

Install Robot and MTECC data acquisition software.

V20171005

- 1 – Copy folders *Z_MTECC_Data*, *Z_MTECC_PGMs*, *Z_MTECC_Docs* and *Z-MTECC_Firmware* to the root of the C-drive of the PC. These folders are stored in folder "*Z_Install_MTECC*".
- 2 – Install **Diolan USB-I2C driver**: Run: *I2CBridge.x64.0.2.3.EXE* or *I2CBridge.x32.0.2.3.EXE*.
 Recommendation: copy shortcut of Diolan "Control Panel.EXE" to the desktop. You can use the Diolan Control Panel to verify the USB-I2C connection when the MTECC is connected and powered.
IMPORTANT: do not connect MTECC to the PC before installation of the driver is finished.
 In case you did make a connection, go *Device Manager* of Windows (Right click the START Button of Windows and you will see *Device Manager*). There you will see that there is problem with the driver. Remove driver and unplug USB connection.
 Plug in again, and repeat installation of USB-I2C driver.
 In case of problems after making the USB connection with MTECC, go to "Device Manager" and update driver, if needed. When updating the driver, select: "**Search automatically for updated driver software....**" NOT "Browse my computer for update....." (This will not work).
- 3 – Do full installation of one CVI project Install "MTECC_24CH_Manual_RS" that is stored in folder *C:\Z_MTECC_PGMs*. Look for folder "Volume" in run "Setup".
 Purpose: install the *CVI RUN-Time library* on this PC. It is used in all MTECC programs.
- 4 – In order to make use of visual C-runtime: run [*vcredist_x86.exe*](#). Otherwise, applications using the MTUtil API will not run and respond with error message: *0xc000007b*.
- 5 – Data files that are required and stored in folder *C:\Z_MTECC_Data*:
 - *RTX_IM1_IM2_User.txt*: RTX file used to select optimal setting for PD/RT recording.
 - *UIR_Settings.tecc*: file that has the user interface settings used during the last run.
 - At least one TASK file together with the associated TODO file.
 TASK files are made with *Make protocol table.exe*. Several examples will be in this folder.
- 6 – Recommendations:
 - Make short-cuts of the EXE files that are stored in "*C:\Z_MTECC_PGMs*" to the desktop of your PC.
 - Verify the connection between PC and MTECC by running the Manual Mode of PD-RT recording. Just insert dummies in the MTECC and make sure power is on.
 Use TASK file: *Manual_Infinite_Loop_PD_RT.TASK*. Make a short connection between OUT-1 and IN-2 on the back panel of MTECC. In this way, you do not need a microswitch to trigger the MTECC when a "Move to Platform" is requested in the TASK file.
 - Store data (results obtained using MTECC) on the D-Drive of your PC. In this way data files are stored in a partition, separated from Windows and Program files.

Setup Yamaha Robot ZXYx with RCX240 controller.

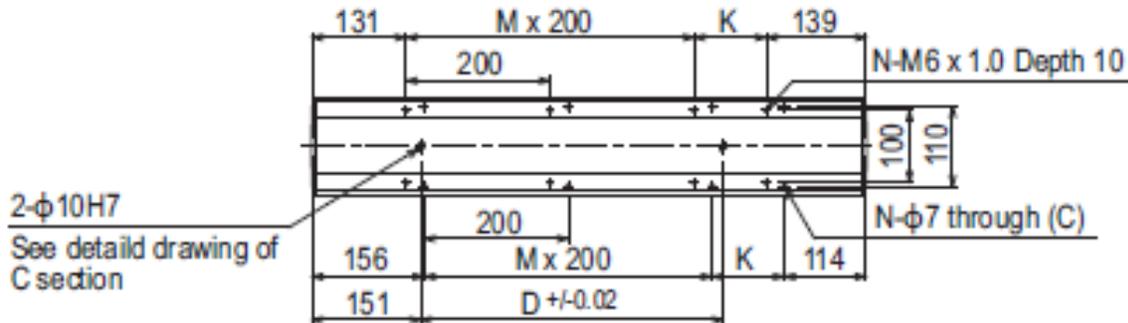
1 – Mechanical setup of SXYx robot - e. g. SXYx-C-A3-95-25-ZF-15-3L-RCX240S-E-P-EN-BB; RED numbers: X and Y stroke.

Robot is mounted on a TMC breadboard (Metric type) that has 6mm threaded holes (M6) at distances of 25mm. The robot is mounted on support blocks, 3 or 4 supports, depending on the X-stroke.

A - These blocks lift the robot so that the Z-axis can move above the HPs and wash station.

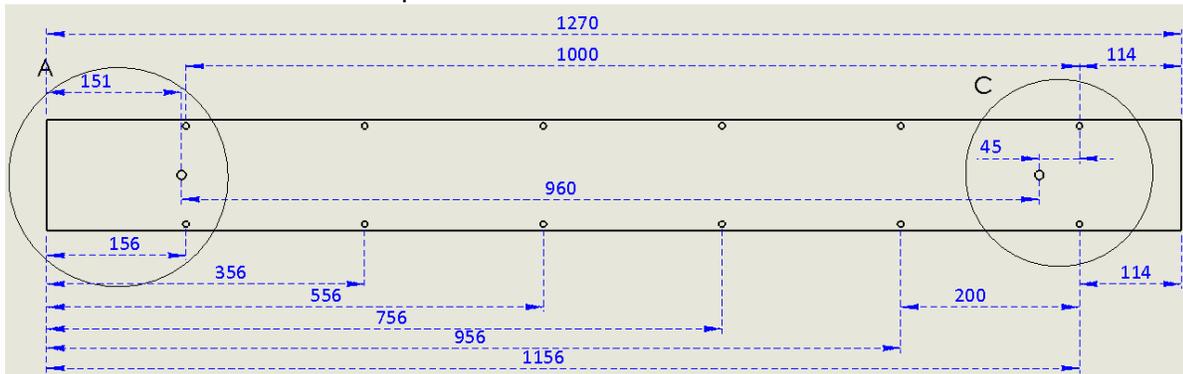
B – With the supports the user can align the X-axis with the lower side of the breadboard.

Yamaha robot – location of holes for mounting and alignment of robot:

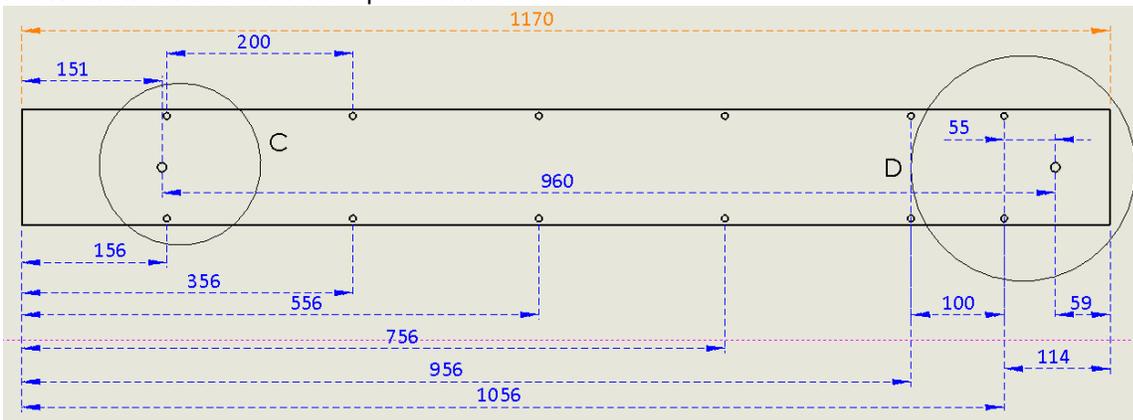


X stroke	150	250	350	450	550	650	750	850	950	1050
L	470	570	670	770	870	970	1070	1170	1270	1370
K	200	100	200	100	200	100	200	100	200	100
D	240	240	420	420	600	600	780	960	960	1140
M	0	1	1	2	2	3	3	4	4	5
N	4	6	6	8	8	10	10	12	12	14
Y stroke	150	250	350	450	550	650				
T	55	110	165	220	275	330				
Z stroke	150	250	350							

For X-stroke of 950 mm: hole pattern in robot.



For X-stroke of 850 mm: hole pattern in robot.

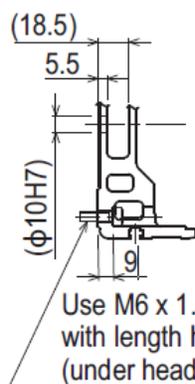


Note: to align the robot, there are 2 holes ($\phi=10$) in the bottom of the robot. In the 950mm stroke version, the distance (parameter "D" in table above) is 960mm. Two pins are inserted in the support blocks: one in small support on the left, and one pin in large support used on the right side. See below.

Install mounting blocks on the TMC breadboard:

Note that holes $\phi=8.1$ mm are for **positioning screws** of 8mm.

- (1) Bring support blocks in the required position on breadboard: see schematic for the robot that is used.
- (2) Insert **positioning screws** in $\phi=8.1$ mm holes and turn till they are firmly attached to the breadboard. The positioning screws will not hold down the supports: used for alignment of robot with the breadboard.
- (3) Insert the M6 screws (with hex head) in the $\phi 6.5$ mm holes, turn them down but do not tighten yet: the support blocks should not yet firmly attached to the breadboard; will be done after robot is mounted on supports.
- (4) Remove cover from robot. Make sure that the head of the M4 screws are not damaged: press screwdriver firmly down while removing screws. (At factory, the screws are inserted with a pneumatic screwdriver!!!).
- (5) Bring the robot on the supports with the alignment pins ($\phi 10$ mm) in the alignment holes in the bottom of the robot. The support blocks can still move (less than 0.1mm) so that alignment pins can match with the holes in bottom of robot.
- (6) Make sure the robot is well attached to the supports with M6 screws in holes ($\phi 7$ mm) in the bottom of robot.



Use M6 HEX screws **Length=20mm**.

Length of PINS: MAX 18.5mm above block

Thickness bottom plate: 5.5 mm.

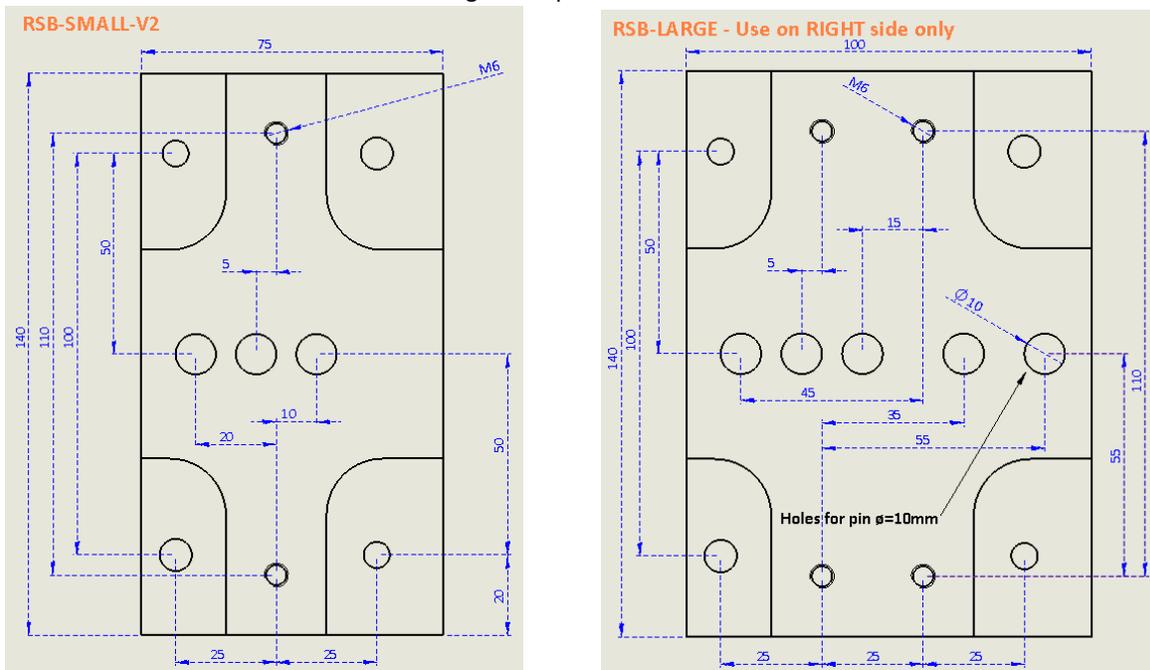
Also: M6 screws: bottom plate of robot 9mm thick..

Detail of section C

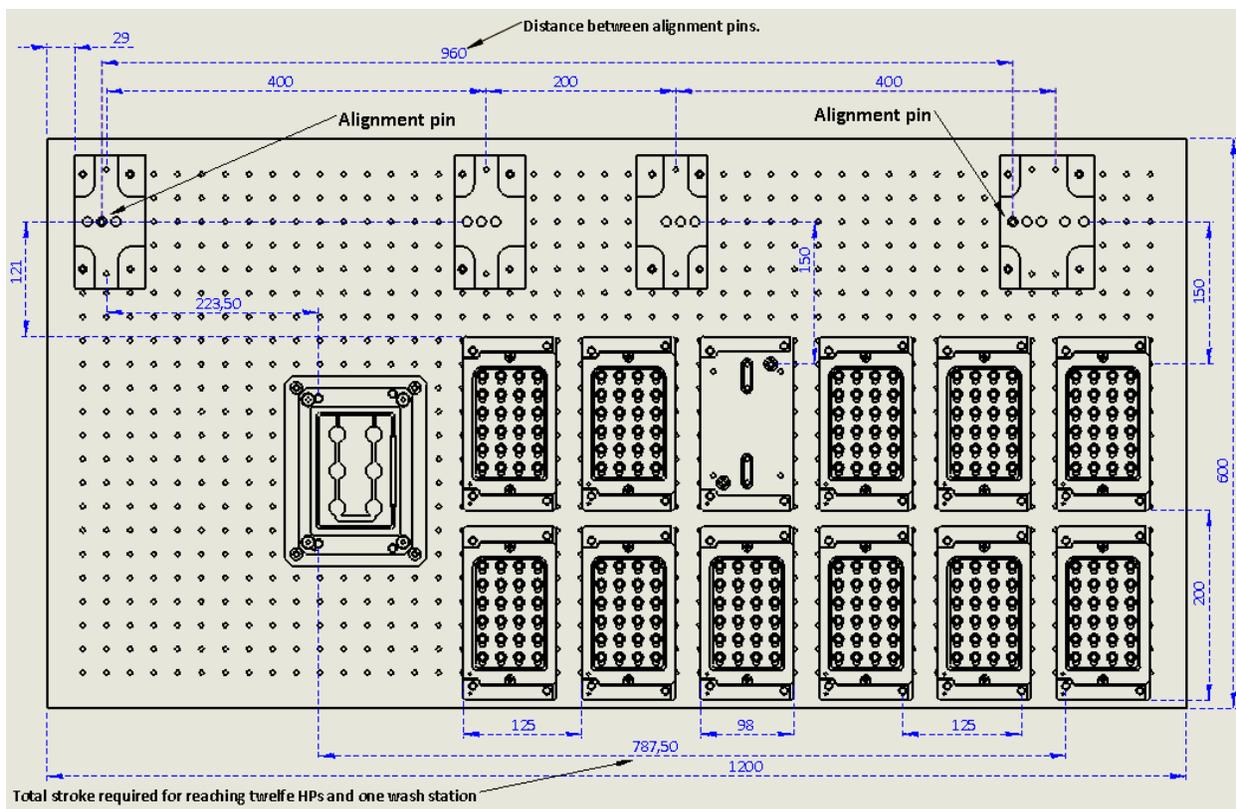
- (7) Tighten now the M6 screws that hold the support blocks to the breadboard.

LEFT side support block – RSB-SMALL: Mount this support at the most left side possible position on the TMC breadboard and also use this type of small support in the middle of the robot. In left most support, a pin ($\phi=10$) is inserted in the hole ($\phi=10$ mm), at 5mm to the left from the $\phi 7$ mm holes in the bottom of the robot. The small supports in the middle do not need an alignment pin.

RIGHT side support block – RSB-LARGE: mounted at right side. Different holes are available for the alignment pin. Select the hole that is at the correct distance “D” from the left alignment pin the small block. The distance between alignment pins is the parameter “D” in the table above. If needed, the large block needs to be turned 180 degrees around the Z-axis. The orientation of the large support block and selection of the 10mm hole will make it possible to obtain the correct distance “D” between alignment pins. See dimensions below.



An example of mounting the robot with 950mm X-stroke is shown below. On request, similar figures can be made for robots with another X-stroke. Note: the **TMC breadboard** shown here is type **75SSC-119-12**, size 600x1200mm. Recommendation: use size 900x1200mm, type **75SSC-135-12**. In this way temperature controllers can be mounted in the back.



2 - Mount box that holds MTECC at robot.

To be completed.....

3 - Mounting electrode attachment and dummy electrode replacement at Z-axis.

To be completed..... Also include the installation of the 24 channel dummy circuit. Fits in electrode replacement.

4 - Mount cable connection and guide for 16 way flay cables.

To be completed..... Connect cables to 24 channel dummy circuit.

5 – Mount holders for plate warmers on TMC breadboard.

To be completed.....

6- Connecting robot with RCX240 controller.

A – Protective connections.

It is highly recommended to connect the ground terminals at the robot with ground that is available in the lab. For the SXY-type robot, this is explained in “[Chapter 7 SXYX](#)” of the Yamaha manual “[XY-X robot - User manual.pdf](#)” under [Installation – 1.5 Protective Connections](#). Recommendation: connect the TMC breadboard with ground. By connecting the breadboard to ground Electrical interferences with the MTECC electronics will be diminished and reliability of the recording of electrical parameters will be improved.

B – RCX240 Controller: line voltage is 220 VAC.

simran Simran AC-3000 Step Up/Down Voltage Converter Transformer
110V/220V - 3000 Watts
Description



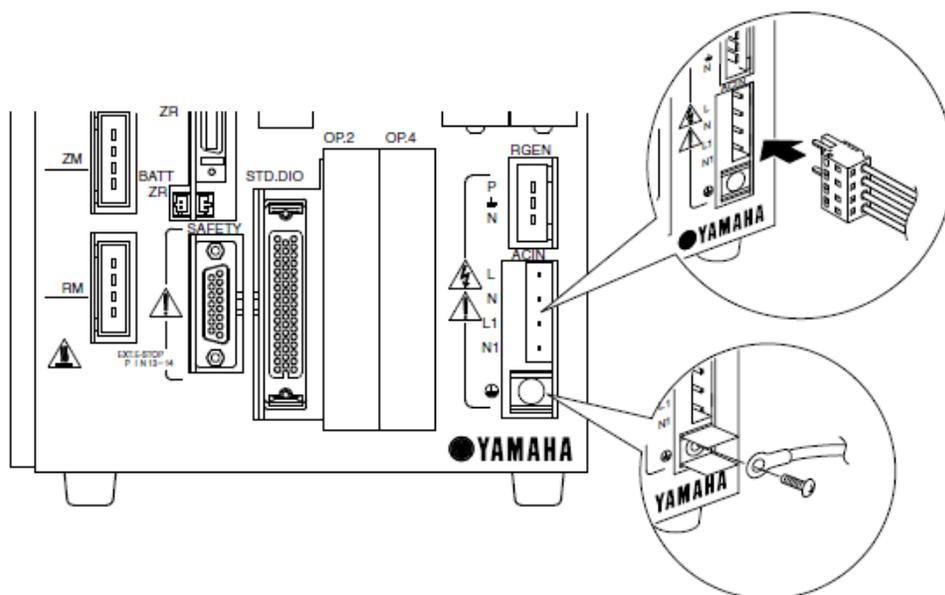
Because the RCX240 controller should be powered by 220 VAC, users in the USA should use a transformer with power of at least 1500 Watt.

Recommendation: use the Simran AC-3000 Step Up/Down Voltage converter:

<http://www.sears.com/simran-ac-3000-step-up-down-voltage-converter/p-SPM6677561703?plpSellerId=DVD>

AC power is applied with a **WAGO 231-704/026 connector** shown in the RCX240 manual RCX240-User Manual, Chapter 3 – Installation, section 4 – Connecting to the power. A diagram is shown below.

AC IN and ground terminals



Connecting the robot cables and installing the batteries is explained in detail in Chapter 3 as well, Section 5. Please also look to the video [VIPPLUS-004-RESET.WMV](#) where the use of the batteries is explained.

Important notes

3. Power-ON procedures

Step 1 Check the setup and connections.

Make sure that the necessary setup and connections are correctly completed according to the instructions in the user's manual.

Step 2 Activate emergency stop.

Press the emergency stop button on the programming box to activate emergency stop.

Step 3 Turn on the power.

Supply the power to the AC IN terminal on the front panel of the robot controller.

The "PWR" LED lights up and MANUAL mode screen appears. (After the "PWR" LED is lit, it will take a maximum of 3 seconds for the controller to operate normally.)

24106-R6-00

Step 4 Cancel emergency stop.

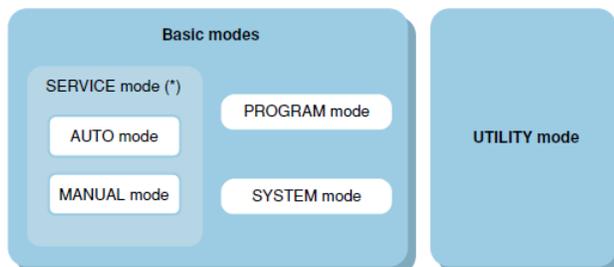
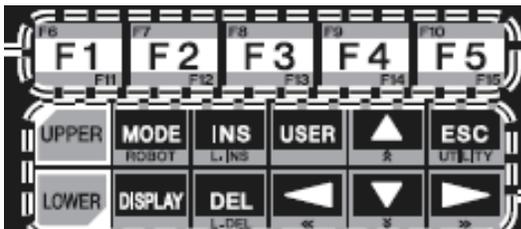
Turn the emergency stop button on the programming box clockwise to cancel emergency stop.

Step 5 Turn on the servo.

To turn on the servo, see Chapter 7, UTILITY mode.

Step 6 Perform return-to-origin.

For details on return-to-origin, see "9. Return-to-origin" and "10. Absolute reset" in Chapter 5.



* SERVICE mode can be used only when SAFE mode is enabled.



NOTE

The #1+X to #6- keys are hereafter called the Jog keys. The Jog keys are enabled in MANUAL mode.

5.1 Basic modes

1. AUTO mode

This mode executes robot programs. Robot programs can be executed only in this mode.

2. MANUAL mode

Select this mode to move the robot manually or perform operation regarding point data. Return-to-origin and manual movement of the robot can be executed only in this mode.



NOTE

- Absolute reset and return-to-origin operation can be performed only in MANUAL mode.
- AUTO mode may be selected depending on the execution level when the robot controller is turned on.

3. PROGRAM mode

Select this mode to create and edit robot programs. Robot programs can be edited on the programming box screen.

4. SYSTEM mode

Select this mode to set parameters for the robot and axis.

For more details on SYSTEM mode, refer to the user's manual.

5. SERVICE mode

SERVICE mode can be used only when SAFE mode is enabled.

Use this mode to perform work using the programming box while within the safety enclosure of the robot system.

This mode includes AUTO and MANUAL modes in the basic operation mode, and can be selected by turning DI02 (SERVICE mode input) OFF. The following functions are selected in SERVICE mode.

1. Robot is controlled only by programming box operation.
2. Automatic operation is prohibited.
3. Robot moving speed is set to below 3% of the maximum speed.
4. Robot operation is allowed only when a operation key on the programming box is pressed.

CAUTION

Do not turn off the robot controller during program execution.

If turned off, the internal system data may be corrupted and the program may not restart when the power is again turned on.

Always be sure to terminate or stop the program before turning the power off.

Robot control software – VIP+. Installation files for Yamaha are stored in folder "[Z_Install_Yamaha](#)".

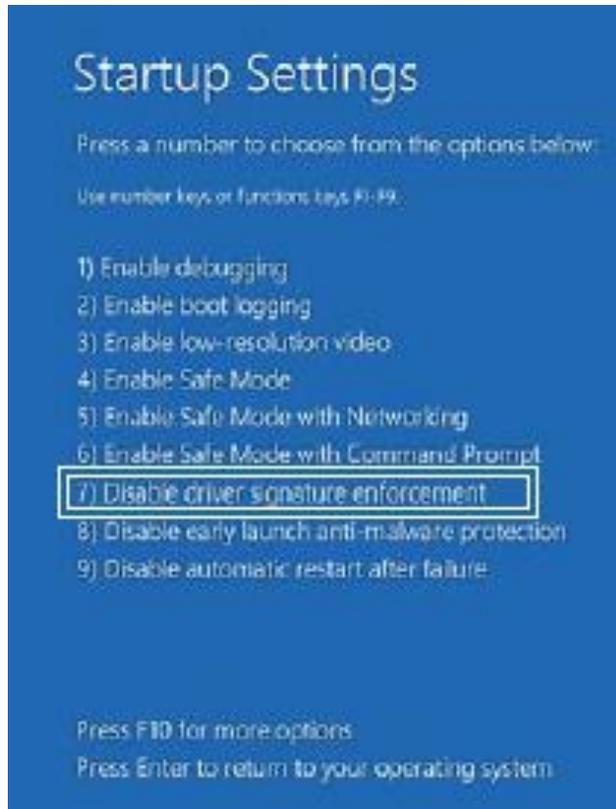
It is highly recommended to get familiar with the use of the RPB. RPB will be needed to startup and turn off the robot and to start the software that controls the robot movements and communicates with MTECC software over TELNET. Moreover the user should have basic knowledge of the VIP+. It is used to download the controller settings and software into the RCX240 controller (Restore Controller settings). The use of the RPB as well as VIP+ is explained in the videos that Yamaha made. Please watch the videos before using the robot and its RCX240 controller.

A – Install driver for USB-RS232 connection. Run “Setup_64bits.EXE” that is stored in the folder: USB_Driver. Windows 10 might prevent installation of Device Drivers that do not have the correct certificate. To overcome this problem follow the instructions below:

– Hit the Start button  - **Power**, and there select:

RESTART PC WHILE HOLDING DOWN SHIFT key.

- The PC will restart and bring you in a screen with different option. Select TROUBLE SHOOT.
- Then you will see a screen with “Startup Settings”. Select this one.
- Click Restart. PC restarts (in SAFE mode).
- During restart of Windows you will get a screen as:



PRESS number key “7”:

Disable driver signature enforcement,
and proceed.

Now PLUG IN the cable.

Check Device Manager.

Locate driver and do: UPDATE DRIVER.

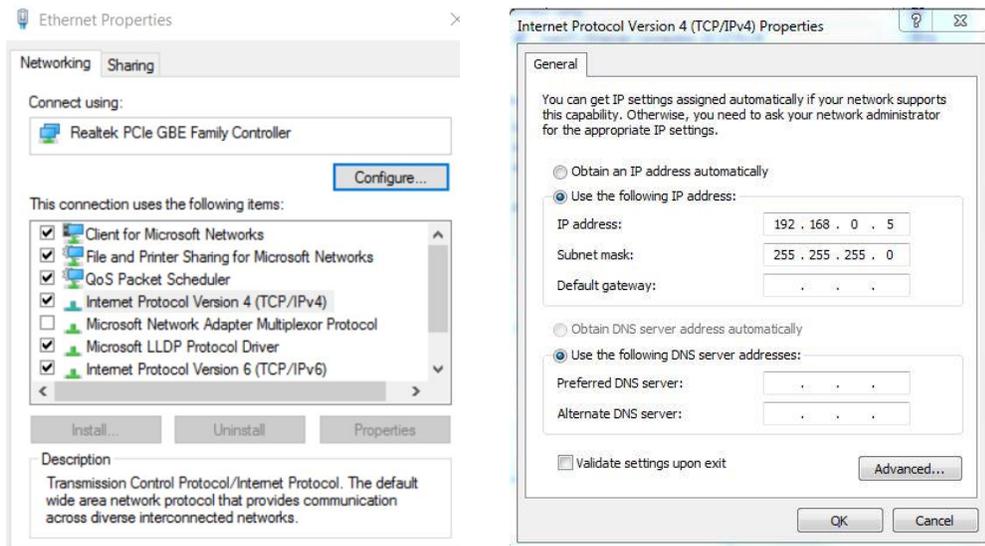
Select the driver location in the PC.

INSTALL DRIVER and ignore warning from
Windows.

Alternatively another USB-RS232 cable can be used. We recommend a device manufactured by Digitus. Its driver software is Windows 10 compatible and easy to install.

B- After installing the USB driver for the serial port cable, install VIP+.
VIP+ can make a connection to the robot controller.

Internet Protocol Settings on PC



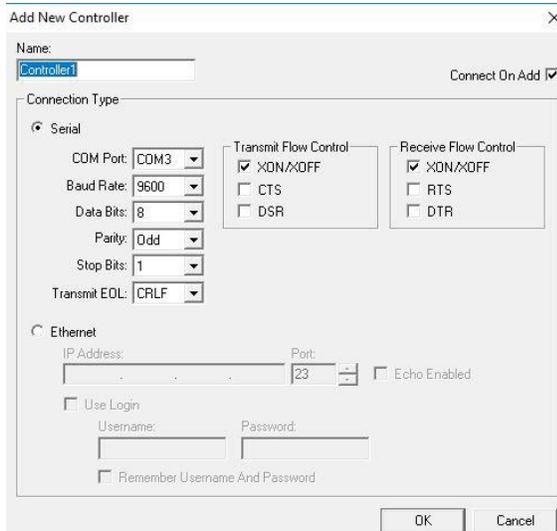
1 – Turn on power of the robot.

IMPORTANT: before turning on the power, press the **Emergency switch** on the RPB. With the emergency switch pressed, the robot cannot move when turning on power, preventing unexpected behavior.

Safe stop and start of robot use:

- Before turning OFF robot controller power: Press Emergency Switch on RPB.
- After turning on power: on RPB, release the Emergency Switch (Turn counterwise).
- On RPB: press LOWER-ESC or that brings you to UTILITY MODE.
- Clear Emergency flag.
- Press MOTOR (F1) and turn ON power of motors.

2 – Run VIP+ and connect VIP+ with RCX240.



In the *Controller window* of VIP+: highlight the “*Controllers*” folder and hit the icon

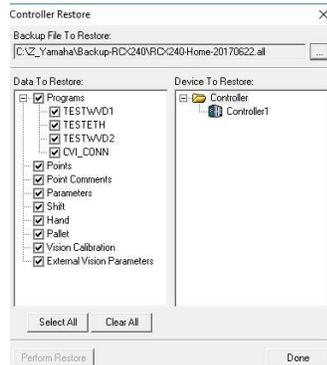


The window “*Add New Controller*” shown on the left will come up, at least when the serial port connection is properly installed (can be verified in “*Settings - Devices*” of Windows).

The default settings are OK and the “*OK*” button can be hit. Data from the RCX240 will be uploaded into VIP+.

3 – Restore the settings that are stored in folder C:\\Z_Yamaha_Projects.

Use VIP+ and select the icon:



Select file, “Select ALL” and hit “Done”.

Now, most settings are stored in the controller:

- Programs
- Points: these need to be updated for this robot setup.
- Point Comments: as for instance Plate number.

Not updated: setting of Option Boards, like Ethernet.

4 – Ethernet connection.

Note that the settings for the Option Boards, as the Ethernet board, are not stored in a backup of the RCX240 controller. Therefore, these settings need to be entered with the RPB. Basic knowledge on how to use the RPB is essential.

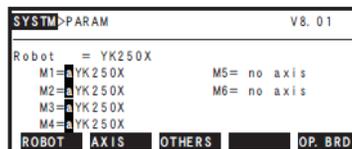
Setting Ethernet in RCX240.

See manual: [Ethernet-RCX240.PDF](#)

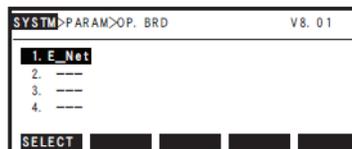
2-4-1 Validating the Ethernet unit

To use the Ethernet, the Ethernet board must first be enabled by setting the parameter.

- 1) Press **F1** (PARAM) in "SYSTEM" mode to enter "SYSTEM>PARAM" mode.
- 2) Press **F5** (OP. BRD).

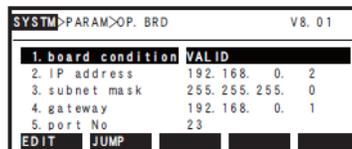


- 3) Select the number for "E_Net" with the **↑** key and press **F1** (SELECT).



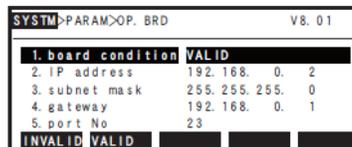
- 4) The current Ethernet unit identity status appears on the display.

With the cursor positioned on the "1. board condition" ("1. board function" for RCX221/222), press **F1** (EDIT).



- 5) Press **F2** (VALID) to make the Ethernet identifiable from the controller.

If making it unidentifiable from the controller, press **F1** (INVALID).



2-4-2 Setting the IP address

The following explains how to set the IP address.

The IP address is a number unique to each device and identifies that device from among many other devices connected on the network. The IP address of one device must not be the same number as another device so use caution when setting the IP address.

1) Press **F1** (PARAM) in "SYSTEM" mode to enter "SYSTEM>PARAM" mode.

2) Press **F5** (OP. BRD).

```

SYSTEM>PARAM                                V8.01
Robot = YK250X
M1=YK250X      M5= no axis
M2=YK250X      M6= no axis
M3=YK250X
M4=YK250X
ROBOT  AXIS  OTHERS  OP. BRD
  
```

3) Select the number for "E_Net" with the **↑** **↓** keys and press **F1** (SELECT).

```

SYSTEM>PARAM>OP. BRD                        V8.01
1. E_Net
2. ---
3. ---
4. ---
SELECT
  
```

4) Press the **↓** key once to select "2. IP address" and press **F1** (EDIT).

```

SYSTEM>PARAM>OP. BRD                        V8.01
1. board condition VALID
2. IP address 192.168.0.2
3. subnet mask 255.255.255.0
4. gateway 192.168.0.1
5. port No 23
EDIT  JUMP
  
```

5) The currently set IP address appears.

To change it, enter the new IP address with the **0** to **9** keys. Enter the exact number including periods (.).

After changing the setting, press **↵**.

```

SYSTEM>PARAM>OP. BRD                        V8.01
1. board condition VALID
2. IP address 192.168.0.2
3. subnet mask 255.255.255.0
4. gateway 192.168.0.1
5. port No 23
Enter IP address >192.168.0.2
  
```

Option Board (Ethernet) Settings.

Need to be entered with the RPB.

Select "SYSTEM MODE", press F1: "PARAM", press F5 "OP.BRD", and edit entries 1 to 16, if needed.

Pay special attention to those in RED:

1 - Board condition	VALID
2 - IP Address	192.168.0.2
3 - subnet mask	255.255.255.0
4 - gateway	192.168.0.1
5 - port No	23
6 - Echo back	INVALID
7 - Timeout (MIN)	0
8 - Login check	INVALID
9 - login user	WVD (standard: USER)
10 - login password	PASSWORD
11 - logout	CONT.
12 - Keep alive [SEC]	20
13 - Keep alive count	3
14 - MAC address	00-04-C6-01-07-22
15 - unit version	1.03
16 - ETH mode	ONLINE

ACCESS LEVEL Setting:

If the **access level** was changed, that data changes become prohibited. You can find the description of the access levels in the RCX240 user manual in chapter 4, 14.6 *Changing the access level (operation level)*. In order to change the access level back to 0, you can use either VIP+ PC software or RPB teaching pendant:

Changing access level using VIP+.

Select the controller, and go to *Controller* → *Utility...* In the Utility menu, change *Access Level* back to LEVEL 0 (q. v. attached screen shots).

Changing access level using RPB.

Press [UTILITY] ([LOWER] + [ESC]) to enter the utility mode. Press [UTILITY] again to go to the second Utility page. Press [F2] (Access). Enter password "LVL". Press [F1] for Level 0.

STD.DIO disable Power.

Error 12.2 : Interlock on.

There is no 24 V coming to pin 4 (DI11 Interlock) of the (big blue) STD.DIO parallel I/O connector. In case you are currently setting up the controller with nothing much connected, you can disable STD.DIO and plug in dummy connector into the SAFETY I/O plug.

To disable STD.DIO, go to **SYSTEM>PARAM>OTHERS** and set «**Watch on STD.DIO DC24V**» to **INVALID**. Please note that STD.DIO is automatically activated when you connect 24 V DC.

Reset to English with RPB.

[ESC]

[MODE]

[F4] (System)

[F1] (Parameters)

[F3] (Others)

[F1] (Edit)

[F2] (English)

Reset Absolute zero.

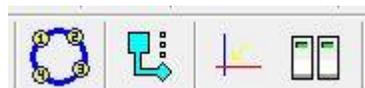
It is absolutely mandatory to reset the zero of the encoders of the robot before recording the coordinates of positions where the robot has to move to. Detailed information is available in the movie VideosVIPplus-[vipplus-004-reset.wmv](#) or in video [RPB-011-absolute-reset.wmv](#).

Enter POINT data in VIP+

Attach "Electrode Manifold Holder" to the Z-axis. Remove the manifold to avoid damage!!!

Use a dummy electrode manifold with posts.

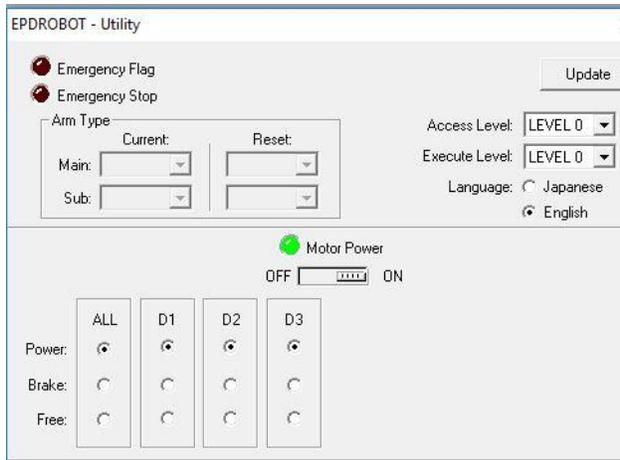
In Controllers window: Click on controller that is used, e.g. "EPDROBOT".



Manual Mode – AUTO Mode – Absolute Reset – Utility Mode.

Click UTILITY Mode icon.

- EPDROBOT-Utility window pops up.
- This window will enable you to turn ON and OFF power of the motors.



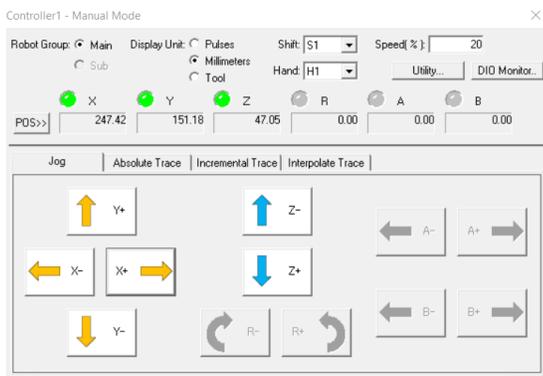
Check “Free” in panel “Motor Power.”

Ignore message. Power will be turned off power for all axes.

Insert pin holders in the holes of a platform (plate holder) for alignment of the electrode manifold holder. The posts of the manifold holder have holes where the pins fit.

Move the robot arm so that the posts fit in the pins. In window below you can see the X, Y and Z coordinates.

Manual Control



In **window “POINTS”**, select the POINT line that corresponds to the platform in use.

Convention used in software: coordinates of platforms 1 to 31 are stored in POINT numbers 9001 to 9031.

DO NOT USE these POINTS for other purposes, as for testing programming instructions of the RCX240.

EPDROBOT - Points

Enter Current Position Robot Group: Main Display Unit: Pulses
 Refresh Current Position Sub Millimeters
 Tool Utility... DIO Monitor...

	Current Position	1.00	1.00	5.07	0.00
	Comments	X	Y	Z	R
P9001	Plate #1	5.21	12.43	121.50	0.00
P9002	Plate #2	5.22	213.15	121.50	0.00
P9003	Plate #3	130.41	12.20	121.50	0.00
P9004	Plate #4	130.23	212.92	121.50	0.00
P9005	Plate #5	255.21	12.25	121.50	0.00
P9006	Plate #6	255.21	212.50	121.50	0.00
P9007	Plate #7	393.04	37.28	99.50	0.00
P9008	Plate #8	430.00	10.00	30.00	0.00
P9009	Plate #9	430.00	10.00	30.00	0.00
P9010	Plate #10	430.00	10.00	30.00	0.00
P9011	Plate #11	430.00	10.00	30.00	0.00
P9012	Plate #12	430.00	10.00	30.00	0.00
P9013	Plate #13	430.00	10.00	30.00	0.00
P9014	Plate #14	430.00	10.00	30.00	0.00
P9015	Wash Station	430.00	10.00	30.00	0.00
P9016	Wash Station	430.00	10.00	30.00	0.00
P9017	Not Used	393.04	37.28	99.50	0.00
P9018	Not Used	400.00	10.00	40.00	0.00
P9019	Not Used	400.00	10.00	40.00	0.00

Refresh Point (P#): Jump Hide Unused Points

Pulses units (joint coordinates) : integer of up to 8 digits
 Millimeters units (cartesian coordinates) : number with a decimal point

After the electrode attachment is positioned on the plate holder:

- 1 – Select the Point line of this plate.
- 2 – Press “Enter Current Position”.
- 3 - Remove pins from the holes and place them in the next plate holder.

With the coordinates that were recorded a test can be done to verify whether they were entered correctly.

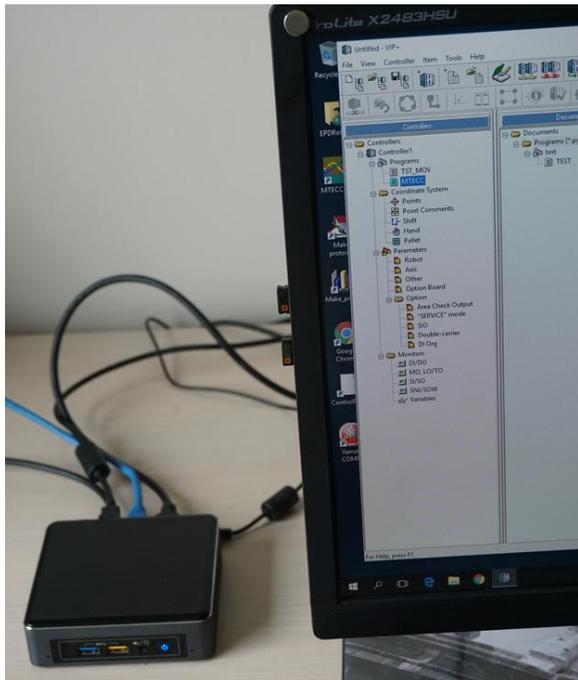
for posts and let the manifold holder down into its final position.

Now you can record the Z for this platform and enter this MANUALLY in the POINT data of the corresponding point. It is highly recommended to run a test program, TST_MOV in the robot. It will move to 6 plates and a wash station position. It can easily be changed to 10 or plates by changing the loop counter.

Installation of software on INTEL NUC7I5BNK.

The NUC barebone equipped with 8GB RAM and an SSD of 250GB is used in our application for robot control and data acquisition with MTECC. This small computer should be connected to a monitor that has HDMI, audio speaker and if possible 2 USB ports. Size of the monitor: at least 24 inch, 27 inch recommended. The NUC has video display capabilities for 4096x2160 resolution. The USB ports on the monitor are not essential because there are 4 ports available on the NUC itself. One USB port is used for the RS232 connection to the RCX240 controller and the use of VIP+. The NUC also has an ethernet port to make the connection to the RCX240 for data exchange. Moreover, wireless network can be used.

This barebone can be made available to the user. It will have Windows 10 installed with Local user. All the software for data acquisition with MTECC and for using the Yamaha robot is installed.



Size of the NUC computer: WxDxH 11.5x11.5x3.5 cm.

Power supply: external supply with 20 Watt supply that can be used at 220 as well 110 VAC.

This system is available from EP Devices.

Short Guide.

To use Yamaha Setup:

FIRST: Use RCX240 and the RPB.

- 1 – Turn ON RCX240.
- 2 – Release Emergency switch on RPB.
- 3 – Press ESC to see the MODE SCREEN on the RPB and Press LOWER-ESCAPE (Utility Mode).
- 4 – Clear Emergency Flag.
- 5 - Press MOTOR.
- 6 – Turn All Motors ON.
- 7 – ESC _ESC _ESC till you see the MODE SCREEN.
- 8 - Select AUTO mode and check whether you see whether the MTECC program is selected and press RESET Program. If not selected, move to PROGRAM mode, press DIR.

With cursor arrows on RPB highlight MTECC and press Return.

10 - Compile program and press ESC to leave PROGRAM mode.

11 – Return to AUTO Mode, select RESET Program and Press RUN.

Now the Robot controller RCX240 is waiting for commands from the PC (sent over the ethernet connection).

In the PC:

Start the communication program: *"Telnet_Client_Yamaha.EXE"*.

Check IP address of the RCX240 and click CONNECT button.

An "OK" response will appear in the Response panel.

You can set the speed for moving and for Up-Down. Click: *"Update Speed"*.

The connection can also be tested by setting MV or UD and a number <16. Press *"SEND"*.

Edit Protocol Table that will be used.

- Start *"Make protocol table.exe"*. and go through following sequence:
- Press button: *"Make protocol table"*.
- *"Import table"*: a window with protocol tables that are available in folder *"C:\\MTECC_Data"* will be shown.
- Select one and edit it with *"Add row"*, *"Delete row"* buttons as well as by editing individual lines.
- When finished: press *"Check table"*. Errors might show up. Correct them.
- After success with *"Check table"*, hit *"Execute table commands"*.
- If no errors were found, you can save the table and change the name.
- *"Quit"*.

Start program to record data: *"MTECC_24CH_Robot_RT_RS.EXE"*.