

ICS-9 Laser Safety Interlock Controller

NRTL Certified

The ICS-9 Expandable Laser Interlock System is NRTL Certified and can achieve performance level 'e' (EN ISO 13849-1 PL_e), It is derived from the ICS-6 which is the most popular Laser Interlock Control System.

This compact, versatile unit can control laser interlocks, door locks, illuminated warning signs and other equipment. It can operate beam shutters and the laser power with feedback monitoring and fault detection. It can be interfaced to Access Control and Fire Detection Systems and may be fitted with an Override to allow controlled access through interlocked doors while also accepting emergency stop inputs.

The ICS-9 is NRTL provides high levels of safety and functionality and has full start-to-end dual channel architecture and fault detection to meet the latest standards. The ICS-9 is NRTL certified and complies with the relevant European Machinery Directive Standards and can be connected to achieve EN ISO 13849-1 PL_e (Performance Level 'e' - Safety related control systems).

It has a simple, easy-to-use control panel which can be wired directly to 4 interlocks or groups of interlocks.

The ICS-9 functions include the following:

- Full start-to-end dual channel architecture
- Full start-to-end fault detection
- Interlocked AC Power
- Interlocked low voltage supply for beam shutters
- Laser interlock connector operators



Expandable Laser Interlock System 'e' (ELISE)

- Key switch operation to prevent unauthorized use
- Arm laser button
- Time limited fail-safe override option
- Automatic switching of illuminated signs
- Emergency stop circuit

ICS-9 can be configured as a locking or non-locking interlock system featuring:

- Automatic fault detection and shutdown
- Dual-redundant fail-safe circuitry
- Dual Channel Override control
- Feedback based Sign Control - to maintain warning sign at Danger if the shutter/power control fails to go to the safe condition
- LED indication for the Status of the following:
 - Interlock Switch
 - Expansion Cards

- Emergency Stop
- Safety Circuits OK
- System Overridden
- Safety Circuit Fault (Mismatch Fault)
- Laser Armed

Expandable

Several Expansion Cards (which are automatically tested) may be fitted to enable the following options:

- Remote Communications (Ethernet/USB Connectivity)
- Integrated Active Laser Guarding
- Safety Logic Plus integration
- The provision of an uncommitted relay board for future options

The expandable capability of the ICS-9 means that new options can be integrated on additional boards as they are developed.

ICS-9

Expandable Laser Interlock System to Performance

The standard ICS-9 can have 9 interlock outputs as it includes an IB9 interlock board. By using the deep back box, contactors can also be added to give interlocked 32A single phase and 3 phase AC Power.

Further ICS-9 functions

- ICS-9 can be connected to other interlock controllers to operate as a primary or secondary unit
- Optional safety status and ready status outputs can be provided to communicate with other interlock controllers or a remote indicator panel
- The ICS-9 has a standard deep box for expansion cards or safety contactors to switch high power or multiple lasers
- External facility to allow the system to be disabled by an external source e.g. supervisor's key-switch
- Integrated automatic switching of single or dual mode signs
- Connect to virtually unlimited number of door contacts and Emergency Stop Buttons

NRTL Certification

OSHA's Nationally Recognized Testing Laboratory (NRTL) Program recognizes private sector organizations so they can perform certification for certain products to ensure that they meet the requirements of both the construction and general industry OSHA electrical standards.

The interlock has been tested by TÜV SÜD America Inc. to IEC 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1 General requirements.

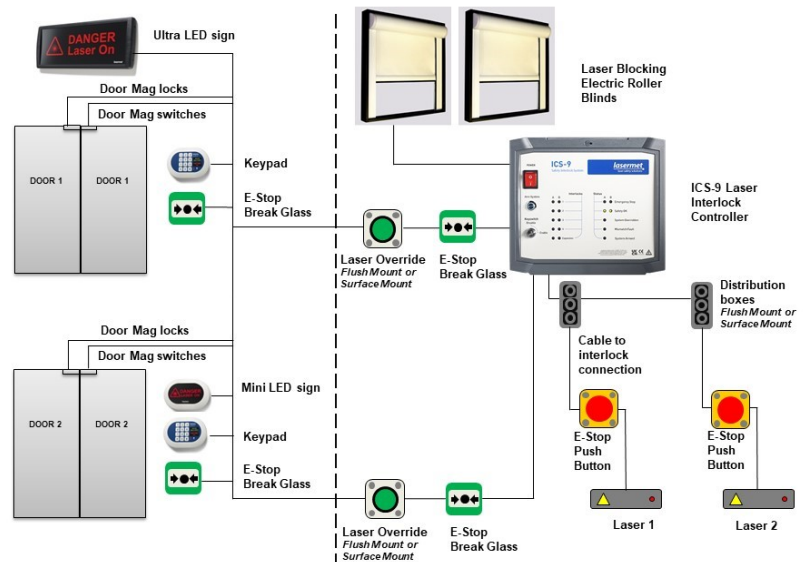
The product fulfils the requirements of CAN/CSA C22.2 No. 61010-1:2012, UL 61010-1:2012 and EN 61010-1:2010

EN ISO 13849-1 Performance Level e (PLe)

The Performance Level of ICS-9 is based on the ability of the safety-related parts to perform a safety function, which is expressed through the determination of the performance level (PL).

The integrity of the correctly specified and installed ICS-9 to EN ISO 13849-1 to 'Performance Level e' means that it is almost not possible for a failure to occur that results in a dangerous situation over the lifetime of the installation, assuming the system has been correctly installed, commissioned and maintained in accordance with the appropriate instructions. These measures are vital to ensure the safety of personnel and surrounding infrastructure.

Laser Safety Interlock Control System ICS-9



ICS-9 and Laser Jailer

Active Laser Guarding System

Active Laser Guard integration option

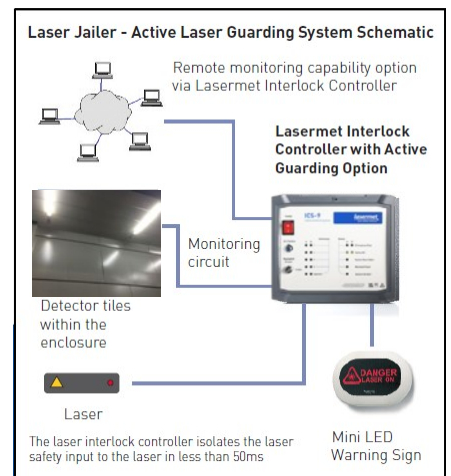
The ICS-9 can be integrated with the Active Laser Guarding System—Laser Jailer.

Laser Jailer is a modular active guarding system which is built into the internal structure of a laser safety enclosure. It is designed to provide protection from multi-kw lasers. If the laser beam inadvertently strikes the internal wall of the enclosure, which is composed of an array of detector tiles, the interlock controller detects this signal as part of its monitoring function

and isolates the laser safety input in less than 50ms.

The ICS-9 is specifically designed to accommodate an expansion card dedicated to controlling the active guarding function, which can be used with any type of laser covering any wavelength and power.

The ICS-9 failsafe interlock control system automatically tests the operation of the detector panel array whenever the system is armed. It then continues to monitor the system. Patents applied for.



Laser Jailer—Active Laser Guarding System Schematic

ICS-9 & Safety Logic Plus

Logic Integration System

Safety Logic Plus Integration option

Safety Logic Plus is a simple but cost effective and safe concept whereby the logic configuration required for a safety interlock system is hard wired in a single logic enclosure.

The system uses modules that receive inputs from all of the interlock switches individually from the laser facility. The enclosure contains all of the logic functions for the safety interlock. It is set to arm the laser via the Interlock Controller when all of the safe conditions have been met. This includes self-checking.

Customers can...

- Design and build complex safety interlock systems

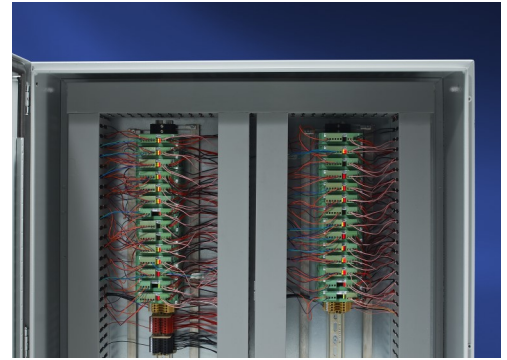
- Virtually eliminate obsolescence (30+ years of life expectancy) as there is no software, no Programmable Logic Control, no operating system and no specialist training.
- Simplify on-site installation and reduce installation time and costs
- Simplify testing and fault finding

Simple design—easy to maintain and understand

- All safety switches are wired back to the enclosure
- All logic functions are performed in the enclosure
- Modules are used for all logic functions

Safety: It is a fail-safe system:

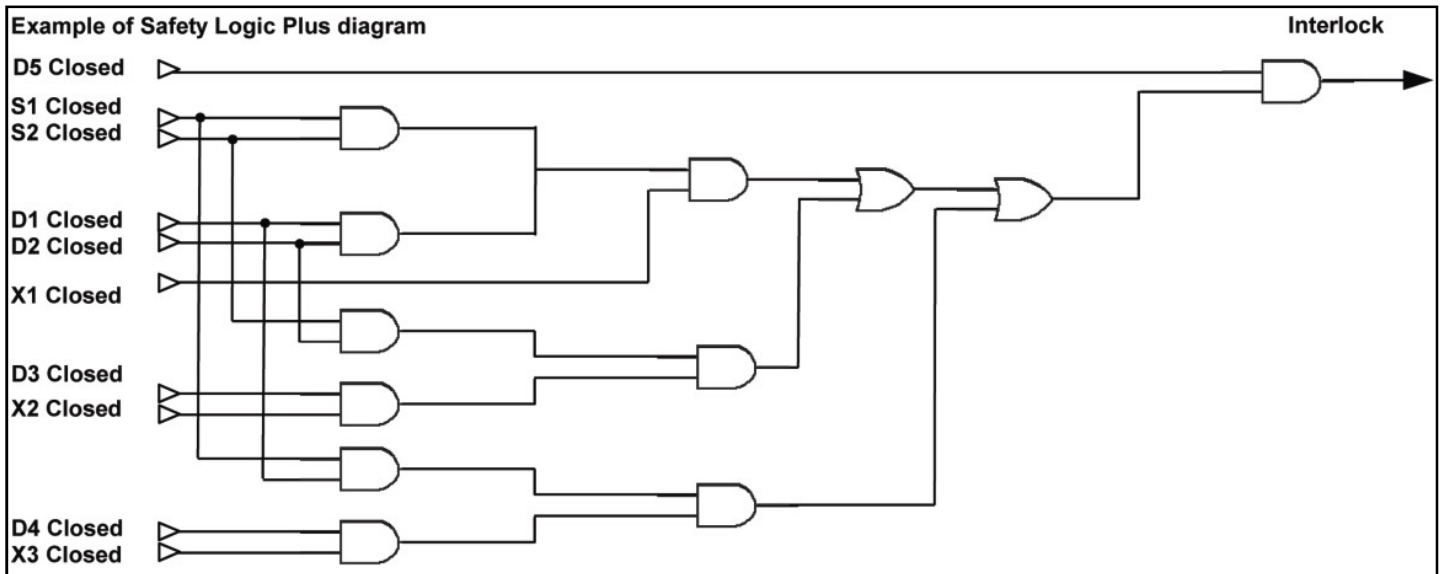
It uses dual channels: It has full cross checking of all circuits. The laser will not arm until all circuits are checked on both channels and all conditions are satisfied—including self-checking.



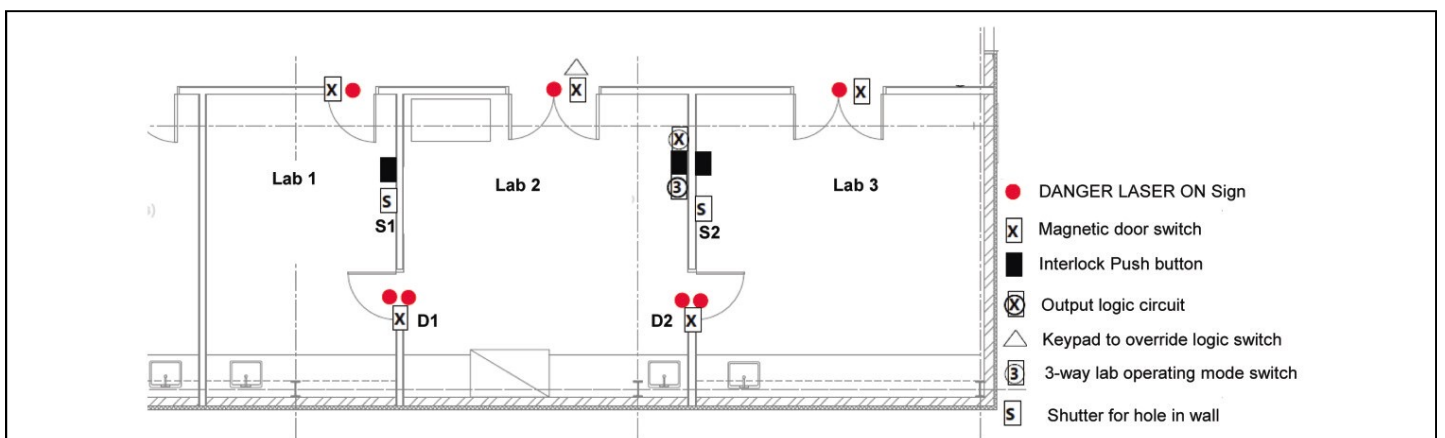
Example of complex safety logic plus installation

Costs are reduced because installation, maintenance and testing is straightforward; no specialist PLC training is required; the design enables easy and fast fault finding; and logic changes are done within the enclosure.

Safety Logic Plus is a dual channel, cross-checked system that uses simple proven components, follows basic engineering logical principles and is cost effective.



Typical example of safety logic plus diagram derived from example lab set up



Remote Communications and Control

ICS Buddy

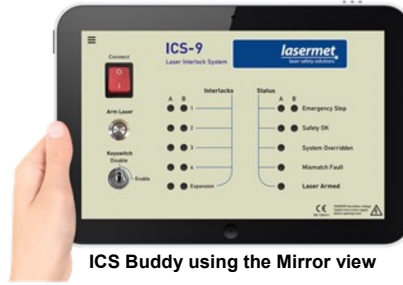
Portable interlock controller

Remote communications and control with ICS-Buddy

The ICS-9 can communicate directly with the ICS Buddy. The ICS Buddy is a portable Interlock Monitor and Controller that can be used to remotely view and control the status of laser interlock controllers and laser shutters in a lab.

It enables portable control so users can just walk around with the tablet from office to other locations. The user can also remotely view and control laser shutters – just using the local Wi-Fi signal to stay in touch. The status of the whole lab can be viewed remotely in Lab View – ideal for numerous Interlocks, shutters and LED Warning Signs.

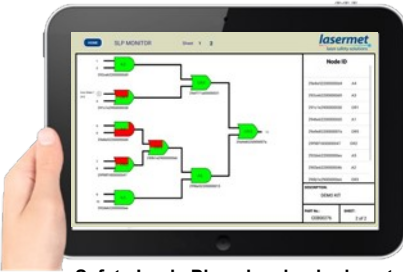
It can also display Safety Logic Plus, the electrical logic gate system that sets up complex labs with a sequence of logical AND/OR gates to permit a laser to be armed safely.



ICS Buddy using the Mirror view



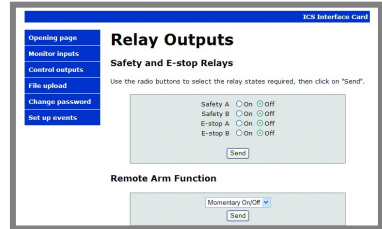
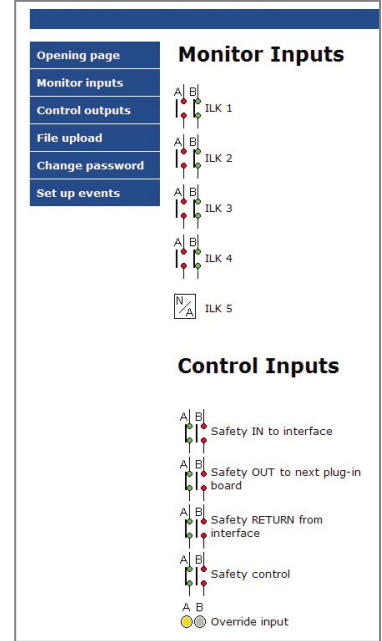
ICS Buddy using the Lab View—showing laser shutters and LED Warning sign status



Safety Logic Plus showing logic gate status

Network Communications Interface

The Network Board allows the ICS-9 to be plugged into an Ethernet network to enable remote monitoring and control of the ICS-9 inputs and connected interlock signals.



ICS-9 Specifications	ICS-9	ICS-9 + Contactor Enhancement
Interlocked outputs	9 x Outputs 8 A at 110/250 VAC / 50 VDC Configure as desired e.g. 1 off Interlocked mains output (8 A) 1 off Interlocked shutter output (for up to 6 shutters) 7 off Interlock connector operators	8 x outputs (rated at 8 A at 110/250 VAC / 50 VDC) 4 x mains outputs (rated at 32 A, 415 VAC) Configure as desired e.g. 1 off Interlocked mains output (32 A) 1 off Interlocked 3-phase output (32 A) 1 off Interlocked shutter output (for up to 30 shutters) 7 off Interlock connector operators
Door interlock switches	Unlimited numbers can be connected. Monitoring available for 4 switches or groups of switches	
Warning light output	110/230 V or 24 VDC, 1 A. Automatic switching of single or dual message signs	
Emergency Stops	Unlimited numbers of emergency stops can be connected. Can be connected into Fire Alarm or Access Control system	
Supply	110/230 V, 1 A + connected load	
Size	10.43w x 9.06h x 5.67deep (in) 265w x 230h x 145deep (mm)	10.43w x 9.06h x 5.67deep (in) 265w x 230h x 145deep (mm)
Weight	4.84 lbs 2.2 kg	6.6 lbs 3 kg
Directives	Conforms to Machinery Directive, Low Voltage Directive, EMC Directive	
Standards	NRTL Certified and meets EN954-1 & EN ISO 13849-1 PLc (Cat 3 safety system, performance level 'e'). EN61508 (SIL 4), EN61010, EN60947-1	

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