

ABB MOTION DRIVES US - CONNECTIVITY

## VFD-GATEWAY

# EtherNet/IP™ to Modbus RTU gateway User Manual

Type number: VFD-GATEWAY

Part number: 3AUA0000235813



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# VFD-GATEWAY EtherNet/IP™

## User Manual

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# 1. Safety instructions

These instructions are for all who install or connect an optional module to a drive, converter or inverter and need to open its front cover or door to do the work.



**WARNING! Obey these instructions. If you ignore them, injury or death, or damage to the equipment can occur.**

- If you are not a qualified electrician, do not do installation or maintenance work.
- Disconnect the drive, converter or inverter from all possible power sources. After you have disconnected the drive, converter or inverter, always wait for 5 minutes to let the intermediate circuit capacitors discharge before you continue.
- Disconnect all dangerous voltages connected to other control signal connectors in reach. For example, it is possible that 120/230 V AC is connected from outside to a relay output of the drive, converter or inverter.
- Always use a multimeter to make sure that there are no parts under voltage in reach. The impedance of the multimeter must be at least 1 Mohm.



## Avoidance of electrostatic discharges

VFD-GATEWAY devices and equipment are sensitive to electrostatic discharge, which can cause internal damage and affect normal operation.

Observe the following rules when handling the VFD-GATEWAY:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wrist strap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.
- When not in use, store the equipment in appropriate static-safe packaging.



## VFD-GATEWAY damage due to missing grounding

Ensure the VFD-GATEWAY is grounded.

- The ground (switch cabinet earthing, PE) is supplied both by the mains connection (or 24 V supply voltage) and via the DIN rail (if mounted).
- The DIN rail must be connected to the ground before the device is subjected to any power. The ground may be removed only if it is certain that no more power is being supplied to the control system.



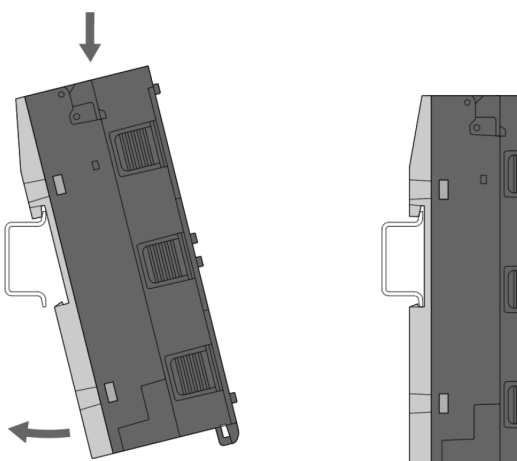
## 2. Installation

### Contents of this chapter

This chapter describes the installation and wiring of the VFD-GATEWAY, showing how to mount the device and where the power/communications connections are made.

#### 2.1 Mounting the VFD-GATEWAY

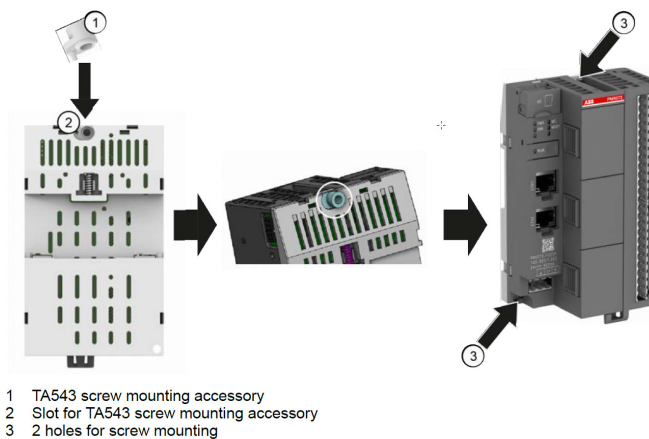
DIN rail according to DIN EN 50022 35 mm, depth 7.5 mm or 15 mm:



Mounting with screws M3 (see Appendix for hole fixing dimensions):

Note: TA543 option (not included) is ordered separately from the VFD-GATEWAY.

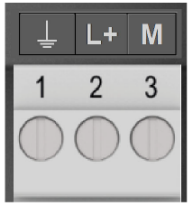

Fastening torque 1.2 Nm



## 2.2 Power supply connection and requirements

Connect Power Supply (user supplied): 24 V DC via 3-pin Terminal

Current Consumption from Power Supply (Max.): 340 mA

Pin Assignment	Pin	Label	Function	Description
 Terminal block inserted	1		FE	Functional earth
	2	L+	+24 VDC	Positive pin of the power supply voltage
	3	M	0 V	Negative pin of the power supply voltage

The following Power supply will mount on the same DIN Rail as the gateway and provide the required 340mA:  
**ABB 1SVR427041R0000, CP-D 24/0.42**

If additional power or other features are needed, additional ABB Power Supplies are available at [new.abb.com/low-voltage/products/power-supplies](http://new.abb.com/low-voltage/products/power-supplies)



### CAUTION!

Risk of damaging the VFD-GATEWAY! Make sure that the supply voltage never exceeds 30 VDC



### Safety Extra Low Voltage (SELV) and Protective Extra Low Voltage (PELV)

To ensure electrical safety of VFD-GATEWAY extra low voltage circuits, 24 V DC supply, communication interfaces, I/O circuits, and all connected devices must be powered from sources meeting requirements of SELV, PELV, class 2, limited voltage, or limited power according to applicable standards.

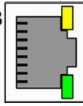
## 2.3 Ethernet interface

Connect your Ethernet interface via the VFD-GATEWAY RJ45 jack

**Note:** EtherNet cable not included. The network cable must be CAT5 or higher, and type UTP, FTP or STP.

The maximum length for an Ethernet segment on twisted pair media is 100 meters.

The VFD-GATEWAY supports twisted pair as the physical media in a star topology. All twisted pair media between the Ethernet node and the switch or router must be shorter than 100 meters, including media within patch panels.

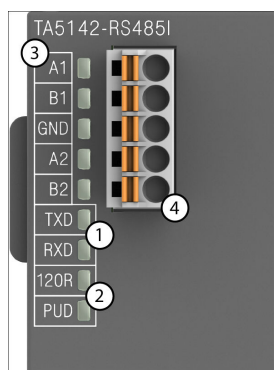
Interface	Pin	Description	
 Activity Link	1	Tx+	Transmit Data +
	2	Tx-	Transmit Data -
	3	Rx+	Receive Data +
	4	NC	Not connected
	5	NC	Not connected
	6	Rx-	Receive Data -
	7	NC	Not connected
	8	NC	Not connected
	Shield	Cable shield	Functional earth

LED	Color	Off	On	Flashing
Activity	Yellow	No Activity	-	Activity
Link	Green	No Link	Link	-



## 2.4 Modbus RTU Interface and wiring

1. 2 LEDs for communication state display (TxD and RxD)
2. 2 LEDs for termination state display
3. Allocation of signal name
4. 5-pin terminal block for communication interface



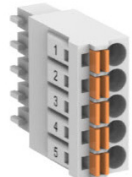
### Status LEDs:

TXD - YELLOW - ON (blinking) - transmitting  
 RXD - YELLOW - ON (blinking) - receiving  
 120R - YELLOW - ON - Bus termination  
 PUD - YELLOW - ON - Pull up/pull down

(This VFD-GATEWAY has built in Bus Termination and Pull Up/Pull down resistors)

When yellow lights are lit, bus termination resistor is activated or the pull up/pull down resistors are activated)

The Modbus-RTU can be connected to up to 5 ABB drives via the following connections:

Serial Interface	VFD Gateway		ABB Drive
	PIN	Signal	Terminal Pin
	1	A1	Data_B, B
	2	B1	Data_A, A
	3	GND	GND_B, DGND, AGND
	4	A2	-
	5	B2	-

A1 on VFD-Gateway needs to be wired to B on VFD  
 B1 on VFD-Gateway needs to be wired to A on VFD

### Terminating resistors

120 Ω ¼ W is required at both line ends of the Modbus-RTU network



The VFD-GATEWAY has Built in 120 Ω resistor that is enabled from the factory; the VFD-GATEWAY must be at the beginning/end of the network at not mid-network.



The user must also turn on termination resistor at the end of line node (see specific drive manual for information).



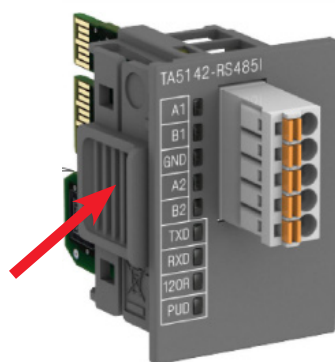
## Disabling terminating resistors

If the gateway needs to be installed in the middle of the Modbus network, the resistor on the gateway needs to be turned off. To do this the Modbus module on the gateway needs to be removed using the following instructions.



Ensure the VFD-GATEWAY is turned off.

Press the tab on the side of the module and pull up on the module to remove it from the VFD-GATEWAY:



After it is removed, turn the top dip-switches off. They are currently in the on position from the factory. Flip the switches to the left for OFF (towards the ABB logo) and reinstall.





### Modbus-RTU cable requirements

Make sure you use cable with the following specification for reliable Modbus-RTU performance.

Use shielded twisted-pair cable with a twisted pair for data and a wire or another pair for signal ground (nominal impedance 100 to 165 ohm, for example Belden 9842) for the wiring. For best immunity, ABB recommends high quality cable. Keep the cable as short as possible.

Avoid unnecessary loops and parallel runs near power cables such as motor cables.

BUS Cable	
Transmission rate	38.4 kbit/s
Construction	2 cores, twisted, with common shield
Conductor cross section	> 0.22 mm <sup>2</sup> (24 AWG)
Twisting rate	> 10 per meter (symmetrically twisted)
Core insulation	Polyethylene (PE)
Resistance per core	< 100 Ω/km
Characteristic impedance	ca. 120 Ω (100 Ω...150 Ω)
Capacitance between cores	< 55 nF/km (if higher, the max. bus length must be reduced)



## 3. Setup

### Contents of this chapter

This chapter describes the how to configure the VFD-GATEWAY and drive parameter tables using the VFD-Gateway's built in web browser configuration pages.

#### 3.1 Drive Setup

The VFD-GATEWAY supports the following drives and data connection sizes:

Drive	Supported data words
ACS355	9 words in / 3 words out*
ACS180	7 words in / out
ACS380	7 words in / out
ACH/Q/S580	7 words in / out
ACS880	12 words in / out
DCS880	12 words in / out
ACH580 E-Clipse bypass	9 words in / 3 words out**

\*With the ACS355 and ACH580 E-Clipse data mapping is handled differently than the ALL-Compatible drives due to a number of fixed registers and will be illustrated further in sections 3.2 and 3.5.

Note, in this manual:

- Read (In) is VFD to EtherNet/IP Network
- Write (Out) is EtherNet/IP Network to VFD

#### 3.2 Data mapping examples for ACS355

Drive Parameter	Example for ACS355
<b>Setup parameters</b>	
10.01 Start Stop EXT 1	Comm
11.03 Speed Reference 1	Comm
11.04 Ref 1 Min	0 Hz
11.05 Ref 1 Max	60 Hz
98.02 Comm Protocol Select	STD Modbus**
53.02 Station ID	Drive 1,2..up to 5 *
53.03 Baud Rate	38.4 kbps**
53.04 Parity	8 EVEN 1**

<b>ACS355 typical parameters</b>	
<b>READ from VFD</b>	
Fixed word 4	Status Word
53.10 EFB Par 10	104 Motor Current
53.11 EFB Par 11	107 DC Bus Voltage
53.12 EFB Par 12	106 Motor Power
53.13 EFB Par 13	110 Drive Temp
53.14 EFB Par 14	1202 Constant Speed 1
53.15 EFB Par 15	1203 Constant Speed 2
53.16 EFB Par 16	1204 Constant Speed 3
53.17 EFB Par 17	1205 Constant Speed 4
53.18 EFB Delay***	0
30.18 Comm Loss	Warning
<b>WRITE to VFD</b>	
Fixed word 1	Control Word
Fixed word 2	Ref 1
Fixed word 3	Ref 2

\*58.03 Node Address corresponds to the VFD-GATEWAY Node Settings (see VFD-GATEWAY Settings Web Interface)

\*\*The VFD-GATEWAY only supports these default settings

\*\*\*It is recommended to set this to 0 to avoid adding delays to the data

The first 4 registers are pre-mapped as Control Word, Ref 1, Ref 2, and Status Word. The next 8 registers can be customized as reads data. Note: Every Parameter from 53.10-53.17 MUST contain a non-zero a value otherwise communication will not occur.

**ACS355 must be power cycled for changes to take effect**



### 3.3 Setup, data mapping and typical parameters for ACS180, ACS380, ACH/Q/S580

Drive Parameter	Example for ACS180, ACS380, ACQ/S580
<b>Setup parameters</b>	
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

#### ACS180, 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

\*58.03 Node Address corresponds to the VFD-GATEWAY Node Settings (see VFD-GATEWAY Settings Web Interface)

\*\*It is recommended to set this to 0 to avoid adding delays to the data

\*\*\*The VFD-GATEWAY only supports these default settings

For ACH/Q/S580 the write data starts at 58.108 and First 7 registers must be reads (58.101-58.107)

**Note: You MUST set 58.06 to refresh settings after all parameters in group 58 are set.**



### 3.4 Setup, data mapping and typical parameters for ACS880, DCS880

Drive Parameter	Example for ACS880, DCS880
<b>Setup parameters</b>	
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

<b>ACS880 typical parameters</b>	
<b>READ from VFD</b>	
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
58.108 Data I/O 8	1.13 Output Voltage
58.109 Data I/O 9	1.10 Motor Torque
58.11 Data I/O 10	1.06 Output Frequency
58.111 Data I/O 11	1.31 Ambient Temperature
58.112 Data I/O 12	47.21 Data Storage
<b>Write to VFD</b>	
58.113 Data I/O 13	Control Word 16 bit
58.114 Data I/O 14	Ref 1 16 bit
58.115 Data I/O 15	Ref 2 16 bit
58.116 Data I/O 16	47.21 Data Storage
58.117 Data I/O 17	47.22 Data Storage
58.118 Data I/O 18	47.23 Data Storage
58.119 Data I/O 19	47.24 Data Storage
58.12 Data I/O 20	23.14 Acceleration time 2
58.121 Data I/O 21	23.15 Deceleration time 2
58.122 Data I/O 22	22.26 Constant Speed 1
58.123 Data I/O 23	22.27 Constant Speed 2
58.124 Data I/O 24	22.28 Constant Speed 3
58.06 Comm Control	Refresh Settings

\*58.03 Node Address corresponds to the VFD-GATEWAY Node Settings (see VFD-GATEWAY Settings Web Interface)

\*\*It is recommended to set this to 0 to avoid adding delays to the data

\*\*\*The VFD-GATEWAY only supports these default settings

For ACS880 and DCS880 the write data starts at 58.113 and First 12 registers must be reads (58.101-58.112)

**Note: You MUST set 58.06 to refresh settings after all parameters in group 58 are set.**



### 3.5 Setup, data mapping and typical parameters for ACH580 and ACH580 E-Clipse bypass

#### ACH580

Drive Parameter	Example for ACH580
<b>Setup parameters</b>	
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

#### ACH580 typical parameters

<b>READ from VFD</b>	
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
<b>Write to VFD</b>	
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

\*58.03 Node Address corresponds to the VFD-GATEWAY Node Settings (see VFD-GATEWAY Settings Web Interface)

\*\*It is recommended to set this to 0 to avoid adding delays to the data

\*\*\*The VFD-GATEWAY only supports these default settings

\*\*\*\* 58.107 - 58.112 are set in Hex format in the E-Clipse. The drive parameter group number, and number in the group, make up two separate hex numbers that are combined. Example: parameter 47.21: 47 (decimal) = 2F (Hex), 21 (decimal) = 15 (Hex). Combining 2F and 15 Hex together gives 2F15 that is entered into E-Clipse parameters 58.107 - 58.112.

For ACH580 the write data starts at 58.108 and First 7 registers must be reads (58.101-58.107)

For ACH580 E-Clipse the first 4 registers are pre-mapped as CW, Ref 1, Ref 2, and SW. The next 8 registers are all reads. The first 2 of those reads are fixed at Speed or Frequency (dictated by scalar vs vector selection). The next 6 are customizable. The 3 words out are (CW, Ref 1, and Ref 2). The 9 words in are (1: SW, 2: output frequency, 3: output frequency, 4 - 9: E-Clipse parameters 58.107 - 58.112 settings).

**Note: You MUST set 58.06 to refresh settings after all parameters in group 58 are set.**

**Note: ACH580 E-Clipse power must be cycled for changes to take effect**

#### ACH580 E-Clipse

Drive Parameter	ACH580 E-Clipse
<b>Setup parameters</b>	
16.01 Start/Stop (bypass parameter)	Comm
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

#### ACH580 E-Clipse typical parameters

<b>READ from VFD</b>	
Fixed word 4	Status Word
Fixed word 5	Speed or Freq
Fixed word 6	Speed or Freq
58.107 Data I/O 7****	107 Motor Current (107 Hex)
58.108 Data I/O 8****	111 DC Bus Voltage (10B Hex)
58.109 Data I/O 9****	103 Output Freq (103 Hex)
58.11 Data I/O 10****	114 Motor Power (10F Hex)
58.111 Data I/O 11****	47.21 Data Storage (2F15 Hex)
58.112 Data I/O 12****	47.22 Data Storage (2F16 Hex)
<b>WRITE to VFD</b>	
Fixed word 1	Control Word
Fixed word 2	REF 1
Fixed word 3	REF 2



### 3.6 ABB Drives control profile

The VFD-GATEWAY only uses the ABB Drives profile, see below for Control/Status Word and speed scaling instructions:

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

#### Control Word sequence:

##### To Run Drive:

1. 1150 decimal will put the drive into a ready state
2. 1151 decimal will put the drive in Run state

##### To Stop Drive:

1. 1150 decimal will ramp to a stop.
2. 1149 decimal will coast to stop.
  - 0 decimal will immediately stop the drive.
  - Note the drive will have to be sent 1150 again before starting (1151).

#### Speed Scaling ACS180, ACS380, ACH/S/Q580, ACS880, DCS880 and ACH580 E-Clips:

The speed scaling is +-20000

1. For Vector Mode: Parameter 46.01 needs to be set to the rpm of max speed
2. For Scalar Mode: Parameter 46.02 needs to be set for max

#### Speed Scaling ACS355:

The speed scaling is +-20000

1. Scaling is set in 11.03 and 11.04.



### 3.7 Ethernet configuration settings

	Assembly Instance	Size	
Input	101	75	16-bit
Output	100	75	16-bit
Configuration	1	0	8-bit

Communication mapping in the PLC/Controller: Integer

Drives Input/Output data array mapping is as follows:

Drive 1 = Integers 0-14

Drive 2 = Integer 15-29

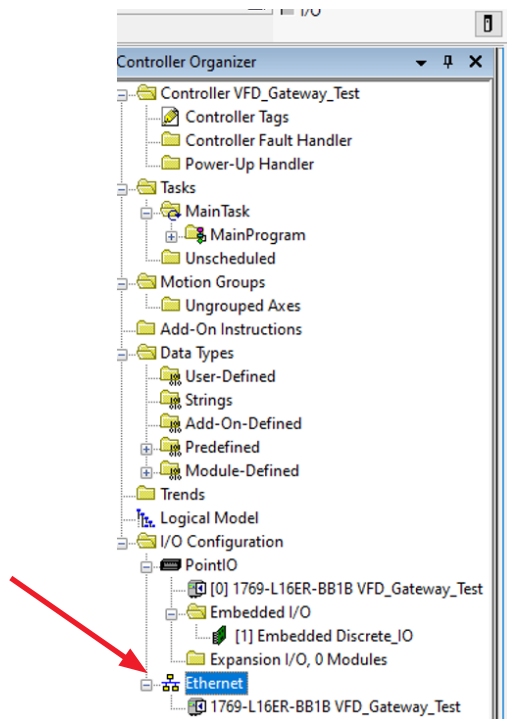
Drive 3 = Integer 30-44

Drive 4 = Integer 45-59

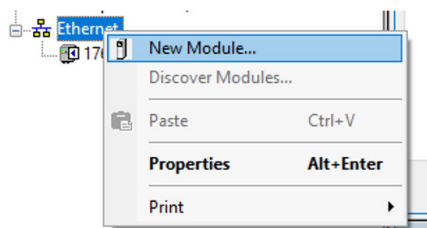
Drive 5 = Integer 60-74

### 3.8 Ethernet/IP scanner setup

Step 1: In the project find the Ethernet Connection, in your controller configuration, that will be used for the VFD-GATEWAY.



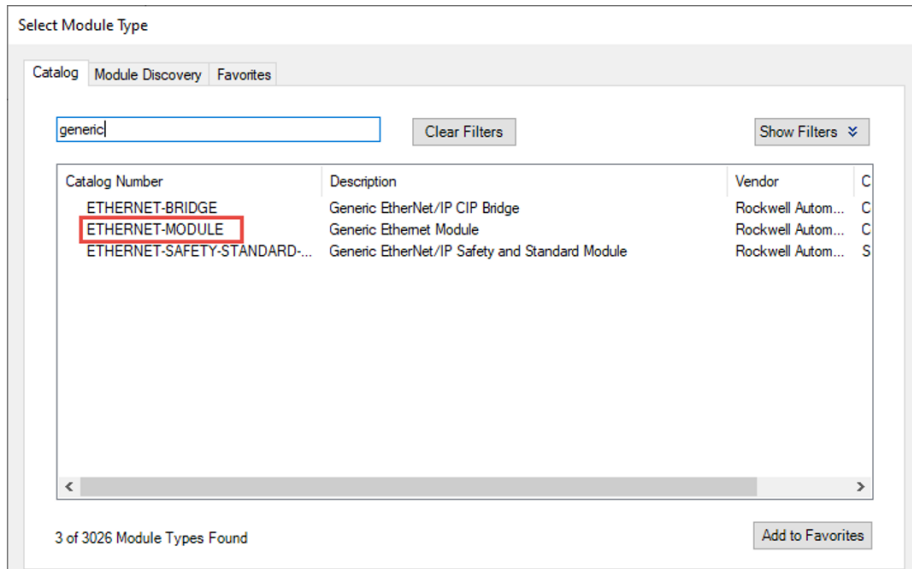
Step 2: Right click on it and select 'New Module'



Step 3: Set up using the Generic Ethernet Module Skip to Step 5 if using EDS file)

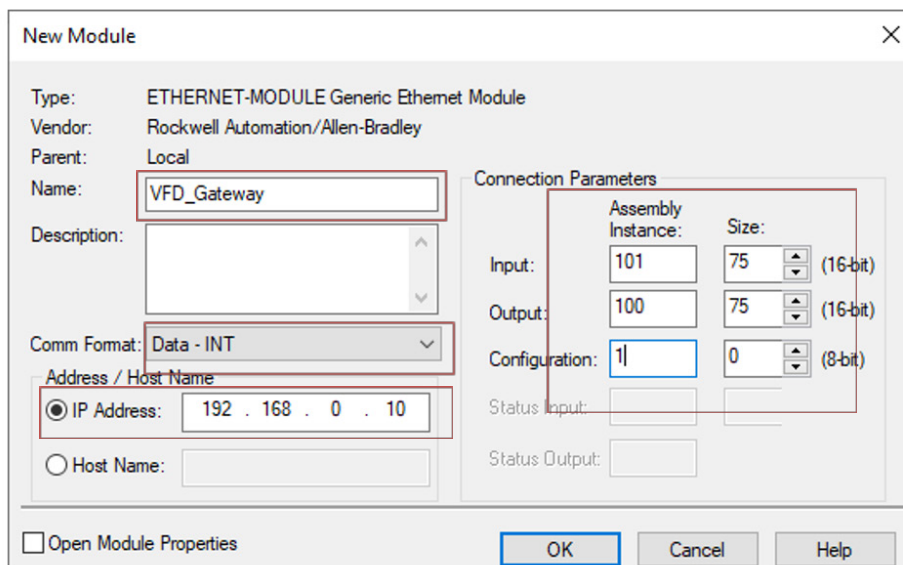
Search for generic module and select Generic Ethernet Module and hit create.

**Note: Use either EDS File or Generic module DO NOT USE BOTH**



Step 4 : Next populate the required generic module fields per below and press OK.

Name: Example: VFD\_Gateway  
 Comm Format: Data-INT  
 IP address: (default of gateway is 192.168.0.10)  
 Input Instance Assembly: 101 Size 75  
 Output Instance Assembly: 100 Size 75  
 Configuration: 1 Size 0



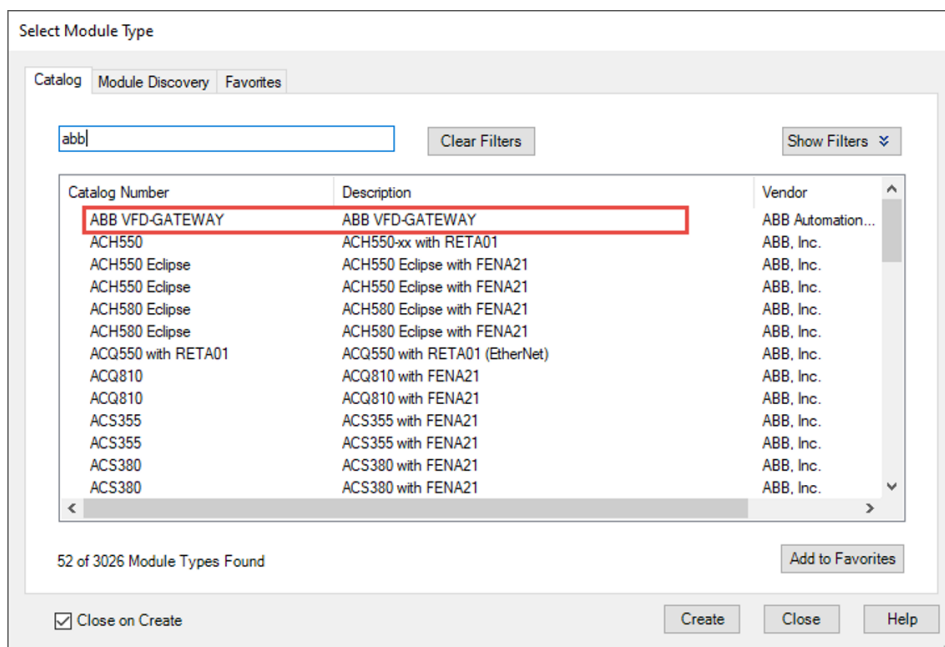


### Step 5: Using the EDS file

Search for ABB VFD-GATEWAY and select create. EDS file will need to be installed into the PLC software, to be selected.

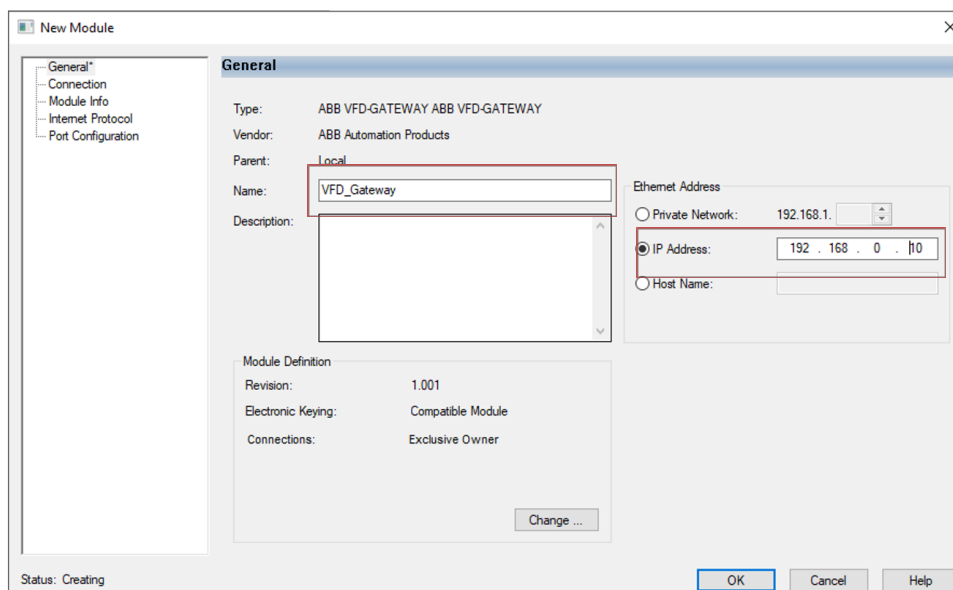
(Note: the EDS file **MUST** be installed through EDS hardware installation tool before it is available to use.)

**Note: Use either EDS File or Generic module DO NOT USE BOTH**



Step 6 : On the next screen, give the module a name and enter the VFD-GATEWAY's IP address.

(Default is 192.168.0.10. This can be changed from the web page setup)



Step 7: Select 'Change' under module definition.

The 'New Module' dialog box is shown with the 'General' tab selected. The left sidebar lists 'General', 'Connection', 'Module Info', 'Internet Protocol', and 'Port Configuration'. The main area contains the following fields:

- Type: ABB VFD-GATEWAY ABB VFD-GATEWAY
- Vendor: ABB Automation Products
- Parent: Local
- Name: VFD\_Gateway
- Description: (empty text area)
- Ethernet Address:
  - ☐ Private Network: 192.168.1.
  - ☒ IP Address: 192 . 168 . 0 . 10
  - ☐ Host Name: (empty text field)
- Module Definition:
  - Revision: 1.001
  - Electronic Keying: Compatible Module
  - Connections: Exclusive Owner

The 'Change ...' button in the Module Definition section is highlighted with a red rectangle. At the bottom, there are 'OK', 'Cancel', and 'Help' buttons. The status bar at the bottom left says 'Status: Creating'.

Step 8 : After change is selected the following screen will appear. Select INT and press OK.

The 'Module Definition' dialog box is shown. It contains the following fields:

- Revision: 1 (dropdown) and 001 (spin box)
- Electronic Keying: Compatible Module (dropdown)
- Connections: (table)

Name	Input	Output	Size
Exclusive Owner	75	75	INT

At the bottom, there are 'OK', 'Cancel', and 'Help' buttons.

This will create 75 integers in/out.

Drives Input/Output data array mapping is as follows:

- Drive 1 = Integers 0-14
- Drive 2 = Integer 15-29
- Drive 3 = Integer 30-44
- Drive 4 = Integer 45-59
- Drive 5 = Integer 60-74

The data registers that are not used will be just blank data as a place holder.

Name	Value	Force Mask	Style	Data Type	Description	Constant
VFD_Gateway.I	{...}	{...}		AB_ETHERNET_MODULE_INT_150Byte...		<input type="checkbox"/>
VFD_Gateway.I.Data	{...}	{...}	Decimal	INT[75]		
+ VFD_Gateway.I.Data[0]	0		Decimal	INT	Drive 1 Data Input 1	
+ VFD_Gateway.I.Data[1]	0		Decimal	INT	Drive 1 Data Input 2	
+ VFD_Gateway.I.Data[2]	0		Decimal	INT	Drive 1 Data Input 3	
+ VFD_Gateway.I.Data[3]	0		Decimal	INT	Drive 1 Data Input 4	
+ VFD_Gateway.I.Data[4]	0		Decimal	INT	Drive 1 Data Input 5	
+ VFD_Gateway.I.Data[5]	0		Decimal	INT	Drive 1 Data Input 6	
+ VFD_Gateway.I.Data[6]	0		Decimal	INT	Drive 1 Data Input 7	
+ VFD_Gateway.I.Data[7]	0		Decimal	INT	Drive 1 Data Input 8	
+ VFD_Gateway.I.Data[8]	0		Decimal	INT	Drive 1 Data Input 9	
+ VFD_Gateway.I.Data[9]	0		Decimal	INT	Drive 1 Data Input 10	
+ VFD_Gateway.I.Data[10]	0		Decimal	INT	Drive 1 Data Input 11	
+ VFD_Gateway.I.Data[11]	0		Decimal	INT	Drive 1 Data Input 12	
+ VFD_Gateway.I.Data[12]	0		Decimal	INT	Not Used	
+ VFD_Gateway.I.Data[13]	0		Decimal	INT	Not Used	
+ VFD_Gateway.I.Data[14]	0		Decimal	INT	Not Used	
+ VFD_Gateway.I.Data[15]	0		Decimal	INT	Drive 2 Data Input 1	
+ VFD_Gateway.I.Data[16]	0		Decimal	INT	Drive 2 Data Input 2	
+ VFD_Gateway.I.Data[17]	0		Decimal	INT	Drive 2 Data Input 3	
+ VFD_Gateway.I.Data[18]	0		Decimal	INT	Drive 2 Data Input 4	
+ VFD_Gateway.I.Data[19]	0		Decimal	INT	Drive 2 Data Input 5	
+ VFD_Gateway.I.Data[20]	0		Decimal	INT	Drive 2 Data Input 6	
+ VFD_Gateway.I.Data[21]	0		Decimal	INT	Drive 2 Data Input 7	
+ VFD_Gateway.I.Data[22]	0		Decimal	INT	Drive 2 Data Input 8	
+ VFD_Gateway.I.Data[23]	0		Decimal	INT	Drive 2 Data Input 9	
+ VFD_Gateway.I.Data[24]	0		Decimal	INT	Drive 2 Data Input 10	
+ VFD_Gateway.I.Data[25]	0		Decimal	INT	Drive 2 Data Input 11	
+ VFD_Gateway.I.Data[26]	0		Decimal	INT	Drive 2 Data Input 12	

Name	Value	Force Mask	Style	Data Type	Description	Constant
VFD_Gateway.O	{...}	{...}		AB_ETHERNET_MODULE_INT_150Byte...		<input type="checkbox"/>
VFD_Gateway.O.Data	{...}	{...}	Decimal	INT[75]		
+ VFD_Gateway.O.Data[0]	0		Decimal	INT	Drive 1 Data Output 1	
+ VFD_Gateway.O.Data[1]	0		Decimal	INT	Drive 1 Data Output 2	
+ VFD_Gateway.O.Data[2]	0		Decimal	INT	Drive 1 Data Output 3	
+ VFD_Gateway.O.Data[3]	0		Decimal	INT	Drive 1 Data Output 4	
+ VFD_Gateway.O.Data[4]	0		Decimal	INT	Drive 1 Data Output 5	
+ VFD_Gateway.O.Data[5]	0		Decimal	INT	Drive 1 Data Output 6	
+ VFD_Gateway.O.Data[6]	0		Decimal	INT	Drive 1 Data Output 7	
+ VFD_Gateway.O.Data[7]	0		Decimal	INT	Drive 1 Data Output 8	
+ VFD_Gateway.O.Data[8]	0		Decimal	INT	Drive 1 Data Output 9	
+ VFD_Gateway.O.Data[9]	0		Decimal	INT	Drive 1 Data Output 10	
+ VFD_Gateway.O.Data[10]	0		Decimal	INT	Drive 1 Data Output 11	
+ VFD_Gateway.O.Data[11]	0		Decimal	INT	Drive 1 Data Output 12	
+ VFD_Gateway.O.Data[12]	0		Decimal	INT	Not Used	
+ VFD_Gateway.O.Data[13]	0		Decimal	INT	Not Used	
+ VFD_Gateway.O.Data[14]	0		Decimal	INT	Not Used	
+ VFD_Gateway.O.Data[15]	0		Decimal	INT	Drive 2 Data Output 1	
+ VFD_Gateway.O.Data[16]	0		Decimal	INT	Drive 2 Data Output 2	
+ VFD_Gateway.O.Data[17]	0		Decimal	INT	Drive 2 Data Output 3	
+ VFD_Gateway.O.Data[18]	0		Decimal	INT	Drive 2 Data Output 4	
+ VFD_Gateway.O.Data[19]	0		Decimal	INT	Drive 2 Data Output 5	
+ VFD_Gateway.O.Data[20]	0		Decimal	INT	Drive 2 Data Output 6	
+ VFD_Gateway.O.Data[21]	0		Decimal	INT	Drive 2 Data Output 7	
+ VFD_Gateway.O.Data[22]	0		Decimal	INT	Drive 2 Data Output 8	
+ VFD_Gateway.O.Data[23]	0		Decimal	INT	Drive 2 Data Output 9	
+ VFD_Gateway.O.Data[24]	0		Decimal	INT	Drive 2 Data Output 10	
+ VFD_Gateway.O.Data[25]	0		Decimal	INT	Drive 2 Data Output 11	
+ VFD_Gateway.O.Data[26]	0		Decimal	INT	Drive 2 Data Output 12	



### 3.9 Configuring the VFD-GATEWAY Web browser interface

This chapter describes the how to configure the VFD-GATEWAY using the VFD-Gateway's' built in web browser configuration pages.

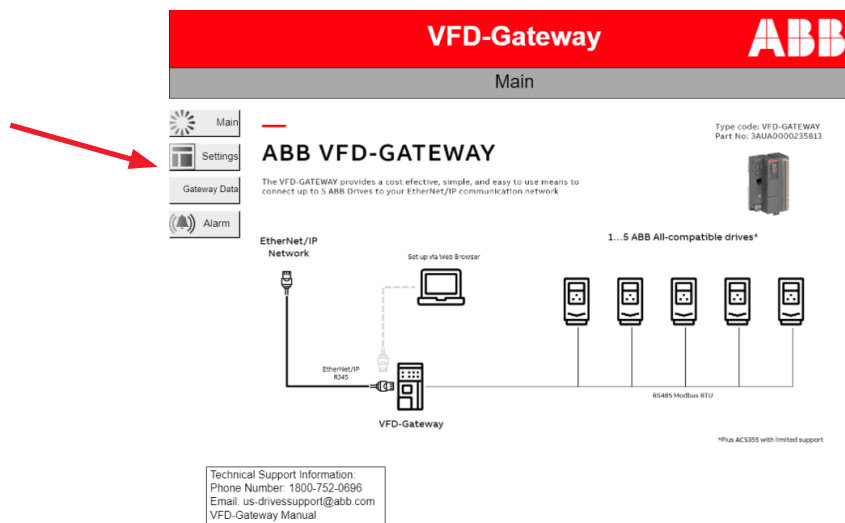
Step 1: Connect and power up:

1. Connect your Ethernet cable, Modbus wiring and apply 24VDC power.
2. From the web interface device (Laptop/PC) open a web browser window\* and navigate to the default IP address 192.168.0.10 (255.255.255.0)\*\*
3. The VFD-GATEWAY will navigate to the main page of the setup interface.

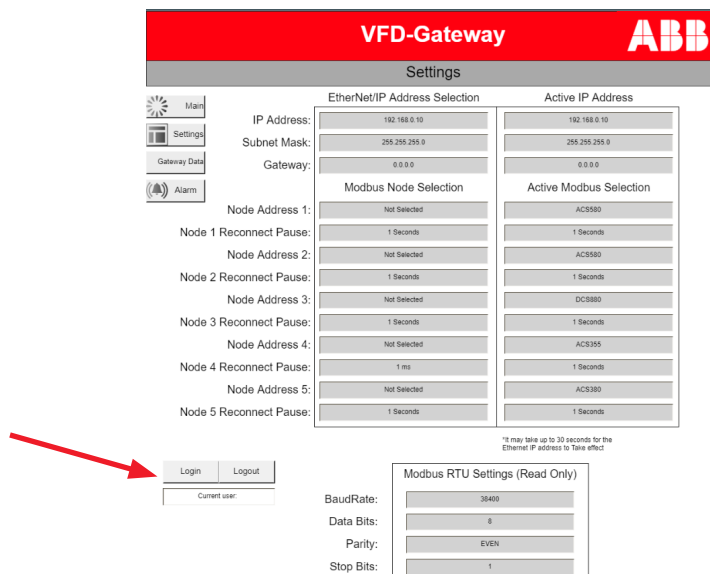
\* Supported web browsers: HTML5-capable web browsers, supported by most modern browsers

\*\* If the IP address is unknown, see the appendix 'Discover or Reset IP address'.

Step 2: Open the settings by clicking on the 'Setting' button:

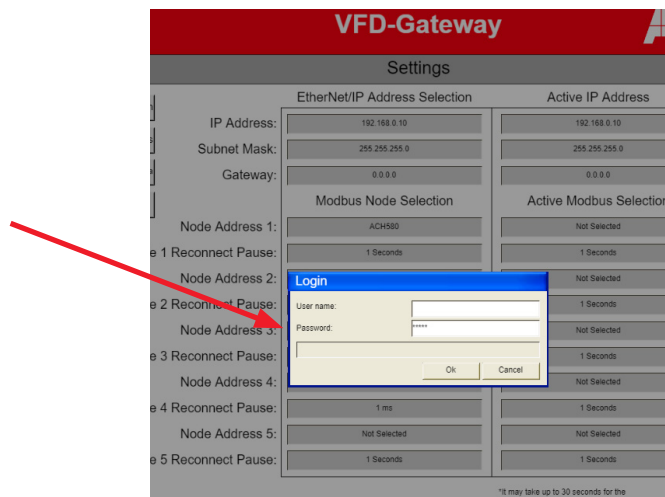


Step 3: Login to VFD-GATEWAY (to make changes you MUST log in):



#### Step 4: Login as Admin

From the Settings screen log in by pressing the Login Button (All Caps Username: ADMIN; Default Password: ADMIN)

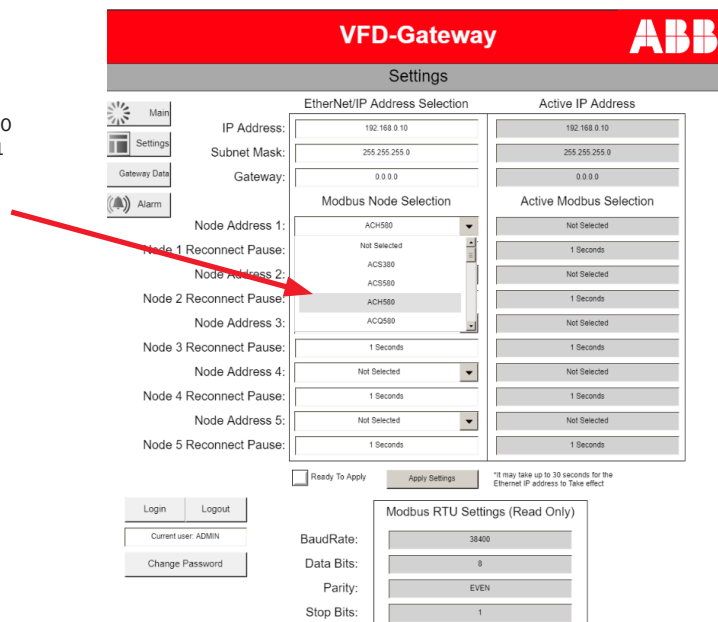


#### Step 5: Update settings

Once logged in as the Admin user the following settings can be updated:

- Ethernet IP Address, Subnet Mask
- Modbus Node Type for one or each of the 5 drives can be entered in the corresponding Drop-down lists.
- The reconnection pause in seconds (default is 1s). This setting controls how often the VFD-Gateway will check for a loss of connection with a Node/drive on the Modbus RTU network. Example, if the value is programmed to 3 seconds and node/drive is powered down, the gateway will check every 3 seconds for this node/drive. A lower setting will decrease the update speed of the VFD-Gateway when there is a problem with the Modbus RTU network.
- The Ethernet IP Address, Subnet Mask, and the Gateway information can be entered into the corresponding white boxes
- The Modbus Node Type for one or each of the 5 drives can be entered in the corresponding Drop-down lists. (ACS180, ACS380, ACS580, ACH580, ACQ580, ACS880, DCS880, ACH580 E-Clipse, and ACS355)

Example: Selecting ACH580 from drop-down as Node 1



## Step 6: Apply changes

Apply changes by (1) checking the 'Ready to apply' button/check box, then (2) Apply setting button:

**VFD-Gateway** **ABB**

**Settings**

Main Settings Gateway Data Alarm

**EtherNet/IP Address Selection**

IP Address: 192.168.0.10  
Subnet Mask: 255.255.255.0  
Gateway: 0.0.0.0

**Modbus Node Selection**

Node Address 1: ACH580  
Node 1 Reconnect Pause: 1 Seconds  
Node Address 2: Not Selected  
Node 2 Reconnect Pause: 1 Seconds  
Node Address 3: Not Selected  
Node 3 Reconnect Pause: 1 Seconds  
Node Address 4: Not Selected  
Node 4 Reconnect Pause: 1 Seconds  
Node Address 5: Not Selected  
Node 5 Reconnect Pause: 1 Seconds

**Active IP Address**

192.168.0.10  
255.255.255.0  
0.0.0.0

**Active Modbus Selection**

Not Selected  
1 Seconds  
Not Selected  
1 Seconds  
Not Selected  
1 Seconds  
Not Selected  
1 Seconds  
Not Selected  
1 Seconds

☒ Ready To Apply  \*It may take up to 30 seconds for the Ethernet IP address to take effect

Login Logout  
Current user: ADMIN  
Change Password

**Modbus RTU Settings (Read Only)**

BaudRate: 38400  
Data Bits: 8  
Parity: EVEN  
Stop Bits: 1

The VFD-GATEWAY will perform a restart (communication will be lost) and the web interface will need to be reconnected with the new IP address.

**Note: Confirm the updated settings have been updated by navigating back to the settings screen.**

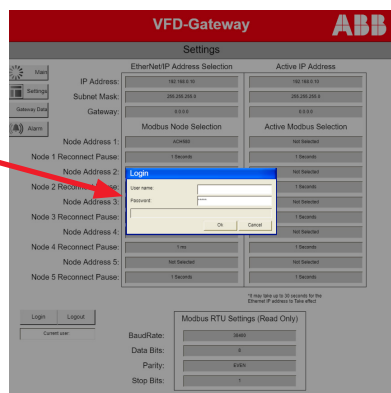
**Note: The Modbus RTU setting are not User programmable.**



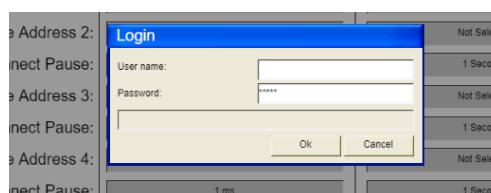
### 3.10 Additional screens and settings

#### Changing the VFD-GATEWAY ADMIN password

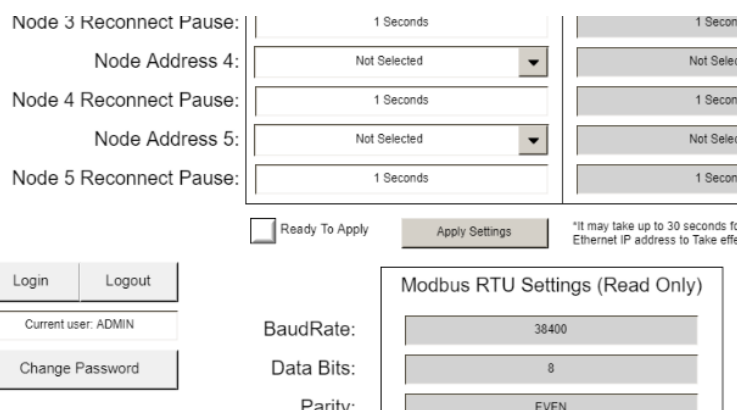
Step 1: From the settings Screen Login as the ADMIN user



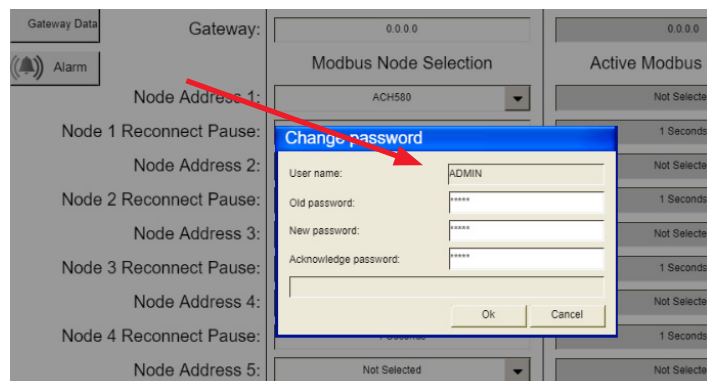
Step 2: Enter Username: ADMIN; Default Password: ADMIN) click OK.



Step 3: Click Change Password.



Step 4: The password change box will prompt you to enter the existing password and the new password twice.



Modbus RTU configuration

Modbus RTU settings can be found on the Setting screen. Note: The Modbus RTU settings can't be changed.

Main

Settings

Gateway Data

Alarm

VFD-Gateway

ABB

Settings

EtherNet/IP Address Selection

Active IP Address

IP Address:192.168.0.10

Subnet Mask:255.255.255.0

Gateway:0.0.0.0

Modbus Node Selection

Active Modbus Selection

Node Address 1:Not Selected

Node 1 Reconnect Pause:1 Seconds

Node Address 2:Not Selected

Node 2 Reconnect Pause:1 Seconds

Node Address 3:Not Selected

Node 3 Reconnect Pause:1 Seconds

Node Address 4:Not Selected

Node 4 Reconnect Pause:1 ms

Node Address 5:Not Selected

Node 5 Reconnect Pause:1 Seconds

ACS580

ACS580

DCS880

ACS355

ACS380

1 Seconds

LoginLogout

Current user:

Modbus RTU Settings (Read Only)

BaudRate:38400

Data Bits:8

Parity:EVEN

Stop Bits:1

\*It may take up to 30 seconds for the Ethernet IP address to Take effect

The Settings screen shows the Active Ethernet/IP settings and the Active Modbus Settings.

Note: The Standard User can only **view** the settings from this page.





## VFD-GATEWAY data tables

The VFD-GATEWAY Drive data tables (Drive 1 shown) will display data read and write data within the VFD-GATEWAY and can be used for troubleshooting.

VFD-Gateway

ABB

Drive 1 Gateway Data Table (Monitoring Only)

Main

Settings

Gateway Data

Alarm

Drive 1 Data

Drive 2 Data

Drive 3 Data

Drive 4 Data

Drive 5 Data

Modbus Node Selection:

ACS380

VFD To Ethernet IP Network (Read Data)

Ethernet IP Network To VFD (Write Data)

Actual Data 1:	0	0
Actual Data 2:	0	0
Actual Data 3:	0	0
Actual Data 4:	0	0
Actual Data 5:	0	0
Actual Data 6:	0	0
Actual Data 7:	0	0
Actual Data 8:	0	0
Actual Data 9:	0	0
Actual Data 10:	0	0
Actual Data 11:	0	0
Actual Data 12:	0	0

\*Decimal Data Shown

\*Data Provided for Troubleshooting Only

\*Parameters configured in VFD

The Modbus Node Selected in the Settings Screen will be shown above the Data table.


The Actual Gateway Drive Data being transferred from the VFD to the Ether-net/IP Network (Read Data) and the Ethernet/IP network to VFD (Write Data) is displayed in the tables.  
(Data is shown in Decimal and is Read Only)


Each of the five drives can be selected by clicking on the corresponding drive number at the top of the screen.


VFD-Gateway


ABB

Drive 1 Gateway Data Table (Monitoring Only)

Main

Settings

Gateway Data

Alarm

Drive 1 Data

Drive 2 Data

Drive 3 Data

Drive 4 Data

Drive 5 Data

Modbus Node Selection: ACS380

VFD To Ethernet IP Network (Read Data)

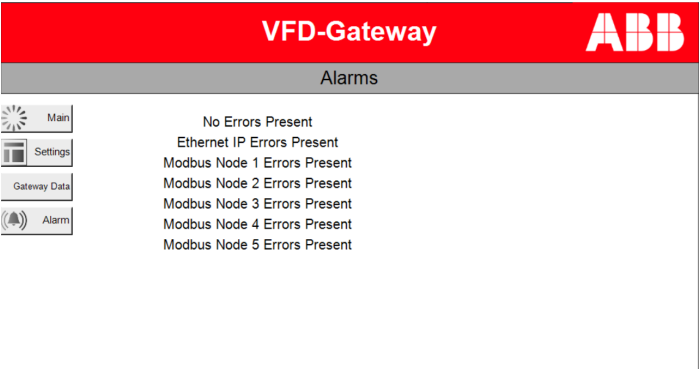
Ethernet IP Network To VFD (Write Data)

Actual Data 1:	0	0
Actual Data 2:	0	0
Actual Data 3:	0	0
Actual Data 4:	0	0

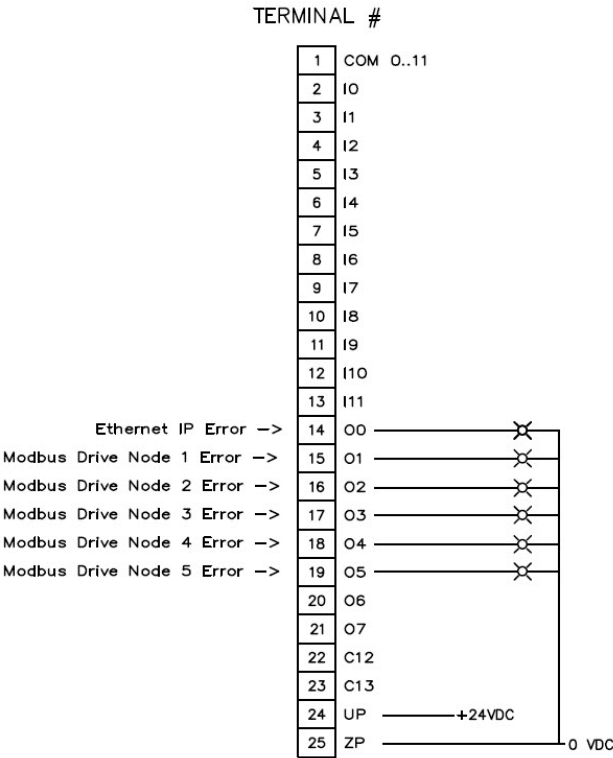


Alarms

The Alarm screen shows any Communication errors on each of the Ethernet/IP or Modbus Drive Nodes.



The VFD-Gateway Alarms can be represented in the following Output Lights. The wiring shown is optional, each output has a status LED built into the VFD-GATEWAY.



The VFD-Gateway Alarms can be accessed by the Scanner PLC through the Ethernet/IP network.

Drives Input/Output data array mapping is as follows:

- Drive 1 = Integers 0-14
- Drive 2 = Integer 15-29
- Drive 3 = Integer 30-44
- Drive 4 = Integer 45-59
- Drive 5 = Integer 60-74
  - Integer 74
    - Bit 0 – Reserved for Ethernet/IP Errors
    - Bit 1 – Modbus Node 1 Errors
    - Bit 2 – Modbus Node 2 Errors
    - Bit 3 – Modbus Node 3 Errors
    - Bit 4 – Modbus Node 4 Errors
    - Bit 5 – Modbus Node 5 Errors

Example Setup with Error:

Node 1 – ACS580 – Modbus Network OK

Node 2 – ACS580 – Modbus Network OK

Node 3 – ACS880 – Modbus Network Error

The data [74] registers show that Modbus Node 3 has an issue:

	VFD_Gateway.I.Data[74]	8		Decimal	INT
	VFD_Gateway.I.Data[74].0	0		Decimal	BOOL
	VFD_Gateway.I.Data[74].1	0		Decimal	BOOL
	VFD_Gateway.I.Data[74].2	0		Decimal	BOOL
	VFD_Gateway.I.Data[74].3	1		Decimal	BOOL
	VFD_Gateway.I.Data[74].4	0		Decimal	BOOL
	VFD_Gateway.I.Data[74].5	0		Decimal	BOOL
	VFD_Gateway.I.Data[74].6	0		Decimal	BOOL



## 4. Troubleshooting

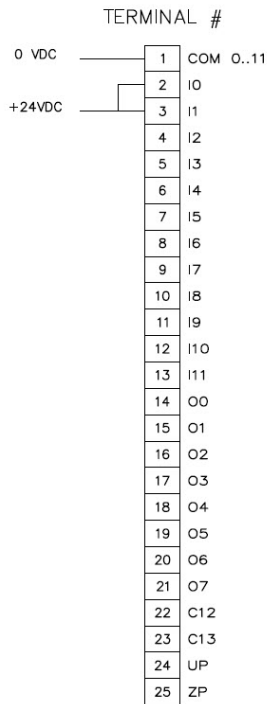
### Contents of this chapter

This chapter describes typical errors and conditions that may prevent operation.

#### 4.1 Hard reset of the VFD-GATEWAY

In cases where you need to reset the VFD-GATEWAY to factory settings, it can be achieved with the hard reset procedure:

1. Power down the VFD-GATEWAY.
2. Connect 24VDC to Terminal 2 and 3 and connect the 0VDC to Terminal 1:



3. Power up the VFD-GATEWAY.
4. When output terminal lights 14 through 21 are lit the VFD-GATEWAY power can be removed.
5. When the VFD-GATEWAY is powered down, remove the connections from terminal 2 and 3.
6. Power up the VFD-GATEWAY

The following will be reset:

- VFD Gateway web password (to be verified)
- EtherNet/IP Address setting
- Drive selected for each Modbus node will default to disabled for all five nodes



## 4.2 Troubleshooting steps

### VFD-GATEWAY is not running

- If gateway web interface is not accessible make sure the VFD-GATEWAY run light is illuminated green

### VFD-GATEWAY is not accessible from known EtherNet/IP Address

- Try the default IP address 192.168.0.10
- Check Ethernet Connection between PC and VFD-GATEWAY
- Check EtherNet/IP Address of PC.
- Finally reset the VFD-GATEWAY by following the Factory reset steps (Refer to factory reset section 4.1)

### Modbus connection troubleshooting:

- Check Address for each Node
- Drive baud rate is set to 38.4k baud.
- Drive parity needs to be set to 8 Even 1
- Check Modbus wiring (see page 7):
  - A1 on VFD-Gateway needs to be wired to B on VFD
  - B1 on VFD-Gateway needs to be wired to A on VFD
- Make sure you use the correct cable
- Termination resistors are in the correct place in the network
- In ACS/ACH/ACQ/ACS880 and DCS880 products see 58.07 – Communication Diagnostics (refer to the Drive manuals in each case)
- 58.08 Receive and 58.09 transmit
- ACS355 – look at 53.06 – “OK Messages”
- Use the Data screen in the VFD to see if we are transmitting data.

### Drive Communicating but not running:

- Check Start Stop Speed Reference (refer to drive set up page) for all drives
- Make sure the control device is sending the correct information see ABB State Machine (refer to state machine area of the drive manual)
- Speed reference should follow the ABB speed reference specification (refer to speed reference area)
- Check the correct drive is selected in the settings screen of the VFD-Manual
- Use the Data screen in the VFD to see if we are transmitting data.
- Make sure the Ethernet data mapping is correct for each drive (refer ethernet data section of manual)

### Ethernet troubleshooting:

- Make sure VFD-GATEWAY Ethernet IP address/Subnet mask/Gateway is programed correctly.
- Make sure Ethernet Scanner device Ethernet IP address/Subnet mask/Gateway is programed correctly.
- Check Ethernet Cable is properly connected
- Make sure the Ethernet data mapping is correct for each drive (refer ethernet data section of manual)
- If using a generic module make sure the assembly instance number and sizes are correctly programed (see ethernet scanner setup section)

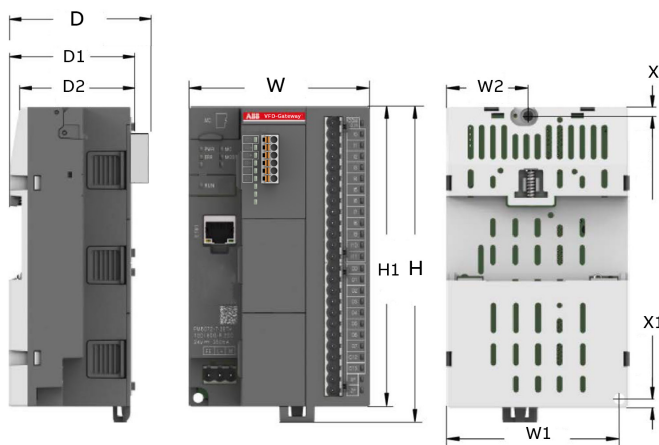


# 5. Appendix

## Contents of this chapter

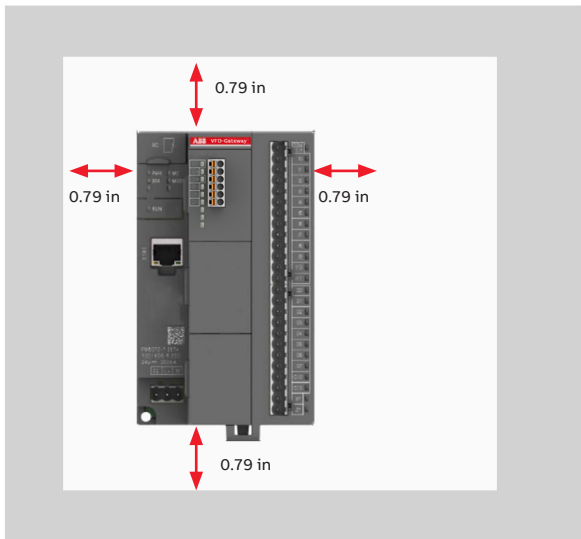
This chapter contains dimensions, technical information and resources for the of the VFD-GATEWAY.

### 5.1 Dimensions



VFD-GATEWAY									
H	W	D	H1	W1	W2	D1	D2	X	X1
in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)
5.63	3.23	2.84	5.31	3.07	1.45	2.24	2.04	0.17	0.16
(143.1)	(82)	(72.1)	(135)	(78)	(37)	(57)	(52)	(4.25)	(4)

### 5.2 Free space requirements



Allow a minimum of 0.79 in (20mm) clearance on all sides. This provides ventilation and electrical isolation.

It is recommended to mount the modules on an earthed mounting plate, or an earthed DIN rail, independent of the mounting location.

Horizontal mounting is recommended.



### 5.3 Module Status LEDs

LED	State	Color	LED=ON	LED=OFF	LED Flashing
PWR	Power supply	Green	Power supply present	Power supply missing	-
MC	Micro memory card indication	Yellow	Micro memory card is in the socket	Micro memory card is not in the socket	Micro memory card is in read/write state
ERR	Error indication	Red	An error occurred	No errors or only warnings encountered	See troubleshooting section
MOD1	Mode 1 indication	Yellow	Processor module is in mode 1 state	Processor module is not in mode 1 state	-
RUN	Run/Stop mode	Green	Processor is in Run mode	Processor is in Stop mode	-

### 5.4 Gateway specific errors

O0 solid green – Ethernet/IP Errors

O1 solid green– Modbus Drive 1 errors

O2 solid green– Modbus Drive 2 errors

O3 solid green– Modbus Drive 3 errors

O4 solid green– Modbus Drive 4 errors

O5 solid green– Modbus Drive 5 errors

Cycle through O0 through O7: On Startup lights O0 through O7 turn on hold for 1 second then turn off and step to the next light.

Run/Stop Button – By Pressing the Run/Stop Button (next to the Run LED) the Gateway can be Started or Stopped.

### 5.5 Resources

For more information on the drive parameter setup information, refer to:

- 3AXD0000467860 ACS180 Firmware Manual
- 3AXD0000029275 ACS380 Firmware Manual
- 3AXD50000027600 ACH580 Firmware Manual
- 3AXD50000611058 ACQ580 Firmware Manual
- 3AXD0000016097 ACS580 Firmware Manual
- 3AUA0000085967 ACS880 Firmware Manual Primary Control Program
- 3ADW000474R0301 DCS880 Firmware Manual
- 3AXD50000289554 ACH580 E-Cclipse User Manual



## 5.6 Technical Data

<b>Power supply requirements (user supplied)</b>	
Voltage	24 VDC (-15 %, +20 %)
Protection against reverse polarity	Yes
Current consumption	340mA Max
<b>Environmental limits</b>	
Operating temperature (horizontal mounting)	0 °F... +140°F (0 °C...+60 °C)
Operating temperature (vertical mounting)	0 °F... +104°F (0 °C...+40 °C)
Storage temperature	-40°F... +158°F (-40 °C...+70 °C)
Ambient Relative Humidity	Max. 95 %, without condensation
Air pressure (operating)	> 800 hPa / < 2000 m
Air pressure (storage)	> 800 hPa / < 2000 m
<b>Construction</b>	
Housing	Plastic, Classification V0 according to UL 94
Weight	0.88lb (0.4kg)
IP Rating	IP20
<b>EtherNet/IP Port</b>	
10/100BaseT(X) Port	1 – Auto/10/100 - RJ45 connection
Mode	Adapter
CIP Gateway Objects Supported	Identity, Message Router, Assembly, Connection Manager, Ethernet link, Port
Max. No. Of Adapter Connections	100
Input data size	150 bytes
Output data size	150 bytes
CIP Message Class Supported	Class 1 or I/O messages; Class 3 or Explicit message are not supported
Cable type	CAT5 or higher, and type UTP, FTP or STP
<b>Serial interface</b>	
Serial standard	RS-485 (Modbus RTU)
Baudrate	38,400 bps
Data bits	8
Parity	Even
Stop bits	1
Terminator for RS-485	120 ohms, ¼ watt (Built In)
Isolation	2kV (Built In)
Serial signals	RS-485 2 wire
No of drive connections	Up to 5 (max)
ABB Drives supported	ACS355 (limited support) ACH580 E- Clipse (limited support) ACS180; ACS380; ACS580, ACH580; ACQ580; ACS880; DCS880
Cable type	2 cores, twisted, with common shield (see manual Modbus installation section for full requirements)
<b>Communication speeds</b>	
Typical read time	60-70ms per drive
Continuous read/write time.	100 -110ms per drive
The VFD-Gateway is set up to only write data to the drive when the write data changes, this allows us to optimize communication speed.	
<b>Standards and certifications</b>	
cUL, CE and RoHS	
<b>Package contents</b>	
Device	1 x VFD-GATEWAY
Modbus RTU	1 x TA5142 RTU RS485 adapter
Terminal block	1x 3 pin spring loaded terminal block 1 x 12 pin spring loaded terminal block 1 x 13 pin spring loaded terminal block
Documentation	1 x quick installation guide 1 x warranty card

For more information please contact your local ABB representative or visit:

**[www.abb.com/drives](http://www.abb.com/drives)**

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