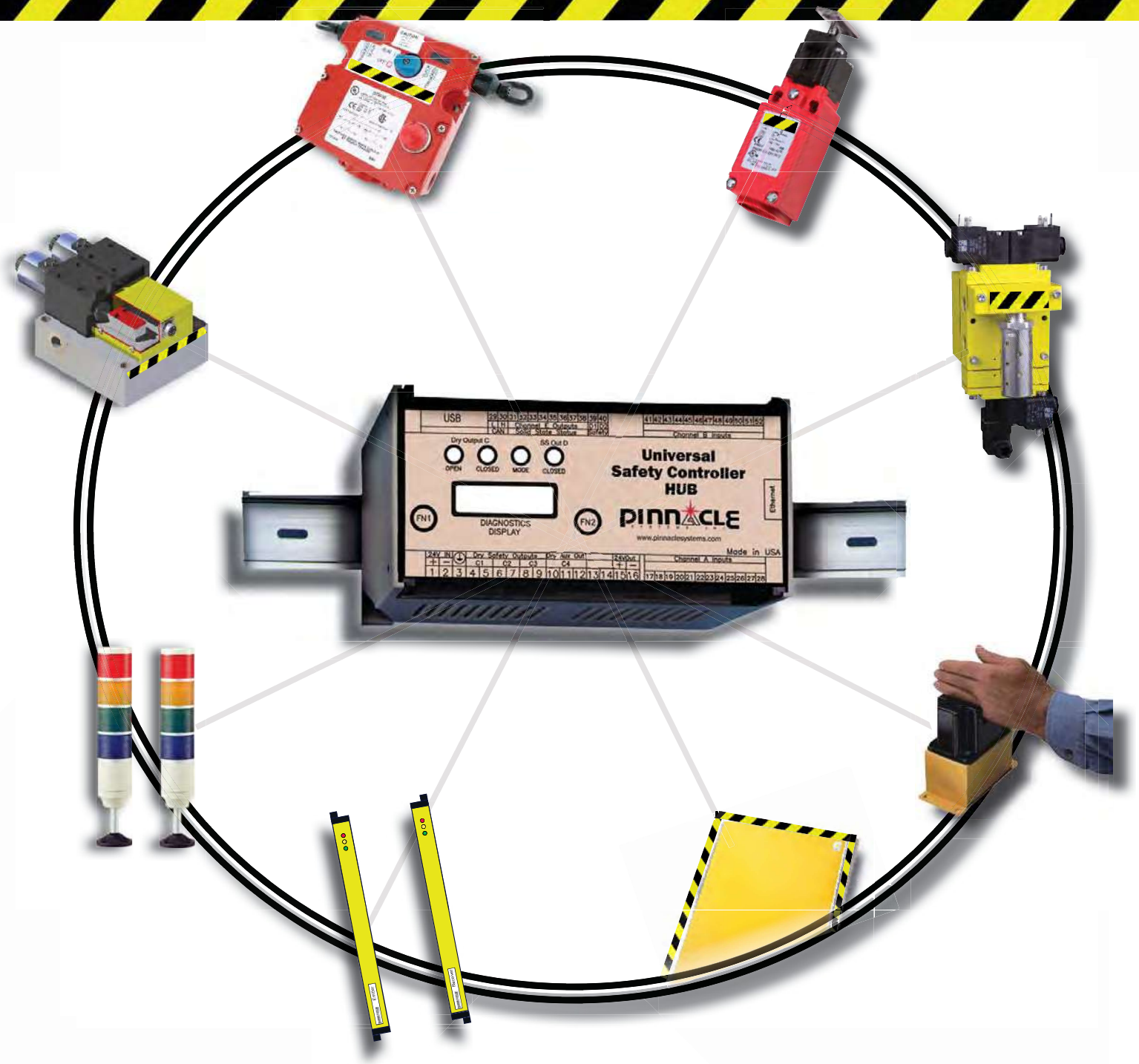
Multiple Safety Devices . . . One Safety Controller!



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.

PINNACLE SYSTEMS, INC.

Safety Sensors and Controls for Industrial Machine Guarding Systems

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°-120°F (0°-51°C)
- Shock: Tested to withstand high vibration application per UL 991
- Ethernet Network: Optional
- Warranty - 2 years

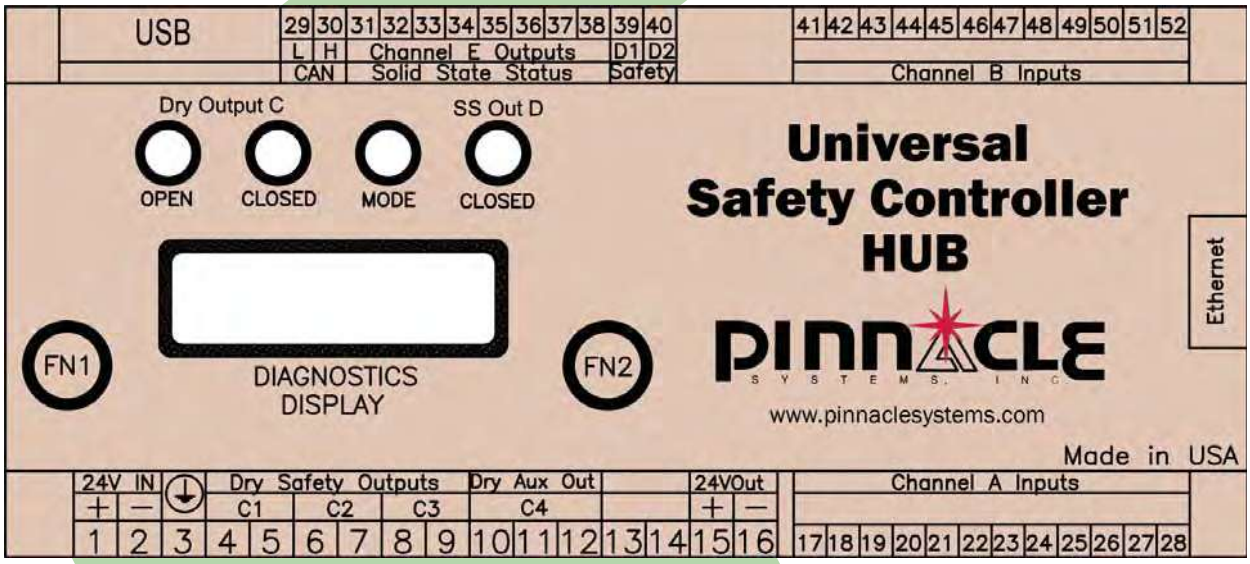
Enclosure

- 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	External Device Monitoring (EDM)	Expansion
Cincinnati Interface CI	Two Hand Control for operator machine initiation	Ethernet
Latching Relays	Customized logic functions	

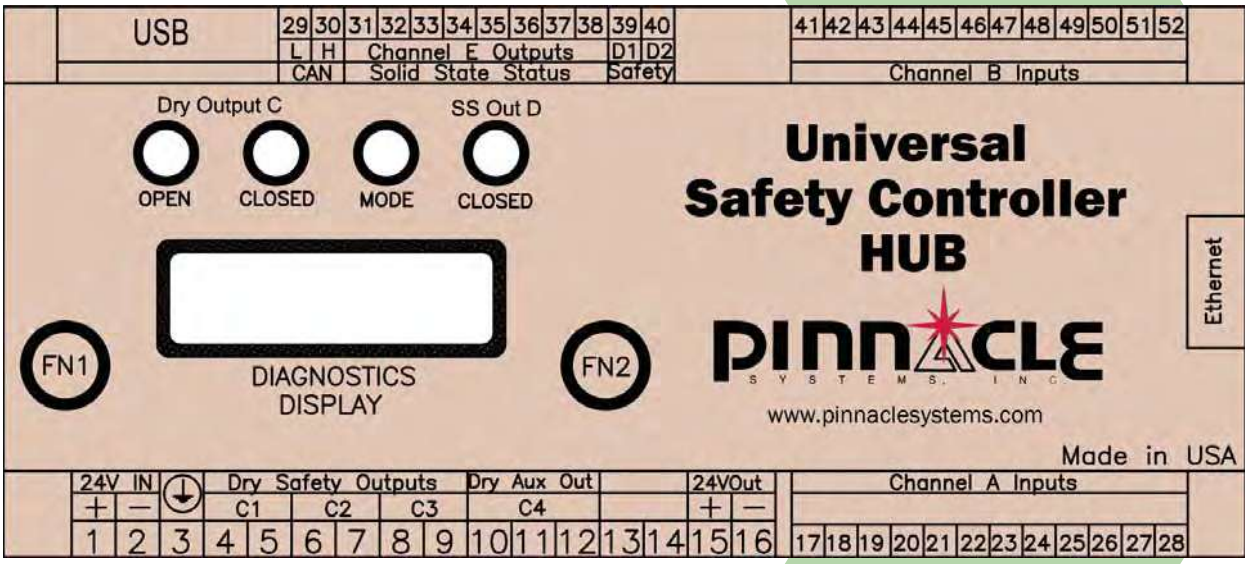
* Must be wired to control reliable system or our 52-278 captive contact safety relays.
Higher Amp Output for Channel D also available

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 *



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	Channel B / Safety or non-safety inputs B-1 to B-12		
Terminal 41	Channel B-1	(pnp/npn input or signal output)	
Terminal 42	Channel B-2	(pnp/npn input or signal output)	
Terminal 43	Channel B-3	(pnp/npn input or signal output)	
Terminal 44	Channel B-4	(pnp/npn input or signal output)	
Terminal 45	Channel B-5	(pnp/npn input or signal output)	
Terminal 46	Channel B-6	(pnp/npn input or signal output)	
Terminal 47	Channel B-7	(pnp/npn input or signal output)	
Terminal 48	Channel B-8	(pnp/npn input or signal output)	
Terminal 49	Channel B-9	(pnp/npn input or signal output)	
Terminal 50	Channel B-10	(pnp/npn input or signal output)	
Terminal 51	Channel B-11 (Mat + IN)	(pnp/npn input or signal output)	Dedicated terminals 11 & 12 for
Terminal 52	Channel B-12 (Mat - IN)	(pnp/npn input or signal output)	powering control logic for Safety Mats, Edges and Bumpers.



12 Position Connector Lower Right	Channel A / Safety or non-safety inputs A-1 to A-12		
Terminal 17	Channel A-1	(pnp/npn input or signal output)	
Terminal 18	Channel A-2	(pnp/npn input or signal output)	
Terminal 19	Channel A-3	(pnp/npn input or signal output)	
Terminal 20	Channel A-4	(pnp/npn input or signal output)	
Terminal 21	Channel A-5	(pnp/npn input or signal output)	
Terminal 22	Channel A-6	(pnp/npn input or signal output)	
Terminal 23	Channel A-7	(pnp/npn input or signal output)	
Terminal 24	Channel A-8	(pnp/npn input or signal output)	
Terminal 25	Channel A-9	(pnp/npn input or signal output)	
Terminal 26	Channel A-10	(pnp/npn input or signal output)	
Terminal 27	Channel A-11 (Mat + OUT)	(pnp/npn input or signal output)	Dedicated terminals 11 & 12 for
Terminal 28	Channel A-12 (Mat - OUT)	(pnp/npn input or signal output)	powering control logic for Safety Mats, Edges and Bumpers.

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

Sinking		***Sourcing***
NPN	or	PNP per input
= Ground		+24V

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.

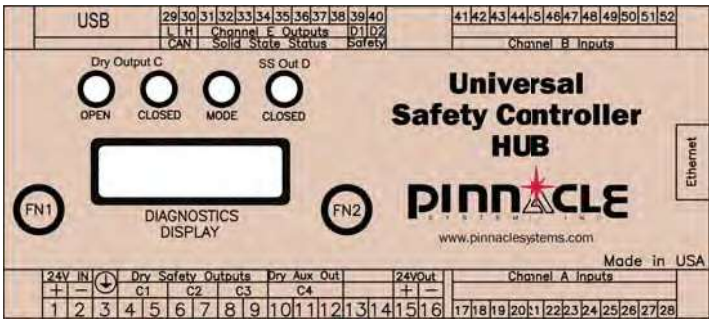
For additional information regarding the HUB, please email us at hub@pinnaclesystems.com

Available Models

53-448 Standard Safety HUB as shown and described on the preceding page pre-programmed and ready to plug and play.

Options with 53-448

30-012 24vdc @ 2.2A power supply (90-260vac In) 3.9” L x 3.8” W x 1.4” H (99.1mm x 96.5mm x 35.6mm) (Option is standard in the 53-455)



53-455 Basic pre-programmed Safety HUB in a 16” x 14 ”x 6” painted steel control panel, with a Plexiglass clearview cutout on the front door to view status display. Also included is a 24VDC 2A power supply and terminal strip, all mounted on to a backplate.

Examples

Example#1: Safety Center with 1 Mat, 4 4-wire ESTOP switches with the first ESTOP switch muted by key-switch, and a Momentary key-switch to Reset a TRIP condition.

Example#2: Small Hydraulic press control with Up Limit switch, Down Limit switch, 1 Light curtain, 1 ESTOP button, 1 Cancel/return Button, and 1 palm button station (with anti-tie-down, concurrency)

Custom Programming

Available for all special system layouts and electrical interfaces. The Safety HUB comes complete for any special or unique logic functions you may desire (consult factory).

For additional information regarding the HUB, please email us at hub@pinnaclesystems.com

Ordering/Pricing Procedure

Format Model#: **SH-XX(YY)-XX(YY)-XX(YY)- …**
(where XX is the Input device type, where YY is an OPTIONAL Output device type)

Example Model#: **SH-2-2-6-10-2-2D-6D-8C**
(2 light curtains + 1 ESTOP tied to C with latching RESET, 1 light curtain + mat tied to C with no latching, 1 light curtain + 1 ESTOP tied to D with no latching)

Custom programming optional.

Current List of Input Device Types

XX	Terminals used	Input Device Type
1(T)	2	START or STOP or CANCEL button inputs
2	2	CAT 4 Light curtain or CAT 2 ESTOP
3	2	Foot Pedal
4	3	Cat 3 ESTOP input
5		Reserved
6	4	Cat 4 ESTOP input
7(T)	2	Palm button station (2 palm buttons) N.O. from each button
8	4	NSD Safety Mat or any 4-wire pressure sensor device
9(T)	2	Limit Switch (mechanical or Pressure)
10(T)	2	Reset Button for Channel C
11(T)	2	Reset Button for Channel D
12(T)	2	Cincinnati Interface for Channel C
13(T)	2	Cincinnati Interface for Channel D
14(T)	2	Mute-Out bypass for Channel C
15(T)	2	Mute-Out bypass for Channel D
16(T)	2	EDM (External Device Monitor) for Channel C
17(T)	2	EDM (External Device Monitor) for Channel D
18		Reserved
19		Reserved
20(T)	2	Key Switch bypass (used to bypass other devices)
21(T)	2	Prox sensor input (1/4” pinch point)
22(T)	2	Mute-Out bypass for Foot Switch device #3
23(T)	4	Palm button station (2 palm buttons) N.O. and N.C. from each button

(T) - optional Timer Function to allow time limits. User programmable times.

Current List of Output Device Types

YY	Channel output	Output Device Type
	C	Assume Devices use Channel C if left blank Assume Device Status tied to each Channel E output
E	E	Device Status Output (default)
C	C	Devices tie to Channel C mechanical relays
D	D	Devices tie to Channel D solid state relays
240C	C	Timer function to hold Channel C ON
241C	C	Timer function to hold Channel C OFF
242D	D	Timer function to hold Channel D ON
243D	D	Timer function to hold Channel D OFF
251CD	C/D	Devices Latch C ON and D OFF
252CD	C/D	Devices Latch D ON and C OFF
253CD	C/D	Devices Latch both C & D OFF
254CD	C/D	ESTOP devices turn C & D OFF both
255CD	C/D	Devices turn C & D OFF both

For additional information regarding the HUB, please email us at hub@pinnaclesystems.com

Order Form

Name: _____ Company: _____

Phone: _____ Email: _____

Fax: _____

Address: _____ City: _____

State: _____ Zip: _____

SH	-		-		-		-	
Prefix		**XX(YY)**		**XX(YY)**		**XX(YY)**		***(Options)***