

Technical Instructions User Manual



Pic. 01 SMARTSHIFT Electrical & Pneumatic Robot Master (RM)
connected to Tool Holder (TH) Pic. 02 Tool Gripper (TG)



Buind AS

Hensmoveien 17
NO-3516 Hønefoss
Phone: +47 92 17 07 80
E-mail: post@buind.no

Original instructions User manual

Manufacturer: _____ Buind AS
Machine type: _____ SmartShift
Designation: _____ Clutch
Manufacturing year: _____ 2019

1 Introduction

The SMARTSHIFT clutch designed for manual or automatic robotic tool shifting. The SMARTSHIFT is UR+ certified and applicable with all Universal Robots and similar robots.

SMARTSHIFT clutch set consists of three units:

A Tool Gripper (TG), a Robot Master (RM), and Tool Holders (TH) with pneumatically connection and optional Electrical (E) connections. Several set variations are therefore possible.



Product information:

Machin type: _____ SMARTSHIFT Clutch

Drawing number: _____ X

Type designation: _____ xxxxxxxx

Manufacturing year: _____ 2019

Manufacturer:

Name: _____ Buind AS

Reference: _____ Kjell Buind

Address: _____ Hensmoveien 17,
3516 Hønefoss

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3 General description

3.1 The SMARTSHIFT Clutch

The automatic SMARTSHIFT clutch is capable of connecting mechanical, pneumatically and electrical tools for robots and consists of following three main units:

A Robot Master (RM), mounted on the robot such as the Universal Robots or similar equipment. Tool Grippers (TG) and Tool Holders (TH) applies in a number and variations depending on demands for tool applications at the robot. In automatic mode, the robot exchange tools in a simple process sequence by placing a Tool Holder (TH) in an empty Tool Gripper (TG) and select another Tool Holder (TH) from another Tool Gripper (TG). Tools also exchanges manually if desired.

Detail Overview

- A) Robot Master (RM)
- B) Tool Holder (TH)
- C) Tool Gripper (TG)
- D) Robot Master with electrical connectors (RME)
- E) Tool Holder with electrical connectors (THE)



3.2 Robot Master (RM) specification

Recommended for robots handling payload up to: 25 kg

Pneumatic/Vacuum connection: Double connection with two G1/8"

Electrical connection: Up to eight pins (Optional)

Outer diameter: 63 mm

Flange diameter 31.5 mm h7

Reference diameter: Ø 50 mm

Total Weight: 130 g

Material: POM-C (The entire part is POM-C)

3.3 Tool Holder (TH) specification

Recommended for robots handling payload up to: 25 kg

Pneumatic/Vacuum connection: Double connection with two G1/8"

Electrical connectors: Up to 8 pins

Outer diameter: 63 mm

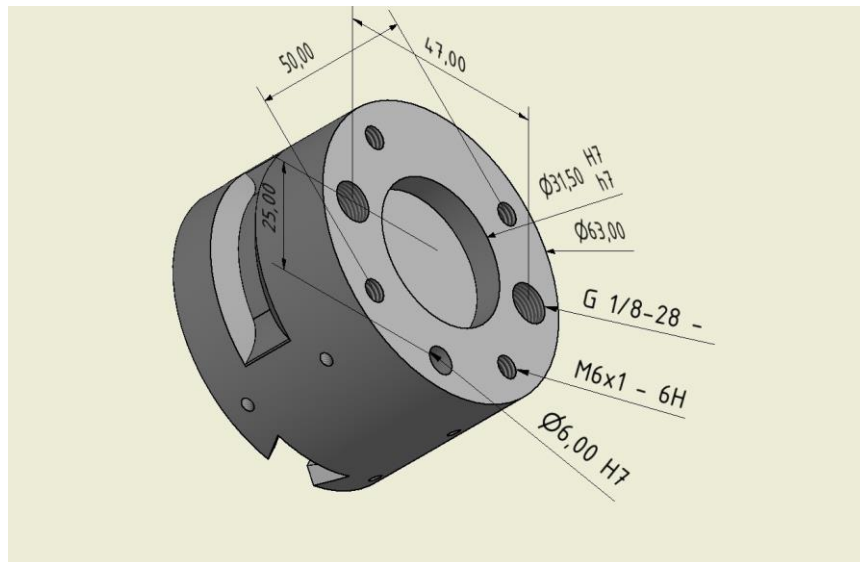
Flange diameter 31.5 mm h7

Reference diameter: Ø 50 mm

Total Weight: 250 g

Material: Aluminium 6082-T6 Anodized (Tool holder and Disc) Free cutting steel (Locking pin),

Rubber (Air pass through sealants)



3.4 Tool Gripper (TG) specification

Recommended handling weight: Up to 10 kg

Total weight: 710 g

Materials: Aluminium 6082-T6 Anodized (Bottom plate, top plate), POM-C (Gripper holder arms), Bright steel EN10278 (Spacers) PVC (Sticker)

3.5 Robot Master Electrical (RME) connector specification

Same specification as Robot Master (RM) with following add on.

Eight pins electrical pass-through rated for 500 m.AMP

Materials: Brass, Soldering tin, copper cable, ABS plastic

IMPORTANT: Power connection must be **OFF** during clutching in and out. A charged pin will create a spark that will destroy the connector pins by welding/burns.

3.6 Tool Holder Electrical (THE) connector specification

Same specification as Robot Master (RM) with following add on.

Eight pins electrical pass-through rated for 500 m.AMP

Materials: Brass, Soldering tin, copper cable, ABS plastic

IMPORTANT: Power connection must be **OFF** during clutching in and out. A charged pin will create a spark that will destroy the connector pins by welding/burns.

4 Safety instructions

4.1 General safety

Keep hands and tools away from all SMARTSHIFT components when the program is running.

Follow this manual carefully also regarding maintenance and recommended weight. Always have security data sheet for recommended lubrication available.

If the SMARTSHIFT clutch is damaged, then stop using immediately and contact Buind for replacement parts. Notice that the Tool Gripper and Tool Holder is spring loaded and the electrical units carries current. Buind is not responsible for damage to people and property caused by using damaged components.

5 Mounting / use

Mount Robot Master (RM) directly onto the Universal Robot arm or on similar equipment.

Mount the Tool Gripper (TG) horizontally and place it so that the robot easily can pick and place Tool Holders (TH) from Tool Gripper (TG). Mount the tool for your application on the Tool Holder (TH), recommended handling weight is max. 10 kg. The owner is fully responsible for mounting the SMARTSHIFT clutch securely.

5.1 Setup guide

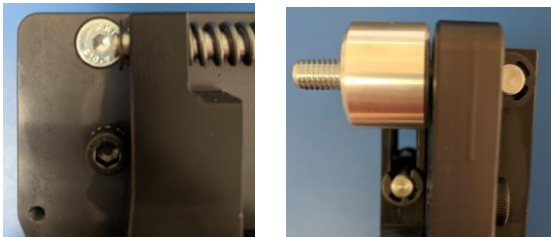
Unscrew the top plate by loosening the two M4 screws.



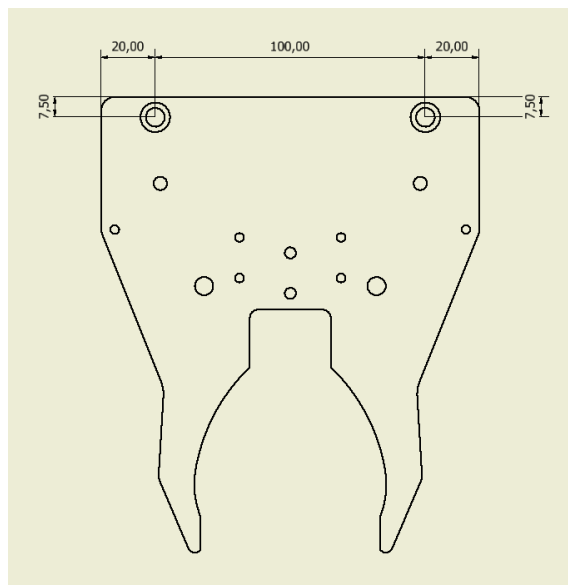
Remove the top-plate and the two cylindrical spacers



Put two M6 screws through the two mounting holes in the bottom plate and through the two larger cylindrical spacers provided



Put the gripper on top of a flat and stable surface with threaded holes and tighten down the two M6 screws. Put the top-plate back on the gripper with the spacer cylinders and tighten down the two M4 screws just enough to keep the top plate from moving.



6 UR CAP

6.1 Setup guide

1. Download our URCap from <https://www.SMARTSHIFT-robotics.com>
2. Install the URCap onto the robot.
3. When first using the URCap the tools must be configured. To configure the tools go to the “Installation” tab then tap “SMARTSHIFT”.
4. To add a new tool, press the button labelled “Add” on the bottom of the page.
5. Give the tool a fitting name in the “Tool name” tab.
6. To configure the gripper position, press the “Set point” button.
7. Move the robot to the tool changing position, the tool changing position is the point where the two tool parts just barely connect (see picture below).



8. When the robot is in the correct position, teach the robot the position by pressing “OK”.
9. Fill in the specifications of the tool such as weight in grams, TCP (Tool centre point), Tool rotation and COG (Center of gravity). This is not required but highly recommended.
10. Repeat steps 4 through 10 for each tool you want to set up, to change the tool you want to edit, move through the tool list by tapping “Prev” and “Next”
11. The SMARTSHIFT tool list is saved in the installation file. **Highly important.** The installation file must be saved **before** newly configured tools can be used in the robot program.

12. Using the URCap and is like using the normal functions like “Waypoint” and “Move” commands. Go to the “Structure” tab, select the “URCaps” tab and tap “SMARTSHIFT” this will create a new SMARTSHIFT node with “no tool” by default
13. Go to the “Command” tab and select what tool you want to use from the dropdown menu labelled “Select tool”
14. Add the actions and moves you want the too to make under the SMARTSHIFT folder just as if you would program the robot normally.
15. When the robot program gets to the SMARTSHIFT folder, the robot will move behind the gripper using a Move J from the last point. So make sure there is clearance for this. After the robot is done with the SMARTSHIFT folder, it will move in front of the gripper using a Move J. Make sure, there is clearance for this move as well.

7 Maintenance

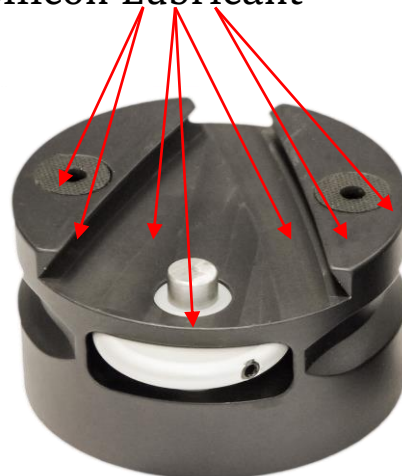
7.1 General

Make sure to keep SMARTSHIFT in a clean environment. If chips or other big particles comes between the Robot Master (RM) and the Tool Holder (TH) the lifetime of the SMARTSHIFT system can be shortened.

7.2 Lubrication

Once every second week, put a few drops of silicon-based lubricant (silicone spray) on each rubber seal, a few drops on each surface to keep the components sliding easily against each other, and a few drops on the locking pin to, keep the pin sliding easily. Recommended silicone spray is WD-40 300014 silicone oil, or equivalent silicone-based lubricant.

Silicon Lubricant



8 EC Declaration



EC Declaration of incorporation for Partly Completed Machine

(according Directive 2006/42/EC, Annex 2B)

PROHIBITION TO PUT INTO SERVICE

Manufacturer Buind AS
Hensmoveien 17
3516 Hønefoss
Tel.: +4732170780

Hereby declares that the produkt
SmartShift
Manufacturing No. 100-500
Order No.

is not allowed to be put into service until the machinery or plant into which it is going to be incorporated, has been found and declared to be in conformity with the provisions of Directive 2006/42/EC and with any other Directives and National requirements which are applicable for the completed machinery.

The basic requirements of Directive 2006/42/EG, Annex 1 which are complied with are specified in the Annexes to this declaration, as listed below.

All relevant parts of the following European harmonised standards have been considered

EN 60204-1 Safety of Machinery - Electrical Equipment of Machines -General Requirements
The relevant technical documentation is compiled in accordance with part B of Annex VII.

This documentation or parts hereof will be transmitted by post or electronically in response to a reasoned request by the national authorities. The undersigned is entetled to issue the technical documentation.

Hønefoss 15.06.2018
Buind AS
CEO



Basic requirements that relate to: User manual SmartShift