Original instructions

JSHD4 AS-i

Enabling device with safe AS-i input slave

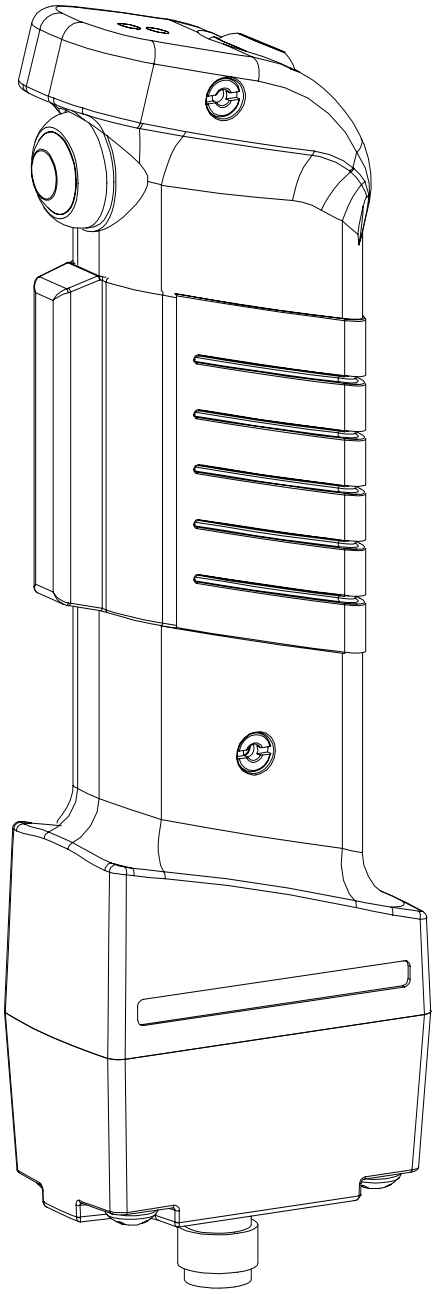

ABB AB / Jokab Safety Varlabergsvägen 11, SE-434 39 Kungsbacka, Sweden
www.abb.com/lowvoltage

Read and understand this document

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Systems, machines, and equipment that could present a risk to life or property.

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Table of Contents

1 Introduction

Scope

The purpose of these instructions is to describe the three-position enabling device and to provide the necessary information required for installation and operation.

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 Jokab Safety products.
- Knowledge of the AS-i system.
- 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

JSHD4 AS-i is a 3-position enabling device with a built-in dual channel safe AS-i input slave. Some versions also include a standard input slave for extra push-buttons and anti tampering protection. 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 the publication “AS-Interface The Automatic Solution”.

The anti-tampering device consist of a capacitive sensor and an accelerometer, by combining these sensors the device can be used to determine if a person is holding the enabling device. This can be used if there is a risk for tampering of the enabling device.

⚠ **Warning!** The anti tampering device is not a safety function; the safety relies on the operator using the three-position-button.

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.

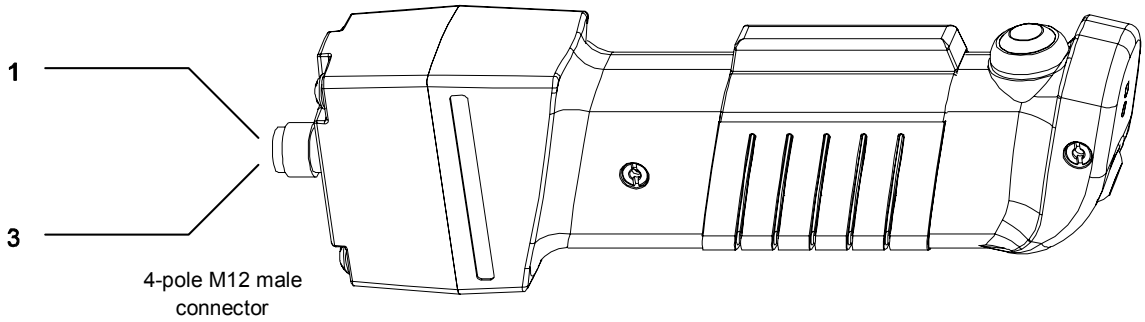
Failure to comply with instructions, operation that is not in accordance with the use prescribed in these instructions, improper installation or handling of the device can affect the safety of people and the plant.

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.

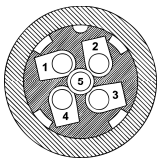
3 Connections

JSHD4 AS-i connections

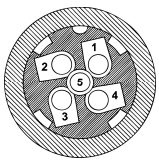


4-pole M12-connector:

1) AS-i +
2) Not used
3) AS-i –
4) Not used



M12 5-pole male seen from cable side



M12 5-pole female seen from cable side

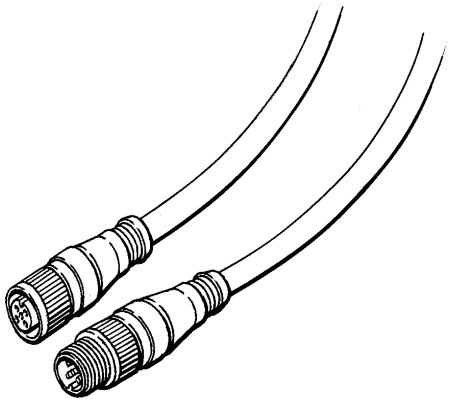
Standard slave bit description (input only)

The standard, non-safe input slave (available in some versions) send a 4-bit message to indicate the press of the top and/or front button, and if the anti tampering device detect an operator or not.

Bit no	Value	Description
1	1	Top button pressed
	0	Top button not pressed
2	1	Front button pressed
	0	Front button not pressed
3	1	Anti tampering device detect an operator
	0	Anti tampering device does not detect an operator
4	-	Not used

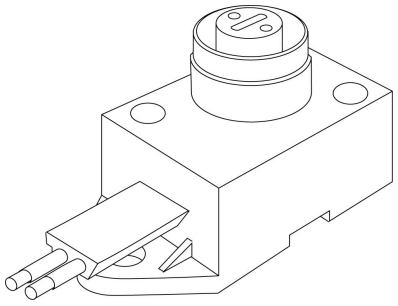
Accessories for connection to the AS-i bus

Type	Article number	Description
AS-i T-connector with M12	2TLA020073R0000	Flat cable connector to M12
M12-C112	2TLA020056R2000	1 m cable, 5-pole, 0.34 mm^2, M12 female + M12 male connectors
M12-C312	2TLA020056R2100	3 m cable, 5-pole, 0.34 mm^2, M12 female + M12 male connectors



5 x 0.34 mm2 cable, screen with straight female + male M12 connectors.
Screen connected to pin 3 (0 VDC) on male connector.

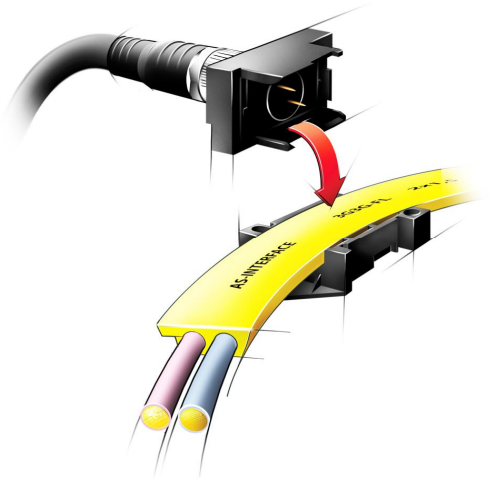
Article numbers:
2TLA020056R2000 (1 m)
2TLA020056R2100 (3 m)



Flat cable connector to M12

Article number:
2TLA020073R0000

4 Installation and maintenance



JSHD4 AS-i is supplied with 30 VDC from the AS-i bus.

Recommended connection to the AS-i bus is through a flat cable connector to M12 (see figure to the left), making it possible to quickly and easily connect JSHD4 AS-i to the yellow AS-i cable.

The unit can also be connected directly to the AS-i bus using only two cables (pin-1 and 3 of the M12-connector on the unit) according to *Connections* above.

Installation precautions

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

Maintenance

⚠ **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.

5 Operation

Three-position button

The three possible positions of the main button represent three different states according to the figure below.

State 1 – ”Waiting state”:

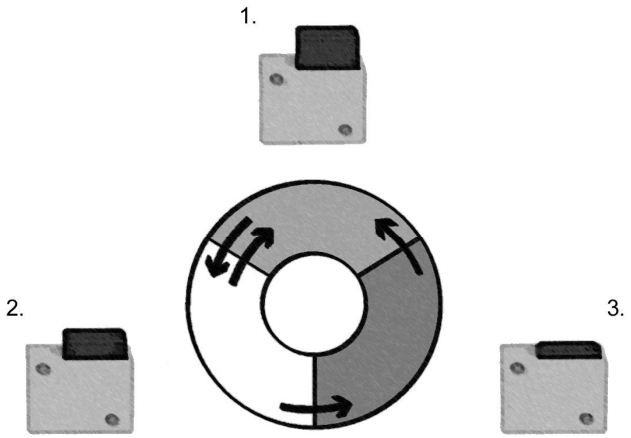
- Button free, i.e. not pressed.
- Process not allowed to run.
- Waiting for the button to be pressed into its middle position (”running state”).

State 2 – ”Running state”:

- Button pressed into its middle position.
- Process is allowed to run.
- Process is stopped if the button is released or pressed to its end position (“stopping state”).

State 3 – ”Stopping state”:

- Button is pressed to its end position.
- Process is stopped.
- To restart the process the button must first be completely released (“waiting state”), then pressed into its middle position (“running state”).



Front and top button

The front and top button functionality are user defined and determined in the PLC program, see “Standard slave bit description” above for details.

Anti-tampering device

The anti-tampering device has two requirements to determine if JSHD4 AS-i is operated correctly:

1) A capacitive sensor determines if the device is held by a hand.
2) An accelerometer determines if the device is moving.

Faulty operation is reported if the device is not held by a hand or if it has not moved for more than 20 seconds.

NB: Not all models are equipped with the additional (front and/or top) button or the anti-tampering device (see “Model overview” below).

⚠ **Warning!** The front and/or top button, as well as the anti-tampering device, are connected to a non-safe input slave and must **never** be used for safety functions.

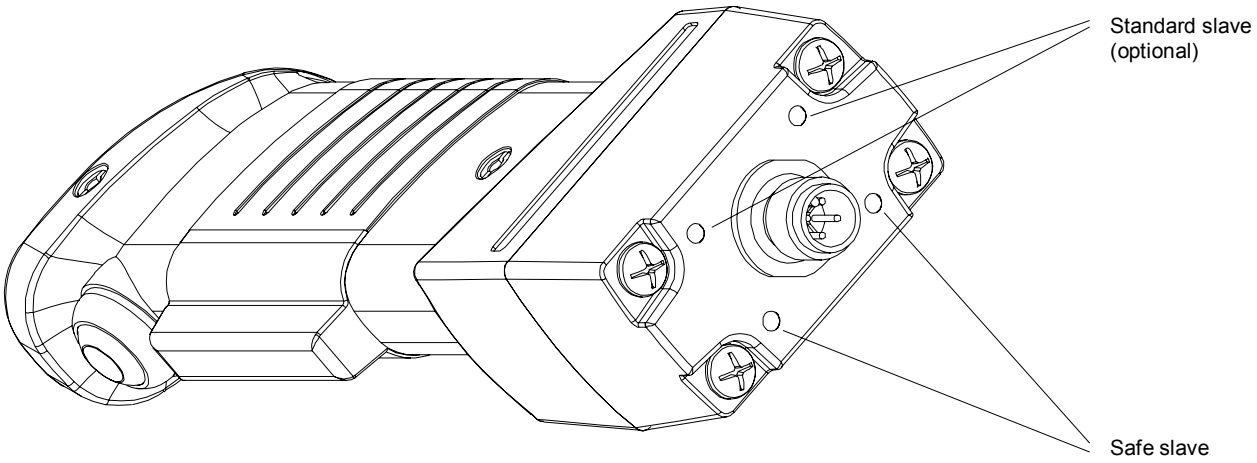
LED indication

LEDs on the top of the device:

LED	Indication	Description
Red	ON	Out bit 1 (safe slave) ON
	OFF	Out bit 1 (safe slave) OFF
Green	ON	Out bit 2 (safe slave) ON
	OFF	Out bit 2 (safe slave) OFF

AS-i LED and Fault LED in combination:

Depending on the model, there are one or two pairs of LEDs on the underside of the device. The combination of the individual LEDs indicates the status of a corresponding input slave.



A LED pair consists of a green “AS-i” LED and a red “Fault” LED. If there are two pairs of LEDs, the device is equipped with an additional standard input slave and the LED pairs are then placed as shown in the figure above. Both LED pairs indicate respective slave status as described in the table below.

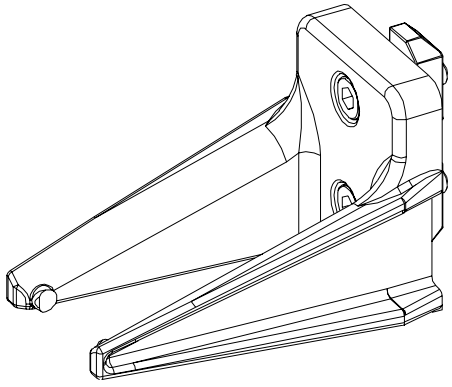
AS-i (Green)	Fault (Red)	Description
OFF	OFF	AS-i power missing
ON	OFF	Normal operation
ON	ON	No data exchange with master
Flash	ON	No data exchange because address = 0

6 Model overview

Type	Article number	Description
JSHD4-2-AF	2TLA019995R0600	3-position-, front- and top button Safe- and non-safe slave
JSHD4-2-AF-A	2TLA019995R0700	3-position-, front- and top button Safe- and non-safe slave Anti-tampering device
JSHD4-3-AF-A	2TLA019995R1800	3-position button Safe- and non-safe slave Anti-tampering device
JSHD4-3-AG	2TLA019995R1900	3-position button Safe slave
JSHD4-4-AF	2TLA019995R2800	3-position- and front button Safe- and non-safe-slave
JSHD4-4-AF-A	2TLA019995R2900	3-position- and front button Safe- and non-safe slave Anti-tampering device
JSHD4-5-AF	2TLA019995R3800	3-position- and top button Safe- and non-safe-slave
JSHD4-5-AF-A	2TLA019995R3900	3-position- and top button Safe- and non-safe slave Anti-tampering device

Accessories

Type	Article number	Description
JSM55	2TLA040005R0500	Wall fixing for 3-position device



JSM55
Wall fixing for 3-position device

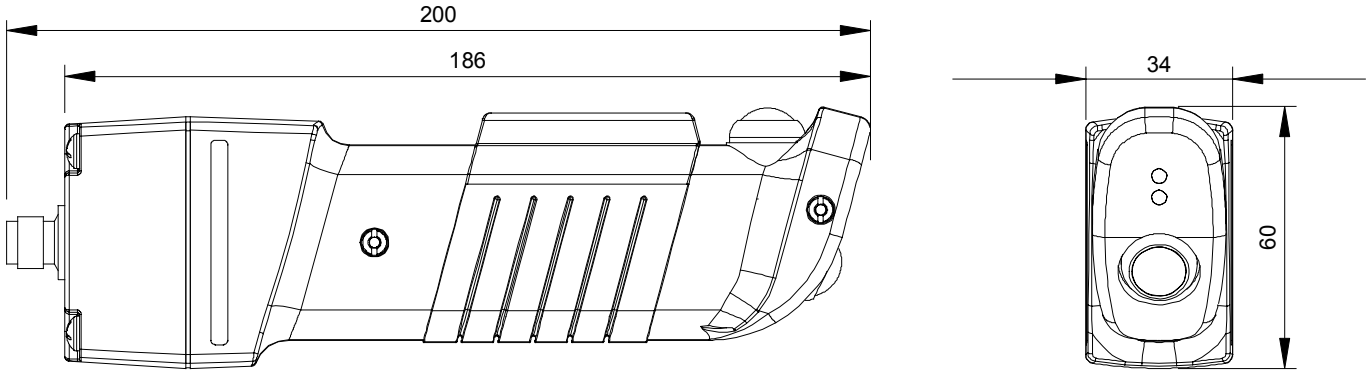
Article number:
2TLA040005R0500

7 Technical data

Manufacturer	
Address	ABB AB / JOKAB SAFETY Varlabergsvägen 11 SE-434 39 Kungsbacka Sweden
AS-i data	
AS-i profile (safe slave)	S-7.B.0
Slave address at delivery (safe slave)	0
AS-i profile (std. slave)	S-0.A.0 (Not in JSHD4-3-AG)
Slave address at delivery (std. slave)	31A
Addressing	M12-connector (internal switch enable separation of nodes)
Response time over AS-i bus	5 ms (+ response time of safety monitor)
Power supply	
Operating voltage	30 VDC, AS-i bus. Tolerance 26.5 – 31.6 VDC
Total current consumption	< 100 mA
General	
Degree of protection	IP65
Ambient temperature	-10…+50°C
Size	See drawing
Operating force	Approx. 15N
Life, mechanical	1.000.000 operations to middle position
Safety / Harmonized Standards	
Conformity	European Machinery Directive 2006/42/EC CE EN ISO 12100-1:2010, EN 954-1:1996/EN ISO 13849-1:2008, EN ISO 13849-2:2008, EN 62061:2005, EN 60204-1:2006+A1:2009
IEC/EN 61508-1…7	SIL3, PFD_{avr}: $3.25*10^{-5}$, PFH_d: $7.55*10^{-9}$
EN 62061	SIL3
EN ISO 13849-1	Performance level: PL e, category 4 $MTTF_d$: High (if $n_{op} < 6.5*10^5$)
EN 954-1	Category 4
Certificates	TÜV Nord

Dimensions

JSHD4 AS-i 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 JOKAB SAFETY manufacture with type designations and safety functions as listed below, are in conformity with the Directive

2006/42/EC

Person authorised to compile the technical file

Lars-Magnus Felth
ABB AB
JOKAB SAFETY
Varlabergsvägen 11
SE-434 39 Kungsbacka
Sweden

Product	**Certificate/Notified Body**
Three position device, versions	11-SKM-CM-0110/No. 0409
JSHD4-2-AF-A JSHD4-2-AF JSHD4-3-AF-A JSHD4-3-AG JSHD4-4-AF-A JSHD4-4-AF JSHD4-5-AF-A JSHD4-5-AF	44 799 10 555633 000/No. 0044

Notified Body

Inspecta Sweden AB Box 30100 SE-104 25 Stockholm Sweden	TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen Germany
Notified Body No. 0409	Notified Body No. 0044

Used harmonized standards

EN ISO 12100-1:2010, EN 954-1:1996/EN ISO 13849-1:2008,
EN ISO 13849-2:2008, EN 62061:2005, EN 60204-1:2006+A1:2009

Mats Linger
PRU Manager
Kungsbacka 2011-03-04

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