Connection examples for wiring the safety relay

G1501S
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We reserve the right to make alterations without prior notice
1 E-stop application

1.1 Two channels with monitored start and relay control with feedback loop monitoring

Description:

The e-stop button (trigger element) must be connected to the input circuits (S33/S34 and S44/S43) and the start button to Y1/Y2. If a feedback contact is to be monitored, it must be connected between Y1/Y6, otherwise a link must be connected. The outputs are activated after pressing and releasing the start button with closed input circuits (e-stop button not pressed). By pressing the e-stop button the outputs are de-energised, the contacts 13-14 and 23-24 are opened. The signal output Y7 is deactivated. The e-stop contacts are not monitored with respect to the time period.

General information:

For this operating mode the terminals Y4/Y5 must be linked! For the e-stop application the simultaneity is indefinite. At power on no different signals are allowed at the two input circuits. The e-stop contacts must be both closed or both open. In case of a faulty wiring of the inputs the unit goes to the FAIL-SAFE state (safety deactivation).
2 Protective guard application

2.1 With monitored start

The safety switches (trigger elements) must be connected to the input circuits (S33/S34 and S44/S43) and the start button to Y1/Y2. If a feedback contact is to be monitored, it must be connected between Y1/Y6, otherwise a link must be connected. The outputs are activated after closing and reopening of the reset circuit (start button) with closed input circuits (safety switch button pressed). By pressing one or both buttons of the safety switch (opening contacts) the outputs are de-energised, the contacts 13-14 and 23-24 are opened, the signal output Y7 is deactivated. A new cycle can only be started after resetting the contacts of the safety switch. The contacts of the safety switch are not monitored with respect to the time period.

General information:
For this operating mode the terminals Y4/Y5 must be linked! The simultaneity is indefinite for the protective guard application. At power on no different signals are allowed at the two input circuits (S33/S34 and S44/S43). The contacts of the safety switch must be both closed or both open. In case of a faulty wiring of the inputs the unit goes to the FAILSAFE state (safety deactivation).

*Optional
**Note: ensure the potential is identical when using the signal current path!
2.2 With automatic start

The trigger elements (safety switch contacts) must be connected to the input circuits (S33/S34 and S44/S43). The link Y1/Y2 configures the unit for the automatic start. If a feedback contact is to be monitored, it must be connected between Y1/Y2 instead of the link. The outputs are activated after closing the contacts of the safety switch. By opening one or both contacts of the safety switch the outputs are de-energised, the contacts 13-14 and 23-24 are opened, the signal output Y7 is deactivated. A new cycle can only be started after opening both contacts of the safety switch. The contacts of the safety switch are not monitored with respect to the time period.

General information:
For this operating mode the terminals Y4/Y5 must be linked! The simultaneity is indefinite for the protective guard application. At power on no different signals are allowed at the two input circuits (S33/S34 and S44/S43). The contacts of the safety switch must be both closed or both open. In case of a faulty wiring of the inputs the unit goes to the FAIL-SAFE state (safety deactivation).

*Optional
**Note: ensure the potential is identical when using the signal current path!

We reserve the right to make alterations without prior notice
3 Connection of a non-contact safety device with semiconductor outputs (2 x PNP), e.g. GM701S, through-beam sensor, light curtain, laser scanner

3.1 With automatic start and supply of the non-contact safety device (current consumption < 50 mA) via the G1501S

The trigger elements OSSD1 and OSSD2 must be connected to the safety input circuits (S43, S34). The link Y1-Y2 configures the unit for the automatic start. If a feedback contact is to be monitored, it must be connected between Y1/Y2 instead of the link. The outputs are activated after switching of the safety device outputs (OSSDs 1 and 2 have high signal). If both or only one OSSD of the safety device switch off, the outputs of the G1501S are de-energised. The contacts 13-14 and 23-24 are opened, the signal output Y7 is deactivated. The safety device is supplied via the unit G1501S (L- of the device to Y4 and L+ of the device to S44).

General information:
For this operating mode the terminals Y4/Y5 must NOT be linked! The simultaneity is determined by the signal application to the input terminals S34 and S43. The high signal at the input S43 must be activated no later than max. 0.5 s after the high signal at the input S34. A high signal at the input S34 can be applied at any time after the high signal at the input S43. When exceeding the simultaneity a new cycle can only be restarted after deactivation of both OSSDs. At power on no high signals are allowed at both input circuits, i.e. both OSSDs must be deactivated. The G1501S remains in a waiting state as long as the inputs are not wired correctly.

*Optional
**Note: ensure the potential is identical when using the signal current path!
3.2 With monitored start and supply of the non-contact safety device (current consumption < 50 mA) via the G1501S

The trigger elements OSSD1 and OSSD2 must be connected to the safety inputs (S43, S34) and the start button to Y1/Y2. If feedback contacts are to be monitored, they must be connected to Y1/Y6, otherwise a link must be connected. The outputs are activated after pressing and releasing the start button with switched outputs of the safety device (OSSDs 1 and 2 have high signal). If both or only one OSSD of the safety device switch off, the outputs of the G1501S are de-energised. The contacts 13-14 and 23-24 are opened, the signal output Y7 is deactivated. The safety device is supplied via the unit G1501S (L- of the device to Y4 and L+ of the device to S44).

General information:
For this operating mode the terminals Y4/Y5 must NOT be linked! The simultaneity is determined by the signal application to the input terminals S34 and S43. The high signal at the input S43 must be activated no later than max. 0.5 s after the high signal at the input S34. A high signal at the input S34 can be applied at any time after the high signal at the input S43. When exceeding the simultaneity a new cycle can only be restarted after deactivation of both OSSDs. At power on no high signals are allowed at both input circuits, i.e. both OSSDs must be deactivated. The G1501S remains in a waiting state as long as the inputs are not correctly wired.

*Optional
**Note: ensure the potential is identical when using the signal current path!
3.3 With automatic start and external supply of the non-contact safety device (current consumption > 50 mA)

The safety device is externally supplied. L- of the device is additionally connected to Y4.

See point 3.1 for the other function.

*Optional
**Note: ensure the potential is identical when using the signal current path!

We reserve the right to make alterations without prior notice
3.4 With monitored start and external supply of the non-contact safety device (current consumption > 50 mA)

The safety device is supplied externally. L- of the device is additionally connected to Y4.

See point 3.2 for the other function.

*Optional
**Note: ensure the potential is identical when using the signal current path!
4 Connection of a clocked fail-safe sensor from ifm, e.g. GM504S, GG505S, Gl505S, etc.

4.1 With automatic start and supply of the fail-safe sensor via the G1501S

The G1501S provides a clock signal to the fail-safe sensor. To do so, the clock input of the fail-safe sensor must be connected to S33.

If the fail-safe sensor is enabled, the clock signal is applied to the output of the fail-safe sensor after a delay and is read by the G1501S via the terminal S43. The link Y1-Y2 configures the unit for the automatic start. If a feedback contact is to be monitored, it must be connected between Y1/Y2 instead of the link. If the correct clock signal is read by the G1501S, the outputs of the G1501S are activated. If a different signal is read, the outputs of the G1501S are immediately de-energised. The contacts 13-14 and 23-24 are opened, the feedback output Y7 is deactivated. The fail-safe sensor is supplied via the unit G1501S (L- of the fail-safe sensor to Y4 and L+ to S44).

General information:
For this operating mode the terminals Y4/Y5 must NOT be linked! At power on no signal is allowed at the output of the clocked fail-safe sensor. The G1501S remains in a waiting state as long as the inputs are not correctly wired, i.e. a static high signal is applied to the output of the clocked fail-safe sensor.

*Optional
**Note: ensure the potential is identical when using the signal current path!

We reserve the right to make alterations without prior notice
4.2 With monitored start and supply of the fail-safe sensor via the G1501S

The G1501S provides a clock signal to the fail-safe sensor. To do so, the clock input of the fail-safe sensor must be connected to S33.

If the fail-safe sensor is enabled, the clock signal is applied to the output of the fail-safe sensor after a delay and is read by the G1501S via the terminal S43. If the clock signal is read by the G1501S, the G1501S outputs are activated at the terminals Y1 and Y2 after pressing and releasing the start button. If feedback contacts are to be monitored, they must be connected to Y1/Y6, otherwise a link must be connected. If a different signal is read, the outputs of the G1501S are immediately de-energised. The contacts 13-14 and 23-24 are opened, the signal output Y7 is deactivated. The fail-safe sensor is supplied via the unit G1501S (L- of the device to Y4 and L+ of the device to S44).

General information:
For this operating mode the terminals Y4/Y5 must NOT be linked! At power on no signal is allowed at the output of the clocked fail-safe sensor. The G1501S remains in a waiting state as long as the inputs are not correctly wired, i.e. a static high signal is applied to the output of the clocked fail-safe sensor.

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*Optional
**Note: ensure the potential is identical when using the signal current path!
4.3 With automatic start and external supply of the non-contact safety device

The clocked fail-safe sensor is supplied externally. L- of the fail-safe sensor is additionally connected to Y4. See point 4.1 for the other function.

*Optional
**Note: ensure the potential is identical when using the signal current path!
4.4 With monitored start and external supply of the non-contact safety device

The clocked fail-safe sensor is supplied externally. L- of the fail-safe sensor is additionally connected to Y4.

See point 4.2 for the other function.
5  Two-hand control using mechanical switches

The trigger elements (two-hand buttons) must be connected to the input circuits (S33/S43 and S34/S44). If feedback contacts are to be monitored, they must be connected to Y1/Y2, otherwise a link must be connected.

If a button (S1 or S2) is pressed and held pressed and within 0.5 s the other button is also pressed and held pressed, the outputs 13-14, 23-24 are closed and the signal output Y7 is activated.

If one or both buttons are released, the outputs 13-14 and 23-24 open immediately. Y7 is deactivated. A new cycle can only be started after enabling (releasing) both S1 and S2 buttons. The outputs are not enabled if the time between actuating both switches is longer than 0.5 s. The outputs 13-14 and 23-24 remain open, Y7 deactivated. The machine cannot be started.

General information:
For this operating mode the terminals Y4/Y5 must be linked! The simultaneity between the two buttons S1 and S2 is limited to max. 0.5 s. When exceeding the simultaneity a new cycle can only be restarted after pressing both buttons. At power on no high signal is allowed at both input circuits, i.e. the two-hand buttons must not be pressed. In case of faulty wiring of the inputs the G1501S goes to the FAIL-SAFE state (safety deactivation).

This wiring (with only one normally open contact per switch) meets the requirements type IIIb to EN574. Using switches approved to EN60947-1 annex K and protected or shielded cables enables applications up to type IIIC.

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*Optional
**Note: ensure the potential is identical when using the signal current path!
### 6 Two-hand control using electronic sensors

The suitability of an ifm sensor can be checked at [http://www.ifm-electronic.com](http://www.ifm-electronic.com). If an ifm sensor is not listed, please contact ifm electronic. The suitability of sensors from other manufacturers cannot be guaranteed.

The trigger elements (two-hand buttons) must be connected to the input circuits (S33/S43 and S34/S44). If feedback contacts are to be monitored, they must be connected to Y1/Y2, otherwise a link must be connected.

If a button (S1 or S2) is pressed and held pressed and within 0.5 s the other button is also pressed and held pressed, the outputs 13-14, 23-24 are closed and the signal output Y7 is activated.

If one or both buttons are released, the outputs 13-14 and 23-24 open immediately. Y7 is deactivated.

A new cycle can only be started after enabling (releasing) both buttons S1 and S2. The outputs are not enabled if the time between pressing both buttons is longer than 0.5 s. The outputs 13-14 and 23-24 remain open, Y7 deactivated. The machine cannot be started.

**General information:**

For this operating mode the terminals Y4/Y5 must be linked! The simultaneity between the two buttons S1 and S2 is limited to max. 0.5 s. When exceeding the simultaneity a new cycle can only be restarted after pressing both buttons. At power on no high signal is allowed at both input circuits, i.e. the two-hand buttons must not be pressed. In case of a faulty wiring of the inputs the G1501S goes to the FAIL-SAFE state (safety deactivation).

*This wiring meets the requirements type III B to EN574. Using sensors with two independent switching elements, internal plausibility check and protected or shielded cables enables applications up to type III C.*

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<table>
<thead>
<tr>
<th>Connection examples</th>
<th>Performance Level: e to DIN EN ISO 13849-1 SIL 3 to DIN EN 61508 Category 4 to EN954-1</th>
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*Optional  
**Note:** ensure the potential is identical when using the signal current path!