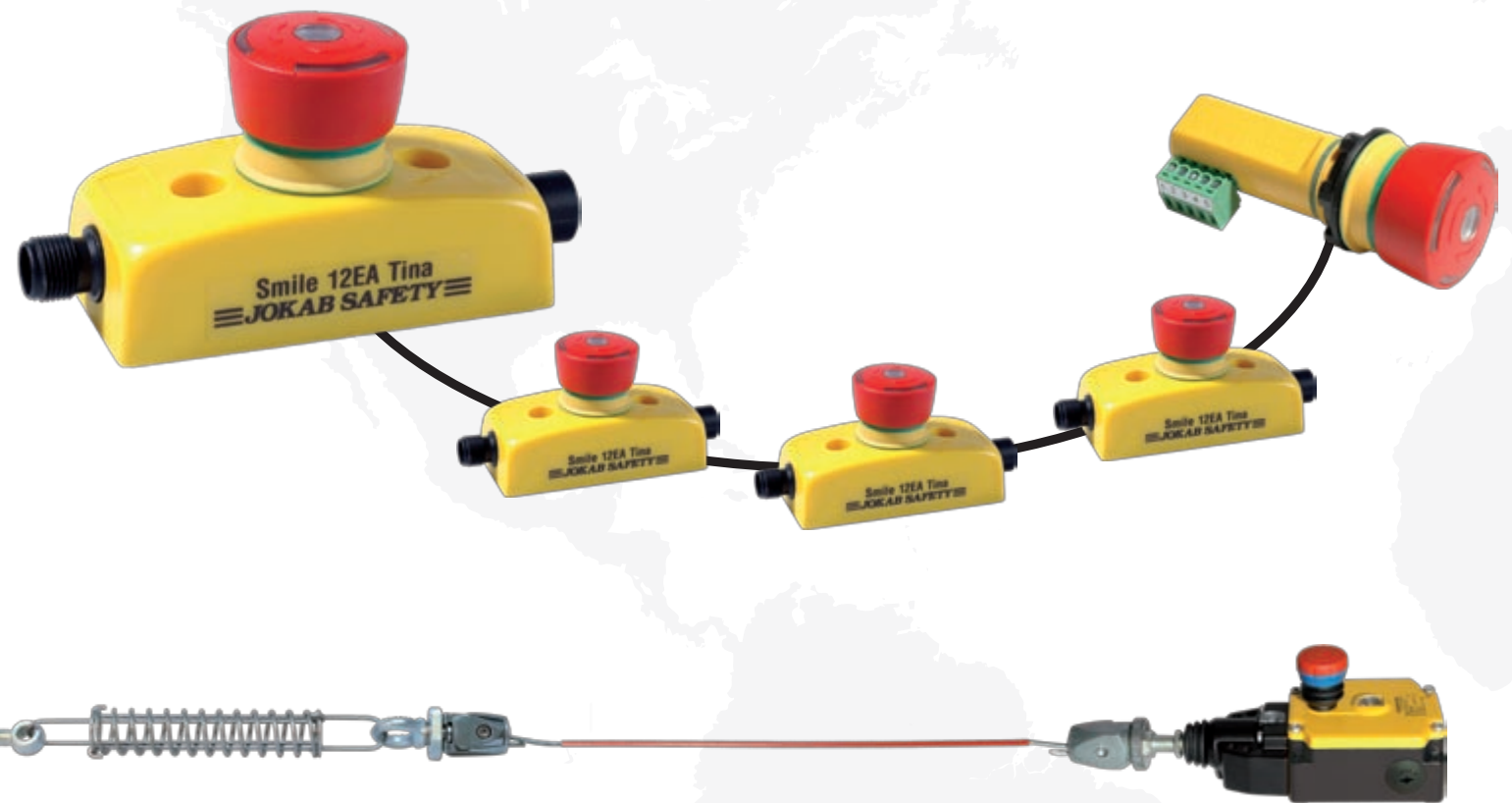


# Emergency stops

## and safety stops



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# Why do you need an Emergency stop?

**So that anyone shall be able to stop a machine during a machine break-down or if someone is in danger.**

## How do I recognise an E-stop?

E-stop buttons shall according to relevant standards be red with a yellow background. An emergency stop grab wire shall be red for high visibility. A sign that indicates the location of the E-stop shall be green with a white picture and possibly with text in the local country's language.



## How shall an E-stop stop the machine?

An E-stop shall stop the machine as quickly as possible. To obtain a quick stop one either removes the power directly or one lets a frequency converter 'run down' and afterwards after a little delay, remove the power. An E-stop shall not create other hazards. Therefore a risk analysis must be made for the E-stop to be correctly connected.

From 2006/42/EC, clause 1.2.4.3

...

This device must:

- have clearly identifiable, clearly visible and quickly accessible control devices,
- stop the hazardous process as quickly as possible, without creating additional risks,
- where necessary, trigger or permit the triggering of certain safeguard movements.

...

## Requirements for E-stops are stated in the following standards and regulations

### 2006/42/EC The Machinery Directive

Clause 1.2.4.3 in Annex 1 gives requirements for the emergency stop function for new machines). See also clause 1.2.2 Control devices. (see chapter "Standard and Regulations")

### Council Directive 89/655/EEC (with amendments) concerning the minimum safety and health requirements for the use of work equipment by workers at work

Clause 2.4 gives the requirements for the emergency stop function for older machines. See also clause 2.1. (see chapter "Standard and Regulations")

### EN ISO 13850 Safety of machinery – Emergency stop – Principles for design

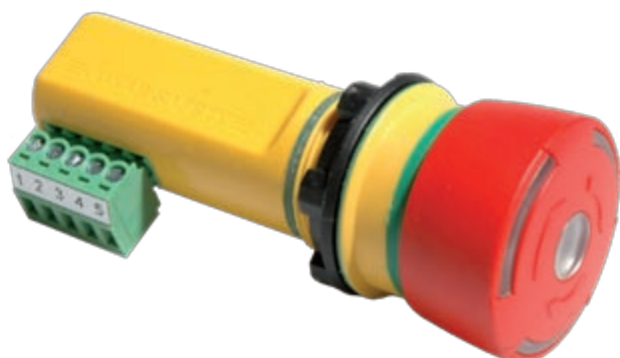
A harmonized standard that gives technical specifications for the requirements in the Machinery Directive. Could also be used for older machinery.

### EN 60204-1 Safety of Machinery - Electrical equipment of machines – Part 1: General requirements.

Harmonized standard that gives requirements for the electrical equipment of machinery including the emergency stop actuator/function. See clauses 9.2.2 and 9.2.5.4.2.

# Emergency stop for enclosure installation

# INCA 1



## Approval:



## Application:

Emergency push button for installation in cabinets

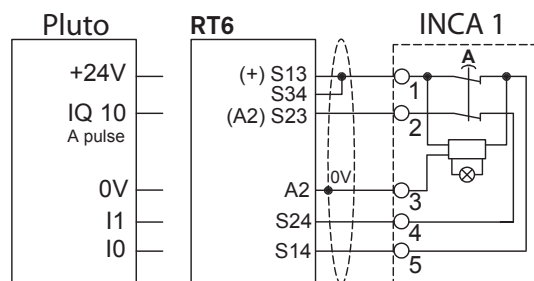
## Advantages:

- Terminal blocks
- Emergency push button up to cat. 4/PL e acc. to EN ISO 13849-1
- Only 53 mm's construction depth
- With LED info in print
- Push button IP65, connector IP20
- Available as safety stop (black push button)

INCA 1 is an emergency stop designed for installation in 22.5 mm holes on cabinets. "INCA 1" has potential free contacts for connection to safety relays. The connection is made in cabinets via a removable terminal which also have excellent measuring points. Inca 1 is also available with a black pushbutton and used as a safety stop. See section on safety stops.

In the emergency stop button there is a LED that displays current status on:

- Green = everything ok
- Red = this emergency push button has been pressed
- Off = a unit earlier in the circuit is affected



Yellow front ring and emergency stop signs for emergency stop.

# Emergency stop for enclosure installation

# INCA 1 Tina



## Approval:



## Application:

Emergency push button for installation in cabinets

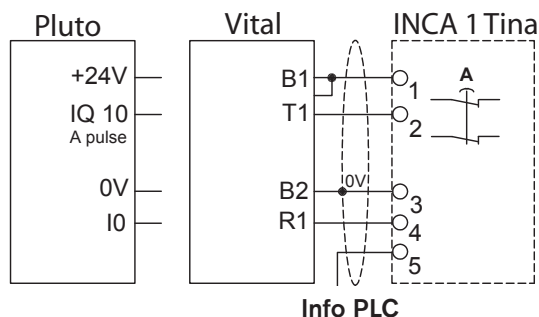
## Advantages:

- Terminal blocks
- Emergency push button up to cat. 4/PL e acc. to EN ISO 13849-1
- Only 53 mm's construction depth
- With LED info in push button
- Info output (Inca1 Tina)
- Push button IP65, connector IP20
- Available as safety stop (black push button)

INCA 1 Tina is an emergency stop designed for installation in 22.5 mm holes in equipment cabinets. In addition to the INCA 1 version, "INCA 1 Tina" is also available with electronic adjustment of the dynamic safety loop for connection to the Vital and Pluto units. The connection is made in equipment cabinets via a removable terminal block which also has marked measuring points. Inca 1 Tina is also available with black push button and is used in this case as a safety stop. See section on safety stops.

The emergency stop button has a LED that displays the current status:

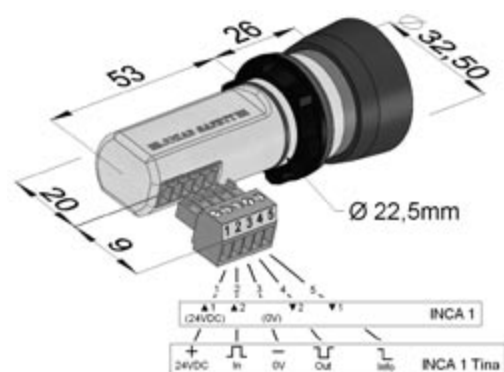
- Green = everything is OK
- Red = this emergency stop has been pressed.
- Flashing red/green = a protection device earlier in the loop has been actuated.



Yellow front ring and emergency stop signs for emergency stop.

Technical data - INCA 1/INCA 1 Tina	
<b>Manufacturer:</b>	ABB AB/Jokab Safety, Sweden
<b>Article no./Ordering data:</b> INCA 1 INCA 1 Tina	2TLJ030054R0100 2TLJ030054R0000
<b>Impact resistance (half sinusoidal)</b>	Max. 150m/s <sup>2</sup> , pulse width 11 ms, 3-axis, acc. to EN IEC 60068-2-27
<b>Vibration resistance (sinusoidal)</b>	Max. 50 m/s <sup>2</sup> at 10 Hz... 500 Hz, 10 cycles, 3 axis, acc. to EN IEC 60068-2-6
<b>Climate resistance</b> Damp heat, cyclical  Damp heat, sustained  Dry heat  Cooling  Salt mist	96 hours, +25 °C / 97%, +55 °C / 93 % relative humidity, as per EN IEC 60068-2-30 56 days, +40 °C / 93 % relative humidity, as per EN IEC 60068-2-78 96 hours, +70 °C, as per EN IEC 60068-2-2 96 hours, -40 °C, as per EN IEC 60068-2-1 96 hours, +35 °C in a chemical solution with NaCl as per EN IEC 60068-2-11
<b>Level of safety:</b> Cat. 4/PL e Category 4 SIL 3 SIL 3	EN ISO 13849-1 EN 954-1 EN 62061 IEC/EN 61508-1...7
<b>PFH<sub>d</sub>:</b> INCA 1 INCA 1 Tina:	PFH <sub>d</sub> : 1,60×10 <sup>-10</sup> PFH <sub>d</sub> : 4.66×10 <sup>-9</sup>
<b>Colour:</b>	Yellow, red and black
<b>Weight:</b>	Approx. 45 grams
<b>Size:</b>	See drawing
<b>Material:</b>	Polyamide PA66, Macromelt, Polybutylenterephthalate PBT UL 94 V0
<b>Temperature:</b>	-10°C to +55°C (operation), -30°C to +70°C (storage)
<b>Enclosure classification</b>	Print: IP 65, Connector: IP20
<b>Installation:</b>	22,5 mm
<b>Emergency stop LEDs:</b>	<b>INCA 1:</b> Green: Safety device OK. Not lit: A unit earlier in the circuit is affected. Red: This emergency stop has been pressed. <b>INCA 1 Tina:</b> Green: Safety device OK, safety circuit OK Flashing: Safety device OK, safety circuit previously broken. Red: This button is pressed in, and the safety circuit is broken.

<b>Operating voltage (LED):</b>	<b>INCA 1:</b> 24 VDC <b>INCA 1 Tina:</b> 24VDC +15% -25%
<b>Current consumption (LED):</b>	<b>INCA 1:</b> 15 mA <b>INCA 1 Tina:</b> 47 mA
<b>Emergency stop button Operating force:</b>	22 ± 4 N
<b>Operating movement:</b>	Approx. 4 mm to locked position
<b>Contact material:</b>	Gold-plated silver alloy
<b>Minimum current:</b>	<b>INCA 1:</b> 10 mA, 10 VDC/10 VAC <b>INCA 1 Tina:</b> —
<b>Maximum current:</b>	<b>INCA 1:</b> 2 A 24 VDC, 1A 125 VAC <b>INCA 1 Tina:</b> —
<b>Mechanical life:</b>	> 50 000 operations
<b>Standards:</b>	EN 60204, EN 60947-5-1 & -5 EN ISO 13850
<b>Accessories:</b> Front ring yellow for INCA Emergency stop sign S D F, 22,5mm Emergency stop sign E FT, 22,5mm	2TLJ030054R0400  2TLJ030054R0500  2TLJ030054R0600
<b>Conformity:</b>	2006/42/EG EN 954-1, EN ISO 13849-1, EN 62061, EN 60204-1, EN 61496-1, IEC 60664-1, EN 61000-6-2, EN 61000-6-4, EN 60947-5-1, EN 1088





# Emergency stop with indication

# Smile



## Approvals:



## Application:

To stop a machine or a process

## Features:

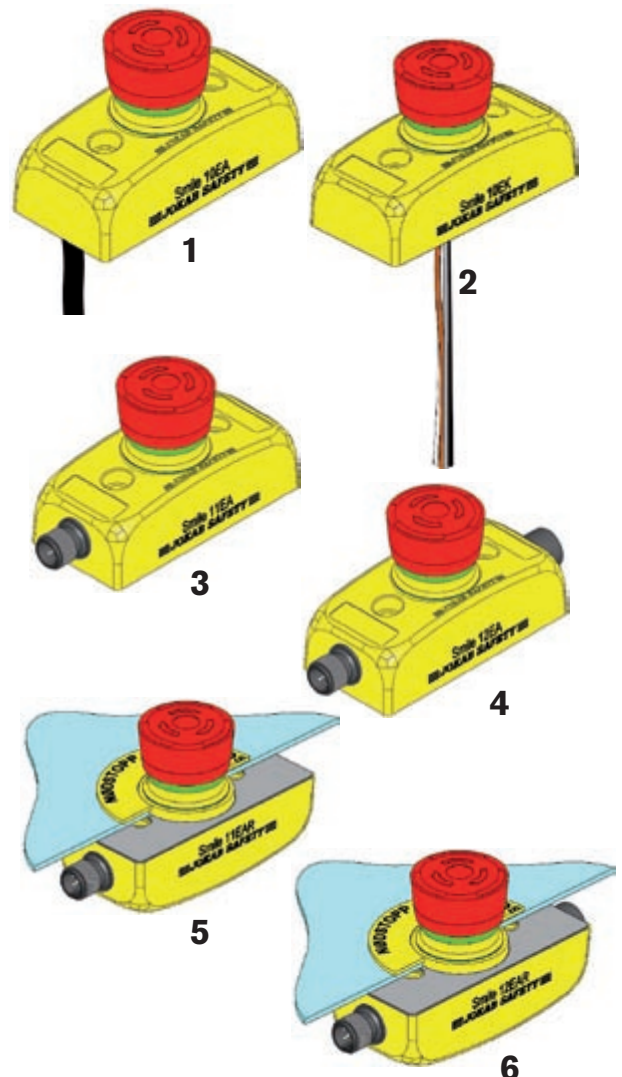
- Emergency push button up to cat. 4/PL e acc. to EN ISO 13849-1
- With LED info in push button
- Robust
- Push button IP 65, housing IP67
- Available as safety stop (black push button)

## Smile - small and cost effective E-stop

In order to fulfil the need for a small and easy to install E-stop, Smile has been developed. The size of the device makes it possible to be installed wherever you want. With M12 connection/s or cable and centralised mounting holes Smile is very easy to install, especially on aluminium extrusions. Smile is available for E-stops in both dynamic and static safety circuits i.e. for interfacing to Vital/Pluto and Safety relays. Each version is available with either one or two M12 connections or cable. At the top of Smile, a LED shows the current status as: green = protection OK, red = this emergency stop has been pressed and if the LED is off, an emergency stop earlier in the loop has been actuated. Smile is also available with black push button and is used as a safety stop. See section on safety stops.

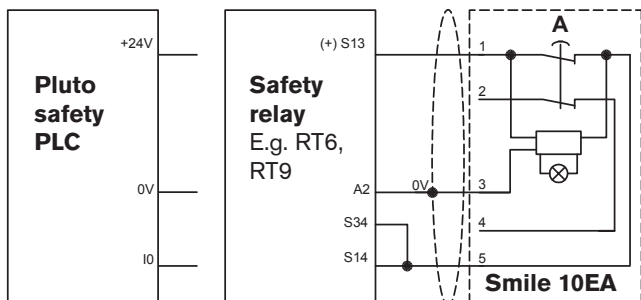
### Smile emergency stop has six different variants:

1. Smile 10EA has a 1 m cable connected through the base of the unit.
2. Smile 10EK has four 1 m short connecting leads through the base of the unit. No LED.
3. Smile 11EA has a five-pole M12 connector on one end of the unit.
4. Smile 12EA has two five-pole M12 connectors, one on each end of the unit.
5. Smile 11EAR has one 5-pole M12 connector at one end.
6. Smile 12EAR has two 5-pole M12 connectors at each end.

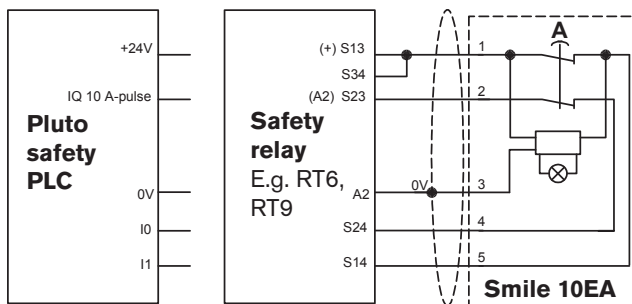


## Connection examples – Smile

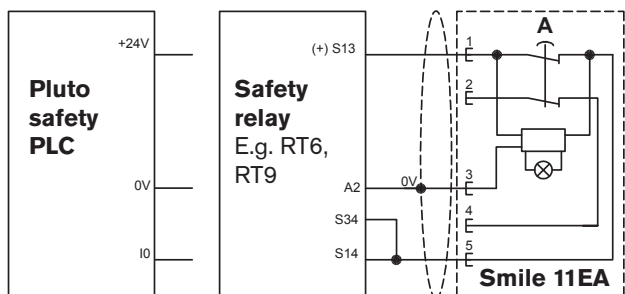
**Smile 10EA** can be connected to either Pluto or a safety relay. *Single channel* example with LED indication. Safety category 1. The connection cable exits from underneath the unit.



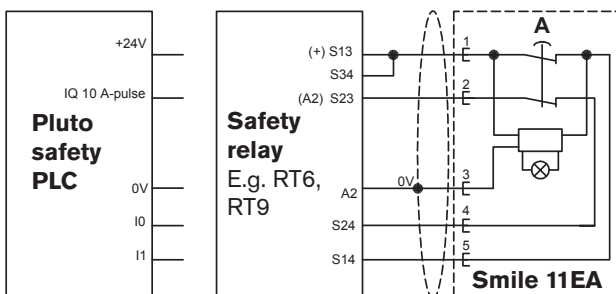
**Smile 10EA** can be connected to either Pluto or a safety relay. *Two channel* example with LED indication. Safety circuit category 4.



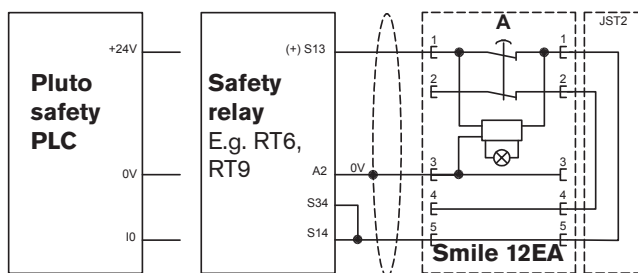
**Smile 11EA** can be connected to either Pluto or a safety relay. *Single channel* example with LED indication. Safety category 1. Connection via M12 connector.



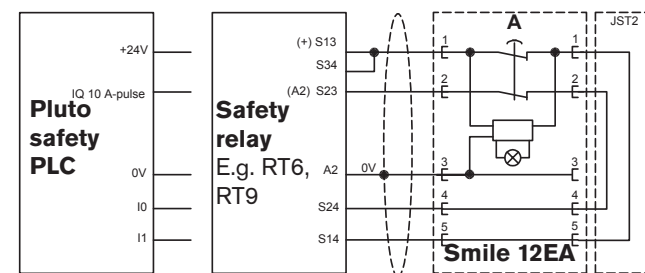
**Smile 11EA** can be connected to either Pluto or a safety relay. *Two channel* example with LED indication. Safety circuit category 4. Connection via M12 connector.



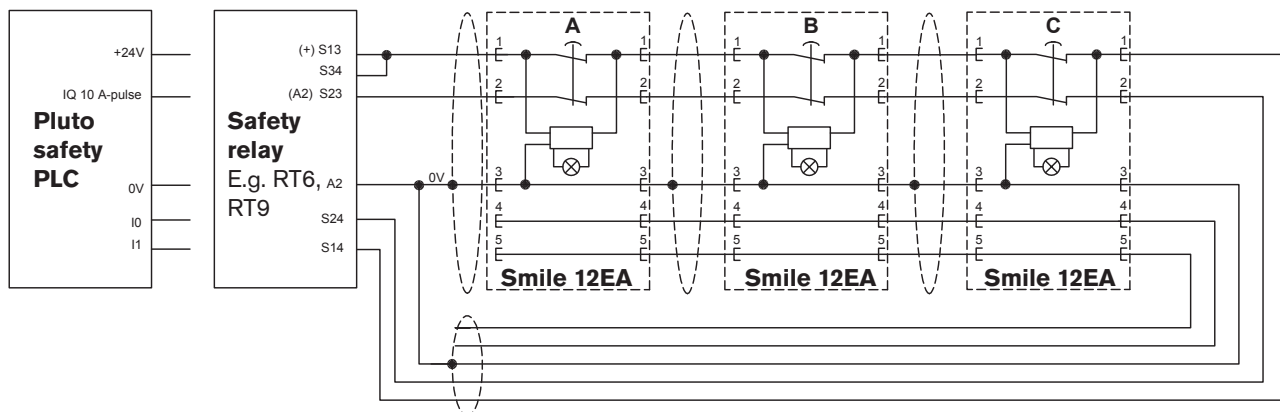
**Smile 12EA** can be connected to either Pluto or a safety relay. *Single channel* example with LED indication. Safety category 1. Connection via M12 connector + termination connector.



**Smile 12EA** can be connected to either Pluto or a safety relay. *Two channel* example with LED indication. Safety circuit category 4. Connection via M12 connector + termination connector.



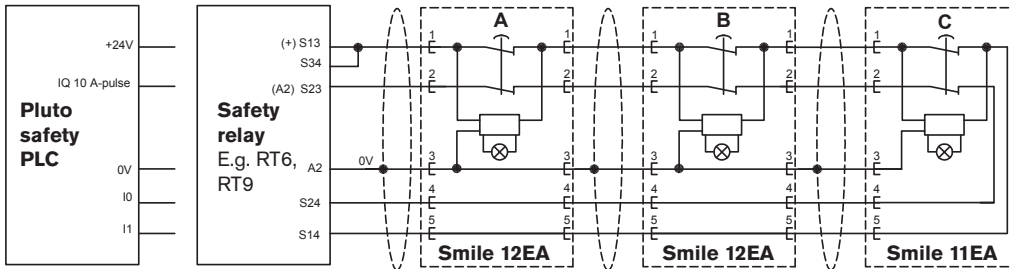
**Smile 12EA** can be connected to either Pluto or a safety relay. *Two channel* serial connection example with LED indication. Safety circuit category 3. Connection via M12 connectors. Connection is made here without a termination device for Smile 12EA (C), this unit is reconnected to the Pluto/safety relay via a separate cable. You can also use JST2 as a termination device after Smile 12EA (C).





## Connection examples – Smile

**Smile 12EA and 11EA** can be connected to either Pluto or safety relay. *Two channel* example with LED indication. Safety circuit category 3. Connection via M12 connectors. Note that there is no termination connector as the Smile 11EA (C) completes the circuit without the need for a termination connector (JST2) or return cable.



### E-Stop Button status LED Indication

A	B	C		A	B	C
R	R	R	↔	G	G	G
R	R	D	↔	G	G	Rd
R	D	R	↔	G	Rd	B
R	D	D	↔	G	Rd	B
D	R	R	↔	Rd	B	B
D	R	D	↔	Rd	B	B
D	D	R	↔	Rd	B	B
D	D	D	↔	Rd	B	B

The table shows the LED indication status of the E-Stop buttons from the example shown in above example.

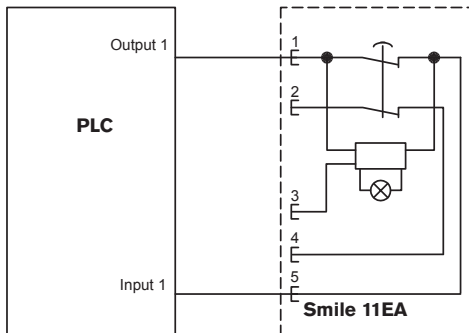
A = Smile 12EA  
 B = Smile 12EA  
 C = Smile 11EA  
 R = Released  
 D = Depressed  
 G = Green light from the top of the button  
 Rd = Red light from the top of the button  
 B = Blank, no light



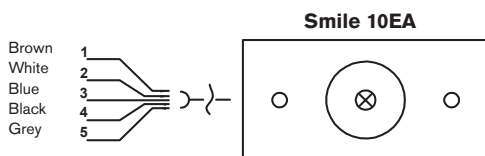
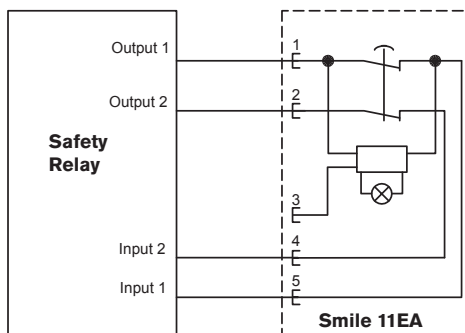
Termination device JST2

**Smile 10EA/11EA/12EA** are like any other emergency stops when 0V to the LED indication is not connected. This means that any suitable Safety PLC or safety relay can be used. If the LED indication is used, the voltage between Pin 1(+) and Pin 3 (-) should be between 19.2 – 28.8 VDC. The following examples show connections to Safety PLC and Safety relay.

### Single channel PLC connection



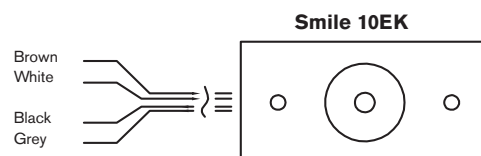
### Two channel Safety relay connection



Smile 10EA

The cable is connected to Smile 10EA via the lid at the back.

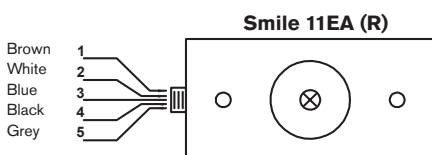
1. Input 1
2. Input 2
3. 0 VDC (to be connected only if LED indication is required)
4. Output 2
5. Output 1



Smile 10EK

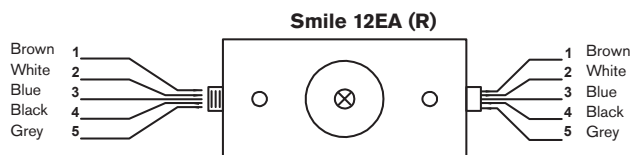
The leads are connected to Smile 10EK via the lid at the back. No LED connection.

- Brown Input 1
- White Input 2
- Black Output 2
- Grey Output 1



Smile 11EA (R)

1. Input 1
2. Input 2
3. 0 VDC (to be connected only if LED indication is required)
4. Output 2
5. Output 1



Smile 12EA (R)

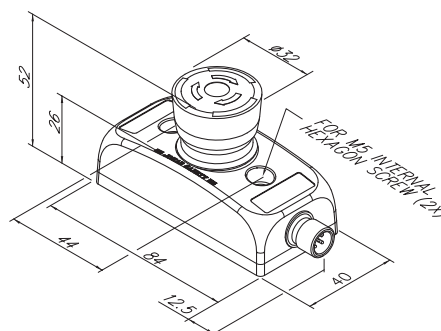
1. Input 1
2. Input 2
3. 0 VDC (to be connected only if LED indication is required)
4. Output 2, feedback
5. Output 1, feedback

Technical data – Smile	
<b>Manufacturer:</b>	ABB AB/Jokab Safety, Sweden
<b>Article number/ ordering data:</b>	
Smile 10EA with 1 m cable	2TLJ030051R0400
Smile 10EK with short connecting leads (No LED connection)	2TLJ030051R0600
Smile 11EA with M12 male connector	2TLJ030051R0000
Smile 12EA with male and female M12 connectors	2TLJ030051R0200
Smile 11EAR	2TLJ030051R0100
Smile 12EAR	2TLJ030051R0300
JST2 termination for Smile 12.	2TLJ030051R1300
<b>Note.</b> There are versions for dynamic technology (with Tina).	
<b>Impact resistance (half sinusoidal)</b>	max. 150 m/s <sup>2</sup> , pulse width 11 ms, 3-axis, as per EN IEC 60068-2-27
<b>Vibration resistance (sinusoidal)</b>	max. 50 m/s <sup>2</sup> at 10 Hz, 10 cycles, 3-axis, as per EN IEC 60068-2-6
<b>Climate resistance</b>	
Damp heat, cyclical	96 hours, +25 °C / 97%, +55 °C / 93 % relative humidity, as per EN IEC 60068-2-30
Damp heat, sustained	56 days, +40 °C / 93 % relative humidity, as per EN IEC 60068-2-78
Dry heat	96 hours, +70 °C, as per EN IEC 60068-2-2
Cooling	96 hours, -40 °C, as per EN IEC 60068-2-1
Salt mist	96 hours, +35 °C in a chemical solution with NaCl as per EN IEC 60068-2-11
<b>Level of safety:</b> IEC/EN 61508-1...7	SIL 3
<b>PFH<sub>d</sub>:</b>	1,60E-10
<b>Colour:</b>	Yellow, red and black
<b>Weight:</b>	Approx. 65 grams
<b>Size:</b>	Length: 84 mm + M12 contact(s) (12.5 mm each) Width: 40 mm Height: 52 mm
<b>Material:</b>	Polyamide PA66, Macromelt, Polybutylenterephthalate PBT, Polypropylene PP, UL 94 V0
<b>Ambient temperature:</b>	-10°C to +55°C (operation), -30°C to +70°C (stock)
<b>Protection class:</b>	IP 65

<b>Mounting:</b>	Two M5 recessed hexagon head screws, L ≥25 mm. Hole cc: 44 mm
<b>LED on E-Stop:</b>	Green: Safety device ok, Safety circuit closed Off: Safety circuit broken (When an E-Stop is depressed all following units in the circuit lose the LED function). Red: Safety device actuator depressed and Safety circuit broken.
<b>Input voltage (LED):</b>	17-27 VDC ripple ±10% (LED supply voltage)
<b>Current consumption (LED):</b>	15 mA
<b>E-Stop button Actuating force:</b>	22 ± 4 N
<b>Actuator travel:</b>	Approx. 4 mm to latch
<b>Material, contacts:</b>	Silver alloy gold plated
<b>Min current:</b>	10 mA 10 VDC/ 10 VAC
<b>Max current:</b>	2 A 24 VDC, 1 A 125 VAC
<b>Life, mechanical:</b>	> 50 000 operationer
<b>Accessories:</b>	
Emergency stop button S D F, 32,5mm	2TLJ030054R0700
Emergency stop button E F T, 32,5mm	2TLJ030054R0800
<b>Conformity:</b>	EN ISO 13850, EN 60204, EN 60947-5-1 & -5



Sign for emergency stop



# Emergency stop with indication

# Smile Tina



## Smile Tina - small and cost effective E-stop

In order to fulfil the need for a small and easy to install E-stop, Smile has been developed. The size of the device makes it possible to be installed wherever you want. With M12 connections or cable and centralised mounting holes Smile is very easy to install, especially on aluminium extrusions. Smile is available for E-stops in both dynamic and static safety circuits i.e. for interfacing to Vital system/Pluto safety PLC and Safety relays. Each version is available with either one or two M12 connections or cable. Two M12 connectors are used to enable the connection of E-stops in series, which is often used with dynamic safety circuits fulfilling safety category 4. In the top of the Smile Tina E-stop unit, LEDs show the actual status according to the dynamic system:

Green = everything is OK, Red = E-stop activated.

Flashing Red/Green = Stop activated from another preceding device. Smile is also available with black push button and used as a safety stop. See section on safety stops.

### The Smile Tina emergency stop is available in four versions:

1. Smile 10EA Tina has a 1 m cable connected via the base of the unit.
2. Smile 11EA Tina has a five-pole M12 connector on the end of the unit for connecting the ABB Jokab Safety cable.
3. Smile 12EA Tina has two five-pole M12 connectors, one on each end of the unit for connecting the ABB Jokab Safety cable.
4. Smile 11EAR Tina has one 5-pole M12 connector at one end for connection of cable from ABB Jokab Safety.

## Approvals:



## Application:

To stop a machine or a process

## Features:

Emergency push button up to cat. 4/PL e acc. to EN ISO 13849-1

Light grids, emergency stop and Eden in the same safety loop together with Vital or Pluto gives cat. 4/PL e acc. to EN ISO 13849-1

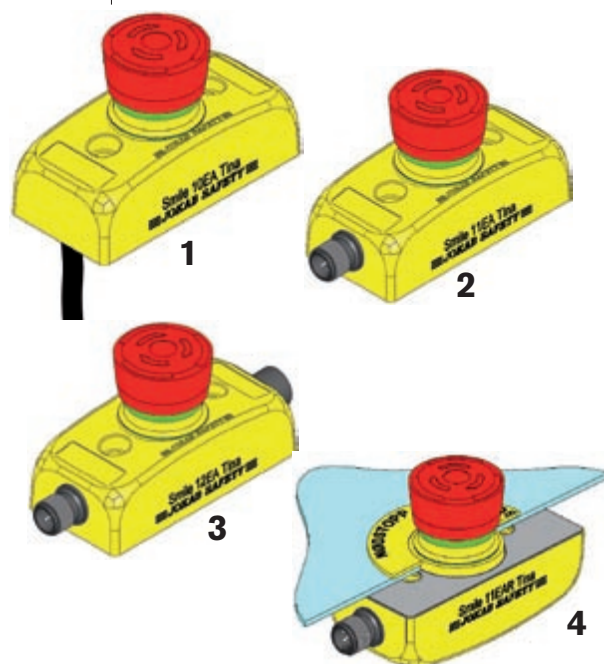
With LED indication on push button

Robust

Info-signal from each emergency stop

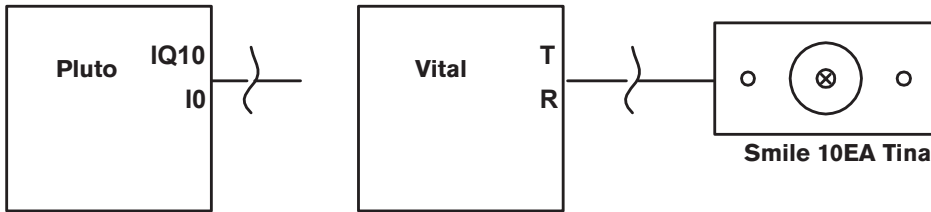
Push button IP 65, housing IP67

Available as safety stop (black push button)

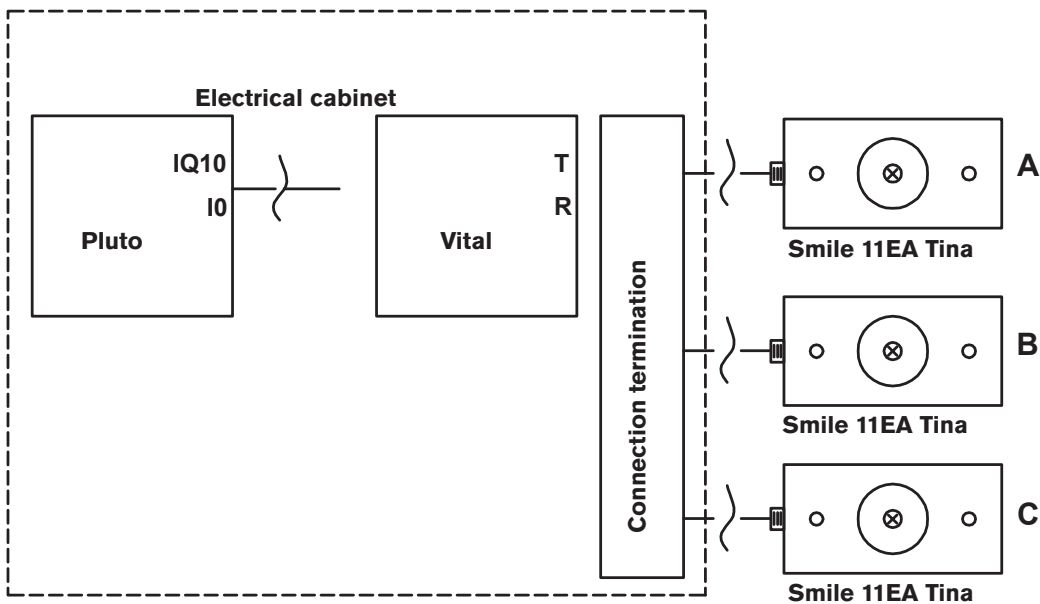


## Connection examples – Smile Tina

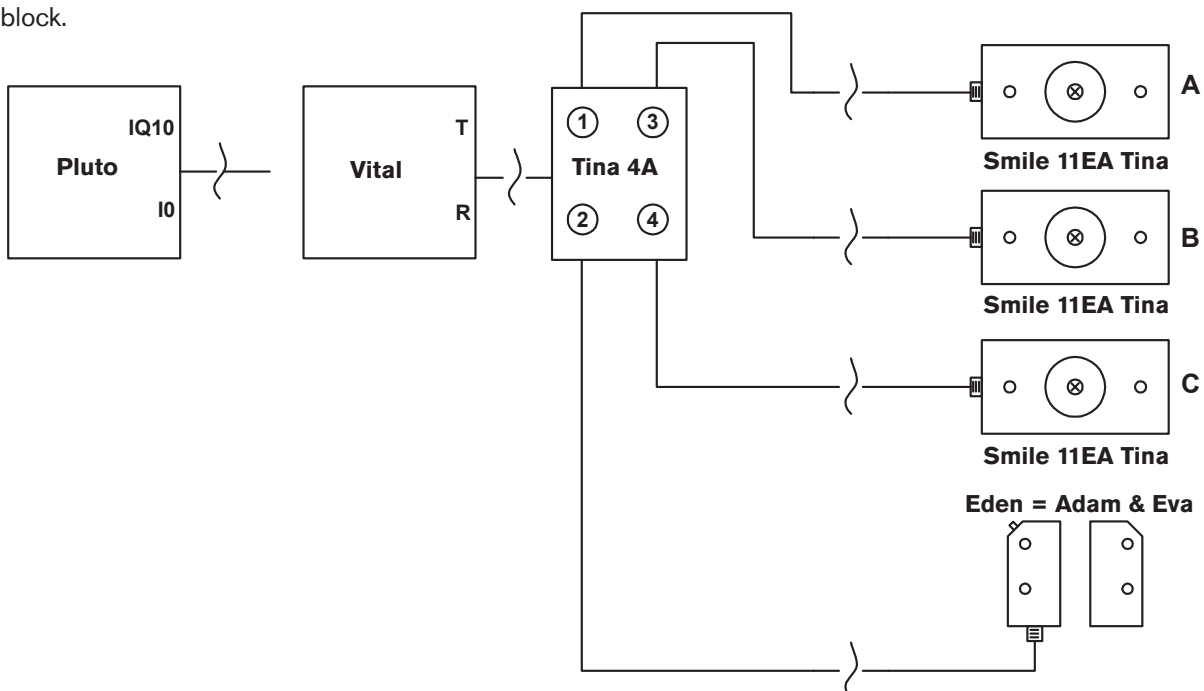
**Smile 10EA Tina** can be connected to either a Pluto or Vital system. Safety circuit category 4 with LED indication/information. The connection cable exits from underneath the unit.



**Smile 11EA Tina** can be connected to either a Pluto or Vital system. Safety circuit category 4 with LED indication/information. Connection via M12 connectors. The circuit below shows three Smile 11EA Tina units connected *in series* via connection terminals in the electrical cabinet.



**Smile 11EA Tina** can be connected to either a Pluto or Vital system. Safety circuit category 4 with LED indication/information. Connection via M12 connectors. The circuit below shows three Smile 11EA Tina units and one Eden connected *in series* via a Tina 4A connection block.



# Connection examples – Smile Tina

## E-Stop Button status Information output signal

A	B	C		A	B	C
R	R	R	↔	H	H	H
R	R	D	↔	H	H	L
R	R	R	↔	H	L	H
R	R	D	↔	H	L	L
D	R	R	↔	L	H	H
D	R	D	↔	L	H	L
D	D	R	↔	L	L	H
D	D	D	↔	L	L	L

The table shows the information output signal status from each of the Smile 11EA Tina units in the previous connection examples.

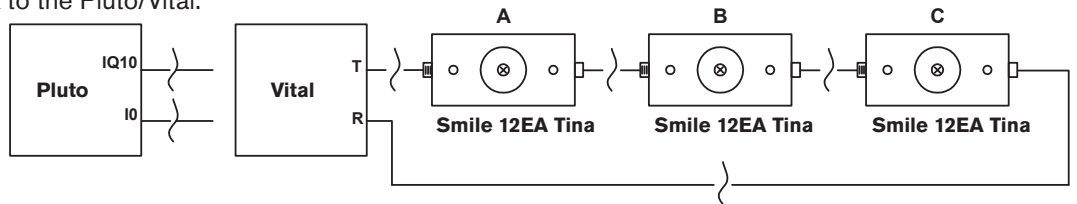
In the example showing connection with an Eden sensor, the Eden status information signal acts in the same way as the Smile Tina 11EA units.

The status information signal can be connected to e.g. PLC input.

**Note.** The information signal must not be used as a safety signal. The signal should only be used to indicate the status of connected devices.

- A = Smile 11 EA Tina
- B = Smile 11 EA Tina
- C = Smile 11 EA Tina
- D = Depressed
- H = High (i.e. supply voltage)
- L = Low (= 0 VDC)
- R = Released

**Smile 12EA** can be connected to either a Pluto or Vital system. Safety circuit category 4 with LED indication/information. Connection via M12 connectors. The last Smile 12 EA Tina unit feeds the dynamic signal back to the Pluto/Vital.



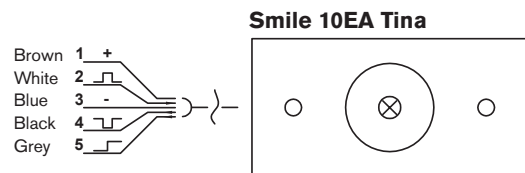
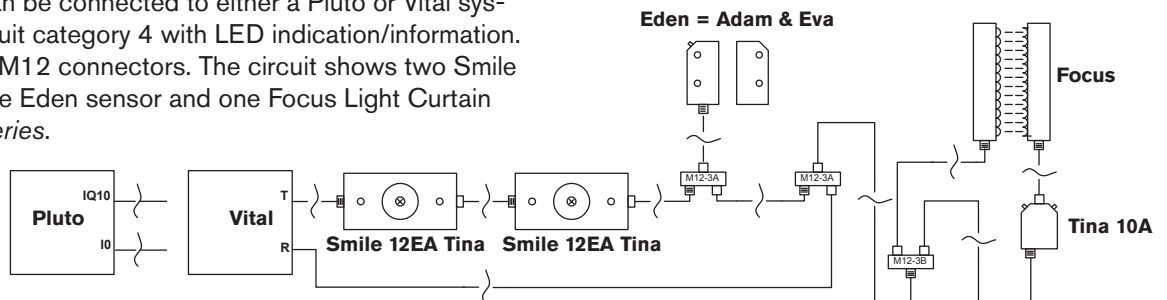
## E-Stop Button status LED Indication

A	B	C		A	B	C
R	R	R	↔	G	G	G
R	R	D	↔	G	G	Rd
R	D	R	↔	G	Rd	F
R	D	D	↔	G	Rd	Rd
D	R	R	↔	Rd	F	F
D	R	D	↔	Rd	F	Rd
D	D	R	↔	Rd	Rd	F
D	D	D	↔	Rd	Rd	Rd

The table shows the LED indication status of the E-Stop buttons in the previous connection examples, where three Smile 10 EA, Smile 11EA or 12EA Tina units are connected in series.

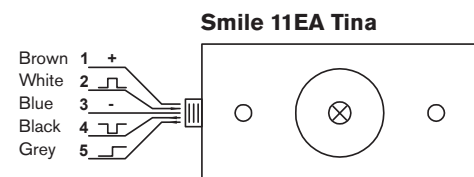
- A = Smile 10/11/12 EA Tina
- B = Smile 10/11/12 EA Tina
- C = Smile 10/11/12 EA Tina
- R = Released
- D = Depressed
- G = Green light from the top of the button
- Rd = Red light from the top of the button
- F = Flashes between green and red light

**Smile 12EA** can be connected to either a Pluto or Vital system. Safety circuit category 4 with LED indication/information. Connection via M12 connectors. The circuit shows two Smile 12EA Tina's, one Eden sensor and one Focus Light Curtain connected *in series*.

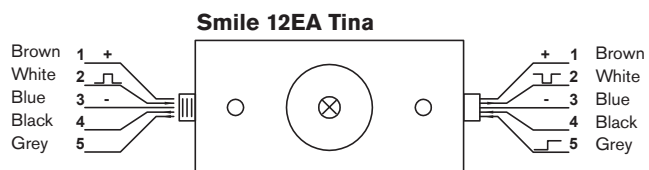


1. Input voltage, 17-27 VDC ripple +/- 10%
2. Dynamic input signal
3. 0 VDC
4. Dynamic output signal
5. Information output

The connection cable is connected to the Smile 10EA Tina unit via the back panel.



1. Input voltage, 17-27 VDC ripple +/- 10%
2. Dynamic input signal
3. 0 VDC
4. Dynamic output signal
5. Information output



1. Input voltage, 17-27 VDC ripple +/- 10%
  2. Dynamic input signal
  3. 0 VDC
  4. Not used
  5. Not used
1. Output voltage to next unit
  2. Dynamic output signal (To next Smile or to Pluto or Vital system)
  3. 0 VDC
  4. Not used
  5. Information output

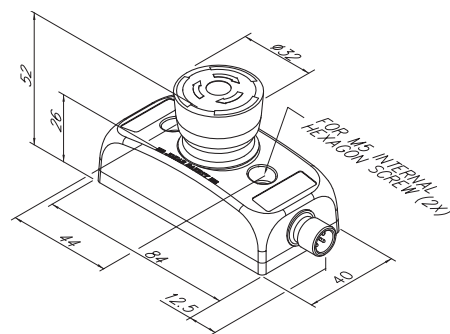


Technical data – Smile Tina	
<b>Manufacturer:</b>	ABB AB/Jokab Safety, Sweden
<b>Article number/ ordering data:</b>	
Smile 10EA Tina with 1 m connection cable	2TLJ030050R0400
Smile 11EA Tina with M12 male connector	2TLJ030050R0000
Smile 12EA Tina with male and female M12 connectors	2TLJ030050R0200
Smile 11EAR Tina	2TLJ030050R0100
Note. There are versions for use with relay technology (without Tina).	
<b>Impact resistance (half sinusoidal)</b>	max. 150 m/s <sup>2</sup> , pulse width 11 ms, 3-axis, as per EN IEC 60068-2-27
<b>Vibration resistance (sinusoidal)</b>	max. 50 m/s <sup>2</sup> at 10 Hz, 10 cycles, 3-axis, as per EN IEC 60068-2-6
<b>Climate resistance</b>	
Damp heat, cyclical	96 hours, +25 °C / 97%, +55 °C / 93 % relative humidity, as per EN IEC 60068-2-30
Damp heat, sustained	56 days, +40 °C / 93 % relative humidity, as per EN IEC 60068-2-28
Dry heat	96 hours, +70 °C, as per EN IEC 60068-2-2
Cooling	96 hours, -40 °C, as per EN IEC 60068-2-1
Salt mist	96 hours, +35 °C in a chemical solution with NaCl as per EN IEC 60068-2-11
<b>Level of safety:</b> IEC/EN 61508-1...7	SIL 3
<b>PFH<sub>d</sub>:</b>	4,66E-09
<b>Colour:</b>	Yellow, red and black
<b>Weight:</b>	Approx. 65 grams
<b>Size:</b>	Length: 84 mm + M12 contact(s) (12.5mm each) Width: 40 mm Height: 52 mm
<b>Material:</b>	Polyamid PA66, Macromelt, Polybutylenterephthalate PBT, Polypropylen PP, UL 94 V0
<b>Ambient temperature:</b>	-10°C to +55°C (operation) -30°C to +70°C (stock)
<b>Protection class:</b>	IP 65
<b>Mounting:</b>	Two M5 hexagon socket screws, L ≥25 mm. Hole centres: 44 mm

<b>LED on E-Stop:</b>	Green: Safety device OK, Safety circuit OK Flashing: Safety device OK, safety circuit broken. Red: Breaks in safety device and safety circuit
<b>Time delay:</b>	1:1.5 (Two Smile units are equal to three Edens in time delay)
<b>Input voltage:</b>	17-27 VDC ripple ±10%
<b>Current consumption:</b>	47 mA (57mA with max. current from information output)
<b>Current from information output:</b>	10 mA max
<b>E-Stop button Actuating force:</b>	22±4 N
<b>Actuator travel:</b>	Approx. 4 mm to latch
<b>Material, contacts:</b>	Silver alloy gold plated
<b>Life, mechanical:</b>	> 50 000 operations
<b>Accessories:</b>	
Emergency stop sign S D F, 32.5mm	2TLJ030054R0700
Emergency stop sign E F T, 32.5mm	2TLJ030054R0800
<b>Conformity:</b>	EN ISO 13850, EN 60204, EN 60947-5-1 & -5



Sign for emergency stop



# Emergency stop with indication

# Smile AS-i

## Approvals:



## Application:

To stop a machine or a process  
Safe input node in AS-i systems

## Features:

Emergency push button up to cat. 4/PL e acc. to EN ISO 13849-1  
Simple connection to AS-i bus  
With LED indication on push button and AS-i status indication  
Robust  
Push button IP 65, housing IP67  
Available as safety stop (black push button)



Smile 11EA AS-i is an emergency stop with a built-in dual channel safe AS-i input node. The AS-i bus and the safety around it is specified by the two organisations "AS-International Association" and "AS-Interface Safety at Work", and is described in publications such as "AS-Interface The Automatic Solution".

Smile 11EA AS-i is supplied with 30 V DC from the AS-i bus. The recommended connection to the AS-i bus is made via a flat cable terminal to M12 (see Figure), which makes it possible to quickly and easily connect the device to the yellow AS-i cable.

Smile AS-i can also be connected directly to the AS-i bus using only two conductors (pins 1 and 3 on the unit's M12 contact). Smile is also available with black push button and is used in this case as a safety stop. See section on safety stops.



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Technical data – Smile AS-i	
<b>Manufacturer:</b>	ABB AB/Jokab Safety, Sweden
<b>Article number/ ordering data:</b> Smile 11EA AS-i	2TLJ030052R0000
<b>AS-i data</b> AS-i profile Addressing Node address on delivery Response time across the AS-i bus	S-7.B.0 M12-contact 0 5 ms (+ response time for safety monitor)
<b>Pin configuration</b> (1) (2) (3) (4) (5)	AS-i + Not used AS-i – Not used Not used
<b>Voltage supply</b> Output voltage Total current consumption	30 V DC from the AS-i bus. Tolerance 26.5 – 31.6 V DC. < 60 mA
<b>General</b> Enclosure protection class Ambient temperature Dimensions Colour Actuating force Actuating movement Mechanical life	IP65 -25...+50°C 52 x 40 x 84 (+12,5 mm M12 contact) (H x B x D) Base: Yellow Emergency stop button (Smile 11EA AS-i): Red Safe stop button (Smile 11SA AS-i): Black 22 ±4 N Ca 4 mm till lås > 50 000 operationer
<b>PFH<sub>d</sub></b>	6,95x10 <sup>-9</sup>
<b>Safety/Harmonised standards</b> IEC/EN 61508-1..7 EN 62061 EN ISO 13849-1 EN 60947-5-1 & -5 EN ISO 13850:2008 Certification	SIL3, PFD <sub>avr</sub> : 2,95x10 <sup>-5</sup> SIL3 Performance level PL e, Category 4, MTTF <sub>d</sub> : high For emergency stop buttons/ safety stop buttons For emergency stop buttons/ safety stop buttons TÜV Nord

### LED in emergency stop button

LED displays can be individually programmed in the PLC program as shown below.

LED in push-button	Indicator	Description
Red	ON	Output bit 1 ON
	OFF	Output bit 1 OFF or Output bit 1 & 2 ON
Green	ON	Output bit 2 ON
	OFF	Output bit 2 OFF or Output bit 1 & 2 ON

### AS-i LED and Fault LED in combination

LED pair at the M12 contact.

AS-i (Green)	Fault (Red)	
OFF	OFF	AS-i voltage missing
ON	OFF	Normal operation
ON	ON	No data exchange with master
Flash	ON	No data exchange due to address = 0

### Push button control panel



**Smile 41xxxx-x**  
with one AS-i node for four pushbuttons.



**Smile 41Exxxx-x**  
with one AS-i safety node for e-stop and one AS-i node for three pushbuttons.



**Smile 41EKxxx-x**  
with two safety nodes (e-stop and mode selector) and one AS-i node for two pushbuttons.

# Emergency stop Grab Wire Safety Switch

# Stop-Line

## Approvals:

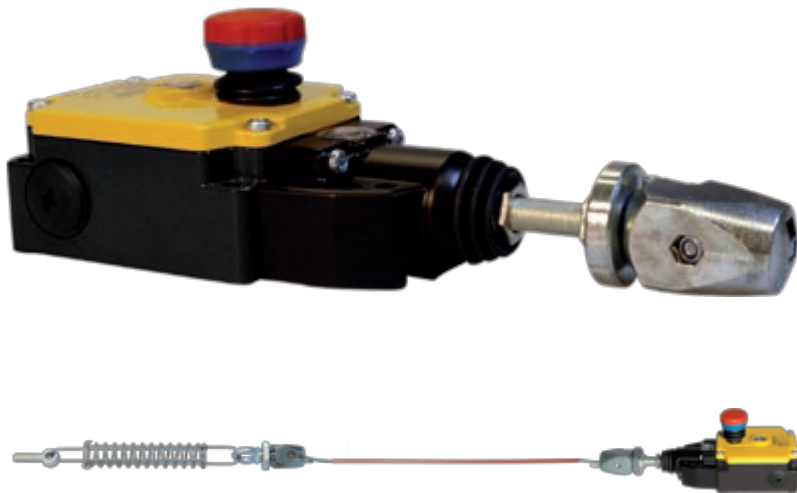


## Application:

Emergency stop Grab Wire Safety Switch along machines or conveyors

## Features:

- Duplicate extraction in two directions
- Up to 75 m length
- Robust
- IP 67
- Integrated emergency stop button
- Warned before the safety circuit is broken



### Duplicated safety in both directions

Stop-Line is used for easy reach of an emergency stop along machines, conveyors and processes. Stop-Line is easier to install than a system of several emergency stop buttons along a carriage path. Stop-Line indicates operation status, reset or triggered mode. There is also indication of how taut the wire is.

Stop-Line can be used as protection for conveyors with low risks. The wire can, for example, be installed at waist height in front of the conveyor, which provides an emergency stop if someone falls towards the conveyor.

Stop-Line has four contacts. If someone pulls the wire or if the wire is broken, all the contacts are affected. In both cases, the machine is emergency-stopped. Just before the safety contacts are broken an indication is given since the wire may accidentally trigger the stop signal as a result of temperature differences.

To reset the Stop-Line the combined emergency- and reset button must be pulled out.

### Forced Disconnected Contacts

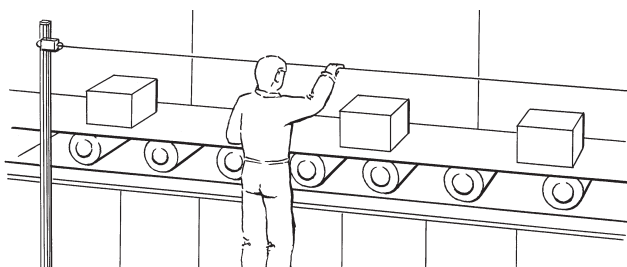
The contacts of the Stop-Line are forced-disconnected. Forced disconnection means that the contacts are mechanically pulled apart, thus ensuring protection against contact welding or sticking.

### Safety level

The forced disconnected contacts provide a high level of safety. To achieve a high level of safety in respect to the connection with the machine control system, it is appropriate to use a safety relay manufactured by ABB Jokab Safety. Stop-Line can be combined with Tina devices for use in a safety circuit containing other safety devices and emergency stops according to PL e.

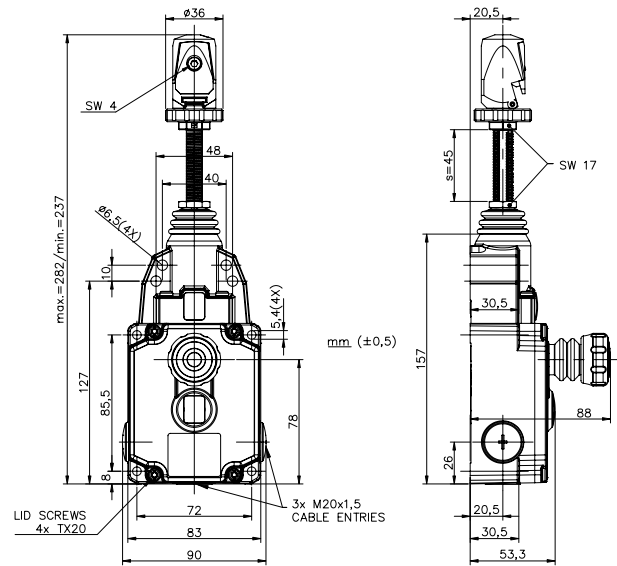
### Regulations and Standards

The Stop-Line is designed and approved in accordance with relevant standards. See technical data.



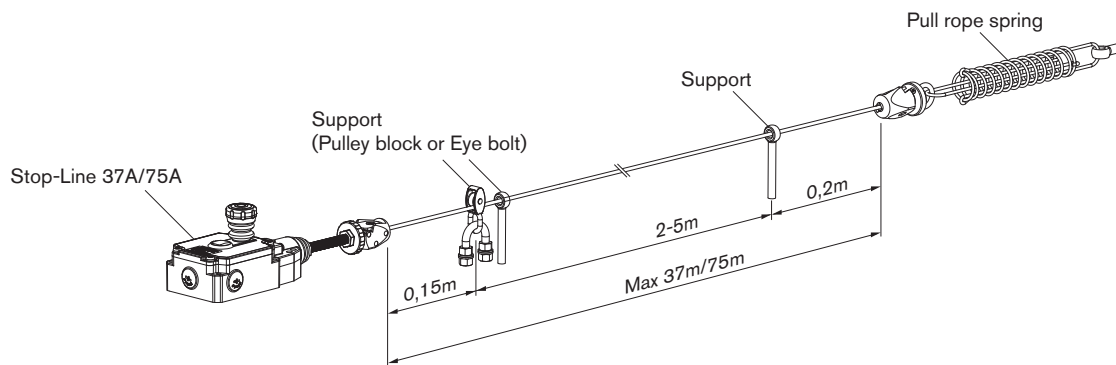
*Emergency-stop Grab Wire easily accessible during normal work operation along a machine*

Technical data – Stop-Line	
<b>Manufacturer:</b>	ABB AB/Jokab Safety, Sweden
<b>Article number/ Ordering data</b>	
Stop-Line 75A	2TLJ020041R0000
Stop-Line 37A	2TLJ020042R0000
Stop-Line 75B	2TLJ020041R0100
Stop-Line 37B	2TLJ020042R0100
<b>Colour</b>	Black with yellow label
<b>Level of safety</b>	Cat. 4/PL e, EN ISO 13849-1
<b>Housing Material</b>	Cast aluminium
<b>Lid Material</b>	Cast aluminium
<b>Operating temperature</b>	-30°C to +80°C
<b>Switching contacts</b>	2 NC + 2 NO
<b>Protection class</b>	IP 67, EN 60529
<b>Mechanical life</b>	100 000 switching cycles
<b>Max. switching frequency</b>	20/min
<b>Reset method</b>	mushroom-head slam button
<b>Max. wire length</b>	37,5 m./75 m.
<b>Mounting</b>	4 x M5/4 x M6
<b>Terminals</b>	Screw terminal, 8 x M4
<b>Cable access</b>	3 x M20 x 1.5
<b>Weight</b>	0,9 kg
<b>Max. voltage</b>	250 VAC
<b>Information output</b>	
Rated voltage	Ue 10-30 V DC
Rated current	Ie 50mA
<b>Thermal current</b>	10A
<b>Utilisation category</b>	AC 15, DC 13
<b>Short-circuit protection</b>	Melting Fuse 6A DII type gG
<b>Conformity</b>	EN ISO 13849-1, EN ISO 13850, EN60947-1, EN 60947-5-1, VDE 0113, EN ISO 12100-1, -2 och VDE 0660 T200.



## Mounting – Stop-Line

The wire should be mounted at least 20 mm from the underlying surface. If the wire is longer than 25 m it must be supported with low friction supports. The ambient temperature during installation should be the same as during operation. For the Stop-Line type A.. After installation, pull the wire strongly several times and then adjust the tension to compensate for any extensions due to deformation of the thimbles.





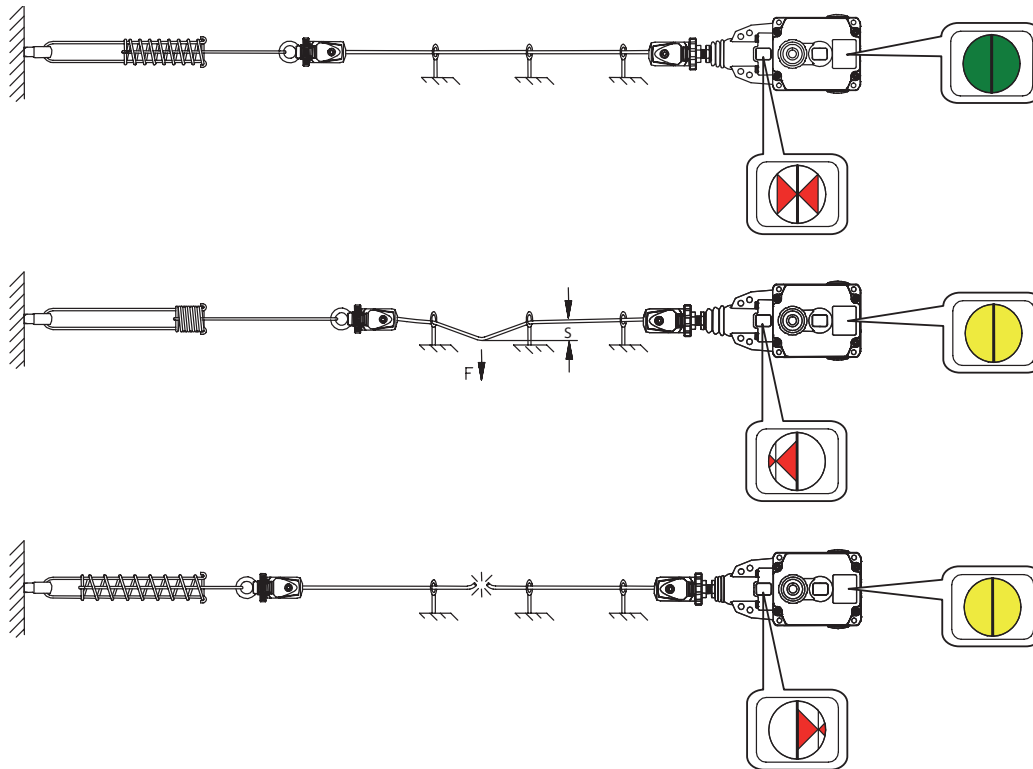
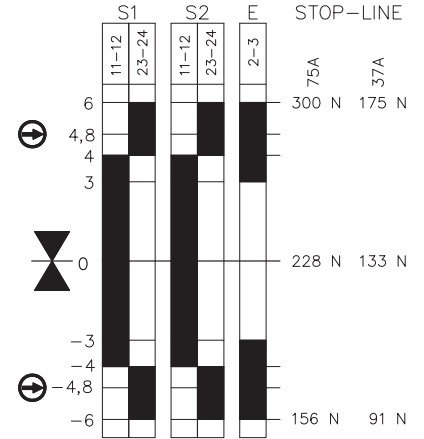
## Contact Adjustment Stop-Line

The tension is adjusted using the built-in set screw until the arrowhead is aligned with the label in the window (see picture below). When the combined emergency- and reset button is then pulled making the status window show green, all contact pairs are in operational mode and the machine can be started.

Pulling the wire, or if the wire is broken, all the contact pairs shift position and the machine is stopped. Before doing so, an electronic warning signal is provided which can be used to alert an operator to compensate for slow variations of the tension in the Stop-Line wire. This is useful to avoid unnecessary stops caused by e.g. ambient temperature variations.

Tolerance: distance  $\pm 0.5$  mm, power  $\pm 15\%$

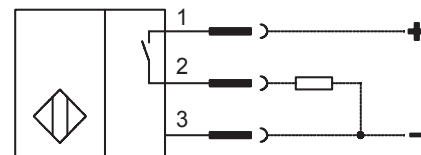
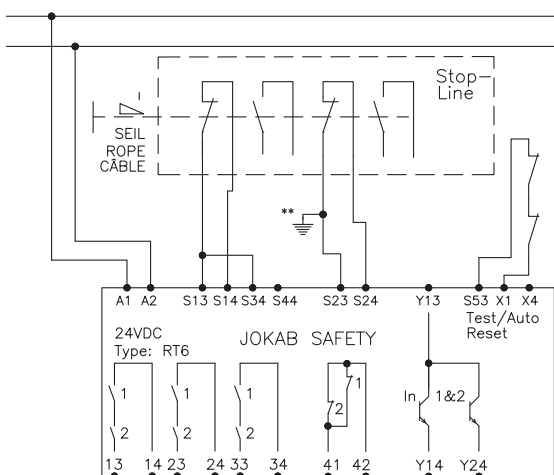
- on (closed)
- off (open)
- ⊕ for contacts 11-12



## Electrical Connection Stop-Line

Electrical connection of Stop-Line, highest level of safety.




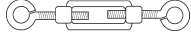










24VDC/  
24VAC/  
48VAC/  
115VAC/  
230VAC/



Connection terminal 1 and 3:  
Connection of supply voltage 10-30V DC

Connection terminal 2 and 3:  
Connection to signal circuit or lamp for indication

**Note!** The connection shows the Stop-Line in a correctly tensioned condition.

Ordering data – Stop-Line accessories		
<b>Installation kit 1</b>	<b>2TLJ020043R1200</b> Contents: 2TLJ020034R0500 x 25 Wire 2TLJ020034R0400 x 6 Wire clamp 2TLJ020034R0300 x 6 Thimble 2TLJ020034R0600 x 1 Turnbuckle 2TLJ020034R0900 x 8 Eye bolt M8x50	
<b>Installation kit 2</b>	<b>2TLJ020043R1300</b> Contents: 2TLJ020034R0500 x 40 Wire 2TLJ020043R0100 x 1 Pull wire spring 2TLJ020043R0300 x 9 Pulley block 2TLJ020043R0600 x 9 Fastener for pulley block	
<b>Wire 3mm (sheath 4mm)</b>	2TLJ020034R0500	
<b>Wire clamp for 3mm</b>	2TLJ020034R0400	
<b>Thimble</b>	2TLJ020034R0300	
<b>Turnbuckle</b>	2TLJ020034R0600	
<b>Swivel</b>	2TLJ020034R1300	
<b>Eye bolt M6x50</b>	2TLJ020034R0200	
<b>Eye bolt M8x50</b>	2TLJ020034R0900	
<b>Pull wire spring QF 75</b>	2TLJ020043R0000	
<b>Pull wire spring QF 37</b>	2TLJ020043R0100	
<b>Pulley block, unhinged</b>	2TLJ020043R0300	
<b>Fastener for pulley block</b>	2TLJ020043R0600	
<b>Pulley block, hinged</b>	2TLJ020043R0400	
<b>Deflection pulley Ø 75mm</b>	2TLJ020043R0200	
<b>Nut M6</b>	2TLJ020034R0100	

## Safety stop

# Inca and Smile

### When should I use the safety stop?

Safety stops are used to stop the operation of a machine in a safe manner. It must not be used as an emergency stop, but only as a stop for an individual hazardous motion. This is indicated by black push button. Likewise, an emergency stop push button with red push button must not be used as a safety stop.



#### Inca for panel mounting

The Inca series is available with black push button and is called Inca 1S/Inca 1S Tina. The safety stop is identical to the corresponding emergency stop apart from the black push button. For technical data see the Inca emergency stop.

Article number	Ordering data
2TLJ030054R0300	INCA 1S
2TLJ030054R0200	INCA 1S Tina

#### Smile with indication

The Smile series is available with black push button and has a similar designation apart from an S in the name instead of E. The safety stops are identical to the corresponding emergency stops apart from the black push button. For technical data see the Smile emergency stop.

Article number	Ordering data
2TLJ030051R0900	Smile 11 SA
2TLJ030051R1000	Smile 12 SA
2TLJ030051R1100	Smile 11 SAR
2TLJ030050R0500	Smile 11 SA Tina
2TLJ030050R0600	Smile 12 SA Tina
2TLJ030050R0700	Smile 11 SAR Tina
2TLJ030050R0800	Smile 12 SAR Tina
2TLJ030052R0100	Smile 11SA AS-i

## Reset button

# Smile 11R

### When do I need reset push button?

Smile 11RA/B are reset Push buttons intended to reset safety circuits. Smile 11RA has a connections for the NO-contact and for the LED in the PB. The reset LED is to be turned off after reset of the safety circuit. Smile 11RB is used together with our Pluto Safety Plc in order to reduce the number of terminals, on terminal is used as both input for the reset as well as output for the LED.



Technical data – Smile 11R	
<b>Manufacturer</b>	ABB AB/Jokab Safety, Sweden
<b>Article number/ ordering data</b>	
Smile 11RA	2TLJ030053R0000
Smile 11RB	2TLJ030053R0100
<b>Colour</b>	
Base	yellow
Pushbutton	blue
<b>Material</b>	
Housing	Polypropylene PP
Pushbutton contact	Au
<b>Power Supply</b>	
LED operating voltage	24 VDC (maximum 33 VDC)
LED current consumption	20 mA at 24 VDC 30 mA at 33 VDC
Pushbutton operating voltage	Min: 5 V, max: 35 V
Pushbutton current consumption	Min: 1 mA, max 100 mA
Pushbutton rated power	Max: 250 mW

<b>Ambient temperature</b>	-25...+55°C
<b>Humidity range</b>	35 to 85% (with no icing or condensation)
<b>Protection class</b>	IP65
<b>Connectors</b>	5-pole male M12 connector
<b>Size</b>	84x40x36 (LxWxH) + 12 mm for M12 connector (L)
<b>Weight</b>	aprox. 60 g
<b>Mechanical life</b>	1.000.000 operations at 10 mA/24 VDC
<b>Switching reliability</b>	10 x 10 <sup>-6</sup> at 5 mA/24 VDC