LS089

Features:

- Four solid state relays, each rated 8 A
- Input voltage: 10 to 30 V
- Class 1 division 2 certified
- Total maximum current input current: 25 A
- Short circuit protection (current limit)
- Voltage inversion protection
- Cable inversion protection
- Over temperature shutdown (with auto-restart)
- Active clamp outputs
- Ambient temperature range: -30ºF to +140ºF (-30ºC to +60ºC)
- Enclosure: rugged die cast aluminum alloy, dimensions 8.7 in. x 4.7 in.
- ESD level 4 protection (IEC-61000-4-2)
- Rated IP60

Applications:

- Replaces 4 electro-mechanical relays
- Reliable solid state relays, auto-protected against short-circuits, voltage inversions, wiring errors
- Optimized to provide 8 A per wire from an LSI display unit instead of the default 1 A limit.

Photo: LSI p/n LS089

General Description:

This junction box is inserted in line between the power source and the display to provide up to 8 A of current on each output to drive valve solenoids or external lights. The 4 pins on the right side connector is a duplicate of the lockout control pins on the display, but with the added current handling capability.

Note: the information in this document is subject to change without notice

LS089

Table of content

Ordering information

Model	Description
LS089A	Kit (Relay Junction Box for GS Display with cables)
Contains:	
LS089	Relay Junction Box for GS Display - CSA Approved
TM152 (included in the LS089 kit)	5 way Display Cable 12' Yellow
TM174 (included in the LS089 kit)	4 Way / 1 connector Yellow cable 12 ft
TM176 (included in the LS089 kit)	6 Way / 2 connector Yellow cable 12 ft
LM089 (included in the LS089 kit)	LS089 User instruction

Related part numbers:

LS088	120Vac to 12Vdc power supply, 27 amperes

LS089

Specifications

Parameter	Test Condition	Min	Typ	Max	Unit
Input					
Voltage range		10	12 / 24	30	V
Current				25	A
Outputs (each of four)					
Voltage	When active	Vin-1.1		Vin	V
	When not active		0	0.2	V

Absolute maximum ratings

Parameter	Test Condition	Min	Typ	Max	Unit
Input voltage				33	V
Temperature range	Operating	-40		+60	ºC
Temperature range	Storage	-50		+70	ºC

Certifications

Class I, Division 2, Groups A, B, C and D, Temperature Code T3C

Ratings in accordance with CSA C22.2 No. 142:1987 - Clause 6.3 / UL 508:Ed. 17 - Clause 62

Temperature in accordance with CSA C22.2 No. 142:1987 – Clause 6.4 / UL 508: Ed. 17 - Clause 40

Temperature Code in accordance with CSA C22.2 No. 213:1987 - Clause 6.2 / ANSI/ISA 12.12.01:2007 - Section 10

Dielectric Strength in accordance with CSA C22.2 No. 142:1987 - Clause 6.8 / UL 508:Ed. 17 – Clause 49

LS089

Application information

4 wire cable:
10 to 30 Vdc input.
25 A maximum input.

A

B

C

6 wire cable for display power and lockout.

5 wire cable: Valve solenoid control able to drive up to 8 A per wire. Each wire switches positive supply to a load. The other side of the load must be connected to a good ground.

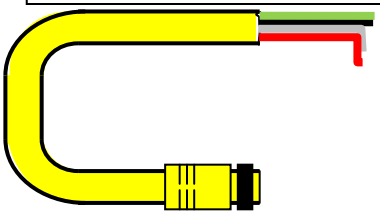


Figure: Yellow cable, LSI part № TM174
12 ft, 4 conductors

Cable "A": power cable for junction box to power supply

Wire Colour	Function
Black & Green	Negative (ground)
Red & White	Positive 12 or 24 V (crane power supply)

Note: Connect both black and green wires to ground and both the red and the white to the positive supply to reach the maximum cable power rating and prevent cable heating.

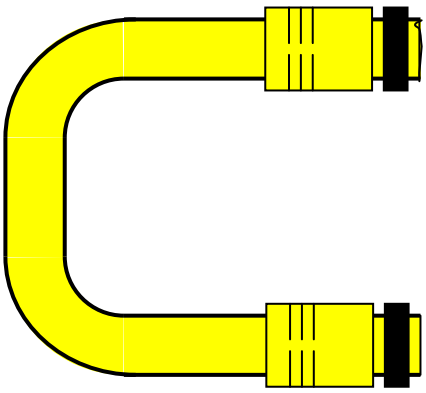


Figure: Yellow cable, LSI part № TM176

Cable "B" to display unit: 6 wire cable

Wire Colour	Function
Black	Negative (ground)
Red	Positive 12 or 24 V (crane power supply)
White	Lockout № 1 control from display
Green	Lockout № 2: control from display
Orange	Lockout № 3: control from display
Blue	Optional: input to send lockout bypass signal to the display data logger for recording

---

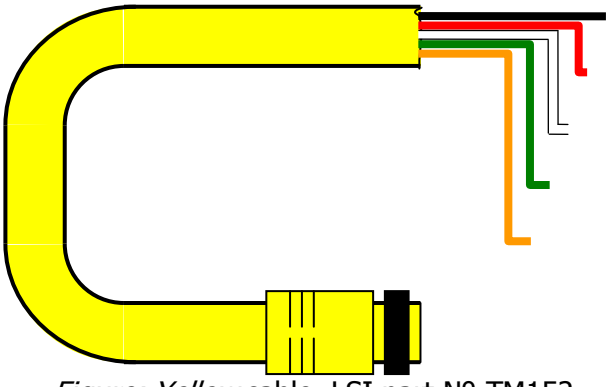
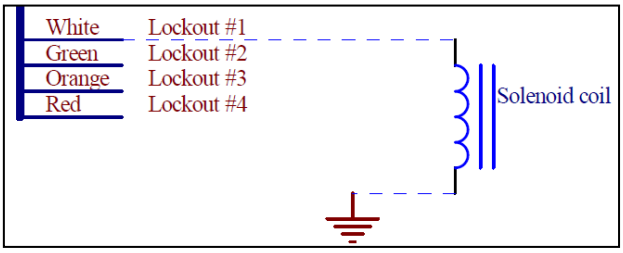


Figure: Yellow cable, LSI part № TM152

Cable "C": Solenoid 5 wire valve control

Wire Colour	Function
Black	Spare ground
White	Lockout № 1: 8 A maximum
Green	Lockout № 2: 8 A maximum
Orange	Lockout № 3: 8 A maximum
Red	Optional lockout № 4: 8 A maximum

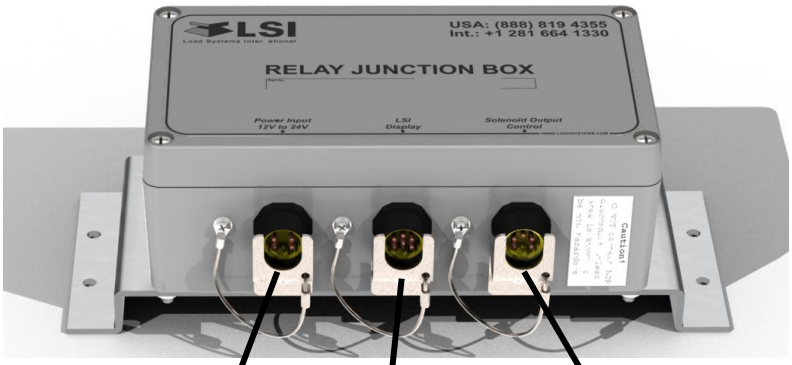
Positive power is switched with up to 8 A on each wire. A return ground wire or a good ground connection should be used for each of the switched devices. A solenoid coil wiring example is shown here:



LS089

Installation

Insert the relay junction box between the display and the power supply and lockout valve solenoids in place of the standard power supply and lockout cable. Remove the display power supply and lockout cable (if already installed). Connect the display, the power supply and the lockout valve solenoids to the relay junction box with the supplied cables.



Power Input Cable
TM174

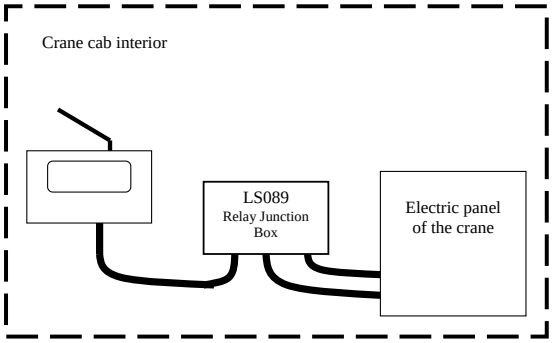
LSI Display
TM176

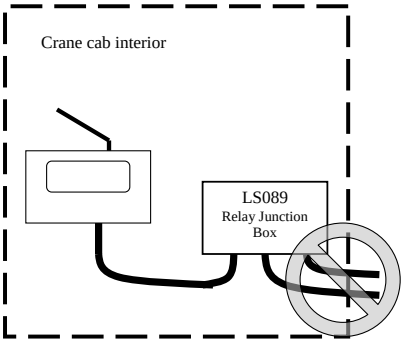
Solenoid Output Control
TM152

WARNING!

For class 1 division 2: always ensure the area is known to be non-hazardous before connecting or disconnecting wires.

Electric installation



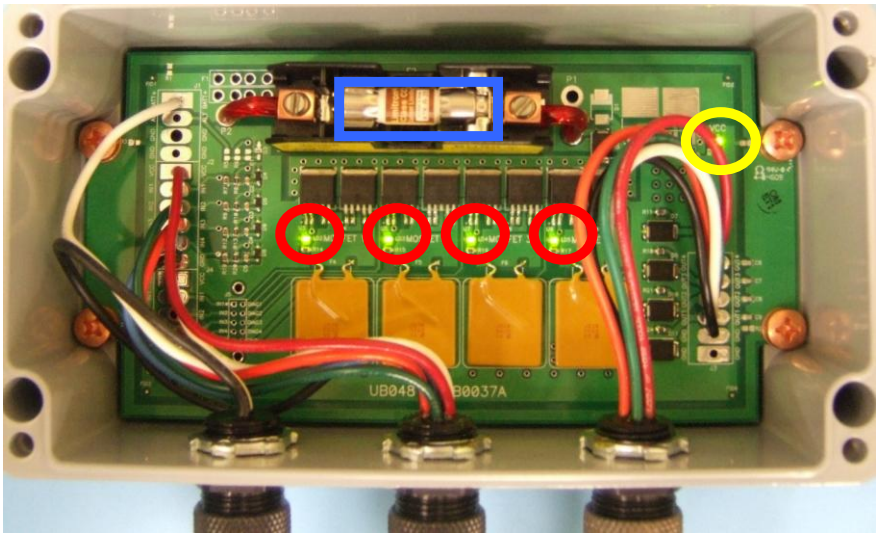


Warning: Cables for this product must be connected inside a protected area (ex: crane cab). Cable must be routed to protect wiring from being damaged during normal use.

Troubleshooting

Inside the relay box, there is one green light for each of the four relays (red circles in the photo below). A fifth green light indicates when input power supply is good (yellow circle).

Note: the GS550 display has only three lockout wires, by default, the fourth being optional[1]. It is thus normal for this display to have only three of the four lights 'on'.



Fuse (**blue rectangle**): 25 A, p/n KTK-R-25 Bussmann class CC 600V / 25A fast acting fuse. Certification requires replacing the fuse by the same fuse part number. LSI P/N: TF103

Troubleshooting:

Always verify that the display is working properly, that no messages are present and that no lights are flashing, before troubleshooting this relay box.

If a green relay light is off, it indicates that the relay does not output power. To ensure the display is sending the command to energize the relays, press and hold the **bypass** key on the display. It should activate the four relays, and the four relay lights should come on.

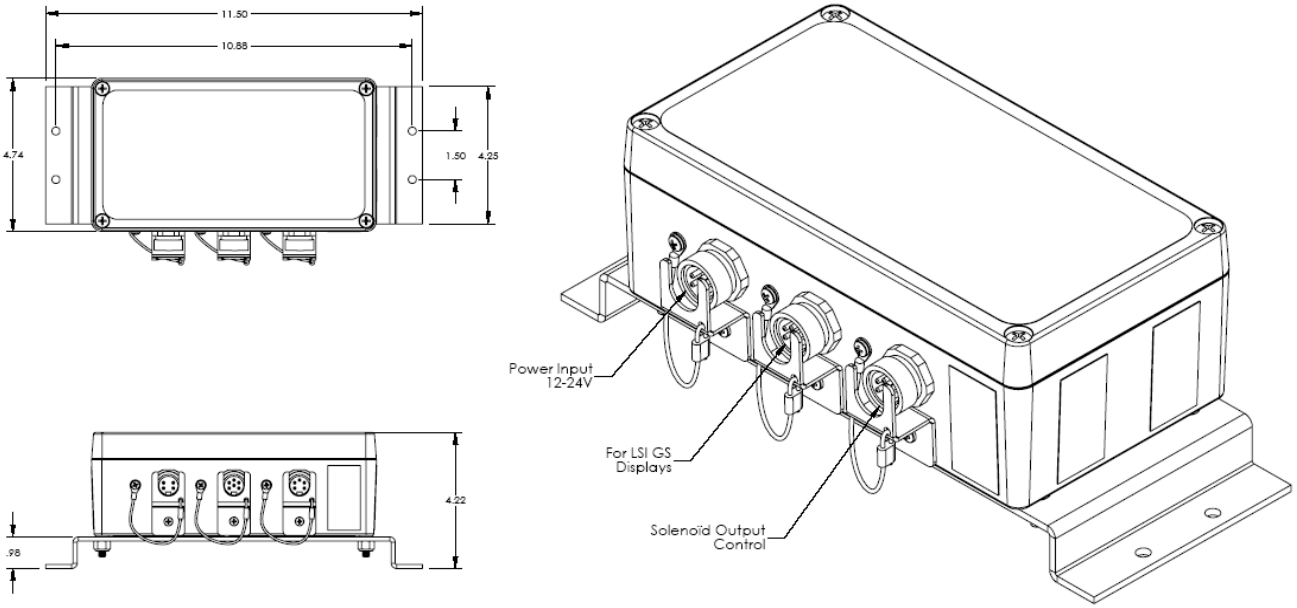
If one of the LEDs stays off, it could be because of excessive current; disconnect the solenoid output cable. If one of the green LEDs stays off while the others are on, verify that the display is not indicating a lockout wire problem; follow display lockout troubleshooting procedure if required. If a green light turns off only when the solenoid cable is plugged in, it means that excessive current is being drawn. If too many solenoids are connected to the same lockout wire, the solution is to spread the solenoid control over several relays. Look up the display manual to set the right function lockout to the required output wire.

[1] *Part number GS550-11 has the optional fourth lockout control installed*

If one of the LEDs stays on while it should be off, disconnect the solenoid cable.

- If the light turns off, it means the solenoid is sending power to this junction box; make sure the other side of the solenoid is connected to ground. This junction box sends power on the solenoid wires, so the other side of the solenoid coil should be connected to the negative pole of the battery, the ground.
- If the light stays on, disconnect the cable to the display. If the light then turns off, it means that the display is sending a control signal to energize the relay, verify the display lockout codes. If a relay green light stays on when both the display cable and lockout cable are disconnected, it means the relay is broken. The choices are then to use another of the available relays, or to contact your LSI representative for repair or exchange

Dimensions



Mounting Screw Placement: