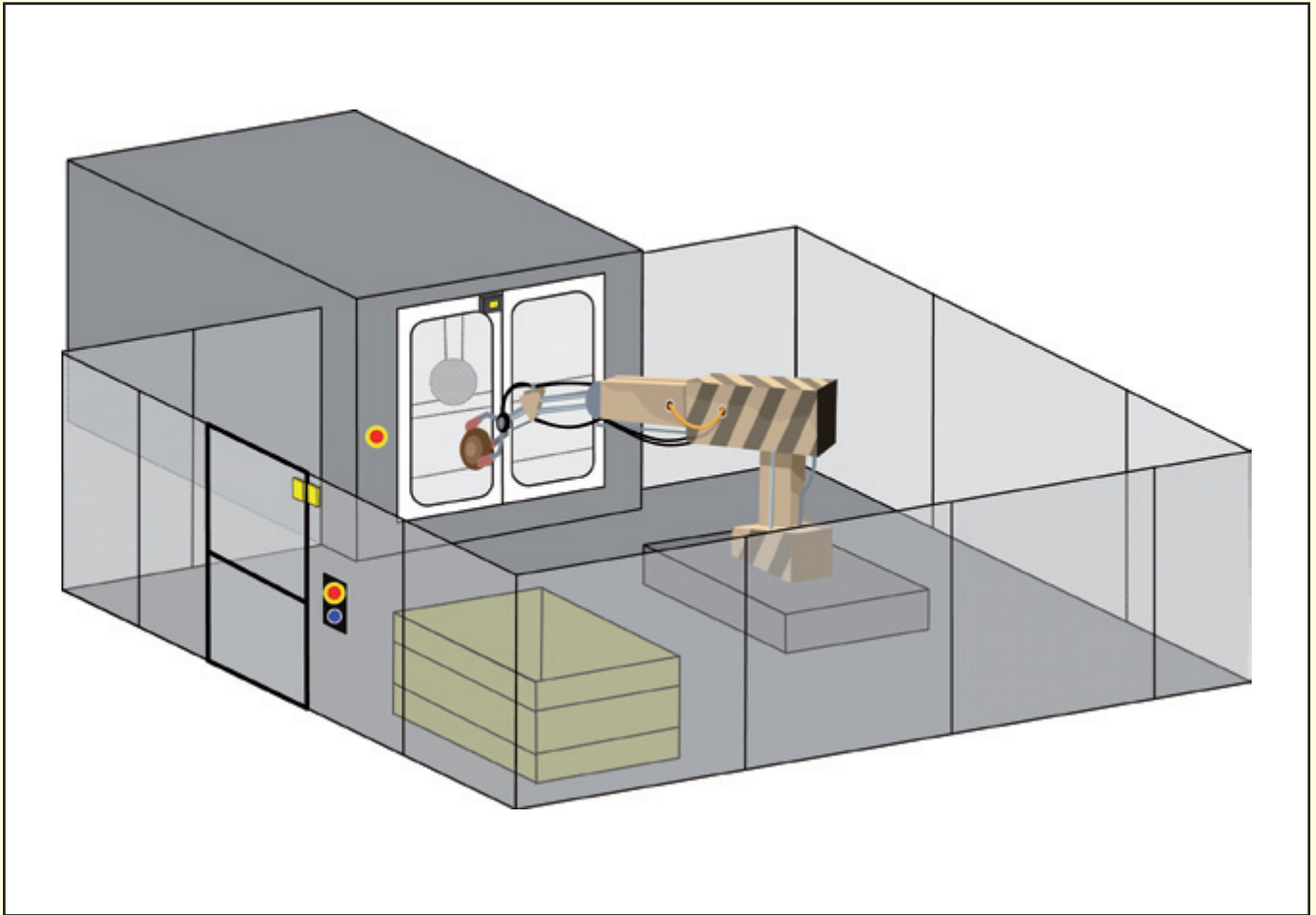


Example – Robot cell with Pluto



Description:

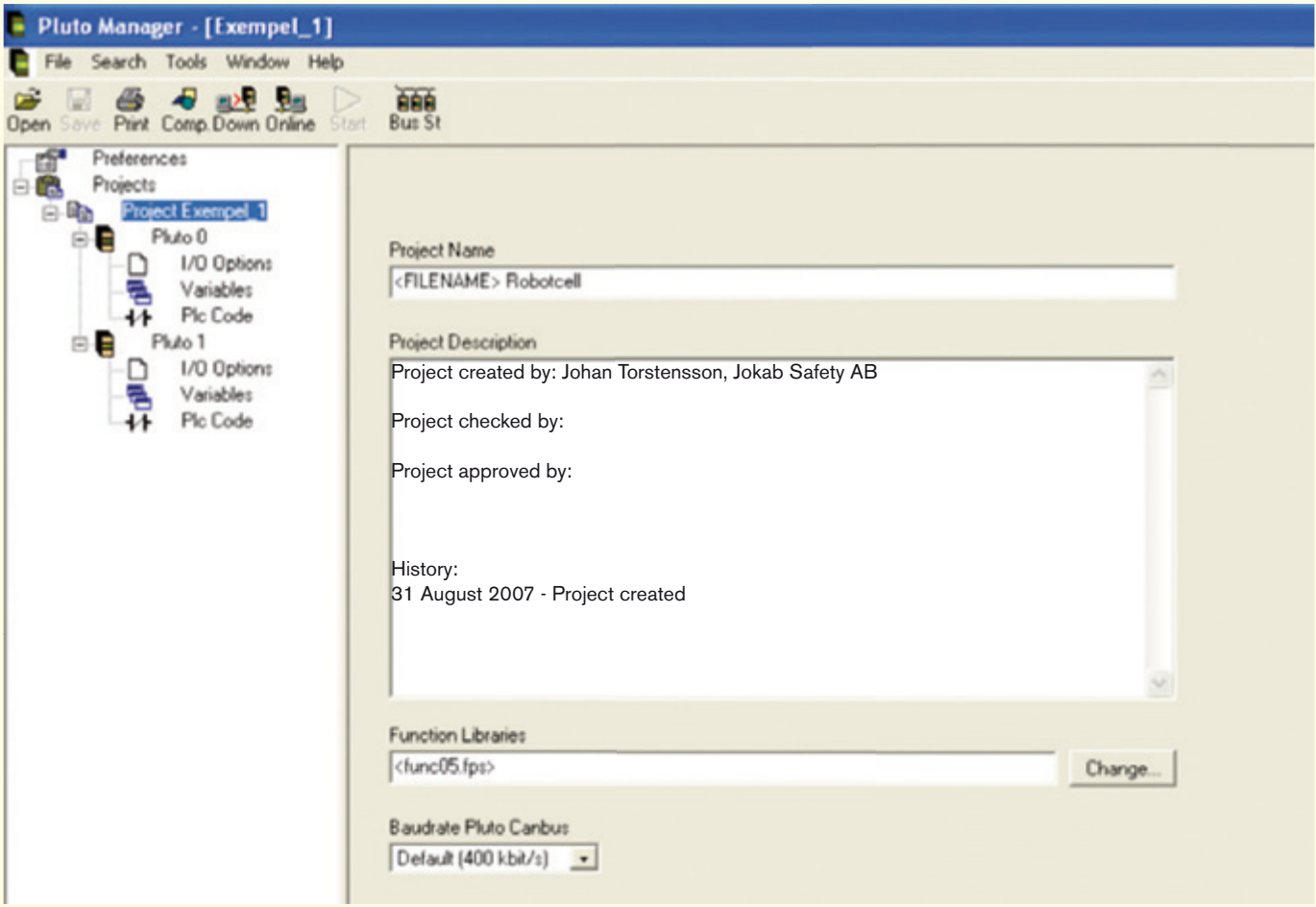
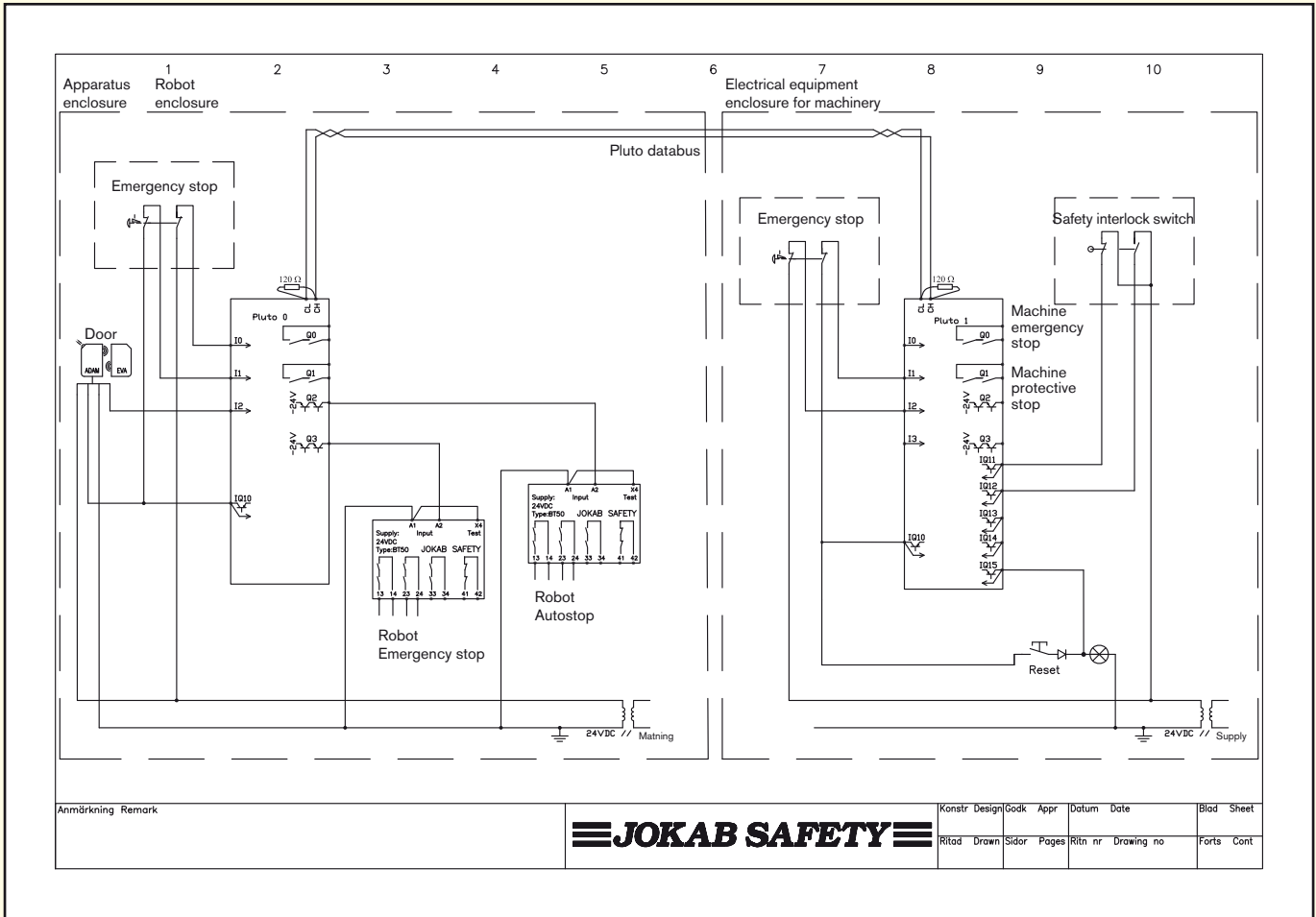
The example describes a processing machine served by a robot. The machine safety system consists of one Pluto to which all protection has been connected. The robot has been equipped with a Pluto to which the cell protection has been connected. The Pluto for the machine has been connected via a databus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

Function:

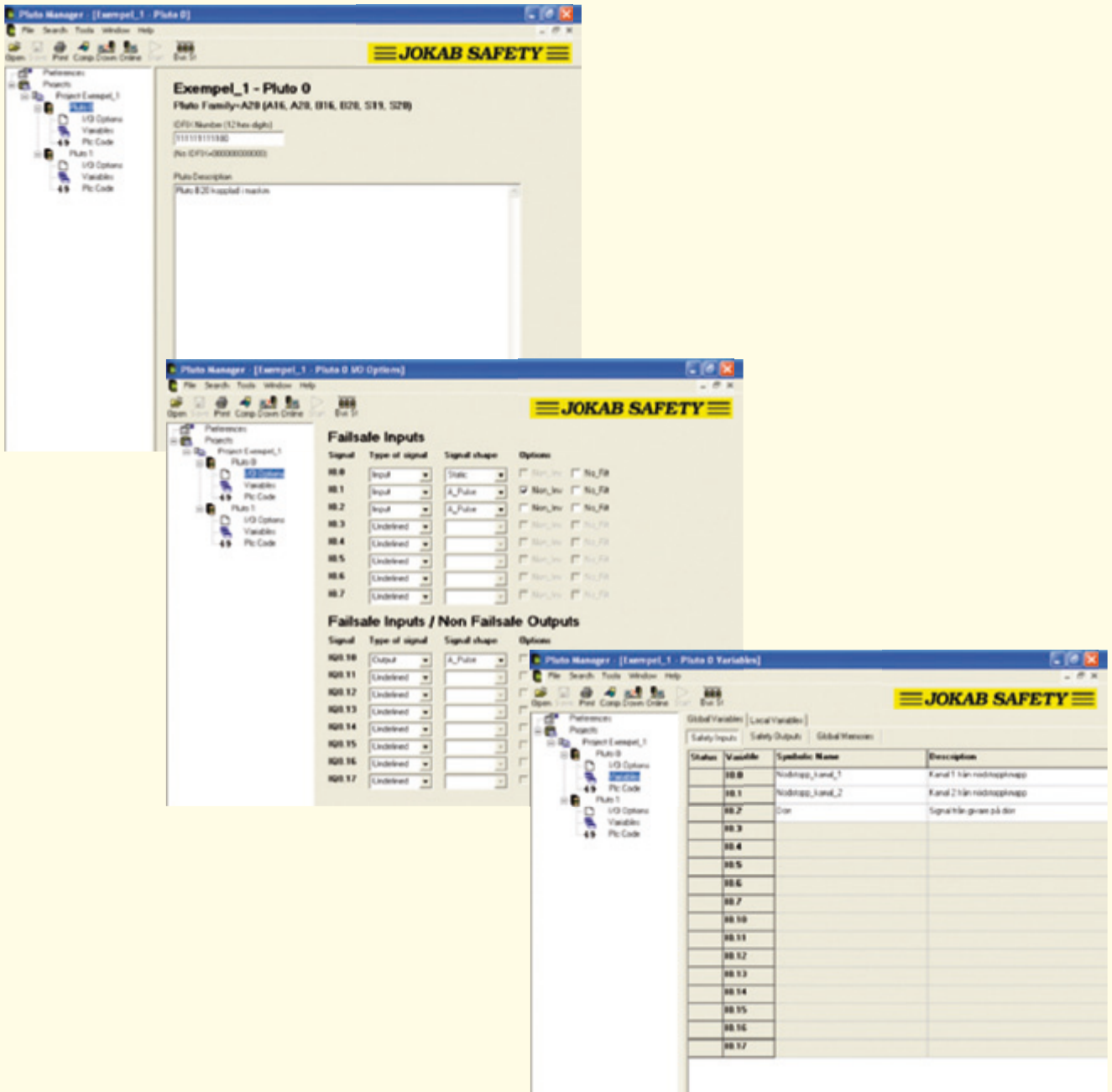
Emergency stop takes priority and will stop both the machine and the robot. The machine hatch acts as the zone divider, when the hatch is closed the machine forms one zone and the robot another zone. When the machine hatch is open, both the machine and the robot belong to the same zone. If the door is 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



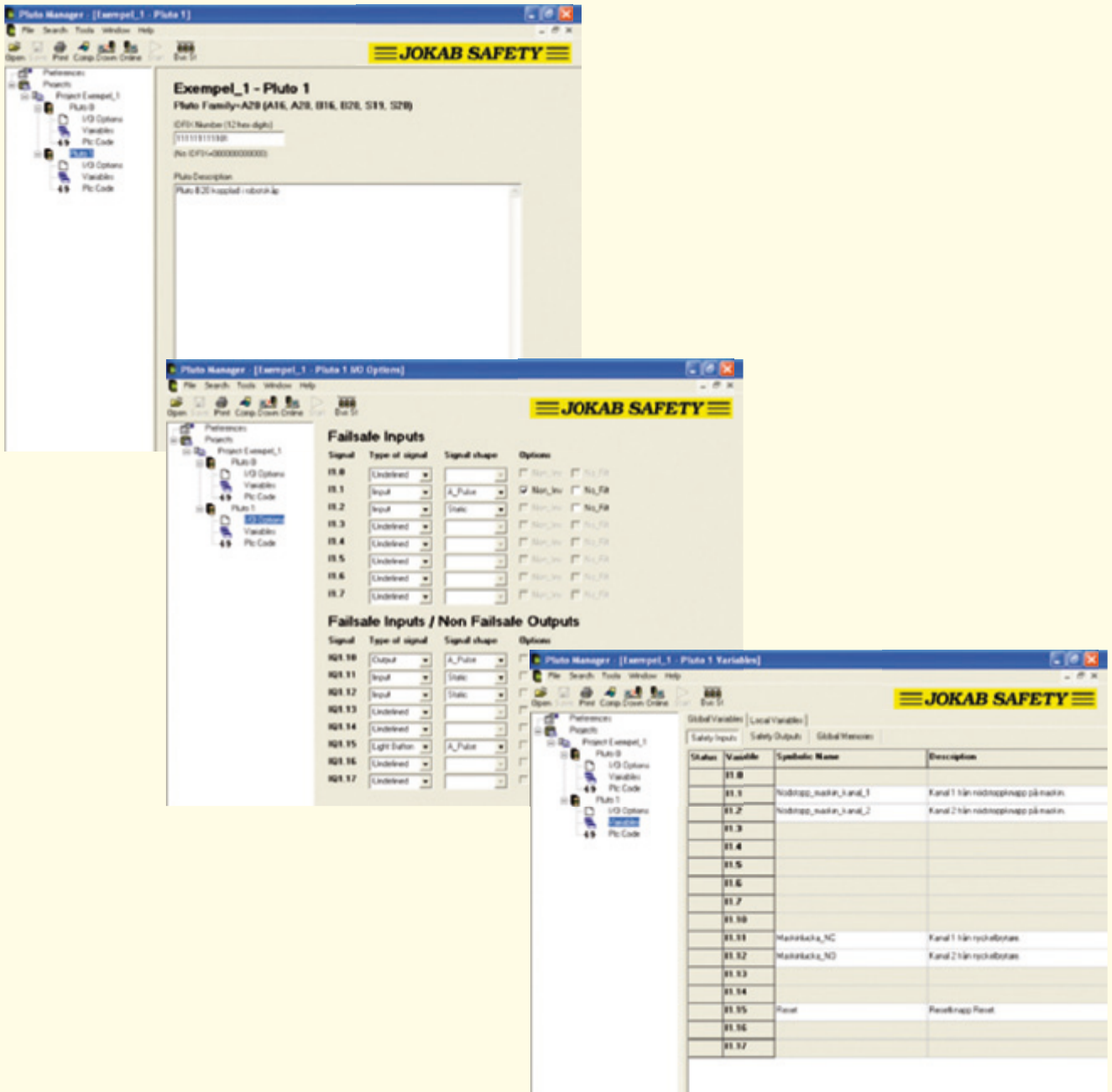
Pluto 0 settings



Pluto 0

IO.0 = Emergency stop_channel_1 ;Channel 1 from the emergency stop button
 IO.1 = Emergency stop_channel_2 ;Channel 2 from the emergency stop button
 IO.2 = Door ;Signal from the door sensor
 Q0.2 = Robot_Autostopp_OK ;Automatic stop for the robot
 Q0.3 = Robot_Emergencystop_OK ;Emergency stop for the robot
 Q0.10 = ;Output that generates a dynamic signal
 GM0.0=Reset_ind_mem ;Collective memory for indication in the reset button
 GM0.1=Emergencystop_OK_mem ;Auxiliary memory for emergency stop OK
 M0.0=Reset_Ind_1_mem ;Auxiliary memory 1 for indication in the reset button

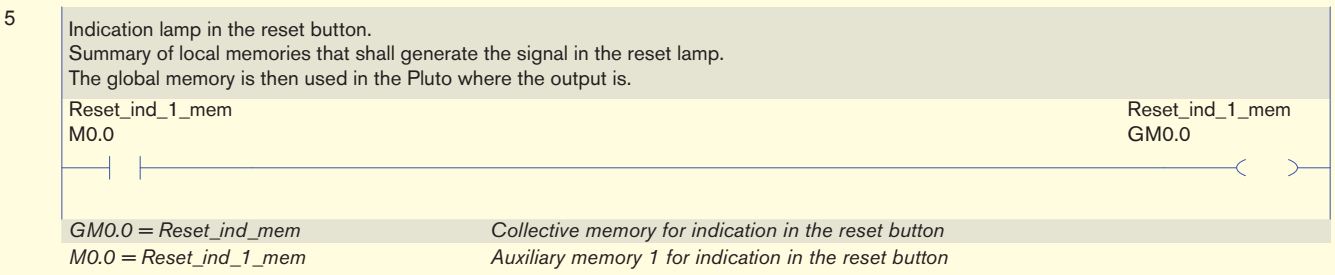
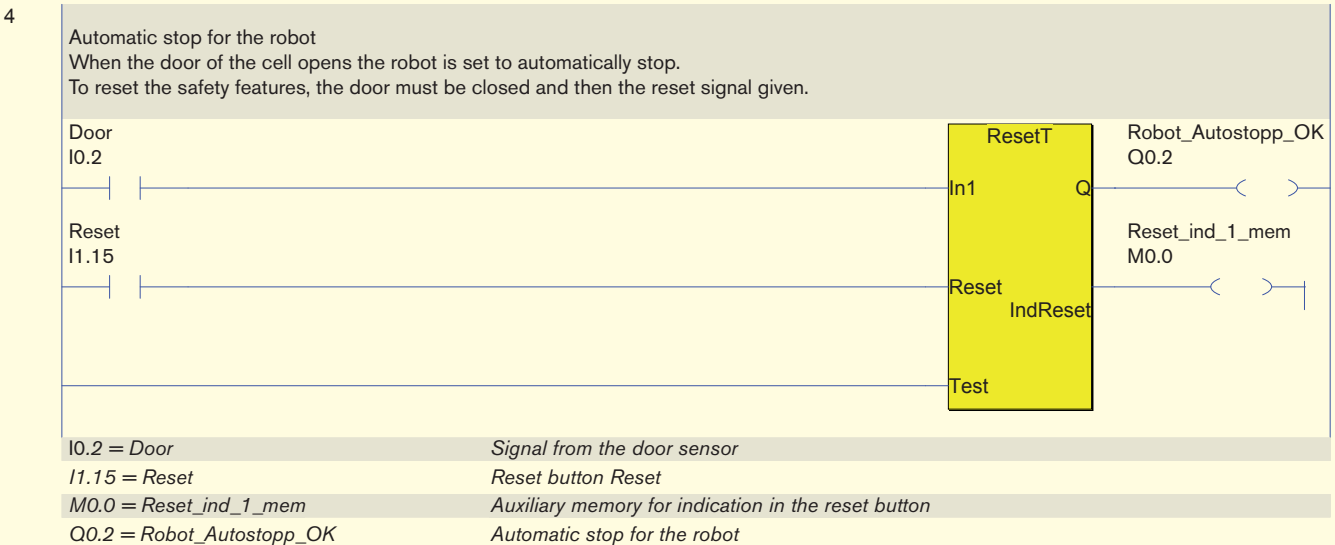
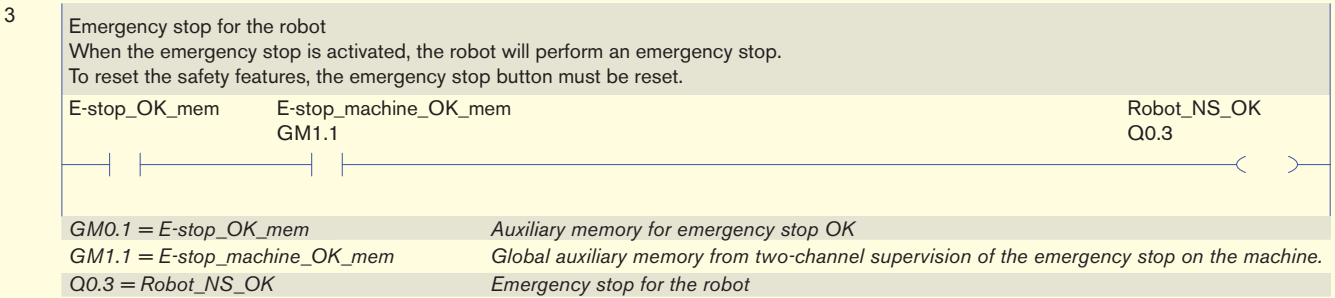
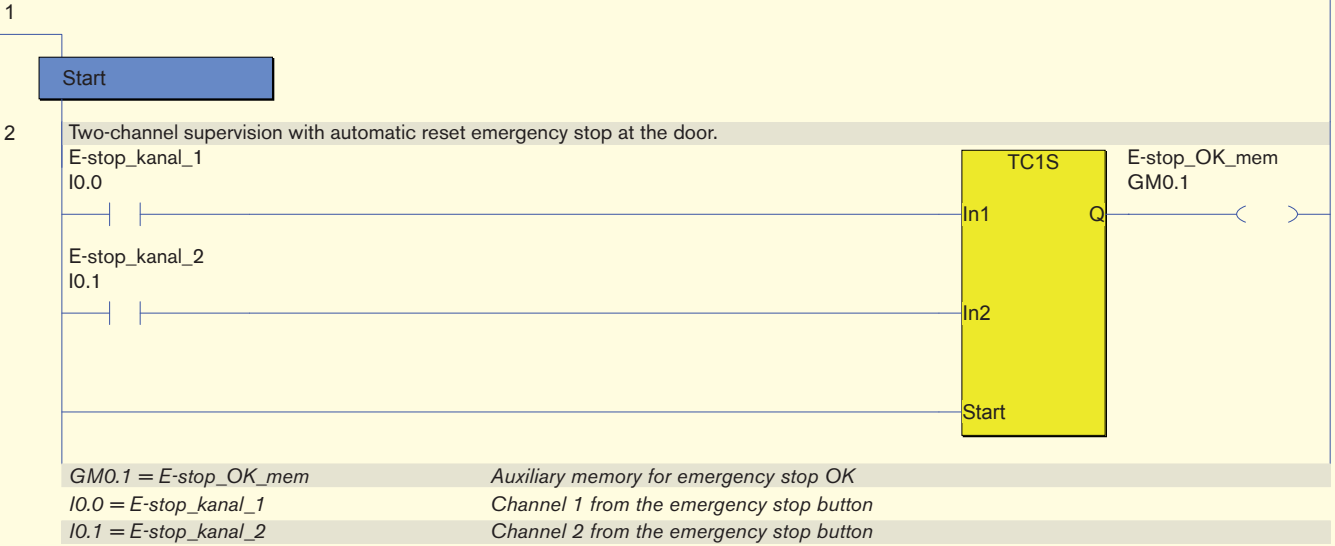
Pluto 1 settings



Pluto 1

I1.1=E-stop_machine_channel_1	;Channel 1 from the emergency stop button on the machine
I1.2=E-stop_machine_channel_2	;Channel 2 from the emergency stop button on the machine
I1.11=Machine hatch_NC	;Channel 1 from the safety interlock switch
I1.12=Machine hatch_NO	;Channel 2 from the safety interlock switch
I1.15=Reset	;Reset button Reset.
Q1.0=E-stop_machine_OK	;Emergency machine stop.
Q1.1=Machine_prot.stop_OK	;Protective machine stop.
Q1.10=	;Output that generates a dynamic signal.
Q1.15=Reset_Ind	;Indication lamp in the reset button.
GM1.0=Machine hatch_OK_mem	;Global auxiliary memory from two-channel supervision of the safety interlock switch in the machine hatch.
GM1.1=E-stop_machine_OK_mem	;Global auxiliary memory from two-channel supervision of the emergency stop on the machine.
M1.0=Reset_Ind_2_mem	;Auxiliary memory 2 for indication in the reset button

PLC code Pluto 0



6

Indication on the display.

Alarm 03 – Machine hatch open.

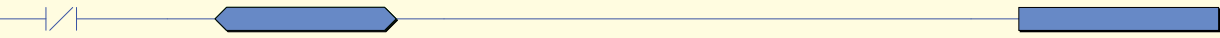
To generate an alarm, a UE code (UE = User Error) can be shown on the Pluto's display.

This alarm code is selected by a value of between 200 and 299 being written into the Pluto's display register.

SR_ErrorCode = 0 is used as a condition to prioritise an internal alarm from the unit.

Machine hatch_OK_mem SR_ErrorCode = 0
GM1.0 SR0.11 = 0

SR_PlutoDisplay = 203
SR0.10 = 203



GM1.0 = Machine hatch_OK_mem Global auxiliary memory from two-channel supervision of the safety interlock switch in the machine hatch.

SR0.10 = SR_PlutoDisplay Pluto display figure

SR0.11 = SR_ErrorCode Error code. For user error 200 + no

7

Indication on the display.

Alarm 02 – Door open.

To generate an alarm, a UE code (UE = User Error) can be shown on the Pluto's display.

This alarm code is selected by a value of between 200 and 299 being written into the Pluto's display register.

SR_ErrorCode = 0 is used as a condition to prioritise an internal alarm from the unit.

Door SR_ErrorCode = 0
I0.2 SR0.11 = 0

SR_PlutoDisplay = 202
SR0.10 = 202



I0.2 = Door Signal from the door sensor

SR0.10 = SR_PlutoDisplay Pluto display figure

SR0.11 = SR_ErrorCode Error code. For user error 200 + no

8

Indication on the display.

Alarm 01 - Emergency stop activated

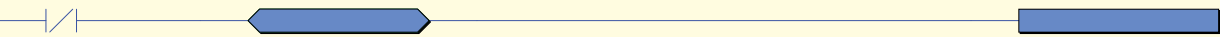
To generate an alarm, a UE code (UE = User Error) can be shown on the Pluto's display.

This alarm code is selected by a value of between 200 and 299 being written into the Pluto's display register.

SR_ErrorCode = 0 is used as a condition to prioritise an internal alarm from the unit.

E-stop_OK_mem SR_ErrorCode = 0
GM0.1 SR0.11 = 0

SR_PlutoDisplay = 201
SR0.10 = 201



GM0.1 = E-stop_OK_mem Auxiliary memory for emergency stop OK

SR0.10 = SR_PlutoDisplay Pluto display figure

SR0.11 = SR_ErrorCode Error code. For user error 200 + no

PLC code Pluto 1

1

Start

2

Two-channel supervision with automatic reset of the emergency stop on the machine.

E-stop_machine_kanal_1

I1.1

E-stop_machine_kanal_2

I1.2



E-stop_OK_mem
GM1.1

GM1.1 = E-stop_machine_OK_mem Global auxiliary memory from two-channel supervision of the emergency stop on the machine.
I0.0 = E-stop_machine_kanal_1 Channel 1 from the emergency stop button on the machine
I0.1 = E-stop_machine_kanal_2 Channel 2 from the emergency stop button on the machine

3

Two-channel supervision of the machine hatch switch.

The switch has alternating contacts and the variable name shows the contact arrangement for the respect signals when the key is in the sensor.

- Machine hatch_NC gives a signal
- Machine hatch_NO gives a signal.

Machine hatch_NC

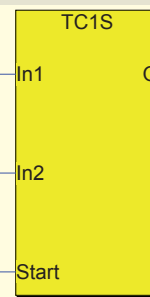
I1.11

Machine hatch_OK_mem

GM1.0

Machine hatch_NO

I1.12



GM1.0 = Machine hatch_OK_mem Global auxiliary memory from two-channel supervision of the safety interlock switch in the machine hatch.
I1.11 = Machine hatch_NC Channel 1 from the safety interlock switch
I1.12 = Machine hatch_NO Channel 2 from the safety interlock switch

4

Emergency machine stop.

When the emergency stop is activated, the machine will perform an emergency stop.

To reset the safety features, the emergency stop button must be reset.

E-stop_OK_mem

E-stop_machine_OK_mem

GM1.1

Maskin_E-stop_OK

Q1.0

GM0.1 = E-stop_OK_mem Auxiliary memory for emergency stop OK

GM1.1 = E-stop_machine_OK_mem Global auxiliary memory from two-channel supervision of the emergency stop on the machine.

Q1.0 = Maskin_E-stop_OK Emergency machine stop.

5

Protective machine stop.

When the protective stop is activated, the machine will stop.

If the door in to the robot area is opened at the same time as the machine hatch is closed, the machine will continue with its work cycle.

To reset the safety features, the door or the machine hatch must be closed and then the reset signal given.

Machine hatch_OK_mem

GM1.0

Door

I0.2

Reset

I1.15



Maskin_skyddstopp_OK
Q1.1

Reset_ind_2_mem
M1.0

GM1.0 = Machine hatch_OK_mem	Global auxiliary memory from two-channel supervision of the safety interlock switch in the machine hatch.
I0.2 = Door	Signal from the door sensor
I1.15 = Reset	Reset button Reset
M1.0 = Reset_Ind_2_mem	Auxiliary memory 2 for indication in the reset button
Q1.1 = Maskin_skyddstop_OK	Protective machine stop.

