ABB

ROBOTICS

Product specification

CRB 1300

Trace back information:
Workspace 24C version a5
Checked in 2024-09-17
Skribenta version 5.5.019

Product specification

CRB 1300-11/0.9
CRB 1300-10/1.15
CRB 1300-7/1.4

OmniCore

Document ID: 3HAC083113-001

Revision: F

Keep for future reference.

Additional copies of this manual may be obtained from ABB.

Original instructions.

Table of contents

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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
- Integrators and customers

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References

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

Document name	Document ID
Product manual - CRB 1300	*3HAC083111-001*
Product manual, spare parts - CRB 1300	*3HAC083112-001*
Product specification - OmniCore C line	*3HAC065034-001*
Product manual - OmniCore C30	*3HAC060860-001*
Product manual - OmniCore C90XT Type A	*3HAC089065-001*
Circuit diagram - CRB 1300	*3HAC080868-003*

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Revisions

Revision	Description
A	First edition.
B	Published in release 23A. The following updates are done in this revision: • Updated image for 1 SafetyIO-based laser scanner (option 3051-2).
C	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 67*.
D	Published in release 23D. The following updates are done in this revision: • Minor changes.
E	Published in release 24A. The following updates are done in this revision: • Updated maximum arm load information and updated the load area figure.
F	Published in release 24C. The following updates are done in this revision: • Added support for OmniCore C90XT Type A controller and removed information for C90XT. • Updated graphics for floor cables.

1 Description

1.1 Structure

1.1.1 Introduction

General introduction for CRB 1300

CRB 1300 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 one or two safety laser scanner, CRB 1300 ensures workers are never inside its working envelope while it is moving. Offering both lead-through functionality via the clip-on lead through device and Wizard easy programming software, CRB 1300 can be configured with no specialized training.

IP67 protection

The robot has IP67 as an option. The option will add sealing, machining parts and gasket.

Software product range

We have 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 robot is equipped with the OmniCore C30/C90XT 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.

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*.

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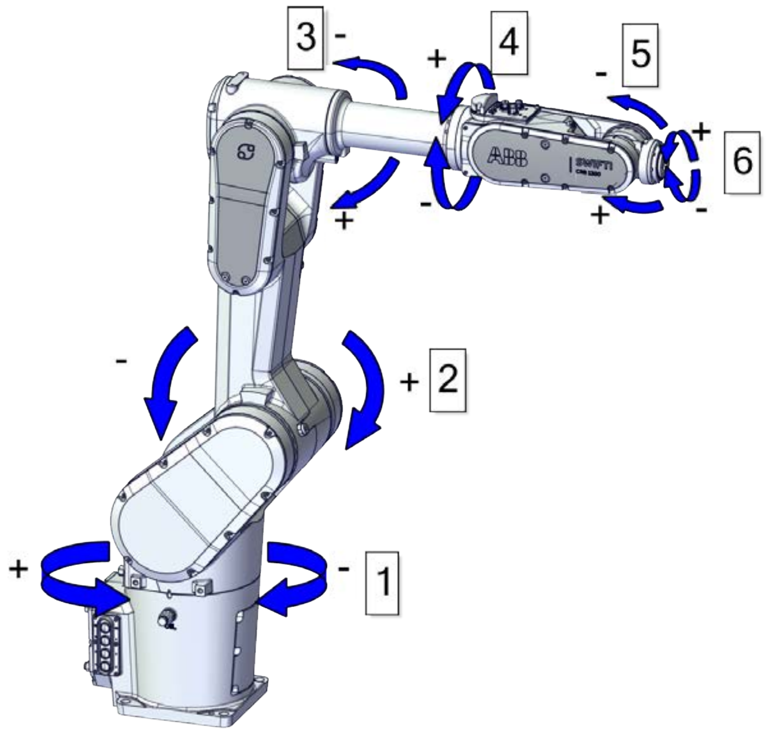
Robot axes



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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 variants

General

The CRB 1300 is available in three variants.

Robot variants

The following robot variants are available.

Robot variant	Handling capacity (kg)	Reach (m)
CRB 1300-11/0.9	11 kg	0.9 m
CRB 1300-10/1.15	10 kg	1.15 m
CRB 1300-7/1.4	7 kg	1.4 m

1.1.3 Technical data

1.1.3.1 Technical data

Weight, robot

The table shows the weight of the robot.

Robot model	Nominal weight
CRB 1300	CRB 1300-11/0.9: 75 kg CRB 1300-10/1.15: 77 kg CRB 1300-7/1.4: 79 kg

Note

The weight does not include additional options, tools and other equipment fitted on the robot.

Mounting positions

The table shows valid mounting positions and the installation (mounting) angle for the manipulator.

Mounting position	Installation angle
Floor mounted	Any angle
Wall mounted	Any angle
Suspended	Any angle

Note

The actual mounting angle must always be configured in the system parameters, otherwise the performance and lifetime is affected. See the product manual for details.

Loads on foundation, robot

The illustration shows the directions of the robots stress forces.

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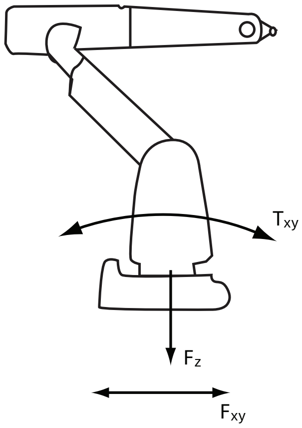
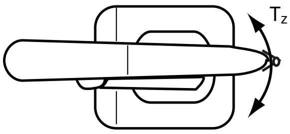
The directions are valid for all floor mounted, suspended and wall mounted robots.





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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

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	±821 N	±2186 N
Force z	428 N±1000 N	1547 N±1000 N
Torque xy	±814 Nm	±2392 Nm
Torque z	±236 Nm	±583 Nm

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Wall mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	±1478 N	±2860 N
Force z	±288 N	±963 N
Torque xy	±1068 Nm	±2741 Nm
Torque z	±352 Nm	±863 Nm

Suspended

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	±821 N	±2186 N
Force z	428 N±1000 N	1547 N±1000 N
Torque xy	±814 Nm	±2392 Nm
Torque z	±236 Nm	±583 Nm

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.
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 the description of *Motion Process Mode* in the manual that describes the controller software option, see *References on page 7*.
Minimum foundation material yield strength	150 MPa	

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.

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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)
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 [i]
Manipulator, protection type Standard	IP40 IP67 (option 3350-670)

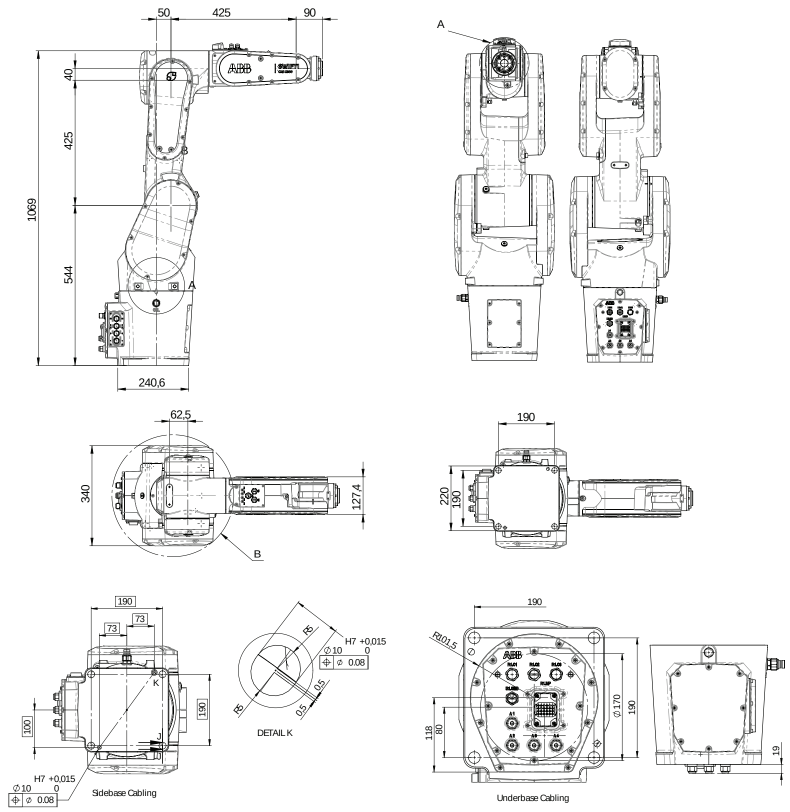
i According to IEC 60529.

Environmental information

The product complies with IEC 63000. *Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*.

1.1.3.2 Dimensions

Main dimensions of CRB 1300-11/0.9



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Pos	Description
A	Turning radius: R84
B	Turning radius: R207

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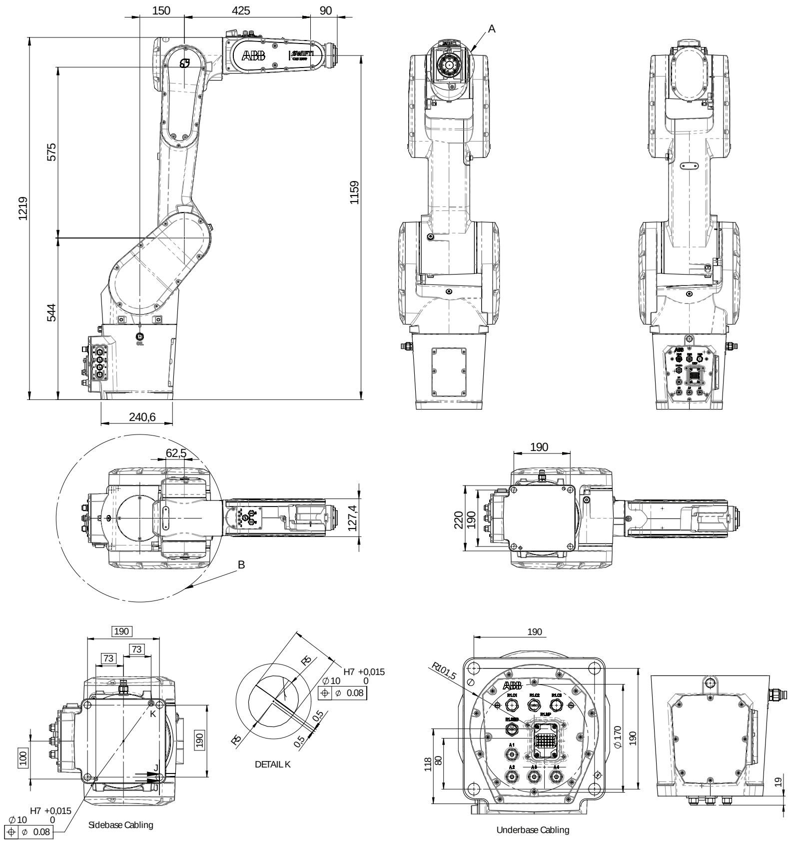
Main dimensions of CRB 1300-10/1.15



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Pos	Description
A	Turning radius: R84
B	Turning radius: R282

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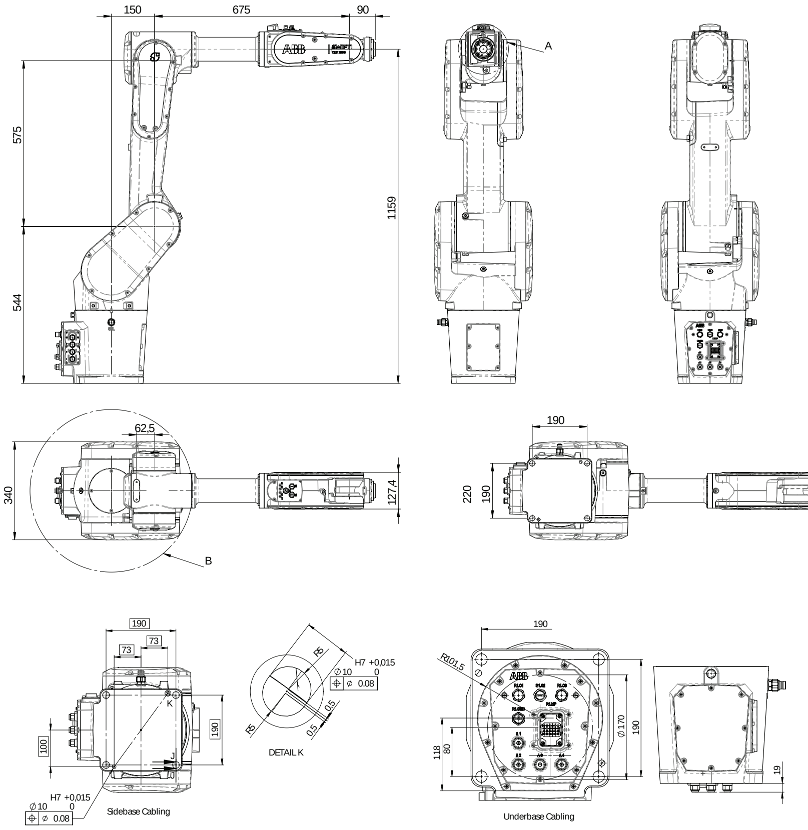
Main dimensions of CRB 1300-7/1.4



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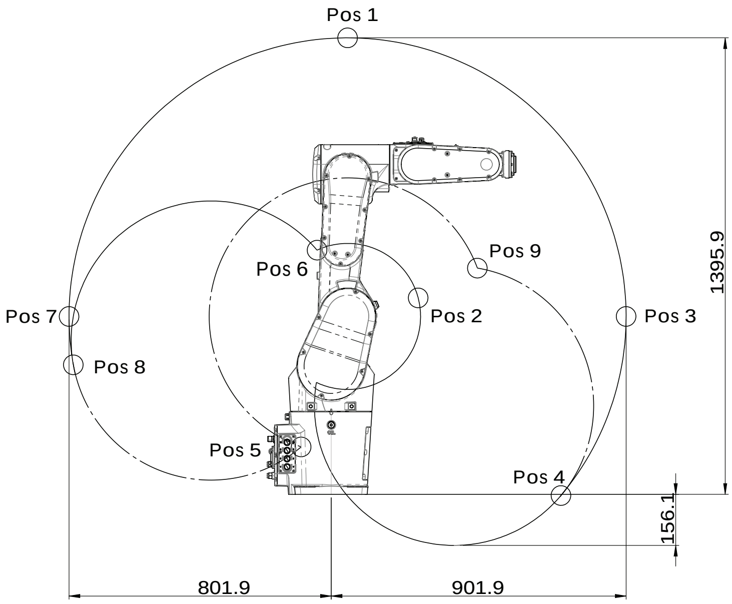
Pos	Description
A	Turning radius: R84
B	Turning radius: R282

1.1.3.3 Working range

Illustration, working range CRB 1300-11/0.9

This illustration shows the unrestricted working range of the robot.



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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	475	1009	0°	0°
pos1	50	1,395.9	0°	-84.6°
pos2	265.9	600.7	0°	65°
pos3	901.9	544	90°	-84.6°
pos4	702.6	-3.6	130°	-84.6°
pos5	-64.7	170.3	-100°	-210°
pos6	-43.3	746.7	-100°	65°
pos7	-801.9	544	-90°	-84.6°
pos8	-788.9	396.1	-100°	-84.6°
pos9	410	696.3	130°	-210°

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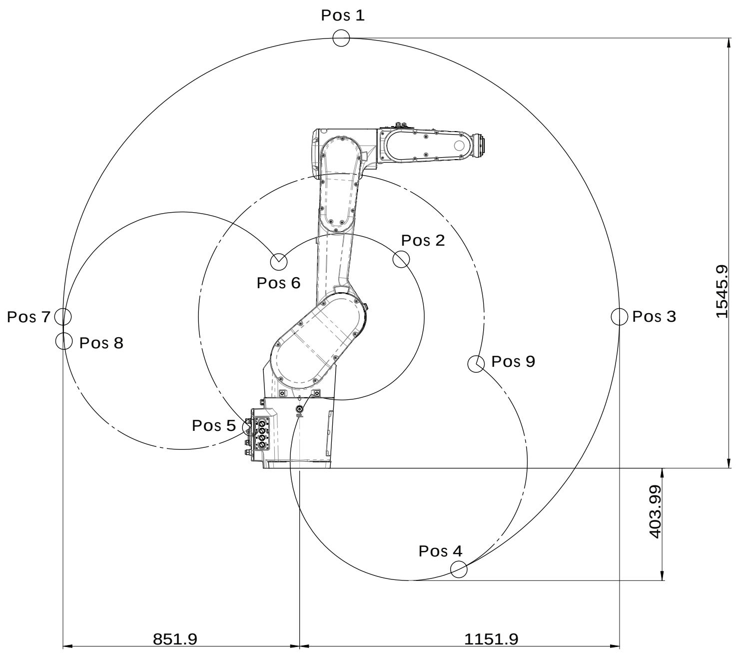
Illustration, working range CRB 1300-10/1.15

This illustration shows the unrestricted working range of the robot.



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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	575	1159	0°	0°
pos1	150	1,545.9	0°	-84.6°
pos2	365.9	750.7	0°	65°
pos3	1,151.9	544	90°	-84.6°
pos4	573.4	-364	155°	-84.6°
pos5	-146.3	168.7	-95°	-210°
pos6	-74.8	741	-95°	65°
pos7	-851.9	544	-90°	-84.6°
pos8	-848.1	456.9	-95°	-84.6°
pos9	604	394	155°	-210°

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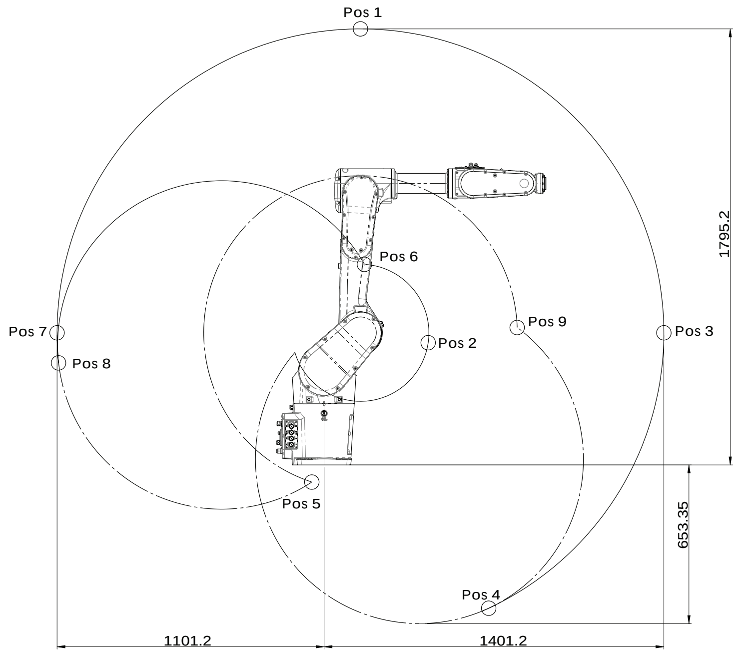
Illustration, working range CRB 1300-7/1.4

This illustration shows the unrestricted working range of the robot.



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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	825	1159	0°	0°
pos1	150	1,795.2	0°	-86.6°
pos2	429.2	503.2	0°	69°
pos3	1,401.2	544	90°	-86.6°
pos4	678.8	-590	155°	-86.6°
pos5	-2.9	-36.1	-95°	-210°
pos6	166.3	825.7	-95°	69°
pos7	-1,101.2	544	-90°	-86.6°
pos8	-1,096.4	435	-95°	-86.6°
pos9	747.4	598.7	155°	-210°

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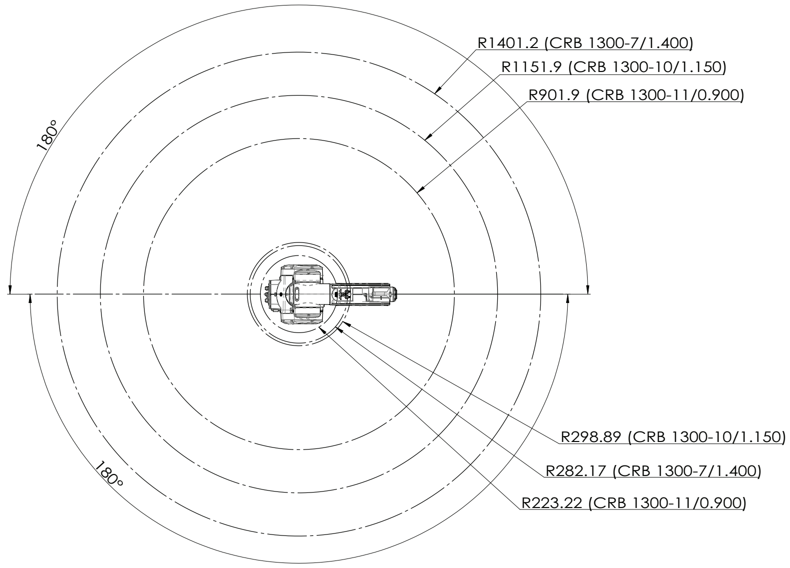
Top view of working range



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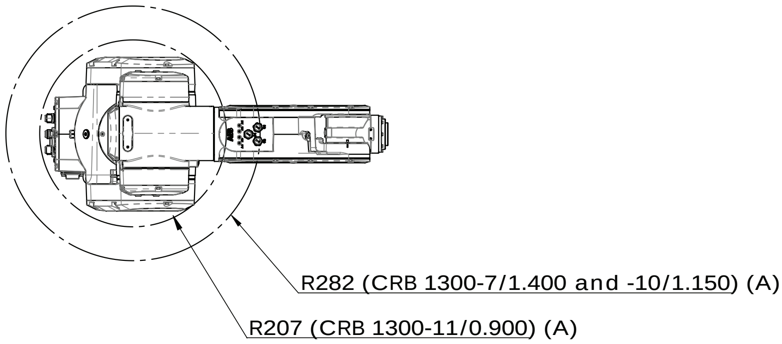

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Working range

Axis	Working range	Note
Axis 1	±180°	Wall mounted robot has a work area for axis 1 that depends on payload and the positions of other axes. Simulation in RobotStudio is recom-mended.
Axis 2	**CRB 1300-10/1.15 and CRB 1300-7/1.4** -95°/+155° **CRB 1300-11/0.9** -100°/+130°	
Axis 3	**CRB 1300-7/1.4** -210°/+69° **CRB 1300-10/1.15 and CRB 1300-11/0.9** -210°/+65°	
Axis 4	±230°	

Continues on next page

Axis	Working range	Note
Axis 5	±130°	
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.

Other technical data

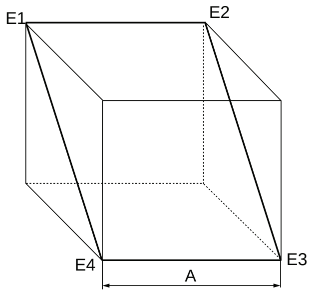
Data	Description	Note
Airborne noise level	The sound pressure level outside the working space.	< 70 dB(A) Leq (acc. to machinery directive 2006/42/EC)

Power consumption at max load

With OmniCore C30/90XT

Type of movement	11/0.9	10/1.15	7/1.4
ISO Cube Max. velocity (W)	494	442	343

Robot in calibration position	11/0.9	10/1.15	7/1.4
Brakes engaged (W)	92	69	63
Brakes disengaged (W)	219	191	207



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Pos	Description
A	400 mm

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.
UL 1740 (option) CSA Z434 (option)	Standards For Safety - Robots and Robotic Equipment Industrial robots and robot Systems - General safety requirements Valid for USA and Canada.

1.3 Installation

1.3.1 Introduction to installation

General

CRB 1300 is available in three variants and all variants can be floor mounted, inverted/suspended, wall mounted, or tilted mounted (any angle). Depending on the robot variant, an end effector with max. weight of 7 kg, 10 kg, and 11 kg including payload, can be mounted on the tool flange (axis 6). See *Load diagrams on page 45*.

Extra loads

The upper arm can handle an additional load of 0.5 kg (1 kg for reach 0.9m).

Working range limitation

The working range of axes 1 can be limited by mechanical stops as option. See *Working range on page 22*.

1.3.2 Operating requirements

Protection standard

Robot variant	Protection standard IEC529
All variants, manipulator	IP40
Option, all variants	IP67

Explosive environments

The robot must not be located or operated in an explosive environment.

Working range limitations

EPS will not be selectable. No mechanical limitation.

Ambient temperature

Description	Protection class	Temperature
Manipulator during operation	Standard	+ 5°C [i] (41°F) to + 45°C (113°F)
For the controller	Standard/Option	See *Product specification - OmniCore C line*
Complete robot during transportation and storage	Standard	- 25°C (-13°F) to + 55°C (131°F)
For short periods (not exceeding 24 hours)	Standard	up to + 70°C (158°F)

i At low environmental temperature < 10ºC is, as with any other machine, a warm-up phase recommended to be run with the robot. Otherwise there is a risk that the robot stops or run with lower performance due to temperature dependent oil and grease viscosity.

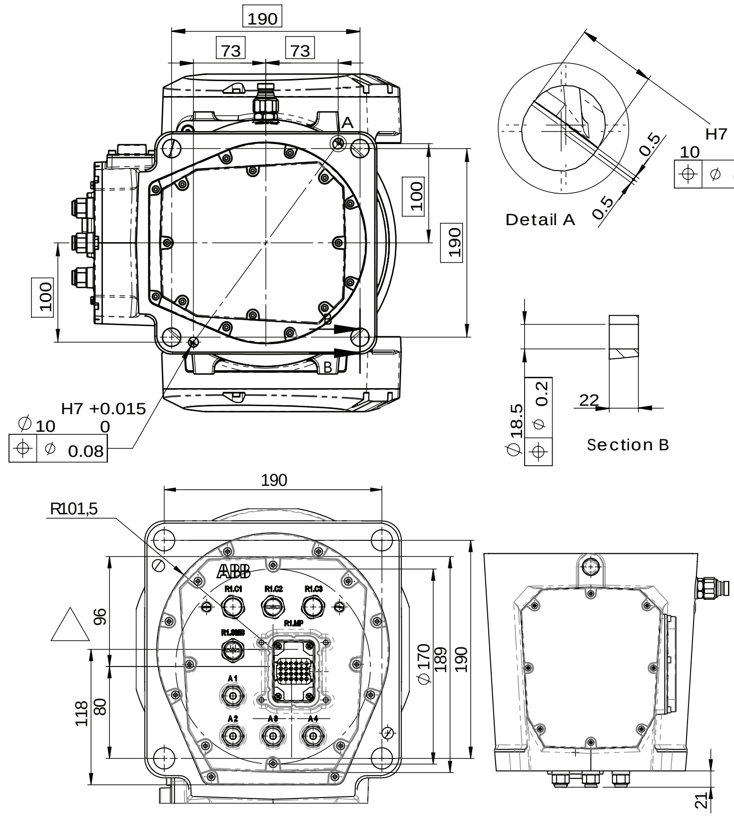
Relative humidity

Description	Relative humidity
Complete robot during operation, transportation and storage	Max. 95% at constant temperature

1.3.3 Mounting the manipulator

Hole configuration, base

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



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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.

Suitable screws	M16x50
Quantity	4 pcs
Quality	8.8
Suitable washer	17 x 30 x 3, steel hardness class 200HV
Guide pins	2 pcs, D10x30, ISO 2338 - 10m6x30 - A1
Tightening torque	150 Nm±10 Nm
Length of thread engagement	Minimum 19 mm for ground with material yield strength 150 MPa
Level surface requirements	0.1/500 mm

1.3.4 Installation of lead-through device

Introduction

The lead-through functionality is available for robots with the Collaborative Speed Control add-in installed and option 3313-1 Lead-through Device selected. With the lead-though functionality enabled, you can hold the handler of the lead-through device that is mounted on teh tool flange and move the robot arm manually to the desired position, as an alternative to jogging.

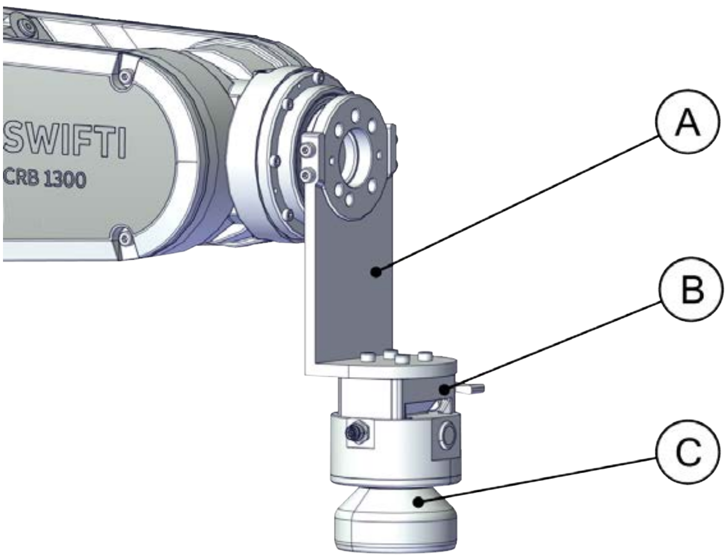
To use lead-through, make sure the system is running in manual mode; otherwise, the functionality cannot be enabled. If running the system in auto mode, always remove the lead-through device from the robot first to prevent any unexpected damages.

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.

Location of lead-through device

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



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A	Adapter
B	Lead-through device base
C	Lead-through device

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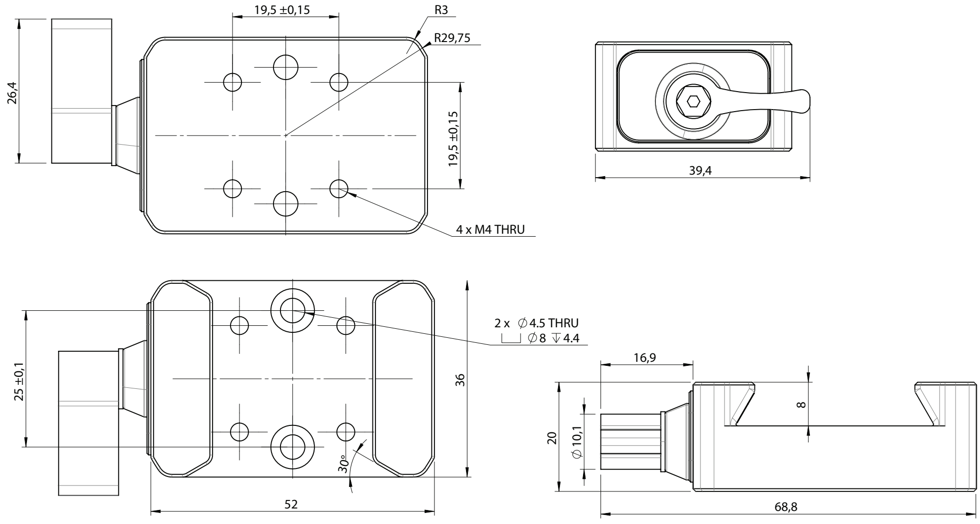
Preparing the adapter

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.

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



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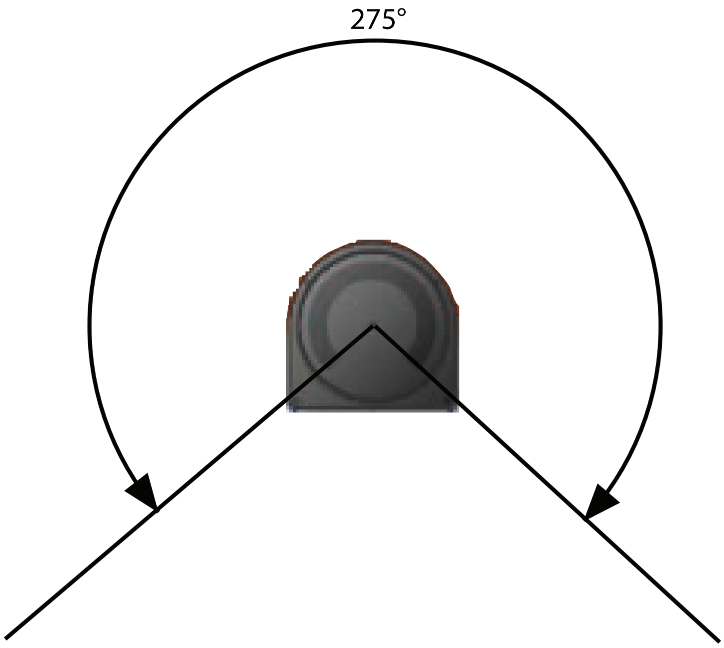
For the hole dimensions on robot tool flange, see *Tool flange standard on page 59*.

1.3.5 Installation of laser scanner

Overview

ABB provides safety separation and speed control functions to CRB 1300 by installing the Collaborative Speed Control add-in in the robot system and connecting the robot with one or two safety laser scanners. The 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.



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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 LAN 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.

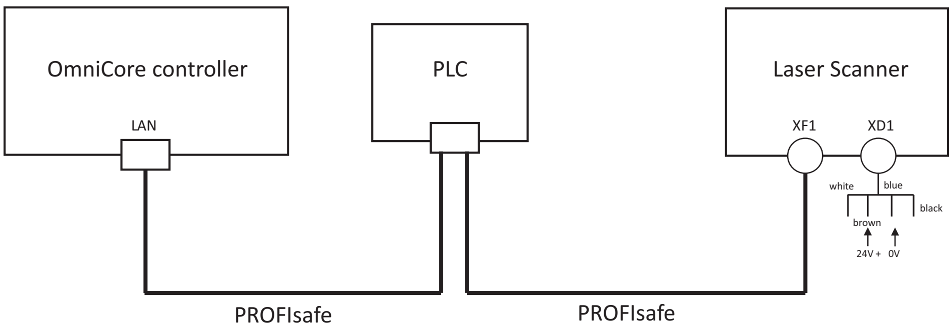
For more details about the safety laser scanners, see *Operating instructions microScan3 - PROFINET* and *Operating instructions microScan3 - Pro I/O* from the vendor, which are available on *SICK®* website.

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



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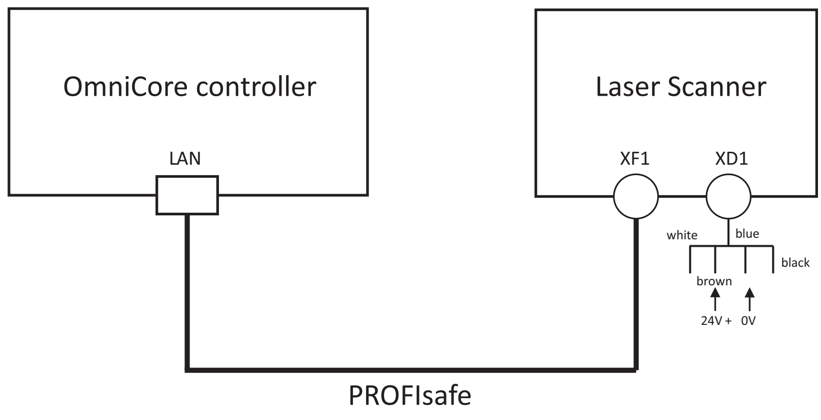
1 PROFIsafe-based laser scanner (option 3051-1), without PLC connected



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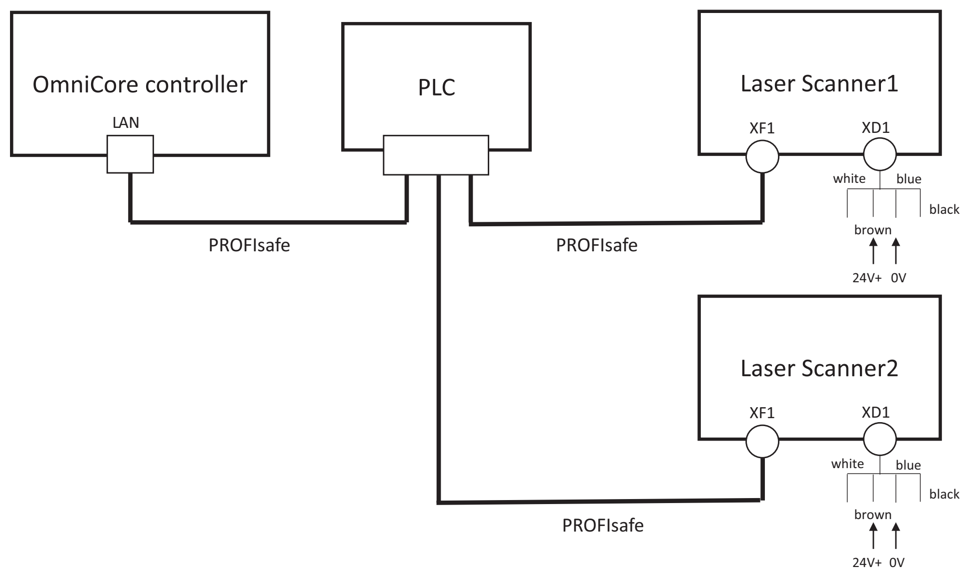
2 PROFIsafe-based laser scanners (option 3051-3), with PLC connected



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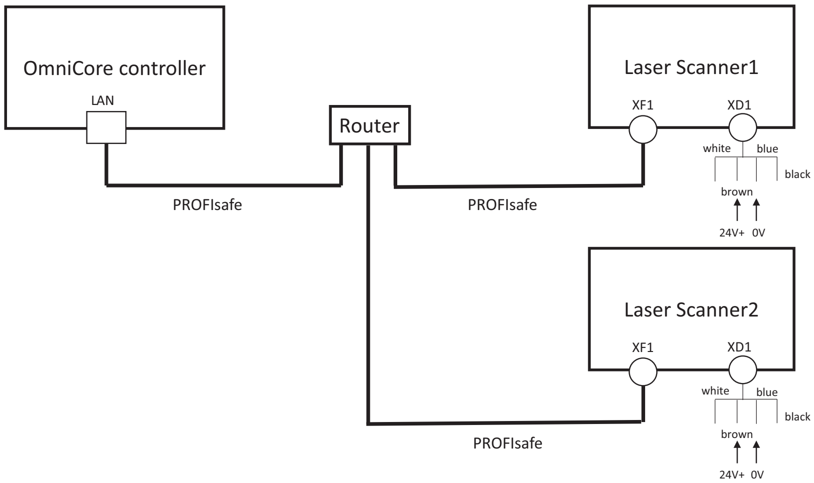
2 PROFIsafe-based laser scanners (option 3051-3), without PLC connected



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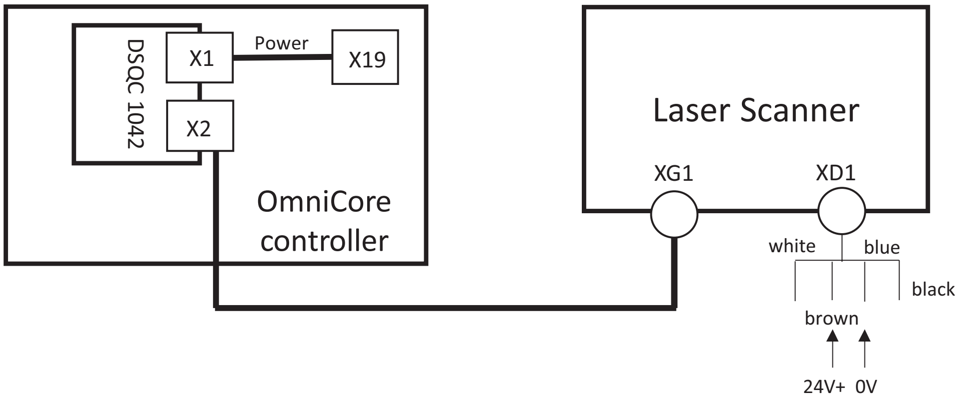
1 SafetyIO-based laser scanner (option 3051-2)



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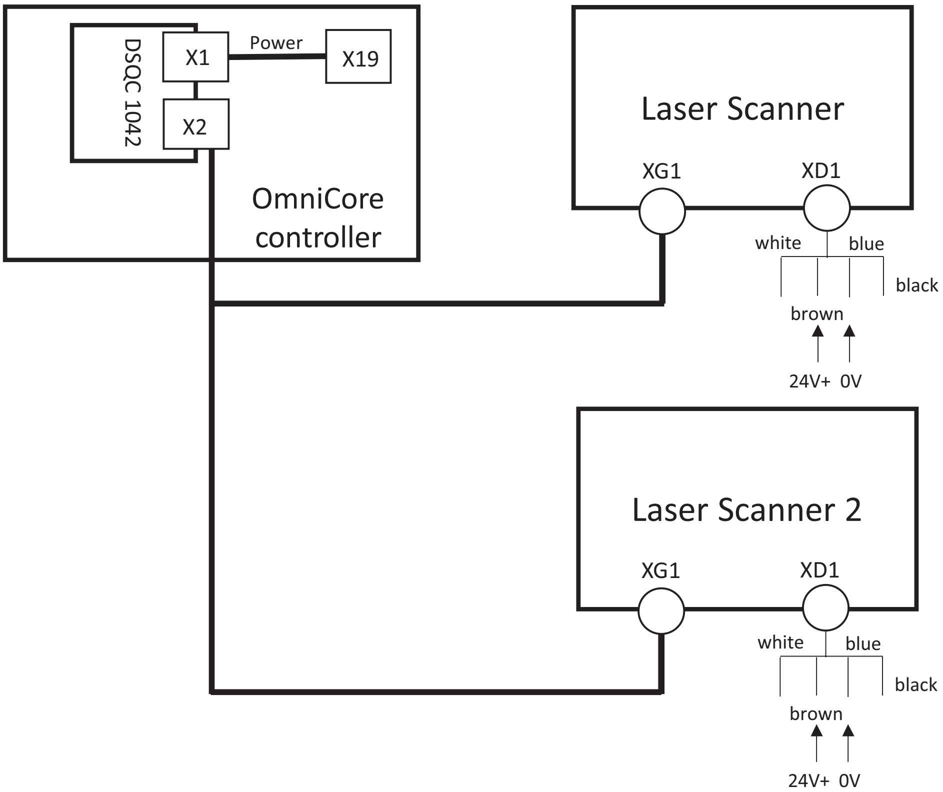
2 SafetyIO-based laser scanners (option 3051-4)



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Note

For PROFIsafe-based laser scanner, if working with the CRB 1300 in a version 1.2.1 or earlier, the scanners should connect to the WAN port on the controller.

Note

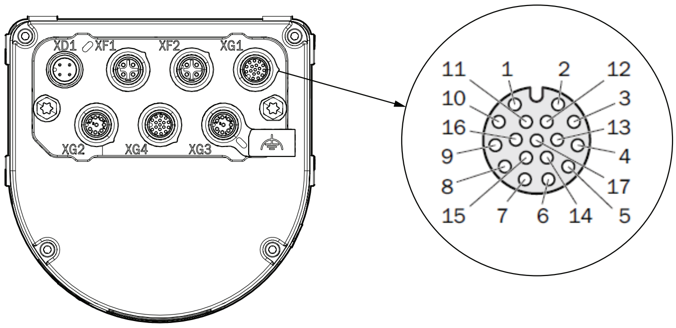
If there are additional scalable I/O devices available, install and configure the additional devices by following the detailed procedures in *Application manual - Scalable I/O*.

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.



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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

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.

Continues on next page

For details about how to configure the scanners and required actions for scenarios such as RobotWare update or rollback, see *Application manual - Collaborative Speed Control add-in*.

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. **Note** For advanced users, it is also possible to use the do the wrist optimization using the RAPID instruction `WristOpt`, see *Technical reference manual - RAPID Instructions, Functions and Data types*. This instruction is only available for OmniCore robots.	Wrist Optimization

Continues on next page

Brief description of calibration methods

Axis Calibration method

Axis Calibration is a standard calibration method for calibration of CRB 1300. It is the recommended method in order to achieve proper performance.

The following routines are available for the Axis Calibration method:

- Fine calibration
- 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*.

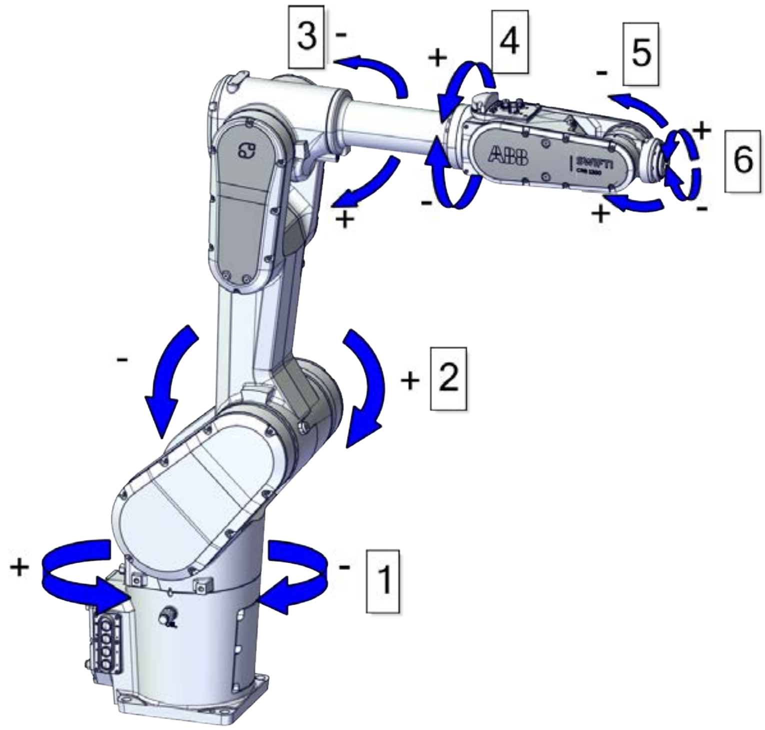
If a service operation is done to a robot with the option Absolute Accuracy, a new absolute accuracy calibration is required in order to establish full performance. For most cases after replacements that do not include taking apart the robot structure, standard calibration is sufficient.

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 Fine calibration

General

The fine calibration is done with the Axis calibration method.



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Axes

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

1.4.3 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.

> **Note**
>
> Singularities might appear in slightly different positions on a real robot compared to RobotStudio, where *Absolute Accuracy* is off compared to the real controller.

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.

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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
- 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 1300-11/0.9	0.15	0.30	100
CRB 1300-10/1.15	0.15	0.35	100
CRB 1300-7/1.4	0.20	0.40	100
	0.30	0.70	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.

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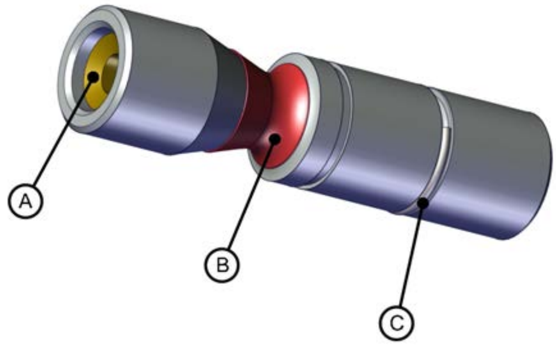

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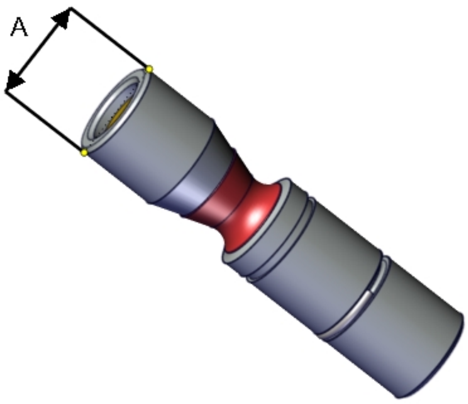
A	Tube insert
B	Plastic protection
C	Steel spring ring

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.



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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.

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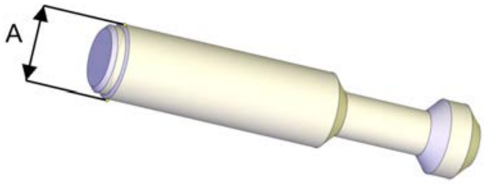
.



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A	Outer diameter

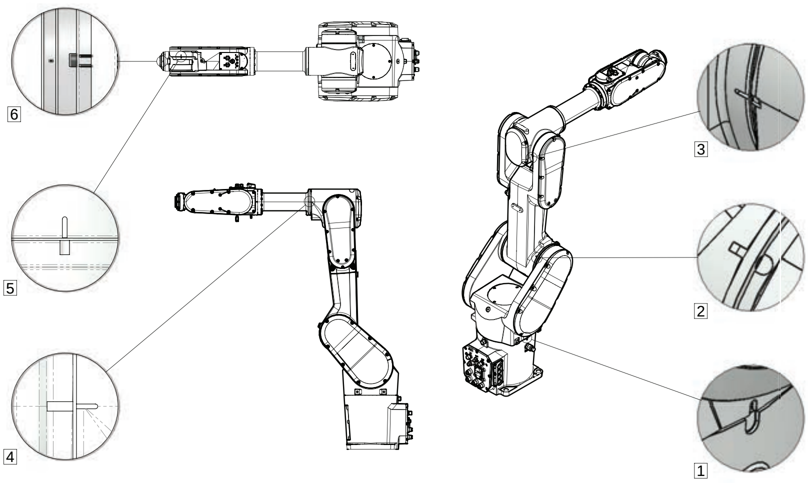
1.4.4 Synchronization marks and axis movement directions

1.4.4.1 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 1300



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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 (1 kg for reach 0.9m) 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.

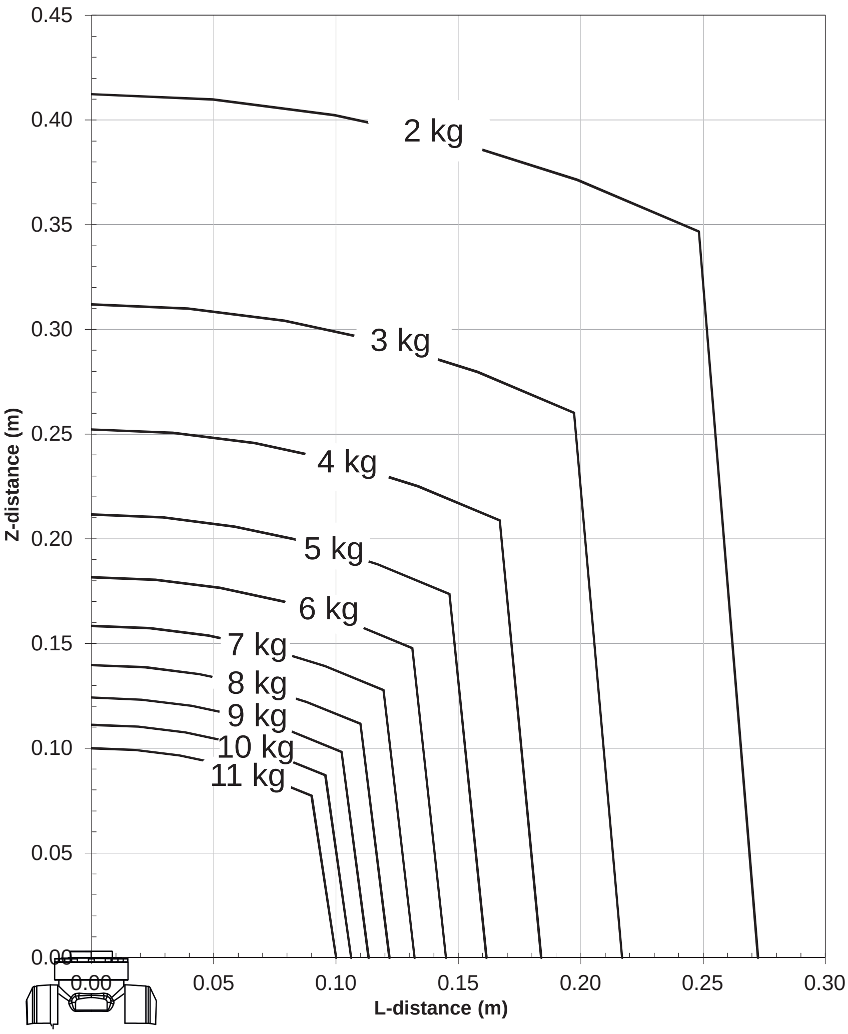
Control of load case with RobotLoad

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

CRB 1300-11/0.9



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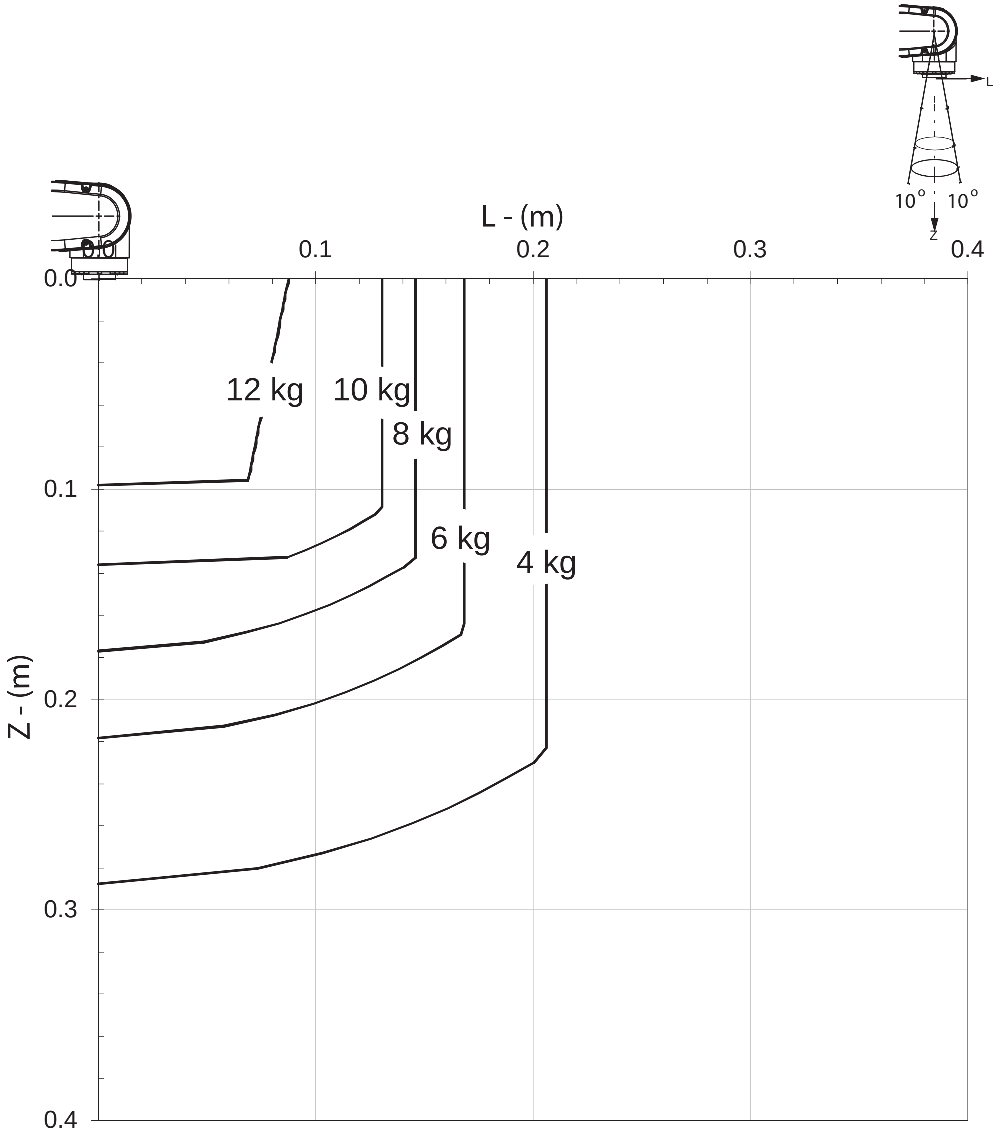
CRB 1300-11/0.9 "Vertical Wrist" (±10°)



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

	Description
Max load	12 kg
Z_{max}	0.098 m
L_{max}	0.088 m

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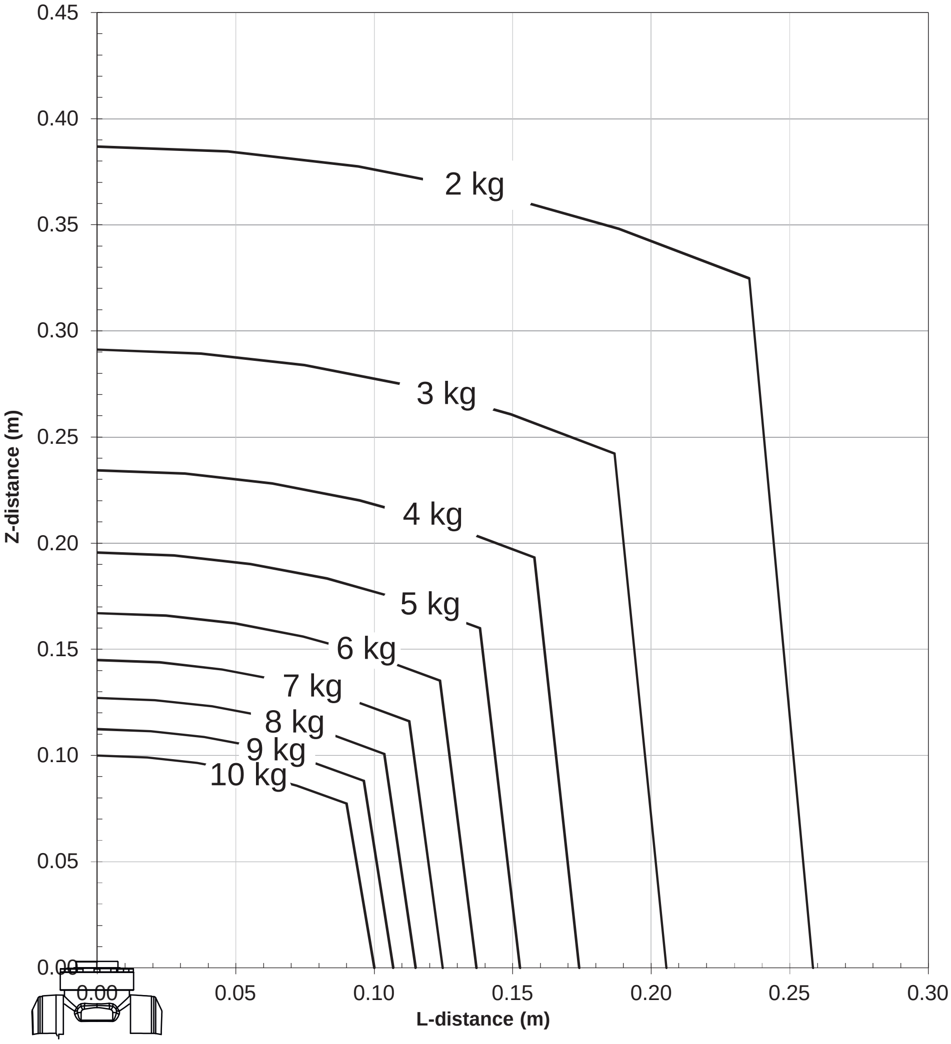
CRB 1300-10/1.15



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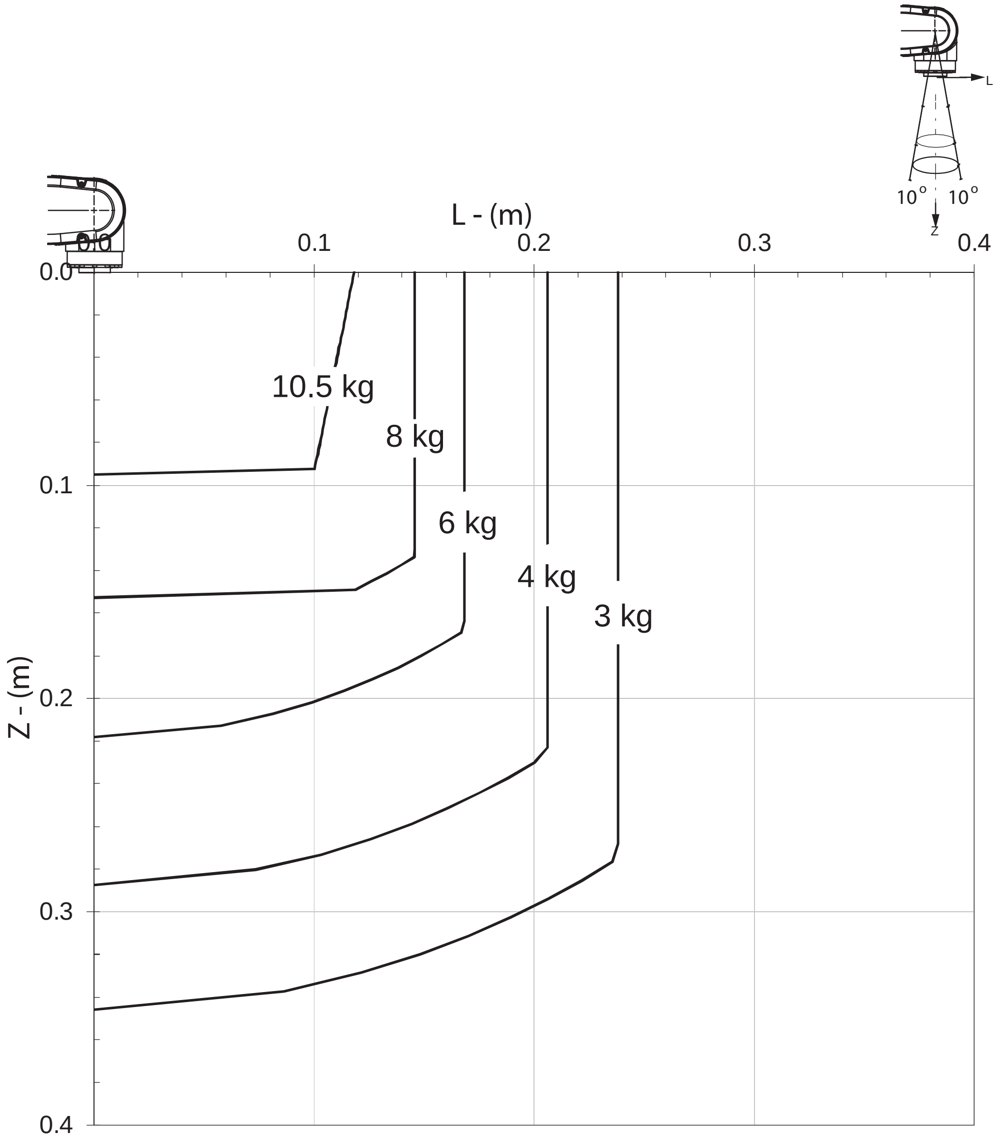
CRB 1300-10/1.15 "Vertical Wrist" (±10°)



xx2000001101

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

	Description
Max load	10.5 kg
Z_{max}	0.095 m
L_{max}	0.118 m

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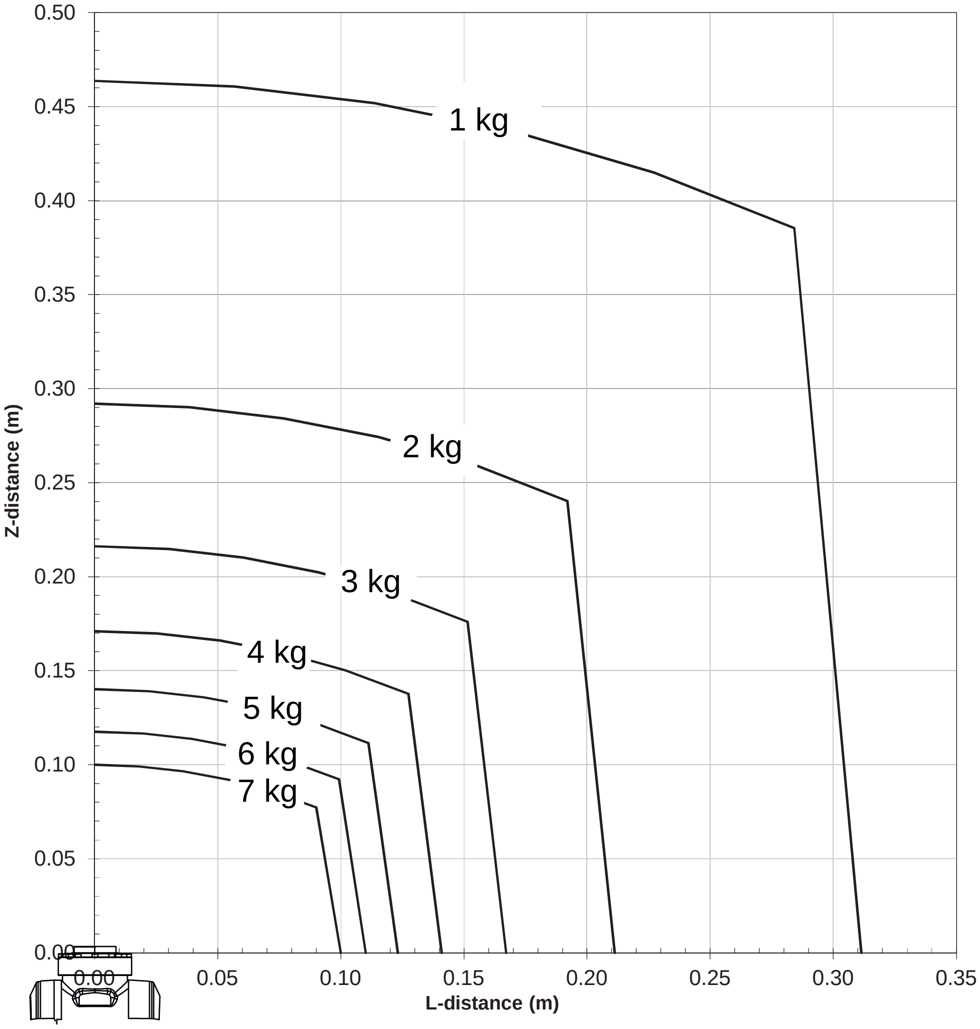
CRB 1300-7/1.4



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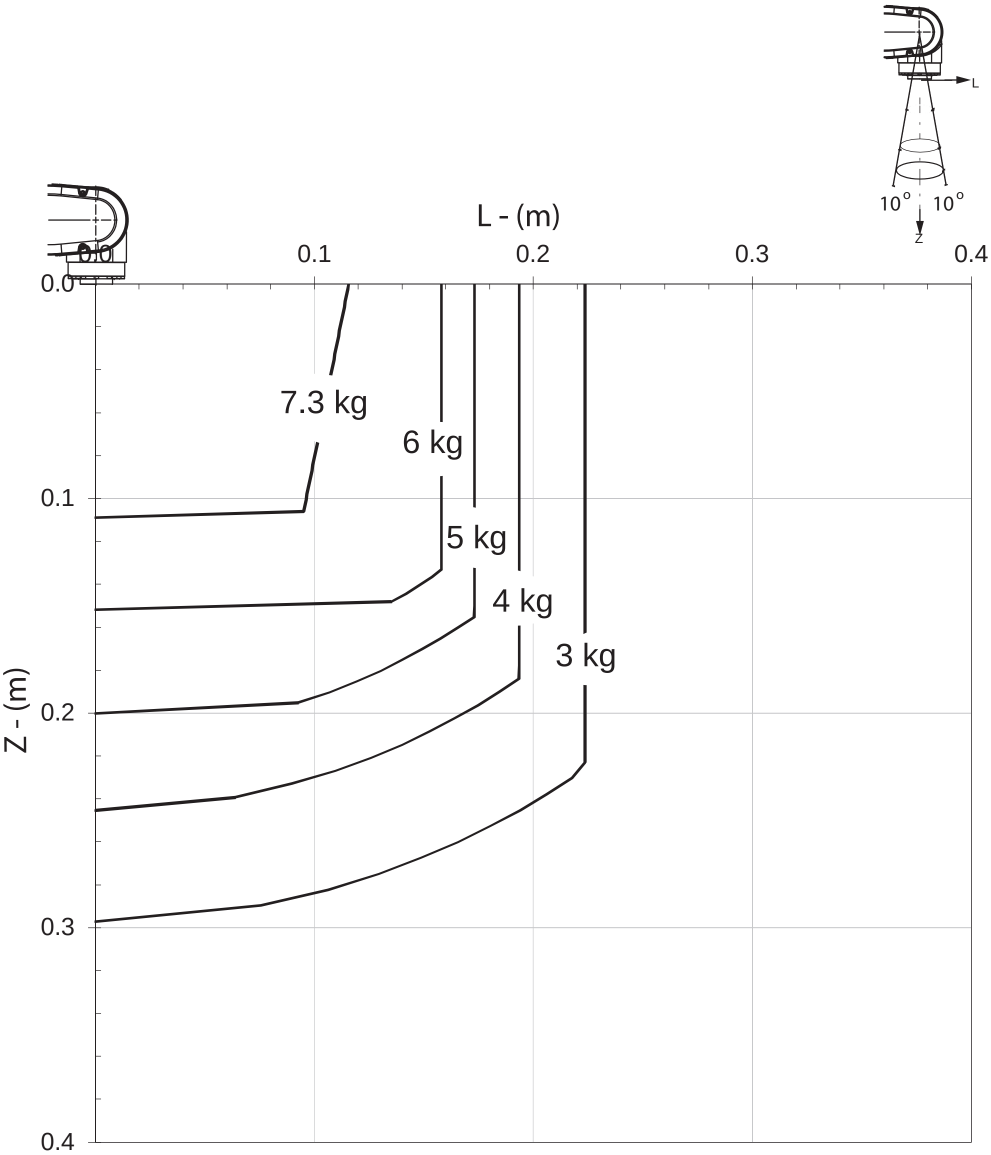
CRB 1300-7/1.4 "Vertical Wrist" (±10°)



xx2000001100

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

	Description
Max load	7.3 kg
Z_{max}	0.109 m
L_{max}	0.116 m

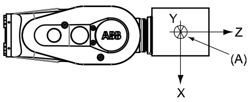
1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement

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 (±130^o)

Axis	Robot type	Maximum moment of inertia
5	CRB 1300-11/0.9 CRB 1300-10/1.15	Ja_5 = Load x $((Z + 0.09)^2 + L^2)$ + max (J_{ox}, J_{oy}) ≤ 0.6 kgm^2
5	CRB 1300-7/1.4	Ja_5 = Load x $((Z + 0.09)^2 + L^2)$ + max (J_{ox}, J_{oy}) ≤ 0.5 kgm^2
6	CRB 1300-11/0.9 CRB 1300-10/1.15 CRB 1300-7/1.4	Ja_6 = Load x L^2 + Joz ≤ 0.2 kgm^2



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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.

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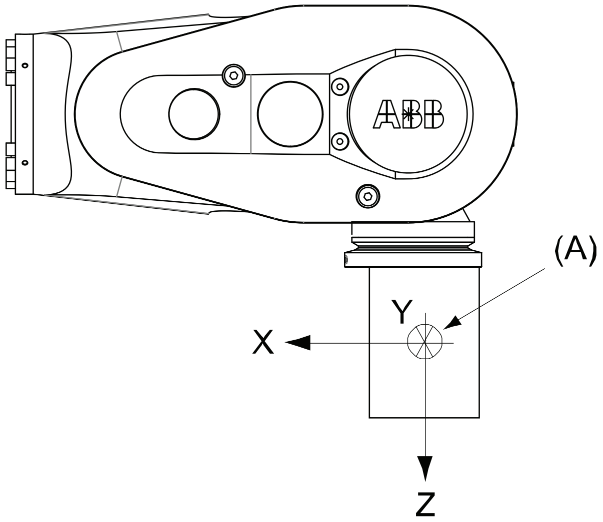
Limited axis 5, center line down

Axis	Robot type	Maximum moment of inertia
5	CRB 1300-11/0.9 CRB 1300-10/1.15	Ja_5 = Load x $((Z + 0.09)^2 + L^2)$ + max $(J_{ox}, J_{oy}) \leq 0.6\ kgm^2$
5	CRB 1300-7/1.4	Ja_5 = Load x $((Z + 0.09)^2 + L^2)$ + max $(J_{ox}, J_{oy}) \leq 0.5\ kgm^2$
6	CRB 1300-11/0.9 CRB 1300-10/1.15 CRB 1300-7/1.4	Ja_6 = Load x $L^2 + J_{oz} \leq 0.2\ kgm^2$



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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 1300-11/0.9	20.45 Nm	10.8 Nm	11 kg
CRB 1300-10/1.15	18.59 Nm	9.8 Nm	10 kg
CRB 1300-7/1.4	13 Nm	6.9 Nm	7 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 1300-11/0.9	75	49.5
CRB 1300-10/1.15	68	50
CRB 1300-7/1.4	82	66

Note

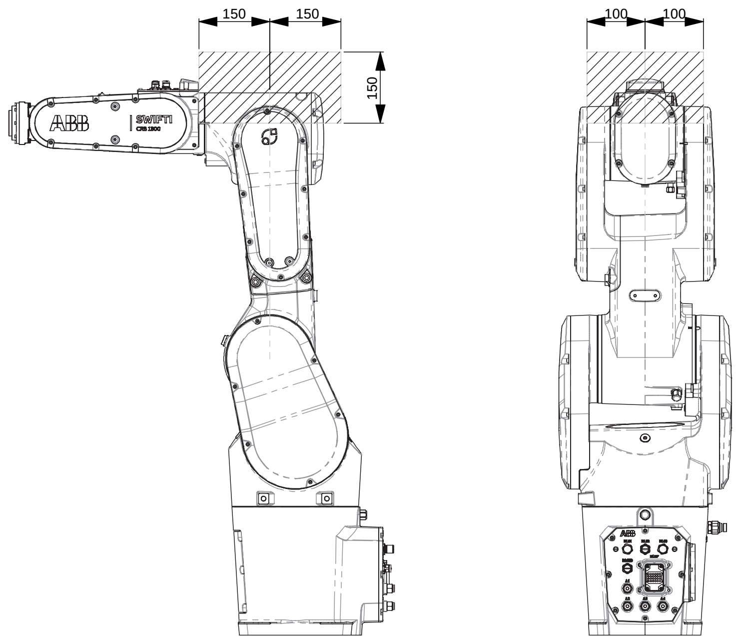
Acceleration levels for emergency stop and controlled motion includes acceleration due to gravitational forces. Nominal load is defined with nominal mass and cog with max offset in Z and L (see the load diagram).

1.6 Fitting equipment on the robot (robot dimensions)

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.



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Variant	Max. armload (kg)
CRB 1300-11/0.9	1
CRB 1300-10/1.15	0.5
CRB 1300-7/1.4	0.5

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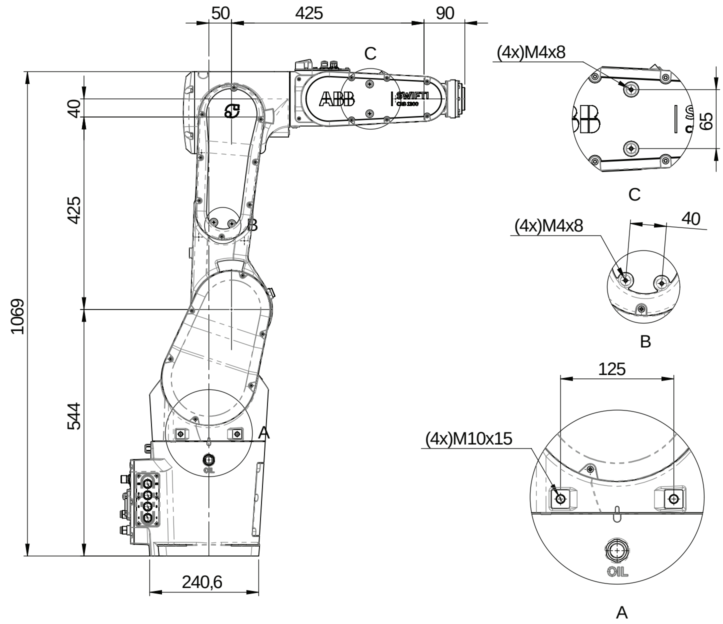
Holes for fitting extra equipment

The robot is supplied with holes for fitting extra equipment, as shown in the following figures



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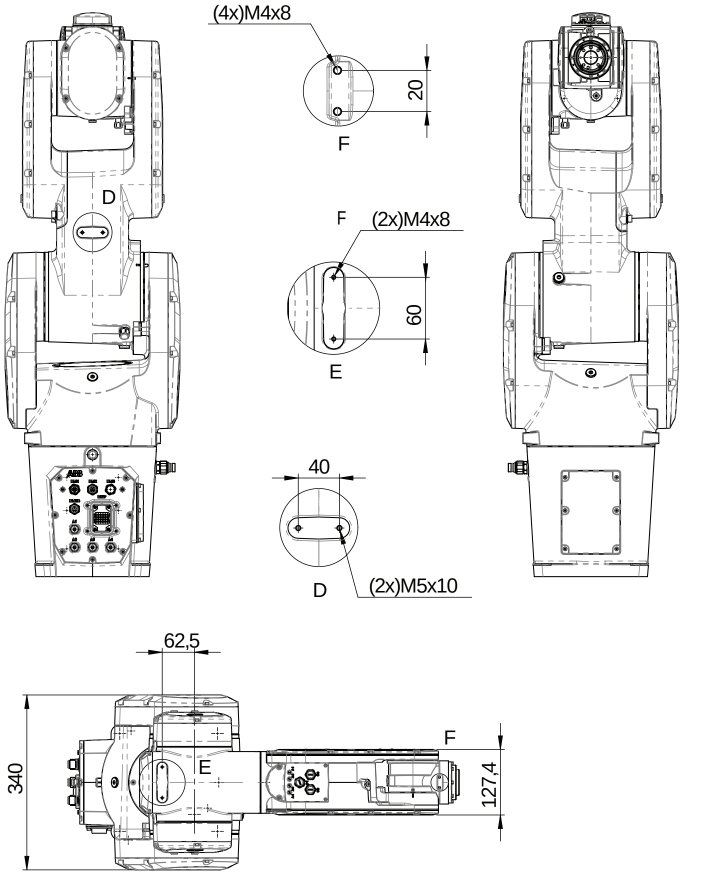

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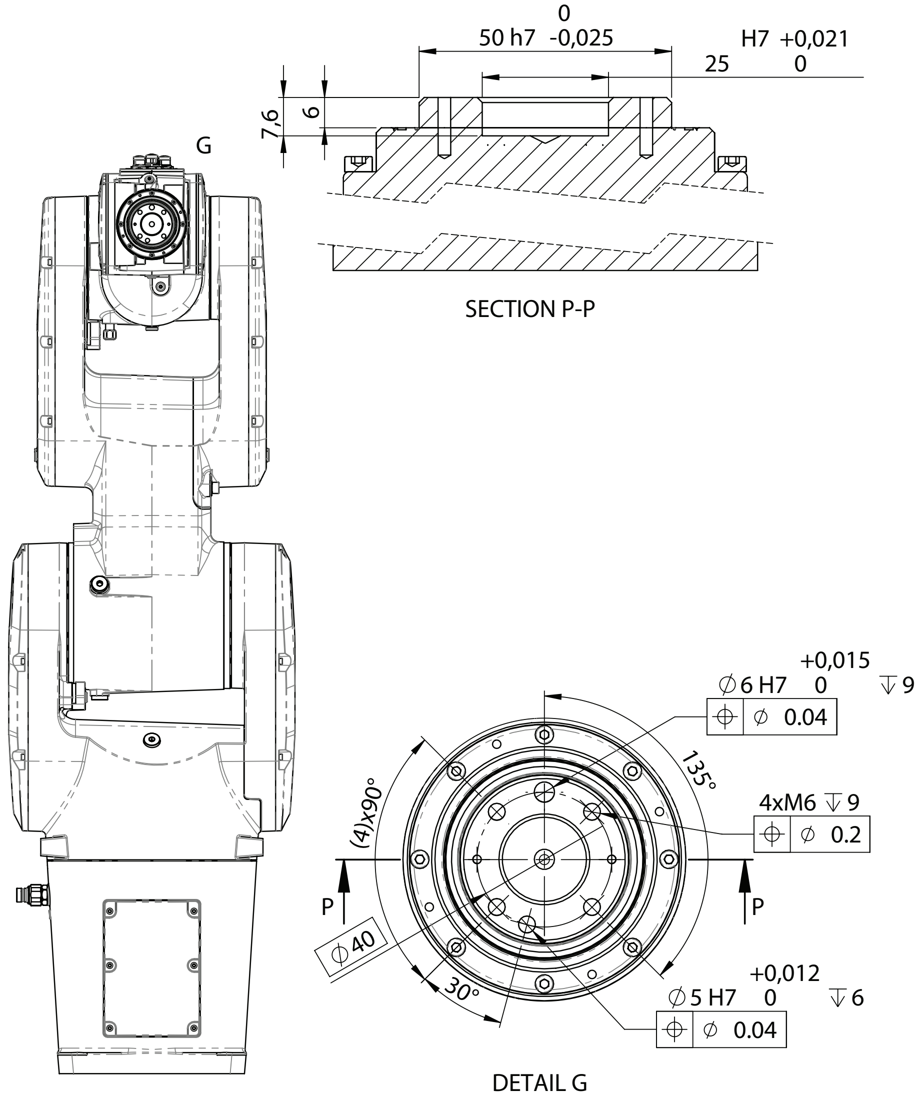
Tool flange standard



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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.
- Oil 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 1300*.

1.8 Robot motion

1.8.1 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 22*.

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	yes	no
Axis 5	yes	no
Axis 6	no	no

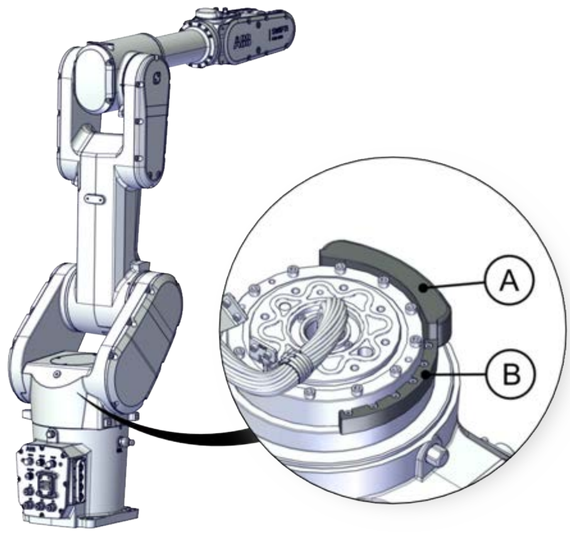
i Part of the casting or fixed on the casting and can not /should not be removed.

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 Mechanically restricting the working range

Location of mechanical stops

Axis 1



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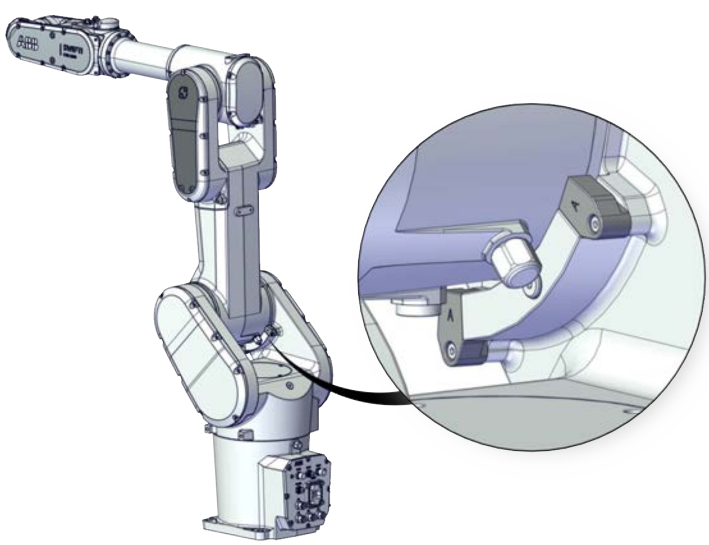
A	Mechanical stop, axis 1, slider
B	Mechanical stop, axis 1, fixed block

Axis 2



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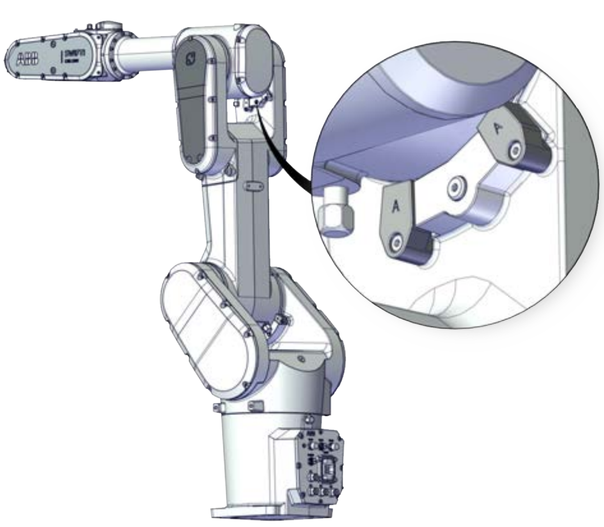
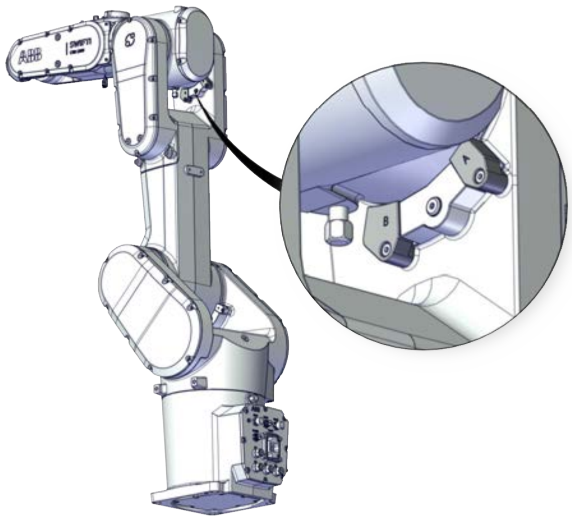
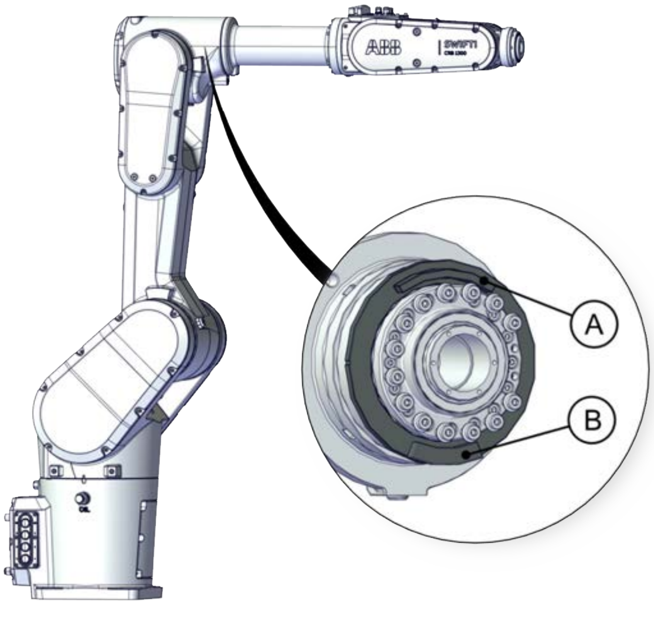
Axis 3

CRB 1300-11/0.9, CRB 1300-7/1.4	CRB 1300-10/1.15
 xx2200001136	 xx2200001139

Axis 4



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A	Mechanical stop, axis 4, flange
B	Mechanical stop, axis 4, slider

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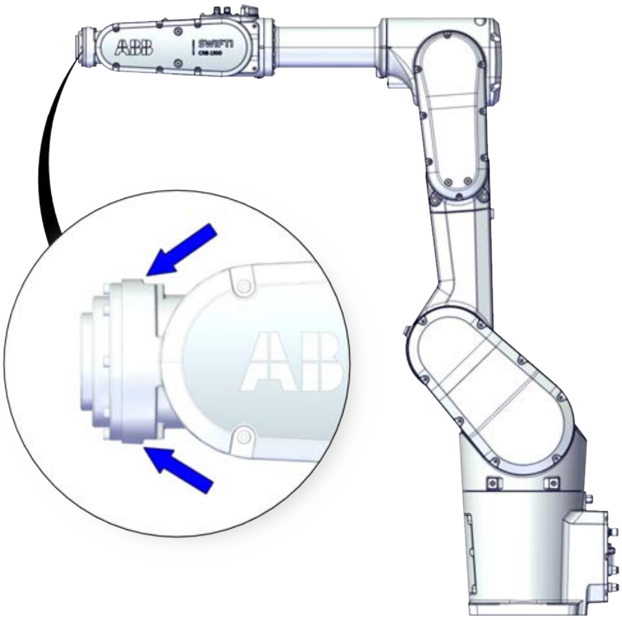
Axis 5



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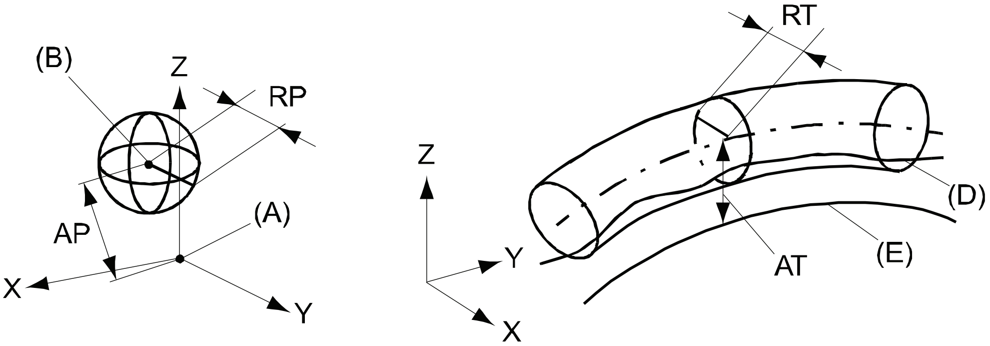
1.8.3 Performance according to ISO 9283

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.



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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 1300	11/0.9	10/1.15	7/1.4
Pose accuracy, AP[i] (mm)	0.02	0.025	0.02
Pose repeatability, RP (mm)	0.02	0.023	0.03
Pose stabilization time, PSt (s) within 0.1 mm of the position	0.28	0.27	0.38
Path accuracy, AT (mm)	1.01	0.98	1.49
Path repeatability, RT (mm)	0.08	0.04	0.07

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 (full performance)

with OmniCore C30/C90XT

Robot type	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
CRB 1300-11/0.9	243 °/s	225 °/s	330 °/s	500 °/s	420 °/s	720 °/s
CRB 1300-10/1.15	238 °/s	228 °/s	336 °/s	500 °/s	420 °/s	720 °/s
CRB 1300-7/1.4	249 °/s	180 °/s	247 °/s	500 °/s	420 °/s	720 °/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 69*.

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 45*.

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.

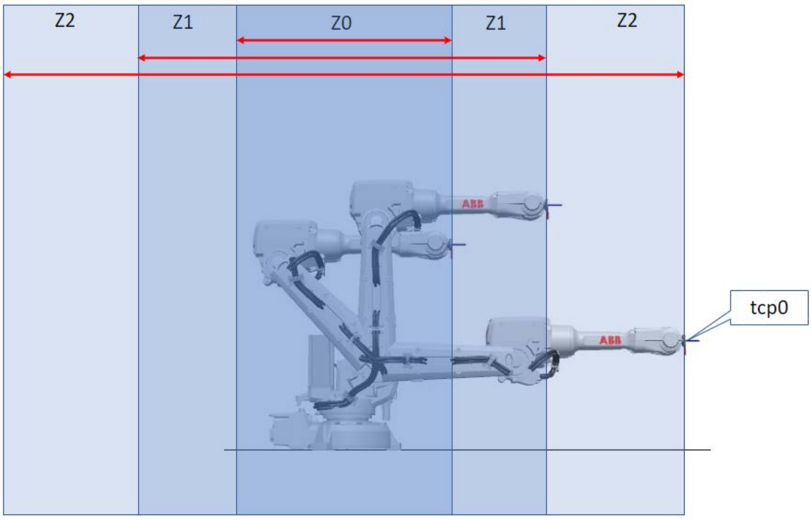
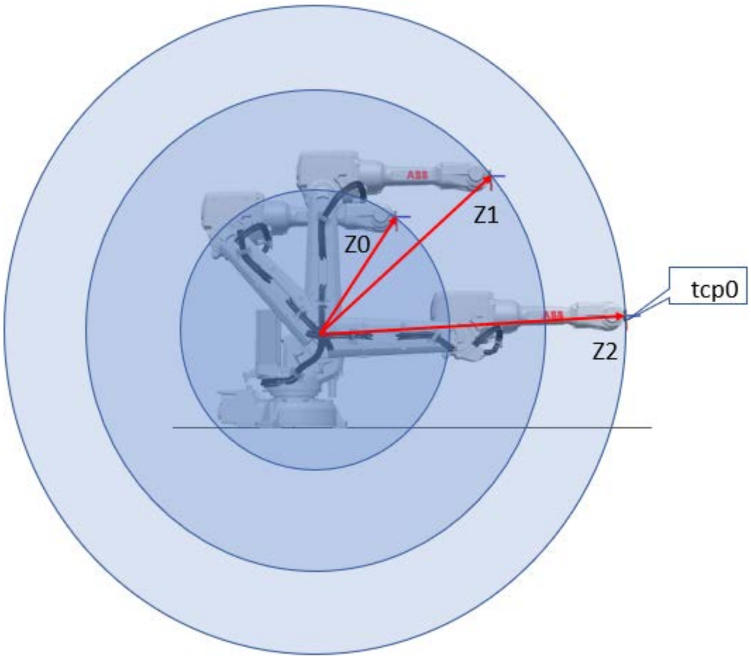
	Illustration
Axis 1	 xx2300000860
Axis 2	 xx2300000861

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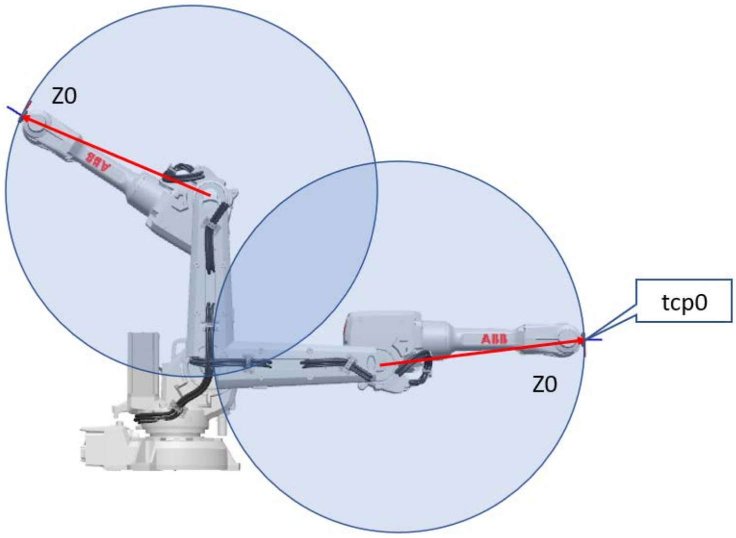
	Illustration
Axis 3	 xx2300000862

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

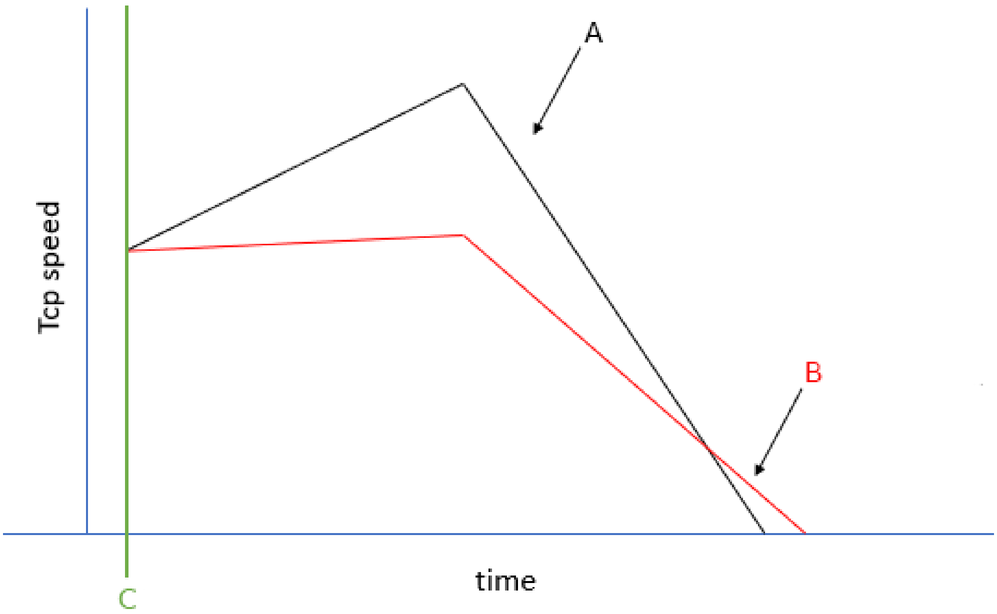
The data for stop category 0 is presented in tables, with distance and time for each axis.

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.

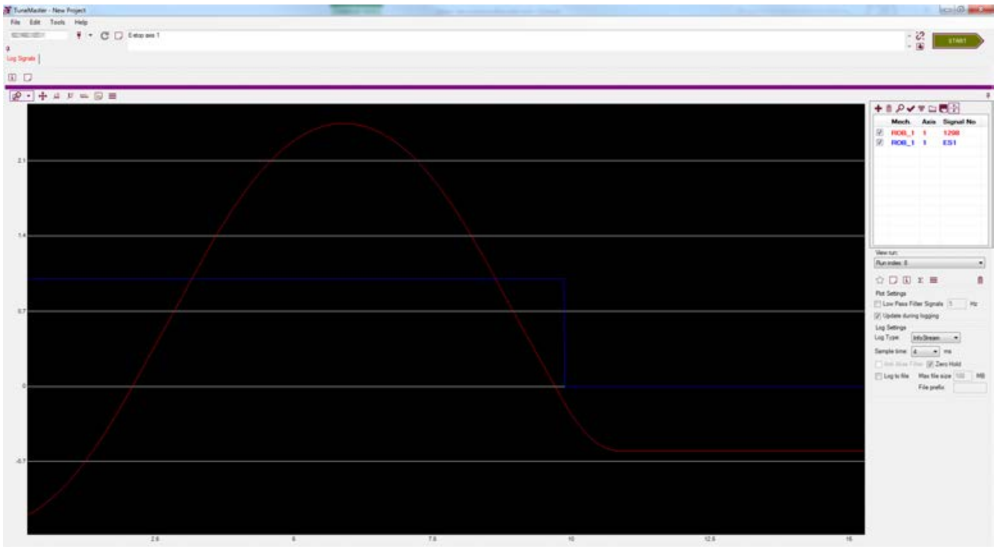
Continues on next page

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



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1.9.3 CRB 1300 0.9 m 11 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	39.26	0.27
2	35.23	0.31
3	52.07	0.30

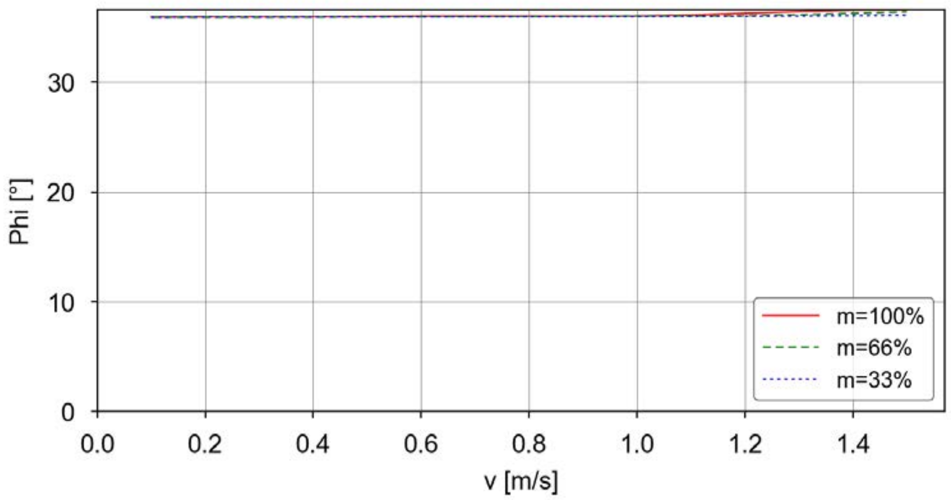
Category 1, extension zones

For definitions of the zones, see *Extension zones on page 68*.

Zone	wcp min (m)	wcp max (m)
0	0	0.301
1	0.301	0.601
2	0.601	max reach

Category 1, Axis A1

Extension zone 0, stopping distance and stopping time



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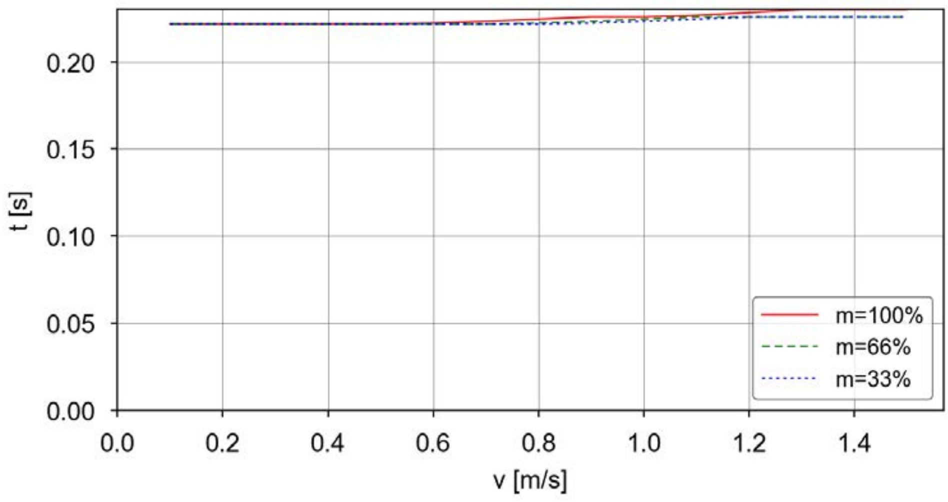
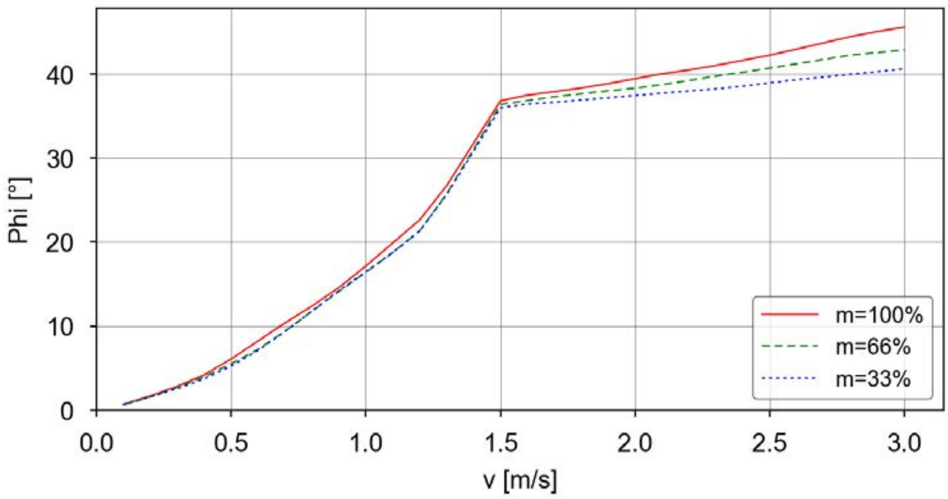
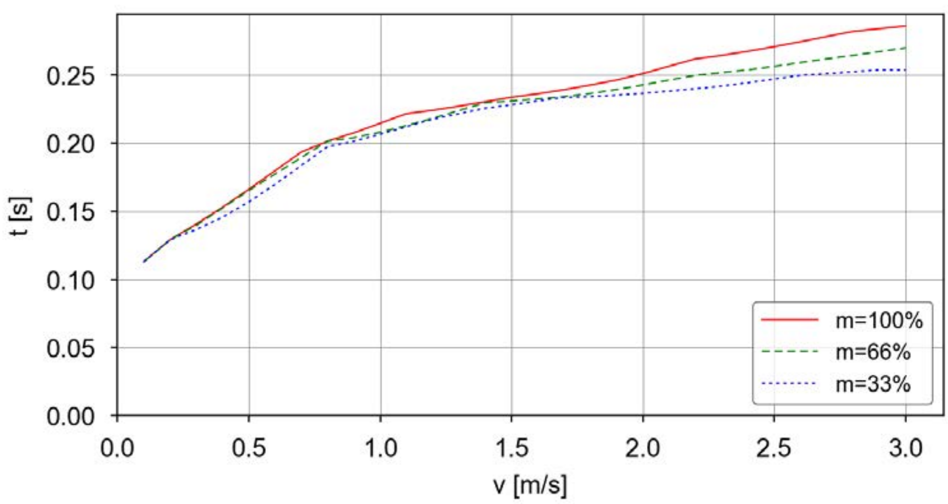


Extension zone 1, stopping distance and stopping time





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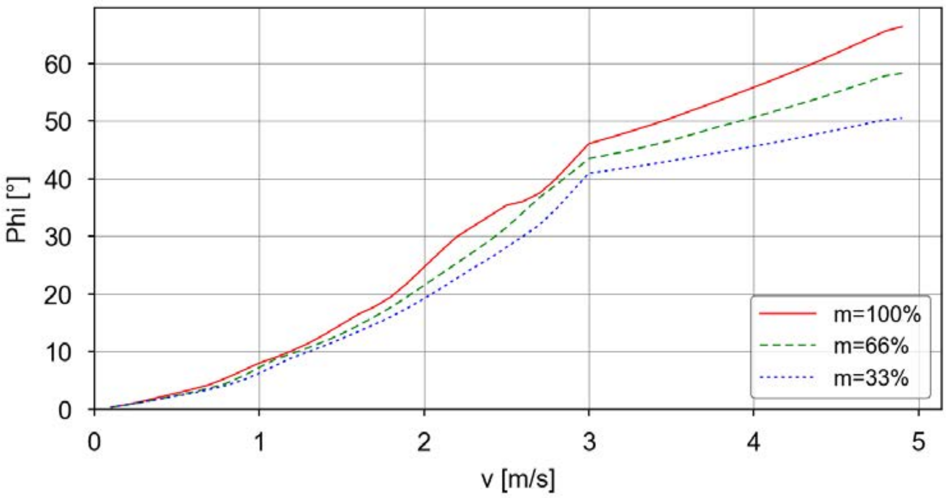
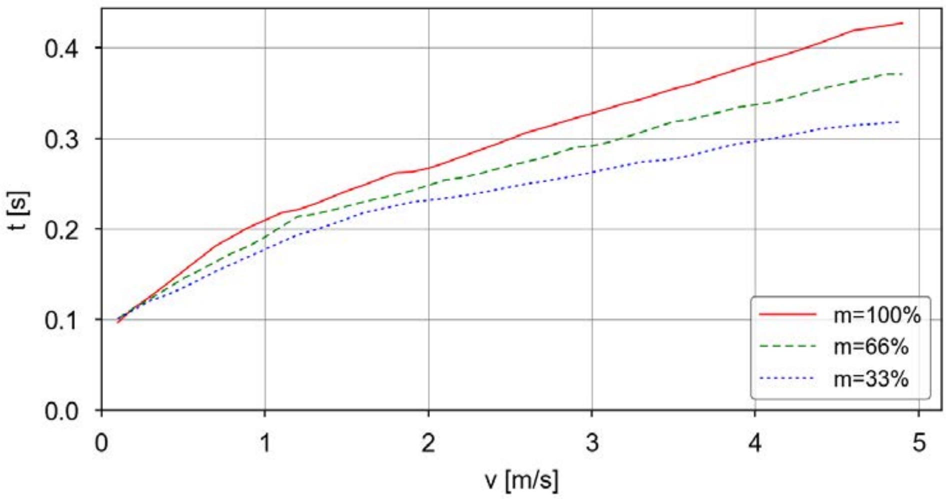
Extension zone 2, stopping distance and stopping time





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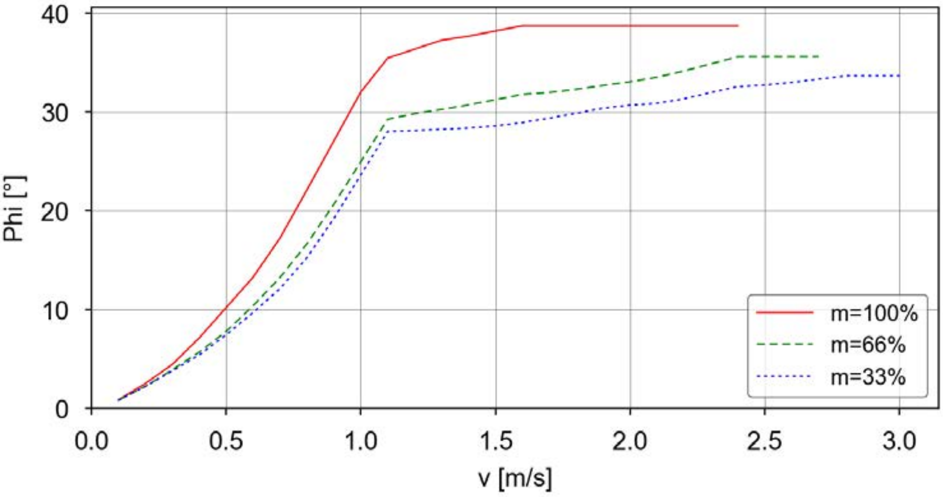
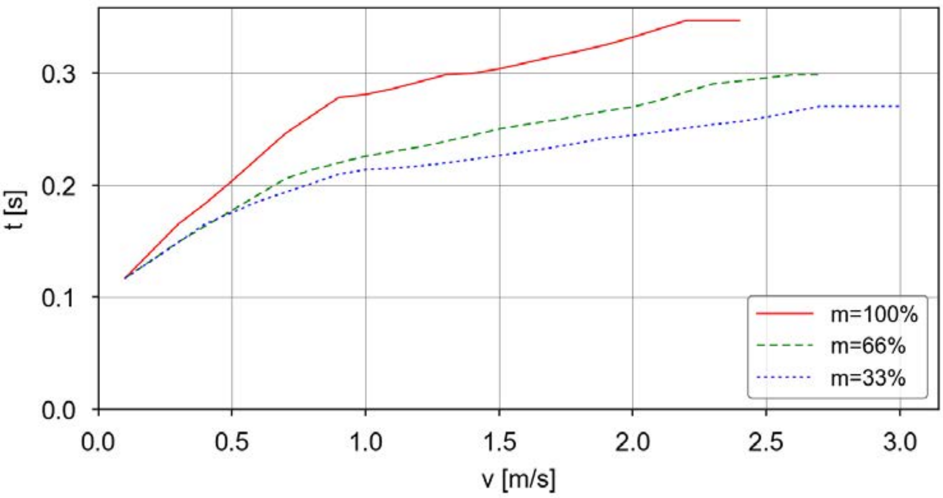
Category 1, Axis A2

Extension zone 0, stopping distance and stopping time





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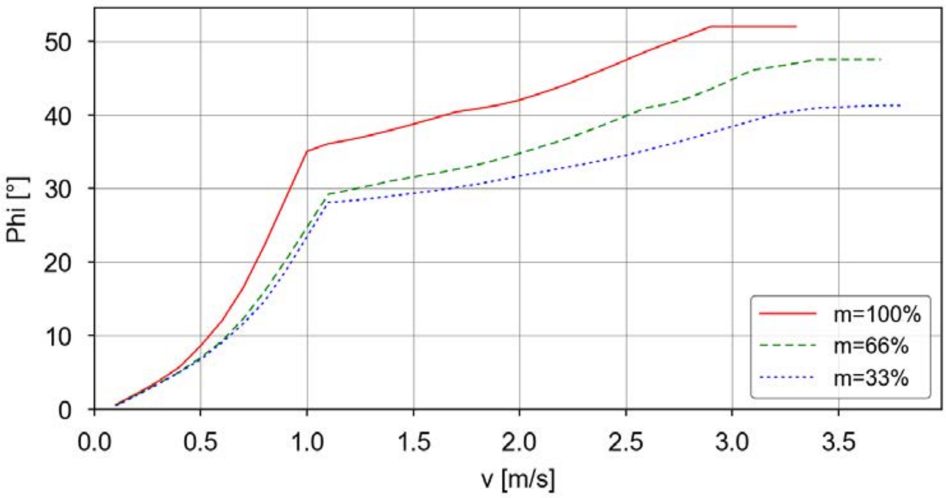
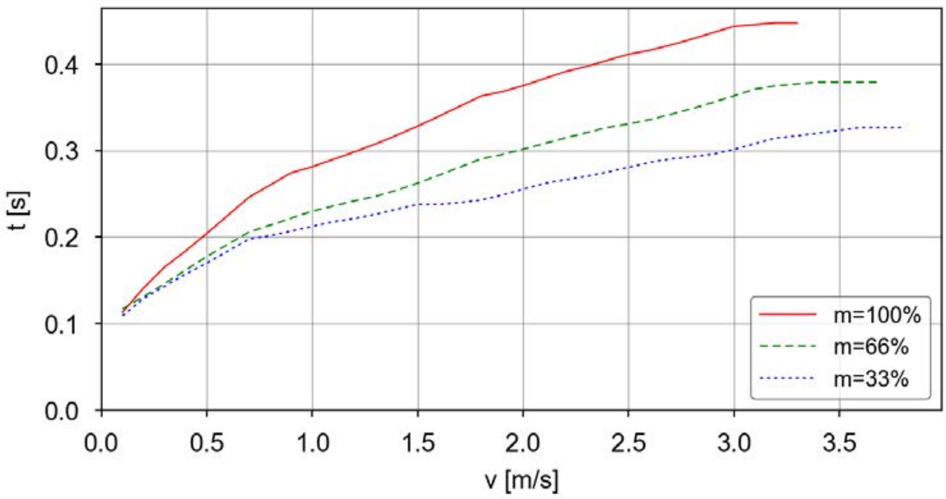
Extension zone 1, stopping distance and stopping time





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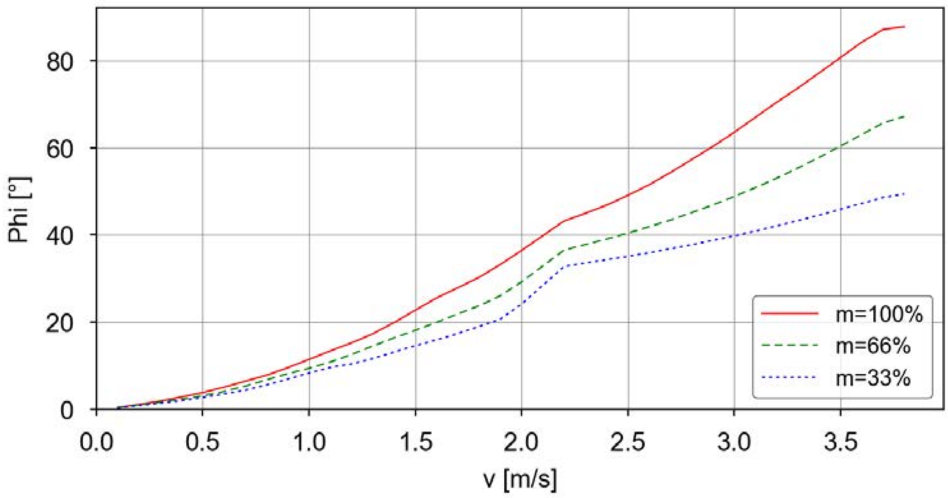
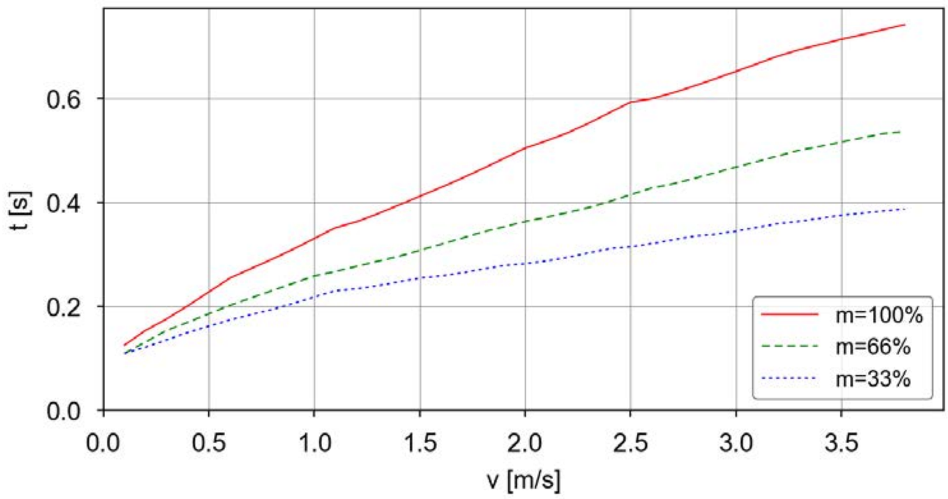
Extension zone 2, stopping distance and stopping time





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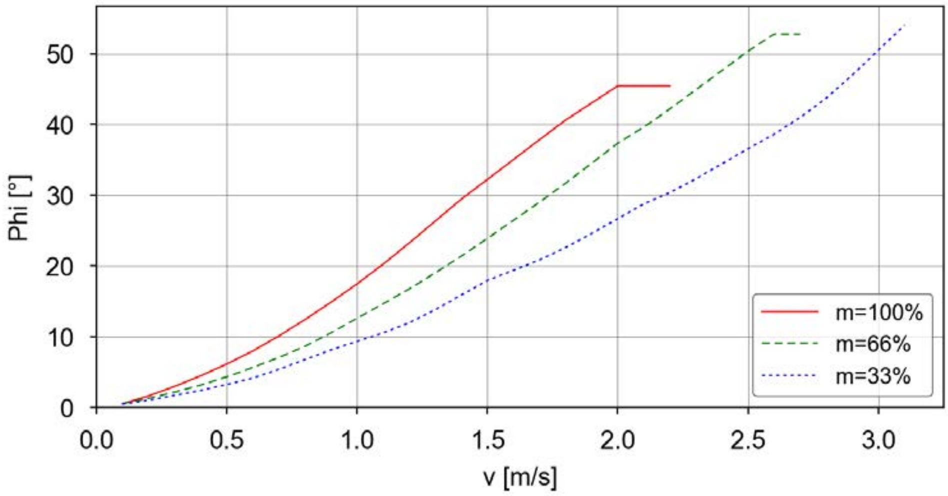
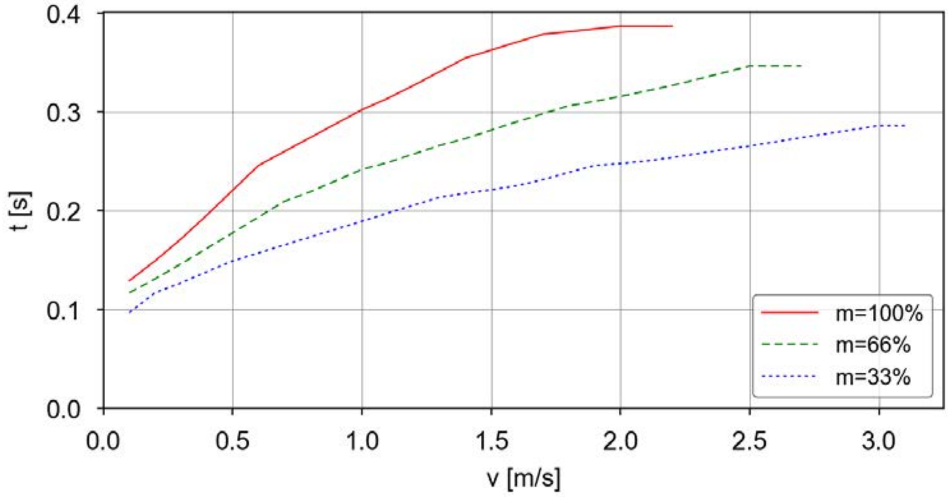
Category 1, Axis A3

Extension zone 0, stopping distance and stopping time





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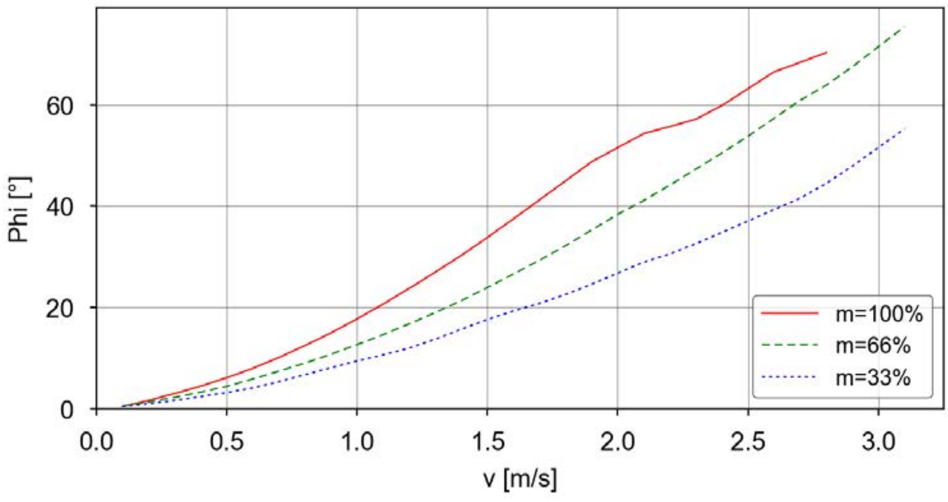
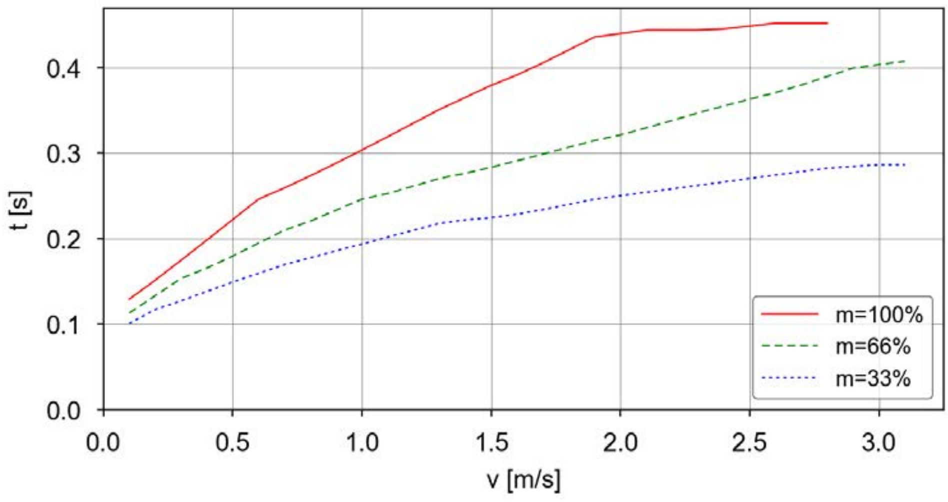
Extension zone 1, stopping distance and stopping time





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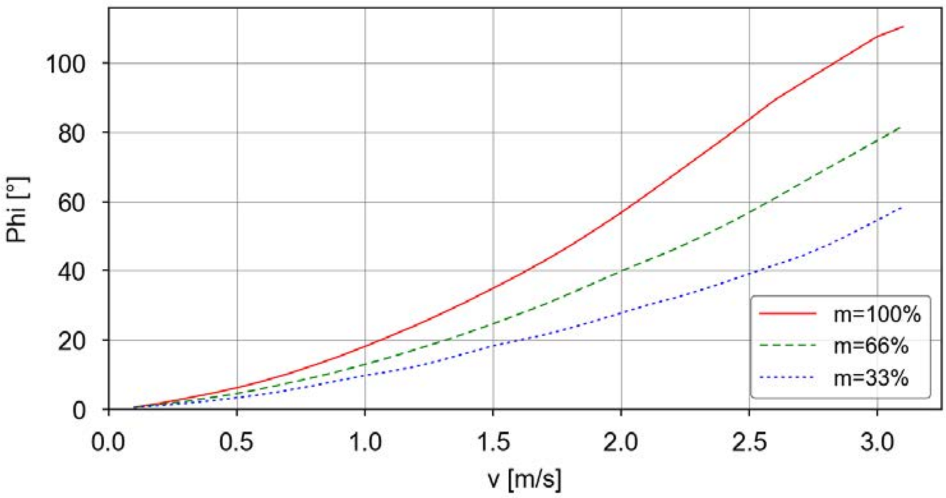
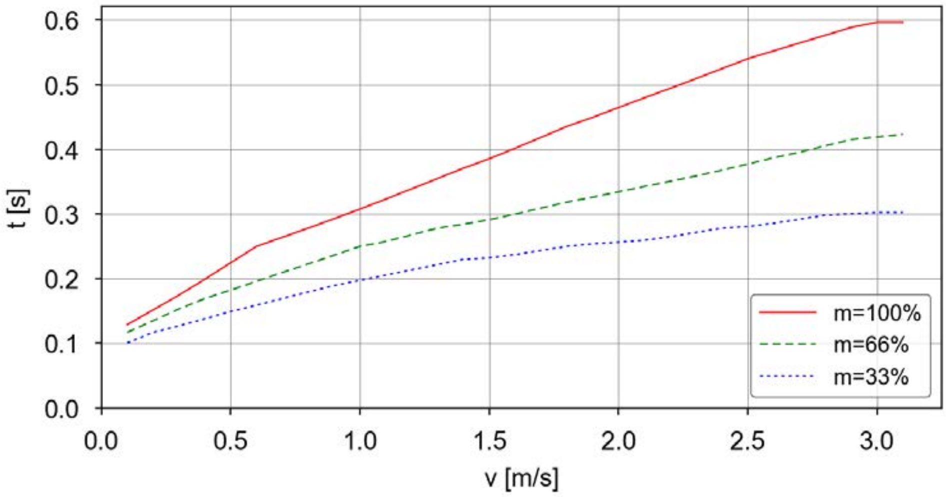
Extension zone 2, stopping distance and stopping time





1.9.4 CRB 1300 1.15 m 10 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	53.95	0.37
2	30.42	0.27
3	47.77	0.28

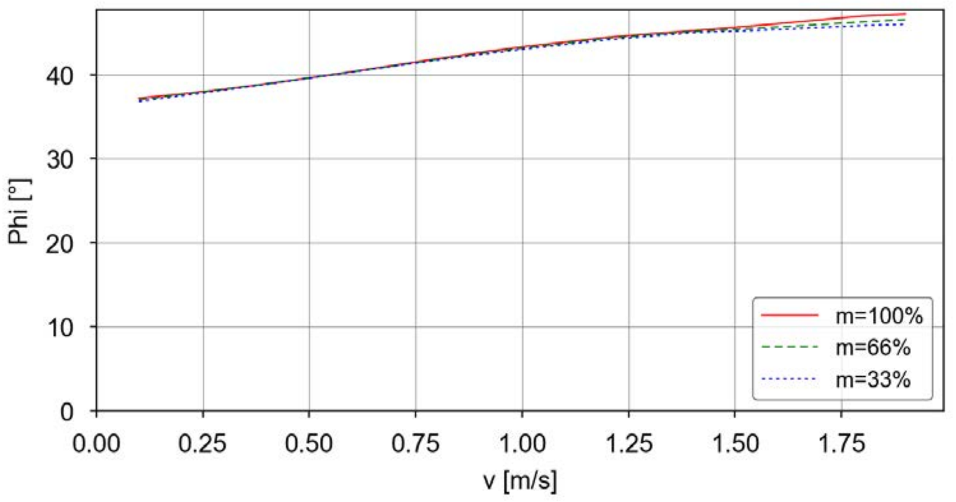
Category 1, extension zones

For definitions of the zones, see *Extension zones on page 68*.

Zone	wcp min (m)	wcp max (m)
0	0	0.384
1	0.384	0.768
2	0.768	max reach

Category 1, Axis A1

Extension zone 0, stopping distance and stopping time



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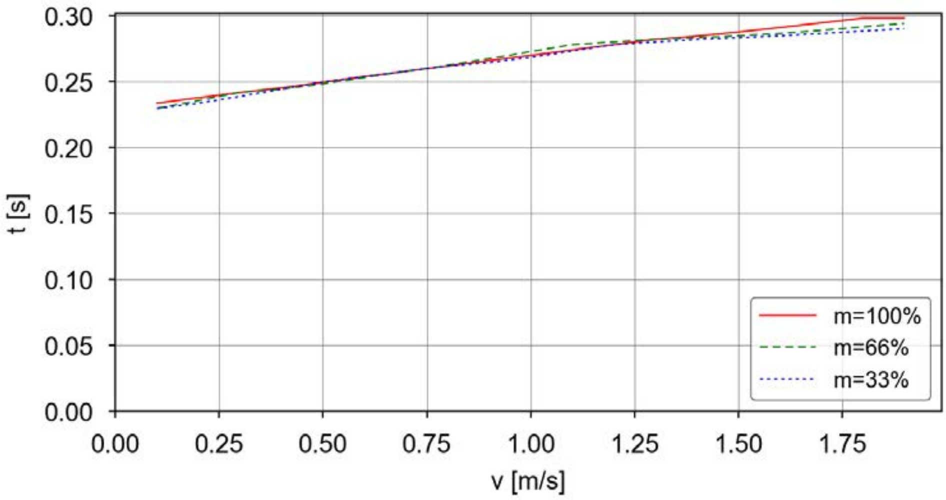
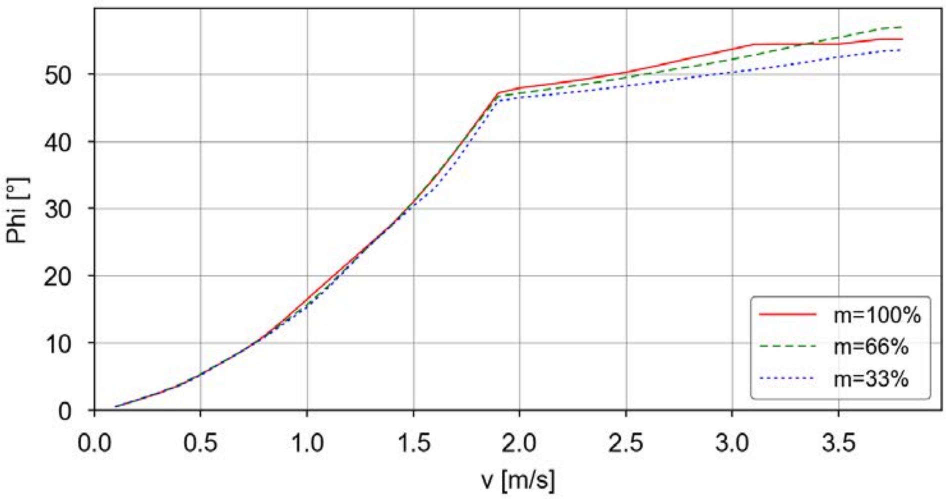
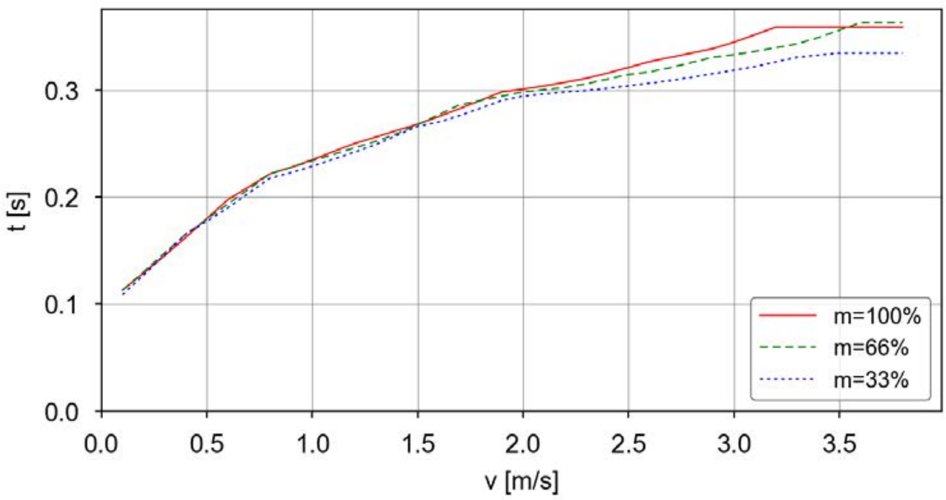


Extension zone 1, stopping distance and stopping time





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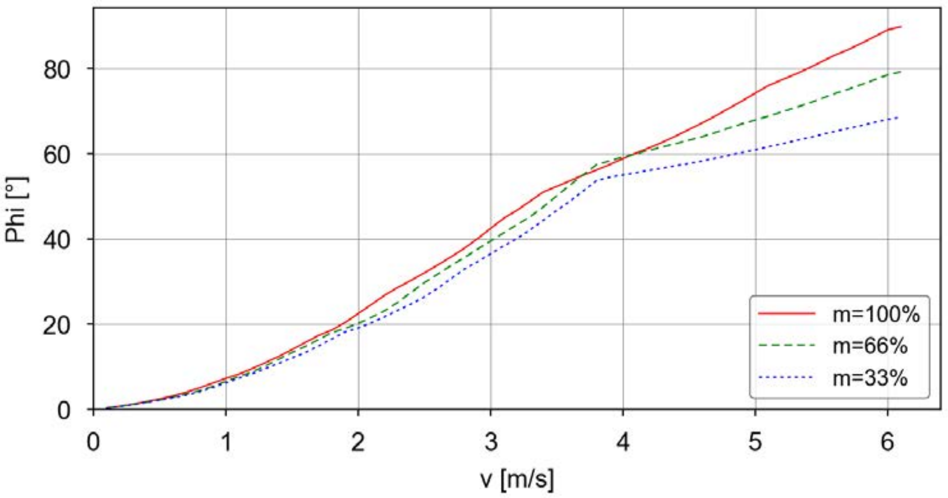
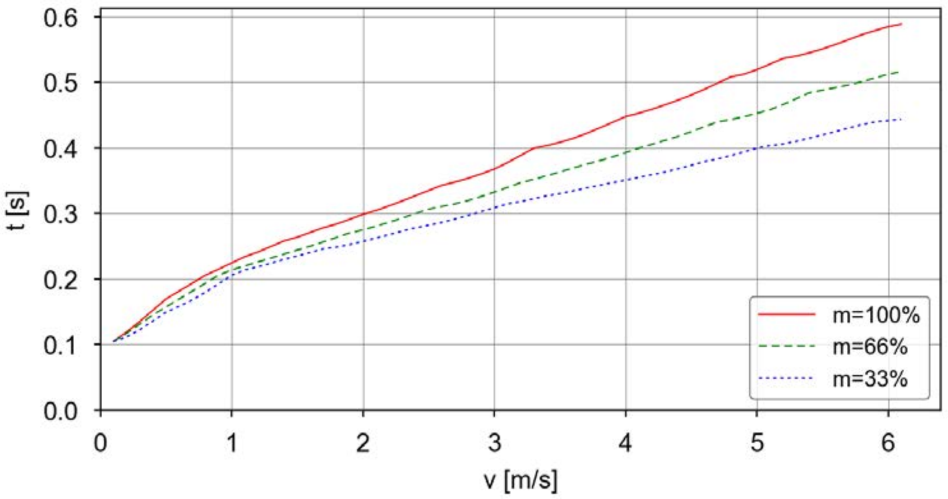
Extension zone 2, stopping distance and stopping time





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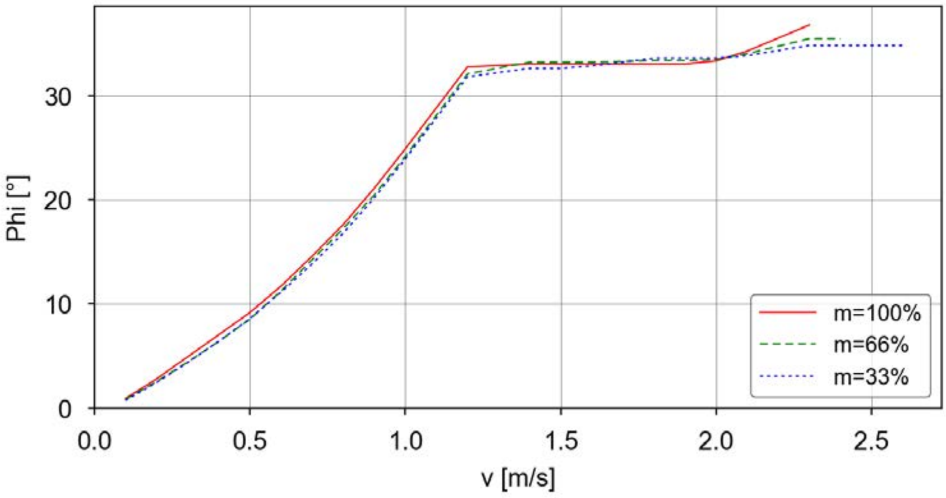
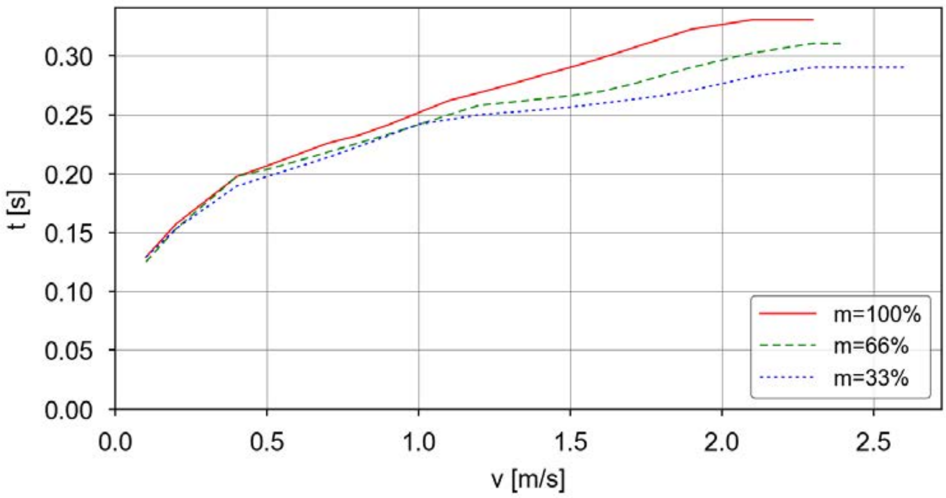
Category 1, Axis A2

Extension zone 0, stopping distance and stopping time





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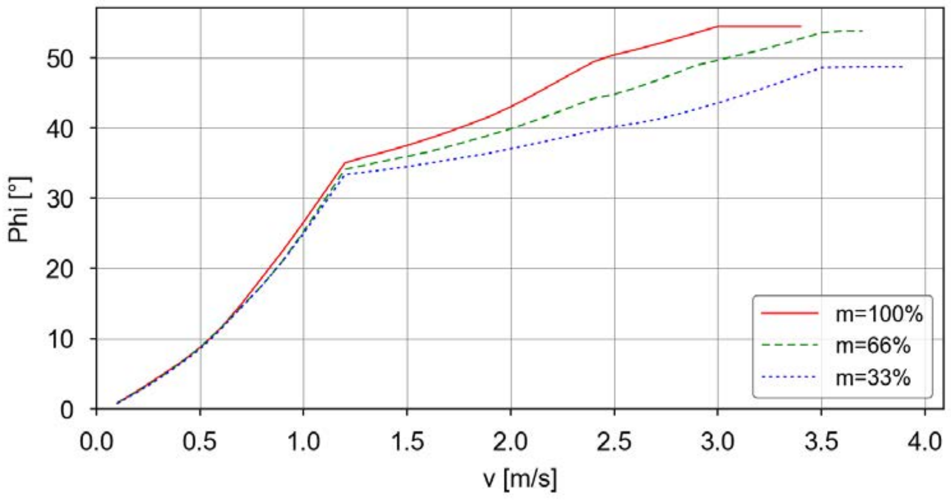
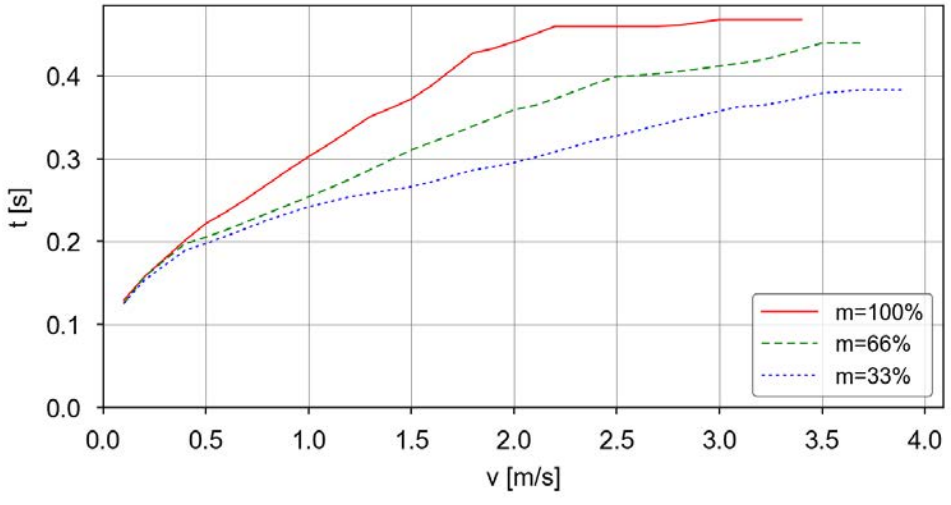
Extension zone 1, stopping distance and stopping time





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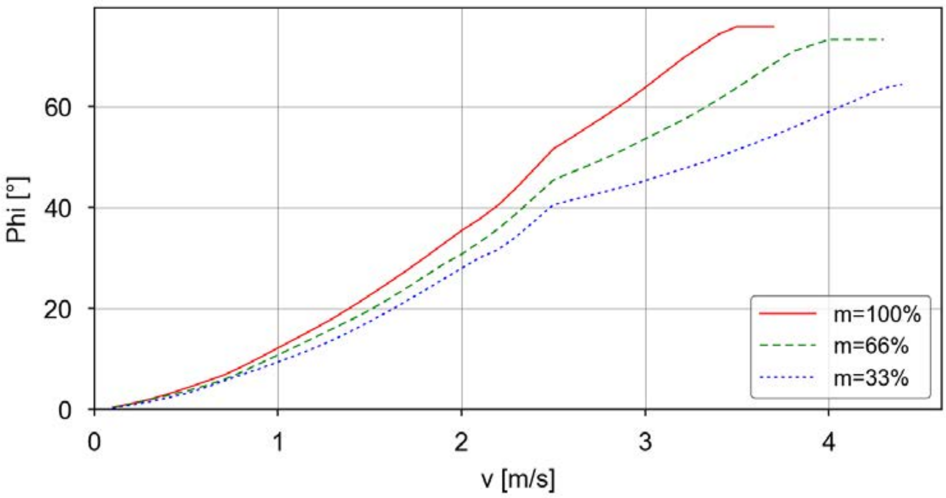
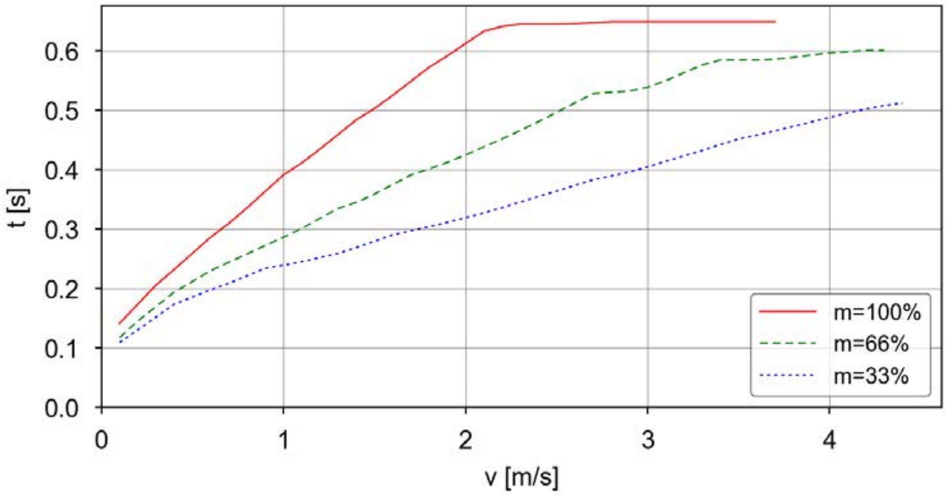
Extension zone 2, stopping distance and stopping time





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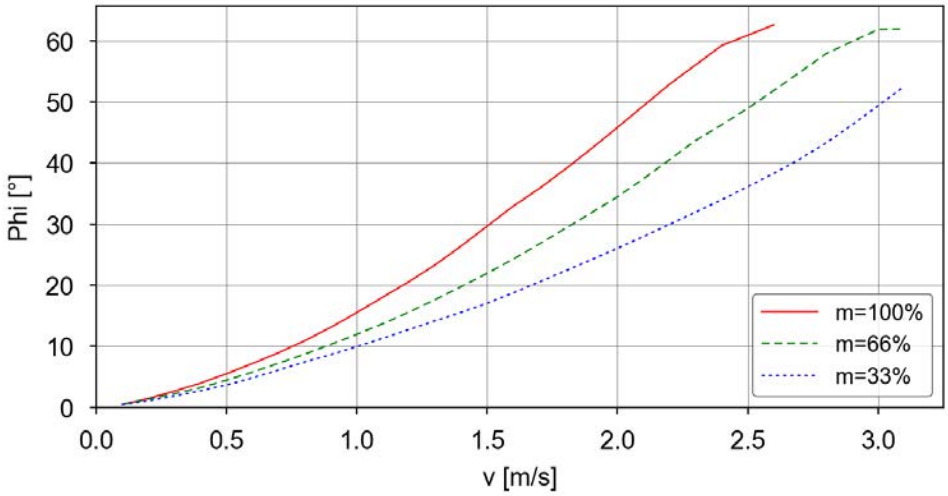
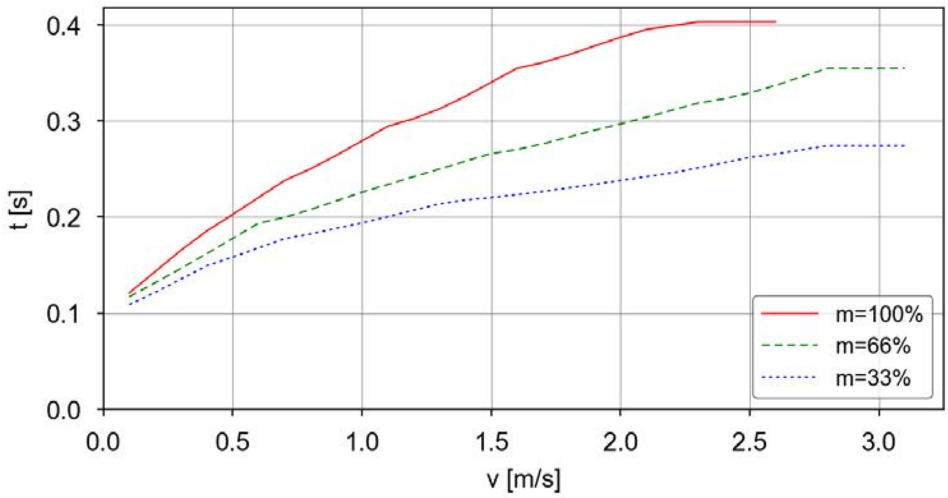
Category 1, Axis A3

Extension zone 0, stopping distance and stopping time





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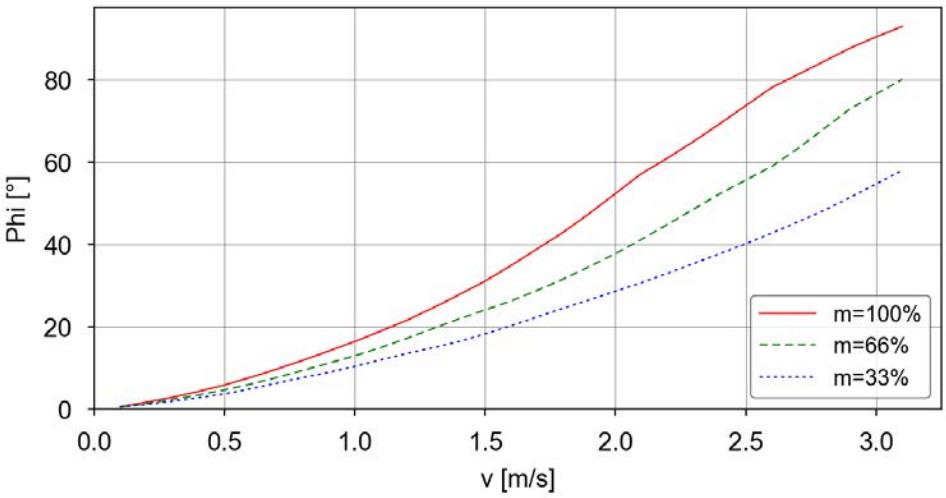
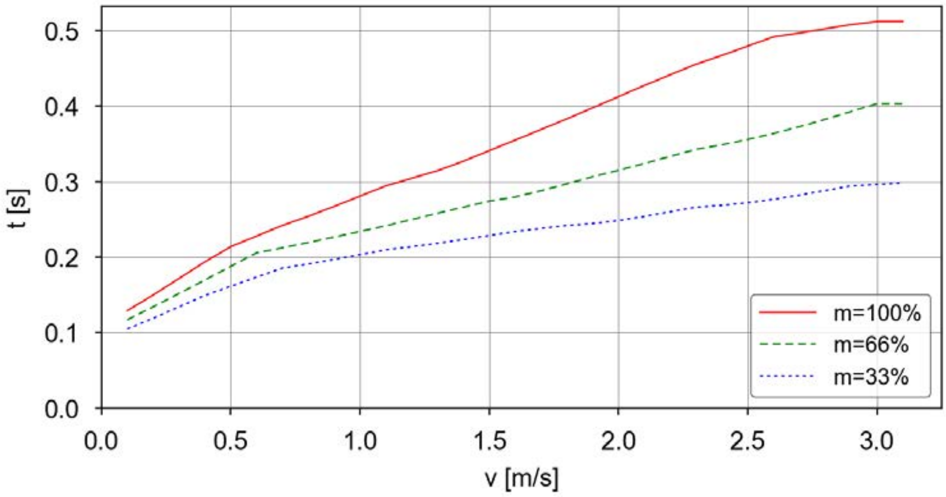
Extension zone 1, stopping distance and stopping time





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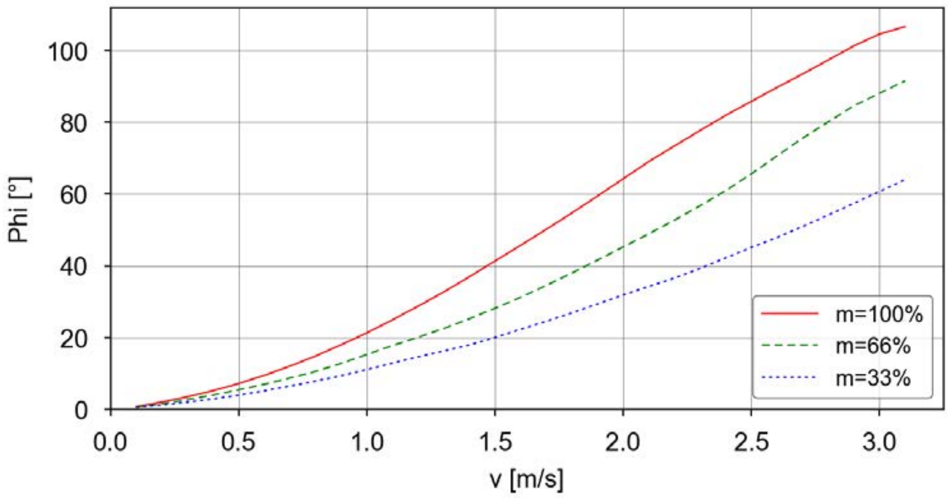
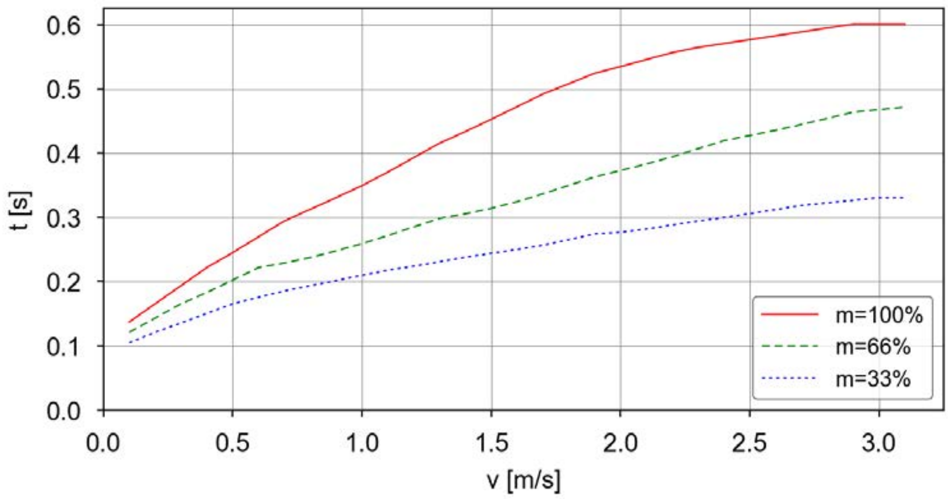
Extension zone 2, stopping distance and stopping time





1.9.5 CRB 1300 1.4 m 7 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	55.25	0.40
2	33.39	0.37
3	35.66	0.27

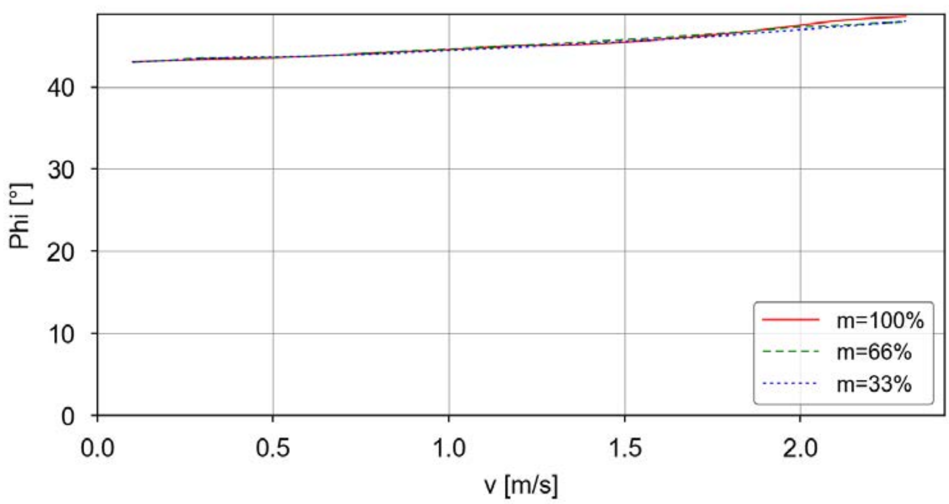
Category 1, extension zones

For definitions of the zones, see *Extension zones on page 68*.

Zone	wcp min (m)	wcp max (m)
0	0	0.467
1	0.467	0.934
2	0.934	max reach

Category 1, Axis A1

Extension zone 0, stopping distance and stopping time



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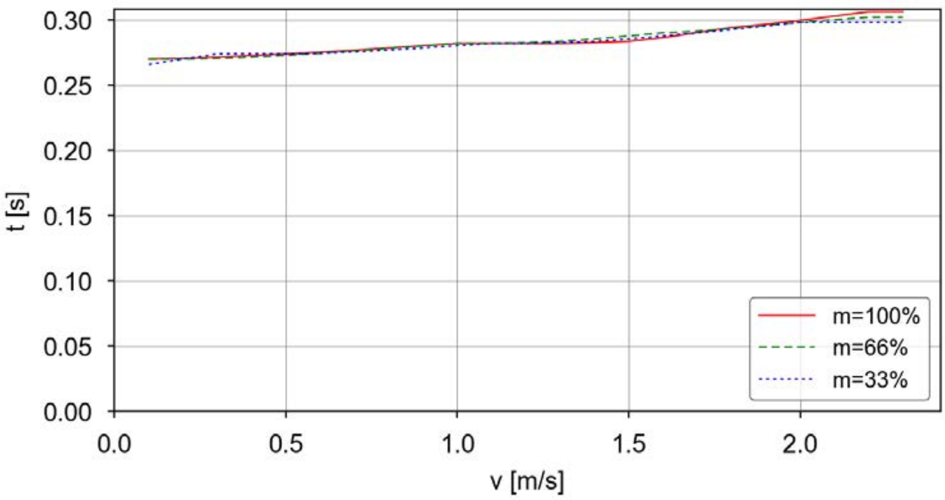
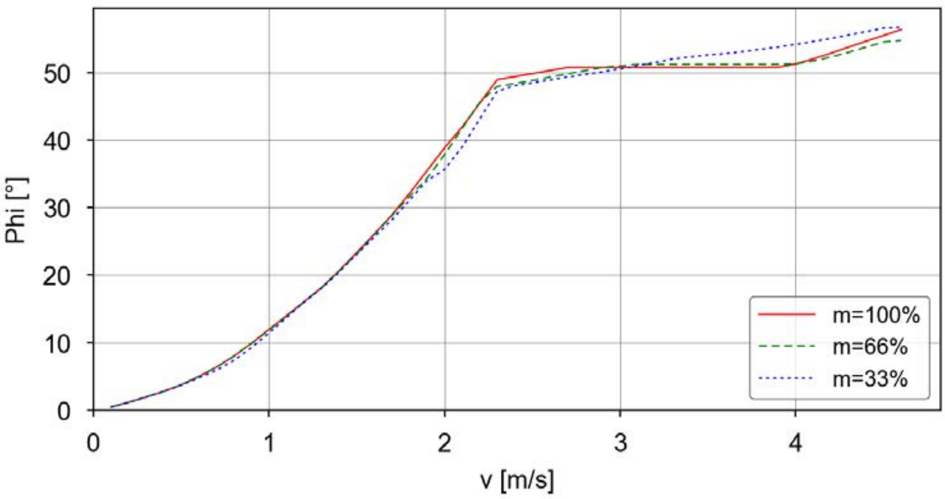
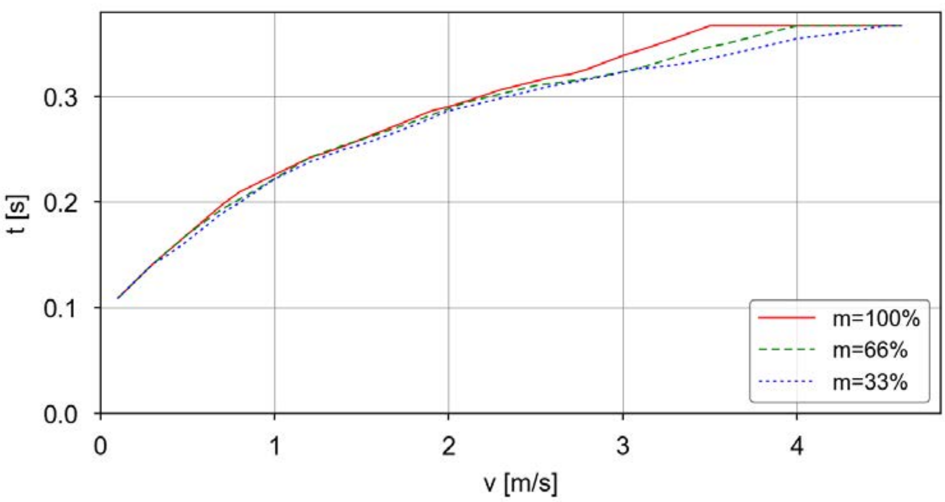


Extension zone 1, stopping distance and stopping time





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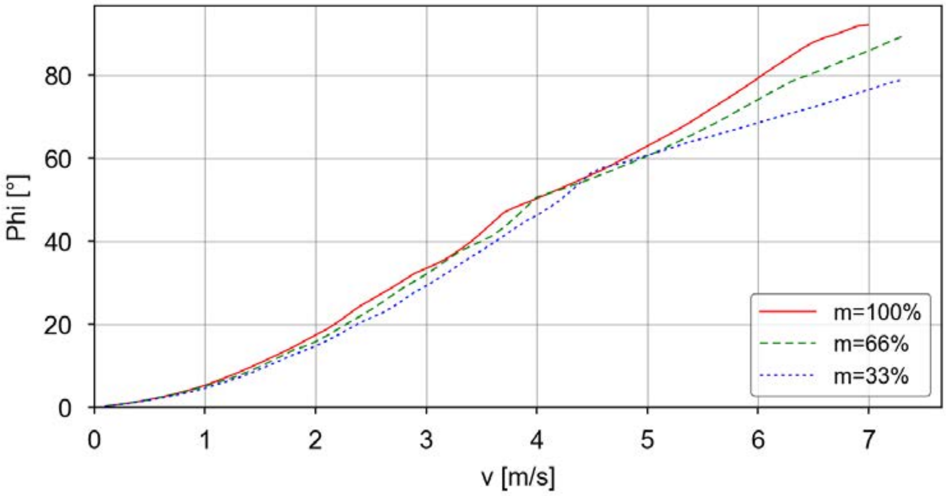
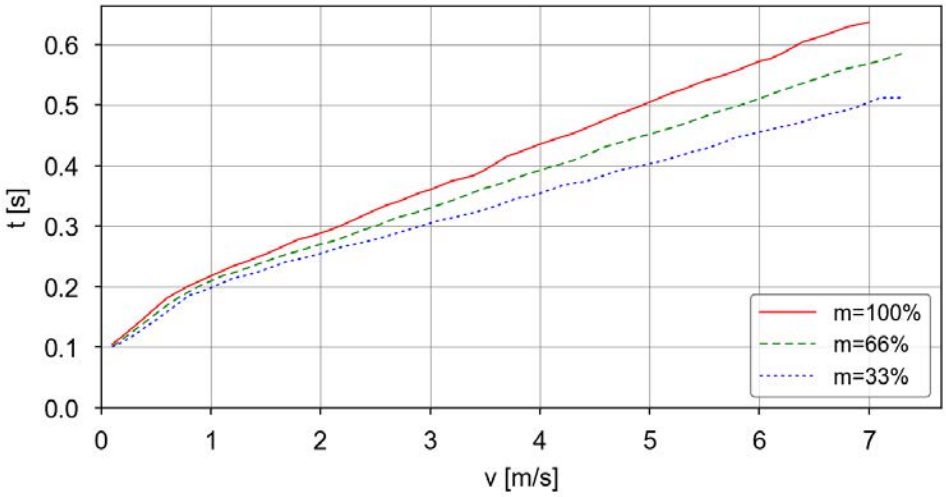
Extension zone 2, stopping distance and stopping time





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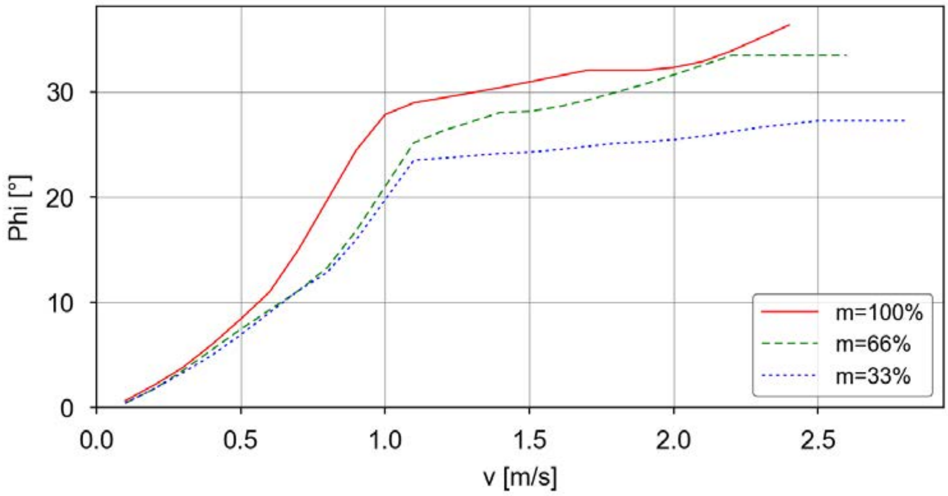
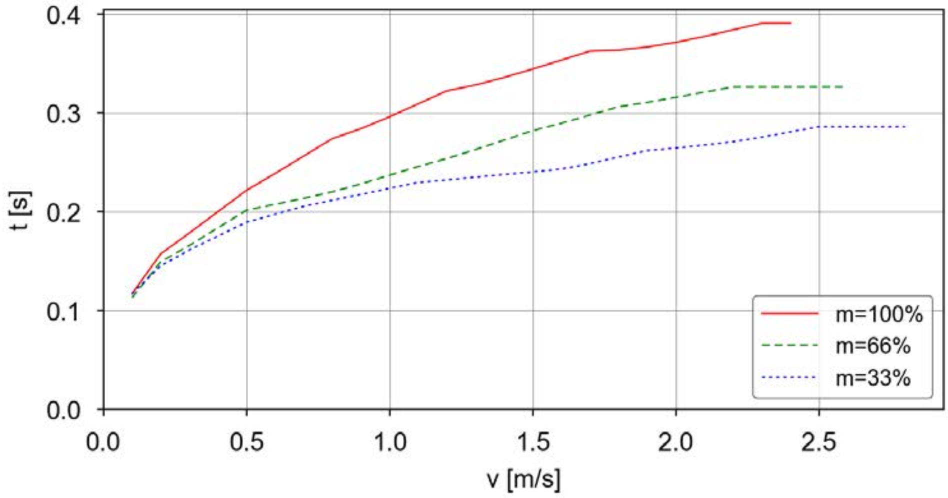
Category 1, Axis A2

Extension zone 0, stopping distance and stopping time





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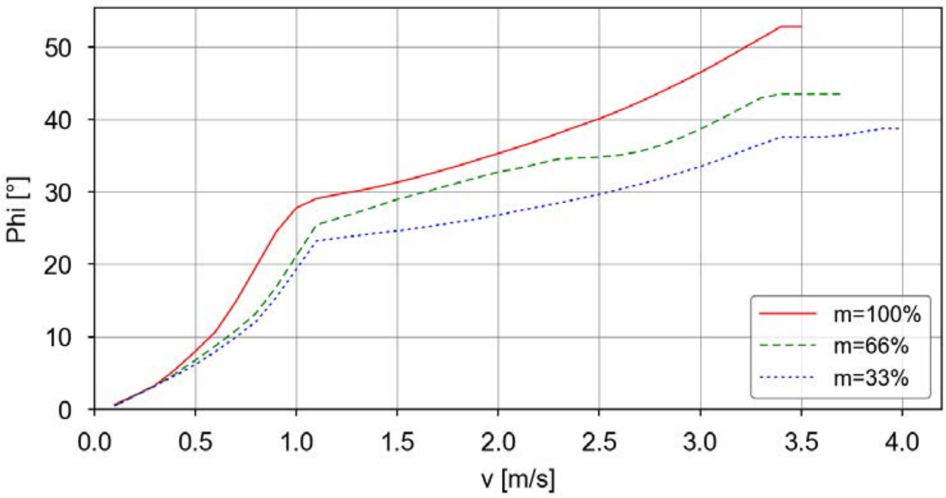
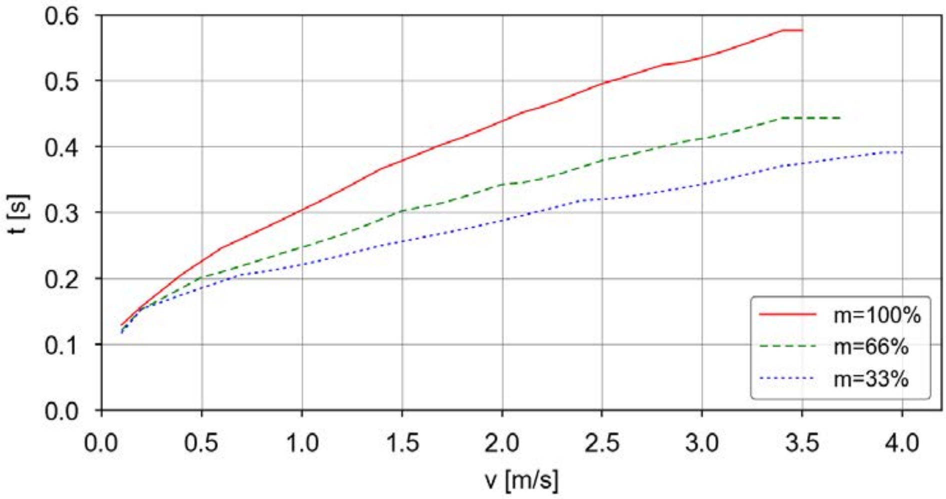
Extension zone 1, stopping distance and stopping time





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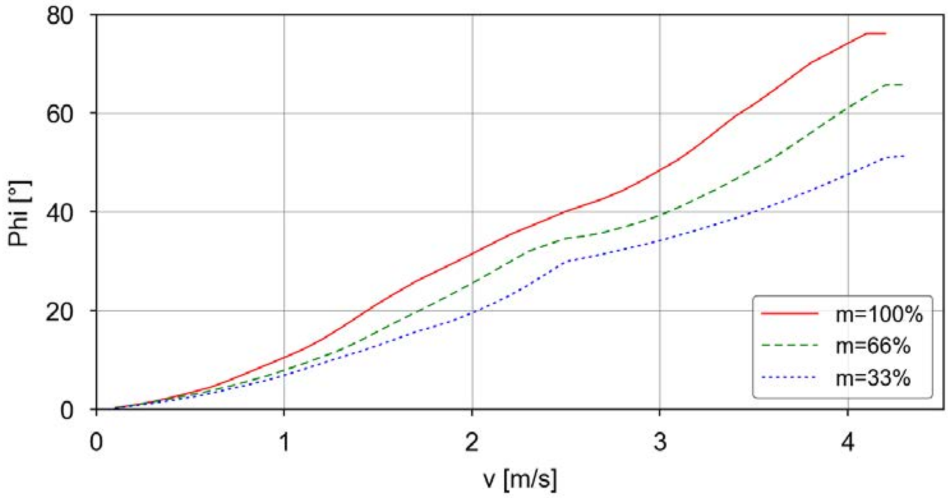
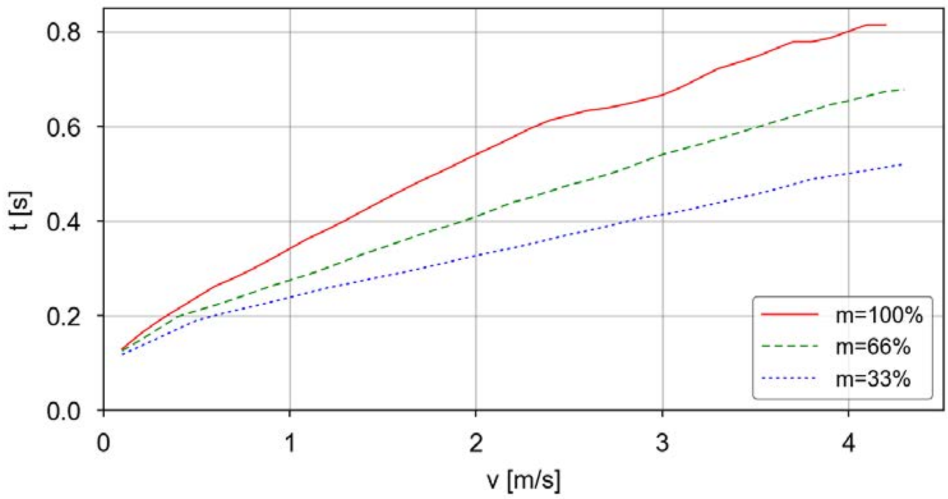
Extension zone 2, stopping distance and stopping time





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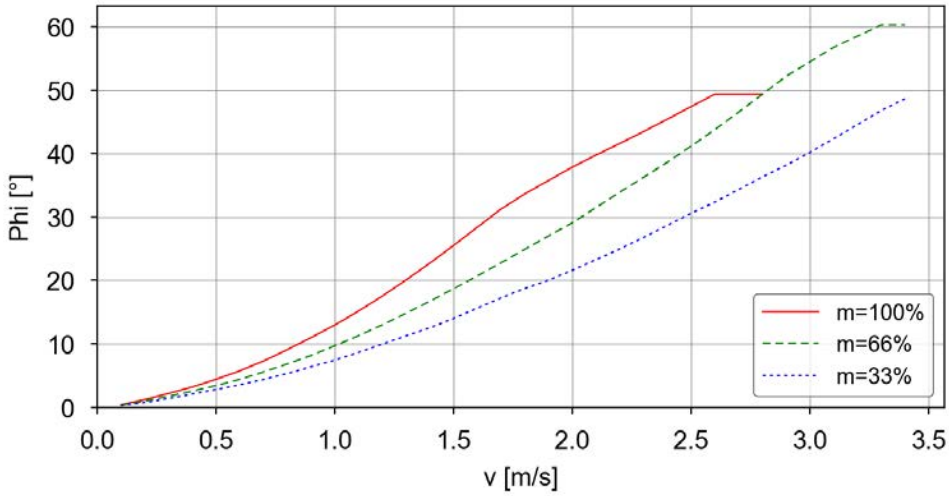
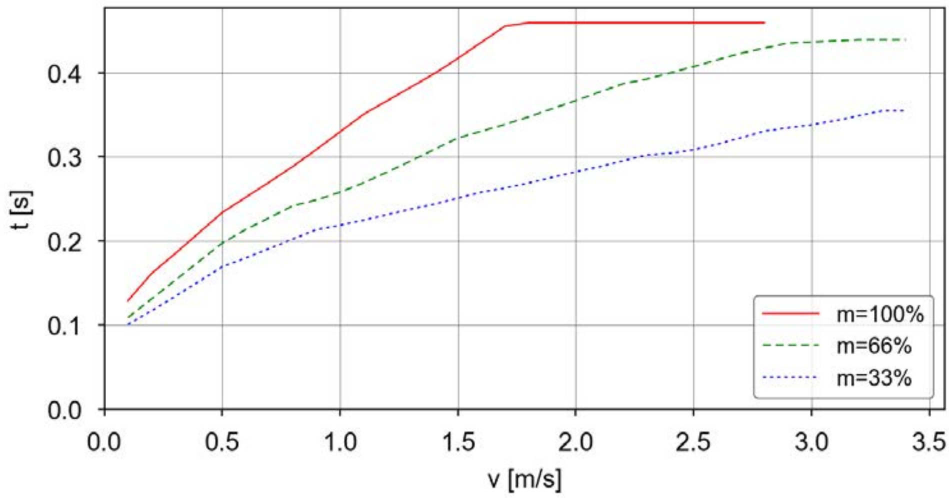
Category 1, Axis A3

Extension zone 0, stopping distance and stopping time





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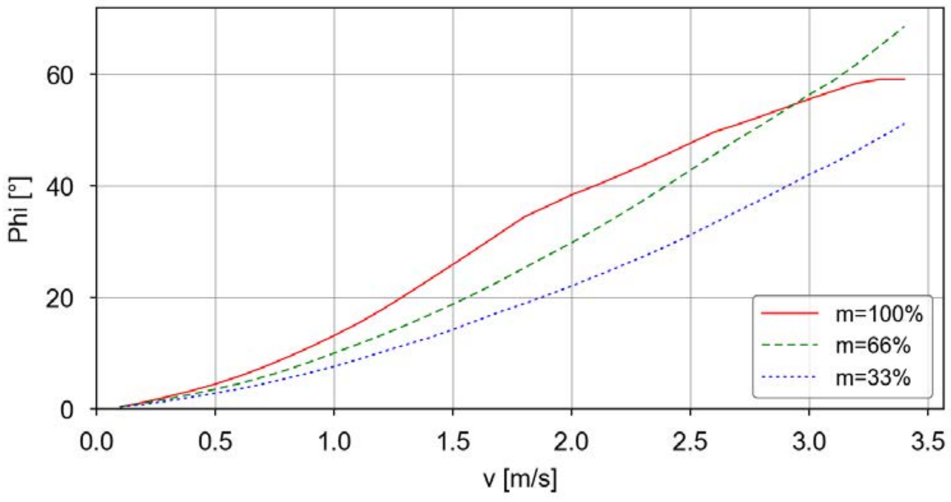
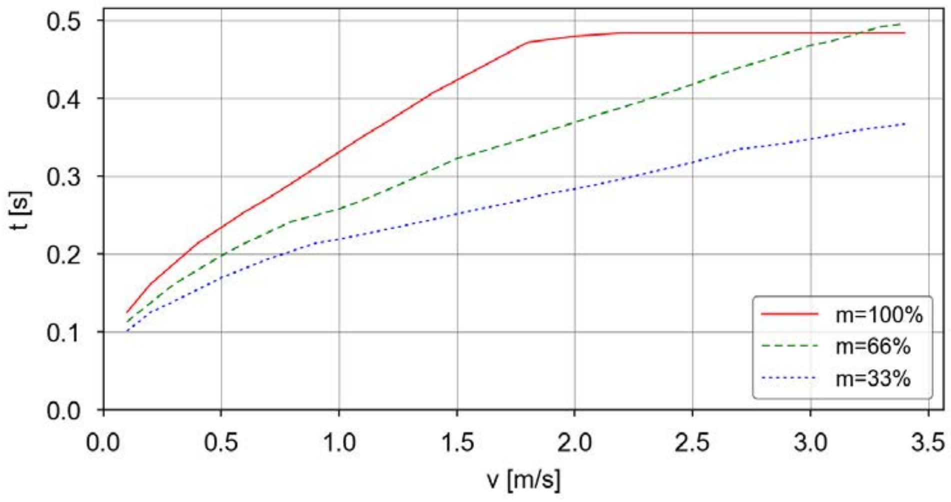
Extension zone 1, stopping distance and stopping time





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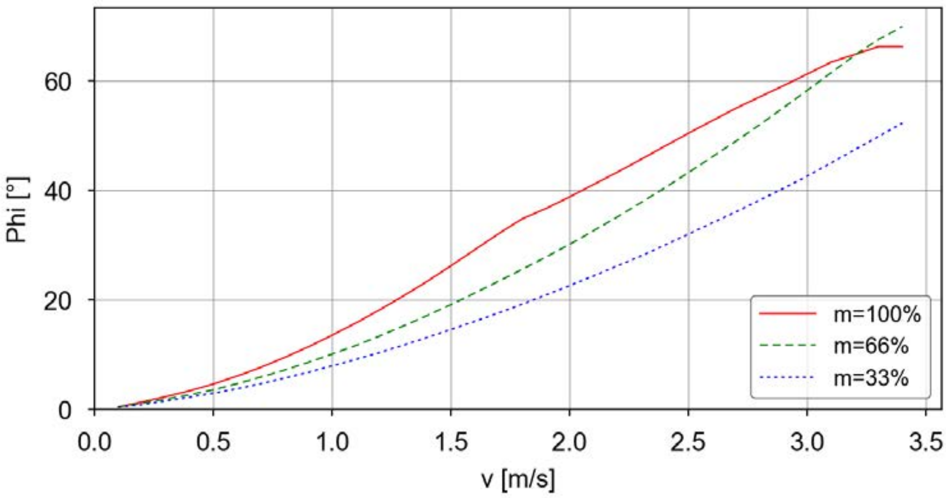
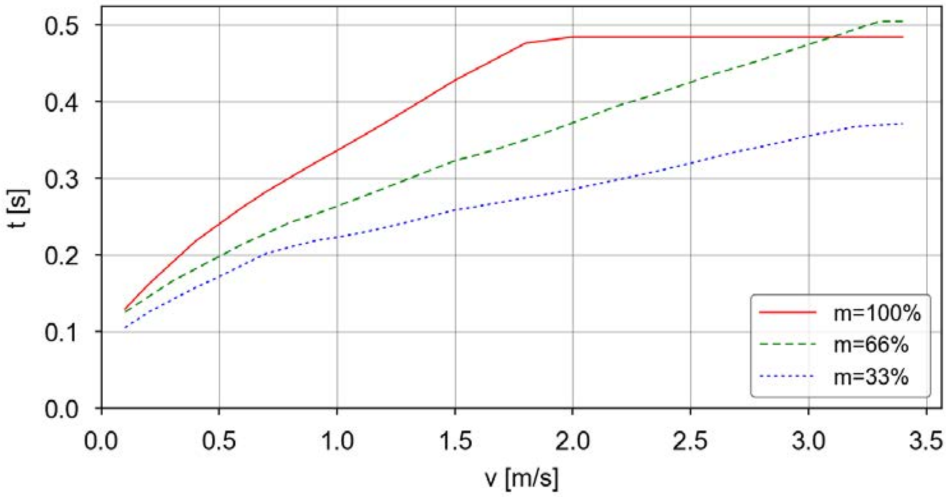
Extension zone 2, stopping distance and stopping time





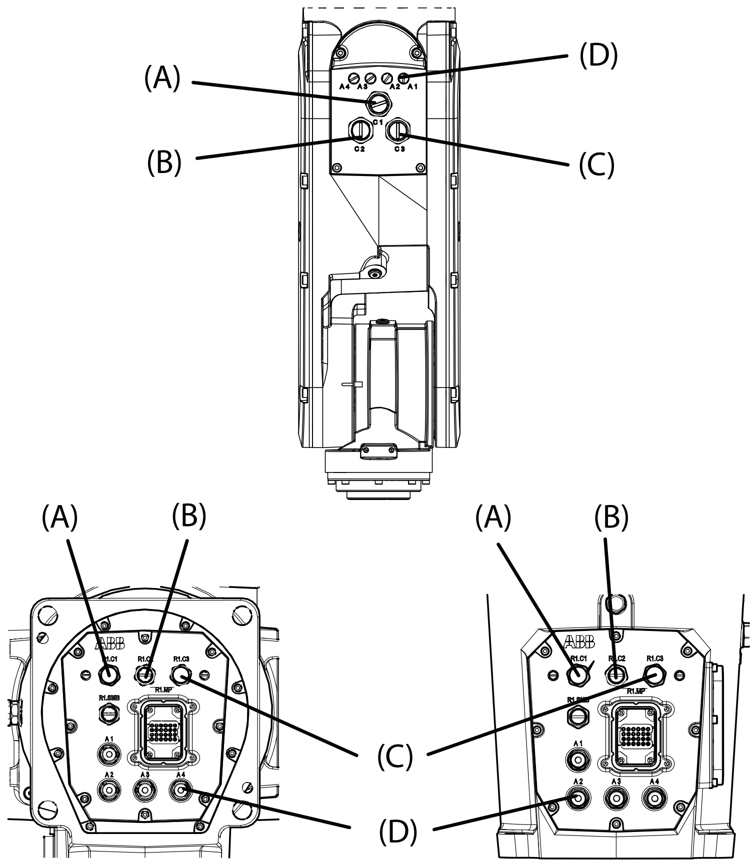
1.10 Customer connections

Introduction to customer connections

The cables for customer connection are integrated in the robot and the connectors are placed on the tubular and at the base. There are two connectors R2.C1 and R2.C3 at the tubular. Corresponding connectors R1.C1 and R1.C3 are located at the base.

There is also connections for Ethernet, one connector R2.C2 at the tubular 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 tubular.



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Position	Connection	Description	Number	Value
A	(R1)R2.C1	Customer power/signal	12 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	(R1)R2.C3	Customer power/signal	4 wires	42 V DC or 25 V AC, 4 A[iii]
D	Air	Max. 6 bar	4	Outer diameter of air hose: 6 mm

i The connector has 12 pins. Only pins 5 to 12 are available for use. Pins 1 to 4 are used for LED indicator.

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

iii Contact ABB for more information if to use the (R1)R2.C3 connection for an application with a higher voltage.

Connector kits (optional)

Connector kits, base

R1.C1 and R1.C2 connectors on the base are parts of the CP/CS cable and Ethernet floor cable, respectively. For details about the robot cabling, see "Robot cabling and connection points" in product manual of the manipulator.

Customers need to do wiring when using the R1.C3 connector on the base. Make sure to use the R1.C3 connector in M12 A-code 4p female type.

Connector kits, tubular

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

Position	Description			Art. no.
Connector kits	CP/CS	R2.C1	M12 CPCS Male straight connector kits	3HAC066098-001
			M12 CPCS Male angled connector kits	3HAC066099-001
		R2.C3	M12 CPCS Male straight connector kits	3HAC068412-001
			M12 CPCS Male angled connector kits	3HAC068413-001
	Ethernet	R2.C2	M12 Ethernet CAT6a Male straight connector kits	3HAC067413-001
			M12 Ethernet CAT6a 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.

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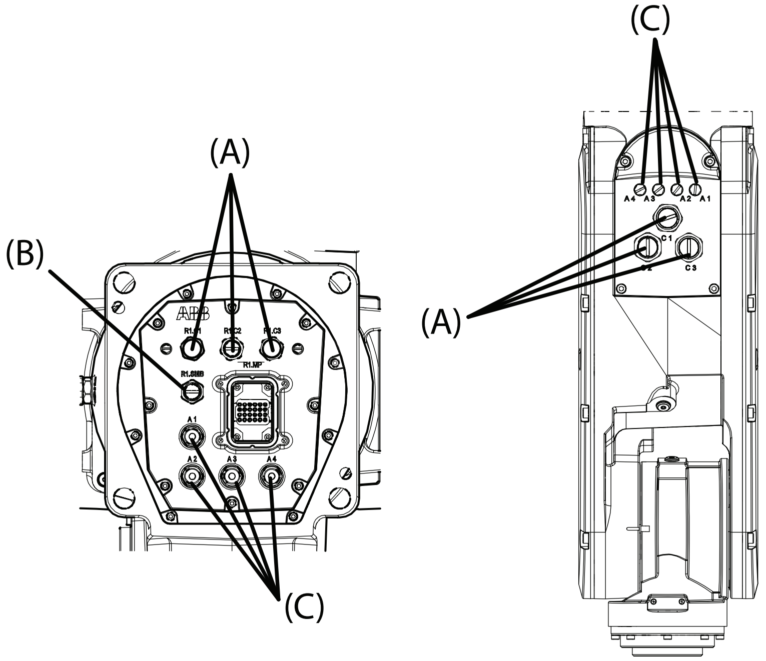
Always remember to refit the protection covers after removing them.



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

Scalable I/O device connection

For robot working with safetyIO-based laser scanners, a safety I/O device DSQC1042 will be available and required to be connected with the base I/O device DSQC1030 installed on the controller.

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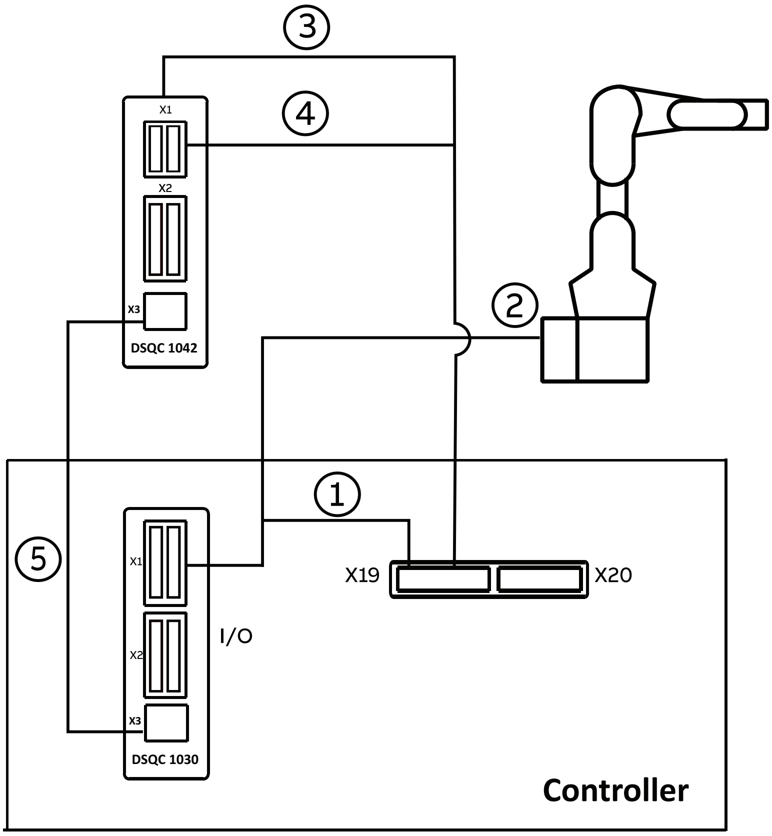
The following figure illustrates the connection among manipulator, controller with base I/O device configured and the safety I/O device.



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1	Ethernet connection	Between X3 connectors on DSQC1030 and on DSQC1042
2	Lamp unit cabling	Using CP/CS cable to connect, • X1 connector on DSQC1030 Pins GND, DO1, DO2 and DO3 are occupied for lamp unit • X19 connector on controller Pins 1 and 2 are occupied for lamp unit • R1.C1 connector on manipulator base
3	Power connection	Between X4 connector on DSQC1030 and X19 connector on controller

For details about the I/O module models, see *Application manual - Scalable I/O*.

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2 Specification of variants and options

2.1 Introduction to variants and options

General

The different variants and options for the CRB 1300 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	CRB Type	Handling capacity (kg)	Reach (m)
3300-66	1300	11	0.9
3300-67	1300	10	1.15
3300-68	1300	7	1.4

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.

Lead through device

Option	Description
3313-1	Lead through device

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

Media & Communication

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

Option	Type	Description
3303-2	Ethernet, Parallel, Air	Includes CP/CS (C1,C3) + PROFINET(C2), and air.

Manipulator protection

Option	Description
3350-400	Base 40,IP40
3350-670	Base 67,IP67

Note

Base 40 includes IP40, according to standard IEC 60529.

Base 67 includes IP67, according to standard IEC 60529.

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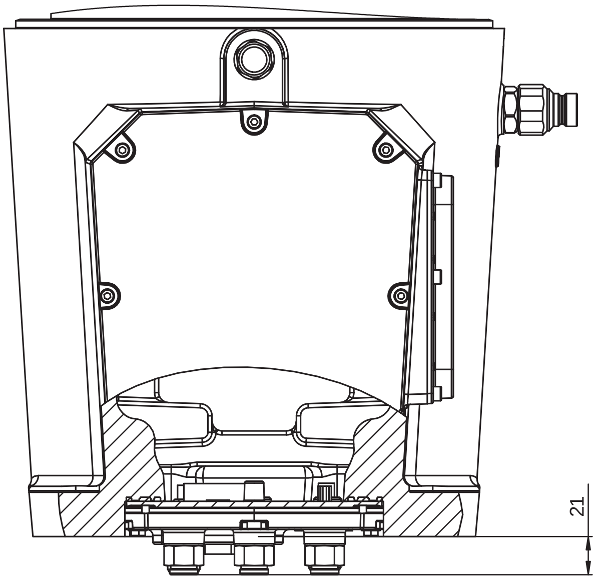
Robot cabling routing

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



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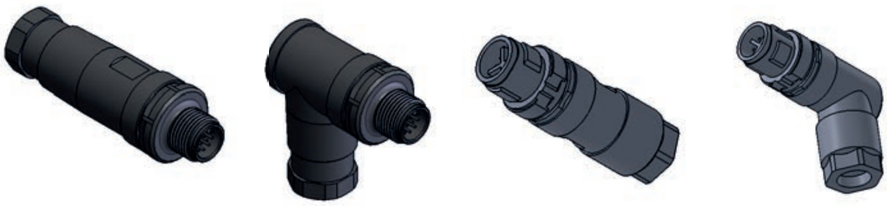
Connector kits manipulator

The kit consists of connectors, pins and sockets.

Option	Description
3304-1	Male-type, Straight arm connector kits REQUIRES: Media & Communication 3303-x
3305-1	Male-type, Angled arm connector kits REQUIRES: Media & Communication 3303-x
3306-1	Male-type, Straight arm Ethernet connector kits REQUIRES: 3303-2 Ethernet, Parallel, Air or 3303-3 Solenoid Valves Ext.
3307-1	Male-type, Angled arm Ethernet connector kits REQUIRES: 3303-2 Ethernet, Parallel, Air or 3303-3 Solenoid Valves Ext.



Straight connector kits | Angled connector kits | Straight Ethernet connector kits | Angled Ethernet connector kits

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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.

Warranty

For the selected period of time, ABB will provide spare parts and labor 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 with ABB Connected Services 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.

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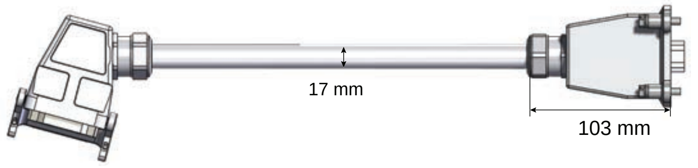
Option	Type	Description
438-8	Stock warranty	Maximum 6 months postponed start of standard warranty, starting from factory shipment date. Note that no claims will be accepted for warranties that occurred before the end of stock warranty. Standard warranty commences automatically after 6 months from *Factory 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



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Manipulator cable - Angled

Option	Lengths
3209-1	Angled type connector

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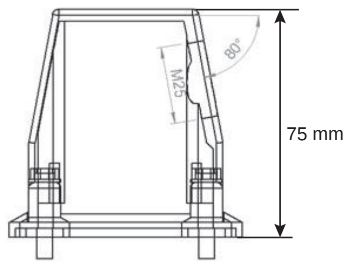

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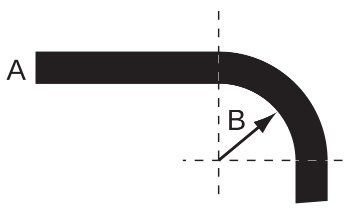
Bending radius for static floor cables

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



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A	Diameter

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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 parallell communication

Required 3303-1 Parallel & Air or 3303-2 Ethernet, Parallel, Air.

Option	Lengths
3201-1	3 m
3201-2	7 m
3201-3	15 m

Connection of Ethernet

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

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

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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*, *Product specification - OmniCore V line* and *Product specification - OmniCore E line*.

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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

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