ROBOTICS

Product specification

IRB 6640

Trace back information:
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Checked in 2020-12-11
Skribenta version 5.3.075

Product specification

IRB 6640-235/2.55
IRB 6640-185/2.8

Document ID: 3HAC028284-001
Revision: Y

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Original instructions.

Table of contents

Overview of this specification

About this product specification

It describes the performance of the manipulator or a complete family of manipulators in terms of:

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

Usage

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

Users

It is intended for:

- Product managers and Product personnel
- Sales and Marketing personnel
- Order and Customer Service personnel

References

Reference	Document ID
Product specification - Controller IRC5 IRC5 with main computer DSQC1000.	*3HAC047400-001*
Product specification - Controller software IRC5 IRC5 with main computer DSQC1000 and RobotWare 5.6x.	*3HAC050945-001*
Product specification - Controller software IRC5 IRC5 with main computer DSQC1000 and RobotWare 6.	*3HAC050945-001*
Product manual - IRB 6640	*3HAC026876-001*
Product manual - DressPack/SpotPack IRB 6640	*3HAC028638-001*
Operating manual - Calibration Pendulum	*3HAC16578-1*
Application manual - Electronic Position Switches	*3HAC050996-001*
Product specification - IRBT 4004/6004/7004	*3HEA802965-001*
Product specification - Robot user documentation, IRC5 with RobotWare 6	*3HAC052355-001*

Revisions

Revision	Description
-	New Product specification
A	Working range for axis 6 changed to ±360° (not IRB 6640ID)

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Continued

Revision	Description
B	• Option Foundry Prime added • SpotPack Basic
C	• Changes for Calibration data • Work range • Explanation of ISO values (new figure and table) • ISO-values for IRB 6640-205/2.75, -130/3.2 and -175/2.55 • Stopping distance • Use documentation on DVD
D	General update for 9.1 release
E	Foundry Plus 2
F	• Foundry Plus 2 • Foundry Prime 2 • ISO-Cube • Option 474-1 Removed
G	Text for standards updated
H	Minor corrections
J	• Table for ambient temperature adjusted • Minor corrections
K	• Machinery directive updated • General corrctions • Lean ID added • Base plate drawing updated
L	• New load diagram for LeanID added • General updates and minor corretions
M	• Information regarding working range for LeanID added • General updates and minor corrections
N	• Minor corrections/update
P	• Text for ISO test adjusted • Robot stopping distances and times for category 0 and category 1 stops are moved to a separate document, *Product specification - Robot stopping distances according to ISO 10218-1*
Q	• Text for Foundry Plus updated. • Minor corrections/update
R	• Information about Foundry Prime 2 that was missing in revision Q is added • Tightening torque for robot adjusted
S	• Minor corrections/update
T	• Protection Clean Room and Foundry Plus 2 removed
U	Published in release R17.1. The following updates are done in this revision: • Restriction of load diagram added.
V	Published in release R17.2. The following updates are done in this revision: • Updated list of applicable standards. • TCP acceleration information added. • Delete option 828-1, 828-2, 768-3 and 782-1 as they were all phased out.

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Revision	Description
X	Published in release R20C. The following updates are done in this revision: • Updated information about *Absolute Accuracy*. • Minor changes.
Y	Published in release R20D. The following updates are done in this revision: • Warranty section updated.

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1 Description

1.1 Structure

1.1.1 Introduction

General

The IRB 6640 serie is ABB Robotics latest generation of high payload, high per-formance industrial robots. Based on the famous IRB 6600 series, with the flexible bending backwards concept, the very high wrist torque, the service friendly modular built up and the availability, significant for ABB's robots, the IRB 6640 robot family goes even further. With focus on high production capacity, compact design and low weight, simple service and low maintenance cost. The IRB 6640 is ideal for process applications, regardless of industry. Typical areas are for example Spot Welding, Material Handling and Machine Tending.

Software product range

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

Process options

There are a large number of process options for Material Handling integrated in the robot.

Operating system

The robot is equipped with the IRC5 controller and robot control software, RobotWare. RobotWare supports every aspect of the robot system, such as motion control, development and execution of application programs, communication etc. See *Product specification - Controller IRC5 with FlexPendant*.

Safety

Safety standards valid for complete robot, manipulator and controller.

Additional functionality

For additional functionality, the robot can be equipped with optional software for application support - for example gluing and welding, communication features - network communication - and advanced functions such as multitasking, sensor control etc. For a complete description on optional software, see the *Product specification - Controller software IRC5*.

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1.1.1 Introduction
Continued

Protection type Foundry Prime 2

Robots with the option Foundry Prime are designed for water jet cleaning of casts and machined parts, and similar very harsh, but proven robotic application environments. Applicability in other applications cannot be guaranteed without prior testing, previous experience or professional judgment by ABB. Please contact ABB Robotics Sales organization if in doubt regarding specific application feasibility.

The manipulator can withstand surrounding solvent based detergents which must be approved by ABB. In addition, the manipulator can withstand indirect spray from jet pressure (max. 600 bar) and 100% humidity (gaseous mixture only).

The manipulator can work in an environment with a cleaning bath temperature < 60^{o} C, typically used in a washing application with moderate robot speed. Surrounding temperature can not be higher than specified for the option.

If fluids that may cause rust formation, for example water, are continuous splashing the robot or are used in the vicinity of the robot it is strongly recommended to add rust inhibitor to the fluid or take other measures to prevent potential rust formation on the robots unpainted areas, joints, or other unprotected, surfaces.

The robot is protected by well-proven sealings for gears and bearings, pressurized motors and electronic compartment, and detergent resistant painting system in three layers (two layer epoxy paint under a protective layer of clear coat). Non painted surfaces has rust preventive coating (Mercasol), and motors (IRB 4400) are sealed with a sealing compound.

As the robot is designed for very harsh environments, an extended service and maintenance program is required. Special care must be taken when replacing parts or performing other maintenance and service that breaks the paint surface as the paint surface act as a protective barrier. For detailed information of the maintenance program, see chapter Maintenance in the product manual. It is highly recommended to sign a Service Agreement with ABB due to difficult and severe environmental conditions.

The Foundry Prime robot can be cleaned with appropriate washing equipment according to the product manual. Appropriate cleaning and maintenance are required to maintain the Foundry Prime protection, for example can the rust preventive be washed off with wrong cleaning method.

Detergents

General detergent requirements:

- Washing detergent with max pH <9.0, if not stated otherwise
- Washing detergent must be approved by ABB
- ABB maintain a list of approved cleaners/detergents, see 3HAC037554-001
- The washing detergent must:
  - be cleaned continuously
  - contain rust inhibitor
  - be checked regulalry for pH value and concentration
  - not use other additives than water without prior testing
- The user must follow the recommendations regarding detergent concentration anf pH value

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- No other additive than water is guaranteed without prior testing or consultation with ABB. Other additives than water may have a harmful effect on the life time of the robot and its components.

Please contact your local ABB organization for an updated list of approved washing detergents.

Available robot versions

The option Foundry Prime might not be available for all robot versions.

See *Specification of variants and options on page 129* for robot versions and other options not selectable together with Foundry Prime.

1.1.2 Different robot versions

General

The IRB 6640 is available in two versions and only with protection Foundry Prime 2.

Robot types

The following different standard robot types are avaliable.

Robot type	Handling capacity (kg)	Reach (m)
IRB 6640	235 kg	2.55 m
IRB 6640	185 kg	2.8 m

1.1.3 Definition of version designation

IRB 6640 Mounting

Handling capacity (kg)/Reach (m)

	Prefix	Description
Mounting	-	Floor-mounted manipulator
Handling capacity (kg)	yyy	Indicates the maximum handling capacity (kg)
Reach (m)	x.x	Indicates the maximum reach at wrist center (m)

Manipulator weight

Robot type	Weight
IRB 6640-235/2.55	1310 kg [a]
IRB 6640-185/2.8	1320 kg [a]

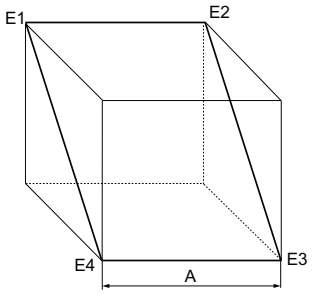
a. Without DressPack

Other technical data

Data	Description	Note
Airborne noise level	The sound pressure level outside the working space.	< 71 dB (A) Leq (acc. to machinery directive 2006/42/EG)

Power consumption at max load

Type of Movement	IRB 6640 (all variants)
ISO Cube Max. velocity	2.7 kW



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Pos	Description
A	1000 mm

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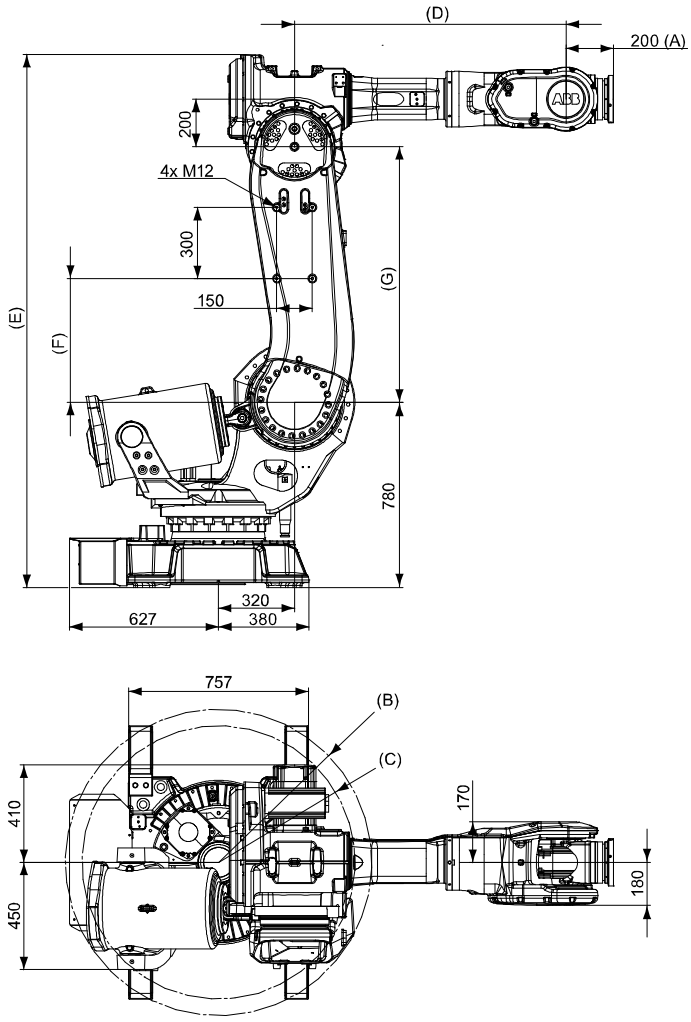
1.1.3 Definition of version designation

Continued



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Pos	Description
A	Not applicable
B	R665
C	R575 Front side

Robot variant	D	E	F	G
IRB 6640-2.55	1142,5	2240	520	1075
IRB 6640-2.8	1392,5	2240	520	1075

Note

For DressPack dimensions, see *Definition of version designation on page 15*.

1.2 Standards

1.2.1 Applicable standards

Note

The listed standards are valid at the time of the release of this document. Phased out or replaced standards are removed from the list when needed.

General

The product is designed in accordance with EN ISO 10218-1, Robots for industrial environments - Safety requirements -Part 1 Robot. If there are deviations, these are listed in the declaration of incorporation which is included on delivery.

Standards, EN ISO

The product is designed in accordance with selected parts of:

Standard	Description
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 13849-1:2015	Safety of machinery, safety related parts of control systems - Part 1: General principles for design
EN ISO 13850:2015	Safety of machinery - Emergency stop - Principles for design
ISO 9787:2013	Robots and robotic devices -- Coordinate systems and motion nomenclatures
ISO 9283:1998	Manipulating industrial robots, performance criteria, and related test methods
EN ISO 14644-1:2015 [i]	Classification of air cleanliness
EN ISO 13732-1:2008	Ergonomics of the thermal environment - Part 1
EN 61000-6-4:2007 + A1:2011 IEC 61000-6-4:2006 + A1:2010 (option 129-1)	EMC, Generic emission
EN 61000-6-2:2005 IEC 61000-6-2:2005	EMC, Generic immunity
EN IEC 60974-1:2012 [ii]	Arc welding equipment - Part 1: Welding power sources
EN IEC 60974-10:2014 [ii]	Arc welding equipment - Part 10: EMC requirements
EN IEC 60204-1:2016	Safety of machinery - Electrical equipment of machines - Part 1 General requirements
IEC 60529:1989 + A2:2013	Degrees of protection provided by enclosures (IP code)

i Only robots with protection Clean Room.
ii Only valid for arc welding robots. Replaces EN IEC 61000-6-4 for arc welding robots.

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1.2.1 Applicable standards
Continued

European standards

The product is designed in accordance with selected parts of:

Standard	Description
EN 614-1:2006 + A1:2009	Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
EN 574:1996 + A1:2008	Safety of machinery - Two-hand control devices - Functional aspects - Principles for design

UL, ANSI, and other standards

Standard	Description
ANSI/RIA R15.06	Safety requirements for industrial robots and robot systems
ANSI/UL 1740	Safety standard for robots and robotic equipment
CAN/CSA Z 434-14	Industrial robots and robot Systems - General safety requirements

1.3 Installation

1.3.1 Introduction to installation

General

All versions of IRB 6640 are designed for floor mounting (no tilting allowed around X-axis or Y-axis). Depending on the robot version, an end effector with max. weight of 130 or 235 kg including payload, can be mounted on the tool flange (axis 6). See *Load diagrams on page 32*.

Extra loads

Extra load (valve packages, transformers, DressPack) of 50 kg, which is included in the load diagrams, can be mounted on the upper arm. An extra load of 250 kg can also be mounted on the frame of axis 1.

See *Holes for mounting extra equipment on page 43*.

Working range limitation

The working range of axes 1-3 can be limited by mechanical stops as option. See.*Equipment on page 134*.

1.3.2 Operation requirements

Protection standards

Robot version/Protection standard	IEC60529
All variants, manipulator	IP67

Clean room standards

Clean room class 5 for manipulator according to:

Standards	Description
DIN EN ISO 14644	Clean rooms and associated controlled environments

Explosive environments

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

Ambient temperature

Description	Standard/Option	Temperature
Manipulator during operation	Standard	+ 5°C[i] (41°F) to + 50°C (122°F)
For the controller	Standard/Option	See *Product specification - Controller IRC5 with FlexPendant*
For the spot welding cabinet	Standard	+ 5°C (41°F) to + 45°C (113°F)
Complete robot during transportation and storage	Standard	- 25°C (- 13°F) to + 55°C (131°F)
For short periods (not exceeding 24 hours)	Standard	up to + 70°C (158°F)

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

Relative humidity

Description	Relative humidity
Complete robot during transportation and storage	Max. 95% at constant temperature
Complete robot during operation	Max. 95% at constant temperature
Complete robot during operation, option 287-6 Foundry Prime	Max. 100%

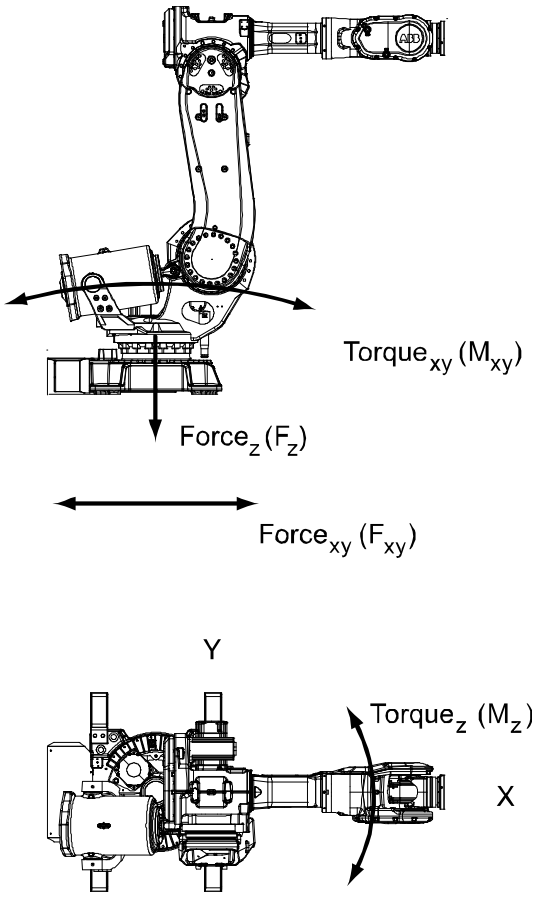
1.3.3 Mounting the manipulator

Maximum load

Maximum load in relation to the base coordinate system.

Floor Mounted

Force	Endurance load (in operation)	Max. load (emergency stop)
Force xy	± 8.5 kN	± 20.4 kN
Force z	15.0 ± 9.0 kN	15.0 ± 20.0 kN
Torque xy	± 20.1 kNm	± 45.2 kNm
Torque z	± 5.1 kNm	± 10.6 kNm



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Note regarding M_{xy} and F_{xy}

The bending torque (M_{xy}) can occur in any direction in the XY-plane of the base coordinate system.

The same applies to the transverse force (F_{xy}).

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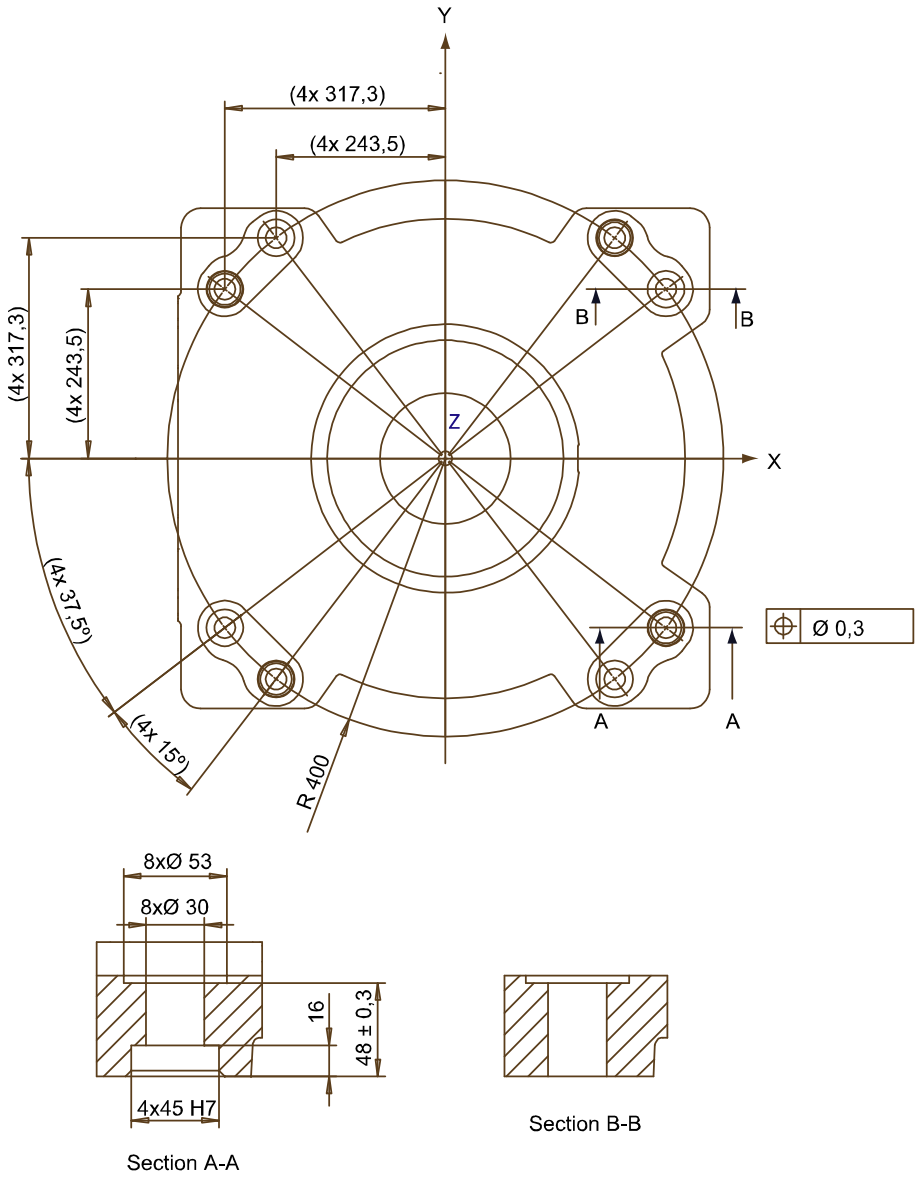
1.3.3 Mounting the manipulator
Continued

Fastening holes robot base - for all variants



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Recommended screws for fastening the manipulator to the base	M24 x 100 8.8 with 4 mm flat washer
Tightening torque (none or lightly lubricated):	600 - 725 Nm, typical 650 Nm

Note

Only two guiding sleeves shall be used. The corresponding holes in the base plate shall be circular and oval according to Figure below and the last Figure in this chapter.

Regarding AbsAcc performance, the chosen guide holes according to Figure below and last Figure in this chapter

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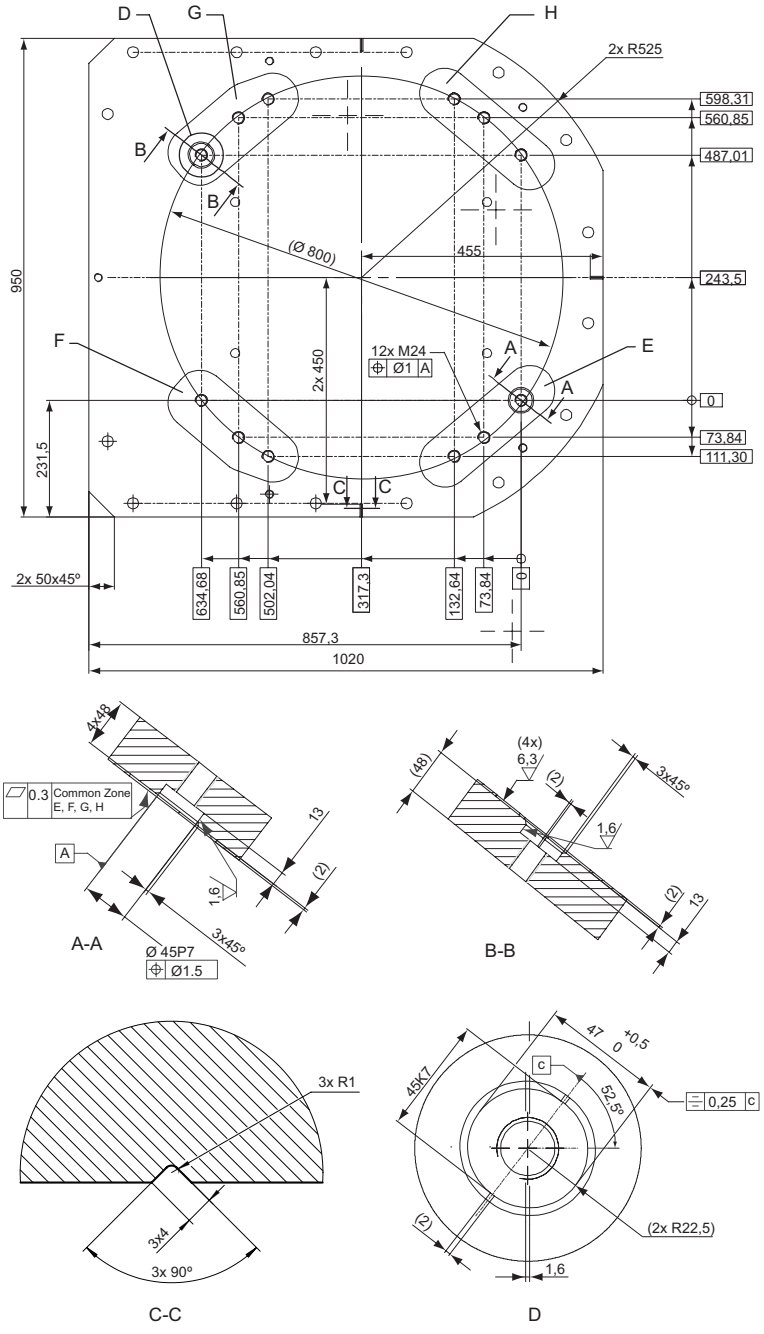
Base plate drawing

The following figure shows the option base plate (dimensions in mm).



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E, F, G, H	Common tolerance zone (accuracy all over the base plate from one contact surface to the other)

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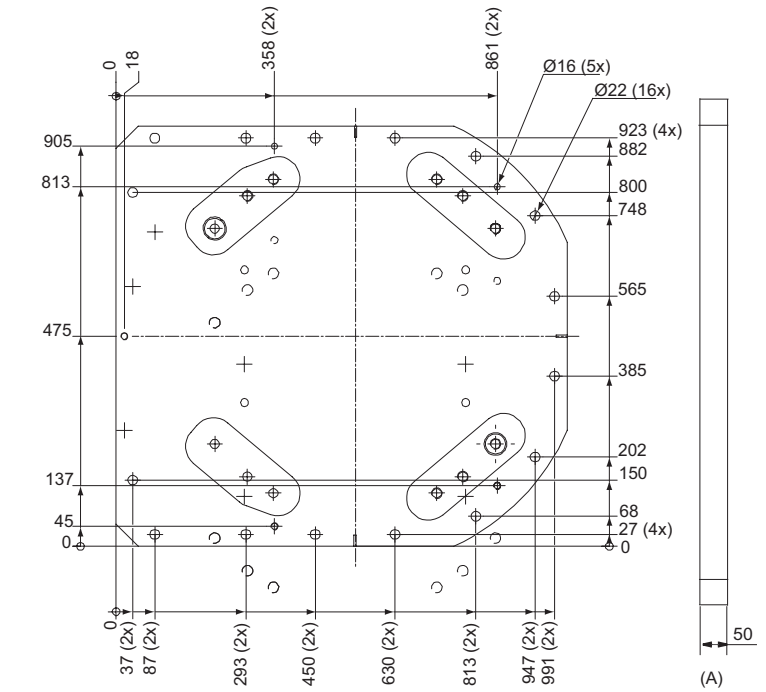
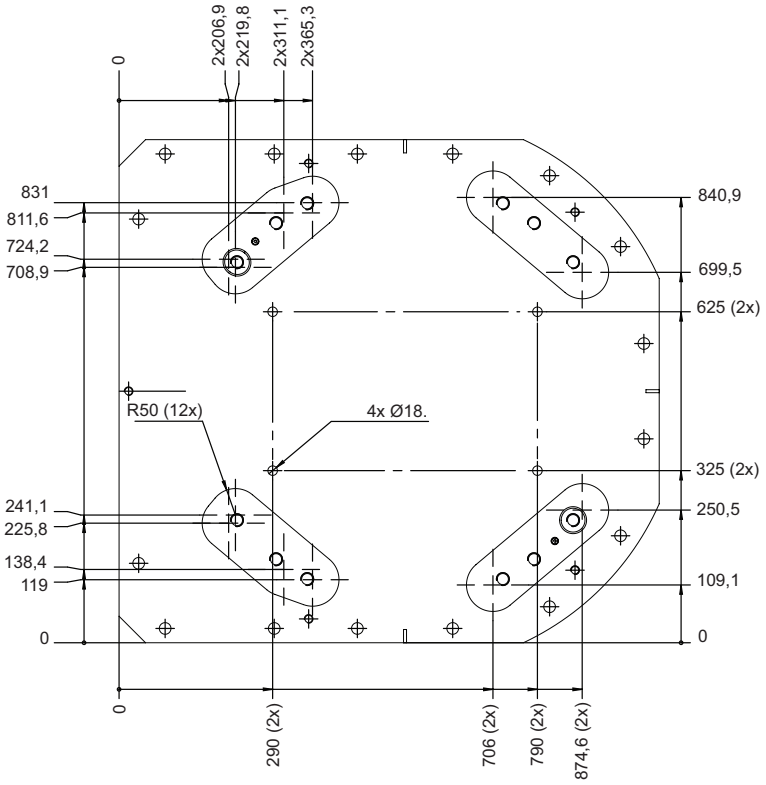
1.3.3 Mounting the manipulator
Continued





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Pos	Description
A	Color: RAL 9005 Thickness: 80-100 µm

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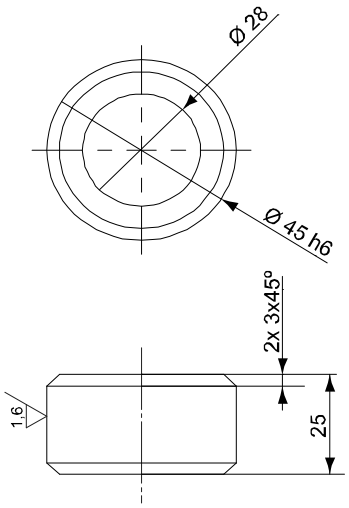

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Pos	Description
A	Guide sleeve protected from corrosion

1.4 Calibration and references

1.4.1 Calibration methods

Overview

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

More information is available in the product manual.

Types of calibration

Type of calibration	Description	Calibration method
Standard calibration	The calibrated robot is positioned at calibration position. Standard calibration data is found on the SMB (serial measurement board) or EIB in the robot. For robots with RobotWare 5.04 or older, the calibration data is delivered in a file, calib.cfg, supplied with the robot at delivery. The file identifies the correct resolver/motor position corresponding to the robot home position.	Calibration Pendulum
Optimization	Optimization of TCP reorientation performance. The purpose is to improve reorientation accuracy for continuous processes like welding and gluing. Wrist optimization will update standard calibration data for axes 4 and 5.	Wrist Optimization

Brief description of calibration methods

Calibration Pendulum method

Calibration Pendulum is a standard calibration method for calibration of all ABB robots (except IRB 6400R, IRB 640, IRB 1400H, and IRB 4400S).

Two different routines are available for the Calibration Pendulum method:

- Calibration Pendulum II
- Reference calibration

The calibration equipment for Calibration Pendulum is delivered as a complete toolkit, including the *Operating manual - Calibration Pendulum*, which describes the method and the different routines further.

Wrist Optimization method

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

The following routines are available for the Wrist Optimization method:

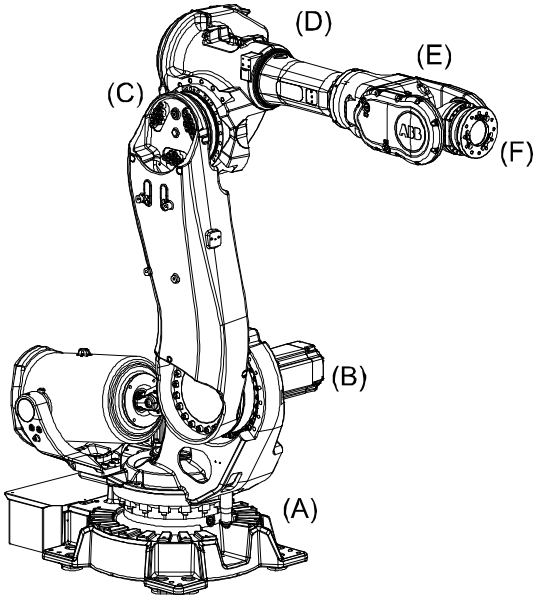
- Wrist Optimization

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

1.4.2 Fine calibration

General

Fine calibration is made using the Calibration Pendulum, see *Operating manual - Calibration Pendulum*.



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Pos	Description	Pos	Description
A	Axis 1	B	Axis 2
C	Axis 3	D	Axis 4
E	Axis 5	F	Axis 6

Calibration

Calibration	Position
Calibration of all axes	All axes are in zero position
Calibration of axis 1 and 2	Axis 1 and 2 in zero position
	Axis 3 to 6 in any position
Calibration of axis 1	Axis 1 in zero position
	Axis 2 to 6 in any position

1.4.3 Absolute Accuracy calibration

Purpose

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

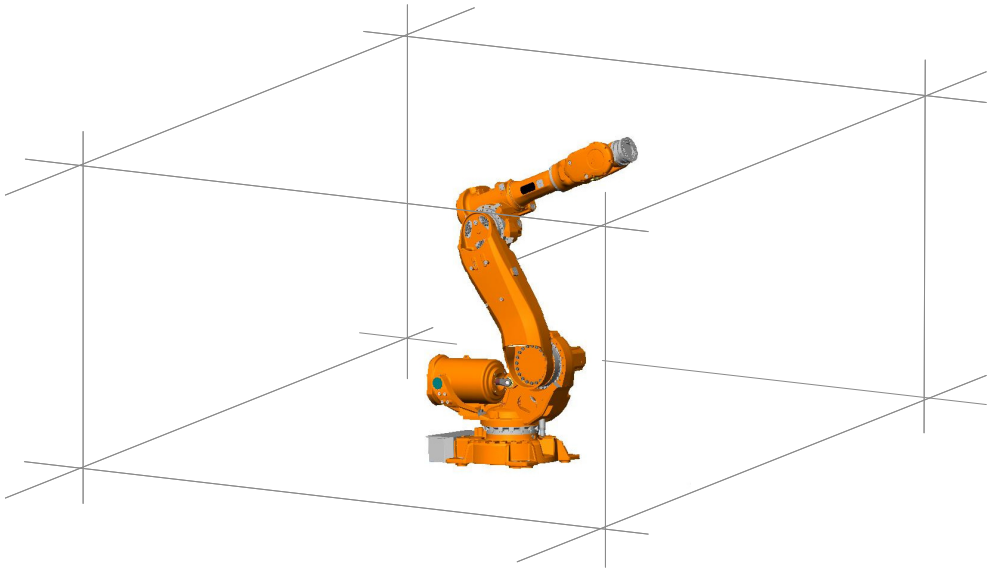
Here are some examples of when this accuracy is important:

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

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

Note

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



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What is included

Every *Absolute Accuracy* robot is delivered with:

- compensation parameters saved on the robot's serial measurement board
- a birth certificate representing the *Absolute Accuracy* measurement protocol for the calibration and verification sequence.

Continues on next page

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

Absolute Accuracy supports both floor mounted and inverted installations. The compensation parameters differ depending on if the robot is floor mounted or inverted.

When is *Absolute Accuracy* being used

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

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

Absolute Accuracy active

Absolute Accuracy will be active in the following cases:

- Any motion function based on robtargets (e.g. `MoveL`) and ModPos on robtargets
- Reorientation jogging
- Linear jogging
- Tool definition (4, 5, 6 point tool definition, room fixed TCP, stationary tool)
- Work object definition

Absolute Accuracy not active

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

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

Note

In a robot system with, for example, an additional axis or track motion, the Absolute Accuracy is active for the manipulator but not for the additional axis or track motion.

RAPID instructions

There are no RAPID instructions included in this option.

Production data

Typical production data regarding calibration are:

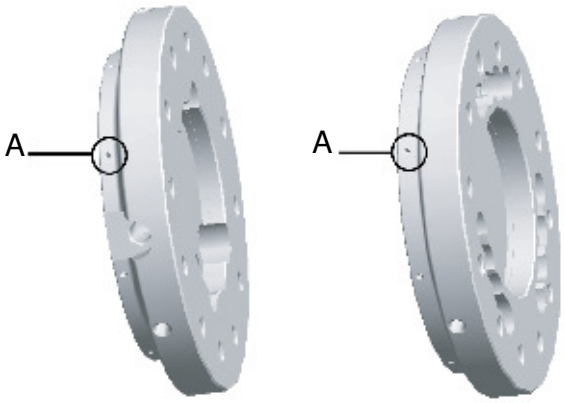
Robot	Positioning accuracy (mm)		
	Average	Max	% Within 1 mm
IRB 6640 -235/2.55	0.5	1.20	97
IRB 6640-185/2.8	0.5	1.20	97

1.4.4 Robot references

General

The holes shown in Figures below are used for measuring the robot position when integrated in a production cell.

The holes are not available for options Foundry Plus, Foundry Prime and Clean Room.



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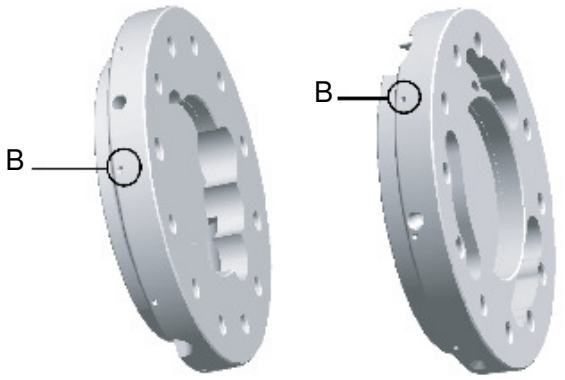

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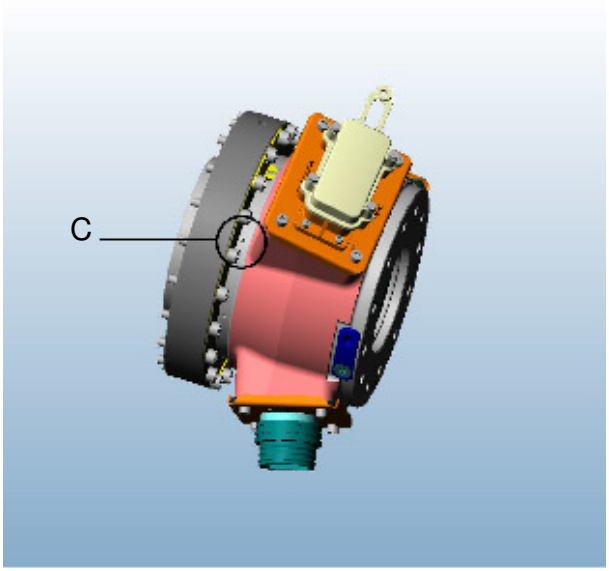

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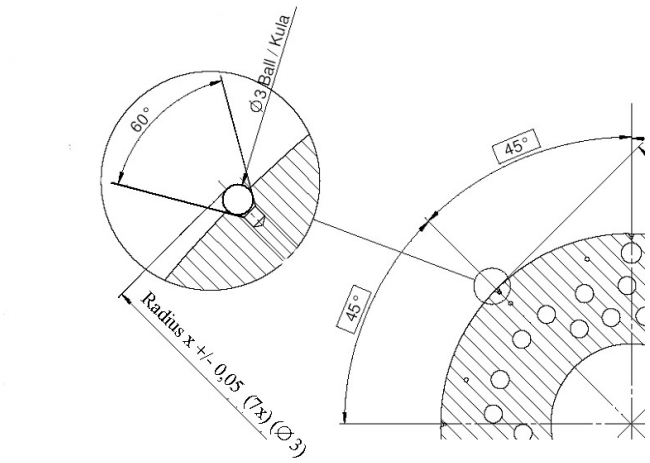

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Robot	Radius X (mm) for reference on tool flange	
	Standard	Insulated
IRB 6640 -235/2.55-185/2.8	R=87.5	R=101.5

1.5 Load diagrams

1.5.1 Introduction

WARNING

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

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

- motors
- gearboxes
- mechanical structure

WARNING

In the robot system is the service routine LoadIdentify available, which allows the user to make an automatic definition of the tool and load, to determine correct load parameters. Please see *Operating Manual - IRC5 with FlexPendant*, art. No. 3HAC16590-1, for detailed information.

WARNING

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

General

The load diagrams include a nominal payload inertia, J_0 of 15 kgm^2, and an extra load of 50 kg at the upper arm housing.

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

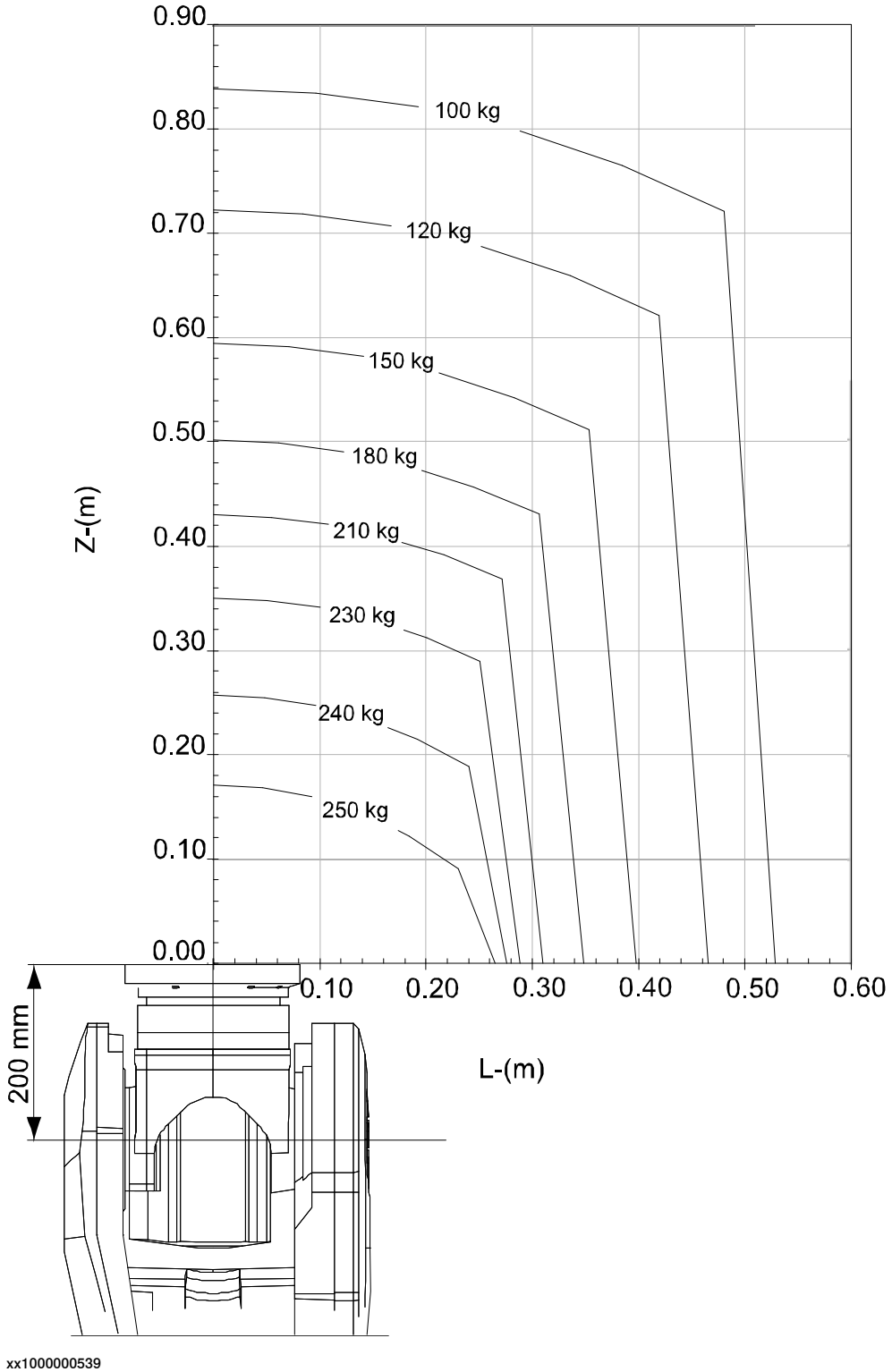
Control of load case by "RobotLoad"

To easily control a specific load case, use the calculation program ABB RobotLoad. Contact your local ABB organization for more information.

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

1.5.2 Load diagrams

IRB 6640-235/2.55



xx1000000539

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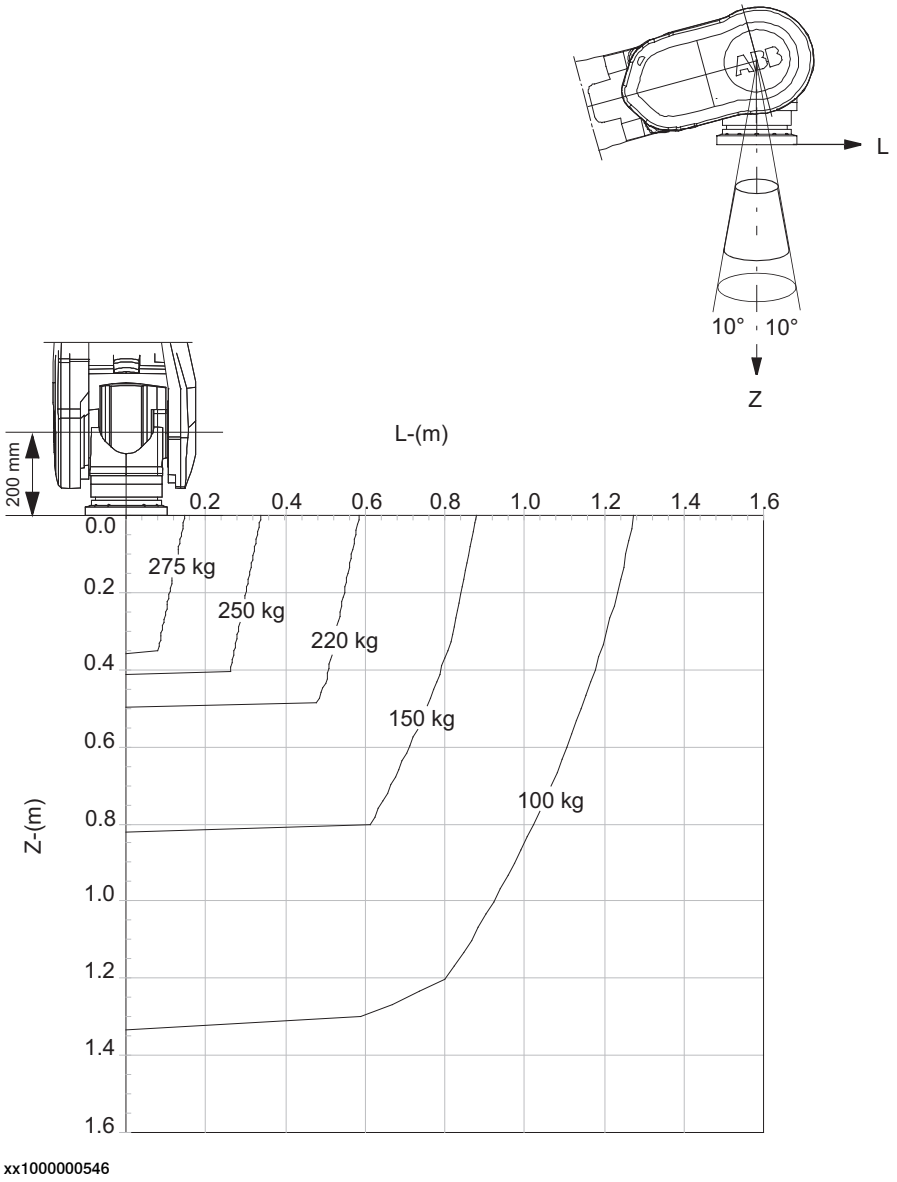
1.5.2 Load diagrams
Continued

IRB 6640-235/2.55 "Vertical Wrist" (±10°)



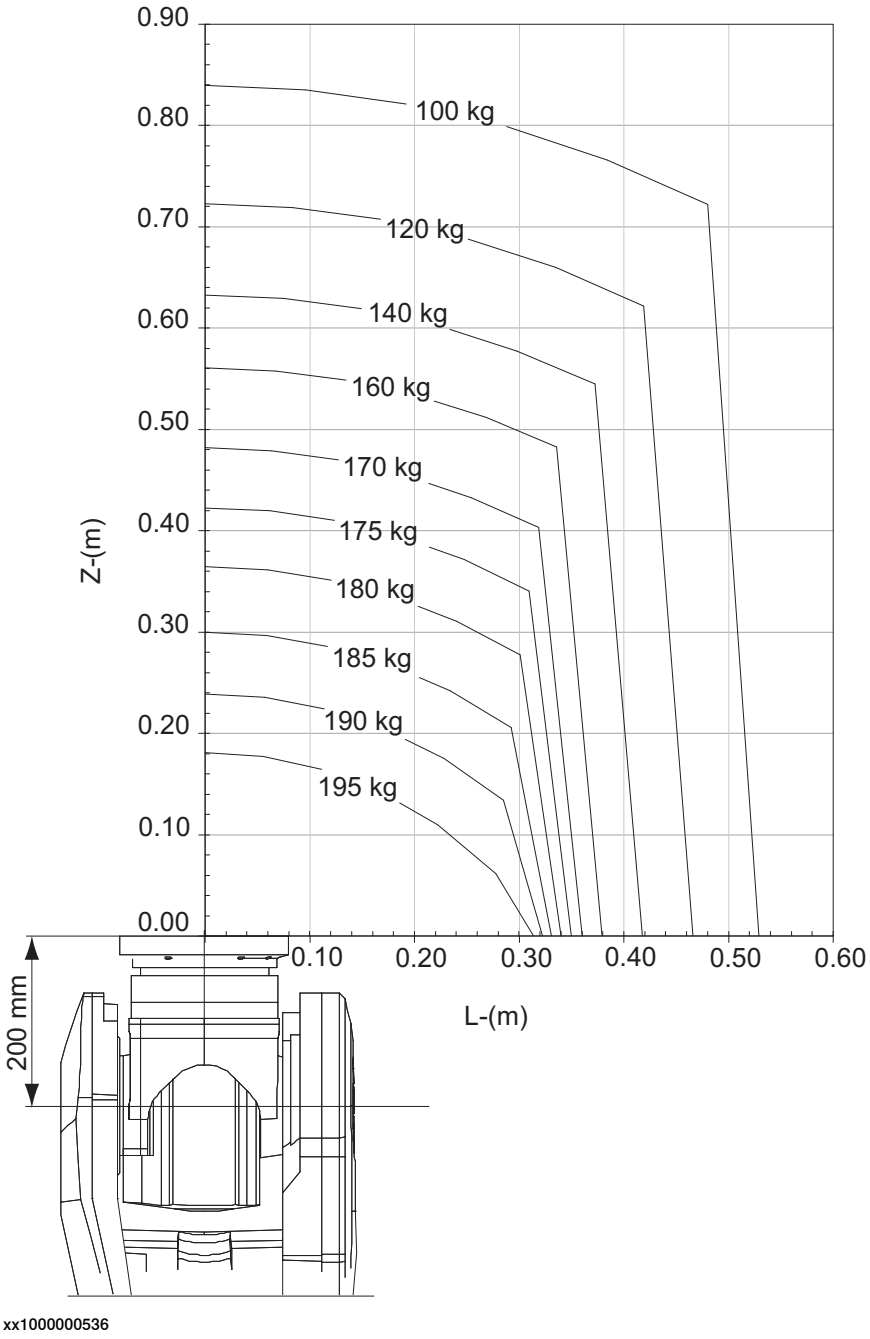
xx1000000546

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

	Description
Max load	285 kg
Z_{max}	0.338 m
L_{max}	0.118 m

Continues on next page

IRB 6640-185/2.8



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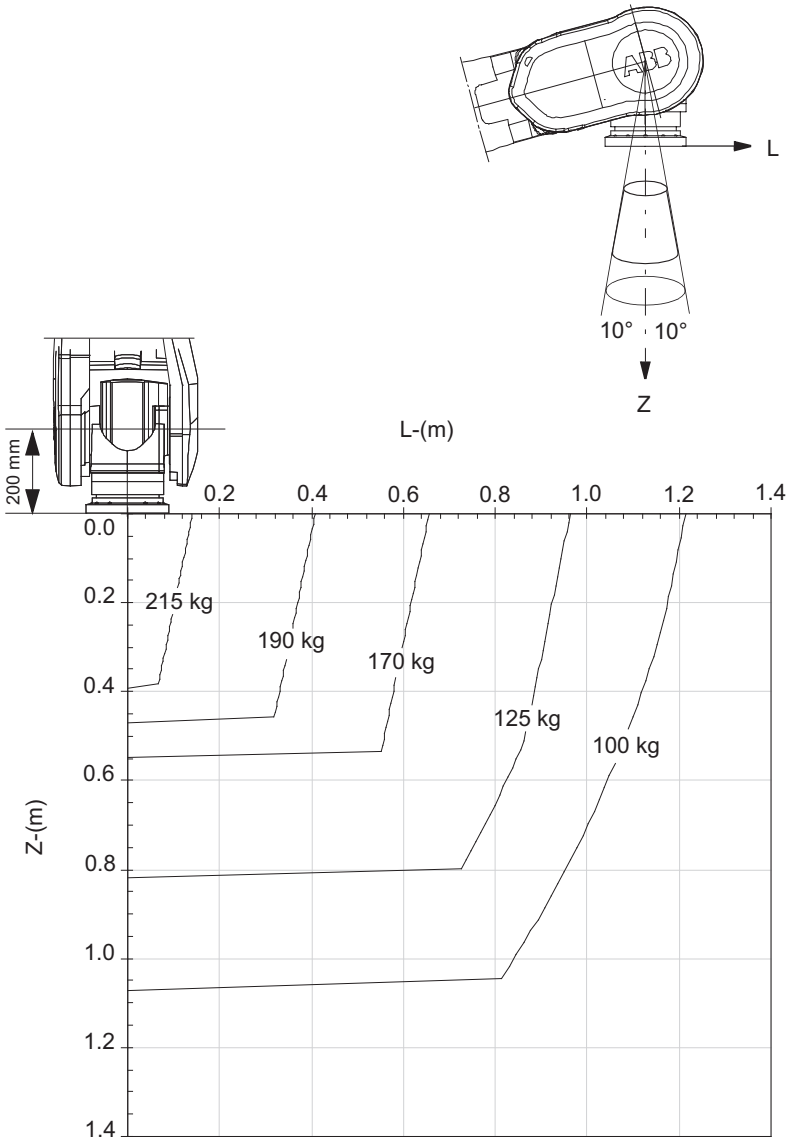
1.5.2 Load diagrams
Continued

IRB 6640-185/2.8 "Vertical Wrist" (±10°)



xx1000000543

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

	Description
Max load	220 kg
Z_{max}	0.369 m
L_{max}	0.122 m

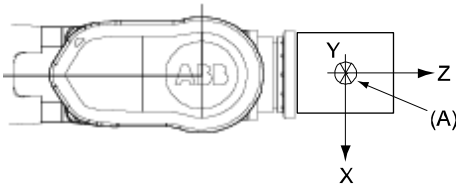
1.5.3 Maximum load and moment of inertia for full and limited axis 5 (center line down) movement

Note

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

Full movement of axis 5

Axis	Robot type	Maximum moment of inertia
5	235/2.55 and 185/2.8	Ja5 = Load x $((Z + 0{,}200)^2 + L^2)$ + max (J_{0x}, J_{0y}) ≤ 250 kgm^2
6	235/2.55 and 185/2.8	Ja6 = Load x L^2 + J0Z ≤ 185 kgm^2



xx0900000774

Pos	Description
A	Center of gravity

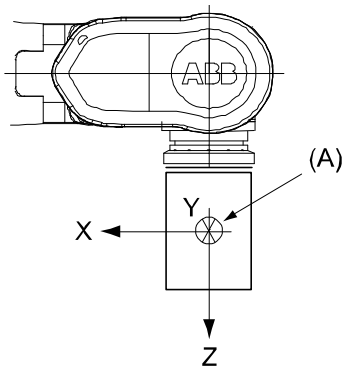
	Description
J_{ox}, J_{oy}, J_{oz}	Max. moment of inertia around the X, Y and Z axes at center of gravity.

Continues on next page

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

Limited axis 5, center line down

Axis	Robot type	Maximum moment of inertia
5	235/2.55 and 185/2.8	Ja5 = Load x $((Z + 0{,}200)^2 + L^2) + \max(J_{0x}, J_{0y}) \leq 275 kgm^2$
6	235/2.55 and 185/2.8	Ja6 = Load x $L^2 + J_{0Z} \leq 250\ kgm^2$



xx0900000775

Pos	Description
A	Center of gravity

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

1.5.4 Wrist torque

Note

Note! The values are for reference only, and should not be used for calculating permitted load offset (position of center of gravity) within the load diagram, since those also are limited by main axes torques as well as dynamic loads. Also arm loads will influence the permitted load diagram. For finding the absolute limits of the load diagram, please use the ABB RobotLoad. Please contact your local ABB organization.

Torque

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

Robot type	Max wrist torque axis 4 and 5	Max wrist torque axis 6	Max torque valid at load
IRB 6640-235/2.55	1324 Nm	650 Nm	225 kg
IRB 6640-185/2.80	1206 Nm	601 Nm	165 kg

1.5.5 Maximum TCP acceleration

General

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

Maximum Cartesian design acceleration for nominal loads

Robot type	E-stop Max acceleration at nominal load COG [m/s^2]	Controlled Motion Max acceleration at nominal load COG [m/s^2]
IRB 6640 - 180/2.55	43	21
IRB 6640 - 235/2.55	40	21
IRB 6640 - 205/2.75	42	20
IRB 6640 - 185/2.8	47	24
IRB 6640 - 130/3.2	52	30
IRB 6640ID - 200/2.55	45	21
IRB 6640ID - 170/2.75	49	22

Note

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

1.6 Mounting equipment

1.6.1 Introduction

General

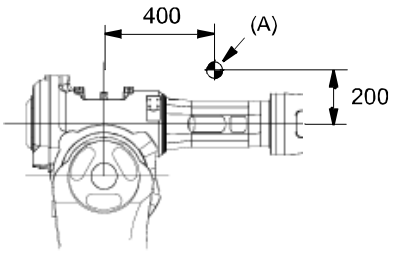
Extra loads can be mounted on the upper arm housing, the lower arm, and on the frame. Definitions of distances and masses are shown in Figures below. The robot is supplied with holes for mounting extra equipment (see Figure in *Holes for mounting extra equipment on page 43*). Maximum allowed arm load depends on center of gravity of arm load and robot payload.

No extra load is included in the load diagrams for IRB 6640ID.

Upper arm

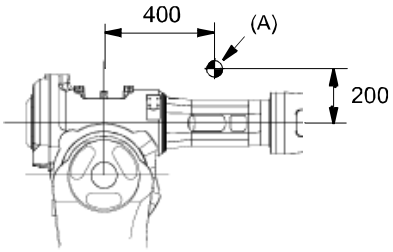
Allowed extra load on upper arm housing plus the maximum handling weight (see Figure below):

M1 ≤ 50 kg with distance a ≤ 500 mm, center of gravity in axis 3 extension.



xx1000000399

Pos	Description
A	Mass center



xx1000000399

Pos	Description
A	Center of gravity 50 kg

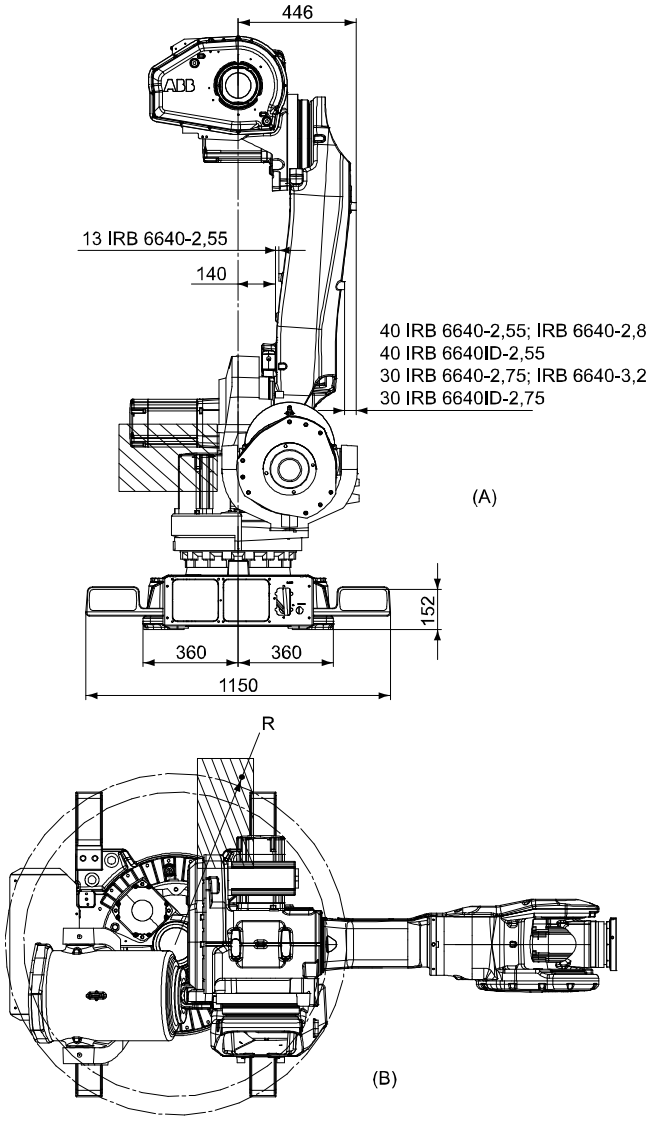
Frame (Hip Load)

	Description
Permitted extra load on frame	J_H = 100 kgm^2

Continues on next page

1.6.1 Introduction
Continued

	Description
Recommended position(see Figure below)	$J_H = JH0 + M4 \times R^2$ where: • J_{H0} is the moment of inertia of the equipment • R is the radius (m) from the center of axis 1 • M4 is the total mass (kg) of the equipment including bracket and harness (≤ 250 kg)



xx1000000412

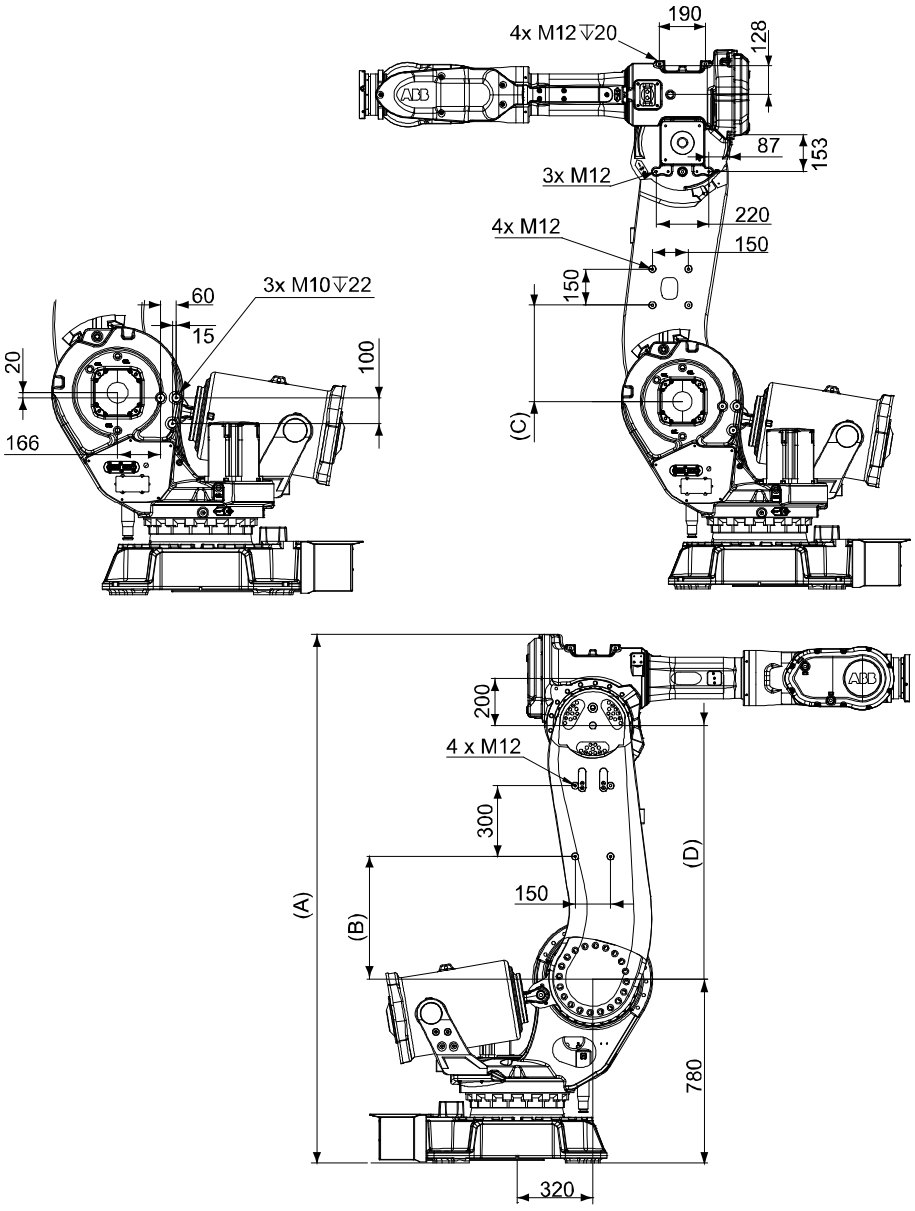
Pos	Description
A	View from the rear
B	View from above

1.6.2 Mounting of extra equipment

General

The extra load can be mounted on the frame. Holes for mounting see next two Figures below. When mounting on the frame all four holes (2x2, Ø16) on one side must be used.

Holes for mounting extra equipment



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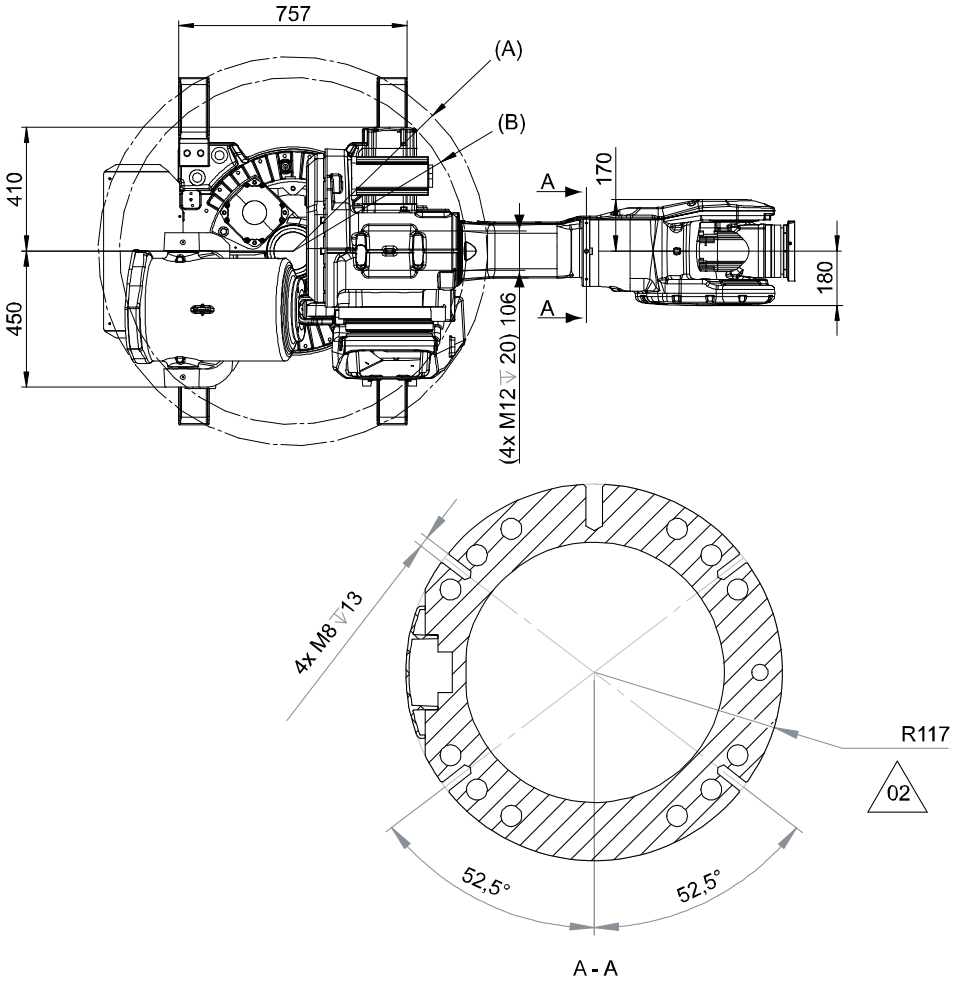
Robot variant	A	B	C	D
IRB 6640-2.55	2240	520	400	1075
IRB 6640-2.8	2240	520	400	1075

Continues on next page

1.6.2 Mounting of extra equipment

Continued



xx1000000414

Pos	Description
A	R 645
B	R 575 Front side

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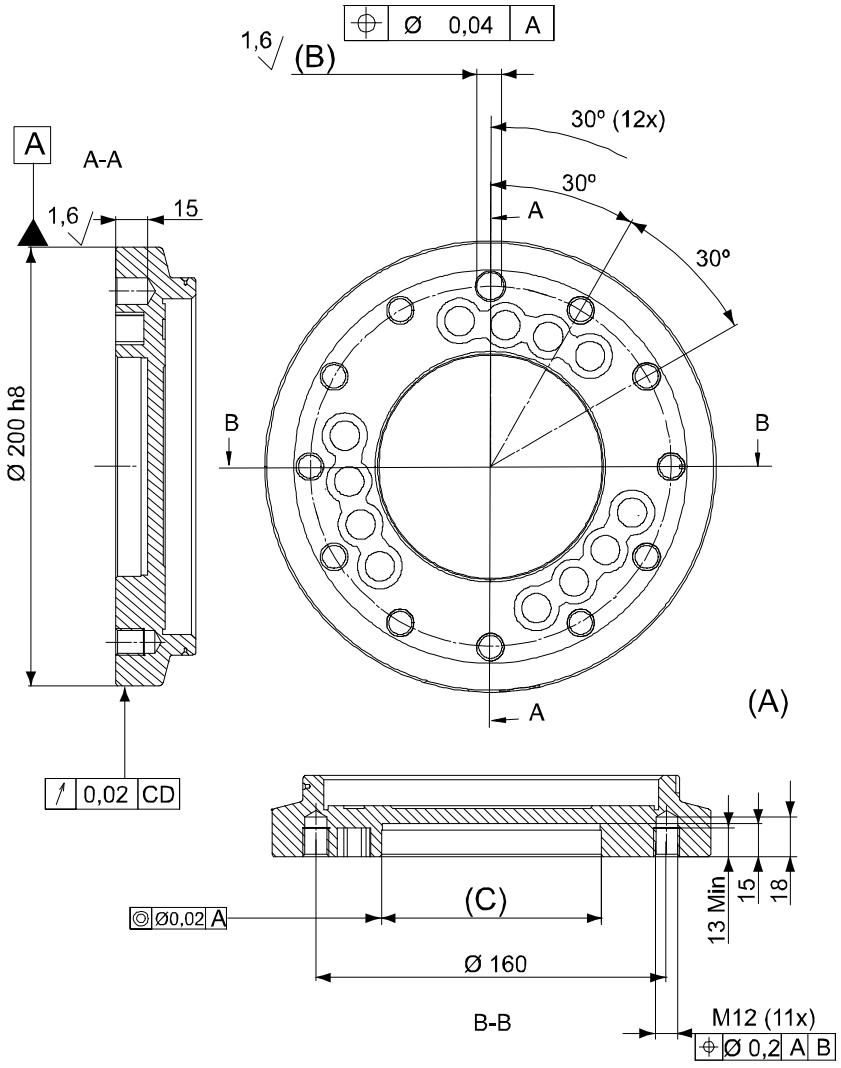
Tool flange, axis 6

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6640	235	2.55
IRB 6640	185	2.8



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Pos	Description
A	Minimum thread length for screws in M12-hole is 9 mm.
B	Ø 12 H7 Depth 15
C	Ø 100 H7 Depth 8 min

For fastening of gripper-tool-flange to robot-tool-flange (see Figure above) all bolt holes for 11 bolts quality class 12.9 shall be used.

1.7 Maintenance and troubleshooting

1.7.1 Introduction

General

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

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

Maintenance

The maintenance intervals depend on the use of the robot. The required maintenance activities also depends on the selected options. For detailed information on maintenance procedures, see the maintenance section in *Product manual - IRB 6640*.

1.8 Robot motion

1.8.1 Robot motion

Type of motion

Axis	Type of motion	Range of movement	
		IRB 6640	
1	Rotation motion	+ 170° to - 170° + 220° to - 220° (option)	
2	Arm motion	+ 85° to - 65°	
3	Arm motion	+ 70° to - 180°	
4	Wrist motion	+ 300° to - 300°	
5	Bend motion	+ 120° to - 120°	
6	Turn motion	+ 360° to - 360° default± 96 Revolutions [i]	

[i] The default working range for axis 6 can be extended by changing parameter values in the software.Option 610-1 “Independent axis” can be used for resetting the revolution counter after the axis has been rotated (no need for “rewinding” the axis).

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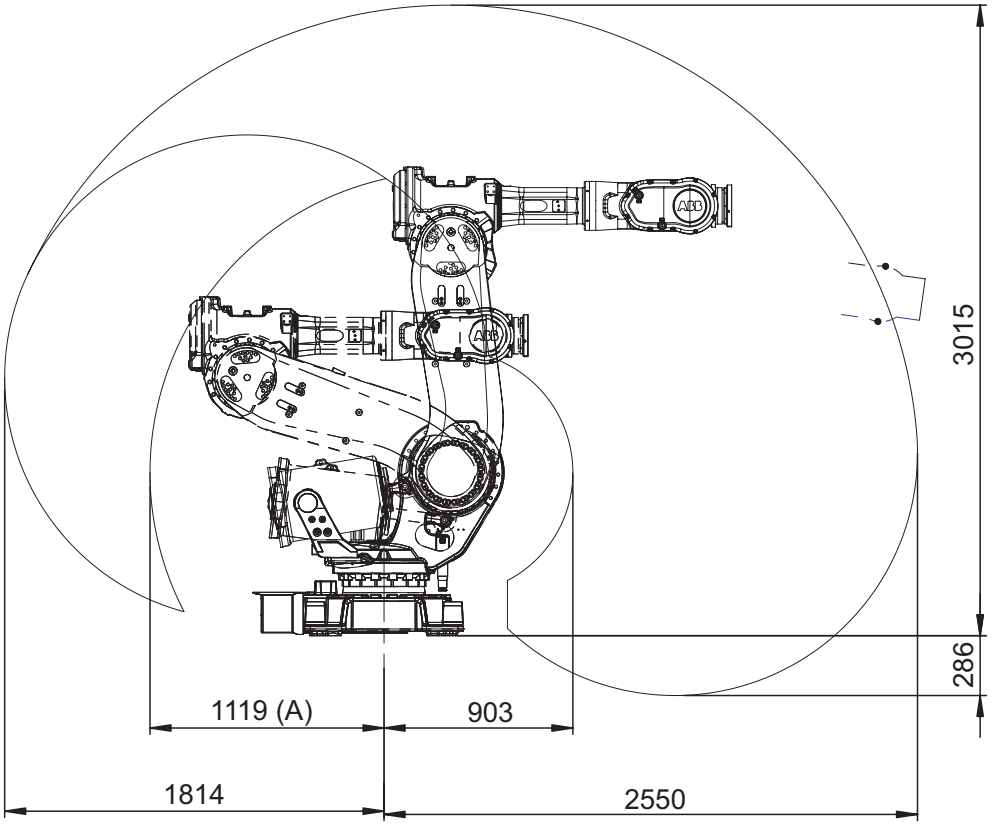
1.8.1 Robot motion

Continued

Robot type	Handling capacity (kg)	Reach (m)
IRB 6640	235	2.55



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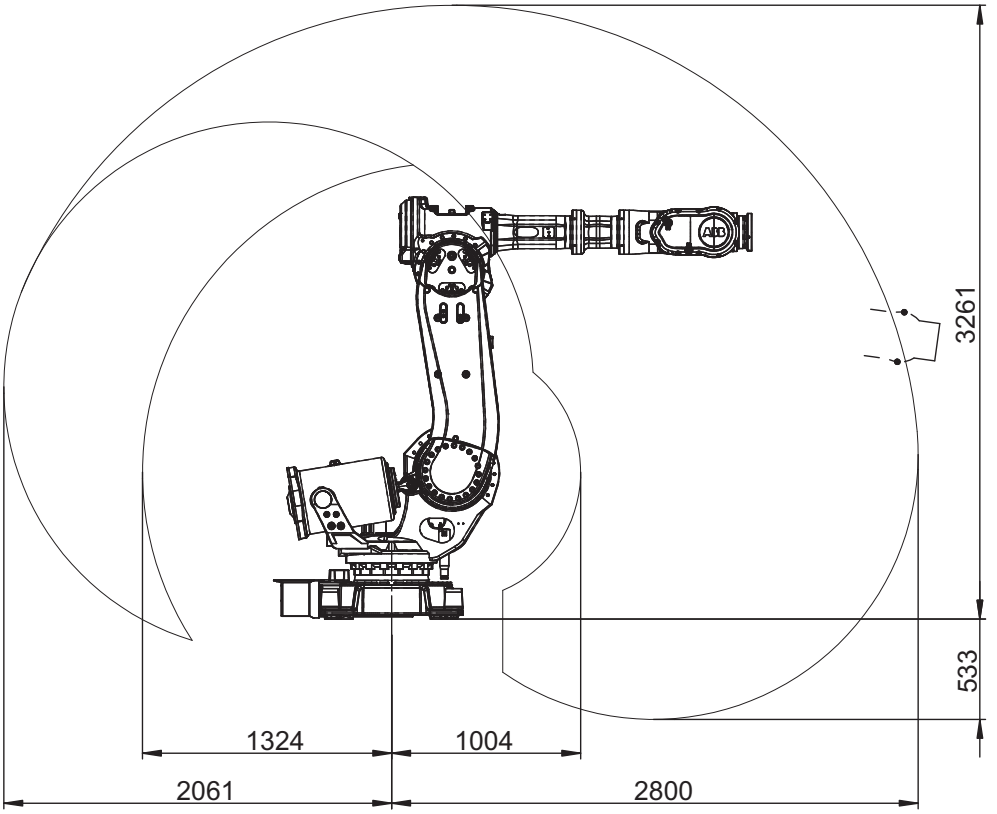
Pos	Description
A	Not applicable

Continues on next page

Robot type	Handling capacity (kg)	Reach (m)
IRB 6640	185	2.8



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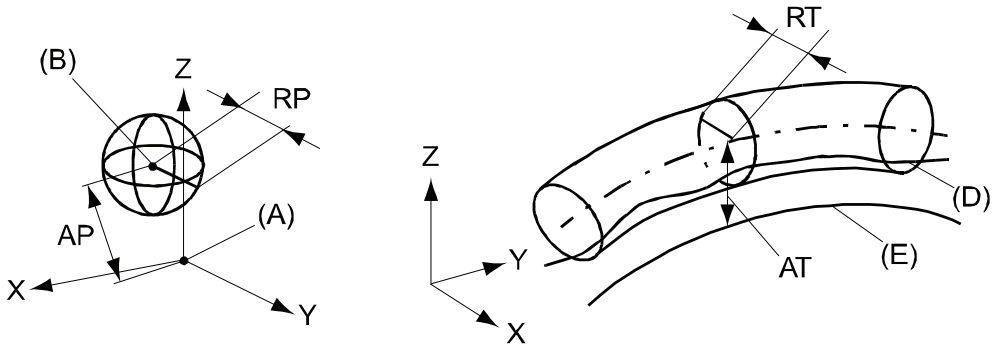
1.8.2 Performance according to ISO 9283

General

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

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



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

IRB 6640		235/2.55		185/2.8	
Pose accuracy, AP[i] (mm)		0.15		0.30	
Pose repeatability, RP (mm)		0.05		0.05	
Pose stabilization time, PSt (s) within 0.4 mm of the position		0.19		0.30	
Path accuracy, AT (mm)		2.17		1.88	
Path repeatability, RT (mm)		0.66		0.74	

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

1.8.3 Velocity

Maximum axis speed

Robot type	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
IRB 6640-235/2.55	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/s
IRB 6640-185/2.8	100 °/s	90 °/s	90 °/s	170 °/s	120 °/s	190 °/s

There is a supervision function to prevent overheating in applications with intensive and frequent movements.

Axis resolution

0.001° to 0.005°.

1.8.4 Robot stopping distances and times

Introduction

The stopping distances and times for category 0 and category 1 stops, as required by EN ISO 10218-1 Annex B, are listed in *Product specification - Robot stopping distances according to ISO 10218-1* (*3HAC048645-001*).

2 DressPack

2.1 Introduction

2.1.1 Included options

DressPack

Includes options for lower arm and floorThese are described separately below but are designed as a complete package for various applications.

The DressPack for the floor contains customer signals.

The DressPack for lower arm contains process cable packages including signals, process media (air) for customer use.

Necessary supports and brackets are also included.

The routing of the process cable package on the robot is available in different configurations.

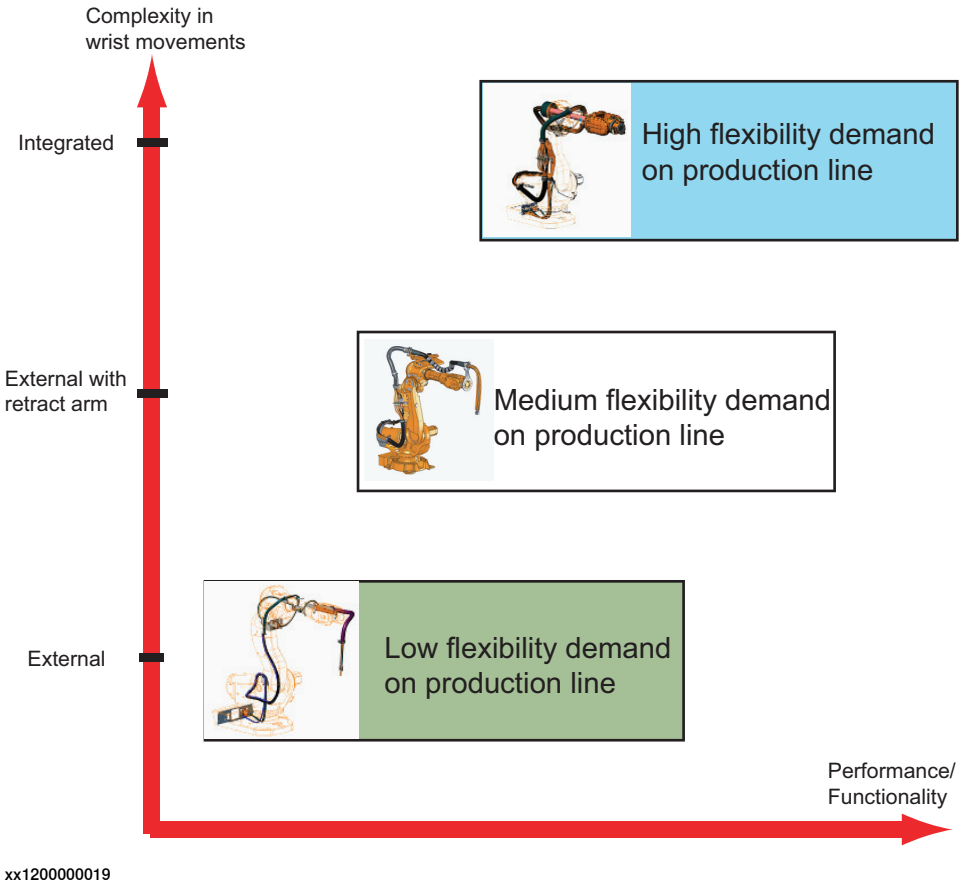
For the upper arm there are also internal routing alternative for some of the manipulator variants and material handling option.

2.1.2 Product range

DressPack solutions for different users needs

The different robot types can be equipped with the well integrated cable and hose packages in the SpotPack or DressPack options. The DressPack is designed in close conjunction with the development of the manipulator and is therefore well synchronized with the robot.

As there is a big span between different users need of flexibility, depending of the complexity of the operation/wrist movements, there are three major levels of dress pack solutions available, see figure below.



Integrated

This type of dress pack is intended for a production where there are many complex wrist movements and the need for flexibility in changing products is high.

Available options are 798-3 and 780-4 for material handling/spot welding.

External with retract arm

This type of dress pack is recommended for production where there are limited complexity in wrist movements. This normally occurs when there are not to many different products running in the same production cell.

Available options are 798-2 and 780-2 for both material handling/spot welding.

Continues on next page

External

This type of dress pack is recommended where there are less complexity in wrist movements. This normally occurs when there are not many different products running in the production cell. This package requires more individual adjustment to optimize towards robot program at set up.

Available options are 798-1 and 780-3 for material handling.

2.1.3 Limitations of robot movements

General

When using DressPack options on the upper arm the robot movements will be limited. The position of bracket installed on axis 6 must be taken in consideration when optimizing the possible robot movements.

- The axis 5 working range is limited to +/- 110 degrees due to the axis 6 bracket attachment (when applicable).
- In bending backwards positions there are limitations due to inteference with manipulator or Water and Air unit (if such is mounted).
- Might restrict working range

Note

For more detail information please contact Serop Product support/SEROP/ABB.

E-mail address: serop.product_support@se.abb.com

The above is valid for external and external with retract arm. ID variants has built in software limits.

Restrictions for LeanID, option 780-4

Axis	Working range
Axis 4	+250° to -250°
Axis 5	120° to -120°
Axis 6	220° to -220°

2.1.4 Impact on DressPack lifetime

General

There are some robot movements/positions that shall be avoided in the robot production program. This will improve the lifetime significantly of external upper arm dresspack and wear parts e.g. protection hose, hose reinforcement and protective sleeves.

- The axis 5 movement is not allowed to press the DressPack against the robot upper arm.
- Combined rotation of the wrist axes must be limited so that the DressPack is not wrapped hard against teh upper arm.

See the Product Manual for more detailed information and recommended set-up adjustments.

2.1.5 Information structure

General

The information for SpotPack and DressPack is structured in the following way.

The SpotPack and DressPack can be delivered in five versions developed for two different applications. Each type is described in a separate section.

Section	Option	Description
2.2	DressPack	DressPack includes general description DressPack with common information.

Material Handling application / DressPack

Section	Option	Description
2.3	Type H	DressPack for Material Handling.
	Type HS	SpotPack for handling the part against pneumatic transformer guns stationary mounted.
	Type Hse	SpotPack for handling the part against electrical servo driven transformer guns stationary mounted.

Spot Welding application / SpotPack and DressPack

Section	Option	Description
	Type S	SpotPack for pneumatic transformer guns carried by the robot manipulator.
	Type Se	SpotPack for electrical servo driven transformer guns carried by the robot manipulator.

Spot Welding cabinet

Section	Option	Description
2.5	Spot Welding Cabinet	Includes general description of Spot Welding cabinet with common information.

Water and Air unit

Section	Option	Description
2.6	Water and Air unit	Includes general description of Water and Air unit with common information.

Connector Kits

Section	Option	Description
2.7	Connector Kits	Includes general description of connector kits for SpotPack and DressPack.

2.2 DressPack

2.2.1 Introduction

Available DressPack configurations for Material Handling

The table below shows the different DressPack configurations available for Material Handling.

	Lower arm	Upper arm
Option 778-1, Material Handling	Option 798-1, Base to axis 3	Option 780-3, Axis 3 to 6 External routing
	Option 798-2, Base to axis 2	Option 780-2, Axis 2 to 6 External routing
		Option 780-1, Axis 2 to 6 Internal routing
	Option 798-3, Base to axis 3	Option 780-4, Axis 3 to axis 6 Internal routing

Available DressPack configurations for Spot Welding

The table below shows the different DressPack configurations available for Spot Welding.

	Lower arm	Upper arm
Option 778-2, Spot Welding	Option 798-2, Base to axis 2 External routing	Option 780-2, Axis 2 to 5 External routing
		Option 780-1, Axis 2 to 6 Internal routing
	Option 798-3, Base to axis 3 External routing	Option 780-4, Axis 3 to axis 6 Internal routing

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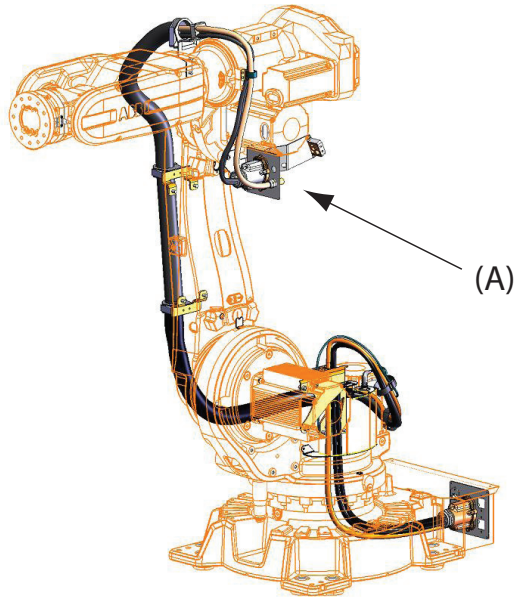
2.2.1 Introduction
Continued

DressPack lower arm

For the Material Handling application there are three alternative routings for the lower arm shown in the three figures below. This is designed to fit to the upper arm routing.



xx1000000402

Pos	Description
A	Connection point at axis 3. Base to axis 3, option 798-1.

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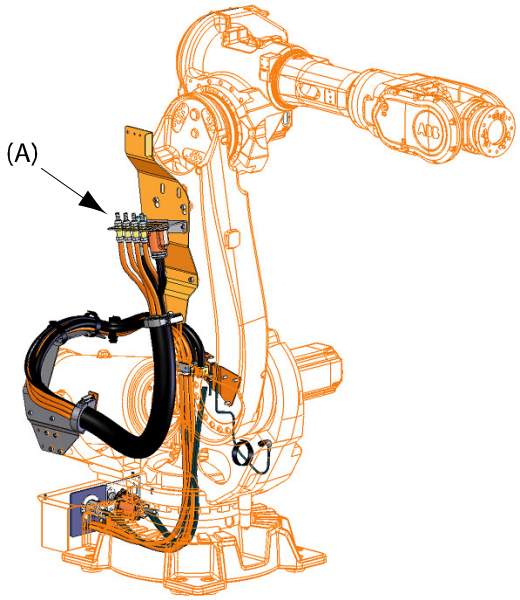
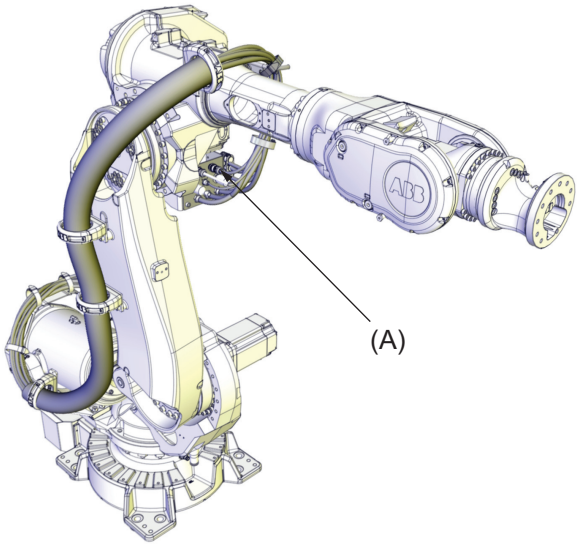
The routing of the DressPack lower arm for Spot Welding or Material Handling application is shown in the figures below. This is designed to fit to the upper arm routing.



xx1000000401

Pos	Description
A	Connection point at axis 2. Base to axis 2, option 798-2.



xx1200000070

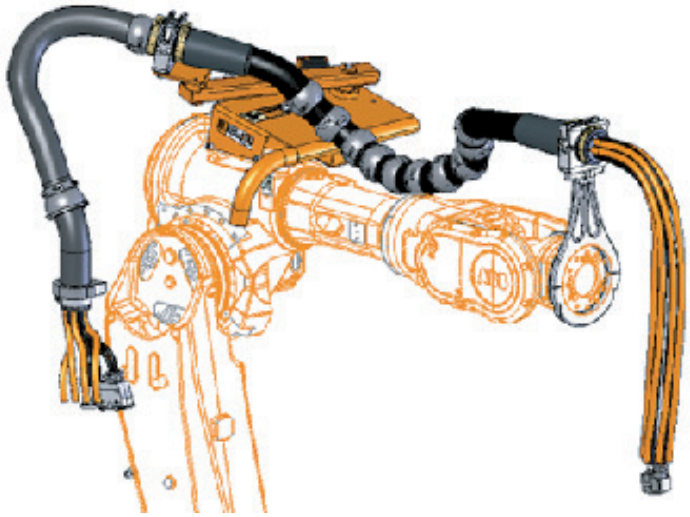
Pos	Description
A	Connection point at axis 3. Base to axis 3, option 798-3.

Continues on next page

2.2.1 Introduction
Continued

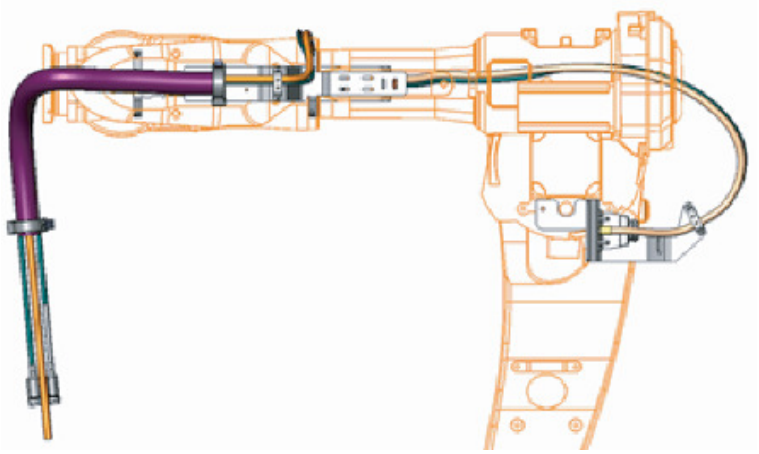
DressPack Upper arm

There are four alternatives for the Material Handling and three for the Spot Welding application. Two of the alternatives are external, and they are shown in the next two Figures. The internal routing is shown in last figures for this block.



xx1000000404

Ext. Axis 2 to axis 6, option 780-2.



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Ext. Axis 3 to axis 6, option 780-3.

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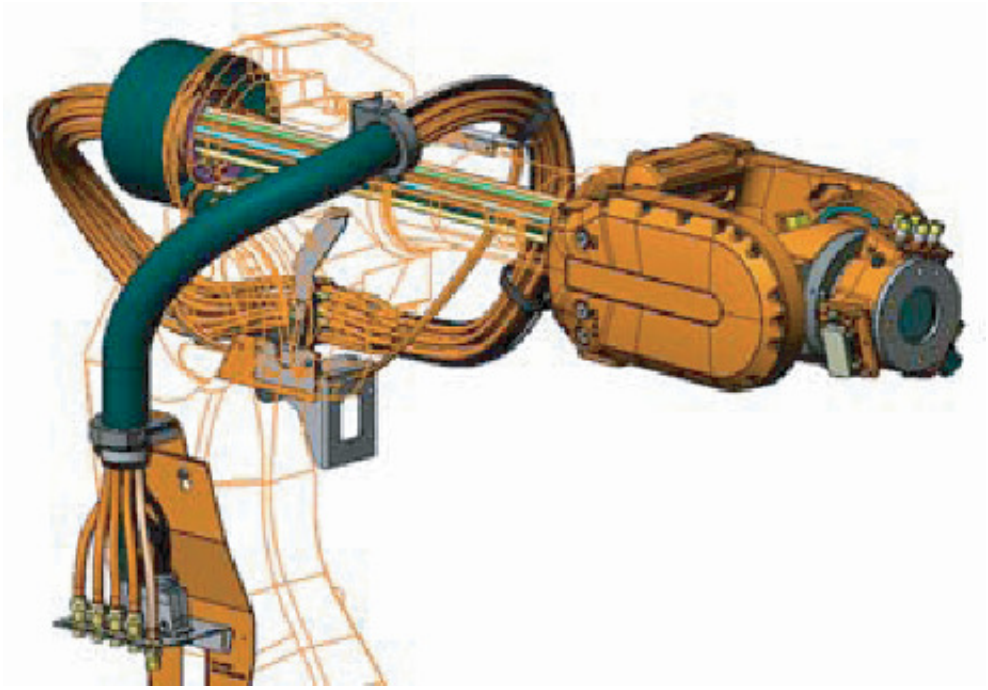

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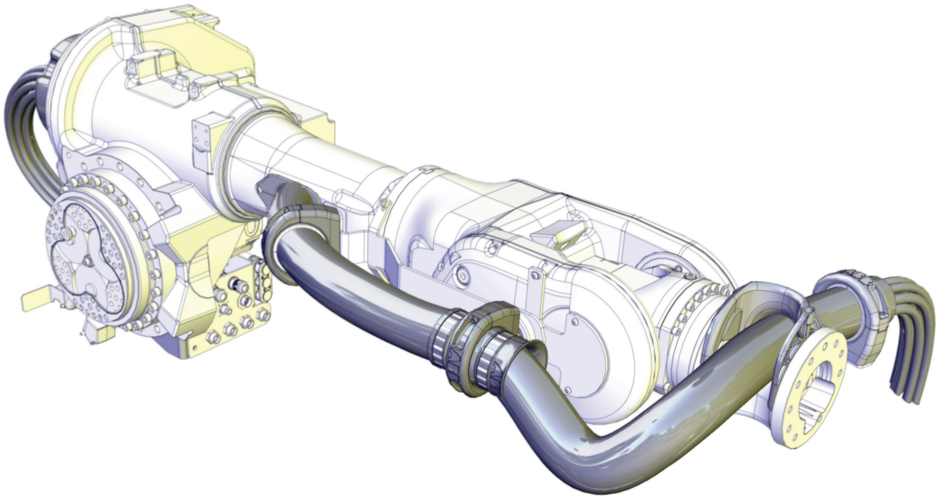
Int. Axis 2 to axis 6, option 780-1



xx1200000071

Int. Axis 3 to axis 6, option 780-4

2.2.2 Built-in features for upper arm DressPack

External

Material handling (option 780-3):

- Internal routing through the rear part of the upper arm.
- Protection hose can easily be replaced if damaged.
- One version for all IRB 6640 versions.
- Adjustment for optimal hose/cable lengths.

Spot welding and Material handling (option 780-2):

- Adjustable bracket axis 6 with position marking.
- Adjustable retracting force to optimize the system depending on cycle and hose package.

Internal

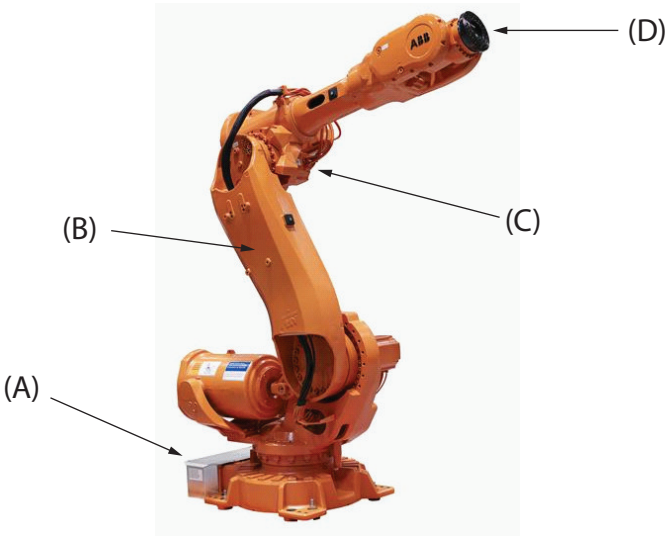
Spot Welding and Material handling (option 780-1 and 780-4):

- Internal routing through the upper arm (partly for option 780-4).
- Suitable for complex movements.
- High demands for flexibility and accessibility.
- Longer lifetime.

2.2.3 Interface descriptions for DressPack

General

Below is an overview showing the different DressPack options and locations. For detailed information see the circuit diagram, see *Product manual - DressPack/SpotPack IRB 6640*



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Pos	Location	Options
A	Base	798-1, 798-2, 798-3 and 864-1
B	Axis 2	798-2
C	Axis 3	798-1 and 798-3
D	Axis 6	780-1, 780-2, 780-3 and 780-4

Base

Material handling (option 798-1, -2, -3), see figure below:

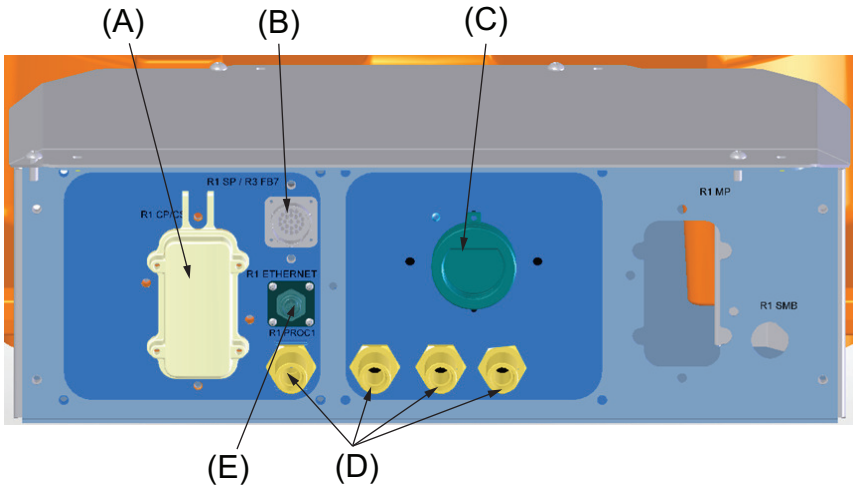
- Included are: A, B (if applicable), one D (Proc 1) and E (if applicable).

Spot welding (option 798-2, -3), see figure below:

- Included are: A, B (if applicable), C, D (Proc 1-4) and E (if applicable).

Continues on next page

2.2.3 Interface descriptions for DressPack
Continued



xx1000000619

For corresponding parts of the tool, see *Connection kits on page 120*.

Pos	Description
A	R1.CP/CS
B	R1.SP (Spot Welding Servo gun) or FB7 (Resolver connection)
C	R1.WELD 3x35mm2. (Spot Welding)
D	R1.PROC 1 (Material Handling/Spot Welding 1/2”, M22x1.5, 24 degree seal) R1.PROC 2 - 4 (Spot Welding 1/2”, M22x1.5, 24 degree seal)
E	R1.ETHERNET (M12 connector, when EtherNet communication is selected)

Axis 2

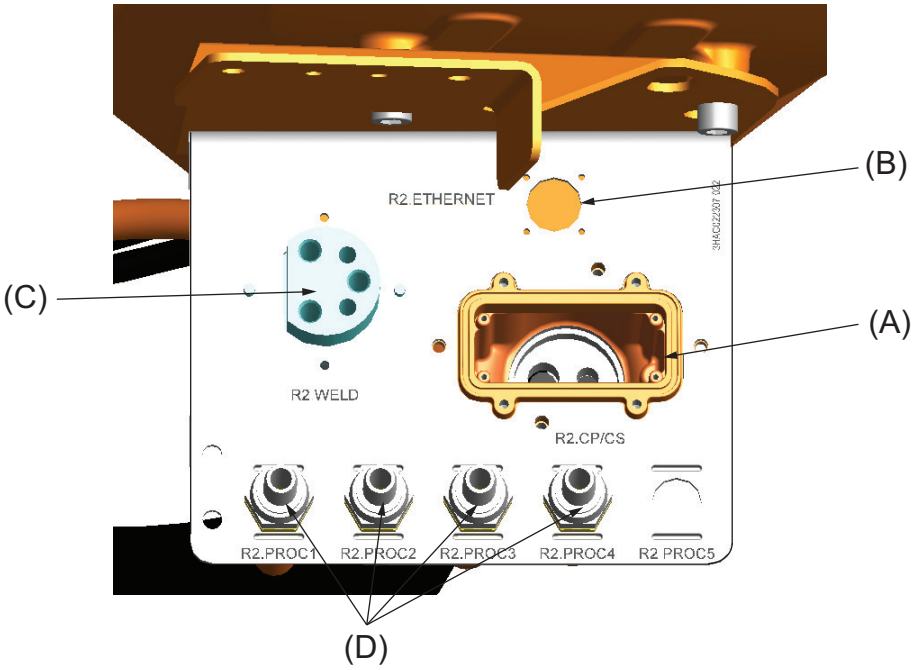
Material handling (option 798-2), see figure below:

- Included are: A, B (if applicable) and one D (Proc 1).

Spot welding (option 798-2), see figure below:

- Included are: A, B (if applicable), C and D (Proc 1-4).

Continues on next page



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For corresponding parts of the tool, see *Connection kits on page 120*.

Pos	Description
A	R2.CP/CS
B	R2.ETHERNET (M12 connector, when EtherNet communication is selected)
C	R2.WELD 3x35 mm2. (Spot Welding)
D	R2.PROC 1 (Material Handling/Spot Welding 1/2”, M22x1.5, 24 degree seal) R1.PROC 2 - 4 (Spot Welding 1/2”, M22x1.5, 24 degree seal)

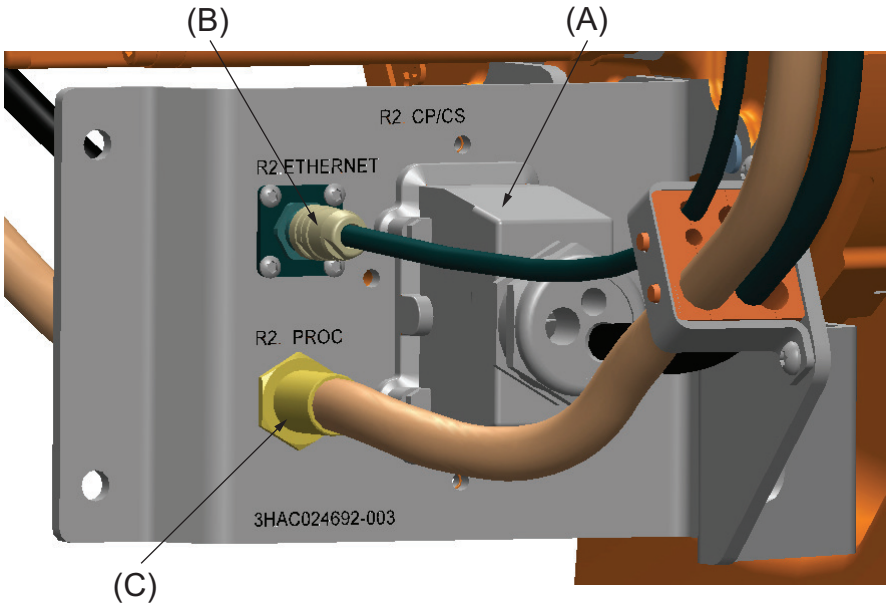
Axis 3

Material handling (option 798-1), see figure below:

- Included are: A, B (if applicable) and one C (Proc 1).

Continues on next page

2.2.3 Interface descriptions for DressPack
Continued



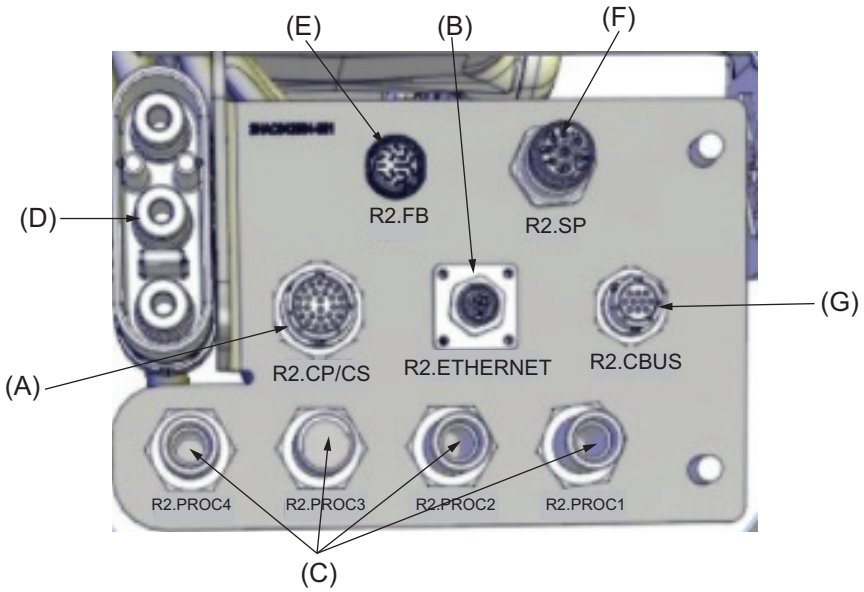
xx1100000958

Material Handling (option 798-3), see figure below:

- Included are: A, B/G (if applicable) and one C (Proc 1).

Spot welding (option 798-3), see figure below:

- Included are: A, D, B/E/F/G (if applicable) and C (Proc 1-4).



xx1200000072

For corresponding parts of the tool, see *Connection kits on page 120*.

Pos	Description
A	R2.CP/CS
B	R2.ETHERNET (M12 connector, when EtherNet communication is selected)
C	R2.PROC 1 (Material Handling 1/2”, M22x1.5, 24 degree seal) R2.PROC 2-4 (Spot Welding 1/2”, M22x1.5, 24 degree seal)

Continues on next page

Pos	Description
D	R2.WELD 3x25mm^2 (Spot Welding)
E	R2.FB7 (Spot Welding Servo gun, resolver)
F	R2.SP (Spot Welding Servo gun)
G	R2.CBUS

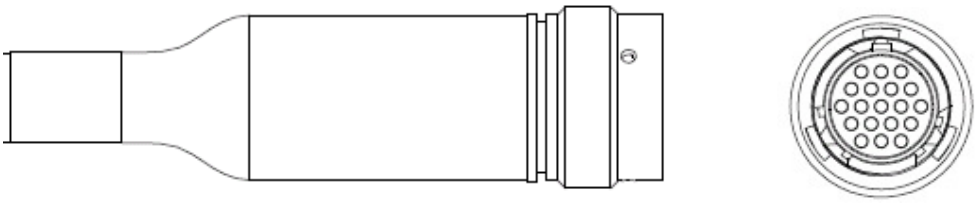
Axis 6

External

Material handling (option 780-3), see figure below:

- Hose and cable free length, min. 1000 mm.
- Air hose ends with free end.

The cable ends with a connector, for corresponding parts of the tool, see *Connection kits on page 120*:



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External with retract arm

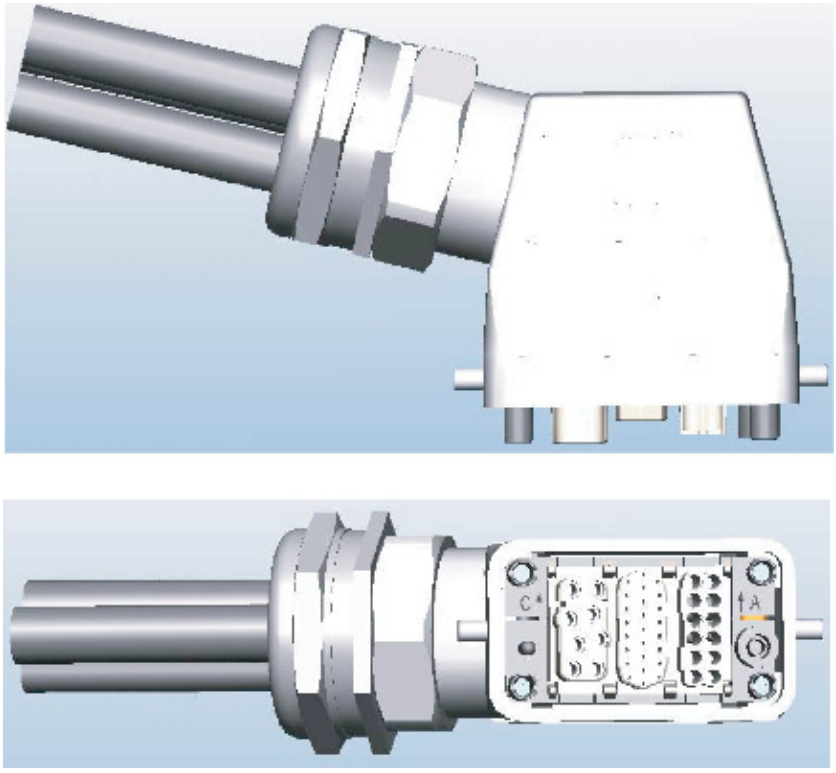
Spot welding/Material handling (option 780-2), see figure below:

- Hose and cable free length, min. 1000 mm.
- Hoses and weld power cable (only for spot welding) end with free end.
- All signals are connected with a Harting connector.

Continues on next page

2.2.3 Interface descriptions for DressPack
Continued

The cable ends with a connector, for corresponding parts of the tool, see *Connection kits on page 120* and within the Harting product offer.



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EtherNet connector

Spot welding/Material handling (option 780-2/-3), see figure below:

- Cable free length, min. 1000 m.
- Signals are connected with a M12 connector.

The cable ends with a connector, the different main parts within the connector are described in the list below, for corresponding parts of the tool, see within the Phoenix product offer.

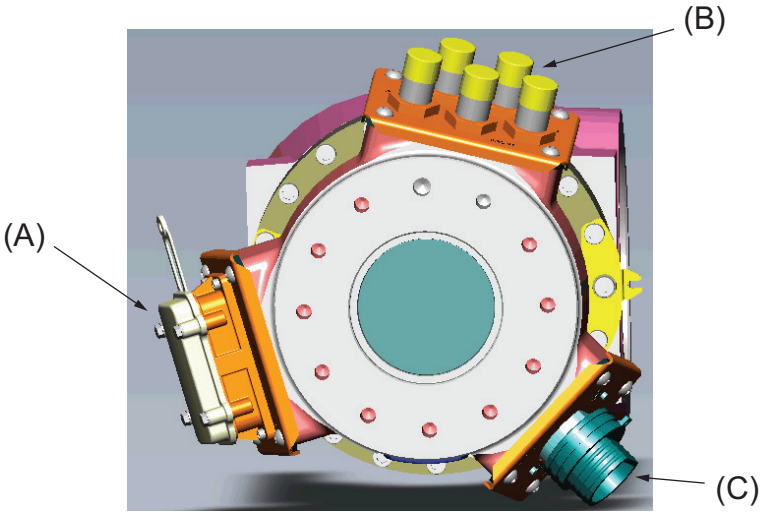
Name	Harting article
PIN connector, R3.ETHERNET	21 03 882 1405
PIN	61 03 000 0094
Sealing cap M12x1	3HAC033600-001 ABB article

xx1100000956

Continues on next page

Integrated

Spot welding/Material handling (option 780-1), see figure below:



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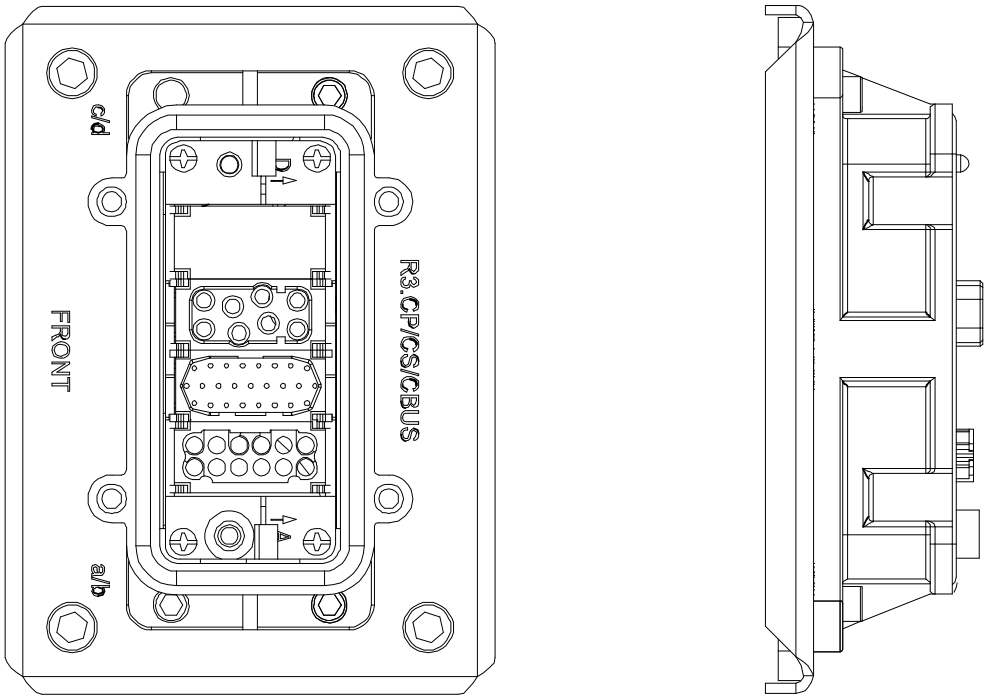
Pos	Description
A	I/O connection
B	Media (water and air)
C	Weld contact

- The hoses ends with fitting type: Parker Pushlock, (½”, M22x1,5 Brass, 24 degree seal)
- Weld power contact type MC TSB 150/35 (3x35 mm2).
- All signals are connected with a Harting connector, see Figure below.

Continues on next page

2.2.3 Interface descriptions for DressPack
Continued

For corresponding parts of the tool, see *Connection kits on page 120* and within the Harting product offer.



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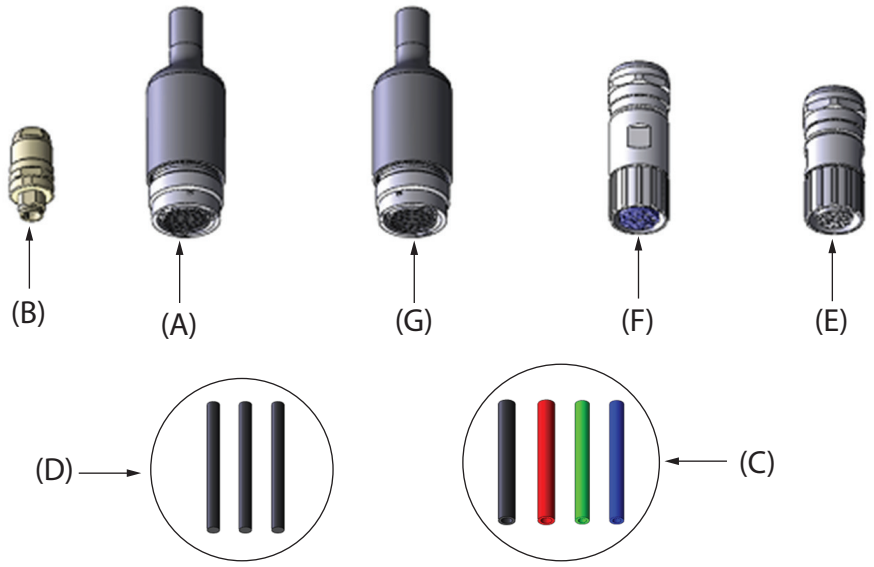
Material Handling/Spot Welding option 780-4 (LeanID), see figure below:

- Hose and cable free length, min. 1200 mm.
- Hoses and weld power cable (only for spot welding) end with free end.

The cable ends with connectors, for corresponding parts of the tool, see *Connection kits on page 120* and within the UTOW product offer.



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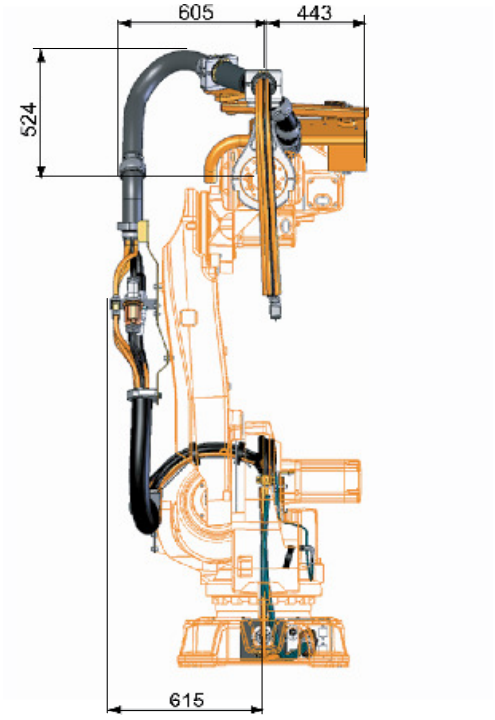
2.2.4 Dimensions

General

Dimensions are shown in Figures below.

Base to axis 2 - Axis 2 to axis 6 (option 798-2 + 780-2)



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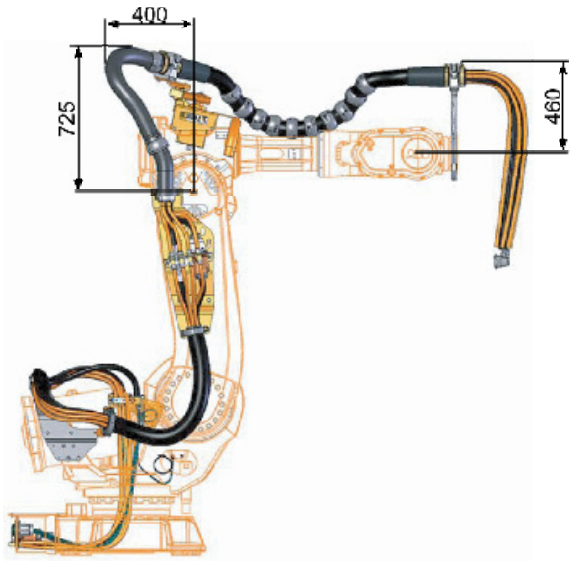
Base to axis 2 - Axis 2 to axis 6 (option 798-2 + 780-2)



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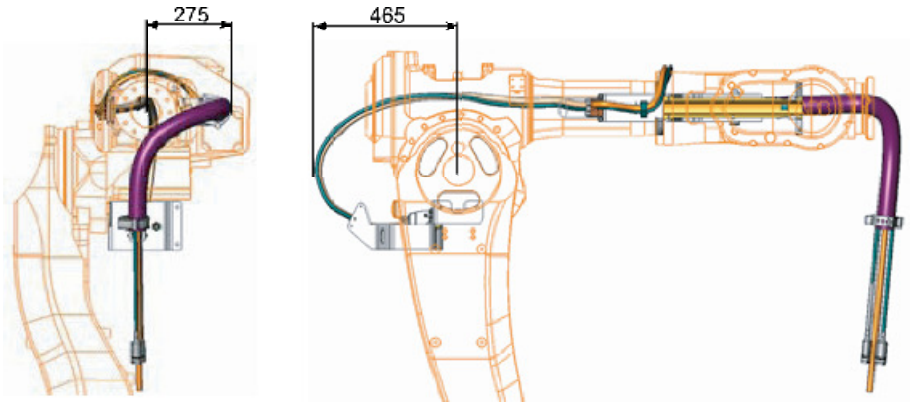
2.2.4 Dimensions
Continued

Axis 3 to axis 6 (option 780-3)



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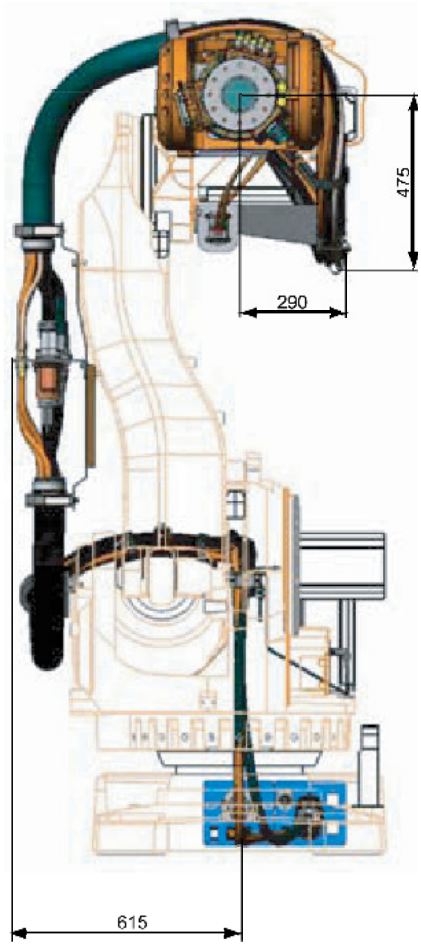
Base to axis 3 - Axis 3 to axis 6 (option 798-3 + 780-3)



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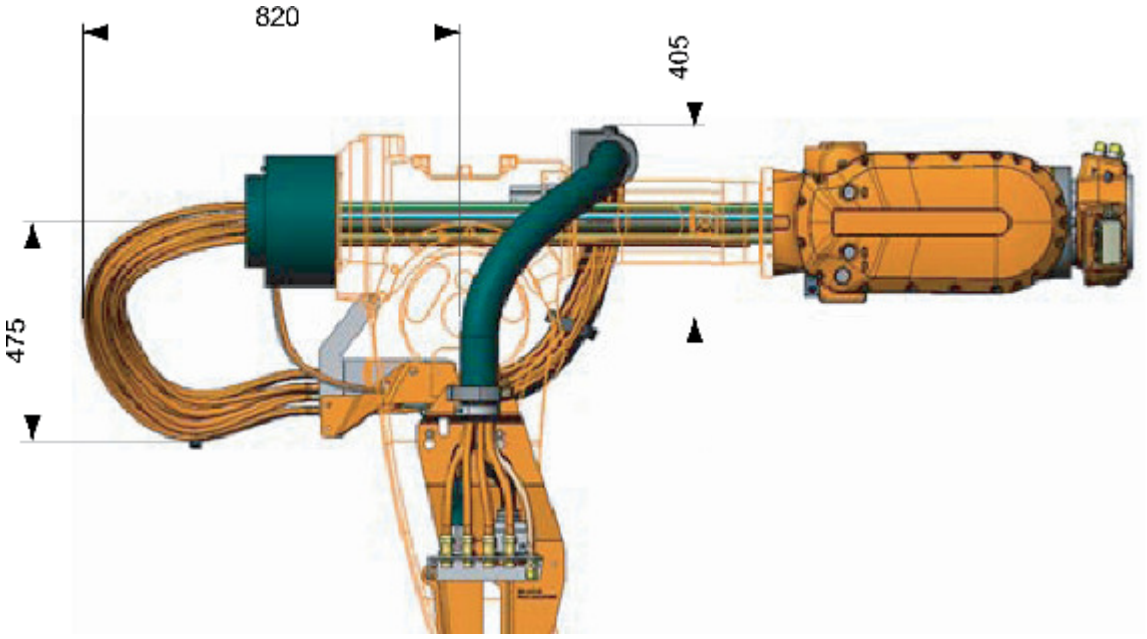
Axis 2 to axis 6 (option 780-1)



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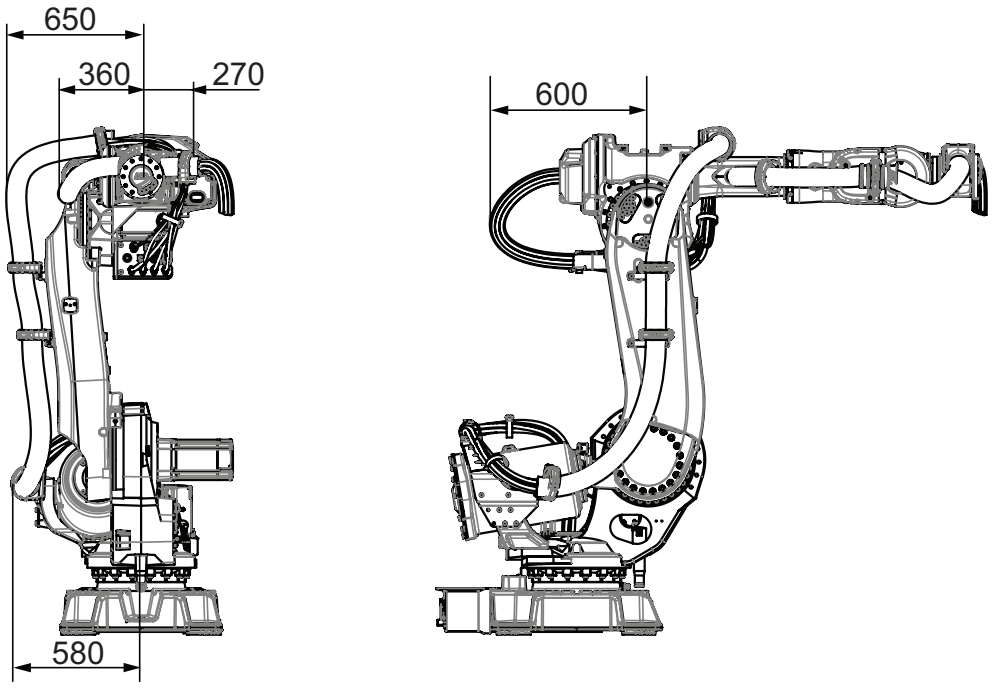
Base to axis 3 - Axis 3 to axis 6 (option 798-3 + 780-4)



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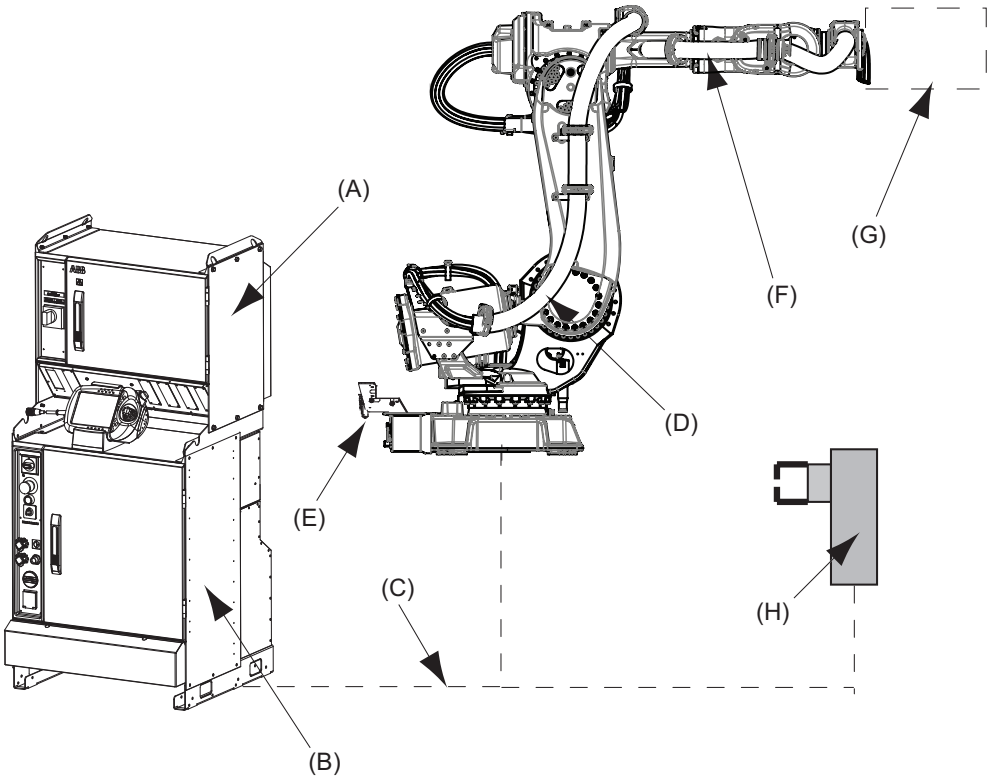
2.3 Tye H/HS/HSe

2.3.1 Introduction

General

Variant Type H is designed for Material Handling (MH) application and HS(e) to handling parts against a stationary Spot Welding gun (pneumatic or servo controlled). Included modules are shown in Figure below.



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Pos	Name	
A	Spot Welding cabinet	For type HS and HSe
B	Robot Cabinet IRC5	Incl. 7:th axis drive for servo gun, HSe
C	DressPack, Floor	
D	DressPack, Lower arm	
E	DressPack, Upper arm	
F	Water and Air unit with hoses	For type HS and HSe
G	Robot Gripper	
H	Stationary gun	Pneumatic or servo controlled, HS and HSe

Available configurations with linked option numbers are described below.

Continues on next page

Option description

Option	Type	Description
16-1	Connection to cabinet	Floor cables and connections inside the I/O section for the DressPack are chosen. The length and configuration of the floor harness is specified under the options below. Option 94-1,-2,-4 for parallel communication. Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet. Option 92-2,-3 for parallel communication and field bus communication with Profibus.
455-1	Parallel communication	Offers the signal cables needed for parallel communication in lower and upper arm DressPack. To be combined with option 94-1,-2,-4.
455-4	Parallel and Bus communication	Offers the signal cables needed for the combination of parallel and bus communication in lower and upper arm DressPack. To be combined with option 90-2,-3,-4,-5 or 92-2,-3.
455-8	Parallel and Ethernet communication	Offers the signal cables needed for the bus communication in lower and upper arm DressPack. To be combined with option 859-1,-2,-3,-4. Requires selection of option 94-X.

- Option 778-1. For the application Material Handling.

  Lower arm (one off)
- Option 798-1. Base to axis 3. Offers DressPack Lower arm for Material Handling application with internal routing from base to axis 3.
- Option 798-2. Base to axis 2. Offers DressPack Lower arm for Material Handling application with internal routing from base to axis 2.
- Option 798-3. Base to axis 3. Offers DressPack Lower arm for Material Handling application with internal routing from base to axis 3.

  Upper arm (one off)
- Option 780-4 (and Option 798-3). Axis 3 to 6. Offers DressPack upper arm for Material Handling application with external routing from axis 3 to 6
- Option 780-3 (and Option 798-1). Axis 3 to 6. Offers DressPack upper arm for Material Handling application with external routing from axis 3 to 6.
- Option 780-2 (and Option 798-2). Axis 2 to 6. Offers DressPack upper arm with rectract arm, for Material Handling application with external routing from axis 2 to 6.
- Option 780-1 (and option 798-2). Axis 2 to 6. Offers DressPack Upper arm for Material Handling application with internal routing from axis 2 to 6.

Continues on next page

2.3.1 Introduction
Continued

The available alternatives and allowed combinations are shown in the schematic Figures below.

Applicatioon Interface connected to Option 16-1, Cabinet	Option 455-1 Parallel communication	Option 94-1, -2, -3, -4 Cable length, Parallel communication	Option 778-1. Material Handling
	Option 455-4 Parallel and bus communication	Option 90-2, -3, -4, -5 Option 92-2, -3 Cable length, Parallel and bus communication	
	Option 455-8 Parallel and Ethernet communication	Option 859-1, -2, -3, -4 Cable length, Ethernet communication	

Continued

	Lower arm	Upper arm
Option 778-1. Material Handling	Option 798-1, Base to axis 3	Option 780-3, Axis 3 to 6 External routing
	Option 798-3, Base to axis 3	Option 780-4, Axis 3 to 6 Internal routing
	Option 798-2, Base to axis 2	Option 780-2, Axis 2 to 6 External routing
		Option 780-1, Axis 2 to 6 Internal routing

2.3.2 Configuration result for Type H/HS/HSe

General

Depending on the choice of options above the DressPack will have different content. The choice of routing will not affect the content. See tables for signal content below.

DressPack Type H/HS/HSe. Parallel communication

- Option 16-1 with Connection to cabinet
- (Option 94-1,-2,-3,-4 to specify cable length)
- Option 455-1. Parallel communication
- Option 778-1. Material Handling
- Option 798-1, 798-2 or 798-3. Internal routing, DressPack Lower arm

One of the options:

- Option 780-1 (and Option 798-2.) Internal routing
- Option 780-2 (and Option 798-2). External routing with retract arm
- Option 780-3 (and Option 798-1). External routing
- Option 780-4 (and option 798-3) Internal routing

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, Axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [a]
Protective earth		1	0,5 mm^2	250 VAC [a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [b]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI

a.For option 780-3 50 VAC / 60 VDC.

b.For option 780-3 8 signals instead of 20 and for option 780-4 13 signals.

DressPack Type H/HS/HSe. Parallel and field bus communication, Can/DeviceNet

- Option 16-1 with Connection to cabinet
- (Option 90-2,-3,-4,-5 to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-1 Material Handling
- Option 798-1, 798-2 or 798-3. Internal routing, DressPack Lower arm

Continues on next page

2.3.2 Configuration result for Type H/HS/HSe
Continued

One of the options:

- Option 780-1 (and Option 798-2.) Internal routing
- Option 780-2 (and Option 798-2). External routing with retract arm
- Option 780-3 (and Option 798-1). External routing
- Option 780-4 (and option 798-3). Internal routing

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At Connection point. Base, Axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [a]
Protective earth		1	0,5 mm^2	250 VAC [a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [b]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Can/DeviceNet spec
Bus signals	At bus board	2	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair		6 (3x2) [c]	0,14 mm^2	50 V DC, 1 A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI

a. For option 780-3 50 VAC / 60 VDC.

b. For option 780-3, 8 signals instead of 20 and for option 780-4, 13 signals.

c. For option 780-4, 2 signals instead of 6.

DressPack Type H/HS/HSe. Parallel and field bus communication, Profibus

- Option 16-1 with Connection to cabinet
- (Option 92-2,-3 to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-1. Material Handling
- Option 798-1, 798-2 or 798-3. Internal routing, DressPack Lower arm

One of the options:

- Option 780-1 (and Option 798-2.) Internal routing
- Option 780-2 (and Option 798-2.) External routing with retract arm
- Option 780-3 (and Option 798-1). External routing
- Option 780-4 (and option 798-3) Internal routing

Continues on next page

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, Axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [a]
Protective earth		1	0,5 mm^2	250 VAC [a]
Customer Signals (CS)				
Signals twisted pair	22	22 (11x2) [b]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	4 [c]	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2) [d]	0,14 mm^2	50 V DC, 1 A rms
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI

a. For option 780-3 50 VAC / 60VDC.

b. For option 780-3, 8 singals instead of 22 and for option 780-4, 13 signals.

c. For option 780-4, 2 signals instead of 4.

d. For option 780-4, 4 signals instead of 6.

DressPack Type H/HS/HSe. Parallel and field bus communication, Ethernet

- Option 16-1 with Connection to cabinet
- (Option 859-1, -2, -3, -4 to specify cable length)
- (Option 94-1, -2, -3, -4 to specify cable length)
- Option 455-8. Parallel and Ethernet communication
- Option 778-1. Material Handling
- Option 798-1, 798-2 or 798-3. Internal routing, DressPack Lower arm

One of the options:

- Option 780-1 (and Option 798-2.) Internal routing
- Option 780-2 (and Option 798-2.) External routing with retract arm
- Option 780-3 (and Option 798-1). External routing
- Option 780-4 (and option 798-3) Internal routing

The table below shows the available type of wires/media.

Type	At terminals in cabinet	At connection point. Base, Axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms [i]

Continues on next page

2.3.2 Configuration result for Type H/HS/HSe
Continued

Type	At terminals in cabinet	At connection point. Base, Axis 2/3 or axis 6	Cable/part area	Allowed capacity
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [ii]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0,4 mm^2	Ethernet CAT 5e, 100 Mbit [iii]
Media				
Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI

i For option 780-3 50 VAC / 60 VDC.
ii For option 780-3, 8 signals instead of 20 and for option 780-4, 13 signals.
iii Ethernet with wire colors according to PROFINET standard, M12-connectors.

Required general options for Type HS/HSe

To enable the SpotPack IRB 6640 to perform as intended, general standard robot options are required. These standard options are further described under other chapters and are also mentioned in this chapter.

- Option 716-1. 1 pc. Digital 24 VDC I/O 16 inputs/ 16 outputs
- Option 727-1. 24V 8 Amps power supply
- Option 635-1. Spot. Software option for pneumatic guns

Required additional options for servo gun Type HSe

To enable the spot welding function package SpotPack IRB 6640 to run with a servo controlled gun, some additional (additional to those described in previous section "Required general options for Type Se") servo drive options are required. These standard options are described under other chapters and are also mentioned below in this chapter.

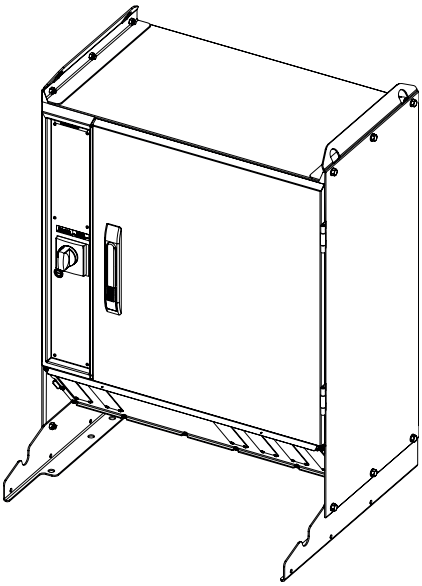
- Option 770-4. First additional drive, W Drive
- Option 864-1. Resolver connection, axis 7
- Option 785-5. Stationary gun
- Option 786-1,-2,-3,-4. Connection to first drive (Cable length to be stated)
- Option 635-3. Spot Servo. Software option for servo controlled guns
- (Software option 635-5 could also be used)

Also option 630-1, Servo tool change, should be used if servo gun tool change is required.

Continues on next page

Required Spot Welding cabinet options for Type HS/HSe

The SpotPack IRB 6640 also requires a Spot Welding cabinet (option 768-3) to perform as intended. There are three different variants (see below) of Spot Welding cabinet available. Weld timer brand and weld capacity are stated by choosing one of the optional variants. Additional features could then be added to each of the cabinet variant. All these options are further described under *Spot Welding cabinet on page 104* but are also mentioned in this chapter.



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Option	Type	Description
782-1	Bosch Basic AC	This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated AC-thyristor with basic capacity. Type Bosch PST 6100.630L1.
782-7	Bosch Basic MFDC	This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated inverter with basic capacity. Type Bosch PSI 6100.630L1.
782-11	Bosch MFDC ProfiNet	This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated inverter with basic capacity. Type Bosch PSI 61C0.751OEM.

Additional options to the different Spot Welding cabinets are mentioned below. For further technical details as well as restrictions in combinations see *Spot Welding cabinet on page 104*

Option	Type	Description
788-1	Forced air cooling	Offers a cooling fan with housing placed on the rear of the Spot Welding cabinet which forces air on the cooling surface/grids of the thyristor or MFDC inverter.
789-1	Earth fault protection unit	Offers an earth fault protection integrated with the circuit breaker for the weld power.

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2.3.2 Configuration result for Type H/HS/HSe
Continued

Option	Type	Description
790-1	Contactor for weld power	Offers a weld contactor with necessary wiring placed inside the Spot Welding cabinet.
791-1	Weld power cable, 7 m	Offers floor cable of 7 m length for weld power.
791-2	Weld power cable, 15 m	Offers floor cable of 15 m length for weld power.
809-1	Process cable to stationary gun, 7 m	Offers floor cable of 7 m length for process signals between the Spot Welding cabinet and to the stationary gun.
809-2	Process cable to stationary gun, 15 m	Offers floor cable of 15 m length for process signals between the Spot Welding cabinet and to the stationary gun.
858-1	Bosch Adaptive control	Offers additional functionality for adaptive welding regulation. Only possible with option 782-11.

2.3.3 Interface description stationary gun

General

The interface towards the stationary gun includes 3 common parts and 2 extra for servo gun.

Common parts:

- Signal interface with a signal connector type modular Harting
- (Cable option 809-1, -2).
- Power cable with a Multi Contact interface (Cable option 791-1 or option 791-2)

  (Ending Multi contact type MC TSB 150/35).
- Water and air connections made by the customer directly on the water and air unit. See *Water and air unit on page 111*.

Extra for servo gun:

- Servo power cable (Option 786-1,-2,-3 or -4). Cable goes from robot control cabinet to stationary gun and ends with a 23 pin Souriau connector (Type UT 061823SH).
- Resolver signal cable, 7 m length (included in option 785-5). Cable goes from robot foot R3.FB7 to stationary gun and ends with 8 pin Souriau connector

  (Type UT 06128SH)

The connector configurations are described in the circuit diagram included in the Product Manual DressPack/SpotPack IRB 6640, art No. 3HAC028638-001.

The Harting connector is shown below. The different main parts within the connector are showed both with name and Harting article number. Corresponding parts at the tool are available within the Harting product offer.

Name	Harting article No.
Hood	09 30 010 0543
Hinged frame, hood	09 14 010 0303
Multicontact, female (HD)	09 14 025 3101
Multicontact, female (DD)	09 14 012 3101
Multicontact, female (EE)	09 14 008 3101

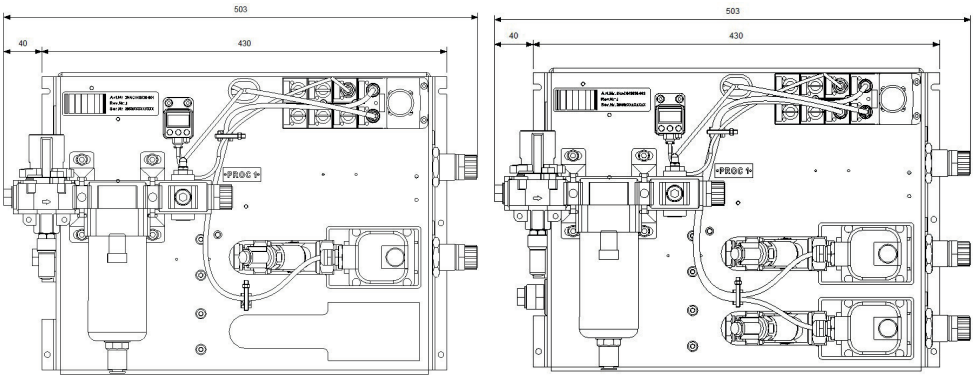
For the contacts above corresponding female crimp-contacts for the different cable diameters are required.

Continues on next page

2.3.3 Interface description stationary gun
Continued

Required Water and Air unit options for Type HS/HSe

The SpotPack IRB 6640 also requires Water and Air unit options to perform as intended. These options are further described under chapter 1.6 Water and Air unit and are also mentioned in this chapter.



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Option	Type	Description
792-2	Water and Air unit, type HS	Offers the basic water and air unit for type HS including splitbox for signal distribution.
793-1	Second water return	Offers an additional water return circuit.
796-1 [a]	Electrical proportional valve for air	Offers a proportional valve with cables and additional hoses.
797-1	Cable to split box, 7 m	Offers floor cable of 7 m length for signals between the cabinet and to the split box placed on the water and air unit.
797-2	Cable to split box, 15 m	Offers floor cable of 15 m length for signals between the cabinet and to the split box placed on the water and air unit.
797-3	Cable to split box, 22 m	Offers floor cable of 22 m length for signals between the cabinet and to the split box placed on the water and air unit.
797-4	Cable to split box, 30 m	Offers floor cable of 30 m length for signals between the cabinet and to the split box placed on the water and air unit.

a. Not used together with type HSe.

2.3.4 Summary common options Type H/HS/HSe

General

The following options are the minimum required to form a complete SpotPack Type H/HS/HSe:

- Option 16-1. Connection to cabinet (Cable length and communication type to be stated)
- Option 455-1, 455-4 or 455-8. Parallel, Parallel and Bus communication or EtherNet (Communication type to be stated)
- Option778-1. Material Handling
- Option 798-1, 798-2 or 798-3. DressPack Lower arm (Routing type to be stated)
- Option 780-1, -2, -3, -4. DressPack Upper arm (Routing type to be stated)

2.3.5 Summary options required for Type HS/HSe

General options

- Option 716-1. 1 pc. Digital 24 VDC I/O 16 inputs/ 16 outputs
- Option 727-1. 24V 8 Amps power supply
- Option 635-1. Spot (only for type HS)

Servo gun

- Option 770-4. First additional drive, W Drive
- Option 785-5. Stationary gun
- Option 786-1. Connection to first drive (other lengths available)
- Option 635-3. Spot Servo. Software option for servo controlled gun

Spot Welding cabinet

- Option 791-1. Power cable 7 m (other lengths available)
- Option 809-1. Process cable to stationary gun (other lengths available)

Water and air unit

- Option 792-2. Water and air unit, Type HS
- Option 797-1. Splitbox cable 7 m. (other lengths available)
- Option 796-1 is also normally required for pneumatic gun handling

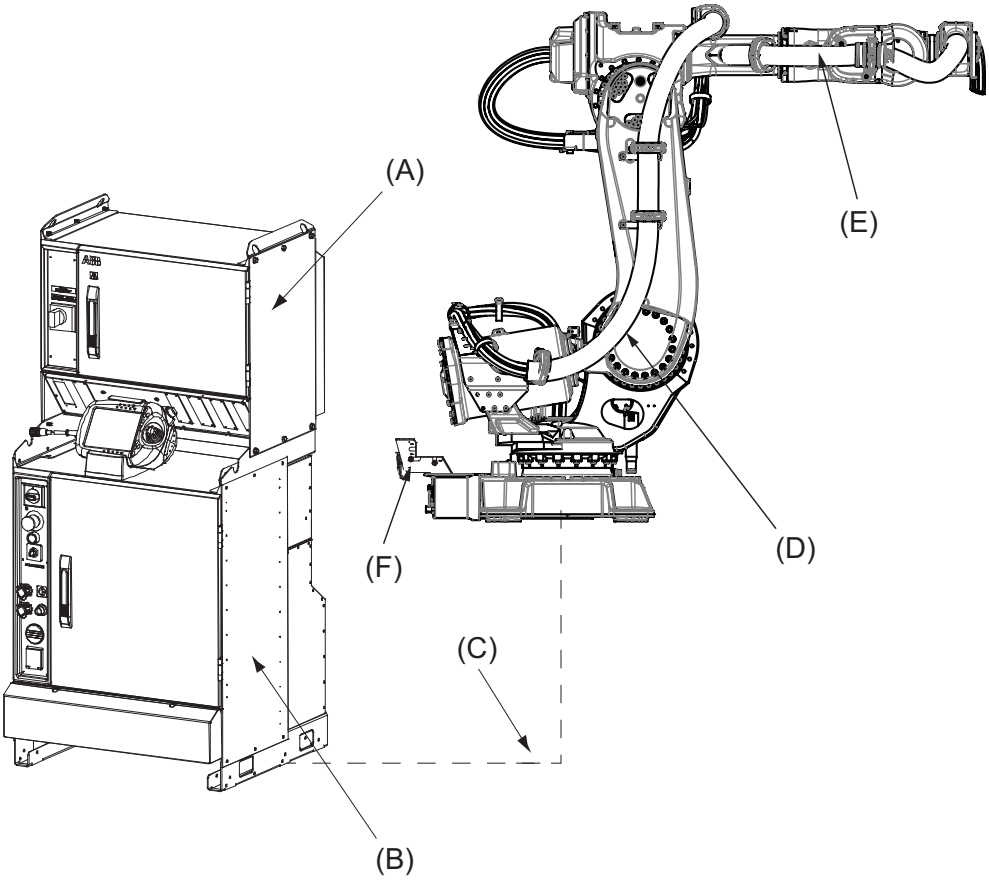
Other described options depend on specific system need and performance.

2.4 Type S/Se

2.4.1 Introduction

General

Variant Type S is designed for robot handled pneumatic gun and Se is designed for robot handled servo-controlled tool (electrical gun). Included modules are shown in Figure below. Available configurations with linked option numbers are described below.



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Pos	Name
A	Spot Welding cabinet
B	Robot Cabinet IRC5 (including 7th axis drive), Se
C	DressPack, Floor
D	DressPack, Lower arm
E	DressPack, Upper arm
F	Water and Air unit with hoses

Available configurations with linked option numbers are described below. To achive the specific servo motor connections within the DressPack for Type Se option 785-1 Robot gun must also to be chosen.

Continues on next page

2.4.1 Introduction
Continued

Option description

Option	Type	Description
16-1	Connection to cabinet	Floor cables and connections inside the I/O section for the DressPack are chosen. The length and configuration of the floor harness is specified under the options below. Option 94-1,-2, -4 for parallel communication Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet Option 92-2,-3 for parallel communication and field bus communication with Profibus
455-1	Parallel communication	Offers the signal cables needed for parallel communication in lower and upper arm DressPack. To be combined with option 94-1,-2,-4.
455-4	Parallel and Bus communication	Offers the signal cables needed for the combination of parallel and bus communication in combination in lower and upper arm DressPack. To be combined with option 90-2,-3,-4,-5 or 92-2,-3.
455-8	Parallel and Ethernet	Offers the signal cables needed for the Ethernet communication in combination in lower and upper arm DressPack. To be combined with option 859-1,-2,-3,-4. Requires selection of option 94-X.

- Option 778-2. For the application Spot Welding.

  Lower arm (one off)
- Option 798-2. Base to axis 2. Offers DressPack Lower arm for Spot Welding application with external routing.
- Option 798-3. Base to axis 3. Offers DressPack Lower arm for Spot Welding application with external routing.

  Upper arm (one off)
- Option 780-2 (and Option 798-2). External Axis 2 to 6. Offers DressPack Upper arm for Spot Welding application with external routing.
- Option 780-1 (and option 798-2). Internal Axis 2 to 6. Offers DressPack Upper arm for Spot Welding application with internal routing.
- Option 780-4 (and option 798-3). Internal Axis 3 to 6. Offers DressPack Upper arm for Spot Welding application with internal routing.

Continues on next page

The available alternatives and allowed combinations are shown in the schematic Figure below below.

Application Interface connected to Option 16-1, Cabinet	Option 455-1, Parallel communication	Option 94-1, -2, -3, -4 Cable length, Parallel communication	Option 778-2, Spot Welding
	Option 455-4, Parallel and Bus communication	Option 90-2, -3, -4, -5 Option 92-2, -3 Cable length, Parallel and Bus communication	
	Option 455-8, Parallel and Ethernet communication	Option 859-1, -2, -3, -4 Cable length, Ethernet communication	

Continued

	Lower arm	Upper arm
Option 778-2 Spot Welding	Option 798-2, Base to axis 2 External routing	Option 780-2, Axis 2 to 6 External routing
		Option 780-1, Axis 2 to 6 Internal routing
	Option 798-3, Base to axis 3 External routing	Option 780-4, Axis 3 to 6 Internal routing

2.4.2 Configuration result for Type S/Se

General

Depending on the choice of options above (combined with option 785-1 Robot gun) the DressPack will have different content. The choice of routing will not affect the content. See tables for signal content below.

DressPack Type S/Se. Parallel communication

- Option 16-1 with Connection to cabinet
- (Option 94-1,-2,-3,-4 to specify cable length)
- Option 455-1. Parallel communication
- Option 778-2. Spot Welding
- One of option 798-2 and 798-3. External routing, DressPack Lower arm

One of the options:

- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-4 (and Option 798-3). Internal routing, DressPack Upper arm

The table below shows the available type of wires/media for type S.

Type S	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2) [i]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [ii]	Max. air pressure 16 bar/ 230 PSI Max. water pressure 10 bar/ 145 PSI
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [iii]	600 VAC, 150 A rms at 20 °C (68 °F)
Protective earth (Lower and Upper arm)		1		

[i] For option 780-4, 13 signals instaed of 20.
[ii] For LeanID 2x1/2" + 2x3/8"
[iii] For LeanID upper arm 25 mm^2

Continues on next page

The table below shows the available type of wires/media for type Se.

Type Se	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	8	8 (4x2) [i]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	4 (2x2) [ii]	0,24 mm^2	50 V DC, 1 A rms
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12 A rms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6	0,23 mm^2	50 V DC, 1 A rms
Brake	-	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [iii]	Max. air pressure 16 bar/ 230 PSI. Max. water pressure 10 bar/ 145 PSI
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [iv]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

[i] For option 780-4, 13 signals instead of 8.
[ii] For option 780-4, 8 signals instead of 4.
[iii] For LeanID 2x1/2" + 2x3/8"
[iv] For LeanID upper arm 25 mm^2

DressPack Type S/Se. Parallel and field bus communication, Can/DeviceNet

- Option 16-1 with Connection to cabinet
- (Option 90-2,-3,-4,-5 to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-2. Spot Welding
- One of option 798-2 and 798-3. External routing, DressPack Lower arm

One of the options:

- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-4 (and option 798-3). Internal routing, DressPack Upper arm

Continues on next page

2.4.2 Configuration result for Type S/Se
Continued

The table below shows the available type of wires/media for type S.

Type S	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	1 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	20	20 (10x2) [i]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Can/DeviceNet spec
Bus signals	At bus board	2	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair	6	6 (3x2) [ii]	0,14 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [iii]	Max. air pressure 16 bar/230 PSI Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [iv]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

i For option 780-4, 13 signals instead of 20.
ii For option 780-4, 2 signals instead of 6.
iii For LeanID 2x1/2" + 2x3/8"
iv For LeanID upper arm 25 mm^2

Continues on next page

The table below shows the available type of wires/media for type Se.

Type Se	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	14	14 (7x2) [i]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	4	4 (2x2) [ii]	0,23 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	2	0,14 mm^2	Can/DeviceNet spec
Bus signals	At bus board	2	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair	6	6 (3x2) [iii]	0,14 mm^2	50 V DC, 1 A rms
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12 A rms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6[a]	0,23 mm^2	50 V DC, 1 A rms
Brake	-	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [iv]	Max. air pressure 16 bar/230 PSI. Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [v]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

i For option 780-4, 13 signals instead of 14.
ii For option 780-4, 8 signals instead of 4.
iii For option 780-4, 2 signals instead of 6.
iv For LeanID 2x1/2" + 2x3/8"
v For LeanID upper arm 25 mm^2

a. Interface only at axis 3 or axis 6.

DressPack Type S/Se. Parallel and field bus communication, Profibus

- Option 16-1 with Connection to cabinet
- (Option 92-2,-3,-4,-5 to specify cable length)
- Option 455-4. Parallel and bus communication
- Option 778-2. Spot Welding

Continues on next page

2.4.2 Configuration result for Type S/Se
Continued

- One of option 798-2 and 798-3. External routing, DressPack Lower arm

One of the options:

- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-4 (and option 798-3). Internal routing, DressPack Upper arm

The table below shows the available type of wires/media for type S.

Type S	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	22	22 (11x2) [i]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded		8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	4 [ii]	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2) [iii]	0,14 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [iv]	Max. air pressure 16 bar/230 PSI Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [v]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

[i] For option 780-4, 13 signals instead of 22.
[ii] For option 780-4, 2 signals instead of 4.
[iii] For option 780-4, 4 signals instead of 6.
[iv] For LeanID 2x1/2" + 2x3/8"
[v] For LeanID upper arm 25 mm^2

Continues on next page

The table below shows the available type of wires/media for type Se.

Type Se	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	8	8 (4x2) [i]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	4	4 (2x2) [ii]	0,24 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board 6	6 (3x2) [iii]	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair		4 (2x2)	0,14 mm^2	50 V DC, 1 A rms
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12 A rms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6[a]	0,23 mm^2	50 V DC, 1 A rms
Brake	-	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [iv]	Max. air pressure 16 bar/230 PSI. Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [v]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

i For option 780-4, 13 signals instead of 8.
ii For option 780-4, 8 signals instead of 4.
iii For option 780-4, 2 signals instead of 6.
iv For LeanID 2x1/2" + 2x3/8"
v For LeanID upper arm 25 mm^2

a. Interface only at axis 3 or axis 6.

DressPack Type S/Se. Parallel and field bus communication, Ethernet

- Option 16-1 with Connection to cabinet
- (Option 859-1, -2, -3, -4 to specify cable length)
- (Option 94-1, -2, -3, -4 to specify cable length)
- Option 455-8. Parallel and Ethernet communication
- Option 778-2. Spot Welding

Continues on next page

2.4.2 Configuration result for Type S/Se
Continued

- One of option 798-2 and 798-3. External routing, DressPack Lower arm

One of the options:

- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-4 (and Option 798-3). Internal routing, DressPack Upper arm

The table below shows the available type of wires/media for type S.

Type S	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	20	20 (10x2) [i]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0,4 mm^2	Ethernet CAT 5e, 100 Mbit [ii]
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [iii]	Max. air pressure 16 bar/230 PSI Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [iv]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

i For option 780-4, 13 signals instead of 20.
ii Ethernet with wire colors according to PROFINET standard, M12-connectors.
iii For LeanID 2x1/2" + 2x3/8"
iv For LeanID upper arm 25 mm^2

Continues on next page

The table below shows the available type of wires/media for type Se.

Type Se	At terminals in cabinet	At connection point. Base, axis 2/3 or axis 6	Cable/part area	Allowed capacity
Customer Power (CP)				
Utility Power	2+2	2+2	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	20	20(10x2) [i]	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (Ethernet)				
Bus signals	4	4	0,4 mm^2	Ethernet CAT 5e, 100 Mbit [ii]
Servo motor signals				
Servo motor power	At drive	3	1,5 mm^2	600 VAC, 12 A rms
Protective earth	At drive	1	1,5 mm^2	600 VAC
Signals twisted pair for resolver	-	6 [iii]	0,23 mm^2	50 V DC, 1 A rms
Brake	-	2	0,23 mm^2	50 V DC, 1 A rms
Temperature control/PTC	-	2	0,23 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter [iv]	Max. air pressure 16 bar/230 PSI. Max. water pressure 10 bar/145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2 [v]	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1		

i For option 780-4, 13 signals instead of 20.
ii Ethernet with wire colors according to PROFINET standard, M12-connectors.
iii Interface only at axis 3 or aqxis 6.
iv For LeanID 2x1/2" + 2x3/8"
v For LeanID upper arm 25 mm^2

Required general options for Type S/Se

To enable the SpotPack IRB 6640 to perform as intended, general standard robot options are required. These standard options are further described under other chapters and are also mentioned in this chapter.

- Option 716-1. 1 pc. Digital 24 VDC I/O 16 inputs/ 16 outputs
- Option 727-1. 24V 8 Amps power supply
- Option 635-1. Spot. Software option for pneumatic guns

Continues on next page

2.4.2 Configuration result for Type S/Se
Continued

Required options for servo gun, type Se

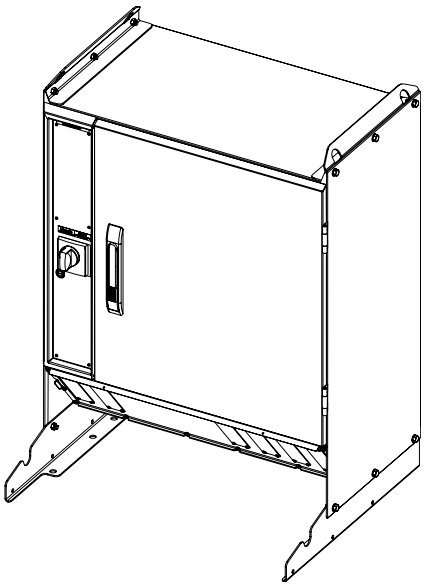
To enable the spot welding function package SpotPack IRB 6640 to run with a servo controlled gun, some additional (additional to those described in previous section "Required general options for Type Se") servo drive options are required. These standard options are described under other chapters and are also mentioned below in this chapter.

- Option 770-4. First additional drive, W Drive
- Option 864-1. Resolver connection, axis 7
- Option 785-1. Robot Gun
- Option 786-1,-2,-3,-4. Connection to first drive (Cable length to be stated)
- Option 635-3. Spot Servo. Software option for servo controlled guns.
- (Software option 635-4 and option 635-5 could also be used)

Also option 630-1, Servo tool change, should be added if servo gun tool change is required.

Required Spot Welding cabinet options for Type S/Se

There are two different variants (see below) of Spot Welding cabinets available. Weld timer brand and weld capacity are stated by choosing one of the optional variants. Additional features could then be added to each cabinet variant. All these options are further described under *Spot Welding cabinet on page 104* and are also mentioned in this chapter.



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Option	Type	Description
782-7	Bosch Basic MFDC	This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated inverter with basic capacity. Type Bosch PSI 6100.630L1.

Continues on next page

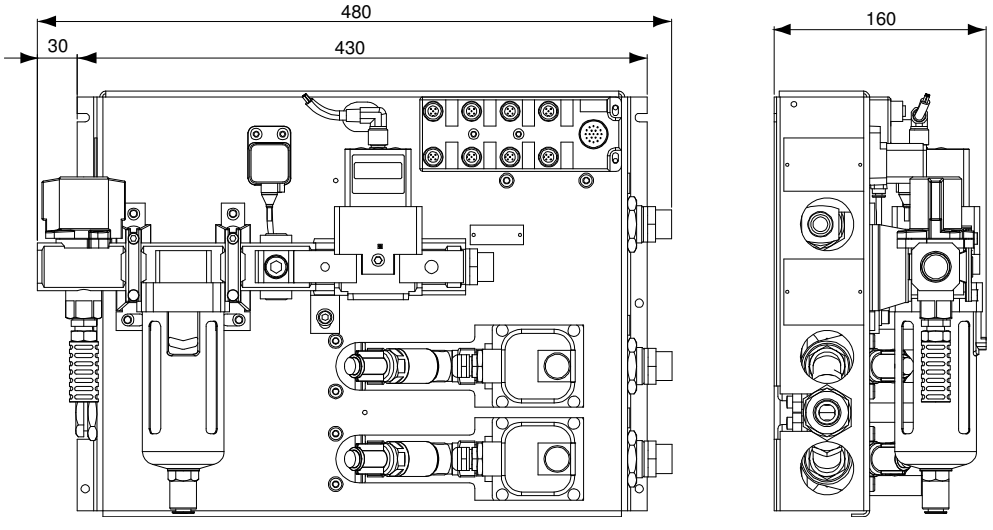
Option	Type	Description
782-11	Bosch MFDC ProfiNet	This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated inverter with basic capacity. Type Bosch PSI 61C0.751OEM.

Additional options to the different Spot Welding cabinets are mentioned below. For further technical details as well as restrictions in combinations see *Spot Welding cabinet on page 104*

Option	Type	Description
788-1	Forced air cooling	Offers a cooling fan with housing placed on the rear of the Spot Welding cabinet which forces air on the cooling surface/grids of the thyristor or MFDC inverter.
789-1	Earth fault protection unit	Offers an earth fault protection integrated with the circuit breaker for the weld power.
790-1	Contactor for weld power	Offers a weld contactor with necessary wiring placed inside the Spot Welding cabinet.
791-1	Weld power cable, 7 m	Weld power cable, 7 m
791-2	Weld power cable, 15 m	Offers floor cable of 15 m length for weld power.
858-1	Bosch Adaptive control	Offers additional functionality for adaptive welding regulation. Only possible with option 782-11.

Required Water and Air unit options for Type S/Se

The SpotPack IRB 6640 also requires Water and Air unit options to perform as intended. These options are further described under *Water and air unit on page 111* and are also mentioned in this chapter.



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Option	Type	Description
792-1	Water and Air unit, type S	Offers the basic water and air unit for type S including splitbox for signal distribution.
793-1	Second water return	Offers an additional water return circuit.

Continues on next page

2.4.2 Configuration result for Type S/Se
Continued

Option	Type	Description
797-1	Cable to split box, 7 m	Offers floor cable of 7 m length for signals between the Spot Welding cabinet and to the split box placed on the water and air unit.
797-2	Cable to split box, 15 m	Offers floor cable of 15 m length for signals between the Spot Welding cabinet and to the split box placed on the water and air unit.
797-3	Cable to split box, 22 m	Offers floor cable of 22 m length for signals between the Spot Welding cabinet and to the split box placed on the water and air unit.
797-4	Cable to split box, 30 m	Offers floor cable of 30 m length for signals between the Spot Welding cabinet and to the split box placed on the water and air unit.

2.4.3 Summary common options for Type S/Se

General

The following options are the minimum required to form a complete SpotPack Type S/Se:

- Option 16-1. Connection to cabinet, (Cable length and communication type to be stated)
- Option 455-1, 455-4 or 455-8. Parallel, Parallel and Bus communication or EtherNet (Communication type to be stated)
- Option 778-2. Spot Welding
- Option 798-2 or 798-3. External routing, DressPack Lower arm (Routing type to be stated)
- Option 780-1 Integrated, 780-2 External routing or 780-4 Internal routing, DressPack Upper arm (Routing type to be stated)

General options

- Option 716-1. 1 pc. Digital 24 VDC I/O 16 inputs/ 16 outputs
- Option 727-1. 24V 8 Amps power supply
- Option 635-1. Spot. (only for type S)

Servo gun type Se

- Option 770-4. First additional drive, W Drive
- Option 785-1. Robot Gun
- Option 786-1,-2,-3,-4. Connection to first drive (cable length to be stated)
- Option 635-3. Spot Servo

Spot Welding cabinet

- Option 791-1. Power cable 7 m (other length available)

Water and air unit

- Option 792-1. Water and air unit, Type S
- Option 797-1. Splitbox cable 7 m (other lengths available)

Other described options depend on specific system need and performance.

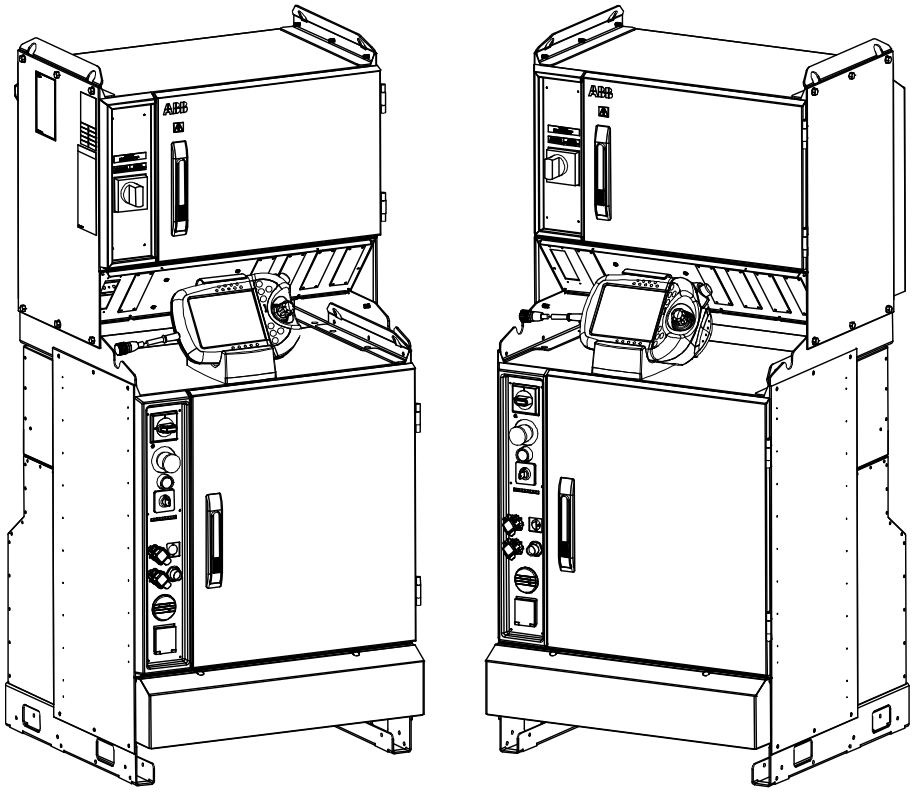
2.5 Spot Welding cabinet

2.5.1 Introduction

General

The Spot Welding cabinet for SpotPack contains the electric components and circuits needed for spot welding application. The Spot Welding cabinet, with the welding controller built in, is controlled from the robot controller via the process software. The capacity and functionality depends on the choice of different option combinations.

The Spot Welding cabinet is designed to be placed on top of the robot controller cabinet (Single cabinet version option 700-3), see Figure below. This is also how it is assembled at delivery.



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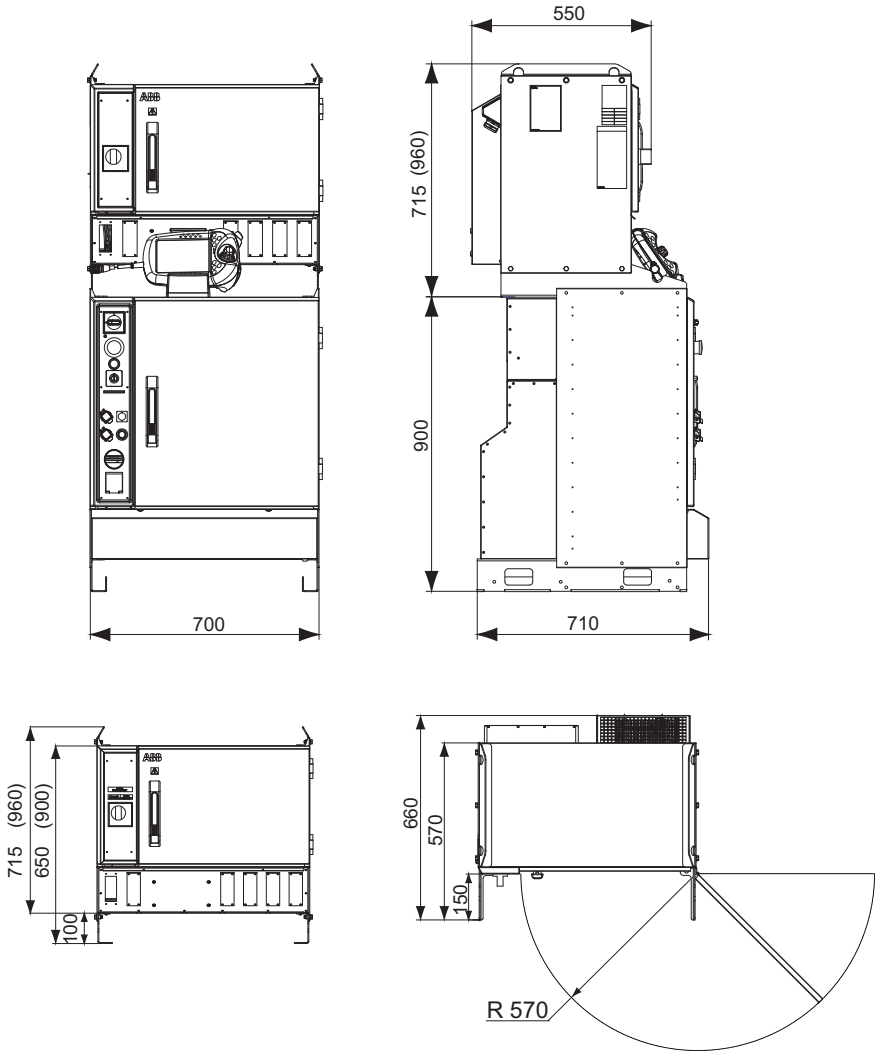
There are interface cables between the robot control cabinet and the Spot Welding cabinet (cable length 1,5 m, connected at rear of the control cabinet and at front of Spot Welding cabinet). These cables includes power feeding for control circuits, process signals to the welding gun, safety signals, communication towards weld timer and I/O:s for indication and control. Depending on chosen options wiring will differ (see option descriptions below for further details).

The Spot Welding cabinet has the following common main features.

- Modular built for easy repair and installation (see Figure below)
- Rotary switch with adjustable thermal release (not for UL option) and short circuit release

Continues on next page

- Cross connection of signal handling with separate fusing for different circuits to achive selectivity
- Programmable weld timer with proportional valve control
- A compact cabinet family based on a common platform prepared for additional options and for easy exchange



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Weld power circuit

The electrical circuits of the Spot Welding cabinet consist of weld power circuit and control circuits to control the welding. The welding power for the welding gun is fed through a circuit breaker and welding thyristor (for AC welding) or inverter (for MFDC welding) and further out to the welding power cable. The cabinet is prepared for power feeding from the floor or from top. The welding power cable (outgoing feeding) is connected, via cable gland, directly to terminals inside the Spot Welding cabinet.

The circuit breaker has a built in thermal release that could be adjusted (not for UL version) for customer specific needs to protect welding equipment and to get

Continues on next page

selectivity in the power circuit. The thermal release is set at 110 A at delivery. The maximum level should not exceed 150 A.

Control Circuits

Power feeding 240/115 V AC and 24 V DC for the control circuits is fed from the robot controller cabinet. Also, the safety circuits in the robot controller cabinet are used to interlock the welding timer.

A welding timer (Bosch), integrated with the air cooled thyristor or inverter, controls the welding current. The welding timer includes control program that gives possibility to program different weld sequences. The programming is normally done on a programming device or a PC that is connected directly to the welding timer. The interface between the robot system and the welding timer is handled via a field bus interface (Can DeviceNet or ProfiNet). Examples of signals are weld start, weld ready, weld program choice and error handling.

Also, cross connections, of interface signals and interlocking between the robot system (I/O-boards), the water and air unit, signals to DressPack or stationary gun, are done within the Spot Welding cabinet.

Programming device for the welding timer is not included in the delivery.

If the option 744-1 is chosen there will follow a door interlock with the Spot Welding cabinet. If option 429-1 is chosen a circuit breaker type T3 will be supplied.

Note

For more information see:

- *Product manual - DressPack/SpotPack IRB 6640*
- Circuit diagrams
- Separate manuals for the Bosch equipment

The welding capacity as well as the weld timer brand could be chosen among the 3 versions described below. Additional features could then be added to each of the cabinet variants.

Option 782-1 Bosch Basic AC

This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated AC-thyristor with basic capacity.

General technical data	Description
Weld timer and thyristor	Bosch PST 6100.630L1
Power feeding	400-600 V AC
Max welding current	130 A rms, 100 kVA transformer
Max wire range, incoming power	3 x 70 mm^2
Main breaker (ABB Sace T1), thermal release	160 A (adjustable) 110-160 A
Main breaker, magnetic release	36 kA
Protection class	IP54

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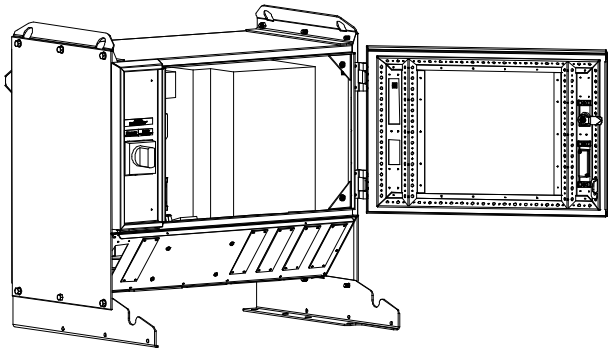

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Option 782-7 Bosch Basic MFDC

This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated inverter with basic capacity.

General technical data	Description
Weld timer and inverter	Bosch PSI 6100.630L1
Max wire range, incoming power	3 x 70 mm2
Power feeding	400-480 V AC
Max welding current	110 A rms, 20 kA weld current
Main breaker (ABB Sace T1), thermal release	160 A (adjustable) 110-160 A
Main breaker, magnetic release	36 kA
Protection class	IP54

Option 782-13 Bosch MFDC ProfiNet

This option gives a basic Spot Welding cabinet equipped with a weld timer from Bosch with an integrated inverter with basic capacity.

General technical data	Description
Weld timer and inverter	Bosch PSI 61C0.751OEM
Max wire range, incoming power	3x50 mm^2
Power feeding	400-480 V AC
Max welding current	110 A rms, 20 kA weld current
Main breaker (ABB Sace T1), thermal release	160 A (adjustable) 110-160 A
Main breaker, magnetic release	36 kA
Protection class	IP54

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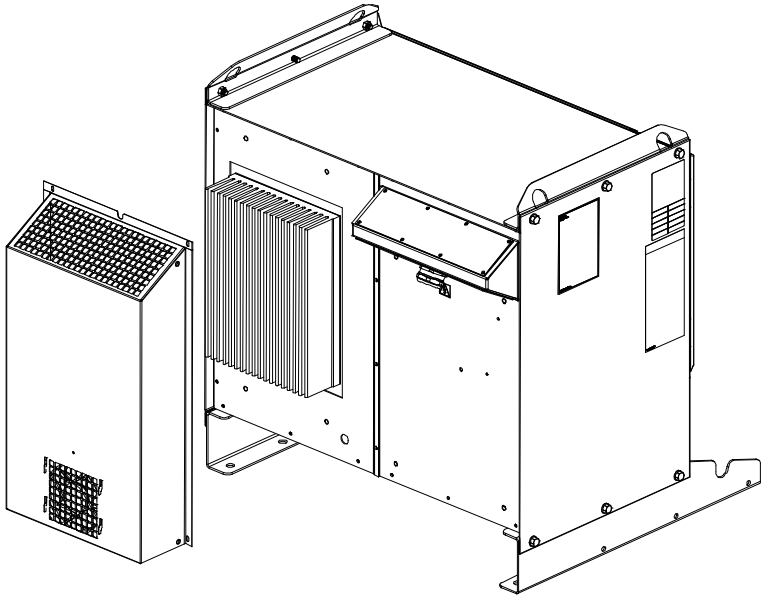
2.5.1 Introduction
Continued

Option 788-1 Forced air cooling

Offers a cooling fan with housing placed on the rear of the Spot Welding cabinet which forces air on the cooling surface/grids of the thyristor or MFDC inverter (see pictures below). Cabling to the fan goes via a cable gland at the rear of the Spot Welding cabinet. The fan runs continuously when the welding system is powered up.

The fan is required to be used together with Bosch MFDC (option 782-7 and -11). For the AC option (option 782-1) the need will depend on the welding conditions and surrounding temperature.



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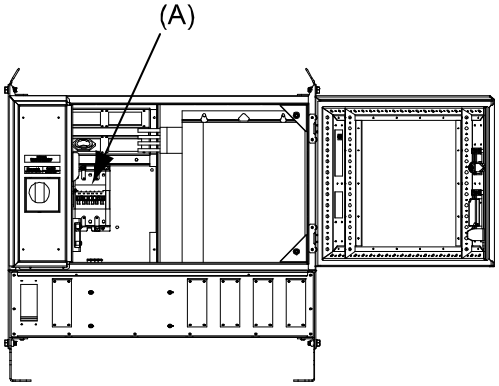
Option 789-1 Earth fault protection unit

Offers an earth fault protection integrated with the circuit breaker for the weld power. This protection could be used for AC welding or MFDC welding. The sensitivity of the earth fault protection could be adjusted. If an earth fault occurs the circuit breaker is tripped.

Continues on next page

Option 790-1 Contactor for weld power

Offers a weld contactor with necessary wiring placed inside the Spot Welding cabinet. The contactor is mounted after the thyristor or inverter and opens up the weld circuit out from the cabinet. It is recommended to be used for increasing safety or when using tool change for weld guns. The contactor is open when the robot system is in motor off mode or when an specific I/O is set.



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Pos	Description
A	Weld contactor

Option 791-1 Weld power cable, 7 m

Offers floor cable of 7 m length for weld power (3x35 mm²). One end of the weld power cable is connected at terminals to the weld timer (Bosch) or the contactor (when option 790-1 is chosen). The cable enters the Spot Welding cabinet via cable gland. The other end is equipped with an MC connector TSB 150/35 and is connected at either the manipulator base (for robot handled gun Type S or Se) or to the stationary gun (for Type HS or HSe).

Option 791-2 Weld power cable, 15 m

Offers floor cable of 15 m length for weld power (3x35 mm²). See option 791-1 for further details.

Option 809-1 Process cable to stationary gun, 7 m

Offers floor cable of 7 m length for process signals between the Spot Welding cabinet and to the stationary gun. This option also includes internal cross connections between I/O, weld timer and power feeding etc.

One end of the process cable enters the Spot Welding cabinet via cable gland and is connected at Phoenix terminals. The other end is equipped with a HD Harting 3 modules and is connected to the stationary gun (for Type HS or HSe).

Option 809-2 Process cable to stationary gun, 15 m

Offers floor cable of 15 m length for process signals between the Spot Welding cabinet and to the stationary gun. See option 809-1 for further details.

2.5.2 Interface description Spot Welding cabinet

General

The interface towards the Spot Welding cabinet is described in the tables below.

Connections for Spot Welding cabinet

Type	Pcs	Specification	Allowed capacity
Incoming power from line [i]	1		400-480 VAC, Max. 110 A rms, 50/60 Hz
Outgoing power to robot	1	Cable gland (min 24 mm / max 28 mm cable diameter)	Max. 150 A rms, 50/60 Hz
Floor cable	2	35 mm^2	Max. 600 VAC, 150 A rms at + 20°C (68°F) ambient temperature
Floor cable protective earth	1	35 mm^2	Max. 600 VAC, 150 A rms at + 20°C (68°F) ambient temperature

[i] Incoming power connection made by customer. For incoming power and safety recommendations see *Product manual - DressPack/SpotPack IRB 6640*.

Connections for Signals

Type	Pcs	Specification	Allowed capacity
Water and air unit (XS 103)	1	Modular Harting connector, type DD	24 V DC, Max 0.5 A / output
Stationary gun (XS 104)	1	Modular Harting connector, type HD	24 V DC, Max 0.5 A / output See interface description Stationary gun type HS and HSe

2.6 Water and air unit

2.6.1 Introduction

General

The Water and Air unit contains components for water and air distribution and control within the SpotPack. The water and air unit is controlled from the robot controller via the process software. Wiring is made via the Spot Welding cabinet.

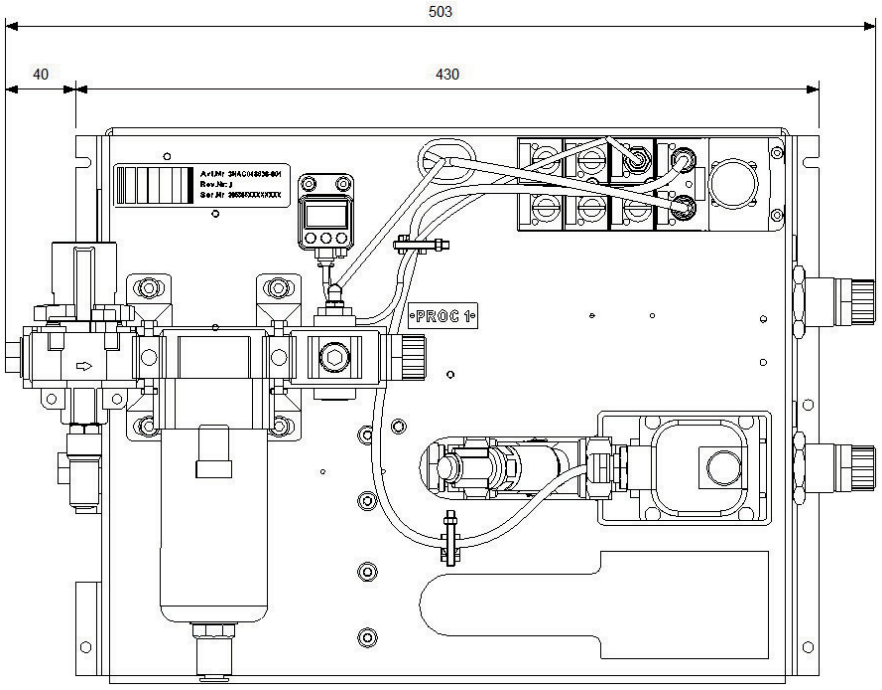
The capacity and functionality depends on the choice of different option combinations, see water and air unit options under this chapter.

The unit is only used for the spot welding application

The Water and Air unit

The Water and Air unit has the following main features (See Figure below):

- Adjustable, high speed water flow sensors.
- Adjustable digital pressure switch for air.
- Air filter with auto draining.
- Possibility to balance water flow for complete package and for individual circuits.
- Preparation for additional options and preparation for easy exchange of complete unit or separate circuits.
- Equipped with extra (plugged) air outlets.



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The standard water and air unit consists of four main assemblies.

- Water in circuit

Continues on next page

2.6.1 Introduction
Continued

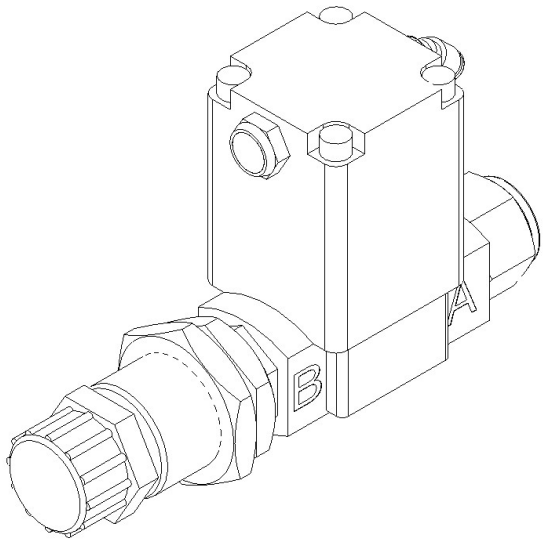
- Water return circuit
- Air supply circuit
- Split box

Cables and hoses required for Water and Air unit are defined and described under each option for water and air unit.

Water in circuit

The function of the water in circuit is to open / close the cooling water supply to the Spot welding gun (see Figure below). An electrical 2 port solenoid valve is used. The valve is controlled by a digital signal from the robot control system.

The circuit begins from left to right with a lead in hole in the mounting plate, a G ½" thread is used for the connection of the factory water supply system, electrical 2 port solenoid valve and ends with a Parker Pushlock adapter. (Suitable for a Parker Pushlock DIN 20 078 A, we recommend a Parker Pushlock 39C82-15-8BK fitting). From this point the water is led to the gun/robot base.



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Water return circuit

The water return circuit monitors the flow of the returning cooling water from the Spot welding gun (see Figure below). The flow switch detects if the water flow is too low in the cooling water circuit.

The flow switch gives a digital signal to the robot control system, which automatically shuts off the electrical shut off valve in the water in circuit if the flow is too low.

The system and the supply of cooling water are then automatically stopped to minimize risk of damage to the system.

The water return circuit is delivered with a pre-set flow limit, set to 8 liters per minute at 0.2 MPa water pressure.

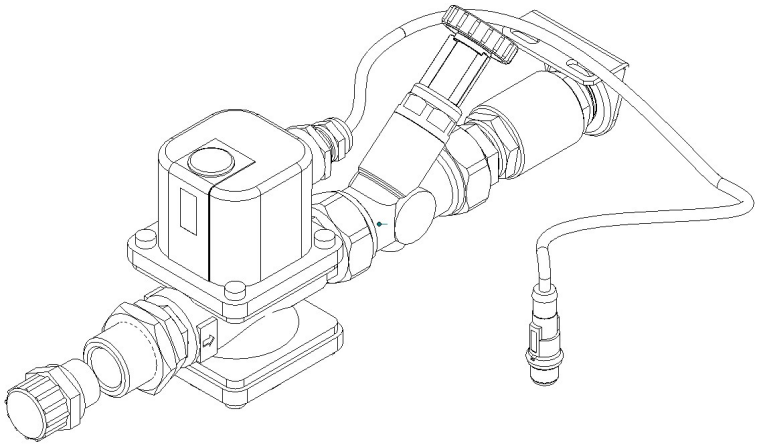
Continues on next page

The water return circuit begins from right with a Parker Pushlock adapter (suitable for a Parker Pushlock DIN 20 078 A, we recommend a Parker Pushlock 39C82-15-8BK fitting).

It is also equipped with a flow control valve; the flow control can adjust the water flow to the desired flow level. The flow rate can be monitored by the scale on the flow control valve. The scale can be rotated so that easy reading can be performed. This will serve as a rough function check in the flow range between 1 to 8 litres per minute.

The flow control valve is when delivered adjusted for maximum flow.

The circuit ends with a check-valve that will stop any reversing water flow and ends with an internal G ½" thread. From this point the water is led to the factory water system.



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A second water return, option 793-1, is also available with the same specification as above.

Air supply circuit

The air supply circuit provides the function package with filtered air (see Figure below).

The air supply circuit begins with a internal G ½" thread, manually operated shut off valve with residual pressure release though a silencer, air filter with nominal filtration of 5 µm with a metal protection of the bowl, a digital pressure switch and a cross interface containing plugged air outlet ports (internal G 3/8" thread).

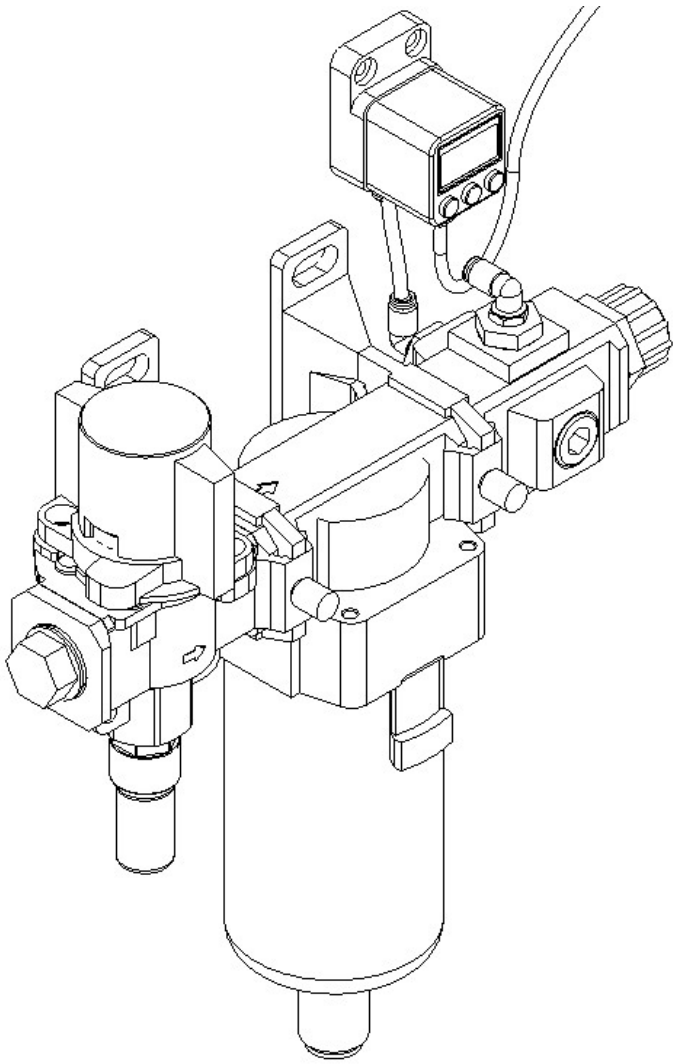
There is a digital pressure switch to monitor the air pressure and to give a signal to the control system if the pressure becomes too low.

The pressure switch is delivered with pre-set pressure limit, set to 0.6 MPa.

Continues on next page

2.6.1 Introduction
Continued

The air supply circuit ends with a Parker Pushlock adapter (suitable for a Parker Pushlock DIN 20 078 A, we recommend a Parker Pushlock 39C82-15-8BK fitting).



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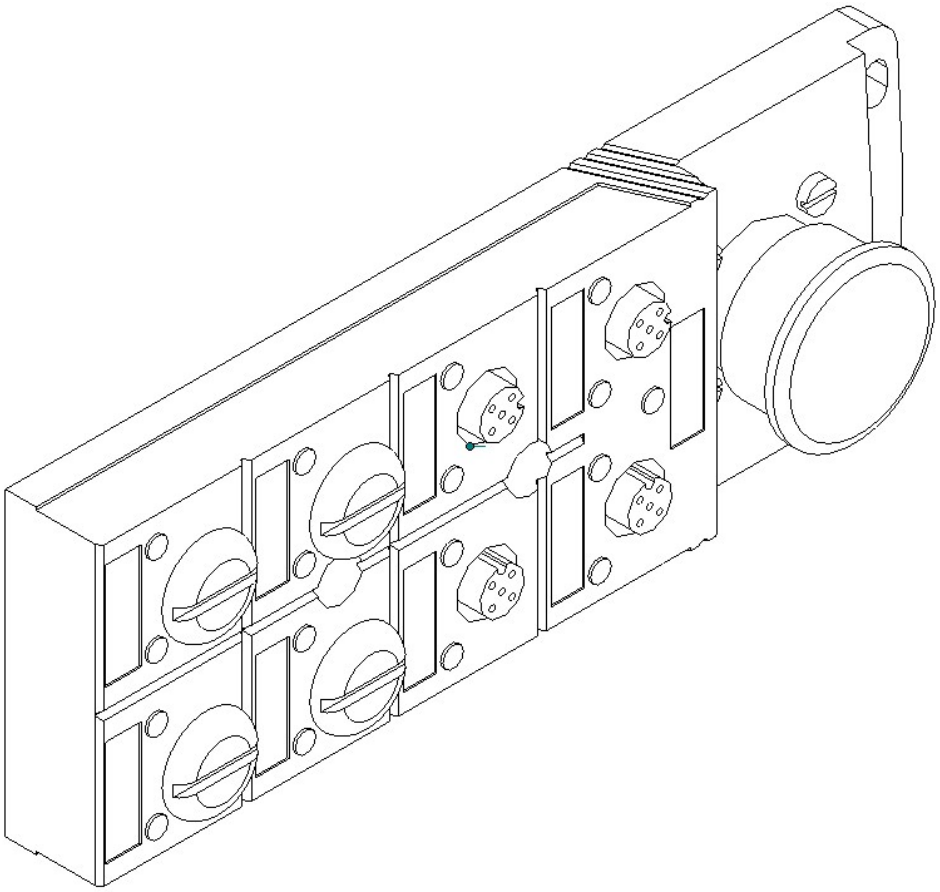
Split box/Connection box

With the split box, the 24VDC supply and signals are connected and distributed to the different units on the water and air unit, see Figure below. The design makes disconnection of separate items for service and repair on the water and air unit very easy. The split box has a protection class IP67, which means it is well protected against dust and water leakage.



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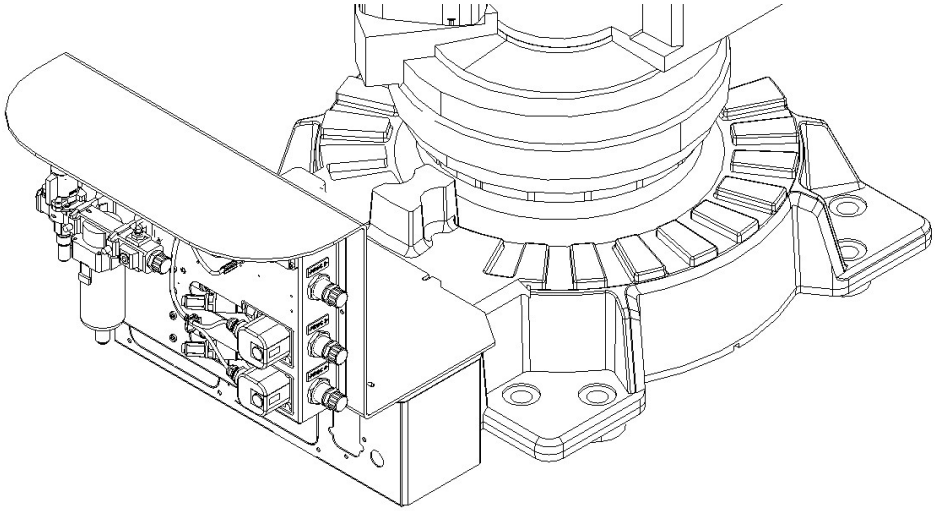
2.6.1 Introduction
Continued

Mounting

Type S, robot mounted spot welding gun, is mounted at the robot at factory and water and air hoses are included and connected to the robot base.



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Type HS, robot handles part against a pedestal mounted spot welding gun, the Water and Air panel is delivered in a together with the robot.

Signals for water and air unit

Electrical connections to robot I/O board are made via the Split box on the Water and Air unit or to connection box at robot base (Figure below shows Split box. For connection box see Circuit diagram.)

8 x M12 connections (4 pins) are available. The number in use depends on option choices. But at least two are free connection and can be used for customer purposes.

The Split box has six connections prepared for the following units:

- 1. Electric water shut off valve
- 2. Pressure switch
- 3. Flow switch 1
- 4. Flow switch 2 (Option 793-1 Second Water Return)
- 5. Proportional valve: Prop. ref. signal & pressure OK signal
- (Option 796-1 Electrical proportional valve for air)
- 6. Proportional valve: Power supply
- (Option 796-1 Electrical proportional valve for air)

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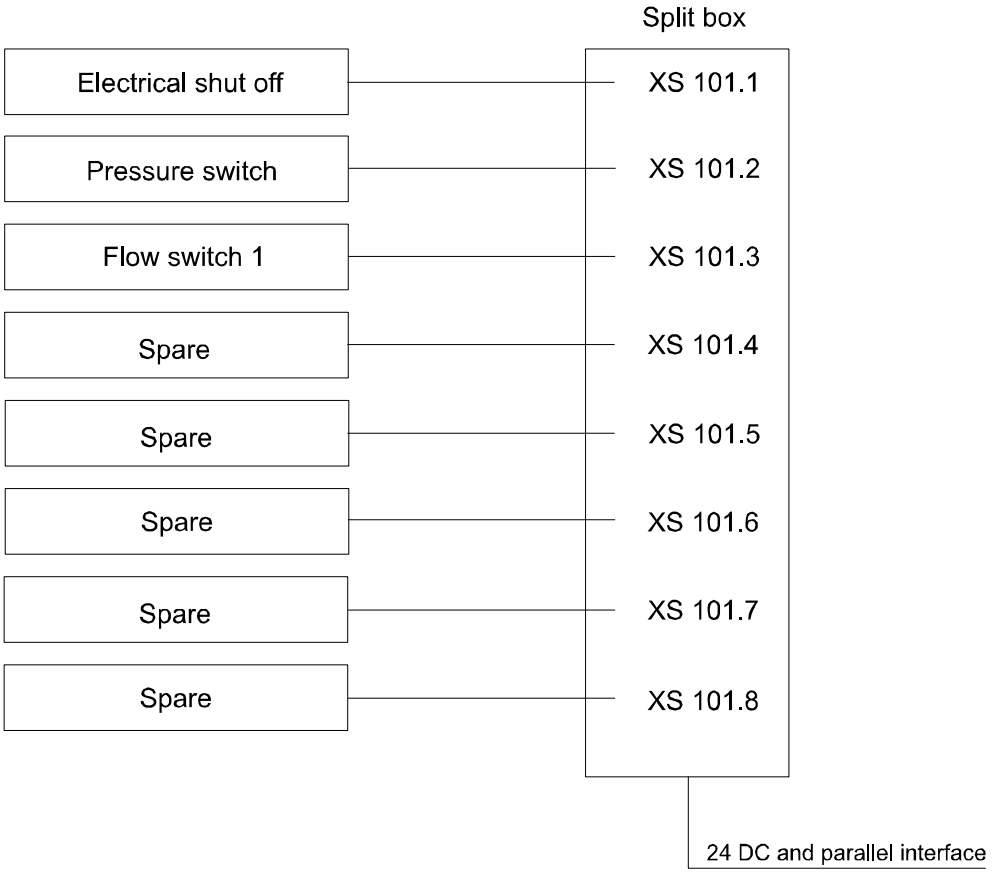
The cable and cable length between the Split box and the Spot Welding cabinet must be specified (see option 797-1,-2,-3,-4).



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Option	Type	Description
792-1	Water and Air unit, type S	The basic water and air unit for type S is equipped for a robot handled gun and with the following components: Water in circuit Water return circuit Air supply circuit Split box 1/2 " hose between air supply circuit and manipulator base (PROC 1) 1/2 " hose between water in circuit and manipulator base (PROC 2) 1/2 " hose between water return circuit and manipulator base (PROC 3)
792-2	Water and Air unit, type HS	The basic water and air unit for type HS is equipped for a pedestal/stationary gun. Hoses between water and air unit, welding equipment and robot are not supplied. These have to be arranged by the customer.

Continues on next page

2.6.1 Introduction
Continued

Option	Type	Description
793-1	Second water return	The option adds an additional water return circuit. See Water return circuit. An additonal 1/2” water hose (PROC 4) from the Water and Air unit to manipulator base is included.
796-1	Electrical proportional valve air Eq.	Offers a proportional valve with integrated control circuit and connection cable to the splitbox.
797-1	Cable to split box, 7 m	Offers floor cable of 7 m length for signals to the split box placed on the water and air unit. This cable is connected to the cabinet with a modular Harting and it ends with a quick connector at the split box.
797-2	Cable to split box, 15 m	Offers floor cable of 15 m length for the split box. See description of option 797-1.
797-3	Cable to split box, 22 m	Offers floor cable of 22 m length for the split box. See description of option 797-1.
797-4	Cable to split box, 30 m	Offers floor cable of 30 m length for the split box. See description of option 797-1.

2.6.2 Technical data

Media interface description

The interface towards the Water and Air unit is described in table below.

Type	Pcs	Specification
Incoming water	1	G 1/2” thread[i]
Outgoing water	1	G 1/2” thread[i]
Incoming air	1	G 1/2” thread[i]
Extra air outlet	1	G 3/8” thread[ii]

i Connection to be made by customer.
ii Plugged at delivery (to be used for tip-dresser or other equipment).

General data

Water	Description
Operating pressure	Max. 0.6 MPa / 87PSI
Proof pressure	1.2 MPa / 174 PSI
Maximum pressure drop	< 0.2 MPa at 8 litre/minute[i]
Flow regulating (each circuit)	1 - 16 l/min
Flow setting range	-0.100 - 1.000 MPa
Water quality	Normal filtred industrial water 80 to 100 mesh.

i The pressure drop is measured under the following conditions:
- Measuring point 1: Incoming water connection at water and air unit.
- Measuring point 2: Outgoing water connection at water and air unit.

The water hoses (Proc 2 and Proc 3) are cross-connected at the end at axis 6 (the pressure drop is measured without any tool).

Air	Description
Operating pressure	Max. 1.0 MPa / 145 PSI
Flow capacity	Max. 5800 litres/min. (at 0.7 MPa with a 0.1 MPa pressure drop
Pressure switch set range	- 0.100 - 1.000 MPa
Air quality	Use clean air. When there is excessive condensate, install a device that eliminates water such as dryer or water separator (Drain Catch) on the inlet side of the air filter.

2.7 Connection kits

General

For detailed information on connection location see *Interface descriptions for DressPack on page 65*

Below is an example of a connector kit and its parts.

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Base - Connector kits

		DressPack options			Resolver conn., axis 7	Description
Option	Name	798-1	798-2	798-3	864-1	
459-1	CP/CS, Proc 1 on base	X	X	X		
453-1	FB 7				X	

Option 459-1, CP/CS, Proc 1 on base

R1. CP/CS and Proc 1 on base.

This option offers a kit with connectors. This must be assembled by the customer. The kit contains:

- 1 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN EMC / M 40
1 pcs Hinged frame (Harting)	Shell size 16
2 pcs Multicontact, female (Harting)	Type HD (25 pin)
1 pcs Multicontact, female (Harting)	Type DD (12 pin)
1 pcs Multicontact, female (Harting)	Type EE (8 pin)
10 pcs Female crimp contacts	For 1,5 mm^2

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10 pcs Female crimp contacts	For 0,5 mm^2
10 pcs Female crimp contacts	For 1,0 mm^2
10 pcs Female crimp contacts	For 2,5 mm^2
12 pcs Female crimp contacts	For 0,14– 0,37 mm^2
45 sockets	For 0,2– 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

Option 453-1, FB 7

R3. FB 7 on base

This option offers a kit with a connector. This must be assembled by the customer. The kit contains:

- Connector with:

1 pcs Multiple connector (pin)	Souriau
1 pcs Adaptor	8 pin
15 pcs Pin	for 0,13-0,25 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

Axis 2 - Connector kits

		DressPack option	Description
Option	Name	798-2 (MH/SW 2)	
458-1	CP/CS, Proc 1 axis 3	X	4 module Harting
479-1	Weld, Proc 2-4 axis 3	X	MC

Option 458-1, CP/CS, Proc 1 axis 3

R2. CP/CS and Proc 1 on axis 2/3

This option offers a kit with connectors. This must be assembled by the customer.

The kit contains:

- 1 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN EMC / M 40
1 pcs Hinged frame (Harting)	Shell size 16
2 pcs Multicontact, male (Harting)	Type HD (25 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 pin)
1 pcs Multicontact, male (Harting)	Type EE (8 pin)
10 pcs Male crimp contacts	For 1,5 mm^2
10 pcs Male crimp contacts	For 0,5 mm^2
10 pcs Male crimp contacts	For 1,0 mm^2

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2.7 Connection kits
Continued

10 pcs Male crimp contacts	For 2,5 mm^2
12 pcs Male crimp contacts	For 0,14 – 0,37 mm^2
45 pin	For 0,2 – 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

Option 479-1, Weld, Proc 2-4 axis 3

R2. Weld and Proc 2-4 on axis 2/3

This option offers a kit with weld connector and fittings. This must be assembled by the customer.

The kit contains:

- 3 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- Weld connector with:

1 pcs Welding connector pin with flange (MC)	3x35 mm2 (25 mm2 pin)
1 pcs Cable gland, plastic	Diameter 24-28 mm
Assembly Accessories to complete connector	
Assembly instruction	

Axis 3 - Connector kits

		DressPack options		Description
Option	Name	798-1 (MH 1)	798-3 (LeanID)	
458-1	CP/CS, Proc 1 axis 3	X	No kit available	4 Module Harting

Option 458-1, CP/CS, Proc 1 axis 3

R2. CP/CS and Proc 1 on axis 2/3

This option offers a kit with connectors. This must be assembled by the customer.

The kit contains:

- 1 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN EMC / M 40
1 pcs Hinged frame (Harting)	Shell size 16
2 pcs Multicontact, male (Harting)	Type HD (25 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 pin)
1 pcs Multicontact, male (Harting)	Type EE (8 pin)
10 pcs Male crimp contacts	For 1,5 mm^2
10 pcs Male crimp contacts	For 0,5 mm^2
10 pcs Male crimp contacts	For 1,0 mm^2
10 pcs Male crimp contacts	For 2,5 mm^2
12 pcs Male crimp contacts	For 0,14 – 0,37 mm^2

Continues on next page

45 pin	For 0,2 – 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

Axis 6 - Connector kits

		DressPack options				Description
Option	Name	780-1 (ID)	780-2 (MH/SW 2)	780-3 (MH 3)	780-4 (LeanID)	
543-1	CP/CS/BUS Proc 1 axis 6		X		X	3 Module Harting
452-1	Weld Proc 1-4 axis 6		X		X	MC
543-1	CP/CS/CBUS Proc 1 axis 6			X		UTOW
452-1	Weld Proc 1-4 axis 6			X		MC, Seperate conductors
458-1	CP/CS Proc 1 axis 3	X				4 Module Harting (Same as for axis 3)
479-1	Weld Proc 2-4 axis 3	X				MC (Same as axis 3)

Option 543-1, CP/CS/CBus, Proc 1 axis 6

Harting

CP/CS/CBus, Proc 1 axis 6 on tool side for option 780-2.

This kit offers a kit with connectors to be mounted at toolside of axis 6.

This must be assembled by the customer.

The kit contains:

- 1 Hose fitting (Parker Push lock (1/2”, M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs Hood Foundry (Harting)	HAN
1 pcs Hinged frame (Harting)	Shell size 10
1 pcs Multicontact, male (Harting)	Type HD (25 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 pin)
1 pcs Multicontact, male (Harting)	Type EE (8 pin)
10 pcs Male crimp contacts	For 1,5 mm^2
10 pcs Male crimp contacts	For 0,5 mm^2
10 pcs Male crimp contacts	For 1,0 mm^2
10 pcs Male crimp contacts	For 2,5 mm^2
15 pcs Male crimp contacts	For 0,14 – 0,37 mm^2
30 pins	For 0,2 – 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

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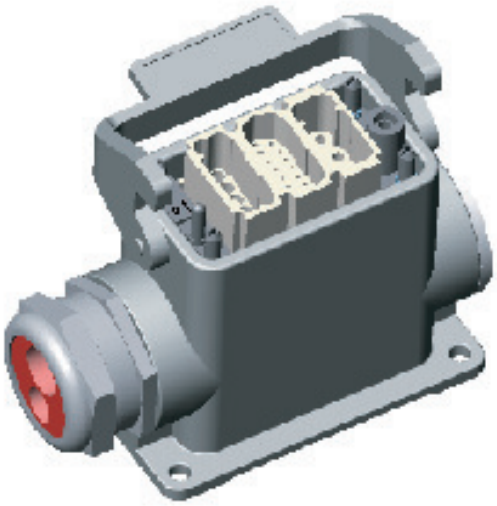
2.7 Connection kits

Continued



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Souriau

CP/CS/CBus, Proc 1 axis 6 on tool side for option 780-3.

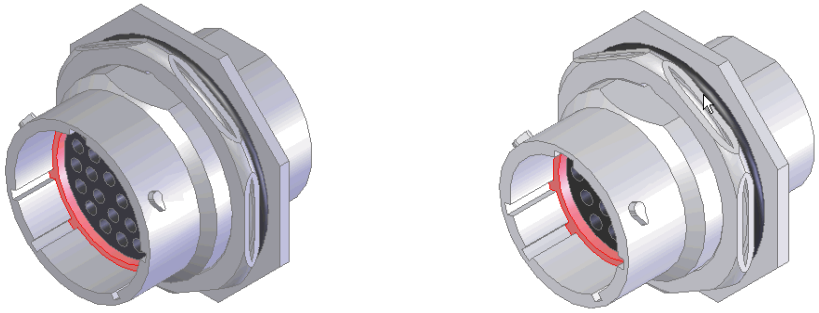
This kit offers a kit with connectors to be mounted at toolside of axis 6.

This must be assembled by the customer.

The kit contains:

- 1 Hose fitting (Parker Push lock (1/2”, M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs UTOW Pin connector 32p (Souriau)	Shell size 18
1 pcs Backshell (Souriau)	Shell size 14
1 pcs Cable cland, EMC (Souriau)	M20 D=11,0-14,0
1 pcs UTOW Pin connector 19p (Souriau)	Shell size 14
1 pcs Backshell (Souriau)	Shell size 18
1 pcs Cable gland, EMC	M25 D=13,0-16,0
40 pcs Pin	0.21-0.93 mm^2
Assembly Accessories to complete connector	
Assembly instruction	



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LeanID

CP/CS/CBus, Proc 1 axis 6 on tool side for option 780-4.

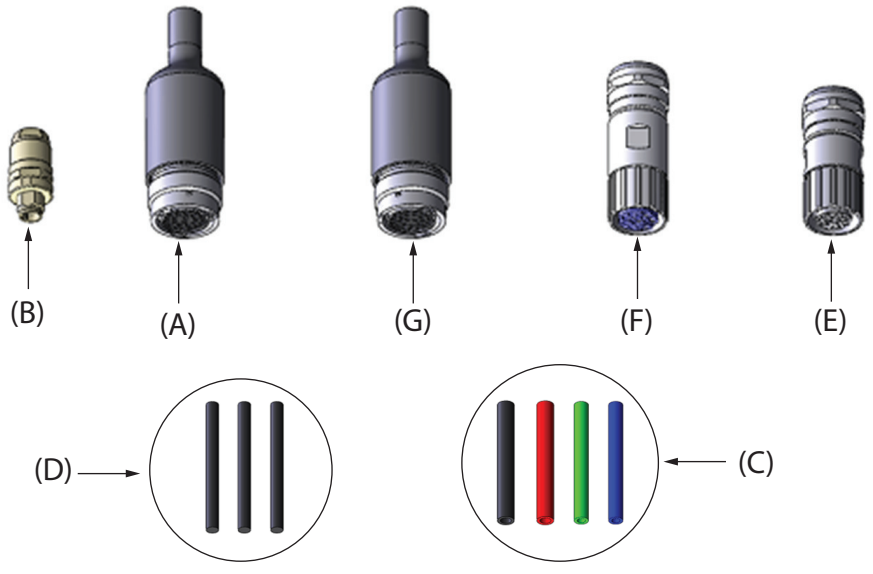
This kit offers a kit with connectors to be mounted at toolside of axis 6.

This must be assembled by the customer.

The kit contains:

- 1 Hose fitting (Parker Push lock (1/2”, M22x1,5 Brass, 24 degree seal))
- Connector with:

1 pcs UTOW Pin connector 26p	Shell size 16
1 pcs Shrink boot adapter	Shell size 16
26 pcs Pin	0.21-0.93 mm^2
1 pcs UTOW Pin connector 10p	Shell size 12
1 pcs Cable cland, EMC	M20 D=11,0-14,0
1 Shrink boot adapter	Shelll size
6 pcs Pin	0.21-0.93 mm^2
1 pcs Socket connector	M12
4 pcs Socket	0.13-0.33 mm^2
1 pcs Hose coupling	1/2", M22x1.5
Assembly Accessories to complete connector	
Assembly instruction	



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Option 452-1, Weld, Proc 1-4 axis 6

Weld and Proc 1-4 axis 6 on manipulator side

The process cable package from axis 2 to axis 6 (option 780-2 or 780-4) ends with free end for media and for weld power cable. The option 452-1 offers a kit for connectors. This must be assembled by the customer when hoses and power cable has been cut to required length.

Continues on next page

The kit contains:

- 4 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- 1 Multi contact connector (Female) type including:

1 pc Welding connector socket incl. housing	3x35 mm^2 (35 mm^2 socket)
1 pc Cable gland	
1 pc End housing	
Assembly Accessories to complete connector	
Assembly instruction	

LeanID

Weld and Proc 1-4 axis 6 on manipulator side

The process cable package from axis 3 to axis 6 (option 780-4) ends with free end for media and for weld power cable. The option 452-1 offers a kit for connectors. This must be assembled by the customer when hoses and power cable has been cut to required length.

The kit contains:

- 4 Hose fittings (Parker Pushlock, (2 x ½", M22x1,5) and (2x 3/8", M16x1.5))
- 1 Multi contact connector (Female) type including:

1 pc Welding connector	3x35 mm^2
1 pc Cable gland	Diameter 24-28 mm
1 pc End housing	0,21-0,93 mm^2
1 pcs Reducing coupling	PG36/PG29
Assembly Accessories to complete connector	
Assembly instruction	

Option 479-1, Weld, Proc 2-4 axis 3

R2. Weld and Proc 2-4 on axis 2/3

This option offers a kit with weld connector and fittings. This must be assembled by the customer.

The kit contains:

- 3 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))
- Weld connector with:

1 pcs Welding connector pin with flange (MC)	3x35 mm2 (25 mm2 pin)
1 pcs Cable gland, plastic	Diameter 24-28 mm
Assembly Accessories to complete connector	
Assembly instruction	

Option 458-1, CP/CS, Proc 1 axis 3

R2. CP/CS and Proc 1 on axis 2/3

This option offers a kit with connectors. This must be assembled by the customer.

The kit contains:

- 1 Hose fittings (Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal))

Continues on next page

2.7 Connection kits
Continued

- Connector with:

1 pcs Hood Foundry (Harting)	HAN EMC / M 40
1 pcs Hinged frame (Harting)	Shell size 16
2 pcs Multicontact, male (Harting)	Type HD (25 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 pin)
1 pcs Multicontact, male (Harting)	Type EE (8 pin)
10 pcs Male crimp contacts	For 1,5 mm^2
10 pcs Male crimp contacts	For 0,5 mm^2
10 pcs Male crimp contacts	For 1,0 mm^2
10 pcs Male crimp contacts	For 2,5 mm^2
12 pcs Male crimp contacts	For 0,14 – 0,37 mm^2
45 pin	For 0,2 – 0,56 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

3 Specification of variants and options

3.1 Introduction to variants and options

General

The different variants and options for the IRB 6640 are described in the following sections. The same option numbers are used here as in the specification form.

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

3.2 Manipulator

Variants

Option	IRB type	Handling capacity (kg)	Reach (m)
435-72	6640	235	2.55
435-74	6640	185	2.8

Manipulator color

Option	Description	Note
209-196	ABB grey standard	Mandatory for Foundry Prime

Protection types

Option	Protection type	Note
287-4	Standard	IP 67

Continues on next page

Option	Protection type	Note
287-6	Foundry Prime 2	See *Protection type Foundry Prime 2 on page 12* for a complete description of protection type Foundry Prime 2. Only available for robot versions IRB 6640-235/2.55, IRB 6640-185/2.8. The following options are NOT selectable together with option 287-6: • 209-2 ABB White standard • 209 RAL code • 213-1 Safety lamp • 37-1 Base plate • 87-1 Cooling fan for axis 1 motor • 184-1 Insulated Tool Flange • 536-1 Chip protection • 34-1 Working range limit axis 3 • 429-1 Underwriters Laboratories • 438-2 Standard + 12 months • 438-4 Standard + 18 months • 438-5 Standard + 24 months • 438-6 Standard + 6 months • 438-7 Standard + 30 Months • 455-1 Parallel Communication • 778-2 Spot Welding • 798-2 Base to axis 2 • 798-3 Base to axis 3 • 780-1/-2/-3/-4 DressPack upper arm • 786-1 to -4 Connection to first drive • 715-1 Installation kit • 788-1 Forced air cooling • 789-1 Earth fault protection unit • 804-1 Syncronize labels • 452-1 Weld Proc 1-4 axis 6 • 543-1 CP/CS/BUS, Proc 1 axis 6 • 453-1 FB 7 • 791-1/-2/-4/-5 Weld power cable • 797-1 - -4 Cable to Split box • 790-1 Contact for weld power • 828-1/-2 Weld cabinet prepared for • 792-1/-2/-6 Water and Air unit • 793-1 Second water return • 796-1 El. prop. valve air eq.

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Warranty

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

Note

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

Option	Type	Description
438-1	Standard warranty	Standard warranty is 12 months from *Customer Delivery Date* or latest 18 months after *Factory Shipment Date*, whichever occurs first. Warranty terms and conditions apply.
438-2	Standard warranty + 12 months	Standard warranty extended with 12 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-4	Standard warranty + 18 months	Standard warranty extended with 18 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-5	Standard warranty + 24 months	Standard warranty extended with 24 months from end date of the standard warranty. Warranty terms and conditions apply. Contact Customer Service in case of other requirements.
438-6	Standard warranty + 6 months	Standard warranty extended with 6 months from end date of the standard warranty. Warranty terms and conditions apply.
438-7	Standard warranty + 30 months	Standard warranty extended with 30 months from end date of the standard warranty. Warranty terms and conditions apply.
438-8	Stock warranty	Maximum 6 months postponed start of standard warranty, starting from factory shipment date. Note that no claims will be accepted for warranties that occurred before the end of stock warranty. Standard warranty commences automatically after 6 months from *Factory Shipment Date* or from activation date of standard warranty in WebConfig. **Note** Special conditions are applicable, see *Robotics Warranty Directives*.

Continues on next page

Warranty for DressPack

Note

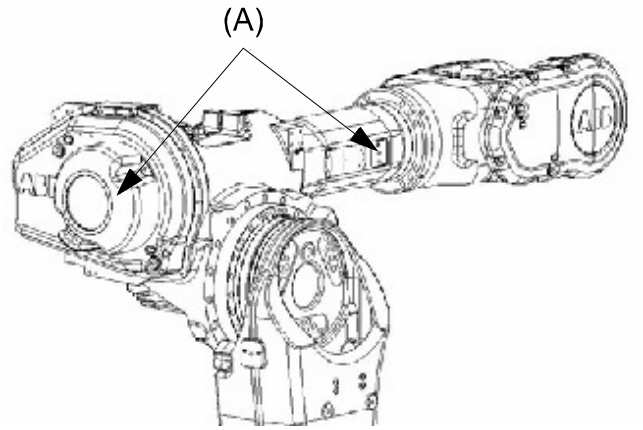
Option 780-3 upper arm DressPack HM3 is not covered by warranty.

3.3 Equipment

General

Option	Type	Description
159-1	Fork lift device	Lifting device on the manipulator for fork-lift handling. Note. When Cooling Fan for axis 1 motor unit is used, this must be disassembled in order to use fork lift device.
430-1	Upper arm covers	See Figure in *Upper arm covers on page 134*. Included in protection Foundry.

Upper arm covers



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Pos	Description
A	Option 430-1

Electronic Position Switches (EPS)

The mechanical position switches indicating the position of the three main axes are replaced with electronic position switches for up to 7 axes, for increased flexibility and robustness. For more detailed information, see *Product specification - Controller IRC5* and *Application manual - Electronic Position Switches*.

Working Range Limit

To increase the safety of the robot, the working range of axes 1, 2 and 3 can be restricted by extra mechanical stops.

Option	Type	Description
29-2	Axis 1, 7,5/15 degrees	Two stops which allow the working range to be restricted in increments of 7,5° or 15°.
32-1	Axis 2	Six stops which allow the working range to be restricted in increments of 15° at both end positions. Each stop decreases the motion by 15°.

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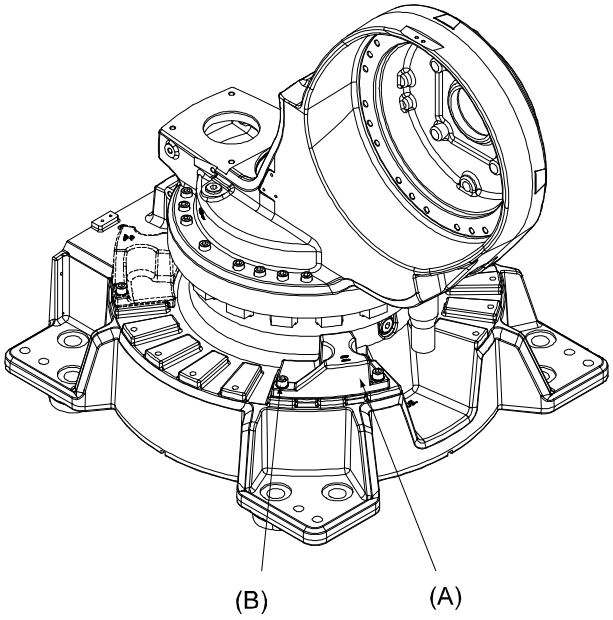

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Pos	Description
A	Four mechanical stops
B	Bolt tightening torque: 120 Nm

3.4 Floor cables

Manipulator cable length

Option	Lengths
210-2	7 m
210-3	15 m
210-4	22 m
210-5	30 m

3.5 Process DressPack

Connection to

Option	Connection to	Description
16-1	Cabinet	The signals CP/CS are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08, in the controller. The cable between R1.CP/CS and the controller is supplied. For information about the limited number of signals available, see *Tye H/HS/HSe on page 76*, and *Type S/Se on page 89*.

Communication

Option	Type	Description
455-4	Parallel and bus communication	Includes CP, customer signals and CAN/DeviceNet or Profibus for process cable package.

3.6 DressPack floor cables

Connection to Parallel/CAN DeviceNet/Profibus/Ethernet

Following information specifies the cable length for Parallel, CANDeviceNet/Profibus/Ethernet for connection to cabinet.

Option	Lengths	Description
90-2/92-2	7 m	
90-3/92-3	15 m	
90-4/92-4	22 m	
90-5/92-5	30 m	

3.7 DressPack lower arm

DressPack process configuration

Note

For more information about the process cable packages, see *DressPack lower arm on page 139*

Option	Description	Note
778-1	Material Handling	Includes signals and one air hose.

DressPack lower arm

Option	Description	Note
798-1	Routing from base to axis 3	Material Handling, Harting connector at axis 3 .
798-3	Routing from base to axis 3	Material Handling, UTOW connector at axis 3

3.8 Connection kits

General

The connectors fit to the connectors at the manipulator base, axis 3 and 6 respectively.

Content

The kit consists of connectors, pins and sockets. For technical description, see *Connection kits on page 120*.

Option	Type	Description
459-1	R1.CP/CS, PROC1	For the Customer Power/Customer Signal connector and one Process connector on the manipulator base. Sockets for bus communication are included.
458-1	R2.CP/CS, PROC1	For the Customer Power/Customer Signal connector and one Process connector at axis 3. Pins for bus communication are included.

3.9 Process cabinet

Empty cabinet

Option	Type	Description
768-1	Empty cabinet small	See *Product specification - Controller IRC5 with FlexPendant*
768-2	Empty cabinet large	See *Product specification - Controller IRC5 with FlexPendant*
715-1	Installation kit	See *Product specification - Controller IRC5 with FlexPendant*

3.10 User documentation

User documentation

The user documentation describes the robot in detail, including service and safety instructions.

All documents can be found via myABB Business Portal, *www.myportal.abb.com*.

4 Accessories

4.1 Introduction to accessories

General

There is a range of tools and equipment available, especially designed for the manipulator.

Basic software and software options for robot and PC

For more information, see *Product specification - Controller IRC5 with FlexPendant* and *Product specification - Controller software IRC5*.

Robot peripherals

- The Track Motion is not adapted for the remote connector plate on IRB 6790 and the air supply needed for the overpressure in manipulator and the air pressure supervision.
- Motor Units

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