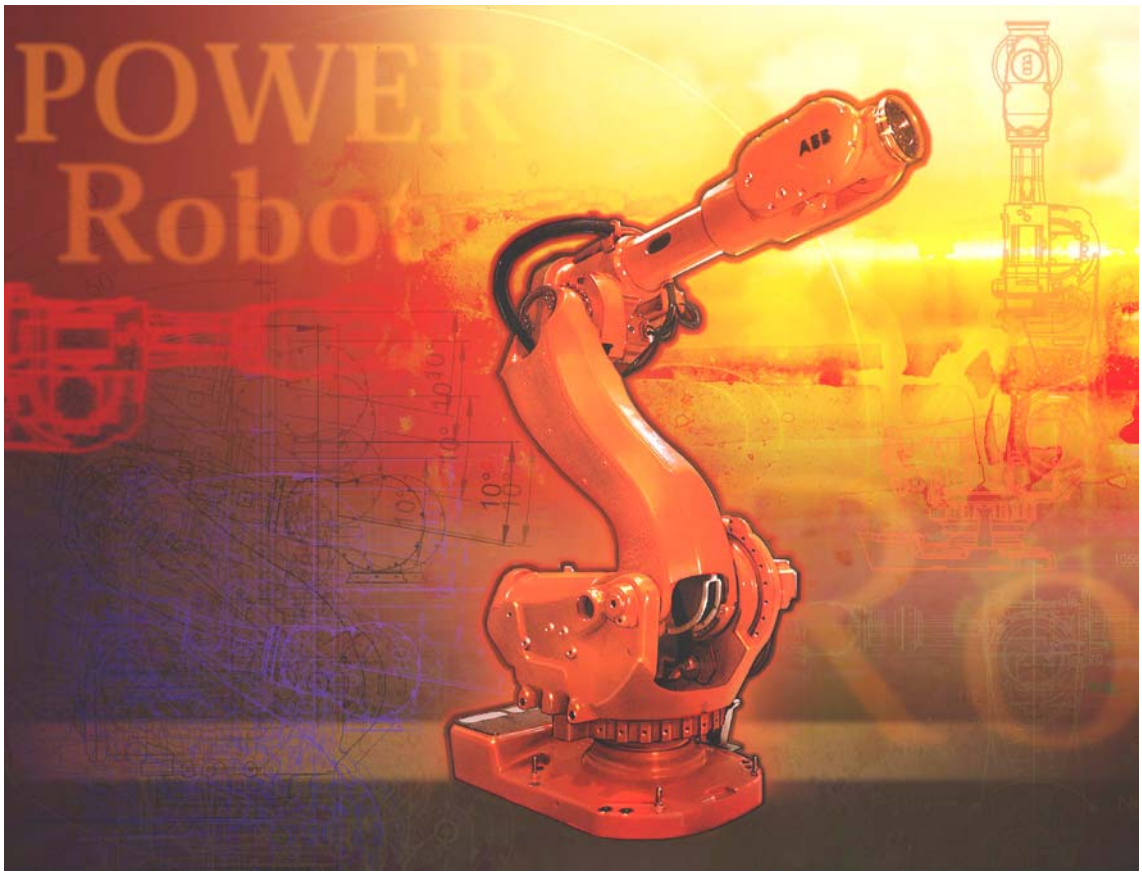
The heart of Robotics

Product specification

Articulated robot

IRB 6600 - 175/2.55
IRB 6600 - 225/2.55
IRB 6600 - 175/2.8
IRB 6650 - 125/3.2
IRB 6650 - 200/2.75
IRB 6650S - 90/3.9
IRB 6650S - 125/3.5
IRB 6650S - 200/3.0
IRB 6600ID - 185/2.55
IRB 6650ID - 170/2.75
M2004



ABB

Product specification

Articulated robot
3HAC 023933-001
Rev.H
IRB 6600 - 175/2.55
IRB 6600 - 225/2.55
IRB 6600 - 175/2.8
IRB 6650 - 125/3.2
IRB 6650 - 200/2.75
IRB 6650S - 90/3.9
IRB 6650S - 125/3.5
IRB 6650S - 200/3.0
IRB 6600ID - 185/2.55
IRB 6650ID - 170/2.75
M2004

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Overview

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 integrated auxiliary equipments as that is: Customer Connections, Servo Gun, DressPack and SpotPack
- The specifiaction of variant and options available

Users

It is intended for:

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

Contents

Please see Table of Contents on page 3.

Revisions

Revision	Description
Revision 4	- Specifications for the new variant IRB 6650S - 90/3.9 added. - The note that an arm load of 50 kg for the upper arm is not included in the load diagrams for IRB 6600ID/IRB 6650ID, is introduced. - New ISO 9283 measurements for -225/2.55, -175/2.8, -125/3.2 and -200/2.75. - Path accuracy for -125/3.5 and -200/3.0 corrected.
Revision E	- Changes in SpotPack and DressPack
Revision F	- Introduction of Foundry Prime and the new media panel - Changed text in chapter Load diagrams, Control of load case by “RobotLoad” - Servo gun configurations Stationary and Robot gun, Twin stationary gun and Stationary gun and Track Motion deleted from chapter 1.9.
Revision G	- Clean room robots added - Option 91-2,-3,-4,-5 (Interbus) removed - Footnote for “Pose accuracy” - New text in chapter 1.7 - New text in chapter 1.9

Revision	Description
Revision H	- Changes in chapter 1.2 Safety/Standards - Direction of forces and note regarding M_{xy} and F_{xy} added - Chapter Wrist torque added - Warranty information for load diagrams - Changes in chapter 1.9 - New option added in chapter 1.10.4 - Option 782-3 deleted - Souriau connector for CP/CS/CBUS - Footnote option 287-6 Foundry Prime - Synchronize lables for axis 2 to axis 6

Complementary documentation

Product specification	Description
Controller	IRC5 with FlexPendant, 3HAC021785-001
Controller Software IRC5	RobotWare 5.09, 3HAC022349-001
Robot User Documentation	IRC5 and M2004, 3HAC024534-001
Product Manual	**Description**
Manipulator	IRB 6600, 3HAC023082-001

1 Description

1.1 Structure

1.1.1 Introduction

Robot family

A new world of possibilities opens up with ABB's IRB 6600 robot family. It is available in ten versions:

Handling capacity (kg)	Reach (m)
175 kg	2.55 m
225 kg	2.55 m
175 kg	2.8 m
125 kg	3.2 m
200 kg	2.75 m
90 kg	3.9 m
125 kg	3.5 m
200 kg	3.0 m
185 kg	2.55 m
170 kg	2.75 m

The IRB 6600 is ideal for process applications, regardless of industry. Typical areas can be 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.

Operating system

The robot is equipped with the operating system BaseWare OS. BaseWare OS controls every aspect of the robot, like motion control, development and execution of application programs, communication etc. see Product specification - Controller IRC5 with FlexPendant.

Additional functionality

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

Clean room robots

The Clean room robots are classified for room class 100 according to US Federal Standard 209 or class 5 according to ISO 14644-1.

The performed clean room test has classify the air cleanliness exclusively in terms of concentration of airborne particles generated by the robot. Other aspects of the clean room test or other clean room requirements are not considered.

Foundry Plus

The robot version Foundry Plus is designed for harsh environments and have special surface treatment and paint for excellent corrosion protection. The connectors are designed for servere environments, and bearings, gears and other sensitive parts are highly protected. The robots have the Foundry Plus protection which means that the whole manipiulator is IP67 classified and steam washable.

Foundry Prime

The robot version Foundry Prime is designed for water jet cleaning of casts and machined parts, and similar very harsh environments.

The manipulator can withstand surrounding solvent based detergent (max. pH 9.0 and must contain rust inhibitor). The detergent must be approved by ABB. In addition, the manipulator can withstand indirect spray from jet pressure (max. 600 bar) and 100% humidity. The manipulator can work in an environment with a cleaning bath temperature < 60^{o} C, typically used in a water jet cleaning application with moderate speed.

The robot is protected by special sealings for gears and bearings, pressurized motors and electronic compartment, special detergent resistant polyurethane painting system in three layers. Non painted surfaces has a special rust preventive coating, and motors are sealed with a sealing compound.

As the robot is designed for very harsh environments, an extended service and maintenance program is required. For detailed information of the maintenance program, see chapter Maintenance in the Product Manual.

The protection, Foundry Prime is only available for robot versions
IRB 6600-225/2.55, IRB 6600-175/2.8 and IRB 6650S-200/3.0.

See chapter Specification of Variants and Options for options not selectable together with Foundry Prime.

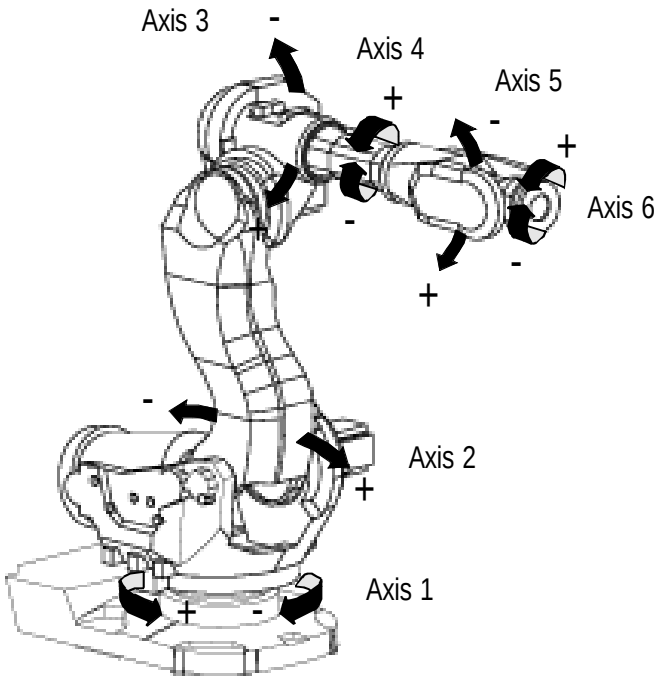

Figure 1 The IRB 6600 manipulator has 6 axes.

1.1.2 Different robot versions

General

The IRB 6600 is available in ten versions.

Standard

The following different standard robot types are available:

Robot type	Handling capacity (kg)	Reach (m)
IRB 6600	175 kg	2.55 m
IRB 6600	225 kg	2.55 m
IRB 6600	175 kg	2.8 m
IRB 6650	125 kg	3.2 m
IRB 6650	200 kg	2.75 m
IRB 6650S	90 kg	3.9 m
IRB 6650S	125 kg	3.5 m
IRB 6650S	200 kg	3.0 m
IRB 6600ID	185 kg	2.55 m
IRB 6650ID	170 kg	2.75 m

1.1.3 Definition of version designation

IRB 6600 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	Handling capacity (kg)	Reach (m)	Weight
IRB 6600	175 kg	2.55 m	1700 kg[a]
IRB 6600	225 kg	2.55 m	1780 kg[a]
IRB 6600	175 kg	2.8 m	1780 kg[a]
IRB 6650	125 kg	3.2 m	1780 kg[a]
IRB 6650	200 kg	2.75 m	1780 kg[a]
IRB 6650S	90 kg	3.9 m	2275 kg[a]
IRB 6650S	125 kg	3.5 m	2250 kg[a]
IRB 6650S	200 kg	3.0 m	2250 kg[a]
IRB 6600ID	185 kg	2.55 m	1880 kg
IRB 6650ID	170 kg	2.75 m	1880 kg

a. Without DressPack

Other technical data

Data	Description	Note
Airborne noise level	The sound pressure level outside the working space.	< 73 dB (A) Leq (acc. to Machinery directive 98/37/EEC)

Power consumption at max load

Type of Movement	IRB 6600/ 6650 IRB 6600ID/ IRB 6650ID	IRB 6650S
ISO Cube	2.6 kW	2.4 kW
Normal robot movements	3.8 kW	-

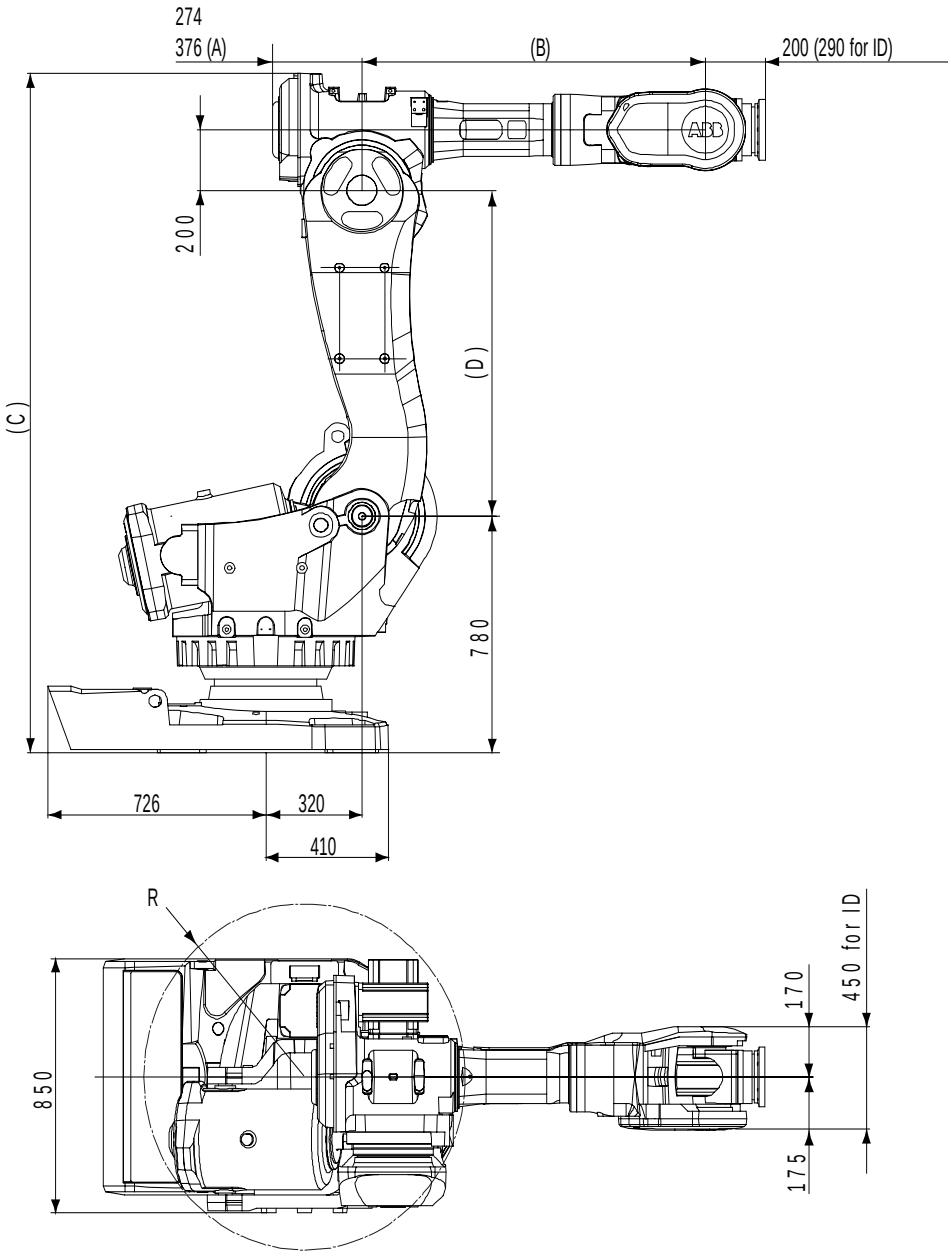

Figure 2 View of the IRB 6600 and IRB 6650 manipulator from the side and above (dimensions in mm). Allow 200 mm behind the manipulator foot for cables.

Pos	Description
A	Dimensions for versions without Foundry = 274 mm Dimensions and size of the lock for all Foundry versions = 376 mm
R	R 580 for type A R 595 for type B (front side, motor axis Z) R 690 with fork lift

For DressPack dimensions see chapter 2.2 DressPack

1.1.3 Definition of version designation

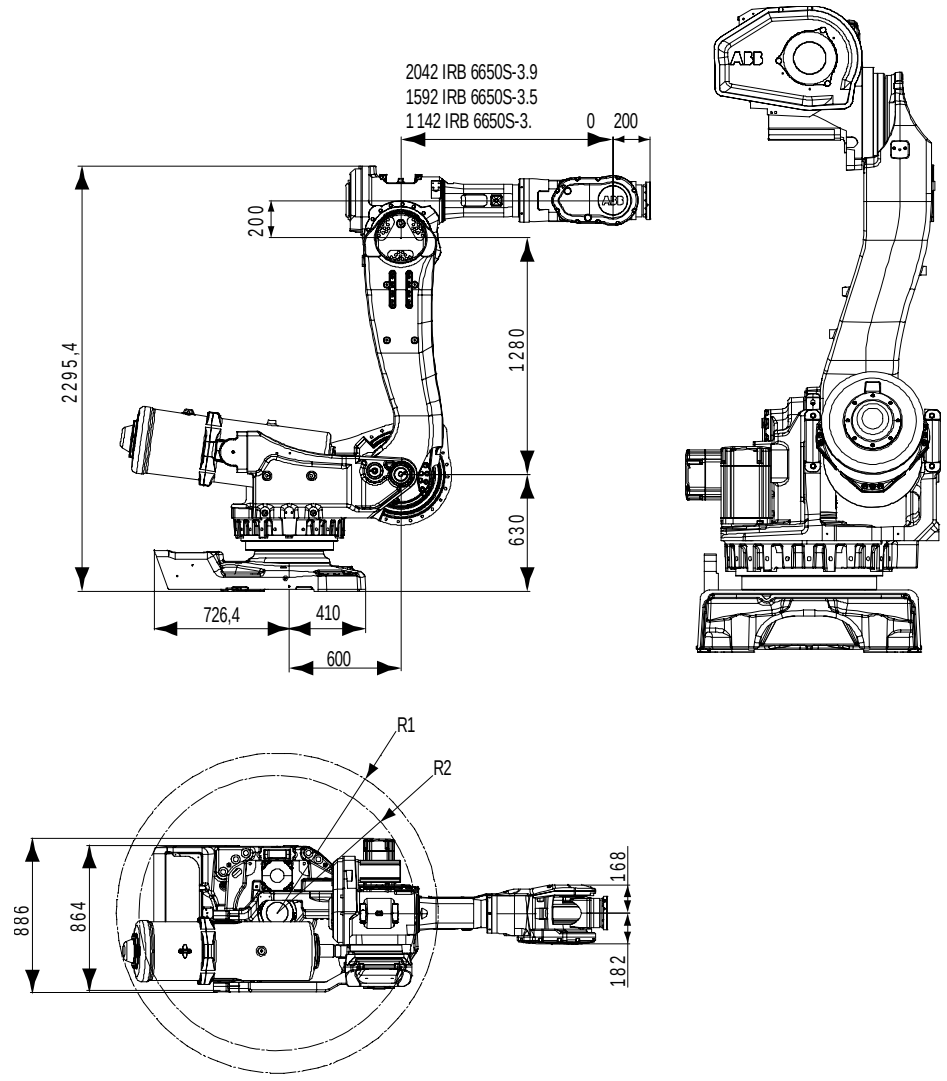

Figure 3 View of the IRB 6650S Manipulator from side and above (dimensions in mm). Allow 200 mm behind the manipulator foot for cables.

Pos	Description
R1	R 960 (Rear side, Balancing device)
R2	R 813 (Front side, Motor axis 2)

1.2 Safety/Standards

1.2.1 Standards

The robot conforms to the following standards:

Standard	Description
EN ISO 12100 -1	Safety of machinery, terminology
EN ISO 12100 -2	Safety of machinery, technical specifications
EN 954-1	Safety of machinery, safety related parts of control Systems
EN 60204	Electrical equipment of industrial machines
EN ISO 60204-1:2005	Safety of machinery - Electrical equipment of machines
EN ISO 10218-1:2006[a]	Robots for industrial environments - Safety requirements
EN 61000-6-4 (option)	EMC, Generic emission
EN 61000-6-2	EMC, Generic immunity

a. There is a deviation from paragraph 6.2 in that only worst case stop distances and stop times are documented.

Standard	Description
IEC 60529	Degrees of protection provided by enclosures

Standard	Description
ISO 9787	Manipulating industrial robots, coordinate Systems and motions

Standard	Description
ANSI/RIA 15.06/1999	Safety Requirementsfor Industrial Robots and Robot Systems.
ANSI/UL 1740-1998 (option)	Safety Standard for Robots and Robotic Equipment
CAN/CSA Z 434-03 (option)	Industrial Robots and Robot Systems - General Safety Requirements

The robot complies fully with the health and safety standards specified in the EEC's Machinery Directives.

Safety function

Safety function	Description
The Service Information System (SIS)	The service information system gathers information about the robot's usage and determines how hard the robot is used. The usage is characterized by the speed, the rotation angles and the load of every axis. With this data collection, the service interval of every individual robot of this generation can be predicted, optimized and service activities planned ahead. The collection data is available via the FlexPendant or the network link to the robot. The Process Robot Generation is designed with absolute safety in mind. It is dedicated to actively or passively avoid collisions and offers the highest level of safety to the operators and the machines as well as the surrounding and attached equipment. These features are presented in the active and passive safety system. The time the robot is in operation (brakes released) is indicated on the FlexPendant. Data can also be monitored over network, using for example WebWare.

The Active Safety System

The Active Safety System	Description
General	The active safety system includes those software features that maintain the accuracy of the robot's path and those that actively avoid collisions which can occur if the robot leaves the programmed path accidentally or if an obstacle is put into the robot's path.
The Active Brake System (ABS)	All robots are delivered with an active brake system that supports the robots to maintain the programmed path in General Stop (GS), Auto Stop (AS) and Superior Stop (SS). The ABS is active during all stop modes, braking the robot to a stop with the power of the servo drive system along the programmed path. After a specific time the mechanical brakes are activated ensuring a safe stop. The stopping process is in accordance with a class 1 stop. The maximum applicable torque on the most loaded axis determines the stopping distance. In case of a failure of the drive system or a power interruption, a class 0 stop turns out. Emergency Stop (ES) is a class 0 stop. All stops (GS, AS, SS and ES) are reconfigurable. While programming the robot in manual mode, the enabling device has a class 0 stop.

The Active Safety System	Description
The Self Tuning Performance (STP)	The Process Robot Generation is designed to run at different load configurations, many of which occur within the same program and cycle. The robot's installed electrical power can thus be exploited to lift heavy loads, create a high axis force or accelerate quickly without changing the configuration of the robot. Consequently the robot can run in a "power mode" or a "speed mode" which can be measured in the respective cycle time of one and the same program but with different tool loads. This feature is based on QuickMove™. The respective change in cycle time can be measured by running the robot in NoMotionExecution with different loads or with simulation tools like RobotStudio.
The Electronically Stabilised Path (ESP)	The load and inertia of the tool have a significant effect on the path performance of a robot. The Process Robot Generation is equipped with a system to electronically stabilize the robot's path in order to achieve the best path performance. This has an influence while accelerating and braking and consequently stabilizes the path during all motion operations with a compromise of the best cycle time. This feature is secured through TrueMove™.
Over-speed protection	The speed of the robot is monitored by two independent computers.
Restricting the working space	The movement of each axis can be restricted using software limits. As options there are safeguarded space stops for connection of position switches to restrict the working space for the axes 1-3. Axes 1-3 can also be restricted by means of mechanical stops.
Collision detection (option)	In case of an unexpected mechanical disturbance, such as a collision, electrode sticking, etc., the robot will detect the collision, stop on the path and slightly back off from its stop position, releasing tension in the tool.

The Passive Safety system

The Passive Safety System	Description
General	The Process Robot Generation has a dedicated passive safety system that by hardware construction and dedicated solutions is designed to avoid collisions with surrounding equipment. It integrates the robot system into the surrounding equipment safely.
Compact robot arm design	The shape of the lower and upper arm system is compact, avoiding interference into the working envelope of the robot. The lower arm is shaped inward, giving more space under the upper arm to re-orientate large parts and leaving more working space while reaching over equipment in front of the robot. The rear side of the upper arm is compact, with no components projecting over the edge of the robot base even when the robot is moved into the home position.
Moveable mechanical limitation of main axes (option)	All main axes can be equipped with moveable mechanical stops, limiting the working range of every axis individually. The mechanical stops are designed to withstand a collision even under full load.
Position switches on main axes (option)	All main axes can be equipped with position switches. The double circuitry to the cam switches is designed to offer personal safety according to the respective standards.

The Internal Safety Concept

The Internal Safety Concept	Description
General	The internal safety concept of the Process Robot Generation is based on a two-channel circuit that is monitored continuously. If any component fails, the electrical power supplied to the motors shuts off and the brakes engage.
Safety category 3	Malfunction of a single component, such as a sticking relay, will be detected at the next MOTOR OFF/MOTOR ON operation. MOTOR ON is then prevented and the faulty section is indicated. This complies with category 3 of EN 954-1, Safety of machinery - safety related parts of control Systems - Part 1.
Selecting the operating mode	The robot can be operated either manually or automatically. In manual mode, the robot can only be operated via the FlexPendant, that is not by any external equipment.
Reduced speed	In manual mode, the speed is limited to a maximum of 250 mm/s (600 inch/min.). The speed limitation applies not only to the TCP (Tool Center Point), but to all parts of the robot. It is also possible to monitor the speed of equipment mounted on the robot.
Three position enabling device	The enabling device on the FlexPendant must be used to move the robot when in manual mode. The enabling device consists of a switch with three positions, meaning that all robot movements stop when either the enabling device is pushed fully in, or when it is released completely. This makes the robot safer to operate.
Safe manual movement	The robot is moved using a joystick instead of the operator having to look at the FlexPendant to find the right key.
Emergency stop	There is one emergency stop push button on the controller and another on the FlexPendant. Additional emergency stop buttons can be connected to the robot’s safety chain circuit.

The Internal Safety Concept	Description
Safeguarded space stop	The robot has a number of electrical inputs which can be used to connect external safety equipment, such as safety gates and light curtains. This allows the robot's safety functions to be activated both by peripheral equipment and by the robot itself.
Delayed safeguarded space stop	A delayed stop gives a smooth stop. The robot stops the same way as at a normal program stop with no deviation from the programmed path. After approx. 1 second the power supplied to the motors is shut off.
Hold-to-run control	"Hold-to-run" means that you must depress the start button in order to move the robot. When the button is released the robot will stop. The hold-to-run function makes program testing safer.
Fire safety	Both the manipulator and control system comply with UL's (Underwriters Laboratories Inc.) tough requirements for fire safety.
Safety lamp (option)	As an option, the robot can be equipped with a safety lamp mounted on the manipulator. This is activated when the motors are in the MOTORS ON state.

1.3 Installation

1.3.1 Introduction

General

All versions of IRB 6600 are designed for floor mounting. Depending on the robot version, an end effector with max. weight of 125 to 225 kg including payload, can be mounted on the mounting flange (axis 6). See Load diagram for IRB 6600 generation robots on page 34.

Extra Loads

Extra load (valve packages, transformers) of 50 kg, which is included in the load diagrams, can be mounted on the upper arm. No extra arm load is included in the load diagrams for IRB 6600ID/IRB 6650ID. An extra load of 500 kg can also be mounted on the frame of axis 1. See Holes for mounting extra equipment on IRB 6600/6650 and IRB 6600ID/6650ID on page 55.

Working Range

The working range of axes 1-3 can be limited by mechanical stops. Position switches can be supplied on axes 1-3 for position indication of the manipulator.

1.3.2 Operating requirements

Protection standards

Standard and Foundry Manipulator IP67

Cleanroom standards

Cleanroom class 100 for manipulator according to:

Standards	Description
DIN EN ISO 14644	Cleanrooms and associated controlled environments
US Federal Standard 209	e-Air-clean-classes

Not available for IRB 6650S and IRB 6600ID/6650ID.

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 (41°F) to + 50°C (122°F)
For the controller	Standard	+ 5°C (41°F) to + 45°C (113°F)
For the controller	Option	+ 5°C (41°F) to + 52°C (126°F)
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)

Relative humidity

Description	Relative humidiy
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% at constant temperature

1.3.3 Mounting the manipulator

Maximum Load

Maximum load in relation to the base coordinate system.

	Endurance load in operation all IRB 6600/ 6650/ 6600ID/ 6650ID	Max. load at emergency stop all IRB 6600/ 6650/ 6600ID/ 6650ID
Force xy	± 10.1 kN	± 20.7 kN
Force z	18.0 ± 13.8 kN	18.0 ± 22.4 kN
Torque xy	± 27.6 kNm	± 50.6 kNm
Torque z	± 7.4 kNm	± 14.4 kNm

	Endurance load in operation all IRB 6650S	Max. load at emergency stop all IRB 6650S
Force xy	± 10.6 kN	± 20.9 kN
Force z	28.2 ± 7.7 kN	28.2 ± 16.4 kN
Torque xy	28.2 kNm	50.5 kNm
Torque z	7.9 kNm	13.6 kNm

When using Base spacers (option 571-1) the Torque xz on the floor is for IRB 6600/6650/6600ID/6650ID, 30,4 kNm and for IRB 6650S, 31 kNm for Endurance load in operation and for IRB 6600/6650/6600ID/6650ID, 55,7 kNm and for IRB 6650S, 55,6 kNm for Max. load at emergency stop. The other values above are the same as without Base spacers.

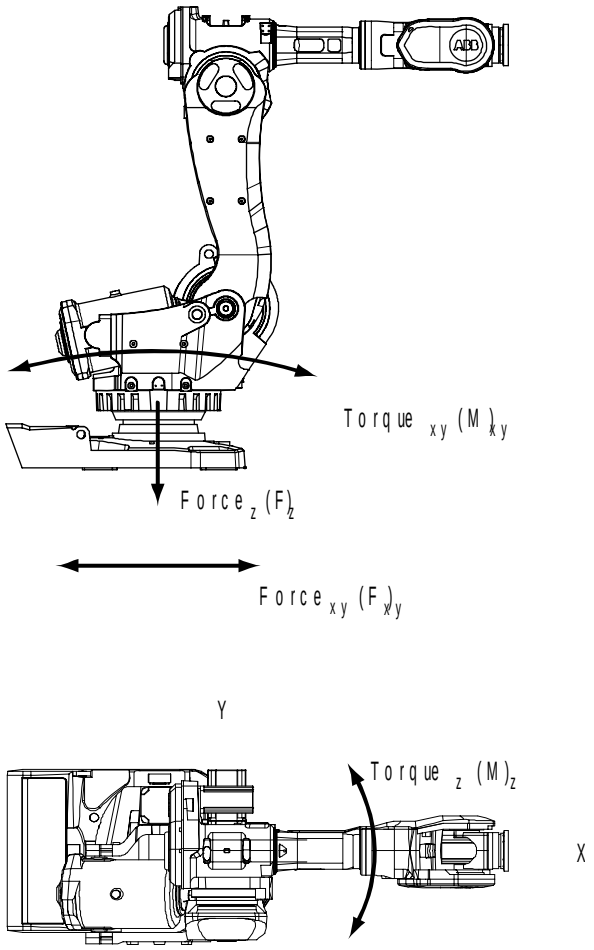

Figure 4 Directions of forces.

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}).

Fastening holes robot base - for all variants except IRB 6650S

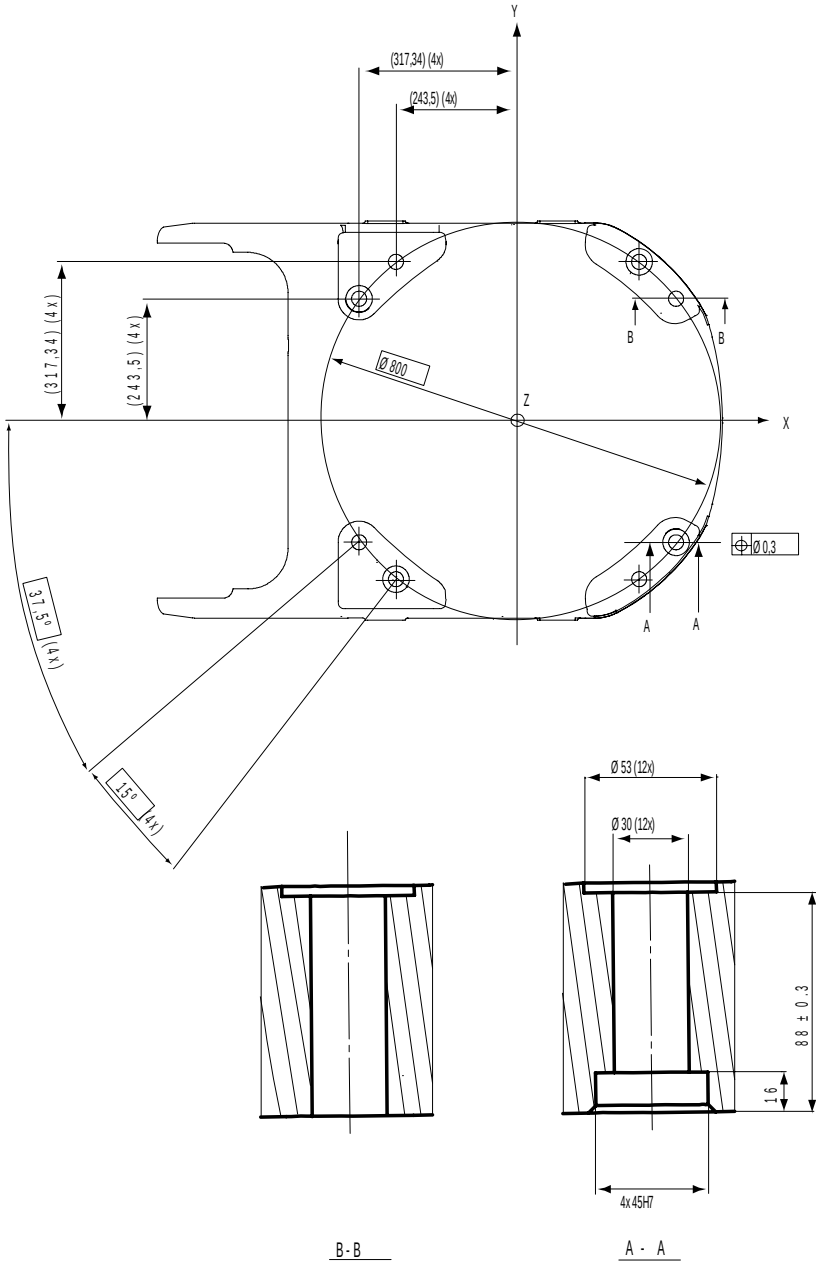

Figure 5 Hole configuration (dimensions in mm).

Recommended srews for fastening the manipulator to the base	M24 x 140 8.8 with 4 mm flat washer
Torque value	775 Nm

Only two guiding sleeves shall be used. The corresponding holes in the base plate shall be circular and oval according to Figure 7 and Figure 10.

Regarding AbsAcc performance, the chosen guide holes according to Figure 7 and Figure 10 are recommended.

Fastening holes robot base - for IRB 6650S

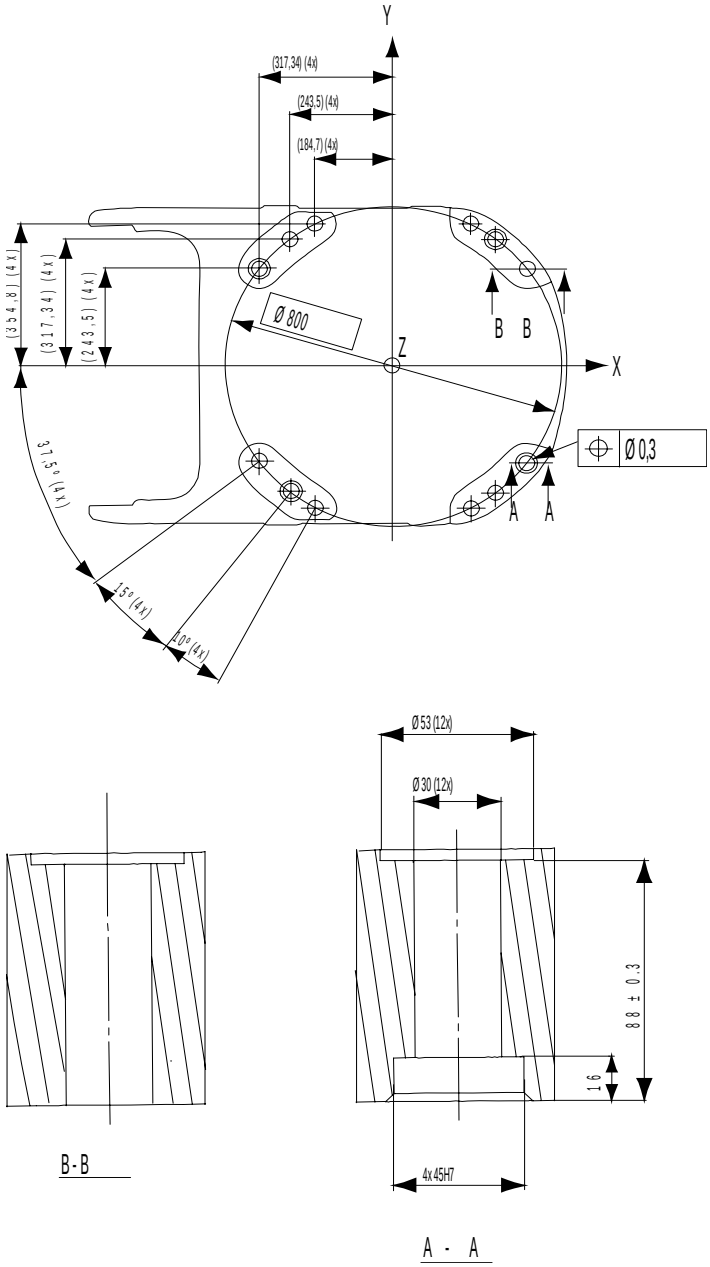

Figure 6 Hole configuration (dimensions in mm).

Recommended srews for fastening the manipulator to the base	M24 x 140 8.8 with 4 mm flat washer
Torque value	775 Nm

Only two guiding sleeves shall be used. The corresponding holes in the base plate shall be circular and oval according to Figure 7 and Figure 10.

Regarding AbsAcc performance, the chosen guide holes according to Figure 7 and Figure 10 are recommended.

1.3.3 Mounting the manipulator

Base plate drawing

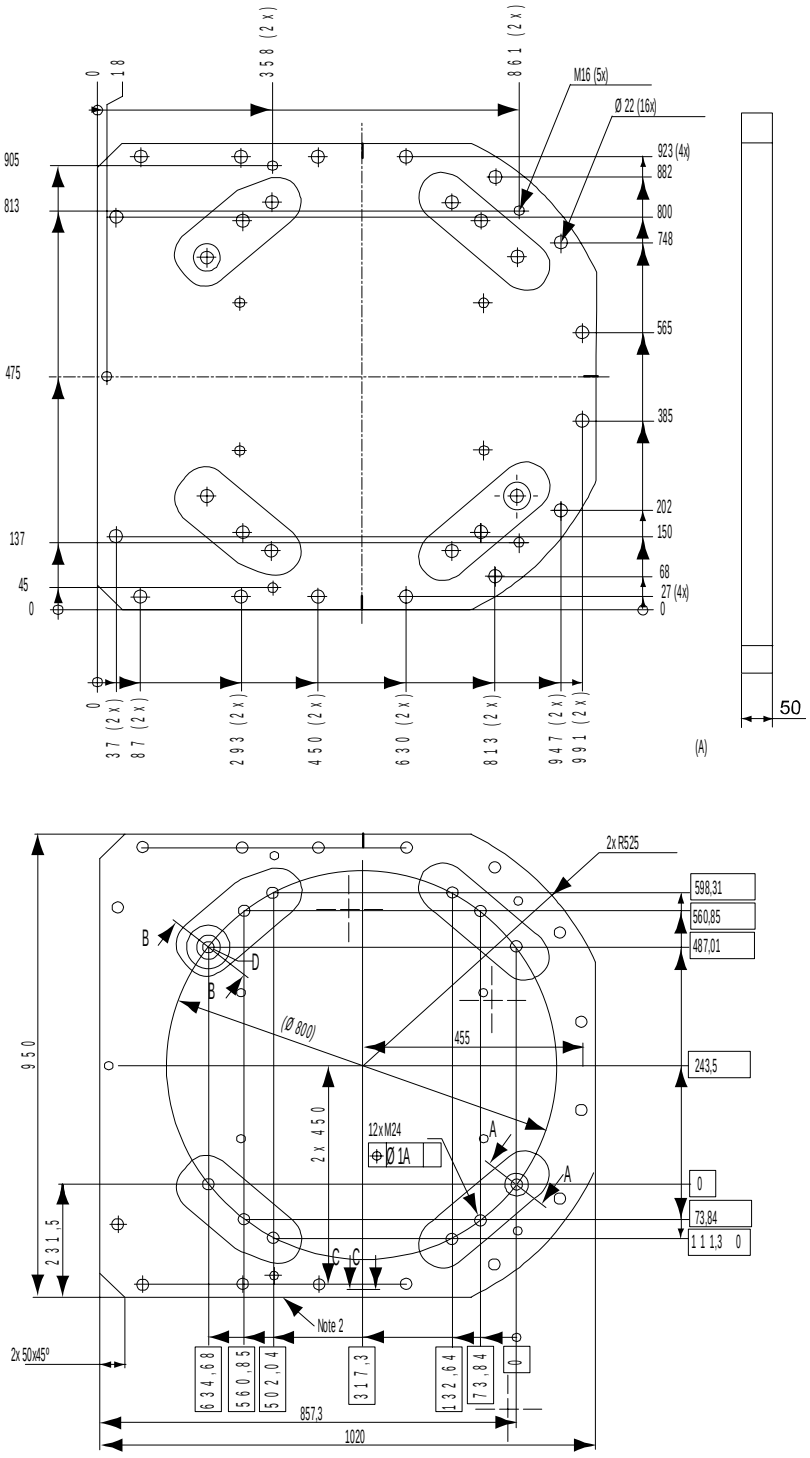

Figure 7 Base plate dimension print, main dimensions and holes measurements (dimensions in mm).

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

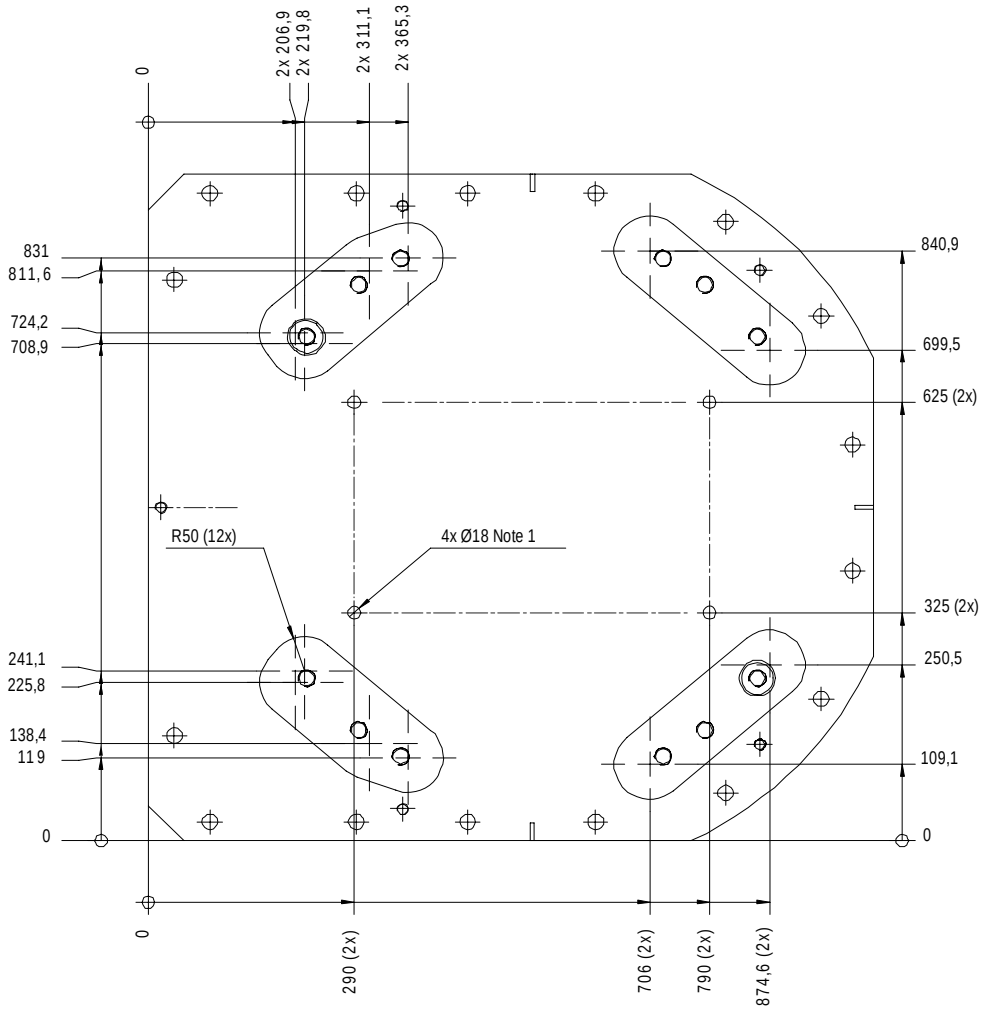

Figure 8 Base plate dimension print, measurements of the adaption for the robot base (dimension in mm).

Two guiding sleeves required, dimensions see Figure 9.

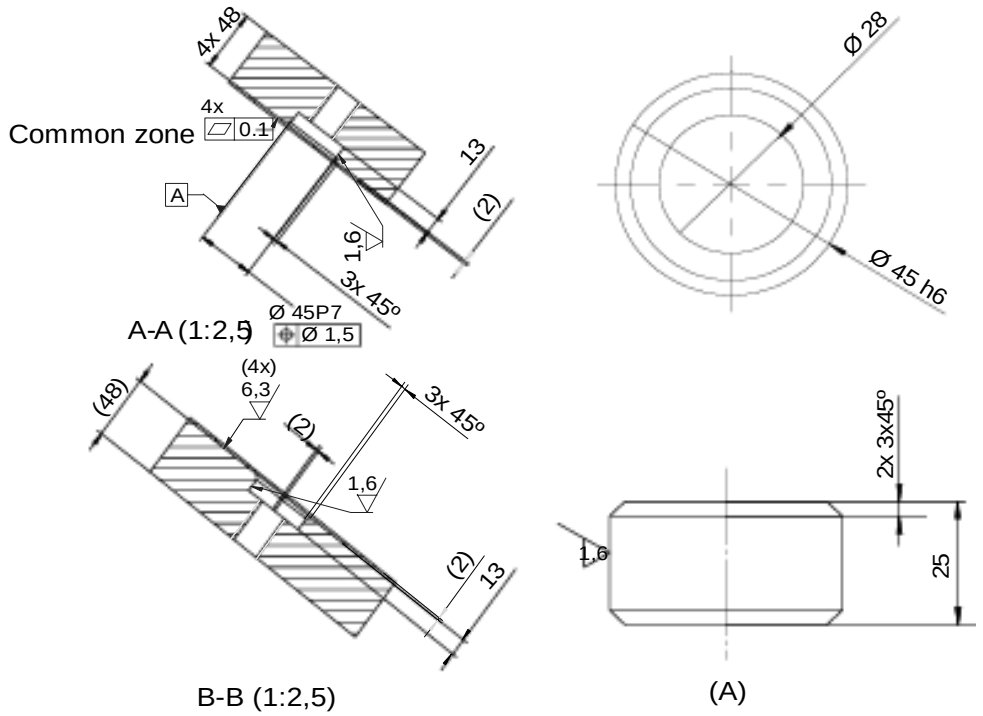

Figure 9 Sections of base plate and guide sleeve (dimensions in mm).

Pos	Description
A	Guide sleeve protected from corrosion

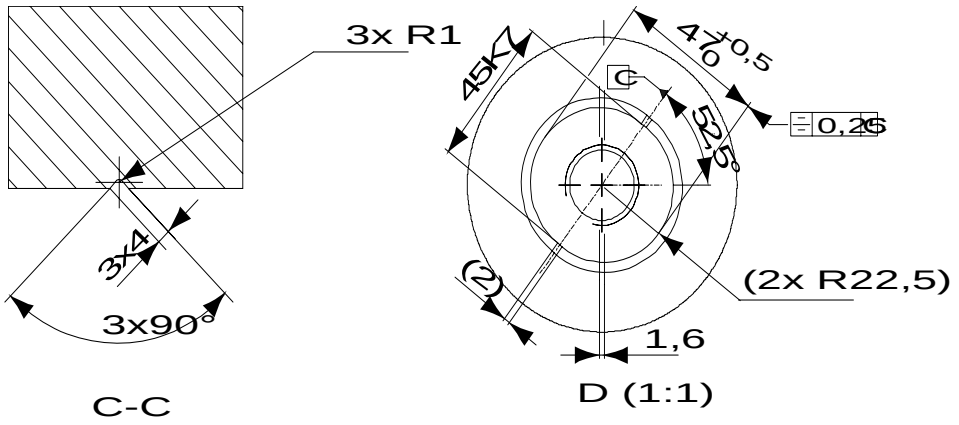

Figure 10 Sections of base plate (dimensions in mm).

1.4 Calibration and references

1.4.1 Fine calibration

General

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

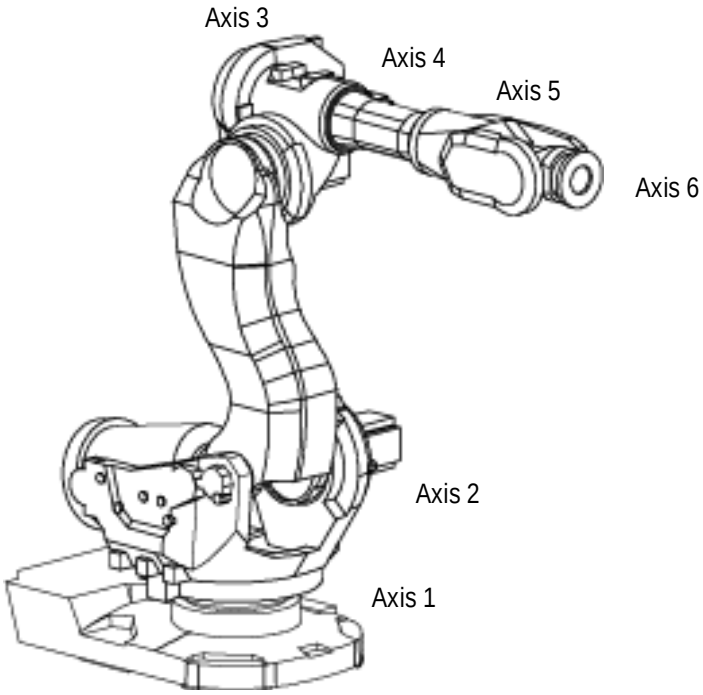

Figure 11 All axes in zero position.

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

1.4.2 Absolute Accuracy calibration

General

Requires RobotWare option Absolute Accuracy, please see Product specification - Controller software IRC5 for more details.

The calibration concept

Absolute Accuracy (AbsAcc) is a calibration concept, which ensures a TCP absolute accuracy of better than ± 1 mm in the entire working range (working range of bending backward robots, for example IRB 6600, are limited to only forward positions).

Absolute accuracy compensates for:

- Mechanical tolerances in the robot structure
- Deflection due to load

Absolute accuracy calibration is focusing on positioning accuracy in the cartesian coordinate system for the robot. It also includes load compensation for deflection caused by the tool and equipment. Tool data from robot program is used for this purpose. The positioning will be within specified performance regardless of load.

Calibration data

The user is supplied with robot calibration data (compensation parameter file, absacc.cfg) and a certificate that shows the performance (Birth certificate). The difference between an ideal robot and a real robot without AbsAcc can typically be 8 mm, resulting from mechanical tolerances and deflection in the robot structure.

Absolute Accuracy option

Absolute Accuracy option is integrated in the controller algorithms for compensation of this difference and does not need external equipment or calculation.

Absolute Accuracy is a RobotWare option and includes an individual calibration of the robot (mechanical arm).

Absolute Accuracy is a TCP calibration in order to Reach (m) a good positioning in the Cartesian coordinate system.

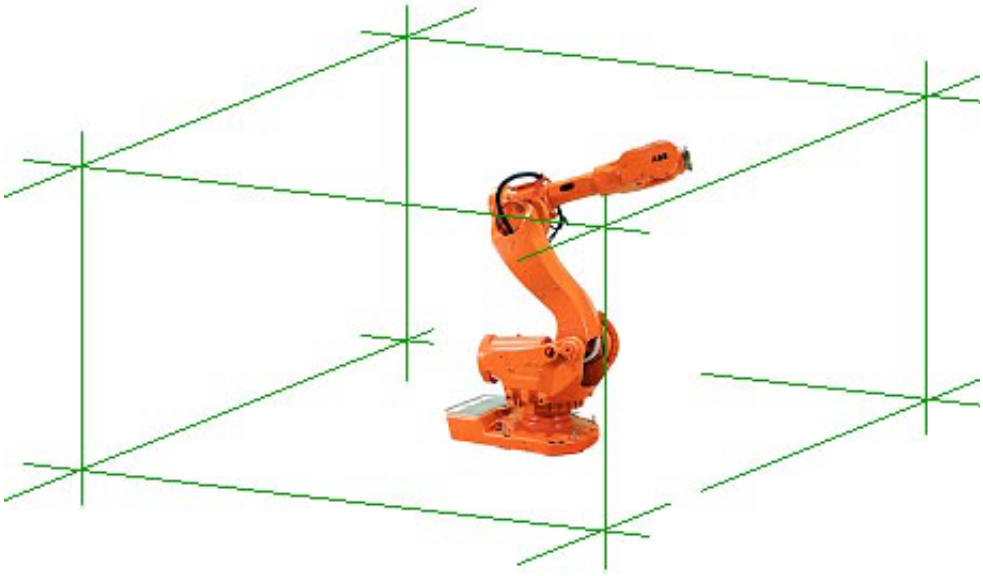

Figure 12 The Cartesian coordinate system.

Production data

Typical production data regarding calibration are:

Robot	Positioning accuracy (mm)		
	Average	Max	% Within 1 mm
IRB 6600 - 175/2.55 225/2.55 175/2.80 125/3.20 200/2.75	0,50	1,20	97
IRB 6650 - 125/3.20 200/2.75	0,50	1,20	97
IRB 6650S - 125/3.50 200/3.00	0,50	1,20	97
IRB 6600ID - 185/2.55 IRB 6650ID - 170/2.75	a	a	a
IRB 6650S - 90/3.9	a	a	a

a. For detailed data and data missing in the table, please contact ABB for more information.

1.4.3 Robot references

General

The holes shown in Figure 13 to Figure 18 are used for measuring the robot position when integrated in a production cell.

Figure 13 Four Ø12 H8 (depth 12) on radius 400 mm from axis 1 center on robot base.

Figure 14 One Ø12 H8 (depth 12) in +x- direction from axis 1 center of robot base.

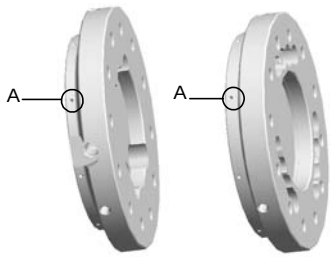

Figure 15 Seven holes A, on a radius of x mm from axis 6 center on the two standard tool flanges.

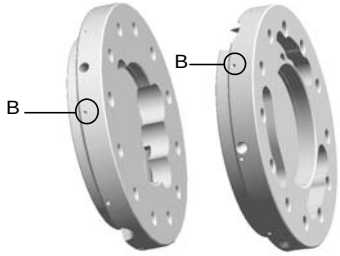

Figure 16 Seven holes B, on a radius of x mm from axis 6 center on the two insulated tool flanges.

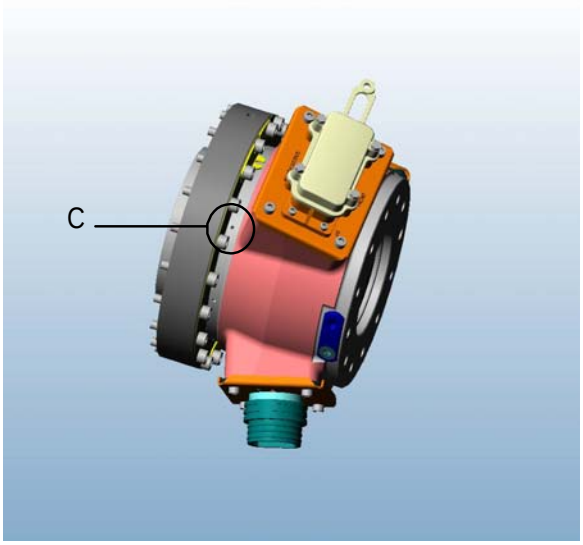

Figure 17 Seven holes C, on a radius of x mm from axis 6 center on the flange for IRB 6600ID/IRB 6650ID.

1.4.3 Robot references

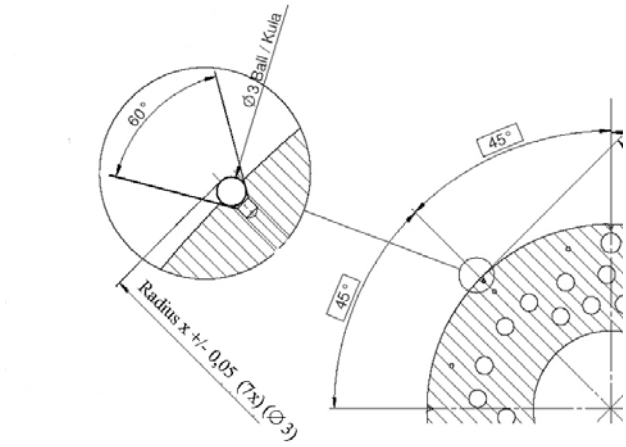

Figure 18 Detailed view of Tool Flange.

Robot	Radius X (mm) for references on tool flange	
	Standard	Insulated
IRB 6600 - 175/2.55	R=81,5	R=101,5
IRB 6600 -225/2.55 175/2.80 125/3.20 200/2.75	R=87,5	R=101,5
IRB 6650 - 125/3.20 200/2.75	R=87,5	R=101,5
IRB 6650S - 90/3.90 125/3.50 200/3.00	R=87,5	R=101,5
IRB 6600ID - 185/2.55 IRB 6650ID - 170/2.75	R=87,5	-

1.5 Load diagrams

1.5.1 Introduction

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 outside load diagram is used the following parts can be damaged due to overload:

- motors
- gearboxes
- mechanical structure

Robots running with incorrect load data and/or with loads outside load diagram will not be covered by the 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, see Figure 19.

Not included for IRB 6600ID/IRB 6650ID.

At different arm load, payload and moment of inertia, the load diagram will be changed.

Control of load case by “RobotLoad”

For an easy check of a specific load case, use the calculation program ABB Robot-Load. Please contact your local ABB organization.

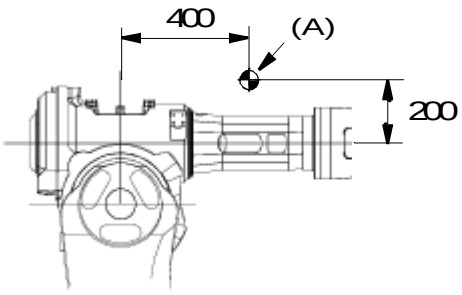

Figure 19 center of gravity for 50 kg extra load at arm housing (dimensions in mm).

Pos	Description
A	Center of gravity 50 kg

1.5.2 Diagrams

IRB 6600 - 175/2.55

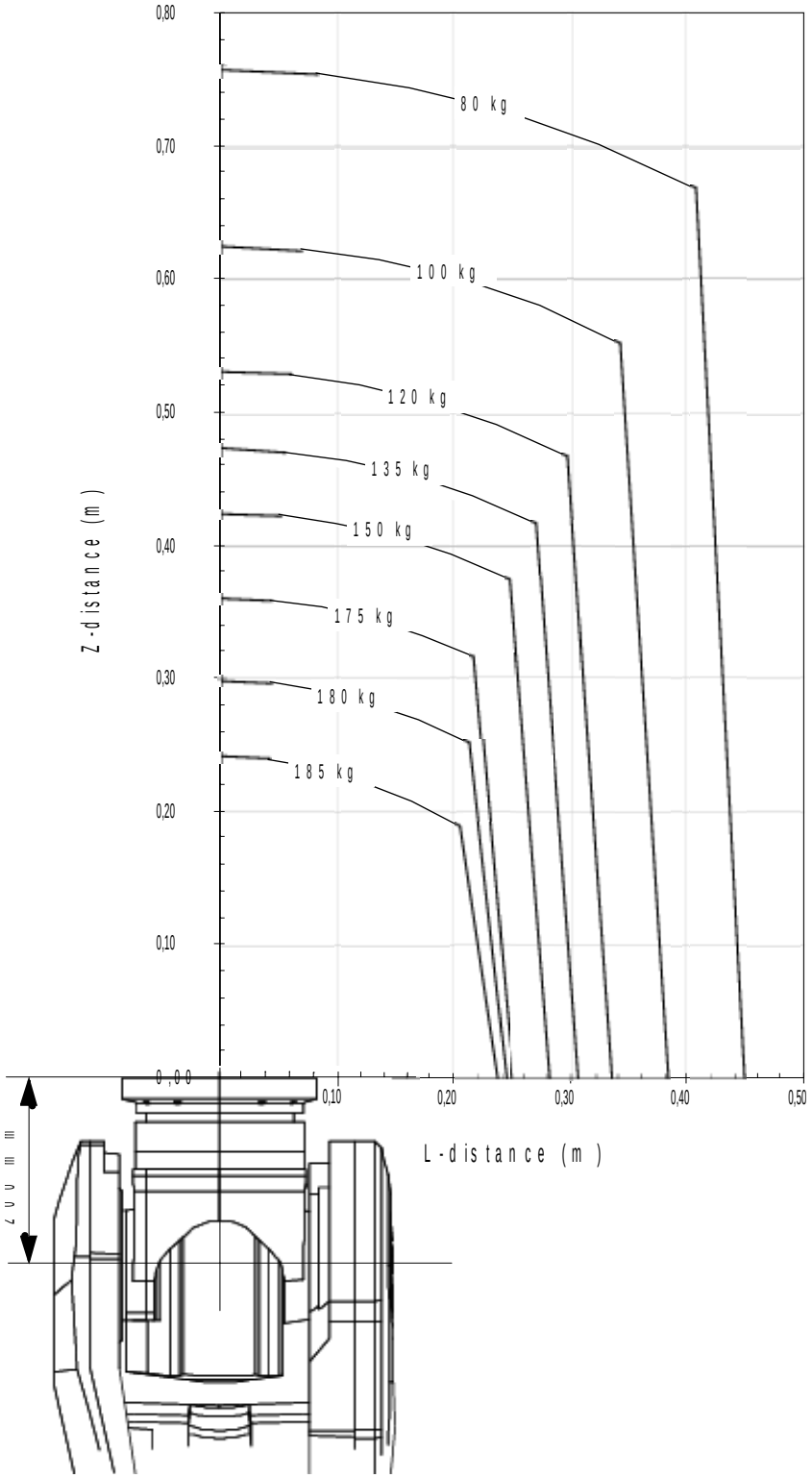

Figure 20 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6600 - 175/2.55 “Vertical Wrist” (±10°)

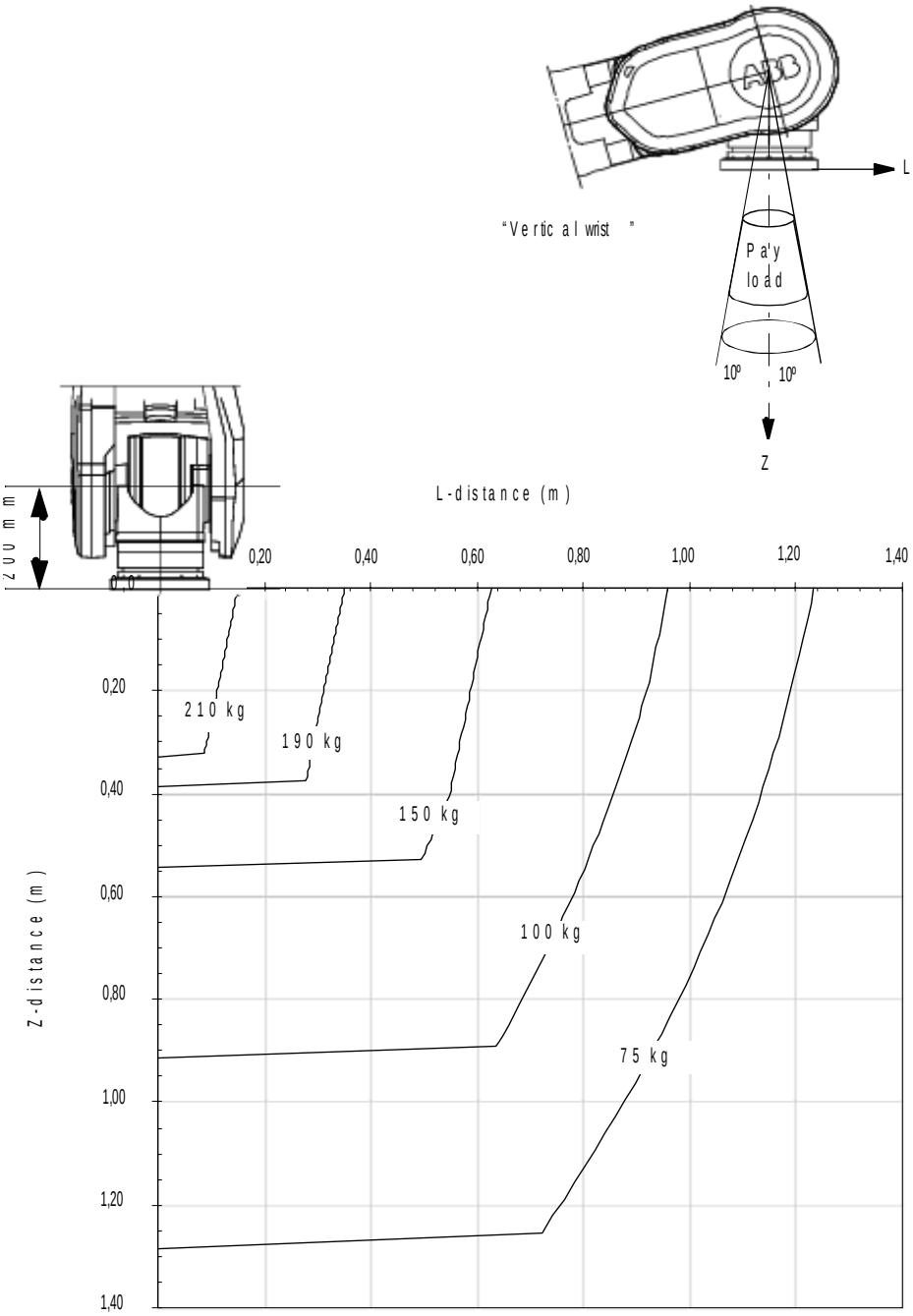

Figure 21 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10°), J_0 =15 kgm^2.

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

	Description
Max load	215 kg
Z_{max}	0,310 m
L_{max}	0,133 m

1.5.2 Diagrams

IRB 6600 - 225/2.55

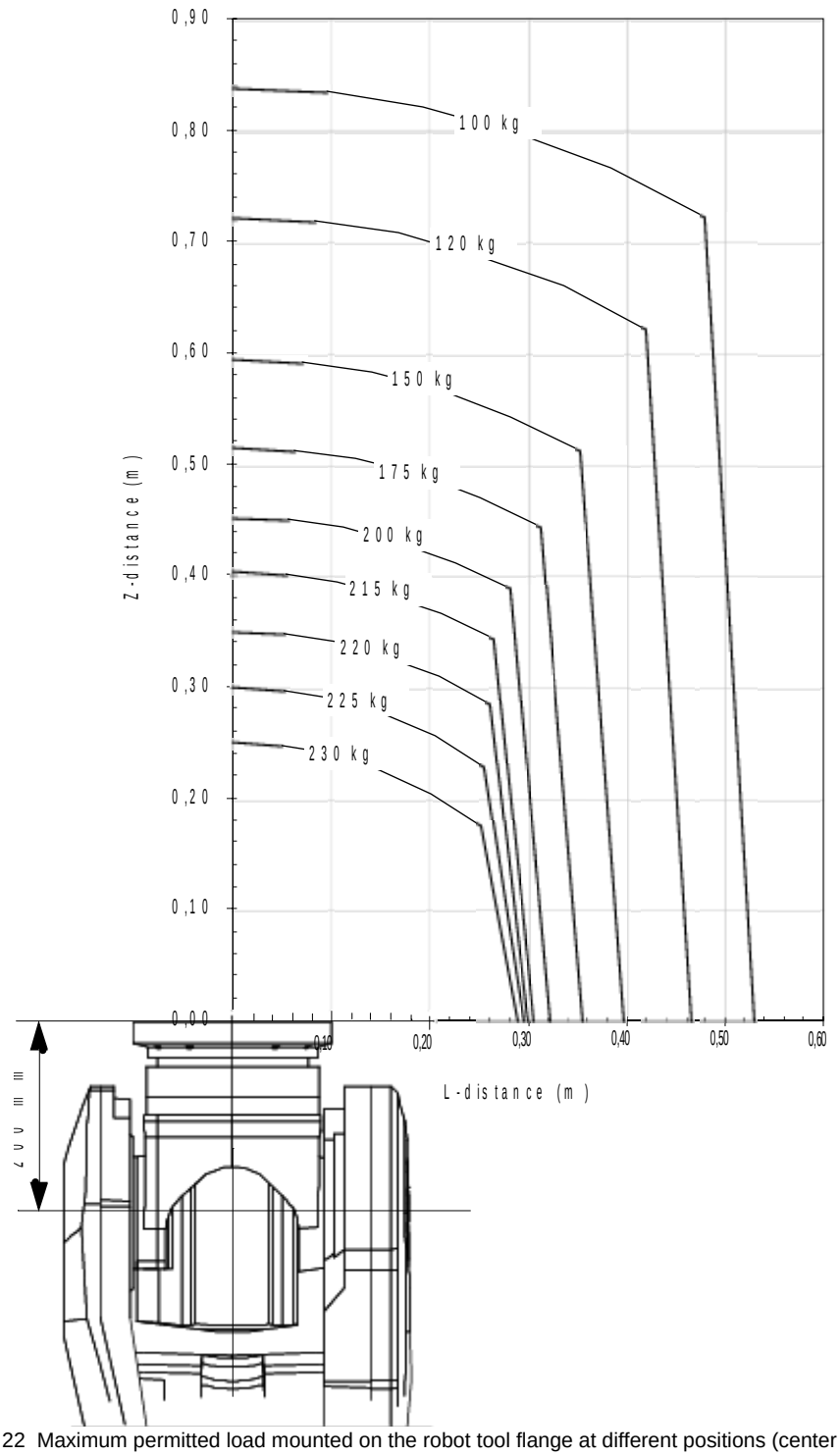

Figure 22 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6600 - 225/2.55 “Vertical Wrist” (±10°)

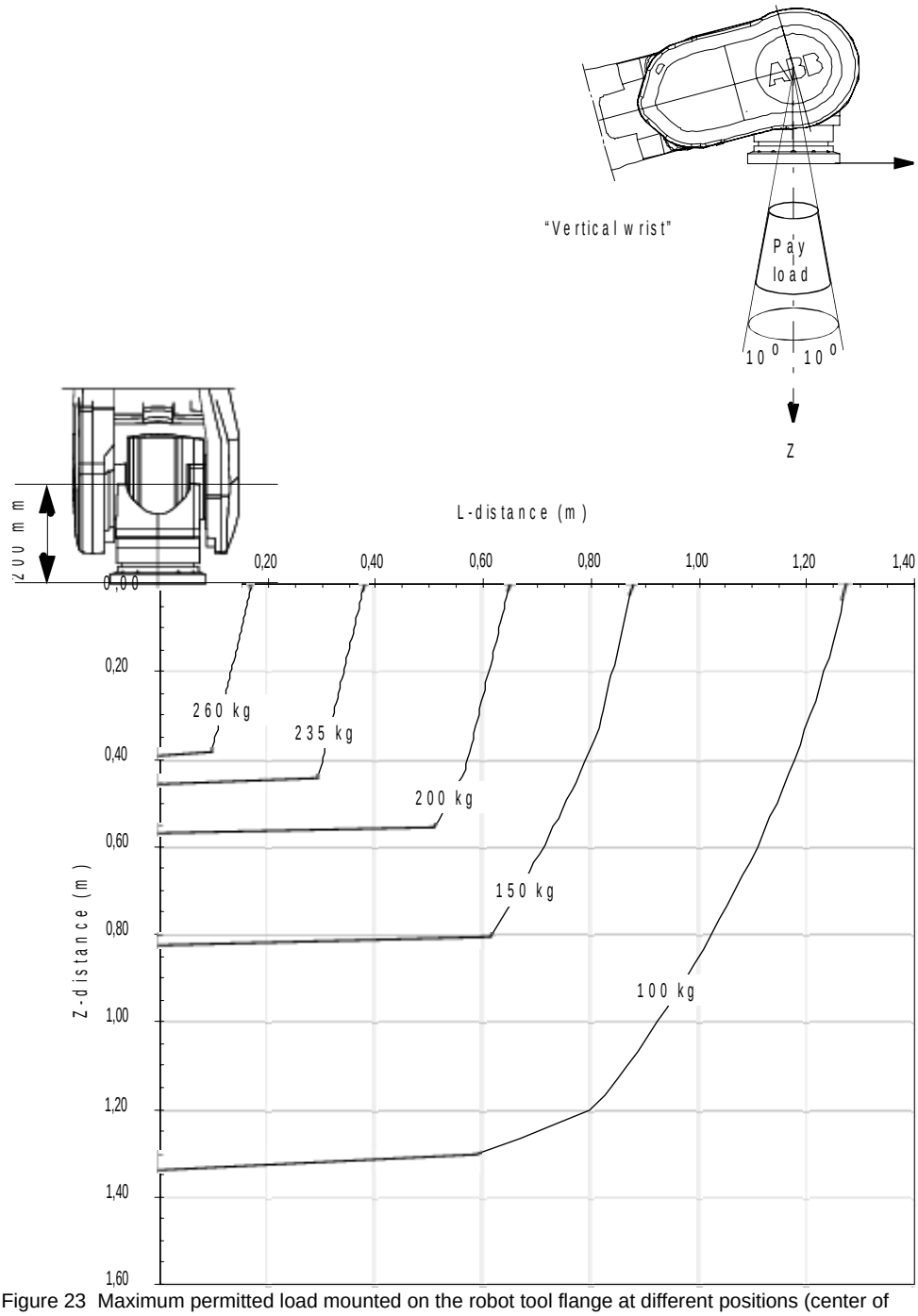

Figure 23 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10°).

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

	Description
Max load	270 kg
Z_{max}	0,359 m
L_{max}	0,124 m

1.5.2 Diagrams

IRB 6600 - 175/2.8

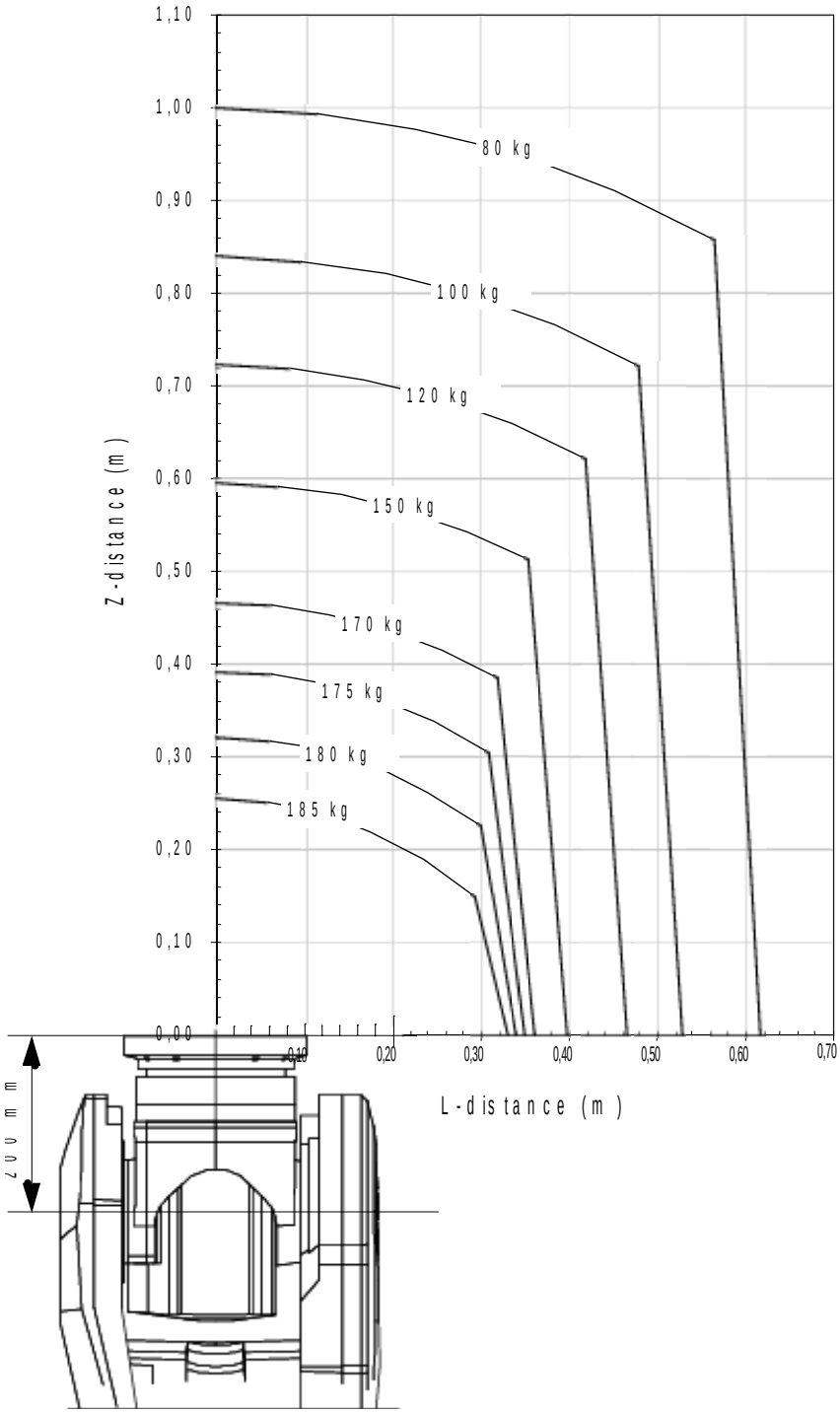

Figure 24 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6600 - 175/2.8 “Vertical Wrist” (±10°)

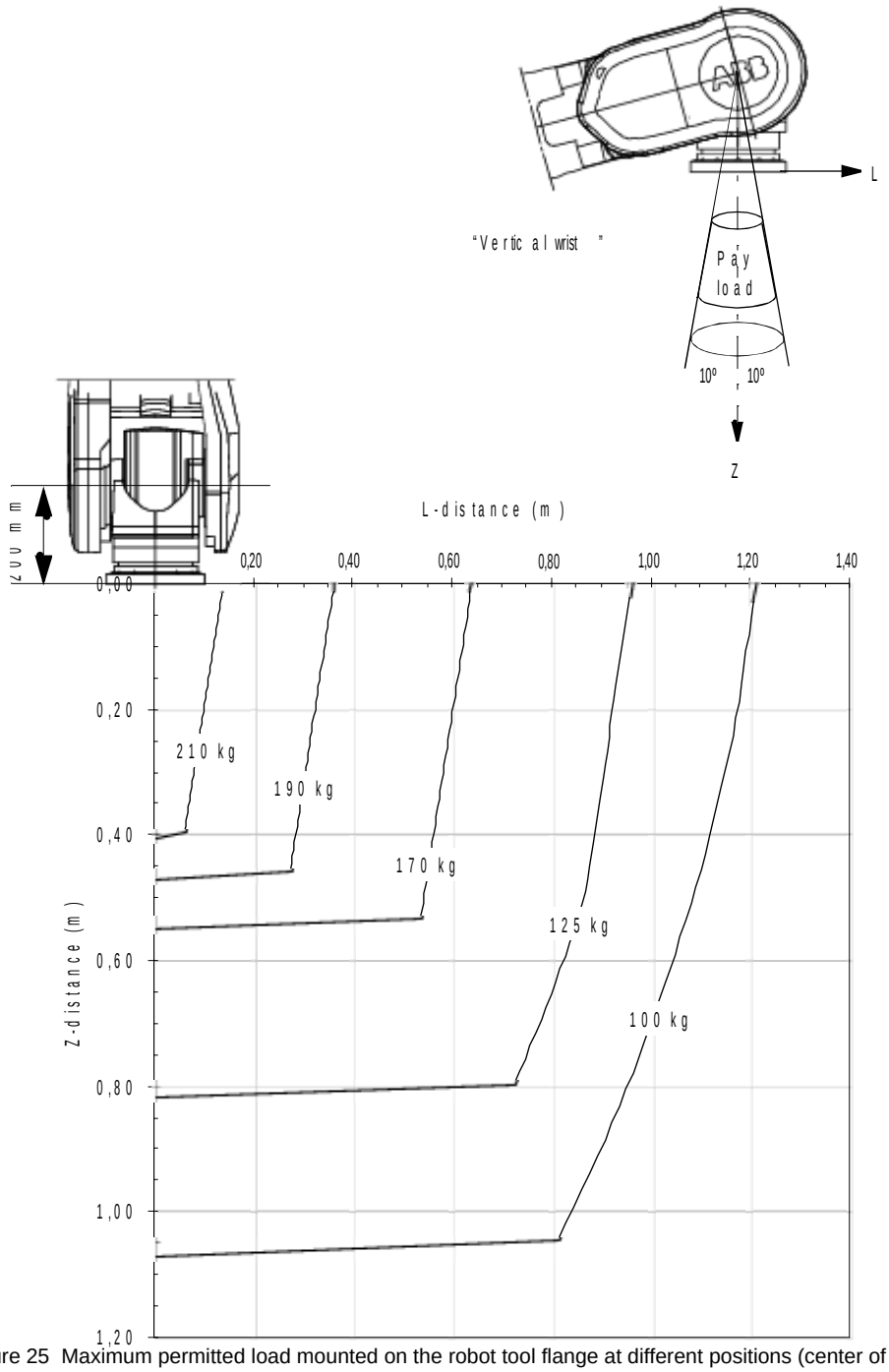

Figure 25 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10°).

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

	Description
Max load	215 kg
Z_{max}	0,382 m
L_{max}	0,116 m

IRB 6650 - 125/3.2 and IRB 6650S-125/3.5

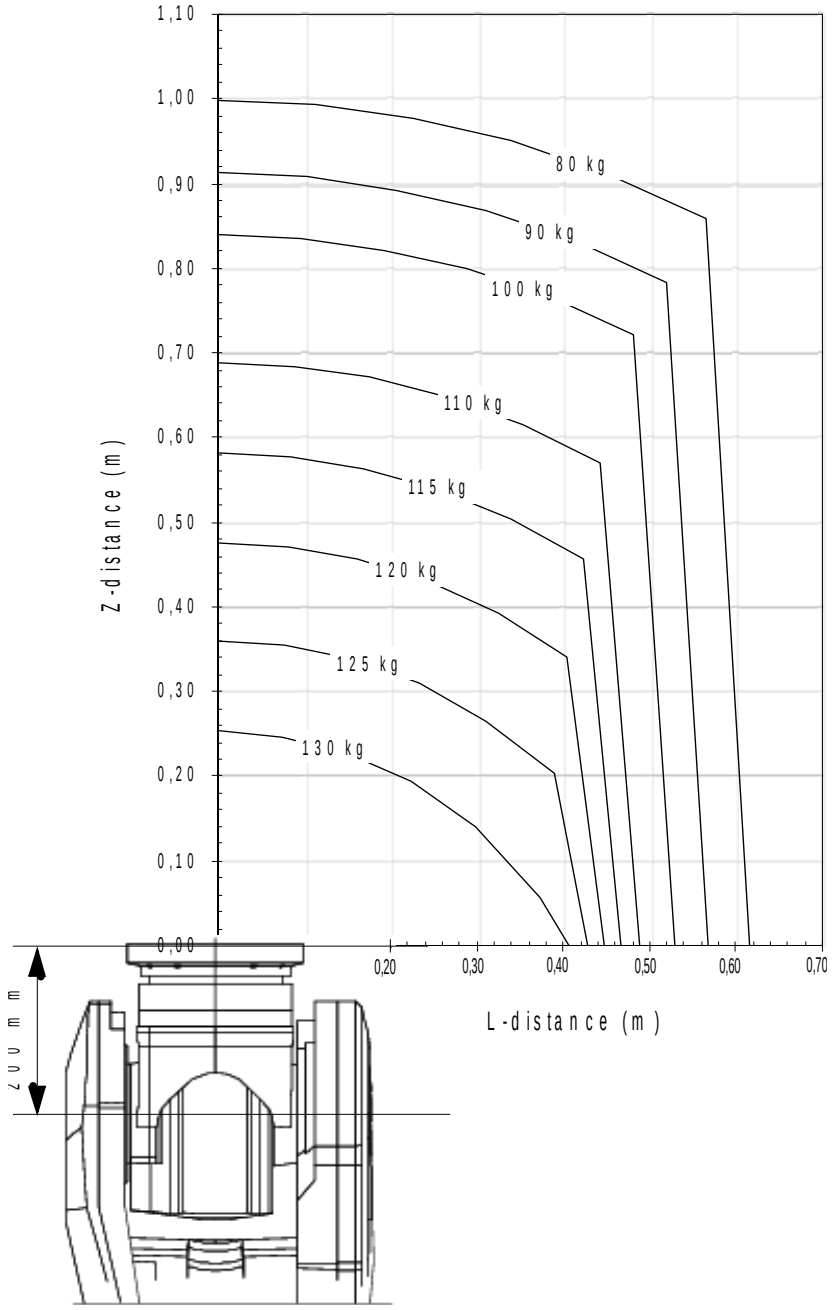

Figure 26 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6650 - 125/3.2 and IRB 6650S-125/3.5 “Vertical Wrist” (±10°)

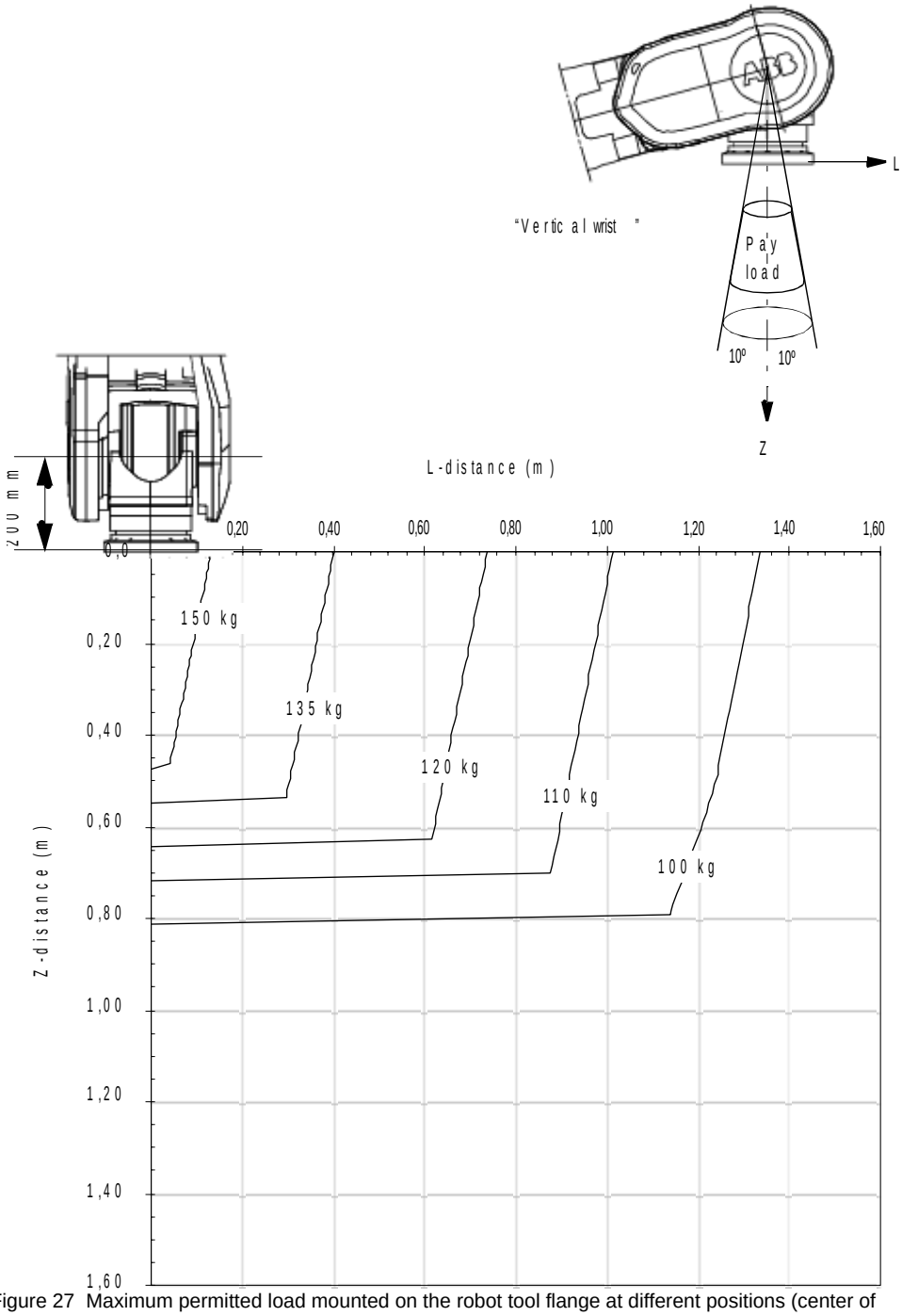

Figure 27 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10°).

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

	Description
Max load	150 kg
Z_{max}	0,462 m
L_{max}	0,156 m

1.5.2 Diagrams

IRB 6650S - 90/3.9

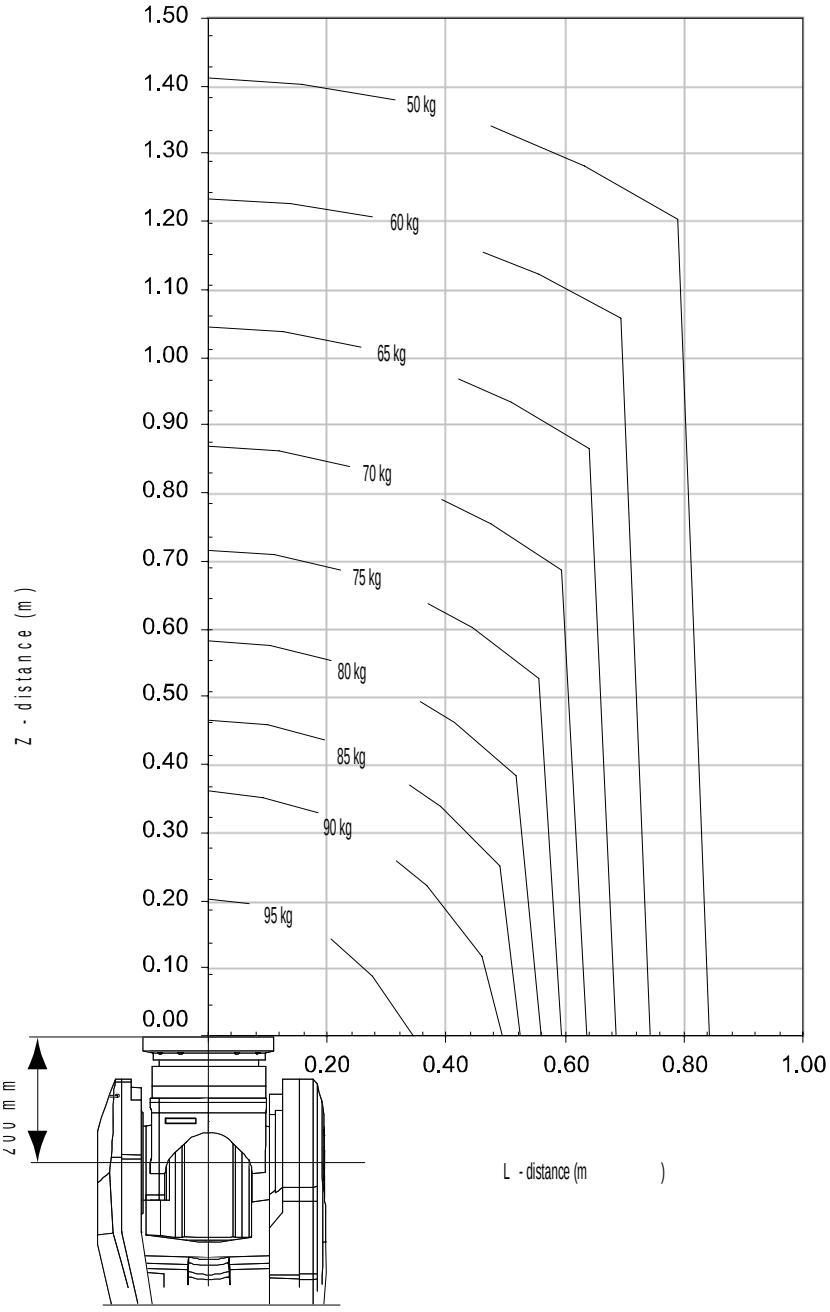

Figure 28 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6650S - 90/3.9 “Vertical Wrist” (±10º)

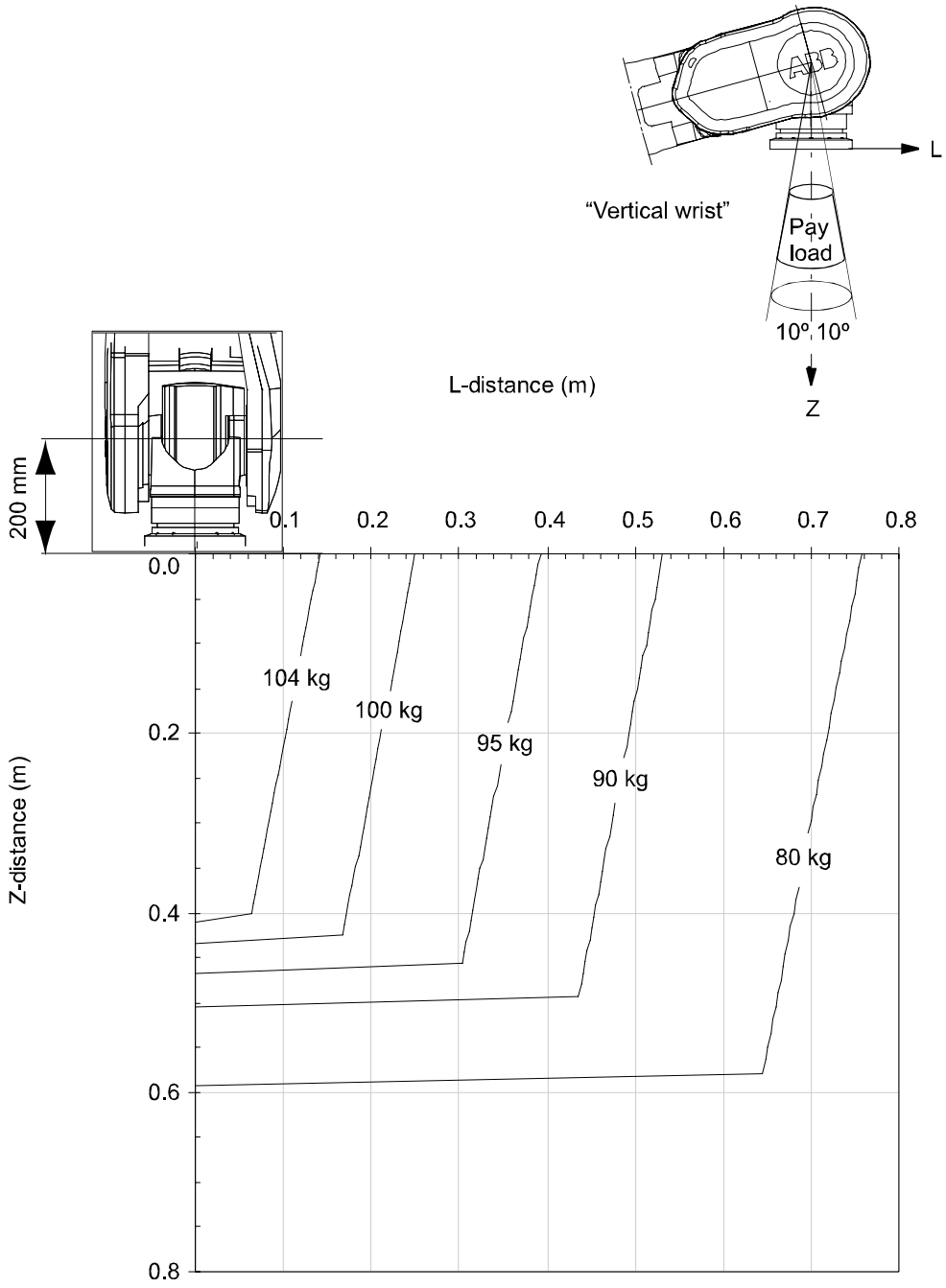

Figure 29 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10º).

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

	Description
Max load	107 kg
Z_{max}	0,2 m
L_{max}	0,1 m

1.5.2 Diagrams

IRB 6650 - 200/2.75 and IRB 6650S-200/3.0

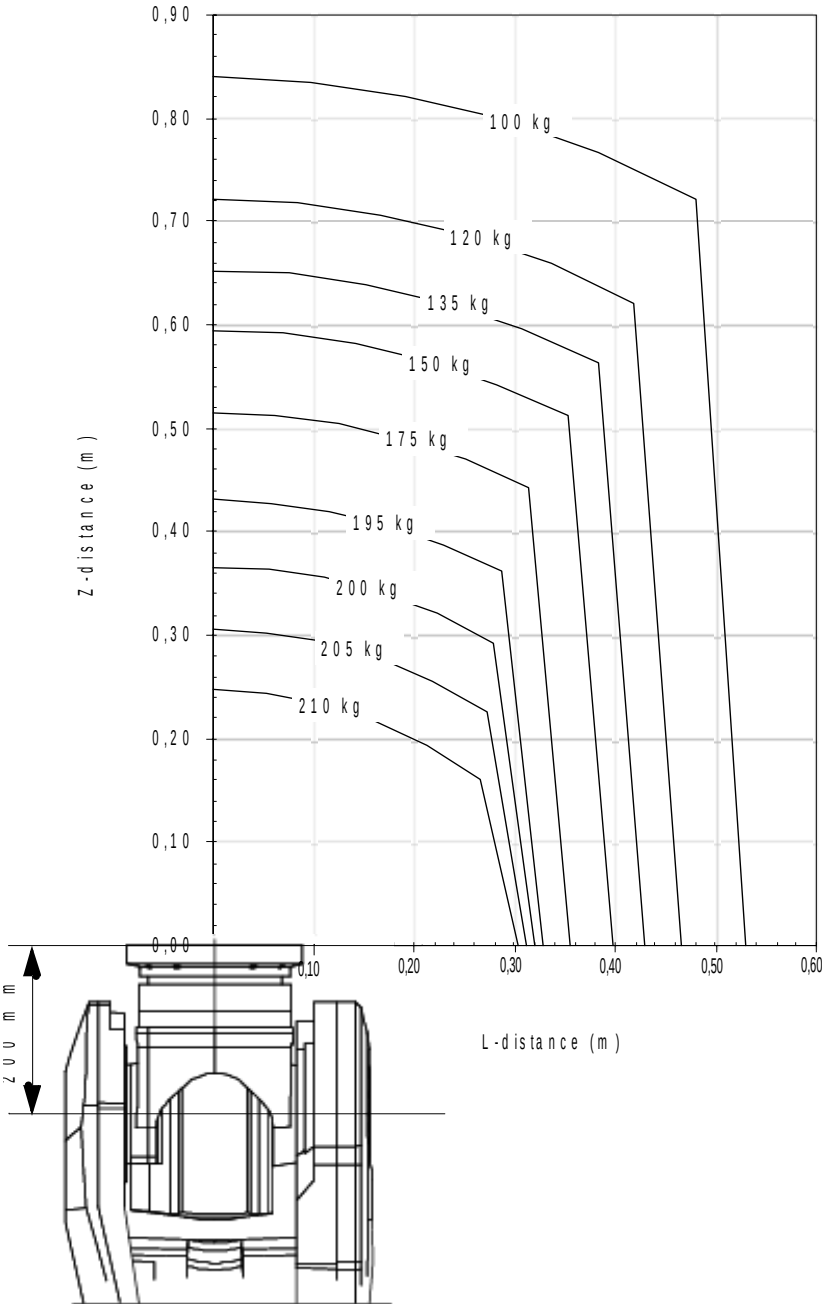

Figure 30 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6650 - 200/2.75 and IRB 6650S-200/3.0 “Vertical Wrist” (±10°)

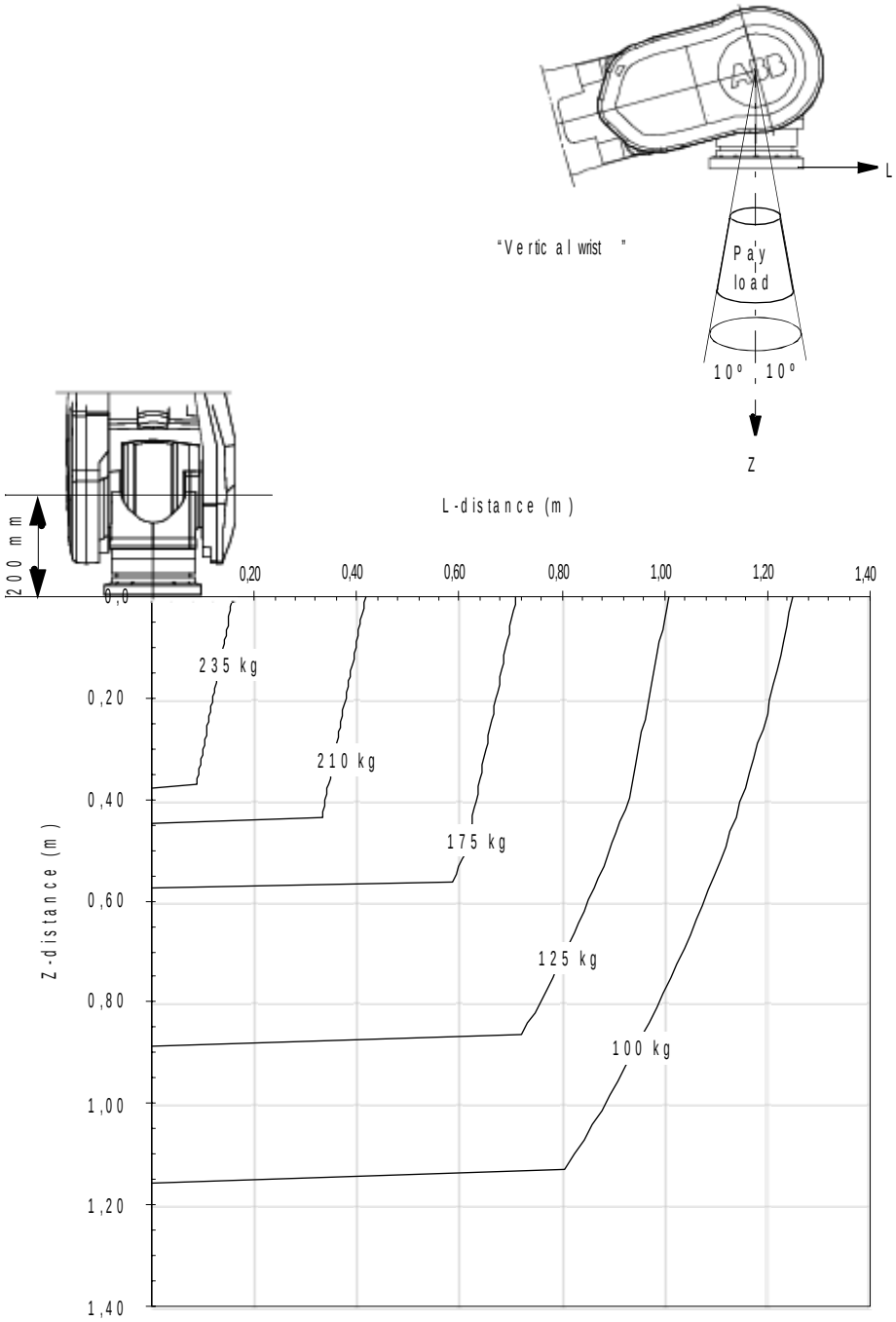

Figure 31 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10°).

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

	Description
Max load	245 kg
Z_{max}	0,345 m
L_{max}	0,098 m

1.5.2 Diagrams

IRB 6600ID - 185/2.55

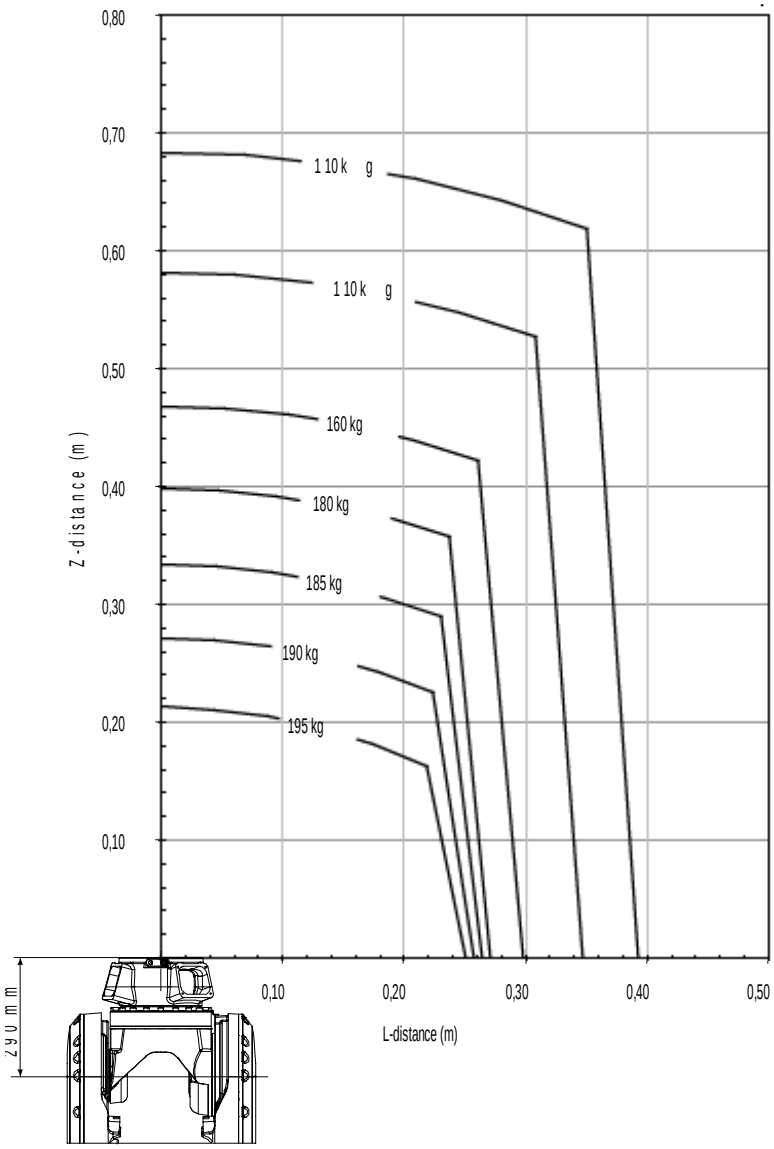

Figure 32 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6600ID - 185/2.55 “Vertical Wrist” (±10º)

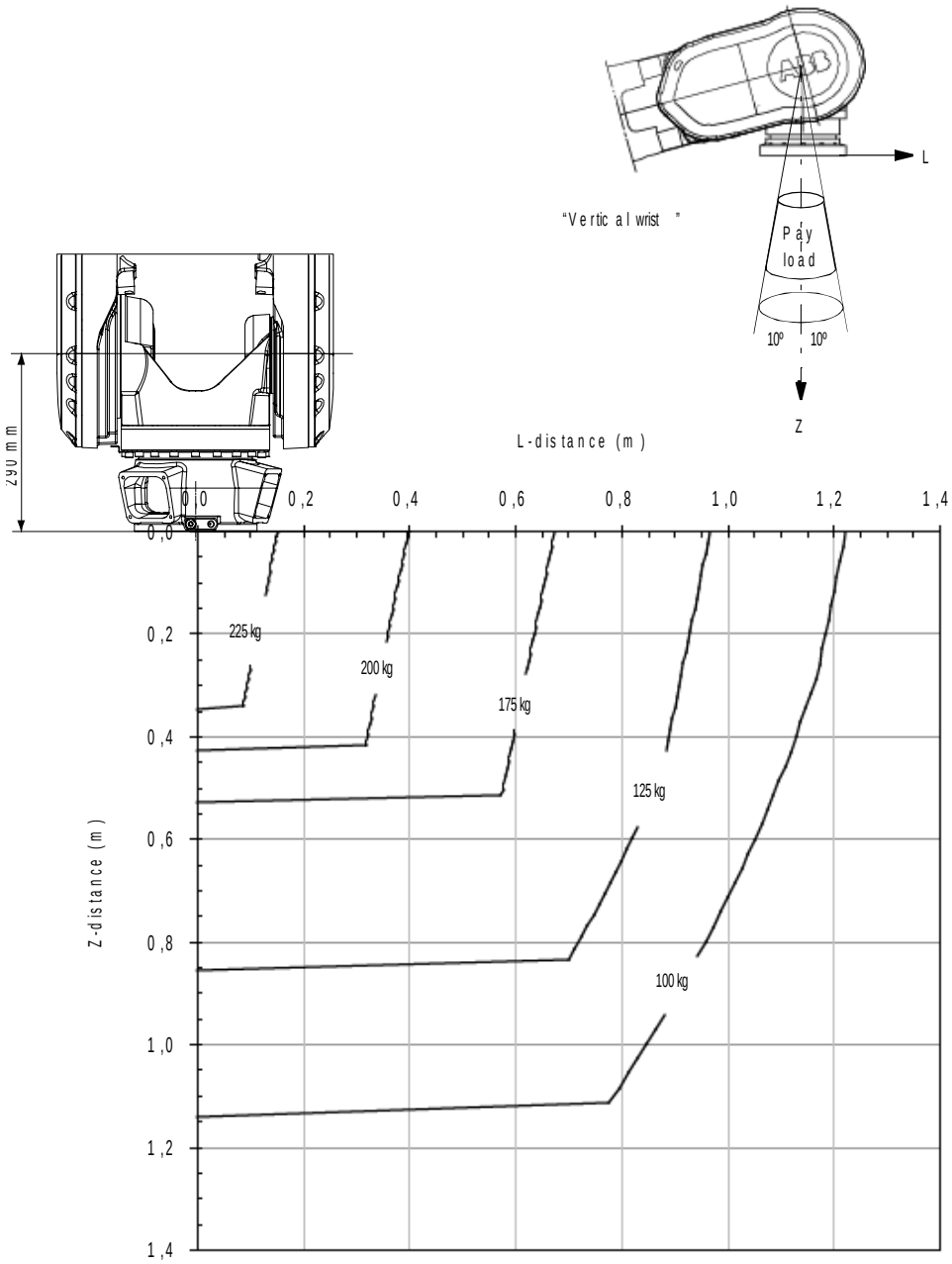

Figure 33 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10^{o}).

For wrist down (0^{o} deviation from the vertical line).

	Description
Max load	225 kg
Z_{max}	0,345 m
L_{max}	0,153 m

1.5.2 Diagrams

IRB 6650ID - 170/2.75

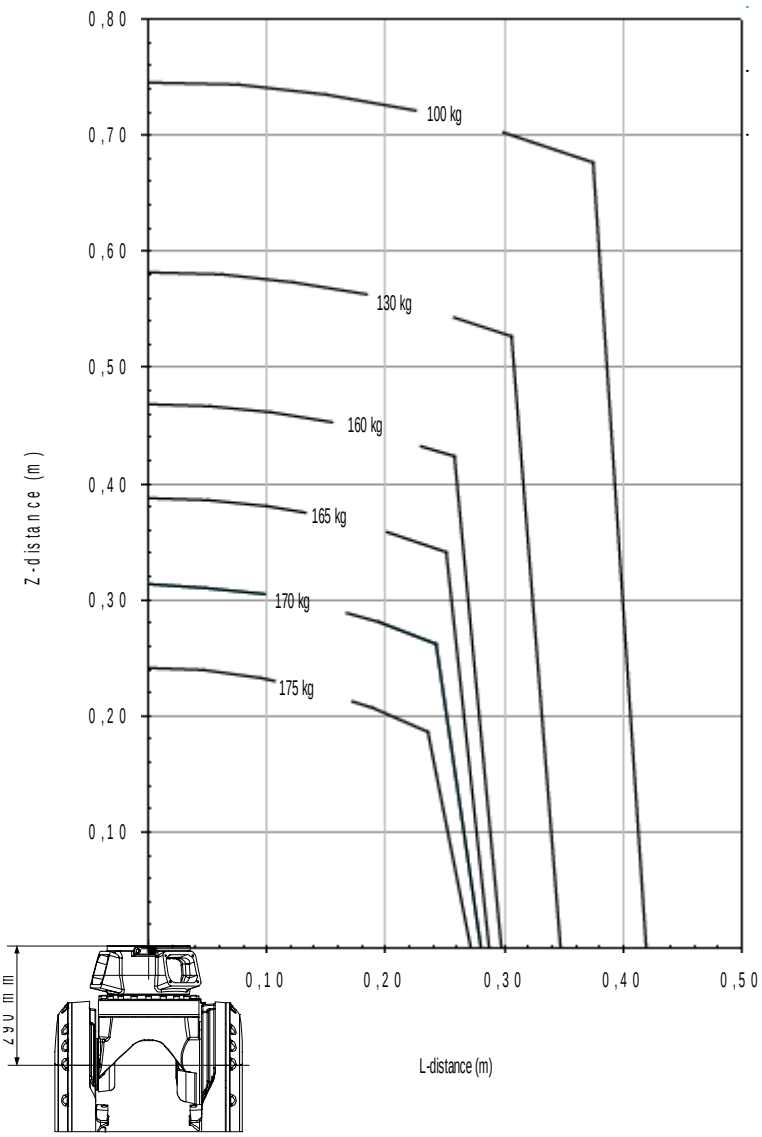

Figure 34 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity).

IRB 6650ID - 170/2.75 “Vertical Wrist” (±10º)

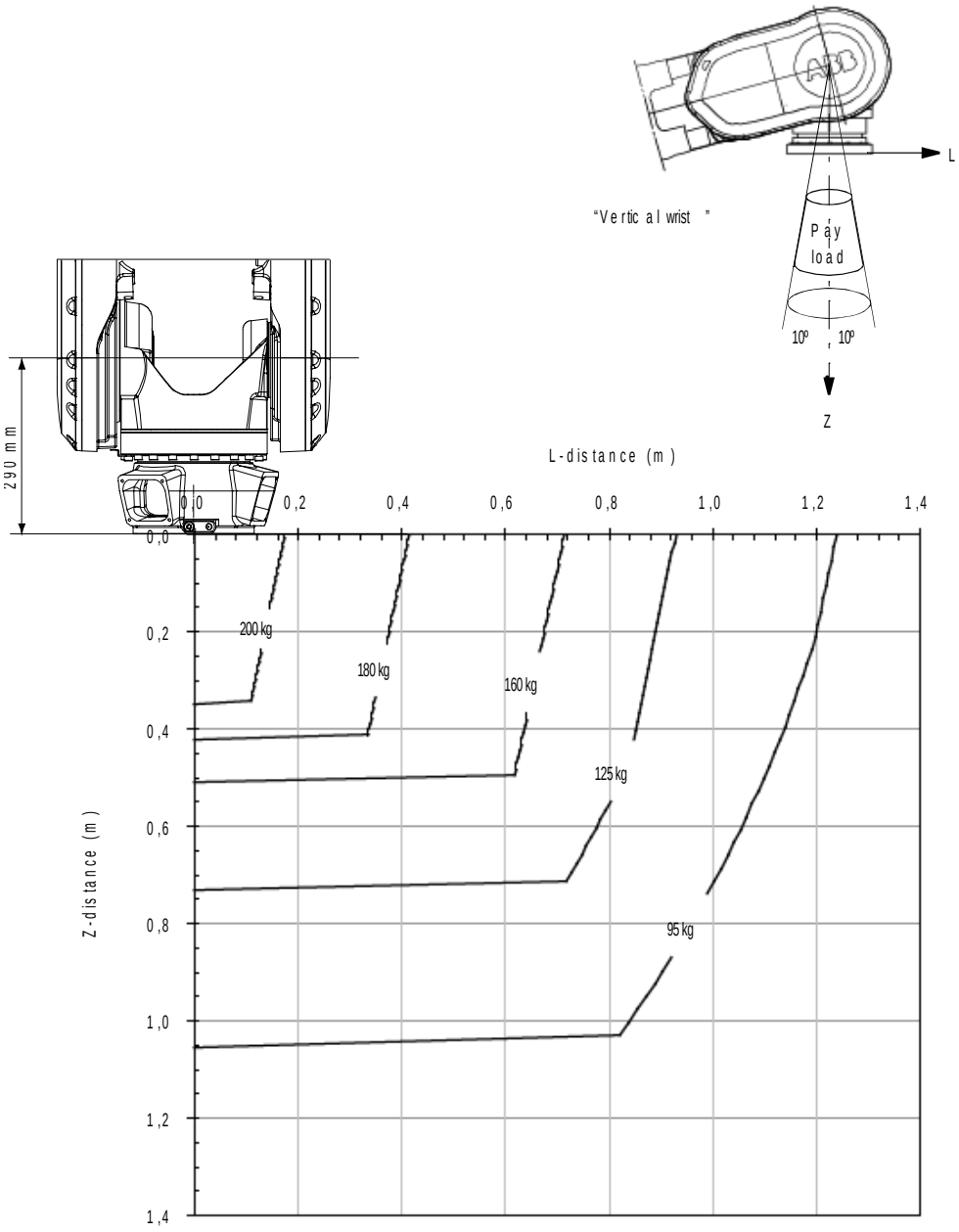

Figure 35 Maximum permitted load mounted on the robot tool flange at different positions (center of gravity) at “Vertical Wrist” (±10º).

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

	Description
Max load	200 kg
Z_{max}	0,349 m
L_{max}	0,177 m

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

Load in kg, Z and L in m and J in kgm^2

Full movement of axis 5 (±120°/±100° for ID)

Axis	Robot Type	Maximum moment of inertia
5	225/2.55, 175/2.8, 125/3.2, 125/3.5, 200/2.75, 200/3.0 and 90/3.9	Ja5 = Load x $((Z + 0{,}200)^2 + L^2) + J_{0L} \leq 250$ kgm^2
	ID-170/2.75 and ID-185/2.55	Ja5 = Load x $((Z + 0{,}290)^2 + L^2) + J_{0L} \leq 250$ kgm^2
	175/2.55	Ja5 = Load x $((Z + 0{,}200)^2 + L^2) + J_{0L} \leq 195$ kgm^2
6	225/2.55, 175/2.8, 125/3.2, 125/3.5, 200/2.75, 200/3.0, ID-170/2.75, ID-185/2.55 and 90/3.9	Ja6 = Load x $L^2 + J_{0Z} \leq 185$ kgm^2
	175/2.55	Ja6 = Load x $L^2 + J_{0Z} \leq 145$ kgm^2

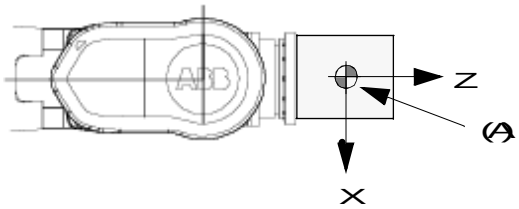

Figure 36 Moment of inertia when full movement of axis 5.

Pos	Description
A	Center of gravity

	Description
J_{0L}	Maximum own moment of inertia around the maximum vector in the X-Y-plane
J_{0Z}	Maximum own moment of inertia around Z

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

Limited axis 5, center line down

Axis	Robot Type	Maximum moment of inertia
5	225/2.55, 175/2.8, 125/3.2, 125/3.5, 200/2.75, 200/3.0 and 90/3.9	$Ja5 = Load \times ((Z + 0{,}200)^2 + L^2) + J_{0L} \leq 275 kgm^2$
	ID-170/2.75 and ID-185/2.55	$Ja5 = Load \times ((Z + 0{,}290)^2 + L^2) + J_{0L} \leq 275\ kgm^2$
	175/2.55	$Ja5 = Load \times ((Z + 0{,}200)^2 + L^2) + J_{0L} \leq 215\ kgm^2$
6	225/2.55, 175/2.8, 125/3.2, 125/3.5, 200/2.75, 200/3.0, ID-170/2.75, ID-185/2.55 and 90/3.9	$Ja6 = Load \times L^2 + J_{0Z} \leq 250\ kgm^2$
	175/2.55	$Ja6 = Load \times L^2 + J_{0Z} \leq 195\ kgm^2$

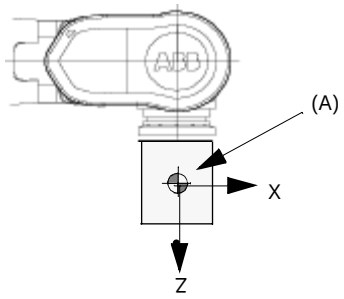

Figure 37 Moment of inertia when axis 5 center line down.

Pos	Description
A	Center of gravity

	Description
J_{0L}	Maximum own moment of inertia around the maximum vector in the X-Y-plane
J_{0Z}	Maximum own moment of inertia around Z

1.5.4 Wrist torque

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

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.

Robot type	Max wrist torque axis 4 and 5	Max wrist torque axis 6	Max torque valid at load
IRB 6600 - 175/2.55	961 Nm	429 Nm	175 kg
IRB 6600 - 225/2.55	1324 Nm	650 Nm	225 kg
IRB 6600 - 200/2.75	1264 Nm	625 Nm	192 kg
IRB 6600 - 175/2.80	1201 Nm	598 Nm	163 kg
IRB 6600 - 125/3.20	1037 Nm	526 Nm	105 kg
IRB 6600ID - 185/2.55	1233 Nm	478 Nm	179 kg
IRB 6600ID - 170/2.75	1190 Nm	466 Nm	160 kg

1.6 Mounting equipment

1.6.1 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 Figure 38 and Figure 39. The robot is supplied with holes for mounting extra equipment (see Figure 40). 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 6600ID/6650ID.

Upper arm

Allowed extra load on upper arm housing plus the maximum handling weight (see Figure 38):

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

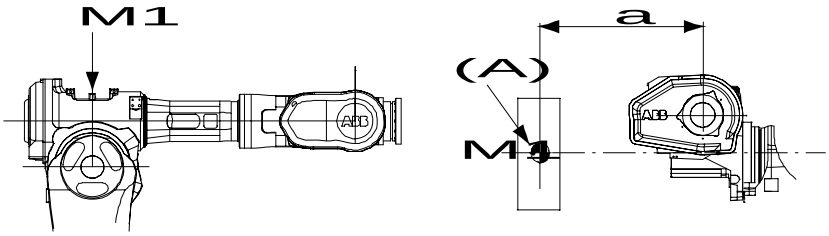

Figure 38 Permitted extra load on upper arm.

Pos	Description
A	Mass center

Frame (Hip Load)

	Description
Permitted extra load on frame	J_H = 200 kgm^2
Recommended position (see Figure 39)	$J_H = J_{H0} + M4 \times R^2$ 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 (≤ 500 kg)

1.6.1 General

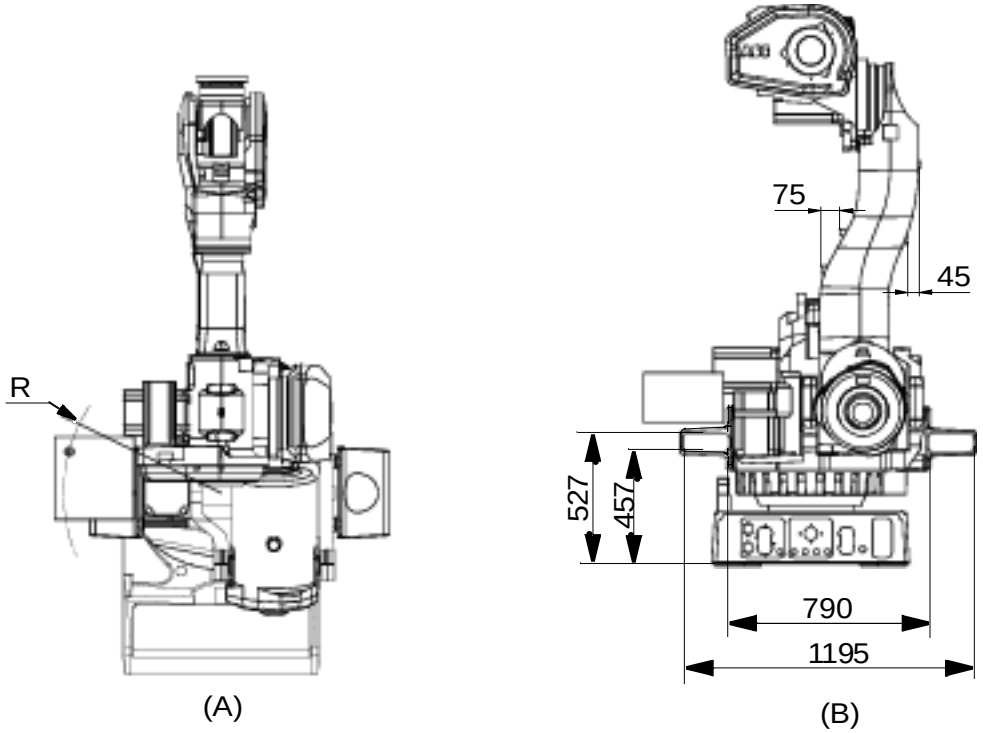

Figure 39 Extra load on the frame of IRB 6600 (dimensions in mm).

Pos	Description
A	View from above
B	View from the rear

1.6.2 Mounting of hip load

General

The extra load can be mounted on the frame. Holes for mounting see Figure 40 and Figure 41. When mounting on the frame all four holes (2x2, ∅16) on one side must be used.

Holes for mounting extra equipment on IRB 6600/6650 and IRB 6600ID/6650ID

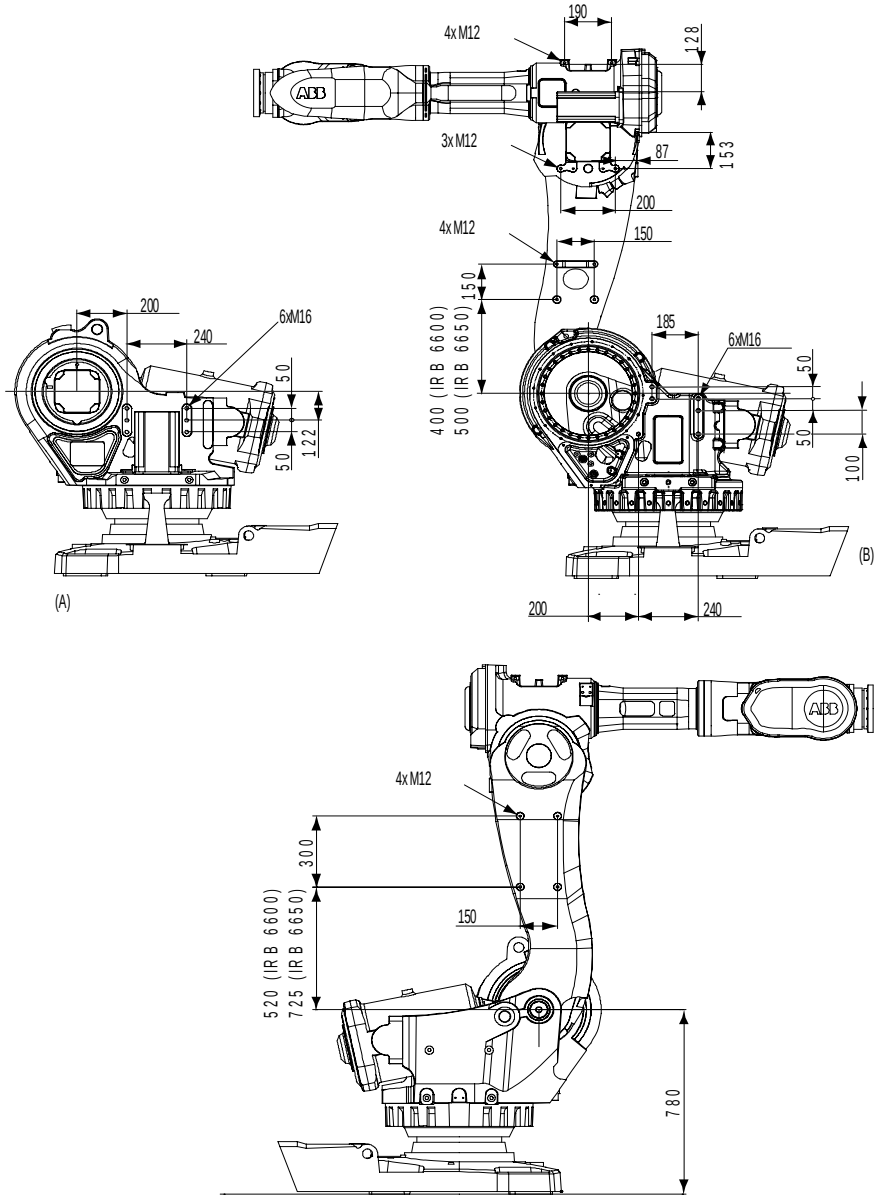

Figure 40 Holes for mounting extra equipment on the upper and the lower arm, and the frame on IRB 6600/ 6650 (dimensions in mm).

Pos	Description
A	Differences for Type A
B	Type B

1.6.2 Mounting of hip load

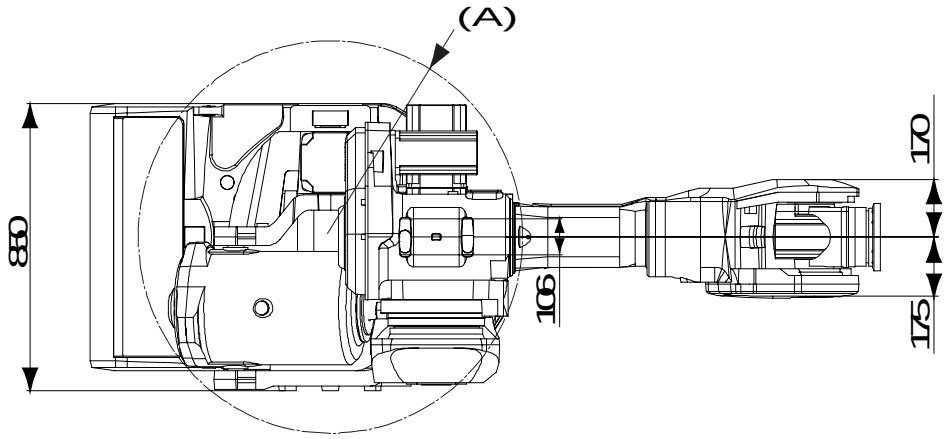

Figure 41 Holes for mounting of extra load on the upper arm on IRB 6600/6650 (dimensions in mm).

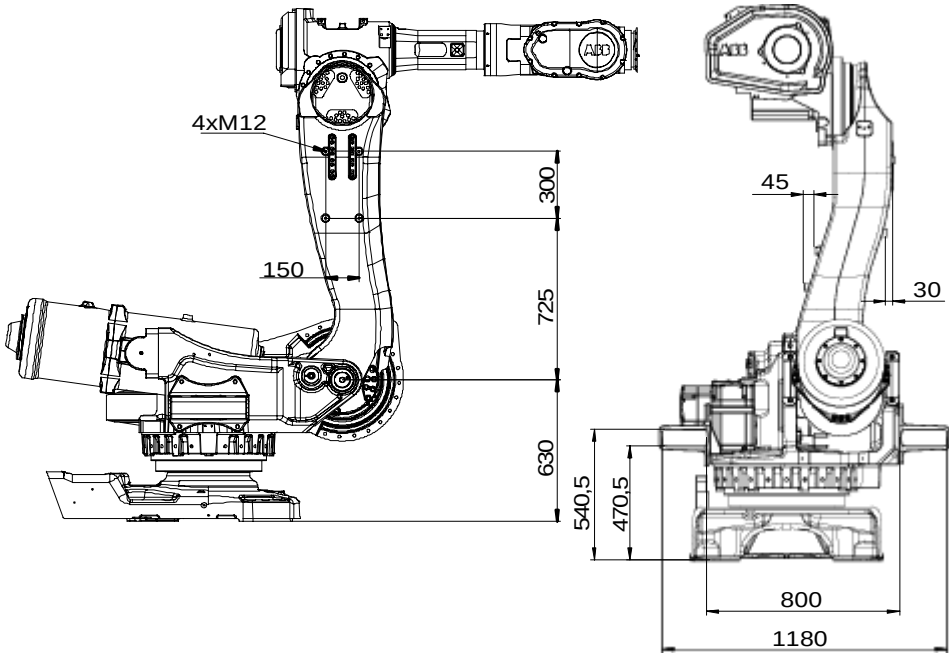

Figure 42 Holes for mounting extra load on upper arm on IRB 6650S (dimensions in mm).

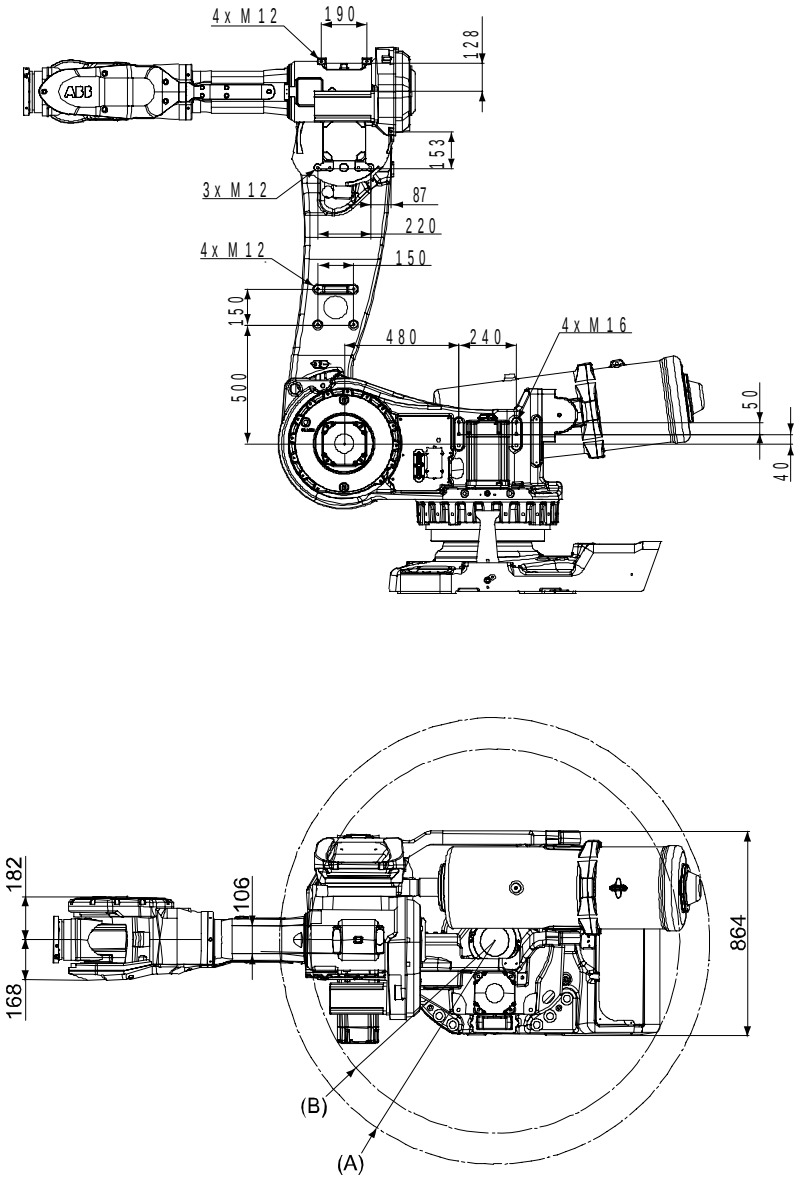

Figure 43 Holes for mounting extra load on upper arm on IRB 6650S (dimensions in mm).

Pos	Description
A	R 946 (Rear side, Balancing device)
B	R 813 (Front side, Motor axis 2)

1.6.2 Mounting of hip load

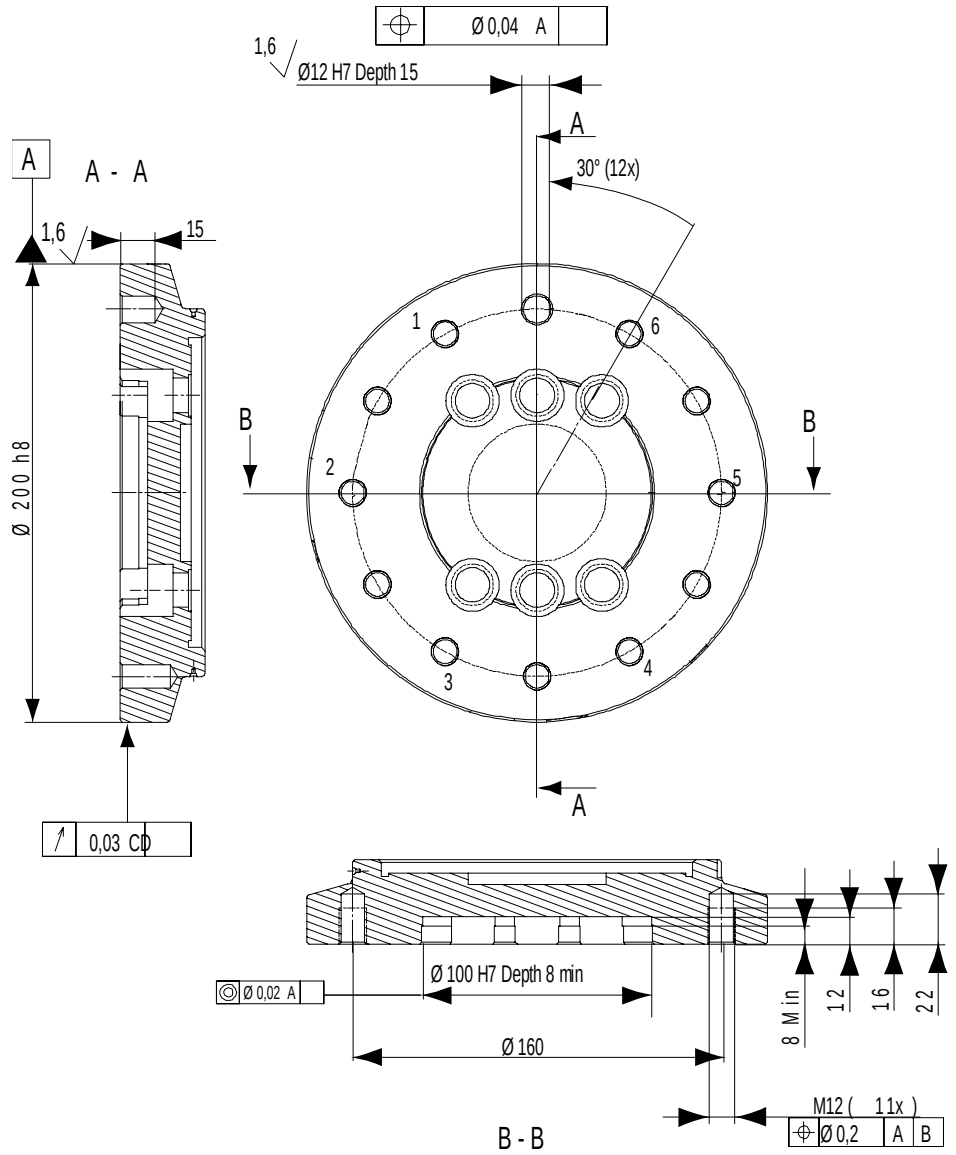

Figure 44 Robot tool flange SS-EN ISO 9409-1:2004 (dimensions in mm).

Robot Type	Handling capacity (kg)	Reach (m)	Wrist type
IRB 6600	175	2.55	Type 1

For fastening of gripper-tool-flange to robot-tool-flange every other one (see Figure 44) of the bolt holes for 6 bolts quality class 12.9 shall be used.

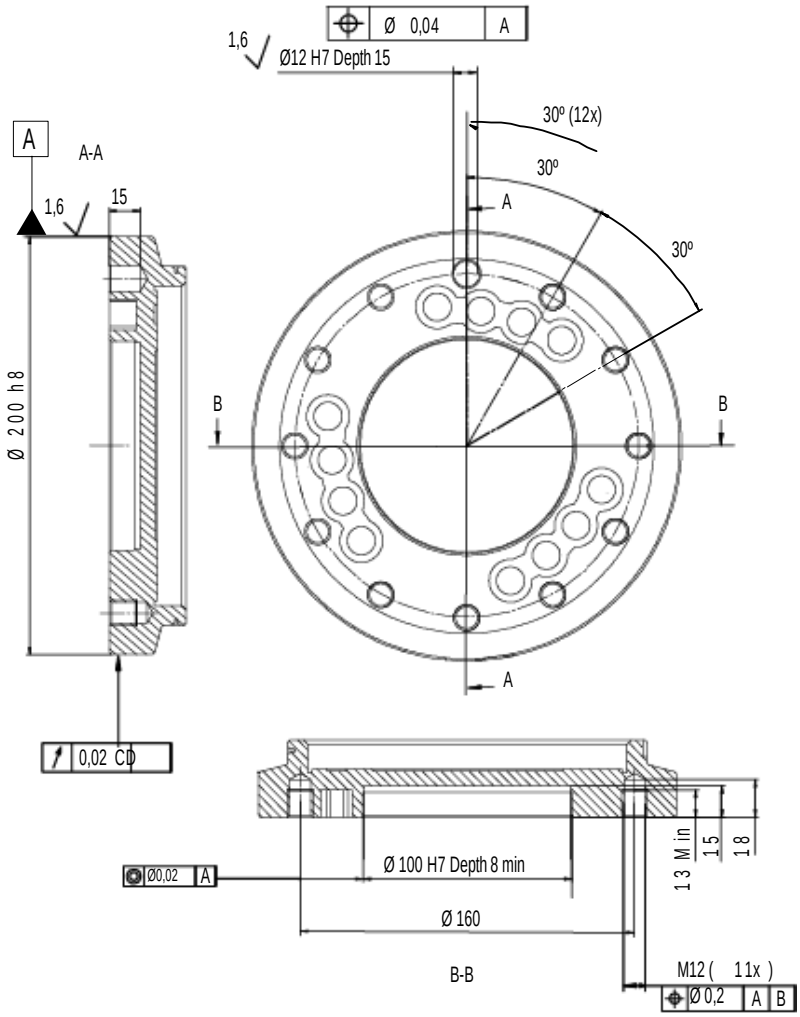

Figure 45 Robot tool flange ISO/DIS 9409-1:2002 (dimensions in mm).

Robot Type	Handling capacity (kg)	Reach (m)	Wrist type
IRB 6600	225	2.55	Type 2
IRB 6600	175	2.8	Type 2
IRB 6650	125	3.2	Type 2
IRB 6650	200	2.75	Type 2
IRB 6650S	90	3.9	Type 2
IRB 6650S	125	3.5	Type 2
IRB 6650S	200	3.0	Type 2

For fastening of gripper-tool-flange to robot-tool-flange (see Figure 45) all bolt holes for 11 bolts quality class 12.9 shall be used.

1.6.2 Mounting of hip load

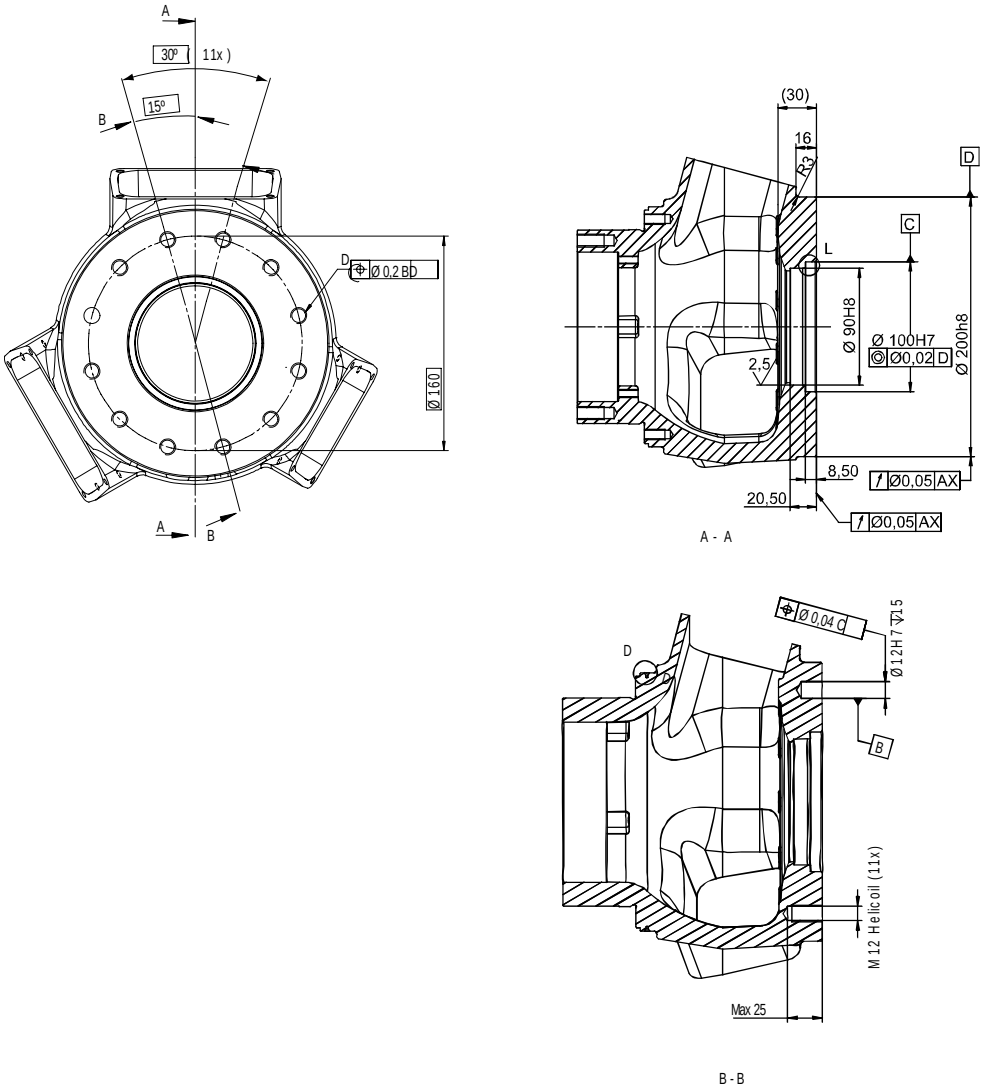

Figure 46 Robot tool flange SS-EN ISO 9409-1:2004 (dimensions in mm).

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6600ID	185	2.55
IRB 6650ID	170	2.75

For fastening of gripper-tool-flange to robot-tool-flange (see Figure 46) 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 selected options. For detailed information on maintenance procedures, see Maintenance section in the Product Manual.

1.8 Robot Motion

1.8.1 Introduction

Type of Motion

Axis	Type of motion	Range of movement		
		IRB 6600/6650	IRB 6650S	IRB 6600ID/6650ID
1	Rotation Motion	+ 180° to - 180° + 220° to - 220° (option)	+ 180° to - 180° + 220° to - 220° (option)	+ 180°to - 180°
2	Arm motion	+ 85° to - 65°	+ 160° to - 40°	+ 85° to - 65°
3	Arm motion	+ 70° to - 180°	+ 70° to - 180°	+ 70° to - 180°
4	Wrist motion	+ 300° to - 300°	+ 300° to - 300°	+ 300° to - 300°[a]
5	Bend motion	+ 120° to - 120°	+ 120° to - 120°	+ 100° to - 100°
6	Turn motion	+ 360° to - 360° default ± 96 Rev[b]	+ 360° to - 360° default ± 96 Rev[b]	+ 300° to - 300°[a]

a. For IRB 6600ID/6650ID axis 4 and 6 together max. +300º to -300º.
b. Rev. = Revolutions

Note! For limitation of range of motion in combination with DressPack see chapter 2.2 DressPack.

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6600	175	2.55
	225	2.55
IRB 6600ID	185	2.55

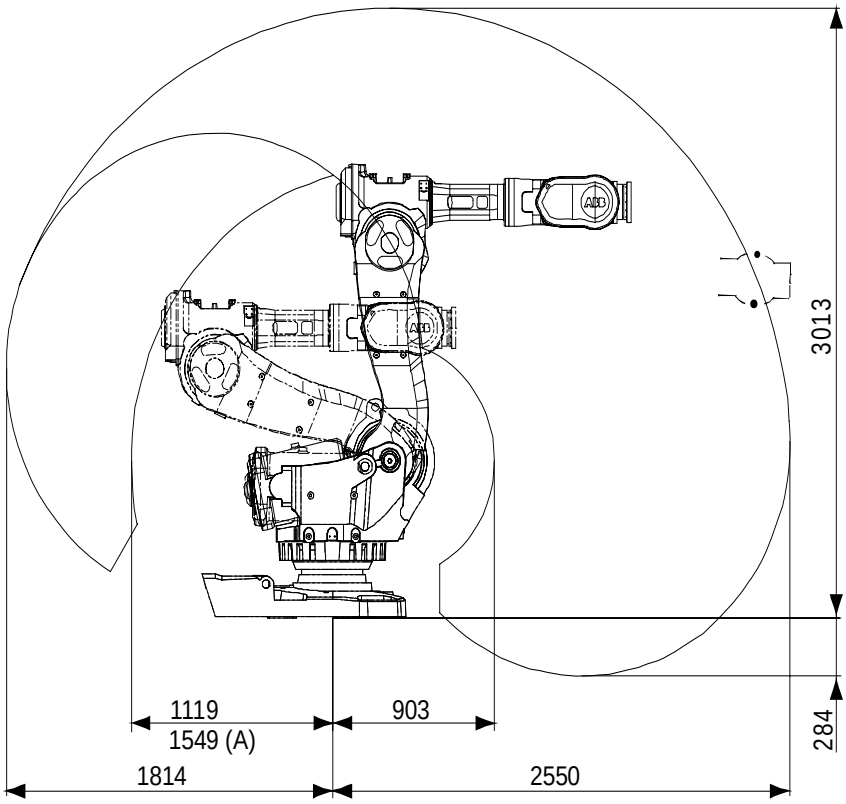

Figure 47 The extreme positions of the robot arm specified at the wrist center (dimensions in mm).

Pos	Beschreibung
A	Because of the process cable on the upper arm of the IRB 6600ID the working range of the backward motion is limited.

1.8.1 Introduction

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6600	175	2.8

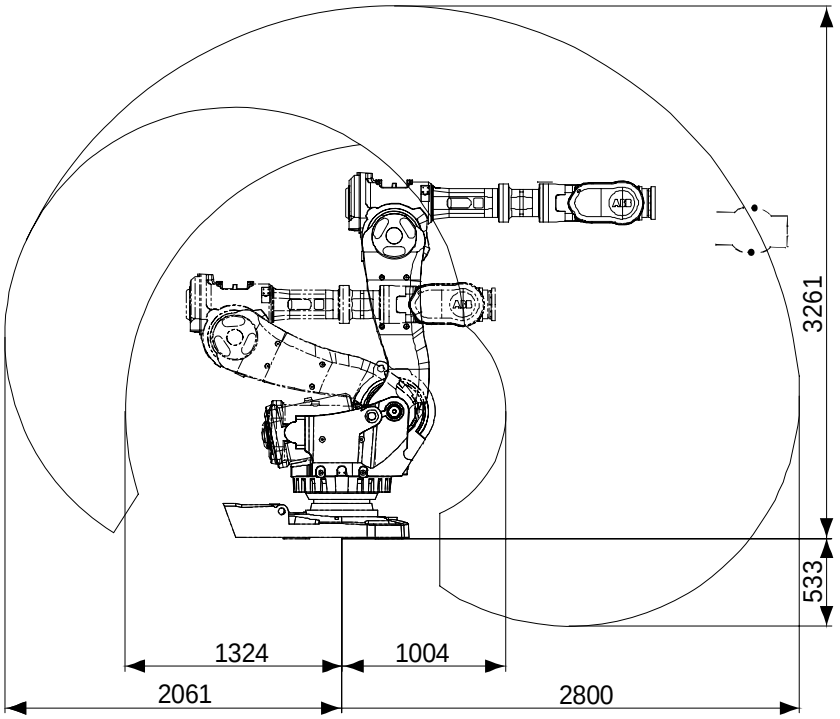

Figure 48 The extreme positions of the robot arm specified at the wrist center (dimensions in mm).

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6650	125	3.2

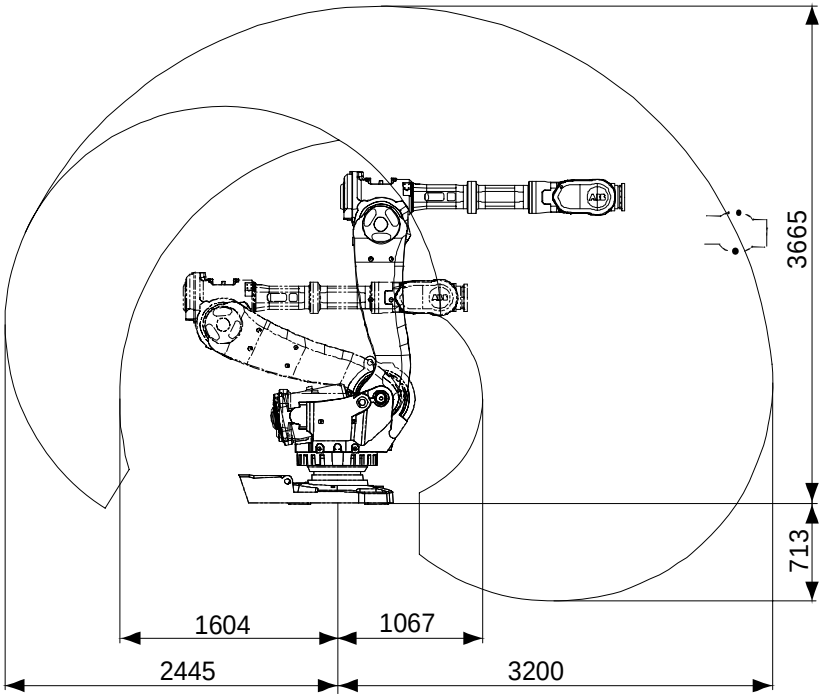

Figure 49 The extreme positions of the robot arm specified at the wrist center (dimensions in mm).

1.8.1 Introduction

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6650	200	2.75
IRB 6650ID	170	2.75

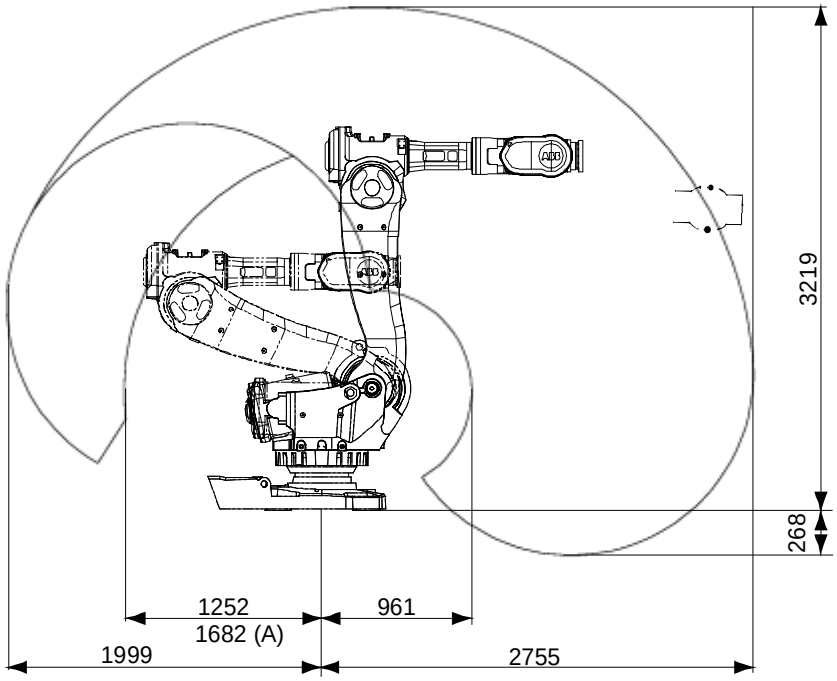

Figure 50 The extreme positions of the robot arm specified at the wrist center (dimensions in mm).

Pos	Beschreibung
A	Because of the process cable on the upper arm of the IRB 6600ID the working range of the backward motion is limited.

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6650S	200	3.0

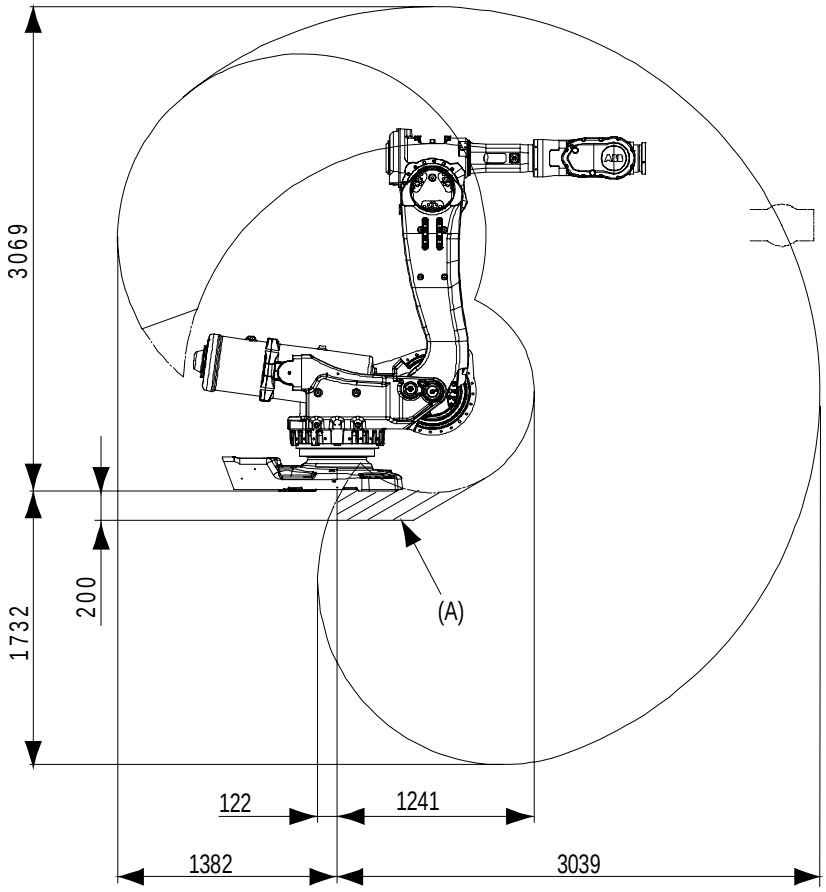

Figure 51 The extreme positions of the robot arm specified at the wrist center (dimensions in mm).

Pos	Description
A	Marked area not available under the robot base.

1.8.1 Introduction

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6650S	125	3.5

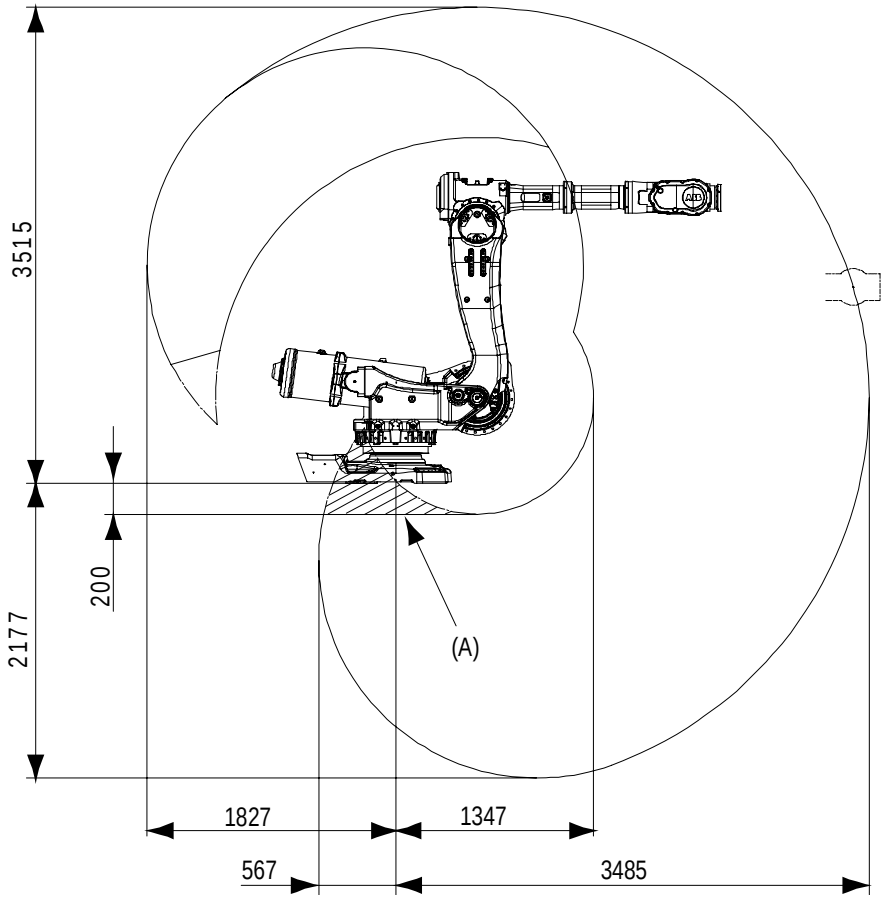

Figure 52 The extreme positions of the robot arm specified at the wrist center (dimensions in mm).

Pos	Description
A	Marked area not available under the robot base.

Robot Type	Handling capacity (kg)	Reach (m)
IRB 6650S	90	3.9

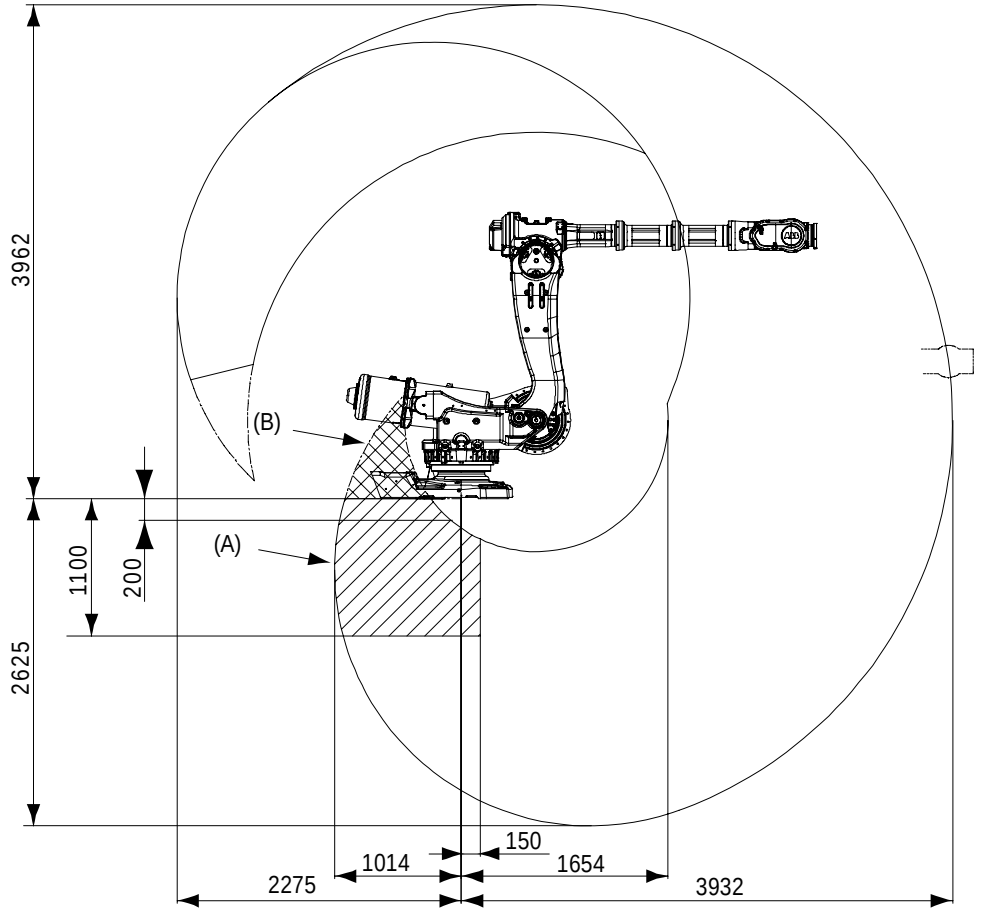

Figure 53 The extreme positions of the robot arm specified at the wrist center (dimensions in mm).

Pos	Description
A and B	Marked area, max. payload 50 kg
B	Marked area not available under the robot base

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, 1 m cube with all six axes in motion.

IRB 6600/6650	175/2.55	225/2.55	175/2.8	125/3.2	200/2.75
Pose accuracy, AP[a] (mm)	0.09	0.12	0.17	0.11	0.16
Pose repeatability, RP (mm)	0.18	0.14	0.14	0.11	0.14
Pose stabilization time, PSt (s)	0.03	0.68	0.24	0.46	0.28
Path accuracy, AT (mm)	2.33	2.30	2.07	1.85	2.83
Path repeatability, RT(mm)	1.05	0.56	0.36	0.19	0.41

a. 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.

IRB 6650S	125/3.5	200/3.0	90/3.9
Pose accuracy, AP[a] (mm)	0.16	0.13	[b]
Pose repeatability, RP (mm)	0.13	0.14	[b]
Pose stabilization time, PSt (s)	0.33	0.18	[b]
Path accuracy, AT (mm)	2.58	2.98	[b]
Path repeatability, RT(mm)	0.90	0.70	[b]

a. 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.
b. The values for IRB 6650S - 90/3.9 are not yet available.

IRB 6600ID/6650ID	185/2.55	170/2.75
Pose accuracy, AP[a] (mm)	[b]	0.11
Pose repeatability, RP (mm)	[b]	0.03
Pose stabilization time, PSt (s)	[b]	0.61
Path accuracy, AT (mm)	[b]	3.54
Path repeatability, RT(mm)	[b]	0.46

a. 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.
b. The values for IRB 6600ID - 185/2.55 are not yet available.

The above values are the range of average test results from a number of robots.

1.8.3 Velocity

Maximum axis speeds

Robot Type	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 6
IRB 6600 - 175/2.55	100°/s	90°/s	90°/s	150°/s	120°/s	190°/s
IRB 6600 - 225/2.55	100°/s	90°/s	90°/s	150°/s	120°/s	190°/s
IRB 6600 - 175/2.8	100°/s	90°/s	90°/s	150°/s	120°/s	190°/s
IRB 6650 - 125/3.2	110°/s	90°/s	90°/s	150°/s	120°/s	235°/s
IRB 6650 - 200/2.75	100°/s	90°/s	90°/s	150°/s	120°/s	190°/s
IRB 6650S - 90/3.9	100°/s	90°/s	90°/s	150°/s	120°/s	235°/s
IRB 6650S - 125/3.5	110°/s	90°/s	90°/s	150°/s	120°/s	235°/s
IRB 6650S - 200/3.0	100°/s	90°/s	90°/s	150°/s	120°/s	190°/s
IRB 6600ID - 185/2.55	100°/s	90°/s	90°/s	150°/s	120°/s	190°/s
IRB 6650ID - 170/2.75	100°/s	90°/s	90°/s	150°/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°.

1.9 Cooling fan for axis 1 and 2 motor

1.9.1 Introduction

Option 87-1, 88-1

To be used to avoid overheating of motors and gears in applications with intensive motion (high average speed and /or high average torque and/or short wait time) of axis 1 and/or axis 2.

IP54 valid for cooling fan. Fan failure stops the robot.

1.10 Servo Gun

1.10.1 Introduction

General

The robot can be supplied with hardware and software for control of the following configurations:

- Stationary Gun
- Robot Gun
- Robot Gun and Track Motion
- Track motion

The specific parts related to the servo motor control for electrical welding guns and for track motion configurations are shown in the conceptual pictures below. The major parts and required options are also stated in the configurations lists below each picture.

The cables for control of the basic robot are shown in the pictures with dotted lines.

1.10.2 Stationary Gun

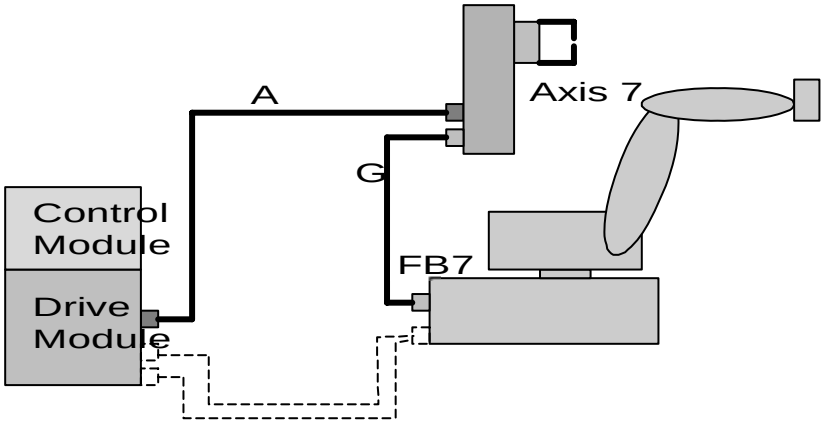

Figure 54 Configuration of Stationary Gun.

Options

Options according to the table below are required to complete the delivery.
For further details on each option see corresponding Product specification.

Option	Description	Product specification
785-5	Stationary gun.This option includes: Cable **G** (7 m length) for resolver signals from robot base (FB7) to stationary gun/axis 7.	
770-4	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
786-1,-2,-3,-4	Connection to first drive. Cable **A** (7-30 m) between Drive Module and stationary gun/axis 7 for servo drive power.	
635-3, -4 or -5	Spot Servo, Spot Servo Multiple Guns or Spot Servo Equalizing.	Controller software IRC5

1.10.3 Robot Gun

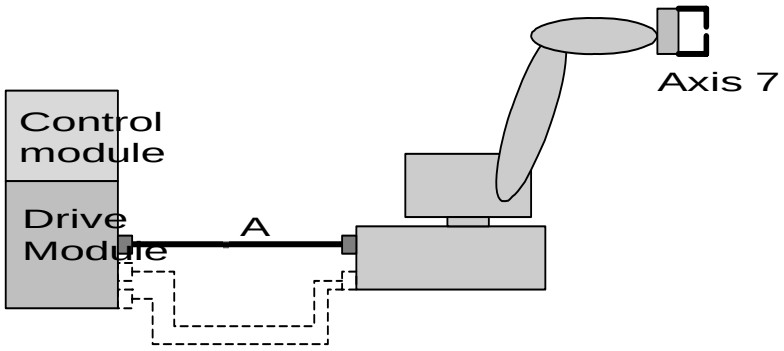

Figure 55 Configuration of Robot Gun.

Options

Options according to table below are required to complete the delivery.
For further details on each option see corresponding Product specification.

Option	Description	Product specification
785-1	Robot gun. This option includes: Cables within manipulator for servo power signals (servo gun/axis 7).	
770-4	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
786-1,-2,-3,-4	Connection to first drive. Cable **A** (7-30 m) between Drive Module and robot base for servo drive power.	
635-3, -4 or -5	Spot Servo, Spot Servo Multiple Guns or Spot Servo Equalizing.	Controller software IRC5

1.10.4 Robot Gun and Track Motion IRBT 6004

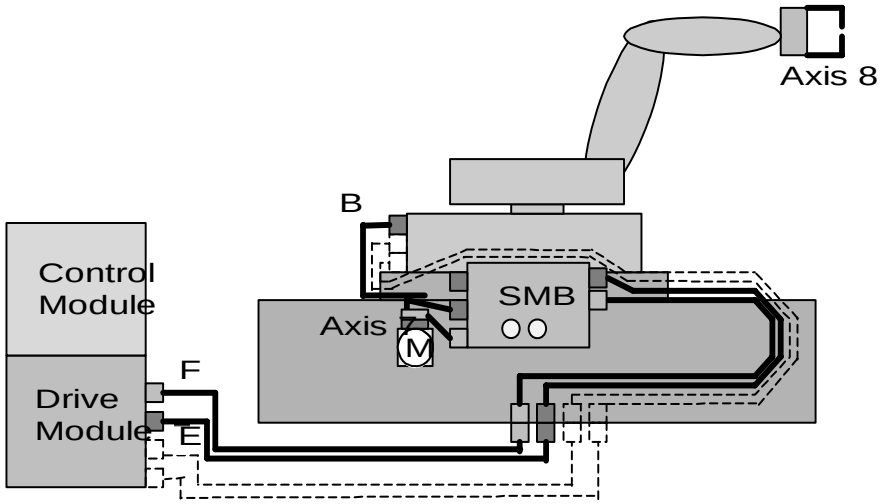

Figure 56 Configuration of Robot Gun and Track Motion.

Options

Options according to table below are required to complete the delivery.
For further details on each option see corresponding Product specification.

Option	Description	Product specification
785-1+1002-8[a]	Robot Gun - Track Motion. This option includes: Cables within manipulator for servo power signals (servo gun/axis 7).	Track motion IRBT 6004 + IRB 6600
Track motion delivery includes	Serial measurement box (SMB2, Split box) for distribution of servo power to axis 7 and 8. The box is placed on the track motion. Cables from serial measurement box to track motion. Cable **B** for servo power (1,5 m length).Connection to first and second drive. Cable **E** and **F** (7-22 m) between Drive Module and serial measurement box for dual servo drive power/resolver signals.	Track motion IRBT 6004/IRBT 7004
770-4	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
771-4	Second additional drive. Drive unit for 8th axis with corresponding cables assembled inside Drive Module.	Controller IRC5 with FlexPendant
635-3, -4 or -5	Spot Servo, Spot Servo Multiple Guns or Spot Servo Equalizing.	Controller software IRC5

a. To specify robot on track equipped with servo gun. Option 1002-8 from specification form for Track Motion.

1.10.5 Track Motion IRBT 6004

General

The robot can be supplied with a Track Motion, see Product specification - IRBT 6004. For configuration and specification of hardware see Figure 57.

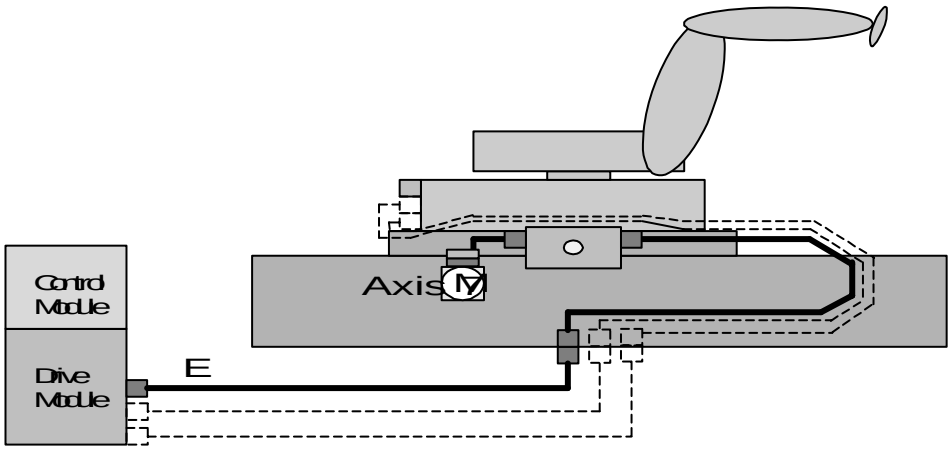

Figure 57 Configuration of Track Motion.

General. The robot can be combined with a Track Motion, for further details see Product specification - IRBT 6004/IRBT 7004.

Options

Options according to table below are required to complete the delivery.
For further details on each option see corresponding Product specification.

Option	Description	Product specification
Track motion delivery includes	Serial measurement box (SMB, Split box) for distribution of servo power signals to axis 7/Track motion. The box is placed on the track motion. Cable **E** for between Drive Module and track motion servo for drive power.	Track motion IRBT 6004/IRBT 7004
770-4	First additional drive. Drive unit for 7th axis with corresponding cables assembled inside Drive Module.	

1.10.5 Track Motion IRBT 6004

2 SpotPack and DressPack

2.1 Introduction

2.1.1 General

The different robot types can be equipped with the SpotPack or DressPack options. The SpotPack is designed for spot welding and handling applications. The function package supplies the transformer gun or the robot gripper with necessary media, such as compressed air, cooling water and electrical power.

The SpotPack contains the modules shown in Figure 58 below.

Details for the modules within DressPack are shown in Figure 59.

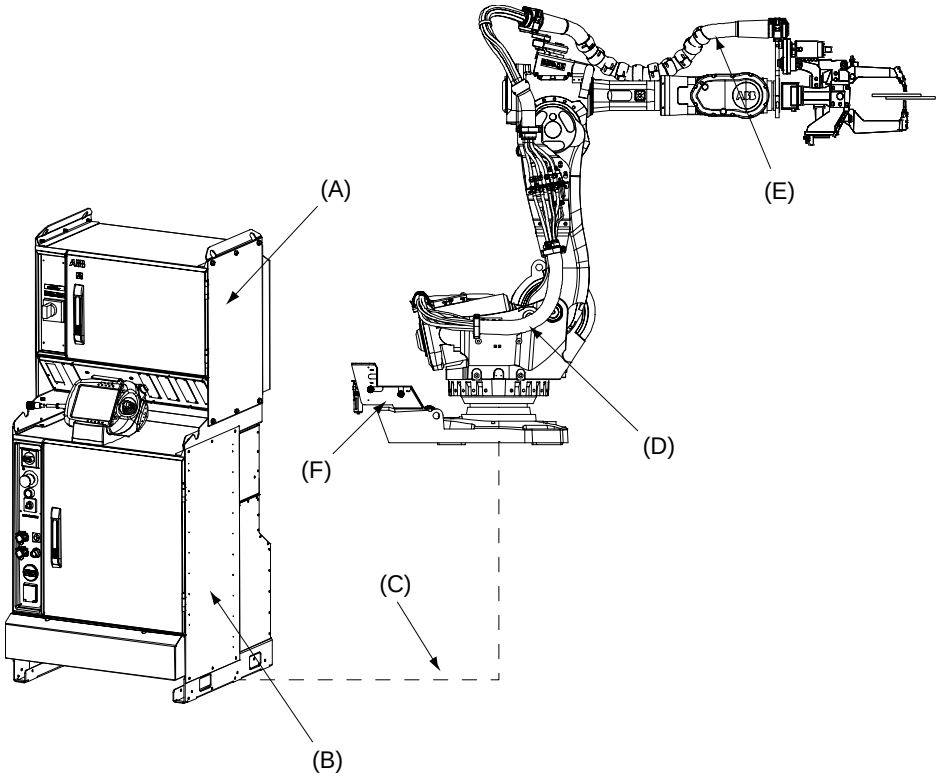

Figure 58 SpotPack modules M2004.

Pos	Name
A	Spot Welding cabinet
B	Robot Cabinet IRC5
C	DressPack, Floor
D	DressPack, Lower arm
E	DressPack, Upper arm
F	Water and Air unit with hoses

Illustration DressPack

Figure 59 Illustration of option 798-2.

2.1.2 Chapter Structure

The Chapters for SpotPack and DressPack are structured in the following way.

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

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

Material Handling application / DressPack

Chapter	Option	Description
2.3	Type H	Designed for Material Handling.

Spot Welding application / SpotPack and DressPack

Chapter	Option	Description
2.4	Type S	Designed for pneumatic transformer guns carried by the robot manipulator.
2.5	Type HS	Designed for handling the part against pneumatic transformer guns stationary mounted.
2.6	Type Se	Designed for electrical servo driven transformer guns carried by the robot manipulator.
2.7	Type HSe	Designed for handling the part against electrical servo driven transformer guns stationary mounted.
2.8	Spot Welding Cabinet	Includes general description of Spot Welding cabinet with common information.
2.9	Water and Air unit	Includes general description of Water and Air unit with common information.

Connector Kits

Chapter	Option	Description
2.10	Connection Kits	Includes general description of Connection kits for SpotPack and DressPack.

2.2 DressPack

2.2.1 Introduction

General

Dress Pack includes options for Upper arm, Lower arm and Floor see Figure 58 pos C, D and E. These 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 upper and lower arm contains process cable packages including signals, process media (water and/or air) and power feeding (for Spot Welding power) 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.

DressPack lower arm

For the Material Handling application there are two alternative routings for the lower arm, shown below in Figure 60 and Figure 61. This is designed to fit to the upper arm routing.

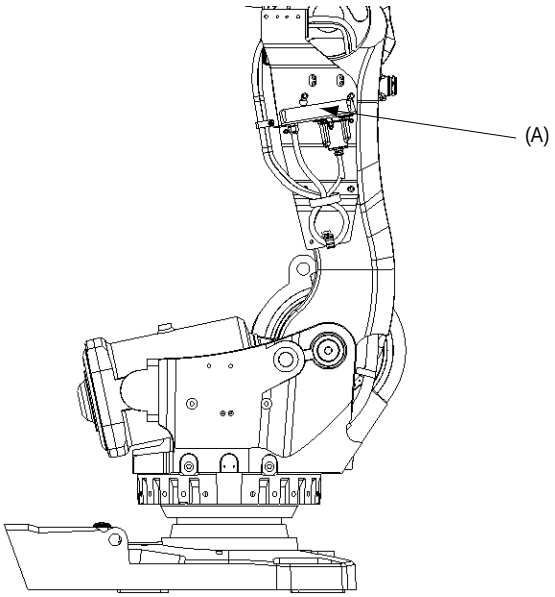

Figure 60 DressPack Lower arm right side view Material Handling (option 778-1 and option 798-2).

Pos	Description
A	Connection point

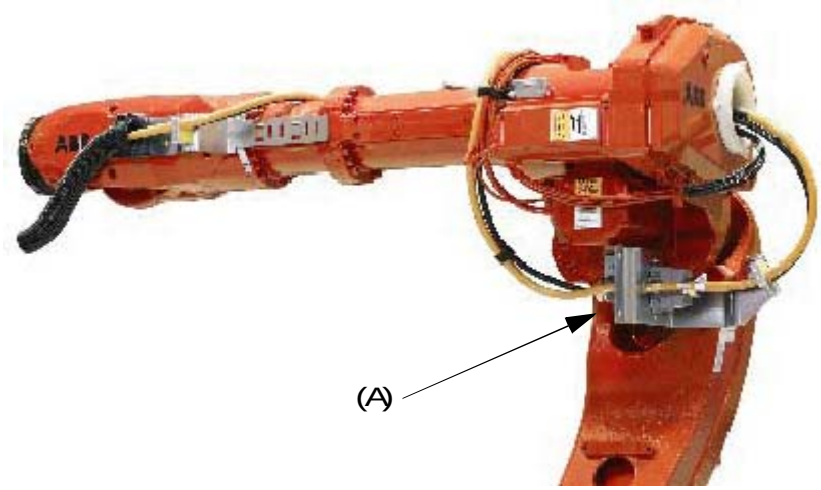

Figure 61 DressPack Lower arm left side view Material Handling (option 778-1 and option 798-1).

Pos	Description
A	Connection point

The routing of the DressPack lower arm for Spot Welding application is shown below in Figure 62. This is designed to fit to the upper arm routing.

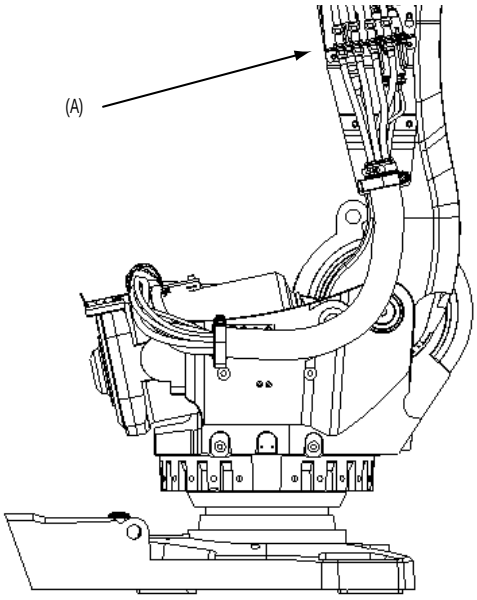

Figure 62 DressPack Lower arm left side view Spot Welding (option 778-2 and option 798-2).

Pos	Description
A	Connection point

DressPack Upper arm

There are three alternatives for the Material Handling and two for the Spot Welding application. Two of the alternatives are external, and they are shown in Figure 63 and Figure 64 below. The internal routing is shown in Figure 65.

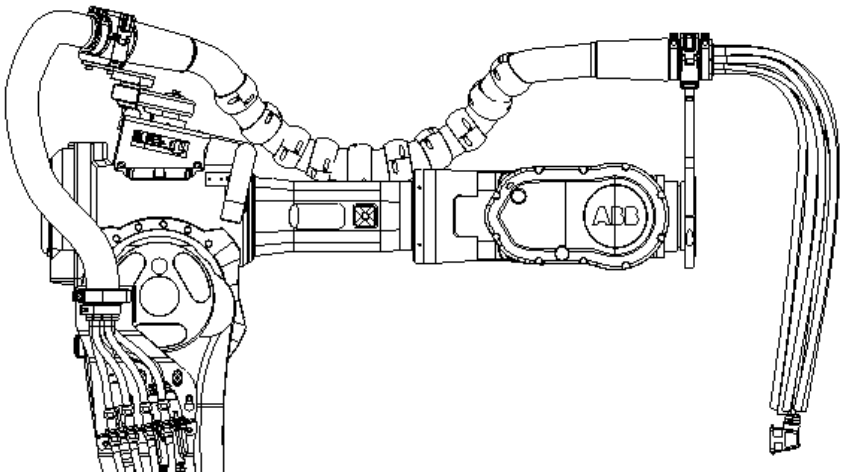

Figure 63 DressPack Upper arm. Axis 2 to 6, Spot Welding and Material Handling (option 778-1 (778-2), option 780-2 and option 798-2).

Figure 64 DressPack Upper arm. Axis 3 to 6, Material Handling (option 778-1, option 780-3 and option 798-1).

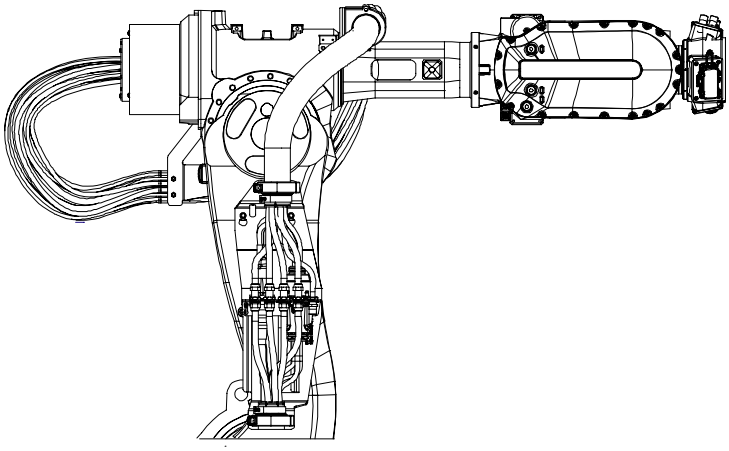

Figure 65 Internal routing. DressPack right upper arm. Material Handling and Spot Welding (option 778-2 (778-1), option 780-1 and option 798-2).

DressPack Upper arm/Lower arm

For Spot Welding application there is one additional alternative without the connection point between lower and upper arm available.

Figure 66 DressPack Upper/Lower arm Spot Welding (option 778-2 and option 781-1).

External process cable package

The external process cable package has a 1000 mm free length at axis 6 for connection to a robot tool. The retractor arm unit keeps hose package close to the robot upper arm.

The external DressPack Upper arm part version axis 2 to 6 (option 780-2), has the following main features:

- Adjustable bracket axis 6 with position marking.
- Adjustable retracting force to optimize the system depending on cycle and hose package.
- Hose guiding to support large working range.

For Material Handling there is a less expensive alternative, with some limitations in possible movements as there is no retractor arm. The adjustment and mounting of the DressPack must be given extra attention.

The DressPack upper arm version external routing axis 3 to 6 (option 780-3) has the following main features:

- Internal routing through the rear part of the upper arm.
- Protection hose can easily be replaced if damaged.
- One version for all IRB 6600 versions.

For more information see Product Manual SpotPack/DressPack.

The DressPack Lower arm part has a connection point at the manipulator base. The configuration, is shown in Figure 67 below.

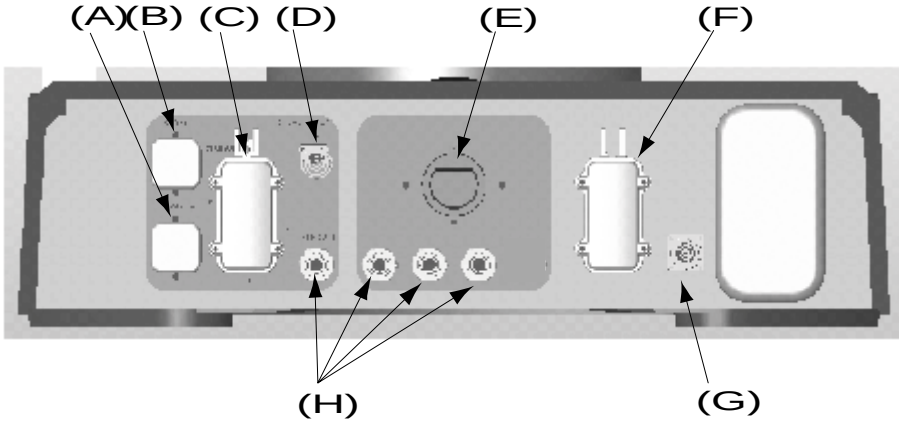

Figure 67 Connection point at base.

Pos	Description
A	R1.SW2/3
B	R1.SW1
C	R1.CP/CS
D	R3.FB7 or R1.SP (Spot Welding Servo gun)
E	R1.WELD 3x35mm^2. (Spot Welding)
F	R1.MP
G	R1.SMB
H	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)

The DressPack floor has a connection point inside the robot controller where connections can be made to terminals.

Limitation of movements of axes

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

Note: Maximum movement of axis 5 is ± 110º.

For more detail information please contact Serop Product support/SEROP/ABB.
E-mail address: serop.product_support@se.abb.com

Dimensions for external routing are shown in Figure 71 and Figure 72. Dimensions for internal routing (6600ID-185/2.55 and 6650ID-170/2.75) are shown in Figure 68, Figure 69 and Figure 70.
All routing alternatives are shown in the Spot Welding version and option 798-1 and 780-3.

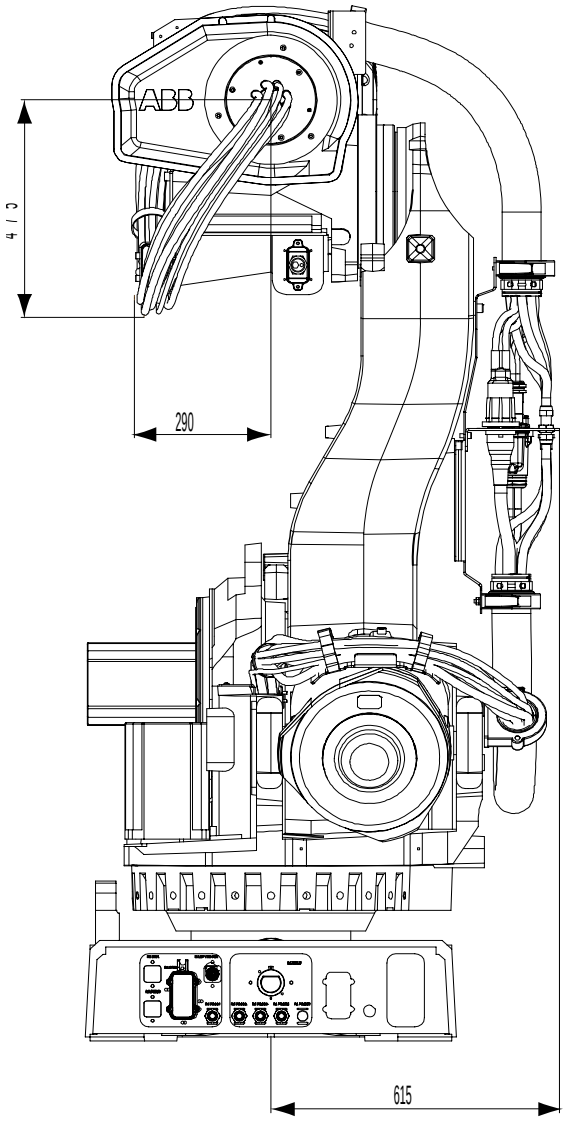

Figure 68 Front and back view. Internal routing.

2.2.1 Introduction

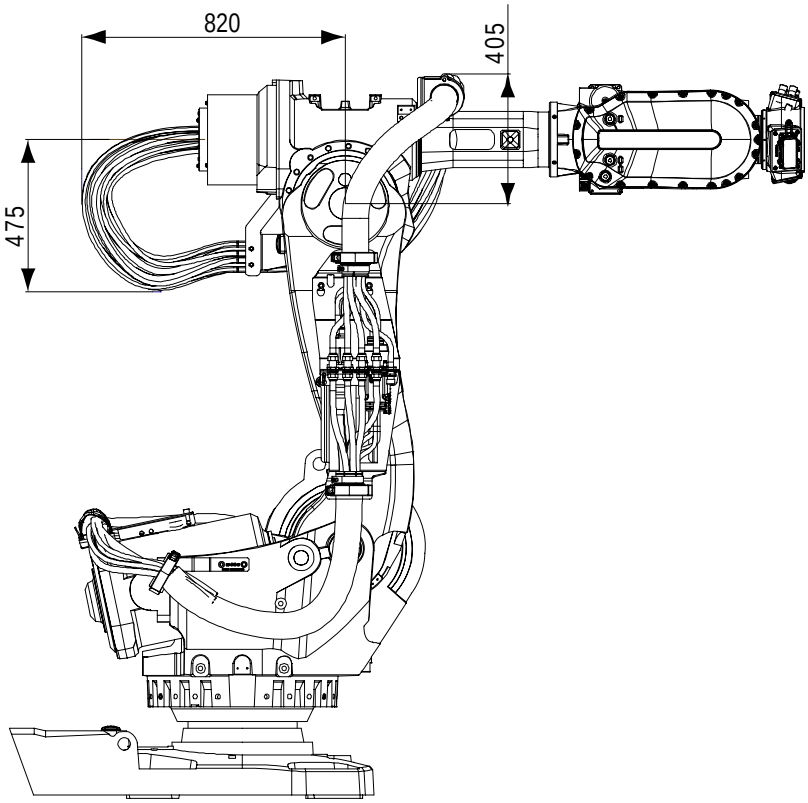

Figure 69 Right side view. Internal routing.

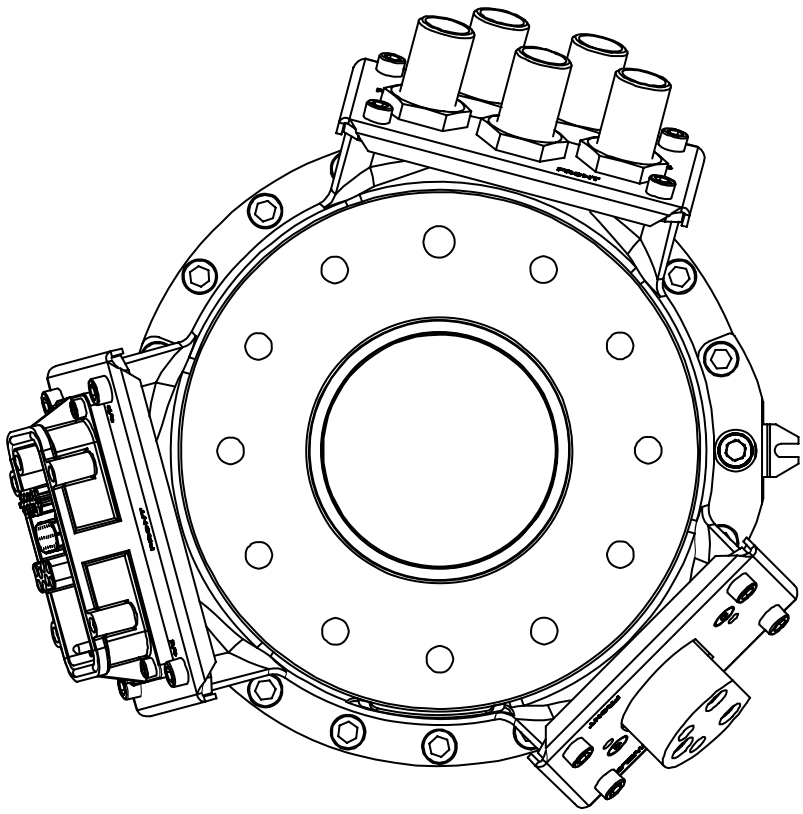

Figure 70 Detailed view for axis 6. Internal routing.

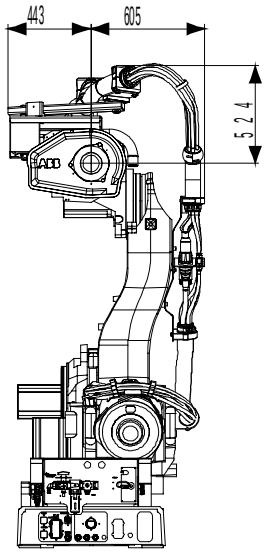

Figure 71 External routing option 780-2 and 781-1 (Dimensions in mm).

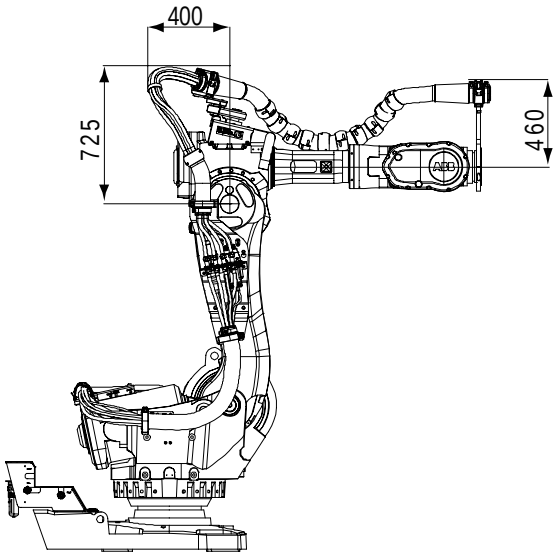

Figure 72 External routing option 780-2 and 781-1 (Dimensions in mm).

2.2.1 Introduction

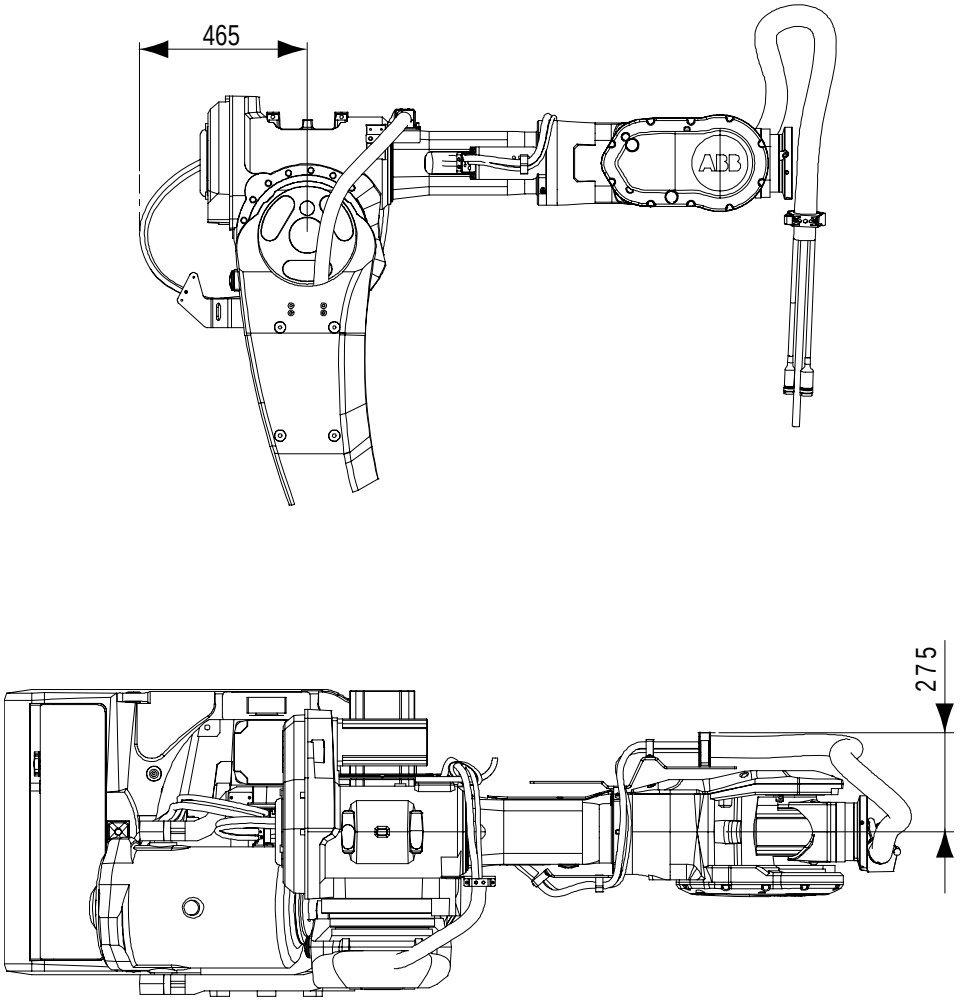

Figure 73 External routing Material Handling, option 798-1 and 780-3 (Dimensions in mm).

2.3 Type H

2.3.1 Introduction

General

Variant Type H is designed for Material Handling (MH) application. Included modules are shown in Figure 74.

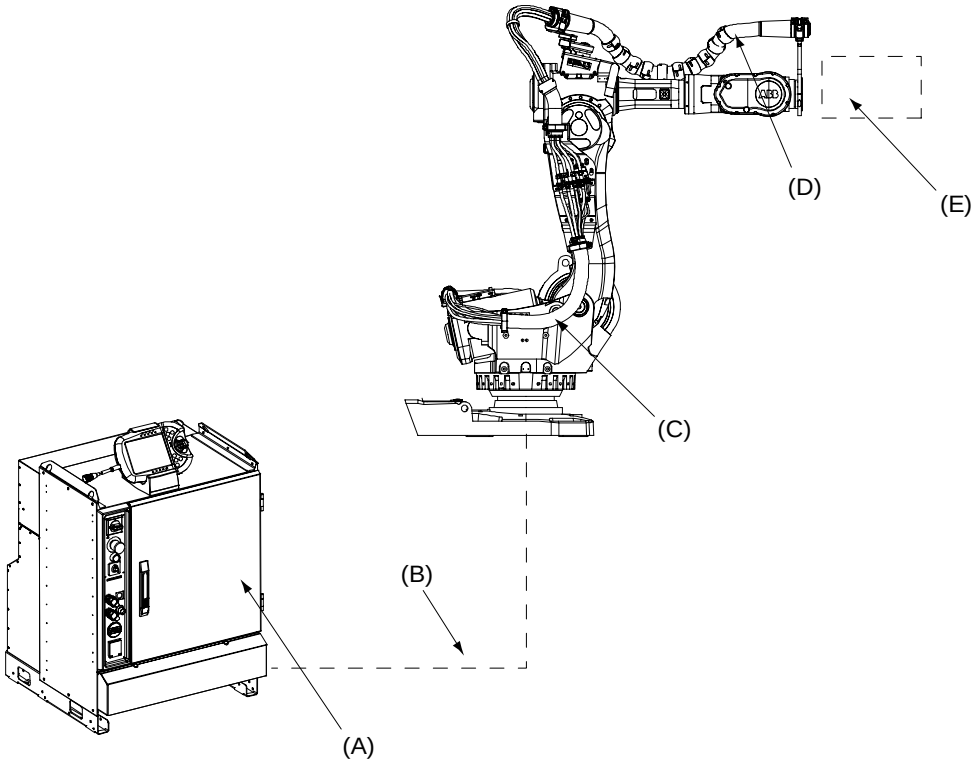

Figure 74 Dresspack configuration.

Pos	Name
A	Robot Cabinet IRC5
B	DressPack, Floor
C	DressPack, Lower arm
D	DressPack, Upper arm
E	Robot Gripper

Available configurations with linked option numbers are described below.

2.3.1 Introduction

Option description

Option	Type	Description
16-2	Connection to manipulator	No Floor harness for the DressPack is chosen.
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,-3,-4 for parallel communication. Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet. Option 92-2,-3,-4,-5 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,-3,-4,-5.
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,-4,-5.

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

The available alternatives and allowed combinations are shown in the schematic Figure 75 below.

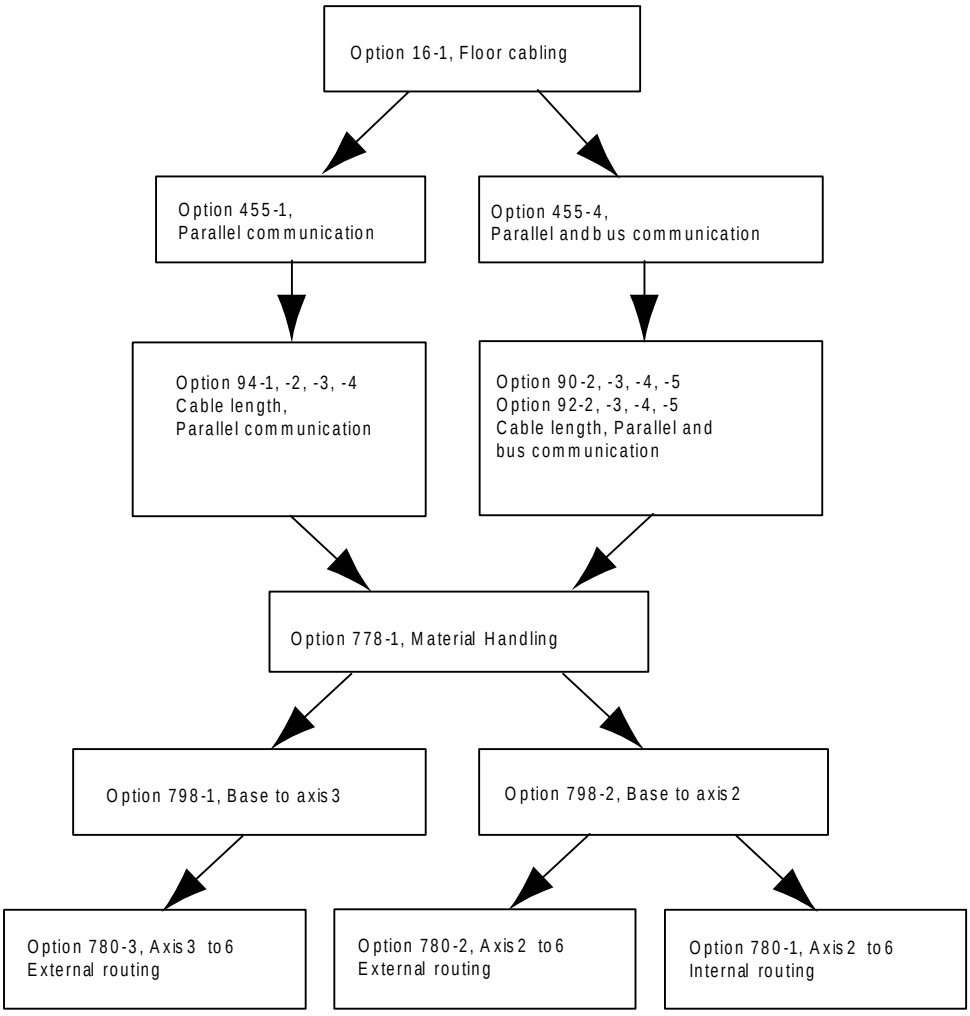

Figure 75 Schematic picture for configuration of DressPack for Material Handling application.

2.3.2 Configuration result for Type H

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. Parallel communication

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing
- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 780-3 (and option798-1). External 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 Protective earth	2+2	2+2 1[a]	0,5 mm^2 0,5 mm^2	250 VAC, 5 A rms[b] 250 VAC[a]
Customer Signals (CS) Signals twisted pair Signals twisted pair and separate shielded	20 8	20 (10x2)[c, d] 8 (4x2)	0,24 mm^2 0,24 mm^2	50 V DC, 1 A rms 50 V DC, 1 A rms
Media Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60 VDC.
c. For IRB 6600/6650 ID 16 signals instead of 20 signals.
d. For option 780-3 8 signals instead of 20.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

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

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing
- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 780-3 (and Option 798-1). External 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[b]
Protective earth		1[a]	0,5 mm^2	250 VAC[a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2)[c, d]	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	6(3x2)	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[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60 VDC.
c. For IRB 6600/6650 ID 16 signals instead of 20 signals.
d. For option 780-2 8 signals instead of 20.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.3.2 Configuration result for Type H

DressPack Type H. Parallel and field bus communication, Profibus

- Option 16-2 or 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 778-1. Material Handling
- Option 798-1 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing
- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Optiion 780-3 (and Option 798-1). External 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 Protective earth	 2+2	 2+2 1[a]	 0,5 mm^2 0,5 mm^2	 250 VAC, 5 A rms[b] 250 VAC[a]
Customer Signals (CS) Signals twisted pair Signals twisted pair and separate shielded	 22 8	 22(11x2)[c, d] 8 (4x2)	 0,24 mm^2 0,24 mm^2	 50 V DC, 1 A rms 50 V DC, 1 A rms
Customer bus (CBus) Bus signals Signals twisted pair	 At bus board 6	 4 6 (3x2)	 0,14 mm^2 0,14 mm^2	 Profibus 12 Mbit/s spec 50 V DC, 1 A rms
Media Air (PROC 1)		 1	 12,5 mm inner diameter	 Max. air pressure 16 bar/230 PSI[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60VDC.
c. For IRB 6600/6650 ID 18 signals instead of 22 signals.
d. For option 780-3 8 singals instead of 22.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.3.3 Interface description DressPack for Type H

General

The interface at axis 6 has a hose ending with free end for external routing and a fitting for internal routing. The signal cables end with a signal connector type modular Harting. In case of option 780-3, External routing Axis 3 to 6, the connectors are of type Souriau. One of the customer power and customer signal cable and when Bus communication is selected also one for this cable. The connector configurations are described in the curcuit diagram included in the Product Manual DressPack/ SpotPack IRB 6600/7600, art No. 3HAC025058-001.

Harting Connector - External routing

The Harting connector for external routing is shown in Figure 76. The different main parts within the connector are described in the table below, both with name and Harting article number. (Corresponding parts of the tool are available with a Connection kit, see chapter 2.10 Connection kits, and within the Harting product offer).

Name	Harting article No.
Hood	09 30 010 0543
Hinged frame, hood	09 14 010 0303
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

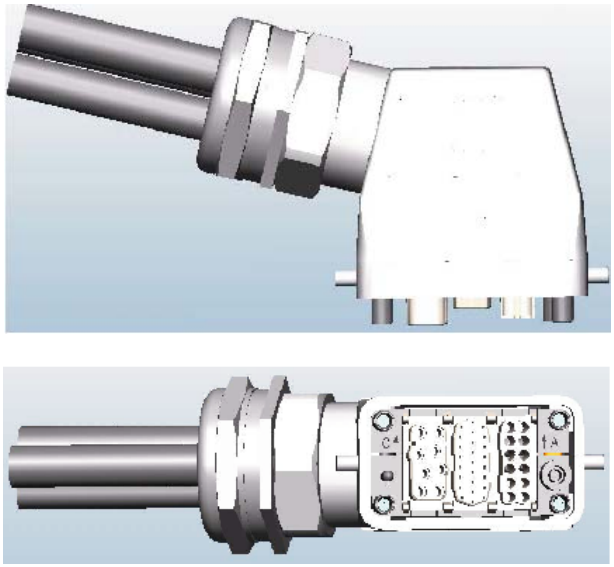

Figure 76 Harting connector external routing.

Souriau connectors - External routing

The Souriau connectors for external routing is shown in Figure 77. The main parts within the connector are described in the table below.

Name	Souriau article No.
Socket connector, R3.CPS	UTOW61832SH
Shrink boot adapter, R3.CPS	UTO18AD
Sockets, R3.CPS	RC18W3k
Socket connector, R3.CBUS	UTOW61419SH
Shrink boot adapter, R3.CBUS	UTO14AD
Sockets, R3.CBUS	SC24W3S25

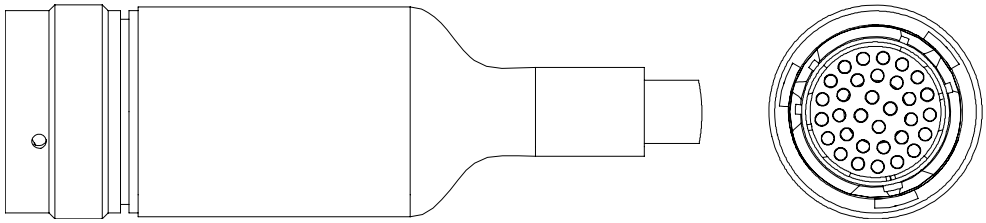

Figure 77 Souriau connetor external routing (UTOW61419SH shown).

Harting connector - Internal routing

Name	Harting article No.
Hood	09 62 040 0301
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

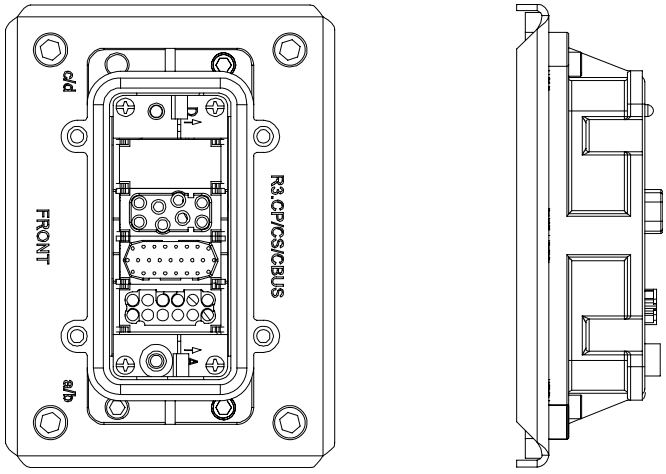

Figure 78 Harting connector for internal routing.

Hose fitting, Internal routing

- For the internal routing the hose ends with fitting type: Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal).

2.3.4 Summary Type H

The following options are required to form a complete DressPack Type H:

- Option 16-1. Connection to cabinet, (Cable length and communication type to be stated)
- Option 455-1, 455-4. Parallel or Parallel and Bus communication (Communication type to be stated)
- Option 778-1. Material Handling
- Option 798-1 or Option 798-2. Internal routing, DressPack Lower arm (Routing type to be stated)
- Option 780-2. External routing Axis 2 to 6, option 780-3 External routing Axis 3 to 6 or option 780-1 Internal routing, DressPack Upper arm (Routing type to be stated)

2.4 Type S

2.4.1 Introduction

General

Variant Type S is designed for Spot Welding application with robot handled pneumatic gun. Included modules are shown in Figure 79. Available configurations with linked option numbers are described below.

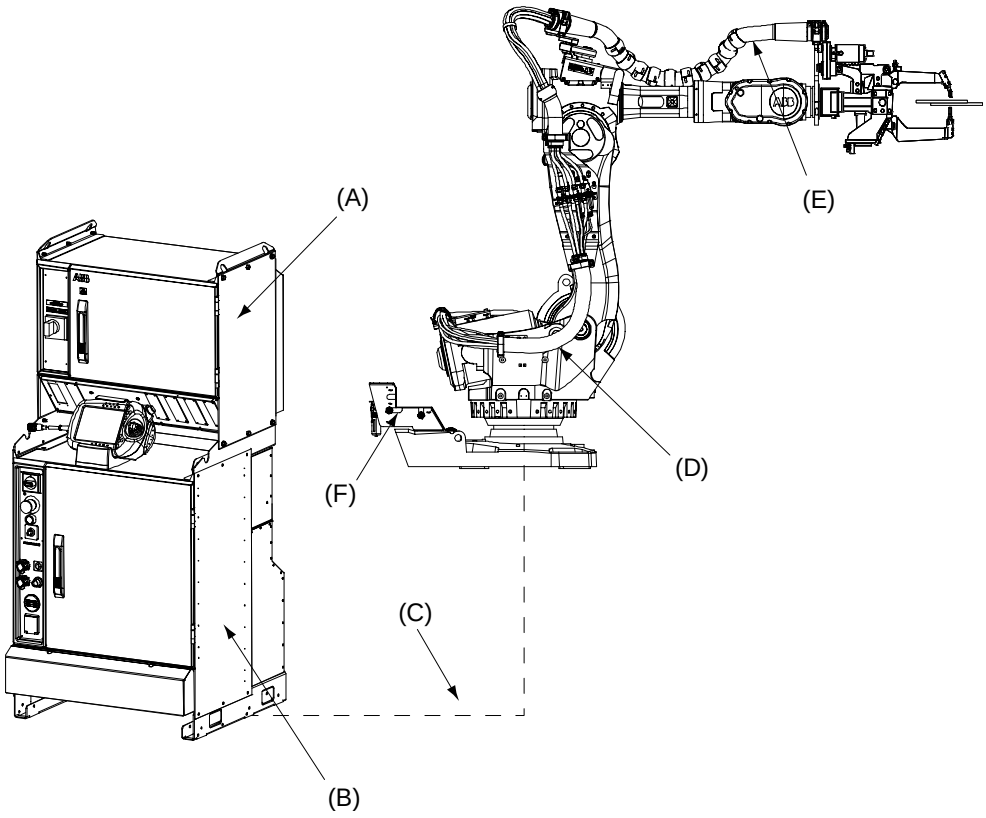

Figure 79 Type S DressPack.

Pos	Name
A	Spot Welding cabinet
B	Robot Cabinet IRC5
C	DressPack, Floor
D	DressPack, Lower arm
E	DressPack, Upper arm
F	Water and Air unit with hoses

Available configurations and allowed combinations with linked option numbers are described below.

Option Description

Option	Type	Description
16-2	Connection to manipulator	No Floor harness for the DressPack is chosen.
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,-3,-4 for parallel communication Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet Option 92-2,-3,-4,-5 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,-3,-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,-4,-5.

- Option 778-2. For the application Spot Welding.
- Option 798-2. Base to axis 2. Offers DressPack Lower arm for Spot Welding application with external routing.
- Option 780-2 (and option 798-2). External Axis 2 to 6. Offers DressPack Upper arm for Spot Welding application with external routing.
- Option 781-1 (and option 778-2). External base to axis 6. Offers DressPack Lower and Upper arm external routing without intermediate connection point.
- Option 780-1 (and option 798-2). Internal Axis 2 to 6. Offers DressPack Upper arm for Spot Welding application with internal routing.

The available alternatives and allowed combinations are shown in the schematic Figure 80 below.

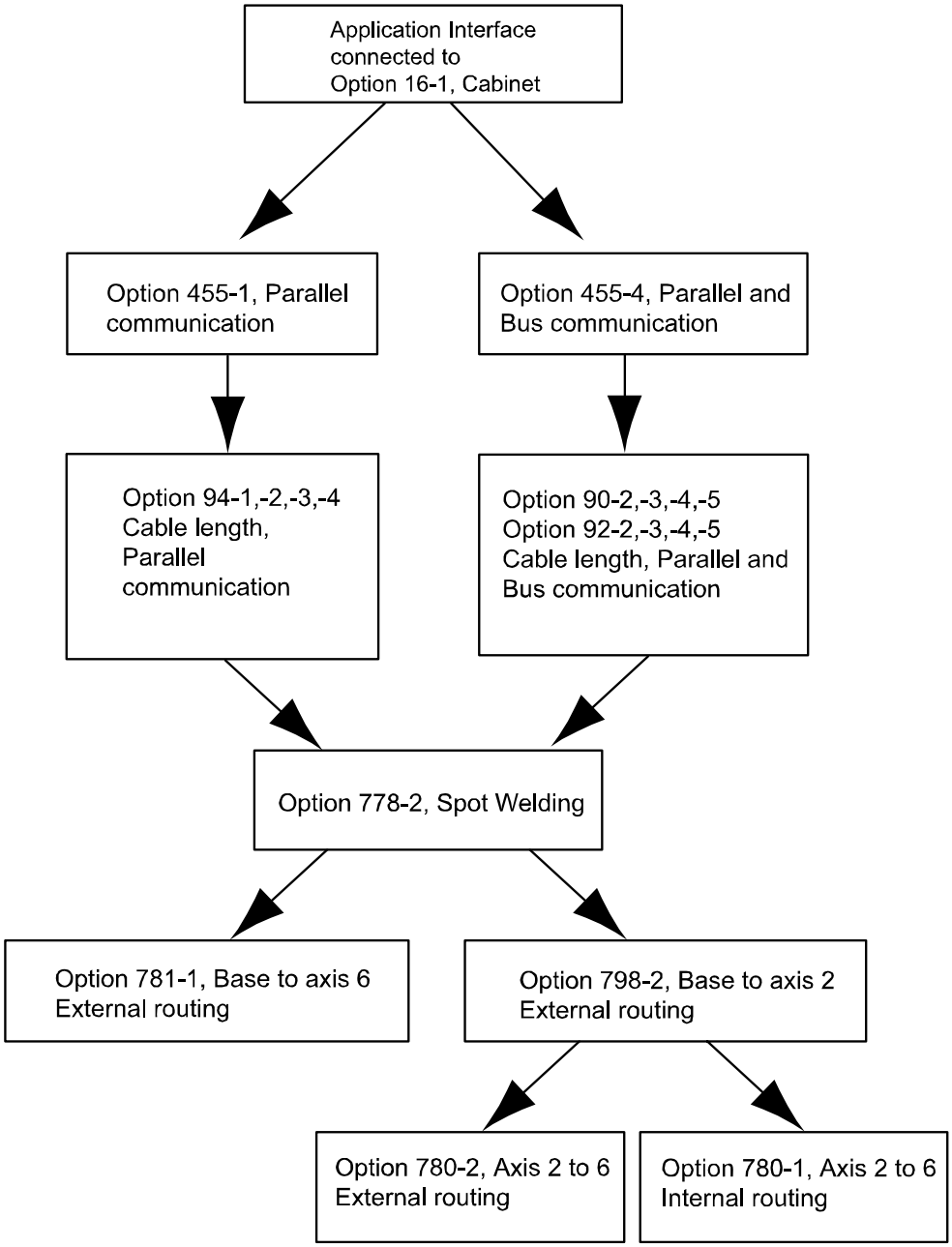

Figure 80 Schematic picture for configuration of DressPack for Spot Welding application.

2.4.2 Configuration result for Type S

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 S. Parallel communication

- Option 16-2 or Option 16-1 with Connection to cabinet (Option 94-1,-2,-3,-4 to specify cable length)
- Option 455-1. Parallel communication
- Option778-2. Spot Welding
- Option 798-2. External routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-1 (and option 798-2). Internal routing, DressPack Upper arm
- Option 781-1 (and Option 778-2). Routing base to axis 6

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 Protective earth	2+2	2+2 1	0,5 mm^2 0,5 mm^2	250 VAC, 5 A rms 250 VAC
Customer Signals (CS) Signals twisted pair Signals twisted pair and separate shielded	20 8	20 (10x2)[a] 8 (4x2)	0,24 mm^2 0,24 mm^2	50 V DC, 1 A rms 50 V DC, 1 A rms
Media Water/Air (PROC 1-4)		4	12,5 mm inner diameter	Max. air pressure 16 bar/ 230 PSI[b] Max. water pressure 10 bar/ 145 PSI
Welding power (WELD) Lower and Upper arm Protective earth (Lower and Upper arm)		2 1	35 mm^2 35 mm^2	600 VAC, 150 A rms at 20°C (68°F)

a. For IRB 6600/6650 ID 16 signals instead of 20 signals.
b. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.4.2 Configuration result for Type S

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

- Option 16-2 or 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
- Option 798-2. External routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing
- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 781-1 (and Option 778-2). Routing base to axis 6

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
Protective earth		1	1 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	20	20 (10x2)[a]	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)	0,14 mm^2	50 V DC, 1 A rms
Media				
Water/Air (PROC 1-4)		4	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI[b] Max. water pressure 10 bar/ 145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1	35 mm^2	

a. For IRB 6600/6650 ID 16 signals instead of 20 signals.
b. For IRB 6600/6650 ID Max. air pressure 12 bar.

DressPack Type S. Parallel and field bus communication, Profibus

- Option 16-2 or 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
- Option 798-2. External routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing
- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 781-1 (and Option 778-2). Routing base to axis 6

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
Protective earth		1	0,5 mm^2	250 VAC
Customer signals (CS)				
Signals twisted pair	22	22 (11x2)[a]	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	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2)	0,14 mm^2	50 V DC, 1 A rms
Media Water/Air (PROC 1-4)		4	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI[b] Max. water pressure 10 bar/ 145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1	35 mm^2	

a. For IRB 6600/6650 ID 18 signals instead of 22 signals.
b. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.4.3 Interface description DressPack for Type S

Customer Interface

The DressPack interface at axis 6 has a connector type modular Harting for the signals. For external routing the hoses and the weld cable have free ends. For the internal routing the weld cable ends with a connector and the hoses end with fittings. The connector configurations are described in the curcuit diagram included in the Product Manual DressPack/SpotPack IRB 6600/7600, art No. 3HAC025058-001.

Harting Connector -External routing

The Harting connector for external routing is shown in Figure 81 below. The different main parts within the connector are described in the table below, both with name and Harting article number. (Corresponding parts of the tool are available with a Connection kit, see chapter 2.10 Connection kits, and within the Harting product offer).

Name	Harting article No.
Hood	09 30 010 0543
Hinged frame, hood	09 14 010 0303
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

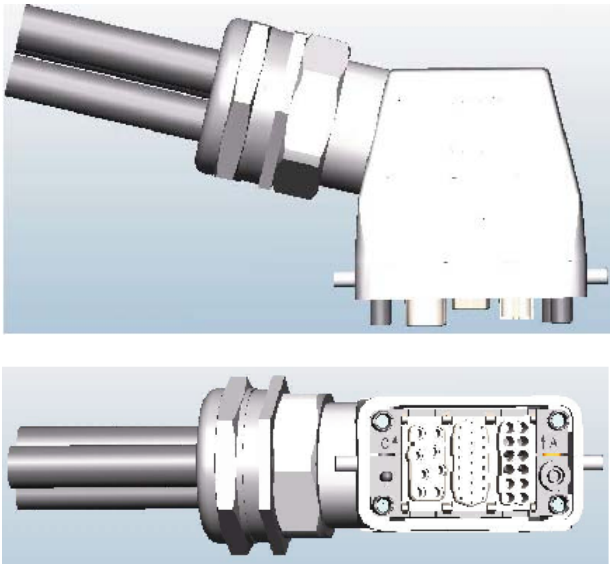

Figure 81 Harting connector for external routing.

Harting connector/hoses Internal routing

Name	Harting article No.
Hood	09 62 040 0301
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

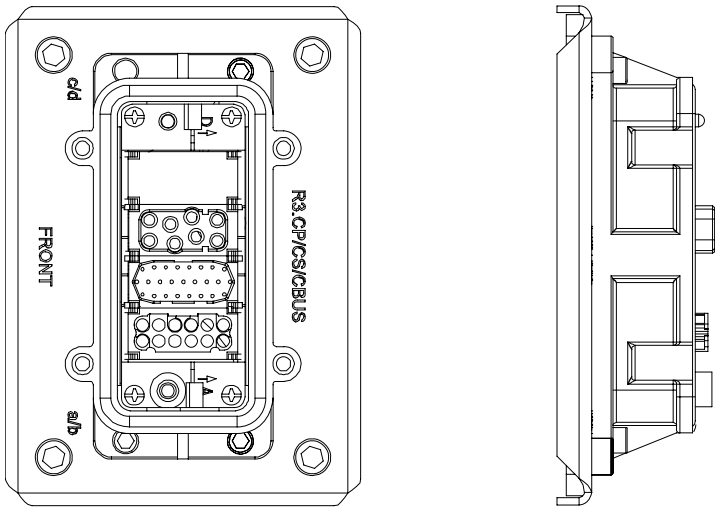

Figure 82 Harting connector for internal routing.

Weld connector and hose fittings, Internal routing

- For the internal routing the weld cable ends with connector type: MC TSB 150/35
- The hoses end with fitting type: Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal)

Required general options for Type S

To enable the SpotPack IRB 6600/6650 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 (software option 635-2 could also be used)

Required Spot Welding cabinet options for Type S

The SpotPack IRB 6600/6650 also requires a Spot Welding cabinet (option 768-3) to perform as intended. There are two 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 chapter 2.8 Spot Welding cabinet and are also mentioned in this chapter.

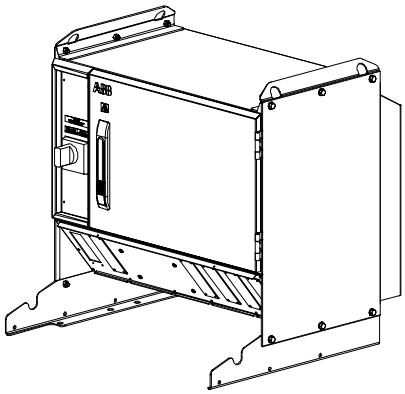

Figure 83 Spot Welding cabinet overview.

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.

Additional options to the different Spot Welding cabinets are mentioned below. For further technical details as well as restrictions in combinations see chapter 2.8 Spot Welding cabinet.

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	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.

Required Water and Air unit options for Type S

The SpotPack IRB 6600/6650 also requires Water and Air unit options to perform as intended. These options are further described under chapter 2.9 Water and Air unit and are also mentioned in this chapter.

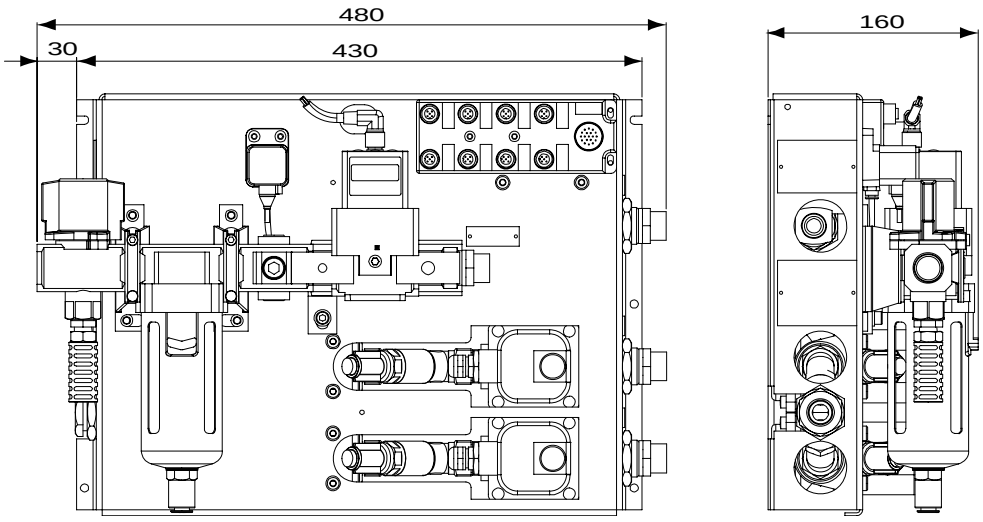

Figure 84 Water and Air unit overview.

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.
796-1	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 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.

2.4.4 Summary Type S

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

DressPack

- Option 16-1. Connection to cabinet, (Cable length and communication type to be stated)
- Option 455-1, 455-4. Parallel or Parallel and Bus communication (Communication type to be stated)
- Option778-2. Spot Welding
- Option 798-2. External routing, DressPack Lower arm
- Option 780-2. External routing or Option 780-1 Internal routing, DressPack Upper arm (Routing type to be stated)

Another routing alternative without change over connection point is:

- Option 781-1. Routing base to axis 6

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

Spot Welding cabinet

- Option 768-3. Spot Welding small
- Option 782-1,-7. Weld timer capacity
- Option 791-1. Power cable 7 m (other lengths available)

Water and air unit

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

(Also option 796-1 at the water and air unit is normally required for pneumatic gun handling).

Other described options depends on specific system need and performance.

2.5 Type HS

2.5.1 Introduction

General

Variant Type HS is designed for handling against a stationary mounted Spot Welding pneumatic gun. Included main modules are shown in Figure 85 below. Available configurations with linked option numbers are described below starting at the DressPack.

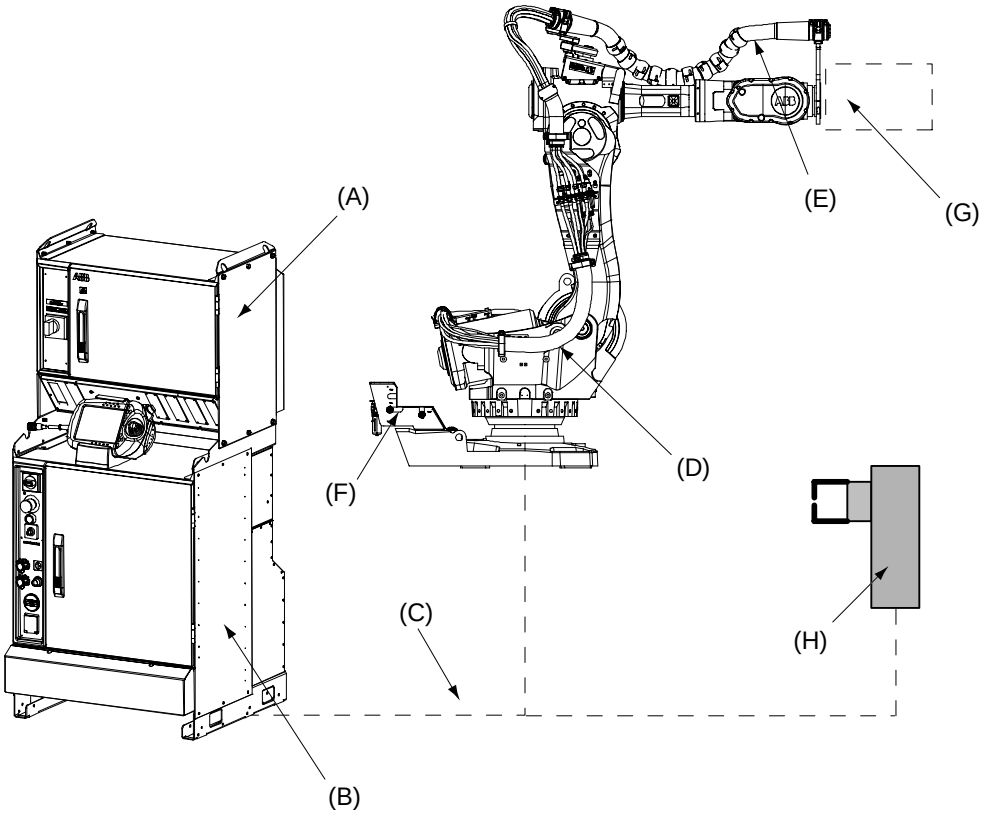

Figure 85 Type HS DressPack.

Pos	Name
A	Spot Welding cabinet
B	Robot Cabinet IRC5
C	DressPack, Floor
D	DressPack, Lower arm
E	DressPack, Upper arm
F	Water and Air unit with hoses
G	Robot Gripper
H	Stationary gun

2.5.1 Introduction

Available configurations with linked option numbers are described below.

Option description

Option	Type	Description
16-2	Connection to manipulator	No Floor harness for the DressPack is chosen.
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,-3,-4 for parallel communication. Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet. Option 92-2,-3,-4,-5 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,-3,-4,-5.
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,-4,-5.

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

The available alternatives and allowed combinations are shown in the schematic Figure 86 below.

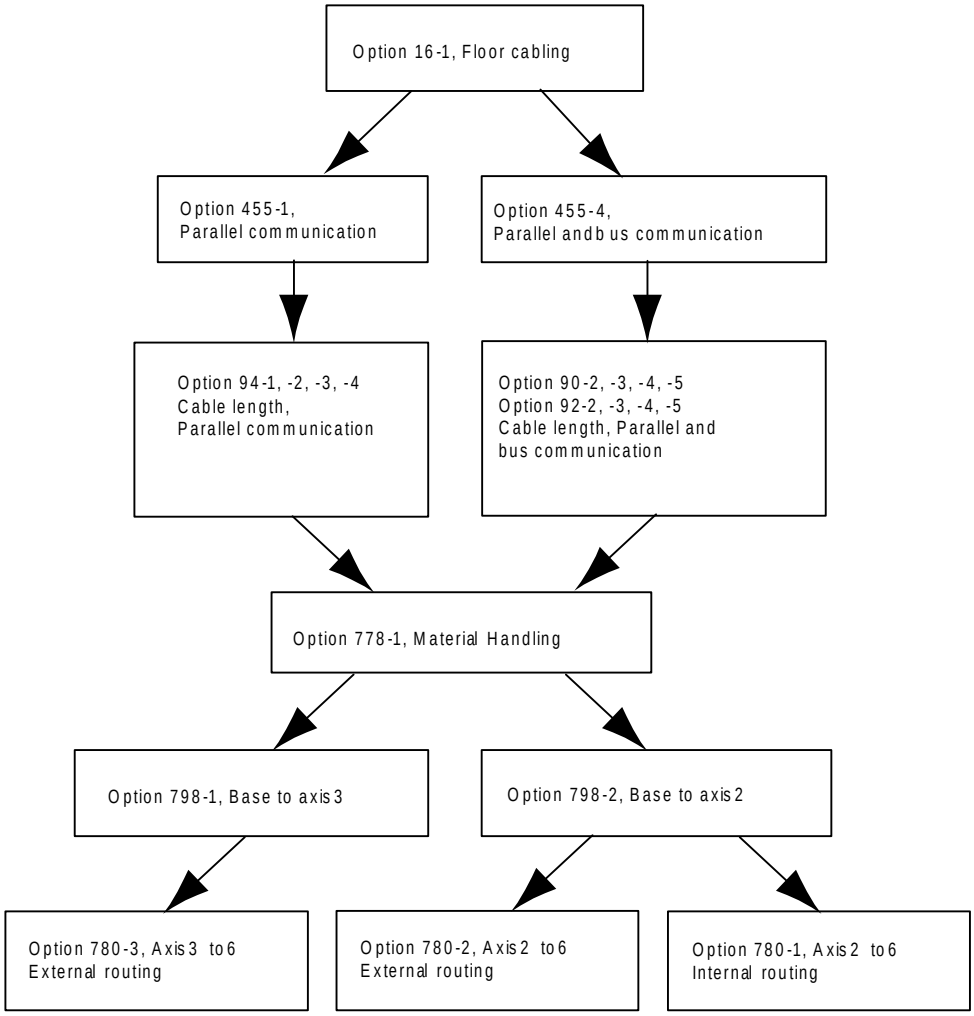

Figure 86 Schematic picture for configuration of DressPack for Material Handling application.

2.5.2 Configuration result for Type HS

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 HS. Parallel communication

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

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

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 Protective earth	2+2	2+2 1[a]	0,5 mm^2 0,5 mm^2	250 VAC, 5 A rms[b] 250 VAC[a]
Customer Signals (CS) Signals twisted pair Signals twisted pair and separate shielded	20 8	20(10x2)[c, d] 8 (4x2)	0,24 mm^2 0,24 mm^2	50 V DC, 1 A rms 50 V DC, 1 A rms
Media Air (PROC 1)		1	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60VAC.
c. For IRB 6600/6650 ID 16 signals instead of 20 signals.
d. For option 780-3 8 signals instead of 20.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

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

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

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

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[b]
Protective earth		1[a]	0,5 mm^2	250 VAC[a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2)[c, d]	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)	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[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60 VAC.
c. For IRB 6600/6650 ID 16 signals instead of 20 signals.
d. For option 780-3 8 signals instead of 20.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.5.2 Configuration result for Type HS

DressPack Type HS. Parallel and field bus communication, Profibus

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

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

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[b]
Protective earth		1[a]	0,5 mm^2	250 VAC[a]
Customer Signals (CS)				
Signals twisted pair	22	22(11x2)[c, d]	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	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2)	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[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60 VDC.
c. For IRB 6600/6650 ID 18 signals instead of 22 signals.
d. For option 780-3 8 signals instead of 22.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.5.3 Interface description DressPack for Type HS

General

The interface at axis 6 has a hose ending with a free end for external routing and a fitting for internal routing. The signal cables end with a signal connector type modular Harting. I case of option 780-3, External routing Axis 3 to 6, the connectors are of type Souriau. The connector configurations are described in the curcuit diagram included in the Product Manual DressPack/SpotPack IRB 6600/7600, art No. 3HAC025058-001.

Harting Connector - External routing

The Harting connector for external routing is shown in the Figure 87. The different main parts within the connector are described in the table below, both with name and Harting article number. (Corresponding parts of the tool are available with a Connection kit, see chapter 2.10 Connection kits, and within the Harting product offer).

Name	Harting article No.
Hood	09 30 010 0543
Hinged frame, hood	09 14 010 0303
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

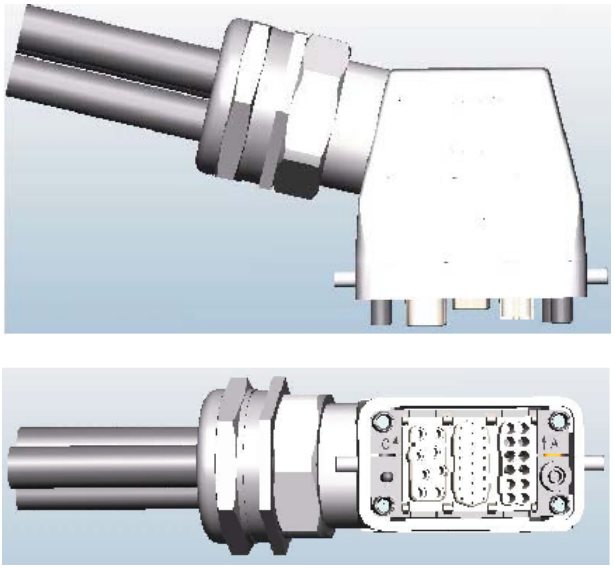

Figure 87 Harting connector external routing.

Souriau connectors - External routing

The Souriau connectors for external routing is shown in Figure 77. The main parts within the connector are described in the table below.

Name	Souriau article No.
Socket connector, R3.CPS	UTOW61832SH
Shrink boot adapter, R3.CPS	UTO18AD
Sockets, R3.CPS	RC18W3k
Socket connector, R3.CBUS	UTOW61419SH
Shrink boot adapter, R3.CBUS	UTO14AD
Sockets, R3.CBUS	SC24W3S25

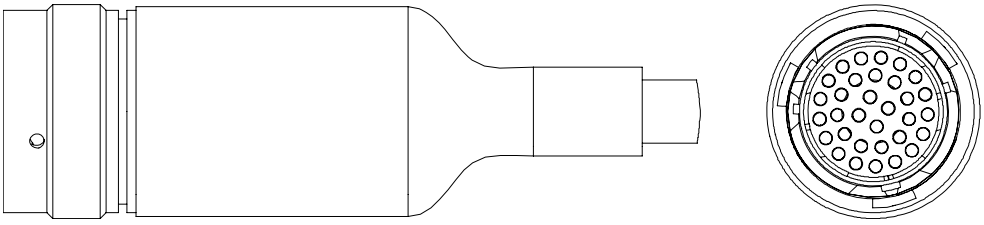

Figure 88 Souriau connetor external routing (UTOQ61419SH shown).

Harting connector - Internal routing

Name	Harting article No.
Hood	09 62 040 0301
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

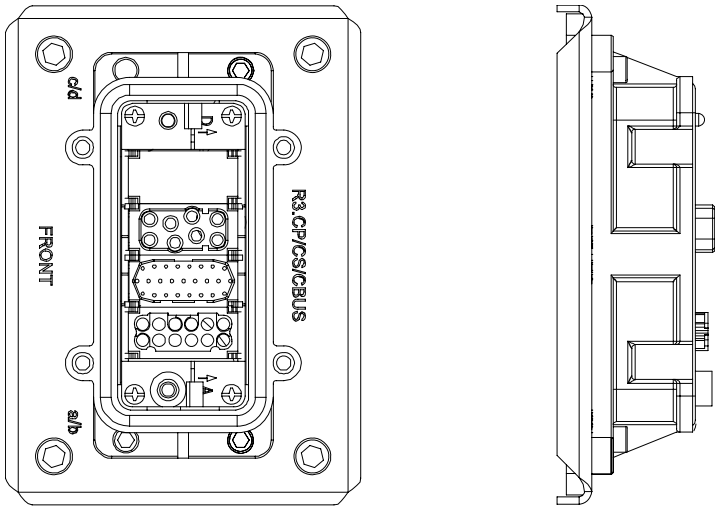

Figure 89 Harting connector for internal routing.

Hose fitting, Internal routing

- For the internal routing the hose ends with fitting type: Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal)

Required general options for Type HS

To enable the SpotPack IRB 6600/6650 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. (software option 635-2 could also be used)

Required Spot Welding cabinet options for Type HS

The SpotPack IRB 6600/6650 also requires a Spot Welding cabinet (option 768-3) to perform as intended. There are two 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 chapter 2.8 Spot Welding cabinet but are also mentioned in this chapter.

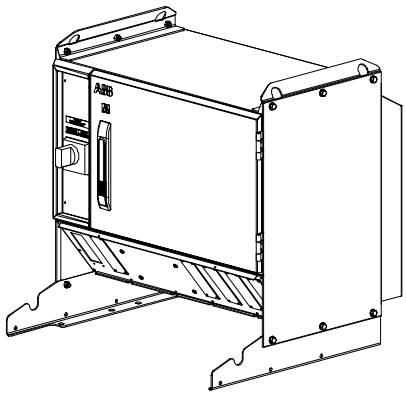

Figure 90 Spot Welding cabinet overview.

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.

Additional options to the different Spot Welding cabinets are mentioned below. For further technical details as well as restrictions in combinations see chapter 2.8 Spot Welding cabinet

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	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.

Option	Type	Description
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.
809-3	Process cable to stationary gun, 22 m	Offers floor cable of 22 m length for process signals between the Spot Welding cabinet and to the stationary gun.
809-4	Process cable to stationary gun, 30 m	Offers floor cable of 30 m length for process signals between the Spot Welding cabinet and to the stationary gun.

2.5.4 Interface description stationary gun

General

The interface towards the stationary gun includes 3 parts.

- Signal interface with a signal connector type modular Harting
(Cable option 809-1,-2,-3 or -4). The connector configurations are described in the tables below. Signals with (parentheses) are to be connected by customer. Other signals are connected if a complete SpotPack Type HS is ordered.
- 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 chapter 2.9 Water and Air unit)

The connector configurations are described in the tables below. Signals with (parentheses) are to be connected by customer in control cabinet end.

Name	Connector Pin Spot Welding cabinet	Connector Pin No. Stationary gun
Harting module type*	(Cable gland)	EE+HD+DD

Customer power signal

Name	Connector Pin Spot Welding cabinet	Connector Pin No. Stationary gun
+24 V	XT 5.6/1	C4
0 V	XT 5.6/2	C5

Customer signals

Name	Connector Pin Spot Welding cabinet	Connector Pin No. Stationary gun
(Spare)	XT 5.6/10	B20
(Spare)	XT 5.6/11	B21
(Spare)	XT 5.6/12	B22
KSR Sep. screened	XT 5.7/1	B24
KSR Sep. screened	XT 5.7/2	B25
(Spare) Sep. screened	XT 5.7/4	B16
(Spare) Sep. screened	XT 5.7/5	B17
gl_close_gun (DO7)	XT 5.6/5	B1
gl_gun_open (DI9)	XT 5.6/6	B2
gl_hlift_open (DI10)	XT 5.6/7	B3
gl_equalize (DO0)	XT 5.6/8	B4
gl_open_hlift (DO8)	XT 5.6/3	B18
gl_close_hlift (DO9)	XT 5.6/4	B19
gl_tempo_ok (DI7)	XT 5.6/9	B14

The Harting connector is shown below. The different main parts within the connector are shown 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 (EE)	09 14 012 3101
Multicontact, female (DD)	09 14 008 3101

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

Required Water and Air unit options for Type HS

The SpotPack IRB 6600/6650 also requires Water and Air unit options to perform as intended. These options are further described under chapter 2.9 Water and Air unit and are also mentioned in this chapter.

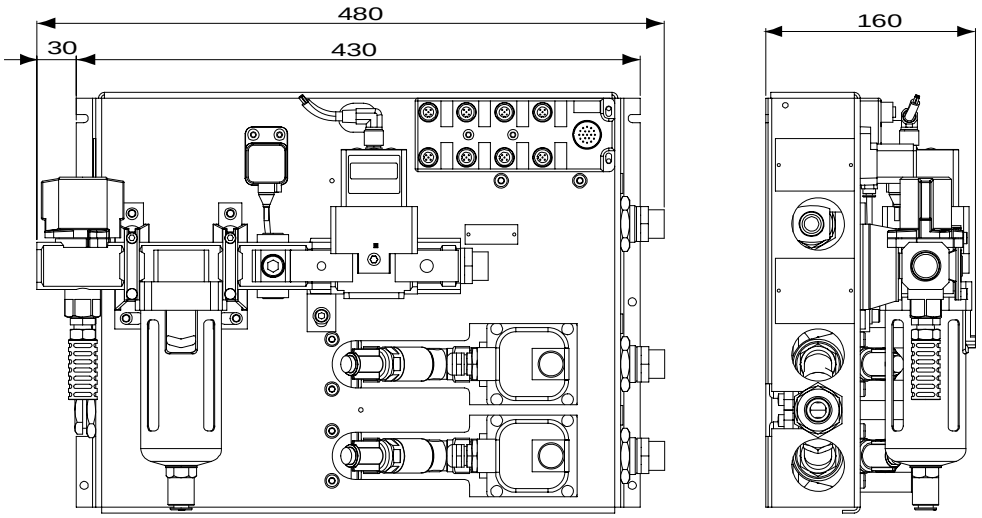

Figure 91 Water and Air unit overview.

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	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 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.

Option	Type	Description
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.

2.5.5 Summary Type HS

General

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

DressPack

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

Spot Welding cabinet

- Option 768-3. Spot Welding small
- Option 782-1,-7. Weld timer capacity
- 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)

(Also option 796-1 of the water and air unit is normally required for pneumatic gun handling).

Other described options depend on specific system need and performance.

2.6 Type Se

2.6.1 Introduction

General

Variant Type Se is designed for Spot Welding application with robot handled servo-controlled tool (electrical gun). Included modules are shown in Figure 92. Available configurations with linked option numbers are described below.

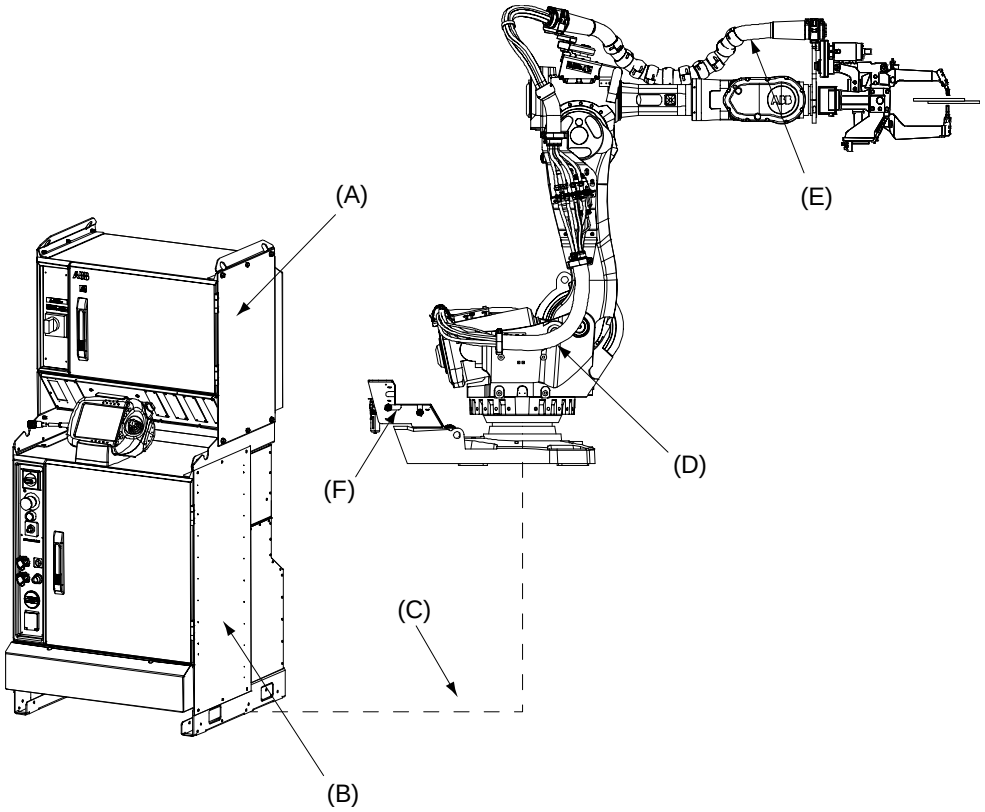

Figure 92 Type Se DressPack.

Pos	Name
A	Spot Welding cabinet
B	Robot Cabinet IRC5 (including 7th axis drive)
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 option 785-1 Robot gun must also to be chosen. See chapter 1.9.3 Robot Gun for details.

Option description

Option	Type	Description
16-2	Connection to manipulator	No Floor harness for the DressPack is chosen.
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,-3,-4 for parallel communication Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet Option 92-2,-3,-4,-5 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,-3,-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,-4,-5.

- Option 778-2. For the application Spot Welding.
- Option 798-2. Base to axis 2. Offers DressPack Lower arm for Spot Welding application with external routing.
- Option 780-2 (and option 798-2). Axis 2 to 6. Offers DressPack Upper arm for Spot Welding application with external routing.
- Option 781-1 (and option 778-2). Base to axis 6. Offers DressPack Lower and Upper arm external routing without intermediate connection point.
- Option 780-1 (and option 798-2). Axis 2 to 6. Offers DressPack Upper arm for Spot Welding application with internal routing.

The available alternatives and allowed combinations are shown in the schematic Figure 93 below.

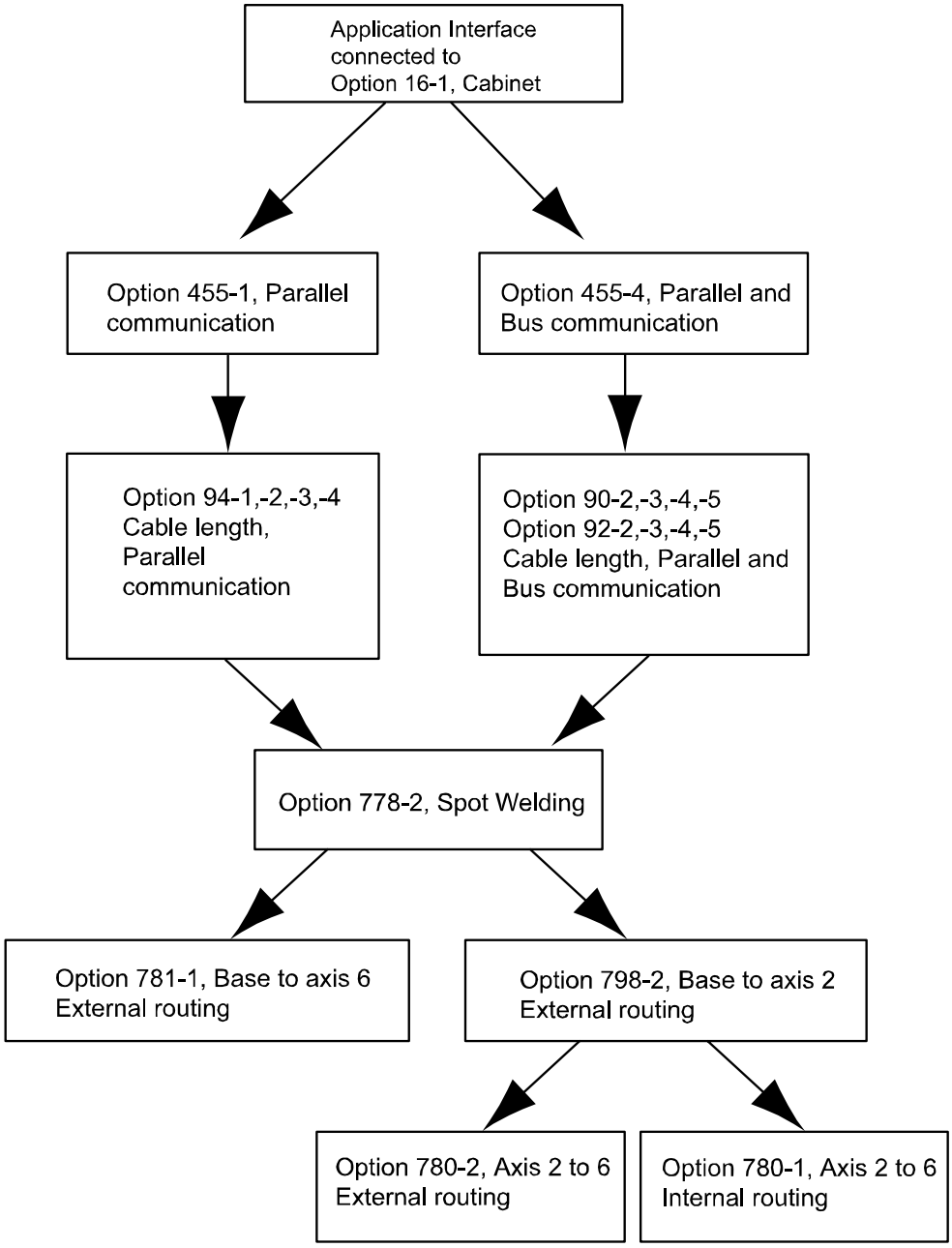

Figure 93 Schematic picture for configuration of DressPack for Spot Welding application.

2.6.2 Configuration result for Type 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 Se. Parallel communication

- Option 16-2 or Option 16-1 with Connection to cabinet (Option 94-1,-2,-3,-4 to specify cable length)
- Option 455-1. Parallel communication
- Option778-2 .Spot Welding
- Option 798-2. External routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-1 (and option 798-2). Internal routing, DressPack Upper arm
- Option 781-1 (and Option 778-2). Routing base to axis 6

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	1+1	1+1	0,5 mm^2	250 VAC, 5 A rms
Protective earth		1	0,5 mm^2	250 VAC
Customer Signals (CS)				
Signals twisted pair	16	16 (8x2)	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	4 (2x2)	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[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	Max. air pressure 16 bar/ 230 PSI[b]. Max. water pressure 10 bar/ 145 PSI
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1	35 mm^2	

a. Interface only at axis 3 or axis 6.
b. For IRB 6600/6650 ID Max. air pressure 12 bar.

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

- Option 16-2 or 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
- Option 798-2. External routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 781-1 (and Option 778-2). Routing base to axis 6

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 Protective earth	 2+2	 2+2 1	 0,5 mm^2 0,5 mm^2	 250 VAC, 5 A rms 250 VAC
Customer signals (CS) Signals twisted pair Signals twisted pair and separate shielded	 14 4	 14 (7x2) 4 (2x2)	 0,24 mm^2 0,24 mm^2	 50 V DC, 1 A rms 50 V DC, 1 A rms
Customer bus (CBus) Bus signals Bus signals Signals twisted pair	 At bus board At bus board 6	 2 2 6 (3x2)	 0,14 mm^2 0,23 mm^2 0,14 mm^2	 Can/DeviceNet spec 50 V DC, 1 A rms 50 V DC, 1 A rms
Servo motor signals Servo motor power Protective earth Signals twisted pair for resolver Brake Temperature control/PTC	 At drive At drive - - -	 3 1 6[a] 2 2	 1,5 mm^2 1,5 mm^2 0,23 mm^2 0,23 mm^2 0,23 mm^2	 600 VAC, 12 A rms 600 VAC 50 V DC, 1 A rms 50 V DC, 1 A rms 50 V DC, 1 A rms
Media Water/Air (PROC 1-4)		4	12,5 mm inner diameter	Max. air pressure 16 bar/230 PSI[b]. Max. water pressure 10 bar/ 145 PSI.
Welding power (WELD) Lower and Upper arm Protective earth (Lower and Upper arm)		2 1	35 mm^2 35 mm^2	600 VAC, 150 A rms at 20°C (68°F)

a. Interface only at axis 3 or axis 6.
b. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.6.2 Configuration result for Type Se

DressPack Type Se. Parallel and field bus communication, Profibus

- Option 16-2 or 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
- Option 798-2. External routing, DressPack Lower arm

One of the options:

- Option 780-2 (and Option 798-2). External routing, DressPack Upper arm
- Option 780-1 (and Option 798-2). Internal routing, DressPack Upper arm
- Option 781-1 (and Option 778-2). Routing base to axis 6

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	1+1	1+1	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)	0,24 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	4	4 (2x2)	0,24 mm^2	50 V DC, 1 A rms
Customer bus (CBus)				
Bus signals	At bus board	4	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2)	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	Max. air pressure 16 bar/230 PSI[b]. Max. water pressure 10 bar/ 145 PSI.
Welding power (WELD)				
Lower and Upper arm		2	35 mm^2	600 VAC, 150 A rms at 20°C (68°F)
Protective earth (Lower and Upper arm)		1	35 mm^2	

a. Interface only at axis 3 or axis 6.
b. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.6.3 Interface description DressPack for Type Se

Customer Interface

The DressPack interface at axis 6 has a connector type modular Harting for the signals. For external routing the hoses and the weld cable have free ends. For the internal routing the weld cable ends with a connector and the hoses end with fittings. The connector configurations are described in the curcuit diagram included in the Product Manual DressPack/SpotPack IRB 6600/7600, art No. 3HAC025058-001.

Harting connection - External routing

The Harting connector for external routing is shown in Figure 94. The different main parts within the connector are described in the table below, both with name and Harting article number. (Corresponding parts of the tool are available with a Connection kit, see chapter 2.10 Connection kits, and within the Harting product offer).

Name	Harting article No.
Hood	09 30 010 0543
Hinged frame, hood	09 14 010 0303
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

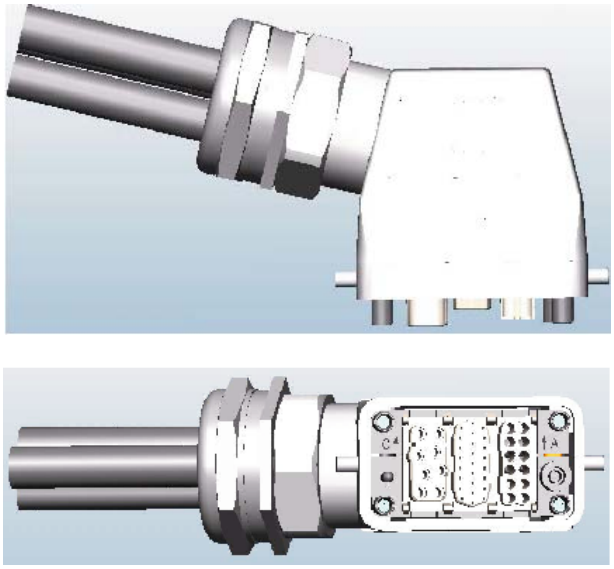

Figure 94 Harting connector for external routing.

2.6.3 Interface description DressPack for Type Se

Harting connector/hoses Internal routing

Name	Harting article No.
Hood	09 62 040 0301
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

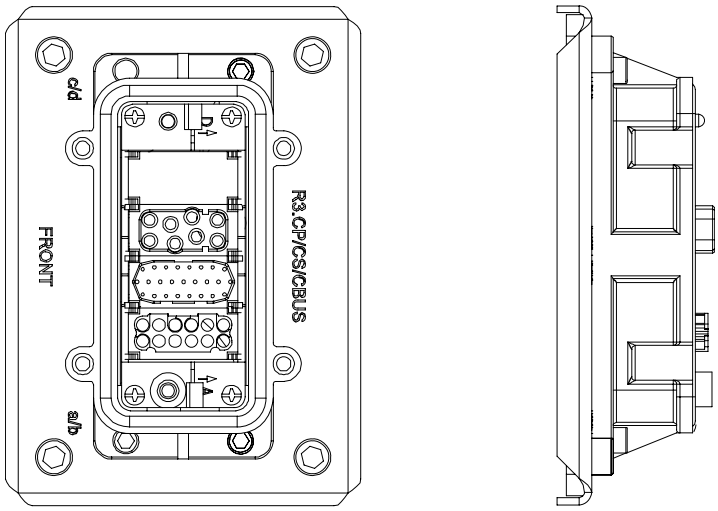

Figure 95 Harting connector for internal routing.

Weld connector and hose fittings, Internal routing

- For the internal routing the weld cable ends with connector type: MC TSB 150/35
- The hoses end with fitting type: Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal)

Required general options for Type Se

To enable the SpotPack IRB 6600/6650 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

Required options for servo gun

To enable the spot welding function package SpotPack IRB 6600/6650 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 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 Se

The SpotPack IRB 6600/6650 also requires a Spot Welding cabinet (option 768-3) to perform as intended. 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 chapter 2.8 Spot Welding cabinet and are also mentioned in this chapter.

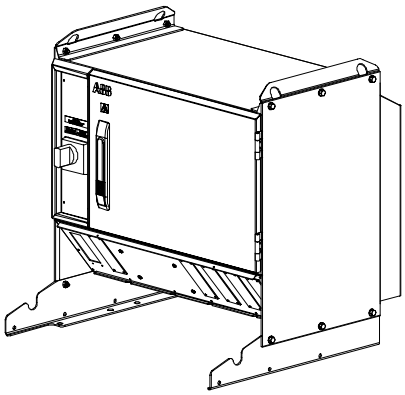

Figure 96 Spot Welding cabinet overview.

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.

Additional options to the different Spot Welding cabinets are mentioned below. For further technical details as well as restrictions in combinations see chapter 2.8 Spot Welding cabinet

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	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.

Required Water and Air unit options for Type Se

The SpotPack IRB 6600/6650 also requires Water and Air unit options to perform as intended. These options are further described under chapter 2.9 Water and Air unit and are also mentioned in this chapter.

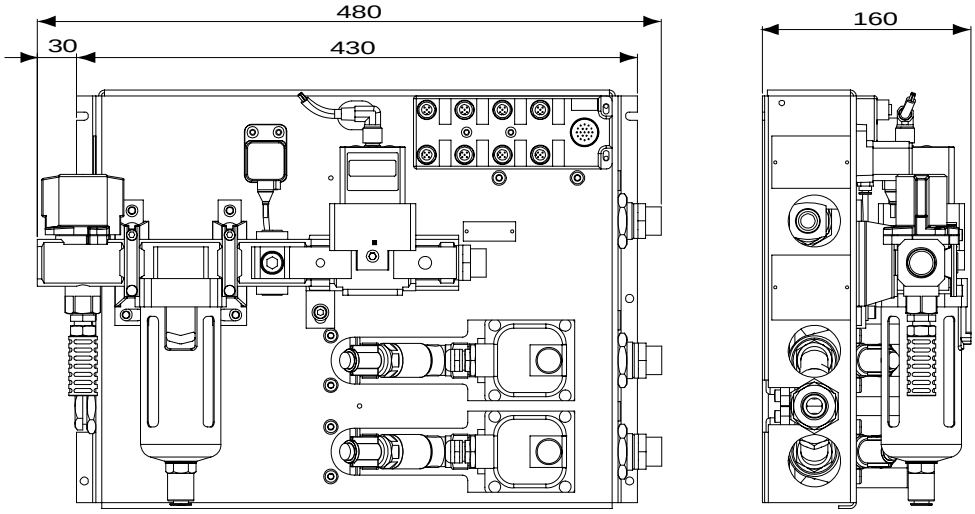

Figure 97 Water and Air unit overview.

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.
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.

Option	Type	Description
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.

2.6.4 Summary Type Se

DressPack

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

- Option 16-1. Connection to cabinet, (Cable length and communication type to be stated)
- Option 455-1, 455-4. Parallel or Parallel and Bus communication (Communication type to be stated)
- Option778-2. Spot Welding
- Option 798-2. External routing, DressPack Lower arm (Routing type to be stated)
- Option 780-2. External routing, DressPack Upper arm (Routing type to be stated)

Another routing alternative without change over connection point is:

- Option 781-1 (and Option 778-2). Routing base to axis 6

See chapter 1.9.3 Robot Gun for further drive details.

General options

- Option 716-1. 1 pc. Digital 24 VDC I/O 16 inputs/ 16 outputs
- Option 727-1. 24V 8 Amps power supply

Required options for servo gun

- 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 768-3. Spot Welding small
- Option 782-1,-7. Weld timer capacity
- Option 791-1 Power cable 7 m (other lengths available)

Water and air unit

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

Other described options depend on specific system need and performance.

2.7 Type HSe

2.7.1 Introduction

General

Variant Type HSe is designed for handling against a stationary mounted Spot Welding servo controlled tool (electrical gun). Included main modules are shown in Figure 98 below. Available configurations with linked option numbers are described below with starting with the DressPack.

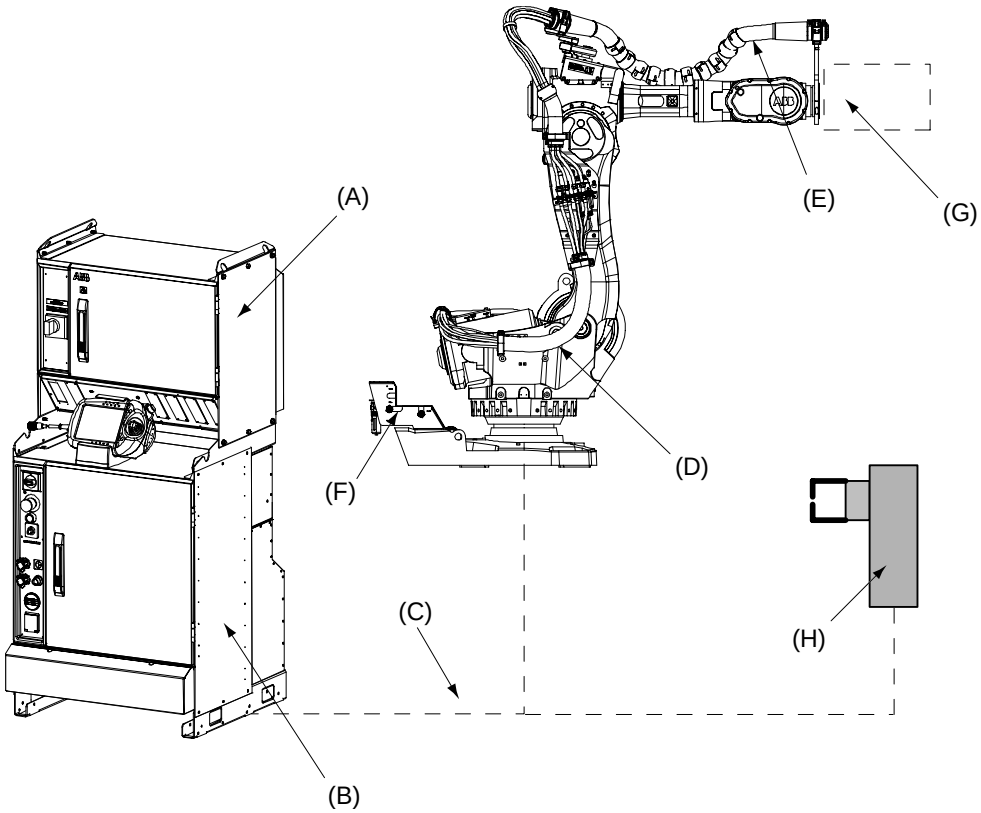

Figure 98 Type HSe DressPack.

Pos	Name
A	Spot Welding cabinet
B	Robot Cabinet IRC5 (incl. 7 th axis drive)
C	DressPack, Floor
D	DressPack, Lower arm
E	DressPack, Upper arm
F	Water and Air unit with hoses
G	Robot Gripper
H	Stationary gun with axis 7

Available configurations with linked option numbers are described below.

Option description

Option	Type	Description
16-2	Connection to manipulator	No Floor harness for the DressPack is chosen.
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,-3,-4 for parallel communication. Option 90-2,-3,-4,-5 for parallel communication and field bus communication with Can/DeviceNet. Option 92-2,-3,-4,-5 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,-3,-4,-5.
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,-4,-5.

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

The available alternatives and allowed combinations are shown in the schematic Figure 99 below.

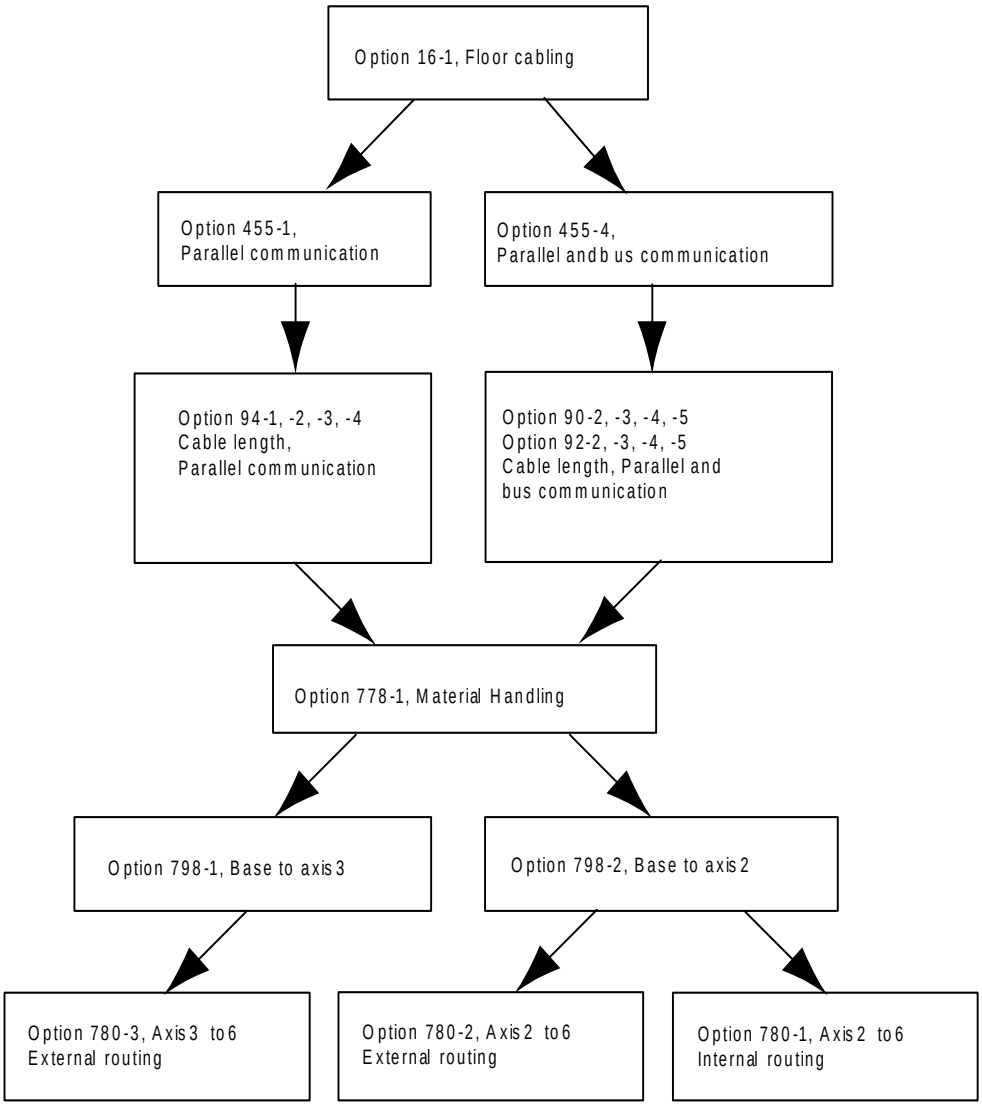

Figure 99 Schematic picture for configuration of DressPack for Material Handling application.

2.7.2 Configuration result for Type 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 HSe. Parallel communication

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

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

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[b]
Protective earth		1[a]	0,5 mm^2	250 VAC[a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2)[c, d]	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[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60 VDC.
c. For IRB 6600/6650 ID 16 signals instead of 20 signals.
d. For option 780-3 8 signals instead of 20.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.7.2 Configuration result for Type HSe

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

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

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

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[b]
Protective earth		1[a]	0,5 mm^2	250 VAC[a]
Customer Signals (CS)				
Signals twisted pair	20	20 (10x2)[c, d]	0,23 mm^2	50 V DC, 1 A rms
Signals twisted pair and separate shielded	8	8 (4x2)	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)	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[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60 VAC.
c. For IRB 6600/6650 ID 16 signals instead of 20 signals.
d. For option 780-3 8 signals instaed of 20.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

DressPack Type HSe. Parallel and field bus communication, Profibus

- Option 16-2 or 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 or Option 798-2. Internal routing, DressPack Lower arm

One of the options:

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

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[b]
Protective earth		1[a]	0,5 mm^2	250 VAC[a]
Customer Signals (CS)				
Signals twisted pair	22	22 (11x2)[c, d]	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	0,14 mm^2	Profibus 12 Mbit/s spec
Signals twisted pair	6	6 (3x2)	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[e]

a. Not included in option 780-3.
b. For option 780-3 50 VAC / 60 VDC.
c. For IRB 6600/6650 ID 18 signals instead of 22 signals.
d. For option 780-3 8 signals instead of 22.
e. For IRB 6600/6650 ID Max. air pressure 12 bar.

2.7.3 Interface description DressPack for Type HSe

General

The interface at axis 6 has a hose ending with a free end for external routing and a fitting for internal routing. The signal cables end with a signal connector type modular Harting. I case of option 780-3, External routing Axis 3 to 6, the connectors are of type Souriau. The connector configurations are described in the curcuit diagram included in the Product Manual DressPack/SpotPack IRB 6600/7600, art No. 3HAC025058-001.

Harting Connector - External routing

The Harting connector for external routing is shown in the Figure 100. The different main parts within the connector are described in the table below, both with name and Harting article number. (Corresponding parts of the tool are available with a Connection kit, see chapter 2.10 Connection kits and within the Harting product offer).

Name	Harting article No.
Hood	09 30 010 0543
Hinged frame, hood	09 14 010 0303
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

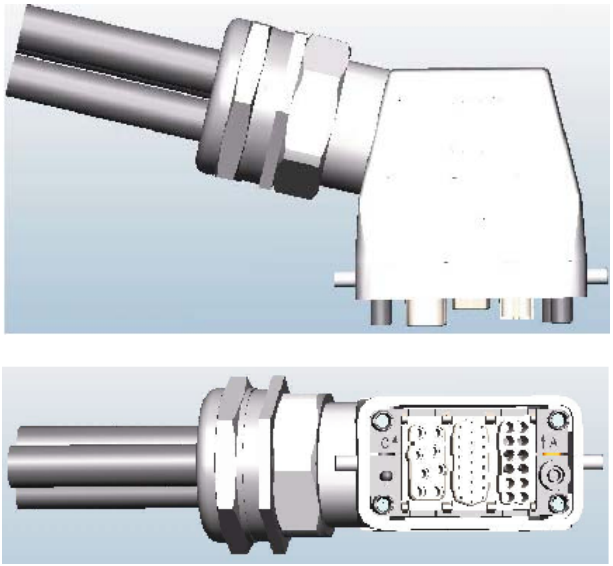

Figure 100 Harting connector external routing.

Souriau connectors - External routing

The Souriau connectors for external routing is shown in Figure 77. The main parts within the connector are described in the table below.

Name	Souriau article No.
Socket connector, R3.CPS	UTOW61832SH
Shrink boot adapter, R3.CPS	UTO18AD
Sockets, R3.CPS	RC18W3k
Socket connector, R3.CBUS	UTOW61419SH
Shrink boot adapter, R3.CBUS	UTO14AD
Sockets, R3.CBUS	SC24W3S25

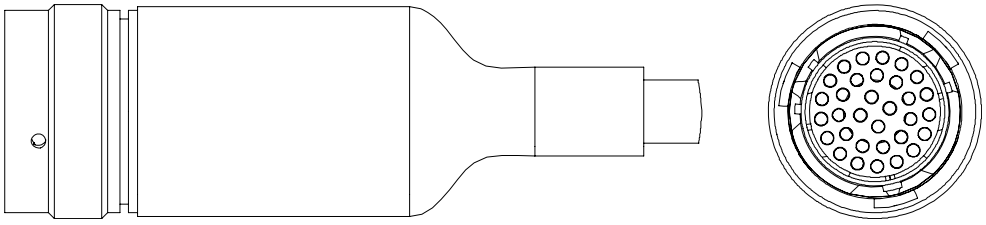

Figure 101 Souriau connetor external routing (UTOW61419SH shown).

Harting connector - Internal routing

Name	Harting article No.
Hood	09 62 040 0301
Multicontact, female (HD) (25 pin)	09 14 025 3101
Multicontact, female (EE) (12 pin)	09 14 012 3101
Multicontact, female (DD) (8 pin)	09 14 008 3101

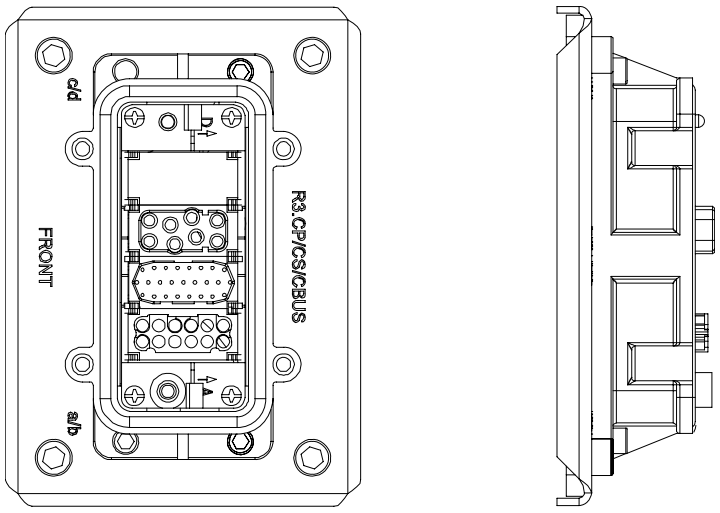

Figure 102 Harting connector for internal routing.

Hose fitting, Internal routing

- For the internal routing the hose ends with fitting type: Parker Pushlock, (½", M22x1,5 Brass, 24 degree seal)

Required general options for Type HSe

To enable the SpotPack IRB 6600/6650 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

Required options for servo gun

To enable the spot welding function package SpotPack IRB 6600/6650 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 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 635-4 and option 635-5 could also be used)

Required Spot Welding cabinet options for Type HSe

The SpotPack IRB 6600/6650 also requires a Spot Welding cabinet (option 768-3) to perform as intended. 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 of the cabinet variants. All these options are further described under chapter 2.8 Spot Welding cabinet and are also mentioned in this chapter.

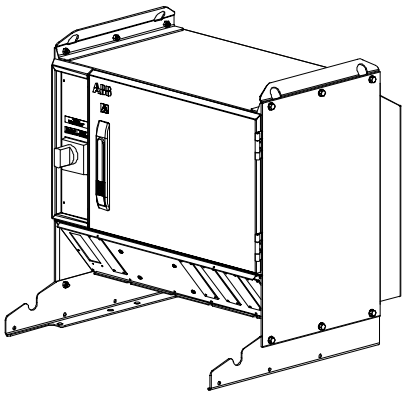

Figure 103 Spot Welding cabinet overview.

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.

Additional options to the different Spot Welding cabinets are mentioned below. For further technical details as well as restrictions in combinations see chapter 2.8 Spot Welding cabinet.

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	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.

Option	Type	Description
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.
809-3	Process cable to stationary gun, 22 m	Offers floor cable of 22 m length for process signals between the Spot Welding cabinet and to the stationary gun.
809-4	Process cable to stationary gun, 30 m	Offers floor cable of 30 m length for process signals between the Spot Welding cabinet and to the stationary gun.

2.7.4 Interface description stationary gun

General

The interface towards the stationary gun includes 5 parts.

- 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 a 8 pin Souriau connector (Type UT 06128SH)
- Signal interface with a signal connector type modular Harting (Cable option 809-1,-2,-3 or -4). The connector configurations are described in the tables below. Signals with (parentheses) are to be connected by customer. Other signals are connected if a complete SpotPack Type HS is ordered
- 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

The connector configurations are described in the tables below. Signals with (parentheses) are to be connected by customer in control cabinet end.

Name	Connector Pin Spot Welding cabinet	Connector Pin No. Stationary gun
Harting module type*	(Cable gland)	EE+HD+DD

Customer power signals

Name	Connector Pin Spot Welding cabinet	Connector Pin No. Stationary gun
+24 V	XT 5.6/1	C4
0 V	XT 5.6/2	C5

Customer signals

Name	Connector Pin Spot Welding cabinet	Connector Pin No. Stationary gun
(Spare)	XT 5.6/10	B20
(Spare)	XT 5.6/11	B21
(Spare)	XT 5.6/12	B22
KSR Sep. screened	XT 5.7/1	B24

Name	Connector Pin Spot Welding cabinet	Connector Pin No. Stationary gun
KSR Sep. screened	XT 5.7/2	B25
(Spare) Sep. screened	XT 5.7/4	B16
(Spare) Sep. screened	XT 5.7/5	B17
(Spare)	XT 5.6/5	B1
(Spare)	XT 5.6/6	B2
(Spare)	XT 5.6/7	B3
gl_equalize (DO0)	XT 5.6/8	B4
(Spare)	XT 5.6/3	B18
(Spare)	XT 5.6/4	B19
temp_ok (DI7)	XT 5.6/9	B14

The Harting connector is shown below. The different main parts within the connector are shown both with name and Harting article number. Corresponding parts of 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 (EE)	09 14 012 3101
*Multicontact, female (DD)	09 14 008 3101

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

Required Water and Air unit options for Type HSe

The SpotPack IRB 6600/6650 also requires Water and Air unit options to perform as intended. These options are further described under chapters 2.9 Water and Air unit and are also mentioned in this chapter.

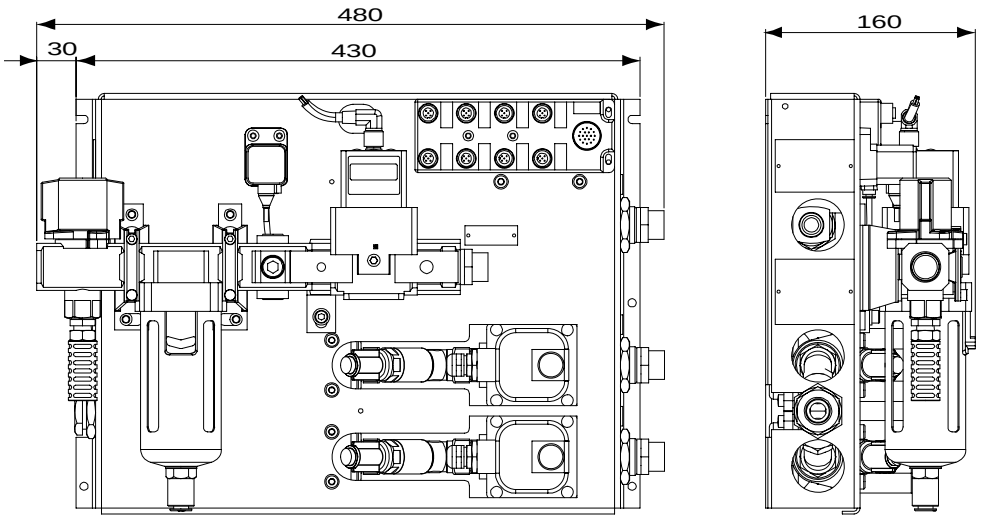

Figure 104 Water and Air unit overview.

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.
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.

2.7.5 Summary Type HSe

DressPack

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

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

Required options for 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 guns

Spot Welding cabinet

- Option 768-3. Spot Welding small
- Option 782-1,-7. Weld timer capacity
- 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)

Other described options depend on specific system need and performance.

2.8 Spot Welding cabinet

2.8.1 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 105 below. This is also how it is assembled at delivery.

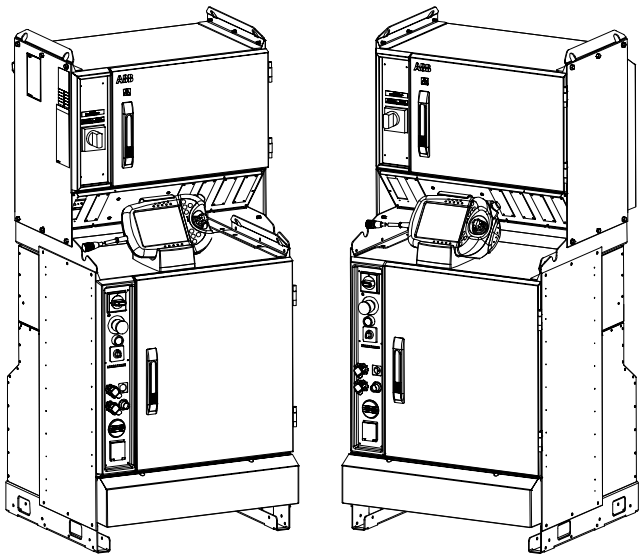

Figure 105 Spot Welding cabinet with robot controller cabinet.

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 106 below)
- Rotary switch with adjustable thermal release (not for UL option) and short circuit release
- 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

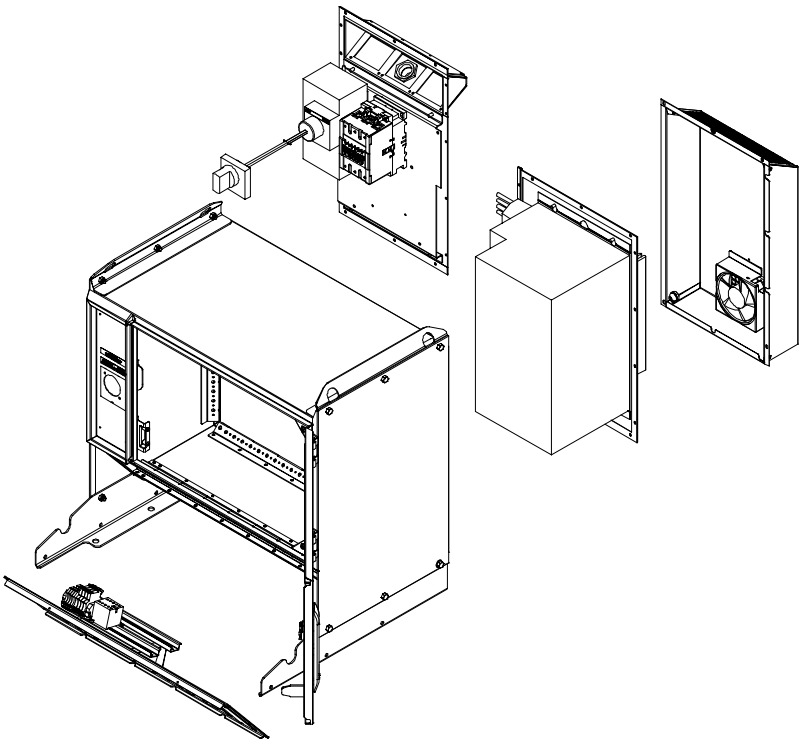

Figure 106 Exploded view drawing of the Spot Welding cabinet.

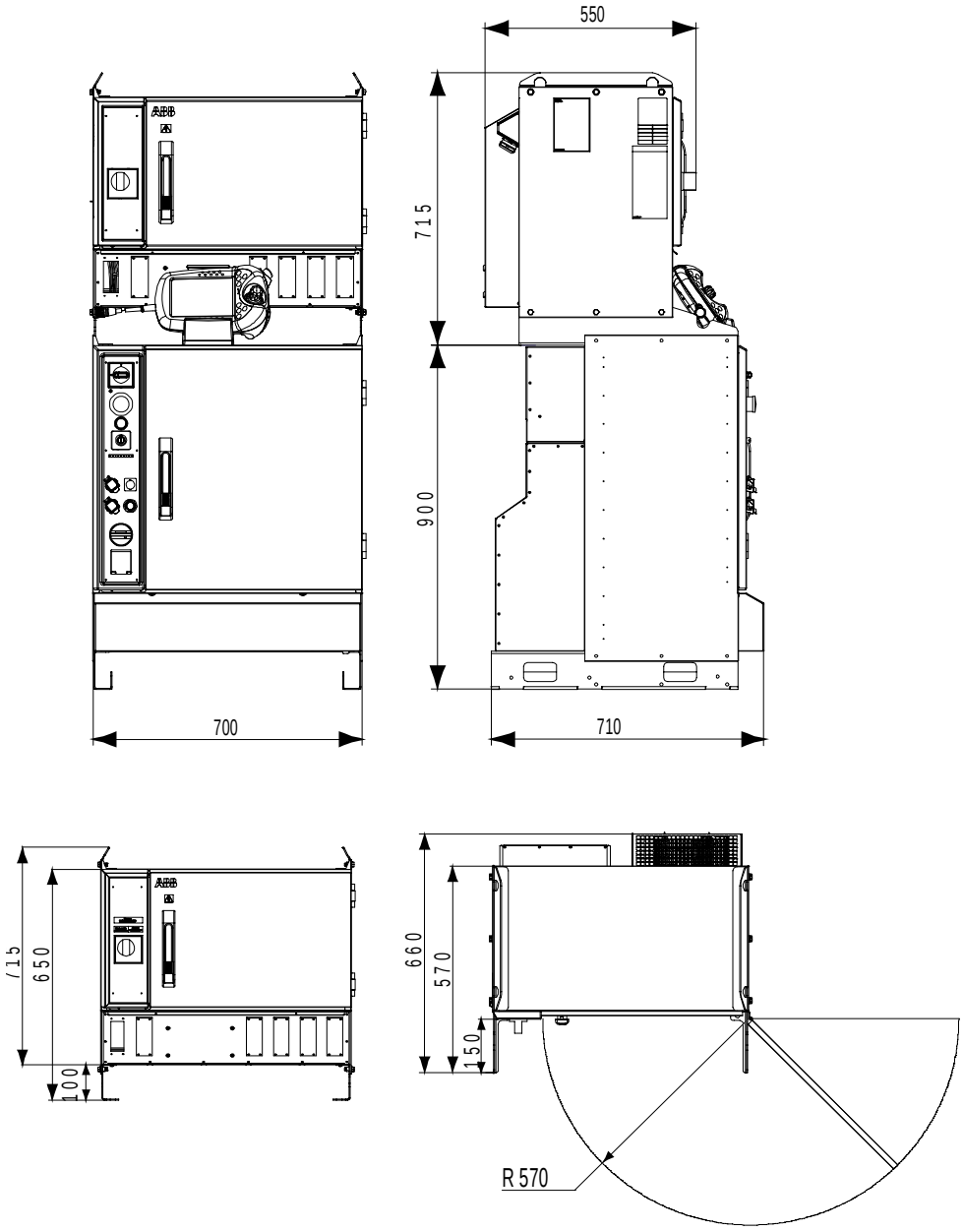

Figure 107 Different views of the Spot Welding cabinet (dimensions in mm).

The electrical circuits of the Spot Welding cabinet consist of weld power circuit and control circuits to control the welding.

Weld power circuit

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 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). 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. The cross connections to the water and air unit are supplied when choosing cable to split box (option 797-1,-2,-3 or - 4). The cross connections for process signals to the stationary gun are supplied when choosing process cable to stationary gun (option 809-1,-2,-3 or -4).

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.

For further information see:
-Installation and Maintenance manual for SpotPack and DressPack
-Product Manual DressPack/SpotPack
-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

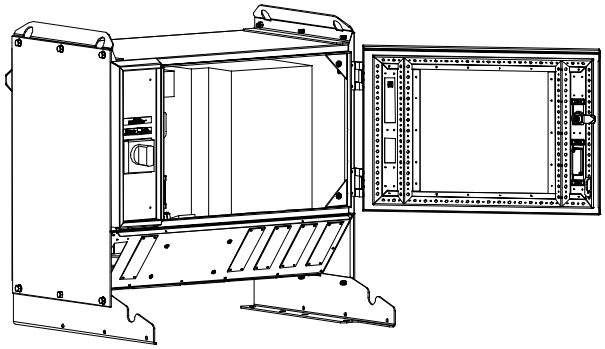

Figure 108 Spot Welding cabinet equipped with a weld timer from Bosch.

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 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

Option 828-1 Region A

Offers 120 V power supply. Can not be combined with service outlet 230 V (option 736-1).

Mainly for the North American market.

Option 828-2 Region E

Offers 230 V power supply. Can not be combined with service outlet 120 V (option 736-2).

Mainly for the European market.

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). For the AC options (option 782-1) the need will depend on the welding conditions and surrounding temperature.

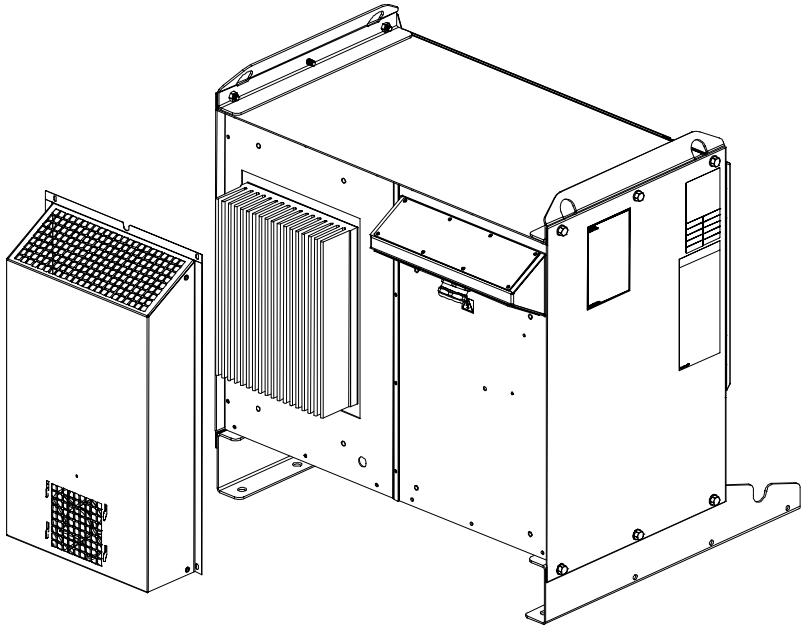

Figure 109 Exploded view drawing showing fan assembly at the rear of the Spot Welding cabinet.

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.

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.

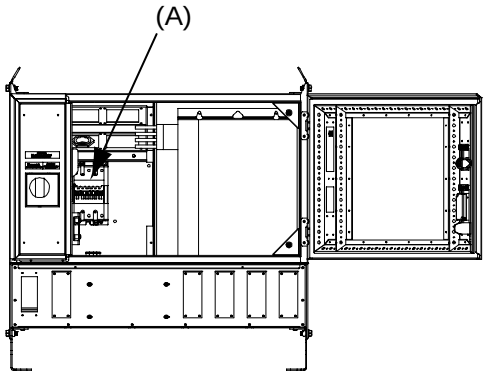

Figure 110 Cabinet with weld contactor, front view.

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, 3 and 4 Process cable to stationary gun

Offers floor cable of 15, 22 or 30 m length for process signals between the Spot Welding cabinet and to the stationary gun. See option 809-1 for further details.

2.8.2 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[a]	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

a. Incoming power connection made by customer. For incoming power and safety recommendations see the Product Manual DressPack/SpotPack IRB 6600/6650 3HAC025058-001.

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

2.9 Water and Air unit

2.9.1 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 111).

- 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

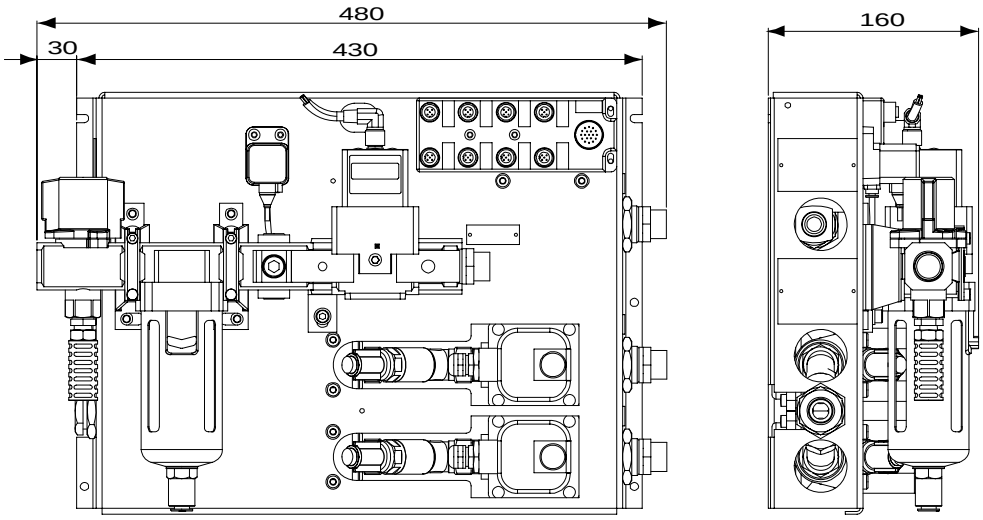

Figure 111 Water and air unit with outer dimensions (mm), media connections, signal connection.

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

- Water in circuit
- 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 112). 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.

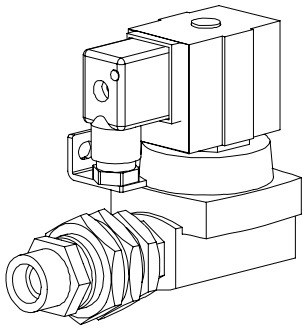

Figure 112 Water in circuit.

Water return circuit

The water return circuit monitors the flow of the returning cooling water from the Spot welding gun (see Figure 113). 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.

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.

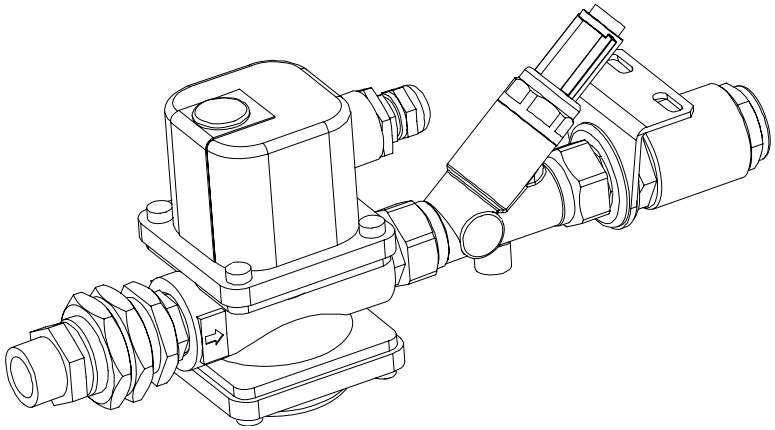

Figure 113 Water return circuit.

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 114).

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.

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).

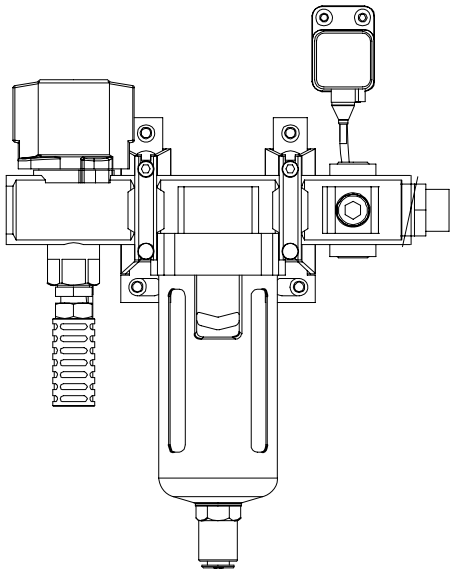

Figure 114 Air Supply Circuit.

Split 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 115. 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.

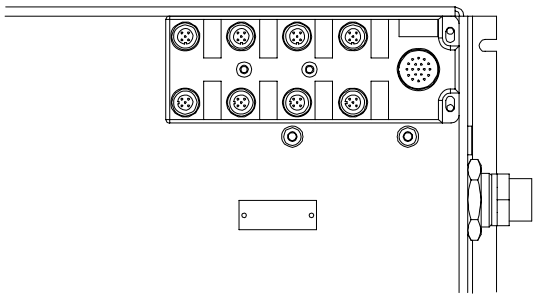

Figure 115 Split box connections.

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.

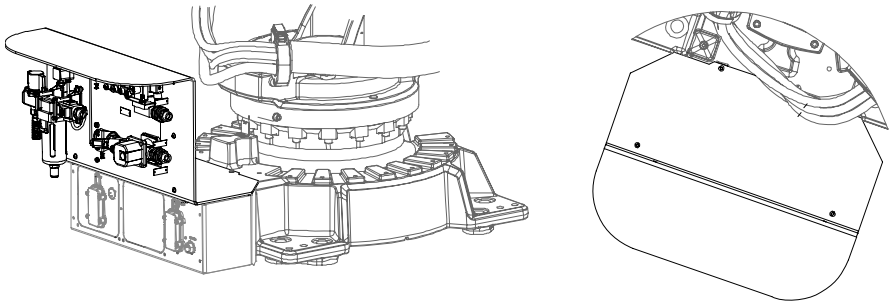

Figure 116 Water and air unit mounted on the base.

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

Electric proportional valve (option 796-1)

The proportional valve controls the welding force of the pneumatic spot welding gun. The proportional valve is controlled by the welding timer in the Spot welding cabinet.

An analogue signal 0 - 10V, controls the proportional valve and the air pressure in the range of 0.05 - 0.9MPa.

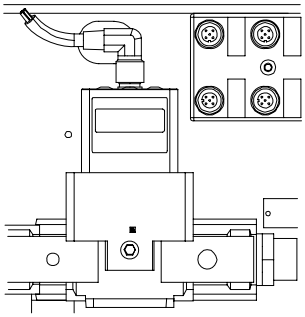

Figure 117 Electric proportional valve unit.

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.

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)
- 5. Proportional valve: Power supply (Option 796-1 Electrical proportional valve for air)

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

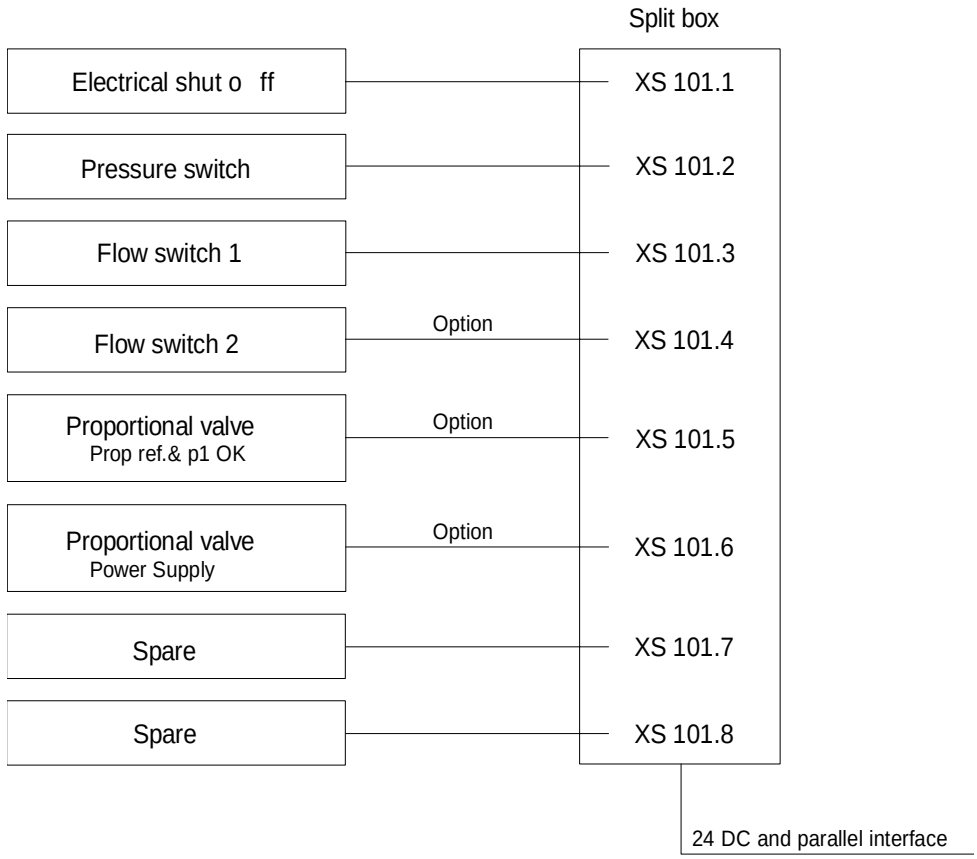

Figure 118 Block diagram.

2.9.1 Introduction

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.
793-1	Second water return	Yhe 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 Spot Welding 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.

2.9.2 Technical data Water and Air unit

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[a]
Outgoing water	1	G 1/2” thread[a]
Incoming air	1	G 1/2” thread[a]
Extra air outlet	1	G 3/8” thread[b]

a. Connection to be made by customer.
b. 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[a]
Flow regulating (each circuit)	1 - 8 l/min
Flow setting range	-0.100 - 1.000 MPa
Water quality	Normal filtred industrial water 80 to 100 mesh.

a. 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.

2.10 Connection kits

2.10.1 Options

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 EE (8 pin)
1 pcs Multicontact, female (Harting)	Type DD (12 pin)
10 pcs Female crimp contacts	For 1,5 mm^2
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 480-1, Weld, Proc 2-4 on base

R1. Weld and Proc 2-4 on base

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

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

1 pcs Welding connector socket (MC)	3x35 mm^2
1 pcs Cable gland, plastic	Diameter 24-28 mm
Assembly Accessories to complete connector	
Assembly instruction	

Option 474-1, Pos switch on base

R1. SW1 and SW2/3 on base

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

- Connector for position switch axis1 (SW 1) with:

1 pcs Socket connector (32p)	Souriau UTOW
1 pcs Adaptor	Used with form shrink
35 pcs Sockets Souriau UTOW	for 0,13-0,25 mm^2
Assembly Accessories to complete connector	
Assembly instruction	

- Connector for position switch axis 2/3 (SW2/3) with:

1 pcs Socket connector (32p)	Souriau UTOW, Rotated version (85 degrees)
1 pcs Adaptor	Used with form shrink
35 pcs Sockets Souriau UTOW	for 0,13-0,25 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)	Burndy
1 pcs Adaptor	8 pin
15 pcs Pin	for 0,13-0,25 mm^2
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. This option could also be used at axis 6 for IRB 6600ID.

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 EE (8 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 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	

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. This option could also be used at axis 6 for IRB 6600ID.

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 mm^2 (25 mm^2 pin)
1 pcs Cable gland, plastic	Diameter 24-28 mm
Assembly Accessories to complete connector	
Assembly instruction	

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 option 781-1) ends with free end for media and for weld power cable[a]. 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, (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	

a.Not for 6600ID/6650ID

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[b].

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 EE (8 pin)
1 pcs Multicontact, male (Harting)	Type DD (12 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	

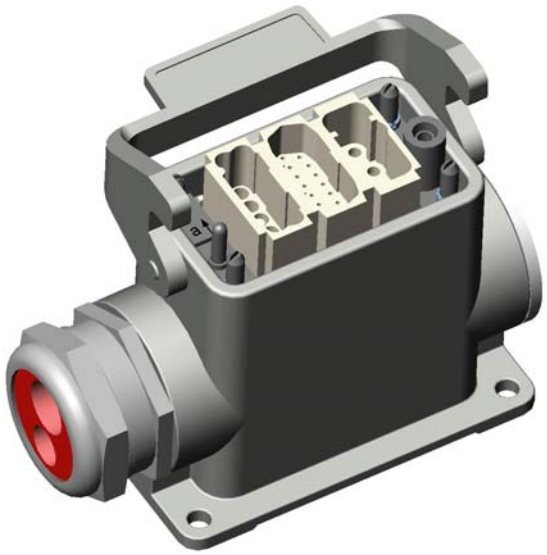

Figure 119 Connector for CP/CS/CBUS, Proc 1 axis 6.

b.Not for 6600ID/6650ID

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	

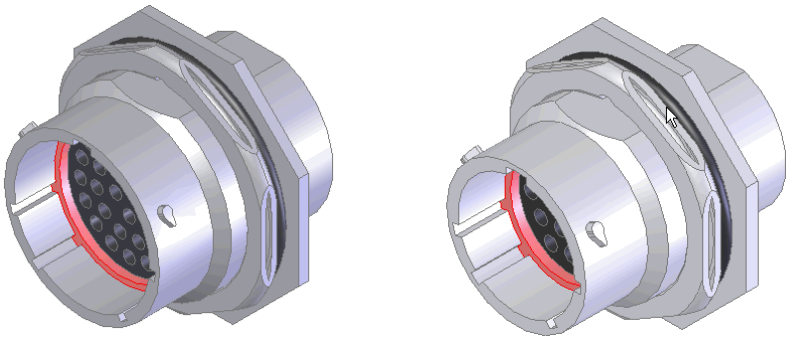

Figure 120 Connector for CP/CS/CBUS, Proc 1 axis 6.

2.10.1 Options

3 Specification of Variants and Options

3.1 Introduction

3.1.1 General

The different variants and options for the IRB 6600 are described in the following sections.

The same numbers are used here as in the Specification form. For controller options, see Product specification - Controller IRC5 with FlexPendant and Product specification - Controller software IRC5.

3.1.2 Manipulator

Variants

Option	IRB Type	Handling capacity (kg)/Reach (m)
435-22	6600	175/2.8
435-17	6600	225/2.55
435-16	6600	175/2.55
435-30	6650	125/3.2
435-19	6650	200/2.75
435-69	6650S	90/3.9
435-50	6650S	125/3.5
435-51	6650S	200/3.0
435-53	6600ID	185/2.55
435-55	6650ID	170/2.75

Manipulator color

Option	Description	Note
209-1	Standard	The manipulator is painted in ABB orange.
209-4 --192	RAL code	Colors according to RAL-codes.

Protection

Option	Description	Note
287-4	Standard	IP 67
287-3	Foundry Plus	Robot adapted for foundry or other harsh environments. The robot has the FoundryPlus protection which means that the whole manipulator is steam washable. The excellent corrosion protection is obtained by a special coating. The connectors are designed for severe environment, and bearings, gears and other sensitive parts are highly protected.
287-6	Foundry Prime[a]	Robots adapted for water jet cleaning of casts and machined parts, and similar very harsh environments. The manipulator can withstand surrounding solvent based detergent (max. pH 9.0 and must contain rust inhibitor). The detergent must be approved by ABB. In addition, the manipulator can withstand indirect spray from jet pressure (max. 600 bar) and 100% humidity. The manipulator can work in an environment with a cleaning bath temperature < 60°C, typically used in a water jet cleaning application with moderate speed. The robot is labeled “Foundry Prime”. 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 • 88-1 Cooling fan for axis 2 motor • 89-1 Cooling fan for axis 3 motor • 184-1 Insulated Tool Flange • 536-1 Chip protection • 571-1 Base spacers • 25-3 Position switches axis 1 • 30-1 Position switches axis 2 • 33-1 Position switches axis 3 • 271-1/-2 Position switch Connection to

Option	Description	Note
287-6	Foundry Prime[a]	• 34-1 Working range limit axis 3 • 561-1 Extended Work Range Axis 1 • 429-1 Underwriters Laboratories • 438-5 Standard + 24 months • 438-7 Standard + 30 months • 455-1 Parallel Communication • 778-2 Spot Welding • 798-2 Base to axis 2 • 780-1/-2 DressPack upper arm • 781-1 Base to axis 6 • 543-1 CP/CS/BUS, Proc 1 axis 6 • 786-1 to -4 Connection to first drive • 768-1 Empty cabinet small • 715-1 Installation kit • 788-1 Forced air cooling • 789-1 Earth fault protection unit

a. Only available for IRB 6600-225/2.55, IRB 6600-175/2.8 and IRB 6650S-200/3.0

3.1.3 Equipment

Option	Type	Description
213-1	Safety lamp	A safety lamp with an orange fixed light can be mounted on the manipulator. The lamp is active in MOTORS ON mode. The safety lamp is required on a UL/UR approved robot.
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.
37-1	Base plate	Can be used for IRB 6600 and IRB 7600. See 1.3 Installation, for dimension drawing.
87-1	Cooling fan for axis 1 motor (IP 54)	Cannot be combined with Cooling fan for axis 2 motor option 88-1. For in use recommendations see 1.9 Cooling fan for axis 1 and 2 motor. Not for protection Foundry.
88-1	Cooling fan for axis 2 motor (IP 54)	For in use recommendations see 1.9 Cooling fan for axis 1 and 2 motor. Not for protection Foundry.
430-1	Upper arm covers	See Figure 126. Included in protection Foundry.
804-1	Labels for synchronization markings	For a more accurate marking of the synchronization position of the robot. Assembly instructions are included. See Figure 121 to Figure 125.

Synchronize lables

The option contains synchronize lables for each axis.

Synchronize lables for Axis 2

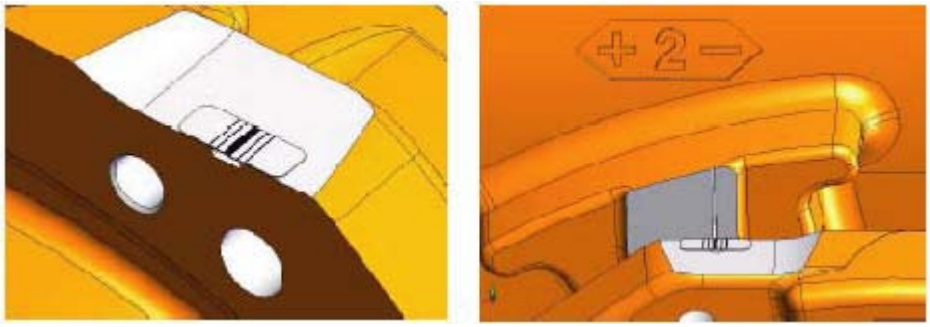

Figure 121 Position for synchronize lables, Axis 2.

Synchronize lables for Axis 3

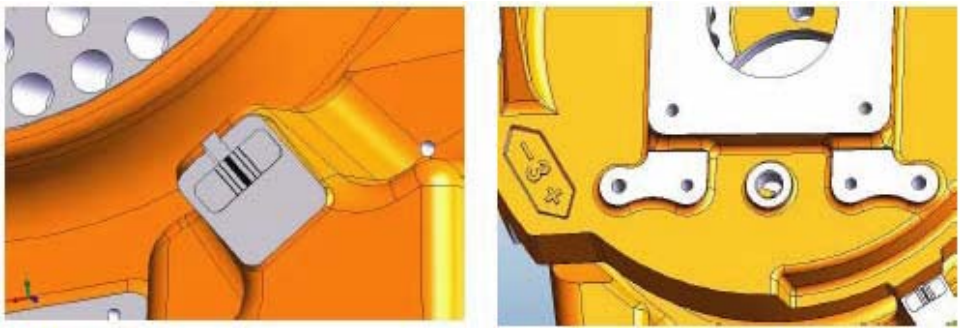

Figure 122 Position for synchronize lables, Axis 3.

Synchronize lables for Axis 4

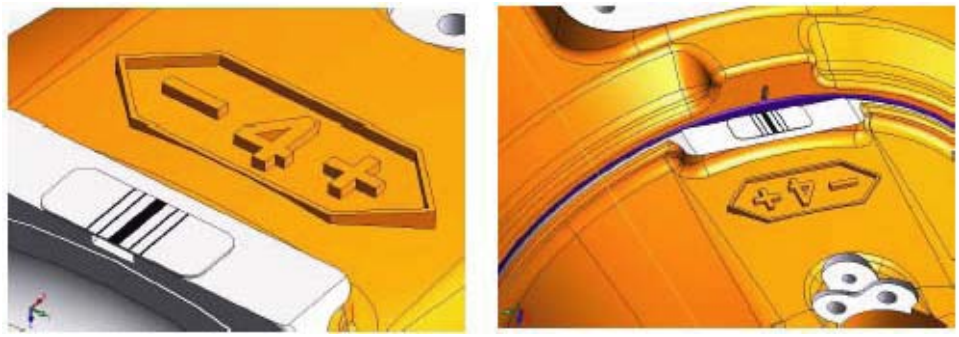

Figure 123 Position for synchronize lables, Axis 4.

Synchronize lables for Axis 5

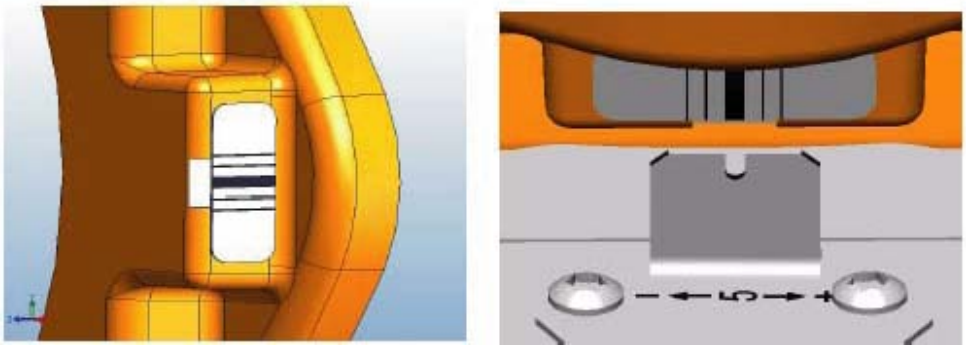

Figure 124 Position for synchronize lables, Axis 5.

Synchronize lables for Axis 6

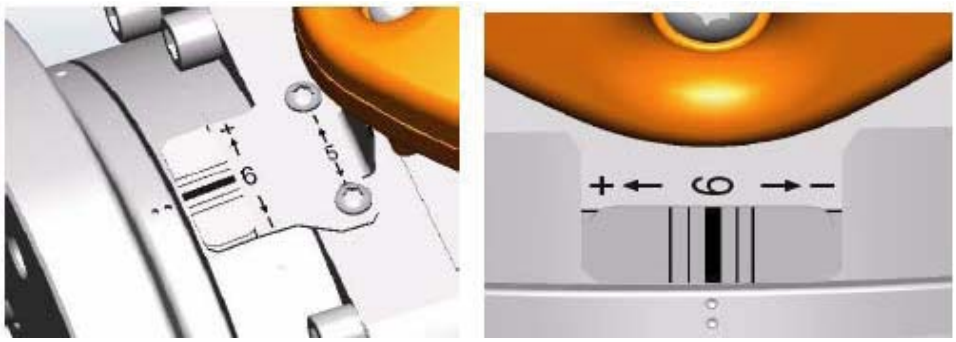

Figure 125 Position for synchronize lables, Axis 6.

Upper arm covers

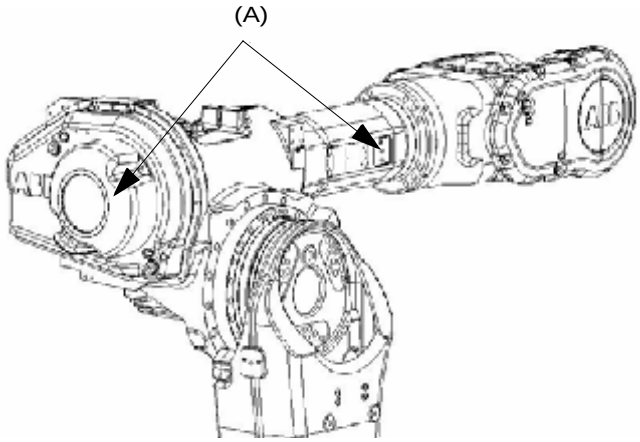

Figure 126 Upper arm covers.

Pos	Description
A	Option 430-1

Insulated tool flange

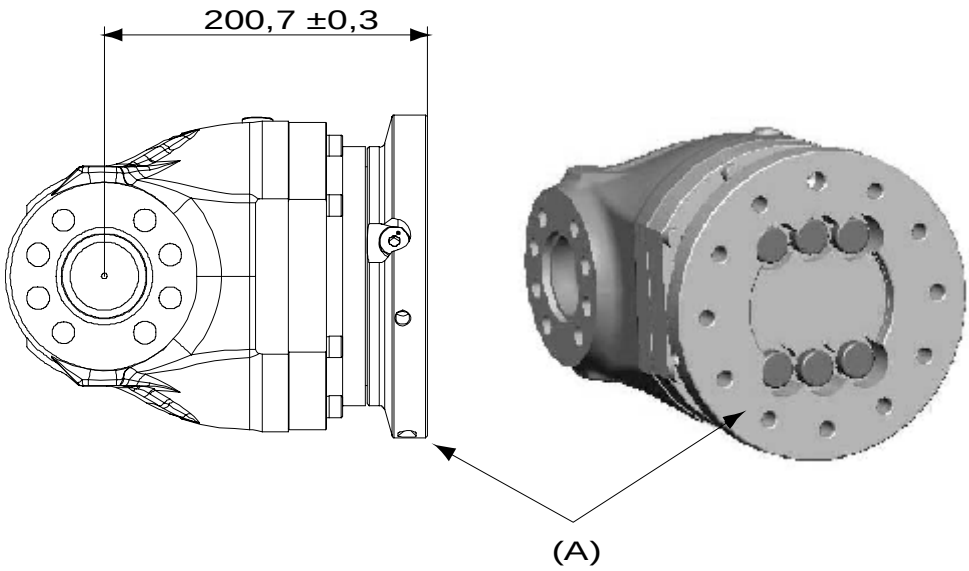

Figure 127 Insulated tool flange (dimensions in mm).

Option	Type	Description
184-1	Insulated tool flange (A)	The electrically insulated tool flange, according to European Standard EN 60204-1, withstands dangerous voltage (in case of an electrical fault in the spot welding equipment mounted on the Insulated tool flange) of 500 V DC during 30 seconds in non water applications without passing it further to the electronics in the manipulator and the controller. Not available together with Protection Foundry, option 287-4 and IRB 6600ID/6650ID options 435-53,435-55. Connection holes and all dimensions are the same as for the standard tool flange except for the distance from c/c 5th axis to the end surface of the Insulated tool flange. The distance is 0,7 mm longer compared to the standard tool flange, see Figure 127. The countersinked holes for the fastening bolts to the gear box are larger, and the bolts are insulated from the tool flange, see Figure 127.

The Insulated tool flange option can be ordered in combination with the Absolute Accuracy option, and the robot will then be factory calibrated.

When the Insulated tool flange is mounted after the robot delivery, the robot must be re-calibrated for absolute accuracy.

Chip protection

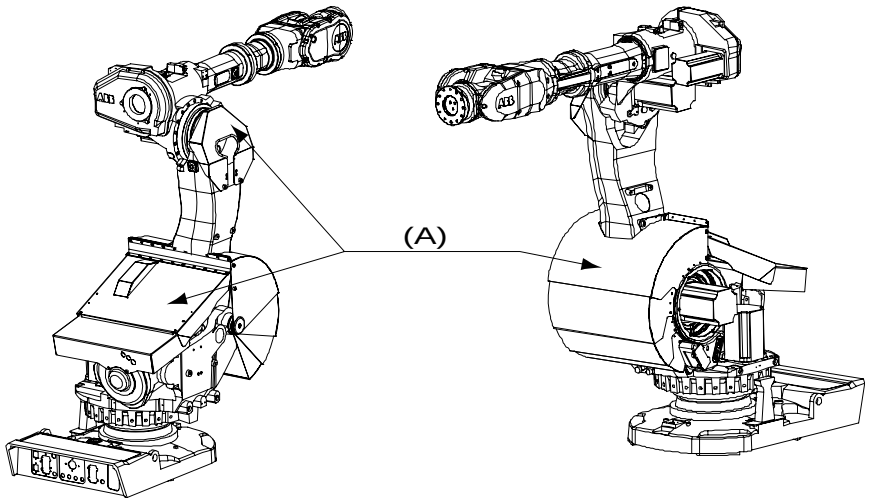

Figure 128 Chip protection.

Option	Type	Description
536-1	Chip protection (A)	The mechanical protection prevents chips created at applications as for instance, deburring, sawing and milling to be accumulated on the robot and secure its movable functionality. Only together with protection Foundry. See Figure 128.

Base Spacers

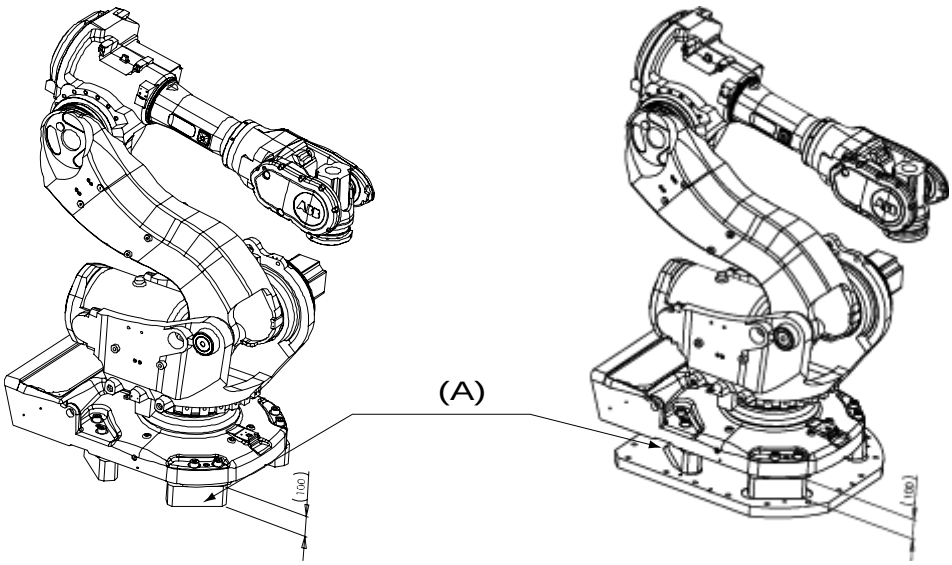

Figure 129 Base spacers.

Option	Type	Description
571-1	Base Spacers (A)	Four spacers to raise the robot 100 mm from the floor or the base plate. See Figure 129.

3.1.4 Position Switches

General

Position switches indicating the position of the three main axes. Rails with separate adjustable cams are attached to the manipulator. The cams, which have to be adapted to the switch function by the user, can be mounted in any position in the working range for each switch. No machining operation of the cams is necessary for the adaptation, simple hand tools can be used.

Function

For axis 1, there are three redundant position zones available, each with two independent switches and cams. For axes 2 and 3, two channels position zones are available, each with two independent switches and cams.

Each position zone consists of two switches mechanically operated by separate cams. Each switch has one normally open and one normally closed contact. The design and components fulfill the demands to be used as safety switches. These options may require external safety arrangements, for example light curtains, photocells or contact mats.

The switches can be connected either to the manipulator base (R1.SW1 and R1.SW2/3, see Figure 67), or to the controller. In the controller the signals are connected to screw terminal XT8 Phoenix MSTB 2.5/12-ST-5.08. Switch type Balluff Multiple position switches BNS, according to EN 60947-5-1 and EN 60947-5-2.

Position switches

Option	Type	Description
25-3	Position switches axis 1	Three redundant position zones are available, each with two independent switches and cams. Two plus one zone.
30-1	Position switches axis 2	Two redundant position zones are available, one with two independent switches and cams, and the other with one independent switch and cam. Not for protection foundry (option 287-3).
33-1	Position switches axis 3	Two redundant position zones are available, one with two independent switches and cams, and the other with one independent switch and cam. Not for protection foundry (option 287-3).

Connection to

Option	Type	Description
271-2	Manipulator	Connection on the manipulator base with one/two Souriau 32-pin connector.
271-1	Cabinet	Connection inside the cabinet wall. See Product specification - Controller IRC5 with FlexPendant. Position switch cables are included.

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 degrees	Four stops, two which allow the working range to be restricted in increments of 15° and two stops of 7,5°.
29-1	Axis 1, 15 degrees	Two stops which allow the working range to be restricted in increments of 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°.
34-1	Axis 3	Six stops which allow the working range to be restricted in increments of 20° at both end positions. Each stop decreases the motion by 20°.

Extended work range

Option	Type	Description
561-1	Extended work range axis 1	To extend the working range on axis 1 from ± 180° to ± 220°. When the option is used the mechanical stop shall be disassembled. Position switches axis 1, option 25-3, are required.

Warranty

Option	Type	Description
438-1	Standard Warranty	Standard warranty is 18 months (1 1/2 years)
438-2	Standard + 12 months	18 + 12 months (2 1/2 years)
438-4	Standard + 18 months	18 + 18 months (3 years)
438-5	Standard + 24 months	18 + 24 months (3 1/2 years)
438-6	Standard + 6 months	18 + 6 months (2 years)
438-8	Stock Warranty	18 months standard warranty. Warranty period starts automatically 6 months after delivery, or can be activated earlier at commissioning.

DressPack options 778-1, 778-2, 780-1, 780-2 and 781-1 are not included in the warranty options.

3.1.5 Floor cables

General

Additional floor cables for SpotPack options, see chapter 3.1.7 DressPack Floor.

Manipulator cable length

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

Cable length Position switches Axis 1

Option	Lengths
273-1	7 m
273-2	15 m
273-3	22 m
273-4	30 m

Cable length Position switches Axis 2 and 3

Option	Lengths
274-1	7 m
274-2	15 m
274-3	22 m
274-4	30 m

3.1.6 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 2.3 Type H to 2.6 Type Se.
16-2	Manipulator	The signals are connected directly to the manipulator base to one heavy duty industrial housing with a Harting modular connector R1.CP/CS, see Figure 76. The cables from the manipulator base are not supplied.

Communication

Option	Type	Description
455-1	Parallel communication	Includes customer power CP, customer signals CS.
455-4	Parallel and bus communication	Includes CP, customer signals and CAN/DeviceNet or Profibus for process cable package.

3.1.7 DressPack Floor

Connection to Parallel/CAN DeviceNet/Profibus

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

Option	Lengths
94-1/90-2/92-2	7 m
94-2/90-3/92-3	15 m
94-3/90-4/92-4	22 m
94-4/90-5/92-5	30 m

Connection to first drive

Following information specifies the cable length for Connection to first drive. For further information see chapter 1.10 Servo Gun.

Option	Lengths
786-1	7 m
786-2	15 m
786-3	22 m
786-4	30 m

3.1.8 DressPack Lower and Upper arm

DressPack process configuration

For more information about the process cable packages, see 2.2 DressPack.

Option	Description	Note
778-1	Material Handling	Includes signals and one air hose.
778-2	Spot Welding	Includes signals, weld power cable, one air hose and three media hoses.

DressPack lower arm

Option	Description	Note
798-1	Material Handling from base to axis 3	Requires option 778-1.
798-2	Routing from base to axis 2	

DressPack upper arm

Option	Description	Note
780-1	Internal routing from axis 2 to axis 6	Only available for IRB 6600ID/6650ID together with option 798-2.
780-2	External routing from axis 2 to axis 6	Requires option 798-2.
780-3	External routing from axis 3 to axis 6	Requires option 778-1 and 798-1.

DressPack lower and upper arm

Option	Description	Note
781-1	Routing base to axis 6	Routing without change-over connection.

3.1.9 Connection Kits

General

The connectors fit to the connectors at the manipulator base, axis 2/3 and 6 respectively.

Content

The kit consists of connectors, pins and sockets. For technical description, see chapter 2.10 Connection kits.

Option	Type	Description
459-1	R1.CP/CS and PROC1	For the Customer Power/Customer Signal connector and one Process connector on the manipulator base. Sockets for bus communication are included.
480-1	R1.WELD and PROC2-4	For the Weld connector and three Process connectors on the manipulator base.
474-1	R1.SW1 and SW2/3	For the position switch axis 1 connector and the position axis 2/3 connector on the manipulator base.
453-1	R3.FB7	For the 7-axis connector on the manipulator base.
458-1	R2.CP/CS and PROC1	For the Customer Power/Customer Signal connector and one Process connector at axis 2/3. For IRB 6600ID/6650ID at axis 6. Pins for bus communication are included.
479-1	R2.WELD and PROC2-4	For the Weld connector and three Process connectors at axis 2/3. For IRB 6600ID/6650ID at axis 6.
452-1	WELD and PROC1-4 axis 6	Weld connector and four Process connectors at axis 6, the manipulator side.
543-1	CP/CS/BUS, PROC1 axis 6	Connector for customer power/customer signal/customer bus at axis 6 tool side.

3.1.10 Servo Gun

Content

For technical description see chapter 1.10 Servo Gun.

Option	Lengths
785-1	For robot handled Servo Gun.
785-5	For Stationary Servo Gun.

3.1.11 SpotPack Floor Cables

Weld Power Cable

Following information specifies the cable length for the Weld Power cable, from the Spot Welding process cabinet to the manipulator base.

Option	Lengths
791-1	7 m
791-2	15 m

Process Cable to Stationary Gun

Following information specifies the cable length for the Process Cable to the Stationary Gun, from the Spot Welding process cabinet to the Stationary Gun.

Option	Lengths
809-1	7 m
809-2	15 m
809-3	22 m
809-4	30 m

Cable to Split Box

Following information specifies the cable length for the cable to Split Box, from the Spot Welding process cabinet to the Split box on the manipulator base.

Option	Lengths
797-1	7 m
797-2	15 m
797-3	22 m
797-4	30 m

3.1.12 Process Cabinet

Empty Cabinet

Option	Type	Description
768-1	Empty cabinet small	See Product specification - Controller IRC5 with FlexPendant, chapter 2.2.1
715-1	Installation kit	See Product specification - Controller IRC5 with FlexPendant, chapter 2.2.1

Process Cabinet

Option	Type	Description
768-3	Spot Welding small	See chapter 2.8.1
788-1	Forced air cooling	See chapter 2.8.1
789-1	Earth fault protection unit	See chapter 2.8.1
790-1	Contactor for weld power	See chapter 2.8.1

Weld Timer capacity

Option	Type	Description
782-1	Bosch Basic AC S/SE	See chapter 2.8.1
782-7	Bosch Basic MFDC S/SE	See chapter 2.8.1

Weld cabinet prepared for

Option	Type	Description
828-1	Region A	See chapter 2.8.1
828-2	Region E	See chapter 2.8.1

3.1.13 Water and Air

Water and Air unit

Option	Type	Description
792-1	Type S	See chapter 2.9.1
792-2	Type HS	See chapter 2.9.1

Second water return

Option	Type	Description
793-1	Second water return	See chapter 2.9.1

Electrical proportional valve for air

Option	Type	Description
796-1	Electrical proportional valve for air	See chapter 2.9.1

3.1.14 Documentation

CD User Documentation

Option	Type	Description
808-1	Documentation on CD	See Product specification - Robot User Documentation

3.1.14 Documentation

4 Accessories

General

There is a range of tools and equipment available, specially designed for the robot.

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

- Track Motion
- Motor Units

3HAC 023933-001, Revision H, en

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