KUKA

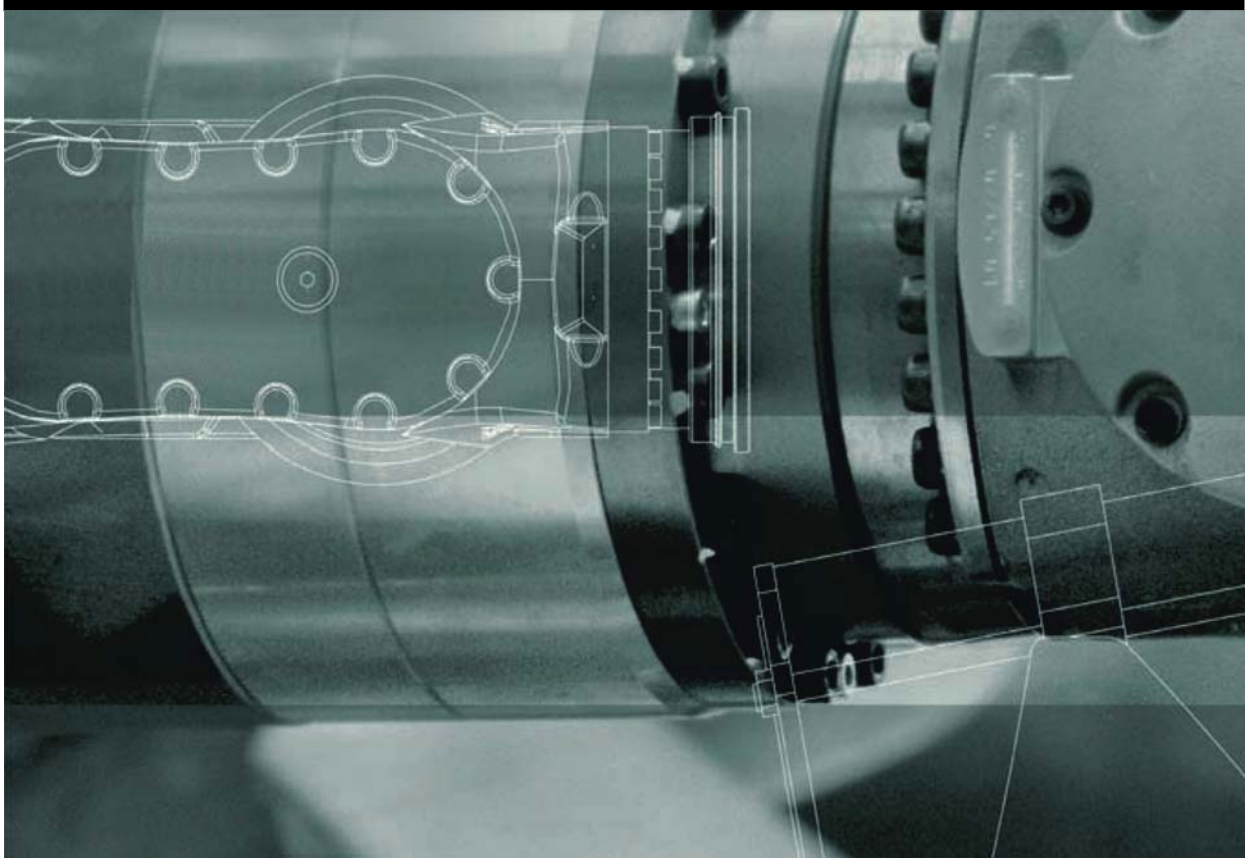
Robot Option

KUKA Roboter GmbH

Media Flange

For Product Family LBR iiwa

Assembly and Operating Instructions



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1 Introduction

1.1 Documentation for the options

The documentation for this option consists of the following parts:

- Assembly and operating instructions for this option
- Assembly and operating instructions for the higher-level system

Each of these sets of instructions is a separate document.

1.2 Representation of warnings and notes

Safety

These warnings are relevant to safety and **must** be observed.

DANGER	These warnings mean that it is certain or highly probable that death or severe injuries **will** occur, if no precautions are taken.
WARNING	These warnings mean that death or severe injuries **may** occur, if no precautions are taken.
CAUTION	These warnings mean that minor injuries **may** occur, if no precautions are taken.
NOTICE	These warnings mean that damage to property **may** occur, if no precautions are taken.
⚠	These warnings contain references to safety-relevant information or general safety measures. These warnings do not refer to individual hazards or individual precautionary measures.

This warning draws attention to procedures which serve to prevent or remedy emergencies or malfunctions:

SAFETY INSTRUCTIONS	Procedures marked with this warning **must** be followed exactly.

Notices

These notices serve to make your work easier or contain references to further information.

ℹ	Tip to make your work easier or reference to further information.

1.3 Terms used

Term	Description
DTM	Device Type Manager
EtherCAT	EtherCAT is an Ethernet-based field bus.
MF	Media flange

1.4 Trademarks

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

2 Purpose

2.1 Target group

This documentation is aimed at users with the following knowledge and skills:

- Advanced knowledge of mechanical engineering
- Advanced knowledge of electrical and electronic systems
- Knowledge of the robot controller system

For optimal use of our products, we recommend that our customers take part in a course of training at KUKA College. Information about the training program can be found at www.kuka.com or can be obtained directly from our subsidiaries.

2.2 Intended use

Use

The media flange is a universal interface that enables the user to connect electrical and pneumatic components to the robot flange, to configure them via the robot program and to access the internal energy supply system of the robot.

Misuse

Any use or application deviating from the intended use is deemed to be impermissible misuse. This includes e.g.:

- Operation outside the permissible operating parameters
- Operation in potentially explosive environments
- Outdoor operation
- Underground operation

NOTICE Changing the structure of the manipulator, e.g. by drilling holes, etc., can result in damage to the components. This is considered improper use and leads to loss of guarantee and liability entitlements.

3 Product description

3.1 Media flange overview

Description The following media flanges are available:

Media flange	Description
Basic flange	(>>> 3.1.1 "Basic flange" Page 11)
Media flange electrical	(>>> 3.1.2 "Media flange electrical" Page 12)
Media flange pneumatic	(>>> 3.1.3 "Media flange pneumatic" Page 12)
Media flange IO pneumatic	(>>> 3.1.4 "Media flange IO pneumatic" Page 13)
Media flange Touch pneumatic	(>>> 3.1.5 "Media flange Touch pneumatic" Page 13)
Media flange Touch electrical	(>>> 3.1.6 "Media flange Touch electrical" Page 15)
Media flange IO electrical	(>>> 3.1.7 "Media flange IO electrical" Page 16)
Media flange IO valve pneumatic	(>>> 3.1.8 "Media flange IO valve pneumatic" Page 17)

3.1.1 Basic flange

Overview

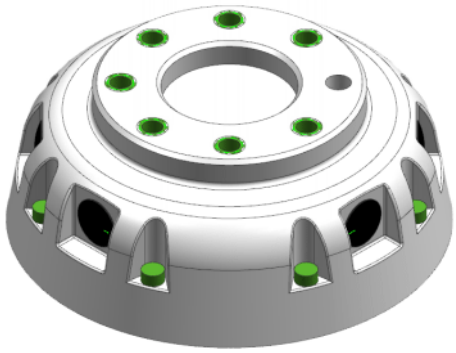


Fig. 3-1: Basic flange

Description The basic flange has a hole pattern conforming to DIN ISO 9409-1-50-7-M6. The basic flange has no additional connection options.

3.1.2 Media flange electrical

Overview

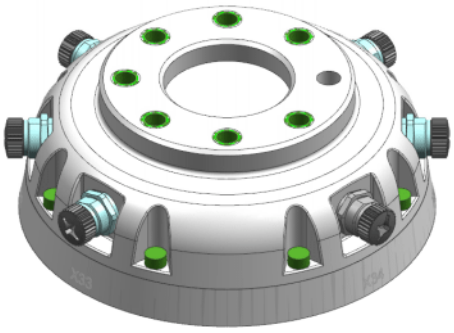


Fig. 3-2: Media flange electrical

Description

The media flange electrical is a universal interface that enables the user to connect electrical components to the robot flange.

The media flange electrical has a hole pattern conforming to DIN ISO 9409-1-50-7-M6.

The media flange electrical offers the following expansions:

- Connections for two supply voltages are available.
- Two interfaces for analog signals and CAT5 data transfer are available.

The electrical interface must be supplied by an external power or data source and not by the robot controller.

3.1.3 Media flange pneumatic

Overview

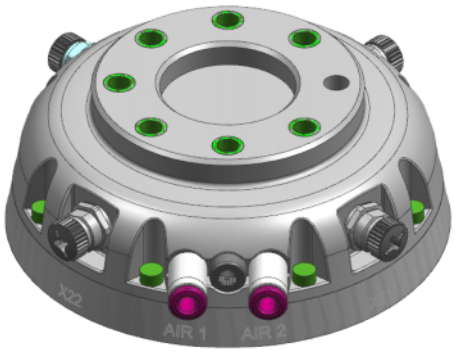


Fig. 3-3: Media flange pneumatic

Description

The media flange pneumatic is a universal interface that enables the user to connect pneumatic and electrical components to the robot flange.

The media flange pneumatic has a hole pattern conforming to DIN ISO 9409-1-50-7-M6.

The media flange pneumatic offers the following expansions:

- Pneumatic interface with two compressed air connections.
- Connection for a supply voltage.
- An interface for analog signals and CAT5 is available.

The electrical interface must be supplied by an external power or data source and not by the robot controller.

3.1.4 Media flange IO pneumatic

Overview

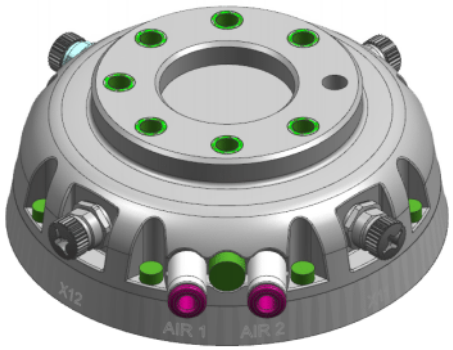


Fig. 3-4: Media flange IO pneumatic

Description

The media flange IO pneumatic is a universal interface that enables the user to connect electrical and pneumatic components to the robot flange.

The media flange IO pneumatic has a hole pattern conforming to DIN ISO 9409-1-50-7-M6.

The media flange IO pneumatic offers the following expansions:

- Configurable inputs and outputs for direct connection of sensors and other electrical components.
- Connection for a supply voltage.
- Connection of additional EtherCAT bus devices.
- Pneumatic interface with two compressed air connections.

The media flange IO pneumatic is supplied with power by the robot controller. No external power or data source is required. Data cable X650, X651 is required for operation.

3.1.5 Media flange Touch pneumatic

Overview

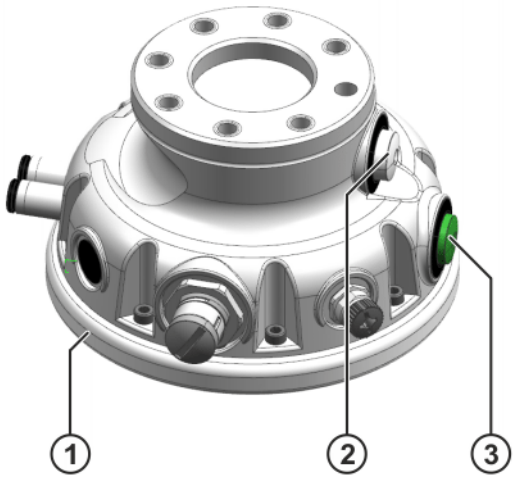


Fig. 3-5: Media flange Touch pneumatic

1 LED strip
2 Enabling switch
3 Application button

Description

The media flange Touch pneumatic is a universal interface that enables the user to connect electrical and pneumatic components to the robot flange.

The media flange Touch pneumatic has a hole pattern conforming to DIN ISO 9409-1-50-7-M6.

The media flange Touch pneumatic offers the following expansions:

- Configurable inputs and outputs for direct connection of sensors and other electrical components.
- Connection for a supply voltage.
- Additional EtherCAT devices can be connected.
- Pneumatic interface with two compressed air connections.
- Enabling switch
- Programmable application button
- Programmable visual indication
- Handle for manual guidance

The media flange Touch pneumatic is supplied with power by the robot controller. No external power or data source is required. Data cable X650, X651 is required.

Function

- LED strip
  - 2 light rings
    - Blue (freely configurable)
    - Red/green (reserved internally)
  - Switching speed:
    - Application-specific, min. change of state every 25 ms
- Enabling switch

  The enabling switch has 3 positions:
  - Not pressed
  - Center position
  - Fully pressed (panic position)

  The enabling switch must be held in the center position in operating modes T1, T2 and CRR in order to be able to jog the manipulator.

  By default, the enabling switch has no function in Automatic mode.
- Application button
  - The application button is freely programmable.
  - Switching states:
    - OFF (0): Application button is not pressed
    - ON (1): Application button is pressed

Debouncing is not carried out for any inputs.

  - Switching speeds:
    - Application-specific, scanning of the input values every 25 ms

3.1.6 Media flange Touch electrical

Overview

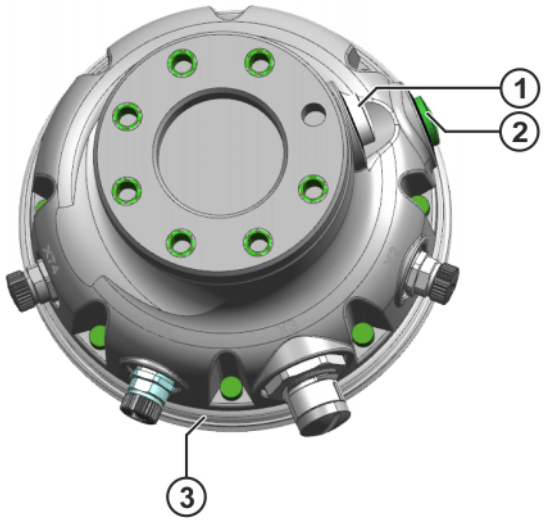


Fig. 3-6: Media flange Touch electrical

1 Enabling switch
2 Application button
3 LED strip

Description

The media flange Touch electrical is a universal interface that enables the user to connect electrical components to the robot flange.

The media flange Touch electrical has a hole pattern conforming to DIN ISO 9409-1-50-7-M6.

The media flange Touch electrical offers the following expansions:

- Configurable inputs and outputs for direct connection of sensors and other electrical components.
- Connection for two supply voltages.
- Additional EtherCAT devices can be connected.
- Additional interface for analog signals and CAT5.
- Enabling switch
- Programmable application button
- Programmable visual indication
- Handle for manual guidance

The media flange Touch electrical is supplied with power by the robot controller. Data cable X650, X651 is required. The interfaces X74 and X75 must be supplied by an external power or data source and not by the robot controller.

Function

- LED strip
  - 2 light rings
    - Blue (freely configurable)
    - Red/green (reserved internally)
  - Switching speed:
    - Application-specific, min. change of state every 25 ms
- Enabling switch

  The enabling switch has 3 positions:
  - Not pressed

- Center position
- Fully pressed (panic position)

The enabling switch must be held in the center position in operating modes T1, T2 and CRR in order to be able to jog the manipulator.

By default, the enabling switch has no function in Automatic mode.

- Application button
  - The application button is freely programmable.
  - Switching states:
    - OFF (0): Application button is not pressed
    - ON (1): Application button is pressed

> Debouncing is not carried out for any inputs.

  - Switching speeds:
    - Application-specific, scanning of the input values every 25 ms

3.1.7 Media flange IO electrical

Overview

Fig. 3-7: Media flange IO electrical

Description

The media flange IO electrical is a universal interface that enables the user to connect electrical components to the robot flange.

The media flange IO electrical has a hole pattern conforming to DIN ISO 9409-1-50-7-M6.

The media flange IO electrical offers the following expansions:

- Configurable inputs and outputs for direct connection of sensors and other electrical components.
- Connection for two supply voltages.
- Connection of additional EtherCAT bus devices.
- Additional interface for analog signals and CAT5.

The media flange IO electrical is supplied with power by the robot controller. Data cable X650, X651 is required for operation. No external power or data source is required. The interfaces X44 and X45 must be supplied by an external power or data source and not by the robot controller.

3.1.8 Media flange IO valve pneumatic

Overview

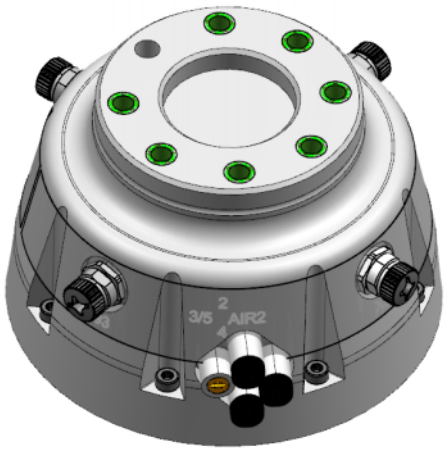


Fig. 3-8: Media flange IO valve pneumatic

Description

The media flange IO valve pneumatic is a universal interface that enables the user to connect electrical and pneumatic components to the robot flange.

The media flange IO valve pneumatic has a hole pattern conforming to DIN ISO 9409-1-50-7-M6.

The media flange IO valve pneumatic offers the following expansions:

- Configurable inputs and outputs for direct connection of sensors and other electrical components.
- Connection for a supply voltage.
- Connection of additional EtherCAT bus devices.
- Intelligent pneumatic interface: Two integrated bistable valves and an additional air connection.

The media flange IO valve pneumatic is supplied with power by the robot controller. No external power or data source is required. Data cable X650, X651 is required for operation.

4 Technical data

4.1 Technical data – overview

Overview

The technical data of the individual media flanges can be found in the following sections:

Media flange	Technical data
Basic flange	■ Technical data (>>> 4.2.1 "Basic data, basic flange" Page 22) ■ Dimensions (>>> 4.2.2 "Dimensions, basic flange" Page 23) ■ Identification plate (>>> 4.2.3 "Identification plate, basic flange" Page 23) ■ Payloads (>>> 4.2.4 "Payloads, basic flange" Page 24) ■ Working envelope (>>> 4.2.5 "Working envelope, basic flange" Page 26) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)
Media flange electrical	■ Technical data (>>> 4.3.1 "Basic data, media flange electrical" Page 26) ■ Dimensions (>>> 4.3.2 "Dimensions, media flange electrical" Page 27) ■ Identification plate (>>> 4.3.3 "Identification plate, MF electrical" Page 27) ■ Payloads (>>> 4.3.4 "Payloads, media flange electrical" Page 28) ■ Working envelope (>>> 4.3.5 "Working envelope, media flange electrical" Page 30) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)

Media flange	Technical data
Media flange pneumatic	■ Technical data (>>> 4.4.1 "Basic data, media flange pneumatic" Page 30) ■ Dimensions (>>> 4.4.2 "Dimensions, media flange pneumatic" Page 31) ■ Identification plate (>>> 4.4.3 "Identification plate, MF pneumatic" Page 31) ■ Payloads (>>> 4.4.4 "Payloads, media flange pneumatic" Page 31) ■ Working envelope (>>> 4.4.5 "Working envelope, media flange pneumatic" Page 34) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)
Media flange IO pneumatic	■ Technical data (>>> 4.5.1 "Basic data, media flange IO pneumatic" Page 34) ■ Dimensions (>>> 4.5.2 "Dimensions, media flange IO pneumatic" Page 35) ■ Identification plate (>>> 4.5.3 "Identification plate, MF IO pneumatic" Page 35) ■ Payloads (>>> 4.5.4 "Payloads, media flange IO pneumatic" Page 35) ■ Working envelope (>>> 4.5.5 "Working envelope, media flange IO pneumatic" Page 38) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)

Media flange	Technical data
Media flange Touch pneumatic	■ Technical data (>>> 4.6.1 "Basic data, media flange Touch pneumatic" Page 38) ■ Dimensions (>>> 4.6.2 "Dimensions, media flange Touch pneumatic" Page 39) ■ Identification plate (>>> 4.6.3 "Identification plate, MF Touch pneumatic" Page 39) ■ Payloads (>>> 4.6.4 "Payloads, media flange Touch pneumatic" Page 39) ■ Working envelope (>>> 4.6.5 "Working envelope, media flange Touch pneumatic" Page 43) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)
Media flange Touch electrical	■ Technical data (>>> 4.7.1 "Basic data, media flange Touch electrical" Page 43) ■ Dimensions (>>> Fig. 4-31) ■ Identification plate (>>> 4.7.3 "Identification plate, MF Touch electrical" Page 44) ■ Payloads (>>> 4.7.4 "Payloads, media flange Touch electrical" Page 45) ■ Working envelope (>>> 4.7.5 "Working envelope, media flange Touch electrical" Page 48) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)

Media flange	Technical data
Media flange IO electrical	■ Technical data (>>> 4.8.1 "Basic data, media flange IO electrical" Page 48) ■ Dimensions (>>> 4.8.2 "Dimensions, media flange IO electrical" Page 49) ■ Identification plate (>>> 4.8.3 "Identification plate, MF IO electrical" Page 49) ■ Payloads (>>> 4.8.4 "Payloads, media flange IO electrical" Page 50) ■ Working envelope (>>> 4.8.5 "Working envelope, media flange IO electrical" Page 53) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)
Media flange IO valve pneumatic	■ Technical data (>>> 4.9.1 "Basic data, media flange IO valve pneumatic" Page 53) ■ Dimensions (>>> 4.9.2 "Dimensions, media flange IO valve pneumatic" Page 54) ■ Identification plate (>>> 4.9.3 "Identification plate, MF IO valve pneumatic" Page 54) ■ Payloads (>>> 4.9.4 "Payloads, media flange IO valve pneumatic" Page 55) ■ Working envelope (>>> 4.9.5 "Working envelope, media flange IO valve pneumatic" Page 58) ■ Stopping distances and times (>>> 4.10 "Stopping distances and times" Page 58)

4.2 Technical data, basic flange

4.2.1 Basic data, basic flange

General

Media flange	Basic flange
Weight	230 g
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.2.2 Dimensions, basic flange

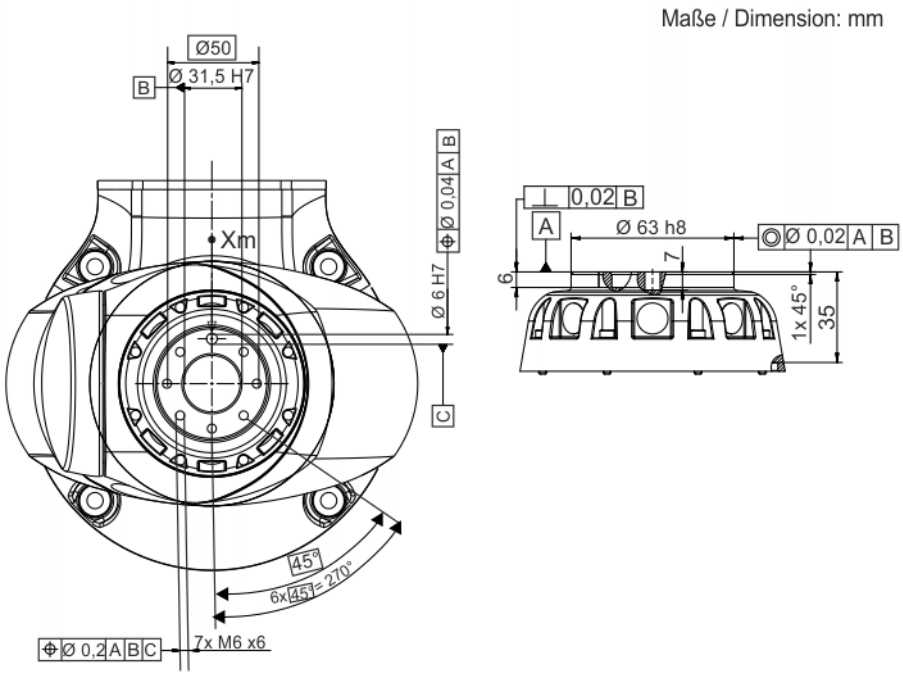


Fig. 4-1: Dimensions, basic flange

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

4.2.3 Identification plate, basic flange

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

Fig. 4-2: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.2.4 Payloads, basic flange

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	60 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

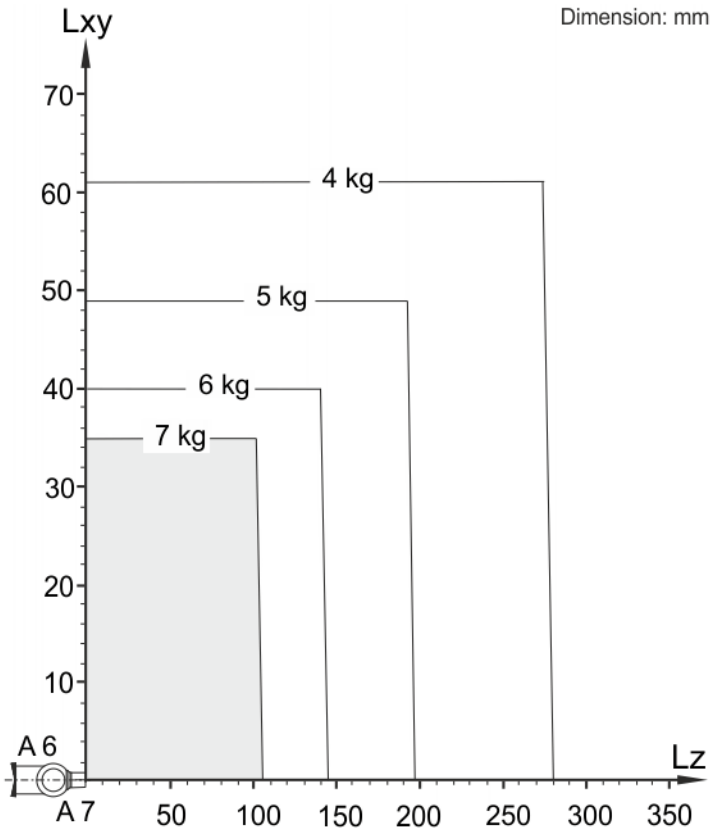


Fig. 4-3: LBR iiwa 7 R800 payload diagram

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	44 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

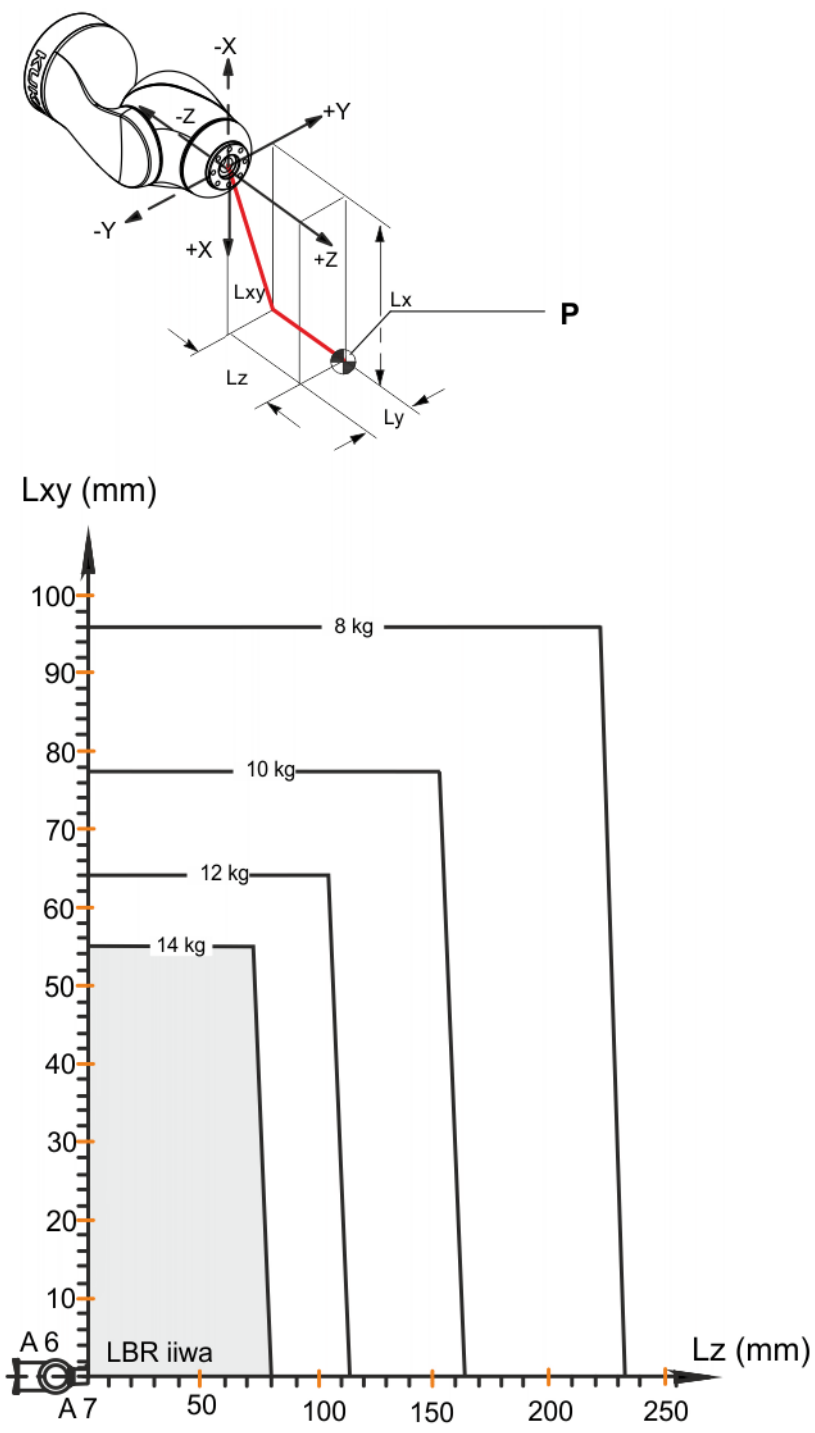


Fig. 4-4: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load

The robot cannot carry a supplementary load.

4.2.5 Working envelope, basic flange

The diagram shows the shape and size of the working envelope for the robot with the basic flange:

- **LBR iiwa 7 R800**

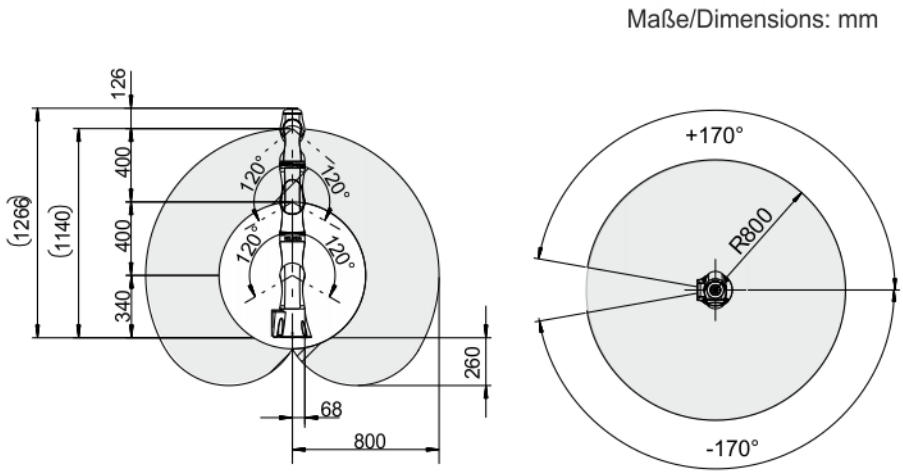


Fig. 4-5: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

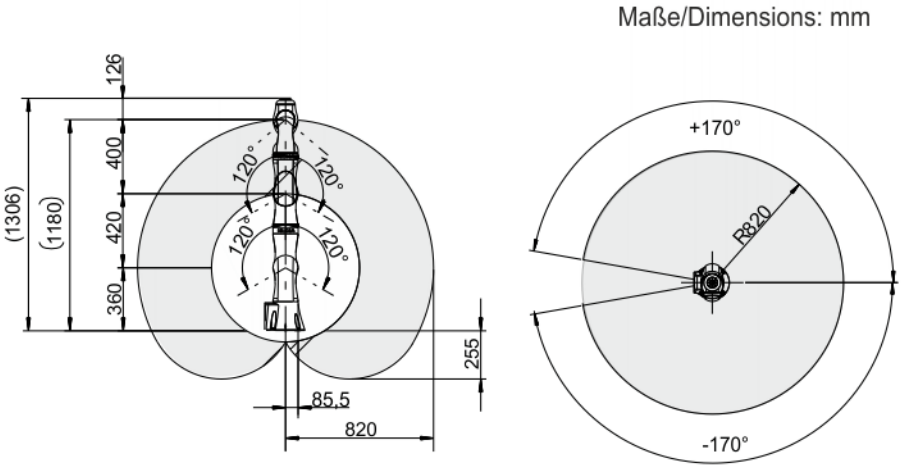


Fig. 4-6: Working envelope, LBR iiwa 14 R820 with media flange

4.3 Technical data, media flange electrical

4.3.1 Basic data, media flange electrical

General

Media flange	Media flange electrical
Weight	230 g
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.3.2 Dimensions, media flange electrical

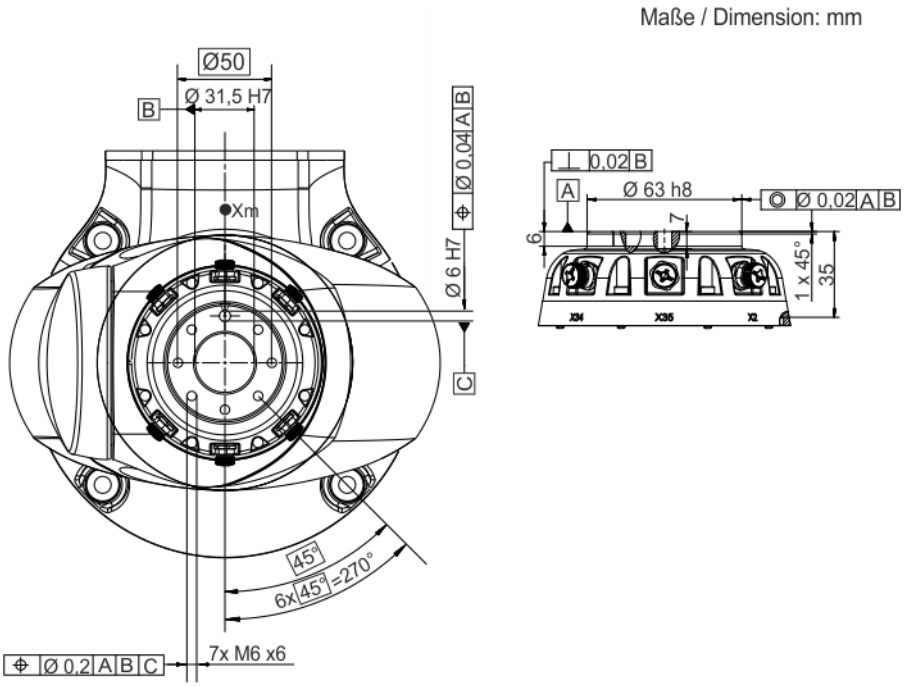


Fig. 4-7: Dimensions, media flange electrical

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

4.3.3 Identification plate, MF electrical

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

Fig. 4-8: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.3.4 Payloads, media flange electrical

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	60 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

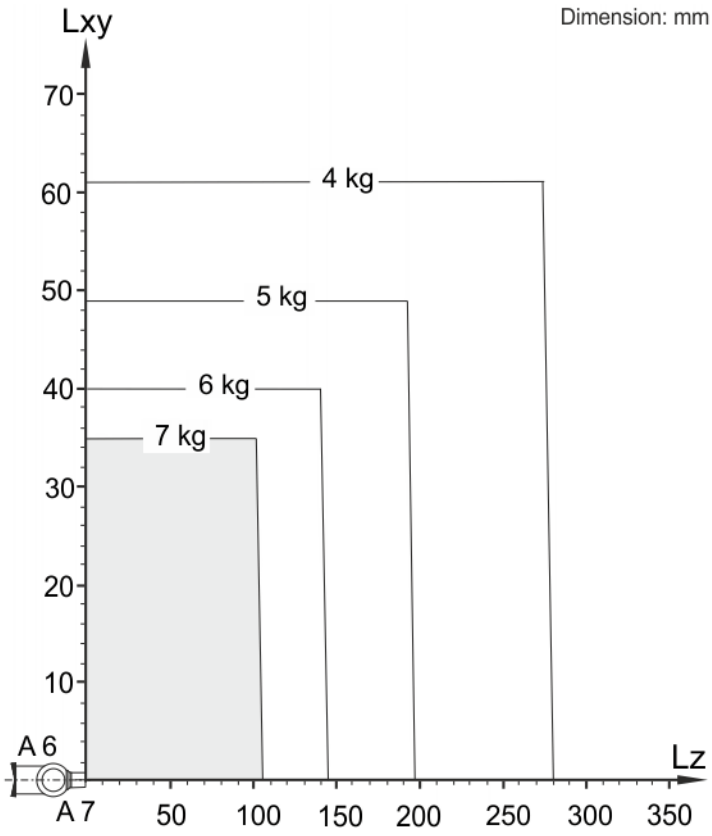


Fig. 4-9: LBR iiwa 7 R800 payload diagram

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	44 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

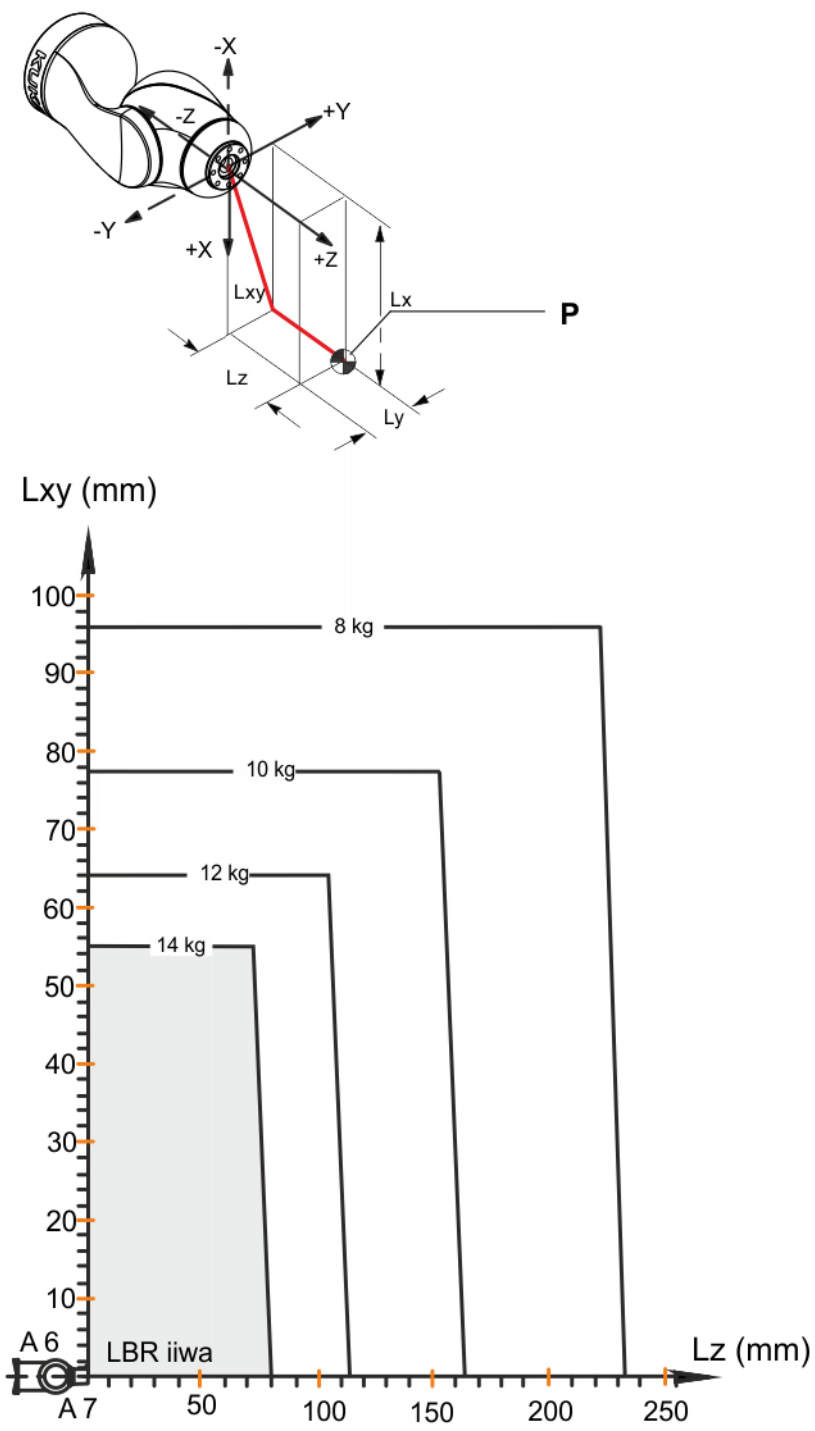


Fig. 4-10: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load The robot cannot carry a supplementary load.

4.3.5 Working envelope, media flange electrical

The diagram shows the shape and size of the working envelope for the robot with the media flange electrical:

- **LBR iiwa 7 R800**

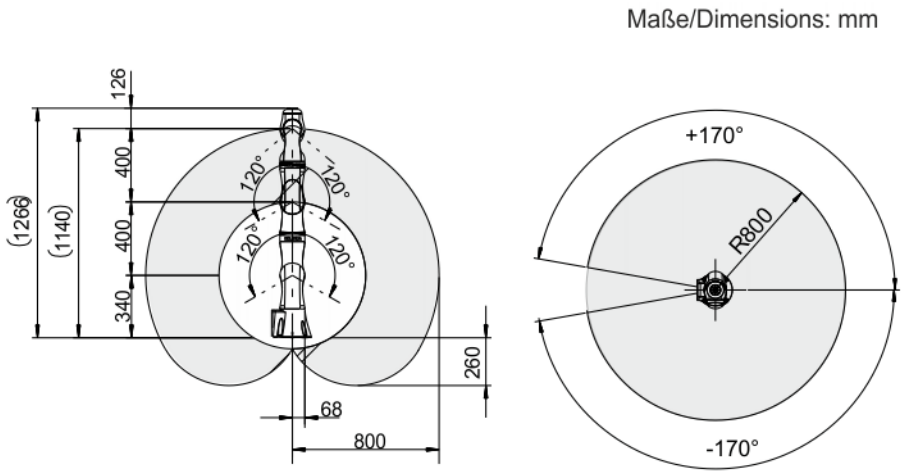


Fig. 4-11: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

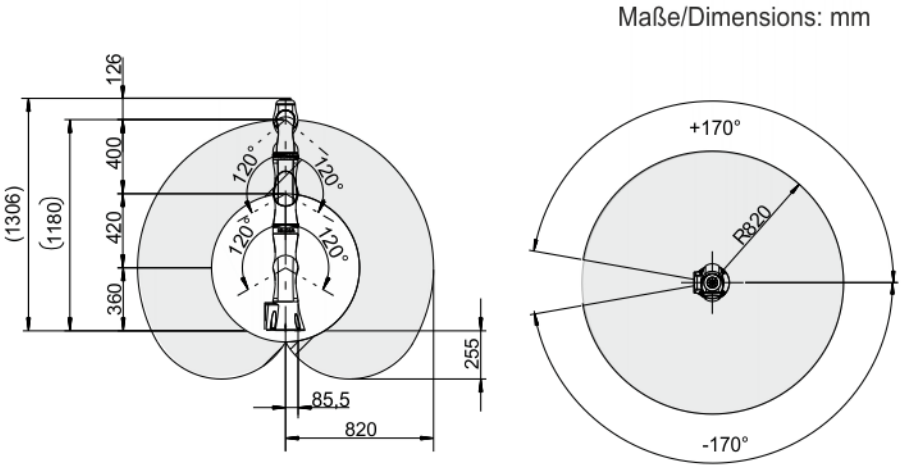


Fig. 4-12: Working envelope, LBR iiwa 14 R820 with media flange

4.4 Technical data, media flange pneumatic

4.4.1 Basic data, media flange pneumatic

General

Media flange	Media flange pneumatic
Weight	230 g
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.4.2 Dimensions, media flange pneumatic

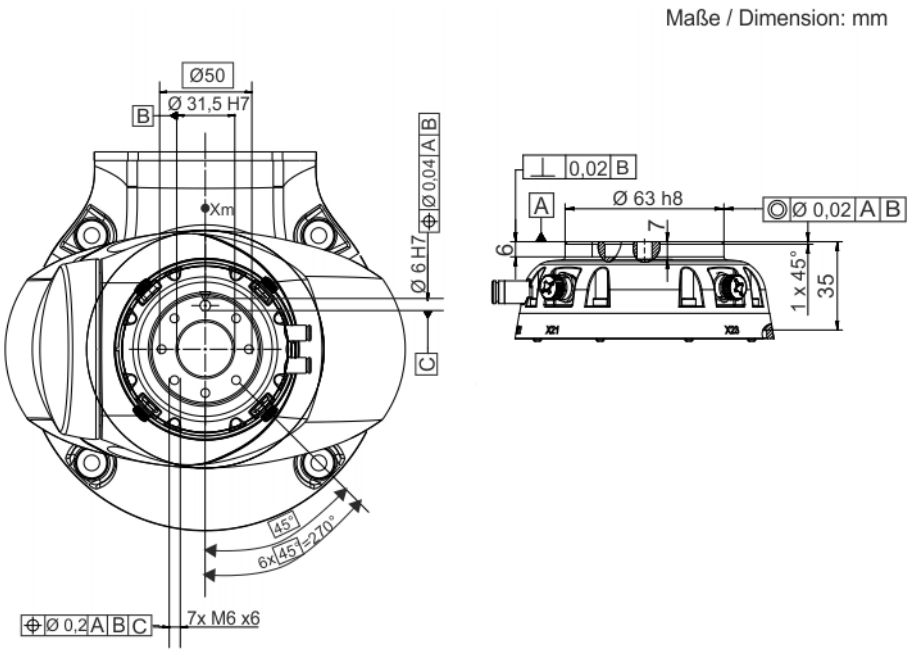


Fig. 4-13: Dimensions, media flange pneumatic

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

4.4.3 Identification plate, MF pneumatic

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

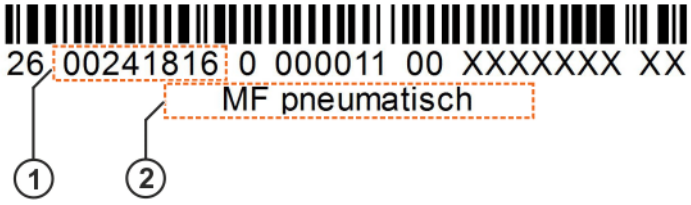


Fig. 4-14: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.4.4 Payloads, media flange pneumatic

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	60 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

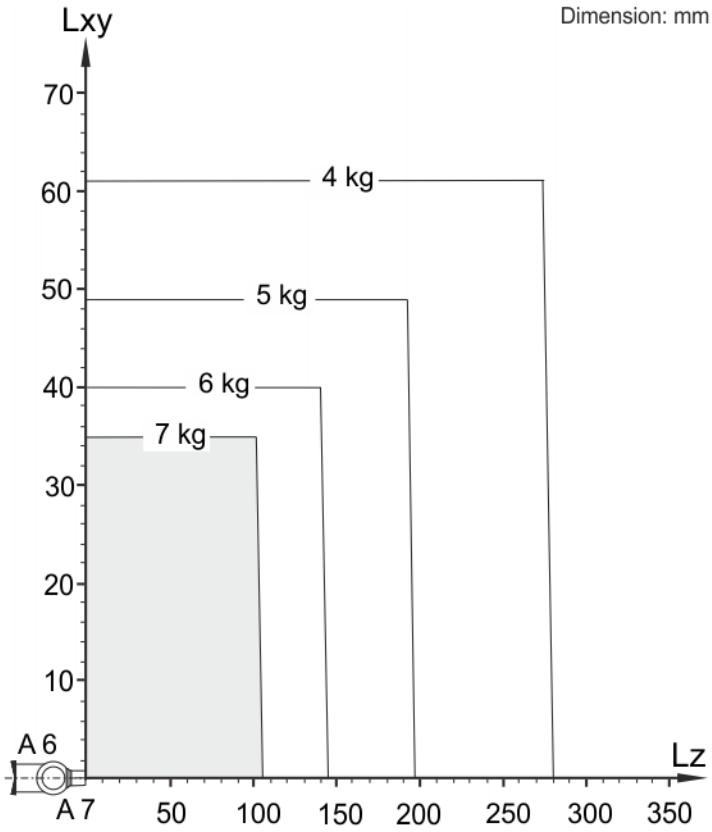


Fig. 4-15: LBR iiwa 7 R800 payload diagram

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	44 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

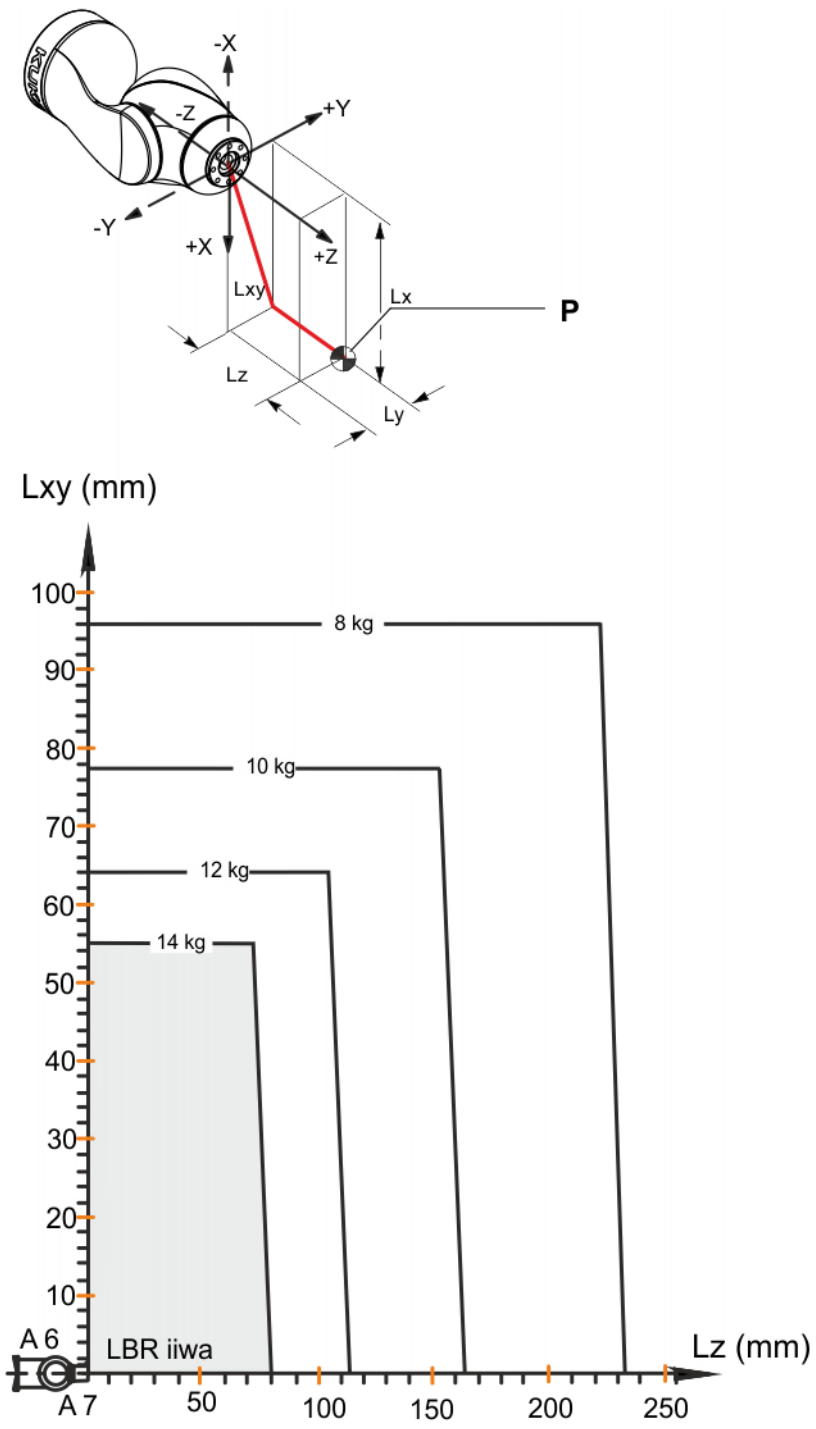


Fig. 4-16: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load

The robot cannot carry a supplementary load.

4.4.5 Working envelope, media flange pneumatic

The diagram shows the shape and size of the working envelope for the robot with the media flange pneumatic:

- **LBR iiwa 7 R800**

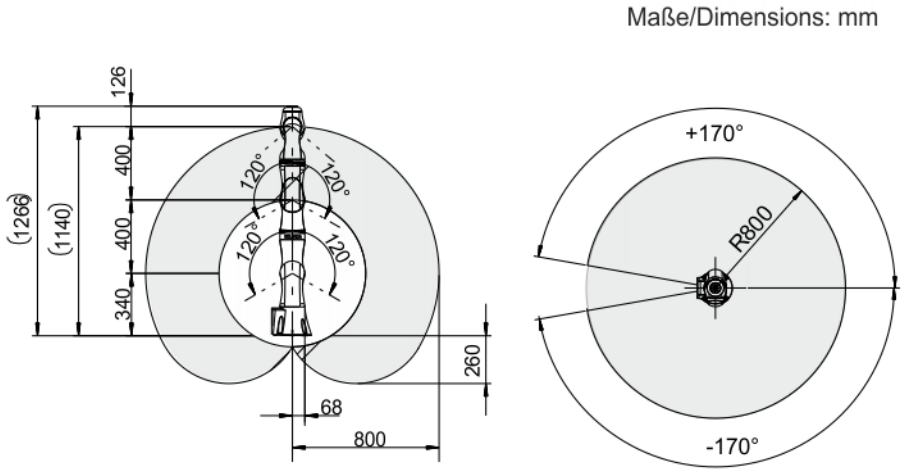


Fig. 4-17: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

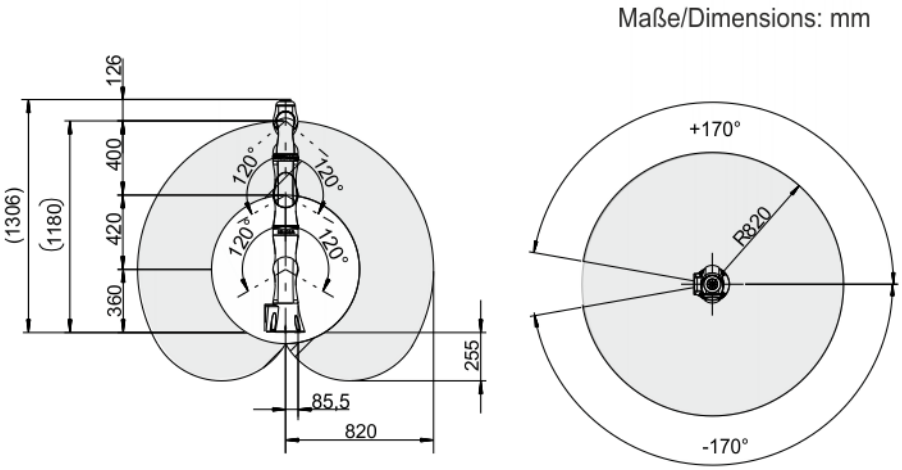


Fig. 4-18: Working envelope, LBR iiwa 14 R820 with media flange

4.5 Technical data, media flange IO pneumatic

4.5.1 Basic data, media flange IO pneumatic

General

Media flange	Media flange IO pneumatic
Weight	230 g
Power supply	18 V…30 V
Power requirement	■ 2 A for 4 outputs ■ 150 mA for EtherCAT ■ 3 A supply voltage
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.5.2 Dimensions, media flange IO pneumatic

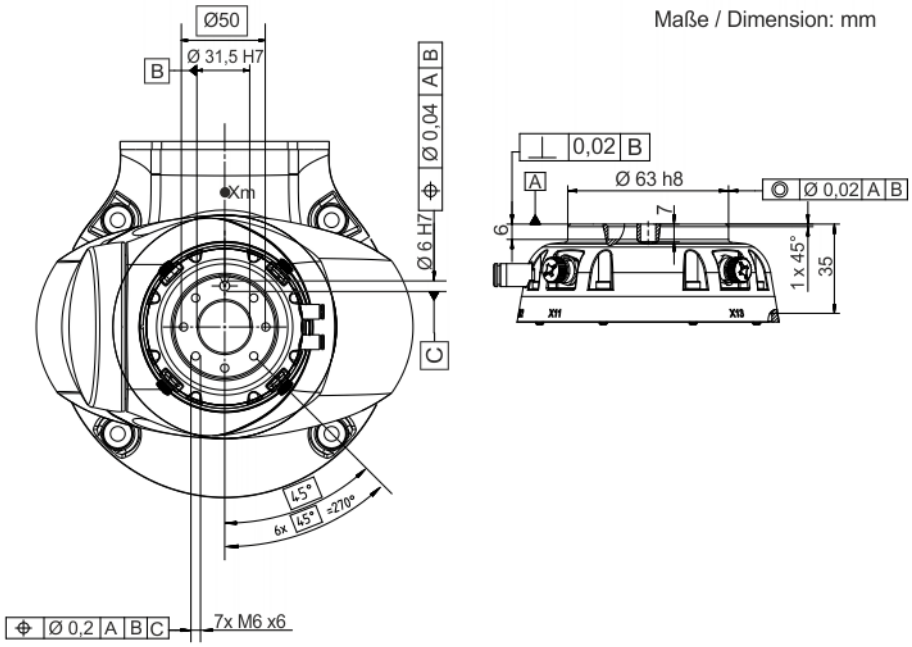


Fig. 4-19: Dimensions, media flange IO pneumatic

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

4.5.3 Identification plate, MF IO pneumatic

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

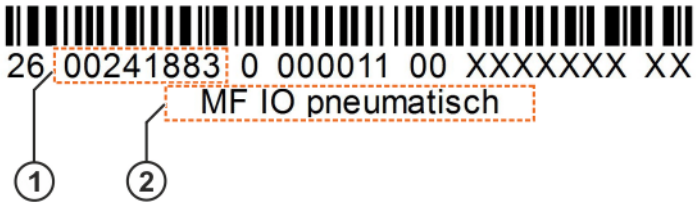


Fig. 4-20: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.5.4 Payloads, media flange IO pneumatic

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	60 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

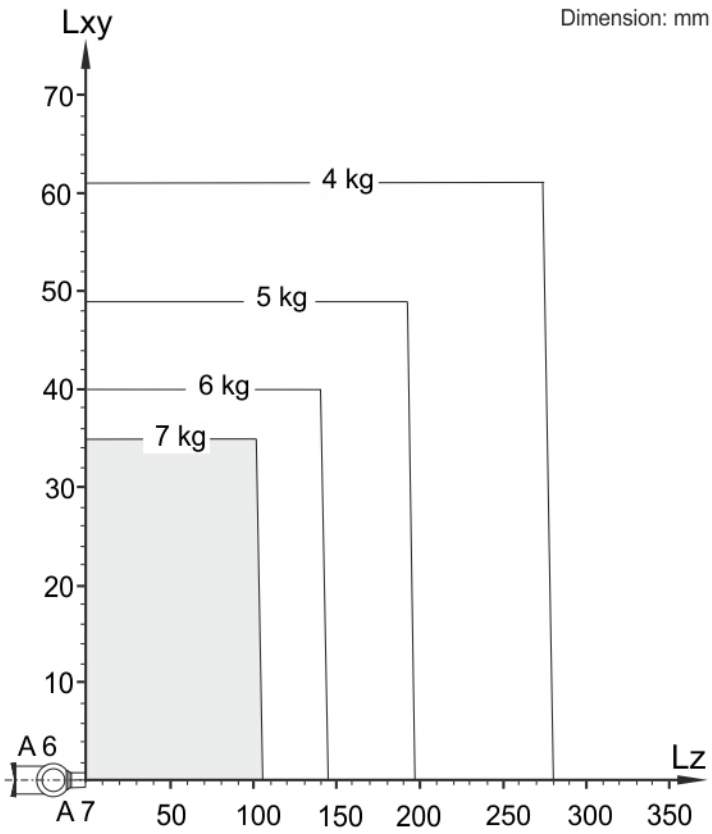


Fig. 4-21: LBR iiwa 7 R800 payload diagram

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	44 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

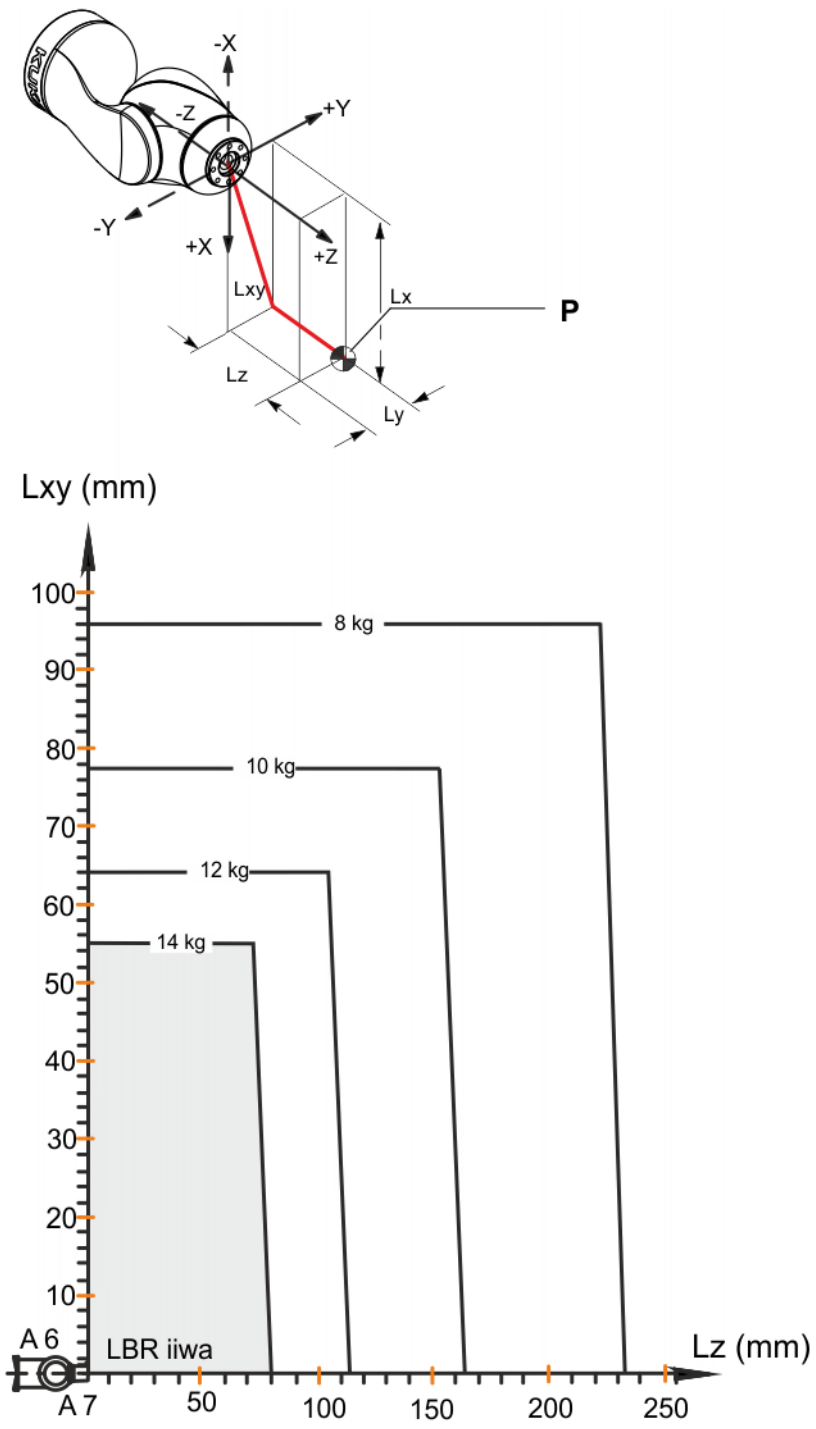


Fig. 4-22: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load

The robot cannot carry a supplementary load.

4.5.5 Working envelope, media flange IO pneumatic

The diagram shows the shape and size of the working envelope for the robot with the media flange IO pneumatic:

- **LBR iiwa 7 R800**

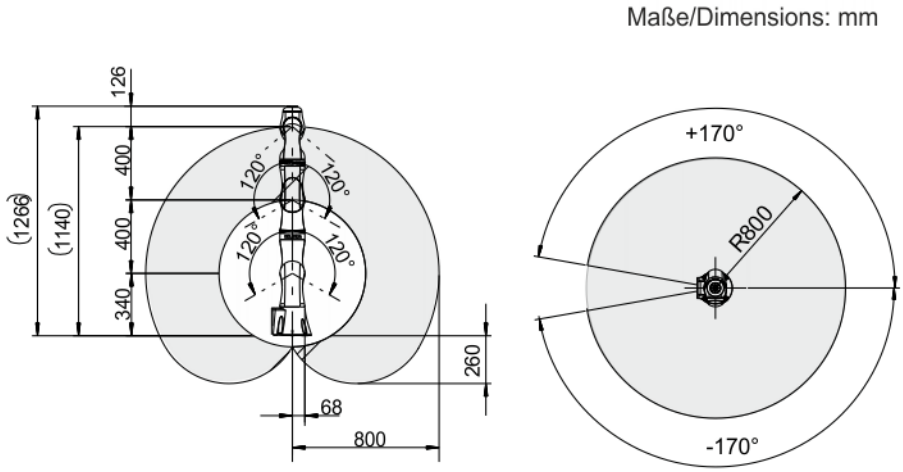


Fig. 4-23: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

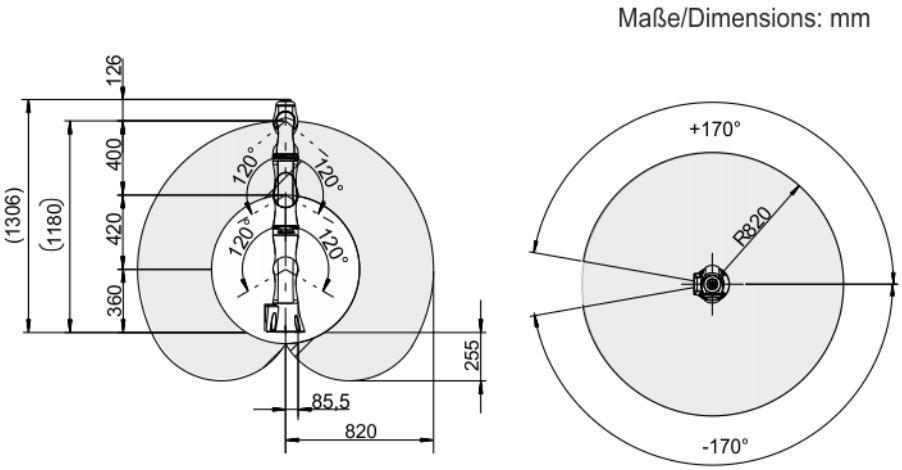


Fig. 4-24: Working envelope, LBR iiwa 14 R820 with media flange

4.6 Technical data, media flange Touch pneumatic

4.6.1 Basic data, media flange Touch pneumatic

General

Media flange	Media flange Touch pneumatic
Weight	458 g
Power supply	18 V…30 V
Power requirement	■ 2 A for 4 outputs ■ 150 mA for EtherCAT ■ 3 A supply voltage
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.6.2 Dimensions, media flange Touch pneumatic

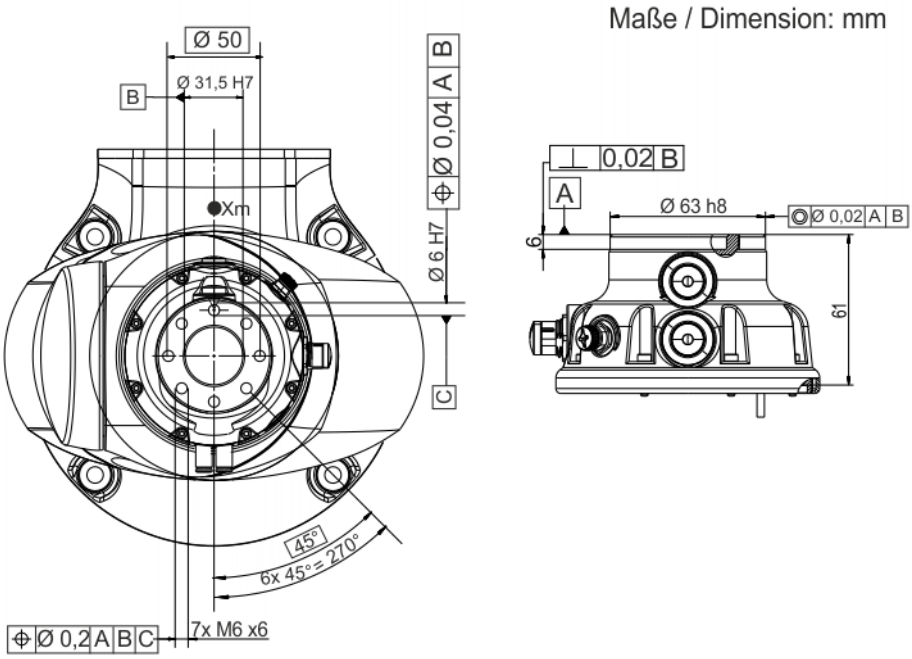


Fig. 4-25: Dimensions, media flange Touch pneumatic

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

4.6.3 Identification plate, MF Touch pneumatic

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

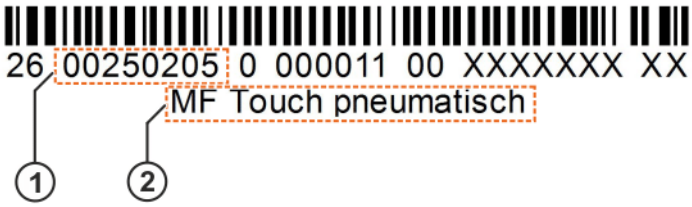


Fig. 4-26: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.6.4 Payloads, media flange Touch pneumatic

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	35 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

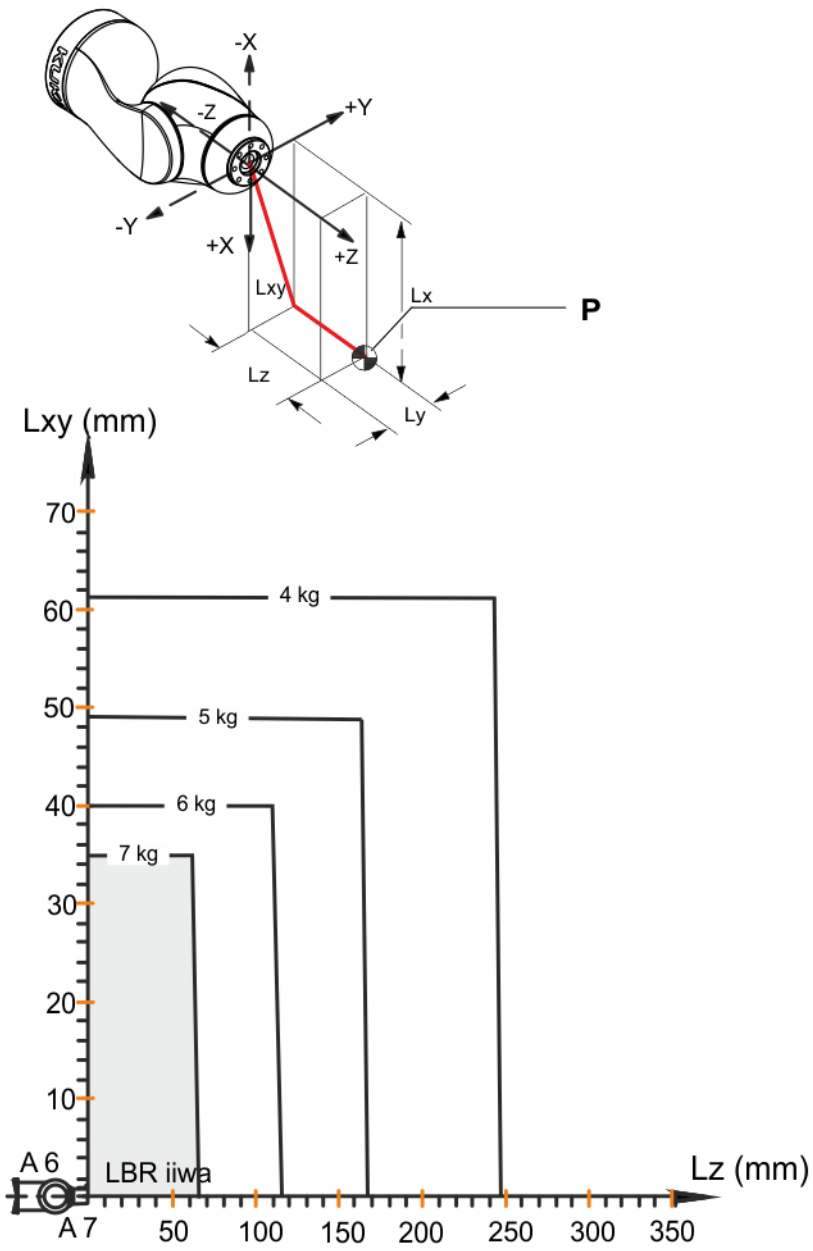


Fig. 4-27: Payload diagram, LBR iiwa 7 R800

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	30 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

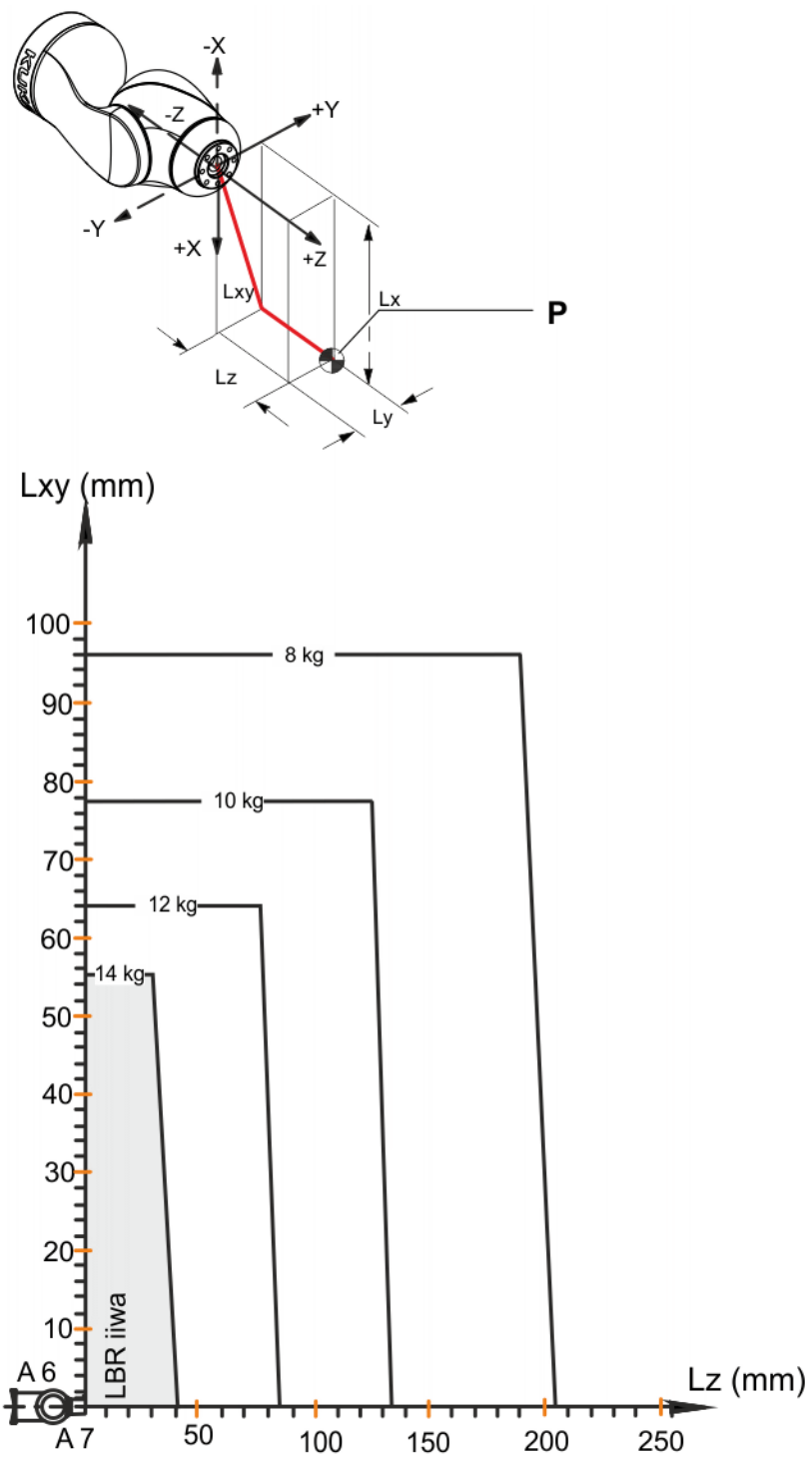


Fig. 4-28: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load

The robot cannot carry a supplementary load.

4.6.5 Working envelope, media flange Touch pneumatic

The diagram shows the shape and size of the working envelope for the robot with the media flange IO pneumatic:

- **LBR iiwa 7 R800**

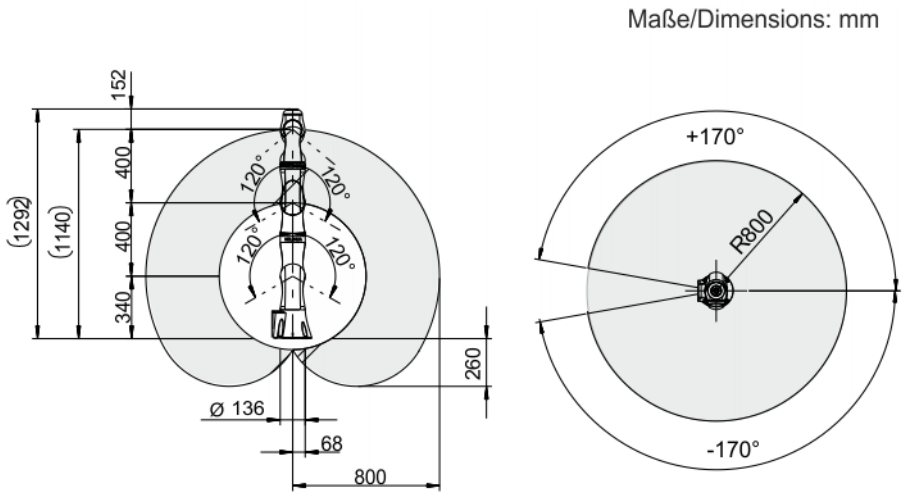


Fig. 4-29: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

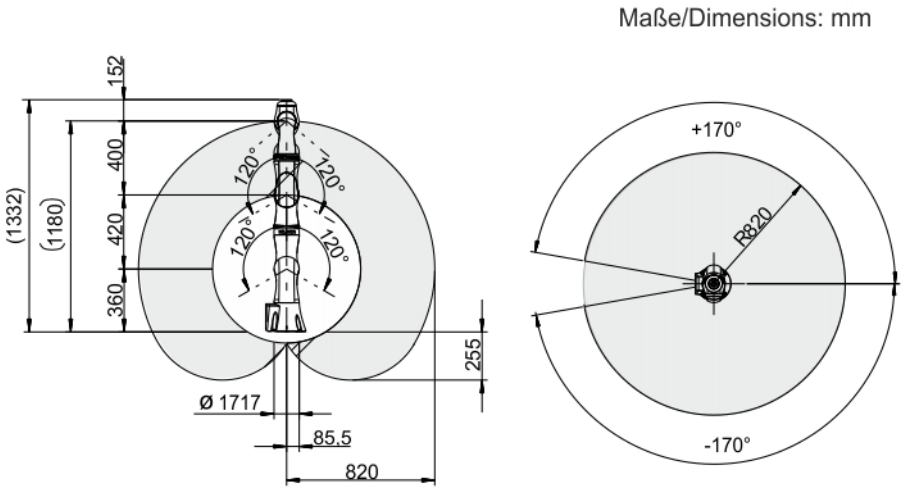


Fig. 4-30: Working envelope, LBR iiwa 14 R820 with media flange

4.7 Technical data, media flange Touch electrical

4.7.1 Basic data, media flange Touch electrical

General

Media flange	Media flange Touch electrical
Weight	458 g
Power supply	18 V…30 V (internal)

Power requirement	■ 2 A for 4 outputs (internal) ■ 150 mA for EtherCAT (internal) ■ 3 A supply voltage (internal)
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.7.2 Dimensions, media flange Touch electrical

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

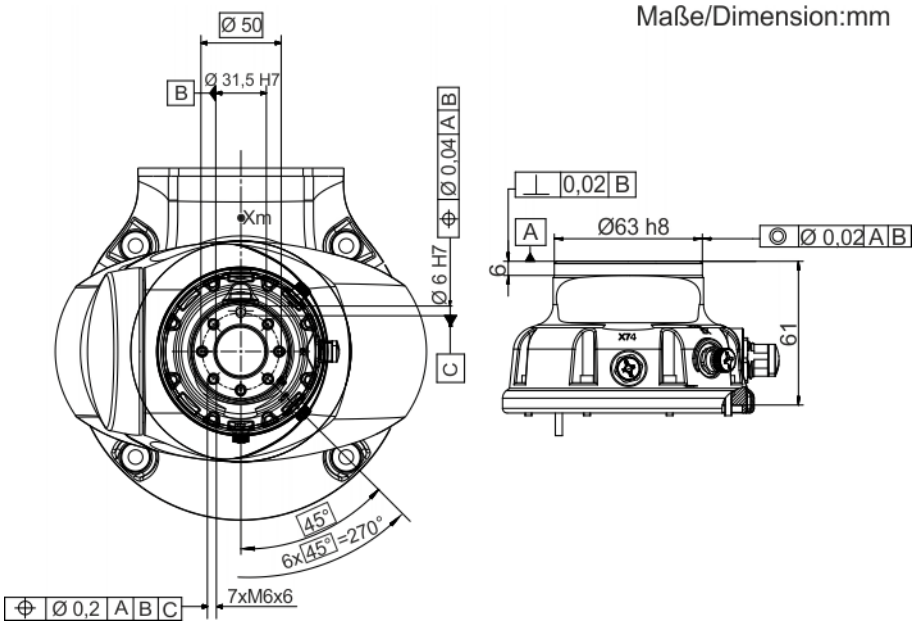


Fig. 4-31: Dimensions, media flange Touch electrical

4.7.3 Identification plate, MF Touch electrical

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

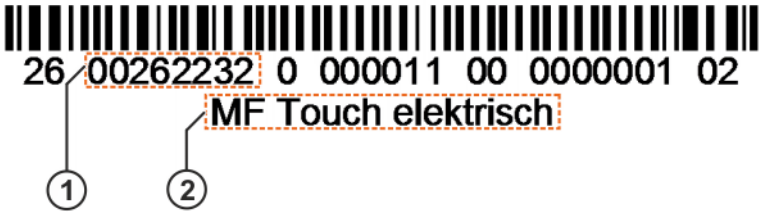


Fig. 4-32: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.7.4 Payloads, media flange Touch electrical

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	35 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

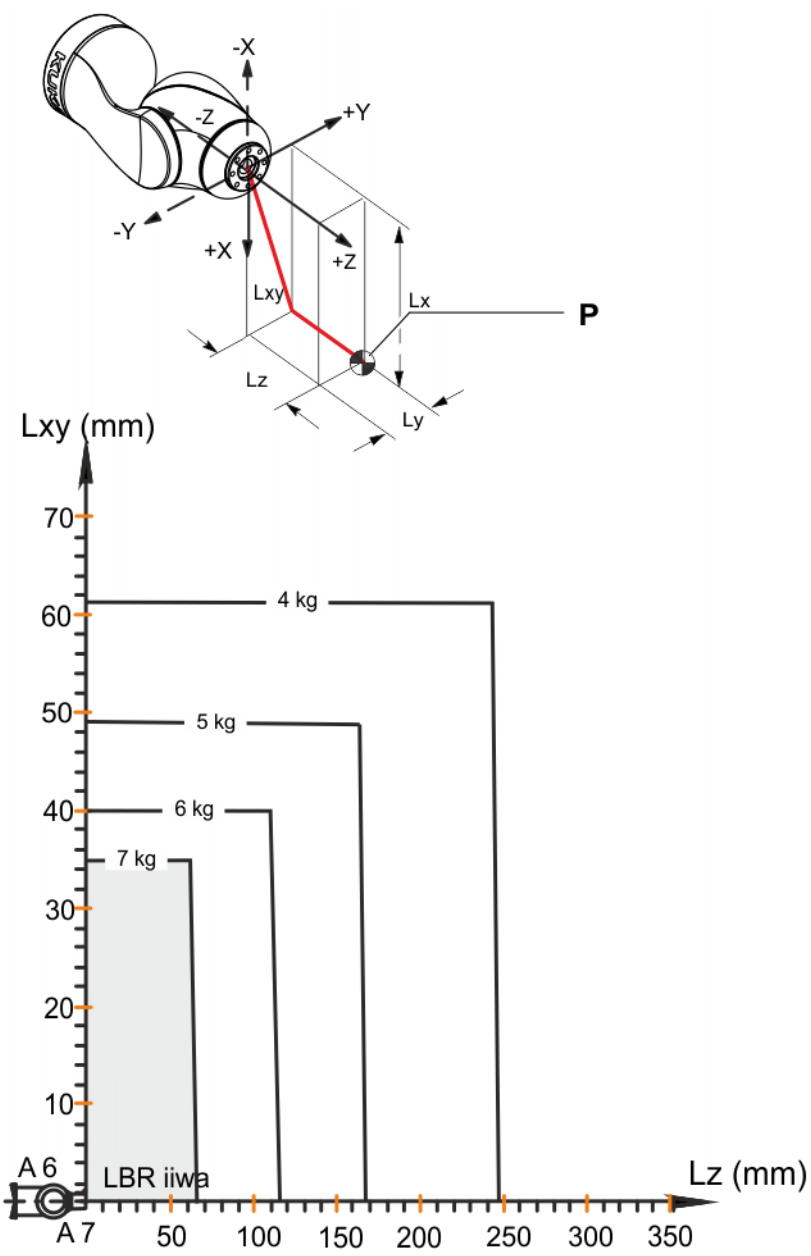


Fig. 4-33: Payload diagram, LBR iiwa 7 R800

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	30 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

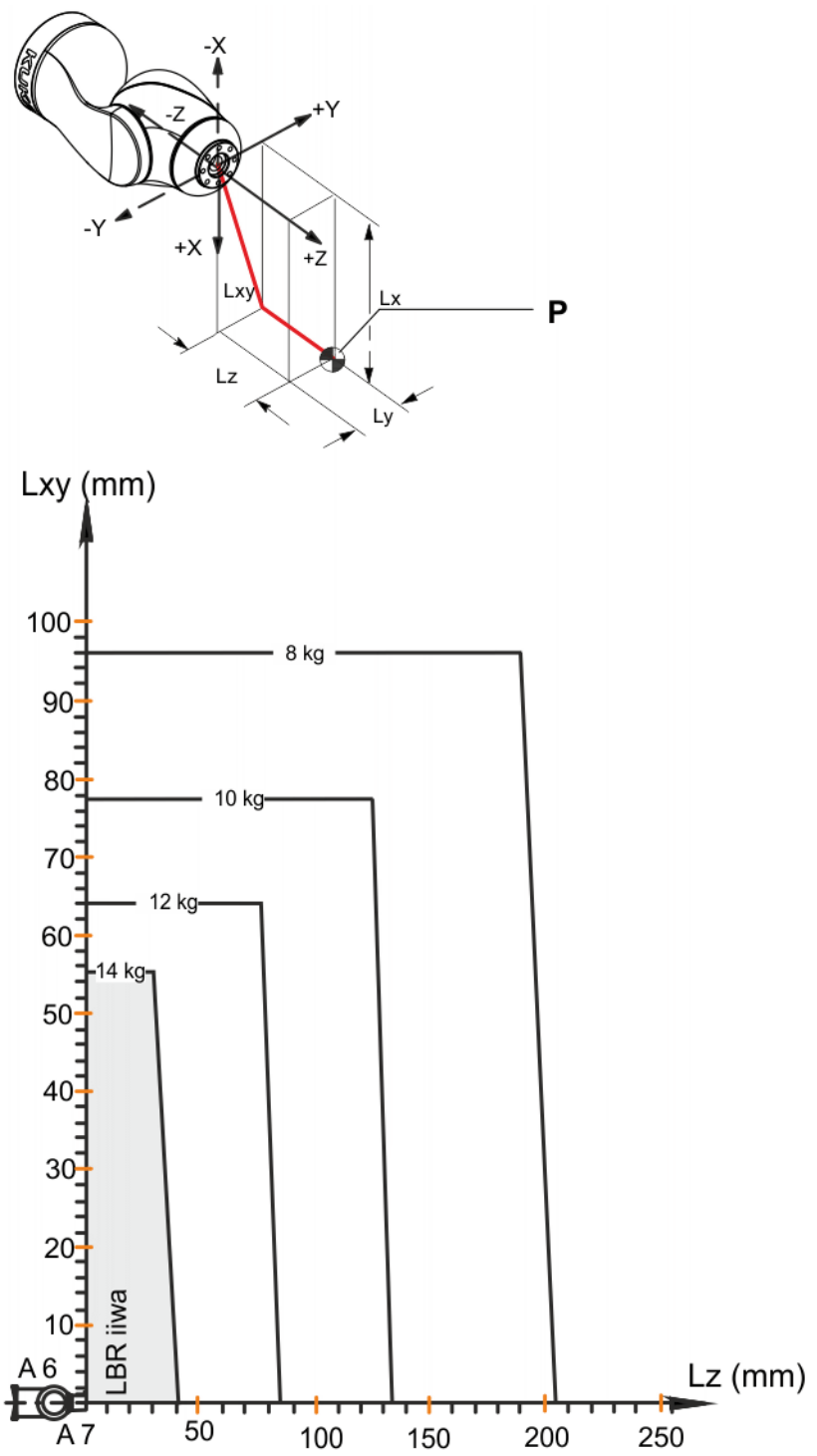


Fig. 4-34: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load The robot cannot carry a supplementary load.

4.7.5 Working envelope, media flange Touch electrical

The diagram shows the shape and size of the working envelope for the robot with the media flange Touch electrical:

- **LBR iiwa 7 R800**

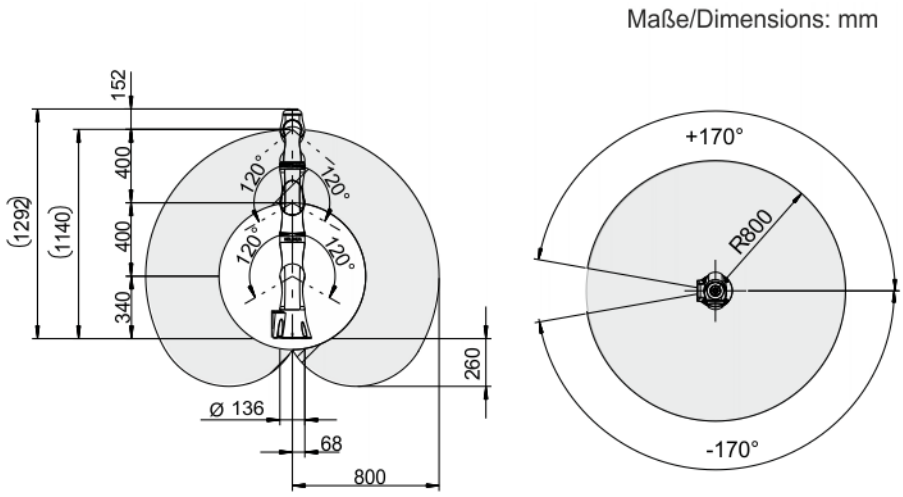


Fig. 4-35: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

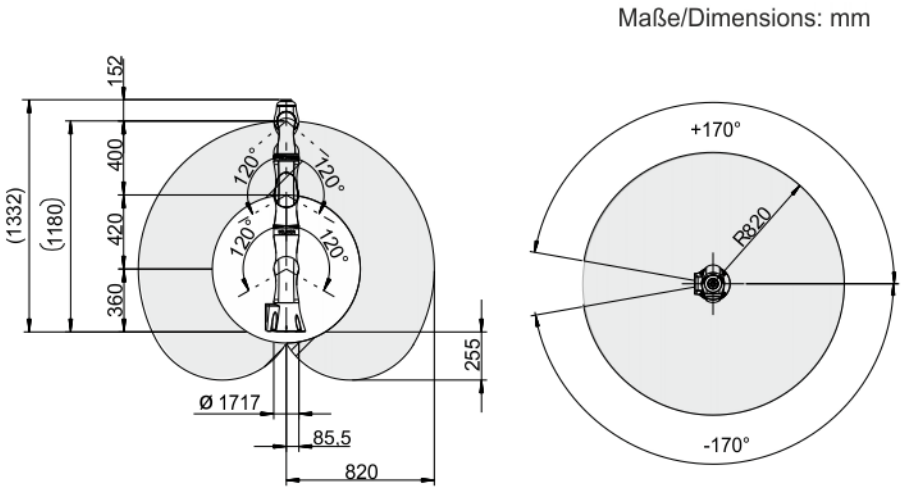


Fig. 4-36: Working envelope, LBR iiwa 14 R820 with media flange

4.8 Technical data, media flange IO electrical

4.8.1 Basic data, media flange IO electrical

General

Media flange	Media flange IO electrical
Weight	230 g
Power supply	18 V…30 V (internal)

Power requirement	■ 2 A for 4 outputs (internal) ■ 150 mA for EtherCAT (internal) ■ 3 A supply voltage (internal)
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.8.2 Dimensions, media flange IO electrical

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

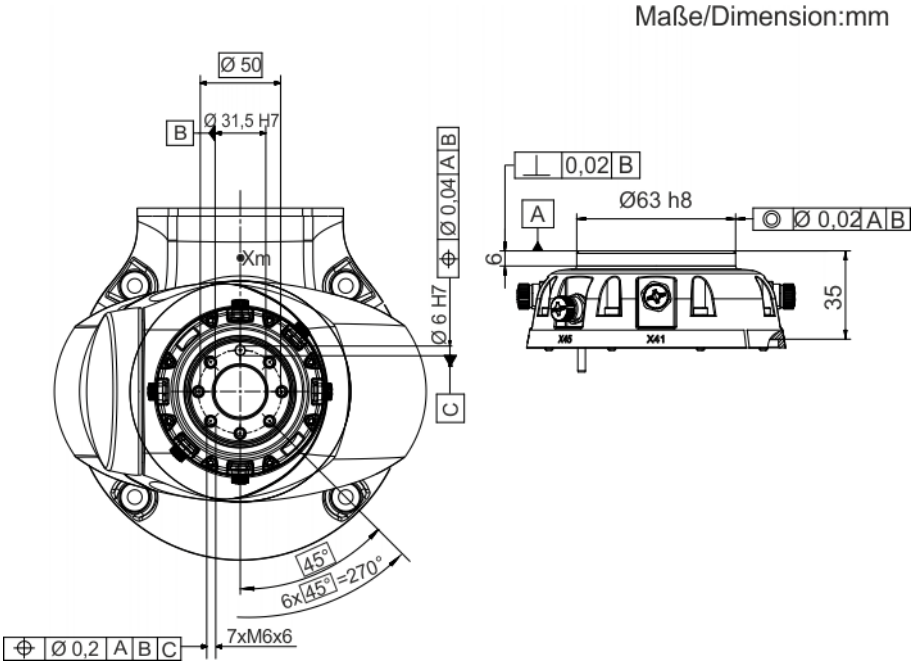


Fig. 4-37: Dimensions, media flange IO electrical

4.8.3 Identification plate, MF IO electrical

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

Fig. 4-38: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.8.4 Payloads, media flange IO electrical

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	60 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

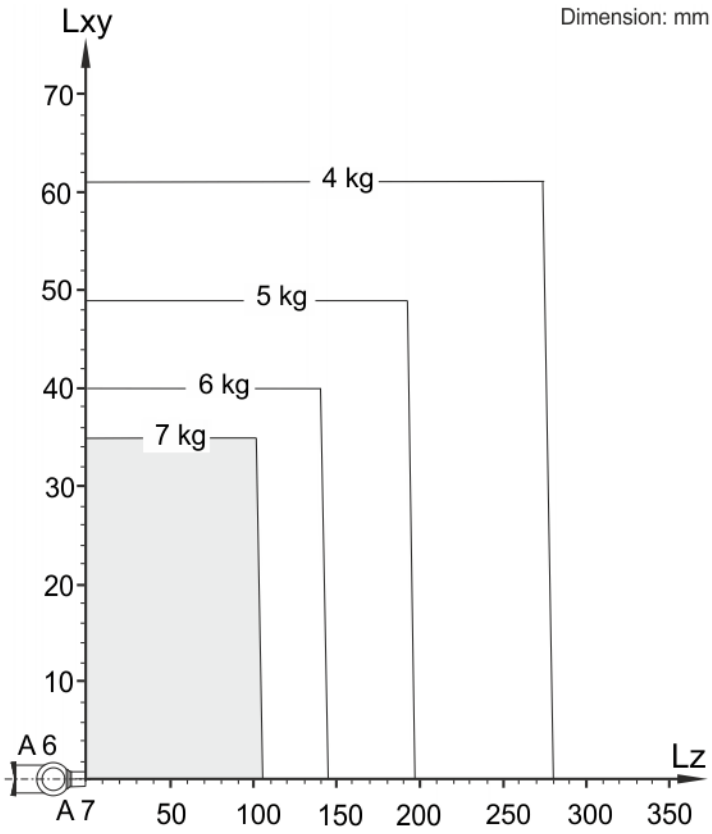


Fig. 4-39: LBR iiwa 7 R800 payload diagram

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	44 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

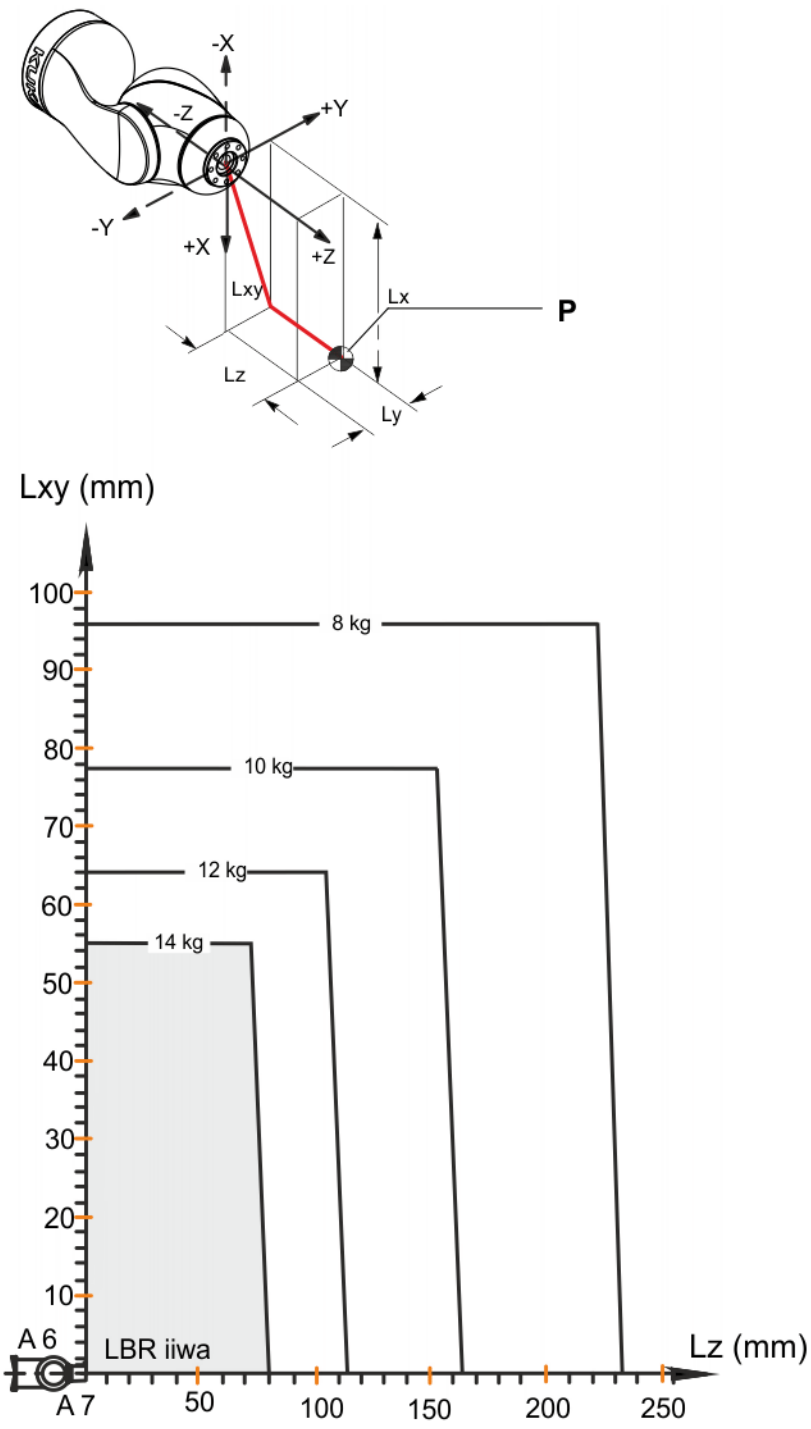


Fig. 4-40: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load

The robot cannot carry a supplementary load.

4.8.5 Working envelope, media flange IO electrical

The diagram shows the shape and size of the working envelope for the robot with the media flange Touch electrical:

- **LBR iiwa 7 R800**

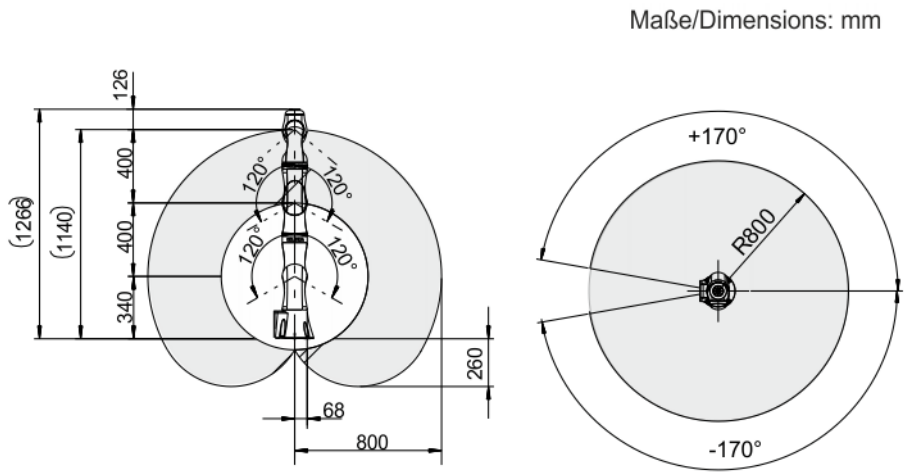


Fig. 4-41: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

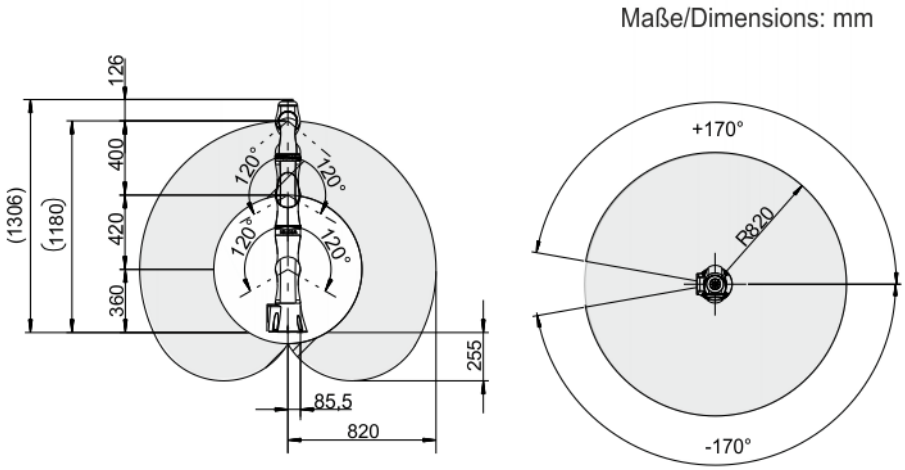


Fig. 4-42: Working envelope, LBR iiwa 14 R820 with media flange

4.9 Technical data, media flange IO valve pneumatic

4.9.1 Basic data, media flange IO valve pneumatic

General

Media flange	Media flange IO valve pneumatic
Weight	458 g
Power supply	18 V…30 V
Power requirement	■ 2 A for 4 outputs ■ 150 mA for EtherCAT ■ 3 A supply voltage
EMC resistance	EN 61000-6-2 and EN 61000-6-4

The weight of the media flange is automatically taken into consideration by Sunrise.OS.

Ambient conditions

Operation	+5 °C to +45 °C (278 K to 318 K)
Storage and transportation	-25 °C … +70 °C (248 K … 343 K)
Air humidity	20% … 80%
Protection rating of the media flange	IP 54 Ready for operation, with connecting cables plugged in (according to EN 60529)

4.9.2 Dimensions, media flange IO valve pneumatic

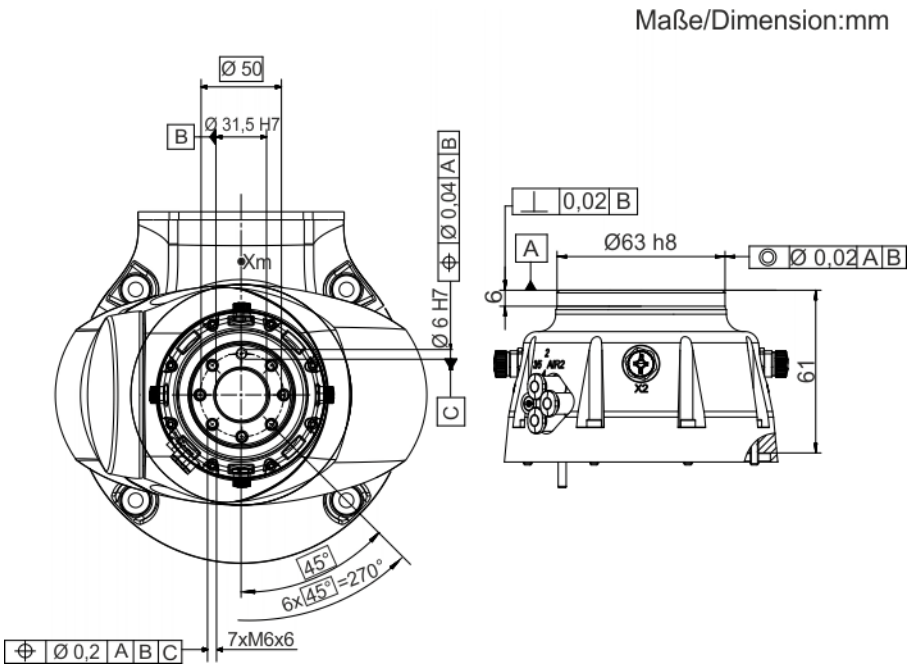


Fig. 4-43: Dimensions, media flange IO valve pneumatic

The media flange is depicted with axis 7 in the zero position. The symbol **Xm** indicates the position of the locating element in the zero position.

4.9.3 Identification plate, MF IO valve pneumatic

The following identification plate is attached to the media flange. It must not be removed or rendered illegible. Illegible plates and labels must be replaced.

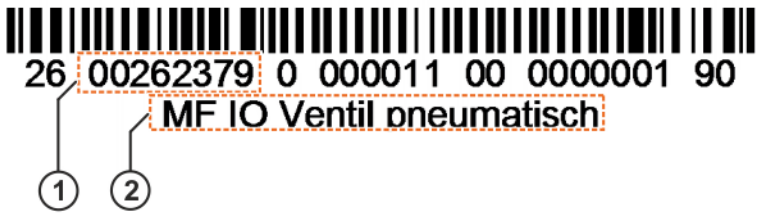


Fig. 4-44: Rating plate

1 Article number of the media flange
2 Designation of the media flange

4.9.4 Payloads, media flange IO valve pneumatic

Payloads

- LBR iiwa 7 R800

Robot	LBR iiwa 7 R800
Wrist	IW
Rated payload	7 kg
Distance of the load center of gravity L_z	35 mm
Distance of the load center of gravity L_{xy}	35 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	7 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

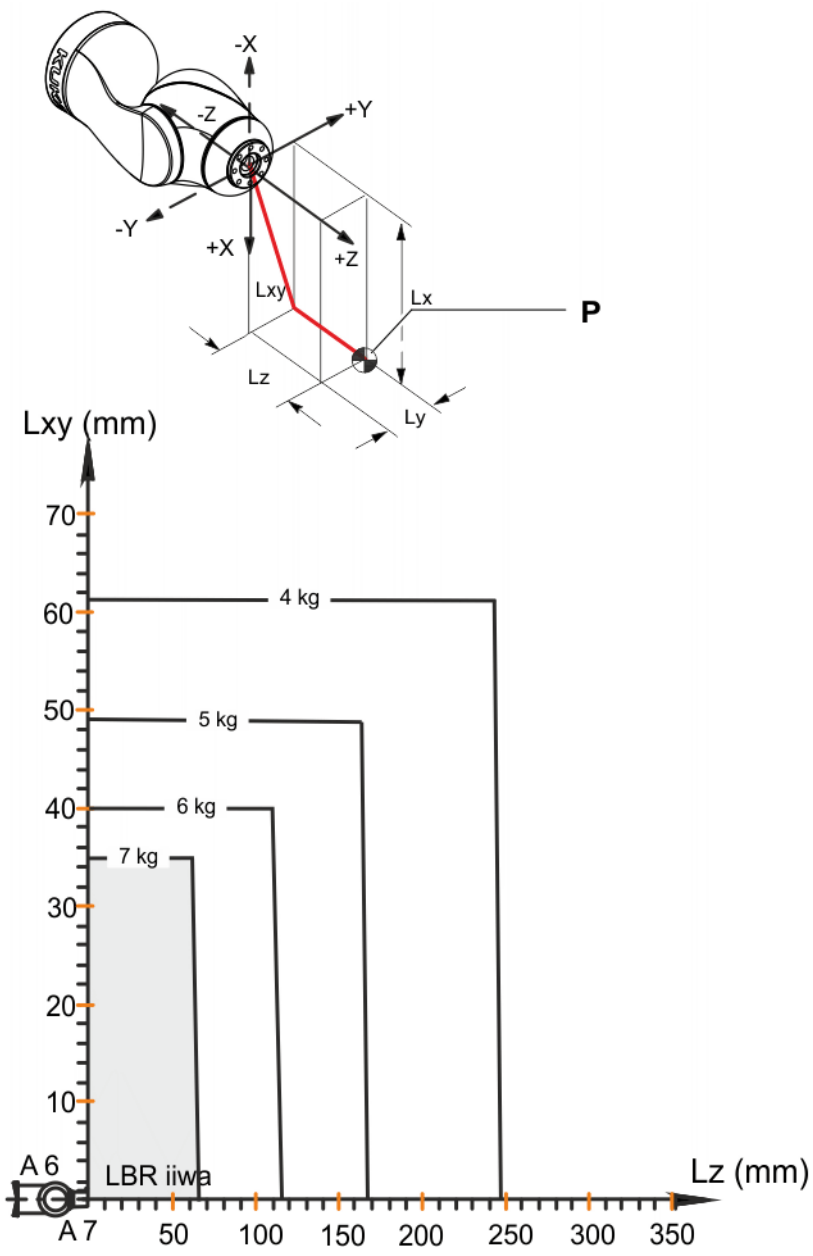


Fig. 4-45: Payload diagram, LBR iiwa 7 R800

- **LBR iiwa 14 R820**

Robot	LBR iiwa 14 R820
Wrist	IW
Rated payload	14 kg
Distance of the load center of gravity L_z	30 mm
Distance of the load center of gravity L_{xy}	40 mm
Permissible moment of inertia	0.3 kgm^2
Max. total load	14 kg
Supplementary load	None

Load center of gravity P

For all payloads, the load center of gravity refers to the distance from the face of the mounting flange on axis A7.

Payload diagram

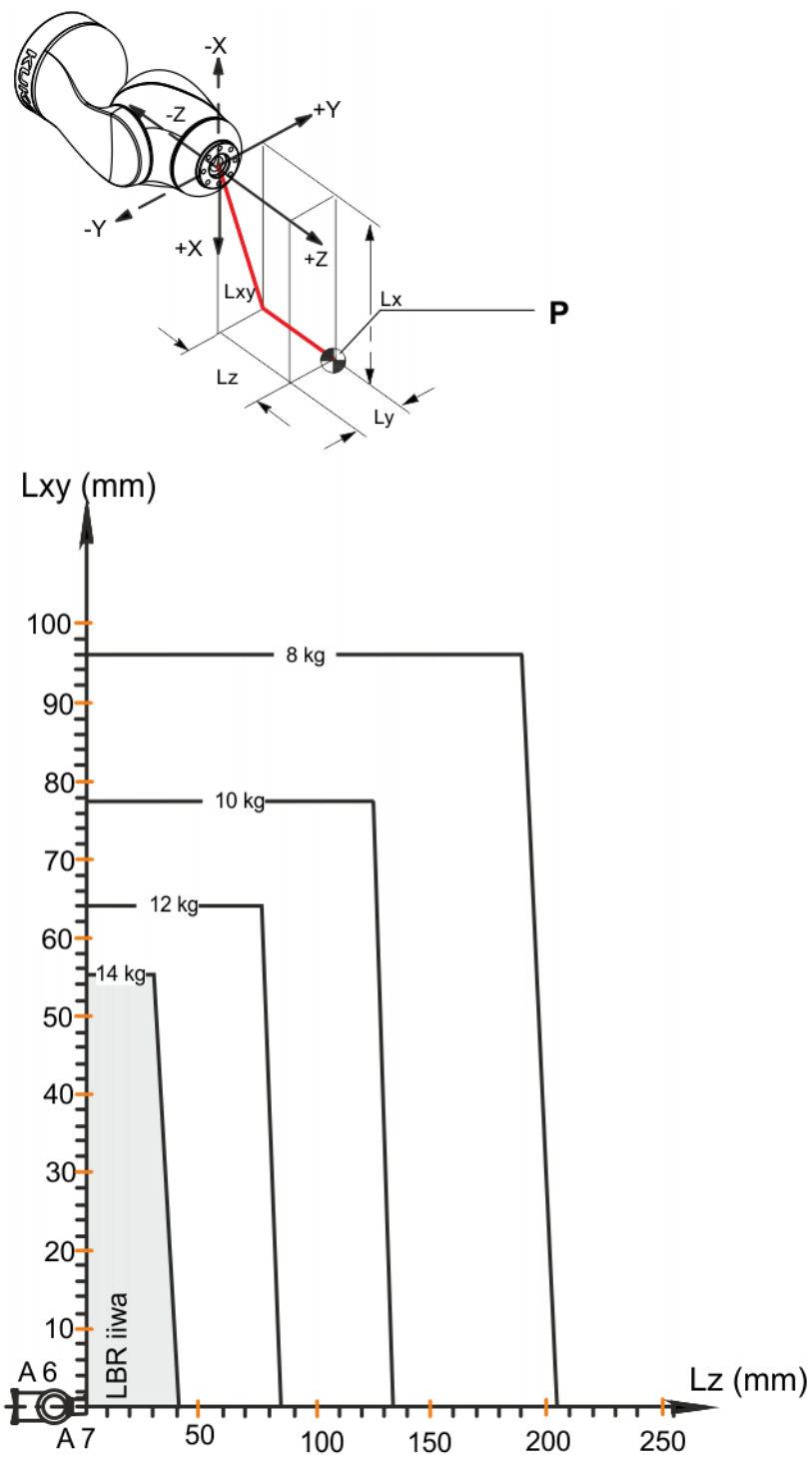


Fig. 4-46: Payload diagram, LBR iiwa 14 R820

NOTICE This loading curve corresponds to the maximum load capacity. Both values (payload and mass moment of inertia) must be checked in all cases. Exceeding this capacity will reduce the service life of the robot and overload the motors and the gears; in any such case KUKA Customer Support must be consulted beforehand.
The values determined here are necessary for planning the robot application. For commissioning the robot, additional input data are required in accordance with the operating and programming instructions of the control software.

Supplementary load The robot cannot carry a supplementary load.

4.9.5 Working envelope, media flange IO valve pneumatic

The diagram shows the shape and size of the working envelope for the robot with the media flange IO valve pneumatic:

- **LBR iiwa 7 R800**

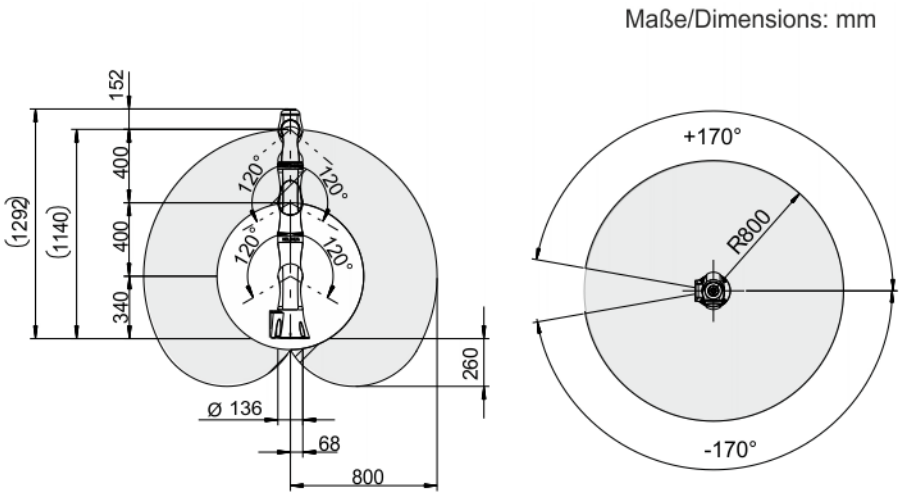


Fig. 4-47: Working envelope, LBR iiwa 7 R800 with media flange

- **LBR iiwa 14 R820**

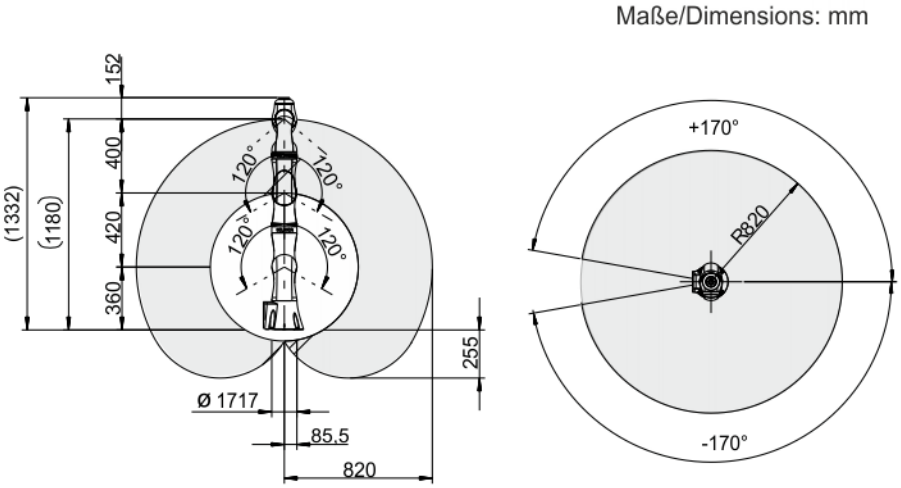


Fig. 4-48: Working envelope, LBR iiwa 14 R820 with media flange

4.10 Stopping distances and times

4.10.1 General information

Information concerning the position control data:

- The stopping distance is the axis angle traveled by the robot from the moment the stop signal is triggered until the robot comes to a complete standstill.
- The stopping time is the time that elapses from the moment the stop signal is triggered until the robot comes to a complete standstill.

- The data are given for axes A1, A2, A3 and A4. These axes are the axes with the greatest deflection.
- The data apply to single-axis motions. Superposed axis motions can result in longer stopping distances.
- As reference, PTP motions with position control have been used without further parameterization (e.g. robot.move(ptp(Zielpose))).
- Stopping distances and stopping times in accordance with DIN EN ISO 10218-1, Annex B.
- Stop categories:
  - Stop category 0 » STOP 0
  - Stop category 1 » STOP 1 (path-maintaining)

    according to IEC 60204-1
- The values specified are guide values determined by means of tests and simulation. They are average values which conform to the requirements of DIN EN ISO 10218-1. The actual stopping distances and stopping times may differ due to internal and external influences on the braking torque. It is therefore advisable to determine the exact stopping distances and stopping times under the real conditions of the actual robot application.
- Measuring technique

  The stopping distances were measured using the robot-internal measuring technique with rated payloads.
- The wear on the brakes varies depending on the operating mode, robot application and the number of STOP 0 stops triggered. It is therefore advisable to check the stopping distance at least once a year.

The stopping distances and stopping times can be determined, for example, by using safety monitoring to trigger axis-specific or Cartesian workspace monitoring of the safety stop that is to be checked and evaluating the corresponding measured data from the trace (by means of DataRecorder).

4.10.2 Terms used

Term	Description
m	Mass of the rated load and the supplementary load on the arm.
Phi	Angle of rotation (°) about the corresponding axis. This value can be entered in the controller via the KCP and is displayed on the KCP.
POV	Program override (%) = velocity of the robot motion. This value can be entered in the controller via the KCP and is displayed on the KCP.
Extension	Distance (l in %) between axis 1 and the intersection of axes 6 and 7.
KCP	The KCP teach pendant has all the operator control and display functions required for operating and programming the robot system.

Extension The following figures illustrate the 0%, 33%, 66% and 100% extensions of axes A1-A4:

Extension 0% The robot is in 0% extension when the axes are in the following positions:

Axis	A1 (J1)	A2 (J2)	A3 (J4)	A4 (J5)	A5 (J6)	A6 (J7)	A7 (J8)
1	0°	0°	0°	0°	0°	0°	0°
2	0°	0°	90°	0°	0°	0°	0°

Axis	A1 (J1)	A2 (J2)	A3 (J4)	A4 (J5)	A5 (J6)	A6 (J7)	A7 (J8)
3	0°	90°	0°	90°	0°	0°	0°
4	0°	90°	0°	90°	90°	0°	0°

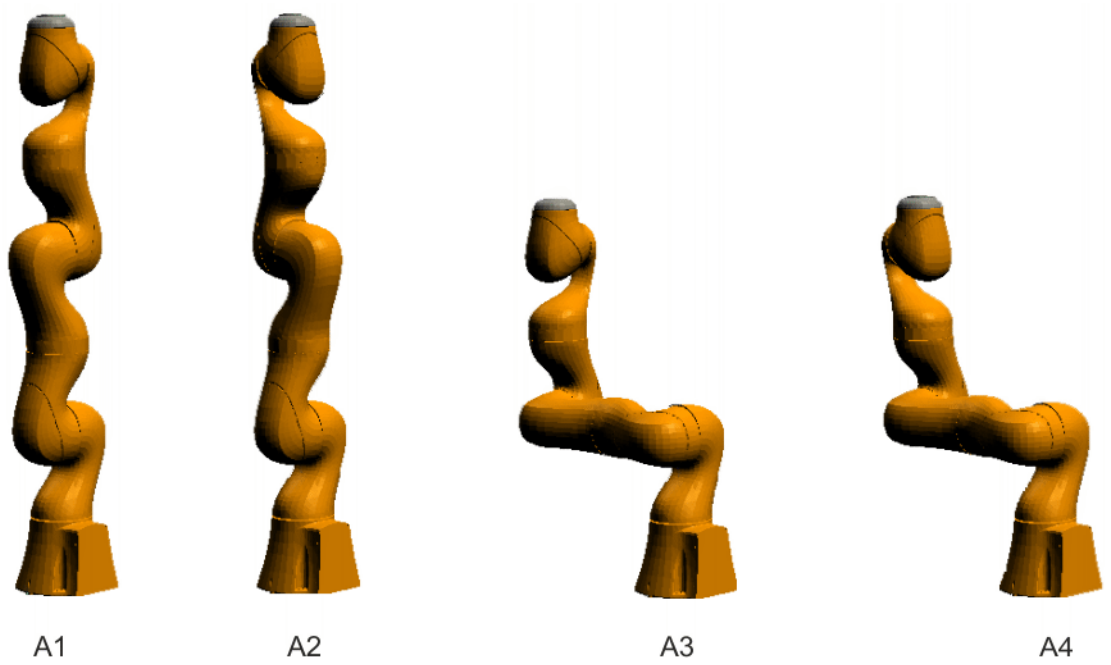


Fig. 4-49: Extension 0%, axis 1 - axis 4

Extension 33%

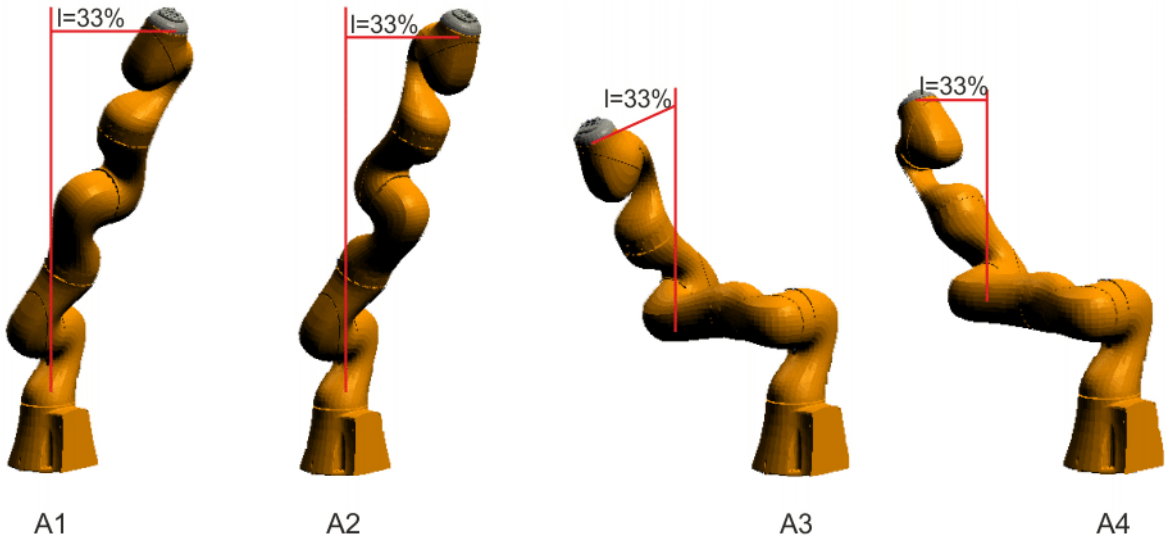


Fig. 4-50: Extension 33%, axis 1 - axis 4

Extension 66%

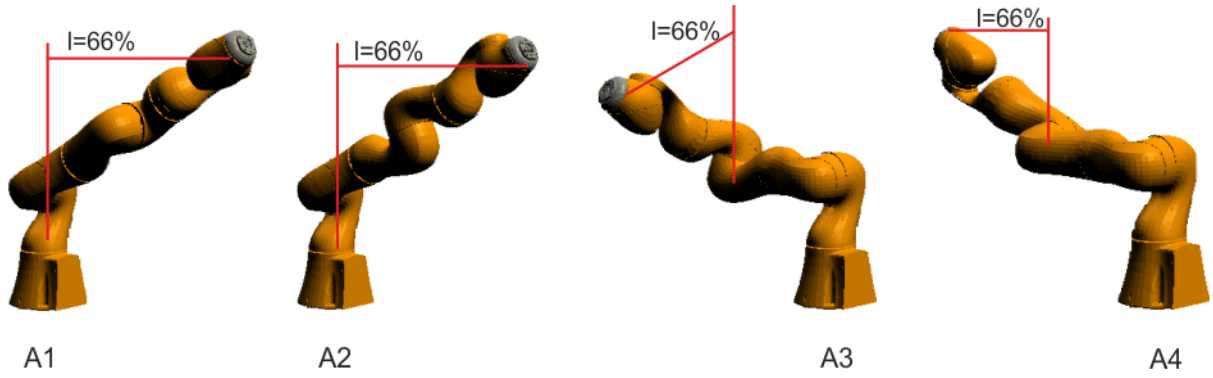


Fig. 4-51: 66% extension, axis 1 - axis 4

Extension 100%

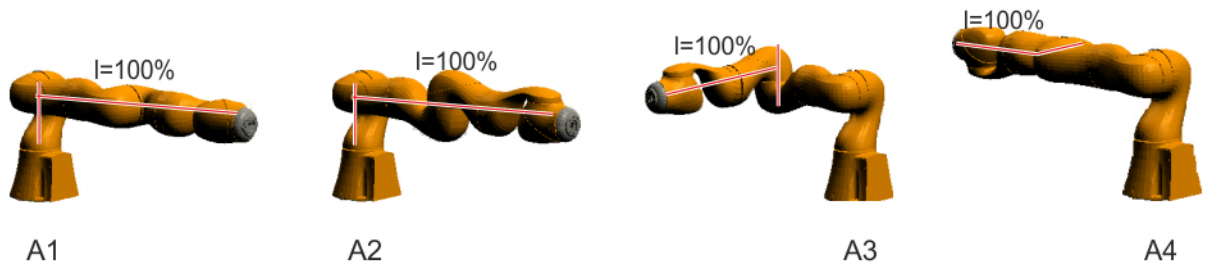


Fig. 4-52: Extension 100%, axis 1 - axis 4

4.10.3 Stopping distances and stopping times for LBR iiwa 7 R800

The stopping distances and stopping times indicated apply to the following media flanges:

- Basic flange
- Media flange electrical
- Media flange pneumatic
- Media flange IO pneumatic
- Media flange IO electrical
- Media flange IO valve pneumatic

4.10.3.1 Stopping distances and stopping times for STOP 0, axis 1 to axis 4

The table shows the stopping distances and stopping times after a STOP 0 (category 0 stop) is triggered. The values refer to the following configuration:

- Extension l = 100%
- Program override POV = 100%
- Mass m = maximum load (rated load + supplementary load on arm)

	Stopping distance (°)	Stopping time (s)
Axis 1	22.04	0.523
Axis 2	28.714	1.071
Axis 3	40.728	0.797
Axis 4	68.258	0.997

4.10.3.2 Stopping distances and stopping times for STOP 1, axis 1

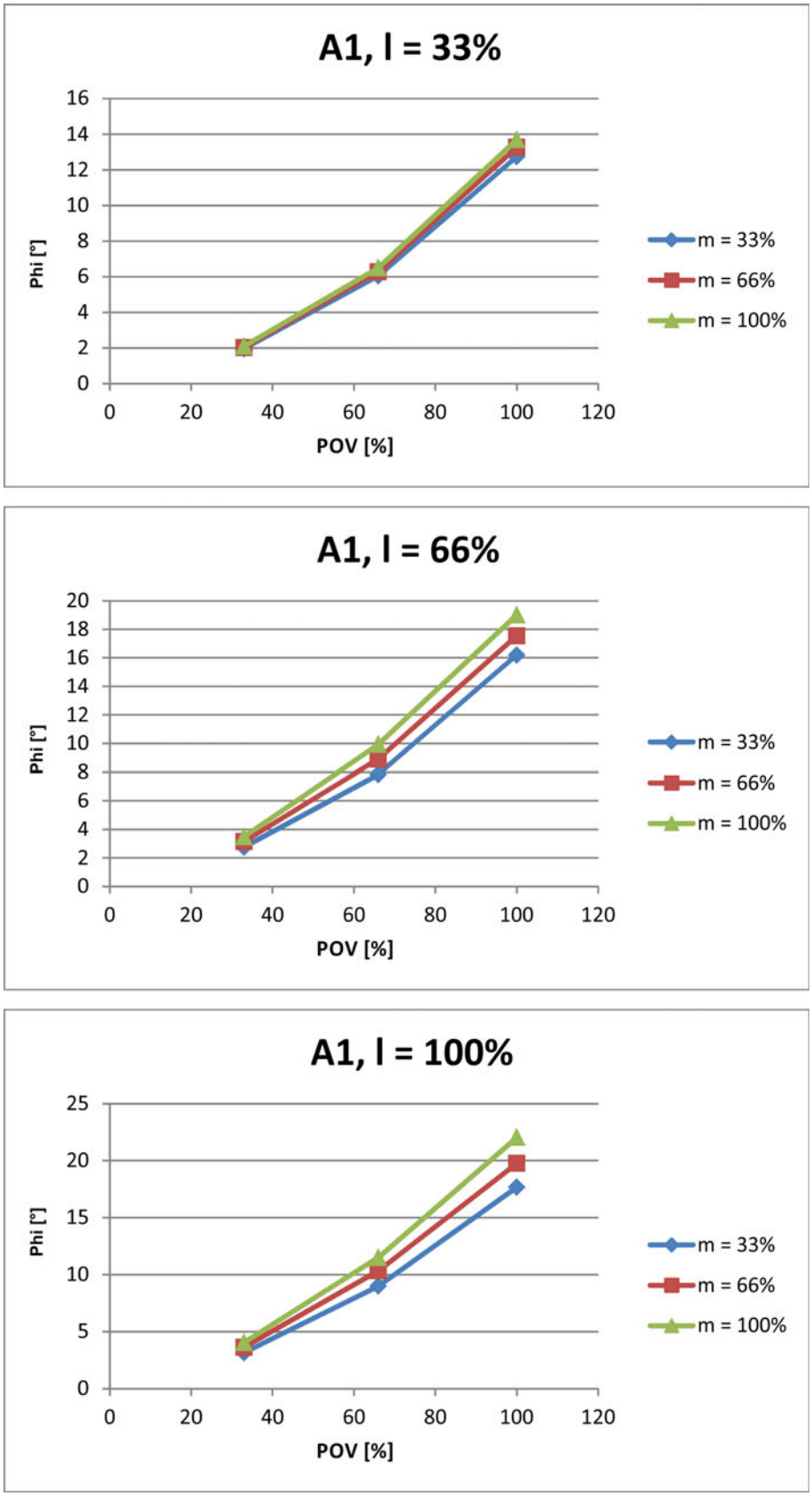


Fig. 4-53: Stopping distances for STOP 1, axis 1

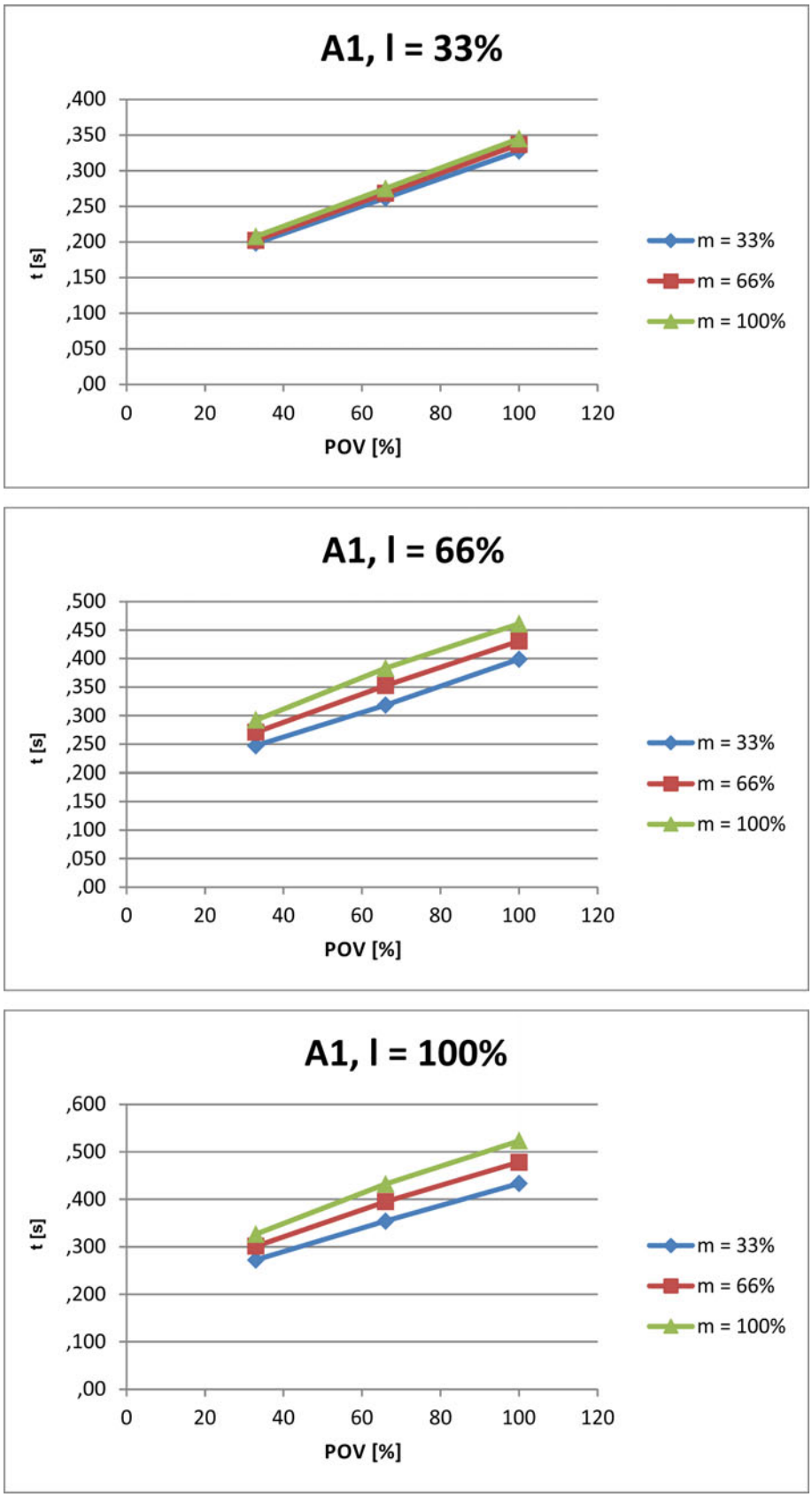


Fig. 4-54: Stopping times for STOP 1, axis 1

4.10.3.3 Stopping distances and stopping times for STOP 1, axis 2

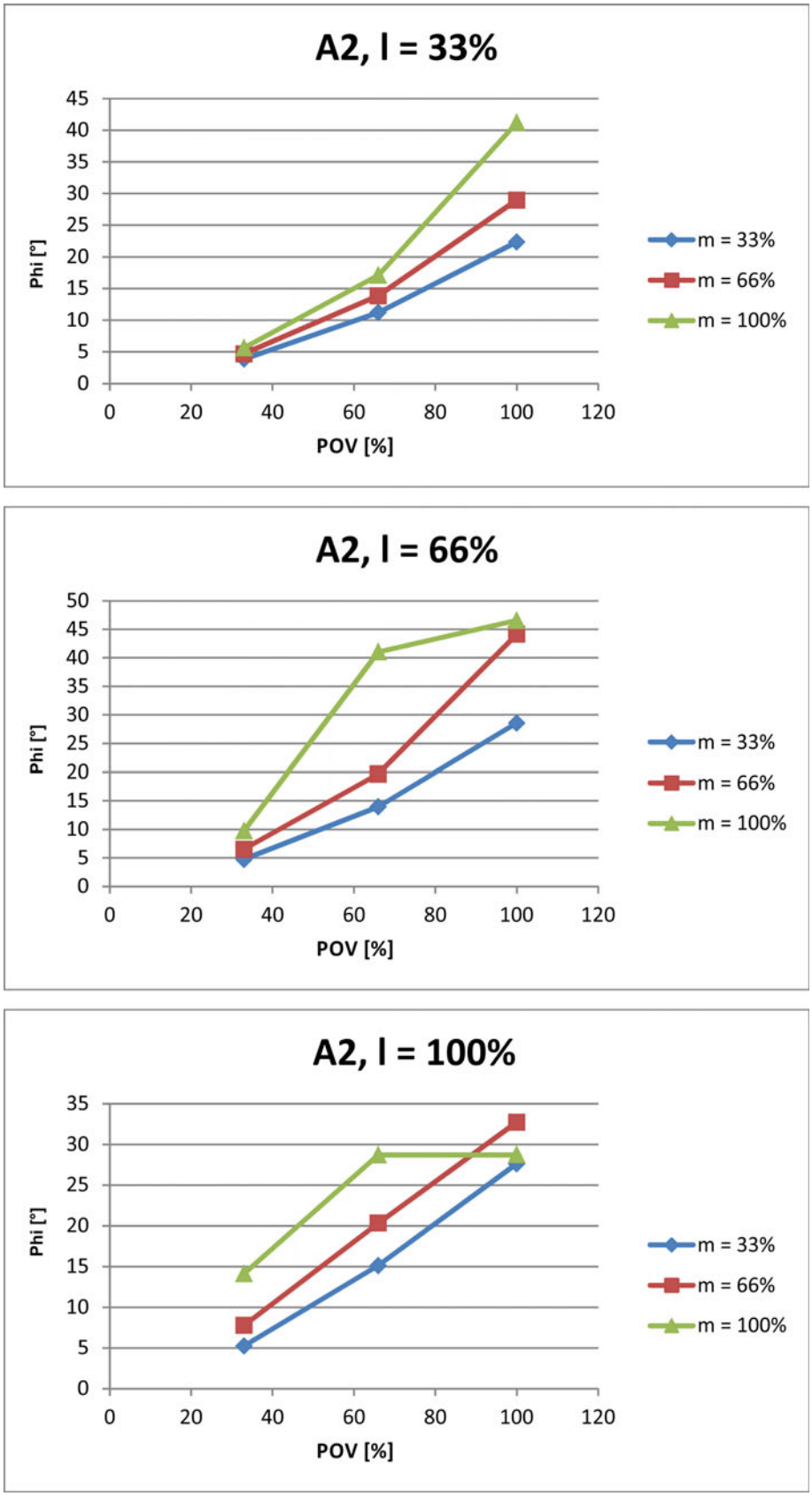


Fig. 4-55: Stopping distances for STOP 1, axis 2

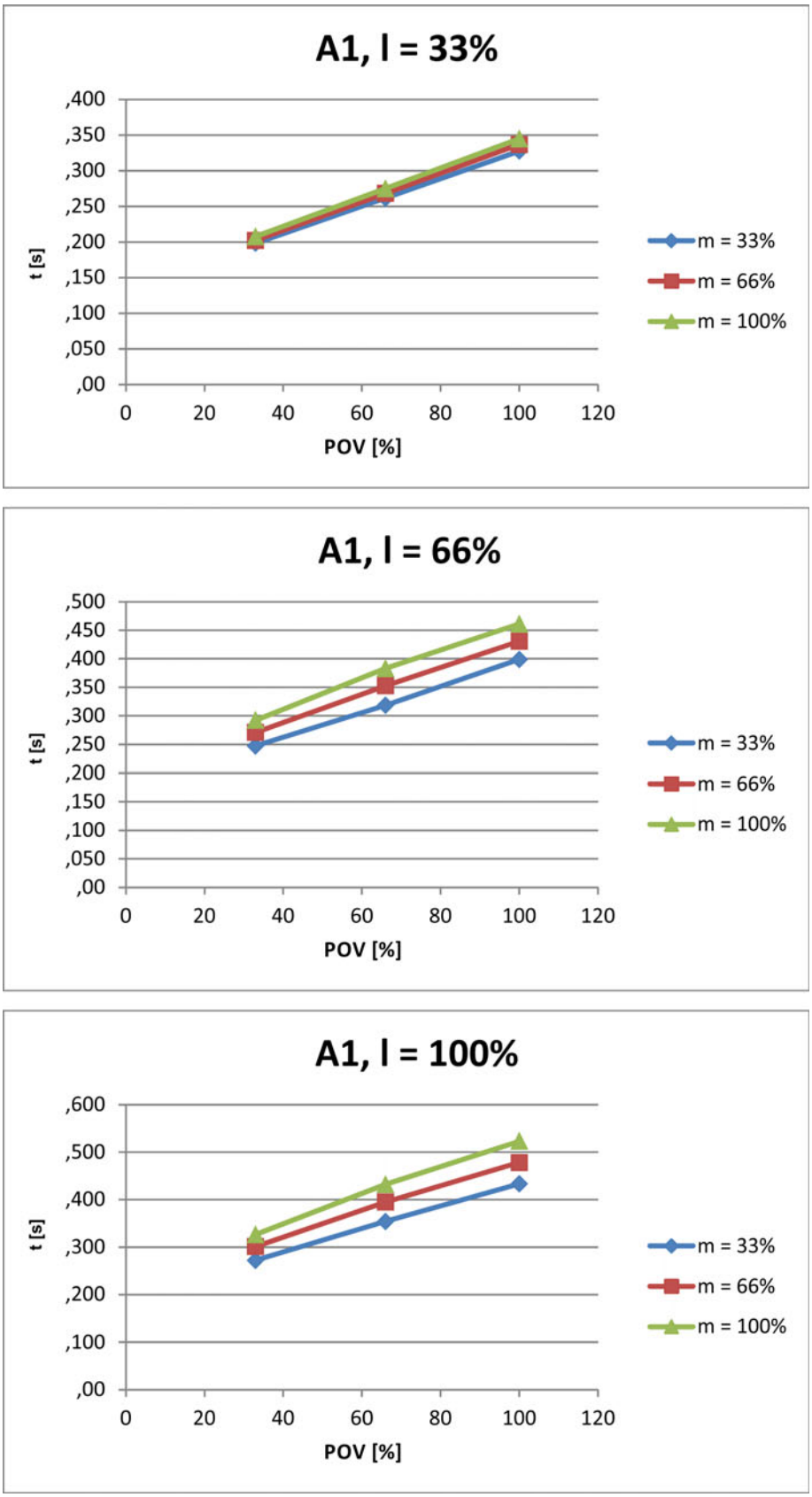


Fig. 4-56: Stopping times for STOP 1, axis 2

4.10.3.4 Stopping distances and stopping times for STOP 1, axis 3

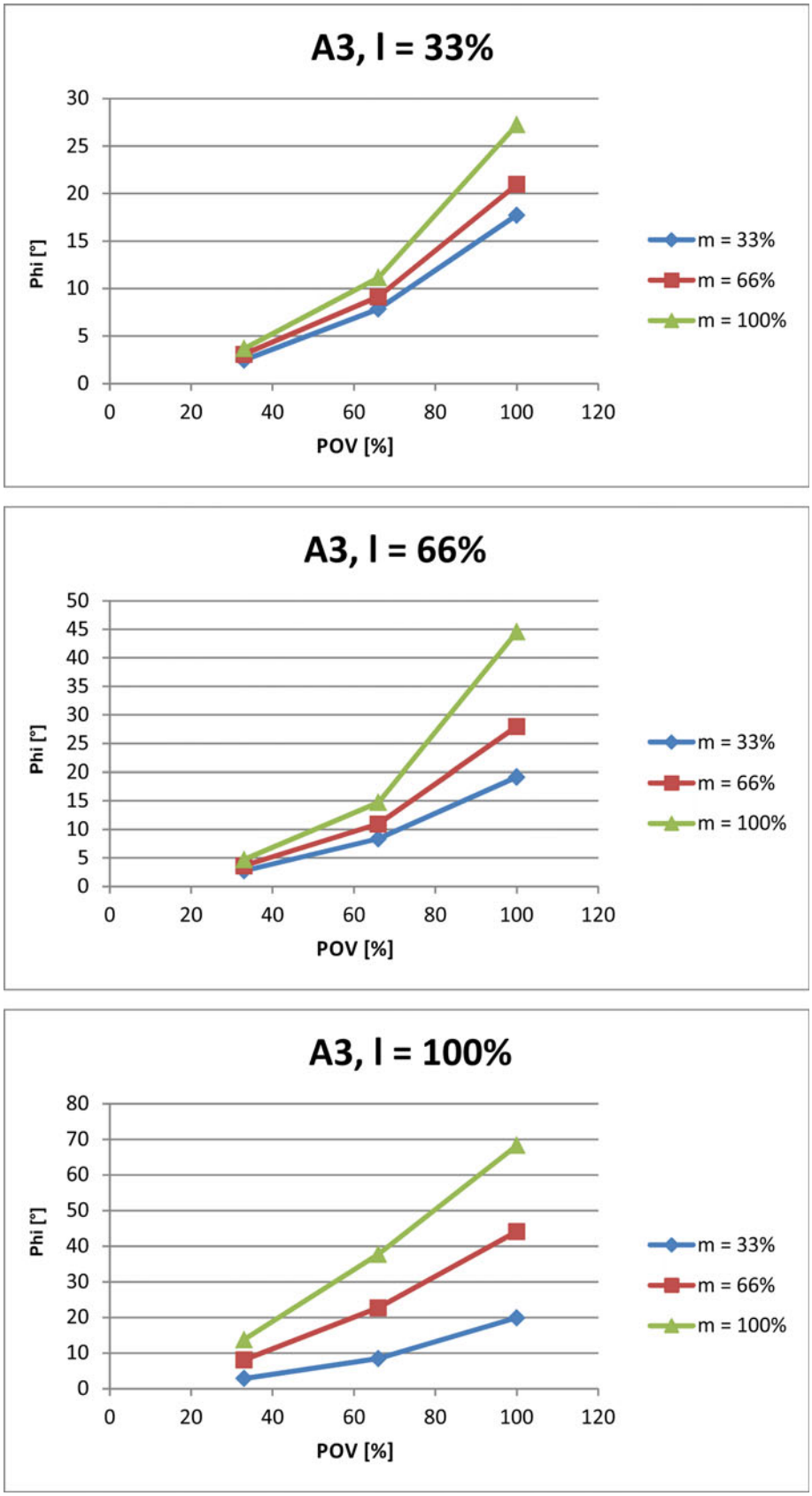


Fig. 4-57: Stopping distances for STOP 1, axis 3

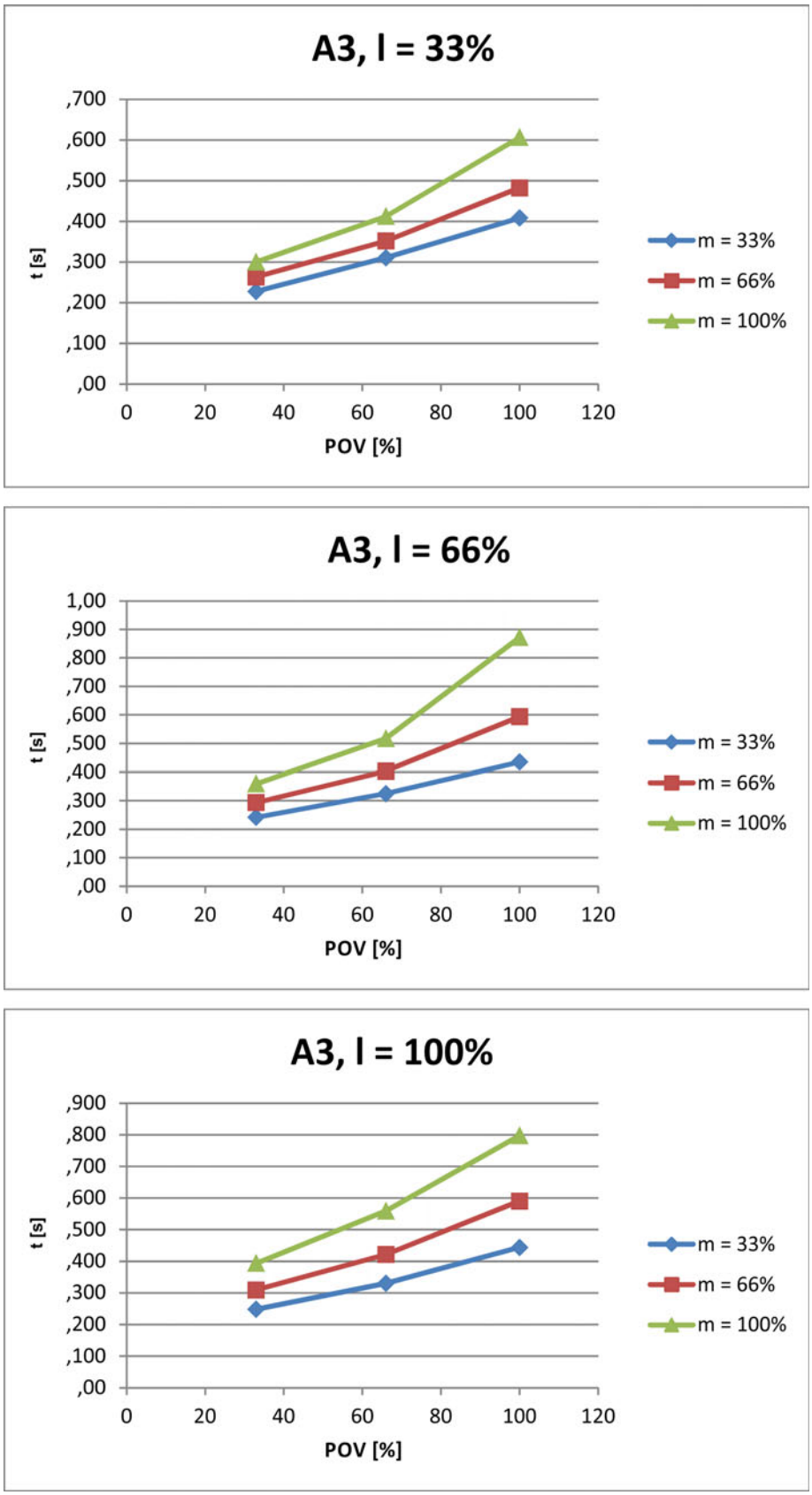


Fig. 4-58: Stopping times for STOP 1, axis 3

4.10.3.5 Stopping distances and stopping times for STOP 1, axis 4

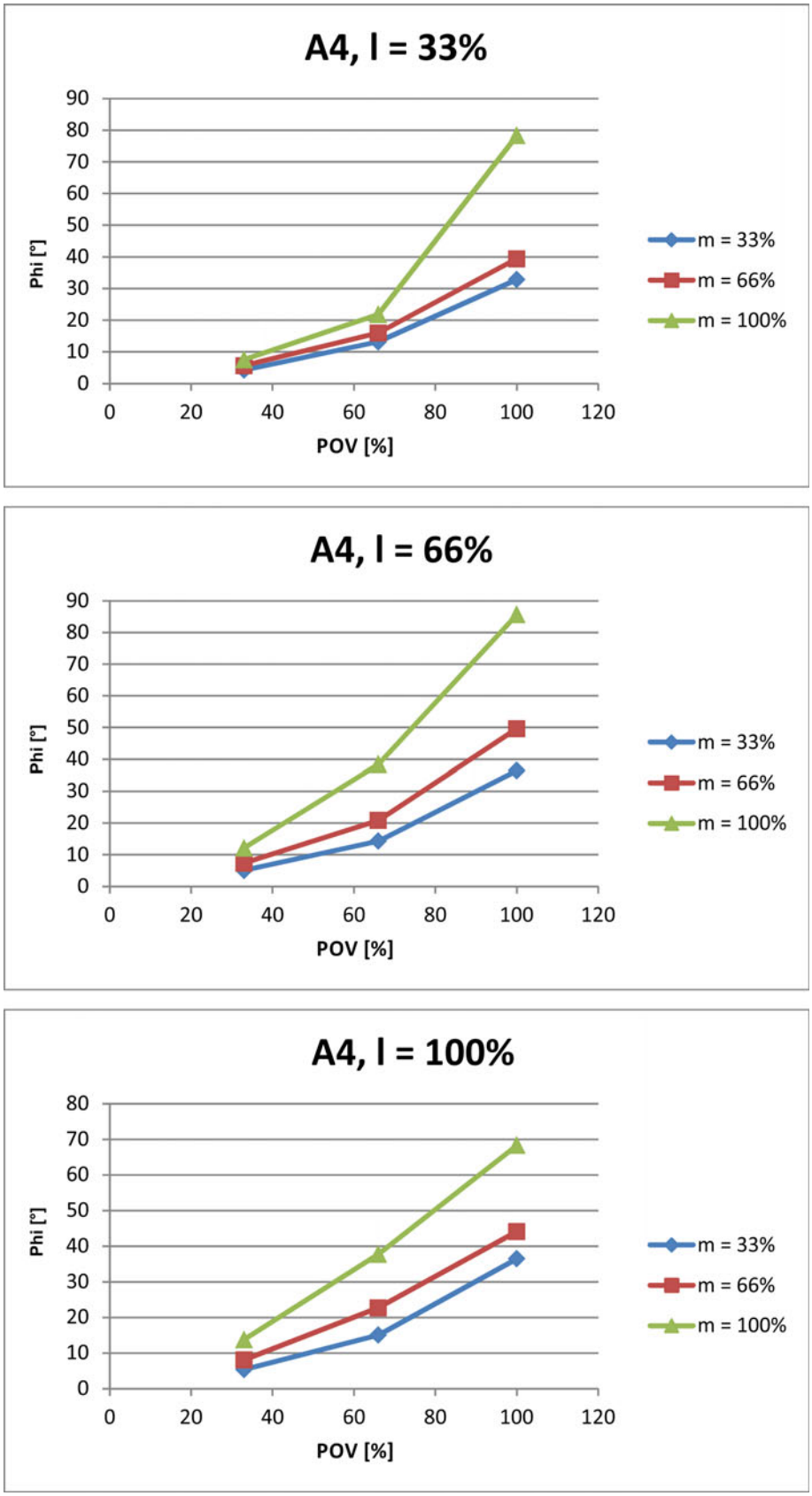


Fig. 4-59: Stopping distances for STOP 1, axis 4

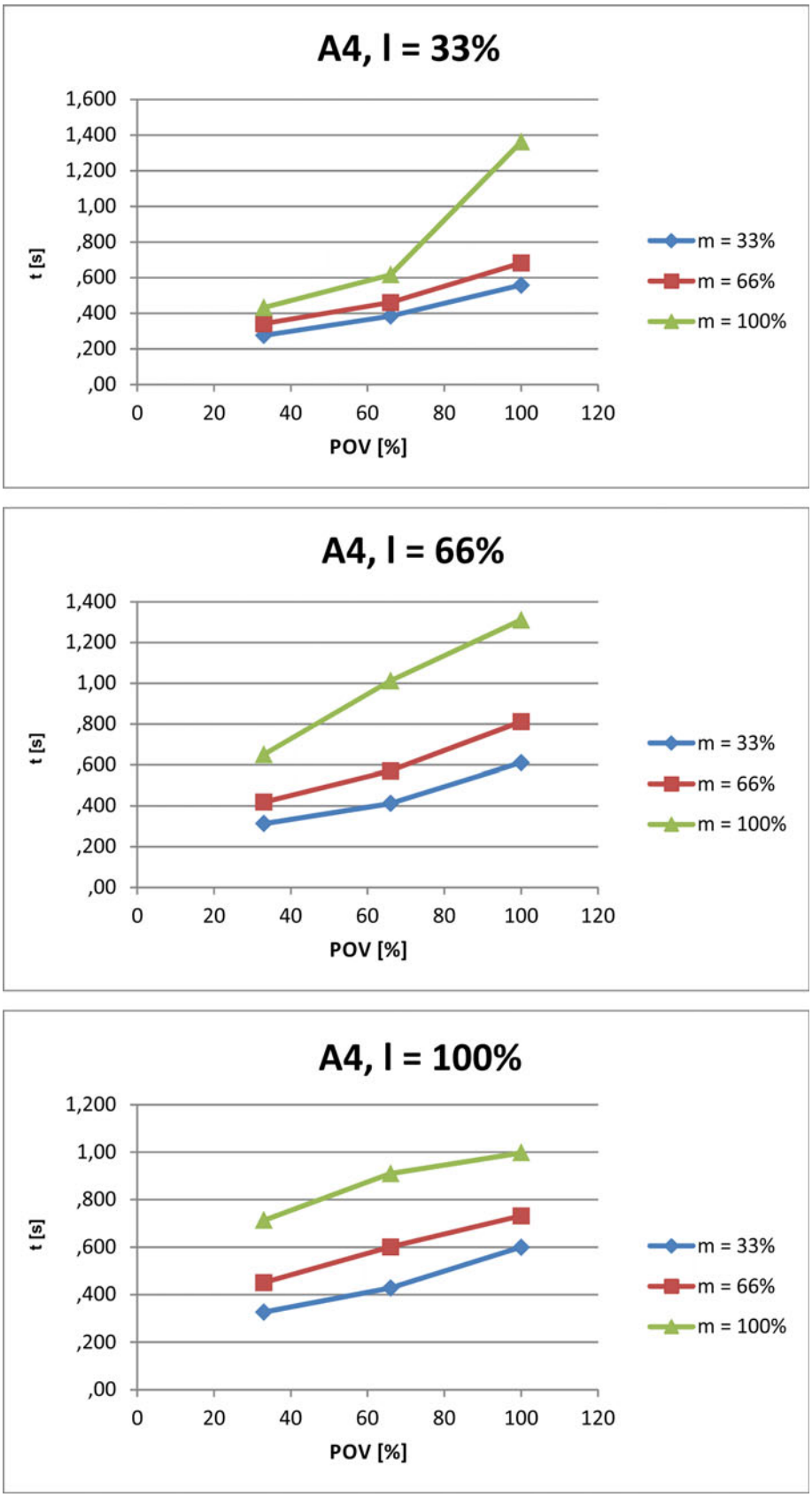


Fig. 4-60: Stopping times for STOP 1, axis 4

4.10.4 Stopping distances and stopping times for LBR iiwa 14 R820

The stopping distances and stopping times indicated apply to the following media flanges:

- Basic flange
- Media flange electrical
- Media flange pneumatic
- Media flange IO pneumatic
- Media flange IO electrical
- Media flange IO valve pneumatic

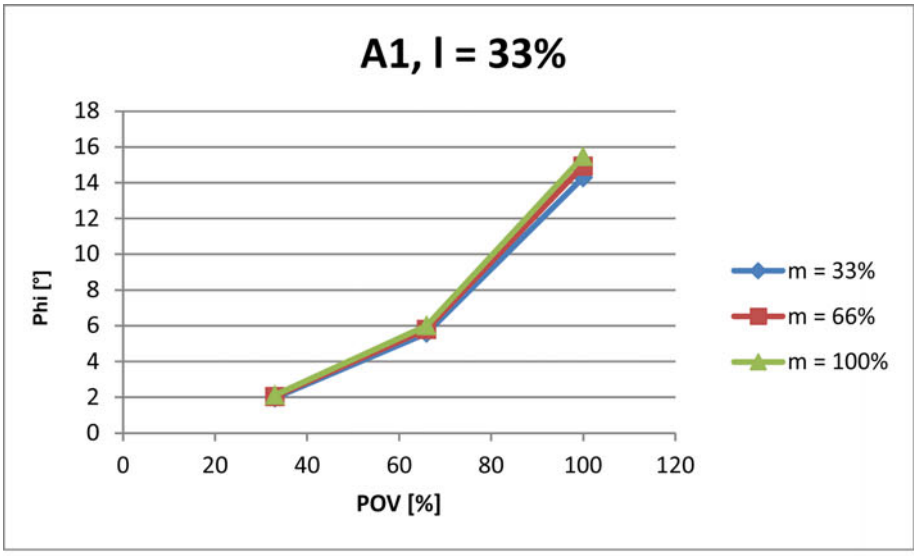
4.10.4.1 Stopping distances and stopping times for STOP 0, axis 1 to axis 4

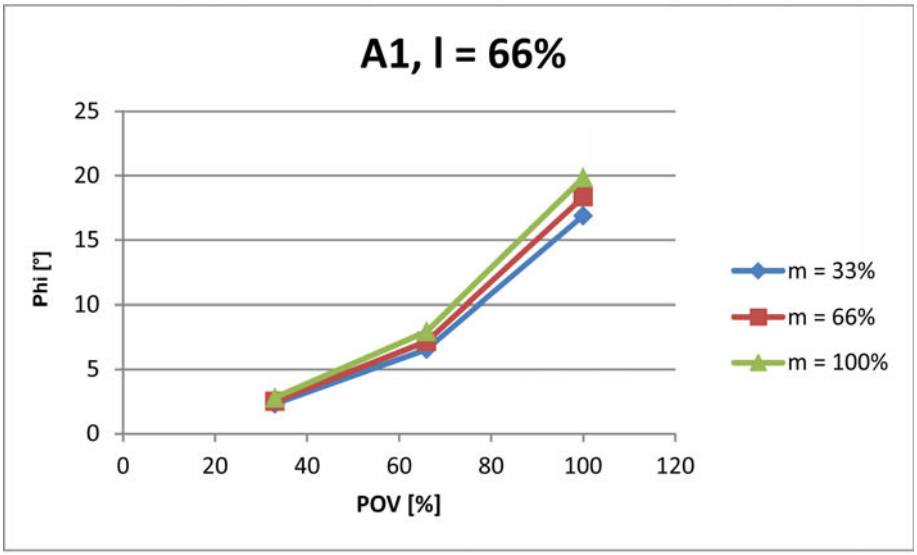
The table shows the stopping distances and stopping times after a STOP 0 (category 0 stop) is triggered. The values refer to the following configuration:

- Extension l = 100%
- Program override POV = 100%
- Mass m = maximum load (rated load + supplementary load on arm)

	Stopping distance (°)	Stopping time (s)
Axis 1	22.110	0.569
Axis 2	30.613	0.965
Axis 3	46.557	0.898
Axis 4	40.019	1.010

4.10.4.2 Stopping distances and stopping times for STOP 1, axis 1





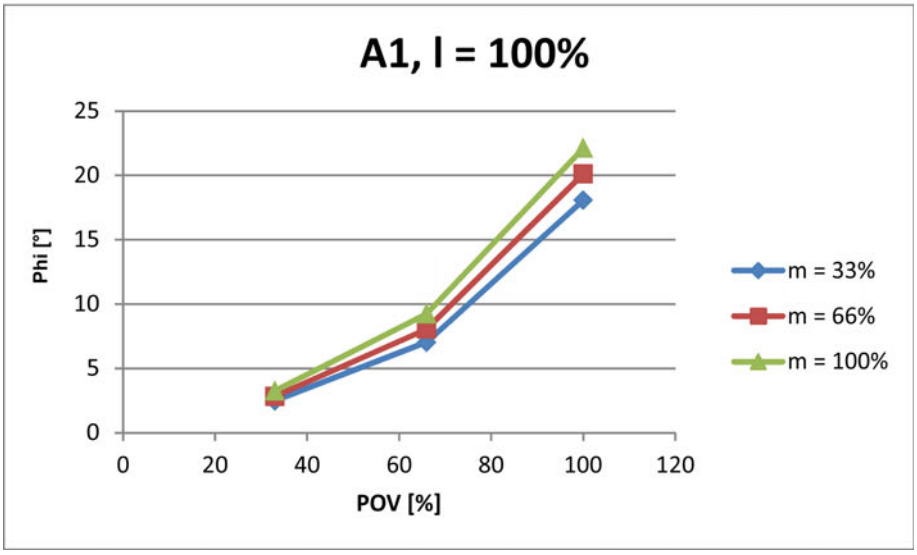


Fig. 4-61: Stopping distances for STOP 1, axis 1

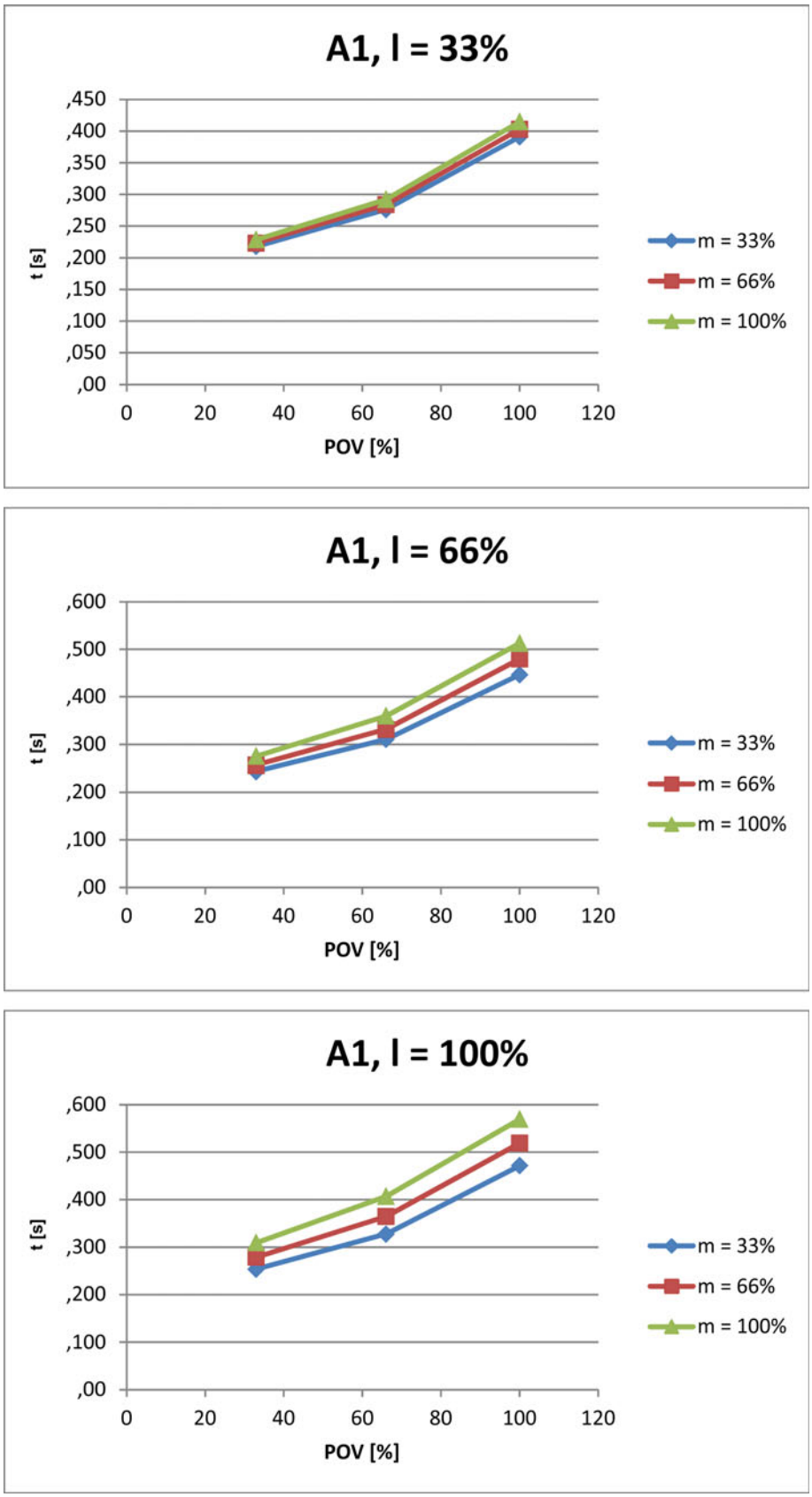
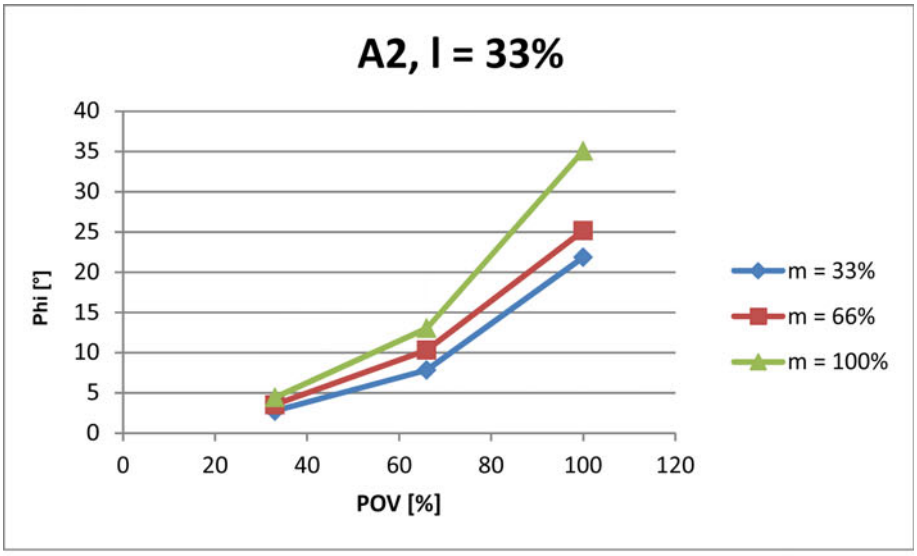
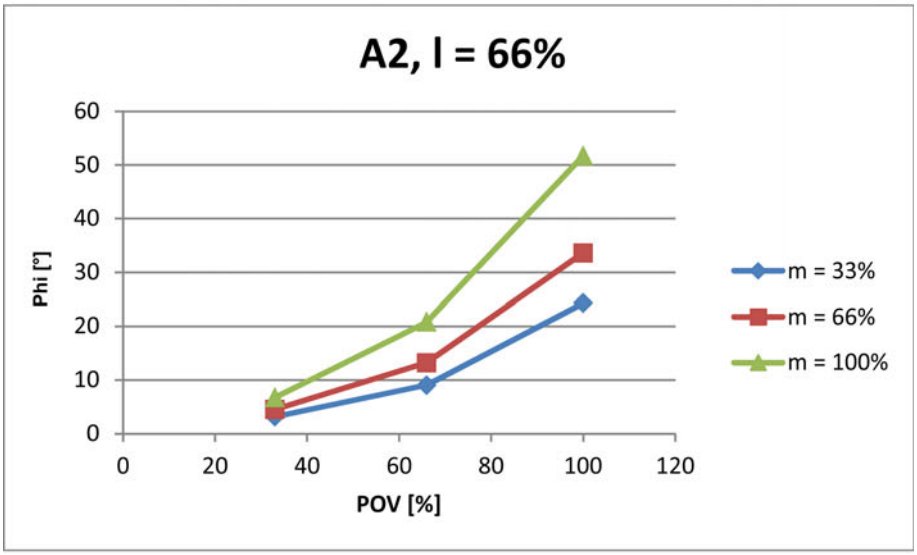


Fig. 4-62: Stopping times for STOP 1, axis 1

4.10.4.3 Stopping distances and stopping times for STOP 1, axis 2





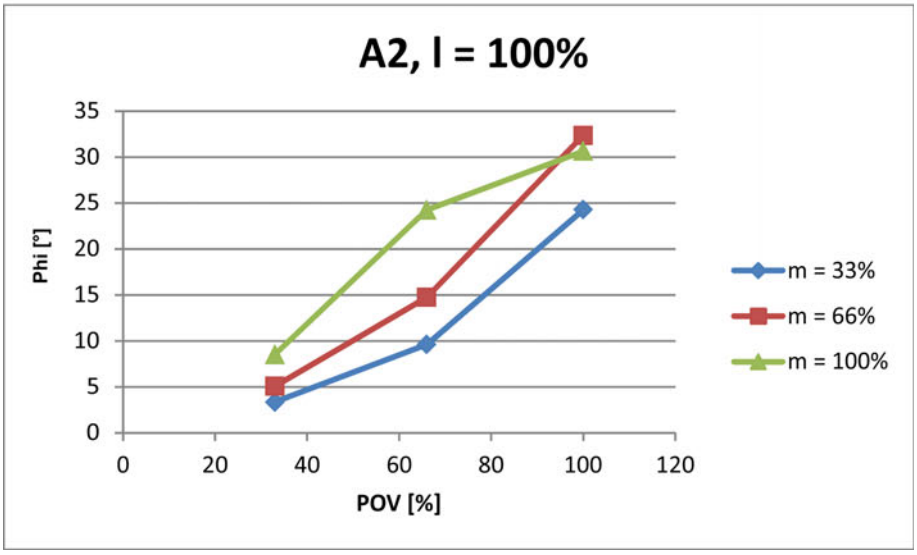


Fig. 4-63: Stopping distances for STOP 1, axis 2

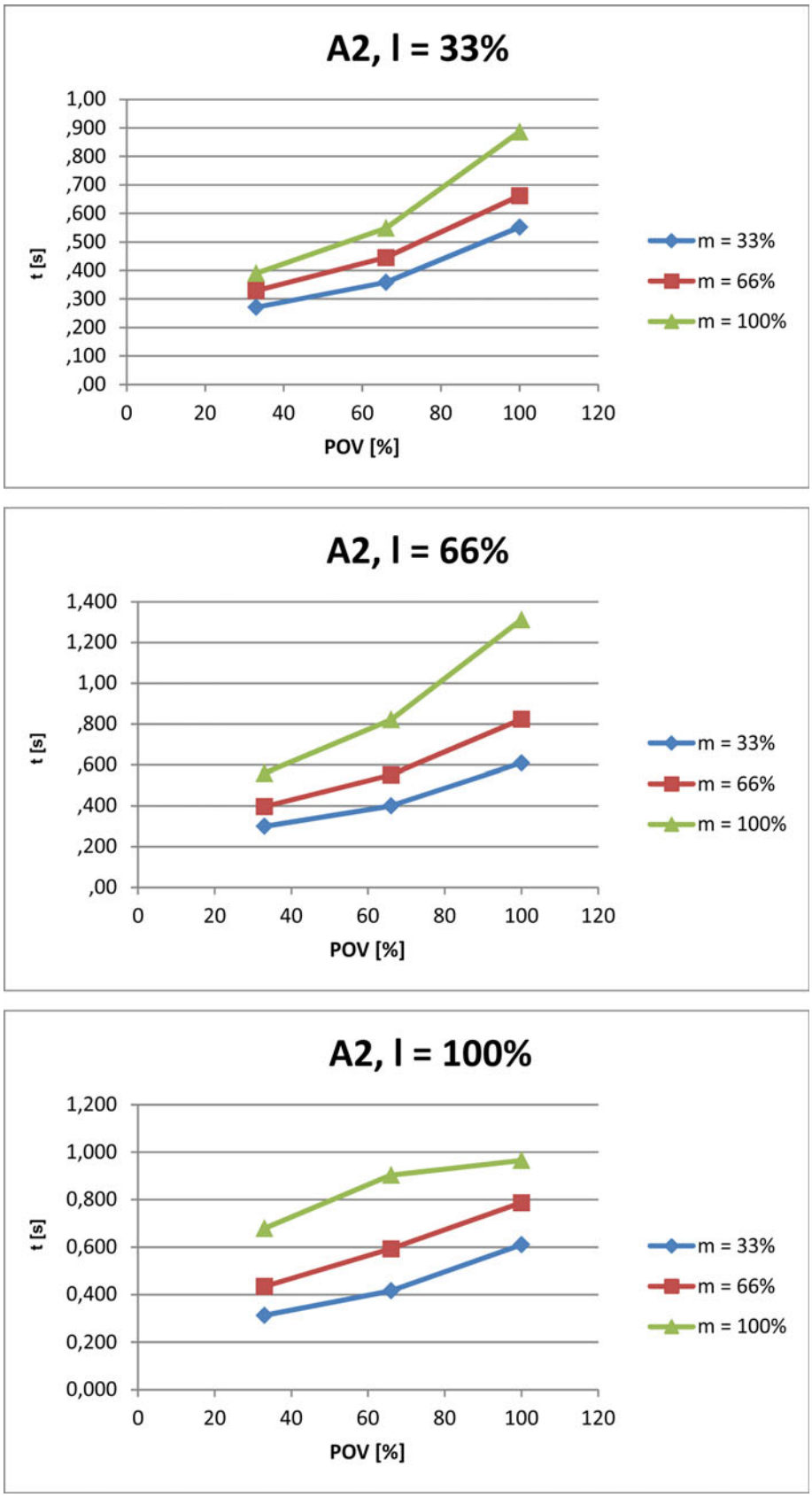


Fig. 4-64: Stopping times for STOP 1, axis 2

4.10.4.4 Stopping distances and stopping times for STOP 1, axis 3

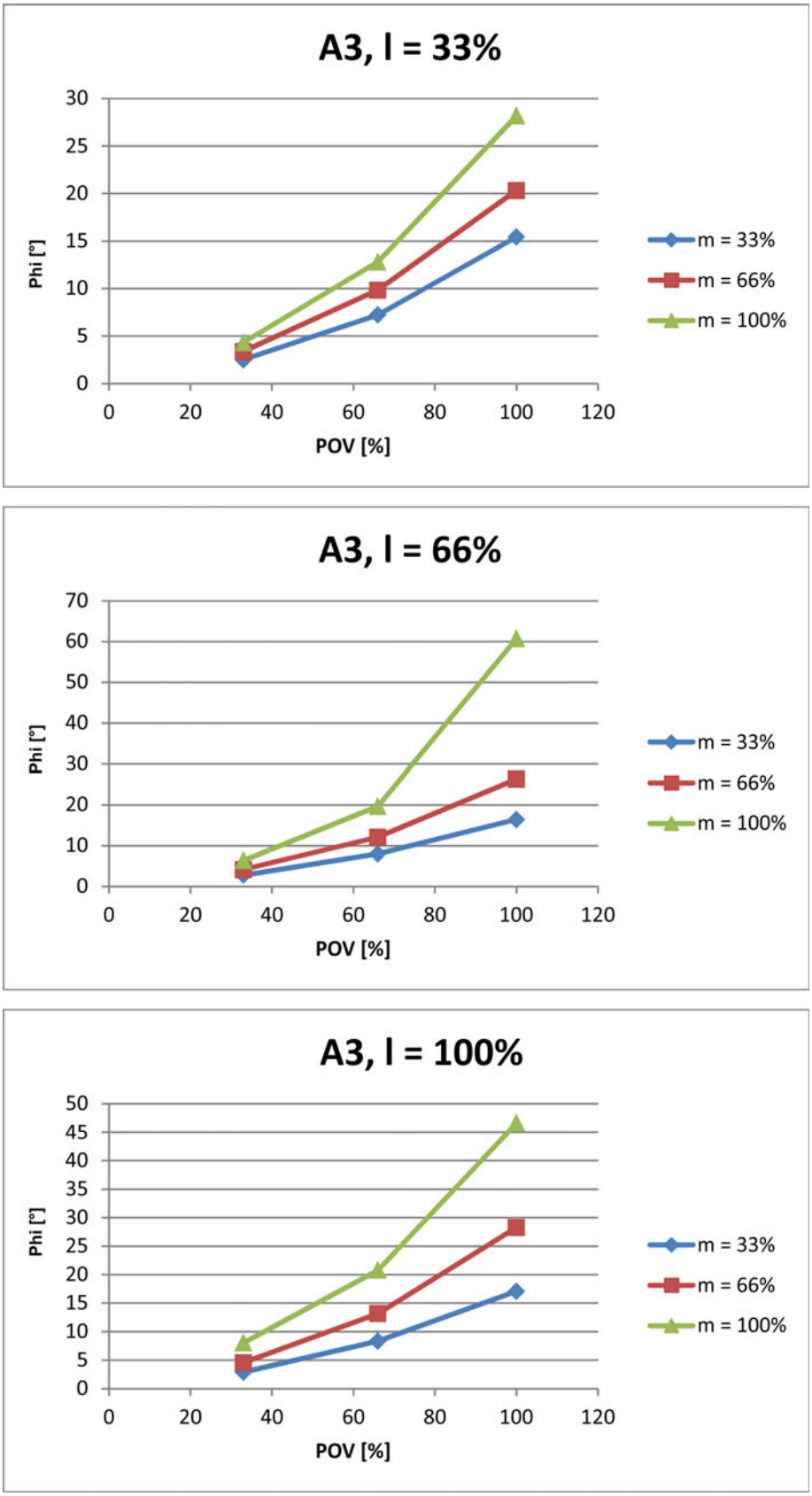
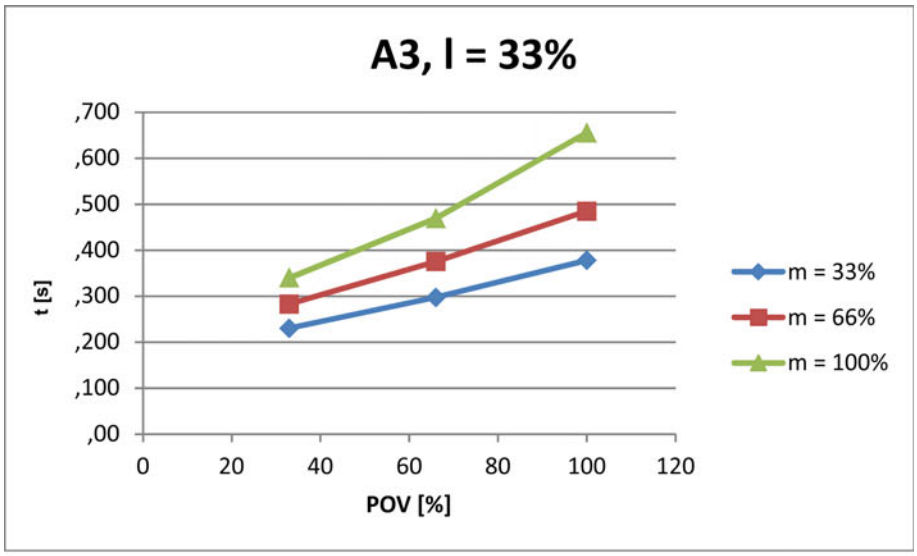
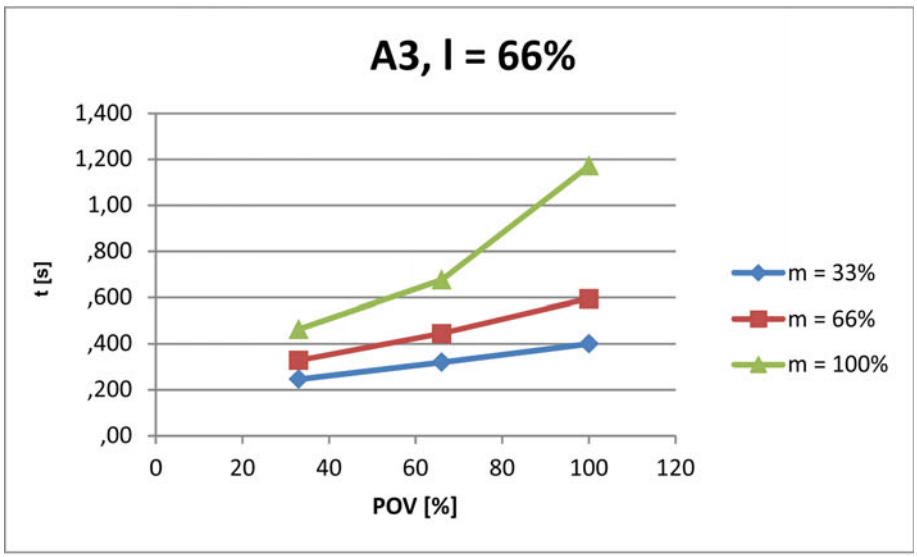


Fig. 4-65: Stopping distances for STOP 1, axis 3





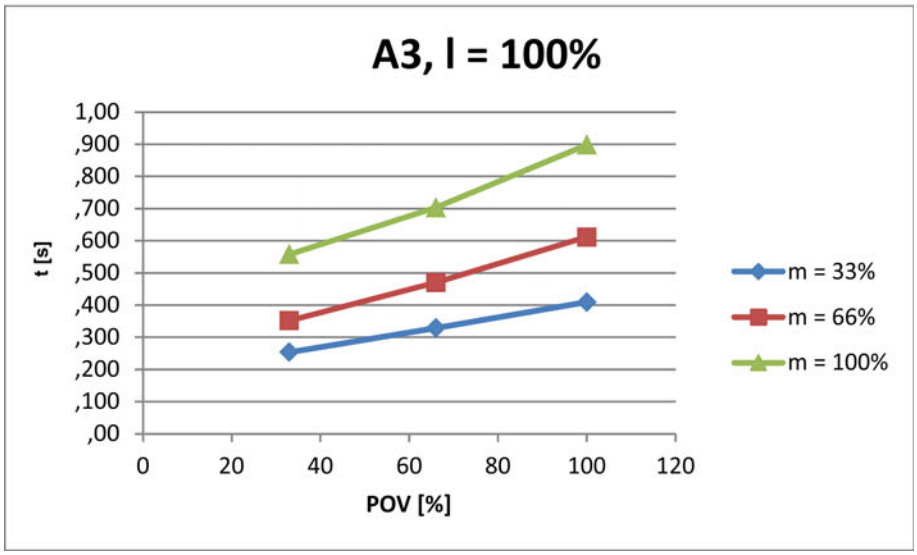


Fig. 4-66: Stopping times for STOP 1, axis 3

4.10.4.5 Stopping distances and stopping times for STOP 1, axis 4

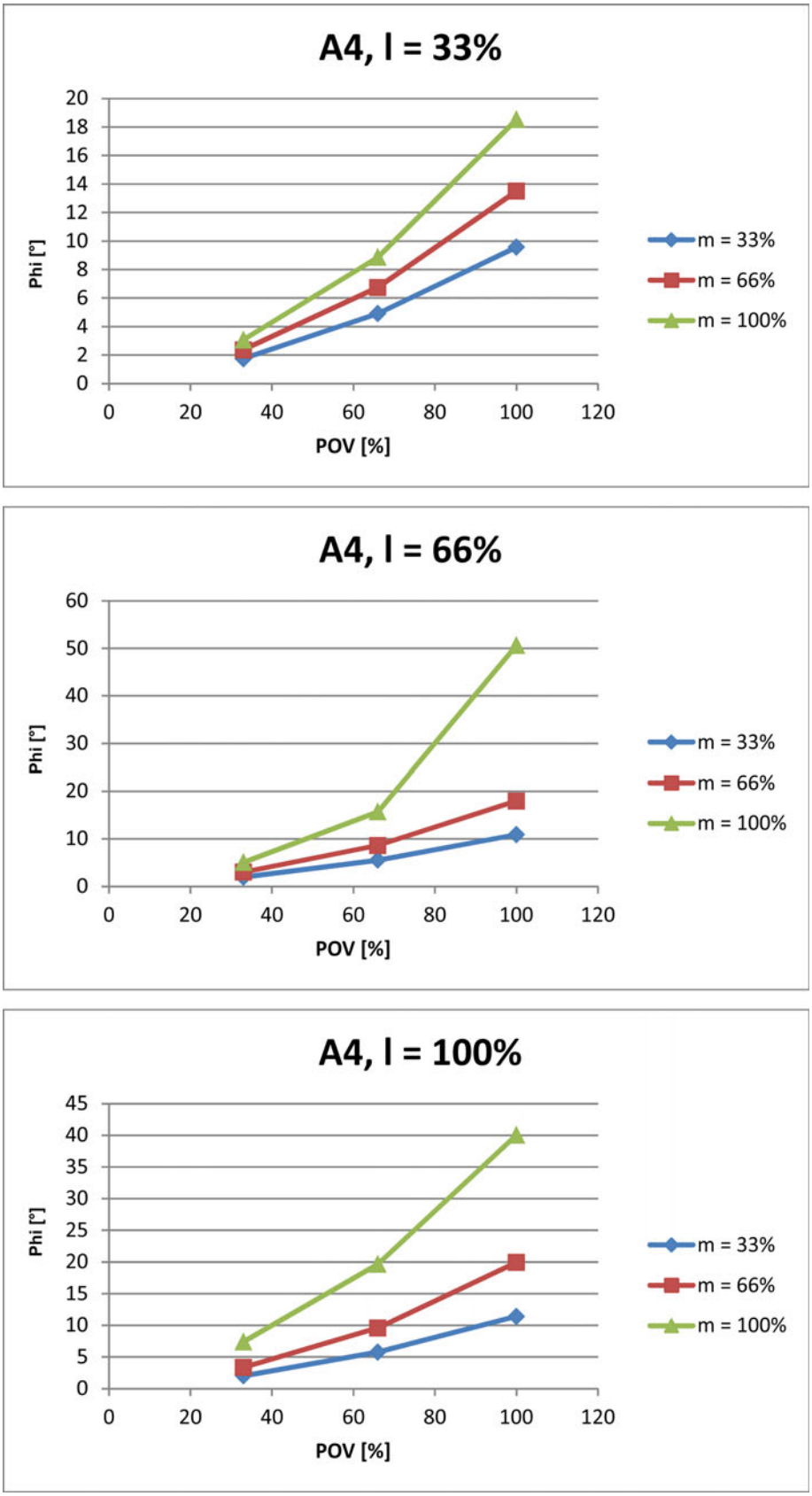
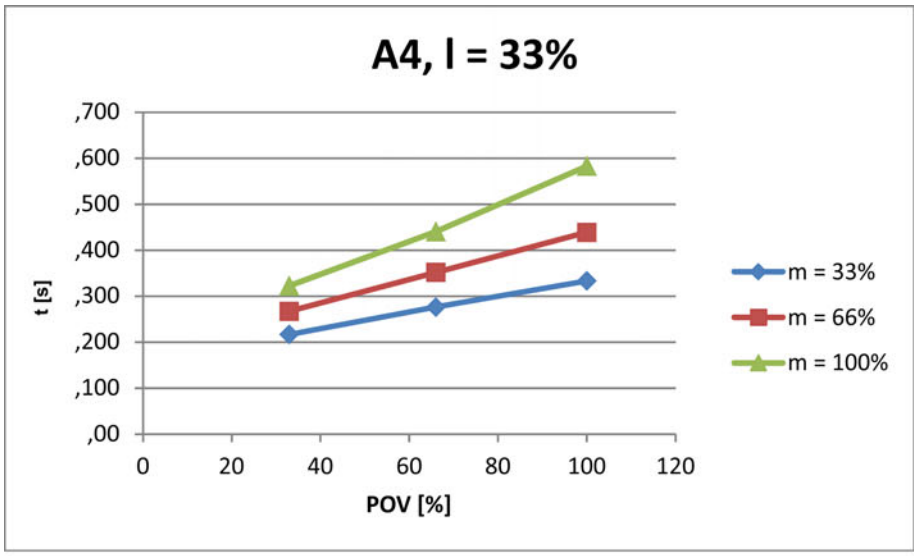
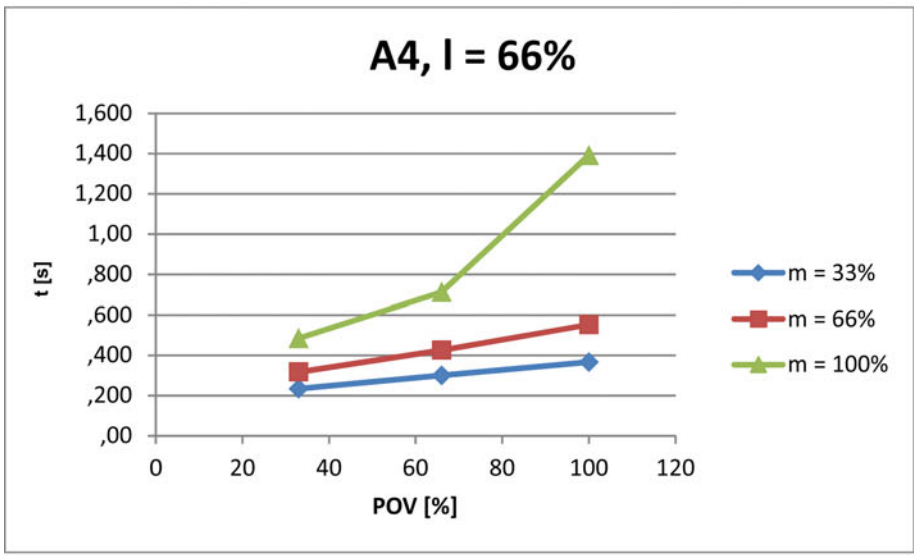


Fig. 4-67: Stopping distances for STOP 1, axis 4





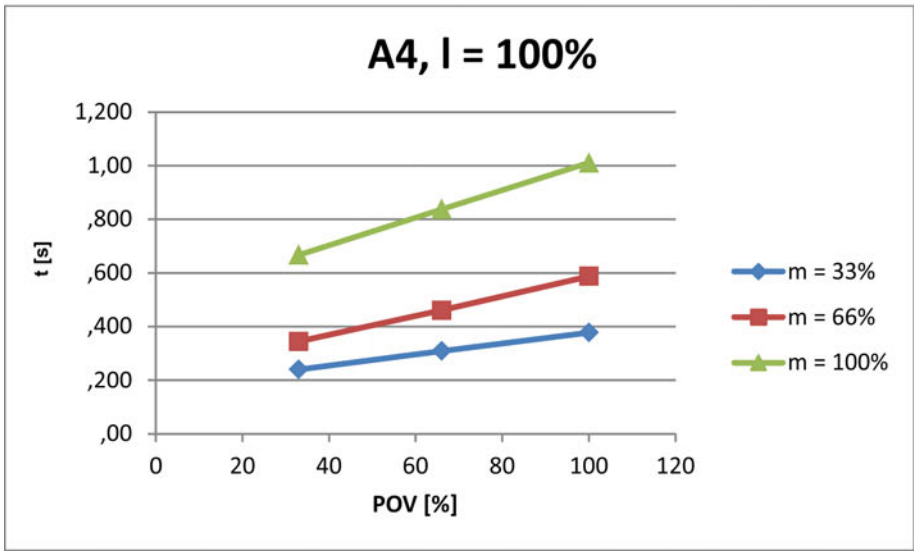


Fig. 4-68: Stopping times for STOP 1, axis 4

4.10.5 Stopping distances and stopping times for LBR iiwa 7 R800

The stopping distances and stopping times indicated apply to the following media flange:

- Media flange Touch pneumatic
- Media flange Touch electrical

4.10.5.1 Stopping distances and stopping times for STOP 0, axis 1 to axis 4

The table shows the stopping distances and stopping times after a STOP 0 (category 0 stop) is triggered. The values refer to the following configuration:

- Extension I = 100%
- Program override POV = 100%
- Mass m = maximum load (rated load + supplementary load on arm)

	Stopping distance (°)	Stopping time (s)
Axis 1	8.034	0.184
Axis 2	3.809	0.196
Axis 3	6.155	0.116
Axis 4	9.156	0.150

4.10.5.2 Stopping distances and stopping times for STOP 1, axis 1

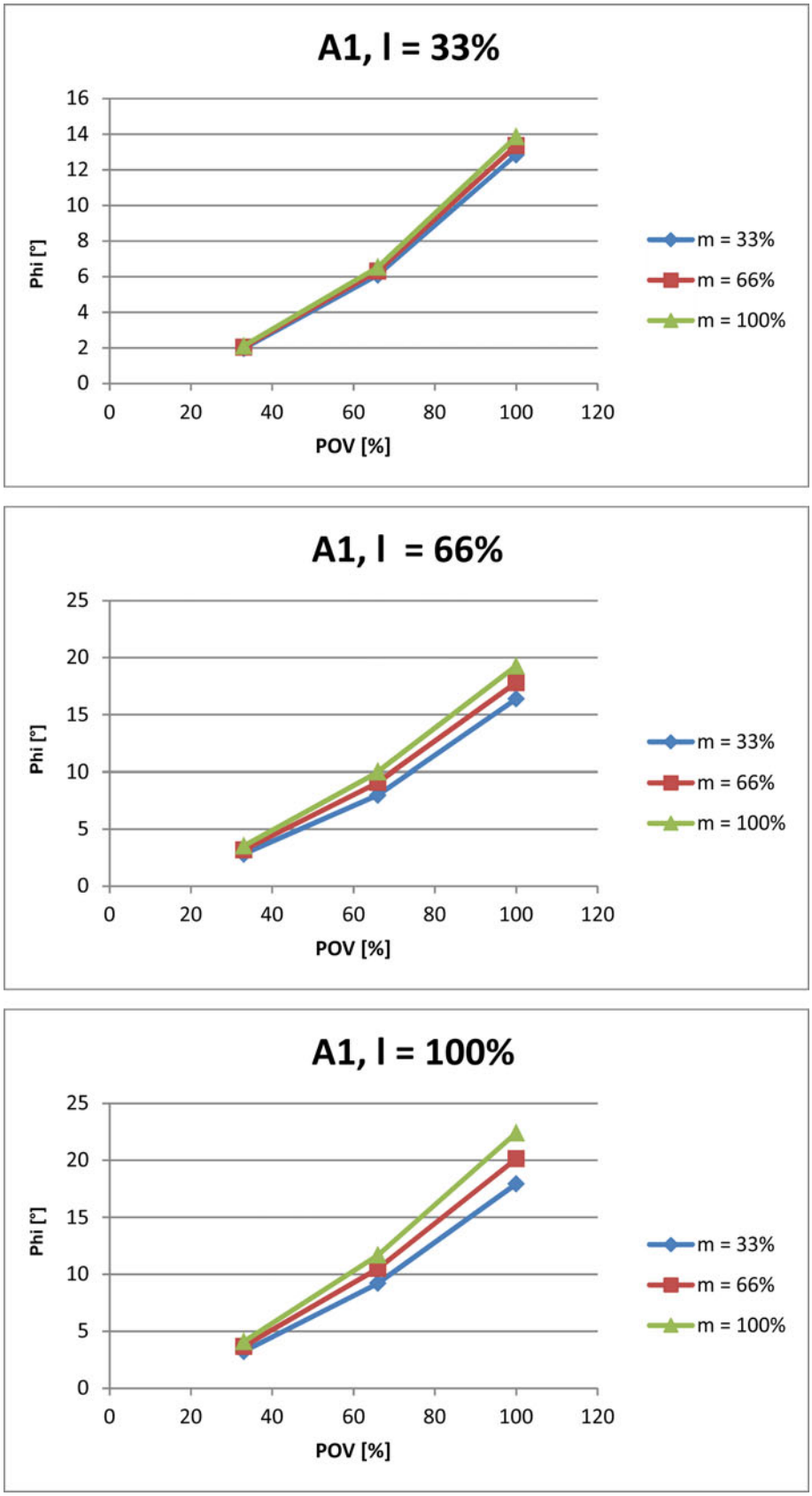


Fig. 4-69: Stopping distances for STOP 1, axis 1

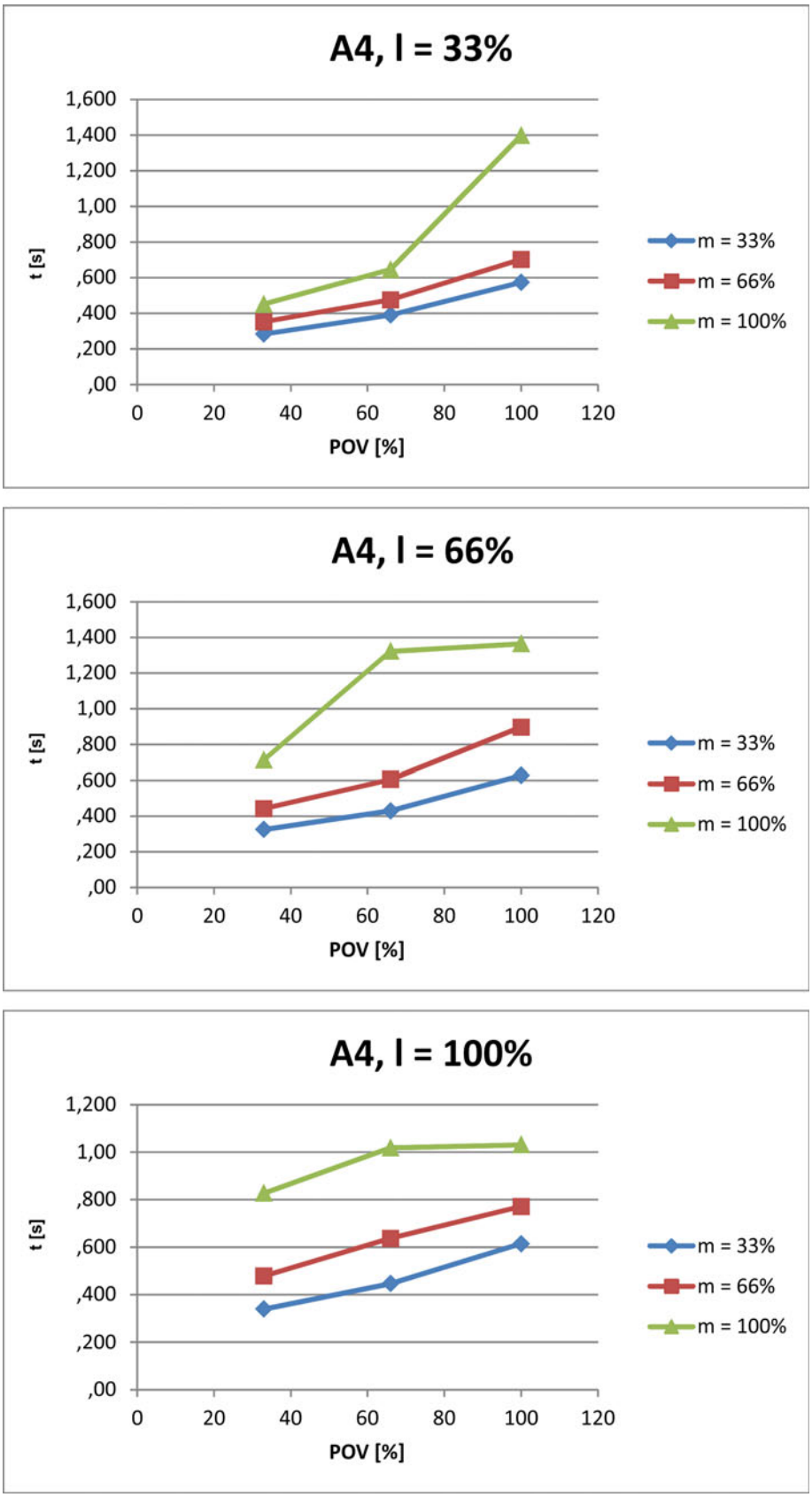


Fig. 4-70: Stopping times for STOP 1, axis 1

4.10.5.3 Stopping distances and stopping times for STOP 1, axis 2

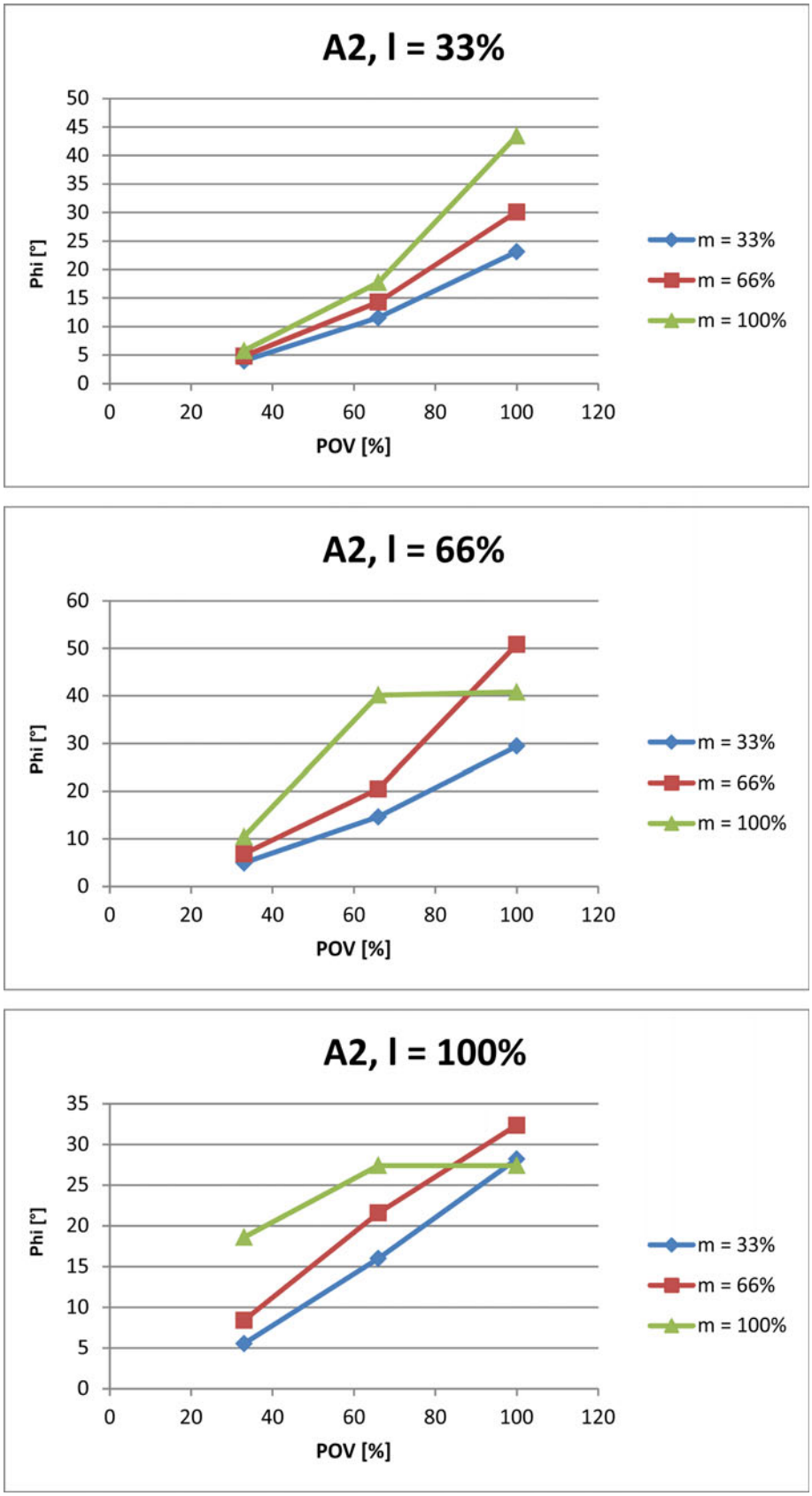


Fig. 4-71: Stopping distances for STOP 1, axis 2

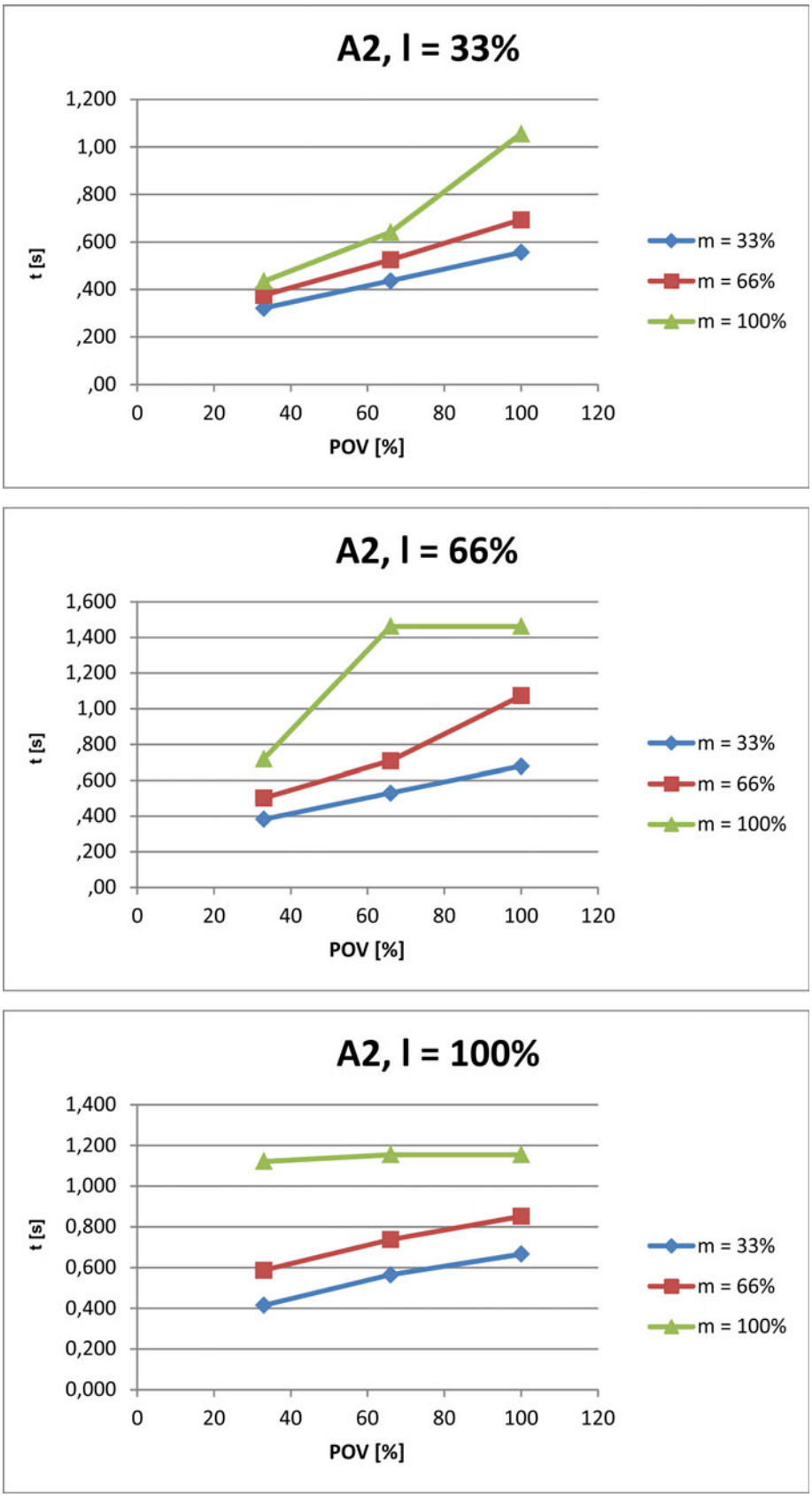


Fig. 4-72: Stopping times for STOP 1, axis 2

4.10.5.4 Stopping distances and stopping times for STOP 1, axis 3

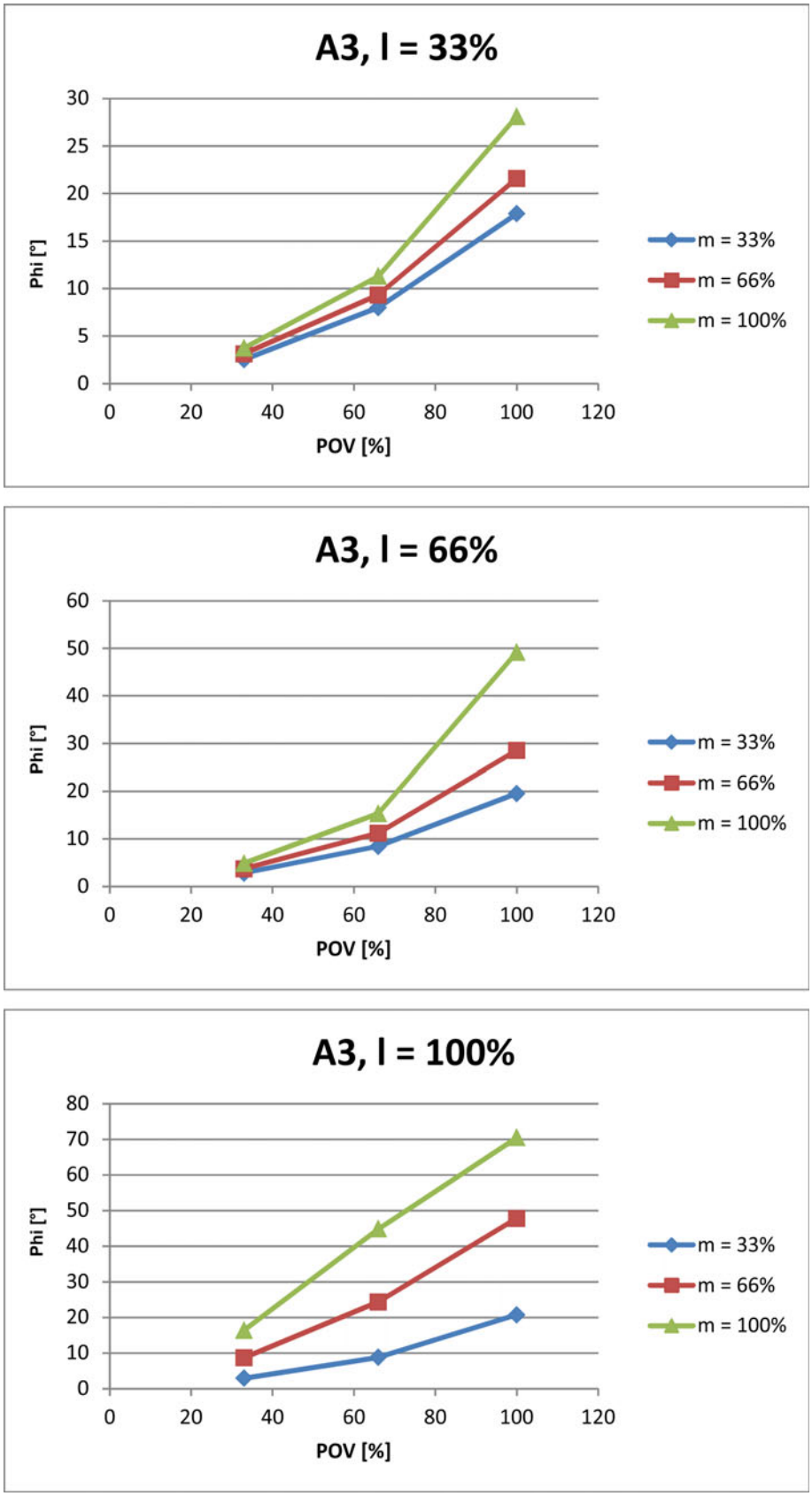


Fig. 4-73: Stopping distances for STOP 1, axis 3

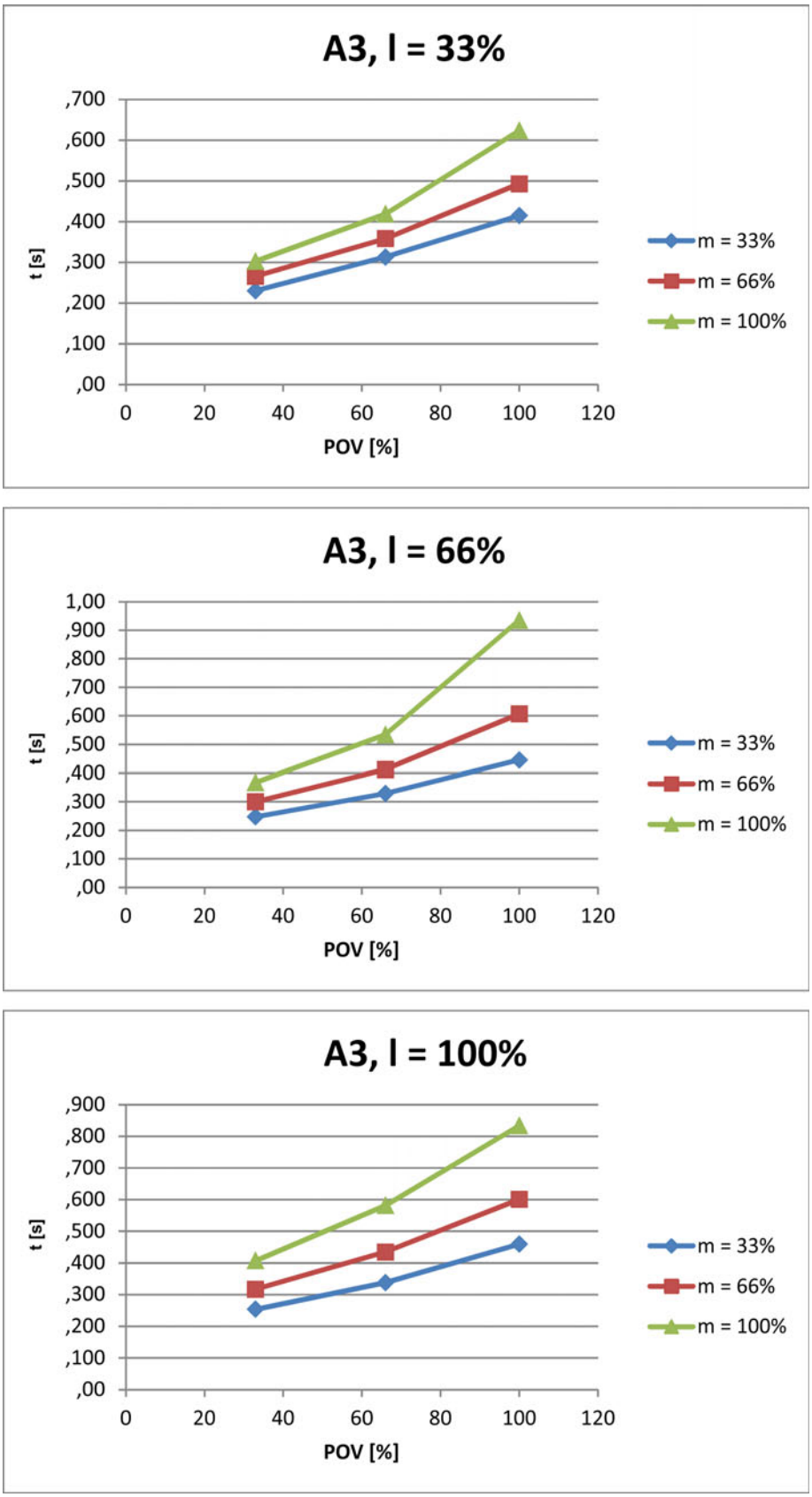


Fig. 4-74: Stopping times for STOP 1, axis 3

4.10.5.5 Stopping distances and stopping times for STOP 1, axis 4

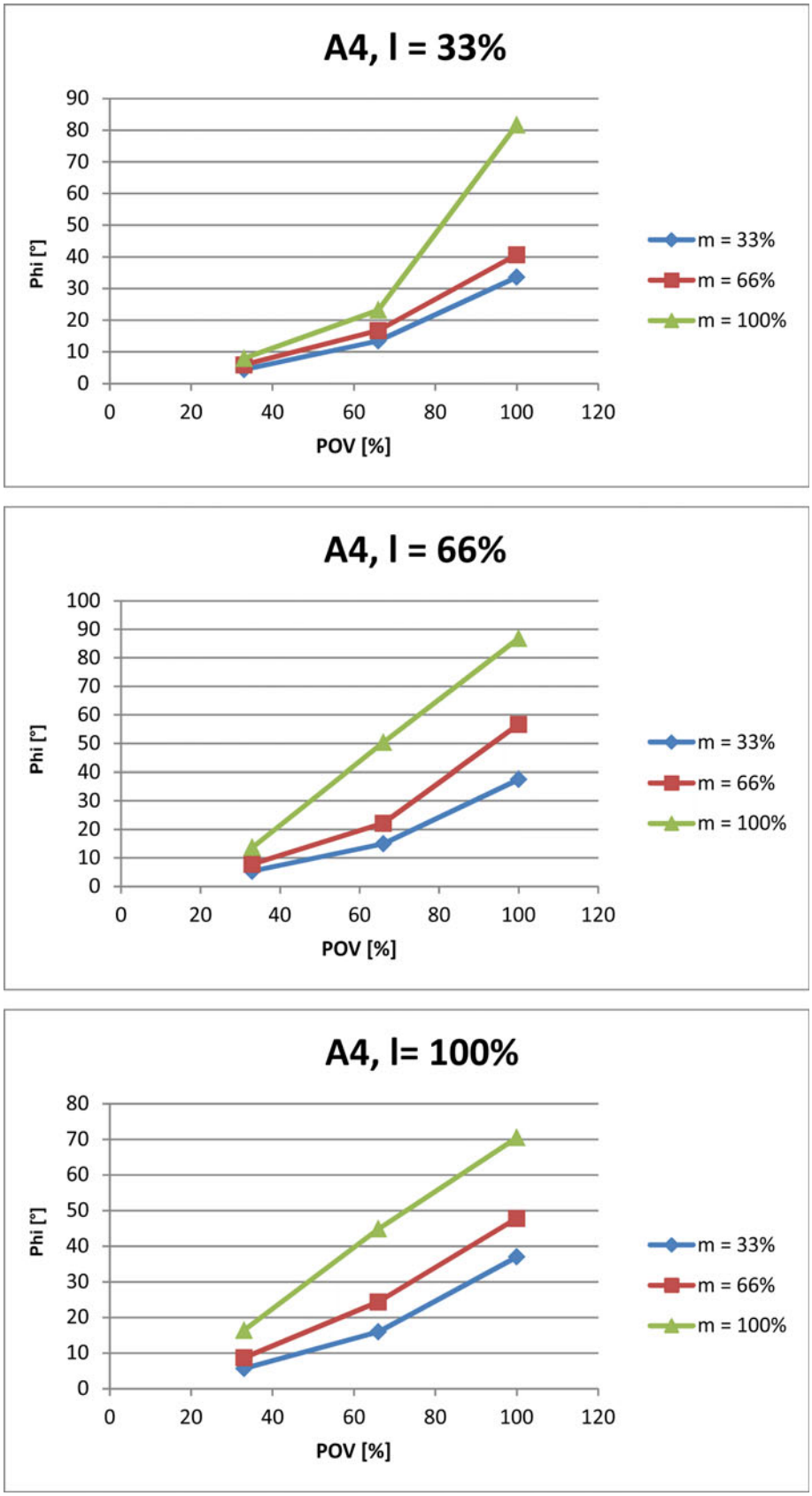


Fig. 4-75: Stopping distances for STOP 1, axis 4

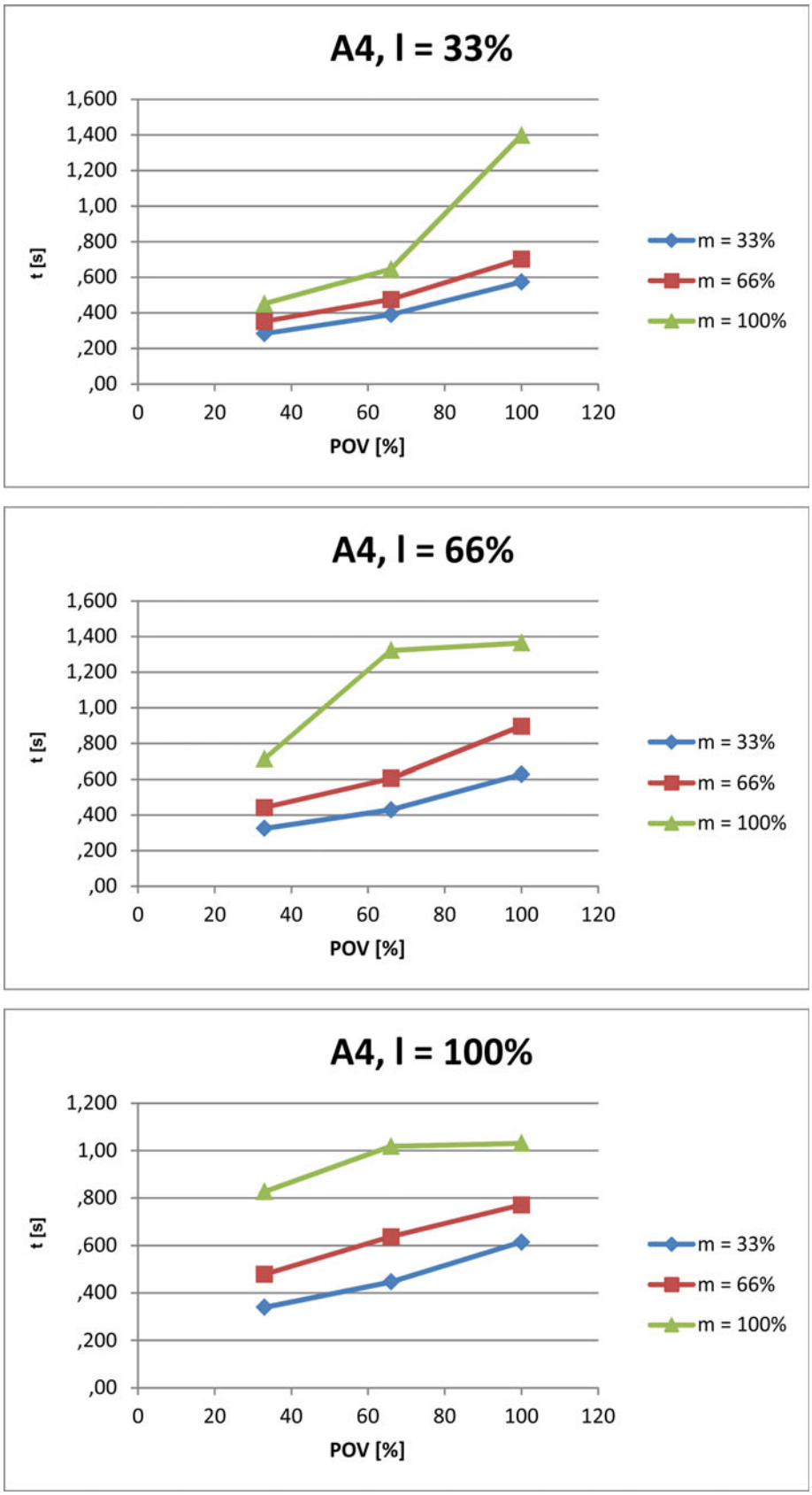


Fig. 4-76: Stopping times for STOP 1, axis 4

4.10.6 Stopping distances and stopping times for LBR iiwa 14 R820

The stopping distances and stopping times indicated apply to the following media flange:

- Media flange Touch pneumatic
- Media flange Touch electrical

4.10.6.1 Stopping distances and stopping times for STOP 0, axis 1 to axis 4

The table shows the stopping distances and stopping times after a STOP 0 (category 0 stop) is triggered. The values refer to the following configuration:

- Extension l = 100%
- Program override POV = 100%
- Mass m = maximum load (rated load + supplementary load on arm)

	Stopping distance (°)	Stopping time (s)
Axis 1	4.51	0.186
Axis 2	7.208	0.206
Axis 3	8.691	0.184
Axis 4	3.53	0.088

4.10.6.2 Stopping distances and stopping times for STOP 1, axis 1

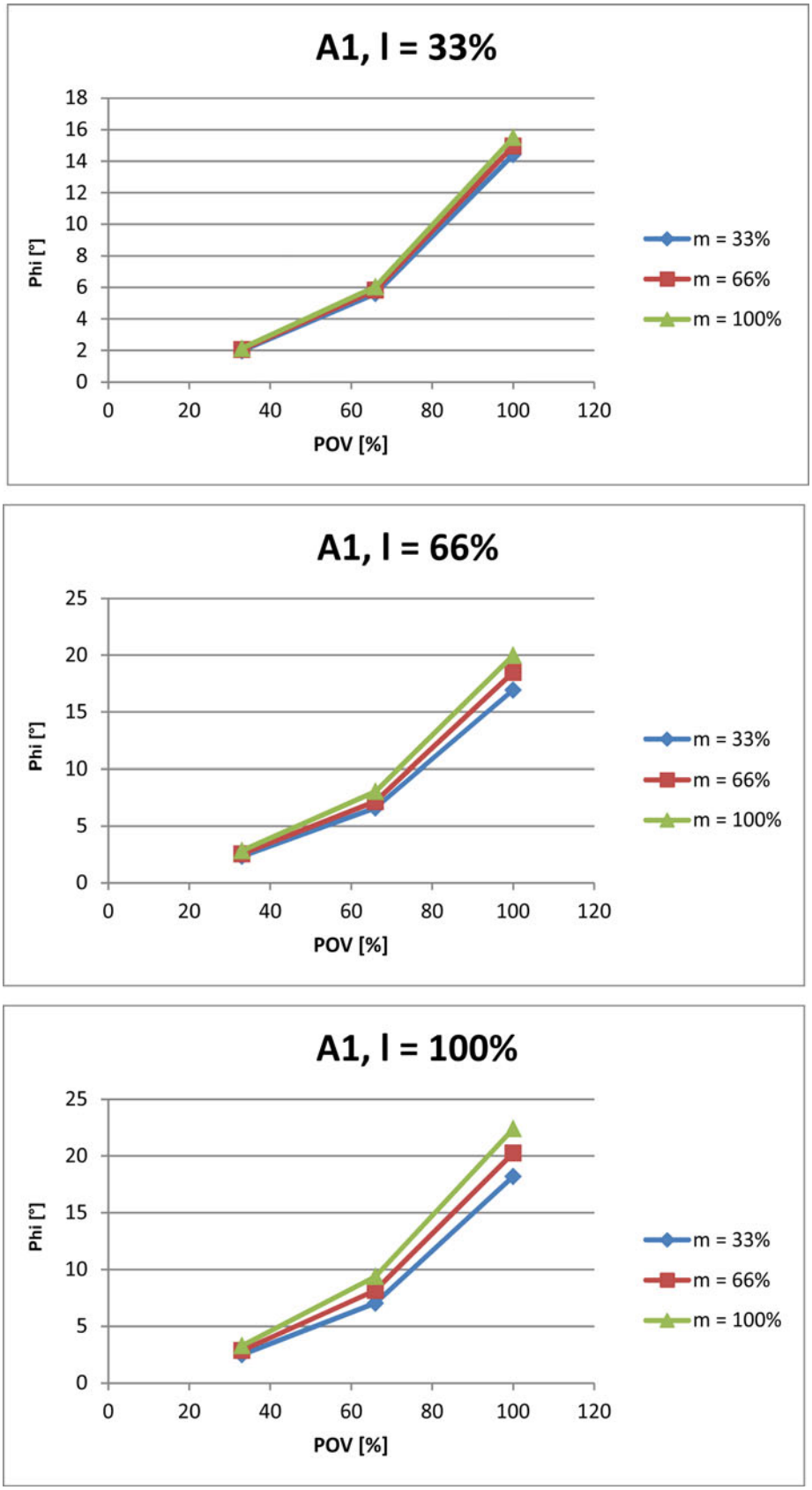


Fig. 4-77: Stopping distances for STOP 1, axis 1

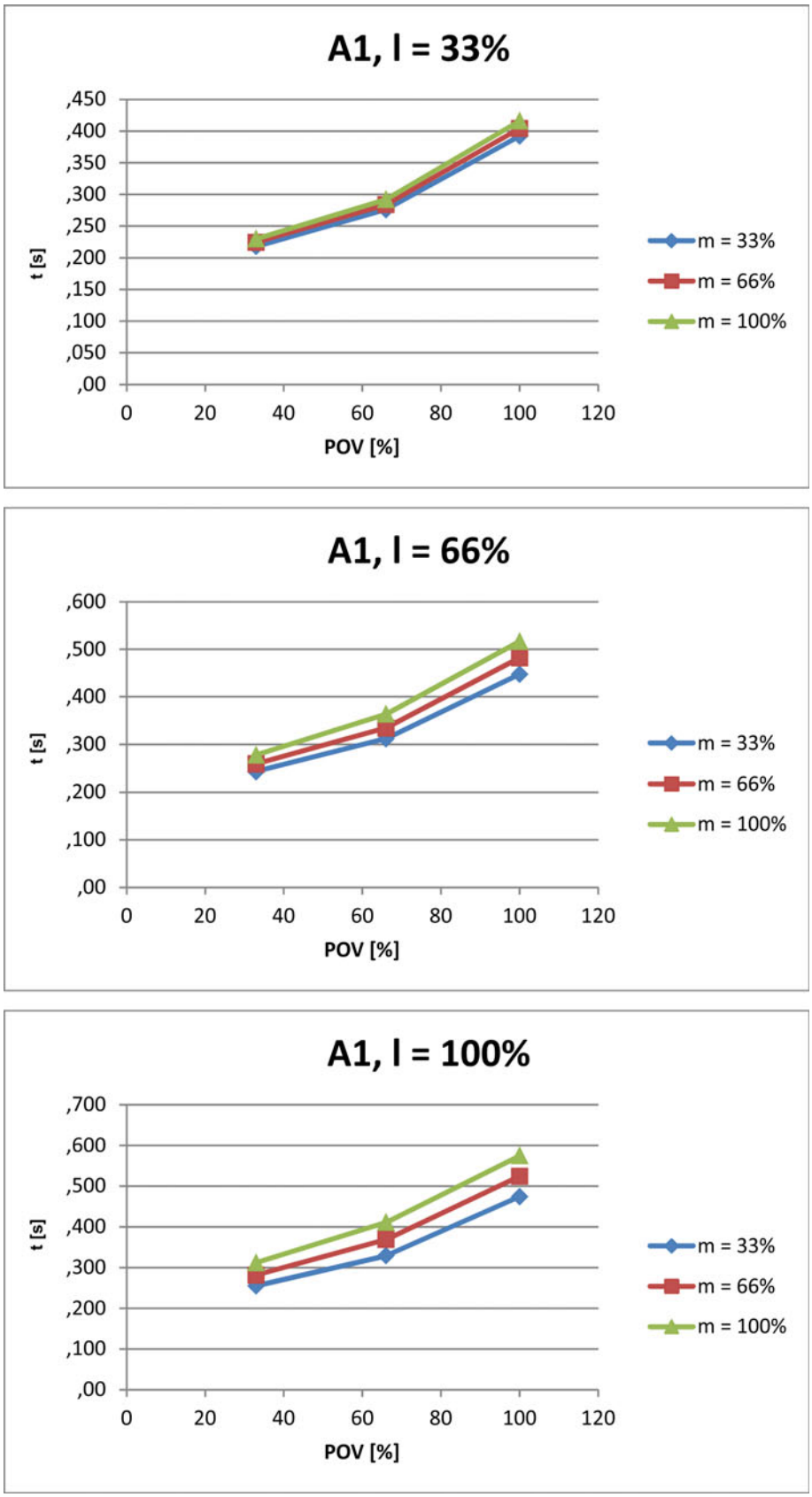


Fig. 4-78: Stopping times for STOP 1, axis 1

4.10.6.3 Stopping distances and stopping times for STOP 1, axis 2

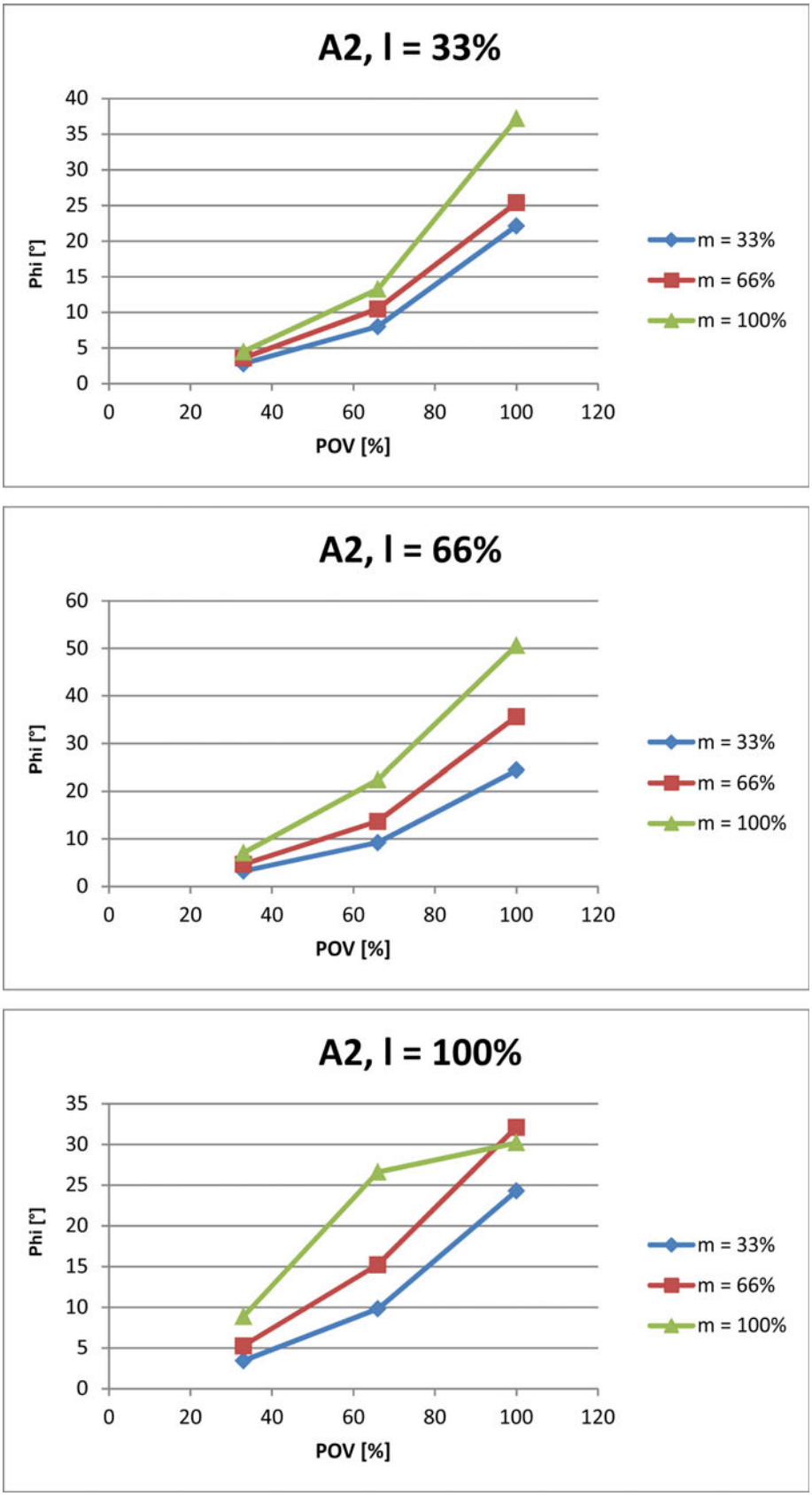
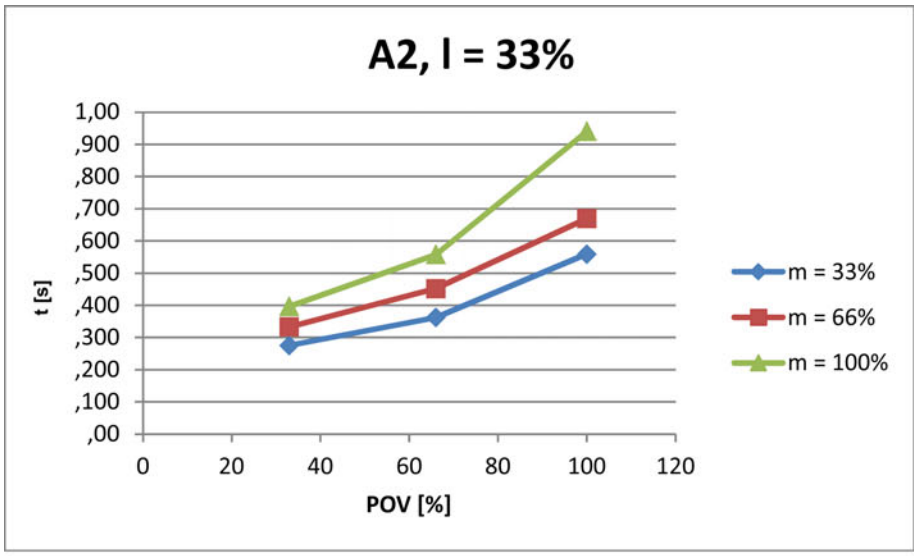
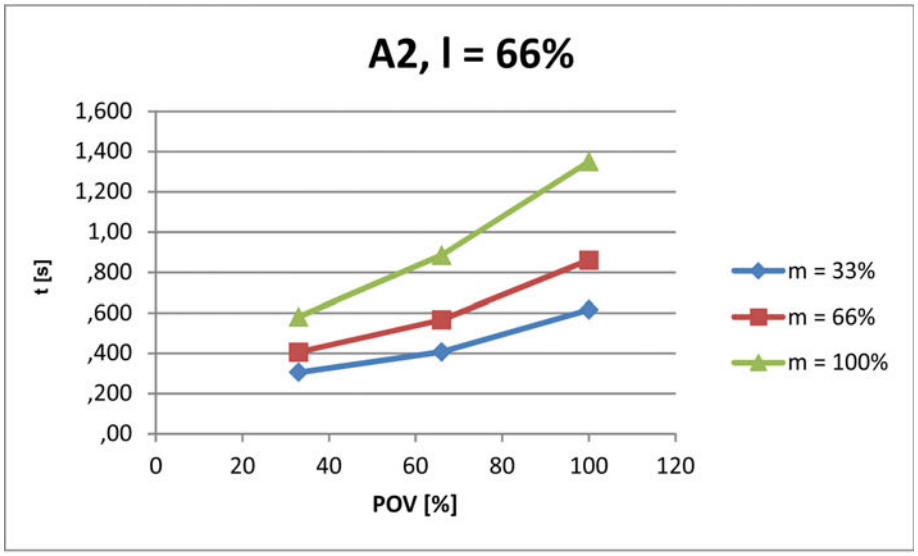


Fig. 4-79: Stopping distances for STOP 1, axis 2





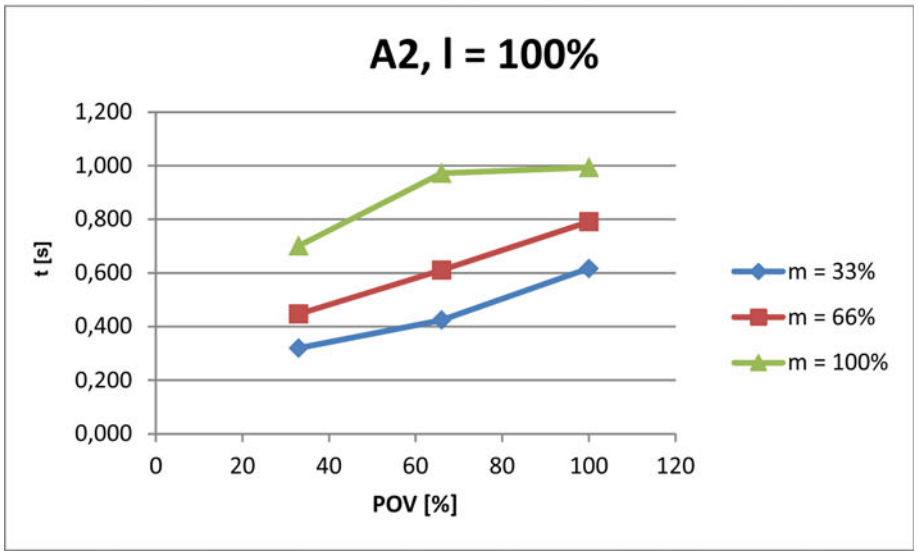


Fig. 4-80: Stopping times for STOP 1, axis 2

4.10.6.4 Stopping distances and stopping times for STOP 1, axis 3

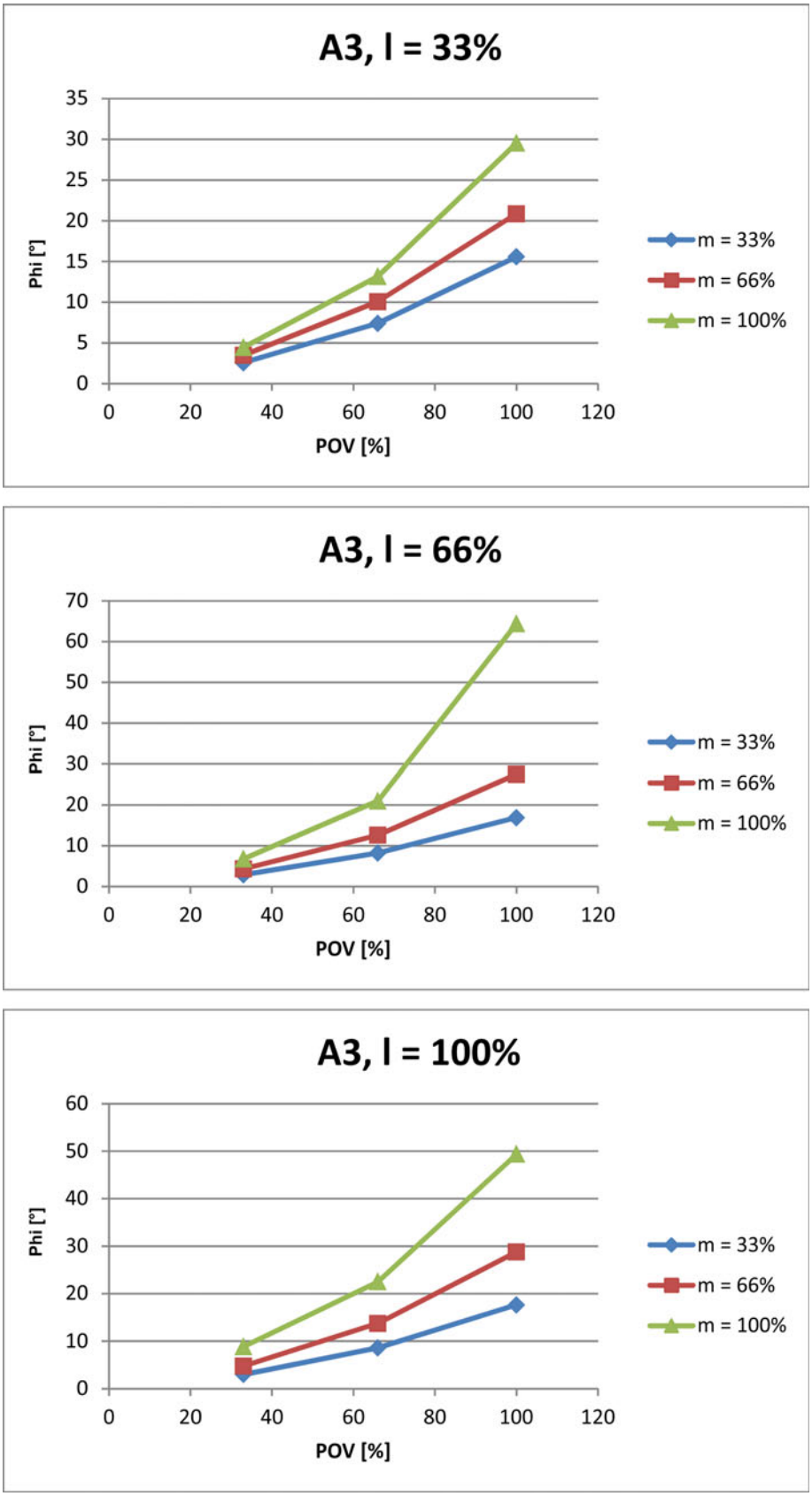
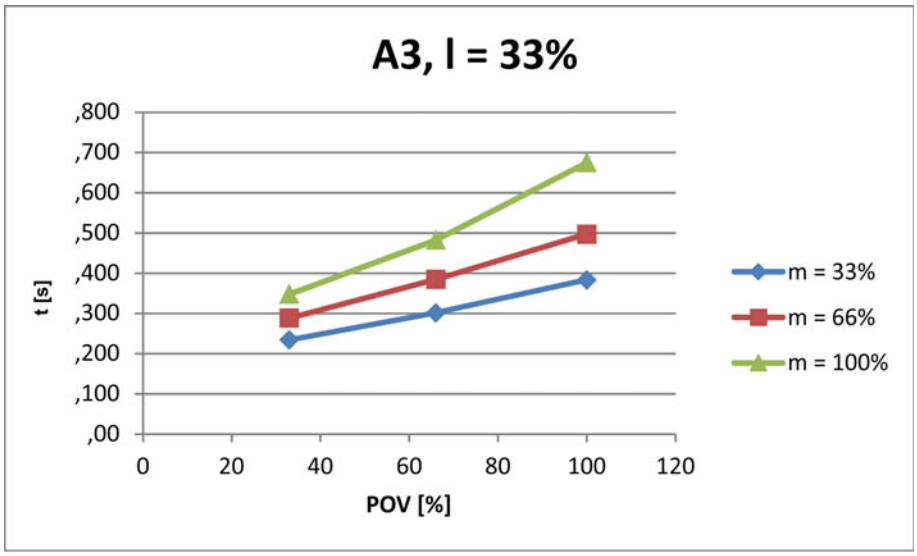
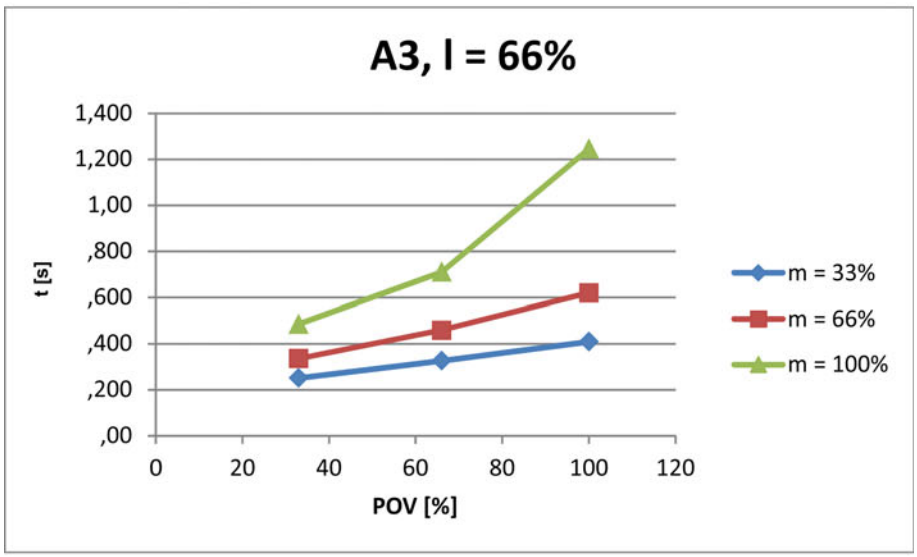


Fig. 4-81: Stopping distances for STOP 1, axis 3





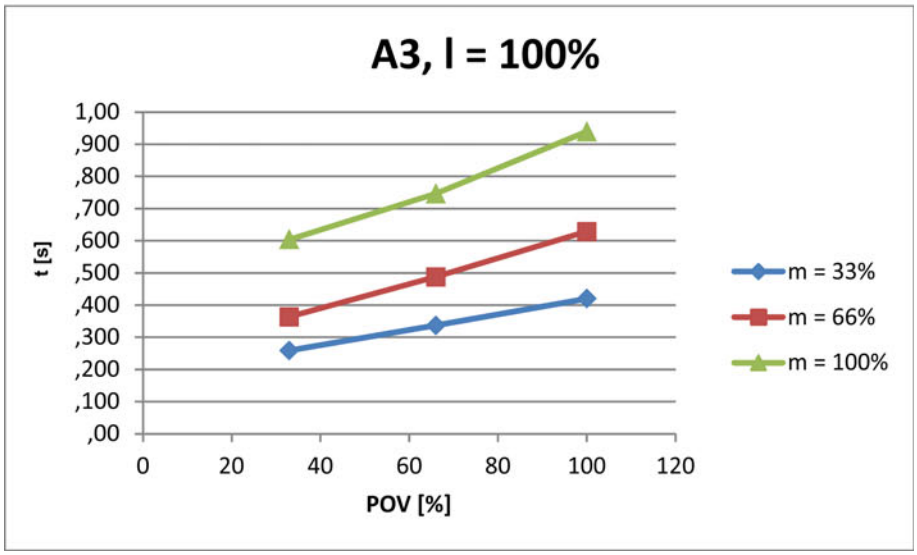


Fig. 4-82: Stopping times for STOP 1, axis 3

4.10.6.5 Stopping distances and stopping times for STOP 1, axis 4

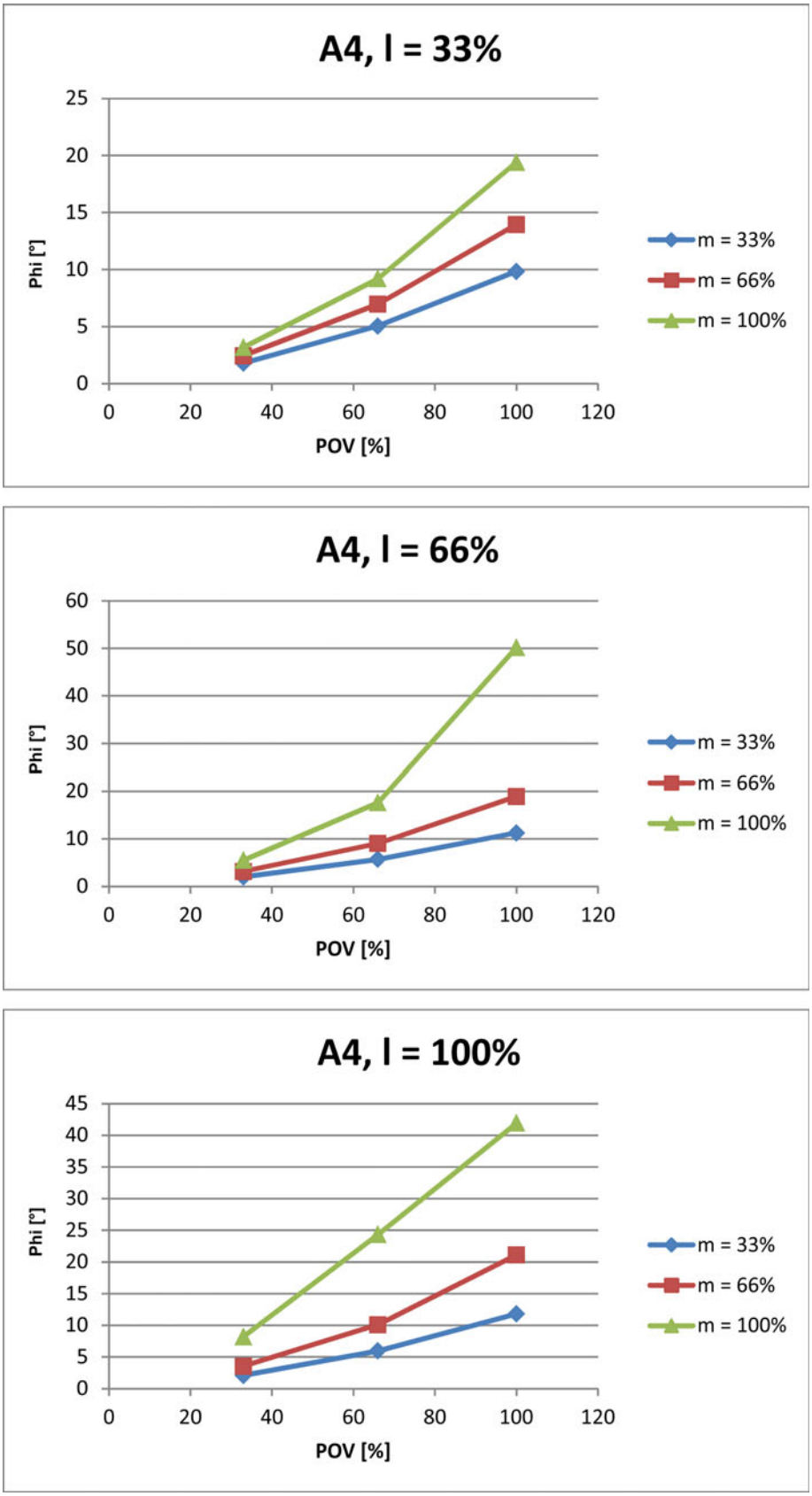
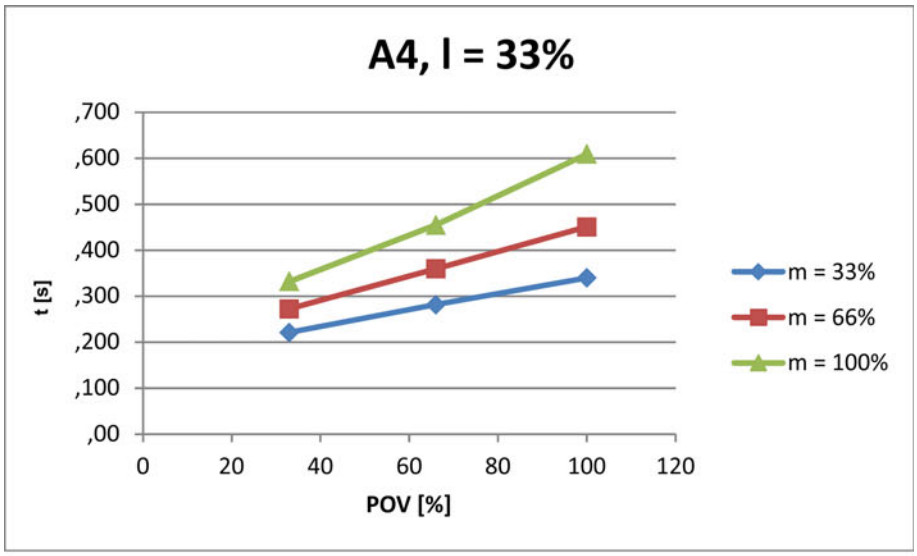
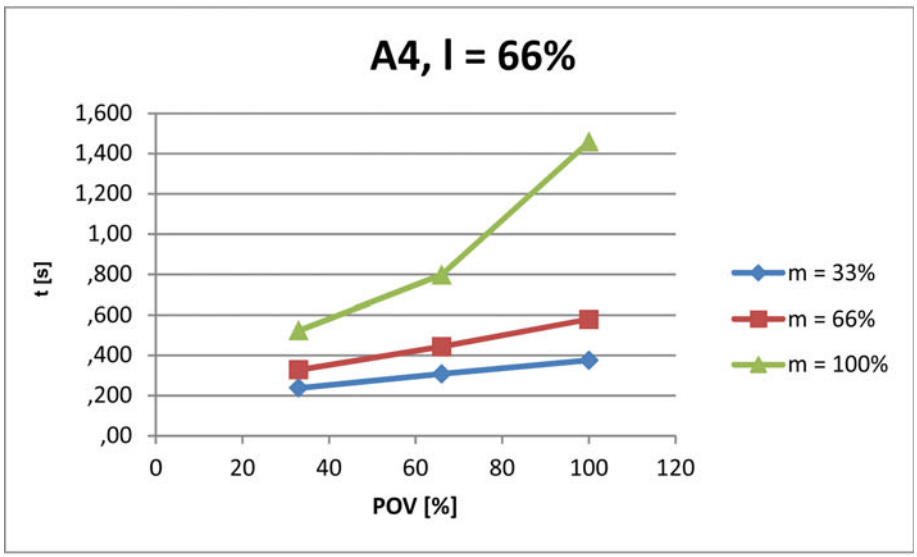


Fig. 4-83: Stopping distances for STOP 1, axis 4





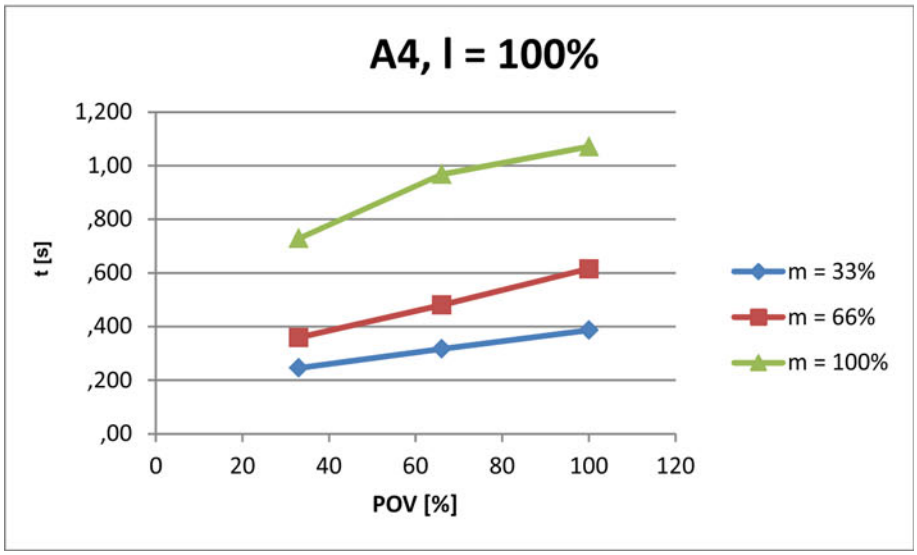


Fig. 4-84: Stopping times for STOP 1, axis 4

5 Safety

5.1 Safety of the option

For this assembly or option, the safety instructions of the higher-level system with which it is operated apply. The general safety instructions also apply. All applicable safety measures required by national law, as well as all regulations and ordinances for the avoidance of personal injury and material damage, must likewise be observed at all times.

The relevant personal protective equipment must be worn during performance of all work on the system, system components or equipment.

5.2 Applied norms and regulations

Name	Definition	Edition
2006/42/EC	**Machinery Directive:** Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast)	2006
2004/108/EC	**EMC Directive:** Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC	2004
EN ISO 13850	**Safety of machinery:** Emergency stop - Principles for design	2008
EN ISO 13849-1	**Safety of machinery:** Safety-related parts of control systems - Part 1: General principles of design	2008
EN ISO 13849-2	**Safety of machinery:** Safety-related parts of control systems - Part 2: Validation	2012
EN ISO 12100	**Safety of machinery:** General principles of design, risk assessment and risk reduction	2010
EN ISO 10218-1	**Industrial robots – Safety requirements** Part 1: Robot **Note:** Content equivalent to **ANSI/RIA R.15.06-2012, Part 1**	2011
EN 614-1 + A1	**Safety of machinery:** Ergonomic design principles - Part 1: Terms and general principles	2009

EN 61000-6-2	**Electromagnetic compatibility (EMC):** Part 6-2: Generic standards; Immunity for industrial environments	2005
EN 61000-6-4 + A1	**Electromagnetic compatibility (EMC):** Part 6-4: Generic standards; Emission standard for industrial environments	2011
EN 60204-1 + A1	**Safety of machinery:** Electrical equipment of machines - Part 1: General requirements	2009

6 Planning

6.1 Interfaces on A1

Description

Interface A1 is located at the rear of the base frame. There are separate interfaces on A1 for the media flange electrical and the media flange pneumatic. The following interfaces are available on A1:

- Interface A1, electrical, for the following media flanges:
  - Basic flange
  - Media flange electrical
  - Media flange Touch electrical
  - Media flange IO electrical
- Interface A1, pneumatic, for the following media flanges:
  - Basic flange
  - Media flange pneumatic
  - Media flange IO pneumatic
  - Media flange Touch pneumatic
  - Media flange IO valve pneumatic

The connections for the media flange-specific interfaces on A1 are shown in the following illustrations.

Interface A1, electrical

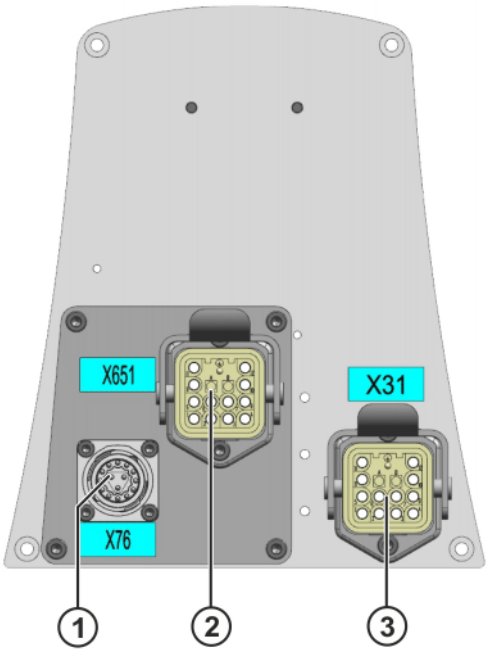


Fig. 6-1: Interface A1, electrical

1 Power supply for the media flange, X76
2 Data and power supply for the media flange, X651
3 Robot data cable connection, X31

Interface A1, pneumatic

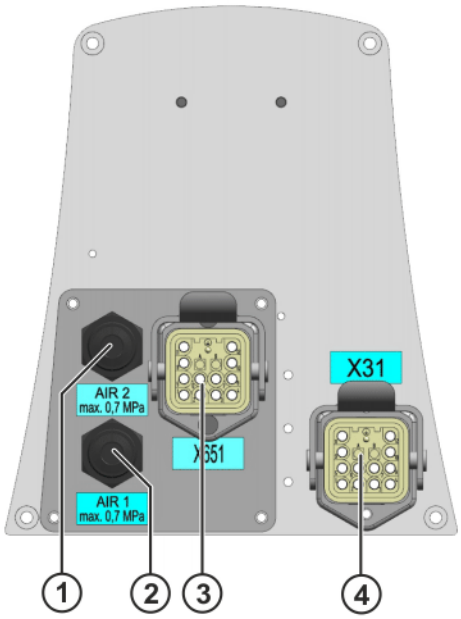


Fig. 6-2: Interface A1, pneumatic

1 Connection for air line AIR 2 (Ø 6.0)
2 Connection for air line AIR 1 (Ø 6.0)
3 Data and power supply for the media flange, X651
4 Robot data cable connection, X31

Customer-specific air connection with the following values:

Connection	Designation	Limit values	Vacuum
Air line AIR 1	Max. pressure	7 bar	0.95 bar
Air line AIR 2	Max. pressure	7 bar	0.95 bar

6.2 Media flange interfaces, overview

Overview

The interfaces of the individual media flanges can be found in the following sections:

Media flange	Technical data
Basic flange	No interfaces available
Media flange electrical	■ Interfaces (>>> 6.2.1.1 "Interface, media flange electrical" Page 102) ■ Wiring diagram (>>> 6.2.1.2 "Wiring diagrams, media flange electrical" Page 103) ■ Connector bypacks X651 (>>> 6.2.8 "Connector bypack X651" Page 133) and X76 required

Media flange	Technical data
Media flange pneumatic	■ Interfaces (>>> 6.2.2.1 "Interface, media flange pneumatic" Page 105) ■ Wiring diagram (>>> 6.2.2.2 "Wiring diagrams, media flange pneumatic" Page 106) ■ Connector bypack X651 required (>>> 6.2.8 "Connector bypack X651" Page 133)
Media flange IO pneumatic	■ Interfaces (>>> 6.2.3.1 "Interface, media flange IO pneumatic" Page 107) ■ Wiring diagram (>>> 6.2.3.2 "Wiring diagrams, media flange IO pneumatic" Page 109) ■ Connecting cable set X650, X651 (>>> 6.2.9 "Data cable" Page 133)
Media flange Touch pneumatic	■ Interfaces (>>> 6.2.4.1 "Interface, media flange Touch pneumatic" Page 112) ■ Wiring diagram (>>> 6.2.4.2 "Wiring diagrams, media flange Touch pneumatic" Page 114) ■ Connecting cable set X650, X651 (>>> 6.2.9 "Data cable" Page 133)
Media flange Touch electrical	■ Interfaces (>>> 6.2.5.1 "Interface, media flange Touch pneumatic" Page 115) ■ Wiring diagram (>>> 6.2.5.2 "Wiring diagrams, media flange Touch electrical" Page 118) ■ Connecting cable set X650, X651 (>>> 6.2.9 "Data cable" Page 133) ■ Connector bypack X76 required

Media flange	Technical data
Media flange IO electrical	■ Interfaces (>>> 6.2.6.1 "Interface, media flange IO electrical" Page 121) ■ Wiring diagram (>>> 6.2.6.2 "Wiring diagrams, media flange IO electrical" Page 123) ■ Connecting cable set X650, X651 (>>> 6.2.9 "Data cable" Page 133) ■ Connector bypack X76 required
Media flange IO valve pneumatic	■ Interfaces (>>> 6.2.7.1 "Interface, media flange IO valve pneumatic" Page 127) ■ Wiring diagram (>>> 6.2.7.2 "Wiring diagrams, media flange IO valve pneumatic" Page 130) ■ Connecting cable set X650, X651 (>>> 6.2.9 "Data cable" Page 133)

6.2.1 Media flange electrical

6.2.1.1 Interface, media flange electrical

Overview

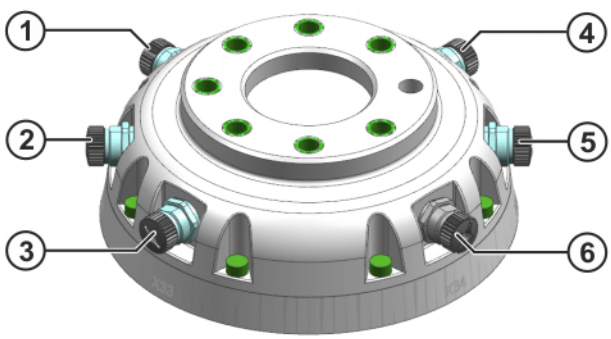


Fig. 6-3: Interface for media flange electrical

1 X36 power supply
2 X32 power supply
3 X33 power supply
4 X2 CAT5 interface
5 X35 power supply
6 X34 CAT5 interface

Connection/ function

Connection	Function
X2	CAT5 interface 4x AWG 26 shielded (CAT5), external via X651, M8 connection, 4-pole
X36	Power supply max. 60 V / 4 A per connection, max. total 8 A, external via X651, M8 connection, 3-pole
X32	

Connection	Function
X33	Power supply
X35	max. 60 V / 4 A per connection, max. total 5 A, external via X76, M8 connection, 3-pole
X34	Interface for analog signals and CAT5 6x AWG 28 shielded, external via X76, M8 connection, 8-pole

6.2.1.2 Wiring diagrams, media flange electrical

Connection X651, X32, X36

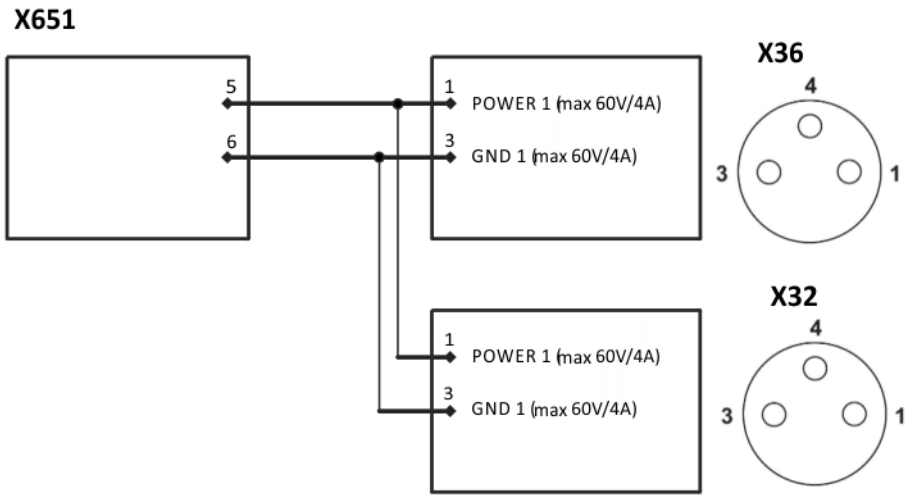


Fig. 6-4: Wiring diagram, MF electrical, X651, X32, X36

Connection X651, X2

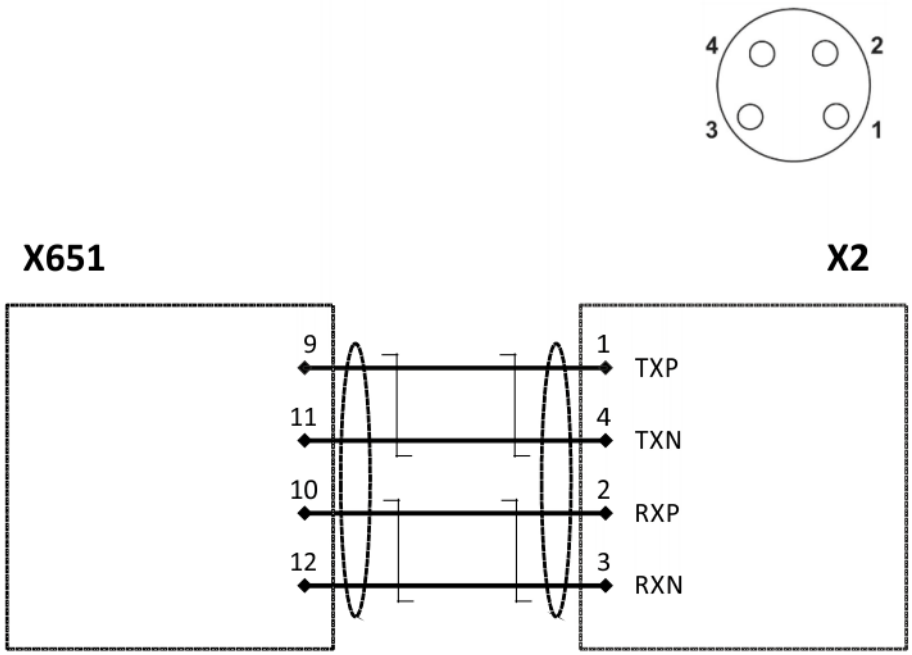


Fig. 6-5: Wiring diagram, MF electrical, X651, X2

Connection X76, X33, X35

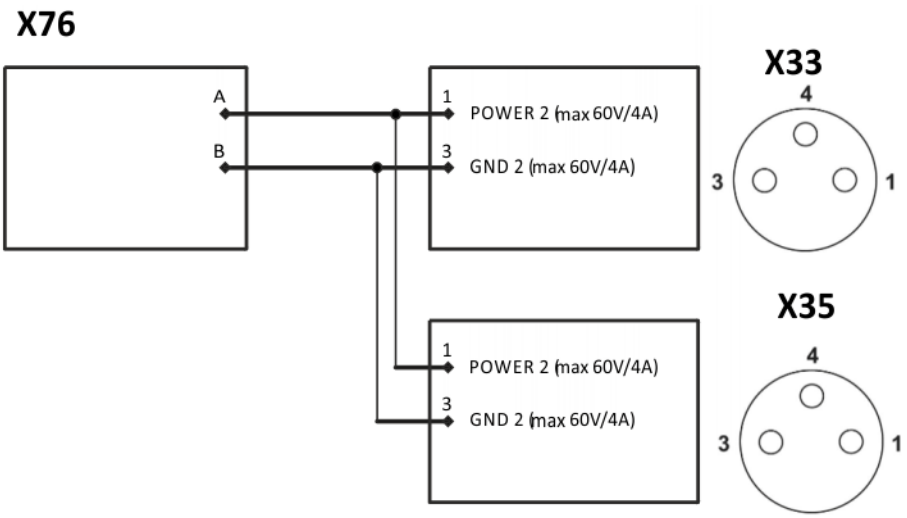


Fig. 6-6: Wiring diagram, MF electrical, X76, X33, X35

Connection X76, X34

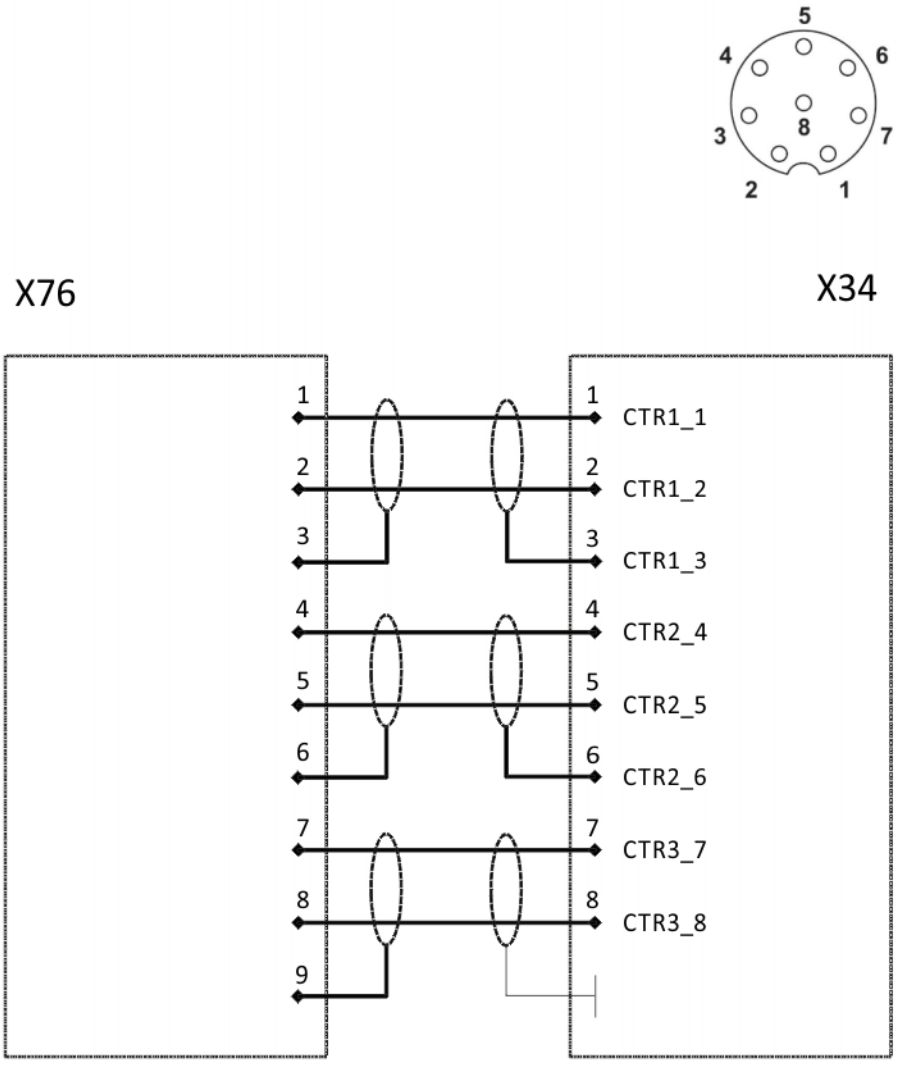


Fig. 6-7: Wiring diagram, MF electrical, X76, X34

6.2.2 Media flange pneumatic

6.2.2.1 Interface, media flange pneumatic

Overview

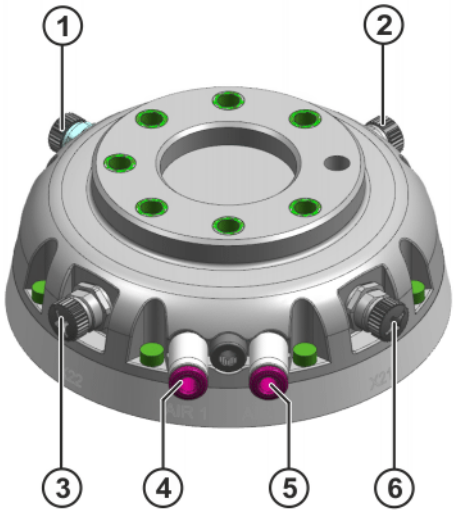


Fig. 6-8: Interface for media flange pneumatic

1 X2 CAT5 interface
2 X23 power supply
3 X22 power supply
4 Air 1 air connection
5 Air 2 air connection
6 X21 power supply

Connection/ function

Connection	Function
X2	CAT5 interface 4x AWG 26 shielded (CAT5), external via X651, M8 connection, 4-pole
X21	Power supply max. 30 V / 3 A per connection, max. total 8 A, via X651, M8 connection, 8-pole
X22	
X23	

Connection	Designation	Limit values
Air 1, air 2	Max. pressure	7 bar
	Operating temperature	+5 °C to +45 °C (278 K to 318 K) condensation-free
	Hose connection	4.0 mm Ø
	Medium	Air, oil-free, dry, filtered according to: ISO 8573.1-1, 1.2 to 16.2 Degree of filtration: max. 5 µm

6.2.2.2 Wiring diagrams, media flange pneumatic

Connection X651, X21, X22, X23

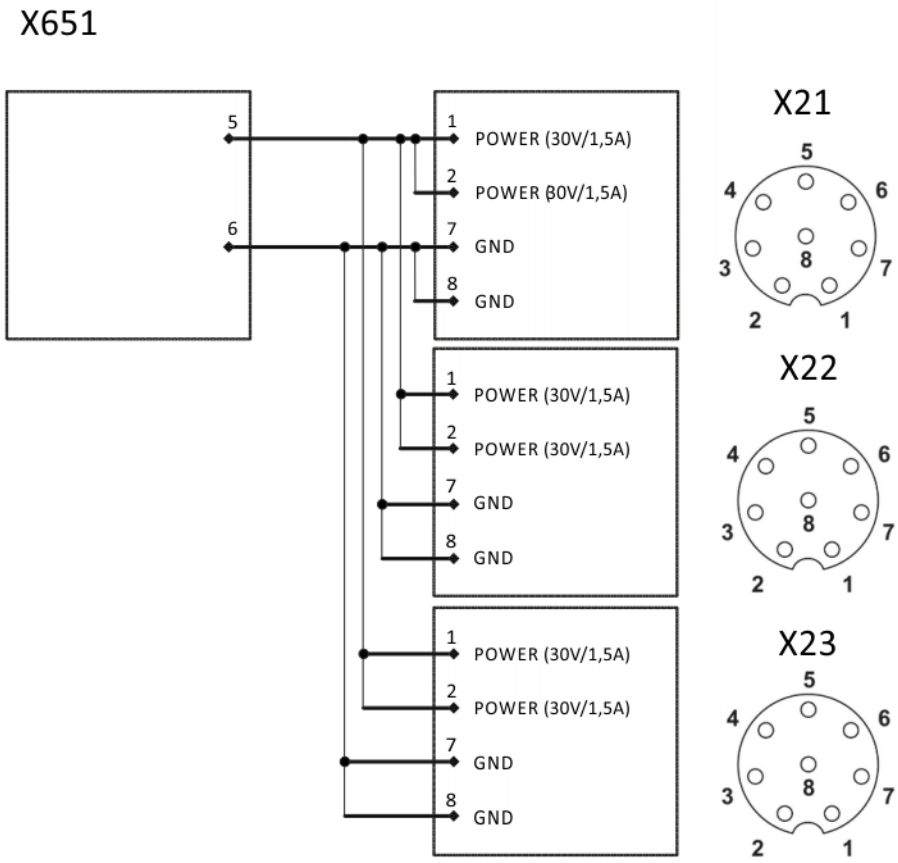


Fig. 6-9: Wiring diagram, MF pneumatic, X651, X21, X22, X23

Connection X651, X2

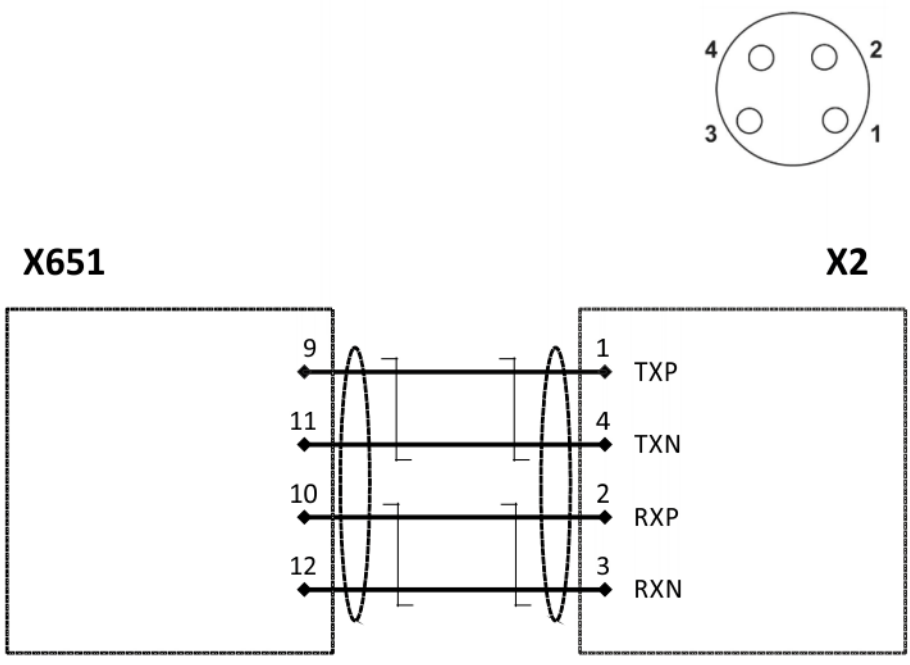


Fig. 6-10: Wiring diagram, MF pneumatic, X651, X2

6.2.3 Media flange IO pneumatic

6.2.3.1 Interface, media flange IO pneumatic

Overview

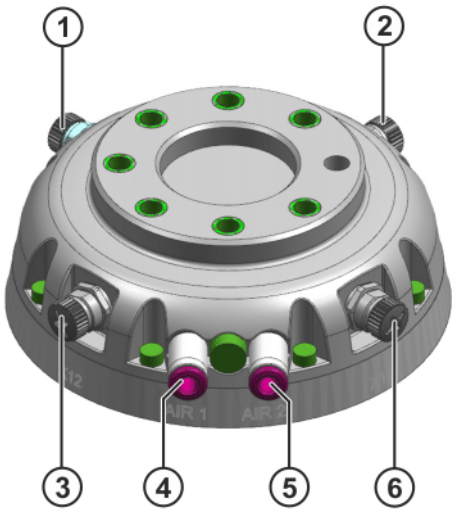


Fig. 6-11: Interface for media flange IO pneumatic

1 X2 EtherCat
2 X13 power supply, digital inputs/outputs
3 X12 power supply, digital inputs/outputs
4 Air 1 air connection
5 Air 2 air connection
6 X11 power supply, digital inputs/outputs

Connection/ function

Connection	Function
X2	EtherCAT, M8 connection, 4-pole
X11	Power supply Digital inputs/outputs, M8 connection, 8-pole
X12	Power supply Digital inputs/outputs, M8 connection, 8-pole
X13	Power supply Digital inputs/outputs, M8 connection, 8-pole

Connection	Designation	Limit values
Air 1, air 2	Max. pressure	7 bar
	Operating temperature	+5 °C to +45 °C (278 K to 318 K) condensation-free
	Hose connection	4.0 mm Ø
	Medium	Air, oil-free, dry, filtered according to: ISO 8573.1-1, 1.2 to 16.2 Degree of filtration: max. 5 µm

Digital outputs

Designation	Values
Digital outputs	4 short-circuit proof
Rated voltage	24 V DC (-15%/+20%)
Output current	max. 0.5 A per output
Short-circuit current	max. 2 A
Load type	Ohmic, inductive Lamp load
Maximum cable length	1 m

Power supply

Designation	Values
Power supply	24 V DC (-15%/+20%) / 3 A nominal 27 V max. 1.5 A per pin max. 2 A per socket max. 3 A total
Maximum cable length	1 m

Digital inputs

Designation	Values
Digital inputs	8
Signal voltage “0”	-3 V … +5 V EN 61131-2, type 3
Signal voltage “1”	15 V … 30 V EN 61131-2, type 3
Input current	typically 3 mA EN 61131-2, type 3
Input filter	typically 0.3 ms
Maximum cable length	1 m

6.2.3.2 Wiring diagrams, media flange IO pneumatic

Connection X11, X12, X13

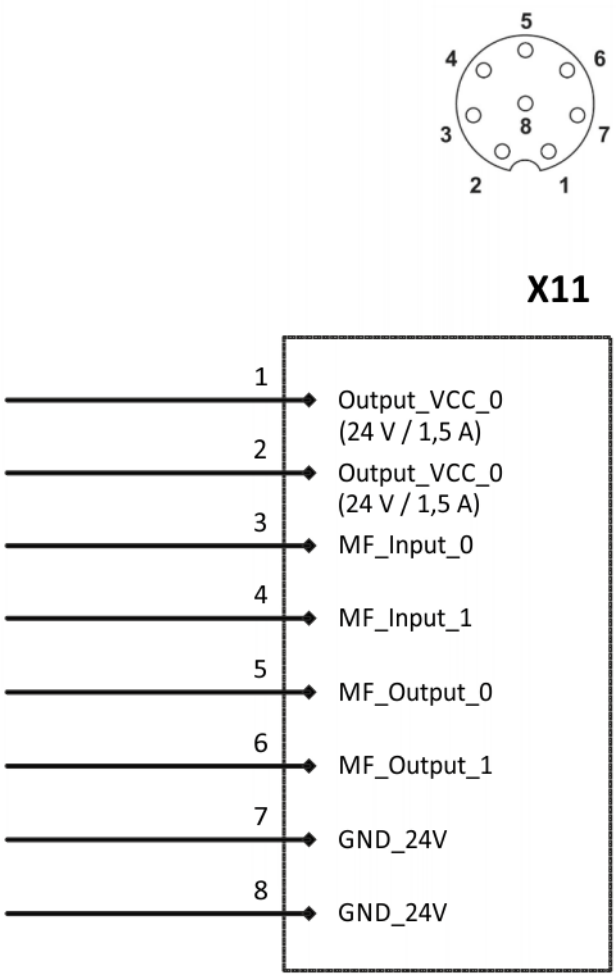


Fig. 6-12: Wiring diagram, MF IO pneumatic, X11

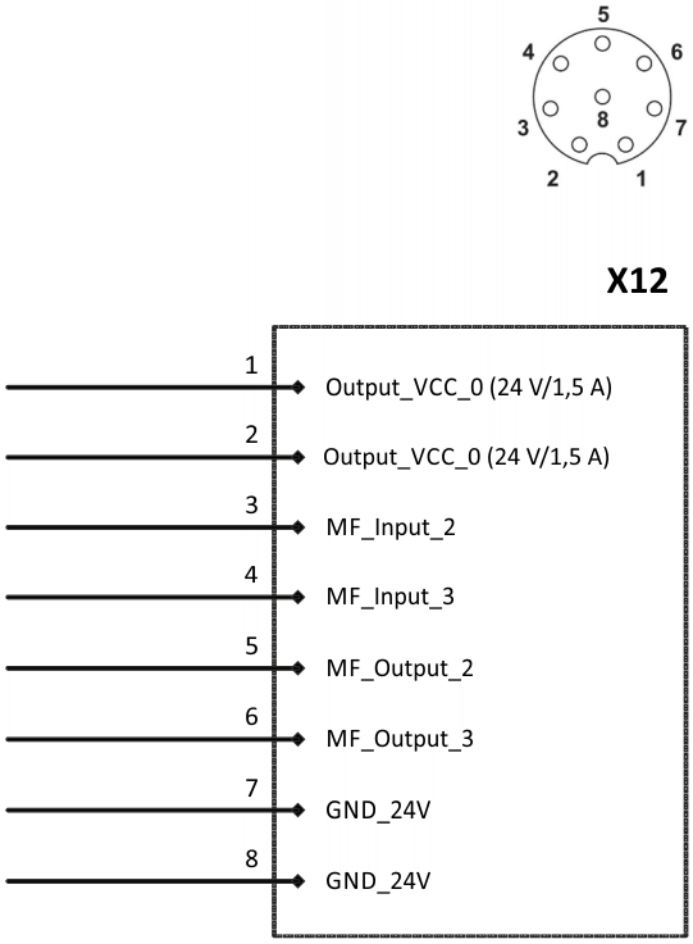


Fig. 6-13: Wiring diagram, MF IO pneumatic, X12

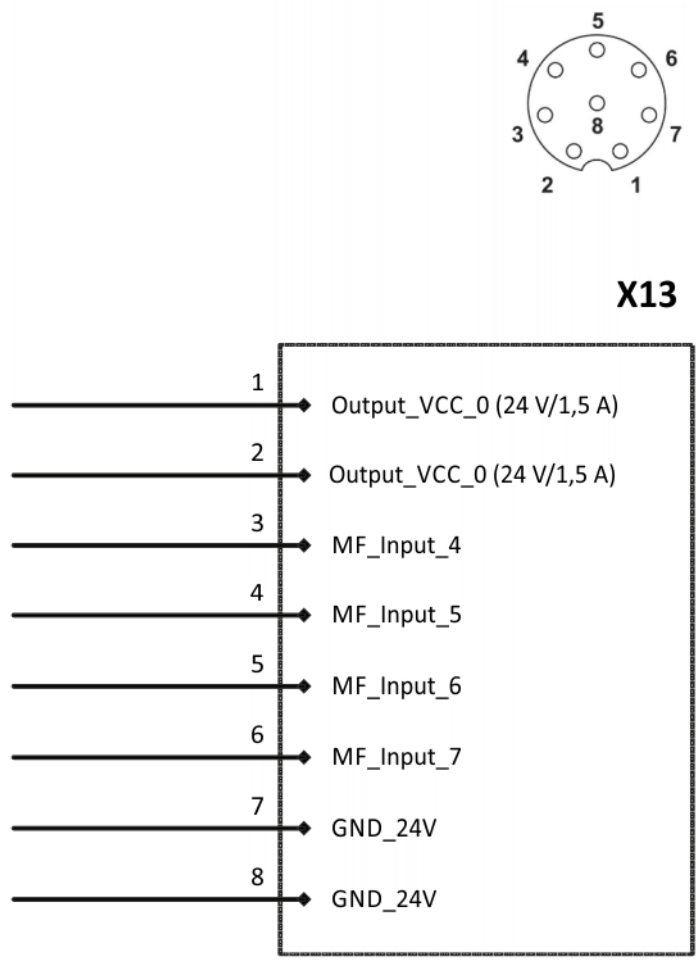


Fig. 6-14: Wiring diagram, MF IO pneumatic, X13

Connection X2

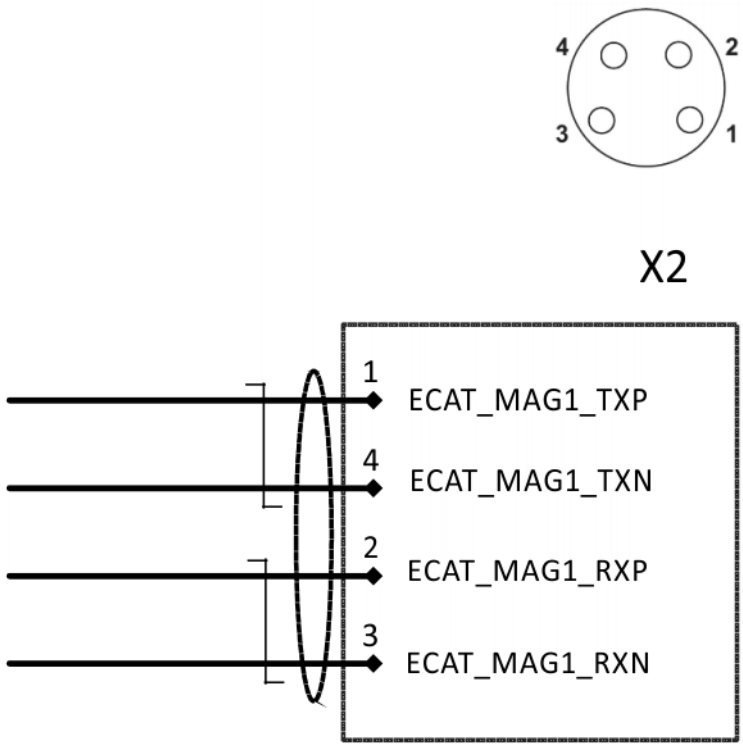


Fig. 6-15: Wiring diagram, connection X2

6.2.4 Media flange Touch pneumatic

6.2.4.1 Interface, media flange Touch pneumatic

Overview

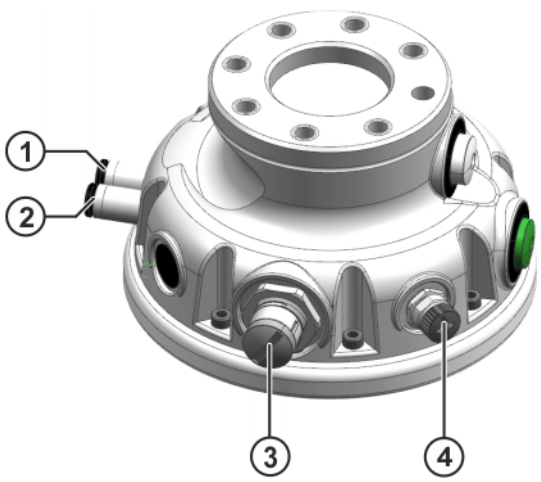


Fig. 6-16: Interface, media flange Touch pneumatic

1 Air 1 air connection
2 Air 2 air connection
3 X3 power supply, digital inputs/outputs
4 X2 EtherCat

Connection/ function

Connection	Function
X2	EtherCAT, M8 connection, 4-pole
X3	Power supply Digital inputs/outputs, M12 connection, 17-pole

Connection	Designation	Limit values
Air 1, air 2	Max. pressure	7 bar
	Operating temperature	+5 °C to +45 °C (278 K to 318 K) condensation-free
	Hose connection	4.0 mm Ø
	Medium	Air, oil-free, dry, filtered according to: ISO 8573.1-1, 1.2 to 16.2 Degree of filtration: max. 5 µm

Digital outputs

Designation	Values
Digital outputs	■ 4 digital outputs ■ short-circuit proof ■ Current monitoring for all 4 outputs together.
Switching states (rated voltage)	■ OFF (0): 0-1.5 V ■ ON (1): 11 V-30 V
Output current	max. 0.5 A per output
Short-circuit current	max. 2 A

Designation	Values
Load type	■ Resistive: min. 56 ohms ■ Capacitive: max. 1 uF ■ Inductive: max. 400 mH **Note:** For higher loads, the current limitation may be triggered or the switching times may be extended.
Maximum cable length	1 m

Digital inputs

Designation	Values
Digital inputs	■ 5 digital inputs **Note:** Debouncing is not carried out for any inputs. **Note:** Inductive and capacitive loads are not permissible.
Signal voltage “0”	0 V … +5 V **Note:** If no signal is connected, the input takes the state “0”.
Signal voltage “1”	11 V … 30 V
Input current	min. 5 mA with 27 V
Switching speed	Application-specific, scanning of the input values every 25 ms
Maximum cable length	1 m

Power supply

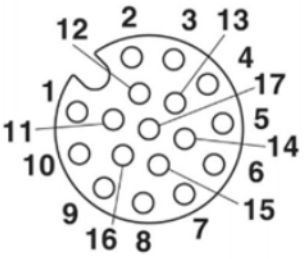
Designation	Values
Power supply	24 V (±25%) / 3 A, switchable nominal 27 V Output SwitchOffX3Voltage ■ Logic 0: Power on ■ Logic 1: Power off Default: 0 **Note:** The 4 Output_VCC and GND_24V pin pairs must be connected. **Note:** Resupply of the media flange via the customer supply connections is not permissible.
Load type	■ Resistive: min. 9 ohms ■ Capacitive: max. 1 uF ■ Inductive: max. 400 mH **Note:** For higher loads, the current limitation may be triggered or the switching times may be extended.
Maximum cable length	1 m

EtherCAT

Values	Designation
Ethernet connection	100 Base-TX
Max. cable length EtherCAT	1 m

6.2.4.2 Wiring diagrams, media flange Touch pneumatic

Connection X3



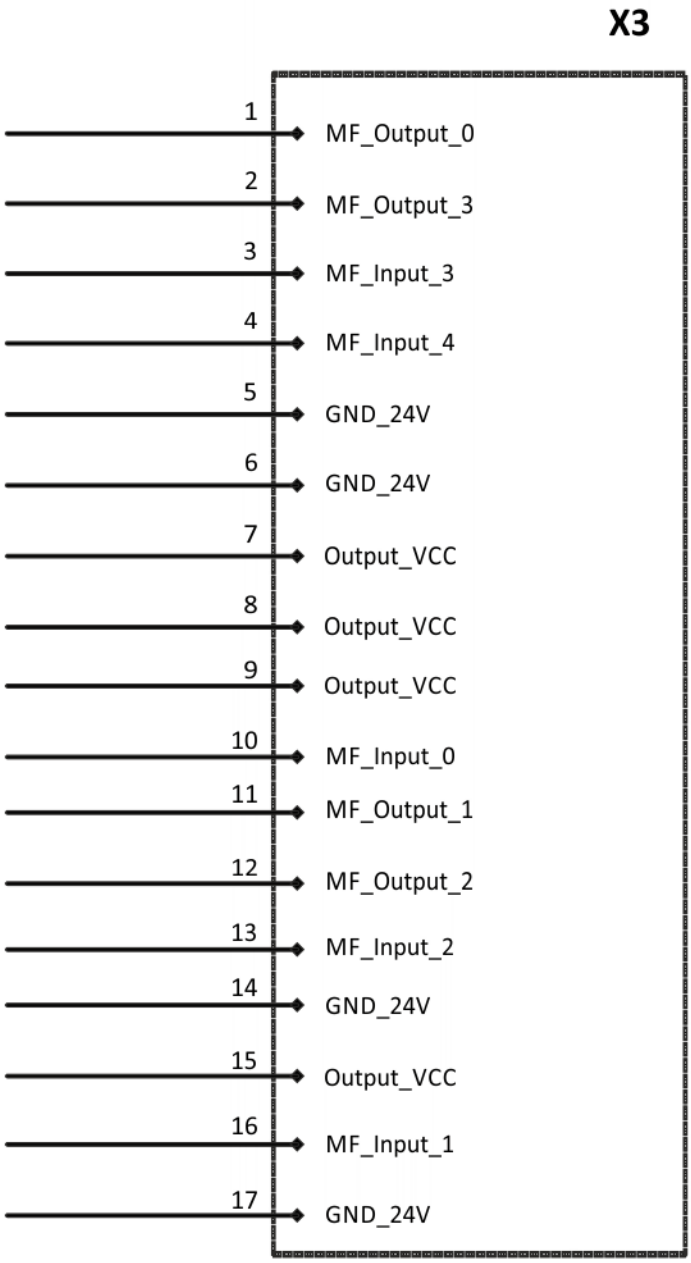


Fig. 6-17: Wiring diagram, connection X3

Connection X2

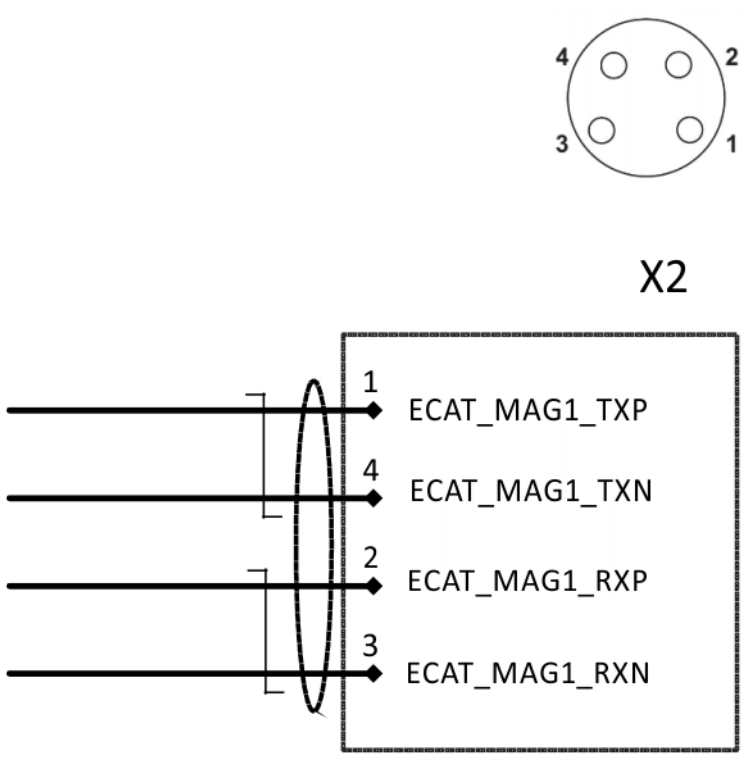


Fig. 6-18: Wiring diagram, connection X2

6.2.5 Media flange Touch electrical

6.2.5.1 Interface, media flange Touch pneumatic

Overview

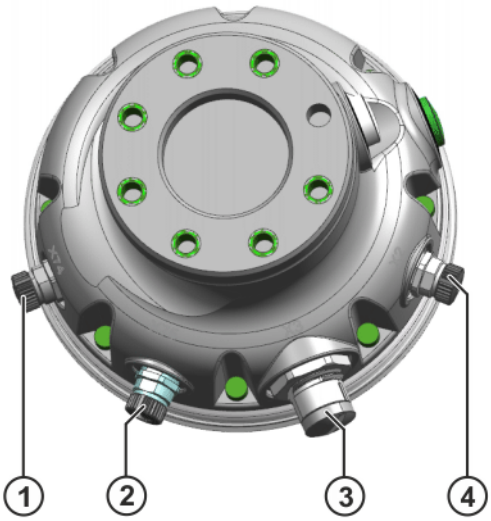


Fig. 6-19: Interface, media flange Touch electrical

1 X74 interface for analog signals and CAT5 (external)
2 X75 power supply (external)
3 X3 power supply (internal), digital inputs/outputs
4 X2 EtherCat

Connection/ function

Connection	Function
X2	EtherCAT, M8 connection, 4-pole
X3	24 V power supply, internal Digital inputs/outputs, M12 connection, 17-pole
X74	Interface for analog signals and CAT5 6x AWG 28 shielded, external via X76, M8 connection, 3-pole
X75	Power supply max. 60 V/4 A, externally via X76, M8 connection, 8-pole

Digital outputs

Designation	Values
Digital outputs	■ 4 digital outputs ■ short-circuit proof ■ Current monitoring for all 4 outputs together.
Switching states (rated voltage)	■ OFF (0): 0-1.5 V ■ ON (1): 11 V-30 V
Output current	max. 0.5 A per output
Short-circuit current	max. 2 A
Load type	■ Resistive: min. 56 ohms ■ Capacitive: max. 1 uF ■ Inductive: max. 400 mH **Note:** For higher loads, the current limitation may be triggered or the switching times may be extended.
Maximum cable length	1 m

Digital inputs

Designation	Values
Digital inputs	■ 5 digital inputs **Note:** Debouncing is not carried out for any inputs. **Note:** Inductive and capacitive loads are not permissible.
Signal voltage “0”	0 V … +5 V **Note:** If no signal is connected, the input takes the state “0”.
Signal voltage “1”	11 V … 30 V
Input current	min. 5 mA with 27 V
Switching speed	Application-specific, scanning of the input values every 25 ms
Maximum cable length	1 m

Power supply

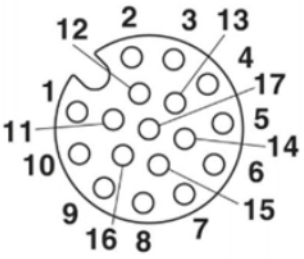
Designation	Values
Power supply	24 V (±25%) / 3 A, switchable nominal 27 V Output SwitchOffX3Voltage ■ Logic 0: Power on ■ Logic 1: Power off Default: 0 **Note:** The 4 Output_VCC and GND_24V pin pairs must be connected. **Note:** Resupply of the media flange via the customer supply connections is not permissible.
Load type	■ Resistive: min. 9 ohms ■ Capacitive: max. 1 uF ■ Inductive: max. 400 mH **Note:** For higher loads, the current limitation may be triggered or the switching times may be extended.
Maximum cable length	1 m

EtherCAT

Values	Designation
Ethernet connection	100 Base-TX
Max. cable length EtherCAT	1 m

6.2.5.2 Wiring diagrams, media flange Touch electrical

Connection X3



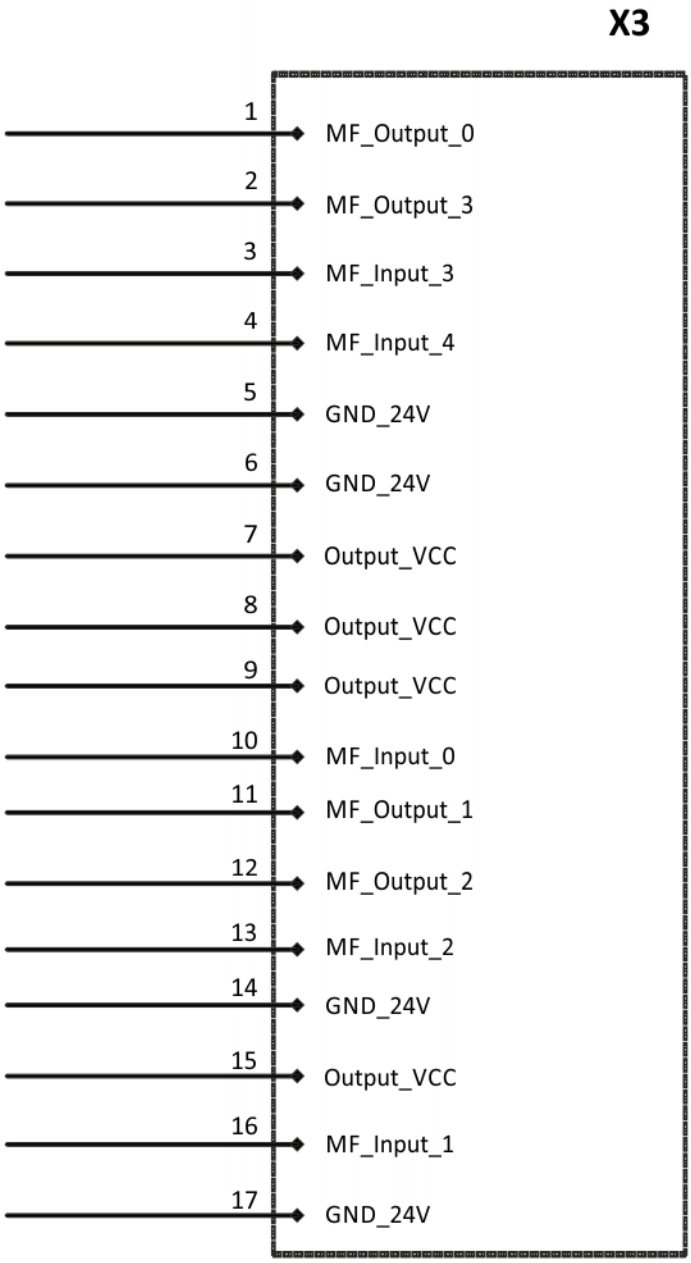


Fig. 6-20: Wiring diagram, connection X3

Connection X2

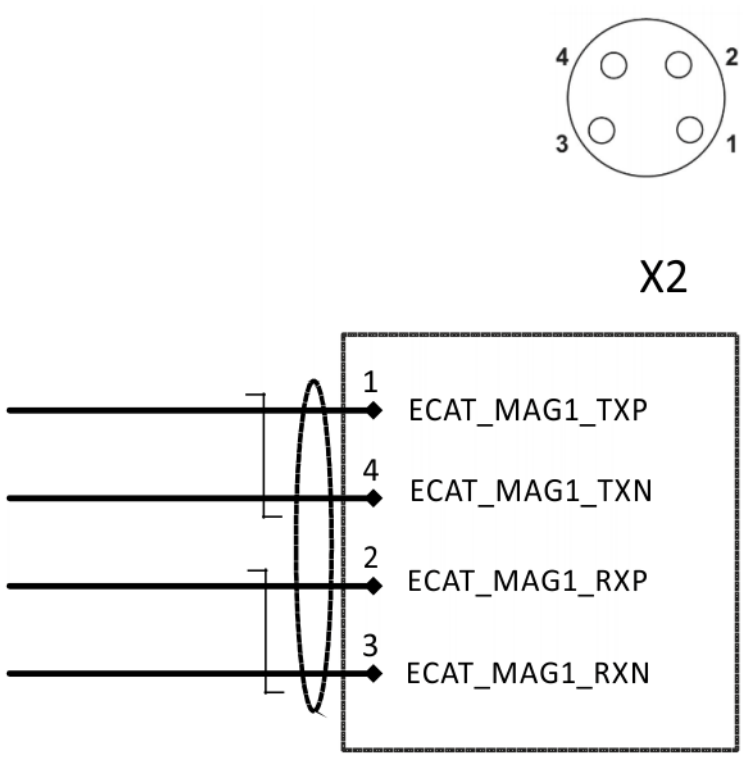


Fig. 6-21: Wiring diagram, connection X2

Connection X76, X75

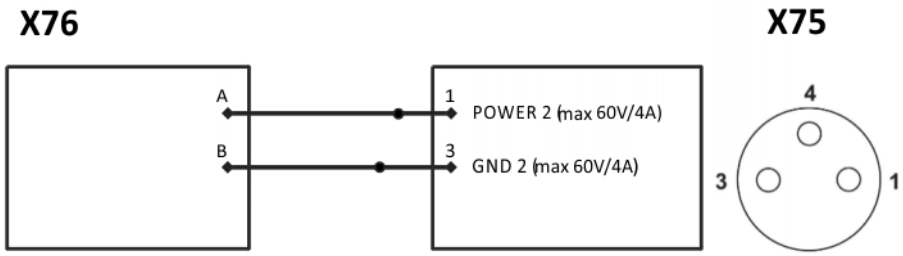


Fig. 6-22: Wiring diagram, X76, X75

Connection X76, X74

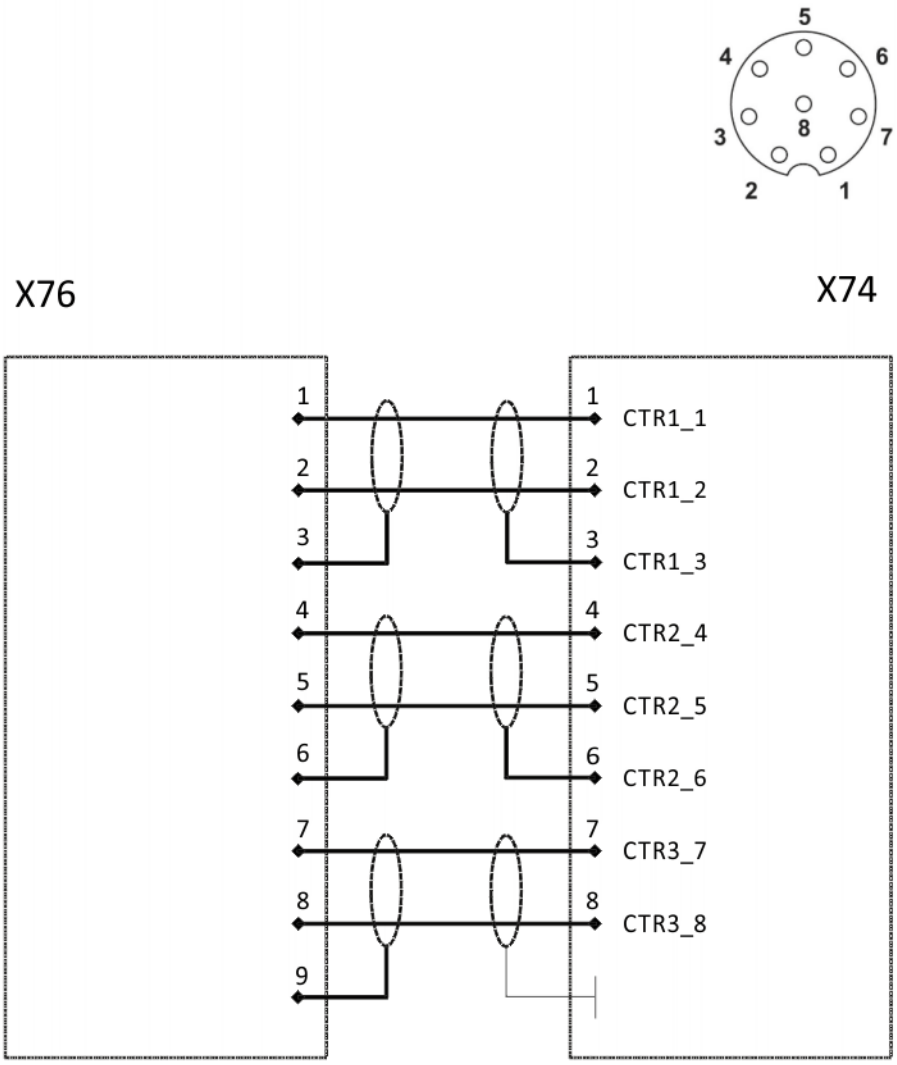


Fig. 6-23: Wiring diagram, connection X76, X74

6.2.6 Media flange IO electrical

6.2.6.1 Interface, media flange IO electrical

Overview

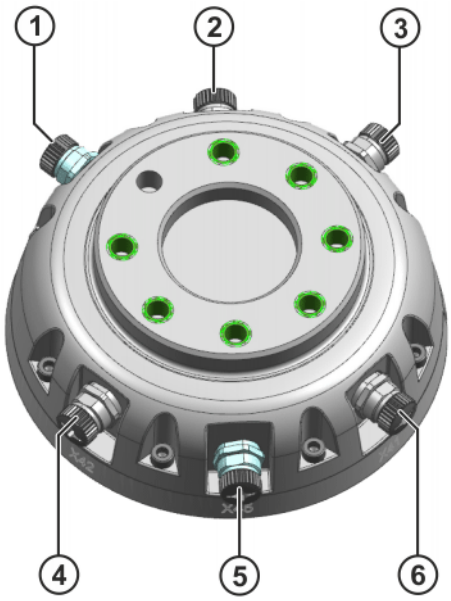


Fig. 6-24: Interface, media flange IO electrical

1 X2 EtherCat
2 X44 interface for analog signals and CAT5 (external)
3 X43 power supply, digital inputs/outputs
4 X42 power supply, digital inputs/outputs
5 X45 power supply (external)
6 X41 power supply, digital inputs/outputs

Connection/ function

Connection	Function
X2	EtherCAT, M8 connection, 4-pole
X41	24 V power supply, internal Digital inputs/outputs, M8 connection, 8-pole
X42	24 V power supply, internal Digital inputs/outputs, M8 connection, 8-pole
X43	24 V power supply, internal Digital inputs/outputs, M8 connection, 8-pole
X44	Interface for analog signals and CAT5 6x AWG 28 shielded, external via X76, M8 connection, 8-pole
X45	Power supply max. 60 V/4 A, externally via X76, M8 connection, 8-pole

Digital outputs

Designation	Values
Digital outputs	4 short-circuit proof
Rated voltage	24 V DC (-15%/+20%)

Designation	Values
Output current	max. 0.5 A per output
Short-circuit current	max. 2 A
Load type	Ohmic, inductive Lamp load
Maximum cable length	1 m

Power supply

Designation	Values
Power supply	24 V DC (-15%/+20%) / 3 A nominal 27 V max. 1.5 A per pin max. 2 A per socket max. 3 A total
Maximum cable length	1 m

Digital inputs

Designation	Values
Digital inputs	8
Signal voltage “0”	-3 V … +5 V EN 61131-2, type 3
Signal voltage “1”	15 V … 30 V EN 61131-2, type 3
Input current	typically 3 mA EN 61131-2, type 3
Input filter	typically 0.3 ms
Maximum cable length	1 m

6.2.6.2 Wiring diagrams, media flange IO electrical

Connection X41

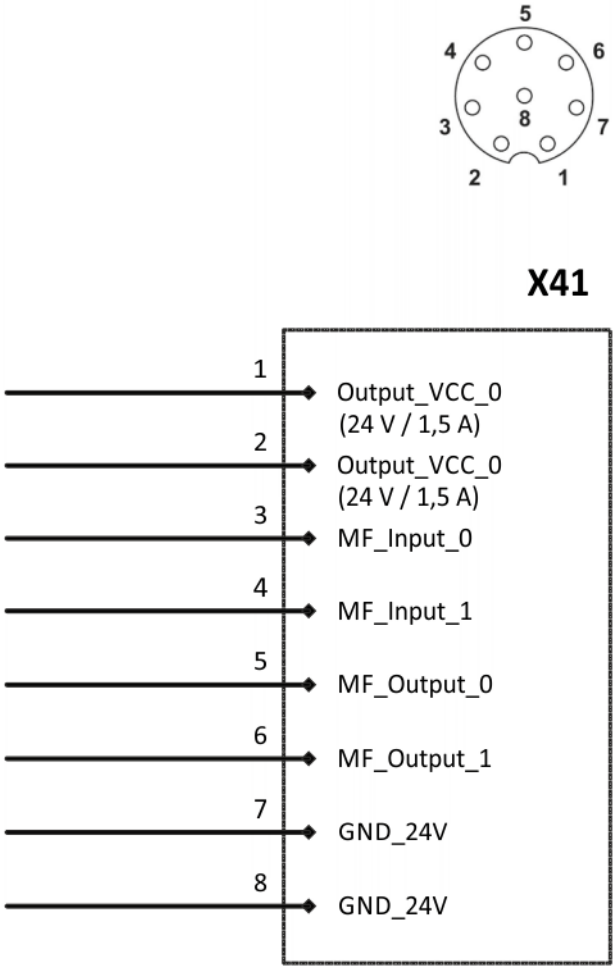


Fig. 6-25: Wiring diagram, connection X41

Connection X42

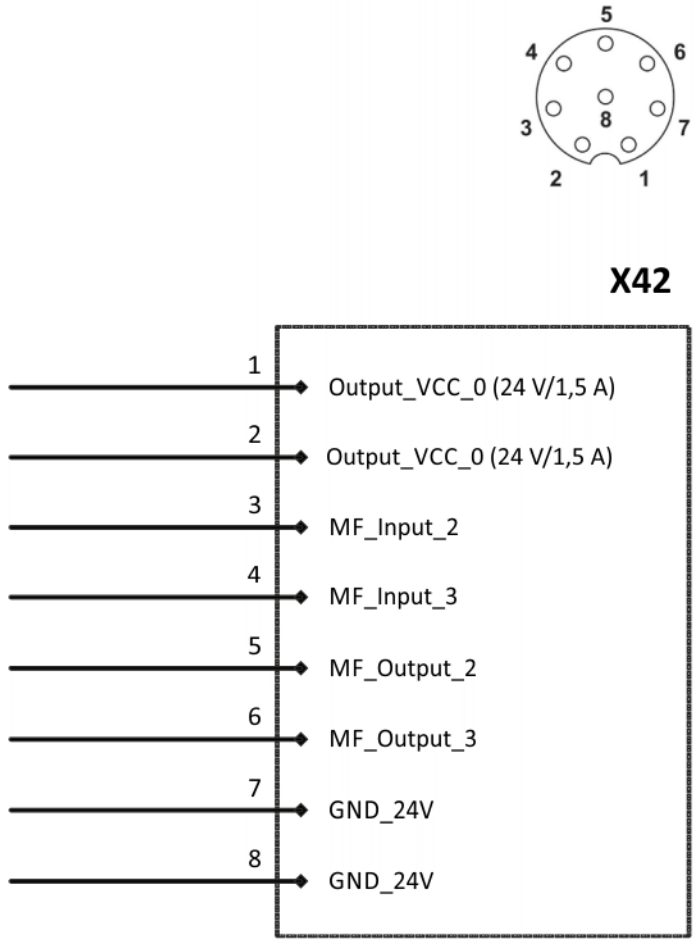


Fig. 6-26: Wiring diagram, connection X42

Connection X43

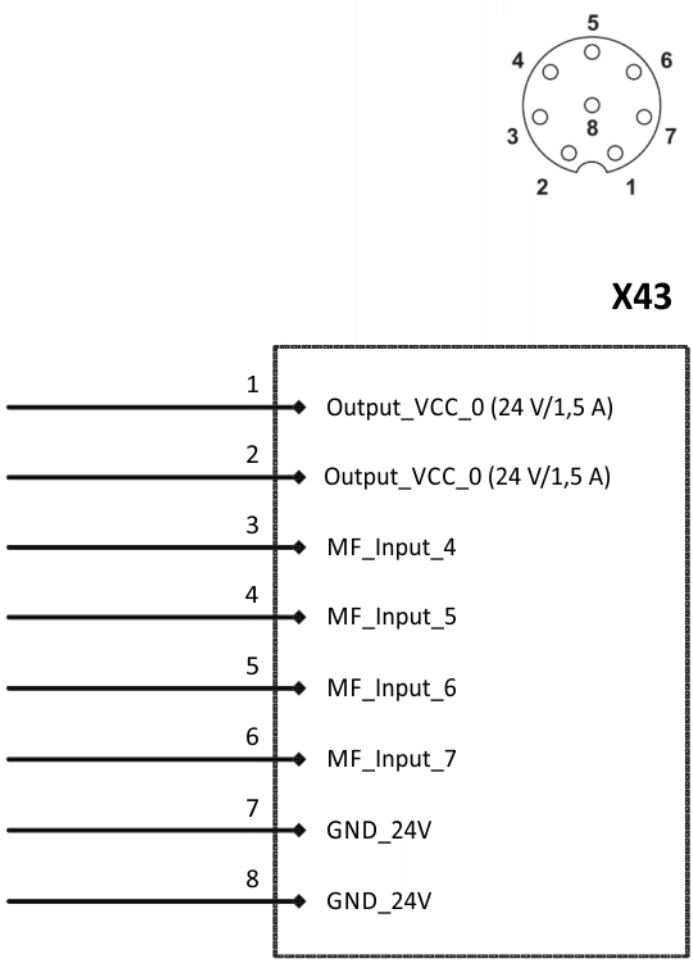


Fig. 6-27: Wiring diagram, connection X43

Connection X76, X44

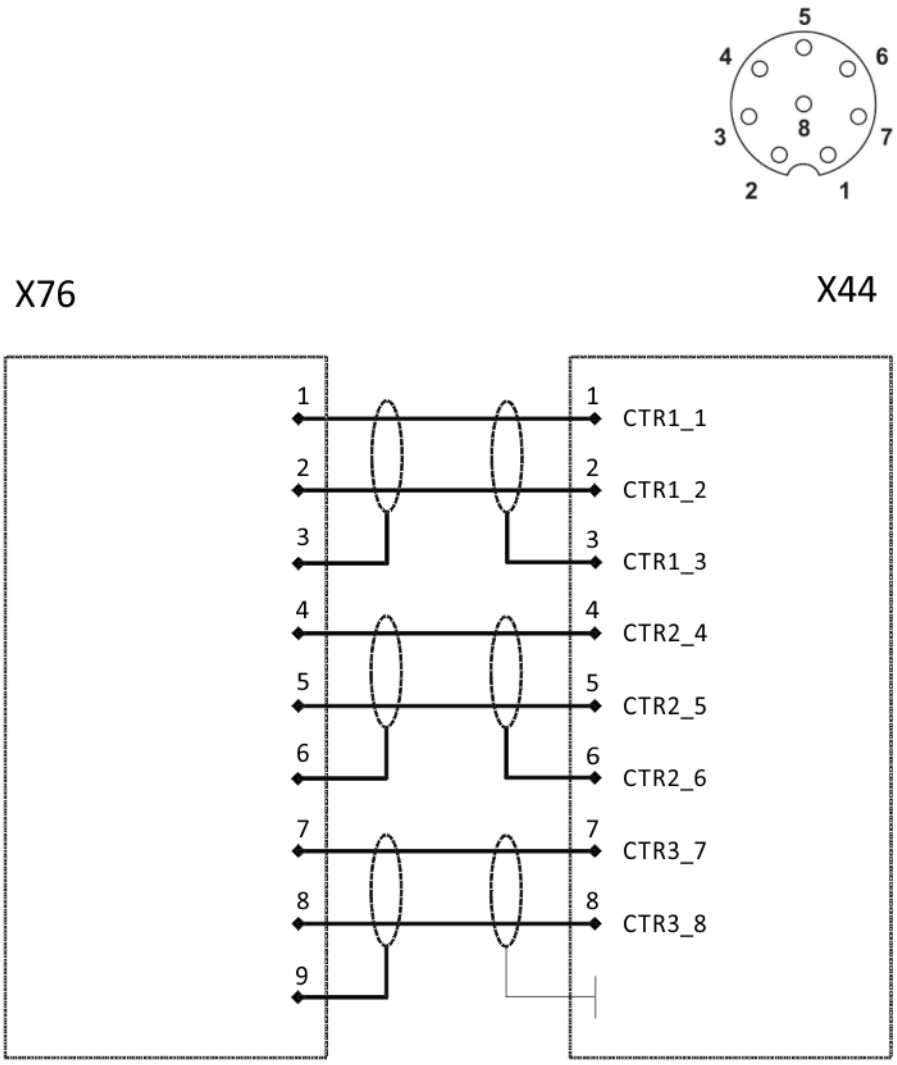


Fig. 6-28: Wiring diagram, connection X76, X44

Connection X76, X45

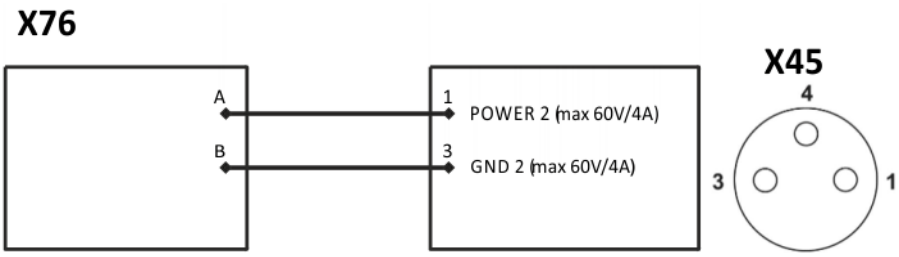


Fig. 6-29: Wiring diagram, connection X76, X45

Connection X2

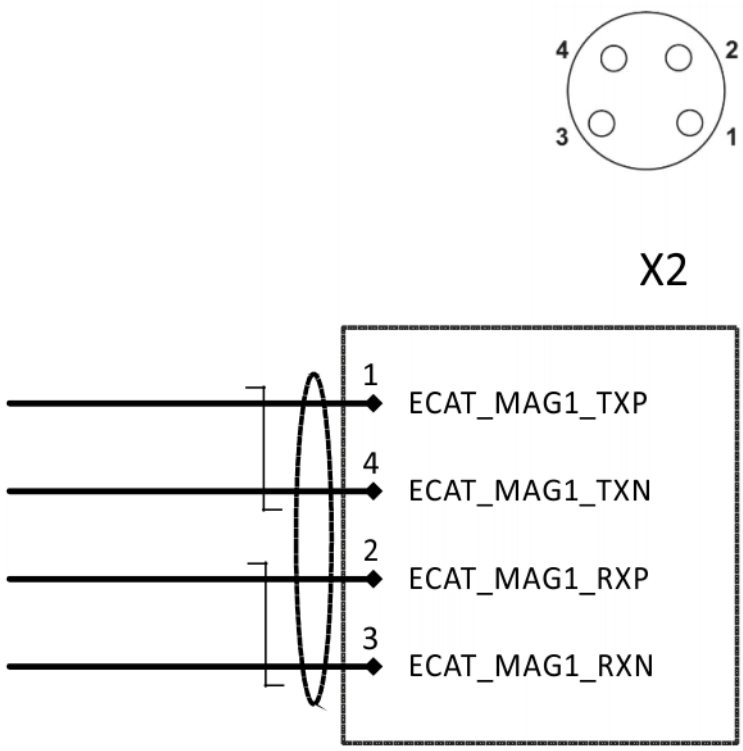


Fig. 6-30: Wiring diagram, connection X2

6.2.7 Media flange IO valve pneumatic

6.2.7.1 Interface, media flange IO valve pneumatic

Overview

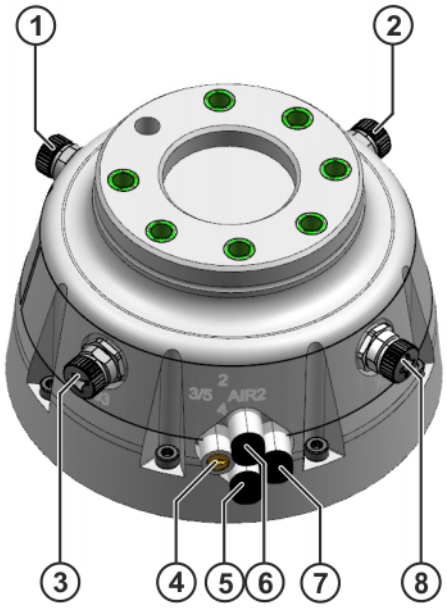


Fig. 6-31: Interface, media flange IO valve pneumatic

1 X91 power supply, digital inputs/outputs
2 X92 power supply, digital inputs/outputs
3 X93 power supply, digital inputs/outputs
4 Silencer
5 Air connection valve

6 Air connection valve
7 Air line AIR 2
8 X2 EtherCat

Connection/ function

Connection	Function
X2	EtherCAT, M8 connection, 4-pole
X91	Power supply Digital inputs/outputs, M8 connection, 8-pole
X92	Power supply Digital inputs/outputs, M8 connection, 8-pole
X93	Power supply Digital inputs/outputs, M8 connection, 8-pole

Connection	Designation	Limit values
Air 2	Min. pressure	0.95 bar
	Max. pressure	7 bar
	Operating temperature	+5 °C to +45 °C (278 K to 318 K) condensation-free
	Hose connection	4.0 mm Ø
	Medium	Air, oil-free, dry, filtered according to: ISO 8573.1-1, 1.2 to 16.2 Degree of filtration: max. 5 µm
2.4	Min. pressure	3 bar
	Max. pressure	7 bar
	Operating temperature	+5 °C to +45 °C (278 K to 318 K) condensation-free
	Hose connection	4.0 mm Ø
	Medium	Air, oil-free, dry, filtered according to: ISO 8573.1-1, 1.2 to 16.2 Degree of filtration: max. 5 µm
	Operating time	■ On: 30 ms ± 15% ■ On: 20 ms ± 15%

Schematic diagram

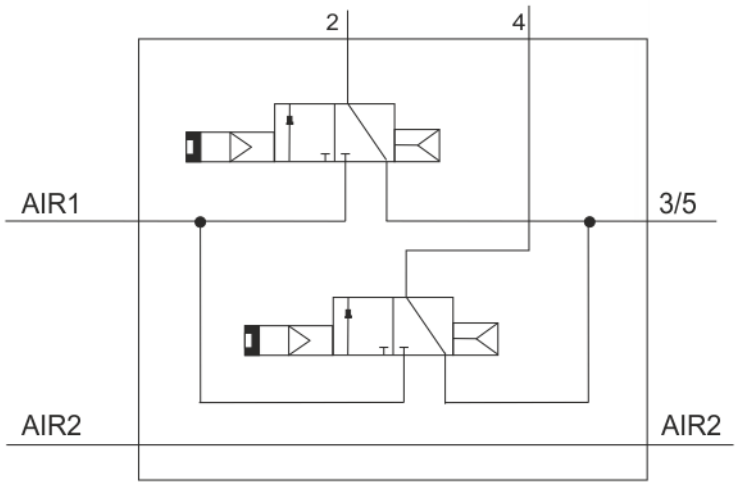


Fig. 6-32: Circuit diagram of pneumatic valves

Digital outputs

Designation	Values
Digital outputs	4 short-circuit proof
Rated voltage	24 V DC (-15%/+20%)
Output current	max. 0.5 A per output
Short-circuit current	max. 2 A
Load type	Ohmic, inductive Lamp load
Maximum cable length	1 m

Power supply

Designation	Values
Power supply	24 V DC (-15%/+20%) / 3 A nominal 27 V max. 1.5 A per pin max. 2 A per socket max. 3 A total
Maximum cable length	1 m

Digital inputs

Designation	Values
Digital inputs	8
Signal voltage “0”	-3 V … +5 V EN 61131-2, type 3
Signal voltage “1”	15 V … 30 V EN 61131-2, type 3
Input current	typically 3 mA EN 61131-2, type 3
Input filter	typically 0.3 ms
Maximum cable length	1 m

6.2.7.2 Wiring diagrams, media flange IO valve pneumatic

Connection X91

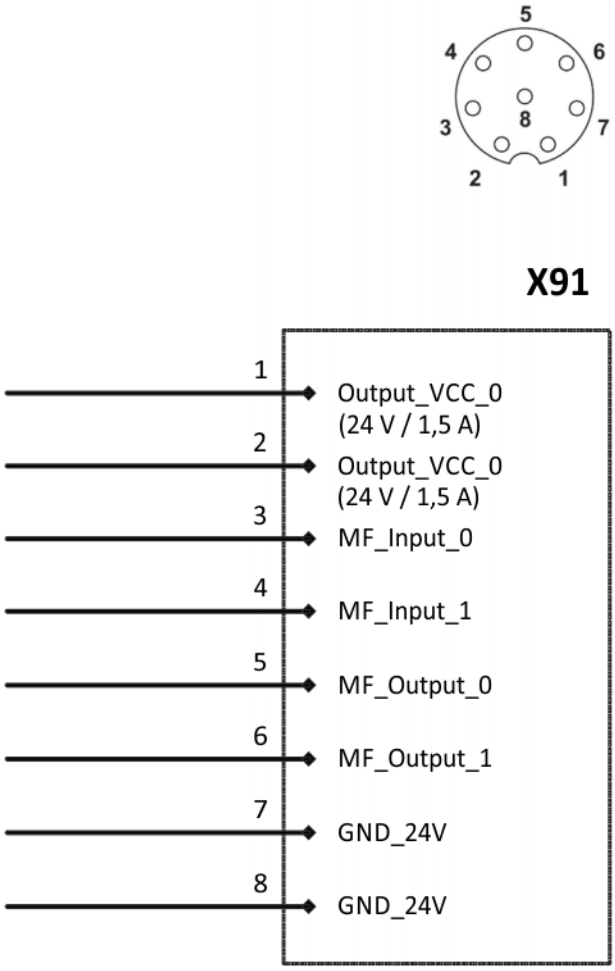


Fig. 6-33: Wiring diagram, connection X91

Connection X92

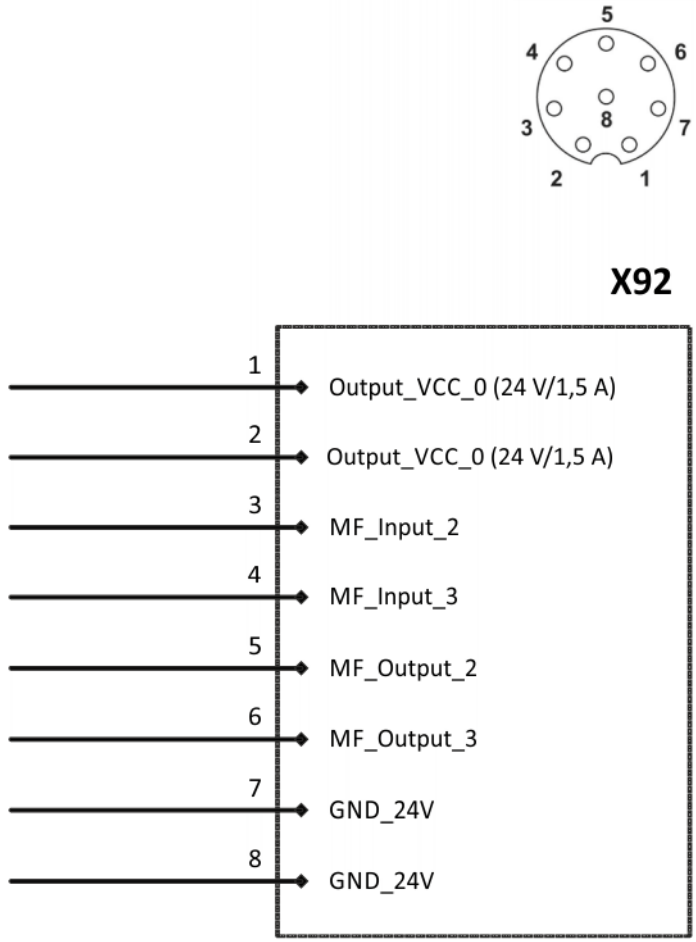


Fig. 6-34: Wiring diagram, connection X92

Connection X93

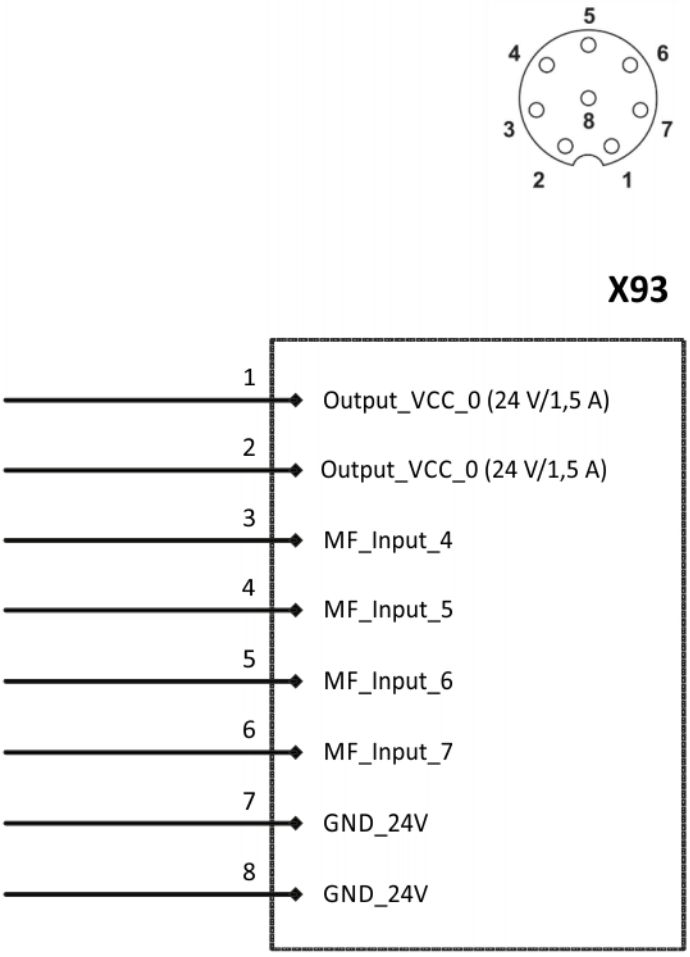


Fig. 6-35: Wiring diagram, connection X93

Connection X2

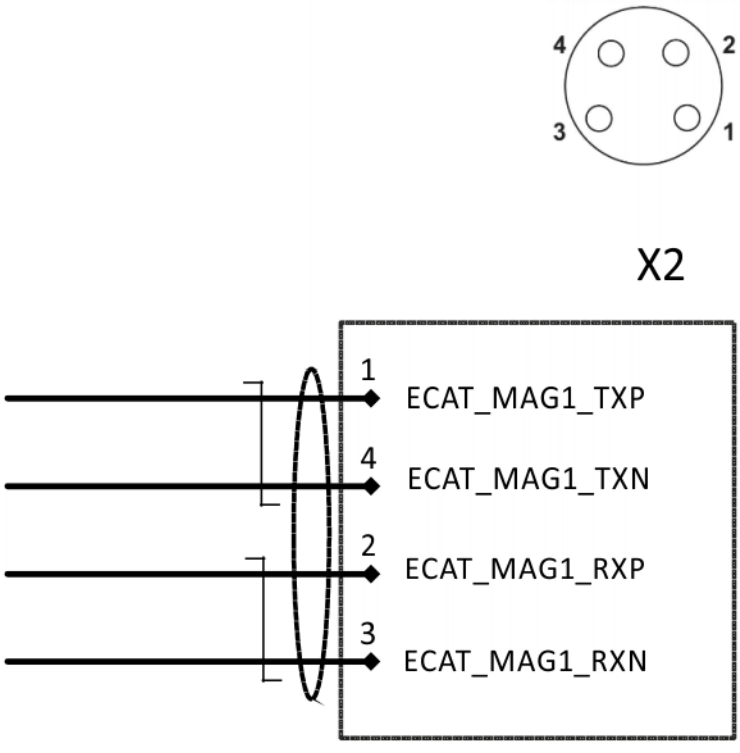


Fig. 6-36: Wiring diagram, connection X2

6.2.8 Connector bypack X651

Description

Two coding pins are included in the connector bypack. These are to be inserted as illustrated below.

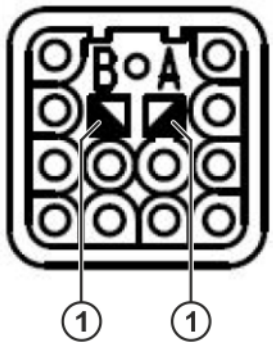


Fig. 6-37: Connector bypack X651

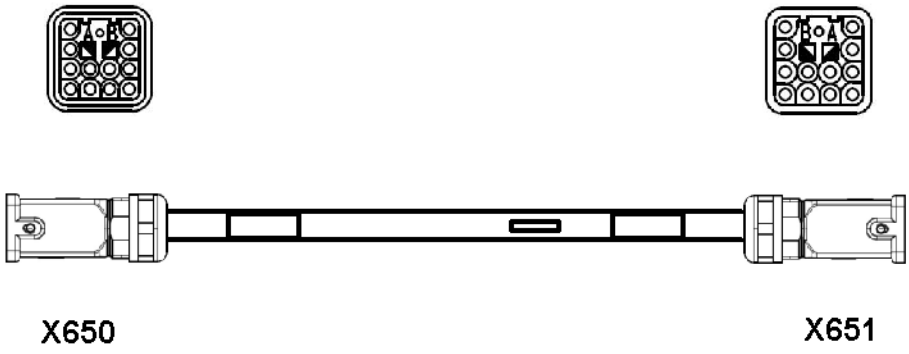
6.2.9 Data cable

Description

The following points must be observed when planning and routing the connecting cables:

- The bending radius for fixed routing must not be less than 35 mm for data cables with power supply for media flange and 45 mm for data cables.
- Protect cables against exposure to mechanical stress.
- Route the cables without mechanical stress – no tensile forces on the connectors
- Cables are only to be installed indoors.
- Observe the permissible temperature range (fixed installation) of -10 °C to +70 °C (263 K to 343 K).
- Route the motor cables and the control cables separately in metal ducts; if necessary, additional measures must be taken to ensure electromagnetic compatibility (EMC).

This data cable is required for operating the robot with the media flange IO pneumatic and media flange Touch pneumatic.



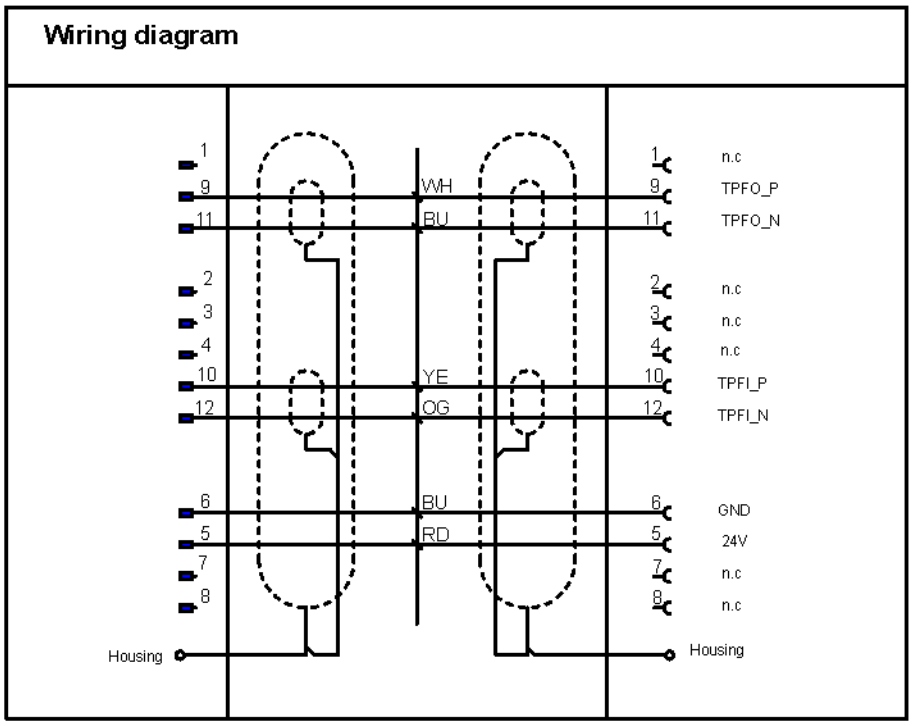


Fig. 6-38: Data cable X650, X651

NOTICE Connecting the data cable to the robot with different media flange types can result in damage to the components.

7 Transportation

The media flange must not be transported without the robot.

Further information about transporting the robot can be found in the operating or assembly instructions for the robot.

8 Configuration

8.1 Overview

Further information about configuration is provided in the following sections:

Media flange	I/O	Description
Media flange Touch pneumatic	■ Inputs: InputX3Pin3, InputX3Pin4, InputX3Pin10, InputX3Pin13, InputX3Pin16, UserButton (= application button) ■ Outputs: OutputX3Pin1, OutputX3Pin2, OutputX3Pin11, OutputX3Pin12, SwitchOffX3Voltage, LEDBlue (= light ring, blue)	(>>> 8.1.1 "Media flange configuration" Page 137)
Media flange IO pneumatic	■ Inputs: Input0…Input7 ■ Outputs: Output0…Output3	(>>> 8.1.1 "Media flange configuration" Page 137)
Media flange Touch electrical	■ Inputs: InputX3Pin3, InputX3Pin4, InputX3Pin10, InputX3Pin13, InputX3Pin16, UserButton (= application button) ■ Outputs: OutputX3Pin1, OutputX3Pin2, OutputX3Pin11, OutputX3Pin12, SwitchOffX3Voltage, LEDBlue (= light ring, blue)	(>>> 8.1.1 "Media flange configuration" Page 137)
Media flange IO electrical	■ Inputs: Input0…Input7 ■ Outputs: Output0…Output3	(>>> 8.1.1 "Media flange configuration" Page 137)
Media flange IO valve pneumatic	■ Inputs: Input0…Input7 ■ Outputs: Output0…Output3, Valve1_ON, Valve1_OFF, Valve2_ON, Valve2_OFF The pneumatic valves can be switched to bistable independently of one another using Valve1_ON, Valve1_OFF or Valve2_ON, Valve2_OFF. To change the state, the variable set originally must be reset to “false”.	(>>> 8.1.1 "Media flange configuration" Page 137)

8.1.1 Media flange configuration

The media flange with which the robot is equipped must be selected when creating the Sunrise project. The I/O configuration for the media flange is created automatically and contains the complete bus structure of the media flange, including the I/O mapping.

The I/O configuration is created automatically for the media flange set in the project. If a media flange with an EtherCAT output (e.g. media flange IO pneumatic) is used and additional EtherCAT devices are connected, these must be configured using WorkVisual.

When connecting additional EtherCAT devices to a media flange with an EtherCAT output, e.g. media flange IO pneumatic, it must be ensured that the number of available signals on the bus is limited.
If there are too many connected devices, this can result in overloading of the bus and loss of communication. Under certain circumstances, the robot can then no longer be moved.

The I/O group in which the inputs/outputs are configured is called MediaFlange. It contains inputs and outputs that are relevant for the corresponding media flange. The type and number of inputs and outputs the media flange has are found in the overview in the table (>>> 8.1 "Overview" Page 137).

The inputs/outputs can be addressed directly in the robot application. When the media flange is selected during creation of the Sunrise project, the class MediaFlangeIOGroup.java is generated at the same time. The class already contains the methods required for programming in order to access the inputs/outputs of the media flange.

Detailed information about project creation is contained in the system software documentation.

Detailed information on device mapping is contained in the **WorkVisual** documentation.

9 Maintenance

9.1 Maintenance

Description

If used for its intended purpose, the media flange requires minimal maintenance, i.e. visual inspections are recommended. Regular visual inspections make sure that any changes are detected in good time. This enables early detection of damage, thereby preventing failure of components and assemblies. Damaged components or assemblies must be exchanged.

Maintenance, cleaning and inspection measures must only be carried out by appropriately qualified and authorized personnel. All other maintenance, cleaning and inspection work not described in this documentation must only be carried out by KUKA Roboter GmbH.

Interval	Activity
1 year	■ Test the enabling switch

Information about testing the enabling switch is contained in the Sunrise.OS documentation.

9.2 Cleaning

Precondition

- Power supply lead is disconnected.
- Observe the EMC guidelines.

Work regulations

- The manufacturer's instructions must be observed when using cleaning agents for cleaning work.
- It must be ensured that no cleaning agents enter electrical components.
- Do not use compressed air during cleaning work.
- Do not spray with water.

Procedure

1. Loosen and vacuum up any dust deposits.
2. Clean the media flange with a cloth soaked with a mild cleaning agent.
3. Replace damaged, illegible or missing identifications, labels and plates.

Further information on cleaning is contained in the robot documentation.

10 Repair

10.1 Repair

No repair work is planned for the media flanges. For further information, please contact your local KUKA Customer Support.

11 Troubleshooting

11.1 Troubleshooting, media flange IO pneumatic, media flange Touch pneumatic

Fault	Cause	Remedy
Short circuit	Impermissible loads have been used.	■ The system automatically deactivates all outputs and automatically restarts after 5 s. or ■ The system automatically disconnects the voltage supply and automatically restarts after 5 s.

12 Decommissioning, storage and disposal

12.1 Decommissioning

Decommissioning of the media flanges is carried out by KUKA Service.

12.2 Storage

Description

If the media flanges are to be put into long-term storage, the following points must be observed:

- The place of storage must be as dry and dust-free as possible.
- Avoid temperature fluctuations.
- Avoid wind and drafts.
- Avoid condensation.
- Use appropriate coverings that cannot detach themselves and which can withstand the expected environmental conditions.
- Do not leave any loose parts on the media adapter module, especially ones that might knock against other parts.
- Do not leave media flanges exposed to direct sunlight while in storage.
- Observe and comply with the permissible temperature ranges for storage.
- Select a storage location in which the packaging materials cannot be damaged.

12.3 Disposal

When the media flanges reach the end of their useful life, they can be removed from the system and dismantled, and the materials can be disposed of properly by type.

The following table provides an overview of the materials used in the media flanges. All plastic components are marked with a material designation and must be disposed of accordingly.

Material, designation	Subassembly, component	Note
Aluminum, steel	Media flange	
PUR	Cable sheaths	
Copper	Cables, wires	
PU	Compressed air hoses	
PA	Connector housing	
Electrical components	Bus modules, valve terminals, sensors, connecting cables	Dispose of as electrical scrap without disassembling

13 KUKA Service

13.1 Requesting support

Introduction

This documentation provides information on operation and operator control, and provides assistance with troubleshooting. For further assistance, please contact your local KUKA subsidiary.

Information

The following information is required for processing a support request:

- Description of the problem, including information about the duration and frequency of the fault
- As comprehensive information as possible about the hardware and software components of the overall system

  The following list gives an indication of the information which is relevant in many cases:
  - Model and serial number of the kinematic system, e.g. the manipulator
  - Model and serial number of the controller
  - Model and serial number of the energy supply system
  - Designation and version of the system software
  - Designations and versions of other software components or modifications
  - Diagnostic package **KrcDiag**:

    Additionally for KUKA Sunrise: Existing projects including applications

    For versions of KUKA System Software older than V8: Archive of the software (**KrcDiag** is not yet available here.)
  - Application used
  - External axes used

13.2 KUKA Customer Support

Availability

KUKA Customer Support is available in many countries. Please do not hesitate to contact us if you have any questions.

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