system” has a pump-down feature upon shut-off. On a non-safety, non-unit switch shutdown, the LLSV will be turned OFF and the last compressor will be allowed to run until the suction pressure falls below the suction pressure cutout or for 180 seconds, whichever comes first.

Capacity control

To initiate the start sequence of the chiller, all run permissive inputs must be satisfied (flow/remote start/stop switch), and no chiller or system faults exist.

The first phase of the start sequence is initiated by the Daily Schedule Start or any Remote Cycling Device. If the unit is shut down on the daily schedule, the chilled water pump contacts (Terminals 23 and 24 of XTBC2) will close to start the pump when the daily schedule start time has been reached. Once flow has been established and the flow switch closes, capacity control functions are initiated, if the remote cycling contacts wired in series with the flow switch are closed.

It should be noted that the chilled water pump contacts (Terminals 23 and 24 of XTBC2) are not required to be used to cycle the chilled water pump. However, in all cases the flow switch must be closed to allow unit operation.

The control system will evaluate the need for cooling by comparing the actual leaving or return chilled liquid temperature to the preferred setpoint, and regulate the leaving or return chilled liquid temperature to meet that setpoint.