

**⚠ WARNING . . . Keep
this Document with the
Primary Manual**

It is very important to keep this document with its associated primary manual. Both documents contain information critical to the operation of this product.

This document is intended as a supplement to EZ-SCREEN manual 112852, for products produced after date code 0834. These products feature an Aux. Output option, and changes to the EDM hookups.

Information in this document is either supplemental or a replacement of information in the manual, as indicated. Use the information in this document in conjunction with the primary manual.

Section 3.5.3 Replacement:

3.5.3 Machine Primary Control Elements and EDM Inputs

A machine primary control element (MPCE) is an “electrically powered element that directly controls the normal operation of a machine in such a way that it is the last element (in time) to function when machine operation is to be initiated or arrested” (per IEC61496-1). Examples include motor contactors, clutch/brakes, valves, and solenoids.

Depending on the level of risk of harm, it may be required to provide redundant MPCEs or other control devices that are capable of immediately stopping the dangerous machine motion, irrespective of the state of the other. These two channels of machine control need not be identical (i.e., diverse redundant), but the stop time performance of the machine (Ts, used to calculate the separation distance, see Section 3.3.1) must take into account the slower of the two channels. Refer to Figure 3-23 or consult the machine manufacturer for additional information.

To ensure that an accumulation of failures does not compromise the redundant control scheme (i.e., cause a failure to danger) a method to verify the normal functioning of MPCEs or other control devices is required. EZ-SCREEN provides a convenient method for this verification: external device monitoring (EDM).

For the EZ-SCREEN external device monitoring to function properly, each device must include a normally closed (N.C.), forced-guided (mechanically linked) contact that can accurately reflect the status of the device. This ensures that the normally open contacts, used for controlling hazardous motion, have a positive relationship with the normally closed monitoring contacts and can detect a failure to danger (e.g., contacts that welded closed or stuck ON).

It is strongly recommended that a normally closed, forced-guided monitoring contact of each FSD and MPCE be connected to EDM inputs (see Figures 3-21 and 3-23). If this is done, proper operation will be verified. Monitoring FSD and MPCE contacts is one method of maintaining control reliability (OSHA/ANSI) and Category 3 and 4 (EN954-1/ISO13849-1).

**⚠ WARNING . . . EDM
Monitoring**

If system is configured for “No Monitoring,” it is the user’s responsibility to ensure that this does not create a hazardous situation.



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If monitoring contacts are not available or do not meet the design requirement of being forced-guided (mechanically linked), it is recommended to:

- Replace the devices so that they capable of being monitored,
or
- Incorporate the EDM function into the circuit as close to the MPCE as possible (e.g., monitor the FSDs),
and
- Employ use of well-tried, tested, and robust components, and generally accepted safety principles, including fault exclusion, into the design and installation to either eliminate, or reduce to an acceptable (minimal) level of risk, the possibility of undetected faults or failures that can result in the loss of the safety function.

The principle of fault exclusion allows the designer to design out the possibility of various failures and justify it through the risk assessment process to meet the required level of safety performance, such as the requirements of Category 2, 3 or 4. See ISO 13849-1/-2 for further information.

External Device Monitoring

EZ-SCREEN provides three possible EDM configurations: 1-channel monitoring, 2-channel monitoring, and no monitoring. Their functions are described below. The most common form of EDM is 1-channel monitoring; its primary advantages are simplicity of wiring and the ability to use the Auxiliary output. The installation must prevent short circuits across the N.C. monitoring contacts and to secondary sources of power. Two-channel monitoring has the ability to detect additional failures, such as short circuits, and should be used when those failures can not be designed out or reasonably be excluded. Two-channel monitoring is also the default setting and has the advantage on additional diagnostic capability that can identify which specific element that has slowed or failed.

External Device Monitoring Hookup

If not connected previously, it is again strongly recommended that one normally closed, forced-guided monitoring contact of each FSD and MPCE be wired as shown in the monitoring circuit (see Figures 3-21 and 3-23). Pins 2 and 3 of the receiver connector provide connection for the external device monitoring input. External device monitoring (EDM) must be wired in one of three configurations described below and this wiring configuration must agree with the receiver's EDM DIP switch settings (see Section 4.2).

One-Channel Monitoring: This is a series connection of closed monitor contacts that are forced-guided (mechanically linked) from each device controlled by the EZ-SCREEN. The monitor contacts must be closed before the EZ-SCREEN can be reset and the OSSDs can turn ON. After a reset is executed and the safety outputs (OSSDs) turn ON, the status of the monitor contacts are no longer monitored and may change state. However, the monitor contacts must be closed within 250 milliseconds of the OSSD outputs going from ON to OFF. See Figure 3-16.

Refer to Figure 3-23 for 1-channel EDM hookup. Connect the monitor contacts between +24V dc and EDM1 (pin 3). Leave EDM2

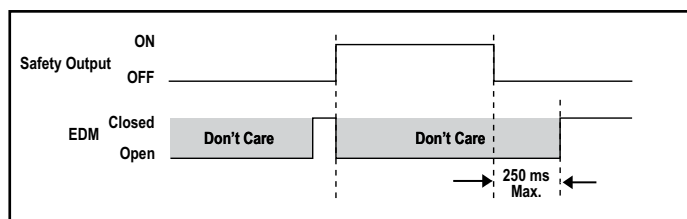


Figure 3-16. One-channel EDM status, with respect to safety output

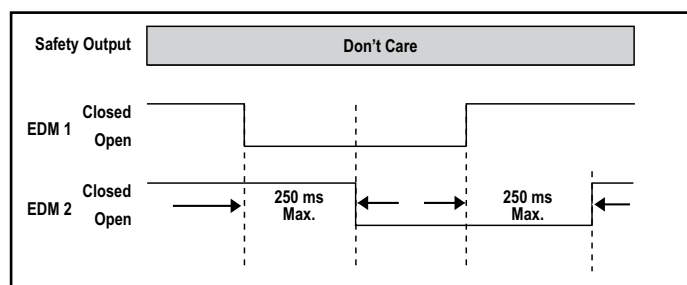


Figure 3-17. Two-channel EDM, timing between channels

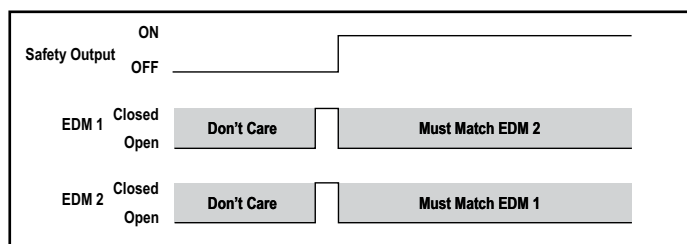


Figure 3-18. Two-channel EDM status, with respect to safety output

(pin 2) open (no connection). Set the configuration DIP switch to E1, per Section 4.2.

NOTE: For EZ-SCREEN receivers with a date code prior to 0834, the monitoring contacts must open within 200 milliseconds of the OSSD outputs turning ON (a clear condition) and must close within 200 milliseconds of the OSSD outputs turning OFF (a blocked condition) or a lockout will occur.

Two-Channel Monitoring: This is an independent connection of closed monitor contacts that are forced-guided (mechanically linked) from each device controlled by the EZ-SCREEN. The monitor contacts must be closed before the EZ-SCREEN can be reset and the OSSDs can turn ON. Regardless of the state of the OSSDs, the monitor contacts may change state (either both open, or both closed). If the monitor contacts remain in opposite states for more than 250 milliseconds, a lockout will occur.

Refer to Figures 3-21 or 3-23 for 2-channel EDM hookup. Connect the monitor contacts as shown between +24V dc and EDM1 (pin 3) and between +24V dc and EDM2 (pin 2). Set the configuration DIP switch to E2, per Section 4.2.

NOTE: For EZ-SCREEN receivers with a date code prior to 0834, the monitoring contacts must close within 200 milliseconds of the corresponding OSSD state change (turning OFF) or a lockout will occur.

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No Monitoring: Use this setting initially, in order to perform the initial checkout; see Section 3.6. *If the application does not require the EDM function, it is the user's responsibility to ensure that this setting does not create a hazardous situation.*

Refer to Figure 3-22 for “no monitoring” hookup. To configure the EZ-SCREEN for no monitoring, connect or jumper EDM1 (pin 3) to EDM2 (pin 2) using the supplied wire-nut. Set the configuration DIP switch to E2, per Section 4.2.

An alternate method to configure no monitoring is to set the configuration DIP switch to E1 (1-channel monitoring), per Section 4.2, and connect EDM1 (pin 3) to +24V dc. This method allows the ability to use the auxiliary output (see Section 3.5.5) in applications that do not require the EDM function.

New Section 3.5.5 (Addition):

3.5.5 Auxiliary (Aux) Output

On EZ-SCREEN receivers with date code 0834 or newer, an auxiliary status output is available that provides a PNP current-sourcing output (75 mA max.) that mirrors the state of the OSSDs. The output is on pin 2 (orange/black wire) when the EDM configuration DIP switch is set to E1 (1-channel monitoring), per Section 4.2. See the 1-channel EDM circuit on Figure 3-23 for hookup information.

To use the auxiliary output in an application configured for no monitoring, set the configuration DIP switch to E1 (1-channel monitoring) per Section 4.2., and connect EDM1 (pin 3) to +24V dc (see Section 3.5.3).

There are no compatibility issues retrofitting receivers with aux output into earlier installations, if precautions are taken to prevent EDM2 (pin 2, orange/black wire) from shorting to ground or another source of energy.

Replacement to Figure 3-18 of the primary manual:

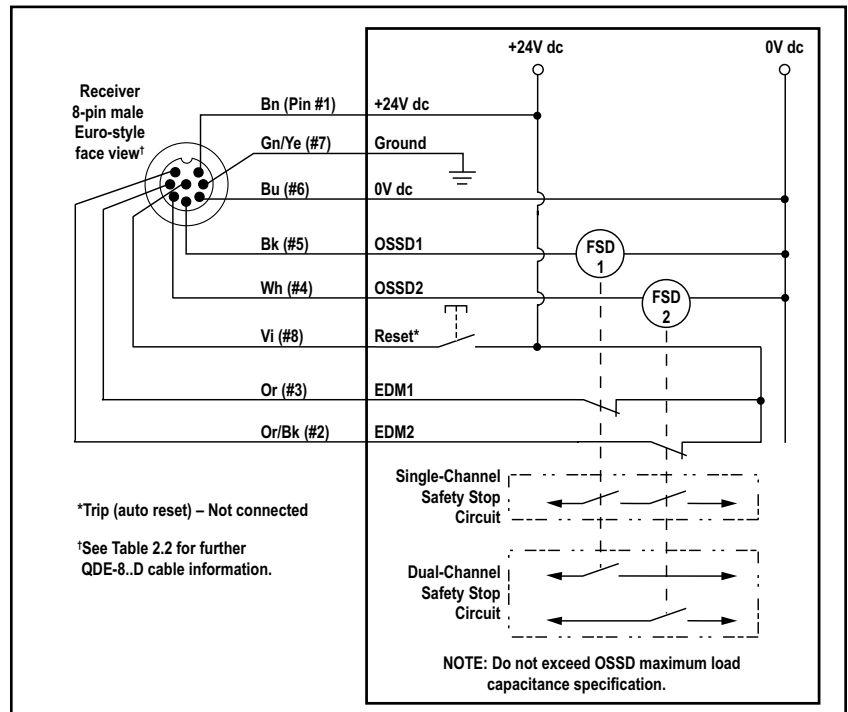


Figure 3-21. Generic hookup – FSDs (2-channel EDM, manual reset)

New Figure (Addition):

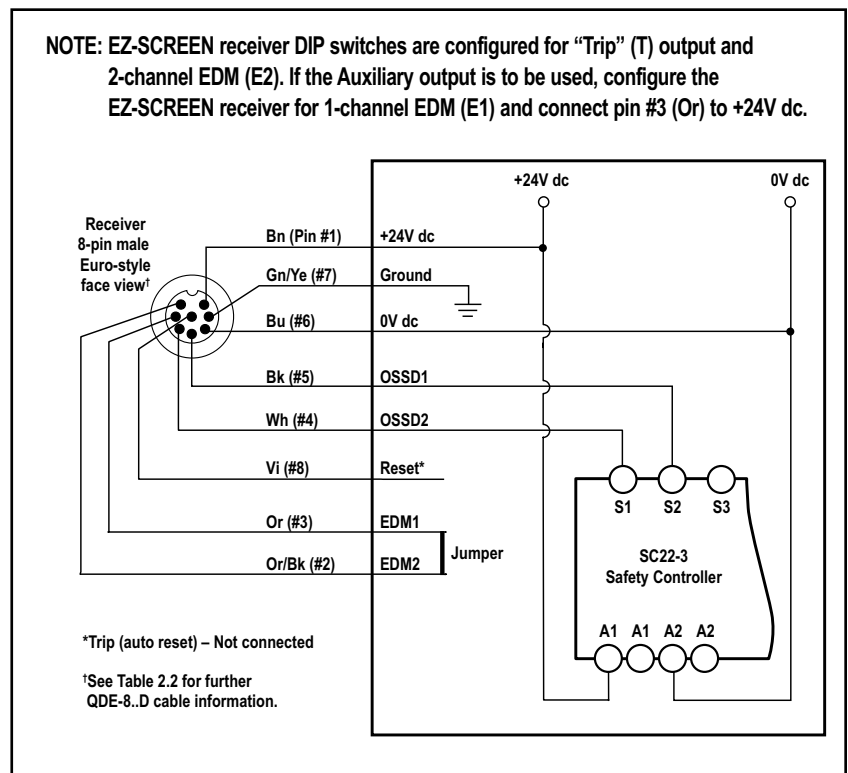
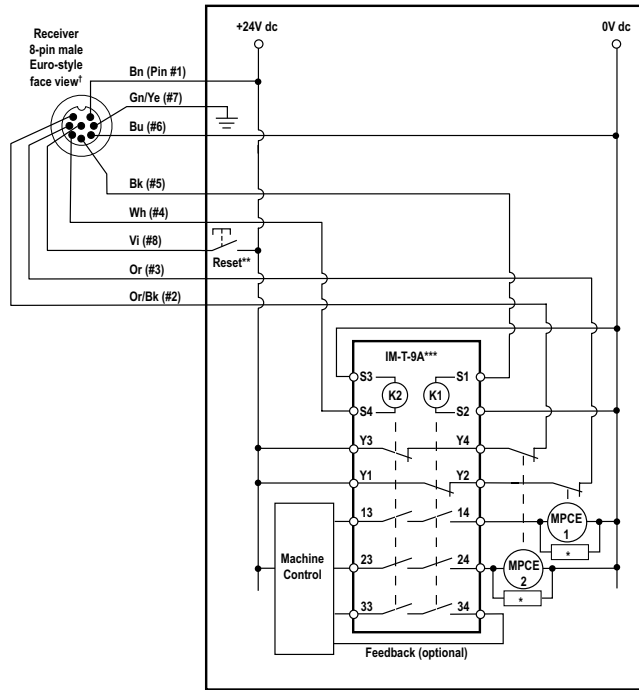


Figure 3-22. Generic hookup – self-checking Safety module, Safety Controller, Safety PLC (no monitoring, automatic reset)

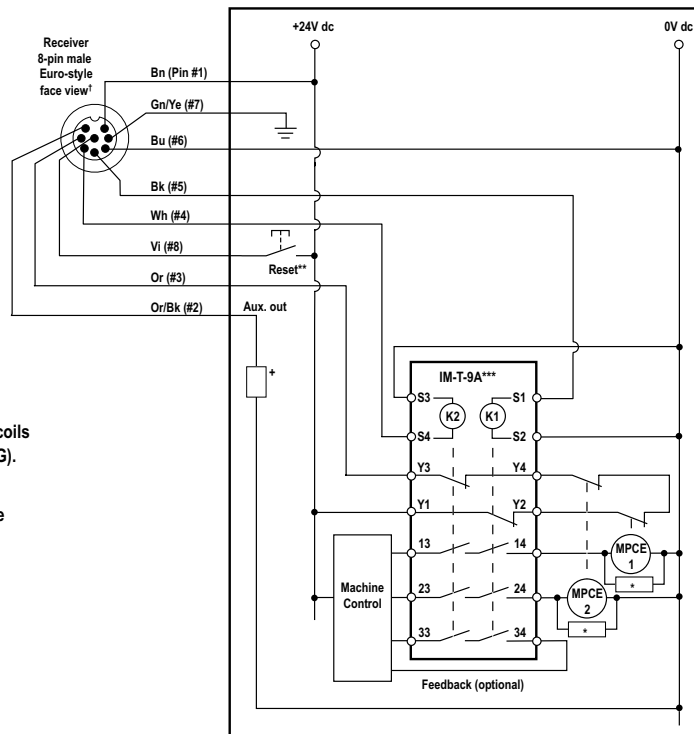
EZ-SCREEN with Aux. Output Option

Replacement to Figures 3-19 and 3-20 of the primary manual:

2-Channel EDM



1-Channel EDM



WARNING . . . Use of Transient Suppressors

If transient suppressors are used, they **MUST** be installed across the coils of the machine control elements. **NEVER** install suppressors directly across the contacts of the IM-T-.A Module. It is possible for suppressors to fail as a short circuit. If installed directly across the contacts of the IM-T-.A Module, a short-circuit suppressor will create an unsafe condition.

* Installation of transient (arc) suppressors across the coils of MPCE1 and MPCE2 is recommended (see WARNING).

** Trip (auto reset) — Not connected

*** Other interfacing modules and solutions available, see Section 2.3 or the Banner Safety Catalog.

† See Table 2.2 for further QDE-8D cable information.

Figure 3-23. Generic hookup – Interface Module (1-Channel or 2-Channel EDM, manual reset)



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