# Technical description

# Tool system TS100/80 for ABB IRB

M0411-1

Tool changers | Swivels | Swivel tool changers | Grippers | Hose packages | Valve units | Tool systems





The information in this document is subject to change without prior notice and should not be regarded as an undertaking from Robot System Products AB. Robot System Products AB assumes no responsibility for errors that may occur in this document.

Robot System Products AB bears no responsibility for damage that is incurred by the use of this document, or the software or hardware described in this document.

The document, or parts of it, may not be reproduced or copied without prior permission from Robot System Products AB. It may neither be imparted to a third party, nor otherwise be used without authorization. Infringement hereof will be subject to action in accordance with the applicable laws.

Further copies of this document can be obtained from Robot System Products AB at current prices.

© Robot System Products AB

Robot Systems Products AB Isolatorvägen 4 SE-721 37 Västerås Sweden

# CONTENTS

ROBOT AND FUNCTIONALITY GUIDE	6
1. INTRODUCTION	7
1.1 Safety	8
1.1.1 General	8
1.1.2 Explanation of warnings	8
1.2 Description of tool system TS100/80	9
1.2.1 Swivels, swivel tool changers and CiRo	9
2. TECHNICAL SPECIFICATIONS	10
2.1 Tool system overview, swivel-based	10
2.2 Tool system overview, CiRo-based	
2.3 Technical definitions	
2.3.1 Coordinate system	13
2.3.2 Deflection angle	13
2.4 Swivel based tool system configurations	
2.4.1 Swivel tool changing with 2 air channels and 10 electric signals	14
2.4.2 Circuit diagram E0251-018.02 for TS131-402 and TS132-402	
2.4.3 Pheumatic diagram (Pheu214-103) for tool system with STC100-2	
2.4.5 Circuit diagram E0251-018.04 for TS131-404 and TS132-404	
2.4.6 Pneumatic diagram (Pne0214-101) for tool system with STC100-6	
2.4.7 Swivel with 4 air channels and 12 electric signals	20
2.4.8 Circuit diagram E0251-018.06 for TS131-406 and TS132-406	21
2.4.9 Pneumatic diagram (Pne0214-104) for tool system with S100-4	
2.4.10 Swiver with 8 air channels and 12 electric signals	23 24
2.4.12 Pneumatic diagram (Pne0214-102) for tool system with S100-8	
2.5 CiRo based tool system configurations	
2.5.1 CiRo Basic. Articles: TS131-410 and TS132-410	
2.5.2 CiRo Complete with 8 air channels and 12 electric signals	27
2.5.3 Circuit diagram E0251-023 for TS131-411 and TS132-411	
2.5.4 Pneumatic diagram Pne0251-023 for tool system with CiRo MHD	
3. SPECIFICATIONS OF PARTS AND OPTIONS	30
3.1 Swivel tool changer and tool attachments	30
3.1.1 Swivel tool changer STC100-2E. Article no: P1909	
3.1.2 Swivel tool changer STC100-6E. Article no: P1907	
3.1.3 100I attachment, TA100-8E. Article no: P0409	
3 1 5 Pneumatic diagram for STC100-2F with TA100-8F	ວວ ຊ⁄າ
3.1.6 Pneumatic diagram for STC100-8E with TA100-8E	
3.1.7 Circuit diagram E0199-002 for STC100-6E and STC100-2E	35

3.2 Swivel	36
3.2.1 Swivel S100-4E. Article no: P1913	
3.2.2 Swivel S100-8E. Article no: P1911	37
3.2.3 Pneumatic diagram swivel P1913	
3.2.4 Pneumatic diagram swivel P1911	
3.2.5 Circuit diagram E0199-003 for P1913 and P1911	
3.3 CiRo	40
3.3.1 CiRo MHD1. Article no: P5125	40
3.3.2 Option tool adapter kit for CiRo MHD. Article: P5205	41
3.4 Robot adaptation kits	42
3.5 Hose packages, air hoses and air supply	43
3.6 Valve units. Articles: P0027, P0028, P0035 and P0036	44
3.6.1 Circuit diagram E0214-190 for valve unit on IRB 4600	45
3.7 Cables	46
3.7.1 Upper arm cable. Article: P0055 and P8435	
3.7.2 Robot cable, Articles: P8119-8	
3.8 Air supply hose. Article: P2050-9	46
4. ROBOT PROGRAMMING DATA	47
E ODTIONS FOR STO WITH TOOL ATTACHMENT	40
5. UPTIONS FOR STC WITH TOOL ATTACHMENT	
5.1 Tool stand kit 100. Article: P0423	48
6. DISPOSAL AND RECYCLING	49

# **ROBOT AND FUNCTIONALITY GUIDE**

Robot model Functionality and maximum load		No. of air channels and electric signals	Article number
ABB IRB 4600-40	Swivel tool changing, 100 kg	2 air, 10 signals	TS131-402 (section 2.4.1)
	Swivel tool changing, 100 kg	6 air, 10 signals	TS131-404 (section 2.4.4)
	Swivel, 100 kg	4 air, 12 signals	TS131-406 (section 2.4.7)
	Swivel, 100 kg	8 air, 12 signals	TS131-408 (section 2.4.10)
	CiRo Basic, 80 kg	-	TS131-410 (section 2.5.1)
	CiRo Complete, 80 kg	8 air, 12 signals	TS131-411 (section 2.5.2)
ABB IRB 4600-45/60	Swivel tool changing, 100 kg	2 air, 10 signals	TS132-402 (section 2.4.1)
	Swivel tool changing, 100 kg	6 air, 10 signals	TS132-404 (section 2.4.4)
	Swivel, 100 kg	4 air, 12 signals	TS132-406 (section 2.4.7)
	Swivel, 100 kg	8 air, 12 signals	TS132-408 (section 2.4.10)
	CiRo Basic, 80 kg	-	TS132-410 (section 2.5.1)
	CiRo Complete, 80 kg	8 air, 12 signals	TS132-411 (section 2.5.2)

# **1. INTRODUCTION**

**Robot System Products** is a front-rank provider of peripheral products for high performance robot applications. We provide complete system solutions for your robot installations, aiming to improve your productivity with the most reliable and cost-effective tooling on the market. Continuously we explore emerging technologies, working with leading edge design.

Robot System Products has a wide range of standard robot peripheral products:

- Tool changers
- Swivels
- Swivel tool changers
- CiRo
- Grippers
- Hose Packages
- Valve units
- Tool systems
- Tool parking systems

**Robot System Products'** tool changers are constructed to maximize the flexibility and reliability of your robot fleet. Through our patented locking device TrueConnect<sup>™</sup> robustness and high safety are combined with low weight and compactness. With our swivels compressed air, water, electrical and data signals as well as weld and servo power are transferred to your tools with robot motion capabilities fully maintained. Our swivel tool changers unite the TrueConnect<sup>™</sup> mechanism with our swivel technology, combining the best out of the two technologies. With RSP's cost-effective CiRo, cables and hoses can be freely selected with high robot flexibility maintained, and space requirements reduced. Our integrated tool systems are delivered as complete plug-and-play solutions designed for quick and simple installation.

**Robot System Products'** product lines are available for all major robot brands and come with complete documentation. 3D-models for simulation are available for download at: <u>www.rsp.eu.com</u>.



## 1.1 Safety

## 1.1.1 General

The integrator installing the tool system must follow the safety demands stated in standards and provisions applicable in the country where the tool system is to be installed. The products are all prepared for CE-certification.

The user of the Robot System Products tool system is responsible that law and directives applicable in respective countries, with regards to safety, are followed. The user is also responsible to guarantee that all safety devices are installed correctly.



#### WARNING!

Never carry out service work on a robot that has not been taken out of operation. See safety information for the robot.



#### WARNING!

Only perform work on tools attached to the swivel, swivel tool changer or CiRo if the air pressure is safely switched off.



#### WARNING!

Be aware that the swivel or swivel tool changer and tool attachment are heavy and may cause personal injury and equipment damage if dropped.



#### NOTE!

The swivel tool changer shall always be in locked position, also when empty, to avoid unexpected locking if air pressure is lost.



#### WARNING!

Electric signals and power must be disconnected/switched off when docking the tool attachment to the swivel tool changer. This is to prevent sparking between signal pins and tool attachment.

#### 1.1.2 Explanation of warnings

The warnings in this document are specific to the products in this manual. It is expected that the user also pay attention to certain notifications from the robot manufacturer and/or the manufacturers of other components used in the installation.



#### WARNING!

The warning sign will make you aware that a situation could result in potential serious injury or damage to equipment.



#### NOTE!

The note sign will alert you about something important to consider.

## 1.2 Description of tool system TS100/80

Tool systems from Robot System Products are complete plug-and-play solutions designed for quick and easy installation. With our tool systems, compressed air and electrical signals are supplied to the tool with a minimum of limitations on the robot's working range. An RSP tool system is based on a swivel, a swivel tool changer (STC) or a CiRo and includes hose package, valve unit and a complete set of cables, hoses and connectors for signals and air – all delivered as a ready-mounted package. CiRo Basic is, however, delivered with adaptation kit and hose package only (valve units, connections, cabling and air hoses shall be selected separately).

RSP tool systems simplify and reduce required design time, as the components all are matched, and the media supply is already fully adapted to the specific robot and its functions. When using a swivel or STC based tool system compressed air and electric signals are made available directly at the tool without limiting axis 6 rotation or the robot's working range. For CiRo based tool systems the axis 6 rotation will be limited to  $\pm 250^{\circ}$ . Using RSP tool systems there are no need of considering loose, hanging cables and hoses during programming, concentration can be given to the tool path.

3D-models are available in RobotStudio and STEP-format.

## 1.2.1 Swivels, swivel tool changers and CiRo

When using an RSP swivel, compressed air and electric signals will be made directly available at the tool without limiting the axis 6 rotation. RSP's tool changer technology enables robots to switch between multiple tools. Our swivel tool changers integrate the advantages of swivels and tool changers into a single unit. The principle behind the patented locking device TrueConnect<sup>™</sup> is that load is distributed uniformly through pressing locking balls into spherical grooves, the play is a minimum and the position repeatability is practically absolute throughout the lifespan.

With a swivel tool changer, the air supply to the tool is shut off automatically during tool change, no on/off-program instructions are required. As the solution is fully integrated with the robot, the reliability is improved, and the operational life extended as compared with traditional solutions. In addition, the system can with ease be reconfigured with changing requirements, or when additional functions are needed.

With a CiRo, cables and hoses can be connected to tools or tool changers similarly to robots with internal dressing. The robots working range and ability to move freely, independent of transferred media, is maximised. For the tool system CiRo Complete hoses and cables for air, signals and power are included. For CiRo Basic they shall be selected separately according to the requirements of the application. With CiRo the axis 6 can rotate up to 500 degrees, only limited by the flexibility of hoses and cables.



# **2. TECHNICAL SPECIFICATIONS**

An RSP tool system includes all components for implementing swivel tool changers, swivels and CiRo's on specified robots. All tool systems are complete (with the exception of CiRo Basic) and includes valve unit, cabling, hoses, fittings as well as all screws, nuts and washers needed. It is delivered as a single unit ready for direct mounting on the robot. Tool systems equipped with tool changing capability should be complemented with tool attachments.

## 2.1 Tool system overview, swivel-based

A swivel based TS100/80 tool system consists of the following components:

- (1) A swivel for direct mounting of tools, with electrical connections, or alternatively, a swivel with integrated tool changer (STC) combined with tool attachments with electrical connections.
- (2) An adaptation kit which prohibits the swivel or STC to rotate in relation to the robot.
- (3) A hose package to be mounted on the upper arm between the swivel or STC and the valve unit. All screws, bolts, and mounting plates needed are included.
- (4) Air hoses connecting the swivel or STC with the valve unit.
- (5) A signal cable between swivel or STC and the connection box on the valve unit.
- (6) A valve unit integrating air and electrical connections into one compact unit. The integrated tool changing function closes the air supply to the tool during tool change.
- (7) A signal cable connecting the valve unit with the application interface of the robot.
- (8) Air supply hose connecting the valve unit with the application interface of the robot.



ltem	Description	Article number
1	Swivel tool changer, STC100-2E	P1909
	Swivel tool changer STC100-6E	P1907
	Tool attachment, TA100-8E (10 signals)	P0409
	Square tool attachment, TA100-8E (10 signals)	P0404
1	Swivel S100-4E	P1913
	Swivel S100-8E	P1911
2	Adaptation kit	P0449A
3	Hose package for IRB 4600-40	P2173-1
	Hose package for IRB 4600-45/60	P2173-2

4	Air hose kit	P2050-10
5	Upper arm cable	P0055-38
6	Valve unit with two valves for tool changing	P0027
	Valve unit with four valves for tool changing	P0028
	Valve unit with two valves for swivel	P0035
	Valve unit with four valves for swivel and Ciro	P0036
7	Robot cable for IRB 4600	P8119-8
8	Air supply hose including coupling	P2050-9



#### NOTE!

For spare parts and wear parts see the manuals and technical description of each component.

## 2.2 Tool system overview, CiRo-based

A complete CiRo based TS100/80 tool system consists of the following components (for CiRo Basic only items 1-3 are included):

- (1) A CiRo for mounting of tools, direct or using tool adapter kit (optional).
- (2) An adaptation kit which prohibits the CiRo to rotate in relation to the robot.
- (3) A hose package to be mounted on the upper arm between the CiRo and the valve unit. All screws, bolts, and mounting plates needed are included.
- (4) Air hoses connecting the tool, mounted through the CiRo, with the valve unit.
- (5) Signal cables connecting the tool, mounted through the CiRo, and the valve unit.
- (6) A valve unit integrating air and electrical connections into one compact unit.
- (7) A signal cable connecting the valve unit with the application interface of the robot.
- (8) Air supply hose connecting the valve unit with the application interface of the robot.



ltem	Description	Article number
1	CiRo MHD1	P5125
2	Adaptation kit for CiRo on IRB 4600	P5203-1
3	Hose package for CiRo on IRB 4600-40	P2171-1
	Hose package for CiRo on IRB 4600-45/60	P2173-2
4	Air hose kit	P2050-18
5	Upper arm cable	P8435-45
6	Valve unit	P0036
7	Robot cable for IRB 4600	P8119-8
8	Air supply hose	P2050-9



**NOTE!** For spare parts and wear parts see the manuals and technical description of each component.

## 2.3 Technical definitions

#### 2.3.1 Coordinate system

A swivel, swivel tool changer or CiRo adds load to the robot. If the arm and tool loads are not stated correctly during programming the behaviour of the robot and the wear of the equipment will be affected. Information about weight and centre of gravity can, in accordance with the co-ordinate system stated below, be found in the technical specification tables of the swivel, swivel tool changer and CiRo.





**NOTE!** For swivels, swivel tool changers and CiRo's the origo is situated on the surface in the centre of the robot mounting flange.

## 2.3.2 Deflection angle



#### NOTE!

**Deflection load**<sub>xy</sub> (0,1°) corresponds the torque applied to obtain an deflection around the x/y-axes of 0,1°



## 2.4 Swivel based tool system configurations

2.4.1 Swivel tool changing with 2 air channels and 10 electric signals. Articles: TS131-402 and TS132-402



This tool system is used when tool changing capability, 2 pneumatic channels and 10 electric signals are required. It consists of a swivel tool changer, adaptation kit, hose package, valve unit and cabling. The valve unit contains one directional (mono-stable 5/2) valve and one tool change (monostable 2x3/2) valve. The hose package contains four air hoses in total. Suitable tool attachments (P0409, and P0404) are described in sections 3.1.3 and 3.1.4.

Robot model Article number		Pneumatic diagram	Circuit diagram	
ABB IRB4600-40	TS131-402	Pne0214-103 (Section 2.4.3)	E0251-018.02 (section 2.4.2)	
ABB IRB4600-45/60	TS132-402	Pne0214-103 (Section 2.4.3)	E0251-018.02 (section 2.4.2)	

#### Components

Article number	STC (1)	Adapt. kit (2)	Hose p. (3)	Air hoses (4)	Upper cable (5)	Valve unit (6)	Robot cable (7)	Air supply hose (8)
TS131-402	P1909	P0449A	P2173-1	P2050-10	P0055-38	P0027	P8119-8	P2050-9
TS132-402	P1909	P0449A	P2173-2	P2050-10	P0055-38	P0027	P8119-8	P2050-9



**NOTE!** The swivel tool changers are delivered with four push-in couplings (I0314) each.



## 2.4.2 Circuit diagram E0251-018.02 for TS131-402 and TS132-402



# 2.4.3 Pneumatic diagram (Pne0214-103) for tool system with STC100-2

# 2.4.4 Swivel tool changing with 6 air channels and 10 electric signals. Articles: TS131-404 and TS132-404



This tool system is used when tool changing capability, 6 pneumatic channels and 10 electric signals are required. It consists of a swivel tool changer, adaptation kit, hose package, valve unit and cabling. The valve unit contains 3 directional (mono-stable 5/2) valves and one tool change (monostable 2x3/2) valve. The hose package contains eight air hoses in total. Suitable tool attachments (P0409, and P0404) are described in sections 3.1.3 and 3.1.4.

Robot model	Article number	Pneumatic diagram	Circuit diagram
ABB IRB4600-40	TS131-404	Pne0214-101 (section 2.4.6)	E0251-018.04 (section 2.4.5)
ABB IRB4600-45/60	TS132-404	Pne0214-101 (section 2.4.6)	E0251-018.04 (section 2.4.5)

#### Components

Article number	STC (1)	Adapt. kit (2)	Hose p. (3)	Air hoses (4)	Upper cable (5)	Valve unit (6)	Robot cable (7)	Air supply hose (8)
TS131-404	P1907	P0449A	P2173-1	P2050-10	P0055-38	P0028	P8119-8	P2050-9
TS132-404	P1907	P0449A	P2173-2	P2050-10	P0055-38	P0028	P8119-8	P2050-9



**NOTE!** The swivel tool changers are delivered with eight push-in couplings (I0314) each.







## 2.4.6 Pneumatic diagram (Pne0214-101) for tool system with STC100-6

## 2.4.7 Swivel with 4 air channels and 12 electric signals. Articles: TS131-406 and TS132-406



This tool system is used when 4 pneumatic channels and 12 electric signals are required. It consists of a swivel, adaptation kit, hose package, valve unit and cabling. The valve unit contains two directional (mono-stable 5/2) valves. The hose package contains four air hoses in total.

Robot model Article num		Pneumatic diagram	Circuit diagram
ABB IRB4600-40	TS131-406	Pne0214-104 (section 2.4.9)	E0251-018.06 (section 2.4.8)
ABB IRB4600-45/60	TS132-406	Pne0214-104 (section 2.4.9)	E0251-018.06 (section 2.4.8)

#### Components

Article number	Swivel (1)	Adapt. kit (2)	Hose p. (3)	Air hoses (4)	Upper cable (5)	Valve unit (6)	Robot cable (7)	Air supply hose (8)
TS131-406	P1913	P0449A	P2173-1	P2050-10	P0055-38	P0035	P8119-8	P2050-9
TS132-406	P1913	P0449A	P2173-2	P2050-10	P0055-38	P0035	P8119-8	P2050-9



**NOTE!** The swivels are delivered with four push-in couplings (I0314) each.







# 2.4.9 Pneumatic diagram (Pne0214-104) for tool system with S100-4

## 2.4.10 Swivel with 8 air channels and 12 electric signals. Articles: TS131-408 and TS132-408



This tool system is used when 8 pneumatic channels and 12 electric signals are required. It consists of a swivel, adaptation kit, hose package, valve unit and cabling. The valve unit contains four directional (mono-stable 5/2) valves. The hose package contains 8 air hoses in total.

Robot model	Article number	Pneumatic diagram	Circuit diagram
ABB IRB4600-40	TS131-408	Pne0214-102 (Section 2.4.12)	E0251-018.08 (section 2.4.11)
ABB IRB4600-45/60	TS132-408	Pne0214-102 (Section 2.4.12)	E0251-018.08 (section 2.4.11)

#### Components

Article number	Swivel (1)	Adapt. kit (2)	Hose p. (3)	Air hoses (4)	Upper cable (5)	Valve unit (6)	Robot cable (7)	Air supply hose (8)
TS131-408	P1911	P0449A	P2173-1	P2050-10	P0055-38	P0036	P8119-8	P2050-9
TS132-408	P1911	P0449A	P2173-2	P2050-10	P0055-38	P0036	P8119-8	P2050-9



**NOTE!** The swivels are delivered with eight push-in couplings (I0314) each.



## 2.4.11 Circuit diagram E0251-018.08 for TS131-408 and TS132-408





## 2.5 CiRo based tool system configurations

## 2.5.1 CiRo Basic. Articles: TS131-410 and TS132-410



This tool system is used when valve units, connections, cabling and hoses are separately supplied and consists of CiRo, adaptation kit and hose package.

Robot model	Article number	Pneumatic diagram	Circuit diagram
ABB IRB4600-40	TS131-410	-	-
ABB IRB4600-45/60	TS132-410	-	-

#### Components

Article number	CiRo (1)	Adaptation kit (2)	Hose package (3)
TS131-410	P5125	P5203-1	P2171-1
TS132-410	P5125	P5203-1	P2171-2



**NOTE!** Hoses and cables should be specifically designed for applications with high torsional and bending stresses. Cables and air hoses are available from Robot System

#### 2.5.2 CiRo Complete with 8 air channels and 12 electric signals. Articles: TS131-411 and TS132-411



This tool system is used when eight pneumatic channels and twelve electric signals are required. It consists of a CiRo, adaptation kit, hose package, valve units, connectors, cabling and hoses. The valve unit contains four directional (mono-stable 5/2) valves. The hose package contains 8 air hoses in total.

Robot model	Article number	Pneumatic diagram	Circuit diagram
ABB IRB4600-40	TS131-411	Pne0251-023 (Section 2.5.4)	E0251-023 (section 2.5.3)
ABB IRB4600-45/60	TS132-411	Pne0251-023 (Section 2.5.4)	E0251-023 (section 2.5.3)

#### Components

Article number	CiRo (1)	Adapt. kit (2)	Hose p. (3)	Air hoses (4)	Upper cable (5)	Valve (6)	Robot cable (7)	Air supply hose (8)
TS131-411	P5125	P5203-1	P2171-1	P2050-18	P8435-45	P0036	P8119-8	P2050-9
TS132-411	P5125	P5203-1	P2171-2	P2050-18	P8435-45	P0036	P8119-8	P2050-9



## 2.5.3 Circuit diagram E0251-023 for TS131-411 and TS132-411





# **3. SPECIFICATIONS OF PARTS AND OPTIONS**

## 3.1 Swivel tool changer and tool attachments

## 3.1.1 Swivel tool changer STC100-2E. Article no: P1909



Swivel with tool changer STC100-2E transfers 2 pneumatic channels and 10 electrical signals to the tool attachment. To be used together with P0409 or P0404.

Working temperature		+10°C-+50°C
Bolt pattern		ISO 9409-1 100-6-M10
Maximum tool load	Fz (static)	±1 000 N
	Mx/My (dynamic)	±1 000 Nm
	Mz (dynamic)	±1 000 Nm
Weight and centre of	gravity (Z)	
P1909		5.2 kg / 48 mm
P1909 with P0409		6.7 kg / 60 mm
P1909 with P0404		7.4 kg / 65 mm
Rotational torque		25 Nm
Air channels	Pneumatic diagram	See section 3.1.5.
	User channels, robot side	2 x G 1/8" (800 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC marked 4/OPEN. Close TC marked 3/CLOSE (6-10 bar)
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content
Electrical signals	Circuit diagram	E0199-002 (section 3.1.7)
	Souriau 12P (UT001412PHT)	
	Total signals	12 x (1A, 60V)
	Dedicated signals	24V, 0V, TC Coupled, TC Uncoupled

#### Technical data

## 3.1.2 Swivel tool changer STC100-6E. Article no: P1907



Swivel with tool changer STC100-6E transfers 6 pneumatic channels and 10 electrical signals to the tool attachment. To be used together with P0409 or P0404.

Working temperature		+10°C-+50°C
Bolt pattern		ISO 9409-1 100-6-M10
Maximum tool load	Fz (static)	±1 000 N
	Mx/My (dynamic)	±1 000 Nm
	Mz (dynamic)	±1 000 Nm
Weight and centre of	gravity (Z)	
P1907		6.0 kg / 62 mm
P1907 with P0409		7.5 kg / 74 mm
P1907 with P0404		8.2 kg / 80 mm
Rotational torque		45 Nm
Air channels	Pneumatic diagram	See section 3.1.6.
	User channels, robot side	6 x G 1/8" (800 l/min, max 10 bar)
	Dedicated channels, G 1/8"	Open TC marked 8/OPEN. Close TC marked 7/CLOSE (6-10 bar)
	Air quality	Oil-clean and waterless filtered air, with max 25µm particle content
Electrical signals	Circuit diagram	E0199-002 (section 3.1.7)
-	Souriau 12P (UT001412PHT)	
	Total signals	12 x (1A, 60V)
	Dedicated signals	24V, 0V, TC Coupled, TC Uncoupled

#### **Technical data**

## 3.1.3 Tool attachment, TA100-8E. Article no: P0409



Tool attachment TA 100-8E transfers 8 pneumatic channels and 10 electrical signals to the tool. To be used together with P1907 or P1909.

Тес	hni	cal	data

Working temperature		+10°C-+50°C
Bolt pattern		ISO9409-1-100-6-M8
Weight		1.5 kg
Maximum tool load	Fz (static)	±1 000 N
(M10-screws)	Mx/My (dynamic)	±1 000 Nm
	Mz (dynamic)	±1 000 Nm
Maximum tool load	Fz (static)	±1 000 N
(M8-screws)	Mx/My (dynamic)	±1 000 Nm
	Mz (dynamic)	±600 Nm
Air channels	Connection, tool side	8 x G 1/8"
Electrical signals	Total number of signals	10
	Dedicated signals	24 V, 0V
	Connection, tool side	1.0 m cable (10x0.5mm <sup>2</sup> ) with free end



#### NOTE!

The tool attachment shall be mounted to the tool using six M8-screws.

#### 3.1.4 Square tool attachment, TA100-8E. Article no: P0404



Tool attachment TA 100-8E transfers 8 pneumatic channels and 10 electrical signals to the tool and gives together with option P0423 a stable tool stand for easy tool changing. To be used together with P1907 or P1909.

Working temperature		+10°C-+50°C
Bolt pattern		ISO9409-1-100-6-M8
Weight		2.2 kg
Maximum tool load	Fz (static)	±1 000 N
(M10-screws)	Mx/My (dynamic)	±1 000 Nm
	Mz (dynamic)	±1 000 Nm
Maximum tool load	Fz (static)	±1 000 N
(M8-screws)	Mx/My (dynamic)	±1 000 Nm
	Mz (dynamic)	±600 Nm
Air channels	Connection, tool side	8 x G 1/8"
Electrical signals	Total number of signals	10
	Dedicated signals	24V, 0V
	Connection, tool side	1.0 m cable (10x0.5mm <sup>2</sup> ) with free end

#### Technical data



#### NOTE!

The tool attachment shall be mounted to the tool using six M8-screws.

## 3.1.5 Pneumatic diagram for STC100-2E with TA100-8E



# 3.1.6 Pneumatic diagram for STC100-8E with TA100-8E





#### 3.1.7 Circuit diagram E0199-002 for STC100-6E and STC100-2E

## 3.2 Swivel

## 3.2.1 Swivel S100-4E. Article no: P1913



Swivel S100-4E transfers 4 pneumatic channels and 12 electrical signals to the tool.

Working temperature		+10°C-+50°C
Bolt pattern		ISO 9409-1 100-6-M10
Maximum tool load	Fz (static)	± 1000 N
	Mx/My (dynamic)	± 1000 Nm
	Mz (dynamic)	± 1000 Nm
Weight and centre of	gravity (Z-direction)	4.4 kg / 46 mm
Air channels	Pneumatic diagram	See section 3.2.3
	Connection, robot side	4 x G 1/8" (600 l/min, max 10 bar)
	Air quality	Oil-clean and waterless filtered air, with max
		25µm particle content
	Connections, tool side	4 x G 1/8"
Electrical signals	Circuit diagram	E0199-003 (section 3.2.5)
	Connection, robot side	Souriau 12P (UT001412PHT)
	Total signals	12 x (1A, 60V)
	Dedicated signals	24V, 0V
	Connection, tool side	Souriau 12S (UT001412SHT)

#### **Technical data**

## 3.2.2 Swivel S100-8E. Article no: P1911



Swivel S100-8E transfers 8 pneumatic channels and 12 electrical signals to the tool.

Working temperature		+10°C-+50°C
Bolt pattern		ISO 9409-1 100-6-M10
Maximum tool load	Fz (static)	± 1000 N
	Mx/My (dynamic)	± 1000 Nm
	Mz (dynamic)	± 1000 Nm
Weight and centre of	gravity (Z-direction)	5.2 kg / 58 mm
Air channels	Pneumatic diagram	See section 3.2.4
	Connection, robot side	8 x G 1/8" (600 l/min, max 10 bar)
	Air quality	Oil-clean and waterless filtered air, with max
		25µm particle content
	Connections, tool side	8 x G 1/8"
Electrical signals	Circuit diagram	E0199-003 (section 3.2.5)
	Connection, robot side	Souriau 12P (UT001412PHT)
	Total signals	12 x (1A, 60V)
	Dedicated signals	24V, 0V
	Connection, tool side	Souriau 12S (UT001412SHT)

#### **Technical data**

## 3.2.3 Pneumatic diagram swivel P1913



## 3.2.4 Pneumatic diagram swivel P1911





3.2.5 Circuit diagram E0199-003 for P1913 and P1911

## 3.3 CiRo



#### 3.3.1 CiRo MHD1. Article no: P5125

CiRo MHD1 supports and holds up to 9 cables and hoses, with up to 8 mm diameter, and is allowing  $\pm 250^{\circ}$  rotation of the 6<sup>th</sup> axis.

#### **Technical data**

Working temperature		+10°C-+50°C
Bolt pattern	Robot side	ISO 9409-1 100-6-M10
	Tool side	145-12-M6
Maximum tool load	Fz (static)	± 800 N
(M10-screws)	Mx/My (dynamic)	± 800 Nm
	Mz (dynamic)	± 800 Nm
Maximum tool load (M8-	Fz (static)	± 800 N
screws)	Mx/My (dynamic)	± 800 Nm
	Mz (dynamic)	± 600 Nm
Weight and centre of grav	ity (Z-direction)	5.2 kg / 52 mm
Deflection load <sub>xy</sub> (0,1°)		300 Nm (section 2.3.2)
Hoses and cables	Maximum rotation	± 250°
	Maximum bundle size	9 x Ø8 mm



**NOTE!** Cables and air hoses should be specifically designed for applications with high torsional and bending stresses. Cables and hoses are available from Robot System Products.

**NOTE!** A tool adapter kit P5205 (section 3.3.2) is designated for mounting on CiRo MHD.

## 3.3.2 Option tool adapter kit for CiRo MHD. Article: P5205



The tool adapter kit P5205 shall be mounted on CiRo MHD and used for mounting of tool or tool changer with bolt pattern ISO 9409-1 100-6-M10 or ISO 9409-1 80-6-M8 (with enclosed adaptation ring).

#### Technical data

Working temperature		+10°C-+50°C
Bolt pattern	CiRo side	145-10-M6
	Tool side	ISO 9409-1 100-6-M10
	Tool side (with adaptation ring)	ISO 9409-1 80-6-M8
Maximum tool load	Fz (static)	± 800 N
(on MHD1 with 100-6-M10)	Mx/My (dynamic)	± 600 Nm
	Mz (dynamic)	± 700 Nm
Maximum tool load	Fz (static)	± 800 N
(on MHD1 with 80-6-M8)	Mx/My (dynamic)	± 600 Nm
	Mz (dynamic)	± 450 Nm

## 3.4 Robot adaptation kits

A rotation stop is a mandatory part of the robot adaptation kit and prohibits the swivel tool changer, swivel or CiRo to rotate in relation to the robot. Rotation stops are robot specific.

The flanges of the robot – and the robot side of the swivel, swivel tool changer or CiRo – have fastening holes in accordance with ISO 9409-1. In addition, dependent on robot model, adaptation plates for other bolt circles may be needed. In such cases the adaptation plates are delivered as an integrated part of the robot adaptation kit.



#### **Technical data**

Article number	Description	Weight
P0449A	Adaptation kit for Swivel and STC on IRB 4600	0.8 kg
P5203-1	Adaptation kit for CiRo on IRB 4600	0.8 kg

## 3.5 Hose packages, air hoses and air supply

.

Hose packages are mounted along the robot's upper arm and is based on a hose for keeping cable slack out of the way and protecting hoses for transfer of air and cables for electrical signals. All hoses for air supply are included. The protective hose is a wear part.

Article number	Description	
P2173-1	Complete hose package for Swivel and STC on IRB4600-40	
P2173-2	Complete hose package for Swivel and STC on IRB4600- 45/60	
P2171-1	Complete hose package for CiRo on IRB4600-40	
P2171-2	Complete hose package for CiRo on IRB4600- 45/60	

#### **Technical data**

.

Article	Total weight	Protective hose (inner/outer diameter)	Air hoses (for swivel, STC or tools)
P2173-1	4.7 kg	35/42.8 mm	P2050-10
P2173-2	4.7 kg	35/42.8 mm	P2050-10
P2171-1	6.0 kg	46.5/54 mm	P2050-18
P2171-2	5.6 kg	46.5/54 mm	P2050-18

## 3.6 Valve units. Articles: P0027, P0028, P0035 and P0036

A valve unit integrates air and electrical connections into one single compact unit which controls air supply. Valve units shall be mounted on the mounting plate at axis 3 at the rear part of the upper arm. A cable connects the valve unit to the robot application interface of the robot.



Valve units without tool changing functions consists of two or four electrically controlled monostable 5/2 valves. With tool changer function the valve unit consists of one or three electrically controlled monostable 5/2 valves and one 2x3/2 open/closed monostable valve dedicated for the tool change function. When the tool change valve is activated the other valves are deactivated – this means that the air supply thereby is automatically turned off during tool change, which is simplifying the programming since no special program instructions are required for turning the air supply on or off.

#### **Technical data**

Article number	Description	Tool change valves	Directional valves	Outlet air channels	Circuit diagram	Max air flow
P0027	Valve unit for tool changing	1	1	2	E0214-190 (section 3.6.1)	550 l/min totally
P0028	Valve unit for tool changing	1	3	6	E0214-190 (section 3.6.1)	550 l/min totally
P0035	Valve unit with two valves	-	2	4		550 l/min for each channel
P0036	Valve unit with four valves		4	8		550 l/min for each channel





## 3.7 Cables

## 3.7.1 Upper arm cable. Article: P0055 and P8435

The upper arm cable connects the STC, swivel or CiRo and the connection box on the valve unit and is mounted through the protective hose.

#### **Technical data**

Article number	Description	Length	Number of signals	Connection, valve	Connection, robot side
P0055-38	Cable for STC	3.8 m	12	Souriau 23P	Souriau 12P
	and swivel			UTO61823PH04	UTO61412SH04
P8435-45	Cable for CiRo	4.5 m	12	Souriau 23P	Cable, open end
				UTO61823PH04	



**NOTE!** The open-ended cable P8435 includes an extra length of one meter free cable for connections to the tools.

## 3.7.2 Robot cable, Articles: P8119-8

The robot cable connects the connection box on the valve unit with the application interface of the robot.



Article number	Robot	Connection to robot	Total length (L)	Stripping length (S)
P8119-8	ABB IRB4600	Souriau 26P (UT0W61626PH)	0.85 m	0.20 m

## 3.8 Air supply hose. Article: P2050-9

The air supply hose connects the valve unit air with the air supply on the robot.



Article number	Hose coupling (1)	Adapter (2)	Air hose length / diameter (3)
P2050-9	10196	M16x1,5 to Ø8mm	1.0 m / 8 mm

# 4. ROBOT PROGRAMMING DATA

Robot model	Functionality (article no.)	Weight (Note! below)	Centre of gravity (Z-direction)	Extension from robot flange
IRB4600-40	STC100-2E (TS131-402)	7.5 kg	50 mm	111 mm
	STC100-6E (TS131-404)	8.4 kg	66 mm	140 mm
	S100-4E (TS131-406)	5.5 kg	34 mm	105 mm
	S100-8E (TS131-408)	6.0 kg	47 mm	134 mm
	CiRo (TS131-410/411)	6.0 kg / 7.0 kg	37 mm / 52 mm	95 mm / 170 mm
IRB4600-45/60	STC100-2E (TS132-402)	7.5 kg	50 mm	111 mm
	STC100-6E (TS132-404)	8.4 kg	66 mm	140 mm
	S100-4E (TS132-406)	5.5 kg	34 mm	105 mm
	S100-8E (TS132-408)	6.0 kg	47 mm	134 mm
	CiRo (TS132-410/411)	6.0 kg / 7.0 kg	37 mm / 52 mm	95 mm / 170 mm

Data to be used primarily for off-line robot programming.



**NOTE!** Weight, centre of gravity and total extension from robot flange, including respective adaptation kit. For STC also tool attachments (P0409/ P0404) are included in the data. Data for CiRo is given without and with tool adapter.

# 5. OPTIONS FOR STC WITH TOOL ATTACHMENT

## 5.1 Tool stand kit 100. Article: P0423



This tool stand kit, mounted on a stand, gives in combination with square tool attachments P0404 a robust tool stand for easy tool changing.

#### **Technical data**

Weight	0.7 kg
Maximum load	180 kg

# 6. DISPOSAL AND RECYCLING

#### Taking care of spent equipment

Used equipment must be taken care of in an environmentally-friendly way.

When disposed of, a major share of the material, or its energy content, can be recycled. The quantities possible to recycle vary depending on technical resources and practises in respective country. Non-recyclable components shall be handed over to an authorized environmental waste treatment facility for destruction or disposal.

#### Electronics

Electronic equipment shall be sent to an authorized recycling company or sorted into different component materials and treated as such.

#### Metals

Metals can, in general, be melted down, recycled and used in new products. They shall be sorted according to type and surface coating and handed over to an authorized recycling facility.

Metal components of steel and aluminium are substantial in size and easy to identify. Copper is primarily used in transmission of power for spot welding. Silver or gold plating of contact surfaces may occur.

#### Plastics

Thermoplastics can, in general, be re-heated and recycled without any major loss of quality. They shall be handed over to an authorized recycling facility. POM occurs in swivel housings, etc. PTFE in some sealings.

#### Rubber

Rubber shall be handed over to an authorized environmental waste treatment facility either for recycling, disposal or destruction. Rubber occurs in O-rings.

#### Other material

All other material shall be sorted and handed to an authorized environmental waste treatment facility in accordance with national legislation.

