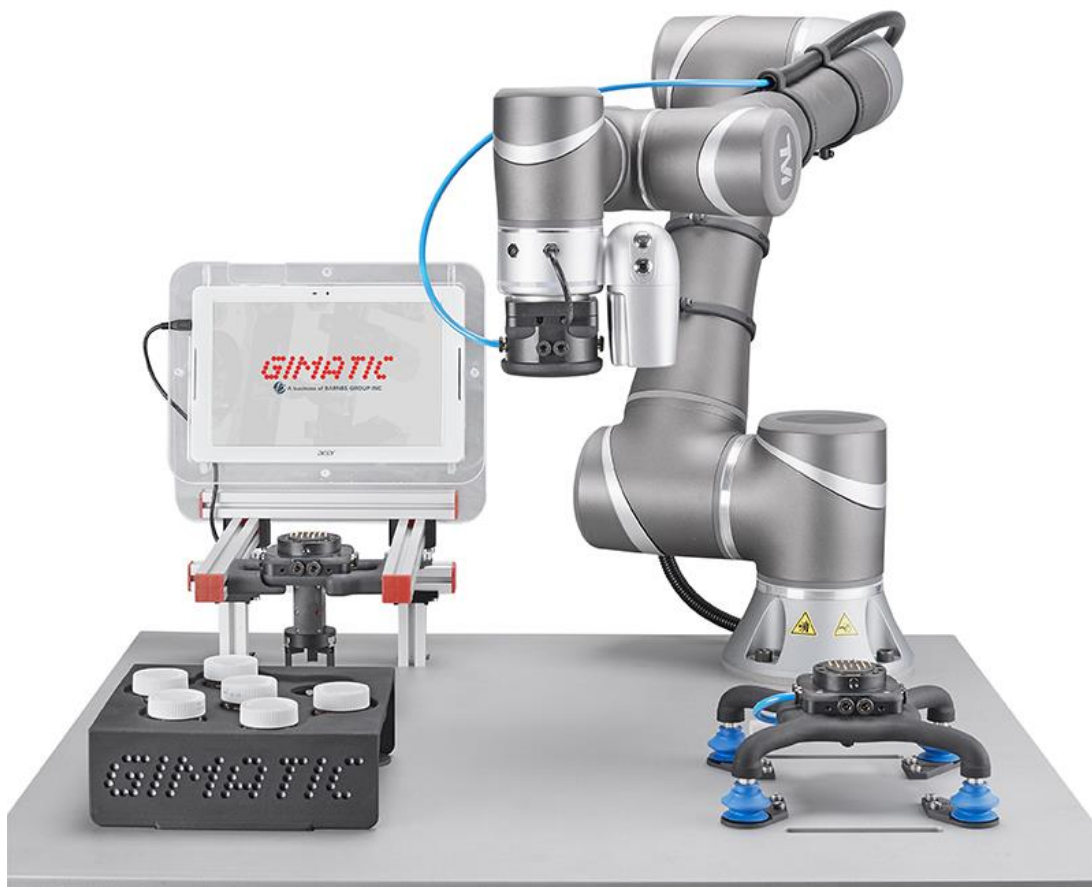


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KIT-TM-EQC20 USER MANUAL

08/2021

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1. INTRODUCTION

The EQC20TM-A is an “Electrical Quick Changer” that allows an easy and automatic replacement of the EOAT (End Of the Arm Tool) with the specific connection to the TECHMAN ROBOT.

It can be used on the whole set of Techman Robot cobots (TM5, TM12 and TM14 series) and it is completely compatible with KIT-TM-J and KIT-TM-V kits. These kits can be used in combination with any collaborative robot that provides a limited power supply capability at the wrist.

The only one component necessary to operate with the EQC20TM is called “Component_Gimatic_EQC20TM_V003_Move”.

This component allow the user to configure and operate the robot with a list of tools (8 at most) and to easily perform three tasks: TAKE (for taking a specific tool), RELEASE (for releasing a specific tool) and CHANGE (to changing from one tool to another one).

This operating manual describes how to import, setup and use this component.

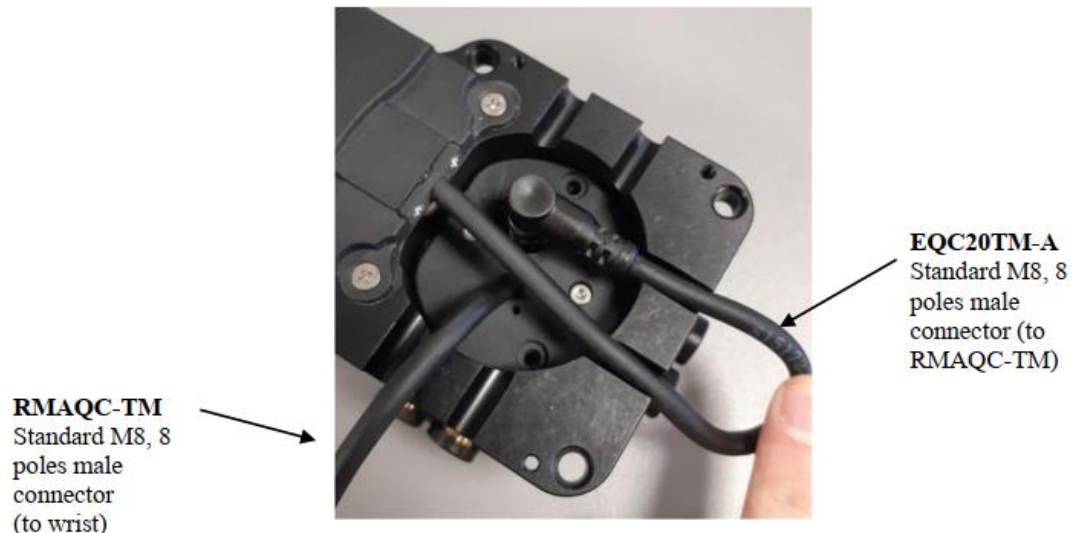


2. MOUNTING INSTRUCTIONS

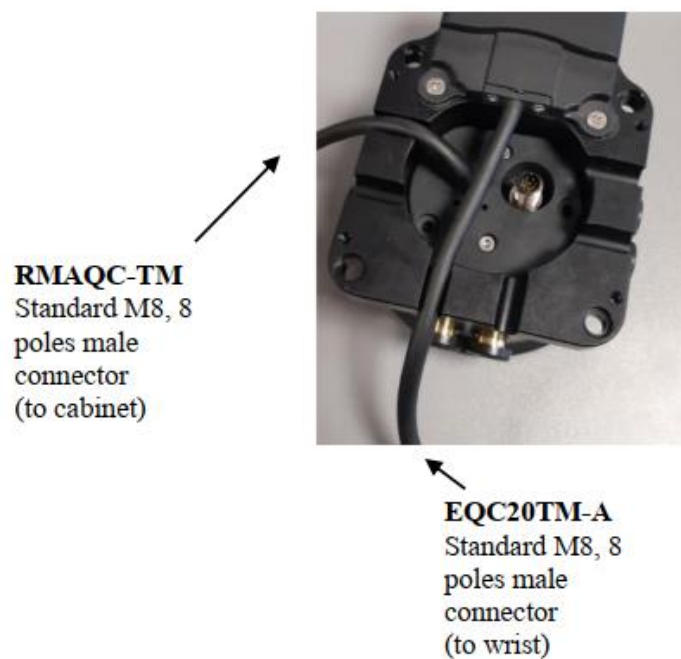
For a correct mounting of this KIT on the TM robot please refer to “IST-KIT-TM-EQC20” istructions.

The KIT-TM-EQC20 allows the user to choose between two different connection configurations:

- *Single connection at the wrist:* to feed both the tool changer and the tool from the robot wrist



- *RMAQC-TM connected at the control box and EQC20TM-A at the wrist:* to feed the tool changer from the wrist of the robot and the tool from the I/O control box.



3. IMPORTING THE COMPONENT

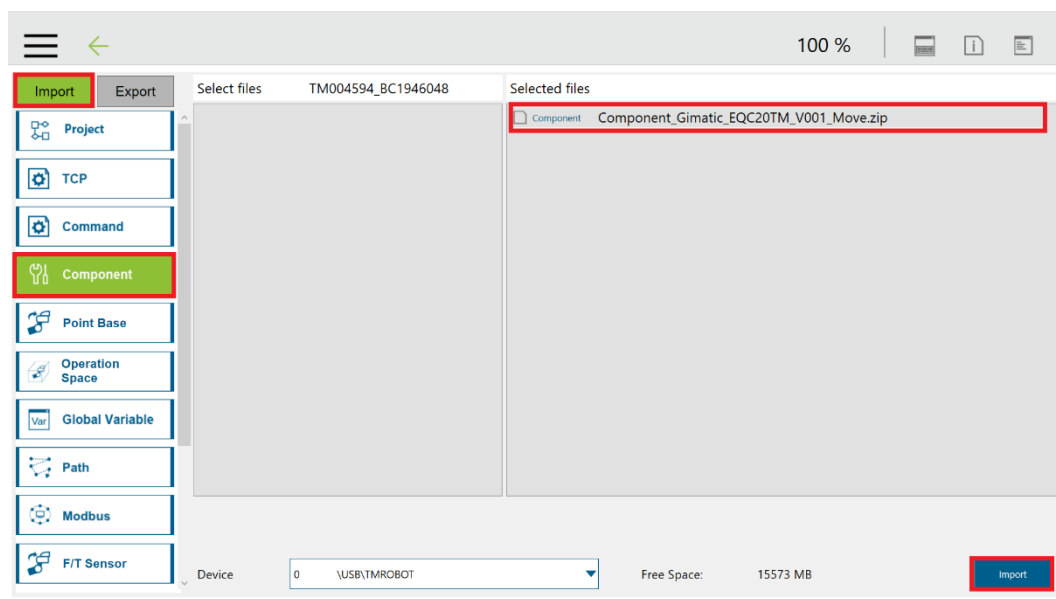
The component can be downloaded from: shop.gimatic.com/en/tm

Copy the folder “TM_Export” to an USB pen and set the name of the pen drive to match the following name: “TMROBOT”. Insert it in the appropriate port on the robot controller.

In the TMflow menu, navigate to System, Import/Export to import the components on TM controller and to make them available in the TMflow.

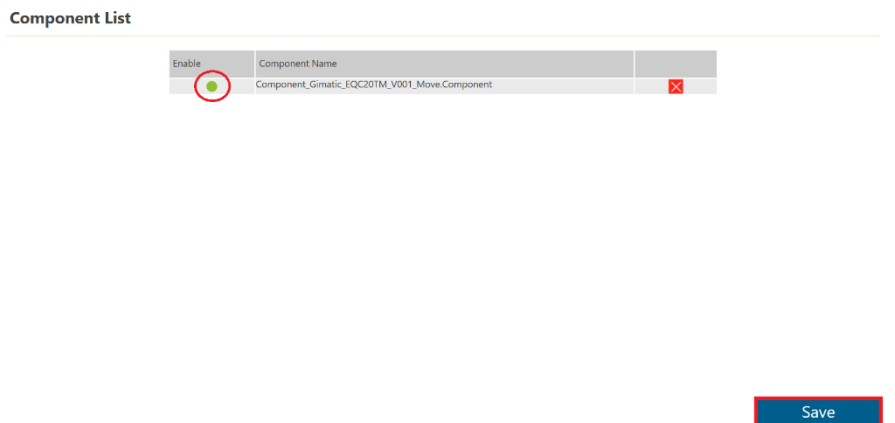
Click the “Import” button and select “TMComponent” on Robot List.

Select “Component” on the leftside menu and choose the components to import, in this case “Component_Gimatic_EQC20TM_V003_Move.zip”.



If the import operation is successfully completed, a success message box will appear, press the “OK” button to continue.

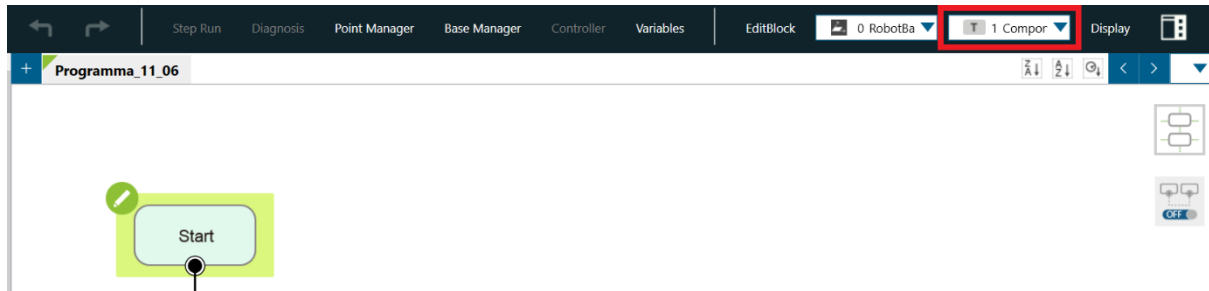
Choose “Component” on Robot Setting page and enable the components just imported on component list, select “Save” button and leave.



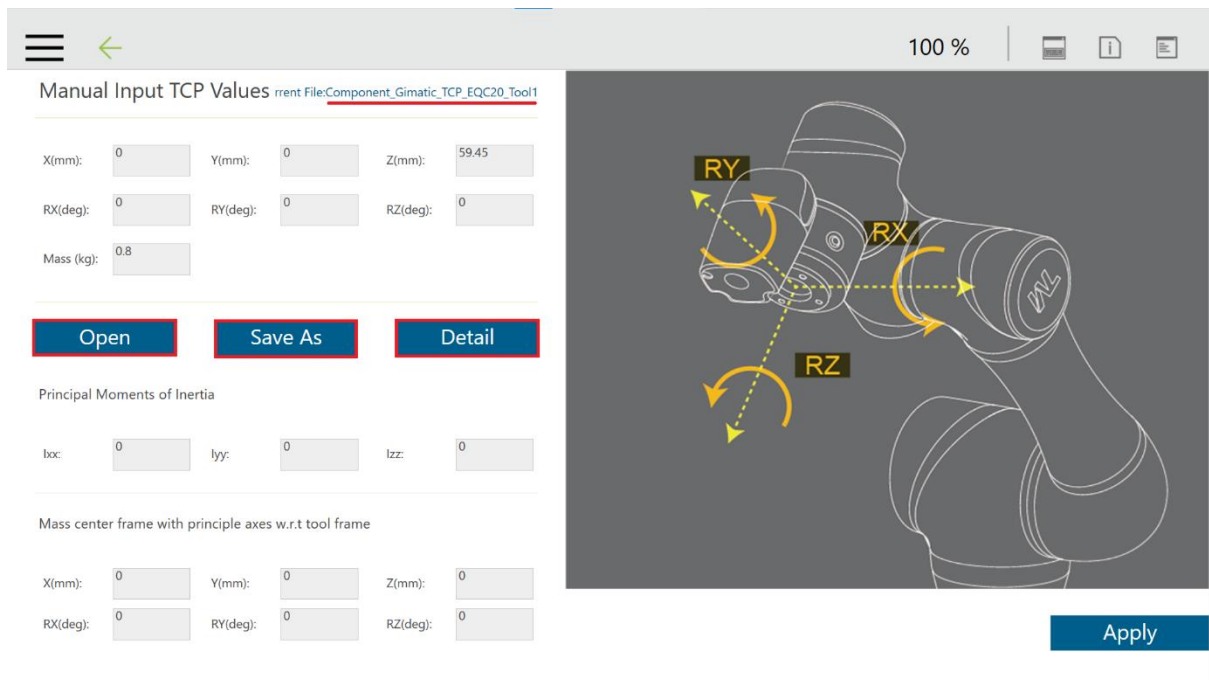
4. GIMATIC EQC20TM MOVE

To make a movement like take or release a tool please insert the component denominated “Component_Gimatic_EQC20TM_V003_Move” into the project.

Once this node has been imported, 9 new TCP entries are automatically added in the top-right angle of the screen, corresponding at 8 tools plus the EQC20TM-A TCP.



For each tool the mass, geometric coordinates (“Value”), moment of inertia (“MOI”) and mass center frame (“MCF”) must be set through the appropriate section of the TM menu (*Setting* → *TCP Setting* → *Manual input parameters of TCP*):



Please pay attention that for tool (or EOAT) is intended the all system including EQC20TM-A, EQC20-B and the user’s specific tool (like a gripper). The default mass and geometric coordinates of the TCPs of the 8 tools are the same as those of the EQC20TM-A and so they must be modified in consequence of the various combinations of EQC and tools.

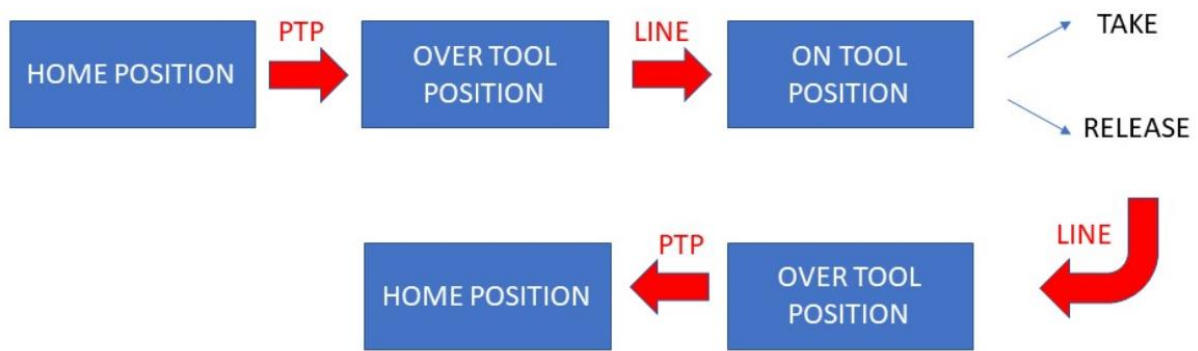
Modify the values corresponding to the tools used in the application and leave the remaining TCPs unchanged.

After setup all the necessary TCPs please proceed with the teaching of all the required positions by the used tools in the project.

By checking the content of the Point Manager, 17 new positions can be accessed and eventually modified to match the custom application setup. During the execution of a movement, the robot moves between three positions:

- Home Position: the safety position where all movements begin and end. This position is shared by all the 8 tools.
- On Tool Position: the storage position of the tool.
- Over Tool Position: is an intermediate position between the previous two and is located in a straight line with the On Tool Position. The distance between the Over Tool Position and the On Tool Position must be greater than the TCP of the tool.

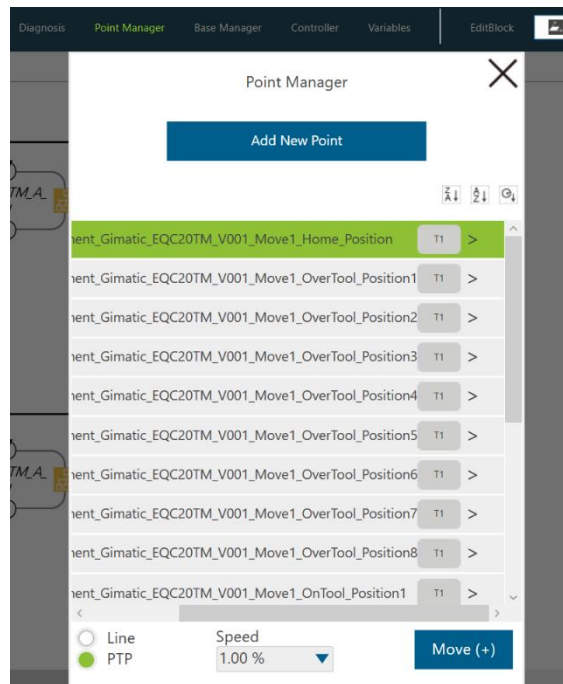
Initially, the robot is in Home Position, it then moves to the Over Tool Position using the PTP mode (i.e. doing the quickest movement) and it ends up in the On Tool Position moving along a straight line in the robot workspace. In this final position the robot takes or releases (based on the choice made by the user) the tool and it retraces the path in reverse.



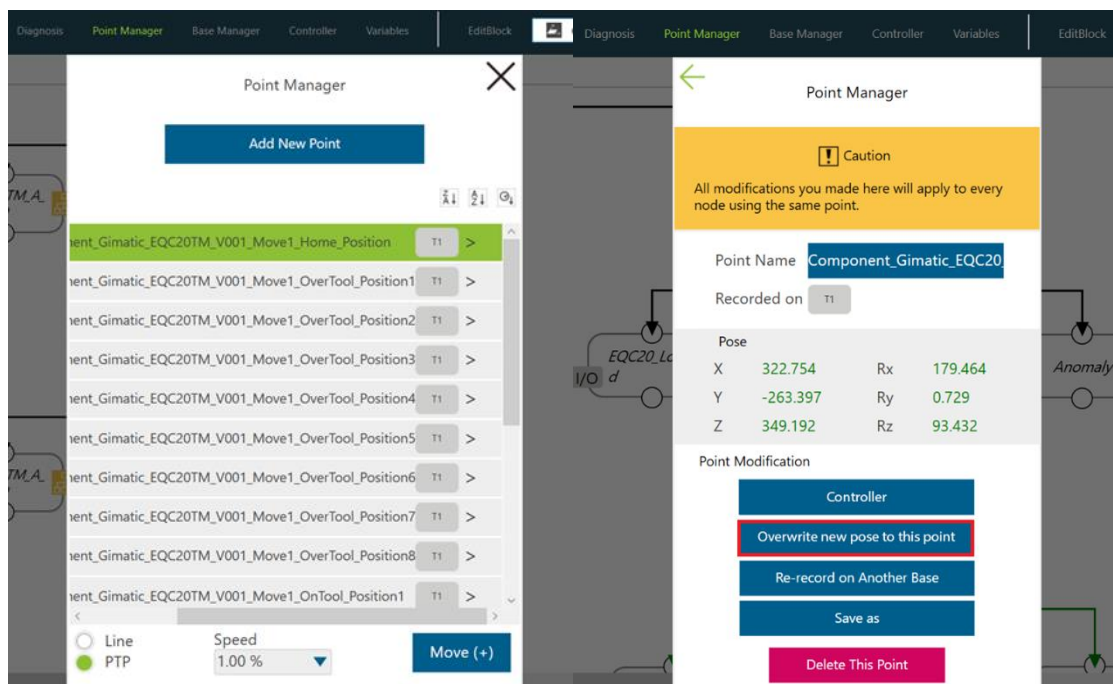
Therefore, for each tool is necessary to define two positions. The Home Position is the same for all the tools.

Please refer to following instructions as a guideline to operate the above described sequence.

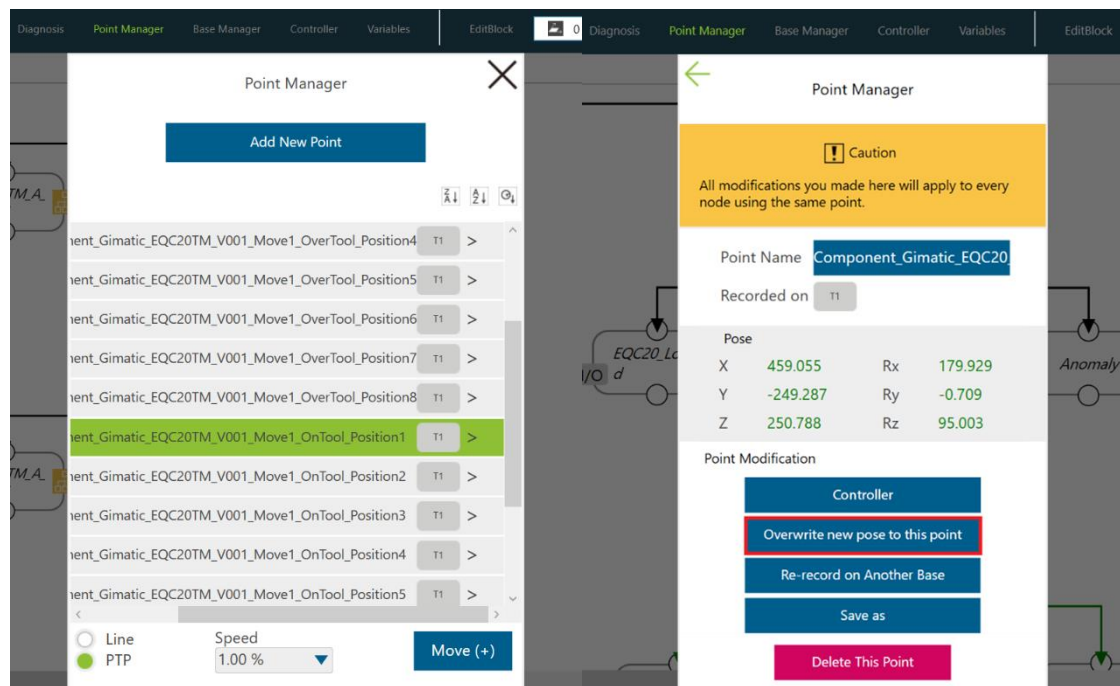
Ensure that there is no tool connected at the EQC20TM-A and select the "Component_Gimatic_TCP_EQC20_A" from the apposite drop down menu in the top of the screen (in the following example corresponding to T1 but depends on the user's program). Navigate to Point manager to see the Point list (at least the 17 positions just imported plus other positions eventually present in the project).



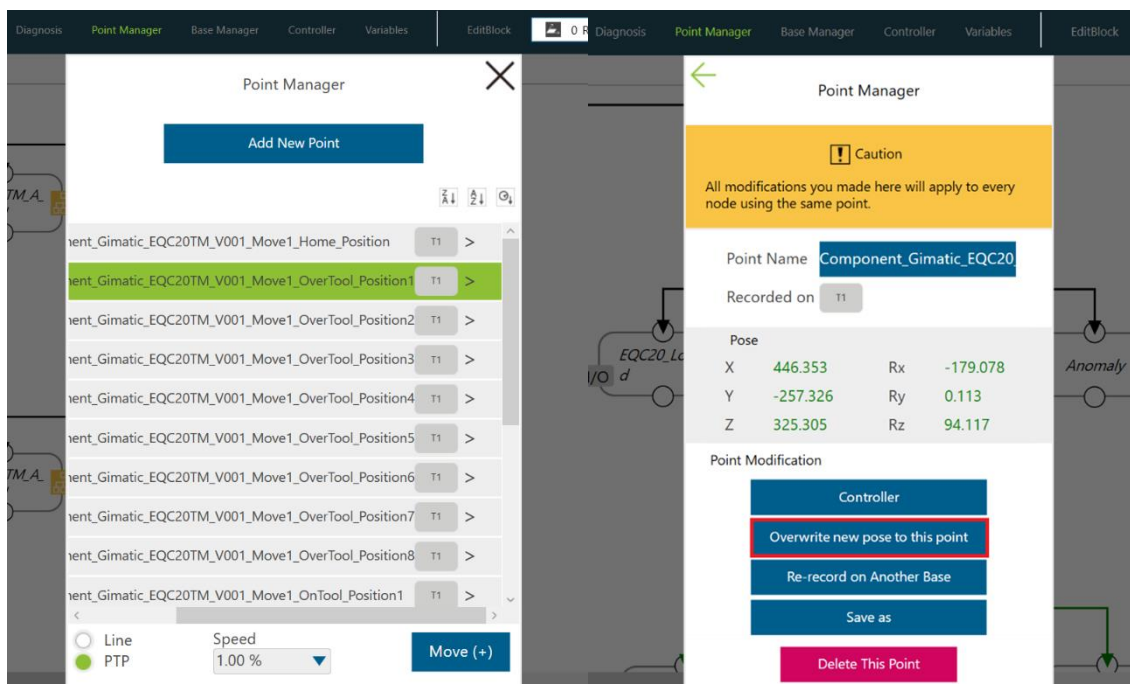
Click on “Home_Position”, move the robot into a principal safety position (using the free button on the arm) and click on “Overwrite new pose to this point” to record the new position.



Click on “OnTool_Position1”, move the robot on the storage position corresponding at the tool number 1 position (using the free button on the arm) and click on “Overwrite new pose to this point”. For a more accurate procedure it is recommended to use the controller tool to make adjustment of the robot position and to be sure that the EQC20TM-A can effectively take and release the tool (make a “Test output” operation).

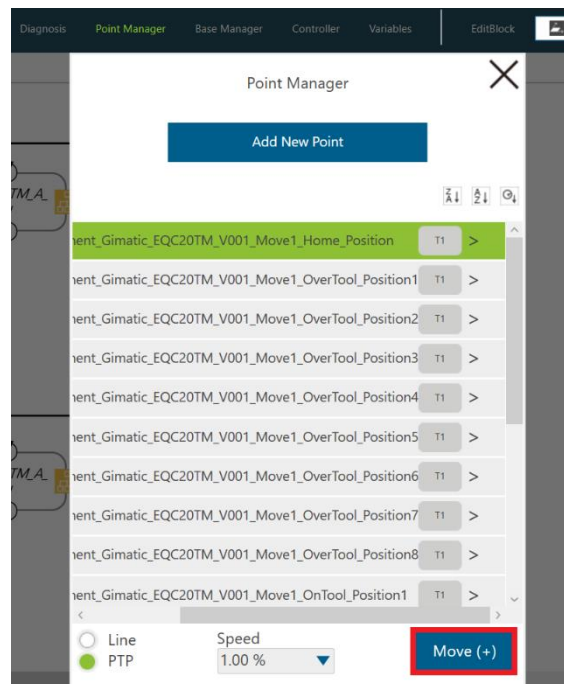


Click on “OverTool_Position1”, move the robot on a position located in straight line with the OnTool_Position1 (using the free button on the arm) and please be sure that it is greater than the TCP of Tool1. For a more accurate procedure it is recommended to use the controller tool blocking the d.o.f. to be sure to make a line movement and reproduce exactly the movement that the robot will do during the automatic mode.

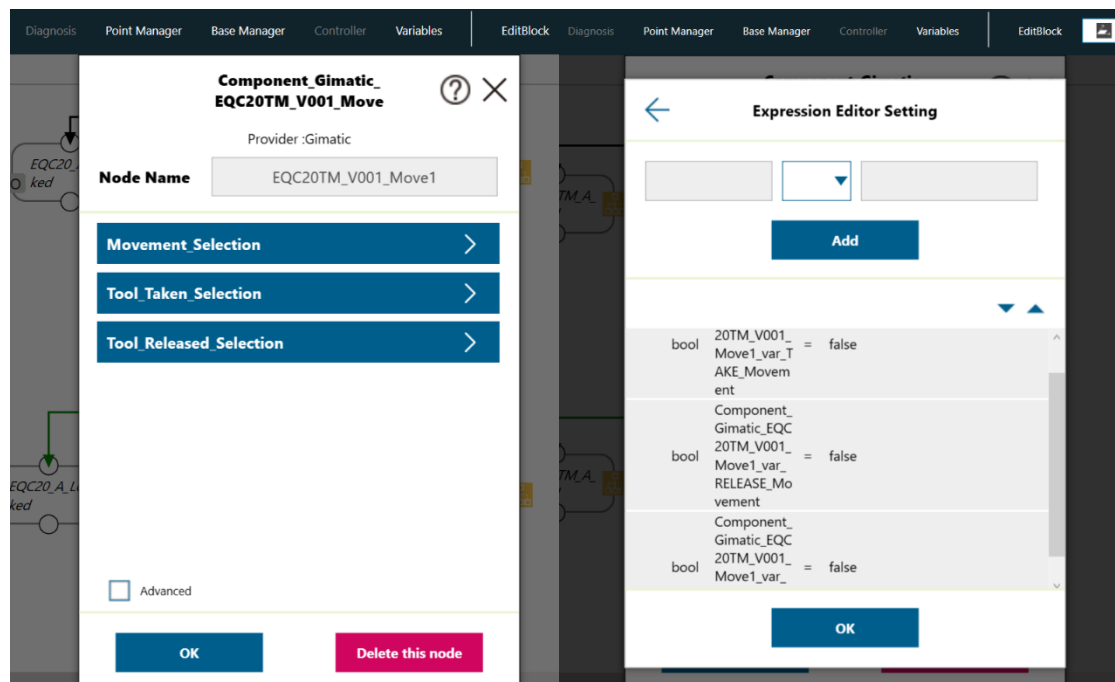


Repeat the last two operations for each tool present in the project, make sure to do them in this order, without any tool attached and with the “Component_Gimatic_EQC20_A_TCP” selected.

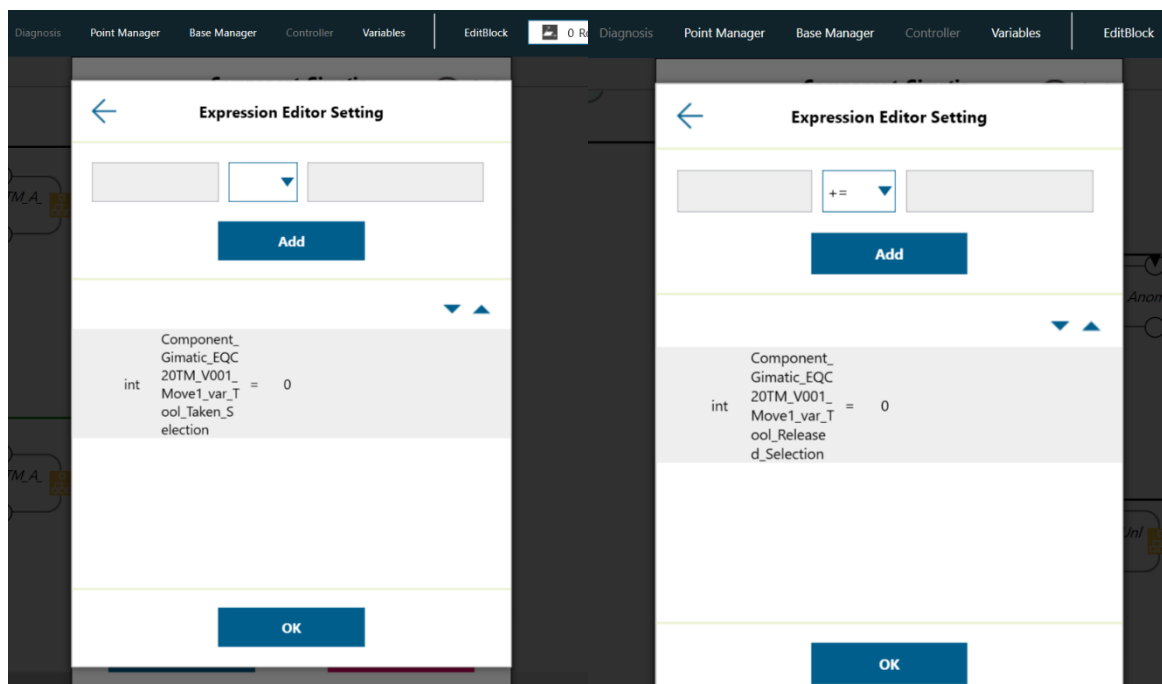
In the Point Manager one can verify the correct saving of the positions selecting each position and trying to move the robot using the apposite button highlighted in the following image.



Once the teaching operation has been completed it's possible to setup the node by entering: the type of the desired movement, the tool to take (for TAKE or CHANGE operations) and the tool eventually to drop (for RELEASE or CHANGE operations).

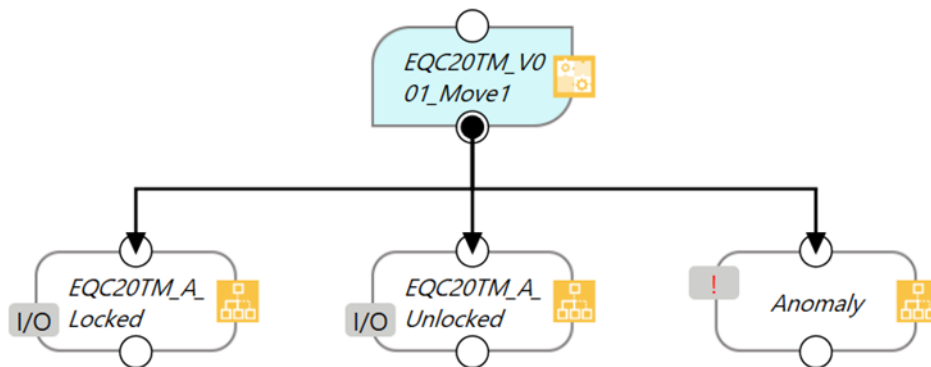


Item	Variable	Type	Description
Movement_Selection	var_TAKE_Movement	bool	In case of TAKE desired movement set this value as TRUE
Movement_Selection	var_RELEASE_Movement	bool	In case of RELEASE desired movement set this value as TRUE
Movement_Selection	var_CHANGE_Movement	bool	In case of CHANGE desired movement set this value as TRUE
Tool_Taken	var_Tool_Taken_Selection	Int	Insert the number corresponding at the tool that one want to be take
Tool_Released	var_Tool_Released_Selection	Int	Insert the number corresponding at the tool that one want to be release



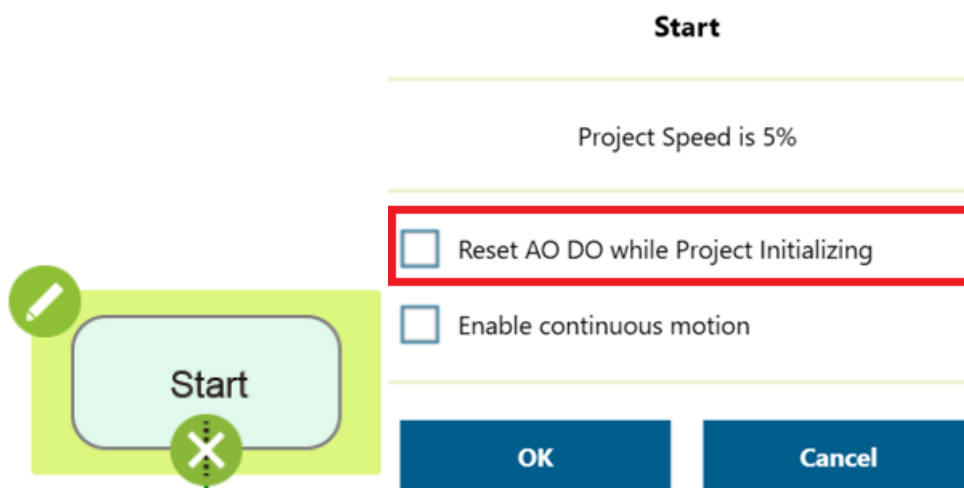
The Move component can generate one of the following results:

- “EQC20TM_A_Locked”: the EQC20TM-A is locked and so please pay attention because there could be a tool locked in. As a consequence of this state the robot can be programmed to release the tool or change it with another one.
- “EQC20TM_A_Unlocked”: the EQC20TM-A is unlocked and so the robot can be programmed to take a new tool.
- “Anomaly”: the EQC20TM-A is in an anomaly situation. It is recommended to stop the program in case of this output result.



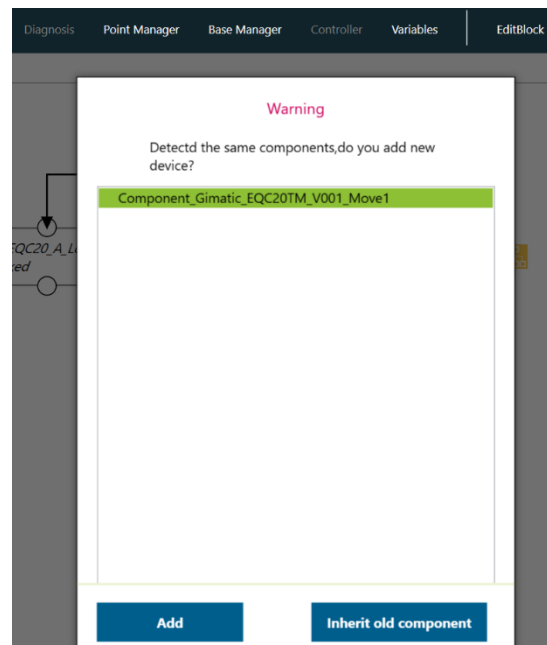
Please pay attention that the setting (open from Start node pencil mark) of “Reset AO DO while Project Initializing” is checked as default. In this case, the EQC20TM-A will close once the project run.

If one want maintain unaltered the I/O this setting must be unchecked.



From this point forward one can import many Move nodes as needed according to the specific robotic application.

Please select “Inherit old component” when importing any additional Move node to ensure that all the nodes share the same 17 positions previously setted in the Point Manager. In doing so every Move node will refer to the same positions.



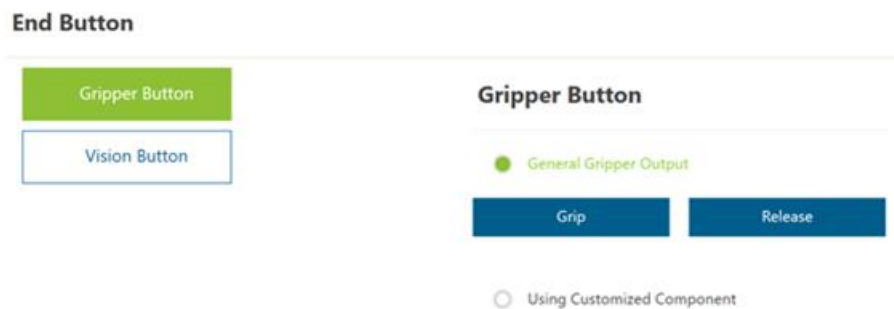
Each Move node has instead its own properties intended as “Movement_Selection”, “Tool_Taken_Selection” and “Tool_Released_Selection” that must be setted.

5. PROGRAMMING WITHOUT TMFLOW CONTROL

TMflow provides a simpler process programming method for the gripper-type software packages.

On the robot setting page, click the **Gripper Button** to set the job triggered by the Gripper Button at the End Module.

Please select “General Gripper Output” and set DO 1 as L in case of “Grip” and DO 1 as H in case of “Release”.



Doing so, this function is useful to command a closing (or an opening) operation for simply and quickly take (or release) a tool.

In practical applications, the robot uses the **FREE Button**, working with the buttons of End Module, to complete flow programming without TMflow control.

For further informations and instructions please refer to TMflow software manual.