

19-6. Diagnostic LEDs

Table 19-7. RTD Diagnostic LEDs

LED	Description
P (Green)	Power OK LED. Lit when the +5V power is OK.
C (Green)	Communications OK LED. Lit when the Controller is communicating with the module.
I (Red)	<p>Internal Fault LED. Lit whenever the Force Error bit (Bit 1) of the Configuration Register (see Table 19-4) is set, or when a timeout of the watchdog timer occurs when the Controller stops communicating with the module.</p> <p>Also lit when the IMOK signal is false (0) indicating failures of part or all of the logic common to the input channels.</p>
CH1 (Red)	Channel error. Lit whenever there is an error associated with Channel 1.
CH2 (Red)	Channel error. Lit whenever there is an error associated with Channel 2.
CH3 (Red)	Channel error. Lit whenever there is an error associated with Channel 3.
CH4 (Red)	Channel error. Lit whenever there is an error associated with Channel 4.

Section 20. Sequence of Events Module

20-1. Description

The Sequence of Events module provides 16 digital channels to monitor the open or closed state of digital inputs or contacts in the field. The module provides a filter to reject changes of state less than 4 milliseconds. The Sequence of Events module can also perform event tagging and chatter control for each input channel.

The Ovation Controller writes a channel event tagging mask to the Electronics module to enable event tagging for specific input channels. It has a chatter control flag for each channel to indicate that an input channel has changed state too many times in a period of time or is changing state at too fast a rate. It also has a channel ID to indicate which channel changed state.

Each channel is checked every 125 microseconds. If the channel event tagging mask bit is zero, that channel is not checked. Time synchronization is accomplished by the Ovation Controller writing a time reference simultaneously to all Sequence of Events modules with a 1 millisecond resolution.

Note

All SOE modules in a Controller MUST be connected to the IOIC card that is configured as the Time Keeper.

A control bit written by the Ovation Controller provides two options for handling input chatter:

- The first option will set the chatter control flag if the rate of change for an input is greater than 1 per 100 milliseconds.
- The second option sets the chatter control flag if 4 or more state changes occur on an input between reads of the event buffer.

There are two 32 event buffers. This allows the event tagging and chatter control function to be writing into one event buffer while the Ovation Controller is reading the other event buffer. The Ovation Controller only reads each module a small portion of the loop time. This allows both event buffers to be available the rest of the loop time.

Each event buffer contains 64 words with up to 32 Channel-IDs and 32 Event-Times. The event buffers are memories. The memory control circuit controls which event buffer to write into and which event buffer to read from. Before reading the event buffer, the buffer status register must be read to determine the number of words to read.

The Sequence of Events Module is applicable for CE Mark Certified Systems.



Caution for CE Mark certified systems:

Any base unit that contains a 125VDC Sequence of Events Electronics module (1C31157G02) with differential Digital Input Personality module (1C31110G02) and interfaces to hazardous voltage (>60 VDC) must include a hazardous voltage warning label (1B30025H01) on that base unit.

Any base unit that contains a 125VDC Sequence of Events Electronics module (1C31157G02) with single-ended Digital Input Personality module (1C31110G01) and interfaces to hazardous voltage (>60 VDC) must include a hazardous voltage warning label (1B30025H01) on **ALL** base units on the branch.

This label must be placed in a visible location on the base unit, preferably above the spare fuse location. The project drawings must indicate this.

20-2. Module Groups

The Sequence of Events module comes in five combinations of Electronics and Personality Modules:

- 24/48 VDC single-ended digital input.
- 24/48 VDC differential input.
- 125 VDC single-ended digital input.
- 125 VDC differential input.
- 48 VDC contact input with on card auxiliary supply.

20-2.1. Electronics Modules

There are three Electronics module groups for the Sequence of Events Module:

- 1C31157G01 provides for 24/48 VDC single-ended or differential inputs.
- 1C31157G02 provides for 125 VDC single-ended or differential inputs.
- 1C31157G03 (Contact Input) provides for 48 VDC on-card auxiliary power.

20-2.2. Personality Modules

There are three Personality module groups for the Sequence of Events Module:

- 1C31110G01 (single-ended inputs) and 1C31110G02 (differential input) are used for digital input ([Section 20-4](#)).
- 1C31110G03 is used for contact input ([Section 20-5](#)).

Table 20-1. Sequence of Events Subsystem

Range	Channels	Electronic Module	Personality Module
24/48 VDC			
Single-ended	16	1C31157G01	1C31110G01
Differential	16	1C31157G01	1C31110G02
125 VDC			
Single-ended	16	1C31157G02	1C31110G01
Differential		1C31157G02	1C31110G02
48 VDC On-Card wetting supply	16	1C31157G03	1C31110G03

All configuration are CE Mark certified except those containing Emod 1C311577 with a 5FDI

When the 125VAC/VDC Sequence of Events Digital Input Emod (1C31157G02) is used in applications without the Fused Pmod (5X00034G01), additional external fusing or other current limiting devices are recommended on the hazardous inputs to provide additional protection to the external wiring and power source.

20-3. External Power Supplies

If the Sequence of Events Digital Input module uses the 1C31110G01 Personality module (configured for sixteen single-ended inputs), the required voltage source may be obtained from the internal auxiliary power supply (backplane) or it may be obtained from an external power supply.

If an external power supply is used, see [Appendix D](#) for the steps to be undertaken before connecting the external power supply to the Sequence of Events Digital Input module base unit terminal block.

20-4. Digital Input Field Interface

The Digital Input configuration contains 16 channels, where each channel has voltage level sensing circuitry used to detect whether an input is on or off. The Sequence of Events module has 16 isolated differential inputs to accommodate separate external auxiliary supplies, or 16 single-ended (common return) digital inputs with an on-card blown fuse detector to accommodate a common external auxiliary supply for all channels. The selection of the Personality module determines if the inputs are differential or single-ended. The input voltage level monitored by the module is determined by the particular card group in the module.

The field side circuitry for the single-ended configuration is shown in [Figure 20-1](#), and the differential configuration in [Figure 20-2](#). An input resistor provides the normal mode surge protection and limits the current during normal operation. An opto-isolator provides high dielectric isolation between the field side and the logic or I/O bus side. The Single-Ended Digital Input configuration has a circuit used to monitor the presence of the wetting supply. Two cases cause this monitor circuitry to report a blown fuse status and issue an attention status to the Ovation Controller:

- Fuse is blown on the PDIA.
- Auxiliary supply level is lower than minimum On Input Voltage.

20-4.1. Field Wiring Considerations for the Digital Input Configuration

The following maximum resistances of the cable and the interfaced device apply:

24 VDC - 100 K Ω

48 VDC - 150 K Ω

125 VDC - 250 K Ω

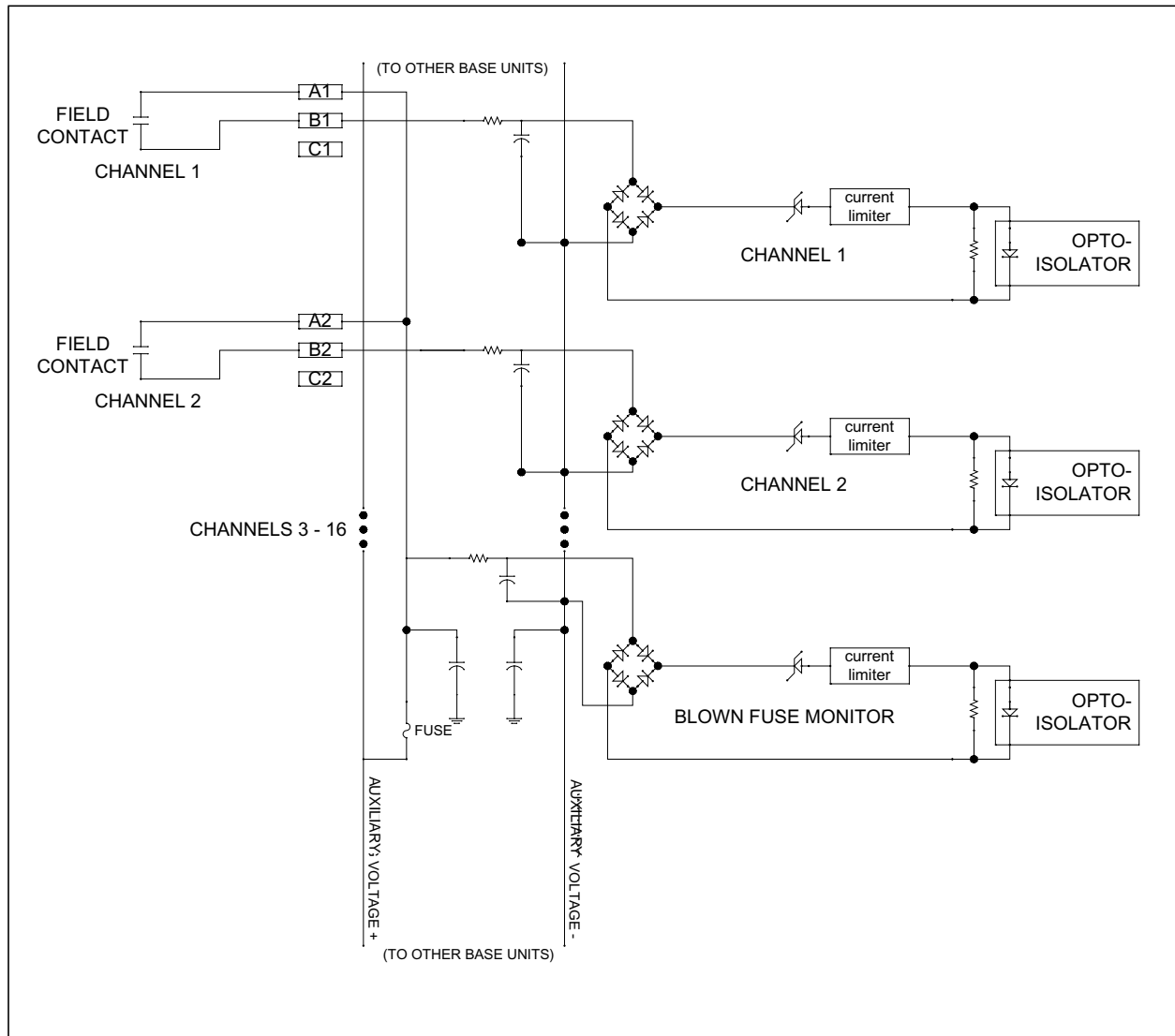


Figure 20-1. Sequence of Events Module Single-Ended Digital Input Front End

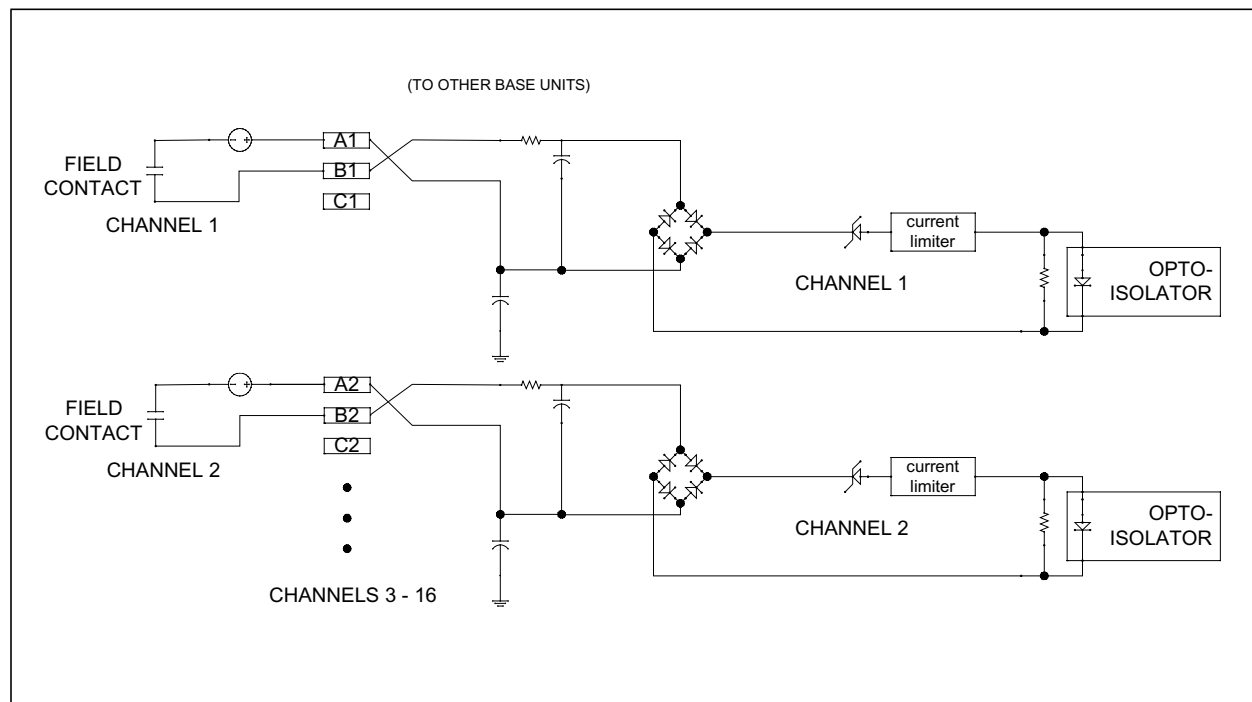


Figure 20-2. Sequence of Events Module Differential Digital Input Front End

20-5. Contact Input Field Interface

The Contact Input configuration provides 16 contact input current detecting channels with common returns. The field side circuitry and terminal connections for three of these channels are shown in [Figure 20-3](#).

A +48V on-board power supply provides current limited contact wetting voltage if the contact is open. If the contact closes, current is drawn from the +10V supply which turns on the associated opto-isolator; thereby, relaying a closed contact state to the I/O bus. The opto-isolators and the isolation provided by the 10V and 48 V power supply provide high dielectric isolation between the field side and the logic or I/O bus side.

There are two methods of wiring field devices to the termination block as shown in [Figure 20-3](#). Each field contact may have a separate input and return line as shown for channel 1. Alternatively, field contacts wired to the same module may share a return line as shown for channels 2 and 3. For either wiring method, **do not** tie the contact return line to earth ground or a ground fault condition will occur as well as a degradation of the common mode surge protection.

Ground fault detection circuitry on the Sequence of Events module with Contact Inputs activates when the input or return line for any channel finds a low impedance (<10K ohms) path to earth ground. A single wire with a ground fault will not cause an error in the point data, but multiple ground faults (if they include input and return lines) could cause faulty data (that is, channels appearing as if their contacts are closed when they are really open).

When a ground fault occurs, the external error LED lights, and the GND Fault bit 11 in the Status Register is set. If the GND Fault Attention Enable bit 8 is set in the Configuration Register, a ground fault is seen as a catastrophic error causing an attention status to be sent back to the Controller. See [Figure 20-3](#) for ground fault detection circuitry.

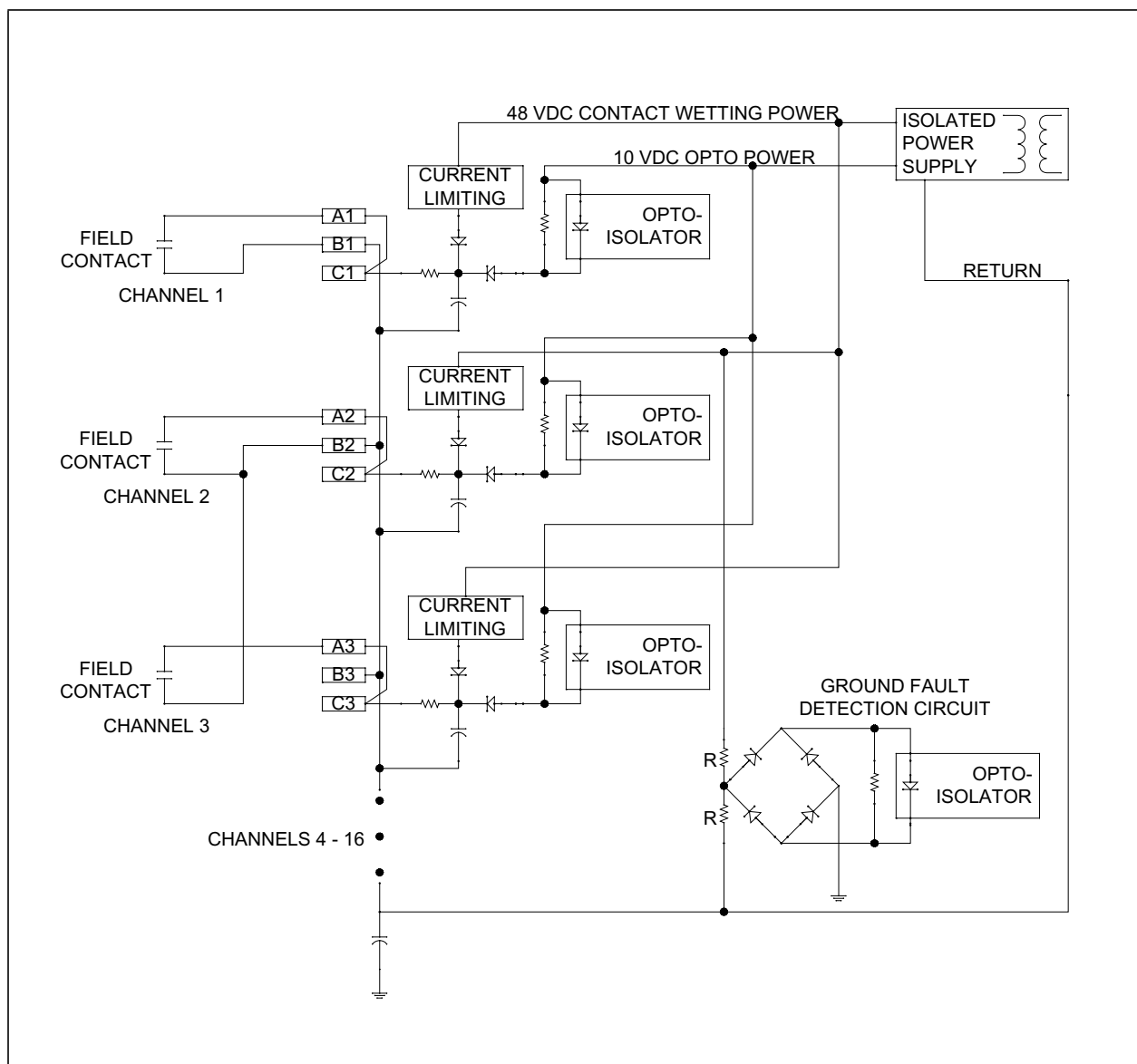


Figure 20-3. Sequence of Events Module Contact Input Front End

20-5.1. Field Wiring Considerations for the Contact Input Configuration

The following definitions apply to the restrictions listed below:

- R_{shunt} = contact shunt resistance
- R_{contact} = resistance associated with a closed contact
- R_{return} = resistance of the common return line
- R_{line} = resistance of the non-common cable length to and from the contact
- $R_{\text{wiring}} = R_{\text{contact}} + R_{\text{line}} + 16R_{\text{return}}$
- R_{fault} = resistance from either line to ground which causes a ground fault

Figure 20-4 shows possible cable resistances that affect contact input performance. The following restrictions apply:

- Under no-ground-fault conditions or if the channel return (low) line has a ground fault:
 - R_{shunt} across contact must be $\geq 10\text{k}$ ohms to always recognize an open contact as open.
 - R_{shunt} across contact must be $\geq 50\text{k}$ ohms to maintain the high level contact-wetting voltage.
- If the input connection from a channel has a ground fault with the contact open:
 - R_{shunt} across contact must be $\geq 150\text{k}$ ohms to guarantee ground fault is detected.
- For a ground fault on the input or return connection to a channel:
 - R_{fault} from either line to ground must be $\leq 5\text{K}$ ohms to guarantee detection of the ground fault.
- With or without ground fault conditions:
 - R_{wiring} through field wiring to contact must be < 100 ohms to always recognize a closed contact as closed.

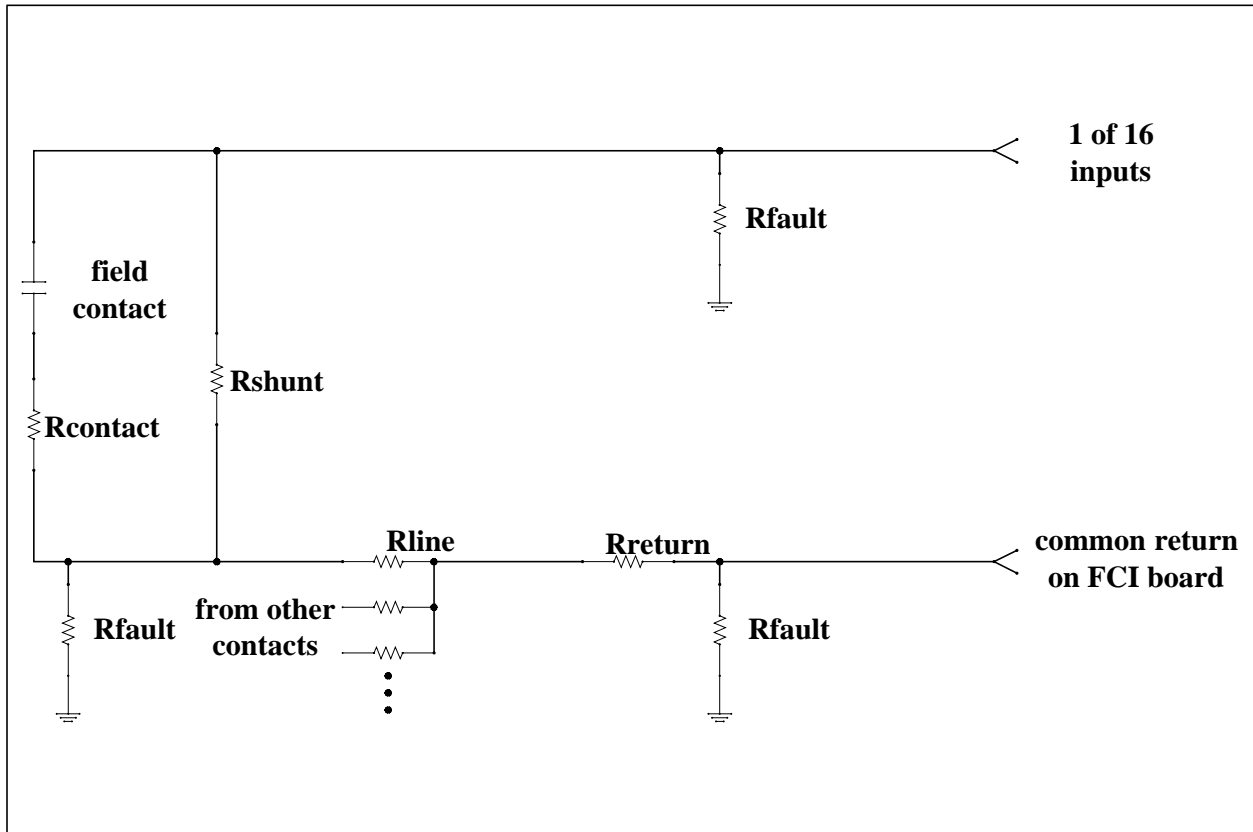


Figure 20-4. Cable Impedances in Field Wiring

20-5.2. Field Wiring Cable Lengths

The following two tables list the maximum cable lengths for field wiring to the contacts. For both, assume R_{contact} is 0 ohms.

Table 20-2 applies when there are individual common return lines brought to the card edge as shown in Figure 20-3. This implies that R_{return} is 0 ohms.

Table 20-2. Maximum Cable Length for 16 Individual Common Returns

Wire Gauge	Ohms per Thousand Feet (Solid Copper Wire)	Maximum Cable Length (Thousands of Feet)
18	6.64	7.5
20	10.2	4.9
22	16.2	3.0

Table 20-3 applies when all 16 channels share a common return line. In both tables, the Maximum Cable Length is the length of the cables from the termination block to the contacts in the field.

Table 20-3. Maximum Cable Length for a Single Common Return for All 16 Inputs

Wire Gauge	Ohms per Thousand Feet (Solid Copper Wire)	Maximum Cable Length (Thousands of Feet)
12	1.66	3.54
14	2.27	2.59
16	4.18	1.40
18	6.64	0.89

20-6. Sequence of Events Digital Input Module

**Electronics Module (1C31157G01 and 1C31157G02)
Personality Module (1C31110G01 and 1C31110G02)**

Table 20-4. Sequence of Events Digital Input Specifications

Description	Value
Number of channels	16
Input range (single-ended or differential) ¹	Refer to Table 20-5 .
Propagation delay of contact change of state ² 24V/48V DC 125VDC	3.75 mSec minimum; 4.25 mSec maximum 3.75 mSec minimum; 4.45 mSec maximum
Signal rejection Always rejects change of state Always accepts change of state	< 3.87 mSec > 4.13 mSec
Cable length (quality is 50pF/ft or better)	1000 feet maximum
Diagnostics	Internal module operating faults and Blown fuse detection. ³
Dielectric isolation: Channel to channel ⁴ Channel to logic	1000 V DC 500 V AC 1000 V AC/DC
Module power from logic supply	Main: 1.44 W typical, 1.8 W maximum
Operating temperature range	0 to 60°C (32°F to 140°F)
Storage temperature range	-40°C to 85°C (-40°F to 185°F)
Humidity (non-condensing)	0 to 95%
¹ Input range level is dependent on module group. ² Does not include cable capacitance. ³ Blown fuse detection applies to single-ended channel configuration only, where an on-board fuse is provided for the auxiliary power supply. ⁴ Channel to channel isolation applies to differential channel configuration only.	


Table 20-5. Sequence of Events Digital Input Ranges

Input Level	On Input Voltage (VDC)		Off Input Voltage (VDC) Max	On Input Current (mA)		Off Input (Watts) Max	Input Power Typical
	Min	Max		Min	Max		
24 VDC	18	60	9	0.9	2.6	0.3	1.1
48 VDC	18	60	9	0.9	2.6	0.3	2.2
125 VDC	80	140	55	0.6	1.5	0.3	3.3

20-6.1. Sequence of Events Digital Input Terminal Block Wiring Information

Each Personality module has a simplified wiring diagram label on its side, which appears above the terminal block. This diagram indicates how the wiring from the field is to be connected to the terminal block in the base unit. The diagrams for the Sequence of Events digital input Personality modules are illustrated in [Figure 20-5](#).

The following table lists and defines the abbreviations used in these diagrams.

Abbreviation	Definition
1+ through 16+	Digital input positive terminal connection
1- through 16-	Digital input negative terminal connection
	Earth ground terminals
PS+, PS-	Auxiliary Power Supply terminals
RSV	Reserved terminal. No connection allowed on these terminals

Note

Do **not** use unmarked terminal block locations.

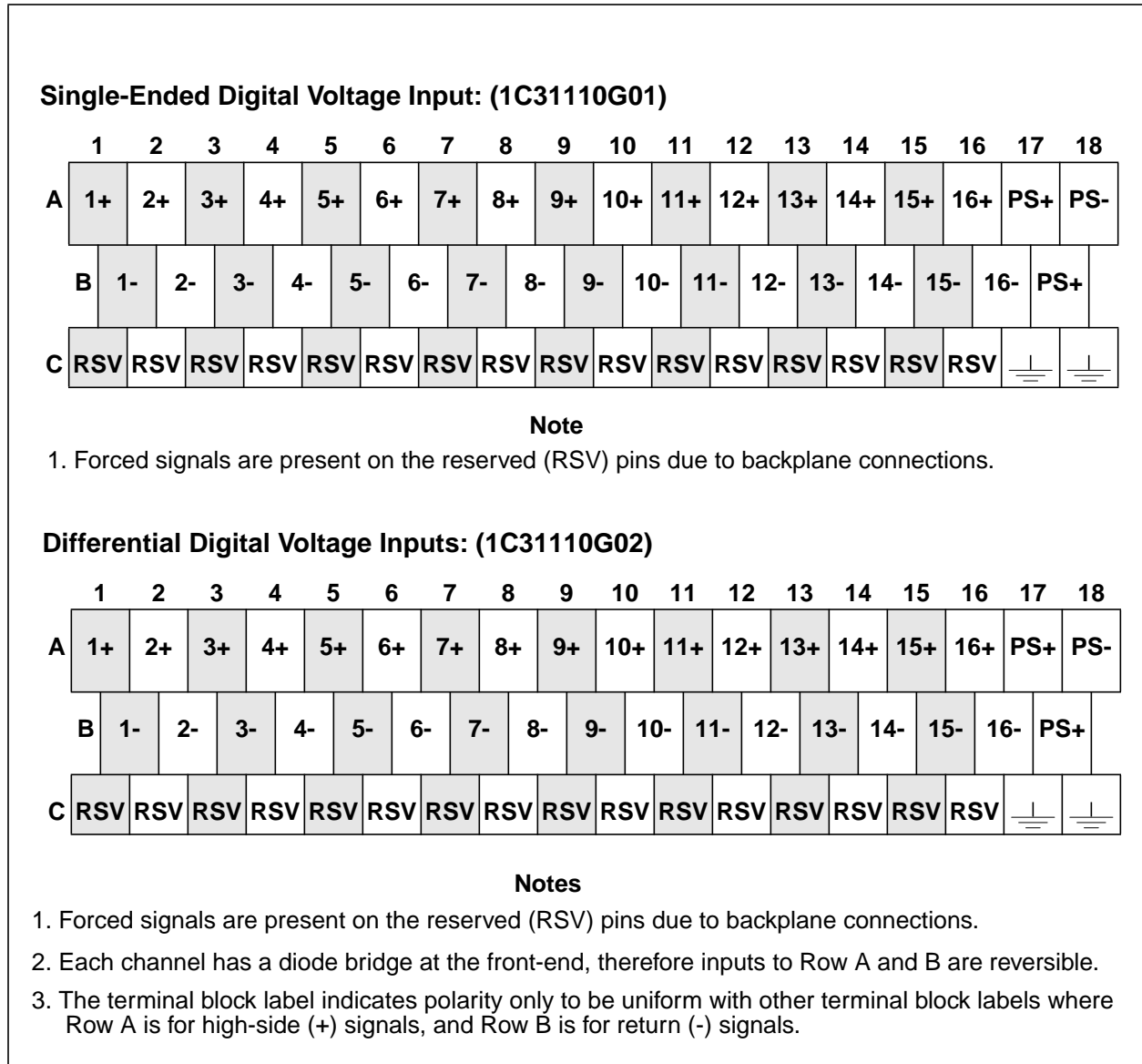


Figure 20-5. Terminal Block Connections for the Sequence of Events Digital Input Personality Modules

20-7. Sequence of Events Digital Input Field Connection Wiring Diagram

Non-CE Mark Certified Systems

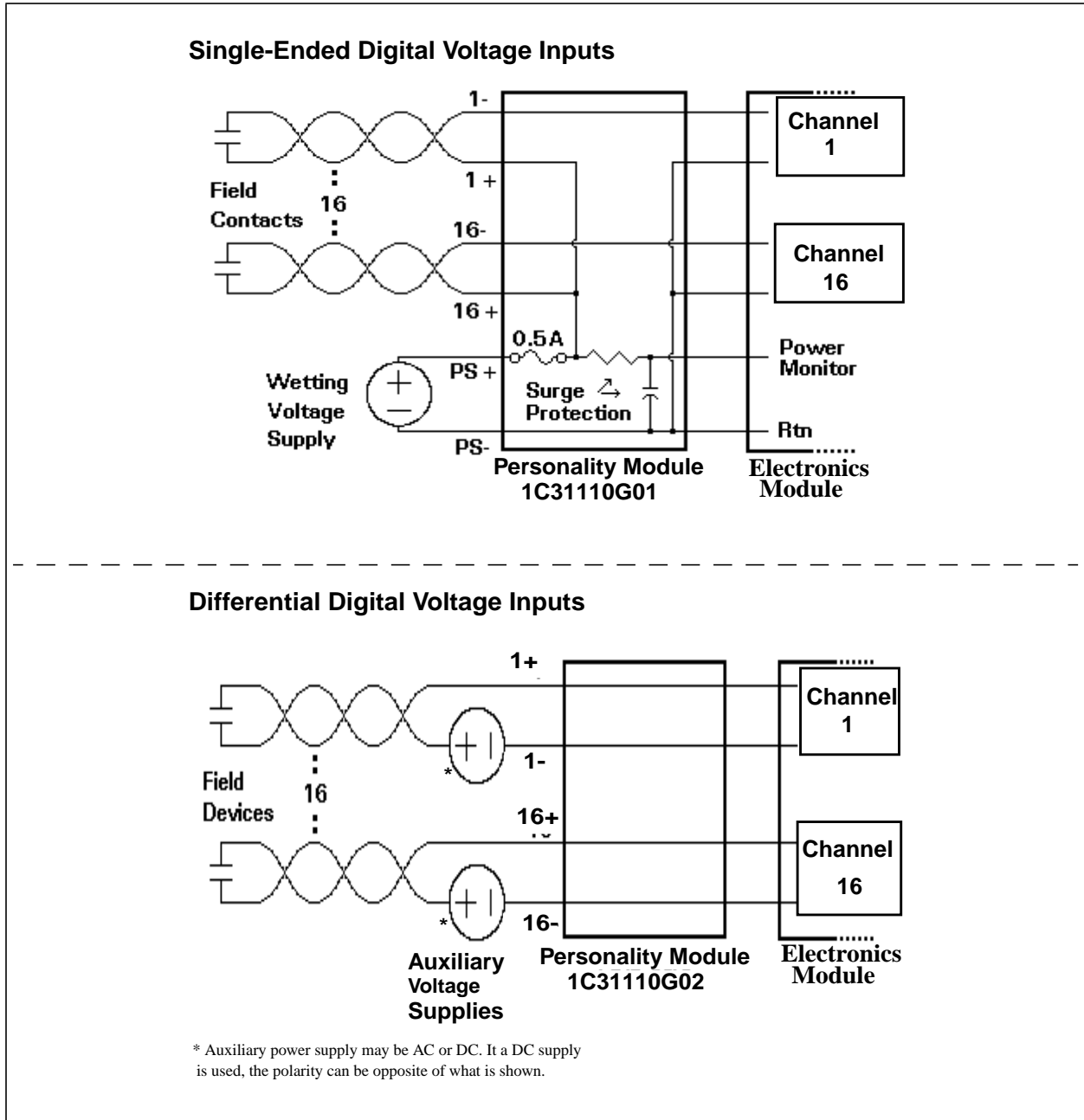


Figure 20-6. Field Connection for the Sequence of Events Digital Input Personality Module (Non-CE Mark)

CE Mark Certified Systems

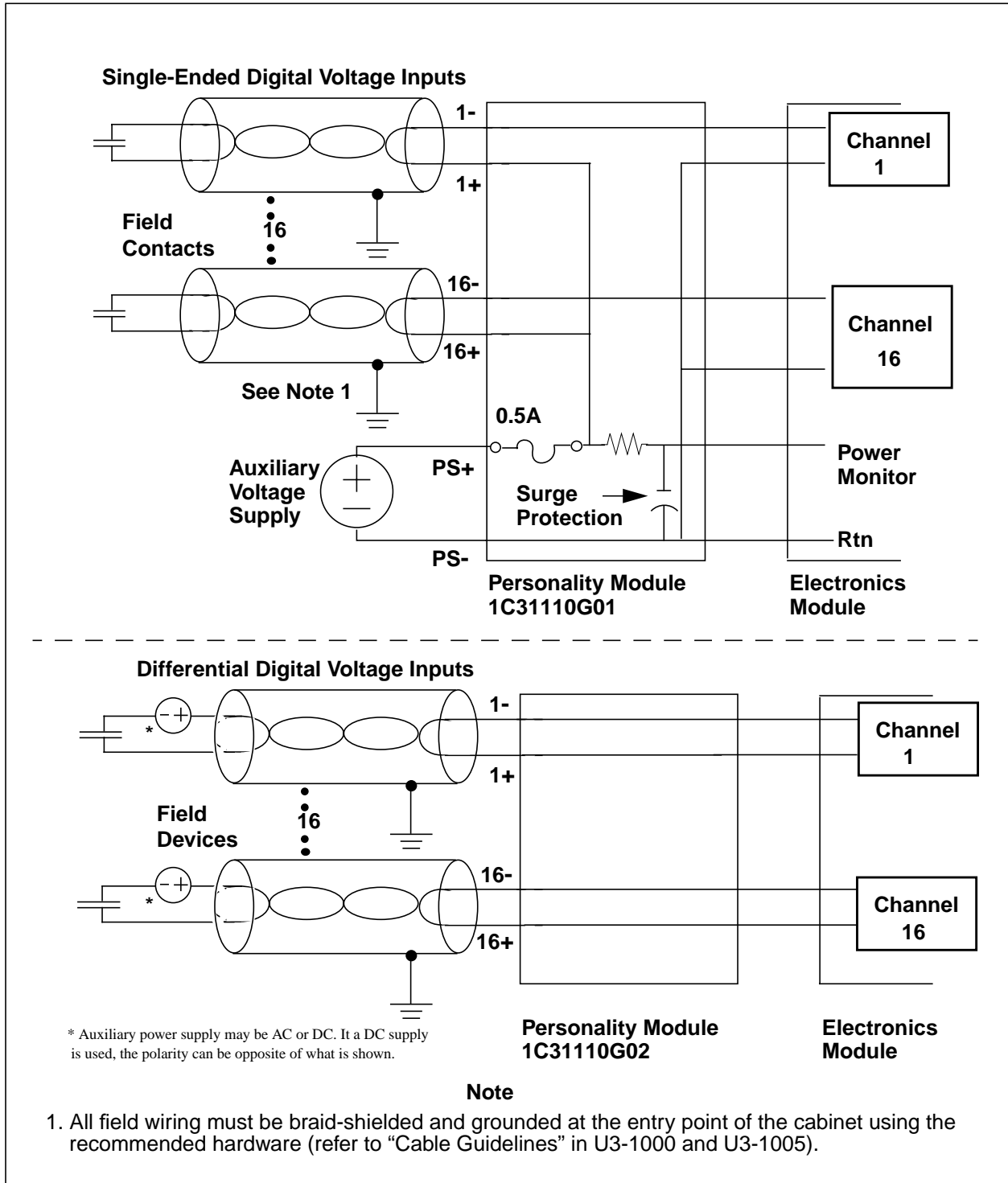


Figure 20-7. Field Connection for the Sequence of Events Digital Input Personality Module (CE Mark)

20-7.1. Sequence of Events Digital Input Configuration and Status Register

Word address 13 (D in Hex) is used to configure the module and provide status information to the Controller. The status register can be read by using the Point Information window at an Operator Station (see the Bit Pattern Field on the Hardware Tab).

Table 20-6. Sequence of Events Digital Input Configuration/Status Register (Address 13 or D in Hex)

Bit	Data Description - Configuration Register (Write)	Data Description - Status Register (Read)
0	Configure Module	Module configured (1 = configured; 0=not configured)
1	Force internal error	Internal error (1 = forced error; 0=no forced error)
2 - 5	Not used. Should be set to zero (0).	Not used
6	Enable digital input blown fuse signal and module attention for blown fuse	Status of enable digital input blown fuse signal and module attention for blown fuse
7	Not used. Should be set to zero (0).	Blown fuse for digital input
8	Contact input field card (enable contact input auxiliary voltage failure signal and module attention for auxiliary voltage failure and ground fault detection circuitry)	Status of contact input field card (enable contact input auxiliary voltage failure signal and module attention for auxiliary voltage failure and ground fault detection circuitry)
9	Not used. Should be set to zero (0).	Auxiliary voltage failure for contact input
10	Enable module attention for a GND fault.	Status of Enable module attention for a GND fault.
11	Not used. Should be set to zero (0).	GND fault
12	Disable chatter control	Disable chatter control
13	Chatter control option.	Status of chatter control option.
14	Not used. Should be set to zero (0).	Clock synchronized.
15	Not used. Should be set to zero (0).	Not used.

Bit 0: Module will not operate until this bit is set with a write.

Bit 1: When this bit is set, the internal error LED is turned on, and only the status registers can be read.

Bit 6: This bit should be set for a single-ended input and cleared for a differential input.

Bits 8-10: These bits should be cleared to zero (0).

Bit 12: When this bit is set and an input channel is not masked off, that input

can chatter and each event will be recorded until the event buffer overflows. Default state is “0” and enables the chatter control function.

- Bit 13: When this bit is set, chatter will be flagged when an input changes state four or more times between event buffer reads. When cleared, chatter will be flagged for state changes greater than 1 per 100 milliseconds.

20-7.2. Secondary/Expansion Configuration and Status Register

Word address 14 (E in Hex) is used to enable or disable the channel event tagging mask.

Table 20-7. Secondary/Expansion Configuration/Status Register (Address 14 or E in Hex)

Bit	Data Description Configuration (Write)	Data Description Status (Read)
0 - 15	Channel Event Tagging mask	Channel Event Tagging mask

Diagnostic LEDs

Table 20-8. Sequence of Events Digital Input Diagnostic LEDs

LED	Description
P (Green)	Power OK LED. Lit when the +5V power is OK.
C (Green)	Communications OK LED. Lit when the Controller is communicating with the module.
E (Red)	For Single-ended Digital Input: Lit when fuse blows or there is a loss of the auxiliary power supply (only when Bit 6 of Configuration register is set; then Bit 7 of the Status register is set). For Differential Digital Input: Not lit since the configuration bit is not set, and the blown fuse signal from the field card is ignored.
I (Red)	Internal Fault LED. Lit whenever the Force Error bit (Bit 1) of the Configuration Register (see Table 20-6) is set, or when a timeout of the watchdog timer occurs when the Controller stops communicating with the module. Also lit when Controller stops communicating with the module.
CH1 through CH16 (Green)	Lit when the input voltage of the LED’s corresponding channel is greater than the channel’s minimum “On Input Voltage.”

20-8. Sequence of Events Contact Input Module


Electronics Module (1C31157G03)
Personality Module (1C31110G03)

Table 20-9. Sequence of Events Contact Input Module Specifications

Description	Value
Number of channels	16
On board auxiliary power supply	42 V minimum 55 V maximum
Signal rejection Always rejects contact change of state Always accepts contact change of state	< 3.87 mSec > 4.13 mSec
Propagation delay of contact change of state ¹	3.75 mSec minimum; 4.4 mSec maximum
Closed contact output current	4 mA minimum 8 mA maximum
Diagnostics	Internal module operating faults Ground Fault Detection
Dielectric isolation: Channel to logic	1000 V AC/DC
Module power from logic supply	4.56 W typical (all inputs on) 5.0 W maximum
Operating temperature range	0 to 60°C (32°F to 140°F)
Storage temperature range	-40°C to 85°C (-40°F to 185°F)
Humidity (non-condensing)	0 to 95%
¹ Does not include cable capacitance.	

20-8.1. Sequence of Events Contact Input Terminal Block Wiring Information

The diagram for the Sequence of Events contact input Personality module is illustrated in Figure 20-8. The following table lists and defines the abbreviations used in this diagram.

Abbreviation	Definition
1+ through 16+	Contact input positive terminal connection.
1- through 16-	Contact input negative terminal connection.
	Earth ground terminals.
PS+, PS-	Auxiliary Power Supply terminals.
RSV	Reserved terminal. No connection allowed on these terminals.

Note

Do **not** use terminal block locations marked RSV.

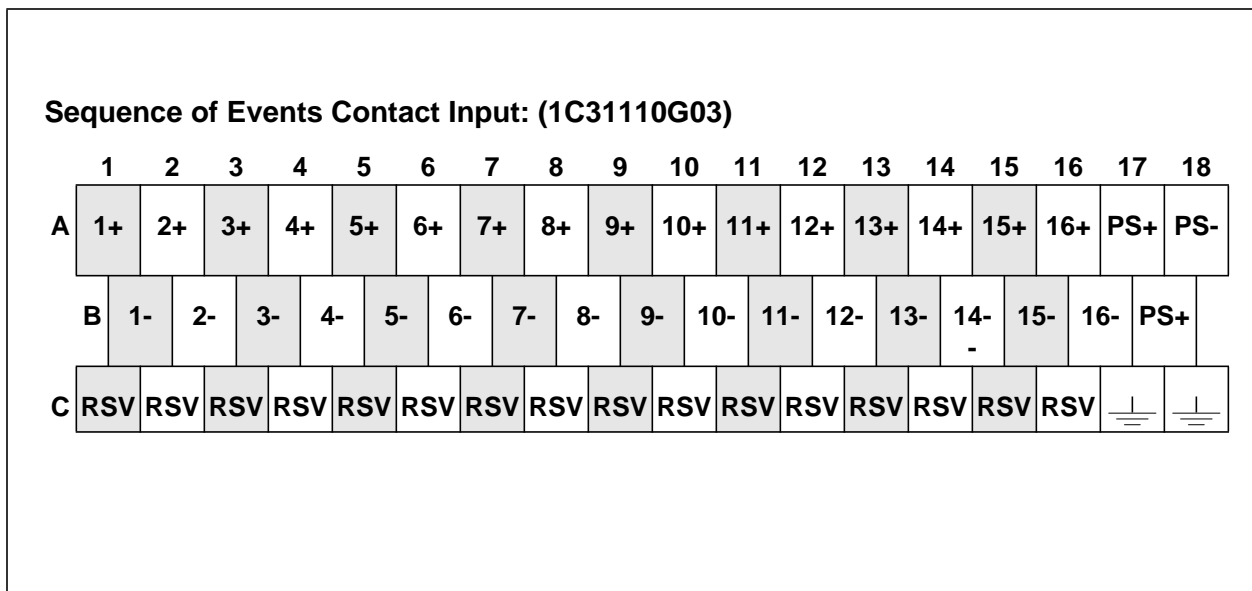


Figure 20-8. Terminal Block Connections for the Sequence of Events Contact Input Personality Modules

20-8.2. Sequence of Events Contact Input Field Connection Wiring Diagram

Non-CE Mark Certified Systems

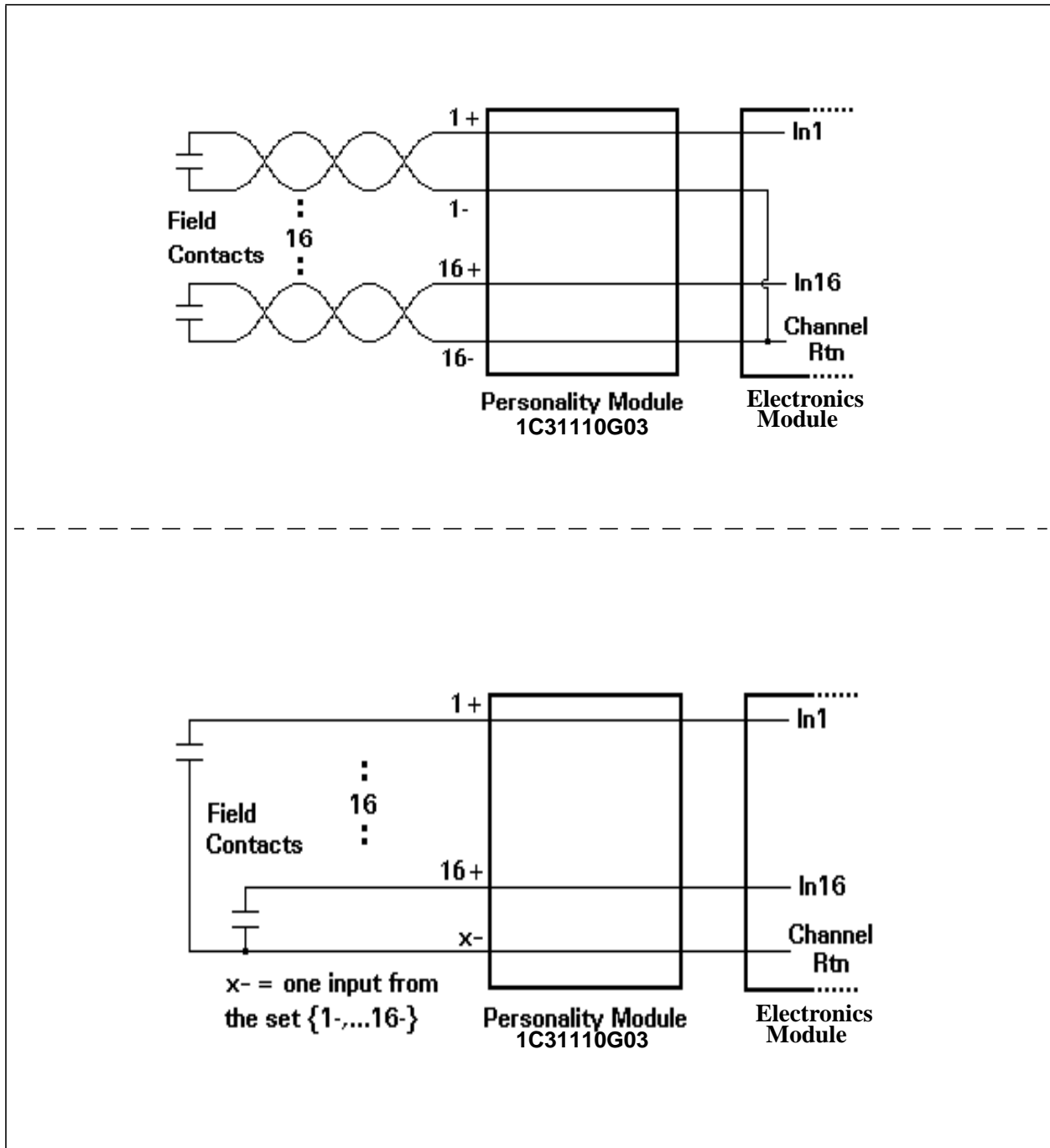


Figure 20-9. Field Connection for the Sequence of Events Contact Input Personality Module (Non-CE Mark)

CE Mark Certified Systems

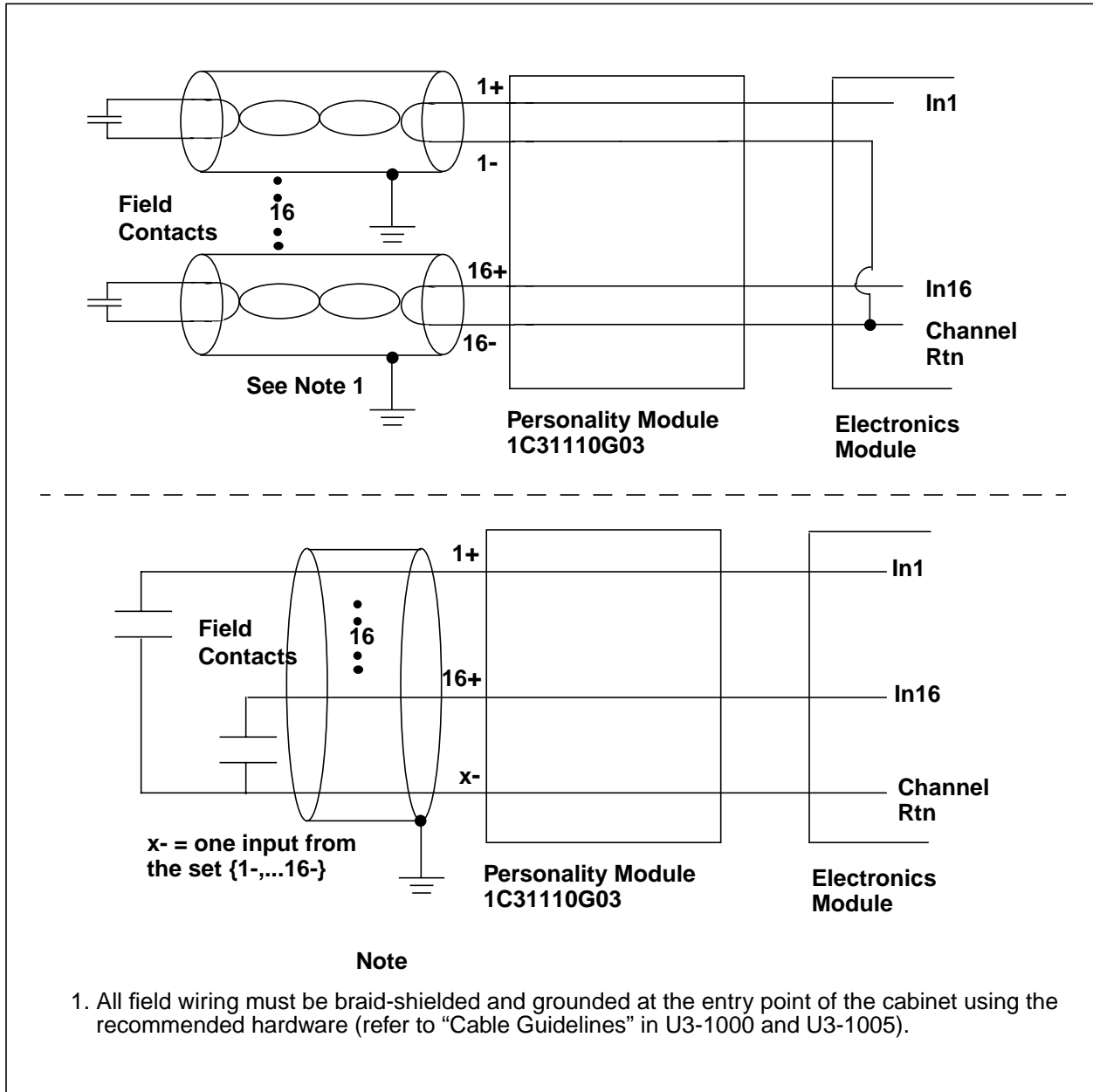


Figure 20-10. Field Connection for the Sequence of Events Contact Input Personality Module (CE Mark)

20-8.3. Sequence of Events Contact Input Configuration and Status Register

Word address 13 (D in Hex) is used to write to the Module Configuration Register and to read the Module Status Register. The status register can be read by using the Point Information window at an Operator Station (see the Bit Pattern Field on the Hardware Tab).

Table 20-10. Sequence of Events Contact Input Configuration/Status Register (Address 13 or D in Hex)

Bit	Data Description - Configuration Register	Data Description - Status Register (Read)
0	Configure Module.	Module configured (1 = configured; 0 = unconfigured)
1	Force internal error.	Internal error (1 = forced error; 0 = no forced error)
2 - 5	Not used.	Not used.
6	Enable digital input blown fuse signal and module attention for blown fuse.	Status of enable digital input blown fuse signal and module attention for blown fuse.
7	Not used. Should be set to zero (0).	Blown fuse for digital input
8	Contact input field card (enable contact input auxiliary voltage failure signal and module attention for auxiliary voltage failure and ground fault detection circuitry).	Status of contact input field card (enable contact input auxiliary voltage failure signal and module attention for auxiliary voltage failure and ground fault detection circuitry).
9	Not used. Should be set to zero (0).	Auxiliary voltage failure for contact input.
10	Enable module attention for a GND fault.	Status of Enable module attention for a GND fault.
11	Not used. Should be set to zero (0).	GND fault.
12	Disable chatter control.	Disable chatter control.
13	Reset chatter control counters on buffer unfreeze (instead of decrementing every 100 milliseconds).	Status of reset chatter control counters on buffer unfreeze (instead of decrementing every 100 milliseconds).
14	Not used. Should be set to zero (0).	Clock synchronized.
15	Not used. Should be set to zero (0).	Not used.

Bit 0: Module will not operate until this bit is set with a write.

Bit 1: When this bit is set, the internal error LED is turned on, and only the status registers can be read.

Bit 6: This bit should be cleared to zero (0).

Bits 8: This bit should be set.

- Bit 10: This bit should be set according to application need.
- Bit 12: When this bit is set and an input channel is not masked off, that input can chatter and each event will be recorded until the event buffer overflows. Default state is “0” and enables the chatter control function.
- Bit 13: When this bit is set, the chatter control counter for each channel is reset each time an event buffer is unfrozen instead of being decremented each 100 milliseconds. Default state is “0” and has the chatter control counter being decremented every 100 milliseconds.

20-9. Diagnostic LEDs

Table 20-11. Sequence of Events Contact Input Diagnostic LEDs

LED	Description
P (Green)	Power OK LED. Lit when the +5V power is OK.
C (Green)	Communications OK LED. Lit when the Controller is communicating with the module.
E (Red)	External fault. Lit when a ground fault occurs in the field wiring. Ground fault is also indicated in bit 12 (GND fault) of the Status register.
I (Red)	Internal fault. Lit when the internal on-card +48V/+10V contact auxiliary power supply has failed. Only lit if Bit 8 of the Configuration register is set.
CH1 through CH16 (Green)	Lit when the input contact of the LED’s corresponding channel is closed.

Section 21. Compact Sequence of Events Module

21-1. Description

The Compact Sequence of Events module provides 16 digital channels to monitor the open or closed state of digital inputs or contacts in the field. The module provides a filter to reject changes of state less than four milliseconds. The Compact Sequence of Events module can also perform event tagging and chatter control for each input channel.

The Ovation Controller writes a channel event tagging mask to the Electronics module to enable event tagging for specific input channels. It has a chatter control flag for each channel to indicate that the input channel has changed state too many times in a period of time, or is changing state at too fast a rate. It also has a channel ID to indicate which channel changed state. Each channel is checked every 125 micro-seconds. If the channel event tagging mask bit is zero, that channel is not checked.

If there is an input channel state change, the change is recorded in the SOE module's Event Buffer and the input channel's Chatter counter is incremented. When the input channel's Chatter counter value reaches four, any additional state changes are not recorded for that input channel. The recording of additional state changes for that input channel is inhibited until the input channel Chatter counter is reset to a zero value.

A control bit written by the Ovation Controller provides two options for resetting an input channel's Chatter counter:

- Each input channel's Chatter counter is reset after the Ovation Controller reads the SOE module's Event Buffer. With this option selected, the SOE module will identify up to four state changes for each of its input channels between successive Ovation Controller Event Buffer read operations.
- Each input channel's Chatter counter is checked every 100 milliseconds and is decremented if its value is greater than zero. When the input channel's Chatter counter value reaches zero, future input channel state changes may be entered into the Event Buffer. With this option selected, an input state change rate greater than 1 per 100 milliseconds will result in no new Event Buffer entries for that input channel, while a lower input state change rate will allow new Event Buffer entries for that input channel.

The Compact Sequence of Events module is applicable for CE Mark certified systems.

There are two 32 event buffers. This allows the event tagging and chatter control function to be writing into one event buffer while the Ovation Controller is reading the other event buffer. The Ovation Controller only reads each module a small portion of the loop time. This allows both event buffers to be available the rest of the loop time.

Each event buffer contains 64 words with up to 32 Channel-IDs and 32 Event-Times. The event buffers are memories. The memory control circuit controls which event buffer to write into and which event buffer to read from. Before reading the event buffer, the buffer status register must be read to determine the number of words to read.

Time synchronization is accomplished by the Ovation Controller writing a time reference simultaneously to all Sequence of Events modules with a 1 millisecond resolution. The Compact Sequence of Event Module is CE Mark applicable.

Note

All SOE modules in a Controller **MUST** be connected to the IOIC card that is configured as the Time Keeper.



Caution

Do **NOT** mix the Compact Sequence of Events module (1C31233) with the Sequence of Events module (1C31157) in the same system.

Cautions for CE Mark certified systems:

Any base unit that contains a 125VDC Compact Sequence of Events Electronics module (1C31233G03) with Foam Insert (1C31238H01) and interfaces to hazardous voltage (>60 VDC) must include a hazardous voltage warning label (1B30025H01) on that base unit.

Any base unit containing a 125VDC Compact Sequence of Events Electronics module (1C31233G03) with Fused Digital Input Personality module (5X00034G01) and interfaces to hazardous voltage (>60 VDC) must include a hazardous voltage warning label (1B30025H01) on **ALL** base units on the branch.

This label must be placed in a visible location on the base unit, preferably above the spare fuse location. The project drawings must indicate this.

21-2. Module Groups

21-2.1. Electronics Modules

There are four Electronics module groups for the Compact Sequence of Events Module:

- 1C31233G01 provides for 24/48 VDC single-ended inputs.
- 1C31233G02 provides for 24/48 VDC differential inputs and supports the 16 point individually fused option.
- 1C31233G03 provides for 125 VDC differential inputs and supports the 16 point individually fused option.
- 1C31233G04 (Contact Input) provides for 48 VDC on-card auxiliary power.

21-2.2. Personality Module

There is one Personality module group for the Compact Sequence of Events Module:

- 5X00034G01 provides for 16 point individual fusing with a common supply.

This is an optional Personality module that is available for use with the differential input Electronics modules (1C31233G02, 1C31233G03) for applications requiring individual point fusing with a common supply.

21-2.3. Foam Insert

There is no Personality module required for use with the Compact Digital Input subsystem (except for the 16 point individually fused option 5X00034G01). A foam insert is available that fits into the Personality module cavity in the Base Unit and provides wiring information.

- 1C31238H01

Table 21-1. Compact Sequence of Events Subsystem

Range	Channels	Electronic Module	Personality Module or Cavity Insert ¹
24/48 VDC (Single-ended) Digital input	16	1C31233G01	1C31238H01 ¹
24/48 VDC (Differential)	16	1C31233G02	1C31238H01 ¹ (Cavity Insert)
Individually fused with common power supply	16	1C31233G02	5X00034G01 (Fused Pmod)
125 VDC (Differential)	16	1C31233G03	1C31238H01 ¹ (Cavity Insert)
Individually fused with common power supply	16	1C31233G03	5X00034G01 (Fused Pmod)
48 VDC On-Card wetting supply	16	1C31233G04	1C31238H01 ¹

¹ This is an insert that fits into the Personality module position and provides a wiring schematic label for the module.

All Configurations are CE Mark certified.

When the 125VAC/VDC Compact Digital Input Emod (1C31233G03) is used in applications without the Fused Pmod (5X00034G01), additional external fusing or other current limiting devices are recommended on the hazardous inputs to provide additional protection to the external wiring and power source.

21-3. External Power Supplies

When using the 1C31233G01 single-ended module, or 1C31233G02/G03 with Personality module 5X00034G01, the required voltage source may be obtained from the internal auxiliary power supply (Controller backplane) or it may be obtained from an external power supply.

If an external power supply is used, see [Appendix D](#) for the steps to be undertaken before connecting the external power supply to the Compact Sequence of Events Digital Input module base unit terminal block.

21-4. Digital Input Field Interface

The Digital Input configuration contains 16 channels, where each channel has voltage level sensing circuitry used to detect whether an input is on or off. Style 1C31233G02/G03 has 16 isolated differential inputs to accommodate separate external auxiliary supplies. Style 1C31233G01 has 16 single-ended (common return) digital inputs with an on-card blown fuse detect to accommodate a common external auxiliary supply for all channels. The input voltage level monitored by the module is determined by the particular card group in the module.

Also, Style 1C31233G02/G03 can be used with the individually fused Personality module 5X00034G01 for applications requiring individual point fusing with a common supply.

The field side circuitry for the single-ended configuration is shown in [Figure 21-1](#), and the differential configuration in [Figure 21-2](#), and the 16 point individually fused configuration is shown in [Figure 21-3](#). An input resistor provides the normal mode surge protection and limits the current during normal operation. An opto-isolator provides high dielectric isolation between the field side and the logic or I/O bus side. The Single-Ended Digital Input configuration has a circuit used to monitor the presence of the wetting supply. Two cases cause this monitor circuitry to report a blown fuse status and issue an attention status to the Ovation Controller:

- Fuse is blown on the module.
- Auxiliary supply level is lower than minimum On Input Voltage.

21-4.1. Field Wiring Considerations for the Digital Input Configuration

The following maximum resistances of the cable and the interfaced device apply:

24 VDC - 100 K Ω ; 48 VDC - 150 K Ω ; 125 VDC 250 K Ω

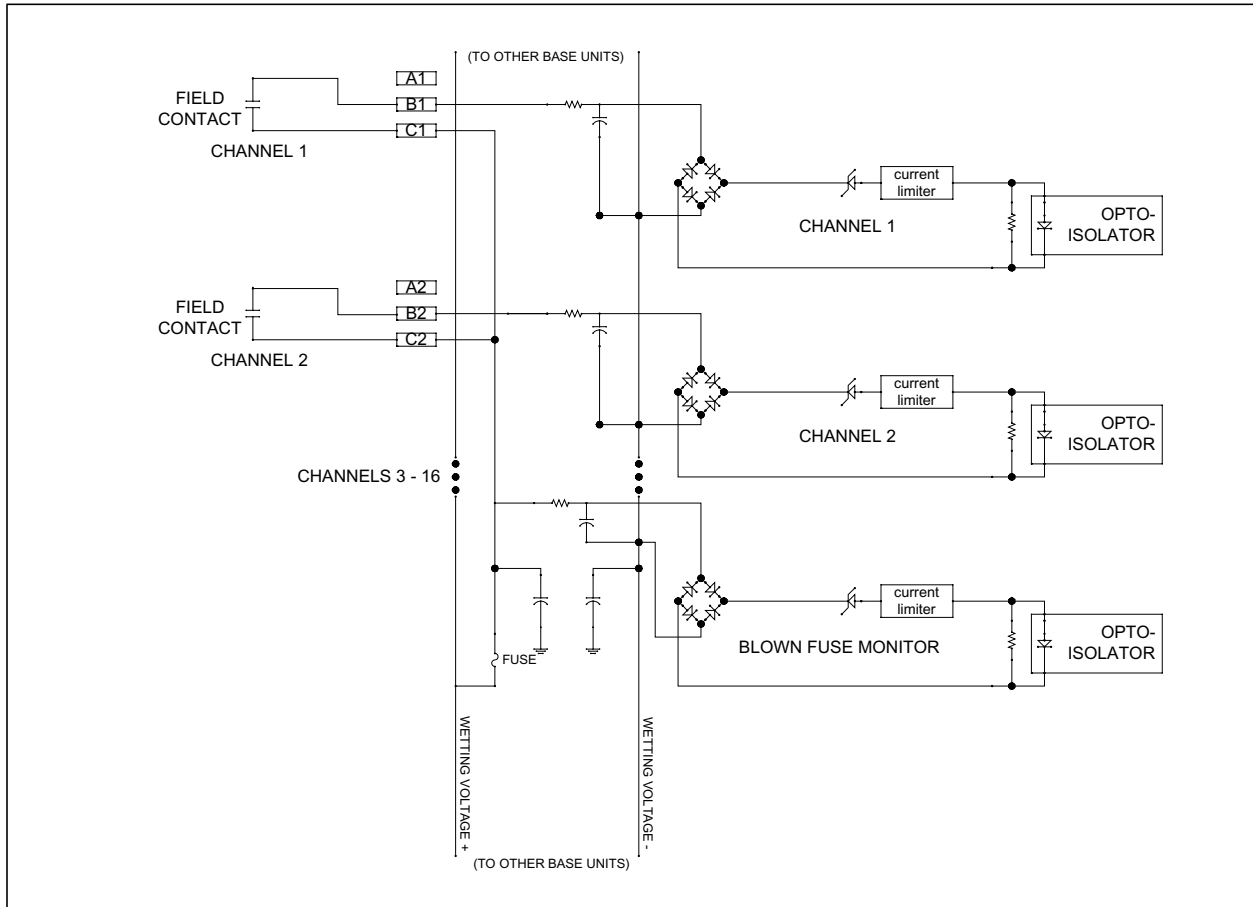


Figure 21-1. Compact Sequence of Events Module Single-Ended Digital Input Front End

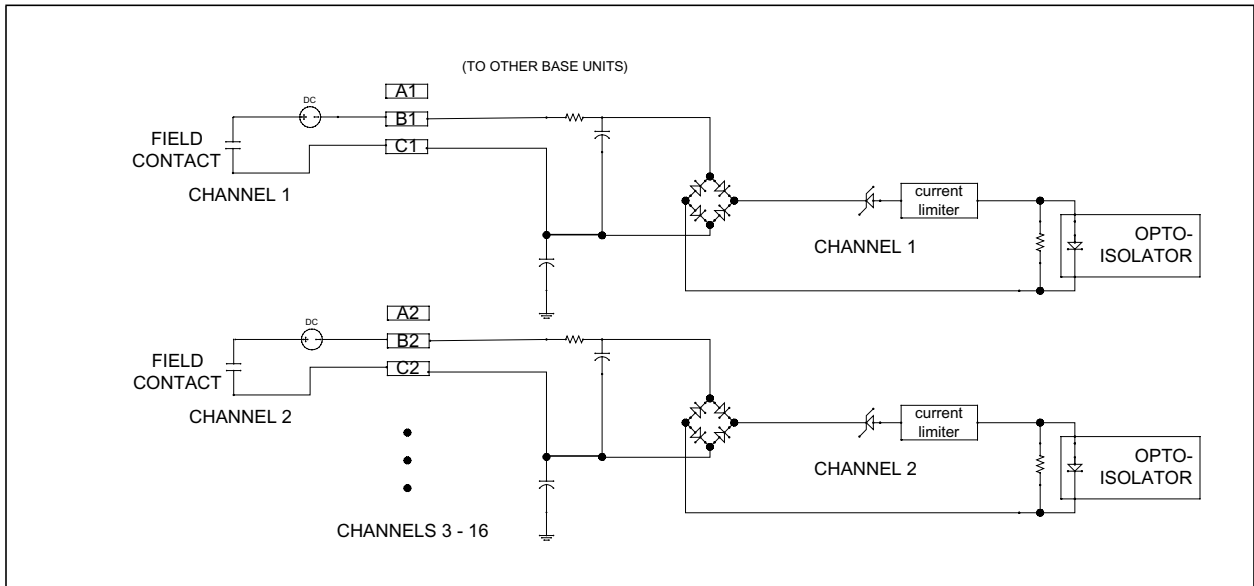


Figure 21-2. Compact Sequence of Events Module Differential Digital Input Front End

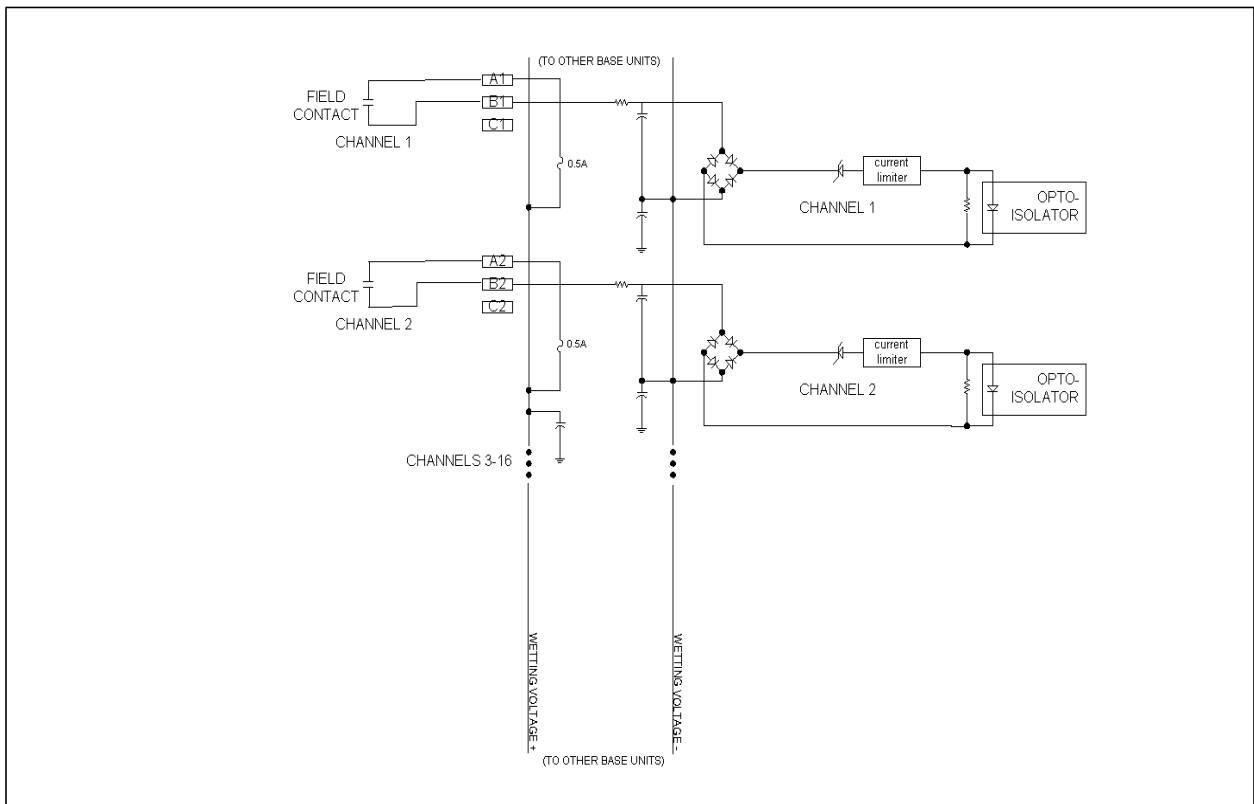


Figure 21-3. 16 Individually Fused Compact Digital Inputs Front End