

Robot cell with Pluto



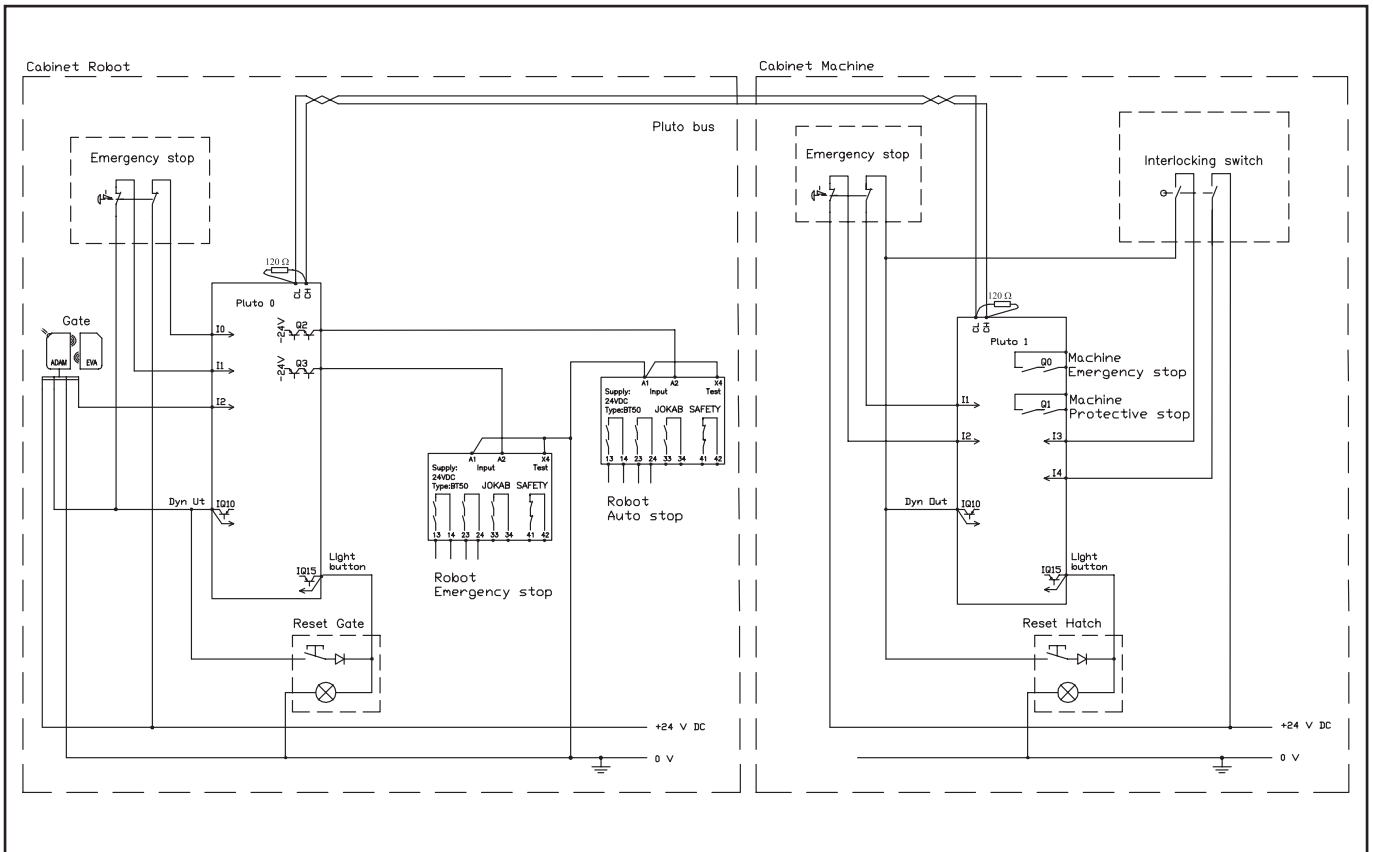
Description:

The example describes a processing machine served by a robot. The machine safety system consists of one (Pluto 1) to which all protection has been connected. The robot has been equipped with a (Pluto 0) to which the cell protection has been connected. The Pluto for the machine has been connected via a databus cable to the robot's Pluto so that common functions, such as emergency stop, can be used by the whole cell.

Function:

Emergency stop takes priority and will stop both the machine and the robot. The machine hatch acts as the zone divider, when the hatch is closed the machine forms one zone and the robot another zone. When the machine hatch is open, both the machine and the robot belong to the same zone. If the door is opened when the machine hatch is open, the machine and the robot will both stop, but if the machine hatch is closed, only the robot will be stopped. After the door has been opened, the system must be reset by means of the reset button on the outside of the door. Emergency stop is reset when the pressed-in button is pulled out. NOTE. The cell operating cycle must not however start immediately on resetting the emergency stop or the door.

Electrical connections



Pluto Manager - [Example]

File Search Tools Window Help

Open Save Print Comp.Down Online Start Bus St AS-i St

JOKAB SAFETY
A MEMBER OF THE ABB GROUP

Example (C:\Program Files\PlutoManager\Example.sps)

Project Name: Example Robot cell

Project Description:

Project created by:

Project reviewed by:

Project approved by:

History:

2010-10-19 - Project created

Function Libraries: <func05.fps> Change...

Baudrate Pluto Canbus: Default (400 kbit/s) Include source code in compiled file

Pluto 0 settings – Robot cabinet

Example - Pluto 0
Pluto Family=A28 (A16, A28, B16, B20, S19, S28)
Instruction set 2
DEF Number (12 hex digits)
111111111130
Pluto Description
Robot cell

Failsafe inputs

Signal	Type of signal	Signal shape	Options
IO.0	Input	Static	<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.1	Input	A_Pulse	<input checked="" type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.2	Input	A_Pulse	<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.3	Undefined		<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.4	Undefined		<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.5	Undefined		<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.6	Undefined		<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.7	Undefined		<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR

Failsafe inputs / Non failsafe outputs

Signal	Type of signal	Signal shape	Options
IO.10	Output	A_Pulse	<input type="checkbox"/> Non_Inv <input type="checkbox"/> No_FR
IO.11	Undefined		
IO.12	Undefined		
IO.13	Undefined		
IO.14	Undefined		
IO.15	Light button	A_Pulse	
IO.16	Undefined		
IO.17	Undefined		

Variable attributes [G] Global variable. These variables are visible to other Plutos on the bus.

Status	Variable	Symbolic Name	Description
[G]	IO.0	P0_ES1_Ch1	Emergency stop 1 channel 1 - Static
[G]	IO.1	P0_ES1_Ch2	Emergency stop 1 channel 2 - Dynamic A non-inverted
[G]	IO.2	P0_Eden1	Door Eden sensor - Dynamic A
[G]	IO.3		
[G]	IO.4		
[G]	IO.5		
[G]	IO.6		
[G]	IO.7		
[G]	IO.10		
[G]	IO.11		
[G]	IO.12		
[G]	IO.13		
[G]	IO.14		
[G]	IO.15	P0_LB1_In	Reset Door - Light button input - Dynamic A
[G]	IO.16		
[G]	IO.17		

Pluto 0

IO.0=P0_ES1_Ch1

;Emergency stop 1 channel 1 - Static

IO.1=P0_ES1_Ch2

;Emergency stop 1 channel 2 - Dynamic A non-inverted

IO.2=P0_Eden1

;Door Eden sensor - Dynamic A

IO.15=P0_LB1_In

;Reset Door - Light button input - Dynamic A

Q0.2=P0_AS_OK

;Robot auto stop - Expansion BT50 relay

Q0.3=P0_ES

;Robot emergency stop - Expansion BT50 relay

GM0.0=P0_ES_OK

;Emergency stop OK in Pluto 0

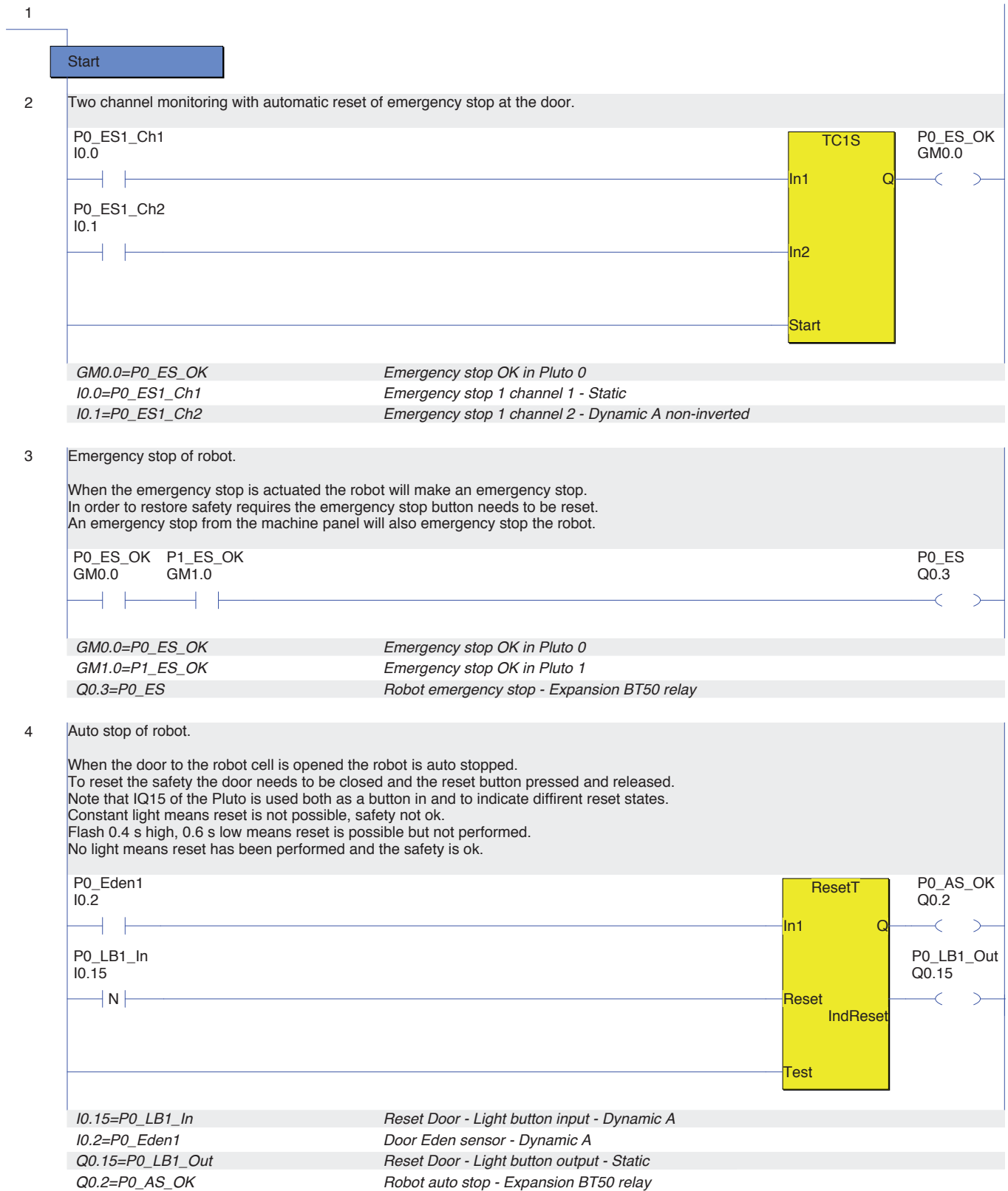
Pluto 1 settings – Machine cabinet



Pluto 1

I1.1=P1_ES1_Ch1 ;Emergency stop 1 channel 1 - Dynamic A non-inverted
 I1.2=P1_ES1_Ch2 ;Emergency stop 1 channel 2 -Static
 I1.3=P1_IS1_Ch1 ;Interlocking switch channel 1 - Dynamic A non-inverted
 I1.4=P1_IS1_Ch2 ;Interlocking switch channel 2 - Static
 I1.15=P1_LB1_In ;Reset Hatch - Light button input - Dynamic A
 Q1.0=P1_ES ;Machine Emergency stop
 Q1.1=P1_PS ;Machine protective stop
 GM1.0=P1_ES_OK ;Emergency stop OK in Pluto 1
 GM1.1=P1_Hatch_OK ;Hatch closed

PLC code Pluto 0 – Robot cabinet



5 Alarm 03 - Machine hatch open.

To generate User Errors (UE) a value of 200 - 299 can be written to the display of the Pluto.
A check of System Register 11 (SR11) in the Pluto prioritises errors from the Pluto itself over User Errors.

P1_Hatch_OK P0_AS_OK SR_ErrorCode=0 SR_PlutoDisplay=203
GM1.1 Q0.2 SR0.11=0 SR0.10=203



GM1.1=P1_Hatch_OK Hatch closed
Q0.2=P0_AS_OK Robot auto stop - Expansion BT50 relay
SR0.10=SR_PlutoDisplay Pluto display figure. For user error: 200+no
SR0.11=SR_ErrorCode Error code

6 Alarm 02 - Door open.

To generate User Errors (UE) a value of 200 - 299 can be written to the display of the Pluto.
A check of System Register 11 (SR11) in the Pluto prioritises errors from the Pluto itself over User Errors.

P0_Eden1 SR_ErrorCode=0 SR_PlutoDisplay=202
I0.2 SR0.11=0 SR0.10=202



I0.2=P0_Eden1 Door Eden sensor - Dynamic A
SR0.10=SR_PlutoDisplay Pluto display figure. For user error: 200+no
SR0.11=SR_ErrorCode Error code

7 Alarm 01 - Emergency stop actuated.

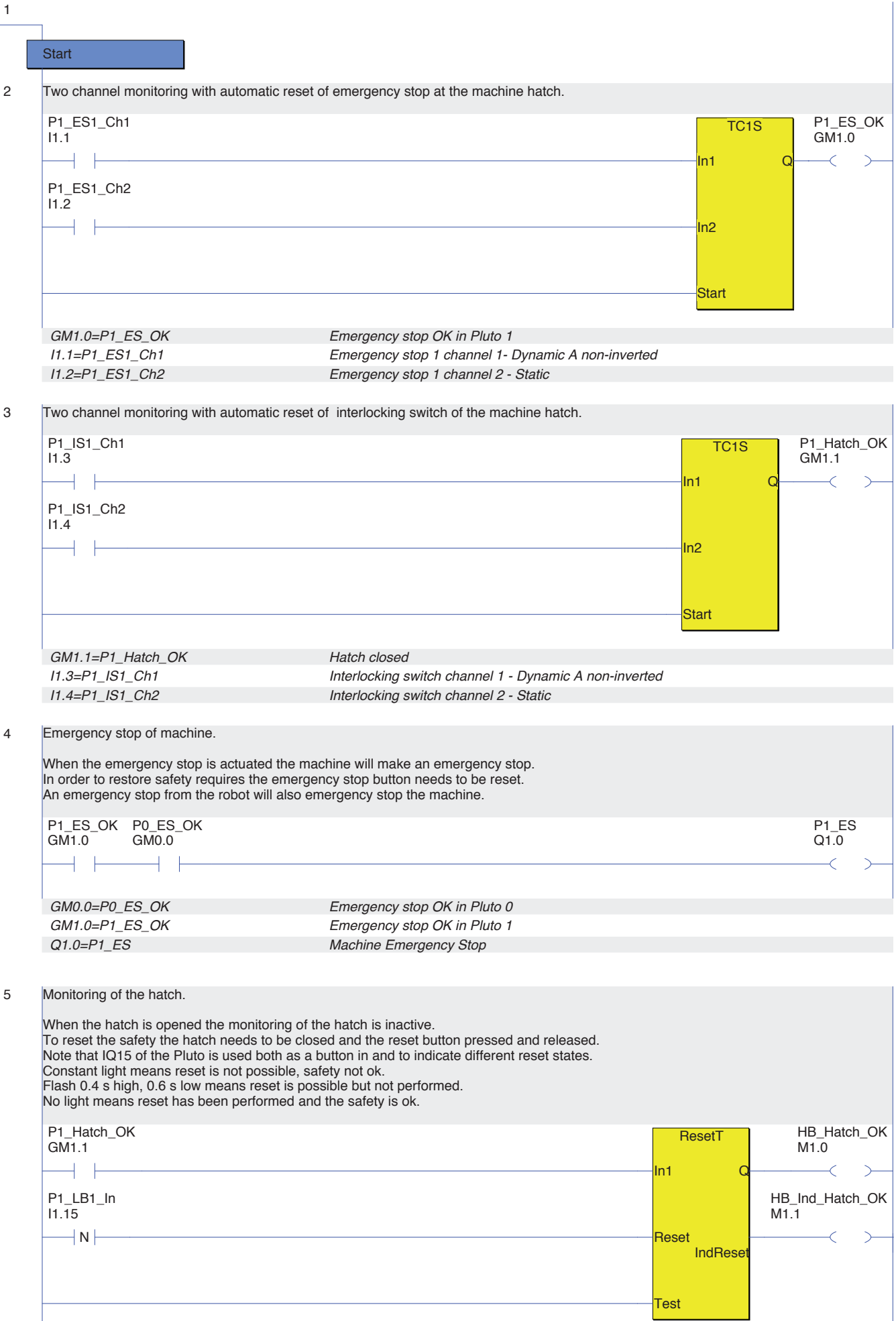
To generate User Errors (UE) a value of 200 - 299 can be written to the display of the Pluto.
A check of System Register 11 (SR11) in the Pluto prioritises errors from the Pluto itself over User Errors.

P0_ES_OK SR_ErrorCode=0 SR_PlutoDisplay=201
GM0.0 SR0.11=0 SR0.10=201



GM0.0=P0_ES_OK Emergency stop OK in Pluto 0
SR0.10=SR_PlutoDisplay Pluto display figure. For user error: 200+no
SR0.11=SR_ErrorCode Error code

PLC code Pluto 1 – Machine cabinet



GM1.1=P1_Hatch_OK	Hatch closed
I1.15=P1_LB1_In	Reset Hatch - Light button input - Dynamic A
M1.0=HB_Hatch_OK	Help Bit - Hatch closed
M1.1=HB_Ind_Hatch_OK	Help Bit - Indication Reset Hatch

6 Light button indication of the reset of the hatch.

If the robot cell's door is closed and reset no light indication is needed inside the cell.

M1.1=HB_Ind_Hatch_OK	Help Bit - Indication Reset Hatch
Q0.2=P0_AS_OK	Robot auto stop - Expansion BT50 relay
Q1.15=P1_LB1_Out	Reset Hatch - Light button output - Static

7 Protective stop of the machine.

Either the hatch is closed and reset or the door to the robot cell is closed and reset. This means the cell can work with the hatch both open or closed as long as the cell's door is closed and reset.

M1.0=HB_Hatch_OK	Help Bit - Hatch closed
Q0.2=P0_AS_OK	Robot auto stop - Expansion BT50 relay
Q1.1=P1_PS	Machine Protective Stop

8 Alarm 03 - Machine hatch open.

To generate User Errors (UE) a value of 200 - 299 can be written to the display of the Pluto. A check of System Register 11 (SR11) in the Pluto prioritises errors from the Pluto itself over User Errors.

GM1.1=P1_Hatch_OK	Hatch closed
Q0.2=P0_AS_OK	Robot auto stop - Expansion BT50 relay
SR1.10=SR_PlutoDisplay	Pluto display figure. For user error: 200+no
SR1.11=SR_ErrorCode	Error code

9 Alarm 02 - Door open.

To generate User Errors (UE) a value of 200 - 299 can be written to the display of the Pluto. A check of System Register 11 (SR11) in the Pluto prioritises errors from the Pluto itself over User Errors.

I0.2=P0_Eden1	Door Eden sensor - Dynamic A
SR1.10=SR_PlutoDisplay	Pluto display figure. For user error: 200+no
SR1.11=SR_ErrorCode	Error code

10 Alarm 01 - Emergency stop actuated.

To generate User Errors (UE) a value of 200 - 299 can be written to the display of the Pluto. A check of System Register 11 (SR11) in the Pluto prioritises errors from the Pluto itself over User Errors.

GM1.0=P1_ES_OK	Emergency stop OK in Pluto 1
SR1.10=SR_PlutoDisplay	Pluto display figure. For user error: 200+no
SR1.11=SR_ErrorCode	Error code