

Interface Controllers (CG1 Series)

For improved reliability of the emergency stop circuit

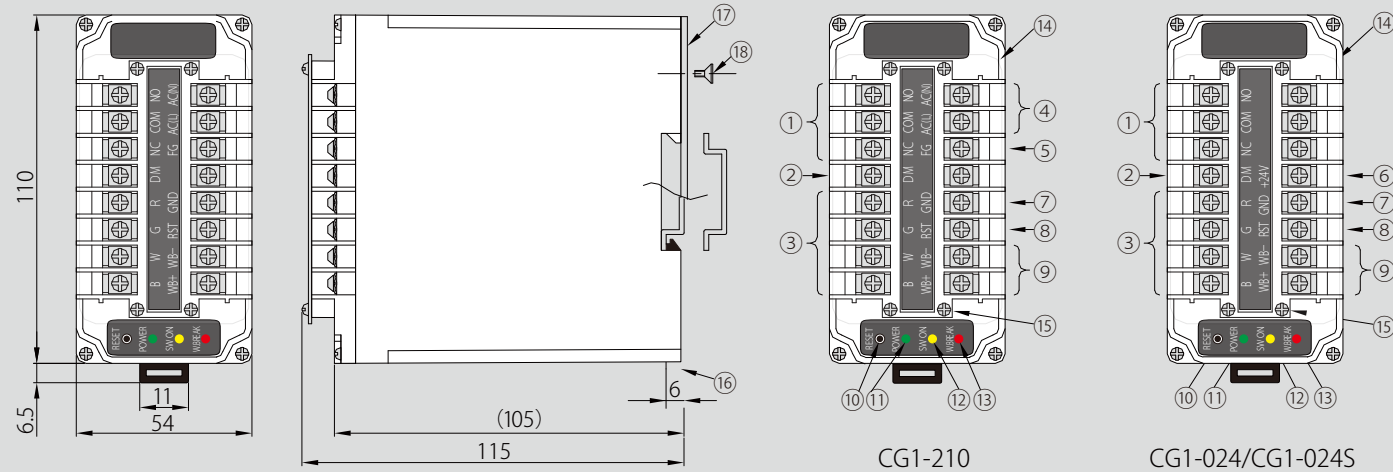


The CG1 series interface controllers can detect on/off and wire-breaking states when used in conjunction with tape switches (page 5), edge switches (page 9), bumper switches (page 13), or mat switches (page 17).

- The following two functions are selectable:
Self-holding function: The output state is switched upon detection of a contact between switch contacts. (Direct output function is also selectable)
Wire break detecting function: The output state is switched upon detection of wire break, even though instant wire break. (Applicable for 4-wire system switches and terminating-register-integrated switches only)
Direct output function: The output state is switched only when a contact between switch contacts is detected (connecting the DM pin to the ground pin).
- There are two output functions. The output is generated from a relay contact.
Main output: The output state is switched upon detection of a contact between switch contacts or a wire break. (c contact: NO/NC terminal display is the status "Power off time")
Wire-breaking detection output: Detecting wire-breaking and switching output from on to off status. (b contact: Self-holding function only)
- The applicable switch products include the 4-wire system switches and terminating-register-integrated switches.
- The interface controller can be installed on a DIN rail or secured on the attached plate with screws.

Caution Do not use the interface controller using the logic which will switch the target device into the active mode when a contact operation is detected. Failure to observe this caution may place the device into the active mode at wire-breaking or controller power loss time, thus jeopardizing its safety.

Product appearance



Names of the parts

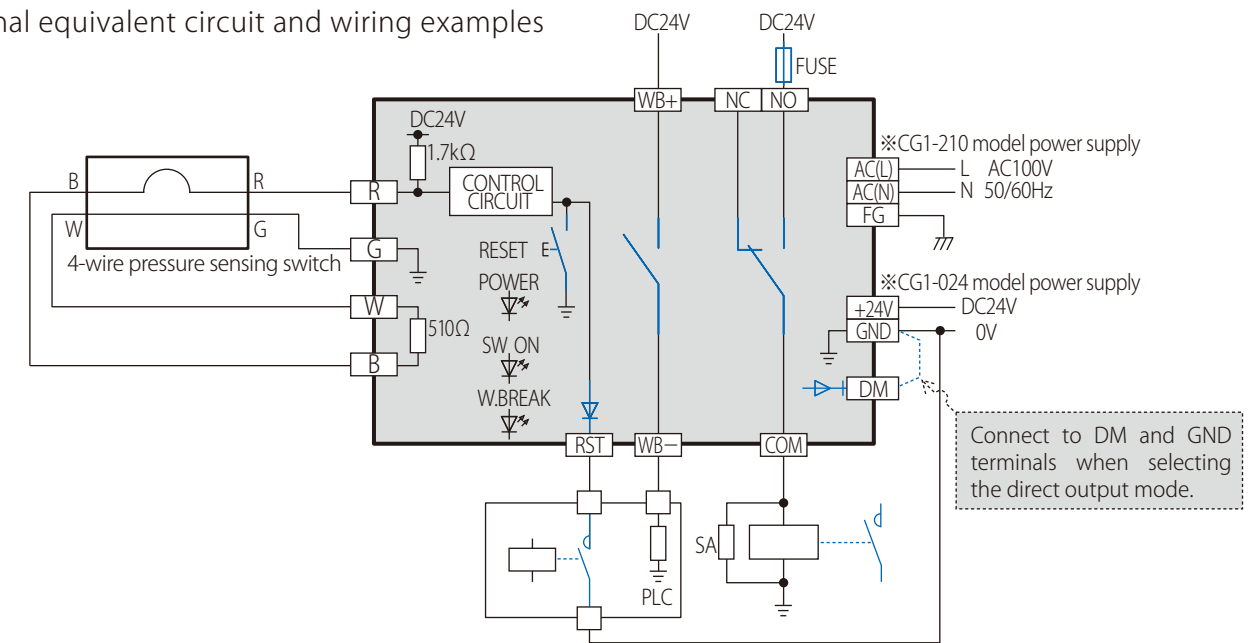
Number	Name/Explanation	Main body name	Number	Name/Explanation	Main body name
1	Main output terminal (c contact)	NO, COM, NC	10	Reset switch	RESET
2	Direct output mode select terminal	DM	11	Power LED (green)	POWER
3	Pressure sensing switch input terminal	R, G, W, B	12	Switch contact detection LED (orange)	SW ON
4	AC power input terminal (CG1-210 only)	AC(N), AC(L)	13	Wire-breaking detection LED (red)	W.BREAK
5	Ground terminal (CG1-210 only)	FG	14	Clear cover (terminal protection cover)	
6	DC power input terminal (CG1-024/CG1-024S only)	+24V	15	M3 tapping pan head machine screw (4 screws for mounting the clear cover)	
7	GND terminal	GND	16	DIN rail clamping lever	
8	Reset terminal (for external control)	RST	17	Base fixture (t = 1.0)	
9	Wire-breaking detection output terminal (a contact)	WB-, WB+	18	M3 tapping countersunk head machine screw (4 screws for mounting the base fixture)	

List of specifications

Specifications	CG1-210	CG1-024	CG1-024S
Supply voltage	AC100 to 240V±10% 50/60Hz	DC24V±10%	
Power consumption	5.5VA maximum	2.0W maximum	
Switch detection	AC5 to 250V:0.01 to 4A, DC5 to 30V:0.01 to 4A		DC5 to 30V: 1 to 50mA
Output terminal (c contact)	(Resistive load)		(Resistive load)
Wire-breaking detection	DC5 to 30V: 0.1 mA to 30 mA (Resistive load)		
Output terminal (a contact)			
External dimensions	54(W) × 110(H) × 115(D)mm		
Weight*	Approx. 280g	Approx. 240g	
Terminating resistor (resistive load)	510Ω		
Ambient temperature	-10 to +50°C (Must not be subjected to freezing and condensation)		
Protection class	IP20 (IEC60529)		
Applied standard	European low voltage directive EN60947-1, EN60947-5-1		—
	European EMC directive EN55011, EN61000-4-2,3,4,5,6,11		
	RoHS directive compliant		

*Weight does not include that of the base fixture (flat mounting plate).

Internal equivalent circuit and wiring examples



Output contact operations and LED indicators

Transition state	Switch contact detection output contact	Wire-breaking detection output contact	LED indicator	Operating state
1. Power off time			POWER ○ SW ON ○ W.BREAK ○	Stopped
2. After power on			POWER ● SW ON ● W.BREAK ●	Stopped
3. Initial state* (After reset sequence)			POWER ● SW ON ○ W.BREAK ○	Ready for operation
4. Switch-on detection* (Subsequently, the output state is held even when the switch is turned off and released after the reset sequence)			POWER ● SW ON ● W.BREAK ○	Stopped
5. Switch wire-breaking detection* (Subsequently, the output state is held even when the switch is turned off and released after the reset sequence)			POWER ● SW ON ● W.BREAK ●	Stopped

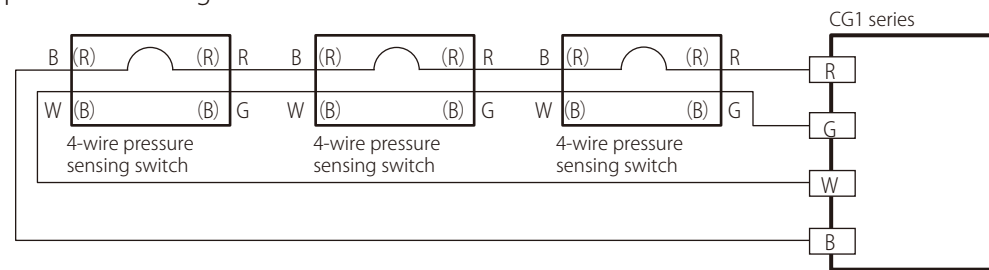
Use and Wiring Examples of the Tokyo Sensor's Pressure Sensing Switching Products

■ Examples of connecting the lead wires of switch products to a CG1 interface controller and equivalent circuits

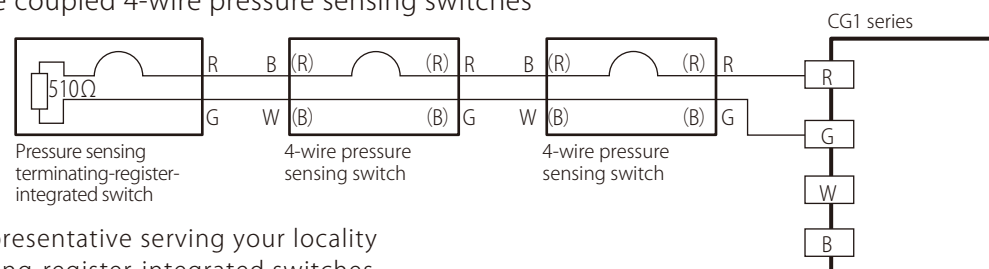
Switch type	4-wire system			Terminating-resistor-integrated switch		
	Lead wire		CG1 terminal	Lead wire		CG1 terminal
	Wire type	Wire color		Wire type	Wire color	
Tape switch (page 5)	VFF	Red (R)	R	VFF	Red (R)	R
		Green (G)	G		Green (G)	G
		Black (B)	B		Black (B)	B
Edge switch (page 9)	VFF	Black (B)	B	VFF	Red (R)	R
		White (W)	W		Green (G)	G
		Red (R)	R		Black (B)	B
Bumper switch (page 13)	VFF	Black (B)	B	VFF	Red (R)	R
		Red (R)	R		Green (G)	G
		Black (B)	B		White (W)	W
Switch equivalent circuit						

■ Examples of coupling pressure sensing switches
(Applicable products: tape switch, edge switch, and bumper switch)

(1) Coupling 4-wire pressure sensing switches



(2) Using a pressure sensing terminating-resistor-integrated switch at the end of the coupled 4-wire pressure sensing switches



※ Contact the sales representative serving your locality for bumper terminating-resistor-integrated switches.

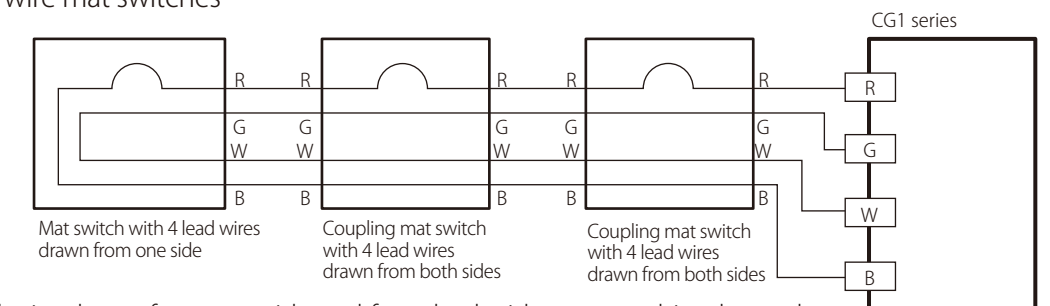
■ Examples of connecting the lead wires of switch products to a CG1 interface controller and equivalent circuits

Switch type	4-wire system with lead wires drawn from one side			Terminating-resistor-integrated switch		
	Lead wire		CG1 terminal	Lead wire		CG1 terminal
	Wire type	Wire color		Wire type	Wire color	
Mat Switch (page 17)	SVCTF (Black, 4 conductors)	Red (R)	R	SVCTF (Black, 2 conductors)	Black (B)	B
		Green (G)	G		White (W)	G
		Black (B)	B		White (W)	W
Switch equivalent circuit						

Coupling mat products

Switch type	4-wire system with lead wires drawn from both sides				2-wire system with lead wires drawn from both sides			
	Lead wire		Lead wire		Lead wire		Lead wire	
	Wire type	Wire color	Wire type	Wire color	Wire type	Wire color	Wire type	Wire color
Mat Switch	SVCTF (Black, 4 conductors)	Red (R)	Red (R)	SVCTF (Black, 2 conductors)	Black (B)	Black (B)	SVCTF (Black, 2 conductors)	Black (B)
		Green (G)	Green (G)		White (W)	White (W)		
		Black (B)	Black (B)		White (W)	White (W)		
Switch equivalent circuit								

■ Example of coupling 4-wire mat switches



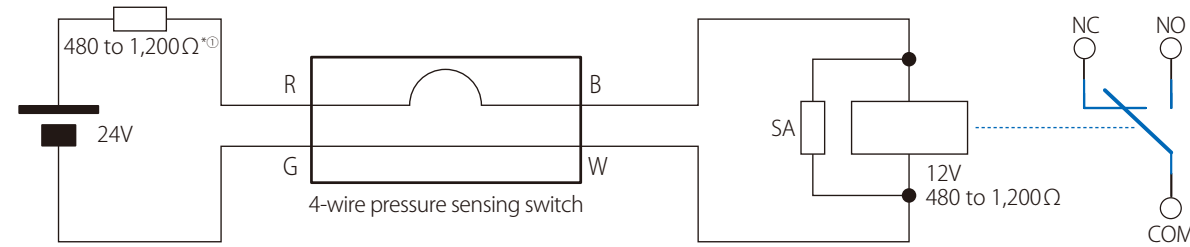
• Mat switches with 4 lead wire drawn from one side and from both sides are combined together.

■ Miscellaneous configuration examples (DC24V applied)

⚠ Safety Precautions

① The following circuits are examples. If these example are adapted, risk assesment must be completed.

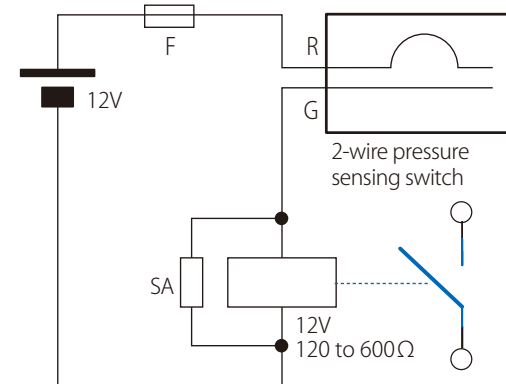
(1) 4-wire pressure sensing switch product



Abbreviation SA: Surge Absorber (Capacitor+resistance, varistor, and so on)

- ① The resistance of the protective resistor to be used on the power supply side should be as close to the resistance value of the relay as possible.
- ② Since the supply voltage is divided by the resistor and the relay, the voltage across the relay turns to be 12V which is half the supply voltage of 24V.
- ③ When the pressure sensing switch is in the off state, power is fed to the relay so that the relay contact is held on the NO (Normally Open) side.
- ④ When the pressure sensing switch turned on, no power is fed to the relay so that the relay contact is returned to the NC (Normally Close) side.
- ⑤ Similarly, the relay contact is returned to the NC side in the event of a power failure or wire break.

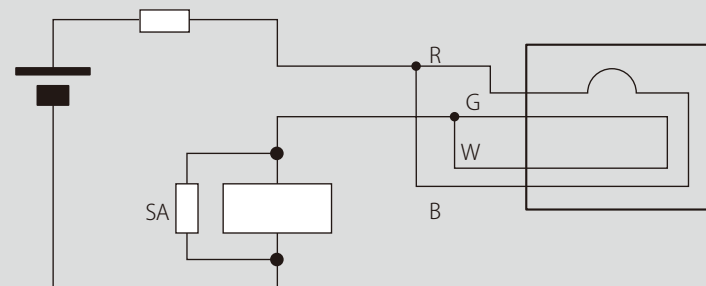
(2) 2-wire pressure sensing switch product



- ① When the pressure sensing switch is in the off state, no power is fed to the relay so that the relay contact remains off.
- ② When the pressure sensing switch is turned on, power is fed to the relay so that the relay contact is on.

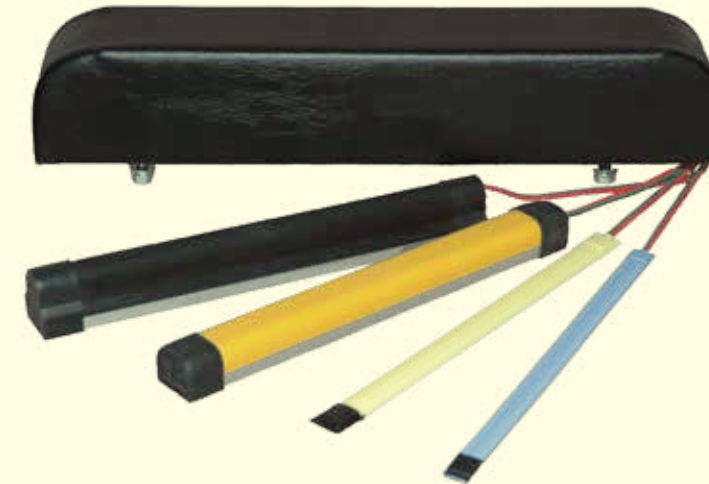
Abbreviation SA: Surge Absorber (Capacitor+resistance, varistor, and so on)
F: Fuse

※ When using a 4-wire mat switch as a 2-wire switch, short between R and B and between G and W.



Wire-breaking detectable 2-wire system dispensing with return wiring

Terminating-resistor-integrated pressure sensing switch products



Applicable products

Tape switch (page 5), edge switch (page 9), Bumper switch (page 13), Mat switch (page 17)

Features

- Wire-breaking detection is possible in 2-wire configuration.
(Can be combined with a CG1 series interface controller (page 21).)
- Use of the terminating-resistor-integrated pressure sensing switch at the terminal of coupled pressure sensing switch products dispenses with long return wiring.
- No changes need be made to the external shape and detectable range of a pressure sensing switch by implementing the terminating-resistor-integrated pressure sensing switch at the terminal of that pressure sensing switch product. Replacement of existing products is also possible.
- Waterproof type is optional.
- Differences among the 2-wire, 4-wire, and terminating-resistor-integrated switches
 - 2-wire type : Generally, only the switching function is used (wire-breaking detection is impossible).
 - 4-wire type : Used in applications where two or more switches are to be put together.
Can be combined with a CG1 series device for wire-breaking detection.
 - Terminating resistor integrated type : Wire-breaking detection is possible by combining the switch with a CG1 series device in 2-wire configuration.

Lead wires Other lead wire types are also available. Contact the sales representative serving your locality.

Product type	Wiring system	Wire type	Standard length	Standard color	Wire-breaking detection
Tape switch Edge switch	2-wire system	VFF (vinyl sheathed flat type cable) 0.5mm ² *1	500mm	Same color as switch jacket*2	×
	4-wire system			Red-green/Black-white*3	○
	Terminating resistor integrated			Red-green	○
Bumper switch	4-wire system	VFF (vinyl sheathed flat type cable) 0.3mm ²	500mm	Red-black×2	○
Mat switch	4-wire system	SVCTF (Soft vinyl cabtyre round cord) 0.75mm ²	1,500mm	Red-green/Black-white	○

* 1 The Lead Wires of EH-02 is VFF 0.3mm², and The Lead Wires of E21BK0 is SVCTF 0.3mm² 2 cores×2.
* 2 The standard color of the lead wires in the 2-wire T20RE0, T20WH0, EH-02 and E20BK is black-white, and 2-wire edge switches is the same as that of the built-in switch jacket
* 3 The Lead Wires color of E21BK0 is black-white.