

Safety Control Unit For Light Curtain Applications

Characteristics

- 2 safety contacts
- 1 auxiliary contact (N/C)
- 2 solid-state switch outputs, short circuit protected
- 2 input circuits for light curtain applications or other safety-sensors with 24VDC outputs
- 10 diagnostic LED's
- 45 mm housing (DIN rail compatible)
- Monitored or automatic start
- Feedback circuit
- Self diagnostics

The Model **F211** is designed for safety control in Emergency Stop applications, per DIN EN 60204, Part 1 / VDE 0113, Part 1 (11/98), Section 9.4. It conforms to EN 954-1, Category 4, for the highest safety level.

The **F211** can be combined with other modules of the F200 Series to configure safety control systems with numbers of inputs and outputs matching users' specific application requirements, as well as diagnostic and networking capabilities.

Description

The **F211** Basic Module has an integrated input section with 2 inputs, each of which can be controlled independently of one another. Therefore, for example, two safety light curtains (beam array barriers), or one light curtain and another safety device, can be connected to the **F211**. A cross-fault between both input signals is not detected by the **F211**, since this function is usually integrated into the light curtain with solidstate switch outputs.

For light curtains with relay outputs, one or more F220 Input Expansion Modules or an F210 Basic Module may be used, depending on the inputs configuration. An F200 system, consisting of one Basic Module connected to a combination of Input and Output Expansion Modules, can have up to 22 inputs and up to 10 output contacts.

Three signal outputs feed all connected contact-equipped protective devices. For dual- or single-channel activation terminals on the appropriate input have to be linked according connection table over- leaf.

The **F211** monitors the individual channels constantly to check their connection to one another, and to check for interruptions.



It opens the safety contacts if either an appropriate control or fault condition occurs. The status of inputs/outputs and diagnostic information are indicated by LED lamps, signalled by relay contacts and solid-state switch outputs, and also transmitted through a serial data interface on the front of the Module.

Mode of Operation

The status LED's on the front of the Module light up to indicate:

Input:	Green: emergency stop circuit closed
	Red: emergency stop circuit open
PWR:	Supply voltage available
RUN:	System on
STOP:	System off
READY:	System ready to start, emergency stop circuits closed
1-2 CH:	Channel 1 or Channel 2 relay energized

The **F211** can be put into operation either manually by pressing the start pushbutton, or automatically as soon as the supply voltage is switched on. When operated in "monitored start" mode, the start switch is checked for every switch-on occurrence. Starting is not possible if the start switch is closed before the emergency stop switch is opened, or before supply voltage has been applied.

In the "auto-start" mode (terminals Y40 and Y41 shorted), the Module starts automatically as soon as the supply voltage is switched on, provided the emergency stop and feedback circuits are closed.

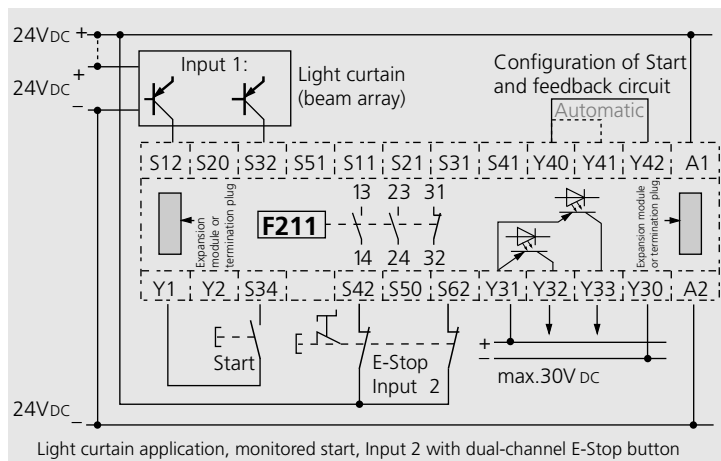
The semiconductor outputs (Y33 and Y32) can be used to transfer status information of the **F211** to a PLC. Output Y33 is on when the Module is in READY condition (both emergency stop circuits closed). Output Y32 is on when the output relay is energized.

If N/C contacts of one or more Expansion Modules are to be monitored, switching between Y1 and Y2 is necessary. This feedback loop is adjustable for dynamic (Electronic Device Monitoring) or static monitoring.

Narrow width Expansion Modules for increasing input channels and output contacts can be connected directly to the Basic Module through a front panel system bus interface connector. A serial data interface port allows operating status and diagnostic information to be transmitted to a supervisory computer station.

The **F211** Basic Module and all the Expansion Modules in this Series are fitted with plug-in coded terminal blocks, for easy installation, removal, or replacement.

External Circuit Example



Light curtain application, monitored start, Input 2 with dual-channel E-Stop button

F211 Input Connections

Inputs for both channels must be 24 VDC signals.

Input 1: OSSD1 output of light curtain to S12 terminal
OSSD2 output of light curtain to S32 terminal
S20 terminal: unconnected

Input 2: OSSD1 output of light curtain to S42 terminal
OSSD2 output of light curtain to S62 terminal
S50 terminal: unconnected

For the system to function, inputs at terminals S12, S32, S42, and S62 must be 24 VDC levels. If only one Light curtain is connected, the inputs to the other channel must be either emergency stop switches (as shown in the circuit example), or these inputs must be connected directly to the +24 VDC line.

The signal inputs and 24 VDC power supply must have a common return path.

Reset and monitoring functions can be set by terminal connections according the following table:

Start button (monitored reset):	Y1 $\overline{\text{S34}}$
or automatic reset:	link between Y40 - Y41
Monitoring dynamic (EDM):	Y1 $\overline{\text{Y2}}$
or static:	Y1 $\overline{\text{Y2}}$ (or linked) & Y40 - Y42

Termination plugs must be installed in unused expansion interface connectors.

Error indications by the red STOP LED:

Blinks twice at intervals: changes in Y40 / Y41 / Y42 external circuits during operation

Blinks 3 times at intervals: fault in external feedback circuit Y1-Y2.

After the fault has been cleared, the Module is re-set by interruption of supply voltage.

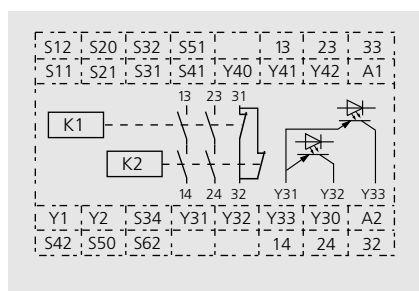
Continuous blinking : internal fault in Basic or Expansion Module

Technical Data

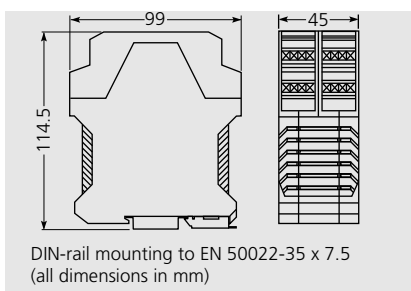
Rated voltage	24 V _{DC} (SELV per IEC 61496-1)
Voltage range	0.8 x to 1.1 x rated voltage
Power consumption	Approx. 8 W; plus approx. 2 W per Output Expansion Module
Rated insulation voltage	250 V
Creep and air paths	Overvoltage Category III, Pollution Level 2 per VDE 0110-01 (11/98)
Test voltage	2.5 kV
Ambient temperature	-5 °C to +55 °C
Protection class	IP 20
Installation	in a cabinet: IP54
Switching capacity	AC: 250 V, 1250 VA. DC: 24 V, 120 W Preferably with spark suppression
Current rating (resistive)	2 x 4 A or 1 x 6 A
Utilisation category	AC-15: 240 V 3 A. DC-13: 24 V 2.5 A
Start-up time	Approx. 3 seconds from switching on power supply

Re-set time at 1.1 x rated voltage	F211:< 25 ms; F211 + F211:<30ms + 2.4ms per F221
Recovery time	40 to 145 ms, depending on Expansion Modules used
Contacts configuration	2 N/O (safety contacts). 1 N/C (auxiliary contact)
Semiconductor outputs	2 x PNP; 30 V _{DC} 20 mA max.; short-circuit protected (SELV)
Mechanical lifetime	10 ⁷ switching cycles
Contacts material	AgSnO ₂ , with 2 micron gold plating
Terminals	Terminal box with wire protection
Wire cross section	2.5 mm ²
Control circuit	24 V _{DC} nominal
Contact protection	Fuse: max. 6A slow blow Circuit breaker: max. C10A quick break
Weight	Approx. 280g

Connection Diagram



Dimensional Diagram



Models and Ordering Data

Contacts	2 N/O Safety contacts 1 N/C Auxiliary contact 2 Semiconductor outputs
Type F 211 24 V _{DC}	Order No. 074 00180

* = Approval expected

