



PLUTO Safety-PLC

Safety Manual

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This manual describes the most important safety related requirements for the use of Pluto.

1 Hardware

The identifier circuit (IDFIX) connected to the terminals ID and 0V is an essential safety part of the system, setting the identity of a unit and determining its function. An incorrect exchange of identifier circuit can lead to unexpected function.

Inputs of I/O type IQ.. must be used as dynamic inputs to fulfil category 4 according to EN954-1/EN ISO 13849-1. See Pluto Hardware Manual "Connection of in/outputs IQ..".

The system is designed for applications where; 0V, open circuit, logic "0", low signal etc generates the safe state (stop/off). The application shall be designed according to the "de-energisation" principle meaning that stop functions shall only operate by de-energizing an input and shutting off an output.

2 Programming

Safe state = "0"

A fault in the system can set inputs, outputs, memories etc. to logic "0" which is regarded as a safe state. Logic "1" must therefore normally not be used to generate a safe state (stop/off). An exception is a dual channel function with logic "1" combined with logic "0".

Analogue values.

When using analogue values in safety applications a "0" value may not be used as a safe condition unless it is used in a dynamically monitored way, meaning that the program must monitor that the input value changes. This is required since values will be set to 0 if an internal fault in the system occurs.

The Pluto system offers a set of function blocks, which are macros for different safety functions such as two-hand, monitoring of dual channel input, etc. It is strongly recommended that these blocks, which are tested and approved by TÜV - Rheinland, are used as much as possible.

3 Personnel

Since Pluto is a system for the control of safety functions it is vital that personnel involved in design, programming and maintenance have sufficient knowledge about the system and also general knowledge in the field of machinery safety and (for lift applications) lift safety.

Reprogramming of an existing program can be necessary and this can be carried out a long time after the original programming was done. It is then important that the programmer is familiar with the system, the hardware application, the program code and is sure about the intention with the revision. It is also important that the modification is carefully tested and documented.

Download of application programs is password protected. The intention is that the password is kept in secret by a responsible person who gives permission for revision of programs. If the password gets commonly known, it should be changed.

4 Test of application

The most important part before a machine or other safety application is taken in use is to verify correct behaviour by test. Since many design faults are difficult to find by a practical test it is also necessary to make a review of drawings and PLC program. Parts of these tests and verifications should be done by a person other than the designer.