

HS1L Interlock Switches with Solenoid

3000N locking strength (strongest* in class)!

Suitable for large and heavy doors.

Same actuators as HS1E (locking strength 3000N) can be used.

Six contacts in a compact housing (same size as HS1E)!

Same dimensions and mounting hole layouts as HS1E.

Size: $35 \times 104 \times 129$ mm Door open, closed, and locked status can be monitored for various applications.





New energy saving design!

Energy efficient new solenoid unit.



Improved safety and usability!

- · Manual unlock key and LED indicator are standard.
- Manual unlock key allows for manual unlocking in the event of power failure or maintenance.
- Indicator has an independent circuit, and can be used for various applications.
- Two locking mechanisms to choose from—spring lock (unlocked with energized solenoid) or solenoid lock (locked with energized solenoid).
- M3 terminal screws for wiring.
- Wide operating temperature range (-20 to +55°C).

*As of October 2009, according to IDEC research of plastic interlock switches with solenoid.

Specifications

| Applicable Standard | ISO14119 IEC60947-5-1 EN60947-5-1 (TÜV approval) GS-ET-19 (TÜV approval) UL508 (UL listed) CSA C22.2 No. 14 (c-UL listed) IEC60204-1/EN60204-1 (applicable standards for use) | |
|---|--|--|
| Operating Temperature | -20 to +55°C (no freezing) | |
| Relative Humidity | 45 to 85% (no condensation) | |
| Storage Temperature | -40 to +80°C (no freezing) | |
| Pollution Degree | 3 | |
| Overvoltage Category | III | |
| Impulse Withstand Voltage | 4.0kV (between LED, solenoid and ground: 1.5 kV) | |
| Contact Resistance | 50mΩ maximum (initial value) | |
| Insulation Resistance | Between live and dead metal parts: 100MΩ minimum (500V DC megger) Between terminals of different poles: 100MΩ minimum (500V DC megger) | |
| Electric Shock Protection | Class II (IEC 61140) | |
| Degree of Protection | IP67 (IEC 60529) | |
| Shock Resistance | Damage limits: 1000m/s ² | |
| Vibration Resistance | Operating extremes: 10 to 55Hz, amplitude 0.35mm Damage limits: 30Hz, amplitude 1.5mm | |
| Actuator Operating Speed | 0.05 to 1.0 m/s | |
| Direct Opening Travel | 11mm minimum | |
| Direct Opening Force | 50N minimum | |
| Actuator Retention Force when Locked | 3000N minimum (GS-ET-19) | |
| Operating Frequency | 900 operations per hour | |
| Mechanical Durability | 1,000,000 operations minimum (GS-ET-19) | |
| Electrical Durability | 100,000 operations minimum (AC-15 3A/250V) 1,000,000 operations minimum (24V AC/DC, 100mA) (operating frequency 900 operations per hour) | |
| Conditional Short-circuit Current | 100A (250V) (Use 250V/10A fast acting type fuse for short-circuit protection.) | |
| Weight (approx.) | 450g (HS1L-DQ44) | |
| | | |

Part Number Guide



Actuator

| Description | Part Numbers |
|--|--------------|
| Straight Actuator | HS9Z-A1S |
| L-shaped Actuator | HS9Z-A2S |
| Angle Adjustable (vertical) Actuator (for hinged door) | HS9Z-A3S |
| | |

Package quantity: 1

Ratings

Contact Ratings

| Rated Insu | n Voltage (Ui) | | 300V | | |
|--------------------|----------------|------------------------|------|------|------|
| Rated Ope | ratin | g Current (Ith) | | 10A | |
| Rated Ope | ratin | g Voltage (Ue) | 30V | 125V | 250V |
| Deter | | Resistive Load (AC-12) | 10A | 10A | 6A |
| Rated Operating | AC | Inductive Load (AC-15) | 10A | 5A | ЗA |
| Current | - | Resistive Load (DC-12) | 8A | 2.2A | 1.1A |
| (le) | DC | Inductive Load (DC-13) | 4A | 1.1A | 0.6A |
| | | | | | |

Minimum applicable load (reference value): 3V AC/DC, 5mA

(Applicable range may vary with operating conditions and load types.) • TÜV rating: AC-15 3A/250V, DC-13 4A/30V

UL, c-UL rating: A300

Pilot duty: AC 3A/250V

Pilot duty: DC 4A/30V

Solenoid Unit and LED Indicator

| Lock Med | chanism | Spring Lock Solenoid Lock | | |
|----------|--|---------------------------|-------------------|--|
| | Rated Operating Voltage | 24V DC (100% duty cycle) | | |
| | Rated Current | 200 mA (initial valu | ue) | |
| | Coil Resistance | 120Ω (at 20°C) | | |
| | Pickup Voltage | Rated voltage × 85 | 5% max. (at 20°C) | |
| Solenoid | Dropout Voltage | Rated voltage × 10 | 0% max. (at 20°C) | |
| | Maximum Continuous Applicable Voltage | Rated voltage × 1 | 10% | |
| | Maximum Continuous Applicable Time | Continuous | | |
| | Insulation Class | Class F | | |
| | Rated Operating Voltage | 24V DC | | |
| LED | Rated Current | 10 mA | | |
| | Light Source | LED | | |
| | Illumination Color | Green (G), Red (R) | | |

Parts and Functions



Accessories

| Description | Part Numbers | | | |
|--------------------------------------|--------------|--|--|--|
| Key Wrench for TORX Screw (L-shaped) | HS9Z-T1 | | | |
| Conduit Port Plug (Size: G1/2 only) | HS9Z-P1 | | | |
| Package quantity: 1 | | | | |

Package quantity: 1

Key Wrench for TORX Screw is supplied with the interlock switch.



Types

| Spring Lock Image: Instant Reset (Second OFF) (Second Instant) Image: Instant Reset (Second OFF) (Second Instant) Red HS1L-R44KMSR-R Main: troch INC Door monitor: INO Main circuit: © 211-12 411-142 Red HS1L-R44KMSR-R Main: troch INC Door monitor: INO Member circuit: © 211-12 411-142 Red HS1L-R44KMSRP-R Main: troch INC Door monitor: INO Inchance circuit: © 211-12 411-142 Red HS1L-R44KMSRP-R Mini: troch INC Door monitor: INO Incontrol: Circuit: © 211-12 Second 211-12 Red HS1L-R44KMSRP-R Mini: troch INC Door monitor: INO Incontrol: Circuit: © 211-12 Second 211-12 Red HS1L-D044KMSRP-R Main: troch INC Door monitor: INO Incontrol: Circuit: © 211-12 Second 211-12 Red HS1L-D044KMSRP-R Main: troch INC Door monitor: INO Incontrol: Circuit: © 211-12 Second 211-12 Red HS1L-D044KMSRP-R Main: troch INC Door monitor: INO Incontrol: Circuit: © 211-12 Second 211-22 Red HS1L-D044KMSRP-R Main: troch INC Door monitor: INO Monitor circuit: © 211-22 Second 201-62 Red HS1L-D044KMSRP-R Main: | Lock Mechanism | Circuit Code | Contact Configuration | Manual Unlocking Key | Conduit Port Size | LED Indicator | Part Number |
|---|-------------------|-----------------|--|----------------------------|----------------------|------------------|-------------------|
| Spring Lock Main: 1NC+1NC Door monitor: 1NO: 1NO: Lock monitor: 1NO: 1NO: Monitor circuit: 0: 0: 11-12 12-12 14-12 Red HS1L-R44KMSRP-G Spring Lock Main: 1NC+1NC Door monitor: 1NO: 1NO: Monitor circuit: 0: 0: 11-12 | | | | | 0.1/0 | Red | HS1L-R44KMSR-R |
| R Index monitor: INC PG135 Red HS1L-F144KMSRP-R Monitor circuit: 6215-52 22 Monitor circuit: 6215-62 Monitor circuit: 33 34 515-52 Monitor circuit: 6115-62 Monitor circuit: 6115-62 Monitor circuit: 6115-62 Red HS1L-R44KMSRP-G Main circuit: 6115-12 24 41 42 Monitor circuit: 6115-62 Main circuit: 6115-12 24 41 42 Monitor circuit: 6115-62 Main circuit: 6115-12 25 515-52 Monitor circuit: 6115-62 DO Main circuit: 6115-12 41 42 Monitor circuit: 6115-62 DT Main circuit: 6115-62 6116 Monitor circuit: 6115-62 Monitor circuit: 6115-62 Monitor circuit: 6115-62 Monitor circuit: 6115-62 Solenoid Lock Main circuit: 6115-62 Monitor circuit: 6115-62 Monitor circuit: 6115-62 | | | $\begin{array}{cccc} (+) & \Box & \Box & (-) \\ X2 & X1 & \Box & A2 \\ \hline & & A2 \\ \hline & & & A1 \end{array}$ | | G1/2 | Green | HS1L-R44KMSR-G |
| Spring Lock Main circuit: 9 11, 12, 14, 42 Main Struct Red HS1L-R44KMSRP-G Spring Lock Main: SW-1NC Do Main: S1, 52 Monitor circuit: 61, 52 Main: SW-1NC Monitor circuit: 61, 52 Red HS1L-R44KMSRM-R Main: SW-1NC Do Main: SW-1NC B1, 52 Red HS1L-DQ44KMSR-R Main circuit: 921, 22 51, 52 Monitor circuit: 83, 34 Red HS1L-DQ44KMSR-G Main circuit: 921, 22 51, 52 Monitor circuit: 83, 24 Red HS1L-DQ44KMSR-G Main circuit: 921, 22 51, 52 Monitor circuit: 83, 24 Red HS1L-DQ44KMSR-R Main circuit: 01, 1, 12, 41, 42 Main circuit: 01, 1, 12, 41, 42 Red HS1L-DQ44KMSR-R Main circuit: 01, 1, 12, 41, 42 Main circuit: 01, 1, 12, 41, 42 Red HS1L-DT44KMSR-R Main circuit: 01, 1, 12, 41, 42 Main circuit: 01, 1, 12, 41, 42 Gireen HS1L-DT44KMSR-R Main: iNC+INC Door moniter: INC <td></td> <td>Б</td> <td></td> <td></td> <td>DC12 5</td> <td>Red</td> <td>HS1L-R44KMSRP-R</td> | | Б | | | DC12 5 | Red | HS1L-R44KMSRP-R |
| Spring Lock Monitor circuit: 33 34 Main: 52 Spring Lock Main: INC+INC Door monitor: INO Door monitor: INO Door monitor: INO Red HS1L-F244KMSRR-G DO Main: incruit: \ominus 11, 12 41, 42 Red HS1L-D044KMSR-R DO Main: incruit: \ominus 11, 12 41, 42 Red HS1L-D044KMSR-R DO Main: incruit: \ominus 11, 12 41, 42 Red HS1L-D044KMSR-R DO Main: incruit: \ominus 11, 12 41, 42 Red HS1L-D044KMSR-R Monitor circuit: ∂ 3, 64 Mini: Red HS1L-D044KMSR-R DO Main: circuit: ∂ 11, 12 41, 42 Red HS1L-D144KMSR-G Main: circuit: ∂ 11, 12 41, 42 Red HS1L-D144KMSR-G Main: circuit: ∂ 11, 12 41, 42 Red HS1L-D144KMSR-G Main: ci | | n | | | FG13.5 | Green | HS1L-R44KMSRP-G |
| Spring Lock Memitro circuit: 611-62 DQ Main: 1NC+1NC 1NC+1NC Door monitor: 1NO Lock monitor: 1NO Main circuit: Or monitor: 1NO Main circuit: Main: 1NC+1NC Door monitor: 1NO Monitor circuit: All All Red HS1L-DQ44KMSRP.G Green HS1L-DT44KMSRP.G Green HS | | | Monitor circuit: 33 34 | | M20 | Red | HS1L-R44KMSRM-R |
| Spring Lock DQ INC+1NC Lock monitor: INO With G1/2 Inoc HS1L-DQ44KMSR-G Main circuit: 911-12 411-42 Site With PG13.5 Red HS1L-DQ44KMSR-G Main circuit: 921-32 51-52 Monitor circuit: 93 64 With Red HS1L-DQ44KMSR-G DU Main: 1NC+1NC Door monitor: 1NC Lock monitor: 1NC Red HS1L-DQ44KMSR-R DT Main: 1NC+1NC Lock monitor: 1NC Lock monitor: 1NC Red HS1L-DT44KMSR-R Main circuit: 911-12 241-42 Site Site Red HS1L-DT44KMSR-R Main circuit: 911-22 251+52 Site Red HS1L-DT44KMSR-R Main circuit: 911-22 24 Main G1/2 Red HS1L-DT44KMSR-R Main circuit: 911-22 24 Main G1/2 Red HS1L-DT44KMSR-G Main circuit: 911-22 24 G1/2 Red HS1L-DT44KMSR-R Main circuit: <td></td> <td></td> <td></td> <td>_</td> <td>11/20</td> <td>Green</td> <td>HS1L-R44KMSRM-G</td> | | | | _ | 11/20 | Green | HS1L-R44KMSRM-G |
| Spring Lock DQ Main circuit: © 11, 12, 41, 42 With Green HS1L-DQ44KMSR-G DQ Main circuit: © 21, 22, 51, 52 Monitor circuit: © 3, 34 Red HS1L-DQ44KMSRP-G Monitor circuit: © 11, 12, 41, 42 Monitor circuit: © 11, 12, 41, 42 Red HS1L-DQ44KMSRP-G DT Main circuit: © 11, 12, 41, 42 Red HS1L-DQ44KMSRP-G DT Main circuit: © 11, 12, 41, 42 Red HS1L-DQ44KMSRP-G Main circuit: © 11, 12, 41, 42 Red HS1L-DQ44KMSRP-G Main circuit: © 11, 12, 41, 42 Red HS1L-DT44KMSRP-G Main circuit: © 11, 12, 41, 42 Red HS1L-DT44KMSRP-G Main circuit: © 11, 12, 41, 42 Monitor circuit: © 11, 32 Red HS1L-DT44KMSRP-G Monitor circuit: © 11, 12, 41, 42 Monitor circuit: © 11, 12, 41, 42 Red HS1L-DT44KMSRP-R Main circuit: © 11, 12, 41, 42 Monitor circuit: © 11, 12, 41, 42 Gircen HS1L-R7Y4KMSRP-R Main circuit: © 11, 12, 41, 42 Monitor circuit: © 11, 12, 41, 42 Monitor circuit: © 11, 12, 41, 42 Gircen HS1L-D07Y4KMSRP-R Main circuit: © 11, 12, 41, 42 Main circuit: © 11, 12, 41 | | | | | G1/2 | Red | HS1L-DQ44KMSR-R |
| DQ Main circuit: $\ominus 1$ 22 51 52 Main circuit: $\ominus 1$ 22 51 52 Monitor circuit: 33 34 63 64 $HS1L-DQ44KMSRP-R$ Main Main circuit: $\ominus 11$ 22 51 52 Main circuit: $\ominus 11$ 22 51 52 Main circuit: $\ominus 11$ 22 51 52 Main circuit: $\ominus 11$ 52 51 52 Monitor circuit: $\ominus 11$ 52 51 52 Main circuit: $\ominus 11$ 12 41 42 51 52 Main circuit: $\ominus 11$ 12 41 42 51 52 Main circuit: | Spring Lock | | | With | | Green | HS1L-DQ44KMSR-G |
| Bod Monitor circuit: 33 34 63 64 Monitor circuit: 63 64 M20 Green HS1L-DQ44KMSRM-R Main circuit: 011-12 41-42 Main circuit: 021-12 Green HS1L-DQ44KMSR-R Main circuit: 021-12 14-142 Green HS1L-DT44KMSR-R Main circuit: 021-12 14-142 Green HS1L-DT44KMSR-R Main circuit: 021-12 14-142 Green HS1L-DT44KMSR-R Monitor circuit: 021-22 51-52 Green HS1L-DT44KMSR-R Main circuit: 011-12 41-42 Green HS1L-R7Y4KMSR-R Main circuit: 011-52 Green HS1L-D7Y4KMSR-G Main circuit: 011-12 41-42 Monitor circuit: <td< td=""><td>oping Lock</td><td>DO</td><td></td><td>vvitii</td><td>PG12.5</td><td>Red</td><td>HS1L-DQ44KMSRP-R</td></td<> | oping Lock | DO | | vvitii | PG12.5 | Red | HS1L-DQ44KMSRP-R |
| Basel Main: 1NC+1NC Door monitor: 1NC Cock monitor: 1NC DT Main: circuit: \ominus 11, 12, 41, 42 Red HS1L-DQ44KMSRR-R Main circuit: \ominus 21, 22, 51, 52 Main circuit: \ominus 21, 22, 51, 52 Red HS1L-DT44KMSR-R Main circuit: \ominus 21, 22, 51, 52 Monitor circuit: \ominus 61, 62 Red HS1L-DT44KMSRR-R Main circuit: \ominus 21, 22 Sil, 62 Red HS1L-DT44KMSRR-R Main circuit: \ominus 61, 62 Red HS1L-DT44KMSRR-R Main circuit: \ominus 61, 62 Red HS1L-DT44KMSRR-R Main circuit: \ominus 11, 12 Ath Monitor Red HS1L-DT44KMSRR-R Green HS1L-DT44KMSRR-R Green HS1L-DT44KMSRR-R Main: 1NC+1NC Lock Monitor Green HS1L-DT44KMSRR-R Main: incruit: \ominus 11, 12 41, 42 Green HS1L-R7Y4KMSR-R Main: incruit: \ominus 11, 12 41, 42 Monitor circuit: Gil, 62 Green HS1L-R7Y4KMSRR-R Main circuit: \ominus 11, 12 41, 42 Monitor circuit: Gil, 62 Green HS1L-DQ7Y4KMSRR-R Main circuit: \ominus 11, 12 41, 42 Monitor circuit: Gil, 63 <td></td> <td>DQ</td> <td>Monitor circuit: 3<u>3 34</u></td> <td></td> <td>FG13.5</td> <td>Green</td> <td>HS1L-DQ44KMSRP-G</td> | | DQ | Monitor circuit: 3 <u>3 34</u> | | FG13.5 | Green | HS1L-DQ44KMSRP-G |
| Solenoid Lock Main: 1NC+1NC Door monitor: 1NC Lock monitor: 1NC boor monitor: 1NC Lock monitor: 1NC Lock monitor: 1NC G1/2 Red HS1L-DQ44KMSRP.R Green R Main circuit: $011+12 = 41+42$ Main circuit: $021+22 = 51+52$ Monitor circuit: $011+22 = 51+52$ Monitor circuit: $011+22 = 51+52$ Monitor circuit: $011+12 = 41+42$ Red HS1L-DT44KMSRP-R Green Red HS1L-DT44KMSRP-R Green Main: 1NC+1NC Door Monitor LCD Door monitor: 1NO/1NC Lock monitor: 2NO/1NC Lock monitor: 2NO/1NC Lock monitor: 2NO/1NC Lock monitor: 2NO/1NC Lock monitor: 2NO/1NC Lock monitor: 1NO/1NC Lock monitor: 1NO/1NC Lock monitor: 1NO/1NC Lock monitor: 1NO Monitor circuit: $011+12 = 41+42$ Red HS1L-R7Y4KMSR-R Green Red HS1L-R7Y4KMSRP-R Green Main: 1NC+1NC Door monitor: 1NO/1NC Lock monitor: 1NO/ Monitor circuit: $011+12 = 41+42$ Main: 1NC+1NC Main: 1NC+1NC Door monitor: 1NO/ Lock monitor: 1NO/ 1NC+1NC Main: 1NC+1NC Main: 1NC+1NC DO Main: 1NC+1NC Door monitor: 1NO/ Lock monitor: 1NO/ 1NC+1NC Door monitor: 1NO/ Lock monitor: 1NO/ 1NC+1NC Main: 1NC+1NC Door monitor: 1NO/ Lock monitor: 1NO/ Lock monitor: 1NC G1/2 Red HS1L-D07Y4KMSRP-R Green Main circuit: $011+12 = 41+42$ Main circuit: $021+22 = 51+52$ Monitor circuit: $021+22 = 5$ | | | Monitor circuit: <u>63_64</u> | | 1400 | Red | HS1L-DQ44KMSRM-R |
| DT INC+1NC Lock monitor: 1NC G1/2 G1/2 Green HS1L_DT44KMSR-G Main circuit: $\ominus 1_1$ 12 41, 42 PG13.5 Red HS1L_DT44KMSRP-G Monitor circuit: $\ominus 1_1$ 22 51 52 M20 Red HS1L_DT44KMSRP-G Monitor circuit: $\ominus 1_1$ 62 M20 Red HS1L_DT44KMSRP-G Main circuit: $\ominus 1_1$ 62 M20 Red HS1L_DT44KMSRP-G Main circuit: $\ominus 1_1$ 62 M20 Red HS1L_DT44KMSRP-G Main: 1NC+1NC Door Monitor Lock Monitor Red HS1L-R7Y4KMSRP-G Main: 1NC+1NC Door monitor: 1NO Main: 1NC+1NC Door monitor: 1NO Red HS1L-R7Y4KMSRP-G Monitor circuit: $\ominus 1_1$ 2 4_1 4_2 M20 Red HS1L-R7Y4KMSRP-G Monitor circuit: $\ominus 1_1$ 2 4_1 4_2 M20 Red HS1L-R7Y4KMSRP-G Monitor circuit: $\ominus 1_1$ 2 A_1 </td <td></td> <td></td> <td></td> <td></td> <td>M20</td> <td>Green</td> <td>HS1L-DQ44KMSRM-G</td> | | | | | M20 | Green | HS1L-DQ44KMSRM-G |
| DT Main circuit: $\ominus 11$, 12 , 41 , 42 Main circuit: $\ominus 21$, 22 , 51 , 52 Red HS1L-DT44KMSRP-R Green Monitor circuit: $\ominus 21$, 22 , 51 , 52 Monitor circuit: $\ominus 31$, 32 Monitor circuit: $\ominus 11$, 62 Red HS1L-DT44KMSRP-G Red HS1L-DT44KMSRP-G Red HS1L-DT44KMSRP-G Monitor circuit: $\ominus 31$, 32 Monitor circuit: $\ominus 11$, 41 , 42 M20 Red HS1L-DT44KMSRP-G Main circuit: $\ominus 11$, 12 , 41 , 42 Main circuit: $\ominus 11$, 12 , 41 , 42 Main circuit: $\ominus 11$, 12 , 41 , 42 Monitor circuit: $\ominus 31$, 52 Red HS1L-RTY4KMSRP-G Main circuit: $\ominus 11$, 12 , 41 , 42 Monitor circuit: $\ominus 31$, 52 Monitor circuit: $\ominus 11$, 12 , 41 , 42 M20 Red HS1L-RTY4KMSRP-G Monitor circuit: $\ominus 11$, 12 , 41 , 42 Monitor circuit: $\ominus 11$, 12 , 41 , 42 M20 Red HS1L-D27Y4KMSRP-G Monitor circuit: $\ominus 11$, 12 , 41 , 42 Main circuit: $\ominus 11$, 12 , 41 , 42 M20 Red HS1L-D27Y4KMSRP-G DQ Main circuit: $\ominus 11$, 12 , 41 , 42 Main circuit: $\ominus 21$, 22 , 51 , 52 M20 Red HS1L-D27Y4KMSRP-G DT Main circuit: $\ominus 21$, 22 , 51 , 52 Main circuit: $\ominus 31$, 32 | | DT | | | 01/0 | Red | HS1L-DT44KMSR-R |
| DT Main circuit: 921+ 22 51+ 52 Monitor circuit: 91- 32 32 32 32 Monitor circuit: 61+ 62 M20 Red HS1L-DT44KMSRP-G Monitor circuit: 01- 61+ 62 M20 Red HS1L-DT44KMSRP-G Main: INC+1NC Door Monitor Lock Monitor Control (01) Red HS1L-DT44KMSRP-G Main: 1NC+1NC Door monitor: 1NO-1 Main: NA Red HS1L-R7Y4KMSRP-G Main: 1NC+1NC Door monitor: NO Red HS1L-R7Y4KMSRP-G Monitor circuit: 021+ 22 Monitor circuit: 61+< | | | Main circuit: $\bigcirc 11 + 12 + 41 + 42$ Main circuit: $\bigcirc 21 + 22 - 51 + 52$ Monitor circuit: $\bigcirc 31 + 32$ Monitor circuit: $61 + 62$ | | G1/2 | Green | HS1L-DT44KMSR-G |
| $ \begin{array}{ c c c c c c c c c c c c c c c c c c c$ | | | | | PG13.5 | Red | HS1L-DT44KMSRP-R |
| $Solenoid Lock \\ DQ \\ DT \\ DT \\ Monitor circuit: \bigcirc 11 + 12 - 41 + 42 \\ Main: 1NC+1NC \\ DQ \\ Main: 1NC+1NC \\ DC \\ Monitor circuit: \bigcirc 21 + 22 - 51 + 52 \\ Monitor circuit: \bigcirc 31 + 32 \\ Monitor circuit: {\bigcirc 31 + 32 \\ Monitor circu$ | | | | | | Green | HS1L-DT44KMSRP-G |
| Solenoid Lock Main trout: Out Out Minor Green HS1L-DT44KMSRM-G R Image: Construct Construst Construct Construct Construst Construct Constr | | | | | M20 | Red | HS1L-DT44KMSRM-R |
| $Solenoid Lock \\ DQ \\ DT \\ Main: 1NC+1NC \\ DQ \\ Main: 1NC+1NC \\ Main: 1NC+1NC \\ INC+1NC \\ I$ | | | | | | Green | HS1L-DT44KMSRM-G |
| R Main: 1NC+1NC Door monitor: 1NO/1NC Lock monitor: 2NC Red HS1L-R7Y4KMSRP-R Main: inC+1NC Door monitor: 1NO/1NC Lock monitor: cruit: © 11+ 12 41+ 42 Monitor circuit: © 11+ 12 41+ 42 Monitor circuit: © 11+ 22 Monitor circuit: © 11+ 22 Monitor circuit: © 11+ 12 41+ 42 Main: inC+1NC Door monitor: 1NO Main Green HS1L-DQ7Y4KMSRP-R Green HS1L-DQ7Y4KMSRP-R Green HS1L-DQ7Y4KMSRP-R Green Main: inC+1NC Door monitor: 1NC Main Green HS1L-DQ7Y4KMSRP-R Main: inC+1NC Door monitor: 1NC Lock monitor: 1NC Green HS1L-DQ7Y4KMSRP-R Green < | | | LED (Actuator Inserted) (Solenoid ON) | | G1/2 | Red | HS1L-R7Y4KMSR-R |
| RLock monitor: 2NC Main circuit: \ominus 11+1241+42 42 22 Monitor circuit: \ominus 21+22 22 22 Monitor circuit: \ominus 21+PG13.5RedHS1L-R7Y4KMSRP-GSolenoid LockMain: 1NC+1NC Main circuit: \ominus 11+1241+42 42 Monitor circuit:RedHS1L-R7Y4KMSRM-RDQMain: 1NC+1NC Main circuit: \ominus 11+1241+42 61+M20RedHS1L-R7Y4KMSRM-GMain: 1NC+1NC Main circuit: \ominus 11+1241+42 42GreenHS1L-DQ7Y4KMSRP-GMain: circuit: \ominus 11+1241+42 42GreenHS1L-DQ7Y4KMSRP-GMonitor circuit: \ominus 11+1241+42 42GreenHS1L-DQ7Y4KMSRP-GMonitor circuit: \ominus 11+1241+42 42GreenHS1L-DQ7Y4KMSRP-GDTMain circuit: \ominus 11+1241+42 42 Main circuit: \ominus 11+1241+42 42 Circuit:G1/2RedHS1L-DT7Y4KMSRP-GDTMain circuit: \ominus 11+1241+42 42 Main circuit: \ominus 11+1241+42 42 Circuit:G1/2RedHS1L-DT7Y4KMSRP-GDTMain circuit: \ominus 11+1241+42 Circuit:G1/2RedHS1L-DT7Y4KMSRP-RDTMain circuit: \ominus 11+1241+42 Circuit:G1/2RedHS1L-DT7Y4KMSRP-RMain circuit: \ominus 11+1241+42 Circuit:G1/2RedHS1L-DT7Y4KMSRP-RMain circuit: \ominus 11+12 | | | | | | Green | HS1L-R7Y4KMSR-G |
| Solenoid Lock Main circuit: $\ominus 11$, 12 , 41 , 42 Monitor circuit: $\ominus 21$, 22 Monitor circuit: $\ominus 11$, 52 Monitor circuit: $G = en$ HS1L-R7Y4KMSRP-G Monitor circuit: $\ominus 11$, 52 Monitor circuit: $G = en$ HS1L-R7Y4KMSRM-R Monitor circuit: $\Theta = 1$ $G = en$ HS1L-R7Y4KMSRM-R Main: INC+1NC Door monitor: INO Nain: INC+1NC Door monitor: INO Main: $O = 11$ 12 41, 42 Main circuit: $\ominus 21$, 22 51 52 Monitor circuit: $\Theta = 11$ 12 41 42 Main circuit: $\Theta = 11$ 12 41 42 Main circuit: $\Theta = 11$ 12 11 42 Main circuit: $\Theta = 11$ 12 11 42 Main circuit: $\Theta = 11$ 12 11 12 11 12 11 12 11 12 11 12 11 12 11 12 <td< td=""><td></td><td>R</td><td>Lock monitor: 2NC</td><td rowspan="2">PG13.5</td><td>Red</td><td>HS1L-R7Y4KMSRP-R</td></td<> | | R | Lock monitor: 2NC | | PG13.5 | Red | HS1L-R7Y4KMSRP-R |
| $ \begin{array}{ c c c c c c } \hline Monitor circuit: & 33 & 34 & \\ \hline Monitor circuit: & 514 & 52 & \\ \hline Monitor circuit: & 614 & 62 & \\ \hline Monitor circuit: & 614 & 62 & \\ \hline Main: 1NC+1NC & Door monitor: 1NO \\ 1NC+1NC & Lock monitor: 1NO \\ \hline Main circuit: & 924 & 22 & 51 & 52 & \\ \hline Monitor circuit: & 33 & 34 & \\ \hline Monitor circuit: & 33 & 34 & \\ \hline Monitor circuit: & 33 & 34 & \\ \hline Monitor circuit: & 33 & 34 & \\ \hline Monitor circuit: & 63 & 64 & \\ \hline Main: 1NC+1NC & Door monitor: 1NC \\ \hline Main circuit: & 924 & 22 & 51 & 52 & \\ \hline Monitor circuit: & 33 & 34 & \\ \hline Monitor circuit: & 63 & 64 & \\ \hline M20 & \hline Red & HS1L-DQ7Y4KMSRP-R \\ \hline Green & HS1L-DQ7Y4KMSRP-G \\ \hline Green & HS1L-DQ7Y4KMSRP-G \\ \hline Green & HS1L-DQ7Y4KMSRP-R \\ \hline Green & HS1L-DT7Y4KMSRP-G \\ \hline Green & HS1L-DT7Y4KMSRP-R \\ \hline Green & HS1L-DT7Y4KMSRP-$ | | | | | | Green | HS1L-R7Y4KMSRP-G |
| Solenoid LockMain: 1NC+1NC 1NC+1NCDoor monitor: 1NO Lock monitor: 1NO Lock monitor: 1NO Lock monitor: 1NO Main circuit: $\odot 21_{1}$ Main: 22 Main: 21_{1} 42 22 WithRedHS1L-DQ7Y4KMSR-R GreenDQMain circuit: $\odot 21_{1}$ 22 51_{1} 52 Monitor circuit: 33 34 Monitor circuit: 33 63 64 DTMain: 1NC+1NC Main circuit: $\odot 21_{1}$ 22 51_{1} 52 Monitor circuit: 33 64 DTMain: 1NC+1NC NC+1NC 1NC+1NCDoor monitor: 1NC Lock monitor: 1NC Lock monitor: 1NC Lock monitor: 1NC Lock monitor: 1NC Monitor circuit: $\odot 21_{1}$ 22 51_{1} DTMain: circuit: $\odot 11_{1}$ 12 41_{1} 42 Core 41_{1} 42 GreenDTMain: circuit: $\odot 11_{1}$ 12 41_{1} 42 Lock monitor: 1NC Lock monitor: 1NC Main circuit: $\odot 21_{1}$ 22 51_{1} 52 Monitor circuit: $\odot 31_{1}$ DTMain: circuit: $\odot 11_{1}$ 12 41_{1} 42 Core 61_{1} 62 DTMain circuit: $\odot 11_{1}$ 21_{1} 22_{1} 51_{1} 52_{1} Monitor circuit: $\odot 31_{1}$ 32_{1} Monitor circuit: $\odot 31_{1}$ 32_{1} Monitor circuit: $\odot 31_{1}$ 32_{1} Monitor circuit: $\odot 31_{1}$ 32_{1} Monitor c | | | Monitor circuit: <u>33</u> <u>34</u> | | M20 | Red | HS1L-R7Y4KMSRM-R |
| Solenoid LockINC+1NCLock monitor: 1NOWithG1/2INCHS1L-DQ7Y4KMSR-GDQMain circuit: $\ominus 11 + 12 + 41 + 42$ Main circuit: $\ominus 21 + 22 - 51 + 52$ Monitor circuit: $33 - 34$ Monitor circuit: $33 - 34$ Monitor circuit: $33 - 44$ Monitor circuit: $33 - 44$ | | | | - | MEO | Green | HS1L-R7Y4KMSRM-G |
| Solenoid Lock Main circuit: $\ominus 11$, 12 41, 42 With Green HS1L-DQ7Y4KMSRP-G DQ Main circuit: $\ominus 21$, 22 51 , 52 Monitor circuit: $\ominus 21$, 22 51 , 52 Monitor circuit: $\ominus 21$, 22 51 , 52 $Green$ HS1L-DQ7Y4KMSRP-G Monitor circuit: $\ominus 33$, 4 Monitor circuit: $Green$ HS1L-DQ7Y4KMSRP-G Main: 1NC+1NC Door monitor: 1NC $Main$ $Green$ HS1L-DQ7Y4KMSRP-G Main circuit: $\ominus 11$, 12 41, 42 $Green$ HS1L-DT7Y4KMSRP-G Main circuit: $\ominus 11$, 12 41, 42 $Green$ HS1L-DT7Y4KMSRP-G Main circuit: $\ominus 21$, 22 51 , 52 $Green$ HS1L-DT7Y4KMSRP-R Main circuit: $\ominus 21$, 22 51 , 52 $Green$ HS1L-DT7Y4KMSRP-R Monitor circuit: $\ominus 21$, 22 51 , 52 $Green$ HS1L-DT7Y4KMSRP-R Monitor circuit: $\ominus 21$, 22 51 , 52 $Green$ HS1L-DT7Y4KMSRP-R Monitor circuit: $\ominus 31$, 32 $Green$ HS1L-DT7Y4KMSRP-R Monitor circuit: 61 , | | | | | G1/2 | Red | HS1L-DQ7Y4KMSR-R |
| DQ Main circuit: $\bigcirc 21$; 22 51 ; 52 Monitor circuit: $\Im 3$; $\Im 4$ $Green$ $HS1L-DQ7Y4KMSRP-G$ Monitor circuit: $\Im 3$; $\Im 4$ $M20$ Red $HS1L-DQ7Y4KMSRP-G$ Main: $INC+1NC$ Door monitor: INC $Green$ $HS1L-DQ7Y4KMSRP-G$ Main: $INC+1NC$ Door monitor: INC $Green$ $HS1L-DQ7Y4KMSRP-G$ DT Main circuit: $\odot 11$ 12 41 42 $Green$ $HS1L-DQ7Y4KMSRP-G$ DT Main circuit: $\odot 11$ 12 41 42 $Green$ $HS1L-DT7Y4KMSRP-G$ Main circuit: $\odot 21$ 22 51 52 $Green$ $HS1L-DT7Y4KMSRP-R$ Monitor circuit: $\odot 21$ 22 51 52 $Green$ $HS1L-DT7Y4KMSRP-G$ Monitor circuit: $\odot 31$ 32 $M20$ Red $HS1L-DT7Y4KMSRP-R$ | Solenoid Lock | | | With | | Green | HS1L-DQ7Y4KMSR-G |
| Monitor circuit: 33 34 Monitor circuit: 63 64 Main: 1NC+1NC Door monitor: 1NC 1NC+1NC Door monitor: 1NC Main: circuit: $\ominus 11$ Main: circuit: $\ominus 11$ Main: circuit: $\ominus 21$ Main: circuit: $\ominus 21$ Monitor circuit: $\ominus 11$ Main: circuit: $\ominus 21$ Monitor circuit: $\ominus 21$ Monitor circuit: $\ominus 11$ $\ominus 11$ 12 $A11$ $A12$ $B12$ $B13$ $B23$ $B12$ $B12$ $B13$ $B23$ $B12$ $B13$ | | DQ | | | PG13.5 | | |
| Monitor circuit: 63 64 Main: 1NC+1NC Door monitor: 1NC 1NC+1NC Door monitor: 1NC Main: circuit: $\ominus 11$ 1NC+1NC Lock monitor: 1NC Main: circuit: $\ominus 21$ Main: circuit: $\ominus 21$ Monitor circuit: $\ominus 31$ Monitor circuit: $\ominus 11$ Main: circuit: $\ominus 11$ Main: circuit: $\ominus 21$ Main: circuit: $\ominus 21$ Monitor circuit: $\ominus 31$ Monitor circuit: $\ominus 11$ Mo | | | | | | | |
| Main: 1NC+1NC Door monitor: 1NC 1NC+1NC Lock monitor: 1NC Main: circuit: $\ominus 1_1$ 11 12 41 42 Main circuit: $\ominus 2_1$ 22 51 52 Monitor circuit: $\ominus 3_1$ 32 Monitor circuit: 6_1 62 | | | | | M20 | | |
| DT NC+1NC Lock monitor: 1NC Main circuit: $\ominus 11+12 41+42$ Main circuit: $\ominus 21+22 51+52$ Monitor circuit: $\ominus 31+32$ Monitor circuit: $\ominus 1+42$ Monitor circuit: $\ominus 31+32$ Monitor circuit: $\ominus 1+62$ M20 Red HS1L-DT7Y4KMSRP-R Red HS1L-DT7Y4KMSRP-R | | | | - | | | |
| DT Main circuit: \ominus 11+ 12 41+ 42 Main circuit: \ominus 21+ 22 51+ 52 Monitor circuit: \ominus 31+ 32 Monitor circuit: \ominus 61+ 62 M20 Green HS1L-DT7Y4KMSRP-G Red HS1L-DT7Y4KMSRP-G Red HS1L-DT7Y4KMSRP-G | | | | | G1/2 | | |
| DT Main circuit: ⊕21 + 22 51 + 52 Monitor circuit: ⊕31 + 32 Monitor circuit: ⊕61 + 62 M20 PG13.5 PG13.5 PG13.5 PG13.5 PG13.5 Red HS1L-DT7Y4KMSRP-G M20 | | | | | | | |
| Monitor circuit: ⊖31+ 32 Monitor circuit: 61+ 62 M20 Red HS1L-DT7Y4KMSRM-R | | DT | | | PG13.5 | | |
| Monitor circuit: $01 - 02$ M20 | | | Monitor circuit: ⊖31 <u>32</u> | | | | |
| | | | | | M20 | Green | HS1L-DT7Y4KMSRM-R |

• The contact configuration shows the status when the actuator is inserted and the switch is locked.

· Actuators are not supplied with the interlock switch and must be ordered separately.

Terminal Numbers



11-42: Main circuit

- 21: Main circuit or monitor circuit (door monitor)
- 22: Monitor circuit (door monitor)
- 31/33: Monitor circuit (door monitor)
- 32/34: Monitor circuit (door monitor)
- 51: Monitor circuit (lock monitor)
- 52: Main circuit or monitor circuit (lock monitor)
- 61/63: Monitor circuit (lock monitor)
- 62/64: Monitor circuit (lock monitor)
- A1: Solenoid (-)
- A2: Solenoid (+)
- X1: LED (-)
- X2: LED (+)

* There is no wiring between 22-51 with circuit code R.





Dimensions and Mounting Hole Layouts (mm)

Note: Plug the unused actuator entry slot with the slot plug supplied with the interlock switch. * Install the interlock switch using four mounting screws when using the actuator entry slot vertical to the mounting panel, and three mounting screws when using the actuator entry slot horizontal to the mounting panel.

Straight Actuator (HS9Z-A1S)



Angle Adjustable (vertical) Actuator (HS9Z-A3S)



Actuator Mounting Reference Position

As shown in the figure on the right, the mounting reference position of the actuator, when inserted in the interlock switch, is where the actuator stop placed on the actuator lightly touches the interlock switch.

Note: After mounting the actuator, remove the actuator cover and stop film.

L-shaped Actuator (HS9Z-A2S)



Note: The actuator cover and the actuator stop film are supplied with the actuator and used when adjusting the actuator position. Remove them after the actuator position has been determined.





Circuit Diagrams and Operating Characteristics

Spring Lock Type

| | Status 1 | Status 2 | Status 3 | Status 4 | Manual Unlock |
|---|---|---|--|--|--|
| Interlock Switch Status | Door Closed Machine ready to operate Solenoid de-energized | Door Closed Machine cannot be operated Solenoid energized | Door Open Machine cannot be operated Solenoid energized | Door Open Machine cannot be operated Solenoid de-energized | Door Closed Machine cannot be operated Solenoid de-energized |
| Door Status | | | | | Unlock position |
| Circuit Diagram (HS1L-DQ4) | $\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ 11 \\ \end{array} \\ 11 \\ \end{array} \\ 11 \\ \end{array} \\ 12 \\ 21 \\ \end{array} \\ 12 \\ 22 \\ \end{array} \\ 11 \\ \end{array} \\ 22 \\ 11 \\ \end{array} \\ 22 \\ 11 \\ \end{array} \\ 52 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $ | $\begin{array}{c} & & & & & & \\ & & & & & & \\ 1 & & & & &$ | $\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $ | $\begin{array}{c} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 $ | $\begin{array}{c} & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ & & & & & \\ \hline & & & &$ |
| Door | Closed (locked) | Closed (unlocked) | Open | Open | Closed (unlocked) |
| | Circuit -42 ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| LED (Actuator (Solenoid OFF) inserted) OFF 21 (+) → → → → → → → → → → → → → → → → → → → | Circuit -52 ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| - Main Circuit: 011 1 12 41 1 42 | Monitor rcuit r Open) 3–34 | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| Monitor Circuit: 63 64 Lock Ci | Monitor rcuit OFF (open) ed) 63-64 | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| Solenoid Power A1-A2 | OFF (de-energized |) ON (energized) | ON (energized) | OFF (de-energized) | OFF (de-energized) |

Solenoid Lock Type

| | | | Status 1 | Status 2 | Status 3 | Status 4 | Manual Unlock |
|---|---|---|---|--|---|--|--|
| Interloc | k Switch Status | | Door Closed Machine ready to operate Solenoid energized | Door Closed Machine cannot be operated Solenoid de-energized | Door Open Machine cannot be operated Solenoid de-energized | Door Open Machine cannot be operated Solenoid energized | Door Closed Machine cannot be operated Solenoid de-energized to energized |
| Door Status | | | | | | | Unlock position |
| Circuit I | Diagram (HS1L-DQ4) | | $\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $ | $\begin{array}{c} \begin{array}{c} & & \\ & & \\ & & \\ & & \\ \end{array} \\ \begin{array}{c} & & \\ & & \\ \end{array} \\ \end{array} \\ \begin{array}{c} & & \\ & & \\ \end{array} \\ \end{array} \\ \begin{array}{c} & & \\ & & \\ \end{array} \\ \end{array} \\ \begin{array}{c} & & \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} & & \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} & & \\ \end{array} \\ \end{array}$ | $\begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $ | $\begin{array}{c} 0 \\ 0 \\ 0 \\ 11 \\ 11 \\ 11 \\ 12 \\ 21 \\ 0 \\ 33 \\ 0 \\ 0 \\ 34 \\ 0 \\ 34 \\ 0 \\ 34 \\ 0 \\ 36 \\ 0 \\ 36 \\ 0 \\ 0 \\ 36 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ $ | $\begin{array}{c} \begin{array}{c} \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} 0 \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $ |
| Door | | | Closed (locked) | Closed (unlocked) | Open | Open | Closed (unlocked) |
| HS1 | 1L-DQ7Y | Main Circuit 11–42 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | LED (Actuator (Solenoid inserted) ON) (-) X1 A2 A1 | Main Circuit 21–52 | ON (closed) | OFF (open) | OFF (open) | OFF (open) | OFF (open) |
| | Circuit: $\bigcirc 11 + 12 + 41 + 42$ Circuit: $\bigcirc 21 + 22 - 51 + 52$ or Circuit: $33 - 34$ | Door Monitor Circuit (Door Open) 33–34 | OFF (open) | OFF (open) | ON (closed) | ON (closed) | OFF (open) |
| Contact Nonito Contact Contact | onitor Circuit: <u>63 64</u> | Lock Monitor Circuit (unlocked) 63-64 | OFF (open) | ON (closed) | ON (closed) | ON (closed) | ON (closed) |
| Solenoi | id Power A1-A2 | | ON (energized) | OFF (de-energized) | OFF (de-energized) | ON (energized) (Note 2) | OFF to ON (Note 1) (Note 2) |

Note 1: Do not attempt manual unlocking while the solenoid is energized. Note 2: Do not energize the solenoid for a long period of time while the door is open or manually unlocked.

Operation Characteristics (reference)



· The operation characteristics show the contact status when the actuator enters into the center of the entry slot.

The circuit No. 12-41 and 22-51 are interconnected. Use circuits • 11-42 and 21-52 for safety circuits (In HS1L-R type, circuit 12-41 is interconnected.)



Safety Precautions

- In order to avoid electric shock or fire, turn power off before installation, removal, wiring, maintenance, or inspection of the interlock switch.
- If relays are used in the circuit between the interlock switch and the load, consider the danger, and use safety relays, since welded or sticking contacts of standard relays may invalidate the functions of the interlock switch. Perform a risk assessment and establish a safety circuit which satisfies the requirement of the safety category.
- Do not place a PLC in the circuit between the interlock switch and the load. Safety security can be endangered in the event of a malfunction of the PLC.
- Do not disassemble or modify the interlock switch, otherwise the switch may fail or an accident may occur.

Do not install the actuator in a location where someone may come in contact with it as injury may occur. Install the actuator where it does not touch anyone when the

- door is opened/closed as injury may occur.
 The solenoid lock type is locked when energized, and unlocked when de-energized. When energization is interrupted due to wire disconnection or other failures, the interlock switch may be unlocked equation provide dependent to the energited.
- may be unlocked causing possible danger to the operators.
 Solenoid lock type must not be used in applications where locking is required for safety. Perform a risk assessment and determine whether a solenoid lock type is appropriate.
 In order to prevent the interlock switch and actuator from be-
- In order to prevent the interlock switch and actuator from being removed without authorization, it is recommended to install an one-way screw or a screw that needs a special tool for removal. Welding or rivets are also recommended.

Instructions

- Regardless of door types, do not use the interlock switch as a door stop. Install a mechanical door stop at the end of the door to protect the interlock switch from excessive force.
- Make sure that no force is applied on the actuator, otherwise the actuator may not unlock properly.
- Do not apply excessive shock to the interlock switch when opening or closing the door. A shock to the interlock switch exceeding 1,000m/s² may cause damage to the interlock switch.
- If the operating atmosphere is contaminated, use a protective cover to prevent the entry of foreign objects into the interlock switch through the actuator entry slots. Entry of foreign objects into the interlock switch may affect the mechanism of the interlock switch and cause it to fail.
- Plug the unused actuator entry slot using the slot plug supplied with the interlock switch.
- Do not store the interlock switches in a dusty, humid, or organic-gas atmosphere, or where the switches are exposed to direct sunlight.
- Use proprietary actuators only. The interlock switch may be damaged if other actuators are used, .
- The actuator retention force is 3000N. Do not apply a load higher than the rated value. When a higher load is expected, provide an additional system consisting of another interlock switch without lock (such as the HS5D interlock switch) or a sensor to detect door opening and stop the machine.
- Regardless of the door, do not use the interlock switch as a door lock. Install a separate lock using a latch or other device.
- While the solenoid is energized, the interlock switch temperature rises approximately 40°C above the ambient temperature (to approximately 95°C while the ambient temperature is 55°C). To prevent burns, do not touch. If cables might come into contact with the interlock switch, use heat-resistant cables.
- The interlock switch solenoid has polarity. Be sure of the correct polarity when wiring.

Minimum Radius of Hinged Door

When using the interlock switch for a hinged door, refer to the minimum radius of doors as shown below. For doors with a small minimum radius, use actuators with adjustable angle (HS9Z-A3S).

Note: The following values apply when the actuator does not interfere with the interlock switch when opening and closing the door. Because deviation or dislocation of hinged door may occur in actual applications, make sure of the correct operation before installation.

When using HS9Z-A2S Actuator

• When the door hinge is on the extension line of the interlock switch surface:



 When the door hinge is on the extension line of the actuator mounting surface:



When using HS9Z-A3S Actuator

- When the door hinge is on the extension line of the interlock switch surface: 50mm
- When the door hinge is on the extension line of the actuator mounting surface: 80mm



Actuator Angle Adjustment

- Using the angle adjustment screw, the actuator angle can be adjusted (refer to the dimensional drawing on page 4). Adjustable angle: 0 to 20°
- The larger the adjusted angle of the actuator, the smaller the applicable radius of the door opening. After installing the actuator, open the door. Then adjust the actuator so that its edge can be inserted properly into the actuator entry slot of the interlock switch.
- After adjusting the actuator angle, apply Loctite to the adjustment screw so that the screw will not move.



Instructions

Mounting Examples

Install the interlock switch and actuator referring to the figures below.



For Manual Unlocking

Spring lock type

The HS1L allows manual unlocking of the actuator to pre-check proper door movement before wiring or turning power on, as well as for emergency use such as in the case of a power failure.

Solenoid lock type

The solenoid lock type interlock switch normally does not need to be manually unlocked. However, only when the interlock switch would not release the actuator even though the solenoid is de-energized, the interlock switch can be unlocked manually. Unlock the interlock switch manually only when the solenoid is de-energized. Do not unlock the interlock switch manually when the solenoid is energized.

Using manual unlock key

- When locking or unlocking the interlock switch manually, turn the key fully using the manual unlock key supplied with the interlock switch.
- Using the interlock switch with the key not fully turned (less than 90°) may cause damage to the interlock switch or operation failure. When manually unlocked, the interlock switch will keep the main circuit disconnected and the door unlocked. Main circuit and lock monitor circuit remain open.
- Do not leave the manual unlock key attached to the interlock switch during operation. This is dangerous and does not satisfy safety standard requirements, because the interlock switch can always be unlocked while the machine is in operation.



Manual unlocking key (supplied with the switch)

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Insert the tip of a small screwdriver into the oblong hole on the back of the interlock switch, and tilt toward the center of the switch until the actuator is unlocked.

· Unlocking from the back of interlock switch

Note: Provide a hole on the mounting panel for unlocking from the back. When making a hole in the panel, take waterproof characteristics into consideration.



Safety Precautions

Before manually unlocking the interlock switch, make sure that the machine has come to a complete stop. Manual unlocking during operation may unlock the interlock switch before the machine stops, and the function of interlock switch with solenoid is lost.

On the solenoid lock type, manual unlocking is provided for the situation where the switch cannot be unlocked even though the solenoid has turned off. Do not attempt manual unlocking while the solenoid is energized.

Cover Opening and Closing Precautions

- When opening the cover before wiring, make sure to open only the cover shown the following figure. Removing unnecessary screws may cause a failure of the interlock switch.
- Use HS9Z-T1 key wrench for TORX screw when removing and installing the cover.
- Make sure that no foreign objects such as dust, water, or oil enter the interlock switch when wiring.



Applicable Crimping Terminal



- Use an insulation tube on the crimping terminal.
- When using stranded wires, make sure that loose wires do not cause a short circuit. Also, do not solder the terminal to prevent loose wires.

| Applicable Crimping Terminal | Applicable Wire |
|------------------------------|-----------------------------|
| N0.5-3 / FN0.5 (JST) | 0.2 to 0.5mm ² |
| N1.25-MS3 (JST) | 0.25 to 1.65mm ² |
| V1.25-YS3A (JST) | 0.25 to 1.65mm ² |

Applicable Wire Size

• 0.5 to 1.5mm²

Applicable Cable Glands

Use IP67 cable glands.



Instructions



When Using Flexible Conduit (Example)

Flexible conduit example: VF-03 (Nihon Flex)

| Conduit Port Size | Plastic Cable Gland | Metal Cable Gland |
|-------------------|---------------------|----------------------------|
| G1/2 | - | RLC-103 (Nihon Flex) |
| PG13.5 | - | RBC-103PG13.5 (Nihon Flex) |
| M20 | - | RLC-103EC20 (Nihon Flex) |

When Using Multi-core Cables (Example)

Flexible conduit example: VF-03 (Nihon Flex)

| Conduit Port Size | Plastic Cable Gland | Metal Cable Gland |
|-------------------|-------------------------------|----------------------------|
| G1/2 | SCS-10 (Seiwa Electric) | ALS-16 (Nihon Flex) |
| PG13.5 | ST13.5 (K-MECS) | ABS-PG13.5 (Nihon Flex) |
| M20 | ST-M20X1.5 (K-MECS) (Note) | ALS-EC20 (Nihon Flex) |

· Different cable glands are used depending on the cable sheath external diameter. When purchasing a cable gland, confirm that the cable gland is applicable to the external diameter of the cable sheath.

Note: When using the ST-M20X1.5 cable gland, use with a gasket (GPM20, K-MECS).

Conduit Port Opening

- · Make an opening for wiring by breaking one of the conduitport knockouts on the interlock switch housing using a screwdriver.
- · Before opening the conduit port, remove the cable gland locking ring inside the interlock switch.
- · When breaking the conduit port, take care not to damage the contact block or other parts inside the interlock switch.
- · Cracks or burrs on the conduit entry may affect the water resistance of the interlock switch.
- · If a different conduit port is used, cover the unused opening with an optional plug (part number: HS9Z-P1).

Recommended Tightening Torque

- HS1L interlock switch: 3.2 to 3.8 N·m (four M5 screws) (Note) • Lid:
- 0.9 to 1.1 N·m (M4 screws)



· Terminal:

· Cable gland:

Actuators

HS9Z-A1S/A2S: 2.7 to 3.3 N·m (two M5 screws) (Note) HS9Z-A3S: 4.5 to 5.5 N·m (two M6 screws) (Note)

2.7 to 3.3 N·m

0.6 to 0.8 N·m (M3 screws)

Note: The above recommended tightening torque of the mounting screws are the values when using 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.

Wire Length Inside the Interlock Switch

| | | Through C | onduit Port |
|----------------|--------------------|-----------|-------------|
| | Screw Terminal No. | 1 | 2 |
| | 11 | 95 ± 2 | 45 ± 2 |
| | 21 | 85 ± 2 | 35 ± 2 |
| | 22 | 60 ± 2 | 70 ± 2 |
| | 31/33 | 75 ± 2 | 35 ± 2 |
| | 32/34 | 50 ± 2 | 60 ± 2 |
| | 42 | 65 ± 2 | 95 ± 2 |
| Wire Length | 51 | 45 ± 2 | 70 ± 2 |
| L1 (mm) | 52 | 55 ± 2 | 85 ± 2 |
| | 61/63 | 35 ± 2 | 60 ± 2 |
| | 62/64 | 45 ± 2 | 75 ± 2 |
| | A1 | 50 ± 2 | 45 ± 2 |
| | A2 | 60 ± 2 | 40 ± 2 |
| | X1 | 70 ± 2 | 35 ± 2 |
| | X2 | 80 ± 2 | 35 ± 2 |
| Wire Stripping | Length: L2 (mm) | 7 : | ±1 |



Note: HS1L-R

Do not remove the wire between terminals 12-41, because these terminals are interconnected for safety circuit input. Use terminals 11-42 for safety circuit inputs. (GS-ET-19)

HS1L-DQ and HS1L-DT

Do not remove the wires between terminals 12-41 and 22-51, because these terminals are interconnected for safety circuit inputs. Use terminals 11-42 and 21-52 for safety circuit inputs. (GS-ET-19)

Specifications and other descriptions in this catalog are subject to change without notice

DEC

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