Original instructions

Safeball JSTD1

One/two hand enabling device



ABB Jokab Safety Varlabergsvägen 11, SE-434 39 Kungsbacka, Sweden
www.abb.com/jokabsafety

Read and understand this document

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1 Introduction

Scope

The purpose of these instructions is to describe the one hand device Safeball, how to set up a two hand device, and to provide the necessary information required for installation, mounting, checks after installation, operation and limitations.

Audience

This document is intended for authorized installation personnel.

Prerequisites

It is assumed that the reader of this document has knowledge of the following:

- Basic knowledge of ABB Jokab Safety products.
- Knowledge of two hand enabling devices.
- Knowledge of machine safety.

Special notes

Pay attention to the following special notes in the document:

⚠ **Warning!**	Danger of severe personal injury! An instruction or procedure which, if not carried out correctly, may result in injury to the technician or other personnel.
Caution!	Danger of damage to the equipment! An instruction or procedure which, if not carried out correctly, may damage the equipment.
NB:	Notes are used to provide important or explanatory information.

2 Overview

General description

Safeball is a one hand device which can also be used in pair to create a two hand device. They can be mounted on a table or on aluminium profiles available from ABB Jokab Safety. In order to increase the grip and ergonomics, the Safeballs can be mounted on a flexible support or similar device.

Safety regulations

Warning!

Carefully read through this entire manual before using the device.

The devices shall be installed by a trained electrician following the Safety regulations, standards and the Machine directive.

Failure to comply with instructions, operation that is not in accordance with the use prescribed in these instructions, improper installation or handling of the device can affect the safety of people and the plant.

For installation and prescribed use of the product, the special notes in the instructions must be carefully observed and the technical standards relevant to the application must be considered.

In case of failure to comply with the instructions or standards, especially when tampering with and/or modifying the product, any liability is excluded.

3 Connections

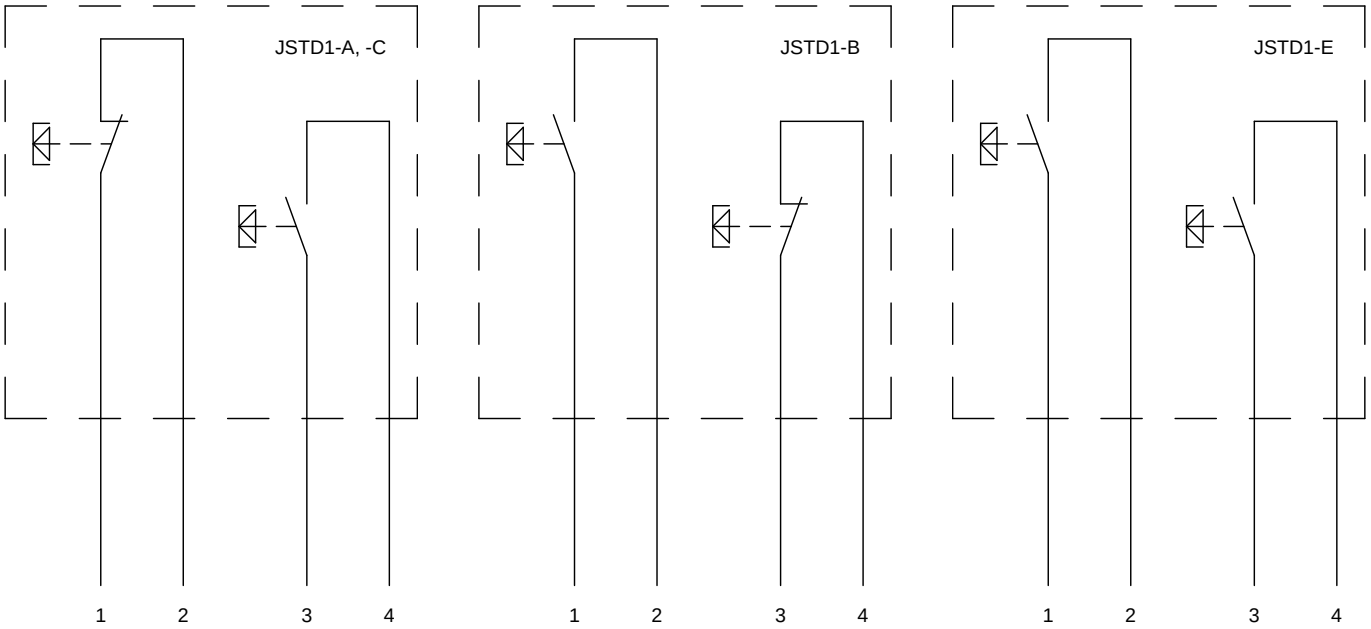
When used as a two-hand device, Safeball is designed for operation together with the safety relay JSBR4 from ABB Jokab Safety. This connection can achieve the highest safety level according to EN 574. To achieve the highest safety level for a two-hand device, dual supervised safety function and simultaneous actuation of the two Safeballs within 0.5 seconds is required (PL e according to EN ISO 13849-1). For further details, see *Installation and maintenance* below.

NB: For specific Pluto safety PLC connection examples, refer to Pluto instruction manual.

Caution! Use of any other safety relay or supervision unit may result in a lower safety level and/or the voltage/current limitations of the JSTD1 switches being exceeded. This may invalidate warranty conditions.

Warning! If the two-hand device is connected to another control unit, it is extremely important to analyse and determine the safety level of the complete system. The achieved safety level is a combination of the safety relay and the Safeballs, and must be checked for any combination of operation.

Cable colours



JSTD1-A, -C:

1) Red
2) Black
3) Grey
4) Blue

JSTD1-B:

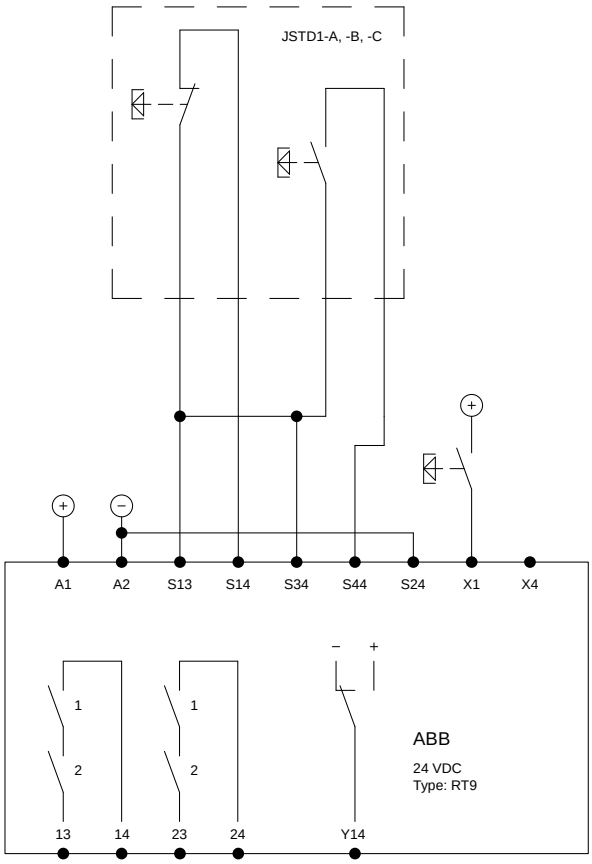
1) Black (1)
2) White
3) Black (2)
4) Red

JSTD1-E:

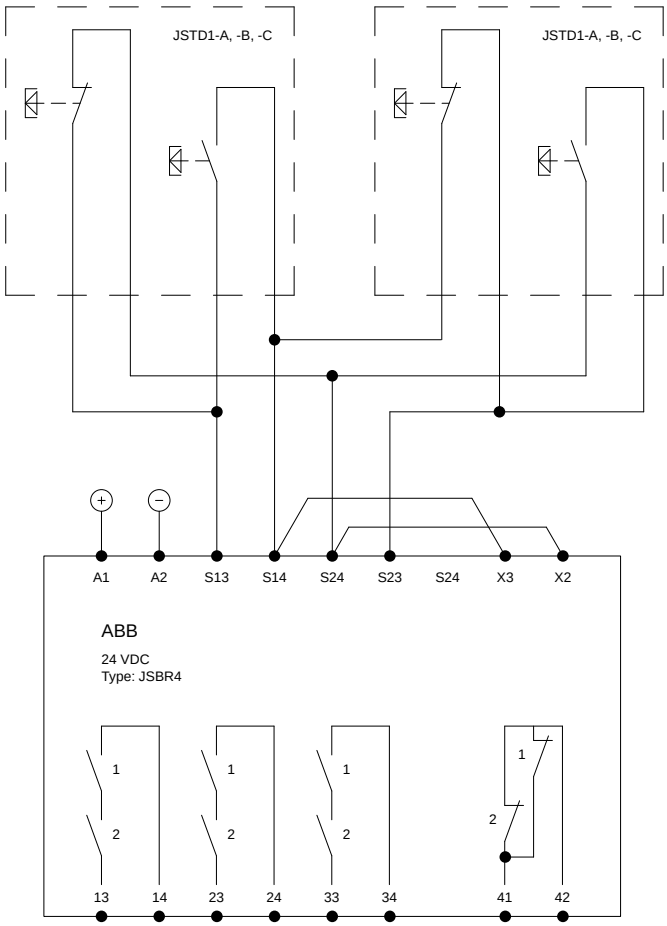
1) Black (1)
2) White (1)
3) Black (2)
4) White (2)

Connection examples

Connection example – JSTD1-A, -B or -C connected in a one-hand or two-hand device setup



One-hand device



Two-hand device

4 Installation and maintenance

The Safeball is mounted using four M5 screws or ST4.8 self-tapping screws. If necessary, the connection cables can be taken out at the sides at the lower part of the Safeball. The two prepared outlets are provided for this purpose.

The distance between two Safeballs (for a two-hand device) or to the edge of a table or a wall depends on how the units are mounted. The minimum distances are given in the below sections.

NB: The Safeball can be mounted in many different ways; on a table or a machine, on a stand or wherever ergonomically suitable. It is also possible to mount the Safeball either in a fixed position or on a flexible mount such as a ball joint, allowing tilt and rotation for increased ergonomic support. Refer to the section *Accessories* below or the product list at www.abb.com/jokabsafety for details.

Installation precautions

⚠ **Warning!** Safeball must be installed with a minimum distance S to the dangerous machine movement. This distance is calculated using the following formula for Safeball according to approving agencies and EN 13855:

S = K x T + C

Where:

S = safe distance in mm

K = hand speed, 1600 mm/s

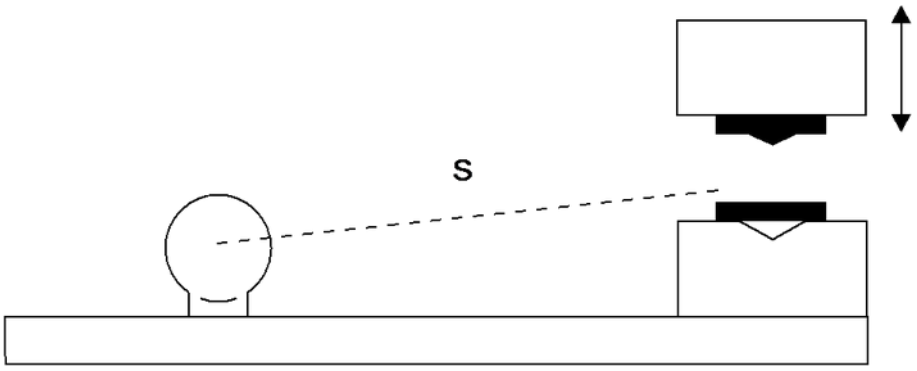
T = total stopping time for the dangerous movement, including the relay response time in seconds

C = constant for possible encroachment while the actuators are operated.

Two-hand configuration: 0 mm

One-hand configuration: Must be calculated by installer, based on possible encroachment reach of operator to ensure sufficient minimum safety distance.

⚠ **Warning!** The minimum mounting distance must never be less than 100 mm. When mounting the Safeballs on aluminium profiles or similar, the fixing screws must be locked in order to prevent the safety distance between two Safeballs being easily changed.



⚠ **Warning!** All the safety functions must be tested before starting up the system.

Minimum mounting distances and requirements for two hand device

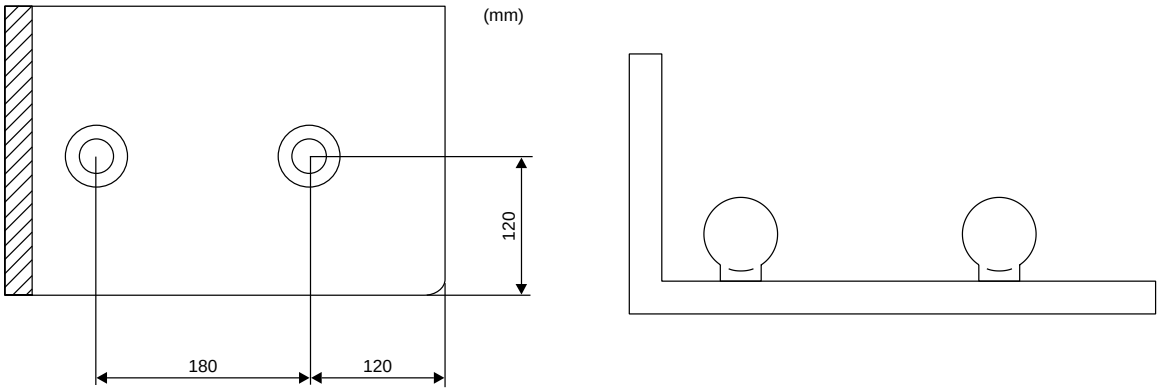
⚠ **Warning!** Follow the below instructions to avoid severe personal injury.

A Safeball must be mounted at a minimum distance to the edge of the mounting surface in order to prevent the system being defeated and the device being activated either intentionally or unintentionally with a part of the body other than the hands.

If the Safeball is mounted on e.g. a ball joint or any other solution where the Safeball can be moved, the distance to the closest wall must also be considered. This distance is determined by the mount, but the Safeball must never be able to reach the wall in any position.

To accomplish a two hand device type IIIC according to EN 574, the following additional requirements must be met:

- Two one-hand devices must be used and connected to the same safety monitor.
- The two devices must be mounted at a minimum distance between each other in order to prevent both of them being operated with one hand (see measurements in the figure below).

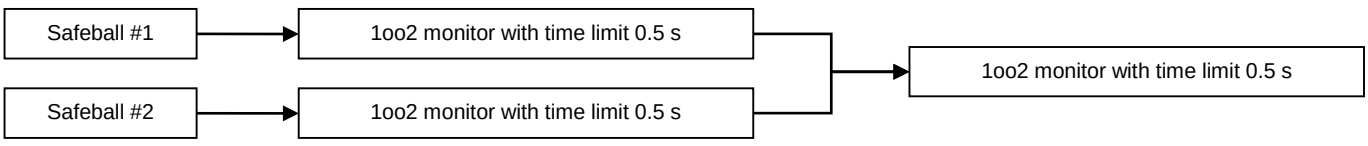


Minimum mounting distances

⚠ **Warning!** The minimum safety distance varies greatly as there are many ways to mount JSTD1 units. The responsible designer must ensure that intended or unintended defeating of the intended use of the two-hand device is not possible. Special care must be taken when Safeball is mounted without shields, and thus possible to reach with legs, stomach or other parts of the human body. It is the responsibility of the user to ensure that Safeball is used in a correct way. This should be checked with appropriate intervals.

Two hand device function description

The safety monitor must be programmed / parameterized to monitor the simultaneous action of both the two channels in the devices and also the simultaneous action of the two devices. The maximum time between activation of the two channels in each device must be 0.5 seconds and the maximum time between activation of the two devices must also be 0.5 seconds.



Two hand device function description

Maintenance

Daily checks:

The function of the two-hand control system should be checked daily. Check that the safety relay is de-energized and the machine is stopped when one or more of the JSTD1 pushbuttons are released. Check that the covers over the JSTD1 switches are OK and that the pushbuttons have a distinct operating function.

Warning!

The safety functions and the mechanics shall be tested regularly, at least once every year to confirm that all the safety functions are working properly (EN 62061:2005).

In case of breakdown or damage to the product, contact the nearest ABB Jokab Safety Service Office or reseller. Do not try to repair the product yourself since it may accidentally cause permanent damage to the product, impairing the safety of the device which in turn could lead to serious injury to personnel.

Testing of the safety functions

Make sure the safety unit is working properly by following these steps:

1) Start the machine by pushing all the JSTD1 pushbuttons – the safety relay should be activated and the machine started.
2) Release all pushbuttons – the safety relay should de-energize and the machine stop.
3) Start the machine by pushing all the JSTD1 pushbuttons – the safety relay should be activated and the machine started.
4) Release one of the JSTD1 pushbuttons – the safety relay should de-energize and the machine stop.
5) Activate the pushbutton again – the safety relay should not re-energize and the machine should not start.
6) Release all pushbuttons.

   Repeat sequence 3-6 for the three other JSTD1 pushbuttons.

7) Activate each JSTD1 pushbutton in turn (in all possible combinations, see table to the right), the safety relay should not energize and the machine should not start.

Button	1	2	3	4
	x			
		x		
			x	
				x
	x	x		
	x		x	
	x			x
		x	x	
		x		x
			x	x
	x	x	x	
	x	x		x
	x		x	x
		x	x	x

Possible pushbutton combinations

Check of simultaneousness:

Check the simultaneousness of the system by operating one of the JSTD1 pushbuttons for more than 0.5 seconds before pressing the three other JSTD1 pushbuttons. The machine should not be started. These checks should be repeated at least every year and after changes or maintenance on the machine. The stopping time should also be measured at least once each year.

5 Operation

One hand device

To activate a one hand device, both buttons on the Safeball must be pressed. Unlike a two-hand device, there is no time requirement for activation of the two buttons. Instead, the safety distance is longer. Refer to *Installation precautions* above for further details. The safety monitor must send a “stop” signal as soon as one or more pushbuttons have been released, and check that both pushbuttons have been released before a new start is possible.

Two hand device

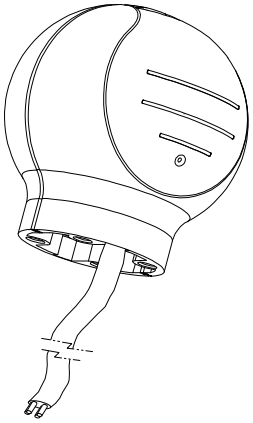
To activate a two-hand device, the two individual one-hand devices must be activated within 0.5 seconds of each other. This must be set up in the safety monitor by the safety application programmer. The safety monitor must also send a “stop” signal as soon as one or more pushbuttons have been released, and check that all pushbuttons have been released before a new start is possible.

Limitations

A two-hand control system does not give any protection against parts or liquids which can be thrown out of a machine. If it is required to protect other persons in the same risk area, either each person at risk should be equipped with a further two-hand control system (suitably interlocked), or complementary protection should be provided, e.g. a light curtain.

6 Model overview

Type	Article number	Description
JSTD1-A	2TLA020007R3000	Safeball with 2 m cable
JSTD1-B	2TLA020007R3100	Safeball with 0.2 m wires
JSTD1-C	2TLA020007R3200	Safeball with 10 m cable
JSTD1-E	2TLA020007R3400	Safeball with 0.2 m wires, 1 NO + 1 NO contacts

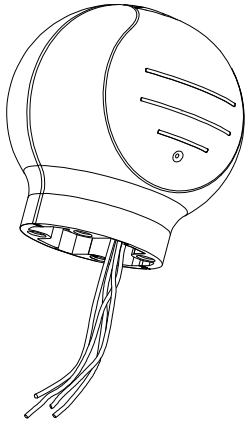


JSTD1-A
2 m cable
1 NO + 1 NC contact

Article number:
2TLA020007R3000

JSTD1-C
10 m cable
1 NO + 1 NC contact

Article number:
2TLA020007R3200



JSTD1-B
0.2 m wires
1 NO + 1 NC contact

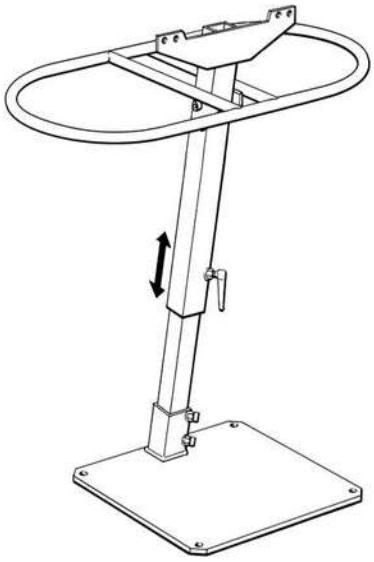
Article number:
2TLA020007R3100

JSTD1-E
0.2 m wires
1 NO + 1 NO contact

Article number:
2TLA020007R3400

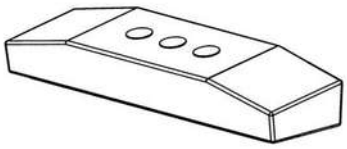
Accessories

Type	Article number	Description
JSM C5	2TLA020007R0900	Ball & socket table mount for Safeball
JSTD25C	2TLA020007R5200	Two-hand station without Safeballs or emergency stop push button
JSTS31	2TLA020007R4100	Floor stand including spacer ring



JSTS31
Floor stand including spacer ring.

Article number:
2TLA020007R4100



JSTD25C
Two-hand station without Safeballs or emergency stop push button.

Article number:
2TLA020007R5200



JSM C5
Ball & socket table mount for Safeball.

Article number:
2TLA020007R0900

A wide variety of mounts and other accessories are available; please refer to the product list at www.abb.com/jokabsafety.

7 Technical data

Manufacturer	
Address	ABB JOKAB SAFETY Varlabergsvägen 11 SE-434 39 Kungsbacka Sweden

Power supply	
Voltage	24 VDC. Tolerance 5 – 30 VDC
Max current (resistive load)	2 A at 30 VDC (max) 20 mA at 24 VDC (recommended)
Min current (resistive load)	10 mA at 6 VDC
Total current consumption	< 50 mA

General	
Degree of protection	IP67 - not intended for use under water.
Ambient temperature	-25…+50°C
Connector	4x connection cables, 0.75 mm^2. Length depending on model.
Size	See drawing
Actuating force	Approx. 2 N
Actuator travel	1.3 ± 0.6 mm
Mechanical life	> 1 x 10^6 operations at max 1 Hz
Colour	Yellow and black
Weight	JSTD1-B, -E: 95 g JSTD1-A: 225 g (with 2 m cable) JSTD1-C: 680 g (with 10 m cable)
Material	Polypropene

Chemical resistance at 20°C	
Alcohols	Good
Paraffin oil	Good
Milk	Good
Silicon oil	Good
Acetone	Good
Please contact ABB Jokab Safety for more information regarding other substances.	

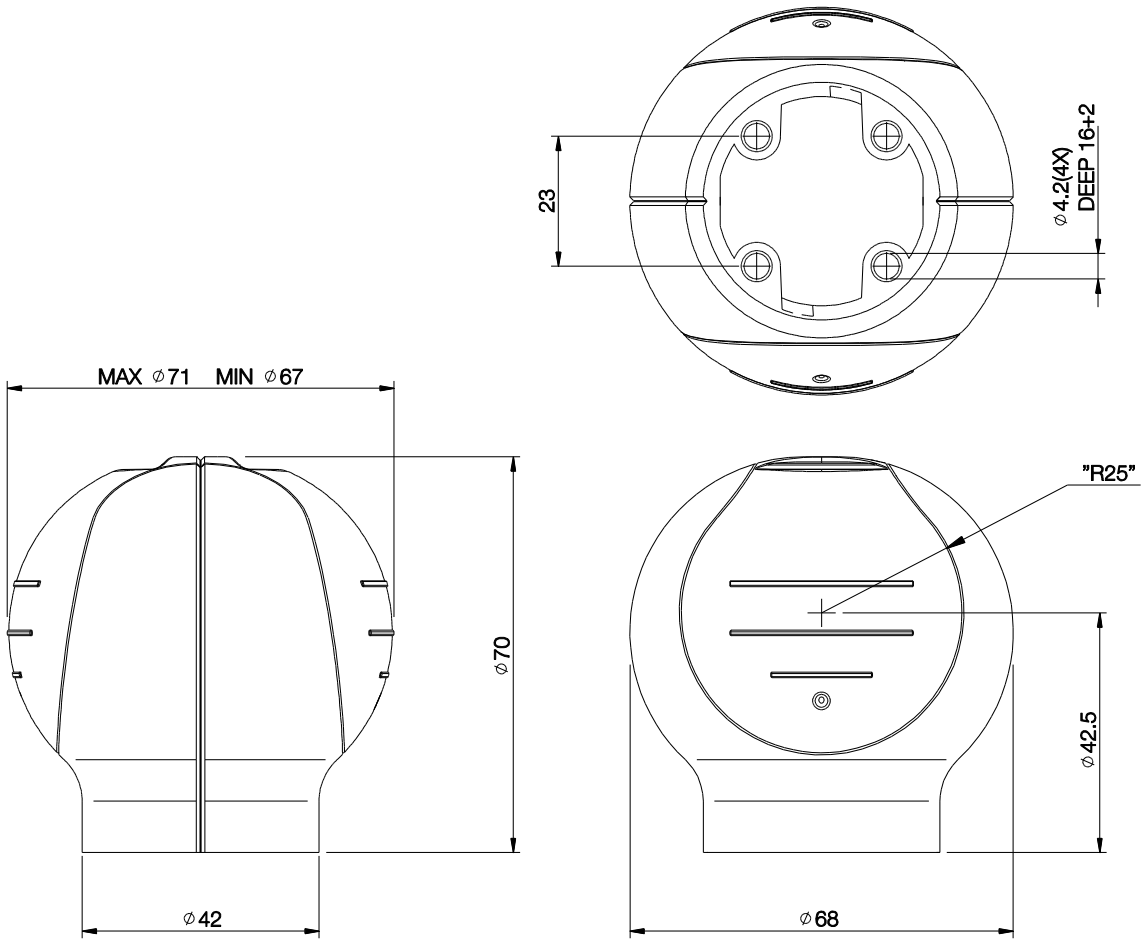
Information for use in USA / Canada
Surrounding air temperature maximum 40°C
Type 1
The device should be mounted on an ultimate enclosure.
Resistive only

Safety / Harmonized Standards	
Conformity	European Machinery Directive 2006/42/EC CE EN ISO 12100:2010, EN 574+A1:2008
EN ISO 13849-1	Suitable for PLe, cat 4 B_{10d}: 20 x 10^6 operations
EN 574	Appropriate for the design of two hand device type IIIC
Certificates	Inspecta, cULus

The Jokab Safety branded product with article number beginning with 2TLJ is fully compatible with the ABB branded product with article number beginning with 2TLA.

Dimensions

Safeball dimensions



NB: All measurements in millimetres

8 EC Declaration of conformity

EC Declaration of conformity

(according to 2006/42/EC, Annex 2A)

We	ABB AB JOKAB Safety Varlabergsvägen 11 SE-434 39 Kungsbacka Sweden	declare that the safety components of ABB AB make with type designations and safety functions as listed below, is in conformity with the Directive 2006/42/EC
Authorised to compile the technical file		ABB AB JOKAB Safety Varlabergsvägen 11 SE-434 39 Kungsbacka Sweden

Product	Certificate
Two hand control device JSTD1 (A-C, E), Safeball	11-SKM-CM-0108
Two hand control desk JSTD25 (A-H, K, P)	11-SKM-CM-0108 (not including the desk)
Two hand control desk JSTD20 (A-B)	11-SKM-CM-0109

Certification body	Inspecta Sweden AB Box 30100 SE-104 25 Stockholm Sweden
Used harmonized standards	EN ISO 12100:2010, EN 574+A1:2008

Jesper Kristensson
LPG Manager
Kungsbacka 2015-11-30

www.abb.com/jokabsafety

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