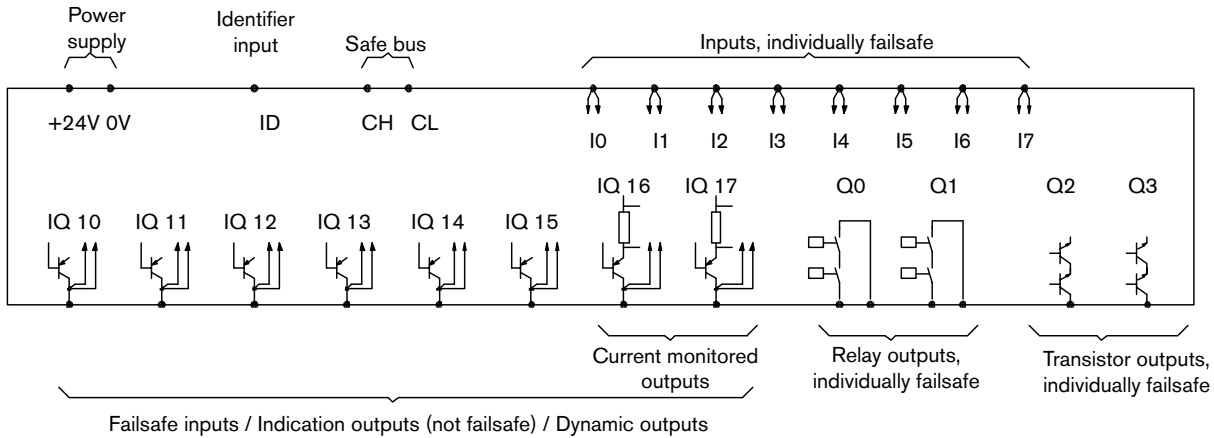# I/O Configuration - Pluto

ID: Input for identifier which provides a unique ID number that can be read by the system.

I0...7: Individually failsafe Safety inputs (24 VDC). A high safety level can be reached by using only one input.

IQ10...17: Multi function terminals that can be used as safety inputs, current monitored outputs, signal outputs for indication or control of non safety related functions.

Q0, Q1*: Relay outputs, individually failsafe and individually programmable.

Q2, Q3*: Failsafe transistor outputs (-24 VDC) which are individually failsafe and individually programmable. Intended for control of electromechanical components such as relays, contactors and valves.

* These outputs exist only on Pluto A20, B20 & Pluto S20.

Connection of input devices

The system offers both dual and single channel solutions for input devices. To detect short circuits in cabling, up to three different dynamic signals and a static +24 VDC can be used as input drivers. Individual inputs are software configured to only accept one type of signal.

In dual channel solutions the two channels must be of a different signal type. A short circuit between the channels is then detected by the system.

In single channel solutions the dynamic signal is modified at each sensor. A short circuit between the sensor input and output is then detected by the the Pluto system. Category 4 can then be fulfilled by using only one channel and one input.
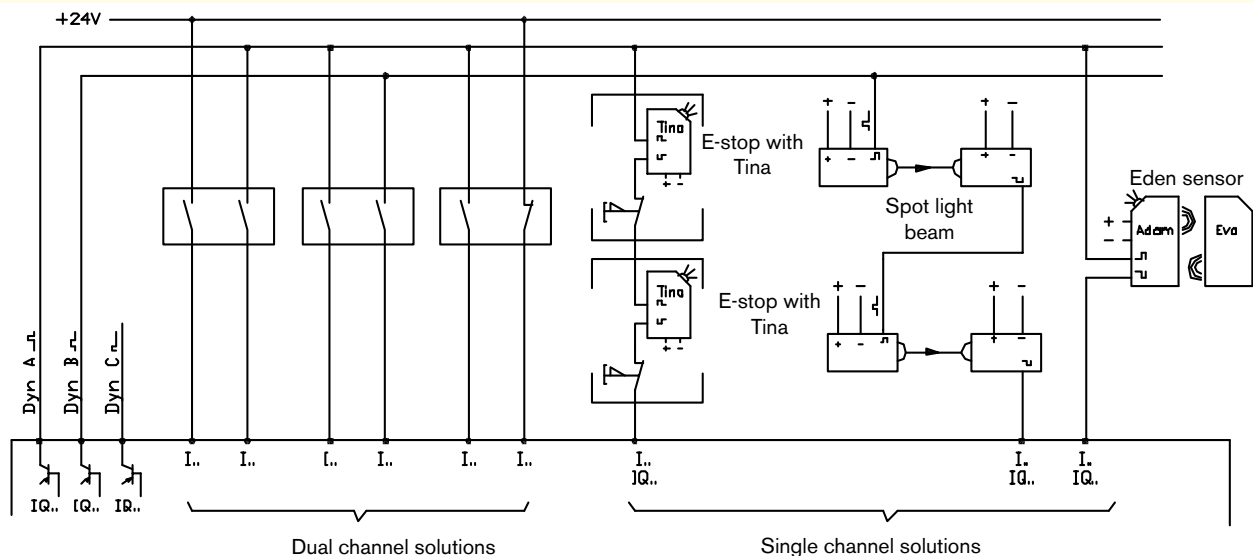
Connection according to Category 4 EN 954-1. Note that only Jokab Safety dynamic sensor adaptors will provide Category 4 in cables and sensors.

Reset device using both the input and output possibility
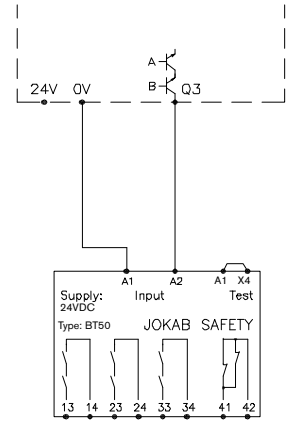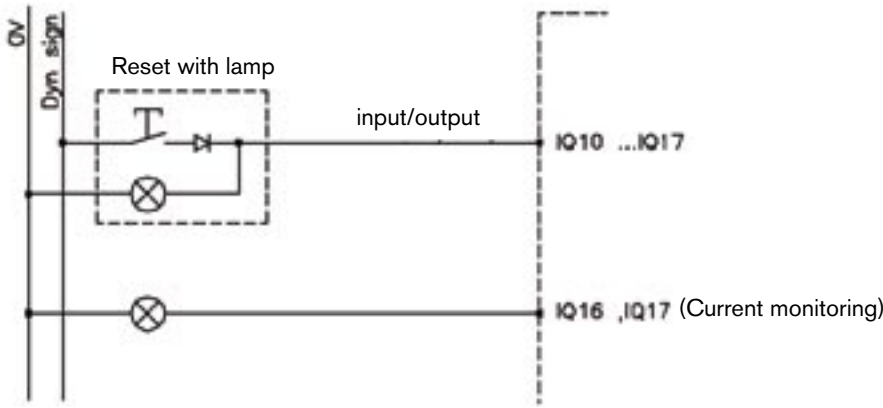
It is possible to connect both an indicator lamp and an input switch to the same terminal e.g. illuminated push button. The function is mainly intended for reset devices and reduces the number of IQ terminals used.

IQ16 and 17 monitors that the muting lamp (bypassing lamp) is functioning, i.e. only if the correct current is flowing through the output, and the lamp is functioning is the muting (bypassing) of safety devices allowed.

Example of contact expansion.

* According to IEC 61496-1 040204 it is no longer a requirement to have supervision of a muting lamp.

Technical data

Manufacturer	JOKAB SAFETY AB, Sweden
Ordering data	Pluto A20, B20, B16 & S20
Supply	
Nominal voltage	24 VDC , -15%, +20%
Max interruption	< 20 ms
Power consumption at 24VDC	
Unit consumption	270 mA / 8,4 W
Fail safe outputs	0 – 1.8 A / 0 - 43 W
PLC outputs (non fail safe)	0 – 2.5 A / 0 - 60 W
Recommended external fuse	6 A
Installation category:	Category II according to IEC 61010-1
Failsafe inputs	
II0 – I7	+24 V (for PNP sensors)
IQ10 – IQ17	+24 V (for PNP sensors) also configurable as non-failsafe outputs.
Max. over voltage	30 V continuously
Filter time (standard)	5 – 10 ms, software
Safety output	
Q2-Q3:	Solid state, -24 VDC
Output voltage tolerance:	Supply voltage -1.5 V at 800 mA
Max. load/output:	800 mA
Q0-Q1:	Relay output
Max voltage	250 VAC
Max. load / output	1.5 A
Outputs, non-failsafe	
IQ10 – IQ17	Transistor +24V, PNP open collector (also configurable as failsafe inputs.)
Max load/output	800 mA
Max total load IQ10-IQ17	2.5 A
Current monitoring IQ16, IQ17*	
Range	0 - 1.0 A
Resolution	20 mA

Safety Bus	
Max. units on the bus	32
Bus cable length	130 m at 400 kb/s (standard) (other combinations are possible)
Response time:	20 - 30 ms
Software setting *NO Filt* reduces the response time.	- 5 ms
Response time over the bus(normal function):	+10 ms
Programming facilities	
Program language	Ladder or boolean algebra
Arithmatic functions	yes
Program memory	32k
Internal memories	500
Registers	150
Timers	50
General	
Enclosure	45 x 84 x 118 mm (w x h x d)
Operating Ambient air temperature:	-10°C - + 50°C
Temperature, transportation and storage:	- 25 - +55°C
Degree of protection:	
Enclosure:	IP 40 - IEC 60 529
Terminals:	IP 20 - IEC 60 529

Certificates
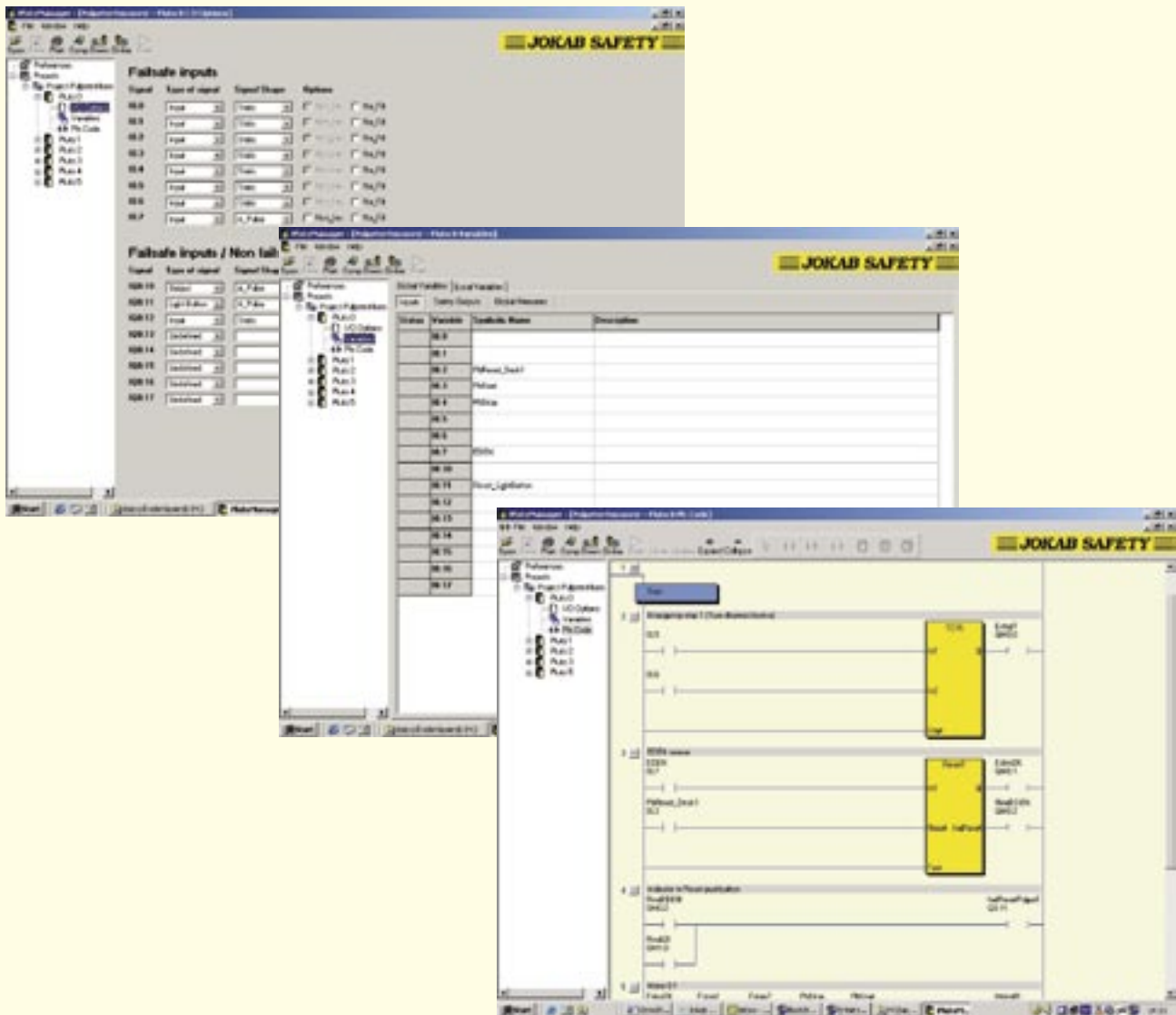

Approved for Canada and USA.

Programming of a project using six Pluto's.

Step by step

Step1
Hardware configuration of Pluto I/O:
Inputs can be selected for static or dynamic pulse inputs. Outputs can be configured to transmit either static or pulsed signals. 8 I/O can be programmed as both inputs and outputs as for example Pushbutton input and light indication.

Step 2
Defining variables
The system has the following variable types: inputs (I), outputs (Q), memories (M), global memories for bus communication (GM) and registers (R). The variables can be assigned a name which is used instead of the actual variable description in the PLC program.

Step 3
Programming
The programming language for Pluto contains predefined function blocks ,certified by TÜV Rheinland, with solutions for ordinary safety functions. The function blocks can be used together with ordinary ladder instructions. The programming language has a full instruction repertoire, like standard PLCs on the market, with timers, arithmetic sequence programming etc.

List of standard and special function blocks for Pluto Manager

The safety designer has full freedom to program safety functions or to use TÜV approved pre-defined safety function blocks.

Standard function blocks:

1. Two-channel function with input for start
2. Two-channel function with test input
3. Two-channel function with test and reset inputs
4. Single-channel function with start input
5. Single-channel function with start and test input
6. Single-channel function with reset and test input
7. Two-channel function with time limitation (equivalent to JSHT2). The timer starts when both inputs are activated.
8. Two-channel function with time limitation (equivalent to JSHT2). The timer starts when one of the inputs are activated.
9. Single-channel pulse function (intended for inner reset)
10. Two-channel pulse function (intended for inner reset)
11. Muting function with two-channel input
12. Muting function with single-channel input
13. Muting function with two-channel input, time limitation and timer for simultanous activation of inputs
14. Safety function with two-channel input and integrated two-channel muting function
15. Two-hand control for actuators with NO/NC + NO/NC contacts
16. Counter which counts up to preset value
17. Counter which counts down from preset value to 0
18. Off-delay
19. Muting-lamp_Q16
20. Muting-lamp_Q17
21. Muting-lamp W_Q16. With possibility to set the number of Watts
22. Muting-lamp W_Q17. With possibility to set the number of Watts

Special function blocks:

- program library with program blocks for eccentric presses

- safe absolute encoders

- pulse transducer cam

- customized special blocks

Web support - Pluto

On our website, especially for you as a Pluto customer, we offer continously updated product support. You can always download the latest information from this website. Example of contents:

- E-mail support directly to our Pluto specialists
- Hardware manual
- Safety manual with the most important safety requirements
- Programming manual
- Gateway manual
- Description of function blocks
- Questions & answers
- Pluto Manager Installation file, programming tool
- Pluto OS, files for updating the system software
- Declaration of conformity