Mech-Mind User's Manual

Mech-Mind

Jun 16, 2023

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If you are using an IRC5 controller, and the version of RobotWare is 6.02 or higher, please read the following content.

CHAPTER 1

ABB Setup Instructions

This section introduces the process of loading the robot master-control program onto an ABB robot. The process consists of the following steps:

- Check Controller and Software Compatibility
- Set up the Network Connection
- Load the Program Files
- Test Robot Connection
- Troubleshooting

Please have a flash drive ready at hand.

1.1 Check Controller and Software Compatibility

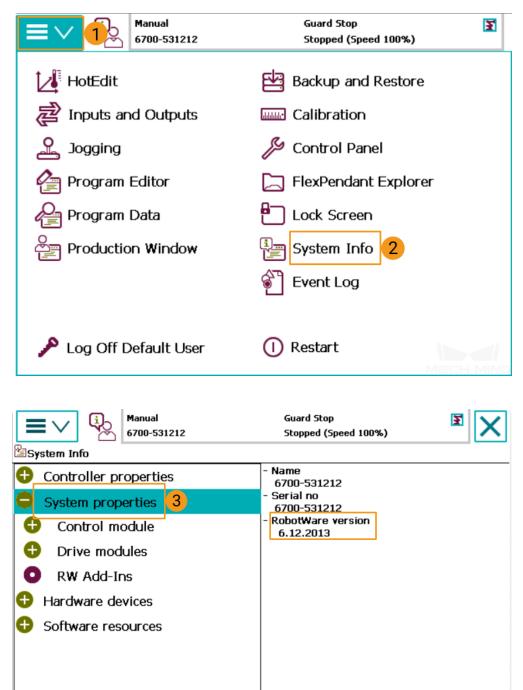
- Controller: IRC5
- Controller system software version: RobotWare 6.02 or above
- Control module options: 623-1 Multitasking and 616-1 PC Interface

Note: The above control module options must be installed to realize master-control of an ABB robot.

• Mech-Mind Software Suite: latest version recommended

Follow the steps below to check the RobotWare version and the installed control module options.

1. Tap \blacksquare and then go to System Info \rightarrow System properties to check the RobotWare version.



Refresh

ROB_1

Z

0

皆 System Info

2. Go to System properties \rightarrow Control Module \rightarrow Options to check whether the necessary options are installed.



1.2 Set up the Network Connection

1.2.1 Hardware Connection

Plug the Ethernet cable of the IPC into the X6 (WAN) port of the robot controller, as shown below.

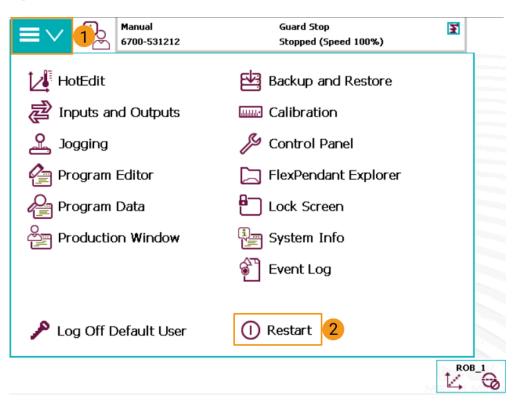


Hint: If you only need to load the master-control program via RobotStudio, you can use either LAN port or WAN port to connect the robot controller. However, in order to enable visual communication, the Ethernet cable can only be connected to the WAN port.

1.2.2 IP Configuration

You can set the IP on the teach pendant or via RobotStudio.

- Set the IP on the teach pendant
 - 1. Tap and select *Restart*.



2. Select $Advanced \cdots$

□ Restart	ц _р	Manual 6700-531212		Guard Stop Stopped (Speed 100%)	[X
		ny changed s		d. The state is save meter settings will the restart.		
		This oper	ation canno	ot be undone.		
Advanced	3			Restart		
1 Restart					1	

3. Select Start Boot Application and tap Next.

Constant Constant Constant Constant Constant Constant Constant	Guard Stop Stopped (Speed 100%)	EX
Advanced restart O Restart Reset system Reset RAPID Start Boot Application Revert to last auto saved Shutdown main computer		
	Next 5	Cancel
① Restart	·	

4. Select Start Boot Application to confirm.

© Restart	1	nual 00-531212		ard Stop pped (Speed 100%)		X
	Appl sav	lication will l ved and dea	be started. T activated (the	rted and the B ne current syst controller is n aintenance on	em is ion-	
		This opera	ation cannot	be undone.		
Advanced				Start Boot Application	6	
Restart						

5. After restarting, you will see the interface as shown below. Tap Settings.

	ABB Robotics Boot Application	R Default User
	6.12.02.00	
Install System	Settings 1 Select System	Restart Controller

6. Select Use the following IP settings and configure the IP Address, Subnet Mask, and Default gateway. Tap OK after configuration.

Network Identity							
O Use no IP address							
O Obtain an IP ac	dress automatically						
• Use the following	7	8	9				
IP Address:	4	5	6				
Subnet mask:	255.255.255.0	3 1	2	3			
Default gateway:		0	CLR				
ervice PC	Misc.	ок	4	Cancel			

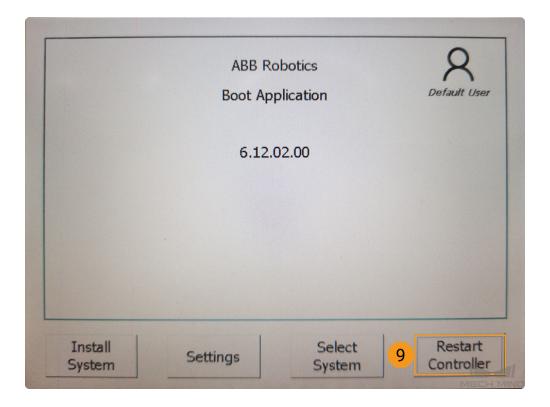
7. Tap Select System.

	ABB Robotics					
	Boot Application					
	6.12.02.00					
Install System	Settings Select System	5 Restart Controller				

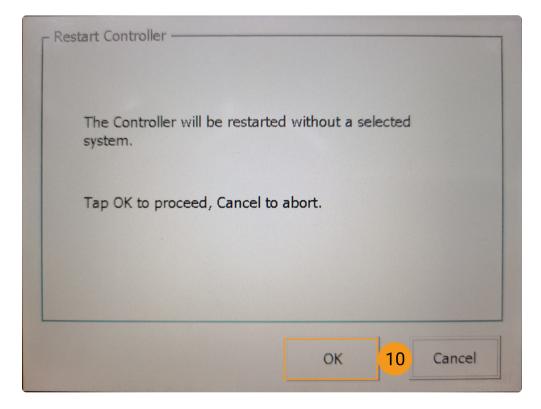
Delete
Deselect

8. Select the system name in Installed Systems box and then tap Select. Tap OK after configuration.

9. Select Restart Controller.



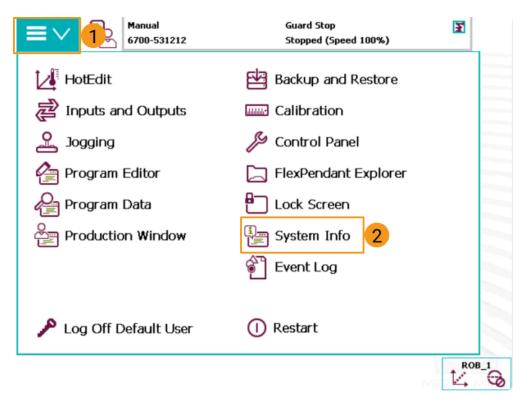
10. Tap OK to proceed.



- Set the IP via RobotStudio
 - 1. Follow the steps as shown below to configure the robot IP, and restart the robot after configuration.

File Home Modeling Simulation Cor	ontroller RAPID Add-Ins			
Add Controller Access Access	ate Restart Backup Inputs/ Events Gutputs/ Events Controller Tools	Online Signal Analyzer Jobs Configuration		nstallation Avoidance Safety C
Controller		(B)	Date and Time	
Service Port		🛃 վ վ վ վ վ վ վ վ վ վ վ վ վ	Controller ID	
▲ ○ 6700-531212 (6700-531212)		Q	Network settings	3
HOME Gonfiguration			Controller and Sys	Network settings
Event Log		1 3	Device Browser	Set an IP address of a real controller.
b ≥ I/O System		G.	Save system diagn	Requires warm start.
D TAPID				
		Network settings: 6700-531212	? ×	
		○ Obtain an IP address automatically		
		The she following TD address	4	
		• Use the following IP address:		
		IP address: 192.168.	1.10	
		Subnet mask: 255.255.2	255. 0	
		Default gateway: 192.168.	1.0	
		OK	5 Cancel	
				MECH MIND

• Go to Sytem Info \rightarrow Network connections \rightarrow WAN to check if the IP configuration was successful after restarting.



Manual 6700-531212	Guard Stop Stopped (Speed 100%)	X
 Controller properties Network connections Service port WAN 	- Configuration Fix IP address - IP address 192.168.1.10 - Subnet mask 255.255.255.0 - Default gateway	
 Installed systems System properties Hardware devices Software resources 	192.168.1.0 Refresh	
System Info	- M	

Attention:

- 1. Please ensure that the Ethernet cable is connected to the X6 (WAN) network port of the robot controller.
- 2. When setting the IP address, be careful not to confuse the IP address of the WAN port with the LAN port.

1.3 Load the Program Files

1.3.1 Preparation

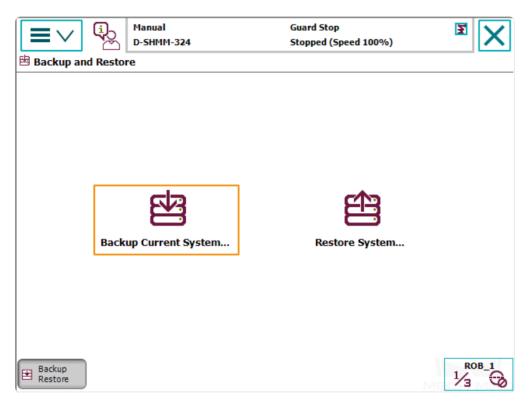
Backup

Before operating the robot, please follow the backup instructions below to back up the system. You can backup the robot system via the **teach pendant** or **RobotStudio**

- Backup on the teach pendant
- 1. Go to the home page using the menu in the upper-left corner, and then select **Restart**.

Hanual D-SHMM-324	Guard Stop Stopped (Speed 100%)			
HotEdit	Backup and Restore			
Inputs and Outputs	Calibration			
🕰 Jogging	🎾 Control Panel			
Production Window	🚰 Event Log			
Program Editor	FlexPendant Explorer			
Program Data	System Info			
🔎 Log Off Default User	() Restart			
		DB_1		

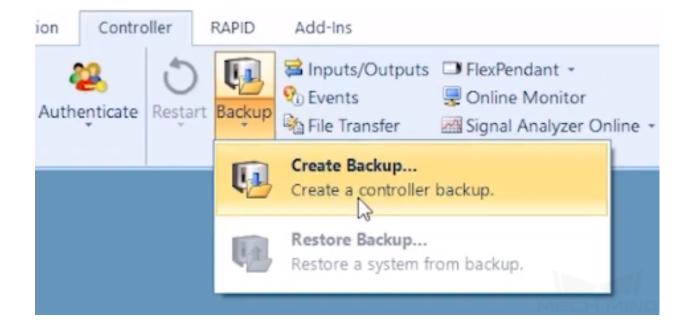
2. Select Backup Current System….



3. Specify the backup file name by pressing on *ABC*..., and specify the directory for saving the file by pressing Then, press **Backup** in the lower-right to start the backup process.

Backu	p Current S	Manual D-SHMM-324 ystem		Guard Stop Stopped (S	p 5peed 100%)	3	X	
All modules and system parameters will be stored in a backup folder. Select another folder or accept the default. Then press Backup.								
Ba	ckup folder:	:					_	
I	RB_6700_2	00kg_2.60m_Ba	ackup_202209	25		ABC		
Ba	Backup path:							
D:/								
Ba	ckup will be	created at:					_	
C	:/IRB_670	0_200kg_2.60m	_Backup_202	20925/				
A	dvanced	•			Backup	Cano	el	
Backu Resto							0B_1	

- Backup in RobotStudio
- 1. In the main interface of RobotStudio, select the controller you want to backup, and then select *Backup* \rightarrow *Create Backup*....



2. In the pop-up window, click OK after confirming the backup name and location.

Create Backup from			?	\times
Backup Name:				
Location:				
Augilable backware			~	
Available backups: Backup name	System name	RobotWare version		
Options Backup to archive file				
		ОК	Ca	ancel

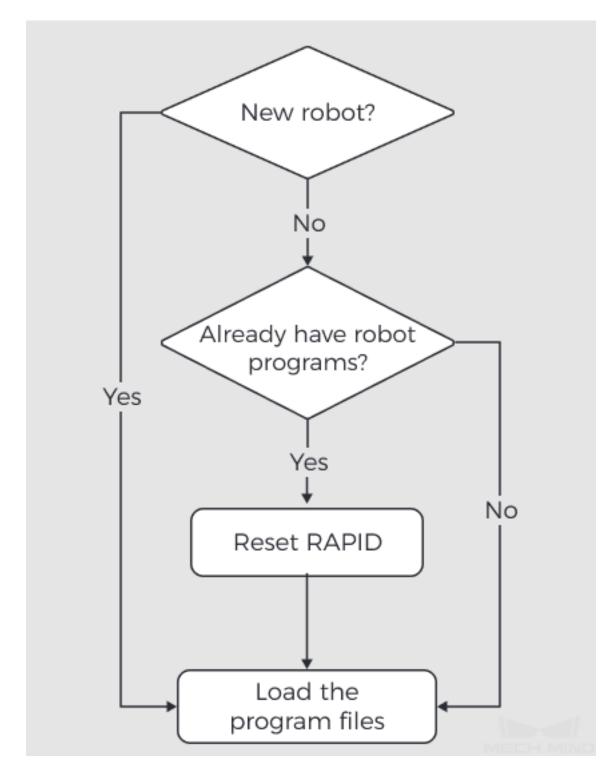
1.3.2 Reset

Note: Two reset options are provided: Reset system and Reset RAPID.

- **Reset system** discards all system parameter settings and changes made to RAPID programs, as well as DI/DO signal configurations. If I/O unit or other communication devices are used, these must be reconfigured after resetting the system.
- **Reset RAPID** only discards changes made to RAPID programs, and system parameter settings are kept. You do not need to re-load the config files after resetting RAPID.

Attention: Please make sure you have backed up the system before resetting.

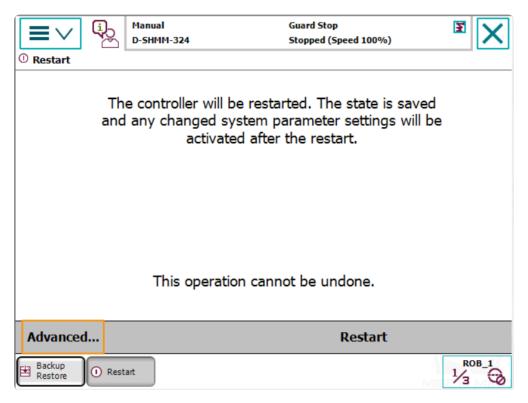
Determine if you need to reset RAPID according to the following figure.



1. Go to the home page using the menu in the upper-left corner, and then select **Restart**.

Hanual D-SHMM-324	Guard Stop Stopped (Speed 100%)	E
HotEdit	Backup and Restore	
Pinputs and Outputs	Calibration	
🕰 Jogging	🎾 Control Panel	
Production Window	Event Log	
Program Editor	FlexPendant Explorer	
Program Data	System Info	_
🎤 Log Off Default User	() Restart	1
Backup Restore	Me	

2. Select **Advanced…** in the lower-left.



3. Select either **Reset system** or **Reset RAPID** according to your needs, and then press **Next** in the lower-right.

© Restart	Manual D-SHMM-324	Guard Stop Stopped (Speed 100%)	x I
Advanced restart Restart Reset syste Reset RAPI Revert to la Shutdown r	D		
		Next	Cancel
Backup Restore	art		

4. Press **Reset system** or **Reset RAPID** in the lower-right, depending on your selection in the previous step, to start the reset process.

■ ∨ ① Restart	С. С	Manual D-SHMM-324	Guard Stopp	Stop ed (Speed 100%)	3	
	p	arameter set discarded, ar	vill be restarted. ttings and RAPID nd the original sy settings will be u	programs will stem installatio	be	
		This ope	eration cannot be	e undone.		
Advanced				Reset system		
Backup Restore	1 Rest	art			1	ROB_1

1.3.3 Prepare the Files

- Copy the program files into a USB flash drive. Please locate the folder where Mech-Mind Software Suite is installed and the files are stored in XXXX/Mech-Center-xxx/Robot_Server/Robot_FullControl/ abb/server on ABB.
- 2. The config file should be compatible with the I/O Unit in use. Please choose the right config file according to the table below:

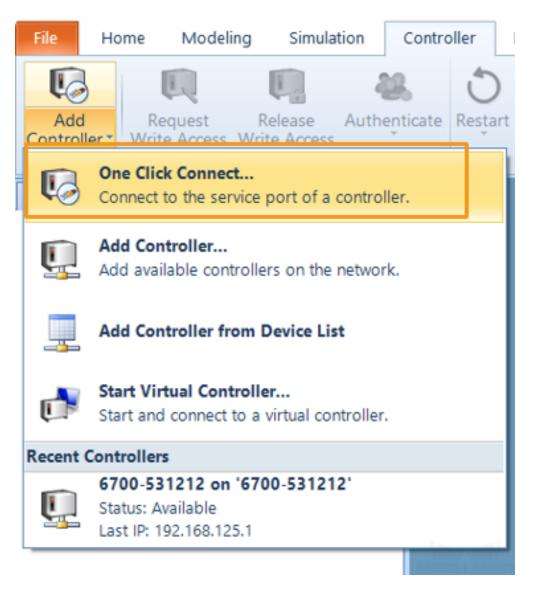
I/O Unit	config file
DSQC 652	D652.cfg, SYS.cfg
DSQC 1030	DSQC1030.cfg, SYS.cfg
Other I/O Units or the program is only used for auto-calibration	EIO.cfg, SYS.cfg

3. The files in the MM folder are robot program modules.

1.3.4 Load the Files to the Robot

Note: Before proceeding, please make sure that the robot is in the manual mode.

- 1. Open RobotStudio on the IPC and connect to the controller.
 - If the robot controller is connected via the LAN port, click **One Click Connect···**.



• If the robot controller is connected via the WAN port or a switch, click *Add Controller* and then select the controller and click *OK*.

File	Home Modeling Simulation	Controller	RAPID	Add-Ins													
Add	Request Release Authent Ier Write Access Write Access	ticate Restar	t Backup	Inputs/ Outputs	Tra	File FlexPendansfer Controller Tools		Signal Analyzer Online *	Jobs	Configuration	Load Parame Save Parame Properties *	ters Insta	allation hager *	Conveyor Trackin Integrated Vision Collision Avoidan	Safety	Control Panel	Opera Wind Virt
Ū3	One Click Connect Connect to the service port of a controller																
<u> </u>	Add Controller Add available controllers on the network.	1		d Contro													
	Add Controller from Device List		8	vstem Na	10	ers on the ne	Controller		_	Address		Robot¥a		sion 2			
¢,	Start Virtual Controller Start and connect to a virtual controller.			700-5312	12		6700-5312	12	19	92. 168. 125. 1		6. 12. 20	013				
Recent	Controllers																
Ļ	6700-531212 on '6700-531212' Status: Available Last IP: 192.168.125.1																
			R	emote Co	ntroller	. Add	l					Filter	r	~			1
				Refresh	Sh	ow Virtual C	ontrollers	Login :	as Loca	al Client	Low Ba	ndwidth		OK	3	ancel	

2. Request write access: click **Request Write Acess** in RobotStudio, and press *Grant* on the teach pendant.



3. Import the config files as shown below. Click *Confirm* in the pop-up windows.

File Home Modeling Simulation Controller F	RAPID Add-Ins					۵ 🚱
Add Controller Request Release Write Access Write Access Access	Backup Inputs/ Outputs Events File Flex Transfer Controller	Pendant Online Signal Analyzer Jobs Configu Tools	ration Properties -	Installation Manager Collision Avoidance - Sa	fety Operating Mode Virtual Controller	Go Create Open
	× Solution29:View1 ×					-
* Expand all	3 Open				×	
Current Station ¶ IRE_6700_205kg_2.80m b a Home	- ·	> USB (H:) > abb > server on ABB > cor	nfig	ٽ ~	Search config 🔎	
Configuration Event Log	.•				III - 🛛 🕜	
I/O System RAPID	SThis PC Nan	ne	Date modified T	Type Size		\backslash
	3D Objects	D652.cfg	5/9/2022 12:06 AM	CFG File 2 KB		
	Desktop	DSQC1030.cfg	5/9/2022 12:06 AM	CFG File 2 KB		
		EIO.cfg		CFG File 2 KB		
	Downloads	SYS.cfg	2/15/2022 8:51 PM C	CFG File 1 KB		
	Music				Select a file to preview.	
	Pictures					
	Videos					
	🧹 USB (H:)					
	USB (H:)					
		Delete existing parameters before loading				
		Load parameters if				
		no duplicates				^
	Ĭ	and replace duplicates				
	File Name.(N)	: "EIO" "SYS"		~	Configuration Files (*.cfg) ~	
					Open(O) 4 Cancel	
		tation): 10010 - Motors OFF state			Event Log	
	1KE_6700_205kg_2.80m (S	tation): 10011 - Motors ON state		11/05/2022 11:21:31 B	Ivent Log	Controller status: 1/1
						Controller Status, 1/1

RobotStudio

 \times

Load parameters from the selected file(s)?

If duplicate parameters are found they will be replaced.

	Confirm	Cancel
RobotStudio		
Loading configuration data succe The changes will not take effect u restarted.		oller is
Do not show this dialog agai	n	Confirm

4. Copy the whole **MM** folder and paste it to the **HOME** directory of the robot system, as shown below. Restart the controller to complete loading the program files.

Add Controller - Access Access	srt Backup 1 File Transfer Controller Tools	Configuration	Load Parameters - Save Parameters Properties - Configuration	Conveyor Tracking Conveyor Tracking Integrated Vision Collision Avoidance	Control Operator Panel Window Vitual Controller	Go Offline Create Relation Open Relation Transfer
Controller	File Transfer × PC Explorer D:\projects\Mech-Center\M Name	Mech_RobServ\install_po Date modified Typ			rer (1.3 GB free of 1.8 GB) 6700-523702'/hd0s/6700-523702/HDME Date modified Type	v 2 x
 M Configuration W Tong W LOS System MATID 	aune board confir	2021/6/4 9:46 文f 2021/6/4 9:46 文f 2021/6/4 9:46 文f 2021/6/4 9:46 文f 2021/5/10 1 文	pe 51ze 件決 件決 行詞 不文档 394 B CX 文档 520.1 KB	Constant of the second	2021/7/23 1 文件夹 rlf 2021/7/23 1 RLF 文件 s 2021/7/23 1 RAFID mode	3.8 103 al 1.1 139 al 307 B al 643 B 1.3 109 1.1 103

5. Modify the safe zone threshold (in mm) in the **safe_area.mod** program according to the actual on-site work space of the robot.

```
iolution29:视图1
               IRB_6700_205kg_2.80m (工作站) ×
safe_area/safe_area x
         MODULE safe_area
     1
           CONST pos min_xyz:=[-3000,-3000,-3000];
     2
       -
           CONST pos max_xyz:=[3000,3000,3000];
     З
           VAR pos current_pos;
     4
           VAR bool area_use := TRUE;
     5

□PROC main()

     6
     7
       Ė
             WHILE TRUE DO
     8
       Ė
             IF area_use THEN
     9
             current_pos := CPos(\Tool:=tool0, \WObj:=wobj0)
    10
       Ė
             IF min_xyz.x>current_pos.x or current_pos.x>max
                  ErrWrite "out of safe area", "Robot Stop" \
    11
                  StopMove\Quick;
    12
    13
                  Stop\AllMoveTasks;
    14
             ENDIF
    15
             ENDIF
    16
             ENDWHILE
    17
         ENDPROC
    18
         ENDMODULE
```

1.3.5 Configure I/O System

If an I/O unit other than DSQC 652 or DSQC 1030 is used, you should configure the robot I/O system after loading the program. Please follow the steps below to proceed:

1. In the main interface of RobotStudio, select Configuration \rightarrow IO System.



2. Locate and click **Signal** in the **Type** column, locate **gi16** and **go16** in the **Name** column on the right, and then double-click to enter the edit window.

Туре	Name	Type of Signal	Assign
Access Level	EN1	Digital Input	PANEL
Cross Connection	EN2	Digital Input	PANEL
Device Trust Level	ENABLE 1	Digital Input	PANEL
DeviceNet Command	ENABLE2_1	Digital Input	PANEL
DeviceNet Device	ENABLE2_2	Digital Input	PANEL
DeviceNet Internal Device	ENABLE2_3	Digital Input	PANEL
	ENABLE2_4	Digital Input	PANEL
EtherNet/IP Command	ES1	Digital Input	PANEL
EtherNet/IP Device	ES2	Digital Input	PANEL
	14.0		T112 T
Industrial Network	gi16	Group Input	PN_Inter
PROFINET Common Data	gi16 gi16_2	Group Input Group Input	PN_Inter
			PN_Inter
PROFINET Common Data	gi16_2	Group Input	PN_Intes
PROFINET Common Data PROFINET Device PROFINET Internal Device	gi16_2 gi16_3	Group Input Group Input	PN_Intes
PROFINET Common Data PROFINET Device PROFINET Internal Device Route	gi16_2 gi16_3 gi16_4	Group Input Group Input Group Input	PN_Inter
PROFINET Common Data PROFINET Device PROFINET Internal Device Route Signal	gi16_2 gi16_3 gi16_4 gi_pause	Group Input Group Input Group Input Group Input	
PROFINET Common Data PROFINET Device PROFINET Internal Device Route Signal Signal Safe Level	gi16_2 gi16_3 gi16_4 gi_pause go16	Group Input Group Input Group Input Group Input Group Output	
PROFINET Common Data PROFINET Device PROFINET Internal Device Route Signal	gi16_2 gi16_3 gi16_4 gi_pause go16 go16_2	Group Input Group Input Group Input Group Input Group Output Group Output	

3. After confirming the corresponding devices and device mapping, modify the values of **Assigned to Device** and **Device Mapping** for **gi16** and **go16** respectively.

Name	gi16	
Type of Signal	Group Input	×
Assigned to Device	PN_Internal_Device	~
Signal Identification Label		
Device Mapping	0-15	
Category		
Access Level	Default	٧
Default Value	0	
Filter Time Passive (ms)	0	
Filter Time Active (ms)	0	
Invert Physical Value	O Yes	
	No	

Name	go16		
Type of Signal	Group Output	~	
Assigned to Device	PN_Internal_Device	~	
Signal Identification Label			
Device Mapping	0-15		
Category			
Access Level	Default	~	
Default Value	0		
Invert Physical Value	 Yes No 		
Safe Level	DefaultSafeLevel	~	

4. After the configuration, click OK. Then restart the controller to make the changes take effect.

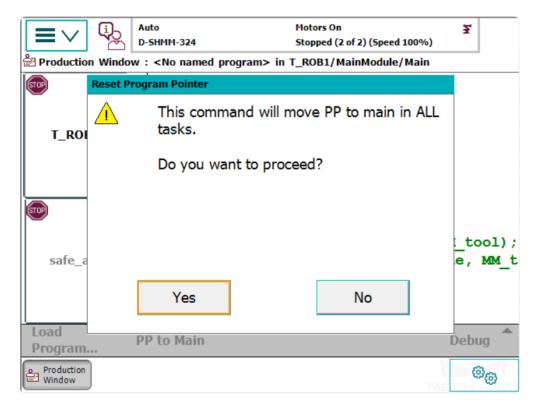
1.3.6 Run the Program

1. Move the PP of tasks $\mathbf{T_ROB1}$ and $\mathbf{safe_area}$ to Main respectively.

$\equiv \lor$	С,	Auto D-SHMM-324			Motors On Stopped (2 of 2) (Speed	100%)	ž	X					
Production Window : <no named="" program=""> in T_ROB1/MainModule/Main</no>													
(STOP)	2	2 LOCAL	VA	R robtar	get hometarg	et;							
	3												
	4	PROC 1	Mai	n ()									
T_ROE	31	1! ***	ve:	rsion 5.	2 *** !								
		5 iı	nit	;									
	7	WHILE	TRI	JE DO									
	8	8 M	M_C(ontrol \]	<pre>branch:=1;</pre>								
STOP	9		_										
	1	.0 !	!! (customer	robot progr	am.							
	1	1 !	ho	netarget	:= CalcRobT	(*, MM	_to	ol);					
safe_a	irea 1	.2 !	Mo	veJ home	target, v100	0, fin	e,	MM_t					
	1	B ENDWH	LE										
	1	.4											
	1	5 ENDPRO	DC										
Load		DD to Mai	_	2) a ha	A					
Program.		PP to Mai	n	2		L)ebu	ıg					
Production Window						MO	6	0					

\equiv	(j) (j)	Aut D-9	to 5HMM-324		Motors On Stopped (2 of 2) (Speed 100%)	ž	X						
Production Window : <no named="" program=""> in safe_area/safe_area/main</no>													
T_ROB1		4	VAR po	os curren	t_pos;								
		5	VAR bool area_use := TRUE;										
		6	PROC main() WHILE TRUE DO IF area_use THEN										
		7→											
		в											
		9	current_pos := CPos(\Tool:=tool0, \WO										
	:	10	IF min_xyz.x>current_pos.x or current										
STOP	:	11		ErrWrite	"out of safe an	rea",	"Rob						
	1	12	StopMove\Quick;										
safe_area		13	<pre>Stop\AllMoveTasks;</pre>										
		3	END	F									
		15	ENDIF										
	1	16	END	HILE									
	1	17	ENDPROC										
Load Program		РР	to Main	4		Debu	ig 🕈						
Production Window)				ſ	6	0						

2. After selecting PP to Main, if a window as shown below pops up, please tap Yes to confirm.



- Auto Motors On ž D-SHMM-324 Running (2 of 2) (Speed 100%) Production Window : <No named program> in T_ROB1/motion_control/exec_motion IF MM trajectory{MM pointer}.moti 112 WaitTime 0.05; 145 RETURN; 114 T_ROB1 ENDIF 115 116 next point := MM trajectory{MM po MM trajectory {MM pointer}.motion 117 MM pointer := get next pointer(MM 118 IF next point.motion id <> 0 THEN 119 120 motion id header := get next motion id buffer{motion id he 121 122 ENDIF safe_area 123 IF (next point.acc <> current acc current acc.acc := next point 124 AccSet current acc.acc, curre 125 Load **PP to Main** Debua Program... Production මල Window
- 3. Run the program manually or automatically. The program pointer is shown below.

1.4 Test Robot Connection

1.5 Troubleshooting

If the program has been loaded but the robot cannot be connected successfully, please check whether the following requirements have been met.

- IPC end:
 - 1. The firewall is turned off.
 - 2. The IPC can communicate with the robot IP address with the ping command in the command prompt.
 - 3. There is no interference from any antivirus software.
 - 4. Two network ports of the IPC belong to different subnets and there is no conflict.
 - 5. If the IPC is connected via a router, there is no interference from other network cables.
- Robot end:

- 1. The Ethernet cable is connected to the WAN port of the controller properly.
- 2. The robot IP address is set correctly. Please ensure that the set IP address is that of the WAN port instead of others.
- 3. You have run the program on the robot end.

chapter 2

ABB Program Description

2.1 Program Module

Program Module	Description
motion_server	Background program used to receive data from Mech-Center
status_server	Background program used to send data of robot pose, signal, and status
motion_control	Foreground program used to guide the robot to move
pause_control	Program used to pause
MainModule	Main program
mm	Program data used to define the master-control program

2.2 Signal

Support 64 D/I and D/O signals in maximum. Support 16 D/I and D/O signals when loading the program files by default.

D/O	go16	$go16_2$	go16_3	go16_4
D/I	gi16	gi16_2	gi16_3	gi16_4

If you are using an OmniCore controller, and the version of RobotWare is 7.3 or higher, please read the following content.

chapter 3

RobotWare7 Setup Instructions

- Check Controller and Software Compatibility
- Set up the Network Connection
 - Hardware Connection
 - IP Configuration
- Load the Program Files
 - Prepare the Files
 - Backup
 - Reset
 - Load the Files to the Robot
- Run the Program
- Test Robot Connection
- Troubleshooting

3.1 Check Controller and Software Compatibility

- Controller: OmniCore.
- Controller system software version: RobotWare 7.3 or higher
- Control module option: 3114-1 Multitasking

In the Home interface of the teach pendant, tap $Settings \rightarrow System$ to check the RobotWare version.

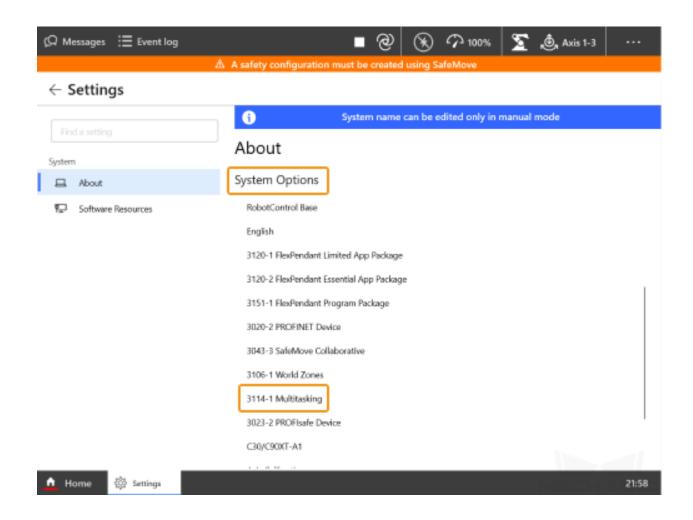
▲ A safety configuration must be a	@ 🕢 🖓 100% 🖺 🛣 💩 Axis 1-3 🛛 ····
ABB Robotics	
Code Program Data Jog	Settings 1/0
Operate Calibrate File Explore	r SafeMove Add-In Installer
Virtual Controller / CR	B1100_4_47_1 14:49

Ω Messages	:≣ Event log		∎ @ (-	1% 💆 💩 Axis 1-3	
	A As	afety config	uration must be created usin Settings	ng SafeMove		
			2			
B	System About, rename this robot, hardware devices, software resources	Ŀ	Network Network summary, configuration	0	ABB Ability ^{***} Connectivity & services	
¢	Backup & Recovery Reset, restart, installer, backup & restore	м	Diagnostics System Diagnostics and logs	色 A字	Time & Language Set language, date & time	
ý	Personalization Programmable keys	Ç	Update Update FlexPendant and Controls software		FlexPendant Configure the FlexPendant Syst	bern
63	Advanced Path and Jog supervisions	6	Safety Controller Safety Controller Settings and Co	introl		
	Ξ	Log out Defa	ult User 🔿 Restar	rt Controller		
🛕 Home	💮 Settings				MECH	21:56

Tap About and you can confirm the RobotWare version in ${\bf System \ Details}.$

(Ω Messages ∷≣ Event log		🔳 🕲 🛞 ᡗ 100% ∑ 🧶 Axis 1-3 🛛 …
(5))	▲ A safety configuration m	ust be created using SafeMove
← Settings		
	()	System name can be edited only in manual mode
System		
🖴 About	RobotOS	6.0.1
🐑 Software Resources	RobotControl	7.7.1
	Robots	1.7.1
	Wizard	1.4.1
	FlexPendant Info	
	App Version	1.9.0.191
	OS Version	Unknown
	System Options	
	RobotControl Base	
	English	
	3120-1 FlexPendant Limit	ted App Package
	3120-2 FlexPendant Esser	ntial App Package
🛕 Home 🛞 Settings		21:57

Check whether 3114-1 Multitasking is in the ${\bf System \ Options}.$

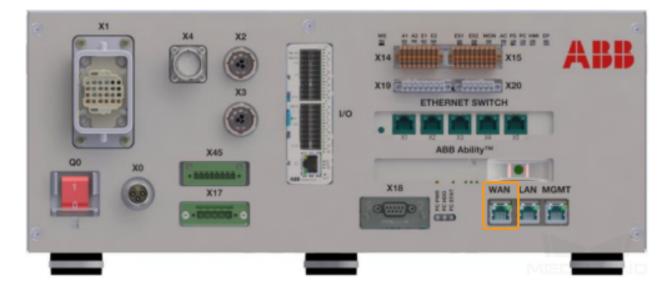


Attention: The robot cannot be connected via Master-control if the system version does not meet the requirement.

3.2 Set up the Network Connection

3.2.1 Hardware Connection

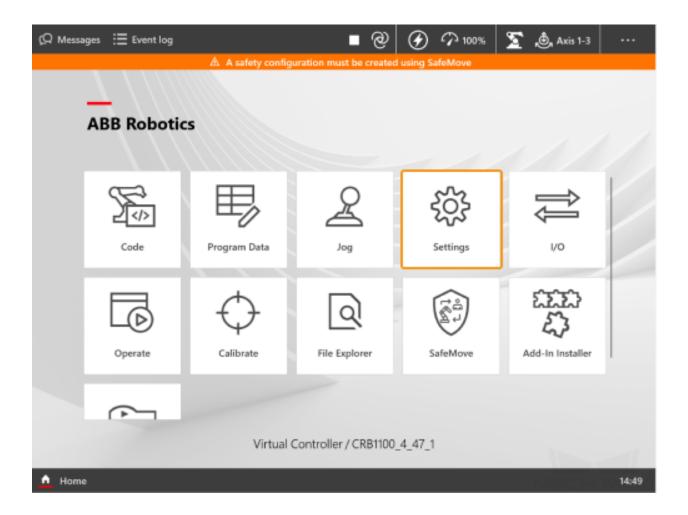
Plug the Ethernet cable of the IPC into the **WAN** port of the robot controller, as shown below.



3.2.2 IP Configuration

In the Home interface of the teach pendant, select $Settings \rightarrow Network \rightarrow Public Network$.

Select Use the following IP address, and enter the IP Address, Subnet Mask, Default Getaway. The IP address of the robot should be in the same subnet as that of the IPC.



ගි Messages	⊞ Event log	- f. i f	∎ @ ⊗		🛐 💩 Axis 1-3	
	20 A :	safety configuration m	ttings	aremove		
晗	System About, rename this robot, hardware devices, software resources	Find a setting Network	ummary, configuration		ABB Ability ^{see} Connectivity & services	
¢	Backup & Recovery Reset, restart, installer, backup & restore	Diagnost System Dia	tics agnostics and logs		fime & Language iet language, date & time	
Ę	Personalization Programmable keys	Update Fie software	exPendant and Controller		RexPendant	lanm.
3	Advanced Path and Jog supervisions	Safety Con Safety Con	ontroller troller Settings and Contro	d		
	Ð	Log out Default User	🔿 Restart Co	ontroller		
A Home	🛞 Settings				MECH	21:58

Attention: The Ethernet cable must be connected to the WAN port. When setting the IP, be careful to distinguish between the robot IP address of the WAN port and that of the LAN port.

3.3 Load the Program Files

3.3.1 Prepare the Files

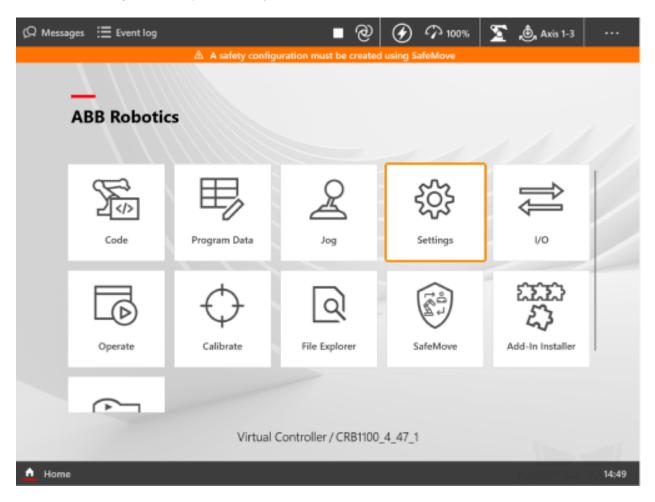
Copy the program files into a USB flash drive. Please locate the folder where Mech-Mind Software Suite is installed and the files are stored in Mech-Center-xxx/Robot_Server/Robot_FullControl/abb/server on ABB.

Folder	Description
con-	Robot configuration file that defines the signals required by the Master-control, the auto-
fig_robware7	loaded module, and task types
MM_robware	7 The robot program module

3.3.2 Backup

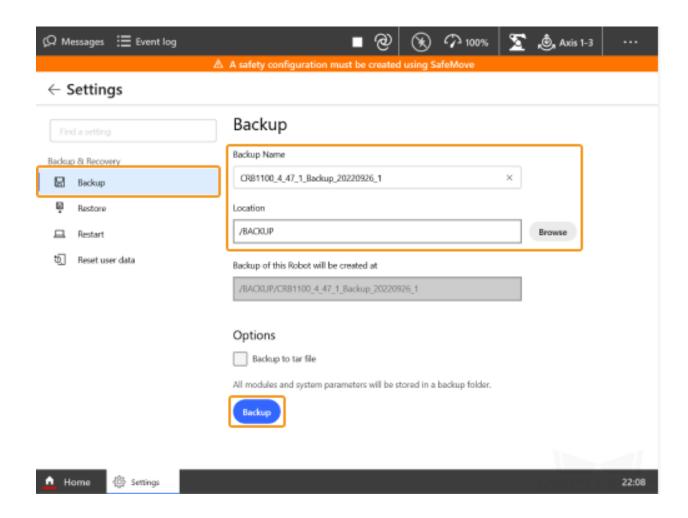
Before operating the robot, please follow the backup instructions below to back up the system so that the robot system can be recovered if a misoperation occurs.

1. Select Settings \rightarrow Backup & Recovery in the Home interface.

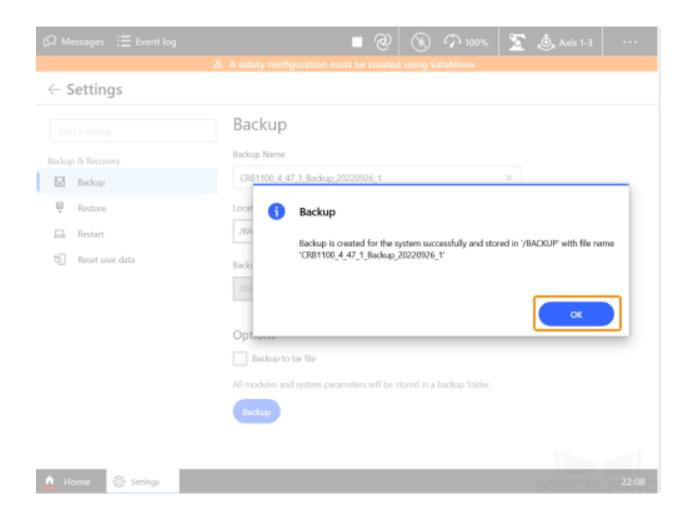


ß	Messages	∃ Event log		∎ @ (🗴 💩 Axis 1-3	
		A As	afety config	uration must be created us	sing Safe	Move		
				Settings				
	B	System About, rename this robot, hardware devices, software resources	<u>.</u>	Network Network summary, configuratio	on		BB Ability ^{ne} onnectivity & services	
[¢	Backup & Recovery Reset, restart, installer, backup & restore		Diagnostics System Diagnostics and logs			ime & Language et language, date & time	
	Ą	Personalization Programmable keys	\mathbb{C}	Update Update FlexPendant and Contro software	oller		lexPendant onfigure the FlexPendant Sj	ystem
	¢	Advanced Path and Jog supervisions	6	Safety Controller Safety Controller Settings and t	Control			
		E	Log out Defa	ault User 🔿 Rest	lart Contro	aller		
۵	Home	贷 Settings					MED	21:58

2. In the Backup window, modify the Backup Name and Location and then tap *Backup*.



3. Click OK in the pop-up window to complete the backup.



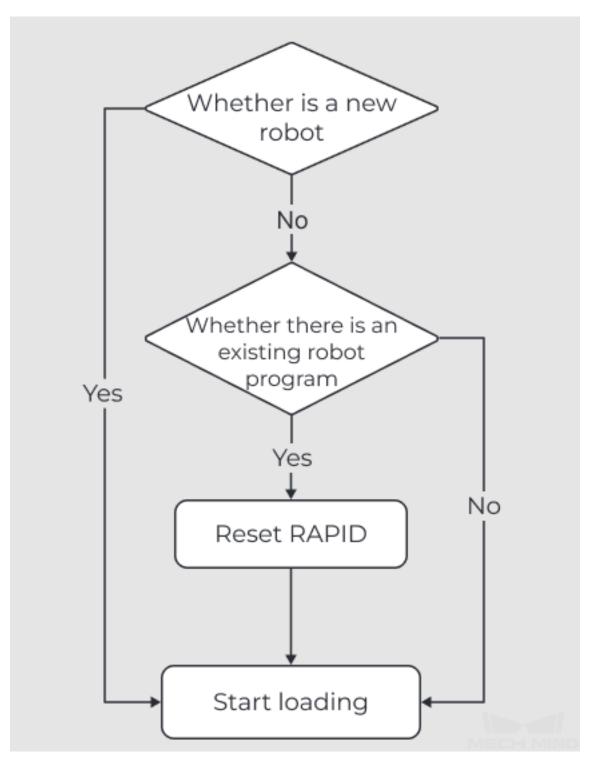
3.3.3 Reset

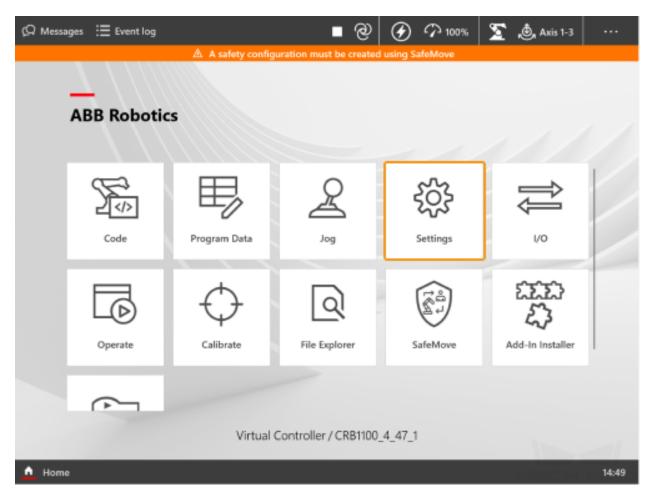
Note: There are two types of resets, which are resetting the system and resetting RAPID.

- **Resetting the system** will restore the default system parameters and RAPID program, and the I/O configuration will be reset too. If a communication board or other communication devices are used, they should be re-configured after the system is reset.
- **Resetting RAPID** will delete the current RAPID program and data, while the system parameter settings will be retained.

Reset RAPID

Please determine whether you should **reset RAPID** according to the following flowchart.

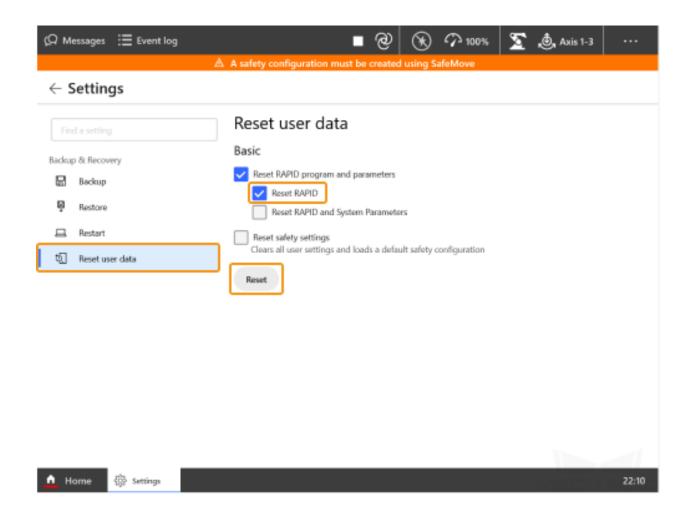




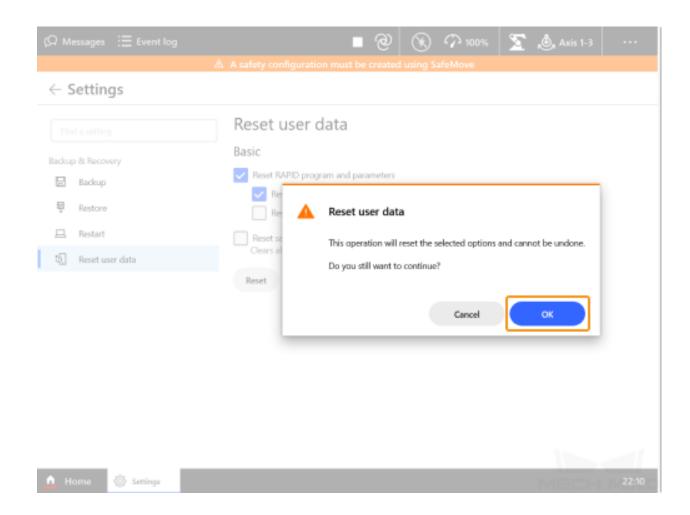
1. Select Settings \rightarrow Backup & Recovery in the Home interface.

ß	Messages	:≣ Event log		∎@ 0	R m 1009	5 💆 💩 Axis 1-3	
		A A:	afety config	uration must be created usin	g SafeMove		
				Settings			
	Ê	System About, rename this robot, hardware devices, software resources	Ę	Network Network summary, configuration	6	ABB Ability** Connectivity & services	
	¢	Backup & Recovery Reset, restart, installer, backup & restore		Diagnostics System Diagnostics and logs	Q A字	Time & Language Set language, date & time	
	¢	Personalization Programmable keys	Ç	Update Update FlexPendant and Controlle software		FlexPendant Configure the FlexPendant Syste	875
	¢	Advanced Path and Jog supervisions	6	Safety Controller Safety Controller Sattings and Cor	ntral		
		E	Log out Defa	ult User O Restart	t Controller		
٨	Home	🔅 Settings				MECH	21:58

2. In the Reset user data window, select Reset RAPID, and then tap Reset.

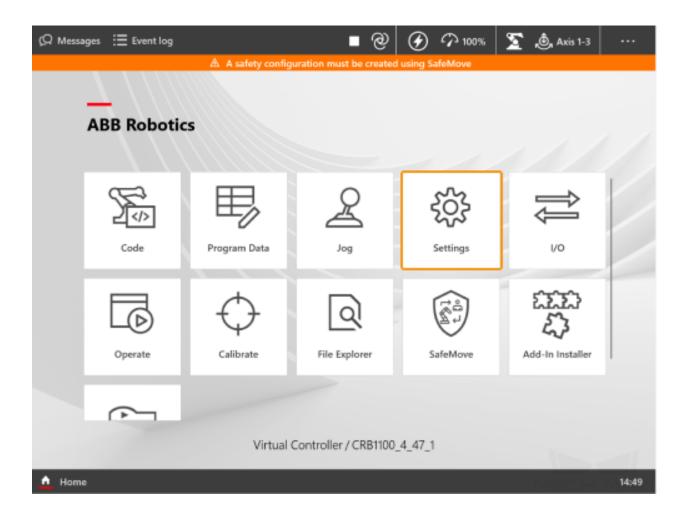


3. Click OK in the pop-up window.



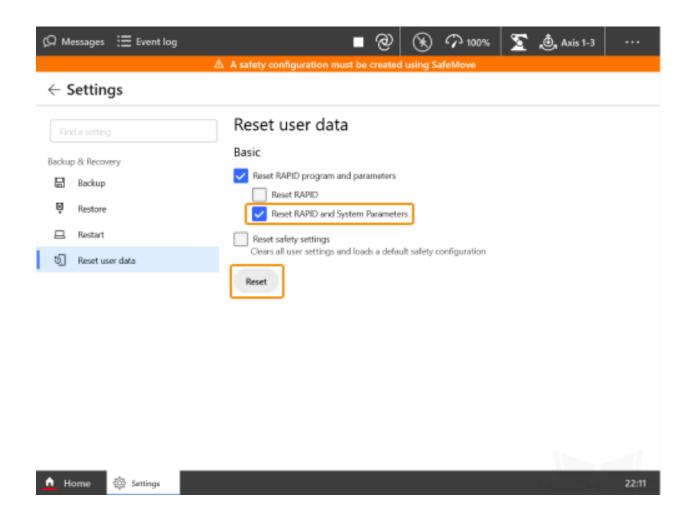
Reset the System (use with caution)

1. Select Settings \rightarrow Backup & Recovery in the Home interface.

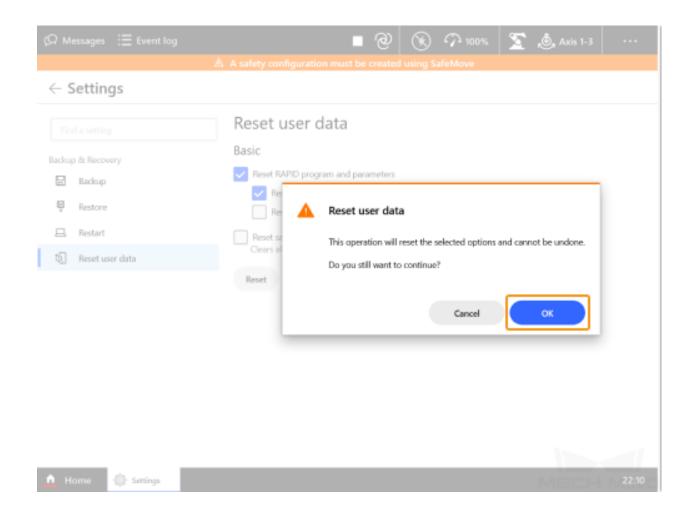


ß	Aessages	:≡ Event log		∎ @ (爱介100	% 💆 💩 Axis 1-3	
		A As	afety config	uration must be created usi Settings	ng SafeMove		
				-			
	B	System About, rename this robot, hardware devices, software resources	Ę	Network Network summary, configuration	6	ABB Ability ^{ne} Connectivity & services	
	٩	Backup & Recovery Reset, restart, installer, backup & restore	困	Diagnostics System Diagnostics and logs	(凸, A字	Time & Language Set language, date & time	
	¢	Personalization Programmable keys	Ç	Update Update FlexPendarit and Control software	ller e	FlexPendant Configure the FlexPendant Syn	item
	¢	Advanced Path and Jog supervisions	6	Safety Controller Safety Controller Settings and Co	ontrol		
		E	Log out Defa	ult User 🔿 Resta	rt Controller		
<u>•</u> •	Home	贷 Settings				MECH	21:58

2. In the Reset user data window, select Reset RAPID and System Parameters, and then tap $\mathit{Reset.}$



3. Click OK in the pop-up window.



3.3.4 Load the Files to the Robot

1. Open RobotStudio, since the Ethernet cable is connected to the WAN port of the controller, click Add Controller and then select the controller and click OK. After the controller is added successfully, the controller management port will be connected automatically.

File	Home Modeling Simulation	Controller	RAPID	Add-Ins													
Add Control		ticate Restan	t Backup	Inputs/ Outputs		le FlexPendar	nt Online Monitor	Signal Analyzer Online *	Jobs	Configuration	Load Parame Save Parame Properties ~	eters	nstallation Manager * iguration	Conveyor Tra	ision	Safety Ci	ontrol Oper Panel Wind Vir
Ę3	Connect to the service port of a controller																
Q	Add Controller Add available controllers on the network.	1	Ad	d Contro	ller												
		_	Âva	ailable d	controller	rs on the net	twork:										
	Add Controller from Device List			rsten Nam			Controller		_	Address			tVare Ve				
d.	Start Virtual Controller Start and connect to a virtual controller.		01	700-53121	2		8700-53121	.2	192	2. 168. 125. 1		6.12	2013	2			
Recent	Controllers																
F	6700-531212 on '6700-531212'																
Ļ	Status: Available Last IP: 192.168.125.1																
												m/1					
				enote Com		Add						Fil	lter	~	_		
				Refresh	Sho	w Virtual Co	ntrollers	🗌 Login a	as Local	l Client	Low Ba	andwidt	n		OK	3 a	ncel

2. Import the two configuration files in the config_robware7 folder as shown below.

Access	Lackup Inputs/ Events Outputs Ventus File FlexPendant Controller Tools	Donline Signal Analyzer Jobs		-1 ²	Conveyor Tracking ntegrated Vision Collision Avoidance - Si	afety Operati Mode	ing Operator	ge Options Go Create O Offline Relation Rela
	× Solution29:View1 ×					_	_	
rrent Station	Open							×
IRE_6700_205kg_2.80m	\leftarrow \rightarrow \checkmark \uparrow \blacksquare > This PC > USB (l:) > abb > server on AB	B > config_robware7		~ U	Search	config ,	٩
W Configuration) T 🗐	0
🚘 I/O System	SThis PC Name	^	Date modified	Туре	Size			
RAPID	3D Objects 🔡 EIO.cfg	2	5/9/2022 12:06 AM	CFG File	2 KB			
	Desktop		2/15/2022 8:51 PM	CFG File	1 KB			
	Documents							
	Downloads						Select a file to preview.	
	Music							
	Pictures							
	Videos							
	🥌 USB (H:)							
	🥌 USB (H:) 🗸 🗸							
	O Delete e parame loading	xisting ers before						
	O Load pa	ameters if						\
	no dupl							
	 Load pa and rep duplicat 	ace 3						
	File Name.(N): "EIO"	SYS*			~	Configura	tion Files (*.cfg)	-
						Open (C		
	(i) IRB_6700_205kg_2.80m (Station):	10010 - Motors OFF stat	e	11/05	/2022 11:21:28	Event Log		

Tip: You can select multiple files by pressing the Ctrl key and the left mouse button.

X

3. Select *Confirm* in the pop-up windows.

RobotStudio

Load parameters from the selected file(s)?

If duplicate parameters are found they will be replaced.

	Confirm	Cancel
RobotStudio		
Loading configuration data succe The changes will not take effect u restarted.		ller is
Do not show this dialog again	n	Confirm

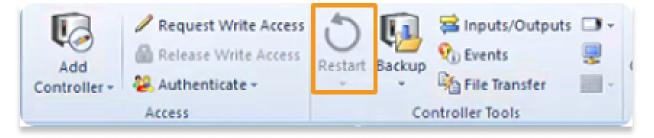
4. Follow the steps as shown in the figure below to copy the entire **MM_robware7** folder and paste it to the **HOME** directory of the robot system.

) rt	Backup Controller Tools	Configuration	Properties -	Installation	Conveyor Tracki Conveyor Tracki Collision Avoid	on Safety	Control Operator	Edit System	Go Offline Create Rel Open Rela Transfer	ation
	File Transfer X									Ŧ
	PC Explorer D:\projects\Mech-Center\Me	ech_RobServ\instal	l_packages\abb\server	• 🛫 😰			(1.3 GB free of 1. 00-523702'/hd0a/670	- 1.5.4		- 2 👔
	Name config_robware? config MM_robware? 2 MM	2022/10/9 9:58 2022/10/9 9:58	Type Size 文件夹 文件夹 文件夹 文件夹			_robware7	Date modif 2022/10/18 2022/10/13 2022/10/13 2022/10/13	文件夹 文件夹 RAPID 模块文件 RAPID 模块文件	Size 2.3 KB 735 B 458 B	
										

5. Follow the steps as shown in the figure below to enable the RapidSockets network service.

Controller $\overline{+}$ ×	ABB-beijinglab:View1	1300-501164 (Station	1) × (r						
Collapse all	Configuration - Comm	unication x							- a + ÷
Current Station	Type	Network Service	Enable on Public Network	Enable on Private Network	linstance Editor	Instance Editor		- 🗆 X	
▲ 🔛 1300-501164				Yes	instance cartor				
Image: Description of the second s	CS Gateway 3G	ConnectedServices		Yes	Name	Value	Information		
 	CS Gateway Wi-Fi			Yes	Network Service	RapidSockets			_
1 🛄 Communication				N/A	Enable on Public Network	Yes	4		
Controller	DNS Client			N/A		O No			-
I/O System 2	Firewall Manager		Yes	Yes N/A	Enable on Private Network	Yes			_
Man-Machine Communication	IP Setting			N/A N/A		O No			-
Motion	Syslog			Yes		-			-
PROC .		333108	103	100					_
Event Log									
⊳ 🧮 I/O System									
A RAPID									
·									
								OK Cancel	
								OK Cancel	THE MIND

- 6. Modify the safe zone threshold (in mm) in the **safe_area.mod** program according to the actual on-site work space of the robot.
- 7. Click *Restart* to complete loading the program files.



3.4 Run the Program

Reset the Program Pointer

1. In the Home interface, tap *Operate*.

(Q Message	is i≣ Eventlog	A safety config	uration must be created	-	🚡 💩 Axis 1-3	
Ā	BB Robotic	:5				
	Code	Program Data	Jog	Settings	↓ V0	
	Operate	Calibrate	File Explorer	SafeMove	Add-In Installer	
	~	Virtual	Controller / CRB1100_	_4_47_1		1
🛕 Home					Mechi	14:49

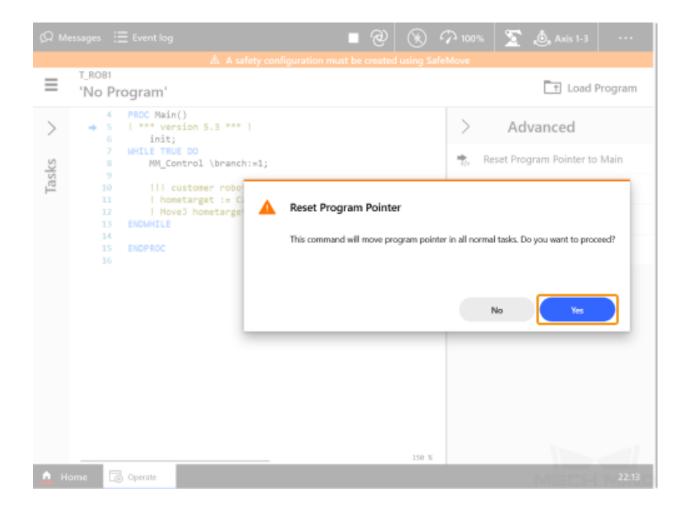
2. Tap *Tasks* on the left and the list of tasks will be expanded. Tap *Advanced* on the right and the advanced settings will appear.

ßЯ Me	essages 🗄	Event log			∎ ଡ	۲	P 100%	Σ	💩, Axis 1-3	•	
=	t_rob1 'No Pi	rogram'		onfiguration mus	t be created	using Sa	afeMove		t Load I	Progra	ım
Tasks 🗸	4 * 5 6 7 8 9 10 11 12 13 14 15 16	init; MHILE TRU MM_Con III co I hom	ion 5.3 *** !	gram. bT([[0, 0, 0,		[8, 9es), 9e9, 9e9,	9e9,	9e9]], MM_too	,1);	✓ Advanced
								_	150	x	11
🛕 н	ome 🗔	Derate							MEEH	14	4:50

3. In the list of tasks, select T_ROB1, and select Reset Program Pointer to Main.

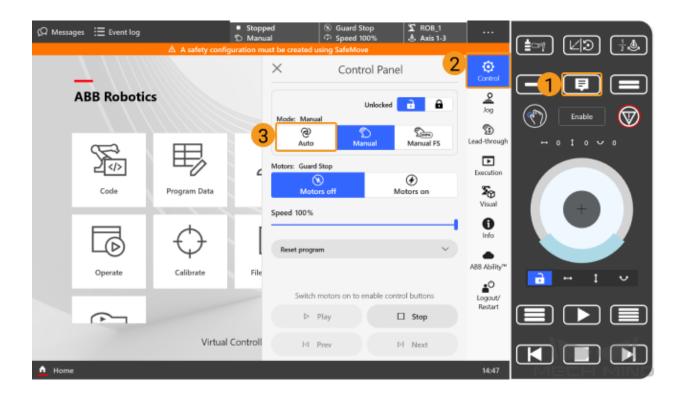
Ω Messages Ξ Event log		∎@ ⊗ 4	J 100	1% ∑ 🧶 Axis 1-3 🛛 …
■ T_ROB1 No Program	▲ A safet	y configuration must be created using Safe	Move	t Load Program
Tasks	<	<pre>4 PROC Main() 5 ! *** version 5.3 *** ! 6 init;</pre>	>	Advanced
safe_area Normal	Ready	7 WHILE TRUE DO 8 MM_Control \branch:=1;	€.	Reset Program Pointer to Main
No Program Pointer set		9 10 !!! customer robot progra 11 ! hometarget := CalcRobT(Update Position
T_ROB1 Normal	Ready	12 ! MoveJ hometarget, v1000 13 ENDWHILE		Show Program Pointer
No Program Pointer set		14 15 ENDPROC 16	ÞI	Show Motion Pointer
		150 %		
🛕 Home 🗔 Operate				13:32

4. Select *Yes* in the pop-up window.



Run the Program

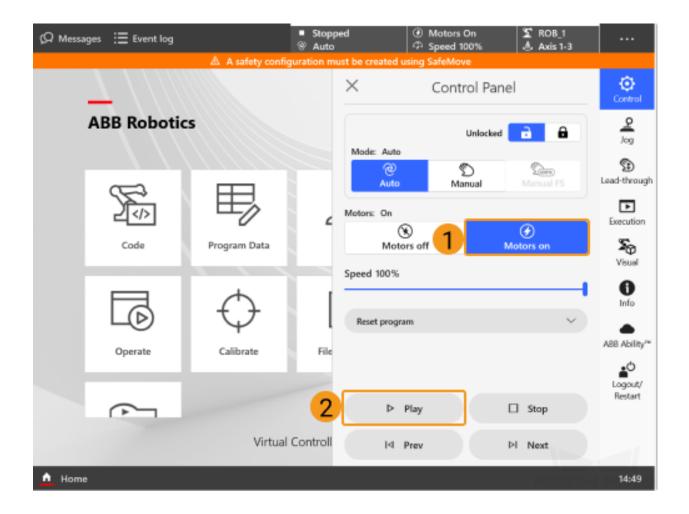
1. Tap to open the **Control Panel**, and select $Control \rightarrow Auto$.



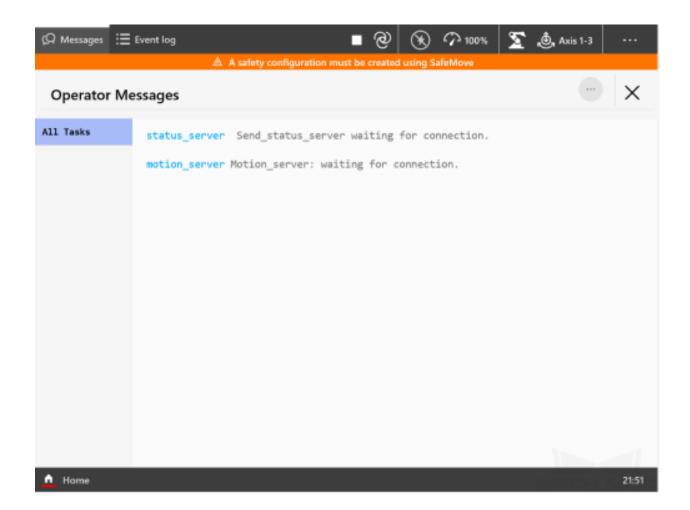
2. Select *Confirm* in the pop-up window.

Ω Messages 🗄 Event lo		 Stopp Auto Cl 		⑧ Guard Stop ⑦ Speed 100%	S ROB_1 Axis 1-3				
			\times	Control Par	nel	Control			
ABB Robo	otics			Unlocke	a	<u>2</u> Jog			
			Mode: Auto C	hange	0	Ð			
		_	e	2	2000	Lord through			
200	1	Automatic mode has been selected.							
Code	Program D	There are	stopped backgrou	ind tasks.		50			
		Please confirm auto condition, then acknowledge the change of operating mode.							
	4					D nfo			
LD	\ominus			Cancel	Confirm				
Operate	Calibrate	File				ABB Ability™			
			Switch	notors on to enable of	ontrol buttons	Logout/ Restart			
					□ Stop	Parstant			
	Virtual	Controll	14	Prev	ÞI Next				
🛕 Home						14:48			

3. Select Motors on \rightarrow Play to run the program.



4. Tap *Messages* in the upper left corner to view the Operator Messages. If messages as shown below appear, the program has been successfully loaded on the robot end.



3.5 Test Robot Connection

3.6 Troubleshooting

If the program has been loaded but the robot cannot be connected successfully, please check whether the following requirements have been met.

- IPC end:
 - 1. The firewall is turned off.
 - 2. The IPC can communicate with the robot IP address with the ping command in the command prompt.
 - 3. There is no interference from any antivirus software.
 - 4. Two network ports of the IPC belong to different subnets and there is no conflict.

- 5. If the IPC is connected via a router, there is no interference from other network cables.
- Robot end:
 - 1. The Ethernet cable is connected to the WAN port of the controller properly.
 - 2. The robot IP address is set correctly. Please ensure that the set IP address is that of the WAN port instead of others.
 - 3. You have run the program on the robot end.