

# Product Specification

*IRB 2400*



**ABB Flexible Automation**



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# 1 Description

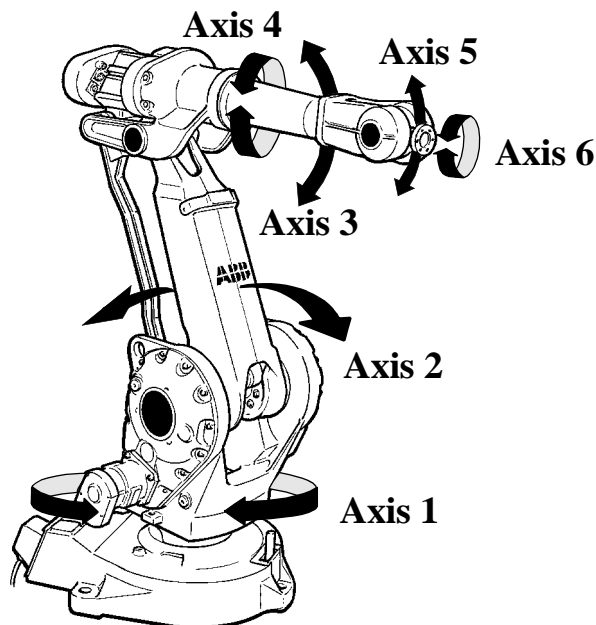
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IRB 2400 is a 6-axis industrial robot, designed specifically for manufacturing industries that use flexible robot-based automation. The robot has an open structure that is specially adapted for flexible use, and can communicate extensively with external systems.

The robots with Foundry protection are designed for harsh environment and have special surface treatment and paint for excellent corrosion protection. The connectors are designed for severe environment, and bearings, gears and other sensitive parts are high protected. The high degree of tightness makes the IRB 2400/10 and /16 steam washable.

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 S4Cplus.

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



*Figure 1 The IRB 2400 manipulator has 6 axes.*

IRB 2400L

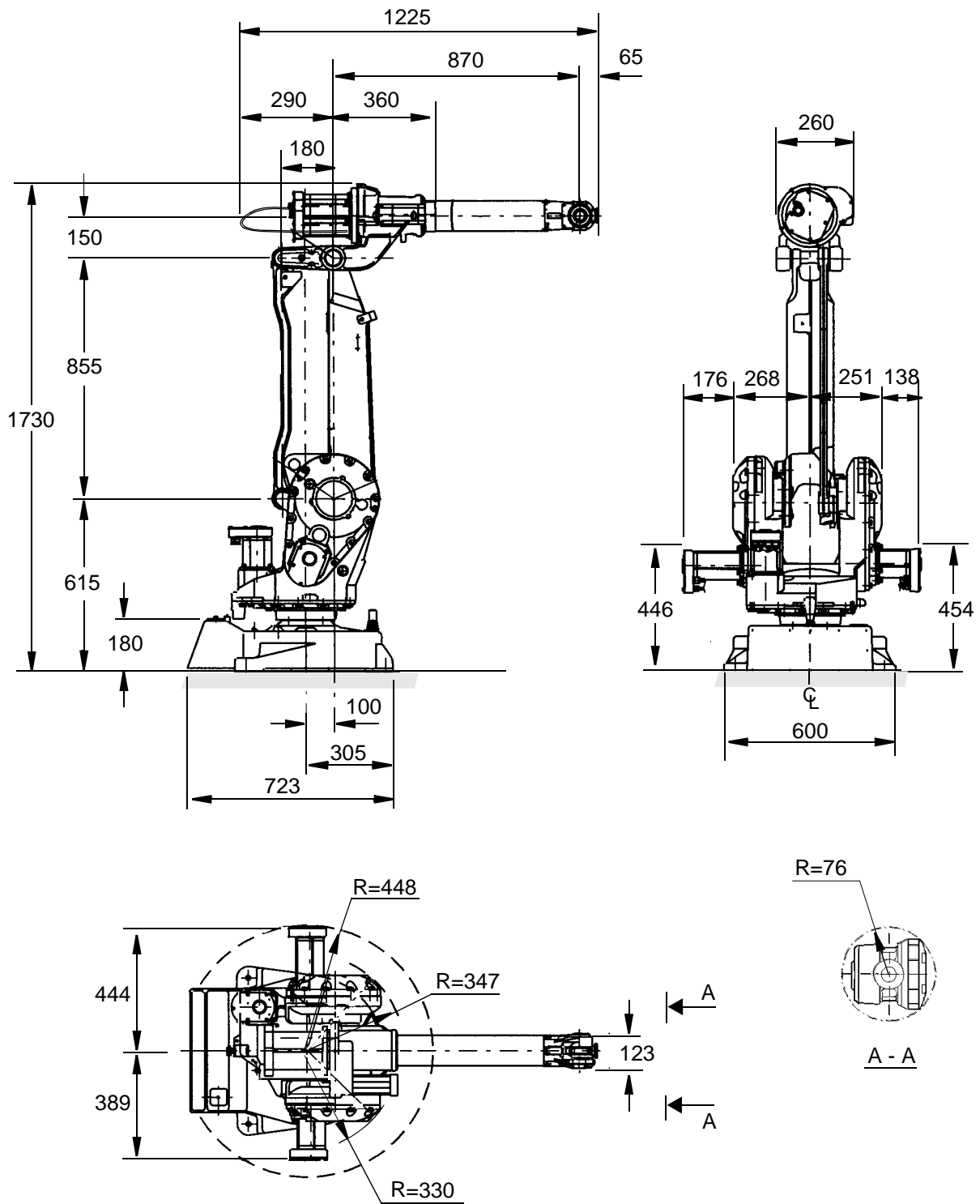


Figure 2 View of the manipulator from the side, rear and above (dimensions in mm).

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## **Installation**

The same version of the robot can either be mounted on the floor or inverted. An end effector, max. weight 7, 10 or 16 kg including payload, can be mounted on the robot's mounting flange (axis 6) depending on the robot version. See load diagrams on page 11.

Other equipment can be mounted on the upper arm, max. weight 11 or 12 kg, and on the base, max. weight 35 kg. Holes for mounting extra equipment, see page 15.

The working range of axes 1-2 can be limited by mechanical stops and axis 3 by limit switches. Position switches can be supplied on axis 1 for position indicator of manipulator.

## **Operating requirements**

<b>Protection standards</b>		IEC529
Standard	Manipulator	IP54
IRB 2400FL	Manipulator	IP55
	Wrist	IP67
	Connectors	IP67

### **Explosive environments**

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

### **Ambient temperature**

Manipulator during operation	+5°C (41°F) to +45°C (113°F)
Complete robot during transportation and storage, for short periods (not exceeding 24 hours)	-25°C (13°F) to +55°C (131°F) up to +70°C (158°F)

### **Relative humidity**

Complete robot during transportation and storage	Max. 95% at constant temperature
Complete robot during operation	Max. 95% at constant temperature

# Description

## Mounting the manipulator

Maximum load in relation to the base coordinate system.

		Endurance load in operation	Max. load at emergency stop
IRB 2400L	Force xy	$\pm 1700$ N	$\pm 2100$ N
	Force z floor mounting	$+4100 \pm 1100$ N	$+4100 \pm 1400$ N
	Force z inverted mounting	$-4100 \pm 1100$ N	$-4100 \pm 1400$ N
	Torque xy	$\pm 3000$ Nm	$\pm 3400$ Nm
	Torque z	$\pm 450$ Nm	$\pm 900$ Nm

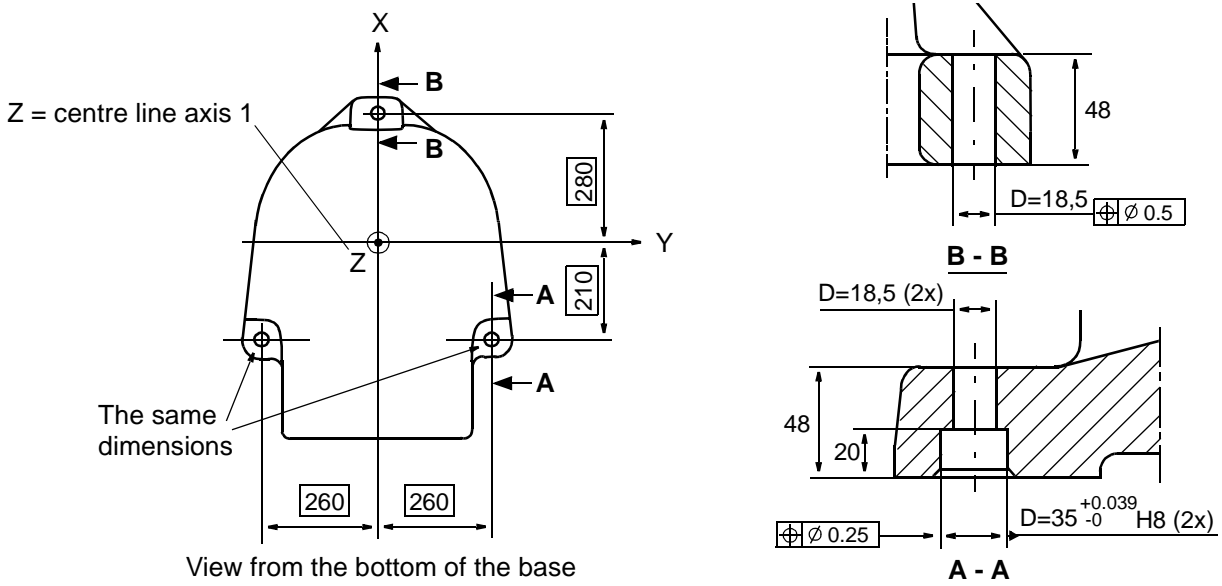
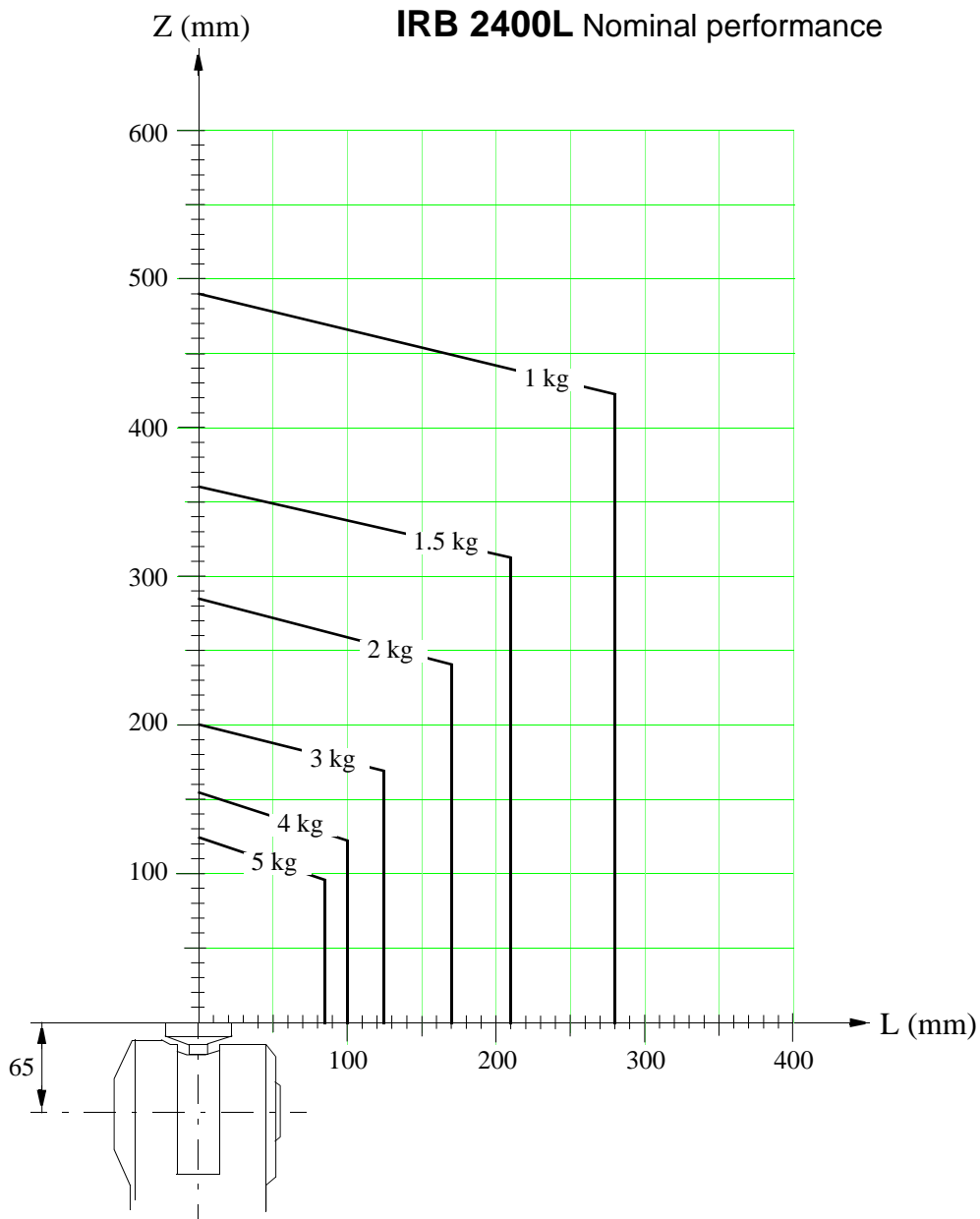


Figure 4 Hole configuration (dimensions in mm).

Load diagrams

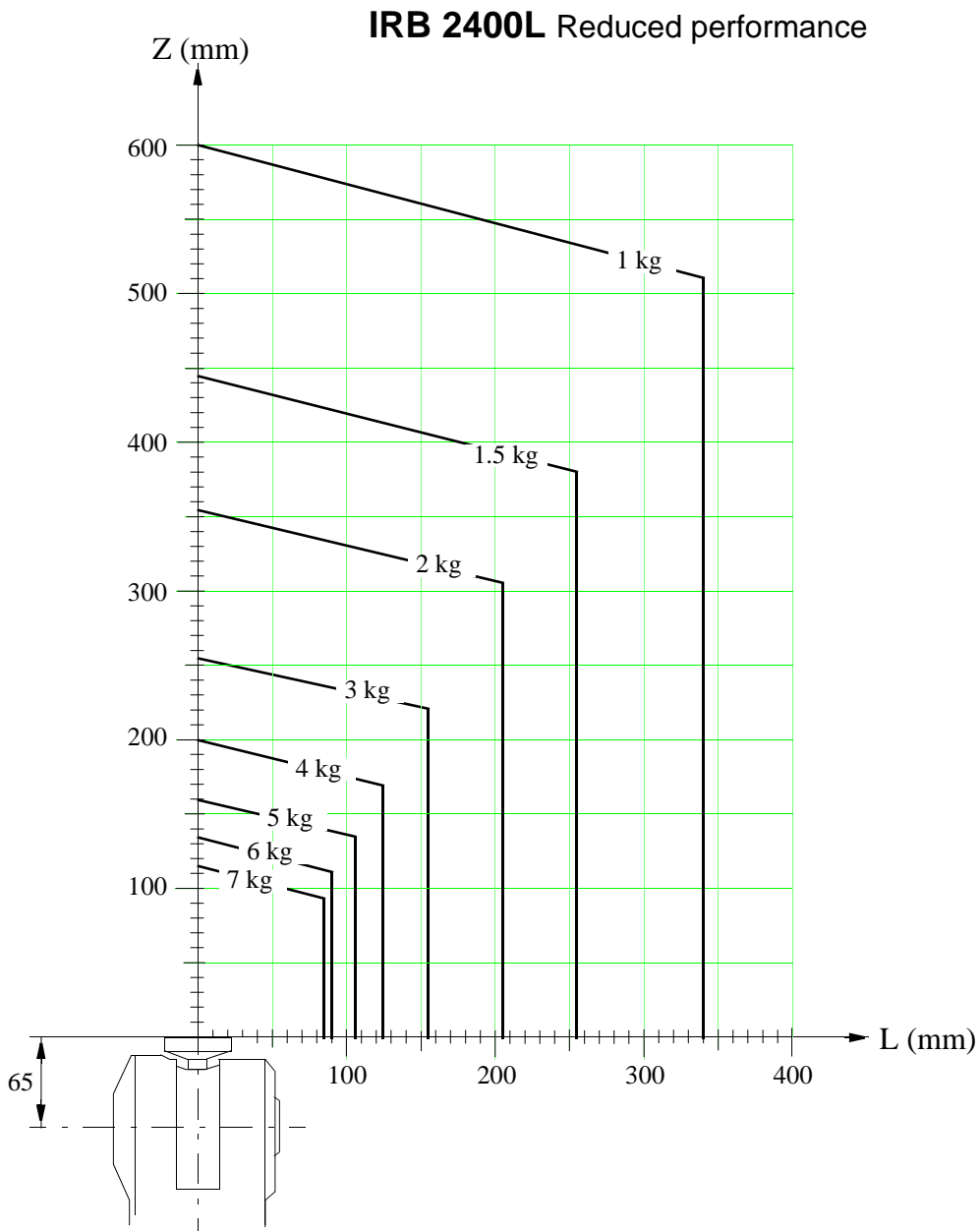


Z = see the above diagram and the coordinate system in Product Specification S4Cplus  
 L = distance in X-Y plane from Z-axis to the centre of gravity

J = maximum own moment of inertia on the total handling weight =  $\leq 0.012 \text{ kgm}^2$

Figure 5 Maximum weight permitted for load mounting on the mounting flange at different positions (centre of gravity).

# Description



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L = distance in X-Y plane from Z-axis to the centre of gravity

J = maximum own moment of inertia on the total handling weight =  $\leq 0.012 \text{ kgm}^2$

Figure 6 Maximum weight permitted for load mounting on the mounting flange at different positions (centre of gravity).

## Mounting equipment

The robot is supplied with tapped holes on the upper arm and on the base for mounting extra equipment.

### IRB 2400L

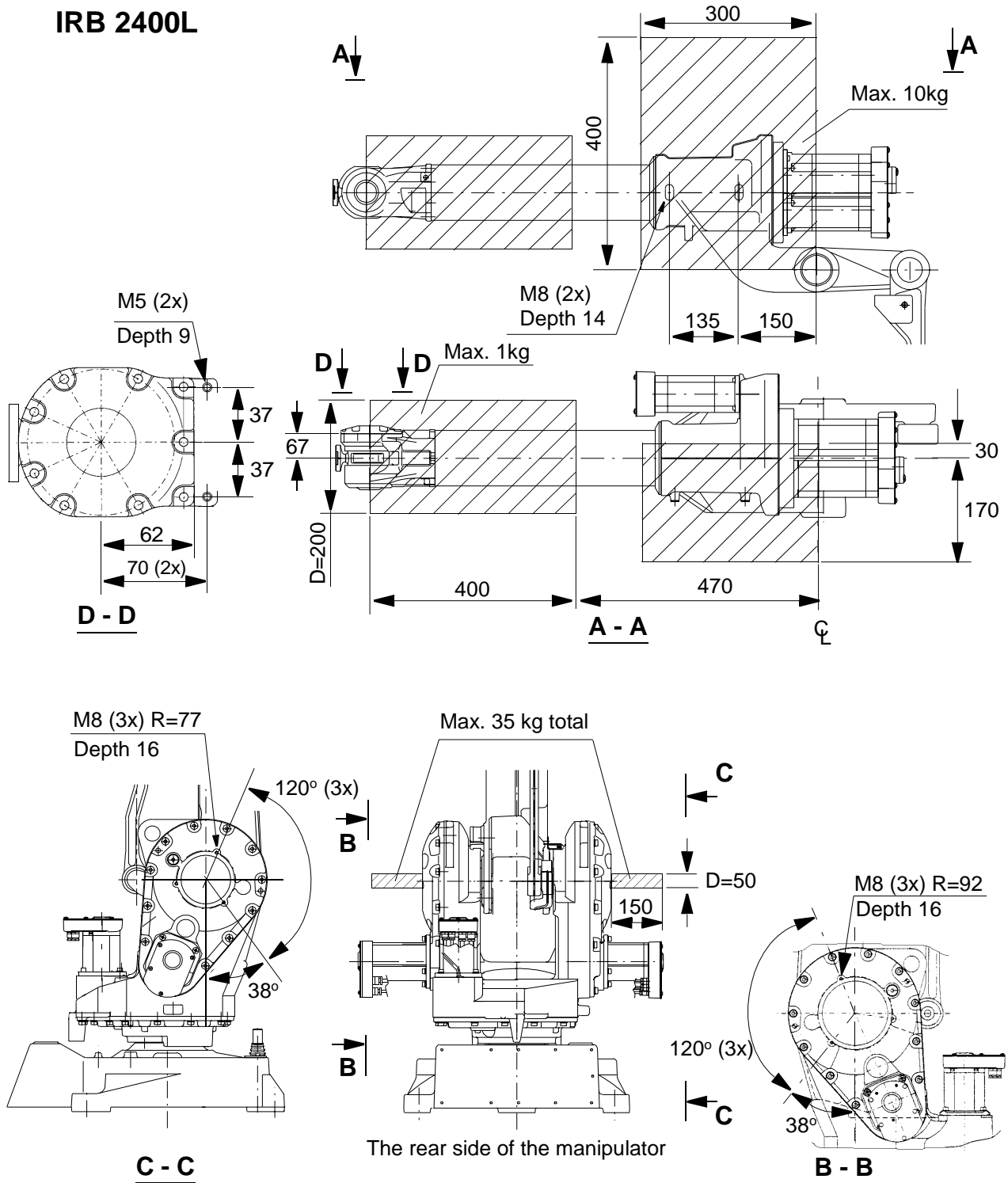
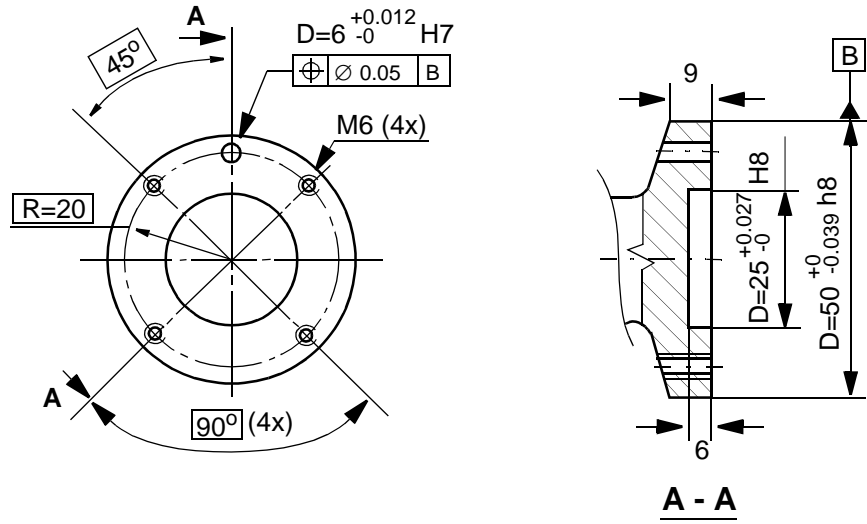


Figure 9 The shaded area indicates the permitted positions (centre of gravity) for any extra equipment mounted in the holes (dimensions in mm).



# IRB 2400L



## 1.5 Robot Motion

### IRB 2400L

The working area is the same for both floor and inverted mounting

Type of motion	Range of movement
Axis 1 Rotation motion	+180° to -180°
Axis 2 Arm motion	+110° to -100°
Axis 3 Arm motion	+65° to -60°
Axis 4 Wrist motion	+185° to -185°
Axis 5 Bend motion	+115° to -115°
Axis 6 Turn motion	+400° to -400° (Unlimited as optional)

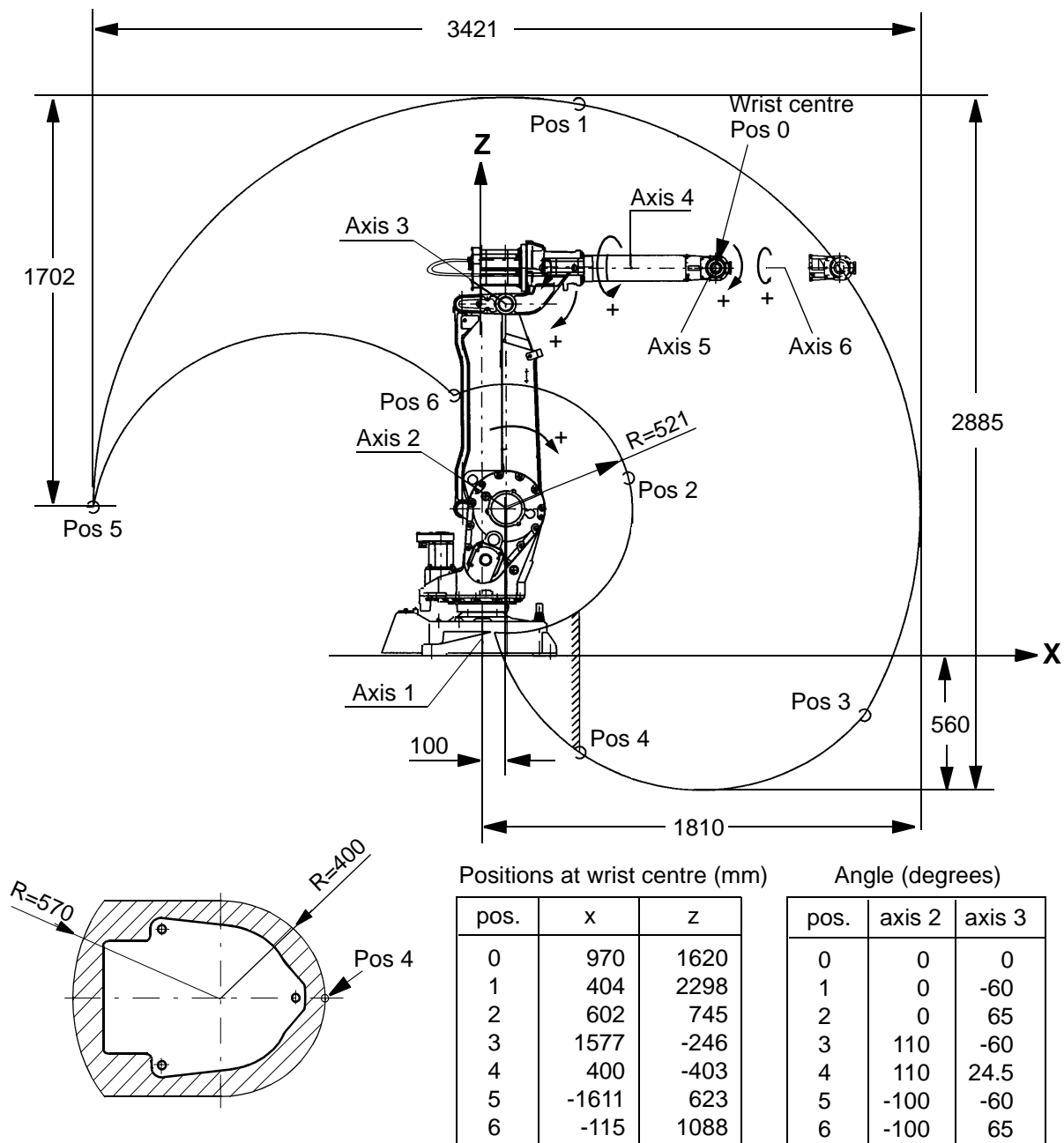


Figure 12 The extreme positions of the robot arm (dimensions in mm).

## Performance according to ISO 9283

At rated load and 1 m/s velocity on the inclined ISO test plane with all six robot axes in motion.

Unidirectional pose repeatability:

RP = 0.06 mm

Linear path accuracy:

AT = 0.45 - 1.0 mm

Linear path repeatability:

RT = 0.14 - 0.25 mm

Minimum positioning time, to within 0.2 mm of the position:

0.2 - 0.35 sec. (on 35 mm linear path)

0.4 - 0.6 sec. (on 350 mm linear path)

The above values are the range of average test-results from a number of robots. If guaranteed values are required, please contact your nearest ABB Flexible Automation Centre.

## Velocity

Versions: IRB 2400L

Axis no.	1	150°/s
	2	150°/s
	3	150°/s
	4	360°/s
	5	360°/s
	6	450°/s

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

## Resolution

Approx. 0.01° on each axis.

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## 1.6 Signals

For more information of air and signals for extra equipment to upper arm, see Application Interface in chapter 2 Specification of Variants and Options.

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## 2 Specification of Variants and Options

The different variants and options for the IRB 2400 are described below.  
The same numbers are used here as in the Specification form. For controller options, see Product Specification S4Cplus, and for software options, see Product Specification RobotWare Options.

### 1 MANIPULATOR

#### VARIANTS

<b>Standard</b> (requires option 035)	<b>Foundry</b> (requires option 036)
<b>021</b> IRB 2400L	IRB 2400FL

#### *IRB 2400 Application Version - Handling capacity*

Application:	F	Robot adapted for foundry environments. Degree of protection as in chapter 1.3. The manipulator is finished with a special coating.
Reach:		Specifies the max. reach at the wrist centre.
Handling capacity:		Specifies the nominal handling capacity.

#### **Manipulator colour**

- 330** The manipulator is painted with ABB orange.
- 353** The manipulator is painted with ABB orange Foundry.
- 331-348** Colours according to RAL-codes. Not available for Foundry protection

#### **Protection**

- 035** Standard
- 036** Foundry  
Robot adapted for foundry environments. Degree of protection as in Chapter 1.3.  
The manipulator is specially painted and finished.  
Only available colour is ABB orange Foundry.

### APPLICATION INTERFACE

#### **Air supply and signals for extra equipment to upper arm**

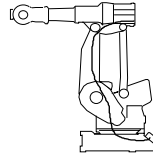
For connection of extra equipment on the manipulator, there are cables integrated into the manipulator's cabling, one FCI UT07 14 12SH44N connector and one FCI UT07 18 23SH44N connector on the rear part of the upper arm.  
A hose for compressed air is also integrated into the manipulator. There is an inlet

(R1/4") at the base and an outlet (R1/4") on the upper arm.

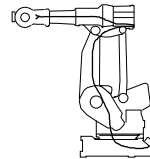
Signals	23	50 V, 250 mA
Power	10	250 V, 2 A
Air	1	Max. 8 bar, inner hose diameter 8 mm

(Available for options 041 and 042)

**041** Integrated hose and cables for connection of extra equipment on the manipulator to the rear part of the upper arm.



**042** Hose and cables for connection of extra equipment are extended to the wrist on the outside of the upper arm. Not possible on IRB 2400L, option 021.



**043** Integrated wire feed cabling

Control signals:

16 signals, 49 V, 500 mA

Connector on upper arm housing: Burndy 23-pin UTG 618-23PN

Connector on robot base: Burndy 23-pin socket UT001823SHT

Power signals:

12 signals, 300 V, 4 A

Connector on upper arm housing: Burndy 12-pin socket UTG 614-12SN

Connector on robot base: Burndy 12-pin UT001412PHT

Not possible on IRB 2400/10 and /16.

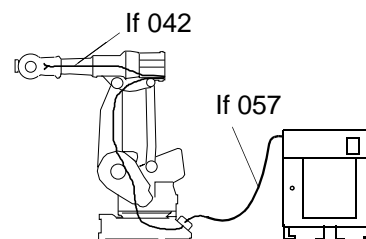
### Connection to

**056** Manipulator

The signals are connected directly to the manipulator base to one 40-pins Harting connector.

**057** Cabinet

The signals are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08, to the the controller.



### Connection to cabinet (Cable lengths)

**675** 7m

**676** 15m

**677** 22m

**678** 30m

## EQUIPMENT

### 691 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.

### 058 Dressing

Mounting of extra equipment, e.g. tool system on robot before delivery, ordered from ABB Flexible Automation/Department U.

## POSITION SWITCH

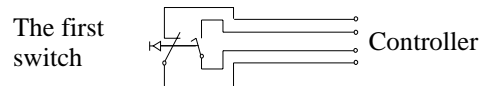
Switches indicating the position of axis 1.

A design with two stationary or 1, 2 or 3 adjustable switches is available. The switches are manufactured by Telemecanique or Burnstein, and of type forced disconnect.

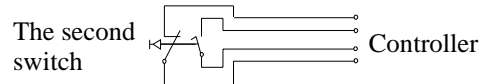
**Note** The switches are not recommended to be used in severe environment with sand or chips.

**Switches axis 1** (see Figure 14)

### 069 One switch



### 070 Two switches



### 071 Three switches

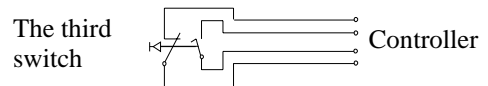


Figure 14 Connections of the switches

### 072 Two switches, axis 1, stationary (see Figure 15)

The two switches divide the working area of axis 1 into two fixed working zones, approx. 175° each. Together with external safety arrangement, this option allows access to one working zone at the same time as the robot is working in the other one.

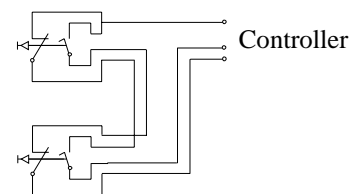


Figure 15 Connections of the switches.

## Connection to

### 075 Manipulator

Connection on the manipulator base with one FCI 23-pin connector.

### 076 Cabinet

Connection on the cabinet wall. Position switch cables are included.

The signals are connected to 12-pole screw terminals, Phoenix MSTB 2.5/12-ST-5.08

## Cable lengths

### 078 7m

### 079 15m

- 080 22m
- 081 30m

## WORKING RANGE LIMIT

To increase the safety of the robot, the working range of axes 1, 2 and 3 can be restricted

### 061 Axis 1

Two extra stops for restricting the working range.  
The stops can be mounted within the area from 50° to 140°. See Figure 16.

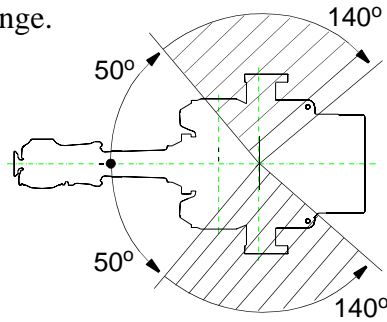


Figure 16

### 062 Axis 2

Stop lugs for restricting the working range.  
Figure 17 illustrates the mounting positions of the stops.

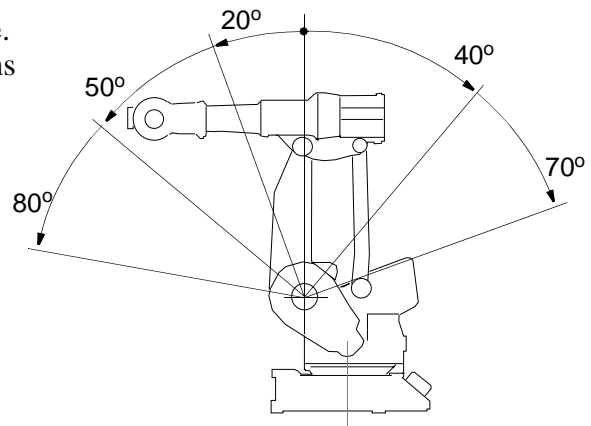


Figure 17

### 063 Axis 3

Equipment for electrically restricting the working range in increments of 5°.

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## **3 Accessories**

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 S4Cplus, and Product Specification RobotWare Options.

### **Robot Peripherals**

- Track Motion
- Tool System
- Motor Units