Project name=<FILENAME>

Electric diagram:
recif\studies\PL-005-schema_electrique_CAB-2\rev06\PL-005_rev06.pdf

Pinout description:
\recif\workspace\PlutoManager\PL-005\PL-005_rev06v01\PL-005_rev06v01.xlsx

Pluto password:
recif

Author: Franco FERRUCCI
Created: 06/01/2023
Last modification: 22/03/2023

System function library include=func06.fps
User function library include=

Can Baudrate=Default (400kbit/s)

Pluto 0: 30 networks
safety: 20 networks
non_safety: 10 networks

IDFIX no=00001E40E4C3

CanBus cycle time=Default
CanBus timeout=Default
PLC cycle time=Default

I0.0: Input, A_Pulse, Non_Inv
I0.1: Input, A_Pulse, Non_Inv
I0.2: Input, B_Pulse, Non_Inv
I0.3: Input, C_Pulse, Non_Inv
I0.4: Input, Static
I0.5: Input
I0.6: Input, B_Pulse, Non_Inv
I0.7: Input, B_Pulse, Non_Inv
I0.10: Undefined
I0.11: Undefined
I0.12: Undefined
I0.13: Undefined
I0.14: Undefined
I0.15: Undefined
I0.16: Undefined
I0.17: Undefined
I0.20: Undefined
I0.21: Undefined
I0.22: Undefined
I0.23: Undefined
I0.24: Undefined
I0.25: Undefined
I0.26: Undefined
I0.27: Undefined
I0.30: Input, B_Pulse, Non_Inv
I0.31: Input, B_Pulse, Non_Inv
I0.32: Input, Static
I0.33: Input, A_Pulse, Non_Inv
I0.34: Input, C_Pulse, Non_Inv
I0.35: Input, Static
I0.36: Input, Static
I0.37: Input, Static
I0.40: Input, C_Pulse, Non_Inv
I0.41: Input, Static
I0.42: Input, A_Pulse, Non_Inv
I0.43: Undefined
I0.44: Undefined
I0.45: Undefined
I0.46: Undefined
I0.47: Undefined

IQ0.10: Output, A_Pulse
IQ0.11: Output, B_Pulse
IQ0.12: Output, C_Pulse
IQ0.13: Output, Static
IQ0.14: Output, Static
IQ0.15: Output, Static
IQ0.16: Output, Static
IQ0.17: Output, Static
IQ0.20: Output, Static
IQ0.21: Output, Static
IQ0.22: Output, Static
IQ0.23: Output, Static
IQ0.24: Output, Static
IQ0.25: Output, Static
IQ0.26: Undefined
IQ0.27: Undefined

Pluto 0

I0.0=in_nh3_detector_open	;NH3 gas detector, NC contact. Open when no gas is detected.
I0.1=in_nh3_detector_closed	;NH3 gas detector, NO contact. Closed when no gas is detected.
I0.2=in_h2_detector1_closed	;H2 gas detector central (GfG). Closed when no gas is detected.
I0.3=in_h2_detector2_open	;H2 gas detector 2 (Dega). Open when no gas or error is detected.
I0.4=in_h2_detector2_closed	;H2 gas detector 2 (Dega). Closed when no gas or error is detected.
I0.5=h2_detector2_analog	;H2 gas detector 2 (Dega) analog input. 4..20mA to 1..5V through a 250 Ohm resistor. 1 count = 0.1V.
I0.6=in_stop_button_container_NC	;Stop button inside container. Closed when button is not pressed.
I0.7=in_stop_button_container_NO	;Stop button inside container. Open when button is not pressed.
I0.30=in_supervision_relay_NC	;"Supervision-Safety" interface relay. Closed when relay is de-energized.
I0.31=in_supervision_relay_NO	;"Supervision-Safety" interface relay. Open when relay is de-energized.
I0.32=in_extractor1_command_NO	;Extractor 1 command. Open when user wants to turn it OFF. Closed when user wants to turn it ON.
I0.33=in_extractor1_pressure_NO	;Extractor 1 pressure sensor. Closed when underpressure is detected (extractor ON). Open when no underpressure is detected (extractor OFF).
I0.34=in_extractors_available	;Extractors 1 and 2 availability. Closed when both extractors are available. Open when thermal protections are triggered or 3-phase power is not available.
I0.35=in_reset_sound_alarm_NO	;Reset "safety action 1" (gas sound alarm). Closed when button is pressed. Note: the button is in series with several feedback NC contacts.
I0.36=in_reset_extractors_NO	;Reset "safety action 2" (extractors and visual alarm). Closed when button is pressed. Note: the button is in series with several feedback NC contacts.
I0.37=in_reset_shutdown_container_NO	;Reset "safety action 3" (container power shutdown). Closed when button is pressed. Note: the button is in series with several feedback NC contacts.
I0.40=in_stop_button_cabinet_NC	;Stop button installed on CAB-2 door. Closed when button is not pressed.
I0.41=in_test_extractors_NO	;Test extractors 1 & 2. 0: No test. 1: Test activated.
I0.42=in_h2_detector1_fault_closed	;H2 gas detector central (GfG). Closed when no default is detected.
Q0.2=out_safety_shutdown1	;Safety action #3. It commands: H2 electrovalve, electrolyzer, PV pannels.
Q0.3=out_safety_shutdown2	;Safety action #3. It commands: container 3-phase power, fuel-cell Li-ion batteries.
Q0.4=out_safety_sound_alarm	;Safety action #1. It commands sound alarm.
Q0.5=out_safety_extractors	;Safety action #2. It commands extractors and visual alarm.
Q0.10=A_pulse_out	;Dynamic output signal. Pulse train type A (marked as red-black cable in PL-005_rev04v01).
Q0.11=B_pulse_out	;Dynamic output signal. Pulse train type B (marked as blue-black cable in PL-005_rev04v01).
Q0.12=C_pulse_out	;Dynamic output signal. Pulse train type C (marked as magenta-black cable in PL-005_rev04v01).
Q0.13=LED_system_online	;Indication light. Light ON: safety PLC is online. Light OFF: PLC is offline (power cut).
Q0.14=LED_H2_alarm_non_latched	;Indication light. Light ON: at least one of the two H2 gas sensors is detecting a gas leak. Light OFF: none of the H2 gas sensors is detecting a gas leak.
Q0.15=LED_H2_alarm_latched	;Indication light. Latched version of 'LED_H2_alarm_not_latched' signal.
Q0.16=LED_NH3_alarm_non_latched	;Indication light. Light ON: NH3 gas sensor is detecting a gas leak. Light OFF: NH3 gas sensor is not detecting a gas leak.
Q0.17=LED_NH3_alarm_latched	;Indication light. Latched version of 'LED_NH3_alarm_non_latched' signal.
Q0.20=LED_extractors_out_of_service	;Indication light. Light ON: at least one extractor is out of service. Light OFF: both extractors are available.
Q0.21=out_non_safety_gas_OK	;Indication. Activated: gas leak has been detected or safety system is out of service. Non activated: no gas has beed detected and safety system is online.
Q0.22=out_non_safety_reset_ready_sound_alarm	;Indication. Reset "safety action 1" (gas sound alarm) is ready to be reseted by pressing 'reset_sound_alarm_NO' button.
Q0.23=out_non_safety_reset_ready_extractors	;Indication. Reset "safety action 2" (extractors) is ready to be reseted by pressing 'reset_extractors_NO' button.
Q0.24=out_non_safety_reset_ready_shutdown	;Indication. Reset "safety action 3" (container power shutdown) is ready to be reseted by pressing 'reset_shutdown_container_NO' button.
Q0.25=out_non_safety_fault_alarm	;'OR' logic combination of all positive-logic fault variables.
M0.0=var_system_online	;1: System is online
M0.1=var_H2_H2_OK	;1: No gas detection or error in either of the H2 gas detectors (not latched).
M0.2=var_H2_H2_OK_latched	;1: No gas detection or error in either of the H2 gas detectors. Latched variable (i.e. it needs to be reset after been triggered).
M0.3=var_NH3_detector_OK	;1: No gas detection or error in NH3 detector (not latched).
M0.4=var_H2_detector1_OK	;1: No gas detection or error in H2 detector 1 (not latched).
M0.5=var_H2_detector2_contacts_OK	;1: NO and NC contacts operate in oposition. 0: they are symultaneously open or closed.
M0.6=var_H2_H2_reset_ready	;1: Both H2 gas detectors indicate no detection or error, so the latched variable can be reset.
M0.7=var_fault_NH3	;1: Fault, NO and NC contacts are either open or closed simultaneously. 0: No fault.

M0.8=var_NH3_detector_OK_latched ;1: No gas detection or error in NH3 gas detector. Latched variable (i.e. it needs to be reset after been triggered).
M0.9=var_NH3_reset_ready ;1: NH3 gas detector indicates no detection or error, so the latched variable can be reset.
M0.10=var_stop_container_OK ;1: Stop button inside container is OK (not pressed and without error).
M0.11=var_fault_stop_container ;1: Stop button inside container is in error state (contacts are simultaneously open or closed).
M0.12=var_STOP_STOP_OK ;1: Both stop buttons are OK (none of them is pressed or in error).
M0.13=var_extractor1_pressure_OK ;1: (extractor 1 is activated AND under-presssure is detected) OR (extractor 1 is not activated AND under-pressure is not detected). Not filtered variable.
M0.14=var_supervision_OK ;1: Supervision input is OK (not triggered and no error).
M0.15=var_fault_supervision ;1: Fault, NO and NC contacts are either open or closed simultaneously. 0: No fault.
M0.16=var_fault_H2_detector2_contacts ;1: Fault, NO and NC contacts are either open or closed simultaneously. 0: No fault.
M0.17=var_H2_detector2_analog_OK ;1: The analog input comming from H2 detector 2 indicates a value greater than or equal to 0.6V (2.4mA with a 250 Ohm resistor).
M0.18=var_extractor1_pressure_OK_filtered_negated ;Filtered and negated version of 'var_extractor1_pressure_OK' variable (to avoid glitches). This is an auxiliary variable in order to use a 'TON' block as filter.
M0.19=var_extractor1_pressure_OK_filtered ;Filtered version of 'var_extractor1_pressure_OK' variable (to avoid glitches).
M0.20=var_shutdown_OK ;1: Container shutdown is OK (Safety action #3) (not latched).
M0.21=var_shutdown_OK_latched ;1: Container shutdown is OK (Safety action #3). Latched variable (i.e. it needs to be reset after been triggered).
M0.22=var_lamp_test ;1: lamp test is activated. All alarms LEDs will turn on, overriding momentarily the states of the LEDs. 0: lamp test is not activated.
SM0.5=SM_FastFlash ;Flash 0.17s/0.33s (on/off)
SR0.41=SR_I5_Volt ;Voltage at analogue input I5 (x10 volt)
SR0.41=SR_I5_Volt ;Voltage at analogue input I5 (x10 volt)
SR0.41=SR_I5_Volt ;Voltage at analogue input I5 (x10 volt)
SR0.41=SR_I5_Volt ;Voltage at analogue input I5 (x10 volt)
SR0.41=SR_I5_Volt ;Voltage at analogue input I5 (x10 volt)

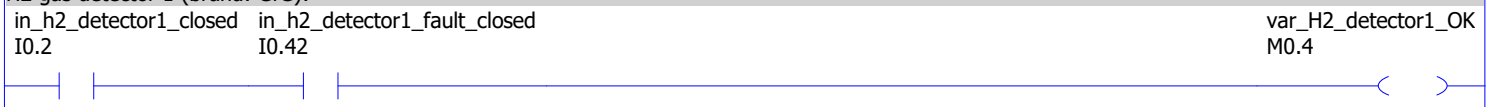
Pluto 0 safety

1

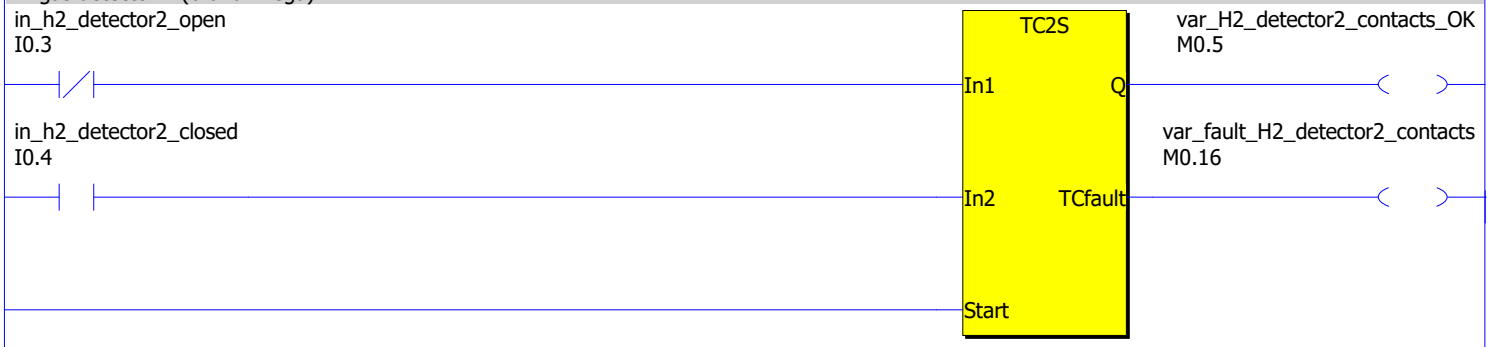
Start

Safety sequence. Program start-up. Not handled by the user.

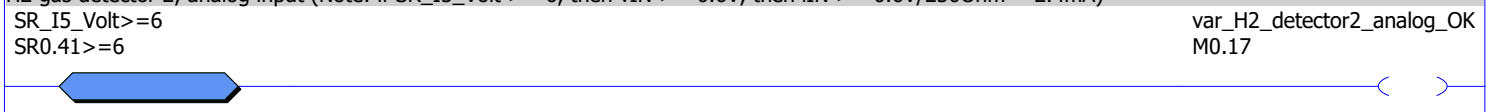
2 H2 gas detector 1 (brand: GfG):



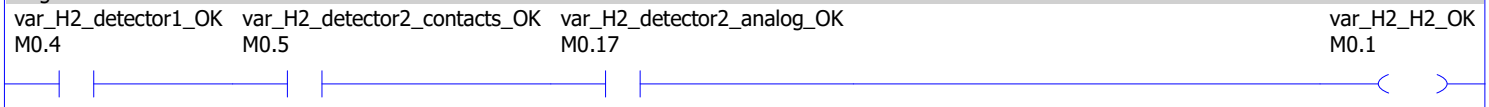
3 H2 gas detector 2 (brand: Dega):



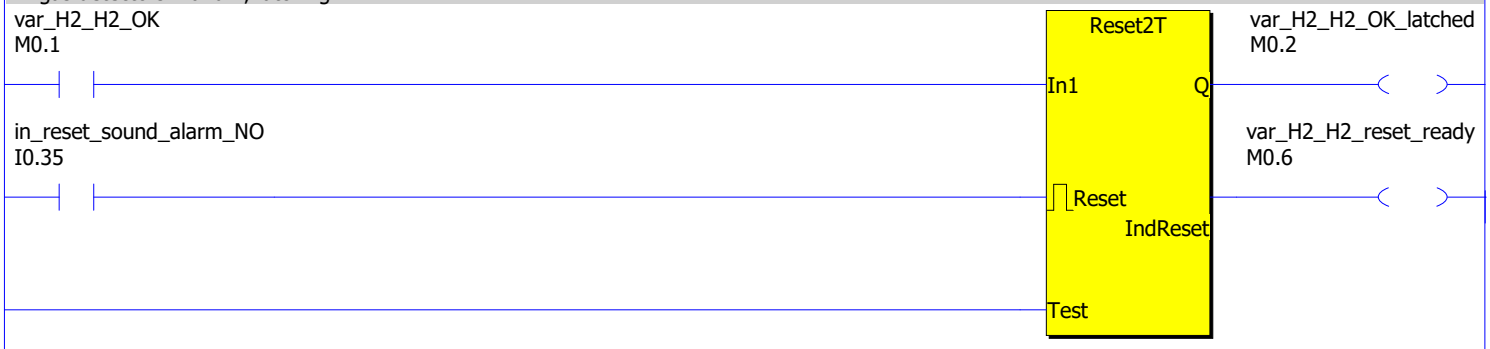
4 H2 gas detector 2, analog input (Note: if SR_I5_Volt >= 6, then vIN >= 0.6V, then iIN >= 0.6V/250Ohm = 2.4mA)



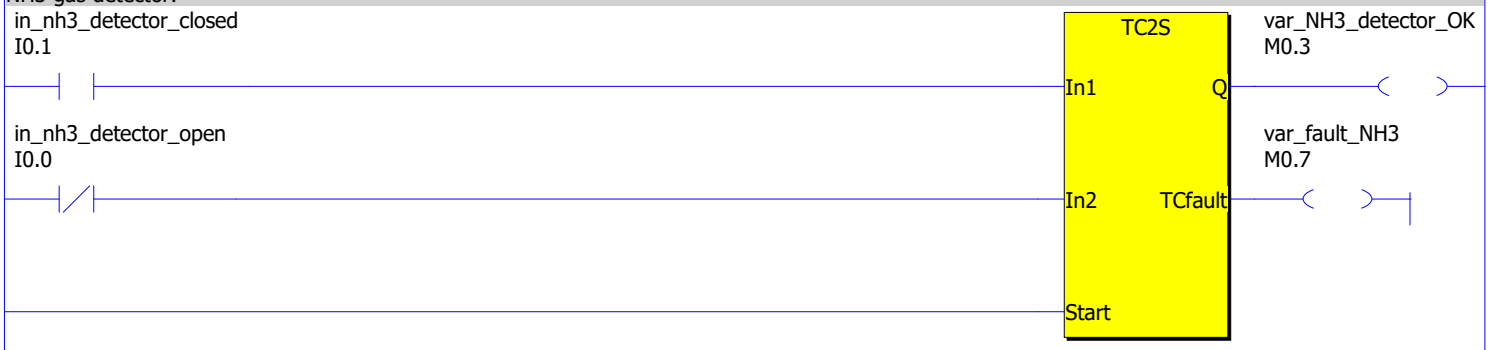
5 H2 gas detectors 1 and 2:



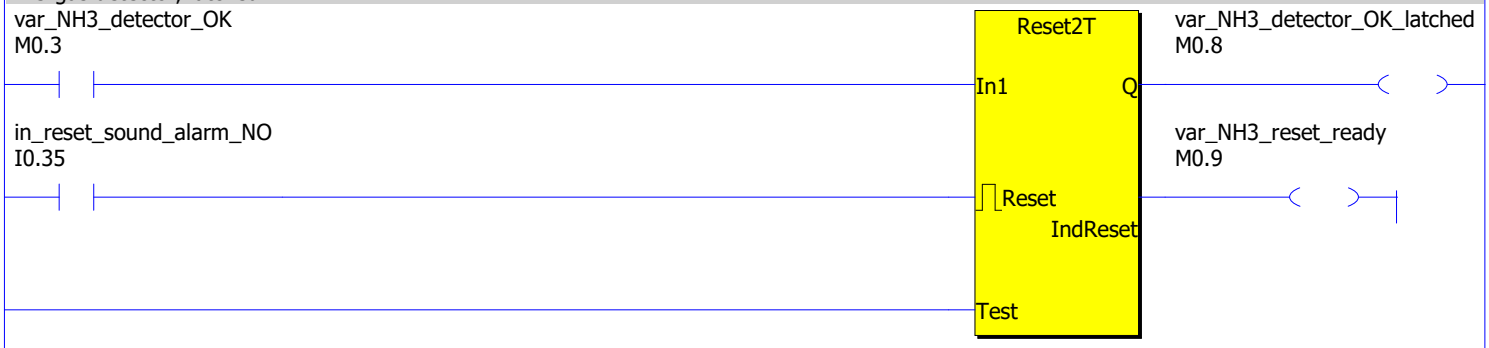
6 H2 gas detectors 1 and 2, latching:



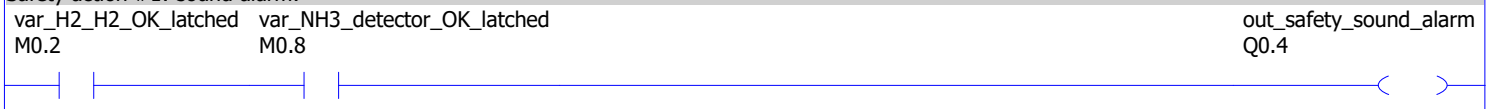
7 NH3 gas detector:



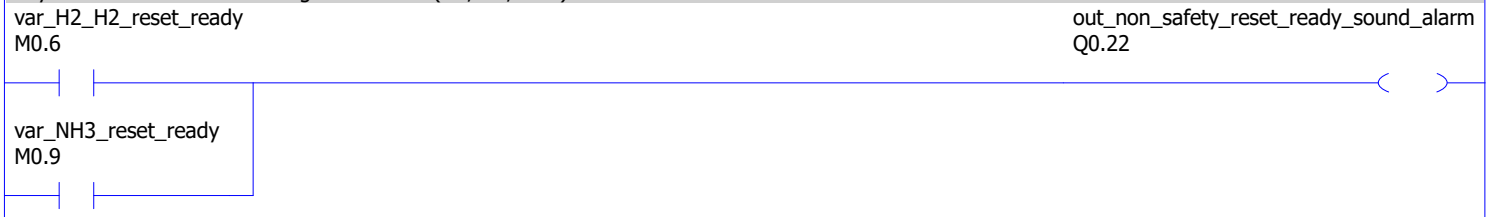
8 NH3 gas detector, latched:



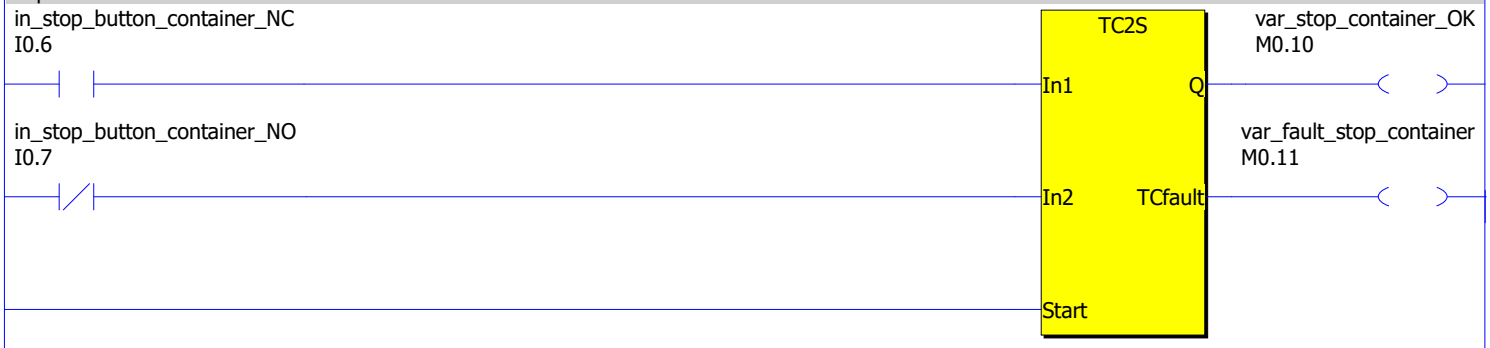
9 Safety action #1: sound alarm:



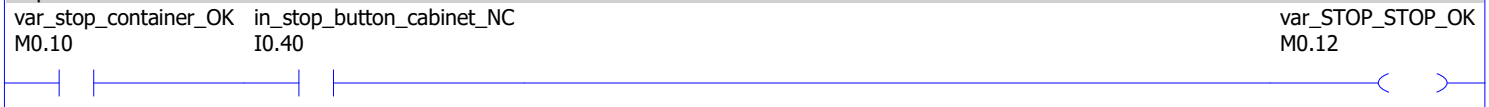
10 Safety action #1 (sound alarm) reset.
Only reseteable when all three gas detectors (H2, H2, NH3) indicate no leak:



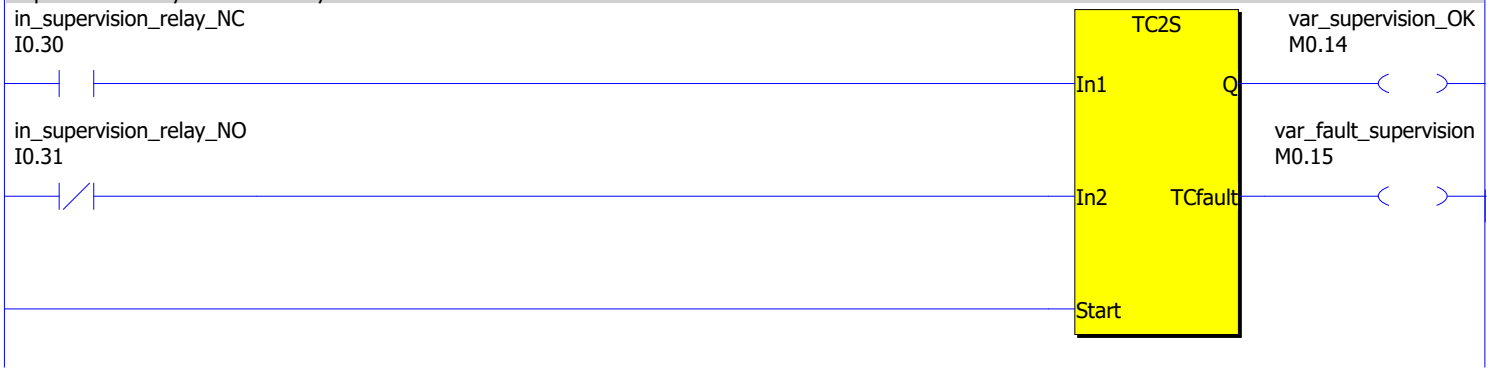
11 Stop button container:



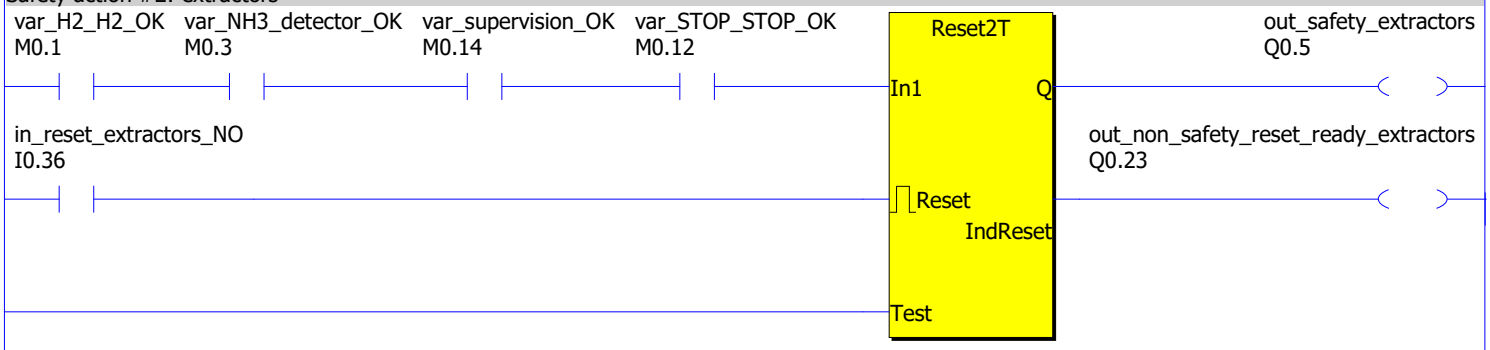
12 Stop button container and CAB-2 front:



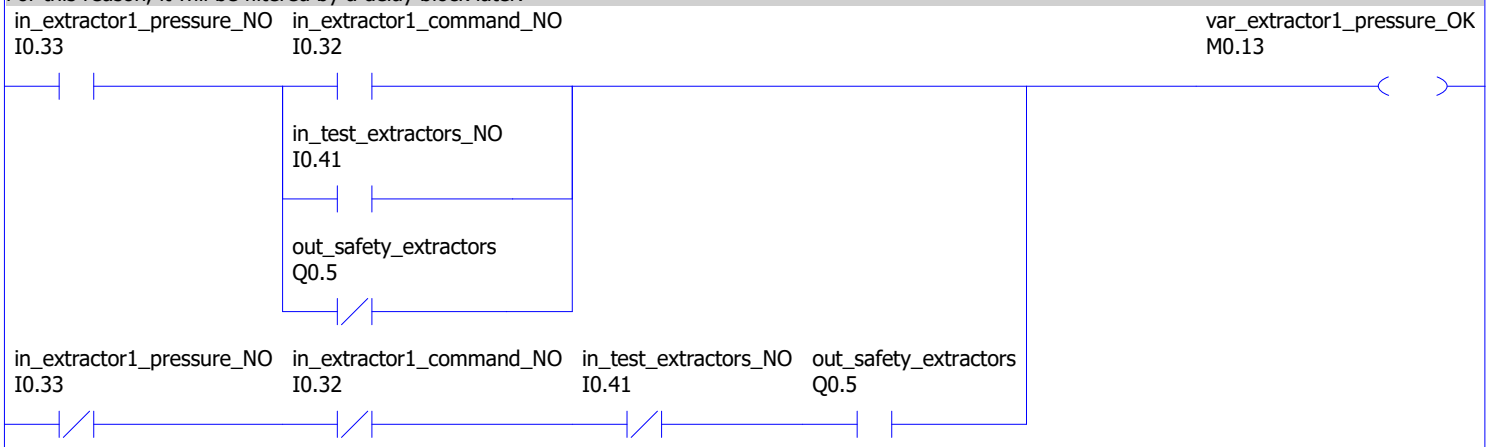
13 'Supervision-safety' interface relay:



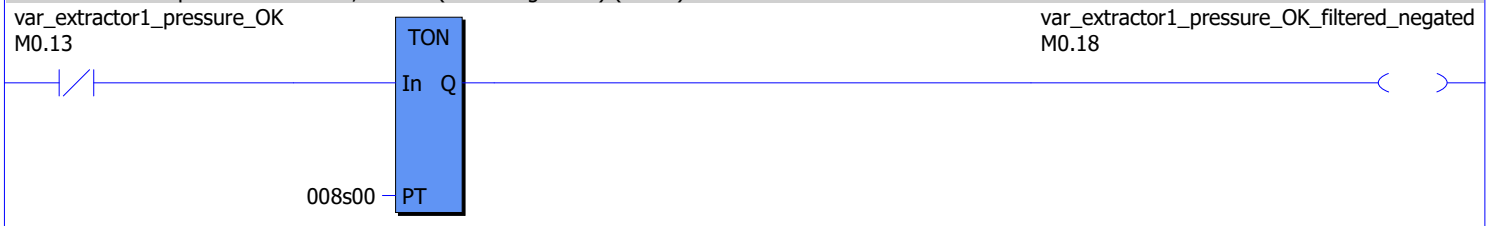
14 Safety action #2: extractors



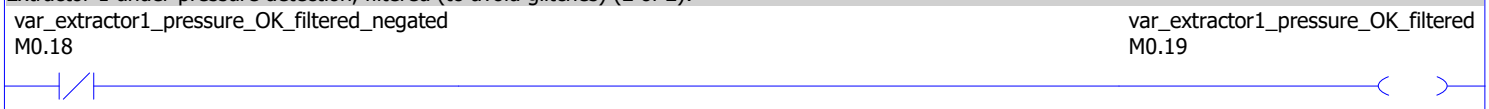
15 Extractor 1 under-pressure detection when extractor is turned on (either in air-renewal mode or emergency mode):
Note: this variable will have glitches in the transitions of 'in_extractor1_command_NO' and 'out_safety_extractors'.
For this reason, it will be filtered by a delay block later.



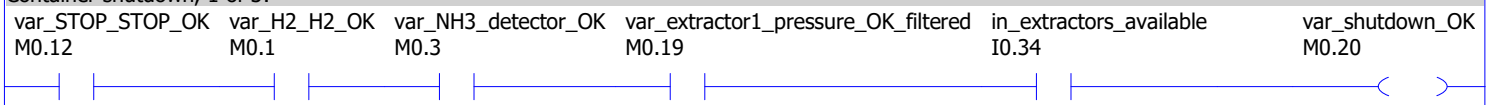
16 Extractor 1 under-pressure detection, filtered (to avoid glitches) (1 of 2):



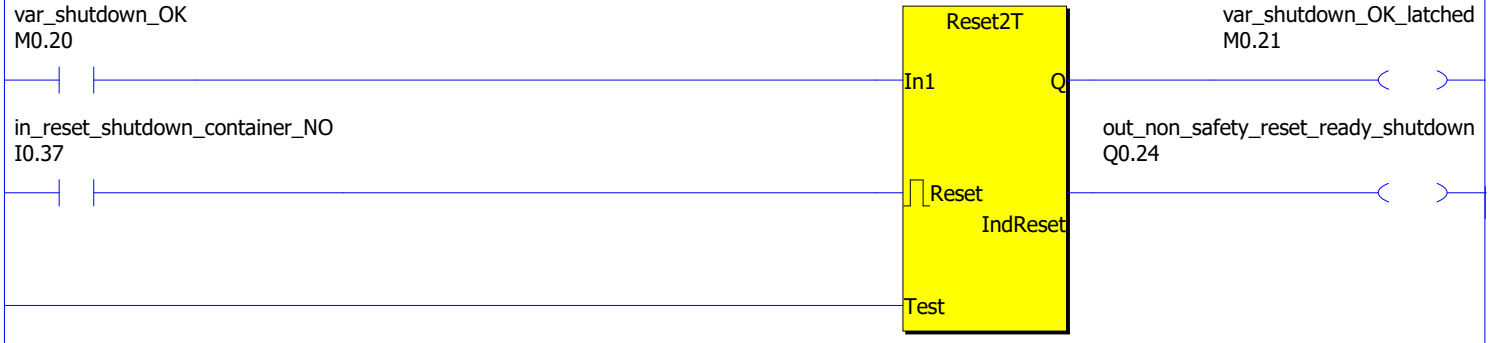
17 Extractor 1 under-pressure detection, filtered (to avoid glitches) (2 of 2):



18 Container shutdown, 1 of 3:

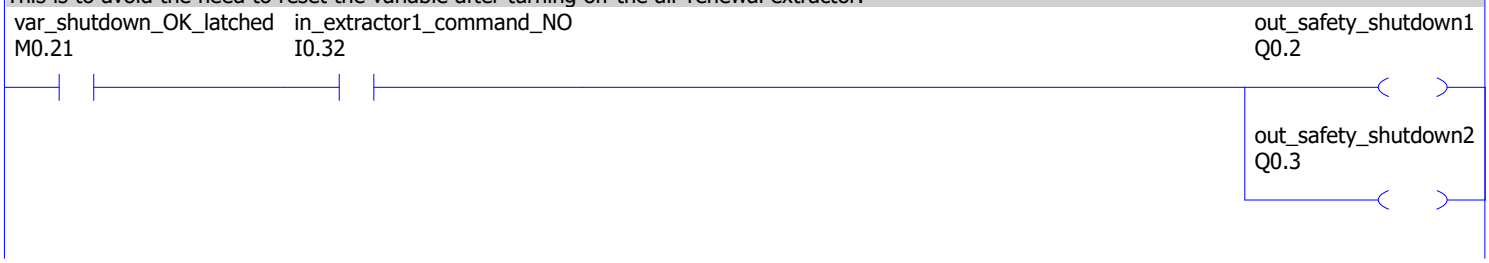


19 Container shutdown, 2 of 3:
Note: This is the latched version of previous result.



20

Safety action #3: container shutdown, 3 of 3:
Note: the input 'in_extractor1_command_NO' is excluded from the latched variable 'var_shutdown_OK_latched'.
This is to avoid the need to reset the variable after turning off the air-renewal extractor.



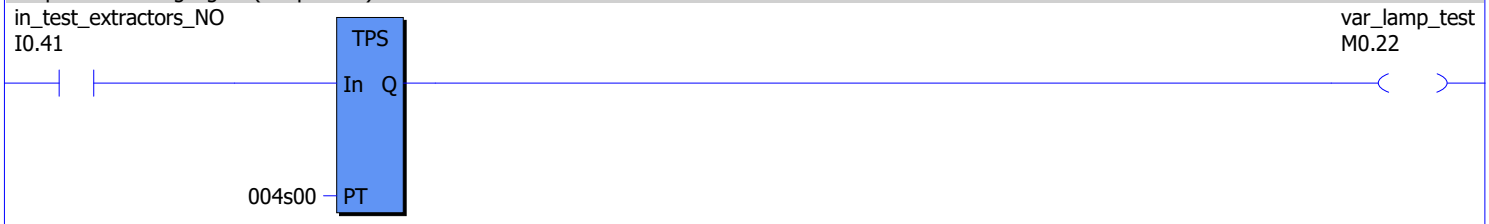
Pluto 0 non_safety

1

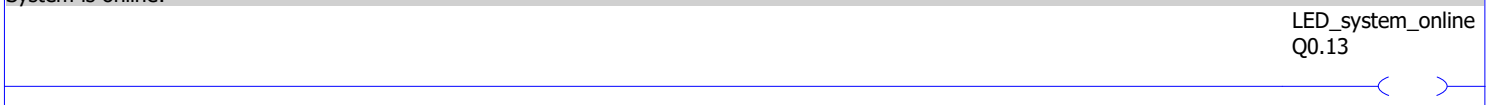
Start

Non-safety sequence. Program start-up. Not handled by the user.

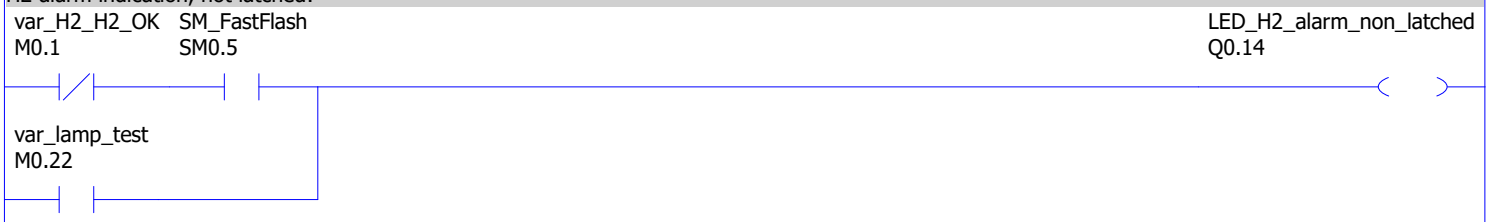
2 Lamp test enabling signal (temporized):



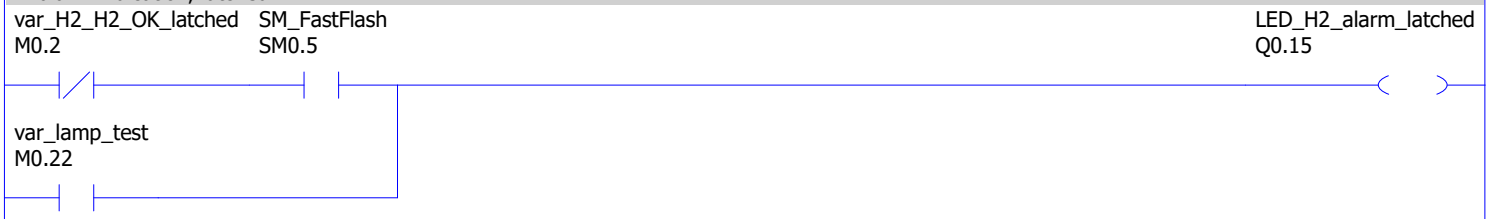
3 System is online:



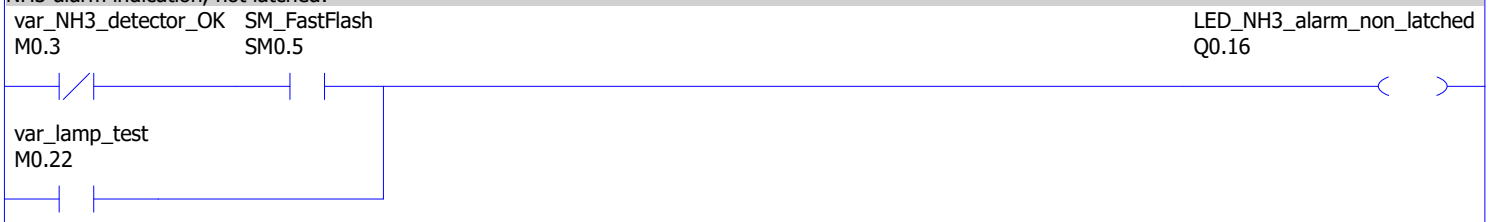
4 H2 alarm indication, not latched:



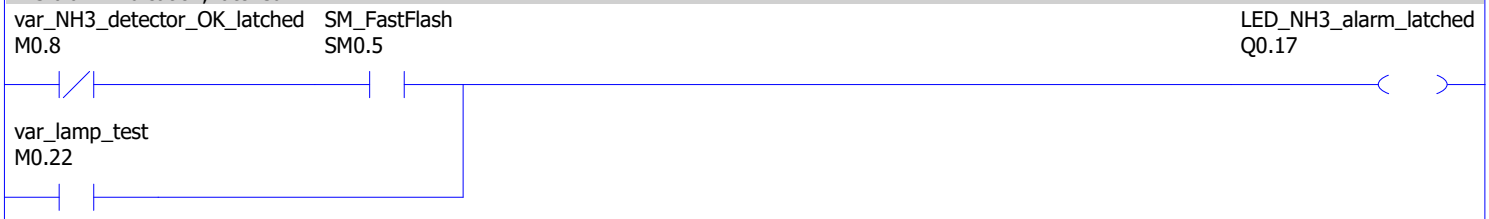
5 H2 alarm indication, latched:



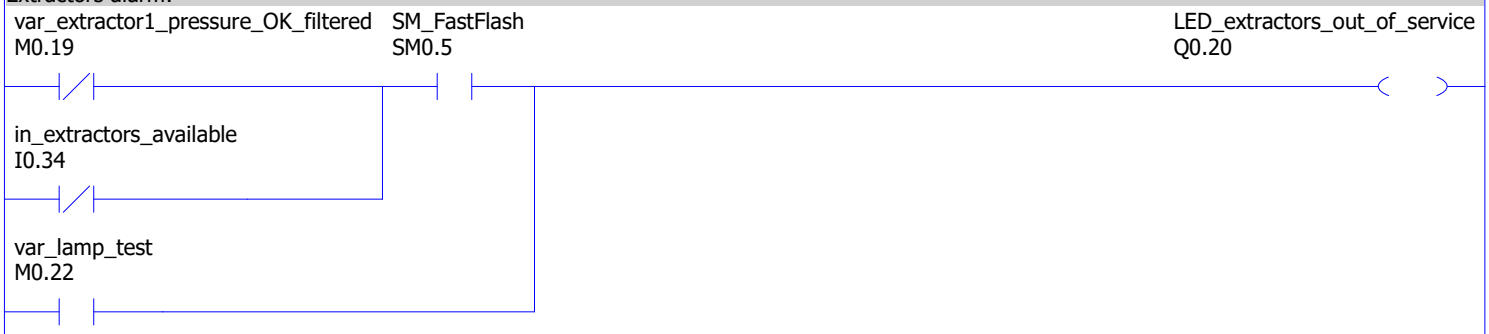
6 NH3 alarm indication, not latched:



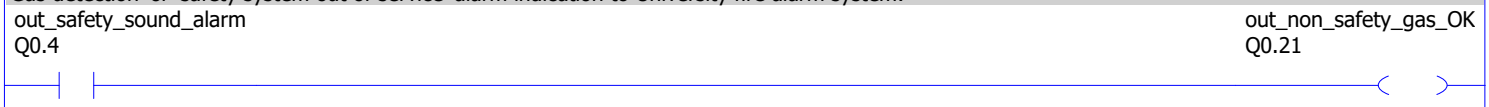
7 NH3 alarm indication, latched:



8 Extractors alarm:



9 'Gas detection' or 'safety system out of service' alarm indication to University fire alarm system:



10 Faut indication alarm for inputs with a combination of a NO and a NC:
Note: this output is not wired to a light indication but observable from the front of the PLC.