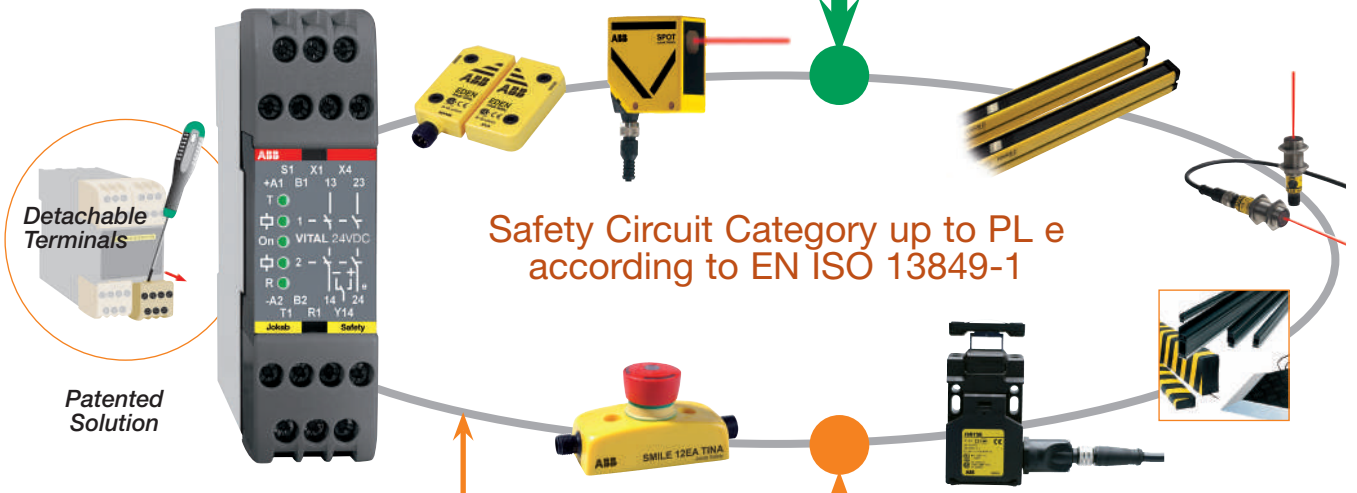
Vital/Tina Safety Systems

Monitor all types of safety devices! Eliminate the need for safety relays! Simplify connections and cables!

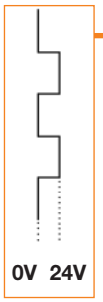
Safety System using Vital Safety Dynamic Pulse Technology

Vital is a safety controller with a dynamic safety circuit that can monitor up to 30 sensors, such as Eden, in accordance with the highest safety level. The safety loop can be expanded by using Tina Duo. Vital has selectable manual or automatic resetting and dual outputs. (The Pluto Safety PLC has many inputs for dynamic safety circuits.)



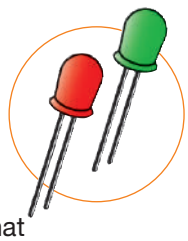
Dynamic Safety

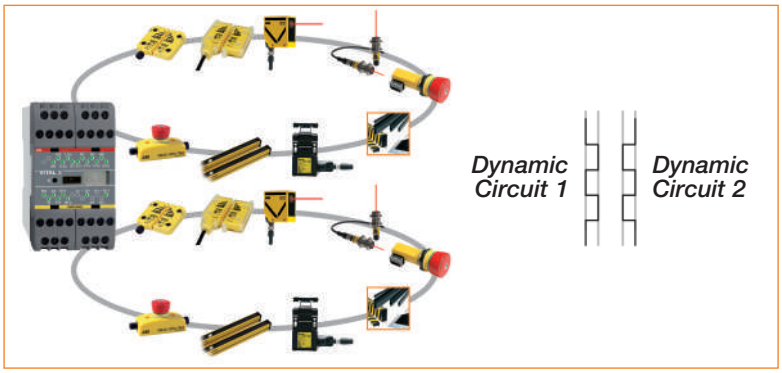
Dynamic "twinned" safety signal that tests a sensor, for example, 200 times per second.

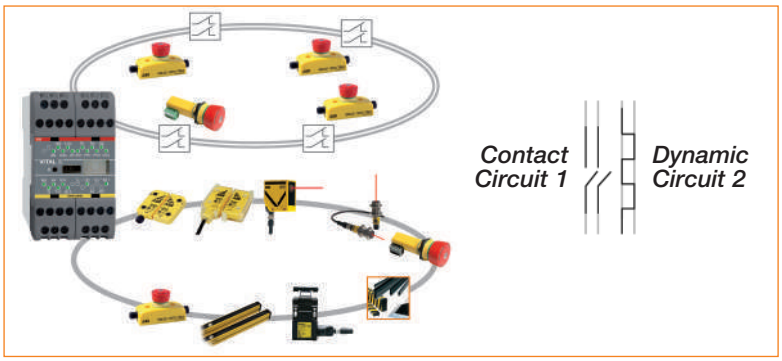


LED Indication

Each active sensor and Tina unit has LEDs that indicate OK (green), broken safety circuit (red) or flashing if the loop has been broken by another, earlier, sensor.







Available in 3 Variations

Vital 1

- Up to 30 sensors can be connected to the same dynamic safety circuit

Vital 2

- Two safety circuits are monitored by one module
- Simple system with extensive functionality
- Up to 10 sensors can be connected to each dynamic safety circuit
- Output group 2 can be set for time delay
- Three different modes of operation

Vital 3

- Two safety circuits are monitored by one module
- Devices with two-channel, opening contacts can be connected to one circuit
- Simple system with extensive functionality
- Output group 2 can be set for time delay
- Three different modes of operation

One Vital Supervises the Entire Robot Cell!

Two Charging Stations

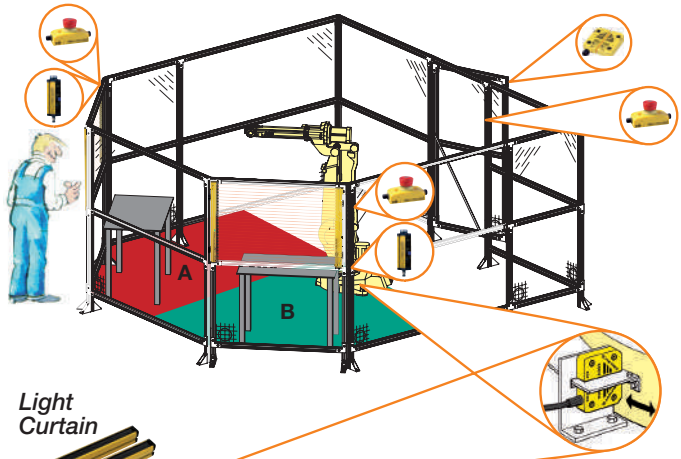
At each charging station a light curtain checks for anyone putting their hand into a risk area, and an Eden sensor checks whether a robot is inside the same risk area. This means that a stop is only ordered if a robot and a person are in the same area. When the station is clear, the person presses the reset button connected to the light curtain.

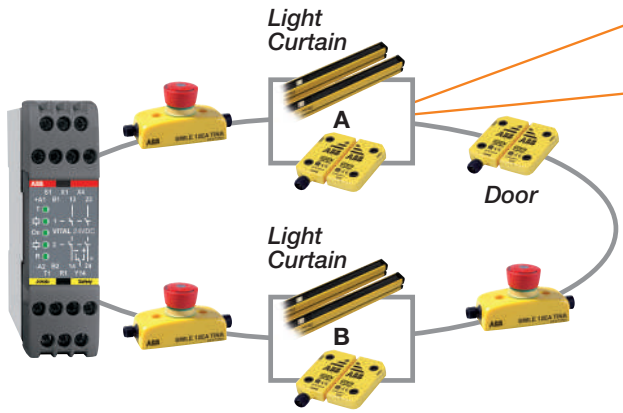
Fence with Eden Interlocked Door

If the door is opened, the robot stops. To reset the robot system, the door must be closed and a supervisory reset button operated.

Three Emergency Stops with Tina Units

If any of the emergency stop buttons is pressed, the robot performs an immediate stop.

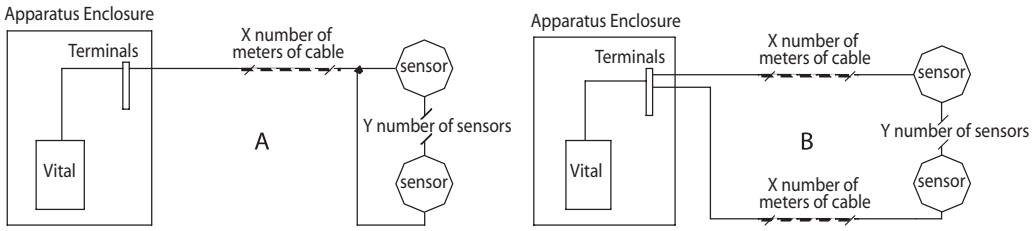




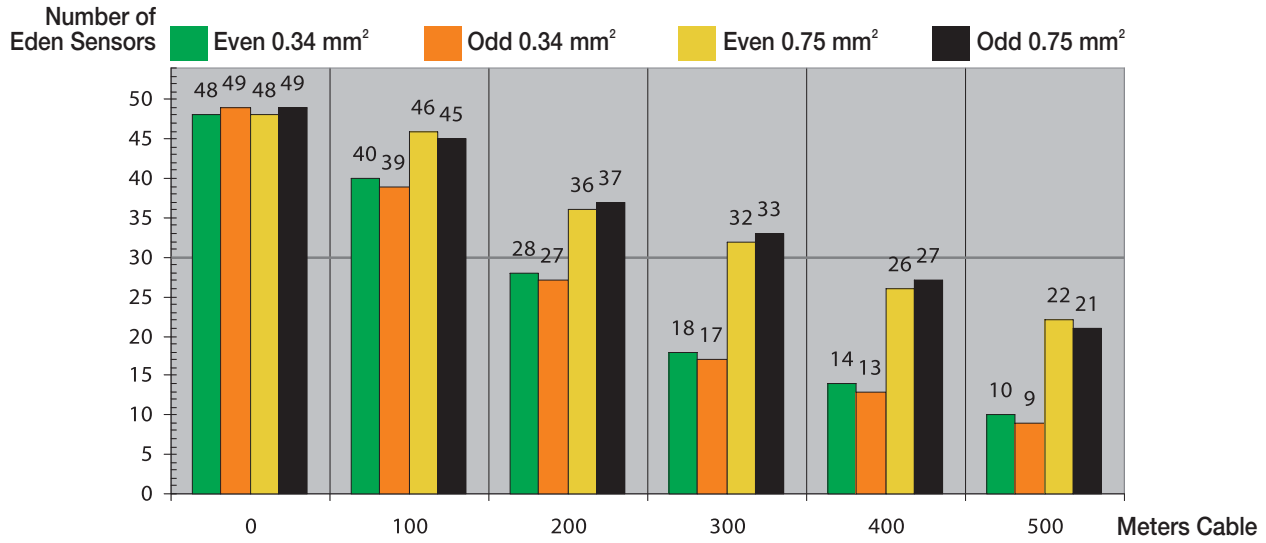
Dynamic Safety Circuit in accordance with Category 4 EN 954-1/EN ISO 13849-1

Number of Edens That Can Be Used with Vital and Pluto

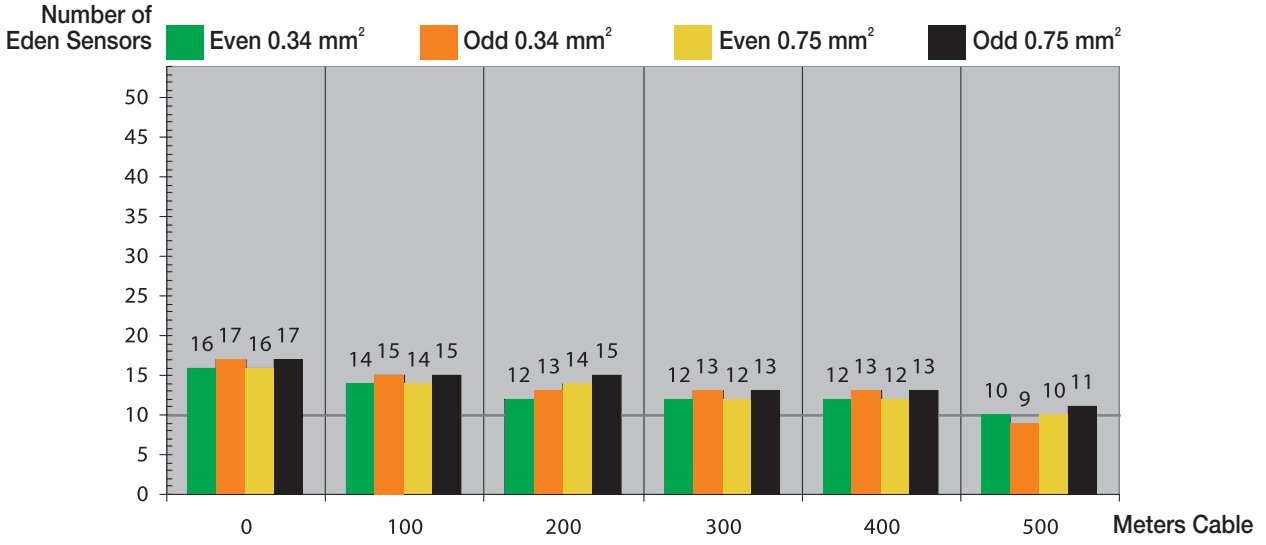
The tables below show the number of Edens that can be connected to Vital and Pluto with the maximum voltage variation. The values have been established in a laboratory environment. The actual possible number of connected Edens may therefore differ from those given in the table. The values should be regarded as guidelines; ABB Jokab Safety recommends a maximum of 30 Edens per Vital 1 and a maximum of 10 Edens per Pluto and Vital 2/3 input. The table was prepared according to measurements with connection example A. If connection example B and 0.34 mm^2 cable is used (with feed voltage from two directions), the values for 0.75 mm^2 in the tables are used.



Number of Edens That Can Be Used with Vital 1



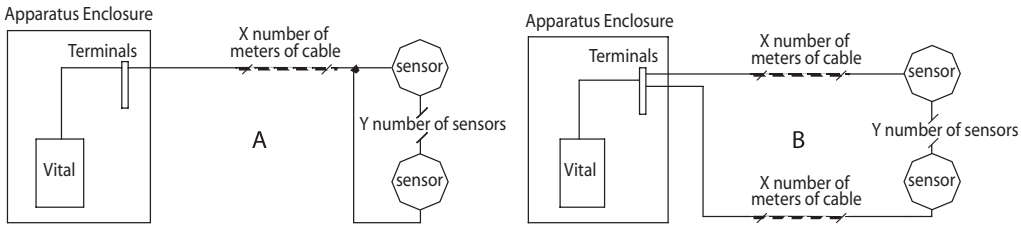
Number of Edens That Can Be Used with Pluto and Vital 2/3



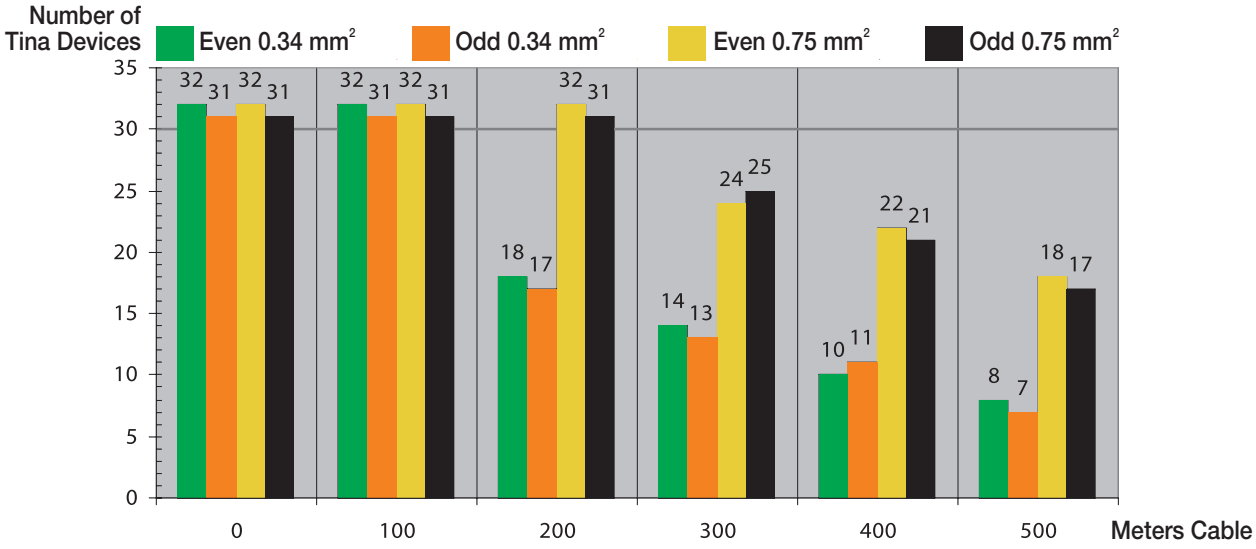
Number of Tinas That Can Be Used with Vital and Pluto

The following tables show the numbers of Tina-3A, Tina-6A, Tina-7A and SmileTina that can be connected to Vital and Pluto with the max voltage variation. The values have been established in a laboratory environment. The actual possible number of connected units may therefore differ from those given in the table. The values should be regarded as guidelines;

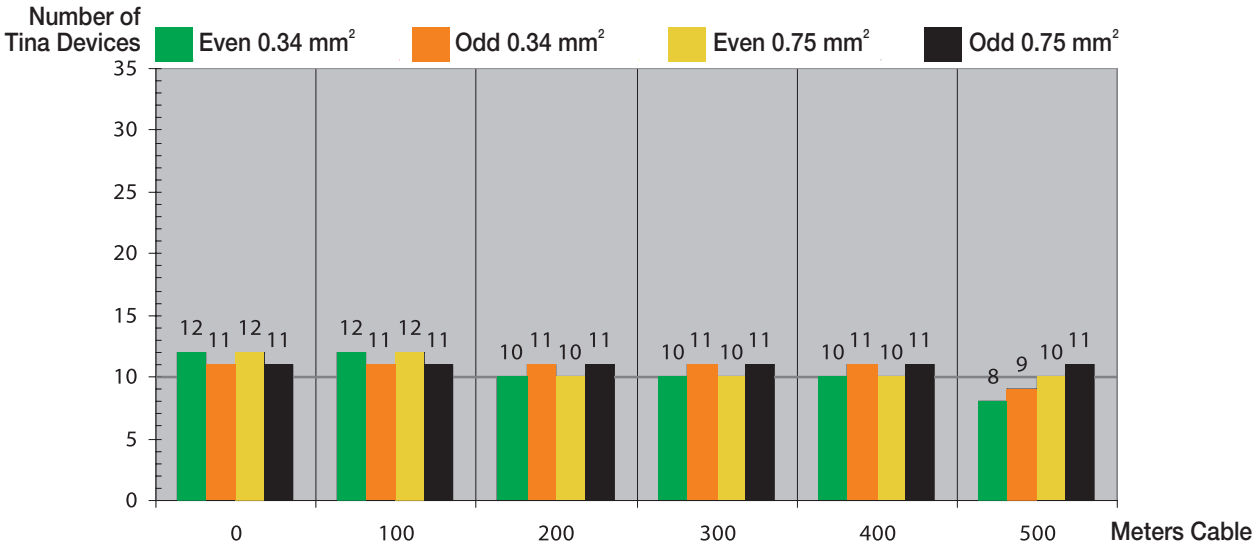
ABB Jokab Safety recommends a maximum of 30 units per Vital 1 and a maximum of 10 units per Pluto and Vital 2/3 input. The table was prepared according to measurements with connection example A. If connection example B and 0.34 mm^2 cable is used, the values for 0.75 mm^2 in the tables are used.



Number of Tina-3A, 6A, 7A and Smile Tinas That Can Be Used with Vital 1



Number of Tina-3A, 6A, 7A and Smile Tinas That Can Be Used with Pluto and Vital 2/3



Why should you use the Vital Safety System?

...to be able to connect several safety components in series — at Category 4 — and supervise them with only one safety controller!

Vital is the heart of a solution which makes it possible to install/connect many different types of safety devices in the same safety circuit and still achieve PL e according to EN ISO 13849-1.

The Vital module is based upon a dynamic single-channel concept as opposed to conventional dual-channel safety relays. Up to 30 dynamic sensors can be connected directly in the safety circuit and be supervised by only one Vital module. The Vital there fore replaces several safety relays. Safety components with output contacts can be connected to the Vital via low cost Tina adapters.

The Vital also has automatically or manually supervised reset selection, dual safety outputs, and an information output for reset indication and status information for PLCs.

...to supervise safety components!

Most safety components on the market can be connected to the Vital module. Dynamic sensors enable safety PL e to be achieved in a single-channel system. For example, ABB Jokab Safety´s dynamic non-contact Eden sensor, Spot light beam and emergency stops (via Tina adapters) can be used. Even mechanical switches can be connected to Vital with the aid of ABB Jokab Safety´s Tina adapters.

...for easy installation and assembly of a safety system!

Vital is a small electronic safety controller that dynamically supervises a number of safety components. Vital´s detachable connector blocks simplify the connection, troubleshooting and exchange of modules. The Vital and other safety components can be connected together using standard cables and with cables having M12 connections.

Why should you choose Vital?

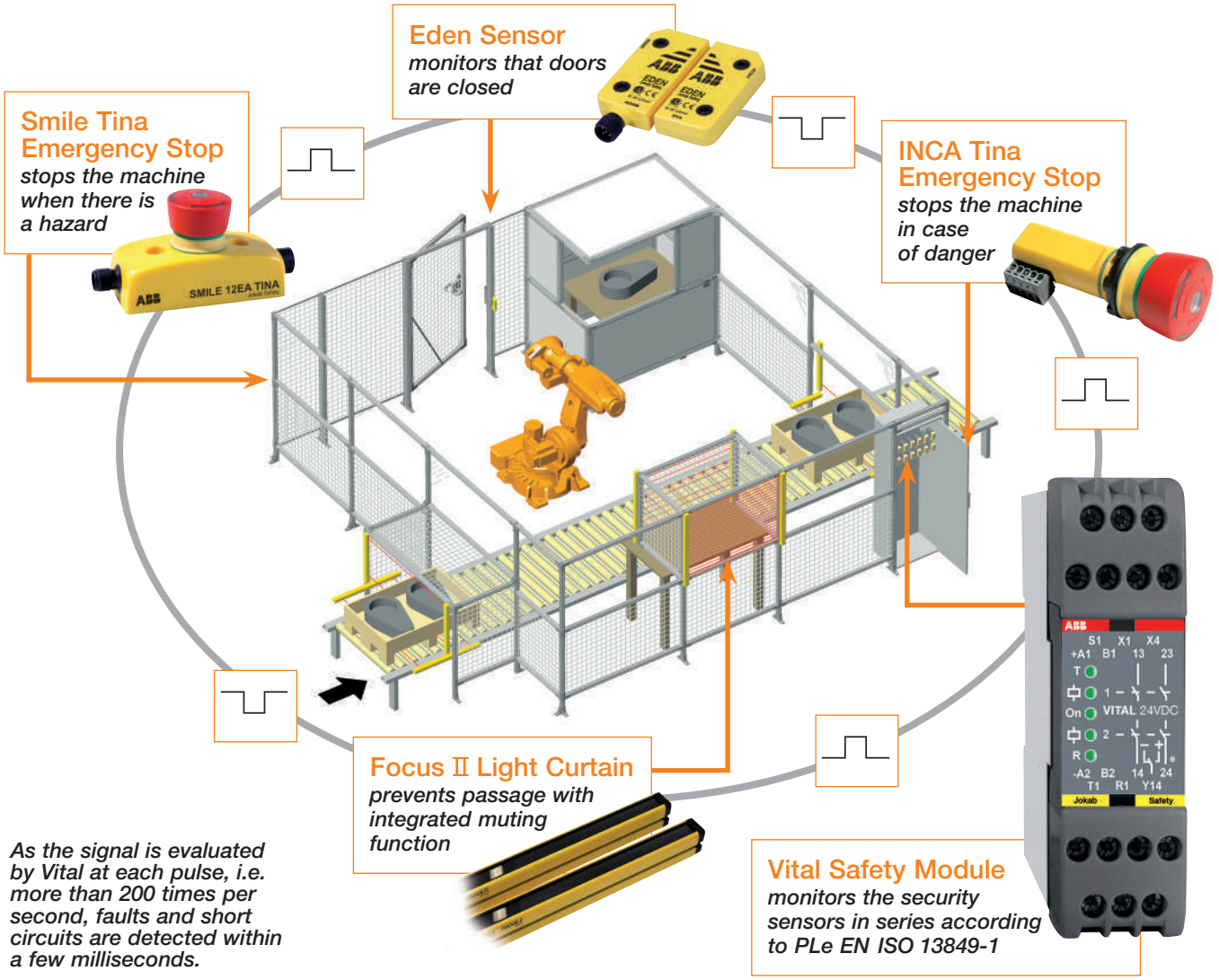
- PL e, according to EN ISO 13849-1 dynamic safety circuit
- Can accommodate long cable lengths
- Manually supervised or automatic reset
- Two NO safety outputs
- Detachable connector blocks
- LED indication of power supply, dynamic signal and outputs
- Information output with two functions
- Cost-effective cable routing/connections

How does a Vital dynamic circuit work?

The dynamic signal consists of a square wave that is transmitted through the safety circuit. The signal is inverted at each safety component and is monitored 200 times per second by Vital or Pluto.

The dynamic signal is transmitted as single channel throughout all the protection in the same safety circuit between input terminals T1 and R1. If a protection breaks, the dynamic signal is not transmitted — which is detected by Vital — which breaks its safe outputs. Even short circuits across a protection are detected since the signal is inverted in each sensor (the protection is then OK), while Vital expects a correctly inverted signal at the right time.

In this case, an even number of sensors are connected to the safety loop which means that the dynamic signal will be inverted an even number of times when it is evaluated by Vital. This is determined by the terminal inputs S1 and B1 being connected together. If an odd number of sensors have been connected, connection of S1 is not required. As the signal is evaluated by Vital at each pulse, i.e. more than 200 times per second, faults and short circuits are detected within a few milliseconds.



As the signal is evaluated by Vital at each pulse, i.e. more than 200 times per second, faults and short circuits are detected within a few milliseconds.

Vital Safety Controllers

Vital is based on a single channel safety concept where multiple safety sensors can be connected in series and monitored with a single safety controller. A dynamic signal is sent from Vital through all connected sensors, and then returned to Vital which then evaluates the received signal. As each safety sensor inverts the signal, it is possible to detect short circuits or faults in any of the sensors.

Vital 2 and Vital 3 are designed for use with ABB Jokab Safety Eden sensors, Tina components and Spot light grids or similar products. Vital 2 and Vital 3 are both safety controllers with two safe input functions and two output groups. The only difference between the two models being in the input configuration.

Applications

- Entire safety system based on the dynamic safety system

Features

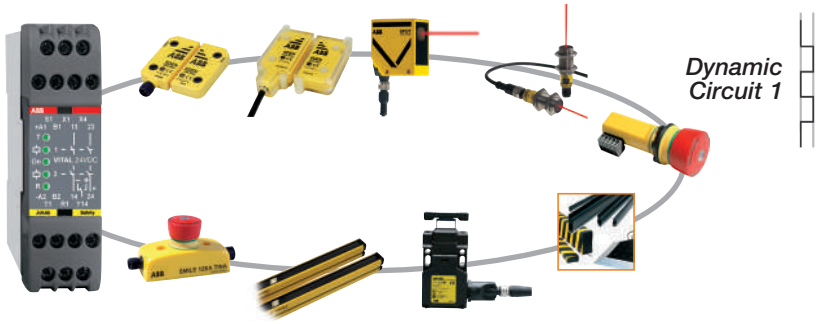
- Easy installation
- Flexible
- Cost effective
- Display for troubleshooting (Vital 2 and Vital 3)
- A wide range of safety sensors can be connected into the circuit
- Several safe outputs
- Information output
- Outputs with time delay (Vital 2 and Vital 3)

Approvals

TÜV Nord (Vital 1)
TÜV Rheinland (Vital 2 and Vital 3)

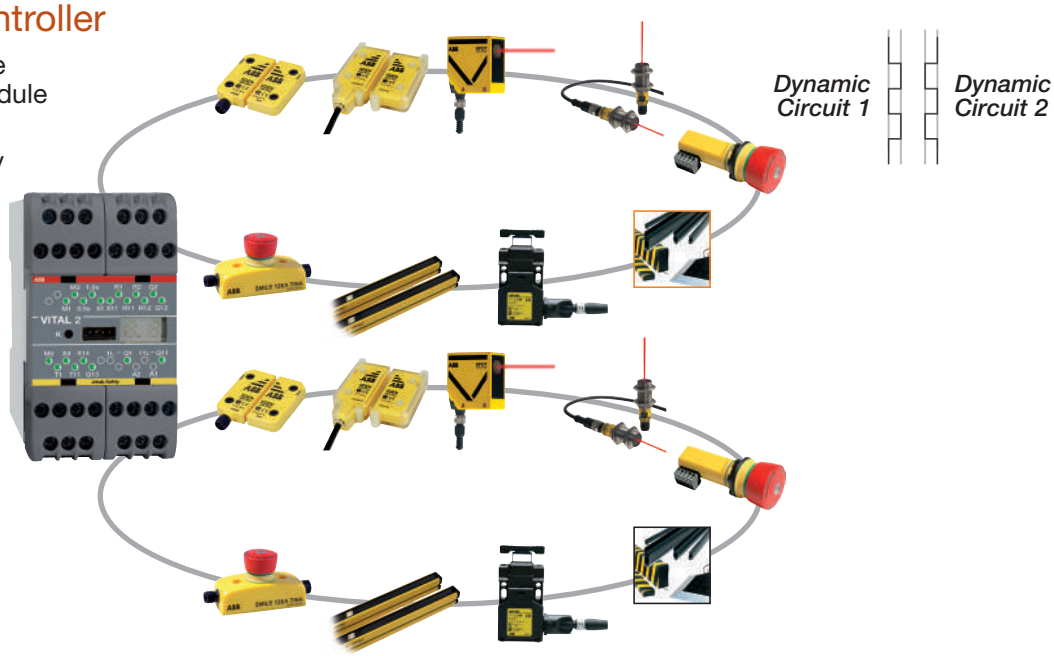
Vital 1 Safety Controller

- Up to 30 sensors can be connected to the same dynamic safety circuit



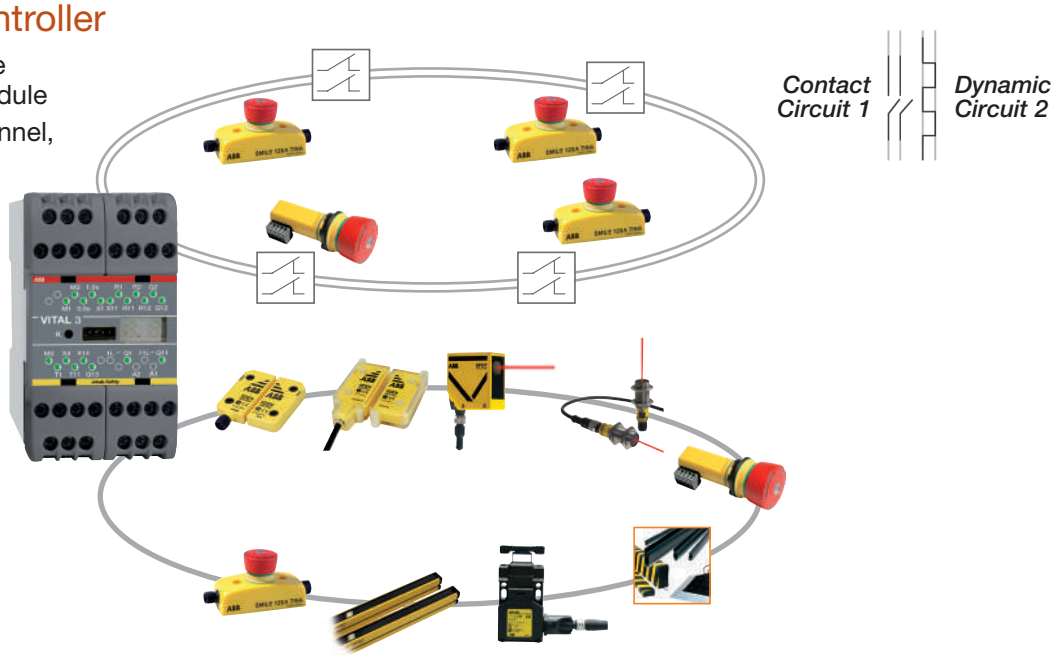
Vital 2 Safety Controller

- Two safety circuits are monitored by one module
- Simple system with extensive functionality
- Up to 10 sensors can be connected to each dynamic safety circuit
- Output group 2 can be set for time delay
- Three different modes of operation



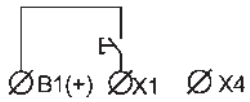
Vital 3 Safety Controller

- Two safety circuits are monitored by one module
- Devices with two-channel, opening contacts can be connected to one circuit
- Simple system with extensive functionality
- Output group 2 can be set for time delay
- Three different modes of operation



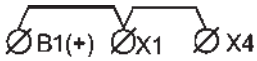
Vital 1 Reset Connections

Manual Supervised Reset



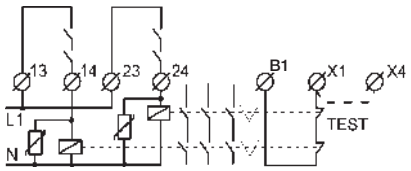
The manual supervised reset contact connected to input X1 must be closed and opened in order to activate the relay output.

Automatic Reset



Automatic reset is selected when B1, X1 and X4 are connected. The relay outputs are then activated at the same time as the inputs.

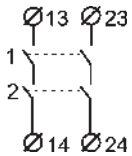
Testing External Contactor Status



Contactors, relays and valves can be supervised by connecting `test' contacts between B1 and X1. Both manually supervised and automatic reset can be used.

Vital 1 Output Connections

Relay Outputs



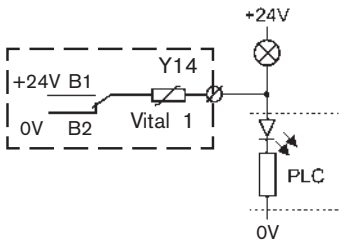
The Vital 1 has two (2 NO) safety outputs. In order to protect the output contacts it is recommended that loads (inductive) are suppressed by fitting correctly chosen VDRs, diodes etc. Diodes are the best arc suppressors, but will increase the switch off time of the load.

Connection of S1

Even number of units in series (Eden+ Spot+Tina) requires a connection between B1 and S1. S1 is not connected at odd number of units.

See drawing below figure A and other examples in the book.

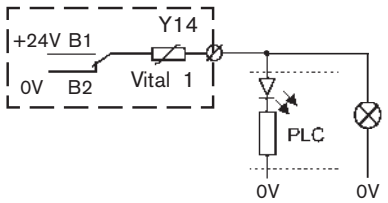
Information Outputs



Vital 1 has a switching relay output for information. The function is determined by a DIP switch.

The DIP switch position 1 (original position) is the information output Y14 internally connected to 0V and +24 V as per:

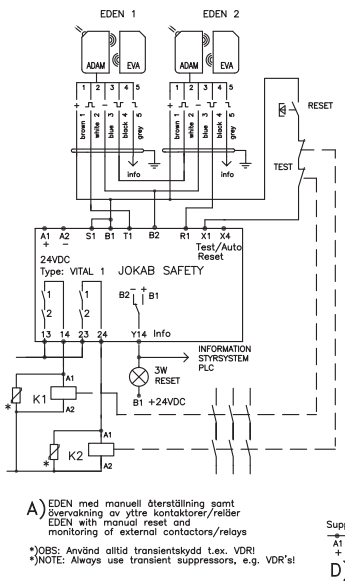
- Y14 is closed to 0V (B2) internally when Vital 1 has not been reset.
- Y14 is closed to +24 V (B1) when Vital 1 has been reset.



In DIP switch position 2 (the purpose of the function is to start/restart block, RES) the information output Y14 is internally connected to 0V and +24 V as per:

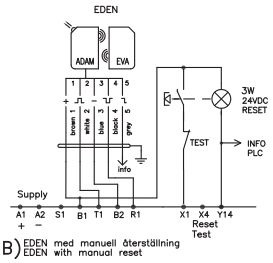
- Y14 is internally closed to 0V (B2) when the dynamic safety loop is open or when the dynamic safety loop is closed and Vital 1 has been reset.
- Y14 is internally closed to +24 V (B1) when the dynamic safety loop is closed but Vital 1 has not been reset (RES).

Vital 1 Connection of Safety Devices

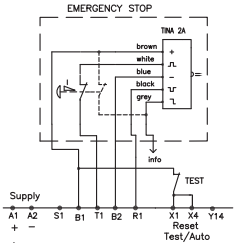


A) EDEN med manuell återställning samt övervakning av yttre kontaktorer/reläer
EDEN with manual reset and monitoring of external contactors/relays

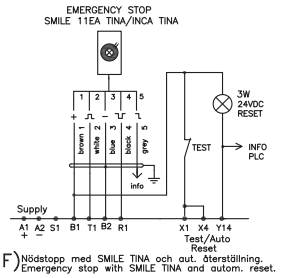
*)OBS: Använd alltid transientskydd t.ex. VDR!
*)NOTE: Always use transient suppressors, e.g. VDR's!



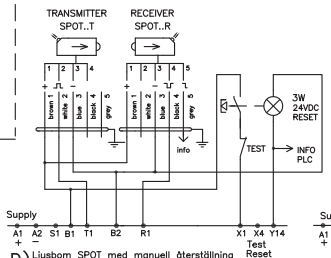
B) EDEN med manuell återställning
EDEN with manual reset



C) Nödstopp med TINA2A och aut. återställning.
Emergency stop with TINA2A and autom. reset.

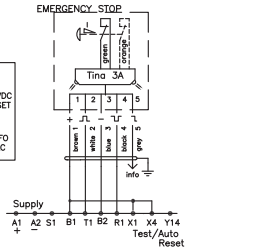


F) Nödstopp med SMILE TINA och aut. återställning.
Emergency stop with SMILE TINA and autom. reset.



D) Ljusbom SPOT med manuell återställning
Safety Lightbeam SPOT with manual reset

Note! Refer to the Vital 1 manual for internal configuration when used together with the light beam Spot 10/35



E) Nödstopp med TINA3A och aut. återställning.
Emergency stop with TINA3A and autom. reset.

M12 Connector/Cable

Pin 1 = brown
Pin 2 = white
Pin 3 = blue
Pin 4 = black
Pin 5 = grey

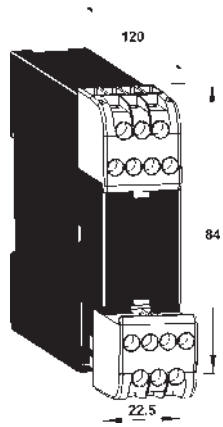
+
in
–
out
info

Vital 1 Technical Data

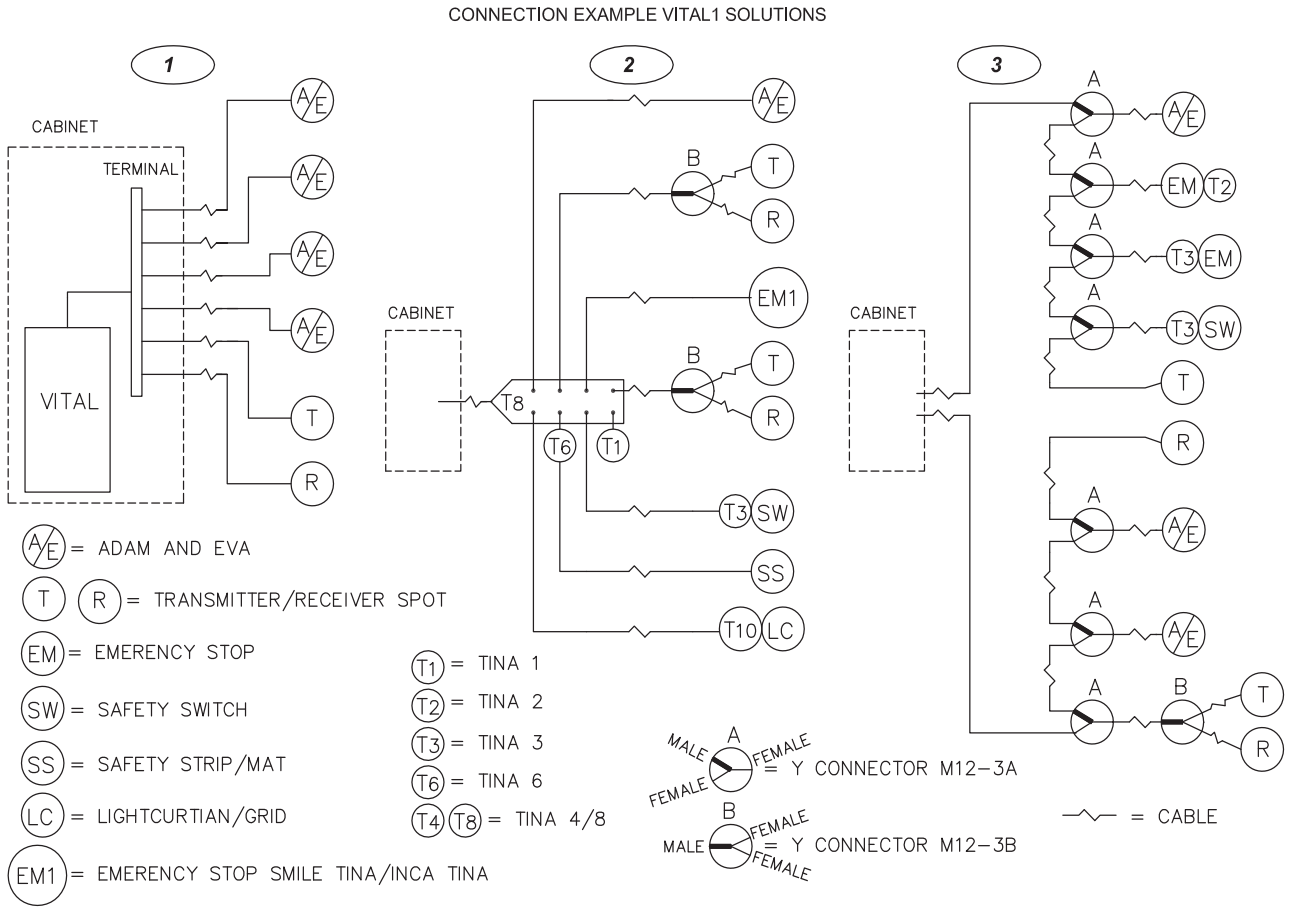
Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:57
Level of safety EN ISO 13849-1 EN 62061 IEC/EN 61508-1…7 EN 954-1	 PL e, category 4 SIL 3 SIL 3 Category 4
PFH_d	2.74×10^{-8}
Color	Grey
Weight	220 g
Power supply Vital, A1-A2 From Vital to sensors/units, B1-B2	 24 VDC ±15% 24 VDC
Fuse An external fuse should be fitted in the supply to A1	 3 AT
Max line resistance at nominal voltage to X1	 150 Ohm
Power consumption DC supply, nominal voltage (without load) DC supply, nominal voltage (with max load)	 3 W 48 W
Dynamic safety circuit T 1 R 1	 Output signal Input signal
Reset input X1 Supply for reset input Reset current Minimum contact closure time for reset	 +24VDC 30 mA max. (inrush current 300 mA during contact closure) 80 ms
Connection of S1 Even numbers of sensors (Eden + Spot T/R + Tina) require a connection between B1 and S1. S1 is not connected for odd numbers of sensors. Odd number, no connection between B1 and S1	
Number of sensors Max. number of Eden/Tina to Vital 1 Total max. cable length to Eden/Tina Max. number of Spot T/R to Vital Total max. cable length to Spot T/R	 30 1000 m 6 pairs 600 m
Maximum number of units varies depending on the installation and cable size. For more information, see the examples in this chapter	
Response time At Power on When activating (input-output) When deactivating (input-output) At Power loss	 < 65 ms < 40 ms < 38 ms < 45 ms
Relay outputs NO Max switching capacity, resistive load Minimum load Contact material Mechanical life External fuse (EN 60947-5-1)	 2 6A/250 VAC/1500 VA/150W 10 mA/10V AgCdO $>10^7$ operations 6.3A or 4A slow

Relay information output (changeover contact) Y14 –(0V) +(24V) Max. load on Y14	 Indicates Vital is not reset Indicates Vital is reset 200 mA (Internal automatic fuse)
LED indication On T R 1 2	 Fixed light: supply voltage OK, Flashing light: under-voltage or overload T: Signal out OK. R: Signal in OK. Indicates that the output relays have been activated
Mounting DIN rail Operating temperature range	 35 mm DIN rail -10°C to + 55°C
Connection blocks (detachable) Max screw torque Max connection area: Solid conductors Conductor with socket contact Air and creep distance	 1 Nm 1x4 mm^2/2x1.5 mm^2/12AWG 1x2.5 mm^2/2x1 mm^2 4kV/2 DIN VDE 0110
Protection class Enclosure Connection blocks	 IP 40 IEC 60529 IP 20 IEC 60529
Conformity	EN ISO 12100-1, EN ISO 12100-2, EN 954-1, EN ISO 13849-1, EN 62061, EN 60204-1, IEC 60664-1, EN 61000-6-2, EN 61000-6-4 EN 60947-5-1, EN 1088, EN 61496-1, IEC/EN 61508-1…7

Note: Connector blocks are detachable without cables having to be disconnected.



Connection of Units and Cable Lengths to Vital 1



SEE DISCLAIMER ON PAGE 4:64

Three Connection Alternatives

According to PL e (EN ISO 13849-1), connection of sensors/adapter units in the Vital safety circuit **must be made per the connection examples.**

Example 1

Use separate connection cables from each sensor/adapter unit to the Vital safety controller. Interconnections to be made via suitable terminals in the control cabinet.

Example 2

Use Tina4A/Tina8A connector blocks to simplify the connection of externally mounted sensors/adapter units. Only Tina4A/Tina8A connector blocks may be used. **Use of any other connector blocks will not meet the safety circuit requirements.**

Example 3

Use M12-3A and M12-3B "Y" connectors to connect sensors in series/parallel.

Cable Lengths and Number of Sensor/Adapter Units for the Three Connection Examples

In order to determine the number of sensor/adapter units that can be connected to a Vital 1 unit it must be remembered that 1 (one) Spot T/R is equivalent to 5 (five) Eden or Tina units. Units in parallel are equal to one unit. The following examples provide guidance as to possible configurations and cable lengths using suitable cables.

Example 1

Up to 1000 meters (0.75 mm^2 or 0.34 mm^2 conductors) in total can be connected to the sensors/units in this example. The connection is equivalent to 9 Eden or Tina units.

A maximum of 30 Eden or Tina units can be connected to the Vital 1 unit on a maximum cable length of 500 meters (0.75 mm^2 conductors) or 300 meters (0.34 mm2 conductors).

Example 2

Up to 600 meters (0.75 mm^2 conductors) to Tina 8A and 10 meter cables type M12-C1012 (0.34 mm^2) to each sensor/unit connected to the Tina 8A. This connection example is equivalent to 17 Eden or Tina units.

A maximum of 3 Tina 8A units, equivalent to 27 Eden/Tina units (= 3 x 8 connected to Tina 8A + 3 Tina 8A) can be connected to one Vital 1 with a total cable length of 600 meters (0.75 mm^2). Up to 6 Tina 4A units can be connected to one Vital 1 (equivalent to 30 Eden/Tina units) with a total cable length of 600 meters (0.75 mm^2) to Tina 4A.

Example 3

Either 2 x 500 meter cables (0.75 mm^2) from the control cabinet and 10 meter cables (0.34 mm^2) to each sensor/unit or 2 x 10 meter cables (0.75 mm^2) from the control cabinet and 200 meter cables (0.75 mm^2)to each sensor/unit. The connection is equivalent to 16 Eden or Tina units.

A Total of 30 Eden/Tina units can be connected using a maximum cable length of 1000 meters (0.75 mm^2) or 400 meters (0.34 mm^2). If the power supply is only fed from one direction (from one end of the network) the total cable length is reduced to approx 300 meters (0.75 mm^2) and 100 meters (0.34 mm^2).

Connection Advice for Dynamic Sensors to Pluto and Vital

Sensors can be connected in many different ways. Here is some advice that can make connection better and more stable. The advice is general, but particularly applicable to the use of Tina 4A and Tina 8A units.

- Never have more than the recommended number of sensors in the loop.
- If possible use a switched main power supply that can deliver a stable 24 VDC.
- In the sensor system, use as short cables as possible.
- When connecting a Tina 4A or Tina 8A unit, the supply voltage at the terminal (out at the unit) must not be less than 20 Volts.
- Use screened cable, preferably 0.75 mm2 or thicker, from the apparatus enclosure and ground it at one end, for example at the apparatus enclosure, not at both ends.
- Do not route the signal wiring close to heavy current cabling or close to equipment that gives off a lot of interference, such as frequency converters for electric motors.
- Never connect "spare" conductors.
- If M12-3B are used for connection of a parallel loop, with supply to the sensors from two directions, the loop must be as short as possible. This is because the conductors that are not being used are also connected, which increases the capacitive load and reduces the stability of the system.

Vital 2

Vital 2 is a safety controller that combines functionality with the quick and easy installation of safety sensors. With two safe input functions and two different output groups, Vital 2 offers the capability to exclusively control smaller machine safety systems that would otherwise have required a programmable controller or multiple safety relays.

How the two output groups are controlled by the input functions depends on which of the three operating modes is selected (see Selection of operating mode).

Input Function 1

A dynamic safety circuit where ABB Jokab Safety's safety sensors such as Eden, Tina and Spot can easily be connected in series. Up to 10 Eden or Tina devices can be connected in series per input function.

Input Function 2

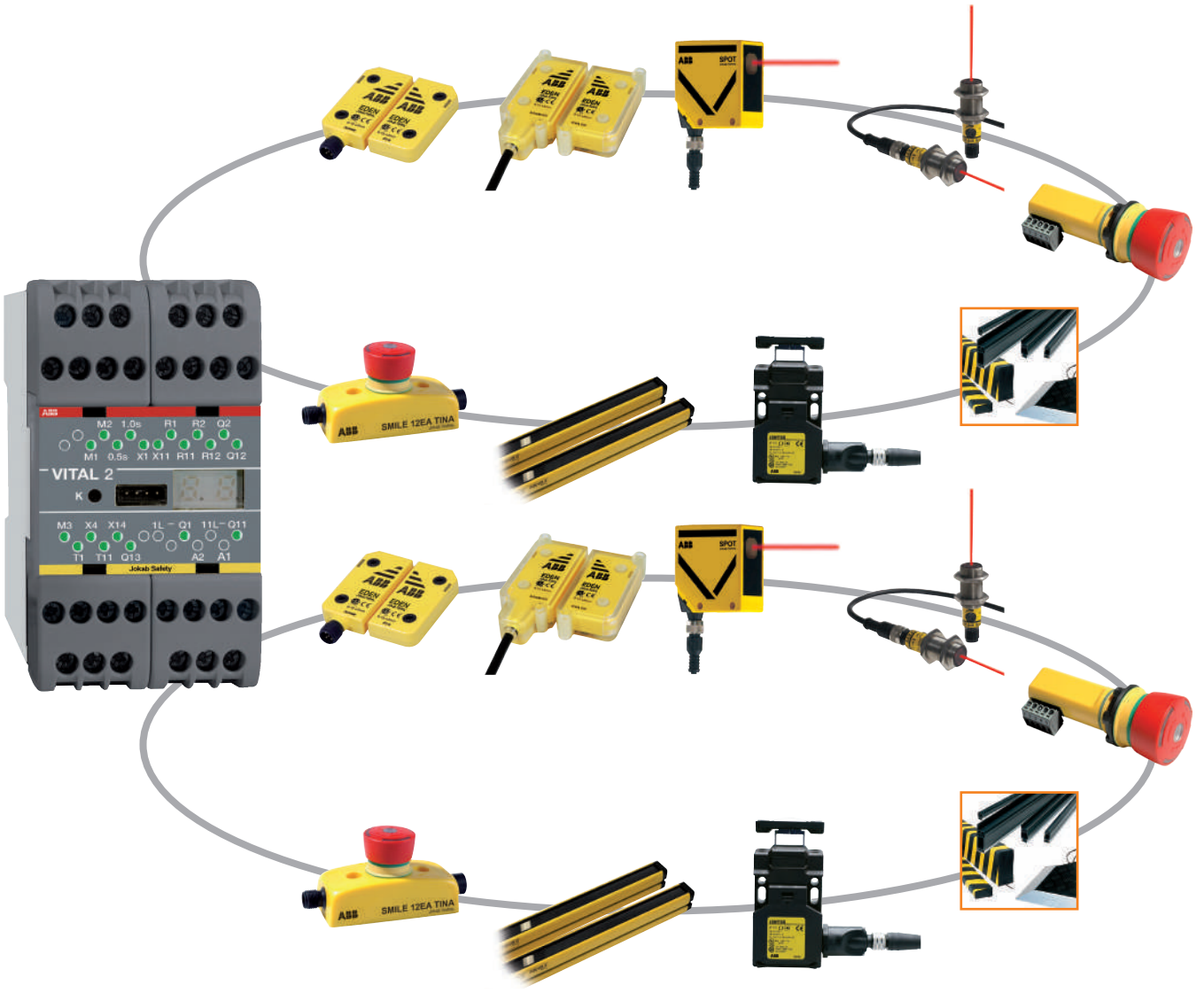
The same function as input function 1.

Output group 1: A safe relay output in a duplicated series and a safe transistor output with output voltage of -24 VDC.

Output group 2: A safe relay output in a duplicated series and a safe transistor output with output voltage of -24 VDC. In addition, output group 2 contains a non-safe transistor output with output voltage of +24 VDC, intended for information. The output group can have time delay from 0 to 1.5 s.

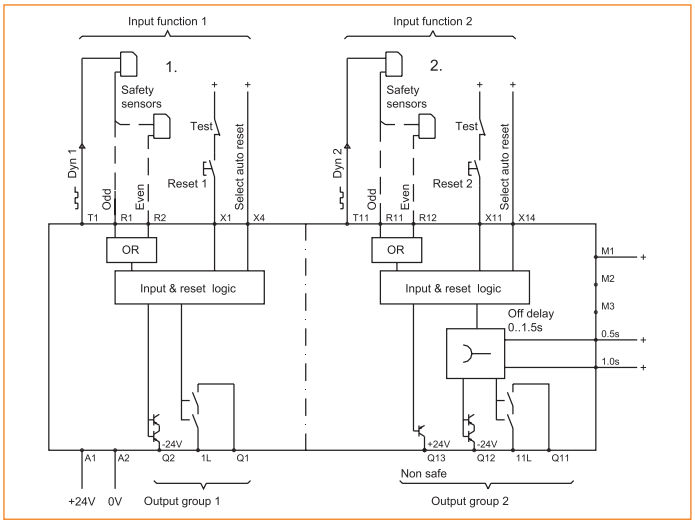
Selection of Operating Modes

Vital 2 can be configured to operate in one of three operating modes M1, M2 or M3. The selection of operating modes is done by connecting one of the terminals M1, M2 or M3 to +24 V.



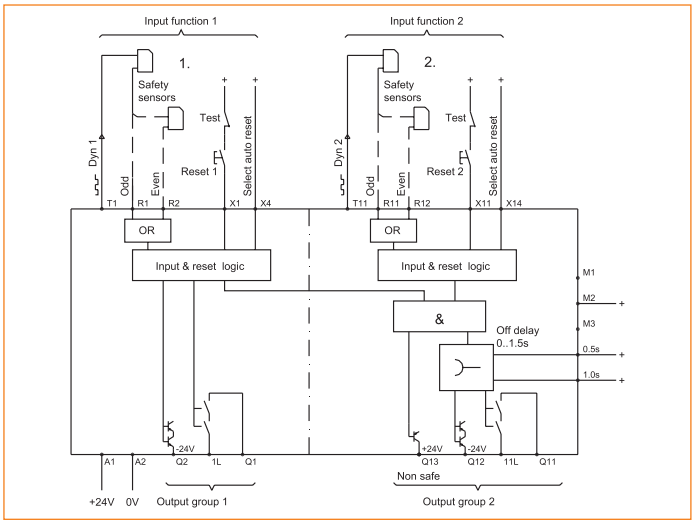
Operating Mode M1 - Separate Function Vital 1

Input function 1 controls output group 1, and input function 2 controls output group 2.



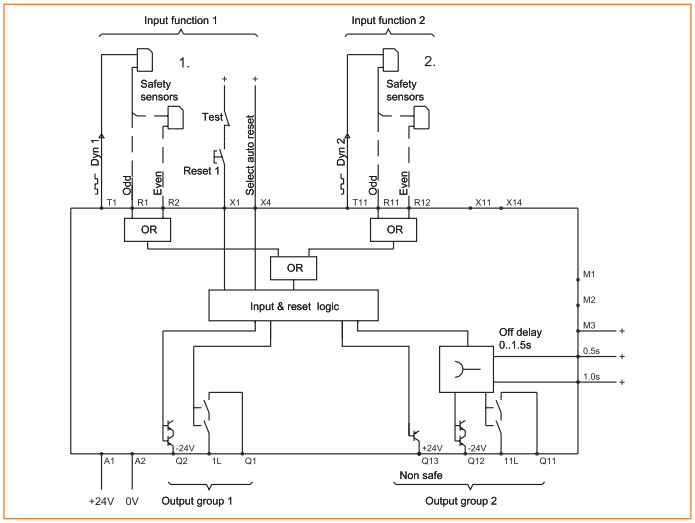
Operating Mode M2 - Input 1, Master Function Vital 2

Input function 1 stops all outputs, and input function 2 stops output group 2.



Operating Mode M3 - Parallel Function Vital 2

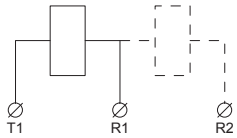
Input function 1 and input function 2 operate in parallel and control all outputs. Reset/Auto reset 1 resets both input functions (Reset/Auto Reset 2 is not used).



Connection of Protection/Sensors - Vital 2

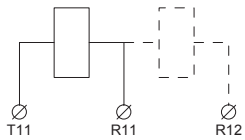
Depending on the input function and the number of sensors connected to the safety circuit (odd or even number), the dynamic signal is connected between different terminals;

Input function 1:



A dynamic signal is transmitted from T1, and depending on the number of sensors in the safety circuit, the signal connects back to R1 (odd number of sensors) or R2 (even number of sensors).

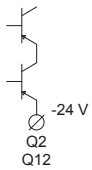
Input function 2:



A dynamic signal is transmitted from T11, and depending on the number of sensors in the safety circuit, the signal connects back to R11 (odd number of sensors) or R12 (even number of sensors).

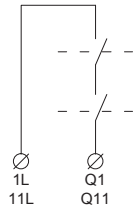
Connection of Outputs - Vital 2

Connection of safe transistor output (-24 V)



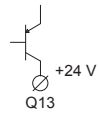
The safe transistor outputs Q2 (output group 1) and Q12 (output group 2) have an output voltage of -24 V.

Connection of safe relay output



The safe relay outputs that are duplicated in series break between 1L-Q1 (output group 1) and 11L-Q11 (output group 2). The loads that break should be fitted with spark arresters to protect the outputs. The correct selection of VDR circuit, RC circuit or diode is appropriate. Note that the diode extends the disconnection time of the load.

Connection of information output

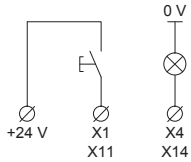


The non-safe transistor output Q13 is high (+24 V) when the outputs from output group 2 are active. The function is therefore dependent on the operating mode selected (see Selection of operating mode).

Connection of Reset - Vital 2

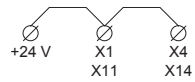
There are two separate reset functions; Reset 1 and Reset 2. The function of these is dependent on the operating mode selected (see Selection of operating mode). Reset 1 and Reset 2 can be configured for manual or automatic reset independently of each other by means of the input's Auto reset 1 and Auto reset 2.

Manual monitored reset



For manual resetting, a push button must be connected between X1 (Reset 1) or X11 (Reset 2) and +24 V. The monitoring contactors for external devices are to be connected in series with the push button. For manual reset, X4 (for Reset 1) and X14 (for Reset 2) serve as output for resetting the indicator lamps.

Automatic reset

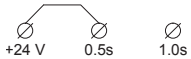


For automatic reset, X1 and X4 (Auto reset 1) or X11 and X14 (Auto reset 2) must be connected to +24 V. Monitoring contacts for external devices must be connected between +24 V and X1 (Auto reset 1) or X11 (Auto reset 2) . If monitoring contacts are not used, X1 and X11 must be connected to +24 V.

Time Delay - Vital 2

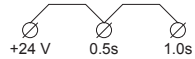
Output group 2 can have disconnection delay by connecting inputs 0.5s and 1.0s being connected to +24 V. The system is binary, which means that the time values of the inputs are added together to give the total delay time.

No delay



0.5 s delay

1.0 s delay



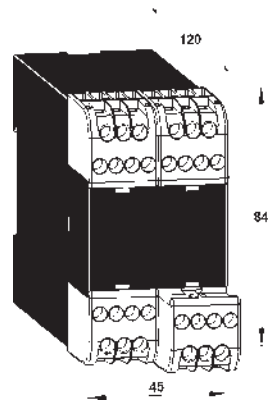
1.5 s delay

Vital 2 Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:57
Level of safety EN ISO 13849-1 EN 62061 IEC/EN 61508-1…7 EN 954-1	 PL e, category 4 SIL 3 SIL 3 Category 4
PFH_d Relay output Transistor output	 2.00×10^{-9} 1.50×10^{-9}
Color	Grey
Weight	390 g
Power supply	24 VDC ±15%
Fuse An external fuse must be connected in series with the supply voltage to A1	 6 A
Max line resistance at nominal voltage to X1	 150 Ohm
Power consumption Total current consumption	 300 mA
Input function 1 (dynamic safety circuit) Dynamic output signal Dynamic input signal	 T1 R1 (odd number of sensors in a circuit) R2 (even number of sensors in a circuit)
Input function 2 (dynamic safety circuit) Dynamic output signal Dynamic input signal	 T11 R11 (odd number of sensors in a circuit) R12 (even number of sensors in a circuit)
Reset input X1/X11 Voltage at X1/X11 when reset Reset current Minimum contact closure time for reset	 +24VDC 30 mA (300 mA peak during contact closure) 80 ms
Number of sensors Max. number of Eden or Tina units per input function Total max. cable length (depending on the number of Eden/Tina units) Max. number of light beams (Spot T/R) per input function Spot 10 Spot 35 Total max. cable length (depending on the number of Spot T/R)	 10 500 m 1 3 100 m
Maximum number of units varies depending on the installation and cable size. For more information, see the examples in this chapter.	
Response time Relay output (Q1, Q11) Safe transistor outputs (Q2, Q12) Non-safe transistor output (Q2, Q12)	 15 – 24 ms 11 – 20 ms 11 – 20 ms

Relay outputs Number of outputs Max. load capacity, res. load Max. load capacity, ind. load	 2 NO 6A/250 VAC AC-1: 250 V/1.5 A AC-15: 250 V/1.5 A DC-1: 50 V/1.5 A DC-14: 24 V/1.5 A
Safe transistor outputs Number of outputs Output voltage (rated) Output voltage (at load) Max. load **Short circuit protection** Output – 0V Output – +24V	 2 –24V > 22V at 800 mA/24V supply voltage 23,3V at 150 mA/24V supply voltage 800 mA Yes Normal (not guaranteed)
Non-safe transistor output (information) Output voltage (rated) Max. load	 +24 VDC 1 A
Mounting DIN rail	 35 mm DIN rail
Operating temperature range	-10°C to + 55°C
Connection blocks (detachable) Max screw torque Max connection area: Solid conductors Conductor with socket contact Air and creep distance	 1 Nm 1x4 mm^2/2x1.5 mm^2/12AWG 1x2.5 mm^2/2x1 mm^2 4kV/2 DIN VDE 0110
Protection class Enclosure Connection blocks	 IP 40 IEC 60529 IP 20 IEC 60529
Approved standards	EN ISO 13849-1/EN 954-1 EN ISO 13849-2 EN 62061 EN 61496-1 EN 574 EN 692 EN 60204-1 EN 50178 EN 61000-6-2 EN 61000-6-4 EN 61000-4- IEC/EN 61508-1…7

Note: Connector blocks are detachable without cables having to be disconnected.



Vital 3

Vital 3 is a safety controller that combines functionality with the quick and easy installation of safety sensors. With two safe input functions and two different output groups, Vital 3 offers the capability to exclusively control smaller machine safety systems that would otherwise have required a programmable controller or multiple safety relays.

How the two output groups are controlled by the input functions depends on which of the three operating modes is selected (see Selection of operating mode).

Input Function 1

A two-channel safety circuit designed for opening contacts, e.g. two-channel emergency stop or ABB Jokab Safety's safety switch JSNY5. One channel is fed with the dynamic signal and the other with static +24 VDC.

Input Function 2

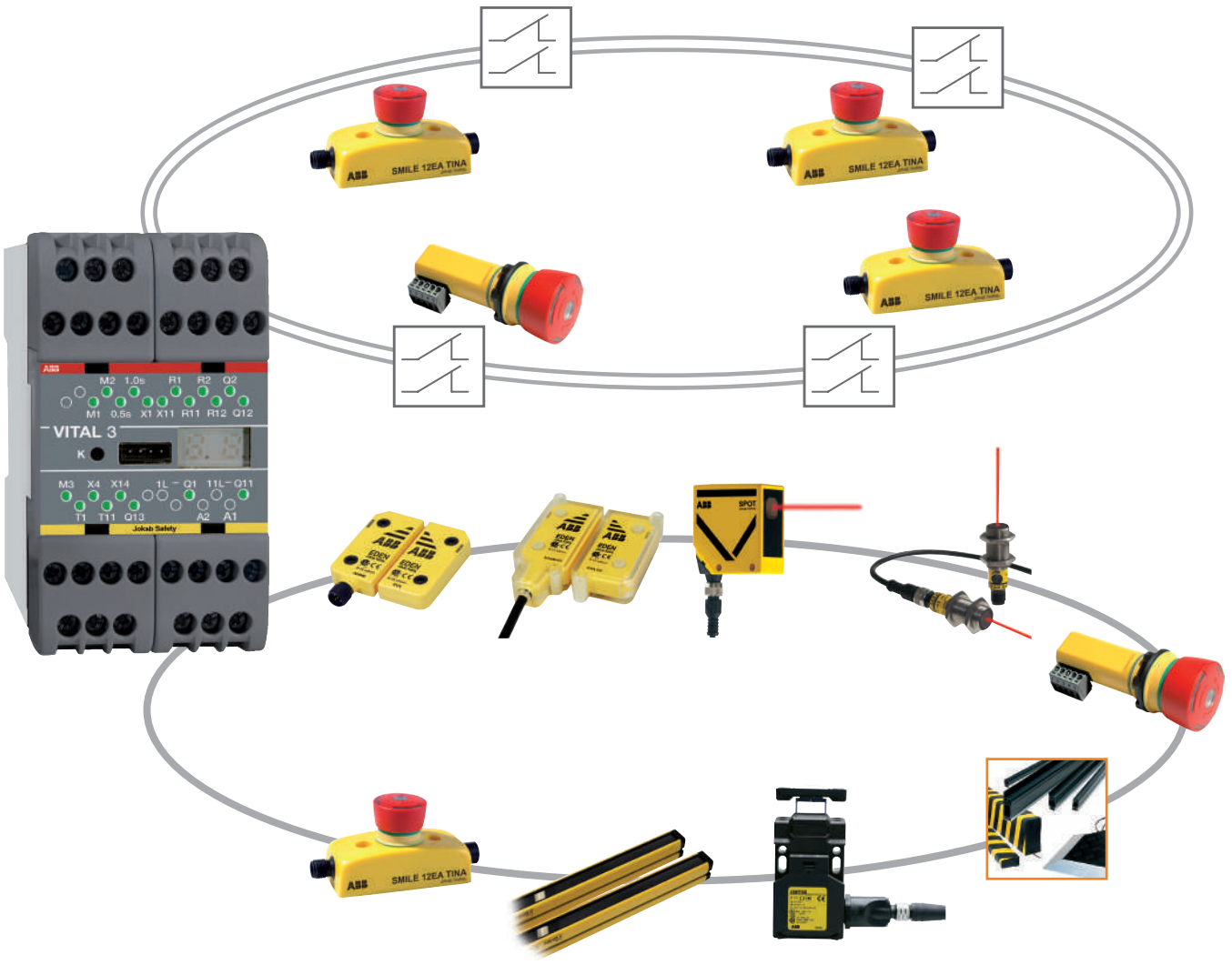
A dynamic safety circuit where ABB Jokab Safety's safety sensors Eden, Tina and Spot can easily be connected in series. Up to 10 Eden or Tina devices can be connected in series per input function.

Output group 1: A safe relay output in a duplicated series and a safe transistor output with output voltage of -24 VDC.

Output group 2: A safe relay output in a duplicated series and a safe transistor output with output voltage of -24 VDC. In addition, output group 2 contains a non-safe transistor output with output voltage of +24 VDC, intended for information. The output group can have time delay from 0 to 1.5 s.

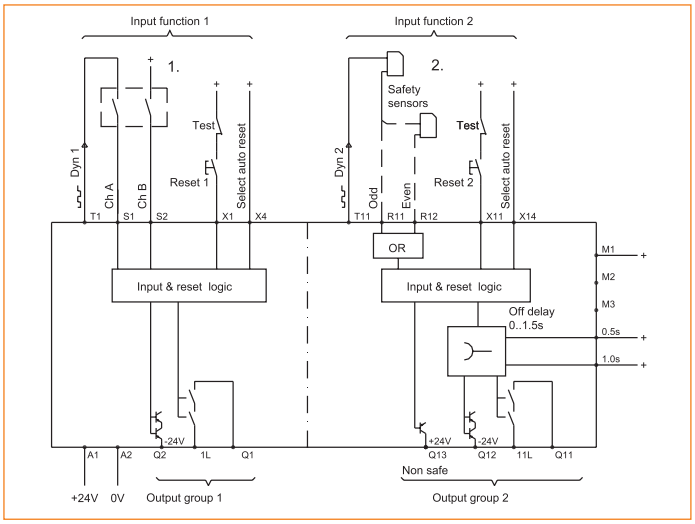
Selection of Operating Modes

Vital 2 can be configured to operate in one of three operating modes M1, M2 or M3. The selection of operating modes is done by connecting one of the terminals M1, M2 or M3 to +24 V.



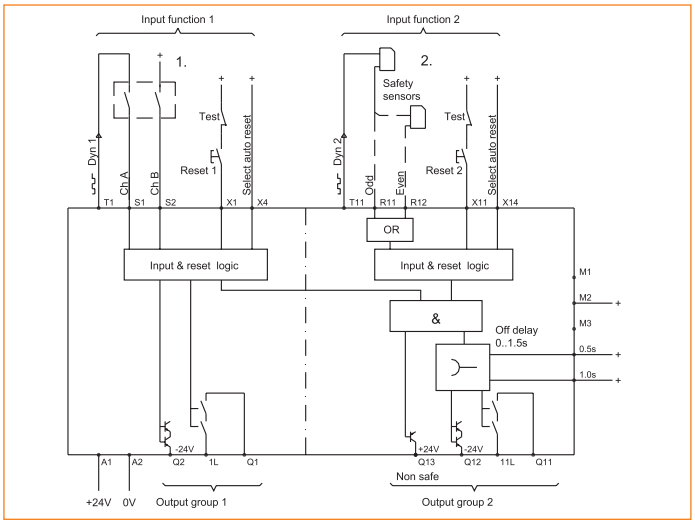
Operating Mode M1 - Separate Function Vital 3

Input function 1 controls output group 1, and input function 2 controls output group 2.



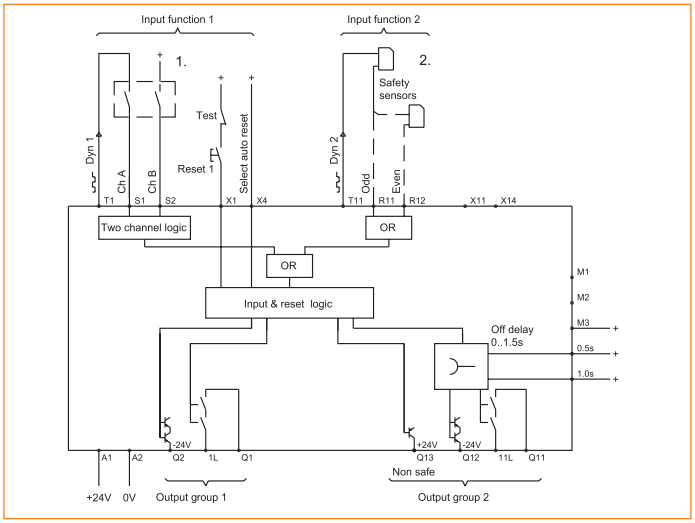
Operating Mode M2 - Input 1, Master Function Vital 3

Input function 1 stops all outputs, and input function 2 stops output group 2.



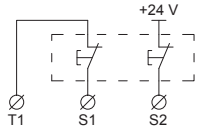
Operating Mode M3 - Parallel Function Vital 3

Input function 1 and input function 2 operate in parallel and control all outputs. Reset/Auto reset 1 resets both input functions (Reset/Auto Reset 2 is not used).

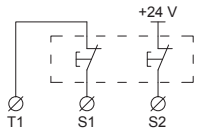


Connection of Protection/Sensors - Vital 3

Depending on the input function and the number of sensors connected to the safety circuit (odd or even number), the dynamic signal is connected between different terminals;

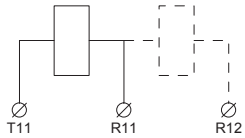


Input function 1:



One of the two opening contacts is connected between T1 and S1 (dynamic signal). The second opening contact is connected between +24 V and S2 (static signal).

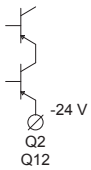
Input function 2:



A dynamic signal is transmitted from T11, and depending on the number of sensors in the safety loop, the signal connects back to R11 (odd number of sensors) or R12 (even number of sensors).

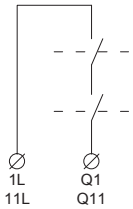
Connection of Outputs - Vital 3

Connection of safe transistor output (-24 V)



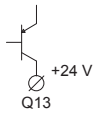
The safe transistor outputs Q2 (output group 1) and Q12 (output group 2) have an output voltage of -24 V.

Connection of safe relay output



The safe relay outputs that are duplicated in series break between 1L-Q1 (output group 1) and 11L-Q11 (output group 2). The loads that break should be fitted with spark arresters to protect the outputs. The correct selection of VDR circuit, RC circuit or diode is appropriate. Note that the diode extends the disconnection time of the load.

Connection of information output

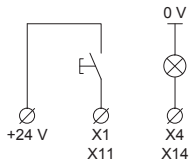


The non-safe transistor output Q13 is high (+24 V) when the outputs from output group 2 are active. The function is therefore dependent on the operating mode selected (see Selection of operating mode).

Connection of Reset - Vital 3

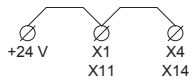
There are two separate reset functions; Reset 1 and Reset 2. The function of these is dependent on the operating mode selected (see Selection of operating mode). Reset 1 and Reset 2 can be configured for manual or automatic reset independently of each other by means of the input's Auto reset 1 and Auto reset 2.

Manual monitored reset



For manual resetting, a push button must be connected between X1 (Reset 1) or X11 (Reset 2) and +24 V. The monitoring contactors for external devices are to be connected in series with the push button. For manual reset, X4 (for Reset 1) and X14 (for Reset 2) serve as output for resetting the indicator lamps.

Automatic reset

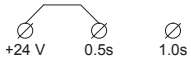


For automatic reset, X1 and X4 (Auto reset 1) or X11 and X14 (Auto reset 2) must be connected to +24 V. Monitoring contacts for external devices must be connected between +24 V and X1 (Auto reset 1) or X11 (Auto reset 2) . If monitoring contacts are not used, X1 and X11 must be connected to +24 V.

Time Delay - Vital 3

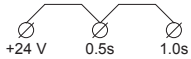
Output group 2 can have disconnection delay by connecting inputs 0.5s and 1.0s being connected to +24 V. The system is binary, which means that the time values of the inputs are added together to give the total delay time.

No delay



0.5 s delay

1.0 s delay



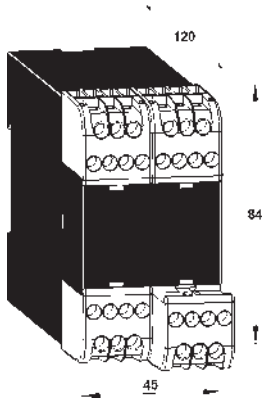
1.5 s delay

Vital 3 Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:57
Level of safety EN ISO 13849-1 EN 62061 IEC/EN 61508-1…7 EN 954-1	 PL e, category 4 SIL 3 SIL 3 Category 4
PFH_d Relay output Transistor output	 2.00×10^{-9} 1.50×10^{-9}
Color	Grey
Weight	390 g
Power supply	24 VDC ±15%
Fuse An external fuse must be connected in series with the supply voltage to A1	 6 A
Max line resistance at nominal voltage to X1	 150 Ohm
Power consumption Total current consumption	 300 mA
Input function 1 (two channel, normally closed circuit) Dynamic output signal Dynamic input signal Static input signal (+24 V)	 T1 S1 S2
Input function 2 (dynamic safety circuit) Dynamic output signal Dynamic input signal	 T11 R11 (odd number of sensors in a circuit) R12 (even number of sensors in a circuit)
Reset input X1/X11 Voltage at X1/X11 when reset Reset current Minimum contact closure time for reset	 +24VDC 30 mA (300 mA peak during contact closure) 80 ms
Number of sensors Max. number of Eden or Tina units per input function 2 Total max. cable length (depending on the number of Eden/Tina units) Max. number of light beams (Spot T/R) per input function 2 Spot 10 Spot 35 Total max. cable length (depending on the number of Spot T/R)	 10 500 m 1 3 100 m
Maximum number of units varies depending on the installation and cable size. For more information, see the examples in this chapter.	
Response time Relay output (Q1, Q11) Safe transistor outputs (Q2, Q12) Non-safe transistor output (Q2, Q12)	 15 – 24 ms 11 – 20 ms 11 – 20 ms

Relay outputs Number of outputs Max. load capacity, res. load Max. load capacity, ind. load	 2 NO 6A/250 VAC AC-1: 250 V/1,5 A AC-15: 250 V/1.5 A DC-1: 50 V/1.5 A DC-14: 24 V/1.5 A
Safe transistor outputs Number of outputs Output voltage (rated) Output voltage (at load) Max. load **Short circuit protection** Output – 0V Output – +24V	 2 –24V > 22V at 800 mA/24V supply voltage 23.3V at 150 mA/24V supply voltage 800 mA Yes Normal (not guaranteed)
Non-safe transistor output (information) Output voltage (rated) Max. load	 +24 VDC 1 A
Mounting DIN rail	 35 mm DIN rail
Operating temperature range	-10°C to + 55°C
Connection blocks (detachable) Max screw torque Max connection area: Solid conductors Conductor with socket contact Air and creep distance	 1 Nm 1x4 mm^2/2x1.5 mm^2/12AWG 1x2.5 mm^2/2x1 mm^2 4kV/2 DIN VDE 0110
Protection class Enclosure Connection blocks	 IP 40 IEC 60529 IP 20 IEC 60529
Approved standards	EN ISO 13849-1/EN 954-1 EN ISO 13849-2 EN 62061 EN 61496-1, EN 574, EN 692 EN 60204-1 EN 50178 EN 61000-6-2 EN 61000-6-4 EN 61000-4- IEC/EN 61508-1…7

Note: Connector blocks are detachable without cables having to be disconnected.



Why should you use the Tina Adapter Units?

...to adapt safety sensors to a dynamic single-channel circuit according to PL e!

The Tina devices adapt safety sensors with mechanical contacts, such as emergency stops, switches and light grids/curtains with dual outputs to the dynamic safety circuit in Vital and Pluto.

This means Vital/Pluto complies with EN ISO 13849-1 and SIL 3 in EN 62061 and EN 61508 for the connected safety sensors with the Vital/Pluto controller.

Note that ABB Jokab Safety's dynamic safety sensors, such as Eden and Spot can be connected directly to the Vital/Pluto circuit without intermediate Tina devices.

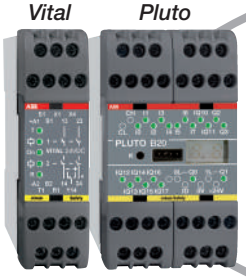
1 *Maximum 30 Tina Units in Series*

Tina 2A *Tina 2B* *Tina 3A* *Tina 7A* *Tina 10A* *Tina 10B/C*

2 *Individual Indication for every connected Safety Mat, Strip or Bumper*

Tina 6A

Vital *Pluto*



Vital/Pluto Safety Circuit PL e using Tina Adapter Units

3 *Simple Connection Arrangements*

Tina 1A *Tina 4A* *Tina 8A* *Tina 11A* *Tina 12A*

4 *Bypassing and Lamp Supervision*

Tina 5A

...for bypassing of safety sensor in a dynamic circuit!

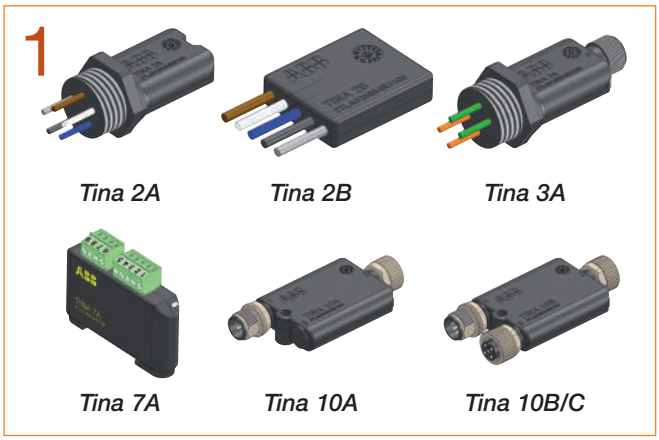
The Tina 5A bypass unit is used for bypassing of safety sensor in a dynamic circuit and provides the possibility for supervision of bypass lamp indication. During bypassing of safety devices, e.g. a light grid or an interlocked gate switch/sensor, it must only be possible to allow the bypass function if a lamp indication is given. The lamp indication must therefore be supervised. With this system it is possible to bypass one or more safety sensors at the same time.

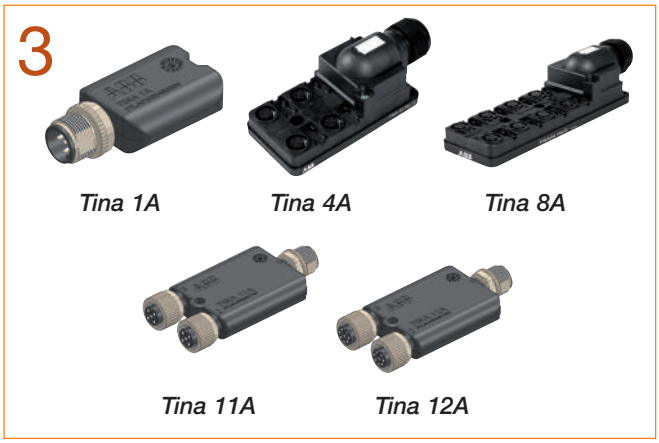
...as a connection block for simplified connection to a dynamic circuit!

The Tina 4A/8A connection blocks are available with 4 or 8 M12 connections. They are used to enable several safety sensors having M12 connection cables to be connected together. The blocks are connected with a suitable multi-core cable, that contains status information from each safety component, to the control cabinet. This enables simplified wiring. The connection block contains electronic circuits which modify the coded dynamic signal in the safety circuit.

Note: Several connection blocks can be connected to one Vital/Pluto. Using Tina 4A/8A connection blocks eliminates connection faults and can significantly reduce system cable costs.

Available in Several Variations





Why should you choose Tina?

- Safety circuit,PL e, EN ISO 13849-1
- Individual status indication of every connected unit in the safety circuit
- Supervision of lamp indicating bypassing of safety device
- Quick release M12 connector

Tina is available in several versions depending on the type of safety component that is connected to the Vital or Pluto circuit. Also available is a bypassing unit, three connector blocks with 2, 4 or 8 M12 connectors, and a blind plug for un-used connections.

As an accessory there is a Y-connector for series or parallel connection and even for connection of light beams with separate transmitter and receiver. Tina units are also included in emergency stop models Smile Tina and Inca Tina. This is to adapt ABB Jokab Safety's products to dynamic safety circuits.

All Tina-units are designed to decode the dynamic signal in the safety circuit of Vital/Pluto.

1 Tina 2A/B, Tina 3A and Tina 7A are used to connect safety components with mechanical contacts, such as emergency stops, switches and light curtains or light beams with relay outputs.

Note: In order to maintain safety category 4 and to reduce the risk of electrical interference, Tina 2 A, 3A and 7A units must be installed within the same physical encapsulation as the safety component that is to be monitored, and this is to be connected to the Tina unit with as short a cable as possible.

Tina 10A/B/C units are used for connection of Focus light beams/curtains to Vital or Pluto. Tina 10B has an extra M12 connector that enables reset, a reset lamp and switching of the Focus supply voltage. The Tina 10C has an additional M12 connector that permits a Focus transmitter to receive power.

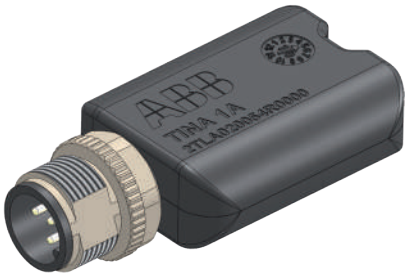
2 Tina 6A is used to connect door sensitive edges and safety mats, and provides an indication for each unit. (Tina 7A may also be used.) If a Tina 6A is connected close to the edge or mat, the risk of electrical interference is reduced.

3 Tina 4A, Tina 8A, Tina 11A and Tina 12A are used as terminal blocks and simplify connection to a Vital or Pluto safety circuit. Each safety component is connected to the terminal block via an M12 connection. A terminal block is connected to the apparatus enclosure by means of a cable that also contains status information from each safety com-ponent that is connected to Tina 4A/Tina 8A and summed information from Tina 11A/Tina 12A. Tina 1A must be used as a blanking plug in unused M12 connections.

4 Tina 5A is used to bypass the safety sensors in Vital security loop and for monitoring the indicator light switch off. Tina 5A bypass units are used for bypassing of safety sensors in a dynamic circuit and provides the possibility for supervision of bypass lamp indication.

Tina 1A Blanking Plug for Connection Block

Tina 1A is a device that is designed for use with the connection blocks Tina 4A or Tina 8A where it is used as a blind plug in unused M12 connections. The device is fitted with a LED for status indication of the dynamic safety circuit.



Application

- Used as a blanking plug in unused M12 connectors at connection blocks

Features

- Indication of status by LED

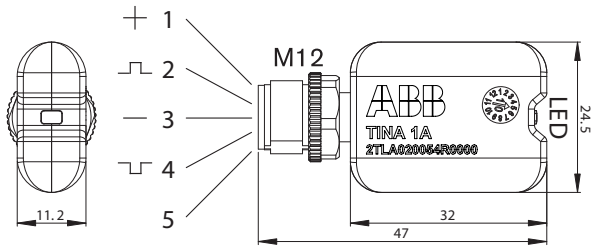
Approvals

TÜV Nord

Tina 1A Technical Data

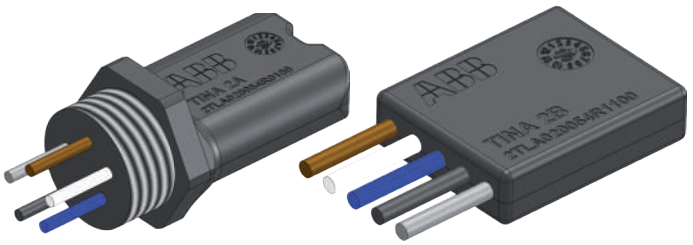
Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:57
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15%, -25% 17 mA (27 mA with max information output) Information output: Max 10 mA t < 60 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connector	M12 5-pole male
Size	48 × 23 × 15 mm (L x W x H)
Weight	~20 g

Color	Black
Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	**TÜV Nord**



5-pin M12 male contact
+24 VDC
Dynamic input signal
0 VDC
Dynamic output signal
Not used

Tina 2A/B
Adaptation Unit



Tina 2A/B is a device that adapts the safety sensors with mechanical contacts, such as emergency stops, switches and light curtains/light grids, with their own relay outputs to the dynamic safety circuit.

Tina 2A is fitted with M20 contact which simplifies connection to safety sensors prepared for M20 connection. Tina 2B is very small and can often be placed in the safety components' enclosure. Both Tina 2A and Tina 2B are fitted with LEDs for status indication of the dynamic safety circuit.

Applications

- Adaptation of safety sensors with mechanical contacts to the dynamic safety circuit
  Example: emergency stops, switches, light beams/light curtains with relay outputs

Features

- Simplifies the system as well as maintaining the safety level
- Indication of status by LED

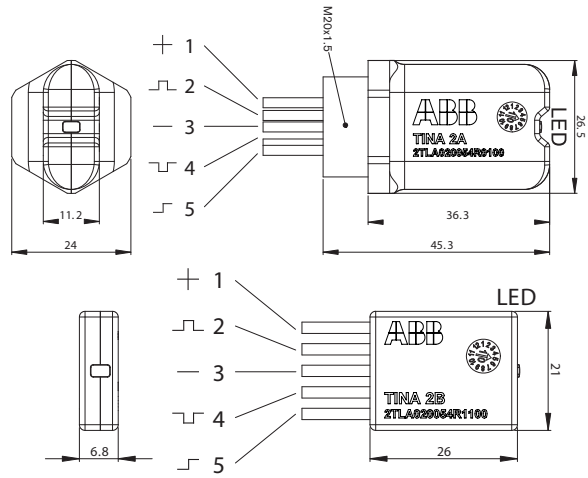
Approvals

TÜV Nord

Tina 2A Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:57
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + 15 %, –25 % 17 mA (27 mA with max information output) Information output: Max 10 mA t < 60 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connector	5x0.34 mm^2 wires, 0.15 m
Size	Tina 2A: 43 × 24 × 24 mm Tina 2B: 28 × 21 × 7 mm (L x W x H)
Weight	Tina 2A: ~30 g Tina 2B: ~20 g
Color	Black

Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	**TÜV Nord**



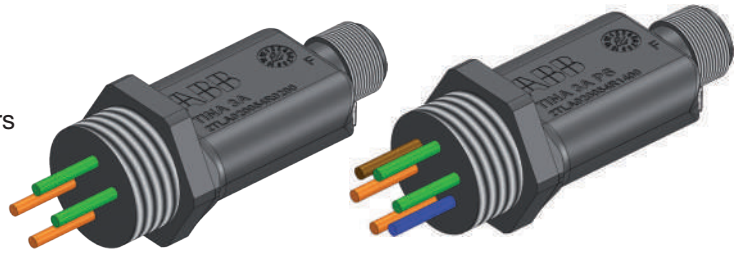
Cable connection

Brown: +24 VDC
White: Dynamic input signal
Blue: 0 VDC
Black: Dynamic output signal
Grey: Information

Tina 3A/Aps Adaptation Unit

Tina 3A/Aps is a device that adapts the safety sensors with mechanical positive forced disconnecting contacts, such as emergency stops, switches and light curtains/light grids, with their own relay outputs to the dynamic safety loop.

Both Tina 3A and Tina 3Aps are fitted with M20 contacts which simplifies connection to safety sensors prepared for M20 connection. The devices are then easily connected to the dynamic safety loop through a 5-pin M12 contact to the Tina device. Tina 3Aps has an extra conductor for the supply voltage to the safety sensor.



Applications

- Adaptation of mechanical positive forced disconnecting contacts to the dynamic safety circuit
  Example: emergency stops, switches, light beams/light curtains with relay outputs

Features

- Simplifies the system as well as maintaining the safety level
- Indication of status by LED

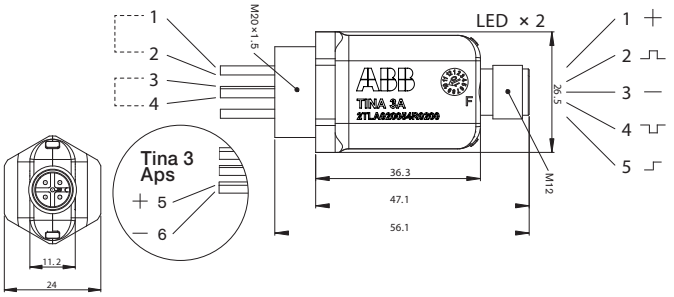
Approvals

TÜV Nord

Tina 3A/3Aps Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:57
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Current through safety device contacts Short circuit current between contacts Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15%, -25% 47 mA (57 mA with max information output) Information output: Max 10 mA t < 70 µs 12 mA 10 mA Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	M12 5-pole connector Green loop wires (A1 & A2) Orange loop wires (B1 & B2) Brown (+24 VDC), Blue (0 VDC) wires (Tina 3Aps only)

Size	54 × 24 × 24 mm (L x W x H)
Weight	~30 g
Color	Black
Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	**TÜV Nord**



Cable connection

Safety circuit A1-A2
Safety circuit A1-A2
Safety circuit B1-B2
Safety circuit B1-B2
Brown: +24 VDC
(only Tina 3 Aps)
Blue: 0 VDC
(only Tina 3Aps)

5-pin M12 male contact

+24 VDC
Dynamic input signal
0 VDC
Dynamic output signal
Not used

Tina 4A
Connection Block

Tina 4A is a connection block with four 5-pin M12 connections. It is used to connect multiple safety sensors with M12 contacts via a single cable to a Vital controller or Pluto Safety PLC. This simplifies cable running and reduces cable costs. Multiple connection blocks can be connected to a Vital/Pluto. Tina 1A is used for unused M12 connections.

Applications

- Connection block for up to four safety sensors adapted to the dynamic safety circuit

Features

- Simplifies cable routing and reduces cable costs
- Allows branching of up to four safety sensors to the dynamic safety circuit

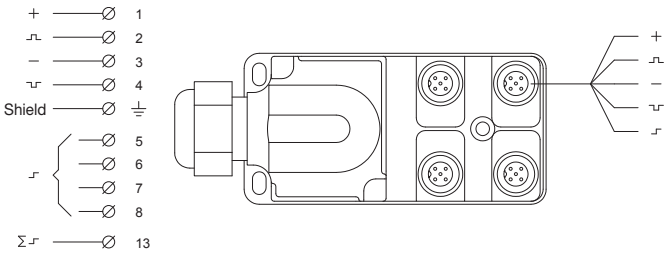
Approvals

TÜV Nord

Tina 4A Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:57
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15 %, –15 % 10 mA (20 mA with max information summary output) Information output: Max 10 mA t < 60 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	M12 5-pole female (4x) 9-pin connection block
Size	99 × 50 × 43 mm (L x W x H)
Weight	~100 g
Color	Black

Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	TÜV Nord



Connection block

1. *+24 VDC*
2. *Dynamic input signal*
3. *0 VDC*
4. *Dynamic output signal*
⏚ *Cable shield*
5. *Information (contact #1)*
6. *Information (contact #2)*
7. *Information (contact #3)*
8. *Information (contact #4)*
13. *Summarized information (contact #1-4)*

5-pin M12 female contact (x4)

1. *+24 VDC*
2. *Dynamic input signal*
3. *0 VDC*
4. *Dynamic output signal*
5. *Information*

Tina 5A
Adaptation Unit

Function

The Tina 5A is designed for bypassing of safety devices connected to the Vital/Pluto safety circuit and for supervision of lamp indication.

During bypassing of safety devices, e.g. a light grid or an interlocked gate, it must only be possible to allow the bypass function if a lamp indication is on. The lamp indication must therefore be supervised. Whether indication is required depends on the specific situation and result of risk analysis.

When the Tina 5A receives a coded dynamic signal to S1 and the bypass indication lamp is on (connected across L1-L2), a bypassing output signal is provided on S2 and S3. A broken or short circuit in the indication lamp leads to an interruption of the bypass output signal on S2 and S3, therefore stopping the bypassing.

The dynamic signal to S1 on Tina 5A must be the input signal from the first of the safety devices intended to bypass. The signal can be connected via output contacts from a safety relay, a safety timer or be initiated via a unit providing the dynamic coded signal, as for example an Eden sensor or a Spot light beam. The dynamic output from S2 or S3 is connected to the output of the safeguards to be bypassed.

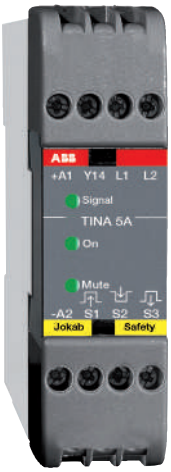
S2 is used if:

- an odd number of dynamic safety units is to be bypassed using an odd number of dynamic safety units, i.e. the sum of Tina + Eden and Spot units, including Tina 5A. (See Connection Example HE3824C.)
- an even number of dynamic safety units is to be bypassed using an even number of dynamic safety units, i.e. the sum of Tina + Eden and Spot units, including Tina 5A. (See Connection Example HE3824F.)

S3 is used if:

- an **odd** number of dynamic safety units is to be bypassed using an even number of dynamic safety units, i.e. the sum of Tina + Eden and Spot units, including Tina 5A. See (See Connection Example HE3824D.)
- an **even** number of dynamic safety units is to be bypassed using an odd number of dynamic safety units, i.e. the sum of Tina + Eden and Spot units, including Tina 5A. (See Connection Example HE3824E.)

The total number of dynamic safety units is calculated by adding the number of Eden, Spot and Tina units connected in the Vital circuit. See the Connection Examples HE3824C, D, E, F or G on pages 5:45 - 5:47.



Application

- Bypassing of safety devices connected to the dynamic safety circuit and for supervision of lamp indication

Features

- One or more safety devices can be bypassed
- Supervised lamp indication
- Indication of status by LED

Approvals

TÜV Nord

Bypassing of Eden and Tina Units

If one or more Eden or Tina units are bypassed by a Tina 5A, a diode, such as a 1N4007, must be inserted with forward current out from pin 4 of the last bypassed unit. If one or more Eden or Tina units are bypassed by one or more Eden or Tina units direct to each other, a diode, such as a 1N4007, must be inserted by the last unit in both loops with forward current out from pin 4. Refer to example HD3801A. In the case of bypassing of a Tina 10A, B or C, or of more than one unit towards each other, it is recommended that a Tina 5A or M12-3M is used. See the Connection Examples HE3824C, D, E, F or G.

Vital 5A Technical Data

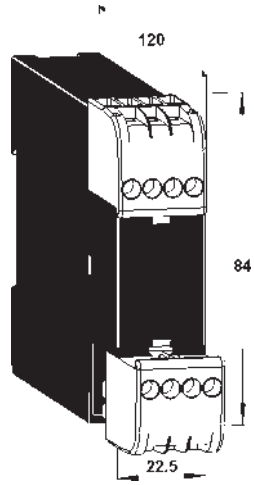
Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:58
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply	
Operating voltage	24 VDC + +10%, -10%
Current consumption, A1-A2	No bypass: 10 mA Bypass using a 5 W indication lamp: 240 mA
Bypass connection	Tina 5A can bypass max. 30 Eden/Tina-units or 6 Spot T/R
Time delay t (in/out)	t < 260 µs
Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	Enclosure: IP40 Connection block: IP20
Ambient temperature	-10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	Connection blocks with a total of 8 terminals (2 x 4)
Mounting	35 mm DIN rail
Size	120 × 84 × 22.5 mm (L x W x H)
Weight	~135 g
Color	Grey

Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005 EN 61496-1:2004 + A1:2008
Certificates	**TÜV Nord**

Connections

+A1: *+24 VDC*
Y14: *Information of bypass*
L1-L2: *Bypass lamp (or 820 ohm/2W resistor)*

-A2: *0 VDC*
S1: *Dynamic signal in*
S2: *Dynamic signal out, transcoded*
S4: *Dynamic signal out, transcoded twice*



Tina 6A
Adaptation Unit

Tina 6A monitors short circuits. It is used to adapt the safety sensors with safety contact strips and safety mats with relay outputs to the dynamic safety circuit. The device is fitted with a LED for status indication of the dynamic safety circuit.

Application

- Short circuit monitoring and adaptation of safety sensors to the dynamic safety circuit
  For example: contact edges, bumpers and safety mats

Features

- Simplifies the system as well as maintaining the safety level
- Indication of status by LED

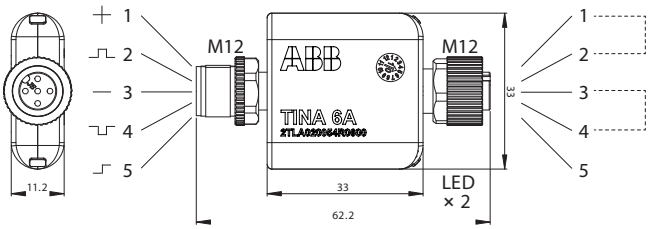
Approvals

TÜV Nord

Tina 6A Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering Information	see page 4:58
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Current through safety device contacts Short circuit current between contacts Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15%, -25% 47 mA (57 mA with max information output) Information output: Max 10 mA 12 mA 10 mA t < 70 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	M12 5-pole male M12 5-pole female

Size	63 × 31 × 15 (L × W × H)
Weight	~30 g
Color	Black
Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	**TÜV Nord**



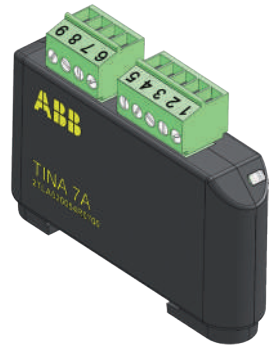
5-pin M12 male contact
+24 VDC
Dynamic input signal
0 VDC
Dynamic output signal
Information

5-pin M12 female contact
Safety circuit A1-A2
Safety circuit A1-A2
Safety circuit B1-B2
Safety circuit B1-B2
Not used

Tina 7A
Adaptation Unit

Tina 7A is a device that adapts the safety sensors with mechanical contacts, such as emergency stops, switches and light curtains/light grids, with their own relay outputs to the dynamic safety circuit.

The device is designed for installation in an equipment cabinet where it can be mounted directly on a 35 mm DIN rail, and the conductors are then connected directly to the screw terminals.



Application

- Adaptation of safety controls with mechanical contacts to the dynamic safety circuit inside the same enclosure.

Features

- Simplifies the system as well as maintaining the safety level
- Indication of status by LED
- Adapted for easy installation on 35 mm DIN rail cabinets

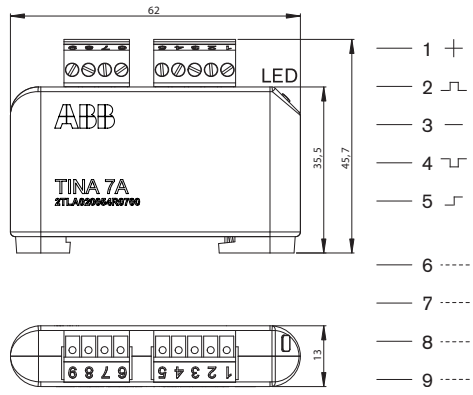
Approvals

TÜV Nord

Tina 7A Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:58
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Current through safety device contacts Short circuit current between contacts Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15%, -25% 47 mA (57 mA with max information output) Information output: Max 10 mA 12 mA 10 mA t < 70 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP20
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	5-pin connection block (power supply, dynamic in/out, info) 4-pin connection block (safety loop A1-A2, B1-B2) Max length on leads connected to terminals 6, 7, 8 and 9 is 200mm

Mounting	DIN rail
Size	61 × 46 × 14 (L × W × H)
Weight	~35 g
Color	Black
Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	TÜV Nord



Connection block

+24 VDC	*Safety circuit A1-A2*
Dynamic input signal	*Safety circuit A1-A2*
0 VDC	*Safety circuit B1-B2*
Dynamic output signal	*Safety circuit B1-B2*
Information	

Tina 8A
Connection Block

Tina 8A is a connection block with eight 5-pin M12 connections. It is used to connect multiple safety sensors with M12 contacts via a single cable to a Vital controller or Pluto PLC. This simplifies cable running and reduces cable costs. Multiple connection blocks can be connected to a Vital/Pluto. Tina 1A is used for unused M12 connections.

Application

- Short circuit monitoring and adaptation of connection block for up to eight safety sensors adapted to the dynamic safety circuit

Features

- Simplifies cable routing and reduces cable costs
- Allows branching of up to four safety sensors to the dynamic safety circuit

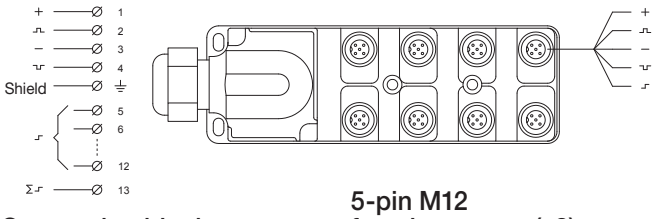
Approvals

TÜV Nord

Tina 8A Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:58
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15%, -15% 15 mA (25 mA with max information summary output) Information output: Max 10 mA t < 60 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	M12 5-pole female (8x) 13-pin connection block
Size	149 × 50 × 43 (L × W × H)
Weight	~140 g
Color	Black

Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	**TÜV Nord**



Connection block

1. *+24 VDC*
2. *Dynamic input signal*
3. *0 VDC*
4. *Dynamic output signal*
⏚ *Cable shield*
5. *Information (contact #1)*
6. *Information (contact #2)*
7. *Information (contact #3)*
8. *Information (contact #4)*
9. *Information (contact #5)*
10. *Information (contact #6)*
11. *Information (contact #7)*
12. *Information (contact #8)*
13. *Summarized information (contact #1-8)*

5-pin M12 female contact (x8)

+24 VDC
Dynamic input signal
0 VDC
Dynamic output signal
Information

Connection Examples of Safety Sensors to Tina 8A

Connection 1

One Eden is connected directly to the Tina 8A. The Eden status is shown by an LED on the Adam sensor. A status information signal is also connected to Tina 8A.

Connection 2

One Focus safety light grid/curtain is connected to the Tina 8A via a Tina 10A. The output from the Tina 10A is via a M12 connector. The connection between Tina 10A and Tina 8A is achieved using a cable with M12 connectors on each end.

The Tina 10A has two LEDs which show the status of the light grid. The same status information signal is connected to the Tina 8A. Tina10A and the Focus transmitter are connected to Tina 8A via an M12-3B.

Connection 3

A Spot 10 light beam is connected directly to Tina 8A. A 'Y' connector M12-3B for M12 plugs is connected to the transmitter and the receiver. The status information shown on the Spot LED is also connected to Tina 8A.

Connection 4

A safety mat is connected via a Tina 6 A to the Tina 8A. (A safety strip or safety bumper is connected in the same manner.) Two LEDs in Tina 6A shows the status of the mat. The same status information signal is connected to Tina 8A.

Connection 5

One Smile is connected to the Tina 8A. The information shown by an LED on the Smile is also connected to the terminal block on the Tina 8A.

Connection 6

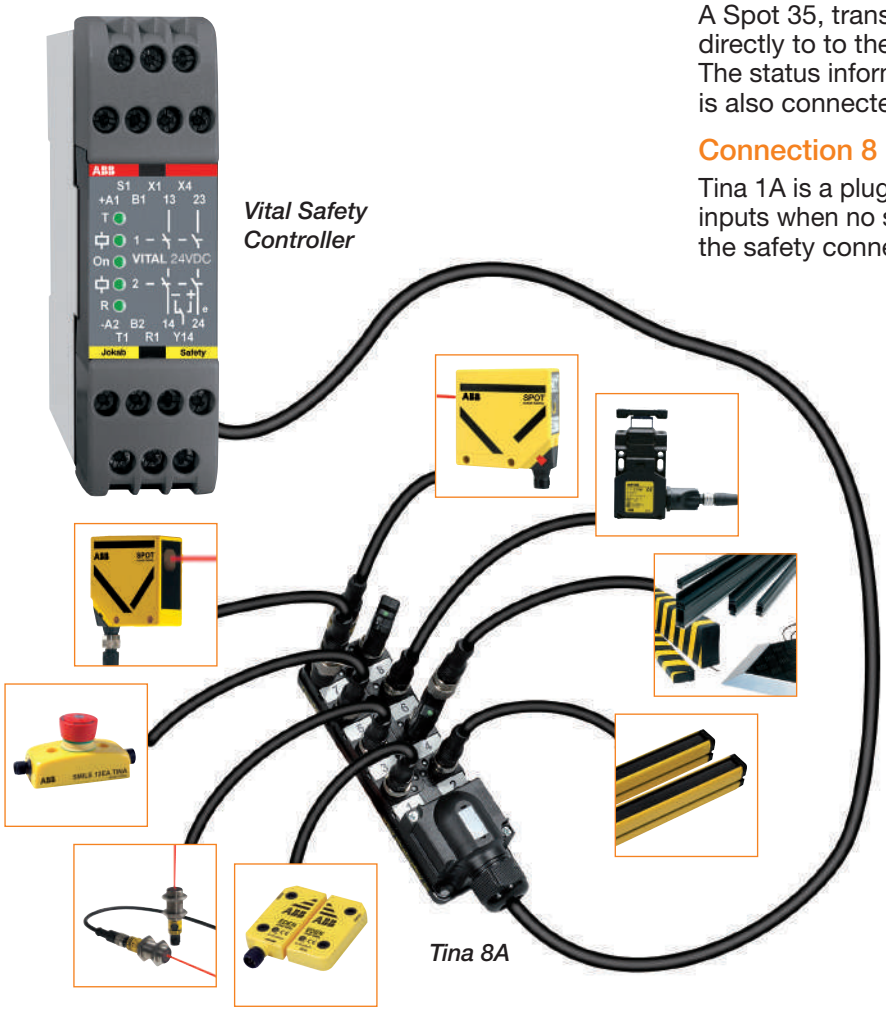
A safety interlock switch is connected via a Tina 3A mounted directly on the switch. The output from the Tina 3A is via a M12 connector. The connection between the Tina 3A and the Tina 8A is therefore simply made with a cable with M12 connectors on each end. On the Tina 3A there is a LED which shows the status of the switch. The same information signal is connected to the Tina 8A.

Connection 7

A Spot 35, transmitter and receiver are connected directly to to the Tina 8A via a M12-3B 'Y' connector. The status information shown by the LED on the Spot is also connected to the Tina 8A.

Connection 8

Tina 1A is a plug which has to be connected to Tina 8A inputs when no sensor is required, in order to complete the safety connection circuit.



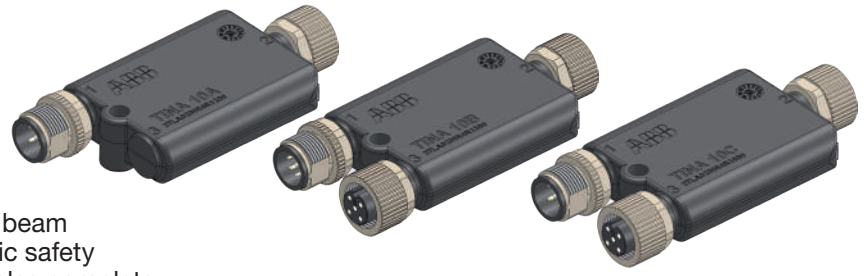
Vital Safety Controller

Tina 8A

Tina 4A

Note: All input connectors on the Tina 4A/8A must be connected to sensors or have Tina 1A plugs fitted.

Tina 10A/B/C Adaptation Unit



Tina 10 A/B/C are three connection units with M12 connections, that make it easy to connect a light curtain or light beam Focus with OSSD outputs to the dynamic safety circuits of Vital and Pluto. This also enables complete external interconnections, with M12 cabling, which reduces the cabling to and connections in the apparatus enclosure. Tina 10 A/B/C has LEDs for function indication, with green, red or flashing green/red indications.

Tina 10A has two M12 connections that are connected to: 1) Vital/Pluto and 2) a light curtain/light beam Focus receiver. See the Connection Example HR7000L-01 on page 6:36.

Tina 10B has three M12 connections that are connected to: 1) Vital/Pluto and 2) a light curtain/light beam Focus receiver, and 4: An external reset button and muting lamp, such as unit FMI-1C. See the Connection Examples HR7000L-01 on page 6:36.

Tina 10C has three M12 connections that are connected to: 1) Vital/Pluto and 2) a light curtain/light beam Focus receiver, and 4: a light curtain/light beam Focus Transmitter. See the Connection Examples HH3302D on page 4:49, HR7000L-01 on page 6:36.

Application

- Adaptation of safety sensors with OSSD outputs to the dynamic safety circuit. For example: Focus light curtain/light beam

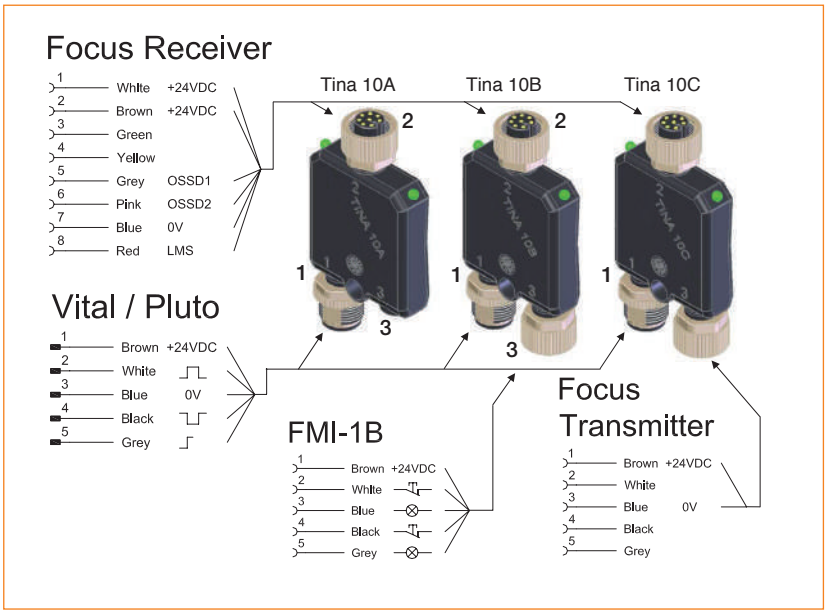
Features

- Simplifies the system as well as maintaining the safety level
- Indication of status by LED

Approvals

TÜV Nord

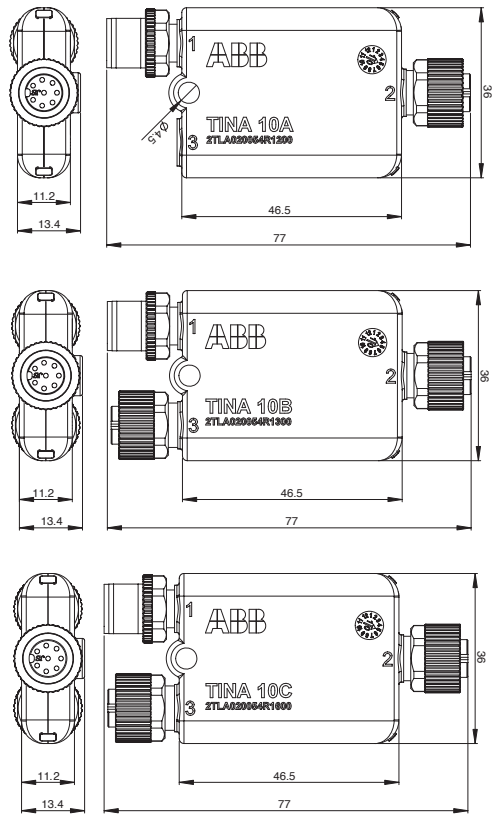
Tina 10A, 10B and 10C Connnections



Tina 10A, 10B and 10C Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:58
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +20%, -20% 60 mA (70 mA with max. info signal out) Info signal out: Max. 10 mA t < 120 µs Dynamic input signal: 9 to 13 V (RMS) Dynamic output signal: 9 to 13 V (RMS) Info signal out: ~23 VDC
Protection class	IP67
Ambient temperature	Storage: –10…+55° C Operation: –10…+55° C
Humidity range	35 to 85 % (without icing or condesation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Size	74 × 36 × 11 mm (L × W × H)
Weight	~40 g
Color	Black
Number of units connected to Vital 1 Max. number of Tina 10A: Max. number of Tina 10B/C:	 6 4 when Focus is supplied by Vital and a reset lamp is used 6 when Focus is supplied separately or no reset lamp is used
Number of units connected to Pluto, Vital 2 or 3, per input Max. number of Tina 10A/B/C:	 2
Connectors Tina 10A Tina 10B Tina 10C	 1: for Vital or Pluto 2: for Focus receiver 1: for Vital or Pluto 2: for Focus receiver 3: for Reset unit 1: for Vital or Pluto 2: for Focus receiver 3: for Focus transmitter

Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005 EN 61496-1:2004 + A1:2008
Certificates	**TÜV Nord CE**



Tina 11A
Terminal Block

Tina 11A is a connection block with two 5-pin M12 connections. It is used to connect two safety sensors with M12 contacts via a single cable to a Vital controller or Pluto Safety PLC. This simplifies cable running and reduces cable costs. Multiple connection blocks can be connected to a Vital/Pluto.

Application

- Terminal block for connection of two safety sensors with 5-pin M12 connectors and adaptation to the dynamic safety circuit

Features

- Simplifies cable routing and reduces cable costs
- Allows connection of two safety sensors to the dynamic safety circuit

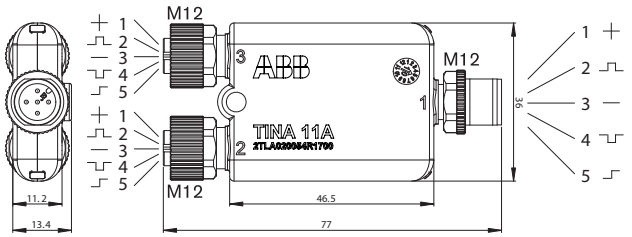
Approvals

TÜV Nord

Tina 11A Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:58
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15%, -15% 17 mA (27 mA with max information output) Information output: Max 10 mA t < 60 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	Out: M12 5-pole male (nr 2) In: M12 5-pole female (nr 1.3)
Size	74 × 36 × 11 mm (L × W × H)
Weight	~40 g
Color	Black

Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	**TÜV Nord**



5-pin M12 female connector (contact #2-3)

+24 VDC
Dynamic input signal
0 VDC
Dynamic output signal
Information

5-pin M12 male connector (contact #1)

+24 VDC
Dynamic input signal
0 VDC
Dynamic output signal
Summarized information (contact #2-3)

Tina 12A
Terminal Block

Tina 12A is a connection block with two 8-pin M12 connections. It is used to connect two process locks (Dalton or Magne 2A/B) with integrated Eden sensors via a single cable to a Vital controller or Pluto Safety PLC. This simplifies cable running and reduces cable costs. Multiple connection blocks can be connected to a Vital/Pluto.

Tina 12A has three 8-pin M12 contacts that connect to: 1) Pluto/Vital, information for sensors and locks and lock signals, 2) Dalton with Eden No 1 and 3) Dalton with Eden No 2.

Application

- Terminal block for connection of two safety sensors with 8-pin M12 connectors and adaptation to the dynamic safety circuit
  For example: Dalton, Magne and Knox

Features

- Simplifies cable routing and reduces cable costs
- Allows connection of two safety sensors to the dynamic safety circuit

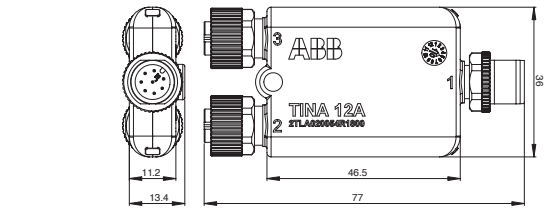
Approvals

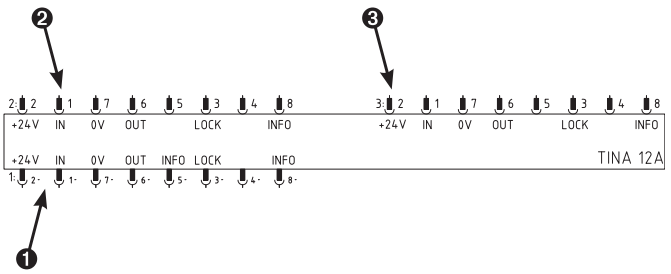
TÜV Nord

Tina 12A Technical Data

Manufacturer	ABB AB/Jokab Safety, Sweden
Ordering information	see page 4:58
Level of safety IEC/EN 61508-1…7 EN 62061 EN ISO 13849-1 EN 954-1	 SIL3 SIL3 PL e, category 4 Category 4
PFH_d	4.50×10^{-9}
Power supply Operating voltage Total current consumption Time delay t (in/out) Voltage supply at normal operation (protection OK) and 24 VDC supply voltage	 24 VDC + +15%, -15% 60 mA (70 mA with max information output) Information output: Max 10 mA t < 60 µs Dynamic input: between 9 and 13 volt (RMS) Dynamic output: between 9 and 13 volt (RMS) Information output: ~ 23 VDC
Protection class	IP67
Ambient temperature	Storage: -30…+70°C Operation: -10…+55°C
Humidity range	35 to 85 % (with no icing or condensation)
Housing material	Based on polyamide, Macromelt OM646 (V0)
Connectors	To Vital/Pluto: M12 8-pole male (nr 2) From safety device: M12 8-pole female (nr 1.3)

Size	74 × 36 × 11 mm (L × W × H)
Weight	~40 g
Color	Black
Approved standards	European Machinery Directive 2006/42/EC EN ISO 12100-1:2003 EN ISO 12100-2:2003 EN 60204-1:2007 EN 954-1:1996 EN ISO 13849-1:2008 EN 62061:2005
Certificates	**TÜV Nord**



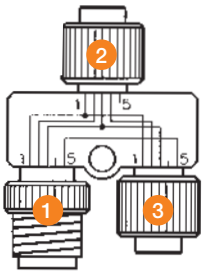


Accessories

'Y' branch with M12 connection and M12-connection device with screw connectors

M12-3A

Female

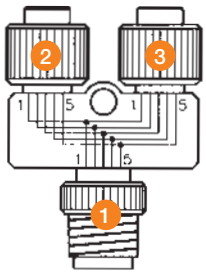


Male *Female*

See the Connection Examples HA3306C, D – pages 5:42, 5:43 HH3300A, D – page 5:48

M12-3B

Female *Female*

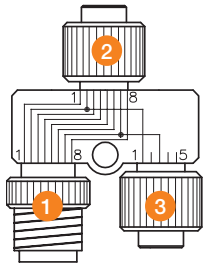


Male

See the Connection Examples HA3306C, D – pages 5:42, 5:43 HH3300D – page 5:48 HH3302D – page 5:49

M12-3D

Female

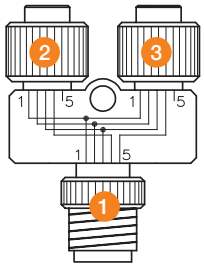


Male *Female*

See the Connection Examples HR7000L – page 5:36 HR7000O – page 5:37

M12-3E

Female *Female*

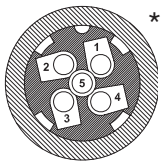


Male

See the Connection Examples HB0001A, 2A, 4A and 6A pages 5:51, 5:52, 5:53

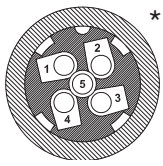
Note: See product list for applications

M12-C01



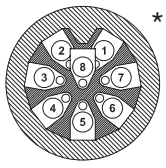
Female

M12-C02



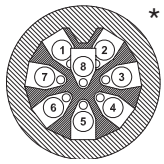
Male

M12-C03



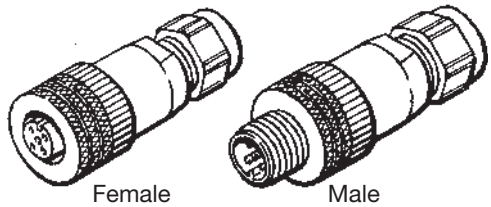
Female

M12-C04



Male

** Seen from the cable connection side*



Female Male

Cabling

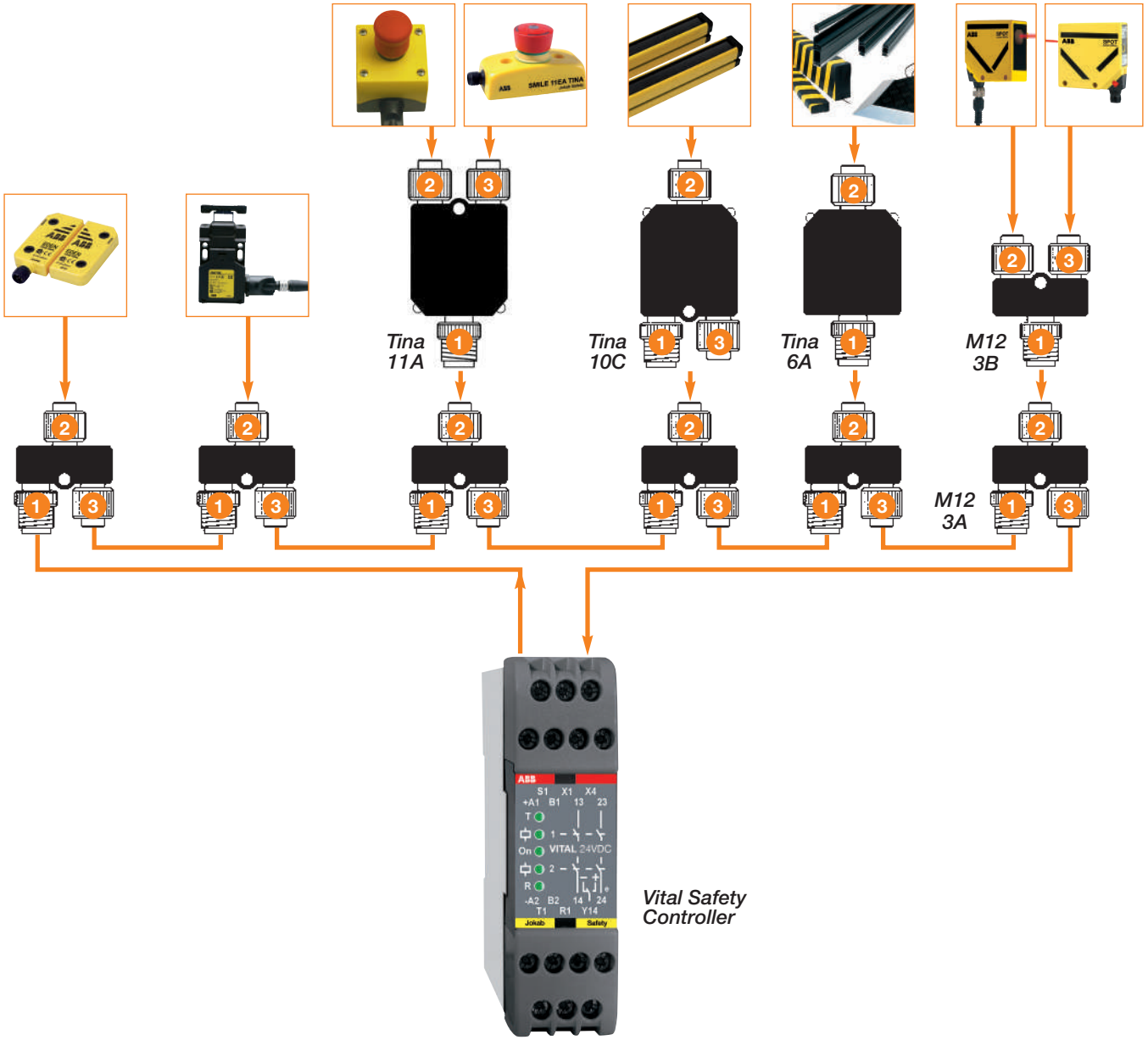
Many of ABB Jokab Safety's products are connected using standard M12 connectors. This facilitates installation, saving a lot of time, and also dramatically reducing the risk of incorrect connection.

We have therefore developed cables with 5 conductors (5 x 0.34 mm + screening) or 8 conductors (8 x 0.34 mm + screening) which offer the advantages that we believe a good cable should have. These are available in any length and in various standard lengths, with molded straight or angled male or female connectors. Particularly suitable cables for the Tina 4A and Tina 8A units are C9 and C13. They have thicker, 0.75 mm^2 conductors for the feed line and 0.5 mm^2 for the other conductors + screening. Refer to the component list for the variants that are available.

Advantages

- Area 0.34 mm^2
- Always screened cable
- The screen is always connected to negative in male connectors
- The guide pin in the small connector is indicated by a recessed arrow that is easy to recognize
- Convenient cable in PVC
- The cable is also available in any length

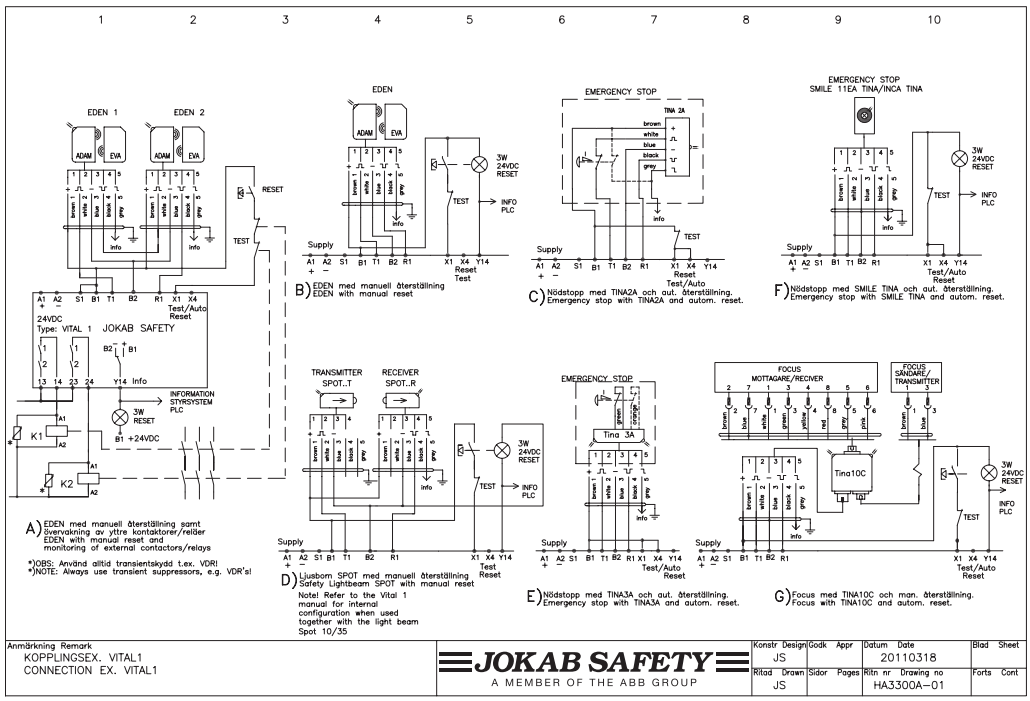
Example of Safety Component Connections based on ‘Y’ Branch



Connection Examples Contents

HA3300A-01 Connection Example

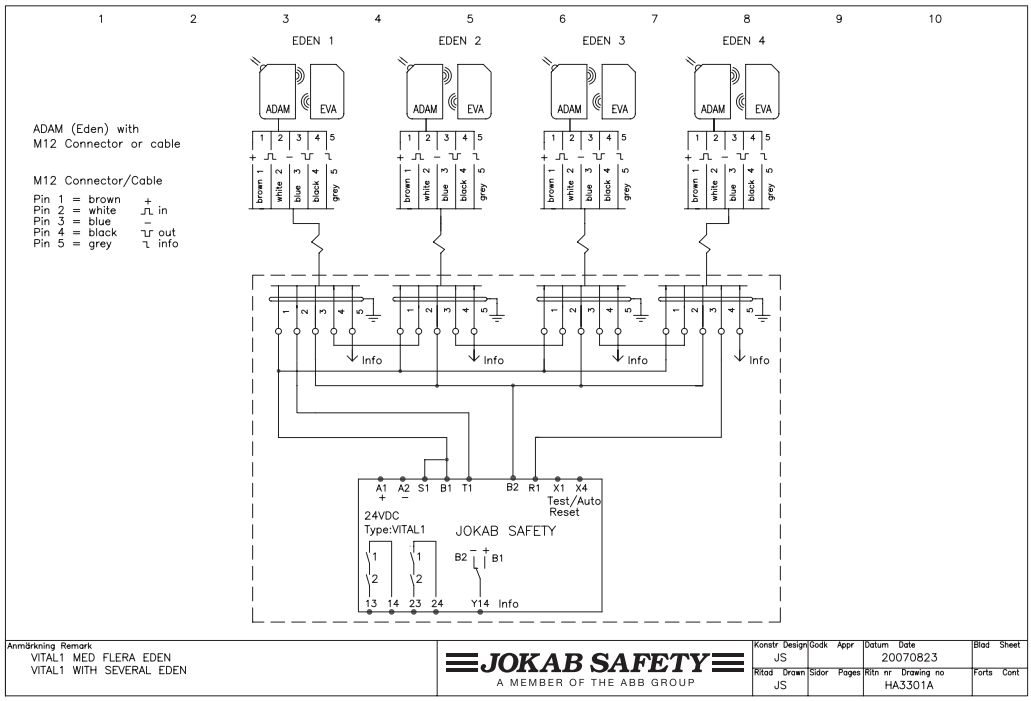
Vital 1



SEE DISCLAIMER ON PAGE 4:61

HA3301A Vital 1 Connection Example

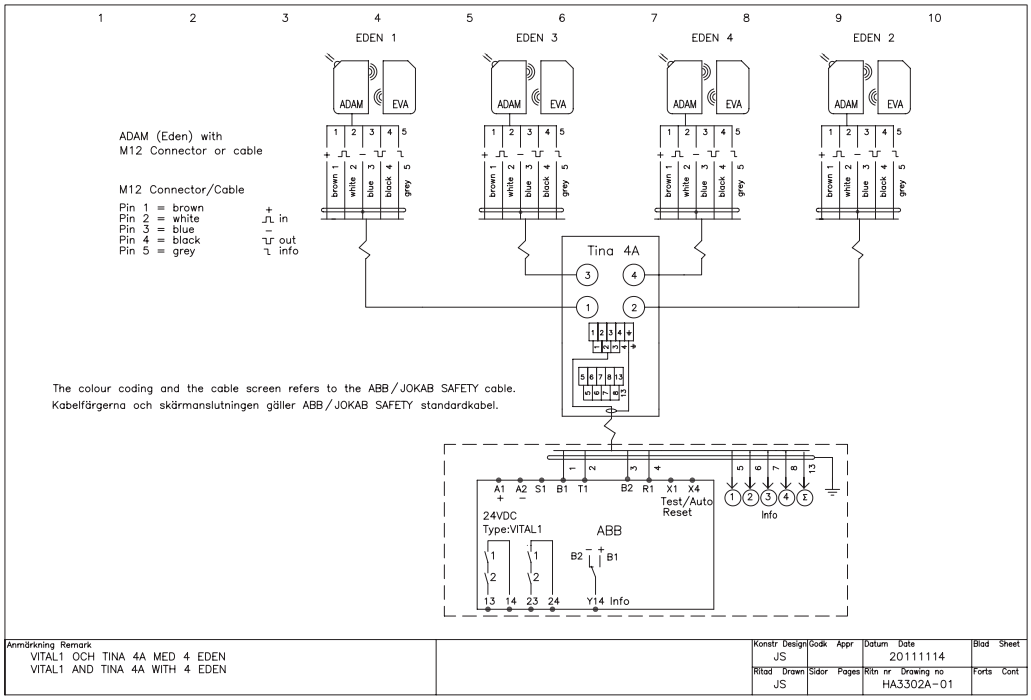
Vital 1 with Several Eden



SEE DISCLAIMER ON PAGE 4:61

HA3302A Connection Example

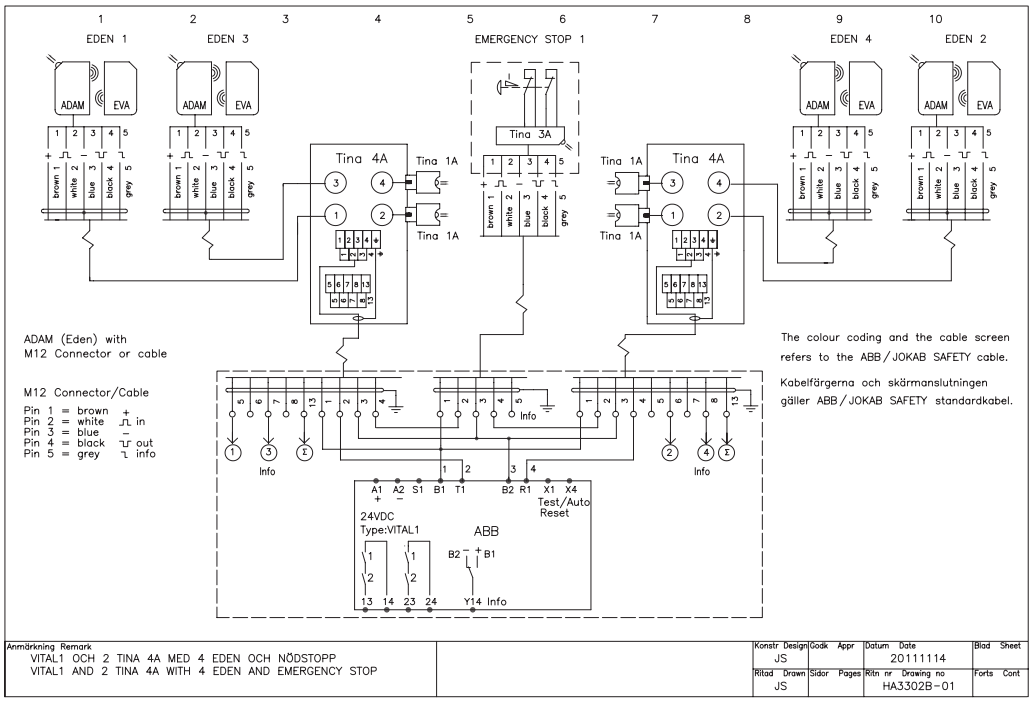
Vital 1 and Tina 4A with 4 Eden



SEE DISCLAIMER ON PAGE 4:61

HA3302B Connection Example

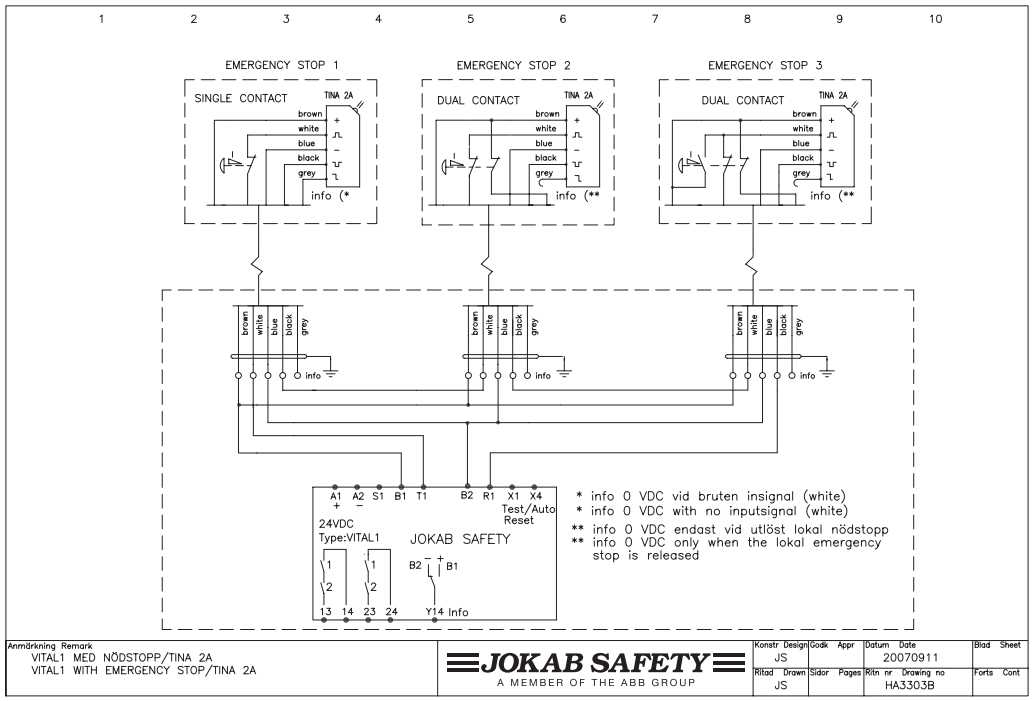
Vital 1 and 2 Tina 4A and 4 Eden and Emergency Stop



SEE DISCLAIMER ON PAGE 4:61

HA3303A Connection Example

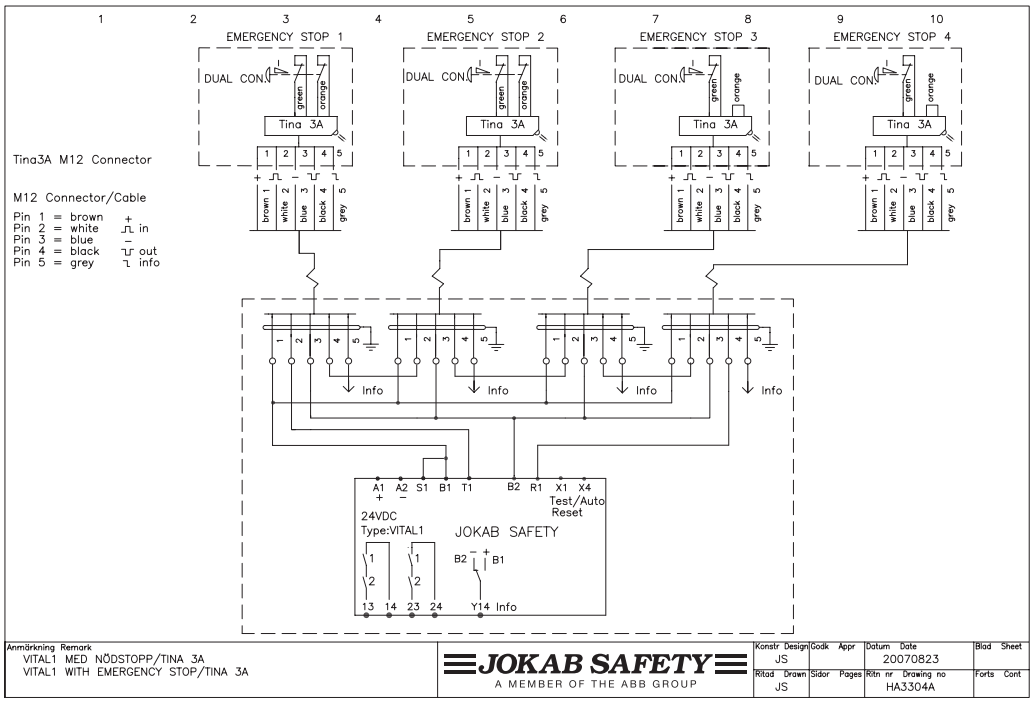
Vital 1 with Emergency Stop/Tina 2A



SEE DISCLAIMER ON PAGE 4:61

HA3304A Connection Example

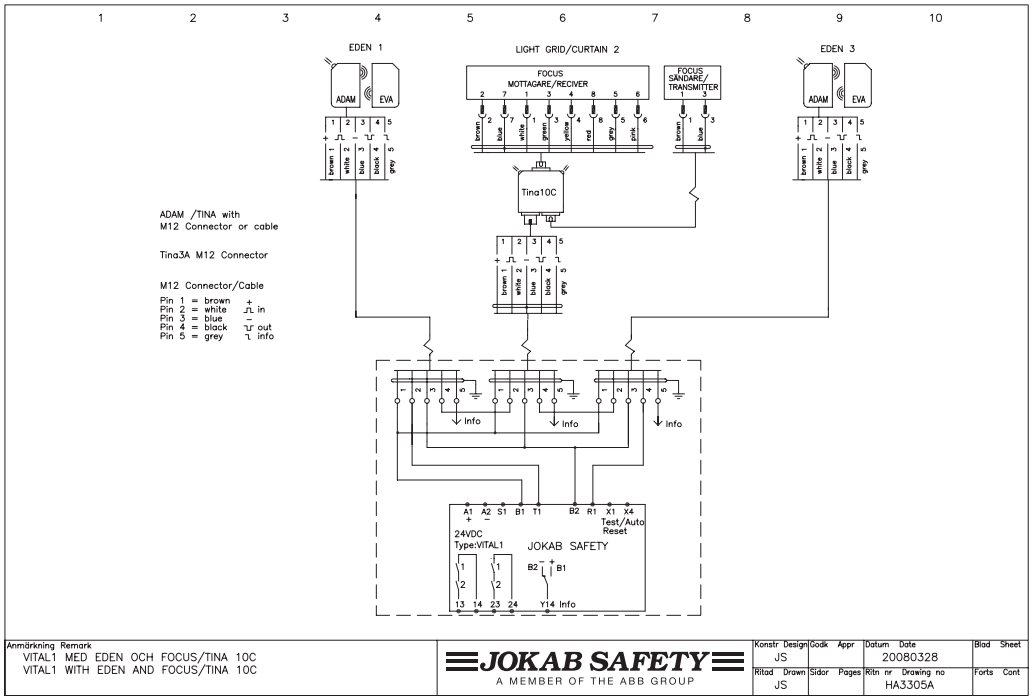
Vital 1 with Emergency Stop/Tina 3A



SEE DISCLAIMER ON PAGE 4:61

HA3305A Connection Example

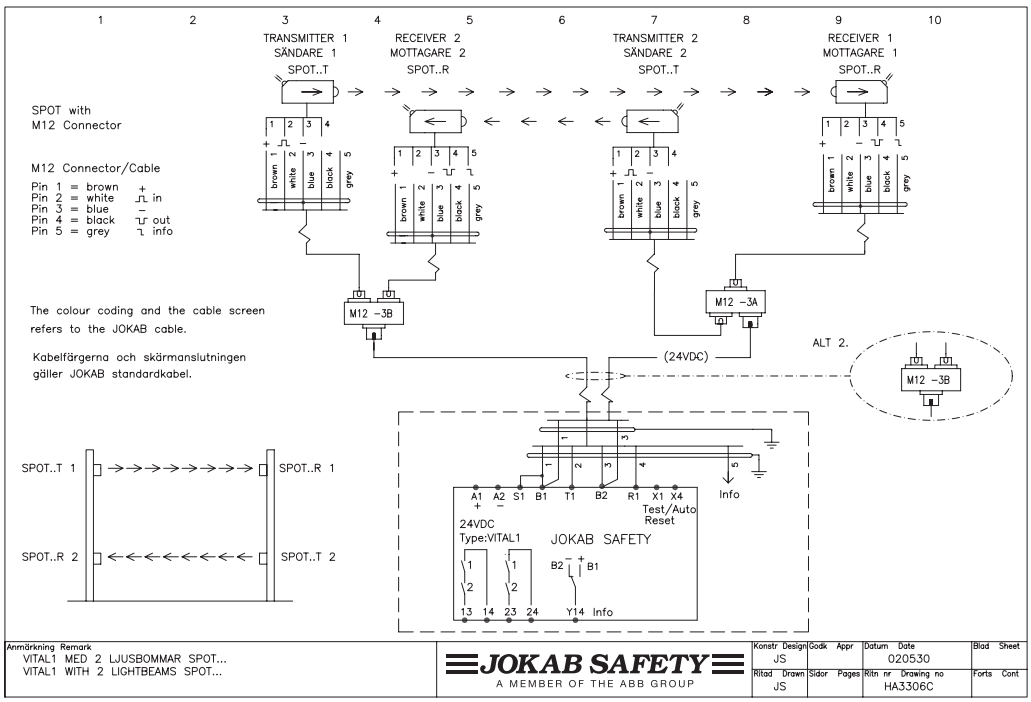
Vital 1 with Eden and Focus Light Grid/Tina 10C



SEE DISCLAIMER ON PAGE 4:61

HA3306C Connection Example

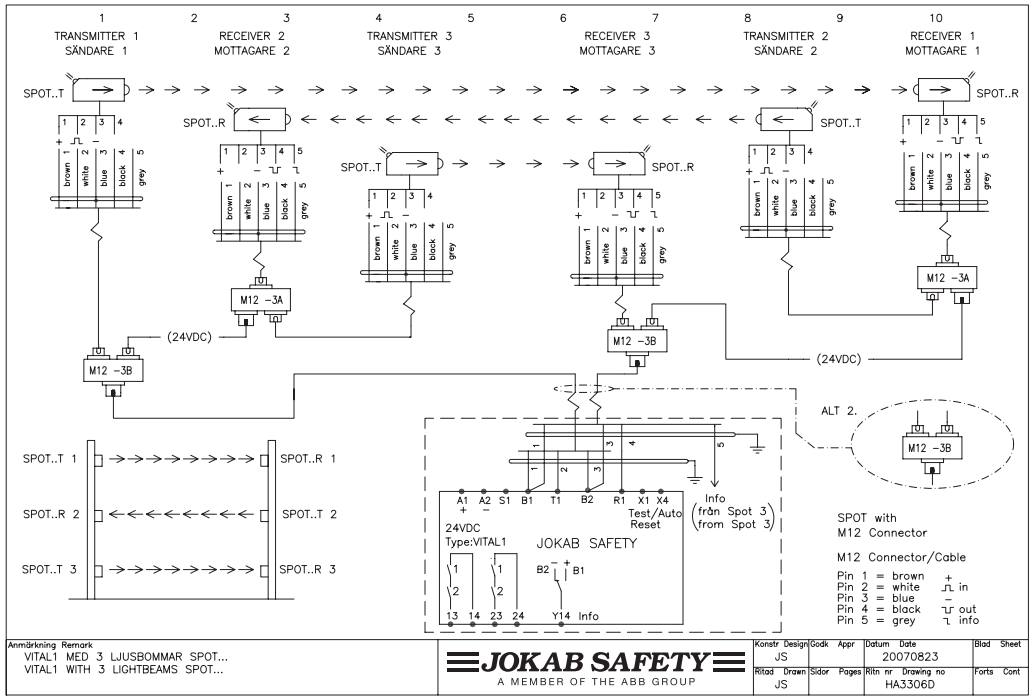
Vital 1 with 2 Spot Light Beams



SEE DISCLAIMER ON PAGE 4:61

HA3306D Connection Example

Vital 1 with 3 Spot Light Beams



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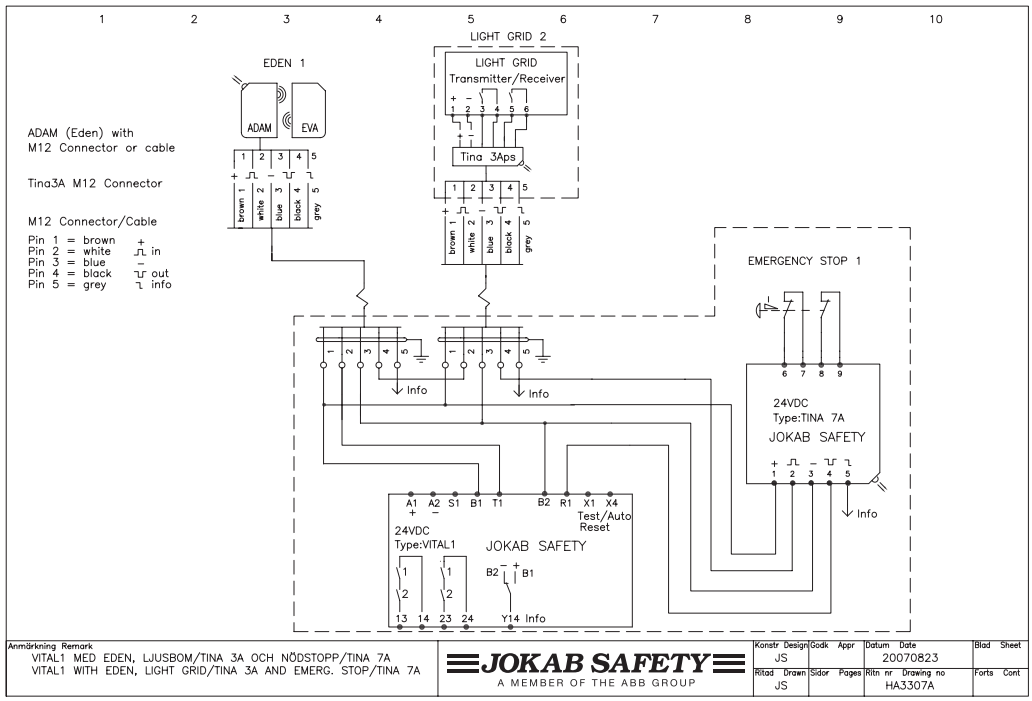
HA3307A Connection Example

Vital 1 with Eden, Light Grid/Tina 3A and Emergency Stop/Tina 7A



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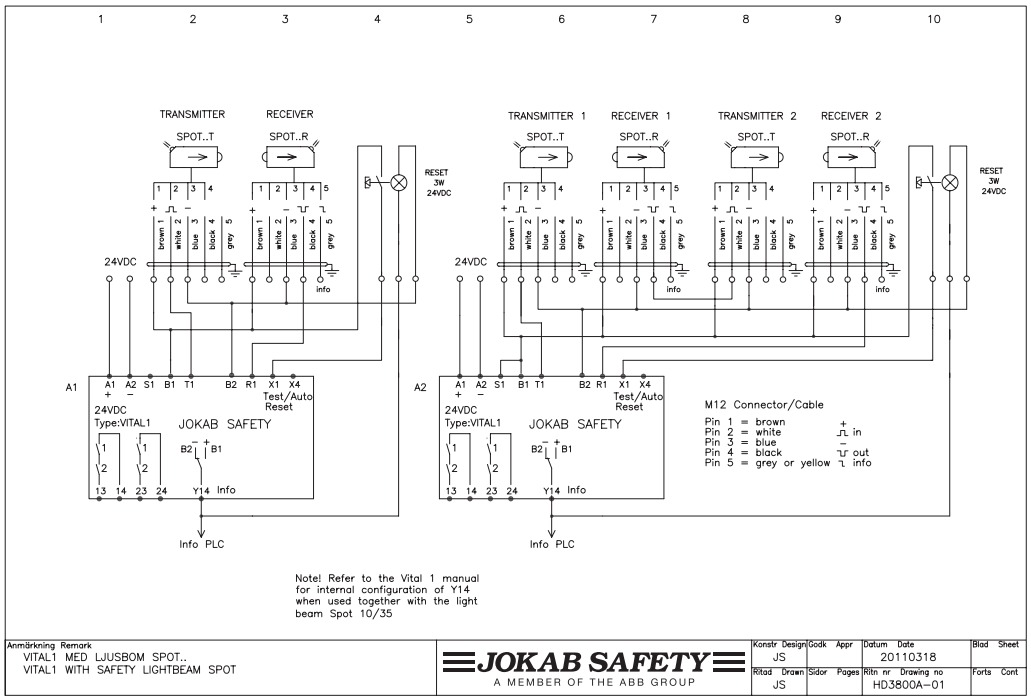
HD3800A-01 Connection Example

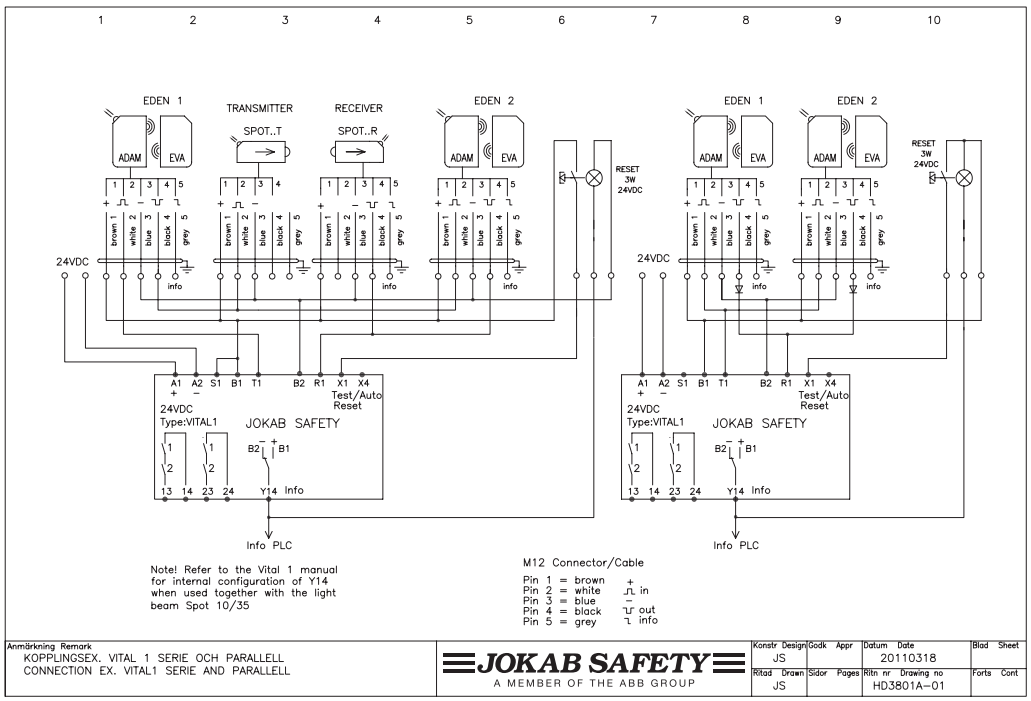
Vital 1 with Spot Safety Light Beam



SEE DISCLAIMER ON PAGE 4:61

HD3801A-01 Connection Example

Vital 1, Series and Parallel



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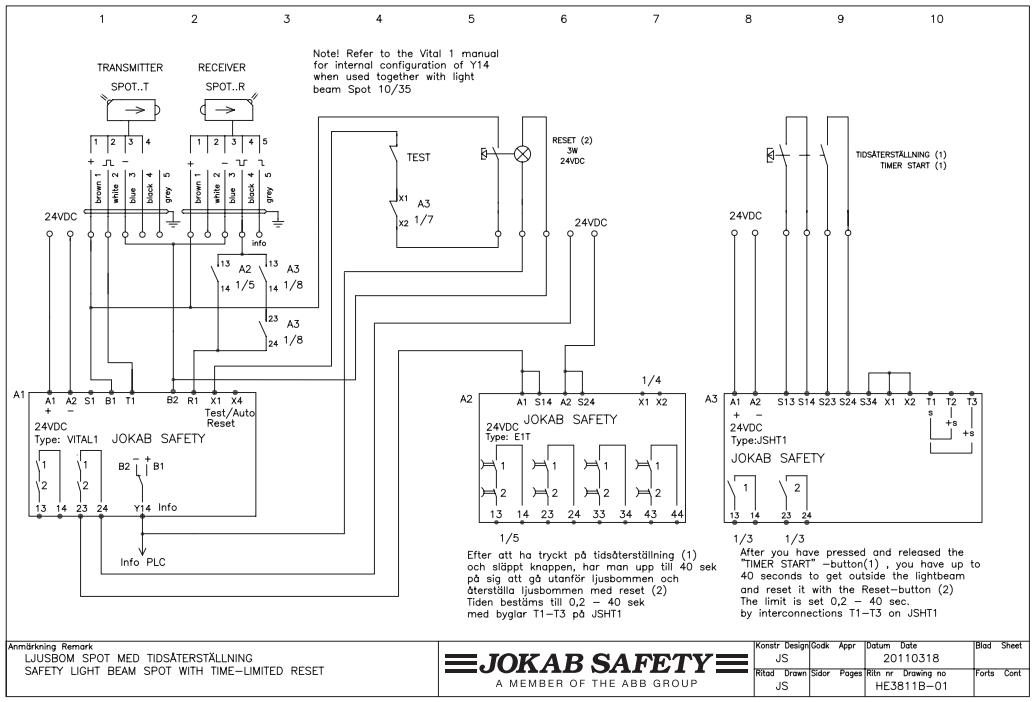
HE3811B-01 Connection Example

Safety Spot Light Beam with Time-Limited Reset



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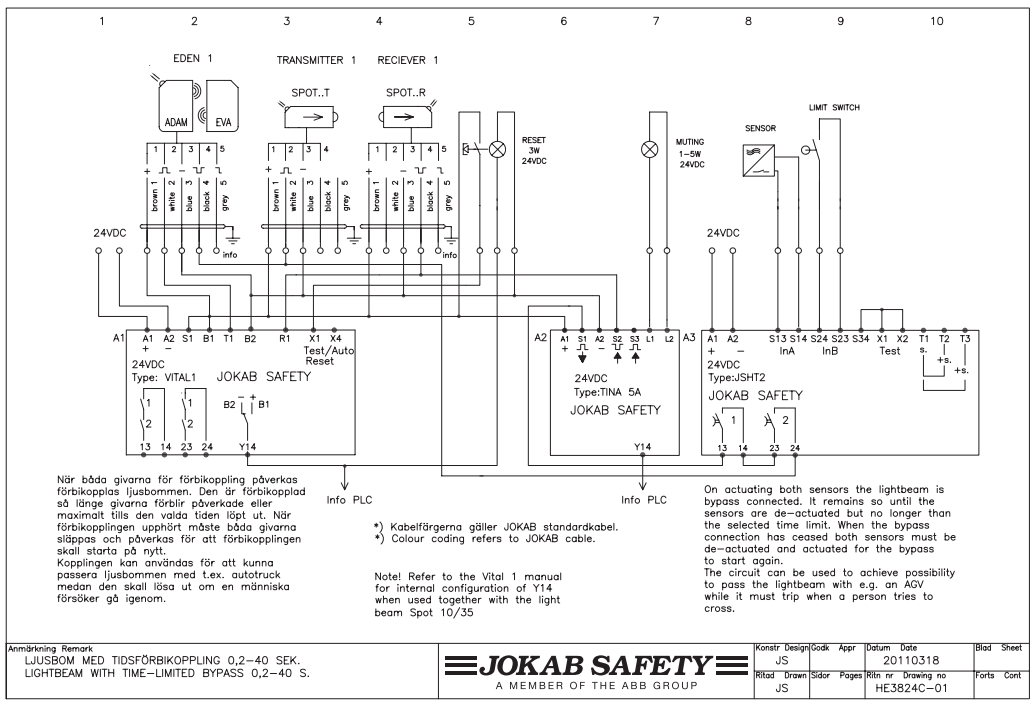
HE3824C-01 Connection Example

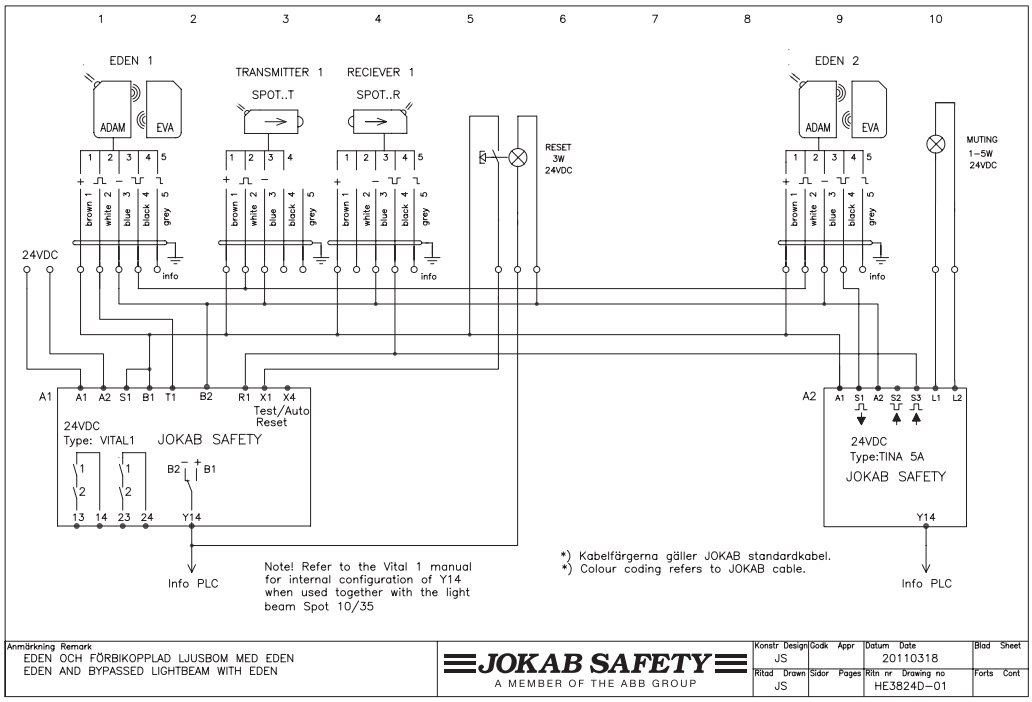
Light Beam with Time-Limited Bypass 0.2–40 s



SEE DISCLAIMER ON PAGE 4:61

HE3824D-01 Connection Example

Eden and Bypassed Light Beam with Eden



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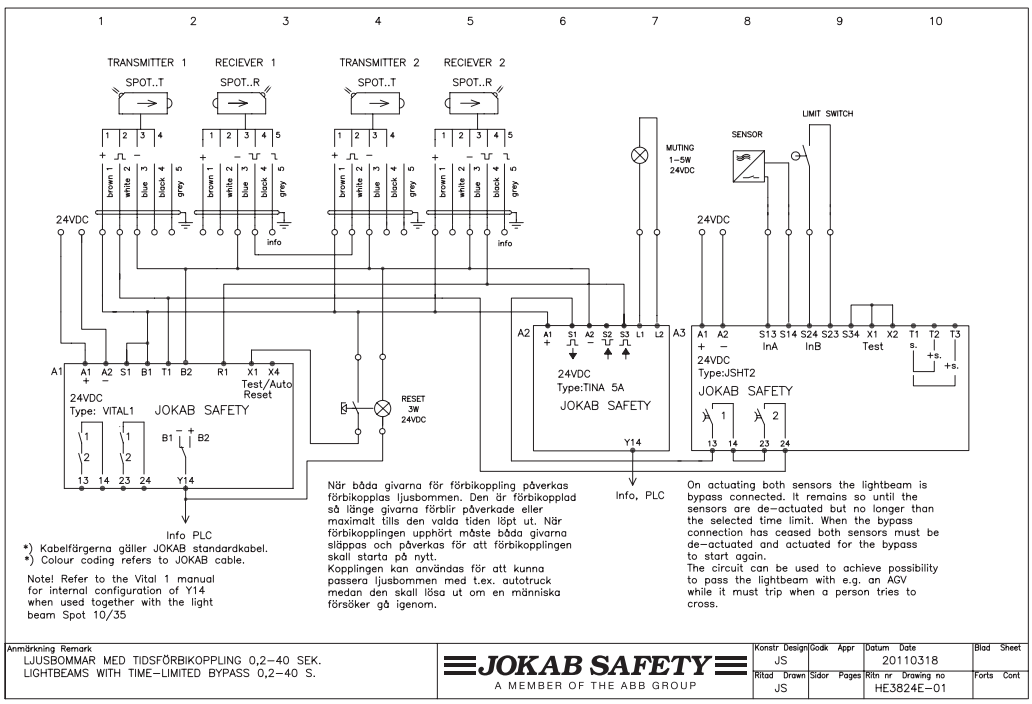
HE3824E-01 Connection Example

Light Beams with Time-Limited Bypass 0.2–40 s



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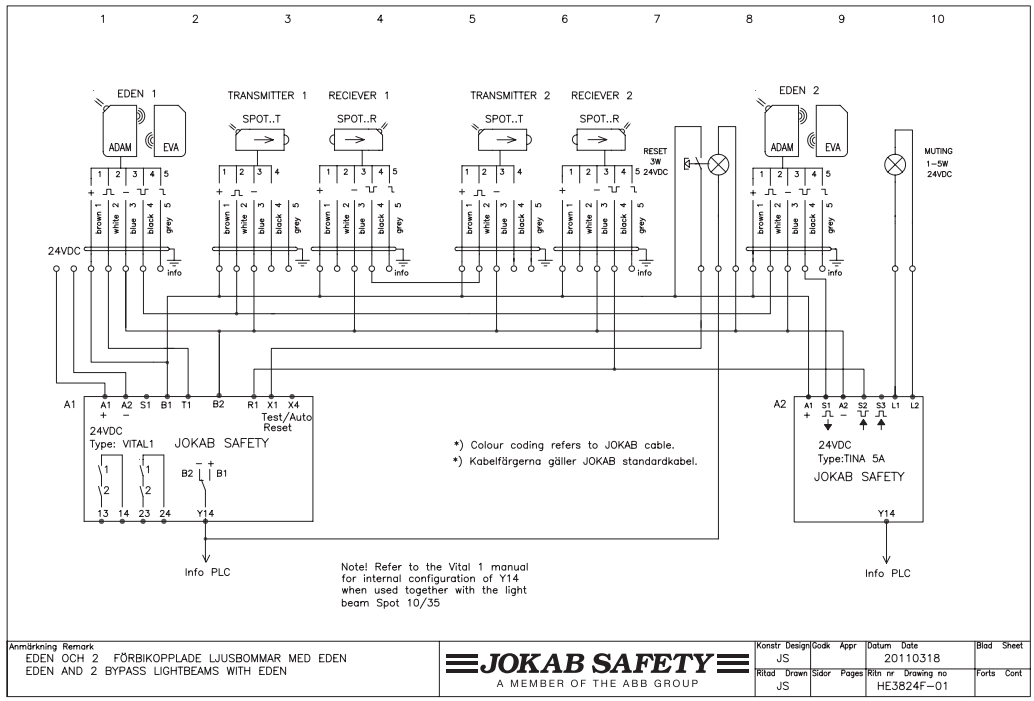
HE3824F-01 Connection Example

Eden and 2 Bypass Light Beams with Eden



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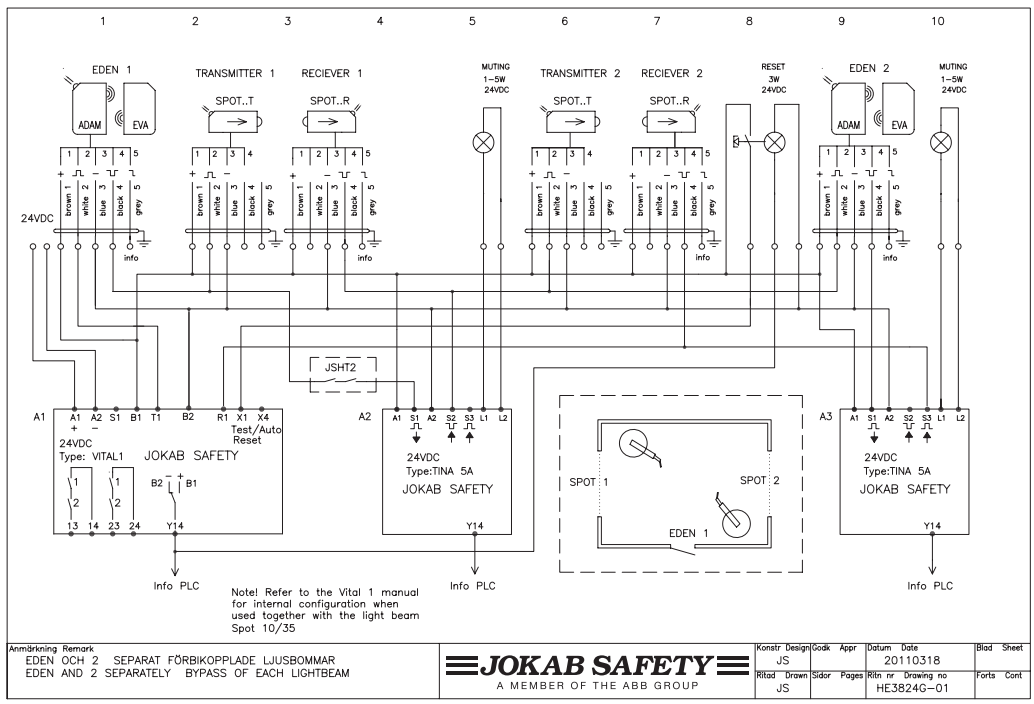
HE3824G-01 Connection Example

Eden and 2 Separately Bypassed Light Beams



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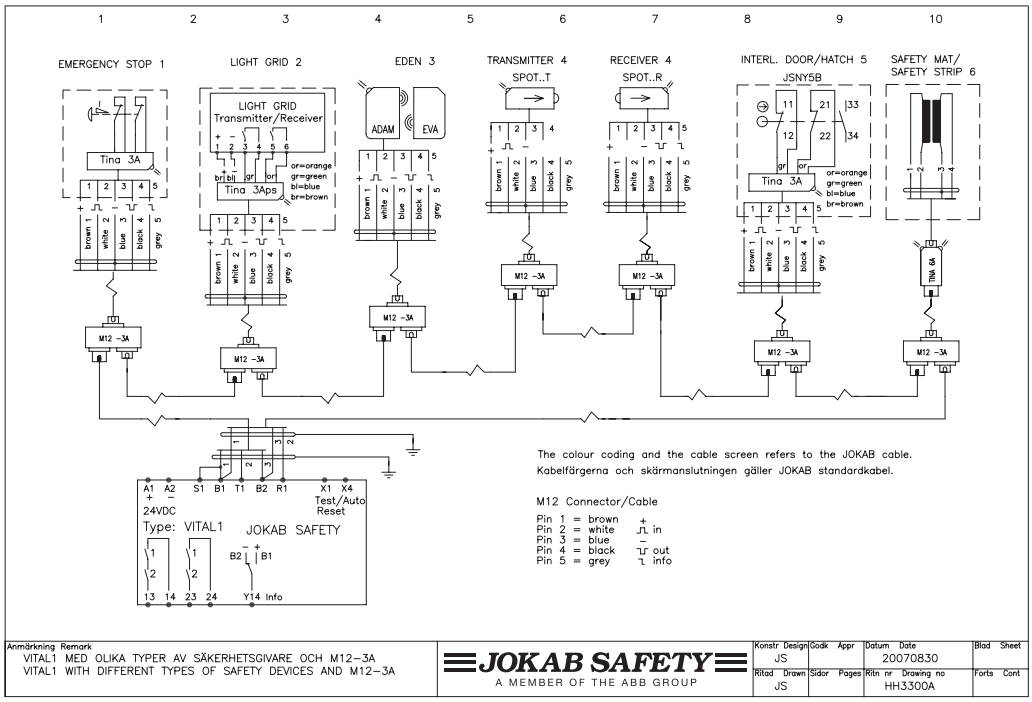
HH3300A Connection Example

Vital 1 with Different Types of Safety Devices and M12–3A



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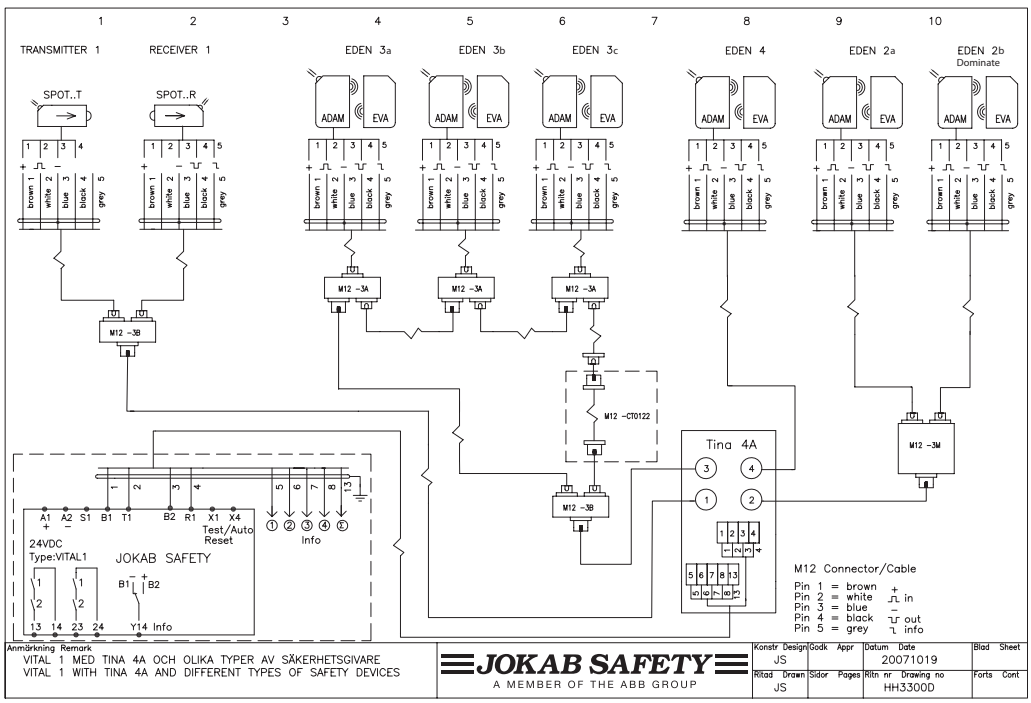
HH3300D Connection Example

Vital 1 with Tina 4A and Different Types of Safety Devices



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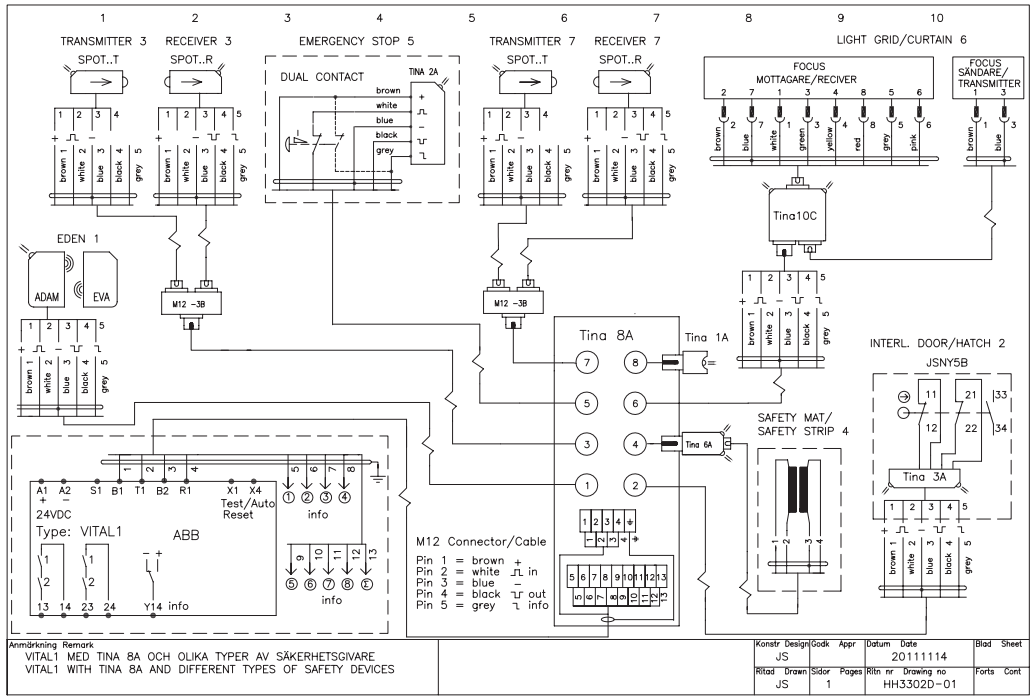
HH3302D Connection Example

Vital 1 with Tina 8A and Different Types of Safety Devices



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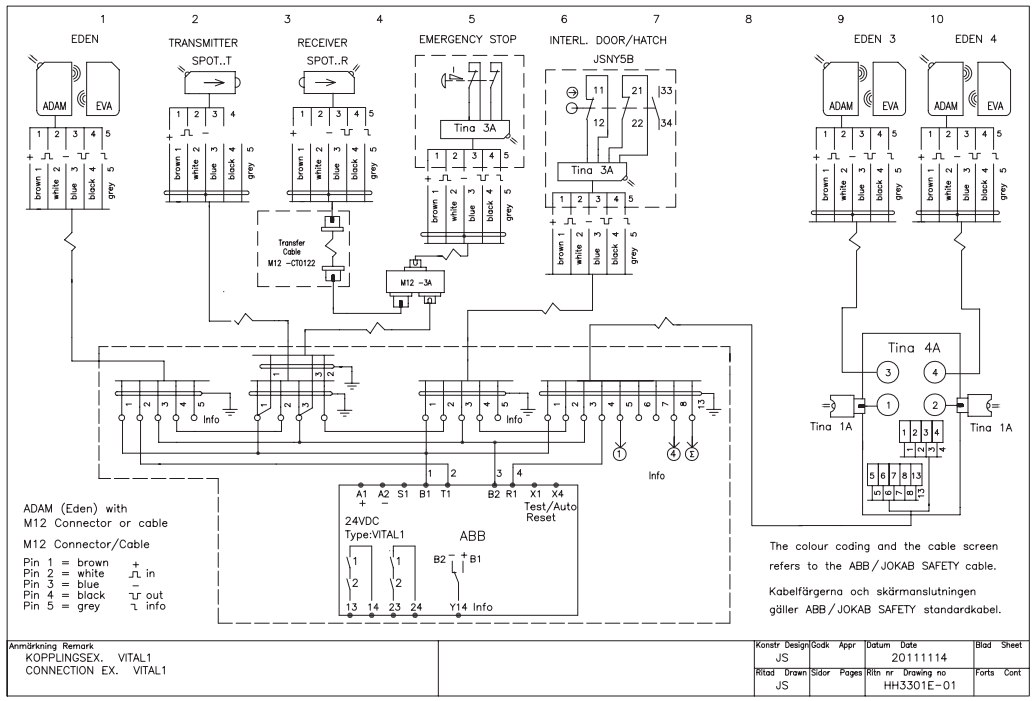
HH3301E Connection Example

Vital 1



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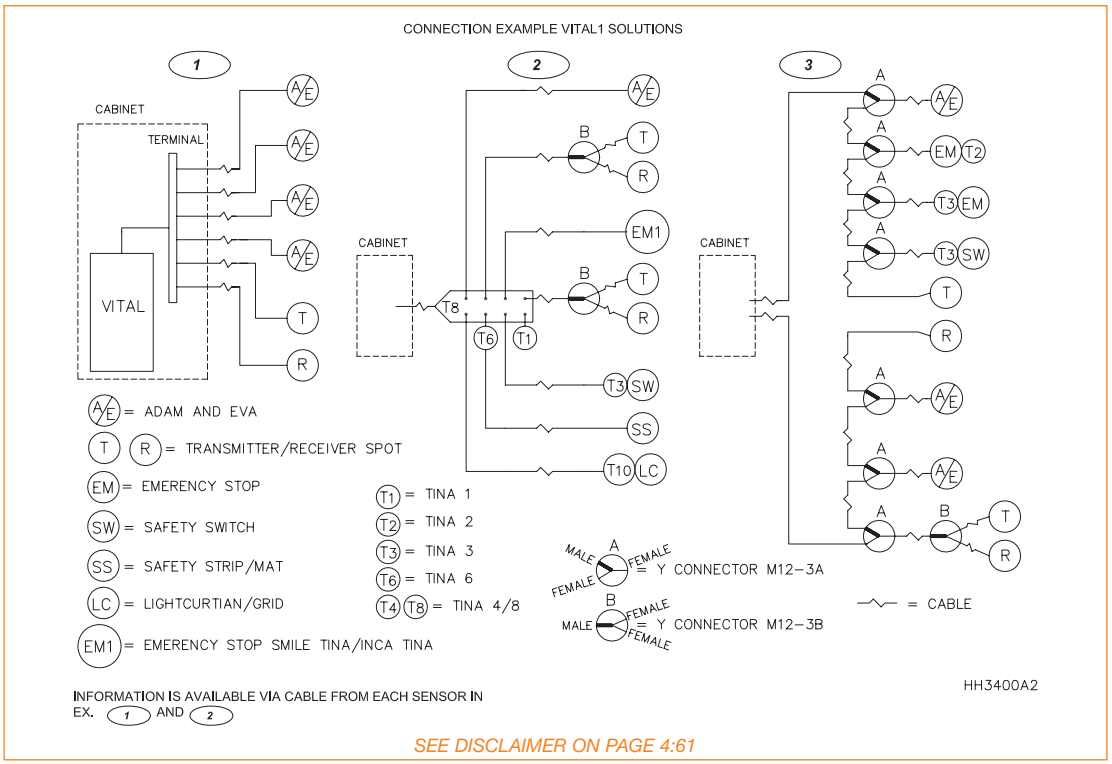
HH3400A2 Connection Example

Vital 1 Solutions



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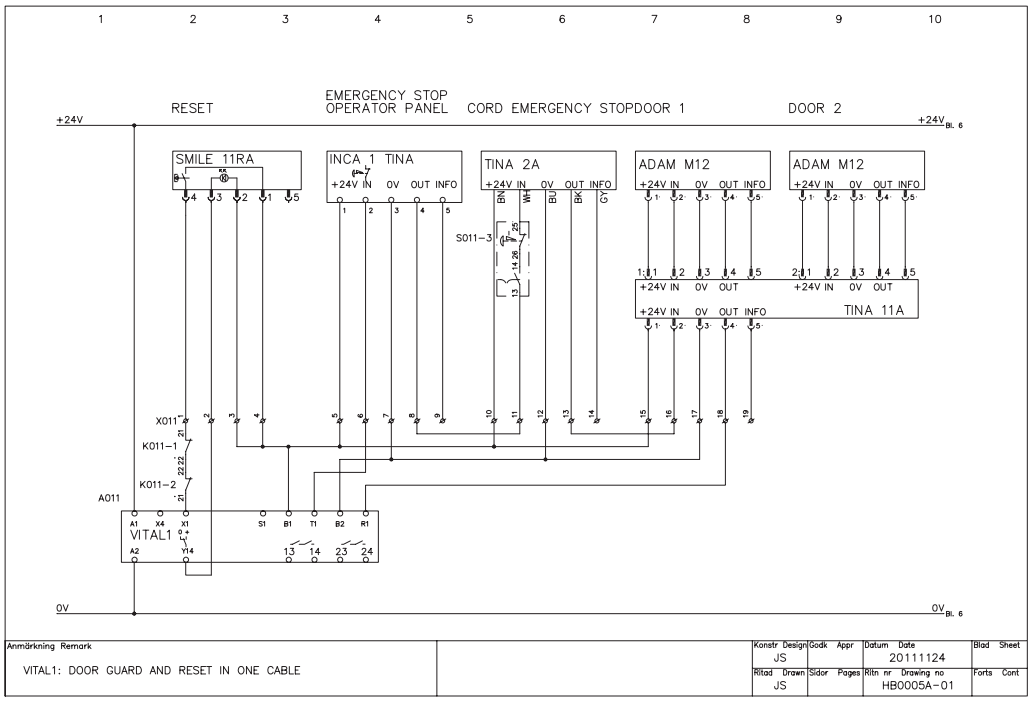
HB0005A Connection Example

Vital with Eden and Inca Emergency Stop, with Separate Reset



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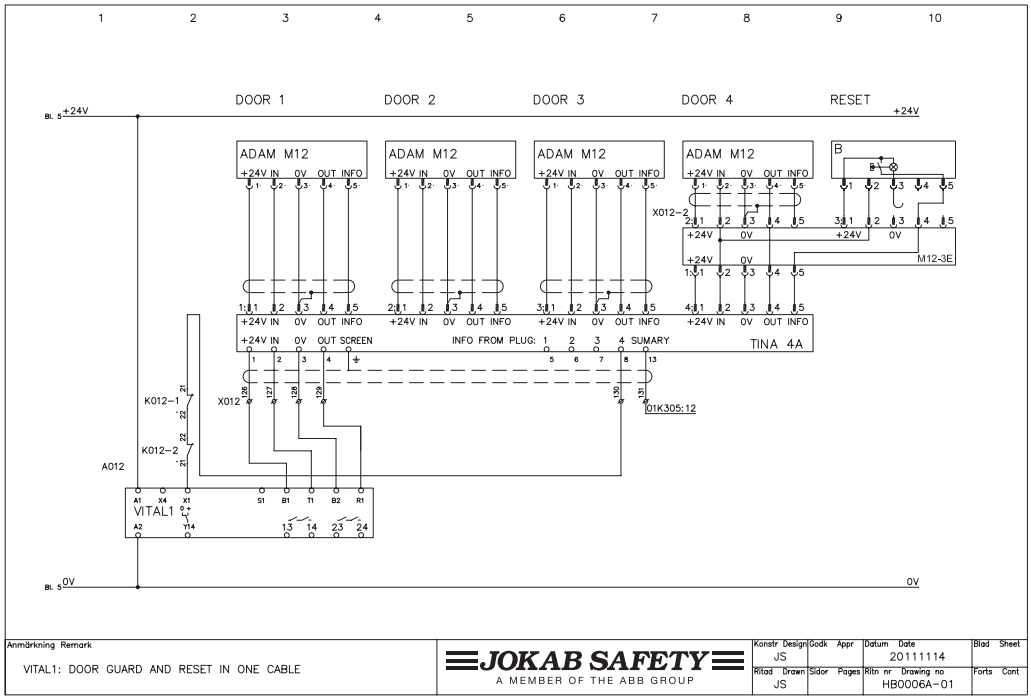
HB0006A Connection Example

Vital with 4 Eden Units + Reset via M12-3E and Tina 4A



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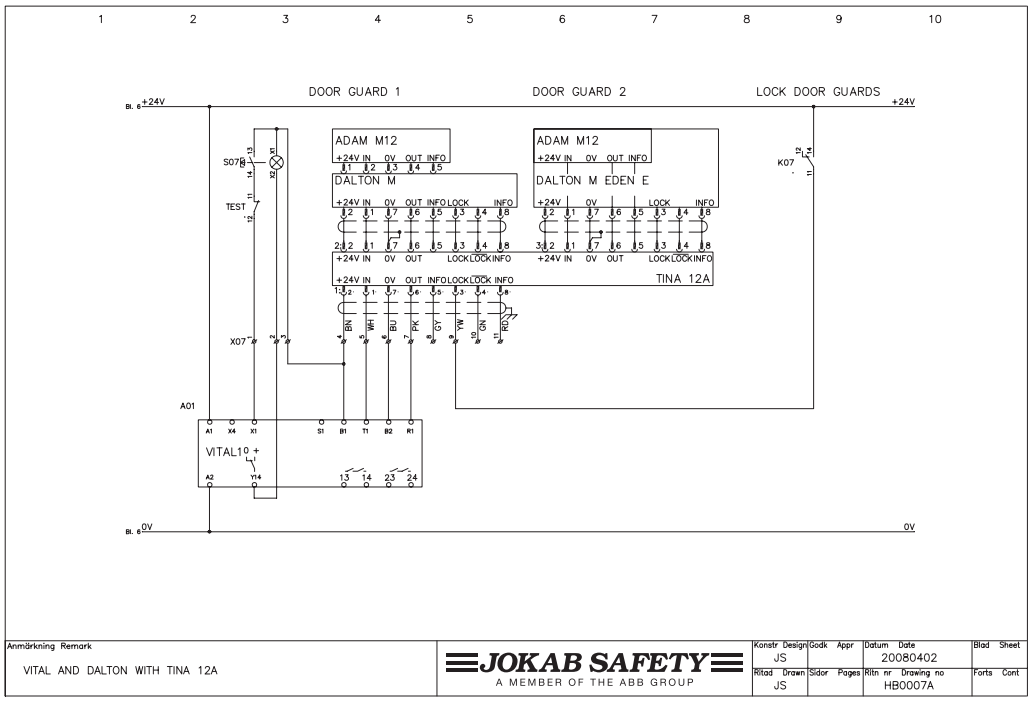
HB0007A Connection Example

Vital with Two Dalton Units via Tina 12A



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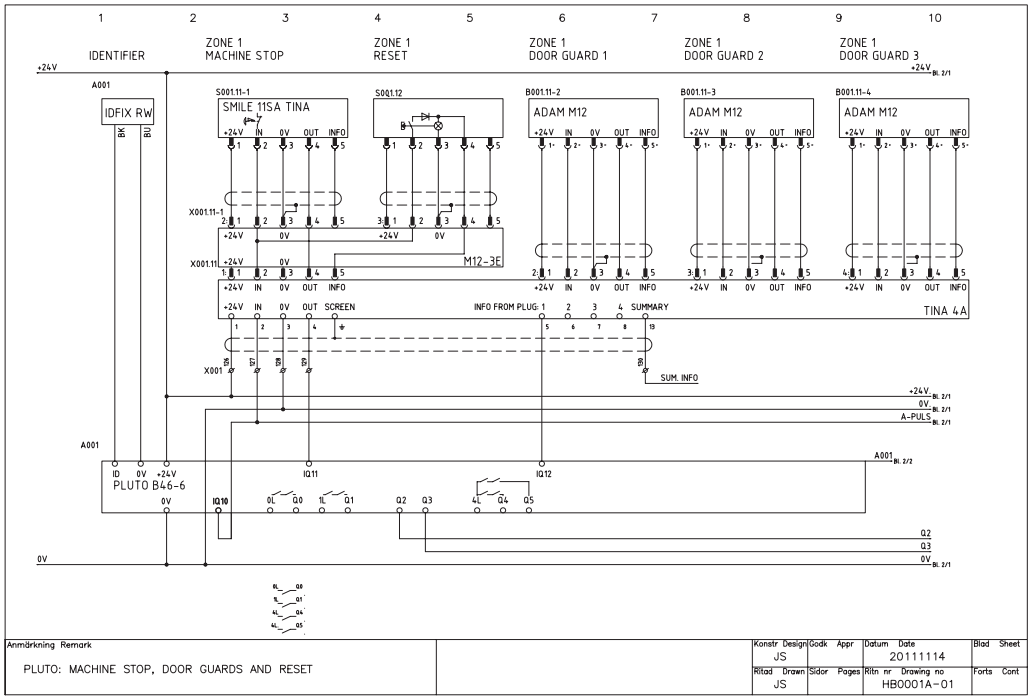
HB0001A Connection Example

Pluto with Smile Emergency Stop Unit + Reset via M12-3E and Adam via Tina 4A



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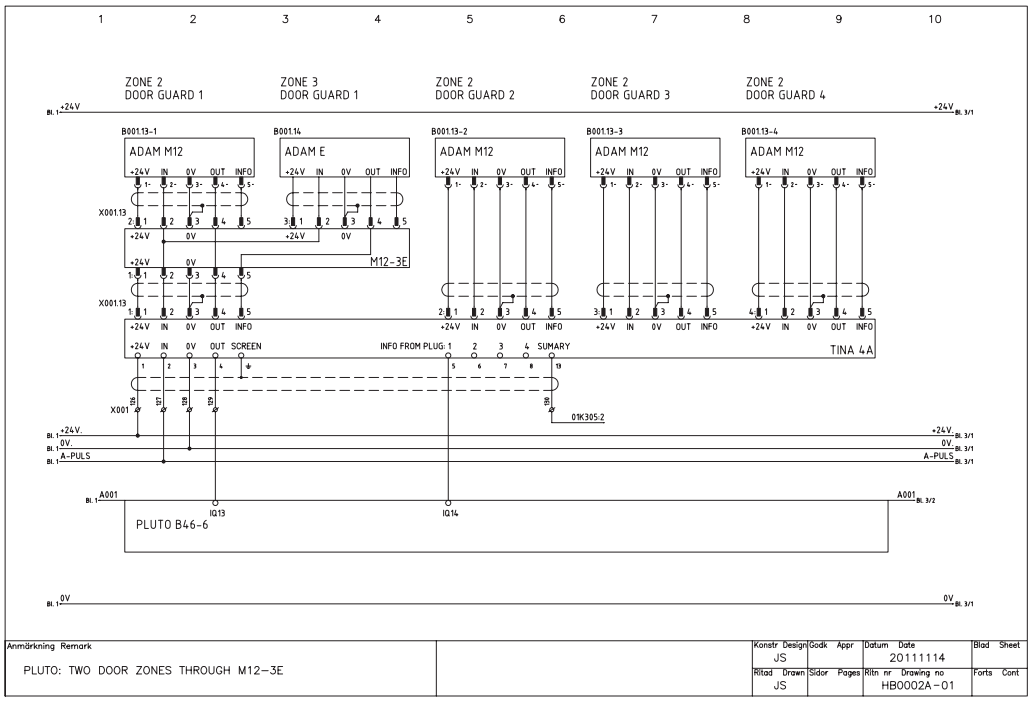
HB0002A Connection Example

Pluto with Five Eden Units, for Two Zones via M12-3E and Tina 4A



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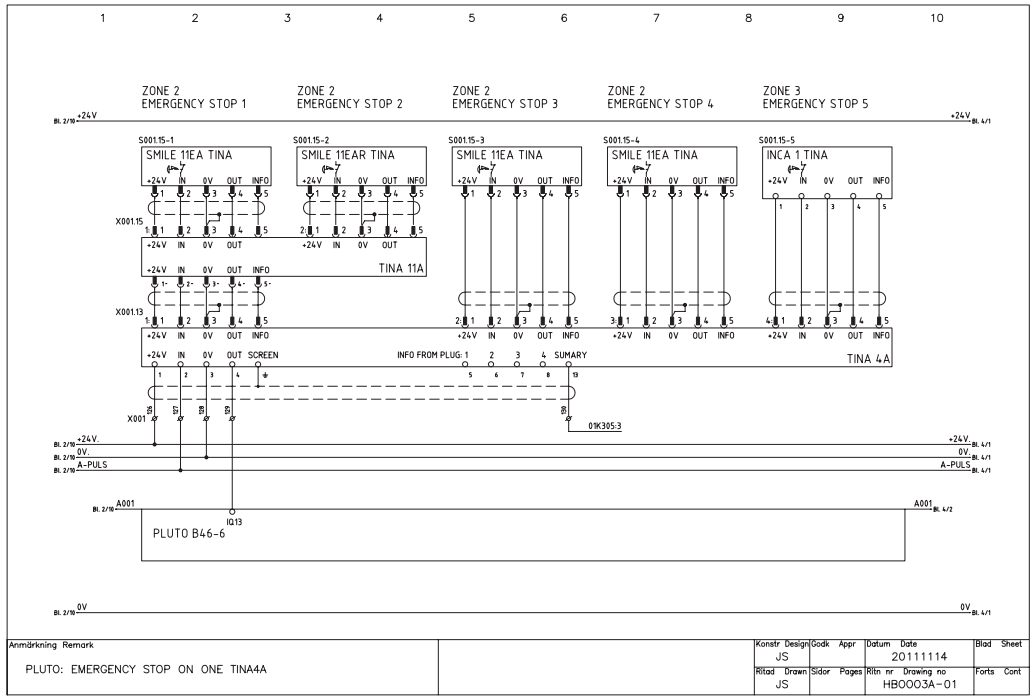
HB0003A Connection Example

Pluto with Smile and Inca Emergency Stop Units, via Tina 11A and Tina 4A



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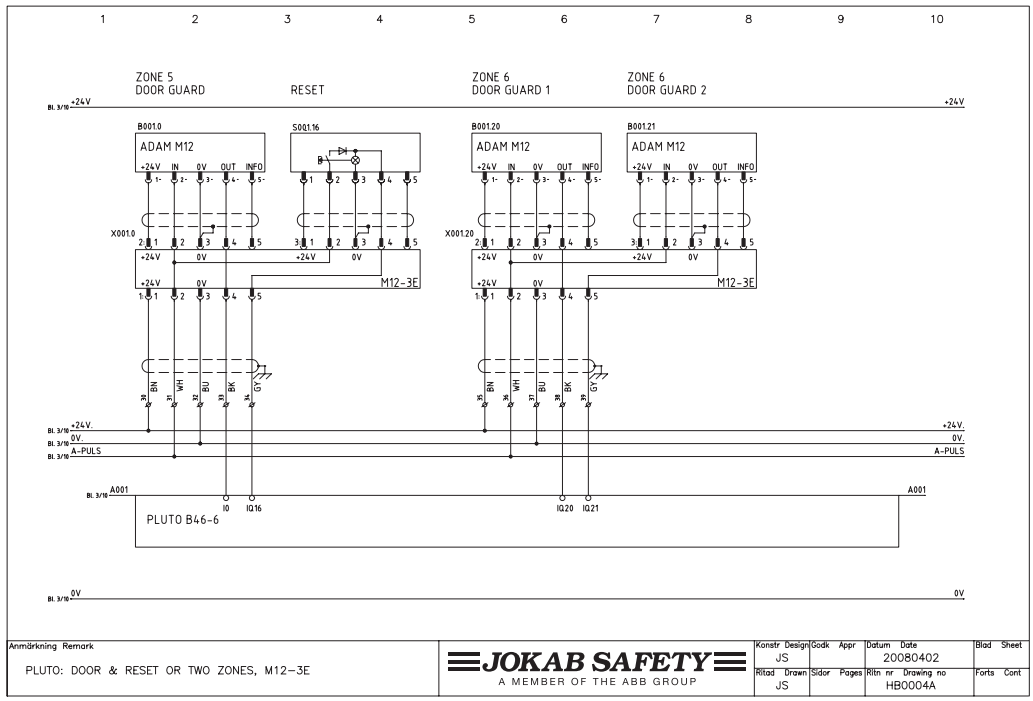
HB0004A Connection Example

Pluto with Different Zones for Eden + Reset and Two Eden units + via M12-3E



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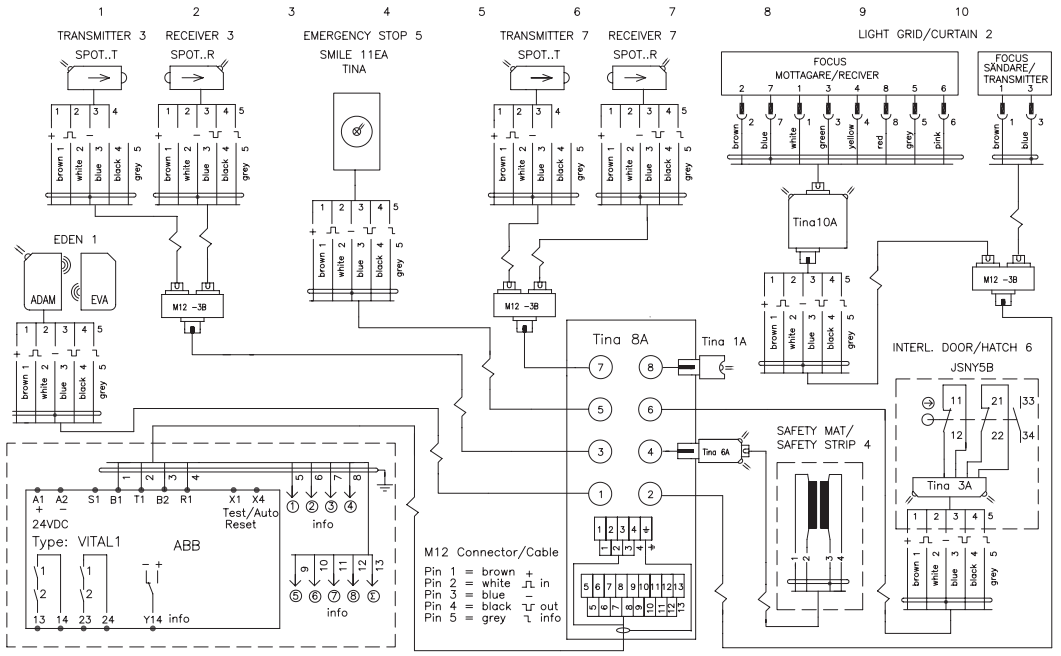
HH3301D Connection Example

Vital 1 and Tina 8A with Different Safety Device Types



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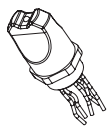
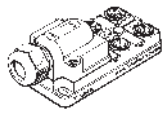
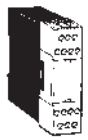
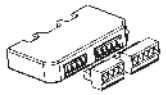
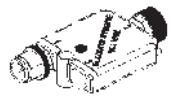
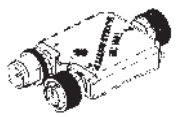
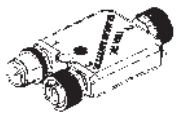
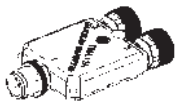
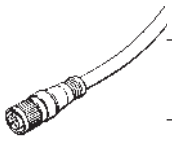
Component List - Vital/Tina

Designation		Ordering Information	Description
Vital 1		2TLJ020052R1000	Safety controller with 2 safety outputs, uses unique dynamic signal technology, automatic or manual supervised reset, test input for monitoring of external positive guided relays/contactors, 5 LED indicators, 1 dual purpose information output, quick release terminal blocks, 22.5mm wide, 24VDC supply. Meets safety category 4, dynamic self test.
Vital 2		2TLJ020070R4300	Safety controller with 2 independant input circuits, up to 10 devices per circuit. 2 output groups. Group 2 can be set for time delay. LED indication and three different modes of operation. 24VDC supply. Meets safety category 4.
Vital 3		2TLJ020070R4400	Safety controller with 2 independant input circuits. Circuit 1 is for 2 channel devices, circuit 2 is for up to 10 dynamic devices. 2 output groups. Group 2 can be set for time delay. LED indication and three different modes of operation. 24VDC supply. Meets safety category 4.
Tina 1A		2TLJ020054R0000	Tina M12 dynamic port plug for Tina 4A/8A connection blocks. Must be used to fill empty ports not used on connection blocks. Multi-function status indicator LED.
Tina 2A		2TLJ020054R0100	Dynamic adapter for connecting potential free dry contact safety devices to the Vital 1 controller or Pluto Safety PLC. M20 thread connection for direct connection to the safety device or safety device enclosure, multi-function status indicator LED, integrated information output 24VDC - 10mA. Comes with plastic locking nut.
Tina 2B		2TLJ020054R1100	Dynamic adapter for connecting potential free dry contact safety devices to the Vital 1 controller or Pluto Safety PLC. Multi-function status indicator LED, integrated information output 24VDC - 10mA. For mounting inside of an enclosure.
Tina 3A		2TLJ020054R0200	Dynamic adapter with 5 pole M12 male quick disconnect for connecting potential free dry contact safety devices to the Vital 1 controller or Pluto Safety PLC. M20 thread connection for direct connection to the safety device or safety device enclosure, multi-function status indicator LEDs, integrated information output 24VDC - 10mA. Comes with plastic locking nut.
Tina 3Aps		2TLJ020054R1400	Dynamic adapter with 5 pole M12 male quick disconnect for connecting potential free dry contact safety devices to the Vital 1 controller or Pluto Safety PLC. M20 thread connection for direct connection to the safety device or safety device enclosure, multi-function status indicator LEDs, integrated information output 24VDC - 10mA, 24VDC and 0VDC power leads for powering up devices. Comes with plastic locking nut.
Tina 4A		2TLJ020054R0300	Dynamic 4 port connection block for connecting up to 4 safety devices with dynamic signal. Ports are 5 pole M12 female quick disconnects. Cable gland cover with internal terminal block for wiring 24VDC supply, dynamic signal input/output from Vital 1 controller or Pluto Safety PLC information outputs for each port, and summation output.

Component List - Vital/Tina

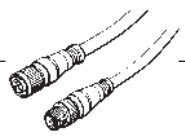
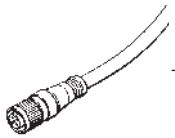
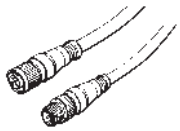
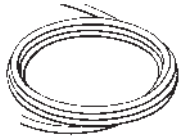
Designation		Ordering Information	Description
Tina 5A		2TLJ020054R0400	Dynamic bypass connection module for bypassing safety devices with dynamic signal connected to Vital 1 controller. Can bypass one or multiple devices at once. 24VDC supply, LED indicators, information output Y14 rated at 24VDC - 10mA, quick disconnect terminal blocks, 22.5mm wide and monitoring of bypassing light (24VDC - 1 to 5W maximum).
Tina 6A		2TLJ020054R0600	Dynamic adapter with in-line 5 pole M12 male & female quick disconnects for connecting safety mats or strips with M12 connector to the Vital 1 controller or Pluto Safety PLC. Multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
Tina 7A		2TLJ020054R0700	Dynamic adapter, din rail mount with quick disconnect for connecting potential free dry contact safety devices to the Vital 1 controller or Pluto Safety PLC. Multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
Tina 8A		2TLJ020054R0500	Dynamic connection block with 8 ports for connecting up to 8 safety devices with dynamic signals. Ports are 5 pole M12 female quick disconnects. Cable gland cover with internal terminal block for wiring 24VDC supply, dynamic signal input/output from Vital 1 controller and information outputs for each port.
Tina 10A		2TLJ020054R1200	Dynamic adapter with 5 pole M12 male quick disconnect for connecting transistor output safety devices to the Vital 1 controller or Pluto Safety PLC. 8 pole M12 female quick disconnect for direct connection to the safety device or safety device enclosure, multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
Tina 10B		2TLJ020054R1300	Dynamic adapter with 5 pole M12 male quick disconnect for connecting transistor output safety devices to the Vital 1 controller or Pluto Safety PLC. 5 pole M12 female quick disconnect for connecting a local reset and power off push button. 8 pole M12 female quick disconnect for direct connection to the safety device or safety device enclosure, multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
Tina 10C		2TLJ020054R1600	Dynamic adapter with 5 pole M12 male quick disconnect for connecting transistor output safety devices to the Vital 1 controller or Pluto Safety PLC. 5 pole M12 female quick disconnect for connecting and powering the transmitter. 8 pole M12 female quick disconnect for direct connection to the safety device or safety device enclosure, multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
Tina 11A		2TLJ020054R1700	Dynamic 2 port connection block for connecting up to 2 safety devices with dynamic signals. Ports are 5 pole M12 female quick disconnects. 5 pole M12 male quick disconnect for connecting the safety devices to the Vital 1 controller. Multi-function status indicator LEDs, integrated information output 24VDC - 10mA.
Tina 12A		2TLJ020054R1800	Dynamic 2 port connection block for connecting up to 2 safety devices with dynamic signals and locking inputs. Ports are 8 pole M12 female quick disconnects. 8 pole M12 male quick disconnect for connecting the safety devices to the Vital 1 controller. Multi-function status indicator LEDs, integrated information output 24VDC - 10mA.

Component List - Vital/Tina

Designation		Ordering Information	Description
M12-3A		2TLA020055R0000	M12 Y connector for series connection for Vital/Pluto safety devices such as Eden Sensors, Smile E-Stops, Inca E-Stops, Spot Single Beams, and Tina Dynamic Adapters. 5 pole M12 female quick disconnect connector for connection of the safety device. 5 pole M12 male quick disconnect for connecting 24VDC, 0VDC and the dynamic transmit signal to the field devices. 5 pole M12 female quick disconnect connector for either the continuation of the circuit or the return of the dynamic receive signal to the Vital 1/Pluto controller.
M12-3B		2TLA020055R0100	M12 Y connector for the parallel connection of 2 Vital/Pluto safety devices such as Eden Sensors, Spot Signal Beams and Tina Dynamic Adapters. Two 5 pole M12 female quick disconnect connectors for connection of the safety devices. 5 pole M12 male quick disconnect for connection to the Vital 1/Pluto controller.
M12-3D		2TLA020055R0300	M12 Y connector parallel Connection. 1 M12 8 pole female connector for connection of the Focus Receiver, 1 M12 5 Pole female connector for connection of the Focus Transmitter and 1 M12 8 pole male connector for panel connection.
M12-3E		2TLA020055R0200	M12 Y connector for the connection of 2 different safety or non-safety circuits in one cable. 5 pole M12 female quick disconnect connector for connection of the first circuit. 5 pole M12 female quick disconnect connector for connection of the second circuit. 5 pole M12 male quick disconnect for connection to IQs on the Pluto controller.
M12-C61		2TLA020056R0000	Cable single ended 6 meter black PVC jacket with straight 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C101		2TLA020056R1000	Cable single ended 10 meter black PVC jacket with straight 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C201		2TLA020056R1400	Cable single ended 20 meter black PVC jacket with straight 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C61V		2TLA020056R0100	Cable single ended 6 meter black PVC jacket with angled 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C101V		2TLA020056R1100	Cable single ended 10 meter black PVC jacket with angled 5 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C62		2TLA020056R0200	Cable single ended 6 meter black PVC jacket with straight 5 pole M12 male molded connector, 22AWG conductors, overall braid shield.*
M12-C102		2TLA020056R1200	Cable single ended 10 meter black PVC jacket with straight 5 pole M12 male molded connector, 22AWG conductors, overall braid shield.*

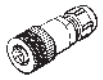
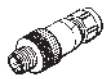
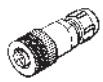
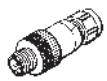
**Screen connected to pin 7 (0VDC) on male connector.*

Component List - Vital/Tina

Designation		Ordering Information	Description
M12-C112		2TLA020056R2000	Extension cable 1 meter, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.*
M12-C312		2TLA020056R2100	Extension cable 3 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.*
M12-C612		2TLA020056R2200	Extension cable 6 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.*
M12-C1012		2TLA020056R2300	Extension cable 10 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.*
M12-C2012		2TLA020056R2400	Extension cable 20 meters, black PVC jacket with straight 5 pole M12 male/female connectors, 22AWG conductors, overall braid shield.*
M12-C63		2TLA020056R3000	Cable single ended 6 meters black PVC jacket with straight 8 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C103		2TLA020056R4000	Cable single ended 10 meters black PVC jacket with straight 8 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C203		2TLA020056R4100	Cable single ended 20 meters black PVC jacket with straight 8 pole M12 female molded connector, 22AWG conductors, overall braid shield.
M12-C134		2TLA020056R5000	Extension cable 1 meter, black PVC jacket with straight 8 pole M12 male/female connectors, 22AWG conductors, overall braid shield.*
M12-C334		2TLA020056R5100	Extension cable 3 meter, black PVC jacket with straight 8 pole M12 male/female connectors, 22AWG conductors, overall braid shield.*
M12-CT0122		2TLA020060R0000	Transfer cable 10cm, black PVC jacket with 2 straight 5 pole M12 male connectors, 22AWG conductors, overall braid shield. Pin 2 transfers to pin 4 for connection to M12-3A Y connector.
M12-CT0214		2TLA020060R0100	Extension cable 20cm, black PVC jacket with straight 5 pole M12 female, 8 pole M12 male connectors, 22AWG conductors, overall braid shield.
M12-CT0232		2TLA020060R0200	Extension cable 20cm, black PVC jacket with straight 5 pole M12 male, 8 pole M12 female connectors, 22AWG conductors, overall braid shield.
M12-CT0134F		2TLA020060R0300	Extension cable 1m, black PVC jacket with straight 8 pole M12 male/female connectors, 22AWG conductors, overall braid shield. Transfer pins.
C5		2TLA020057R0000	Cable 5 conductors, 22AWG, black PVC jacket cable with overall braid shield. Per meter. OD - 5.5mm +/- .15mm.
C8		2TLA020057R1000	Cable 8 conductors, 22AWG, black PVC jacket cable with overall braid shield. Per meter. OD - 6.3mm +/- .15mm.
C9		2TLA020057R1500	Cable 7 conductors at 20AWG and 2 conductors at 18AWG, aluminum shield, drain. Per meter. OD - 8mm. For use with Tina 4A.
C13		2TLA020057R2000	Cable 11 conductors at 20AWG and 2 conductors at 18AWG, aluminum shield, drain. Per meter. OD - 9mm. For use with Tina 8A.

**Screen connected to pin 7 (0VDC) on male connector.*

Component List - Vital/Tina

Designation		Ordering Information	Description
M12-C01		2TLA020055R1000	5 pole M12 female field retro-fittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.
M12-C02		2TLA020055R1100	5 pole M12 male field retro-fittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.
M12-C03		2TLA020055R1600	8 pole M12 female field retro-fittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.
M12-C04		2TLA020055R1700	8 pole M12 male field retro-fittable connector with screw terminals for connecting wires. Cable diameter range 2.5 - 6.5 mm.

Notes