

Logout

To logout of the system, press the “Logout” link on the left menu. You will then be returned to the login page.

Building Automation System Connections

The BrainScan provides several options for Building Automation Systems (BAS) interface. These options may be Armstrong factory configured based on specific customer requirements given at the time of order. The options are enabled by the installation of a specific Processor. Processors are not sent with the BrainScan unless the Installation Detail Form (IDF) has been provided to Armstrong at the time of order. If a Processor is needed but was not provided, please contact your local factory representative.

Two different types of Processors are available. Refer to Table 11-1 for the protocols provided by each.

The Processor plugs into the MOD2 socket on the BrainScan circuit board. This socket is shown in Figure 3-2 on page 3.

Processor Module	Supported Protocols
FPC-ED2	BACnet IP, BACnet MSTP, Modbus TCP, Metasys N2
FPC-F04	LonWorks

The required network connection(s) for each device are described below.

Table 11-1 BAS Protocols Provided by Processor Modules

Modbus

Modbus is a standard protocol for process control and building automation systems. The physical connection uses the CN1 DB9 connector which is a configurable RS-232/422/485 serial port.

The default mode is RS-232, and configuration is controlled in the configuration software. CN1 is used for the Modbus interface when configured in the software. In this case, it will automatically be placed in RS-422/485 mode. See Table 11-2 for connections to an external RS-422/485 network. To use the device in two-wire RS-485 mode, jumper 422 TX+ to 422RX+ and jumper 422TX- to 422RX.

Note: There are no jumper terminating resistors or pullup resistors in this port. Depending on the network used, terminating or pull-up resistors may need to be installed externally.

Terminating resistors of 120 W are recommended only on the two end nodes of a multi-drop RS-422/485 network between the positive and negative differential pairs. Pull-up resistors may be used on some nodes as well to keep the data lines at a neutral state when the drivers on the network are in a high impedance state. Armstrong recommends using 560 W resistors to pull the positive data lines to 5 volts and same value to pull the negative data lines to the common ground.

120 W between 1 - 2 and between 3 - 4
560 W between 1 - 5 and between 4 - 5
560 W between 2 - 5 and between 3 - 5

The baud rate, slave id, and parity for the CN1 DB9 port are selectable through the Admin Configuration page under "External Port".

A register map of the Modbus interface is shown on pages 12-13. These registers must be configured in the customer's system as "Holding" registers not as "Input" registers.

Pin	Name
1	422TX-/485A
2	232RX/422TX+/485B
3	232TX/422RX+
4	422RX-
5	GND
6	NC
7	232RTS
8	232CTS
9	NC

Table 11-2 CN1 DB9 Pin-Out
For RS-485 mode, jump pins 1 to 4 and pins 2 to 3.

Modbus Register Map

Register	Name	Type	Description	Read / Write Access
0	update	integer	force refresh of valve configuration data	Write Only
1	ret_code	integer	return code of last valve command (See Fig 14-1 for more information)	Read Only
2	spv1	integer	valve 1 setpoint	Read Only
3	hitv1	integer	valve 1 hot inlet temp	Read Only
4	citv1	integer	valve 1 cold inlet temp	Read Only
5	otv1	integer	valve 1 outlet temp	Read Only
6	spv2	integer	valve 2 setpoint	Read Only
7	hitv2	integer	valve 2 hot inlet temp	Read Only
8	citv2	integer	valve 2 cold inlet temp	Read Only
9	otv2	integer	valve 2 outlet temp	Read Only
10*	mfr	integer	mixed flow rate	Read Only
11*	mrfr	integer	mixed return flow rate	Read Only
12*	dmt	integer	downstream mixed temp	Read Only
13*	ht	integer	hot water temp	Read Only
14*	ct	integer	cold water temp	Read Only
15*	mrt	integer	mixed return temp	Read Only
16*	ibtv1	integer	valve 1 inlet blended temp	Read Only
17*	ibtv2	integer	valve 2 inlet blended temp	Read Only
18*	bsptv1	integer	valve 1 blended setpoint	Read Only
19*	bsptv2	integer	valve 2 blended setpoint	Read Only
20*	hp	integer	hot water pressure	Read Only
21*	cp	integer	cold water pressure	Read Only
22*	dmp	integer	downstream mixed pressure	Read Only
23	v_select	integer	current valve selection	Read/write
24	v_state	integer	state of selected valve	Read/write
25	curr_sp	integer	current setpoint	Read/write
26	max_sp	integer	maximum setpoint	Read/write
27	def_sp	integer	default setpoint	Read/write
28	min_sp	integer	minimum setpoint	Read/write
29	al_above	integer	above temperature alarm	Read/write
30	al_below	integer	below temperature alarm	Read/write
31	al_error	integer	error temperature alarm	Read/write
32	serialno	integer	valve serial number	Read Only
33				
34	man_time	integer	valve manufacture time and date in seconds from the Unix epoch	Read Only
35				
36	fw_type	integer	valve firmware type	Read Only
37	fw_id	integer	valve firmware id	Read Only
38	units	integer	valve units	Read/write

* field sensors not installed by Armstrong International.

Modbus Register Map (continued)

Register	Name	Type	Description	Read / Write Access
39	location	ASCII String	valve location represented as an ASCII string that is not necessarily null-terminated	Read/write
40				
41				
42				
43				
44				
45				
46				
47	dis_enable	integer	enable disinfection at the BrainScan level	Read/write
48	dis_timeout	integer	disinfection timeout in minutes	Read/write
49				
50	calib_num	integer	calibration number	Read/write
51	comm_time	integer	valve commission time and date in seconds from the Unix epoch	Read/write
52				
53	dis_on	integer	arm and trigger disinfection mode	Write Only
54	dis_cooldown	integer	set disinfection cooldown mode	Write Only
55	dis_id	integer	user id for last disinfection	Read/write
56	dis_time	integer	time and date of last disinfection in seconds from the Unix epoch	Read/write
57				
58	service_id	integer	user id for last service	Read/write
59	service_time	integer	time and date of last service in seconds from the Unix epoch	Read/write
60				
61	bs_units	integer	units for BrainScan system	Read/write
62	dev_type	integer	valve type for BrainScan operation	Read/write
63*	mfr_size	integer	mixed flow sensor size	Read/write
64*	mrfr_size	integer	mixed return flow sensor size	Read/write

* field sensors not installed by Armstrong International.

On the first read of the Modbus interface, all values are read from the sensors and the valve. On subsequent reads, only the valve prime data and sensor readings are updated. Valve configuration data such as the serial number, location, setpoint configuration, etc. are cached. When a write command is received for the update register, all values are re-read from the valve and updated. The actual value of the update register will not change with a write, and it does not matter what value is actually written to the register. If a configuration change is made to the valve from the Modbus interface, that particular section of values is automatically refreshed from the valve following the write command.

The return_code register holds the value of the return code from the previous write or read command from the DRV. Zero indicates normal operation. The value of the return code is defined by the actual error codes returned from the DRV. All possible values are given in Figure 14-1.

Times and dates such as manufacture, commission, service, and disinfection date/time are represented by a 32-bit integer storing the number of seconds elapsed since midnight on January 1, 1970. Writing any value to a date/time register will cause that field to be set to the current date/time. The only exception to this is the manufacture date/time register which has read only access.

The DRV and the BrainScan software can be set to use Fahrenheit or Celsius temperature units. Fahrenheit is represented by a 1, Celsius is represented by a 0 value. This is currently set in two separate registers. The units register controls the units setting in the DRV. This will only change the read out on the DRV LCD display. The bs_units register controls the units used by the BrainScan board and will be used for temperatures in all Modbus registers. To avoid confusion, make sure that the 'bs_units' and 'units' match.

The size of the flow meters is a configuration option specific to the BrainScan software.

The baud rate, slave id, and parity for the CN1 DB9 port are selectable through the configuration page.

BACnet

BACnet MSTP uses an RS-485 signaling interface. BACnet IP uses an ethernet network. The FPC-ED2 ProtoCessor module can provide both BACnet IP and BACnet MSTP as well as Modbus TCP at the same time.

Connect an Ethernet cable to the Ethernet port on the ProtoCessor module and connect this to the network to access BACnet IP and Modbus TCP. Connect the 3-wire RS-485 port on the ProtoCessor to the BACnet MSTP network to access the BACnet MSTP interface.

BACnet uses a node ID for each device. This must be unique on the network. Currently, the default node ID for BACnet interfaces is:

BACnet MSTP: 12
BACnet IP: 11

The BACnet MAC address is factory set to 11. The default baud rate for the BACnet MSTP interface is 38400.

If these values need to be changed for a particular application, the ProtoCessor module can be configured in the Admin Configuration page.

The Modbus TCP interface uses the same register map used for the Modbus RTU interface.as the service user id in the DRV.

Error Code	Description
0	OK
1	General OK value
2	Range error for analog to digital converter
3	Difference error
4	Comparator feedback error
5	Basic analog to digital converter error
6	Analog to digital converter timeout
7	Over temperature error
8	RAM checksum error
16	EE RAM error
32	Flash memory error
35	Welded contact
36	Open contact relay fault
37	General algorithm fault
40	General controller fault
41	Battery fault
45	General outlet error
50	Flow turbine error
60	Motor stuck error
70	Motor calibration error
80	Stack overrun error
90	Incorrect schedule phase
91	Incomplete message was received from controller
92	Invalid message was received from controller
93	A bad checksum was detected by the controller
94	A bad checksum was received from the controller
96	A timeout occurred contacting the valve

Figure 14-1. Error Code Description