ROBOTICS

Product specification

CRB 1100

Trace back information:
Workspace 23C version a8
Checked in 2023-09-21
Skribenta version 5.5.019

Product specification

CRB 1100-4/0.475
CRB 1100-4/0.58

OmniCore

Document ID: 3HAC082108-001
Revision: F

Original instructions.

Table of contents

This page is intentionally left blank

Overview of this specification

About this product specification

This product specification describes the performance of the manipulator or a complete family of manipulators in terms of:

- The structure and dimensional prints
- The fulfilment of standards, safety, and operating equipment
- The load diagrams, mounting or extra equipment, the motion, and the robot reach
- The specification of available variants and options

The specification covers the manipulator using the OmniCore controller.

Usage

Product specifications are used to find data and performance about the product, for example to decide which product to buy. How to handle the product is described in the product manual.

The specification is intended for:

- Product managers and product personnel
- Sales and marketing personnel
- Order and customer service personnel

References

Documentation referred to in the manual, is listed in the table below.

Document name	Document ID
Product specification - OmniCore C line	*3HAC065034-001*
Product specification - OmniCore E line	*3HAC079823-001*
Product manual - OmniCore C30	*3HAC060860-001*
Product manual - OmniCore C90XT	*3HAC073706-001*
Product manual - OmniCore E10	*3HAC079399-001*
Product manual - CRB 1100	*3HAC078007-001*
Product manual, spare parts - CRB 1100	*3HAC078009-001*

Revisions

Revision	Description
A	First edition.
B	Published in release 22A. The following updates are done in this revision: • Added screwing depth information to attachment screws for robot foundation. • Updated the description in *Installation of laser scanner section*.
C	Published in release 22B. The following updates are done in this revision: • Add maximum TCP acceleration value.

Continues on next page

Revision	Description
D	Published in release 22C. The following updates are done in this revision: • Added RAL code in manipulator color. • Updated values for power consumption. • Added new option *Angled type connector* [3209-1].
E	Published in release 23A. The following updates are done in this revision: • Updated image for 1 SafetyIO-based laser scanner (option 3051-2).
F	Published in release 23C. The following updates are done in this revision: • The updated robot stopping distances and times are moved to this document, and removed from the generic document, see *Robot stopping distances and times on page 63*.

1 Description

1.1 Structure

1.1.1 Introduction

General introduction for CRB 1100

CRB 1100 is a collaborative robot. It bridges the gap between collaborative and industrial robots, enabling safe collaborative operation in applications demanding industrial-level speed and lifting capabilities. Combining ABB's SafeMove speed and safety separation technology with a safety laser scanner, CRB 1100 ensures workers are never inside its working envelope while it is moving. Offering both lead-through programming via the clip-on lead through device and Wizard easy programming software, CRB 1100 can be configured with no specialized training.

Software product range

The CRB 1100 added a range of software products - all falling under the umbrella designation of Active Safety - to protect not only personnel in the unlikely event of an accident, but also robot tools, peripheral equipment and the robot itself.

Operating system

The CRB 1100 is equipped with the OmniCore C30 controller and robot control software, RobotWare. RobotWare supports every aspect of the robot system, such as motion control, development and execution of application programs, communication etc. See *Operating manual - OmniCore*.

Safety

Safety standards valid for complete robot, manipulator and controller.

Collaborative safety

Combining ABB's SafeMove comprehensive safety functionality with a safety laser scanner, CRB 1100 can be installed without physical fencing and still collaborate safely with people. If a worker is detected within its working area, CRB 1100 will automatically slow down or halt to allow them to approach safely. An interaction light provides a visual indication of CRB 1100 status. It signals human co-workers when people are inside CRB 1100 working zone.

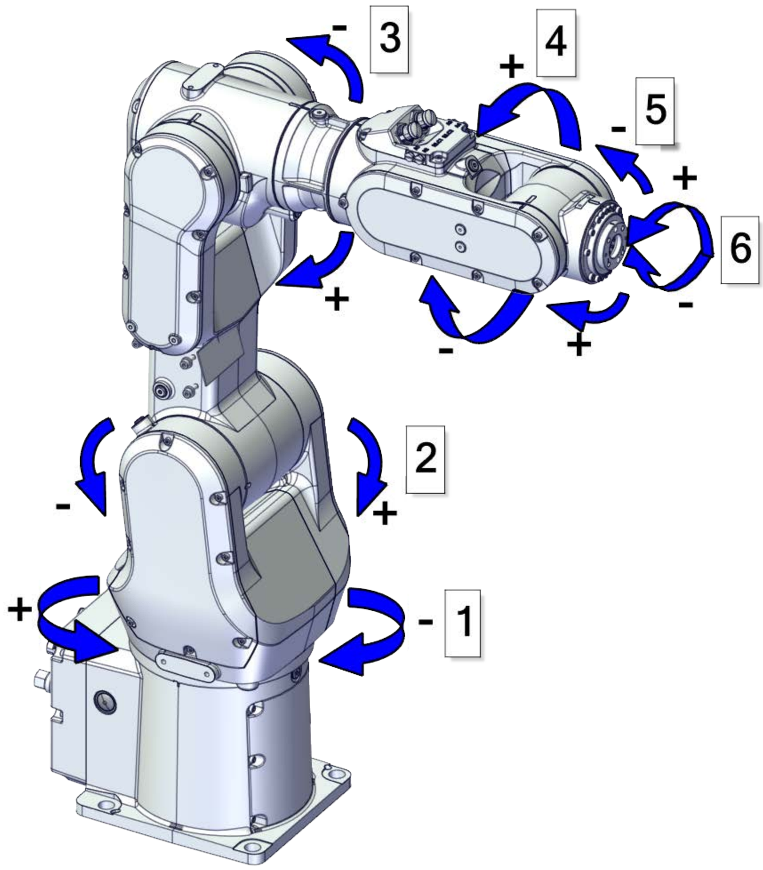
Note that a Safety PLC is required for connection with the laser scanner.

Additional functionality

For additional functionality, the robot can be equipped with optional software for application support - for example communication features - network communication - and advanced functions such as multitasking, sensor control etc. For a complete description on optional software, see the *Product specification - OmniCore C line*.

Continues on next page

Robot axes



xx1800002456

Pos	Description	Pos	Description
1	Axis 1	2	Axis 2
3	Axis 3	4	Axis 4
5	Axis 5	6	Axis 6

1.1.2 Different robot versions

General

The CRB 1100 is available in two versions.

Robot types

The following robot versions are available.

Robot type	Handling capacity (kg)	Reach (m)
CRB 1100-4/0.475	4 kg	0.475 m
CRB 1100-4/0.58	4 kg	0.58 m

1.1.3 Definition of version designations

1.1.3.1 Technical data

Weight, robot

The table shows the weight of the robot.

Robot model	Weight
CRB 1100	21.1 kg

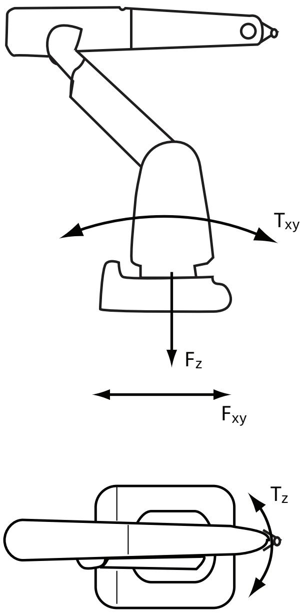
Note

The weight does not include tools and other equipment fitted on the robot!

Loads on foundation, robot

The illustration shows the directions of the robots stress forces.

The directions are valid for all floor mounted, table mounted, wall mounted and suspended robots.



xx1100000521

F_{xy}	Force in any direction in the XY plane
F_z	Force in the Z plane
T_{xy}	Bending torque in any direction in the XY plane
T_z	Bending torque in the Z plane

Continues on next page

The table shows the various forces and torques working on the robot during different kinds of operation.

Note

These forces and torques are extreme values that are rarely encountered during operation. The values also never reach their maximum at the same time!

WARNING

The robot installation is restricted to the mounting options given in following load table(s).

Floor mounted

Force	Endurance load (in operation)	Maximum load (emergency stop)
Force xy	±420 N	±710N
Force z	+210 ±380 N	+210 ±510 N
Torque xy	±180 Nm	±330 Nm
Torque z	±90 Nm	±140 Nm

Wall mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	+210 ±370 N	+210 ±660 N
Force z	±370 N	±540 Nm
Torque xy	±200 Nm	±370Nm
Torque z	±90 Nm	±140 Nm

Suspended

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	±420 N	±710 N
Force z	-210 ±380 N	-210 ±510 N
Torque xy	±180 Nm	±330 Nm
Torque z	±90 Nm	±140 Nm

Table mounted

Force	Endurance load (in operation)	Maximum load (emergency stop)
Force xy	±420 N	±710N
Force z	+210 ±380 N	+210 ±510 N
Torque xy	±180 Nm	±330 Nm
Torque z	±90 Nm	±140 Nm

Continues on next page

Requirements, foundation

The table shows the requirements for the foundation where the weight of the installed robot is included:

Requirement	Value	Note
Flatness of foundation surface	0.1/500 mm	Flat foundations give better repeatability of the resolver calibration compared to original settings on delivery from ABB. The value for levelness aims at the circumstance of the anchoring points in the robot base. In order to compensate for an uneven surface, the robot can be recalibrated during installation. If resolver/encoder calibration is changed this will influence the absolute accuracy.
Maximum tilt	5°	
Minimum resonance frequency	22 Hz **Note** It may affect the manipulator lifetime to have a lower resonance frequency than recommended.	The value is recommended for optimal performance. Due to foundation stiffness, consider robot mass including equipment.[i] For information about compensating for foundation flexibility, see *Application manual - Controller software OmniCore*, section *Motion Process Mode*.

i The minimum resonance frequency given should be interpreted as the frequency of the robot mass/inertia, robot assumed stiff, when a foundation translational/torsional elasticity is added, i.e., the stiffness of the pedestal where the robot is mounted. The minimum resonance frequency should not be interpreted as the resonance frequency of the building, floor etc. For example, if the equivalent mass of the floor is very high, it will not affect robot movement, even if the frequency is well below the stated frequency. The robot should be mounted as rigid as possibly to the floor.

Disturbances from other machinery will affect the robot and the tool accuracy. The robot has resonance frequencies in the region 10 – 20 Hz and disturbances in this region will be amplified, although somewhat damped by the servo control. This might be a problem, depending on the requirements from the applications. If this is a problem, the robot needs to be isolated from the environment.

Storage conditions, robot

The table shows the allowed storage conditions for the robot:

Parameter	Value
Minimum ambient temperature	-25°C (-13°F)
Maximum ambient temperature	+55°C (+131°F)
Maximum ambient temperature (less than 24 hrs)	+70°C (+158°F)
Maximum ambient humidity	95% at constant temperature (gaseous only)

Operating conditions, robot

The table shows the allowed operating conditions for the robot:

Parameter	Value
Minimum ambient temperature	+5°C[i] (41°F)
Maximum ambient temperature	+45°C (113°F)

Continues on next page

Parameter	Value
Maximum ambient humidity	95% at constant temperature

i At low environmental temperature (below 10° C) a warm-up phase is recommended to be run with the robot. Otherwise there is a risk that the robot stops or runs with lower performance due to temperature dependent oil and grease viscosity.

Protection classes, robot

The table shows the available protection types of the robot, with the corresponding protection class.

Protection type	Protection class
Manipulator, protection type Standard	IP40

Other technical data

Data	Description	Note
Airborne noise level	The sound pressure level outside the working space.	< 65 dB(A) Leq (acc. to machinery directive 2006/42/EC)

Power consumption at max load with OmniCore E10

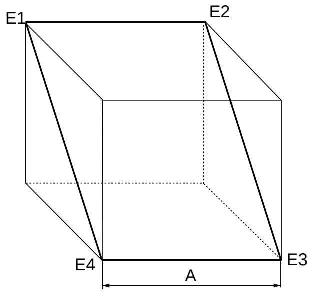
Type of movement	CRB 1100-4/0.475	CRB 1100-4/0.58
ISO Cube Max. velocity (W)	256	249

Robot in calibration position	CRB 1100-4/0.475	CRB 1100-4/0.58
Brakes engaged (W)	58	59
Brakes disengaged (W)	138	130

Power consumption at max load with OmniCore C30/90XT

Type of movement	CRB 1100-4/0.475	CRB 1100-4/0.58
ISO Cube Max. velocity (W)	282	275

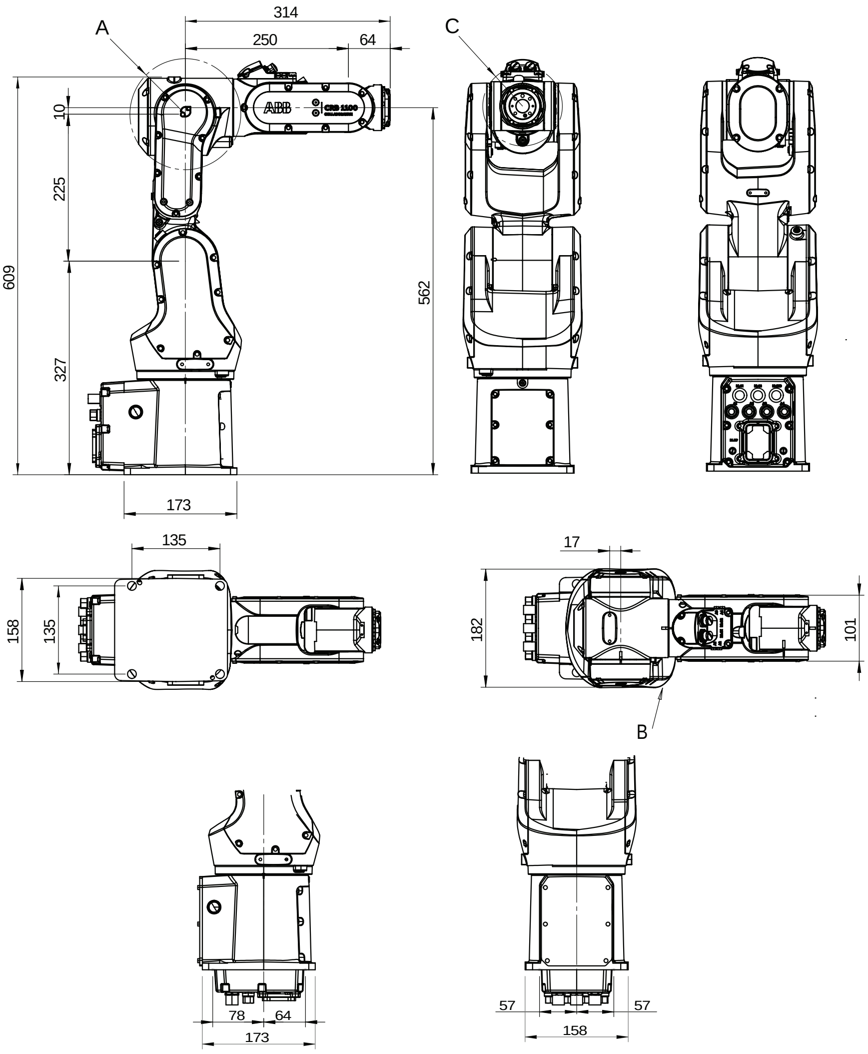
Robot in calibration position	CRB 1100-4/0.475	CRB 1100-4/0.58
Brakes engaged (W)	70	79
Brakes disengaged (W)	154	160



xx1000000101

Pos	Description
A	250 mm

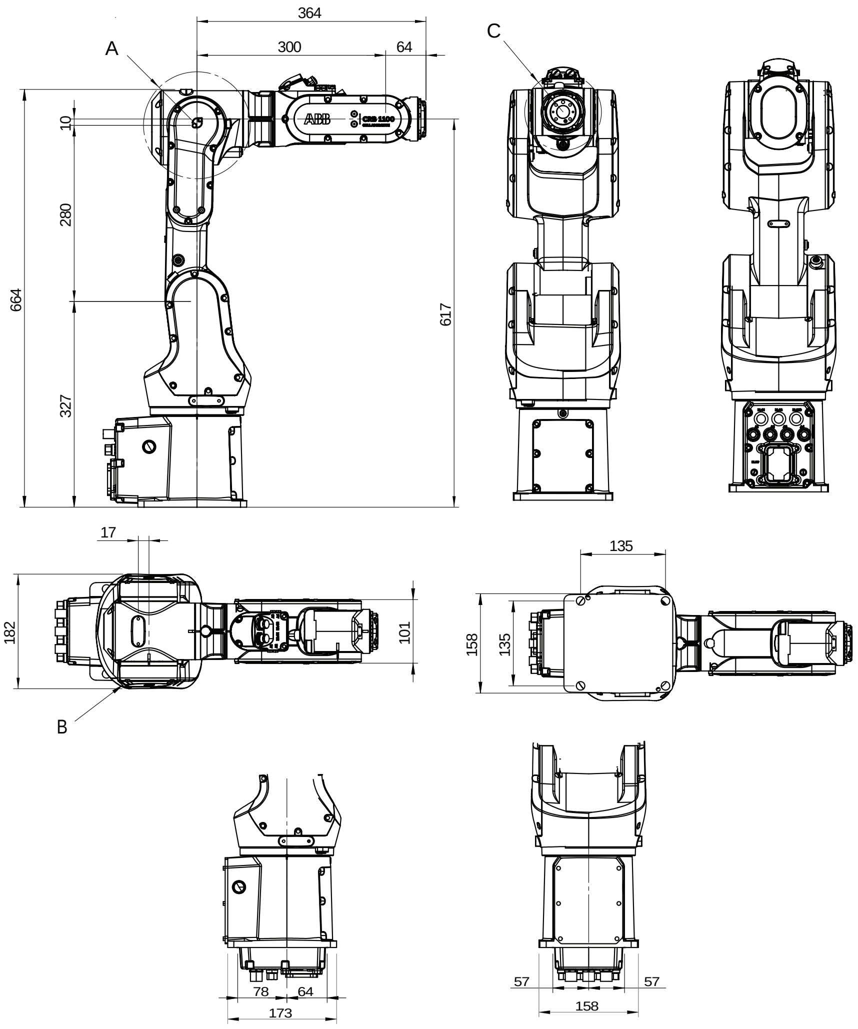
Main dimensions of CRB 1100-4/0.475



xx2000002545

Pos	Description
A	Turning radius: R85
B	Turning radius: R109
C	Turning radius: R61

Main dimensions of CRB 1100-4/0.58



xx2000002546

Pos	Description
A	Turning radius: R85
B	Turning radius: R109
C	Turning radius: R61

1.2 Standards

1.2.1 Applicable standards

General

The product is compliant with ISO 10218-1:2011, *Robots for industrial environments - Safety requirements - Part 1 Robots*, and applicable parts in the normative references, as referred to from ISO 10218-1:2011. In case of deviation from ISO 10218-1:2011, these are listed in the declaration of incorporation. The declaration of incorporation is part of the delivery.

Robot standards

Standard	Description
ISO 9283	Manipulating industrial robots – Performance criteria and related test methods
ISO 9787	Robots and robotic devices – Coordinate systems and motion nomenclatures
ISO 9946	Manipulating industrial robots – Presentation of characteristics

Other standards used in design

Standard	Description
IEC 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements, normative reference from ISO 10218-1
IEC 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
IEC 61000-6-4	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments
ISO 13849-1:2006	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design, normative reference from ISO 10218-1
ISO/TS 15066	Robots and robotic devices - Collaborative robots This Technical Specification specifies safety requirements for collaborative industrial robot systems and the work environment, and supplements the requirements and guidance on collaborative industrial robot operation given in ISO 10218-1 and ISO 10218-2.

Region specific standards and regulations

Standard	Description
ANSI/RIA R15.06	Safety requirements for industrial robots and robot systems
ANSI/UL 1740	Safety standard for robots and robotic equipment
CAN/CSA Z 434-03	Industrial robots and robot Systems - General safety requirements
EN ISO 10218-1	Robots and robotic devices — Safety requirements for industrial robots — Part 1: Robots

1.3 Installation

1.3.1 Introduction to installation

General

CRB 1100 is available in two variants and all variants can be floor mounted, inverted/suspended, wall mounted, or tilted mounted (any angle) and table mounted. Depending on the robot variant, an end effector with a max. weight of 4 kg including payload, can be mounted on the tool flange (axis 6). See *Load diagrams on page 43*.

Extra loads

The upper arm can handle an additional load of 0.5 kg.

See *Fitting equipment to the robot on page 52*.

Working range limitation

The working range of axes 1 can be limited by mechanical stops as option. See *Working range on page 58*.

1.3.2 Assembling the manipulator

Attachment screws

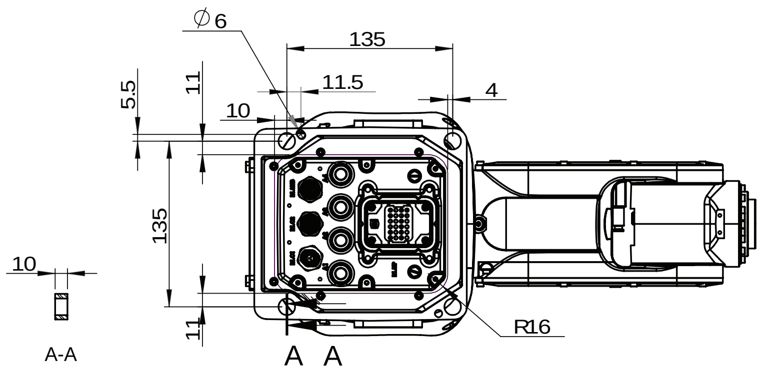
The table below specifies the type of securing screws and washers to be used for securing the robot to the base plate/foundation.

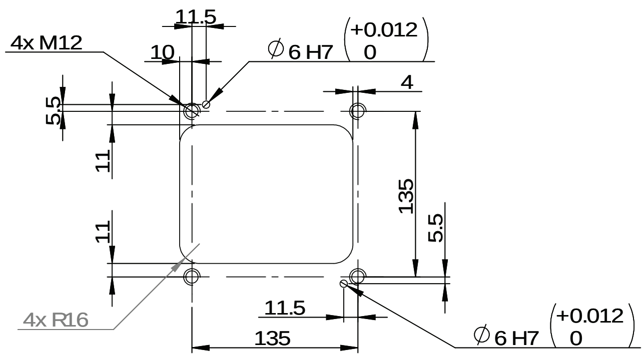
All hardware is enclosed in the robot delivery.

Suitable screws	M12x25 (robot installation directly on foundation)
Quantity	4 pcs
Quality	8.8
Suitable washer	4 pcs, 24 x 13 x 2.5
Guide pins	2 pcs, article number 3HNP00449-1
Tightening torque	50 Nm±5 Nm
Length of thread engagement	Minimum 12.5 mm for ground with material yield strength 150 MPa
Level surface requirements	0.1/500 mm

Hole configuration, base

This illustration shows the hole configuration used when securing the robot.





xx1800002448

1.3.3 Installation of lead-through device

Introduction

The lead-through functionality is available for the CRB 1100 by mounting a lead-through device on axis 6. With the lead-though functionality enabled, you can hold the handler of the lead-through device and move the robot arm manually to the desired position, as an alternative to jogging.

To use lead-through, make sure the system is running in manual mode; otherwise, the functionality cannot be enabled. If running the system in auto mode, always remove the lead-through device from the robot first to prevent any unexpected damages.

CAUTION

Be careful not to stretch or squeeze the device cabling when moving the robot with the lead-through device, especially to extreme positions. Otherwise, it will cause cabling damages.

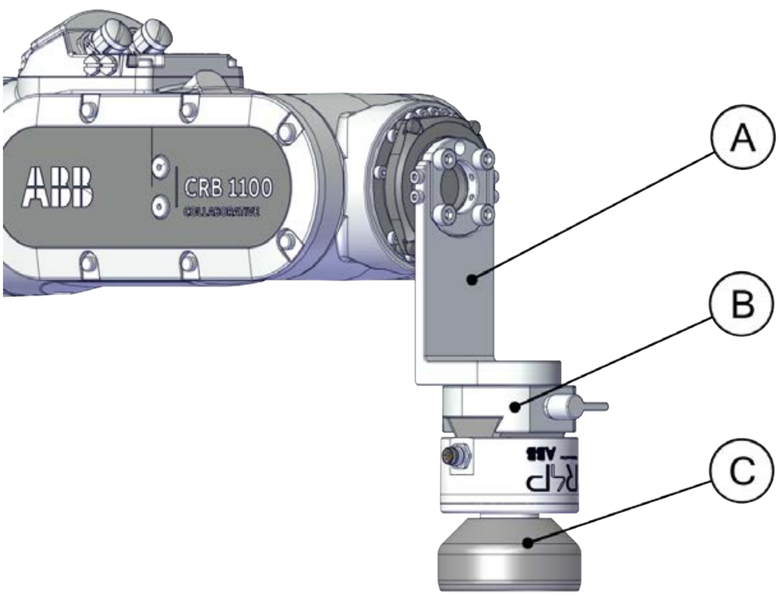
Note

Two types are available to the lead-through device used with the CRB 1100, no-button-type and two-button-type. The actual delivered device type varies according to the order time. Unless otherwise stated, the instructions of installing and configuring the device are applicable to both no-button-type device and two-button-type device. Always read the instructions carefully to install and configure your device based on the actual device type.

Continues on next page

Location of lead-through device

The lead-though device is located as shown in the figure.



xx2100000159

A	Adapter
B	Lead-through device base **Note:** base for no-button-type lead-through device is shown as an example.
C	Lead-through device **Note:** no-button-type lead-through device is shown as an example.

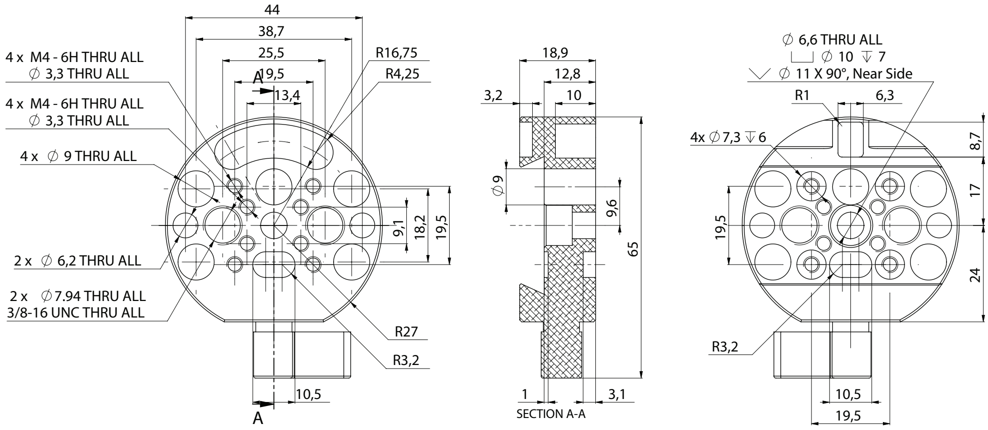
Preparing the adapter

The lead-through device is mounted to the device base and then to the robot tool flange through an adapter. Customers can use an L-shape adapter offered by ABB (option 3314-1) or design adapters according to actual requirements. During adapter design, hole dimensions on the device base and robot tool flange shall be considered.

Continues on next page

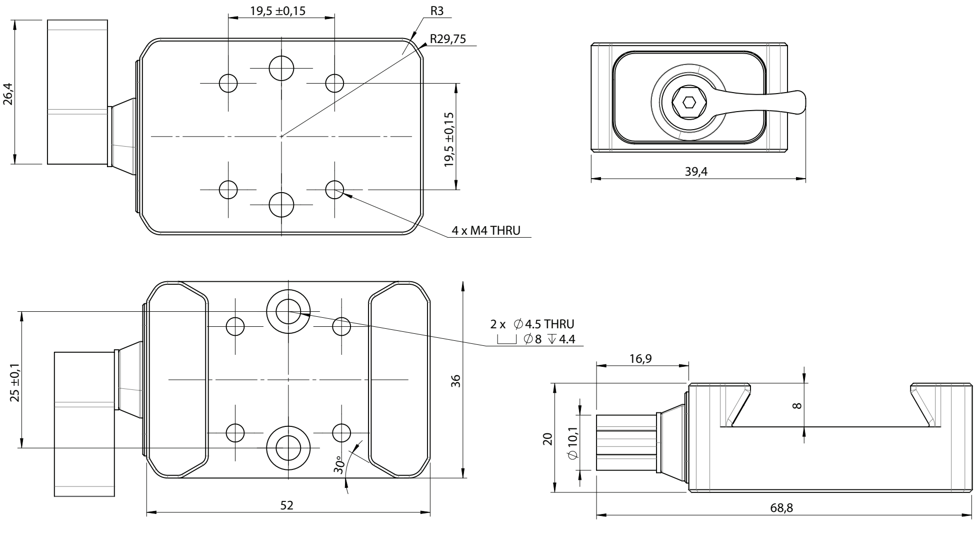
The following figure illustrates the hole dimensions on lead-through device base.

For no-button type



xx2100000164

For two-button type



xx2200000767

For the hole dimensions on robot tool flange, see *Tool flange standard on page 54*.

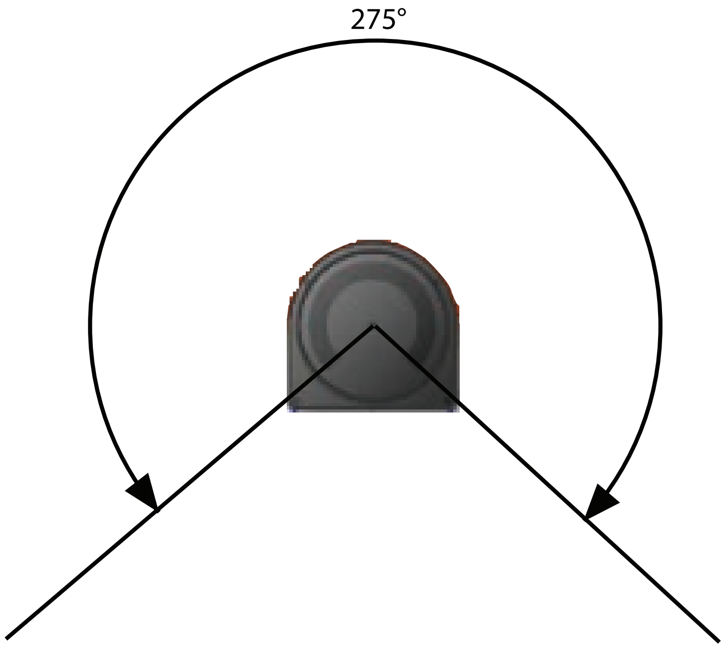
1.3.4 Installation of laser scanner

Overview

The safety separation technology and speed control for CRB 1100 is based on the connection and communication of one or two safety laser scanners in the robot. Laser scanner(s) provides a timely and continuous monitor on the activities within its scanning area and forms a protective field. One laser scanner can provide a scanning range of approximately 275°. The system integrator shall investigate the site environment and place the laser scanner to a suitable location according to the actual requirements.

CAUTION

Safety in the area that not in the scanning range must always be considered. The system integrator shall assess the potential risks within this area and make sure that proper measures have been applied to reduce risks.



xx2100000168

Laser scanner types

The following laser scanner package options are available:

- 1 PROFIsafe-based laser scanner (option 3051-1 PROFIsafe scanner)
- 2 PROFIsafe-based laser scanners (option 3051-3 Dual PROFIsafe scanner)
- 1 SafetyIO-based laser scanner (option 3051-2 I/O scanner)
- 2 SafetyIO-based laser scanners (option 3051-4 Dual I/O scanner)

Continues on next page

Connection between PROFIsafe-based laser scanners and the OmniCore controller differs according to the PROFINET options selected and installed in the system.

- If only options [3020-2] PROFINET Device and [3023-2] PROFIsafe Device are selected and installed, the laser scanners shall connect to a PLC acting as a master first and then to the OmniCore controller with SafeMove via the PROFINET safe (PROFIsafe) network. Users need to prepare a safety PLC of their own.
- If options [3020-1] PROFINET Controller and [3023-1] PROFIsafe Controller are selected and installed, the laser scanner could communicate with the OmniCore controller directly via the WAN port.

SafetyIO-based laser scanners connects to the OmniCore controller with SafeMove and installed with the scalable I/O device DSQC1042 Safety digital base (option 3037-2). For details about the scalable I/O device, see the product specification of the controller and *Application manual - Scalable I/O*.

The supported PROFINET- and SafetyIO-base laser scanners are *SICK®* microScan 3 Core and *SICK®* microScan 3 Pro, respectively. Detailed scanner model can be obtained on the scanner nameplate. Other scanner types or models might not provide full functionality.

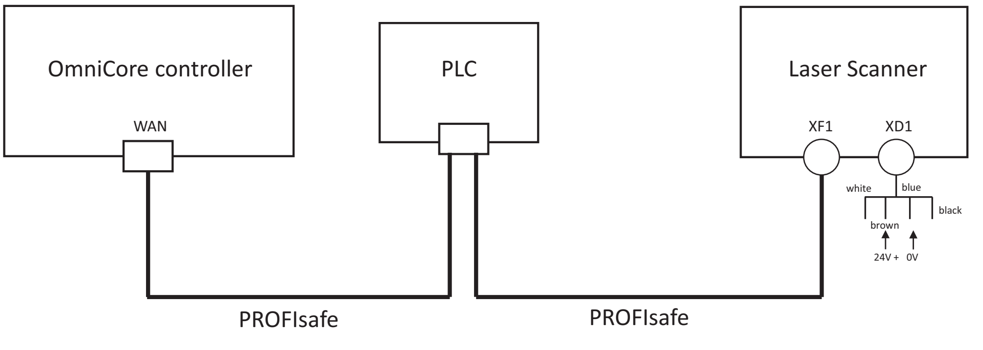
For more details about the safety laser scanners, see *Operating instructions microScan3 - PROFINET* and *Operating instructions microScan3 - Pro I/O* from the vendor, which are available on *SICK®* website.

Connecting the laser scanner(s)

Safety laser scanners shall be connected properly according to the scanner type and system setup.

> **Note**
>
> External 24V power supply shall be prepared for power connection of laser scanners.

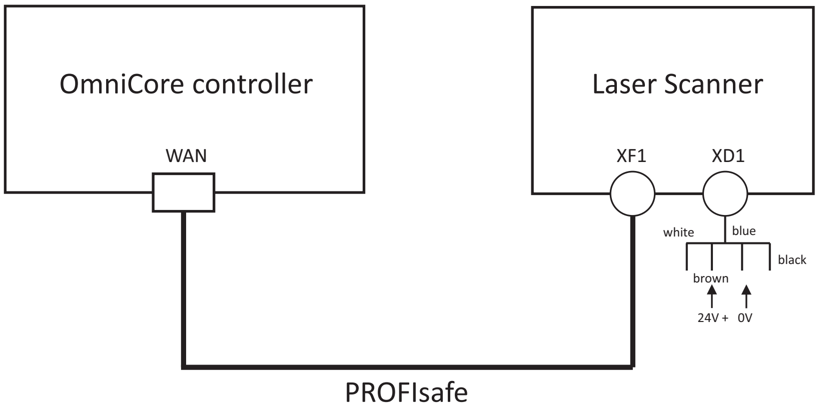
1 PROFIsafe-based laser scanner (option 3051-1), with PLC connected



xx2100000160

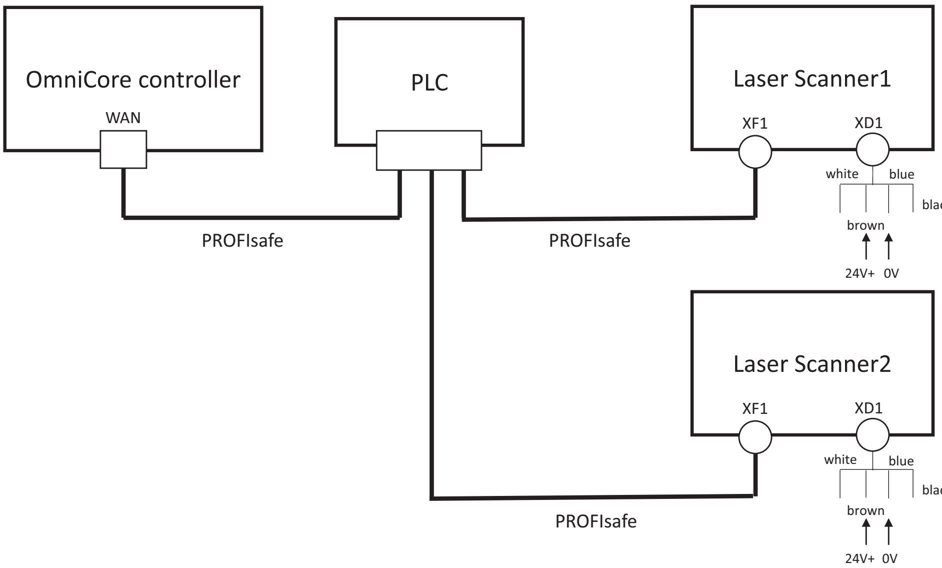
Continues on next page

1 PROFIsafe-based laser scanner (option 3051-1), without PLC connected



xx2300000226

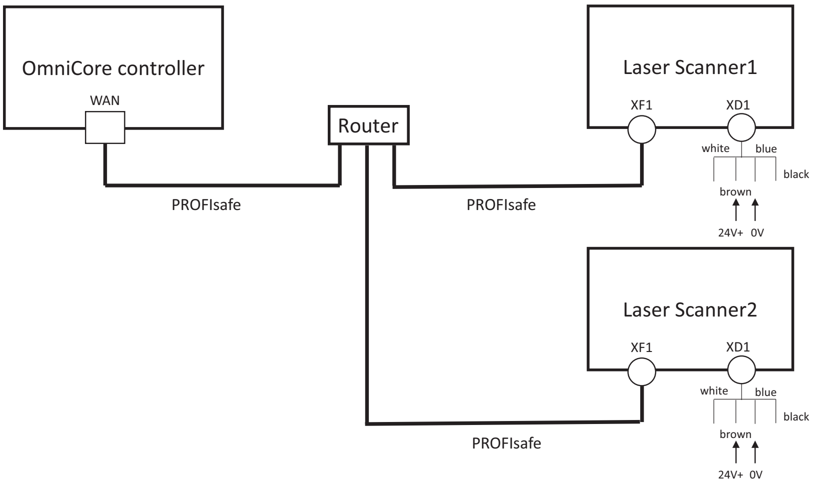
2 PROFIsafe-based laser scanners (option 3051-3), with PLC connected



xx2200000298

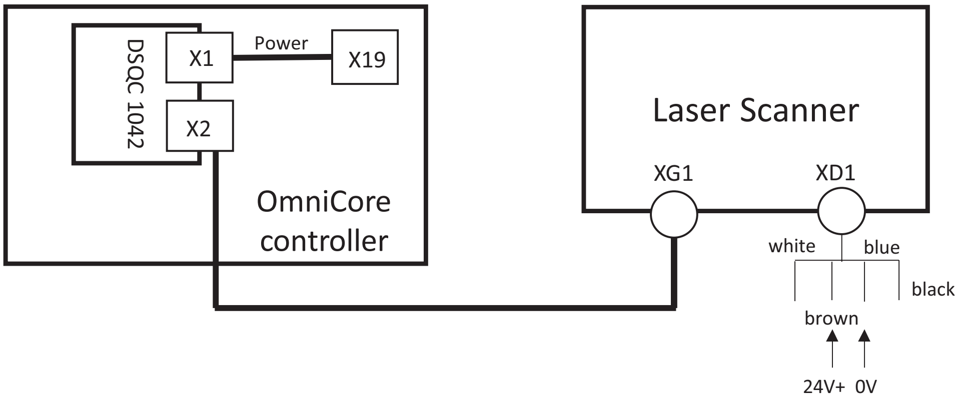
Continues on next page

2 PROFIsafe-based laser scanners (option 3051-3), without PLC connected



xx2300000227

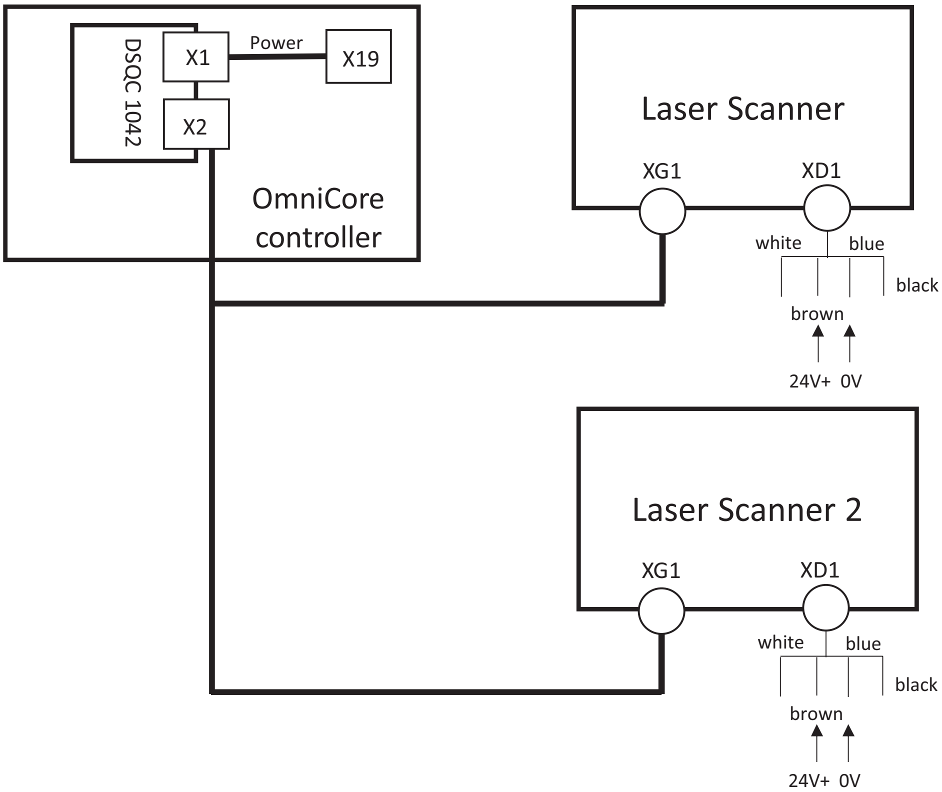
1 SafetyIO-based laser scanner (option 3051-2)



xx2200000299

Continues on next page

2 SafetyIO-based laser scanners (option 3051-4)



xx2200000300

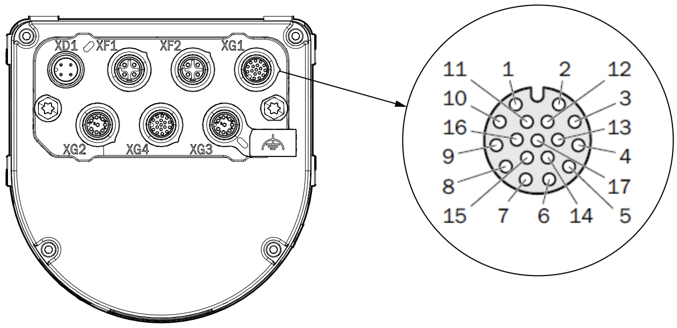
> **Note**
>
> If there are additional scalable I/O devices available, install and configure the additional devices by following the detailed procedures in *Application manual - Scalable I/O*.

Continues on next page

Connector information

Pin assignment on XG1 of SafetyIO-based laser scanners

XG1 connector on SafetyIO-based laser scanner is a 17-pin, A-coded M12 female connector. Pins 1-4 and pin 17 on XG1 are occupied for connecting the laser scanner and scalable I/O device, while other 12 pins can be used for local inputs and outputs.



xx2300000750

Pin	Description	Wiring color
1	OSSD pair 1, OSSD A	Brown
2	OSSD pair 1, OSSD B	Blue
3	OSSD pair 2, OSSD A	White
4	OSSD pair 2, OSSD B	Green
5	Universal input 1	Pink
6	Universal input 2	Yellow
7	Universal input 3	Black
8	Universal input 4	Grey
9	Universal input 5	Red
10	Universal input 6	Violet
11	Universal input 7	Grey with pink
12	Universal input 8	Red with blue
13	Universal input 9	White with green
14	Universal input 10	Brown with green
15	Universal output 1	White with yellow
16	Universal output 2	Yellow with brown
17	Voltage 0 V DC	White with grey

Continues on next page

Configuration scenarios

Laser scanner configuration depends on the type and number of scanners connecting to the robot and RobotWare version. Refer to the following table for applicable scenario.

Scanner type	Works with...			Number of connected scanners	RobotWare version	Require...
	PLC	Scalable I/O deviceDSQC1042	OmniCore controller with SafeMove			Collaborative Speed Control add-in
PROFIsafe-based	Y	N	Y	1	RobotWare 7.5 or earlier	N
	Y	N	Y	1	RobotWare 7.6 or later	Y
	Y	N	Y	2	RobotWare 7.6 or later	Y
	N	N	Y	1	RobotWare 7.10 or later	Y
	N	N	Y	2	RobotWare 7.10 or later	Y
SafetyIO-based	N	Y	Y	1	RobotWare 7.6 or later	Y
	N	Y	Y	2	RobotWare 7.6 or later	Y

For details about how to configure the scanners and required actions for scenarios such as RobotWare update or rollback, see *Product manual - CRB 1100*.

1.3.5 Indicator lamp

Description

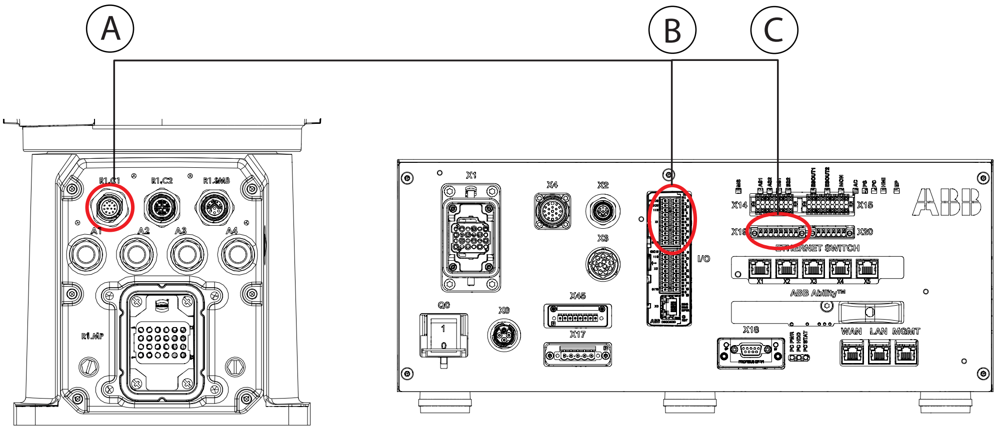
The lamp unit on process hub of CRB 1100 indicates robot status in four colors. Operators should always be aware of the indicator color and handle the situation correspondingly.

Cabling

The lamp unit cabling is integrated in the CP/CS cable. Do not use other types of CP/CS cables that are not provided by ABB; otherwise, the lamp unit will not work.

The cable end connecting the manipulator connects to the R1.C1 connector on the robot base; the other end of the cable is divided to two connectors, which connect to the I/O connector and X19 connector on the controller respectively.

The following figure illustrates the connectors on the robot and controller. For more details about cabling, see *Circuit diagram - CRB 1100*.



xx2100000291

A	R1.C1 connector on robot base	
B	I/O connector on controller	Pins GND, DO1, DO2 and DO3 are occupied for lamp unit
C	X19 connector on controller	Pins 1 and 2 are occupied for lamp unit

Functionality

Color	Manual mode	Automatic mode	Manual full speed mode
White	Standby (in motor on/off state and program is stopped, available for users to perform next actions)		
Green	Program is executing		
Yellow	Lead-through function is enabled	Yellow warning area is triggered (manipulator speed will be limited according to the actual configured value)	
Red	Emergency stop or error is raised	Emergency stop, error is raised or red protecting area is triggered (the manipulator will reduce to 0% speed and stands still)	

1.4 Calibration and references

1.4.1 Calibration methods

Overview

This section specifies the different types of calibration and the calibration methods that are supplied by ABB.

The original calibration data delivered with the robot is generated when the robot is floor mounted. If the robot is not floor mounted, then the robot accuracy could be affected. The robot needs to be calibrated after it is mounted.

More information is available in the product manual.

Types of calibration

Type of calibration	Description	Calibration method
Standard calibration	The calibrated robot is positioned at calibration position. Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot.	Axis Calibration
Absolute accuracy calibration (optional)	Based on standard calibration, and besides positioning the robot at synchronization position, the Absolute accuracy calibration also compensates for: • Mechanical tolerances in the robot structure • Deflection due to load Absolute accuracy calibration focuses on positioning accuracy in the Cartesian coordinate system for the robot. Absolute accuracy calibration data is found on the serial measurement board (SMB) or other robot memory. A robot calibrated with Absolute accuracy has the option information printed on its name plate (OmniCore). To regain 100% Absolute accuracy performance, the robot must be recalibrated for absolute accuracy after repair or maintenance that affects the mechanical structure.	CalibWare
Optimization	Optimization of TCP reorientation performance. The purpose is to improve reorientation accuracy for continuous processes like welding and gluing. Wrist optimization will update standard calibration data for axes 4, 5 and 6.	Wrist Optimization

Brief description of calibration methods

Axis Calibration method

Axis Calibration is a standard calibration method for calibration of CRB 1100. It is the recommended method in order to achieve proper performance.

The following routines are available for the Axis Calibration method:

- Fine calibration

Continues on next page

- Update revolution counters
- Reference calibration

The calibration equipment for Axis Calibration is delivered as a toolkit.

The actual instructions of how to perform the calibration procedure and what to do at each step is given on the FlexPendant. You will be guided through the calibration procedure, step by step.

Wrist Optimization method

Wrist Optimization is a method for improving reorientation accuracy for continuous processes like welding and gluing and is a complement to the standard calibration method.

The actual instructions of how to perform the wrist optimization procedure is given on the FlexPendant.

CalibWare - Absolute Accuracy calibration

The CalibWare tool guides through the calibration process and calculates new compensation parameters. This is further detailed in the *Application manual - CalibWare Field*.

If a service operation is done to a robot with the option Absolute Accuracy, a new absolute accuracy calibration is required in order to establish full performance. For most cases after replacements that do not include taking apart the robot structure, standard calibration is sufficient.

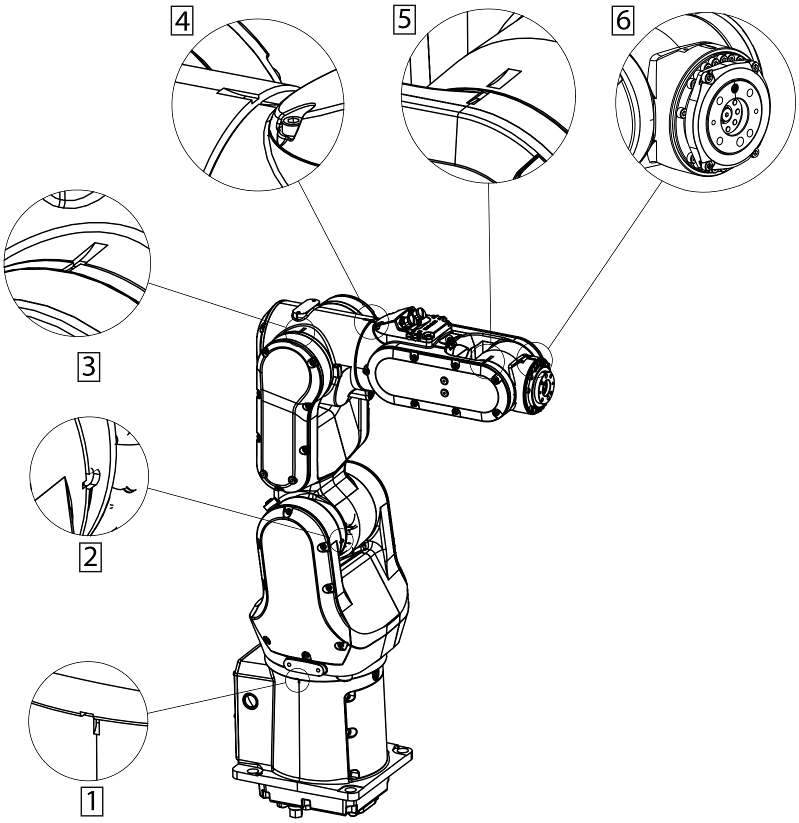
The Absolute Accuracy option varies according to the robot mounting position. This is printed on the robot name plate for each robot. The robot must be in the correct mounting position when it is recalibrated for absolute accuracy.

1.4.2 Synchronization marks and synchronization position for axes

Introduction

This section shows the position of the synchronization marks and the synchronization position for each axis.

Synchronization marks, CRB 1100



xx1800002455

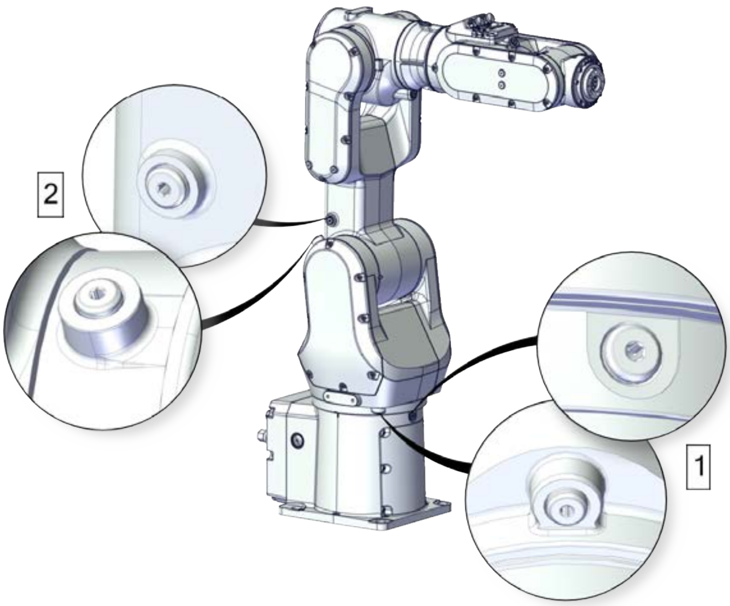
CAUTION

To calibrate the axis 6, the notch on the wrist must be aligned with the marked pin hole on the tool flange. Before installing a tool on the tool flange, make sure a visible mark has been made to the tool at the corresponding position.

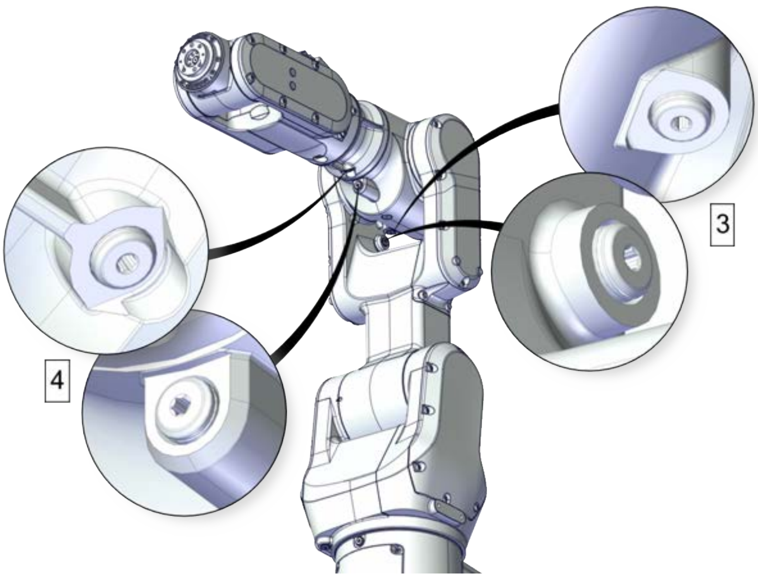
1.4.3 Fine calibration

General

The fine calibration is done with the Axis calibration method.

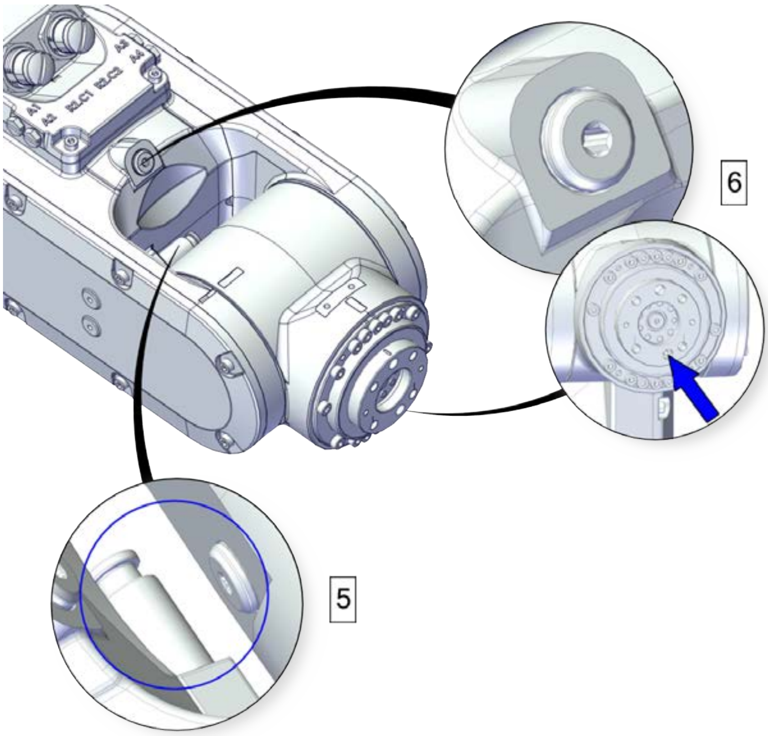


xx1800003320



xx1800003514

Continues on next page



xx1800003515

Axes

Pos	Description	Pos	Description
1	Axis 1	2	Axis 2
3	Axis 3	4	Axis 4
5	Axis 5	6	Axis 6

1.4.4 Absolute Accuracy calibration

Purpose

Absolute Accuracy is a calibration concept that improves TCP accuracy. The difference between an ideal robot and a real robot can be several millimeters, resulting from mechanical tolerances and deflection in the robot structure. *Absolute Accuracy* compensates for these differences.

Here are some examples of when this accuracy is important:

- Exchangeability of robots
- Offline programming with no or minimum touch-up
- Online programming with accurate movement and reorientation of tool
- Programming with accurate offset movement in relation to eg. vision system or offset programming
- Re-use of programs between applications

The option *Absolute Accuracy* is integrated in the controller algorithms and does not need external equipment or calculation.

> **Note**
>
> The performance data is applicable to the corresponding RobotWare version of the individual robot.

What is included

Every *Absolute Accuracy* robot is delivered with:

- compensation parameters saved in the robot memory
- a birth certificate representing the *Absolute Accuracy* measurement protocol for the calibration and verification sequence.

A robot with *Absolute Accuracy* calibration has a label with this information on the manipulator.

Absolute Accuracy supports floor mounted, wall mounted, and ceiling mounted installations. The compensation parameters that are saved in the robot memory differ depending on which Absolute Accuracy option is selected.

When is *Absolute Accuracy* being used

Absolute Accuracy works on a robot target in Cartesian coordinates, not on the individual joints. Therefore, joint based movements (e.g. `MoveAbsJ`) will not be affected.

If the robot is inverted, the Absolute Accuracy calibration must be performed when the robot is inverted.

Absolute Accuracy active

Absolute Accuracy will be active in the following cases:

- Any motion function based on robtargets (e.g. `MoveL`) and ModPos on robtargets
- Reorientation jogging

Continues on next page

- Linear jogging
- Tool definition (4, 5, 6 point tool definition, room fixed TCP, stationary tool)
- Work object definition

Absolute Accuracy not active

The following are examples of when Absolute Accuracy is not active:

- Any motion function based on a jointtarget (`MoveAbsJ`)
- Independent joint
- Joint based jogging

RAPID instructions

There are no RAPID instructions included in this option.

Production data

Typical production data regarding calibration are:

Robot	Positioning accuracy (mm)		
	Average	Max	% Within 1 mm
CRB 1100-4/0.475	0.08	0.25	100
CRB 1100-4/0.58	0.10	0.25	100

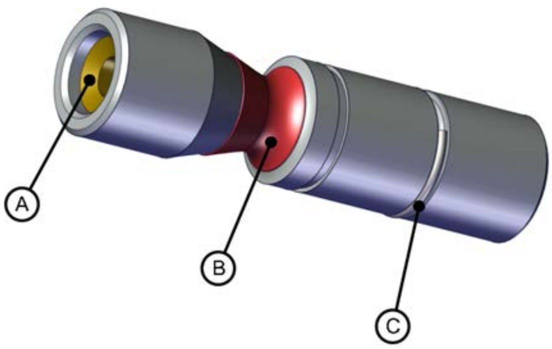
Calibration tool

Check prior to usage

Before using the calibration tool, make sure that the tube insert, the plastic protection and the steel spring ring are present.

WARNING

If any part is missing or damaged, the tool must be replaced immediately.



xx1500001914

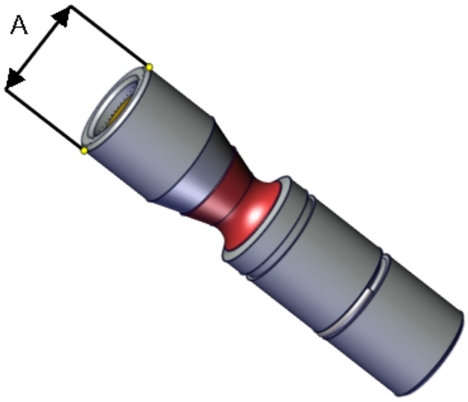
A	Tube insert
B	Plastic protection
C	Steel spring ring

Continues on next page

Periodic check of the calibration tool

If including the calibration tool in a local periodic check system, the following measures should be checked.

- Outer diameter within Ø12g4 mm, Ø8g4 mm or Ø6g5 mm (depending on calibration tool size).
- Straightness within 0.005 mm.



xx1500000951

A	Outer diameter

Periodic check of the calibration tool for the tool flange (3HAC058238-001)

If including the tool flange calibration tool in a local periodic check system, the following measures should be checked.

- Outer diameter within Ø5g5 mm.
- Straightness within 0.005 mm.

.

xx1600001142

A	Outer diameter

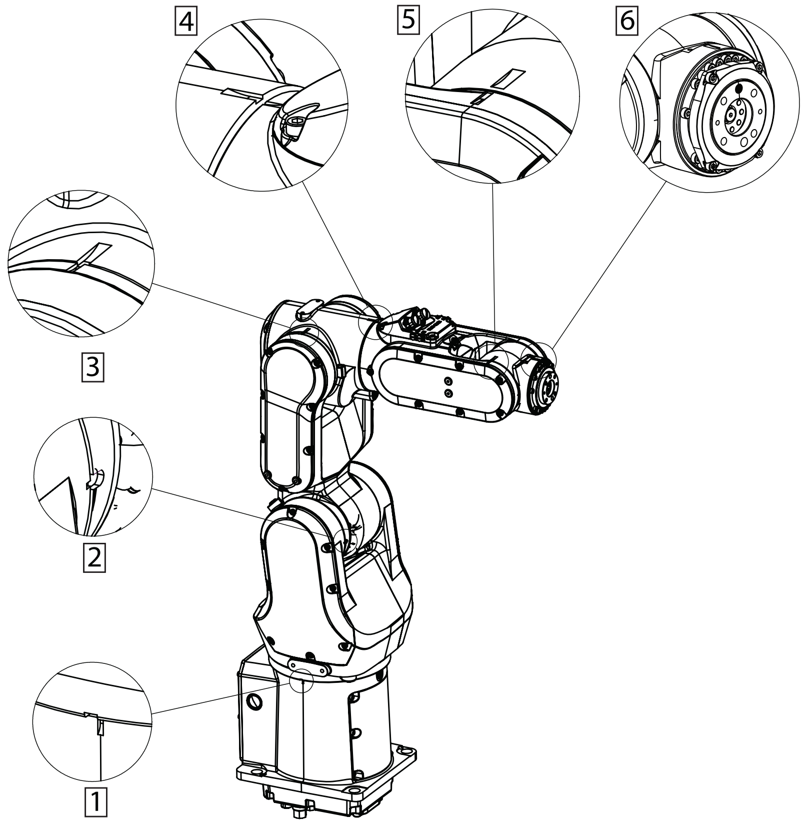
1.4.5 Synchronization marks and axis movement directions

1.4.5.1 Synchronization marks and synchronization position for axes

Introduction

This section shows the position of the synchronization marks and the synchronization position for each axis.

Synchronization marks, CRB 1100



xx1800002455

CAUTION

To calibrate the axis 6, the notch on the wrist must be aligned with the marked pin hole on the tool flange. Before installing a tool on the tool flange, make sure a visible mark has been made to the tool at the corresponding position.

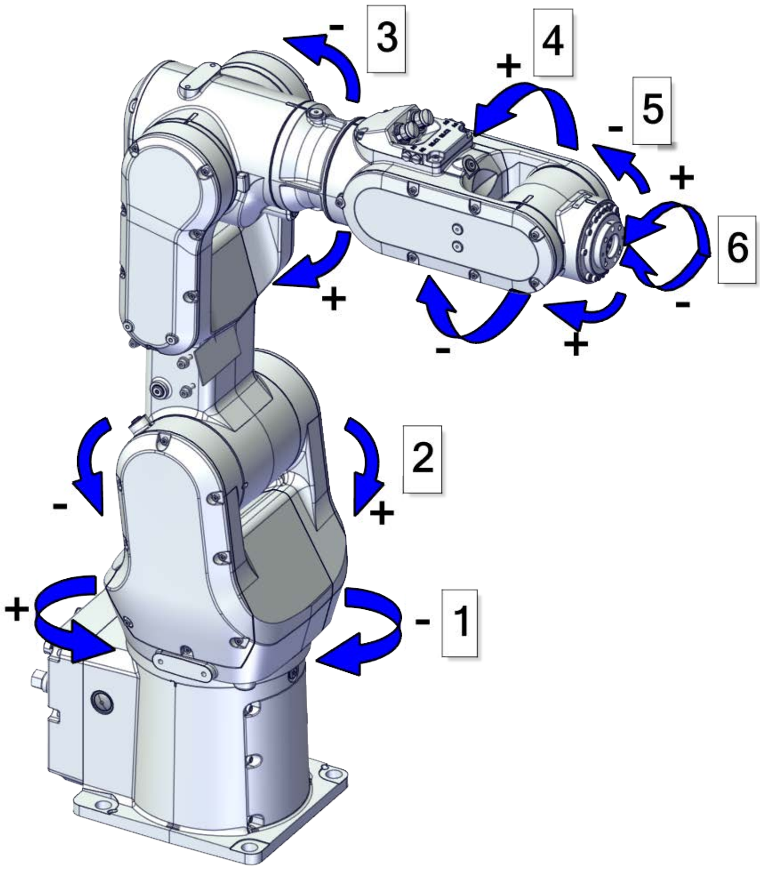
1.4.5.2 Calibration movement directions for all axes

Overview

When calibrating, the axis must consistently be run towards the calibration position in the same direction in order to avoid position errors caused by backlash in gears and so on. Positive directions are shown in the graphic below.

Calibration service routines will handle the calibration movements automatically and these might be different from the positive directions shown below.

Manual movement directions



xx1800002456

1.5 Load diagrams

1.5.1 Introduction

WARNING

It is very important to always define correct actual load data and correct payload of the robot. Incorrect definitions of load data can result in overloading of the robot.

If incorrect load data is used, and/or if loads outside the load diagram are used, the following parts can be damaged due to overload:

- motors
- gearboxes
- mechanical structure

WARNING

In RobotWare, the service routine LoadIdentify can be used to determine correct load parameters. The routine automatically defines the tool and the load.

See *Operating manual - OmniCore*, for detailed information.

WARNING

Robots running with incorrect load data and/or with loads outside the load diagram, will not be covered by robot warranty.

General

The load diagrams include a nominal payload inertia, J_o of 0.012 kgm^2, and an extra load of 0.5 kg at the upper arm housing.

At different moment of inertia the load diagram will be changed. For robots that are allowed tilted, wall or inverted mounted, the load diagrams as given are valid and thus it is also possible to use RobotLoad within those tilt and axis limits.

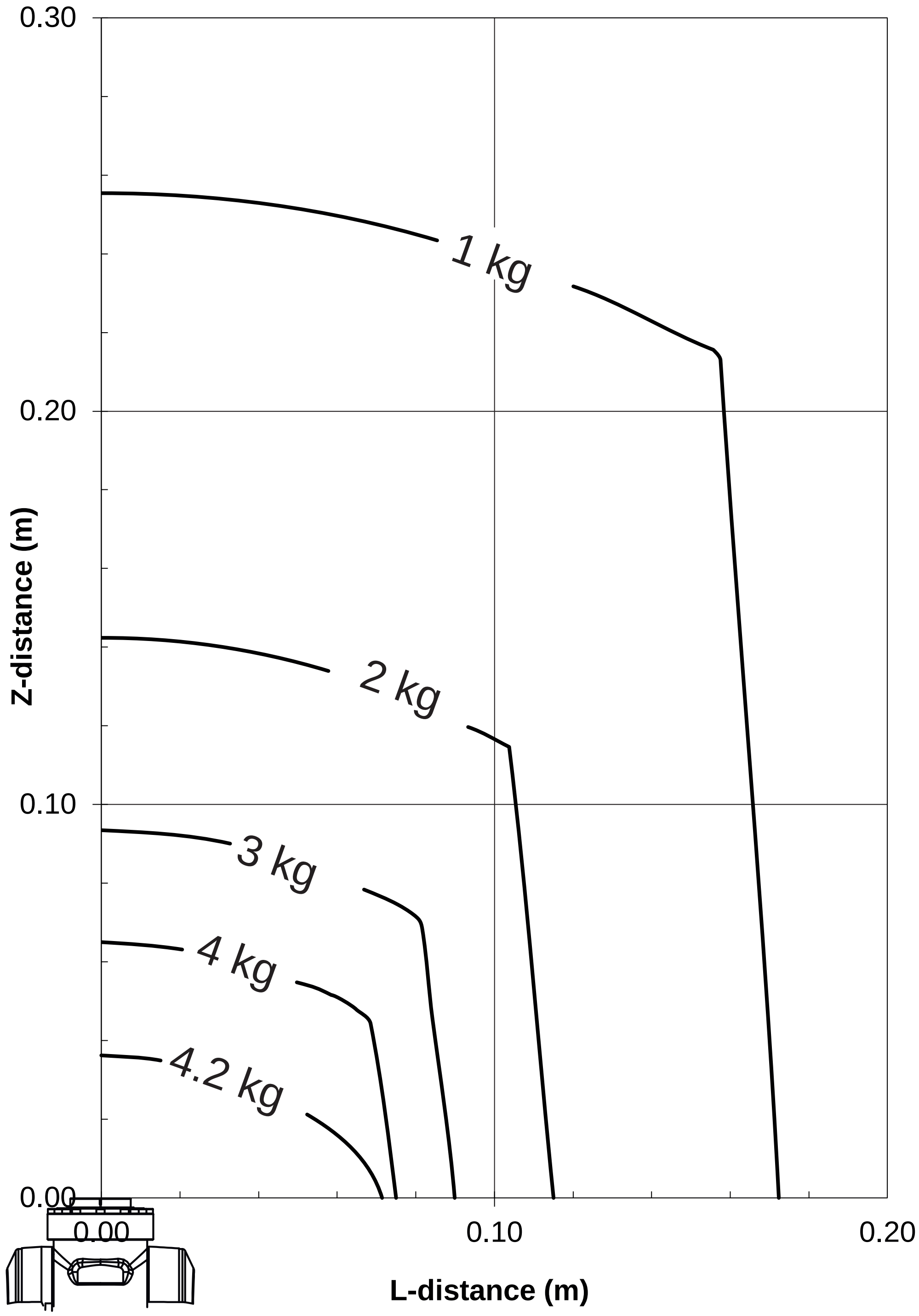
Control of load case with RobotLoad

To verify a specific load case, use the RobotStudio add-in RobotLoad.

The result from RobotLoad is only valid within the maximum loads and tilt angles. There is no warning if the maximum permitted arm load is exceeded. For over-load cases and special applications, contact ABB for further analysis.

1.5.2 Diagrams

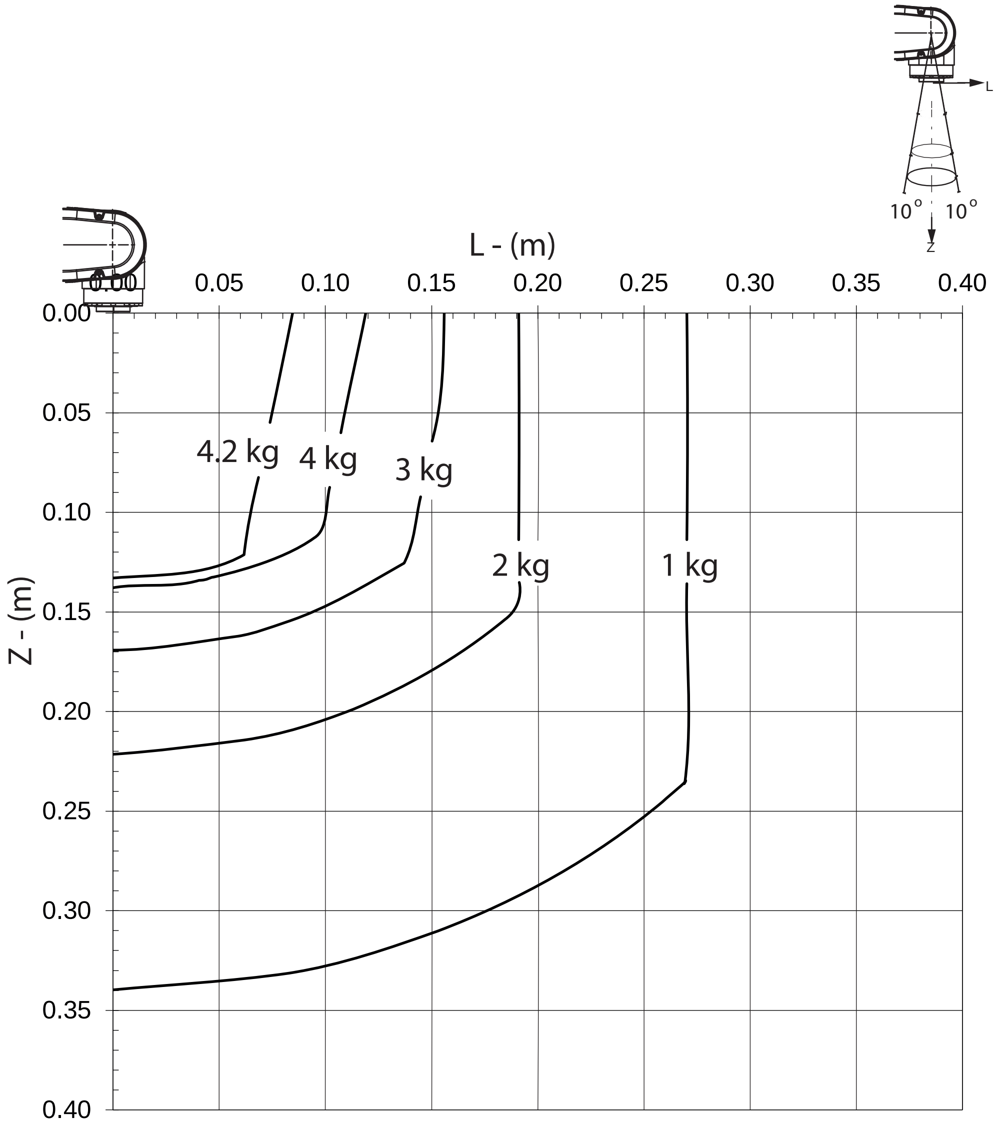
Diagrams of CRB 1100-4/0.475



xx1800002633

Continues on next page

Diagrams of CRB 1100-4/0.475 "Vertical Wrist" (±10°)



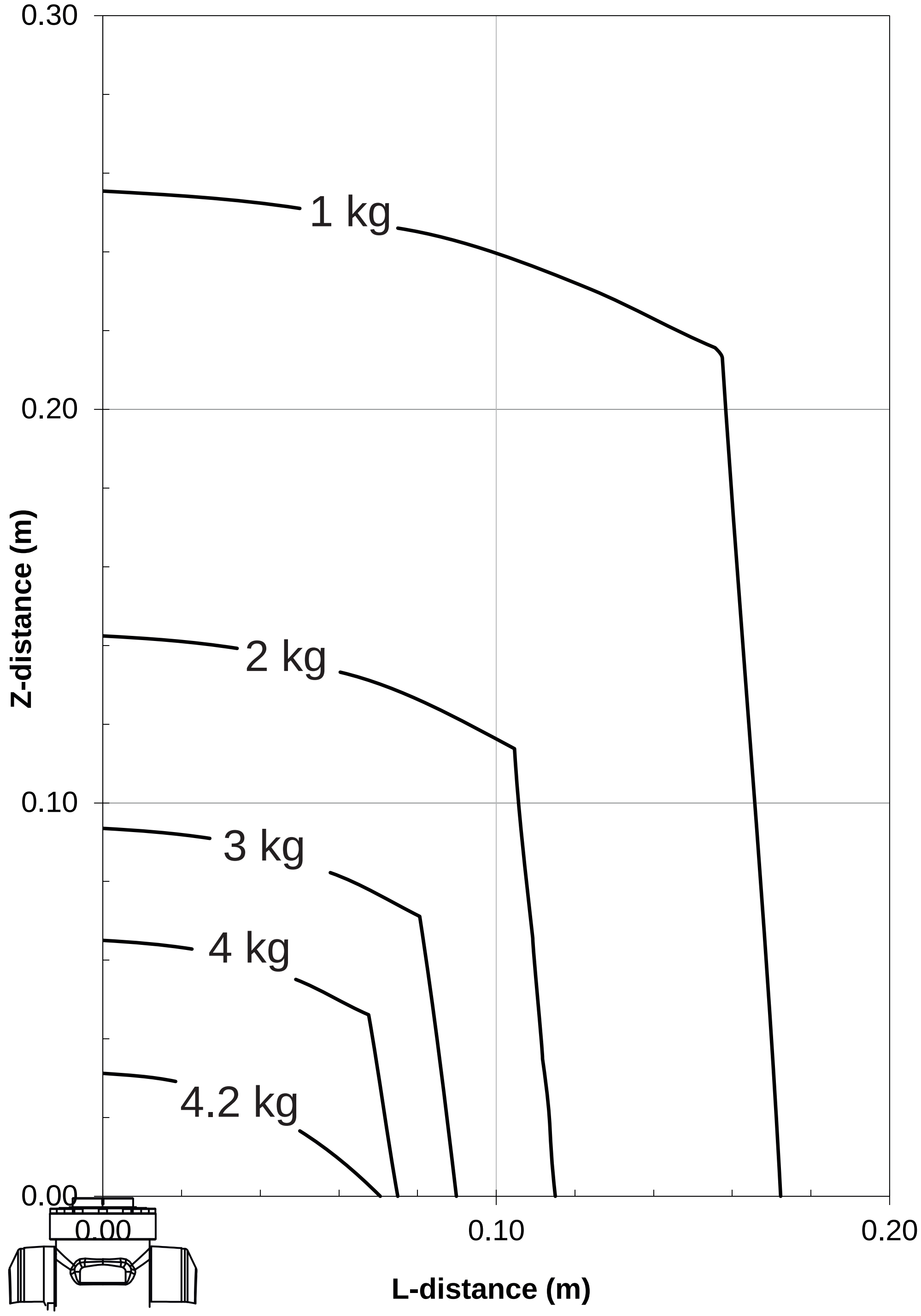
xx1800002634

For wrist down (0° deviation from the vertical line).

	Description
Max load	4.2 kg
Z_{max}	0.13 m
L_{max}	0.09 m

Continues on next page

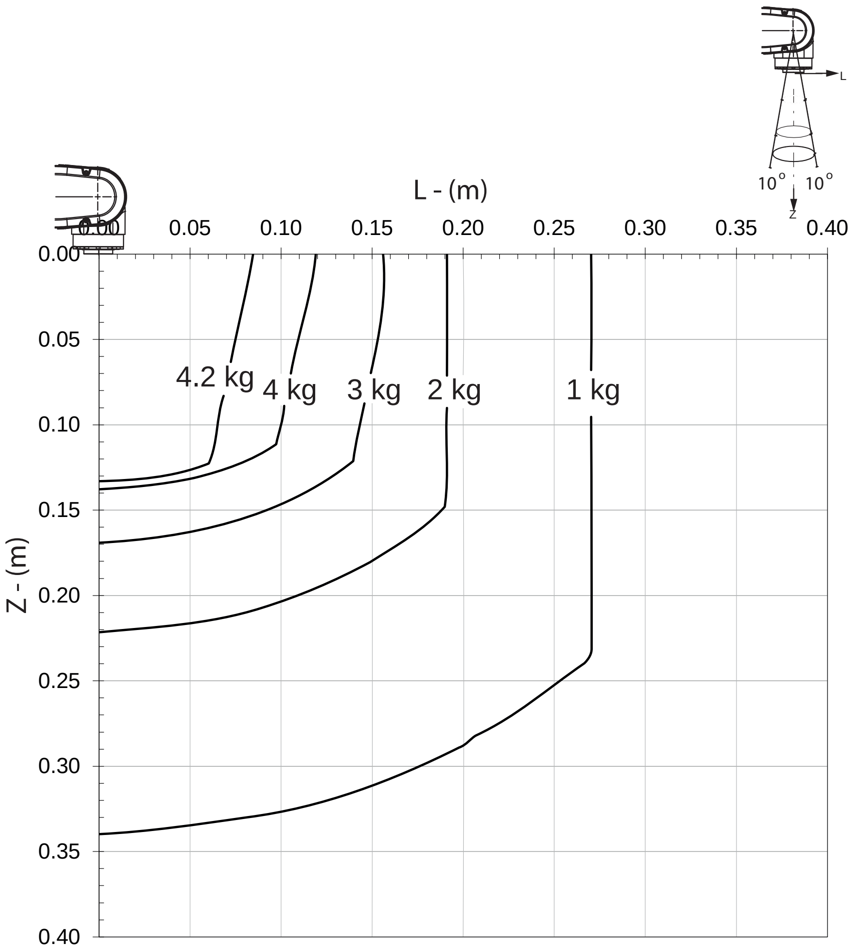
Diagrams of CRB 1100-4/0.58



xx1800002635

Continues on next page

Diagrams of CRB 1100-4/0.58 "Vertical Wrist" (±10°)



xx1800002636

For wrist down (0° deviation from the vertical line).

	Description
Max load	4.2 kg
Z_{max}	0.133 m
L_{max}	0.85 m

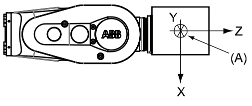
1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement

Note

Total load given as: mass in kg, center of gravity (Z and L) in meters and moment of inertia (J_{ox}, J_{oy}, J_{oz}) in kgm^2. L= sqr (X^2 + Y^2), see the following figure.

Full movement of axis 5 (-125°/+120°)

Axis	Robot type	Maximum moment of inertia
5	CRB 1100-4/0.475 CRB 1100-4/0.58	Ja_5 = Load x ((Z + 0.064)^2 + L^2) + max (J_{ox}, J_{oy}) ≤ 0.175 kgm^2
6	CRB 1100-4/0.475 CRB 1100-4/0.58	Ja_6 = Load x L^2 + Joz ≤ 0.085 kgm^2



xx1400002028

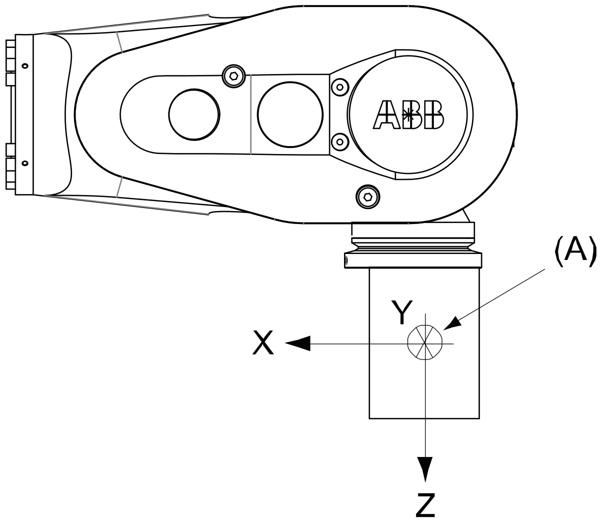
Pos	Description
A	Center of gravity

	Description
J_{ox}, J_{oy}, J_{oz}	Max. moment of inertia around the X, Y and Z axes at center of gravity.

Continues on next page

Limited axis 5, center line down

Axis	Robot type	Maximum moment of inertia
5	CRB 1100-4/0.475 CRB 1100-4/0.58	Ja_5 = Load x $((Z + 0.064)^2 + L^2)$ + max $(J_{ox}, J_{oy}) \leq 0.175$ kgm^2
6	CRB 1100-4/0.475 CRB 1100-4/0.58	Ja_6 = Load x $L^2 + J_{oz} \leq 0.085$ kgm^2



xx1400002029

Pos	Description
A	Center of gravity

	Description
J_{ox}, J_{oy}, J_{oz}	Max. moment of inertia around the X, Y and Z axes at center of gravity.

1.5.4 Wrist torque

Note

The wrist torque values are for reference only, and should not be used for calculating permitted load offset (position of center of gravity) within the load diagram, since those also are limited by main axes torques as well as dynamic loads. Furthermore, arm loads will influence the permitted load diagram. To find the absolute limits of the load diagram, use the RobotStudio add-in RobotLoad.

Torque

The table below shows the maximum permissible torque due to payload.

Robot type	Max wrist torque axis 4 and 5	Max wrist torque axis 6	Max torque valid at load
CRB 1100-4/0.475	5.0 Nm	2.9 Nm	4 kg
CRB 1100-4/0.58	5.0 Nm	2.9 Nm	4 kg

1.5.5 Maximum TCP acceleration

General

Higher values can be reached with lower loads than the nominal because of our dynamical motion control QuickMove2. For specific values in the unique customer cycle, or for robots not listed in the table below, we recommend to use RobotStudio.

Maximum Cartesian design acceleration for nominal loads

Robot type	E-stop Max acceleration at nominal load COG [m/s^2]	Controlled Motion Max acceleration at nominal load COG [m/s^2]
CRB 1100-4/0.475	144	82
CRB 1100-4/0.58	137	71

Note

Acceleration levels for emergency stop and controlled motion includes acceleration due to gravitational forces. Nominal load is defined with nominal mass and cog with max offset in Z and L (see the load diagram).

1.6 Fitting equipment to the robot

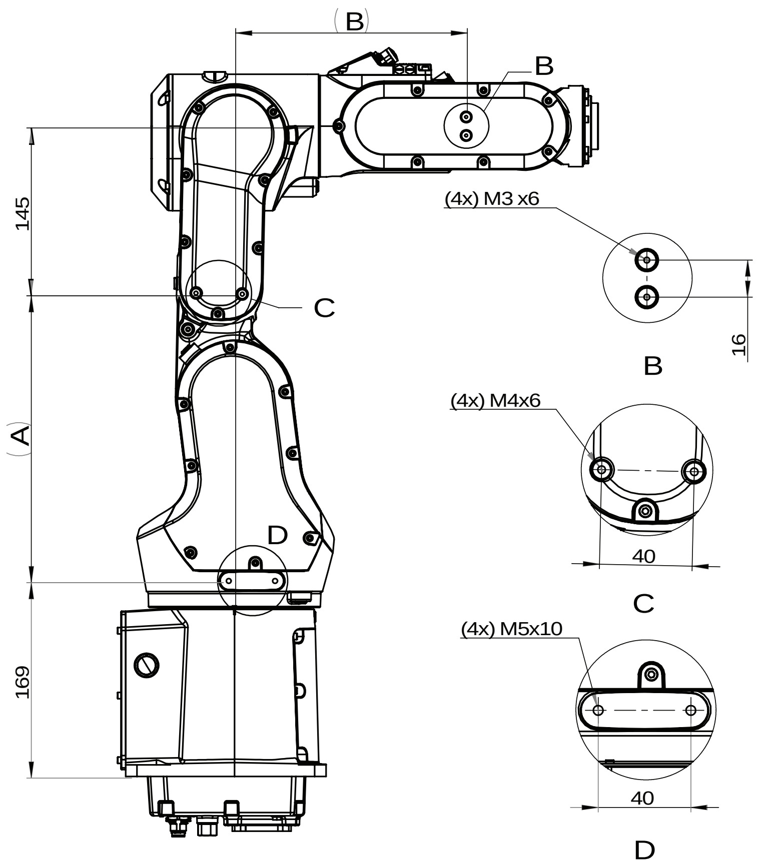
Attachment holes and dimensions

Extra loads can be mounted on robot. Definitions of dimensions and masses are shown in the following figures. The robot is supplied with holes for fitting extra equipment.

Maximum allowed arm load depends on center of gravity of arm load and robot payload.

Variant	Max Armload (kg)
CRB 1100-4/0.475	0.5
CRB 1100-4/0.58	0.5

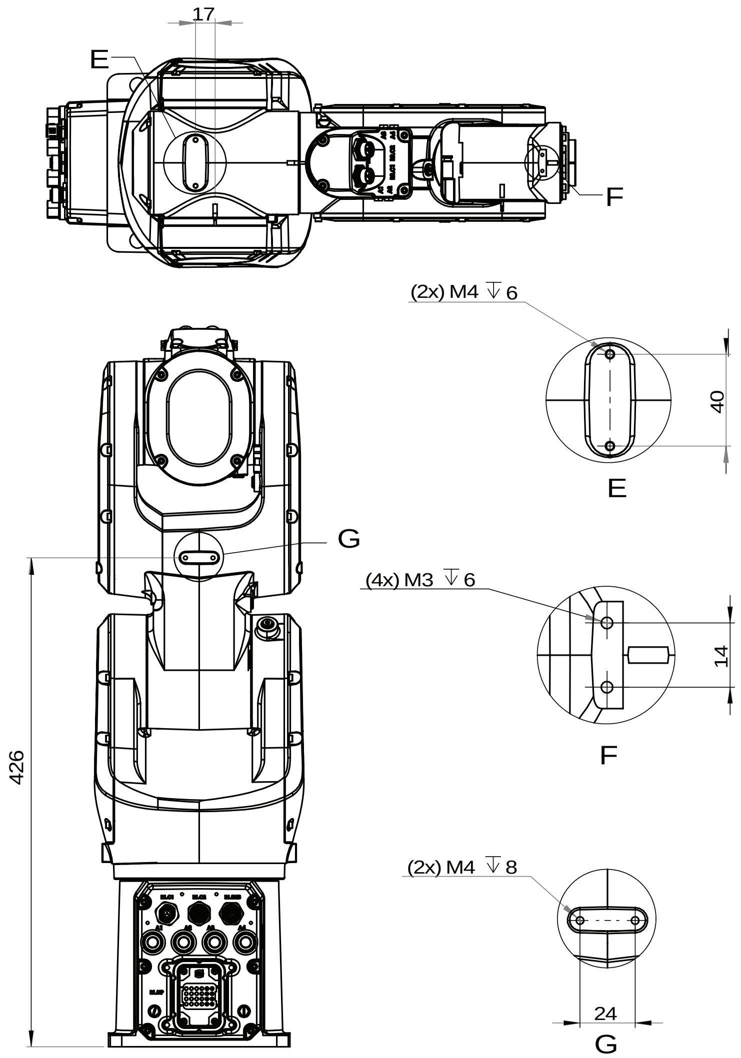
Holes for fitting extra equipment



xx1800002449

Pos	CRB 1100-4/0.475	CRB 1100-4/0.58
A	248	303
B	200	250

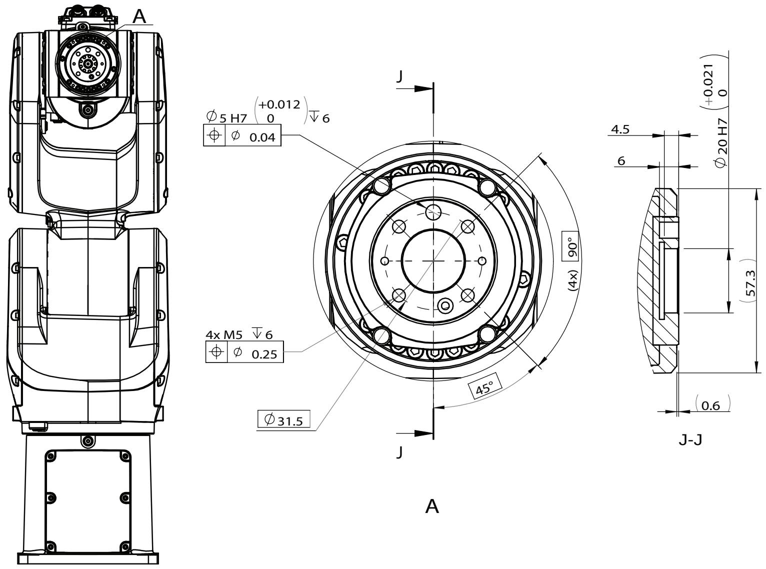
Continues on next page



xx1800002450

Continues on next page

Tool flange standard



xx1800002451

> **CAUTION**
>
> To calibrate the axis 6, the notch on the wrist must be aligned with the marked pin hole on the tool flange. Before installing a tool on the tool flange, make sure a visible mark has been made to the tool at the corresponding position.
>
> For details about the synchronization mark, see *Product manual - CRB 1100*.

Fastener quality

When fitting tools on the tool flange, only use screws with quality 12.9. For other equipment use suitable screws and tightening torque for your application.

1.7 Maintenance and troubleshooting

General

The robot requires only minimum maintenance during operation. It has been designed to make it as easy to service as possible:

- Maintenance-free AC motors are used.
- Grease is used for the gearboxes.
- The cabling is routed for longevity, and in the unlikely event of a failure, its modular design makes it easy to change.

Maintenance

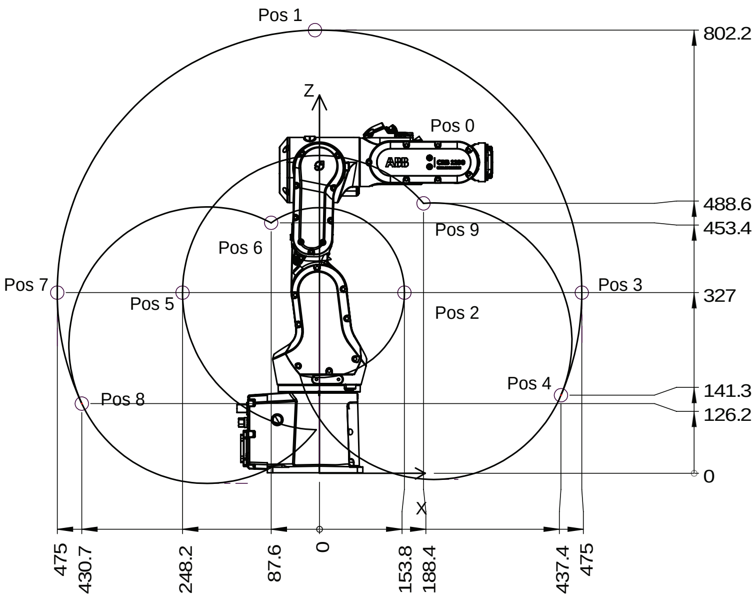
The maintenance intervals depend on the use of the robot. The required maintenance activities also depend on the selected options. For detailed information on maintenance procedures, see the maintenance section in *Product manual - CRB 1100*.

1.8 Robot motion

1.8.1 Working range

Illustration, working range CRB 1100-4/0.475

This illustration shows the unrestricted working range of the robot.



xx2000002543

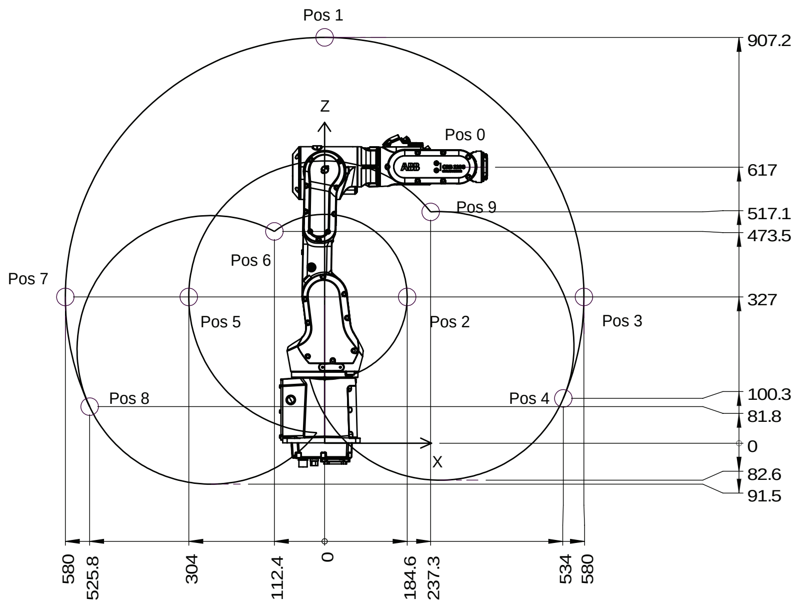
Positions at wrist center and angle of axes 2 and 3

Position in the figure	Positions at wrist center (mm)		Angle (degrees)	
	X	Z	axis 2	axis 3
pos0	314	562	0°	0°
pos1	0	802	0°	-87.7°
pos2	53.8	327	9.7°	55°
pos3	475	327	90°	-87.7°
pos4	437.4	141.3	113°	-87.7°
pos5	-248.2	327	-26.4°	-205°
pos6	-87.6	453.4	-115°	55°
pos7	-475	327	-90°	-87.7°
pos8	-430.7	126.2	-115°	-87.7°
pos9	188.4	488.6	113°	-205°

Continues on next page

Illustration, working range CRB 1100-4/0.58

This illustration shows the unrestricted working range of the robot.



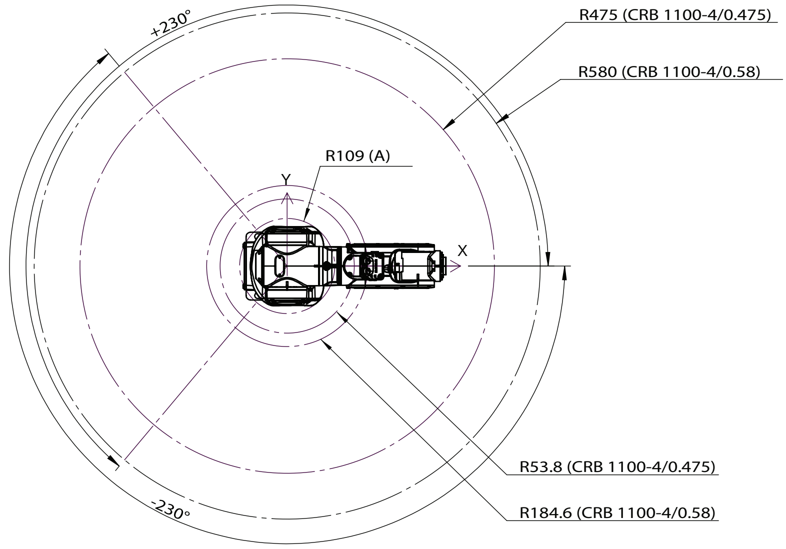
xx2000002544

Positions at wrist center and angle of axes 2 and 3

Position in the figure	Positions at wrist center (mm)		Angle (degrees)	
	X	**Z**	**axis 2**	**axis 3**
pos0	364	617	0°	0°
pos1	0	907.2	0°	-88°
pos2	184.6	327	12.5°	55°
pos3	580	327	90°	-88°
pos4	534	100.3	113°	-88°
pos5	-304	327	-28.3°	-205°
pos6	-112.4	473.5	-115°	55°
pos7	-580	327	-90°	-88°
pos8	-525.8	81.8	-115°	-88°
pos9	237.3	517.1	113°	-205°

Continues on next page

Top view of working range



xx2100002541

Working range

Axis	Working range	Note
Axis 1	±230°	Wall mounted robot has a work area for axis 1 that depends on payload and the positions of other axes. Simulation in RobotStudio is recommended.
Axis 2	-115°/+113°	
Axis 3	-205°/+55°	
Axis 4	±230°	
Axis 5	-125°/+120°	
Axis 6	±400°	Default value.
	±242	Maximum revolution value. The default working range for axis 6 can be extended by changing parameter values in the software.

1.8.2 Axes with restricted working range

1.8.2.1 Adjusting the working range

Reasons for adjusting the manipulator working range

The working range of each manipulator axis is configured in the software. If there is a risk that the manipulator may collide with other objects at installation site, its working space should be limited. The manipulator must always be able to move freely within its entire working space.

Working range configurations

The parameter values for the axes working range can be altered within the allowed working range and according to available options for the robot, either to limit or to extend a default working range. Allowed working ranges and available options for each manipulator axis are specified in *Working range on page 58*.

Mechanical stops on the manipulator

Mechanical stops are and can be installed on the manipulator as limiting devices to ensure that the manipulator axis does not exceed the working range values set in the software parameters.

Note

The mechanical stops are only installed as safety precaution to physically stop the robot from exceeding the working range set. A collision with a mechanical stop always requires actions for repair and troubleshooting.

Axis	Fixed mechanical stop [i]	Movable mechanical stop [ii]
Axis 1	yes	no
Axis 2	yes	no
Axis 3	yes	no
Axis 4	no	no
Axis 5	yes	no
Axis 6	no	no

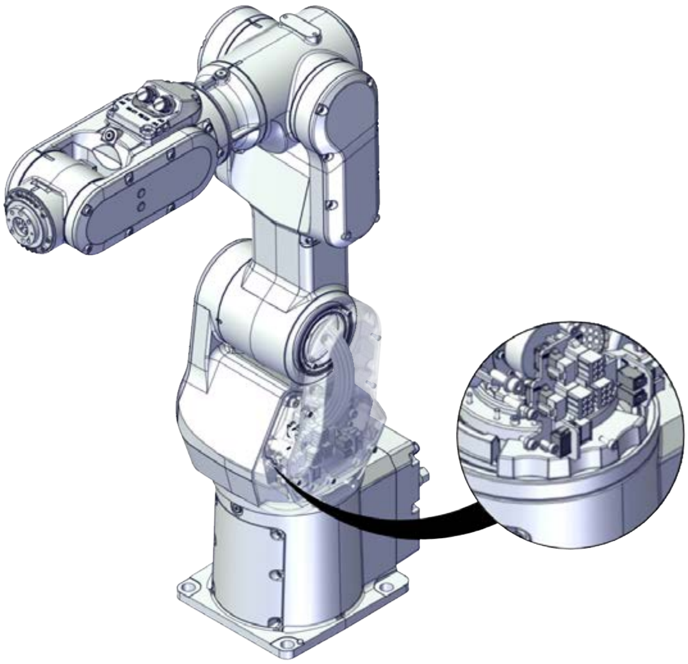
i Part of the casting or fixed on the casting and can not /should not be removed.

ii Can be installed in one or more than one position, to ensure a reduced working range, or be removed to allow extended working range.

1.8.2.2 Mechanically restricting the working range

Location of the mechanical stops

Only axis 1 has a replacable mechanical stop.



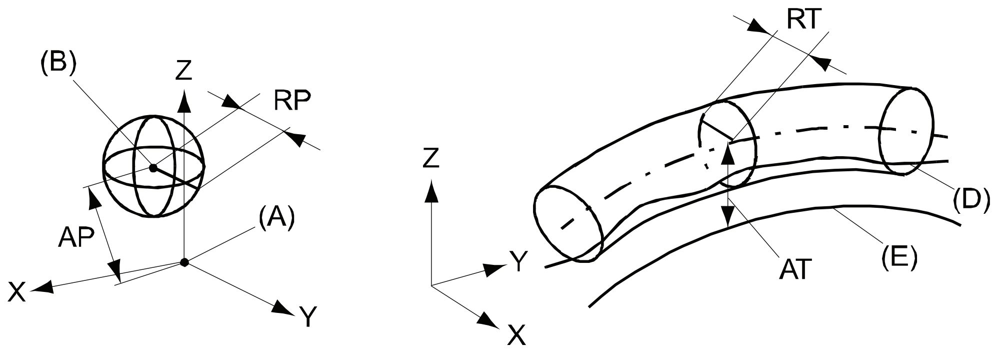
xx1800002452

1.8.3 Performance according to ISO 9283

General

At rated maximum load, maximum offset and 1.6 m/s velocity on the inclined ISO test plane, with all six axes in motion. Values in the table below are the average result of measurements on a small number of robots. The result may differ depending on where in the working range the robot is positioning, velocity, arm configuration, from which direction the position is approached, the load direction of the arm system. Backlashes in gearboxes also affect the result.

The figures for AP, RP, AT and RT are measured according to figure below.



xx0800000424

Pos	Description	Pos	Description
A	Programmed position	E	Programmed path
B	Mean position at program execution	D	Actual path at program execution
AP	Mean distance from programmed position	AT	Max deviation from E to average path
RP	Tolerance of position B at repeated positioning	RT	Tolerance of the path at repeated program execution

CRB 1100	4/0.475	4/0.58
Pose accuracy, AP[i] (mm)	0.01	0.01
Pose repeatability, RP (mm)	0.01	0.01
Pose stabilization time, PSt (s) within 0.1 mm of the position	0.08	0.19
Path accuracy, AT (mm)	1.03	1.18
Path repeatability, RT (mm)	0.05	0.05

i AP according to the ISO test above, is the difference between the teached position (position manually modified in the cell) and the average position obtained during program execution.

1.8.4 Velocity

Maximum axis speed

Robot type	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
CRB 1100-4/0.475	460 °/s	380 °/s	280 °/s	560 °/s	420 °/s	750 °/s
CRB 1100-4/0.58	460 °/s	360 °/s	280 °/s	560 °/s	420 °/s	750 °/s

There is a supervision function to prevent overheating in applications with intensive and frequent movements (high duty cycle).

1.9 Robot stopping distances and times

1.9.1 Robot stopping distances according to ISO 10218-1

About the data for robot stopping distances and times

All measurements and calculations of stopping distances and times are done according to ISO 10218-1, with single axis motion on axes 1, 2, and 3. If more than one axis is used for the movement, then the stopping distance and time can be longer. Normal delays of the hardware and software are taken into account. See more about the delays and their impact on the results, *Reading the data on page 65*.

The stopping distances and times are presented using the tool data and extension zones presented for the respected robot variant. These variables are 100%, 66%, and 33% of the maximum values for the robot.

The stop categories 0 and 1 are according to IEC 60204-1.

Note

The category 0 stop is not necessarily the worst case (depending on load, speed, application, wear, etc.).

Note

The stop category 1 is a controlled stop and will therefore have less deviation from the programmed path compared with a stop category 0.

Loads

The tool data that is used is presented for the respective robot variant.

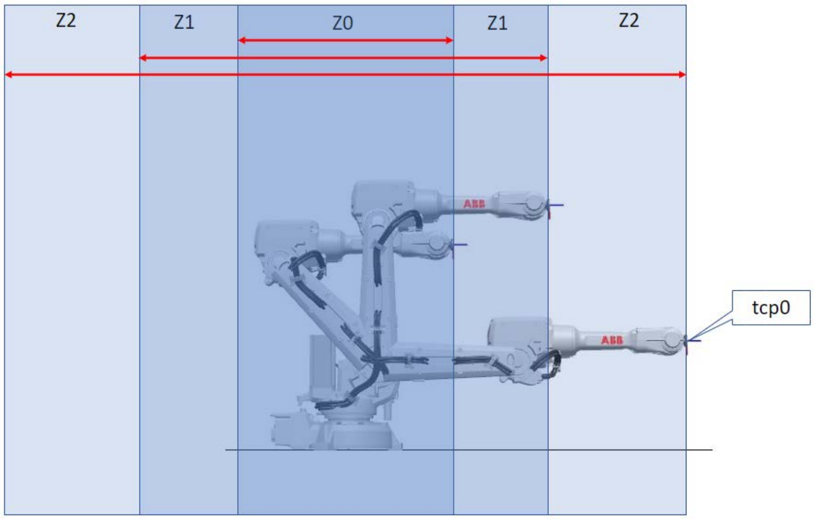
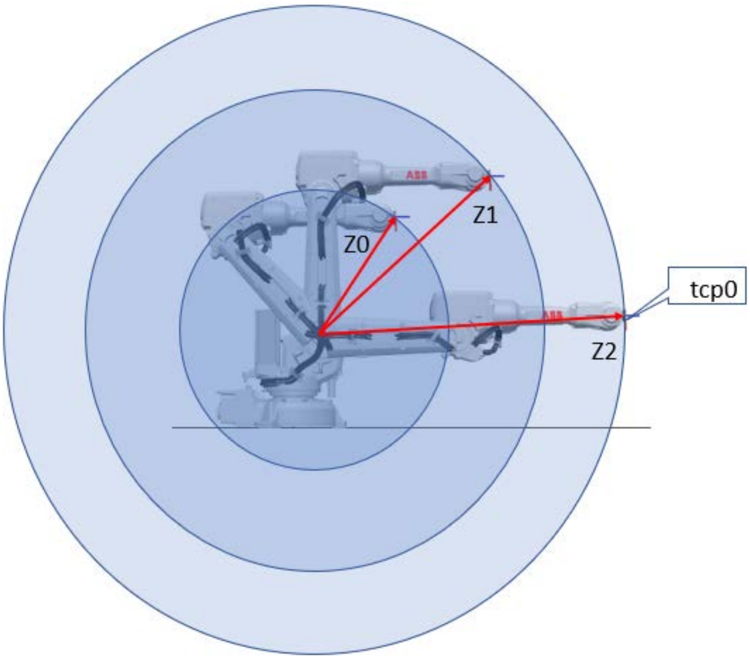
The used loads represent the rated load. No arm load is used. See the *Load diagrams on page 43*.

Continues on next page

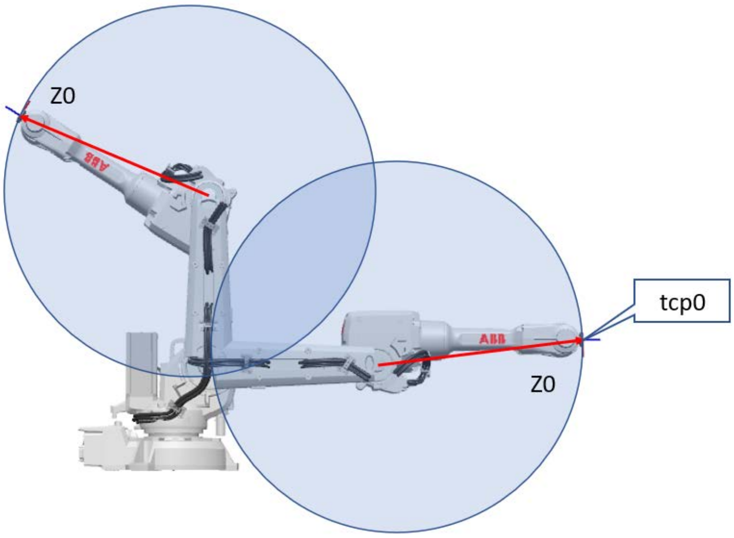
Extension zones

The extension zone for the stop category 1 is based on the tool mounting interface (tool flange) with the axis angles according to the following illustrations. The zone data is presented for the respective robot variant.

The extension zone outer limits are defined by the TCP0 position for the stated angles.

	Illustration
Axis 1	 xx2300000860
Axis 2	 xx2300000861

Continues on next page

	Illustration
Axis 3	 xx2300000862

Speed

The speed in the simulations is based on TCP0.

The TCP0 speed is measured in meters per second when the stop is triggered.

Stopping distances

The stopping distance is measured in degrees.

Stopping times

The stopping time is measured in seconds.

Limitations

The stopping distance can vary depending on additional loads on the robot.

The stopping distance for category 0 stops can vary depending on the individual brakes and the joint friction.

Reading the data

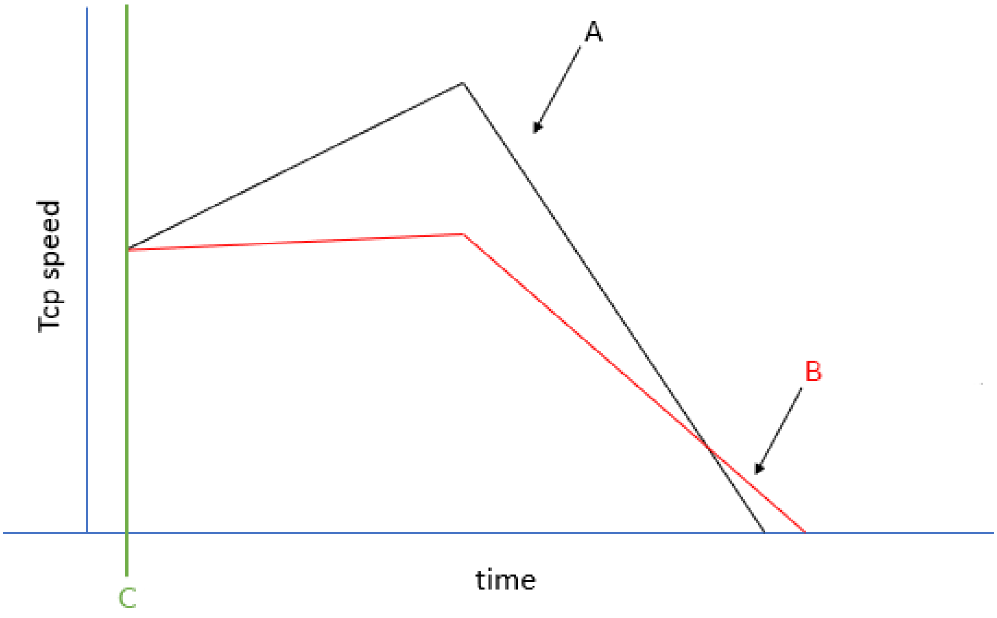
The data for stop category 0 is presented in tables, with distance and time for each axis.

The data for stop category 1 is presented as graphs with curves representing the different loads.

There is a short delay in the stop, which means that if the axis is accelerating when the stop is initiated (C), it will continue to accelerate during this delay time. This

Continues on next page

can result in graphs where a higher load (A) gives shorter stopping distance than a smaller load (B).



xx2300001041

The tcp speed is the actual speed when the stop is initiated, which is not necessarily the programmed speed.

1.9.2 Measuring stopping distance and time

Preparations before measuring

For measurement and calculation of overall system stopping performance, see ISO 13855:2010.

The measurement shall be done for the selected stop category. The emergency stop button on the robot controller is configured for stop category 0 on delivery. A risk assessment can conclude the need for another stop category. The stop category can be changed through the system parameter *Function* (topic *Controller*, type *Safety Run Chain*). In case of deviations of the default configuration of stop category 0, then this is detailed in the product specification for the respective manipulator.

CAUTION

The measurement and calculation of overall stopping performance for a robot must be tested with its correct load, speed, and tools, in its actual environment, before the robot is taken into production.

All load and tool data must be correctly defined (weight, CoG, moment of inertia). The load identification service routine can be used to identify the data.

CAUTION

Follow the safety instructions in the respective product manual for the robot.

Measuring with TuneMaster

The software TuneMaster can be used to measure stopping distances and times for ABB robots. The TuneMaster software contains documentation on how to use it.

1. Download TuneMaster from *www.abb.com/robotics*, section **RobotStudio - Downloads - RobotWare Tools and Utilities.**
2. Install TuneMaster on a computer. Start the TuneMaster app and select **Log Signals**.
3. Connect to the robot controller.
4. Define the I/O stop signal to use for measurement, for example, ES1 for emergency stop.
5. Define the signal number to use for measurement, 1298 for axis position. The value is given in radians.
6. Start the logging in TuneMaster.
7. Start the test program on the controller.

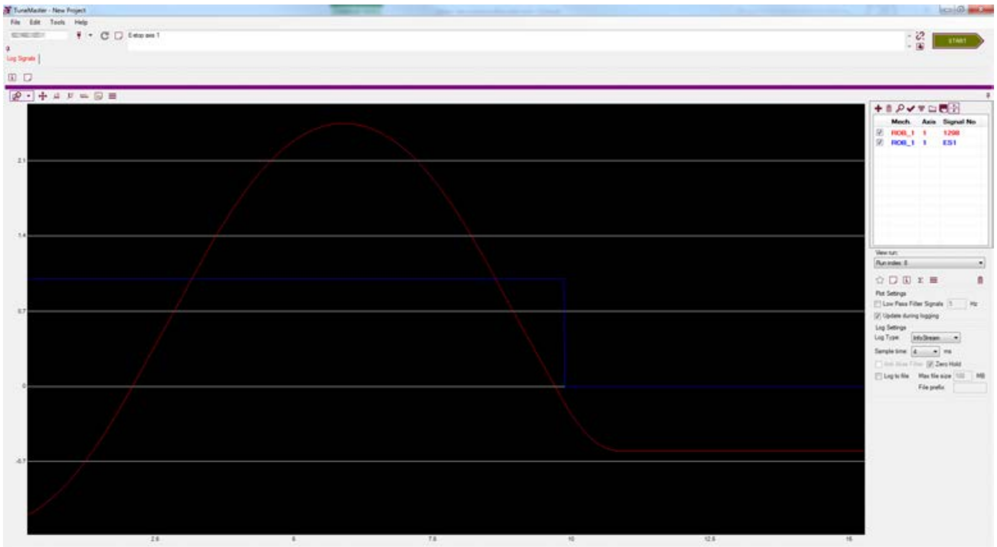
Tip

Use the tool and zone definitions for the respective variant in this document to get results that are comparable with this document.

Continues on next page

8 When the axis has reached maximum speed, press the emergency stop button.
9 In TuneMaster, measure the stopping distance and time.
10 Repeat for all installed emergency stop buttons until the identified hazards due to stopping distance and time for axes have been verified.

Example from TuneMaster



xx1600000386

1 CRB 1100 0.47 m 4 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	56.58	0.27
2	58.21	0.34
3	35.91	0.25

Category 1, extension zones

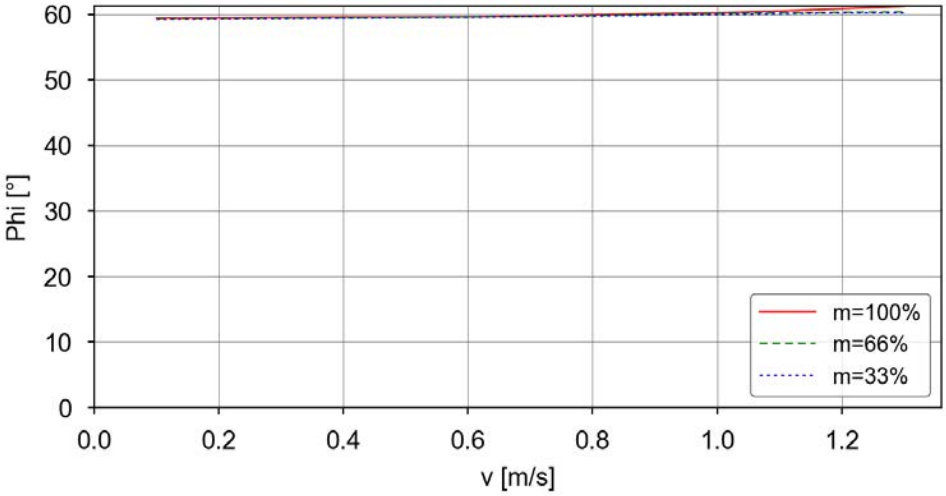
For definitions of the zones, see *Extension zones on page 64*.

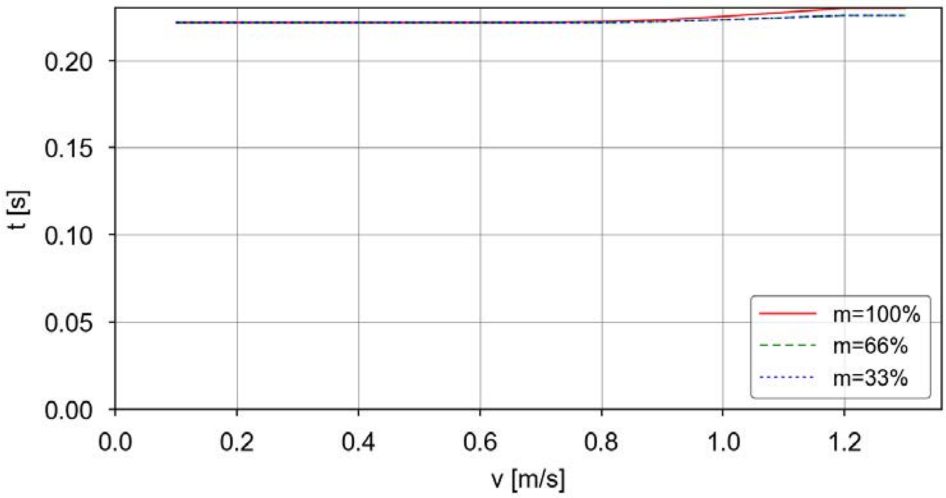
Zone	wcp min (m)	wcp max (m)
0	0	0.158
1	0.158	0.317
2	0.317	max reach

Continues on next page

Category 1, Axis 1

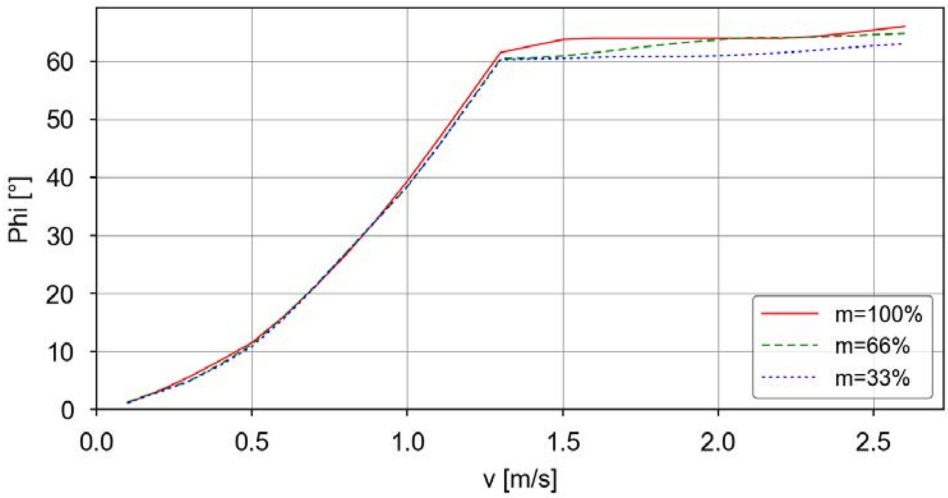
Extension zone 0, stopping distance and stopping time

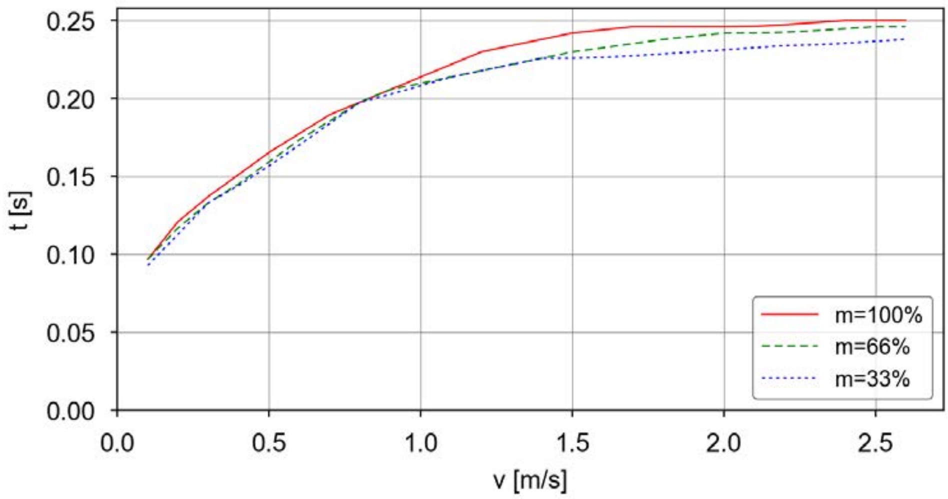




Continues on next page

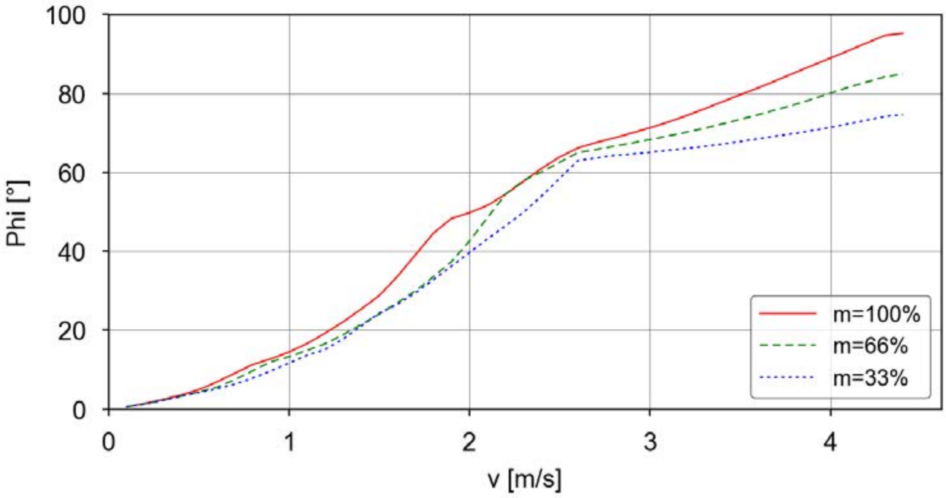
Extension zone 1, stopping distance and stopping time

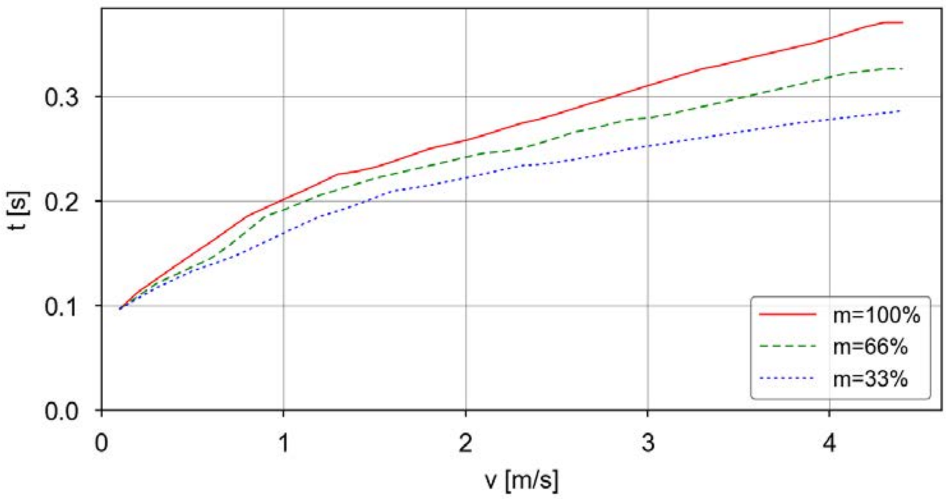




Continues on next page

Extension zone 2, stopping distance and stopping time

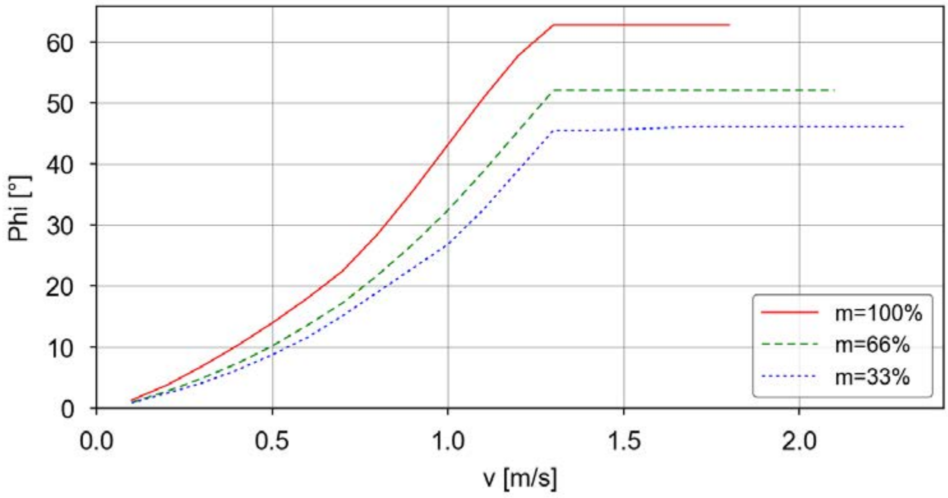


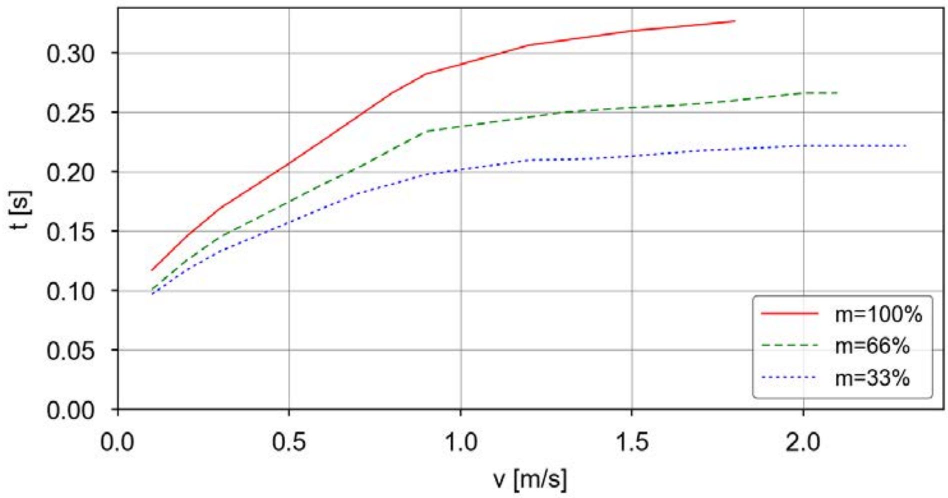


Continues on next page

Category 1, Axis 2

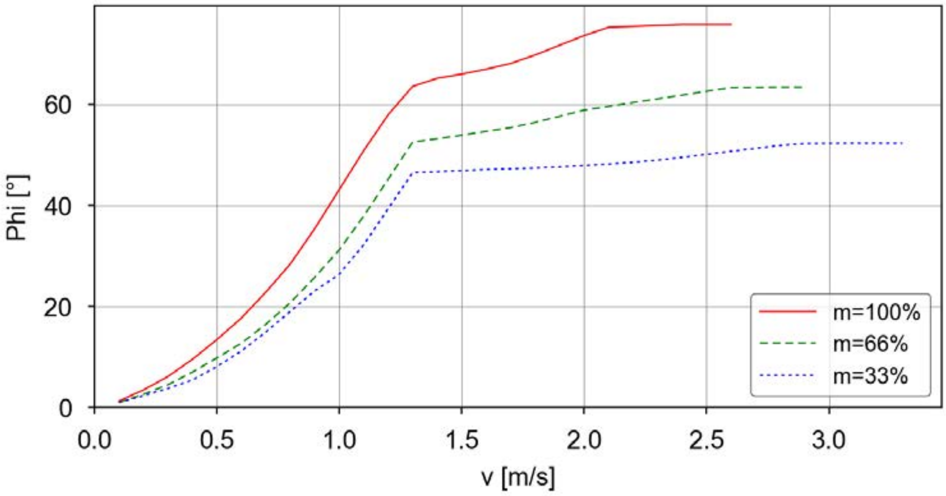
Extension zone 0, stopping distance and stopping time

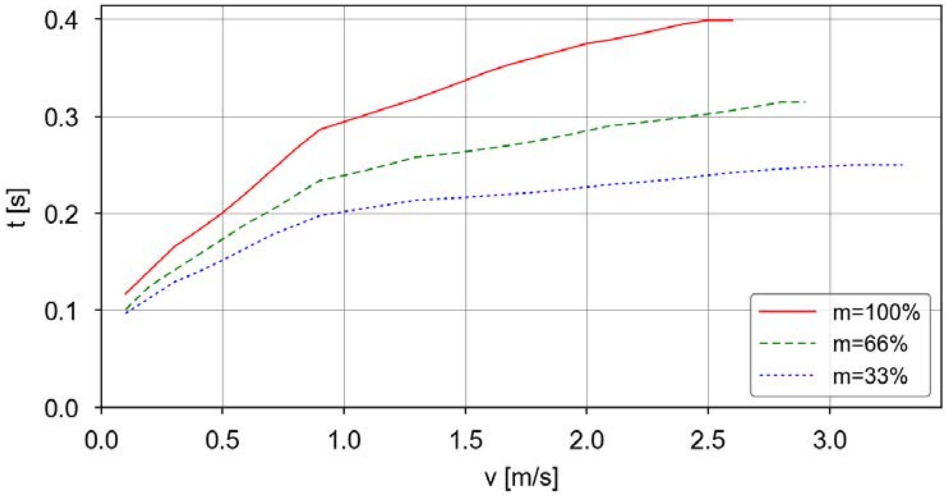




Continues on next page

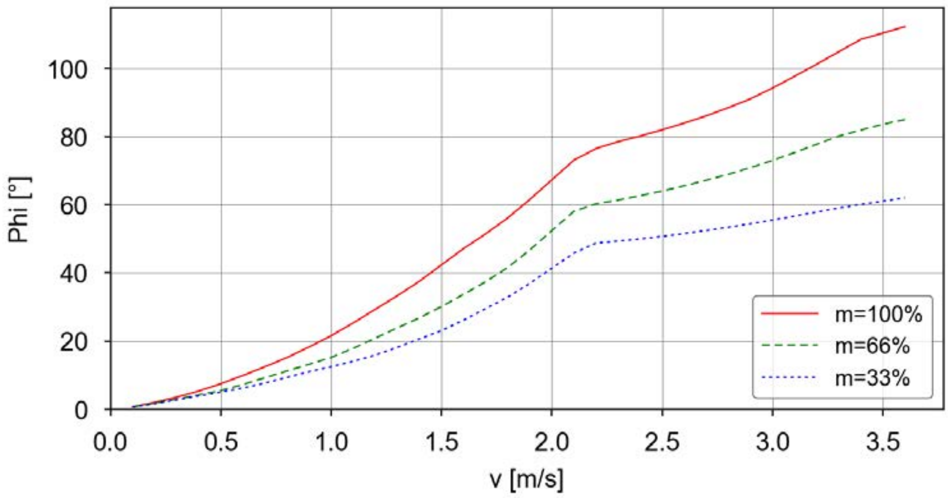
Extension zone 1, stopping distance and stopping time

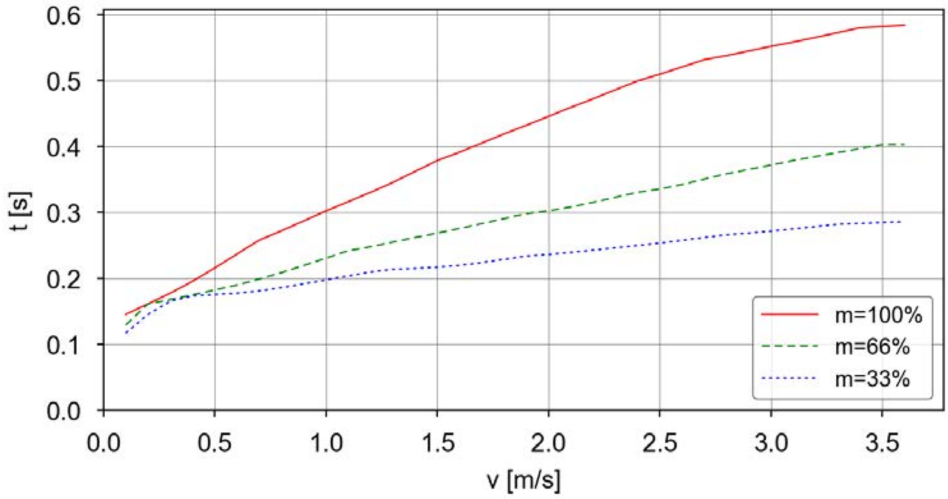




Continues on next page

Extension zone 2, stopping distance and stopping time

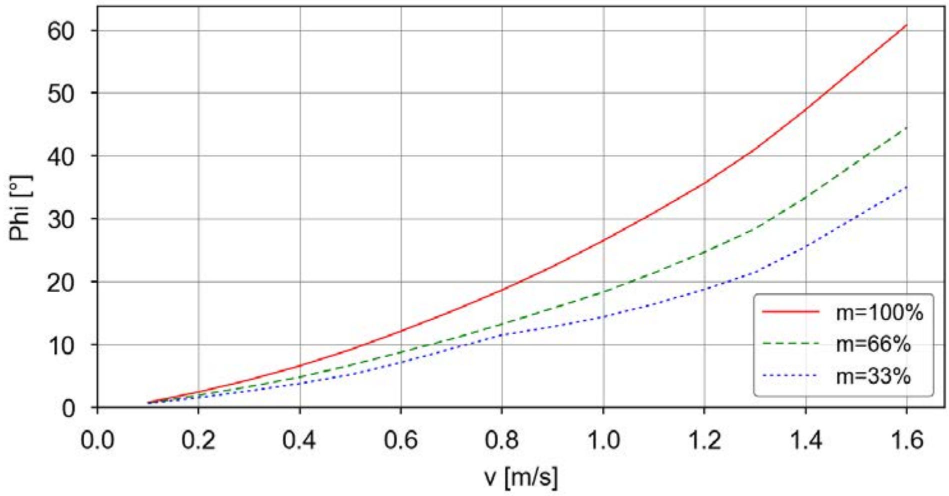


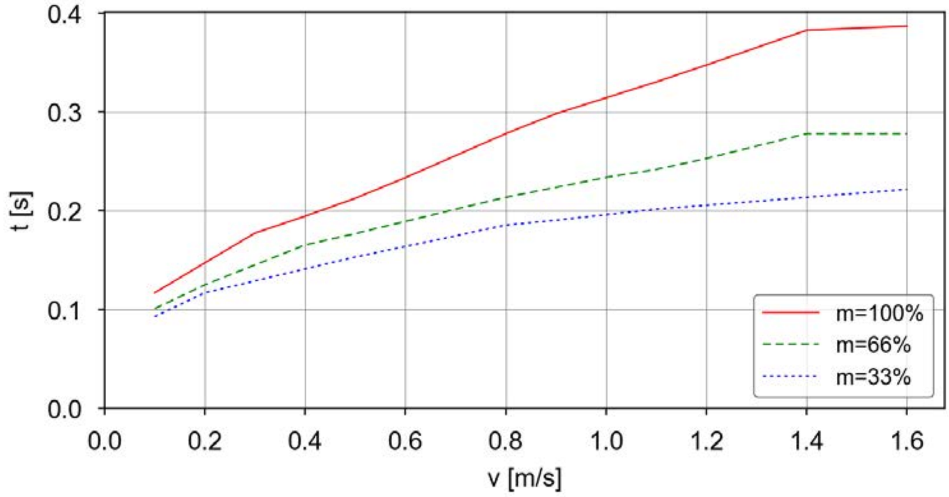


Continues on next page

Category 1, Axis 3

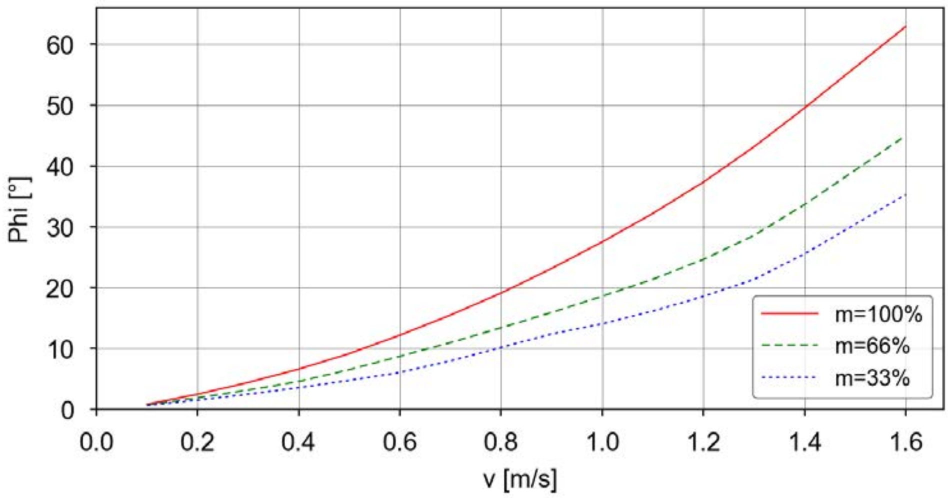
Extension zone 0, stopping distance and stopping time

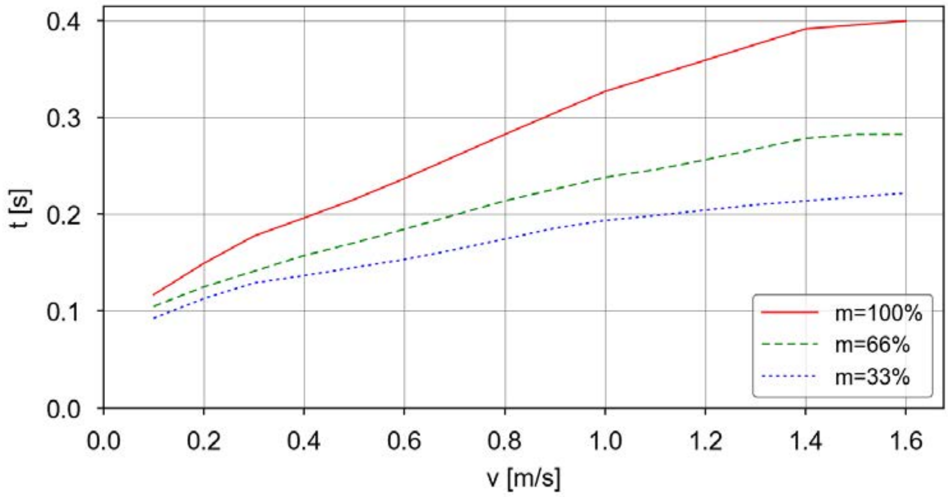




Continues on next page

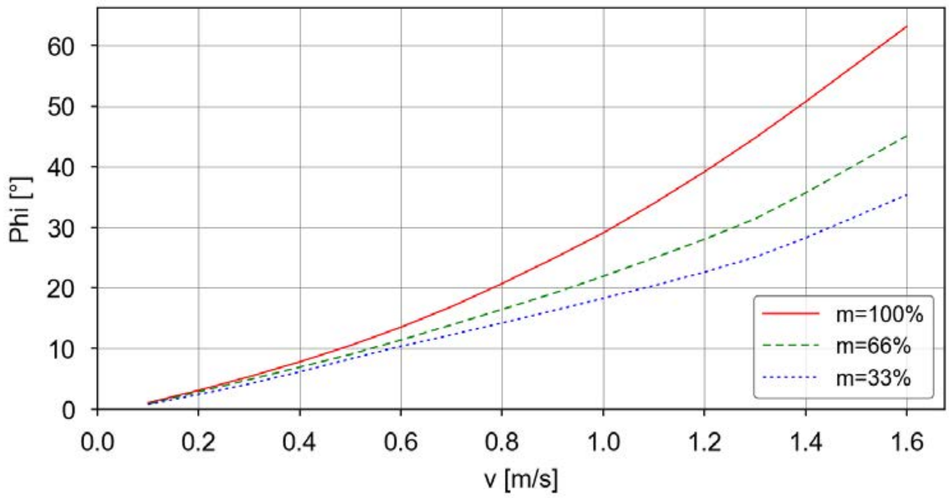
Extension zone 1, stopping distance and stopping time

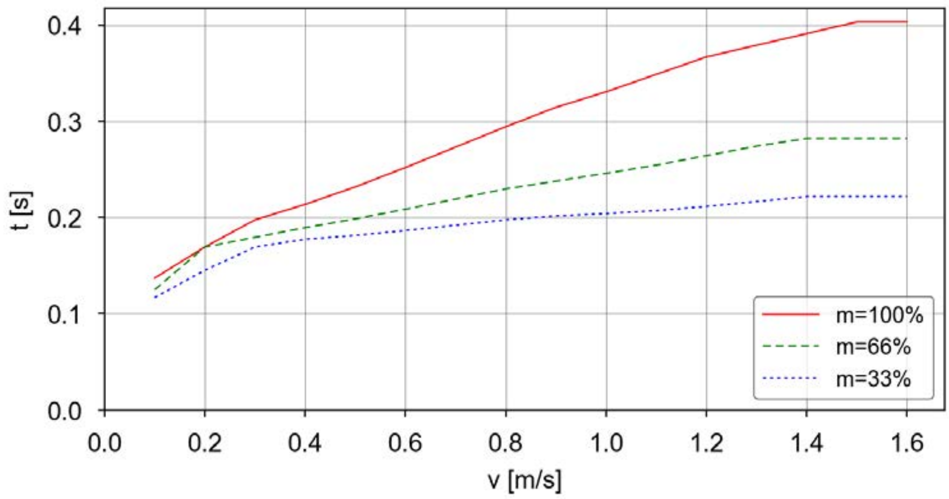




Continues on next page

Extension zone 2, stopping distance and stopping time





2 CRB 1100 0.58 m 4 kg

Category 0

The following table describes the stopping distance and time for category 0 emergency stop at max speed, with the arm stretched out to the maximum with maximum load. All results are from tests on one moving axis.

Axis	Distance (degrees)	Stop time (s)
1	59.09	0.26
2	55.71	0.3
3	29.81	0.22

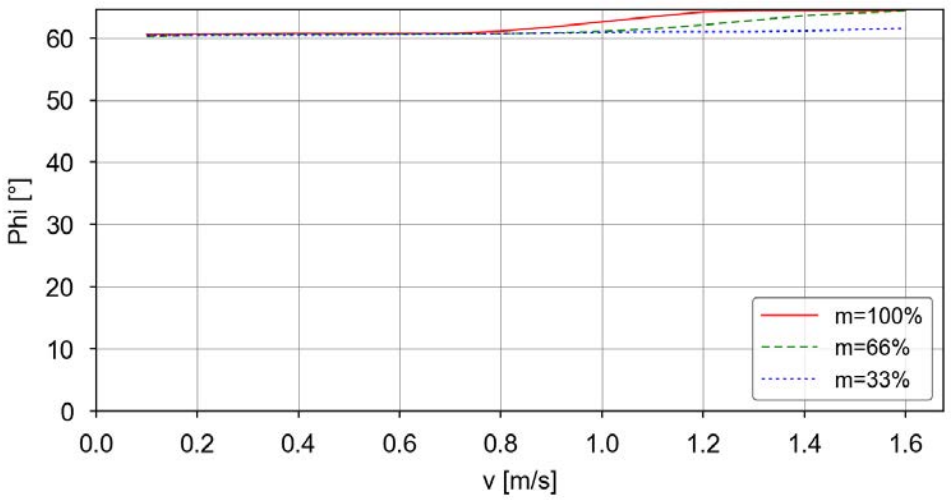
Category 1, extension zones

For definitions of the zones, see *Extension zones on page 64*.

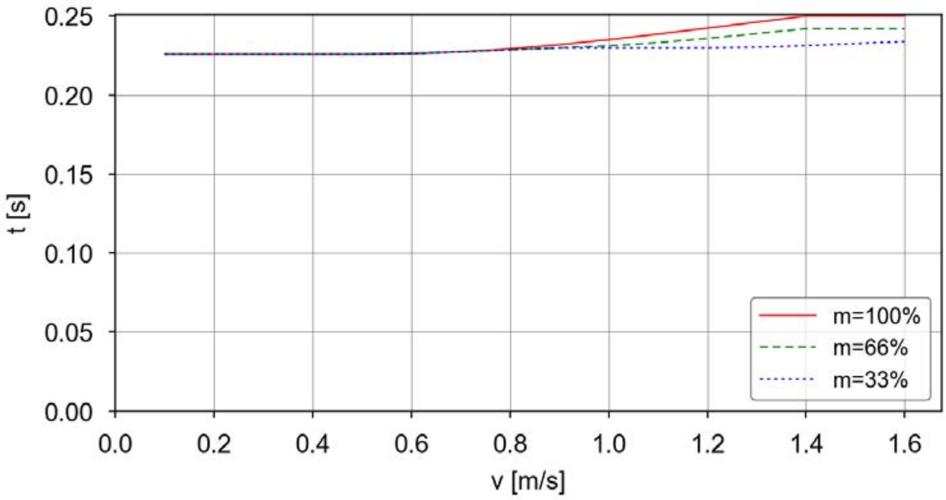
Zone	wcp min (m)	wcp max (m)
0	0	0.193
1	0.193	0.387
2	0.387	max reach

Category 1, Axis 1

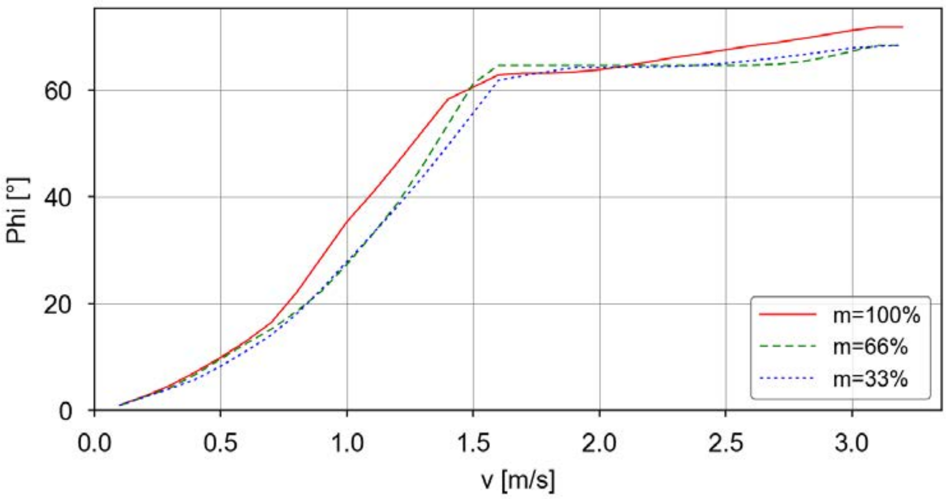
Extension zone 0, stopping distance and stopping time

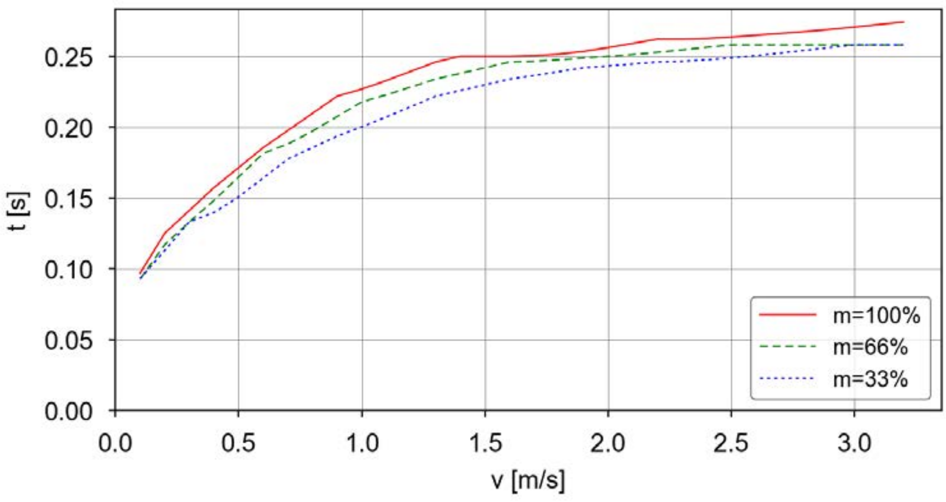


Continues on next page



Extension zone 1, stopping distance and stopping time

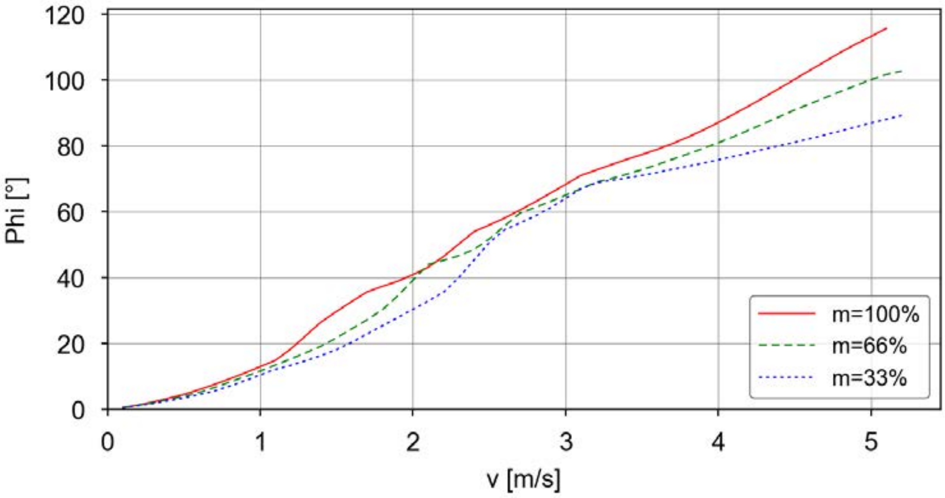


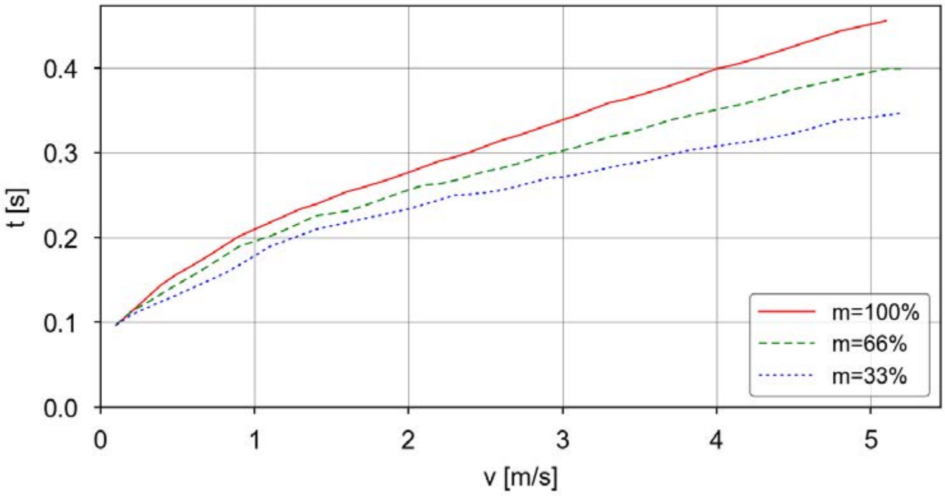


Continues on next page

2 CRB 1100 0.58 m 4 kg
Continued

Extension zone 2, stopping distance and stopping time

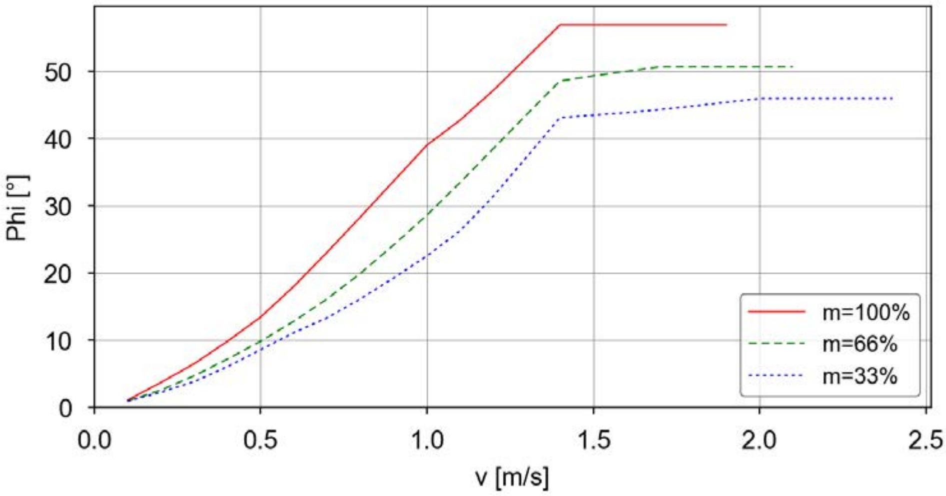


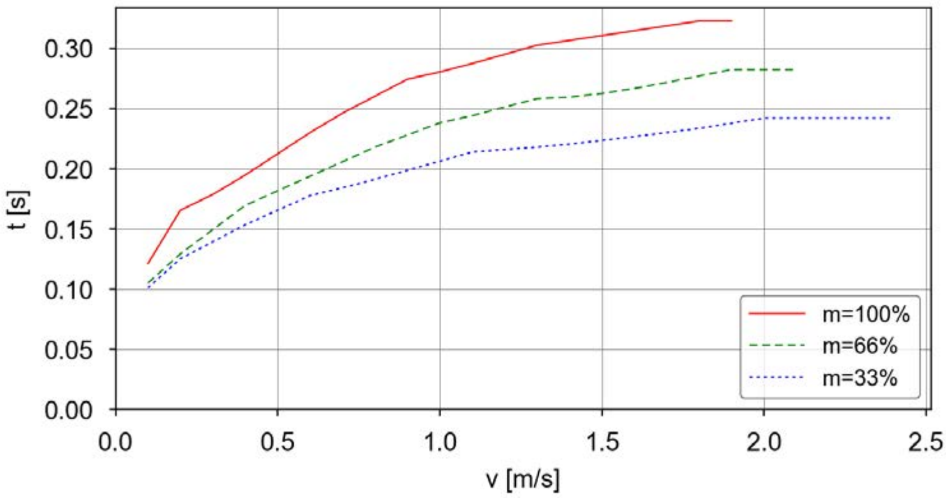


Continues on next page

Category 1, Axis 2

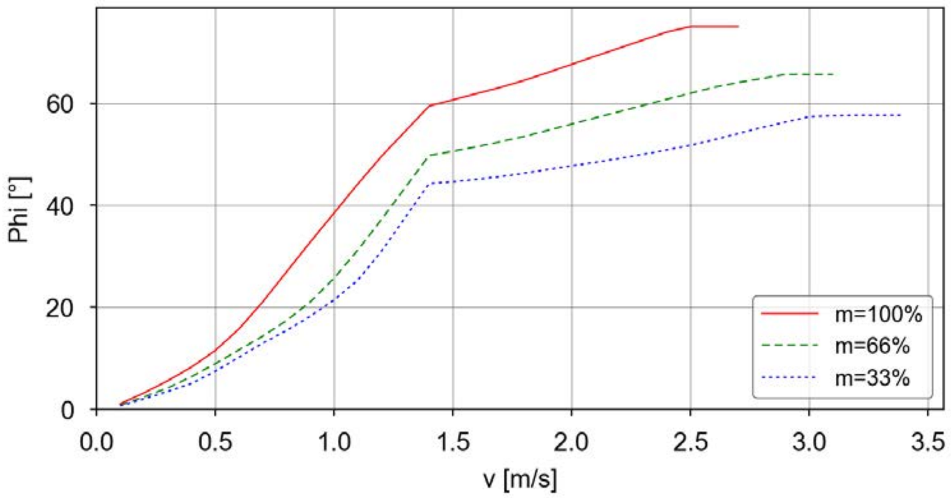
Extension zone 0, stopping distance and stopping time

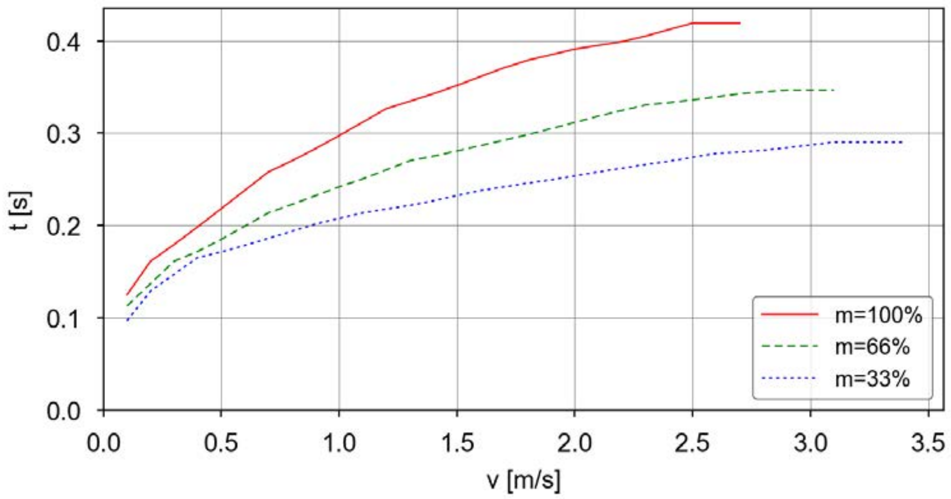




Continues on next page

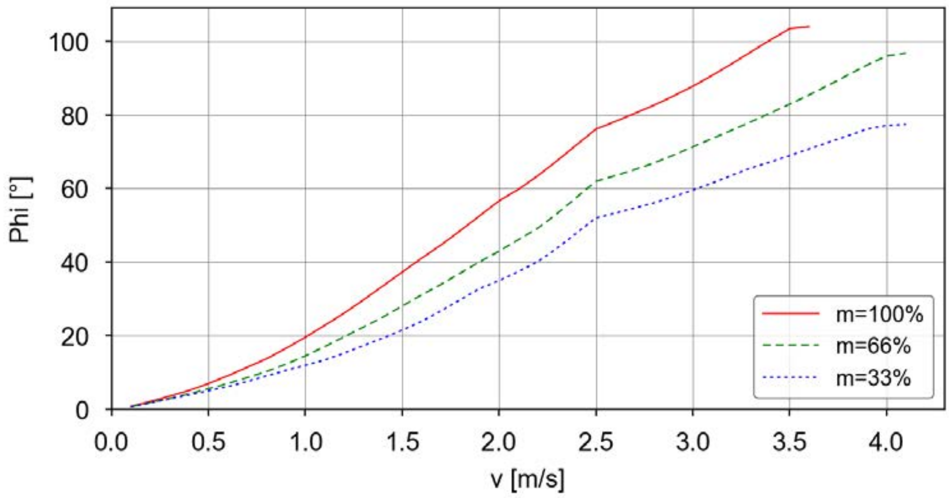
Extension zone 1, stopping distance and stopping time

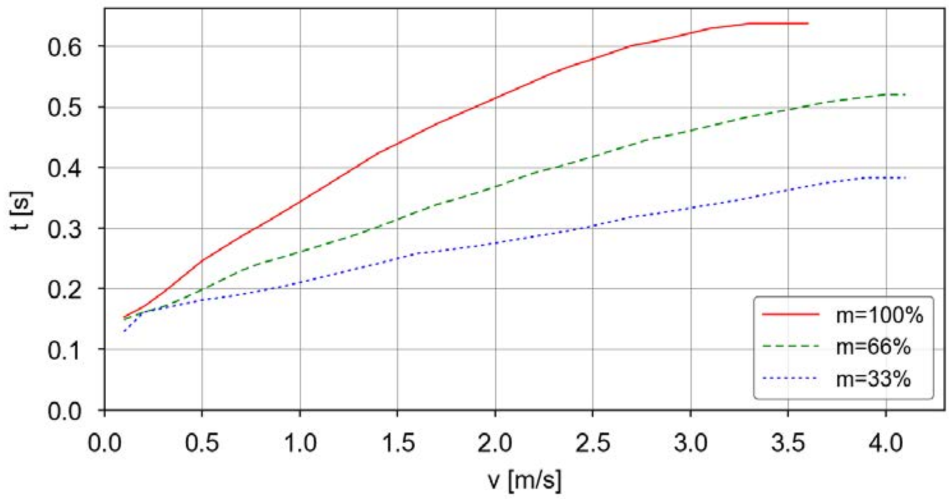




Continues on next page

Extension zone 2, stopping distance and stopping time



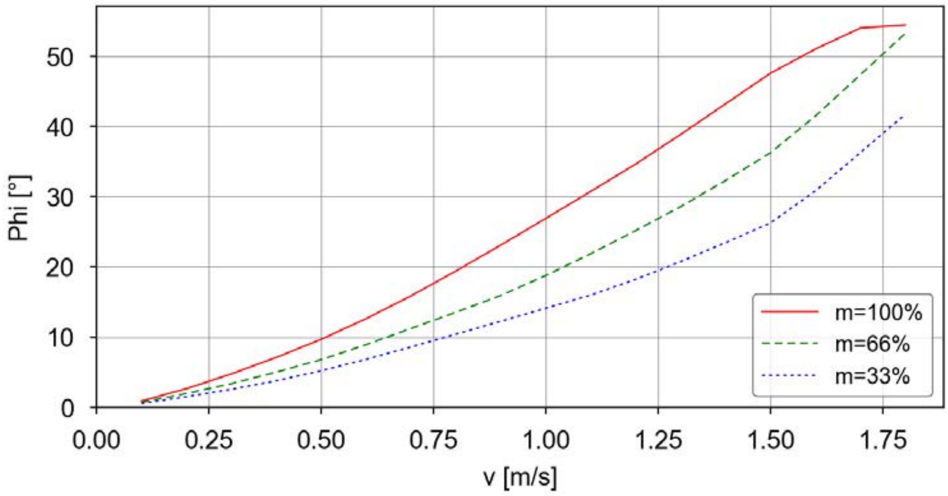


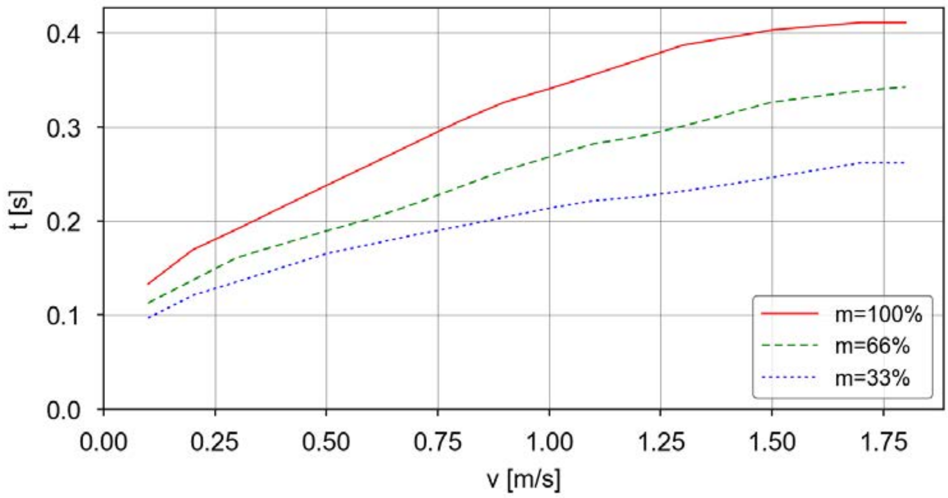
Continues on next page

2 CRB 1100 0.58 m 4 kg
Continued

Category 1, Axis 3

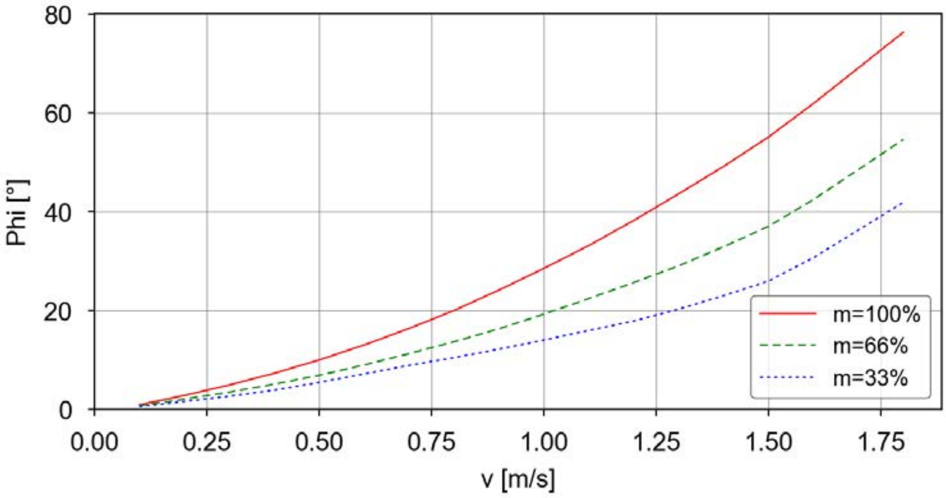
Extension zone 0, stopping distance and stopping time

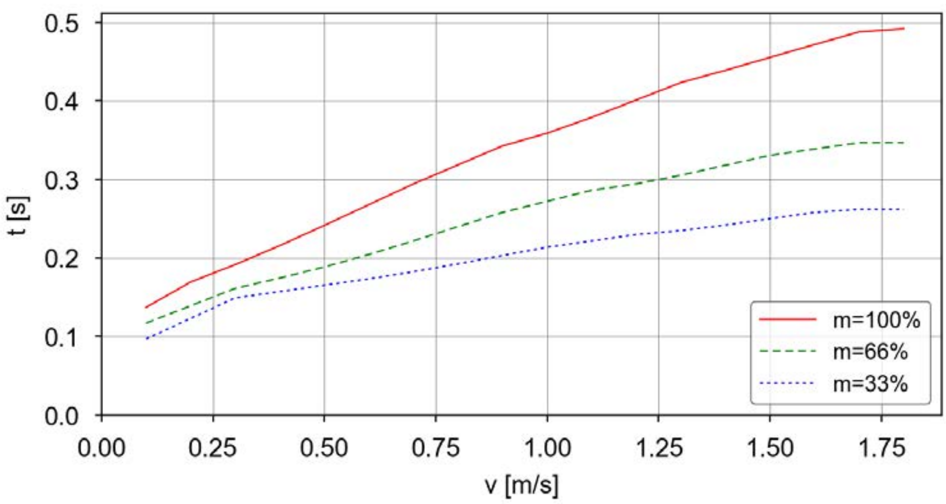




Continues on next page

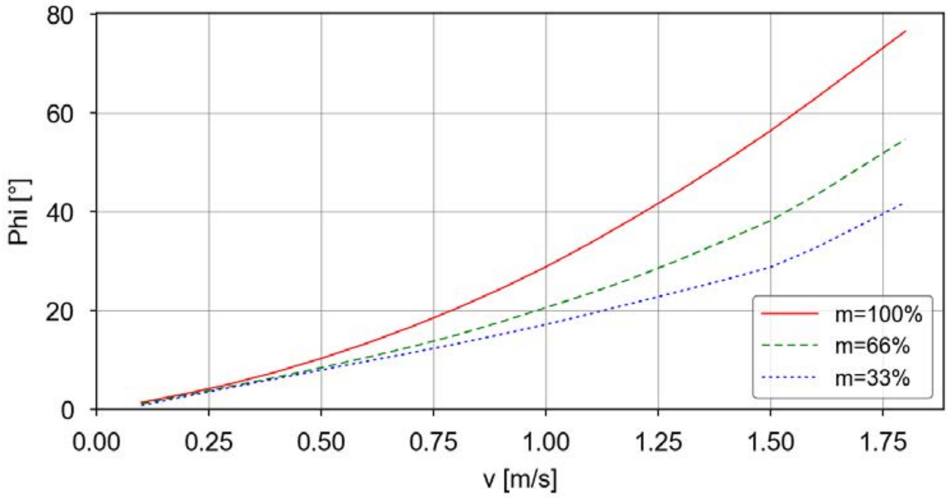
Extension zone 1, stopping distance and stopping time

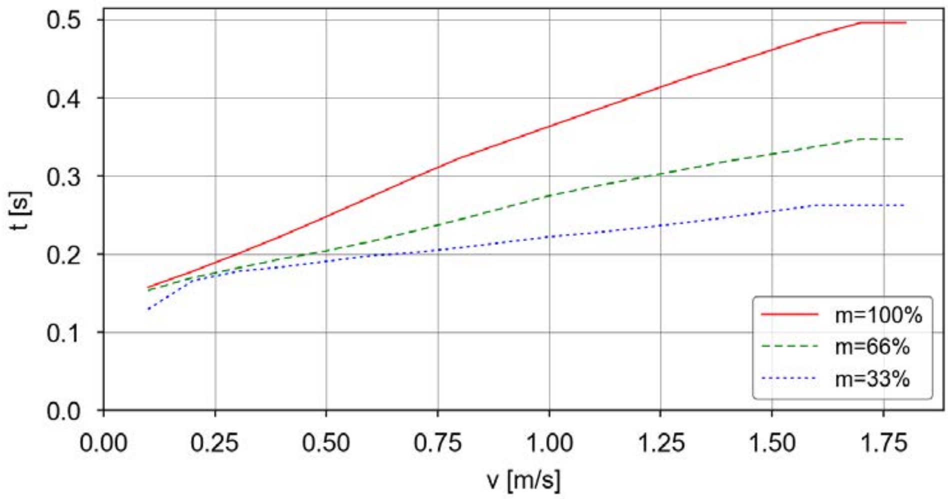




Continues on next page

Extension zone 2, stopping distance and stopping time





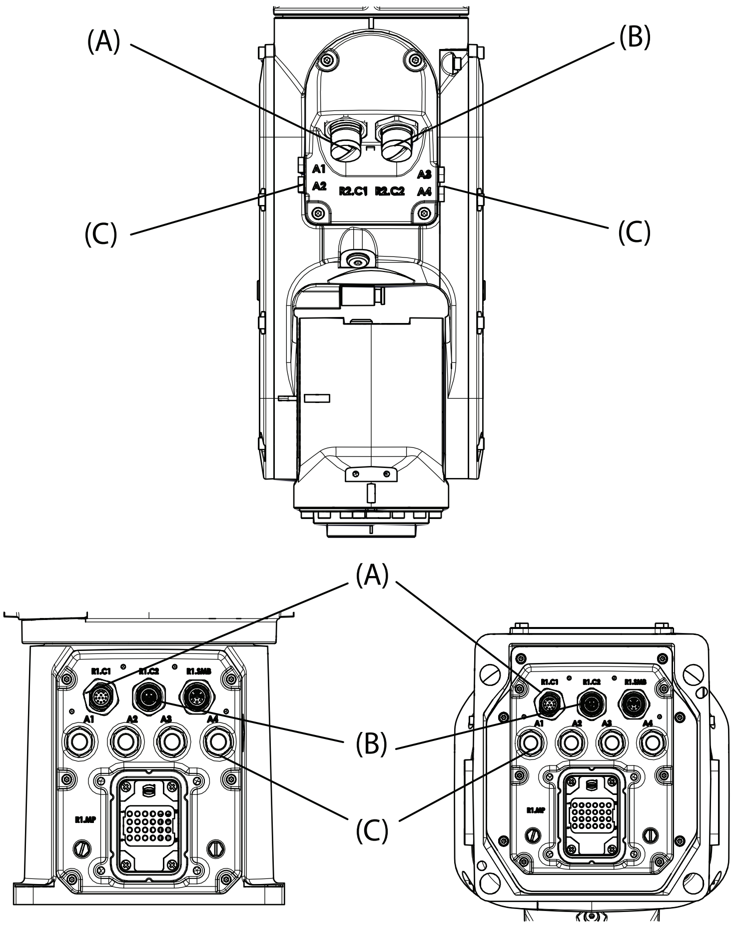
1.10 Customer connections

Introduction to customer connections

The cables for customer connection are integrated in the robot and the connectors are placed on the wrist and one at the base. There is one connector R2.C1 at the wrist. Corresponding connector R1.C1 is located at the base.

There is also connections for Ethernet, one connector R2.C2 at the wrist and the corresponding connector R1.C2 located at the base.

Hose for compressed air is also integrated into the manipulator. There are 4 inlets at the base (R1/8”) and 4 outlets (M5) on the wrist.



xx1900000131

Position	Connection	Description	Number	Value
A	(R1)R2.C1	Customer power/signal	4 wires[i]	30 V, 1.5 A
B	(R1)R2.C2	Customer power/signal or Ethernet	8 wires[ii]	30 V, 1 A or 1 Gbits/s
C	Air	Max. 6 bar	4	Outer diameter of air hose: 4 mm

i The connector has 12 pins. Only pins 5 to 8 are available for use. Pins 1 to 4 are used for LED indicator, and pins 9 to 12 are not connected internally.

Continues on next page

ii If the lead-through device is installed, the C2 connector will be used for the lead-through device and 6 wires are occupied.

Connector kits (optional)

Connector kits, wrist

The table describes the CP/CS and Ethernet (if any) connector kits for wrist.

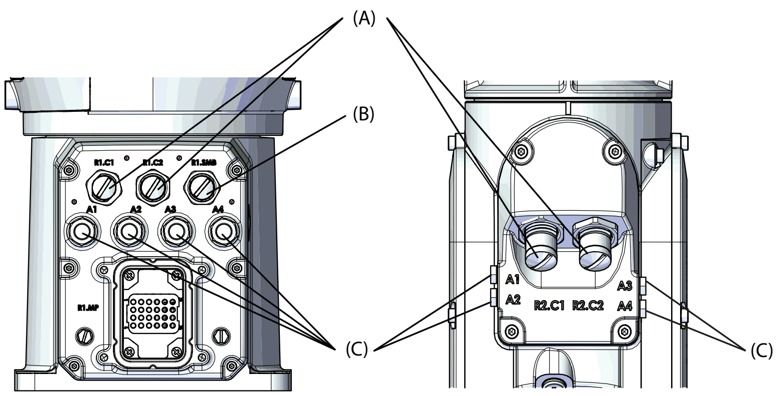
Position	Description		Art. no.
Connector kits	CP/CS	M12 CPCS Male straight connector kits	3HAC066098-001
		M12 CPCS Male angled connector kits	3HAC066099-001
	Ethernet	M12 Ethernet Cat5e Male straight connector kits	3HAC067413-001
		M12 Ethernet Cat5e Male angled connector kits	3HAC067414-001

Protection covers

Protection covers for water and dust proofing

Protection covers are delivered together with the robot and must be well fitted to the connectors in any application requiring water and dust proofing.

Always remember to refit the protection covers after removing them.



xx1900000132

A	CP/CS or Ethernet connector protection covers
B	SMB connector protection cover
C	Air hose connector protection covers

2 Specification of variants and options

2.1 Introduction to variants and options

General

The different variants and options for the CRB 1100 are described in the following sections. The same option numbers are used here as in the specification form.

The variants and options related to the robot controller are described in the product specification for the controller.

2.2 Manipulator

Manipulator variants

Option	Type	Handling capacity (kg)	Reach (m)
3300-20	CRB 1100 Compatible with: 3063-1 Collaborative package	4	0.475
3300-21	CRB 1100 Compatible with: 3063-1 Collaborative package	4	0.58

Manipulator color

Option	Description	RAL code[i]
209-202	ABB Graphite White std	RAL 7035

i The colors can differ depending on supplier and the material on which the paint is applied.

Manipulator protection

Option	Description
3350-400	Base 40,IP40

Note

Base 40 includes IP40, according to standard IEC 60529.

Media & Communication

When 3303-2 Ethernet, Parallel, Air is selected then 3304-1,3305-1,3306-1 and 3307-1 options are activated for selecting.

Option	Type	Description
3303-2	Ethernet, Parallel, Air	Includes CP, CS + air + Ethernet.

Connector kits manipulator

The kit consists of connectors, pins and sockets.

Option	Description
3304-1	Male-type, Straight arm connector kits
3305-1	Male-type, Angled arm connector kits
3306-1	Male-type, Straight arm Ethernet connector kits
3307-1	Male-type, Angled arm Ethernet connector kits

Continues on next page

xx1900000140

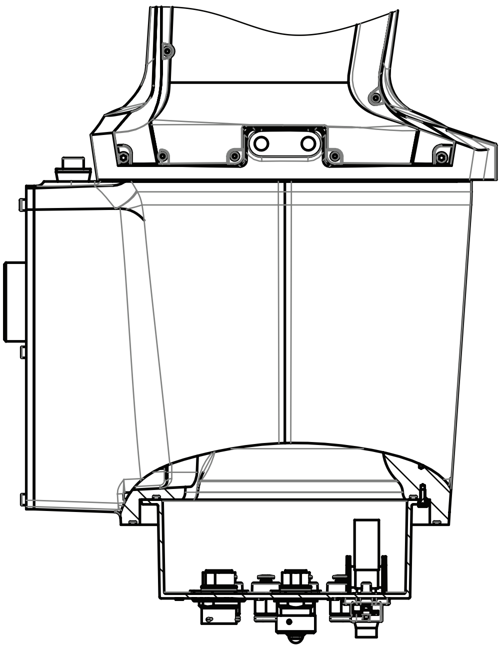
Note

The image shown here is indicative only. If there is inconsistency between the image and the actual product, the actual product shall govern.

The kits are designed and used for connectors on upper arm.

Robot cabling routing

Option	Description
3309-1	Under the base
3309-2	From side of base



xx1300000388

Lead through device

Option	Description
3313-1	Lead through device

Continues on next page

General introduction

The lead-through device is suitable for robots designed for collaborative applications and generally mounted on the robot tool flange. With the lead-through functionality enabled and configured in the FlexPendant, you can hold the lead-through device and move the robot arms manually to a desired position, as an alternative to jogging.

Mounting bracket

Option	Description
3314-1	Mounting bracket. Used for installing lead through device on the tool flange

Warranty

For the selected period of time, ABB will provide spare parts and labour to repair or replace the non-conforming portion of the equipment without additional charges. During that period, it is required to have a yearly Preventative Maintenance according to ABB manuals to be performed by ABB. If due to customer restrains no data can be analyzed in the ABB Ability service *Condition Monitoring & Diagnostics* for robots with OmniCore controllers, and ABB has to travel to site, travel expenses are not covered. The Extended Warranty period always starts on the day of warranty expiration. Warranty Conditions apply as defined in the Terms & Conditions.

Note

This description above is not applicable for option *Stock warranty* [438-8]

Option	Type	Description
438-1	Standard warranty	Standard warranty is 12 months from *Customer Delivery Date* or latest 18 months after *Factory Shipment Date*, whichever occurs first. Warranty terms and conditions apply.
438-2	Standard warranty + 12 months	Standard warranty extended with 12 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-4	Standard warranty + 18 months	Standard warranty extended with 18 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-5	Standard warranty + 24 months	Standard warranty extended with 24 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-6	Standard warranty + 6 months	Standard warranty extended with 6 months from end date of the standard warranty. Warranty terms and conditions apply.
438-7	Standard warranty + 30 months	Standard warranty extended with 30 months from end date of the standard warranty. Warranty terms and conditions apply.

Continues on next page

Option	Type	Description
438-8	Stock warranty	Maximum 6 months postponed start of standard warranty, starting from factory shipment date. Note that no claims will be accepted for warranties that occurred before the end of stock warranty. Standard warranty commences automatically after 6 months from *Factory Shipment Date* or from activation date of standard warranty in WebConfig. **Note** Special conditions are applicable, see *Robotics Warranty Directives*.

2.3 Floor cables

Manipulator cable - Straight

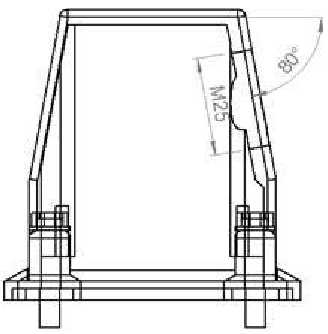
Option	Lengths
3200-1	3 m
3200-2	7 m
3200-3	15 m

xx2100001122

Manipulator cable - Angled

Option	Lengths
3209-1	Angled type connector, requires option *Manipulator cable* - Length [3200-X]

xx2100001123

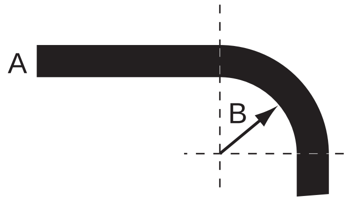


xx2100001124

Continues on next page

Bending radius for static floor cables

The minimum bending radius is 10 times the cable diameter for static floor cables.



xx1600002016

A	Diameter
B	Diameter x10

Mains cable

Option	Lengths	Description
3203-1	EU mains cable, 3 m	Cable assembly with CEE7/VII line-side plug
3203-5	CN mains cable, 3 m	Cable assembly with CPCS-CCC line-side plug
3203-6	AU mains cable, 3 m	Cable assembly with AS/NZS 3112 line-side
3203-7	All regions cable, 5 m	Cable assembly without line-side plug

Connection of Ethernet

Required 3303-2 Ethernet, Parallel, Air and occupies 1 Ethernet port.

Option	Lengths
3202-2	7 m
3202-3	15 m

This page is intentionally left blank

3 Accessories

General

There is a range of tools and equipment available.

Basic software and software options for robot and PC

For more information, see *Application manual - Controller software OmniCore*, *Product specification - OmniCore C line*

This page is intentionally left blank

Index

ABB AB
Robotics & Discrete Automation
S-721 68 VÄSTERÅS, Sweden
Telephone +46 10-732 50 00

ABB AS
Robotics & Discrete Automation
Nordlysvegen 7, N-4340 BRYNE, Norway
Box 265, N-4349 BRYNE, Norway
Telephone: +47 22 87 2000

ABB Engineering (Shanghai) Ltd.
Robotics & Discrete Automation
No. 4528 Kangxin Highway
PuDong New District
SHANGHAI 201319, China
Telephone: +86 21 6105 6666

ABB Inc.
Robotics & Discrete Automation
1250 Brown Road
Auburn Hills, MI 48326
USA
Telephone: +1 248 391 9000

abb.com/robotics

3HAC082108-001, Rev F, en