Digital AC Input Modules

	1738-IA2M12AC3 1738-IA2M12AC4
Number of Inputs	2
Keyswitch Position	8
Voltage, On-State Input, Nom.	120V ac
Voltage, On-State Input, Min.	65V ac
Voltage, On-State Input, Max.	132V ac
Input Delay Time, ON to OFF, Hardware Delay, Max.	20 ms hardware filter plus 0…65 ms digital filter programmable in increments of 1 ms∗
Current, On-State Input, Min.	3.7 mA
Input Impedance, Nom.	10.6 kΩ
Current, Off-State Input, Max.	2.5 mA
PointBus Current (mA)	75
Power Dissipation, Max.	0.7 W @ 132V ac

∗Input ON-to-OFF delay time is the time from a valid input signal to recognition by the module.

Digital AC Output Module

	1738-OA2M12AC3
Number of Outputs	2
Keyswitch Position	8
Voltage, On-State Output, Nom.	120V ac, 220V ac
Voltage, On-State Output, Min.	74V ac
Voltage, On-State Output, Max.	264V ac
Output Current Rating	1.5 A (2 channels @ 0.75 A each)
PointBus Current (mA)	75
Power Dissipation, Max.	0.8 W @ 28.8V dc

Digital DC Input Modules

	1738-IB2M12	1738-IB4M8 1738-IB4M12	1738-IB8M8 1738-IB8M12 1738-IB8M23	1738-IV4M12	1738-IV8M8 1738-IV8M12 1738-IV8M23
Number of Inputs	2 Sinking	4 Sinking	8 Sinking	4 Sourcing	8 Sourcing
Keyswitch Position	1	1	1	1	1
Voltage, On-State Input, Nom.	24V dc	24V dc	24V dc	24V dc	24V dc
Voltage, On-State Input, Min.	10V dc	10V dc	10V dc	10V dc	10V dc
Voltage, On-State Input, Max.	28.8V dc	28.8V dc	28.8V dc	28.8V dc	28.8V dc
Input Delay Time, ON to OFF	0.5 ms hardware + (0…65 ms selectable)∗	0.5 ms hardware + (0…65 ms selectable)∗	0.5 ms hardware + (0…65 ms selectable)∗	0.5 ms hardware + (0…65 ms selectable)∗	0.5 ms hardware + (0…65 ms selectable)∗
Current, On-State Input, Min.	2 mA	2 mA	2 mA	2 mA	2 mA
Current, On-State Input, Max.	5 mA	5 mA	5 mA	5 mA	5 mA
Current, Off-State Input, Max.	1.5 mA	1.5 mA	1.5 mA	1.5 mA	1.5 mA
PointBus Current (mA)	75	75	75	75	75
Power Dissipation, Max.	0.7 W @ 28.8V dc	1.0 W @ 28.8V dc	1.6 W @ 28.8V dc	1.0 W @ 28.8V dc	1.6 W @ 28.8V dc

∗Input ON-to-OFF delay time is the time from a valid input signal to recognition by the module.

Digital DC Output Modules

	1738-OB2EM12	1738-OB2EPM12	1738-OB4EM8 1738-OB4EM12	1738-OB8EM8 1738-OB8EM12 1738-OB8M23	1738-OV4EM12
Number of Outputs	2	2	4	8	4
Keyswitch Position	1	1	1	1	1
Voltage, On-State Output, Nom.	24V dc	24V dc	24V dc	24V dc	24V dc
Voltage, On-State Output, Min.	10V dc	10V dc	10V dc	10V dc	10V dc
Voltage, On-State Output, Max.	28.8V dc	28.8V dc	28.8V dc	28.8V dc	28.8V dc
Output Current Rating, Max.	2.0 A per module, 1.0 A per channel	4.0 A per module, 2.0 A per channel	3.0 A per module, 1.0 A per channel	3.0 A per module, 1.0 A per channel	4.0 A per module, 1.0 A per channel
PointBus Current (mA)	75	75	75	75	75
Power Dissipation, Max.	0.8 W @ 28.8V dc	3.4 W @ 28.8V dc	1.2 W @ 28.8V dc	2.0 W @ 28.8V dc	2.9 W @ 28.8V dc

Digital Contact Output Modules

	1738-OW4M12 1738-OW4M12AC4
Number of Outputs	4 Form A (N.O.) relays, isolated
Keyswitch Position	7
Output Delay Time, ON to OFF, Max.	26 ms✶
Contact Resistance, Initial	30 mΩ
Leakage Current, Off-State Output, Max.	1.2 mA and bleed resistor thru snubber circuit @ 240V ac
PointBus Current (mA)	80
Power Dissipation, Max.	0.5 W

✶Time from valid output off signal to relay deenergization by module.

Analog, Thermocouple, and RTD I/O Modules

The ArmorPoint analog and temperature I/O modules support: on-board, channel-level data alarming (four set-points per channel); scaling to engineering units; channel-level diagnostics (electronic bits and LEDs); and integer format.

Choose analog, thermocouple, and/or RTD I/O modules when you need:

- **Individually configurable channels** to use the module(s) with a variety of sensors.
- **On-board scaling** to eliminate the need to scale the data in the controller. Controller processing time and power are preserved for more important tasks, such as I/O control, communications, or other user-driven functions.
- **On-line configuration.** Modules can be configured in the RUN mode using the programming software or the control program. This allows you to change configuration while the system is operating. For example, the input filter for a particular channel could be changed, or a channel could be disabled based on a batch condition. *To use this feature, the controller and network interface must also support this feature.*
- **Over- and under-range detections and indications.** This eliminates the need to test values in the control program, saving valuable processing power of the controller. In addition, since alarms are handled by the module, the response is faster and only a single bit per channel is monitored to determine if an error condition has occurred.
- **Ability to direct output device operation during an abnormal condition.** Each channel of the output module can be individually configured to hold its last value or assume a user-defined value on a fault condition. This feature allows you to set the condition of your analog devices, and therefore your control process, which may help to ensure a reliable shutdown.
- **Ability to individually enable and disable channels.** Disabling unused channels improves module performance.
- **Selectable input filters** This lets you select the filter frequencies for each channel that best meets the performance needs of your application based on environmental limitations. Lower filter settings provide greater noise rejection and resolution. Higher filter settings provide faster performance. *Note: The analog modules provide four input filter selections; RTD and thermocouple modules provide six.*
- **Selectable response to broken input sensor.** This feature provides feedback to the controller that a field device is not connected or operating properly. This lets you specify corrective action based on the bit or channel condition.
- **High accuracy.** The modules share a high accuracy rating of ±0.1% of full-scale accuracy at 25 °C.

Analog Input Modules

	1738-IE2CM12	1738-IE2VM12	1738-IR2M12✶	1738-IT2IM12✶
Number of Inputs	2	2	2	2
Keyswitch Position	3	3	6	6
Input Signal Range	4…20 mA 0…20 mA	0…10V ±10V	0…600 Ω	±75 mV
Input Resolution, Bits	16 bits - over 21 mA 0.32 μA/cnt	15 bits plus sign 320 μV/cnt in unipolar or bipolar mode	16 bits 9.5 mV/cnt 0.03 °C/cnt (pt 385 @ 25 °C)	15 bits plus sign 2.5 mV per count
Absolute Accuracy, Current Input	0.1% Full Scale @ 25 °C❋	—	—	—
Absolute Accuracy, Voltage Input	—	0.1% Full Scale @ 25 °C ❋	0.1% Full Scale @ 25 °C❋‡	0.1% Full Scale @ 25 °C❋‡
Input Step Response, per Channel	70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz	70 ms @ Notch = 60 Hz (default) 80 ms @ Notch = 50 Hz 16 ms @ Notch = 250 Hz 8 ms @ Notch = 500 Hz	—	—
Input Conversion Type	Delta Sigma	Delta Sigma	—	—
PointBus Current (mA)	75	75	220	175
Power Dissipation, Max.	0.6 W @ 28.8V dc	0.75 W @ 28.8V dc	1.0 W	1.0 W

❋Includes offset, gain, non-linearity and repeatability error terms.
‡ Analog and temperature input modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting; four-alarm and annunciation set-points; calibration mode and electronic reporting; under- and over-range and electronic reporting; channel signal range and update rate and on-board scaling; filter-type; temperature scale; channel update rate.

Analog Output Modules

	1738-OE2CM12	1738-OE2VM12
Number of Outputs	2	2
Keyswitch Position	4	4
Output Signal Range	4…20 mA 0…20 mA	0…10V ±10V
Output Resolution, Bits	13 bits - over 21 mA 2.5 μA/cnt	14 bits (13 plus sign) 1.28 mV/cnt in unipolar or bipolar mode
Absolute Accuracy, Current Output	0.1% Full Scale @ 25 °C✶❋	—
Absolute Accuracy, Voltage Output	—	0.1% Full Scale @ 25 °C ✶❋
Step Response to 63% of FS, Current Output	24 μs	—
Step Response to 63% of FS, Voltage Output	—	20 μs
Output Conversion Rate	16 μs	20 μs
PointBus Current (mA)	75	75
Power Dissipation, Max.	1.0 W @ 28.8V dc	1.0 W @ 28.8V dc

✶Includes offset, gain, non-linearity and repeatability error terms.
❋ Analog output modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting (OE2C only); fault mode; idle mode; alarms; channel signal range and on-board scaling.

Temperature Module Alarms

ArmorPoint I/O temperature modules are capable of detecting and communicating the following electronic conditions:

- over-range alarm
- under-range alarm
- level alarm (low-low, low, high, high-high)
- open-wire alarm

Over-Range Alarm

The channel over-range alarm is set if the input is greater than the maximum temperature (thermocouple or RTD range dependent), millivolt (+75V) or resistance (600 Ω) range value, or above the maximum range of the thermocouple or RTD.

The cold-junction compensator has its own over-range alarm. If the CJC temperature goes above 70 °C, the over-range alarm is set.

Under-Range Alarm

The channel under-range alarm is set if the input is less than the minimum temperature (thermocouple or RTD range dependent), millivolt (-75 mV) or resistance (10 Ω) range value, or below the minimum range of the thermocouple or RTD.

The cold-junction compensator has its own under-range alarm. If the CJC temperature goes below 0 °C, the under-range alarm is set.

Level Alarms

There are four level alarms:

- low
- low-low
- high
- high-high

When the channel input goes below a low alarm or above a high alarm, a bit is set in the data table. All alarm status bits can be read individually or by reading the channel status byte (bits 2-5 for channel 0; bits 10-13 for channel 1).

Each channel alarm can be configured individually.

Open-Wire Alarm

The module has the ability to check for a broken or detached wire. In any mode, if a broken/detached lead is detected, the data value is forced to maximum and the over-range alarm is set. Once the alarm is issued, it remains active as long as the input signal is faulted.

Cold-Junction Compensation (1738-IT2IM12 Only)

When using thermocouples, cold-junction compensation is required at the termination of the thermocouple wire. Cold-junction can be accomplished in two ways:

- enter an estimated temperature
- an M12 terminal chamber with built-in CJC

To use the M12 terminal chamber, order 871A-TS4CJC-DM (straight) or 871A-TR4CJC-DM (right-angle)

Entering an estimated temperature is the least accurate way for cold-junction compensation.

An open cold-junction compensator sets the input point to the maximum temperature value for the selected input type, setting an alarm. Once the alarm is issued, it remains active as long as the input signal is faulted (above maximum).

Cold-Junction Enable (1738-IT2IM12 Only)

Set this bit to enable or disable the cold-junction linearization. If enabled, the proper cold-junction compensation value will be applied to the selected thermocouple. If disabled, the data (cold-junction temperature) will still be available but not applied to the input. A cold-junction value can be added using the cold-junction offset parameter.

Noise Filtering (1738-IR2M12 Only)

You can select the type and amount of noise filtering on each individual channel:

- notch filter of analog to digital converter
- first-order, low-pass digital filter

Choose the filter that provides you with the update and step response that most closely matches your system requirements.

ArmorPoint I/O Temperature Input Module Specifications

	1738-IR2M12	1738-IT2IM12
Number of Inputs	2	2
Input Resolution, Bits	—	—
Thermocouple Type and Resolution Average Over Span	—	Type B, 30…1820° C, 3 counts/ ° C Type C, 0…2315° C, 6 counts/ ° C Type E, -270…1000° C, 24 counts/ ° C Type J, -210…1200° C, 21 counts/ ° C Type K, -270…1372° C, 13 counts/ ° C Type N, -270…1300° C, 11 counts/ ° C Type R, -50…1768.1° C, 4 counts/ ° C Type S, -50...1768.1° C, 4 counts/ ° C Type T, -270…400° C, 15 counts/ ° C
Cold Junction Compensation	—	871A-TS4CJC-DM (Straight) or 871A-TR4CJC-DM (Right Angle)
Cold Junction Compensation Range	—	0…70 °C
Absolute Accuracy, Voltage Input	0.1% Full Scale @ 25 °C✱❄	0.1% Full Scale @ 25 °C✱❄
Accuracy Drift w/Temp., Current Input	30 ppm/°C	30 ppm/°C
Input Update Rate, per Module	20 ms @ Notch = 50 Hz 17 ms @ Notch = 60 Hz (default) 10 ms @ Notch = 100 Hz 8 ms @ Notch = 120 Hz 5 ms @ Notch = 200 Hz 4 ms @ Notch = 240 Hz 3 ms @ Notch = 300 Hz 3 ms @ Notch = 400 Hz 2 ms @ Notch = 480 Hz	20 ms @ Notch = 50 Hz 17 ms @ Notch = 60 Hz (default) 10 ms @ Notch = 100 Hz 8 ms @ Notch = 120 Hz 5 ms @ Notch = 200 Hz 4 ms @ Notch = 240 Hz 3 ms @ Notch = 300 Hz 3 ms @ Notch = 400 Hz 2 ms @ Notch = 480 Hz
Input Step Response, per Channel	60 ms @ Notch = 50 Hz 50 ms @ Notch = 60 Hz 30 ms @ Notch = 100 Hz 25 ms @ Notch = 120 Hz 15 ms @ Notch = 200 Hz 13 ms @ Notch = 240 Hz 10 ms @ Notch = 300 Hz 8 ms @ Notch = 400 Hz 6 ms @ Notch = 480 Hz	60 ms @ Notch = 50 Hz 50 ms @ Notch = 60 Hz 30 ms @ Notch = 100 Hz 25 ms @ Notch = 120 Hz 15 ms @ Notch = 200 Hz 13 ms @ Notch = 240 Hz 10 ms @ Notch = 300 Hz 8 ms @ Notch = 400 Hz 6 ms @ Notch = 480 Hz
Input Impedance	—	100 kΩ
Input Resistance	—	1 MΩ
Input Conversion Type	Delta Sigma	Delta Sigma
Input Common Mode Rejection Ratio	120 dB	120 dB
Normal Mode Rejection Ratio	100 dB ±3 db Notch filter: 13.1 Hz @ Notch = 50 Hz 15.7 Hz @ Notch = 60 Hz 26.2 Hz @ Notch = 100 Hz 31.4 Hz @ Notch = 120 Hz 52.4 Hz @ Notch = 200 Hz 62.9 Hz @ Notch = 240 Hz 78.6 Hz @ Notch = 300 Hz 104.8 Hz @ Notch = 400 Hz 125.7 Hz @ Notch = 380 Hz	-60 dB, -3 dB Notch filter: 13.1 Hz @ Notch = 50 Hz 15.7 Hz @ Notch = 60 Hz 26.2 Hz @ Notch = 100 Hz 31.4 Hz @ Notch = 120 Hz 52.4 Hz @ Notch = 200 Hz 62.9 Hz @ Notch = 240 Hz 78.6 Hz @ Notch = 300 Hz 104.8 Hz @ Notch = 400 Hz 125.7 Hz @ Notch = 380 Hz
Input Data Format	Signed integer	Signed integer
Overvoltage Protection, Inputs	No input protection	Input not overvoltage protected
Input Calibration	Factory calibrated	Factory calibrated
Keyswitch Position	6	6
PointBus Current (mA)	220	175
Power Dissipation, Max.	1.0 W	1.0 W
Thermal Dissipation, Max.	3.3 BTU/hr @ rated load	3.3 BTU/hr @ rated load
Isolation Voltage	50V rms	50V rms Isolation between individual channels
External DC Power Supply Voltage, Nom.	24V dc	—
External DC Power Supply Voltage Range	10…28.8V dc	—
External DC Power Supply Current	15 mA @ 24V dc	—

✱Includes offset, gain, non-linearity and repeatability error terms.
❄ Analog and temperature input modules support these configurable parameters and diagnostics: open-wire with LED and electronic reporting; four-alarm and annunciation set-points; calibration mode and electronic reporting; under- and over-range and electronic reporting; channel signal range and update rate and on-board scaling; filter-type; temperature scale; channel update rate.

Specialty I/O Modules

1738-232ASCM12 and 1738-485ASCM12

The 1738-232ASCM12 and -485ASCM12 serial-interface modules offer a serial-link communication interface solution for peripheral products with:

• RS-232 ports

 use the 1738-232ASCM12

• RS-485 and RS-422 ports

use the 1738-485ASCM12

These modules allow a device with serial-interface output, i.e., bar code readers, to communicate up to 128 bytes of ASCII data onto any network supported by ArmorPoint I/O. Each module is a single-channel, full-duplex interface and is rated for up to 38.4 kbaud. LED indicators on the modules offer diagnostics for the module, ArmorPointBus backplane, and transmit/receive status indication.

1738-SSIM23

The 1738-SSIM23 module collects serial data from industrial absolute-position encoding sensors that use standard SSI protocol. The SSI module is inserted into an ArmorPoint I/O terminal base that provides common power, communications, and wiring connections for the SSI sensors.

ArmorPoint I/O ASCII Module Specifications

	1738-232ASCM12 1738-485ASCM12
Number of Serial Channels	1
Keyswitch Position	2 (specialty)
PointBus Current (mA)	75
Power Dissipation	1.75 W @ 28.8V dc
Serial Port Parameters	
Serial Character Framing	7N2, 7E1, 7O1, 8N1, 8N2, 8E1, 8O1, 7E2, 7O2
Serial Port Comm Speed	9600, 1200, 2400, 4800, 19.2 k, 38.4 k
Serial Port Receive from ASCII Device	
Number of Receive Chars, Max	1…128
Receive Record Start Mode	No, exclude, include start delimiter
Receive Start Delimiter	ASCII character
Receive Record End Mode	No, exclude, include end delimiter
Receive End Delimiter	ASCII character
Send (Produce) on DeviceNet to Master	
Receive String Data Type	Array, short_string, string
Pad Mode	Pad mode disabled, enabled
Pad Character	ASCII character
Receive Swap Mode	Disabled, 16-bit, 24-bit, 32-bit swap
DeviceNet Handshake Mode	Master/slave handshake, produce immediate
Produce Assembly Size	4…132
Serial Data Size	0…128 bytes
Receive Transaction ID	0…255
Serial Port Transmit to ASCII Device	
Number of Transmit Chars, Max	1…128
Transmit End Delimiter Mode	No, exclude, include end delimiter
Transmit End Delimiter Character	ASCII
Consume on DeviceNet from Master	
Consume String Data Type	Array, short_string, string
Transmit Swap Mode	Disabled, 16-bit, 24-bit, 32-bit swap
DeviceNet Record Header Mode	Transmit handshake/immediate
Consume Assembly Size	4…132
Serial Port Transmit/Explicit Messages from Configuration Tool	
Transmit Serial Data String Size	0…128 bytes
Transmitted Serial Data Length	0…128 bytes
Transmit Transaction ID	0…255
Serial Port Status	TX FIFO overflow, RX FIFO overflow, RX parity error, handshake error, new data flag

1738-SSIM23 Module Specifications

	1738-SSIM23
Number of SSI Channels	1
Keyswitch Position	2
PointBus Current (mA)	110
Power Dissipation, Max.	0.94 W
Isolation Voltage	Tested to 1250V ac for 60 s between each of these isolated areas: Logic side and field power Logic side and shield Shield and field power
External DC Power Supply Voltage, Nom.	24V dc
Encoder Type	Any absolute encoder supporting standard SSI protocol including linear, rotary, and optical distance measuring devices
SSI Data Rate	125 kHz, 250 kHz, 500 kHz, 1 MHz, 2 MHz (software selectable)
SSI Bits Per Word	2…31 (software selectable)
SSI Word Length	4 bytes (32 bits)
SSI Word Delay Time	16 μs…64 ms (software selectable)∗
SSI Features	Gray or binary code capable with gray to binary conversion, increasing or decreasing SSI count indication, 2 SSI word comparator values, SSI word latching with I1 input
SSI Cable Type	UL CM/AWM 2464/CSA Type CMG FT4 or similar cable utilizing shielded twisted pairs for D+/- and C+/- connections. See sensor manufacturer for actual cable required for the SSI sensor under use. I1 input can be wired separate from SSI cable.❂
SSI Cable Length	Depends on desired SSI data rate: 125 kHz…1050 ft(320m) 250 kHz…525 ft(160m) 500 kHz…195 ft(60m) 1 MHz…65 ft(20m) 2 MHz…25 ft(8m)
SSI Sensor Power (At V+/- Terminals)	10…28.8V dc common with field power voltage, 0.75A dc maximum with short circuit protection
SSI Clock Drive Current, Max. (Out of C+/- Terminals)	750 mA
Input I1 Category/Type	Similar to IEC Type 3, sourcing
Voltage, On-State Input, Min.	0V dc
Voltage, On-State Input, Max.	Field Power Supply Voltage minus 10V
Current, On-State Input, Min.	2 mA
Current, On-State Input, Nom.	4 mA (Field Power Supply Voltage = 24V dc)
Current, On-State Input, Max.	5 mA
Voltage, Off-State Input, Min.	Field Power Supply Voltage minus 5V
Voltage, Off-State Input, Max.	Equal to Field Power Supply Voltage
Current, Off-State Input, Max.	—
Input Impedance, Nom.	3.6 kΩ
Input Impedance, Max.	4.7 kΩ
Input Filter Time, Nom.	0.5 ms
Field Power Bus Supply Voltage, Min.	10V dc
Field Power Bus Supply Voltage, Nom.	24V dc
Field Power Bus Supply Voltage, Max.	28.8V dc

∗Time between successive SSI words (Tp). Also called Dwell Time.
❂ Use this conductor category information for planning conductor routing as described in publication 1770-4.1, "Industrial Automation Wiring and Grounding Guidelines."

ArmorPoint I/O Counter Modules

Choose the ArmorPoint I/O high-speed counters when you need:

• **Intelligent counter modules** with their own microprocessors and I/O that are capable of reacting to high-frequency input signals up to 1 MHz.

• **Signals received at the inputs** to be filtered, decoded, and counted.

• **A pulse width modulated signal.** (1738-VHSC24M23 only)

• **Count and rate values** that can be used to activate up to two embedded outputs in less than 1 ms (1738-VHSC24M23 only).

• **Signals that are also processed** to generate rate and time-between pulses (pulse interval) data.

Counter Modules Specifications

	1738-IJM23	1738-VHSC24M23
Number of Counters	1	1
Keyswitch Position	2	2
Output Groups	—	1 group of 2
Input Frequency, Max.	1.0 MHz counter and encoder X1 configurations (no filter) 500 kHz encoder X2 configuration (no filter) 250 kHz encoder X4 configuration (no filter)	1.0 MHz counter and encoder X1 configurations (no filter) 500 kHz encoder X2 configuration (no filter) 250 kHz encoder X4 configuration (no filter)
Voltage, On-State Input, Nom.	5V dc	24V dc
Output Delay Time, OFF to ON	—	25 μs (load dependent)∗
Current, On-State Input, Min.	≥5 mA	≥5 mA
PointBus Current (mA)	160	110
Power Dissipation, Max.	1.1 W @ rated load	1.9 W @ rated load

∗OFF to ON delay is time from a valid output "on" signal to output energization.

The counter modules serve as signal conditioners and function blocks, i.e., counters, between the customer process signals on the mounting base and the POINTBus backplane containing the command information. The three main functional blocks are the customer digital I/O interface, the counter ASIC, and the microprocessor.

The counter modules accept feedback from:

• encoders (single-ended or differential)

• pulse generators

• mechanical limit switches

• frequencies up to 1 MHz

A filter is available with four settings:

• 50 Hz

• 500 Hz

• 5 kHz

• 50 kHz

This filter can be turned off to achieve the fastest counting rate.

The input voltage range is 5V dc (1738-IJM23) or 15-24V dc (1738 -VHSC24M23). The module returns the count (or frequency) in the form of a 24-bit binary number (0 to 16,777,215) expressed in a 32-bit word. Each counter has a user-selectable preset and rollover value associated with it.

The counter modules operate in the following modes:

- counter mode - read incoming single-phase pulses, return a binary count

- encoder mode - read incoming two-phase quadrature pulses, return a binary count

- period/rate mode - count internal clocks during the on period, return a frequency (1738-VHSC24M23 outputs are updated only at the end of the period)

- continuous/rate mode - count internal clocks during the on period, return a frequency (1738-VHSC24M23 outputs are updated continuously during this period)

- rate measurement mode - read pulses during the sample period, return a frequency

- pulse width modulation (PWM) mode - generate a pulse width modulated signal (1738-VHSC24M23)

- pulse generator mode - generates a pulse of defined width, returns width and quantity of trigger (1738-VHSC24M23 only)

The operation of the counter and encoder modes is nearly identical. The difference between the two modes is in the type of feedback (one-phase versus two-phase) for the count direction (up or down). In encoder mode, a transition is expected on the B input for counting to proceed in a direction, whereas, in counter mode, the B input may be left at a static level. All operating modes are selected by writing appropriate configuration data to the module.

1738-IJM23 Specifications

	1738-IJM23
Voltage Category/Type, Input	—
Current, Off-State Input, Max.	≤0.250 mA
Voltage, Off-State Input, Max.	≤1.25V dc
Current, On-State Input, Max.	25.7 mA @ 6V dc 19.1 mA @ 5V dc
Voltage, On-State Input, Min.	≥2.6V dc
Voltage, On-State Input, Max.	≥2.6V dc
Input Filter Selections, per A/B/Z group	Off 10 μs (50 kHz) 100 μs (5 kHz) 1.0 ms (500 Hz) 10.0 ms (50 Hz)
Keyswitch Position	2
Thermal Dissipation, Max.	3.75 BTU/hr @ rated load
Isolation Voltage, Min.	Prequalified at 1250V ac/rms between: System side Chassis ground A/B/Z inputs
External DC Power Supply Voltage, Nom.	No additional external power required to power module.

1738-VHSC24M23 Specifications

	1738-VHSC24M23
Voltage Category/Type, Input	24V dc
Current, Off-State Input, Max.	≤0.250 mA
Voltage, Off-State Input, Max.	≤1.8V dc
Current, On-State Input, Max.	10.2 mA @ 24V dc or 6.1 mA @ 15V dc
Voltage, On-State Input, Min.	≥12.5V dc
Input Filter Selections	Off 10 μs (50 kHz) 100 μs (5 kHz) 1.0 ms (500 Hz) 10.0 ms (50 Hz)
Input Frequency, Max.	1.0 MHz counter and encoder X1 configurations (no filter) 500 kHz encoder X2 configuration (no filter) 250 kHz encoder X4 configuration (no filter)
Keyswitch Position	2
Thermal Dissipation, Max.	6.5 BTU/hr @ rated load
Isolation Voltage, Min.	Prequalified for 1250V ac/rms between: Module 1 System side (PointBus) Chassis ground A/B/Z inputs O0/O1 and user power supply Module 2 System side Chassis ground Vaux ± User power supply common
External DC Power Supply Voltage, Nom.	None required

1738-VHSC24M23 Input Derating Curve
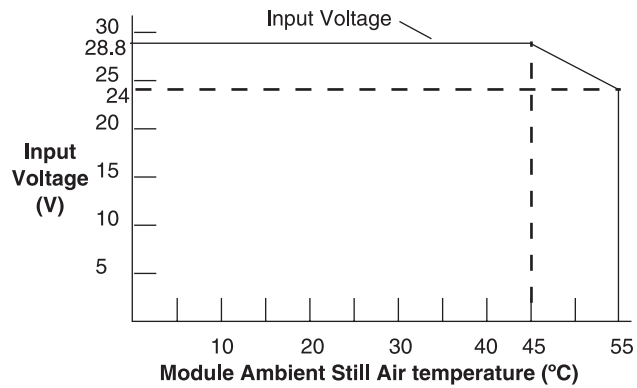
Note: Exceeding the maximum input voltage can cause permanent damage to the input.