

SPECIFICATIONS

No. ISA4415B

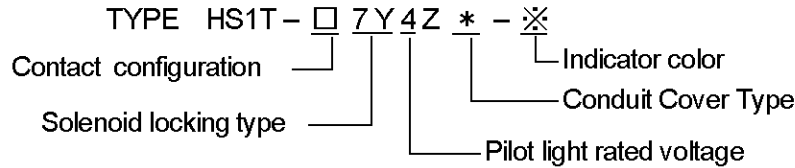
Date: April.24.2024

HS1T SERIES SOLENOID TYPE SAFETY SWITCH

Approved by S.Fujitani

Checked by T.Yasui

Written by E.Watai



1. Applicable standards

Applicable Standards	ENISO/ISO14119
	IEC60947-5-1
	EN60947-5-1(TÜV approval)
	GS-ET-19(TÜV approval)
	UL508(UL Listing approval)
	CSA C22.2 No.14(c-UL Listing approval)
	GB/T14048.5(CCC pending)
Standards for use	IEC60204-1/EN60204-1
Applicable directives	Low voltage directive, Machinery directive

2. Operating conditions

- | | |
|---------------------------|--------------------------------|
| (1) Operating Temperature | - 25 to + 55°C (no freezing) |
| (2) Relative Humidity | 20 to 95% RH (no condensation) |
| (3) Storage temperature | - 40 to + 80°C (no freezing) |
| (4) Pollution degree | 3 (inside: 2) |

3. Ratings

3.1 Contact

- | | |
|---|---------------------|
| (1) Rated insulation voltage | 250V (IEC60947-5-1) |
| (2) Thermal current | 2.5A |
| (3) Rated operating voltage and rated operating current | |

		Rated operating voltage			
		30V	125V	250V	
Rated Operating Current *1	AC	Resistive load (AC-12)	—	2.5A	1.5A
		Inductive load (AC-15)	—	1.5A	0.75A
	DC	Resistive load (DC-12)	2.0A	0.4A	0.2A
		Inductive load (DC-13)	1.0A	0.22A	0.1A

UL,c-UL rating: Pilot Duty AC 0.75A/250V, Pilot Duty DC 1.0A/30V

TUV rating: AC-15 0.75A/250V, DC-13 1.0A/30V

CCC rating: AC-15 0.75A/250V, DC-13 1.0A/30V (Applying)

- | | |
|-----------------------------|---------------------------------|
| (4) Minimum applicable load | 3V AC/DC, 5mA (reference value) |
| (5) Operating frequency | 900 operations / hour |

3.2 Solenoid

- | | |
|------------------------------------|---------------------------------------|
| (1) Rated insulation voltage | 30V |
| (2) Rated operating voltage | 24V DC 100% Duty cycle |
| (3) Rated current (±10%) | 200 mA (initial value) |
| (4) Coil resistance (±10%) | 120Ω (at 20°C) (initial value) |
| (5) Turn on voltage | Rated voltage × 85% maximum (at 20°C) |
| (6) Turn off voltage | Rated voltage × 10% minimum (at 20°C) |
| (7) Continuous applicable voltage | Rated voltage × 110% |
| (8) Continuous applicable duration | Continuous |
| (9) Class of protection | Class F |
| (10) Rated power consumption | Approx. 5W (initial value) |

3.3 Indicator

(1) Rated insulation voltage	30V
(2) Rated operating voltage	24V DC
(3) Rated current	10mA
(4) Light source	LED
(5) Illumination color — (※)	Green (G)

4. Construction

(1) Outside view / Mounting hole layout	See the attached sheet.
(2) Mounting screw	M5×3
(3) Degree of protection	IP67 (IEC60529) Type 4X Indoor Use Only
(4) Contact configuration -- (□)	See the attached sheet
(5) Actuator unlocking method	(a) Solenoid (b) Manual unlock tool
(6) Indicator light	With pilot light
(7) Safety switch housing color	Black
(8) Operation head cover	Zinc alloy die-casting, Silver
(9) Conduit type— (△)	Standard type(M20)(M), Cable side-routed type(M20)(SM)
(10) Terminal number identification	See the operating characteristic chart
(11) Applicable wire	0.3~1.5mm ² (AWG22~16)
(12) Operation of contact elements	By a special actuator
(13) Electric shock protection	Class II (IEC61140)
(14) Weight	Approx. 450g

5. Characteristics

(1) Temperature rise	Contact: 50°C maximum Terminal: 50°C maximum Coil: 105°C maximum Lens: 30°C maximum
(2) Insulation resistance	100 MΩ minimum (500V DC megger)
(3) Impulse withstand voltage	2.5 kV (between LED/solenoid and ground: 0.5 kV)
(4) Contact resistance	50 mΩ maximum (initial value)
(5) Vibration resistance	
(a) Operating extremes	10 to 55 Hz, amplitude 0.35 mm minimum
(b) Damage limits	30 Hz, Amplitude 1.5 mm minimum
(6) Shock resistance	
(a) Operating extremes	100 m/s ²
(b) Damage limits	1,000 m/s ²
(7) Actuator Retention Force	F _{zh} = 5,000N min. (GS-ET-19) The actuator retention force of HS1T is 5000N at static load. Make sure that a force exceeding the above specification is not applied. In the event where the actuator retention force might exceed the expected load, add a system that can detect the opening of the door and stops the machine, such as adding another safety switch without lock (such as HS5D) or a sensor.
(8) Operating force	
(a) Actuator insertion	Approx. 8.0+5.0 N
(b) Actuator removal	Approx. 10.0+5.0 N (Solenoid locking)
(9) Travel (from mounting reference position)	
(a) Actuator total travel	28.5 mm (actuator : HS9Z-A11T)
(b) Direct opening travel	12.0 mm minimum (actuator: HS9Z-A11T)
(10) Direct Opening Force	120 N minimum
(11) Operating speed	0.05~1.0 m/s
(12) Conditional short-circuit current	50A (250 V)
(13) Short-circuit protective device	250V AC, 10A, Fast blowing fuse


6. Life

- (1) Mechanical life 2,000,000 operations minimum
(Operating frequency: 900 operations/hour)
- (2) Electrical life 100,000 operations minimum
(AC-15 250A·0.75A)
(Operating frequency: 900 operations/hour)
2,000,000 operations minimum
(AC/DC24V·100mA)
(Operating frequency: 900 operations/hour)


7. Attachment



- (1) Manual unlock tool Type: HS9Z-KEY5

8. Operation Cycle, Contact Configuration and Operation

- Contact operation is based on the condition that the actuator is inserted into the center of the safety switch slot
- Contact operation shows the HS9Z-A11T/A12T actuator.
- Use main circuit or monitor circuit with  for the input to safety circuit.
- Indicator turns on when solenoid is energized.

●Contact Configuration and Operation

Type	Contact Configuration # 2	Contact Operation (reference)
		(Travel mm) 0 (Actuator Mounting Reference Position) Approx. 4.2 (Lock) Approx. 9.8 Approx. 10.3 Approx. 28.5
HS1T-XD	Monitor Circuit: 11-12 Monitor Circuit: 41-42	11-12 41-42
HS1T-XFE	Monitor Circuit: 11-12 Monitor Circuit: 21-22	11-12 21-22
HS1T-XG	Monitor Circuit: 11-12 Monitor Circuit: 23-24	11-12 23-24
HS1T-XH	Monitor Circuit: 41-42 Monitor Circuit: 51-52	41-42 51-52
HS1T-VA	Monitor Circuit: 11-12 Monitor Circuit: 23-24 Monitor Circuit: 53-54	11-12 23-24 41-42 53-54
HS1T-VB	Monitor Circuit: 11-12 Monitor Circuit: 23-24 Monitor Circuit: 51-52	11-12 23-24 41-42 51-52
HS1T-VC	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 53-54	11-12 21-22 41-42 53-54
HS1T-VD	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 51-52	11-12 21-22 41-42 51-52
HS1T-VF	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 31-32	11-12 41-42 31-32 41-42
HS1T-VG	Monitor Circuit: 11-12 Monitor Circuit: 21-22 Monitor Circuit: 53-54	11-12 21-22 33-34 41-42
HS1T-VH	Monitor Circuit: 11-12 Monitor Circuit: 51-52 Monitor Circuit: 61-62	11-12 41-42 51-52 61-62
HS1T-VJ	Monitor Circuit: 11-12 Monitor Circuit: 51-52 Monitor Circuit: 63-64	11-12 41-42 51-52 63-64
HS1T-VW	Monitor Circuit: 13-14 Monitor Circuit: 51-52 Monitor Circuit: 61-62	13-14 41-42 51-52 61-62
HS1T-VX	Monitor Circuit: 13-14 Monitor Circuit: 51-52 Monitor Circuit: 63-64	13-14 41-42 51-52 63-64
HS1T-DD	Main Circuit: 11-42 Main Circuit: 21-52	11-42 21-52

(Actuator Completely Inserted) (Actuator Pulled Out)
 :Contact Closed  :Contact Open

*1 This locking monitoring marking has been newly described in section 9.2.1 of EN ISO / ISO14119. It indicates that any devices with this marking meet the following EN ISO / ISO 14119 requirements:

- General (- General requirements for guard locking devices) (Section 5.7.1) *
- Locking monitoring (- Locking monitoring for guard locking devices) (Section 5.7.2.2)

When a lock monitor circuit (contact) has the locking monitoring marking, it means that one circuit(contact) can monitor the position and the locking function of the protective door is closed and locked.

Both HS1T spring lock and solenoid lock models have marking for lock monitoring. Note that solenoid lock models can be used in applications where lock for safety purpose is found unnecessary after a risk assessment, e.g. locking is needed for purposes such as in production process.

* 2 These are the image of locking position with actuator inserted.

• Solenoid Lock Type (HS1T-□7Y)

Door States	Closed	Closed	Open	Closed
Solenoid Power A1-A2	ON	OFF	OFF/ON *13	OFF *12 *13
Manual Unlock Key	Turn the key to lock position	Turn the key to lock position	Turn the key to lock position	Turn the key to unlock position
Rear Unlock Button	Returned status	Returned status	Returned status	When operating the Button
Main Circuit 11-42 21-52	Closed	Open	Open	Open
Monitor Circuit 11-12 21-22 31-32	Closed	Closed	Open	Closed
Monitor Circuit 13-14 23-24 33-34	Open	Open	Closed	Open
Monitor Circuit 41-42 51-52	Closed	Open	Open	Open
Monitor Circuit 53-54 63-64	Open	Closed	Closed	Closed
	Door is locked. The machine can be operated.	Door is unlocked. The machine can not be operated.	The machine can not be operated.	Door is unlocked. The machine can not be operated.

*3 Do not attempt manual unlocking when the solenoid is energized.

*4 Do not energize the solenoid for a long time while the door is open or when the door is unlocked manually.