XV-board Series
User Manual

Version 1.0.4, Dec.2019

Edited by Sunny Chiu



DIO Board

- XV107/ XV107A
- XV110
- XV-111/XV111A

Relay Output Board

- XV116

Multi-Function Board

- XV303
- XV306
- XV307
- XV308
- XV310

Encoder/Frequency/Counter Input Board

- XV484

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Preface

This manual is intended to be used as a reference for users who need to communicate with the XV-boards assembled in the VPD-132/133 series, VPD-142/143 series, WP-5231 series, LP-5231 series and WP-2241M-CE7 with Modbus protocol.

This manual assumes that the user has some knowledge of commissioning and programming of Modbus devices, including some knowledge of the Modbus protocol and your controller unit.



WP-5231/LP-5231 series



VPD-132/133 series
VPD-142/143 series

This manual can be obtained from the ICP DAS web site:
http://www.icpdas.com/root/product/solutions/hmi_touch_monitor/touchpad/xv-board_selection.html

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Contents in this Manual

Each section contains the following information for each XV-board:

- I/O Specifications
- Pin Assignments
- Wire Connections
- Modbus Register Table

The table below describes the properties of each field in a Modbus register table.

Register fields	Description
Register	The register addresses DEC: Decimal format (0 based) HEX: Hexadecimal format (0 based)
Point	The number of the I/O point
Description	The function description for the register address
Data Format	The read or write range of the I/O data
Attribute	The access type R: Read only W: Write only

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Selection Guide

◆ Analog/Digital I/O Boards

Model Number	DI	DO	AI	AO
XV107/XV107A	8-ch	8-ch	-	-
XV110	16-ch	-	-	-
XV111/XV111A	-	16-ch	-	-
XV116	5-ch	6-ch Relay	-	-
XV303	4-ch	4-ch Relay		4-ch
XV306	4-ch	4-ch	4-ch	-
XV307	4-ch	4-ch	-	2-ch
XV308	8-ch Universal DI/DO *		8-ch	-
XV310	4-ch	4-ch	4-ch	2-ch

* The 8 Universal DI/DO channels on the XV308 can be individually selected to be DI channels or DO channels via wire connections.

◆ Encoder/Frequency/Counter Input Boards

Model Number	Channel	Encoder	Counter	Counting Rate
XV484	4/8-ch	CW/CCW, Dir/Pulse	Up or Up/Down	200 kHz Max.

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XV107/XV107A

I/O Specifications

Digital Input/Counter		XV107	XV107A
Channels		8	
Contact		Wet Contact	
Sink/Source (NPN/PNP)		Source	Sink
On Voltage Level		+3.5 V_{DC} ~ +50 V_{DC}	
Off Voltage Level		+1 V_{DC} Max.	
Input Impedance		10 KΩ, 0.5W	
Counter	Channels	8	
	Max. Count	4,294,967,285 (32-bit) (*1)	
	Max. Input Frequency	50 Hz (*2)	
	Min. Pulse Width	10 ms	
Overvoltage Protection		+70 V_{DC}	
Digital Output			
Channels		8	
Type		Sink	Source
Max. Load Current		700 mA/channel	650 mA/channel
Load Voltage		+3.5 ~ +50V_{DC}	+10 ~ +40V_{DC}
Overvoltage Protection		+60 V_{DC}	+47 V_{DC}
Overload Protection		Yes	
Short-circuit Protection		Yes	
Power-on Value		Yes, Programmable	

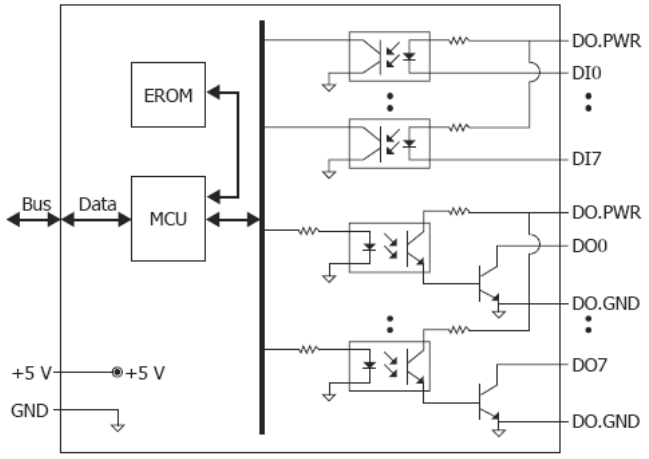
*1, *2: with the firmware version 2.00 and later, all the DI counters are 32-bit with maximum input frequency of 50Hz. While the firmware version is 1.00, DI counters are 16-bit with maximum input frequency of 100Hz.

Pin Assignment

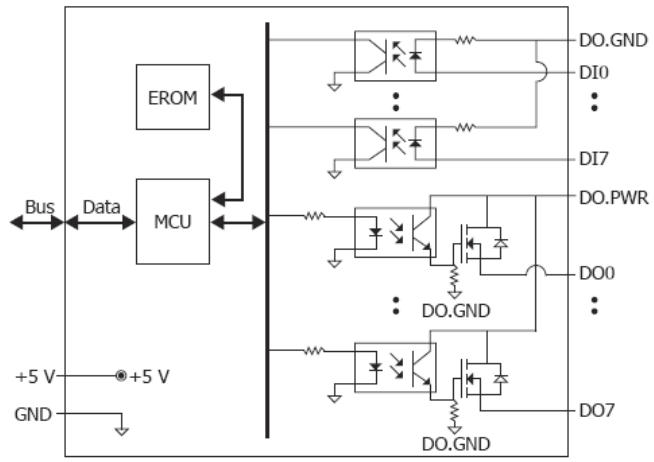


Internal I/O Structure

XV107



XV107A



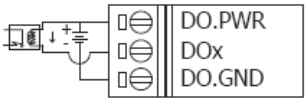
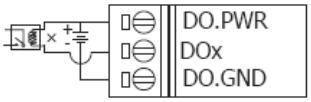
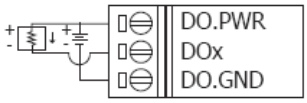
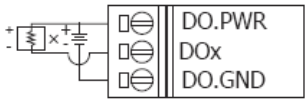
XV107

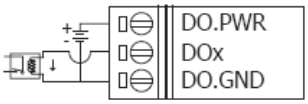
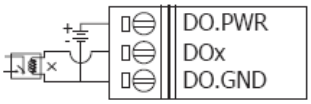
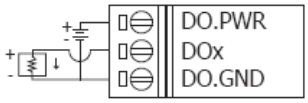
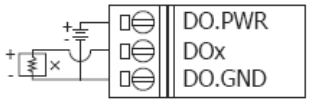


XV107A



Wire Connections

XV107		
Input Type	**Readback as 1**	**Readback as 0**
Source	+3.5 ~ 50 VDC	+1 V Max.
		
Output Type	**Readback as 1**	**Readback as 0**
Drive Relay		
Resistance Load		

XV107A		
Input Type	**Readback as 1**	**Readback as 0**
Sink	+3.5 ~ 50 VDC	+1 V Max.
		
Output Type	**Readback as 1**	**Readback as 0**
Drive Relay		
Resistance Load		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00007	0000 : 0007	8	DO value	0: Off 1: On	R/W	-
00160 : 00167	00A0 : 00A7	8	Set the Power-on value of DO	0: Off 1: On	R/W	0
00192 : 00199	00C0 : 00C7	8	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DI status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0
00512 : 00519	0200 : 0207	8	Clear the DI counter value	1: Clear	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10000 : 10007	0000 : 0007	8	DI value	0: Off 1: On	R
10064 : 10071	0040 : 0047	8	Read DI “high latch” status	0: Normal 1: Latched	R
10096 : 10103	0060 : 0067	8	Read DI “low latch” status	0: Normal 1: Latched	R

Input Register (3xxxx)

For firmware 2.00 and later: (the firmware version can be read from address 40481)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30015	0000 : 000F	8	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

For firmware 1.00: (the firmware version can be read from address 40481)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30007	0000 : 0007	8	1	16-bit DI counter value	0 to 65535	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x0700	-	R	-
40483	01E3	1	1	Module name (high word), 0x5601	-	R	-

XV110

I/O Specifications

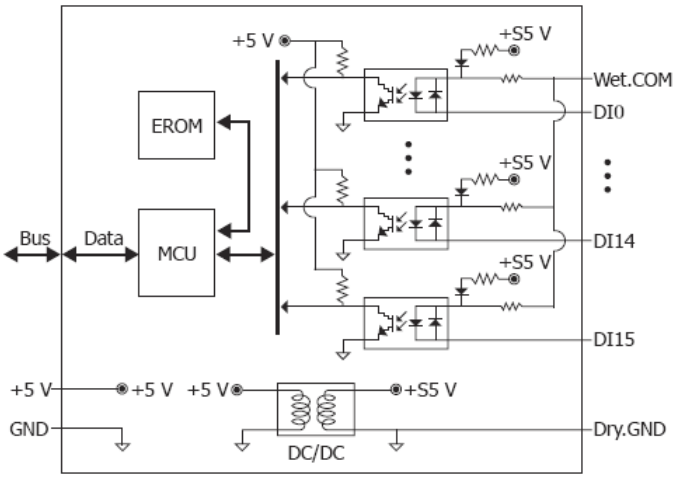
Digital Input/Counter		
Channels		16
Type	Dry Contact	Source
	Wet Contact	Sink/Source
On Voltage Level	Dry Contact	Close to GND
	Wet Contact	+3.5 V_{DC} ~ +50 V_D
Off Voltage Level	Dry Contact	Open
	Wet Contact	+1 V_{DC} Max.
Input Impedance		10 KΩ, 0.5W
Counter	Channels	16
	Max. Count	4,294,967,285 (32-bit) (*1)
	Max. Input Frequency	50 Hz (*2)
	Min. Pulse Width	10 ms
Overvoltage Protection		+70 V_{DC}
Effective Distance for Dry Contact		500 m Max.

*1, *2: with the firmware version 2.00 and later, all the DI counters are 32-bit with maximum input frequency of 50Hz. While the firmware version is 1.00, DI counters are 16-bit with maximum input frequency of 100Hz.

Pin Assignment

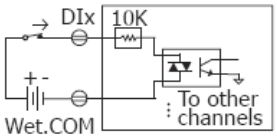
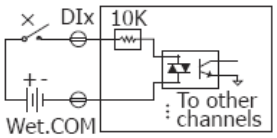
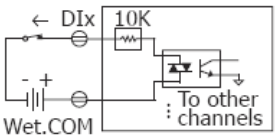
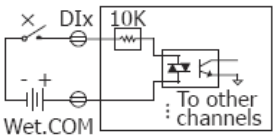
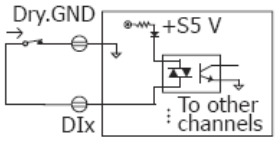
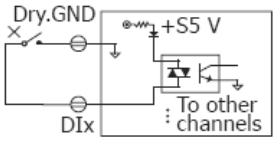


Internal I/O Structure





Wire Connections

Digital Input/Counter	Readback as 1	Readback as 0
Wet Contact (Sink)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Wet Contact (Source)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Dry Contact	Closed to Dry.GND	Open
		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00192 : 00207	00C0 : 00CF	16	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DI status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00512 : 00527	0200 : 020F	16	Clear the DI counter value	1: Clear	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10000 : 10015	0000 : 000F	16	DI value	0: Off 1: On	R
10064 : 10079	0040 : 004F	16	Read DI “high latch” status	0: Normal 1: Latched	R
10096 : 10111	0060 : 006F	16	Read DI “low latch” status	0: Normal 1: Latched	R

Input Register (3xxxx)

For firmware 2.00 and later: (the firmware version can be read from address 40481)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30031	0000 : 001F	16	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

For firmware 1.00: (the firmware version can be read from address 40481)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30015	0000 : 000F	16	1	16-bit DI counter value	0 to 65535	R

Holding Register (4xxxx)

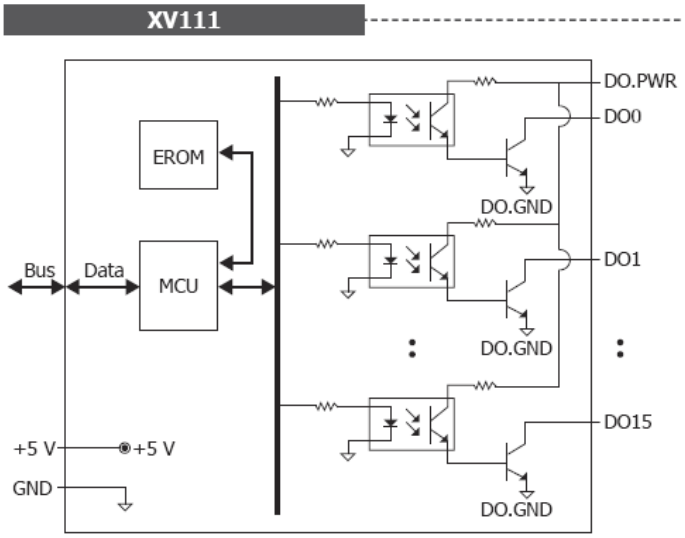
Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x1000	-	R	-
40483	01E3	1	1	Module name (high word), 0x5601	-	R	-

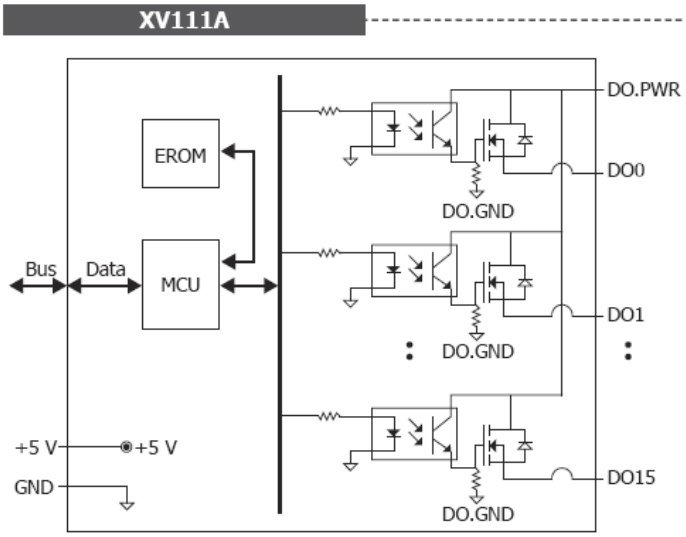
XV111/XV111A

I/O Specifications

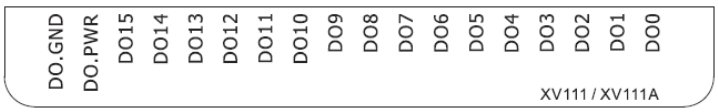
Digital Output	XV111	XV111A
Channels	16	
Type	Sink	Source
Max. Load Current	600 mA/channel	
Load Voltage	+3.5 ~ +50 V_{DC}	+10 ~ +40 V_{DC}
Overvoltage Protection	+60 V_{DC}	+47 V_{DC}
Overload Protection	Yes	
Short-circuit Protection	Yes	
Power-on Value	Yes, Programmable	

Internal I/O Structure





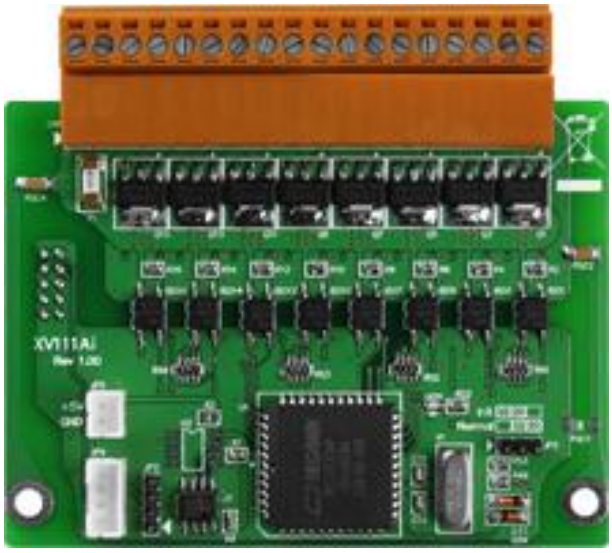
Pin Assignment



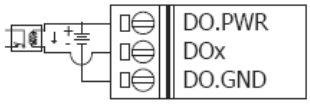
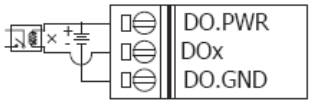
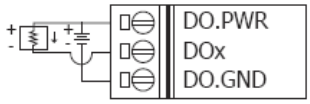
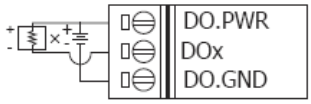
XV111

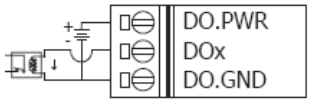
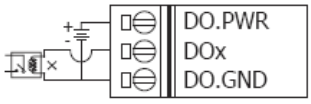
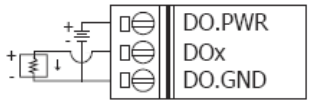
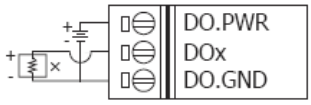


XV111A



Wire Connections

XV111		
Output Type	**Readback as 1**	**Readback as 0**
Drive Relay		
Resistance Load		

XV111A		
Output Type	**Readback as 1**	**Readback as 0**
Drive Relay		
Resistance Load		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00015	0000 : 000F	16	DO value	0: Off 1: On	R/W	-
00160 : 00175	00A0 : 00AF	16	Set the Power-on value of DO	0: Off 1: On	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x1100	-	R	-
40483	01E3	1	1	Module name (high word), 0x5601	-	R	-

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XV116

I/O Specifications

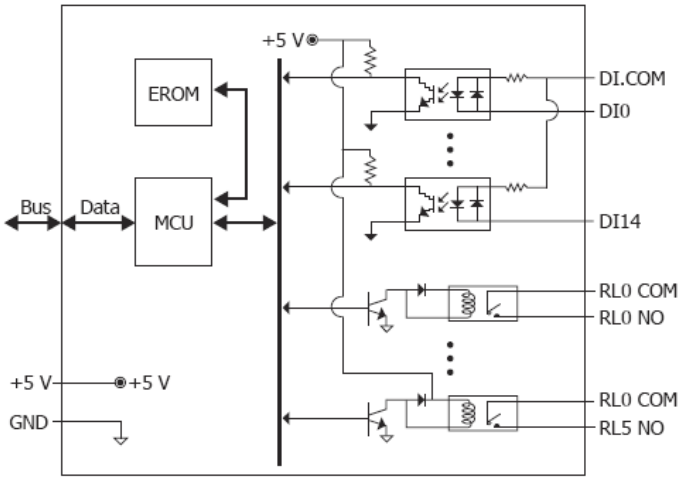
Digital Input/Counter			
Channels		5	
Contact		Wet Contact	
Sink/Source (NPN/PNP)		Sink/Source	
On Voltage Level		+3.5 V_{DC} ~ +50 V_{DC}	
Off Voltage Level		+1 V_{DC} Max.	
Input Impedance		10 KΩ, 0.5W	
Counter	Channels	5	
	Max. Count	4,294,967,285 (32-bit) (*1)	
	Max. Input Frequency	50 Hz (*2)	
	Min. Pulse Width	10 ms	
Overvoltage Protection		+70 V_{DC}	
Digital Output			
Channels		2 (Channel 0,1)	4 (Channel 2 ~ 5)
Type		Signal Relay	Power Relay
Form A Relay	Contact Rating	2 A @ 30 V_{DC} 0.24A@220V_{DC} 0.25A@250V_{AC}	6A @ 35V_{DC} 6A@240V_{AC}
	Min. Contact Load	10mA@20 mV	100mA@≧12 V
	Contact Material	Silver Nickel, Gold-covered	Silver Cadmium Alloy
	Operate Time	3 ms (typical)	5 ms (typical)
	Release Time	4 ms (typical)	1 ms (typical)
	Mechanical Endurance	10^8 ops.	30 X 10^6 ops.
	Electrical Endurance	2 X 10^5 ops.	1 X 10^5 ops.
Power-on Value		Yes, Programmable	

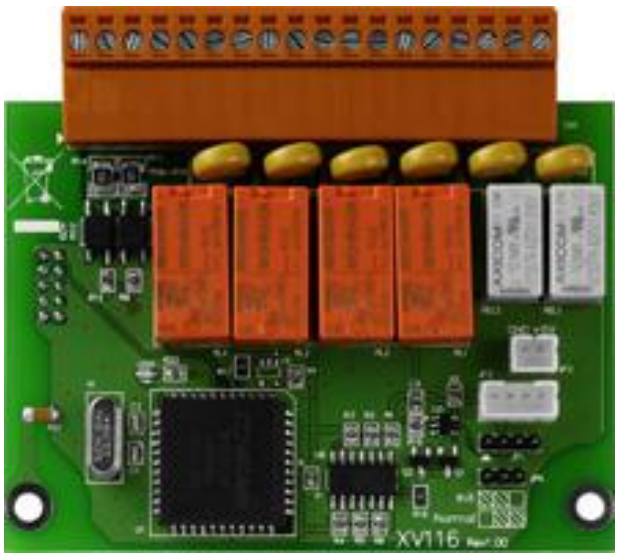
*1, *2: with the firmware version 2.00 and later, all the DI counters are 32-bit with maximum input frequency of 50Hz. While the firmware version is 1.00, DI counters are 16-bit with maximum input frequency of 100Hz.

Pin Assignment

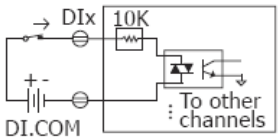
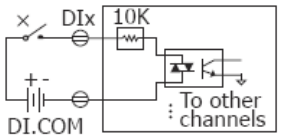
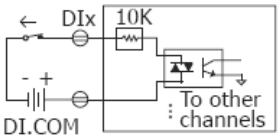
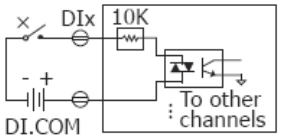
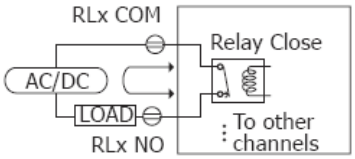
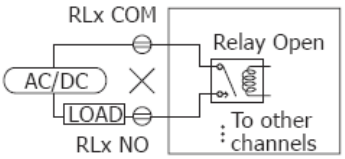


Internal I/O Structure





Wire Connections

Digital Input/Counter	Readback as 1	Readback as 0
Wet Contact (Sink)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Wet Contact (Source)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Power Relay	**Readback as 1**	**Readback as 0**
Relay Output		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00005	0000 : 0005	6	DO value	0: Off 1: On	R/W	-
00160 : 00165	00A0 : 00A5	6	Set the Power-on value of DO	0: Off 1: On	R/W	0
00192 : 00196	00C0 : 00C4	5	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DI status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0
00512 : 00516	0200 : 0204	5	Clear the DI counter value	1: Clear	W	-

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Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10000 : 10004	0000 : 0004	5	DI value	0: Off 1: On	R
10064 : 10068	0040 : 0044	5	Read DI “high latch” status	0: Normal 1: Latched	R
10096 : 10100	0060 : 0064	5	Read DI “low latch” status	0: Normal 1: Latched	R

Input Register (3xxxx)

For firmware 2.00 and later: (the firmware version can be read from address 40481)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30009	0000 : 0009	5	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

For firmware 1.00: (the firmware version can be read from address 40481)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30004	0000 : 0004	5	1	16-bit DI counter value	0 to 65535	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x1600	-	R	-
40483	01E3	1	1	Module name (high word), 0x5601	-	R	-

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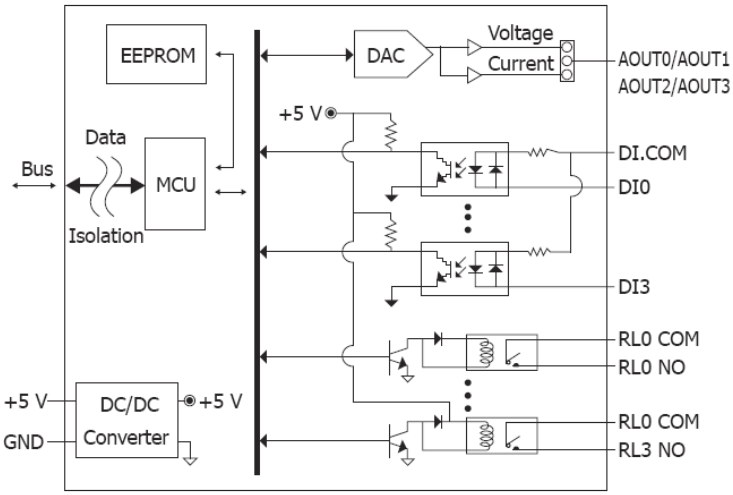
I/O Specifications

Analog Output		
Channels		4
Type		0 V ~ +5 V, ±5 V, 0 V ~ +10 V, ±10 V, 0 mA~ 20 mA, 4 mA~ 20 mA (Jumper Selectable)
Resolution		12-bit
Accuracy		±0.1%
Voltage Output Capability		10 V @ 20 mA
Current Load Resistance		500 Ω
Power-on Value		Yes, Programmable
Individual Channel Configuration		Yes
Digital Input/Counter		
Channels		4
Type		Wet Contact
Sink/Source (NPN/PNP)		Sink/Source
On Voltage Level		+3.5 V_{DC} ~ +50 V_{DC}
Off Voltage Level		+1 V_{DC} Max.
Input Impedance		10 KΩ, 0.5W
Counter	Channels	4
	Max. Count	4,294,967,285 (32-bit)
	Max. Input Frequency	50 Hz
	Min. Pulse Width	10 ms
Overvoltage Protection		+70 V_{DC}
Relay Output		
Channels		4
Type		Power Relay
Form A Relay	Contact Rating	6 A @ 35 V_{DC} 6 A @ 240 V_{AC}
	Min. Contact Load	100 mA @ ≧ 12 V
	Contact Material	Silver Cadmium Alloy
	Operate Time	5 ms (typical)
	Release Time	1 ms (typical)
	Mechanical Endurance	30 X 10^6 ops.
	Electrical Endurance	1 X 10^5 ops.
Power-on Value		Yes, Programmable

Pin Assignment

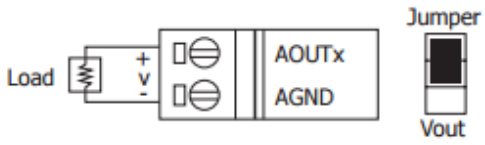
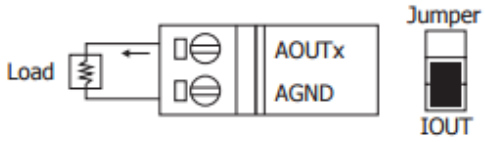


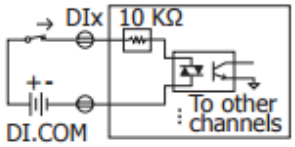
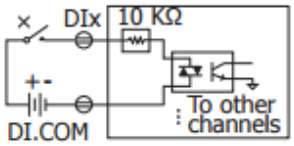
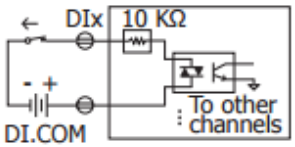
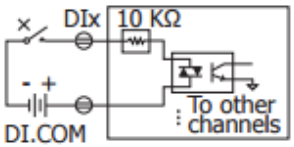
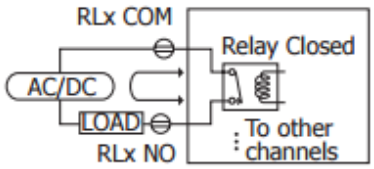
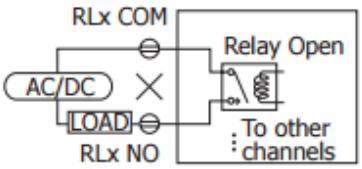
Internal I/O Structure





Wire Connections

Voltage Output
 (Factory Default)
Current Output


Digital Input/Counter	Readback as 1	Readback as 0
Wet Contact (Sink)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Wet Contact (Source)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Power Relay	**Readback as 1**	**Readback as 0**
Relay Output		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00003	0000 : 0003	4	DO value	0: Off 1: On	R/W	-
00160 : 00163	00A0 : 00A3	4	Set the Power-on value of DO	0: Off 1: On	R/W	0
00192 : 00195	00C0 : 00C3	4	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DIO status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0
00268	010C	1	Set the AI data format	0: Hexadecimal format 1: Engineering unit	R/W	0
00512 : 00515	0200 : 0203	4	Clear the DI counter value	1: Clear	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10032 : 10035	0020 : 0023	4	DI value	0: Off 1: On	R
10064 : 10067	0040 : 0043	4	Read “high latch” status of DI	0: Normal 1: Latched	R
10096 : 10099	0060 : 0063	4	Read “low latch” status of DI	0: Normal 1: Latched	R
10232 : 10235	00E8 : 00EB	4	Read the open or broken wire detection status of 4 mA ~ 20 mA of AO (*1)	0: Normal 1: Wire Opened	R

*1: Only the 4 ~ 20 mA of AO supports open or broken wire detection

Input Register (3xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30128 : 30135	0080 : 0087	4	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

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Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40032 : 40035	0020 : 0023	4	1	AO value	-	R/W	-
40192 : 40195	00C0 : 00C3	4	1	Set the Power-on value of AO	-	R/W	0
40288 : 40291	0120 : 0123	4	1	Set the slew rate of AO	0 to 15	R/W	0
40416 : 40419	01A0 : 01A3	4	1	Set the AO range * The jumper associated with an AO channel needs be set to voltage output or current output correctly to meet the AO range setting for the same channel.	0: 0~20 mA 1: 4 ~ 20 mA A 2: 0 ~ 10 V 3: ±10 V 4: 0 ~ 5 V 5: ±5 V	R/W	2
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x0300	-	R	-
40483	01E3	1	1	Module name (high word), 0x5603	-	R	-

Analog Output Range

Type Code	Range	Data Format	Minimum	Maximum
00	0 ~ 20 mA	Engineering	0	+20000
		Hexadecimal	0000h	FFFFh
01	4 ~ 20 mA	Engineering	+4000	+20000
		Hexadecimal	0000h	FFFFh
02	0 ~ +10 V	Engineering	0	+10000
		Hexadecimal	0000h	FFFFh
03	-10 ~ +10 V	Engineering	-10000	+10000
		Hexadecimal	8000h	7FFFh
04	0 ~ +5 V	Engineering	0	+5000
		Hexadecimal	0000h	FFFFh
05	-5 ~ +5 V	Engineering	-5000	+5000
		Hexadecimal	8000h	7FFFh

Analog Output Slew Rate

Set Value	V/s	mA/s
0	Immediate	
1	0.0625	0.125
2	0.125	0.25
3	0.25	0.5
4	0.5	1.0
5	1.0	2.0
6	2.0	4.0
7	4.0	8.0

Set Value	V/s	mA/s
8	8.0	16.0
9	16.0	32.0
10	32.0	64.0
11	64.0	128.0
12	128.0	256.0
13	256.0	512.0
14	512.0	1024.0
15	1024.0	2048.0

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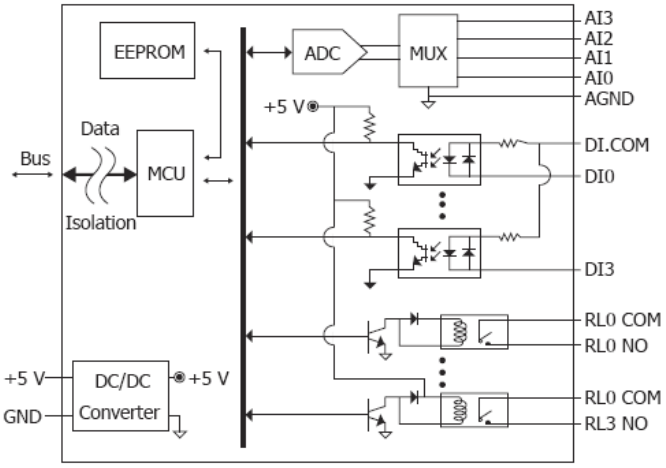
I/O Specifications

Analog Input		
Channels		4
Type		±1 V, ±2.5 V, ±5 V, ±10 V ±20 mA, 0~20 mA, 4~20 mA (Jumper Selectable)
Resolution		16-bit
Sampling Rate	Normal Mode	10 Hz
	Fast Mode	200 Hz
Accuracy	Normal Mode	±0.1%
	Fast Mode	±0.5%
Input Impedance		20 MΩ
Overvoltage Protection		+120 V_{DC}
Individual Channel Configuration		Yes
Digital Input/Counter		
Channels		4
Type		Wet Contact
Sink/Source (NPN/PNP)		Sink/Source
On Voltage Level		+3.5 V_{DC} ~ +50 V_{DC}
Off Voltage Level		+1 V_{DC} Max.
Input Impedance		10 KΩ, 0.5W
Counter	Channels	4
	Max. Count	4,294,967,285 (32-bit)
	Max. Input Frequency	50 Hz
	Min. Pulse Width	10 ms
Overvoltage Protection		+70 V_{DC}
Relay Output		
Channels		4
Type		Power Relay
Form A Relay	Contact Rating	6 A @ 35 V_{DC} 6 A @ 240 V_{AC}
	Min. Contact Load	100 mA @ ≧ 12 V
	Contact Material	Silver Cadmium Alloy
	Operate Time	5 ms (typical)
	Release Time	1 ms (typical)
	Mechanical Endurance	30 X 10^6 ops.
	Electrical Endurance	1 X 10^5 ops.
Power-on Value		Yes, Programmable

Pin Assignment

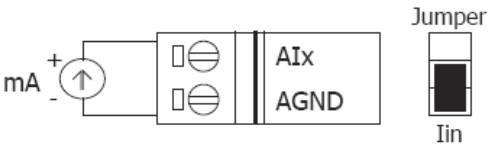


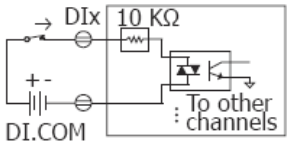
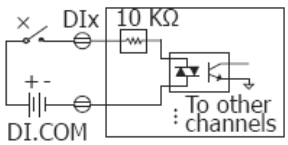
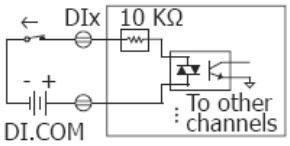
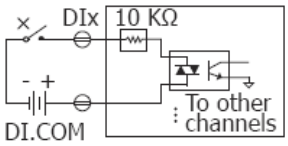
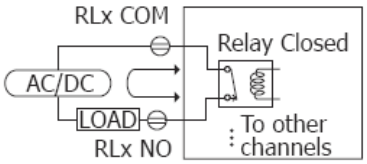
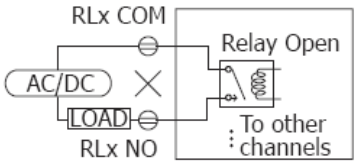
Internal I/O Structure





Wire Connections

Voltage Input
 (Factory Default)
Current Input


Digital Input/Counter	Readback as 1	Readback as 0
Wet Contact (Sink)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Wet Contact (Source)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Power Relay	**Readback as 1**	**Readback as 0**
Relay Output		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00003	0000 : 0003	4	DO value	0: Off 1: On	R/W	-
00160 : 00163	00A0 : 00A3	4	Set the Power-on value of DO	0: Off 1: On	R/W	0
00192 : 00195	00C0 : 00C3	4	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DIO status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0
00268	010C	1	Set the AI data format	0: Hexadecimal format 1: Engineering unit	R/W	0
00270	010E	1	Set the AI sampling rate	0: Normal mode (10 Hz) 1: Fast mode (200 Hz)	R/W	0
00512 : 00515	0200 : 0203	4	Clear the DI counter value	1: Clear	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10032 : 10035	0020 : 0023	4	DI value	0: Off 1: On	R
10064 : 10067	0040 : 0043	4	Read “high latch” status of DI	0: Normal 1: Latched	R
10096 : 10099	0060 : 0063	4	Read “low latch” status of DI	0: Normal 1: Latched	R
10224 : 10227	00E0 : 00E3	4	Read the open or broken wire detection status of 4 mA ~ 20 mA of AI (*1)	0: Normal 1: Wire Opened	R

*1: Only the 4 ~ 20 mA of AI supports open or broken wire detection

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Input Register (3xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30003	0000 : 0003	4	1	AI value	-32768 to 32767 (0x0000 to 0xFFFF)	R
30128 : 30135	0080 : 0087	4	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40256 : 40259	0100 : 0103	4	1	Set the AI range * The jumper associated with an AI channel needs be set to voltage input or current input correctly to meet the AI range setting for the same channel.	0x05: +/- 2.5 V 0x06: +/- 20 mA 0x08: +/- 10 V 0x09: +/- 5 V 0x0A: +/- 1 V 0x0D: +/-20 mA 0x1A: 0~20 mA 0x1D: 4 ~ 20 mA	R/W	0x08
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x0600	-	R	-
40483	01E3	1	1	Module name (high word), 0x5603	-	R	-
40489	01E9	1	1	Enable/Disable the AI channel * Each bit corresponds to one channel. * Disable an unused AI channel can increase the sampling rate of the using channels. Sampling rage per channel = [Total sampling rate] / [Enabled channel count]	0x00 ~ 0xFF Bit N=0: Disable the channel N Bit N=1: Enable the channel N	R/W	0x0F

Analog Input Range

Type Code	Range	Data Format	Minimum	Maximum	Open Wire (Broken Wire)
05	+/- 2.5 V	Engineering	-25000	+25000	-
		Hexadecimal	8000h	7FFFh	
06	+/- 20 mA	Engineering	-20000	+20000	-
		Hexadecimal	8000h	7FFFh	
08	+/- 10 V	Engineering	-10000	+10000	-
		Hexadecimal	8000h	7FFFh	
09	+/- 5 V	Engineering	-5000	+5000	-
		Hexadecimal	8000h	7FFFh	
0A	+/- 1 V	Engineering	-10000	+10000	-
		Hexadecimal	8000h	7FFFh	
0D	+/- 20 mA	Engineering	-20000	+20000	-
		Hexadecimal	8000h	7FFFh	
1A	0 ~ 20 mA	Engineering	0	+20000	-
		Hexadecimal	0000h	FFFFh	
1D	4 ~ 20 mA (*2)	Engineering	+4000	+20000	0
		Hexadecimal	1999h	7FFFh	0000

*2: Only the 4 ~ 20 mA of AI supports open or broken wire detection.

XV307

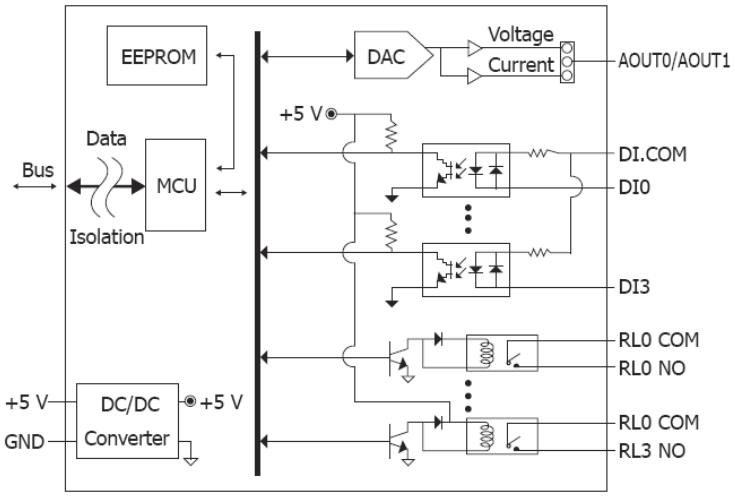
I/O Specifications

Analog Output		
Channels		2
Type		+0 V ~ +5 V, +0 V ~ +10 V, ±5 V, ±10 V 0~20 mA, 4~20 mA (Jumper Selectable)
Resolution		12-bit
Accuracy		±0.1%
Voltage Output Capability		10 V @ 20 mA
Current Load Resistance		500 Ω
Power-on Value		Yes
Individual Channel Configuration		Yes
Digital Input/Counter		
Channels		4
Type		Wet Contact
Sink/Source (NPN/PNP)		Sink/Source
On Voltage Level		+3.5 V_{DC} ~ +50 V_{DC}
Off Voltage Level		+1 V_{DC} Max.
Input Impedance		10 KΩ, 0.5W
Counter	Channels	4
	Max. Count	4,294,967,285 (32-bit)
	Max. Input Frequency	50 Hz
	Min. Pulse Width	10 ms
Overvoltage Protection		+70 V_{DC}
Relay Output		
Channels		4
Type		Power Relay
Form A Relay	Contact Rating	6 A @ 35 V_{DC} 6 A @ 240 V_{AC}
	Min. Contact Load	100 mA @ ≧ 12 V
	Contact Material	Silver Cadmium Alloy
	Operate Time	5 ms (typical)
	Release Time	1 ms (typical)
	Mechanical Endurance	30 X 10^6 ops.
	Electrical Endurance	1 X 10^5 ops.
Power-on Value		Yes, Programmable

Pin Assignment

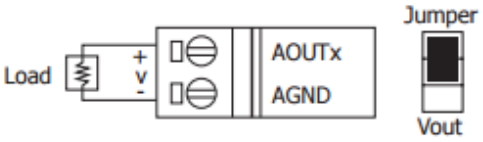
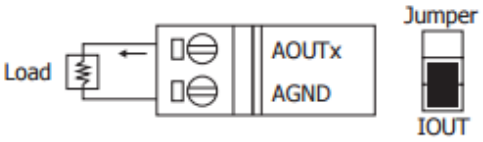


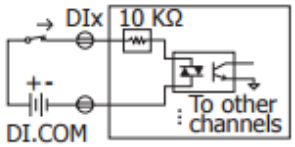
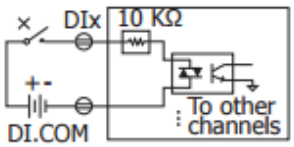
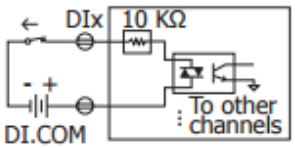
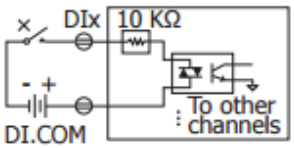
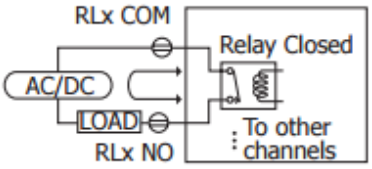
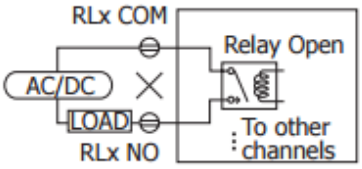
Internal I/O Structure





Wire Connections

Voltage Output
 (Factory Default)
Current Output


Digital Input/Counter	Readback as 1	Readback as 0
Wet Contact (Sink)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Wet Contact (Source)	+3.5 ~ +50 VDC	+1 VDC Max.
		
Power Relay	**Readback as 1**	**Readback as 0**
Relay Output		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00003	0000 : 0003	4	DO value	0: Off 1: On	R/W	-
00160 : 00163	00A0 : 00A3	4	Set the Power-on value of DO	0: Off 1: On	R/W	0
00192 : 00195	00C0 : 00C3	4	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DI status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0
00268	010C	1	Set the AO data format	0: Hexadecimal format 1: Engineering unit	R/W	0
00512 : 00515	0200 : 0203	4	Clear the DI counter value	1: Clear	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10032 : 10035	0020 : 0023	4	DI value	0: Off 1: On	R
10064 : 10067	0040 : 0043	4	Read DI “high latch” status	0: Normal 1: Latched	R
10096 : 10099	0060 : 0063	4	Read DI “low latch” status	0: Normal 1: Latched	R
10232 : 10233	00E8 : 00E9	2	Read the open or broken wire detection status of 4 ~ 20 mA of AO (*1)	0: Normal 1: Wire Opened	R

*1: Only the 4 ~ 20 mA of AO supports open or broken wire detection

Input Register (3xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30128 : 30135	0080 : 0087	4	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40032 : 40033	0020 : 0021	2	1	AO value	-	R/W	-
40192 : 40193	00C0 : 00C1	2	1	Set the Power-on value of AO	-	R/W	0
40288 : 40289	0120 : 0121	2	1	Set the slew rate of AO	0 to 15	R/W	0
40416 : 40417	01A0 : 01A1	2	1	Set the AO range * The jumper associated with an AO channel needs be set to voltage output or current output correctly to meet the AO range setting for the same channel.	0: 0~20 mA 1: 4~20 mA 2: 0 ~ 10 V 3: +/- 10 V 4. 0 ~ 5 V 5. +/- 5 V	R/W	0x02
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x0700	-	R	-
40483	01E3	1	1	Module name (high word), 0x5603	-	R	-

Analog Output Range

Type Code	Range	Data Format	Minimum	Maximum
00	0 ~ 20 mA	Engineering	0	+20000
		Hexadecimal	0000h	FFFFh
01	4 ~ 20 mA	Engineering	+4000	+20000
		Hexadecimal	0000h	FFFFh
02	+0 V ~ +10 V	Engineering	0	+10000
		Hexadecimal	0000h	FFFFh
03	+/- 10 V	Engineering	-10000	+10000
		Hexadecimal	8000h	7FFFh
04	+0 V ~ +5 V	Engineering	0	+5000
		Hexadecimal	0000h	FFFFh
05	+/- 5 V	Engineering	-5000	+5000
		Hexadecimal	8000h	7FFFh

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Analog Output Slew Rate

Set Value	V/s	mA/s
0	Immediate	
1	0.0625	0.125
2	0.125	0.25
3	0.25	0.5
4	0.5	1.0
5	1.0	2.0
6	2.0	4.0
7	4.0	8.0

Set Value	V/s	mA/s
8	8.0	16.0
9	16.0	32.0
10	32.0	64.0
11	64.0	128.0
12	128.0	256.0
13	256.0	512.0
14	512.0	1024.0
15	1024.0	2048.0

XV308

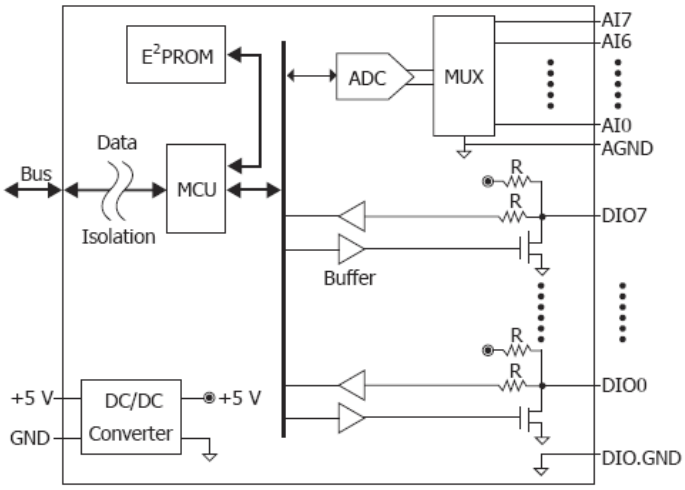
I/O Specifications

Analog Input			
Channels			8
Type			±1 V, ±2.5 V, ±5 V, ±10 V ±20 mA, 0~20 mA, 4~20 mA (Jumper Selectable)
Resolution			16-bit
Sampling Rate	Normal Mode		10 Hz
	Fast Mode		200 Hz
Accuracy	Normal Mode		±0.1%
	Fast Mode		±0.5%
Input Impedance			20 MΩ
Overvoltage Protection			+120 V_{DC}
Individual Channel Configuration			Yes
Universal Digital Input/Output			
Channels			Digital Input and Digital Output=8 (By Wire Connection)
Digital Input	Wet Contact	On Voltage Level	+1 V_{DC} Max.
		Off Voltage Level	+4 V_{DC} ~ +30 V_{DC}
	Dry Contact	On Voltage Level	Close to GND
		Off Voltage Level	Open
	Counters	Max. Count	4,294,967,285 (32-bit)
		Max. Input Frequency	50 Hz
		Min. Pulse Width	10 ms
	Overvoltage Protection		+60 V_{DC}
Digital Output	Output Type		Sink
	Max. Load Current		700 mA
	Load Voltage		3.5 ~ 50 V_{DC}
	Overvoltage Protection		+60 V_{DC}
	Overload Protection		Yes
	Short Circuit Protection		Yes
	Power-on Value		Yes, Programmable

Pin Assignment



Internal I/O Structure





The 8 Universal DI/DO channels on the XV308 can be individually selected to be DI channels or DO channels via wire connections.

When one is wired as a DI channel, the registers for DO value (00000 ~ 00007) and Power on value (00160 ~ 00167) associated with the channel need be set as 0.

Wire Connections

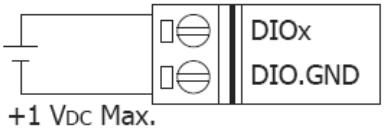
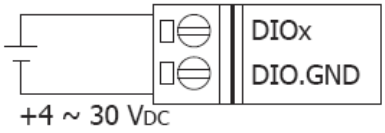
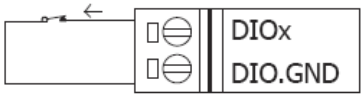
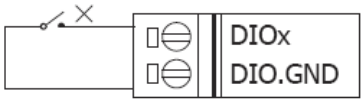
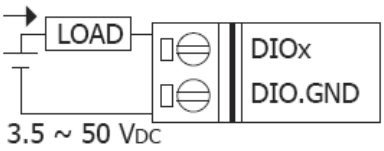
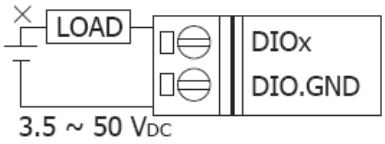
Voltage Input (Single-ended Mode)



(Factory Default)

Current Input (Single-ended Mode)



Digital Input/ Counter	ON State Readback as 1	OFF State Readback as 0
	+1 VDC Max.	+4 ~ 30 VDC
Wet Contact (Sink)		
Dry Contact (Source)		
Digital Output	**ON State Readback as 1**	**OFF State Readback as 0**
Open Collector (Sink)		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00007	0000 : 0007	8	DO value	0: Off 1: On	R/W	-
00160 : 00167	00A0 : 00A7	8	Set the Power-on value of DO	0: Off 1: On	R/W	0
00192 : 00199	00C0 : 00C7	8	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DI status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0
00268	010C	1	Set the AI data format	0: Hexadecimal format 1: Engineering unit	R/W	0
00270	010E	1	Set the AI sampling rate	0: Normal mode (10 Hz) 1: Fast mode (200 Hz)	R/W	0
00512 : 00519	0200 : 0207	8	Clear the DI counter value	1: Clear	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10032 : 10039	0020 : 0027	8	DI value To use a channel as a DI, the corresponding DO value and the power-on value need be set to 0.	0: Off 1: On	R
10064 : 10071	0040 : 0047	8	Read DI “high latch” status	0: Normal 1: Latched	R
10096 : 10103	0060 : 0067	8	Read DI “low latch” status	0: Normal 1: Latched	R
10224 : 00231	00E0 : 00E7	8	Read the open or broken wire detection status of 4 mA ~ 20 mA of AI (*1)	0: Normal 1: Wire Opened	R

*1: Only the 4 ~ 20 mA of AI supports open or broken wire detection

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Input Register (3xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30007	0000 : 0007	8	1	AI value	-32768 to 32767 (0x0000 to 0xFFFF)	R
30128 : 30143	0080 : 008F	8	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40256 : 40263	0100 : 0107	8	1	Set the AI range * The jumper associated with an AI channel needs be set to voltage input or current input correctly to meet the AI range setting for the same channel.	0x05: +/- 2.5 V 0x06: +/- 20 mA 0x08: +/- 10 V 0x09: +/- 5 V 0x0A: +/- 1 V 0x0D: +/-20 mA 0x1A: 0~20 mA 0x1D: 4 ~ 20 mA	R/W	0x08
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x0800	-	R	-
40483	01E3	1	1	Module name (high word), 0x5603	-	R	-
40489	01E9	1	1	Enable/Disable the AI channel * Each bit corresponds to one channel. * Disable an unused AI channel can increase the sampling rate of the using channels. Sampling rage per channel = [Total sampling rate] / [Enabled channel count]	0x00 ~ 0xFF Bit N=0: Disable the channel N Bit N=1: Enable the channel N	R/W	0xFF

Analog Input Range

Type Code	Range	Data Format	Minimum	Maximum	Open Wire (Broken Wire)
05	+/- 2.5 V	Engineering	-25000	+25000	-
		Hexadecimal	8000h	7FFFh	
06	+/- 20 mA	Engineering	-20000	+20000	-
		Hexadecimal	8000h	7FFFh	
08	+/- 10 V	Engineering	-10000	+10000	-
		Hexadecimal	8000h	7FFFh	
09	+/- 5 V	Engineering	-5000	+5000	-
		Hexadecimal	8000h	7FFFh	
0A	+/- 1 V	Engineering	-10000	+10000	-
		Hexadecimal	8000h	7FFFh	
0D	+/- 20 mA	Engineering	-20000	+20000	-
		Hexadecimal	8000h	7FFFh	
1A	0 ~ 20 mA	Engineering	0	+20000	-
		Hexadecimal	0000h	FFFFh	
1D	4 ~ 20 mA (*2)	Engineering	+4000	+20000	0
		Hexadecimal	1999h	7FFFh	0000

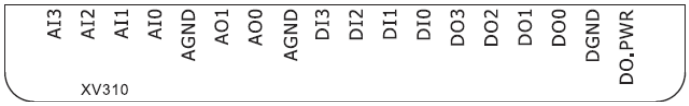
*2: Only the 4 ~ 20 mA of AI supports open or broken wire detection.

XV310

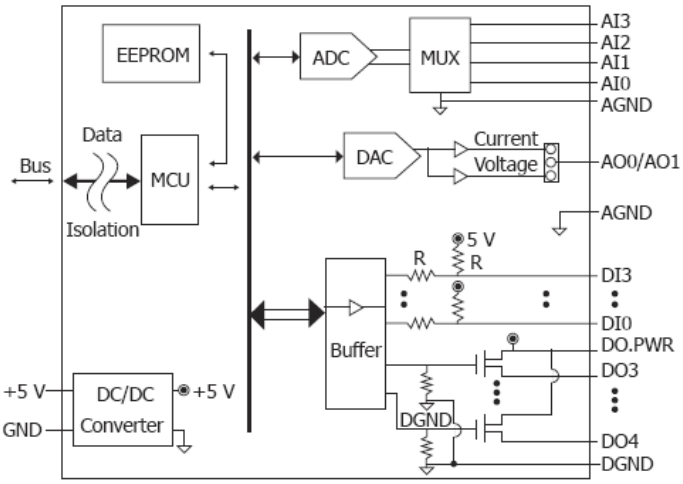
I/O Specifications

Analog Input		
Channels		4
Type		±1 V, ±2.5 V, ±5 V, ±10 V ±20 mA, 0~20 mA, 4~20 mA (Jumper Selectable)
Resolution		16-bit
Sampling Rate	Normal Mode	10 Hz
	Fast Mode	200 Hz
Accuracy	Normal Mode	±0.1%
	Fast Mode	±0.5%
Overvoltage Protection		+120 V_{DC}
Individual Channel Configuration		Yes
Analog Output		
Channels		2
Type		0 V ~ +5 V, 0 V ~ +10 V, ±5 V, ±10 V, 0~20 mA, 4~20 mA (Jumper Selectable)
Resolution		12-bit
Accuracy		±0.1%
Voltage Output Capability		10 V @ 20 mA
Current Load Resistance		500 Ω
Power-on Value		Yes
Digital Input		
Channels		4
Type		Dry Contact
Sink/Source (NPN/PNP)		Source
On Voltage Level		Close to GND
Off Voltage Level		Open
Input Impedance		-
Counters	Max. Count	4,294,967,285 (32-bit)
	Max. Input Frequency	50 Hz
	Min. Pulse Width	10 ms
Overvoltage Protection		+60 V_{DC}
Digital Output		
Channels		4
Type		Source
Max. Load Current		650 mA/channel
Load Voltage		+10 V_{DC} ~ +40 V_{DC}
Overvoltage Protection		+47 V_{DC}
Overload Protection		Yes
Short-circuit Protection		Yes
Power-on Value		Yes, Programmable

Pin Assignment

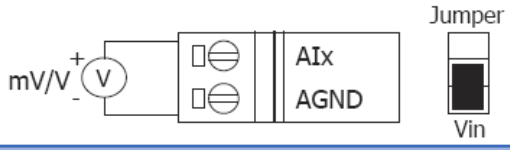
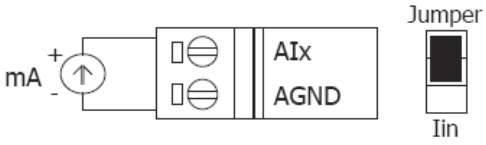
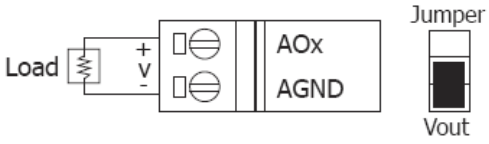
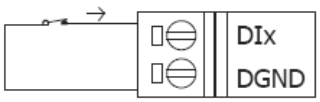
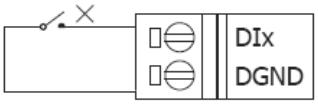
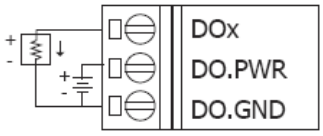
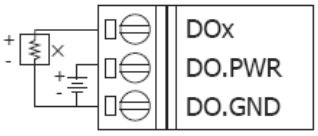


Internal I/O Structure





Wire Connections

Voltage Input		
	(Factory Default)	
Current Input		
		
Voltage Output		
	(Factory Default)	
Current Output		
		
Digital Input/ Counter	**ON State Readback as 1**	**OFF State Readback as 0**
Dry Contact (Source)		
Digital Output	**ON State Readback as 1**	**OFF State Readback as 0**
Open Drain (Source)		

Modbus Register Table

Coils (0xxxx)

Register		Points	Description	Data Format	Attribute	Factory Default
DEC	HEX					
00000 : 00003	0000 : 0003	4	DO value	0: Off 1: On	R/W	-
00160 : 00163	00A0 : 00A3	4	Set the Power-on value of DO	0: Off 1: On	R/W	0
00192 : 00195	00C0 : 00C3	4	Set the trigger mode of DI counter	0: Counted at falling edge 1: Counted at rising edge	R/W	0
00263	0107	1	Clear latched DI status	1: Clear	W	-
00264	0108	1	Enable/Disable the inverse operation of DI signal	0: Disable 1: Enable	R/W	0
00265	0109	1	Enable/Disable the inverse operation of DO signal	0: Disable 1: Enable	R/W	0
00268	010C	1	Set the AI/AO data format	0: Hexadecimal format 1: Engineering unit	R/W	0
00270	010E	1	Set the AI sampling rate	0: Normal mode (10 Hz) 1: Fast mode (200 Hz)	R/W	0
00512 : 00515	0200 : 0203	4	Clear the DI counter value	1: Clear	W	-

Discrete Inputs (1xxxx)

Register		Points	Description	Data Format	Attribute
DEC	HEX				
10032 : 10035	0020 : 0023	4	DI value	0: Off 1: On	R
10064 : 10067	0040 : 0043	4	Read DI “high latch” status	0: Normal 1: Latched	R
10096 : 10099	0060 : 0063	4	Read DI “low latch” status	0: Normal 1: Latched	R
10224 : 10227	00E0 : 00E3	4	Read the open or broken wire detection status of 4 mA ~ 20 mA of AI (*1)	0: Normal 1: Wire Opened	R
10232 : 10233	00E8 : 00E9	2	Read the open or broken wire detection status of 4 ~ 20 mA of AO (*2)	0: Normal 1: Wire Opened	R

*1, *2: Only the 4 ~ 20 mA of AI and AO support open or broken wire detection

Input Register (3xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute
DEC	HEX					
30000 : 30003	0000 : 0003	4	1	AI value	-32768 to 32767 (0x0000 to 0xFFFF)	R
30128 : 30135	0080 : 0087	4	2	DI counter value Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678	0 to 4294967295	R

Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40032 : 40033	0020 : 0021	2	1	AO value	-	R/W	-
40192 : 40193	00C0 : 00C1	2	1	Set the Power-on value of AO	-	R/W	0
40256 : 40259	0100 : 0103	4	1	Set the AI range * The jumper associated with an AI channel needs be set to voltage input or current input correctly to meet the AI range setting for the same channel.	0x05: +/- 2.5 V 0x06: +/- 20 mA 0x08: +/- 10 V 0x09: +/- 5 V 0x0A: +/- 1 V 0x0D: +/-20 mA 0x1A: 0~20 mA 0x1D: 4 ~ 20 mA	R/W	0x08
40288 : 40289	0120 : 0121	2	1	Set the slew rate of AO	0 to 15	R/W	0
40416 : 40417	01A0 : 01A1	2	1	Set the AO range * The jumper associated with an AO channel needs be set to voltage output or current output correctly to meet the AO range setting for the same channel.	0: 0~20 mA 1: 4~20 mA 2: 0 ~ 10 V 3: +/- 10 V 4. 0 ~ 5 V 5. +/- 5 V	R/W	0x02
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x1000	-	R	-
40483	01E3	1	1	Module name (high word), 0x5603	-	R	-
40489	01E9	1	1	Enable/Disable the AI channel * Each bit corresponds to one channel. * Disable an unused AI channel can increase the sampling rate of the using channels.	0x00 ~ 0x0F Bit N=0: Disable the channel N	R/W	0x0F

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				Sampling rage per channel = [Total sampling rate] / [Enabled channel count]	Bit N=1: Enable the channel N		

Analog Input Range

Type Code	Range	Data Format	Minimum	Maximum	Open Wire (Broken Wire)
05	+/- 2.5 V	Engineering	-25000	+25000	-
		Hexadecimal	8000h	7FFFh	
06	+/- 20 mA	Engineering	-20000	+20000	-
		Hexadecimal	8000h	7FFFh	
08	+/- 10 V	Engineering	-10000	+10000	-
		Hexadecimal	8000h	7FFFh	
09	+/- 5 V	Engineering	-5000	+5000	-
		Hexadecimal	8000h	7FFFh	
0A	+/- 1 V	Engineering	-10000	+10000	-
		Hexadecimal	8000h	7FFFh	
0D	+/- 20 mA	Engineering	-20000	+20000	-
		Hexadecimal	8000h	7FFFh	
1A	0 ~ 20 mA	Engineering	0	+20000	-
		Hexadecimal	0000h	FFFFh	
1D	4 ~ 20 mA (*3)	Engineering	+4000	+20000	0
		Hexadecimal	1999h	7FFFh	0000

*3: Only the 4 ~ 20 mA of AI supports open or broken wire detection.

Analog Output Range

Type Code	Range	Data Format	Minimum	Maximum
00	0 ~ 20 mA	Engineering	0	+20000
		Hexadecimal	0000h	FFFFh
01	4 ~ 20 mA	Engineering	+4000	+20000
		Hexadecimal	0000h	FFFFh
02	+0 V ~ +10 V	Engineering	0	+10000
		Hexadecimal	0000h	FFFFh
03	+/- 10 V	Engineering	-10000	+10000
		Hexadecimal	8000h	7FFFh
04	+0 V ~ +5 V	Engineering	0	+5000
		Hexadecimal	0000h	FFFFh
05	+/- 5 V	Engineering	-5000	+5000
		Hexadecimal	8000h	7FFFh

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Analog Output Slew Rate

Set Value	V/s	mA/s
0	Immediate	
1	0.0625	0.125
2	0.125	0.25
3	0.25	0.5
4	0.5	1.0
5	1.0	2.0
6	2.0	4.0
7	4.0	8.0

Set Value	V/s	mA/s
8	8.0	16.0
9	16.0	32.0
10	32.0	64.0
11	64.0	128.0
12	128.0	256.0
13	256.0	512.0
14	512.0	1024.0
15	1024.0	2048.0

XV484

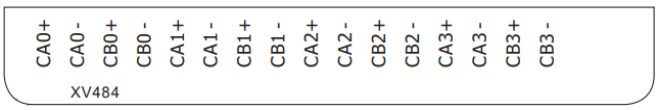
I/O Specifications

Counter/Frequency/Encoder Input	
Channels	4-ch Up/Down Counter (CW/CCW) 4-ch Dir/Pulse Counter (Bi-direction) 4-ch A/B Phase Counter (Quadrant Counting) 8-ch Up Counter 8-ch Frequency
Contact	Wet
Sink/Source (NPN/PNP)	Sink
Types	Counter, Frequency or Encoder
Counter/Encoder-bits	32-bit (4,294,967,295)
ON Voltage Level	+3.5 VDC ~ +30 VDC
OFF Voltage Level	+1 VDC Max.
Programmable Digital Filter	1 ~ 32767 μs
Individual Channel Configuration	Yes
Counter Mode	Up or Up/Down
Encoder Mode	CW/CCW, Dir/Pulse, AB Phase
Frequency Mode	Yes
Max. Speed	3.5 VDC ~ 10 VDC: 200 kHz 10 VDC ~ 30 VDC: 150 kHz
Frequency Accuracy	1 Hz~200 kHz = ±0.025% of Input Frequency (*1)
Virtual Battery Backup to Preserve Counter Values	Yes

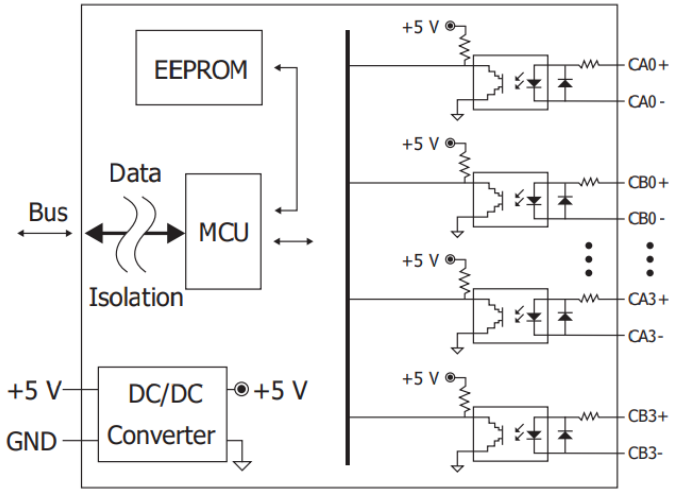
*1: Frequency error related to input range:

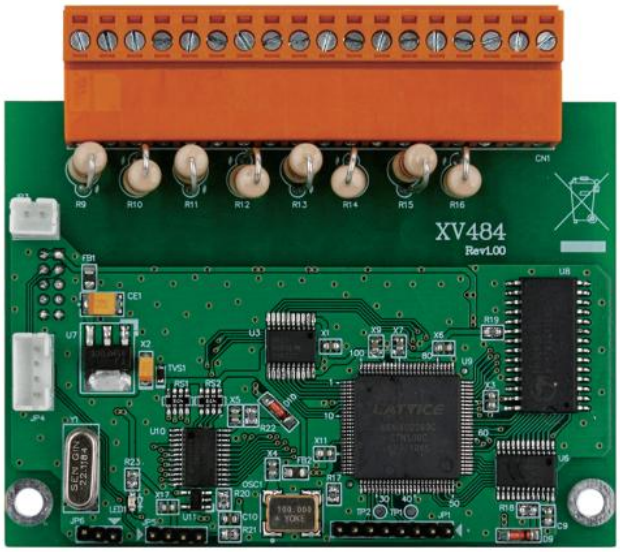
Frequency Range	Frequency Error (typical)
1 Hz ~ 10 Hz	0.01 Hz
10 Hz ~ 10 KHz	0.5 Hz
10 KHz ~ 100 KHz	15 Hz
100 KHz ~ 200 KHz	30 Hz

Pin Assignment

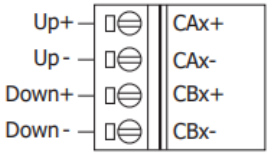
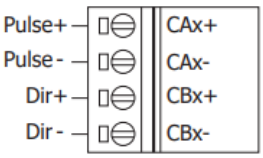
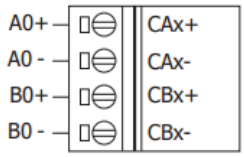


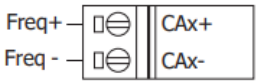
Internal I/O Structure





Wire Connections

	Counter Type
Up	
Up/Down	
Dir/Pulse	
A/B Phase	

	Frequency Type
Frequency	

Modbus Register Table

Coils (0xxxx)

Register DEC	Register HEX	Points	Description	Data Format	Attribute	Factory Default
00032 : 00039	0020 : 0027	8	Input status after XOR mask for channel 0 to 7.	0: Off 1: On	R	-
00040 : 00047	0028 : 002F	8	Input status after low-pass filter for channel 0 to 7.	0: Off 1: On	R	0
00064 : 00071	0040 : 0047	8	Counter overflow status for channel 0 to 7. Write 1 to clear overflow status.	0: Normal 1: Overflow occurs	R/W	0
00268	010C	1	Data format for frequency type.	0: Hex 1: Float	R/W	-
00512 : 00519	0200 : 0207	8	Write 1 to clear counter 0 ~ 7.	-	W	-
00768 : 00775	0300 : 0307	8	Enable battery backup for counter 0 to 7	0: Disable 1: Enable	R/W	-
00800 : 00807	0320 : 0327	8	Automatic switching between high/low frequency mode for frequency measurement of channel 0 to 7	0: Disable 1: Enable	R/W	-
00832 : 00839	0340 : 0347	8	High/low frequency mode for frequency measurement of channel 0 to 7 It is recommended to set to high frequency mode for frequency larger than 10 KHz.	0: Low 1: High	R/W	-
00864 : 00871	0360 : 0367	8	Stop counting on counter overflow for channel 0 to 7	0:Keep counting 1: Stop	R/W	-
00896 : 00903	0380 : 0387	8	Enable low pass filter for channel 0 to 7.	0: Disable 1: Enable	R/W	-
00928 : 00935	03A0 : 03A7	8	XOR mask for channel 0 to 7.	-	R/W	-

Input Register (3xxxx)

Register DEC	Register HEX	Points	No. Per Point	Description	Data Format	Attribute
30000 : 30015	0000 : 000F	8	2	Counter/ frequency value of channel 0 to 7 Each 32-bit counter is calculated by formula: register_high x 65536 + register_low Example: Register_low=0x5678 Register_high=0x1234 32-bit value = 0x1234 x 65536 + 0x5678 = 0x12345678 Data format of frequency value can be Hexadecimal (32-bit unsigned integer) or IEEE-754 floating point, according to the setting in register 00268.	0 to 4294967295	R

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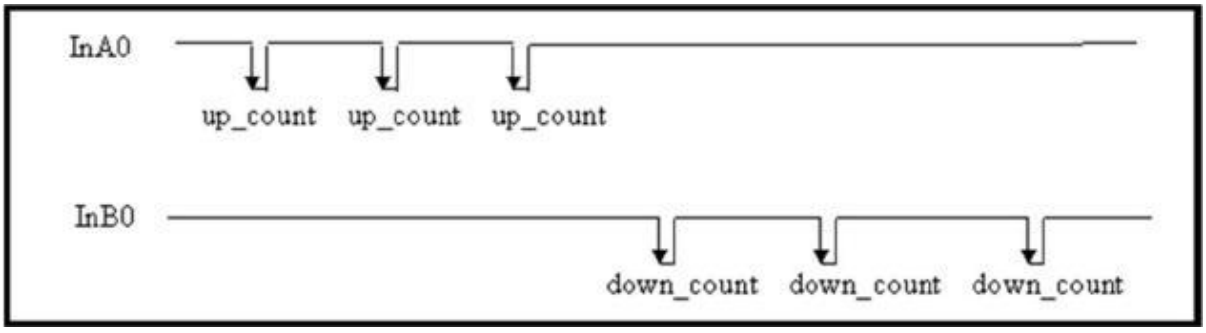
Holding Register (4xxxx)

Register		Points	No. Per Point	Description	Data Format	Attribute	Factory Value
DEC	HEX						
40064 : 40079	0040 : 004F	8	2	Maximum value for up counter 0 to 7, two registers for each channel	0 to 4294967295	R/W	-
40096 : 40111	0060 : 006F	8	2	Preset value of counter 0 to 7, two registers for each channel	0 to 4294967295	R/W	-
40160	00A0	1	1	Frequency measurement timeout in 100ms	1 to 255	R/W	-
40161	00A1	1	1	Low-pass filter time for channel 0 and 1 in µs	1 to 32767	R/W	-
40162	00A2	1	1	Low-pass filter time for channel 2 and 3 in µs	1 to 32767	R/W	-
40163	00A3	1	1	Low-pass filter time for channel 4 to 7 in µs	1 to 32767	R/W	-
40256 : 40263	0100 : 0107	8	1	Type code of channel 0 to 7	50: Up 51: Freq 54: Up/down 55: Pulse/dir 56: Quad	R/W	-
40480	01E0	1	1	Firmware version (low word)	0 to 255	R	-
40481	01E1	1	1	Firmware version (high word)	0 to 255	R	-
40482	01E2	1	1	Module name (low word), 0x8400	-	R	-
40483	01E3	1	1	Module name (high word), 0x5604	-	R	-
40489	01E9	1	1	Start/stop counting, bit 0 for ch0, bit 1 for ch1, …	Bit 0 to 7 0: Stop 1: Start	R/W	-

Counter Type and Data Format Table

Type Code	Counter Type	Data Format	Minimum	Maximum
50	Up	Hexadecimal	00000000h	FFFFFFFFh
54	Up/down	Hexadecimal	80000000h	7FFFFFFFh
55	Pulse/direction	Hexadecimal	80000000h	7FFFFFFFh
56	Quadrature	Hexadecimal	80000000h	7FFFFFFFh

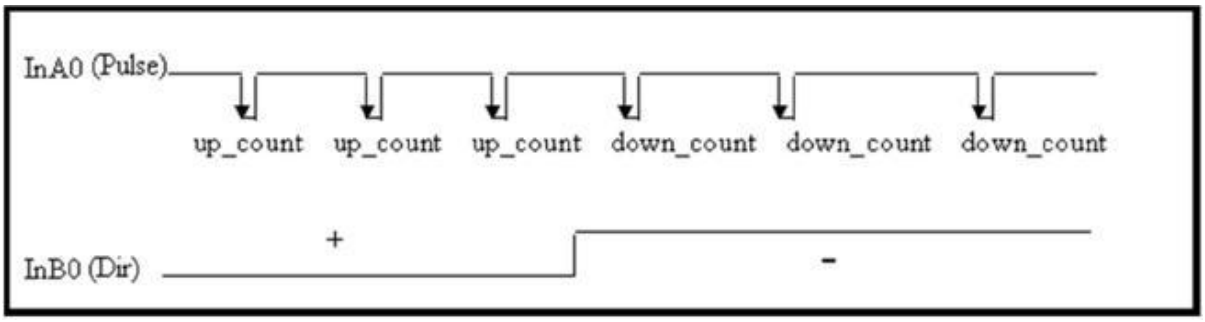
Up/down Counting



When InA0 is used as an up counting clock and InB0 is used as a down counting clock, the counter will be increased by one for every falling edge of InA0 and decreased by one for every falling edge of InB0.

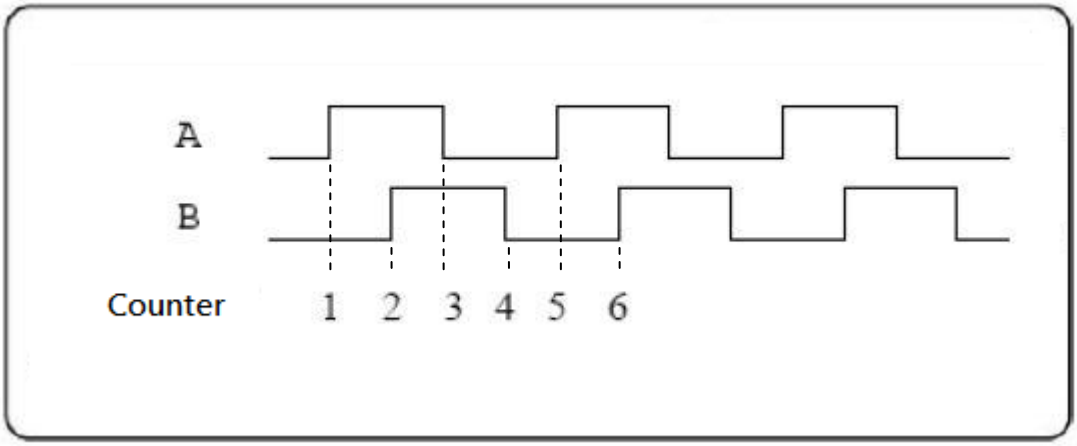
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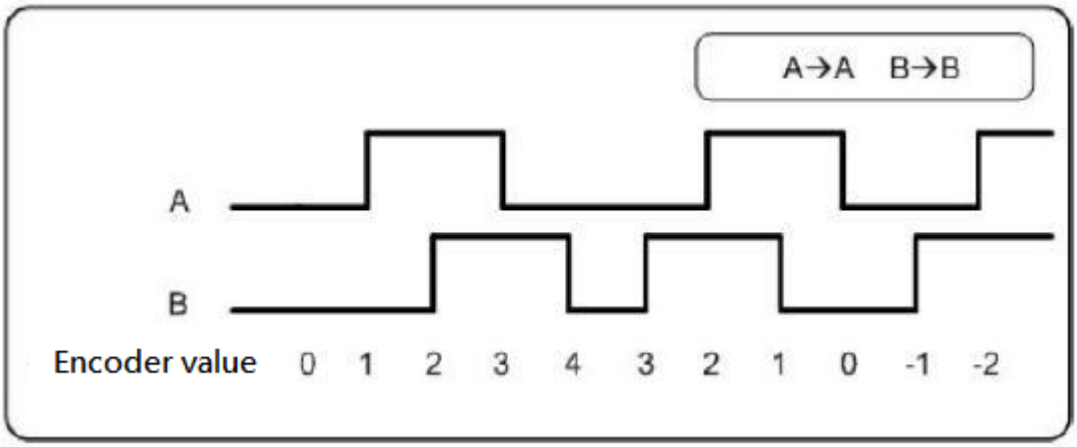
Pulse/direction Counting



The InB0 is used for direction counting. When InB0 is low, the counter will be increased by one for every falling edge of InA0. When InB0 is high, the counter will be decreased by one for every falling edge of InA0.

Quadrature Counting





When InA0 is used as the A signal and InB0 is used as the B signal, the counter will be increased by one when the InA0 phase leads by 90 degrees to InB0 and the counter will be decreased by one when the InA0 phase lags by 90 degrees to InB0.

Revision History

Revision	Date	Description
1.0.0	2015/01	First released
1.0.1	2015/05	Added Coil Register 00268 for XV306 and XV307.
1.0.2	2016/05	Added DI counter specification and Modbus address information for XV-107/107A/110/116 with firmware version 1.00.
1.0.3	2018/08	Added XV303 information.
1.0.4	2019/12	Added XV484 information.

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