Universal Safety Controller HUB™

“Control reliable” Category 4 safety center replaces multiple safety relays/modules and seamlessly integrates many safety devices, outputs and control logic functions.
The Universal Safety Controller HUB from Pinnacle Systems replaces multiple individual freestanding safety relay modules into one completely integrated and multi-faceted safety center. The Safety Controller HUB contains a multitude of input wiring provisions for various safety devices that will be incorporated on the machine to be guarded or controlled. The HUB also contains dry contact safety relays and solid-state outputs in one complete, compact control reliable safety controller package. This provides ease of installation, improved safety and economic improvement on both installation and hardware cost.

Typical safety device inputs that can be monitored and controlled by the Safety HUB are: safety interlock switches (all types), safety light curtains, E-stop switches, cable – pull switches, safety mats, muting systems, operator two hand controls which contains anti-tie down/concurrency logic functions, EDM (External Device Monitoring) and much more.

**Standard Features**

- The Safety Controller HUB has 24 safety input terminals that can utilize safety or non-safety devices. (Expandable).
- The Safety HUB can monitor an input signal or provide 24 VDC when needed.
- Inputs can be NPN sinking/ground or PNP sourcing /+24VDC.
- Monitored mechanical captive contact safety relay outputs (dry) are built-in standard within the Safety HUB.
- Monitored solid state outputs are built-in the Safety HUB.
- Safety Channels A and B are both pulsed independently and sequentially to protect from component and internal shorts of 4 wire E-stop devices.
- No dip switches for inadvertent tampering of safety circuit, outputs or ancillary functions.
- No programming - Pinnacle Systems does everything for you!

**Resets**

- Fault reset button on Safety HUB Controller front panel.
- Manual relay reset button on Safety HUB Controller front panel.
- *Remote reset button – Uses any of the 24 safety inputs for remote reset away from the Controller HUB.

The Universal Safety Controller HUB has built-in field replaceable captive (dry) contact safety relays. This is quite advantageous when compared to regular safety relay modules that require the entire module to be discarded and replaced when a single internal mechanical relay goes bad. The Universal Safety Controller HUB is extremely cost efficient when compared to the total cost of using standard freestanding safety relays, their installation time and repair.

**Communications**: The Safety Controller HUB contains USB Port, CAN Network and optional Ethernet connections.

**Control Reliable Control Systems**

Control reliable resolver based (rotary and linear) position based systems available. Excellent for machine tools such as punch presses and press brakes (consult factory).

**Regulatory Design Requirements**

OSHA (Occupational Safety & Health Administration), ANSI (American National Standard Institute), and the European Standard (CE) mandate that safety circuits and safety systems used for machine guarding applications be “control reliable.”

Monitoring is also required of the safety circuits to assure that system redundancy is maintained. The Safety Controller HUB performs the monitoring functions required & assures that circuit redundancy is maintained with the safety devices utilized. All safety outputs are also monitored by the control reliable internal dual channel control logic of the Safety Controller HUB.

If any fault occurs during the machine operation, (examples safety device, dual channel control logic or the safety output relays), the self-contained safety relay outputs will shut down &
remove power. The power when removed from the MPCE (Machine Primary Control Element) assures that the machine will achieve a safe state status until the fault is cleared. The contacts of the MPCE & additional external safety relays can also be monitored by the Universal Safety Controller HUB when required.

**More Inputs Needed?**

*Safety Controller HUB Expansion*

CAN – (Controller Area Network) Safety HUB communication on how multiple Safety Controller HUBs are connected and communicate with each other. The wiring connections for expansion are made on the two dedicated terminals (29 & 30) located on the upper left wiring connector on the Safety HUB. (CAN L Slave/CAN H Master) The CAN wiring connection is supplied standard on each Safety HUB for future expansion.

*Communications*

Ethernet (Optional) – Connected on the right side of the Safety HUB enclosure with a RJ-45 jack. The Ethernet capability provides the ability to program and review system status of the Safety HUB via the Internet.

**Specifications**

- **Power:** 24V dc +/-10%
- **Power consumption:**
  - Inputs: 24 Opto inputs – Each E-Stop requires 2 inputs
  - Each Category 4 E-stop requires 4 inputs
  - Safety Outputs: 3 normally open (N.O held closed) Dry safety outputs @ 8 Amps @ 250VAC
  - Solid state Outputs: 2 1/2 Amps
  - Auxiliary Output: 1 normally open/normally closed N.O./N.C. auxiliary relay for external status indicators. @ 5Amps @ 250 VAC
- **Status Outputs:** 8
- **Indicators on controller HUB front:** Red, Red, Green, Amber
- **Reset buttons on controller HUB front:** Fault Reset, Manual Relay Reset, Provision for Remote Reset button (requires one input)
- **Standards:** Designed to meet: EN 954-1 Cat 4, IEC 61508-SIL3, ISO 13849-1 Performance Level e, ISO, OSHA and ANSI.
- **Response Time:** 15 milliseconds
- **Self-checking Intervals:** Every milliseconds 19 msec
- **USB Port:** 1
- **CAN Network:** Expansion capability for additional inputs/outputs or additional logic functions built in.
- **Temperature Range:** 32°F-120°F (0°C-51°C)
- **Shock:** Tested to withstand high vibration application per UL 991
- **Ethernet Network:** Optional
- **Warranty - 2 years**

**Enclosure**

- **Enclosure Housing:** Gray polycarbonate with clear cover provides IP40, UL94V-1 Rating
- **Enclosure Dimensions:** 5.87” (149mm) length x 4.33” (110mm) depth x 2.95” (45mm) height
- **Enclosure Mounting:** 35mm Din-rail mountable or mounting screws on corners of enclosure requiring two combo-head screws (3.5 x 0.6mm x 14mm or #6 x .5)
- **Options Available:**
  - Mute-out
  - Cincinnati Interface CI
  - Latching Relays
  - Expansion
  - External Device Monitoring (EDM)
  - Two Hand Control for operator machine initiation
  - Ethernet
  - Customized logic functions
12 Position Connector

**Upper Left**
- CAN Network / Solid State Status Outputs / Solid State Safety Outputs

Terminal 29: CAN L (Slave) Expansion Hub
Terminal 30: CAN H (Slave) Expansion Hub
Terminal 31: Status Output E-1 (1/2A Solid State, +24V or GND out)
Terminal 32: Status Output E-2 (1/2A Solid State, +24V or GND out)
Terminal 33: Status Output E-3 (1/2A Solid State, +24V or GND out)
Terminal 34: Status Output E-4 (1/2A Solid State, +24V or GND out)
Terminal 35: Status Output E-5 (1/2A Solid State, +24V or GND out)
Terminal 36: Status Output E-6 (1/2A Solid State, +24V or GND out)
Terminal 37: Status Output E-7 (1/2A Solid State, +24V or GND out)
Terminal 38: Status Output E-8 (1/2A Solid State, +24V or GND out)
Terminal 39: D-1 Safety Output (1/2A Solid State Safety Output) Monitored *
Terminal 40: D-2 Safety Output (1/2A Solid State Safety Output) Monitored *

* Must be wired to control reliable system or our 52-278 captive contact safety relays. Higher Amp Output for Channel D also available.

16 Position Connector

**Lower Left**
- Power Input / Safety Relay Output / Auxiliary Relay

Terminal 1: Power Supply Input (+24vdc input)
Terminal 2: Power Supply Input (ground)
Terminal 3: Earth Ground
Terminal 4: C-1a Safety Output (N.O. held closed) 8A@250vac (Dry) Monitored
Terminal 5: C-1b Safety Output (N.O. held closed) 8A@250vac (Dry) Monitored
Terminal 6: C-2a Safety Output (N.O. held closed) 8A@250vac (Dry) Monitored
Terminal 7: C-2b Safety Output (N.O. held closed) 8A@250vac (Dry) Monitored
Terminal 8: C-3a Safety Output (N.O. held closed) 8A@250vac (Dry) Monitored
Terminal 9: C-3b Safety Output (N.O. held closed) 8A@250vac (Dry) Monitored
Terminal 10: C-4a Auxiliary Output (N.O.) 5A@250vac (Dry)
Terminal 11: C-4b Auxiliary Output (C) 5A@250vac (Dry)
Terminal 12: C-4c Auxiliary Output (N.C.) 5A@250vac (Dry)
Terminal 13: Open
Terminal 14: Open
Terminal 15: +24vdc out (feed thru from Terminal #1)
Terminal 16: Ground out (feed thru from Terminal #2)
### 12 Position Connector

#### Upper Right

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Channel</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>Channel B-1</td>
<td>(pnp/npn input or signal output)</td>
</tr>
<tr>
<td>42</td>
<td>Channel B-2</td>
<td>(pnp/npn input or signal output)</td>
</tr>
<tr>
<td>43</td>
<td>Channel B-3</td>
<td>(pnp/npn input or signal output)</td>
</tr>
<tr>
<td>44</td>
<td>Channel B-4</td>
<td>(pnp/npn input or signal output)</td>
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<td>45</td>
<td>Channel B-5</td>
<td>(pnp/npn input or signal output)</td>
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<td>46</td>
<td>Channel B-6</td>
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<td>47</td>
<td>Channel B-7</td>
<td>(pnp/npn input or signal output)</td>
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<td>Channel B-8</td>
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<td>49</td>
<td>Channel B-9</td>
<td>(pnp/npn input or signal output)</td>
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<tr>
<td>50</td>
<td>Channel B-10</td>
<td>(pnp/npn input or signal output)</td>
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<tr>
<td>51</td>
<td>Channel B-11</td>
<td>(Mat + IN)</td>
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<tr>
<td>52</td>
<td>Channel B-12</td>
<td>(Mat - IN)</td>
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</table>

#### Lower Right

<table>
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<tr>
<th>Terminal</th>
<th>Channel</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>17</td>
<td>Channel A-1</td>
<td>(pnp/npn input or signal output)</td>
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<tr>
<td>18</td>
<td>Channel A-2</td>
<td>(pnp/npn input or signal output)</td>
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<td>Channel A-11</td>
<td>(Mat + OUT)</td>
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<tr>
<td>28</td>
<td>Channel A-12</td>
<td>(Mat - OUT)</td>
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</tbody>
</table>

*www.pinnaclesystems.com*  hub@pinnaclesystems.com  (800) 569-7697
System Layout/Design and Programming Guideline

- Maximum 24 inputs per Safety Controller HUB (expandable).
- Safety device wiring is always divided equally between Channel A and Channel B inputs for dual channel redundancy.
- Each E-Stop requires the use of two safety inputs: One in Channel A and one in Channel B.
- Each Category 4 E-Stop requires the use of four safety inputs; Two Inputs in Channel A and two Inputs in Channel B.
- Non-safety devices use one input in Channel A or B.
- Dedicated inputs for four wire safety mats, edges and bumpers.
- Factory (with Design Questionnaire) or customer configures input type with supplied jumpers

<table>
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<tr>
<th>Sinking</th>
<th>Sourcing</th>
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<tr>
<td>NPN</td>
<td>PNP per input</td>
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<tr>
<td>= Ground</td>
<td>+24V</td>
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</table>

Factory default setting is PNP sourcing

Options  (Add underlined as suffix to part number)

**Mute-out – (MO)** – Mutes out a safety light curtain device during the non-hazardous portion of the machine cycle. Requires one safety input.
- **MOC** - Mute out the signal routed thru safety output C
- **MOD** - Mute out the signal routed thru safety output D
- **MOB** - Mute out the signal routed thru safety output C and D

Amber Anmuting light (indicator) output can also be supplied

**External Device Monitoring – (EDM)** – Method in which the Safety Controller HUB monitors the state of various external control devices in a control reliable manner. EDM requires the use of two safety inputs.
- **EDMC** - External Device Monitoring routed thru safety output C
- **EDMD** - External Device Monitoring routed thru safety output D
- **EDMB** - External Device Monitoring routed thru safety output C and D

**Two Hand Control – (2H)** – Provides anti-tie down/concurrent operation logic for operator two hand controls for machine actuation. Requires one safety input.
- **2HD** - The two-hand control option is routed thru safety output D.

**Cincinnati interface – (CI)** – Requires the Safety Controller HUB to issue a stop command on every machine cycle. Requires one safety input.
- **CIC** - Cincinnati Interface signal routed thru safety output C
- **CID** - Cincinnati Interface signal routed thru safety output D
- **CIB** - Cincinnati Interface signal routed thru safety output C and D

**Latching Relay – (LR)** – Resettable latching relays option requires that the individual safety device be manually reset after every time the device signals a stop. (The latching relay option does not occupy a safety input.) Reset requires remote manual reset button.
- **LRC** - Latching relay signal routed thru safety output C
- **LRD** - Latching relay signal routed thru safety output D
- **LRB** - Latching relay signal routed thru safety output C and D

**Expansion Module – (EXP)** – Doubles the Safety HUB inputs & outputs. The modules are interconnected via the two wire CAN network connections on each module.

**Ethernet – (ET)** – Capability provides the ability to program or review status of the Safety HUB via the Internet.

The complete system can be upgraded or changed in the field for any system changes that may occur. Pinnacle Systems will configure the Safety HUB to meet your specific requirements.
Next Steps

Email: hub@pinnaclesystems.com

Call: (800) 569-7697

Fax: (412) 262-4055

Contacting us via the information above will initiate the next steps for your total safety solution.

Also Available!
Extremely Durable Safety Mats Available in Any Shape or Size!
WARRANTY
Manufacturer warrants that this product will be free from defects in material and workmanship for a period of one year from the date of shipment thereof. Within the warranty period, manufacturer will repair or replace such products which are returned to it with shipping charges prepaid and which will be disclosed as defective upon examination by the manufacturer. This warranty will not apply to any product which will have been subject to misuse, negligence, accident, restriction, and use not in accordance with manufacturer's instructions or which will have been altered or repaired by persons other than the authorized agent or employees of the manufacturer.

DISCLAIMER
The provisions of the paragraph “Warranty” are the sole obligations of the manufacturer and exclude all other warranties of merchantability, expressed or implied. Further, there are no warranties which extend beyond the above warranty.

LIMITATION OF LIABILITY
In the event of any claim or breach of any obligations of manufacturer under any order, whether expressed or implied, and particularly in the event of any claim or a breach of the warranty or warranties contained in the paragraph “Warranty” or of any other warranties, expressed or implied which might, despite the paragraph entitled “Disclaimer,” be determined to be incorporated in any order, the company shall under no circumstances be liable for any consequential or special damages, either in law or in equity, or for losses or expenses or claims for the same arising from the use of, or inability to use, the products of the manufacturer for any purpose whatsoever.

WARNING: The entire machine safety system must be tested at the start of every shift. Machine testing should include: (1) proper machine operation and stopping capability; and (2) verification of proper installation and settings of all point of operation guards and devices before the operation is released for production.