

## INSTRUCTION SHEET HS1P Interlock Plug Unit



Confirm that the delivered product is what you have ordered. Read this instruction sheet to make sure of correct operation. Make sure that the instruction sheet is kept by the end user.

### SAFETY NOTE

### CAUTION

Caution notices are used where inattention might cause personal injury or damage to equipment.

## 1 Type

HS1P-441-RG	
<b>Solenoid / Pilot Light</b>	<b>PL2 Pilot Light Color</b>
4: With / two Pilot Lights	R : Red
3: With / one Pilot Light	G : Green
2: Without / one Pilot Light	
1: Without / without Pilot Light	<b>PL1 Pilot Light Color</b>
	R : Red
	G : Green
<b>Pilot Light Voltage</b>	<b>Cable Length</b>
4 : 24V DC	1 : 1m
blank : Without Pilot Light	3 : 3m

PL1: Operation Ready Monitor, PL2: Solenoid Power ON Monitor

## 2 Specifications and Ratings

Applicable Standards	UL508 CSA C22.2 No. 14 UL498 CSA C22.2 No. 182.1	
Standards for Use	EN1088	
Operating Condition	Operating Temperature: -20 to +50°C (no freezing) Operating Humidity: 45 to 85% (no condensation) Storage Temperature: -40 to +80°C (no freezing) Pollution Degree: 3	
Insulation Resistance	100 mΩ minimum (DC500V megger)	
Contact Resistance	300mΩ maximum (initial value at cable length 1m)	
Dielectric Strength	Between live and dead parts: 2000V, 1 minute Between terminals of the same pole: 1000V, 1 minute	
Shock Resistance	Damage limits: 1000m/s <sup>2</sup>	
Vibration Resistance	Operating extremes: 10 to 55 Hz, half amplitude 0.5 mm Damage limits: 30 Hz, half amplitude 1.5 mm	
Rotational Strength When Locked	5N·m minimum	
Mechanical Life	30,000 operations minimum (plug rotation, insertion/removal, operating frequency 900 operations/hour)	
Electrical Life (microswitch)	30,000 operations minimum (rated load, operating frequency 900 operations/hour)	
Operation Style	With proprietary plug	
Mounting Screw	Four M5 screws	
Solenoid	Rated insulation voltage	30V
	Rated Operating Voltage	24VDC 100%ED
	Rated Current	260mA
	Coil Resistance	95Ω (at 20°C)
	Turn ON Voltage	Rated Voltage × 90% maximum (at 20°C)
Pilot Light	Rated insulation voltage	30V
	Rated Operating Voltage	24VDC
Weight	Approx. 560 g (HS1P-441-□□)	
	Approx. 800 g (HS1P-443-□□)	

☆ : With solenoid type only  
◎ : With pilot light type only

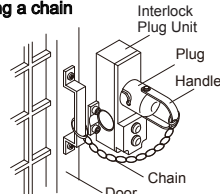
Type	HS1P-4	HS1P-3	HS1P-2	HS1P-1
Plug contact	Rated insulation voltage (Ui)	30V	250V	30V
	Thermal current (Ith)	5A (Use at 24V DC)	5A	10A (Use at 24V DC)
	Rated insulation voltage (Ui)	30V	250V	—
Micro switch	Thermal current (Ith)	5A	5A	—
	Rated Operating Voltage (Ue)	DC24V	250V	—
	Rated Operating current (Ie)	5A (resistive load)	5A (AC250V-DC30V) (resistive load)	—
	Rated Operating current (Ie)	—	—	—

## 3 Mounting

Secure interlock plug unit using four M5 hex socket head bolts.

### Example: When installing the door using a chain

- Secure the interlock plug unit on the machine using four M5 hex socket head bolts.
- Secure the chain on the plug handle and the door.
- Do not use a chain which is unnecessarily long, so that the door does not open wide with the plug installed.



### Recommended Tightening Torque of Mounting Screws

- Interlock plug unit: 4.5 to 5.5 N·m (four M5 screws)
- Mounting screws must be supplied by the user.

### CAUTION

- Turn off the power to the interlock plug unit before starting installation, removal, wiring, maintenance, and inspection on the safety switch. Failure to turn power off may cause electrical shocks or fire hazard.
- Do not disassemble or modify the interlock plug unit. Also do not disable the function of interlock plug unit intentionally. Otherwise a malfunction or an accident may occur.
- Do not install the interlock plug unit in places subject to oil or water. Electric shocks or fire hazard may be caused if the interlock plug is operated when the plug part is contaminated with oil or water.
- Do not store the interlock plug units in a dusty, humid, or organic-gas atmosphere. Also avoid direct sunlight.

## 4 Notes for Operation

- The plug of HS1P interlock plug units resemble the plug of HS2P interlock plug units, however, these plugs are not interchangeable. Do not use the plugs of other types, otherwise the interlock plug units will be damaged. The plugs can be distinguished with the handle color.

HS1P: black  
HS2P: aluminum color

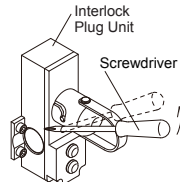
- When chaining a interlock plug unit with the door, give a proper slack to the chain and do not apply excessive force to the plug.
- To prevent a chain from being cut out easily, use a durable chain such as welded chain. Use a chain catch (Mizumoto Machine Mfg. Co., Ltd.) for connecting the chain and handle, so that the chain cannot be removed easily.
- PL2 shows solenoid power ON. If excessive force is applied to the plug, especially to the direction of removing the plug, solenoid operation failure may occur even though the solenoid is energized, resulting in unlocking failure. (with solenoid type only)

### Manual Unlocking (with solenoid type only)

- The plug can be unlocked manually to check for secure mounting of the interlock plug unit before wiring or supplying power and remove the plug in an emergency such as power failure.

#### (Unlocking Method)

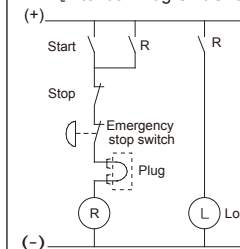
- Remove the screw from the front of the interlock plug unit. Push the lever inside the interlock plug unit towards the pilot light using a small screwdriver until the plug is unlocked. See the figure on the right.
- Turn and remove the plug.
- After the unlocking operation, ensure to turn the screw.



### CAUTION

- Interlock plug units are used to ensure the safety of operators who carry the plugs. Provide only one plug to a guard. Otherwise the hostage control function is lost, endangering the operators. Ensure complete safety management so that the function is maintained.
- Make sure that the interlock plug unit is not energized when removing or installing the plug (after operating the emergency stop button shown in the circuit example shown on the right). Do not start or stop the machine by plug removal/installation, otherwise the interlock plug unit may fail.

### [Interlock Plug Unit Circuit Example]



Note:  
When using the main circuit on AC (HS1P-1, HS1P-3), connect the emergency stop switch to Line, and the interlock plug unit to Neutral.

## 5 Wiring

Circuit Configuration (Plug is installed, and solenoid is de-energized.)

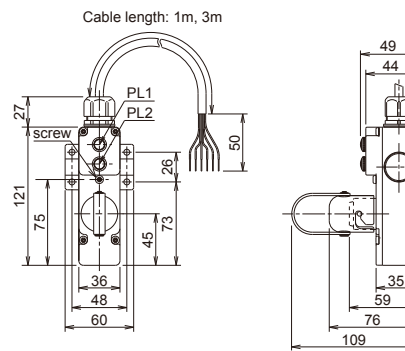
Type	With Solenoid		Without Solenoid	
	HS1P-4	HS1P-3	HS1P-2	HS1P-1
Circuit Configuration	<p>The solenoid and micro switch are linked together mechanically.</p>	<p>The solenoid and micro switch are linked together mechanically.</p>		

### Operation Cycle

Interlock Plug Unit Status	With Solenoid				Without Solenoid	
	Plug is installed Solenoid Power Off	Plug is installed Solenoid Power On	Plug is removed Solenoid Power On	Plug is removed Solenoid Power Off	Plug is installed	Plug is removed
Status						
Main Circuit	White - Yellow: Closed	White - Yellow: Open	White - Yellow: Open	White - Yellow: Open	White - Red: Closed (Note)	White - Red: Open (Note)
Pilot Light (Note)	PL1: On PL2: Off	PL1: Off PL2: On	PL1: Off PL2: On	PL1: Off PL2: Off	On	Off
Solenoid Power	Red - Black: Off	Red - Black: On	Red - Black: On	Red - Black: Off	—	—
	Plug is retained (cannot turn) The machine can be operated.	Plug can be removed by turning The machine can not be operated.	Plug is removed The machine can not be operated.	Plug is removed The machine can not be operated.	Plug can be removed by turning The machine can be operated.	Plug is removed The machine can not be operated.

Note: The status with solenoid is for HS1P-4. HS1P-3 does not have PL1.  
The status without solenoid is for HS1P-2. HS1P-1 does not have PL. Main circuit: Black and Red, Ground: White

## 6 Dimensions



## 7 Precaution for Disposal

Dispose of HS1P Interlock Plug Unit as an industrial waste.