The ABB VFD Gateway – A Doorway to Success

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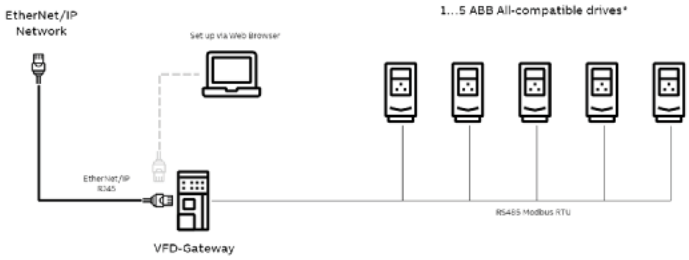
The last two years ushered in some significant challenges to the automation world, no doubt.

In particular was the way in which we built equipment, not just in the procurement of components, but a direct challenge to our very thought process of equipment design: ***How do we meet customer demand when we have no supply?***

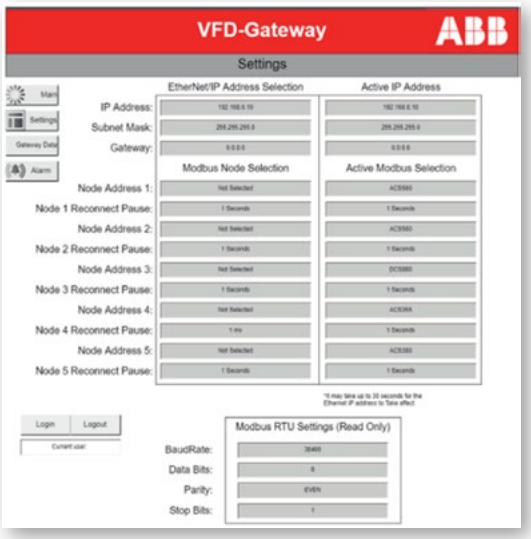
The ABB VFD Gateway

One answer was provided in the form of a simple, dedicated Ethernet/IP to Modbus RTU converter, a gateway between two well known industrial communication protocols. Originally designed and released in response to the significant shortage of Ethernet chipsets, the VFD Gateway from ABB has proven to be a very cost-effective, ***primary solution*** for machine communication designs.

The VFD Gateway accepts Ethernet/IP data and converts it to ABB's Modbus RTU format for use in the ACSx80 series of all compatible drives, up to (5) VFDs can be connected to a single gateway.



Because the VFD Gateway utilizes a built in webpage server for configuration, set-up is quick and easy with no need for dedicated software. It is all done via the PC's standard web browser.



VFD set-up is just as easy. The Gateway uses the ABB Drives profile. This means no need to figure out addressing, word mapping etc. The ABB Drive profile Control and Status words are defined below. Users enter them along with the speed reference (Ref-1 16bit) into the Embedded Fieldbus (EFB) menu 58.

In addition to the Control & Status words, a variety of VFD parameters may be selected for monitoring or control by entering them into Menu 58 Data I/O words.

Serial communication is via 2-wire RS-485, and framing (Baud Rate, Parity etc.) is fixed in the Gateway and matches the default settings of the ABB drive.

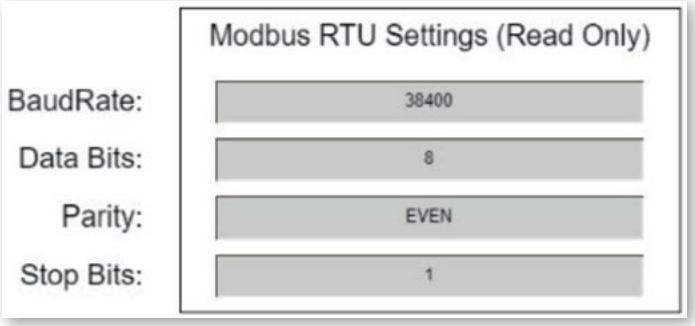


ABB Drives profile Control Word Bit structure								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Reset	Ramp in Zero	Ramp Hold	Ramp Out Zero	Inhibit Oper'n	Off 3 Control	Off 2 Control	Off 1 Control
1					EXT Ctrl Loc	Remote Cmd		

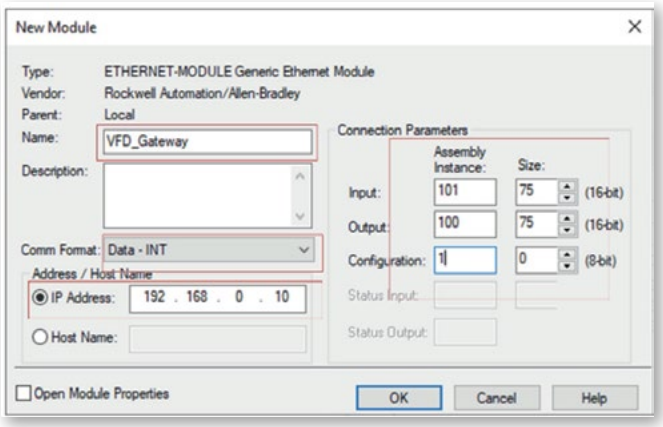
ABB Drives profile Status Word Bit structure								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Alarm	Swc On Inhib	Off 3 Sta	Off 2 Sta	Tripped	Rdy Ref	Rdy Run	Rdy On
1	Fieldbus Error			Ext Run Enable	EXT Ctrl Loc	Above Limit	Remote	At Setpoint

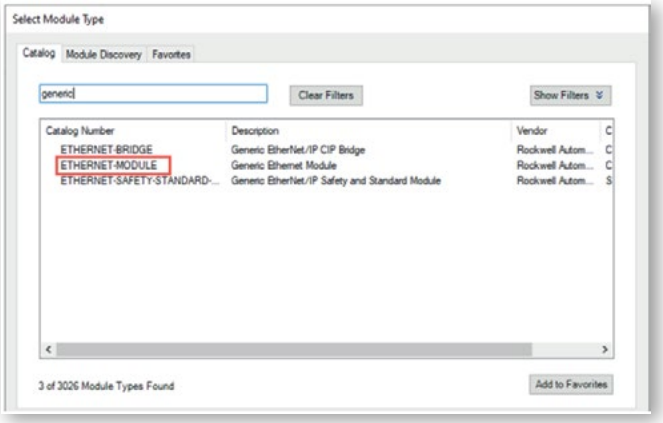
Drive Parameter	Example for ACS380, ACQ/S580
Setup parameters	
16.01 Start/Stop	N/A
20.01 Start/Stop EXT 1	Embedded fieldbus
22.11 Vector Speed Ref	EFB ref1
28.11 Scalar Speed Ref	EFB ref1
58.01 Comms Protocol	Modbus RTU***
58.03 Node Address	Drive 1,2..up to 5 *
58.04 Baud Rate	38.4 kbps***
58.05 Parity	8 EVEN 1***
58.14 Comm Loss Action	Warning
58.15 Comm Loss Mode	Any Message
58.17 Transmit Delay**	0

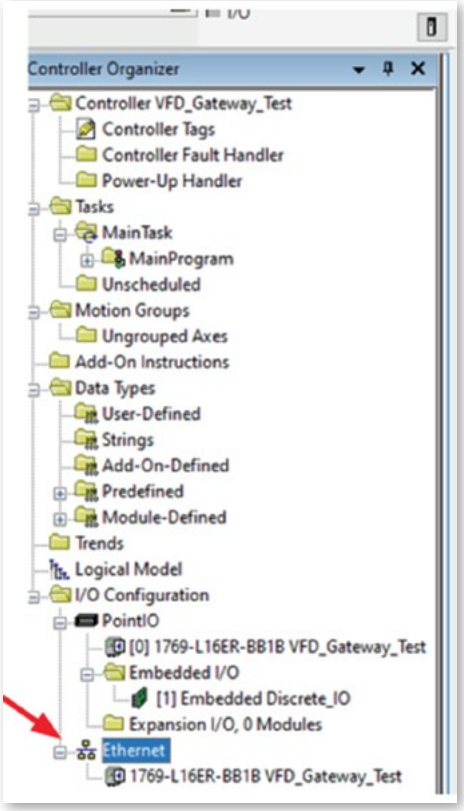
ACS380, ACQ/S580 typical parameters	
READ from VFD	
58.101 Data I/O 1	Status Word 16 bit
58.102 Data I/O 2	Act 1 16 bit
58.103 Data I/O 3	Act 2 16 bit
58.104 Data I/O 4	1.07 Motor Current
58.105 Data I/O 5	1.11 DC Bus Voltage
58.106 Data I/O 6	1.01 Motor Speed
58.107 Data I/O 7	1.14 Motor Power
Write to VFD	
58.108 Data I/O 8	Control Word 16 bit
58.109 Data I/O 9	Ref 1 16 bit
58.11 Data I/O 10	Ref 2 16 bit
58.111 Data I/O 11	47.21 Data Storage
58.112 Data I/O 12	47.22 Data Storage
58.113 Data I/O 13	47.23 Data Storage
58.114 Data I/O 14	47.24 Data Storage
58.06 Comm Control	Refresh Settings

Getting the Gateway connected to your Ethernet/IP controller is simple and straightforward.

Start by adding a Generic Ethernet Module to your project, then configure the new module as shown below. Note the use of specific Input and Output Assembly Instances 101 & 100.

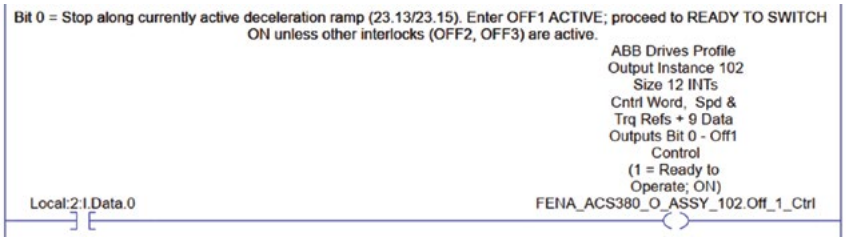


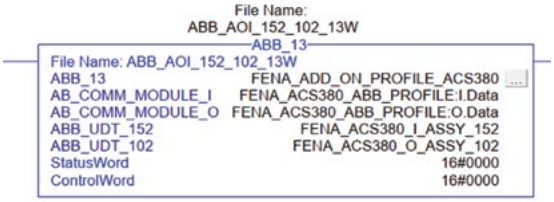


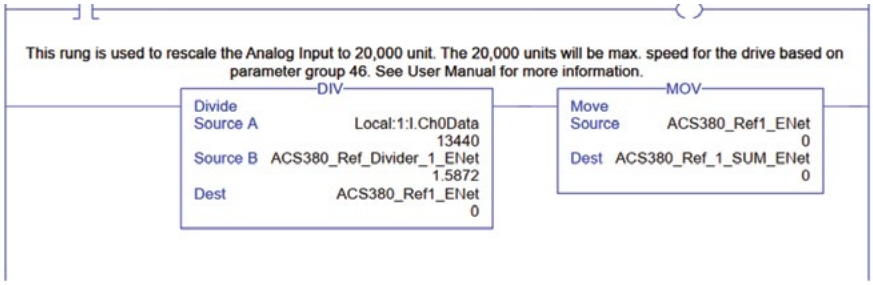


Once you have the module configured in your controller you are ready to begin adding elements to your ladder logic. *(Assembly Instances 102 & 152 shown below as examples, when using the Gateway, these will be Instances 101 & 100)*

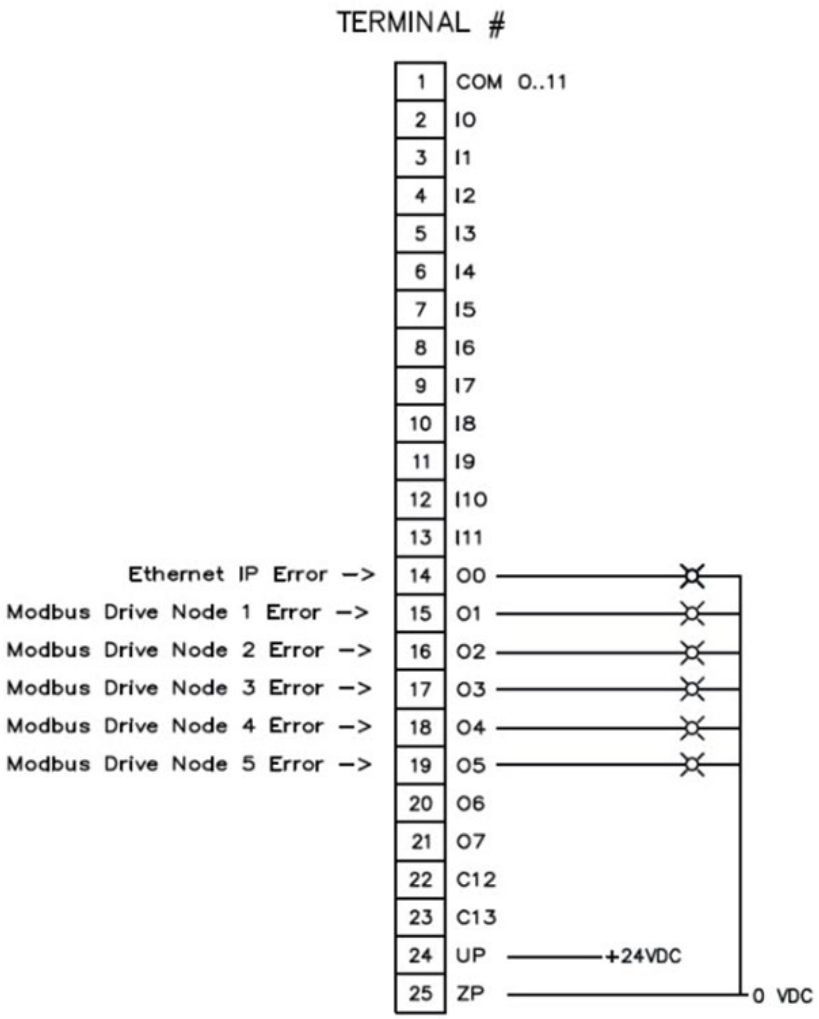
Commanding motion is as simple as sending a value to the reference, then closing a contact that will turn on bit 0 of the control word. *(Below it is FENA_ACS380_O_ASSY_102.OFF_1_Ctrl)*







During operations, the Gateway monitors the status of the Modbus network as well as the individual drive nodes. Diagnostic functions are available both as discreet I/O (below) or via a Gateway Status (Word 74) which can be monitored by the network controller. The status word is similar to the discreet signals, whereas bit0 = Network Error, bit1= VFD 1 Modbus Error, bit2= VFD 2 Modbus Error and so on.



With the ability to connect to (5) ABB drives on a single device, the ABB VFD Gateway has proven itself to be a reliable, cost-effective, tier-1 communication solution.