DuplineSafe
Safety Input Module
Type GS 7510 2101

- **Bus-powered input module**
- **Single input for potential-free contacts**
- **Small dimension IP67 housing for de-central installation at the actual location of the switch**
- **Safety approved according to IEC/EN 61508 SIL3**
- **Safety approved according to EN954 cat 4**
- **Approval authority: TÜV Rheinland Group**
- **Uses two Dupline® channels**
- **Operates on a standard Dupline network**
- **It is possible to use DuplineSafe modules and standard Dupline® modules on the same bus**
- **Address coding with GS73800080**
- **Typically used for emergency stops or other NC safety contacts**

Product Description

Bus-powered safety input module approved according to IEC/EN 61508 and EN954 cat 4 by TÜV. The module has a single input for potential-free contacts, and it uses two Dupline® channels for sending the safety signal. The small dimension IP67 housing makes it suitable for de-central installation, e.g. inside a pull-cord switch. The module is always used in conjunction with the DuplineSafe Safety Relay GS 38300143230. The "safe state" signal is transmitted continuously to the Safety Relay as long as the input contacts are closed and the module self-check is OK.

Type Selection

Supply	Ordering no. DuplineSafe Safety Input Module
	GS 7510 2101

Safety Specifications

Standards	IEC/EN 61508-SIL3 EN954 cat 4
Approval authority	TÜV Rheinland Group
SFF	96%
PFD (T1 = 1 year)	5.0×10^{-6}
PFH	5.9×10^{-9}/h

Supply Specifications

Power Supply	Supplied by Dupline®
Reverse polarity protection	Yes
Current consumption	Typ. 1,0 mA

Ordering Key

GS 7510

DuplineSafe
Housing
Buspowered input module

Input Specifications

Inputs	1 NC Contact
Open loop voltage	2.5 V
Short-circuit current	100 μA
Contact resistance	< 1kΩ
Cable length	max. 1 m
Dielectric voltage	
Inputs – Dupline	None
Response time 1	
From input contact opens to safety relay releases	max 300 ms
Response time 2	
From input contact closes to safety relay activates	max 600 ms

General Specifications

Power ON delay	< 5s
Environment	
Degree of protection	IP 67
Pollution degree	3 (IEC 60664)
Operating temperature	-40°C to 70°C
Storage temperature	-40° C to 70°C
Humidity (non-condensing)	20 - 80%
Housing	
Material	Valox PBT, Yellow
Dimensions	57,5 x 36,0 x 16,4 mm
Termination	Cable
Material	PVC, Black
Length	300 mm
Dimension	6 x 0.5 mm2

Mode of Operation

The DuplineSafe Safety Input module GS75102101 is used to monitor the status of one potential-free contact in a safety device, e.g. an emergency stop palm button or pull cord switch. The status of the safety contact is continuously transmitted on the Dupline® bus using a dynamic signaling principle on two Dupline® channels. The Safety Input module is always used in conjunction with the DuplineSafe Safety Relay GS38300143230, which can monitor up to 63 Safety Input modules all connected to the same Dupline® bus. If one or more GS75102101's fails to send the "safe state" signal the Safety Relay will release.

Addressing

For addressing of GS75102101, the DuplineSafe Configuration Unit GS73800080 is used. The GS75102101 must have 3 Dupline® channels assigned to it

- Synchronization channel (same for all safety transmitters)
- Safety Transmit channel 1
- Safety Transmit channel 2

Please refer to the user manual for the DuplineSafe Configuration Unit GS73800080 for detailed instructions on how to configure the Safety Transmitter GS75102101 with the desired addresses.

The synchronization channel is used by the Safety Relay to send out a synchronization signal to the Safety Input modules on the bus. Therefore, all the Safety Input modules and the Safety Relay must be coded for the same synchronization channel.

Safety Transmit channel 1 and Safety transmit channel 2 are used by the GS75102101 to transmit the status of the safety switch in a dynamic way, ensuring redundancy, diversity and continuous updating. Each GS75102101 must be coded for a unique channel pair not used by any other GS75102101.

Please refer to the datasheet for the safety relay GS38300143230 for detailed instructions how to ensure correct addressing, installation and configuration of a DuplineSafe safety system.

Installation Rules

Due to fact that the DuplineSafe input module is a single channel device (one input), there are specific installation rules that have to be followed in order to achieve an installation complying with EN954-1 Cat 4 and EN61508-SIL3:

- A short circuit between the 2 wires in the cable between the terminals of the input modules and the E-stop button must be excluded. This is possible, when the conditions, which are mentioned in EN ISO 13849-2 table D.4 (see below), are met.

- Short circuits between the adjacent terminals at the input of the input module and between the terminals at the E-Stop push-button must be excluded. This is possible, when the conditions mentioned in EN ISO 13849-2 table D.6 (see below) are met.

- The E-Stop button must meet the requirements for direct opening according to EN 60947-5-1 Annex K. In this case it is ensured, that the contact in the E-Stop button opens, when the push-button is pressed (see table D.8 in EN ISO 13849-2 below).

These 3 conditions are usually fulfilled, if the input module is placed very close to the E-Stop push-button and in a closed housing, which meets IP 54 rating or higher. The push-button and the cabling must not be stressed by external mechanical influences. The E-Stop push-button must have been approved according to EN 60947-5-1 for direct opening.

Table D.4 – Conductors/cables

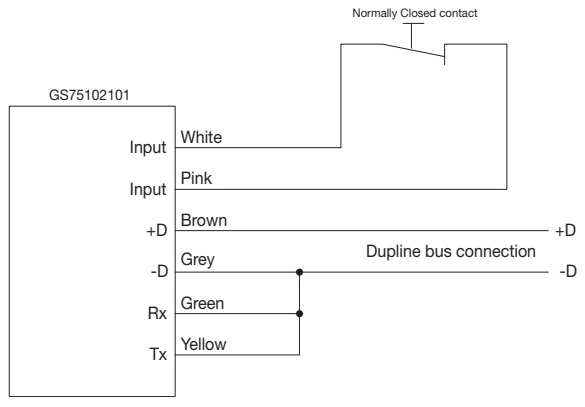
Fault considered	Fault exlusion	Remarks
Short-circuit between any two conductors	Short-circuit between conductors wich are - Permanently connected (fixed) and protected against external damage, e.g. by cable ducting, armouring, or - seperate multicore cables, or - within an electrical enclosure (se remark 1)), or - individually shielded with earth connection.	1) Provided both the conductors and enclosed meet the appropriate requirements (see EN 60204-1 (IEC 60204-1))
Short-circuit of any conductor to an exposed conductive part or to earth or to the protective bonding conductor.	Short-circuits between conductors which are within an electrical enclosure (see remark 1).	-
Open-circuit of any conductor	None	-

Table D.6 – Terminal block		
Fault considered	**Fault exlusion**	**Remarks**
Short-circuit between adjacent terminals	Short-circuit between adjacent terminals in accordance with remarks 1) or 2).	1)The terminals used are in accordance with a CENELEC or IEC standard and the requirement of EN 60204-1:1997 (IEC 60204-1:1997), 14.1.1 are satified. 2) The design by itself ensures that short-circuit is avoiding, e.g. by shapping shrink down plastic tubing over connection point.
Open-circuit of individual terminals	None	-

D.5.3. Switches

Table D.8 – Electromechanical position switch, manually operated switch (e.g. push-button, reset actuator. DIP switch, magnetically operated contacts, reed switch, pressure switch, temperature switch).		
Fault considered	**Fault exlusion**	**Remarks**
Contact will not close	None	–
Contact will not open	Contact in accordance with EN 60947-5-1:1997 (IEC 60947-5-1:1997), annex K are expected to open.	-
Short-circuit between adjacent contacts insulated from each other.	Short-circuit can be excluded for switches in accordance with EN 60947-5-1 (IEC 60947-5-1) (see remark 1)).	1) Conductive parts which become loose should not be able to bridge the insulation between contacts.
Simultaneous short-circuit between three terminals of change-over contacts.	Simultaneous short-circuit can be excluded for switches in accordance with EN 60947-5-1 (IEC 60947-5-1) (see remark 1)).	
NOTE: The fault lists for the mechanical aspects are considered in annex A.		

Wiring Diagram



Caution: Modules can be damaged by static electrical discharge. Before handling any modules, Electrostatic Discharge (ESD) protection must always be used.

Wire Connections

Brown:	+D
Grey:	-D
Green:	Rx
Yellow:	Tx
White:	Input
Pink:	Input