Discrete I/O Interface with CL6700-Series Cards, Termination Panels, and Modules

CL6700-Series Discrete (I/O) instruments are members of the PROVOX® Control I/O family. They interface discrete field devices to SR90 and SRx Controllers in PROVOX Process Management Systems. Discrete I/O instruments consists of:

- Type CL6721 Discrete Input/Output (I/O) Card
- Type CL6741 Discrete I/O Cable Interface Panel
- Type CL6753 Discrete Input Modules
- Type CL6754 Discrete Output Modules
- Type CL6755 Relay Output Module
- Type CL6763 Pulse-Count Input Termination Panel
- Type CL6764 Redundant Pulse-Count Input Termination Panel
- Type CL6775 Relay Output Termination Panel
- Type CL6776 Redundant Relay Output Termination Panel
- Type CL6787 Discrete Input/Output Termination Panel
- Type CL6788 Redundant Discrete Input/Output Termination Panel

The discrete I/O card converts signals between the format used by SR90 and SRx Controllers and the conventional signals of the devices connected to the termination panels. The selection of termination panels, and input and output modules, lets you interface many types of discrete signals to the controllers in both simplex and redundant I/O applications.

Application
Select the combinations of termination panels and modules depending on your I/O application.

Discrete I/O Termination Panels
Discrete I/O termination panels are selected as follows:
Select the Type CL6787 Discrete Input/Output Termination Panel for *simplex* applications for either discrete input or discrete output signals.

Select the Type CL6788 Redundant Discrete Input/Output Termination Panel for *redundant* applications for either input or output signals.

Each termination panel contains sixteen channels. The channels are individually configured, as inputs or outputs, either latching or momentary, in groups of eight (channels one through eight, and channels nine through sixteen).

Not all channels need to be used, but once a latching or momentary configuration is defined in the group, the other channels in the group must be configured the same, or configured as inputs. Each used channel requires either Type CL6753 Discrete Input Modules or Type CL6754 Discrete Output Modules. Several output modules are available for switching both ac and dc voltages, including metal-oxide varistor (MOV) protected modules for switching inductive loads where transients may exceed 600 Volts.

The discrete I/O termination panels also support time proportional outputs (TPO). For TPO, side-by-side channels are ganged to provide eight output channel pairs. One channel in the pair is the UP channel and the other is the DOWN channel.

**Pulse Count Input Termination Panels**

Pulse count input termination panels are selected as follows:

- Select the Type CL6763 Pulse Count Input Termination Panel for *simplex* applications.
- Select the Type CL6764 Redundant Pulse Count Input Termination Panel for *redundant* applications.

Eight channels are available on each pulse count input (PCI) termination panel. Not all channels need to be used, but each channel used requires a Type CL6753 Discrete Input Module. The Type CL6753 input module available for three-terminal transmitters, such as a vortex flowmeter, has an additional fused 24 Vdc output to provide power for the transmitter.

**Relay Output Termination Panels**

Relay output termination panels are selected as follows:

- Select the Type CL6775 Relay Output Termination Panel for *simplex* applications.
- Select the Type CL6776 Redundant Relay Output Termination Panel for *redundant* applications.

Sixteen channels are available on each termination panel. Each used channel requires a Type CL6755 Relay Output Module. The relay module includes a built-in activity indicator and a replaceable bus-style fuse, and provides normally-open/normally-closed SPDT (1 form C) contacts.

All termination panels include a one-inch wide horizontal cable tray for field-wiring. An optional two-inch wide cable tray is available to replace the one-inch tray. The wider tray, which mounts horizontally above a panel, increases both the cable capacity and the cable-bend area.

**Discrete I/O Card Operation**

The discrete I/O card provides electrical interface between the Control I/O bus and the I/O field signals at the termination panels. The card produces output changes as they occur from an SR90 or SRx controller, while input signals are read and transmitted to a controller at 5 millisecond intervals.

Every 250 milliseconds, the card performs readback tests on each configured output channel to verify the integrity of connections to termination panels and to verify that all configured card outputs are operating in the desired active or inactive state.

The card can be configured to provide discrete input, discrete output, pulse-count input (PCI), or time proportional output (TPO) functionality. When the card is configured for a PCI function, eight input channels are available. When it is configured for TPO, all channels on the card are used as TPO outputs.

**TPO Configuration**

In TPO configuration, a configurable setpoint specifies the length of the base period time interval, during which either the UP or DOWN output will complete an ON/OFF cycle. Also in the TPO configuration, the output deadband can be tuned so that oscillations between UP and DOWN outputs are prevented.

Deadband is specified in percentage of controller output span above and below 50 percent, within which the controller output values cause no output. Output commands outside the deadband range cause one of the channel outputs (UP or DOWN) to turn ON.
**TPO Scaling**

- **Controller Output (Highway Percent)**
  - 100%
  - 0%

- **Down Contact**
  - -100%

- **Up Contact**
  - 0%

**TPO Deadband**

- **Controller Output (Highway Percent)**
  - 100%
  - 0%

- **Deadband (Max.)**
  - 52%
  - 48%

**Continuous TPO Control**

- **Down Output** = 25% of Base Period
  - 100%
  - 75%
  - 25%
  - 0%

- **No Output**
  - 100%
  - 50%
  - 0%

- **Up Output** = 75% of Base Period
  - 100%
  - 75%
  - 25%
  - 0%
Deadband can be specified in a range of 0.25 percent to 2 percent in increments of 0.25 percent. For example, a deadband value of 2 percent results in a deadband range between 48 and 52 percent. The scaling and output deadband are illustrated in the *TPO Scaling* and *TPO Deadband* figures.

The eight TPO channel pairs are configured as continuous (latching) or one-shot (momentary) outputs. A channel pair, configured for continuous output, cycles on and off repeatedly, with active output, duty cycle, and ON/OFF output cycle frequency determined by controller output and the configured base period.

A channel pair configured for one-shot output cycles only once, with the active output duration determined by the output value of the base period. Controller output changes to a TPO channel take effect immediately, regardless of current output state. The *Continuous TPO Control* and *One-Shot TPO Control* figures illustrate the relationship between the control parameters.

**Discrete I/O Configuration**

The discrete interface is configured by ENVOX® Configuration Software or PROFLEX® Configuration Software, or by the microPROVOX™ System. Each channel is configured individually for versatile setup to process control system needs.
Simplex Configuration

Installation

The discrete I/O card is installed in a Type CP6701 Control Input/Output Cardfile. The card can be mixed with other CL6700-Series, CL6800-Series, and CL6900-Series I/O cards in the same cardfile. The cardfile is installed on standard EIA rails located in a Type CP7010 System Cabinet or factory-supplied custom cabinet.

Termination panels are installed on standard EIA rails in a Type CP7005 Half-Depth Cabinet, a Type CP7010 System Cabinet, or a factory-supplied custom cabinet. These cabinets provide environmentally protected, temperature controlled mounting.

An I/O bus connects the I/O cards installed in the card file to the I/O connection in an SR90 or SRx controller. A multi-pair cable connects an I/O card to a termination panel. Termination panels accept twisted-pair cable from field devices.

Termination panels can be installed front and back in a Type CP7010 cabinet for efficient space usage. For this installation, front and back doors make panels easily accessible. Discrete I/O termination panels can be intermixed with other Control I/O family panels.

The I/O bus and multi-pair cables allow for local or remote I/O locations. All of the physical-distribution characteristics of the Control I/O family apply. The discrete cards and termination panels can be placed in a control room or placed outside the control room close to the process field devices.

Redundancy

You can choose one-for-one (1:1) or one-for-N (1:N) backup to meet your process requirements. One-for-one backup requires two discrete interface cards, two I/O buses, two multi-pair cables, and one redundant termination panel. To help minimize your system costs, you may be able to use one-for-N backup. In this type of backup, one backup card can support up to eight primary cards. The backup card need not be located in the same file as the primary card.

If a primary card failure is detected, and input or output data is not corrupted when inputs are reported or outputs are driven, both input and output values are held at their last values. Switchover is bumpless for outputs. Switchover for inputs is briefly delayed to allow input filters to stabilize for smooth transitions. Normal input reporting and output driving continues after the switchover is complete.

If the failure is detected, and the data is corrupted when inputs are reported or outputs are driven, a bump of inputs or outputs at switchover may occur.

Several figures illustrate simplex and redundancy configurations. Simplex Configuration shows a simplex termination panel to I/O card configuration with redundant I/O bus setup (not necessary, but recommended). Redundant 1 for 1 Configuration shows a redundant 1:1 I/O setup. Redundant 1 for N (N = 2) Configuration shows one backup card for two primary cards. Both input and output I/O can be simplex or redundant.
Redundant 1 for 1 Configuration

Redundant 1 for N (N = 2) Configuration

Power Failure and Recovery
A power failure involving the entire I/O subsystem causes all outputs to be cleared to a de-activated state. When power is restored, a power up sequence returns outputs to the configured power-up states.

System response to power failures of individual discrete I/O components depends upon the component experiencing the power failure and whether there is a redundant or backup method for that component. Power failures within a cardfile cause redundancy switchover if the failure is a blown fuse on an active card.

Further information is provided in the installation planning manuals for the Control I/O Subsystem.
Ordering Information

See the Application information to determine the termination panels and modules required for the desired signal conversions.

When ordering, specify:

Discrete Input/Output Card
Type CL6721 Discrete I/O Card

Termination Panels
- Type CL6763 Pulse-Count Input Termination Panel
- Type CL6764 Redundant Pulse-Count Input Termination Panel
- Type CL6775 Relay Output Termination Panel
- Type CL6776 Redundant Relay Output Termination Panel
- Type CL6787 Discrete Input/Output Termination Panel
- Type CL6788 Redundant Discrete Input/Output Termination Panel

Signal Conditioning Modules

Caution

The use of Extra Low Voltage (ELV) rated input and output modules on a termination panel limits the use of the panel exclusively for ELV field circuits. Hazardous voltages above ELV-rated voltages of 30 Vac or 42 Vdc must not be connected to termination panels containing ELV-rated modules.

- Type CL6753 Discrete Input Modules, and range:
  - 3 to 32 Vdc with debounce
  - 3 to 32 Vdc without debounce (fast switching)
  - 3 to 32 Vdc for vortex flowmeters
  - 90 to 140 Vac/Vdc
  - 180 to 280 Vac/Vdc
- Dry contact input (low side switching)
  - Type CL6754 Discrete Output Modules, and range:
    - 24 Vdc
    - 3 to 60 Vdc
    - 24 to 140 Vac
    - 24 to 140 Vac with MOV-protection
    - 24 to 280 Vac
    - 24 to 280 Vac with MOV-protection
  - Type CL6755 Relay Output Module (electro-mechanical, 1 form C)

Cable Interface Panel
Specify Type CL6741 Discrete Cable Interface Panel, only if using 1 for N redundancy

I/O Card to Termination Panel Cables
A simplex termination panel requires one cable. A redundant termination panel requires two cables: one to the primary I/O card and the other to the redundant I/O card (for 1 : 1 redundancy) or to the cable interface panel (for 1 : N redundancy).

- Factory specified up to 20 feet for cabling between adjacent cabinets. If the cabinets are not adjacent, specify the lengths below.
  - 5 feet (1.53 m)
  - 10 feet (3.05 m)
  - 20 feet (6.10 m)
  - 50 foot (15.2 m). Includes an extra connector for field alterations.
  - 100 foot (30.5 m). Includes an extra connector for field alterations.
  - 200 foot (61.0 m). Includes an extra connector for field alterations.

Cable Tray
Termination panels include a one-inch wide horizontal cable tray. A two-inch wide cable tray is available to replace the one-inch tray. The wider tray, which mounts horizontally above the panel, increases both the cable capacity and the cable-bend area. Specify the optional wider tray if desired.
## Specifications

<table>
<thead>
<tr>
<th>I/O Card Power</th>
<th>240 Vac/Vdc</th>
</tr>
</thead>
<tbody>
<tr>
<td>+24 Vdc nominal from the cabinet power bus bar at 100 mA</td>
<td>On state: 180—280 Vac/Vdc</td>
</tr>
<tr>
<td>0 mA</td>
<td>Off state: 0—50 Vac/Vdc</td>
</tr>
<tr>
<td>+24 Vdc from the cabinet power bus bar. Type CL6763 Pulse-Count Input: 30 mA (Add 40 mA for each module installed, and add current required by each three-wire transmitter) Type CL6764 Redundant Pulse-Count Input: 50 mA (Add 40 mA for each module installed, and add current required by each three-wire transmitter) Type CL6775 Relay Output: 30 mA (Add 40 mA for each relay output module installed) Type CL6776 Redundant Relay Output: 75 mA (Add 40 mA for each relay output module installed) Type CL6778 Redundant Discrete I/O: 110 mA (Add 40 mA for each module installed except add 200 mA for each +24 Vdc output through a Type CL6754 output module)</td>
<td>Input resistance: 45 Kohms, nominal</td>
</tr>
<tr>
<td>Pulse-Count Input: Can be 3—32 Vdc, Dry Contact or Vortex Flowmeter input as specified below.</td>
<td>Turn-on time: 20 ms maximum</td>
</tr>
<tr>
<td>Dry Contact On state: 0—1.25 Kohms for closed contact input, 7 mm minimum for solid-state switch input</td>
<td>Turn-off time: 20 ms maximum</td>
</tr>
<tr>
<td>Off state: greater than 30 Kohms for open contact input, less than 1 mA for solid-state switch input</td>
<td>Isolation: optically isolated</td>
</tr>
<tr>
<td>On state: 0—1.25 Kohms for closed contact input, 7 mm minimum for solid-state switch input</td>
<td>Open circuit voltage on contact input: 24 Vdc nominal (actual voltage is approximately 2 volts less than supply voltage to termination panel)</td>
</tr>
<tr>
<td>Turn-on time: 10—20 ms</td>
<td>Wetting current: 10 mA</td>
</tr>
<tr>
<td>Turn-off time: 10—20 ms</td>
<td>Isolation: not used</td>
</tr>
<tr>
<td>Vortex Flowmeter On state: 3—32 Vdc at 7.5—37 mA</td>
<td>Vortex motor power: 24 Vdc nominal (actual power is approximately 0.5 Vdc lower than supply voltage to termination panel). Fused at 1 A</td>
</tr>
<tr>
<td>Off state: 0—1 Vdc at 0—100 uA</td>
<td>Input resistance: 900 ohms, nominal</td>
</tr>
<tr>
<td>Minimum pulse width: 50 us high, 50 us low</td>
<td>Maximum frequency: 10 kHz</td>
</tr>
<tr>
<td>Isolation: not used</td>
<td>Off state leakage: 10 uA maximum</td>
</tr>
<tr>
<td>3 to 32 Vdc</td>
<td>Turn-on time: 75 us + I/O bus time</td>
</tr>
<tr>
<td>On state: 3—32 Vdc at 5—18.5 mA</td>
<td>Turn-off time: 500 us + I/O bus time</td>
</tr>
<tr>
<td>Off state: 0—1 Vdc at 0—100 uA</td>
<td>Isolation: not used</td>
</tr>
<tr>
<td>Input resistance: 2 Kohms, nominal</td>
<td>Circuit protection: fused at 1 A.</td>
</tr>
<tr>
<td>Turn-on time: 10—20 ms with debounce, 50 us without debounce (fast switching)</td>
<td>Output switching on the return side</td>
</tr>
<tr>
<td>Turn-off time: 10—20 ms with debounce, 50 us without debounce (fast switching)</td>
<td>Latching/momentary: configuration is selectable in groups of eight outputs. Momentary time can be 0.1 to 25.5 seconds in increments of 0.1 seconds</td>
</tr>
<tr>
<td>Isolation: optically isolated</td>
<td></td>
</tr>
<tr>
<td>30 Vdc, 0.2 A, (Current Sinking)</td>
<td></td>
</tr>
<tr>
<td>On state: 24 Vdc nominal (actual voltage is approximately 2 Vdc less than supply voltage to termination panel), 0.2 A max continuous; 1 A max surge for 1 second</td>
<td></td>
</tr>
<tr>
<td>Off state leakage: 10 uA maximum</td>
<td></td>
</tr>
<tr>
<td>Turn-on time: 75 us + I/O bus time</td>
<td></td>
</tr>
<tr>
<td>Turn-off time: 500 us + I/O bus time</td>
<td></td>
</tr>
<tr>
<td>Isolation: not used</td>
<td></td>
</tr>
<tr>
<td>Circuit protection: fused at 1 A.</td>
<td></td>
</tr>
<tr>
<td>Output switching on the return side</td>
<td></td>
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<tr>
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<th>I/O Card Power</th>
<th>Specifications</th>
</tr>
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<tr>
<td>+24 Vdc nominal from the cabinet power bus bar at 100 mA</td>
<td>Switches One momentary pushbutton switch located on the discrete I/O card for manual switchover to a backup discrete I/O card.</td>
</tr>
<tr>
<td>0 mA</td>
<td>Discrete Input Signals</td>
</tr>
<tr>
<td>+24 Vdc from the cabinet power bus bar. Type CL6763 Pulse-Count Input: 30 mA (Add 40 mA for each module installed, and add current required by each three-wire transmitter) Type CL6764 Redundant Pulse-Count Input: 50 mA (Add 40 mA for each module installed, and add current required by each three-wire transmitter) Type CL6775 Relay Output: 30 mA (Add 40 mA for each relay output module installed) Type CL6776 Redundant Relay Output: 75 mA (Add 40 mA for each relay output module installed) Type CL6778 Redundant Discrete I/O: 110 mA (Add 40 mA for each module installed except add 200 mA for each +24 Vdc output through a Type CL6754 output module)</td>
<td>Discrete Output Signals</td>
</tr>
<tr>
<td>Pulse-Count Input: Can be 3—32 Vdc, Dry Contact or Vortex Flowmeter input as specified below.</td>
<td>3 to 32 Vdc On state: 3—32 Vdc at 5—18.5 mA</td>
</tr>
<tr>
<td>Off state: 0—1 Vdc at 0—100 uA</td>
<td>Input resistance: 2 Kohms, nominal</td>
</tr>
<tr>
<td>Input resistance: 2 Kohms, nominal</td>
<td>Turn-on time: 10—20 ms with debounce, 50 us without debounce (fast switching)</td>
</tr>
<tr>
<td>Turn-on time: 10—20 ms with debounce, 50 us without debounce (fast switching)</td>
<td>Turn-off time: 10—20 ms with debounce, 50 us without debounce (fast switching)</td>
</tr>
<tr>
<td>Isolation: optically isolated</td>
<td></td>
</tr>
<tr>
<td>3 to 32 Vdc</td>
<td>120 Vac/Vdc On state: 90—140 Vac/Vdc</td>
</tr>
<tr>
<td>On state: 90—140 Vac/Vdc</td>
<td>Off state: 0—25 Vac/Vdc</td>
</tr>
<tr>
<td>Off state: 0—25 Vac/Vdc</td>
<td>Input resistance: 22 Kohms, nominal</td>
</tr>
<tr>
<td>Input resistance: 22 Kohms, nominal</td>
<td>Turn-on time: 20 ms maximum</td>
</tr>
<tr>
<td>Turn-on time: 20 ms maximum</td>
<td>Turn-off time: 20 ms maximum</td>
</tr>
<tr>
<td>Turn-off time: 20 ms maximum</td>
<td>Isolation: optically isolated</td>
</tr>
<tr>
<td>Isolation: optically isolated</td>
<td></td>
</tr>
</tbody>
</table>

### Power Interface Panel Power

- **Panel Power**
- **Termination Panel Power**

### Panel Power

- **Switches**
- **Discrete Input Signals**

- **3 to 32 Vdc**
  - **On state:** 3—32 Vdc at 5—18.5 mA
  - **Off state:** 0—1 Vdc at 0—100 uA
  - **Input resistance:** 2 Kohms, nominal
  - **Turn-on time:** 10—20 ms with debounce, 50 us without debounce (fast switching)
  - **Turn-off time:** 10—20 ms with debounce, 50 us without debounce (fast switching)
  - **Isolation:** optically isolated

- **120 Vac/Vdc**
  - **On state:** 90—140 Vac/Vdc
  - **Off state:** 0—25 Vac/Vdc
  - **Input resistance:** 22 Kohms, nominal
  - **Turn-on time:** 20 ms maximum
  - **Turn-off time:** 20 ms maximum
  - **Isolation:** optically isolated
### Specifications (continued)

| 60 Vdc, 3.5 A (Isolated solid-state switch) | On state: 1.2 Vdc maximum across switch (capable of switching voltages up to 60 Vdc. Load current range 0.02—3.5 A  
Off state leakage: 10 µA maximum  
Turn-on time: 75 us + I/O bus time  
Turn-off time: 500 us + I/O bus time  
Isolation: optically isolated  
Circuit protection: fused at 5 A  
Latching/momentary: configuration is selectable in groups of eight outputs. Momentary time can be 0.1—25.5 seconds in increments of 0.1 seconds  
Load current range: 0.03—3.5 A  
Maximum continuous current vs ambient temperature: refer to the De-rating figure below. |
| 120 Vac, 3.5 A (Isolated solid-state switch; with and without MOV) | On-state: 1.5 Vac maximum across switch (capable of switching 24—140 Vac)  
Off-state leakage: 2 mA maximum  
Turn-on time: 8.4 ms at 60 Hz + I/O bus time. Next zero voltage crossing of external load. (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz.)  
Turn off time: 8.4 ms maximum at 60 Hz plus I/O bus time. Next zero voltage crossing of external load. (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz.)  
Load current range: 0.03—3.5 A  
Isolation: optically isolated  
Circuit protection: fused at 5 A  
Latching/momentary: configuration is selectable in groups of eight outputs. Momentary time can be 0.1 to 25.5 seconds in increments of 0.1 seconds  
Maximum continuous current vs ambient temperature: refer to the De-rating figure below. |
| 240 Vac, 3.5 A (Isolated solid-state switch; with and without MOV) | On state: 1.5 Vdc maximum across switch (capable of switching 24—280 Vac)  
Off state leakage: 4 mA maximum  
Turn-on time: 8.4 ms maximum at 60 Hz plus I/O bus time. Next zero voltage crossing of external load. (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz)  
Turn-off time: 8.4 ms maximum at 60 Hz plus I/O bus time. Next zero crossing of external load current (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz)  
Isolation: optically isolated  
Circuit protection: fused at 5 A  
Latching/momentary: configuration is selectable in groups of eight outputs. Momentary time can be 0.1 to 25.5 seconds in increments of 0.1 seconds  
Load current range: 0.03—3.5 A  
Maximum continuous current vs ambient temperature: refer to the De-rating figure below. |
| 120 Vac, 3.5 A (Isolated solid-state switch; without MOV) | On state: 1.5 Vac maximum across switch (capable of switching 24—140 Vac)  
Off state leakage: 2 mA maximum  
Turn-on time: 8.4 ms at 60 Hz + I/O bus time. Next zero voltage crossing of external load. (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz.)  
Turn off time: 8.4 ms maximum at 60 Hz plus I/O bus time. Next zero voltage crossing of external load. (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz.)  
Load current range: 0.03—3.5 A  
Isolation: optically isolated  
Circuit protection: fused at 5 A  
Latching/momentary: configuration is selectable in groups of eight outputs. Momentary time can be 0.1 to 25.5 seconds in increments of 0.1 seconds  
Maximum continuous current vs ambient temperature: refer to the De-rating figure below. |
| 240 Vac, 3.5 A (Isolated solid-state switch; without MOV) | On state: 1.5 Vdc maximum across switch (capable of switching 24—280 Vac)  
Off state leakage: 4 mA maximum  
Turn-on time: 8.4 ms maximum at 60 Hz plus I/O bus time. Next zero voltage crossing of external load. (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz)  
Turn-off time: 8.4 ms maximum at 60 Hz plus I/O bus time. Next zero crossing of external load current (i.e., 8.4 ms maximum at 60 Hz, 10.1 ms maximum at 50 Hz)  
Isolation: optically isolated  
Circuit protection: fused at 5 A  
Latching/momentary: configuration is selectable in groups of eight outputs. Momentary time can be 0.1 to 25.5 seconds in increments of 0.1 seconds  
Load current range: 0.03—3.5 A  
Maximum continuous current vs ambient temperature: refer to the De-rating figure below. |

#### Relay Output Module
- Relay type: 1 form C, electromechanical  
- Operate time: 10 ms, typical, plus I/O bus time  
- Release time: 5 ms, typical, plus I/O bus time  
- Relay contact rating:  
  - 5 A at 0–250 Vac resistive load  
  - 2 A at 0–250 Vac, inductive load  
  - 5 A at 30 Vdc  
- In-rush current: 5 A with 8 A fuse installed in the relay module. With a slow-blow fuse installed, will handle starting current for 0.1 hp motor  
- Latching/momentary: configuration is selectable in groups of eight outputs. Momentary time can be 0.1 to 25.5 in increments of 0.1 seconds  
- Relay contact protection: metal-oxide varistor (MOV) internal to module

#### Field Wiring Connections
- Connectors have the capacity for one 12 AWG or two 14 AWG wires

#### Surge Withstand
- All termination panels meet IEEE STD 472 Surge Withstand Capability (transient protection) at the field wiring terminals.

#### Termination Panel to I/O Card Cable
- Type: Gray PVC jacket, multi-twisted pair conductor, one aluminum-polyester shield with 24 AWG stranded tinned-copper drain wire. Meets VW-1 Vertical Wire Flame Test  
- Conductors: 19 twisted pairs  
- Nominal Resistance: 24 ohms/1000 ft (conductor), 14 ohms/1000 ft (drain wire)  
- Nominal capacitance: 30 pf/ft (98 pf/m) between mutual conductors, 50 pf/m between one conductor and other conductors connected to the shield  
- Lengths: available with molded connectors of both ends, in standard lengths of 5, 10, 20, 50, 100, 200 feet (1.52, 3.05, 6.1, 15.2, 30.5, 61 m). The 50, 100, 200 foot cables are supplied with a field termination kit for custom installation.
**Specifications (continued)**

<table>
<thead>
<tr>
<th>Mounting Depth</th>
<th>All termination panels have a mounting depth of 4 inches (102 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions and Weight</td>
<td>Type CL6721 Discrete I/O Card: 8.66 inches x 9.18 inches (220 mm x 233 mm), 14 ounces (397 grams)</td>
</tr>
<tr>
<td></td>
<td>Type CL6763 Pulse Count Input Panel: 5.25 inches x 19 inches (133 mm x 483 mm) (3 rack units) 2.9 pounds (1.3 kg)</td>
</tr>
<tr>
<td></td>
<td>Type CL6764 Redundant Pulse Count Input Panel: 5.25 inches x 19 inches (133 mm x 483 mm) (3 rack units) 3.0 pounds (1.4 kg)</td>
</tr>
<tr>
<td></td>
<td>Type CL6775 Relay Output Panel: 5.25 inches x 19 inches (133 mm x 483 mm) (3 rack units) 3.0 pounds (1.4 kg)</td>
</tr>
<tr>
<td></td>
<td>Type CL6776 Redundant Relay Output Panel: 5.25 inches x 19 inches (133 mm x 483 mm) (3 rack units) 3.1 pounds (1.4 kg)</td>
</tr>
<tr>
<td></td>
<td>Type CL6787 Discrete I/O Panel: 5.25 inches x 19 inches (133 mm x 483 mm) (3 rack units) 3.0 pounds (1.4 kg)</td>
</tr>
<tr>
<td></td>
<td>Type CL6788 Redundant Discrete I/O Panel: 5.25 inches x 19 inches (133 mm x 483 mm) (3 rack units) 3.1 pounds (1.4 kg)</td>
</tr>
<tr>
<td></td>
<td>Type CL6741 Cable Interface Panel: 5.25 inches x 19 inches (133 mm x 483 mm) (3 rack units) 3 pounds (1.4 kg)</td>
</tr>
<tr>
<td></td>
<td>Optional 2-inch (50.8 mm) Cable Tray: 19 inches (483 mm) wide; requires 1.75 inch mounting height (1 rack-unit) above termination panel.</td>
</tr>
<tr>
<td>Electrical Classification</td>
<td>Refer to the Non-Hazardous Area Classification Bulletin, BU4.7:001</td>
</tr>
<tr>
<td>Electromagnetic Compatibility</td>
<td>Complies with European Standards EN50081-2:1993 and EN50082-2:1995</td>
</tr>
</tbody>
</table>

**Operating Conditions**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Reference Limits (1)</th>
<th>Normal Limits (1)</th>
<th>Operative Limits (1)</th>
<th>Transport &amp; Storage Limits (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Temperature</td>
<td>73 &amp; 81°F (23 &amp; 27°C)</td>
<td>41 &amp; 131°F (5 &amp; 55°C)</td>
<td>32 &amp; 131°F (0 &amp; 55°C)</td>
<td>−40 &amp; 149°F (−40 &amp; 65°C)</td>
</tr>
<tr>
<td>Maximum Temperature Variation</td>
<td>3.5°F/h (2°C/h)</td>
<td>36°F/hr (20°C/hr)</td>
<td>9°F/min (5°C/min)</td>
<td>18°F/min (10°C/min)</td>
</tr>
<tr>
<td>Ambient Relative Humidity (without condensation)</td>
<td>35 to 45%</td>
<td>10 to 90%</td>
<td>5 to 95%</td>
<td>5 to 95%</td>
</tr>
</tbody>
</table>

1. ISA Standard ISA-S51.1-1979.

**Solid-State Switch Output De-rating**

![Graph showing Maximum Continuous Current Vs. Ambient Temperature](image)

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