

Fig.2 (b) Limit switch circuit diagram of the safety fence

2.1 OPERATOR SAFETY

The operator is a person who operates the robot system. In this sense, a worker who operates the teach pendant is also an operator. However, this section does not apply to teach pendant operators.

- (1) If you do not have to operate the robot, turn off the power of the robot controller or press the EMERGENCY STOP button, and then proceed with necessary work.
- (2) Operate the robot system at a location outside of the safety fence
- (3) Install a safety fence with a safety gate to prevent any worker other than the operator from entering the work area unexpectedly and to prevent the worker from entering a dangerous area.
- (4) Install an EMERGENCY STOP button within the operator's reach.

The robot controller is designed to be connected to an external EMERGENCY STOP button. With this connection, the controller stops the robot operation (Please refer to "STOP TYPE OF ROBOT" in SAFETY for detail of stop type), when the external EMERGENCY STOP button is pressed. See the diagram below for connection.

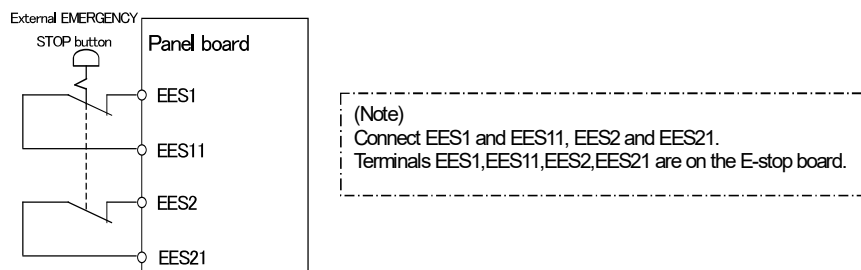


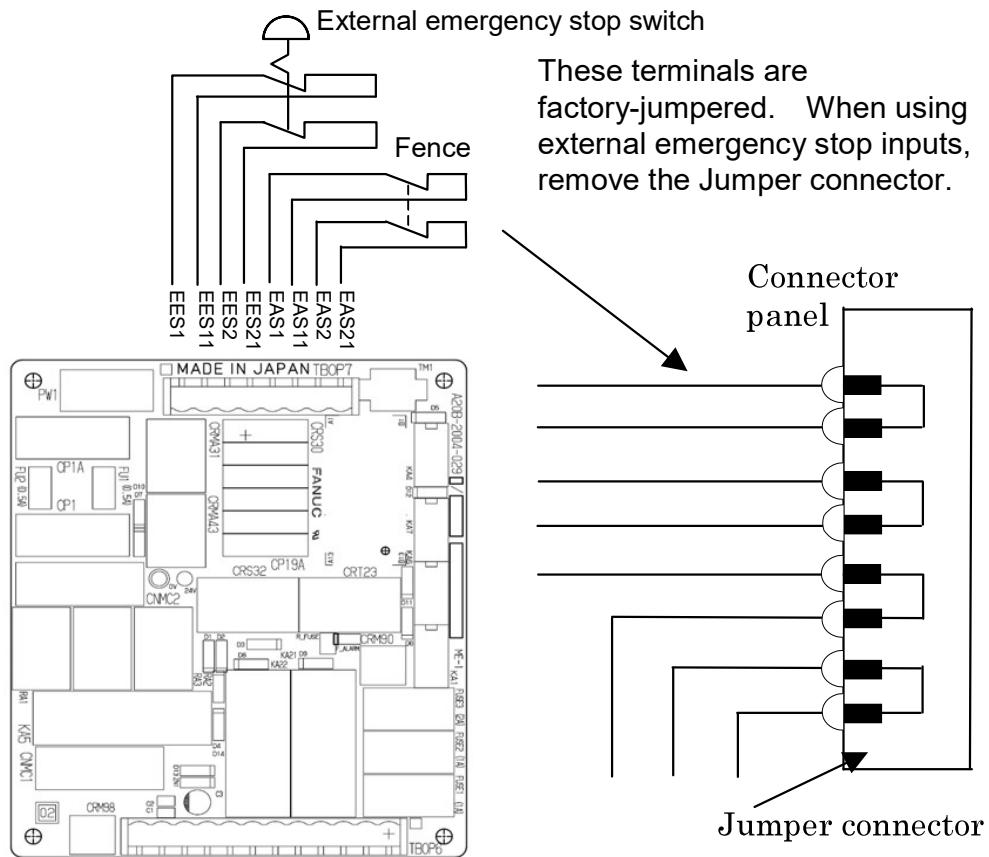
Fig.2.1 Connection diagram for external emergency stop button

2.2 SAFETY OF THE PROGRAMMER

While teaching the robot, the operator must enter the work area of the robot. The operator must ensure the safety of the teach pendant operator especially.

- (1) Unless it is specifically necessary to enter the robot work area, carry out all tasks outside the area.
- (2) Before teaching the robot, check that the robot and its peripheral devices are all in the normal operating condition.
- (3) If it is inevitable to enter the robot work area to teach the robot, check the locations, settings, and other conditions of the safety devices (such as the EMERGENCY STOP button, the DEADMAN switch on the teach pendant) before entering the area.
- (4) The programmer must be extremely careful not to let anyone else enter the robot work area.

External emergency stop input

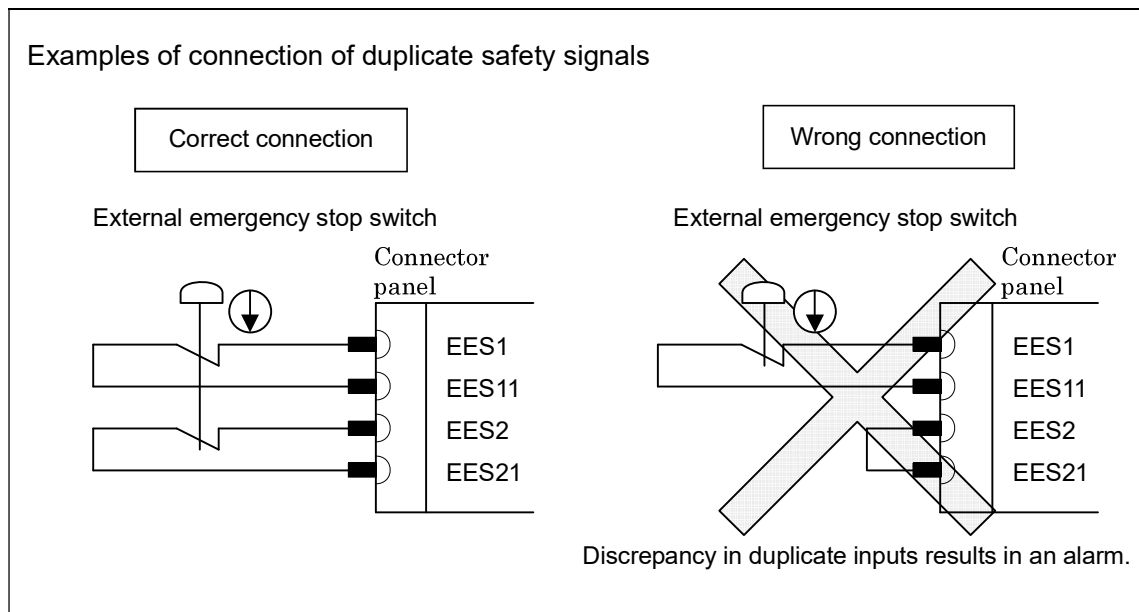


Signal	Description	Current, voltage
EES1 EES11 EES2 EES21	Connect the contacts of the external emergency stop switch to these terminals. When a contact is open, the servo power supply is turned off, and the robot is immediately placed in the emergency stop state. When using the contacts of a relay or contactor instead of the switch, connect a spark killer to the coil of the relay or contactor, to suppress noise. When these terminals are not used, jumper them.	Open and close of 24VDC 0.1A (Note 1)
EAS1 EAS11 EAS2 EAS21	These signals are used to stop the robot safely when the safety fence gate is opened during operation in the AUTO mode. When a contact is open, the robot decelerates then stops, and the servo power supply is turned off. In the T1 or T2 mode and the DEADMAN switch is held correct position, the robot can be operated even when the safety fence gate is open. When using the contacts of a relay or contactor instead of the switch, connect a spark killer to the coil of the relay or contactor, to suppress noise. When these terminals are not used, jumper them.	Open and close of 24VDC 0.1A (Note 1)

NOTE

- 1 Use a contact which minimum load is 5 mA less.

Examples of connection of duplicate safety signals



Input timing of duplicate safety signals

Duplicate inputs are used for signals such as the external emergency stop signal, safety fence signal, and servo off signal so that a response is made even when a single failure occurs. The statuses of these duplicate input signals must always be changed at the same timing according to the timing specifications provided in this section. The robot control unit always checks that the statuses of the duplicate inputs are the same, and if the control unit finds a discrepancy, it issues an alarm. If the timing specifications are not satisfied, an alarm may be issued because of a signal discrepancy.

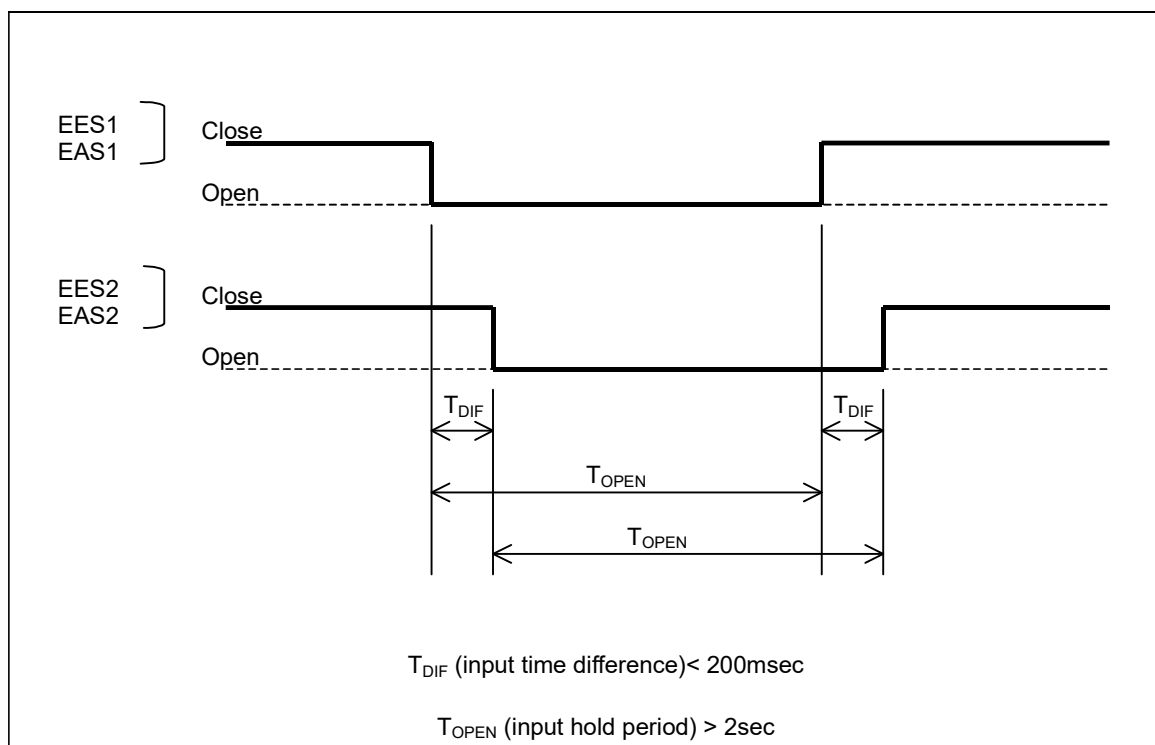


Fig.3.3.4 (c) Input timing of duplicate safety signals

Connecting external on/off and external emergency stop signal input/output wires

	FANUC's specification	Manufacturer's specification (WAGO)	Remark
8-pole terminal block (TBOP7)	A63L-0001-0783#308	231-308/026-000	External emergency stop
12-pole terminal block (TBOP6)	A63L-0001-0783#312	231-312/026-000	External emergency stop
Jumper pin	A63L-0001-0783#902	231-902	
Operation lever	A63L-0001-0783#131-M	231-131	2 pieces of 231-131 and operation manual are included in FANUC's specification

1. Detach the plug connector block from the panel board.
2. Insert the tip of a flat-blade screwdriver into the manipulation slot and push down its handle.
3. Insert the end of the signal wire into the wire slot.
4. Pull out the screwdriver.
5. Attach the plug connector block to the panel board.

Do not insert a wire into the wire hole of a plug connector or pull it out with the plug connector block mounted on the panel board; otherwise, the panel board may be damaged.

FANUC recommends the lever (A05B-2400-K030) for connecting the signal wire to the plug connector block instead of Flat-blade screwdriver.

