

ZE · ZC · ES · EC · RC · GXL-8F Type

Position Detection Switch

Position Detection Switch

Switches Applicable to Grippers

| | ZE135 ZE155 | ZE235 ZE255 | ZC230 ZC253 | ES13A ES13B | ES23A ES23B | ES15A ES15B | ES25A ES25B | ESP15A ESP15B | ESP25A ESP25B | EC22 | EC23 | RCA RCB RCM | GX-F8A |
|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------|------|-------------------|--------|
| HP04 | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP04L | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP04F | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP04V | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP14 | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP04D | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP04DL | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP04DF | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP06 | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP07 | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP08 | | ● | | | ● | | ● | | ● | | | | |
| HP01 | | | ● | | | | | | | ● | ● | ● | |
| HP15 | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP05 | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HP03E | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| EHPE | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| (C)KH(L) | | | | | | | | | | | | | ● |
| HV02G | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| HV02E | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| EHVE | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| EHVJ | ● | ● | | ● | ● | ● | ● | ● | ● | | | | |
| SH | | | | | | | | | | | | | ● |

Switches Applicable to Rotors

| | ZE135 ZE155 | ZE235 ZE255 | ZC230 ZC253 | ES13A ES13B | ES23A ES23B | ES15A ES15B | ES25A ES25B | ESP15A ESP15B | ESP25A ESP25B | EC22 | EC23 | RCA RCB RCM | GX-F8A |
|-------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------|------|-------------------|--------|
| RT02 | | | ● | | | | | | | ● | ● | ● | |
| RT01 | | | ● | | | | | | | ● | ● | ● | |
| RS01 | | | ● | | | | | | | ● | ● | ● | |
| (R)SR | | | ● | | | | | | | ● | ● | ● | |
| RH01 | | ● | ● | | | | | | | ● | ● | ● | |

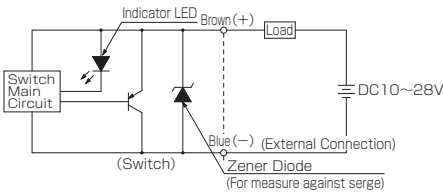
Specifications

| Item \ Type | ZE135 | ZE155 | ZE235 | ZE255 |
|--|--|---|---|---|
| Wiring Method | 2 Wire System | 3 Wire System | 2 Wire System | 3 Wire System |
| Lead Wire Leading Direction | Straight Type | | L-shaped | |
| Power-supply Voltage | — | DC4.5~28V | — | DC4.5~28V |
| Load Voltage | DC10~28V | DC4.5~28V | DC10~28V | DC4.5~28V |
| Load Current | 4~20mA (At 25°C, 10mA at 60°C) | 50mA MAX. | 4~20mA (At 25°C, 10mA at 60°C) | 50mA MAX. |
| Consumption Current at ON | — | 10mA MAX. (DC24V) | — | 10mA MAX. (DC24V) |
| Internal Drop Voltage ^{Note 1)} | 4.5V MAX. | 0.5V MAX. (However, 20 mA at the voltage of 1.0 V or less) | 4.5V MAX. | 0.5V MAX. (However, 20 mA at the voltage of 1.0 V or less) |
| Leak Current | 1mA (DC24V, 25°C) | 50μA MAX. (DC24V) | 1mA (DC24V, 25°C) | 50μA MAX. (DC24V) |
| Delay Time | 1ms MAX. | | | |
| Insulation Resistance ^{Note 2)} | 100MΩ MIN. (Between case and lead wire terminal at DC 500V Mega) | | | |
| Withstand Voltage ^{Note 2)} | AC500V(50/60Hz) 1 minute (Between case and lead wire terminal) | | | |
| Shock Resistance | 294m/s ² {30.0G} (Non-repetitive) | | | |
| Vibration Resistance | Double amplitude 1.5mm·10~55Hz {88.3m/s ² {9.0G}} | | | |
| Protection Structure | IEC IP67, JIS C0920 (Watertight type) | | | |
| Operation Indicator | Red LED indicator illuminates at ON | | | |
| Lead Wire ^{Note 3)} | PCCV0.15SQ×2 cores (brown, blue)× ϕ ^{Note 3)} | CCV0.15SQ×3 cores (brown, blue, black)× ϕ ^{Note 3)} | PCCV0.15SQ×2 cores (brown, blue)× ϕ ^{Note 3)} | CCV0.15SQ×3 cores (brown, blue, black)× ϕ ^{Note 3)} |
| Operating Temperature Range | 0~60°C | | | |
| Storage Temperature Range | -10~70°C | | | |
| Mass | 15 g (When the lead wire length A is 1 m), 35 g (When the lead wire length B is 3 m) | | | |

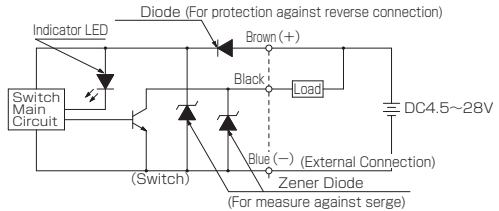
Note 1): The internal drop voltage changes depending on the load current. Note 2): As per our test standards. Note 3): Lead wire length L: A: 1 m, B: 3 m

Internal Circuit

ZE135-ZE235

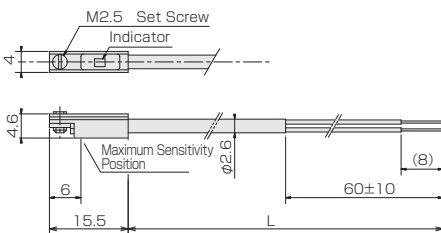


ZE155-ZE255

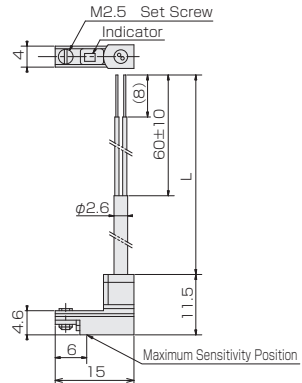


Outside Dimensions [mm]

ZE135-ZE155



ZE235-ZE255

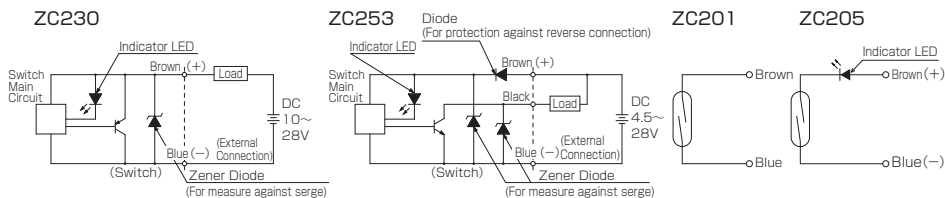


Specifications

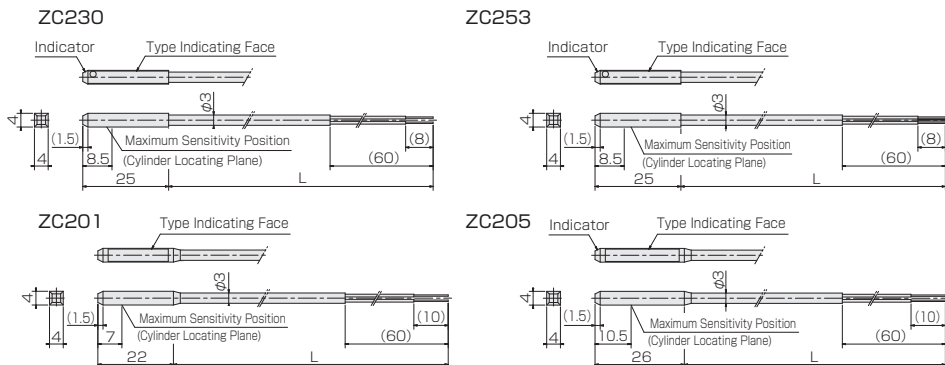
| Item | Type | ZE135 | ZE155 | ZE235 | ZE255 |
|--|------|---|---|---|---|
| Switch Type | | Reed Switch | | Solid State | |
| Wiring Method | | 2 Wire System | | 3 Wire System | |
| Lead Wire Leading Direction | | Straight Type | | | |
| Power-supply Voltage | | — | | | DC4.5~28V |
| Load Voltage | | DC5~28V AC85~115V (r.m.s) | DC10~28V | | DC4.5~28V |
| Load Current | | DC0.1~40mA AC2~25mA | DC5~40mA | | DC100mA MAX. |
| Consumption Current at ON | | — | | | 10mA MAX. (DC24V) |
| Internal Drop Voltage ^{Note 1)} | | 10mV MAX. (When the load current is 40mA) | 2.1V MAX. (When the load current is 40mA) | 3.5V MAX. | 0.5V MAX. (When the load current is 50mA) |
| Leak Current | | 0mA | | 1mA (DC24V) | 50μA MAX. (DC24V) |
| Delay Time | | 1ms MAX. | | | |
| Insulation Resistance ^{Note 2)} | | 100MΩ MIN. (Between case and lead wire terminal at DC 500V Mega) | | | |
| Withstand Voltage ^{Note 2)} | | AC1000V (50/60Hz) 1 minute (Between case and lead wire terminal) | | AC500V (50/60Hz) 1 minute (Between case and lead wire terminal) | |
| Shock Resistance | | 294m/s ² [30.G] (Non-repetitive) | | | |
| Vibration Resistance | | Double amplitude 1.5mm·10~55Hz [88.3m/s ² (9.0G)] Resonance frequency 2750±250Hz | | | |
| Protection Structure | | IEC IP67, JIS C0920 (Watertight type) | | | |
| Operation Indicator | | Red LED indicator illuminates at ON | | | |
| Lead Wire ^{Note 3)} | | PVC0.25SQ×2 cores (brown, blue)×1 | | | PVC0.25SQ×3 cores (brown, blue, black)×1 |
| Operating Temperature Range | | 0~60°C | | | |
| Storage Temperature Range | | -10~70°C | | | |
| Contact Protection Measure | | Required | — | | |
| Mass | | 20 g (When the lead wire length A is 1 m) | | | |

Note 1): The internal drop voltage changes depending on the load current. Note 2): As per our test standards. Note 3): Lead wire length L: A: 1 m, B: 3 m

Internal Circuit



Outside Dimensions [mm]

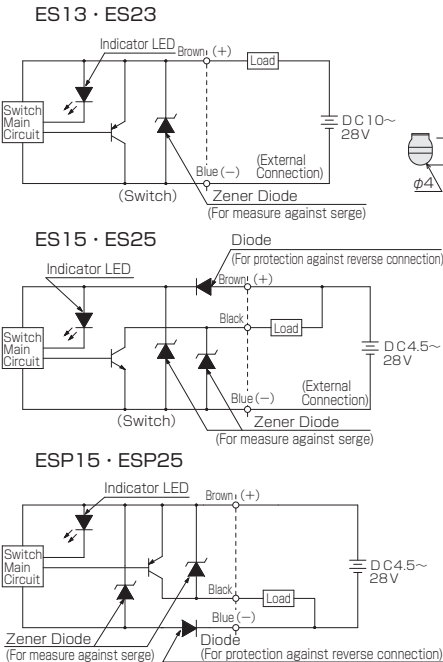


Specifications

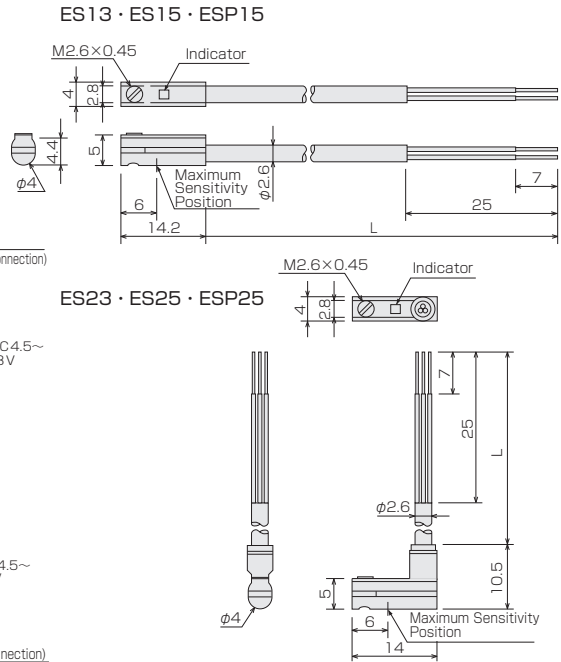
| Item | Type | ES13A | ES23A | ES15A | ES25A | ESP15A | ESP25A |
|--|------|--|----------------|---|----------------|---|----------------|
| | | ES13B | ES23B | ES15B | ES25B | ESP15B | ESP25B |
| Wiring Method | | 2 Wire System | | 3 Wire System | | 3 Wire System | |
| Output System | | — | | NPN Type | | PNP Type | |
| Lead Wire Leading Direction | | Straight Type | L-shaped | Straight Type | L-shaped | Straight Type | L-shaped |
| Power-supply Voltage | | — | | DC4.5~28V | | DC4.5~28V | |
| Load Voltage | | DC10~28V | | DC4.5~28V | | — | |
| Load Current | | 4~20mA | | 50mA MAX. | | 50mA MAX. | |
| Consumption Current at ON | | — | | 10mA MAX. | | 10mA MAX. | |
| Internal Drop Voltage ^{Note 1)} | | 3.5V MAX. | | 0.5V MAX. (When the load current is 50mA) | | 0.5V MAX. (When the load current is 50mA) | |
| Leak Current | | 0.8mA MAX. | | 100μA MAX. | | 100μA MAX. | |
| Delay Time | | 1ms MAX. | | | | | |
| Insulation Resistance | | 100MΩ MIN. (Between case and lead wire terminal at DC 500V Mega) | | | | | |
| Withstand Voltage | | AC1000V(50/60Hz) 1 minute (Between case and lead wire terminal) | | | | | |
| Shock Resistance ^{Note 2)} | | 500m/s ² [50.0G] (Non-repetitive) | | | | | |
| Vibration Resistance ^{Note 2)} | | Double amplitude 1.5mm·10~55Hz [90m/s ² (9.0G)] | | | | | |
| Protection Structure | | IEC IP67, JIS C0920 (Watertight type) | | | | | |
| Operation Indicator | | Red LED indicator illuminates at ON | | | | | |
| Lead Wire | | PVC0.15SQ | | | | | |
| Lead Wire Length L | | A: 1m, B: 3m | | | | | |
| Operating Ambient Temperature Range | | 0~60°C | | | | | |
| Storage Ambient Temperature Range | | -20~80°C | | | | | |
| Mass | | A: 12g, B: 31g | A: 13g, B: 32g | A: 12g, B: 31g | A: 13g, B: 32g | A: 12g, B: 31g | A: 13g, B: 32g |

Note 1): The internal drop voltage changes depending on the load current. Note 2): As per our test standards.

Internal Circuit



Outside Dimensions

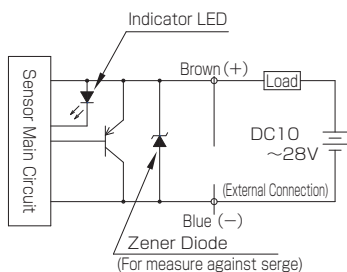


Specifications

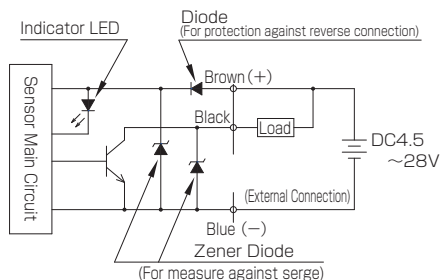
| Item | Type | EC22 | EC23 |
|--|------|---|---------------|
| Switch Type | | Solid State | |
| Wiring Method | | 2 Wire System | 3 Wire System |
| Power Supply Voltage Range | | DC4.5~28V | |
| Load Voltage Range | | DC10~28V | DC4.5~28V |
| Load Current Range | | 4~20mA | 50mA MAX. |
| Withstanding Pressure between Contacts | | — | |
| Internal Drop Voltage | | 100MΩ MIN. (DC500 MV between terminal and case) | |
| Maximum Leak Current* ⁽²⁾ | | 3.5V MAX. | 0.5V MAX. |
| Insulation Resistance | | 1mA. | 50μA |
| Withstand Voltage | | AC500V 1 minute (between terminal and case) | |
| Shock Resistance | | 30G | |
| Vibration Resistance | | Double amplitude 1.5mm Vibration Frequency10~55Hz(9G) | |
| Operating Temperature Range | | 0~60°C | |
| Protection Structure | | IP67 | |
| Indicator | | Red LED illuminates at ON | |
| Lead Wire Length | | A: 1m B: 3m | |

Internal Circuit

EC22

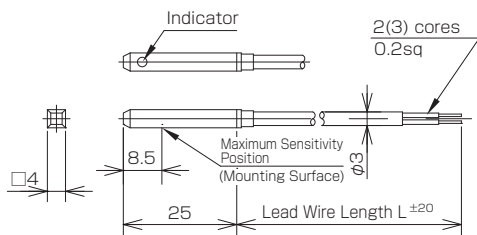


EC23



Outside Dimensions [mm]

EC22 · EC23



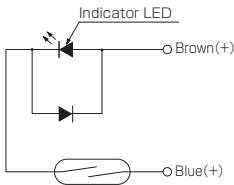
Specifications

| Item | Type | RCA | RCB | RCM |
|---|------|--|--------------------------------------|--|
| Switch Type | | Reed Switch | | Solid State |
| Working Voltage Range | | AC12~125V DC12~100V | AC5~125V DC5~100V | DC4.5 ~ 28V |
| Maximum Opening/ Closing Capacity | | 2VA1W 40mA Whichever is smaller | 5VA2.5W 50mA Whichever is smaller | 70mA |
| Withstanding Pressure between Contacts | | DC200V 1min Leak current of 1 mA or less | | — |
| Maximum Residual Voltage | | — | | 3V |
| Maximum Leak Current | | — | | 1mA |
| Insulation Resistance | | 100MΩ or more: (DC500V Mega between terminal and case) | | |
| Withstand Voltage | | AC1500Vrms, 1minute (between terminal and case) | | |
| Shock Resistance | | 300m/s ² (30G) | | 490m/s ² (50G) |
| Vibration Resistance | | Double amplitude 1.5mm Vibration Frequency 10~55Hz (1 sweep, 1 minute) | | |
| Lead Wire Tension Strength | | 15 N/wire (1.5 kgf/wire) | | |
| Case Tightening Torque | | 0.3N·m(3kgf·cm) | | |
| Operating Temperature Range | | -10~60°C | | |
| Protection Structure | | IP-67 | | IP-66 |
| Indicator | | Red LED illuminates at ON | None | Transparent LED (red light emitting) illuminates at ON |
| Lead Wire Length | | No code: 1500mm LA:5000mm | | |

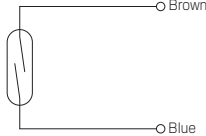
Position Detection Switch

Internal Circuit

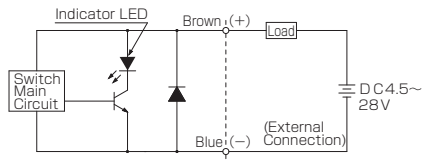
RCA



RCB

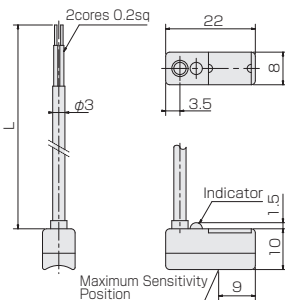


RCM

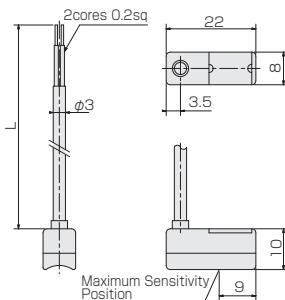


Outside Dimensions [mm]

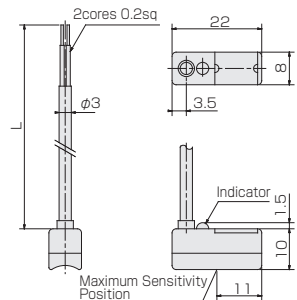
RCA



RCB



RCM



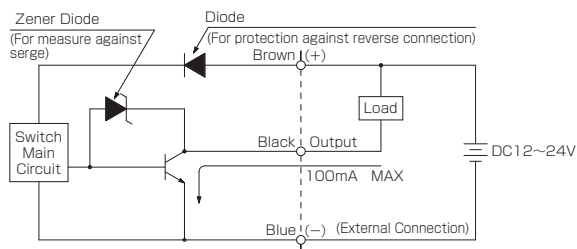
GX-F8A Type

Specifications

| Item | Type | GX-F8A |
|---------------------------------|-----------------------------|--|
| Wiring Method | | 3-wire method |
| Maximum Operating Distance | | 2.5mm±8% |
| Stable Detection Range | | 0~2.1mm |
| Differential (Hysteresis) | | Not more than 20% of the operating distance |
| Repeat Accuracy | | 0.04mm or less |
| Power-supply Voltage | | 12 ~ 24V DC + 10%/ -15% |
| Consumption Current | | 15mA or less |
| Output | | NPN transistor, open collector |
| | | Output |
| | | Applied Voltage: DC 30 V or less |
| | | Residual Voltage: 1 V or less |
| Maximum Response Frequency | | 500Hz |
| Operation Indicator | | Orange LED (ON when the output is ON) |
| Environment Resistance | Protection Structure | IP68 (IEC), IP68g (JEM) |
| | Ambient Working Temperature | - 25 ~ + 70°C, Storage: - 40 ~ + 85°C |
| | Ambient Working Humidity | 35 ~ 85% RH, Storage: 35 ~ 95% RH |
| | Withstand Voltage | AC1.000V 1minute, charging unit collectively, between cases |
| | Insulation Resistance | The 50MΩ or more at DC500V Mega charging unit collectively, between cases |
| | Vibration Resistance | Durability: 10 to 500Hz, double amplitude: 3mm (Max. 20G), 2 hours for X and Y directions respectively |
| Variation of detection distance | Shock Resistance | Durability: 1,000 m/s ² (approx. 1,000G), 3 times for X and Y directions respectively |
| | Temperature characteristic | Within + 8% of the detection distance at 23°C |
| Material | Voltage characteristic | Within + 2% when the variation is + 10% / -15% |
| | | Main body: PBT, Indicator: Polyester |
| Cable | | 0.15 mm ² , 3-core, oilproof, heat-resistant, cold resistant cabtyre cable, 1m |
| Mass (Main Body Mass) | | Approx. 15g |

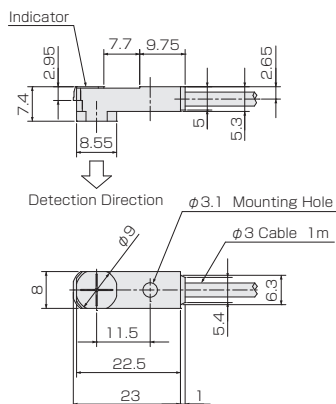
Internal Circuit

GX-F8A



Outside Dimensions [mm]

GX-F8A



Precautions in Switch Handling

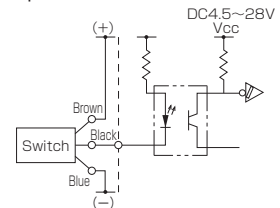
1. Pay attention to the lead wire color when connecting them. Wrong connection may result in malfunction or breakage.
2. Do not connect 2 wire system solid state sensor switches to TTL and C-MOS.
3. Use of a protection diode for surge is recommended for inductive load such as an electromagnetic relay.
4. Do not connect the sensor switches in series (no AND connection) because the circuit voltage is dropped in direct proportion to the number of sensor switches.
5. When the sensor switches are connected in parallel (OR connection), sensor outputs (ex. black wires) can be directly connected. In this case, however, be careful not to cause a load restoration failure because leak current increases in direct proportion to the number of sensors.
6. The sensor switches are magnetic induction type switches. Therefore, do not use them in places with a strong external magnetic field and do not get them closer to the great current such as a power line. Do not use a magnetic body for the mounting member. Doing so may result in malfunction.
7. Do not put a force to the lead wires such as by pulling the lead wire or bending it extremely.
8. Do not use the switches in an environment that is exposed to chemicals or gases.
9. The switch tightening torque shall be $0.1 \text{ N} \cdot \text{m}$ or less when the switch is fixed.

Solid State

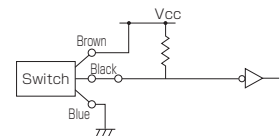
| Switch Connection | 2 Wire System Solid State | 3 Wire System Solid State |
|---|---------------------------|---------------------------|
| Basic Connection | | |
| Connection with relay | | |
| Serial (AND) Connection Parallel (OR) Connection | | |
| Connection with Solenoid Valve | | |
| Connection with Sequencer | | |

The next connection examples show only for the 3 wire system solid state.

★ Connection with TTL Separated Connection



Direct Connection



★ Connection with C-MOS

