When the ENP signal is at 0 or when the PIA and PAI signals take the same value,

No voltage is applied to the solenoid and, as a result, this remains in its previous state. When the ENP signal presents a 1 and, moreover, the PIA and PAI signals are different, a difference is applied Potential of 12 V or -12 V to the solenoid, which releases the door when PIA is at 1 and PAI is at 0 and immobilize it when PAI is at 1 and PIA is at 0. In order to prevent the destruction of the solenoid, It is necessary to limit to about 3 seconds the time in which a potential difference of 12 V or -12 V is applied.

When the door is locked, the opening of the door can be ordered by two procedures.

On the one hand, there is a keyboard located outside the enclosure to which you want to access through the

door This keyboard can be used for the introduction of a secret code that allows the door to be released

from the outside. It can also be used for the modification and verification of this secret code. Keyboard is from

matrix type of twelve keys (\*, # and digits from 0 to 9) distributed in four rows by three columns.

To access the keyboard, there are seven signals, four associated to the rows and three to the columns.

It was chosen to connect the rows to some outputs of selection of the control system and the columns to some

control system data entries. To avoid possible short circuits between the selection outputs,

It has been decided to use open drainage outputs, capable of generating high impedance or low voltage,

and connect resistors of "pull-up" to the data inputs to be able to force in them a high voltage.

When there is no pressed key, high volumes will be obtained in the data entries, be as

are the selection outputs. When the selection outputs are in high impedance, they will be obtained

High voltages to data inputs, whatever the keys are. You will only get a tension

Down in a data entry when there is a key pressed and the row in which it is selected is selected

finds the key (selection output supplying a low voltage). Consequently, both the outputs

of selection, NST3 to NST0, such as data entries, NDT2 to NDT0, are active for 0.

On the other hand, there are two push buttons located inside the enclosure. These two pushbuttons

They generate two active signals for 1, CMD the left button and CET the right button, which

they supply a 1 when pressing them. The purpose of these push buttons may vary according to the specifications

functional of the system. For example, the first one can serve to free the door from the inside,

while the other can serve to enable or disable the opening of the door from the outside.

In addition, the system has two LEDs, one that can be seen from the outside and another that is

you can see from the inside. These two LEDs are commanded by two active signals for 0,

NLEDTA and NLEDET, respectively. The purpose of these two LEDs may vary according to the

functional specifications of the system. For example, the first of them can be used to indicate what has been done

accepted a key that has been pressed, while the other can serve to indicate if the opening of the

Door from outside is enabled or not.

The command system must verify the following requirements:

- The door must be released when, when immobilized, the push button associated with the CMD signal is pressed.

- The door must be immobilized when, when released, any of the following two occur

circumstances:

a) After five seconds from the release of the door, if it has remained closed.

b) Immediately upon closing the door, if it has been opened.

- The door locking operation must be aborted, and then released again, if so

It detects that the door is reopened, in order to avoid damaging the immobilization system. To

That bounces in the door detector do not give rise to oscillating operations of the system, the state

of the door must be filtered, not accepting variations that last less than 40 milliseconds (16

periods of the clock signal).

- At the time of initialization, the system must release the door, if it was open, or has

to immobilize it, in case it was closed. To make that decision, the system will have to

to wait for the state, once filtered, of the door.

- It is recalled that the solenoid can not be activated for more than three seconds in a row. In case of what

during this time the desired change in the state of the door has not been completed, the system of

Command must be locked, deactivating the solenoid.

- The LED associated to the NLEDET signal will remain switched off during the normal operation of the system and

It will turn on when the command system is locked.

States

S0 = initialization

S1 = released door and open

S2 = released door but closed

S3 = immobilized and closed door

if clk400'event and clk400 = '1' then --initialization

if qpob = '1' then-- release the door if it was open

enp <= '1'; -- disable it after 3 seconds

pia <= '1';

pai <= '0';

if(cnt3 = 0) then

enp <= '0';

end if;

else --immobilize at initialization if it was closed

enp <= '1'; -- disable it after 3 seconds

if(cnt40 = 0) then

-- it waits 16 periods of clock cycle to avoid damage

pia <= '0';

pai <= '1';

end if;

if(cnt3 = 0) then

enp <= '0';

end if;

end if;

end if;

if qcmd = '1' then -- If CMD button is pressed the door will be released

-- disable it after 3 seconds

enp <= '1';

pia <= '1';

pai <= '0';

if(cnt3 = 0) then

enp <= '0';

end if;

end if;

if qfca = '1' and qpob = '0' then -- if door is released but it is still closed

-- wait 5 seconds

if(cnt5 = 0) then

enp <= '1';

pia <= '0';

pai <= '1';

end if;

--disable it after 3 seconds

if (cnt3 = 0) then

enp <= '0';

end if;

end if;

if qpob = '0' then -- wait 5 seconds condition

enp <= '1'; -- disable it after 3 seconds

--wait 16 clock cycle

if (cnt40 = 0) then

pai <= '1';

pia <= '0';

end if;

if (cnt3 = 0) then

enp <= '0';

end if;

end if;

if qpob = '1' and fci = '0' and fca = '0' then

--door locking opearation is aborted in case of reopening

enp <= '0';

nledet <= '1';

end if;