Mech-Mind User's Manual

Mech-Mind

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Contents

1	Check Hardware and Software Versions	2
2	Start the Robot and Teach Pendant	3
3	Check the Controller Version	4
4	Set up the Network Connection	6
5	Switch the User Type to Admin	8
6	Prepare the Files	10
7	Load the Files to the Robot	11
8	Configure Robot I/O	15
9	Test Robot Connection	19
10	Common Operations	27

This section introduces the process of setting up Master-Control of a ROKAE industrial robot.

chapter 1

Check Hardware and Software Versions

- The robot in use is a ROKAE industrial robot.
- The series of the controller is XBC3, and the version is 3.6.
- Mech-Mind Software Suite version is 1.5.0 or above.

chapter 2

Start the Robot and Teach Pendant

Turn the controller's power switch on, as shown below. If the controller is started successfully, a welcome interface will appear on the teach pendant.



chapter $\mathbf{3}$

Check the Controller Version

On the teach pendant, press the icon in the upper left corner, and then press **Help** to check the version.



Version					
		HMI Versio RC Versio	n: 3.6.0 n: 3.6.0		
Upgrade					
	Please select the data to	be saved for upgrad	ling:	data	
	Authorization da	ta	🗸 Me	chanical data	
	V Log		🗸 Sta	tus data	
	Y Teach pendant c	onfiguration data			
		Upgra	de		



CHAPTER 4

Set up the Network Connection

4.1 Hardware Connection

Use the Ethernet cable to connect the network ports of the IPC and the robot controller.



4.2 IP Address Configuration

The default IP address of the ROKAE robot to communicate with the vision system is 192.168.2.160, which cannot be modified currently. Therefore, please modify the IP address of the IPC (192.168.2.222 is used in this example). Please refer to Set IP Address of the IPC for detailed instructions.

After modifying the IP address on the IPC, open the cmd command prompt of the IPC (by searching for cmd), enter "ping 192.168.2.160", and test whether the connection between the IPC and the robot is successful.

chapter 5

Switch the User Type to Admin

An operator user does not have the right to manage files or operate. Therefore, please switch to the admin user.

- 1. On the teach pendant, press the icon in the upper left corner, and then press Settings.
- 2. Press General Settings \rightarrow User Group, and select admin.

	new warnings	• • •	c 🕈	太 62% 口 2	26% 🗶 tool01	1	wobj0	Σ
2 User Group	Teach Pendant	Controller	Backup/Restore	Task	Authorization			
	User settings							
	Modi	Select the user: fy the password:	3	admin god admin operator				
	1	1.						
	General Settings	Safety	Communication	Motion Control	Tool Package			

1. Enter the password **123456** in the pop-up window.

CHAPTER 6

Prepare the Files

1. On the IPC, open the Mech-Center/Robot_Server/Robot_FullControl/rokae folder in the installation directory of Mech-Mind Software Suite.

Attention: There are three subfolders in the *rokae* folder.

- *singleTask5* contains commonly-used projects which support robot motion control and DO receiving. In this section, singleTask5 is used as an example.
- *splineCurve* is an upgraded version of *singleTask5*. It is specifically developed for gluing applications. When running the program, please select either singleTask5 or splineCurve.
- getDIServer is an integral service program to receive robot DI. If you want to use singleTask5 and getDIServer at the same time, the multitasking function should be enabled on the robot end. For detailed instructions, please refer to *Enable Multitasking*.
- 2. Plug the USB flash drive into the USB port of the IPC. Copy the **rokae** folder to the USB flash drive and then remove the USB flash drive safely.

CHAPTER 7

Load the Files to the Robot

Attention: It is recommended to back up robot system files before loading Master-Control program files to avoid system corruption that may be caused by the loading operation. In case any issue occurs, you can use the backup file to restore the robot system. Please refer to *Backup and Restore Robot Files* for detailed instructions.

- 1. Plug the USB flash drive with the program files into the USB port on the robot controller.
- 2. On the teach pendant, press the icon in the upper left corner, and then press **Project**.
- 3. Press Project Manager.

ណ៍	No new warnings	∖ ® ₹	Ċ	→> 🛧 62%	口 26% 🗶	tool01 上 v	wobj0 🏾 🏅
r	main 🛛						
6	LOCAL VAR int time = 1						0
7	LOCAL CONST int SIZE =	20					
8							
9	LOCAL VAR int motionPc	pint = 1					
10							
11	LOCAL VAR double type	[90] = {0.0,0.0	,0.0,0.0,0.0,0	0.0,0.0,0.0,0.0,0	.0,0.0,0.0,0.0,0	0.0,0.0,0.0,0.0	,0.0,0.0
12	LOCAL VAR jointtarget jo	$sints[90] = {j:{0}}$	0.00002/194	4,0.000054388,	0.0000000000,	0.0000/3242	,0.0001
13	LOCAL VAR robtarget po	$ses[90] = {p:{}}$	(548.00045)	0891,0.0002600	0 0 0 0 0 0 0 0 0 0	59087},{0.707	10580
14	LOCAL VAR zone blend	$[90] = \{s: \{0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0$	0 , s: { $0.0, 0.0$,s:{0.0,0.0},s:{0.	$0,0.0$, $s:\{0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0$	0 , s: { $0.0, 0.0$ },	240226
15	LOCAL VAR jointlarget JI	01 = 1.(0.000000)		27194,-0.0001	200 0 200 0 0	0 0 01 10120 0	240520
10	LOCAL VAR speed versus 10 CAL VAR int $n = 0$	$0] = \{v.\{50.0, 2\}$.00.0,200.0,0	J.0,0.0},v.{30.0,	200.0,200.0,0.	0,0.0},v.{50.0,	,200.0,2
18	LOCAL VAR double m[20	$001 = \{0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0$	000000	000000000	0000000	0000000	0000
19	GLOBAL VAR int int $0 = 0$)	,0.0,0.0,0.0,0	0,0.0,0.0,0.0,0.0,0.0	5,0.0,0.0,0.0,0.0,0	0,0.0,0.0,0.0,0.0,	0.0,0.0,1
20							
21	GLOBAL PROC main()						
≠22	SocketClose(motionSc	ocket)					
23	SocketCreate("192.168	8.2.222",8080,	CLIENT,"\r",	motionSocket)			
24	while(1)						
25	cmd =SocketReadInt(3	3,86400,motic	onSocket,int	0)			
26	SocketSendString("rec	cieved", motior	nSocket)				\bigcirc
	Insert Instruction	Modify Deb	ug Routine	Update Position F	Project Manager	More	

4. Press More and select Show U disk.



5. Select the singleTask5 folder in the flash drive, press More, and select Copy U disk folder to root directory.



Once pasted successfully, the singleTask5 folder can be found in the file browser at the bottom left.

Chapter $\mathbf{8}$

Configure Robot I/O

- 1. On the teach pendant, press the icon in the upper left corner, and then press **Settings**.
- 2. Press Communication \rightarrow IO Configuration \rightarrow Add in turn.

â	No new	warnings	•	(11)	۶	G	d 🗕	太 12%		26% 🗙	tool01	7	wobj0	Σ
10 Config	guration	System Input	Sys	tem Out	tput	Extern	al Comm.	IO Mod	ules	Serial Co	onfiguratio	n		
		Name		IC	Туре			IO Module			IO Ad	ldress		
		•												
		Add				N	Nodify			De	lete			
						1								
		General Setting	s	Safety	,	Comr	munication	Motion C	ontrol	Tool	Package		Ħ	

3. Add do0, and the specific options are shown below.

Name:	do0			Тур	be:		SignalD	00	
O Model:	RIO-16	-16-1		Ad	dress N	lum:	0		
q w	e	r	t	У	u	i	0	р	
а	s	d f	g		h	j	k	T.	4
★ z	x	c	v	b	n	m	-	,	× .
123								%	1 <u>111</u> 1

Similarly, add do0 to do7. The final result is shown in the figure below.

No ne	w warnings	•		۶		đ	⇒>	太	62%	口 2	6% 🗶	tool01	7	wobj0	ĮΣ
IO Configuration	System Input	Sys	tem Ou	tput	Exter	nal Co	omm.	IO N	Iodule	es S	erial Co	nfiguratio	n		
	Name		IO 1	Гуре			10) Module	e			IO Addres	s		
	do0		Sign	alDO			RIC	0-16-16	-1			0			
	dol		Sign	alDO			RIC	0-16-16	-1			1			
	do2		Sign	alDO			RIC	0-16-16	-1			2			
	do3		Sign	alDO			RIC	0-16-16	-1			3			
	do4		Sign	alDO			RIC	0-16-16	-1			4			
	do5		Sign	alDO			RIC	0-16-16	-1			5			
	do6		Sign	alDO			RIC	0-16-16	-1			6			
	do7		Sign	alDO			RIC	0-16-16	-1			7		S	
	Add	2			1	Modi	fv				Dele	ete			
							,	l				999999 			
181	General Setting	s	Safety	/	Com	nmunio	cation	Motio	on Cor	ntrol	Tool	Package			

CHAPTER 9

Test Robot Connection

Before running the Master-Control program, please ensure you have configured robot in Mech-Viz and configured settings in Mech-Center. The **Host IP address** in Robot Server should be set to **192.168.2.160**. For detailed instructions, please refer to test_robot_connection.

In the main interface of Mech-Center, click **Connect Robot** in the toolbar. The loading and running process should be completed in 120 seconds, or else you should click **Connect Robot** in the toolbar again.

1. Select the local singleTask5 folder, and press Load.



2. Switch the teaching mode to automatic mode. The figure below shows the teach pendant in the automatic mode.



Select \mathbf{Ok} in the pop-up window as shown below.

ណ	No new warnings	÷	ş	Ð	->>	太 62%	D 26%	🗶 tool01	L	wobj0	Ι٢.
n	nain 🔲										
6	OCAL VAR int time =	1									0
7	OCAL CONST int SIZE	= 20									
8											
9	OCAL VAR int motior	Point = 1									
10		10.01									
11	OCAL VAR double ty	$pe[90] = \{0, \dots, 0\}$	0,0.0,0.0),0.0,0.0,0).0,0.0,0	0.0,0.0,0.0),0.0,0.0,	,0.0,0.0,0.	0,0.0,0	10,0.0,0	0.0
12	OCAL VAR jointtarge	t joints[90]	= {]:{0.00	0027194	4,0.0000	J54388,0	.000000	000,0.00	$00/32^{2}$	12,0.00	01
13	OCAL VAR robtarget	Work mode	ode is chan	ging from n	nanual mo	de to autor	matic	9935908	/},{0./(J/1058	0
14	OCAL VAR zone bien	mode, p	lease acking	Jwieuge to	make it ei	nect:		0001464	0.0,0.0 84 0 00	3,5.{0.0,	0.
15	OCAL VAR jointarge			Ok				00014040	1 v·{30	0 200 (20
17	OCAL VAR speed ver OCAL VAR int $n = 0$.0,0.0,0.0	<i>,</i> ,v.(JU.	0,200.0	/,2
18	OCAL VAR double m	$[200] = \{0,0\}$.0.0.0.0.	0.0.0.0.0	0.0.0.0	0.0.0.0.0.	0.0.0.0.0	0.0.0.0.0	.0.0.0.0	0.0.0.0).(
19	GLOBAL VAR int int0 =	= 0	,,,	,,	-,,-			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	10.010	,,.	
20											
21	GLOBAL PROC main()										
≠22	SocketClose(motion	nSocket)									
23	SocketCreate("192."	168.2.222",	3080,CLI	ENT,"\r",	motion	Socket)					
24	while(1)										
25	cmd =SocketReadI	nt(3,86400,i	notionS	ocket,int	D)						
26	SocketSendString("	recieved",m	otionSo	cket)							\bigcirc
										(>
	Insert Instruction	on Modify	Debug	Routine	Update	Position	oject Mana	iger Mor	e MG		

3. Press the button as shown in the figure below. If the once-flashing indicator light turns to be always on, the servo is successfully turned on in the automatic mode.



4. Press the button as shown in the figure below to power on the robot.



5. Press **Debug** and select **PP to Main**.

ណ៍	No new warnings	o	ş	Ð	-> >	六 62%	口 26%	×	tool01	<u>.</u>	wobj0	Σ
r	nain 🔲											
6	LOCAL VAR int time =	1										0
7	LOCAL CONST int SIZE	= 20										
8												
9	LOCAL VAR int motion	Point = 1										
10												
11	LOCAL VAR double typ	$pe[90] = \{0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0$	0,0.0,0.0	0,0.0,0.0	,0.0,0.0	,0.0,0.0,0.	.0,0.0,0.0	,0.0,0	.0,0.0,0).0,0.0	0,0.0,0	.0
12	LOCAL VAR jointtarget	joints[90] =	= {j:{0.00	0002719	94,0.00	0054388,0	0.000000	0000,0	0.0000	/324	2,0.000)1
13	LOCAL VAR robtarget	poses[90] =	{p:{{54	8.00045	50891,0	0.0002600	94,854.9	9935	908/},	0.70	/1058	05
14	LOCAL VAR zone biend	$1[90] = {S:{}}$	2				.0},5:{(0001)},S:{U.U	0,0.0}	S:{0.0,	0.
15		$JI = J.{0.00}$	PP to	o Main	PP	to Cursor	09,-0.	00014	40404,	130 0	200.0	
10	LOCAL VAR speed vers	[90] - {v.{.		_			1.0,200	1.0,0.0	,0.0},v	.[50.0	,200.0	,2
18	LOCAL VAR double m	$2001 = {0}$	Check	Program	Swit	ch MoveL/J	0000	000	0000	000	0000) (
19	GLOBAL VAR int int0 =	0				2.14	0,0.0,0	,	,0.0,0.	0,0.0,	0.0,0.0	~,
20			U	ndo		Redo						
21	GLOBAL PROC main()											
≠22	SocketClose(motion	Socket)	Cut En	itire Line	Paste	e Entire Line						
23	SocketCreate("192.1	.68.2.222",										
24	while(1)		C	ору		Paste						
25	cmd =SocketReadIn	t(3,86400,										
26	SocketSendString("r	ecieved",n	(Cut								\bigcirc
											(
	Insert Instruction	n Modify	Debug	Routin	e Upda	te Position P	roject Mana	ger	More			
		5 L					1993					

6. Click the icon as shown below to adjust the program's running speed.



7. Press the button as shown below to run the program.



If the robot is connected successfully, a message saying **Robot: server connected to the robot** shows up in the **Log** panel of Mech-Center.

8. Please refer to the last part in test_robot_connection to move the robot.

chapter 10

Common Operations

10.1 Backup and Restore Robot Files

10.1.1 Backup

- 1. Plug the USB flash drive into the USB port on the robot controller.
- 2. On the teach pendant, press the icon in the upper left corner, and then press Settings.
- 3. Press General Settings \rightarrow Backup/Restore, and select **Backup**.

No new	warnings	b 🖲 F	→	太 62% 口	26% 🎗 tool01	上 wobj0 🏻 🏅	
User Group	Teach Pendant	Controller	Backup/Restore	Task	Authorization		
	3						
	В	ackup		Res	tore		
1	General Settings	Safety	Communication	Motion Control	Tool Package		

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

No new	warnings	• •	۶	đ	>	太 62%	□ 26%	×	tool01	1	wobj0	5
User Group	Teach Pendant	Control	ler	Backup/Re	estore	Task	,	Author	ization			
	Folde	er Name:	XB7s_R	1206_04xx_I	Backup_2	023_04_17_18	_07					
	Pad	un Dath	11 allah									
	Dace	up Path:	U GISK									
		В	ackup			Cancel						
			11									
	General Settings	Safet	у	Commur	nication	Motion Con	trol	Tool P	ackage	ME		

10.1.2 Restore

1. Press General Settings \rightarrow Backup/Restore, and select **Restore**.

No new	warnings	• •	ş	Ð	~ >>	汏	62%		26% 🗶	tool01	1	wobj0	Σ
User Group	Teach Pendant	Control	ler 2	Backup/R	estore		Task		Author	ization			
						3-							
	в	Backup						Rest	ore				
1	1 General Settings	Safet	у	Commur	nication	Moti	ion Co	ntrol	Tool P	ackage	ME		

2. In the pop-up window, press **Browse** to select the directory where the backup file is stored. Then select the data to be restored according to the actual requirement, and press **Restore**.

No new	warnings	• •	ş	Ð	~ >	챴 62%	口 2	6% 🗶	tool01	7	wobj0	1
User Group	Teach Pendant	Controlle	er	Backup/Re	estore	Task		Author	ization			
	Backed-up fold Please	der: XB7s_R12 select the dat Project data Authorization Log data Teach pendan Restore	206_04xx a to be r data t configu	e_Backup_2	2023_04_3	17_18_07 IO data Mechanic Status dat	al data ta	Brow	se			
181	General Settings	Safety	/	Commur	nication	Motion Cor	ntrol	Tool F	ackage	ME		

Enable Multitasking

Confirm Whether the Robot Supports Multitasking

By default, ROKAE robots do not support multitasking. To enable multitasking, you need to request a license key (a string of keys based on MAC address encryption) from the manufacturer.

- 1. On the teach pendant, press the icon in the upper left corner, and then press Settings.
- 2. Press General Settings \rightarrow Authorization and check whether there is an authorized function.

No nev	v warnings	\ (1) %	đ 🔿	太 62% 口 26%	6 🗶 tool01 🚽	ywobj0 🏻 🍒							
User Group	Teach Pendant	Controller	Backup/Restore	Task	Authorization								
	Mac Address: 00:07:32:72:95:c1												
F	unctions												
	License	e Key: 105979	E8 - 980D647	0 - FDD527C1	ОК								
	Authorized Functions: The authorized functions are multi-task.												
L	ock					-							
	Random	code:			Refresh								
	Unlock	k Key:			ОК								
	Remaining	days:											
	1												
1	General Settings	Safety	Communication	Motion Control	Tool Package								

If there is not an authorized function. You need to contact the robot manufacturer to request a license key and enter it in the corresponding text box.

Configure getDIServer and singleTask5 Tasks

- 1. Copy and paste **singleTask5** and **getDIServer** to the robot system. Please refer to *Prepare the Files* for detailed instructions.
- $2. \ {\rm Add} \ {\rm gi} 0.$
 - a. On the teach pendant, press the icon in the upper left corner, and then press Settings.
 - b. Press Communication \rightarrow IO Configuration \rightarrow Add.

â	No new v	warnings	٠	•	۶	ļ	Ð	→ >	六 12%		26%	×	tool01	7	wobj0	5
IO Configu	ration	System Input	Sys	stem Out	tput	Exter	nal Com	m.	IO Modu	ules	Seria	l Conf	iguratio	n		
	ı	Name		IC	Туре				IO Module				IO Ad	dress		
		3 Add					Modify	2	1 ⁶	1		Delet	e			
	ĺ	General Setting	js	Safety	,	1 Con	nmunicat	ion	Motion C	ontrol	T	ool Pa	ickage	MG	Ħ	

c. Configure the options as shown in the figure below, and press **OK**.

Add/Mo	dify	y :																	
Name:		gi0								pe:			SignalGI 🖌						
IO Mode	el:	RIO-16-16-1							Sta	art A	dd	ress:	۵ 🖌						
									End	d Ac	ddre	ess:	15						
q	w		е		r		t		У		u	i		0		р			
а		s		d		f		g		h		j	k		L		4		
•	z		x		с		v		b		n	m		2		,			
123															%		1 <u>111</u> 1		
				Ok	<							Ca	ance	el					

- 3. Configure tasks and parameters.
 - a. On the teach pendant, press the icon in the upper left corner, and then press **Settings**.
 - b. Press General Settings \rightarrow Task \rightarrow New.

No new w	arning	s	•	į	١		۶		đ	;	-> >		챣 62	!%	묘	26%	🗶 to	ool01	1	wobj0	1
User Group	Teac	h Penda	nt	Controller Backup/					/Restore Task					Authorization							
		Task Co	nfigur	atio	n :											-		1			
	Nan	Name:		Tas	sk_mo	otio	n			Туре:			normal					rojec	t		
		Forward	Task:	no	ne				4	MotionTask:			c Yes								
		TrustLe	no	ne					Project:			singleTask5									
		EntryFunction			main																
			q	w	e		r	t		у	u	i		5	р						
			а	T	s	d		f	g	Γ	h	j	k			4					
			•	z	,	:	с	v		b	n	m		-	,						
			123											9	6	1 <u>111</u> 0					
		_				ок							Canc	el							
	3	Ne	w						М	od	lify					Del	lete				
181	Gene	eral Setti	ngs		Saf	ety		Co	omm	un	ication	M	otion	Cor	ntrol	То	ol Pack	age	ME		

c. Configure the two tasks as shown in the figure below, and click $\mathbf{OK}.$

Task Co	onfigura	ation	:								
Name:		Task	_motio	n		Type:		norma			
Forwar	dTask:	none	9			Motion	Task:	Yes			
TrustLe	evel:	none	9			Project:		single			
EntryFu	unction	main	1								
	q	w	е	r	t	y u	ī	0	р	•	
	а	s	d		f g	h	j	k	T.	el.	
	•	z	x	с	v	b n	m	-	,	•	
	123								%	<u>KWU</u> I	
			ОК								



Please refer to *Test Robot Connection* to learn about how to run the tasks.