Emergency stops
and safety stops

Contents

Page

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. Se clauses 9.2.2 and 9.2.5.4.2.

Emergency stop for enclosure installation

INCA 1

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

Application:
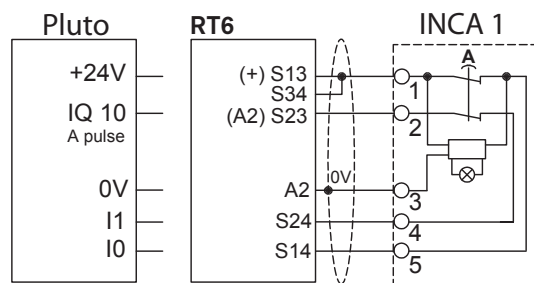
Emergency push button for installation in cabinets

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.
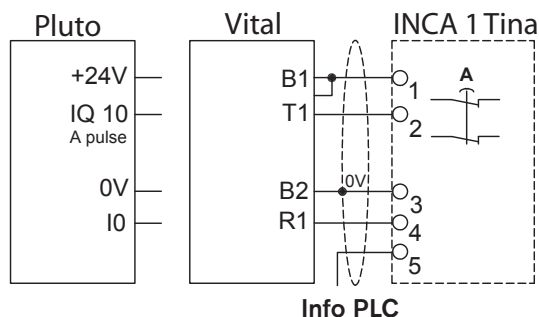
Yellow front ring and emergency stop signs for emergency stop.

Technical data - INCA 1/INCA 1 Tina

Manufacturer:	ABB AB/Jokab Safety, Sweden
Article no./Ordering data: INCA 1 INCA 1 Tina	 2TLA030054R0100 2TLA030054R0000
Impact resistance (half sinusoidal)	Max. 150m/s², pulse width 11 ms, 3-axis, acc. to EN IEC 60068-2-27
Vibration resistance (sinusoidal)	Max. 50 m/s² at 10 Hz… 500 Hz, 10 cycles, 3 axis, acc. to EN IEC 60068-2-6
Climate resistance 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
Level of safety: Cat. 4/PL e Category 4 SIL 3 SIL 3	 EN ISO 13849-1 EN 954-1 EN 62061 IEC/EN 61508-1…7
PFH_D: INCA 1 INCA 1 Tina:	 PFH_D: $1{,}60{\times}10^{-10}$ PFH_D: $4.66{\times}10^{-9}$
Colour:	Yellow, red and black
Weight:	Approx. 45 grams
Size:	See drawing
Material:	Polyamide PA66, Macromelt, Polybutylenterephthalate PBT UL 94 V0
Temperature:	-10°C to +55°C (operation), -30°C to +70°C (storage)
Enclosure classification	Print: IP 65, Connector: IP20
Installation:	22,5 mm
Emergency stop LEDs:	**INCA 1:** Green: Safety device OK. Not lit: A unit earlier in the circuit is affected. Red: This emergency stop has been pressed. **INCA 1 Tina:** 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.

Operating voltage (LED):	**INCA 1:** 24 VDC **INCA 1 Tina:** 24VDC +15% -25%
Current consumption (LED):	**INCA 1:** 15 mA **INCA 1 Tina:** 47 mA
Emergency stop button Operating force:	22 ± 4 N
Operating movement:	Approx. 4 mm to locked position
Contact material:	Gold-plated silver alloy
Minimum current:	**INCA 1:** 10 mA, 10 VDC/10 VAC **INCA 1 Tina:** —
Maximum current:	**INCA 1:** 2 A 24 VDC **INCA 1 Tina:** —
Mechanical life:	> 50 000 operations
Standards:	EN 60204, EN 60947-5-1 & -5 EN ISO 13850
Accessories: Front ring yellow for INCA Emergency stop sign S D F, 22,5mm Emergency stop sign E FT, 22,5mm	 2TLA030054R0400 2TLA030054R0500 2TLA030054R0600
Conformity:	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
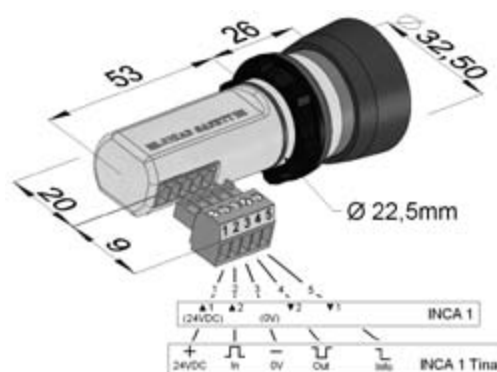
Emergency stop with indication
Smile

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)

Available for AS-i

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. Also available with AS-i.
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.

Smile 11EA adapted for AS-i
The Smile 11EA also comes in a version adapted for direct attachment to the AS-i bus.
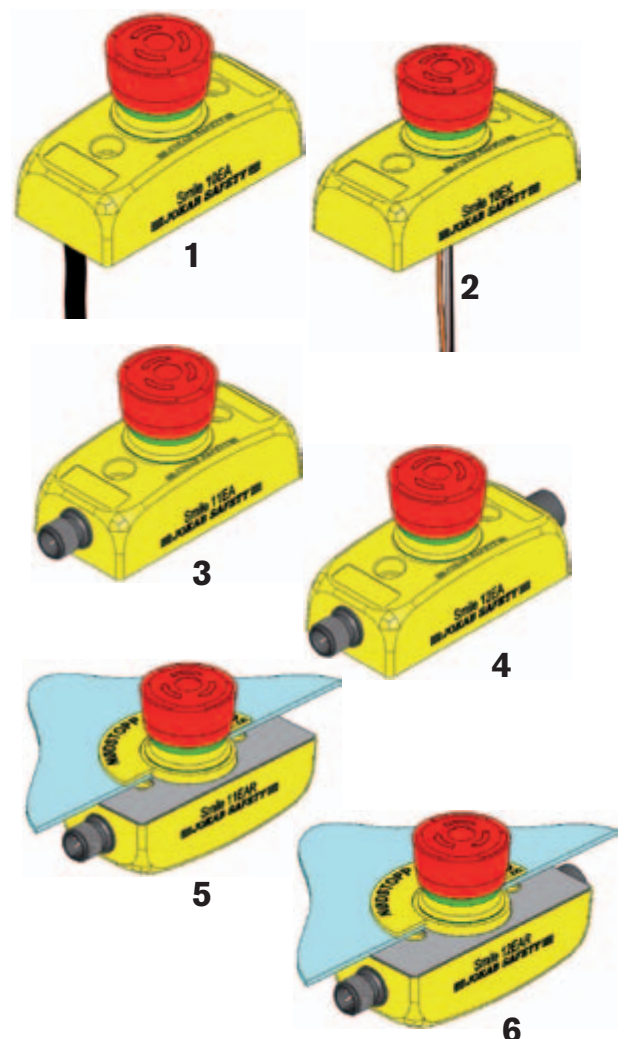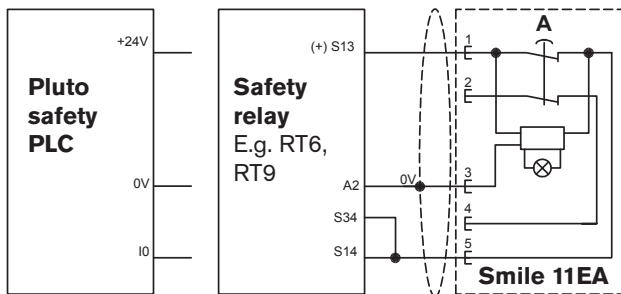
Connection examples – Smile

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.
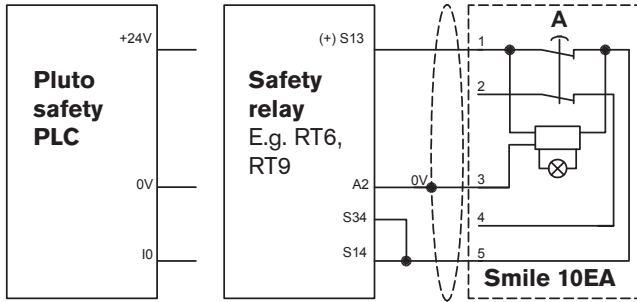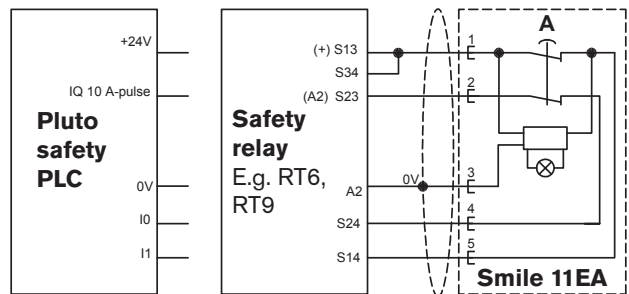

Smile 10EA can be connected to either Pluto or a safety relay. *Two channel* example with LED indication. Safety circuit category 4.
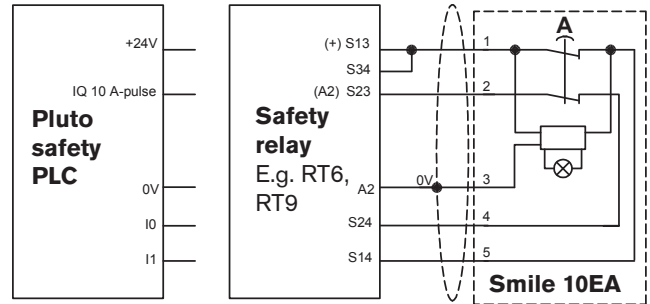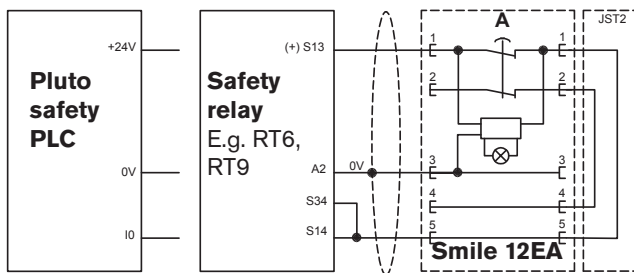

Smile 11EA can be connected to either Pluto or a safety relay. *Single channel* example with LED indication. Safety category 1. Connection via M12 connector.

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.
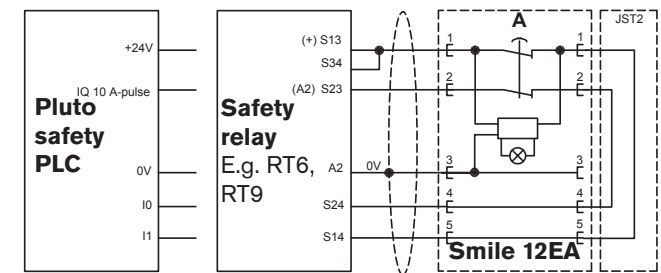

Smile 12EA can be connected to either Pluto or a safety relay. *Two channel* example with LED indication. Safety circuit category 4. Connection via M12 connector + termination connector.

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 Smile12EA (C).

Connection examples – Smile

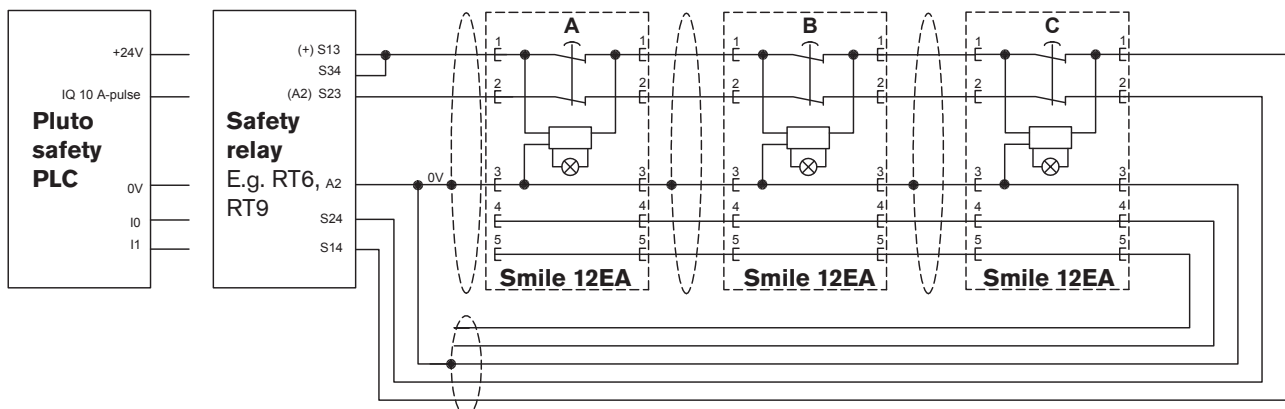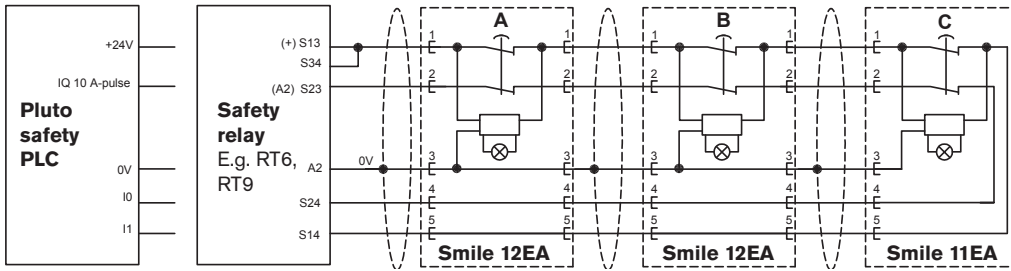**Smile 12EA and 11EA** can be connected to either Pluto or safety relay. *Two channel* example with LED indication. Safety circuit category 3. Connection via M12 connectors. Note that there is no termination connector as the Smile 11EA (C) completes the circuit without the need for a termination connector (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
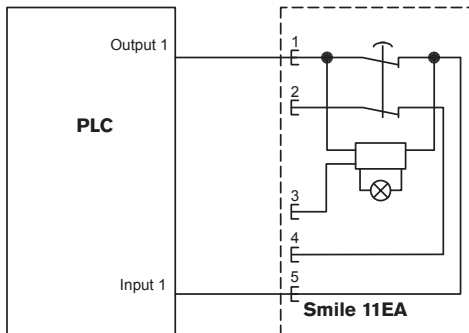
Two channel Safety relay connection
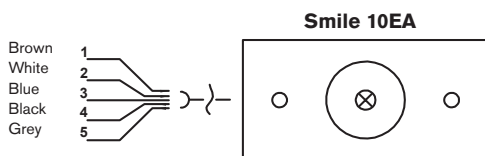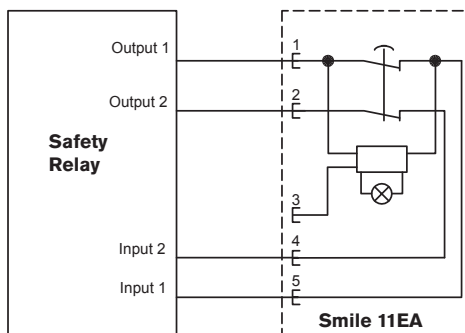
Smile 10EA

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
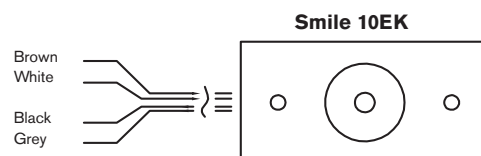
Smile 10EK

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

1. Output 1
2. Output 2
3. 0 VDC
4. Input 2, feedback
5. Input 1, feedback

ABB

Technical data – Smile

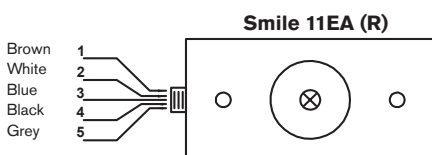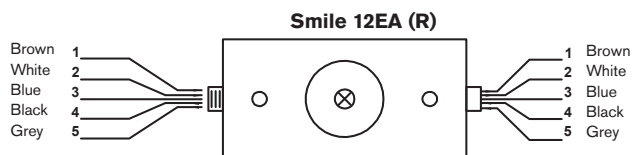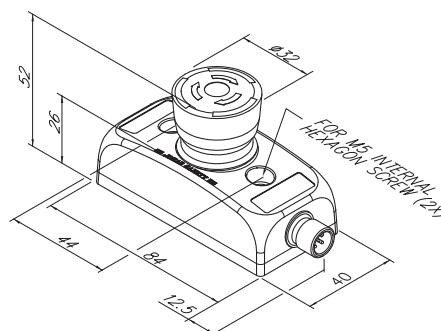|	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Article number/ ordering data:	
Smile 10EA with 1 m cable	2TLA030051R0400
Smile 10EK with short connecting leads (No LED connection)	2TLA030051R0600
Smile 11EA with M12 male connector	2TLA030051R0000
Smile 12EA with male and female M12 connectors	2TLA030051R0200
Smile 11EAR	2TLA030051R0100
Smile 12EAR	2TLA030051R0300
JST2 termination for Smile 12.	2TLA030051R1300
Smile 11EA AS-i	2TLA030052R0000
Note. There are versions for dynamic technology (with Tina).	
Impact resistance (half sinusoidal)	max. 150 m/s2, pulse width 11 ms, 3-axis, as per EN IEC 60068-2-27
Vibration resistance (sinusoidal)	max. 50 m/s^2 at 10 Hz, 10 cycles, 3-axis, as per EN IEC 60068-2-6
Climate resistance 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
Level of safety: IEC/EN 61508-1...7	SIL 3
PFH$_D$:	1,60E-10
Colour:	Yellow, red and black
Weight:	Approx. 65 grams
Size:	Length: 84 mm + M12 contact(s) (12.5 mm each) Width: 40 mm Height: 52 mm
Material:	Polyamide PA66, Macromelt, Polybutylenterephthalate PBT, Polypropylene PP, UL 94 V0
Ambient temperature:	-10°C to +55°C (operation), -30°C to +70°C (stock)
Protection class:	IP 65

Mounting:	Two M5 recessed hexagon head screws, L ≥25 mm. Hole cc: 44 mm
LED on E-Stop:	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.
Input voltage (LED):	17-27 VDC ripple ±10% (LED supply voltage)
Current consumption (LED):	15 mA
E-Stop button Actuating force:	22 ± 4 N
Actuator travel:	Approx. 4 mm to latch
Material, contacts:	Silver alloy gold plated
Min current:	10 mA 10 VDC/ 10 VAC
Max current:	2 A 24 VDC
Life, mechanical:	> 50 000 operationer
Accessories: Emergency stop button S D F, 32,5mm	2TLA030054R0700
Emergency stop button E F T, 32,5mm	2TLA030054R0800
Conformity:	EN ISO 13850, EN 60204, EN 60947-5-1 & -5

Sign for emergency stop

Emergency stop with indication
Smile Tina

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)

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.

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.
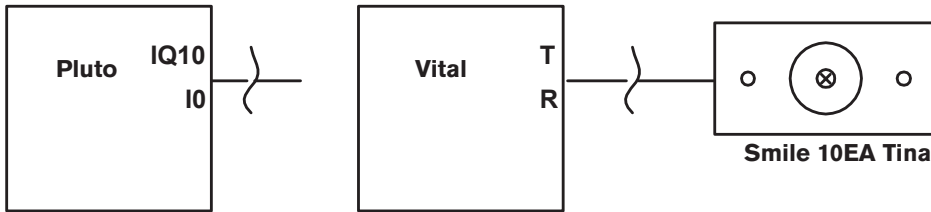
Smile 10EA Tina

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.

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.

Eden = Adam & Eva
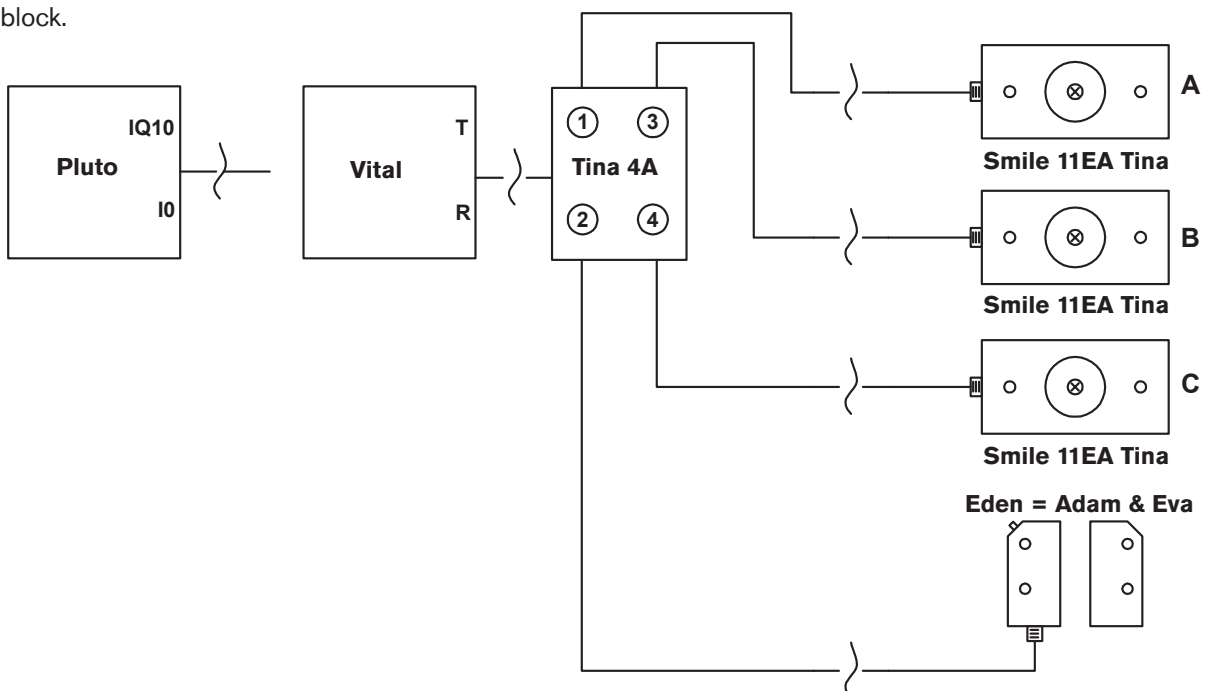
Connection examples – Smile Tina

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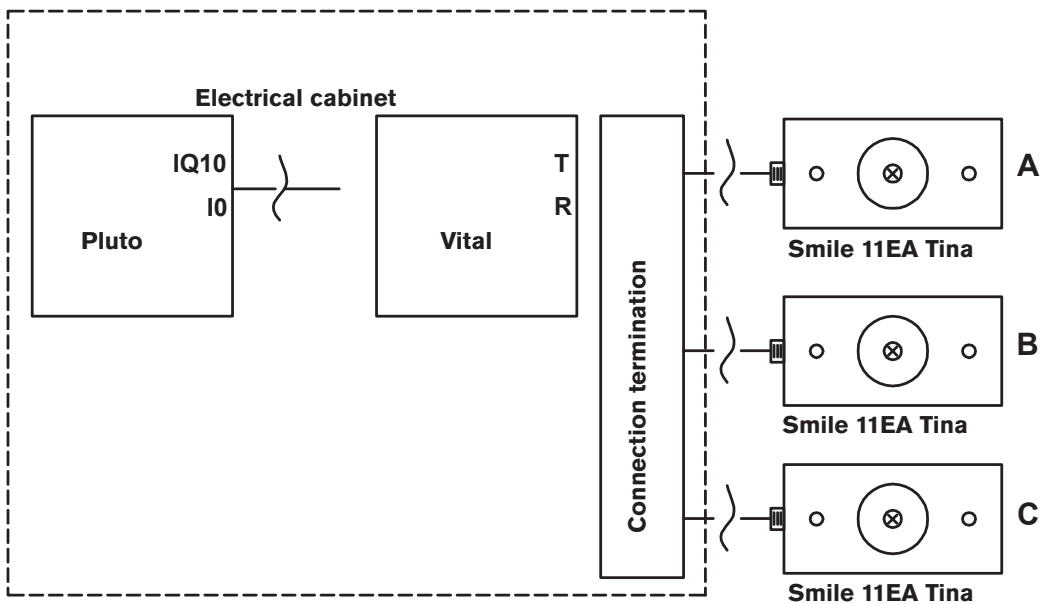B = Smile 11 EA Tina   H = High (i.e. supply voltage)
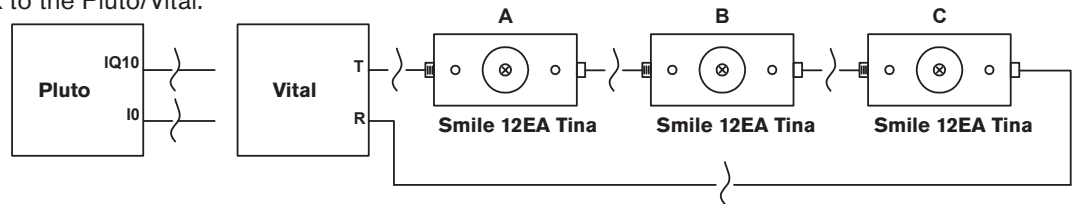C = Smile 11 EA Tina   L = Low (= 0 VDC)
R = Released

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

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*.
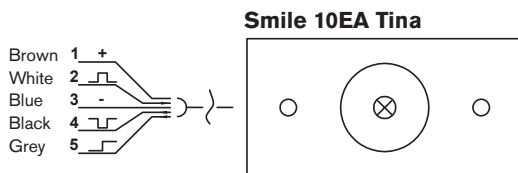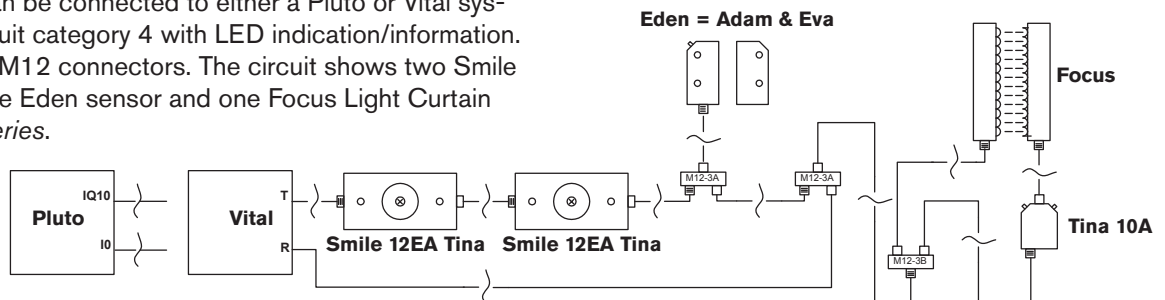
Smile 10EA Tina

Brown 1 +
White 2
Blue 3 -
Black 4
Grey 5

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.
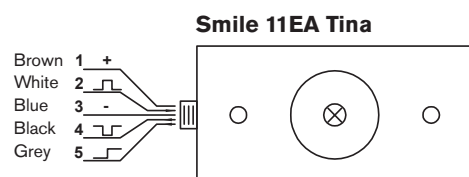
Smile 11EA Tina

Brown 1 +
White 2
Blue 3 -
Black 4
Grey 5

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

Smile 12EA Tina

Brown 1 +
White 2
Blue 3 -
Black 4
Grey 5

+ 1 Brown
2 White
- 3 Blue
4 Black
5 Grey
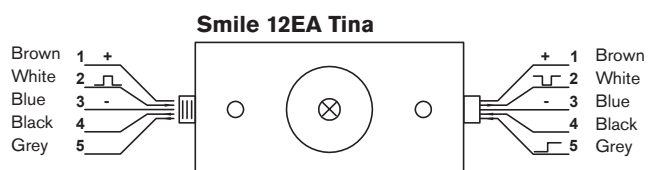
1. Input voltage,17-27 VDC ripple+/- 10%
2. Dynamic input signal
3. 0 VDC
4. Not used
5. Not used

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

|	
Manufacturer:	ABB AB/Jokab Safety, Sweden
Article number/ ordering data: Smile 10EA Tina with 1 m connection cable Smile 11EA Tina with M12 male connector Smile 12EA Tina with male and female M12 connectors Smile 11EAR Tina Note. There are versions for use with relay technology (without Tina).	2TLA030050R0400 2TLA030050R0000 2TLA030050R0200 2TLA030050R0100
Impact resistance (half sinusoidal)	max. 150 m/s^2, pulse width 11 ms, 3-axis, as per EN IEC 60068-2-27
Vibration resistance (sinusoidal)	max. 50 m/s^2 at 10 Hz, 10 cycles, 3-axis, as per EN IEC 60068-2-6
Climate resistance 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
Level of safety: IEC/EN 61508-1...7	SIL 3
PFH$_D$:	4,66E-09
Colour:	Yellow, red and black
Weight:	Approx. 65 grams
Size:	Length: 84 mm + M12 contact(s) (12.5mm each) Width: 40 mm Height: 52 mm
Material:	Polyamid PA66, Macromelt, Polybutylenterephthalate PBT, Polypropylen PP, UL 94 V0
Ambient temperature:	-10°C to +55°C (operation) -30°C to +70°C (stock)
Protection class:	IP 65
Mounting:	Two M5 hexagon socket screws, L ≥25 mm. Hole centres: 44 mm

LED on E-Stop:	Green: Safety device OK, Safety circuit OK Flashing: Safety device OK, safety circuit broken. Red: Breaks in safety device and safety circuit
Time delay:	1:1.5 (Two Smile units are equal to three Edens in time delay)
Input voltage:	17-27 VDC ripple ±10%
Current consumption:	47 mA (57mA with max. current from information output)
Current from information output:	10 mA max
E-Stop button Actuating force:	22±4 N
Actuator travel:	Approx. 4 mm to latch
Material, contacts:	Silver alloy gold plated
Life, mechanical:	> 50 000 operations
Accessories: Emergency stop sign S D F, 32.5mm Emergency stop sign E F T, 32.5mm	2TLA030054R0700 2TLA030054R0800
Conformity:	EN ISO 13850, EN 60204, EN 60947-5-1 & -5

Sign for emergency stop
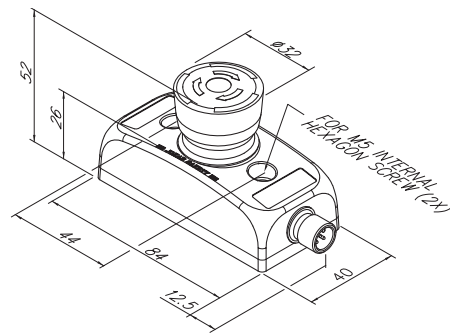
Emergency stop with indication
Smile AS-i

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.

Technical data – Smile AS-i

Manufacturer:	ABB AB/Jokab Safety, Sweden
Article number/ ordering data: Smile 11EA AS-i	2TLA030052R0000
AS-i data 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)
Pin configuration (1) (2) (3) (4) (5)	AS-i + Not used AS-i – Not used Not used
Voltage supply Output voltage Total current consumption	30 V DC from the AS-i bus. Tolerance 26.5 – 31.6 V DC. < 60 mA
General 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
PFH$_D$	6,95x10^{-9}
Safety/Harmonised standards IEC/EN 61508-1..7 EN 62061 EN ISO 13849-1 EN 60947-5-1 & -5 EN ISO 13850:2008 Certification	SIL3, PFDavr: 2,95x10^{-5} SIL3 Performance level PL e, Category 4, MTTF$_d$: 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 41EKxxxx-x
with two safety nodes (e-stop and mode selector) and one AS-i node for two pushbuttons.

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.

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
2TLA030054R0300	INCA 1S
2TLA030054R0200	INCA 1S Tina

Article number	Ordering data
2TLA030051R0900	Smile 11 SA
2TLA030051R1000	Smile 12 SA
2TLA030051R1100	Smile 11 SAR
2TLA030050R0500	Smile 11 SA Tina
2TLA030050R0600	Smile 12 SA Tina
2TLA030050R0700	Smile 11 SAR Tina
2TLA030050R0800	Smile 12 SAR Tina
2TLA030052R0100	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 o be turned of after reset of the safety circuit. Smile 11RB is used together with our Pluto Safety Plc in order to reduce the numder of terminals, on terminal is used as both input for the reset as well as output for the LED.

Technical data – Smile 11R	
Manufacturer	ABB AB/Jokab Safety, Sweden
Article number/ ordering data Smile 11RA Smile 11RB	2TLA030053R0000 2TLA030053R0100
Colour Base Pushbutton	yellow blue
Material Housing Pushbutton contact	Polyprobylene PP Au
Power Supply LED operating voltage LED current consumption Pushbutton operating voltage Pushbutton current consumption Pushbutton rated power	24 VDC (maximum 33 VDC) 20 mA at 24 VDC 30 mA at 33 VDC Min: 5 V, max: 35 V Min: 1 MA, max 100 mA Max: 250 mW

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