## FACTS 205 Analog Modules and Modbus TCP

Use Host Engineering's Netedit3 to find and select the IP address of the H2-EBC100. Select the 'EBC Settings' tab then the 'Show Base Contents' button to see the I/O modules in the H2-EBC100 base and the Modbus addressing for those modules. You should see something like this:

S	5how Base Contents	×
	Base 0 : Slot 0 - Module Type 3C - 4 Channel Temperature Input 4 - Word inputs (Modbus 584/984 - Input registers 30001-30004)	-
	Base 0 : Slot 1 - Module Type 37 - 8 - Word inputs(Modbus 584/984 - Input registers 30005-30012) (Modbus 584/984 - Holding registers 40001-40008)8 - Word outputs(Modbus 584/984 - Holding registers 40001-40008)	
	Base 0 : Slot 2 - Module Type 3B - 8 Channel Analog Input 8 - Word inputs (Modbus 584/984 - Input registers 30013-30020)	
	Base 0 : Slot 3 - Module Type 3C - 4 Channel Temperature Input 4 - Word inputs (Modbus 584/984 - Input registers 30021-30024)	
	Base 0 : Slot 4 - Module Type 7F - 16 Point Discrete Output 16 - Bit outputs (Modbus 584/984 - Coils 1-16)	
	Base 0 : Slot 5 - Module Type 3D - 4 Ch Analog In / 2 Ch Analog Out4 - Word inputs(Modbus 584/984 - Input registers 30025-30028)2 - Word outputs(Modbus 584/984 - Holding registers 40009-40010)	
	Base 0 : Slot 6 - Module Type 3E - 4 Channel Analog Input 4 - Word inputs (Modbus 584/984 - Input registers 30029-30032)	
	Base 0 : Slot 7 - Module Type 3E - 4 Channel Analog Input	•
	Save Print Font	Close

The Modbus protocol defines four data types: Coils, Inputs, Input Registers, and Holding Registers.

Coils are discrete bits that can be read or written. Coil addresses start at 1. Coils are read with function code 1 (Read Coil Status) and written with function code 5 (Force Single Coil) or 15 (Force Multiple Coils). Coils are generally discrete outputs on the H2-EBC100.

Inputs are discrete bits that are read only. Input addresses start at 10001. Inputs are read with function code 2 (Read Input Status). Inputs are generally discrete inputs on the H2-EBC100.

Input Registers are words that are read only. Input Register addresses start at 30001. Input Registers are read with function code 4 (Read Input Registers). Input Registers are generally analog inputs on the H2-EBC100.

Holding Registers are words that can be read or written. Holding register addresses start at 40001. Holding Registers are read with function code 3 (Read Holding Registers) and written with function code 6 (Preset Single Register) or 16 (Preset Multiple Registers). Holding Registers are generally analog outputs on the H2-EBC100.

Use the addresses shown in Netedit3 'Show Base Contents' along with the following table to read/write your analog I/O with your Modbus TCP master.

## **DIAGNOSTICS NOTE:**

See chapter 4 of H24-EBC-M for Modbus TCP Mapping: http://www.automationdirect.com/static/manuals/h24ebc/ch4.pdf

Error Addresses are on Page 4-8

Error Codes are on Page 4-9

To check module diagnostics you must read 'EBC Dynamic Data' to see if there is an error in a particular slot then read the 'I/O Module Status' to see what the error is. The 'Diagnostics' column refers to 'Error Code' and 'Info Code', these are the second and fourth words under 'I/O Module Status' on page 4-8 of H24-EBC-M.

Part Number	Channel Data	Configuration Data	Diagnostics Data
			See DIAGNSOTICS NOTE above
F2-04AD-1 (L) F2-04AD-2 (L)	Input Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4	None	No Broken Transmitter Detection If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0
F2-08AD-1	Input Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4 Word 5 = Ch5 Word 6 = Ch6 Word 7 = Ch7 Word 8 = Ch8	None	Channels with broken transmitter: Channel=0 counts 'Error Code' =121d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = Cycles 0100h thru 0700h
F2-08AD-2	Input Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4 Word 5 = Ch5 Word 6 = Ch6 Word 7 = Ch7 Word 8 = Ch8	None	No Broken Transmitter Detection If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = Cycles 0100h thru 0700h
F2-4AD2DA	Input Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2	None	No Broken Transmitter Detection If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = Cycles 0100h thru 0400h

F2-8AD4DA-1	Input Registers Word 1 = Ch1	Holding Registers Word 5 = Input Resolution	Channels with broken transmitter:
	Word $2 = Ch2$	Word $6 = N/A$	Channel=0 counts
	Word $3 = Ch3$	Word 7 = Track and Hold Word 8 = Not Used	'Error Code' =121d or 142d
	Word $4 = Ch4$ Word $5 = Ch5$	word $\delta = 1001 \text{ Osed}$	'Info Code' = High Byte - Bit On for Each Failed Channel
	Word $6 = Ch6$	See 15-15 of D2-ANLG-M	
	Word $7 = Ch7$	Dec 19 19 01 D2 ANEO M	If No 24VDC or No Terminal
	Word $8 = Ch8$		Block:
	Holding Registers		All channels = 0 counts
	Word $1 = Ch1$		'Error Code' =121d
	Word $2 = Ch2$		'Info Code' = 0FF00h
	Word $3 = Ch3$		
	Word $4 = Ch4$		
F2-8AD4DA-2	Input Registers Word 1 = Ch1	Holding Registers	No Broken Transmitter
	Word $2 = Ch2$	Word 5 = Input Resolution Word 6 = Range Selection	Detection
	Word $3 = Ch^2$	Word $7 = \text{Track and Hold}$	
	Word $4 = Ch4$	Word $8 = $ Not Used	If No 24VDC or No Terminal
	Word $5 = Ch5$		Block:
	Word $6 = Ch6$	See 16-14 and 16-15 of D2-	All channels = 0 counts
	Word $7 = Ch7$	ANLG-M	'Error Code' =121d
	Word $8 = Ch8$		'Info Code' = 0FF00h
	Holding Registers		
	Word $1 = Ch1$		
	Word $2 = Ch2$		
	Word $3 = Ch3$ Word $4 = Ch4$		
F2-04THM	Input Registers	None	Channels with broken
F2-04RTD	Word $1 = Ch1$		transmitter:
1	Word $2 = Ch2$		Channel=0 counts
	Word $2 = Ch2$ Word $3 = Ch3$		'Error Code' = 142d
			'Error Code' = 142d 'Info Code' = High Byte - Bit
	Word 3 = Ch3		'Error Code' = 142d
	Word 3 = Ch3		'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal
	Word 3 = Ch3		'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block:
	Word 3 = Ch3		'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts
	Word 3 = Ch3		'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d
F2-02DA-1(L)	Word 3 = Ch3 Word 4 = Ch4	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h
F2-02DA-1(L) F2-02DA-2(L)	Word 3 = Ch3 Word 4 = Ch4 Holding Registers	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d
F2-02DA-1(L) F2-02DA-2(L)	Word 3 = Ch3 Word 4 = Ch4	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h
F2-02DA-2(L) F2-02DAS-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h
F2-02DA-2(L)	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1		'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' = 121d 'Info Code' = 0F00h None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2 F2-08DA-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers		'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' = 121d 'Info Code' = 0F00h None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2 F2-08DA-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2 F2-08DA-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2 F2-08DA-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2 F2-08DA-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4 Word 5 = Ch5	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2 F2-08DA-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None
F2-02DA-2(L) F2-02DAS-1 F2-02DAS-2 F2-08DA-1	Word 3 = Ch3 Word 4 = Ch4 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Holding Registers Word 1 = Ch1 Word 2 = Ch2 Word 3 = Ch3 Word 4 = Ch4 Word 5 = Ch5 Word 6 = Ch6	None	'Error Code' = 142d 'Info Code' = High Byte - Bit On for Each Failed Channel If No 24VDC or No Terminal Block: All channels = 0 counts 'Error Code' =121d 'Info Code' = 0F00h None None

There is a utility at <u>www.facts-eng.com/tech/H2EBC100</u> <u>Master.zip</u> that you can use to test I/O in the H2-EBC100. Download it and run setup.exe to install it. When you start the application it should look like this:

💐 Modbus TCP Master	for H2-E	BC100 (6/19	/2007)												>
Modbus TCP Address Status This program uses the	Not Conne	ected	emo Versior			innect		Disconr			: program at	nd restart to	a continue I	ise after	the
demo has timed out. Get EBC Info	[	Get Module					ule Sizes			Check for			Read I/O		
EBC Firmware Version	Slot IE	) De	scription		DI	DO	WI	wo	Error	EBC Dyna Codes	imic Data		Slot 0	•	
Booter	1 2								Error	bit-per-slot bit-per-slot		Fla		Hex	Decimal
	3 4 5							_		s pot Count LS pot Count M			or Code arning Code		
-	6 7	-		=				_		Time-out	5w		o Code	]	
Read From Device Read Point Add														····	_
FC (1,2,															
Loop	ength: 5						 					 			_
500 mS 💌		Decimal													_
	C	Hex											-	-	
Write to Device	. –														
Point Add 1=Bit,>1=W		_		0	0		0	0		0	0	0	0	0	_
I=BI(,>I=W	13		0 0	0 0	0		0 0	0		0 0	0	0	0	0	_
				0	0		0	0		0	0	0	0	0	
Write		Ampersand H ex Values		0			0	0		0	0	0	0	0	_
			,												

Use Netedit3 to determine what the address of your H2-EBC100 is and put that in the 'Modbus TCP Address' field in the top left. Click 'Connect' to connect to that address. The 'Status' field should show 'Connected'.

, Modbus TCP Master for H	12-EBC100 (6/19	9/2007)									
Modbus TCP Address 192.1	68.0.76										
Status Conn	ected			Connect		Disconne	ect				
This program uses the Winte			The deep	a will time a	4 - 9 - 20		- Class H				
demo has timed out.	CH MOODUS OCA L	Jemo version.	i ne dem	o will time-o	at after 50	minutes	oruse. Ciose in	e program a	nu restart to	continue u	se alter trie
		1				1		1	ſ		
Get EBC Info	Get Module	IDs		Get Moo	lule Sizes		Check fo	or Errors		Read I/O	Module Status
EBC Firmware Version Slot	ID D	escription		I DO	WI	WO	EBC Dyn	amic Data		Slot 0	-
							Error Codes			,	
Booter 1							Error bit-per-slot				Hex Decimal
							Error bit-per-slot	2nd 16	Flag	js	
3			_	_	$\vdash$		Flags Reboot Count L	0.4	- Erro	or Code	
4	├──				$\vdash$		Reboot Count L Reboot Count N			rning Code	, , 
6	├─-├────				┝──┼		Link Time-out	15W		-	
7					├		Link hine-out		Info	Code	
Read From Device											
Read Point Address:	1	[···· [··									
FC (1,2,3,4):	3										
Loop Length:	50										
	Decimal										
500 mS 🔹	○ Hex										
-Write to Device											
Point Address:	1	0 0		0	0	0	0	0	0	0	0
1=Bit,>1=Word:	3			0	0	0	0	0	0	0	0
Length:	1	0 0		0	0	0	0	lo lo	0	0	0
	Jse Ampersand H	0 0		0	0	0	0	0	0	0	0
	or Hex Values	0 0		0	0	0	0	0	0	0	0

The rest of the buttons are pretty self explanatory. Hover the mouse pointer over any of the data fields to see the corresponding Modbus Address for that field.

Modbus TCP Master for H2-EBC100 (6/1	<u> </u>							_ 🗆
Modbus TCP Address 192.168.0.76 Status OK		Connect		Disconr	nect			
This program uses the Wintech Modbus OCX demo has timed out.	Demo Version. The o	demo will time-	out after 3	0 minutes	s of use. Close the progr	am and re	start to continue use afte	r the
Get EBC Info Get Module	IDs	Get M	odule Size:	5	Check for Errors	:	Read I/O Modul	e Status
BC Firmware Version Slot ID D 4 0 491 0 3C 4 In Tem	escription	DI DO O O	4	W0 0	EBC Dynamic D Error Codes	ata 1000	Slot 0 💌	
Booter 2 2P 9 AI	1	0 0 0 0	8	8	Error bit-per-slot 1st 16 Error bit-per-slot 2nd 16	EF	Hex Flags 1	Decimal 1
4 0 165 3 3C 4 In Temp 4 7F 16 D0		0 0 0 16	4	0	Flags Reboot Count LSW	1 108	Error Code 8E	142
5 3D 4 AI/2 AC 6 3E 4 AI	1		4	2	Reboot Count MSW Link Time-out	0	Warning Code 0	0
7 3E 4 AI	[	0 0	4	0		_	Info Code 200	512
Read From Device								
Read         Point Address:         1           FC (1,2,3,4):         3	0 0 0 0	0	0 0	0	0 0 0 0	0	0 0	
Loop Length: 50	0 0 0 0	0	0 0	0 0	0 0 0 0	0	0 0 0 0	
500 mS C Hex	0 0	0	0	0	0 0	0	0 0	
Write to Device								
Point Address: 1 1=Bit,>1=Word: 3	0 0 0 0	0	0	0	0 0 0 0	0	0 0	
Length: 1 Write Use Ampersand H	0 0	0	0	0	0 0	0	0 0	
for Hex Values	0 0	0	0	0	0 0	0	0 0	

Version History

11/13/2008 – Fixed typo in 'Word Configuration Data' for F2-8AD4DA-1 and 2. Changed 5,7,8,9 to 5,6,7,8.