

# HS1P Interlock Plug Unit

## Interlock plugs for controlling the safety in production areas.

- Ideal as a portable key for bringing into the hazardous area, or for detecting open/closed door status by chaining with a guarded door (chain must be provided by the user).
- Removing the interlock plug maintains the interrupted status of load circuit and control circuit.
- Bayonet-style plug removal/installation ensures stability.
- Prevents intentional short-circuit with a wire on metal chip. (Double-break internal contacts achieve high safety.)
- Solenoid type and non-solenoid type available.
- Solenoid type has a lock mechanism. Lock mechanism prevents removal of interlock plug during machine operation, and allows for removal after the machine has stopped, with solenoid energization signal.
- Manual unlocking is possible in the event of power failure or maintenance using a special tool (solenoid type only).
- Rugged die-cast aluminum housing
- UL listed, c-UL listed.



## Interlock Plug Unit

Solenoid	No. of Indicators	Part No.
With solenoid (24V DC)	2	<b>HS1P-441-②②</b>
	1	<b>HS1P-341-②</b>
Without solenoid	1	<b>HS1P-241-②</b>
	—	<b>HS1P-11</b>

- Specify an indicator color code in place of ② in the Part No.  
G: green, R: red
- Plug alone cannot be sold.
- Key wrench for TORX screws (HS9Z-T1) is supplied with the interlock switch.
- Cable length is 1m, 3m is also available upon request.

## Ratings

### Main Circuit

Model		HS1P-441	HS1P-341	HS1P-241	HS1P-11
Plug Contact	Rated Insulation Voltage (Ui)	30V	250V	30V	250V
	Rated Thermal Current (Ith)	5A (at 24V DC)	5A	10A (at 24V DC)	10A
Micro Switch	Rated Insulation Voltage (Ui)	30V	250V	—	—
	Rated Thermal Current (Ith)	5A	5A	—	—
	Rated Operating Voltage (Ue)	24V DC	250V	—	—
	Rated Operating Current (Ie)	5A (resistive load)	5A (240V AC, 30V DC) (resistive load)	—	—

### Solenoid Unit

Rated Voltage	24V DC (100% duty cycle)
Rated Current	260 mA
Coil Resistance	95Ω (at 20°C)
Pickup Voltage	Rated voltage × 90% maximum (at 20°C)
Dropout Voltage	Rated voltage × 10% minimum (at 20°C)
Maximum Continuous Applicable Voltage	Rated voltage × 110%
Maximum Continuous Applicable Time	Continuous
Power Consumption	6.3W

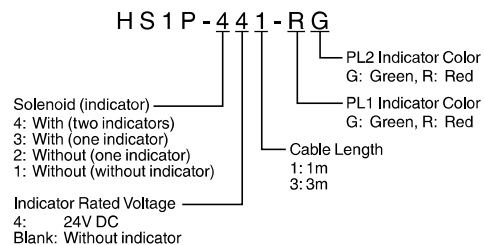
### Indicator

Rated Voltage	24V DC
Rated Current	10 mA
Light Source	LED
Lens Color	G (green), R (red)

## Specifications

Applicable Standards	UL508 (UL listed) CSA C22.2, No. 14 (c-UL listed) UL498 CSA C22.2 No. 182.1 EN 1088 (applicable standards for use)
Operating Temperature	-20 to +50°C (no freezing)
Relative Humidity	45 to 85% (no condensation)
Storage Temperature	-40 to +80°C (no freezing)
Pollution Degree	3
Insulation Resistance	100 MΩ minimum 500V DC megger
Contact Resistance	300 mΩ maximum (initial value at cable length 1m)
Dielectric Strength	Between live and dead metal parts: 2000V, 1 minute Between terminals of the same pole: 1000V, 1 minute
Shock Resistance	Damage limits: 1000 m/s <sup>2</sup>
Vibration Resistance	Operating extremes: 10 to 55 Hz, amplitude 0.5 mm minimum Damage limits: 30 Hz, amplitude 1.5 mm minimum
Operating Frequency	900 operations per hour
Mechanical Life	30,000 operations minimum
Interlock Plug Strength	Rotational strength when locked: 5 N·m
Mounting Screw	M5 × 4
Weight (approx.)	560g (HS1P-441-②②) 800g (HS1P-443-②②)

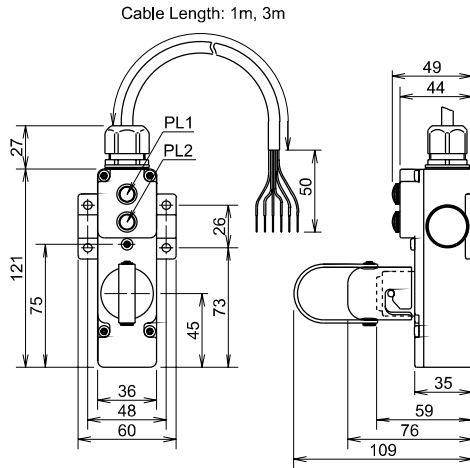
## Part No. Development



# HS1P Interlock Plug Unit

## Dimensions

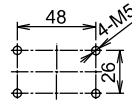
### HS1P



### Cable Size

- HS1P-4: VCTF 0.75 mm<sup>2</sup> (6-pin), Sheath outside diameter ø8.9 mm
- HS1P-3: VCTF 0.75mm<sup>2</sup> (5-pin), Sheath outside diameter ø8.9 mm
- HS1P-2: VCTF 1.25mm<sup>2</sup> (4-pin), Sheath outside diameter ø8.5 mm
- HS1P-1: VCTF 1.25mm<sup>2</sup> (3-pin), Sheath outside diameter ø7.8 mm

### Mounting Hole Layout



## Circuit Diagrams and Operating Characteristics

Interlock Plug Unit Status	With Solenoid (HS1P-4)				Without Solenoid (HS1P-2)	
	Interlock plug is installed Solenoid is de-energized	Interlock plug is installed Solenoid is energized	Interlock plug is removed Solenoid is energized	Interlock plug is removed Solenoid is de-energized	Interlock plug is installed	Interlock plug is installed
Door						
Circuit Diagram	<p>HS1P-3 does not have PL1.</p>	<p>Micro switch turns off when solenoid is energized.</p>	<p>Micro switch turns off when solenoid is energized.</p>	<p>Micro switch maintains off as the interlock plug is removed.</p>		<p>HS1P-1 does not have PL. Main circuit: Black and Red Ground: White</p>
Main Circuit	White - Yellow: Closed	White - Yellow: Open	White - Yellow: Open	White - Yellow: Open	White - Red: Closed	White - Red: Open
Indicator (Note)	PL1: ON PL2: OFF	PL1: OFF PL2: ON	PL1: OFF PL2: ON	PL1: OFF PL2: OFF	ON	OFF
Solenoid Power	Red - Black: Power OFF	Red - Black: Power ON	Red - Black: Power ON	Red - Black: Power OFF	—	—
Remarks	<ul style="list-style-type: none"> <li>• Interlock plug is retained (cannot turn)</li> <li>• Machine can operate</li> </ul>	<ul style="list-style-type: none"> <li>• Interlock plug can be removed by turning</li> <li>• Machine cannot operate</li> </ul>	<ul style="list-style-type: none"> <li>• Interlock plug is removed</li> <li>• Machine cannot operate</li> </ul>	<ul style="list-style-type: none"> <li>• Interlock plug is removed</li> <li>• Machine cannot operate</li> </ul>	<ul style="list-style-type: none"> <li>• Interlock plug can be removed by turning</li> <li>• Machine can operate</li> </ul>	<ul style="list-style-type: none"> <li>• Interlock plug is removed</li> <li>• Machine cannot operate</li> </ul>

# HS1P Interlock Plug Unit

## Safety Precautions

- 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.
- 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.

- In order to avoid electric shocks or fire, turn power off before installation, removal, wire connection, maintenance, or inspection of the interlock plug unit.
- 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.

## Instructions

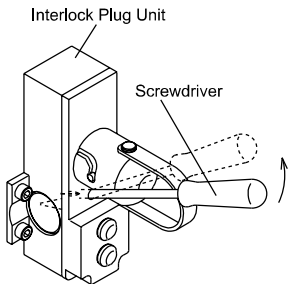
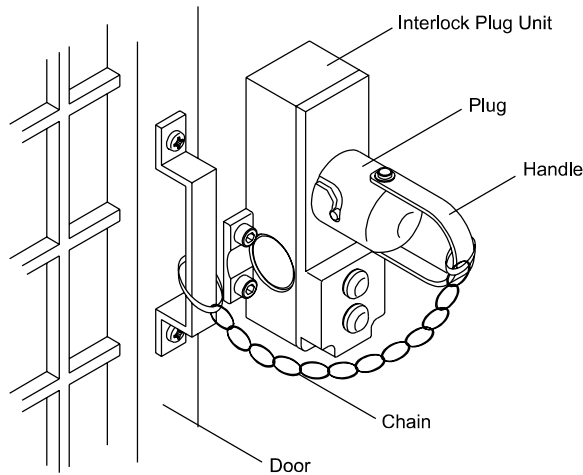
- The plug of HS1P interlock plug units resemble the plug of HS2P interlock plug units, however, these plugs are not interchangeable. Do not use the plugs of other types, otherwise the interlock plug units will be damaged. The plugs can be distinguished with the handset color.  
 HS1P: black  
 HS2P: 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. 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.
- The solenoid has polarity. Make sure of the correct polarity when wiring. Do not apply overvoltage, otherwise the solenoid will be burnt.
- Do not store the interlock plug units in a dusty, humid, or organic-gas atmosphere. Also avoid direct sunlight.
- The HS1P allows manual unlocking of the plug to precheck proper installation as well as for emergency use such as a power failure.
  1. Remove the screw located on the front of the interlock plug unit using the special wrench supplied with the unit. Insert a small screwdriver into the screw hole and push the lever inside as shown below until the key is unlocked.
  2. Turn and remove the plug.
  3. After unlocking, ensure to install the screw.

## Installing the Interlock Plug Units

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

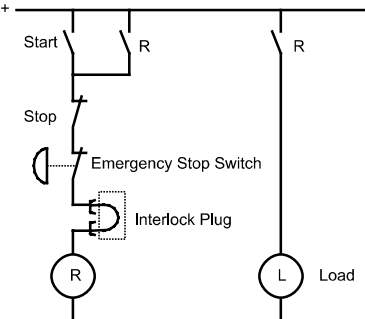
### [Example] When installing the door using a chain

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



- 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 below). Do not start or stop the machine by plug removal/installation, otherwise the interlock plug unit may fail.

### [Interlock Plug Circuit Example]



Note: When using the main circuit on AC (HS1P-1, HS1P-34), connect the emergency stop switch to Line, and the interlock plug unit to Neutral.

## Recommended Tightening Torque of Mounting Screws

- Interlock plug unit: 4.5 to 5.5 N·m (four M5 screws)
- Mounting bolts must be supplied by the user.
- The above recommended tightening torques of the mounting screws are the values with hex socket head bolts. When other screws are used and tightened to a smaller torque, make sure that the screws do not become loose after mounting.
- To avoid unauthorized or unintended removal of the interlock plug unit and the actuator, it is recommended that the interlock switch and the actuator are installed in an unremovable manner, for example using special screws, rivets, or welding the screws.