

### QUICK START GUIDE

# Omron TM Collaborative Robot: Initial Startup



Omron TM Collaborative Robot: Initial Startup – Ver. 1

### Contents

| 1 Introduction                                   | 4  |
|--|----|
| 2 Useful Documents                               | 4  |
| 3 Unboxing                                       | 4  |
| 4 System Configuration                           | 6  |
| 5 Powering On the Robot                          | 7  |
| 5.1 Boot Up Errors                               | 7  |
| 6 Light Ring Indicator                           | 8  |
| 6.1 Collaborative Space Lighting                 | 10 |
| 6.2 Switching to Collaborative Mode              | 11 |
| 7 Get Control of the Robot                       | 12 |
| 8 Backup Factory Settings                        | 13 |
| 9 IP Address Settings                            | 14 |
| 9.1 Change Robot Network Settings                | 14 |
| 9.2 Connecting an External Windows Device        | 15 |
| 10 Changing the Admin Password and User Accounts |    |
| 10.1 Admin Password                              |    |
| 10.2 User Accounts and Groups                    | 19 |
| 11 Example 2-Point Program                       | 20 |
| 11.1 Start a new project                         | 20 |
| 11.2 Running the Program                         | 21 |

### **Figures**

| Figure 3.1 – Shipped Boxes                | 4 |
|---|---|
| Figure 3.2 – Contents of Boxes            | 5 |
| Figure 4.1 – Control Box Connections      | 6 |
| Figure 4.2 – Basic System Configuration   | 6 |
| Figure 5.1 – Robot Stick                  | 7 |
| Figure 5.2 – HMI Start Screen             | 7 |
| Figure 5.3 – Safety Switch Wiring Diagram | 7 |
| Figure 5.4 – Table of Boot Errors         | 7 |
| Figure 6.1 – Robot Button Diagram         | 8 |

| Figure 6.2 – Table of Robot Modes                             | 9  |
|---|----|
| Figure 6.3 – Light Ring Troubleshooting Table                 |    |
| Figure 6.4 – Safety Wiring                                    | 11 |
| Figure 7.1 – Login Screen                                     | 12 |
| Figure 7.2 – Get Control Screen                               | 12 |
| Figure 8.1 – System Setting Menu                              | 13 |
| Figure 8.2 – Backup Screen                                    |    |
| Figure 9.1 – System Settings Menu                             | 14 |
| Figure 9.2 – Network Settings                                 | 15 |
| Figure 9.3 – Ethernet Connection Port                         | 15 |
| Figure 9.4 - Change Adapter Options                           | 16 |
| Figure 9.5 - Change IP Settings on an External Windows Device | 17 |
| Figure 10.1 – System Setting Menu > Administrator Setting     |    |
| Figure 10.2 – Administrator Settings                          |    |
| Figure 10.3 – System Settings > Group / User                  |    |
| Figure 10.4 – Group Permissions                               |    |
| Figure 10.5 – User Permissions                                |    |
| Figure 10.6 – Table of Permissions                            |    |
| Figure 11.1 – New Project Screen                              | 20 |
| Figure 11.2 – Point Button                                    | 21 |
| Figure 11.3 – Basic Program Flow                              | 21 |
| Figure 11.4 – Robot Stick                                     | 21 |
| Figure 11.5 – Diagram of Programmed Motion                    | 22 |

| Version | Date      | Author                          | Changes          | HW Ver. | Sys. Ver. |
|---------|-----------|---------------------------------|------------------|---------|-----------|
| 01      | 1/17/2019 | Kai Lee<br>Aaron H<br>Charlie K | Document Created | 3.0     | 1.68.6800 |



### **1** Introduction

This document details how to setup the Omron TM robot from unboxing to running a simple program.

### **2 Useful Documents**

It is strongly recommended to review the following documents in addition to this one:

| TM Flow Software Manual         | <u>I626-E-02</u>                                     |
|---------------------------------|--|
| TM Hardware Installation Manual | <u>I623-E-02</u> (TM5), <u>I624-E-02</u> (TM12/TM14) |
| TM Safety Manual                | <u>1625-E-02</u>                                     |
| TM Backup, Restore, & Update    | Document number TBD                                  |
| Quick Start Guide               |  |

In addition to the documents listed above, all Omron TM related downloads can be found at: <a href="https://industrial.omron.us/en/products/tm-series#downloads">https://industrial.omron.us/en/products/tm-series#downloads</a>

### **3 Unboxing**

Two boxes come with the Omron TM robot, one for the control box and one for the robotic arm.



Figure 3.1 – Shipped Boxes



The following figure shows all the components that come inside the two boxes.

Figure 3.2 – Contents of Boxes

### **4 System Configuration**

All the components are connected to the control box. Figure 3.1 shows a representation of the Omron TM control box interface. Figure 3.2 shows a typical system configuration.



NOTE: Refer to the Hardware Installation Manual for more detailed info on Omron TM Robot hardware.

Figure 4.1 – Control Box Connections



Figure 4.2 – Basic System Configuration



### **5** Powering On the Robot

- 1. Ensure that the robot and all peripherals are firmly connected to the control box.
- 2. Press the power button on the robot stick. (Figure 5.1)
- 3. Wait for the robot to display on the monitor (HMI). (Figure
- 5.2)



Figure 5.1 – Robot Stick



Figure 5.2 – HMI Start Screen

#### 5.1 Boot Up Errors

The robot will not power up if one of the following has occurred:

| What happen                      | Possible Cause   | Troubleshoot                                  |
|----------------------------------|--|---|
| HMI start up<br>with error       | E-stop is pressed<br>E-stop safety<br>connection is<br>unplugged | Release the Estop<br>Reconnect Estop<br>ports |
| HMI fail to start<br>up          | Safeguard A disconnected   | Reconnect<br>Safeguard A                      |
| HMI start up, red light blinking | Safeguard B<br>disconnected                                      | Reconnect<br>Safeguard B                      |

Figure 5.4 – Table of Boot Errors



Figure 5.3 – Safety Switch Wiring Diagram

### 6 Light Ring Indicator



Figure 6.1 – Robot Button Diagram

The Omron TM robot has a light ring to indicate different modes and error states. For a description of indicator light colors and patterns, please refer to the table 6.2 and 6.3, shown below.

| Operation<br>Mode | Running<br>Status   | Space / Status of Safety<br>Trigger               | Operation Mode Light<br>Indication | Auxillary Light<br>Indication |
|-------------------|---|---|------------------------------------|-------------------------------|
|                   | Project is<br>not   | Full Speed Space /<br>Normal                      | Green (100%)                       |                               |
|                   | running   | Reduced Space                                     | Green (90%)                        | White (10%)                   |
|                   | (Incl. Step<br>Run)   | Trip Safeguard Port B:<br>Collaborative Mode Port | Green (90%)                        | Purple (10%)                  |
|                   | (Manual<br>Control<br>Mode)   | Error   | Green (50%)                        | Red (50%)                     |
|                   | Project is  | Full Speed Space /Normal                          | Green (50%)                        | Light Off (50%)               |
| Manual            | (Manual<br>Trial Run<br>Mode)   | Reduced Space                                     | Green (50%)                        | White (50%)                   |
| Mode              |   | Trip Safeguard Port B:<br>Collaborative Mode Port | Green (50%)                        | Purple (50%)                  |
|                   |   | Error   | Green (50%)                        | Red (50%)                     |
|                   | Paused<br>(Trip<br>Safeguard<br>Port A:<br>Safeguard<br>Pause Port<br>or Paused<br>in Trial<br>Run) | Full Speed Space /Normal                          | Green (10%)                        | Light Off (90%)               |
|                   |   | Reduced Space                                     | Green (10%)                        | White (90%)                   |
|                   |   | Trip Safeguard Port B:<br>Collaborative Mode Port | Green (10%)                        | Purple (90%)                  |
|                   |   | Error   | Green (50%)                        | Red (50%)                     |

| Operation<br>Mode | Running<br>Status  | Space / Status of Safety<br>Trigger               | Operation Mode Light<br>Indication                | Auxillary Light<br>Indication |                             |             |  |
|-------------------|--|---|---|-------------------------------|-----------------------------|-------------|--|
|                   |  |   |   |                               | Full Speed Space<br>/Normal | Blue (100%) |  |
|                   | Project is   | Reduced Space                                     | Blue (90%)  | White (10%)                   |                             |             |  |
|                   | Not<br>Running   | Trip Safeguard Port B:<br>Collaborative Mode Port | Blue (90%)  | Purple (10%)                  |                             |             |  |
|                   |  | Error   | Blue (50%)  | Red (50%)                     |                             |             |  |
| Auto Mode         | Project is<br>Running<br>Paused<br>(Trip<br>Safeguard<br>Port A:<br>Safeguard<br>Pause Port<br>or Paused<br>in Trial<br>Run) | Full Speed Space<br>/Normal                       | Blue (50%)  | Light Off (50%)               |                             |             |  |
|                   |  | Reduced Space                                     | Blue (50%)  | White (50%)                   |                             |             |  |
|                   |  | Running   | Trip Safeguard Port B:<br>Collaborative Mode Port | Blue (50%)                    | Purple (50%)                |             |  |
|                   |  | Error   | Blue (50%)  | Red (50%)                     |                             |             |  |
|                   |  | Full Speed Space<br>/Normal                       | Blue (10%)  | Light Off (90%)               |                             |             |  |
|                   |  | Reduced Space                                     | Blue (10%)  | White (90%)                   |                             |             |  |
|                   |  | Trip Safeguard Port B:<br>Collaborative Mode Port | Blue (10%)  | Purple (90%)                  |                             |             |  |
|                   |  | Error   | Blue (50%)  | Red (50%)                     |                             |             |  |

Figure 6.2 – Table of Robot Modes

#### **6.1 Collaborative Space Lighting**

A blinking purple color on the light ring indicates hardware-initiated collaborative mode (blinking white indicates software-initiated collaborative mode). Refer to figure 6.3 for the description of each state. When collaborative mode triggers an error state, the indication light will return to the original mode. Please refer to the following table for troubleshooting:

| Color/blinking  | Description   | Troubleshooting  |
|---|---|--|
| Solid green light   | Standby status in Manual<br>Mode(Manual Control mode) | N/A  |
| Flashing green light  | Project running in Manual<br>Mode(Trial Run mode)     | N/A  |
| Short Flashing Green light  | Project paused in Manual<br>Mode.                     | N/A  |
| Alternating between Green/Red<br>light<br>(with buzzer 2 beeping) | Manual Mode Error                                     | Press the FREE button to troubleshoot the error.                             |
| Solid blue light  | Standby status in Auto Mode                           | N/A  |
| Flashing blue light   | Project running in Auto Mode                          | N/A  |
| Short Flashing Blue light   | Project paused in Auto Mode                           | N/A  |
| Alternating between Blue/Red<br>light<br>(with buzzer 2 beeping)  | Auto Mode Error                                       | After switching to Manual<br>Mode, press the FREE button<br>to troubleshoot. |
| Light blue light  | Safe Startup Mode                                     | Press Stop Button for 3<br>seconds to return to original<br>Mode             |
| Flashing red light  | Robot is initializing.                                | N/A  |
| Light off   | Emergency stop pressed                                | Release the Emergency Switch<br>to turn to Safe Startup Mode                 |
| Solid red light Buzzer emits a long beep                          | Fatal error   | Shutdown and Restart required  |

*Figure 6.3 – Light Ring Troubleshooting Table* 

#### 6.2 Switching to Collaborative Mode

Before attempting any initial set up, ensure operator safety by switching the Omron TM robot to collaborative mode. This is done by disconnecting any of Safeguard B on the control box.



Figure 6.4 – Safety Wiring

### 7 Get Control of the Robot

| Login        |                             | i | 100 % | 8. |
|--------------|-----------------------------|---|-------|----|
|              | C                           |   |       |    |
| Connect      |                             |   |       |    |
| View         | 3 login<br>ID administrator |   |       |    |
|              | PW OK Cancel                |   |       |    |
|              | тм5-700                     |   |       |    |
| Setting      | Controlled by               |   |       |    |
|              |                             |   |       |    |
| (U) Shutdown |                             |   |       |    |

1. Login as an administrator. (ID is administrator, leave PW blank.)

#### Figure 7.1 – Login Screen

2. Click Get Control to get control of the robot. You are now ready to program your TM robot.



Figure 7.2 – Get Control Screen



### **8 Backup Factory Settings**

Before making any changes in *System Settings*, it is suggested that you back up the default factory settings first. This backup will save all software, firmware, user projects, and user settings.

1. Go to *Backup*\*Restore* under the *System* menu.



Figure 8.1 – System Setting Menu

2. Name the backup file and click the *Backup* button to back up current settings.

|                   | i | 100 % | <i>\$</i> . |
|-------------------|---|-------|-------------|
| Backup\Restore    |   |       |             |
| Backup File Name: |   |       |             |
| Restore Backup    |   |       |             |
|                   |   |       |             |
|                   |   |       |             |
|                   |   |       |             |
|                   |   |       |             |
|                   |   |       |             |
|                   |   |       |             |

Figure 8.2 – Backup Screen

NOTE: Refer to Omron Tech Note – Omron TM – Backup – Restore - Update for more info on backing up the robot.



#### 9 IP Address Settings

If the user requires the robot to be connected to an external Windows device such as a laptop, an Ethernet connection must be established. The robot's IP address settings will need to be updated to the same IP settings as the Ethernet port on the external device, or the other way around.

#### 9.1 Change Robot Network Settings

The easiest method for changing the robot's IP address settings is to plug in a monitor, keyboard, and mouse into the controller (known as the HMI setup) and change the IP settings in TM Flow. The following instructions detail how to do this:

- 1. Plug in the HMI setup peripherals (monitor via HDMI, keyboard and mouse via USB).
- 2. Get control of the robot (see Section 6 of this document)
- 3. Go to *Network* under the *System* menu.



Figure 9.1 – System Settings Menu

4. Select the Local Area Connection and change the network IP address settings. Note that only an active network adapter will appear.

| $\equiv$ $\leftarrow$ |  | i | 100 % | 11 | <i>8</i> . |
|-----------------------|--|---|-------|----|------------|
|                       | Network setting  |   |       |    |            |
|                       | Local Area Connection 9  | Ŷ |       |    |            |
|                       | ASIX AX88179 USB 3.0 to Gigabit Ethernet Adapter #4 C Get IP From DHCP: Static IP IP Address I72.17.6.222 Subnet Mask 255.255.0 Default Gateway 00.0.0 |   |       |    |            |
|                       | Obtain DNS server address automatically  |   |       |    |            |
|                       | Use the following DNS server address:           Preferred DNS server:         0000           Alternate DNS server:         0000                        |   |       |    |            |
|                       | ОК   | Ŷ |       |    |            |

#### Figure 9.2 – Network Settings

#### 9.2 Connecting an External Windows Device

If an external Windows device is needed to control the robot, it must have an Ethernet connection with the top left Ethernet port on the controller such as the one in the figure below. The other two ports on the right are for other devices such as external cameras.



Figure 9.3 – Ethernet Connection Port

To find or change the IP settings of the Ethernet port on an external Windows device, follow these steps:

1. Go to Change adapter options in the Network & Internet settings menu.



Figure 9.4 - Change Adapter Options

- 2. Right click on the Ethernet port and select properties.
- 3. Select the TCP/IPv4.
- 4. Click Properties.
- 5. Change the IP address settings.

| Ethernet 2 Properties  | <  |  |
|--|--|--|
| Networking Sharing   |  |  |
| Connect using:   |  |  |
| Intel(R) Ethemet Connection (5) I219-V   | connection Change settings of  | this connection  |
| Configure This connection uses the following items:  | Ethernet 2 2<br>Network cable  | upplugged Wi-Fi  |
| <ul> <li>✓ <sup>1</sup>/<sub>2</sub> QoS Packet Scheduler</li> <li>▲ Internet Protocol Version 4 (TCP/IPv4) 3</li> </ul>     | Intel(R) Etherne   | t Connectio Intel(R)   |
| Microsoft Network Adapter Multiplexor Protocol     Microsoft LLDP Protocol Driver     Internet Protocol Version 6 (TCP/IPv6) | Internet Protocol Version 4 (TCP/  | IPv4) Properties ×   |
| Link-Layer Topology Discovery Hesponder     Link-Layer Topology Discovery Mapper I/O Driver                                  | You can get IP settings assigned<br>this capability. Otherwise, you ne<br>for the appropriate IP settings. | automatically if your network supports<br>ed to ask your network administrator |
| Description  | Obtain an IP address autom   | atically   |
| Transmission Control Protocol/Internet Protocol. The default<br>wide area petwork protocol that provides communication       | Use the following IP address   | - 5  |
| across diverse interconnected networks.  | IP address:  | 10 . 151 . 24 . 220  |
|  | Subnet mask:   | 255 . 255 . 240 . 0  |
| OK Cancel  | Default gateway:   | 10 . 151 . 16 . 1  |
|  | Obtain DNS server address a  | automatically  |
|  | Use the following DNS serve  | r addresses:   |
|  | Preferred DNS server:  | 10 . 150 . 156 . 5   |
|  | Alternate DNS server:  | 10 . 150 . 0 . 140   |

Figure 9.5 - Change IP Settings on an External Windows Device



### **10 Changing the Admin Password and User Accounts**

#### **10.1 Admin Password**

1. Go to Administrator Setting under the System menu.



Figure 10.1 – System Setting Menu > Administrator Setting

2. Enter a new password, confirm password, and then click *Setting*. The new password is now set.

| ⇒ ←                   |                   |  |  |                  | 100 %                       |  | 8. |  |  |
|-----------------------|-------------------|--|--|------------------|-----------------------------|--|----|--|--|
| Administrator Setting |                   |  |  |                  |                             |  |    |  |  |
| User List             |                   |  |  |                  |                             |  |    |  |  |
|                       | 172.17.6.14:61433 |  |  | Edit Adm         | Edit Administrator Password |  |    |  |  |
|                       |                   |  |  | Old Password     |                             |  |    |  |  |
|                       |                   |  |  | New Password     |                             |  |    |  |  |
|                       |                   |  |  | Confirm Password |                             |  |    |  |  |
|                       |                   |  |  |                  |                             |  |    |  |  |
|                       |                   |  |  |                  |                             |  |    |  |  |
|                       |                   |  |  |                  | Setting                     |  |    |  |  |
|                       |                   |  |  |                  |                             |  |    |  |  |
|                       |                   |  |  |                  |                             |  |    |  |  |
|                       |                   |  |  |                  |                             |  |    |  |  |
|                       |                   |  |  |                  |                             |  |    |  |  |

Figure 10.2 – Administrator Settings



#### **10.2 User Accounts and Groups**

User group and the user account can be used to limit access to certain features and settings in TM flow. Note that only one person can control the robot at any one time and only one instance of TM flow can be logged in under each user account at any time. Therefore, each user should log out and/or exit TM Flow when done using the robot to allow for other users to get control of it.



Figure 10.3 – System Settings > Group / User

Create user groups and define group permissions in the *Group* menu under System.

| GroupName   | Run Setting | Project    | Setting    | View | System     | Edit Se | etting |
|-------------|-------------|------------|------------|------|------------|---------|--------|
| Operator    | $\bigcirc$  | $\bigcirc$ | $\bigcirc$ |      | $\bigcirc$ | 1       | ×      |
| Maintenance |             |            | $\bigcirc$ |      |            | 1       | ×      |
| SafeOp      |             |            |            |      |            | 1       | ×      |

Figure 10.4 – Group Permissions

After creating groups, users can be assigned to those groups in the User Account menu.

| Name : | Group :     | Run Setting | Project    | Setting    | View | System     | Group | Name |
|--------|-------------|-------------|------------|------------|------|------------|-------|------|
| James  | SafeOp      |             |            |            |      |            | 1     | ×    |
| Evan   | Maintenance |             |            | $\bigcirc$ |      |            | 1     | ×    |
| Mimi   | Operator    | $\bigcirc$  | $\bigcirc$ | $\bigcirc$ |      | $\bigcirc$ | 1     | ×    |

Figure 10.5 – User Permissions

| Permission                          | Description  |  |  |  |
|-------------------------------------|--|--|--|--|
| Run Setting                         | User can switch the current running project in Run Setting page                          |  |  |  |
| Project                             | User can create and modify program here  |  |  |  |
| Setting                             | All the Robot setting including I/O, safety, component and more can be found here        |  |  |  |
| View                                | All the robot status can be viewed here  |  |  |  |
| System                              | User can modify the system setting including update, user account, backup and more here. |  |  |  |
| Figure 10.C. Table of Demoistic and |  |  |  |  |

Figure 10.6 – Table of Permissions



### **11 Example 2-Point Program**

#### **11.1 Start a new project.**

| Logout                                |   | i | 100 % | E \$.                |
|---------------------------------------|---|---|-------|----------------------|
|                                       | 💽 🔄 Nep Run Diagnosis Point Manager Base Manager Controller Variables EditBlock |   | •     | ▼ Display <b>[</b> ] |
| Connect                               | Set Vision  |   |       |                      |
| View                                  | Point Stop  |   |       |                      |
| Run Setting                           | Wait for Gateway  |   |       |                      |
| Project                               | Ç→ II<br>If Pause   |   |       |                      |
| Setting                               | Voice Goto  |   |       |                      |
| $(\uparrow\downarrow\uparrow)$ System | Pallet Display  |   |       |                      |
| () Shutdown                           | H Circle  |   |       |                      |
|                                       | SubFlow Network   |   |       |                      |
|                                       |   |   |       |                      |

Figure 11.1 – New Project Screen

- 2. Name the project.
- 3. Press and hold the "Free" button on the robot end effector to move the robot to an initial position.

4. Press point button OR drag and drop a point node in TM Flow. Both operations will create a new point in the project named P1. Note that the flow connection has been already made from the last point you selected, which in this case is "Start".

5. Press and hold the "FREE" button on the robot end effector and move the robot to a new position.

6. Press point button to record this position as P2. Again note that the flow connection has been already made from the last point you selected, which in this case is "P1".

7. Connect the bottom node of P2 to the top node of P1 to create a loop, such as in Figure 10.3.



Figure 11.2 – Point Button



Figure 11.3 – Basic Program Flow

#### **11.2 Running the Program**

1. Press the **Play/Pause** button to start the program. Note, at this point the robot will start to move.

To stop robot motion, do one of the following:

- a. Press the **Play/Pause** button again
- b. Press the **Stop** button (returns to the project menu and resets project flow to the Start).
- c. Press the **E-Stop**. (**E-Stop** kills power to the robotic arm, but the controller will remain powered on).



Figure 11.4 – Robot Stick

At this point, the program is running! The robot will keep moving between P1 and P2.



Figure 11.5 – Diagram of Programmed Motion

OMRON AUTOMATION AMERICAS HEADQUARTERS • Chicago, IL USA • 847.843.7900 • 800.556.6766 • www.omron247.com

OMRON CANADA, INC. • HEAD OFFICE Toronto, ON, Canada • 416.286.6465 • 866.986.6766 • www.omron247.com

OMRON ELECTRONICS DE MEXICO • HEAD OFFICE México DF • 52.55.59.01.43.00 • 01-800-226-6766 • mela@omron.com

OMRON ELECTRONICS DE MEXICO · SALES OFFICE Apodaca, N.L. · 52.81.11.56.99.20 · 01-800-226-6766 · mela@omron.com OMRON ELETRÔNICA DO BRASIL LTDA • HEAD OFFICE São Paulo, SP, Brasil • 55.11.2101.6300 • www.omron.com.br

OMRON ARGENTINA • SALES OFFICE Cono Sur • 54.11.4783.5300

OTHER OMRON LATIN AMERICA SALES 54.11.4783.5300